

THE JOHN F. KENNEDY AUTOPSY X-RAYS: THE SAGA OF THE LARGEST “METALLIC FRAGMENT”

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ABSTRACT

Purpose - To solve the mystery of the 6.5 mm “metallic” object on President John F. Kennedy’s anterior-posterior (AP) skull X-ray. This image was not seen or reported during the official autopsy on November 22, 1963, but first appeared in the historical record in 1968 with the release of the Clark Panel Report.

Methods - On nine separate days, once with Dr. Cyril Wecht (former president of the American Academy of Forensic Science), I examined the John F. Kennedy (JFK) artifacts at the National Archives. Hundreds of optical density measurements were made from the (supposed) original skull X-rays, with a specific focus on the 6.5 mm object that lies within JFK’s right orbit on the AP skull X-ray.

Results - This essay explains (and demonstrates) how X-ray alteration was feasible in 1963, and identifies a candidate for this darkroom work. Hundreds of optical density data points (presented in graphical form here) expose the paradoxes of this 6.5 mm image. In addition, the phantom image (of an authentic bullet fragment), seen inside the 6.5 object, is consistent with a double exposure in the X-ray darkroom.

Discussion/Conclusion - This mysterious 6.5 mm image was (secretly) added to the original X-ray via a second exposure. The alteration of the AP X-ray was likely completed shortly after the autopsy. Its proximate purpose was to implicate Lee Harvey Oswald and his supposed 6.5 mm Mannlicher-Carcano carbine, to the exclusion of any other suspect, and thereby to rule out a possible conspiracy. The ultimate purpose for such a forgery is left to the historians.

Keywords: *JFK, AP X-ray, 6.5 mm, optical density, double exposure, phantom effect, autopsy, conspiracy, John Kennedy, John Ebersole, James Humes, John Fitzpatrick, Lee Harvey Oswald, Clark Panel, Warren Report, Warren Commission, HSCA, ARRB*

INTRODUCTION

In January 1968, the Clark Panel [1] released its long-awaited review of the President John F. Kennedy (JFK) autopsy. That report described an apparent 6.5 mm cross section of a bullet fragment that lay inside JFK's right orbit on the anterior-posterior (AP) X-ray (Figures 1 and 2).

Curiously, despite the fact that it was (by far) the largest apparent metal fragment on this X-ray, it had *not* been described in the autopsy report. Furthermore, it had not been removed during the autopsy, even though the sole point of the autopsy X-rays had been to locate and to collect (for forensic purposes) precisely such objects.

Figure 1. JFK's AP X-ray from the autopsy. The vertical arrow identifies the 6.5 mm object, which was not seen at the autopsy. The horizontal arrow identifies the 7 x 2 mm metal fragment, which was removed at the autopsy.

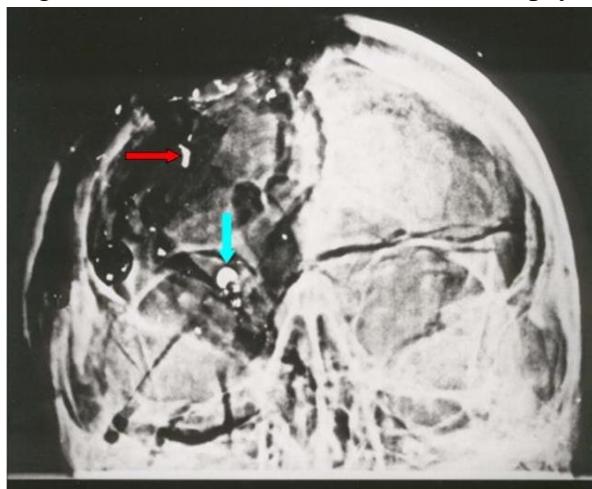
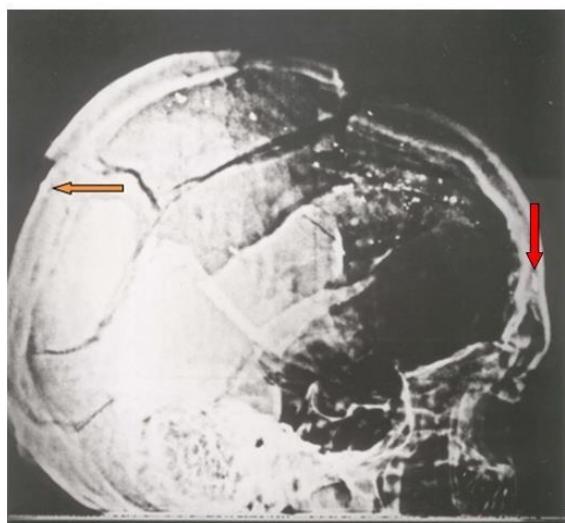


