Understanding God and His Universe

If God created the universe 6,000 years ago, why does it appear to be 14 billion years old?

Continued on the back cover

By Michael Bronson

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This book is a partial printout of my website Bible***Help***.org. Bible***Help***.org has 18,000 new visitors a month from 120 countries. Over 100,000 chapters are accessed every month. Although this website was started as a small personal ministry, it has taken on a life of its own. It has become a ministry in-and-of itself. I still work full-time as a Corrections Officer, but this website has given me opportunities I never thought would be possible.

Now that the website has grown, I feel it is important to raise prayer support for it. Therefore, I am asking you to consider praying for this website on a daily basis. Not only would it be greatly appreciated, it would give your prayers an international impact. You can download a prayer card at:

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Understanding God

"Creation of Man" by Michelangelo (Cappella Sistine, Vatican)

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How can we describe (let alone understand) a being as complex as God Almighty? Obviously, we can't. To think that we could understand God is as ludicrous as thinking a placebo could understand humans. It isn't possible.

Like many new Christians, I had tried to learn as much as I could about God and Christianity. After several years of Bible school and extensive Bible training, I felt I had a pretty good grasp on what God was like. However, as I matured spiritually, I began to realize that I actually knew very little about God. Ironically, the more I currently learn about God, the less I feel that I really understand Him.

Despite our limited knowledge of God, there still are a few things we can learn about Him. An infinite being isn't totally unknown to finite beings. As we look at some of these things, you might be pleasantly surprised.

What is God like? For the most part, we don't really know. We have no idea what His physical structure is like. We have no idea how large or small He is. We know He must be greater and more spectacular than the gigantic universe He created. Greatness, however, has nothing to do with size. Just because he made a large universe doesn't mean He is as large as the universe. On the other hand, the universe might be a miniscule dot in comparison to God's actual size.

I think, however, that God's "physical size" compared to the universe is probably a moot point. I don't believe that the eternal spiritual dimension of God's realm is even comparable to our realm. It's like asking, "How big is this apple compared to the color blue?" They are not even comparable subjects.

We will spend several chapters taking a closer look at our awesome universe to gain a better understanding of its creator. I think you'll be greatly surprised by some of the things you're going to learn about God's universe. I also think you'll have a better appreciation of God, His complexity, and His magnitude.

Is God White, Black, Asian, or Arabic? Some people have made race a major part of their religion, saying that God belongs to a particular race. The following chapter (*What Is God's Race?*) talks about this problem.

A couple of questions that Christians often ask are, "How do you explain the trinity?" and "Was it actually possible for Jesus to sin when He was here on Earth?" The question of Jesus sinning is covered in a couple of chapters (*Could Jesus Have Sinned?*) and the subject of the trinity is covered in the chapter *Is Jesus God* in the section *Understanding Salvation*.

What Is God's Race?

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Although we know very little about God's physical attributes, some religions (and even certain Christian groups) have tried to say that God belongs to a certain race. They feel that this particular race is superior to all other races and since they are part of this race, they are entitled to special privileges. In fact, some of these groups (either directly or indirectly) teach that conquering and even killing inferior races increases their standing with God. Many suicide bombers are motivated by this belief.

Race, of course, is a very divisive issue in our world. Many wars and atrocities have been committed because of racial divides. The strange thing is many of these racial differences are very subtle and insignificant. For example, I can't see any physical difference in the people being murdered in the Baltic ethnic cleansings. Although I have tried to find the differences, these people look the same to me. The same is true for some of the ethnic cleansings that took place in Southeast Asia.

Considering human nature, I'm not too surprised that political groups have used ethnic hatred and smugness to increase their political power. I am somewhat surprised that religious leaders have stooped to this depth. They have used racial tension in the community to attract more followers and to develop a larger power base for themselves. I am even more surprised that religions themselves have incorporated racial biasness as a core of their teachings. Many religions actually teach that God belongs to a particular race. In some religions, this has become a major tool for recruiting suicide bombers.

The Japanese Kamikaze were an earlier version of our modern day suicide bomber. They believed that their emperor was part God and they were taught that if they sacrifice their life for him, it would earn them a special place in the hereafter. Although Kamikaze attacks increased as the Allied invasion force drew closer to Japan, the Kamikaze phenomenon cannot be written off merely as a desperate defense of their homeland. There were Kamikazes long before this.

Kamikazes were used in the attack on Pearl Harbor (although they were not called Kamikazes at the time). Besides using a large fleet of airplanes to attack Pearl Harbor, the Japanese used many small submarines. Although the airplanes were supposed to return to their ships, the submarines were not. The crewmembers on these submarines knew it was a suicide mission for their emperor.

God is not "White," "Black," "Asian," or "Arabic." To say that God belongs to one of these races is as ridiculous as saying that a particular stone belongs to one of these races. God is a spiritual being, not a "carbon-based life form" like us. He doesn't have a flesh-and-blood body that has a genetic heritage. Comparing God's "body" to ours is like comparing the weight of an apple to the color blue. They are not comparable items.

Even our current bodies are not our true identity. Being created in “God’s image” means we were created as spiritual beings with an eternal soul. When our physical bodies die and our soul moves on into eternity, the issue of “race” will become null and void. At that time people will see how ridiculous it is to base so much of their religion on race. Of course, by that time it will be too late.

Think about some of these suicide bombers we have been talking about. These people were under the impression that killing a person of a particular race would earn them a place in Paradise. What do you think will be their reaction when they find out that not only did they waste their life for a worthless cause, they actually did something that greatly displeased God Almighty?

Could Jesus have Sinned?

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Could Jesus have sinned during His stay here on Earth? Christians have been debating this subject for almost two thousand years. The question of Jesus sinning seems to be one of those theological questions that can never be answered. This question appears to be one of those self-contradicting questions like, "Could God create a rock so large that He couldn't lift it?" or "If God is all powerful, couldn't He make a round square?"

Regardless of how you answer the question, you run into some profound implications. If Jesus couldn't have sinned, you have to wonder if He was really tempted? How can a person truly be tempted if there is no possibility of yielding? The Bible clearly says that Jesus was tempted (Hebrew 2:18; 4:15, Matthew 4:1). Therefore, either Jesus was tempted or the Bible is wrong.

On the other hand, if Jesus could have sinned, then our fate (and even God's fate) was realistically in jeopardy. If Jesus (who is part of the Godhead) had actually sinned, then *everything* would have been ruined for eternity. God's holy and righteous nature would have been tainted. God's system of justice would have had to be abolished. God would no longer be sinless, nor could He reasonably expect perfection from us. Either God would have had to condemn Himself to Hell for eternity or He would have had to release everyone from Hell. You have to wonder if God would have put all this at risk if there was a realistic 50/50 chance that He would fail?

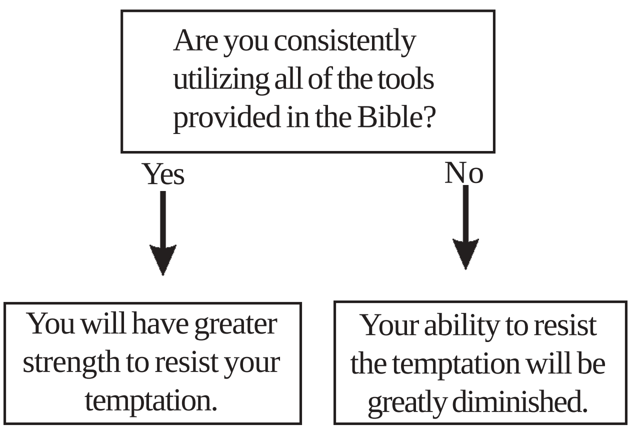
So, what's the answer? For what it's worth, I'll give you my opinion on this subject. I believe that when Jesus was tempted He had a real *choice* in His response. I believe that when He was tempted, He felt the same frustrations and pressures that we do. I believe He had a realistic choice to yield to His temptation. I believe that the temptations Jesus faced had the same potential of being overwhelming as they are to us. I believe that as a result, He could say to us, "I know what you are feeling; I went through the same thing."

On the other hand, I don't believe there was a realistic *possibility* of Jesus ever yielding to the temptation. I realize that this sounds like a bunch of double talk, but please hear me out. Not only do I think I can solve this riddle, I believe you'll find that what I have to say may actually help you deal with your temptations and struggles. I believe you can glean some powerful principles of victorious living from this discussion.

In the first section of this book I talked about how we can have victory in our Christian lives. I pointed out that following certain basic principles can help us have victory over our *future* temptations. I also pointed out that the reason we have difficulties overcoming temptations is because we are inconsistent in following God's principles.

Herein lies the key to our victory: We should consistently utilize the tools that give us the strength to be victorious. Consistent victory is not solely a result of what you do *at the time* of the temptation. Rather, it is greatly influenced by what you do long before you are faced with the temptation. The chapter *Guard your Thoughts* covers this in more detail.

Being victorious over temptation is actually a two-part process. First, there are the choices you make at the actual time of the temptation. Second, there is the preparation done before you are tempted. It is our failures in the preparation stage that makes it more difficult for us to resist our temptations. Preparing ahead of time provides us the tools and strength to help us overcome the temptations. The following flow chart should help you visualize the process.



As you can see, proper preparation is the key to our success. To help you understand its importance, let's look at the following scenario. There are two houses that are identical in construction. Both houses (like all houses) face the realistic possibility of catching fire and burning down. One house has a sophisticated fire alarm and sprinkler system and the other house does not. If both houses are exposed to the same source of fire, one will burn down and the other will not.

This illustration is like to our temptations to sin. Two people can be exposed to the same type of temptation and yet respond quite differently. The person who utilizes the Biblical tools will have more strength to resist the temptation. The person who has not taken advantage of these tools will have difficulty resisting the temptation.

Let's go back to our original question of, "Could Jesus have sinned?" I believe that if Jesus did not utilize these tools (before He was tempted) He probably would have sinned. I don't believe He would have had the strength to resist His temptation. The victory Jesus experienced was a direct result of His utilization of the resources available to Him.

So, instead of asking, "Could Jesus have sinned?" we should be asking, "Was there a realistic possibility of Jesus not utilizing these resources?" I don't believe there was a possibility that Jesus would have disregarded these valuable tools. I believe Jesus (being part of the Godhead) understood the necessity of utilizing these important tools. I believe Jesus saw the value of being prepared.

Some people say that since Jesus did not have a sin nature, He couldn't have sinned. While it is true that Jesus didn't have a sin nature, neither did Adam and Eve. Yet, both of them failed. The difference is Jesus *understood* the process that keeps a person from sinning. Being part of the Godhead, Jesus didn't have to wonder how to be victorious. He knew how to overcome temptation.

I think Jesus had His temptations recorded in the Bible in order to show us how to be victorious over sin. I think He wanted us to realize that we can't always avoid temptation, but we can have control over it.

While I believe it is possible to have consistent victory in our Christian lives, I do not believe we can live lives of "sinless perfection." My chapter *Can We Live Sinless Lives* covers this in more detail.

What are these tools that will help us resist temptation? Following are a few of the tools:

- Maintain an intimate relationship with God

- Bathe yourself in the Word of God
- Commit every area of your life to God
- Get others to pray for you
- Guard your thought life

Maintain an intimate relationship with God. Having an intimate relationship with God is different from "spending time in prayer." For many Christians, "prayer" is a quick trip to God to commit certain problems and issues to Him. Fellowship, on the other hand, is the friendship and relationship you develop with God.

You develop a personal relationship with God the same way you would develop a personal relationship with someone here on Earth. You talk to them continually and share with them your feelings, desires, dreams, etc. This fellowship with God will provide you tremendous spiritual strength.

Bathe yourself in the Word of God. This is an often-neglected resource. Even Jesus realized the importance of using the Word of God. He consistently used scripture when He was defending Himself against the temptations in the wilderness (Mark 9:14-29). I think it's very important to follow Jesus' example in resisting temptation. If you don't consistently study the Word of God, there is no way you can use it as a tool.

Commit every area of your life to God. Some people have said that since God is aware of all of our needs, there isn't any reason to pray for them. This isn't true. Although God knows about our needs, He still wants us to ask Him for help. More important, when we commit something to God, we are actually giving Him full control (or ownership) over it. The section *The Incredible Power of Prayer* covers this in more detail. In Matthew 17:21, the disciples were having problems casting out certain demons. Jesus told them that some situations are so difficult to resolve that they can only be resolved by prayer and fasting.

Get others to pray for you. Getting others to pray for you is important. It's not just missionaries who need to raise prayer support. The section mentioned above talks about the importance of raising prayer support for yourself.

Guard your thought life. Simply put, the more you dwell on a sinful thought, the greater are your chances of falling into its temptation. There is a very direct correlation between the two. For example, if you continually fantasize about having sexual encounters outside your marriage relationship, you will find it very difficult to resist an adulterous temptation when the occasion arises.

What an Awesome God

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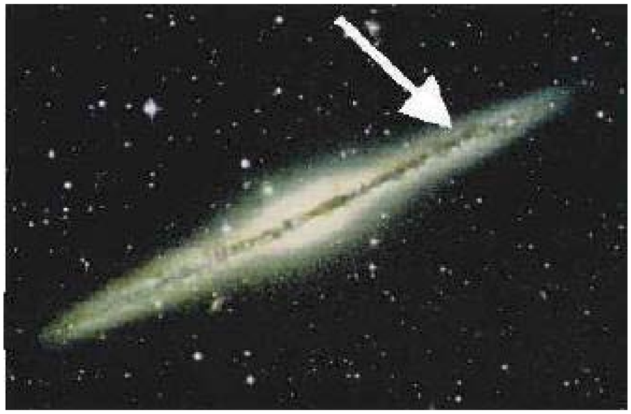

I've provided this map in case you get lost

Chapter: 11.04

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Zaphod Beeblebrox was filled with apprehension as he was escorted to the Frog Star's Total Perspective Vortex. As he drew closer to the dreaded machine, he could hear the screams escaping from its victims. Zaphod Beeblebrox knew that one second in this savage torture device would turn his mind to mush.

Originally, the Total Perspective Vortex was not created as a tool of torture and punishment; it was designed as an educational tool. There was an inventor who would spend hours at a time staring at the stars contemplating the immense size of the universe. His wife, however, didn't understand or appreciate his work. She would continually nag him to spend his time on the more important things. "Have a sense of proportion and perspective," she would say. So, he built the Total Perspective Vortex to give her a sense of perspective. He wanted her to see why he was spending so much time studying the universe.

The Total Perspective Vortex gives a person a complete glimpse of the whole universe almost instantaneously. It compares the incredibly small size of the person to the enormous size of the universe. It shows him the size of the "entire unimaginable infinity of creation" along with a tiny little marker that says, "You are here."

