Campus Christianity

Spiritual Wastelands 101

In the fall of my junior year in college, I had been a Christian for only a year. Since I had been involved in a Christian group on campus, however, I felt I had learned a great deal about my faith. As a science major I had completed most of my requirements for my degree, and I was looking forward to taking electives in my major of animal ecology. However, I still had a couple of hours in humanities to fulfill, not my most favorite subject. While I was looking for a humanities elective, I came across an English course entitled "Spiritual Wastelands." I remember thinking to myself, "That looks interesting. I wonder what spiritual wastelands this course is about?" With my newfound interest in spiritual things, I decided to enroll.

On the first day of class, I was horrified the minute the instructor walked into the room. He wore an old Army fatigue jacket, a blue work shirt open to the middle of his hairy chest, ratty blue jeans, sandals, long tangled hair, and a beard. He punctuated his appearance with a leather necklace containing what looked like sharks' teeth. To make it worse, he proceeded to go around the room and ask every student why he or she took this course. I don't really reember what the other students said but when he got around to me, I sheepishly replied that I was a Christian and that I was interested in knowing what kind of spiritual wastelands he was going to talk about. Immediately, with a look of malevolent glee, he exploded: "You're a *Christian*? I want to *hear* from *you*!"

Needless to say, if there had been a place to hide, I would have found it. As you may guess, the only spiritual wasteland he wanted to talk about was Christianity. I was like a babe who had been thrown to the wolves. Our class discussions, more often than not, were two-sided: the instructor versus me. Hardly anyone else ever spoke up. To say that I found myself floundering like a fish out of water would be an understatement. Occasionally my questions and comments would hit the mark. But I am convinced, as I look back, that even that degree of success was purely the grace of God.

Since that time, I have spent twelve more years in the university environment as both an undergraduate and graduate student. I have learned a great deal about how a Christian student should relate to the academic community, and I would like to share with you four principles for effective Christian witnessing in that setting. I think you will also find that these principles will prove to be an effective guide in any sphere of life.

> **Approach your studies from a Christian worldview.** We need to think Christianly. The only way to accomplish this is to be continually involved in the process of knowing God.
>
> **Realize that the job of the student is to learn**—not to preach. A teachable spirit is highly valued. This may seem obvious to you, but believe me, it isn't obvious to everyone.
>
> **Pursue excellence.** Every exam, every paper, every assignment must be pursued to the best of our ability, as unto the Lord.
>
> **Be faithful to the task**—leave the results (grades) to God. Do not get hung up on the world's definition of success.

Think Christianly

All of our thoughts are to be Christ-centered, including those expressed in a university classroom. Paul tells us in 2 Corinthians 10:5 that "we are taking every thought captive to the obedience of Christ." All knowledge is to be encompassed by a Christian worldview. In other words, we should try to see all knowledge through the eyes of Jesus. This all sounds well and good, but how do we do that?

The only way to think and see as Jesus does is to know Him. This brings us to the basics of the Christian life. There are numerous demands on the time of a student. There are always experiments to do, books to read, papers to write, exams to study for, assignments to turn in, classes to attend. This is doubly true for graduate students, who spend their entire time seemingly three steps behind where they are supposed to be. Let's not forget the demands of a girlfriend or boyfriend, family, exercise, and just plain having fun. How is one supposed to find time for regular personal devotions, worship on Sunday mornings, fellowship with other believers, and the study of God's Word? These activities can all take a serious bite out of the time the university demands from a student. But this is the only way to draw closer to God and to understand His ways.

By being faithful in spiritual things, we trust God to honor the time spent and to bring about His desired results in our academic pursuits despite our having less free time than most non- Christians. Christian campus groups can be of tremendous help in these matters through training, Bible studies, and fellowship with believers who are going through the same struggles you are.

For those times when trouble does arise in the classroom, and you feel that your faith is being challenged and you are confused, an enormous amount of assistance is available to you. The manager of your local Christian bookstore can be a great help in finding books that deal with your problem. Organizations such as Probe Ministries can also help steer you in the right direction with short essays, position papers, and bibliographies. Dedicated and highly educated Christians have addressed just about every intellectual attack on Christianity. There is no reason to feel like you have to do it on your own. That was my mistake in the "Spiritual Wastelands" course. It never even occurred to me to seek help. I could have represented my Lord in a much more credible way if I had only asked.

There are no shortcuts to living the Christian life. We cannot expect to emerge from the university with a truly Christian view of the world if we put our walk with the Lord on hold while we fill our heads with the knowledge of the world. Remember! We are to take every thought captive to the obedience of Christ. In order to do that, we must know Him; in order to know Him, we must spend time with Him. There were many times in my college career when higher priorities prevented me from spending the amount of time I felt necessary to prepare for an exam, paper, or presentation, but I always found God to be faithful.

During my doctoral studies, we moved into a new house and the boys were ages 4 and 2. The room they were going to share desperately needed repainting and we were having new bunk beds delivered on Monday, the same day of an important cell biology exam. The professor writing this exam was the one in whose lab I had hopes of working for my doctoral project. So I needed to do well.

The room was small and the beds were large, so they needed to be constructed inside the room. This meant the room had to be painted before the beds arrived. If I paint, I lose critical study time for an important exam. If I study, the room goes unpainted and I have an unhappy wife and a difficult task getting to it later. I chose to paint the room. I had a total of three hours of study time for the exam! I entered the exam free of tension knowing I did my best and it was in God's hands. I had no idea how

I did on the exam, but when the grades came out, I received the second highest grade in the class and the best exam score in my tenure as a graduate student! The professor was impressed enough to allow me to begin working in her lab.

Cultivate a Teachable Spirit

I have run across numerous professors whose only encounters with Christians were students who simply told them that they were wrong and the Bible was right. Most professors do not have much patience with this kind of approach. It is a great way to gain enemies and demonstrate how much you think you know, but it does not win anybody to Christ.

Some Christian students have the impression that when they hear error being presented in university classroom, it is their duty to call out the heavy artillery and blast away. This is not necessarily so. As a student, your job is to learn, not to teach. In my education, I reasoned that in order to be a *critic* of evolution, I needed to first be a *student* of evolution and demonstrate that I knew what I was talking about. Once professors realized I was serious about wanting to understand evolution, when I began to ask questions, they listened. In the end my professors and I often had to agree to disagree, but we all learned something in the process, and I built relationships that could grow and develop in the future.

The most effective tactic in the classroom is the art of asking questions. This approach accomplishes three things. First, you demonstrate that you are paying attention, which is somewhat of a rarity today. Second, you demonstrate that you are truly interested in what the instructor is talking about. All good teachers love students with teachable spirits, but not students who are so gullible as to believe unquestioningly everything they say. Third, as you become adept at asking just the right question that exposes the error of what is being taught, you allow the professor and other students to see for themselves the lack of wisdom or truth in the idea being discussed. Truth is truth, whether expressed by a believer or a pagan. However, non-Christians will believe other non-Christians much more readily than they will a fanatical Christian waving a Bible in his hand.

As a graduate student, I was in a class with faculty and other graduate students discussing a new discipline called sociobiology, the study of the biological basis for all social behaviors. One day we were discussing the purpose and meaning of life. In an evolutionary worldview, this can only mean survival and reproduction. Disturbed at how everyone was accepting this, I said, “We have just said that the only purpose in life is to survive and reproduce. If that is true, let me pose this hypothetical situation to you. Let’s suppose I am dead and in the ground and the decomposers are doing their thing. Since you say there is no afterlife, this is it. It’s over! What difference does it make to me now, whether I have reproduced or not?” After a long silence, a professor spoke up and said, “Well, I guess that ultimately, it doesn’t matter at all.” “But wait,” I responded. “If the only purpose in life is to survive and reproduce, and ultimately–now you tell me–that doesn’t matter either, then what’s the point? Why go on living? Why stop at red lights? Who cares?!” After another long silence, the same professor spoke up and said, “*Well, I suppose that in the future, those that will be selected for will be those who know there is no purpose in life, but will live as if there is*.” What an amazing and depressing admission of the need to live a lie! That’s exactly the point I wanted to make, but it sank in deeper when, through my **questions**, the ***professor*** said it and not me. When Jesus was found by His parents in the temple with the priests, He was listening and asking them questions–probably not for His benefit, but for theirs (Luke 2:46).

We are all familiar with 1 Peter 3:15, which says, “Sanctify Christ as Lord in your hearts, always being ready to make a defense to every one who asks you to give an account for the hope that is in you, yet with gentleness and reverence.” This verse is a double-edged sword that most of us sharpen only on one side or the other. Many are prepared to make a defense, but they leave destruction in

their wakes, never exhibiting gentleness or reverence. Others are the most gentle and reverent people you know, but are intimidated by tough questions and leave the impression that Christianity is for the weak and feeble-minded. The latter need to go back and read a few important passages:

> 2 Corinthians 10:3-5
>
> For though we live in the world, we do not wage war as the world does. The weapons we fight with are not the weapons of the world. On the contrary, they have divine power to demolish strongholds. We demolish arguments and every pretension that sets itself up against the knowledge of God, and we take captive every thought to make it obedient to Christ.
>
> Colossians 2:8
>
> See to it that no one takes you captive through hollow and deceptive philosophy, which depends on human tradition and the basic principles of this world rather than on Christ.
>
> Acts 17
>
> (The story of what happened when Paul boldly proclaimed the gospel in Thessalonica, Berea, and the Areopagus in Athens.)
>
> Paul was a firm believer in the intellectual integrity of the gospel. The "staunch defender" needs to remember that Jesus told His disciples that the world would know that we are Christians by the love we have for one another (John 13:34-35) and that we are to love our enemies (Matt. 5:43-47). Paul exhorted the Romans not to repay evil with evil, but to repay evil with good and to leave vengeance to the Lord (Rom. 12:17-21). Finally, the writer of Proverbs tells us that a gentle answer turns away wrath, but a harsh word stirs up wrath (Prov. 15:1), and that the foolish man rages and laughs and always loses his temper, but a wise man holds it back (Prov. 29:9,11).

Pursue Excellence

Nothing attracts the attention of those in the academic community as much as a job well done. There is no argument against excellence. In Colossians 3:17 Paul tells us, "Whatever you do in word or deed, do all in the name of the Lord Jesus, giving thanks through Him to God the Father." If we are to do everything in Jesus' name, He deserves nothing less than the best that we can do. How many of our papers and exams would we be comfortable stamping with the words, "Performed by a disciple of Jesus Christ"? I think I would want to ask if I could have a little more time before I actually handed it in! Yet Paul admonishes us to hold to that standard in all that we do. This does not mean that every grade must be an A. Sometimes your best is a B or a C or even just getting the assignment done on time. The important thing is to try. It's important to be able to tell yourself that, with the time, resources, and energy you had available to you, you did your best. The road to excellence is tough, exhausting, and even frightening. It is hard going. But our Lord deserves nothing less.

Ted Engstrom, in his book *The Pursuit of Excellence,* tells the story of a pastor who spent his spare time and weekends for months repairing and rebuilding a dilapidated small farm in a rural community. When he was nearly finished, a neighbor happened by who remarked, "Well, preacher, it looks like you and God really did some work here!" The pastor replied, "It's interesting you should say that, Mr. Brown. But I've got to tell you–you should have seen this place when God had it all to Himself!"

