Optically Terminated Image Pixels Observed on Frei 1978 Samples

Kevin E. Moran
Belmont, NC 28012

ABSTRACT

In 1992 while taking photomicrographs of the 1978 Max Frei samples at the Holy Shroud Guild at Esopus, NY, photos from the arm area showed individual image fibers had very sharp boundaries at their ends across the 15-micron diameter of the fibers. At 200x magnification it is seen that these picture elements, or pixels, are very uniformly darkened about 30% over the natural color of the non-imaged fiber. At the boundary between image pixel and clear fiber, there is a sharp change. There is no gradual edge as expected from a shadow mask or external light source. It is suggested that the image was formed when a high-energy particle struck the fiber and released radiation within the fiber at a speed greater that the local speed of light. Since the fiber acts as a light pipe, this energy moved out through the fiber until it encountered an optical discountinuity, then it slowed to the local speed of light and dispersed.

Image Research in this Century

After Secundo Pia photographed the Shroud of Turin in 1898, it became obvious to observers how unique the image on the cloth is, especially when it is compared to painted copies. Now 100 years later it is still not possible to duplicate the image by any means. Fortunately with the Max Frei samples and the work of STURP (Shroud of TUrin Research Project) in 1978, we now have more insight into the nature of the image. We cannot explain the physics that made the image, but we know it is not a photo, or a painting, or a thermally formed event.

There are six (6) known conditions about the image that have come under study in this century:

1. In 1902, Yves Delage, working from Secundo Pia's photographs, pointed out that the forensic detail on the shroud was that agreeing with the crucified "historic Jesus Christ". Pierre Barbet, and later, other forensic people, supported him.

2. After this, Paul Vignon went on to show how certain details on the Turin Shroud are included on icons and paintings over the last 1500 years, but no painter has been able to represent the body image as it appears on the Turin cloth. Modern photography has given us an overall picture of the body image, proving it to be a negative, but photography has not proven to be the method that formed the image as some have claimed.

3. In 1913, Gabriel Quidor built a mechanical scanning densitometer that showed the 3D properties of the image. After this, another Frenchman, Paul Gastineau, prepared a 3D full face image with the same vertical scanning technique. In 1976 Jackson and others confirmed this unique property using the all-electronic VP-8 analyzer. It operates with standard video camera input and provides a smoother horizontal scan. The VP-8 was designed by George Dalke and built by Interpretation Systems of Lawrence, Kansas for map interpretation in the late 60's.

4. In 1978, STURP researchers showed that the image does not fluoresce, as would a scorch, and that the image picture elements are distributed as a random halftone to occupy individual 15-micron fibers. The imaged fibers are only on the top layers of the threads that make up the linen.

5. Later John Jackson, showed that the image appears to be perpendicular to gravity, showing only the front and back of the man in the shroud. He also concluded that the image appears only where the cloth was closer than 3.5 cm. to the body.

6. The image picture elements, or pixels, fill the whole cross section of the fiber. The pixels we have observed on the Frei samples are sharply terminated at their ends. The pixels are more brittle than the base fiber. Al Adler says the pixels are composed of dehydrated cellulose and the structure is now that of a conjugated carbonyl.

Discussion

Pia's negative photograph, from 1898, showed what looked to be a body that was glowing, but slightly submerged in a bath of cloudy water. This condition is more properly described as an image that is visible, at a distance, but by locally attenuated radiation. The unique front-and-back–only image can be best described as gravitationally collimated. The radiation that made the image acted perfectly parallel to gravity. There is no side

image. The radiation is parallel to gravity and, if moving at light speed, only lasted about 100 picoseconds. It is particulate in nature, colliding only with some of the fibers.

It is not a continuum or spherical-front radiation that made the image, as visible or UV light. It is not the X-ray radiation that obeys the one over R squared law that we are so accustomed to in medicine. It is more unique.

Observations from the Frei Samples

Thanks to the efforts of Paul Maloney and Alan Whanger, I was able to photograph some of the 27 samples that Max Frei took from the shroud in 1978. The samples were gathered by pressing sticky tapes against the shroud and then pressing the individual tapes onto a glass microscope slide. The photos were taken looking through the yellowing, but still clear, tape backing that was already about 15 years old.

