Presentations by Bob Rucker at the St Louis Shroud Conference in 2025

by Robert A. Rucker, October 10, 2025

The International Conference on the Shroud of Turin was held at the Augustine Institute in St. Louis, Missouri, July 30 to Aug. 3, 2025. Bob Rucker made five 50-minute PowerPoint slide presentations (Ref. 1 to 5) at this conference and assisted with a sixth presentation (Ref. 6). These presentations were based on his papers (Ref. 7 to 9) that are available on the research page of his website www.shroudresearch.net, and on his more recent work discussed below. Two of his recent videos are listed in Ref. 10 and 11.

Science and the Shroud

An objection has been raised against science being applied to the study of the Shroud of Turin. This is because if the carbon dating or images on the Shroud are the result of Jesus' resurrection, then this would be a miracle, and we are not able to use miracles in scientific experiments. Simply put, we cannot repeat Jesus' resurrection in a scientific experiment. But there is a category of science that is often applied to non-repeatable events. It is called forensic science, which applies the scientific method to the results of a non-repeatable event. Examples of non-repeatable events where forensic science is used include examination of physical evidence related to a crime, the study of fossils, the study of past civilizations, and the study of how the present structure of our solar system and distribution of galaxies in the universe came about, etc. Part of the problem probably arises because of a lack of an accurate understanding of words like "miracle", "miraculous", and "supernatural". A person with scientific training will often think these words refer to a logical impossibility, claiming that miracles are ruled out because of the laws of science. To avoid the potential problem in using these words, a descriptive phrase can be used instead such as "this event is beyond or outside of our current understanding of the laws of physics".

The question then becomes how the scientific method can be used in the study of the Shroud of Turin. The goal of the scientific method should be to determine the truth. To determine the truth, the priority should be to follow the evidence where it leads, apart from presuppositions. In dealing with a phenomenon which is not well understood, the process of the scientific method is to develop a hypothesis, which is a concept that is believed to explain or at least be consistent with the evidence. When a person proposes a hypothesis, it should be understood that he is not claiming that the hypothesis is true. Rather, he is claiming that the hypothesis could be true, and in this sense there can be multiple good hypotheses that attempt to explain a phenomenon. For a hypothesis to be considered true, it must be consistent with all the evidence that is believed to be true. A good hypothesis should also make predictions that are testable and falsifiable, which means that testing of a prediction is capable of proving the prediction false. If a prediction is tested and it is proven to be false, then the hypothesis cannot be true, at least as stated. If a prediction is tested and proven to be true, then it would normally increase the credibility of the hypothesis. It may take multiple predictions to be proven true before the majority of researchers would consider the hypothesis to probably be true.

A unique prediction is a prediction that is made by only one hypothesis. Testing of a unique prediction, if proven to be true, normally conveys more credibility to the hypothesis than testing of a non-unique prediction. Thus, a hypothesis should not be regarded as true just because it is proposed, or because it claims to explain certain types of evidence. To be true, a hypothesis must be consistent with all the evidence, but even this is not sufficient for a hypothesis to be considered true. A hypothesis should be considered to be probably true only after testing of the predictions, with the testing proving the predictions to be true. According to this standard model of the scientific method, a hypothesis that does not make predictions cannot be determined to be true or not. A good example of this is the various string theories in modern physics because, so far, they have been unable to make any predictions that are testable. This is because the length of a "string" of pure energy in these theories is so short that they cannot be measured with today's technology.

Since a hypothesis must be consistent with all the evidence, it is often best if the hypothesis is developed from the bottom up starting from a consideration of all the evidence, rather than developing the hypothesis from the top down by starting with a concept that is believed to explain certain aspects of the phenomena. The criteria for evaluating a hypothesis related to the Shroud of Turin can be summarized as follows:

1. For a hypothesis to be true, it must be consistent with all the evidence.
2. A hypothesis should make predictions that are testable, falsifiable, and possibly unique. And when tested, the predictions are proven to be true.

3a. A hypothesis is preferred if it explains more than one mystery of the Shroud.

3b. A hypothesis is preferred if it is simple rather than complex, which often means having a minimum number of assumptions that are beyond or outside of our current understanding of the laws of physics.

3c. A hypothesis is preferred if it is corroborated by one or more diverse areas of study such as Biblical history and theology.

3d. A hypothesis to explain image formation is preferred if it explains how information was used to form the images on the Shroud.

Image formation

The Vertically Collimated Radiation Burst (VCRB) hypothesis is documented in Ref. 8 and 9, with the last revision in October of 2024. The VCRB hypothesis was developed by following the evidence where it led in the process of considering 27 evidences related to the images on the Shroud (Ref. 8). It was concluded that there was probably a vertical oscillation of the nuclei in the body that caused a small fraction of the deuterium (H-2, heavy hydrogen) nuclei to split or fission thus releasing protons that formed the images and neutrons that that produced new C-14 on the cloth that shifted the carbon date forward from the true date. This is the only hypothesis that explains both the image formation and the carbon dating.

The deuterium nuclei would have been preferentially split because they require the least energy to split. This is shown on the far left side of Figure 1, which is the curve of binding energy per

nucleon. A "nucleon" is either a proton or a neutron in the nucleus of the atom, so the number of nucleons in an atom is the sum of the number of protons and neutrons in the nucleus. These protons and neutrons in the nucleus of an atom are held together by an energy loss called the binding energy. To split the nucleons from each other requires this same amount of energy be put into the nucleus. This curve in Figure 1 indicates that to split the proton from the neutron in the nucleus of a deuterium atom requires only slightly above one Mev (million electron volts), whereas all other elements and isotopes are far higher. This means that the deuterium nucleus will require the lest energy to split compared to other atoms, so it will be far more likely to split due to the energy provided by the hypothesized vertical oscillation of the nuclei in the body.

This proton emission would have been throughout the body and vertically oscillating in direction between vertically up and vertically down, thus forming the front and dorsal images simultaneously by the same mechanism while not forming images of the sides of the body, consistent with the images on the Shroud. The protons would have formed the images by the process of depositing their positive electrical charge onto the cloth when they were absorbed on the cloth. They would not have formed the images by radiation damage as in other radiation based image formation hypotheses.

Since, according to the VCRB hypothesis, the protons would have been emitted oscillating between vertically up and vertically down directions, these up-down pulses would have produced an alternating electrical current in the top fibers on the side of the cloth facing the body. A well know effect of an alternating current is that it creates oscillating electric and magnetic fields in and around the conductor that forces the electrons to flow in the outer radius of the conductor, as described in the article "skin effect of an alternating current" on Wikipedia.com. The alternating current in the top fibers on the cloth will thus flow in the thin circumferential region of the fibers, depositing heat there as the electrons collide with the atoms in the fibers. This electrically deposited heat discolors this thin circumferential region of the fibers with the color of a scorch, consistent with the evidence on the Shroud. The higher the frequency of the alternating current, the thinner will be the discoloration around the circumference of the fibers. This is the only concept that has been proposed that discolors only a very thin region around the circumference of the fibers.