Figure 2. JFK's lateral X-ray at the autopsy. The horizontal arrow identifies the supposed (very faint) partner image of the 6.5 mm object. This (authentic) fragment was not removed at the autopsy. The vertical arrow identifies the 7 x 2 mm metal fragment, which was removed at the autopsy.



Moreover, this 6.5 mm object had not been cited anywhere in the 1964 *Warren Report* [13] nor in its accompanying 26 volumes. In fact, the X-

ray images had not been introduced to the Warren Commission. The Commission however, did conclude that both the nose and the tail of this (supposedly identical)

bullet had been found inside the presidential limousine (Warren Commission Exhibit Numbers 567 and 569). In other words, this 6.5 mm “metal fragment” supposedly represented an *internal* cross section that had been sliced out of the *inside* of that same bullet, and then deposited onto the back of the skull (near the supposed entry site at the cowlick area—Figure 2).

Subsequently (1976-1978) the House Select Committee on Assassinations (HSCA) [10] correlated this image on the AP X-ray to its partner image on the lateral X-ray (Figure 2)—by employing shared anatomic features of the two X-rays.

Paradoxically though, this partner image on the lateral X-ray was only a tiny metal fragment that was a poor match for the large (and very transparent) image on the AP X-ray.

To further confound this mystery, during 1994-1998 each of JFK’s three attending pathologists were asked (under oath) by the Assassination Records Review Board (ARRB) [8] if they had seen this thing during the autopsy. Each one (independently) denied that they had. As an example, see the deposition of the chief autopsy pathologist, James J. Humes in Figure 3.

Figure 3. Jeremy Gunn’s deposition of Dr. James J. Humes before the ARRB [3].

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Q. All right. If we can go to the X-rays.

MR. GUNN: Off the record.

[Discussion off the record.]

BY MR. GUNN:

Q. Dr. Humes, you’re now looking at X-ray 5-B No. 1. I’d like to ask you whether you have previously seen that X-ray.

A. I probably have. It’s antero-posterior view of the skull and the jaw. It shows the large bony defect in the right side of the skull, and some white material, which I presume may be metallic fragments, in the right side of the photograph.

Q. The left side of the photograph but the right side of the skull?

A. Right side of the skull, yeah.

Q. And that appears to be, at least in

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height, in the orbital range?

A. Yes, somewhere. Yeah, I would guess.

Q. Did you notice that what at least appears to be a radio-opaque fragment during the autopsy?

A. Well, I told you we received one—we retrieved one or two, and—of course, you get distortion in the X-ray as far as size goes. The ones we retrieved I didn’t think were of the same size as this would lead you to believe.

Q. Did you think they were larger or smaller?

A. Smaller. Smaller, considerably smaller. I mean, these other little things would be about the size of what—I’m not sure what that is or whether that’s a defect. I’m not enough of a radiologist to be able to tell you. But I don’t remember retrieving anything of that size.

Q. Well, that was going to be a question, whether you had identified that as a possible fragment and then removed it.

A. Truthfully, I don’t remember anything that size when I looked at these films. They all were more of the size of these others.

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Q. What we’re referring to is a fragment that appears to be semicircular.

A. Yeah. I don’t know.

There is wide agreement that the partner image (on the lateral X-ray) of this mysterious 6.5 mm object must appear at the rear of the skull (near the cowlick area—Figure 2). However, when the forensic radiologist, Dr. John J. Fitzpatrick, reviewed the X-rays (as the premier expert for the ARRB) he remained puzzled by this object, even returning for a second day in

an attempt to extract its secrets. Ultimately, however he failed in this task, saying,

No object directly and clearly corresponding to the bright, 6.5 mm wide radio-opaque object in the A-P X-Ray could be identified by the consultant on the lateral skull X-Rays. Although there is a mere trace of some

additional density near the fragment bilocation at the vertex of the skull, the consultant did not feel this object was anywhere near the density/brightness required for it to correspond to the bright, radio-opaque object on the A-P X-Ray. After briefly speculating that the small metallic density behind the right eye in the lateral X- Rays might correspond to the bright radio-opaque density in the A-P X-Ray, this idea was abandoned because neither the locations nor the density/brightness of the 2 objects are consistent [2].

