

The Kennedy-Connally One Bullet Theory: Further Circumstantial and Experimental Evidence

The principal remaining point of contention - with the Warren Commission Report is whether one bullet could have caused both President Kennedy's neck wound and the wounds of Governor Connally. To test whether this could have happened, the authors constructed an integrated model of the flight path of Bullet 399 through President Kennedy and Governor Connally, based on the circumstantial and experimental evidence. In doing so, they deduced that the controversial bullet (399) must have struck a vertebra in President Kennedy's neck, accounting for the two chips seen there, but not so interpreted prior to this report.

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Kennedy-Connally One Bullet Theory

Everyone^{1, 2, 3, 5} who has viewed and reported on the autopsy and x-ray evidence from President Kennedy's body now agrees that the President was hit by two bullets only, that these were both fired from above and from the rear, and that there is no evidence that he was shot from the side or from the front. This group includes some of the most voluble critics of the Warren Commission Report. Even *they* now agree that these two shots both came from the Texas Book Depository Building but conjecture that perhaps they came from two different windows.⁵ They ignore the fact that the rifling scratches prove that both bullets came from Oswald's gun, to the exclusion of all other guns.^{3, 9}

The principal remaining major issue upon which some critics continue to criticize the Warren Commission Report is the question of whether one bullet (the first of the two that hit President Kennedy) could have passed through both President Kennedy's neck and then through Governor Connally.^{5, 6} These critics are still skeptical that this could have happened and argue indirectly from this that the entire 27 volume Warren Commission Report is a hoax. Practically all of the other doubts about shots from the sides or front have been dispelled by permitting non-government analysts to review the autopsy and x-ray evidence.^{4, 5}

The fact that Governor Connally states that he believed he was hit by a different bullet than the one that went through President Kennedy's neck⁹ (in spite of the circumstantial evidence, documented herein, that it

must have been the same bullet that hit both him and President Kennedy) has been seized upon by the critics as support for their view. They contend that it was a third bullet that hit the Governor, completely ignoring the fact that only two bullets were recovered in the car or its occupants. They also ignore the fact that if three bullets *had* hit the occupants of the car, Governor Connally would have been struck by two of them, whereas he was actually hit only once, and by a bullet that had hit something else first.

They argue that *if* three bullets hit the occupants of the car, one when Governor Connally assumes he was hit, the time was too short for Oswald to fire all three shots. Again, they ignore the facts that there is evidence of only two bullets hitting the occupants, five seconds apart, and that both bullets came out of Oswald's gun to the exclusion of all other guns. They also ignore the fact that Governor Connally could not have been hit at the time he assumed he was hit (Zapruder Frame 234), since his hand, which was wounded, can be clearly seen to have risen out of the path of the bullet that struck it.

About Bullet 399

Some critics, who are obviously unfamiliar with high-powered military rifles, even contend that the bullet (Warren Commission Exhibit 399) could not have passed through two men and retained its so-called "pristine" appearance.⁹ They disregard the evidence that this bullet is not "pristine" (it was flattened somewhat by hitting something hard, such as Governor Connally's rib and

wrist, glancing blows, while traveling sideways and somewhat backward). They also ignore the fact that infantry tacticians are well aware that multiple soldiers are very likely to be penetrated by the same bullet if they stay close together. This is the reason for the "spread" formation required of all troops who are under direct fire. Numerous instances of multiple soldiers being wounded by the same bullet have been reported.¹⁰ In fact, the type of rifle used by Oswald has been found to be so "over-powered" that it has been replaced by a lighter and less powerful rifle and cartridge as our current infantry weapon.

Some critics, who obviously never tested this rifle, claim it is not accurate enough to do what the Warren Commission contends. Our earlier tests verified the findings of the Army weapons researchers, that this is a highly dependable weapon.^{18, 19}

In an effort to determine the actual feasibility of the Warren Commission's proposal that a single bullet penetrated both President Kennedy's neck, and then Governor Connally's body, arm and leg, a mechanical model, reconstructing the flight path of Bullet 399 through the two men has been prepared (Figure 10), which may make it easier to understand exactly what happened to this bullet after it hit President Kennedy. This model was prepared after extensive experimentation, plus a study of the autopsy materials.⁸

A New Interpretation

As a result of our studies, we offer a new interpretation, indicating that this bullet *did* hit a bony trans-

verse process in President Kennedy's neck, as described below.

It is here postulated that shortly after the motorcade car bearing President Kennedy turned into Elm Street, Governor Connally heard a loud noise. In his sworn testimony before the Warren Commission, Governor Connally described it as follows:

"We had just made the turn, well, when I heard what I thought was a shot. I heard this noise which I immediately took to be a rifle shot. I instinctively turned to my right because the sound appeared to come from over my right shoulder, so I turned to look back over my right shoulder and I saw nothing unusual except just people in the crowd but I did not catch the President in the corner of my eye, and I was interested, because once I heard the shot in my own mind I identified it as a rifle shot, the only thought that crossed my mind was that this is an assassination attempt.

So I looked, failing to see him. I was turning to look back over my left shoulder into the back seat, but I never got that far in my turn. I got about in the position I am in now facing you, looking a little bit to the left of center, and then I felt like someone had hit me in the back."¹¹

Although Governor Connally had strained and twisted to look over his right shoulder, he did not get around far enough to see the President. In order to exert the maximum effort to look straight backwards over his right shoulder, a person in the right-hand "jump seat" of an automobile automatically leans to his left in or-