Evidence 14 in Ref. 8 is "The density of ion tracks in the image fibers is about the same as the density of ion tracks in the non-image fibers." This observation was made by Ray Rogers. This evidence only proves that if the images were caused by radiation, then the energy of the radiation had to be relatively low, below the threshold energy required to form ions. According to https://en.wikipedia.org/wiki/Ionizing_radiation, "different molecules and atoms ionize at different energies. The energy of ionizing radiation starts between 10 eV (electron-volts) and 33 eV. Thus, evidence 14 might be true because the energy of this radiation was below the energy threshold required to form ions in flax fibers. But if the energy of the protons is too low to make ion tracks in the fibers, only a very small fraction of the emitted protons would escape the body, and those that did would exhaust their energy by collisions with air molecules before they reached the cloth. However, these very low energy protons might still be transported to the cloth if there were a vertically oscillating electric field, perhaps one that either caused or was the result of the vertically oscillating nuclei in the body. Another option is that perhaps Ray Rogers' observation that the image fibers and the non-image fibers had about the same density of ion tracks was the

result of the fire that the Shroud experienced in 1532. This would be the case if the fire caused the temperature of the cloth to be high enough to cause the visibility of the ion tracks to be reduced sufficiently by annealing of the molecular damage in the ion tracks in the fibers. If this had occurred, then the energy of the protons emitted at the time of Jesus' resurrection could have been much higher, for example in the 1.3 to 1.5 Mev range without changing the ion track density that would have been visible in the fibers after the fire in 1532. This range of 1.3 to 1.5 Mev is about the energy required to allow the protons to travel about 4 cm in normal air to reach the cloth, as required by previous studies (Ref. 12).

Electro-Static Effects

An "electro-static effect" is an effect caused by a difference in electrical charge in different regions. This would be due to the positive charge on protons not being exactly compensated by the negative charge on electrons so that different regions could have a different net electrical charge. It is important to know that regions with like charges (positive/positive or negative/negative) will repel each other but regions with different charges (positive/negative) will attract each other.

Multiple static-electrical effects are indicated on the Shroud, including: 1) the probable static or corona discharge between the body and the cloth that caused only the top two or three layers of fibers in a thread to be discolored, 2) "hot spots" on the mustache explainable by corona discharges between the cloth and the whiskers in the mustache that were more vertically oriented, like lightning from a thunder cloud hitting just the tops of lightning rods that are on the ground, 3) the mottling pattern of the discolored threads in the images, similar to the mottled pattern of lightning from a thunder cloud hitting the ground, 4) the section of the Shroud that was above the body evidently being essentially flat above the body at the instant of Jesus' resurrection, as indicated by the face being the correct width rather than much wider which would be the case if the top cloth were wrapped around the head at the instant of Jesus' resurrection, and 5) the body evidently being above the section of the Shroud that was below the body as indicated by the buttocks and shoulders showing no flattening, which would be apparent if the body was laying on the bottom cloth. These last two, the top cloth being levitated above the body and the body being levitated above the bottom cloth, would occur for example if these three items (top cloth, body, and bottom cloth) were all positively charged, since like charges repel and the electrical-magnetic force is orders of magnitude stronger than the downward force due to gravity.

It has been proposed that the body was in a vertical position at the instant of the resurrection due to the hair being separated from the sides of the head. But an alternate explanation for this observation should be considered which would allow the body to be horizontal at the instant of Jesus' resurrection, consistent with the normal position for burial. The hair being separated from the sides of the head in the front image on the Shroud could be one of the many electro-static effects that are visible on the cloth. For example, if the head and the hair were both positively charged, the hair could easily have separated from the head as seen on the Shroud.

The main mysteries of the Shroud are probably the following: 1) how the images were formed, 2) why the Shroud was carbon dated to 1260 to 1390 AD, and 3) how the blood that would have

dried on the body was transferred to the cloth resulting in the pristine appearance of the blood on the Shroud. An example of this last problem is why the blood that would have dried on his arms, with no wounds under the blood, is now on the cloth since dried blood does not absorb into cloth. It seems unlikely that a moistening of the dried blood due to humidity would allow such pristine transfer from the body to the cloth during contact between the body and the cloth. The sharp appearance of these blood stains on the cloth suggests that some type of force lifted this blood off the arms and transferred it vertically up from the body to the upper cloth, across the vertical gap between the two. Perhaps this is explainable by the positively charged protons emitted from the body in the VCRB hypothesis for image formation (Ref. 8). According to this hypothesis, these protons would have been emitted during the very small fraction of a second of Jesus' resurrection. As the protons exited the body, some of them would have been absorbed in the dried blood on his arms. The VCRB hypothesis proposes that a vertical oscillation of the nuclei in the body caused the deuterium nuclei in the body to split thus releasing protons that caused the images. This vertical oscillation of the nuclei in the body could cause, or been caused by a vertical oscillation of an electric field in and around the body, which could have thrust the electrically charged blood on the arms off the body and caused it to travel vertically to the cloth. This option should be included among the other options being considered for how the blood was transferred from the body to the cloth.

Carbon Dating

In 1988, samples were cut from the corner of the Shroud of Turin for carbon dating. When the Shroud is held horizontally with the front image to the left, the samples were cut from the upper left corner as shown in Figure 2. These samples were sent to three laboratories in Oxford, Zurich, and Tucson. These laboratories cut their samples into 3, 5, and 4 subsamples, respectively. Results of the carbon dating of these 12 subsamples are listed in Figure 3 based on Ref. 13. The carbon dates reported in Ref. 13 are in terms of years BP or "before present", where "present" is defined as the year 1950. Use of BP to indicate the year is standard procedure in the carbon dating industry. In Figure 3, these carbon dates BP have been translated to years AD. The statistical analysis of the carbon dates in Ref. 13 is shown in green in Figure 3. The average or mean values for each laboratory (1200 ± 30, 1274 ± 24, and 1303 ± 31) shows a progression from an earlier date to a more recent date as the sample point is moved away from the short end of the cloth, i.e. toward the center of mass of the body, with a rate of change of about 36 years per cm (91 years per inch), as discussed in Ref. 7. According to Ref. 13, averaging these laboratory mean values results in an average or mean rounded value of 1260 ± 31 years, uncorrected. When this value is corrected for the changing C-14 content in the atmosphere, a rounded date range of 1260 to 1390 AD is obtained. This date range of 1260-1390 AD is based on an uncertainty range of two standard deviations, which is equivalent to a 95% confidence assuming the 1260 ± 31 uncorrected date is correct. There are multiple sources of evidence, including other date indicators and the statistical analysis of the data in Ref. 13, that this assumption is not correct, thus invalidating the claim that the date range of 1260-1390 has a 95% confidence.