I used an Olympus Vanox research-grade microscope mounted with a Pentax 35 mm camera body. The film was developed at the Kodak main lab in Rochester, NY and digitized to Photo CD rom. Some of these original photos have been put on the internet at: **http://shroud.org** that is the site of the Holy Shroud Guild.

Figure 1. Olympus microscope (shown with video camera attached).

Max Frei had marked the slides with a number and letter group such as 2bd, 4bd, and so on. In a broad look at the items present on the samples we saw flower parts, bugs, cotton fibers, modern synthetic fibers and old wool fibers. There was speculation that the old wool fibers seen in the arm area may be matched to the Tunic of Argentueil in the future.

Later on in September 1992, at Mount Saint Alphonsus in Esopus, NY, we held a meeting to plan a method of archiving the information that is on these Frei microscope slides. Alan Adler was present along with Fr. Adam Otterbein and Paul Maloney and others. After surveying some of the samples it was agreed that there is so much information on these slides that a proper project would require a much larger effort, than was possible at this time.

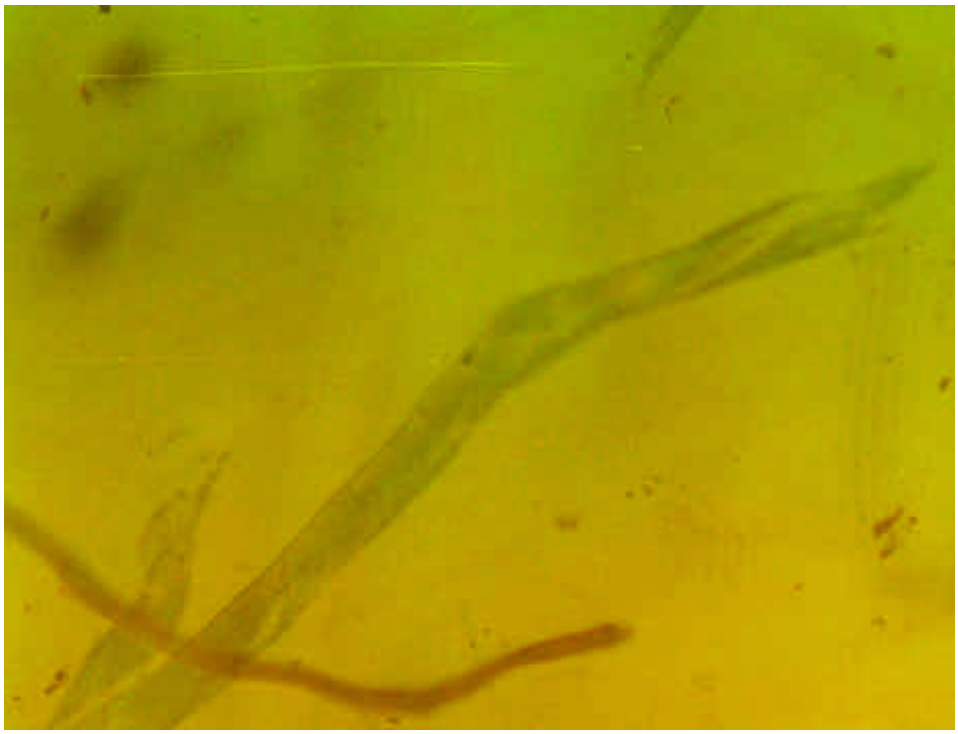
There are many very interesting objects on these sample/slides and a comprehensive inventory is still in progress.

Figure 2. K. Moran, P. Maloney and Prof. A. Adler at Esopus in 1992

There were many larger plant parts than we had expected. We were at first of the idea that Frei had only found pollens. Paul Maloney has pointed out that Frei pressed his fingernail into the back of the sticky tape so that it would sample deeper in the fabric than did the STURP team which used a more gentle tape application to get just the surface materials.