For all practical purposes, after this failed attempt (by the most appropriate specialist for the task) this 6.5 mm object became the most curious—and unsolved—mystery in the history of diagnostic radiology.

During the lifetime of the HSCA, Larry Sturdivan served as its ballistics consultant. In his subsequent book [14] he emphasized that he had never, in his entire career, seen a cross section of a bullet deposited in such an odd fashion on a skull. So, totally contrary to all prior government investigations, he concluded that the 6.5 mm object could *not* be a metal fragment:

I'm not sure just what that 6.5 mm fragment is. One thing I'm sure it is NOT is a cross-section from the interior of a bullet. I have seen literally thousands of bullets, deformed and undeformed, after penetrating tissue and tissue simulants. Some were bent, some torn in two or more pieces, but to have a cross-section sheared out is physically impossible. That fragment has a lot of mystery associated with it. Some have said it was a piece of the jacket, sheared off by the bone and left

on the outside of the skull. I've never seen a perfectly round piece of bullet jacket in any wound. Furthermore, the fragment seems to have great optical density thin-face on [the frontal X-ray] than it does edgewise [on the lateral X-ray]....The only thing I can think is that it is an artifact (e-mail from Larry Sturdivan to Stuart Wexler on 9 March 1998).

This was a radical statement. After all, the HSCA in particular, had relied on the (metallic) authenticity of this fragment in the most fundamental manner: based on the supposed reality of this 6.5 mm object, the HSCA had concluded that the bullet (from the sole headshot) had deposited this 6.5 mm “metal fragment” near its entry site at the back of the skull. So now, if this was merely an artifact, what was to become of the HSCA’s conclusion?

In 1993 I had two telephone conversations with the (sole) autopsy radiologist, Dr. John Ebersole. On the second occasion, he telephoned me. That call was recorded and later transcribed [7]. After (somewhat reluctantly) discussing the autopsy, I asked him about this 6.5 mm object—and Ebersole instantly stopped the conversation. In fact, that was Ebersole’s final comment to history about the JFK autopsy, as he died shortly afterwards [4].

1. MATERIALS AND METHODS

For its unexpected entrance onto the historical stage in 1968, and also for its bizarre properties, a possible explanation occurred to me—perhaps this 6.5 mm object had indeed not been present on the original X-ray, but had been added later (e.g., in the darkroom). To pursue this hypothesis I began (in the early 1990s before the ARRB got underway) to query older radiology technologists. In particular,

I asked them: How exactly had they copied X-ray films in the 1960s? With the further assistance of a close colleague (diagnostic radiologist, Dr. John Szabo) that riddle was solved. In particular, I soon discovered a technologist's handbook [5]¹ that contained detailed recipes (p. 56) for converting standard (double-sided) X-ray films into duplicating films. (In that era, Kodak did not make duplicating films—as I was later able to confirm from their inventory lists.) Cahoon even makes this comment: “By variations of the copying time, one may even improve on the original” (p. 55).

Here then was the key to the 6.5 mm mystery: if an X-ray film could be

copied (with high fidelity), then it could also be altered. The key step was to add a second image during a second exposure. For example, first the image of the original film would be imprinted onto a duplicating film via a light box in the darkroom (which was how X-rays were then copied). But then, before developing that duplicate film, a second exposure would be made. In particular, a piece of cardboard, with a 6.5 mm hole in it, could be precisely positioned over the duplicate film—and then a second exposure made (using *only* this mask). I soon showed the feasibility of this approach (using modern duplicating film) by preparing fantastic X-rays with such double exposures (Figures 4 and 5).

Figure 4. A superimposed scissors; its dark appearance implies that it is merely composed of air, not of metal. I also added the white particles (via a multiple exposure) to mimic bullet fragments.



