Shroud of Turin Website http://www.shroud.com STERA, Inc.

Roberto Villarreal

THE ALPHA-PARTICLE IRRADIATION HYPOTHESIS

INTRODUCTION

- The Prologue: In the beginning was the word…
- “No one has ever seen God. The only son, God, who is at the Father’s side, reveals him.” -John JN 1:18
- The first public appearances of Jesus open with the witness of John the Baptist to the Paschal Lamb of God.
- Nicodemus – a member of the Sanhedrin was a willing believer but could not understand Jesus as he gave him metaphors, explanation and examples. Yet, he did not understand what Jesus meant by “Spirit” and “From Above.”

INTRODUCTION

- The Samaritan woman at the well was open to Jesus' word but could not understand Jesus as he spoke of "Living Water."
- The remainder of the gospel was Jesus' confrontation with "The Jews" as he confronted them with seven miracles.
- **In a personal communication with Ray Rogers, he reiterated that the fibers from the body images in some way weakened the Shroud fibers to become more friable.** This is something I remember, because it initiated a thought for the **Alpha-particle Irradiation Hypothesis**.

CONTINUOUS REVELATION OF THE SHROUD OF TURIN

- The reality of the crucifixion began with the blood flow from the scourging, then the crown of thorns followed by physical beating and nails through the wrists and feet and finally the lance thrust through his side when the cross had been lifted up.
- The body of Jesus had to be soaking wet with sweat and other emanated fluids that were attracted to radon gas accumulated from the solubility of the radon gas in the fluids.
- The blood flows from the wrists down the arms and feet on the cross and the crown of thorns were flowing down the body according to gravity.

CONTINUOUS REVELATION OF THE SHROUD OF TURIN

- After the cross was implanted vertically, the blood flows were down toward the ground
- When Joseph of Arimathea brought the body and laid it flat on the stone bench in the tomb and with the linen cloth placed over and under the body, the flows changed direction and partially ceased, and were absorbed by the linen cloth. The image of the blood flows remained part of the history of the crucifixion of Jesus.
- Apparently, this was to become a relic that was to be revealed even today. More events that caused the image of Jesus on the linen cloth were to come much later; 1898 photography negative images, 1931 confirmed 1898 images, and 1976 3D images and more updated photos of the images.
- Now the image formation process is studies by analyzing alpha emissions from the decay chain daughters of an inert gas, radon 222.

INTRODUCTION

- In John's Gospel, Jesus is in total control of his own destiny even after his resurrection.
- In several accounts when "the Jews" were about to capture Jesus and do him harm, he escaped by changing his features?
- Judas Iscariot offered to overcome this feature-changing ruse by "kissing Jesus" so the guards would know they had the right man.
- But Jesus himself knew how to "hide himself" by becoming incorporeal but at this time he wanted to obey what scriptures had said about the necessity of his death and resurrection.

INTRODUCTION

- The Gospel of John introduced many statements and ideas foreign to the synoptics and brought forth John the Baptist and perhaps associations with the Essenes and other key personnel in the Essene Quarter of Jerusalem.
- The Essenes could well have been associated in providing a crowd for Jesus to process into Jerusalem, and certainly provided the upper room for the last supper, and subsequent meeting place of the disciples for the foot washing and post-resurrection disciple meetings under locked doors.

INTRODUCTION

- The Jews were following a lunar-based calendar and the Essenes and John's Gospel were following a solar based calendar. So the synoptics time for the Jewish Passover was ~4 days after the Essene calendar used in John's Gospel. So John's Essene calendar is certainly different from the lunar calendar of the Jews. This reflects how different John's Gospel is from the synoptics.

INTRODUCTION

- After the discovery of the Dead Sea scrolls in 1947, John's Gospel gained new respect and was found to be more accurate than the synoptics which was a reversal of almost 2000 years.
- John's Gospel has resulted in new meaningfulness of how Jesus is portrayed in the Shroud of Turin.

INITIATORY, CRUCIFIXION, AND POST-RESURRECTION ACTIVITIES

- All four Gospels narrate the crucifixion of Jesus and it takes portions of all gospels to obtain the most accurate of these activities. Jesus was crucified on Friday at 9:00 am. Included in Matthew's account are the following:
  1. "From noon onward darkness came over the whole land until 3:00 pm in the afternoon." The assumption can be made that darkness could mean the manifestation of evil during this catastrophic period. Also, it could mean that cloudiness was pervasive for this period. And it could certainly mean that there was an atmospheric inversion.

INITIATORY, CRUCIFIXION, AND POST-RESURRECTION ACTIVITIES

2. “And behold, the veil of the sanctuary was torn from top to bottom.” This refers to the inner veil being torn because with the death of Jesus, all people have access to the presence of God.” The rending of the veil of the temple indicates the way to God the Father is now opened and the new covenant, sealed with the blood of Jesus, has begun to operate.

INITIATORY, CRUCIFIXION, AND POST-RESURRECTION ACTIVITIES

3. "The earth quaked, rocks were split, tombs were opened, and the bodies of many saints who had fallen asleep were raised." The Gospel accounts narrate that the tomb that was used for Jesus' body was a new tomb that had just been completed for Joseph of Arimathea. The limestone burial lot had been newly hewn by hand and no one had been placed there up to this time. This is in keeping with Jesus riding a donkey or foal of a donkey that had never been ridden before. There may have had to be some divine help at this point.

THE LIMESTONE TOMB

- Limestone throughout the world contains U at different levels because the half-life of U-238 is about 4.47 E 9 years which is close to the age of the planet Earth (4.54 E 9 yr.). The U-238 is typically 2 parts-per million to 100 parts per million depending on the composition of that particular segment of ore.

THE LIMESTONE TOMB

- In Jesus' limestone tomb the concentration could be 2-10 parts per million uranium. The isotope with a long half-life is U-238. All U-238 decay chain series elements are in a state of equilibrium as is shown in Table I. When the decay chain series passes through Rn-222 (3.824 d), an interesting phenomenon occurs, Radon - 222 is a gas and is contained within the limestone matrix but some of the gaseous Rn is channeled through cracks in the rock matrix and released to the environment. This occurs while the Rn-222 is a gas because it will decay to Po-218 which is a solid as is the remainder of the decay chain series.

