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A Forensic Science Analysis of “The Lost Tomb of Jesus” Documentary

INTRODUCTION and SCOPE of this ESSAY.

In a person's career, many events transpire that either challenge one's psyche or build upon the wisdom one has been given. One such event that has challenged my psyche is the documentary “The Lost Tomb of Jesus” broadcast on television in several countries. I was invited by Simcha Jacobovici as a forensic science expert to view and examine the three ossuaries which have become a pivotal issue among biblical scholars, scientists, atheists, agnostics, etc. The filmmakers documented me taking samples inside the purported MARIAMNE ossuary and recorded a preliminary observation under their authority. There was no communication to me at that time that there was a plan to submit samples to a lab for DNA analysis. Not only that, but the samples I collected and left in the ossuaries were more for preservation purposes and for future microscopic analyses rather than for DNA analysis. This paper addresses only a few of the many issues that are in error within the documentary. For the sake of credibility, I will concentrate on facts and opinions in the areas where I have professional experience and I am classified as a legal expert in the field. This paper addresses the patina examination, results and inferences made in comparing the “James Ossuary” and the “Jesus Ossuary” with regard to the question of whether they could have originated from the same tomb. The filmmakers stated, *“This is key evidence indicating that the ossuary inscribed “James, son of Joseph, brother of Jesus” is the missing ossuary from the Talpiot tomb.”*

CREDENTIALS:

My current position as VP of Research & Development for the University of the Holy Land in Jerusalem, in fact, opened the door of opportunity to meet the “The Lost Tomb of Jesus” [TLTJ] group. Dr. Stephen Pfann, the president of the UHL, is actually the one who extended the invitation for me to be at the investigation and viewing of the ossuaries at the IAA facility in Beit Shemesh. Dr. Pfann was not, by any stretch of the imagination, my assistant. My credentials were obviously welcomed by Mr. Jacobovici. He was unaware, however, of my true expertise. It is very easy these days, when one hears “forensic scientist” or “CSI,” to make a rash generalized connection to DNA analysis. Such is the case here. However, my true area of expertise is in microanalysis of materials, modern and ancient, that cannot be seen with an unaided eye. I have spent over 12 years as a practicing forensic scientist with U.S. state and federal government organizations. I am a certified expert in criminalistics in these government groups. These certifications incorporate many varieties of scientific instrumentation to solve medico-legal problems. For example, my technical expertise is heavily weighted in scanning electron microscopy, energy dispersive spectroscopy, energy dispersive x-ray fluorescence [EDXRF], micro-EDXRF and optical microscopic analyses. Beyond the 12 years as a practicing forensic chemist, I worked in the scientific equipment-

manufacturing sector for over 13 years, in the same instrumentation disciplines. I helped design, market, and teach the instrumental, software and technical aspects used in these areas of SEM/EDS, EDXRF, micro-EDXRF. I teach chemists, scientists, forensic scientists, archaeometrists, and professors in many diverse sectors how to accurately use these tools. I now apply these skills to archaeology. Not only do I teach the technical use of these tools, but I also teach a firm grasp of forensic logic in the interpretation of results.

DEFINITIONS of KEY TERMS and CONTEXT:

Patina is very crucial to this documentary and the TL TJ team's conclusions. So, what is this material called patina? Even though the documentary tries to define it with some wonderful graphics, the presentation falls short. The patination process on stone surfaces is a myriad of complex process which can be categorized in terms of biodegradation, weathering and/or environmental exposure. These processes involve not only environmental factors such as the presence, absence or restriction of air, soil, microbial nutrients, fresh water moisture, salt water moisture, pollutants, etc., but also weathering processes such as leaching and complex biodegradation actions from lichens, algae, bacteria and fungi. These destructive or constructive processes result in organic and inorganic surface films described as patina.

One should ask what can be deduced from patina analysis? One thing is for sure, patina cannot be used as an independent dating tool. To quote a prominent international expert in this field who is involved with the "James Ossuary" trial, "...*there is no currently available technique to date the manufacture, engraving or processing of stone artifacts. Existing scientific tests may, at most, cast doubt on the authenticity of such items, or provide evidence that reinforces the probability that the items are ancient e.g. by the detailed analysis of multilayered and structured patina grown with time*" [Krumbein 2005]. Furthermore, Professor Krumbein states, "...*tests used to date patina on the basis of isotopic composition have never received broad scientific recognition by the scientific community due to its numerous limitations and this type of analysis is not considered to constitute unequivocal evidence.*" [Krumbein 2005].

Further uses of patina should also be questioned, such as, can patina examination results be used to indicate provenance? The answer is a definite maybe. Patina can contain microscopic material and chemical markers to exclude or include certain geographic zones from contributing to the patination process. These geographic zones can be related to differences seen in arid, marsh, or tropical regions, etc. In conjunction with such zonal indicators, the complete and/or partial exposure to environments such as wind, soil, sunlight, saltwater, freshwater, and cave environments, etc., can be indicative also. These of course have underlying components of geology, chemistry, botany, microfossils, microbial interactions, and morphological changes in stone due to any or all contributors. In this context, provenance can be ascertained.