Figure 5. A superimposed pteranodon from my then-young daughter's plastic tracing kit. I have described the resulting image as a “birdbrain.” The many dark opacities in the skull bone suggest a diagnosis of multiple myeloma, for which this patient (now deceased) was receiving radiation therapy (to the spine).



¹The fifth edition of Cahoon's book was published in 1961, and was favorably reviewed by M. Frank in the 1963 *British Journal of Radiology* 36:223. That year was, ironically, also the year of JFK's assassination.

The JFK X-rays, however, have emulsion on both sides, not just on one side, but my double-exposed X-rays (Figures 4 and 5) had emulsion only on *one* side (as was then typical of modern duplicating film). When I followed the recipes in Cahoon's book (for converting standard, double-sided X-ray film into duplicating film) and prepared double exposures by using these, every film developed a strange greenish color. I soon learned that, sometime after 1963, Kodak had added a color dye to its standard, double-sided films. Presumably that was done precisely so that copies could easily be distinguished from originals (quite possibly so that altered X-ray images could easily be detected). But that was definitely not the case during the era of JFK's autopsy.

Since the 6.5 mm object was so strangely transparent, it seemed quite clear what had happened: this 1963 secretive, darkroom worker had simply overdone the second exposure. If so, I reasoned, it should be feasible to prove this conjecture-

by means of optical densitometry. Optical density quantitatively describes the lightness or darkness of specific points on the X- film: one simply measures the transmission of light through a specific aperture on an optical densitometer (Figure 6). For example, if 1/5 of the light is transmitted (this area would appear quite transparent to light), then the optical density would be²

$$\text{OD} = -\log_{10}(1/5) = 0.7.$$

Or if 1/100 of the light is transmitted (this area would appear quite dark on the X-ray film), then the optical density would be

$$\text{OD} = -\log_{10}(1/100) = 2.0.$$

In order to accommodate the human eye, in clinical X-ray films the OD range is typically chosen to be 0.5 to 2.0 (by appropriately setting the voltage, current, and exposure times of the X-ray machine).

Figure 6. Tobias optical densitometer



² See "Optical Density" at <http://www.semrock.com/optical-density.aspx>. Areas on the X-ray film that appear *transparent* (to light) are called *radio-opaque*, which can seem paradoxical. These areas are transparent (to light) because the real world object (e.g., lead, or in JFK's case, mercury-silver amalgams) was *opaque* to X-rays. In these transparent areas on the film, the (original) silver salt is washed off the film during development. On the other hand, in areas where mostly unimpeded X-rays have struck the film (such as for the air around JFK's head), the X-rays convert the silver salt to black metallic silver, which is *not* washed off during development. So naturally these areas (e.g., air pockets) are visibly dark. (Note: this explanation is somewhat oversimplified.)

The next step was to adapt our department's scanning drive (essentially a precisely calibrated gear mechanism)³ so that it could be used with the optical densitometer. After devising a simple jig for attaching this device to the densitometer, I took the equipment with me to the National Archives. I would now be able to scan across the 6.5 mm object while taking high resolution OD data. During nine visits to the National Archives, I obtained hundreds of OD data points.

2. RESULTS—AT THE NATIONAL ARCHIVES

As I compared the ODs of the 6.5 mm object to the ODs of JFK's teeth, a stunning paradox quickly arose. The AP X-ray shows multiple overlapping teeth,⁴ all with likely mercury-silver amalgams—as can clearly be appreciated from both lateral skull X-rays taken at the autopsy. But here

was the problem: the OD (approximately 0.6) of the 6.5 mm object implied a metallic thickness (front to back) even greater than all of those (at least four) overlapping amalgams (Table 1). Of course, that made no sense, especially since the lateral X-ray did not confirm such a thickness for the supposed partner image of the 6.5 mm object. In fact, on the lateral X-ray, the partner image of the 6.5 mm object is only a tiny metal fragment (Figure 2). Of course, subsequent experts (e.g., chiefly John Fitzpatrick, but others as well) had already made that same point, based solely on their naked eye inspections. But now my quantitative OD data had confirmed their visual impression. (Actually, my data had been obtained well *before* Fitzpatrick's review). This bizarre result was precisely what should have been expected if the 6.5 mm object had merely been added in the darkroom—without proper control over the duration of the second exposure.