THE DECAY CHAIN SERIES

- This decay chain series is illustrated graphically by Figure I and Table I.
- Statements by Centurion
  - While Jesus has already yielded up his spirit (died) and was still hanging from the cross, an earthquake occurred. When the centurion and those who were with him, keeping watch over Jesus, saw the earthquake and what took place, they were filled with awe, and said, “Truly this was the Son of God!” (MATT 27:54).

FIGURE I

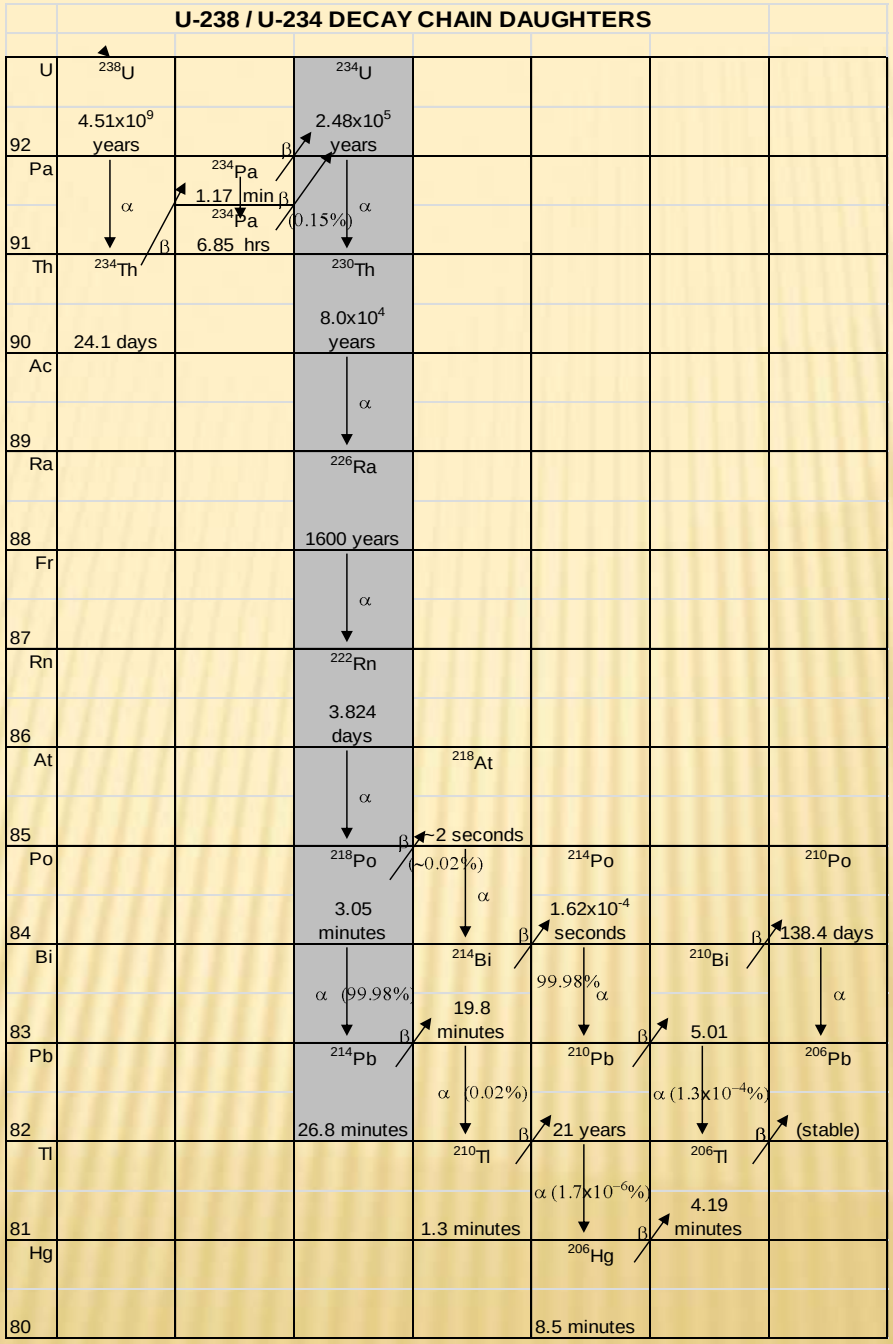


TABLE I: U-238 DECAY CHAIN SERIES

Radioactive Element	Half-Life	Decay Mode	Energy Mev
U-238	4.47E+009	α	4.197
Th-234	24.1 d	β	0.198
Pa-234	6.69 h	β	0.480
U-234	2.46 E 6 yr	α	4.776
Th-230	7.54 E 4 yr	α	4.688
Ra-226	1599 yr	α	4.784
Rn-222	3.824 d	α	5.489
Po-218	3.10 min	α	6.002
Pb-214	27 min	β	0.670
Bi-214	19.9 min	β	3.270
Po-214	163.7μ sec	α	7.687
Pb-210	22.6 yr	β	0.017
Bi-210	5.01 d	β	1.162
Po-210	138.38 d	α	5.304
Pb-206	Stable		

U-238 $t_{\frac{1}{2}}$ = 4.51 x 10^9 yr (99.2745%)

U-235 $t_{\frac{1}{2}}$ = 7.04 x 10^8 yr (0.072%)

U-238 activity = $dN_1 = N_1\lambda_1$ $\frac{dN_1}{dt} = N_1\lambda_1$

U-235 activity = $dN_2 = N_2\lambda_2$ $\frac{dN_2}{dt} = N_2\lambda_2$

U-238 activity = $\frac{dN_1}{dt}$ = (1 gm) (0.992745)
(6.02 x 10^{23} atoms/gm atom) (λ_1)

U-235 activity = $\frac{dN_2}{dt}$ = (1 gm) (0.00720)
(6.02 x 10^{23} atoms/gm atom) (λ_2)

U-238 $\lambda_1 = \left(\frac{0.693}{4.51\ x\ 10^9 yr \left(365 \frac{day}{yr}\right)(1440\ \text{min}/\ day)} \right)$

$= \frac{0.693}{2.92\ x\ 10^{-16} min^{-1}} = 2.37\ \text{x}\ 10^{-17} min^{-1}$

U-235 $\lambda_2 = \left(\frac{0.693}{(0.00720)\left(6.02\ x \frac{10^{23} atoms}{gm-atom}\right)(7.04\ x\ 10^8\ yr)} \right)$

U-238 $\lambda_1 = \frac{0.693}{(238)} = 2.92\ \text{x}\ 10^{-16} min^{-1} = 733{,}226$ d/min/gm

U-235 $\lambda_2 = \frac{0.693}{(235)} = 1.26\ \text{x}\ 10^{-4} min^{-1} = 575$ d/min/gm

U-238 = 733,226 α's per min/gm or 174,507,788 α's/mole

U-238 is in dynamic radioactive equilibrium with each decay chain daughter.

