VALID PROBABILITY CALCULATION
DOES NOT IMPLY GOSPEL JESUS IN TALPIOT TOMB

By Steve Hinrichs 7/31/2007 http://home.roadrunner.com/~rrr33/homepage.html

1. ACKNOWLEDGEMENT

Randy Ingermanson is acknowledge for initiation of the use of Bayes equation for evaluating TLTJ [19]. Stephen Pfann is acknowledge for providing information on ossuaries.

2. INTRODUCTION

Simchi Jacabovici and others claim that the Gospel Jesus was permanently buried in the Talpiot Tomb found around Jerusalem. This theory is called The Lost Tomb Of Jesus (TLTJ). Ref. 12 and 13 explain their reasoning for this TLTJ theory. In this tomb 6 of the 10 ossuaries had the following inscriptions written on them. The 6 inscriptions are listed below.

Yeshua bar Yosef / Jesus Son of Joseph - Identifies Jesus whose Father is Joseph
Mariamne e Mara - Mariamne is interpreted by Jacabovici as Master Mary Magdalene but by Pfann as Mary & Martha. Ossuary #701
Yose - Nickname for Joseph like Joey. Jacabovici interprets this as Jesus' brother, Ossuary #705
Maria - Normally interpreted to be Mary
Matthew -
Judah son of Jesus - Most likely son of the Jesus buried in the Talpiot Tomb.

The key point of debate is whether or not the Talpiot Tomb ossuary contains the Gospel Jesus or some other Jesus. Using the process of elimination of hypothesis to substantiate the claim that the Talpiot ossuary does contain the Jesus of the Gospels, the claim that it contains some other Jesus must be shown implausible (very low probability), implying that some other Jesus is in the tomb is false. This would imply the conclusion that the Talpiot ossuary must contained the body of the Jesus of the Gospels. This article discusses how to do the probability calculation correctly. This article concludes that a correct probability calculation implies that it is quite probable that some other Jesus was buried in the tomb. Thus, no reason to conclude that it is the Gospel Jesus.

3. DEFINITION OF TERMS

Deterministic Relation - Something determined the relation such as a logical principal, a natural law, or intelligent intensions. For example, the earth traveling on its path around the sun is not by chance, rather is governed by gravity. A parent choosing to name their child after the father's name is not by chance, rather the intelligence of being aware of one's own name and the intention of naming one's child after themselves.
Indeterministic Relation - No deterministic relation; thus, relations would at least partially, if not completely, be by random, so the chance can be estimated by statistics or determined by probability calculations. For example, a dice rolling the same number twice in a row would not be deterministically related so the chance of such an occurrence would be 1/6.
Ossuaries - Ice chest size boxes the bones of the deceased are placed in.
Extant Probability (EP) - Probability of one specific hypothesis (Gospel Jesus in the ossuary) divided by the sum of the probability for all possibilities that are expected or known to have occurred which is called the total probability. Labeled just "P"
Nonextant Probability (NP) - Probability of the event which occurred divided by the sum of the probability for all possibilities that are could have occurred but did not necessarily occurred. Labeled "Pn"

All numbers below are for the Jerusalem region.
~ - not , For example ~A = not A
Ap - Average population of Jerusalem
Ad - Average age when somebody in Jerusalem died
No - Total number of ossuaries.
Nof - Number of ossuaries found. Simchi claims 30000 but this seems too high
Ni – Total number of names inscribed on ossuaries.
Nif - Number of names found inscribed on ossuaries
Nim - Number of male names inscribed on ossuaries
Nifm - Number of male names found inscribed on ossuaries
Nifc – Total number of names inscribed on found ossuaries that are candidates for a Gospel Jesus ossuary. See Section 5.1 for explanation.
Rc = Nifc / Nifm
Npo - Total number of people buried in ossuaries
Npof - Number of people found buried in ossuaries
Nsons - Number of sons the father of the Jesus in the Talpiot tomb had.
G – Number of generations
GJ – Gospel Jesus
Np = G Ap – Total population
Npm = 0.50 Np – Total population of males
Npom = Total population of males buried in ossuaries
Npmh - Hypothetical number of males that would have produced Nifc ossuaries
Ntb - Total number of named and unnamed bodies buried in Talpiot tomb
Ntr - Total number of male or female relatives in the Tomb besides the Jesus and his father Joseph.
Ao = Npof / Nof - Average number of people placed in each ossuaries. Kolner estimates 1.7 [3]
Ro = Npo / Np - % of population in ossuaries
Rof = Nof / No - % of ossuaries found
Rom = Npom / Npm - % of male population in ossuaries
Rofm = Nofm / Nom - % of male ossuaries found
Rtm = Npom / Npm - % of male population in ossuaries
Ri - % of ossuaries with inscriptions. Simchi website says 0.20
Rh - % of the inscribed names on ossuaries that are identified as some known historical person.
Rtp - % of ossuaries which were definitely not used for burial around the time period off 30-33AD
Fim - % inscribed names are male rather than female = Nim / Ni
HS - Hypothetical Scenario
Rim - Fim / 0.50
Rs - Total number of males in population / Total number of females in population
Ai - Average number of inscriptions on ossuary with at least one inscription
Fjudah - Factor for probability associated with Jesus having a son named Judah, F2 from [19]
Fbrother - Factor for increase in probability associated with son being named after father, F3 from [19]
Fgj - Probability that the Gospel Jesus relative to another man would be buried in Talpiot Tomb. F1 from [19]
Ft - total factor
Njoj - Expected number of Jesus son of Joseph out of a population of Np
Njjc - Expected number of Jesus son of Joseph out of a population of Np that are not generally excluded as candidates for the Gospel Jesus
Njjh - Hypothetical number of Jesus son of Joseph which would have produce a “JJi”
Rjoj = Rjesus Rjoseph
JJi - Refers to a Jesus son of Joseph inscription on a ossuary.
Pn(~GJ) – Probability of JJi occurring by random that is inscribed with Jesus whose father is Joseph. This could be designated by the ossuary inscribed by “son of Joseph” or inferred by probability by (1 / Pjoseph) “Jesus” inscribed ossuaries being found.
JoJ - A Jesus son of Joseph
TT – Talpiot Tomb Data
TLTJ - The Lost Tomb Of Jesus Theory
Definition of conditional probability P(A|B) - Probability of A given B occurred.

4. PROBABILITY CALCULATION METHODOLOGY

The correct probability calculation involves two steps. First the probability for the Jesus son of Joseph ossuary is calculated. I call this the initial probability and describe it in Section 4.3. The second step is to adjust the initial probability based on the condition of the Jesus son of Joseph ossuary being associated with the other evidence in the Talpiot Tomb. I call this the adjusted probability and describe it in Section 4.5.

A permutation is an outcome with specific order such as HH, TH, HT & TT. A combination is an outcome where order is not counted so HT and TH would be the same combination.

4.1 Formulas for Probability Calculations

Probabilities are calculated by dividing the probability for the actual outcome by the probability for all the possible outcomes. The sample space is the set of all possible outcomes. For example with flipping a coin two times, the set of all possible out comes or sample space is HH, TH, HT & TT. If the probability for each outcome is the same, the sample space is called equiprobable. The sum of the probabilities for all the outcomes in the sample space is called the total probability. For an equiprobable sample space the probability for each outcome is simply calculated by one divided by the number of possible outcomes in the sample space. Unless stated otherwise, in this article all hypothetical sample spaces are assumed to be equiprobable.

The probability for something (X) occurring one time or more given a chance of occurring on one try is P1. Given N tries the probability of X occurring at least once is one minus the probability for X not occurring on N tries which is P = 1 – (1 – P1)^N. When dealing with small amount of opportunities the multipliers are reduced sequentially to account for the decreasing number of options for the sample space as done in Section 4.5.1.7 for exact Af.

4.2 Number of Matching Outcomes

It is important to differentiate between the probability for a certain level of matching and the probability for a specific match. Ref. 4 discusses this extensively so Ref. 4 should be read for a full explanation of this topic. For example as explained in Ref. 4 the probability for rolling exactly 3 sixes on 6 tries is 0.054 while the probability for rolling 3 or more sixes on six tries is 0.062. Ref. 4 also list formulas for cases where there are multiple occurrences of items. These formulas are more complicated because they involve summations which can be quite large requiring a computer program to calculate. The key point is that one needs to determine the number of outcomes that qualify as matching based on the level of matching claimed to have been found. The following excerpts from the beginning of Section 2.2 of Ref. 4 introduces how to do this. The reader should read the rest of section 2.2 of Ref. 4 for a fuller explanation.

Within the range of what is allowed by deterministic principles for certain conditions, there is typically many different possible outcomes. Each of the different outcomes has a certain probability of occurring. Substantiation for whatever based on violation of indeterministic principles involves showing that an actual outcome has a significantly low probability for occurring. This implies that there must be some special characteristic about the actual outcome that sets it apart as a successful match from the other outcomes that are not a successful match. This implies that there is some criterion that identifies characteristics that make certain outcomes a successful match while other outcomes are not. This criterion is referred to as the success criterion. The probability calculation is done by an objective analysis of this success criterion which specifies whether an outcome is successful or not.

The more narrow the range the success criterion allows the characteristics to be, the more restrictive the success criterion. The more fundamental the success criterion requires the characteristics to be, the more restrictive the success criterion. The more straight forward the interpretation process involved with the success criterion, the more restrictive the success criterion. The probability for satisfying the success criterion should be proportionally increased as the number of opportunities for outcomes that satisfy the success criterion are increased by it being more lenient.

This is an important point because the Jacabovici team pushing TLTJ claims that there are 30,000 ossuaries with 20% inscribed [13] from which to find a match. Also, they are searching completely through not just the canonical Gospels, but the many other extra canonical stories association with Jesus such as the Acts of Phillip dated to the fourth century to find a match. They do not limit themselves to just the immediate family of Jesus, but will use persons just associated with the Gospel Jesus with no penalty in their probability calculation for the freedom used in finding such a match. Therefore, it is obvious that number of outcomes that would match the level of matching found by TLTJ must be determined to do a proper probability analysis of TLTJ otherwise the great freedom for finding a successful match will not be appropriately considered. When the number of outcomes for finding a match based on the level of match claimed to have been found are not conservatively and objectively evaluated the strength argument is artificially exaggerated. This false reasoning is well known and called the prosecutors fallacy. Read about prosecutors fallacy in wikipedia.

Consider a women is murdered in a large city and the police find the murderer's blood mixed with hers. The chance of somebody's DNA matching is 1 / 1000000. In this large city 1000000 people's DNA has been sequences, so the police look in the data base and find one person whose DNA matches. They take this person to court and in court claim his DNS match is a 1 / 1000000 chance so he must be the murderer. However, this is invalid because the nonextant probability of finding a match is actually 1 – (1 – 1 / 1000000) ^ 1000000 = 0.632. So finding a match considering 1000000 opportunities for matching is expected because the chance is 63.2%. However, if the police knew that on the day of her murder, only ten men visited her and that one of these had a DNA match, then the nonextant probability would be 1 – (1 – 1 / 1000000) ^ 10 = 0.00001. In the case the police would have strong evidence for claiming guilt because a match considering just 10 opportunities for matching is not expected by random because the chance is 0.001%. So it makes a big difference on how the opportunities for matching are calculated.

