

THE STAR OF BETHLEHEM DECODED

3rd Ed.

APPENDIX-A

By Larry Joyce

starofbethlehemdecoded.com

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APPENDIX-A SECTION I

METHODOLOGY AND MATERIALS

A. The Proper Approach

In determining the best way to investigate this topic or any other topic, one must first assess the nature of the inquiry itself. For example, in laboratory studies one must first ascertain how one will collect the data to ensure not only that one will have enough data points to yield meaningful results, but also to ensure that the data collected will constitute a reliably-representative sample of the whole. If the project is complex, one must normally isolate a control group, one which will not be subject to the variables to be tested in the study.¹ And complex studies on humans, such as clinical trials for a newly-proposed drug, will also benefit from making the project a randomized,² double-blind³ crossover⁴ study, and one will then also normally subject the data collected to a *chi*-squared analysis.⁵

The case is different, however, where one is investigating a specific series of events in the past, and what the meaning and interrelationships between the various events of the past and the persons involved with them may be. Such is the case with the work of a police detective, for instance. And such is also the case here. We cannot study the story of the Star of Bethlehem in a laboratory and see if we can get a group of Magi to show up in Jerusalem and follow a star to Bethlehem over and over again under controlled, laboratory conditions. Rather, like the police detective, we must be content with examining the fixed, given set of data as it is and see whether we can put the various pieces of the puzzle together in a way which makes sense.

In that respect, a scientific analysis of the data (*i.e.*, forensic science) is now an integral part of detective work; nonetheless, on the whole, the detective's inquiry is not a true question of science, but is instead one which deals with a question of history (*e.g.*, whether someone did in fact murder another person on a particular date). And likewise, we ourselves now face a question of history in this book rather than a question of true science.

In taking the approach of a detective, I utilized my background in astronomy, which I have stated in detail in the text portion of this book, to determine what aspects of the heavens should be considered, and how the various celestial events might look to an observer on earth, much as a detective would utilize experience in police work to help solve a puzzle. That being said, here are the principal tools which I used in that respect.

A. The Equipment Used

Nothing is perfect, and this includes the equipment we use to make measurements and conduct studies. As to the equipment I used (as specified below), I have no expertise pertaining to the operation thereof above and beyond that of anyone else, and so, like yourself, I must

¹ <https://www.thoughtco.com/control-and-experimental-group-differences-606113>

² <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/randomized-clinical-trial?redirect=true>

³ <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/double-blind-study>

⁴ https://en.wikipedia.org/wiki/Crossover_study

⁵ https://en.wikipedia.org/wiki/Chi-squared_test

presumably trust those who developed and marketed the equipment to have done so competently. That being said, here is the equipment I used to pursue this study:

Starry Night: The Starry Night series of computer programs is used both by those who study the heavens and also by those who teach astronomy.⁶ When I began studying for this project in 2013 I started with a version from that series known as Starry Night Pro 6 (version 6.3.9 pcEM); later on in this project I also used Starry Night Pro Plus 7 (versions 7.4.1.809 leEM, 7.5.0.951 leEM, 7.6.3.1373 leEM, and 7.6.5.1514 leEM), followed by Starry Night Pro Plus 8 (version 8.0.6.1978 leEM, and now, most recently, I have been using version 8.1.1.2078 leEM); for reasons which are stated in the text, all references to Starry Night are to this version unless noted otherwise.

Google Earth: Initially, I used version 7.1.2.2041 for most functions, although I used the Ruler Line and Ruler Path functions after I upgraded to 7.3.3.7786 (64-bit)⁷ of Google Earth.⁸ In order to illustrate how celestial objects would have lined up with places on earth, I used the Ruler Line function of Google Earth; in order to ascertain distances of travel, I used the Ruler Path function of Google Earth. I also used Google Earth Pro, version 7.3.4.8248 (64-bit), version 7.3.4.8642 (64-bit), version 7.3.6.9285 (64-bit), as well as version 7.3.6.9285 (64-bit), and most recently, version 7.3.6.9796 (64-bit). (Note: I mostly used version 7.3.3.7786 (and version 7.3.6.9284) for the Ruler Line.)

MacBook Pro: The personal computers which I used on this project were all MacBook Pros, the first one (purchased in June of 2011) utilizing the operating system OS X 10.9.5 when I began this project, and then macOS Sierra 10.12.2. The second computer (purchased early in 2017) utilized macOS Sierra 10.12.2 and then macOS Mohave 10.14.6. The third computer utilized macOS Monterey 12.3.1 initially, then Monterey 12.4., Monterey 12.5, Ventura 13.0.1, and Ventura 14.3.1. I then updated it to macOS Sonoma 14.4, then to macOS Sequoia 15.5, then to macOS Sequoia 15.7.3, and now it uses MacOS Tahoe 26.2.

Samsung Galaxy S 22 Ultra is the phone which I used to take all of the photos which I use in this book.

APPENDIX-A SECTION II

MY COMMENTS ON RICK LARSON'S DISCUSSION OF THE "BLOOD MOON"

Rick Larson implies (though he does not expressly state) that the lunar eclipse which occurred on Good Friday (the day that Jesus was crucified) was a total lunar eclipse, and Larson further says that the Apostle Peter told a crowd in Jerusalem about seven weeks later (on the Feast of Pentecost) that on the day Jesus died, they had seen a "blood moon" (*i.e.*, the reddish color associated with a lunar eclipse).⁹ Technically speaking, on the first point, Larson is incorrect, and on the second point he might also be incorrect, as we shall see. Yet none of that is fatal to his main point, however. For instance, with respect to the moon itself, it need not be totally eclipsed in order

⁶ <http://astronomy.starrynight.com>

⁷ <https://google-earth.en.lo4d.com/windows>

⁸ http://filehippo.com/download_google_earth/51037/

⁹ <https://www.space.com/39471-what-is-a-blood-moon.html>

for the reddish hue to show. I myself have seen the reddish hue remain after the moon has left the total portion of a total lunar eclipse. This was when I was in the astronomy club in high school, following the total phase of a lunar eclipse in the early '70s.

Second, with respect to Peter supposedly saying that the people of Jerusalem had seen a blood moon, although Peter did not in fact say that they had actually *seen* a blood moon, what he did say was that they *knew* that God had given them signs and wonders to show that Jesus was approved by God, and he said this right after he had specifically quoted the prophecy about the moon being turned to blood as being one of those signs (Acts 2:14-22).¹⁰ As it turns out, for reasons which we shall go into elsewhere, the moon may or may not have been above the horizon as seen from Jerusalem when it would have had a reddish color. But even if it was not above the horizon at that time, the residents of Jerusalem would have had a way of knowing that there had been a blood moon prior to the time it rose, anyway, and at least some of them (from Parthia) would have been able to see the blood moon themselves, in any event.

To look into this possibility, let us consider some of the facts about the Feast of Pentecost, the day when Peter spoke to the crowd. Historically, Pentecost was a Jewish feast. And although no Jew who lived anywhere outside of Jerusalem could be expected to make it to Jerusalem for every feast, even people who lived abroad probably went to Jerusalem for at least some of the feasts, particularly among the wealthy who could afford to travel.

With that in mind, consider the following Scripture as well:

Now there were Jews living in Jerusalem, devout men from every nation under heaven. (Acts 2:5; NASB)¹¹

Apparently, the Jews from other countries who were living in Jerusalem weren't simply persons whose ancestors had migrated to Jerusalem long ago. Rather, they were probably recent arrivals. For as that chapter also points out, they marveled that they heard the disciples speaking in their own, native tongues (Acts 2:6-12)¹². They probably would not have referred to the native language of their ancestral homeland as their own native tongue unless they themselves (or their parents or grandparents) were recent arrivals in Jerusalem. That being the case, it would come as no surprise then if at least some of them received periodic visits from family members who lived back in their native lands and who had known them or their immediate ancestors there, particularly around the time of any of the feasts (such as Pentecost), which is when many of them would have wanted to travel to Jerusalem, anyway, even if they did not have any family members living in Jerusalem.

Significantly, in verse 9 of that chapter we learn that some of them were Parthians.¹³ Ancient Parthia stretched to the southeast from the Middle East, and included the area where Karachi, Pakistan is located.¹⁴ As I explain in the text, the area around Karachi is a place from which I do

¹⁰ <https://biblehub.com/kjv/acts/2.htm>

¹¹ <http://biblehub.com/nasb/acts/2.htm>

¹² <http://biblehub.com/nasb/acts/2.htm>

¹³ <https://biblehub.com/kjv/acts/2.htm>

¹⁴ <https://www.ancientpages.com/2016/11/10/parthians-their-great-empire-and-skilled-horse-archers/>

believe at least one of the Magi came. And also, as DNA evidence has now established (as per the *Jerusalem Post*), at least certain Jews from this area are probably members of the Tribe of Levy.¹⁵

Now, regardless of whether the moon was or was not above the horizon as seen from Jerusalem when it was a blood moon, there is no question as to whether it was above the horizon at that time as seen from Karachi. So the Parthians in Karachi would have seen a blood moon. The thing is, the Law of Moses provides that a fact pertaining to anything---even to the most serious of matters---can be established by the testimony of two witnesses. (Deut. 17:6)¹⁶ So in other words, if at least two Parthians from the area in or around Karachi had seen the blood moon and had come to Jerusalem by Pentecost---or for that matter, if two persons from anywhere had said they had seen the blood moon (perhaps persons coming in to Jerusalem on trade caravans from the east, for instance)---we could not only expect them to have told people while they were in Jerusalem that they had seen a blood moon, but also, we can know that according to the Law of Moses, the testimony of two or more of them could be deemed sufficient to establish the fact that a blood moon had occurred even if it had occurred prior to moonrise in Jerusalem, a fact which the Apostle Peter could then rely on publicly.

On that note, let me say that in addition to all that, even if the blood moon itself was not visible from Jerusalem, the residents there still would have seen a noticeable darkening along the upper right portion of the moon at moonrise, a darkening which would have soon gone away gradually, from left to right, signifying to those who saw this happen that the moon was just then emerging from at least a partial eclipse, and quite possibly also from a blood moon as well. Thus, no one in Jerusalem would have been left with any doubt about the blood moon if the Parthians or anyone else who might have seen it told them that this is what had happened.

APPENDIX-A SECTION III

THE ROLE OF SCIENCE IN THIS INQUIRY

A. Scientific And Nonscientific Proof

With respect to the issue of proving whether something is true or false, let us first consider whether anything even has to be proven scientifically in order to be really proven indeed. Let me approach that issue with the following hypothetical: A jury is faced with the question of whether a man murdered another man by deliberately and maliciously hitting his head with a hammer. The defense for the accused says that the hammer slipped out of accused man's hand accidentally while he was holding it above the victim's head.

You can prove scientifically how much force would be needed to break a person's skull, and you can likewise prove scientifically that any amount of force less than that would not have been sufficient to break the victim's skull. But what you cannot prove as a strict matter of science is whether the accused acted maliciously. You cannot prove scientifically whether the accused had the intentional thought in mind to murder the victim. You can get a pretty good idea of whether the accused did act maliciously and intentionally just by considering from science the amount of force which was used or not used. But the question of whether the accused did in fact have

¹⁵ <http://www.jpost.com/Food-Index/Bene-Israel-The-Jews-of-Mumbai-India>

¹⁶ <https://biblehub.com/kjv/deuteronomy/17.htm>

malicious thoughts and a malicious heart is not the type of thing which can either be proven or disproven scientifically. At least, that is the case with respect to the state of our technology today, and the fact that our technology might develop to the point where we could determine this scientifically tomorrow does not change the fact that it is perfectly acceptable for us right now to use those tools and understanding of human behavior which are available to us today to arrive at rationally-based conclusions about certain alleged conduct.

In other words, if a particular puzzle is the type of thing which cannot either be proven or disproven scientifically, it is perfectly valid to look to other bases for determining facts if those bases are demonstrably reliable; and in a murder case, simple, everyday experience with human nature will tell us whether a blow that had to have been delivered with crushing force is a blow that was delivered maliciously or not. This type of fact-finding and consideration of the evidence happens in courtrooms around the world every single day. And every culture, primitive or modern, from earliest human history has relied upon this means of assessing important facts in order to function in an orderly and lawful manner.

Let me also illustrate it this way: Let us say that you are watching a parade go by. As you look to your left, a stream of floats being used in the parade comes around the corner and then goes past you. You want to know how many floats are remaining in the parade. There are three basic ways of trying to determine this: by the use of science, personal experience, or faith.

As to the use of science to determine how many floats remain, let us say that you have been told that the parade will go on for thirty more minutes. Each float takes about one minute to pass you by. On that basis you conclude that thirty more floats will pass you by. You look up the street and see that four of the upcoming floats are already in view, and by using science (*i.e.*, the science of mathematics) you conclude that there must be 26 more floats which you cannot see just around the corner.

With respect to using personal experience to determine how many floats remain, let us say that instead of using mathematics, you go look around the corner and see for yourself. And from your own observation you determine that 26 more floats will be coming around the corner.

As to faith, let us say that a friend of yours just came from around the corner. So instead of using mathematics or doing your own personal research, you ask him how many floats remain there, and he tells you that 26 remain. You know him, and you trust him, so you conclude on that basis that there are 26 remaining floats.

Each of these three methods of ascertaining facts is a valid way of determining facts. Each of them can lead you to an accurate conclusion as to how many floats remain. And yet, each of them could lead you to an inaccurate conclusion about how many floats remain.

For instance, a person's use of science can lead to wrong conclusions. That is not to suggest that the scientific method itself is unreliable. Rather, the exact opposite is true: The scientific method itself is unassailable.¹⁷ But all scientists recognize that the data with which they work might

¹⁷ The scientific method is commonly thought of as being something which we created. But it would be more accurate, I submit, to say that the scientific method is instead something which we discovered. For the substance of nature itself, as seen in the way nature operates, does itself establish

be incomplete in a certain instance, or might have been collected in an invalid manner. If you incorrectly measured the amount of time which it takes for each float to pass you by, your calculation that there are a certain number of floats remaining could be incorrect.

The problem there doesn't lie with science itself, of course, but it does show that reliance on science does also necessarily rely at the same time on the ability of a person to use science correctly, and for all pertinent data to be both knowable and in fact actually known. And so if one does not use the scientific method correctly, a reliance on science can lead to incorrect conclusions, though this would be due to no flaw in the scientific method itself.

As to personal experience, it can also be wrong. If something blocked your view of one or more of the floats when you looked around the corner, you might not have seen all of the floats. So likewise, even your own personal experience can prove to be unreliable.

It is likewise the case with respect to faith. Aside from the fact that your friend might be trying to pull a joke on you by giving you incorrect information about how many floats remain, it is still the case that your friend, even if he is trying to tell you accurate information, might not have seen all the floats himself, for that matter. So faith likewise can sometimes be misplaced, and let you down. That being the case, how do we determine what the facts are or are not, and what the truth is or is not? Well, let's go back to the jury deliberation room for a moment, but this time we ourselves, as the jury, we will be the ones trying to determine how many floats remain. Let's consider the fact that the jury, in considering the different testimony which the jury has heard, will have to try to determine the truth from factors such as whether each witness was a reliable witness, including with respect to the witness's competence at trying to count, and whether the witness was capable of coming up with an accurate result.

The jury might conclude that one witness might not have used science (*i.e.*, mathematics) correctly, and therefore came up with an inaccurate figure of 27 remaining floats, or that another witness's own personal experience and statement of actually seeing 25 remaining floats might be of questionable reliability, or that faith in the friend who said that there are 26 remaining floats was faith that may or may not have been misplaced. So the jury could be faced with a very difficult

only one general, overall approach to the study of nature, to the exclusion of any other method: That is to say, nature itself establishes, without any help from us, the scientific method. And just by studying nature we can see that those attributes of nature which establish the scientific method have been there in nature itself from the very beginning of time, long before we ourselves came around and then gradually began to discover---and develop our understanding of---scientific methodology.

That being said, consider this also: The Bible says that Creation was brought into existence by the Word of God (Gen. 1:3-30: https://biblehub.com/nasb/_genesis/1.htm). And so, if the thing which creates the scientific method (*i.e.*, Creation itself) is something which has been brought into existence by the Word of God, it would then follow that the laws of nature and the scientific method itself are each an extension of the Word of God. So for reasons both scientific and Scriptural, we should consider the scientific method as being unassailable.

Now, all that being said, although the fact that science and nature do operate this way may not be something which constitutes actual proof of the existence of God, this nonetheless certainly does at least constitute evidence thereof.

question as to how many floats remained, and it would be up to the jurors to use their own common sense and good judgment to determine who is reliable (if anyone at all, in fact), and how many floats remained, and why it is that the testimony of any particular person (if anyone at all), in light of each juror's own past experience, should be considered reliable or unreliable.

B. The Two Basic Forms Of Science

With that in mind, let us first of all look at what types of things constitute science and scientific proof. There are two fundamental things which make up the overall field of science: basic research, and applied science. Basic research entails attempting to discover the basic principles of science, and sometimes it involves an investigation of things which seem so intangible and so removed from practical living as to appear to be useless.

A case in point which illustrates the natural interaction between basic research, followed later on by applied science, involves the discovery of electromagnetism and the electromagnetic field by famed British physicist Michael Faraday and certain other researchers back in the early 1800s,¹⁸ and the subsequent use of their discoveries. For instance, in 1838, following the discoveries of Faraday and his colleagues, Samuel Morse became the first person to demonstrate the practical benefits of harnessing electromagnetism by means of the telegraph.

The discovery of electromagnetism and the electromagnetic field itself was an example of basic research on the one hand, while the application of this new knowledge of electromagnetism by Samuel Morse and his telegraph was an example of applied science on the other hand. Our understanding of electromagnetism is the basis of everything having anything whatsoever to do with electronics, including the means by which you can view a video, use a computer, use a cell phone, or even just turn on a light bulb; so we can now see today that this discovery of electromagnetism was something of incredible importance, though it may have appeared to be a totally useless discovery for the first few years after the discovery was made.

In this book, our inquiry will not be faced with any questions about basic scientific principles themselves, but rather, our inquiry will consider the application of those principles. So although this book will investigate what is principally a question of history (*i.e.*, whether a group of Magi did, or at least could, travel from the Old City portion of Jerusalem to Bethlehem by following the Star), this book will also illustrate the usefulness of applied science, such as the invention of the telegraph was, and which we likewise see in the work of a police detective, who uses forensic science (a form of applied science) to help solve a crime, or determine if a crime has even been committed at all.

With all that in mind then, let me state and reiterate that in this book, I submit that I do prove a few, limited things scientifically: That is to say, based on what we can learn from computer research on this topic, I do prove scientifically (*i.e.*, by the application of the sciences of mathematics and astronomy to geography) that the story of a certain group of Magi following a star from Jerusalem to Bethlehem is a story which, on the face of things, is something which is at least plausible, something which at least possibly could be true.

C. Answers To Possible Objections To The Scientific Validity Of My Approach

¹⁸ https://en.wikipedia.org/wiki/Michael_Faraday

Generally

a. Unreproducible Results

With respect to all other aspects of this book, I will refer to a number of different events involving the sun, moon, planets, constellations, and individual stars themselves which, I submit, point to the conclusion that the Creator Himself caused these things in the heavens to come together in a way which reveals His presence. In response to that, some will object, saying, “Well, if such and such event happened back then when there was a particular alignment of heavenly bodies, then why hasn’t something like that happened each time a similar event has taken place, because alignments in heavens of a similar nature happened before that particular point in time, and continue to happen even now?”

My reply is this: If what I am saying in this book were to be based on the idea that the things in heaven were actually causing these events to happen on earth (such as is the case with astrology)--or even more remarkably, if what I am saying in this book were based on the idea that the things on Earth were somehow causing the events in the heavens to take place---then an objection like that would of course be a valid objection, because in that case, my own hypothesis would be based on the flawed premise that there is a cause-and- effect relationship between the alignments of things in the heavens and the events which actually took place here on earth.

However, my hypothesis is not based on the idea that there is any causal relationship (note: “causal”,¹⁹ not to be confused with “casual”) between the events on Earth which we shall be looking at and the various corresponding celestial phenomena. Rather, let me emphasize that the Creator, the One who created artists and poets, is Himself (not surprisingly) a true artist and a poet. And it should therefore come as no surprise that if He does exist at all, He could cause even the heavens themselves to reflect His great plans and purpose for us through His artistic and poetic arrangement of things. So what I am saying is that at certain times He does choose to coincide certain celestial events with what He is doing on Earth, even though at other times, similar events may not correspond to a particular thing which He is doing on Earth.

Now, I know that some of you will be saying, “That’s a cop-out, because then there could be no way of proving whether these events really were coincidental or not!” In response to that, let me say, first of all, simply read this book as impartially and open-mindedly as you can, and then judge for yourselves whether I am engaging in a cop-out, and bear in mind that even if what I say here in this book is not enough by itself to convince you of the truth of what I am saying, consider also all the other things outside of this book which you know about Jesus Christ, and ask yourself whether things which you see in this book, combined with the other things which you know and have heard about Jesus, when taken together, constitute proof of His divinity (or at the very least, of His earthly existence 2,000 years ago), even if the various pieces of evidence from this book, when considered just by themselves, might not be enough to convince you just by themselves of the truth of what I am saying.

b. Conclusions That Are Not Falsifiable

¹⁹ <https://www.vocabeasy.com/2019/05/causal-vs-casual-learn-with-mind-trick.html>

Here's another thing to consider: If you say that what I am saying here has no value because it cannot be disproven (*i.e.*, that my ultimate conclusion is not "falsifiable"²⁰), then you make it impossible to consider even so much as the possibility that there really is a God who, in artistic fashion, has signed His work of art (*i.e.*, the Creation itself) by using various different things in the heavens to show us that He is real. Think about that. How logical is it to rule out even the possibility that this really is what happened without first giving fair consideration to the evidence? In essence, you would be saying, "That can't happen because that can't happen." That is circular reasoning,²¹ which of course is invalid as a matter of logic. Of course, it is not at all invalid to use falsifiability as a tool for examining reality in the realm of the physical sciences, because the physical sciences deal with inanimate objects being subjected to the universal laws of physics and chemistry, etc., and do not deal with the effects of some being's mind and will exerting some effect on those inanimate objects, such as when you or I or God takes hold of something and moves it around.

Bear in mind also that falsifiability has no application to a variety of contexts. For instance, if someone 100 years ago had rearranged the furniture in a house and had left no record as to whether the person liked the new arrangement of the furniture, you wouldn't look to the concept of falsifiability to determine whether the person preferred the new arrangement of furniture to the old arrangement, would you? You could draw inferences pertaining to the question of whether the person liked the new arrangement of furniture or not from various things, such as whether the person kept the furniture that way or moved the furniture yet again.

For instance, you might conclude that a person who then moved the furniture around again the next day, and never moved it back to the way that it had been for that one previous day, was someone who did not like the way that the furniture had been arranged for that one day. On the other hand, if the person kept the furniture in the new configuration for over twenty years until the person died, you could conclude on that basis that the person really did in fact like the new arrangement of furniture. But you wouldn't look to falsifiability in addressing the question of whether the person actually did or did not like the new arrangement. More to the point, you couldn't say that no determination can be made one way or the other, to a reasonable degree of certainty, as to whether that person liked the new arrangement of the furniture simply because the question would not be falsifiable.

That being said, I ask you to bear in mind that what I am talking about here in this book is not simply the interaction of inanimate objects as they follow the laws of nature (though that does in fact play a particular, vital role in my analysis); but rather, in addition to that, I am simultaneously exploring the possibility that a sentient being who is separate from the Creation and who exists outside of it---that is, God Himself---picks and chooses where, when, and how to use the Creation in order to manifest His presence, just as you or your friend or anyone else picks and chooses where to place furniture inside one's home. We should therefore consider at least the possibility that even before God created the universe, God made a decision ahead of time to arrange the Creation so that it would simply develop quite naturally on its own (just by following the laws of nature) in a way that would manifest His presence.

c. The Blending Of Science And Non-Science

²⁰ <https://en.wikipedia.org/wiki/Falsifiability>

²¹ https://en.wikipedia.org/wiki/Circular_reasoning

Let me also say here that anyone who says that what I am saying in this book is not real science should consider certain things. First of all, with respect to whether it is *at least possible* that the Star of Bethlehem is indeed a story about certain true, historical events which took place, what I have to share with you on that one specific point itself---the *possibility* that the basic facts of the story are true---is in fact a matter of real science (principally, the sciences of astronomy and mathematics) because part of what I do here (as you shall see) is an example of applied science.

As to all the rest---as to whether we should conclude that there is a God and that Jesus is who the Bible says He is---if anyone says that that part is not real science, my reply to that is, “Well, you’re absolutely right! It’s not real science. But then, what’s the problem with that?” For we cannot prove scientifically that a particular person had malice in his heart when he hit someone over the head with a hammer. We cannot prove scientifically that someone years ago liked or disliked the way some furniture was arranged in room. But that does not mean that we cannot draw rationally-based inferences from the facts as we do know them, and develop sound conclusions from these inferences about whether a particular person acted maliciously, or whether a particular person liked a certain arrangement of furniture. In like manner, certain questions which I address in this book cannot be proven or disproven scientifically, but we can draw rationally-based inferences from the facts as we shall come to know them, and we can develop certain sound conclusions from those inferences.

Again, I do ask you to keep an open mind, to read this book as impartially as you can, and to then make up your mind about what I am saying only after considering all the evidence---plus the other things which you may know about Jesus---after giving the analysis and conclusions which I state herein at least a fair hearing.

APPENDIX-A SECTION IV TELESCOPE PHOTOS



The author, Larry Joyce (left), with his brother Dan Joyce at Lebanon Municipal Airport near Nashville,
Tennessee with a 10" telescope which Dan made.
(Photographer anonymous)



The author, Larry Joyce, with the telescope he built, as seen at Lebanon Municipal Airport near Nashville, Tennessee for the Great American Eclipse, Monday, August 21, 2017.
(Photographer anonymous)

APPENDIX-A SECTION V

HOW ANCIENT PEOPLES COULD HAVE KNOWN THAT CELESTIAL EVENTS WHICH THEY COULD NOT SEE WOULD BE TAKING PLACE

One might wonder how it is that ancient peoples, who had no telescopes or a modern understanding of the laws of physics, could have known that various astronomical events which they could not see were in fact taking place. As it turns out, with respect to the stars themselves, for instance, this would be relatively easy to do. For the Magi would have noticed that each star had a particular, fixed spot in the heavens. So the line across the heavens which they would each take by day or by night would never change---whether by night at one time of year, when they could see it, nor by day at another time of year, when they could not.

As to where along that line the star might be at any given moment, the Magi knew that even though this point would vary relative to the horizon--- depending on the time of day and the time of year---it would also be the case that this would never vary relative to the position of all the other stars, which would always remain just as far north or south of the star, and just as far east or west as well, at any time of day or night, and at any time of year.

Now, they would know that each star would always be found along one particular north-south line in the celestial sphere (a line which we today would call a line of Right Ascension, and which corresponds to the lines of longitude on Earth), and they would also know that some particular point on this line, for example, might always rise above a particular spot on the eastern horizon a certain amount of time (*e.g.*, two hours) before a second star would rise at that same spot. With this knowledge they could know that at the time of year when the sun would be found along the same line of Right Ascension as the first star, and just as far north or south as that star, that the second star would then lie along a line which would follow by two hours, and be to the left of the sun. And since each star will always be located along one specific east-west line through the heavens, whether by day or by night, they could then determine the exact spot along that east-west line which the star would be on even in the middle of the afternoon.

With respect to the sun, as Earth moves in its orbit around the sun each year, the sun would appear to move to a very slight extent against the

background of stars in a predictable way from right to left (*i.e.*, from west to east) across the background of stars in the heavens from one day to the next (and even throughout the course of each day itself). And so the Magi could know on any given day how far east or west the sun might be found against the background of stars on any given day, though those stars themselves would be lost in the glare of the sun.

Now, since the Magi could also see how far north or south the sun was just by noting the point at which it rose and set from day to day, they could use this knowledge along with the knowledge they would gain, as noted in the paragraph above, to determine the exact spot in the heavens with respect to the background of stars which the sun occupied even in broad daylight.

As it turns out, for movements of the moon, this would likewise be relatively easy to do. For instance, you yourself may have noticed on occasion that the moon might appear to the right of a star or a planet on one night, but then be on the left side the following night. Well, it takes no rocket science to figure out that in between those two times---perhaps when the moon and star were below the horizon---the moon had to have moved past the star. And based on just exactly where the moon was on the first night, and where it was on the second night, one could easily discern whether the moon had passed close by the star or not, or whether it perhaps had even passed in front of the star, and approximately when it had done so.

As for the daytime position of the moon, let us first consider the fact that the moon can in fact be commonly seen during daylight. Most people don't notice it, however, because they do not know precisely where to look. Besides, the moon has relatively little tendency to catch one's attention when it is visible during the day, especially if it is not close to the horizon. Of course, during daylight hours, it is easiest to see the moon when it is within a few days of full moon, and more difficult to see (if at all) when it appears as a thin crescent close to the sun, just before or after new moon.

The thing is, the Magi would have known from the above information just exactly where the various stars and constellations could be found at any time during daylight, and so they could know that just by considering the position of the moon or sun by day, they could also know just exactly which stars it was near to at that time, though the stars themselves could not also be seen.

As for the planets, the task would be a little more complicated. For the planets, as is pointed out in the text, can appear to slow down, stop, and then speed up again, and can even appear to go in reverse, though such motion would all be an optical illusion. The thing is, the planets would have appeared to do this many times during the course of the lifetimes of the Magi, and would have repeated their pattern of changing speed and changing course in very similar fashion each time. So the Magi could have calculated where a planet could be expected to be at any given moment, whether that particular moment would happen to be at a time when the planet would be visible or not.

APPENDIX-A SECTION VI

IS IT PROPER FOR BIBLE-BELIEVING CHRISTIANS AND JEWS TO STUDY THE HEAVENS?

A. Biblical Faith Is Not Blind Faith

Of course, one might ask, why bother to study proofs of the truthfulness of the Bible anyway? Can't one just believe something by blind faith without any evidence? Isn't that what faith is really all about, anyway? Isn't faith necessarily irrational at its core, all the time?

In answer to that, let us look at the words which are translated "faith" in the Bible. In the Old Testament we are dealing with Hebrew words. In the New Testament we are dealing with words in Koine Greek (pronunciation: <https://www.merriam-webster.com/dictionary/koine>).

Here are the Old Testament words which are translated "faith": the Hebrew word *emun* (ahy' moon), which is found in Deuteronomy 32:20.^{22,23} Essentially, it means finding "trustworthiness" in something; that is, it means drawing the conclusion that, upon proper, knowledgeable consideration, a particular thing is something which has been found to be reliable and therefore worthy of trust. The other Hebrew word which is translated "faith" is *emunah* (pronunciation: <https://www.howtopronounce.com/emunah>) It is in Habakkuk 2:4,^{24,25} and it is related to *emun*. Again, this is a word which pertains to concluding that something has been found to be trustworthy, or reliable.

The main Greek word which is translated "faith" in the New Testament is *pisteos* (pronunciation: <https://biblehub.com/hebrew/530.htm>) which means, "to be persuaded" (Rom. 1:17,^{26,27} Eph. 2:8-9^{28,29}). This likewise refers to making a finding, after due consideration, that something is reliable, something which you have found you can have confidence in, and in which you can put your trust.

From this we can learn that what the Bible talks about when it says "faith" essentially means a knowledge by inward conviction that something has been found to be reliable ... that is to say, confidence based upon careful consideration of the facts that a particular conclusion is trustworthy. So when the Bible talks about "faith", it is not talking about blind faith. Blind faith is almost a desperate, shrug-your-shoulders, "Gee, I hope so," type of so-called faith, whereas Biblical faith, by contrast, is a belief based upon thoughtful consideration of that which is known and has been found to be reliable.

As such, Biblical faith is similar to a situation in which a parent of a child is confronted by

²² <https://biblehub.com/kjv/deuteronomy/32.htm>

²³ <https://biblehub.com/hebrew/529.htm>

²⁴ <https://biblehub.com/kjv/habakkuk/2.htm>

²⁵ <https://biblehub.com/hebrew/530.htm>

²⁶ <https://biblehub.com/kjv/romans/1.htm>

²⁷ <https://biblehub.com/greek/4102.htm>

²⁸ <https://biblehub.com/kjv/ephesians/2.htm>

²⁹ <https://biblehub.com/lexicon/ephesians/2-8.htm>

the police who say that the parent's child stole something from a store, and that the store owner captured this event on video, and can prove it. However, the parent knows the child from throughout the child's entire lifetime, of course, and therefore does not readily accept either the statement that the child stole anything, or that anyone has a video of such a thing taking place.

Then, upon viewing the video, the parent sees that the child in the video is a different child, one who happens to look very much like that parent's child, and the parent is then able to point this out to the police and to the store owner. This parent's faith is an example of the kind of faith the Bible talks about: knowledge by inward conviction.

Another example of the type of faith which the Bible talks about is something which takes place when someone drives a car. Now, nobody would drive a car without first being confident that the brakes will work when one steps on the brake pedal. But who checks the brake system each and every time before driving a car? No one. Each person knows from experience that only extremely rarely will the brakes simply cease to function with no warning signs of wear and tear first, and so everyone simply gets into a car and drives it without making a personal inspection of the brake system each and every time. And yet, if one grew up in a culture in which there were no automobiles or any knowledge of automobiles, it would come as no surprise that someone might want to inspect the brakes before becoming a passenger (for the first time, at least) in a vehicle that can go as fast as cars do go.

1. The Scriptural Exercise Of Faith

Similarly, in the realm of spiritual things, it would no more be a good idea to believe something without having a good reason to do so---that is, it would not be a good idea to believe something simply by blind faith---than it would be to get in a car without first having some reasonable basis, one way or another, for believing that the brakes will work, or to take someone's word for it that one's child needs to be punished for theft until someone can prove that the child did indeed commit the theft. In fact, in the spiritual realm of things, consider what Jesus said in the Sermon on the Mount:

“Beware of false prophets, which come to you in sheep's clothing, but inwardly they are ravening wolves.” (Matt. 7:15; KJV).³⁰

In other words, we're not just supposed to accept somebody's word for it when they say to us that they are telling the truth. We're supposed to check things out personally.

