

# **The Disappearance of Jesus' Body**

## **Part 2: Physical Considerations**

By Robert A. Rucker, October 11, 2016

### **Abstract**

This document deals with physical/scientific aspects of how Jesus' body disappeared from the tomb. Seven physical processes that might have been involved in the disappearance of Jesus' body from the tomb are considered based on the laws of science as we currently understand them and based on an extrapolation of those laws as suggested by aspects of modern physics. Consideration of the pros and cons for these proposed processes indicates that disintegration of the body and involvement of a wormhole should be rejected as possible mechanisms for how the body disappeared. It is concluded that a transition into an alternate dimensionality is the best option among the seven proposed processes for how Jesus' body disappeared from the tomb, at least among those that are in any way related to our current understanding of the laws of physics. Of course, a yet undefined process that is beyond even an extrapolation of our current laws of science could be the cause of the disappearance of the body, but this option could not be scientifically assessed due to its vagueness.

### **Introduction**

This study considers how Jesus' body could have disappeared from within the Shroud in the tomb. Part 1 of this study considers this question based on the Biblical references to his resurrection and based on the theology of resurrection throughout the Bible. Part 2 of this study (this document) considers how Jesus' body could have disappeared from the tomb based on physical/scientific considerations. The nature of science will first be considered. Then seven physical processes or mechanisms will be proposed for how Jesus' body might have disappeared from the tomb. The pros and cons of each of these seven processes will then be considered in order to select the most feasible process. This study assumes that the Shroud of Turin is the authentic burial cloth of Jesus so that the image that is on the Shroud was formed by the crucified body of Jesus that was wrapped within it when Jesus' body disappeared in his resurrection.

### **Nature of Science**

It is appropriate to begin with a discussion of what science is and what distinguishes good science from poor science as it relates to the Shroud of Turin. It should first be recognized that there are different types of science for different purposes. For example, what might be called forensic science is used to scientifically investigate existing items to determine their nature or source, or to investigate past events that can not be repeated. Examples might be the scientific investigation of the authenticity of a particular document or painting, or the investigation of a reported UFO sighting, or the sinking of the Titanic, or the murder of a particular individual. Forensic science is also the type of science that is used to investigate the Shroud of Turin. The scientific investigation of these items or events ought not to be condemned just because the

origination of the document or painting can not be repeated again and again in the laboratory, or because the UFO sighting, sinking of the Titanic, or murder of the individual can not be repeated under controlled conditions in the laboratory. Similarly, the use of the methodologies of forensic science on the Shroud of Turin to determine its possible authenticity should not be condemned just because the death, burial, and resurrection of Jesus can not be repeated again and again in a laboratory under controlled conditions. This type of objection to the scientific investigation of the Shroud of Turin results from confusion between the purposes and methodologies of forensic science compared to experimental science, for repeated experiments under controlled conditions are not possible for the main issue under investigation with forensic science whereas they are an integral part of experimental science. This confusion results, at least in part, because when most people think of science, they are thinking of experimental science.

The basic nature of science ought to be understood as the following:

- Science is based on a belief that every effect is brought about by a prior cause.
- The objective of science is a search for the truth,
- Using careful observation of repeated experiments,
- With all conditions that affect the results being known and controlled,
- So that a hypothesis can be developed relating the causes to the observed effects,
- Using mathematical equations to the extent possible,
- So that predictions can be made that are testable,
- So that the hypothesis is falsifiable.

For our purposes, the important point of the above list is that science, whether forensic science or experimental science, ought to have truth as the highest objective, so that the researcher ought to follow the results of the scientific investigation where it leads apart from his preconceived ideas or biases. This issue becomes very important for the Shroud of Turin because it contains a front and back image of a man who appears to have been crucified exactly as the gospels say that Jesus was crucified. Thus, to obtain a scientifically objective investigation, the scientific researcher should be very careful to not allow any presuppositions to influence the conduct or results of the scientific investigation. Such presuppositions are called “a priori” because they are beliefs or presuppositions that are held prior to the start of the scientific investigation. For example, in our above examples of using forensic science to investigate past events, it would be unscientific for the person researching the UFO sighting to assume before the scientific investigation begins that the unidentified flying object could not possibly be a spacecraft from another planet, and it would be unscientific for the person researching the sinking of the Titanic to assume before the scientific investigation begins that the sinking of the Titanic could not possibly be any fault of the company that constructed the Titanic, and it would be unscientific for the person researching the murder of the particular individual to assume before the scientific investigation begins that the murder could not possibly have been committed by anyone associated with the city mayor’s office or the police department. Similarly, it would be unscientific for a person researching the Shroud of Turin to hold to any of the following assumptions before the scientific investigation begins, that is, to allow any of the following a priori presuppositions to influence the conduct or the results of the scientific investigation:

- Miracles are not possible.
- God doesn't exist.
- The Bible is just myth and made-up stories.
- Jesus never existed.
- Jesus was just a man, but certainly not God in the flesh.
- Jesus did not die on the cross.
- It is not possible for Jesus to have resurrected from the dead.
- It is not possible for Jesus' actual burial cloth to still exist.
- Hundreds of years ago, people were so superstitious and gullible, and church officials were so corrupt, that the Shroud of Turin must be a forgery.

To pursue truth as the highest goal in a scientific investigation, the scientific researcher must not allow any of the above a priori presuppositions that are popular in our culture to influence the conduct or results of the investigation. In other words, he must be willing and able to follow the scientific evidence where it logically leads, and not allow himself to be influenced by the presuppositions of his worldview. For example, scientists often define a miracle as a violation of the laws of science, while they also often believe that the laws of science are known with such certainty and completeness that our current understanding of the laws of science can never be violated. Logically, this means that a miracle can never happen. A scientific researcher starting with this belief system, or a priori presupposition, will certainly be biased toward believing that miracles could not have played any part in the formation of the image on the Shroud of Turin and thus naturally reject the possibility of Jesus' resurrection as well as the possibility that radiation could have been given off by the dead body of Jesus, even if the scientific evidence in favor of these things is very strong. Simply put, if the concept of Jesus' body disappearing from within the Shroud contradicts his world view that miracles are impossible, then there will be a strong motivation to reject the possibility of the disappearance of his body even before the scientific investigation begins.

But what if the scientific researcher holds to a belief system that is exactly opposite to the above presuppositions? For example, what if the scientific researcher believes that miracles are possible because God exists, that the Bible is eye-witness testimony to real events, that Jesus not only existed but predicted his own resurrection and gave clear proof that he was God in the flesh by rising from the dead after being killed by crucifixion? Would such beliefs bias the scientific researcher to the point of overriding negative scientific evidence so as to force him to accept the Shroud of Turin as authentic? I believe that the answer is no, because the basis for this set of beliefs, which is Christian theism, has never been the authenticity of the Shroud of Turin. Books on Christian apologetics (Ref. 1 to 10) that argue that Christianity is true will seldom if ever even mention the Shroud of Turin so that the Christian has come to his belief system independent of whether the Shroud of Turin is authentic or not. Thus, for the Christian doing scientific research on the Shroud of Turin, it will not ultimately matter to his worldview whether the Shroud of Turin is found to be authentic or not. Neither option contradicts his world view. Even if the Shroud of Turin is proven to be a forgery, it will not affect the Christian's belief in Jesus' resurrection. This makes it less likely that his a priori presupposition of the truth of Jesus' resurrection will affect his judgment regarding the scientific evidence.

Though I use the word “miracle” above, it should be noted at this point that the naturalistic bias against the concept of miracles is so strong and so deeply entrenched that it is best to avoid use of the word “miracle” if possible. It is better to use a descriptive phrase such as a “new and unique phenomenon which is beyond or outside of our current understanding of the laws of physics or science”. But this is a long phrase and often inconvenient, so there is usually a strong tendency to use the word “miracle”. This tendency must be resisted if at all possible because in our current culture of disbelief using the word “miracle” when interacting with scientists will almost invariably poison the discussion.