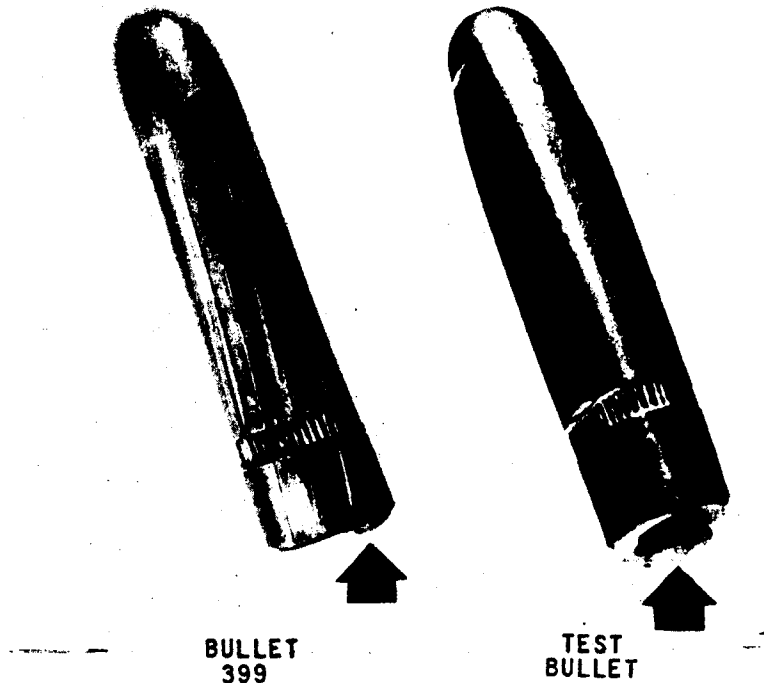


FIGURE 1—THE BULLET: Bullet 399 (left) struck the fifth rib of Governor Connally a tangential blow and was flattened to the same degree as we then flattened our test bullet (right). This caused its soft lead core to extrude from the rear end of Bullet 399, some of which can still be seen (arrow left). We believe the remainder of the extruded lead was scraped off on to the Governor's radius and femur, since the bullet was traveling almost backwards at that point. The extruded portion of the lead from our test bullet weighed exactly 2.1 grains: the same amount as was missing from Bullet 399. (Bullet 399 photo courtesy National Archives).

der to get around far enough to see directly backwards (the reader can confirm this by trying it). This shift would have placed the Governor's body more to the left of the center of the jump seat than usual. This would account for his being hit in the right side of his back, rather than the left side. Governor Connally also stated that he put his right hand, in which he was holding his hat by the brim, down on his left thigh, in order to push himself further around toward his right. In his sworn testimony he said *"having turned to look over my right shoulder—I threw my right wrist over on my left leg."¹²*

We postulate that neither man had been hit at this point. Governor Connally then decided (as he stated) that since he could not see President Kennedy over his right shoulder, he would next look over his left shoulder. Although he began to turn his head, he had not yet been able to unwind completely, and his body was still tilted to his left. His right hand was still down in the car, where it had been pushing on his left leg, just above the knee, with the heel of his right hand, in which he held his hat. We believe that by Frame 223 (when he emerged from behind the

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Stemmons Freeway sign) he had already been struck by Bullet 399, which had just traversed the neck of President Kennedy.

Immediately after he was struck by the bullet he reflexly stiffened and cried out "Oh! No, no, no!"¹³

It is important to note that Governor Connally stated in his original sworn testimony that he said "Oh! No, no, no!" after he was hit.¹³

Backfiring Motorcycles

Mrs. John F. Kennedy, in her original sworn testimony before the Warren Commission, stated that it was hearing Governor Connally cry out that caused her to cease looking out the left side of the automobile and turn her head to look at Governor Connally and President Kennedy, who were to her right.¹⁴ In her sworn testimony in Volume 5 of the Hearings Before the Warren Commission on page 180, Mrs. Kennedy stated, "You know, there is always noise in a motorcade and there are always motorcycles beside us, a lot of them backfiring. So I was looking to the left. I guess there was noise, but it didn't seem like any different noise really, because there is so much noise, motorcycles and things. But then suddenly Governor Connally was yelling, "Oh! No, no, no!"¹⁴

Earlier Zapruder movie frames show Mrs. Kennedy looking to her left as the car approached the Stemmons Freeway sign, but when the car emerged from behind the Stemmons Freeway sign, at Zapruder Frame No. 223, she was clearly looking to her right, towards the Governor and towards her husband.

It is difficult to be sure when she turned her head to the right, but there is no doubt that she did it before she emerged from behind the sign.

Less than a second later (Zapruder Frame 236), as his dazed condition wore off a bit, the Governor was undoubtedly attempting to take his first breath, with his chest torn open, his fifth rib shattered, his right lung collapsed and cut across in the middle lobe. His mouth can be seen to open (in Frame 236) and his face contort, reflecting his terrible pain and the frightening sensation of trying to suck air into a damaged lung when the pleura has been torn open and the lung will not function. Very little air will come in under these conditions,—and Governor Connally's mouth can be seen to open widely in an agony of helplessness and pain in Zapruder Frame 236.

In the same Frame, Governor Connally can also be seen to begin to turn again towards his right, probably in a reflex move to reduce the painful motion of the shattered fifth right rib and to pull his right arm over the painful area to "splint" it. Mrs. Connally, seated in the jump seat to his left, now realized that he had been grievously wounded and pulled him over backwards (he was again facing towards the right side of the car by now; as seen in Zapruder Frame 312) into her lap, where she could bend over him to protect him.

She did this just in time to keep him from being exposed to fragments of the second bullet which hit President Kennedy, (this time in the head, and fatally.)⁸ Fragments of this bullet, which was disrupted by

striking the thick part of his skull, also continued forward after traversing President Kennedy's head and struck the frame and glass of the windshield at the front of the car, dropping into the front seat area, where they were recovered.¹⁵ Their rifling scratches also matched the rifling in Oswald's rifle, to the exclusion of all other rifles.⁸⁹

At some point, Governor Connally glanced down, saw his shirt front covered with blood, and realized that he had been shot through-and-through, probably fatally.⁸ At some point he also said "My God they're going to kill us all." He was still dazed enough, however, to fail to be conscious of the fact that he had also been shot through the wrist and in the leg. In fact, he was unaware of this until the next day when he was recovering from his reparative surgery.

"The Third Shot"

While lying in Mrs. Connally's lap Governor Connally became conscious enough to hear the second bullet strike President Kennedy's head, and saw his own clothing become spattered with President Kennedy's brain tissue. He described this in his original testimony:

"So I reclined with my head in her (Mrs. Connally's) lap, conscious all the time, and with my eyes open, and then, of course, the third shot sounded and I heard the shot very clearly. I heard the shot hit something and assumed again—it never entered my mind that it hit anybody but the President. I heard it hit. It was a very loud noise, just that audible, very clear.