Then there is the experience of the Apostle Paul and his assistant, Silas, in the town of Berea in Greece (pronunciation: <https://www.howtopronounce.com/berea>), as recorded in the Book of Acts in the New Testament. (This book is more fully known as the Book of the Acts of the Apostles. It chronicles what things the apostles did in the first few decades of Christianity. It is analogous to I Chronicles and II Chronicles in the Old Testament.) The Bible says,

“And the brethren immediately sent away Paul and Silas by night unto Berea: who coming *thither* went into the synagogue of the Jews. These were more noble than those in Thessalonica, in that they received the word with all

³⁰ <https://biblehub.com/kjv/matthew/7.htm>

readiness of mind, and searched the scriptures daily, whether those things were so.” (Acts 17:10-11; KJV).³¹

In other words, the Apostle Paul showed up in Berea and said, “I am the Apostle Paul, and I am anointed by God to preach to you the Gospel.” In reply, the Jews in Berea in essence said, “That’s great! But we want to check the Scriptures ourselves, anyway. We want to verify what the Scriptures really do say, and we don’t care who you are. We’re not just going to take your word for it, just because you are the Apostle Paul.” It is for these people, the Bereans, that the Apostle Luke (who wrote the Book of Acts) reserved his highest praise.

Then there is the Apostle John. He wrote five books of the New Testament: the Gospel of John, three epistles (*i.e.*, letters of correspondence) from him known as I John (First John), II John (Second John), and III John (Third John), as well as the final book of the New Testament, the Book of Revelation (also known as the Apocalypse). In I John he said,

“Beloved, believe not every spirit, but try the spirits whether they are of God: because many false prophets are gone out into the world.” (I John 4:1; KJV).³²

This parallels what the Lord told the Children of Israel through Moses during the Exodus:

21 And if thou say in thine heart, How shall we know the word which the LORD hath not spoken? 22 When a prophet speaketh in the name of the LORD, if the thing follow not, nor come to pass, that *is* the thing which the LORD hath not spoken, *but* the prophet hath spoken it presumptuously: thou shalt not be afraid of him. (Deut. 18:21-22; KJV)³³

These are simply some quick examples of a theme that is echoed in several other places in the Scriptures as well. They point to the fact that faith, as the Bible uses that term, is not an exercise in irrationality. Rather, the type of faith which the Bible talks about is based upon a reasoned, considered, and knowledgeable assessment of the facts, and the principles to be applied to the facts, much as a judge or jury applies the known facts to certain principles of law. As such, the type of faith of which the Bible speaks is based upon rationality, not irrationality.

Also, Scripture itself expressly admonishes us to be ready to explain our faith. As the Apostle Peter said in his first epistle, “But sanctify the Lord God in your hearts: and *be* ready always to *give* an answer to every man that asketh you a reason of the hope that is in you with meekness and fear:” (1 Pet. 3:15; KJV).³⁴ Now, if the type of faith of which the Bible speaks were blind faith, it would not make any sense to go to great effort to make yourself always ready to give an answer as to why you believe what you believe, because then there never would be an answer other than the fact that you believe what you believe simply because you do believe it, and that’s that.

So from all of this we can see that, from a Biblical point of view, it is extremely important to understand that when it comes to faith, people are not to indulge in acts of blind faith. Instead,

³¹ <https://biblehub.com/kjv/acts/17.htm>

³² https://biblehub.com/kjv/1_john/4.htm

³³ <https://biblehub.com/kjv/deuteronomy/18.htm>

³⁴ https://biblehub.com/kjv/1_peter/3.htm

the Bible makes it clear in both the Old Testament and the New Testament that one must recognize and understand not only what it is that the Lord God would have us believe, but also, one must recognize and understand just exactly why it is and how it is that we know that the things in the Bible are true, and how it is that when one comes across something new, one can discern whether this new thing is to be believed or not.

This will not only give each of us a more solid foundation for our faith, but it will also further enable us to be God's messengers when it comes to explaining to those who are curious about our faith as to just exactly what it is that causes us to believe what we do believe. So that is why it is a good thing to study things like the Star of Bethlehem, and why it is a good thing to learn more about such things. For having gained useful knowledge of the topic, we can then reinforce the foundations of our own belief, and then also become more prepared to share our faith with others.

B. Scripture Demonstrates The Proper Way For Christians And Jews To Study The Heavens

It is, of course, quite proper to study the heavens from a scientific perspective: that is to say, within the scientific field of astronomy. For the scientific examination of the heavens through astronomy has no substantive connection with astrology. But then, that being said, is it also proper to study the heavens for signs from God? Does that somehow bump into the field of astrology, as opposed to astronomy?

As it turns out, as Rick Larson has pointed out so well, the Bible itself has much to say about the heavens. For instance, it says that God made the various lights in the heavens "... for signs, and for seasons, and for days, and years:" (Gen. 1:14; KJV;³⁵ see also verse 16³⁶). So right there, we see that the Bible says that the lights in the heavens are for signs. We also find a couple of references to the heavens in the Book of Job, a book which many people believe to be the oldest book of the Bible. For instance, the Book of Job says that God is the one who "maketh Arcturus, Orion, and Pleiades, and the chambers [constellations] of the south." (Job 9:9; KJV).³⁷

Later on, in Job, the Bible has this to say: "Canst thou bind the sweet influences [chains] of Pleiades, or loose the bands of Orion? Canst thou bring forth Mazzaroth [the Bear] in his season? or canst thou guide Arcturus with his sons? Knowest thou the ordinances of heaven? canst thou set the dominion thereof in the earth?" (Job 38:31-33; KJV).³⁸ In the Book of Isaiah the Bible also has this to say: "Lift up your eyes on high, and behold who hath created these *things*, that bringeth out their host by number: he calleth them all by names by the greatness of his might, for that *he is* strong in power; not one faileth." (Isaiah 40:26; KJV)³⁹

Before becoming King of Israel, David had been a shepherd boy. He had no doubt spent many nights lying on the ground, looking up at the starry heavens above in the clear, desert night sky, with no modern city lights or pollution to interfere with his view. Here's what he said in one of his Psalms:

³⁵ <https://biblehub.com/kjv/genesis/1.htm>

³⁶ <https://biblehub.com/kjv/genesis/1.htm>

³⁷ <https://biblehub.com/kjv/job/9.htm>

³⁸ <https://biblehub.com/kjv/job/38.htm>

³⁹ <https://biblehub.com/kjv/isaiah/20.htm>

- The heavens declare the glory of God,
and the sky above proclaims his handiwork.
 - Day to day pours out speech,
and night to night reveals knowledge.
 - There is no speech, nor are there words, whose voice
is not heard. Their voice goes out through all the earth,
and their words to the end of the world.
- In them he has set a tent for the sun, (Psalm 19:1-4; ESV)⁴⁰

In the New Testament we learn that before becoming a Christian, the Apostle Paul had been a Pharisee^{41, 42} (that is, a member of the dominant group of rulers of the Jewish people, and quite a scholar of the Law of Moses).⁴³ After becoming a follower of Jesus, Paul wrote an epistle to the new Christians in Rome. Since this letter was written to the Christians in Rome, it is known as the Book of Romans. Here is an excerpt from that book:

17 So faith *comes* from hearing, and hearing by the word of Christ.

18 But I say, surely they have never heard, have they? Indeed they have; “THEIR VOICE HAS GONE OUT INTO ALL THE EARTH, AND THEIR WORDS TO THE ENDS OF THE WORLD.” (Romans 10:17-18; NASB)⁴⁴

So right there, as Rick Larson has pointed out, the Apostle Paul is quoting from King David’s Psalm about the heavens themselves bearing witness to the glory and reality of God. As Jesus Himself said,

And there shall be signs in the sun, and in the moon, and in the stars; (Luke 21:25a; KJV)⁴⁵

Also, on Pentecost Sunday, the Apostle Peter quoted from the Old Testament prophet Joel, saying,

And I will shew wonders in heaven above, and signs in the earth beneath;
blood, and fire, and vapour of smoke:

The sun shall be turned into darkness, and the moon into blood, before that great and notable day of the Lord come: (Acts 2:19-20; KJV)⁴⁶ (quoting Joel 2:30-31).⁴⁷

All in all then, the important thing to remember is that there is a very subtle difference, although a very crucial difference, between saying on the one hand that the stars govern your life

⁴⁰ <https://biblehub.com/esv/psalms/19.htm>

⁴¹ Acts 23:6: <http://biblehub.com/nasb/acts/23.htm>

⁴² Philippians 3:2-5: <http://biblehub.com/nasb/philippians/3.htm>

⁴³ <https://en.wikipedia.org/wiki/Pharisees>

⁴⁴ <https://biblehub.com/nasb/romans/10.htm>

⁴⁵ <https://biblehub.com/kjv/luke/21.htm#c>

⁴⁶ <https://biblehub.com/kjv/acts/2.htm>

⁴⁷ <https://biblehub.com/kjv/joel/2.htm>

and cause things to happen here on earth (which is astrology), and saying on other hand that the great Creator of the universe intentionally placed clues of His divine presence in His Creation (much like an artist signing his work), clues which we can discover (*i.e.*, the “signs” which the Bible alludes to in Genesis 1:14)⁴⁸ in our quest to find out if God is really there. For it is the idea that the heavens may reveal clues of God’s presence that is the basis of this book, and not astrology; for astrology, as I point out in the text of this book, is a concept which operates contrary to the Bible, and is one which I likewise personally reject.

Before closing on this topic, I wish to dwell for a moment on a very important point which Larson raised: A thermometer tells you whether a room is hot or cold. But a thermometer does not make the room either hot or cold. That is the way it is, as he pointed out, with a proper, Biblically-based perspective on looking to the heavens for signs of what God is trying to tell us. The signs in the heavens will not cause anything to happen here on Earth any more than a thermometer could cause a room to become hot or cold. But the things in the heavens can be used by God to tell us about things on Earth just as `a thermometer can tell us about the temperature in a room.

APPENDIX-A SECTION VII

ASTRONOMY AND ARCHITECTURE IN ANCIENT EGYPT AND WORLDWIDE

Certain aspects of ancient Egyptian architecture were apparently designed in a way to mimic the heavens.⁴⁹ So here again, we have an example of an ancient culture---a culture which the Magi would have been familiar with, and which preceded the rise of the Magi class of priests by many centuries---in which the things of Earth were thought of as reflecting the things found in heaven. This likewise lends support to the possibility, at least, that this line of thought could have influenced the thinking of the Magi, and perhaps Plato as well. And this might well be so, for after all, apparently, this tendency was evident in other cultures as well.⁵⁰

A. The Alignment Of The Giza Pyramids With The Belt Of Orion

Some have said that Egypt’s most famous and photographed pyramids, the three Giza Pyramids, were arranged so as to mimic the three stars which constitute a feature known as the belt of Orion in the constellation of the same name. Others have said that no, the relative similarity of the alignment of the Giza pyramids to the belt of Orion is not enough evidence to draw such conclusions because supposedly, they do not really line up after all, as one would expect to be the case if they had been deliberately built so as to line up with the belt of Orion.⁵¹

Yet, I cannot just leave it at that. For this is no small matter. You see, in ancient Egyptian culture, Orion was no ordinary constellation. For it played an important role in the most central aspect of their culture: the annual flooding of the Nile River, without which there would have been

⁴⁸ <https://biblehub.com/kjv/genesis/1.htm>

⁴⁹ <https://africame.factsanddetails.com/article/entry-187.html>

⁵⁰ <https://oi.uchicago.edu/research/symposia/heaven-earth-temples-ritual-cosmic-symbolism-ancient-world-0>

⁵¹ https://en.wikipedia.org/wiki/Orion_correlation_theory

no crops, and no life.

To examine this issue in depth, let us first consider some of the background concerning the constellation Orion. It has a very striking appearance, and it is one of the most prominent and easily recognizable constellations in the sky,^{52, 53} both then and now:⁵⁴

⁵² <https://www.planetguide.net/orion-constellation/>

⁵³ <https://www.pinterest.com/pin/515380751078717586/>

⁵⁴ The most convenient way to find Orion for persons today in the northern hemisphere--specifically, in locations from the subtropics to the subarctic latitudes (*e.g.*, the latitudes from Cairo, Egypt, to Oslo, Norway, and from Miami, Florida to Juneau, Alaska)---is to look to the southeast in the late evening sky (*e.g.*, around 10:00 P.M.) from late-November through the entire month of December, or in that same area of the sky in the early evening (*e.g.*, around 7:30 P.M.) from mid-January to early February. (In the first half of January, one would look for it in the southeast between those times.) It can also be seen straight south in the late evening sky from late January to early February; and it can be seen to the southeast or south earlier on in the winter months, and even during autumn, at hours deep into the night (November and December) or just before dawn (September and October).

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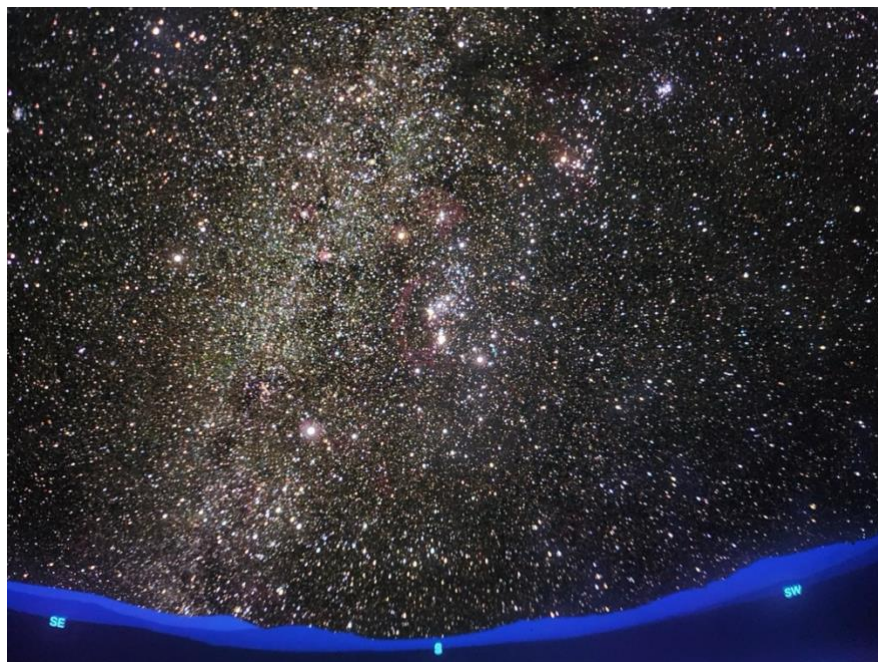
The constellation Orion the Hunter with a stick-figure illustration showing him holding out his shield before him and raising his club up over his head

Images provided courtesy of Starry Night Education. Photograph by the author.

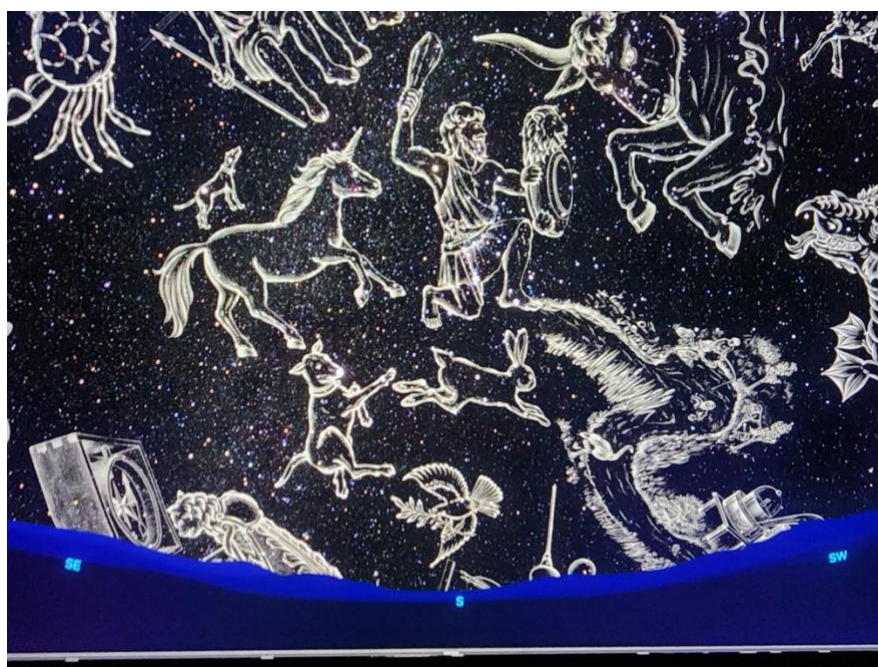
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As you look for it, bear in mind that in modern times the celestial equator divides Orion neatly in two, north and south (though in ancient times, the celestial equator lay slightly north of there.)

What this means for us today is that with respect to latitudes halfway between the equator and the North or South Pole (such as we find in the contiguous 48 states of the United States, in Europe, and in the Orient), when Orion is at its highest point in the sky, for those persons specifically in the northern hemisphere it will appear roughly halfway between the zenith (the point in the sky directly overhead) and the southern horizon, and for persons in the southern hemisphere it will appear at that time roughly halfway between the zenith and the northern horizon.



The same view of Orion as in the preceding photo, but without the stick-figure illustration
Images provided courtesy of Starry Night Education. Photograph by the author.



The same view of Orion (Orion the Hunter, just above center) as in the two preceding photos, but this
time with a full illustration.
Images provided courtesy of Starry Night Education. Photograph by the author.

In the Bible, Orion is mentioned four times.⁵⁵ Orion has also been recognized by many cultures worldwide for more than 30,000 years. In several cultures---including that of the ancient Greeks, from whose mythology we get our modern depiction of Orion---the constellation is shown as a hunter. Prior to that time, in ancient Egypt the constellation was known as the god named Sah.⁵⁶

Sah (Orion) rises just before the star Sirius, the star with the greatest apparent brightness in the heavens,⁵⁷ and the belt of Orion points approximately toward Sirius.⁵⁸ (This was true back then and remains relatively true today, though the apparent position of Sirius has shifted just slightly in the meantime.)

In ancient Egypt, Sirius was considered to be the goddess Sopdet. She was regarded as being the consort of Sah; and in time, Sah and Sopdet were merged into Osiris and Isis, the wife of Osiris.⁵⁹ In turn, Osiris (Orion) was considered to be the god of the dead, whom his widow Isis brought back to life after he had been murdered.⁶⁰

1. A Possible Relationship Between The Heliacal Rising Of Sirius And The Alignment Of The Giza Pyramids

The so-called “heliacal rising” of Sirius each year marked the beginning of the calendar year, for it also heralded the most important yearly event in that culture. The word “heliacal” (pronounced: <https://www.synonyms.com/pronounce/Heliacal>) is taken from the Greek word for the sun: “helios”. A “heliacal rising”⁶¹ takes place on the day when a star or other celestial object can first be seen again in the early morning sky when Earth, in its orbit around the sun, comes into a position where the celestial object will no longer appear to be so close to the sun that it gets lost in the sun’s glare.

The heliacal rising of Sirius is generally accepted as being the day on which that star is 3 degrees above the horizon while at the same time, the sun is still 8 degrees below the horizon; and in modern times, as seen from Cairo, Egypt (which lies adjacent to the Giza Pyramids), this takes place on August 3rd,⁶² although the date for this event has gradually changed by several weeks over the thousands of years since the pyramids were built.

The significance of the heliacal rising of Sirius lay in the fact that in ancient times, it heralded the arrival of the inundation season, the time when the Nile River would overflow its banks and flood the land, leaving behind rich deposits of fertile silt.⁶³ Since the silt and water from the flood were the source of life for all crops in Egypt, there is no overstating the importance of this flood-

⁵⁵ <https://bible.knowing-jesus.com/topics/Orion>

⁵⁶ [https://en.wikipedia.org/wiki/Orion_\(constellation\)](https://en.wikipedia.org/wiki/Orion_(constellation))

⁵⁷ <https://en.wikipedia.org/wiki/Sirius>

⁵⁸ <https://www.constellation-guide.com/orions-belt/>

⁵⁹ <https://en.wikipedia.org/wiki/Sopdet>

⁶⁰ <https://www.worldhistory.org/osiris/>

⁶¹ https://en.wikipedia.org/wiki/Heliacal_rising

⁶² <https://skyandtelescope.org/observing/a-real-scorcher-sirius-at-heliacal-rising/>

⁶³ https://en.wikipedia.org/wiki/Flooding_of_the_Nile

--and the heliacal rising of Sirius---in ancient Egyptian culture.

The ancient Egyptians considered the flood itself to be caused by the tears of Isis⁶⁴ as she mourned the death of her husband, Osiris. And so the return of Orion (Osiris) into the early morning sky, just before Sirius would appear, was looked upon as a reenactment of the mourning of Isis and of her then causing Osiris to be reborn in the next life.⁶⁵

As it turns out, because Sirius appears to be the brightest star in the sky (both then and now), it has only a very brief interval between the time when it disappears in the glow of evening twilight in the spring and its reemergence at its heliacal rising at dawn a few months later, in the summer; this interval would be noticeably longer for dimmer stars, for they would disappear more quickly into the glow of evening twilight at one point in time and would then take longer to emerge in the glow of morning twilight as they would appear to come around from the sun a few months later. And it would no doubt be easy for the ancient Egyptians to conclude that this apparent ability of Sirius itself to spend so little time in the realm of the dead, so to speak, was an illustration of the moving power which brought Osiris/Orion back to life.

The ancient Egyptians also believed that a pharaoh became Osiris upon death, and so the appearance of Orion rising just ahead of Sirius just as the inundation season began was thought of as being the resurrection of the deceased pharaoh as well.⁶⁶ Interestingly enough, the modern depiction of Orion (based on the Greek legends of him being a hunter), shows a striking overlap with certain Egyptian images of pharaoh in his chariot while hunting,^{67, 68} which leaves me wondering whether the Greeks developed the theme of Orion being a hunter all on their own, or whether they were in part influenced by Egyptian culture and art in so doing. In any event, the idea that the Giza Pyramids actually do line up with the stars of the belt of Orion is an idea which should be considered thoroughly due to the special importance which Orion held in ancient Egyptian culture.

Now, this idea that the three stars of the belt of Orion line up with the three Giza Pyramids is known as the Orion Correlation Theory.⁶⁹ One unfortunate aspect of that theory is this: The persons who first proposed it published a book with an illustration showing the supposed overlap of the pyramids with the belt of Orion, but the illustration was based upon a map in which the pyramids were inverted from the way they actually are in order to produce this overlap, and without any statement from the authors advising the readers that this is how they did things.

One might think from the start therefore that on this basis alone, if nothing else, there is no need to investigate this matter further. The thing is, however, I am deeply concerned that by dismissing the whole issue altogether on the basis of this one faulty point, we may overlook the fact that the theory's authors had made another a critical mistake right at the beginning; for I think that by correcting that initial one key point---a potential correction which the authors apparently were

⁶⁴ <https://en.wikipedia.org/wiki/Isis>

⁶⁵ <https://www.ancient.eu/osiris/>

⁶⁶ <https://www.britannica.com/topic/Osiris-Egyptian-god>

⁶⁷ <https://swisscows.com/en/images?query=pharaoh+chariot>

⁶⁸ <https://swisscows.com/en/images?query=pharaoh+chariot+hunting>

⁶⁹ https://en.wikipedia.org/wiki/Orion_correlation_theory

oblivious to---we may find that there is in fact more to this theory than meets the eye.

Specifically, the Orion Correlation Theory, as put forth by its authors, is based on the assumption that the relevant correlation between the Giza Pyramids and the belt stars of Orion should be from the perspective of someone matching the view of the pyramids as seen by someone looking down on the pyramids from the heavens above (perhaps Orion/Osiris himself) as compared to the view of the belt of Orion as seen by us here on earth looking up. This correlation would be slightly out of alignment, however, for the northeastern-most pyramid (the Great Pyramid, Khufu) is slightly to the south of the line formed by the other two pyramids (Menkaure, at the southwest end, and Khafre in the middle), whereas by contrast, the northwestern-most star of the belt of Orion (Mintaka) is instead slightly to the north of the line formed by the other two stars (Alnitak at the southeast end, and Alnilam in the middle). So there is a mismatch in this supposed alignment, which apparently is why the authors first inverted the map of the Giza Pyramids before using it in their book; for in doing so, one can make it appear that there is no mismatch.

What we must consider, however, is that perhaps the authors of this theory were only half wrong. That is, perhaps they were right about the first part, in which the proper perspective from which to consider this issue starts with a view of the Giza Pyramids as seen by someone looking down from the heavens above. But then, with respect to the second half, perhaps they were wrong about it; for perhaps the corresponding view of the belt stars is also to be considered from the perspective of Orion himself in the heavens above, as he looked down upon the earth, rather than from the perspective of us here on Earth looking up into the heavens above (which is what the authors of the theory apparently had assumed).

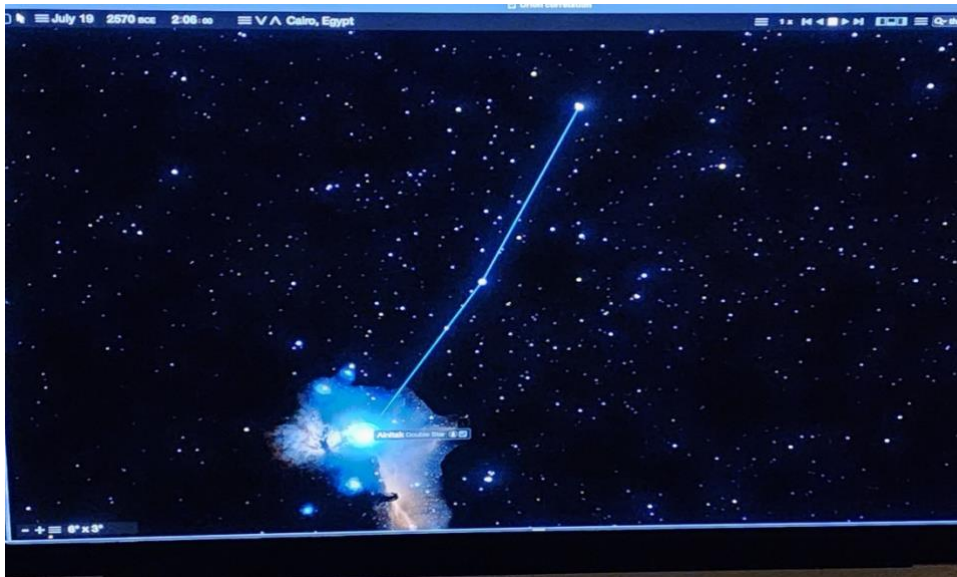
Putting things into proper context then, from the perspective of someone in the heavens looking down on earth, such as Osiris (Orion), the pyramids (starting with the Great Pyramid) are in a line going from the upper right (the northeast) to the lower left (the southwest), whereas the belt stars (from the perspective of Osiris himself) would start at the left side of Orion (just above his hip) and then go downwards from there toward the top of his right thigh while he gazed down upon the pyramids. In other words, perhaps the proper perspective would not be one which would show the belt stars of Orion supposedly overlapping the Giza Pyramids, but rather would be from the perspective of the belt stars crisscrossing the pyramids instead in the middle (*i.e.*, the middle pyramid and the middle star).

Suddenly then, from that perspective, the apparent misalignment of the pyramids does in fact seem to fit after all, and we can see that if such is the case, it would not in fact be a true misalignment. For if the stars and the pyramids should be thought of as crisscrossing each other instead of overlapping each other, then the proper position of the middle pyramid (Khafre) should be just as far above a line between the other two pyramids as the star Alnilam (the central star of the Belt) would be below a line running between the other two stars. In other words, under that scenario, the alignment of the pyramids would be a mirror image of the alignment of the stars, as is shown in the following two images:



View of the main Giza pyramids.

Image from Google Earth Pro: <https://google-earth-pro.en.softonic.com/mac>. Photograph by the author.

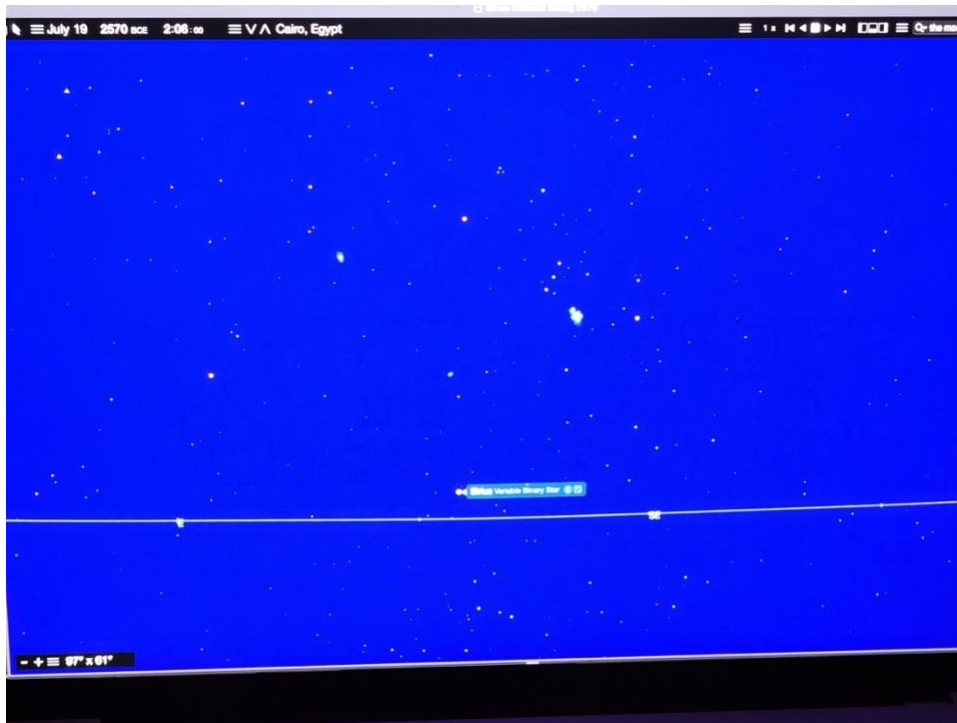


A close-up of the Belt of Orion and a nebula (LBN 918) surrounding the southeasternmost star of the Belt, Alnitak.
(Also shown is the Horsehead Nebula.)

(Note: In celestial images, East is to the left and West is to the right.)
Images provided courtesy of Starry Night Education. Photograph by the author.

That being said, let us now consider the fact that neither now or in ancient times would the Giza Pyramids even come close to lining up in this crisscross fashion with the belt of Orion either when Orion reaches its highest point in the sky---*i.e.*, as it passes by in the heavens to the south---nor would they do so at the very moment that Orion is rising, either. However, in ancient times, the belt stars would appear to have a close correlation to the pyramids (in crisscross fashion) shortly after Orion had risen, when they would be positioned about 22 to 25 degrees above the horizon. The belt stars would in fact line up in this particular way once a day, every day of the year. Sometimes this alignment would come by day, sometimes by night, sometimes at dawn, and sometimes at dusk, sometimes at midnight, and sometimes at noon, depending on the time of year.

What this means is that Orion would therefore enter into this configuration at some point in time on the day of the heliacal rising of Sirius. Now, here is how Orion would look at the very moment of the heliacal rising of Sirius as seen from Cairo, Egypt:



Orion and Sirius at the moment of the heliacal rising of Sirius at 02:06 UTC on July 19, 2570 B.C. as seen from Cairo, Egypt.

(Note: The Belt of Orion consists of the three stars in a row going up and to the right, just to the upper-right of the center of the photo.)

Images provided courtesy of Starry Night Education. Photograph by the author.

This is Orion at 02:06 UTC on the morning of July 19, 2570 B.C., during the midst of the period when researchers commonly believe that the three main Giza Pyramids were built.⁷⁰ What cannot be emphasized strongly enough is that this was, as I said, at the very moment itself when the heliacal rising of Sirius took place each year during that era. So in other words, by building the Giza Pyramids the way they did, the builders set them in place such that from a view in the heavens above, the pyramids and the belt stars of Orion would appear to crisscross each other in symmetrical fashion at the midpoint (in heaven: the star Alnilam; and on Earth: the pyramid Khafre) at the most important moment of the day on the most important day of the year. I do not know if this match-up was made intentionally or unwittingly, but the match-up does indeed exist; and we should consider what meaning this might have if in fact this was intentionally done, as I believe it was.

With that in mind, since Osiris (Orion) rising in the east is supposed to display pharaoh gaining life in the next world, I cannot help but wonder if the alignment of the Giza Pyramids in this criss-crossed manner⁷¹ is something which pertains to the fact that the mummies of pharaohs commonly show pharaoh with his wrists crossed over his waist while his hands hold the traditional Egyptian symbols of power, the flail and the shepherd's crook, which are shown crossed upon his chest.⁷²

In my research I have been unable to find when it was that the mummies of pharaohs first showed the crook and flail crossed upon pharaoh's chest. But if the crossing of pharaoh's wrists on the pharaohs' mummies came before the Giza Pyramids were built, then I would have to wonder if perhaps the aligning of the Giza Pyramids in the way in which they are (*i.e.*, crisscrossing with the belt stars of Orion at the heliacal rising of Sirius) was intended to show the pyramids participating in this imagery, thereby being at least one of the ways in which the mummies would thereby be joined with heaven above. In the alternative, if the crossed wrists and symbols of power developed after the Giza Pyramids were built, could it perhaps be the case that this development in mummification was introduced as a means of mimicking the crossing of the belt of Orion with the Giza Pyramids?

At this point let us also reflect for a moment on the point that the ancient Egyptian's basic compass alignment was not to the north, as ours is, but rather, it was instead to the south. This would mean that if the crisscrossing of the wrists of pharaoh's mummy at the waist was meant to recreate the crisscrossing of the Giza Pyramids with the belt of Orion, then perhaps we should think of the lands to the north of the Giza Plateau as lying below the waist of pharaoh/Osiris.

The thing is, in such a configuration, the area just below the waist (*i.e.* just north of the Giza Plateau) is where the fertile fields adjacent to the Nile open up widely east and west. This is where the fruitful harvest of Egypt comes from, which feeds all of Egypt, and even provides Egypt with enough agricultural abundance to have exports of such products. With that in mind, let us

⁷⁰ Bear in mind that this would be the date on the Julian calendar, and that---depending on how one would calculate the corresponding date on the Gregorian calendar---this date would correspond to the morning of June 28th of that year on our modern, Gregorian calendar if one were simply to extrapolate backwards to that time to calculate the corresponding date on the Gregorian calendar.

⁷¹ *i.e.*, in a manner which does at least appear to show them crisscrossed with the belt of Orion at this one, most-important moment of the year in ancient Egypt

⁷² https://en.wikipedia.org/wiki/Crook_and_flail

consider that in human anatomical terms, the area just below the waist is where the male reproductive organs are, which produce male fertility.