In the above eight bullet points defining science, notice that it says nothing about whether events can occur which appear to violate the current laws of science, as they are stated at any given point in time. And since they are not prohibited in the definition of science, such events that violate the current laws of science ought to be regarded as possible. This view of science is consistent with a realization that the laws of science as we currently understand them have been a long time in development, that our statement of the laws of science have often changed in the past because phenomena were discovered that violated the laws of science as they previously were stated, that there will undoubtedly be many changes and additions of new scientific principles and laws as they are discovered in the future, and that the laws of science in our current statement of them may only cover a subset of a much larger reality. An excellent example of this last point is Newtonian physics (classical mechanics) which was accepted for hundreds of years as being universally true, yet was proven by Einstein’s theory of relativity to be true only for relatively low speeds and relatively weak gravitational fields. Thus, Newton’s laws of physics that were accepted for hundreds of years as being absolutely true were only a subset of the larger reality of relativity theory. So it is that our current laws of science may be only a subset of a larger reality – perhaps a much larger reality that includes not only our physical universe of three dimensions in space and one time dimension, but alternate dimensionalities as well. This possibility can not be scientifically excluded.

According to the above definition, science involves repeated experiments under controlled conditions. Thus, to scientifically prove that God does not exist would require careful observation of repeated experiments regarding God’s existence, while knowing and controlling all conditions that affect the results of the experiments. Since God has not been scientifically proven to not exist, the neutral or unbiased researcher of the Shroud of Turin ought to assume the possibility that God could exist. The application of this is that in our investigation of the Shroud of Turin we ought not to reject the possibility of Jesus’ resurrection just because it violates our current understanding of the laws of science. The researcher on the Shroud of Turin who, for whatever reason, believes that God does not exist and incorporates this belief into his scientific methodology by rejecting any possibility of Jesus’ resurrection reveals that he is not being an objective scientist in that he has allowed the philosophical assumptions of his world view to become more important than a search for the truth in his scientific investigation.

The application of the above view of science to our following discussion on how Jesus’ body could have physically disappeared is as follows. From a scientific perspective, since God could exist and since our current understanding of the laws of science could only be a subset of a larger reality, it will not be necessary to fully understand the process or mechanism by which his body disappeared. This allows us to proceed in our consideration of the seven processes

proposed below in applying our current understanding of the laws of science, or an extrapolation of those laws as suggested by aspects of modern physics, to judge the pros and cons of each proposed process. It is acknowledged that the discussion below does not propose an experimental program that satisfies all of the eight characteristics of experimental science discussed above, for it is forensic science that is being used to investigate the Shroud of Turin and forensic science does not require the main issue under investigation to be experimentally repeated in the laboratory under controlled conditions. So our goal is to make progress in understanding, from a scientific perspective, the pros and cons of the seven processes proposed below for the disappearance of Jesus' body.

## **Review of Part 1**

In Part 1 of this study, the nature of Jesus' resurrection body was investigated by considering the passages in the Bible that discuss Jesus' resurrection and his post-resurrection appearances, and by considering references to resurrection in general throughout scripture. It was concluded that at the resurrection, Jesus' body underwent a basic transformation, a metamorphosis, from what Paul called a "natural body" to a "spiritual body". With this new "spiritual body", Jesus could do things that we cannot do. Jesus evidently disappeared from the tomb without going through the burial shroud or the walls of the tomb. Jesus also disappeared while the two disciples in Emmaus were watching Him. And on more than one occasion, He appeared in the middle of a room full of his incredulous followers without entering through a door or any other opening into the room. One second He was not there - the next second He was. We must admit that these abilities are beyond the realm of our understanding of what is physically possible according to the laws of science as we currently understand them. And this indicates that the process by which Jesus' body disappeared from the tomb could also be beyond our current understanding of the laws of science.

## **Proposed Physical Processes**

The above discussion forms the basis for a consideration of how his body physically disappeared from the tomb. Consider what this means. A person's body consists of various organs and tissues such as heart, liver, skin, etc. These organs and tissues consist of various types of cells. These cells consist mostly of various organic molecules called proteins. These molecules consist of various atoms, and these atoms consist of neutrons, protons, and electrons. While the constituents of the neutrons and the protons, i.e. quarks, could also be mentioned, it is sufficient to stop at the level of the atoms with their neutrons, protons, and electrons for the considerations here. So when Jesus' body disappeared from the tomb, the atoms, including the neutrons, protons, and electrons in the atoms, had to disappear from the tomb. While understanding that God is the ultimate cause of Jesus' resurrection and thus of the disappearance of Jesus' body from the tomb, it is legitimate to consider various physical processes or mechanisms that were operative in the disappearance of Jesus' body from the tomb, such as the following options:

1. The molecules in Jesus' body broke into their constituent atoms which then passed through the shroud and into the walls of the tomb.
2. The atoms in Jesus' body disintegrated into their neutrons, protons, and electrons, which passed through the shroud and into the walls of the tomb.
3. The atoms in Jesus' body disintegrated, with the entire mass of his body being converted into energy – specifically electromagnetic energy such as light, ultraviolet, and X-rays. The photons of this electromagnetic energy penetrated through the shroud and into the walls of the tomb.
4. The atoms in Jesus' body disintegrated, with the entire mass of his body being converted into neutrinos and anti-neutrinos which would have penetrated through the shroud and through the walls of the tomb.
5. Jesus' body was transported out of the shroud and the tomb into some other location in this physical universe by a wormhole.
6. Jesus' body disappeared from inside the shroud by a transition into an alternate dimensionality.
7. Jesus' body disappeared by an unknown mechanism not related to, and not an extrapolation of any known physical phenomenon or law of physics.

### **Consideration of Each Process**

In considering the above options, the known laws of physics will be used as far as possible. This approach will be used to consider the energy required or released in options 1 to 4. Beyond the limit of the known laws of physics, we will use what might be called extrapolations of the laws of physics as suggested by current considerations and models in modern physics. This approach will be used for options 5 and 6. Option 7 is beyond even extrapolations from modern physics.

Options 1 to 4 all involve disintegration of the body in some sense. The two main objections to the disintegration of the body are: 1) the large amounts of energy that would either be required as input to the body or that would be released from the body, and 2) how the multiple reappearances and disappearances of the body would take place.

The energy issue will be considered first. In option 1, sufficient energy must be input to the body to break all of the molecular bonds between the atoms to release the individual atoms which then pass through the burial shroud and into the walls of the tomb. The required energy input to the body would be on the order of the energy required to cremate a body. This amount of heat should have left an effect on the burial shroud. And a significant fraction of the atoms from Jesus' body should have remained on the shroud. Investigation of the Shroud of Turin, which the author believes to be the authentic burial cloth of Jesus, indicates that neither of these is true.