When the carbon dates for the 12 subsamples are plotted as a function of the distance from the short end of the cloth, with the values plotted at the center of each of the three sample areas, the result is Figure 4. This figure shows that the dates increase from left to right and appear in high

and low pairs. This is difficult to explain unless it is realized that these measured dates are the result of both the true date of the Shroud, i.e. about 33 AD, and the neutron distribution in the tomb, with a small fraction of the neutrons that were emitted in Jesus' resurrection being absorbed in N-14 to produce new C-14 on the cloth. This is important because it is C-14 that is measured in carbon dating. In Figure 4, the increase from left to right is the result of the distribution of neutrons in the horizontal direction (X-direction) in Figure 2 due to the neutrons that were emitted throughout Jesus' body in his resurrection, with the carbon dates occurring in high and low pairs because of the neutron distribution in the vertical direction (Y-direction) in Figure 2. The neutron flux (neutrons/cm^2-sec) decreases as the distance increases from the centerline of the body, so that the higher date is from a position closer to the centerline of the body and the lower date is from a position further from the centerline of the body. This realization allows the subsample locations to be estimated based on their carbon dates compared to the neutron distributions in the tomb. The proposed subsample sizes and locations are shown in Figure 5, with the higher carbon dates across the top of the sample area and the lower carbon dates across the bottom of the sample area, with a general slope upward in the dates from the left to the right. This is the first proposal for the subsample sizes and locations, since no information regarding how the samples were cut into subsamples has previously been available. Future consideration regarding the size and location of each subsample may result in some changes from that shown in Figure 5.

The author's previous conclusions (Ref. 7) regarding the 1988 carbon dating of the Shroud are the following: 1) the stated average carbon date of 1260 to 1390 is to be rejected, i.e. given no credibility, due to the presence of a systematic measurement error that caused the twelve subsample dates to be heterogeneous (not consistent with each other within their uncertainties), as though they were not related to one another, and 2) the best explanation for the carbon dating of the Shroud is that neutrons were emitted from the body, with a small fraction of them being absorbed in N-14 to produce new C-14 atoms on the cloth by the [N^{14} + neutron → C^{14} + proton] reaction. These new C-14 atoms produced on the cloth would have shifted the measured carbon date forward from the true date to the range of 1260-1390 AD. This production of new C-14 atoms on the cloth by neutron absorption caused the systematic measurement error that is evident in the measurement data from carbon dating in Ref. 13. This explanation is called the neutron absorption hypothesis. This explanation is the only hypothesis that can be consistent with the four things we know to be true about carbon dating related to the Shroud: 1) the average or mean carbon date is 1260 ± 31 (uncorrected value), 2) the change in the carbon date as it depends on the distance from the short edge of the Shroud is about 36 years per cm, 3) the distribution (1155 to 1359 AD) of the measured carbon dates for the twelve subsamples, and 4) the measured carbon date of about 700 AD for the Sudarium of Oviedo, which is believed to be Jesus' face cloth. Use of the MCNP (Monte Carlo N-Particle, where N is for Neutrons) computer code in 2013 and 2014, documented in Ref. 7, indicated that the neutron absorption hypothesis is consistent with #1, #2, and #4 above. Additional MCNP calculations were needed to prove it is consistent with #3 because the subsamples are much smaller than the samples, and because there is no documentation how the samples were cut into the subsamples. This was evidently not considered to be an important issue in the process of carbon dating the Shroud in 1988.

MCNP is standard computer software used in the nuclear industry, for design of radiation detectors and shielding design, for medical purposes, etc. It was developed over multiple decades by a team of programmers at the Los Alamos National Laboratory in New Mexico, US. It has

been fully verified and validated to the requirements of US government regulations based on MCNP calculations of thousands of experiments in nuclear facilities.

In 2025, additional MCNP calculations were run to determine whether #3 above would also be satisfied by the neutron absorption hypothesis, i.e. whether the MCNP calculated carbon dates for the 12 subsamples would have a distribution that was in good agreement with the 1988 measured dates. The proposed subsample sizes and locations in Figure 5 were developed to allow the new MCNP calculations of the carbon dates for the 12 subsamples. In Figure 6, the 1988 measured carbon dates for the 12 subsamples are shown in black and the results of the new MCNP calculations are shown in red. There appears to be good agreement in Figure 6 between the MCNP calculations in red and the 1988 measured dates in black, but the question is whether this agreement is any better than the agreement between the 1988 measured dates and an assumption that the Shroud was made in the Middle-Ages between 1260 and 1390 AD. These are two different hypotheses to explain the distribution of the carbon dates that were measured in 1988: 1) the Medieval hypothesis assumes naturalism, so that the distribution of the carbon dates measured for the 12 subsamples is simply due to the Shroud being fabricated during the period of 1260 to 1390 plus the random measurement process used in the 1988 measurements, and 2) the neutron absorption hypothesis assumes neutrons were emitted during Jesus' resurrection, so that the 1988 measured carbon dates result from the true date for the Shroud being about 33 AD plus new C-14 produced on the cloth from neutron absorption based on the neutron distributions in the tomb, with allowance for the random measurement process used in the 1988 measurements. These two options are considered below to determine which is in better agreement with the distribution of the 1988 measured dates for the 12 subsamples.

To determine whether the Medieval hypothesis or the neutron absorption hypothesis is in better agreement with the measured dates, the appropriate methodology is to calculate the chi-squared value for each hypothesis and then compare them. The chi-squared value is obtained by calculating the square of the difference between the measured value and the predicted value for each of the 12 subsamples and then adding them to get the total:

$$Chi^2 = (MV1 - PV1)^2 + (MV2 - PV2)^2 + (MV3 - PV3)^2 + \ldots + (MV12 - PV12)^2$$

where MV = Measured Value and PV = Predicted Value for the 12 subsamples

This will first be calculated for the Medieval hypothesis. The simple average of the measured carbon dates is 1261.2. To minimize the chi-squared value for the Medieval hypothesis, it will be assumed that the Shroud was made in 1261.2 AD (uncorrected date), so that the predicted carbon date for every location on the Shroud will be 1261.2 AD, if there were no measurement uncertainties. The resulting chi-squared value for the Medieval hypothesis is 32.69 as shown in Figure 7. Calculating the chi-squared value for the neutron absorption hypothesis, with the predicted value being the MCNP calculated value, gives a value of 7.30 as also shown in Figure 7. This proves that the chi-squared value is a factor of 4.48 lower for the neutron absorption hypothesis than for the Medieval hypothesis. This indicates that the neutron absorption hypothesis, which is the basis for the MCNP calculations, is in much better agreement with the 1988 measured dates than the Medieval hypothesis. If carbon dating were the only issue being considered, this comparison of the Chi-squared values means that the neutron absorption hypothesis would be more likely to be true than the Medieval hypothesis, since a hypothesis must

agree with the evidence, i.e. the measured values, to be true. However, as stated in the first section of this paper, the final basis for determining which hypothesis is true will be whether predictions made by each hypothesis will be proven to be true when tested.