4.3 Initial Probability Description

This section discusses what I call the initial probability, but the more technical terminology is the naïve probability or prior probability. This probability is just a basic probability not modified by conditions. It is called the initial probability because it is the first probability calculation. Subsequently it may be adjusted to produce the final probability. There are two different types of basic probabilities which I call the extant and nonextant probability. They are based on the two different types of finite probability sample spaces. Extant probability as explained in Section 4.3.1 is based on a sample space that consists of outcomes that existed. Nonextant probability as explained in Section 4.3.2 is based on a sample space that consist of outcomes that did not necessarily existed, but could have occurred.

4.3.1 Extant Probability

The extant probability is based on a sample space that consists of a set of outcomes that occurred or are expected to have occurred. The extant probability is calculated by dividing the number of actual outcomes that qualify as matching by the number of all the outcomes that could have occurred or are expected to have occurred. It is the probability that a certain item is a specific unique item out of possible set of items which does contain that specific unique item. In the following discussion are examples of extant probabilities.

Consider the case where there are 10 balls in a bucket labeled 1 through 10. So these 10 possible outcomes all exist. Suppose you randomly select a ball out of the bucket, the extant probability that it is ball #5 is 10%. In this example there is 100% certainty that ball #5 and the other 9 balls do exist in the bucket so the probability is the extant type.

Consider the case where you see two identical ossuaries both inscribed with Jesus son of Joseph and you know for sure one of them contains the Gospel Jesus. In this case the extant probability that one of them contains the Gospel Jesus is 50%.

The extant probability is the probability of one specific outcome divided by the sum of the probability of all the possible outcomes which do exist or occurred. So the extant probability is a percentage that the probability for one outcome is of a total probability. If the total probability is a measure of all the outcomes that exist or occurred, then the extant probability is a direct measure the % chance of a identifying a specific outcome. Thus, only with extant probability is it appropriate to state the odds such as 2:1 for something being true or 1:2 against something being true.

4.3.2 Nonextant Probability

The nonextant probability is based on a sample space that consists of a set of outcomes that could occur, but did not necessarily occur. The nonextant probability is calculated by dividing the number of potential outcomes that qualify as matching by the number of outcomes that could have occurred. Since the nonextant probability is not based on a sample space of outcomes that existed or occurred, there is no direction relation of the nonextant probability to the chance of something being true. In the following discussion are examples of nonextant probabilities.

Assume no special natural phenomenon occurring. Consider you are investigated a coin and flipped it many times and found it to land 50% of the times head and 50% tales. Then your friend came along and said by his supernatural powers he could make it land heads every time. So you flip it once and it lands head. The chance for this is a nonextant probability of 0.500. So is 0.500 nonextant probability enough evidence to be convinced that your friend is supernaturally causing the coin to land heads? Obviously not because a nonextant probability of 0.500 for an event means the event is just about what is expected to occur in a perfectly random world. What if you flipped it again and it lands head a second time in a row? The chance for this set of events is a nonextant probability of 0.250. Three times would be 0.125 etc .... The chance is one divided by the number of the possible permutations which keep growing as you do more coin flips. We often observe many events with probabilities quite low and do not assume the match was not just a random occurrence.

The following is an example of the value of a nonextant probability that the whole world can appreciate. Plate tectonics or the movement of the continental plates was inferred by probability before there was any known evidence that the continental plates were moving. I have read this was accomplished by calculating a nonextant probability of ~0.000001 (not a extant probability) for the match between the shapes of the continents in how they would have fit together as Pangea, the original super continent. This is a one time event that has no freedom for biased selection of opportunities for matches, but there would be some subjectivity in interpreting how well the contour of the edges matched. In fact this was the initial clue that got the scientist looking for more evidence for continental plate movement and they sure found plenty of corroborating evidence.

So the nonextant probability is just the probability of a match occurring by random. The value for the nonextant probability is not directly related to something being true. However, the smaller the nonextant probability for a certain hypothesis, the greater the chance for that hypothesis being false. Also, nonextant probability argument strengths can be compared directly be comparing the nonextant probability values.

4.3.3 Comparison of Extant and Nonextant Probability

For both the extant and nonextant probability, the evidence is evaluated based on how well the evidence matches with the item the theory is trying to identify. For the extant probability, the probability calculation is based on a sample space of outcomes that existed or occurred or are expected to have existed or occurred. For the nonextant probability the probability calculation is based on a sample space of outcomes that could have occurred, but did not necessarily occur. This difference makes the meaning of the value for the extant probability quite different from the meaning of the value for the nonextant probability. As explained in Section 4.3.1, the value for the extant probability can be directly related to the chance of a hypothesis being true. As long as the extant probability is less than 0.50 there is no justification for claiming the hypothesis is true. The more the extant probability is over 0.50 and closer to 1.00 the more justification for claiming the hypothesis is true or the greater the argument strength. As explained in Section 4.3.2, the value for the nonextant probability is not directly related to the chance of a hypothesis being true. However, the smaller the nonextant probability for a certain hypothesis, the greater the chance for that hypothesis being false. Thus, the higher the extant probability value, the stronger the argument that something is true and the lower the nonextant probability the stronger the argument that something is false.

The extant and nonextant probability types are the two basic type of probabilities so they cover the two basic ways of probabilistic analysis. Both are important and are suited for addressing different issues. If you are trying to identify something that you know exists, then the extant probability is appropriate because you can calculate the chance of the thing you found is that unique thing of interest. For a sample space of things that exist, one can also calculate a nonextant probability; however, it would not be as useful as the extant probability because the value of the nonextant probability cannot be directly related to the chance that you have actually identified the unique item of interest. If you are trying to check if something exist, then the nonextant probability is more appropriate because it does not assume the thing exists. It is a calculation for the chance of the thing found matching the item of interest. If there is a low nonextant probability of the thing not existing, then an inference can be made that the thing must exists. An extant probability cannot be calculated for the chance of finding something existing whose probability for existence is unknown, because the total probability for the sample space would not be related to probability for something existing. However, it would be conservative to assume the item of interest does exist and calculate a probability assuming it is part of a sample space of other similar items that are known to exist. Thus, one could calculate a conservative estimate for the extant probability for identifying the item of interest. One could assume the probability for existence which is the Fgj factor mentioned in Section 5.1.1; however, the Fgj value could be arbitrary. The true strength can be no greater than that determined by a correct conservative extant probability calculation.

4.4 Inductive Reasoning using Proof by Elimination

Inductive reasoning uses probabilities and logic so the arguments typically never have 100% certainty. Deductive reasoning just uses logic so the arguments typically have 100% certainty. However, for any argument about something in reality being true, there is usually always some uncertainty. Since the nonextant probability is not directly related to something being true, the question is how can it be used to determining if something is true. Well the key theory used in science for determining if something is true is proof by elimination (PE). This logical concept is explained fully in Ref. 4 and 20. If there is a theory that describes a certain reality and all possible hypothesis for explaining that certain reality are false except for one hypothesis, then PE implies that this one non-false hypothesis is true. For example, if there were 10 different possible hypothesis for explaining a certain event and it was shown that 9 out of the 10 were implausible, implying they were false, then there would be a logical case that the one remaining plausible hypothesis is true.

Science typically does not prove anything true directly. It only shows things false directly by showing an explanation has a low probability so it is implausible. The way to show something true through science is to show all other possible explanations false implying the one remaining explanation must be true. The is called proof be elimination. In dealing with nonextant probabilities there is no definite way to define the % chance of something being true. It is just the chance of something occurring by random. The smaller the chance for something happening, the more likely a theory that it happened by chance is false.

As explained in Ref. 4, in my experience scientist are not even interested in dismissing that a match occurred by random unless the nonextant probability is less than 0.01. A significant match would be less than 0.0001 and a compelling match would be 0.000001. If you want to see an objective way of determining this nonextant probability threshold read my explanation in Ref. 4 Section 2.2.5. It basically depends upon the amount of potential for theories inferred true to contradict that you are willing to accept.

For example, in the coin flipping example in section 4.3.2 of just two heads in a row, obviously the 25% chance of this occurring by random does not mean that the chance of supernatural involvement is 75% or that there is a 75% chance of somehow a double headed coin was snuck in. If you considered 25% chance as the threshold, then if you reran the hypothetical example of two flip coins many times, you would conclude 25% of the time the supernatural intervened and 75% of the time it did not. This shows if you want an approach the does not make false conclusions or contradictions, then you would use very low probability thresholds for determining something false in order to get the point of determining something true by the process of elimination.

If you show an explanation has a logical contradiction, then consider it as having a zero probability for being true and 100% probability for being false. Contradiction cannot be true. Scientist do not like approaches that are likely to produce contradictions because they know that two things that contradict cannot both be true. So they use low probabilities threshold for determining something false, so that way they will not mistakenly infer something is true that is false. This applies to nonextant probabilities, the threshold is different for extant probabilities.

If you are 100% sure that your objective analysis has considered all possible explanations and you have correctly shown that all possible explanation except one has a low nonextant probability, then the nonextant probability is a measure of how much you have reduced the risk of being wrong that the one remaining explanation is the true explanation.

In Matthew 12:25-29 the Gospel Jesus uses the idea of proof be elimination to respond to the Pharisees who claimed that Jesus cast out demons by using Satan's power. Jesus explains that a partner of Satan would not cast out Satan's demons; thus, Jesus power must not be from Satan.

4.5 Bayes Formula Adjusted Probability

This section discusses what I call the adjusted probability, but the more technical term is the posterior probability. The appropriate way to do this is by Bayes equation. It uses the initial probability and adjusted it depending upon the probability for the evidence in relation to supporting the hypothesis. Bayes equation is the well know basic formula for dealing with condition probability. It is most always mentioned in the first few chapters of Probability text books [14,16] and books on logic [15]. Wikipedia has a very good explanation of Bayes equation, so this article will not provide much explanation of Bayes equation, rather the reader should do a keyword search on "Bayesian inferences" & "Bayes theorem" on Wikipedia and read the article. Also, the reader should do a keyword search on "Prosecutors Fallacy" and read the article. Also, the reader should read Ref. 19 which provides a good explanation of how to use Bayes formula to evaluate TLTJ. Just a brief explanation of Bayes formula is listed below. "H" stands for the hypothesis and "E" stands for the evidence.

General Form for where the set of hypotheses (H1, H2, … HN) is the set of all possible explanations for the evidence, labeled "E".

$$P(H1 \mid E) = P(E \mid H1)\,P(H1) / [\,P(E \mid H1)\,P(H1) + P(E \mid H2)\,P(H2) + \ldots + P(E \mid HN)\,P(HN)\,] \qquad \text{(Equation \#1)}$$

For comparing H1 to not ~H1 Bayes formula is written as the following.

$$P(H1 \mid E) = P(E \mid H1)\,P(H1) / [\,P(E \mid H1)\,P(H1) + P(E \mid \sim H1)\,P(\sim H1)\,] \qquad \text{(Equation \#2)}$$

Where P(E | ~H1) P(~H1) = P(E | H2) P(H2) + … + P(E | HN) P(HN) & P(~H1) = 1 – P(H1)

Equation #2 is a very useful form of Bayes equation. It weighs the evidence for and against a specific hypothesis (H1) all in one equation to come up with a single probability value for the strength of the evidence for or against a specific hypothesis. Most arguments are not of the type where all the significant evidence can be evaluated by one equation to produce a single number to measure the strength of the argument; however, with the TLTJ hypothesis this can be done as explain in the following discussions in this article. First hypothetical scenarios are given in Section 4.5.1 to prove Bayes equation correctly evaluates problems of this type and then in Section 5 the probability for the TLTJ theory is calculated.