Rn-222 theoretically has an equivalent activity per mole of Rn-222 a rare earth gas; 22.4 liters/mole.

The general equation that governs the amount of Ra-226 and Rn-222 from decay of the U-238 chain is given as:

$$N_2 = \frac{\lambda_1 - \lambda_2}{\lambda_2 - \lambda_1} \frac{dN_1/dt}{\lambda_1} e^{-(\lambda_2 t)} + \frac{dN_2/dt}{\lambda_2} e^{-(\lambda_2 t)}$$

And re-arranging:

$$\frac{dN_2}{dt} = \frac{\lambda_2}{\lambda_2 - \lambda_1} \frac{dN_1}{dt} (e^{-(\lambda_1 t)} - e^{-(\lambda_2 t)}) + \frac{dN_2/dt}{\lambda_2} e^{-(\lambda_2 t)}$$

Where $\frac{dN_1}{dt}$ = activity of U-238 given in moles/gm

$\frac{dN_2}{dt}$ = activity of Rn-222 given in moles/gm

$\frac{dN_1}{dt}$ = U-238 = (0.99274) (6.02 x 10^{23} atoms/gm-mole) (2.92 x 10^{-16}) = 175,784,000

$\frac{dN_2}{dt}$ = Rn-222= (6.02 x 10^{23} atoms/gm-mole) (1.26 x 10^{-4})

$\frac{dN_1}{dt}$ = U-238 = (1 mole) ((0.99274) (6.02 x 10^{23} atoms/gm-mole) (2.92 x 10^{-16}) = 1.75 x 10^{8} d/mol

$\frac{dN_2}{dt}$ = Rn-222= (1 mole) (6.02 x 10^{23} atoms/mole) $\left(\frac{0.693}{(3.824day)(1440\frac{min}{day})}\right)$

= (6.02 x 10^{23}) (1.26 x 10^{-4}) = 7.58 x 10^{19} d/min/mol

These calculations give an indication of the activity of Rn-222 in the tomb based on assumptions of the physical volume of the interior of the tomb. Scripture tells us that as many as 2 or 3 people were able to be in the tomb and that in John's Gospel that John bent down to view the inside of the burial chamber, but they did this by looking through the hole that was covered by the huge stone that had been removed and so the interior of the tomb was relatively large and dimensions can be approximated from drawings as 10'2" length, 4.5' depth, 32-36" height and for an approximation of 203,000 $inches^3$.

The amount of limestone rock that could have released Ra-222 into the tomb is estimated as

$V_2 - V_1 = 770{,}556\ cm^3$ of limestone

$(770{,}556\ cm^3)\ (\frac{2.8\ gm}{cm^3}) = 4.3 \times 10^6$ μ U or

4 gm of U in surface of internal volume.

(4 gm U-238) (7.33×10^5 d/min/gm) = 2.93×10^6 d/min

This estimation of 2.93 x 10^6 d/min or α's per minute is the power of alpha-radiation on the cloth and is certainly a large fluence (flux x time) to yield an image of a human being that is within the mean free path length of an alpha-particle (4-6 cm depending on energy). The statement that the alpha-particles are what created the image because the limit of the alpha particles in air is totally consistent with the limit of the presence of an image–cloth distance on the Shroud image of 4-6 cm. This measurement is quite revelatory alone. It points to the attraction of the body, especially the hair and beard to draw Rn-222 and be a source of alpha-particles that gave an image of what was on the burial cloth.

FIRST EARTHQUAKE

- We do not know if the earthquake was local or general but the reaction of people (notably women) was that the earthquake was local to that immediate area and the Rn-222 that was in equilibrium with radioactive U-238 that was an elemental isotope of natural uranium. The uranium would initiate a U-238 decay chain that would include Rn-222 as part of the decay chain that would end with stable lead (Pb-206). The decay chain of U-238 to Pb-206 is given in Table I and Figure I below.

U-238 TO Rn-222

- Once the U-238 decay chain series progresses to Ra-226 as shown in Table I, it has decayed by alpha-particle and beta-particle emissions. Each alpha-particle emitted has an energy of ~5 MeV and becomes a bombarding alpha-particle that is slowed by many scattering collisions (Rutherford Scattering) with other atoms and particles until the 5-MeV alpha-particles approaches the velocity (energy) of a K-shell electron at which point captures two electrons to become a neutralized $^{4}_{2}$ He atom or molecule. The emitted alpha-particle has become a noble gas (inert gas) and retains the properties of He gas.

Ra-226 TO Rn-222

- In the process of becoming Ra-226, a solid element with a half-life of 1599 years and retains the properties of radium but it is radioactive and decays to Rn-222 with a half-life of 3.824 d and during its life as an inert gas with a density of 9.73 gram/liter as compared with air of 1.0 gram/liter. This radium particle to gaseous radon transformation is unique to the periodic chart and chart of nuclides but is critically important to the formation of the image created by the alpha-particles bombarding the burial shroud from a distance of less than 4-5 cm of the body of Jesus is the source of alpha particles. Ra-226 has historically been important because it was the principal isotope that allowed watches to light up so you could see them in the dark.

PROPERTIES OF Rn-222

- The gaseous chemistry of Rn is only temporary but during its short half-life of 3.824 d it will seek the low cool or colder places and if humans are around it will contaminate their clothes and will cause irradiation of the lungs with decay alpha-particles. The very heavy Rn-222; while it is still a gas will seek low places as expected and be attracted to charged clothes and will be quite radioactive. Hair is an excellent home for Ra-222 and contaminates people during atmospheric inversions.