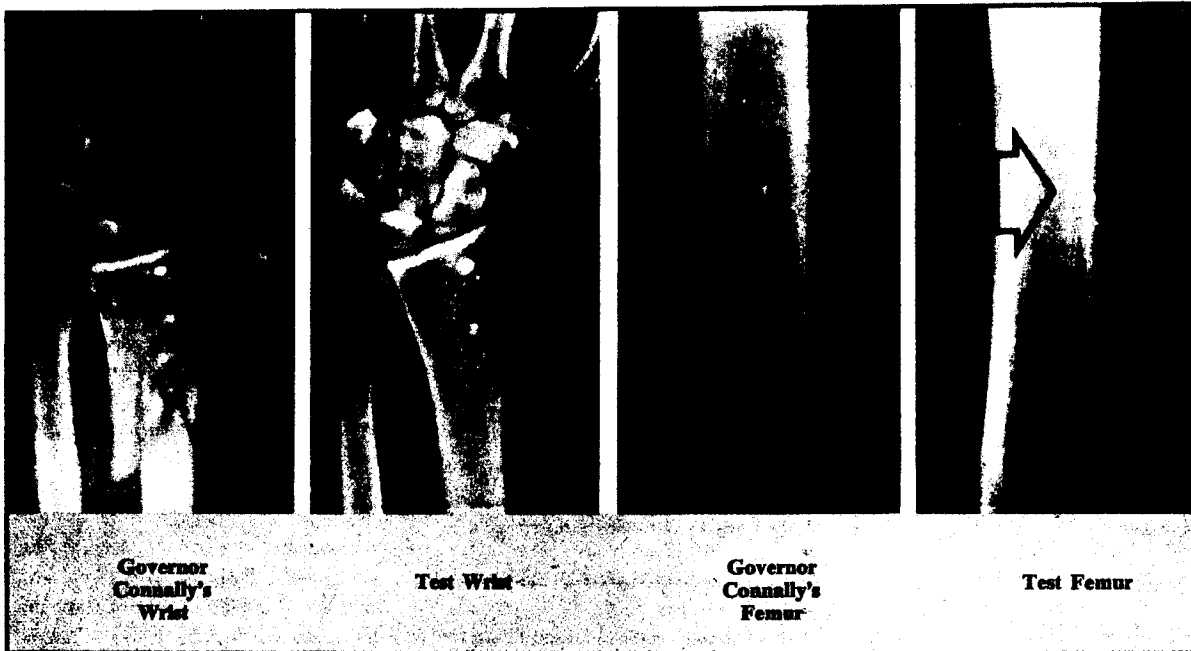


FIGURE 2—X-RAYS OF GOVERNOR CONNALLY: The x-rays of Governor Connally showed three fragments (of soft gray lead) in his wrist (left) and one in his femur. We believe these were scraped off the extruded lead core now projecting from the rear end of bullet 399 (see Figure 1) as it travelled almost

backwards through Governor Connally's radius and on into his thigh, at a greatly reduced velocity. Also see Figure 5—x-ray of a "test radius." (X-rays courtesy National Archives and Dr. J. Becker, Squier Urological X-Ray Dept., Columbia University)

"Immediately I could see my clothing, I could see on the interior of the car, which as I recall it, was a pale blue, brain tissue, which I immediately recognized, and I recall very well on my trousers there was one chunk of brain tissue that was almost as big as my thumb nail, and again I did not see the President at any time either after the first, second or third shots."¹⁰

Governor Connally further stated that he then lapsed into complete unconsciousness until the car swerved into the Parkland Hospital driveway, whereupon he regained consciousness enough to attempt to get out of the car himself, before again collapsing.

Governor Connally made the assumption that the first loud noise he heard was the shot that penetrated

President Kennedy's neck. He assumed that a second and different bullet hit him (the Governor) without having first gone through President Kennedy.⁸ The circumstantial and experimental evidence clearly shows, however, that Governor Connally was *not* hit by a bullet that came directly from a gun, but by a bullet that was tumbling, and that the most probable thing to make it tumble was President Kennedy's neck. In fact, if it *had* been an earlier bullet that traversed President Kennedy's neck, Governor Connally almost certainly would have been hit by it also, but in a different spot on his back. Furthermore some sign of a third bullet would have been found in the car or its occupants (and no third bullet hole was found). The bullet that

traversed President Kennedy's neck was still travelling fast enough, and probably tumbling enough to have caused very obvious damage to the interior of the car, had it not hit Governor Connally.²⁴

The Zapruder movie frame (Frame No. 234) which Governor Connally selected as the one at which he speculated he was hit, could not possibly be the correct one, since his right wrist can be distinctly seen to have, by this time, risen off his left knee and is clearly out of the line of the bullet. He must have been hit prior to Frame 234.

Governor Connally's Chest Wound

Governor Connally's wounds were described in detail in an arti-

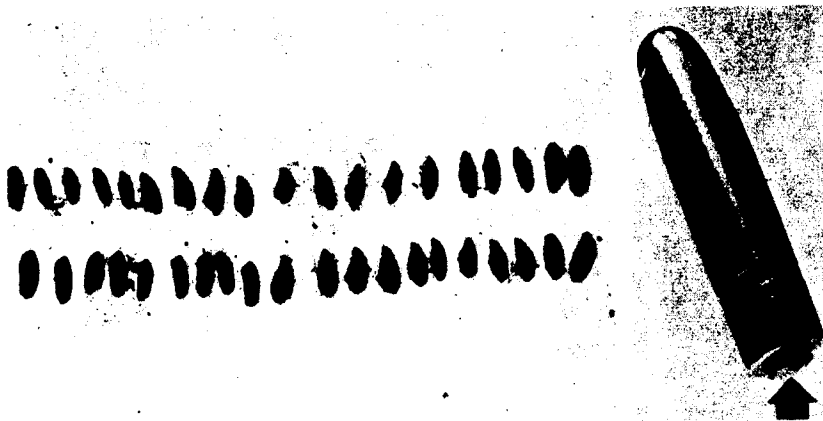


FIGURE 3—FORTY-ONE FRAGMENTS: The extruded portion of soft gray lead from the rear end of our test bullet (right, and Figure 1) was sliced up to yield the 41 fragments seen here. Thus, the four fragments in Gov. Connally were by no means too many for two grains of lead, as claimed by critics of the Warren report.