What may also be significant is the direction in which one would face to observe the heliacal rising of Sirius. During the era in which the Giza Pyramids were built, at the moment of the heliacal rising of Sirius each year, it would be seen in the skies to the southeast, at an azimuth (heading) of just under 116 degrees: *i.e.*, almost 26 degrees to the south of straight east. The thing is, to the ancient Egyptians, “south” and “east” had important meanings. As the authors of *Before Philosophy* put it, the ancient Egyptian,

[T]ook his orientation from the Nile River, the source of his life. He faced south, from which the stream came. One of the words for ‘south’ is also a term for ‘face’; the usual word for ‘north’ is probably related to a word which means the ‘back of the head’. On his left was the east and on his right was the west. The word for ‘east’ and ‘left’ is the same, and the word for ‘west’ and ‘right’ is the same.⁷³

With that in mind, I can’t help but think that the crossed wrists of pharaoh and his symbols of power, left and right, may also symbolize pharaoh’s unification of Egypt east and west just as pharaoh’s double crown, which combined the crowns of Upper and Lower Egypt, showed pharaoh unifying Egypt north and south.⁷⁴

In any event, from this we can see that just as we commonly portray our usual orientation of geography as showing north being up, to the ancient Egyptian, by contrast, the usual orientation, as I said, was instead to the south. More precisely, though, the authors of *Before Philosophy* admit to the following:

We were technically incorrect in stating that the Egyptian’s orientation was to the south; more precisely we should say that the Egyptian ‘australized’ himself toward the source of the Nile.⁷⁵

The authors of the book also note that because the sun, which gave life and light to all, rose in the east, the east was referred to as “God’s Land”.⁷⁶

Now, as we can see from Google Earth Pro, the ancient Egyptians’ view toward Sirius at its heliacal rising combined all of this into one: For a view from the Giza Plateau out toward a compass heading of about 116 degrees (the azimuth of Sirius at its heliacal rising) looks out toward the midst of the Nile just as the land which it fertilizes starts to spread out into the Nile Delta:

⁷³ *Before Philosophy*, p. 51

⁷⁴ <https://www.ees.ac.uk/the-royal-crowns-of-egypt>

⁷⁵ *Ibid.*

⁷⁶ *Ibid.*



The line of sight (red line in the center, running from upper left to lower right) at a heading of 116, from the Giza Pyramids out toward the azimuth of Sirius at its heliacal rising (116), to the place where the lands fertilized by the Nile River start to expand out into the Nile Delta.

Image from Google Earth Pro: <https://google-earth-pro.cn.softonic.com/mac>

So this view combines a view toward the arrival of the Nile into their land from the south with a view toward God's Land to the east.

In fact, as can be seen on Starry Night, this view also faces to within about two degrees of where the sun would rise at the winter solstice each year at that time.⁷⁷ And for that matter, over the course of the next sixteen minutes following the helical rising of Sirius, Sirius would move into position directly over the exact point of sunrise at the winter solstice, right about the time---and possibly at the very moment itself---when Sirius would disappear in the glow of morning twilight, just after its appearance a few minutes earlier at the very moment of the heliacal rising itself.

So in other words, the heliacal rising of Sirius was neatly pinned roughly halfway between east and south, and virtually directly over the point of sunrise at the winter solstice, which is when the sun would appear to be reborn, so that it could bring forth new life all over again, just as it had always done. It would come as no surprise, then, if all of this added to the belief of the ancient Egyptians that the heliacal rising of Sirius should be considered the centerpiece of Egyptian life and the calendar.

B. A Possible Relationship Between The Location Of The Giza Plateau, Osiris/Orion,

⁷⁷ In modern times, at the winter solstice the sun rises at an azimuth (heading) of just under 117.5 degrees (on December 21st) as seen from Cairo, whereas at the time when the Giza Pyramids are believed to have been built, it rose at an azimuth of 118 degrees (on January 10th).

And The Life-Giving Flow Of The Nile River

Yet another clue as to the importance of Orion in ancient Egyptian culture might likewise be found in astronomy. In our modern day and age, Orion appears to stand upright when it is nearly due south (specifically, when it has an azimuth centered at about 183):



Orion in modern times, showing it upright; at which time it is centered on an azimuth of 183 (*i.e.*, just three degrees west of straight south).

Images provided courtesy of Starry Night Education. Photograph by the author.

But around 2570 B.C., which was right around when most researchers believe that the Giza Pyramids were built, Orion appeared to stand upright when it had an azimuth centered at about 162 (to the south-southeast):



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Orion standing upright as seen from Cairo, Egypt on August 30, 2570 B.C.

Orion is centered on the star Alnilam, the middle star of the belt, this time at an azimuth of 162.

Images provided courtesy of Starry Night Education. Photograph by the author.

As it turns out, when one is looking out along that heading from the Giza Pyramids, one is looking out toward where the Nile River turns to approach Lower Egypt (which is where the Giza Plateau itself lies):

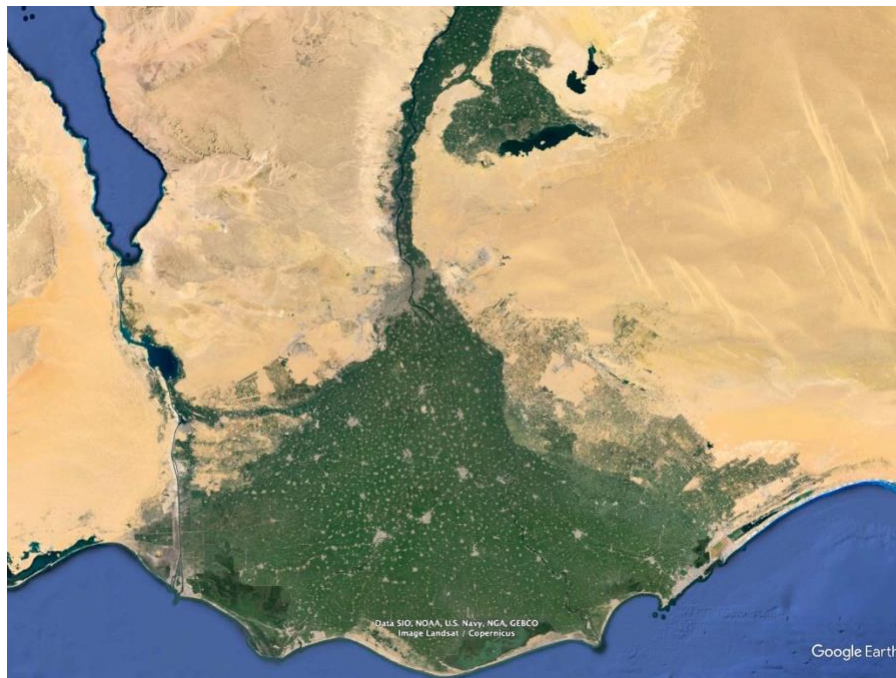


The line of sight at a heading of 162 (red line in the center, running roughly vertically) from the Giza Pyramids down toward where the Nile River begins to flow into Lower Egypt.

Image from Google Earth Pro: <https://google-earth-pro.en.softonic.com/mac>

In other words, around 2570 B.C., the Nile River would appear to begin to flow to Lower Egypt from directly between the legs of Osiris/Orion at the time within each 24-hour time period when Osiris/Orion would be standing fully upright.⁷⁸

Seeing this overlap of Osiris/Orion with the Nile River would no doubt seem appropriate to the ancient Egyptians, for as I pointed out in the text itself (in another context), the attribute of the flowing water of a river bringing forth new life (especially following floods) does have a parallel to human reproduction, in which the flow of the ejaculate of the male into the riverbed (so to speak) of the female produces new life. This is most clearly illustrated by considering the above image of Orion (showing the view which, in ancient times, would be seen by someone in Cairo looking south-southeast toward Orion when it would be fully upright) and an image of Egypt inverted from the way which we usually consider it today (*i.e.*, this time, with south being up instead of down), thereby illustrating how the floodwaters of the Nile could be thought of as coming from Orion's phallus to fertilize the land:



The Nile Delta as seen with south, rather than north, being up.
Image from Google Earth Pro: <https://google-earth-pro.en.softonic.com/mac>
(Photograph by the author.)

⁷⁸ Note: This would have been for about two and a half hours each day (whether by day, or by night) after Orion would have been in the position in which the belt stars would appear to crisscross with the Giza Pyramids.

It is with all this in mind that we should also consider yet another interesting aspect of Egyptian mummification, albeit from a later period. For researchers have concluded that King Tut (King Tutankhamun) was mummified with an erect phallus: <https://www.livescience.com/42290-king-tut-mummified-penis-explained.html>.

Granted, King Tut lived about 1,200 years after the Giza Pyramids were built, but it may be the case that the thoughts and beliefs about pharaoh in his era were at least similar to what they had been during the building of the Giza Pyramids. Consistent with that idea, for instance, is the fact that changes in the written language, for example, came about quite slowly.⁷⁹ And it is believed that the reason King Tut was mummified in this fashion was to make him in his mummified state appear as similar to Osiris as possible during those times when Osiris was at his regenerative best.

In fact, the constellation Orion (Osiris) itself would seem to support this conclusion. For the imagery which we have of Orion from the ancient Greeks is that the sword of Orion can be seen hanging from his belt directly between his legs: [https://media.sciencephoto.com/image/r5500433/800wm/R5500433- Orion_constellation.jpg](https://media.sciencephoto.com/image/r5500433/800wm/R5500433-Orion_constellation.jpg) . The thing is, that is never the place where a man in the days of old would wear his sword, and he would instead wear it on one hip or the other. By contrast, in this illustration we see that the alignment of the sword with the stars of the belt would suggest that Orion's sword was to be thought of supposedly as being directly between his legs: <https://cdn.wallpapersafari.com/74/83/eJf0WO.jpg> .

All in all, then, it may be that as the ancient Egyptians beheld Osiris (Orion) standing astride the Nile River, with its flow coming forth to fertilize the land, it may have occurred to them, in their own way of thinking, that Osiris was fully upright in more ways than just one. For the position of the "sword" stars of Orion is more consistent with that of a phallus than that of a sword. In fact, the middle "star" of the sword stars is not just a star; rather, it is a giant gas cloud---a "nebula",⁸⁰ in the parlance of astronomy---which glows from the light of a star imbedded within it. This nebula is commonly called the Orion Nebula.⁸¹ The thing is, when viewed without the aid of optics, the reddish coloration of the Orion Nebula cannot be seen, and it looks like a cloudy, milky mist; that is, it looks like the ejaculate of a male, as can be seen in the preceding photos of Orion. (Note: This is not easily seen from modern cities, in which the glare of city lights can wash out the view of faint objects in the heavens.)

Personally, I find it hard to believe that the ancient Egyptians would have failed to notice this, and so this may have had at least some influence on their decision as to just exactly where in all of Egypt they would want to locate these massive pyramids. For it is from the Giza Plateau that this relationship between the life-giving flood of the Nile River and Osiris (Orion) could be most easily seen during that era.

As it also turns out, when one is looking out along that same heading (162) from the Giza Pyramids, one is looking straight out toward Luxor (Waset/Thebes), many miles beyond the

⁷⁹ Scott, Joseph and Scott, Lenore, *Egyptian Hieroglyphs For Everyone*, p. 78-79.

⁸⁰ <https://www.britannica.com/science/nebula>

⁸¹ <https://science.nasa.gov/mission/hubble/science/explore-the-night-sky/hubble-messier-catalog/messier-42/>

horizon, which was a provincial administration center even back when the Giza Pyramids were being built ^{82,83}



The line (in red, through the middle, running up and down) from the midst of the Giza Pyramids (specifically, Khafre) to Luxor/Thebes at a heading of 162.

Image from Google Earth Pro: <https://google-earth-pro.en.softonic.com/mac>
Photograph by the author.

⁸² <https://en.wikipedia.org/wiki/Luxor>

⁸³ <https://www.livescience.com/37740-luxor.html>

More significant, I think, is the fact that the famous Valley of the Kings is immediately adjacent to Luxor/Thebes. The Valley of the Kings was used extensively from 1539 to 1075 B.C. as a burial place for pharaohs, including King Tutankhamun ("King Tut").⁸⁴

I am left wondering then, did the ancient Egyptians, whose skills at mathematics were probably good enough to discern this alignment, think of this alignment as being significant at all (assuming that they did notice this)? And is it perhaps the case that Luxor eventually grew into the great metropolis that it turned into years later, and that the Valley of the Kings became a prominent burial site, at least in part because someone did notice this relationship (whether it had ever been intended to align things this way)?

1. Sopdet/Sirius Brings Osiris/Orion Back To Life

As we have seen above, the ancient Egyptians believed that Sopdet---the wife of Osiris, whom the Egyptians equated with the star Sirius---brought Osiris/Orion back to life after he had been murdered. As it turns out, there is an illustration in the heavens which corresponds to the belief that Sopdet brought him back to life.

After each winter, when Orion can be plainly seen in the night sky, Earth comes around to a place in its orbit from which Orion appears to be so far to the west that it appears close to the western horizon shortly after sunset (*i.e.*, to the left of the sun), and thus becomes completely lost in the glow of evening twilight in the Spring (which I shall refer to as the "heliacal setting" of Orion). From that point on, even though Orion would still pass across the heavens each day, it would be so close to the sun that it would remain invisible until Earth, in its orbit, would cause the sun to appear to go above and around to the other side of Orion so that Orion could first be seen once again, this time in the morning sky (to the right of the sun), with each star of Orion having its own heliacal rising just before sunrise:

⁸⁴ https://en.wikipedia.org/wiki/Valley_of_the_Kings

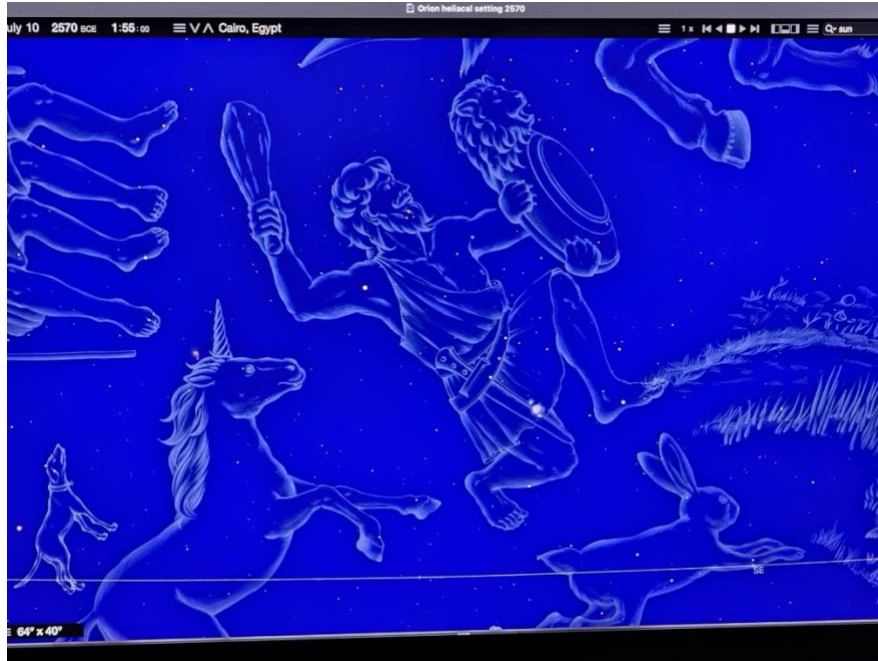


The heliacal setting of Orion following sunset in April of 2570 B.C., as seen from Cairo, Egypt.
Images provided courtesy of Starry Night Education. Photograph by the author.



The following month, the sun (with daylight removed) moves into position over Orion during its transition from being west (right) of Orion, when it would have set before Orion in the evening sky, to being east (left) of Orion, and thus eventually rising after Orion in the morning sky in May of 2570 B.C., as seen from Cairo, Egypt. (Note: The motion of the sun in the months preceding and following this image would be from West---i.e., right---to East--i.e., left.)

Images provided courtesy of Starry Night Education. Photograph by the author.



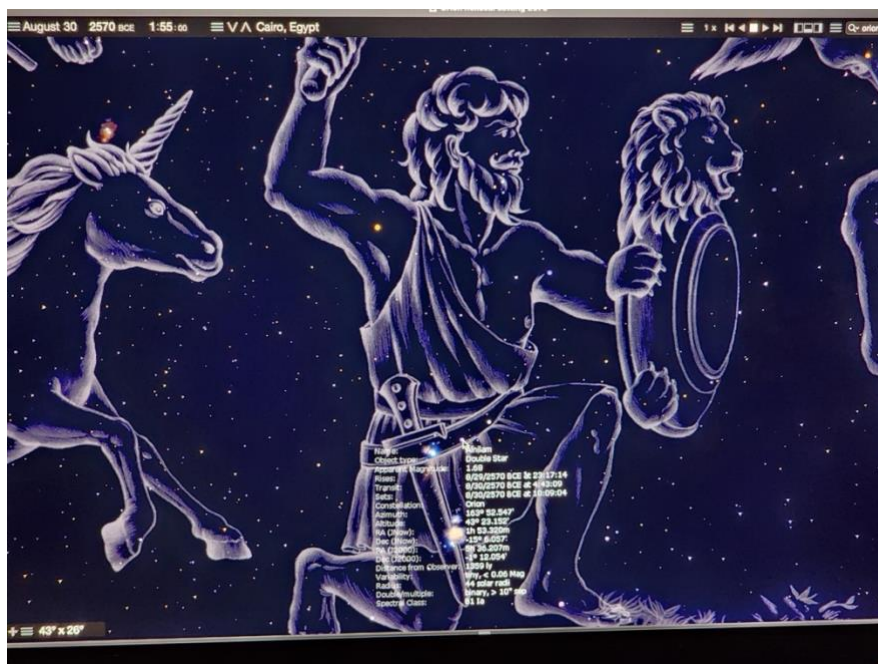
Two months later, the heliacal rising of Orion takes place before sunrise in July of 2570 B.C., as seen from Cairo, Egypt. The sun (and the star Sirius) are out of the picture and below the horizon to the lower left. The white horizontal line marks the horizon.

Images provided courtesy of Starry Night Education. Photograph by the author.

This occurs just over one week before the heliacal rising of Sirius (Sopdet) during that era (July 19th); so in that context, Sirius, coming up higher and higher each morning from behind Orion, would appear to be pushing Orion up into the position from which he would be resurrected.

At that moment, however, Osiris/Orion would not yet have reached the point where it would appear to be standing upright, and there would be so much glow from morning twilight that Orion could not yet be fully seen in any event. But this would soon change. For as the summer wore on, Orion could be seen to rise earlier and earlier each morning until there would come a time when it would be standing completely upright while it would still be fully dark out, just before morning twilight would begin.

Here, for instance, we see Orion once again (as was shown previously) at 01:50 UTC on August 30, 2570 B.C. (*i.e.*, at the very start of morning twilight), as seen from Cairo, Egypt:



Orion standing upright at the very start of morning twilight as seen from Cairo, Egypt on August 30, 2570 B.C.

Note: Orion is centered on the star Alnilam (azimuth: 162), the middle star of the belt.

Images provided courtesy of Starry Night Education. Photograph by the author.

The thing is, this appearance of Orion standing up tall for the first time that season during full darkness (*i.e.*, when it would, for the first time that season, reach its greatest strength, and could be most completely seen) would be just as the Nile would be preparing to reach its crest, which, during that time, would usually take place the first week of September.⁸⁵ And as noted above, this would be when the Nile would appear to flow into lower Egypt from between the legs of Osiris/Orion.

Furthermore, the crest of the Nile in September would usually be followed (though not always) by a slight increase in October.⁸⁶ This is notably similar to how male copulation takes place, with the main flood of ejaculate coming at one point, which is usually followed (though not always) by a lesser flow immediately thereafter.

What we should keep in mind here is that the annual surge of floodwaters would start to have an increase in volume around mid-July---in other words, at about the time of the heliacal rising of Sirius. So in other words, the appearance of Sopdet/Sirius would appear to bring about the gradual reemergence of Osis/Osiris from mid-July to late August into his full strength and glory, and he would then promptly fertilize the land once more, as he had always done. In keeping with this, Osiris is sometimes portrayed as being black (like the fertile mud deposited by the annual flood of the Nile) and is sometimes portrayed as being green (in keeping with his role of fertilizing the land and bringing forth the crops).⁸⁷

⁸⁵ https://en.wikipedia.org/wiki/Flooding_of_the_Nile

⁸⁶ https://en.wikipedia.org/wiki/Flooding_of_the_Nile

⁸⁷ <https://en.wikipedia.org/wiki/Osiris>

2. The “Incomplete” Great Pyramid

It is commonly believed that the Great Pyramid at Giza is incomplete in at least two respects. Well, perhaps it is; I myself can't really say for certain that it is or isn't. And yet, upon consideration of the alleged incomplete aspects of it, I cannot help but wonder if those who say it is incomplete are perhaps assuming too much.

In order to examine this question thoroughly, we must first consider the contrast between ancient and modern thought in terms of assessing what reality is. For this I refer the reader to another section in this Appendix, the section entitled The Merger Of The Physical And The Spiritual Prior To Plato.

a. The Pyramid Without A Top

The first aspect of incompleteness pertains to the top of the pyramid. It is commonly believed that some stone or stones may be missing which would have completed the pyramid structure, and it is believed that this final portion of the pyramid---which would be known as a pyramidion (pronunciation: <https://forvo.com/word/pyramidion/#en>) on ancient Egyptian structures⁸⁸--- somehow got removed.

This is puzzling to researchers, and many theories abound about the presumed missing capstone.^{89, 90} No remnant of any stone or stones which could comprise the top portion has ever been found, although of course, if it had been made of gold, this would explain why no trace of it could be found today, for the gold would have been carried off many years ago. That being said, however, it would probably be the case that if the capstone really did have any gold on it at all, it would have simply been covered in gold rather than made entirely of solid gold.⁹¹ And so we are left with a mystery as to why the underlying stone which the gold would have covered still has not been found anywhere.

Perhaps, though, there never was a capstone; and perhaps there never even was any intention at all to have one, as has been speculated about before.⁹² Consider this: As any astronomer---amateur, or professional---can tell you, the platform which exists at the top of the pyramid would be that entire region's most excellent observing station for astronomy back in that day and age (and would still be outstanding today, despite the light glow from nearby Cairo). For even in ancient Egypt, although there would be no air pollution in the modern sense to contend with, there would be smoke from fires to deal with (particularly at night), as well as dust from high winds and other sources.

So having an observing platform high above the haze would transform the excellent observing conditions on the ground into nearly perfect conditions up at the top. This would be

⁸⁸ <https://en.wikipedia.org/wiki/Pyramidion>

⁸⁹ <https://www.dawn.com/news/1079617>

⁹⁰ <http://www.openculture.com/2019/12/what-the-great-pyramid-of-giza-wouldve-looked-like-when-first-built.html>

⁹¹ I base this conclusion on the assumption that having gold on the capstone would be for visual effect, which would render any gold other than just that which would be needed for a covering unnecessary.

⁹² <https://freshpress.info/uncategorized/missing-capstone-great-pyramid-giza/>

particularly pronounced just before dawn (especially at the conclusion of a night which with little or no wind), when all the smoke and particulate matter in the atmosphere would tend to settle down into a layer of air closest to the ground, leaving the dazzling, pristine view of the heavens from the top of the pyramid at its absolute best. In addition, the Giza pyramids are built on a plateau high above the surrounding plain,⁹³ and this plain itself would be above much of the smoke and dust in the area, thereby potentiating the advantage to be gained by being on top of the pyramid.

The same might hold true for light pollution. For although ancient Egyptian astronomers did not have street lights to contend with, it is nevertheless the case that any source of light at night in those days would have to have come from a flame. And even if you do not have a lot of flames around you, if you are in relatively close proximity to a flame, that could be enough to ruin your so-called night vision.

More specifically, I remember reading once back in the '70s that gaining your night vision is a two-part process. The first part is mechanical: Within 30 seconds of entering a dark area, the iris of your eye can fully dilate. This immediately gives you 50% of your night vision. Then, a chemical process starts to take place, changing the sensitivity of your eye to dim light. As a result, after five minutes, you will have achieved 90% of your optimal night vision. Following that, the chemical process continues, and you can achieve 99% of your optimal night vision 30 minutes after being away from light (although the revised version of that today is that it may take up to 40 minutes).⁹⁴ So if the ancient Egyptians used the top of the Great Pyramid as an observing platform (and I can assure you that any astronomer would love to do so, either then or now), then that position so high above the ground would give them an area above the smoke and dust where they would also have no lights to contend with.

Perhaps significantly, the elevation above the dust, smoke, and haze would tend to help them overcome, at least in part, the phenomenon covered elsewhere in this book known as “atmospheric extinction”: the tendency of objects to appear more and more dim when they appear closer and closer to the horizon.⁹⁵ For the greater the atmospheric haze, the longer the horizon will appear to glow just after sunset or just before sunrise, thereby preventing some stars near the horizon from being seen which otherwise could have been seen had the atmosphere near the horizon not had such a bright glow to it.

That being so, this would lead to the question of whether, from their observing platform atop the pyramid in the morning---high above the dust and smoke which would have settled near the ground overnight---they perhaps could have observed the heliacal rising of Sirius a day or so sooner than observers on the ground could. If so, this would no doubt seem to bestow upon anyone who could actually observe this a very special, divine power, and would seem to make the top of the pyramid a very special, divine place.

The thing is, in their minds, they would of course seek an explanation as to why any of this might be true. And although they were obviously brilliant people, we nonetheless could not expect their ancient minds to seek a scientific explanation for this, such as the concept of atmospheric

⁹³ <https://www.constellation-guide.com/wp-content/uploads/2014/06/Giza-pyramids.jpg>

⁹⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5787096/>

⁹⁵ <https://asterism.org/resources/atmospheric-extinction-and-refraction/>

extinction. That being the case, I cannot help but think that one possible explanation for this may be that in their thinking, they believed they were so high up when they were on that platform that they had actually ascended up into the heavens themselves, at least to the entry level.

There may be another piece of evidence for the possibility that they thought they were already in the heavens. Bear in mind that because Earth, as we know today, is curved, we can see that when the sun sets in any given location, any tall buildings which are in the area, or any mountain peaks nearby, will still be touched by the sun after the sun itself has already disappeared as seen from down on the ground. So anyone who is on top of such a structure or mountain will thus be able to see the disc of the sun after anyone down below can see it. The same holds true for sunrise: those on top of the structure or mountain will be able to see the sun before those lower down will be able to do so.

For the ancient Egyptians, this may have had profound implications. It would mean that in the evening, for instance, anyone on top of the pyramid would be able to see the sun while the sun, in their thinking, had already descended below the Earth, into the land of darkness, the very realm of the dead; and the same would hold true in reverse at sunrise. In that context, it would come as no surprise if perhaps they concluded that the only explanation as to why they could see the sun while it would be in the realm of the dead would be if they were observing it from the heavens while they were on top of the pyramid. This would make the top of the pyramid a particularly special place in light of the fact that they had no modern, tall buildings from which to observe this same phenomenon, nor were there any mountains around from which to do the same. So a platform atop the pyramid from which to observe this phenomenon might possibly reinforce the idea that such a platform was a sacred place.

All things considered then, I cannot help but think that perhaps the absence of a capstone came about intentionally, either because they never planned on having one up there to begin with, or because they changed their minds about having one once they had built the pyramid up to that point and had come to realize what the observing platform could do for them. For not only would the ancient Egyptians (some of them, at least) not have wanted to eliminate their most excellent observing platform by putting a capstone on it, but when it comes to building the pyramid itself, they may have concluded that there would essentially be no need to go any farther than they had already gone by placing a capstone on it; for the platform itself, in their thinking, may have been thought of as having already penetrated physically (and not just spiritually) up into the heavens, thereby eliminating the need to gain any further height for the pyramid. This likewise leads me to believe that if such were the case, then probably only a very select group of people would ever have been allowed up on that platform.

True, in their way of thinking, each and any pyramid would be, in a substantive way, something which was a part of heaven anyway, even if it was not tall enough to produce this effect itself. But no doubt they also would have been impressed by what we today would call objective, physical corroborating evidence of that.

b. The Riverbed For The Boat Of The Sun

The other feature of the Great Pyramid which researchers believe is unfinished is the lower

level.^{96,97} It is very roughly and unevenly hewn from rock, and is completely unadorned. It is uneven in height as well, with the eastern end of the larger chamber therein being about 140 inches from the ceiling, whereas the western end is about 10 inches from the ceiling. There is a portion in the middle where the chamber is at its deepest (155 inches from the ceiling), and which has a shaft in it about another 40 inches deep. Also, there are roughly hewn trenches throughout.⁹⁸

From all of this, Egyptologists generally conclude that the lower level is incomplete. And yet, I wonder about that.

You see, ancient Egyptians believed that the sun traveled through the heavens on a barge, and that every night after sunset, this barge would sail into the pyramid to pick up the soul of pharaoh and carry him off to the east, where he would rise again from the dead at sunrise. So in order for this to happen, perhaps the pyramid would have to have a riverbed to accommodate the barge.

The thing is, in the minds of the ancient Egyptians, the substantive reality of what something actually is was based strictly upon what feelings it would produce in the mind of the beholder.⁹⁹ In the present context, this would mean that the more that the trench looked like a riverbed to anyone, the more it could actually in fact be a riverbed; conversely, the less it looked like a riverbed, the less it could actually in fact be a riverbed.

Now, since the riverbed of the Nile itself was unadorned, and was very plain and simple, then presumably, the best way to reproduce the riverbed of the Nile in the pyramid would not be to produce something with fancy adornments, but rather, the best way to reproduce the Nile riverbed in the pyramid would be to produce something plain and simple, as the riverbed of the Nile itself is. And so for that reason alone, the lower level may have been left looking as plain as possible.

Granted, modern researchers found it in a condition in which it almost looked like it was being used to store some items. But that is not necessarily the way the actual builders of the Great Pyramid had left it. And in any event, if, upon the completion of the Great Pyramid, they had filled the lower chamber with water (to imitate the Nile River), any untoward appearance of clutter or disorderliness would remain unseen beneath the water.

It is also the case that even the basic dimensions of the lower chamber are consistent with it being intended to represent the riverbed of the Nile. For instance, the center of the lower chamber (*i.e.*, including its lowest part) is just over two feet to the east of the main axis of the pyramid itself. This is consistent with the position of the low-elevation Nile River *viz a viz* the higher-elevation Giza Plateau (to the west of the Nile), which is where the pyramids are.¹⁰⁰

Also, as was just noted, the east and west walls of the lower chamber are of dissimilar heights, the floor of the western end being less than 10 inches from the top, whereas the floor of

⁹⁶ https://en.wikipedia.org/wiki/Great_Pyramid_of_Giza

⁹⁷ http://www.gizapyramids.org/pdf_library/petrie_gizeh.pdf (See pp. 19-22.)

⁹⁸ http://www.gizapyramids.org/pdf_library/petrie_gizeh.pdf (See pg. 20.)

⁹⁹ See the section following this one: C. The Merger Of The Physical And The Spiritual Prior To Plato.

¹⁰⁰ <http://www.gizapyramid.com/measurements.htm>

the eastern end is 11 feet, 8 inches from the top. So there is quite a downhill slope overall from west to east, with the deepest portion near the middle, just as there is from the Giza Plateau to the eastern boundaries of Egypt, with the lowest portion down at the Nile.

The bottom line is this: The lower chamber might not be unfinished after all. Rather, it is perhaps the case that it was originally left in the form in which it was always intended to be left for all of eternity: *i.e.*, resembling, and therefore constituting, a riverbed (albeit today without any water which may have once been present), one which may have been intended to mimic the topography of all of Egypt, from west to east. And the many items found in there now may have simply been thrown in there after the fact.

C. The Merger Of The Physical And The Spiritual Prior To Plato

Taken all together, this should illustrate the point that the belief of the ancients that the things of earth were linked with a higher dimension---as may have been illustrated, for example, by their possibly intentionally aligning the Giza Pyramids with the belt of Orion/Osiris (in crisscross manner, rather than by overlap)---is something which was not a new idea with the arrival of Plato. But to comprehend how the ancients thought, we must understand that the difference which we today in the Western world place between the objective and the subjective simply did not exist in ancient gentile thought.¹⁰¹ In the minds of the ancients, logical barriers to the development of a thought or a conclusion were irrelevant; that is because in ancient thought, whether something was true or not depended not on any logical, sequential analysis of the facts, but rather, whether something was true or not depended only on what subjective feelings the thing might evoke in a person.¹⁰²

To illustrate the point, bear in mind that prior to the construction of dams along the Nile River in modern times, the Nile would flood each year. Ancient Egyptians noticed that as the waters receded, many forms of life could be seen to emerge on the land as it began to reappear from beneath the flood. At first, this would consist of little mounds of mud just barely sticking out of the water, on which various insects could be seen crawling. This trend gradually increased more and more each day until the land was uncovered and life was fully restored and renewed to its full vigor.

To the ancient Egyptian, all life, it therefore seemed, stemmed from these mounds rising up out of the flood waters. And so mounds and hills were deemed to be sources of life.¹⁰³ And in fact, in their myths, at the creation of the world, a certain mound arose out of the waters of chaos, and it is from this mound that the first living things came. With that in mind, it is worth noting that a hieroglyph which was used to designate the letter “q”, which is intended to represent a hill slope, resembles the profile of the abdomen of a woman as she is lying on her back in labor (which

¹⁰¹ Frankfort, Henri, Frankfort, Mrs. H.A., Wilson, John A., Jacobsen, Thorkild, *Before Philosophy*, pp. 19-36, Baltimore: Penguin Books, 1968. (Note: this work was originally released as an Oriental Institute essay published by the University of Chicago in 1946, and its title was *The Intellectual Adventure of Ancient Man*.)

¹⁰² Frankfort, Henri, *et al.*, *Before Philosophy*, pp. 19-20.

¹⁰³ Frankfort, Henri, *et al.*, *Before Philosophy*, pp. 30-31, 44.

may or may not be an intended effect).^{104, 105} It is also the case that this hieroglyph resembles the profile of a swollen breast of a nursing mother, and likewise, whether this was or was not an intended effect, I do not know, though I suspect that in each case, it was.

Certain authors on this topic offer relevant insight here:

In Egypt the creator was said to have emerged from the waters of chaos and to have made a mound of dry land upon which he could stand. This primeval hill, from which the creation took its beginning, was traditionally located in the sun temple at Heliopolis, the sun-god being in Egypt most commonly viewed as the creator. However, the Holy of Holies of each temple was equally sacred; each deity was---by the very fact that he was recognized as divine---a source of creative power. Hence each Holy of Holies throughout the land could be identified with the primeval hill. Thus it is said of the temple of Philae, which was founded in the fourth century B.C.: 'This (temple) came into being when nothing at all had yet come into being and the earth was still lying in darkness and obscurity.' The same claim was made for other temples. The names of the great shrines at Memphis, Thebes, and Hermonthis explicitly stated that they were the 'divine emerging primeval island' or used similar expressions. Each sanctuary possessed the essential quality of original holiness; for, when a new temple was founded, it was assumed that the potential sacredness of the site became manifest. The equation with the primeval hill received architectural expression also. One mounted a few steps or followed a ramp at every entrance from the court or hall to the Holy of Holies, which was thus situated at a level noticeably higher than the entrance.