The energy considerations for option 2 are more complex. Some background information will be needed first. In any atom, the electrons, which have a negative electrical charge (-1), circle very rapidly around the very small central mass called the nucleus. The nucleus contains

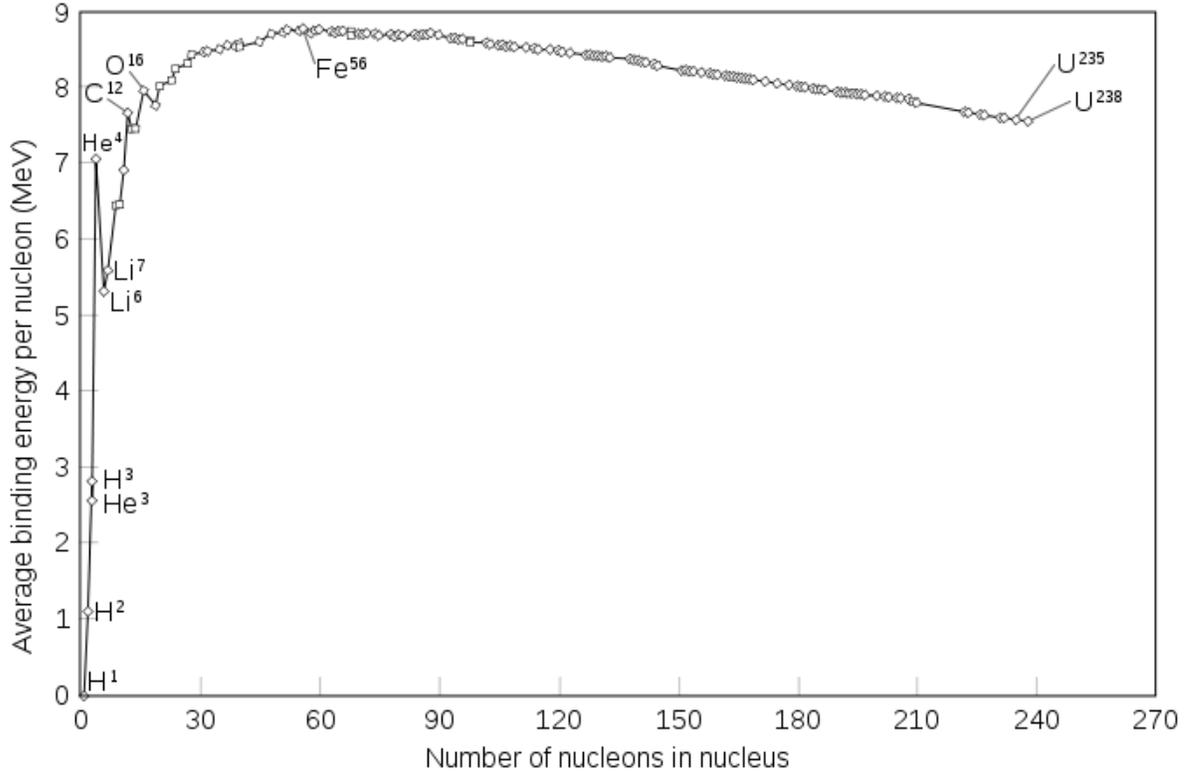
all of the neutrons and protons. The protons have a positive electrical charge (+1), whereas the neutrons have no electrical charge. The mass of the proton and electron relative to the neutron are: Neutron = 1, Proton = 0.99862349, Electron = 0.00054386734, so that on the average about 99.97% of the mass of an atom is located in the nucleus.

When neutrons and protons combine to form a nucleus, as occurred at the beginning of the universe or in a super-nova, energy is released. Since according to Einstein's equation ( $E = M C^2$ , Energy is equal to the Mass of material destroyed times the speed of light C squared) mass can be changed into energy and energy can be changed into mass, the energy released when a nucleus forms results in the nucleus weighing less than the sum of the weights of the neutrons and protons that combined to form the nucleus. Neutrons and protons in a nucleus are called nucleons. The amount that a nucleus weighs less than the sum of its nucleons is called the mass defect. To split a nucleus again into its component neutrons and protons requires that this mass defect must be overcome by putting energy into the nucleus. This energy that is required to split a nucleus into its component neutrons and protons is called the binding energy because this is the energy that binds the neutrons and protons together in the nucleus, so that the binding energy is equal to the energy equivalent of the mass defect according to  $E = M C^2$ . The binding energy that holds the neutrons and protons together in a nucleus can be calculated using Einstein's formula  $E = M C^2$  where the energy E that is binding the neutrons and protons together in the nucleus is equal to the decrease in the mass M, i.e. the mass defect, times the speed of light C squared. In other words, to break the nucleus of an atom into separate neutrons and protons requires an amount of energy equal to the binding energy of the nucleus. This energy is not released from the nucleus; rather it must be put into the nucleus. The neutrons and protons must absorb this amount of energy in the process of being released from the nucleus as separate particles.

If this binding energy for the nucleus is calculated for each element, and the result divided by the number of nucleons (# nucleons = # protons + # neutrons) in the nucleus, and plotted as a function of the number of nucleons for each element, then the result is a plot of the "binding energy per nucleon" as shown in Figure 1. The element with the highest binding energy per nucleon is iron, because it is at the highest point on this curve. Energy will be released in a nuclear process if the results of the nuclear process move up on this curve to higher values of the binding energy per nucleon. So if elements heavier than iron fission (break down) into lighter elements that are higher on this curve, or if elements lighter than iron fuse (combine) to produce heavier elements that are higher on this curve, then energy will be released in the process. For example, energy will be released in fission if  $U^{235}$ , with 92 protons and 143 neutrons in its nucleus, fissions into two fission products such as Tellurium ( $Te^{135}$ ) with 52 protons and 83 neutrons in its nucleus and Zirconium ( $Zr^{97}$ ) with 40 protons and 57 neutrons in its nucleus, with the release of three neutrons in the process. Energy will also be released in fusion if Hydrogen ( $H^3$  called tritium) with 1 proton and 2 neutrons in its nucleus fuses with Helium ( $He^4$ ) with 2 protons and 2 neutrons in its nucleus to produce Lithium ( $Li^7$ ) with 3 protons and 4 neutrons in its nucleus.

But option 2 is not related to fission of the heavy elements or fusion of the light elements, which would be represented by moving up on the curve in Figure 1, and thus releasing energy. Option 2 is the nuclei of all of the atoms being broken down into their constituent neutrons and

Figure 1. Binding Energy That Holds the Nucleons Together in the Nucleus



[The graph is from <http://physics.ucsd.edu/do-the-math/2012/01/nuclear-fusion/>]

protons. This would be represented on Figure 1 by moving from any element on the curve to the lower left hand point on the curve where the binding energy per nucleon is zero. For any element, such a process would move down on the curve and thus would require that energy be put into the nuclei to separate the neutrons and protons from each other in each element. So this energy must be absorbed by the nuclei rather than being released from it. To break down all of the nuclei into their constituent neutrons and protons would require a huge input of energy to overcome the binding energy of all the neutrons and protons in the nuclei of all the atoms. The amount of energy can be determined by calculating the total binding energy of all the neutrons and protons in the nuclei of all the atoms in the body of Jesus. Based on the figure on the Shroud of Turin, the weight of Jesus' body is usually estimated to be about 170 to 175 pounds. Assuming a body weight of 170 pounds and the weight fractions for the elements in the body from Ref. 11, the total energy that must be absorbed by the nuclei in the body can be calculated. The calculation is summarized in Table 1.

As shown in Table 1, the calculation was done assuming only the most common 13 elements out of the 59 elements listed in Ref. 11. These 13 elements gave a body weight of 77105 grams (169.988 pounds) so the other 46 elements that were omitted accounted for only 0.012 pounds out of the 170 pound assumed weight of the body. The energy required to be put into the body to separate all the nuclei for these 13 elements into their neutrons and protons is calculated to be  $3.305 \times 10^{29}$  Mev (Million electron volts), which rounds off to 3 followed by 29

Table 1. Calculation of Energy Required to Split All Nuclei into Neutrons & Protons