When the inventor connected his wife to the Total Perspective Vortex, she saw, in an instant, the whole infinity of creation and herself in relation to it. The shock of this discovery totally annihilated her brain. Although this psychotic break was totally unexpected and undesired, it did stop her from nagging. When the evil inhabitance of Frog Star heard about this invention, they immediately saw its potential as a torture device.

To everyone's surprise and amazement, Zaphod Beeblebrox exited the Total Perspective Vortex totally unscathed. It didn't affect him at all (except for being a little thirsty). He became the first and only person to survive the Total Perspective Vortex.

The reason for Zaphod Beeblebrox's survival was actually quite simple; he had a large ego. In fact, his ego was so large it was the size of the universe. He actually thought he was the most important person in the universe. As a result, he didn't see himself as being insignificant in comparison to the gigantic universe. The immense size of the universe didn't overwhelm him or make him feel hopelessly lost.

This story, of course, was taken from the classic novel *The Hitchhiker's Guide to the Galaxy*. If you have ever wondered about life, the universe, and whatever, you can find the answer in this book. (In case you are wondering, the book says that the answer to "life, the universe, and whatever" is *42*).

If you like dry British humor, you'll love *The*

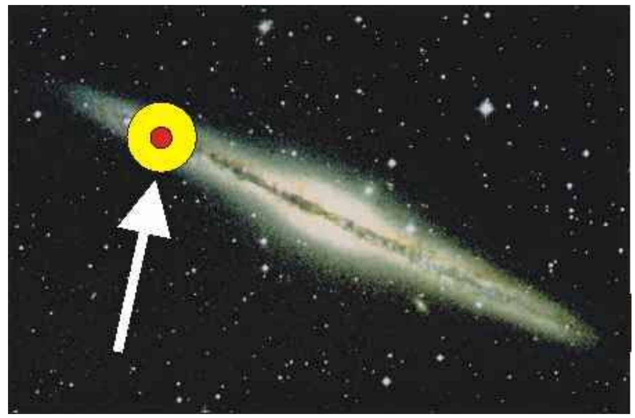
Hitchhiker's Guide to the Galaxy. Although the Total Perspective Vortex is not real, the fear that something like this could cause is real. Seeing oneself in relationship to the immense universe can be frightening. In fact, before my mom became a Christian, this very thing frightened her.

A couple years after my parents were married, my dad told my mom about the enormous size of the universe. This began to scare her. It made her feel small, insignificant, and inadequate. This led her to feel isolated, vulnerable, and overwhelmed.

It was one thing to view herself as a small insignificant dot on planet Earth, but it was devastating to discover that our incredibly large galaxy (Milky Way) was only a small insignificant dot in a gigantic universe. It was hard enough visualizing a higher power being able to keep a personal eye on every single person on planet Earth, but it seemed inconceivable that personal attention could be given to each person with a universe this large. This made her feel like her life had no meaning and purpose; that there was no watchful eye looking out for her protection.

We usually think of the stars as being loosely scattered throughout the vast expanse of outer space. As you can see from the picture at the beginning of the chapter, these stars are not "spread out," but are "lumped" together in confined groups called galaxies. These confined groups, however, are still enormous in size. Our galaxy (the Milky Way), for example, is over 90,000 light years wide. This means if you were traveling at the speed of light (186,282 miles per second) it would take you 90,000 years to get from side to side. For you joggers, that's a distance of over 500 million billion miles. Although our galaxy is incredibly huge, it is only a small spec in comparison to the rest of the universe. There are at least a 100 billion galaxies in the universe.

Most galaxies consist of 10 to 100 billion suns (stars). Our Milky Way, however, has over 200 billion stars and there are some galaxies that have over 50 trillion stars. When we look up at night and see the stars scattered throughout the sky, we usually think we are seeing the various stars scattered throughout the *whole* universe. In reality, though, we are only seeing the stars in our own galaxy; and even then it is only a small portion of them (about 3,000 stars).



"The red circle shows the basic range of most of our nighttime vision (with our naked eye). The yellow circle shows the location of some of the very bright stars we see at night.

Although 100 billion galaxies take up a lot of room, the empty space *between* the galaxies is even larger. If a space explorer had the ability to instantly and randomly transport himself to anyplace in the universe, he would find himself in empty dark space over 99% of the time. Even the "closest" stars or galaxies would still be too far away for him to see.[1]

The chart above shows the vast emptiness of outer space. These few galaxies are the *only* ones in this entire region. Item 1 shows where we live (the Milky Way) and item 2 shows our nearest galaxy (Large Magellanic Cloud). If a space traveler could travel at the speed of light, it would still take him 170,000 years to reach our nearest galaxy. It would take him 2.3 million years to reach our closest major galaxy (item 3). Note the vast empty space between our galaxy and item 3.

Go back to the previous photograph that shows the range of our nighttime vision. In relation to the above chart, our nighttime vision would be smaller than the period (.) on this page. That explains why a space traveler would find total darkness 99% of the time.

The powerful Hubble telescope was pointed to a "dark" spot near the Big Dipper and took the photograph below. This deep field photograph captured previously unknown galaxies residing deep in the universe. No other telescopes has the power to be able to see galaxies this far away. These galaxies are so far away, it took 100 hours of exposure time to take this picture.

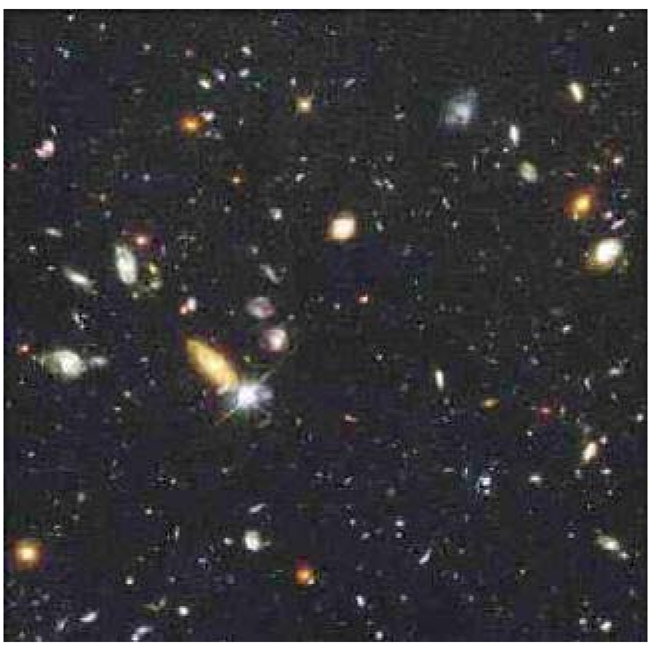


Photo by NASA 1995, Hubble telescope

Although the Hubble telescope is very powerful, it still cannot see the "far edges" of the universe. We have no idea of what's behind the galaxies in this photo. What would we see if we had a more powerful telescope? I believe if we were to point it to a "dark spot" between a couple of these galaxies, we would probably come up with a photograph *full* of newly discovered galaxies.

Nearly every object in this photograph is a galaxy with hundreds of billions of suns. (The poster version of this photograph shows many more galaxies than this low resolution Internet photograph.) Considering the tremendous size of a single galaxy, this photograph represents a very large expanse. Take a few moments to reflect on this.

The thing that makes this *random* photograph so spectacular is the fact that it is a very, very small sample of our universe. Go outdoors some night and stretch out your arm and pretend you are holding a grain of sand between your fingers. That distance between your fingers is the amount of area from which this photograph was taken.

If scientists didn't already have enough to think about, God has given them another problem to ponder. It appears there is more to the universe than what meets the eye. Calculations have shown that there is an unknown invisible mass scattered throughout the universe (usually near clusters of galaxies). This mysterious mass (referred to as "dark matter") is exerting a tremendous gravitational pull on the galaxies.

This dark matter is different from the "black holes" astronomers have been recently talking about. I won't go into the complex details to describe this mysterious mass, but scientists feel that the "invisible" part of the universe may be 10 to 100 times the mass of the visible universe. So, if you thought the universe was already incredibly large, try thinking of it being 10 to 100 times larger.

Yes, our universe is very large, but there is still more to it than what you probably realize. Most people have never considered the amount of energy needed to create a single atom. Powerful bonds hold atoms together and when these bonds are broken, a tremendous amount of energy is released. This energy can be calculated by using Albert Einstein's historic $E=mc^2$ (See footnote #2 below for more information).

For example, the atomic energy stored in 1 gram (.035 ounce) of matter is equal to the power obtained from 700,000 gallons of octane fuel. (Source: *ChemCom*, page 309.) For a more dramatic example, the atomic energy stored in the atoms of a 200-pound man is equal to 157,307 atomic bombs (the ones dropped on Hiroshima). For you weightlifters, that's the same as bench-pressing a 500-pound weight over 12 million billion times.

If there is that much atomic energy in a 200-pound man, imagine how much energy was needed to create the whole universe. Imagine the magnitude of the God who created all this. I find it amazing that people actually have the audacity to say that they will boldly stand up to God when they enter eternity. They obviously don't comprehend the God who created them.

Just as our minds can't comprehend the magnitude and complexity of the universe, it can't comprehend the magnitude and complexity of God. Obviously, God is far greater and more powerful than the universe He created. Even though our universe is incredibly staggering in size, it is probably just a minuscule dot in comparison to God's actual greatness and power. I can't even begin to imagine how great, majestic, powerful, and awesome our God must be.

Psalms 8:3 says, "When I consider your heavens, the work of your fingers ..." Although we should be careful about reading too much into a single verse, it almost sounds like the Bible is saying that it was a simple thing for God to create the universe. It kind of sounds like our phrase, "He barely needed to raise a finger to get the job done."

The reason I'm writing this chapter is because we all (including myself) take God for granted. We would never talk to or treat a powerful earthly king the way we do God. Most of us do not praise or honor God the way we should. If we truly saw God for who and what He is, we would immediately fall prostrate before Him. There would be no question at all that He is Lord of lords and King of kings. The song *Our God is an Awesome God* would flow naturally from our lips. Worshiping and praising God would be a privilege and pleasure.

Obviously, God is an incredible being. The thing I find even more amazing is the fact that He has taken a *personal* interest in our lives and has invited us to be His friend. In fact, He has actually invited us to marry Him[3]. Think about that: Being married to God Almighty. Most of us would be greatly honored if we were invited to be *guests* at a royal wedding in England, yet we often yawn at our upcoming marriage to God Almighty.

Take a vacation from your hectic schedule and go outdoors to a quiet place. Spend some time thinking about the creator of our universe. Take a trip through the Total Perspective Vortex and see yourself in relation to this gigantic universe. When you see the tiny little sign that says, "You are here," be sure to look at the bottom of the sign. It says, "You are very important to me -God."

Footnote 1

> Most of the universe (99%) is void of any stars or galaxies and is, therefore, totally dark. There are, however, some very bright galaxies (as bright as 50 trillion stars). As a result, these "totally dark" areas of space might have a very faint, single white dot.

Footnote 2

> Einstein's historic formula, $E=mc^2$ provides us a way to calculate the atomic energy of an object (multiply the mass of the object by the speed of light squared). The formula to find the atomic energy of a 200 pound (90.9 kg) man would look like this:

Energy = $(90.9) \times (3 \times 10^8)^2$

Therefore, the atomic energy in a 200-pound man is 8.18×10^{18} joules. The bomb dropped on Hiroshima released 5.2×10^{13} joules of energy (the same destructive power of 13,000 tons of TNT). This means that the atomic energy in a 200 pound man is 157,307 times greater than the Hiroshima bomb.

Most people don't realize it, but very little of the uranium's atomic energy was actually released over Hiroshima. First, it is estimated that only one pound of the 15 pounds of uranium was able to reach critical mass and split. Second, only an incredibly small number of atomic bonds were even intended to be broken. Many people think that the atomic explosion was the result of the uranium breaking down completely. In reality, though, the uranium atoms only split *in half* (making Barium-140 and Krypton-93). Basically, all of the other bonds remained intact. If all of the bonds in the uranium's atoms were broken, the energy released would have been over 16,000 times greater.

Calculation of the bench presses: One joule is equal to .737 foot-pound. Therefore, the 8.18×10^{18} joules of atomic energy found in a 200 pound man is equal to 6.033×10^{18} foot-pounds. The 6.033×10^{18} foot-pounds is 6,033,000,000,000,000,000 pounds of weight being lifted one foot. A single bench-press of a one-pound weight is approximately equal to one "foot-pound" of energy. Therefore, this energy is equal to a person lifting 500 pounds over 12 million billion times.

Footnote 3

Verses that talk about us marrying God Almighty: Revelations. 19:7,9; 21:2,9, Ephesians 5:32, Is. 54:5,6; 62:4-5, Hos. 2:16,19, Matthew. 22:2-14.

Related Sources:

- *The Universe and Beyond*, (1999) by Terence Dickinson
-*Endless Universe*, (1999) by Heather Couper
-*Other Worlds*, (1999) by James Trefil
-*Majestic Universe*, (1999) by Serge Brunier
-*Nightwatch*, (2000), by Herence Dickinson
-*Atlas of Deep-sky splendors*, (1983) by Hans Vehrenberg

7-Day Creation: Figurative or Literal?

"*Creation*" by Joe Tucciarone (copyrighted and used by permission) His pictures can be found at http://members.aol.com/INTERSTELL/joe.html

Chapter: 11.05
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In a previous chapter (*Is There Life on Other Planets?*), I gave some reasons why I did not believe there was extraterrestrial life. I pointed out that if the 7-day creation account in the Bible is taken literally (which I do) the universe would only be about 6,000 years old.

Not all "Christians," however, believe in a literal 7-day creation. I have found that these Christians fall into two general groups. The first group consists of people who do not believe God inspired the Bible. As a result, they do not believe it should be taken literally. They feel the stories in the Bible are fictitious and were written only to provide us with good teaching. These "Christians" tend to base their salvation more on good works and usually do not believe Jesus is the only way to Heaven.

The second group consists of people who believe God inspired the whole Bible. They feel the Bible should be taken literally unless there is ample reason to believe the text was meant to be taken figuratively (like a parable). The people in this group have come to the conclusion that the creation account is one of those passages that should not be taken literally.

It is important to understand that the people in the second group do not believe that we (or anything else in the universe) are a product of evolution. They believe God created each item unique, complete, and whole. Their disagreement with the creation account is the timetable of seven literal consecutive days. As a general rule, most of these people will say that the plants, animal, and people *could* have been created in consecutive literal days, but earth and our universe were created millions or even billions of years earlier.

Like the second group, I believe the Bible must be taken literally unless it is clearly shown otherwise. Unlike the second group, I do not believe the creation account is one of those passages that can be taken figuratively. Although I disagree with this second group, I understand some of the items that have led them to this viewpoint.

