The Stone Oil Lamp with the Menorah- After The Verdict

The distribution of the chemical elements of the patina on the decoration of the Stone Oil Lamp (SOL) is identical to the patina in the bottom of the SOL and similar to the elements found in the stone. Soot was found embedded within the multi-layered calcitic patina which is attached firmly to the lamp's outer and inner surface.

The Judge Aharon Farkash, concluded that the determination of the prosecution experts about the glue "sodium silicate" remains a possibility which required further testing. The judge accepted the testimony of the defense adhesive expert Professor Hanna Dodiuk that the evidence submitted by the prosecution experts was not sufficient to prove the existence of glue. The judge accepted Dr. Daren's testimony that found no differences between the patina on the decorations and the patina from the bottom/inside of the SOL which indicate no act of forgery.

The Judge accepted Dr. Sussman's report (an oil lamp expert) that the decorations of the Menorah and the seven species, namely wheat, figs, pomegranates, palm tree (honey), grapes, olives and barley are most probably authentic and that the age of the SOL is probably from the first CE century, before the destruction of the second Temple.

The Judge wrote in his verdict: "After weighing all the evidences and testimonies for this indictment, there is a reasonable doubt in my mind as to the fake decorations on the Stone Oil Lamp." Therefore, he acquitted Golan by a reasonable doubt of forging the decorations. The Judge, in his verdict, strengthened our determination about the authenticity of the decorations of the SOL.

See Also: **Essays on the James Ossuary and the Temple Tablet from Bible and Interpretation**
THE JEHOASH INSCRIPTION TABLET-AFTER THE VERDICT
Implications of the "Forgery Trial" Verdict on the Authenticity of the James Ossuary
An Archaeometric Analysis of the "Miriam Ossuary" – Zissu and Goren, 2011
A Stone Oil Lamp with Seven Nozzles Carved with Jewish Symbols from the Late Second Temple Period.

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Introduction

This article is based on the testimony of the expert witnesses who testified in the "Forgery Trial" and mainly on the 475 pages of the verdict of the Judge Aharon Farkash, District (Criminal) Court in Jerusalem, Israel. The verdict was delivered on March 14th, 2012 (case number 482/04) the State of Israel (Israel Antiquity Authority, IAA) - against Oded Golan and 4 others who were accused of forging very important antiquities. We discuss herein only the scientific problems related to the verdict of count # 7. The verdict in case 482/04, by Judge Farkash **acquitted** Oded Golan from forging the decorations of the stone oil lamp with the Menorah, because proof was not presented to the court beyond any reasonable doubt. This acquittal comes not because of technicalities but because of substantial scientific issues. We have investigated, published and testified on this artifact (Krumbein, 2005; Rosenfeld, et al., 2010 and 2011) and our main conclusions are summarized herein.

The forgery trial was very thorough, lasted 7 years, and contained about 13,000 protocol pages, with hundreds of exhibits, reports and books. It expanded to more than 120 sessions that lasted more than 8 hours per day, some lasted until the late evening hours. The 74 prosecution witnesses and the 54 for the defendant (total of 128 witnesses) originated from different fields and came from Israel, the United States, Canada, France

and Germany. The court had to decide about the forging of certain antiquities most of which came from the antiquity market (unprovenanced) and had to hear expert testimonies and lectures from various scientific fields in: geology, chemistry, geochemistry, microbiology as well as experts from the humanities such as archaeology, philology, epigraphy, paleography, Biblical scholars and more. The scope of the questions dealt with during the trial, revealed many scientific as well as judicial issues.

We must praise the work of the Honorable Judge Aharon Farkash and his assistant attorney Inbal Moshe. They have painstakingly worked faithfully and with great skill to produce such an important well thought out verdict. Judge Farkash praised all the experts who appeared in the trial and said that his impression is that the experts were loyal to their fields and worked according to their skills, ability, experience and honesty in order to seek scientific truth. Judge Farkash believes that in the future some more conclusive new scientific methods will be developed, enabling the identification of fake or genuine antiquities.

The Judge emphasized that he found no proof of forgery, either regarding the artifacts or any clue of an act of forgery by the accused or his collaborators (Rosenfeld et al., 2012 a, b). The judge expressed his own view on some key questions and stated that the Stone Oil Lamp was not proved to be a fake and could well be genuine. The scientific issues of the expert testimonies were woven by Judge Farkash's reasoning into the verdict in a masterful way and we translated it from the Hebrew. The numbers next to the subheadings are the paragraph numbers that appear in the Judge's verdict. The citation (e.g. p. 1234) relates to the Court protocol page(s) of the testimony in this case.

Our Conclusion

A circular oil lamp 22 cm in diameter with seven nozzles was archaeometrically studied to verify its authenticity (Krumbein, 2005; Rosenfeld et al., 2010 and 2011). Traditional Jewish decorations are carved in the upper part of the lamp: a seven-branched Menorah (candelabrum), wheat ear, a basket with figs, pomegranates, date palm tree, grape leaf and grapes, olive branches and barley ear [Rosenfeld et al., 2010 and 2011; Figure 1]. Most of the symbols are similar to those found on Jewish coins of the period. It is made of silica-enriched chalk of the Early Senonian sequence exposed in the Jerusalem area. This oil lamp is the product of the Jewish limestone industry that flourished during the late Second Temple period in Jerusalem (first century CE), related to religious purity laws. The prevalence of malleable silicified chalk in the Jerusalem environs and sophisticated processing techniques such as use of a lathe facilitated the production of this stone oil lamp. The distribution of the chemical elements of the patina is similar to those elements found in the stone. Soot was found embedded within the multi-layered calcitic patina which is attached firmly to the lamp's outer and inner surface. Microcolonial fungi structures and minerals are indicative of natural long-term development in a subsurface burial setting. All of these factors reinforce its authenticity.

The Stone Oil Lamp (Count No. 7; Defendant # 1, Golan)

The Indictment

(A summary)

In the course of 2000 or immediately prior thereto, defendant No. 1 [Oded Golan] planned to forge various ornamentations in relief on a stone oil lamp, in order that it should

appear as a unique stone lamp. Defendant No. 1 did so in order to fraudulently obtain financial gain, as specified below.

To execute his scheme, Golan used a Stone Oil Lamp from the Second Temple period and, either alone or through others, added decorations in relief: the Temple Menorah and the seven species "Shiv'at Haminim." By doing so, he increased the value of the lamp and transformed it into a unique item. He applied various substances as a patina on the lamp, [as a camouflage] so that when examined, the ornamentations would appear to be from the Second Temple period. Golan offered the lamp for sale and sold it to an antiquities dealer and to an individual and presented the lamp as an important artifact that probably belonged to one of the higher priests of the Second Temple period [2000 years BP]. Golan created a partnership in the Stone Oil Lamp with two other dealers. They also created a cover up story so that they could sell the Lamp in accordance with the antiquity law.

The main charge is forgery with intent to make gain under aggravating circumstances. Golan was accused of selling an imitation of an artifact or a composite artifact without indicating it as the law obliged.

Judge Farkash's Summaries of the Testimonies and the Reasoning of the Verdict

Only the important scientific issues written by the Judge Aharon Farkash's verdict and the testimonies of the experts concerning the Stone Oil Lamp in this trial were translated by us. The parentheses (…) were used by the Judge as well as his initials A.F. The numbers next to the subheadings are the paragraph numbers that appear in the Judge's original verdict in Hebrew. The **bold text** is the judge's notations. The brackets […] are used by the authors for clarification. The abbreviation SOL is used here for the Stone Oil Lamp.

The Material Aspect

[Remarks and Summaries by the Judge]

(798) The Stone Oil Lamp was first examined by Dr. Ilani and Dr. Rosenfeld from the Geological Survey of Israel [GSI] and they did not indicate any suspicion of forgery. The SOL was then examined by three other experts: Prof. Goren, Dr. Ayalon and Dr. Bar - Matthews. All three testified on behalf of the accuser - the Israel Antiquity Authority (IAA) and their conclusion was that the patina on top surface of the SOL on the decorations contains a mixture of natural patina pasted over the SOL by the use of synthetic adhesive, apparently "sodium silicate." For the defense, six experts testified: Dr. Ilani and Dr. Rosenfeld; Mr. Dvorachek (Scanning Electron Microscope [SEM] operator from the Geological Survey), Dr. Steve Daren (chemist); Professor Krumbein and Professor Dodiuk (adhesives specialist).