	Contents of the Body			Binding Energy,	Mev Required
	Element	Grams	Atoms	Mev/atom	to Overcome the Mass Defect
1	Oxygen	47309.89	1.781E+27	127.65	2.273E+29
2	Carbon	17603.68	8.826E+26	92.21	8.139E+28
3	Hydrogen	7701.61	4.601E+27	0.00027	1.240E+24
4	Nitrogen	1980.41	8.515E+25	104.70	8.915E+27
5	Calcium	1100.23	1.653E+25	343.17	5.673E+27
6	Phosphorus	858.18	1.669E+25	262.92	4.387E+27
7	Potassium	154.03	2.372E+24	334.93	7.946E+26
8	Sulfur	154.03	2.893E+24	272.70	7.889E+26
9	Sodium	110.02	2.882E+24	186.56	5.377E+26
10	Chlorine	104.52	1.775E+24	302.79	5.376E+26
11	Magnesium	20.90	5.180E+23	201.02	1.041E+26
12	Iron	4.62	4.983E+22	491.27	2.448E+25
13	Fluorine	2.86	9.068E+22	147.80	1.340E+25
Total		77105.00	7.394E+27		3.305E+29

zeros. This value is equal to  $5.30 \times 10^{16}$  Joules, which is equal to the energy released from 12.7 megatons of TNT. The most powerful nuclear weapon detonated by the United States was the Castle Bravo device set off on March 1, 1954. It released an energy equivalent to 15.0 megatons of TNT. In other words, to split all of the nuclei in Jesus' body into their constituent neutrons and protons would require 84% of the energy of the most powerful nuclear weapon ever detonated by the United States. The amount of energy required to remove the electrons from the atoms would be very insignificant compared to the energy required to split the nuclei into their neutrons and protons. So  $5.30 \times 10^{16}$  Joules would also be the energy required to split all of the atoms into their constituent parts (neutrons, protons, and electrons). This energy would not be released from the body; it would have to be put into the atoms in the body in order to split them into their neutrons, protons, and electrons. In other words, this amount of energy would be absorbed by the neutrons, protons, and electrons in the process of splitting the atoms into their constituent parts. So this energy must be absorbed in the body rather than being given off in an explosion.

Another important objection to option 2 is the number of neutrons and protons that would be emitted from the body. In option 2, all of the atoms in the body are broken apart into their component parts so that all of the neutrons and protons in all of the atoms in the body are emitted from the body. For the estimated weight of the body of 170 pounds, there would be  $2.09 \times 10^{28}$  neutrons and  $2.55 \times 10^{28}$  protons in the body. There would also be the same number of electrons as protons. Calculations with the MCNP (Monte Carlo Neutron Particle) nuclear analysis computer code indicate that if  $3.04 \times 10^{18}$  neutrons are emitted homogeneously in the body, it would cause the C-14 dating for a sample near the feet of the image to be shifted from 30 AD to 1260 AD (Ref. 12). This number of neutrons is only  $3.04 \times 10^{18} / 2.09 \times 10^{28} = 1.45 \times 10^{-10} =$

0.000000015% of the total number in the body. From experiments with irradiation of linen with protons (Ref. 13), and assuming that the discoloration forming the image on the Shroud of Turin is entirely due to protons, we know approximately how many protons must have hit the Shroud to cause the discoloration – about  $1.2 \times 10^{12}$  protons/cm<sup>2</sup>. Multiplying this number by the approximate area of the front and back image on the shroud ( $1.1 \times 10^4$  cm<sup>2</sup>) yields about  $1.3 \times 10^{16}$  protons hitting the shroud. If it is assumed that the protons are emitted homogeneously in the body, and if it is assumed that of the number of protons that reach the surface of the body to exit from it is only 1% of the total (the actual number has not yet been determined), then the number of protons emitted in the body would be  $1.3 \times 10^{16} \times 100 = 1.3 \times 10^{18}$ . Thus, the fraction of the total number of protons in the body that must hit the shroud would be  $1.3 \times 10^{18} / 2.55 \times 10^{28} = 5.1 \times 10^{-11} = 0.0000000051\%$ . So the evidence is very much against 100% of the neutrons and protons being released from the body. If 100% of the protons were emitted from the body it would damage the Shroud beyond recognition. And if 100% of the neutrons were emitted from the body it would have caused a dramatically larger effect on the C-14 dating. And if 100% of the neutrons and protons were released from the body, when they reached the shroud and the limestone in the tomb, they would be captured by the nuclei in the atoms. This would release a small fraction, probably a few percent, of the total energy ( $5.30 \times 10^{16}$  Joules calculated above) that was absorbed by the neutrons and protons when they were initially separated from the nuclei. But a few percent of  $5.30 \times 10^{16}$  Joules (12.7 megatons of TNT) is far more than enough energy to pulverize and vaporize the shroud and the tomb. So option 2 is unrealistic for multiple reasons.

Option 3 converts the entire 170-pound mass of Jesus' body into energy. If this were to happen, the amount of energy that would result can again be calculated from Einstein's equation  $E = M C^2$ , where the energy E is in Joules, the mass M is in kg, and the speed of light =  $2.9979 \times 10^8$  m/s (meters per second). The estimated 170-pound weight of Jesus' body = 77.11 kg, so the energy released would be  $77.11 \times (2.9979 \times 10^8)^2 = 6.93 \times 10^{18}$  Joules = the energy released from 1655 megatons of TNT, which is 110 times more energy than the largest nuclear weapon detonated by the United States. Since under the assumptions of option 3, this energy is converted into electromagnetic energy such as light, ultraviolet, and X-rays, it would be deposited in the materials around the body. With this amount of energy being released in this way, it would vaporize the shroud, the tomb, and Jerusalem, and probably kill most people in Israel. These events obviously did not happen, so option 3 must be rejected.

In option 4, the atoms in Jesus' body disintegrated, with the entire mass of his body being converted into neutrinos and anti-neutrinos. In option 3, the energy from the mass of the body was assumed to be converted into electromagnetic energy such as light, ultraviolet, and X-rays which would be deposited in the surrounding materials, and as a result would vaporize them. To avoid this problem, option 4 assumes that the energy is converted into neutrinos and anti-neutrinos. These particles are believed to have a very small mass but it is so small that as yet it has not been accurately measured. If they have mass, then they would travel at a velocity which is just below the speed of light. These particles have no charge so interact with matter to only an extremely slight extent. It is estimated that about 65 billion ( $6.5 \times 10^{10}$ ) neutrinos per second from the sun pass through every square centimeter on the earth, including through our bodies, yet we don't even notice them. The extremely low interaction probability of these particles means that the energy resulting from the disappearance of the body from the shroud and the tomb is not

deposited in the surrounding materials, so that the shroud, tomb, and city of Jerusalem would not be vaporized. In fact, the interaction of neutrinos and anti-neutrinos with matter is so minimal, that there would probably be no noticeable effect when this huge energy release took place within the shroud.

One author that takes the view that the mass of Jesus' body was converted into neutrinos and anti-neutrinos is Frank J. Tipler, professor of mathematical physics at Tulane University. He believes (Ref. 14) that in the resurrection of Jesus, his "Dematerialization can be accomplished by electroweak quantum tunneling ... This would convert all the matter in Jesus' body into neutrinos". Tipler admits that the problem with this is the probability that all atoms in Jesus' body (about  $6.7 \times 10^{27}$  atoms) would undergo "electroweak quantum tunneling" simultaneously, which he defines as within the same 0.01 second, when the probability of a single atom dematerializing in this short time interval is about  $10^{-100}$ . The probability of all atoms in Jesus' body undergoing this process within the same 0.01 second is beyond the realm of credibility, given any commonly held view of probability theory. And this is without consideration of the multiple dematerializations and rematerializations that must have happened to explain Jesus' post-resurrection appearances.