Equation #2 is fair, unbiased and objective formula for evaluating the probability for a specific hypothesis which in this case is labeled "H1". Within one formula the evidence for H1 and for the alternatives to H1 labeled ~H1 are considered. This is done by appropriate weighting the initial probability for H1 and ~H1 based on their conditional probabilities P(E | H1) and P(E | ~H1) based on the evidence "E". It forces one to deal with the evidence for and against the hypothesis H1 and the other possible explanations provided by other hypothesis labeled ~H1. This thwarts and exposes the spin doctors who prefer to biasly select out just the evidence or interpretation that supports their preferred conclusion.

4.5.1 Hypothetical Scenarios (HS)

Many different hypothetical scenarios are evaluated in this section. The probability calculations are done two different ways, by the direct method and by using Bayes formula. The direct calculation involves determining explicitly every outcome in the sample space (Nos) and the outcomes that have certain level of matching (Nom). This way the probability for matching can be calculated directly by the formula, Nom/Nos. The direct calculation for the complete sample space allows one to see what the conditional probability is calculating. It provides a check for the method used to calculate the conditional probabilities used in the Bayes formula. If the probability calculated the direct way is equal to the probability calculated the Bayes way, then there is corroboration that the formulas used for both calculations are correct. If these formulas are correct, then any method that is inconsistent with this method would be incorrect.

The hypothetical scenarios are based on a population of 168 sons. There are 8 equally probable names; A, B, C, D, E, F, G and H. There are 56 families with 3 boys each. Assume a perfectly random even distribution amongst the brother names and combinations so each name percentage is 1/8. The complete sample space of combinations for the boys of these families based on these conditions is.

ABC, ABD, ABE, ABF, ABG, ABH, ACD, ACE, ACF, ACG, ACH, ADE, ADF, ADG, ADH, AEF, AEG, AEH, AFG, AFH, AGH, BCD, BCE, BCF, BCG, BCH, BDE, BDF, BDG, BDH, BEF, BEG, BEH, BFG, BFH, BGH, CDE, CDF, CDG, CDH, CEF, CEG, CEH, CFG, CFH, CGH, DEF, DEG, DEH, DFG, DFH, DGH, EFG, EFH, EGH, FGH

The key family to identify is the ABC family. A'U is the label for the A in the ABC family. Notice that there are 10 other families other than the ABC family that have an A and a brother named B or C. Also, notice that there are 20 other families that have an A. In these scenarios you will come across family tombs in which you will find names of the bothers in the family. Assume that each tomb contains only the brothers for a specific family. So the matching of the tomb names with the family is based on just the brother names so the conditional probability is labeled P(Brother|A'U).

Jacabovici [13] presents his arguments for TLTJ in a way of making one falsely feel they are discovering the truth that the Talpiot Tomb is the Gospel Jesus tomb. I believe these hypothetical scenarios present facts that let someone correctly discover the correct way to calculate a probability for a cluster of names found in a tomb. Through this one discoveries that Jacabovici probability calculation is invalid and that a correct probability calculation does not imply the Gospel Jesus was buried in the Talpiot Tomb.

4.5.1.1 Bayes Formula Adjusted Probability

This section lists the Bayes formula used in the hypothetical scenarios. The extant probability (Equation #3) is for the chance that the family tomb is the A'U Family tomb. The Bayes formula for such an event is shown below. The stronger the evidence supports the tomb is the ABC family tomb the more this extant Bayes equation increases P(A'U | Brother) which means the higher the probability for the level of matching of the names in the tomb with the names of the A'U Family. The higher this probability, the stronger the inference that it is the A'U Family Tomb. ~A'U is the case where one of the other A's was placed in the tomb. An extant probability value adjusted by a Bayes formula is still an extant probability value. P(A'U | Brother) is the probability of the A being A'U given the brother (B or C) found in the tomb with the A. P(Brother | ~A'U) is the probability of brother (B or C) being found in the tomb given the A is not A'U.

P(A'U | Brother) = P(Brother | A'U) P(A'U) / [P(Brother | A'U) P(A'U) + P(Brother | ~A'U) P(~A'U)] (Equation #3)

The nonextant probability (Equation #4) is for the chance by random for the level of matching of the names in the tomb with the names of the ABC family. This event occurring by random means that family tomb is not the ABC Family tomb. Notice that we are calculating the probability for finding an A so the probability is for Af not A'U. The stronger the evidence supports TLTJ the more this nonextant Bayes equation reduces Pn(Af | Brother) which means the lower the probability for the level of matching by random of the names in the tomb with the names of the ABC Family tomb. The lower this probability, the stronger the inference that it did not happed by chance implying that it is the ABC Family tomb. A nonextant probability value adjusted by a Bayes formula is still a nonextant probability value.

Pn(Af | Brother) = P(Brother | A'U) P(Af) / [P(Brother | A'U) Pn(Af) + P(Brother | ~A'U) Pn(~Af)] (Equation #4)

4.5.1.2 HS EP See 3 but Remembering 2 Complete Single Fill of Combinations

Consider you come across a family tomb with three names in it. You see all three names. One is an A one is a brother (B or C), and the other is not a brother (D, E, F, G or H). You artificially decide to forget the fact that one is not a brother and calculate the probability with no consideration of this negative evidence. Calculate the extant probability for the hypothesis that this is A'U family tomb. The initial probability P(A'U) is 1 / 21 because A'U is 1 of 21 A's. Thus P(~A'U) = 1 – 1/21 = 20/21. The conditional evidence is that of the remaining two names at least one is a B or C. This evidence will be labeled "Brother". If it is A'U, then the probability of a brother is 1.00 = P(Brother | A'U). If it is not A'U, then getting a brother is not guaranteed, rather the probability of getting a brother by random is 10 / 20 because you can see from the list of brothers for A's not A'U in Section 4.5.1, 10 of the total 20 have at least one B or C. Thus, P(Brother | ~A'U) = 10 / 20. Bayes formula for the extant probability of having found A'U in this condition is listed below.

P(A'U | Brother) = P(Brother | A'U) P(A'U) / [P(Brother | A'U) P(A'U) + P(Brother | ~A'U) P(~A'U)]
= 1 * (1 / 21) / [1 * (1 / 21) + (10 / 20) (20 / 21)] = 1 / 11 = 0.0909

Directly calculating the extant probability is done by dividing the number of families of A'U which is one by the total number of families with an A and at least one brother (B or C) which is 11. This directly calculated value is the same as the Bayes adjusted value which shows the use of Bayes formula is correct.

4.5.1.3 HS EP See A & brother Single Population Complete Fill of Combinations

Consider you come across a family tomb with two names in it. One is an A and the other name is a brother (B or C). Calculate the extant probability for the hypothesis that you picked A'U. The initial probability P(A'U) = 1/21 and P(Brother | A'U) = 1.00 as mentioned in the previous example. The conditional evidence is that the one other name is a brother. If it is not A'U, then the probability of a brother is 10 / 40 because of the brother population in the families with an A but not an A'U, there are 40 members, 10 of which are B or C. Or 10 of the 20 possible families have a B or C, but since only one is seen the chance is of it being seen is 1/2 * 10/20 = 1 / 4 = 10 / 40. Also, notice that of the 8 equally probable names, 2 are for a brother, 2 / 8 = 1 / 4. Thus, P(Brother | ~A'U) = 1 / 4. Bayes formula for the extant probability of having found A'U in this condition is listed below.

P(A'U | Brother) = P(Brother | A'U) P(A'U) / [P(Brother | A'U) P(A'U) + P(Brother | ~A'U) P(~A'U)]
= 1 * (1 / 21) / [1 * (1 / 21) + (1 / 4) (20 / 21)] = 1 / 6 = 0.1667

Directly calculating the extant probability is done by realizing if you found a "A" and a brother then for the remaining spot to be filled there are 6 choices left and 1 of them would be a brother so the probability is 1/6. Another way to calculate the probability directly is by realizing of the 10 families not ABC but have an A and a brother, there is just one way of finding a brother, but for the ABC family there is 2 ways. So of the 12 ways of finding this condition, 2 of the ways finds the ABC family, so 2 / 12 = 1 / 6. This directly calculated value is the same as the Bayes adjusted value which shows the Bayes formula is correct. In this case odds are 1 : 6 against this tomb being the ABC family tomb.

I have seen two incorrect ways of calculating extant probabilities. The first way is to take the number of expected families and multiply it by the probabilities for the two names found. 56 families * 1/8 * 1/8 = 0.875 families. From this they would claim odds are 1.14 : 1 for this tomb being the ABC family tomb. This number is very different than the correct odds of 1 : 6 against this tomb being the ABC family tomb. Therefore, this first way is incorrect. The second incorrect way is to take the number of expected males and multiply it by the probabilities for the two names found. 168 males * 1/8 * 1/8 = 2.625 males. From this they would claim odds are 1 : 2.625 against this tomb being the ABC family tomb. This number is different than the correct odds of 1 : 6 against this tomb being the ABC family tomb. Therefore, this second way is also incorrect.

4.5.1.4 HS EP See ABC Single Population Complete Fill of Combinations

Assume for each of the 56 possible combinations of names there is one family that has that combination of brother names. Consider you come across a family tomb three names in it. One is an A and the other two are brother names (B and C). Calculate the extant probability for the hypothesis that you picked A'U. The initial probability P(A'U) = 1/21 and P(Brother | A'U) = 1.00 as mentioned in the previous example. The conditional evidence is that both of the other names are brothers. If it is not A'U, then the probability of two brothers is 0 because in all the other families A, B and C do not both appear. Thus, P(Brother | ~A'U) = 0. Bayes formula for the extant probability of having found A'U in this condition is listed below.

P(A'U | Brother) = P(Brother | A'U) P(A1) / [P(Brother | A'U) P(A'U) + P(Brother | ~A'U) P(~A'U)]
= 1 * (1 / 21) / [1 * (1 / 21) + (0) (20 / 21)] = 1.000

Bayes adjusted probability is correct that you have definitely found (100% sure) the ABC family.

4.5.1.5 HS EP See ABC Complete Double Fill of Combinations

In this hypothetical scenario there is a brother population of 168 * 2 = 336. So there are two families having each combination of three brother names. So there are two ABC families, the unique one ABC'U and the other one which we will call ABC'O. Consider you come across a family tomb with three names in it. One is an A and the other two are brother names (B and C). Calculate the extant probability for the hypothesis that you picked A'U. The initial probability P(A'U) = 1/42 and P(Brother | A'U) = 1.00. The conditional evidence is that both of the other names are brothers. If it is not A'U, then the probability of a brother is 1/41 because in all the other 41 families with an A, there is only one family, ABC'O where , B and C do both appear. Thus, P(Brother | ~A'U) = 1/41. Bayes formula for the extant probability of having found A'U in this condition is listed below.

P(A'U | Brother) = P(Brother | A'U) P(A1) / [P(Brother | A'U) P(A'U) + P(Brother | ~A'U) P(~A'U)]
= 1 * (1 / 42) / [1 * (1 / 42) + (1/41) (41 / 42)] = 0.500

There are two ABC families so there is a 50% chance that the one you found is the ABC'U family. Thus, Bayes adjusted probability is correct.