Professor Yuval Goren

(800) Professor Goren examination focused on the authenticity of the patina that occurs on the surface of the oil lamp between the decorations and on top of them. When Professor Goren conducted the examination of the SOL the report of Dr. Ilani and Dr. Rosenfeld who found that the oil lamp and the decorations that appear on top of it is

authentic was before him. Also, Dr. Preuser's report from the USA that reviewed Ilani's and Rosenfeld's report was before Professor Goren. Their report included details of their methods and research which included the use of various microscopic examinations. These are the results of the examinations carried out by Professor Goren:
A. The test he used to define the rock matched the results reported by Dr. Ilani and Dr. Rosenfeld.
B. The stereomicroscopic examination of the surface (mainly the decorative area) revealed a significant layer of material that appeared to be a natural patina that covers the decorations, but in many sections, especially in the lamp with the seven branches the patina seems not to be a homogeneous layer.
C. Testing with UV light - illustrates that there are decorations with added material, which cause in different sections to glow. Prof. Goren explained in his testimony that this UV test is only a preliminary examination and is not sufficient [to indicate of something] .(and therefore other methods of examinations were carried out (pp. 1085-1086

According to Professor Goren the petrographic examinations of five samples of the patina taken from the decorations indicate the expected patina that formed on such objects in the environment. However, Professor Goren observed a material that does not match a natural patina. "The appearance of this material and its characteristics indicate the nature of which it is epoxy glue or similar synthetic material. Tiny, air bubbles that was trapped by the mixing processes of this yellowish transparent isotropic material can be seen." Following this discovery patina samples were examined by Dr. Ayalon and Dr. Bar - Matthews from the GSI who found in the patina "remains of unnatural substances added, that seemed to be the cement that holds these natural substances which cling to the lamp surface." Scanning electron microscope examination yielded the composition of the material, and the shape of this appearance which was identified as "sodium silicate" also called "water Glass" which is a modern gluing material soluble in water used in the research and preservation of archaeological sediments or to harden them.

The conclusion of Professor Goren in his report is that the patina covering the decorative patterns contains a mixture of natural patina glued over the SOL using artificial adhesive apparently "sodium silicate." This patina is not the result of natural formation processes but it is an artificial mixture made in modern times. Therefore, according to Professor Goren, "there is to cast a serious doubt on the authenticity of the decorations appearing on the SOL, and perhaps even on the authenticity of the entire item." (See also testimony, p. 1088; and cross examination – p. 1501).

Dr. Avner Ayalon and Dr. Mira Bar-Matthews

(804-811, summaries by the Judge)

Dr. Ayalon was appointed by the IAA to check the authenticity of the SOL. Dr. Ayalon together with Dr. Bar - Matthews and Dr. Bettina Shilman from the GSI conducted various examinations on the patina of the stone lamp and presented a summary report to the director of the IAA (T / 74). Dr. Ayalon's report detailed the various tests conducted, the working assumptions the results and the conclusions. These are the results of the examinations in the report:
A. Oxygen isotope tests were done on the patina from five different areas of the surface of the SOL and yielded results within the expected range [about the oxygen isotopes method in archaeological artifacts see Rosenfeld et. al. 2012, a, b]. The same goes for the

two samples of rock of the SOL itself.
B. The composition of the patina samples taken from different areas of the SOL yielded the expected composition of natural patina [that has developed] on the rock type of the SOL.
C. In addition to the natural material, they found in the samples materials which are not typical of a natural patina. Their morphology and their high carbon (C) content indicated that they are organic materials. Carbon associated elements include silicon (Si), sodium (Na), fluorine (F) and calcium (Ca), which are not characteristic of a natural organic material. As written in Dr. Ayalon report he found silicon-rich material in a spherical structure, also containing relatively high concentrations of sodium and fluorine in quantities which are characteristic, to the best of their knowledge not to natural substances. Organic matter surrounds mineral particles appeared to be "smeared." In other words, they found foreign organic substances in the patina. According to the appearance and the form of the particles in the patina "there is a reasonable suspicion that it is an adhesive material."

The conclusion of Dr. Ayalon's report is that the oxygen isotope composition of the patina does not contradict the authenticity of the patina. The petrography and chemical tests of the lamp's patina indicate the presence of organic materials that look like a foreign substance. These materials are suspected as being glue which was affixed to the natural patina that was taken from a rock or other original items and affixed to the surface of the SOL. The researchers, according to these findings doubt the authenticity of the patina of the SOL.

Dr. Bar - Matthews also testified on this subject. She explained that they found in the patina materials with chemical composition (described above) that cannot be formed under natural conditions. In the petrographic examination "They look really smeared." (pp. 2470-2471). According to her, no [natural] mineral of such composition exists, concluding that it is a foreign material. They checked on the internet and found that the most common composition of sodium and silicone is used as glue ("sodium silicate.") The addition of fluorine makes an ideal glue paste for conservation because fluorine alters the viscosity of the material and allows a better penetration between the particles (p. 2470 and later; in cross examination, p. 2601).

Dr. Bar - Matthews agreed that [the images they presented in court] are very tiny and the granules are very difficult to see without using an electron microscope and hence was asked how the foreign substance was added to the patina. First she replied that the material seems to be spread, as seen by images taken with the microscope. The foreign material (which appears dark in color) surrounds the calcite (bright color), and it was "poured."(p. 2602). Later she changed her mind and she replied: "... I say that if they poured glue and adhesive liquid which is something that could go in between the grains, the grain became coated... "(p 2605). And Dr. Bar Matthews continued:" It is not a smear, ... I do not know what to do, I mean when you paste, when we paste something, we pour some glue and the glue is spreading, spreading through the spaces and that is how the business sticks to the substrate, that's what we're doing in lab, I cannot talk about how they do it in archaeology, I never did it in my life, I am not an archaeological restorer ... I'm sorry if I say smearing, I do not know how they did ... Pour glue ... I do not know how they did ... Probably poured glue… I do not know this paste or liquid, how it entered between the holes, the porosity... "(pp. 2606-2607). Later she made it clear that she sees

no liquid substance in the SEM but only solid materials and she stressed that she does not know how to add the glue to the patina - "I do not know how, if it stuck, I do not know how to do an application of glue on it substance. "(p. 2608).

Both Dr. Ayalon and Dr. Bar - Matthews admitted in their testimonies that they are not chemists or archaeologists who are experts in applying the glue. They explained that they found within the patina foreign substances that are not formed naturally. They checked out the professional literature to see what characterizes these materials. They referred to the exhibit T / 140 and an abstract of an article by Professor Paul Goldberg (T / 197). Professor Goren was once his student (see e-mail written by Prof. Goren to Dr. Ayalon - T / 196). Dr. Ayalon and Professor Goren studied the properties of "sodium silicate" and its use as an adhesive or coating, and its use in restoration when fluorine is added to it (Dr Ayalon - pp. 4125-4126 and pp. 4127 to 4129; Dr. Bar - Matthews - pp. 2472 and p. 2474).

Dr. Bar - Matthews said in her cross-examination: "... We are not glue experts and what we found in the literature, it is likely to be adhesive. Moreover, the article by Professor Paul Goldberg on restoration in archeology also came to our aid. We used it reasonable, we were very, very cautious."(p 2602). And later," I say that this is material ... And I see that its molecular weight is heavier it is not a mineral that I know of. The composition is sodium, silicone, fluorine and carbon, and I say this is a suspect material something strange and suspicious, glue according to the literature we have found, adhesives, that's all I'm saying ... I don't know what is there, there's a foreign substance. "(pp. 2606-2607). And again:…"I don't say that I determined the structure of the glue I just said I determined a foreign substance which is suspected as glue, according to what I found online and in the literature." (p. 2610).

However, Dr. Bar - Matthews, in her re-investigation at the request of the accuser's attorney, testified that she has found no other reasonable explanation for the foreign material in the patina except for the explanation of adhesive (p 2696).