The verse, "With the Lord, a day is like a thousand years …" (2 Peter 3:8) is often used as justification to view this passage figuratively. They say that the creation "days" could have been thousands or even billions of years long. This approach creates a whole new set of problems, but this is not the reason I am writing this chapter. I want to address the actual reason that has led them to believe the creation account cannot be taken literally.

The main reason these Christians feel obligated to view the creation account as figurative is the fact that the universe *appears* to be billions of years old, not 6,000 years old. Obviously, if the universe is billions of years old it couldn't have been created 6,000 years ago. There are many things that make the world appear old, but one of the most compelling items is the light coming from the stars. Some of the stars are so far away that it would take billions of years for their light to reach us.

Light travels at the rate of 186,282 miles per second. Therefore, it takes 8.3 minutes for the light from our sun to reach earth. The star closest to us (Proxima Centauri) is so far away that it takes 4.2 years for its light to reach us. It would take 170,000 years for the light from the closest galaxy (Large Magellanic Cloud) to reach us. Some galaxies are so far away it would take 15 billion years for its light to reach us.

The question, of course, is did God create the universe billions of years ago (in order to let the light *naturally* reach us) or did He create the universe fully functioning (with the light instantly visible to us)? In my opinion, creating a fully functioning universe is the most logical approach. For example, if I wanted to make a botanical garden, I would not plant seeds and wait 30 years for the vegetation to mature before I opened it to the public. I would import fully mature vegetation and start out with a fully functioning garden.

Some Christians have said that God would not have created a fully functioning universe because that would have given the universe an appearance of age. They say creating the universe with an appearance of age would be deceptive, creating a universe that looks like it is 15 billion years old would be the same as lying.

Would creating something that was fully functioning (and thus having an appearance of age) be deceptive and the same as lying? Let's go back to the botanical garden I was talking about earlier. Didn't I create an "appearance of age" when I imported mature plants for my garden? What was my motivation and intent? Was I trying to be deceptive or was I just being practical? Obviously, my intent was not to be deceptive. Likewise, I don't think it would be deceptive for God to make a fully functional universe.

Some people may still insist that it would be deceptive for God to create anything with an appearance of age. For the sake of argument, let's assume this is true. As you will soon see, taking this approach creates some other problems you may not have considered.

The biggest problem with this approach is there are several other things that must have started out with an appearance of age. For example, there was the original vegetation in the Garden of Eden, the original animals, and Adam and Eve. They were all created with an appearance of age.

What did the Garden of Eden look like when it was first created? Did Adam see a garden that was fully functioning with trees, plants, and rivers, or did he see a barren wasteland? Since the height and size of a plant shows its age, the existence of mature plants in the Garden of Eden would have given an "appearance" of age. Topsoil (decayed vegetation) accumulates at the rate of one inch every 100 to 500 years. (Source: *U.S. Dept. of Agriculture*.) Therefore, the existence of topsoil would make the "new" garden appear old. Even local wind patterns are developed decades (and maybe centuries) earlier by global environmental conditions.

Obviously, Adam, Eve, and the animals needed food to eat from the very beginning of their creation. Therefore, mature plants had to be present on their first day. If we refuse to say God created mature plants (with the appearance of age) we are forced to say God created the Garden of Eden centuries before he created humans and the animals.

If you take this approach, you still have to answer the question of how God created the *first* plants: Did they start out as seeds or as little plants. (It's kind of like the question, "What came first, the chicken or the egg?") When you think of it, both the seed and small plant have an appearance of age. No matter what part of the plant's growth cycle you start with, it will always have an appearance of age. This fact is inescapable.

Some may say since Adam was not around when the plants were created, it doesn't matter if God created them with an appearance of age. They say if there was no one around to be deceived, there can be no deception. If this is the case, why couldn't God have created a fully functioning universe a couple days before He created Adam?

Some people may insist that plants could have been created without an appearance of age. We will, therefore, look at some other things that were created with an appearance of age. What did the animals look like when God created them? Were they created as adults or as babies? If they were created as adults they obviously had an appearance of age. If they were created as "newborn," they still had an appearance of age. For example, the gestation period for most mammals is 2 to 14 months. Just like with plants, any part of the animal's growth cycle has an appearance of age.

Even if you were somehow able to present a convincing argument that a "newborn" animal does not show the appearance of age, we still have the question of who raised the baby to adulthood? Some animals don't need much nurturing when they are young, but others need a tremendous amount of nurturing. You could say that God raised the first generation of animals, but that would be considered unnatural and thus "deceptive."

The most powerful example of something being created with the appearance of age is Adam and Eve. These two people were created as adults and thus had an appearance of age. If Adam was not created as an adult, we run into the same problems we discussed in the previous paragraphs.

What did Eve look like when she was created? Genesis 2:22 says, "The Lord God made a *woman* from his rib." The word woman means an adult female. Adam and Eve were called *man and wife* right after Eve was created (Genesis 2:25). Adam's "helpmate" was obviously created as an adult; not as a baby or an embryo. There is no denying that Eve had the appearance of an adult and thus had an appearance of age.

As you can see, God created the plants, animals, and humans all with an appearance of age. If you think about it, there are many other subtle things that had to be created with an appearance of age. Therefore, I don't find it unreasonable to say He created the rest of the universe with an appearance of age.

If we take the position that creating something with an appearance of age is deceptive, we must also say miracles are deceptive. Miracles, by their very nature, are an alteration of the natural course of events. Turning water into wine, restoring a person's sight, or raising a person from the dead are not "natural." God had to change the laws of physics (and thus the item's appearance) to perform these miracles. If altering something from its natural course of events is deceptive, then miracles are the most deceptive action of all. Obviously, I don't think we want to say God is trying to be deceptive when He performs miracles.

I have one final point to make. Revelation 21:1 says that in the end times God is going to destroy the heavens and earth and create a new heaven and earth. When God creates this new world for us, will we have to wait 15 billion years for the light to naturally reach us before we can inhabit it?

Obviously, the things I've pointed out in this chapter do not prove the universe was created in seven days. The only thing it shows is God could have created a fully functioning universe without being deceptive. In my opinion, if God says He created the world in seven days, I think we should take Him at His Word.

Is there Life on Other Planets?

Chapter: 11.06
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Are we alone in the universe or is there other life out there? Is our planet the only one with life or is the universe riddled with planets populated with life? If you are like most people, you have asked yourself these questions one time or another.

Public opinion has swung to extremes on this issue. In 1600, the Italian philosopher, Giordano Bruno was burned at the stakes because he maintained the "heretical" notion that there were countless other worlds out there containing life. In the 18th century, the pendulum shifted to the other extreme; many astronomers were convinced that every star had planets with life. Will Herschel (the man who discovered Uranus), even speculated that the sun was populated with life.

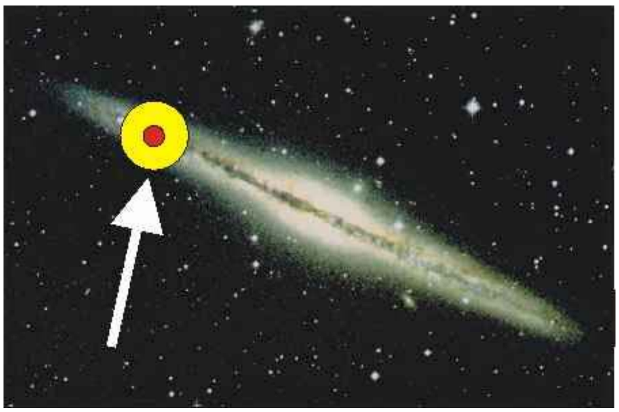
In order for life to exist on other planets, there obviously has to be "other planets." This is where we run into our first problem in our quest for extraterrestrial life. Scientists haven't seen any other planets outside of our solar system. Of course, this doesn't mean other planets don't exist. Even if the universe was riddled with trillions of planets, we would never be able to see them with our current telescopes (they would be too small to be seen at these distances). The only reason we can even see stars is because they are gigantic floodlights blasting a tremendous amount of light in our direction. Planets, on the other hand, don't produce their own light; they only reflect the light of their sun.

The moons of Uranus provide us a great example of the difficulties of seeing "non-burning" objects in outer space. We originally thought that Uranus had only five moons. However, when Voyager flew by Uranus in 1986, it discovered ten more moons. If our telescopes couldn't even see these nearby moons, there is no way that we would be able to see planets that are over 14.5 million times the distance. (Uranus is 1.7 million miles away and the *nearest* star is 24.7 trillion miles away).

To compensate for this shortcoming, scientists are trying to find planets by measuring the movement of stars. They theorize that planets will exert a gravitational pull on their sun and slightly alter its movements. Although this approach is controversial and its findings are considered inconclusive by many scientists, 60 planets (as of 2001) have been "discovered."

In my chapter, *Our God is an Awesome God*, I talked about the immense size of our universe. Our sun is part of a galaxy (the Milky Way) that consists of over 200 billion suns (stars). Although our galaxy is huge, it is just a minuscule dot in comparison to the rest of the universe. Our universe has over 100 billion galaxies.

Why did God create these *other* galaxies? Was it to provide us light to "govern the night" (Genesis 1:6 and Psalms 136:9)? No, the stars in these galaxies are too far away to provide visible light to our naked (unaided) eye[1]. It is only the stars in our own galaxy that provide us our nighttime view and even then we are only able to see a small portion of them (about three thousand stars). In fact, we didn't even know about the other galaxies until powerful telescopes were developed this past century.



"The red circle shows the basic range of most of our nighttime vision. The yellow circle shows the location of some of the very bright stars we see at night.

If these other galaxies are not for our benefit, why did God create them? Why did God create such a large universe? Is there some special purpose for such a large universe or did the blueprint for a quality "Grade A" universe come in only one size?

Before we discovered that the universe was so huge, it was easy for us to think that we were probably alone in the universe. It was easy to think that the few thousand small dots in the sky were only there to provide us light at night. However, when we now see that over 99.999999…% of the universe was not created for "our benefit," we have to wonder why God made it so large. With a universe this size, it becomes easier to believe that maybe God has other special creations out there. Maybe God has hundreds or even trillions of planets inhabited with life.

If there are other life forms out there, what are they like? What are their levels of intelligence and complexity? Do they have a "soul?" Does God take a personal interest in them like He does with us? If they have sinned, has God provided a special redemption for them like He has for us? Will their "redeemed" spend eternity in the same Heaven with us? Will their "lost" go to our Hell? Will their redeemed have the special privilege of being the "Bride of Christ" along with us?

Obviously, the answers to these questions are beyond our reach. Technology is too limited to verify the existence (or non-existence) of life and the Bible doesn't even address this subject. Therefore, as I present my view on this subject, keep in mind it is only my opinion and is not Biblical dogma.

Do I believe there is extraterrestrial life on other planets? No. You may be surprised with this answer considering what I have already said. I believe that our tiny insignificant planet is the only planet in this humongous universe that has life. As incredulous and arrogant as this may sound, I believe that God built this humongous universe just for the human creation package.

There are a couple minor reasons why I believe this, but the main reason is the limited time frame God has placed on the universe. It appears that the universe has only been in existence for about 6,000 years and will probably be destroyed in one or two thousand years. This means that the universe will probably not reach the age of 8,000 years. (See footnote #2 below for an explanation on how these figures were derived.)

If the universe has a maximum life of less than 8,000 years, then all of the worlds that it contains will also have a maximum life of less than 8,000 years. As the footnote below shows, God will bring our society to its final culmination just before He ends the universe. Likewise, if there are other worlds out there, God will have to bring their societies to a final culmination before He ends the universe. If you are only talking about a couple planets with life, I can see (statistically) how this might be *probable*.

Remember, a main argument some Christians have used to support the existence of extraterrestrial life is the “apparent” lack of need for these other galaxies. It is reasoned that if these galaxies have zero impact on us (or on each other) they must have been created to support other creation projects. Therefore, if supporting extraterrestrial life were the only reason for their existence, we would then have to assume that all of these galaxies have planets with life. If all of these galaxies don’t have life, we are back to our original question of, “Why did God create all of these *unneeded* galaxies?”

Assuming that there is only one planet with life per galaxy, there would be over 100 billion planets with life. If, however, every star in each galaxy has a planet with life, you will have to multiply the above number by at least another 100 billion. It seems very improbable (statistically) that all of these other societies will have their final culmination at the exact same time as us. Our God could do that, of course, but it seems highly unlikely.

If the purpose of this large universe was not to accommodate other life forms, why then did God create it so large? I see four main reasons why God made this universe as large as He did. First, it seems that almost everything God does is a first-class major production. I think God likes creating spectacular and awesome things and He enjoys looking at the finished product.

Second, I think God wanted to give our world a surrounding that has no visible end, a surrounding that seems complete. God could have created our world the same way Hollywood creates a city street for a movie: Fake fronts on all of the buildings. When you walk down a Hollywood street, you see a city that looks complete. However, when you take a closer look and peek behind the doors and windows, you find that the buildings are not real. I think God wanted to create a surrounding for us that could withstand as much scrutiny as we could give.

Obviously, up until the past couple hundred years, the depth of our scrutiny had not been very deep. However, all of this has changed. We now have technology that allows us to “peek behind the doors and windows” of our surroundings. For example, we used to think that atoms were the smallest building block elements. (Of course, this was after we discovered that “fire, water, wind, and dirt” were not the basic building block elements.)

As technology increased, we discovered that atoms were made up of neutrons, protons, and electrons. Later, we discovered that these small particles were made up of smaller particles called quarks. I personally don’t think we will ever find the smallest building block particles. Likewise, I don’t think we will ever find the final limits of outer space. I believe God knew that we would eventually break out of the shell of our immediate surroundings and He wanted something out there that we could see and explore.

What would have happened if God made our surrounding boundaries much smaller? I’ll try to give you an example. Let’s say that God created a brand new world and populated it with a colony of 1,000 people. These people were placed in the middle of a territory that looked like one of our deserts. As far as they could see in all directions, there was nothing but sand, cactus, rocky hills, etc. Since the only water supply was in the middle of this desert, this primitive community could not travel more than 20 miles in any direction.

A thousand years later the community is still centered around the water supply. The faces have changed and their population has fluctuated, but the community is still tied to their water supply. Then, one day someone discovered that glass can be made by super-heating the desert sand. Before long, large water jugs were made and people began to travel and explore.

As people reached distances of 100 miles, they discovered something unusual. They find that the “endless” desert suddenly stops. About 100 miles in all directions from the watering hole they find a gigantic wall surrounding the desert. Since this wall was blue in color, it blended in well with the background. Even the rocky hills suddenly stopped with no back sides to them. Since this wall seemed infinitely tall and indestructible, exploration stopped at this point.