4.5.1.6 HS EP See A & Brother Double Population Complete Fill of Combinations

This hypothetical scenario has the same double population described in the previous scenario. Consider you come across a family tomb with two names in it. One is an A and the other name is a brother (B or C). Calculate the extant probability for the hypothesis that you picked A'U. The initial probability P(A'U) = 1/42 and P(Brother | A'U) = 1.00 as mentioned in the previous example. The conditional evidence is that the one other name is a brother. If it is not A'U, then the probability of a brother is 22 / 82 because of the population in the families with an A, but not an A'U, there are 82 members, 22 of which are B or C. Thus, P(Brother | ~A'U) = 11 / 41. Comparing to P(Brother | ~A'U) in Section 4.5.1.3 makes evident that the conditional probability is not a constant but varies slightly depending upon the population size.

The general formula for P(Brother | ~A'U) = (10 + 12 (N - 1)) / (40 + 42 (N – 1)) = (12 N - 2) / (42 N – 2)

Where N is the population divided by 168. As N increase P(Brother | ~A'U) converges to 2 / 7.

As the population increases, P(Brother | ~A'U) asymptotes to 2 / 7, because A is not a choice so of the remaining 7 choices 2 are brothers. Bayes formula for the extant probability of having found A'U in this condition is listed below.

P(A'U | Brother) = P(Brother | A'U) P(A'U) / [P(Brother | A'U) P(A'U) + P(Brother | ~A'U) P(~A'U)]
= 1 * (1 / 42) / [1 * (1 / 42) + (11 / 41) (41 / 42)] = 1 / 12

Directly calculating the extant probability is done by realizing if you found a "A" and a brother then for the remaining spot to be filled there are 6 choices left and 1 of them would be a brother so the probability is 1/6. However, since there are two ABC families divide this by two and you get 1 / 12. Another way to calculate the probability directly is by realizing of the 21 families not ABC'U but have an A and a brother, there 1 * 20 + 2 * 1 = 22 ways of finding a brother, and for the ABC'U family there is 2 ways So of the 24 ways of finding this condition 2 of the ways finds the ABC family, so 2 / 24 = 1 / 12. This directly calculated value is the same as the Bayes adjusted value which shows the Bayes formula is correct. In this case odds are 1 : 12 against this tomb being the ABC'U family tomb.

4.5.1.7 HS NP See 2 inside 1 Tomb Complete Single Fill of Combinations

Consider only one family of this complete population was buried in a tomb. In this tomb there are two names, one is an "A" and the other name is a brother (B or C). Calculate the nonextant probability for the chance of this level of matching with the ABC family occurring by random with no deterministic effect causing you to find the ABC family tomb. The initial probability is the chance of seeing an A amongst 2 names. There are 21 A's amongst a total population of 168. Since there are 2 found names of a population of 168, there is a 2/168 = 1/84 chance for each individual being found. The nonextant probability, for one A being found based on 21 having a 1/84 chance is calculated below.

Approximate: Pn(Af) = 1 - (1 – 1/84)^21 = 0.2224 , So Pn(~Af) = 0.7776
Exact: Pn(Af) = 1 - (1 – 2/168)(1-2/167)(1-2/166) … (1-2/148) = 0.2350 , So Pn(~Af) = 0.7650

Bayes formula for the nonextant probability of having found a "A" in tomb with a brother is listed below.

Pn(Af | Brother) = P(Brother | A'U) Pn(Af) / [P(Brother | A'U) Pn(Af) + P(Brother | ~A'U) Pn(~Af)]
= (2 / 8) * (0.2350) / [(2 / 8) (0.2350) + 1 * (0.7650)] = 0.07132

Notice that we are calculating the probability for finding an A so the probability is for Af not A'U. There is no way to calculate the nonextant probability for A'U because all A's look like A'U. However, if we find that there is very low probability of finding this level of matching by random with the A'U family, then one could claim that there must have been some deterministic cause for finding an "A". If there was something special about A'U making A'U much more likely to be found, then one could claim the improbable finding of an A in this tomb condition must be due to it being A'U.

The direct way to determine the nonextant probability for this case is to do the permutations for the different orders of finding the different members of each family. There are six different orders or permutations for finding 3 items; 123, 132, 213, 231, 312 & 321. So each of the combinations could be found in one of these orders. For example the ABC family could be found with these 6 different orders A1B2C3, A1B3C2, A2B1C3, A2B3C1, A3B1C2 & A3B2C1. So any case where A is not found third would fit this hypothetical scenario, which is permutations A1B2C3, A1B3C2, A2B1C3 & A2B3C1. For the other 10 combinations where the family has an A and one brother (B or C) just the 123 and 213 orders would fit this hypothetical scenario. So there would be 4 + 2 * 10 = 24 different permutations that would fit this hypothetical scenario out of 56*6 = 336 possible permutations. The nonextant probability directly calculated is listed below.

1 - (1 – 24 / (56*6)) = 0.07143

The 0.07143 is very close to 0.07132 which shows these methods are correct. The Feuerverger way of calculating the probability for this scenario is shown below. It's value is much lower which shows it is wrong; therefore, any inductive argument based on it is invalid.

(# of tombs) * (% for "A" name) * (% for single "brother" name) = 1 * (1 / 8) * (1 / 8) = 0.0156

4.5.1.8 Hypothetical Scenario Complete "8" Family

This hypothetical scenario is not based on the distribution of families with three brothers, rather consider a family with 8 brothers. So the family uses all 8 names (A, B, C, D, E, F, G & H) to name the brothers. In this scenario every possible male name would qualify as a brother so the sum of the name percentages for the males in the family is 100%; therefore, P(Brother | ~A'U) = 1.00. Since P(Brother | A'U) is also equal to 1.00, Bayes equation would always reduce to P(A'U) as shown by the following.

$$P(A'U \mid Brother) = P(Brother \mid A'U)\, P(A'U) \;/\; [\; P(Brother \mid A'U)\, P(A'U) + P(Brother \mid \sim A'U)\, P(\sim A'U) \;]$$
$$= 1.00 * P(A'U) \;/\; [\; 1.00 * P(A'U) + 1.00 * (1 - P(A'U)) \;] = P(A'U)$$

This is appropriate because ever male name in every tomb would qualify as a brother name, so any of the other male names found in he tomb would not help in identifying if an A was A'U. Thus, Bayes formula provides no adjustment to the initial probability, P(A'U). So again Bayes formula is correct while the discussion below shows again the other approaches such as Feuerverger leads to false contradictory conclusions.

Suppose Feuerverger found an A with 3 brother names in a tomb. Using his approach he would multiply the probability for the three names together which would produce a very small probability as shown by the following. But every tomb with three names would get the small probability because all male names would qualify as a brother. Thus, he could potentially be concluding that many or most all tombs must be the A'U family tomb which is contradictory. Thus, again it is evident that the Feuerverger approach for calculating probabilities is an invalid approach that leads to false conclusions.

$$1\ Tomb * (1/8) * (1/8) * (1/8) * P(A'U) = 0.00195 * P(A'U)$$

4.5.1.9 Lesson learned from Hypothetical Scenarios (HS)

Each of the hypothetical scenarios have shown that the Bayes formula correctly calculates the probability value based upon a comparison to the direct method calculated value. Thus, it has been proven that Bayes equation correctly evaluates problems of this type. The calculations make evident the importance in determining the number of outcomes that qualify as having the level of matching that is found. In other words, an assessment has to made to determine what are the chances of such a level of matching occurring. The conditional probability P(Brother | ~A'U) is the key value for correctly determining this effect in Bayes equation. P(Brother | ~A'U) is the term where the number of outcomes that qualify as matching is assessed. The "Complete 8 Family" extreme case in the Section 4.5.1.8 clearly makes this evident. In this case A'U brother's names are every possible name in the pool so the opportunity for a successful match is 100%. Thus, P(Brother | ~A'U) = 1.00 which results in Bayes equation making no adjustment to the initial probability. Using the Feuerverger the probability is calculated the same regardless of how great the chance is for finding a match which again shows it is false. Feuerverger nonextant probability calculation method is specifically shown false in Section 4.5.1.7. Other extant probability calculation methods are specifically shown false in Section 4.5.1.3.

The Jacabovici team pushing TLTJ claims that there are 30,000 ossuaries with 20% inscribed [13] from which to find a match. Also, they are searching completely through not just the canonical Gospels, but the many other extra canonical stories associated with Jesus such as the Acts of Phillip dated to the fourth century to find a match. They do not limit themselves to just the immediate family of Jesus, but will use persons just associated with the Gospel Jesus with no penalty in their probability calculation for the freedom used in finding such a match. Therefore, it is obvious that number of outcomes that would match the level of matching found claimed by TLTJ must be determined by a proper probability analysis of TLTJ otherwise the great freedom for finding a successful match will not be appropriately considered. This section has shown that Bayes formula correctly account for these issues. Therefore, when Bayes formula is not used, such as in the Feuerverger approach, the strength of the argument can be artificially exaggerated. This invalid reasoning is well known and called the prosecutors fallacy.

5. PROBABILITY FORMULAS FOR TLTJ

The probability calculation should not be for the specific match, but the level of matching of the Talpiot Tomb names with the Gospel Jesus family occurring by random.

5.1 Initial Probability for Jesus son of Joseph Ossuary

In this section the extant and nonextant initial probability for a Jesus son of Joseph Ossuary is explained. The extant probability evaluates the opportunities for successful matches by considering the number of Jesus Son of Josephs that are likely to have really existed. The nonextant probability evaluates the opportunities for successful matches by considering the number of inscribed male ossuaries that have been found. These two probabilities are complimentary and comprehensively cover the two basic sources of opportunities for making a match with the Gospel Jesus Family. Both are important and are suited for addressing the two basic types of sources for matching with the Gospel Jesus Family.

5.1.1 Extant Initial Probability

As mentioned in Section 4.3.3, the extant probability cannot be calculated for the chance of finding something existing whose probability for existence is unknown. However, it is conservative to assume the item of interest does exist and calculate a probability assuming it is part of a sample space of other similar items that are known to exist. In this case the extant initial probability is listed below.

P(GJ) = Fgj / Njjc   where Njjc = (1-Rtp) Rm G Ap Rjoj , G = (70CE + 30BCE) / Ad

Rtp is the percent of found ossuaries which were definitely not used for burial around the time period off 30-33AD. Rtp is included because a percentage of the population would be excluded as ossuaries are generally excluded due to them being identified not belonging to the time period when the Gospel Jesus was buried. For example, if 50% of the ossuaries were not used for burial during the 30-33CE time period, then 50% of the population would be excluded as part of the pool from which to draw a Jesus son of Joseph for the Talpiot Tomb. The extant probability is the percentage that one Jesus son of Joseph is of the expected number of Jesus son of Joseph. The extant probability follows the obvious intuition that the more other Jesus son of Joseph there are, the more likely that the Talpiot Tomb Jesus son of Joseph is some other Jesus than the Gospel Jesus.

Fgj is the probability that the Gospel Jesus would be buried in Talpiot Tomb relative to the average man buried in Jerusalem. If the Gospel Jesus indeed resurrected and ascended to heaven then this value would be 0.00. If the Gospel Jesus was permanently buried, but the Talpiot Tomb was so far away reducing the probability of the Gospel Jesus being buried in the Talpiot Tomb, then this value would be reduced from 1.00. For this study to be conservative Fgj is set to it's maximum value of 1.00.