Dr. Ayalon first used a more cautious terminology - "those are suspicious points," "this chemical composition ... It is very demanding of explanation, and we need to check it." (p. 845). Later, Dr. Ayalon was a bit more decisive in his answers: "The finding that we see here is far more suspicious, because here it is not a single grain as we saw in the previous picture, but here we see something, that was smeared ... It's completely foreign material, it is not a natural material ... (composed) of carbon, but with silicone, sodium and fluorine, which is unequivocally that we see here actually adhesive material applied and glued to a piece of naturally scraped patina from elsewhere, and may even be [removed] from another place of the lamp itself, but naturally patina glued with a dark smear around. He added, "it's not a single grain, that can be an organic matter that entered to the patina, but you can see the foreign material" leaked "or" someone used a brush to apply and smeared it. "Unambiguously, this indicates a smeared foreign substance within the patina" (pp. 845-846).

However, its ultimate conclusion was and remains, as written in the report, that the foreign substance is suspected as adhesive which has been glued natural patina on the decorations. This cast doubt on the patina that coats the SOL, and hence [cast doubt] about the authenticity of the SOL as a whole (pp. 846 -847).

These were the testimonies of the prosecution's experts on the material aspect.

Professor Hanna Dodiuk-Koenig

(812-820, summaries by the Judge)

Professor Hanna Dodiuk - Koenig testified on behalf of Golan ("Glue-like structures, stone oil lamp patina" (N / 199). Professor Dodiuk serves as head of the Polymer Engineering Plastics in Shenkar - School of Engineering and Design, and is an expert on science and technology of chemistry, adhesives and polymers. Here are excerpts from her opinion: Professor Doiduk asked to review whether the test results, photos and opinions of Dr. Ayalon and Professor Goren indicate the presence of modern glue/s in the patina of the SOL. After examining the material presented to her, **her decisive and univocally conclusion is that the findings of the prosecution experts do not suggest the presence of an organic adhesive or other organic matter coating the SOL / or the decorations on it.** (Judges' emphasis).

She said that there are two main types of glues based on organic material: non-synthetic adhesives (such as blood and rubber trees) and synthetic adhesives (man-made glues). Since the prosecution experts indicated the presence of synthetic adhesives in the patina of the SOL her opinion addressed the question whether indeed synthetic adhesives exist and are present in the patina of the SOL. In any case non-synthetic adhesives do not contain sodium and fluorine that were found in samples of the patina, and cannot be purchased commercially and therefore are irrelevant to the discussion.
Synthetic adhesives are adhesives based on organic matter, and their characteristic and chemical properties and their classification of the different types of adhesives were described in Professor Dodiuk's report. It was noted, that analysis of most adhesives contains nitrogen or sulfur, but the prosecution's experts did not find these elements.

In her report she criticized the incorrect tools and methods of the prosecution experts used to determine adhesives. According to Prof. Dodiuk, the test methods employed by the prosecution experts (using a scanning electron microscope and polarized optical microscopy) are completely unsuitable for examination of adhesives. Thus, the conclusion and the answer to the question whether there is a glue in the patina based on these tests are unfounded speculation and misleading.

The prosecution's experts found a high number of atoms of the element fluorine but this does not make sense for glue because fluorine and its derivatives are typically materials designed specifically to prevent adhesion (such as the manufacturing process of Teflon).

Twelve families of organic adhesives are known, but their composition is not consistent with the findings of the prosecution's experts. In addition, the sodium and fluorine levels are significantly different in each of the samples and this suggests that the source of the material is not a glue, for if it were a synthetic glue we would expect to find more or less the same levels of fluorine, sodium and silicon in each of the samples [a consistent composition, but the case is not so].

Professor Dodiuk also raised the theoretical possibility that maybe for the purpose of conserving the SOL someone used glue or fixing materials such as is typical in preserving stone from peeling by "smearing" or spraying or by pouring. Professor Dodiuk's opinion is that the test results of the prosecution experts also do not support this option for reasons stated above, unless the material used for conservation is unfamiliar to her.

The allegedly identified “smearing” phenomenon found by the prosecution experts are a few microns in size, and therefore does not necessarily indicate the presence of glue.

Actions such as scraping the surface cleaning and handling operations of the SOL, and even sampling of the SOL may predictably alter the appearance of the surface and create the appearance of a "brush-stroke" or "smearing."

Gluing a patina on three-dimensional relief as claimed by the prosecution experts would have created a lack of continuity and lack of perfect contact between the surface of the SOL and the surface of the patina crumbs on the decorations. It would then be easy to see this [mosaic] with a simple optical microscope. Other experts who examined the SOL (Dr. Ilani, Dr. Rosenfeld, Professor Krumbein, Professor Preuser and others) noticed the presence of a multi - layered patina which cannot be artificially produced.

Professor Dodiuk repeated in her main investigation and in her main opinion that she strongly reinforced her conclusion based on the material presented to her that there is no organic adhesive on the patina. She noted that the methods used are insufficient to prove unequivocally whether there is adhesive, and proposed two additional methods for testing the composition of the material (pp. 5490 - 5491). She said: "adhesives are a whole world, there are really many, many kinds… in my humble opinion there is no organic adhesive, that I could swear, I do not think that there is a different kind of a glue, but in order to realize it, we must do some more testing…" (p. 5493). She continues: "... there is no synthetic glue even on the top layer. In my opinion there is no glue, but, to declare that there is no glue ... we should still be cautious, and we should add more methods of an examination -the FTIR, should be done, but in my opinion, from what I've seen, let's be precise, all the evidence given to me, do not show unequivocally the existence of a glue. To swear in court that there is no glue, and never was, one should add other methods. “(p. 5495).

The argument of the prosecution is that the opinion of Professor Dodiuk is irrelevant and cannot be useful to Golan, because it focused on the existence or non-existence of organic adhesive in the patina, while the prosecution's experts testified specifically about the existence of "sodium silicate," a material with adhesive characteristics, and her testimony did not address this question.

In her testimony, Professor Dodiuk explained, that she does not exclude the possibility that the patina has "sodium silicate" (pp. 5499-5500), but she said it is a ceramic material and not an organic material, "it is not called glue ... this material is not defined as a glue.” (p. 5501) and "...in the last thirty years I have not seen anyone ever usimg it as a glue, or as a coating for synthetic adhesives ..." (p 5500). However she added that "Sodium silicate is not within my expertise and I have no desire to talk about something, I said ‘humbly’, I do not have the expertise [in this material] and I did not work with it, but I'm a chemist and I studied chemistry, I know the basics. Sodium silicate is a salt, the salt dissolves in water, the ratio of sodium to silicone must be fixed " (p 5501) [and according to the prosecution experts each sample indicates a different ratio].”Sodium silicate is a ceramic material, I do not know [that it is a glue] but I have no doubt that it was not used as glue." (p 5504).

During the testimony of Professor Dodiuk, it became known that when Professor Dodiuk prepared her opinion the prosecutions reports T/140 and T/196 were not available to her. The prosecution establishes the claim that "sodium silicate" is familiar

glue used as binder (p 5506 and p 5512). However, after she read these reports [in the court room] she insisted that these documents are not sufficient to demonstrate the use of "sodium silicate" as glue. In relation to T / 140 Professor Dodiuk repeated that the document is from the Internet, and it also mentioned potassium [which is not presented in our case]. For her, this document is a kind of a promotional brochure for commercial, technical information and it is usually not a scientific data, but it is a little bit like an advertisement: "In most of my professional work, I look on these papers only as an indication, I never establish a technical opinion, because companies have a lot of misleading information, as the company wants to sell a product, it is very important for me to say it. If it was an article out of a Chemical Review, or a scientific paper, it has a very big difference compared to the business information of a company." (p. 5507; p. 5512 and in relation to T / 196, p. 5515).

Judge Farkash' Remarks: (817) "I will note that, oddly enough, Professor Dodiuk was not asked in her cross-examination about the report T / 197. This is an abstract of the essay by Prof. Goldberg, although this was the only document that the prosecution establishes the claim that this is glue and it was published as an article in a scientific publication. However, even after Professor Dodiuk had suggested to read T / 140 – and T / 196 she was adamant that even she could not refute the possibility that "sodium silicate" can glue paper, or all kinds of materials, she as an expert of glue, never encountered the use of "sodium silicate" as a glue. "I have not seen this [material] in textbooks of adhesives ..." (pp. 5515-5516). In other words, even "sodium silicate" is not defined as a glue, she cannot rule out the possibility of forming "sodium silicate" glue with fluorine to be strong enough, but "it should be proved [by the prosecution experts] ... to add more tests" (p , 5523).