RADIATIONAL INVERSIONS

- Release and concentration of Rn from radiational inversions are common and happen when cold air is trapped near the surface and warm air is layered above the cold air. The ground is more conductive than the air and old air that is next to the ground will form a cold-air trap. Radon will be trapped by the cold air and will concentrate to be a radiation hazard to workers especially in basements and depressed areas. This is the probable situation when they placed Jesus' body on the tomb bench on a long wintry night.

INTRA-TOMB ACTIVITIES

- After Joseph of Arimathea received and lowered Jesus' body from the cross, he and his helpers and perhaps Nicodemus took him to a nearby garden that had a fairly recent tomb completed. Other nearby tombs had been constructed of caves dug into the limestone. There they placed Jesus' body and conducted certain preliminary preparations according to Jewish Tradition and placed a single large linen burial cloth under and over the body and closed the tomb with a large rolling stone.

ALPHA AND BETA DECAY PROCESSES

- An alpha-particle consists of 2 neutrons and 2 protons and each proton has a +1 charge (+2 total) whereas the 2 neutrons have about the same mass as a proton but are not charged. The rest mass of an alpha particle is about 6.644×10^{-24} gm, however, an alpha-particle released from an atomic nucleus will have a different mass because of relativistic considerations.

ALPHA AND BETA DECAY PROCESSES

- Radioactive elements that are actinides or below have various degrees of stability according to the ratio of neutrons to protons in the element. A neutron-rich radioisotope is more likely to emit an alpha-particle to balance the excess energy or the excess protons or neutrons of the radioisotope. An emitted alpha-particle will generally have an energy of 4-7 MeV and combined with beta-emission (-1 charge) will move the radioisotope toward the line of maximum stability.

U-238 DECAY CHAIN THROUGH Rn-222 AND ON TO Po-218

- The U-238 decay chain series begins with U-238 that decays by alpha-emission to Th-234 which is followed by two successional beta decays to Pa-234 and U-234 followed by two alpha-emitting radioisotopes to Th-230 and then Ra-226. Up to Ra-226, the alpha and beta decay form new elements that are contained within the elemental matrix.

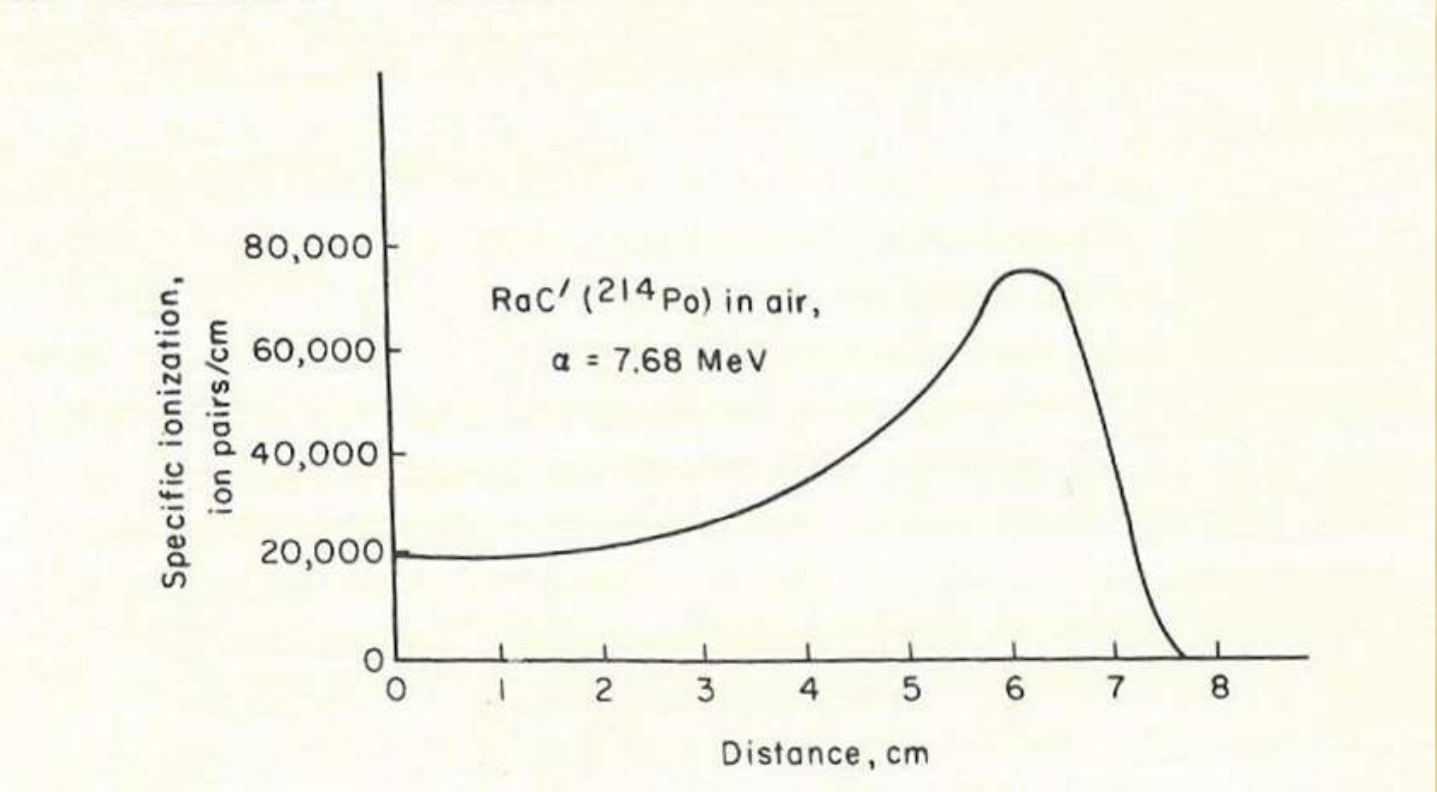
U-238 DECAY CHAIN THROUGH Rn-222 AND ON TO Po-218