But this coalescence of temples with the primeval hill does not give us the full measure of the significance which the sacred locality had assumed in the minds the ancient Egyptians. The royal tombs were also made to coincide with it. The dead, and, above all, the king, were reborn in the hereafter. No place was more propitious, no site promised greater chances for a victorious passage through the crisis of death, than the primeval hill, the centre of creative forces where the ordered life of the universe had begun. Hence the royal tomb was given the shape of a pyramid which is the Heliopolitan stylization of the primeval hill.

To us this view is entirely unacceptable. In our continuous, homogenous space the place of each locality is unambiguously fixed. We would insist that there must have been one single place where the first mound of dry land actually emerged from the chaotic waters. But the Egyptian would have considered such objections mere quibbles. Since the temples and the royal tombs were as sacred as the primeval hill and showed architectural forms which resembled the hill, they shared essentials. And it would be fatuous to argue whether one of these monuments could be called the primeval hill with more justification than the others.¹⁰⁶

¹⁰⁴ Scott, Joseph and Scott, Lenore, *Egyptian Hieroglyphs For Everyone*, p. 15.

¹⁰⁵ <https://en.wiktionary.org/wiki/>

¹⁰⁶ Frankfort, Henri, *et al.*, *Before Philosophy*, pp. 30-31.

The above-cited work also provides further insight to help us better understand the difference between our thought processes and those of the ancients:

Meaningless, also, is our contrast between reality and appearance. Whatever is capable of affecting mind, feeling, or will has thereby established its undoubted reality. There is, for instance, no reason why dreams should be considered less real than impressions received while one is awake. On the contrary, dreams often affect one so much more than the humdrum events of daily life that they appear to be more, and not less, significant than the usual perceptions. The Babylonians, like the Greeks, sought divine guidance by passing the night in a sacred place hoping for a revelation in dreams. And pharaohs, too, have recorded that dreams induced them to undertake certain works. Hallucinations, too, are real. We find in the official annals of Assarhaddon of Assyria a record of fabulous monsters---two-headed serpents and green, winged creatures---which the exhausted troops had seen in the most trying section of their march, the arid Sinai Desert. We may recall that the Greeks saw the Spirit of the Plain of Marathon arisen in the fateful battle against the Persians. As to monsters, the Egyptians of the Middle Kingdom, as much horrified by the desert as are their modern descendants, depicted dragons, griffins, and chimeras among gazelles, foxes, and other desert game, on a footing of perfect equality.

Just as there was no sharp distinction among dreams, hallucinations, and ordinary vision, there was no sharp separation between the living and the dead. The survival of the dead and their continued relationship with man were assumed as a matter of course, for the dead were involved in the indubitable reality of man's own anguish, expectation, or resentment. 'To be effective' to the mythopoeic mind means the same as 'to be'.

Symbols are treated in the same way. The primitive uses symbols as much as we do; but he can no more conceive them as signifying, yet separate from, the gods or powers than he can consider a relationship established in his mind---such as resemblance---as connecting, and yet separate from, the objects compared. Hence there is a coalescence of the symbol and what it signifies, as there is coalescence of two objects compared so that one may stand for the other.

In a similar manner we can explain the curious figure of thought *pars pro toto*, 'a part can stand for the whole'; a name, a lock of hair, or a shadow can stand for the man because at any moment the lock of hair or shadow may be felt by the primitive to be pregnant with the full significance of the man. It may confront him with a 'Thou' which bears the physiognomy of its owner.

An example of the coalescence of a symbol and the thing it stands for is the treating of a person's name as an essential part of him---as if it were, in a way, identical with him. We have a number of pottery bowls which Egyptian kings of the Middle Kingdom had inscribed with the names of hostile tribes in Palestine, Libya,

and Nubia; the names of their rulers; and the names of certain rebellious Egyptians. These bowls were solemnly smashed at a ritual, possibly at the funeral of the king's predecessor; and the object of this ritual was explicitly stated. It was that all these enemies, obviously out of the pharaoh's reach, should die. But if we call the ritual act of the breaking of the bowls symbolic, we miss the point. The Egyptians felt that *real* harm was done to the enemies by the destruction of their names. The occasion was even used to cast a propitious spell of wider scope. After the names of the hostile men, who were enumerated 'that they should die', were added such phrases as: 'all detrimental thought, all detrimental talk, all detrimental dreams, all detrimental plans, all detrimental strife', etc. Mentioning these things on the bowls to be smashed diminished their actual power to hurt the king or lessen his authority.

For us there is an essential difference between an act and a ritual or symbolic performance. But this distinction was meaningless to the ancients.¹⁰⁷

In other words (if I may summarize the author's thoughts), as we see things---*i.e.*, in light of our Hebrew/Platonic distinction between subjective thoughts and feelings on the one hand and objective reality itself on the other hand---we recognize a difference between thoughts about something in the abstract or theoretical sense on the one hand and the thing itself on the other hand. And thus, in our minds, we can readily deem reality itself to have two different aspects: abstract thoughts, ideas, and concepts about something on the one hand, and the thing itself on the other hand.

In ancient thought, however, reality was not thought to have two different aspects. Rather, reality had only one aspect to it, and all thoughts about something were merged with the thing itself as one thing, which apparently is why evil thoughts about pharaoh would supposedly do actual harm to pharaoh, and good thoughts about pharaoh would help and strengthen pharaoh.

Thus also, if I do understand the authors of the book *Before Philosophy* correctly, the ancients probably had no recognition or understanding of any such thing as a concept. For nothing could be simply thought of in the abstract without also necessarily being a part of the thing itself. Neither is it likely that the ancients had any idea of there being such a thing as a philosophy. For the thoughts and ideas which we today might think of as being a philosophy could not be thought of as somehow existing separate and apart of those aspects of life which the philosophy embraced.

1. Hieroglyphs That Speak?

In light of all that, I also cannot help but wonder what the ancients made of the fact that as they could begin to learn to read, it would be the case that within their own minds they could hear themselves pronouncing the writings which they were reading (as is likewise the case with us today, of course). With that in mind, I cannot help but wonder then if perhaps the ancient Egyptians who were literate thought they could not only *read* the hieroglyphs, but also that they perhaps could also *hear* the hieroglyphs.

That is to say, I cannot help but wonder if perhaps they thought that the sounds of the words

¹⁰⁷ Frankfort, Henri, *et al.*, *Before Philosophy*, pp. 20-22.

in their minds as they were reading something were not simply sounds which they themselves were creating within their own minds, but rather that those sounds were perhaps instead sounds which were emanating from the hieroglyphs themselves, sounds to be heard and understood by any of the elite as they looked upon them.

Their own name for hieroglyphs, after all, was *medoo netjer*: the “words of the gods”, or “the divine word”.¹⁰⁸ And so perhaps it is the case that the ancients believed that anywhere the hieroglyphs were, the gods were present also ... at least, so long as there was sufficient light for the hieroglyphs to be readable (*i.e.*, and thus, “audible”). And since the gods could be thought of as being present anywhere that the hieroglyphs were, then naturally the gods could be speaking aloud the words of the hieroglyphs, and their voices could be heard by the elite---*i.e.*, the literate class---as they looked upon the words. If such were the case, I could envision them thinking that as dawn progressed each morning and the hieroglyphs along their monuments became gradually more and more visible, perhaps they thought that the volume of the sound which the hieroglyphs were supposedly making may have been deemed to be growing louder than they were just at the first light of dawn, for then they could be read (heard) at a greater distance.

This could also perhaps go toward explaining how it is that the ancients believed that the scrolls with the sacred spells which were left with the dead could speak on behalf of the dead to raise them back to life. For after all, if the spells were meant to bring pharaoh back to life, how could the deceased pharaoh read the scrolls to the sun god in order to come back to life, since prior to their being read, the deceased pharaoh would still in fact be dead? The answer may lie in the idea that the sun god, as he entered pharaoh’s tomb--- and thereby brought into the tomb sufficient light (by his presence) to make it possible to see the hieroglyphs---the sun god could then not only read the hieroglyphs on the scrolls, but could also hear the hieroglyphs speak to him on behalf of the author of the scrolls, the dead pharaoh.

a. Living Hieroglyphs?

For that matter, if the ancients did think that the sounds which they heard within their own minds as they were reading the hieroglyphs were sounds which the hieroglyphs themselves were making, could this perhaps have given rise to the idea that the hieroglyphs themselves may have had life? That's not to say that the ancients might have thought of the hieroglyphs as actually being separate, independent living beings, the way two persons are, but rather, perhaps as living things which were part of the gods themselves, in the same way that your hand is alive, though it is not a separate, independent living being from you yourself. After all, as I just said, their own term for “hieroglyph” (*medoo netjer*) means “the words of the gods”, so it should come as no surprise if they considered those words themselves to be living, eternal things, as a part of the gods.

Interestingly enough, there is a parallel thought in the writings of the Apostle Paul with respect to the Word of God. He said,

[12](#) For the word of God *is* quick, and powerful, and sharper than any two-edged sword, piercing even to the dividing asunder of soul and spirit, and of the

¹⁰⁸ Scott, Joseph and Scott, Lenore, *Egyptian Hieroglyphs For Everyone*, p. 79, New York: Funk and Wagnalls, (1968). ISBN 0-308-80223-3.

joints and marrow, and *is* a discerner of the thoughts and intents of the heart. (Heb. 4:12; KJV)¹⁰⁹

The thing is, the translation of the Bible used here (the King James Version) was translated in the early 1600s,¹¹⁰ and for many years the word "quick" was commonly used to mean "alive".¹¹¹ For instance, in colonial times-

--and for years following American independence---the Common Law (*i.e.*, the Common Law of England), which was followed extensively in the United States,¹¹² looked upon the death of a fetus in two different ways, depending on when the "quickening" had taken place, the "quickening" being the point in time when the mother could first feel the movement of her unborn child in her womb, which is when she---or anyone else at that time---could first say that the child had become "quick", and was therefore alive.¹¹³ So when the Apostle Paul says in this verse that the Word of God is "quick", he is really saying that it is "alive", that it is animated.

Now, whatever the case may be with respect to that idea specifically, it is the case in any event that from our general, overall understanding of how the ancients envisioned the world around them, we may obtain a deeper understanding of why it is that otherwise intelligent persons would engage in the illogic which the Prophet Isaiah wrote of concerning idolatry: Isaiah 44:9- 20¹¹⁴. For the mind of the ancients (such as the Egyptians) did not assess the world around them in the same way which we do. And from this we can also infer that in the minds of any Magi who were not Jewish, the signs in the heavens which we shall examine were not simply symbolic or representative of what was happening in heaven or on Earth, but rather that these signs were themselves an actual, integral part of the substance of the drama which was unfolding on Earth and of the divine and human actors who were taking part.

So as we shall see, while we ourselves would no doubt deem many of the things which we shall be considering here to be striking in the way that they seem to tell a tale (*i.e.*, the tale of the coming of the King of the Jews), in ancient pagan thought these signs would have even greater significance still, and probably would have been thought of as being inseparable from, and the irrefutable proof of, the various events which these signs seemed to say would be taking place here on Earth. Such certainty could easily have led at least some of the Magi to conclude that it was perhaps even their duty to act on such knowledge (or at least, their privilege to do so) if for no other reason than that reason alone, and to go seek out the newborn King of the Jews.

Ancient Jewish thought made a break with ancient pagan thought (as would ancient Greek thought shortly thereafter), and such ancient Jewish and Greek thought was quite similar in many ways to our own way of thinking today.¹¹⁵ Even so, any Magus who was Jewish certainly would have had no less of an interest in signs which seemed to point to the coming of the King of the Jews than his gentile fellow Magi would have had; and as I said, since Jewish Magi in Babylon (or other places in the east) would have been immersed in a culture which would have had the usual

¹⁰⁹ <https://biblehub.com/kjv/hebrews/4.htm>

¹¹⁰ https://en.wikipedia.org/wiki/King_James_Version

¹¹¹ <https://www.merriam-webster.com/wordplay/quick-word-history>

¹¹² https://en.wikipedia.org/wiki/Law_of_the_United_States

¹¹³ <https://en.wikipedia.org/wiki/Quickening>

¹¹⁴ <http://biblehub.com/nasb/isaiah/44.htm>

¹¹⁵ Frankfort, Henri, *et al.*, *Before Philosophy*, pp. 237, 241-248.

pagan view of the world and the heavens, then if anything, they would have noticed the unfolding events in the heavens with even greater interest than we ourselves might have developed today, and they quite probably would have been fully prepared to accept the idea that the heavens themselves were revealing a secret about the coming birth of the King of the Jews.

APPENDIX-A SECTION VIII

A PRIMER ON CELESTIAL COORDINATES

The relationship between the lines of latitude on Earth and the lines of Declination in the heavens is very simple. For example, if an object in the heavens lies directly above the 45th parallel North on Earth (*i.e.*, if it is directly above the parts on Earth with a latitude of 45 degrees North), it is said in astronomical terms to have a Declination of +45 (“plus forty-five”); if the celestial object lies directly above the 45th parallel South on Earth (*i.e.*, if it is directly above the parts on Earth with a latitude of 45 degrees South), it is said to have a Declination of -45 (“minus forty-five”).¹¹⁶ Likewise for example, most of the border between Canada and the United States (across the lower 48 states) is at the 49th parallel (*i.e.*, latitude 49 degrees North). So a celestial object which would pass directly over that border would have a declination of +49 (“plus forty-nine”).

The relationship between the geographical lines of longitude and the corresponding lines of celestial coordinates is a bit trickier to understand, however. The lines of celestial coordinates which correspond to the lines of longitude are known as the lines of Right Ascension (commonly abbreviated “RA”, with each individual letter being pronounced: “R”, “A”). And just as each point in the sky has a particular Declination, so also does it have a particular Right Ascension.¹¹⁷

Now, although the lines of longitude are divided the same way that the lines of latitude are (*i.e.*, in degrees, minutes, and seconds),¹¹⁸ the lines of Right Ascension in the heavens are not divided the same way as the lines of longitude on Earth. Rather, the lines of Right Ascension are instead referred to by a different nomenclature: hours, minutes, and seconds (instead of degrees, minutes, and seconds). One hour of Right Ascension pertains to the distance from east to west which a particular point in the sky will move in one hour’s time; accordingly, the north-to-south lines of *celestial* coordinates consist of 24 *hours* of Right Ascension, whereas by contrast, *Earth’s geographical* north-to- south lines of coordinates (the lines of longitude) consist of 360 *degrees* of longitude.¹¹⁹

With that in mind then, 360 degrees of longitude divided by 24 hours equals 15 degrees of longitude per hour. That means that as you look up into the sky, after the passage of one hour, an object which was one hour of Right Ascension east of the meridian (*i.e.*, 15 degrees east of the meridian, in celestial terms) at the start of the hour will then appear directly on the meridian at the end of that hour; similarly, an object which was on the meridian at the start of the hour will then appear one hour of Right Ascension west of the meridian (*i.e.*, 15 degrees west of the meridian, in celestial terms) at the end of the hour. Here I use the phrase “in celestial terms” because measuring movements in the heavens within the celestial framework itself must be denominated in celestial

¹¹⁶ <https://en.wikipedia.org/wiki/Declination>

¹¹⁷ https://en.wikipedia.org/wiki/Right_ascension

¹¹⁸ https://en.wikipedia.org/wiki/Geographic_coordinate_system

¹¹⁹ https://en.wikipedia.org/wiki/Right_ascension

terms; otherwise, one would be “adding apples and oranges”, which would produce erroneous results.

Here’s the tricky part: on Earth, sixty minutes of longitude equals one degree of longitude; in celestial coordinates, however, sixty minutes of Right Ascension, by comparison, equals one hour of Right Ascension. As we have seen though, over the course of one hour, a celestial object will move across 15 degrees of longitude on Earth, not just one degree of longitude. So there is a ratio of 15:1 when it comes to the lines of minutes of longitude here on Earth as compared to the lines of minutes of Right Ascension in the heavens; to put it another way, 1 minute of Right Ascension in the heavens corresponds to 15 minutes of longitude on Earth. (And the same holds true for seconds of longitude as compared to seconds of Right Ascension.)

The confusion comes from the use of the word “minute” (and “second”) to describe two different things, operating on two completely different scales, one being a celestial coordinate on one scale, and the other being an earthly coordinate on a completely different scale. This is something to watch for carefully when using celestial coordinates.

APPENDIX-A SECTION IX

THE DATES FOR CELEBRATING PURIM IN 3752 (9 B.C.)

On the Hebrew calendar, Purim is observed on the 14th and 15th days of the month of Adar, the final month of the ecclesiastical year; and it is preceded by observing the Fast of Esther on the 13th of Adar (unless the Fast is celebrated earlier to prevent it from interfering with Sabbath preparations and observances).^{120,121} By using the computer program Starry Night, let us see if we can determine when the Jewish people would have marked the 1st of Adar in the year 3752 (9 B.C.); for as I said in the text, at that time, only the eyewitness testimony method of determining the start of any given month on the Hebrew calendar (*i.e.*, by spotting the crescent new moon) was in existence at the time, and not the current system for doing so, which was developed by Rabbi Hillel II centuries later.

A. When Can The Crescent New Moon First Be Seen With The Unaided Eye?

With all that in mind, allow me to share with you something that happened in my own personal experience which may shed some light on this. I myself have located the moon with the unaided eye when it was only twenty- two hours old.^{122,123} At that time it was only just barely enough of a crescent to be seen at all. This was on April 16th of 1999, at about 7:20 or 7:25 P.M.,

¹²⁰ http://www.chabad.org/holidays/purim/article_cdo/aid/645309/jewish/What-Is-Purim.htm

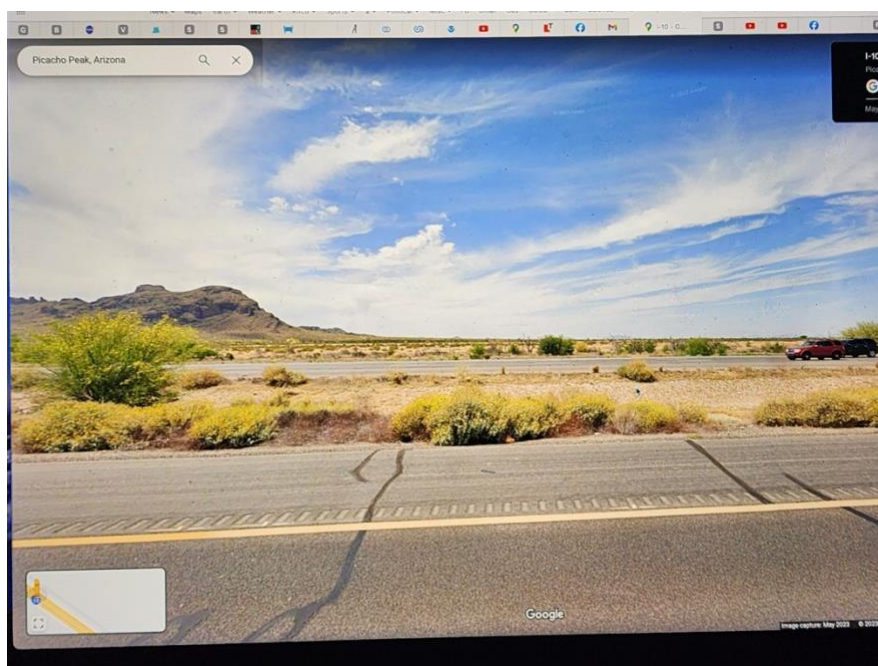
¹²¹ https://en.wikipedia.org/wiki/Fast_of_Esther

¹²² https://stellafane.org/observing/moon_phase.html

¹²³ Note: The current version of Starry Night (Starry Night Pro Plus 8) uses the correct means of ascertaining the exact moment as to when new moon occurs (*i.e.*, by reference to the ecliptic grid), and so this is the basis for my saying that the moon was then 22 hours old. Some earlier versions of Starry Night erroneously used the celestial grid instead of the ecliptic grid for making this determination, and so the indication of just exactly when new moon took place is just slightly off under some of those prior versions. (This error, I should note, is a completely different one from the equipment issue which I also mention herein.)

when I had perfect conditions for seeing so thin a crescent moon. I was driving north on Interstate 10 in Arizona. (Arizona, I should note, does not observe Daylight Savings Time; this time would have corresponded to 8:20 or 8:25 P.M. if Arizona did observe Daylight Savings Time. In any event, this can also be thought of as being 0220 or 0225 UTC on the 17th of April that year.)

For those who are familiar with Interstate 10 in Arizona, I was just north of Picacho Peak. (Picacho Peak is, incidentally, the scene of the southwestern-most battle of the American Civil War.¹²⁴) If you wish to see for yourself what the crescent new moon looked like from there at that time on Starry Night, I was just a few miles southeast of the town of Casa Grande, which is one of the towns you can select as an observation site on the computer program Starry Night. Here is a look from Google Maps at the site from which I made this observation (or at least, close to it):



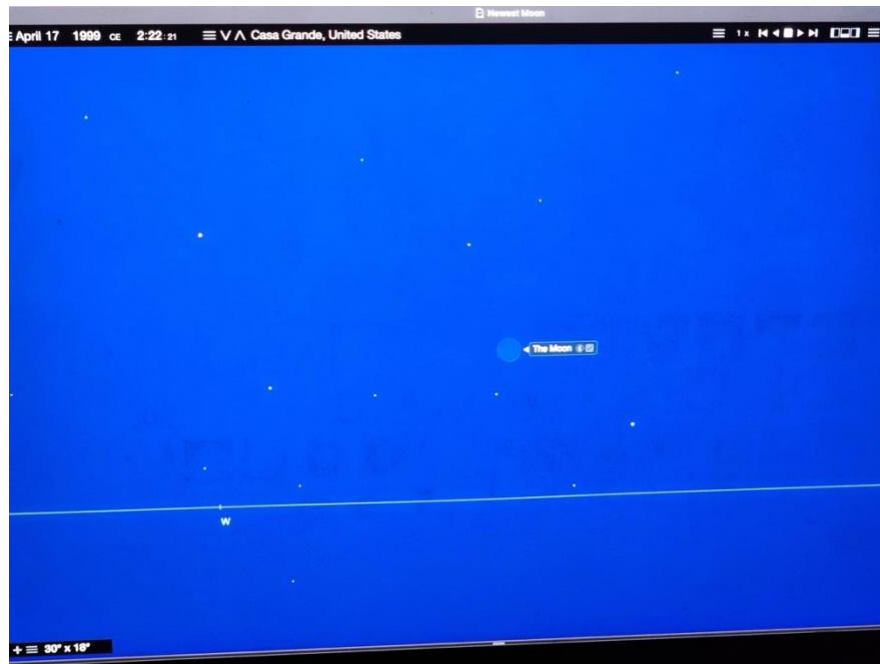
Looking west from Interstate 10, just north of Picacho Peak and just southeast of the town of Casa Grande, Arizona.

Image from Google Maps: <https://www.google.com>
Photograph by the author.

As you can see, this was an excellent location from which to see the crescent new moon.

Next, here is a computer image of how the crescent new moon appeared to me (with the artificial horizon line running left to right across the bottom of the screen). At that time it was about four to five degrees above the western horizon:

¹²⁴ <https://www.battlefields.org/learn/civil-war/battles/picacho-peak>



The new moon as seen from Casa Grande, Arizona, following sunset on April 16, 1999 (April 17th, by reference to UTC).

Images provided courtesy of Starry Night Education. Photograph by the author.

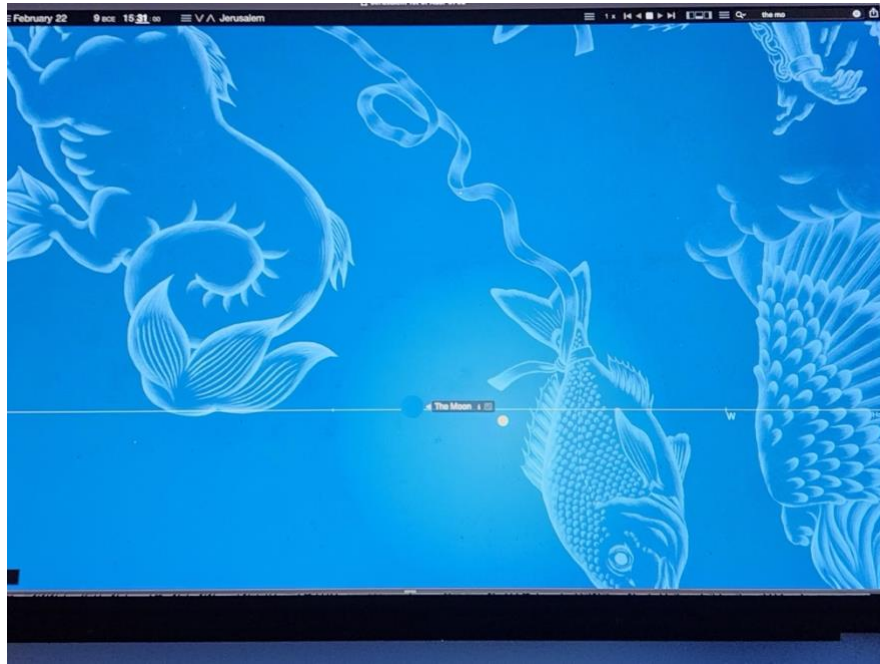
This was almost half an hour after sunset. To further understand this situation, bear in mind that whenever the sun has recently set, its glow, quite naturally, will be greatest along that portion of the horizon which is directly above it. In astronomical terms, the direction of the line of sight toward a celestial object is known as the azimuth of the object (pronunciation: <https://dictionary.cambridge.org/us/pronunciation/english/azimuth>). It is the astronomical equivalent of a heading (or more fully, a compass heading) for determining directions here on Earth.

Now, when the moon (or any other celestial object) is four or five degrees above the horizon when it is directly above the recently-set sun, there is less chance that it will be visible than if it is seen along an azimuth which is substantially removed from that part of the horizon which is directly above the sun; this is due to the extra glow of sunlight above the point on the horizon which the sun is directly beneath.

As it turns out, on this particular occasion in 1999, the moon, with an azimuth of 278, was eight degrees off-axis from the sun, which itself was nearly six degrees directly below the horizon along a heading of 286. This displacement of eight degrees from a straight line toward the point on the horizon which the sun was directly beneath was of some benefit to me in seeing the moon, for the moon at that time was thereby seen against a background sky which was slightly darker than the sky which was an equal height above the point on the horizon directly above the sun.

B. Determining The Start Of The Month Of Adar In 3752 (9 B.C.)

Here we have a photo showing the new moon following sunset in Jerusalem on February 22, 9 B.C.:



The moon as seen from Jerusalem moments after sunset on Feb. 22, 9 B.C.
Images provided courtesy of Starry Night Education. Photograph by the author.

This not only shows that the moon was just a few hours old at sunset on February 22nd, but also that the moon did in fact actually set only four minutes after the sun itself set. So it would have been impossible for anyone at the time to have seen it.

We can also see in this next photo that, by contrast, the following day (February 23rd), at forty minutes after sunset, the moon was roughly as high above the western horizon as it was when I had sighted the new moon in April of 1999:



The moon as seen from Jerusalem following sunset on Feb. 23, 9 B.C.
Images provided courtesy of Starry Night Education. Photograph by the author.

By comparison, I had seen the moon about 20 to 25 minutes after sunset in 1999. Also, as seen from Jerusalem, the moon on February 23, 9 B.C. was slightly more than one day old; when I had seen it, it was slightly less than one day old.

So certainly then, in the year 3752 (9 B.C.), the 1st of Adar would have started at sunset on February 23rd and would have continued until sunset on February 24th. I should also note that this rapid change in the relative ease of spotting the moon from just one day to the next does illustrate the point that the new moon can be spotted sooner in its monthly orbit around the earth at times near the vernal equinox than would be the case at other times of the year, and February 23rd was close to (less than one month of) the vernal equinox. For a discussion of this, here in the Appendix read the separate section entitled SPOTTING THE CRESCENT NEW MOON.

Now, with respect to calculating which date was the 13th day of Adar (the Fast of Esther) that year, let us keep in mind that 9 B.C. was a Julian calendar leap year, so by standard reckoning, February would have had 29 days on the Julian calendar instead of 28.¹²⁵ What this means in turn is that, based on our present-day notation, the Fast of Esther (the 13th of Adar) would have begun at sunset on Wednesday, March 6th, and that the first day of Purim (the 14th of Adar) would have begun at sunset on March 7th, just a few hours before the conjunction of Saturn and Venus was set to take place.

Here we are presented with a curious phenomenon, however. For it is obvious that the moon which rises on the night of March 7th (at the start of the 14th day of Adar) is a full moon, whereas in the ordinary course of things, the moon is not supposed to be full until the nighttime hours of the 15th day of any Hebrew month (*i.e.*, following the sunset which marks the *end* of the 14th day of the month, not the *start* of the 14th day of the month). So here we have a full moon coming one day ahead of schedule somehow. One must ask then, “How could that have happened?”

The answer, as it turns out, is a simple matter of astronomy and physics. We start with the fact that the moon’s orbit around the Earth is elliptical.¹²⁶ So there are times when it is closer to the Earth than at other times, and times when it is farther away.¹²⁷ During those times when it is closer than others, Earth’s gravity exerts a slightly greater pull on the moon than at other times. What this does is to speed the moon along in that particular part of its orbit at a faster pace than normal, in the manner of a slingshot, or in a “crack-the-whip” fashion. (Of course, correspondingly, half a month before that point, and also half a month afterwards, the moon would be at its farthest from Earth, and would be moving somewhat slower than normal in its orbit.)

Now, the average distance from the Earth to the moon is just under 240,000 miles, with a range of about 221,500 to 252,700 miles.^{128, 129} As can be seen on Starry Night, the moon’s distance from Earth at new moon (the 1st of Adar) in 3752 (February 23, 9 B.C.) was 244,114 miles. From there it went down to a distance of just 223,200 miles on the evening of March 3rd (at the start of

¹²⁵ <http://www.cgsf.org/dbeattie/calendar/?roman=9bc>

¹²⁶ <https://eclipse.gsfc.nasa.gov/SEhelp/moonorbit.html>

¹²⁷ <https://www.timeanddate.com/astronomy/moon/lunar-perigee-apogee.html>

¹²⁸ [https://en.wikipedia.org/wiki/Lunar_distance_\(astronomy\)](https://en.wikipedia.org/wiki/Lunar_distance_(astronomy))

¹²⁹ <https://lco.global/spacebook/earths-moon/>

the 9th of Adar) before then coming back out again to a distance of 229,542 miles, which is still less than average, on the evening of March 7th (at the start of the 14th of Adar). So in other words, the moon completed its journey from new moon to full moon that month in one day less than normal because it made its closest approach to Earth for that month right during the midst of this time, and so Earth's gravity pulled more forcefully on it than normal, causing the moon to speed up in that part of its orbit during that time.

The Magi certainly would have been familiar with this phenomenon. For they would have seen this phenomenon (and the corresponding slow movement of the moon in its orbit while it was farthest from Earth) on other occasions as well. Even so, it would not be common for circumstances to come together in such a way as to have a full moon on the night of the 14th of Adar, which would make it look as though heaven itself had sped up the progress of the moon's phases, such that the virgin would appear to go through childbearing and childbirth just in time for the conjunction of Venus and Saturn. So this is something which probably would have caught the attention of the Magi as well. And so also, it would not be surprising then if they were to conclude that all of these signs in the heavens, when taken together, were starting to show that the liberation of the Jewish people and the birth of God's son, the Messiah, was drawing nigh, and that heaven itself was implying that God was eager to speed things up in order to accomplish this.

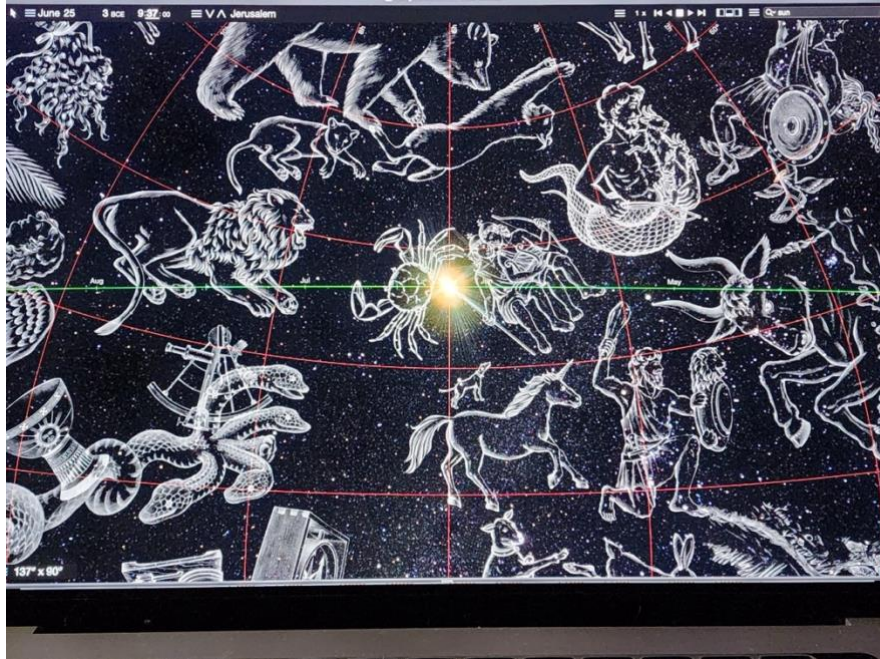
APPENDIX-A SECTION X

SPOTTING THE CRESCENT NEW MOON

Spotting the crescent new moon in the evening sky is never easy, but there is one thing above all other factors which can make the task either easier or harder. It is simply this: If all things could be held equal (though as it turns out, they are not), one could expect to spot the crescent new moon sooner in the spring than during autumn.¹³⁰ (This is true for both the northern and southern hemisphere, though at opposite times of the year on the calendar, of course.) To learn why this is so, see the following photos.

In this first photo, in which the glare of daylight has been removed, we begin with a view of the sun as seen from Jerusalem at the northern hemisphere's summer solstice (the date on which the sun is at its most northerly position for the year) in June of 3 B.C.:

¹³⁰ This is true for both the northern hemisphere and the southern hemisphere, although the months of spring and autumn for each hemisphere will be six months apart from those of the opposite hemisphere.



The sun at the northern hemisphere's summer solstice in June of 3 B.C. The green line shows the path of the ecliptic. The red lines show the celestial coordinates of Right Ascension (running vertically, and corresponding to the lines of longitude on Earth) and the lines of Declination (running horizontally, and corresponding to Earth's lines of latitude).

Images provided courtesy of Starry Night Education. Photograph by the author.