Professor Dodiuk repeated in her testimony of the criticisms she wrote in her report on the tools and methods of the prosecution experts, which she said are not suitable to determine adhesives, and therefore conclusions based on them will be a misleading speculation. Her opinion noted that "the use of a scanning electron microscope ... is very limited (if at all possible) regarding the identification of formulas of compounds, of organic materials ... This instrument [SEM-EDS] can recognize the presence of elements of high atomic number and cannot detect or imply the covalentic bonds as exist in glues." In her testimony she clarified the issue: "When you say that this substance sodium fluorine and silicone, you do not have the slightest idea, sorry, on its chemical structure, you have no idea. You would not know whether it will adhere, if it is a coating, if it was there, if it is ceramics from the ground, if it is - WHATEVER, anything can go... The only way to know what the composition of this matter, if it's glue, or not glue, I have to know what it is. I do not know what it is, why should I say it is glue? I have no evidence [to say] it's adhesive. "(p. 5491-5492; and on page 5525).

(819) Another argument that Professor Dodiuk pointed out relates to the fact that the relationship between the sodium and the silicate elements in "Sodium silicate" should have a constant ratio (p. 5499; p. 5503). "The ratio between the sodium and the silicate must be fixed, because this is chemistry, with this chemistry you cannot argue at all." (.p 5515).

Judge Farkash's Remarks: (820)

I will summarize and say, therefore, that Professor Dodiuk's expertise does not doubt the prosecution's experts, each in his field, but she criticizes them by purported to define the foreign material found in the patina as glue "Although they are not specialists for adhesives. She does not negate the existence of "sodium silicate" in the patina, nor rule out the possibility that you can use this material as glue, though she, as an expert in adhesives, never heard of the glue of the "sodium silicate" and especially not the addition of fluorine, which according to her experience fluorine is precisely added to prevent adhesion. She does not exclude completely the prosecution's experts test and method but claimed that they are not enough. Thus their, conclusions based on these methods alone are not enough and that they are only assumptions (p. 5502, p. 5511, p 5531).

Remarks of the authors: [The so-called "glued" patina was, at the beginning of the trial, considered an organic rich carbon material observed by the prosecution experts. Later on they changed their determination to "sodium silicate glue" which was detected in a micron-size location/s. We claim that this, supposedly glue-like material if it is a forgery, should be observed everywhere in the patina, but this is not the case. Sodium silicate is not an organic glue rather inorganic salt material {$Na_2SiO_3 \cdot nH_2O$; where n = 5, 6, 8, 9}, which can be easily detected by an XRD diffractometer that is available at the GSI. We have examined the patina using an XRD (Rosenfeld et al., 2010, 2011) and we found in the patina on the decoration of the SOL the following minerals: calcite associated with quartz grains and only traces of small aggregates of fluorite, small amounts of whewellite (calcium oxalate) and apatite (calcium phosphate) (op. cit). But we definitely did not find the sodium silicate.

Moreover, we tested in the lab the salt sodium silicate, also called "water glass" - and when it solidified or melted (depending on whether one uses a solution or solid material) it leaves a shiny glassy surface. This shiny glassy layer all over the patina of the SOL and/or under the patina was not observed by the prosecution experts as well as by the authors of this article because it is simply non-existent in the patina of the SOL. Only multi- calcium-carbonate layers with a regularly white matte appearance can be observed following the relief of the decorations. So, according to our examination no glue or sodium silicate is found in the patina of the SOL].

Professor Wolfgang Krumbein

(821-834. summaries by the Judge)

The findings and conclusions of Prof. Krumbein in relation to the SOL were summarized on page 11 of his opinion (N / 189) and these are his main conclusions: The patina of the SOL is multi-layered and indicates slow development of the patina over time. Morphological analysis indicates that the patina is continuously and uninterrupted. The patina's remains were found in different parts of the SOL, including in inaccessible places (e.g. in the nozzles of the lamp). The patina on top of the margin of the lamp and on the decorations is continuous (Photos 124-125 on page 76 of the report). The finding supports that patina developed naturally in the cave, and it is also being supported by the results of Dr. Ayalon's examinations.

There is no indication that the surface of the SOL has been cut, stripped or etched in a particular site. On the contrary, microscopic observations particularly in the crack

leading to the conclusion that the production of the SOL and the decorations were made during the same time period.

Mineralogical analysis of the patina indicates the presence of calcite with apatite (calcium phosphate), and small amount of calcium oxalate and only traces of quartz. There was no indication of any adhesives. However, finding a single remnant of patina adhesive as Professor Goren noted, could be an indication that a conservation activities were carried out on the SOL in order to prevent "peeling" of the patina. Another possibility is that the "glue-like " material is crystalline sodium chloride (salt), some of which may be dissolved under the influence of rain or cleaning water. Such occurrences are often reported in the scientific literature.

A technique that allows one to paste or attach antique patina particles continuously on a new item is unknown. It is unlikely that it [the patina] was glued on a "three dimensional" vessel like the SOL and without observing such an action under a microscope or in mineralogical tests.

The SOL and the ossuary are both made of stone [limestone], but they and their patinas have apparently a different morphology and different mineral structure. This suggests that the items were subjected to different environmental conditions over long periods of time. The SOL was probably stored in undisturbed conditions (cave?). And it was never cleaned, as was the case in the [James] ossuary inscription. However, it cannot be ruled out that the antiquity dealers used a chemical stabilizer (a preservative to strengthen the patina and prevent it from peeling off).

The crack in the SOL was formed a long time ago and it is very likely that it occurred during the production phase, which would suggest that the lamp was almost unused. The remains of charcoal (soot) were found on the nozzles of the SOL, but obviously the oil lamp had not been used over time.

The SOL is made of chalk (limestone) and no signs of cleaning or intensive treatment can be seen. It should be noted that the isotopic test results on the patina of the oil lamp made by the GSI [Drs. Ayalon and Bar-Matthews] indicate that the composition [of the oxygen isotopes] of the patina of the SOL matches the natural patina development over the centuries in a cave environment near Jerusalem.

In the summary Professor Krumbein stated that "**the patina on the oil lamp is a multi-layered and was also identified in the hidden sections, like in the nozzles. The patina is continuous and consistent throughout the oil lamp. Because of the condition of the artifact that seemed not to be cleaned or to pass serious procedures of treatment as well as the isotopic results, may indicate at some extent, in a high degree of probability that the object "as is" (including the decorations) was created before many centuries. "** (Emphasis is original – A.F.).

Professor Krumbein submitted a final report (N / 189 A) in which he added two comments regarding the SOL as follows: The fact that professor Goren identified mucus-like adhesive structures within the patina (a phenomenon called "Nari") is not surprising, and supports the authenticity of the patina. Professor Krumbein added that in his 1986 article he referred to similar findings observed by Professor Goren and it was interpreted by Professor Krumbein as mucus-like adhesive structures of biogenic activity on the rock, which changed the original rock to calcium carbonate and apatite. These findings were also presented at a scientific conference before the involvement of the Golan's case. About the existence of sodium fluorine and silicone in the patina: According to Prof.

Krumbein, SEM-EDS microscope which the prosecution experts made use of does not give information on the composition of the materials but only identifies the chemical elements and their approximate relationships in the compounds. Therefore, the tools used by the prosecution experts cannot identify adhesives. The tools they used are not quantitative tools and therefore cannot serve as basis for the conclusion regarding the existence of any adhesive patina.

Professor Krumbein was interrogated at length in these issues, and the attorney in his summaries indicated a number of matters which Prof. Krumbein withdrew from his determinations (such as on the mucus-like adhesive structures - T / 207; p. 4965), and a number of problems arising from his testimony. Thus, the attorney questioned the sampling problem of Prof. Krumbein, when it became clear that he does not have a record of the samples because of burglary and theft, and that his report was written after the theft. [Professor Krumbein's laptop was stolen when he visited Russia]. Another issue rose in Professor Krumbein's testimony. Namely, that there is a material that he did not recognize. He noted that while it is not possible toidentify adhesive according to the methods used by the prosecution experts, he cannot rule out this option entirely, and in any case he is not a glue specialist (p 4906-4908).