Another important question is can patina be an indicator of modern adulteration or forgery? Absolutely. The changes in patina composition, type and location can be highly indicative of such man-made interventions.

The more specific question in this case is can patina conclusively prove a common origin exists between the “James Ossuary” and the “Jesus Ossuary?” Patina analysis could possibly give a yes here, but only under very stringent criteria. What is for certain is that, the TL TJ team’s conclusion of “yes” could not have been deduced by their work. This statement will be expounded further below. In respect to this question, however, the documentary states, “Over time, in a tomb, minerals and sediment accumulate on ossuaries. This accumulation is called “patina” and it can be scientifically analyzed to produce a chemical and mineral fingerprint specific to an ossuary or tomb. Every ossuary discovered in a particular tomb will have the same patina fingerprint.” This is absolutely an unproven statement. There is no conclusive scientific study of such a claim. It is a speculation that has not been established with scientific protocol and methodologies. Within a cave or tomb different ecologies and environments can and do exist which would cause different patina formation. Only relative correlations could possibly be deduced without corroborating scientific support.

OBSERVATIONS of ERROR:

One must keep in mind, as with any scientific examination, there are prerequisites or qualifying criteria to validate the examination’s conclusion. Error has to be dealt with. In other words, it is not a valid scientific approach if there are systematic or statistical errors which have not be defined, eliminated and/or minimized. For example, why perform a trace chemical analysis on an ossuary that has been cleaned chemically? Can there be a real possibility that the cleaning processes contributed to the trace chemical results and the human intervention contaminated the natural chemistry of the ossuary? The answer, of course, is yes. Then, this real possibility has to be logically accepted or rejected by additional testing. The analytical conclusion, as well, has to be weighted to reflect the doubt or possibility of contamination error.

It should be obvious by watching the documentary that there is abundant error in the scientific processes and logic. First of all, when the SEM/EDS spectra is reviewed by Dr. Pellegrino, he states, “*The signature is the same. It matches.*” The samples used for this examination do not include all of the ossuaries from the Talpiot tomb, by the way. Only, one ossuary from the Talpiot tomb is used to make a comparison to the “James Ossuary” and a limited number of unrelated ossuaries are chosen as random [control] samples. However, at least three ossuaries were available in the documentary that could have been tested. And in fact, there were a total of nine ossuaries from the tomb which could have been analyzed for more accurate patina opinion. As Dr. Gibson points out, “*I went to the storerooms of the Israel Antiquities Authority in Beit Shemesh. They provided me with this computer sheet which indicates that from this tomb, that are nine items, it says it quite clearly. Number of items - nine. And it has the description of these, these ossuaries and where they’re located in the storerooms.*” The foundation of the comparison in the TL TJ documentary is extremely

biased toward an expected outcome. In other words, an opinion has been preconceived (i.e., that the James and Jesus ossuaries are possibly from the same tomb) and then select data is searched to support this predetermined notion (i.e., testing of only the two ossuaries). Again, nine ossuaries are available to test a theory, but only one is chosen from the Talpiot tomb to support a preconceived opinion.

Next, it should be noted there are many procedural errors which would influence the opinions stated in this documentary. Take, for the first example of this type, an error called “sample collection error.” The film explicitly shows Dr. Pellegrino collecting samples from inside the “Jesus Ossuary” by ungloved hand. The samples he collected were loose debris not removed from the surface of the stone. Therefore, the collected material has no definitive connection to any location of the stone surface from the ossuary. Many possible sources of origin are now in play. The transcript also confirms that Dr. Pellegrino collected samples from *inside* the “Jesus Ossuary”. Pellegrino states, “*Well, right now we’re just taking other samples of the accretion from inside the ossuary.*” Since a comparison is being made to the “James Ossuary”, where did those samples originate? Did they come from inside the ossuary or from outside the ossuary? Even though there is probably patina on the inside surface and the outside surface of both ossuaries, the patina from inside would be different from outside. Not only would patina differ from inside to outside, but patina in contact with soil, water, etc. would be different from the other patina sites on or in the ossuary. It is a grave error to not know from where the samples were collected and in what environment they were established.

The subsequent procedural error is known as “sample contamination errors” in forensic science. As stated above and presented in the documentary, the samples were collected by ungloved hand from the “Jesus Ossuary”. This is a severe case of possible sample contamination. Can the possibility of sample contamination be eliminated from the “James Ossuary?” Absolutely not. As a matter of fact, the “James Ossuary” was contaminated by cleaning. Professor Krumbein states, “*The microscopic, morphological and ultra-morphological tests we conducted confirm that the ossuary inscription have been cleaned and treated more than once over a period of many years, sometimes clumsily...*” [Krumbein 2005]. Again, human intervention is confirmed and the possibility of sample contamination cannot be eliminated for both ossuaries. This contamination could or could not contribute to the chemical profile seen in the SEM/EDS results. However, because of the possibility and the lack of proof to exclude the possibility, the conclusion must reflect the risk.