This important conclusion is the result of the MCNP calculated values in Figure 6, which is only the first iteration of MCNP calculations to find the best fit between the measured values and the MCNP calculated values. This issue arises because according to the neutron absorption hypothesis, the measured carbon dates for the 12 subsamples will depend on their exact location at the instant of Jesus' resurrection. Because their exact location is not known from other considerations, it can only be determined by the location which gives the best fit to the measured values. The same is true for the sizes and locations for the 12 subsamples within the sample area. Thus, the neutron absorption hypothesis will ultimately be phrased in terms of the sizes and locations of the 12 subsamples in the sample area, and the location of the 12 subsamples at the instant of Jesus' resurrection that gives the best fit between the MCNP calculated values and the 1988 measured values. As a result, it should be expected that additional MCNP calculations will ultimately produce a better fit to the 1988 measured values than is shown in Figure 6, which would then produce a lower calculated chi-squared value than the 7.30 value in Figure 7.

Several specifics of these MCNP calculations should be discussed as follows.

1. MCNP 6.3 was used for these calculations. Version 6.3 is the latest version now available.
2. In the MCNP calculations that produced the carbon dates in Figure 6, the location of the 12 subsamples was at the midpoint of the feet in the x-direction and near the outer edge of the feet in the Y-direction.
3. The MCNP calculations output values for the number of neutrons absorbed in N-14 in specified regions, since this is also the number of new C-14 atoms produced in the specified regions. The values that are output by MCNP are normalized to only one neutron in the system, which makes it difficult to derive meaning from the values. To allow accurate comparison of the distribution between the MCNP calculated dates and the 1988 measured values, the MCNP calculated values were renormalized to a simple average of 1261.2 AD which is also the simple average of the 1988 measured dates. This normalization process was done in an EXCEL spreadsheet.
4. The MCNP calculations only included new C-14 produced by neutron absorption in N-14, since this process produces about 96.4% of the total new C-14. Small amounts of new C-14 are also produced by neutron absorption in C-13 (C^{13} + neutron produces C^{14} + gamma) and O-17 (O^{17} + neutron produces C^{14} + alpha particle, i.e. $_2He^4$).
5. The VCRB hypothesis assumes that radiation could be emitted during the process of the atoms in Jesus' body disappearing from our perception of reality in his resurrection. This means that the radiation was emitted during the process of the density of his body decreasing from full density to zero density over a small fraction of a second, perhaps in the milli-second to micro-second range. As a result, this process becomes a time dependent calculation, but MCNP cannot run such a time dependent calculation with the density of the body decreasing from full density to zero density. To simulate the time dependence of this calculation, the process of the disappearance of the atoms in his body, with the associated emission of neutrons, was divided into 10 steps as shown in Figure 8, with a separate MCNP calculation run for each time step. These 10 MCNP calculations were run with atom densities appropriate

for body densities of 95%, 85%, 75%, 65%, 55%, 45%, 35%, 25%, 15%, and 5%. For example, the 95% body density case simulated the body density as it decreased from 100% density to 90%, the 85% body density case simulated the body density as it decreased from 90% density to 80%, etc., and the 5% body density case simulated the body density as it decreased from 10% density to 0% density. The time required to run these 10 MCNP cases on my four-year-old quad core desktop computer was about two weeks with over two trillion neutrons being followed one at a time. Results from these 10 MCNP cases were then combined to simulate the time dependence of the body density decreasing from 100% density to 0% density. The process of combining this data was done in an EXCEL spreadsheet.

Invisible Reweave

Figures 9 to 13 show the problem that exists with the invisible reweave hypothesis when the carbon dates of the 12 subsamples are considered. Figures 9 and 10 show how the invisible reweave hypothesis was originally communicated with a 50/50 mix of new and old material, where the material can consist of threads and/or fabric. It has been proposed that this new material is probably from the early 1500s, possibly about 1520 AD, so Figures 9 to 13 show the new material from 1520 AD in orange above the old material from 33 AD shown in yellow below it. Choosing another date such as 1540 AD makes no difference regarding the conclusions reached below. These figures show the parts of the sample that were sent to Oxford, Zurich, and Tucson. These labs cut their samples into 3, 5 and 4 subsamples, respectively, for a total of 12 subsamples. Figure 9 shows these cuts vertically (perpendicular to the length of the Shroud) whereas Figure 10 shows these cuts horizontally (parallel to the length of the Shroud). Figure 9 shows that a 50/50 mix of new and old material with the subsamples cut vertically results in every subsample being carbon dated to about 810 AD, based on how a 50/50 mix of 1520 AD material and 33 AD material would be carbon dated. This contradicts the average measured carbon date of 1260 AD so it cannot be a 50/50 mix of new and old material. Figure 10 shows that horizontal cuts produce many subsamples that would carbon date to 1520 AD and others that would carbon date to 33 AD. This contradicts the measured carbon dates of the 12 subsamples which have a range of 1155 to 1359 AD, according to Figure 3. Thus, for a 50/50 mix of new and old material, neither vertical nor horizontal cuts produce carbon dates consistent with the measured range of 1155 to 1359 AD for the 12 subsamples.

Figures 11 and 12 show the current concept of the invisible reweave hypothesis with the new/old mix chosen to produce an average or mean carbon date of 1260 AD and with the interface between the new and old material chosen to be sloped to force the carbon date to depend on the distance from the short end of the cloth with a rate of change of about 36 years per cm. To produce a mean date of 1260 AD, the cloth must be 81.2% new (1520 AD) material and 18.8% old (33 AD) material. These values (81.2% and 18.9%) were calculated taking into account the exponential decay of the C-14. Figure 11 shows that with this new/old mix, if all the cuts were vertical, then both the average or mean carbon date of 1260 AD and the rate of change of the carbon date of 36 years/cm would be satisfied. But Figure 12 shows that if all the cuts were horizontal, then all the subsamples would be either 1520 AD or they would be below the lower limit of 1155 AD for the measured dates. This means that with horizontal cuts, none of the subsample carbon dates would be within the measured range of 1155 to 1359 AD.

When the labs cut their samples into subsamples, it is doubtful whether they would have known or cared whether their cuts were vertical or horizontal, so the probability of a cut being either vertical or horizontal was probably equal, i.e. 50% probability for either direction. For this assumption, then for the nine cuts shown on Figures 9 and 10, the probability of all the cuts being vertical would be 0.5 times itself nine times = 0.00195 which is a probability of about 0.2%. If there were 10 or 11 cuts as in Figures 5 or 6 with each cut having a 50% probability of being either vertical or horizontal, then the probability of having all vertical cuts would be at most 0.5 times itself 10 times = 0.1%. This means there would be a 99.8% to 99.9% probability of there being some horizontal cuts, which would cause some, many, or all of the subsample carbon dates to contradict the measured range of 1155 to 1359 AD. Thus, even this 81.2/18.8 new/old mix with a properly sloped interface is very unlikely to be consistent with the measured carbon dates for the 12 subsamples.