Mr. Michael Dvorachek

(825-828, summaries by the Judge)

Recall that Mr. Dvorachek is a certified technician working at the GSI. He is an expert in SEM [scanning electron] microscopy who worked with Dr. Ayalon and Dr. Bar - Matthews on the internal committee of the GSI, but here he testified for the defense. Dvorachek, at the beginning of his testimony, explained that the SEM-[EDS] shows only the chemical composition of the elements: "We do not get the composition of compounds, we get only the elements" (p. 8365) and we can detect elements from boron (atomic number is 5) to uranium (atomic number is 92). He also explained the limitations of the instrument such as the fact that its resolution is limited to one micron or so. Therefore, if one examines the two points of half-micron often we get the composition of the two elements together and you cannot separate them. He explained further that not only the chemical composition is important but also the angle of impact of the electron beam of the instrument is important. (pp. 8365-8366).

Dvorachek [having seen the SEM images of the so-called glue], claimed that he did not examine the SOL samples and he said: "it is very, very hard to talk about the results and to analyze things from the picture… we run into a lot of question marks at the end of work" (pp. 8366-8367). However, he has seen the pictures and the results of the prosecution's experts' examinations, and he claimed that he would have examined it in another way, by mapping the elements, but he was never asked to do so. And so Dvorachek's investigation begins: "I would have examined it in a "digitized mapping method." ["Digi-map" = the distribution of the elements made by the SEM-EDS in a map style]. I would have examined all kinds of the important grains of the samples, (should be: suspected – A.F). [it is a typo mistake in the protocol it is written CHASHUVIM = important, and it should be CHASHUDIM = suspected]. They [Ayalon and Bar-Matthews] claim that around each grain there is a glue, I would have mapped all the relevant elements ... So, that you can see if there is smearing, or if it's shaped more or less naturally, I'm not saying it [that digitize mapping method by the SEM] can solve the

problem but it can give a different view altogether. We still may end the job with the remaining of a question. We could get no answer if we are talking of glue. So if it is glue, what I think, and I have no experience with glue, I'm not an expert on glue but just in general, adhesives according to the logic if I was going and wanted to connect something with glue ... I would have looked for a film [a crust], I would have looked for a patch, but I would not… say it is glue? Someone pasted a grain, to glue a grain? I cannot think so. I would have looked for a patch then … to look at it from the side, to section it perpendicularly and to see what's there, maybe it's just a deposit of a natural substance, perhaps it is just calcium carbonate." (P. 8368 -8369).

Several pictures and graphs were presented to Mr. Dvorachek from the report of the presentations of Dr. Ayalon, and he continued to question the assertion that this is glue. He told the court that there are "grains" that he claimed that he would not have examined, because they are not related to the stone itself, they are **"detached from reality,"** and could have been fallen on the sample during the examinations, since this is not a sterile environment (pp. 8372-8375). I suggest that these "detached grains" are organic matter (due to the presence of carbon). The silicone may have originated from the environment [the stone], but I cannot say, and **"I do not see how it is glue."** (p. 8378).

In his cross-examination Mr. Dvorachek claimed regarding the "detached grains" that they were polluted, foreign grains that "fall" on the sample, they should not be considered **…"it is in such a [detached] degree that I would not have checked it…and I never would have reached the question of interpretation."** He said that he has dozens of such samples [with detached grains] that he was not checking them because he had no confidence that they were really connected to the rock. (pp. 8389-839).

Dr. Steve Daren

(829-837, summaries by the Judge)

Dr. Steve Daren is a chemist who graduated from the Weitzman Institute. Today he is an independent [chemist] consultant on a wide range of subjects and therefore not afraid to go into an unfamiliar subject such as archaeology. Dr. Daren prepared a chemical report on the SOL (N / 221). In his report he is detailing his education, expertise and experience and the questions for which he was asked to give his professional opinion.

According to his report Dr. Daren, took 6 samples from the SOL for his examinations: two patinas samples near the decorations, two patinas samples from the bottom of the SOL, one sample from the stone itself and another sample of a black spot, which was different from its surroundings. The samples were examined by SEM morphologically and by the EDS to determine the elemental composition. Each sample was tested up to four different sites. He was told that there is no dispute about the authenticity of the SOL itself, so if someone tampered with the decorations, it is not logical that he had removed [or forged] the patina located on the bottom [inside] of the SOL that could prove the authenticity of the item. Therefore, the question of authenticity is largely limited to whether the patina on the top of the SOL on the decorations is the same or different from the patina inside the lower surface of the SOL. Secondly, there is a substantial difference between natural materials (especially when they are from a biological source) and synthetic materials. The latter can be reconstructed in time and space ("reproducibility"), whereas materials with a biological source are variables depending on their surroundings, time of year and weather. Therefore, by checking the

patina he questioned whether the compositions from the various sites on the SOL are reproducible or not, and whether there are significant differences between the upper patina [of the decorations] and the lower surface patina [from the bottom/ inside] of the lamp. The reproducibility would be an indication of forgery (synthetic) whereas different compositions would be an indication of material which is formed naturally.

Dr. Daren's conclusions in his report were as follows:

No statistically significant differences were found between the mean values of concentrations of the elements taken from the upper (decoration) sampling sites of the SOL (from the decorations) to those at the bottom of the SOL; the level of statistical certainty is 95% variance values. No statistically significant differences were found between the various values (variance values) which indicate the same certainty level. In other words, the patina samples taken from all sites that were tested in the SOL (in the decorations and from the bottom - inside of the lamp) are similar not only in the average concentration of their elements (percentage relative weight of each element) but also their statistical similarity in that the distribution or their variance values is similar. Therefore, there is no statistical difference between the patina samples taken from the top of the lamp and those taken from the base of the lamp regarding the element concentrations, and with regard to the distribution concentrations of these elements in any sample.

The rock of the SOL contains several elements: calcium, carbon, oxygen (calcium - carbonate = limestone / chalk), and traces of fluorine, sodium, magnesium, aluminum and iron, basically the same elements that occur also in the patina.

Later, in his report Dr. Daren referred to the results of the samples examined by Dr. Ayalon and Dr. Bar - Matthews as follows: Dr. Ayalon's graph shows the same wide distribution of concentrations of different elements as found by Dr. Daren, and this wide distribution suggests that the source of the elements in the patina is due to biological activity and/or environmental conditions and activities of the natural weathering of the rock, and not some industrial [artificial] material.

In three of the six graphs the "peaks "(the records) of the fluorine and the sodium are about the same height. In the other three graphs the peaks of the sodium is significantly higher than of the fluorine. This result is not compatible with the presence of a synthetic [artificial] compound of patina - glue or another material- in which the ratio between the two elements will be fixed. In nature, such differences [in peaks of the elements] will be found. Differences in the relative weights of each element in different samples taken from the same object in variable concentrations are typical of the elements found in nature and not typical of synthetic compounds.

The EDS instrument does not indicate the presence of compounds, but only on the presence of elements. Therefore, the statement that the presence of sodium, silicone and fluorine compound indicates the presence of sodium - silicate (with or without fluorine), or glue, or any other compound, attributes to the EDS capabilities which the instrument does not have. Furthermore their elemental relations [between the sodium and the fluorine] are not fixed.

About the source of the silicone - the greatest likelihood is that the silicone is part of a silicone dioxide [SiO_2], silica or quartz or part of a clay mineral and occurs even in the rock itself.

About the source of the fluorine – it is probably connected to the large amount of calcium which is used to a strong bond of the insoluble salt calcium fluoride [the mineral

fluorite; CaF_2]. The rock, chalk of the SOL, contains fluorine as well as the patina, so we cannot say that it is a "foreign" material in the patina.
The inconstant presence of chlorine and sulfur in a sample or two is not surprising. Many microorganisms thrive on these elements, and the randomness of the occurrence of these elements contributes and reinforces the authenticity of the
samples. The presence of the elements aluminum and sulfur in the patina are characteristic of soils rich in clay minerals (e.g. sodium- alumino-silicate) or gypsum mineral (composed of calcium and sulfur) and therefore the occurrence of these elements may also suggest the burial of the SOL in such conditions.