On this date, the sun ends its annual northward motion in the sky and begins heading back south once more.

As you can see, those portions of the ecliptic where the sun was prior to the solstice (*i.e.*, to the right of the sun) tend to be further and further south of the sun's Declination the more and more you go back in time (*i.e.*, to the right, where the sun was in the spring); and likewise, those portions of the ecliptic where the sun will be in the upcoming months (*i.e.*, to the left of the sun, after the solstice) also tend to be further and further south of the sun's Declination the more and more you go forward in time (*i.e.*, to where the sun will be during autumn):



The sun at the northern hemisphere's preceding vernal equinox in March of 3 B.C. The green line shows the path of the ecliptic (the sun's annual path across the sky).
Images provided courtesy of Starry Night Education. Photograph by the author.



The sun during the northern hemisphere's subsequent autumnal equinox in September of 3 B.C. The green line shows the path of the ecliptic (the sun's annual path across the sky).
Images provided courtesy of Starry Night Education. Photograph by the author.

Also, notice that the slope of the sun's path along the ecliptic barely moves north or south at all within a month or so either side of the solstice, whereas the slope of the sun's path along the ecliptic moves at an ever-steeper north/south angle as the sun moves south in autumn or heads north in the spring, and this is most noticeable around

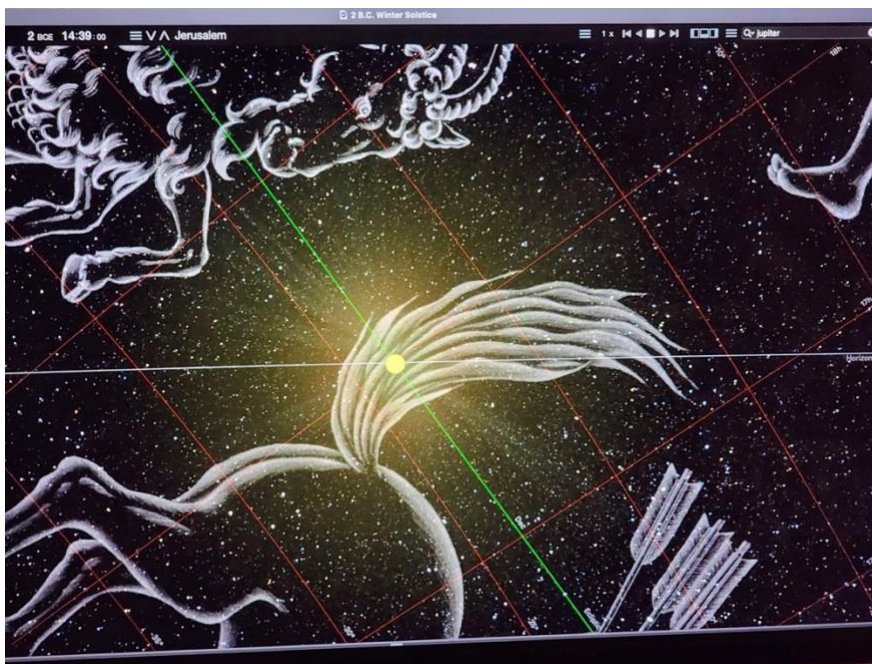
each equinox itself (*i.e.*, the vernal equinox in the spring, and the autumnal equinox six months later), which is when the sun is halfway between its most northerly and southerly positions in the sky, and can be seen directly over earth's equator.

Pretty much the same holds true, in mirror-image fashion, at the northern hemisphere winter solstice, with the sun's Declination tending to be further and further north the more and more you go forward in time (to the left of the sun, toward spring) and likewise further north the more and more you go backward in time (to the right of the sun, toward the previous autumn). Also, the ecliptic likewise has a shallow angle north or south at the winter solstice (as was the case at the summer solstice), but it tends to steepen more and more as one heads toward the upcoming vernal equinox¹³¹ (when the sun will be over Earth's equator on the sun's annual journey north) or as one heads back toward the preceding autumnal equinox¹³² (when the sun would have been over Earth's equator on the sun's annual journey south). By contrast, at either equinox (in the spring or autumn), the path of the ecliptic is at its steepest: in the evening, it moves at a sharp angle northward in the northern hemisphere's spring and at a sharp angle southward in the corresponding autumn.

Here's what all this means when it comes to spotting the crescent new moon from the northern hemisphere. In the following photo we are looking at the western horizon at sunset on the day when the sun was at its southernmost position for the year---at the northern hemisphere's winter solstice---during the year when Larson, myself, and others believe Jesus was born: *i.e.*, we are looking at sunset on the day of the winter solstice during 2 B.C. To illustrate my point most clearly, I have taken away not only the glare of daylight, but I have also eliminated the computer program's artificial horizon and I have substituted it with a line to show the exact location of the apparent horizon. I have also placed the red lines of the celestial coordinates (Right Ascension and Declination) in the image:

¹³¹ <https://en.wikipedia.org/wiki/Equinox>

¹³² <https://en.wikipedia.org/wiki/Equinox>



Sunset on the day of the northern hemisphere's winter solstice in December of 2 B.C.
The green line shows the path of the ecliptic (the sun's annual path across the sky), and the white horizontal line illustrates the position of the horizon.
Images provided courtesy of Starry Night Education. Photograph by the author.

Now, when most people think of a sunset being either further north in the summer or further south in the winter, they usually think only of the place on the horizon where the sun sets. As it turns out, although that by itself is in fact correct, there is much more to it than that. As you can see from this photo, with respect to an object along any given Right Ascension (the celestial equivalent of the lines of longitude here on Earth), such as the one which the sun may occupy at any given moment, the question of just exactly when that object will set is dependent upon its Declination (which corresponds to the lines of latitude, which run east and west). At this exact moment in this photo here (sunset), the sun itself is, of course, the only object along the sun's Right Ascension which is exactly on the horizon. And as you can see here, any object along the sun's Right Ascension at that moment (depicted here by the red line which runs through the sun from lower left to upper right) which happens to have a Declination north of the sun would not yet have reached the horizon; and conversely, any object along the sun's Right Ascension at that moment which happens to have a Declination south of the sun would have already set below the horizon.

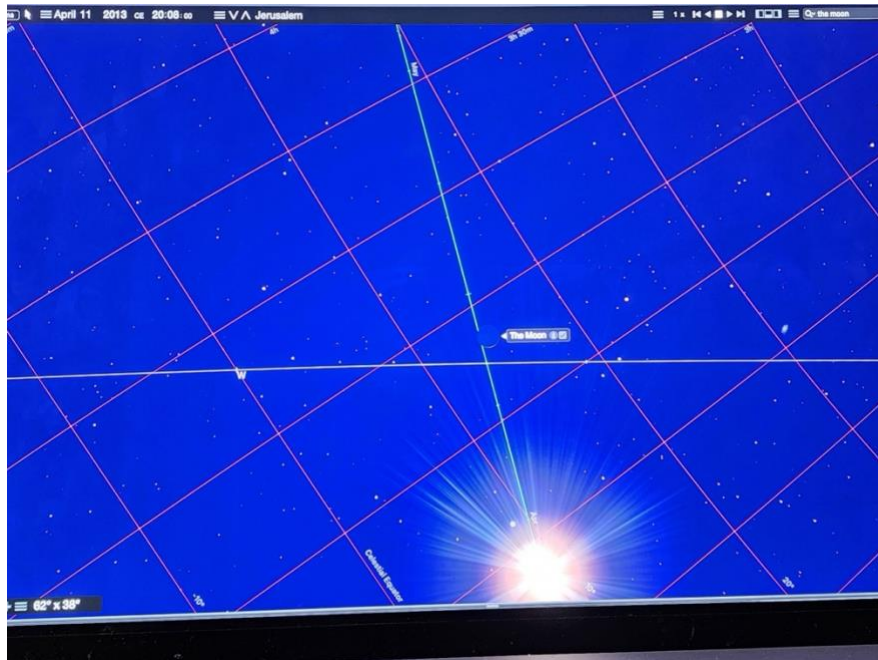
In fact, if you go back in time two hours and then show the rotation of Earth on its axis over the next two hours, you will see how the pinwheel effect of celestial motion (which is discussed separately in the next section of this Appendix, A PRIMER ON CELESTIAL COORDINATES) is an effect which will tend to move objects which are to the south of the sun (and which have its same Right Ascension) toward the horizon first for observers in the northern hemisphere. Then the sun will follow and reach the horizon; and finally, objects to the north of the sun which have the same Right Ascension as the sun will eventually reach the horizon (unless they are so close to the celestial pole that they will not reach the horizon at all) after the sun has reached the horizon.

In addition, we must keep in mind that the moon's orbit does not quite overlap precisely with the ecliptic (the path of the sun through the sky). Thus, the moon can sometimes be off by a

few degrees north or south of the ecliptic.

So in other words, when it comes to just exactly where objects will be at any given moment with respect to the horizon is not simply a matter of them being north or south in terms of an earth-bound perspective (as we look to the horizon), but is instead also a matter of how far north or south a celestial object is on the celestial pinwheel. And for this reason, just exactly when the sun will set on any given day depends on how far north or south it is on that pinwheel, causing the sun to set earlier on a winter day than it would in the spring or fall, or especially as compared to sunset during summer.

To see one good example of all of this, let us now look specifically at the crescent new moon of April of 2013:¹³³



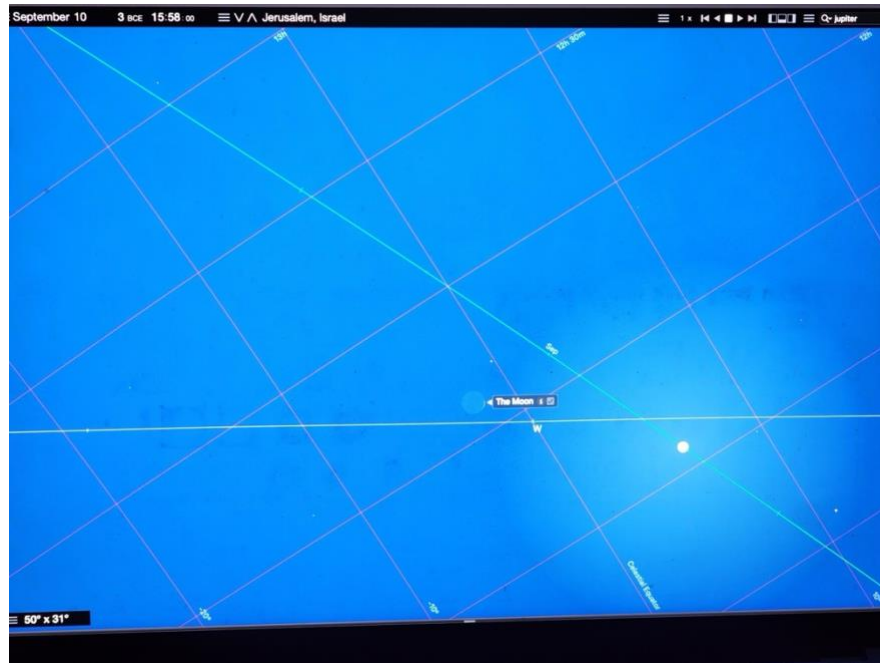
The new moon (1.31 days old) as seen from Jerusalem on April 11, 2013.
Images provided courtesy of Starry Night Education. Photograph by the author.

Here we see that the ecliptic (the green line) is moving relatively sharply northward along the celestial grid, for it is spring. And so in the spring, as the moon (which roughly follows the ecliptic) moves further and further along in its orbit around the Earth during that time, it will have a tendency to move more and more north with each passing day. Thus, on April 11, 2013, for example, as Earth rotated, the new moon (1.31 days old) took longer to reach the horizon than it would have taken at other times of the year, and it did not do so until the sun was well below the horizon (as can be seen here). And in fact, as can be seen in this photo, if the moon had had the same Declination as the sun, it would have been below (*i.e.*, to the left of) the red line of Declination which it was above (to the right of) at that time, just as the sun itself was likewise below that red line of Declination; and that would have meant that the moon, like the sun, would then be just below the horizon instead of just above it.

¹³³ This particular month and year were chosen because the moon goes through fluctuations in its position which sometimes place it north of the ecliptic and sometimes place it south of it. In April of 2013 those fluctuations were nearly all evened-out, so that the moon was directly on the ecliptic.

Specifically, the moon at that time did not come to within a couple of degrees of the horizon until more than an hour after sunset, when the sky would be dark, and the moon could thus be more easily seen. Thus, this northerly position of the moon would have at least some tendency to make it easier to spot the new moon following sunset in the spring than at other times of the year (particularly autumn) because the moon in the spring would not be low to the horizon until well after sunset (as can be seen here).

Let us now consider the crescent new moon on September 10th of 3 B.C. in the following photo:



The new moon (1.01 days old) as seen from Jerusalem on September 10, 3 B.C.
Images provided courtesy of Starry Night Education. Photograph by the author.

Here we see in this view looking straight West that, by way of contrast to the previous photo, the ecliptic (the green line) is moving relatively sharply southward, as it does every year at that time of year, for summer is ending, and it is nearly autumn; so the sun is heading south, to where it will be in winter. And so during late summer and early autumn, as the moon, in following the ecliptic, moves further and further along in its orbit around the Earth after new moon, it will tend to move more and more to Declinations which are farther and farther south of the sun. (Here that effect is in fact exaggerated, for the moon, as I mentioned above, is sometimes below---*i.e.*, to the left of---the ecliptic, as is the case in this image.)

Thus, on September 10, 3 B.C., as the Earth rotated, the moon took much less time to reach the horizon than it would have if it had not been south of the sun. Specifically, the moon at that time came within two degrees of the horizon just 7 minutes after sunset, meaning that the western sky (where the moon was) would still be relatively bright, thereby making it much more difficult to see the crescent moon than would be the case if the sky had been darker.

In other words, anyone looking for the crescent new moon at that time, when it was only about a degree and a half above the horizon, would have had viewing conditions which were roughly 10 to 15 minutes closer to sunset than I had had in April of 1999 when I had first spotted the crescent new moon that evening, when the moon had been higher---about four degrees above the horizon---around 20 to 25 minutes after sunset; and this is why the sky above the western horizon on September 10th of 3 B.C. would have been much brighter than it was when I first saw the new moon, even if one were to wait, as we assume here, until the moon had come closer to the horizon (*i.e.*, two degrees in September of 3 B.C. as compared to four degrees when I saw it in April of 1999).

This explains why there would be so much more glare of daylight to contend with while trying to spot the crescent new moon on that day in 3 B.C. than I had had to contend with in April of 1999, and why the crescent new moon would have been so much harder to spot on September 10th of 3 B.C. than it was for myself when I saw it. And since, as I mentioned in the text, I could only just barely spot the crescent new moon when I did see it, I do not see how it would have been possible for anyone in Jerusalem to have seen the crescent new moon on September 10th of 3 B.C.

APPENDIX-A SECTION XI

THE CELESTIAL ASPECTS OF THE FALL OF BABYLON AND CHAPTER FIVE OF THE BOOK OF DANIEL

Allow me to emphasize before we get started that the information in this section is, for the most part, background information, most of which is off-topic from the subject of this book itself; nonetheless, certain aspects of this section are pertinent to at least a certain degree. For first of all, this section tells the details of certain events during an important night in Jewish history, one of very great historical interest to any Jewish Magi who may have lived in Babylon around the time of Jesus' birth. And if what the Magi were seeing in their own lifetimes, in the year 3752 (9 B.C.) could be thought of in any way as being connected with that fateful night 530 years earlier, when Babylon fell to King Cyrus I and his army of Persians and Medes, this would be a source of great interest to them. And in particular, if they were wondering whether the things which they were seeing themselves were specifically signs that the Messiah was coming, then anything which might connect the events of their lifetimes with the events of such an important event 530 years earlier would quite probably have been taken into consideration by them.

Second, although ancient Jewish thought would have been substantially different from that of their pagan neighbors, it would be difficult for us today to say just exactly how different it was, particularly for those Jews who were immersed in a pagan culture in Babylon instead of living back in the land of Israel. And of course, for any Magus who might not have been Jewish, the thoughts of such a person would be essentially indistinguishable from other ancient pagan thought. So in other words, for reasons which I shall now offer herein, both Jewish and gentile Babylonians 2,000 years ago would have been interested in how the events in the heavens might have been connected with the events of that fateful night 530 years earlier, and how their pagan and Jewish ancestors would have regarded those events.

Besides all that, the other parts of this section (those which deal with things which are entirely off-topic) are so rich in respect to gaining an understanding of how the ancient mind worked that it would seem a crime to go so far in developing an understanding of some aspects of

the ancient world and yet then turn away and end it all after having come so close to completion. So allow me to indulge, if you will, in addressing not just those things which did in fact take place in a physical, material sense, but also those things which may have been the operating aspects of the minds of the ancient Medes and Persians. All that being said, let us now take a look at the details of the fall of Babylon and then at the celestial aspects thereof.

A. The Story Of The Fall Of Babylon

1. Ancient Babylon

During autumn in the year 3223 (539 B.C.), the Babylonian (Neo- Babylonian) Empire was as mighty an empire as any in the Near East and the Mediterranean world, and was perhaps more powerful than Egypt.¹³⁴ The city of Babylon itself is still renowned today for having perhaps held the so-called Hanging Gardens of Babylon, one of the Seven Wonders of the Ancient World.¹³⁵ The outer walls were massive: at least 80 feet high (by some accounts, perhaps as much as 320 feet high), and eighty feet thick as well, wide enough to allow two four-horse chariots to pass each other at the top.¹³⁶

Babylon seemed unconquerable. Its army was as powerful as any in the known world at the time; and just as an extra measure of caution, the Babylonians had stored up many years' worth of provisions in the event of a siege. Furthermore, the Babylonians had an endless supply of fresh water; for the city occupied both sides of the Euphrates (Phrat) River. The river itself, in fact, provided part of the defense of the city. For the river was deep where it flowed through Babylon. Apparently, the inner walls of the city along the river, though they apparently were not as high as the outer walls, nonetheless rose steeply and sharply out of the river.¹³⁷ Large copper doors opened out from the city walls toward a bridge across the river, and these doors, plus the inner walls which they were part of, could keep out any who might try to access the city from the river.

Consequently, if any nation were to attempt to conquer the Babylonians, the effort would no doubt entail a war lasting many years, costing many lives, and costing much treasure as well, and with no guarantee of success in the end, at that. Yet in one night, the entire mighty Babylonian Empire fell with hardly a whimper.

How could this be? What could possibly have happened that would take down such a mighty empire literally overnight, with virtually no struggle? Accounts of the details do differ,¹³⁸ but let us consider what the various accounts generally seem to have in common.

The first thing we need to consider is the Babylonian calendar. As was mentioned in the text, the modern configuration of the Hebrew calendar was greatly influenced by the Babylonian calendar while the Jews were in exile in Babylon. Now, the overthrow of Babylon occurred during the Babylonian month of Tasritu, which corresponds to the month of Tishri on the Hebrew

¹³⁴ https://en.wikipedia.org/wiki/Neo-Babylonian_Empire

¹³⁵ https://en.wikipedia.org/wiki/Hanging_Gardens_of_Babylon

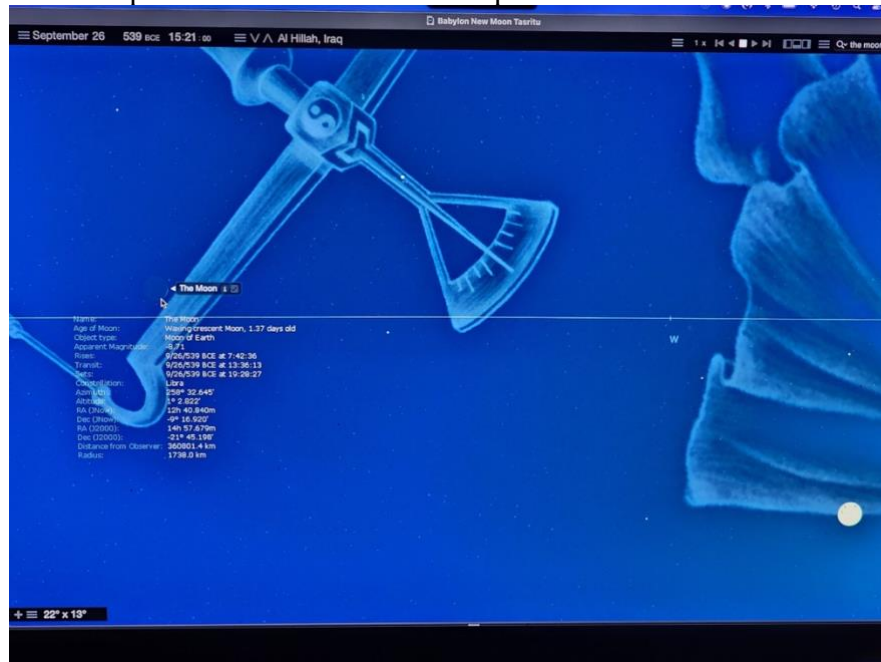
¹³⁶ <https://oneyeardevotional.wordpress.com/tag/walls-of-babylon/>

¹³⁷ <https://www.kadingirra.com/babylon.html>

¹³⁸ https://en.wikipedia.org/wiki/Fall_of_Babylon

calendar.^{139,140} Also, the ancient Babylonians, during at least part of the duration of their empire, marked the start and end of the days on their calendar in the same way that the Jews at that time did (and still do): from sunset of one day to sunset of the following day.^{141,142}

According to the ancient accounts, Babylon fell during the nighttime hours of the 16th of Tasritu (Tishri). Since the only method for determining the start of a month at that time was the eyewitness testimony method (which the Babylonians, like the Jews, would have to have made use of), we can ascertain from astronomy software when this would have been. As can be seen in the following photos, the crescent new moon of that month during that year could first have been seen by the Babylonians on September 26th, meaning that the first day of Tasritu (Tishri) would have been from sunset on September 26th to sunset on September.



The moon following sunset as seen from Babylon on September 26, 539 B.C. (at the start of the 1st of Tasritu, 3223), just above the horizon line, near the left edge.

The sun is seen between the bottom of the photo and the horizon line, near the right edge.

Images provided courtesy of Starry Night Education. Photograph by the author.

So the nighttime hours of the 16th of Tasritu that year would have corresponded to the night of October 11th (to the early morning hours of October 12th) that year, if we were to extrapolate the ancient Julian calendar back to that point in time.

¹³⁹ <https://books.google.com/books?id=iczrCgAAQBAJ&pg=PA138&lpg=PA138&dq=tishri+tasritu&source=bl&ots=M9Gw6jqkPW&sig=su4EosyjtgzUACPAjUHTUaGQS0&hl=en&sa=X&ved=0ahUKEwiclezOiNDZAhVLWq0KHemDAVEQ6AEIKjAB#v=onepage&q=tishri%20tasritu&f=false>

¹⁴⁰ <https://en.wikipedia.org/wiki/Tishrei>

¹⁴¹ <https://books.google.com/books?id=dSELAIAIAAJ&pg=PA23&lpg=PA23&dq=babylonian+day+sunset&source=bl&ots=LWZEvSa06M&sig=4rLj-Lv-bc6tSE7S3rFHGP-PYg&hl=en&sa=X&ved=0ahUKEwifwjitDZAhVDIqwKHchjAOAQ6AEIbTAH#v=onepage&q=babylonian%20day%20sunset&f=false>

¹⁴² <https://www.webexhibits.org/calendars/calendar-ancient.html>

2. Daniel Tells The Tale

Let us now look to the Book of Daniel in the Bible to see the events which led to the demise of Babylon that night. On the night that Babylon fell, the king of Babylon, King Belshazzar, held a feast. (Dan. 5:1)¹⁴³ Apparently, this feast was a rather drunken, rowdy affair.¹⁴⁴ And in the midst of it, King Belshazzar made one really big mistake: For upon recalling, in that fateful hour, that one of his ancestors, King Nebuchadnezzar, had carried away from King Solomon's Temple in Jerusalem the various cups and other vessels which were dedicated exclusively to the Lord, he decided to have them brought out of storage and used as part of their drunken festival in tribute to their pagan god. (Dan. 5:1-4)¹⁴⁵ No sooner had he done so, however, then suddenly, a disembodied hand appeared in the midst of the king and his company. This hand wrote the following words upon the wall: *mene, mene, tekel, upharsin*. This is the source of the modern phrase, "The handwriting's on the wall," when one speaks of the impending demise of some person, government, or enterprise. Now, the king was deeply shaken at the sight, and he trembled. (Dan. 5:5-6)¹⁴⁶

None of the king's usual counselors could discern the meaning of this event. But finally, his mother reminded him that King Nebuchadnezzar had also brought to Babylon from Jerusalem a certain Hebrew named Daniel, who had always been widely regarded as being richly gifted with wisdom and knowledge. (Dan. 5:7-12)¹⁴⁷ So King Belshazzar had Daniel brought before him, and he made Daniel quite an offer: If he could discern the meaning of these words, he would have him clothed in scarlet. A gold chain would be placed around his neck, and he would be made the number three ruler in all the kingdom. (Dan. 5:13-16)¹⁴⁸

Daniel dismissed the king's offer, but said he would tell the king the meaning of the words anyway. *Mene* is a word which can mean two things: numbered, or brought to an end. *Tekel* can likewise mean two things: weighed in the balance, or found wanting. *Upharsin*, in like manner, can mean two things: Persia, or divided. Daniel told the king that each of these words carried each of their two respective meanings: that the days of his kingdom had been numbered, and were now brought to an end; that his kingdom had been weighed in the balance, and had been found wanting (for he had treated the sacred vessels of the Hebrew temple as if they were common merchandise); and that his kingdom would therefore be divided that very night, and given over to the Persians and the Medes. (Dan. 5:17-28)¹⁴⁹

King Belshazzar did as he had promised, and gave Daniel his rewards despite Daniel's disinterest in them. But later that night, Babylon fell, and King Belshazzar was killed. (Dan. 5:29-31)¹⁵⁰ Let us now return to a look at the various other accounts of this night to consider certain other details about what took place.

3. Babylon's Pearl Harbor

¹⁴³ <http://biblehub.com/nasb/daniel/5.htm>

¹⁴⁴ Dan. 5:1-4; <https://biblehub.com/kjv/daniel/5.htm>

¹⁴⁵ <https://biblehub.com/kjv/daniel/5.htm>

¹⁴⁶ <https://biblehub.com/kjv/daniel/5.htm>

¹⁴⁷ <https://biblehub.com/kjv/daniel/5.htm>

¹⁴⁸ <https://biblehub.com/kjv/daniel/5.htm>

¹⁴⁹ <https://biblehub.com/kjv/daniel/5.htm>

¹⁵⁰ <https://biblehub.com/kjv/daniel/5.htm>

Shortly before this fateful night, King Cyrus I of Persia (an area which was principally modern-day Iran) had begun an invasion of the Babylonian Empire and started a siege of the city of Babylon.¹⁵¹ Although King Cyrus's army did deal the Babylonian army a defeat in an initial skirmish out on the open plains, the Babylonians retreated to their fortress city. There they felt quite secure, and with smug indifference they dismissed the seemingly futile siege of their city.

As for King Cyrus, he recognized that it would be nearly impossible to capture Babylon by a direct assault. But he came up with another plan. Apparently, this stroke of genius by him, or by someone in his entourage, stemmed from a most unfortunate incident which occurred shortly before he had reached Babylon. For while his army was on the banks of a stream named Gyndes, one of the sacred white horses of his entourage bolted into this stream in an attempt to cross it.¹⁵² The horse was swept away and drowned. Cyrus, in a fit of rage, decided to lower this stream as a punishment to the stream, so he set about having his army dig 360 trenches (180 on each side of the stream) to divert the water away from it. After many months of delay in digging the trenches, his plan worked. The Gyndes went lower, and the king and his army moved on to Babylon.

So now, faced with the seemingly impenetrable walls of Babylon, Cyrus hoped for some way other than a direct assault by which to take the city. At that point, either he himself or someone who was with him came up with the idea of doing the same thing to the Euphrates that he had done to the Gyndes. So upstream from Babylon, out of sight of the city walls, he had his army dig trenches leading to a marshy area which could hold much of the water of the river. Then, on the night of the 16th of Tasritu (October 11th to October 12th), the Persians removed the final barriers between the Euphrates itself and their trenches. Water poured from the river into the trenches and into the marsh. The Euphrates eventually went down that night to the level where it only came halfway up a man's thigh.

Persian troops then marched into the river. Just exactly how it is that they made their way into the city itself remains unclear. Some have speculated that they made their way out of the river and into the city by way of a canal which led from the east portion of the city into the river. Another possibility, however, would be that there may have been docks for boats near the bridge on each side of the river, with stairs leading from the docks up to the bridge, just in front of the inner doors leading out to the bridge.¹⁵³

These doors may have been open on this night (for the sake of the festival perhaps, if nothing else) if the Babylonians had felt that any possibility of an attack from the river was unrealistic. As for the guards on the wall above, apparently they felt so smug and secure, and were so interested in the partying that was going on, that they didn't bother to keep a close eye on the river, if they even bothered to look at it at all in their drunken stupor.

As for the Persians, the first wave of them to enter the city probably pretended to be taking part in the drunken festival. This would make great sense, for not only would their movements, as they made their way from the river to the palace, seem nonthreatening---like nothing more than

¹⁵¹ <http://www.livius.org/sources/content/herodotus/cyrus-takes-babylon/>

¹⁵² <https://historysrambles.weebly.com/historyess-ramblings/king-cyrus-the-great-and-the-gyndes-river>

¹⁵³ <https://www.pinterest.com/pin/545428204845759885/>

the staggering gait of fellow drunken men---but it would also explain why their speech would not sound normal to Babylonian ears, and why some of them might have appeared to be unable to speak at all.

The vanguard of Persian troops soon reached the palace. They quickly and easily overwhelmed the guards, who suspected nothing, and they went in and killed King Belshazzar. In the meantime, their fellow Persians began storming in, and the city was taken that night. During all of this, up in the watchtowers, the drunken guards apparently were unable to distinguish the cries of battle in the city below from the cries of drunken rowdiness, and at dawn they were astonished to learn that their king was dead and that their empire had ceased to exist. Faced with inevitable death if they resisted (and probably being too hungover to resist, anyway), they meekly surrendered, and the fall of Babylon became an accomplished fact by the morning light.

Interestingly enough (and indeed, disturbingly enough), the modern-day Persians (*i.e.*, the Iranians) may be capable of doing virtually this exact same thing to the United States today, the difference being that what happened 2,500 years ago resulted in the nearly bloodless overthrow of a government, whereas what the Persians could do to us today could result in about 90 percent of the U.S. population dying within a year, and probably, in fact, within less than half a year. And all from exploding one nuclear bomb in just the right place high above Earth's atmosphere.¹⁵⁴

¹⁵⁴ It has been the case for some time now that an Iranian Shahab-3 missile (<https://en.wikipedia.org/wiki/Shahab-3>) and its launch platform could probably be smuggled piece by piece by piece into Canada and then assembled, and the missile then launched from there. A nuclear warhead, if detonated about 250 miles above the heartland of the U.S., could generate an electromagnetic pulse (an EMP; see <http://www.empcommission.org>; see also https://en.wikipedia.org/wiki/Electromagnetic_pulse; this could damage so much electrical equipment that even healthy people would soon start dying from a lack of drinkable water and food because the pumping equipment at water filtration plants (and all backup pumps and generators) would be irreversibly damaged, as would all means of food production, delivery, and storage other than by using horses or mules to plow fields and deliver food to market. At the same time, harvesting would have to be done by hand, with horses and mules to assist.

The Iranians have already conducted tests to prepare for this, sending their missiles over the Caspian Sea and detonating a dummy warhead high above the atmosphere and then calling the test a success: <https://books.google.com/books?id=vK8WU70WKpWC&pg=PA117&lpg=PA117&dq=iran+missile+test+caspian+sea+success&source=bl&ots=7oYGgFoba4&sig=gyOpBfe3VCuEJrbC34Of9yBhk5Y&hl=en&sa=X&ved=0ahUKEwj7xO6Tt9rUAhUI1oMKHbADJoQ6AEILzAC#v=onepage&q=iran%20missile%20test%20caspian%20sea%20success&f=false>; see also, <https://beyondthecusp.wordpress.com/category/iran/nuclear-sites/page/42/>. It would make absolutely no sense to call a test like that a success if the warhead was supposed to hit a target on earth, but it would make infinite sense to call the test a success if the warhead was actually supposed to detonate at the apex of the missile's trajectory, which is what they would need to have it do, with a nuclear warhead, if they were to create an EMP in an actual attack.

Furthermore, back in January of 2000, the Central Intelligence Agency (CIA) advised then-President Bill Clinton that in their opinion, the Iranians might have already obtained the material to create a nuclear weapon based upon the CIA's reassessment of the possibility that the Iranians may have obtained the necessary bomb-grade materials on the black market. (See "CIA suspects Iran can make bomb." Arizona Republic [Phoenix] 17 January 2000: A13. Print.) This assessment by the CIA, if true, would render moot the whole issue as to whether the Iranians plan to make bomb-grade fissionable material from the material which they have received from Russia. For it opens up the possibility that the entire Iranian nuclear program with Russia may have just been

camouflage all along so that the Iranians and Russians could hide the true source of at least some of Iran's nuclear material (i.e., the Russian black market), something which, if true, could prove to be an embarrassment for the Russians, whether any person in the current administration in Moscow took part in any such black market activities or not.

Now, based on the range of the Shahab-3 missile, there is a dome-shaped area along a portion of a map of Canada--- one reaching from the U.S. border in eastern Montana, going up in an arch north of Lake Winnipeg, and then coming back down again to Thunder Bay over in Lake Superior---from which such a missile could be launched and the warhead then detonated 250 miles over the heartland of the U.S. Virtually the entire U.S. would then be plunged back into the 1800s in less than one second, with no electricity, no tap water, no cell phones, no land line phones, no internet, no television, no radio (commercial, police, fire, or military), etc., for years, probably decades. It would also make most modern motor vehicles--- including personal vehicles, fire engines, police cars, ambulances, and military vehicles--- instantly inoperable as well. And the damage to equipment would be, as I say, irreversible.

What is more, the Iranian missiles are based on the Nodong-1 missile developed by North Korea. And the North Koreans have enhanced the range of their missile arsenal with the development of the Hwasong-15 missile, so that now either they, or someone who borrows from their technology (such as the Iranians, who have done so in the recent past), could launch a missile capable of detonating a warhead high above the United States from all of Canada, or even from as far away as northern Peru or northern Brazil. (For that matter, unlikely as it may be, they could launch it from Greenland, Iceland, western Scandinavia, most of Britain and Ireland, or the Azores, assuming, of course, that they could overcome the problems in keeping it concealed until launch in such places.)