5.1.2 Nonextant Initial Probability

The nonextant probability is calculated for the level of matching of the names on the ossuaries with the Gospel Jesus Family names. The goal is to estimate the number of opportunities for there being a Jesus son of Joseph ossuary found based on the freedom for finding matches involved with claiming a match found in the Talpiot tomb. Kolener does mention there are sherds that date the Talpiot Tomb to the beginning of the first century, but I believe there is really is no evidence that specifies the complete duration when the Talpiot tomb was used. In other words, nothing about the Talpiot Tomb narrow it's usage time period from 30BC to 70AD to some more narrow range that still covers 30AD to 33AD. So there is no reason that the opportunities for finding a match with the Gospel Jesus should be reduced from the 30BC to 70AD range when ossuaries were used to bury the dead. So if one can use the Talpiot tomb for a match with the Gospel Jesus, then one can really use any Tomb which has no evidence that it was not in use during the time of the Gospel Jesus death (30AD to 33AD). This I suspect is most tombs with ossuaries. So the opportunity for matching is essentially any ossuary used 30BC to 70AD, the common time when the population of Jerusalem was being buried in ossuaries. Also, if an inscribed ossuary has definitely been identified as some specific known historical person (i.e. Pontius Pilot ossuary found), then it would be excluded as a candidate for the Gospel Jesus. This is accounted for by the Rh ratio in the following formula. The Rtp ratio is included for the same reason mentioned in Section 5.1.1.

The formula for the nonextant probability is listed below. The definitions of the terms are listed in Section 3. The nonextant initial probability is the probability for finding an inscribed ossuary with the name Jesus inscribed on it whose father is Joseph.

$Pn(JJi|Njjh) = 1 - (1 - Rtm)^{Njjh}$ for $Njjh > 30$, $Pn(JJi|Njjh) = Pn(JJi|Nifc) = 1 - (1 - Rjoj)^{Nifc} = Pn(\sim GJ)$
$Njoj = Rm\ G\ Ap\ Rjoj$, $Rtm = Nifc / Npmh$
$Njjh = (1-Rtp)(1-Rh)\ Njoj$, $Npmh = (1-Rtp)(1-Rh)\ Rm\ G\ Ap$

$Rom = Npom / Npmh = Ao\ Nom / Npmh = Ao\ Nofm / (Nphm\ Rofm)$ so $Nofm / Npmh = Rom\ Rofm / Ao$
$Rtm = Nifc / Npmh = = Ai\ Ri\ (1-Rtp)(1-Rh)\ Nofm / Npmh = Ai\ Ri\ (1-Rtp)(1-Rh)\ Rom\ Rofm / Ao$

The nonextant probability follows the obvious intuition that the more male names inscribed on found ossuaries, the more likely of finding a Jesus son of Joseph whose name is inscribed on a found ossuary. It does assume the sequence of finding ossuaries is irrelevant. In other words, the first one found is just as probable to be found as the last one found. This is appropriate because the finding of ossuaries is quite a random phenomenon. However, the percentage of people buried in inscribed ossuaries may not be. So Pn(~GJ) is a conservative estimate of any potentially real bias because all the inscribed ossuaries will never be found. As more ossuaries are found Pn(~GJ) increases.

For ossuaries with multiple names inscribed such as son X of father Y, father Y does not count. However, every X does count even on ossuaries with multiple names. However, it is a good idea to also just count ossuaries with just one male name (Y's do not count) on it, so the claim that the Gospel Jesus would be by himself in a ossuary could be addressed.

Thus, the key value to estimate is the number of found male name inscribed ossuaries (Nifc) which would not be objectively excluded as candidate for the Gospel Jesus. This means there is no definite evidence that the burial date was not around 30 to 33AD and the name inscribed on the ossuary has not been identified as some specific known historical person. Aside from the specific name, these ossuaries would qualify as candidates just like the Talpiot Tomb Jesus son of Joseph would. This number of opportunities is used in conjunction with the probability for a Jesus son of Joseph ossuary given one opportunity to estimate the probability of one Jesus son of Joseph occurring given the actual number of opportunities (Nifc) which occurred.

The nonextant probability addresses the issue that the Gospel Jesus ossuary is much more likely to be found. So if everybody was buried in an inscribed ossuaries and all of them were found, then there would be no value in the nonextant probability. However, the number of found inscribed ossuaries is a small percentage of the total population so this is a legitimate issue.

5.2 Bayes Formula Adjusted Probability

5.2.1 Extant Adjusted Probability

The extant probability is for the chance that the family tomb is the Gospel Jesus Family tomb. The Bayes formula for such an event is shown below. The stronger the evidence supports TLTJ the more this extant Bayes equation increases P(GJ | TT) which means the higher the level of matching of the names in the tomb with the names of the Gospel Jesus Family. TT refers to the Talpiot Tomb data. The higher this probability, the stronger the inference that it is the Gospel Jesus Family Tomb. ~GJ is the case where one of the many other Jesus son of Josephs was placed in the Talpiot Tomb ossuary. An extant probability value adjusted by a Bayes formula is still an extant probability value. P(GJ | TT) is the probability that the Jesus son of Joseph ossuary did contain the Gospel Jesus given the context of being found in the Talpiot Tomb. P(TT | ~GJ) is the conditional probability of Talpiot Tomb names occurring given the Jesus son of Joseph ossuary did not the Gospel Jesus. P(TT | GJ) is the conditional probability of Talpiot Tomb names given the Jesus son of Joseph ossuary contains the Gospel Jesus.

The extant probability on it's own cannot dismiss the claim that something about the way the Gospel Jesus was buried made it more likely to be found. For example, the followers of the religious leaders could put extra effort into building a prominent tomb making it more likely to be found and withstand erosion over time. The nonextant probability, Pn(~GJ), is included in P'(TT | ~GJ) the extant conditional probability to address the claim that something about the way the Gospel Jesus was buried may have made it more likely to be found. No additional term included in P(TT | GJ) means the probability of finding the Gospel Jesus tomb is set to 1.00. Thus, this formulation is set to maximize P(GJ | TT) so it is as conservative as possible. However, I actually think there are more reasons for the early Christian church to hide the Gospel Jesus tomb if he remained buried because they were trying to convince others that the Gospel Jesus resurrected and they were being persecuted. So one could argue that a term less than Pn(~GJ) should be included in P(TT | GJ) to account for this. There are no signs of special religious reverence in the Talpiot Tomb. In fact the Jesus son of Joseph ossuary is so poorly written it is almost illegible.

$$P(GJ \mid TT) = P(TT \mid GJ)\, P(GJ) \,/\, [\, P(TT \mid GJ)\, P(GJ) + P'(TT \mid \sim GJ)\, P(\sim GJ)\,]$$

where $P'(TT|\sim GJ) = Pn(\sim GJ)\, P(TT|\sim GJ)$

5.2.2 Nonextant Adjusted Probability

The nonextant probability is for the chance by random for the level of matching of the names in the tomb with the names of the Gospel Jesus Family. This event occurring by random means that family tomb is not the Gospel Jesus Family tomb (~GJ) so the event labeled is marked by a "~" as shown in the formula below. The stronger the evidence supports TLTJ the more this nonextant Bayes equation reduces Pn(~GJ | TT) which means the lower the probability for the level of matching by random of the names in the tomb with the names of the Gospel Jesus Family. The lower this probability, the stronger the inference that it did not happed by chance implying that it is the Gospel Jesus Family Tomb. A nonextant probability value adjusted by a Bayes formula is still a nonextant probability value. The nonextant conditional probability P(TT | ~GJ) does not include Pn(~GJ) because Pn(~GJ) is the initial nonextant probability.

$$Pn(\sim GJ \mid TT) = P(TT \mid \sim GJ)\, Pn(\sim GJ) \,/\, [\, P(TT \mid GJ)\, Pn(GJ) + P(TT \mid \sim GJ)\, Pn(\sim GJ)\,]$$

5.3 Conditional Probabilities for other Ossuaries

Ingermanson [19] already developed conditional probabilities for the Talpiot Tomb. This document's conditional probabilities are different because they considered more adjustments. Njjc is used rather than Njoj for reasons explained in Section 5.1.1.

The match with the mother Mary is used rather than a match with Mary Magdalene. Section 10 provides a strong and solid argument that the Mary Magdalene reading of the inscription is implausible. Thus, the P(TT | GJ) conditional probability would include a very low probability for using the Mary Magdalene interpretation. Also, Mary Magdalene and Matthew are not in the immediate family, but just associates. Having the freedom to match with associates opens up so many other opportunities for matching the many names associated with the Gospel Jesus in the Gospels. This would result in the P(TT | ~GJ) being very high (close to 1.00) because the sum of the percentages for all the names that are associated with the Gospel Jesus is a high number similar to the scenario explained in Section 4.5.1.8. Section 4.5.1.8 shows these conditions produced no significant adjustment to the initial probability. The combination of a low P(TT | GJ) and high P(TT | ~GJ) means a very strong argument against TLTJ. Thus, it is clear that the best argument for the TLTJ theory is to use the straight forward match with the mother Mary, not Mary Magdalene and leave out matching with Matthew.

In reality the name percentages are different than the hypothetical scenarios given in Section 4.5.1 where the percentages are all the same. There is a stronger correlation if a brother with a smaller names percent is found compared to a brother with a larger name percentage. However, it always makes a difference on how many brothers exists. The following formulas account for this. The brothers with a percent higher than the percent for the one found are reduced to the percent for the one found. The reduced portion is removed out of the sample space and of the remaining choices of brother names for the family of Jesus, Jesus is not a choice for a brother name so the new sum is divided by (1 - Rreduce - Rjesus). Hypothetical scenario in Section 4.5.1.6 shows that the Rjesus modification is correct for large populations.

If Rsimon > Rjoseph then R'simon = Rjoseph , Rreduce = Rsimon – R'simon
R'brother = (Rjoseph + R'simon + Rjudah + Rjames) / (1 - Rreduce - Rjesus)

Yose (Joseph) is the brother of Jesus match and it is the same as the father name. It is a common tradition to name a son after a father today and it was also in the first century. The Fjoseph Fuzzy Factor accounts for this increase in probability. If this Fuzzy Factor is 1.00, then 100% of the time the son would be named after the father. If this Fuzzy Factor is 0.00, then there is no increase in probability. R"brother is not diluted by Ntr as done in Ref. 19 because with the power set to "2" in the conditional probabilities for the brothers regardless of the Ntr value, means the conditional probabilities are always based on the Yose being the one of two male name matches. So it is consistent to not dilute R"brother based on the Ntr value.

R"brother = (1 – R'brother) * Fjoseph + R'brother

Ntr is the total number of male or female relatives in the Tomb besides the Jesus and his father Joseph. The father Joseph assumed to be one of the unnamed bodies in the tomb. Pmary is 1.00 if there is just one other female relative estimated in the tomb which would be the case for Ntr = 1. This is conservative because it assumes if there was one female she must be the mother which may not be true. As Ntr becomes large Pmary asymptotes to the number expected by random, Rmary. Pbrother is 1.00 if there is four other male relatives estimated in the tomb which would be the case for Ntr = 4. This is conservative because it assumes the four males must be the four brothers of Jesus which may not be true. As Ntr becomes large Pbrother asymptotes to the number expected by random R"brother. In other words, the larger the population within the tomb, the more it is expected to be proportioned as the population is outside the tomb. So the following two formulas are based on the fact that the greater the number of members in the tomb, the smaller the chance that a specific one would be a relative of the Jesus son of Joseph in the tomb.