Dr. Daren referred mainly to two arguments: first, the presence of the alleged organic matter, and second, the alleged presence of high concentrations of fluorine, silicone and carbon which the researchers thought was some glue.

Dr. Daren made it clear that an important finding in his report relies on a statistical examination conducted by taking patinas samples from the SOL. He attributes great importance to this "because statistics has no prejudice," that is why he took a number of measurements per sample (up to 4 measurements). The findings showed significant changes in the concentrations of the elements, all the results occur within the range of the standard deviation, which is typical to natural systems, especially for biological systems, that vary according to weather, temperature, humidity and food [supply]. The broad distribution is characteristic to biological systems. There is no difference between samples from the “decorations” zone and those examined from the bottom and inside of the SOL. There were no differences in the morphology nor in the composition of the elements (pp. 8125-8126). Later Dr. Daren explained that the assumption that someone scratched patina and mixed it with some glue and glued it, would result in the standard deviation of the sodium, silicone and fluorine, which composite the glue. We also should observe differences in the concentrations [of the elements] between the top and bottom [inside] of the SOL, but we did not find such differences. Dr. Daren critically reviewed the work of the prosecution experts who had taken patina samples only from the top of the SOL, and not bothered to take patina samples from the bottom of the lamp for comparison and did not carry out several measurements from the same sample (pp. 8127-8130).

Dr. Daren, in his cross-examination, repeated his position that he cannot discard the existence of "sodium silicate" in the patina, but if there is "sodium silicate" "I would expect to see a statistical effect on the concentrations ... the standard deviation of the distribution [of the elements] had to be reduced, because synthetic [homogeneous] material was collected (should be: added – A.F.)” (pp. 8155-8156).

Judge Farkash’s Remarks:

Despite the detailed objections of the prosecution’s attorney, I do not think that they have completely negated all the arguments and conclusions of Dr. Daren, some of which had not been refuted, and it will be clarified later. Dr. Daren performed the examinations he believed are appropriate under the circumstances, which he was asked to perform. That fact alone does not determine that his report of opinion cannot answer the real questions of the disputed issue. Also other experts, including experts for the prosecution, often chose not to perform such tests or take other such aspects and not the others, and that is not wrong at all.

During the cross-examination of Dr. Daren I [the Judge], found out that his report included topics that were not within his expertise, such as on the electron microscopy and the related biological activity he learned from the internet article of Prof. Krumbein (pp. 8155-8158), as complained by the prosecution's attorney in his summation. It should be noted that during his investigation Dr. Daren confirmed from time to time that there are issues that are not in the field of his expertise and therefore he avoided answering these questions that were asked by the prosecution (see, for example in p. 8156). In any case it is clear that a witness expert who testifies not about his field of expertise, generally should be given a low weight of consideration [by the court]. Naturally, this statement applies to all the experts, the prosecution as well as the defense, including the prosecution experts who testified on the "sodium silicate" glue that is not in their field of expertise.

Dr. Shimon Ilani and Dr. Amnon Rosenfeld

(838-843, summaries by the Judge)

Dr. Ilani and Dr. Rosenfeld filed a review on the SOL, co-authored by Dr. Varda Sussman, the Department of Eretz-Israel of the Bar Ilan University [Dr. Sussman is an oil lamp expert] (included in N / 192). They both also testified on the examinations they carried out on the SOL and their conclusions are summarized in their presentations (the presentation of Dr. Ilani - N / 200, p. 71 and later; the presentation of Dr. Rosenfeld - N / 191, pp. 62-74). The conclusions of Dr. Ilani and Dr. Rosenfeld were as follows:

A. The patina of the SOL is of a multi – layered carbonate formation, typical of the carbonate deposition of meteoric water in caves or a niche.

B. The isotopic values of the patina correspond to the formation of the calcite patina under natural condition.

C. According to Professor Krumbein, the presence of oxalates and the presence of the pitting in the patina are typical to micro- fungi colonies and microbial activity that took place over many decades

D. The hard chalk stone of the lamp contains a high amount of silica (10%) which gives a uniaxial characteristic to the stone which makes it excellent for engraving and carving. The rock contains phosphate.

E. The occurrence of the element fluorine in the patina apparently originates from the mineral CaF_2 [fluoride] found in the rock and / or the ground of the cave which has abundant fragmented bones and / or the presence of the mineral apatite (calcium phosphate) as a result of biogenic processes on the lamp;

F. Tests found a match and continuity between the patina of the decoration zones and the patina over the rest of the SOL (if the lamp is ancient, the decorations are also ancient);

G. Examinations by the GSI and tests conducted in the USA by Professor Preuser [Paul Getty Museum in Malibu, California] found no signs or traces of artificial additives or glue in the patina;

H. Examinations in hidden areas that are not accessible by a man (in the nozzles and in the container of the oil lamp) indicate the presence of the same identical patina as on and between the decorations (p 5103);

I. Multi layered patina from another object (or from elsewhere on the oil lamp) cannot be glued on the decorations (the Menorah) of the SOL without crushing the layers of the patina, and without being observed by microscopic examination;

J. Multi-layered patina from somewhere else on the lamp cannot be glued, because it will

not create a perfect contact between the relief of the decorations and the pasted patina and it would not form a continuity with the rest of the SOL;
K. It was not possible to engrave the SOL decorations on the surface of the lamp after emptying the inside of the stone without breaking the lamp or without having in the container a support within the stone. No internal support remains were found inside the stone container.

The prosecution pointed out that, Dr. Ilani and Dr. Rosenfeld tried to publish the article they have written on the stone lamp (N / 192), but various editors refused to publish it because of suspicion of forgery, and later the experts [Ilani and Rosenfeld] by their own initiation asked the editors to withdraw the article because they did not want to publish an article on which the whole world, "says that it is fake" (p. 5101, pp. 5143 and p. 6099). [The authors would like to note that their article including the color plates of the stone oil lamp was lately published (see Rosenfeld et. al., 2010, 2011)].

The main criticism of the attorney is that they examined the SOL with an electron microscope, but in contrast to the prosecution experts they did not find some of the elements the prosecution experts have found and also did not find suspicious particles. This raises doubts about the professionalism of the examinations the defendant experts conducted. And indeed Dr. Rosenfeld confirmed in his testimony that they did not find the fluorine or the sodium, and that if he would have found them, he would have "continued to investigate." (p. 6088, lines:11-21). The prosecution added in his critique that Dr. Ilani and Dr. Rosenfeld tried to give different explanations for the existence of these elements in the patina. Explanations, which "do not hold water." The explanation for the source of the fluorine from the bones is unlikely because of the absence of phosphorus in the patina, and even the defense expert Dr. Daren confirmed this (p. 8121). The explanation which the source of the sodium is from salt is unlikely because of the absence of chlorine, which is a component of salt (sodium chloride) (pp. 4122-4123). However, it should be noted to the credit of the defense experts that in some cases, after they were alerted by their mistake, they agreed with the prosecution attorney that there is sometimes a problem with their explanations and withdrew (pp. 5983-5985; pp. 6090-6091).

[We should note that professor Krumbein (2005) already found the mineral calcium phosphate-apatite in the patina, which indicates that the source of the fluorine could be from the apatite and the fluoride. Fluorine also occurs within the rock (Rosenfeld et al., 2010, 2011) which explains the occurrence of the fluorine in the patina].

Dr. Ilani testified, that his approach on examining the items was primarily a comparison between the composition of the rocks and the patina, and checking the presence of suspicious substances in metals that are found in patinas such as adhesives or anachronistic elements and anomalies, such as plastic particles or glue, which would cause a suspicion of forgery (p. 5594 and p 5656). The prosecution claimed that a sophisticated forger, such as Golan, could make an ideal glue, that does not contain modern materials, but composed of elements that their occurrences in the patina is not suspicious, but combining them together as a glue.