Figure 13 considers this 81.2/18.8 new/old mix with a properly sloped interface overlaid onto how the subsamples are proposed to have been cut in Figures 5 and 6. This results in several subsamples being carbon dated to 1520 AD and all the other subsamples having carbon dates below the lowest measured value of 1155 AD, so that none of the subsample carbon dates are within the measured range of 1155 to 1359 AD. This indicates that it is very unlikely for an invisible reweave to produce the carbon dates that were measured for the 12 subsamples. The many other reasons to reject an invisible reweave of the 1988 sample region can be summarized as follows:

1. Photographs in 1978 taken in back-lighting show thread striations that are continuous across the 1988 sample location. This would have been impossible to produce in the early 1500s with a reweave because those doing the reweaving would have been working in front lighting.

2. Careful examination by fabric experts using a modern microscope on the front and back of the cloth found no evidence of a reweave. There is no such thing as a reweave that could not be seen by a modern compound microscope.

3. The location of the interface between the new and old material in Figures 11 to 13, when projected into the surrounding material that still exists on the Shroud, does not show the presence of a reweave.

4. The location of the interface between the new and old material in Figures 11 to 13 does not show evidence of a reweave in photographs taken before the samples were removed in 1988.

5. The connection across the interface between the new and the old material (Figures 11 to 13) might be attempted at the fiber level, with each of the 100 or more fibers in a thread of new material wrapped around one of the 100 or more fibers in a thread of the old material. However, detailed consideration of how this could have been done by hand in the early 1500s for fibers about one-fifth the diameter of a human hair with a hundred or more threads that would have to be connected in this way, leads to the conclusion that this process is not credible.

6. The only other option is that the connection across the interface between the new and the old material (Figures 11 to 13) might be attempted at the thread level using tweezers, with each of the threads of new material wrapped around one of the threads of the old material. However, the result would be visible even to the unaided eye. Thus, there is no credible option that allows the connection of the new material to the old material to be invisible to the unaided eye. The invisible reweave is discussed further in Section 10 of Ref. 7.

References

1. "Carbon Dating and Image Formation on the Shroud of Turin" by Robert A. Rucker, presented at 2:00 PM on the Day-Pass Session at the St Louis Shroud conference, July 31, 2025, using the PowerPoint slides on file "PP for St Louis, Day Pass Session, Carbon Dating and Image Formation, 7-31-25, 36 slides".
2. "The VCRB Hypothesis for Image Formation on the Shroud" by Robert A. Rucker, presented at 4:00 PM on the Academia Track 1 at the St Louis Shroud conference, August 1, 2025, using the PowerPoint slides on file "PP for St Louis-1, Image Formation, 8-1-25, 41 slides".
3. "Neutron Absorption Explains the Carbon Dating Consistent with the Authenticity of the Shroud" by Robert A. Rucker, presented at 11:00 AM on the Academia Track 1 at the St Louis Shroud conference, August 2, 2025, using the PowerPoint slides on file "PP for St Louis-2, Carbon Dating, 8-2-25, 34 slides".
4. "VCRB Hypothesis Explains the Image Formation and Carbon Dating" by Robert A. Rucker, presented at 2:00 PM on the Academia Track 2 at the St Louis Shroud conference, August 2, 2025, using the PowerPoint slides on file "PP for St Louis-3, VCRB Hypothesis Explains the Image Formation and Carbon Dating, 8-2-25, 32 slides".
5. "The Big Picture on the Shroud of Turin" by Robert A. Rucker, presented at 4:00 PM on the Academia Track 2 at the St Louis Shroud conference, August 2, 2025, using the PowerPoint slides on file "PP for St Louis-4, The Big Picture, 8-2-25, 33 slides".
6. "Reasons to Doubt the Invisible Reweave Hypothesis" by José Carlos Espriella Godinez and Robert A. Rucker, presented at 1:00 PM on the Academia Track 2 at the St Louis Shroud conference, August 2, 2025, using the PowerPoint slides on file "Reasons to Reject the Invisible Reweave, slides 1-155, RAR 8-2-25".
7. "Solving the Carbon Dating Problem for the Shroud of Turin" by Robert A. Rucker, Paper 33 on his website www.shroudresearch.net
8. "Hypothesis for Image Formation on the Shroud of Turin" by Robert A. Rucker, Paper 34 on his website www.shroudresearch.net.
9. "Nuclear Analysis of the Shroud of Turin" by Robert A. Rucker, Paper 35 on his website www.shroudresearch.net.
10. "Image Formation on the Shroud of Turin" at https://www.youtube.com/watch?v=Qt8U7f7yCdM&t=38s
11. "Latest Progress on the Shroud of Turin" at https://www.youtube.com/watch?v=Ow7wE_Bynr8&t=921s
12. John P Jackson, Eric J Jumper, William R Ercoline, "Correlation of Image Intensity on the Turin Shroud with the 3-D Structure of a Human Body Shape"
13. P.E. Damon, and 20 others, "Radiocarbon Dating of the Shroud of Turin", Nature, Feb. 16, 1989

Figure 1.