Pmary = Rmary + (1 - Rmary) / Ntr , Ntr = (Ntb – 2) / 2
Pbrother = R"brother + 4 (1 – R"brother) / Ntr For Ntr >= 4

The Gospels never mention Jesus had a son, so finding a Judah son of Jesus in the Talpiot Tomb is negative evidence for TLTJ. This negative evidence is considered through the Fjudah factor. The probability of the Gospel Jesus having a son Judah is assigned a value of Fjudah which varies between 0 and 1.00.

The final individual probabilities are multiplied based on the number of opportunities for matches using the formula listed in Section 4.1. Mary is cubed rather than squared because of the strong argument explained in Section 10, that three rather than two female names were found in the Talpiot Tomb. Brother is squared because there were two males names, Joseph (Yose) and Matthew that could have been a brother. These probability factors are all independent; thus, can be multiplied together to calculate the following conditional probabilities.

P(TT|GJ) = Fjudah [1 – (1 – Pmary) ^ 3] [1 – (1- Pbrother) ^ 2]
P(TT|~GJ) = [1 – (1 – Rmary) ^ 3] [1 – (1 – R"brother) ^ 2]

The Gospel Jesus mother's name, Mary, is common. There are actually two Marys and one Martha in this tomb, but considering 35 people in the tomb and that 25% of the females were named Mary it is not an unexpected find. So who was the mother of the "Jesus son of Joseph" in the Talpiot Tomb? There is now way of knowing because the mother could be one of these two Marys, Martha or one of the other unnamed females buried in this tomb. It could be the mother for some unfortunate reason was not even buried in this tomb, but that is not likely. Considering that about 17 other females are likely to have been buried in this tomb it is unlikely (12% chance) that one of these two Marys happen to be the mother of this "Jesus son of Joseph".

The only other name in the tomb that is part of the immediate Jesus family is Yose which is a nickname for Joseph, the second most common male name. So was Yose part of the immediate family of the Jesus named in this tomb?

We do not know. Considering that about 17 other males are likely to have been buried in this tomb it is unlikely (~25% chance assuming 4 immediate families in this tomb) that this Joseph is a brother of this Jesus.

6. JERUSALEM POPULATION STATISTICS
To make the probability calculation the frequency of the names needs to be determined.

Below is the frequency list of personal names on inscribed ossuaries is as follows from a total amount of 286 [1,8]. Following is the % that I estimate of the male or female names found.

Salome (Shalom, Shlomzion) 26 , 11.0%
Simon (Shim'on) 26 . , 11.0%
Mary (Miriam, Maria) 20. , 49.2%
Joseph 19. , 8.0%
Judas (Yehudah) 18. , 7.6%
Lazarus (El'azar, Eli'ezer) 16. , 6.7%
Joezer (Yeho'azar) 13. , 5.5%
John (Yehonan) 12. , 5.1%
Martha 11. , 27.0%
Jesus (Yeshua') 10. , 4.2%
Saul 10. , 4.2%
Ananias (Hananiah) 10. , 4.2%
Matthew (Mattitiyahu, Mattai) 8. , 3.4%
Jonathan (Yehonatan) 6. , 2.5%
Jacob/James (Ya'aqov) 5. , 2.1%
Ezekias (Hezekiah) 4. , 1.5%
Total names 4x or more 214. , %
Other less common names:
3x: 'Amah, Hanan, Shalum, Shappira
2x: 'Azaviah, 'Ahai, Haniah, Hanin/Hanun, Yatira, 'Ezra, Qariah, Shamai, Seth

Pfann [8] writes, "All of the names that are ascribed in the Gospels to Jesus of Nazareth's father (Joseph), mother (Mary) and brothers (Jacob/"James", Joseph/Josehs, Simon, and Judas) are found in the list of the 16 sixteen most commonly inscribed names. In fact, four of these names, Simon, Mary, Joseph and Judas are among the top five in the frequency list of names (109 of 286 names: 38% of the entire list of names). The names Mary* (2x), Joseph/Joseh (2x), Judas and even Jesus, found in the Talpiot tomb should well be expected there (or in almost any other tomb in the area, for that matter). These are simply the most common names of the day. The only difference is that the Talpiot tomb has so many names preserved among its ossuaries! If other tombs contained so many inscribed ossuaries, the name census in most other tombs would be very much the same. This being the case, there very well could be numerous tombs which could have claim to the title "a Jesus' family tomb." However in all cases, as in the this (Talpiot Tomb), there would be no compelling reason to connect them with Jesus of Nazareth!"

Table 1 Name Frequencies

Name	[21]	[22]	[8]	Estimate
Mary	0.214	0.254	0.2854	0.250
Jesus	0.09	0.0411	0.0481	0.042
Simon	0.21	0.1024	0.1250	0.111
Joseph	0.14	0.0921	0.0914	0.091
Judah	0.10	0.0713	0.0866	0.080
James	0.02	0.0179	0.0240	0.021
Sum of Brothers	0.47	0.2837	0.3270	0.300

On pages 342-343 of Ref. 23, Lee Levine discusses the various population estimates that have been made, concluding that there were probably 60 to 70 thousand inhabitants during the beginning of the first century. Thus , Ap = 60000 is used in all calculations. The following estimated values are also used in all calculations; Rm = 0.50 (% of males), Rtp = 0.40 and Ad = 60 (average age at death).

6.1 Nifc Estimate

Jacabovici reports that there have been found 30000 ossuaries [13]. This seems large so for a conservative estimate assume 10000 have been found. Kloner reports 20% of ossuaries are inscribed [3]. On average males names on ossuaries are more common than female names, so conservatively assume 50% of inscribed names on ossuaries are male. Conservatively assume 40% of the inscribed names on ossuaries are identified as some known historical person. Conservatively assume 40% of the ossuaries were definitely not used for burial around the time of the f Gospel Jesus death 30-33AD. Based on these assumptions the value for Nifc is calculated.

Nifc = Nof * Ri * Rm * (1-Rh) * (1-Rtp) = 10000 * 0.20 * 0.50 * (1 - 0.40) * (1 – 0.40) = 360

So 0.090 * 0.040 * 360 = 1.296 Jesus son of Joseph are expected to be buried in found ossuaries with at least Jesus inscribed on it. Actually Kloner states two Jesus son of Joseph ossuaries have been found which supports this calculation as conservative. There is no tomb evidence that the burial was not during 30-33CE for either one of these Jesus son of Josephs to be dismissed as a candidate for the Gospel Jesus.

7. PROBABILITY CALCULATION FOR TALPIOT TOMB

Three different calculations are presented for different levels of bias towards the TLTJ theory. The formulas mentioned in Section 5 are summarized below. They are used in the following sections for the actual numeric calculations.

G = (70CE + 30BCE) / Ad
Rjoj = Rjesus Rjoseph
If Rsimon > Rjoseph then R'simon = Rjoseph , Rreduce = Rsimon – R'simon
R'brother = (Rjoseph + R'simon + Rjudah + Rjames) / (1 - Rreduce - Rjesus)
R"brother = (1 – R'brother) * Fjoseph + R'brother
Ntr = (Ntb – 2) / 2
Pmary = Rmary + (1 - Rmary) / Ntr , Pbrother = R"brother + 4 (1 – R"brother) / Ntr
Njjc = (1-Rtp) Rm G Ap Rjoj
P(GJ) = Fgj / Njjc , P(~GJ) = 1 - P(GJ)
Pn(~GJ) = 1 - (1 – Rjoj) ^ Nifc , Pn(GJ) = 1 - Pn(~GJ)
P(TT|GJ) = Fjudah [1 – (1 – Pmary) ^ 3] [1 – (1- Pbrother) ^ 2]
P(TT|~GJ) = [1 – (1 – Rmary) ^ 3] [1 – (1 – R"brother) ^ 2]
P'(TT|~GJ) = Pn(~GJ) P(TT|~GJ)

P(GJ | TT) = P(TT | GJ) P(GJ) / [P(TT | GJ) P(GJ) + P'(TT | ~GJ) P(~GJ)]
Pn(~GJ | TT) = P(TT | ~GJ) Pn(~GJ) / [P(TT | GJ) Pn(GJ) + P(TT | ~GJ) Pn(~GJ)]

10 Ossuaries were found in the tomb along with the remains of 3 bodies outside of the ossuaries. According Section 10, one of the ossuaries actually has 2 female names on it. Thus, at least 14 bodies were buried in the Talpiot Tomb. Based on statistics from other tombs, Ref. 3 estimates a total of 35 bodies buried in the Talpiot Tomb.

Ref. 24 addresses claims that the Gospel accounts of the resurrection are unreliable; however, to ensure the calculations are conservative, the canonical Gospel accounts of the resurrection are given no credibility so Fgj is set to 1.00.

7.1 Implausible Fully Biased in Favor of TLTJ

This calculation uses for the unknowns, values maximized as much as possible to be in favor of TLTJ. Thus, the calculation is fully biased towards TLTJ. The assumptions are all the extreme so they each have a low probability of being true amounting to a very low total probability for all these assumptions making this case implausible. Thus, this calculation is not for historians that prefer science for investigating TLTJ because the assumptions are so implausible. Rather it is for those that strongly personally prefer TLTJ to be true.

The minimum number of the bodies in the tomb is assumed; thus, Ntb = 14. The negative evidence of Jesus having a son named Judah is not considered; thus, Fjudah = 1.00. It is assumed that the is absolutely no tradition of naming sons after their father so Fjoseph = 0.0. The calculated values for the fully biased case are listed in Table 2. The extant probability value, P(GJ|TT), is 0.0276, thus, odds are at least 1:36 against the Talpiot Tomb containing the Gospel Jesus. The nonextant probability value, Pn(~GJ|TT), is 0.552. This is 55 times higher than a probability for an interesting argument and 5520 times higher than a probability for a significant argument. Thus, the fully biased nonextant probability implies no argument for TLTJ. Refer to Section 4.4 for nonextant argument strengths.

7.2 Plausible Bias in Favor of TLTJ

This calculation uses for the unknowns, values biased towards TLTJ. The assumptions are moderate so they do not have a significantly low probability of being true. This, this calculation could interest historians that are inclined towards TLTJ and prefer science for investigating TLTJ because the assumptions are not so implausible.

The number of bodies in the tomb is determined by averaging the minimum and the expected; thus, Ntb = (14+35)/2 = 25. The negative evidence of Jesus having a son named Judah is considered slightly; thus, Fjudah = 0.10. It is assumed that there is a slight tradition of naming sons after their father; thus, Fjoseph=0.90. The calculated value for this plausible biased case are listed in Table 2. The extant probability value, P(GJ|TT), is 0.0169, thus, odds are at least 1:59 against the Talpiot Tomb containing the Gospel Jesus. The nonextant probability value, Pn(~GJ|TT), is 0.670. This is 67 times higher than a probability for an interesting argument and 6700 times higher than a probability for a significant argument. Thus, the plausible biased nonextant probability implies no argument for TLTJ.