It is certainly true that God is the source of all our strength, and all glory and honor for what we may accomplish is His. But, it is no less true that God has always chosen people to be His instruments—frail, mistake-prone, imperfect people. His servants have not exactly enjoyed a life of ease while in His service. Striving for excellence is a basic form of Christian witness. We pay attention to people who always strive to do their best. In the classroom, people may not always agree with what you say, but if they know you as a person who works diligently and knows what you are talking about, they will give your words great respect. And, if there is enough of the Savior shining through you, your listeners will come back and want to know more.

I am reminded of the impact of four Hebrew youths in the Babylonian culture during the reign of Nebuchadnezzar: Daniel, Hananiah, Mishael and Azariah (whom you may recognize by their Babylonian names: Meshach, Shadrach and Abednego). They entered the prestigious secular institution, "Babylon University," and were immersed into an inherently hostile atmosphere. But Scripture says that

> And as for these four youths, God gave them knowledge and intelligence in every branch of literature and wisdom; Daniel even understood all kinds of visions and dreams . . . And as for every matter of wisdom and understanding about which the king consulted them, he found them ten times better than all the magicians and conjurers who were in all his realm (Daniel 1:17, 20).

You can be sure they were instructed in Babylonian literature and wisdom, not Hebrew, yet they excelled. If our God is indeed the King of Kings and Lord of Lords, then He can not only protect us as we enter the university, but He can also prosper us. Imagine the testimony for Jesus Christ if the best philosophers, the best doctors, the best poets and novelists, the best musicians, the best astrophysicists, and on and on, were all Christians. That would be a powerful witness!

As you pursue excellence, do not be deterred by mistakes. They are going to come, guaranteed. The pursuit of excellence is an attitude in the face of failure. Thomas Edison, the creator of many inventions including the light bulb and the phonograph, was never discouraged by failed experiments. He simply reasoned that he now knew of one more way that his experiment was not going to work. Mistakes were his education. The wise man admits and learns from his mistakes, but the fool ignores them or covers them up. We all admire someone who freely admits a mistake and then works hard not to repeat it.

Strive for Faithfulness, Not Success

As students in the university learn to approach their studies from a Christian worldview, as they grow to appreciate their place as people who are there to learn and not necessarily to confront, and as they begin to pursue excellence in everything they do, it is tempting for them to believe that God will bless whatever they set out to accomplish. Their primary focus becomes whether or not all of their efforts are successful. It can become depressing if they do not see the kind of results they expected God to bring about.

Soon after Mother Teresa received the Nobel Peace Prize for her work among the poor in Calcutta, she was asked by a reporter in New York City how she could dedicate herself so completely to her work when there was no real hope of success. It was obvious she was not going to eliminate hunger, poverty, disease, and all the other ills of that densely populated city in India. In other words, he asked, if you can't really make a dent in the conditions these people live in, why bother? Her reply was simple, yet profound; she said, "God has not called us to success, but to faithfulness." How many

times have we heard in witnessing seminars that our job is to share the gospel and leave the results to God? What I hear Mother Teresa saying is that our responsibility is the same in everything we do.

Oswald Chambers, in his timeless devotional book *My Utmost for His Highest,* caused me to recall Mother Teresa and reflect on my own expectations. He said,

> Notice God's unutterable waste of saints, according to the judgment of the world. God plants His saints in the most useless places. We say—God intends me to be here because I am so useful. Jesus never estimated His life along the line of the greatest use. God puts His saints where they will glorify Him, and we are no judges at all of where that is. (August 10)

The main point here is that we should be faithful to the task God has given to us rather than worry about whether or not we are achieving the results we think God should be interested in. When we begin thinking that "God is wasting my time and His," we have probably stepped over the line. I spent five and a half years in the laboratory on doctoral experiments in molecular biology, experiments that never accomplished what I had planned. The most frustrating aspect was that these experiments did not result in work that was publishable in the scientific literature, which is the ultimate goal of any scientist. I had a great deal of confidence when I started this difficult research problem that the Lord and I would work it out. Well, we didn't. I never dreamed how much Mother Teresa's words concerning the value of faithfulness over success would be lived out in my own life. It has been a hard, hard lesson. And I don't believe I have a complete answer as to why God chose to deal with me in this way. Scientific publications seemed not just desirable but necessary in my future career; yet God is sovereign and He apparently has other plans. During those years, I learned a great deal about living the Christian life in the midst of difficult circumstances. I can only pray that I will not forget what was so painful to learn.

Conclusion

In summary, orient your studies according to a Christian world view. Your main job as a student is to learn and to develop the skill of asking questions, and to keep the boxing gloves at home. Pursue excellence and remain faithful to the task to which God has called you, and leave the results to Him.

Suggested Reading

Oswald Chambers. *My Utmost for His Highest.* Westwood, NJ: Barbour and Company, 1963.

Ted Engstrom. *The Pursuit of Excellence.* Grand Rapids, Mich.: Zondervan, 1982.

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.

Sexual Purity – A Biblical Worldview Perspective Remains Truth

Dr. Bohlin uses a passage from Proverbs to provide us insight into the importance of sexual purity for our age. This important biblical worldview concept is still valid today even in this age where sexual promiscuity is trumpeted from the media.

Medical Reasons for Sexual Purity

As our society prepares to enter the 21st century, one trend and long-time staple of our culture looms ever larger on the horizon. The places to which one can escape in order to avoid sexual temptation continue to shrink. Children cannot be allowed to roam unsupervised through the neighborhood video stores because of the racks of videos with alluring covers of scantily clad exercisers and playmates of the year. The aisles of popular new releases contain images from R-rated movies that were only found in skin magazines thirty years ago. A trip to the grocery store can take you past the book aisle with suggestive covers on romance novels which contain graphic descriptions of sexual encounters. Billboards for beer, cars, and movies all use sex to sell. Radio stations readily play songs today that were banned from the airwaves decades ago. A trip to the mall takes you past stores with only sex to sell. Your home is invaded with sexually explicit images over even the free non-cable channels and your home computer. Unwelcome mail enters your home selling well-known sex magazines that continue to earn millions of dollars every year.

From the moment Adam and Eve were ashamed of their nakedness, sexual temptation has been in our midst. But except for brief periods in declining cultures, the temptations had to be sought after. There were places where one could be relatively safe from the sights and sounds which inflame lust and desire. Those days are over. Oh, sure, you can have blocks installed on your computer or phone and the local video store will allow you to put a screen on your children's rentals. But the fact that such systems are necessary and only voluntary should be enough to tell us of the pervasiveness of sex in our society. Sexual purity is a rare and often scorned virtue today. When a Hollywood couple makes it known that they are saving sex for marriage, people ask, "Why would you do that?"

While sex is clearly pervasive in our society, you don't have to look very far to find plenty of reasons to avoid sexual relations outside of marriage. The biblical words for *fornication* or *sexual immorality* refer to all sexual activity outside of marriage, and the Scriptures clearly state that all such activity is forbidden (Lev. 18 & 20; Matt. 15:19; 1 Cor. 6:9-10,18; 1 Thess. 4:3). But a person may rationalize that while sexual activity outside of marriage is sin, "I can always be forgiven for my sin, and as long as I am not found out, who gets hurt?" Paul answers this resoundingly in Romans 6. "May it never be!" cries the apostle. By allowing sin to reign in our hearts we effectively say that Christ's death and resurrection has no power in our life.

If this is not powerful enough, consider the physical consequences of sexual immorality that exist today. In the 1960s there were only two STDs: syphilis and gonorrhea. Today there are over 25, and 1 in 5 Americans between the ages of 15 and 55 has a viral STD. That number is 1 in 4 if bacterial infections are included. There are 12 million new infections every year with 60 percent of these among teenagers.

Chlamydia and gonorrhea can lead to pelvic inflammatory disease which often results in sterility. Human Papilloma Virus (HPV) frequently produces genital warts which can develop into cancer. Rampant HPV infection is the primary reason that women are urged to have Pap smears on a yearly basis. If you are sexually active outside of marriage and "lucky," you may only contract herpes, but even this is an embarrassing, bothersome, incurable infection. But you may get AIDS, which will kill you. Since the human immunodeficiency virus (HIV) can lie dormant for years before developing into deadly AIDS, your sex partner may not know that he or she is infected. The fact is, if you are sexually active outside of marriage, it is almost guaranteed that you will contract at least one STD.

But information is not enough. Why is sexual purity within marriage so important to God? And what do we do to avoid falling into sexual sin with so much temptation swirling around our heads? We will now turn to explore some time tested advice from Scripture to see what we must do and why.

The Naturalistic Rejection of the Mystical Nature of Marriage

In his book *Reason in the Balance*, Phillip Johnson brilliantly documents the vise grip of philosophical naturalism in science, law, and education in the United States. Our populace has been taught for so long that matter, energy, space, and time are all that exists that it has infected every form of cultural discourse, including our sexual behavior. Freedom of choice and personal fulfillment are praised as the ultimate virtues because, for the naturalist, sex is just a physical act that fulfills a basic need and instinct of every person. People should be free to pursue whatever sexual expression they choose to meet that basic physiological need. And this need is only created by our fundamental drive to reproduce and spread our genes into the next generation. In the naturalistic worldview, sex becomes simply a basic need and marriage just a relative cultural expression to satisfy that need for some, but not all people.

That is why so many people, including Christians, look at Scripture's clear statements condemning sex outside of marriage as antiquated and old-fashioned. "Oh," they say, "they applied to the people of that time, but not now. Not as we prepare to enter the 21st century!" But this raises some important questions. First, do the Scriptural injunctions against any sex outside of marriage really apply today? The answer, of course, is, "Yes, they do." We recognize readily what the Bible has to say about sex, and we see all about us the physical, emotional, and relational consequences of sexual immorality. Since God is sovereign, He established these consequences as warning signs not to transgress His principles. But second, just why is sexual fidelity so important to God?

The first reason is because God's intentions for marriage were clearly stated right from the beginning. Genesis 2:18-25 makes it plain that God's design was one man and one woman for life. Jesus used this passage as the basis for His teaching on divorce in Matthew 19: "What God has joined together, let no man break apart." As Creator, God has every right to tell us what He wants.

Second, the Father has used the marriage union as an analogy for His relationship with Israel in the Old Testament and the church's relationship with Jesus in the New Testament. Isaiah 1:21, Jeremiah 2:20, 3:1-10, and especially Ezekiel 16:15-34 accuse Israel of playing the harlot, chasing after other gods and ignoring her rightful "husband." God's union with Israel was to be forever. He was faithful, but Israel was not. The Lord rained down His judgment on the unfaithfulness of Israel and Judah. In Ephesians 5 Paul tells husbands that they are to love their wives as Christ loves the church.

Elsewhere, Jesus is spoken of as the bridegroom and the church as His bride, another relationship that is to be forever. Jesus will be faithful. Will the church? Our marital and sexual relationships are to mirror the Lord's special relationships with Israel in the Old Testament and the church in the New. God hates divorce and any sexual relationships outside of marriage, because He hates it when His faithfulness to us is spurned by our turning to other gods. This is true whether they be the pagan gods of old, which are still around, or the modern gods of self, money, power, and sex.

Well, we may know what is right, but knowing what is right is often not the same as doing what is right. Now, I want to look at a passage in Proverbs that instructs its readers concerning dangers, both obvious and subtle, of sexual temptation.