In review of the options involving disintegration of Jesus' body, option 1 should be rejected because of lack of evidence on the Shroud of Turin, option 2 should be rejected because of the huge amount of energy that must be put into the body without any evidence of it being left on the Shroud, option 3 should be rejected because the Shroud, the tomb, and Jerusalem were not vaporized, and the mechanism behind option 4 should be rejected due to probability considerations. Another sufficient reason to reject all concepts of disintegration is that it leaves you with no body. If the body disintegrates, then it no longer exists. So to explain Jesus' appearances after the resurrection, of which there are at least ten (Mt. 28:9-10, 16-20, Luke 24:13-32, 36-49, John 20:11-21:25, Acts 1:3-12, 1 Cor. 15:3-7), the body has to be either recreated out of new atoms for each appearance, or it has to be recomposed from the original materials. This would involve bringing the atoms back together that had scattered into the shroud and the limestone walls of the tomb (option 1), or bringing the neutrons, protons, and electrons back together (option 2), or bringing the photons of light, UV, and X-rays back together (option 3), or bringing the neutrinos and anti-neutrinos back together (option 4). From this consideration, it should be obvious that a far preferable option would be for Jesus' body to continue to exist after the resurrection so that it doesn't need to be recreated or recomposed for each appearance after the resurrection. Two options have been suggested to satisfy this requirement: a wormhole (option 5) and an alternate dimensionality (option 6).

In option 5, Jesus' body was transported out of the shroud into some other location in this physical universe by a wormhole. The term "wormhole" is used for a topological curving of our four dimensional reality (three space dimensions + one time dimension) known as space-time in Einstein's relativity theory. There is some theoretical basis for believing that a wormhole could result when the topological curving in space-time is sufficient to construct a passageway (tunnel, shortcut) from one point in space-time to another point in space-time.

The concept of a wormhole is readily recognized by many in our culture through Star Trek and other science fiction TV shows and movies. Wormholes are sometimes used in such

science fiction programs to create new possibilities for the plot in the program, and because a wormhole is considered to be a theoretical possibility by physicists based on Einstein's equations on general relativity. In our current understanding of physics, it is not possible for anything to travel faster than the speed of light in a vacuum. But in Star Trek, the Enterprise is able to travel many orders of magnitude faster than the speed of light because the ship has what is called warp drive. Powered by annihilation of matter and anti-matter in the warp drive engines on the Enterprise, the warp drive creates a bubble of normal space-time immediately around the Enterprise, but outside this bubble creates a curvature (bending, warp) in the fabric of space-time, i.e. in the space-time field, which moves with the Enterprise, thus allowing the Enterprise to exceed the speed of light and sometimes even travel through time. In contrast to warp drive on the fictional Enterprise, according to relativity theorists a wormhole could be a naturally occurring phenomenon and thus a self-sustaining warp in the fabric of space-time. A sufficiently strong warping in the fabric of space-time to create a wormhole is normally associated with a black hole, but there are evidently other theoretical possibilities to create a wormhole. In this discussion it should be emphasized that there is no experimental evidence for the existence of any wormhole, and that things don't have to happen or even be physically possible just because they are mathematical solutions to equations in certain theories in physics and mathematics. For example,  $2 - 3 = -1$ , but if I have two apples on the table, I can't take three apples from them.

So in option 5, a wormhole would have to be created inside the Shroud as it covers the body inside the tomb. The wormhole would have to transport the body to another location and/or time in this physical universe, according to current theory. The wormhole would have to transport the body back for the first post-resurrection appearance and then away again when the appearance is over. This process would have to repeat itself for each of the ten post-resurrection appearances. And each time, there would have to be nothing else transported in either direction. For example, when the wormhole initially transports the body out of the shroud, it would have to transport no part of the shroud away, because we still have the entire burial cloth' as the Shroud of Turin. And when the wormhole transports Jesus' body into the midst of his disciples in the upper room, his disciples are not injured in any way by the wormhole and there is no indication of anything else being deposited in the room along with Jesus' body. A wormhole occurring as a natural phenomenon would not behave this way, and a wormhole resulting from a black hole would have destroyed anything that falls into it, including Jesus' body. As with disintegration, this would again leave us with no body to return for the post-resurrection appearances. Even if God is appropriated as creating the wormhole each time, the complexity of option 5 and the many miracles that would be required to make it work argues strongly against it.

In option 6, Jesus' body disappeared from inside the shroud by a transition into an alternate dimensionality. Some background is necessary at this point to help the reader understand the concepts being discussed. The reality in which we exist appears to consist of three space dimensions and one time dimension. The three space dimensions can be visualized in a rectangular room by two walls and the floor. These three surfaces meet in a point in the lower corner of the room. This point in the lower corner of the room can be designated as the origin, or starting point, for what is called a coordinate system. Coming out from this point is three lines where the two walls and the floor intersect each other. Where one wall and the floor intersect can be called the x-axis. Where the other wall and floor intersect can be called the y-axis. And where the two walls intersect can be called the z-axis. Thus the point in the lower

corner of the room along with the two walls and floor that go through it is a coordinate system composed of an x, y, and z-axis going through the origin (point in the corner). The concept of a coordinate system is useful because it allows us to locate every other point in the universe by specifying its distance from the origin along the x, y, and z-axis of the coordinate system.

It will now be useful to develop a nomenclature to help us abbreviate these concepts. A dimensionality consisting of a certain number of dimensions will be designated by the capital letter “D”. Following the “D” will be parentheses which contain within them the names of the dimensions. For example, in our world with three space dimensions, the dimensionality would be designated as D(x, y, z). But there is also a time element in our reality. At one point in time, the location of the tip of my pencil can be specified by the x, y, and z coordinates in our coordinate system. But the tip of my pencil is at different locations (x, y, and z coordinates) at different times. We actually need four dimensions (x, y, z, and t) to specify where the tip of my pencil is located at any time. So our reality consists not only of three space dimensions but also a time dimension. The dimensionality of our reality is thus designated as D(x, y, z, t), where four values (x, y, z, and t) are required to locate the tip of my pencil, or any other object, in our reality. How these concepts can be related to option 6 and a “transition into an alternate dimensionality” can be illustrated by the following story.

### **Mr. Dotman in Lineland**

Once upon a time, there was a man named Mr. Dotman who lived in a country named Lineland. Mr. Dotman was very small; in fact he had no dimension (length, width, or height) at all. He was just a dot. But he didn’t feel bad about himself for where he lived; everyone was only a dot, having no dimension at all. Now the country of Lineland was a strange place too, for it had only one dimension in space, where everyone lived on the x-axis and everyone was convinced that this was all that existed. But they could move along the x-axis, which was important. For this meant that their reality also had a dimension of time.

Now Mr. Dotman loved to tickle his imagination by reading strange sounding things with strange looking symbols, and so one day he found himself reading about strange seeming thoughts by a strange sounding man named Einstein. And as a result, our Mr. Dotman realized that he was living in a universe of one spatial dimension and one time dimension so that Lineland could be designated as a dimensionality of two dimensions, D(x, t). And when he realized this, strange seeming thoughts started bouncing around in his zero dimensional brain as to why this might be so. But upon discussing it with his friends in Lineland, they thought him rather strange, and for their own protection and profit they started behaving in a most unfriendly manner. Now Mr. Dotman thought their response was very strange, and before long Mr. Dotman found himself confined to prison. He was only allowed to move between  $x = -1.0$  and  $x = 1.0$  on the x-axis by two dot guards stationed at these two points who watched Mr. Dotman at all times lest he attempt an escape. Now the situation for Mr. Dotman was far worse than it might at first appear for he by nature was a very positive person; far preferring to be positive rather than negative, but that is a different story.

Now the advantage for one being in jail is that one has plenty of time to focus one's thoughts on what is important, and so it was for Mr. Dotman. As he meditated upon his confinement along the x-axis, and upon Mr. Einstein's strange ideas, it occurred to him that the dimensionality of the universe in which he lived,  $D(x, t)$ , might, just possibly, be a part, a subset, a simplification of a larger reality, a higher dimensionality with a y-axis as well,  $D(x, y, t)$ , where he was not only confined along the x-axis by the prison in which he meditated, but also, by the nature of things, was confined along the y-axis at  $y = 0$ . So that this larger reality, this higher dimensionality with three dimensions,  $D(x, y, t)$ , for him and his ex-friends only appeared to be a two dimensional reality,  $D(x, t)$ , because of their inability to perceive the third dimension because of their restriction to  $y = 0$ .