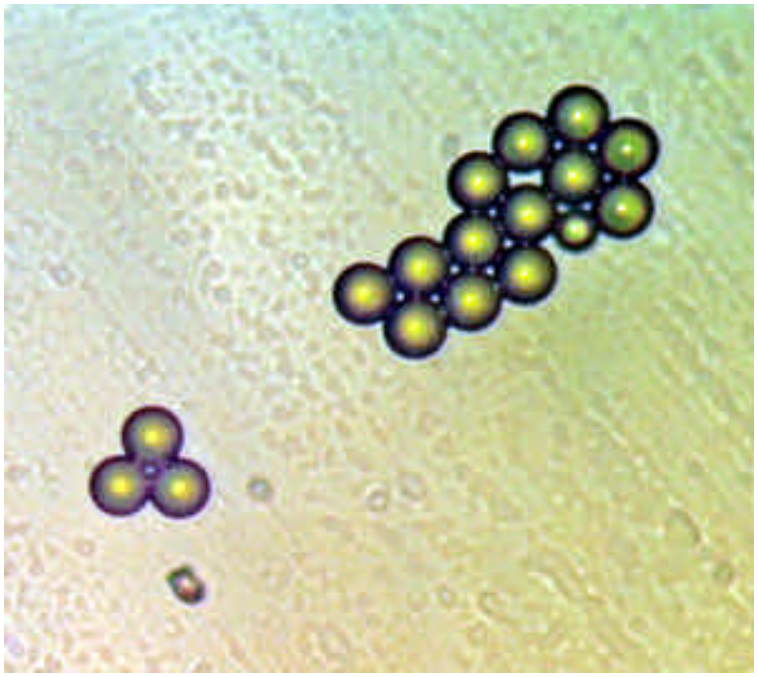
This sampling method would prove important to explain the condition of the image pixels, as we shall see later.

Figure 3. Cotton fibers and a red intrusion that may be modern



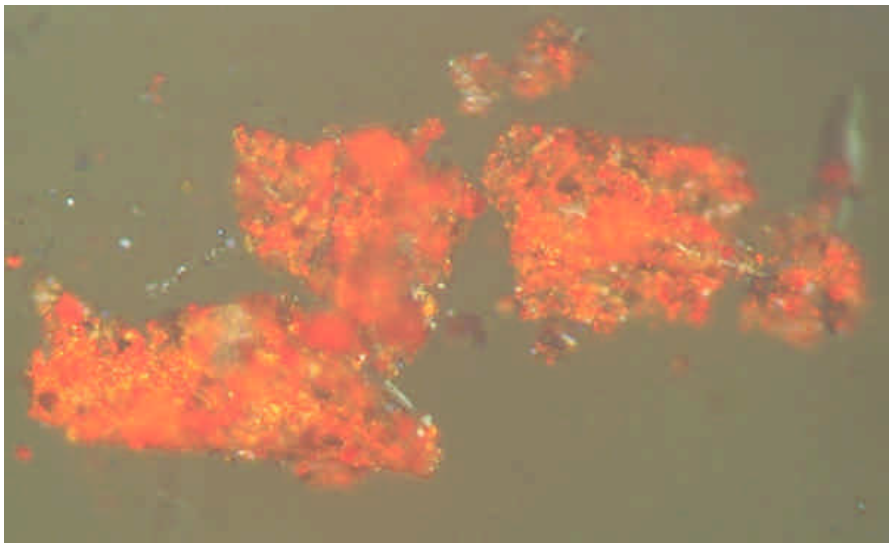
The question always arises about calibration of the photomicrographs. It is a custom to put a fiducial mark in the photo in some way to get a size reference. Since I was with Kodak at the time, it was easy to obtain some of their own product that is 10-micron polystyrene beads that we placed on a piece of sticky polyester tape. These are shown in the next figure. The optical magnification is 200x.