This discovery, of course, would not alter their belief in God. It would not change their life significantly. Life would carry on as usual up to that 100 mile boundary. I do believe, however, that this discovery would be rather confusing and disconcerting. I think they would wonder why God chose to put the boundaries where He did. They would wonder why God put the "end of the world" so easily within their grasp. Somehow their world would probably seem incomplete.

The third reason that I think God created our universe so large was for the sake of those in eternity (both the angels and believers in Heaven). God is obviously mightier, more complex, and more magnificent than the universe He created. This immense universe provides others a *tangible* glimpse of His greatness and power. It displays His wisdom, majesty, and creativity. Psalms 19:1 says, "The heavens declare the glory of God."

The fourth reason I think God created our universe so large was to give those of us *on Earth* a glimpse of His power and majesty. I think He wanted to demonstrate that He truly is Lord of lords and King of kings. If the universe consisted of only our planet, we would think God was great, but His true greatness would still be hidden from us. Now, that we have a glimpse of the magnitude of the universe, we have a better appreciation of God's true greatness. We learn more about God as we learn more about His creation. Yet, with all we have seen, I still don't think we even come close to understanding God's true magnitude.

As I said before, we were unaware of the immense size of the universe until this last century. Therefore, some people say that this gigantic universe was not created to show us (those here on Earth) His glory. I have two responses to this. First, God's revelation of Himself is progressive. Mankind has learned more about God as the centuries have unfolded. Moses knew more about God than Abraham. King David knew more than Moses and the Apostle Paul knew more than King David. Therefore, I don't find it surprising that we know more about God than our predecessors.

My second response is I think God continually reveals more about Himself to keep us humble. As we (mankind) make educational and scientific advances, we begin to get delusions of grandeur. Our "great" technological advances tend to make us proud, arrogant, and overconfident. As we begin to harness incredible powers through technology, we begin to think we can control almost anything. I think God continually reveals more about Himself (through His creation) to help us keep our "great" advances in proper perspective.

Although I do not believe there are other life forms in our universe, I do believe God is *currently* working on other creation projects. Our God is a creative God and I believe He always has and always will be creating things. I don't believe, however, that they are part of our realm or dimension. It is quite possible that God is currently working on dozens of other creation projects in other realms.

Obviously, we have no idea how many other realms or dimensions God has created. We shouldn't be surprised that an Almighty God (a being who has no beginning nor end) would be restricted by our simple four dimensions (height, width, depth, and time). The Bible briefly mentions some of these other realms. For example, we know Heaven and Hell are not part of our realm because they won't be destroyed when our universe is destroyed.

Heaven and Hell are eternal in nature, whereas our universe is in a continual state of deterioration. When you buy a new car it doesn't take too many years for entropy (2nd Law of Thermodynamics) to turn it into rust. Even if God doesn't destroy our universe in a couple thousand years, it would eventually come to an end on its own. Our universe is like a big clock that has been wound up; it will eventually unwind itself.

Angels and demons are creatures of multiple realms. Not only can these beings operate fully in our realm, they can also operate invisibly behind the scenes. Our laws of physics do not bind them and they can traverse back and forth between our realm and Heaven.

Our souls are another example of multiple realms. Although our current bodies are made of flesh and blood ("carbon-based life forms") our true identity is spiritual in nature. When our body dies, our soul will leave its earthly vessel and continue living. Our souls are not made up of the materials from this dimension. That is why a person's body could be completely vaporized by a nuclear bomb and his soul will depart totally unscathed.

Am I convinced that we are alone in this universe? No, of course not. I may be completely wrong in my speculations on this subject. It wouldn't bother me, however, if I am wrong about this. It wouldn't shake my faith or theology if we do find life out there. As I mentioned before, these are my opinions, not Biblical dogma.

As I contemplate the immense size of our universe, I usually do not wonder about extraterrestrial life. Rather, I spend my time pondering the age-old question of why would such an awesome God care so much for mortal man? Why would God Almighty seek our friendship?

Footnote #1

> The only stars we see at night are the ones in our own galaxy (Milky Way). The stars in the other galaxies are too far away to be seen from our planet. I would like to point out that there are three nearby galaxies that can be seen with our naked (unaided) eye. They are the *Large Magellanic Cloud*, *Small Magellanic Cloud*, and *Andromeda*. The only reason we can see them is because they are over 100 billion times brighter than an individual star. One of these galaxies (Andromeda) is over a trillion times brighter than a star. Yet, because these galaxies are so far away, they only appear as faint stars.

Footnote #2

> Although evolutionists believe the universe has been in existence for about 15 billion years, most Christians do not. Many Christian scholars have estimated that the universe has been in existence for only about 6,000 years. If you believe in a literal seven-day creation (which I do) you then believe the universe was created around the same time Adam was created. Look at the chapter *7-Day Creation: Literal or Figurative?* for more information on this subject.
>
> Using the genealogical records provided in the Old Testament, many scholars say Adam was created about 6,000 years ago (4,000 BC). There are, however, some disagreements on a couple of the genealogical dates. An example of a book providing a detailed timeline from Adam to Jesus is *The Wall Chart of World History* (Publisher: *Barnes and Noble*).
>
> Although the universe has the potential of existing for several dozen billion years, God will cut its life short. God has a special plan for mankind and the Bible says that when He is finished, He will destroy the universe (Revelation 21:1).
>
> The Bible provides a description of several events that will take place in the "End Times." First, the Christians will be taken out of the world ("Rapture"). Second, seven years of trouble ("Tribulation") will immediately follow the Rapture. Third, after the Tribulation there will be a period lasting a thousand years where Christ will rule directly here on Earth ("Millennium"). At the end of the Millennium, there will be a "short season" when Satan will have one final reign. At the end of these events, the

universe will be destroyed.

Once the Rapture takes place, the countdown clock is set in motion. After the clock has been started, there will only be 1007 years (plus a "short season") left for the universe. The question, of course, is when will the Rapture take place? No one knows when Jesus will come as a "thief in the night" and rapture His church (1 Th. 5:2), but it could happen at any time.

Related Sources:

-*The Universe and Beyond*, (1999) by Terence Dickinson
-*Endless Universe*, (1999) by Heather Couper
-*Other Worlds*, (1999) by James Trefil
-*Majestic Universe*, (1999) by Serge Brunier
-*Nightwatch*, (2000), by Herence Dickinson
-*Atlas of Deep-sky splendors*, (1983) by Hans Vehrenberg

UFOs: Fact or Fiction?

(Part 1 of 8 parts)

Picture drawn by Vincent Dumond

Chapter: 11.07

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Do I believe in UFOs? Yes. Do I believe these UFOs are space ships from other planets? No. UFO, of course, stands for *Unidentified* Flying Object. This means a UFO is any object in the sky we can't identify. "Unidentified" means just that; unidentified. So, when I say that I believe in UFOs, I'm saying that I believe people see things in the sky they can't identify.

I realize some people automatically equate "UFOs" with flying saucers, but they are not the same. They shouldn't be used interchangeably. If we *know* something is a flying saucer, it stops being "unidentified" and it becomes a "flying saucer." So, instead of asking people if they believe in UFOs, we should be asking them if they believe these mysterious sightings are flying saucers from other planets.

In my previous chapter (*Is There Life on Other Planets?*) I talked about why I do not believe there is extraterrestrial life out there. Of course, any study on extraterrestrial life is not complete without talking about "UFOs." Therefore, I have written these chapters to cover a couple major points concerning this subject.

Unfortunately, it is very difficult to adequately cover the subject of UFOs because of abuses on both sides of the issue. The military and government have greatly fueled suspicions and mistrust by their arrogant secrecy on issues that didn't need to be kept secret. On the other hand, many authors have deliberately sensationalized this subject with misleading or false information in order to sell more books and gain recognition.

As a result, the issue has become completely mired in a tangled web of secrets, conspiracies, and lies. It would be a monumental task to try to unwind this tangled mess and, quite frankly, it wouldn't be worth my time or yours to try. Therefore, this chapter will not address individual UFO sightings. Rather, I'm going to present two fundamental reasons that have led me to believe that flying saucers *cannot* be visiting our planet.

The first reason I don't think we are being visited by extraterrestrial life is because I don't believe there is extraterrestrial life out there. The previous chapter (*Is There Life on Other Planets?*) covers this in detail. The second reason I don't think we are being visited by flying saucers is because I don't believe interstellar travel (travel between stars) is physically realistic. Even if there is extraterrestrial life out there, I don't think they could make it to our planet.

In the 1800s it was commonly believed that most stars had planets inhabited with life. In fact, Will Herschel (the man who discovered Uranus) even thought that the sun itself was inhabited with life. People assumed it was only a matter of time before we would be visited by extraterrestrials. Orson Welles, in his infamous 1939 radio broadcast, *War of the Worlds*, convinced many people that Martians were invading Earth. His broadcast was so convincing that some people actually committed suicide out of fear. Although he was not the first to write about space aliens, he did sensationalize the subject and was the inspiration of many other science fiction books.

For most of the last two centuries, scientists assumed our neighboring planets could support life. Then, in the mid 1900s, they began to realize this wasn't the case. New technological advancements gave researchers their first comprehensive look at these planets. They discovered that the environments on these planets are far too hostile to support life. As a result, scientists have turned their attention to the stars in their search for extraterrestrial life.

As I mentioned earlier, I don't believe UFOs are flying saucers from outer space because I think it would be very impractical for extraterrestrials (if they exist) to make fly-by visits to our world. There are six major reasons I feel interstellar travel is physically unrealistic. They are:

Distances are too great. If we could travel 10 times faster than our fastest spaceship, it would still take us 8,200 years to reach our closest star.

Ultra high-speeds are impossible. To propel a spaceship the size of NASA's space shuttle to 50% of the speed of light, it would take energy equal to 23 million atomic bombs. This estimate does not even include the weight of the fuel and rockets needed to get the shuttle into earth's orbit (which is 95% of the shuttle's weight at the time of launch). In fact, this estimate does not include a large number of things that would add weight to the spaceship.

Collision problems. Running into a pebble the size of a pea (while flying at 50% of the speed of light) would produce kinetic energy equal to 2.2 atomic bombs.

Force fields could not protect ultra high-speed spaceship. Even if "force fields" technically could be designed, it would be impossible to supply them the necessary power to protect ultra high-speed spaceships. As stated earlier, hitting a pebble would generate energy equal to 2.2 atomic bombs. Therefore, the energy powering the force field must be at least that great to absorb the impact. In fact, (as the chapter shows) this number needs to be multiplied millions of times for every second of use.

Outer space is anything, but empty. Outer space is full of hidden objects that can completely destroy ultra high-speed spaceships.

Difficulties in detecting objects in its path. Let's say a spaceship has a "radar" so sensitive that it can detect a rock the size of a TV at 10,000 miles. If it is flying at 50% of the speed of light, the pilot will only have 4/100th of a second to respond.

Difficulties in avoiding objects. In the above scenario, the flight adjustment to avoid the rock would produce 1.8 million Gs of G force. Three Gs will give a fighter pilot red eye and nine Gs can kill him.

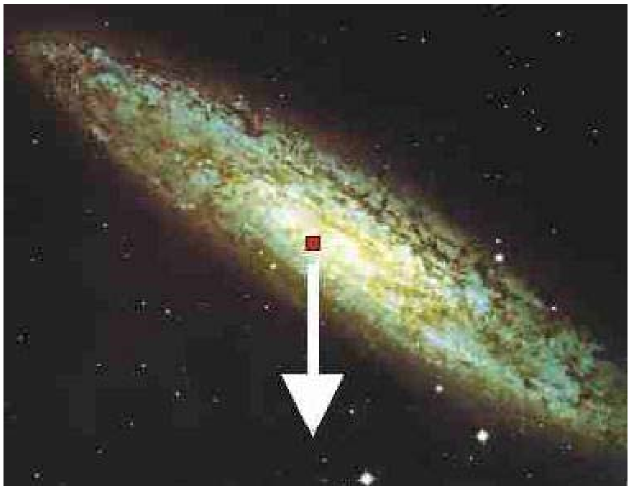
The following seven chapters will cover each of these problems in detail. In summary, the slower speeds may be "safer" but they would take too long. The faster speeds may reduce the travel time, but they would be far too dangerous. Even though technology can overcome many obstacles, we still need to be realistic. Interstellar travel makes great science fiction, but it is not scientific.

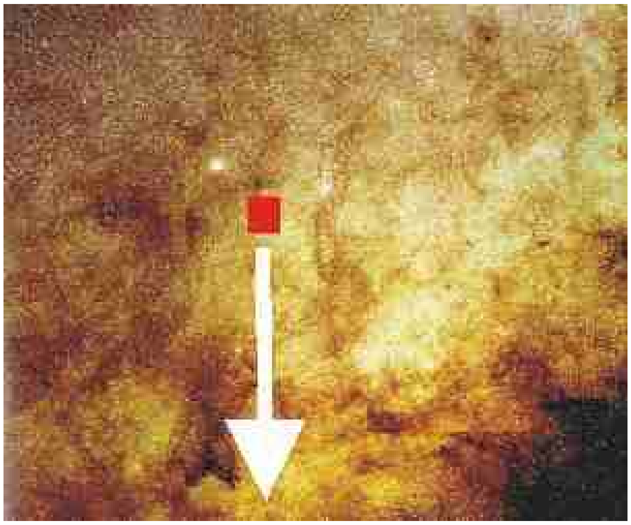
Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.Related Sources:

-*The Universe and Beyond*, (1999) by Terence Dickinson
-*Endless Universe*, (1999) by Heather Couper
-*Other Worlds*, (1999) by James Trefil
-*Majestic Universe*, (1999) by Serge Brunier
-*Nightwatch*, (2000), by Herence Dickinson
-*Atlas of Deep-sky splendors*, (1983) by Hans Vehrenberg
-*Artificial Space Debris,* Johnson and McKnight, p 69

UFOs -2: Distances are too Great

(part 2 of 8 parts)





Chapter: 11.08

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Stars are not scattered evenly throughout the universe, but are clumped together in confined groups called galaxies. Our galaxy (Milky Way) has over 200 billion stars. The photograph at the top shows a galaxy similar to our Milky Way. The next two photographs are a magnification of the area under the red square.[2.1]

Although pictures like the ones above are helpful in showing the tight grouping of stars, they are also deceptive. They give people the false impression that stars are actually close together. This has misled some people to believe that interstellar travel (travel between stars) is a realistic possibility.

In reality, stars are very far apart. There is so much space between stars that (on average) you could line up at least 100 million stars between each star. The reason these stars appear so close together is because these photographs had to be greatly overexposed to make the stars visible. If the true size of these stars were shown in comparison to their actual distance to the other stars, we would not be able to see them in these photographs.