But with two dot guards on either side of him, looking straight at him, what could Mr. Dotman do? And then the answer suddenly occurred to him. The two dot guards, who were looking straight at him, were looking straight on the x-axis at him. It was their world view of only one spatial dimension that prevented them from even considering the possibility of a larger reality composed of a higher dimensionality. And it was then, when this thought came to completion in his zero dimensional brain that he turned his zero dimensional body to look off the x-axis. And then he saw it – the y-axis. And he wondered why had he not seen it before? It had evidently been there all the time, but he had never even looked for it before.

And then Mr. Dotman did something that had never been done before in all of Lineland. He moved from  $y = 0$  up to  $y = 1$ , and when he did, the two dot guards, who lived on the x-axis at  $y = 0$ , screamed and ran away, for Mr. Dotman had simply vanished from before their eyes as they were looking right at him on the x-axis. And when the guards reported to the king of Lineland what had happened, the king bribed the guards to say that Mr. Dotman's friends had come at night and stolen him from the prison while they were asleep. And this fooled most of the people of Lineland, for in their world view, they were convinced that they lived in a reality of only one spatial dimension, so that it was impossible for a person to move off of the x-axis because it contradicted their very advanced science.

Mr. Dotman now found himself in a new and strange place; in a country called Planeland, because the x and y-axis that he found there defined a broad plane on which the inhabitants lived. And he made new friends, and these new friends renamed him because Dotman no longer seemed to describe him, so they renamed him Mr. Squareman. This was only partially because of his new found shape, but also because his silly ideas seemed to limit their freedom in their frivolity and vanity. So before long, newly named Mr. Squareman again found himself in prison with guards at (x, y) coordinates of (-1, 0), (1, 0), (0, 1), and (0, -1) who watched him very carefully lest he attempt an escape. But this time he knew what to do; for again he suspected that the reality of two spatial dimensions and one time dimension,  $D(x, y, t)$ , in which he now lived was only a subset of a higher dimensionality,  $D(x, y, z, t)$ . And as he turned his two dimensional body to look off the x-y plane, he quickly spotted the z-axis. And then Mr. Squareman did something that had never been done before in all of Planeland. He moved from  $z = 0$  up to  $z = 1$ , and when he did, the four guards, who lived on the x-y plane at  $z = 0$ , screamed and ran away, for Mr. Squareman had simply vanished from before their eyes as they were looking right at him in the x-y plane. And when the guards reported to the king of Planeland what had happened, the king bribed the guards to say that Mr. Squareman's friends had come at night and stolen him

from the prison while they were asleep. And this fooled most of the people of Planeland, for in their world view, they were convinced that they lived in a reality of only two spatial dimensions, so that it was impossible for a person to move off of their x-y plane because it contradicted their very advanced science.

And he now found himself in a country called earth, where again they gave him a new name, and where everyone was convinced that reality consisted of only three spatial dimensions and one time dimension, so that their universe had a dimensionality of four dimensions,  $D(x, y, z, t)$ . And very quickly he again found himself in prison because his ideas seemed to limit people's frivolity and vanity. But this prison was deeper and darker for they had killed him – but only his body. And they placed his body in a prison and placed many guards outside with orders to watch very carefully lest anything strange should happen. But again he knew what to do, for the supposed four dimensional reality,  $D(x, y, z, t)$ , of the country called earth was actually only a subset of a higher dimensionality containing 10 dimensions,  $D(x, x', x'', y, y', y'', z, z', z'', t)$ , where the primed and double-primed dimensions were wrapped so tightly around the x, y, and z-axis that they were not even noticed by the people living in the land. So when he moved his body from  $x' = y' = z' = 0$  over to  $x' = y' = z' = 1$ , the guards, who were confined to the x-y-z space at  $x' = y' = z' = 0$ , screamed and ran away for his body had simply vanished from before their eyes as they were looking right at it. And when the guards reported to the king what had happened, the king bribed the guards to say that his friends had come at night and stolen his body from the prison while they were asleep. And this fooled most of the people of the land called earth, for in their world view, they were convinced that they lived in a reality of only three spatial dimensions and one time dimension,  $D(x, y, z, t)$ , so that it was impossible for a person to move out of their x-y-z space because it contradicted their very advanced science. The End

### **Application of the Story**

The main purpose of the above story is to illustrate what it means to make a transition into an alternate dimensionality. Mr. Dotman initially lived in Lineland where everyone thought that the entire universe consisted of only one spatial dimension and one time dimension, for a total of two dimensions,  $D(x, t)$ , but it actually had three dimensions,  $D(x, y, t)$ , except that everyone was limited to  $y = 0$  by their worldview which informed them that the x-axis was all that there was. Mr. Dotman discovered that the y-axis could be found if one only looked for it, and that by an act of his will he could go from  $y = 0$  to  $y = 1$  and thus escape from being imprisoned on the x-axis. His “transition to an alternate (or higher) dimensionality” consisted in going from what everyone thought was a universe of two dimensions,  $D(x, t)$ , to a universe of three dimensions,  $D(x, y, t)$ , although it was a universe of three dimensions,  $D(x, y, t)$ , all along.

The same can be said for him in Planeland. Everyone in Planeland thought that the entire universe consisted of only two spatial dimensions and one time dimension, for a total of three dimensions,  $D(x, y, t)$ , but it actually had four dimensions,  $D(x, y, z, t)$ , except that everyone was limited to  $z = 0$  by their worldview which informed them that the x-y plane was all that there was. Mr. Dotman, now renamed Mr. Squareman, discovered that the z-axis could be found if he only looked for it, and that by an act of his will he could go from  $z = 0$  to  $z = 1$  and thus escape from being imprisoned on the x-y plane. His “transition to an alternate (or higher)

dimensionality” consisted in going from what everyone thought was a universe of three dimensions,  $D(x, y, t)$ , to a universe of four dimensions,  $D(x, y, z, t)$ , although it was actually a universe of four dimensions,  $D(x, y, z, t)$ , all along.

The same can be said for him in the country called earth, where everyone thought that the entire universe consisted of only three spatial dimensions and one time dimension, for a total of four dimensions,  $D(x, y, z, t)$ . But in the story the universe actually had ten dimensions,  $D(x, x', x'', y, y', y'', z, z', z'', t)$ , except that the primed and double-primed dimensions were not perceived by people. So everyone’s world view was defective. They actually existed in a much higher dimensionality of 10 dimensions rather than the 4 dimensions that they perceived. Mr. Dotman, now under his new name, for an unexplained reason had the power to find the primed dimensions and by an act of his will transitioned to them, i.e. he went from  $x' = y' = z' = 0$  to  $x' = y' = z' = 1$ . To the guards, this “transition to an alternate dimensionality” was observed as a disappearance or vanishing from their reality because they were confined to  $x' = y' = z' = 0$ . So his “transition to an alternate (or higher) dimensionality” consisted in going from what everyone thought was a universe of four dimensions,  $D(x, y, z, t)$ , to a universe of ten dimensions,  $D(x, x', x'', y, y', y'', z, z', z'', t)$ , although it was actually a universe of ten dimensions all along. A universe of ten dimensions was used because some “string theories” in modern physics postulate this dimensionality. Various string theories postulate that we actually live in a reality of between 10 and 26 dimensions, although we are only aware of four of them.

In the story, the body of Mr. Dotman never disintegrated and it never ceased to exist. In transitioning to an alternate dimensionality, his body was always located somewhere and he maintained continuous consciousness. The transition to the alternate dimensionality did not cause any energy release and did not injure anyone. And the transition to the alternate dimensionality was brought about by Mr. Dotman in an act of his will. Presumably, though not utilized in the story, Mr. Dotman could have transitioned back into jail if he had wanted to do so. Thus, a “transition into an alternate dimensionality” can be compared to a person in a room with a closed door, who opens the door, goes into the next room, and closes the door behind him. When he exits the first room and enters the second room, his body does not need to disintegrate and there is no huge explosion. He is simply in the next room and can come back into the first room anytime he wants to.