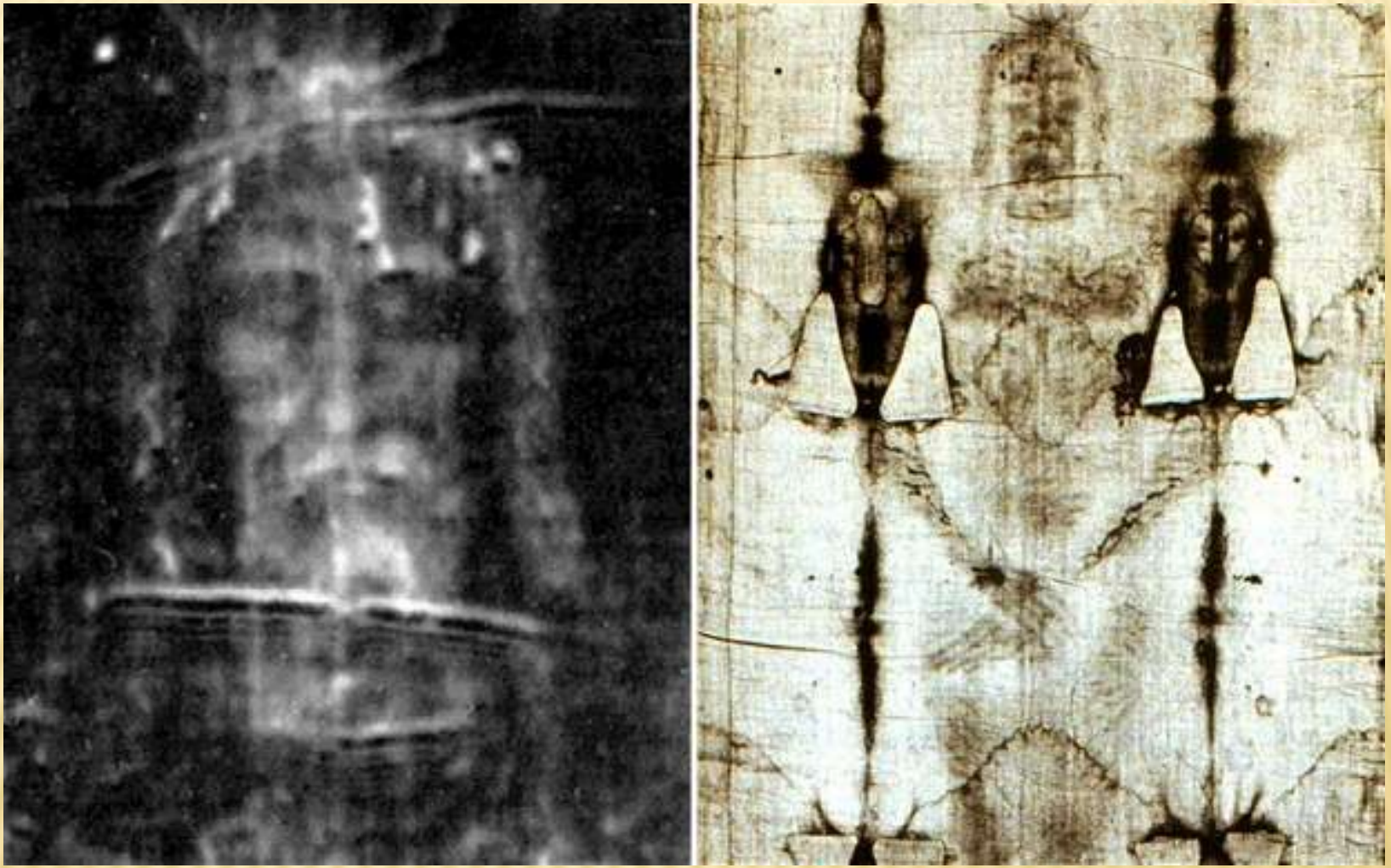
- The alpha and beta particle emissions are contained within the solid matrix of U, Th, Pa, Ra and other solid matrix solids. However, a very interesting, indeed, unique process occurs in a particle which was captive in a solid matrix of Ra-226 become a gaseous element or component, after the next alpha-decay to Rn-222. If Rn-222 remains a gas with a half-life of 3.824 days before another alpha-decay process converts Ra-222 to Po-218, a solid element albeit it will reside as a solid particle on the surface of the following radioisotopes. But during the Rn-222 gaseous state the properties are no longer of a solid matrix but have the properties of a gas with a density of 9.22 gm/cm^3 (a very heavy gas).

U-238 DECAY CHAIN THROUGH Rn-222 AND ON TO Po-218

- As an inert gas, the Rn-222 will seek to escape through cracks in the solid matrix and evolve to be part of the gaseous state or atmosphere and subject to the laws of gaseous components. It is as if it is a new universe for a few days and then becomes a part of a solid matrix again as the next alpha decay chain moves on to Po-218 followed by Pb-214, etc. It is during the initial gaseous process as Rn-222 that this gaseous element has an impact on the image impressed on the shroud.

ALPHA PARTICLE GRAPHIC





Shroud of Turin Website http://www.shroud.com STERA, Inc.

Shroud of Turin Website http://www.shroud.com STERA, Inc.

Roberto Villarreal

ADDENDUM TO SHROUD PRESENTATION

I. Italian Team Results

- In 1973, an Italian team examined the Shroud and saw that the color of the images of Jesus was contained in the crests of the topmost microfibers. As an example they said if your out stretched arm is a single thread, the hairs on the top of your arm would be equivalent to the topmost microfibers. The color of the images is confined to the crowns of those arm hairs; there was no capillary action or evidence of diffusion. There would have been no liquids or vapors. The intensity of the color did not vary from one microfiber to the next. The front and back images appear to have the same intensity of color, even though the body had clearly been lying on its back. Had the images resulted from body chemicals, the back image should have been more intense or saturated than the frontal image. This was not the case. There was no physical mechanism that could produce a 3-D image by heat. (Report on the Shroud of Turin, Copyright @ 1983, John Heller, Houghton Mifflin Company, Boston, Mass)

II. Irradiation Hypothesis

- The body images were straw-yellow and were essentially monochrome, with color only on the crowns of the microfibers of the thread. Where one of these fibrils crossed over another, there was a white spot on the underlying one. This indicates the resolution of the bombarding alpha-particle is the thickness of a microfiber. It also is consistent with the penetration /non-penetration of the alpha-particle. Some microfibers looked like yellow and white candy canes, the white area resulting from one thread crossing another and protecting the underlying area from the image-making process. The straw-yellow fibers show no sign of capillarity. The absence of capillarity is evidence that no fluid was the cause of the image formation.
- There was no meniscus so no paint was used, but there was meniscus in the presence of blood.