The Archaeological Aspect
[Summaries by the Judge]

Professor Dan Barag

(844-847) Regarding the archaeological aspect, the late Professor Dan Barag testified on behalf of the prosecution. He was an archaeologist, a full professor at the Hebrew University in Jerusalem. His main field was the history of glass in the ancient East, especially the Roman and the Byzantine periods; he also specialized in the study of coins, he was in charge of the antiquity coin collection at the Hebrew University and edited the journal "Land of Israel and its Antiquities." Jewish Art and History of the Menorah was part of his expertise (pp. 2053-2054).

Professor Barag reported (T / 125) in a letter dated May/18/2004 addressed to Ganor [Head of the anti-theft department, the Israel Antiquities Authority], that the SOL is not an antiquity. He reached this conclusion on the basis of several comments relating to shape and style, as follows: A. The shape of the SOL is generally similar to clay and bronze lamps from the Roman period and according to the decorations it imitates the pottery lamps from Judea during the time period between the Jewish War and the Bar - Kochba war (70-135 AD). What surprised Professor Barag was the depiction of the seven - branches of the Menorah together with the decorations of the seven species as well as the shape of the Menorah and especially its base. There are no descriptions of the Menorah on the Jewish War coins and on the Bar - Kochba coins. In conclusion, Professor Barag wrote in the same letter: "The deviation in the form of the bow of the SOL, the strange base and the short seven branches of the Menorah as well as the seven species arouse the most serious doubts about the possibility that the SOL is from the ancient times."

However, in the cross-examination of Professor Barag it became clear that the shape of the Menorah is not so unusual in relation to the descriptions of other Menorahs presented to him. In addition, regarding the base of the Menorah, Professor Barag confirmed that the base can be interpreted as a triangular base, as depicted in other familiar Menorahs (pp. 2075-2077). Professor Barag repeated his doubts whether this is indeed a Menorah or other decorations, including agricultural implements such as a rake (N / 103, p 62), but agreed that there are various hypotheses by various researchers. "It's, difficult, very difficult. It can be a rake or a Menorah; I'd rather say a rake, but .. I will not break out of laughter if somebody will call it a Menorah. "(pp. 2091-2102). Recall also, that the indictment states that among the decorations relief on the SOL there are the "Menorah of the Temple and the seven species."

In his cross-examination it was found that Professor Barag never knew that the prosecution considered the SOL itself as authentic antiquity and only the decorations were forged, and he learned this only from the defense attorney. Professor Barag disagreed with the state's argument on this issue and believed that the entire oil lamp is not ancient. Professor Barag explained that he has not seen, not examined, nor was he interested in other opinions filed in relation to the SOL. "... if the SOL was displayed at the museum and was not an issue, in the court, I am very interested ... that is part of a natural research, but in a situation where the SOL is not in a museum ... I was asked if the SOL is old, I said I think it's not from the ancient time ... [If] I had to write an article on the subject, I would have checked all the reviews, leading to greater detail in the footnotes and the text, as should be done in a scientific work. "(pp. 2060-2062). Professor Barag confirmed that it is possible that after reading the opinions of other

experts he would have changed his mind about the SOL, but no one offered him or asked him to do so (p. 2063).

On the evidence of Dr. Varda Sussman (an oil lamp expert)

Judge Farkash's Remarks: (848)

The defense had not submitted a separate report or opinion on the archaeological aspect. However, the submitted opinions of Dr. Ilani and Dr. Rosenfeld mentioned above (N / 192), was co-authored and also signed by Dr. Varda Sussman Department of Israel Studies at Bar - Ilan University. No one disputes that Dr. Sussman is an expert in oil lamps. She contributed to the typological and archaeological aspect of the SOL in N-192. However, Dr. Sussman was not called to testify and each side argued that not bringing her as a witness worked against the other side. Before we discuss this claim, we will specify below Dr. Sussman's major opinion on the archaeological perspective as written in N-192:

Her opinion was devoted to a discussion about the typology- the shape of the SOL in which some elements of the shape of the lamp are known and others are not known. However, there is no dispute that only a few stone oil lamps were excavated and that most lamps are made of pottery. The conclusion expressed in the discussion is that according to the oil lamp's shape the age of the SOL is consistent with the period ranging from the second part of the Hellenistic period until the mid-second century CE (end of the Bar - Kochba period), namely the Early Roman period. Another discussion was devoted to the decorations on the SOL depicting some of the most important symbols of the Second Temple period, and some from other oil lamps.

About the Menorah [the seven branches candelabra] which decorates the SOL, its shape matches the description that appears in the Bible, but very few artifacts are known to bear a Menorah from the early periods before the destruction of the Second Temple. The earliest Menorah approaching to the shape of the SOL is the Menorah depicted in a Mattathias Antigonus coin. The nearest analogy to the Menorah's style is engraved on the walls of the priest's [house] in the Jewish Quarter. Another depiction is the one that appears near the top of the Arch of Titus in Rome, which was made soon after the destruction of the Second Temple, excluding the (different) base. Two additional Menorah images in the period before the destruction are engraved (with a triangular base) over stones (one discovered in the Old City), and the other a graffiti on the Menorah in the "Jason tomb" in [Rehavia, Alfassi street], Jerusalem. The report also stated that in general it is common to assume that after the destruction of the Temple it was prohibited to draw the seven-branched candelabrum. Professor Barag believed that in the period immediately after the destruction of the Temple the Menorah was not particularly important, and that the Menorah received its special [Jewish] significance only later. It is assumed that the Halacha [Jewish law] prohibited the imitation and depiction of the Menorah on objects, so the apparent date of the SOL must be before 70 CE. If the SOL was made at the time of the South Lamps [Nerot Darom] after the destruction, we should perhaps change the assumption that in this period it was permissible to depict the Menorah. But till now the Menorah's image was not found on the oil lamps after the destruction of the Second Temple until the end of Bar-Kochba's war.[135 CE].

In the summary chapter of the report N / 192, it states that according to the existence of the [Jewish] stone industry in Jerusalem in the first century CE, and

according to the decorations of the Menorah (assuming not to be engraved after 70 CE), the vine grapes (without the rare combination of a cluster grapes) and the palm tree, the SOL should be dated to the first century CE. The physical shape of the SOL is also in agreement with the above date; we find this shape even later. Some other symbols (the wheat, a basket of figs and the pomegranates) are more similar in style to the South Lamps whose production was after the destruction until after the Bar-Kochba rebellion (70-135 CE). In terms of the typology, petrography and religious [Jewish] laws it appears that the SOL was produced in Jerusalem during the first century CE, but determining the exact production time of this unique artifact is difficult to date more accurately, because the style "falls through the cracks" so to speak and therefore may have actually been produced closer to the destruction of the Second Temple. The authors made it clear in their conclusion that this SOL is a unique item but some unanswered questions still remained.

Judge Farkash's Remarks: (849)

According to the defense, the conclusion of the archaeological aspect in N / 192 reinforces the argument that the SOL including the decorations and especially the Menorah is genuine. However the prosecution's opinion that the defense did not call Dr. Sussman to testify suggests that Dr. Sussman was not prepared to defend her position regarding what she wrote about the SOL and/or she changed her mind about the SOL. The court should determine that her testimony was not refuted. Golan's attorney replied in his summation that firstly Dr. Sussman's article was submitted also by the prosecution as part of the documents on T / 155, and therefore the opinion expressed in it can be relied on even without the need of her testimony; Secondly, Dr. Sussman previously worked at the Israel Antiquities Authority and asked not to be involved in this case and not to testify. Thirdly, other witnesses also testified that Dr. Sussman had examined the SOL and expressed a positive opinion about it (e.g. [the antiquity dealer Edie] Shapira, the prosecution's witness, who testified that Dr. Sussman said that the item is "too good to be true" and she was "very enthusiastic about it" (p. 925, line. 10-12)). The prosecution witness Ganor [anti-theft department of the IAA] claimed during his testimony that Dr. Sussman withdrew from her previous opinion about the authenticity of the SOL (p. 3226), but since it was a verbal claim, the burden of proof (bringing Dr. Sussman to testify), should be placed on the prosecution.