A Young Man Lacking Sense Meets a Harlot

It is hard for some to imagine that the Bible contains explicit advice on how to avoid sexual temptation. But the entire chapter of Proverbs 7 is devoted to exactly that. In the first five verses, Solomon essentially pleads with his son to listen and guard his words carefully concerning the adulteress.

My son, keep my words,
And treasure my commandments within you.

Keep my commandments and live,
(sounds like serious stuff!)
And my teaching as the apple of your eye.
(actually the "pupil" or "little man of your eye." This was meant therefore to be a precious truth to be closely guarded and kept.)

Solomon goes on in verse 3:

Bind them on your fingers;
Write them on the tablet of your heart.

Say to wisdom, "You are my sister,"
And call understanding your intimate friend.

That they may keep you from an adulteress,
From the foreigner who flatters with her words.

In verses 6-9, King Solomon takes the role of an observer, telling his son what he sees unfolding before him.

For at the window of my house,
I looked out through my lattice,

And I saw among the naive,
I discerned among the youths,
A young man lacking sense.

Passing through the street near her corner;
And he takes the way to her house.

In the twilight, in the evening,
In the middle of the night and in the darkness.

Solomon speaks of one who is young, inexperienced, and lacking judgment. His first clue was that he purposefully walks down her street and actually heads straight to her house in the middle of the night. As Charlie Brown would say, “Good grief!” The young man’s intent is probably harmless. He is curious, perhaps hoping for a glimpse of the adulteress plying her wares to someone else on the street. Sin is probably not on his mind. He just wants to see what the real world is like. That kind of thinking is still heard today. “I just need to know what is out there so I can warn my family and others around me.” In reality, our young fool was looking for titillation and was confident that he could withstand the temptation.

This is precisely why Solomon says he is lacking sense. The apostle Paul warns in 1 Corinthians 10:12, “Therefore let him who thinks he stands take heed lest he fall.” Overconfidence is our worst enemy in the face of temptation. I am reminded of two contrasting characters in J.R.R. Tolkien’s *Lord of the Rings* trilogy, Boromir and Faramir. Boromir and Faramir were brothers. Boromir, the elder, was renowned for his exploits in war. He was his father’s favorite and the principal heir. He was confident, however, that were he to wield the One Ring, the Ring of Power, he would not be corrupted by it and could use it to defeat the armies of the evil Sauron. However, his overconfidence and lust for power lead him to attempt to steal the ring from the designated Ring- bearer. His foolishness caused the Fellowship of the Ring to be split apart under attack and led eventually to his death. He thought he could stand, but he fell.

His brother Faramir, however, had a more realistic picture of his sinful nature. When confronted later with the same opportunity to see and even hold the Ring, he refused. He knew the temptation would be strong and that the best way not to yield to the lust for power was to keep the temptation as far away as possible. Faramir, though perceived to be weaker than his brother, was, in a sense, actually the wiser and stronger of the two. He took heed and did not fall and later played a significant role in the final victory over the forces of evil.

What about you? Do you consider yourself strong enough to resist the temptations presented in movies, books, commercials, etc.? Do you walk into the movie theater blindly, lacking sense, uninformed as to why this movie is R-rated or even PG-13? Are you a headstrong Boromir, or a wise Faramir who knows his weakness in the face of temptation and avoids it whenever possible?

The Schemes of the Adulteress

As we continue in our walk through Proverbs 7, Solomon now focuses his attention on the schemes of the seductress. Our young man lacking sense is walking down her street, right past her house. Solomon continues in verse 10:

And behold, a woman comes to meet him,
Dressed as a harlot and cunning of heart.

She is boisterous and rebellious;
Her feet do not remain at home;

She is now in the streets, now in the squares,
And lurks by every corner.

Wow! What a surprise! A woman comes to meet him! Can’t you just hear Gomer Pyle exclaiming at the top of his lungs, “Surprise! Surprise! Surprise!” Surprise, indeed! This is only what was expected. Her boisterousness lends an air of fun and frivolity. Let’s face it, if sin weren’t so enjoyable we wouldn’t fall prey to it so easily. Solomon next gives the impression that she is everywhere to be found. As I pointed out earlier, that is even more true today. Even a widely

proclaimed family movie like *Forrest Gump* surprised many with scenes that were unnecessary and sexually explicit. If you were surprised, you shouldn't have been. Check these things out beforehand. Don't act like a young man lacking sense and wander down the street of temptation unaware. Remember that Jesus extended the moral law from our actions to our thought life. If we simply lust after a woman, we have already committed adultery in our hearts (Matt. 5:27 28).

Solomon next turns to the woman's tactics:

So she seizes him and kisses him,
(Suddenness can put you off your guard unless you have predecided what you would do, whether it is a real seduction, a scene in a movie, TV program, or book. Will you close your eyes, leave, change channels, skip a few pages? What? Know beforehand!)

And with a brazen face she says to him:
"I was due to offer peace offerings;
Today I have paid my vows.
(I'm not such a bad person. See, I do a lot of the same things you do. You're not going to reject and judge me, are you?)

Therefore I have come out to meet you,
To seek your presence earnestly, and I have found you."

Ah, the ultimate weapon with a man: female flattery. Men are suckers when they're told that they are needed. It was he, particularly, that she was waiting for. Not just anybody. If a man senses he is needed, he will be very reluctant to say no. Men usually hate to disappoint.

Solomon continues:

"I have spread my couch with coverings,
With colored linens of Egypt.

I have sprinkled my bed
With myrrh, aloes and cinnamon.

Come, let us drink our fill of love until morning;
Let us delight ourselves with caresses."

As she continues her assault on the male ego by indicating all the trouble she has gone through just for him ("Don't hurt my feelings now," she says), she creates a sensual picture that is meant to arouse him and draw him in. Be realistic. This sounds inviting, even from the pages of Scripture. This should be a loud tornado siren in your ear to tell you: "There, but for the grace of God, go I!" The adulteress finishes her seduction with the assurance that no one need ever know, in verses 19 and 20. She says:

"For the man is not at home,
He has gone on a long journey;

He has taken a bag of money with him,
At the full moon he will come home."

This rationalization of "no one will know" is true not only of an affair, but also of what we allow into our minds through the privacy of our computer, videos rented when no one else is home, magazines stashed away in a secret place, or visits to parts of town where we certainly don't expect to find

anyone we know. But it's a lie. These things cannot be hidden for a lifetime. Either you will slip up sooner or later, or you will poison your mind to such an extent that the outward temptation can no longer be resisted. Moses speaks to Israel in Numbers 32:23 warning them that if they do not obey the Lord, "their sin will find them out."

The Young Man Capitulates and Must Face the Consequences

As we have seen, the young man in Proverbs 7 has walked right into temptation's snare and has been totally mesmerized by the pleas and schemes of the adulteress. I have made many parallels to today as to how prevalent sexual temptation is. Now we will see the young man's demise and the consequences of his actions. Beginning in verse 21:

With her many persuasions she entices him;
With her flattering lips she seduces him.

Suddenly he follows her,
(probably as if in a trance)
As an ox goes to the slaughter,
(silently and dumbly)
Or as a stag goes into a trap,

Until an arrow pierces through his liver,
As a bird hastens to the snare,
(again blindly and without knowledge)
So he does not know that it will cost him his life.

He capitulates without a word, mesmerized by her seduction. The analogy to the ox, the deer, and the bird point out that each of them walk blindly, silently, and unknowingly to their death. So it is with the young man lacking sense. While he will not die in a physical sense, though he may if he contracts AIDS, he will die in the sense that his life will never be the same. Not only will the shame and guilt be difficult to overcome, but there will be severed relationships that may never be repaired. There may also be consequences that can never be removed and scars that may never be healed, such as a child out of wedlock or a broken marriage in which children are the real victims. But even if the sin is with pornography, remember your sins will find you out. You may keep up appearances for awhile but your ministry, your family, and your relationship with God will slowly rot from the inside out. Solomon closes with some final warnings and observations:

Now therefore, my sons, listen to me,
And pay attention to the words of my mouth.

Do not let your heart turn aside to her ways,
(do not give your mind opportunity with impure material)
Do not stray into her paths.

For many are the victims she has cast down,
And numerous are all her slain.

Her house is the way to Sheol,
Descending to the chambers of death.

Your best defense is to first realize that none are immune. Remember Boromir and Faramir from Tolkien's *Lord of the Rings*. Boromir, the stronger, older brother, thought he could resist the power

of the One Ring and use it to defeat the enemy. In the end, his lust for power drove him to irrationality and eventually to his death. Faramir, however, assessed his weakness correctly and refused to even look at the Ring when the opportunity arose, knowing its seductive power. He not only lived but was used mightily in the battles that followed. No one was capable of totally resisting the power of the Ring. Those who actually gazed upon the Ring, handled it and even used it, resisted only through an extreme exercise of will often aided by the intervention and counsel of others or circumstances (Frodo, Bilbo, and Samwise). Those who totally yielded to it were destroyed by it (Gollum).

Many have faltered before you and many will come after you. Your first mistake would be to think of yourself as above this kind of sin or immune to it. Don't kid yourself. It can ruin you physically! It can ruin you emotionally! It can ruin you spiritually!

Purity affirms who we are; we are made in the image of God. Purity affirms our relationship to Jesus Christ as His bride. Purity affirms women as a treasure God created for us as a companion and helpmate and not as an object for us to conquer.

Pray and ask forgiveness for any involvement in pornography, R- rated movies, and lustful thoughts. Commit to predecide what to do about those sudden temptations, commit to purity, commit to wives and husbands (or future wives and husbands) to be faithful in the power of the Holy Spirit. Martin Luther said that you cannot stop birds from flying over your head, but you can certainly stop them from making a nest in your hair. Some temptation is unavoidable, but as far as it depends on you, give it no opportunity to set up residence in your mind.

"There is No Satan, No Hell, and No People Born Bad"

I believe after 25,000 hrs of study and research, that WE should teach more about Creation and nature, along with philosophy and science, at a early age.

Western man starts his voyage of life thinking, he/she is bad, a sinner and always going to hell with Satan. There is NO Satan. There is no hell. These are for all serious realists a level of evil conciousness. Our children are not born into a world of sin. No more than a new born fawn, calf, bird etc. etc. We all have the knowledge of knowing right from wrong. In the Eastern cultures, primarily the Buddhist, teach their young that they are good boys/girls.

The orthodox churches take hold of one's spirit and give it fright and scare. The conformist and orthodoxy are nothing more than a industrialized money making venture. Now our new president wants to give our tax dollars to the same groups.

Somewhere, somehow America must change. This earth will probably be here for a very long time. When we think on terms of eternity, infinity and the finite, let us teach the truth about nature and clean up this planet, and the young minds. We continue to tell our youth

of how bad they are, they believe this. No, this gives them the license to murder, child molest, rape and a total criminal behavior. What would one expect, but our terrible bad society. Every generation this grows worse.

I'm not sure why you sent us this recent message except perhaps as a mild rebuke of our Christian Theistic worldview. Let me just point out that setting yourself up as an authority by stating the number of hours you have studied this subject and simply stating your position as categorically true with no attempt at argument or persuasion conforms to the standard practice of propaganda and not rational discourse.

If you want to challenge something specific on our site, please write us stating what you disagree with and why and we will respond as best we can. I'm afraid your e-mail as it stands accomplishes little more than an opportunity for you to state your opinions to no one in particular. Therefore, there is no reason to specifically respond to any of your speculations.