Our closest star (Proxima Centauri) is 4.2 light-years away. This means if you were traveling the speed of light (186,282 miles per second) it would take you 4.2 years to reach the star. Obviously, scenes from *Star Wars* and *Star Trek* that show hundreds of stars quickly flying past the spaceship are inaccurate. Even if a spaceship could fly at the impossible speed of light, it would still take (on average) over four years for the spaceship to pass each star.

To help put things into perspective, let's look at our space flights to the moon. *Apollo 8* flew to the moon at the record-breaking speed of 24,593 mph. Even if *Apollo 8* were structurally capable of flying to our nearest star, it would take 115,000 years to reach it. Then, of course, it would take another 115,000 years to return home. Obviously, this trip would take way too much time.

It has been argued that if there are extraterrestrial societies out there, you would expect some to be primitive and some to be advanced. Therefore, they argue, there is a good possibility that some of the advanced societies would have spaceships faster than ours. Even if this were true, interstellar travel would still be unrealistic.

Let's assume, for the sake of argument, there is an extraterrestrial society so advanced, their spaceships travel 10 times faster than our fastest spaceship. Even flying at the incredible speed of 340,000 miles per hour (94 miles per second), it would still take them over 8,200 years to reach our planet. The table below shows the time it would take our closest neighbors to travel to our planet.[2.2]

The time it takes to fly from our closest neighbors (flying at 340,000 mph)

Description	Travel Time (years)	Distances (light years from us)	Name
Closest star 1	8,200	4.2	Proxima Centauri
Closest star 2 & 3	8,600	4.4	Alpha Centauri A and B
Closest star 4	11,600	5.9	Barnard's star
Closest star 5	15,300	7.8	Wolf 359
Far side of our galaxy	158 million	80,000	Milky Way
Closest galaxy	335 million	170,000	Large Magellanic Cloud
Closest major galaxy	4.5 billion	2.3 million	Andromeda

Although distances between stars are very great, distances between galaxies are even greater. There is a tremendous amount of space between galaxies. These incredible distances have forced scientists to concede that intergalactic travel (travel between galaxies) will never be possible. Even if we could travel at the impossible speed of light, these distances are still too great.

The chart above shows the vast emptiness of space between galaxies. As you can see, there is a great gulf of empty space between our galaxy (item 1), our nearest galaxy (item 2), and our nearest major galaxy (item 3). The distances from us to these galaxies are 170,000 light years and 2.3 million light years (respectively). These distances are so great that we didn't even know that these other galaxies existed until this past 80 years. Up until then, we thought our galaxy (Milky Way) *was* the universe. To help keep things in perspective, our huge galaxy is only one of over 100 billion galaxies.

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

UFO -3: Ultra High-Speeds are Impossible

(part 3 or 8 parts)

The Thrust SSC *racing for the land speed record*

Chapter: 11.09

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In the previous chapter I said that it would take us 8,200 years to reach the nearest star if our spaceship was traveling 340,000 mph (which is 10 times faster than our fastest spaceship). Although I used this number as an illustration, we don't even know if this speed is possible. Currently, technology needed for this type of speed doesn't even exist on our planet. This, of course, doesn't mean it isn't possible; it just means we currently can't obtain these speeds.

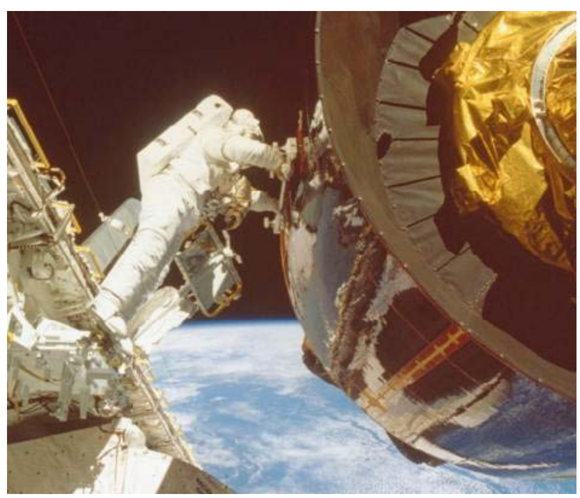
While I believe we can go much faster than our current speeds, it's important to understand that there are upper limits to spaceship speeds. There are certain inescapable laws of physics that limit the speed of every type of vehicle. Cars, boats, and aircrafts are good examples of this. When these vehicles were in their infancy, they were slow and clumsy. As they were made more efficient, their speeds increased greatly. However, after a period of time, the increases in speed became smaller and less frequent. Although future refinements will probably squeeze out a few more mph here and there, there will no longer be frequent and substantial increases in speed. These vehicles have already come close to their upper limits.

What is the maximum speed for a spaceship? At this point, no one really knows. My guess is the limit will probably be less than 1 million mph (which is a great jump from our current speed of 34 thousand mph). Of course, I could be wrong. The limit could be as high as 2 million mph (555 miles per second). Even with this speed, it would still take 1,200 years to reach our closest star.

As we saw in the previous chapter, it would take thousands of years to fly to our closest star. The only way we can bridge this incredible gap is if we could fly near to the speed of light. Even flying at half the speed of light would still take 8.4 years to reach our nearest star. While this is still a long time, it can at least be done within a person's lifetime.

Although I believe there are structural limitations that will keep spaceships from flying this fast, there is another limitation. There is no power source great enough to propel a spaceship to these speeds. As we will see shortly, even propelling a small object to these speeds would require an impossible amount of energy.

Many people assume that when something becomes "weightless" in space, it can be easily moved. This is not the case; the object still has the same *mass* in space as it does on earth. The more mass an object has, the more energy is needed to move it.



To illustrate, let's say that an astronaut is on a space walk and is going to throw two objects. The first object is a "one-pound" ball and the second object is a "30,000-pound" ball. Neither ball "weighs" anything because there is virtually no gravity up there.[3.1] If the astronaut has a good baseball arm, he would be able to throw the small ball very fast. However, he would barely budge the large ball. It would feel like he was pushing against a wall. The only movement taking place (apart from a slight movement of the big ball), would be the astronaut moving backwards.

How much energy will it take to propel a spaceship to ultra high-speeds? To keep things easy to visualize, we are going to calculate the energy needed to propel a one-pound object to 50% of the speed of light. The formula to determine this is:

Kinetic Energy = (1/2) (mass) (velocity) (velocity)

See *footnote 3.2* for more information. To propel an object that weighs one pound to a speed 50% of the speed of light would require an energy source equal to the energy of 98 atomic bombs. That's a tremendous amount of energy. Think about the size of an engine and the fuel that would be needed to supply that much energy. Remember, this is the energy needed to propel just a single pound. How much energy do you think would be needed to propel a whole spaceship?

The landing of NASA's Space Shuttle Endeavor

Since most people can visualize NASA's space shuttle, I will use its weight for our calculations. Although this obviously would be way too small for a trip of this duration and distance, it does provide us something tangible in which to base our calculations. For the sake of simplicity, we will not include the weight of the extra supplies needed for a trip of this length. (Note: These calculations will not include the tremendous energy needed to push the spaceship out of earth's gravitational pull. Instead, my calculations are based on the spaceship already being outside of our solar system.)

Using the above formula, we see that it would take energy equal to the energy of 23 million atomic bombs to propel the space shuttle to 50% of the speed of light. I have another way of looking at it. Visualize all the energy (from utility companies) consumed in the U.S. in a whole year. Multiply that number by 108 and that is amount of energy needed to propel the spaceship to 50% of the speed of light. To propel the spaceship to 90% of the speed of light would equal the energy of 73 million atomic bombs or 351 years of U.S. energy.[3.3]

Of course, once the spaceship reaches its desired destination, it will need to slow down. To stop the spaceship would require the same amount of energy as it took to get it moving. Of course, if the spaceship plans on returning back to earth, it will need energy to speed up and slow down one more time. This means we need four times the energy listed above. One trip over and back will consume more energy than what the entire United States does in 432 years (or 1,406 years flying at 90% of the speed of light).

The launching of NASA's Space Shuttle Atlantis

Actually, the required energy would be much greater. We've only calculated the amount of energy needed to move the *actual* spaceship. We didn't calculate the amount of energy needed to move the massive engines and fuel. To illustrate this, let's look at the launching of NASA's space shuttle.

The first step is to calculate the amount of fuel needed to get the spaceship to the desired location. For example, if the space shuttle and its payload weighs

230,000 pounds, 210,000 pounds of fuel would be needed to get it into orbit. Unfortunately, adding this fuel also added more weight to the space shuttle. Therefore, we have to calculate the amount of fuel needed to get this new weight into orbit. This turns out to be 190,000 pounds of fuel. Again, another calculation is required. When it is all said and done, the 230,000-pound space shuttle now weighs 4.5 million pounds. As you can see, 94% of the weight is now fuel and massive engines. (There is, of course, a more complex formula that does all of these calculations at one time.)

In reality, only 6% of the fuel is used to get the shuttle into orbit. The other 94% of the fuel is needed to get *itself* off the ground. This is the reason it takes large rockets to put small satellites into orbit. I would like to point out that when I refer to the "weight of the fuel," I am actually talking about the weight of the fuel, its storage tanks, and the extra rocket engines. Therefore, from now on, I will use the term "rocket" to refer to all of these items.

Let's look at a couple variations of the fuel calculations. Let's says scientists have discovered a new fuel so powerful that a 100-pound rocket could push 230,000 pounds into orbit. After we recalculate the extra fuel needed to get the rocket itself into orbit, we see that we need a rocket that weighs less than 101 pounds.

Let's go to the other extreme where the fuel is less powerful than our current fuel. In this situation, it would take a 250,000-pound rocket to put 230,000 pounds into orbit. This presents a serious problem. The rocket isn't powerful enough to even get itself to the desired location, let alone the shuttle. The mass-to-thrust ratio is too great. Therefore, it doesn't matter how many rockers are added to the shuttle, they won't be able get the shuttle to the desired location.

When we calculated the energy needed to propel the spaceship to 50% of the speed of light, we did not include the extra weight for the rockets. How much would the rockets weigh? To answer this question, we will look at the one-pound object that we had been talking about earlier.

Our previous calculations showed us that we need the energy equal to 98 atomic bombs (5.1×10^{15} joules of energy) to get one pound to the desired speed. Therefore, we need a rocket that can provide this much energy and still weigh less than a pound. Since conventional rockets don't even come close to this mass-to-thrust ratio, we need something more powerful. Nuclear power, of course, provides more energy per pound of fuel, than any other energy source. Therefore, we will see if it can provide the needed energy and still stay under a pound.

The atomic bomb dropped on Hiroshima produced 5.1×10^{13} joules of energy (which is about 1/98th of what we need). Although the bomb had 16 pounds of Uranium-238, it is estimated that only one pound reached critical mass and split. Therefore, as a rough estimate, we can say that it would take about 98 pounds of uranium-238 to produce the energy needed. This is obviously way above the one-pound limit. Keep in mind we still haven't included the extra weight for the nuclear reactor itself.

I realize that the uranium-238 used in the Hiroshima bomb was not as refined and "enriched" as what is currently used in nuclear reactors today. Nevertheless, nuclear power still doesn't come close to producing the amount of energy for the needed mass-to-thrust ratio.

Up until now, we have been assuming that our engines are 100% efficient. Nothing is 100% efficient, and most engines and power generators are very inefficient. Usually this "loss" occurs in the form of heat. For example, even if a car could efficiently burn 100% of its fuel, about 75% of the energy would still be lost in the form of heat. Utility companies are not much better (30 – 35% efficient). Therefore, when we calculate the necessary energy to propel a spaceship, the inefficiency factor must be taken into consideration.

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

UFO -4: High Speed Collisions

(part 4 of 8 parts)

The space shuttle window after being hit by a flake of paint

Chapter: 11.10

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In the previous chapter I showed how it was impossible to propel a spaceship to speeds near the speed of light. We saw that to propel NASA's space shuttle to a speed 50% of the speed of light would consume the same amount of energy that the whole U.S. consumes in 108 years. (To slow the ship down would take another 108 years worth of energy.) I also showed that our most powerful fuel (nuclear power) would still be over 98 times too heavy (power-to-mass ratio) to get the ship to the desired speed.

Some people, however, will still insist that technology can overcome all obstacles. They believe that traveling near the speed of light is an obtainable goal. Most of these people don't realize that *even* if these speeds could be obtained, ultra high-speed space travel is still unrealistic. There is another limiting factor that most people have not considered. In ultra high-speed travel, speed itself becomes our biggest enemy.

Ultra high-speeds cause three major problems. First, higher speeds increase the damage brought on by a collision. Second, higher speeds reduce the pilot's ability to detect objects in his path. Third, higher speeds reduce the pilot's ability to avoid objects once they have been detected.

Running into large objects is bad at any speed, but running into something as small as a grain of sand can be destructive for high-speed travelers. In 1983, a small paint flake struck the space shuttle *Challenger* with such force that it gouged a small crater in the front window[4.1] (see the picture above). The damage was so great the window had to be replaced after the flight (costing $50,000). Many windows, in fact, have been replaced over the years because of this problem. It is the *speed* of the impact that makes these small objects so destructive. If the shuttle had been hit by an object 1/35th the weight (mass) of an aspirin, it would have struck with the impact of a .30 caliber bullet.

Most people are surprised that a paint flake can cause so much damage. Imagine what the damage would be like if the shuttle was traveling 20 times faster (the speed necessary to reach the nearest star in 7,900 years). You would think that if the speed was 20 times greater, the impact would be 20 times greater. It isn't; it is actually 400 times greater. You can see the reason for this if you look at the formula for kinetic energy.

Kinetic energy = (½) (mass) (velocity) (***velocity***)

Since velocity is listed twice in this formula, any increase in velocity makes a big difference in the amount of kinetic energy generated. If the shuttle had been traveling 100 or 1000 times faster, the impact would be 10,000 and 1,000,000 times greater (respectively). If a paint flake can do this much damage, imagine what a rock or boulder could do to a spaceship.

The pictures below provide another example of the damage caused by high-speed impacts. In this situation, an object about the size of a nickel (1.5 grams, 1.6 cm diameter), was shot toward an inch thick aluminum plate at 1.5 miles a second (4,900 mph). If this projectile had been moving at the same speed as the paint flake, the impact would have been 11 times greater.

The tables below will provide you a visual idea of the damage brought on by high-speed impacts. The first table shows the damage caused by high-speed impacts of various objects [4.2]. The next two tables show the amount of energy created by various impacts.