cle entitled: "Medical Report from the Parkland Hospital" in the Texas State Journal of Medicine for January 1964.¹⁷ The repair of the Governor's chest wound, as described by Dr. Robert E. Shaw, Professor of Thoracic Surgery at Southwestern Medical School was as follows:

"(Dr. Shaw) performed a thoracotomy, removed rib fragments, and debrided the chest wound. Diagnosis of the chest condition was, 'gunshot wound of the chest with comminuted fracture of the fifth rib, lacerations of the middle lobe of the right lung and hematoma of the lower lobe of the right lung.'

"The Governor was brought to the operating room from the emergency operating room, where a sucking wound of the right chest had been partially controlled by an occlusive dressing supported by manual pressure. A tube had been placed through the second interspace of the right chest, in the midclavicular line, and connected to a water-seal bottle to evacuate hemopneumothorax. An intravenous infusion of lactated Ringer's solution had al-

ready been started. As soon as the patient was positioned on the operating table, anesthesia was induced by Dr. Giesecke and an endotracheal tube was put in place. As soon as it was possible to control respirations with positive pressure, the occlusive dressing was taken from the right chest and the extent of the wound more carefully determined. It was found that the bullet had made a wound of entrance just lateral to the right scapula, close to the axilla, and passed through the latissimus dorsi muscle, shattered approximately 10 cm. of the lateral and inferior position portion of the right fifth rib, and emerged below the right nipple. The wound of entrance was approximately 3 cms. in its longest diameter and the wound of exit was a ragged wound approximately 5 cms. in its greatest diameter. The skin and subcutaneous tissues over the path of the missile moved in a 'paradoxical' manner with respiration, indicating softening of the chest. The skin of the whole area was carefully cleansed with pHisoHex® and iodine. The en-

tire area, including the wound of entrance and wound of exit, was draped, partially excluding the wound of entrance for the first part of the operation. An elliptical incision was made around the wound of exit, removing the torn edges of the skin and the damaged subcutaneous tissue. The incision was then carried in a downward curve up toward the right axilla so as not to have the skin incision over the actual path of the missile through the chest wall. This incision was carried down through the subcutaneous tissue to expose the serratus anterior muscle and the anterior border of latissimus dorsi muscle. The fragmented and damaged portions of the serratus anterior muscle were excised. Small rib fragments that were adhering to the periosteal tags were carefully removed, preserving as much periosteum as possible. The fourth and fifth intercostal muscle bundles were not appreciably damaged. The ragged ends of the damaged fifth rib were cleaned with the rongeur. The pleura had been torn open by the secondary missiles created by the fragmented fifth rib.

"The wound was widely opened and exposure was maintained with a self-retaining retractor. Approximately 200 ccs of clot and liquid blood were removed from the pleural cavity. The middle lobe had a linear rent starting at its peripheral edge and going down toward the hilum, separating the lobe into two segments. There was an open bronchus in the depths of this laceration. Since the vascularity and bronchial connections to the lobe were intact,

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it was decided to repair the lobe rather than to remove it. The repair was accomplished with a running suture of #3-0 chromic catgut on an atraumatic needle, closing both pleural spaces as well, with two running sutures approximating the tissue of the central portion of the lobe. This almost completely sealed off the air leaks which were evident in the torn portions of the lobe. The lower lobe was next examined and found to be engorged with blood, and at one point a laceration allowed the oozing of blood from the lobe. This laceration had undoubtedly been caused by a rib fragment. The laceration was closed with a single suture of triple-0 chromic catgut on an atraumatic needle. The right pleural cavity was now carefully examined. Small rib fragments were removed. The diaphragm was found to be uninjured. There was no evidence of injury to the mediastinum or its contents. Hemostasis had been accomplished within the pleural cavity with the repair of the middle lobe and the suturing of the laceration of the lower lobe. The upper lobe was found to be uninjured."

Governor Connally's Wrist Wounds¹⁷

"Dr. Charles F. Gregory, an orthopedic surgeon certified by the American Board of Orthopedic Surgery, is Professor and Chairman of Orthopedic Surgery at Southwestern Medical School. He is a veteran of both World War II and the Korean War. He states that there was a comminuted fracture of the Governor's right distal radius, which oc-

curred when the bullet passed through the chest and struck the arm. Dr. Gregory debrided the wound and reduced the fracture. This took place while the patient was still under general anesthesia following a thoracotomy and repair of the chest injury, which was done by Dr. Shaw. The right upper extremity was thoroughly shaved and prepped in the routine fashion. The patient was draped in routine fashion, using stockinette. In addition, was the use of a debridement pan.

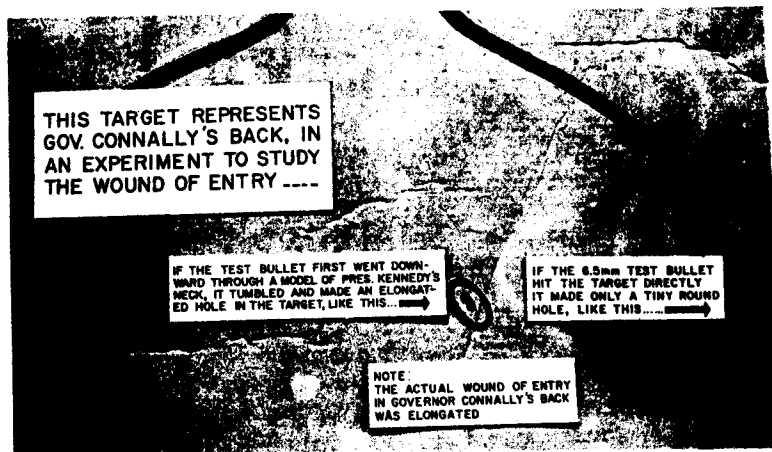
"The wound of entrance, on the dorsal aspect of the distal right forearm at the junction of the distal fourth of the radius and its shaft, was approximately 2 cms. in length and rather oblique, with a loss of tissue and with considerable contusion at its margins. There was a wound of exit along the volar surface of the wrist about 2 cm. above the flexion crease of the wrist in the midline. The wound of entrance was carefully excised and developed through the muscles and tendons from the radial side of that bone to the bone itself, where the fracture was encountered. It was noted that the tendon of the abductor pollicis longus was transected. Only two small fragments of bone were removed; one approximately 1 cm. in length, consisted of lateral cortex, which lay free in the wound and had no soft tissue connections, and another much smaller fragment, 3 mm. in length (Figure 2). Small bits of metal were encountered at various levels throughout the wound. Whenever they were identified and could be picked up, they were submitted to the Pathology Depart-