Respectfully,

Ray Bohlin, Ph.D.
Probe Ministries

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”

Darwin’s Black Box

Darwin’s Black Box: The Biochemistry of the Cell

What do mouse traps, molecular biology, blood clotting, Rube Goldberg machines, and irreducible complexity have to do with each other? At first glance they seem to have little if anything to do with each other. However, they are all part of a recent book by Free Press titled, *Darwin’s Black Box: The Biochemical Challenge to Evolution* by Michael Behe. Michael Behe is a biophysics professor at Lehigh University in Pennsylvania and his book, released last summer, has been causing a firestorm of activity in academic circles ever since.

The stranglehold that Darwinism has had in the biological sciences for decades has already been weakened over the last 30 years due to the new creationist movement and more recently by the push from intelligent design theorists. But Behe’s new book may end up being the straw that broke the camel’s back. Usually books like these are released by Christian publishers or at least a secular

press that is small and willing to take a chance. Also, creationist books are rarely sold in secular bookstores or reviewed in secular publications. *Darwin's Black Box* has gained the attention of evolutionists not normally accustomed to responding to anti- evolutionary ideas in the academic arena. People like Niles Eldredge from the American Museum of Natural History, Daniel Dennett, author of *Darwin's Dangerous Idea*, Richard Dawkins of Oxford University and author of *The Blind Watchmaker*, Jerry Robison of Harvard University, and David Hull from the University of Chicago have all been forced to respond to Behe either in print or in person.

In summary, the reason for all this attention is that they readily admit that Behe is clearly a reputable scientist from a reputable institution and his argument is therefore more sophisticated than they are accustomed to hearing from creationists. Mild, backhanded compliments aside, they unreservedly say he is flat wrong, but they have gone to much greater lengths in the literature, from the podium, and in the electronic media to explain precisely why they think he is wrong. Creationists and intelligent design theorists are usually dismissed out of hand, but not Behe's *Darwin's Black Box*.

Behe's simple claim is that when Darwin wrote *The Origin of Species*, the cell was a mysterious black box. We could see the outside of it, but we had no idea of how it worked. In *Origin*, Darwin stated,

> If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find no such case.

Simply put, Behe has found such a case. Behe claims that with the opening of the black box of the cell through the last 40 years of research in molecular and cell biology, there are now numerous examples of complex molecular machines that absolutely break down the theory of natural selection as an all-encompassing explanation of living systems. The power and logic of his examples prompted *Christianity Today* to name *Darwin's Black Box* as their 1996 Book of the Year. Quite a distinction for a book on science published by a secular publisher!

In this essay I will be examining a few of Behe's examples and detailing further just how the scientific community has been reacting to this highly readable and influential book.

Irreducible Complexity and Mousetraps

Behe claims the data of biochemistry argues strongly that many of the molecular machines in the cell could not have arisen through a step-by-step process of natural selection. In contrast, Behe claims that much of the molecular machinery in the cell is irreducibly complex.

Let me first address this concept of irreducible complexity. It's really a quite simple concept to grasp. Something is irreducibly complex if it's composed of several parts and each part is absolutely necessary for the structure to function. The implication is that such irreducibly complex structures or machines cannot be built by natural selection because in natural selection, each component must be useful to the organism as the molecular machine is built. Behe uses the example of a mousetrap. A mousetrap has five parts that are absolutely necessary for the mousetrap to function. Take any one of these parts away and the mousetrap can no longer catch mice.

The mousetrap must contain a solid base to attach the four other parts to, a hammer that clamps down on the mouse, a spring which gives the hammer the necessary power, a holding bar which

holds the now energized hammer in position, and a catch to which the holding bar is secured, holding the hammer in coiled tension. Eventually, the jiggling action of a mouse, lured to the catch by a tasty morsel of peanut butter, causes the holding bar to slip away from the catch, releasing the hammer to spring down upon the unsuspecting mouse.

It's fairly easy to imagine the complete breakdown of functionality if you take away any of these five parts. Without the base, the other parts can't maintain the proper stability and distance from each other to be functional; without the spring or hammer, there is no way to actually catch the mouse; and without both the catch and holding bar, there is no way to set the trap. All the parts must be present and accounted for in order for a mouse to be caught and the machine to function at all.

You can't build a mousetrap by Darwinian natural selection. Let's say you have a factory that produces all five parts of a mousetrap but uses them for different purposes. Over the years as the production lines change, leftover parts of no-longer-made contraptions are put aside on shelves in a storage room. One summer, the factory is overrun with mice. If someone were to put his mind to it, he might run by the storage room and begin to play around with these leftover parts and just might construct a mousetrap. But those pieces, left to themselves, are never going to spontaneously self-assemble into a mousetrap. A hammer-like part may accidentally fall from its box into a box of springs, but it's useless until all five parts are assembled so they can function together. Nature would select against the continued production of the miscellaneous parts if they are not producing an immediate benefit to the organism.

Michael Behe simply claims that we have learned that several of the molecular machines in the cell are just as irreducibly complex as a mousetrap and, therefore, just as unable to be constructed by natural selection.

The Mighty Cilium

One of Behe's examples is the cilium. Cilia are tiny hair-like structures on the outside of cells that either help move fluid over a stationary cell, such as the cells in your lungs, or serve as a means of propelling a cell through water, as in the single-celled paramecium. There are often many cilia on the surface of a cell, and you can watch them beat in unison the way a stadium crowd performs the wave at a ball game.

A cilium operates like paddles in a row boat; however, since it is a hair-like structure, it can bend. There are two parts to the operation of a cilium, the power stroke and the recovery stroke. The power stroke starts with the cilium essentially parallel to the surface of the cell. With the cilium held rigid, it lifts up, anchored at its base in the cell membrane, and pushes liquid backwards until it has moved nearly 180 degrees from its previous position. For the recovery stroke, the cilium bends near the base, and the bend moves down the length of the cilium as it hugs the surface of the cell until it reaches its previous stretched out position, again having moved 180 degrees back to its original position. How does this microscopic hair-like structure do this? Studies have shown that three primary proteins are necessary, though over 200 others are utilized.

If you made a cross-section of a cilium and made a photograph of it with an electron microscope, you would see that the internal structure of the cilium is composed of a central pair of fibers surrounded by an additional 9 pairs of these same fibers arranged in a circle. These fibers or microtubules are long hollow sticks made by stacking the protein tubulin. The bending action of cilia depends on the vertical shifts made by these microtubules.

The bending is caused by another protein that is stretched between the pairs of tubules called nexin. Nexin acts as a sort of rubber band connector between the tubules. As the microtubules shift

vertically, the rubber band is stretched taut, the microtubules continue to shift if they bend. Whew! I know this is getting complicated, but hang with me a little longer. The microtubules slide past each other by the action of a motor protein called dynein. The dynein protein also connects two microtubules together. One end of the dynein remains stationary on one microtubule, while the other end releases its hold on the neighboring microtubule and reattaches a little higher and pulls the other microtubule down.

Without the motor protein, the microtubules don't slide and the cilium simply stands rigid. Without nexin, the tubules will slide against each other until they completely move past each other and the cilium disintegrates. Without the tubulin, there are no microtubules and no motion. The cilium is irreducibly complex. Like the mousetrap, it has all the properties of design and none of the properties of natural selection.

Rube Goldberg Blood Clotting

Rube Goldberg was a cartoonist in the earlier part of this century. He became famous for drawing weird contraptions that must go through many seemingly unnecessary steps in order to accomplish a rather simple purpose. Over the years, some evolutionists have alluded to living systems as Rube Goldberg machines as evidence of their construction by natural selection as opposed to being designed by a Creator. Things such as the Panda's thumb and the intricate workings of the many varieties of orchids are said to be contrived structures that an intelligent creator surely would have found a better way of doing.

If you have never seen a cartoon of a Rube Goldberg machine, let me describe one for you from Mike Behe's book, *Darwin's Black Box*. This one is titled the "Mosquito Bite Scratcher." Water falling off a roof migrates into a drain pipe and collects into a flask. In the flask is a cork that floats up as the glass fills. Inserted in the cork is a needle that eventually rises high enough to puncture a suspended paper cup filled with beer. The beer then sprinkles onto a nearby bird that becomes intoxicated and falls off its platform and onto a spring. The spring propels the inebriated bird onto another platform where the bird pulls a string (no doubt mistaking it for a worm in its intoxicated state). The pulled string fires a cannon underneath a small dog, frightening him and causing him to flip over on his back. His rapid breathing raises and lowers a disk above his stomach which is attached to a needle positioned next to a mosquito bite on a man's neck allowing the bite to be scratched, causing no embarrassment to the man while he talks to a lady.

Well, this machine is obviously more complicated than it needs to be. But the machine is still designed and as Behe claims, it is also irreducibly complex. In other words, if one of the steps fails or is absent, the machine doesn't work. The whole contraption is useless. Well, there are a few molecular mechanisms in our bodies that are very similar to Rube Goldberg machines and therefore irreducibly complex. One is the blood-clotting cascade. When you cut your finger an amazing thing happens. Initially, it begins to bleed, but if you just leave it alone, after a few minutes, the flow of blood stops. A clot has formed, providing a protein mesh that initially catches the blood cells and eventually closes up the wound entirely, preventing the plasma from escaping as well.

This seemingly straightforward process involves over a dozen different proteins with names like thrombin, fibrinogen, Christmas, Stuart, and accelerin. Some of these proteins are involved in forming the clot. Others are responsible for regulating clot formation. Regulating proteins are needed because you only want clots forming at the site of a wound not in the middle of flowing arteries. Yet other proteins have the job of removing the clot once it is no longer needed. The body also needs to eliminate the clot when it has outlived its usefulness, but not before.

Now it's easy to see why some, when considering the blood-clotting cascade, wonder if a Creator

could have devised something simpler. But that assumes we fully understand the system. Perhaps it absolutely needs to be this way. Besides, this doesn't in any way diminish the fact that even a Rube Goldberg machine is designed just as the blood clotting system seems to be.

Silence of Molecular Evolution and the Reaction

Clearly, the irreducible complexity inherent in many biochemical systems not only precludes the possibility that they evolved by Darwinian natural selection, but actually suggests the strong conclusion that some kind of intelligent design is necessary. Behe makes a very significant point by recognizing that the data that implies intelligent design doesn't necessarily mean one knows who the designer is. Inferring that intelligent design is present is a reasonable scientific conclusion. Planetary astronomers, for example, claim that we will be able distinguish a radio signal from space that was sent by an intelligent civilization from the surrounding radio noise even though we won't initially understand it and won't know who sent it.

Yet the astounding complexity of the cell has gone largely unnoticed and greatly unreported to the general public. There is an embarrassed silence. Behe speculates as to why; he says,

> Why does the scientific community not greedily embrace its startling discovery? Why is the observation of design handled with intellectual gloves? The dilemma is that while one side of the elephant is labeled intelligent design, the other side might be labeled God (p.233).

This may also help to account for another curious omission that Behe highlights, the almost total lack of scientific literature attempting to describe how complex molecular systems could have arisen by Darwinian natural selection. The *Journal of Molecular Evolution* was established in 1971, dedicated to explaining how life at the molecular level came to be. One would hope to find studies exploring the origin of complex biochemical systems in this journal. But, in fact, none of the papers published in *JME* over the entire course of its life as a journal has ever proposed the origin of a single complex biochemical system in a gradual step-by-step Darwinian process.