Depth of penetration from a 6.2 miles/sec impact[4.3]

Diameter (inches)	0.039	0.083	0.173	0.378	0.83	1.77
Mass (ounces)	0.0003-5	0.0035	0.035	0.35	3.5	35
Penetrati-on depth (inches)	0.201	0.429	0.925	1.992	4.291	9.244

Force of impact caused by an object the size of a pea

Weight: 10 grams

Diameter: .96 cm

Speed of the impact (miles per hour)	**Example of impact force**	**Force equivalence** (This would be the same as being hit by a weight falling at 100 mph)
22,300	7/10th of ahand grenade	a .5 ton weight
100 thousand	15 hand grenades	a 11 ton weight
500 thousand	363 hand grenades	a 275 ton weight
1 million	1,454 hand grenades	a 1,100 ton weight
2 million	1 ton of TNT	a 4,400 ton weight
50% speed of light	2.2 atomic bombs[4.4]	a 124 million ton weight
90% speed of light	7 atomic bombs[4.4]	a 401 million ton weight

Force of impact caused by a grain of sand
Weight: .01 gram
Diameter: .1 cm

Speed of the impact (miles per hour)	**Example of impact force**	**Force equivalence** (This would be the same as being hit by a weight falling at 100 mph)
22,300	1 bullet (.30-cal)	a 1.1 pound weight
100 thousand	22 bullets (.30-cal)	a 22 pound weight
500 thousand	.4 hand grenade	a 550 pound weight
1 million	1.5 hand grenades	a 1.1 ton weight
2 million	5.8 hand grenades	a 4.4 ton weight
50% speed of light	27 tons of TNT	a 124,000 ton weight
90% speed of light	87.5 tons of TNT	a 401,000 ton weight

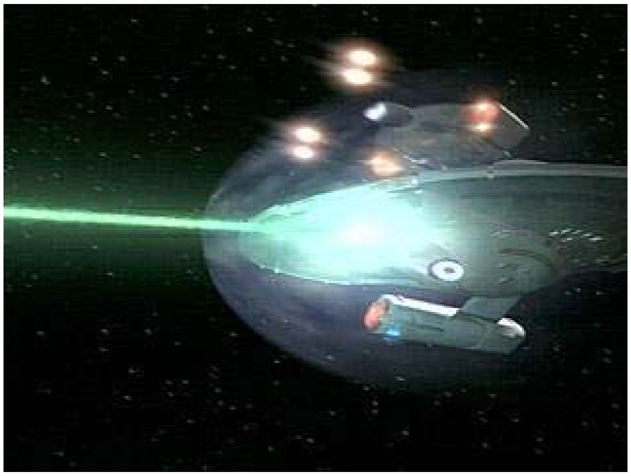
(Source: Artificial Space Debris, *p69 and* Dept of Aerospace Engineering Science, *University of Colorado.)*

As you can see from the tables above, ultra high-speed impacts can be devastating to a spaceship. The impact by a pebble flying at 90% of the speed of light will produce energy equal to seven atomic bombs. There is no way of building a spaceship that can withstand this type of impact. Since, there will never be a way of being able to detect these small objects at great distances, ultra high-speed travel is not a realistic possibility.

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

UFO –5: Could Force Fields Protect a Spaceship?

(part 5 of 8 parts)



The *USS Prometheus* under attack and protected by its force field. From *Star Trek: Voyager*, Paramount Pictures

Chapter: 11.11

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Shows like *Star Wars* and *Star Trek* have given people the impression that "force fields" could protect spaceship from high-speed impacts. Even if force fields were available, they still could not protect ultra high-speed spaceships. They would require far more power than what a spaceship could provide.

As we saw earlier in this chapter, the impact from a pebble the size of a pea would produce energy equal to seven atomic bombs. The force field protecting the spaceship would obviously need to be more powerful than that. Although that is a great deal of energy, it is only a small portion of the energy needed.

This energy (the energy equal to 7 atomic bombs) is the amount of energy needed to protect a single spot (an area the size of a pea). If the whole front of the spaceship were to be protected, we would need to greatly increase the power of the force field. The front surface area of the space shuttle is about a million times larger than the area we have been talking about (approximately one million centimeters). Therefore, to protect the entire front side of the spaceship for one second, the power going to the force field needs to be a million times greater. That would equal the total amount of energy consumed by the U.S. for 34 years.

Even though this is a great deal of energy, this is still only a very small portion of the energy needed. The energy listed above is the energy consumed in one second. The spaceship will need around-the-clock protection, which means the force field needs to be operating all of the time.

To protect the spaceship for the entire five years, you would need to increase the power by 158 million. [5.1] This would equal the energy released by a million billion atomic bombs. This is as much energy as the U.S. would consume in 5.4 billion years.

To help make things a little more complicated, I have one more calculation to add. Previously, I talked about the energy needed to protect the spaceship for a period of *one second*. Actually, it would be much less than one second.

Here on earth, the speeds of most collisions are usually rather slow so the *duration-of-impact* usually lasts about a full second. However, since the spaceship (in the above scenario) is traveling almost one billion feet per second, the duration-of-impact would be around 1/200,000,000th of a second. Therefore, the required energy to protect the spaceship would actually be 200 million times greater than what we already calculated.

Although we obviously do not know how futuristic force fields would work, we still have to wonder how they would affect the forward movement of a spaceship. You would think the spaceship would slow down or go backwards if that much energy is projected toward its front. If this were true, we would have to increase the propulsion of the spaceship by that amount.

So far we have only been talking about protecting the spaceship against objects the size of a pea. The force field will not fully protect the spaceship against larger objects. Larger objects will be slowed down a little, but they will still strike the spaceship with great force.

If you increase an object's size by 10, you increase its weight (mass) by 1,000. This means a rock the size of a softball would have an impact 1,000 times greater than the pebble we have been talking about. This means the rock will go through the force field almost as if nothing was stopping it.

Some people will say outer space is a vacuum, completely void of anything but stars and planets. They will say that since there is virtually no chance of running into something in outer space, the issue of impact damage is a mute point. Unfortunately, this is not true. The following chapter will show that outer space is anything, but empty.

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

UFO -6: Outer Space is Anything but Empty

(part 6 of 8 parts)

The famous Eagle Nebula

Chapter: 11.12

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We usually think of outer space as being completely empty except for the stars and their accompanying planets. Scientist now realize this is not true. "Empty" space is anything, but empty. Over the past 50 years scientists have found an amazing and complex world out there. The myth of outer space being a total vacuum has been destroyed. Following are just a few of the discoveries:

A. Individual atoms
B. Atomic oxygen
C. Nebulas
D. Dark matter
E. Asteroid belts
F. Oort Clouds

A Individual atoms: Every cubic yard of outer space has over 700,000 atoms.

B Atomic oxygen: Oxygen, of course, is a very reactive element. Many of our chemical reactions are based on oxygen. Rust is the oxidation of various metals and "fire" is the *rapid* oxidation of other items.

On Earth, oxygen atoms are normally grouped together in pairs (O_2) and in the ozone layer they are normally grouped together in threes (O_3). In outer space the oxygen atoms are usually found by themselves. Individual oxygen atoms are called "atomic oxygen."

Atomic oxygen is highly reactive and very unstable. It has an incredibly strong attraction to bond with something else. This is why atomic oxygen is causing problems with our spaceships. For example, after only a week of flying in space, the front edge of the space shuttle's cargo door has wear spots from atomic oxygen.

The damage from atomic oxygen increases as the speed of impact increases. What do you think would be the damage from atomic oxygen if the space shuttle were traveling at 50% of the speed of light (which would be 20,000 faster than its current speed)? What do you think the damage would be if the space shuttle were traveling for 8.4 years (the time necessary to reach the nearest star traveling at 50% of the speed of light) instead of one week?

The highest concentration of atomic oxygen is found in low earth orbit. This is why satellites in low orbit are damaged quicker by atomic oxygen than satellites in higher orbits. Although we don't really know for sure, scientists assume that the concentrations of atomic oxygen are even lower outside of our solar system. Let's say, for the sake of argument, that the concentration of atomic oxygen outside our solar system is $1/1{,}000^{th}$ of what the space shuttle encounters. Even in this situation, a trip to our nearest star would still expose the spaceship to 10 million times the amount of atomic oxygen than what the space shuttle encounters.

And, since the spaceship is going 20,000 times faster than the space shuttle, the impact of each atom would be much worse.

C Nebulas: The picture at the beginning of the chapter is the famous *Eagle Nebula*. Our galaxy (like all other galaxies) is full of these beautiful wonders. Nebulas are made up of dust and gases and are billions and sometimes trillions of miles wide. Although most nebulas are dark and hidden from view, some are lit up like giant neon signs.

Nebulas do not generate their own light, but are illuminated by nearby stars. Sometimes the glow of the charged particles produce sharp beautiful colors and sometimes clouds of dust partially block the light and produce muddy and eerie looking monsters (like the picture above). The pictures below show the famous *Horsehead Nebula* and the *Hourglass Nebula*.

D Dark Matter: Scientists are mystified by something that is totally invisible. The only reason we know about these mysterious objects is because they are exerting a tremendous gravitational pull on nearby galaxies. These invisible objects (now referred to as "dark matter") are so massive that entire galaxies are orbiting them. Wherever you look in the universe, you'll see dozens or even hundreds of galaxies orbiting "empty space." Scientists are now saying that the invisible part of the universe is somewhere between 10 to 100 times the size of the visible universe. I won't go into the complex details, but dark matter is different from the black holes that scientists have been recently talking about.

E Asteroid belts: Most people are unaware that there are two massive asteroid belts orbiting our sun. The first belt is between Mars and Jupiter (separating the solid planets from the giant gas planets) and the second belt (Kuiper Belt) is located a little past Pluto. Some of the debris in Kuiper Belt is as small as grains of sand while some are larger than the planet Pluto. It is felt that this type of debris (although less concentrated) is flying all over the universe.

F Oort's Cloud: Out past Kuiper Belt lies a spherical cloud of asteroids completely surrounding our solar system. This cloud of debris extends half way out to our nearest star. It is thought that most stars have something similar to our Oort's Cloud.

Oort's Cloud is a vast reservoir of sand, dirty snowballs, and boulders. Experts estimate that Oort's Cloud has over 6 trillion comets that are over several miles across. It should be noted that our knowledge of Oort's Cloud is very limited and some of the estimates are speculative.

As you can see, outer space holds many hidden dangers for spaceships flying to our nearest star. While it is true that most of these objects are spread apart, they are still lurking in the darkness. More important, the vast distances a spaceship has to travel means there are plenty of objects to run into.

To illustrate, let's say that there is a spaceship flying to our nearest star and it will only come across an object once every million miles. To put this into prospective, let's shrink this trip (24.7 trillion miles) down to a trip similar to driving across the U.S. (3,000 miles). In our trip across the U.S., we would have to be avoiding objects in the road every 16 inches. [6.1]

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

UFOs -7: Problems Detecting Objects in its Path

(part 7 of 8 parts)

Chapter: 11.13

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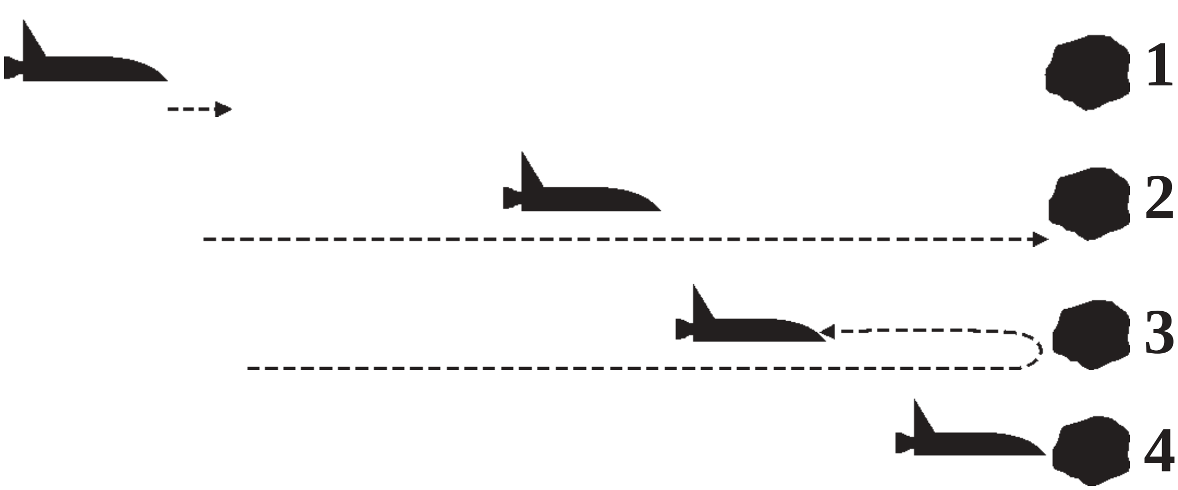
Detecting objects in outer space is much more difficult than what most people realize. There are two basics ways of detecting objects: Visually and electronically. When we drive slow vehicles (like cars) we rely entirely on our vision to keep us from running into objects. Visual detection, however, is totally useless in ultra high-speed space travel.

Apart from the small white dots (distant stars) there is no light in outer space. It is so dark out there that a spaceship could be heading straight toward a large boulder and the pilot would never see it. Even if the spaceship had headlights, the pilot still wouldn't be able to see the boulder because the spaceship would be traveling hundreds (or even thousands) of miles a second.

The only other way of detecting objects in the path of the spaceship is to use some type of electronic scanning device (such as a specialized form of radar). Basically, this scanner would send out a signal (at the speed of light) and the signal would bounce back if there is something in its path.

There are, however, a couple major limitations with scanners being used on ultra high-speed vehicles. First, scanners will never be sensitive enough (at these distances) to be able to detect small objects like dust, individual grains of sand, or small pebble. Therefore, the spaceship would always be vulnerable of being punctured by these small objects. Second, ultra high-speeds greatly reduce the range and effectiveness of scanners.

To illustrate the limitations of scanners, let's study what will happen to a spaceship traveling at half the speed of light (93,000 miles per second). Let's say this spaceship has an incredibly powerful and sensitive scanner that is able to detect a boulder (the size of a TV) at 10,000 miles. To put this into perspective, that would be the same as a scanner being sensitive enough to be able to detect a grain of sand at 10 miles. Even with this powerful long-range scanner, the pilot would have less than 4/100th of a second to be able to respond.[7.1] The chart below provides for a graphical view of this problem.



Data table for the above diagram

Step	Comment	Distance to the boulder (miles)	Time laps for each step (seconds)	Total time laps (seconds)
1	Spaceship (traveling at half the speed of light) sends out a signal traveling at the speed of light.	10,000	0	0
2	The signal reaches the boulder.	5,000	.053765	.053765
3	The signal reaches the spaceship after being bounced back.	3,333	.017900	.071605
4	The spaceship reaches the boulder. The pilot has .0358 seconds to respond once the boulder has been detected.	0	**.035800**	.107405

People often assume that light travels *instantaneously* from one location to another. While it appears instantaneous to us in most of our everyday situations, it does take time for light to travel from one spot to another. When you consider the gigantic size of the universe, light actually travels very slowly. In fact, if the "known" universe was shrunk down to the size of earth, light would appear to be traveling at the rate of 1.9 inches every 100 years. That's about the width of a hair every year.[7.2]

This "slowness" of light becomes more apparent as the spaceship increases its speed. In the above scenario, the spaceship will have traveled two-thirds of the way to the boulder before it is notified that the boulder is there. By then the pilot has very little time to respond.