ment. Throughout the wound there were noted fine bits of cloth, like mohair. Dr. Gregory was told that the patient was wearing a mohair suit at the time of injury, thus accounting for the deposition of such organic material within the wound. After as careful and complete debridement of the volar wound as was possible, and the integrity of the flexor tendons and the median nerve on the volar side established, the wound of exit on the volar surface of the wrist was closed primarily with wire sutures. The wound of entrance on the radial side of the forearm was only partially closed, being left open for the purpose of drainage. This was in deference to the presence of mohair and organic material deep in the wound."

In an additional reference to the wrist wounds in Volume IV, Hearings Before The Warren Commission, on page 142, Dr. Gregory describes the healed wounds of Governor Connally's wrist as follows: "The upper limb of the wound on the dorsum of the wrist is about 5 cms. above the wrist joint. [This was the wound of entry of the bullet into the wrist]. The length of that excisional scar is about 4 cms. [*an inch and a half*]. The wound on the palmar side of the wrist [this was the wound of exit from the wrist] is now converted to a well healed linear scar approximately *one half inch in length* [emphasis ours—JKL] and located about $\frac{3}{4}$ inch above the distal flexion crease."

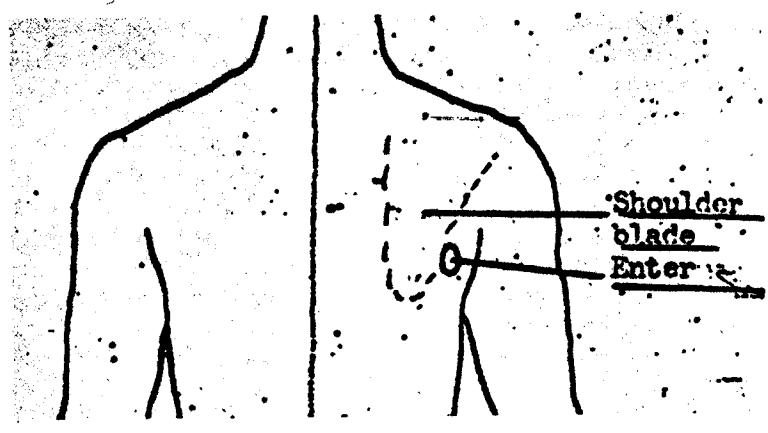
The Leg Wound

Governor Connally's leg wound was described by Dr. Thomas Shires,



◀ **FIGURE 4—A SIMULATED "CONNALLY":** An oval hole in our target simulating Governor Connally's back, was caused by our test bullet that had first passed through a simulation of President Kennedy's neck, causing the bullet to "wobble" and start to "tumble" end-over-end. Governor Connally's wound of entry was elongated, like the one in the center of this target. The "punctate" round hole, with black margins, of the type which always occurred when our test bullets struck the "Governor Connally" target without hitting something else first, can be seen to the right of Governor Connally's outline in the photograph. These bullets never "wobbled" or "tumbled" spontaneously; they were very stable in their flight to the target, unless they hit something else first.

Mr. SPECTER. Would you draw, Dr. Shaw, right above the shoulder as best you can recollect, what that wound of entry appeared at the time you first observed it? Would you put your initials right beside that?
(The witness, Dr. Shaw, complied with the request of Counsel Specter.)



◀ **FIGURE 4A—DR. SHAW'S TESTIMONY:** Dr. Shaw initialed and described his careful drawing depicting the wound of entry into Governor Connally's back, showing it as 3 cm. long. (WCR, Vol. VI, pages 86 and 95 [text] and Vol. XVII, pages 336, exhibit 679 [drawing]). He later attests to its accuracy, under oath.

Mr. SPECTER. As to the wound on the back of Governor Connally, was there any indication that the bullet was tumbling prior to the time it struck him?
Dr. SHAW. I would only have to say that I'm not a ballistics expert, but the wound on his chest was not a single puncture wound, it was long enough so that there might have been some tumbling.
Mr. SPECTER. You mean the wound on his back?
Dr. SHAW. The wound on his back—yes, it was long enough so that there might have been some tumbling. In other words, it was not a spherical puncture wound.

Mr. SPECTER. You say the hole which appears on Governor Connally is just about the size that it would have been on his body?
Dr. SHAW. Yes; it is drawn in good scale.
Mr. SPECTER. In good scale to the body?
Dr. SHAW. Yes.

Professor and Chairman of the Department of Surgery at Southwestern Medical School. "Dr. Shires performed the surgery for exploration and debridement of the gunshot wound of the Governor's left thigh. The operation lasted twenty minutes. He reported that there was a one cm. (two-fifths of an inch), punctate missile wound over the lower third of the medial aspect of the left thigh. X-rays of the thigh and leg revealed a bullet fragment which was embedded in the body of the femur in the distal third (Figure 2). The leg was prepared with pHiso-Hex and iodine and was draped in the usual fashion.

"Following this, the missile wound was excised and the bullet tract was explored. This missile wound was seen to course through the subcu-

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taneous fat and into the vastus medialis. The necrotic fat and muscle were debrided down to the region of the femur. The direction of the missile wound was judged not to be in the course of the femoral vessels, since the wound was distal and anterior to Hunter's canal. Following complete debridement of the wound and irrigation with saline, the wound was felt to be adequately debrided, enough so that three simple through and through stainless steel alloy #28 wire sutures were used, encompassing skin, subcutaneous tissue and muscle fascia on both sides. Following this, a sterile dressing was applied. The dorsalis pedis and posterior tibial pulses in both legs were good."