Binding Energy Per Nucleon

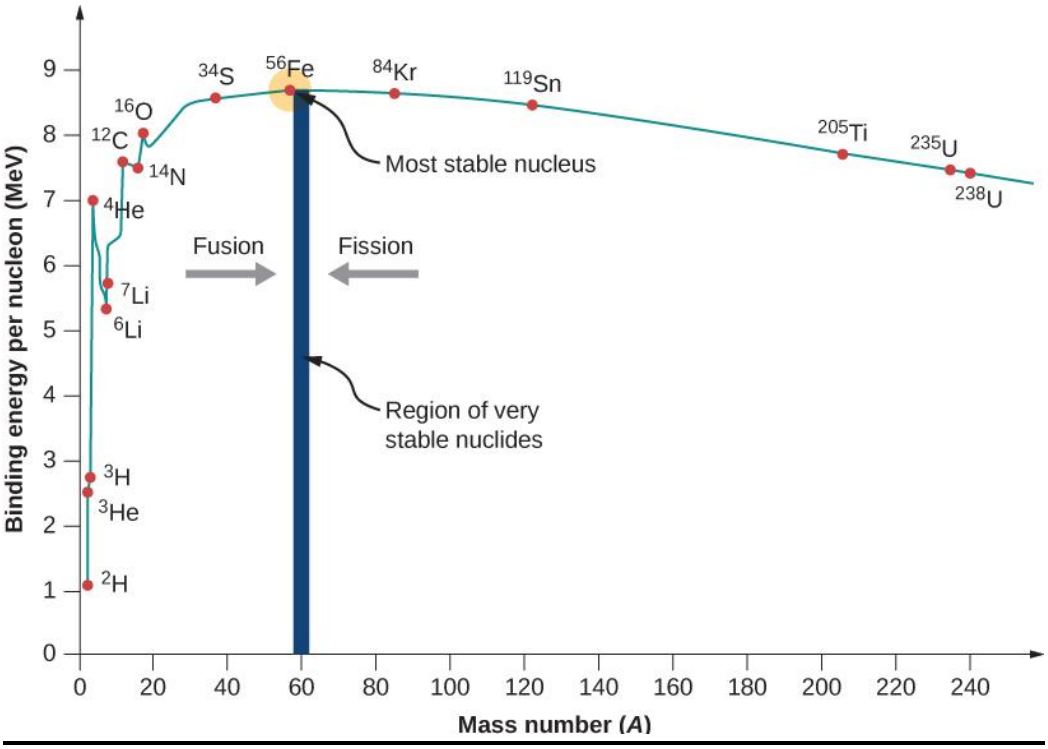
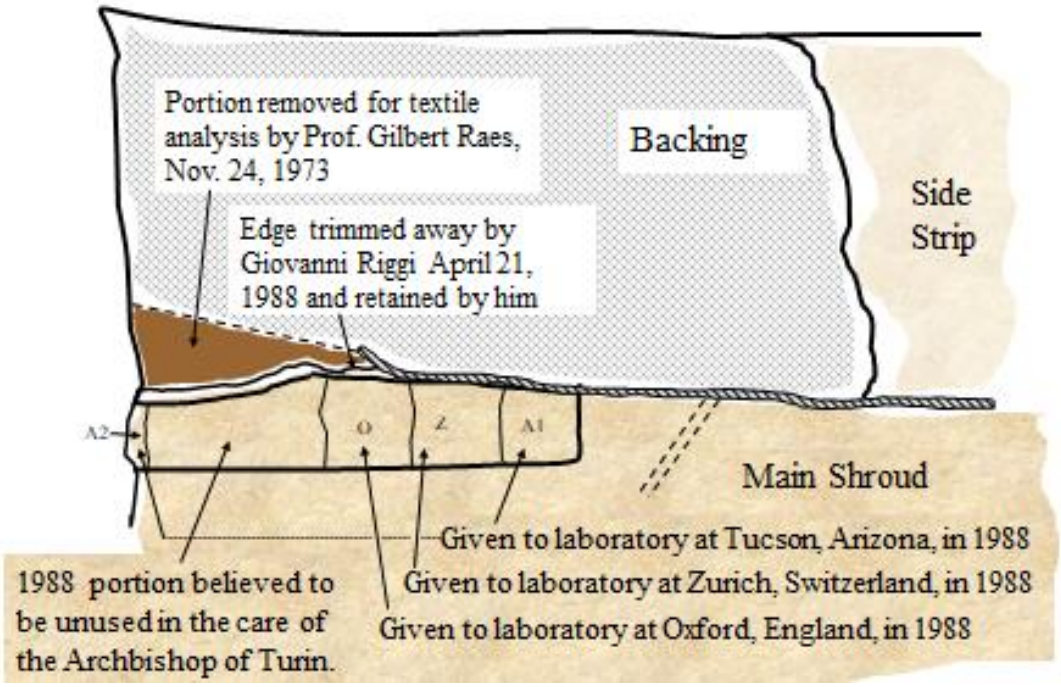


Figure 2.

Location of Samples



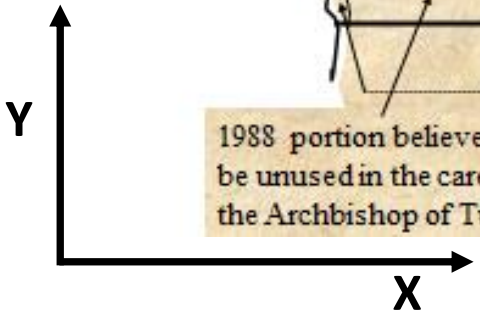


Figure 3.

Values Listed in Damon, et al:

1988 Carbon Dating Results (A.D.)

Oxford	Zurich	Tucson
1155 ± 65	1217 ± 61	1249 ± 33
1205 ± 55	1228 ± 56	1260 ± 35
1220 ± 45	1271 ± 51	1344 ± 41
	1311 ± 45	1359 ± 30
	1315 ± 57	
1200 ± 30	1274 ± 24	1303 ± 31

1260 ± 31

→ 1260 to 1390 when corrected

Figure 4.

Carbon Dates are in High and Low Pairs

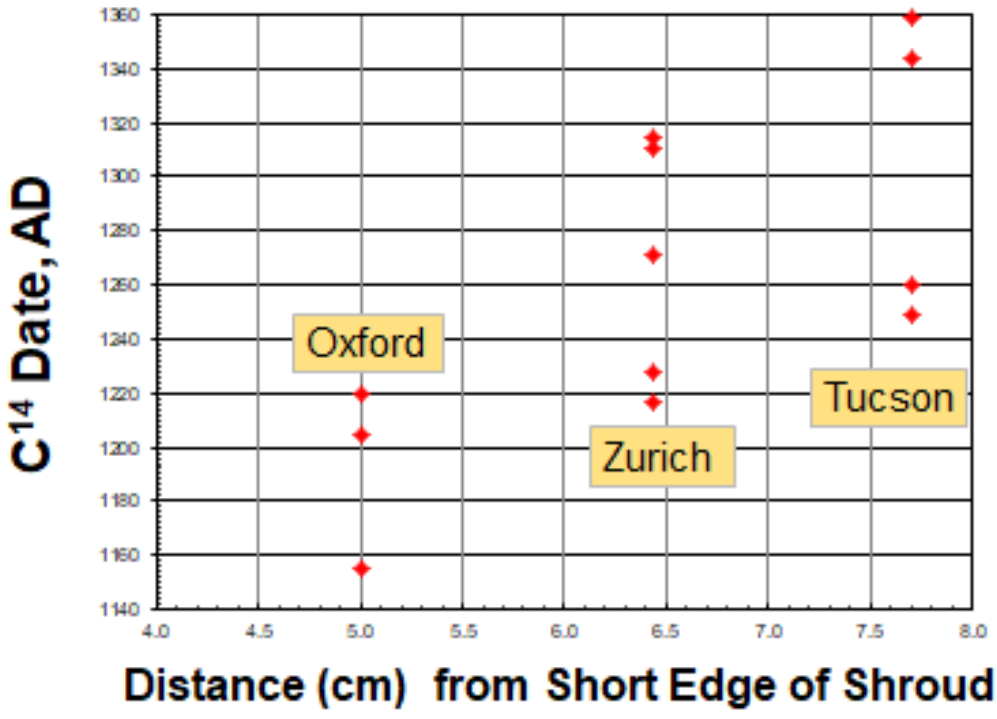


Figure 5.