Of course, even if the scanner signal did travel *instantaneously*, there still wouldn't be enough time for the pilot to respond. Traveling at half the speed of light, the spaceship would travel the 10,000 miles in 1/10th of a second.

Some people say that even though human pilots can't respond this quickly, computerized piloting could. Even if this were true, the scanner still doesn't know *exactly* where the boulder is located. It only knows that thousands of miles away, there is a boulder very close to its projected path.

To illustrate this problem, go outdoors and stretch your hand out above your head. Now, pretend you are holding a grain of sand between your fingers. Behind the grain of sand is a very small piece of sky (about 1mm wide). Let's say that the narrow signal being sent out by the spaceship's scanner is so highly focused that it is only scanning an area the size of that small piece of sky. At 10,000 miles, that small area is actually an area that is 14 by 14 miles wide.[7.3]

To help you visualize this phenomenon, cut a 1-inch hole in a piece of paper. Hold the paper at arm's length and look at a person through the hole. If the person is nearby, you can only see his head. If the person is farther away, you would be able to see his whole body. If he is very far away, the person would appear as a dot. This *expansion* is what's happening when the scanner is scanning a piece of sky the size of a grain of sand.

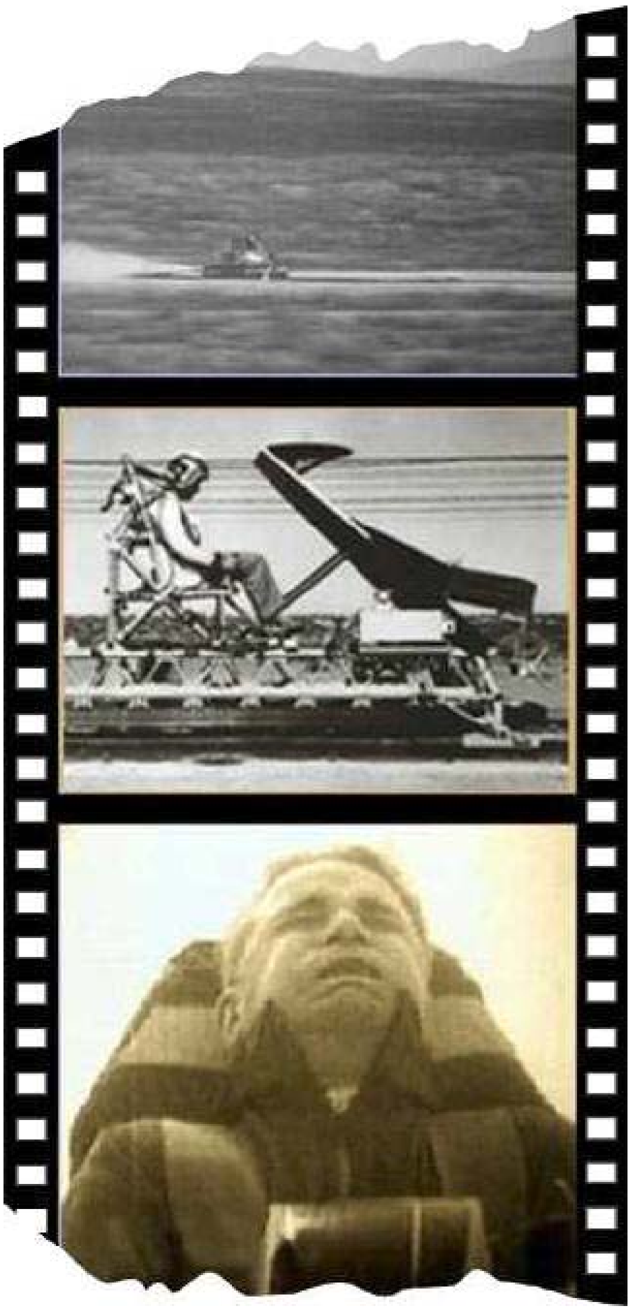
When the scanner tells the pilot that a boulder has been detected, it is only telling the pilot there is a boulder somewhere *near* his projected path (somewhere in the 14 x 14 mile zone). How does a pilot (or computer) respond to that? The only option is to slightly alter the ship's course to avoid the danger zone. The spaceship will have to move up or down (or left or right) at least seven miles to get away from the danger zone.

Although this would seem like a simple thing to do, this flight adjustment produces two serious problems. First, the pilot (or computer) would be moving from a "danger zone" to an "unknown zone." The pilot has no idea what lies ahead in the area he is moving into. The unknown zone could be completely safe or it could be filled with even larger boulders. The second problem is this slight corrective action will produce a very abrupt movement for the spaceship and its occupants. This problem will be discussed in the next chapter.

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

UFOs -8: Unable to Avoid Objects in its Path

(Part 8 of 8 parts)



John Stapp on his historic ride on a rocket-powered G-force sled

Chapter: 11.14

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In the previous chapter, we talked about a spaceship detecting a boulder in its path and making a flight adjustment to avoid hitting it. The spaceship had 3,333 miles to make a seven miles flight adjustment. Although you would think that this flight adjustment would not be too abrupt, it would be very abrupt.

The problem comes from having to do this adjustment very quickly. Imagine slowly moving a person seven miles from one spot to another. Now, imagine quickly moving a person the same distance in less than 4/100th of a second. (Most elevators are about 500,000 times slower than this.) This is what's happening to the spaceship and its passengers.

In the above example, the miniscule adjustment to avoid the danger zone would produce a G force of about 1.8 million Gs.[8.1] One G force is the force of earth's gravity. The dropping sensation you feel when you first jump out of an airplane is equal to one G force. (This is similar to what you feel when you're going down a steep roller coaster.) Three G force is enough force to give fighter pilots "red eye" (the rupturing of blood vessels in the eyes) and 5 Gs can cause the pilot to pass out. A few seconds at 9 Gs will kill the pilot and a few more Gs will tear the aircraft apart. (Source: *World Book Encyclopedia*)

Obviously, the G force needs to be reduced from the 1.8 million Gs to at least 5 Gs and preferably down to ½ G. Although ½ G would be desirable, it may not be as practical. Therefore, we will calculate what would be necessary to reduce it down to 3 Gs.

Basically, spreading the flight adjustment out over a longer period of time would reduce the G force. This means the pilot (or computer) needs to know about the boulder sooner, which means the spaceship needs to have a more powerful and sensitive scanner. Instead of detecting objects at 10,000 miles, the scanner needs to be able to detect objects at 2.7 million miles.[8.2] Instead of having the sensitivity of being able to detect a grain of sand at a distance of ten mile, it'll have to be able to detect it at 2,700 miles. That's similar to a person dropping a grain of sand in New York and having a person in California track its movement. The tables below shows what will happen if the spaceship is traveling at 90% of the speed of light instead of 50%.

G force exerted as a result the flight adjustment

Spaceship's speed (% of light speed)	**Range of scanner** (miles)	**Sensitivity of scanner** (# of miles away a grain of sand can be detected)	**G force Pressure**
50 %	10,000	10	1.8 million Gs
90 %	10,000	10	284 million Gs [8.3]

Range and sensitivity of scanner needed to reduce the G force down to 3 Gs

Spaceship's speed (% of light speed)	**Range of scanner** (miles)	**Sensitivity of scanner** (# of miles away a grain of sand can be detected)
50 %	2.7 million	2,700
90 % 8.4	97 million	97,000

Think about what these flight adjustments would be like for the astronauts. These adjustments would be sudden and unannounced. People could not be walking around like they do on *Star Trek* or *Star Wars*. They would have to be tightly strapped into their chairs for the entire trip. Even when they are strapped in, simple things like eating would be a disaster if flight adjustments were to take place during this time.

Star Trek: The Next Generation, Paramount Pictures

When we reduced the G force down to 3Gs, we increased the time it takes to do the flight adjustment to 27.5 seconds. Actually, the total time for the flight adjustment would be twice as long (55 seconds). After the flight adjustment is done, the spaceship is now moving *farther* off course at a rate of a half-mile per second. Another flight adjustments in the opposite direction (of equal time and G force) will be needed to stop the spaceship from going farther off course. After the second adjustment is finished, the spaceship is still 14 miles off course. Since the spaceship has years to slowly get back on course, we won't cover the G force involved in this adjustment.

I realize some people will balk at the size of the "danger zone." They would say that the scanner would know exactly where the boulder is located. I won't go into the complex explanation of how scanners work, but that type of detection at these distances is not possible for a single source scanner.

Besides watching for incoming enemy missiles, NORAD also keeps track of satellites orbiting our planet. NORAD plots the movement of thousands of satellites in order to predict possible collisions. Even with their vast radar system scattered all over the world, they still don't know the *exact* locations of the satellites. When they predict possible collisions, they issue warnings such as, "Satellites 1973-40A and 1978-16A will pass within 3.5 km (2.2 miles) with an *uncertainty* of 20 km (12.4 miles)." They have a rough idea of where the satellites are located and when they predict a collision, the owners will move one of the satellites away from the "danger zone."

Having said that, I realize some people will still insist that technology can overcome all problems. Therefore, for the sake of argument, let's say that a scanner is able to pinpoint a boulder's location to within a few feet. Let's also say that the spaceship is only going to adjust its course 30 feet to avoid hitting the boulder. Even with these extreme impossibilities, this flight adjustment would still produce a G force of 1,463 Gs.[8.5] If the spaceship were traveling at 90% of the speed of light, this adjustment would produce a G force of 234,363 Gs.[8.6]

How many times would a spaceship have to avoid hitting objects as it travels to our nearest star? Would it only be a couple times or several dozen times? Obviously, we have no idea how many objects are actually out there. Let's say, for the sake of argument, the space between the two stars is so empty that the spaceship will only have to avoid hitting something once every million miles. Even at this rate, the spaceship will have to avoid hitting 24.7 million objects. If the spaceship is traveling at 50% of the speed of light (an 8.4 year trip), it would have to avoid hitting something once every 10.7 seconds.

As I stated in the first "UFO" chapter, slower speeds may be "safer" but they take too long. The faster speeds may reduce the time, but they are far too dangerous. Even though technology can overcome many obstacles, we still need to be realistic. Interstellar travel makes great science fiction, but it is not scientific.

Footnotes: The footnote section for the UFO chapters has 10 pages of calculations. I have, therefore, put all of the footnotes and calculations in another chapter to keep these chapters cleaner looking. Go to chapter 12.15 for footnote information.

Footnotes for the 8 UFO chapters

Since the 8 chapters on UFOs have many calculations in the footnotes, I created a separate web page to put these footnote calculations.

Chapter: 11.15

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Footnote 2.1

Magnification of part of our galaxy: Pictures 2 and 3 are a magnification of our galaxy (*Milky Way*). Picture 1 is not of our galaxy. Obviously, since there's no way of getting a photograph of our galaxy, I used a photograph of a galaxy that looks like ours (*NGC 253* from the *Sculptor Constellation*).

Footnote 2.2

The formula used to calculate the travel time from the closest star:

·A light year is the distance light can travel in a year
·Light travels at 186,282 miles per second
·There are 31,536,000 seconds in a year
·That means light travels 5.87 trillion miles in one year
·The closest star is 4.2 light years away
·Therefore, the closest star is 24.7 trillion miles away
·Flying at 340,000 miles per hour, it would take 8,284 years to travel this distance
(24.67 trillion miles / 340,000)

Footnote 3.1

To say that there is "no gravity in space" is inaccurate. There is no limit to the influence of gravity. The gravitational pull of a galaxy can be felt hundred of millions of light years away. As a general rule, small objects in outer space *appear* not to be affected by gravity in space. It should be noted that objects orbiting Earth are still slightly affected by Earth's gravitational pull. However, the speed of the spacecraft is timed in such a way as to offset the effects of gravity.

Footnote 3.2

This is the formula to calculate the energy needed to propel a spaceship to 50% of the speed of light. This does not include the energy needed to get the spaceship out of earth's orbit. The calculations are for a spaceship that is already out of our solar system.

The weight of the spaceship (used in these calculations) is the normal weight of NASA's space shuttle when it goes on a one-week trip. These calculations do not include the weight of any of the extra supplies needed for the 8.2 years to get to the nearest star. These calculations don't even include the energy needed to move the engine and fuel that would be necessary to 50% of the speed of light. It only accounts for the energy needed to get the ship *itself* to 50% of the speed of light.

The formula below is to calculate getting one pound to 50% of the speed of light.

·50% of speed of light = 1.5×10^8
·1 pound = 0.4536 kg
·Kinetic energy = (.5) (mass) (velocity) (velocity)
·Kinetic energy = (.5) (.4536 kg) (1.5×10^8) (1.5×10^8)
·Kinetic energy = (5.1×10^{15})

The formula below compares this energy to an atomic bomb

·Energy of Hiroshima atomic bomb = 5.2 x 10^{13}
·Kinetic energy needed to propel the ship = (5.1 x 10^{15})
·Number of atomic bombs = (5.1 x 10^{15}) / (5.2 x 10^{13})
·Number of atomic bombs = 97.998

The calculations to find the energy to propel the whole ship

·Spaceship weighs 231,053 pounds
·Amount of energy to propel whole ship = (energy for 1 pound) (weight of ship)
·Amount of energy to propel whole ship = (5.1 x 10^{15}) (231,053)
·Amount of energy to propel whole ship = 3.81 x 10^{21}

The formula below compares the energy to propel the *whole* spaceship to the total energy used in the U.S. for an entire year.

·Amount of energy consumed in US in a year = 3,015,383 million kilowatt hours
·1 kilowatt hour = 3,600,000 joules
·3,015,383 million kilowatt hours = 1.09 x 10^{19} joules
·Number of years worth of energy = (energy for ship) / (energy used by US)
·Number of years worth of energy = (1.18 x 10^{21}) / (1.09 x 10^{19} joules)
·Number of years worth of energy = 108.464 years

Footnote 3.3

This is the formula to calculate the energy needed to propel a spaceship to 90% of the speed of light. This does not include the energy needed to get the spaceship out of earth's orbit. The calculations are for a spaceship that is already out of our solar system.

The weight of the spaceship (used in these calculations) is the normal weight of the space shuttle when it goes on a one-week trip. These calculations do not include the weight of any of the extra supplies needed for the 5 years to get to the nearest star. These calculations don't even include the energy needed to move the engine and fuel that woule be necessary to propel it to 50% of the speed of light. It only accounts for the energy needed to get the ship itself to 50% of the speed of light.