Table 1. OD comparison of JFK's teeth (with dental amalgams) vs. the 6.5 mm object. The 7 x 2 mm metal fragment is visible on both JFK's AP and lateral X-rays (Figures 1 and 2), and it was removed during the autopsy. ODs shown here are representative only. Actually, many OD data points were taken.

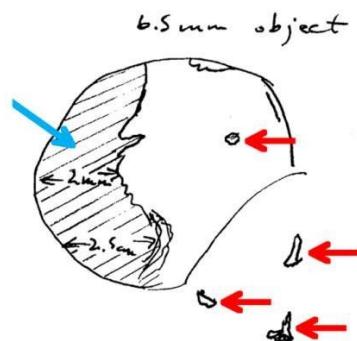
Object	OD (AP X-ray)	Implied thickness (from AP X-ray)	Actual thickness (lateral X-ray)
6.5 mm	0.60	Very thick (front to back)>40 mm	3-4 mm
amalgams	0.76	30-40 mm	30-40 mm
7 x 2 mm	1.44	thin	2 mm

³ This scanning equipment is commonly used in departments of radiation oncology to calibrate dose distributions (by using water tanks as targets), e.g., see http://www.ptw.de/sla48_air_scanner_table.html?&cId=.

⁴ The teeth have been cropped out of publicly available images of JFK's skull X-rays, but JFK's (pre-mortem) dental images were published by the HSCA at <http://jfkassassination.net/russ/infojfk/jfk1/1exhf295p150.jpg>. That there is a match between these two different sets of X-ray images is proof that the body at the autopsy really was JFK's.

Another visual feature leapt out at me as I viewed the 6.5 mm object with my then- extremely myopic (-9.0 diopter) eyes: I was seeing a phantom effect—as a result of a double exposure.⁵ As shown in Figure 7, I could actually see the original (crescent-shaped) metal fragment (the one that matched the authentic image on the lateral X-ray at the back of the skull). On the AP X-ray, the authentic metal fragment lay at the anatomic right side of the 6.5 mm object, but it was located entirely inside of the 6.5 mm object. In fact, it appeared that

Figure 7. My sketch of the 6.5 mm object, as drawn at the Archives. The crescent-shaped (cross-hatched) area represents the authentic fragment—the real one that lay at the back of JFK’s skull (Figure 2). Scattered tiny metal fragments are identified by arrows, including one (paradoxically) *inside* the 6.5 mm object.



I could also see (Figure 7) tiny pieces of metal adjacent to the 6.5 mm object, but one tiny particle actually lay *inside* of this 6.5 mm object. The separate appearance of this tiny particle, as well as the separate appearance of the crescent-shaped, original fragment (actually located

at the back of the skull) are both examples of the phantom effect. This is a well-known Hollywood phenomenon, which results from a photographic double exposure (Figure 8).⁶

⁵ This observation (of a phantom effect) was confirmed on 22 April 2015 by Dr. Mike Chesser (a neurologist) during his own visit to the JFK X-rays at the National Archives (personal communication, publication pending). He also measured the ODs of the 6.5 mm object, of the petrous bone, and of the posterior “White Patch” (using an optical densitometer supplied by the Archives). His results for these ODs are in excellent agreement with mine.

⁶ Like many other amateurs, I have accidentally produced this effect myself when my old-fashioned, film-based camera failed to advance the film. Images of double exposures may be seen at https://www.google.com.mx/webhp?sourceid=chrome-instant&rlz=1C1CHFX_enUS629US629&ion=1&espv=2&ie=UTF-8#q=double%20exposure%20phantom%20image.

Figure 8. Another intentional double exposure.⁷

Next, in order to obtain high resolution OD data across the 6.5 mm object, I modified the densitometer aperture. In particular, I used aperture slits of about 60 microns, instead of the manufacturer-provided 2 mm circular aperture. And OD data were taken at increments of 0.1 mm, meaning that within an interval of 6.5 mm about 65 measurements were made.