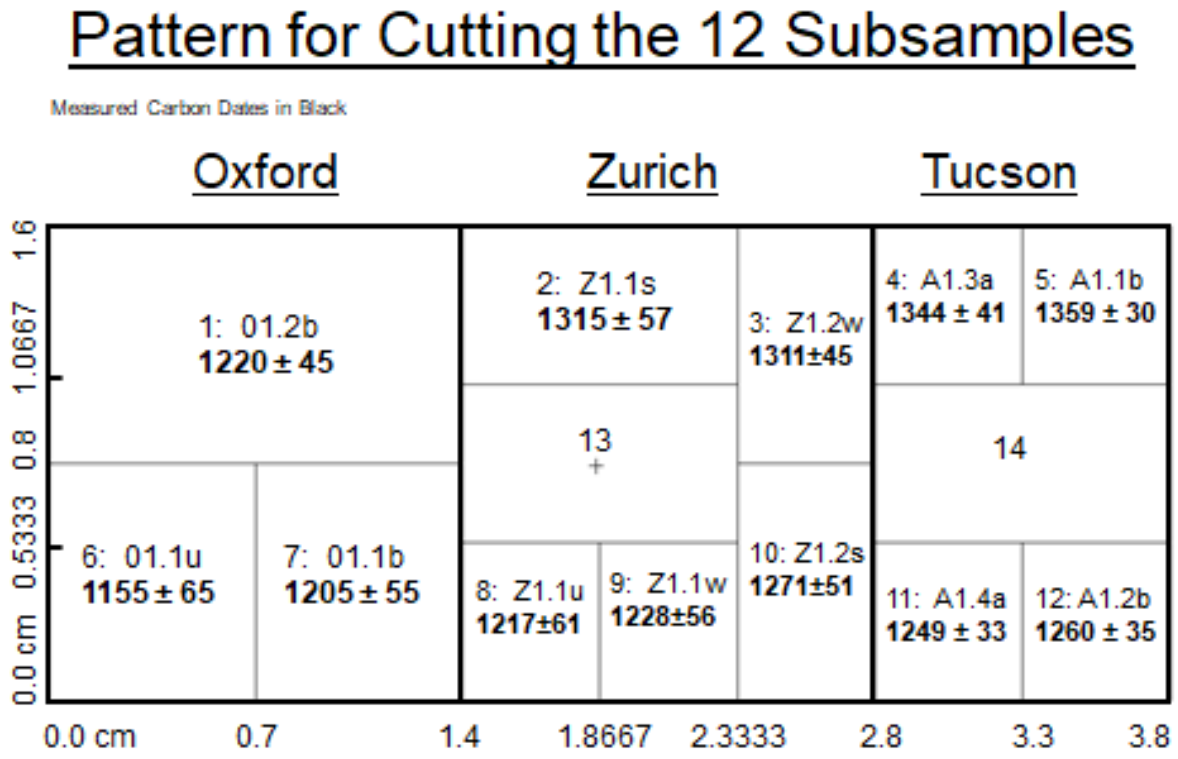


Figure 6.

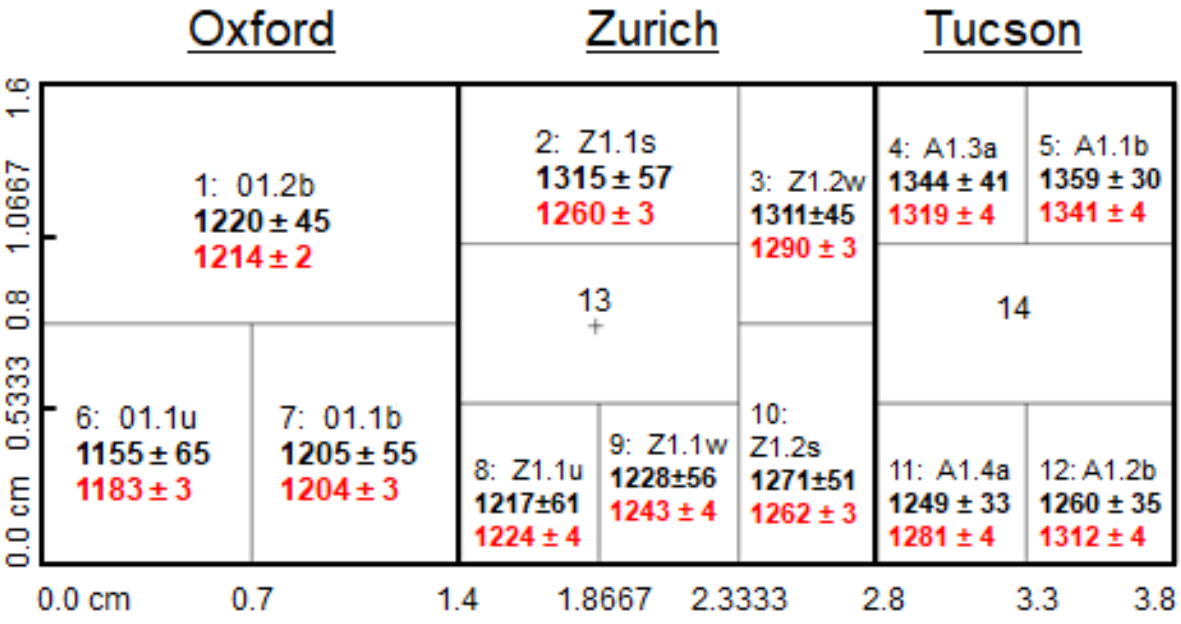


Figure 7.

Calculation of Chi-Squared for Two Hypotheses

					Renormalized	
		Measured	Medieval Date		MCNP Region 371	
	Sub-	Carbon	Carbon	Chi	Carbon	Chi
	Sample	Date	Date	squared	Date	squared
	1	1220	1261.17	1.343751	1214.03	2.9332E-02
	2	1315	1261.17	2.297894	1260.17	2.3857E+00
	3	1311	1261.17	1.969098	1290.13	3.3776E-01
	4	1344	1261.17	5.440487	1318.75	4.8358E-01
	5	1359	1261.17	7.589291	1341.44	2.2979E-01
	6	1155	1261.17	8.937249	1183.47	6.8482E-01
	7	1205	1261.17	2.501410	1203.95	9.1763E-04
	8	1217	1261.17	1.546738	1223.54	3.4936E-02
	9	1228	1261.17	0.872230	1243.48	1.9262E-01
	10	1271	1261.17	0.076671	1262.18	6.1617E-02
	11	1249	1261.17	0.117374	1280.85	7.9183E-01
	12	1260	1261.17	0.001079	1312.02	2.0627E+00
	Sum =	15134.00	15134.00		15134.00	
	Average =	1261.17	1261.17		1261.17	
Total chi-squared =				32.69		7.30
Medieval/MCNP ratio =						4.48

Figure 8.