A not so obvious error but, nonetheless, one of the most critical procedural errors involves sample preparation and the orientation of the sample to the SEM/EDS instrument. This would be very obvious to an experienced forensic professional. To the laymen it would go unnoticed. The only scientific instrument used in this documentary for patina analysis was a scanning electron microscope [SEM] with energy dispersive spectroscopy [EDS]. The tool images particles that the unaided eye can’t see [SEM] and then provides an elemental profile of what is being imaged [EDS]. Specifically in this documentary, patina is a film on the surface of the limestone ossuary, the patination process is a surface morphological/chemical issue. To compare the surfaces one to another would not be a surface side up examination of

the particles. Rather, it would be necessary to embed the particles in an epoxy material and polish the mount smooth to reveal cross-sections of the particles being examined. This would allow the viewing and analysis of the film as it penetrates into the stone thickness. Furthermore, this presentation would allow a complete analysis of many other morphological changes created by the patination process. This type of sample preparation is absolutely essential for SEM/EDS analysis as well as for optical microscopy. Now, couple this error with sample orientation errors from the documentary. Again, Dr. Pellegrino performed a random collection of loose debris inside the “Jesus Ossuary”. When particles collected in such manner are mounted and coated for SEM/EDS analysis in this case, it would be impossible to know conclusively if you were analyzing the surface side of the particle or some other side of the particle. Therefore, the analysis could be the chemistry of the interior wall of the ossuary more than the surface wall of the ossuary. In other words, patina could not have been analyzed at all and only the limestone component of the ossuary was being represented. This means that one could not be certain if the analysts were examining the true outside surface of the ossuary or the inner composition of the ossuary wall. This error applies to both ossuaries in the documentary.

The final error I would bring to the reader’s attention encompasses poor research. Again, the documentary states, *“This is key evidence indicating that the ossuary inscribed “James, son of Joseph, brother of Jesus” is the missing ossuary from the Talpiot tomb.”* If what I have written thus far is not convincing enough to the reader that this statement is unfounded and is a flight of the imagination, then consider this one last piece of evidence. The “James Ossuary” clearly has been the subject of an extensive series of examinations because of its Biblical implications and legal ramifications. I bring to your attention a result produced by 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”* [Krumbein 2005]. This evidence proves that the “James Ossuary” existed in an environment totally different than the known conditions of the Talpiot tomb. There is no evidence of the Talpiot tomb having collapsed. There is no evidence of alluvial soil penetrating the Talpiot tomb with water and soil [mud]. There is no evidence of the “Jesus Ossuary” or the other eight ossuaries being buried partially or completely in mud. There is no evidence on the Talpiot ossuaries of plant growth. There is evidence that the Talpiot ossuaries have been in their secure niches for more than the last 200 years, contrary to the habitat of the “James Ossuary”. Therefore, the possibility that the “James Ossuary” and the “Jesus Ossuary” shared a common origin from the same tomb is beyond reason, scientific fact, and proper scholarship.

PROPER FORENSIC OPINION:

In respect to examination of material from the “James Ossuary” and the “Jesus Ossuary,” the ultimate and more accurate forensic assessment which could be derived from the examination of these samples showing only a matching EDS spectra presented in this documentary is as follows: The collected samples purported to have been collected from the respective ossuaries, untraceable to source and unidentifiable in orientation, indicate the ossuaries could have originated from the same quarry from where they were hewn. To further qualify this opinion as conclusive and unique would require more testing of known samples of ossuary stone from numerous quarry sites in and around Jerusalem. This would allow a database which would paint a more confident chemical profile than what was shown in the documentary. To arrive at an opinion stating the ossuaries shared a common tomb or cave environment in the last hundreds of years requires an enormous leap of logic and stretch of science.

CONCLUDING REMARKS:

This paper was written to address the filmmakers’ inferences and statement, *“This is key evidence indicating that the ossuary inscribed “James, son of Joseph, brother of Jesus” is the missing ossuary from the Talpiot tomb.”* I believe this paper should not only challenge the reader to question the validity of this statement but prove contradiction, as well. It should be very evident at this point that the TL TJ team’s statement is, at best, an overstatement of opinion based on limited fact, poor scientific protocol, unresolved sources of error and shrouded in poor research. In my opinion, one of the greatest tools a forensic scientist learns is not how to operate an instrument. Rather, it is how to logically assess the weight of the result derived from examining evidence or artifacts. In forensic work, someone’s life hangs in the scales of justice. Be it a suspect or a victim of crime, the result and the following testimony will effect that persons’ life forever. So, a forensic scientist has to take making conclusions and opinions very, very seriously. If this type of conservative and cautious reporting were applied to the TL TJ documentary, the program probably wouldn’t have gotten much notice or, at best, it would have produced more responsible journalism.

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