But the next step was the critical one. When I returned home I performed the

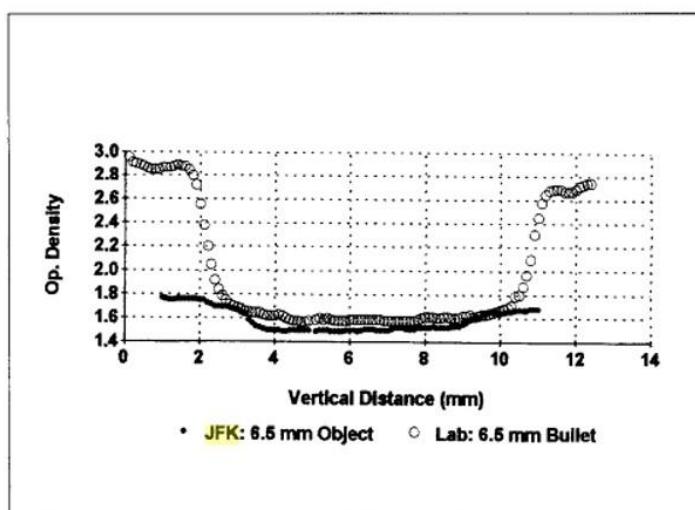
appropriate control experiment: I took X-rays of an authentic slice of a 6.5 mm (Mannlicher-Carcano) bullet that I taped to the back of an authentic human skull that I had purchased (Figures 9 and 10). I then repeated the same steps that I had previously performed at the National Archives, i.e., I took data points across the authentic 6.5 mm slice. The data points from those two experiments are compared in Figure 11.

Figure 9. AP X-ray of an authentic (empty) human skull, showing the cross section (4 mm) of an authentic 6.5 mm bullet. Its location is very similar to Figure 1.**Figure 10.** Lateral X-ray of an authentic (empty) human skull, showing the cross section of an authentic 6.5 mm bullet. Compare this metal fragment to the (barely visible) one at the back of JFK's head (Figure 2). An authentic cross section should have been visibly obvious in Figure 2, rather than almost imperceptible.

⁷ Ibid.



Figure 11. Optical density comparison (on lateral skull X-rays) of the small fragment at the back of JFK's head (presumably the partner image of the 6.5 mm object) versus a genuine 6.5 mm bullet cross section (as shown in Figures 9 and 10). The discrepancy between the two is obvious.

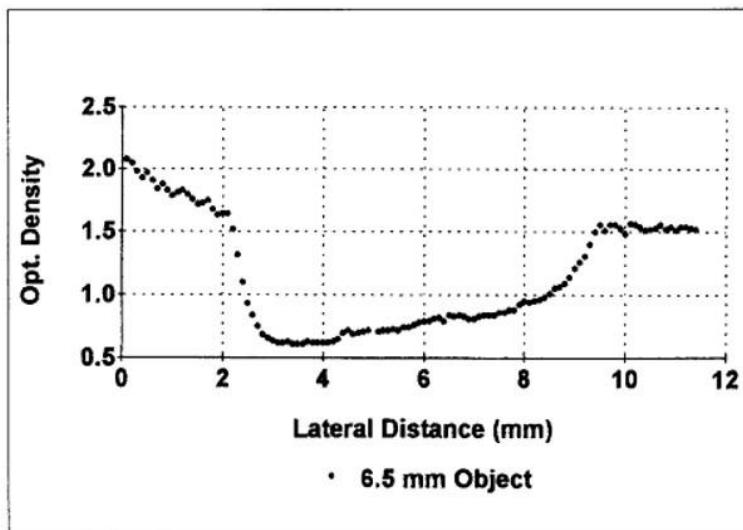


This comparison provides powerful, essentially conclusive, evidence that *the 6.5 mm object was not authentic*. In fact, the data are entirely consistent with its subsequent addition in the darkroom. Moreover, the corroborating evidence from the dental amalgams, and from the phantom effect, essentially closes the case. Finally, my fantastic X-ray double exposures had already provided clear proof of feasibility.

Additional optical density scans were also taken—on both the lateral and AP X-rays. Just one of these, a horizontal scan of JFK's AP X-ray, is shown in

Figure 12. An authentic cross section should, of course, show a fairly constant OD from left to right. That is not the case in Figure 12, which shows a slowly rising OD (inside the object, reading from left to right), from about 3 mm through 9 mm on the abscissa. A lower optical density would be expected on the left side (from about 3 to 6 on the abscissa) due to the superposition of the darkroom double exposure over the real metal fragment, i.e., the cross-hatched one in Figure 7. Since this graph is not flat (inside the object), this data introduces yet another paradox into the JFK X-rays.