Furthermore, Behe adds,

> The search can be extended, but the results are the same. There has never been a meeting, or a book or a paper on details of the evolution of complex biochemical systems (p. 179).

Behe's sophisticated argument has garnered the attention of many within the scientific community. His book has been reviewed in the pages of *Nature*, *Boston Review*, *Wall Street Journal*, and on many sites on the Internet. While some have genuinely engaged the ideas and offered serious rebuttal, most have sat back on Darwinian authority and claimed that Behe is just lazy or hasn't given the evolutionary establishment enough time. Jerry Coyne in *Nature* (19 September 1996, pp. 227-28) put it this way:

> There is no doubt that the pathways described by Behe are dauntingly complex, and their evolution will be hard to unravel. Unlike anatomical structures, the evolution of which can be traced with fossils, biochemical evolution must be reconstructed from highly evolved living organisms, and we may forever be unable to envisage the first

> proto-pathways. It is not valid, however, to assume that, because one man cannot imagine such pathways, they could not have existed.

But that's precisely the point; it is not one man but the entire biochemical community that has failed to elucidate a specific pathway leading to a complex biochemical system.

I highly recommend Behe's book. Its impact will be felt for many years to come.

The Little Lamb That Made a Monkey of Us All

Like many others, I was caught totally flat-footed, astonished by the announcement of the successful cloning of an adult sheep, Dolly. Caught so unaware, in fact, that Probe is re-airing my three-year-old program on human cloning the week of March 17-21, 1997, because so little had changed. When the announcement of a successful sheep cloning was made, it was too late to pull the program from the schedule; tapes had already been sent to all the radio stations and there just wasn't time to replace it in only three weeks. Consequently (and spurred by a number of phone calls and e-mails from around the country), I have compiled a few thoughts and comments regarding scientific and moral considerations about this historic breakthrough to temporarily plug the gap.

Scientific Considerations

Normal mammary cells were intentionally starved of critical growth nutrients in order to allow the cells to reach a dormant stage of the normal cell cycle. This process of bringing the cells into dormancy apparently allows the cell's DNA to be reprogrammed by the proteins already in the egg cell for renewed cell division and new cell functions. The cells were fused with an enucleated egg cell (a cell that had its nucleus removed) and stimulated to begin cell division by an electric pulse.

The process was inefficient. Out of 277 cell fusions, 29 began growing *in vitro.* All 29 were implanted in receptive ewes, 13 became pregnant, and only one lamb was born as a result. This is a success rate of only 3.4%. In nature, somewhere between 33 and 50% of all fertilized eggs develop fully into newborns.

The procedure was very non-technical, and no one is really sure why it worked. It needs to be repeated. All attempts to clone mouse cells from adults have failed. Some suggest that sheep embryos do not employ the DNA in the nucleus until after 3-4 cell divisions. This may give the egg cell sufficient time to reprogram the DNA from mammary cell functions to egg cell functions. Human and mouse cells employ the nuclear DNA after the second cell division. Human and mouse cells may not be capable of being cloned because of this difference.

The purpose of these experiments was to find a more effective way to reproduce genetically engineered sheep for the production of pharmaceuticals. A sheep embryo can be engineered to produce a certain human protein or hormone in its milk. The human protein can then be harvested

from the milk and sold on the market. Instead of trusting the somewhat unpredictable and time-consuming methods of normal animal husbandry to reproduce this genetic hybrid, cloning it assures that the engineered gene product will not be lost.

Genetic material is the same in all cells of an organism (except the reproductive cells, sperm and egg, which have only half the full complement), but differentiated cells are biochemically programmed to perform limited functions, and all other functions are turned off. Based on attempts in frogs and mice, most scientists felt that the reprogramming was impossible.

A critical question is the lifespan of Dolly. All cells have a built-in senescence or death after so many cell divisions. Dolly began from a cell that was already six years old. A normal lifespan for a ewe is around 11 years. Will Dolly live to see her seventh birthday?

It is also uncertain as to whether Dolly will be reproductively fertile. Frog clones are usually sterile.

Reprogramming the nucleus could lead to procedures to stimulate degenerating nerve cells to be replaced by newly growing nerve cells. Adults do not generate nerve cells normally.

Moral Considerations

Will humans be cloned for spare parts? While this is certainly possible, I consider it very unlikely that this would be sanctioned by any government. That doesn't mean, however, that someone won't try.

Will humans be cloned to replace a dying infant or child? This is certainly a possibility, but we need to ask if this is an appropriate way to deal with loss. Might unrealistic expectations be placed on a clone that would not be placed on a normally-produced child?

Will humans be cloned to produce children for otherwise childless couples? This is the most often-given reason for human cloning. This argument is unpersuasive when there are currently so many children that need adoption. Also, this further devalues children to the level of a commodity. If *in vitro* fertilization is expensive, cloning will be worse.

Will humans be cloned for vanity? Someone will certainly try.

Will human clones have a soul? In my mind, they will be no different from an identical twin or a baby that results from *in vitro* fertilization. How a single fertilized egg splits in two to become two individuals is a similar mystery.

Does cloning threaten genetic diversity? Excessive cloning may indeed deplete the genetic diversity of an animal population, leaving the population susceptible to disease and other disasters. But most biologists are aware of these problems, and I would not expect this to be a major concern unless cloning were the only means available to continue a species.

If the technique is perfected in animals first, will this save the tragic loss of fetal life that resulted from the early human experimentation with *in vitro* fertilization? *In vitro* fertilization was perfected in humans before it was known how effective a procedure it would be. This resulted in many wasted human beings in the embryonic stages. The success rate is still only 1 in 5 to 1 in 10; normal fertilization and implantation success rates are 2-3 times that. While animal models will help, there will be unique aspects to human development that can only be known and overcome by direct human experimentation which disrespects the sanctity of human life.

This provides a means for lesbians to have a child. One supplies the nucleus and the other provides

the egg. The egg does contain some unique genetic material in the mitochondria that are not contributed by sperm or nucleus. One cell from each donor would be fused together to create a new individual, though all the nuclear genetic material comes from one cell. Sue Bohlin has an upcoming program on homosexual myths including gay marriage. This is no longer marriage as it is currently understood, and the technological hoops that must be jumped through for any gay couple to have children should be a clear warning that something is wrong with the whole arrangement.

Are human clones unique individuals? Even identical twins manage to forge their own identity. The same would be true of clones. In fact, this may argue strongly against the usefulness of cloning since you can never reproduce all the life experiences that have molded a particular personality. The genes will be the same, but the environment and the spirit will not.

All together, I find the prospect of animal cloning potentially useful. But I wonder if the procedure is as perfectible as some hope, and may end up being an inefficient process to achieve the desired result. Human cloning is fraught with too many possible difficulties, from the waste of human fetal life during research and development to the commercializing of human babies (see my previous cloning article) with far too little potential advantage to individuals and society. What there is to learn about embryonic development through cloning experiments can be learned through animal experimentation. The cloning of adult human beings is an unnecessary and unethical practice that should be strongly discouraged if not banned altogether.

Can Humans Be Cloned Like Sheep?

Why Is Cloning So Difficult and How Did They Do It?

Like so many others I was caught totally flat-footed and astonished by the announcement of the successful cloning of an adult sheep, Dolly. A few years ago I aired a radio program on the prospects of human cloning and considerably downplayed the possibilities. Earlier this year, we here at Probe had decided to rebroadcast this program because little had changed. When the announcement about Dolly was made, it was too late to pull the program from the schedule as tapes had already been sent to all the radio stations, and there just wasn't time to replace or update it. Consequently, I compiled a few thoughts and comments on this historic breakthrough and quickly made it available on our web site to temporarily plug the gap.

Subsequently, the article was featured on Christian Leadership's web site, Leadership University (www.leaderu.com), and I started receiving numerous phone calls and e-mails as a result. This essay is now an updated and expanded version of that article to help us think through both the scientific and moral implications of this stunning achievement.

The genetic material is the same in all cells of an organism (except the reproductive cells, sperm and egg, which have only half the full complement of chromosomes). However, differentiated cells (liver cells, stomach cells, muscle cells, etc.) are biochemically programmed to perform limited functions and all other functions are turned off. Most scientists felt that the reprogramming was next to

impossible based on cloning attempts in frogs and mice.

So what did the scientists in Scotland do that was successful? Well, they took normal mammary cells from an adult ewe and starved them (i.e., denied them certain critical growth nutrients) in order to allow the cells to reach a dormant stage. This process of bringing the cells into dormancy apparently allows the cells' DNA to be deprogrammed. Apparently most if not all of the programming for specific functions of the mammary cells were turned off and the DNA made available for reprogramming. The starved mammary cells were then fused with an egg cell that had its nucleus removed. The egg cell was then stimulated to begin cell division by an electric pulse. Proteins already in the egg cell somehow altered the DNA from the mammary cell to be renewed for cell division and embryological functions.

As might be expected, the process was inefficient. Out of 277 cell fusions, 29 began growing as embryos *in vitro* or in the petri dish. All 29 were implanted into 13 receptive ewes, yet only one became pregnant. As a result of these efforts, one lamb was born. This translates to a success rate of only 3.4%, and the success rate is even less (.36%), when you calculate using the 277 initial cell fusions attempted. In nature, on the other hand, somewhere between 33 and 50% of all fertilized eggs develop fully into newborns.

Altogether the procedure was rather non-technical, and no one is really sure why it worked. The experiments still need to be repeated. Previously, all attempts to clone mice from adult cells have failed. But clearly, an astounding breakthrough has been made. You can be sure that numerous labs around the world will be attempting to repeat these experiments and trying the technique on other mammalian species. Can this procedure be done with humans? Should we try it with humans? I'll be dealing with these questions later in this discussion.

Why Clone Anything?

Before proceeding to deal with the question of human cloning, a more basic concern needs to be addressed. Some, for example, may be asking, "Why would anyone want to clone anything in the first place, but especially sheep?"

The purpose of these experiments was to find a more effective way to reproduce already genetically engineered sheep for production of pharmaceuticals. Sheep can be genetically engineered to produce a certain human protein or hormone in its milk. The human protein can then be harvested from the milk and sold on the market. This is accomplished by taking the human gene for the production of this protein or hormone and inserting it into an early sheep embryo. Hopefully the embryo will grow into a sheep that will produce the protein.

This is not a certainty, and while the process may improve, it will never be perfect. Mating the engineered sheep is also not foolproof because even mating with another genetically engineered sheep may result in lambs that have lost the inserted human gene and cannot produce the desired protein. Therefore, instead of trusting the somewhat unpredictable and time-consuming methods of normal animal husbandry to reproduce this genetic hybrid, cloning more directly assures that the engineered gene product will not be lost.

There may be other benefits to cloning technology. Reprogramming the nucleus of other cells, such as nerve cells, could lead to procedures to stimulate degenerating nerve cells to be replaced by newly growing nerve cells. Nerve cells in adults do not ordinarily regenerate or reproduce. This could have important implications for those suffering from Parkinson's and Alzheimer's.

If the process can actually be perfected to the extent that production costs are reduced and the

quality of the eventual product is improved, then this would be a legitimate research goal. The simplicity of the technique, though still inefficient, makes this plausible. But there are still questions that need to be answered.