The metallic fragment was so tiny that no attempt was made to remove it. The metallic fragment was located slightly distal to the wound of entry into the skin of the upper leg.³⁶

It is important to note that, in his original sworn testimony, Dr. Shaw, the chest surgeon, stated that the wound in Connally's back was not a puncture wound, but was elongated, indicating that there could have been some tumbling.³⁷ His careful diagram (Figure 4A) of the wound of entry (which he revised and then initialed) showed it to be elongated in its vertical axis (not horizontal) and to be at least 3 cm. in length.³⁸ This is important, as we shall see.

It would seem that all the various wounds in Governor Connally were almost undeniably made by the same tumbling bullet, which first traversed his chest, then traversed

his right wrist and finally embedded itself in his leg, being stopped by his femur after completing an entire 180° turn, which caused it to be travelling completely backwards as it struck his leg. Being a very long bullet, it was easy for it to be knocked out of Governor Connally's leg. It was found on the stretcher, in Parkland Hospital, which was assured to be his.

Reconstruction of What Happened

The shapes and sizes of the wounds in President Kennedy's neck and in Governor Connally's back, wrist, and leg have graduated differences in lengths, all of which fit exactly with our reconstruction of the course taken by Bullet 399 in its "tumbling" configuration through the two men (Figure 10). Our reconstruction is as follows:

The 6.5 mm. bullet, fired from above and behind the President, had entered the top of the prominent roll of soft tissue across the back of President Kennedy's neck, making a wound of entry approximately 6.5 mm. in diameter and bearing the typical dark circumferential halo, characteristic of a wound of entry by a high-speed rifle bullet. It grazed the tip of the transverse process of the President's sixth or seventh cervical vertebra (Figure 9), dislodging two tiny fragments of bone which are visible in a post-mortem x-ray film of his neck studied by one of us (JKL).³ While these two fragments had been noted by the government-sponsored panel in 1968,² they were then assumed to be metallic, whereas our x-ray

studies of various materials indicate that they are more likely fragments of bone rather than metal. This suggests that Bullet 399 hit the bony tip of the transverse process of either the sixth or seventh cervical vertebra of the President with stunning effect (Figure 9). This is a *new* interpretation, which is different from all previous assumptions that Bullet 399 hit no bone in President Kennedy. It then traversed the soft tissues of his neck and his trachea, emerging approximately in the mid-line, just below his "Adam's apple," and exited from his neck while travelling downward at approximately an 18° to 20° angle. It undoubtedly began to "tumble" as it left the President's neck. No photographs of the "wound of exit" in the President's neck are available, since the large transverse tracheostomy wound was made directly through the bullet hole by Dr. Perry, in order to insert the cuffed tracheostomy tube, during the frantic efforts to resuscitate the President. Dr. Perry noted that this wound was not excessively large and even agreed, reasonably enough, with some of his questioners that it might have been compatible with a wound of entry.^{17A} The fact that it was not as large as a conventional wound of exit (and it was later proved to indeed be a wound of exit), we believe is accounted for by the fact that the skin was supported at this point by the collar band of the President's shirt, which was in "new" condition, and of strong fabric, with a strongly sewn-on collar button. This has been tested on the President's original shirt by one of us.⁸

PARKLAND MEMORIAL HOSPITAL OPERATIVE RECORD		ROOM: 220	STATUS: Pvt
DATE: 11-22-63 Thoracic Surg		NAME: John Connally	UNIT # 26 36 99
PRE-OPERATIVE DIAGNOSIS: Gunshot wound of the chest with comminuted fracture of the 5th rib		AGE:	RACE: W/M
POST-OPERATIVE DIAGNOSIS: Same with laceration right middle lobe, hematoma lower lobe of lung			
OPERATION: ^A Thoractomy, removal rib fragment, debridement of wound			
ANESTHETIC: General		BEGAN: 1300	ANESTHESIOLOGIST: Giesecke
SURGEON: Robert Shaw, M.D.		DRAINS:	
ASSISTANTS: Drs. Boland and Duke		APPLIANCES:	
SCRUB NURSE: King/Burkett	CIRC. NURSE: Johnson	CASTS/SPLINTS:	
SPONGE COUNTS: 1ST Correct		DRUGS	I.V. FLUIDS AND BLOOD
2ND Correct			111-500 cc whole blood 11-1000cc D-5-RL
COMPLICATIONS: None			
CONDITION OF PATIENT: Satisfactory			
<p>Clinical Evaluation: The patient was brought to the OR from the EOR. In the EOR a sucking wound of the right chest was partially controlled by an occlusive dressing supported by manual pressure. A tube been placed through the second interspace in the mid-clavicular line connected to a waterseal bottle to evacuate the right pneumothorax and hemathorax. An IV infusion of RL solution had already been started. As soon as the patient was positioned on the OR table the anesthesia was induced by Dr. Giesecke and an endotracheal tube was in place. As soon as it was possible to control respiration with positive pressure the occlusive dressing was taken from the right chest and the extent of the wound more carefully determined. It was found that the wound of entrance was just lateral to the right scapula close the the axilla yet had passed through the latysmus dorsi muscle shattered approximately 3 cm of the lateral and anterior portion of the right fifth rib and emerged below the right nipple. The wound of entrance was approximately three cm in its longest diameter and the wound of exit was a ragged wound approximately five cm in its greatest diameter. The skin and subcutaneous tissue over the path of the missile moved in a paradoxical manner with respiration indicating softening of the chest. The skin of the whole area was carefully cleansed with Phisohex and Iodine. The entire area including the wound of entrance and wound of exit was draped partially excluding the wound of entrance for the first part of the operation. An elliptical incision was made around the wound of exit removing the torn edges of the skin and the damaged subcutaneous tissue. The incision was then carried in a downward curve up toward the right axilla so as to not have the skin incision over the actual path of the missile been through the chest wall. This incision was carried down through the subcutaneous tissue to expose the Serratus anterior muscle and the anterior border of the latissimus dorsi muscle. The fragmented and damaged portions of the Serratus anterior muscle were excised. Small rib fragments that were adhering to periosteal tags were carefully removed preserving as much periosteum as possible. The fourth intercostal muscle bundle and fifth intercostal muscle bundle were not appreciably damaged.</p>			
.RS:bl (continued)		M.D. Dr. Robert Shaw	

FIGURE 4B—OPERATIVE NOTE, dictated and signed by chest surgeon Shaw immediately after the operation, in which he states that the wound of entry in Connally's back was 3 cm. in length (WCR).