So as we ponder this, let us keep in mind that within Persian history, the Persians overthrew a government and a military which had been far more powerful than theirs, and in a manner which was just as sudden, just as bold, and just as dramatic as this type of thing once already, when they overthrew the Babylonian Empire in a single night. And as Persians, the Iranians no doubt remember their own Persian history quite well. Quite well.

B. The Celestial Aspects Of The Assault On Babylon

With respect to the celestial aspects of the assault on Babylon, recall that I mentioned in the text that on that night, Saturn had occupied a position against the background of stars which would be very close to the position which it would eventually come to occupy during Purim 530 years later, in 3752 (9 B.C.), and that on the night that Babylon fell in 3223 (539 B.C.), it was along the eastern edge of the constellation Aquarius, relatively close to the constellation Pisces (which the Babylonians considered to be the sign of the Jew). Now, the constellation Aquarius, one of the constellations of the zodiac, is the so-called water carrier.¹⁵⁵ That being the case, it should therefore be apparent, in light of how Cyrus I diverted the waters of the Euphrates, as to how the Magi (particularly Jewish Magi) may have deemed it to be significant that Saturn should happen to have appeared in Aquarius on that one particular night of great importance to the Jewish people 530 years earlier, one of special significance to their then-upcoming liberation (when they would soon be allowed to return home to Jerusalem): *i.e.*, the night when King Cyrus I carried away the waters of the Euphrates---much like Aquarius---into a marsh with his trenches. This would perhaps be especially true since Saturn, during the time in which the Magi were awaiting the coming of the Messiah (just before Jesus was born), was not only within the constellation Aquarius, but was even (as I mentioned in the text) within the actual celestial orb of the position which Saturn had been in on the night that Babylon fell.

Now, as to whether the ancient Persians themselves in 3223 (539 B.C.) did in fact deem it to be significant that Saturn appeared in Aquarius, the water carrier, on the night they diverted the waters of the Euphrates and captured Babylon, it is unfortunately the case that I cannot tell one way or the other. The record, so far as my own research can reveal, seems devoid of any discussion of that one specific point. But I believe that it is, if nothing else, one of the signs placed in the heavens by God for us, at least, and perhaps also for the Magi of old, or anyone else.

Moving on, there are other aspects of Saturn to consider, both from Persian culture and from Babylonian culture. In ancient Persia, Saturn was called Kayvan, and it was he who controlled exalted status.¹⁵⁶ Certainly, in light of what the ancient Persians wanted to do to King Belshazzar of Babylon and to King Cyrus I of Persia that night---depose one from his exalted status, and install the other in his place---it would have seemed appropriate to them to do so while Saturn/Kayvan presided overhead.

Now, about twenty minutes after sunset that night (about the time Saturn would have first become visible), Saturn was already in a prominent position: about 28.5 degrees above the horizon, and located to the southeast (specifically, with an azimuth of 140). And as can be seen in the following photo, it would continue to get higher and higher into the night sky until it reached the meridian almost two and a half hours after that (*i.e.*, at 17:25:07 UTC), when it would have an altitude of almost 40 degrees (in other words, almost halfway from the southern horizon to the zenith):

¹⁵⁵ [https://en.wikipedia.org/wiki/Aquarius_\(constellation\)](https://en.wikipedia.org/wiki/Aquarius_(constellation))

¹⁵⁶ <https://en.wikipedia.org/wiki/Kayvan>



Saturn reaches the meridian at 17:25:07 UTC as seen from Babylon on 16 Tashritu/Tishri in 3223 (Oct. 11, 539 B.C.). The white vertical line illustrates the meridian.
Images provided courtesy of Starry Night Education. Photograph by the author.

With respect to Babylonian thought, it would come as no surprise if the ancient Persians also knew enough about concurrent Babylonian lore to appreciate the presence of Saturn from the perspective of Babylonian lore as well. For Babylonian lore was part of Mesopotamian lore, and Mesopotamia included not only the land where Babylon was, but also a portion of the area where the Medes and Persians lived prior to their conquest of Babylon. Now, that being said, the ancient Babylonians knew Saturn as Ninurta; significantly, Ninurta was believed to be the son of the god Enlil (who was also the father of the moon god).¹⁵⁷

1. Enlil (Lord Storm) As A God Of War

In ancient Mesopotamia, the god Enlil had been considered the number two god in the pantheon of the Mesopotamians.¹⁵⁸ The only god above Enlil was Anu, the overall god of the sky.¹⁵⁹ Simultaneously, Enlil was a sky god as well, but not of the sky generally; rather, he was the god of the stormy sky, and his name means “Lord Storm”.¹⁶⁰ As the god of the storm, he was a god of violence and disruption. Not surprisingly then, Enlil was in charge of leading the wars on Earth which had been ordained by the gods above.¹⁶¹ In that respect, when an army would storm a city, it was thought that this was Enlil himself, personally, coming down upon the city. One modern author puts it this way:

¹⁵⁷ <https://en.wikipedia.org/wiki/Enlil>

¹⁵⁸ <https://en.wikipedia.org/wiki/Mesopotamia>

¹⁵⁹ Frankfort, Henri, Frankfort, Mrs. H.A., Wilson, John A., Jacobsen, Thorkild, *Before Philosophy*, pp. 150-153, Baltimore: Penguin Books, 1968. (Note: this work was originally released as an Oriental Institute essay published by the University of Chicago in 1946, and its title was *The Intellectual Adventure of Ancient Man*.)

¹⁶⁰ Frankfort, Henri, et al., *Before Philosophy*, pg. 150.

¹⁶¹ Frankfort, Henri, et al., *Before Philosophy*, pg. 153-156.

The city of Ur had long held sway over Babylonia. Then it fell before a merciless attack by Elamitic hordes which swept down upon it from the eastern mountains. The utter destruction of the city was wrought, in our terms, by the barbaric hordes which attacked it. Not so in terms of the Mesopotamian's own understanding of his universe: the wild destructive essence manifest in this attack was Enlil's. The enemy hordes were but a cloak, an outward form under which that essence realized itself. In a deeper, truer sense the barbaric hordes were a storm, Enlil's storm, wherewith the god himself was executing a verdict passed on Ur and its people by the assembly of the gods; and as that storm the enemy attack is seen and described:

*Enlil called the storm.
The people mourn.*¹⁶²

The author of the book then goes on to say,
This storm is the true cause of the city's downfall:

*The storm ordered by Enlil in hate, the storm which wears
away the country,
covered Ur like a cloth, enveloped it like a linen sheet.
It is the cause of the destruction wrought:*

*On that day did the storm leave the city: that city was
a ruin.
O father Nanna, that city was left a ruin.
The people mourn.
On that day did the storm leave the country.
The people mourn.*¹⁶³

All in all then, it would seem quite appropriate to ancient peoples of that region that a god known as the son of Enlil (Ninurta/Kayvan/Saturn) should rise higher and higher into the night sky while their army approached and then stormed the city of Babylon.

2. The Role Of The Persian Moon Goddess In The Fall Of Babylon

As it turns out, Saturn wasn't the only prominent thing in the sky that night. In fact, it wasn't even the most prominent thing: Half an hour after sunset, the moon, one day past full, rose in the east. With that in mind, two things should be considered from the start: First, as we have seen, in Mesopotamian belief, Enlil was not only the god of the storm, and the father of Saturn, he was also the father of the Babylonian moon god. Second, in Persian lore specifically, a goddess named Anahita was considered to be the goddess of the moon; and she, in fact, was deemed to be a war goddess also, among her various other functions.¹⁶⁴

The Persians (Zoroastrians) apparently traded ideas with the Babylonians. So it would probably not be surprising, then, if the Magi of 530 years later (in 9 B.C.) deemed there to be a

¹⁶² Frankfort, Henri, et al., Before Philosophy, pg. 154.

¹⁶³ Frankfort, Henri, et al., Before Philosophy, pg. 155.

¹⁶⁴ <https://www.ancient-symbols.com/persian-symbols.html>

significant connection between the position of Saturn on the night that Babylon fell and its position during Purim in 3752 (9 B.C.). Thus, they themselves might have taken careful note of how all of these different myths seemed to come into play.

At this point it is probably safe to say that to the ancient Persians, the image of the moon wasn't simply a symbol of their goddess. Rather, within the scope of ancient thought, it would be more likely that in the minds of the ancient Persians, Anahita herself (the war-goddess/moon-goddess/river-goddess) had come down personally from heaven to visit them by means of the appearance of her reflection in the river, and to then join ranks with them as they first marched into and then through the river to do battle against the Babylonians. For while they were in the river, with her reflection clearly shining there amongst them, it would be easy for them to think that she was part of them and that they were then comingled with her. And while a son of Enlil (Ninurta/Kayvan/Saturn) presided overhead, they could have thought that they themselves had become the substance of Enlil's storm (at least, from a Babylonian perspective), and that in a meaningful way they were a part of Enlil, and he a part of them.

Adding further to all of this was the celestial position of the moon that night. As can be seen in the following series of photos, it was in the midst of the constellation Taurus:



Moonrise with the moon (one day after full) in Taurus the Bull (just below center) during evening twilight as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.).

The white horizontal line illustrates the horizon.

Images provided courtesy of Starry Night Education. Photograph by the author.



Taurus and the moon as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.), three hours after the previous photograph.

Images provided courtesy of Starry Night Education. Photograph by the author.



Taurus and the moon as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.), three hours later (six hours after the first photograph).

Images provided courtesy of Starry Night Education. Photograph by the author.



Taurus and the moon as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.), three hours later (nine hours after the first photograph).

Images provided courtesy of Starry Night Education. Photograph by the author.

Significantly (as can be seen most clearly in the most recent photo), the image of the constellation Taurus is of a bull which comes charging up out of the water. What could possibly be more appropriate, then, than for this Persian war goddess/moon goddess Anahita to be riding on a bull which comes charging out of the water on the night when the Persians themselves would come charging out of the river to storm the city?

3. The Timing Of The Attack

Now, keep in mind that the armies of Cyrus I probably would not have started to divert the Euphrates River during broad daylight, because then even the least attentive of the guards atop the city walls could have noticed the river going down; and besides, their drunken festival would not have started until sunset, anyway, because sunset would mark the start of the day on which the festival was held. However, just as the skies would start getting dark following sunset---as Saturn was first coming into view, and as the moon itself reached the horizon as it rose---would perhaps have been the best time to begin diverting the flow of the river, the level of which, of course, we would expect to have then dropped gradually, rather than suddenly.

This leads us to the question, “Is there a way to know when the attack itself would have taken place?” I think the short answer to that question is, “Not precisely.” But we may be able to glean some clues from astronomy as to at least what may have been the potentially best time for the attack to have taken place, whether that is when it actually took place or not.

Also please notice from the preceding photos that even though the moon started out the night near the Pleiades, a star group which is considered to mark the shoulder of the bull (<http://earthsky.org/favorite-star-patterns/pleiades-star-cluster-enjoys-worldwide-renown>), as the night progressed until sunrise, the moon’s orbital motion brought it up along the neck of the bull,

to the base of its head. This is interesting to note in light of the fact that the image of the woman riding the bull at the European Union headquarters, and also in other artwork, stretches herself out along the neck of the bull, from its shoulders to its head.

I strongly suspect that all of this is no coincidence, and that these various forms of art have a common root in the celestial imagery from this annual Babylonian feast of the moon god (which would be highly similar to this each year), including specifically the night when the Persians conquered Babylon, when the moon rode on the bull---stretched out from the shoulders to the top of the neck---as the bull came charging out of the water, and that this common root is now simply lost in the sands of time.

First of all, we should consider the fact that despite Cyrus's earlier success at lowing the River Gyndes, this effort to do the same thing at the Euphrates was still a bit experimental, and he knew it. No one could have predicted just exactly when the Euphrates River would go down to the point where it would be possible to wade through it, or whether it would ever go down that much during the night at all. And Cyrus knew that he would have just one shot at it. It would not be possible on any night after this one for him to surprise the Babylonians if the Babylonians had then become able, by the morning light the next day, to look down and see that the river had gone down to a considerable extent, even if not enough for King Cyrus to have launched his attack.

So Cyrus knew that in undertaking this project, he would have to succeed that very night itself. It therefore follows that in planning for the exact timing of the attack, Cyrus would have wanted to start the attack no sooner than he would have to, in order to give the river the chance to go down as much as it possibly could. This would be particularly true in light of the fact that he could not know whether the river was uniformly deep; and if it were even just slightly deeper along the walls of the city than it was away from town, the mere fact that the river might be low enough for his soldiers to enter it beyond the outer walls would not necessarily mean that they could wade through it once they got past the outer walls. Furthermore, since everyone would have expected the Babylonians to get more and more drunk (and more and more stuporous) the more the night wore on, he would have wanted to wait until the drunken Babylonian army was as helpless as possible before starting his attack.

So, when would be that time by which Cyrus would have to start his attack? Just before morning twilight, perhaps?

Actually, no. For as was mentioned above, the moon was one day past full. And so the prospect of the river being bathed in bright moonlight---which might easily have exposed his army even to drunken, relatively inattentive guards---is something which would probably have been the limiting factor in Cyrus's calculations as to the time by which the attack would have to begin.

The geography and architecture of the area might help us find our way through this puzzle. Granted, one cannot be certain in this day and age what the exact details of the layout and architecture of the city of Babylon itself were, or what changes may have taken place in the flow of the Euphrates River around that site over the years. But from research which has taken place, we can be at least relatively sure of what the general layout of Babylon was, and we can see today approximately how the course of the Euphrates around that site may have changed over time.¹⁶⁵

¹⁶⁵ <https://www.wikiwand.com/en/Babylon> (Note: Scroll down and enlarge the illustration

From this we can infer much about what may have been the best plan of attack of King Cyrus. This is not to say that what I shall show you next would necessarily be the only way the attack could have been made, or even necessarily the best way. But from what I shall show you now, I think we may agree that it would be at least one very good way for Cyrus to have conducted his attack.

That being said, here we see maps of how archeologists believe the city of Babylon looked in ancient times: <https://www.pinterest.com/pin/525373112762769741/>; And here we have a map showing both the modern course of the Euphrates and what is believed to have been its ancient course: https://www.wikiwand.com/en/articles/Babylon#/media/File:Plan_of_Ruins_of_Babylon_1905.jpg. And here we also have satellite images of the area today around where the famed Ishtar Gate¹⁶⁶ and the Southern Palace had been located: https://www.google.com/maps/place/Ishtar+Gate/@32.5451434,44.4242168,8834m/data=!3m1!1e3!4m6!3m5!1s0x1558fd15f70c94df:0xedfed08bd34bce96!8m2!3d32.5415574!4d44.4239594!16zL20vMDJzYnQ3?entry=ttu&g_ep=EgoyMDI1MDgxNy4wIKXMDSOASAFAw%3D%3D;https://www.wikiwand.com/en/articles/Babylon#/media/File:Map_of_Babylon_with_major_areas.jpg

As can be seen by comparing this latter image (if you zoom in slightly) to the former images, the course of the Euphrates apparently has changed partially around this area since ancient times. Specifically, just northwest of the Ishtar Gate, the Euphrates now curves sharply to the southwest instead of curving to the south-southeast, as was apparently the case back then. And although we cannot now know just exactly what the path of the Euphrates was in ancient times, we can at least reasonably estimate that at that point, the western wall of the east portion of the city, which bulged just slightly into the river itself, ran down from the north on a heading of about 175 degrees. Now, prior to the time that the moon shone fully into the Euphrates at that spot on the night that Babylon fell, Cyrus would have had the chance to have his men approach the canal from the north by staying close to the east bank of the Euphrates, where they could be hidden from the moonlight by the shadow of the wall towering high overhead.

As for getting to the east bank undetected in the first place, it is not unreasonable to think that the guards atop the wall may have been drinking since sunset (or at least, since moonrise, shortly after sunset) as part of their festival in honor of their moon god, and also that they may have been gazing at the moon frequently, some of them for long periods of time, perhaps, while offering toasts and swearing oaths to the moon god. The thing is, as I can tell you from having lived in a desert environment (similar to Babylon's) for many years (*i.e.*, Arizona), and after having been raised in the upper Midwest (specifically, Chicago), air which does not have a lot of humidity (such as is the case in Arizona) is much more transparent than humid air. Sunlight and moonlight, for example, are much more intense when either one is near the horizon in Arizona than would be the case in Chicago. So on this night in Babylon, the light from the moon, one day past full moon, would have been quite intense right from the very beginning, when it was just above the horizon.

What this means is that any guard who would have been gazing directly upon the moon

entitled *Plan of Ruins in 1905 with locations and names of villages*).

¹⁶⁶ https://en.wikipedia.org/wiki/Ishtar_Gate

would have had his naturally-occurring “night vision”¹⁶⁷ ruined by the sight of it. And this effect could even persist for up to 40 minutes after he had turned away from looking at the moon, even if he did not look back at the moon during that time.¹⁶⁸ So given the fact that it would be difficult enough for a guard on the night of any bright moon to look down into places which were in shadow and see what might lie therein, it would be particularly difficult for any guard who had had his night vision completely compromised (such as might have happened on this night) by staring straight at the moon to offer toasts to it, if he were then to turn away and gaze down upon the shadows, even if he were sober. And it would not be unreasonable to think that any guard who stopped gazing at the moon for a little while on that night may well have looked up at it over and over again, at less than 40-minute intervals (*i.e.*, before his night vision could be restored).

Now, as can be seen on *Starry Night*, from Babylon that night, the moon had an azimuth of 75 when it rose (*i.e.*, 15 degrees north of straight east), and two hours after it rose it lay directly east, with an azimuth of 90 (straight east). That being the case, it would not be unreasonable to think that the guards along the wall on the east side of the river would have had their backs turned to the river much of that time to gaze at the moon. And if the Persians had entered the river from the west bank, at a place directly across from an area just north of the palace complex (which was on the east bank), they would have entered the river from a point which apparently had no wall upon the west bank.

In other words, as they crossed the river from the west bank to the east bank (if that’s how they approached the city), they would have had no guards looking out in their direction from behind their backs from the west bank, for along the west bank, the city wall did not go that far north. It may seem strange from a security standpoint that there would have been no guards there, but bear in mind that this lack of a wall on the west bank must be considered in light of the fact that apparently, that area (directly across the river from the palace complex) was not an actual part of the city at the time, as is seen here: <https://nickjanetakis.com/blog/ancient-babylonians-may-have-invented-irc-2000-years-ago>.

Now, since the river, as I mentioned above, apparently flowed south as it ran past the palace complex on a heading of about 175, we could expect the moon to shine directly down upon that part of the river when the moon reached an azimuth of 175; and prior to that, as I mentioned, the shadow of the wall along the east bank would have hidden anyone crouched up next to it. With that in mind, as is shown on *Starry Night*, the moon on that night, as seen from Babylon, did not come to an azimuth of 175 until 21:45 UTC on the night of October 11th (12:45 A.M. in Babylon, by the reckoning of modern Standard Time, on the morning of October 12th). So Cyrus would have had until shortly before then (or possibly a little later, as we shall see) to avoid having the bright moonlight of that night shine directly down upon his men if he had positioned them properly.

a. The “Overhanging” Gardens Of Babylon

A clue as to yet another way that they could have kept their attack a surprise until the very last moment might be found in the true name of Babylon’s most famous feature: the Hanging

¹⁶⁷ https://en.wikipedia.org/wiki/Night_vision

¹⁶⁸ <https://pmc.ncbi.nlm.nih.gov/articles/PMC5787096/>

Gardens. As it turns out, the Greek word which is translated “hanging”¹⁶⁹ could probably be more accurately translated as “overhanging”; and this apparently pertains to the branches of trees (and perhaps other foliage) which would overhang the garden.¹⁷⁰ I cannot help but wonder, however, if perhaps there is more to that name than simply that. For apparently, these gardens, if they did exist at all, were built as a form of consolation for Queen Amytis, the wife of King Nebuchadnezzar II. She had been born and raised among the green hills and valleys of Media, and she was homesick for the sight of them.

The thing is, with respect to the way the hanging gardens are commonly portrayed in modern-day paintings, although these paintings do in fact make Babylon look like a city set in a garden, they do not also do a good job of making the city look like a hillside covered with forestation and verdant fields: https://en.wikipedia.org/wiki/Hanging_Gardens_of_Babylon. That could probably change in a heartbeat, however, if each of the balconies of the gardens had vines or branches overhanging them from the rails, and thus covering the space between the various levels of the gardens so as to make the gardens appear from a distance to be a smooth hillside covered with verdant foliage, as the queen wanted.

What this means for purposes of our inquiry is that I cannot help but wonder if vines overhanging the lowest balcony along at least the south wall of the Southern Palace might have reached down from the balcony itself all the way to the ground. If such were the case, then perhaps the Persians could have snuck along that wall by hiding behind the overhanging vines until they reached---or at least came very near to---the Procession Street bridge: <https://www.pinterest.com/pin/525373112762769741/>.

i. Persian Artifacts In The Water

All that being said, I cannot help but wonder if perhaps the riverbed along the east side of the river just west and north of the palace complex may have had more artifacts fall into it from the Persian army than any other section of the river that night. Of course by now, 2,500 years later, the Euphrates River may have swept such artifacts away and dispersed them evenly throughout the parts of the river downstream from where Babylon had been. And any artifact that was not of a durable material would no doubt by now have disintegrated. And yet, perhaps we assume too much. Perhaps that portion of the east side of the riverbed might still contain a higher concentration of Persian artifacts from that night than any other portion of the river. Perhaps even more promising would be to dig within the course of where the canal had been, since the flow of water there probably would not have been nearly as powerful as that of the river itself even when the canal itself was still in existence, (which it no longer is). And so more of the lost artifacts might remain buried in the sediment there than in the river itself.

4. The Signs In The Heavens Which May Relate To The Handwriting On The Wall

As to the words which were written on the wall which caused King Belshazzar to tremble---*mene (mene), tekem, upharsin*---I must wonder: Were there signs in the heavens when this event took place which correspond to each of these words? Let us consider the first word: *mene*, meaning

¹⁶⁹ *kremastos*; pronunciation: <https://www.howtopronounce.com/kremastos>

¹⁷⁰ https://en.wikipedia.org/wiki/Hanging_Gardens_of_Babylon

“numbered” or “brought to an end”. In ancient Babylon, as today, the zodiac has a specific number of signs.

Originally, the Babylonian zodiac had 17 or 18 signs¹⁷¹ (which later on, by around the year 400 B.C., was reduced to 12).¹⁷² Significantly, whether one is talking about the original 17 or 18 signs of the zodiac of Mesopotamia/Babylon, or whether one is talking about the final 12 signs, the list of signs begins either with the star group known as the Pleiades (which lies within the constellation Taurus the Bull),¹⁷³ or else it begins with the constellation Taurus the Bull itself.¹⁷⁴

Likewise significant is the fact that apparently, in the astrology of Mesopotamia/Babylon, the zodiac was not principally thought of as being the path of the sun through the sky, as we think of it today, but rather, it was principally thought of as being the path of the moon through the sky.¹⁷⁵ (Actually, it is, of course, both of these.) With that in mind let us look once again at the moon as it would have appeared at moonrise on that fateful night:



Moonrise with the moon in Taurus the Bull (just below center) during evening twilight as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11, 539 B.C.).

The white horizontal line illustrates the horizon.

Images provided courtesy of Starry Night Education. Photograph by the author.

Here we see that just as the moon rose that night, as seen from Babylon, it did so right after it had passed the Pleiades (the small, tight star cluster just above the moon) in its monthly journey across the sky (It had just passed the Pleiades by about four hours, in fact). Given the fact that the people of this region thought of the zodiac as being something which marked the passage of the moon across the sky, we can look upon this event as signaling that the moon had just gone through the total number of signs in the heavens which made up the zodiac, and that therefore a circuit of the moon through each of those numbered signs had just been finished, and a new one had just begun, as the moon rose that night. This sense of completion, the completion of a numbered cycle

¹⁷¹ <https://sumerianastrology.com/babylonian-zodiac-original-sidereal-zodiac/>

¹⁷² <https://en.wikipedia.org/wiki/Zodiac>

¹⁷³ https://en.wikipedia.org/wiki/Babylonian_star_catalogues

¹⁷⁴ <https://sumerianastrology.com/babylonian-zodiac-original-sidereal-zodiac/>

¹⁷⁵ https://en.wikipedia.org/wiki/Babylonian_star_catalogues

which is now brought to an end, is entirely consistent with both meanings of the Hebrew word *mene*.

The next word we shall consider shall be the last of these three words: *upharsin*. As we saw above, this word can mean “Persia”. And when we look to where the moon rose that night with respect to a map of the region, we can see that the moon and Taurus the Bull rose with an azimuth (a heading) of about 75 degrees, which means that as one would look toward it from Babylon while it rose, one would be looking directly out toward the midst of Persia:



The moon rising with an azimuth of 75 on the 16th of Tashritu/Tishri in 3223 (Oct. 11, 539 B.C.) as seen from Babylon. The white horizontal line, which runs through the moon, marks the actual location of the horizon.

Images provided courtesy of Starry Night Education. Photograph by the author.



The red line shows a heading (azimuth) of 75 degrees outwards from the site of ancient Babylon (modern-day Hillah) into ancient Persia (modern-day Iran).

Images provided courtesy of Starry Night Education. Photograph by the author.

Furthermore, a bull was recognized as being a symbol of ancient Persia.¹⁷⁶ So in other words, anyone looking out from Babylon that night along a heading/azimuth of 75 degrees would be looking out toward a bull in the heavens and at the same time, a bull on Earth (Persia).

We also saw that this word (*upharsin*) can mean “divided”. And interestingly enough, the display of the heavens that night presents an image of something which can be thought of as corresponding to the rise of a king of a two-pronged (split) kingdom. For as the moon rose higher and higher, the constellation Taurus the Bull fully rose above the horizon as well. And there, between the two horns of Taurus, was Jupiter, while it rode the Bull, which appeared to lift Jupiter higher and higher into the sky until 23:12:30 UTC, when Jupiter reached the meridian. See the following photo:

¹⁷⁶ <https://books.google.com/books?id=conmlB95wbwC&pg=PA252&lpg=PA252&dq=bull+%22persian+empire%22&source=bl&ots=31MEZxRaw8&sig=JOWZbF35efZlx9ymHdQpgPO1Chw&hl=en&sa=X&ved=0ahUKEwitzITDudPZAhVF2oMKHe3ABeIQ6AEIjAEwDg#v=onepage&q=bull%20%22persian%20empire%22&f=false>



Jupiter on the meridian between the horns of Taurus as seen from Babylon at 23:12:30 UTC on the night of 16th of Tashritu/Tishrei in 3223 (Oct. 11, 539 B.C.)

Images provided courtesy of Starry Night Education. Photograph by the author.

In ancient Babylon, Jupiter was known as Marduk, the chief god. It is believed that the Romans based their god Jupiter on Marduk.¹⁷⁷

Significantly, a particular type of a chimera¹⁷⁸ (pronunciation: <https://dictionary.cambridge.org/us/pronunciation/english/chimera>), specifically, one depicting a cross between a man and a bull (which the Persians took from the Assyrians to be a symbol of their own), shows the head as that of a man, while the horns of a bull are retained, so that interestingly enough, the head of the man is actually between the horns; and this man/bull has wings.¹⁷⁹

Of further interest, as can be seen in the photo within the link in this footnote, all of this imagery fits quite well with the imagery of the heavens that night. For the Bull (Taurus) rose up high into the heavens, just as though it had wings, and the man (Jupiter) was at the head, in between the horns, which can bring to mind the image of a king of a split (or divided) kingdom: namely, that of the Persians and the Medes (each of the horns), which are then unified at the head (again, the king). Plainly then, there was imagery in the heavens that night which can quite easily be thought of as corresponding to the word *upharsin*, both in terms of its reference to Persia, and in terms of its reference to a realm which was the product of a two-pronged (divided) kingdom.

So it would not be surprising if King Cyrus also had this aspect of the astronomy of that night in mind when he was planning his timing for the attack. For the slaying of King Belshazzar at about that time would simultaneously lift Cyrus up into the kingship over Babylon by the two-pronged attack of the Medes and the Persians, just as the Bull was raising Jupiter to its highest

¹⁷⁷ <https://www.newworldencyclopedia.org/entry/Marduk>

¹⁷⁸ [https://en.wikipedia.org/wiki/Chimera_\(mythology\)](https://en.wikipedia.org/wiki/Chimera_(mythology))

¹⁷⁹ http://www.ahuramazda.com/pages/wing_bull_.html

level between its divided horns.

Cyrus probably was likewise aware that the Babylonians themselves did consider the planet Jupiter to be a manifestation of their most powerful god, Marduk, who was also the patron god of Babylon.¹⁸⁰ And so Cyrus may have thought it to be fitting to start his attack a little ahead of time, so that his army would have enough time to overcome the drunken defenders and take down Babylon by the time that Jupiter/Marduk reached the meridian (its highest point for the evening) and would then start dropping back down toward the Earth again for the remainder of the night.

Let me also note that, as can be seen in one of the photos above---the one which shows the moon and Taurus rising (right after sunset)---the image of the Bull is shown coming out of the water, but it is shown with the Bull facing downwards. Later on, however, the Bull would appear to come charging out of the water while facing upwards. Now, in terms of the present-day course of the Euphrates River, the moon would have come to the point where it would be shining right down the course of the Euphrates River along that portion of the city (at a heading of 202 degrees) at 22:24 UTC, whereas if the course of the Euphrates River in ancient times along that portion of the city was instead what researchers today think it had been back then (about 175 degrees), the moon, as I noted above, would have started shining right down the course of the Euphrates at about 21:45 UTC.

In either case, as I likewise noted above, this would be the time when the soldiers would have to have come out of the river in order to avoid being exposed by the moonlight, and under either scenario, they would have had time to overthrow the Babylonian king by the time Jupiter had reached the meridian (at 23:12:30 UTC). As it also turns out, the Bull, in either case, would no longer be pointing downwards as it came up out of the water; instead, it would either be level with the Earth, and then shortly thereafter, charging upwards out of the water:

¹⁸⁰ https://en.wikipedia.org/wiki/Babylonian_astrology



Taurus straightening out as the moon reaches an azimuth of 175 at 21:45 UTC as seen from Babylon on the night of the 16th of Tashritu/Tishri in 3223 (Oct. 11, 539 B.C.)

Images provided courtesy of Starry Night Education. Photograph by the author.

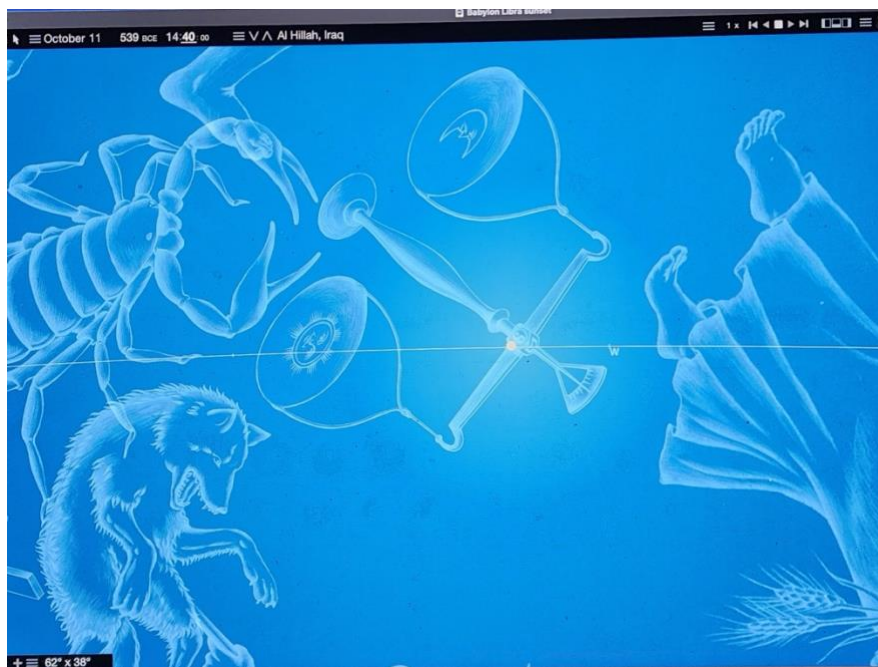


Taurus starting to rise up out of the water as the moon reaches an azimuth of 202 at 22:24 UTC as seen from Babylon on the night of the 16th of Tashritu/Tishri in 3223 (Oct. 11, 539 B.C.)

Images provided courtesy of Starry Night Education. Photograph by the author.

All that being said, however, perhaps the most striking imagery from the heavens that night which might correspond to the “handwriting on the wall” would pertain to the second word of the three: *tekel*. As we have seen, it can mean “weighed in the balance” or “found wanting”.

With respect to the reference to a balance, one sign above all others in the heavens comes to mind: the constellation Libra,¹⁸¹ which is one of the constellations of the zodiac.¹⁸² So on that night, where would we find this balance? The following photo shows its location at sunset on that day, which of course marked the end of one day and the start of another, as well as the start that evening of the drunken festival which the Babylonians were celebrating that night. In other words, this would have been around the time that the king called for the sacred vessels from Solomon’s Temple to be brought forth for use in the pagan ritual:



The constellation Libra at sunset on the 16th of Tashritu/Tishrei in 3223 (Oct. 11, 539 B.C.) as seen from Babylon. The white horizontal line, which runs through the sun, marks the actual location of the horizon. Images provided courtesy of Starry Night Education. Photograph by the author.

¹⁸¹ [https://en.wikipedia.org/wiki/Libra_\(constellation\)](https://en.wikipedia.org/wiki/Libra_(constellation))

¹⁸² It is commonly referred to as a scale, but as a pharmacist I can say that the image of the so-called scales of justice is actually that of a balance, and not that of a scale. And thus, the more proper term for “the scales of justice” would be “the balance of justice”: https://en.wikipedia.org/wiki/Weighing_scale

Here we see two things: First of all, we see the balance of justice. And in this configuration it is seen crashing to earth and divided in two, with half of it already below the horizon. At the same time, the most powerful light in the heavens, the sun, lies directly in the midst of the balance. And the sun is likewise divided: Half of it is above the horizon, and half of it below.

What a perfect illustration of the words of Daniel, this image portrays! King Belshazzar was all-powerful during his appointed time to reign. But then, when he treated the things of God as though they were common and ordinary, the days of his kingdom were numbered and brought to an end. His kingdom was weighed in the balance, and found wanting; it was overturned and brought down to earth and destruction, and the king himself was brought down to death, while his kingdom was divided and given over the Medes and Persians.

The next question we face then, is whether Daniel had any of this imagery in mind as he contemplated those fateful words and sought to give the king an answer. On that point, the Bible doesn't say, one way or the other, although Daniel, I think, was so close to God that he would have needed no prompting from the celestial signs to solve the mystery of the handwriting on the wall, anyway.