One critical question concerns the lifespan of Dolly. All cells have a built in senescence or death after so many cell divisions. Dolly began with a cell from a ewe that was already six years old. A normal lifespan for a ewe is around 11 years. Will Dolly live to see her seventh birthday? Actually most cell divisions are used up during embryological development. Dolly's cells may peter out even earlier. This is critical because a 10-year-old sheep is considered elderly, and lambing and wool production decline in sheep after their seventh year. My guess though is that since Dolly's genes were reprogrammed from mammary cell functions to embryological functions, that the senescence clock was also reset back to the beginning. I expect Dolly to live a normal lifespan.

It is also uncertain as to whether Dolly will be reproductively fertile. Frogs cloned from tadpole cells are usually sterile. It is possible that while Dolly is normal anatomically, the cloning process may somehow interfere with the proper development of the reproductive cells. If this were the case, there may be other problems not immediately detectable. This will be answered this summer when Dolly reaches sexual maturity.

Can We Clone Humans?

While we have established that animal cloning may be permissible and even scientifically useful, what about cloning humans? First of all, is it feasible? Secondly, just because we can do it, should we? Should we even try?

At this point it is reasonable to assume that because the procedure works with sheep and possibly with cattle (the experiments with cattle are already underway), it should be perfectible with humans. This does not mean, however, that there may not be unique barriers to cloning humans as opposed to cloning sheep.

Some suggest that by using the particular procedure developed by the researchers in Scotland, sheep may be easier to clone. The reason is that sheep embryos do not employ the DNA in the nucleus until after 3 to 4 cell divisions. This may give the egg cell sufficient time to reprogram the DNA from mammary cell functions to egg cell functions. Human and mouse cells employ the nuclear DNA after only the second cell division. This may be why similar experiments have not worked in mice. Therefore, human cells and mouse cells may not be capable of being cloned because of this difference.

If this barrier does indeed exist, it is not necessarily insurmountable. The news of a cloned sheep was surprising enough that no one, including me, is now going to step out on the same sawed-off limb and predict that it **can't** eventually work with humans. I mentioned earlier that the procedure is so startlingly non-technical that there are numerous laboratories around the world that could immediately begin their own cloning research program with a minimum of investment and expertise. While I fully expect that many labs will begin studies on cloning other mammalian species besides sheep, I'm not so sure about humans.

In 1993, researchers here in the United States employed well known techniques to artificially twin human embryos. They immediately became embroiled in a firestorm of public scrutiny that they did not anticipate nor enjoy (see my earlier article, "Human Cloning: Have Human Beings Been Cloned?"). They were even criticized by other researchers in the field for jumping ahead without scrutinizing the ethical ramifications. The public reaction was no doubt very sobering to the rest of the scientific community. Many countries have already either completely banned experimentation in

human cloning or at least imposed a temporary moratorium so that the ethical questions can be properly investigated before stepping ahead. Even the researchers in Scotland responsible for Dolly have plainly stated that they see no reason to pursue human cloning and are personally repulsed by the idea.

There are some in the scientific community, however, who feel that the ability to do something is reason enough to do it. But in this case, I believe that they are the minority. For example, molecular biologists imposed a moratorium of their own in the 70s when genetic technology was first being developed until critical questions could be answered. Also, while nuclear weapons have been produced for over 50 years, only two have been used and that was 52 years ago. Many are now being dismantled. These cases show us that human restraint, though rare, is possible.

So while it is reasonable to believe that humans can be cloned, and that someone, somewhere may try, the overall climate is so against it that I don't think we will see it announced anytime soon.

Why Clone Humans?

Overall, the public reaction has been negative toward cloning human beings, and this is rather curious in a culture that is admittedly post-Christian in orientation. Nevertheless, many people still want to draw a distinction between animals and humans.

As Christians we understand this desire because we assert that humans are made in the image of God and that animals are not. There is, therefore, a clear demarcation between animals and humans. But in an evolutionary view, humans are nothing special–just another animal species. The expected reaction was offered by an editorial in the *Dallas Morning News* (Monday, 3 March 1997, 9D) by Tom Siegfried which he titled: "It's hard to see a reason why a human Dolly is evil." He summarized his perspective when he said, "The ability to clone is part of gaining deeper knowledge of life itself. So Dolly should not be seen as scary, but as a signal that life still conceals many miracles for humans to discover." To the naturalist, any knowledge is valuable, and the means to obtain it is justified essentially by its benefit to society.

With this in mind, let's explore some of the reasons why people have suggested that human cloning is a worthwhile proposition and deal with some of the questions people are asking.

Concerns About Human Cloning

There is much that can be learned about human embryonic development by researching human cloning. While this is true, this is precisely the reasoning used by Nazi Germany to justify experimentation on Jews. Experiments were performed on exposure to cold, water, and other extreme conditions with human subjects, frequently to the point of death, because data on human subjects was deemed indispensable. Of course, we know now that animal models work just as well; consequently, there is no need to use human models to gain this type of data.

Will humans be cloned for spare parts? A few writers have suggested that some individuals may want to establish an embryonic clone to be frozen and put away. Then, in the event of a childhood disease requiring a transplant, the embryo can be thawed, implanted in a surrogate, and raised to a sufficient age for the spare organ to be harvested and transplanted. While this is certainly possible, I consider it very unlikely that these practices would be sanctioned by any government because it completely tosses aside the uniqueness of humanity and trashes the concept of human dignity. That doesn't mean, however, that someone won't try.

Will human cloning be used to replace a dying infant or child? This is certainly a possibility, but we need to ask if taking such a course of action is an appropriate way to deal with loss. Unrealistic expectations may be placed on a clone that would not be placed on a normally produced child. The cloned child may be the same genetically, but different in other respects. This could create more frustration than comfort.

Will humans be cloned to provide children for otherwise childless couples? This is the reason most often given for human cloning, yet the argument is unpersuasive when there are so many children that need adoption. Also, this devalues children to the level of a commodity. Also, if *in vitro* fertilization seems expensive at $5,000-8,000 a try, cloning will be more so.

Will human clones have souls? In my mind, they will be no different than an identical twin or a baby that results from *in vitro* fertilization. How a single fertilized egg splits in two to become two individuals is a similar mystery, but it happens.

Does cloning threaten genetic diversity? Excessive cloning may indeed deplete the genetic diversity of an animal population, leaving the population susceptible to disease and other disasters. But most biologists are aware of these problems, and I would not expect this to be a major concern unless cloning were the only means available to continue a species.

If the technique is perfected in animals first, will this save the tragic loss of fetal life that resulted from the early human experimentation with in vitro *fertilization? In vitro* fertilization was perfected in humans before it was known how effective a procedure it would be. This resulted in many wasted human beings in the embryonic stages. The success rate is still only 10 to 20%. The success rate of normal fertilization and implantation is around 33 to 50%. While animal models will help, there will be unique aspects to human development that can only be known and overcome by direct human experimentation which does not respect the sanctity of human life.

Cloning provides a means for lesbians to have children as a couple. One supplies the nucleus and the other provides the egg. The egg does contain some unique genetic material in the mitochondria that are not contributed by sperm or nucleus. One cell from each partner is fused together to create a new individual, though all the nuclear genetic material comes from only one cell. The real question is whether this is the proper environment for any child to grow up in. (For more information on this topic, see Sue Bohlin's essay, "Homosexual Myths.") Homosexual "marriages" are not really marriages in the normal understanding of the term, and the technological hoops that must be jumped through for any gay couple to have children should be a clear warning that something is wrong with the whole arrangement.

Are human clones unique individuals? Even identical twins manage to forge their own identity. The same would be true of clones. In fact, this may argue strongly against the usefulness of cloning since we can never reproduce all the life experiences that have molded a particular personality. The genes will be the same, but the environment and the spirit will not.

All together, I find the prospect of animal cloning potentially useful. But I wonder if the procedure is as perfectible as some hope. It may end up being an inefficient process to achieve the desired result. Human cloning is fraught with too many possible difficulties, from the waste of human fetal life during research and development to the commercializing of human babies (see my previous Human Cloning article) with far too little potential advantage to individuals and society. What there is to learn about embryonic development through cloning experiments can be learned through animal experimentation. The cloning of adult human beings is an unnecessary and unethical practice that should be strongly discouraged if not banned altogether.

A Darwinian View of Life

Probe's Dr. Ray Bohlin reviews Richard Dawkins' anti-theistic book, A River Out of Eden: A Darwinian View of Life*, showing the holes in Dawkins' arguments.*

A River of DNA

A River Out of Eden: A Darwinian View of Life by Richard Dawkins is the fourth in a series being published by Basic Books entitled "The Science Masters Series." This series is said to be "a global publishing venture consisting of original science books written by leading scientists. "Purposing to "present cutting-edge ideas in a format that will enable a broad audience to attain scientific literacy," this series is aimed at the non-specialist.

The first three releases were *The Last Three Minutes: Conjectures about the Ultimate End of the Universe* by Paul Davies, *The Origin of Humankind* by Richard Leakey, and *The Origin of the Universe* by John D. Barrow. These were followed by the contribution from Dawkins. A look at these books, and at future contributors like Daniel Dennett, Jared Diamond, Stephen Jay Gould, Murray Gell-Mann, Lynn Margulis, and George C. Williams, makes the endeavor look less like a scientific literacy series and more like an indoctrination in philosophical naturalism.

The exposition of a Darwinian view of life by Dawkins in *River Out of Eden* certainly fits into the overt anti-theism category. His "River Out of Eden" is a river of DNA that is the true source of life and the one molecule that must be understood if life is to be understood.

This river of DNA originally flowed as one river (one species) which eventually branched into two, three, four, and eventually millions of rivers. Each river is distinct from the others and no longer exchanges water with the others, just as species are isolated reproductively from other species. This metaphor allows Dawkins to explain both the common ancestry of all life along with the necessity of gradualism in the evolutionary process.

Dawkins refers to this river of DNA as a digital river. That is, the information contained in the DNA river is completely analogous to the digital information of languages and computers.

Surprisingly, Dawkins gives away the store in this first chapter. In pressing home the digital analogy, Dawkins first uses probability to indicate that the code arose only once and that we are all, therefore, descended from a common ancestor:

> The odds of arriving at the same 64:21 (64 codons: 21 amino acids) mapping twice by chance are less than one in a million million million million million. Yet the genetic code is in fact identical in all animals, plants and bacteria that have ever been looked at. All earthly living things are certainly descended from a single ancestor.(p. 12)

So it is reasonable to use probability to indicate that the code could not have arisen twice, but there

is no discussion of the probability of the code arising by chance even once. A curious omission! If one tried to counter with such a question, Dawkins would predictably fall back on the assumption of naturalism that since we know only natural processes are available for the origin of anything, the genetic code must have somehow beaten the odds.

African Eve

Chapter 2 attempts to tell the story of the now famous "African Eve." African Eve embodies the idea that we are all descended from a single female, probably from Africa, about 200,000 to 100,000 years ago. This conclusion originates from sequence data of the DNA contained in mitochondria.

Mitochondria are tiny little powerhouses that produce energy in each and every cell of your body. Just as your body contains many organs that perform different functions, the cell contains many organelles that also perform specific functions. The mitochondrion is an organelle whose task is to produce energy molecules the cell can use to accomplish its tasks.

However, mitochondria are also the only organelle to contain their own DNA. Certain proteins necessary to the function of mitochondria are coded for by the mitochondrial DNA and not by the nuclear DNA like every other protein in the cell. One other unique aspect of mitochondria is their maternal inheritance. That is, all the mitochondria in your body are descended from the ones you initially inherited from your mother. The sperm injects only its DNA into the egg cell, not its mitochondria. Therefore, an analysis of mitochondrial DNA reveals maternal history only, uncluttered by the mixture of paternal DNA like nuclear DNA. That's why these studies only revealed an African Eve, though other recent studies claim to have followed DNA from the Y chromosome to indicate an ancient "Adam."