Dr. Shaw repeatedly reaffirmed this operative note

was accurate, in testimony before the Commission:

MR. SPECTER: Permit me to make available to you a copy of the Parkland Memorial Hospital operative record and let me ask you, first of all, if you can identify these two pages on an exhibit heretofore

Thus the supported skin of the front of the President's neck did not bulge and burst open in the usual ragged manner, before this exiting bullet, as usually occurs when the

skin is unsupported.

Traversing a simulation of the President's neck, made of either rubber or horsemeat, makes a bullet like this begin to "tumble," we

found (Figure 4), as did the Government investigators.²⁴ Striking the tip of the transverse process of a vertebra, however thin, as just described, would be even more reason

PARKLAND MEMORIAL HOSPITAL
OPERATIVE RECORD

CONNALLY OHN G 263699
WM 11-22-63
John Connally
26 36 99

DESCRIPTION OF OPERATION (Continued): The ragged ends of the damaged fifth rib were cleaned out with the rongeur. The plura had been torn open by the secondary missiles created by the fragmented fifth rib. The wound was open widely and exposure was obtained with a self retaining retractor. The right plural cavity was then carefully inspected. Approximately 200 cc of clot and liquid blood was removed from the plural cavity. The middle lobe had a linear rent starting at its peripheral edge going down towards its hilum separating the lobe into two segments. There was an open bronchus in the depth of this wound. Since the vascularity and the bronchial connections to the lobe were intact it was decided to repair the lobe rather than to remove it. The repair was accomplished with a running suture of #000 chromic gut on atraumatic needle closing both plural surfaces as well as two running sutures approximating the tissue of the central portion of the lobe. This almost completely sealed off the air leaks which were evident in the torn portion of the lobe. The lower lobe was next examined and found to be engorged with blood and at one point a laceration allowed the oozing of blood. This laceration had undoubtedly been caused by a rib fragment. This laceration was closed with a single suture of #3-0 chromic gut on atraumatic needle. The right plural cavity was now carefully examined and small ribs fragments were removed, the diaphragm was found to be uninjured. There was no evidence of injury of the mediastinum and its contents. Hemostasis had been accomplished within the plural cavity with the repair of the middle lobe and the suturing of the laceration in the lower lobe. The upper lobe was found to be uninjured. The drains which had previously been placed in the second interspace in the midclavicular line was found to be longer than necessary so approximately ten cm of it was cut away and the remaining portion was penetrated with two additional openings. An additional drain was placed through a stab wound in the eighth interspace in the posterior axillary line. Both these drains were then connected to a waterseal bottle. The fourth and fifth intercostal muscles were then approximated with interrupted sutures of #0 chromic gut. The remaining portion of the Serratus anterior muscle was then approximated across the closure of the intercostal muscle. The laceration of the latissimus dorsi muscle on its innermost surface was then closed with several interrupted sutures of #0 chromic gut. The subcutaneous tissue was then closed with several interrupted sutures of #0 chromic gut. Before closing the subcutaneous tissue one million units of Penicillin and one gram of Streptomycin in 100 cc normal saline was instilled into the wound. The stab wound was then made in the most dependent portion of the wound coming out near the angle of the scapula. A large Penrose drain was drawn out through this stab wound to allow drainage of the wound of the chest wall. The subcutaneous tissue was then closed with interrupted #0 chromic gut inverting the knots. Skin closed with interrupted vertical sutures of black silk. Attention was next turned to the wound of entrance. It was excised with an elliptical incision. It was found that the latissimus dorsi muscle although lacerated was not badly damaged so that the opening was closed with sutures of #0 chromic gut in the fascia of the muscle. Before closing this incision the palpation with the index finger the Penrose drain could be felt immediately below in the space beneath the latissimus dorsi muscle. The skin closed with interrupted vertical mattress sutures of black silk. Drainage tubes were secured with safety pens and adhesive tape and dressings applied. As soon as the operation on the chest had been concluded Dr. Gregory and Dr. Shires started the surgery the was necessary for the wounds of the right wrist and left thigh.

RS:hl

Robert Shaw
Dr. Robert Shaw

* There was also a comminuted fracture of the right radius secondary to the same missile and in addition a small flesh wound of the left thigh. The operative notes concerning the management of the right arm and left thigh will be dictated by Dr. Charles Gregory and Dr. Tom Shires.

marked as Commission Exhibit 392 as to whether or not this constitutes your report?

DR. SHAW: Yes; this is a transcription of my dictated report of the operation.

MR. SPECTER: Are the facts set forth therein true

and correct?

DR. SHAW: Yes. On this it states that the operation itself was begun at 1300 hours or 1 o'clock, 1 p.m., and that the actual surgery started at 1335 or 1:35 p.m.

to make it begin to turn, and to commence a "tumbling" rotational movement (starting to spin "end-over-end") on its long axis. We confirmed that this tumbling reaction

does occur, by firing several bullets of this exact type from this exact type of gun, downward through a simulation of President Kennedy's neck, and having them then strike

a target simulation of Governor Connally's back (Figure 4).