7.3 Unbiased Towards TLTJ

This calculation uses for the unknowns, neutral values with respect to TLTJ. The assumptions are neutral, thus, are optimized for having a high probability of being true. This, this calculation would interest historians that prefer unbiased science for investigating hypothesis because the assumptions are neutral.

The number of bodies in the tomb is assumed from the unbiased demographic; thus, Ntb = 35. The negative evidence of Jesus having a son named Judah is considered moderately; thus, Fjudah = 0.20. It is assumed that there is a tradition of naming sons after their father; thus, Fjoseph=0.80. The calculated value for this unbiased case are listed in Table 2. The extant probability value, P(GJ|TT), is 0.0125, thus, odds are 1:80 against the Talpiot Tomb containing the Gospel Jesus. The nonextant probability value, Pn(~GJ|TT), is 0.734. This is 73 times higher than a probability for an interesting argument and 7340 times higher than a probability for a significant argument. Thus, the nonextant unbiased probability implies no argument for TLTJ.

Table 2 Probability Calculation Summary

Parameter	Fully Biased	Biased Historian	Unbiased Historian
Ap	60000	60000	60000
Ad	60	60	60
Ntb	14	25	35
Rtp	0.4000	0.4000	0.4000
Rjesus	0.0420	0.0420	0.0420
Rsimon	0.1110	0.1110	0.1110
Rjoseph	0.0910	0.0910	0.0910
Rjudah	0.0800	0.0800	0.0800
Rjames	0.0210	0.0210	0.0210
Rm	0.5000	0.5000	0.5000
Rmary	0.2500	0.2500	0.2500
Fjoseph	0.00	0.10	0.20
Fjudah	1.00	0.90	0.80
Fgj	1.00	1.00	1.00
Nifc	360	360	360
G	1.67	1.67	1.67
Rjoj	0.0038	0.0038	0.0038
R'simon	0.0910	0.0910	0.0910
Rreduce	0.0200	0.0200	0.0200
Rbrother	0.3163	0.3163	0.3163
R'brother	0.3017	0.3017	0.3017
R"brother	0.3017	0.3715	0.4414
Ntr	6.00	11.25	16.50
Pmary	0.3750	0.3167	0.2955
Pbrother	0.7672	0.5950	0.5768
Njjc	114.7	114.7	114.7
P(GJ)	0.0087	0.0087	0.0087
P(~GJ)	0.9913	0.9913	0.9913
Pn(GJ)	0.2519	0.2519	0.2519
Pn(~GJ)	0.7481	0.7481	0.7481
P(TT|GJ)	0.7149	0.5123	0.4270
P(TT|~GJ)	0.2962	0.3498	0.3977
P'(TT|~GJ)	0.2216	0.2617	0.2975
P(GJ|TT)	0.0276	0.0169	0.0125
Pn(~GJ|TT)	0.5516	0.6697	0.7344

7.4 Comparison

Considering the profound implication of TLTJ for traditional Christianity, it is appropriate to compare the strength of the argument for TLTJ to the strength of the best known argument for the super natural claims for the Gospel Jesus. The nonextant probability for a super natural claim for the Gospel Jesus is 0.00356 listed in Ref. 25. Thus, the best argument for super natural claims for the Gospel Jesus is 0.7376 / 0.00354 = 208 times greater than the strength for the TLTJ nonextant probability. Therefore, it would be inconsistent to claim there is evidence for TLTJ, but not super natural evidence for the Gospel Jesus.

8. INVALID PROBABILITY CALCULATIONS

8.1 Feuerverger Probability Calculation

Jacabovici claims to have shown that the Talpiot ossuary contains some other Jesus to have a low nonextant probability of 1/600 = 0.00167 implying a compelling argument that it must be the Jesus of the Gospels. The probability calculation done by Feuerverger for Jacabovici is listed below.

Feuerverger calculates the probability by multiplying these factors together and then multiplying by 1000 to account for the fact that over 900 tombs have been discovered which increases the chance of finding this cluster of names together in a single tomb. He also multiplies by a factor of 4 to account for unintentional biases in the historical sources. This unintentional biases should be explained to make evident whether or not they are conservative accounted for. The Feuerverger probability is listed below.

1/190 * 1/160 * 1/20 * 1/4 * 1000 * 4 = 1 / 600 = 0.00167 = 0.167 % chance

1/190 for Jesus son of Joseph
1/160 for Mariamenou thought of as Mary Magdalene because acts of Philip connection
1/20 for Yosi
1/4 for mother Mary
1000 number of tombs found in Jerusalem
4 for unintentional biases in the historical sources

Section 4.5.1.7 proves that this mathematical way of calculating the probability is incorrect. It does not properly account for all the possible opportunities for a match involved with the freedom used in achieving a match as Bayes formula does. It is no wonder how with so many flaws in the calculation shown below, Feuerverger, manages to calculate a nonextant probability about 400 times lower than the correct value which according to Table 2 is at least 0.674. With so many mistake involved with estimating the opportunities for matches as shown below, the Feuerverger calculation clearly has committed the Prosecutors Fallacy.

- Does not account for the three female names, (Mary twice, Martha once) found in the tomb provide three opportunities for matches to occur.
- Does not account for the two male names, (Yose and Matthew) found in the tomb provide two opportunities for matches to occur.
- Does not account for the fact that other names, such as Simon, Judah and James would have qualified as matches.
- Does not account for the fact that the Mary and Yose in the tomb may not be the brother of the Jesus in the Talpiot Tomb.
- Does not account for the negative evidence of this Jesus having a son Judah.
- Does not account for the tradition of sons being named after their father.
- Uses an implausible unsubstantiated interpretation of the Mary/Martha ossuary to make a match with Master Mary Magdalene (Ref. Section 10)
- Uses number of tombs rather the number of inscribed ossuaries as a basis for measuring opportunities for a match.
- Nothing about the calculation evaluates the probability that the tomb could contain one of the many other Jesus son of Josephs expected to have existed.

A highly motivated journalist, Simchi Jacabovici, supported by a wealthy James Cameron put together a team to produce and sell a story. Working with a Jesus Scholar Dr. Tabor who knows all the many ancient texts outside of the canonical Gospels with stories about Jesus such as the acts of Phillip, provides a source who can think through all the many possible connections and associations with Jesus in these many different stories. This produces a large source of possibilities for finding a match. Feuerverger , a professor of probability and statistics, obviously knows Bayes equation is used for conditional probabilities and the importance of considering the opportunities for matching. No wonder this team intentionally had no outside critical review of TLTJ before they went public with it. No wonder the other scholars in this field rejected it. A legitimate question is, what is the chance of such a well funded knowledgeable highly motivated team finding a match with the Gospel Jesus for which a low probability can be calculated when an invalid formula is used. I believe such a chance is quite high and has in fact occurred.

Subsequently Feuerverger has acknowledged problems with his calculation. In fact, Feuerverger acknowledged this in Ref. 10 and concludes, “I now believe that I should not assert any conclusions connecting this tomb with any hypothetical one of the NT family. The interpretation of the computation should be that it is estimating the probability of there having been another family at the time, living in Jerusalem, whose tomb would be at least as `surprising', under certain specified assumptions.”

9. JAMES OSSUARY

The archeologists examining the tomb 26 years ago found 10 ossuaries, but only nine are in storage at the Israeli Antiquities Authority. Jacabovici claims that the “James son of Joseph brother of Jesus” ossuary was stolen from this Talpiot tomb to make a stronger case that the Gospel Jesus body was in the Talpiot Tomb. However, former FBI agent Gerald Richard testified in a Jerusalem courtroom that a photo of the James ossuary, showing it in James ossuary owner Oded Golan's home, was taken before 1976 because the FBI photo lab said they found in the photograph paper stamped an expiration date of 1976. If the James ossuary was photographed in the 1976, then it could not have been found in the Talpiot Tomb discovered in 1980. No report of the Talpiot Tomb mentions any James Ossuary. Amos Kloner stated that he remembers that the missing ossuary had no inscription which would make it impossible to be the "James bother of Jesus" ossuary. According to Ref. 6, Golan has consistently maintained that he bought this ossuary before 1978 [6]. Also, Rahmani writings under ossuary 701 states that the department retained 9 ossuaries from the tomb and that one additional plain broken ossuary was found.

Professor Krumbein, an international authority in these matters, who in his thorough examination of this ossuary presented his findings in an Israeli court of law. Dr. Krumbein states, "Based on a comparison of the ossuary surface to many other ossuaries, it appears that the cave in which the James Ossuary was placed, either collapsed centuries earlier, or alluvial deposits penetrated the chamber together with water and buried the ossuary, either completely or partially. Further the root or climbing plant marks as well as the severe biopitting on the top and bottom parts of the ossuary indicate that the ossuary was exposed to direct sunlight and atmospheric weathering and other conditions that are not typical of a cave environment, for a period of at least 200 years" [17]. These observation are not consistent with the Talpiot tomb.

Ref. 18 provides a critique of the Patina analysis made by those promoting TLTJ.

10. MARIAMENOU AS MARY MAGDELENE

The 4th century document Acts of Philip mentions Mariamenou. Jacabovici claim this is a reference to Mary Magdalene. The Mariamenou referred to in the Acts of Philip is an evangelist in Greek who is the sister of Philip and is never called Mary Magdalene. Some connect Mariamene in the Acts of Philip to Mary Magdalene, because the Acts of Philip associates Mariamenou with special powers and in those day certain groups thought Mary Magdalene had special powers. The Apocalyptic Fiction, Act of Phillips, is dated at the earliest to the fourth century and all four canonical gospels are dated to the first century and use the name Mary Magdalene.

The name Mary Magdalene is just the common Mary with historians believe with a reference to Magdala the city near Galilee. There is nothing about the name Mary Magdalene or Mariamne that would give the early Christian church motivation to change the name as Jacabovici supposed with his Master Mariamenou conspiracy theory. Historian have found the approach of using the most ancient information which is corroborated by other sources as the more reliable method for determine the truth about historical events. So in this case the reliable method clearly determines the name was originally Mary Magdalene not Mariamenou. Even the expert in the Film Francois Bovon, the Harvard professor of the history of religion who is the main source in the film for interpreting the ossuary as Mariamenou, has sent a letter to the Society of Biblical Literature where he says the he disagrees with associating Mary Magdalene to this ossuary [11].

Professor Phan who was interviewed in the film is a textual scholar and paleographer at the University of the Holy Land in Jerusalem. His analysis of this ossuary [7] determined that the inscription reads Mariame (Mary) and Mara (Martha) not Mariamenou, Mariamene or Mariamne. Phan points out that Ref. 1 originally misinterpreted a "K" as a "N". There must be an "N" in this name to connect it to the Mariamenou in the Acts of Philip. Phan's key point is that there really is no "N", it is a "K" misinterpreted by being thought of as a "N" written in reverse which never has been observed on ossuaries. Interpreted correctly as a K produces KAI which is "and" and makes sense because it is connecting two names and as Ref. 7 shows, is commonly used to connect names on ossuaries. So the Phan explanation is the highly probable one of the common "and" connecting the two most common female names found on ossuaries Mary and Martha. In the lists of all the names found on ossuaries in Ref. 8 I estimate of the female names Mary is found on about 49% of the ossuaries and Martha is found on 27% of the ossuaries, by far the most common names while Mariamenou is not found on any. The connections to the Acts of Philip explanation has the never found on any other ossuary name "Maramenou" (quite low probability) produced by an unexpected never found elsewhere reversed "K" to produce a "N" (quite low probability). Scientific reasoning selects the reliable highly probable explanation over the (quite low probability)^2 = very low probability explanation. Thus, I do not see how a rationale person can believe in a connection of this ossuary to the Mariamenou of the Acts of Philip. So the 1/160 factor for the Mariamenou should obviously be removed from the probability calculation.