So on the whole, I do believe that this is yet another example of signs which God placed in the heavens for us today rather than for those who lived during the time when God placed those signs on display (in this case, Daniel, and those around him), just as the case was with the signs of the Annunciation and of the virgin (Virgo) going through ovulation and the conception of Jesus (as is mentioned in the text of this book) are signs that were placed by God in the heavens for us to find today, and may not necessarily have been placed in the heavens for anyone else thousands of years ago.

With that in mind, consider this: If Daniel had known of these signs, would it not be likely that these signs---which tend to confirm the truth of Daniel's interpretation of the handwriting on the wall---are signs which would have been mentioned in the Book of Daniel? For these signs would tend to bolster the credibility of Daniel's story.

That being said, given the fact that these celestial signs in the heavens are nowhere mentioned in the Book of Daniel, when they almost certainly would have been if the author of the book had known of them, does this not tend to support the idea that what is written in the Book of Daniel about the fall of Babylon is a true account? For the fact that these important details are nowhere mentioned in the Book of Daniel strongly suggests (*i.e.*, it almost certainly means) that the author of the Book of Daniel (probably Daniel himself) did not simply make up the tale that is told in Chapter Five in order to make the tale correspond to certain signs in the heavens which he had seen (and it means that he almost certainly didn't even notice these signs at all).

This is similar to something which we examine in Part Four of the text of this book, about the significance of the fact that there is a great lack of mention of many very important details in Chapter Two of the Gospel of Matthew about how the Magi came to worship Jesus just exactly when they did, and how they could have followed the Star from Jerusalem down to Bethlehem; for the lack of any mention of the virtual cascade of details about the Star strongly suggests that Matthew, in telling the tale of the Magi, was not simply making up a story to correspond to something which he knew about in the heavens, and that he probably was totally unaware of those

details at all.

All in all then, this lack of detail in the telling of Daniel's tale about the fall of Babylon (and in the telling of Matthew's tale of the Star of Bethlehem) constitutes strong evidence that the things which are said in Daniel and in Matthew are true concerning at least the facts themselves which are written about therein. Likewise, from all of this we can find that the accounts in the Book of Daniel and the Gospel of Matthew are divinely inspired. For as we consider the fact that the heavens themselves tend to confirm what the authors of those two books wrote, we must likewise bear in mind that we would have to accept an extraordinary coincidence if we were to think that these signs in the heavens just happened to correspond in such a remarkable way to what was written by Daniel and Matthew, who quite obviously were oblivious to these signs.

APPENDIX-A SECTION XII

RETROGRADE MOTION

The planets display a phenomenon known as retrograde motion; in this section we shall be looking specifically at the retrograde motion of two of the planets of interest to us: Jupiter and Saturn.

Now, the stars and planets appear to go from east to west as they pass by each night overhead, of course. This is caused by Earth's rotation. This motion is, however, simply one of the two ways in which the planets appear to move across the heavens. For in light of the fact that all of the planets are in orbits around the sun, they each constantly appear to be moving against the actual background of the stars themselves, albeit very slowly, as they appear to move along in their orbits.

As it turns out, the planets' motion against the background of stars occurs so slowly that ordinarily it is not visible over the course of just one night, or even (in most cases) from one night to the next. With that in mind, we must likewise keep in mind that planet Earth itself is also moving in its orbit around the sun, and so the way the other planets appear to be moving is thus affected by the fact that we ourselves are on a moving platform, planet Earth.

The motion of Earth in its orbit is what causes the phenomenon of retrograde motion. In retrograde motion, the planets appear to be moving in the opposite direction against the background of stars from the way they usually do.

Retrograde motion itself has two forms: the retrograde motion of the outer planets (which is the usual kind of retrograde motion), and the so-called retrograde motion of the inner planets. The outer planets (*i.e.*, those whose orbits lie outside of Earth's orbit) are Mars, Jupiter, Saturn, Uranus, and Neptune; the inner planets, whose orbits lie within Earth's orbit, are Mercury and Venus. As mentioned, in this section we shall focus specifically on two of the outer planets: Jupiter and Saturn.

Now, the farther out a planet is from the sun, the more slowly it appears to move against the background of stars. Of the three outer planets which can be seen readily without the aid of modern optics (Mars, Jupiter, and Saturn), Saturn is the farthest from the sun. So Saturn appears to move more slowly against the background of stars than Jupiter does (or Mars). As a matter of fact, it

takes about twenty-nine and a half years for Saturn to go around the sun once.¹⁸³ Jupiter, however, takes only about twelve years to go around the sun once.¹⁸⁴ (And Earth, of course, takes just one year to go around the sun once.) Also, since Earth is closer to the sun than Jupiter and Saturn are, we who are here on Earth will appear to race past Jupiter and Saturn about once per year as Earth moves in its orbit around the sun.

An illustration of retrograde motion can be found here: <https://www.sciencefocus.com/space/retrograde>. From this link we can see that the retrograde motion of the outer planets---Jupiter and Saturn (along with Uranus and Neptune)---is strictly an optical illusion, and nothing more than that.

image of the moon wasn't simply a symbol of their goddess. Rather, within the scope of ancient thought, it would be more likely that in the minds of the ancient Persians, Anahita herself (the war-goddess/moon-goddess/river- goddess) had come down personally from heaven to visit them by means of the appearance of her reflection in the river, and to then join ranks with them as they first marched into and then through the river to do battle against the Babylonians. For while they were in the river, with her reflection clearly shining there amongst them, it would be easy for them to think that she was part of them and that they were then comingled with her. And while a son of Enlil (Ninurta/Kayvan/Saturn) presided overhead, they could have thought that they themselves had become the substance of Enlil's storm (at least, from a Babylonian perspective), and that in a meaningful way they were a part of Enlil, and he a part of them.

Adding further to all of this was the celestial position of the moon that night. As can be seen in the following series of photos, it was in the midst of the constellation Taurus:



Moonrise with the moon (one day after full) in Taurus the Bull (just below center) during evening twilight as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.).

The white horizontal line illustrates the horizon. Images provided courtesy of Starry Night Education. Photograph by the author.

¹⁸³ <https://en.wikipedia.org/wiki/Saturn>

¹⁸⁴ <https://en.wikipedia.org/wiki/Jupiter>



Taurus and the moon as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.), three hours after the previous photograph.

Images provided courtesy of Starry Night Education. Photograph by the author.



Taurus and the moon as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.), three hours later (six hours after the first photograph).

Images provided courtesy of Starry Night Education. Photograph by the author.



Taurus and the moon rising out of the water as seen from Babylon on 16 Tashritu/Tishrei in 3223 (Oct. 11-12, 539 B.C.), three hours later (nine hours after the first photograph).

Images provided courtesy of Starry Night Education. Photograph by the author.

Significantly (as can be seen most clearly in the most recent photo), the image of the constellation Taurus is of a bull which comes charging up out of the water. What could possibly be more appropriate, then, than for this Persian war goddess/moon goddess Anahita to be riding on a bull which comes charging out of the water on the night when the Persians themselves would come charging out of the river to storm the city.

APPENDIX-A SECTION XIII

THE DETAILS OF THE EYEWITNESS TESTIMONY METHOD OF DETERMINING THE START OF A HEBREW MONTH

The court would meet twenty-nine days after a month had been sanctified. This would be the thirtieth day of the month if the new moon had not been seen the night beforehand (in which case it would instead be the first day of the new month rather than the thirtieth day of the original month.)

The court would then hear from witnesses (if any) again. Once more, if two witnesses could convince the court that they had seen the new moon the preceding night, a new month would be sanctified, and the preceding month would be deemed to have had only twenty-nine days.

If there were not at least two witnesses who could persuade the court that they had seen the new moon, it would be deemed conclusive that the crescent new moon would then be visible in the upcoming evening (regardless of whether that upcoming evening would in fact turn out to be clear or cloudy), and the preceding month would be deemed to have had thirty days. In Hebrew reckoning, a 29-day month is known as a *chaser* month, and a 30-day month is known as a *malei* (pronunciation: <https://www.howtopronounce.com/malei>) month.¹⁸⁵

The term in Hebrew for the start of a month is Rosh Codesh, or Rosh Kodesh (pronunciation: <https://vimeo.com/212852461>); it means “Head of the Month”.¹⁸⁶ It is similar to Rosh Hashanah (pronunciation: <https://www.youtube.com/watch?v=KdmkEImbGR0>), the “Head of the Year”, which itself marks the start of a modern Hebrew civil new year.¹⁸⁷ In Hebrew calendar reckoning, the first day of any given month is always part of the Rosh Codesh of that month, and if the preceding month was a twenty-nine day month, the Rosh Codesh of the new month would be observed for one day only. If, however, the preceding month was a thirty day month, the Rosh Codesh of the new month would be a two-day event, with the thirtieth day of the month which had just ended being considered retroactively as being part of the Rosh Codesh of the new month, despite the fact that it was also, simultaneously, an actual day (the 30th day) of the preceding month.¹⁸⁸

Now, the time from one new moon to the next (*i.e.*, a synodic lunar month) is, on average, just over 29.53 days,¹⁸⁹ meaning that ordinarily, the interval between two consecutive months

¹⁸⁵ http://www.chabad.org/library/article_cdo/aid/526874/jewish/The-Jewish-Month.htm

¹⁸⁶ http://www.chabad.org/library/article_cdo/aid/526874/jewish/The-Jewish-Month.htm

¹⁸⁷ https://www.chabad.org/library/article_cdo/aid/526875/jewish/The-Jewish-Year.htm

¹⁸⁸ http://www.chabad.org/theJewishWoman/article_cdo/aid/526942/jewish/Why-is-Rosh-Chodesh-sometimes-one-day-and-sometimes-two.htm (Note: this web site makes reference to months of the Hebrew calendar having fixed values of 29 or 30 days. But fixed values for the various months of the Hebrew calendar were not given until about 350 years after Jesus was born. Other than that, the foregoing link is quite useful in explaining important details about Rosh Codesh, generally speaking.)

¹⁸⁹ specifically, 29 days, 12 hours, 44 minutes, and 2.8 seconds: <https://www.thoughtco.com/sidereal-lunar-month-4135226>

would be almost exactly 59 days. For this reason, it would not be uncommon for eyewitnesses in a given month to see the crescent new moon thirty days after the previous sighting of the new moon, followed by the sighting of the new moon just twenty-nine days later in the next month, and then followed by the sighting of the new moon thirty days later in the next month. And it was not uncommon for this pattern to repeat.

However, a particular aspect of earth's orbit would also come into play here. Here I refer the reader once again to a video of NASA astrophysicist Dr. Jeremy Schnittman, who has pointed out that the elliptical nature of earth's orbit causes the time from one new moon to the next to be just slightly longer than average during the northern hemisphere winter, and slightly less during the corresponding summer:

http://www.chabad.org/multimedia/media_cdo/aid/1643088/jewish/Astronomy-and-Torah.htm (starting at thirty-three minutes). This has a slight tendency to make northern winter months *malei* (30-day) months, and has a slight tendency to make summer months *chaser* (29-day) months. In addition, there are three other factors which may have some effect.¹⁹⁰

Now, all that being said, under the original method of determining the beginnings of months (by eyewitness testimony), there could be times when one thirty-day month would be followed by another thirty-day month, and times when one twenty-nine day month could be followed by yet another twenty-nine day month. Furthermore, if clouds had obscured the moon just after a sunset marking the end of what would normally be a 29-day month, there could be no eyewitness testimony that the crescent new moon had been spotted. So the preceding month would have to be deemed a 30-day month even though the crescent new moon would have been observable if the skies had been clear. This would mean that one could not simply rely on a system of just using alternating 29 and 30-day months all the time. So all of this taken together shows how pivotal a role the eyewitness testimony method played in determining when a new month had begun.

APPENDIX-A SECTION XIV

THE DEBATE OVER WHEN ELIZABETH BECAME PREGNANT

¹⁹⁰ First of all, the changing length of the amount of daylight which each day would have, particularly at the start of spring and autumn, could likewise have some effect on how soon the crescent new moon could be spotted because this would also affect how much time the crescent new moon of the following month would have had to develop before sunset on a given day (a greater amount of time for this development in spring, due to the later sunset times in the spring, and correspondingly, a lesser amount during autumn). Another factor to be considered is the angle of the ecliptic (the apparent path of the sun through the sky over the course of a year) to the horizon, which would also have some tendency to effect one's ability to see a new moon. And third, the inclination of the moon's orbit to the ecliptic could also play a role.

Now, a meaningful discussion of those points will involve investigating them in detail; however, coming to understand these particular points is not actually crucial to our discussion here, so I continue a discussion of this elsewhere in this Appendix for those who simply wish to study this issue further. So for further study on this point, and to see photos illustrating what I mean, I again refer you to the part in this Appendix entitled SPOTTING THE CRESCENT NEW MOON.

Near the beginning of Chapter 1 of the Gospel of Luke, prior to describing the Annunciation to Mary, the Apostle Luke tells us of a previous birth announcement by the angel Gabriel (*i.e.*, the same angel who made the Annunciation to Mary); this announcement was given to the father of the one whom we know as John the Baptist (a different person from the Apostle John). The father's name was Zacharias, and his wife's name was Elizabeth, who, as the angel mentioned in the verses quoted above, was a relative of Mary, the mother of Jesus, which would make Jesus and John the Baptist relatives, probably cousins in some respect. The Bible also says that Elizabeth was a descendant of Aaron,¹⁹¹ the first High Priest, who was Moses's brother.¹⁹² This would also at least appear to make Jesus and Moses relatives by blood or adoption somewhere along the line.

The Bible furthermore says that Zacharias received this announcement while he was serving as a priest in the Temple in Jerusalem, and it then has this to say:

[23](#) When the days of his priestly service were ended, he went back home.

[24](#) After these days Elizabeth his wife became pregnant, and she kept herself in seclusion for five months, saying, [25](#) "This is the way the Lord has dealt with me in the days when He looked *with favor* upon *me*, to take away my disgrace among men." (Luke 1:23-25; NASB)¹⁹³

The next verse after that is the verse quoted above at the start of the Annunciation to Mary, which says,

[26](#) And in the sixth month the angel Gabriel was sent from God unto a city of Galilee, named Nazareth, (Luke 1:26; NASB)¹⁹⁴

Now, the Gospel of Luke specifies that Zacharias served in the division (or "course") of Abijah [Abia] (Luke 1:5).¹⁹⁵ The course of Abijah was a certain portion of the yearly priestly duty calendar. Those priests who were assigned to the course of Abijah would spend part of their yearly service at the Temple from the second Sabbath (Saturday) of the month of Sivan until the third Sabbath of that month.¹⁹⁶

The Hebrew month of Sivan corresponds roughly to portions of May and June on our modern (Gregorian) calendar.¹⁹⁷ But that is not the only time that the priests who served in the course of Abijah performed their service; it is also the case that those priests who served in the course of Abijah would spend part of their yearly course of service in the Temple during the High Holy Day of Yom Kippur,¹⁹⁸ which falls during September or October on our modern calendar.¹⁹⁹

One line of thought assumes from the above-quoted Scripture that John the Baptist was

¹⁹¹ <http://biblehub.com/nasb/luke/1.htm>

¹⁹² <https://en.wikipedia.org/wiki/Aaron>

¹⁹³ <http://biblehub.com/nasb/luke/1.htm>

¹⁹⁴ <http://biblehub.com/nasb/luke/1.htm>

¹⁹⁵ <http://biblehub.com/nasb/luke/1.htm>

¹⁹⁶ <https://www.hebrew4christians.com/Articles/Christmas/christmas.html>

¹⁹⁷ <https://en.wikipedia.org/wiki/Sivan>

¹⁹⁸ <https://www.hebrew4christians.com/Articles/Christmas/christmas.html>

¹⁹⁹ https://en.wikipedia.org/wiki/Yom_Kippur

conceived just as soon as Zacharias returned home from one of these assignments of his duties in the Temple.²⁰⁰ And so some try to calculate the time frame for the Annunciation on that basis. But the Bible doesn't say that John was conceived just as soon as Zacharias got home; rather, as noted above, it simply says instead that John was conceived "*after these days*", *i.e.*, at some point in time after Zacharias's return home, and not necessarily right away.

Significantly, the Bible does not say something to the effect that Elizabeth got pregnant "*during these days*" (upon Zacharias's return home), or "*at that time*"; nor does it say something like, "Elizabeth his wife *then* became pregnant." Any of these possible wordings would imply that Elizabeth did get pregnant just as soon as Zacharias returned home. But the Bible, as we have just noted, simply says instead, more broadly, that Elizabeth became pregnant "*after these days*".

So from these verses alone we must consider at least the possibility that any month at all could have been the month in which Elizabeth got pregnant. That being said, it would now behoove us to consider whether or not Luke's statement that the Annunciation took place in the sixth month was principally a reference to the sixth month of the Hebrew calendar, or whether the sixth month simply referred to the sixth month of Elizabeth's pregnancy.

APPENDIX-A SECTION XV

WHEN WAS ROSH HASHANAH OBSERVED IN 3759 (3 B.C.)?

As was noted previously, the Sanhedrin would meet on the 30th day of each month to ascertain whether there was sufficient credible eyewitness testimony concerning the sighting of the crescent new moon the evening beforehand. And as we have already seen, the month of Elul in 3758 (3 B.C.) began at sunset on August 12th.

If instead, as some have argued, the daytime hours of the 1st of Elul were on August 12th that year²⁰¹ (which would mean that the month of Elul would have begun at sunset on August 11th), then the daylight hours of the presumed 30th day of the month would have occurred on Tuesday, September 10th, and the Sanhedrin, in the ordinary course of things, would have met on that day to determine whether the crescent new moon had been sighted the previous evening (on the evening of Monday, September 9th). As it turns out, at sunset on September 9th, the moon would have only just barely been reaching new moon, and in fact, it even would have set before sunset that day. So it would be absurd to think that anyone in Jerusalem could have seen the crescent new moon following sunset on September 9th.

²⁰⁰ <https://www.hebrew4christians.com/Articles/Christmas/christmas.html>

²⁰¹ As was noted in the text, at least one online Hebrew calendar refers to the daytime hours of August 12th that year as being the first day of Rosh Hashanah; but as was also likewise noted, that site makes reference to the *molad* of the new moon (<http://www.cgsf.org/dbeattie/calendar/?roman=3bc>), and doing so was strictly a part of the process of using the method for determining the time of the new moon which was developed by Rabbi Hillel almost 350 years later, and which thus would not have been a method that anyone could have used around the time of the birth of Jesus.

The thing is, by rule, if any given month did not have 29 days, then ordinarily it would automatically be deemed conclusive that the month had 30 days, which in that year would have meant that under ordinary circumstances, Tishri and Rosh Hashanah would have started at sunset on Tuesday, September 10th. In that case, however, an issue pertaining to what is known as the Four Gates Rule for the start of Rosh Hashanah would then arise.

A. The Four Gates For The Start Of Rosh Hashanah

By a rule of the sages, the daylight hours of the first day of Rosh Hashanah can never fall on a Sunday, Wednesday, or Friday. With respect to Wednesday and Friday, this is because Yom Kippur, the Day of Atonement, takes place nine days after the first day of Rosh Hashanah, and thus, the conflict in making preparations for both Yom Kippur and an ordinary Sabbath (Saturday) would cause too many problems. With respect to Sunday, the first day of Rosh Hashanah could not be on this day because another holiday, Hoshana Rabbah, the last day of Sukkot (the Feast of Booths, or Tabernacles), would then have to fall on a Saturday (the Sabbath), which likewise would have caused problems regarding the overall preparations for both holidays.²⁰²

Accordingly, even though the time for the fulfillment of the Torah obligation as to when to observe Rosh Hashanah/Yom Teruah might be most properly done on one particular day (when it would be most likely for one to make the first sighting of the crescent new moon), if that were to make the daytime hours of the first day of Rosh Hashanah fall on a Sunday, Wednesday, or Friday, it would not be proper to mark that day as the beginning of the new year, anyway. Thus, the first day of Rosh Hashanah (*i.e.*, the daytime hours) can only be on one of the dates known as “the Four Gates”: Monday, Tuesday, Thursday, or Saturday (Shabbat).²⁰³

1. The Postponement Rules For The Start Of Rosh Hashanah

In addition to the rule of the Four Gates, there are also the four Postponement Rules (the *dechiyot*); each of these rules (a *dechayah*) can be used to postpone the start of Rosh Hashanah when needed.²⁰⁴ In this case, Rule 2 goes hand-in-hand with the Four Gates Rule. Rule 2 provides that the start of Rosh Hashanah shall be postponed if it is necessary to do so in order to avoid having the daytime hours of the first day of Rosh Hashanah occur on one of the unacceptable days (*i.e.*, Sunday, Wednesday, or Friday). Thus, even if the crescent new moon could have first been observed after sunset on Tuesday, September 10th that year, Rule 2 would have been invoked at that time because otherwise, the daytime hours of a Wednesday (September 11th) would mark the start of Rosh Hashanah, which would violate the Four Gates Rule.

Furthermore, according to Chabad.org, the Sanhedrin would not hold its usually scheduled court for determining the start of a new month if there would be no point in doing so. That web site does not give specific details as to what conditions would cause the Sanhedrin to decide not to hold court on the usual schedule, but it would come as no surprise to me if the Sanhedrin would not hold court when doing so would mean that even if the crescent new moon had been seen the

²⁰² https://en.wikipedia.org/wiki/Days_of_week_on_Hebrew_calendar

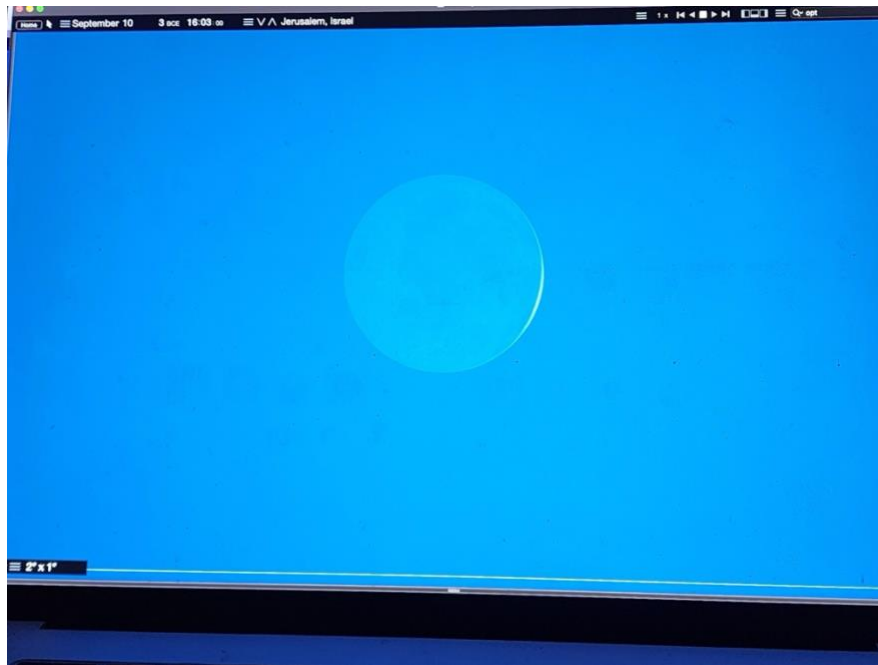
²⁰³ https://en.wikipedia.org/wiki/Days_of_week_on_Hebrew_calendar

²⁰⁴ https://en.wikibooks.org/wiki/Mathematics_of_the_Jewish_Calendar/The_four_postponements_of_the_New_Year

evening before, a Postponement Rule would have to be invoked, anyway. Consequently, if Rule 2 would have to have been invoked on this occasion, it would have been the case that the daytime hours of the first day of Rosh Hashanah would have been observed on a Thursday, which is one of the Four Gates.

B. When Would The Crescent New Moon Of Tishri In 3759 (3 B.C.) Have First Become Visible?

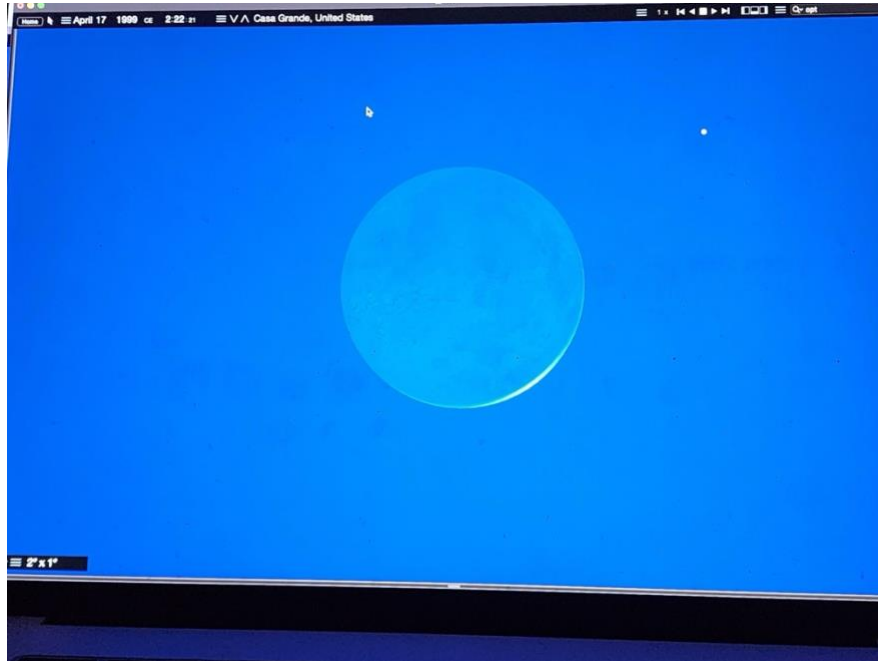
Of course, if the crescent new moon could not have been seen even on the evening of September 10th of 3 B.C., the whole issue of the whether the Four Gates Rule and the Postponement Rules would have to be invoked would be rendered moot. Now, the issue of whether the new moon could have been seen on the evening of September 10th may have arisen if the daytime hours of the first day of Elul had fallen on August 13th that year instead of on August 12th. For if such were the case, then all things being held equal (*i.e.*, if the Four Gates Rule would not apply), the Sanhedrin would have met on September 11th to hear eyewitness testimony about whether the new moon had been spotted the previous evening (September 10th). To consider that question, let us consider the following photos which show the moon above the western horizon as seen from Jerusalem on September 10th of 3 B.C. as compared to the new moon as I saw it in April of 1999 in Arizona, as I mentioned previously in this Appendix (Find: When Can The Crescent New Moon First Be Seen With The Unaided Eye?)



The crescent new moon as seen from Jerusalem on September 10, 3 B.C. at 1603 UTC.
Delta T 10547.0 (by interpolating the Delta T between NASA's lunar eclipse catalog numbers 04818 and 04819):
<https://eclipse.gsfc.nasa.gov/LEcat5/LE-0099-0000.html>, as modified according to the method explained in the Appendix in the section entitled THE COMPUTER DISCREPANCY AND OUR LADY OF GUADALUPE. Images provided courtesy of Starry Night Education. Photograph by the author.

Here above we see the moon when it was one degree (about two lunar diameters) above the horizon. This was just thirteen minutes after sunset, and the moon was about twelve degrees off-

axis from the sun.



The new moon as seen from near Casa Grande, AZ at 0222 UTC the evening/morning of April 16/17, 1999 A.D.

Delta T 63.5 (by interpolating the Delta T between NASA's lunar eclipse catalog numbers 09647 and 09648): <https://eclipse.gsfc.nasa.gov/LEcat5/LE1901-2000.html>, as modified according to the method explained in the Appendix in the section entitled THE COMPUTER DISCREPENCY AND OUR LADY OF GUADALUPE.

Images provided courtesy of Starry Night Education. Photograph by the author.

By contrast, as you may recall, when I saw the crescent new moon in 1999 (as is depicted in this second photograph), it was about four to five degrees above the horizon nearly half an hour after sunset, and it was off-axis from the Sun by about eight degrees. Furthermore, on September 10, 3 B.C., the moon was approximately 252,000 miles from Earth, whereas when I saw it in April of 1999, it was approximately only 222,275 miles from Earth. So as you can see in the photographs, the moon would have appeared slightly larger when I saw it in April of 1999 than it would have appeared in September of 3 B.C. (Note that the field of view in each case is 2 degrees by 1 degree, as is indicated in a box in the lower-left of each photo. So although the magnification of the moon is the same in each photo, it nonetheless appears larger in the image from April of 1999 than it does in the image from 3 B.C.)

Perhaps more importantly, since the photograph from 3 B.C. does show the moon at a time so much closer to sunset than the photo from when I saw it in 1999 (13 minutes after sunset as opposed to nearly half an hour), the photo from 1999 does show the moon against a darker background than was the case in 3 B.C. This would be a very important point to consider in trying to ascertain whether the moon would have been visible on September 10, 3 B.C., against a more brightly-lit sky.

On the basis of these criteria alone then, one might conclude that no one could have seen the crescent new moon on the evening of September 10th. However, recall as well that the crescent new moon which I saw was only 0.93 days old, whereas the crescent on the evening of September 10, 3 B.C. was already 1.01 days old; and the moon when I saw it was off-axis from the sun by only about eight degrees, whereas on this date (September 10th) it was off-axis by twelve degrees. So

these latter two points would militate in favor of concluding that the crescent new moon might have been visible on the evening of September 10th after all.

We are thus left with no clear-cut way of resolving this issue one way or the other, although I strongly suspect on the basis of my own personal experience in 1999 that no one could have seen the moon from Jerusalem on September 10, 3 B.C.; this would again be due to the increased brightness of the background sky and an increase in what astronomers call atmospheric extinction.²⁰⁵ Atmospheric extinction is a term which refers to the fact that the closer a celestial object is to the horizon, the more atmosphere one must look through in order to see the object, which of course would make the object appear to be more dim and fuzzy. And in this instance, I am comparing the moon as I saw it when it was four to five degrees above the horizon as compared to merely one degree.

We must wonder, though: Would the Sanhedrin have even met on Wednesday, September 11th of that year to hear eyewitness testimony? For if the Sanhedrin had done so, then the only thing which the Sanhedrin could have done would have been to conclude either on the one hand that there were not two witnesses who could say that they had seen the crescent new moon the night before (which would mean that Rosh Hashanah would begin at sunset on September 11th), or else conclude on the other hand that by the operation of the Four Gates Rule, they would have to invoke Rule 2 of the Postponement Rules to delay the start of the first day of Rosh Hashanah until sunset later that day, at sunset on September 11th; so at the start of the month of Tishri in the year 3759 (September of 3 B.C.), Rosh Hashanah would have begun at sunset on Wednesday, September 11th either way.²⁰⁶

C. A Summary Of Why The First Day Of Rosh Hashanah Would Have Begun At
Sunset On September 11th In The Year 3759 (3 B.C.)

Summing this all up, we are brought to the following conclusions:

First, if the Sanhedrin did meet on September 10th that year (which it would have done if the daytime hours of the 1st of Elul had been during August 12th), there could not have been any eyewitness testimony regarding the sighting of the crescent new moon the evening beforehand (September 9th), due to practical considerations. Thus, by the ordinary operation of the rules, if in fact the daytime hours of the 1st of Elul had been on August 12th, then the daytime hours of the first day of Tishri (and with it, the first day of Rosh Hashanah) would have been deemed to have occurred on Wednesday, September 11th; but this ordinary operation of the rules would have

²⁰⁵ [https://en.wikipedia.org/wiki/Extinction_\(astronomy\)](https://en.wikipedia.org/wiki/Extinction_(astronomy))

²⁰⁶ In so saying, I am aware that in the history of Judaism, for the reasons given above concerning the peculiarities of earth's orbit, plus the changing amount of daylight as summer turns to autumn, it may not have been common for Elul to have had 30 days instead of 29 days (and in modern times, using the mathematical formula developed by Rabbi Hillel II for determining the start of months, Elul is now always 29 days). Nonetheless, prior to the development of Rabbi Hillel's calculations, there were at least some occasions when Elul did have 30 days. For further consideration of that point, I refer the reader yet again to the video presentation by Dr. Jeremy

Schnittman:

http://www.chabad.org/multimedia/media_cdo/aid/1643088/jewish/Astronomy-and-Torah.htm (starting at 29 minutes and 58 seconds).

violated the Four Gates Rule, and so Rule 2 of the Postponement Rules would have then been invoked to postpone the start of Tishri and Rosh Hashanah until sunset on September 11th, with the daytime hours of the first day of Rosh Hashanah thus being on Thursday, September 12th that year.

Second, if the Sanhedrin would have ordinarily been scheduled to convene on Wednesday, September 11th (*i.e.*, if the daytime hours of the 1st of Elul had been on August 13th), the court might not have been convened anyway because then the only thing which that court could do would be to either on the one hand find that the crescent new moon had not been seen following sunset the previous day, September 10th (in which case it would be deemed that Tishri and Rosh Hashanah would begin following sunset on September 11th), or else on the other hand, if the crescent new moon had in fact been spotted on September 10th, the Sanhedrin would have to have invoked Rule 2 of the Postponement Rules, thereby pushing the start of Tishri and Rosh Hashanah to sunset on September 11th, anyway. So the Sanhedrin might not have met on September 11th, even if it normally might have been scheduled to do so.

Third, even assuming for a moment that the court did in fact convene on Wednesday, September 11th, there still might not have been two credible witnesses who could have said that they had seen the crescent new moon the evening beforehand (on September 10th), in which case, as noted above, the start of Tishri and Rosh Hashanah would have begun at sunset on September 11th just by the ordinary operation of the eyewitness testimony method of determining the start of any given month, without regard to the Four Gates Rule one way or the other. Consequently, in any event, we can conclude that either by the ordinary use of the eyewitness testimony method of determining the start of Rosh Hashanah, or else by the invocation of the Four Gates Rule and Postponement Rule 2, Rosh Hashanah in the year 3759 (3 B.C.) would have to have been observed from sunset on Wednesday, September 11th through sunset on Friday, September 13th.

APPENDIX-A SECTION XVI

HALF MOON

A third-quarter moon is a half-moon, one of two half-moons which can be seen each month.²⁰⁷ The first half-moon of a lunation (*i.e.*, the moon's monthly orbit around the Earth)²⁰⁸ is when a half-moon is visible in the evening sky, and this is referred to as a first-quarter moon. It rises at about noon and can be seen in the sky to the east of the meridian until about sunset; around sunset it then reaches its highest point in the sky (*i.e.*, it is on the meridian itself), and it sets around midnight. By contrast, the second half-moon of a lunation---that is, a third-quarter moon---is a half-moon which comes two weeks later, when the moon has already gone past full moon and is now on the exact opposite side of Earth from where it was at first-quarter; and so the times when it can be seen, and when it rises and sets, are the precise opposite of those of the first- quarter moon.