In option 6, Jesus’ body disappears from inside the shroud by a transition into an alternate dimensionality. If we apply the characteristics of such a transition as presented in the above story to Jesus’ resurrection there are many similarities. In Jesus’ resurrection, there is no evidence in Scripture that his body disintegrated, or that it ceased to exist, or that it caused a huge energy release or that it injured anyone. The only evidence in Scripture is that his body was no longer in the burial shroud in the tomb as if it had disappeared from within the wrapped burial shroud. After his resurrection, He also had the ability to reappear and disappear and did so at least ten different times in his post-resurrection appearances (Mt. 28:9-10, 16-20, Luke 24:13-32, 36-49, John 20:11-21:25, Acts 1:3-12, 1 Cor. 15:3-7). There is no evidence in scripture that his reappearances and disappearances involved a significant energy release, no one was injured, and these passages read as though his reappearances and disappearances are occurring simply as the result of an act of his will. This is most consistent with his body continuing to exist between his post-resurrection appearances. If this is so then his body never disintegrated and it never

ceased to exist. It was always somewhere though not in our dimensionality,  $D(x, y, z, t)$ . The concept that Jesus' resurrection and his post-resurrection appearances are transitions to and from an alternate dimensionality seems to fit the evidence very nicely.

### **Energy Release in an Earthquake**

There is a question whether there could have been a significant energy release due to Jesus' resurrection from the tomb because an earthquake is noted in Mt. 28:2. While this earthquake is called great (KJV, ESV, NLT), severe (NASB), or violent (NIV), there is no indication in Scripture that it was felt elsewhere in the city and there is no archeological evidence that the city of Jerusalem was destroyed in about 30 to 33 AD. For these reasons, some have suggested that Matthew's reference to a violent earthquake should either be understood figuratively in some sense, or is simply not true. But there is good reason to reject these views and take the reference to an earthquake in Mt. 28:2 at face value. If a violent earthquake occurred due to shifting rock layers deep in the earth, then its destructive effect would have occurred over a very large area, but this earthquake was very localized at the surface, not deep under ground, because it was due an event in the tomb, i.e. Jesus' resurrection. For an earthquake that has its point of origin in the tomb, the energy released would take the form of compression or P waves and shear or S waves in the rock and soil that would spread out in a half-sphere in the ground below and around the tomb. An insignificant amount of energy would be transferred to the air above the ground. As the compression and shear waves in the ground spread out in a half-sphere, their strength would decrease as the inverse square of the distance from the tomb, i.e.  $(1/r)^2$  where  $r$  = distance of the observer from the tomb. There would also be surface waves (Love waves and Rayleigh waves) that would spread out in a circle on the surface so that their strength would decrease as the inverse of the distance of the observer from the tomb, i.e.  $(1/r)$ . So what might be described as a violent earthquake by the women or guards near the tomb (Mt. 28:2) might not even be felt by most people in Jerusalem. This being the case, the reference to the earthquake in Mt. 28:2 should be understood literally to refer to a real event.

The text of Mt. 28:2 is not clear whether the earthquake occurred at the moment of Jesus' resurrection or whether his resurrection was earlier, and it is not absolutely clear whether the angel caused the earthquake in the process of rolling away the stone or whether it was caused by Jesus' resurrection. Matthew 28:2 in the NIV only says "There was a violent earthquake, for an angel of the Lord came down from heaven and, going to the tomb, rolled back the stone and sat on it." The preposition is translated as "for" or "because" in most translations (NASB, NIV, ESV, NLT, TLB, RSV, NBV, NJB, Amplified, Phillips, Williams, and Wuest). These translations imply that the earthquake was caused by the angel in the process of coming down from heaven and rolling away the stone. But the "for" is not included in some translations (NEB, REB, NCV, Beck, TEV, and The Message). And in The Expanded Bible, the "for" is omitted from the main reading but inserted in brackets with an "L" to indicate it is the literal translation of a word that is present in the Greek. The "for" in English is the translation of the Greek word "γάρ" which is pronounced "gar". According to "The NIV Exhaustive Concordance" (Ref. 15), this Greek word occurs 1040 times in the New Testament. In the NIV, it is translated "for" 502 times, "because" 85 times, "but" ten times, "and" nine times, "now" seven times, "indeed" six times, "in fact" or "since" four times each, and "after all" or "why" three times each. For 31

other occurrences of “γαρ”, it is translated in 27 other ways. But most significantly, for 376 occurrences of “γαρ” in the New Testament, which is 36% of the total, it is not translated at all, being entirely omitted in the English. As in any translation, the way in which a word ought to be translated, or whether it is simply to be omitted in the translation, is determined by what makes sense in the context of what comes before and after it.

Several points need consideration regarding the context of the earthquake in Mt. 28:2. It is unlikely that the mere appearance of the angel at Jesus' tomb caused the earthquake referred to in Matthew 28:2, since the scriptures never associate an earthquake with the appearance of any other angel. And it seems unlikely that the angel rolling away the stone would require a violent earthquake to accomplish it. So it seems more likely that the earthquake was the result of Jesus' resurrection. If the disappearance of Jesus' body in the resurrection involved a transition of his body into an alternate dimensionality, then such a transition might cause oscillations or ripples in the space-time field or continuum that defines our dimensionality, like ripples on the surface of a lake that result when a stone is thrown into the water. Such an oscillating warp or perturbation in the space-time field of our dimensionality could have caused a general shaking of the ground around the tomb, as waves on the water would cause a toy boat to move up and down. But there is no evidence for an earthquake occurring at any of the ten post-resurrection appearances, which argues against the concept that a transition into an alternate dimensionality would necessarily cause an earthquake. In Jesus' resurrection, besides his body disappearing, at least two other important things happened – his body was glorified, i.e. his physical body was changed into a spiritual body, and his soul was reunited with his body to make it alive again. So while it seems more likely that the earthquake was caused by Jesus' resurrection than by the angel moving the stone, we must admit that we have no basis for even speculating how enough energy could be released to cause a violent earthquake around the tomb.

If the earthquake in Mt. 28:2 was due to Jesus' resurrection, as argued for above, then the “γαρ” in Mt. 28:2 could be translated as “and” or possibly as “now” but more likely just left out of the translation to eliminate the implication that the earthquake was caused by the angel rolling the stone away. This is done in Today's English Version (TEV, also called Good News for Modern Man): “Suddenly there was a strong earthquake; an angel of the Lord came down from heaven, rolled away the stone, and sat on it.” The commentaries usually recognize that the earthquake was associated with the angel coming to roll away the stone, but usually do not say that the earthquake was caused by the angel rolling away the stone. For example, “The Bible Knowledge Commentary” for Mt. 28:2 says “There was, however, a violent earthquake associated with an angel coming from heaven and rolling away the stone from the door of the tomb.” This would only imply that the earthquake occurred at very close to the same time as the angel coming and rolling away the stone. The conclusion of this matter is that the earthquake could have been caused by Jesus' resurrection, and probably was.