Figure 12. Horizontal scan of the 6.5 object on JFK's AP X-ray. The left side here corresponds to JFK's anatomic left. This is the same side that contains the authentic metal fragment (shown cross-hatched in Figure 7). A lower optical density would be expected on the left side due to the superposition of the authentic metal fragment over the darkroom double exposure. That is precisely what this scan shows.



Additional scans (not shown here) were taken through the small metal fragment at the back of the skull (Figure 2—the lateral X-ray). These scans were taken both horizontally and vertically. On JFK's AP X-ray, a segment is missing (from the nearly perfect circle) at the inferior pole of the 6.5 mm object. Therefore, these scans on the lateral X-ray should demonstrate noticeably *less metal at the inferior pole* of this object. In fact, they do not, which is yet another paradox. Of course, if this 6.5 mm image actually derived from a double exposure in the darkroom, then all of these paradoxes would be expected.

3. DISCUSSION: MOTIVES AND A TIMELINE

The only viable explanation for the 6.5 mm object is this: it is indeed an artifact, one that was *deliberately* superimposed (in the dark room) directly over a pre-existing, authentic piece of metal that lay at the back of the skull (i.e.,

the one that is barely visible in Figure 2). That explanation addresses all of the mysteries of this image. In particular, its diameter was deliberately chosen to match the caliber of the 6.5 mm carbine, and it was intentionally placed directly over a pre-existing (very small) metal fragment. An (inattentive) overexposure led to its remarkable transparency (and to its oddly curious ODs). Furthermore, the timing of this superposition—*after* the autopsy—explains why no one saw it at the autopsy. Finally, it may also explain why the radiologist, Dr. Ebersole, refused to discuss this artifact with me. After all, he was the single individual most likely to possess the required expertise and creativity to perform X-ray alteration.

So when was this 6.5 mm image added to the original X-ray? One event provides a clue: several weeks after November 22, 1963, Dr. Ebersole was called to the White House by the Secret Service (who controlled all of the autopsy materials). As preposterous as it seems, Ebersole claimed that the purpose of his

visit was to assist in preparing a bust of JFK. While there (he also reported) he drew a straight pencil line obliquely across one lateral X-ray.⁸ More likely, in my opinion, the reason for his summons to the White House was to see how he would react to the now-altered X-rays. Based on this episode then, the alteration must have occurred within several weeks (quite possibly immediately) after the assassination. But there is one more clue to the timeline – the recollections of Jerrol Custer, the radiology technologist. He recalled (to me personally, as well as publicly) that the morning after the assassination, he was called into the radiology suite (by Dr. Ebersole) and was tasked with taking X-rays of bullet fragments taped to skull X-rays. In my opinion, however, none of these X-rays were used, especially after it occurred to the master forger that the alteration was easier to perform in the darkroom via a double exposure.

The final question, of course, is this: Why was this forgery necessary? The answer to that question has been proposed in dozens, if not hundreds, of books and articles over the decades⁹, but the proximate motive must have been this: It was to implicate Oswald and his supposed 6.5 mm Mannlicher-Carcano carbine. In particular, with Oswald as the lone gunman, conspiracy had been ruled out, and a supposed Cold War catastrophe could then be averted (e.g., nuclear war with the Soviet Union). Of course, as a corollary, *a conspiracy of any stripe* could also (conveniently) be ruled out. However, these issues are all beyond the scope of this essay.

⁸ I observed that this pencil line lay on *only one side* of the film. This means that the film that I saw had not been copied since Ebersole drew his line.

⁹ For just one of these books, especially for readers interested in the whodunits in the JFK case, see *Bloody Treason* by Noel Twyman [15].

CONCLUSION

The 6.5 mm object was not described in the autopsy report nor was it seen (by anyone) on the original autopsy X-rays. Among the many (dozens) of individuals at the autopsy, no one saw it, even though the X-rays were on public display during the autopsy. Nor has anyone at the autopsy ever recalled a single conversation about it. This peculiar object simply materialized in the public record, for the first time (four years later) with the 1968 Clark Panel report.