Professor Phan also explains as one can see by looking at the inscription in Ref. 7, the "Mary" and the "and Martha" are written in two very different writing styles implying they were written at different times; thus, for different people.

To associate ossuary 701 with Mariamenou you need to find an "N" and "U" on the ossuary. To associate it with Mariamne or Mariamene you need you need to find an "N" on the ossuary. If you look at the inscription in Ref. 7 you will see that to find an “N” you are required to think of a forward slash “/” is really intended to be a back slash “\”. The argument below is strong that this “/” is part of a “K” of Kai. So if good reason cannot be presented to claim this "/" is part of a "N", then one should conclude the implications in the previous paragraph rather than association ossuary 701 with Mariamne or Mariamene. If you look at the inscription in Ref. 7 you will see that to find an “U” you are required to think of a "| |" as a “U”. The argument in Ref. 7 and below is strong that the first part of this “| |” is a “i” that is part of “Kai”. So if good reason cannot be presented to claim this “| |” is "U", then one should conclude the implications in the previous paragraph rather than association ossuary 701 with Mariamenou.

In Ref. 9 Dr. James Tabor addresses Ref. 7. He points out that the inscription what Ref. 7 interprets as “Kai” is found on ossuary Rahmani #108 at the end where it could not be “Kai” which is “and”. But “Kai” in Greek or Aramaic is “and” so why does it matter that it is found on ossuary Rahmani #108 at the end? Ref. 9 provides no explanation for how a "/" can be part of a "N" and a "| |" can be called a "U" to imply Mariamenou? Ref. 9 points out that the DNA study of this ossuary found only one person, but this is just an argument from silence of a 2000 year old small sample of the remains.

The sequence of reasoning the team promoting TLTJ is to select the much lower probability interpretation of Ossuary #701 (Mariamenou) rather than the much more probable one of Mary and Martha. Then they use the low probability Mariamenou to formulate an argument that such a low probability would not happen by random so it must be rejected that it happened by chance; therefore it must be the Gospel Jesus tomb. This shows that their argument is achieved only through a contradiction. In the first step of the reasoning the low probability interpretation is chosen by avoiding the high probability interpretation so in the second step they can claim they have discovered a low probability relation with the Gospel Jesus. But in the first step they selected the low probability interpretation, rather than high probability interpretation they claim which is contradictory. If low probability explanations are consistently rejected, then the Mariamenou interpretation would be rejected in the first step so their conclusion in the second step would not be achieved. If the first step in the reasoning is invalid, then it does not matter what the second step in the reasoning implies. Thus, there is no validity in using Mariamenou to make a low probability association with the Gospel Jesus.

11. YOSE NICKNAME USSAGE

The Yose inscription has only been found on one ossuary, the one in the Talpiot Tomb making it a very rare occurrence for Ossuary Inscriptions. The nickname Yose is mentioned in the list of brothers in the Gospel Mark and the other 3 Gospels mention the basic name, Joseph, as Jesus brother. It is not known which Gospel is more correct in identifying the name, in fact both names are probably correct for he probably used both names. Just like today those with the given name Joseph are called by their nickname, Joe or Joey, during the Gospel Jesus times, those with the given name of Joseph would have often been called Yose. Just like today the more formal the document, the less likely the nickname rather than the basic name is written. Tombstones are very formal so this is why nicknames seldom show up on tombstones even though nicknames are commonly used in every day life. For this reason Yose has a low occurrence on ossuaries. So the low percentage of Yoses on ossuaries is not because it is a rare name, but because it is a nickname. If the Talpiot tomb Yose is in the immediate family of the Jesus in the Talpiot Tomb, then the parents would have preferred to call him by his nickname rather than his basic name to distinguish between the two. Also, it is a preferred tradition for the Father to name their child after himself. In additional no family with a child name Joe or Joey (Yose) would name another child Joseph. So this shows that the nickname is essentially like the basic name in terms of the portion of the sample space it takes in the probability relations. For probabilities of two events to be the probability of the individual events multiplied together, the events have to be independent. Yosi and Joseph are clearly not independent, rather interrelated. So it is not appropriate to assign a low probability for a Yose ossuary representing a match for a brother of the Gospel Jesus as a multiplier of the other probabilities, rather it should be assigned the probability for the basic name Joseph.

Originally the Jacabovici team did not use the low probability value for the “Yose” ossuary because it is obviously not appropriate; however, with Pfann’s dismissal of Mariamne [7], the Jacabovici team is looking for an alternative to come up with a low probability. The previous paragraph has shown it is inappropriate to use the low probability relation of the nickname Yose on Ossuary #705, rather than the higher probability for the basic name, Joseph, to relate to Jesus’ Brother. The low probability Yose argument is achieved only through a contradiction. In the first step of the reasoning the low probability interpretation is chosen by avoiding the high probability interpretation so in the second step in the reasoning they can claim they have discovered a low probability relation with a random Jesus. Then they claim the low probability relation with a random Jesus should be rejected as by chance for some other Jesus, implying the ossuary must have contained the Gospel Jesus. If low probability explanations are consistently rejected, then the low probability for a nickname would be rejected in the first step so their conclusion in the second step would not be achieved. If the first step in the reasoning is invalid, then it does not matter what the second step in the reasoning implies. Thus, there is no validity in using the low probability for the nickname, Yose, to make a low probability association with a random Jesus.

12. MISCELANEOUS

12.1 Symbol over Tomb Entrance

To claim one certain interpretation of this symbol is the correct one requires showing that this certain interpretations is much more probable than all other ones. The following interpretation is very straight forward so just as probable as the other most probable ones.

A most straight forward interpretation for the symbol over the tomb is the one that one would be the most common sight represented by this combination of symbols which is the sun symbolized by a “O” rising or setting over the silhouette of the landscape symbolized by a “^”. This interpretation is corroborated by the fact that this is directly analogous to what occurs at death and also what is hoped for at death by most every type of person (not just Christians). The sunset represents termination caused by death and a sunrise represents a new life which most everyone hopes for after they die. This would be a common interest for all people in Jerusalem, not just Christians so no reason to specifically link it to the Early Christians.

To think it is possible link the symbol over the Talpiot Tomb with the Early Christian Church is like thinking one can prove that one certain art work is much better than all other art work. This is not an area where probabilities can be objectively calculated to objectively prove one theory the correct one.

13. CONCLUSIONS

Bayes equation, the basic formula commonly used to evaluate conditional probabilities, is the correct equation for evaluating the probabilities associated with the level of matching found between the Talpiot Tomb and the Gospel Jesus Family. Section 4.5.1 proves that Bayes equation is the correct formula for evaluating the probability for this type of problem. Thus, any formulation that is not consistent with Bayes equation would be invalid. Section 4.5.1.7 shows that the Feuerverger formulation is incorrect for the many reasons listed in Section 8.1. Other methods are also shown incorrect in Section 4.5.1.3.

Section 5 lists the equations that are used in Bayes equation to determine the extant and nonextant probability for the level of matching found between the Talpiot Tomb and the Gospel Jesus Family. The extant is fundamentally based on the number of other Jesus son of Josephs that could have been placed in the Talpiot Tomb. The nonextant is fundamentally based on the number of found inscribed male names on ossuaries that aside from their specific name would be consider as candidate ossuaries for the Gospel Jesus just as the Talpiot Tomb ossuaries are by TLTJ. Based on the calculations in Section 7 conservative odds of at least 59:1 against the Talpiot Tomb containing the Gospel Jesus are determined. The nonextant probability cannot be used to directly measure argument strength; however, it’s value of at least 0.669 is very high and is order of magnitudes higher than a minimum standard used in science use to make a significant argument. The probabilities imply that the match found is at a level well expected to occur just by random. Thus, valid probabilistic analysis of TLTJ clearly does not imply the Gospel Jesus was buried in the Talpiot Tomb.

14. REFERENCES

1. L.Y. Rahmani, Catalogue Of Jewish Ossuaries
2. Tal Ilan, Lexicon of Jewish Names
3. Amos Kloner, A Tomb with Inscribed Ossuaries in East Talpiot, Jerusalem, Archaeological Report of Talpiot Tomb , Atiqot, XXIX, 1996
4. Hinrichs, S.C., Rationale Methodology for Identifying Super Natural Intervention, http://home.comcast.net/~rrr33/spntid.pdf
5. Hinrichs, S.C., Daniel's Messiah in the Critic's Den, http://home.comcast.net/~rrr33/critic7.pdf
6. benwitherington, http://benwitherington.blogspot.com/2007/03/jesus-tomb-show-biblical-archaeologists.html
7. Stephen J. Pfann, A Corrected Reading of Rahmani Ossuary 701, http://www.uhl.ac/MariameAndMartha/
8. Stephen J. Pfann, http://www.uhl.ac/JudeanTombsAndOssuaries.html
9. Dr. James Tabor, http://jesusdynasty.com/blog/2007/03/13/the-mariamene-ossuary-at-talpiot-a-technical-note/
10. Andrey Feuerverger, http://fisher.utstat.toronto.edu/andrey/OfficeHrs.txt
11. François Bovon, http://www.sbl-site.org/Article.aspx?ArticleId=656
12. http://dsc.discovery.com/convergence/tomb/explore/explore.html
13. http://www.jesusfamilytomb.com/
14. Charles Grinstead, J. Laurie Snell, Introduction to Probability, American Mathematical Society
15. Patrick Hurley, A Concise Introduction to Logic, Seventh Edition, Wadsworth Thomson learning
16. McClave, S., Probability and Statistics for Engineers, 2nd Edition, Duxbury Press
17. Preliminary Report: External Expert Opinion on three Stone Items, http://www.bib-arch.org/bswbOOossuary_Krumbeinreport.pdf, [September 2005], Prof. Dr. Dr. hc. mult. Wolfgang E. Krumbein.
18. Steven J. Cox, A Forensic Science Analysis of "The Lost Tomb of Jesus" Documentary, http://www.uhl.ac/Lost_Tomb/ForensicAnalysisOfTLTJ.pdf
19. Randy Ingermanson, http://www.ingermanson.com/jesus/art/stats2.php
20. Hinrichs, S.C., Rational Reasoning for Reality, http://home.roadrunner.com/~rrr33/reason.pdf
21. Rachel Hachili, "Names and Nicknames of Jews in Second Temple Period," Eretz Israel, 17, 1984
22. Tal Ilan, Lexicon of Jewish Names in Late Antiquity: Part 1, Palestine 330 BCE – 200CE
23. Lee I. Levine, Jerusalem: Portrait of the City in the Second Temple Period (538 B.C.E.-70 C.E.) , The Jewish Publication Society, 2002
24. Hinrichs, S., Gospel Jesus Ressurection Puzzle, http://home.roadrunner.com/~rrr33/rssrdeb/pdf
25. Hinrichs, S.C., Daniel's Messiah in the Critic's Den, http://home.roadrunner.com/~rrr33/critic7.pdf