III. Ca, Sr, & Fe Distribution

- There was calcium, strontium, and Fe of **high purity** throughout the Shroud; it was uniformly spread except in the bloodstained area where Fe was significantly higher. This is evidence that the high purity Fe, Ca and Sr was transferred to the cloth by ion exchange during the retting process of the flax plant to linen. Natural Fe, Ca, and Sr compounds are impure and the X-Ray fluorescence spectrometer would have determined that quite easily.

IV. Directionality and Universality of Images

- There was no evidence of directionality from brush strokes in the body images and this indicates that a single fiber brush could not have been used to produce a random directionality image. This would have to necessitate a single fiber brush to be used from a 3 or 4 meter distance because the image resolution is only achievable from that distance because of our visual limitation.
- In a personal communication with Ray Rogers, he reiterated that the **fibers from the body images had in some way weakened the shroud fibers to become more friable.** This is something I remembered because it struck a thought that gave credence to the Alpha-particle Irradiation Hypothesis that I had a particular interest in, so I elaborated my thoughts to Barrie Schwortz. He told me, then, that if the cloth-body distance was greater that about 4 cm that there would be no image formation.

V. Background

- While I was conducting research at Los Alamos National Laboratory, there was a great need to solve a problem of hydrogen concentration in the head space of WIPP drums. I had devised and constructed an alpha-particle irradiation chamber and I had calculated that the mean free path of an alpha-particle in air was 4-5 cm depending on the initial energy of the alpha-particle and the gas environment in the chamber. I was certainly aware of the range of an alpha-particle in air because of the cloud chamber experiments we had conducted. The alpha-particles that I selected were from dehydrating small drops of an Am-241 solution in circular plates (half pipe) of nickel. When we experimented with irradiation of air without any additives, we learned that irradiation gave a background of nitrogen oxides and some carbon oxides. When we added alpha-particle flux from Am-241, there was a recombination of hydrogen with natural oxygen to form water. The reaction was immediate. These experiments sensitized my preference of mechanisms that might have caused the images on the Shroud of Turin.

VI. Blood and Image Formation

- Most STURP scientists had reported that where there was blood on the cloth that there was no image under the blood. This fact gives a reason to the scenario that no image formation occurred during the crucifixion or post-crucifixion activities but image formation occurred during the 36 hour period while the cloth was covering the body of Jesus until he rose on the third day. This amounts to an irradiation time of 36 hours. This is when generation of the images must have taken place.
- This scenario gives increased credence to the alpha-particle irradiation that occurred during the 36 hours and wherever there was blood, the blood absorbed the energy of the alpha-particle and no images would be formed. **The alpha particle images gave a universality to the Shroud.**

NOTE ON RADON:

- Radon according to the Merck Index is a colorless, odorless, gas with density of 9.73 gm/L, and is very soluble in water (230 cc/liter) and organic liquids and mixtures and is highly susceptible to absorption on certain surfaces. Boiling point of -62 °C (Co2 B.P. = -78 °C).
- The alpha-particle decay energies of radioisotopes were in the range of 4-6 MeV and the two protons and two neutrons gave structure that was much larger in volume than single neutrons, beta-particles and protons; and could be stopped by a thin piece of paper and would also be stopped by the walls of the medulla of the linen fibers (the tubular void down the middle of the linen fiber). However, the hard walls of the medullas would be weakened and made friable by the defects from the alpha-particle bombardment. This weakened structure is the resulting straw-yellow color of the linen that has been made friable by the defects caused by irradiation with alpha-particles. There would be no liquid meniscus, no undue penetration, definite superficial defects and damages that would affect only the crests of the linen fibers and give the same color density to ventral and dorsal linen fibers. The alpha-particle source would be the body and shape of Jesus and the limited but lesser and greater ranges would give a 3-D effect as well as a negative image effect. These effects are presumed and have not been tested via equipment.
- The radiation damage or defects that would yield a yellow color on the crests or tops of the fibers first where the initial reaction occurs when the maximum alpha-particle energy is largely dissipated and slows the alpha-particle to a lesser velocity that is closer to the velocity of the K-shell electrons and eventually captures two electrons to form He and the alpha-particle becomes a He molecule that is released to the air and the base of the fibrils may or may not be damaged, only the crests.

VII. BASE OF THE FIBRILS

- The straw-yellow color on the crest is converted to He that is initially confined to the surface fibrils only. The hue of each straw-yellow fibril was essentially the same as all the rest. A single fibril was 10-15 microns in diameter.
- To fulfill the criteria listed for formation of the body images I believe the Alpha-Particle Irradiation Hypothesis fits this tall order. But there had to be certain processes that had to be incorporated into this sequenced scenario.

VII. 1. Post-death Conditions

- The crucified and deceased body of Jesus had very little time to remain on the cross. Response: Jesus' legs were not broken, but a Roman pierced his body with a lance and immediately blood and water flowed from his right side. Joseph of Arimathea, a wealthy Sanhedrin member was given permission from Pilate to remove the body of Jesus. The Pharisee Nicodemus came offering an immense quantity of embalming spices (~100 lbs.). **They took the body and placed it in a nearby tomb that had never been used.** Someone had quickly and preliminarily prepared the body including combing his hair and Joseph bought and placed a large burial cloth over and under Jesus' body after including burial spices according to Jewish custom. They rolled a stone across the entrance of the tomb.

VII. 2. Discontinuities and Universalities of Images

- The body had to have been wet with sweat, blood and other fluids. The body lay in the tomb for an estimated 36 hours until early Sunday morning. Any wiping of the sweat and body fluids would appear as discontinuities in the images.

VII. 3. POST RESURRECTION ACTIVITIES

- Mary of Magdala came early Sunday morning to complete the washing and embalming of Jesus' body and someone had opened the tomb and Mary ran to Peter and the other disciple, John (the Evangelist), and told them about what she had seen. John and Peter ran to the tomb. John arrived first and bent down and saw the burial cloths. When Peter arrived they both saw the burial cloths and the cloth that had covered his head, not with the burial cloths but rolled up in a separate place. The Beloved Disciple, John, looked at the burial cloths and believed and the disciples went home.