Figure 4. Kodak 10-micron polystyrene spheres



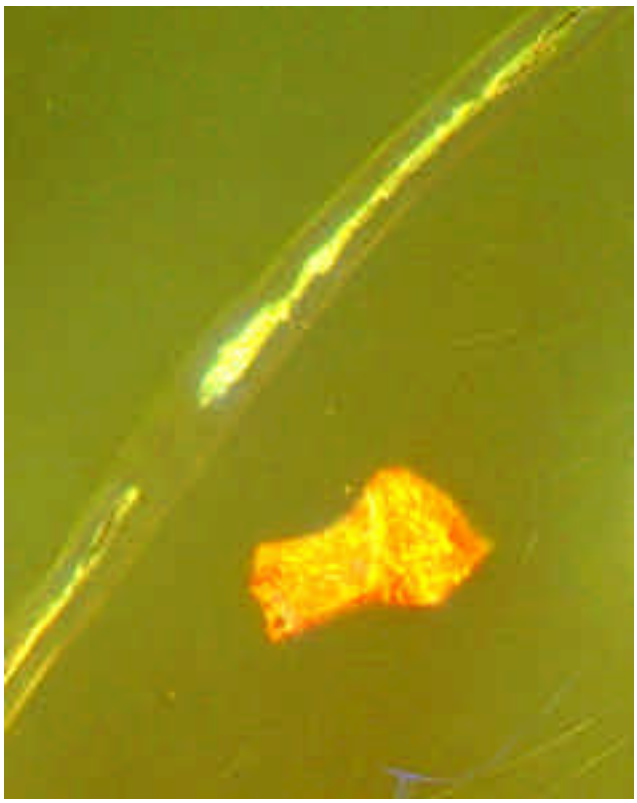
One of the observations that were made at this time is the amount of blood that was seen on slide 4bd. It is a clump that is about 0.3 millimeters across and very red. Al Adler has explained that this due to the chemistry of bilirubin, the substance that the human body makes when it is under severe stress as when Christ was tortured. This fits the on going forensic evidence.

Figure 5. A large clot of blood on slide 4bd



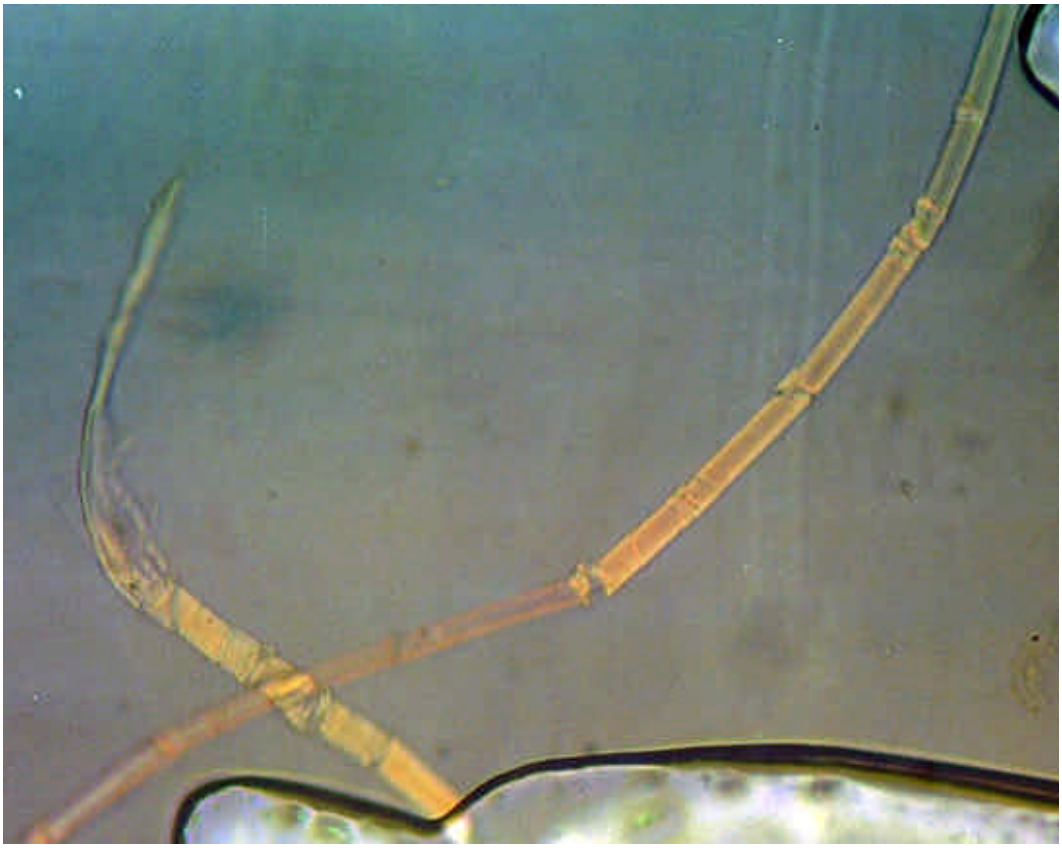
Many of the linen fibers have a visible hollow core as can be seen in figure 6.The fragments of blood are noticeably larger than the diameter of a single fiber. The non-imaged fibers are transparent, so the yellowed image areas are very readily discerned.