The report of opinion N / 192 is signed by the three experts - Dr. Ilani, Dr. Rosenfeld and Dr. Sussman - as one piece and without noting how much each one had written. However, there is no dispute that of the three Dr. Sussman has the expertise on oil lamps, both archaeologically about the shape of the SOL and about the decorations on it. Here, too, it should be noted that most of the expert's reports and articles in this case were submitted in a similar manner, by several writers as a whole, without distinguishing between the parts of the opinion written by each expert, and in some cases not all the authors were being brought to testify.

The report N / 192, was submitted without the objections and without the attorneys rejecting it as an admissible evidence. Thus, formally, there is no reason why not to accept the opinion of Dr. Sussman as admissible evidence although it is apparent, at least in part, that it is hearsay testimony. It is clear that this should be given consideration [references to the law is given here]. In this case, according to the defense attorney's summation, Dr. Sussman declined to be involved and to testify in the court, as

a former IAA worker. This claim was not contradicted by the accuser, and was supported by the testimony of the defense witnesses Dr. Ilani and Dr. Rosenfeld, who testified that Dr. Sussman held the opinion that the SOL is genuine, as detailed in the report N / 192, but when they sought to publish the combined article, she "got cold feet" regarding the "public relations" [campaign] against Golan and the suspicion that he is a forger [this intimidated her] and she withdrew from publishing the issue (p. 5616; pp. 5099-5100, pp. 5143-5144). Remember also, that she was not the only or primary witness that can shed light on the subject, but an additional expert to many other experts who were summoned to testify on this subject, and in any case, the testimony of the defense expert Professor Barag was reserved and not conclusive.

These considerations and other ones were combined and brought me [the Judge] to the conclusion that there is no obstacle in principle to rely fully on the opinion stated in report N / 192 about the SOL, meaning the archaeological aspect, but with the adequate weight that should be given under the circumstances of this issue.

Intermediate Conclusions of the Judge

(851) In the scientific chapter of the prosecution's summary it was claimed re the Stone Oil Lamp: **"... While in itself the conclusion from the evidences does not prove specific fake evidence, but it has a very suspicious data."** According to the accuser, a combination of the testimony of Professor Barag evidence on the subject matter required from Golan to present a convincing factual explanation to the presence of an intact and naturally stone oil lamp and the way it was found, but this was not done. According to the prosecution, by examining all the evidences, including the factual evidence, it brings them to the conclusion that it is a forgery of Golan.

(**852)** I have considered carefully the arguments of the accuser, but I cannot agree with them about it. The evidence described above suggests that the prosecution experts, that I don't doubt their professionalism in their fields, identified in the patina of the SOL a foreign suspicious substance. As non-experts of this ["foreign substance"] they were looking in the literature and in the Internet, and discovered the possibility that it might be "sodium silicate," which they claimed is used as a binder. This conclusion, that the foreign substance is suspected as glue, found a way to cast doubt on the authenticity of the patina. However, as clarified by several defense experts, the electron microscope [SEM] cannot detect compounds, but only elements. Dvorachek testified without anyone disputing his expertise on scanning electron microscopy, and Prof. Dodiuk, Dr. Daren and Prof. Krumbein, and their testimonies on this issue, is accepted by me and was not contradicted.

The defense experts Professor Dodiuk and Dr. Daren indeed confirmed, that they cannot rule out that the elements together in the patina form "sodium silicate," but my conclusion is that this remains a possibility, requiring further testing before we declare it as such in a high degree of certainty more than just a suspicion. I accept the testimony of the defense experts. The prosecution claimed that the foreign material was identified by the prosecution's experts in two different tests (ultraviolet [UV] and electron microscopy). But this does not change my conclusion, as Professor Goren himself testified that his UV examination is a preliminary test and is not sufficient, in any case we are left with the possibility of the existence of "sodium silicate" in the patina.

(**853)** Moreover, it is difficult for me to determine in a criminal process beyond a reasonable doubt, that the finding of the foreign material in the patina is actually "sodium silicate," and this based solely on the testimony of Dr. Ayalon and Dr. Bar - Matthews, who are not experts in this subject. They themselves testified that their conclusion and the documents presented in support of it (T / 140, T / 196 and T / 197) were in an Internet literature search. **I accepted the testimony of Professor Dodiuk an adhesives expert,** who was asked about the documents A / 140 - A / 196, and she testified that **they are not sufficient, professionally, to prove the existence of glue**. As I wondered before, and I repeat to wonder here, Professor Dodiuk was not cross investigated about T / 197, that was the only document that can be considered as scientific literature, which is only an abstract of an article, and I should give it the proper weight. In any case, I doubt whether we can rely on [the abstract] of the T/197 as a proof for the usage and character of the "sodium silicate" because this abstract of an article was not submitted by the appropriate experts that can sufficiently explain it.

(854) The findings and conclusions of Dr. Daren regarding the comparisons which he conducted between the patina on the top of the lamp from the decorations and the bottom/inside of the SOL, which are accepted by me, were not rebutted by the prosecution experts. As Dr. Daren made clear, there is no statistical difference between the patina samples taken from the pieces of the lamp, regarding their relative concentration of the elements and their relative dispersion. The fact is that the results fell within the standard deviation which is typical of natural systems. If an artificial material, such as "sodium silicate," was added to the lamp decorations, one would expect to find significant differences in the element concentrations and a clear statistically significant [between the top and the bottom patina]. Strangely, these comparative tests conducted by Dr. Daren, were not carried out by the prosecution experts. The answer given to this lack of comparison was not a satisfactory explanation (Prof. Goren - pp. 1501-1504, Dr. Bar - Matthews – p. 2612). Dr. Daren criticized the work of the prosecution experts. The lack of comparative testing is particularly puzzling because that was essentially their examination for other items, such as the ossuary, which the prosecution experts emphasized the importance of such comparative testing. Indeed, Prof. Goren admitted in his testimony that there is certainly significance for comparative examination between the different regions of the patina of the SOL, but these tests were not done by them (pp. 1516-1517). As described above, the prosecution's criticism of Dr. Daren is not enough to completely eliminate his conclusions on this subject that was not refuted by the prosecution experts. Recall, for example, that even Professor Barag confirmed that he was asked to give his opinion on a particular aspect of the oil lamp, but he was not faced to all the relevant material, and if he would have seen the relevant material he might have changed his mind about the lamp.

(855) All of the evidences and the testimonies of the archaeological aspect should be added to these provisions. Not only they [the archaeological aspect] did not strengthen the suspicion that the SOL has a fake decorations, but they left many doubts and many questions on this topic. Ultimately, the prosecution expert Professor Barag agreed that the subject is opened to various hypotheses given by different researchers, so that his position on the oil lamp decorations is inconclusive and he might have had a different opinion if he would have been exposed to more relevant material that was not presented to him.

Also the opinion of (Dr. Sussman) in N/192 shows that the possibility that the SOL decorations are authentic decorations is a perfectly reasonable option.

(856) Interim conclusion is, therefore, that there is a reasonable doubt on the question of the forgery of the SOL decorations. …We now turn to examine the factual aspect of the transaction of the SOL and examine whether it has to change this conclusion and to strengthen the suspicion for forged decorations, as argued by the accuser.

(870) The examining of the totality of the evidences in this charge, in terms of both the material and the factual aspect, still leaves in my mind a reasonable doubt about the proof of fake decorations.

(878) The Sale of imitation of antiquity and combined antiquity (Antiquity law): "(a) No person shall sell a copy or imitation of an antiquity and present it for sale without marking it in the accordance to the prescribed regulations, that the artifact is not a reliable antiquity."

(879) In our case [the SOL], the factual foundations for all the above section [of the law], were not proven and it seems that the prosecution abandoned this section in its summation. However, there is left a reasonable doubt about the forgery and it cannot be determined that the SOL is an "imitation of antiquity" or a "combined antiquity."

The Result
[by the Judge Aharon Farkash]

(880) After weighing all the evidences and testimonies for this indictment, there is a reasonable doubt in my mind as to the fake decorations on the Stone Oil Lamp. Therefore:

A. I acquit Golan, by a reasonable doubt, in the violations of counterfeit and aggravated fraud offense as well as an attempted fraud under aggravating circumstances.
B. I withdraw the offense of importing an antiquity abroad without a permit.
C. I acquit Golan from the offense of selling an imitated antiquity or combined antiquity.

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