Now these scientists don't actually think they have uncovered proof of a real Adam and Eve. They only use the names as metaphors. But this action does reveal a shift in some evolutionists minds that there is a single universal ancestor rather than a population of ancestors. This at least is closer to a biblical view rather than farther away.

Finally, Dawkins makes his case for the reliability of these molecular phylogenies in general. Here he glosses over weaknesses in the theory and actually misrepresents the data. On page 43 he says, "On the whole, the number of cytochrome c letter changes separating pairs of creatures is pretty much what we'd expect from previous ideas of the branching pattern of the evolutionary tree." In other words, Dawkins thinks that the trees obtained from molecular sequences nearly matches the evolutionary trees we already had. Later on page 44, when speaking of all molecular phylogenies performed on various sequences, he says, "They all yield pretty much the same family tree which by the way, is rather good evidence, if evidence were needed, that the theory of evolution is true."

Well, besides implying that evidence is not really needed to prove evolution, Dawkins stumbles in trying to display confidence in the molecular data. What exactly does "pretty much" mean anyway? Inherent in that statement are the numerous contradictions that don't fit the predictions or the ambiguous holes in the general theory. But then, evidence isn't really needed anyway is it?

While this chapter contained the usual degree of arrogance from Dawkins, particularly in his disdain for the original account of Adam and Eve, it was somewhat less compelling or persuasive than is his usual style. He hedged his bet frequently and simply waived his hand at controversy. Unfortunately, this may not be picked up by the unwary reader.

Scoffing at Design

In Chapter 3 Dawkins launches a full-scale assault on the argument from design. After presumably debunking arguments from the apparent design of mimicry (not perfect design, you know, just good enough), Dawkins states, “Never say, and never take seriously anybody who says, ‘I cannot believe so-and-so could have evolved by gradual selection.’ I have dubbed this fallacy ‘the Argument from Personal Incredulity.'”

To some degree I’m afraid that many creationists have given Dawkins and others an easy target. Such a statement, “I cannot believe…,” has been used many times by well-meaning creationists but is really not very defensible. It is not helpful to simply state that you can’t believe something; we must elaborate the reasons why. First, Dawkins levels the charge that much of what exists in nature is far from perfectly designed and is only good enough. This he claims is to be expected of natural selection rather than a designer. This is because a designer would design it right while natural selection has to bumble and fumble its way to a solution. To begin with, the lack of perfection in no way argues for or against a designer.

I have always marveled at some evolutionists who imply that if it isn’t perfect, then Nature did it. Just what is perfection? And how are we to be sure that our idea of a perfect design wasn’t rejected by the Creator because of some flaw we cannot perceive? It is a classic case of creating God in our own image.

The evolutionists are the ones guilty of erecting the straw man argument in this instance. In addition, Dawkins fully admits that these features work perfectly well for the task at hand. The Creator only commanded His creatures to be fruitful and multiply, not necessarily to be perfectly designed (humanly speaking) wonders. Romans 1:18-20 indicates that the evidence is sufficient if you investigate thoroughly.

Dawkins further closes off criticism by declaring that “there will be times when it is hard to think of what the gradual intermediates may have been. These will be challenges to our ingenuity, but if our ingenuity fails, so much the worse for our ingenuity.” So if explanations fail us, the fault is not with the evolutionary process, just our limited thinking. How convenient that the evolutionary process is so unfalsifiable in this crucial area. But after all, he implies, this is science and intelligent design is not!

Dawkins concludes the chapter with a discussion on the evolution of the honeybee waggle dance. It is filled with probabilistic statements like “The suggestion is that…. Perhaps the dance is a kind of…. It is not difficult to imagine…. Nobody knows why this happens, but it does…. It probably provided the necessary….” Yet at the end, Dawkins proclaims,

> We have found a plausible series of graded intermediates by which the modern bee dance could have been evolved from simpler beginnings. The story as I have told it…may not be the right one. But something a bit like it surely did happen.

Again, “it happened” only because any other explanation has been disallowed by definition and not by the evidence.

God’s Utility Function

Dawkins concludes his attack on design in his book *River Out of Eden,* with a more philosophical

discussion in Chapter 4, God's Utility Function. He begins with a discussion of the ubiquitous presence of "cruelty" in nature, even mentioning Darwin's loss of faith in the face of this reality. Of course, his answer is that nature is neither cruel nor kind, but indifferent. That's just the way nature is.

But a curious admission ensues from his discussion. And that is, "We humans have purpose on the brain." Dawkins just drops that in to help him put down his fellow man in his usual arrogant style. But I immediately asked myself, "Where does this 'purpose on the brain' stuff come from?"

The rest of nature certainly seems indifferent. Why is it that man, within an evolutionary worldview, has "purpose on the brain"? In his attempt to be cute, Dawkins has asked an important question: Why is man unique in this respect?

As Christians, we recognize God as a purposeful being; therefore if we are made in His image, we will also be purposeful beings. It is natural for us to ask "Why?" questions. No doubt if pressed, someone will dream up some selective or adaptive advantage for this trait. But this, as usual, would only be hindsight, based on the assumption of an evolutionary worldview. There would be no data to back it up.

At the chapter's end Dawkins returns to his initial topic. "So long as DNA is passed on, it does not matter who or what gets hurt in the process…. But Nature is neither kind nor unkind…. Nature is not interested one way or another in suffering, unless it affects the survival of DNA." Even Dawkins admits that this is not a recipe for happiness. The problem of evil returns. Dawkins's simple answer is that there is no problem of evil. Nature just is.

He recounts a story from the British papers of a school bus crash with numerous fatalities and reports a Catholic priest's inadequate response to the inevitable "Why" question. The priest indicates that we really don't know why God would allow such things but that these events at least confirm that we live in a world of real values: real positive and negative. "If the universe were just electrons, there would be no problem of evil or suffering." Dawkins retorts that meaningless tragedies like this are just what we expect from a universe of just electrons and selfish genes.

However, it is also what we expect in a fallen world. Evolutionary writers never recognize this clear biblical theme. This is not the way God intended His world to be. What is unexpected in an evolutionary world are people shaped by uncaring natural selection who care about evil and suffering at all. Why are we not as indifferent as natural selection?

In making his point, Dawkins says that the amount of suffering in the natural world is beyond all "decent" contemplation. Where does decency come from? He calls the bus crash a "terrible" story. Why is this so terrible if it is truly meaningless? Clearly, Dawkins cannot live within the boundaries of his own worldview. We see purpose and we fret over suffering and evil because we are created in the image of a God who has the same characteristics. There are aspects of our humanity that are not explainable by mutation and natural selection. Dawkins must try to explain it, however, because his naturalistic worldview leaves him no choice.

Are We Alone?

Dawkins closes his book with a final chapter on the origin of life and a discussion on the possibilities of life elsewhere in the universe. This chapter is a bit of a disappointment because there is really very little to say. To be sure, it is filled with the usual Dawkins arrogance and leaps of naturalistic logic, but there is no real conclusion just the possibility of contacting whatever other life may be out there.

Dawkins begins with a definition of life as a replication bomb. Just as some stars eventually explode in supernovas, so some stars explode with information in the form of life that may eventually send radio messages or actual life forms out into space. Dawkins admits that ours is the only example of a replication bomb we know, so it is difficult to generalize as to the overall sequence of events that must follow from when life first appears to the sending of information out into space, but he does it anyway.

While we can clearly distinguish between random and intelligent radio messages, Dawkins is unable to even ask the question about the origin of the information-rich DNA code. I suppose his answer is contained on page 138 when he says, “We do not know exactly what the original critical event, the initiation of self-replication, looked like, but we can infer what kind of an event it must have been. It began as a chemical event.”

This inference is drawn not from chemical, geological, or biological data, because the real data contradicts such a notion. Dawkins takes a few pages to evoke wonder from the reader by documenting the difficult barriers that had to be crossed. His conclusion that it was a chemical event is rather an implication that is derived from his naturalistic worldview. It is a chemical event because that is all that is allowed. Creation is excluded by definition, not by evidence. While chemical evolution may be difficult, we are assured that it happened!

The book closes with a discussion of the Ten Thresholds that must be crossed for a civilization of our type to exist. Along the way, Dawkins continues to overreach the evidence and make assumptions based on naturalism without the slightest thought that his scenario may be false or at least very wide of the mark.

All along the way Dawkins tries to amaze us with both the necessity and complexity of each threshold but fails miserably to explain how each jump is to be accomplished. He depends totally on the explanatory power of natural selection to accomplish whatever transition is needed. It is just a matter of time.

But, of course, this begs the question. Dawkins perfects this art for 161 pages. Despite the smoke and mirrors, Richard Dawkins is still trying to sail upstream without a paddle. It just won’t work. While many of his explanations and ruminations should make careful reading for creationists (he is not stupid and writes well), I have tried to point out a few of his inconsistencies, assumptions, and poor logic.

What bothers me most is that this is meant to be a popular book. His wit and dogmatism will convince and influence many. For these reasons I found it a frustrating and sometimes maddening book to read. Unfortunately, few will think their way through these pages and ask tough questions of the author along the way. This is where the real danger lies. We must not only show others where he is wrong but help them how to discover these errors on their own. We must help people to think, not just react.

Evolution’s Big Bang

Another Big Bang?

The impish Calvin, from the now defunct daily comic strip “Calvin and Hobbes,” once offered to rename the Big Bang Hypothesis, “The Horrendous Space Kablooie!” Most of us have heard at some point of cosmology’s preferred explanation for the origin of the universe, the Big Bang Hypothesis. The Big Bang of cosmology describes the origin of the universe as occurring in a powerful explosion that eventually results in the universe as we see it today. But a recent issue of *Time* magazine (4 December 1995) heralded a new Big Bang, a Big Bang of biological evolution previously known as the Cambrian Explosion of Life. And just as many draw theistic conclusions from cosmology’s Big Bang, so it is possible to draw theistic conclusions from what is now being called Evolution’s Big Bang.

But first, just what is evolution’s Big Bang? The cover of this issue of *Time* declared: “New discoveries show that life as we know it began in an amazing biological frenzy that changed the planet almost overnight.” A subheading just in front of the inside article proclaimed, “For billions of years, simple creatures like plankton, bacteria, and algae ruled the earth. Then, suddenly, life got very complicated.”

The standard evolutionary story describes an earth bombarded by meteorites from its origin 4.5 billion years ago until almost 3.8 billion years ago. Within only 100 million years the first life evolved following the cessation of this celestial onslaught. This, in and of itself, is a huge evolutionary hurdle without explanation. For the next 3 billion years, little else but single- celled life forms ruled the planet. Then suddenly, in the Cambrian geological period, the earth is populated with a huge diversity of complex multicellular life forms. This has always looked suspiciously like some form of creation event, and paleontologists frequently seemed rather embarrassed by the reality of the Cambrian Explosion.