Figure 6. Non imaged linen fiber seen with blood shard



The length of these image areas or pixels can be longer than a millimeter or shorter than 200 microns, or 0.2 millimeters. But they are uniform over their length suggesting they have been abruptly chemically altered. Two of such sections are shown in figure 7.

Figure 7. Two sharply terminated image pixels



The individual image pixels have very sharp boundaries at their ends across the 15-micron diameter of the fibers. When seen at a magnification of 200 power, these pixels show uniformly darkened area over the natural color of the non-imaged fiber. At the boundary between the image pixel and the clear fiber, there is a sharp change. There is no gradual edge as expected from a shadow mask or external light source. The pixels are cracked because Frei used his fingernail to crease the sticky tape sharply on the cloth.

Theoretical model

It is suggested that the image was formed when a high-energy particle struck the fiber and released radiation within the fiber at a speed greater that the local speed of light. Since the fiber acts as a light pipe, this energy moved out through the fiber until it encountered an optical discountinuity, then it slowed to the local speed of light and dispersed.

Discussion

The fact that the pixels don't fluoresce suggests that the conversion to their now brittle dehydrated state occurred instantly and completely so no partial products remain to be activated by the ultraviolet light. This suggests a quantum event where a finite amount of energy transferred abruptly.

The fact that there are images front and back suggests the radiating particles were released along the gravity vector.

The radiation pressure may also help explain why the blood was "lifted cleanly" from the body as it transformed to a resurrected state.

Further Work

To verify this work and pixel theory, in future testing, a careful microscopic scan should be made in-situ to map the high gradient areas like the fingers or the nose.. A resulting histogram of the pixels may tell what type of particle collided with the fibers. It will prove the true nature of the image as well.

The atlas of image information that should be constructed from detailed micro scans, should classify items on the cloth by their image forming mechanism as well as their chemistry and history. For example the blood is certainly on the cloth by contact and absorption. But it appears there is no image under the blood. The burns have certainly pyrolized the linen and show gradient information between the carbon black and the natural clean linen. But where did the vapor by-products go? Did they interfere with the carbon dating?

The atlas should include at least 9 layers of mapping to show the overlay effects and help classify the types of images. See the attached list.

Nine (9) Categories To Microscopically Map on the Shroud

These areas require database entry based on position and so they should be handled by an appropriate X-Y servo carriage attached to the examination table.

1. Map the pixels that make up the image in small areas with steep gradients such as the nose and fingers. This will document the statistical distribution of the darker pixel segments in the linen fibers if the scans can be done in the 200x or more visual microscopic levels.

2. Locate and map blood areas in a separate database from burns, pollens and other materials, so that a good picture of the mortal death image of the crucified man can be imaged separately from the resurrection image.

3. Pollens and materials such as travertine aragonite should be located in separate databases to distinguish the geographic identity of the cloth and show its historic background and provenance.

4. Bugs and microbial items likewise should have their own section in the study to account for the general fiber conditions, and damage or preservation problems that have to be addressed for the future.

5. Fluid stains should be mapped to a separate database to show the fire damage and other contaminants as different from the blood and body fluids.

6. Hard items should be mapped closely to see how their image differs from the main body image. The coins on the eyes theory should be easy to study, because some mechanical residue of copper may be present.

7. Burns are especially important to map to their own database because it will show how the cloth was affected by the molten-silver pyrolysis of the cellulose in the fire of 1532. There is an important question to answer here, because of the effect it had on the carbon 14 dating assumptions.

8. Paint pigments should be logged into another database because of the question artistic works that have been touched to the cloth over the years to see if a contact pattern results. Iron particles and full paint chips should be noted to give further forensic and historic basis for the cloth's whereabouts.

9. The basic cloth weave and it's flaws should be mapped to try to further identify its origins. The patches must be properly labeled so the cloth-fold model for the fire data can be more closely shown. Also the places where samples have been taken must be kept in a separate file to append results.