This artifact was added to the JFK AP skull X-ray (in the darkroom) via a double exposure of a 6.5 mm aperture (e.g., via a 6.5 mm hole in a piece of cardboard). In this process, the first step was to imprint the image from the original X-ray onto a duplicate film (via a light box in the dark room). The second step was another exposure that imprinted the 6.5 mm image onto the duplicate film (i.e., superimposing it over the image of the original X-ray). This duplicate film was then developed to yield the image seen in Figure 1. This process inevitably produces a phantom effect, whereby objects (e.g., bullet fragments in this case) on the original film are seen *separately* from the superimposed 6.5 mm image. On JFK's AP skull X-ray, the original metal fragment (that lay at the back of the skull) can be seen separately *through* the 6.5 mm image (Figure 7). Furthermore, the double exposure was unprofessional: it produced a significant overexposure of the 6.5 mm image, so much so that the resulting OD implies a very long section of metal (from front to back—Table 1).

There is, of course, no such partner image on the lateral X-ray, which immediately exposes this object as an artifact.

On JFK's lateral X-ray, high resolution OD scans of the posterior skull fragment (Figure 2), and comparison of these ODs to a control experiment using an authentic bullet cross section (Figures 9 and 10) also yielded highly paradoxical results. These results are inexplicable if the 6.5 mm object is an authentic bullet fragment. This conclusion is consistent with the chief consultant for the ARRB (Dr. John Fitzpatrick), who actually admitted that he could not explain the mysteries of this 6.5 mm image.

The addition of this 6.5 mm image to the AP X-ray was completed during the first several weeks (perhaps even immediately) after November 22, 1963. Its proximate purpose could only have been to implicate the 6.5 mm Mannlicher-Carcano carbine (supposedly owned by Oswald) in the assassination. Its ultimate purpose, however, awaits resolution by professional historians, who have been remarkably reticent about accepting responsibility for their task.

CONFLICT OF INTEREST

The author has no conflict of interest to disclose.

REFERENCES

1. "1968 Panel Review of Photographs, X-Ray Films, Documents and Other Evidence Pertaining to the Fatal Wounding of President John E Kennedy on November 22, 1963, in Dallas, Texas" [Clark Panel Report] at <http://www.jfklancer.com/ClarkPanel.html>
2. "ARRB staff report of observations and opinions of forensic radiologist Dr. John J. Fitzpatrick, after viewing the JFK autopsy photos and X-rays" at <http://www.maryferrell.org/showDoc.html?docId=145280&relPageId=225>
3. "The [ARRB] deposition of Dr. James J. Humes" at <http://jfkassassination.net/russ/testimony/humesa.htm>
4. Author, "A Telephone Conversation with Dr. John Ebersole" at <http://jfkassassination.net/russ/testimony/humesa.htm>
5. Cahoon, John B. 1961. *Formulating X-ray Techniques* (5th edition). Duke University Press, Durham, North Carolina at <http://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC197800&blobtype=pdf>
6. Fetzer, James H., editor. 1998. *Assassination Science: Experts Speak out on the Death of JFK*. Catfeet Press, an imprint of Open Court, Peru, Illinois
7. Fetzer, James H., editor. 2000. *Murder in Dealey Plaza: What We Know Now that We Didn't Know Then about the Death of JFK*. Catfeet Press, an imprint of Open Court, Peru, Illinois
8. *Final Report of the Assassination Records Review Board* (1998) at <http://fas.org:8080/sgp/advisory/arrb98/index.html>
9. Frank, M. 1963. *British Journal of Radiology* 36:223
10. *House Select Committee on Assassinations Final Report* (1979) at <https://www.maryferrell.org/showDoc.html?docId=800>
11. Images of double exposures at https://www.google.com.mx/webhp?sourceid=chrome-instant&rlz=1C1CHFX_enUS629US629&ion=1&espv=2&ie=UTF-8#q=double%20exposure%20phantom%20image
12. "JFK Dental X-rays" at <http://jfkassassination.net/russ/infojfk/jfk1/1exhf295p150.jpg>
13. *Report of the President's Commission on the Assassination of President Kennedy* [The Warren Report] at <http://www.archives.gov/research/jfk/warren-commission-report/>
14. Sturdivan, Larry. 2005. *The JFK Myths: A Scientific Investigation of the Kennedy Assassination*. Paragon Press, St. Paul, Minnesota
15. Twyman, Noel. 1997. *Bloody Treason*. Laurel Publishing, Rancho Santa Fe, California