So, where is the documentation for the long history of the evolution of these creatures? The usual answer is that the necessary fossil layers prior to the Cambrian period have not been discovered yet. The fossils are just missing! Hmmm. . . . how convenient! This, after all, was Darwin’s excuse and many evolutionists after him followed suit. Well, recent discoveries from Canada, Greenland, China, Siberia, and Namibia document quite clearly that this period of biological creativity occurred in a geological instant virtually all around the globe. So, the usual excuse no longer holds water. While evolutionists are not exactly joining a creationist wave of conversion, they are being forced to ask tough questions concerning the nature of evolutionary change. Darwin did not envision major evolutionary change happening this fast. Darwinism has always been characterized by slow gradual change that is imperceptible in our time frame. Major evolutionary change was only visible as we looked to the fossils to reveal the number and type of intermediates between species and major groups. But the Cambrian explosion is anything but gradual, and identifiable intermediates are totally absent. Where are the ancestors? What conditions could have prompted this frenzy of creativity? Is there some form of unknowable evolutionary mechanism at work? I think you will find the evolutionary community’s answers to be quite revealing.

How Fast is Fast?

Anomalocaris! Ottoia! Wiwaxia! Hallucigenia! Opabinia! If these names are unfamiliar to you, well, they should be. For they are only becoming familiar to paleontologists over the last twenty years. Paleontologists are those scientists who study the fossils embedded in ancient layers of rock. And

this strange list represents a group of animals from the Cambrian period that is only now being appreciated–animals which supposedly lived over 500 million years ago. These animals not only possess strange sounding names, but are even stranger looking! So strange and different are they that most are contained in phyla of which they are the only example and which no longer exists.

Whoa! . . . you say! And just what is a phyla? Well, if you think way back to high school biology, *phyla* is actually the plural form of *phylum,* a Latin term designating a large category of biological classification. The largest category of classification is the Kingdom. We all know about the Animal and Plant Kingdoms. Well, Phylum is the next category below Kingdom. The Animal Kingdom consists of such well known phyla as the molluscs which contains clams, oysters, and snails. Another commonly known phylum is the annelids to which belong the earthworms. The largest of all phyla is the arthropods. Arthropods range from insects to millipedes to spiders to shrimp. We are placed in the phylum Chordata along with all other vertebrates, the fish, amphibians, reptiles, and other mammals. Representatives from different phyla are very different creatures. There is not much in common between a human, an earthworm, a clam, and a mosquito. They are all from different phyla–so different that evolutionists have assumed that it must have taken tens of millions of years for these phyla to evolve from one common ancestor.

Yet, here is the real puzzle of the Cambrian Explosion for the theory of evolution. All the known phyla, except one, along with the oddities with which I began this discussion, first appear in the Cambrian period. There are no ancestors. There are no intermediates. Fossil experts used to think that the Cambrian lasted 75 million years. But even that seemed to be a pretty short time for all this evolutionary change. Eventually the Cambrian was shortened to only 30 million years. And if that wasn't bad enough, the time frame of the real work of bringing all these different creatures into existence was limited to the first five to ten million years of the Cambrian. This is extraordinarily fast! Harvard's Stephen Jay Gould says, "Fast is now a lot faster than we thought, and that is extraordinarily interesting." What an understatement! "Extraordinarily impossible" might be a better phrase!

In the *Time* magazine article (p. 70), paleontologist Samuel Bowring says, "We now know how fast fast is. And what I like to ask my biologist friends is, How fast can evolution get before you start feeling uncomfortable?" I would love to ask Bowring just what he meant by that statement. It's almost as if he is recognizing that current evolutionary mechanisms can't possibly act that fast. The potential answers to that dilemma are only creating more questions, questions that evolutionists may never be able to answer.

How Could the Cambrian Explosion Occur?

Charles Darwin proposed an evolutionary process that was slow and gradual. This formulation has remained the mainstay of evolutionary explanations for the over 100 years since Darwin until very recently. One of the many reasons for a rethinking of this slow, gradual, snail-like pace has been the intricate complexity of living things. In the years before Darwin, the marvelous fit of an organism to its environment was considered the chief evidence of a Supreme Designer. But Darwin supposedly showed another and better way, natural selection. But if organisms were so finely-tuned to their environment, so wonderfully adapted to their particular niche, then if they were to change at all over time, then that change would have to be very gradual so as not to upset too quickly that delicate balance between the organism and its environment.

This notion of the gradualness of the evolutionary process was deeply reinforced with the discovery of DNA and the genetic code. DNA operates as an informational code for the development of an organism from a single cell to an adult and also regulates all the chemical processes that go on in cells. Mutations, or mistakes in the code had to have very minor effects. Disruption of the blueprint

would be very sensitive. The small changes brought about by mutations would have to be cumulative over very long periods of time to bring about significant evolutionary changes.

This necessity of gradualism explains the difficulty evolutionists have concerning the Cambrian explosion or Evolution's Big Bang, as *Time* magazine called it. How could animals as diverse as arthropods, molluscs, jellyfish, and even primitive vertebrates all appear within a time span of only 5-10 million years with no ancestors and no intermediates? Evolution just doesn't work this way. Fossil experts and biologists are only beginning to wrestle with this thorny dilemma. Some think that genes which control the process of development from a fertilized egg to an adult, the so- called *Hox* genes, may have reached a critical mass which led to an explosion of complexity. Some of the simplest multi-celled organisms like the jellyfish only have three *Hox* genes, while insects have eight, and some not-quite-vertebrates have ten. Critical mass may be a real phenomena in physics, but biological processes rarely if ever work that way. Besides, that doesn't solve the important riddle of where the first *Hox* gene came from in the first place. Genetic information does not just spontaneously arise from random DNA sequences.

Other scientists think that a wholesale reorganization of all the genes must have also changed along with the duplication of *Hox* genes to bring about this stupendous amount of change. But that only complicates the picture by requiring additional, simultaneous genetic mutations that have to occur virtually all at once. This would have an enormous negative effect on an organism that was already adapted to its environment. How could it survive? It seems that the equivalent of a miracle would be required. But such things aren't allowed in evolution. To quote *Time* magazine again,

> Of course, understanding what made the Cambrian explosion possible doesn't address the larger question of what made it happen so fast. Here scientists delicately slide across data- thin ice, suggesting scenarios that are based on intuition rather than solid evidence.

Why Hasn't Such Rapid Change Ever Happened Again?

Before addressing this question, let's review our discussion thus far. Evolution's Big Bang, the Cambrian explosion of life that supposedly occurred over 500 million years ago, continues to puzzle evolutionists. Recent discoveries have narrowed the time frame from over 70 million years to less than 10 million years. This has only complicated their dilemma because so many different creatures appear in the Cambrian with no ancestors or intermediates. The major evolutionary innovations represented in the Cambrian would ordinarily require at least tens of millions of years to accomplish. Some might even suggest over 100 million years would be required. The differences between the creatures that suddenly appear in the Cambrian are enormous. In fact these differences are so large many of these animals are one of a kind. Nothing like them existed before and nothing like them has ever appeared again.

In fact, a question that is just as perplexing as how this explosion of diversity could occur so fast, is why hasn't such drastic change ever happened in the 500 million years since? The same basic body plans that arose in the Cambrian remain surprisingly constant ever since. Apparently, the most significant biological changes in the history of the earth occurred in less than ten million years, and for 500 million years afterward, this level of change never happened again. Why not? This may seem like a simple question, but it is far more complicated than it appears.

Many biologists think the answer must lie within the genetic structure of organisms. During the Cambrian, new forms of life could readily appear because the genetic organization of organisms was

relatively loose. Once all these body plans came into existence and were successful, then these same genetic structures became relatively inflexible in order to preserve what worked so well. In other words there may be genetically built-in limits to change. Developmental biologist Rudolf Raff said, "There must be limits to change. After all we've had these same old body plans for half a billion years." Lane Lester and I coauthored a book over ten years ago titled *The Natural Limits to Biological Change*. Though the limits to change we proposed were tighter than what these evolution scientists are proposing, it is the same basic idea. We even suggested that these limits to change would be found in the genetic organization and regulatory programs that are already built in.

Some evolutionists have gone so far as to suggest that the mechanisms of evolution operating in the Cambrian were probably radically different from what has taken place ever since. This raises the possibility that we may never be able to study these mechanisms because animals with the proper genetic structure no longer exist. We are left only with the products of the Cambrian explosion and none of the precursors. The speculations will therefore be wild and uncontrollable since there will be no way to test these theories. Fossils leave no trace of their genetic organization. We may never be able to know how this marvelous burst of creativity occurred. Sounds like evolutionists may be faced with the very same problems they accuse creationists of stumbling over: a process that was unique to the past, unobservable in any shape or form, and unrepeatable.

Stuart Kaufmann, a leader in complexity theory, places his faith in self-organizing systems that spontaneously give rise to order out of chaos–a sort of a naturalistic, impersonal self-creator. A supernatural Creator performs the same function with the added benefit of providing a source of intelligent design as well.

Marvelous Evidence of Creation and Design and the Role of World View

So often at Probe our focus is on some issue that has the opposing forces shaped by worldview. A worldview is a system of beliefs or philosophy of life that helps us to interpret the world around us. We often compare one's worldview to a pair of glasses that helps bring everything into focus. Just as it is important for someone with impaired vision to have the right prescription glasses, so it is also necessary for sin-impaired people to have the right world view with which to make sense of the world of ideas around us.

Clearly we believe that the Bible offers the only tool to arrive at the right prescription or worldview. We have been discussing here Evolution's Big Bang, the Cambrian explosion of life approximately 543 million years ago according to evolutionists. The latest discoveries in this field were highlighted in *Time* magazine's 4 December 1995 issue. Three weeks later, some very interesting letters appeared from readers in *Time*. They are very instructive of the effects of one's worldview when evaluating the very same evidence. Much of our time in this pamphlet has been spent detailing the vast problems that the Cambrian explosion produces for evolutionary theory. But that is from the vantage point of a biblical worldview. One *Time* magazine reader commented, "This report should end discussions about whether God created the earth. Now there is no way to deny the theory of evolution." Another reader said, "It is great to see a national magazine put the factual evidence of evolution's vast, complex story out there for the lay public."

Now, before you go assuming that they surely didn't read the same story I have been describing in these pages, listen to these readers with a different perspective. "A more appropriate title for your article could have been 'Evolution's Big Bust.' One hundred and thirty-five years of Darwinism out the window just like that? What a poor excuse for the lack of transitional forms." Another reader said, "This story read more like confirmation for Noah's Deluge than Darwin's theory of evolution."

Well, they all read the same story. Many even quoted from the article to explain their views. So, how

can four people read the same information and come to such radically different conclusions? The difference is worldview. To those who are working within a naturalistic worldview, one which holds that there is no God, some form of evolution must be true. Therefore, while the evidence of the Cambrian may be perplexing, the fact that scientists are wrestling with it and offering some possible explanations is exciting and invigorating. However, I find that they are usually missing the big picture. By concentrating on explaining the minutiae, naturalistic thinkers often miss the clear possibility of intelligent design precisely because they don't expect to find any.

A great example of this is a comment by Harvard's Steven Jay Gould on the Cambrian creatures found in the Burgess Shale of Canada:

> Imagine an organism built of a hundred basic features, with twenty possible forms per feature. The grab bag contains a hundred compartments, with twenty tokens in each. To make a new Burgess creature, the Great-Token-Stringer takes one token at random from each compartment and strings them together. *Voila*, the creature works–and you have nearly as many successful experiments as a musical scale can build catchy tunes.

Sounds like a marvelous description of a Creator to me, but perhaps only if you are thinking biblically from the start.