VIII. LIMESTONE AND URANIUM IN TOMB

- Joseph of Arimathea had a tomb prepared in a garden close by where Jesus was laid.
- Joseph had a tomb hewn out of local limestone rock and it had not yet been used by anyone. Because the tomb was hewn out of the limestone rock, it is expected there would be natural uranium in the limestone. The typical tomb would have had a cave-like structure so that people bent down to look inside but it was large enough for at least 3 or 4 people to be in the tomb. Jesus was probably laid on a stone bench for preparation for burial and placed in a stone chamber so his body could be prepared by washing and embalming with myrrh and aloes and other fluids. It was here that the hewn tomb was lower than the natural geography, that it would have been cooler than the outside, especially at night. We can assume that the hewn rock was approximately as old as the planet Earth and the uranium in the limestone was ~4.5 -4.6 E9 years old. The uranium decay would have been at equilibrium or near equilibrium (this is an important factor). The U decay chain would have consisted of the U-238 decay chain series; U-238, Th-234, Pa-234, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210, Pb-206 stable.

IX. CONDITIONS DURING IMAGING

- All the U decay chain series are solids except for Rn-222 which is an inert gas with a half-life of 3.8235 days with a specific gravity of 9.73 gram/liter and is the most dense of the inert gases in the periodic chart. It concentrates in cold places, low places, and in the lower atmosphere during atmospheric inversions. So Jesus' body, drenched in his own sweat, blood and bodily fluids is a magnet for Rn-222. Also, Jesus' hair is like an activated charcoal trap for concentrating Rn-222 and that is how the body images of Jesus on the Shroud of Turin were generated. It is from Jesus' body concentrating Rn-222 alpha-particle emissions that the upper crests of each fibril of the burial cloth is defected by alpha-particles impinging on the cloth. It is not the direct bombardment of alpha-particles from Rn-222 on Jesus' body that gives the image. It is the alpha-particles bombarding the cloth that give the negative image and at the same time a random distribution of greater and lessor that gives a 3-D effect that is so unusual. I have calculated the mean free path of an alpha-particle in air from Rn-222 (5.4896 MeV) according to the Bragg-Kleeman equation and it is about 4 cm. It is interesting to note on the Shroud of Turin that for a cloth-to-body distance of 4 cm or greater there is no image formation. This is a strong confirmation of the Alpha-Particle Irradiation Hypothesis.

X. ALPHA PARTICLE DYNAMICS

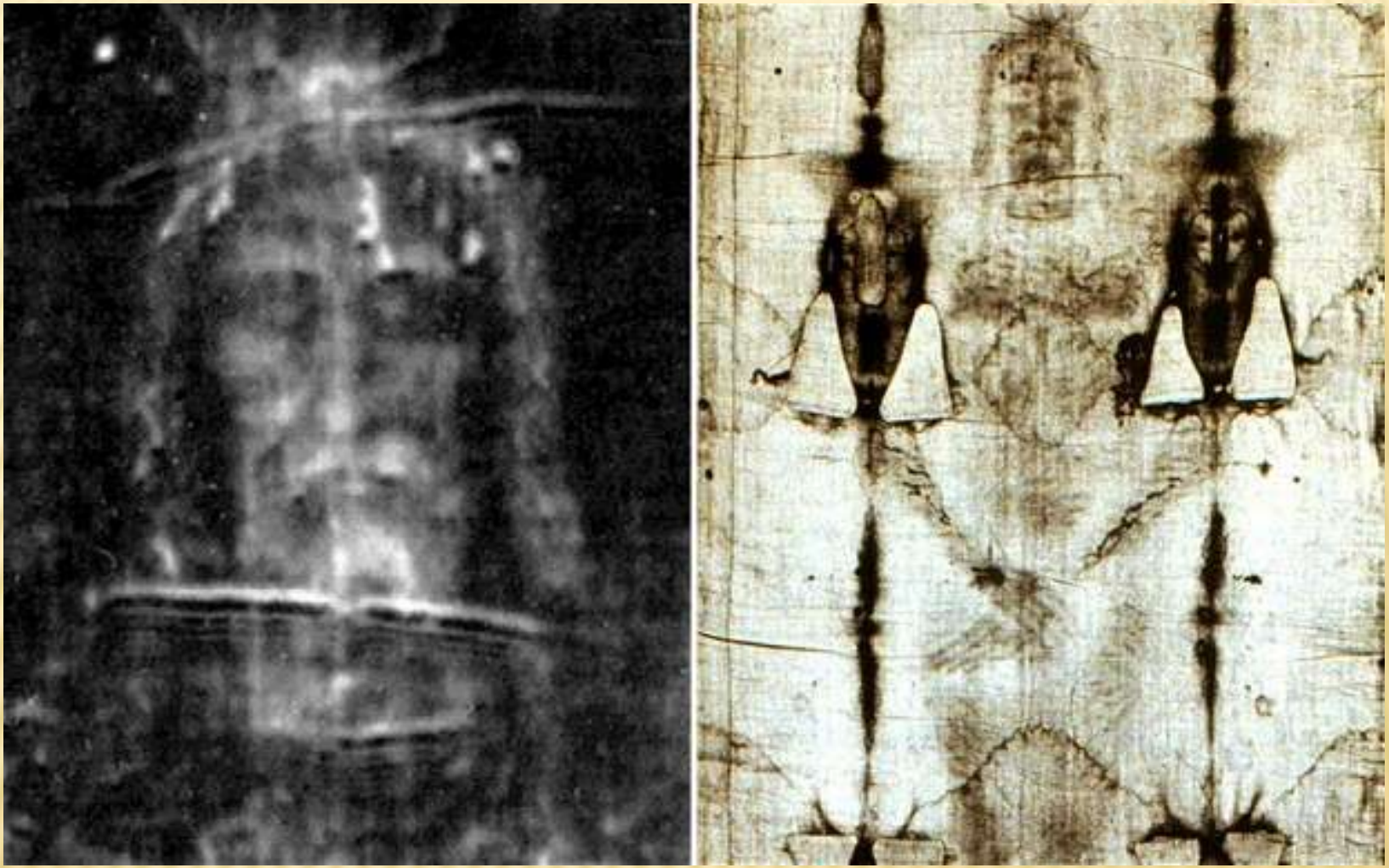
- Any photon (quantum of light) of a shorter wavelength than about 530 nm can cause the breakage of both C-OH and C-C bonds. The bond strengths of both C-OH and C-C bonds are about 90-91 kilocalories per mole. An alpha-particle of 5.4896 MeV (Rn-222) has more than enough energy to break chemical bonds but it is limited in its ability to penetrate because of its size. That is why alpha-particles can be stopped by thin sheets of paper. For linen it will penetrate through the crests of the microfibers and be slowed down until it becomes a helium atom. But enough penetration is conducted to cause an image of limited thickness on the crests of the microfibers. This is what we see on the Shroud.