Disappearance of the Body is Simulated in 10 Time Steps

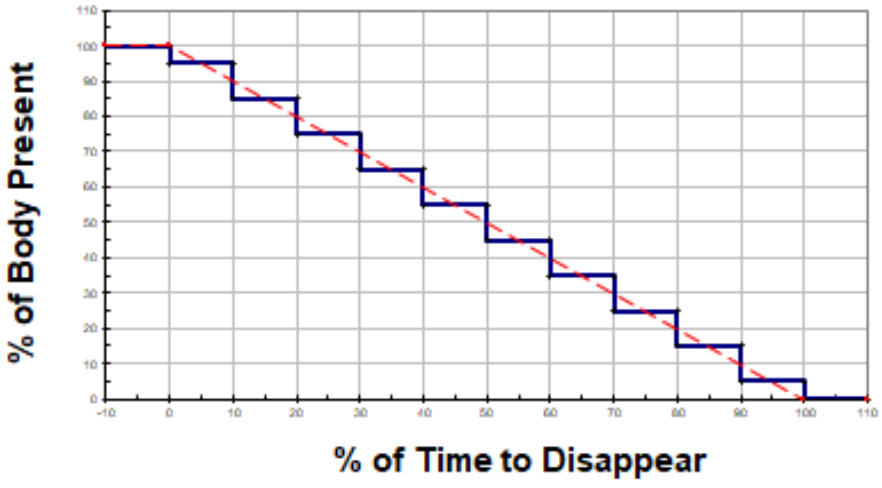


Figure 9.
Invisible Reweave with a 50/50 Mix
of New (1520 AD) & Old (33 AD) Material

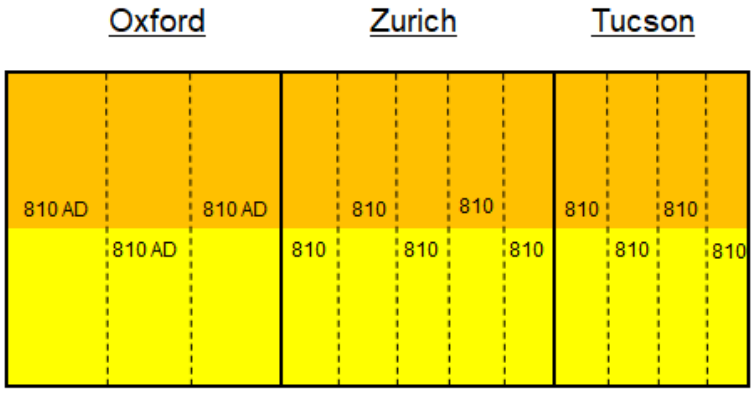


Figure 10.
Invisible Reweave with a 50/50 Mix
of New (1520 AD) & Old (33 AD) Material

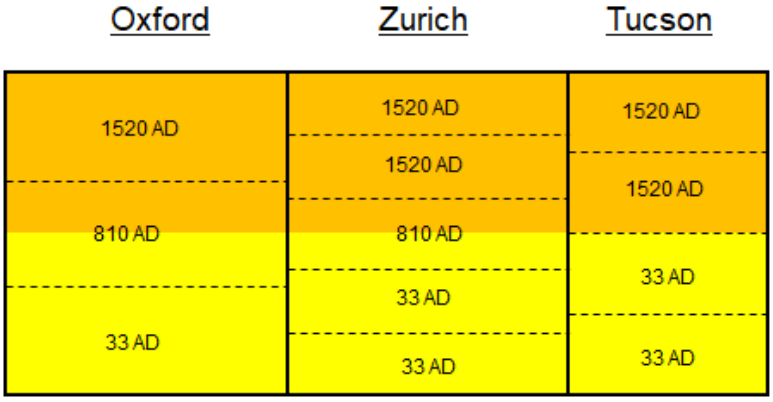


Figure 11.
81.2/18.8 Mix of New (1520 AD) and
Old (33 AD) Material with a Sloped Interface

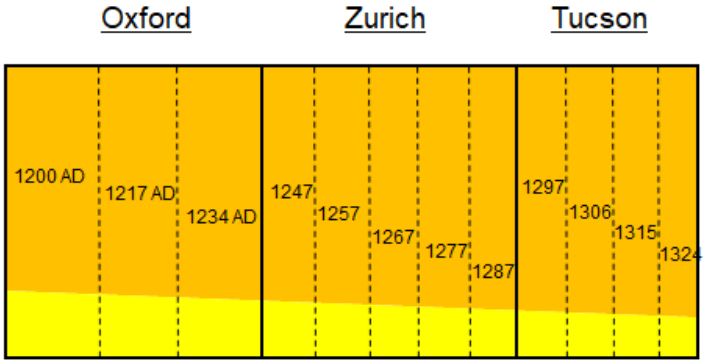


Figure 12.

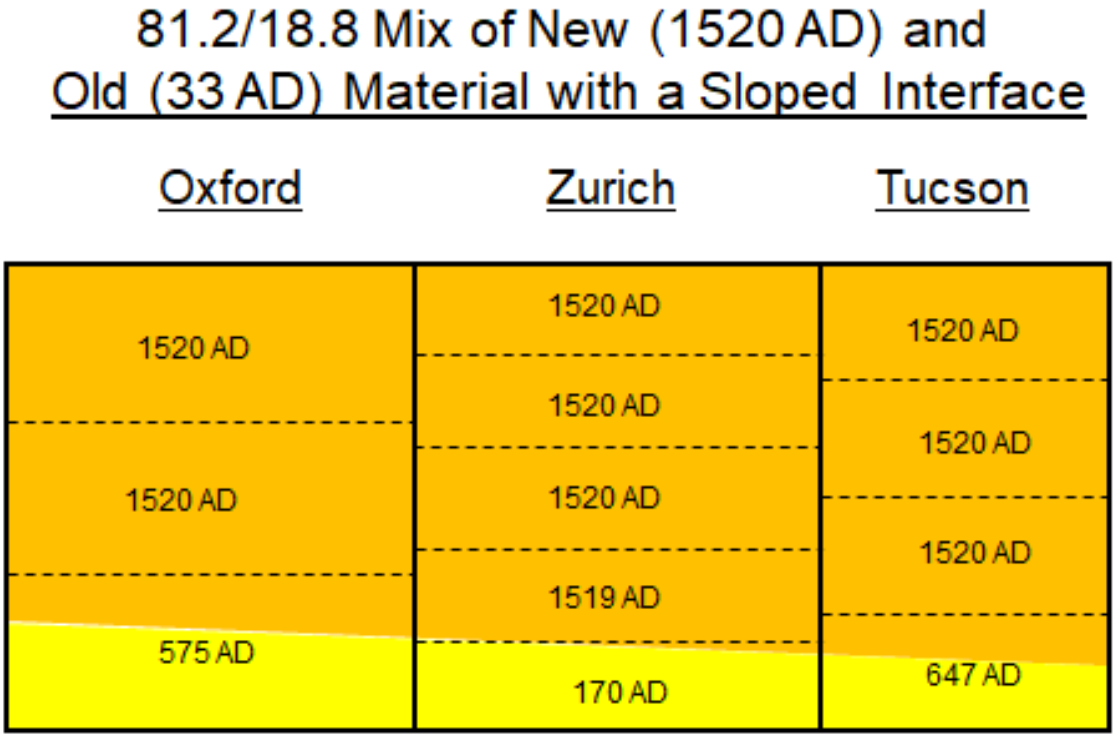


Figure 13.