That is, a third-quarter moon rises about midnight and sets around noon (as opposed to a first-quarter moon, which rises at noon and sets around midnight). After rising, the third quarter moon is then visible for the remainder of the night and is high overhead (on the meridian) around

²⁰⁷ https://en.wikipedia.org/wiki/Lunar_phase

²⁰⁸ https://en.wikipedia.org/wiki/New_moon

sunrise. It is also visible even during the day as well, to the west of the meridian, until it sets around noon. (See the links in the footnotes used in this paragraph to see illustrations of all of this.)

APPENDIX-A SECTION XVII

MY QUESTION TO ARTHUR C. CLARKE

Being able to ask a question to Dr. Arthur C. Clarke was a truly special experience for me. During the spring semester of 1973 (during my first year of undergraduate studies), I heard Dr. Clarke speak at a science fiction convention hosted by my alma mater, the University of Arizona. Seated half way down the row from me in the theater was the speaker from the previous night, who apparently had stayed over an extra day so he could hear Dr. Clarke speak; that person was Gene Roddenberry, the author and creator of *Star Trek*.

During the question-and-answer session, Dr. Clarke called on me. I reminded him that in his novel *2001: A Space Odyssey*, our government had decided not to announce the discovery of a monolith on the moon, named TMA- 1,²⁰⁹ out of fear that doing so could cause a societal collapse. This fear was based on the fact that in human history, on at least some occasions, when our own society would make first contact with a primitive tribe, that tribe's society might not be able to endure the cultural shock of meeting modern technology, and the cultural order of the tribe would sometimes simply collapse. I then noted that in our own culture in 1973, there was an enormous clash taking place between the younger generation and the older generation, and that the difference in technology between the era of the older generation's youth was dramatically different from the technology of my generation in 1973.²¹⁰

I then asked him if it was perhaps the case that our technology was changing so fast that the same effect which we had observed from our first encounters with primitive tribes was actually taking place right before our very eyes, within our own culture, such that the societal upheaval of that time was taking place as a result (at least in part) of the differences in technology from just one generation to the next. (Note: This clash was principally over the generational difference of opinion concerning the U.S. government's role in the war in Viet Nam. I didn't mention that part in my question, but it would have been obvious to all who were present that such was the case, and that my question really pertained to whether the technology gap was something which may have enhanced this intergenerational conflict.)

He replied that what I said could be the case, and that as time went on, he would expect to

²⁰⁹ Tycho Magnetic Anomaly One, so named because it would be the first magnetic anomaly discovered in Tycho, the moon's brightest crater.

²¹⁰ To give the younger readers of this book an idea of what those differences in technology were, my parents were children when Lindbergh flew the Atlantic---
https://en.wikipedia.org/wiki/Charles_Lindbergh---whereas I and my fellow youths of my own era had watched a live television broadcast of the first person stepping on the moon. And I remember my parents also watching that live broadcast of the first step on the moon in astonishment at the changes they had seen in their own lifetimes (e.g., not only space travel, but also the development of nuclear weapons, transcontinental air travel, and television.) Dr. Clarke, I am sure, who was from the same generation as my parents, must have likewise been acutely aware of the differences in life, technology, and society which he had likewise seen within his lifetime.

see those individuals who are capable of advancing technologically becoming more and more distant from those with lower intellectual abilities, and that the latter group would simply be unable to keep up with the progress of society. Chillingly enough, recent discussions about how robotics and artificial intelligence may soon replace many in the labor force would seem to substantiate his prescient claim.^{211, 212}

APPENDIX-A SECTION XVIII

HOW OBJECTS APPEAR TO MOVE ACROSS THE SKY

Many people assume that when stars cross above in the heavens at night that they rise straight up from the horizon (perpendicular to the horizon) and continue across the heavens that way before likewise setting in a straight line, perpendicular to the horizon. In fact, however, such is the case only as seen from the equator. In all other places, it is different. That is because the apparent rotation of the stars in the heavens is caused by Earth's rotation on its axis, which runs through the center of the Earth from the north pole to the south pole.

Picture a pinwheel. Whether you are at the equator, or at the north or south pole, or any other location, the motion of the stars across the heavens always resembles the motion of a pinwheel. For instance, if you hold a pinwheel vertically, when you rotate the pinwheel, the pinwheel moves in the same way that the stars move as seen from either of Earth's two poles: the North Pole, or the South Pole. By contrast, if you hold a pinwheel horizontally, when you rotate the pinwheel, the pinwheel moves in the same way that the stars move as seen from the equator. And if you hold the pinwheel at a 45-degree angle, when you rotate the pinwheel, the pinwheel moves in the same way that the stars move as seen from latitude 45 degrees north or south (*i.e.*, halfway between the equator and the north or south pole).

To illustrate this point, we shall take a look at the motion generally of the famous constellation Orion, the hunter, as it would have appeared near the time of the visit of the Magi, and at the motion of one of the bright stars of that constellation specifically, a star known as Betelgeuse. (It is commonly pronounced either bet' [short "e"] el gis or bee' tel joos. Note: Professor Raymond E. White, whom I mention in the text of this book, insisted that it is bet' el gis, with a short "e" at the beginning.²¹³) Furthermore, because Orion neatly straddles the celestial equator, one-half is in the northern hemisphere and the other half is in the southern hemisphere. So using Orion will help illustrate how the heavens look as seen from various latitudes.

We'll start with how Orion is set to appear on the night of December 31, 2023-January 1, 2024 A.D. To show how the rotation of earth on its axis makes the heavens appear to move, we shall view Orion from three different latitudes: at the equator (0 degrees N/S latitude), from the north pole (90 degrees N latitude), and from the latitude of Jerusalem (roughly 32 degrees N latitude).

²¹¹ <https://www.bloomberg.com/graphics/2017-more-robots-fewer-jobs/>

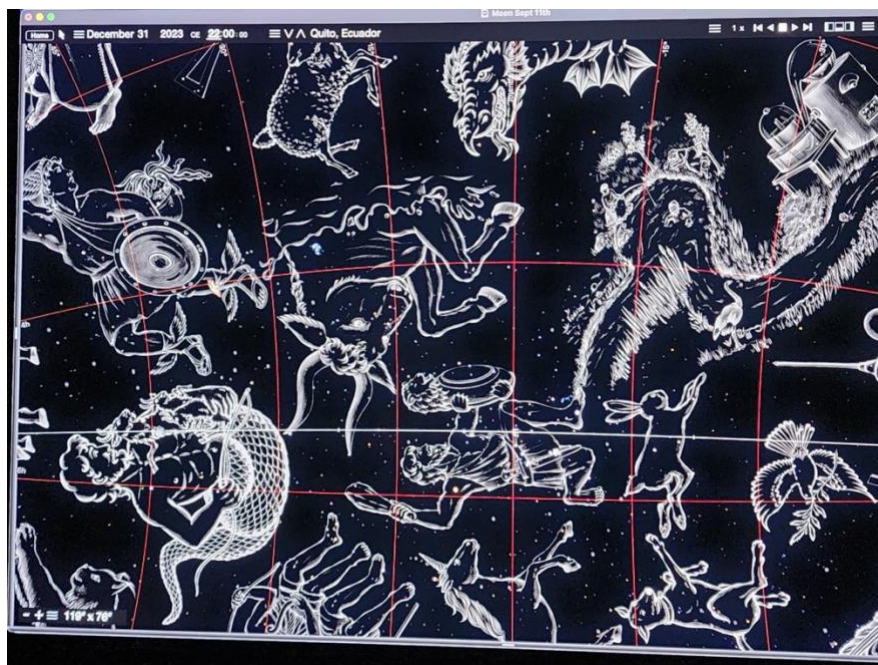
²¹² <https://www.newstarget.com/2022-10-31-klaus-schwab-mass-extinction-event-great-reset.html>

²¹³ <https://www.cloudynights.com/topic/497136-astro-trivia-how-do-you-pronounce-betelgeuse/>

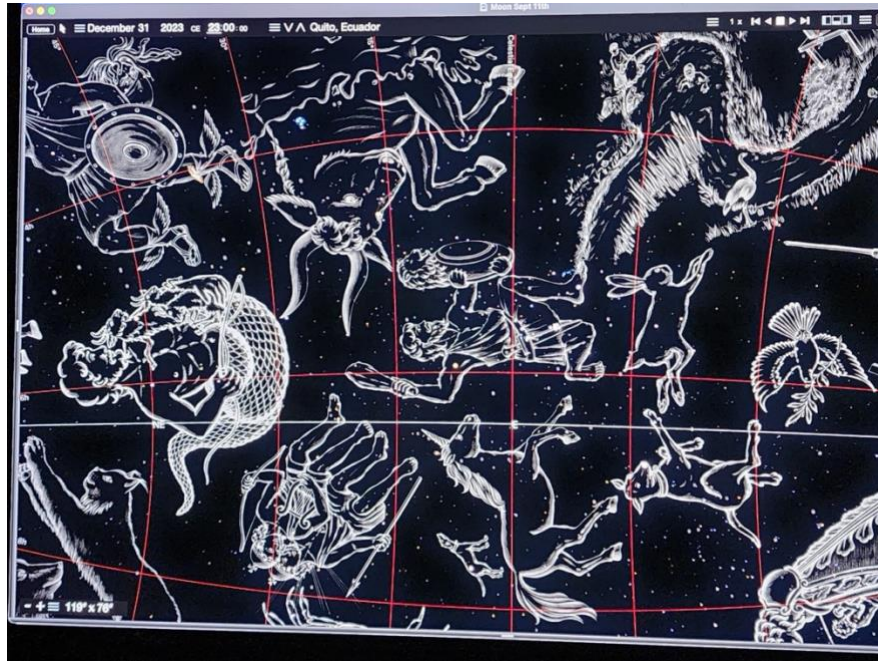
Notice also from the following photos (at one-hour intervals) that when the stars along the celestial equator rise as seen from Earth's equator, they do come straight up from the horizon. In fact, as seen by someone who is located on the equator, a star which might actually be on the celestial equator itself (*i.e.*, a star which appears directly over Earth's equator) will appear to rise straight east and pass directly overhead, and then set straight west.

So here we are looking east, watching Orion rising as seen from Earth's equator. With the computer program, I have added in the lines of celestial coordinates which astronomers use. The red lines you see running left and right are the lines known as Right Ascension; they run north and south, and they correspond to the lines of longitude on Earth. (For instance, 0 degrees E/W longitude runs north and south through Britain, whereas 90 degrees W longitude likewise runs north and south, approximately along the Mississippi River in the United States.)

By contrast, the red lines you see running up and down are the so-called lines of Declination. They correspond to the lines of latitude here on Earth. The equator is, of course, at 0 degrees N/S (and the north pole is at 90 degrees N, *i.e.*, 90 degrees North). For those who have not read the section of this Appendix on celestial coordinates, allow me to reiterate that most of the boundary between the United States and Canada is at latitude 49 degrees N.



Facing east along the Equator as Orion rises (center). The white horizontal line illustrates the horizon.
Images provided courtesy of Starry Night Education. Photograph by the author.



Facing east along the Equator, one hour after the previous photo.
Images provided courtesy of Starry Night Education. Photograph by the author.



Facing east along the Equator, one hour after the previous photo.
Images provided courtesy of Starry Night Education. Photograph by the author.



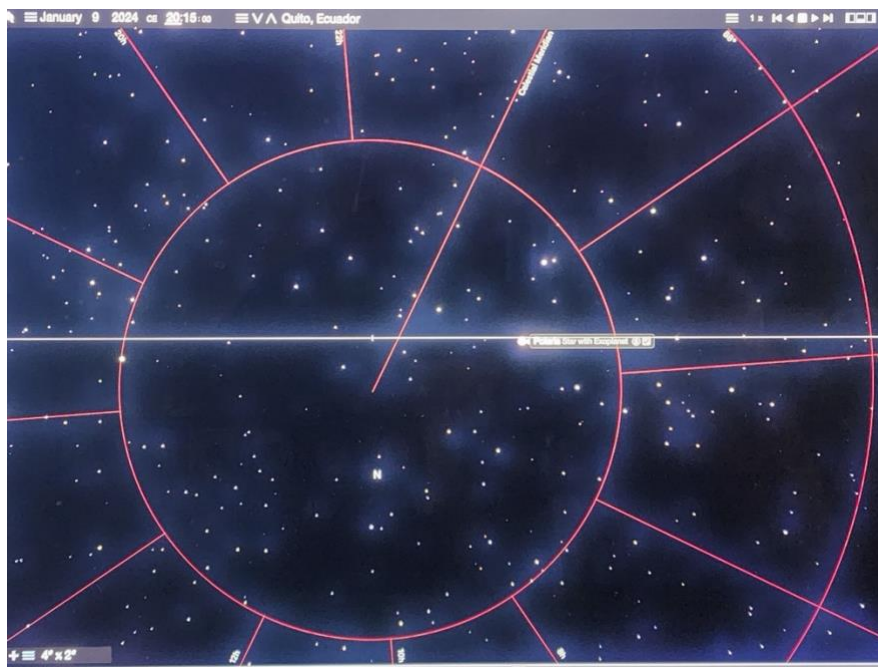
Facing east along the Equator, one hour after the previous photo (three hours after the initial photograph).
Images provided courtesy of Starry Night Education. Photograph by the author.

At the equator, Earth's axis is parallel to the horizon. This axis can be thought of as a line running from the horizon straight south (to the right, for someone facing east) and going beneath where one is standing (specifically, through the center of the Earth), and then over to the horizon straight north (to the left). (Of course, alternatively, while standing on the equator, one can think of Earth's axis as being a line running beneath one's feet from north to south instead of south to north.)

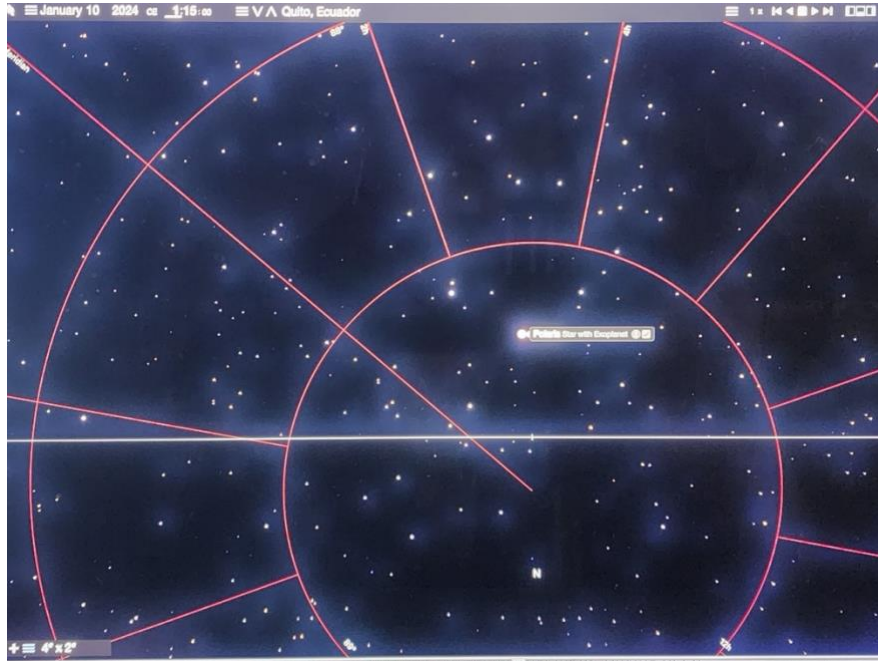
Here at the equator, throughout the course of a year, one can see every star that is in the heavens. Every star rises at some point during each 24-hour period (rising sometimes at night, and sometimes by day, depending on the time of year), and every star then sets half a day later (again, sometimes at night, and sometimes by day). Even Polaris, the North Star, rises and sets every day as seen from the equator, because Polaris is not precisely over Earth's north pole. It is off from the pole by slightly less than one degree;²¹⁴ if instead it were directly over the north pole, from the equator it would constantly appear to be exactly on the horizon straight north.

So as seen from the equator, all of the stars which are very close to the north celestial pole will appear to be right along the northern horizon, and the stars in the immediate vicinity of Earth's south celestial pole will appear to be right along the southern horizon. As seen from the equator, as the Earth rotates, the stars near either of the celestial poles will rise just barely east of due north or due south; they will make a tiny arc above the horizon just above a point straight north or straight south, and they will then set just west of due north or due south. See the following photos:

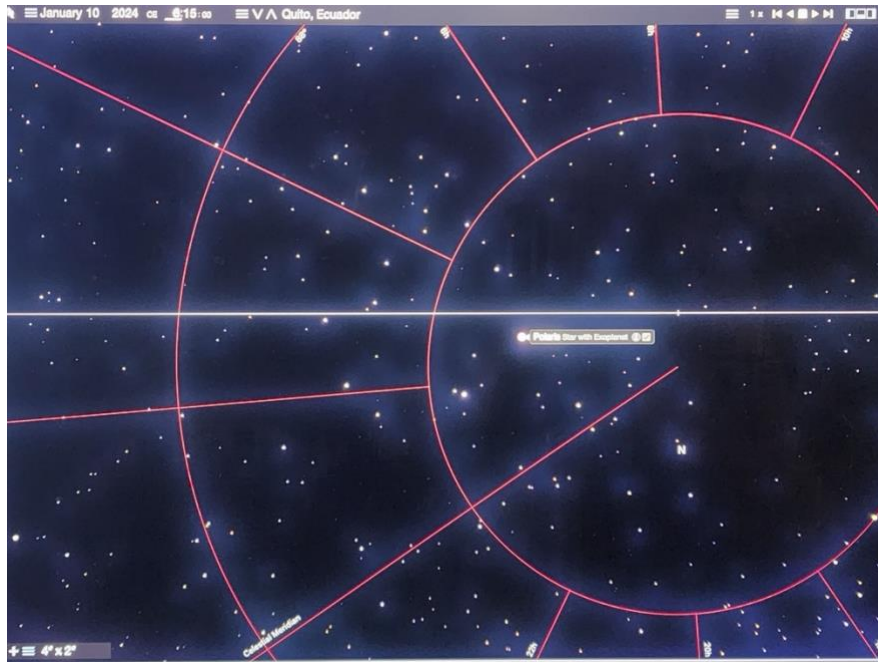
²¹⁴ <https://en.wikipedia.org/wiki/Polaris>



The North Star (Polaris) rising as seen from the Equator. The horizon is illustrated by the white horizontal line.
Images provided courtesy of Starry Night Education. Photograph by the author.



The North Star (Polaris) five hours after rising as seen from the Equator.
Images provided courtesy of Starry Night Education. Photograph by the author.



The North Star (Polaris) ten hours after rising as seen from the Equator.
Images provided courtesy of Starry Night Education. Photograph by the author.

Now let us consider this exact same scene as viewed from the North Pole. And everything we see is now changed by 90 degrees, so the lines of celestial coordinates have switched positions. The red lines which correspond to the lines of longitude on Earth (*i.e.*, the lines of Right Ascension) no longer run left and right; instead, they are the ones which now run up and down. And conversely,

the red lines which correspond to the lines of latitude on Earth (*i.e.*, the lines of Declination) no longer appear to run up and down; instead, they now appear to run left and right. At the same time, Earth's axis can be thought of as being a line which comes up from beneath where one is standing and which then passes straight up into the sky directly overhead.



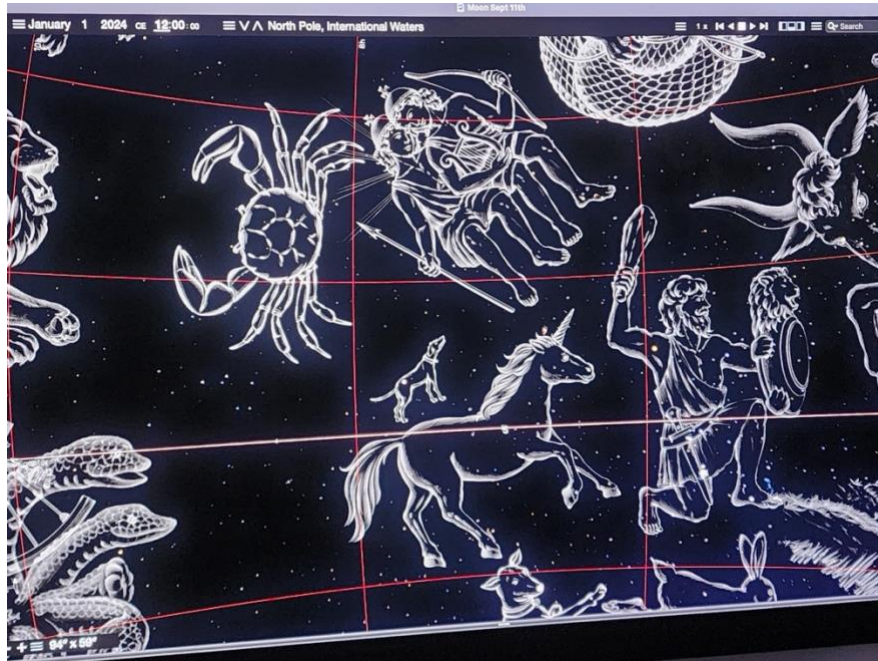
Facing Orion (the Hunter), Taurus (the Bull), Aires (the Ram), and Cetus (the whale) as seen from the North Pole. The white horizontal line illustrates the horizon.
Images provided courtesy of Starry Night Education. Photograph by the author.



Facing Orion, Taurus, and now also Canis Minor (the Little Dog), Gemini (the Twins), and Monoceros (the unicorn) as seen from the North Pole, one hour after the previous photo.
Images provided courtesy of Starry Night Education. Photograph by the author.



Facing Orion, Taurus, Gemini, Canis Minor, Monoceros, and now also Cancer (the crab) as seen from the North Pole, one hour after the previous photo.
Images provided courtesy of Starry Night Education. Photograph by the author.



Facing Orion, Monoceros, Canis Minor, Gemini, and Cancer as seen as seen from the North Pole, one hour after the previous photo.

Images provided courtesy of Starry Night Education. Photograph by the author.

Here at the North Pole, one can never see any of the stars which appear over Earth's southern hemisphere at any time. That is to say, none of the stars shown above which are beneath the horizon (the white horizontal line) would ever be visible from here (the North Pole) at any time of any day or night throughout the entire year. Instead, following the prolonged evening twilight at the start of the one "night" which the North Pole has each year (from when the sun sets in late September until it rises again in late March the following year), one can see every star that is over Earth's northern hemisphere at every moment during that time; for none of those stars ever set, and they never rise.

For this reason, every star in the northern hemisphere is said to be "circumpolar"²¹⁵ as seen from the North Pole. During the six-month winter night, the stars all appear to stay the exact same distance above the horizon both day and night while they go around and around and around in a circle every 24 hours. Any star which appears directly over latitude 10 N, and which therefore has a Declination of +10 ("plus ten") will appear to be exactly ten degrees above the horizon at all times as seen from the North Pole, year in and year out; likewise, a star which passes directly over latitude 20 N (with a Declination of +20) will appear from this location to be exactly twenty degrees above the horizon at all times and on all days, etc.

As you can see, the northern half of Orion (including Betelgeuse) is always visible, but the southern half of Orion (which lies over the southern hemisphere) can never be seen at all. Also note how easy it would be for someone who is at either one of earth's poles to visualize the pinwheel effect of the stars' rotation.

²¹⁵ https://en.wikipedia.org/wiki/Circumpolar_star

Now let us look at that exact same scene as viewed from the latitude of Jerusalem, which is just south of latitude 32 degrees North. The latitude of Jerusalem, I wish to note, is just south of the latitude of Savannah, Georgia in the U.S.; also, the cities of Montgomery, Alabama, Vicksburg, Mississippi, Dallas, Texas, Tucson, Arizona, and San Diego, California each likewise have a latitude just a little bit farther north than that of Jerusalem.

Here we see that the lines of Right Ascension and Declination are all at an angle to the horizon: Specifically, they are at a nearly 32-degree angle to where they were positioned as seen from the equator. That is because Jerusalem (as mentioned above) is at approximately 32 N latitude. As we watch the stars move through the night sky, the pinwheel effect is again evident.



Facing Taurus, Orion (with Betelgeuse), Aries, and Cetus as seen from Jerusalem. The white horizontal line illustrates the horizon.

Images provided courtesy of Starry Night Education. Photograph by the author.



Facing Taurus, Gemini, and Orion (with Betelgeuse) as seen from Jerusalem, one hour after the previous photo.
Images provided courtesy of Starry Night Education. Photograph by the author.

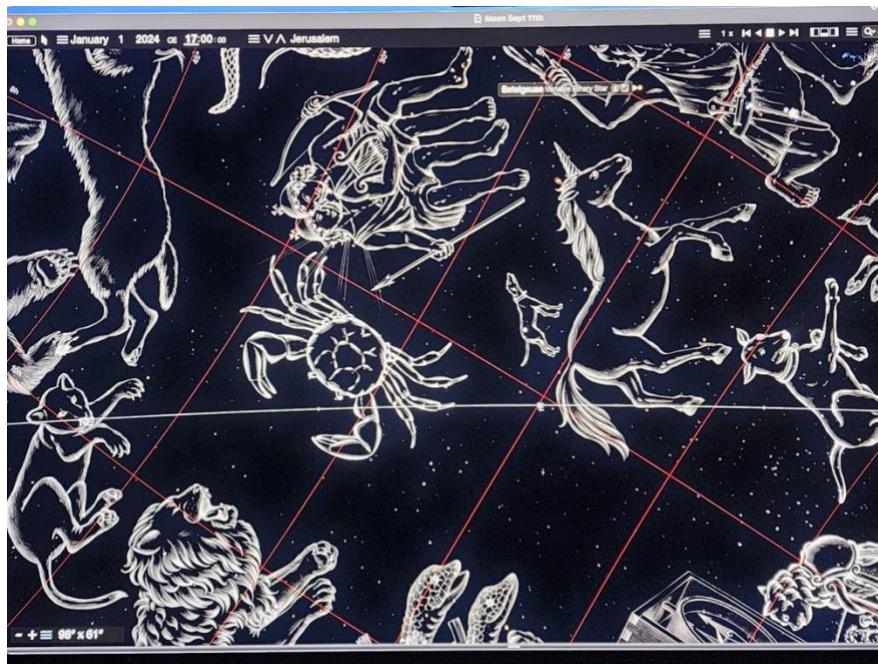


Facing Orion (with Betelgeuse), Gemini, Canis Minor, and Monoceros as seen from Jerusalem, one hour after
the previous photo
Images provided courtesy of Starry Night Education. Photograph by the author.



Facing Orion (with Betelgeuse), Canis Minor, Monoceros, Gemini, and Cancer as seen from Jerusalem, one hour after the previous photo

Images provided courtesy of Starry Night Education. Photograph by the author.



Facing Orion (with Betelgeuse), Canis Minor, Monoceros, Gemini, Cancer, and now also Leo Minor (the Little Lion), and Leo (the Lion) itself as seen from Jerusalem, one hour after the previous photo.

Images provided courtesy of Starry Night Education. Photograph by the author.

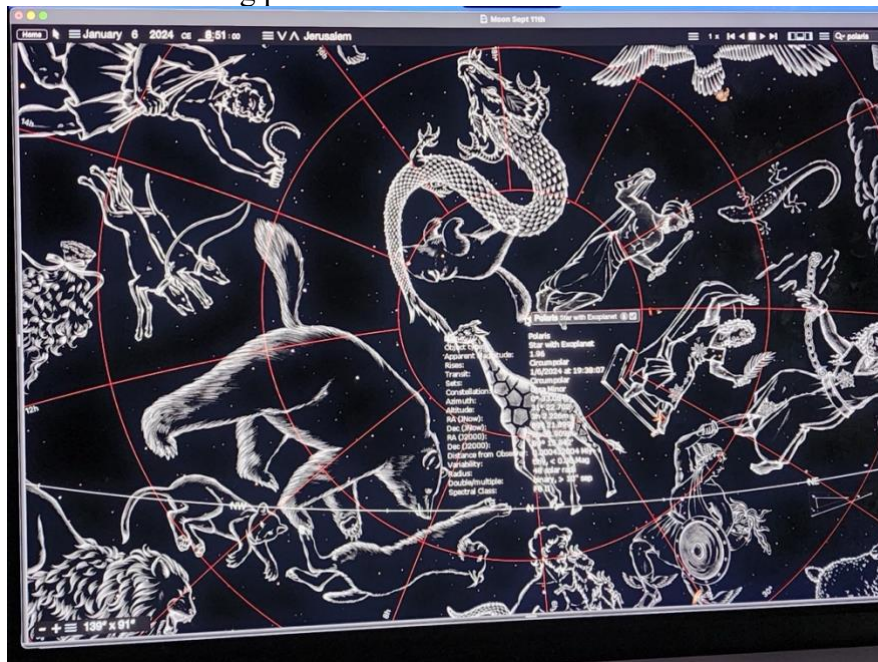
The most significant thing to be gleaned from all of this is illustrated by the motion of

Betelgeuse through the night sky as seen from 32 degrees north latitude (roughly the latitude of Jerusalem). One can see that, contrary to what we saw at the equator, none of the stars (such as Betelgeuse) rise up at a 90-degree angle to the horizon. Instead, we can see that they follow the pinwheel effect caused by the rotation of Earth on its axis about the North Celestial Pole, which, in modern times, is neatly illustrated by the North Star (Polaris).

So at this latitude, Betelgeuse, like all other stars visible from this latitude, comes up from the horizon at an angle (instead of rising straight up, as it does at the Equator). It appears to rise approximately ten degrees north of straight east as seen from Jerusalem. But then, in a little while, due to the pinwheel effect, it appears to move slightly southward as it continues to rise at an angle, to where it then appears to be straight east above the horizon.

Following that, it would soon appear to move to the southeast as it continues to rise at an angle, and then to the south. During that time---upon passing through and then beyond the meridian---it would then appear to head to the southwest, and then straight west, until finally it would appear to set just as far north of straight west as it had risen to the north of straight east when it first came up.

As you can also see in the next series of photos, since the North Celestial Pole is now 32 degrees above the northern horizon, the stars which are within 32 degrees of the North Pole (*i.e.*, the ones 58 degrees or more north of the equator) never rise and never set as seen from Jerusalem. They are continuously above the horizon, whether by night or day, every day of the year. So from the latitude of Jerusalem, the stars within 32 degrees of the North Celestial Pole appear to be circumpolar.²¹⁶ See the following photos:



The North Star (Polaris) and surrounding skies as seen from Jerusalem in modern times.

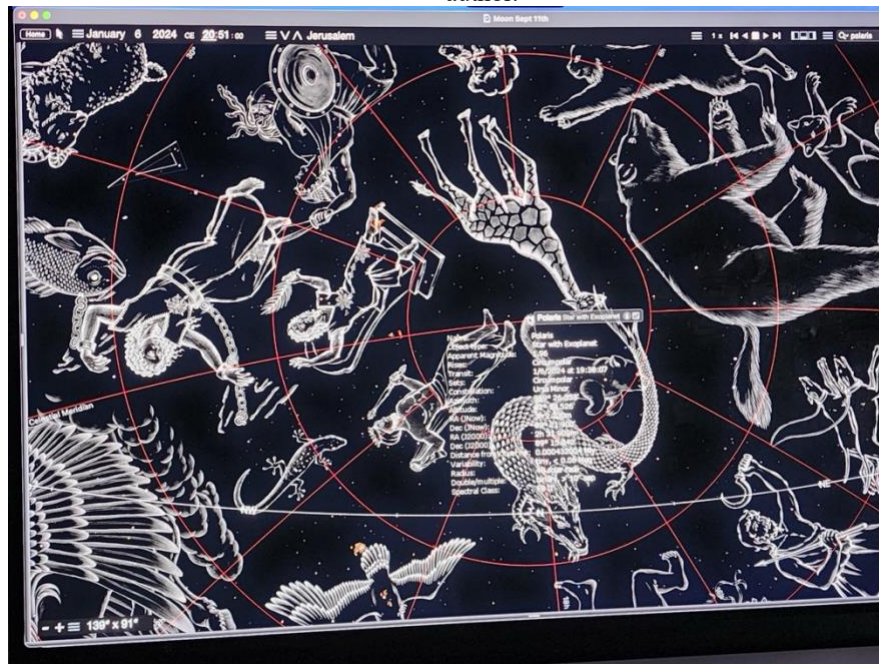
Images provided courtesy of Starry Night Education. Photograph by the author.

²¹⁶ https://en.wikipedia.org/wiki/Circumpolar_star



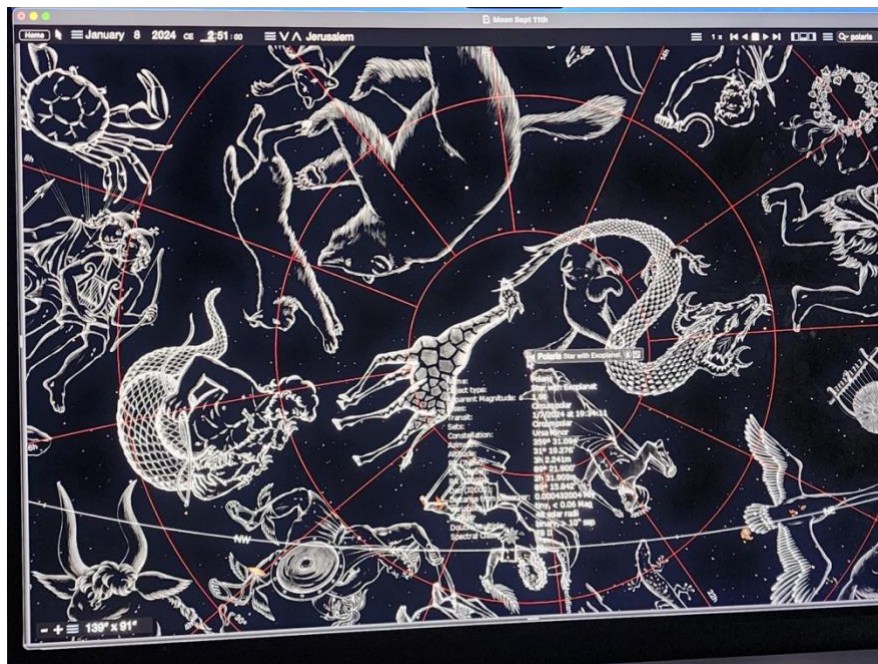
The North Star (Polaris) and surrounding skies as seen from Jerusalem, six hours after the preceding photo.

Images provided courtesy of Starry Night Education. Photograph by the author.



The North Star (Polaris) and surrounding skies as seen from Jerusalem, six hours after the preceding photo.

Images provided courtesy of Starry Night Education. Photograph by the author.



The North Star (Polaris) and surrounding skies as seen from Jerusalem, six hours after the preceding photo.

Images provided courtesy of Starry Night Education. Photograph by the author.