XI. DYNAMICS OF DECAY PROCESS

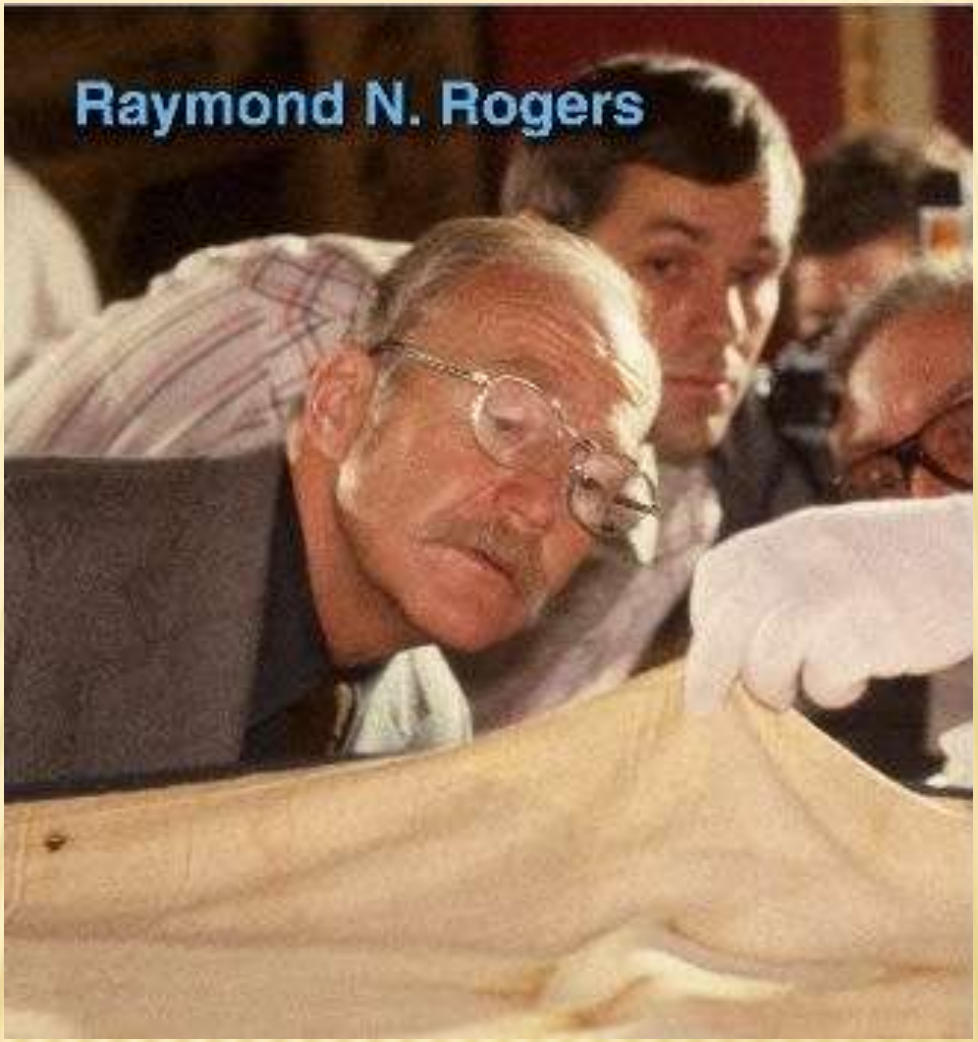
- Incorruptibility –not subject to decay, inflexibly just and upright. Incapable of being bribed or morally corrupted.
- Jesus had repeatedly prophesied that although it had taken 46 years to build an incomplete Temple that he would raise it up in three days. It could have been three weeks or three months but three days was written in scripture. But after death, decay of the human body begins immediately and somehow it doesn't matter to Jesus, especially when he was dealing with Lazarus. He waited 4 days before he raised Lazarus. He tried to tell Martha that he was the way, the truth, and the life and the resurrection. She accepted what he said, but did not understand when she replied, "It has been 4 days and there will be a stench." Jesus was not going to relate theological reasons to her because she would not understand his language. Likewise, we would not understand his language but we are aware that decay can be delayed by freezing or by divinity. So, when Lazarus was raised to new life he had not decayed and when Jesus was raised after three days, he was not affected by decay and he passed through the burial cloth and the tomb with no problem. But we are saddled with trying to explain how he could do this because it begins to make sense that all these happenings waited two thousand years before they were revealed to humanity. The seven or eight miracles revealed by the Gospel of John have divinity as a holdover term of explanation. And so we have to accept his divine attributes and our human inabilities and let it go at that. We don't have a term that characterizes a person who is dead but is inevitably going to be raised after a period of several days and divinity is to make this whole episode possible.

XII. JESUS' CURE OF THE MAN BORN BLIND

- The disciples asked Jesus "Rabbi, who sinned this man or his parents that he was born blind?" Jesus answered, as usual, with a cryptic response, "Neither he nor his parents sinned; it is so the works of God might be known through him. While I'm in the world, I am the light of the world." When he had said this he spat on the ground and made clay with his saliva and smeared (or anointed) the clay on his eyes and said to him, "Go wash in the Pool of Siloam" (which meant sent; Jesus was sent by the Father and he sent the blind man.).
- Mark's Gospel relates that a deaf man was healed when Jesus anointed him with his spittle (Ephpheta).
- Jesus did these miracles through his divinity and to emphasize the power of Baptism which we still do today as a Sacrament. In this case, he was demonstrating what happened in Genesis at the beginning of the making of human beings and Jesus in curing this man with a rebirth so he could see. Jesus was demonstrating that he was the Logos at the birth of life in the world and continues to create life for us.
- Universality definition: When the elements of the seven miracles reported in John's Gospel are representative of the reality of what has occurred.



Shroud of Turin Website http://www.shroud.com STERA, Inc.



Shroud of Turin Website http://www.shroud.com STERA, Inc.