### **Modern Physics and Alternate Dimensionalities**

The conclusion of our consideration of option 6 is that the Scriptural evidence regarding Jesus' resurrection and post-resurrection appearances fits nicely with the concept that He was transitioning to and from an alternate dimensionality. But don't we know that our universe only

has three spatial dimensions and one time dimension so that the dimensionality of our universe is  $D(x, y, z, t)$ ? And isn't science so well based that there is no controversy remaining? This may appear to be so to the layman, but in the realm of modern physics, very strange things often seem to be necessary. For example, quantum mechanics has been proven to be true when applied to very small things and general relativity theory has been proven to be true when applied to very large things but they can't both be entirely true because the basic assumptions of these two theories are inherently contradictory: quantum mechanics assumes that gravitational attraction results from the exchange of virtual particles whereas relativity theory assumes that gravitational attraction results from the bending of the fabric of space-time. Another example is the wave-particle duality of light, where light acts like a wave and a particle (photon) at the same time, because if individual photons are allowed, one at a time, to go through either one or the other of two slits in a barrier they can accumulate into an interference pattern behind the barrier, which is characteristic of a wave. The same has been found to be true of subatomic particles such as electrons. Another example is that the universe not only consists of matter and energy that can be seen, but it must also contain what is called dark matter and dark energy that can not be seen. Dark matter was originally hypothesized to explain the fact that the arms of galaxies are usually not all wrapped upon themselves as they ought to be given the age of the galaxies. This dark matter interacts with normal matter through gravitation, but it does not give off light, it does not reflect light, and it does not scatter or absorb light from behind it, so that it can not be seen. And the dark energy, though invisible, must pervade "empty" space so as to cause the acceleration in the expansion of the universe that is observed. It is now believed that there is about 5.5 times as much dark matter as there is ordinary visible matter in the universe, and that dark matter is composed of some as yet unknown subatomic particle. It is believed that dark matter plus dark energy constitutes about 95% of the total mass-energy content of the universe.

Many problems remain in our understanding of physics. How can force be exerted across space? Can the four forces in nature (gravity, electromagnetic, weak nuclear, and strong nuclear) be unified into a single force that displays itself in four different ways? Can all the sub-atomic particles be unified into a single understanding (usually called the "standard model") of matter? Why does matter have mass and weight? Why is there so much more matter than antimatter in the universe? Is there a single unified theory that explains all of these questions? In an attempt to develop a unified "theory of everything" which resolves the conflict between quantum mechanics and general relativity theory, some theorists in modern physics have developed various forms of what is called string theory, also sometimes called superstring theory. These theories say that everything is made up of extremely small one-dimensional loops of pure energy called "strings" which are like infinitely thin rubber bands whose vibration modes account for all the characteristics of matter and energy. These string theorists develop their theories based on geometrical considerations of higher dimensionalities of more than four dimensions  $D(x, y, z, t)$ . In his book *The Elegant Universe* (Ref. 16), Brian Greene said "Most of us take for granted that our universe has three spatial dimensions. But this is not so according to string theory, which claims that our universe has many more dimensions than meet the eye - dimensions that are tightly curled into the folded fabric of the cosmos." As conceived by various string theorists, these higher dimensionalities are composed of from 10 to 26 dimensions. In our story of Mr. Dotman in *Lineland*, the story utilized a dimensionality of 10 dimensions, with six of the dimensions wrapped so tightly around the x, y, and z-axis that they were not observable, as one type of string theory postulates.

Oxford mathematician Roger Penrose has even developed an alternative to the various forms of string theory in an attempt to better understand reality. He bases his theory on the use of complex numbers, whereas string theory is based on real numbers. A complex number is of the form  $A+Bi$  (A plus B times i) where A and B are real numbers but i is the square root of -1 (which can have no real solution so is called “imaginary”), so that A is the real part of the complex number  $A+Bi$  and B times i is the imaginary part of the complex number. With this shift from real numbers to complex numbers in his theory, he can produce a mathematical concept of what he calls a twistor, which has no mass, is 20 orders of magnitude (factors of 10) smaller than a nuclear particle, is shaped like a doughnut or piece of rope with a single twist as it circles a central axis, and can travel at the speed of light in the direction of its axis. According to Penrose, the fundamental subatomic particles are made up of combinations of a small number of various types of twistors, the continuous fabric of space and time in Einstein’s equations is replaced by a space of twistors with each twistor being the smallest possible unit so that space-time (now called twistor space) is not continuous, i.e. is not infinitely divisible, but is composed of points with each point being a twistor, and the four basic forces (gravity, electromagnetic, weak nuclear, and strong nuclear) may one day be shown to be the result of various types of deformations in twistor space. Penrose explains twistor theory in Chapter 33 of his book “The Road to Reality” (Ref. 17).

There are 5 different variations on current String Theory, which, according to Penrose, may all include facets of ultimate reality, but nobody really knows. In addition to the various string theories and twistor theory, there is something called “11-dimensional supergravity” theory (Ref. 18). However, none of the above theories answers all of the questions or solves all of the problems. The point of the above examples is that at the deepest level of our understanding of how things operate in our reality, there are many unknowns and unresolved issues and conflicts, so that our perceived dimensionality  $D(x, y, z, t)$  may be only a subset of a higher order dimensionality. This might allow for Jesus’ body to disappear from within the shroud by a transition into an alternate dimensionality as option 6 postulates.

## **Conclusions**

The process by which Jesus’ body disappeared from the tomb in the resurrection was considered in Part 1 of this study from the Biblical references to his resurrection and from the theology of resurrection throughout the Bible. Part 2 of this study, which is this document, considered how Jesus’ body could physically disappear from the tomb based upon the laws of science as we currently understand them and based on extrapolation of those laws as suggested by aspects of modern physics. Seven different physical processes were considered for how Jesus’ body could have disappeared from the tomb, with the requirement that each process be consistent with the nature of Jesus’ post-resurrection appearances. The results are as follows:

1. Disappearance of the body from the tomb due to processes involving disintegration of the body, or involving one or more wormholes, ought to be rejected based on the large energies involved, the cessation of the body’s existence, and the multiplicity of very unusual events required.

2. Disappearance of the body from the tomb due to a transition of Jesus' body into an alternate dimensionality ought to be adopted as the best alternative because the characteristics of Jesus' resurrection and post-resurrection appearances agree with the characteristics of transitions between alternate dimensionalities, there is no requirement for large energies to be involved, the body would not cease to exist after a transition into an alternate dimensionality, and radiation could be given off in the process of the transition to possibly cause the image on the shroud and shift the C<sup>14</sup> date. Jesus' post-resurrection appearances would then also be best understood as transitions between alternate dimensionalities.
3. Disappearance of the body from the tomb due to an unknown process which is beyond an extrapolation from modern physics is also possible but pros and cons of this option could not be considered because of its vagueness.

Also discussed under option 2, based on nuclear analysis computer calculations (Ref. 12), was the following. If a very small fraction ( $1.45 \times 10^{-10}$ ) of the number of neutrons in the body were emitted from within the body, it would explain the shift in the radiocarbon dating for the Shroud of Turin from about 30 AD to an uncorrected value of 1260 AD. And based on experiments (Ref. 13), if a very small fraction (very approximately  $5 \times 10^{-11}$ ) of the number of protons in the body were emitted from the body, it would have caused a discoloration on the linen similar to that in the image on the Shroud of Turin. If Jesus' body disappeared from the tomb by a transition into an alternate dimensionality, or by another unknown mechanism, then there is no reason to reject the possibility that these very small fractions of the neutrons and protons that were in his body could have been emitted in the process of his disappearance, thus explaining the shift in the C<sup>14</sup> date from 30 AD to 1260 AD, as well as explaining the appearance of the image on the shroud as a radiation burn.

Another possible effect of a burst of radiation emitted from within the body due to this transition between alternate dimensionalities is related to the blood that is imbedded in and on the threads of the Shroud of Turin. Since radiation, including particle radiation such as protons and electromagnetic radiation such as photons of light or ultraviolet, applies a force to anything which it hits, such a burst of radiation emitted from within the body at his resurrection might also have forced the dried blood off of his body, heated the blood to the point of liquefying it, and then thrust it against and into the threads of the cloth covering his body as we see on the Shroud of Turin. According to the known laws of physics, a burst of vertically oriented radiation emitted from within the body would exert a vertical force on any blood that is dried on the surface of the skin, but experiments have not yet been done regarding this mechanism. This possibility needs further consideration.

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