The formula below is to calculate getting one pound to 90% of the speed of light.

·90% of speed of light = 2.7 x 10^{8}
·1 pound = 0.4536 kg
·Kinetic energy = (.5) (mass) (velocity) (velocity)
·Kinetic energy = (.5) (.4536 kg) (2.7 x 10^{8}) (2.7 x 10^{8})
·Kinetic energy = (1.65 x 10^{16})

The formula below compares this energy to an atomic bomb

·Energy of Hiroshima atomic bomb = 5.2 x 10^{13}
·Kinetic energy needed to propel the ship = (1.65 x 10^{16})
·Number of atomic bombs = (1.65 x 10^{16}) / (5.2 x 10^{13})
·Number of atomic bombs = 317.515

The calculations to find the energy to propel the whole ship.

·Spaceship weighs 231,053 pounds
·Amount of energy to propel the whole ship = (energy for 1 pound) (weight of ship)
·Amount of energy to propel the whole ship = (1.65 x 10^{16}) (231,053)
·Amount of energy to propel the whole ship

$= 3.81 \times 10^{21}$

The formula below compares this energy to the *whole* spaceship to the total energy used in the U.S. for an entire year.

·Amount of energy consumed in US in a year = 3,015,383 million kilowatt hours
·1 kilowatt hour = 3,600,000 joules
·3,015,383 million kilowatt hours = 1.09×10^{19} joules
·Number of years worth of energy = (energy for ship) / (energy used by US)
·Number of years worth of energy = $(3.81 \times 10^{21}) / (1.09 \times 10^{19}$ joules)
·Number of years worth of energy = 351.426 years

Footnote 4.1

Source of paint flake hitting the Challenger:

·*Discover Magazine*, April 1990
·*U.S. News and World Report*, October 22, 1990
·*Artificial Space Debris*, Johnson and McKnight, p 69

Footnote 4.2

To find the impact power of an object, we use the following formula

·Kinetic energy = (.5) (mass) (velocity) (velocity)
·Where energy is measured in Joules
·Where mass is measured in kilograms
·Where velocity is measured in meters per second

Footnote 4.3

Determining the depth of penetration of a high-speed projectile is very complicated. Once you have calculated the kinetic energy generated from the impact, you need to know several things about the material being impacted. The material's density, its "elasticity," its heat of fusion, the speed in which sound travels through it, etc.

Density is the amount of matter packed into a certain amount of space. For example, a square inch of gold is much more dense than a square inch of wood. Density is an important factor in calculating the depth of penetration. Let's say we have two objects that weigh the same (have the same mass), but one is much more dense than the other. In an impact, the less dense object would make a wider and shallower hole while the denser object would make a narrower and deeper hole.

The outer shell of most spaceships is made out of aluminum (with a density of 2.7 g/cm^3). The density of potential object hitting the spaceship ranges from .05 g/cm^3 to 8 g/cm^3. To simplify the calculations, scientists often use a density somewhere between these two extremes (impacts of aluminum on aluminum). The Bjork's equation for this type of impact is:

·Penetration = $1.09(\text{mass} \times \text{velocity})^{1/3}$
·Penetration in cm
·Mass in grams
·Velocity in meters per second

Although this formula will give you a ballpark idea of what happens with the "slower" high-speed impacts, it should not be used on impacts higher than 10 km/sec. We know very little about ultra high-speed impacts. We do know that with speeds between 3 and 6 km/sec, the impact site is treated as a solid. At impact speeds around 20 km/sec, the impact site is treated as a liquid and higher speeds it is treated as a vapor.

Our knowledge of hypervelocity impacts comes from experimenting with hypervelocity guns. Shooting various objects at various speeds has given us a wealth of information. Since these guns are currently limited to about 7 km/sec (4.4 miles/sec) computer models are used to simulate higher speeds. Of course, these computer models are not very accurate on speeds past 20 km/sec.

For those who are interested, I have listed 3 other formulas used to calculate penetration depths. Since these formulas are beyond the scope of this chapter, I am not including any explanation for them.

Whipple's equation: $P = K_1 (1/ \text{pi } Q9)^{1/3} E^{1/3}$

P = Penetration depth in a thick target material
K_1 Constant of proportionality
E Meteorite (debris) energy
Q Density of target material
9 Heat of fusion of target material

Kornhauser's equation: $h = K_2(T/E)^{1/3} (E/E_O)^{0.009}$

h Penetration (depth of crater)
K_2 Constant of proportionality
T Kinetic energy of projectile
E Modulus of elasticity of target
E_O Reference modulus

Summer's equation: $P/d = 2.28(Q_P/Q_T)^{2/3} (Vc)^{2/3}$

P Penetration depth in a thick target material
d Diameter of projectile
Q_P Density of projectile
Q_T Density of target
V Projectile velocity
c Speed of sound in target material(5.1×10^5 cm/s for aluminum)

Footnote 4.4

The atomic bomb dropped on Hiroshima created 5.2×10^{13} Joules of energy. When the spaceship (flying at half the speed of light) hits the object the size of a pea, it creates 3.65×10^{14} joules of energy. Therefore, the impact creates the kinetic energy of 7.03 atomic bombs

1 Ton of TNT = 4.184×10^9 Joules
1 Pound of TNT = 2,092,000 Joules
1 Hand grenade = 150 grams of TNT = 690,360 Joules
1 bullet (30 Cal) = 464 Joules

Footnote 5.1

To provide round-the-clock force field protection for the spaceship (traveling 90%) we need to find the number of seconds in 5 years.

·Seconds in 5 years = (sec) (min) (hours) (days) (years)
·Seconds in 5 years = (60 sec) (60 min) ((24 hours) ((365 days) (5 years)
·Seconds in 5 years = 157,680,000 seconds

Footnote 5.2

The aluminum object the size of a pea has the mass of 10 grams. The aluminum object the size of a softball has a mass of 10,000 grams. Therefore, its impact would be 1,000 times greater

Footnote 6.1

These calculations will shrink the trip to our nearest star to a trip similar to the distances across the United States. This calculation is assuming that these is only one object near the path of the spaceship once every million miles.

·Distances to nearest star = 24.7 trillion miles
·# of objects in its pathway = (24.7 trillion miles) (1 object per million miles)
·# of objects in its pathway = 24.7 million objects
·# of objects across the US = 3,000 miles
·# of object per miles = (# of objects) / (3,000 miles)
·# of object per miles = 24.7 million) / (3,000 miles)
·# of object per miles = 8233
·# of object per foot = 1.6

Footnote 7.1

A spaceship is traveling at 50% of the speed of light (93,000 miles per second) and there is a boulder 3,333 miles away. The formula below calculates the time it will take to reach the boulder.

·Time = distance / speed
·Time = 3,333 miles / 93,000 miles per second
·Time = .03584 seconds

Footnote 7.2

At present, we can see about 13 billion light years in all directions. Therefore, the "known" universe is at least 26 billion light years wide.

·*Item A:* Light travels at 186,282 miles per second
·*Item B*: A light year is 5.874 trillion miles
·*Item C*: 26 billion light years would be 1.527×10^{23}
·*Item D*: The Earth's diameter is 7,926 miles
·The relative miles-per-second is calculated by: (Item A) (Item D) / (Item C)
·This gives us: 9.666×10^{-15} miles per second
·(9.666×10^{-15}) (60 seconds) (60 minutes) (24 hours) (365 days)
·This gives us 3.048×10^{-7} miles per year
·There are 63360 inches per mile (5280 feet x 12 inches)
·(3.048×10^{-7}) (63360) = .0193 inches per year

Footnote 7.3

A spaceship is sending out a scanning signal to look for objects in its path. This signal is so narrow and highly focused that it is only scanning a piece of sky that is the size of a grain of sand (As described in the chapter). After 10,000 miles, this narrow signal will have expanded a great deal. This footnote calculates the area of growth. This area of growth (referred to as the "danger zone") was calculated by using trigonometry on a triangle:

·Angle C = less than 8/100th of a degree (.078 degree)
·Side a = 10,000 miles
·Side b = 10,000 miles
·Side c = ?
·The formula to find side c is: $c^2 = a^2 + b^2 - 2ab(\cos C)$
·$c^2 = (10,000)^2 + (10,000)^2 - 2(10,000)(10,000)(\cos .078)$
·$c^2 = (200,000,000) - (200,000,000)(.999999086)$
·$c^2 = 185.329$
·c = 13.614 miles

Angle C (used in the above formula) was derived by the following formula:

·The grain of sand is approximately 1 mm
·The grain of sand is viewed at approximately 740 mm away
·The following triangle is used for the equation

·[pic of triangle]
·(cos C) = c^2 - (a^2 +b^2) / -2ab
·(cos C) = 1^2 - (740^2 +740^2) / -2(740)(740)
·(cos C) = 1 - (1,095,200) / (-1095,200)
·angle C =.0077426 degrees

Footnote 8.1

A spaceship is traveling at **50%** speed of light and detects a boulder. It has .0358 seconds to make an adjustment of seven miles (36,400 feet) to avoid hitting the boulder. The following formula is used to determine the G-force exerted on the spaceship:

·acceleration = 2(distance) / (time)(time)
·acceleration = 2(36,400 feet) / (.0358 seconds)(.0358 seconds)
·acceleration = 56,802,222 feet/second^2
·One G-force is equal to an acceleration of 32 feet per second^2. Therefore:
·G-force = (56,802,222) / (32)
·G-force = 1,775,069

Footnote 8.2

A spaceship is traveling at **50%** speed of light and detects a boulder. It needs to make an adjustment of seven miles (36,400 feet) to avoid hitting the boulder. The following formula is used to determine the response distance needed to keep the G-force at 3 Gs:

·1 G = an acceleration of 32 feet per second^2, therefore,
·3 Gs = an acceleration of 96 feet per second^2
·Time = square root of [2(distance) / (acceleration)]
·Time = square root of [2(36,400 feet) / (96 feet per second^2)]
·Time = 27.5 seconds
·The spaceship is traveling at 93,000 miles per second
·Distance = (27.5 seconds)(93,000 miles per second)
·Distance = 2,561,020 miles

The above distance is the response distance (the distance needed to make a safe adjustment. Now, we need to find the total distance (the distance when the signal is first sent out). We already know (from the chapter) that the total distance is 3 times the response distance(3,333 miles out of 10,000 miles). Therefore, the total distance is 7,683,060 miles.

Footnote 8.3

A spaceship is traveling at **90%** speed of light and detects a boulder. It has .0028285 seconds to make an adjustment of seven miles (36,400 feet) to avoid hitting the boulder. The following formula is used to determine the G-force exerted on the spaceship:

·Acceleration = 2(distance) / (time)(time)
·Acceleration = 2(36,400 feet) / (.0028285 seconds)(.0028285 seconds)
·Acceleration =72,800 / 000008 seconds^2
·Acceleration = 9,099,531,090 seconds^2
·One G-force is equal to an acceleration of 32 feet per second^2. Therefore:
·G-force = (9,099,531,090) / (32)
·G-force = 284,360,346

Footnote 8.4

A spaceship is traveling at **90%** speed of light and detects a boulder. It needs to make an adjustment of seven miles (36,400 feet) to avoid hitting the boulder. The following formula is used to determine the amount of time needed and distance to keep the G-force at 3 Gs:

·1 G = an acceleration of 32 feet per second^2, therefore,
·3 Gs = an acceleration of 96 feet per second^2

·Time = square root of [2(distance) / (acceleration)]
·Time = square root of [2(36,400 feet) / (96 feet per second^2)]
·Time = 27.5 seconds
·The spaceship is traveling at 167,653 miles per second
·Distance = (27.5 seconds)(167,653 miles per second)
·Distance = 4,616,803 miles

The above distance is the response distance (the distance needed to make a safe adjustment. Now, we need to find the total distance (the distance when the signal is first sent out). We already know (from the chapter) that the total distance is 21 times the response distance. Therefore, the total distance is 96,952,876 miles.

Footnote 8.5

A spaceship is traveling at **50%** speed of light and detects a boulder. It has .0358 seconds to make an adjustment of 30 feet to avoid hitting the boulder. The following formula is used to determine the G-force exerted on the spaceship:

·acceleration = 2(distance) / (time)(time)
·acceleration = 2(30 feet) / (.0358 seconds)(.0358 seconds)
·acceleration = 46,815 feet/second^2
·One G-force is equal to an acceleration of 32 feet per second^2. Therefore:
·G-force = (46,815) / (32)
·G-force = 1,463

Footnote 8.6

A spaceship is traveling at **90%** speed of light and detects a boulder. It has .0028285 seconds to make an adjustment of 30 feet to avoid the boulder. The following formula is used to determine the G-force exerted on the spaceship:

·acceleration = 2(distance) / (time)(time)
·acceleration = 2(30 feet) / (.0028285 seconds)(. 0028285 seconds)
·acceleration = 7,499,614 seconds^2
·One G-force is equal to an acceleration of 32 feet per second^2. Therefore:
·G-force = (7,499,614) / (32)
·G-force = 234,363

Conversion Table:

1 inch = 2.54 centimeters (cm)
1 mile = 1.609 Kilometers (km)
1 mile = 1,609.344 meters (m)
1 kilometer = 0.621371 miles
1 meter = 3.28084 feet
1 meter = 1.093613 yards
1 foot = 0.3048 meters
1 pound = 0.4536 kilograms (kg)
1 pound = 453.6 grams (g)
1 kilogram = 2.204586 pounds
1 gram = 0.002204586 pounds
Speed of light = 186,282 miles per second
Speed of light = 299,791,819 meters per second

If God created the universe 6,000 years ago, why does it appear to be 14 billion years old?

This "contradiction" has forced many Christians to alter the Biblical creation account to include some type of Big Bang origin. They say initially there was no sun to mark out literal 24 "days." Therefore, the first three creation "days" could have been billions of years long.

One issue that has caused some Christians to seriously consider the "old universe" theory is the incredible size of the universe. Some galaxies are so far away from us that it would take over 14 billion years for their light to reach us. Therefore, they say, the universe has to be at least 14 billion years old.

Most Christians, of course, assume that when God created the universe, He created it fully functioning and ready to be used. Yet, other Christians say, "God would not do it that way. He would let the light reach us *naturally*. Having these distant galaxies visible on the day of creation would give the universe an *appearance of age*. Creating a universe that has an appearance of age would be deceptive and the same as lying."

Was God being deceptive or just being practical? Is a landscaper being deceptive when he uses mature plants (instead of seeds) to make a tropical garden? Is the owner of this garden a liar because his garden appears to be 300 years old instead of a few months? See inside for more information.

As with most studies of the universe, there are a couple questions that always seem to surface. These two questions (shown below) will be covered in this book:

- Is there life on other planets?
- Are UFOs visiting us?