Traversing some 28 inches of air space between the two men took 1/400th of a second, during which



FIGURE 5—A TEST RADIUS: This x-ray of a test radius shows the much more extensive damage to a radius which always occurred if it was hit directly, nose first, by a bullet that had not been slowed down, as by traversing President Kennedy's neck and Governor Connally's chest. (Photograph courtesy of the National Archives.)

the bullet rotated enough to assume an almost completely sideways position. The bullet then entered the back of Governor Connally, 2 cm. lateral to the lateral margin of his right scapular (shoulder blade) making a wound of entrance 3 cm. long,¹⁷ which happens to be the exact length of this bullet. While the question arises as to whether some of the elongation of this wound might have been attributable to the tangential course of the bullet, our experiments did not indicate this to be a major factor, since any elongation due to a tangential course, always turned out to be horizontal. Dr. Shaw, the chest surgeon, carefully reviewed and initialled his diagram showing the long axis of the wound of entry to be vertical.²⁸ The bullet continued its rotating, end-over-end motion as it struck the Governor's fifth rib tangentially (shattered fragments of which cut the middle lobe of the right lung almost in two and also injured the lower lobe) and then exited from his body below and medial to his right nipple.¹⁷ Here it caused the unsupported skin to bulge and then burst open, causing the more customary large and jagged type of wound-of-exit, approximately 5 cm. (two inches) in diameter.^{12, 17} It should be noted that here, *because* the skin was unsupported at this point, it expanded ahead of the bullet and showed the characteristic large "bursting" tears of a wound-of-exit of a tumbling, high-speed bullet.

After leaving Governor Connally's chest, the bullet continued its end-over-end turn, now traveling par-

tially backwards, and entered the dorsum of his wrist at an angle which subtended 2 cm., thus causing a 2 cm. wound of entrance, and struck his radius a glancing blow while travelling at a greatly reduced speed.¹⁷ This softened blow shattered the radius but did not displace the fragments.¹⁷ Since the bullet had been travelling sideways, as well as somewhat backwards, it was probably slightly flattened in its rear portion by the impact on the Governor's rib, squeezing two grains of its soft lead core out through the rear end of the bullet, like toothpaste out of a tube (see Figure 1). Dr. Olivier's Army ballistics experiments on animal's ribs showed the same effect on some bullets.²² Because it was now also travelling partly backwards, these protruding leaden fragments were now scraped off by the bone and remained in the wounds of Governor Connally's radius and femur (Figure 2).

The Extruded Lead

Our experiments^{18, 19} with a bullet which we compressed (with great difficulty) so as to deform it to exactly the same degree as Bullet 399, showed that the soft lead of the bullet's interior did indeed extrude through the rear end of the "gilding-metal" jacket of the bullet when it was flattened (Figure 1), and that the extruded portion weighed exactly two grains. (Bullet 399 was also missing two grains of weight).^{19B} As stated above, the fact that these lead fragments were scraped off onto the bone was because the bullet was travelling mostly backwards at this juncture.

Kennedy-Connally One Bullet Theory

Our reconstruction indicates that Bullet 399 now emerged from the palmar side of Governor Connally's wrist, travelling almost *entirely* backwards, as it continued its turn. We postulate that this accounts for the fact that the wound of exit was smaller than the wound of entrance²⁰ on the dorsal side of the wrist, since the bullet was still turning, to travel almost in its long axis, albeit going backwards, and had been greatly slowed down by its passage through Connally's thorax and partly sideways passage through his wrist.

The bullet now entered the top of Governor Connally's left thigh, about four inches above the knee.¹⁷ It penetrated the skin, fascia and muscles of the leg, and then struck the femur hard enough to scrape off the fourth fragment of soft lead from the rear end of the bullet, which was referred to (p. 40) by Dr. Shires, and can be clearly seen in the x-ray (Figure 2). It should be noted that surgeon Shires described this wound (p. 40) as "punctate" (implying that it was small, like a puncture). The bullet had been so sufficiently slowed by this time, that it did not fracture the femur. The fragment in his leg was located well below the point of entry into the skin, and was so tiny that it was left in place.³⁶

A Powerful Bullet

Our experiments¹⁸ showed that this bullet was so powerful that if it had not been slowed down, as by passing through President Kennedy's neck and Governor Connally's thorax and wrist, it *undoubtedly* would

have shattered Governor Connally's femur.

We found that this bullet would penetrate 25 inches of the toughest elm wood, or 47 inches of ponderosa pine, as Nichols had previously also observed.²¹ Certainly the Governor's thigh was not hit primarily by a bullet coming directly from the gun muzzle, because such a bullet would have shattered and removed a very large segment of the femur, without any doubt. Likewise, the Governor's wrist bone was not hit directly by a bullet that had not been slowed down, because experimental bullets coming directly from the gun always shattered the wrist bone in an entirely different manner, causing a total loss of bone, with devastating effect (Figure 5).²² The gross difference in the x-rays of the two types of wounds is clearly evident to anyone who has ever had to deal with such wounds²² (Figure 2).

By far the most significant feature of all these wounds is the fact that the wound of entry into Governor Connally's back was elongated in its vertical axis (3 centimeters long in Dr. Shaw's original signed operative note^{17b}—Figure 4B—and also in the account of the care of Governor Connally in the *Texas State Journal of Medicine*).¹⁷ This demonstrates that he was not hit by a bullet which had come directly from a gun. He was hit by a bullet which had hit something else first, and was tumbling at a rate which is compatible with the effect of the neck wound sustained by President Kennedy and with the other subsequent wounds in Governor Con-

nally's wrist and leg. (Even the shape of the wound in Governor Connally's back is compatible with a tumbling bullet, and *only* with a tumbling bullet.)

It should also be noted that, in testimony taken four or more months after the original operative report was written, the wound of entry, while still elongated in a vertical direction, was recollected by Dr. Shaw as being 1.5 cm. in length. While this length is at variance with his carefully written operative report (Figure 4B) made on the day of the actual operation, and with the pictures of the wound, drawn, corrected, and initialled by Dr. Shaw (Figure 4A), it was still recorded as elongated in its vertical dimension. This elongation is the most important detail.

Seven Vital Questions

To approach these matters still differently, several specific questions are here posed concerning the possibility that Governor Connally might have been hit by a different bullet from the one that exited from the front of President Kennedy's neck.

1. *Was Governor Connally hit by a bullet that had come directly from the muzzle of a gun?* The answer is clearly *no*. Our experiments showed that when bullets were fired directly into a "Governor Connally" target, they always made a round hole 6.5 millimeters ($\frac{1}{4}$ inch) in diameter (see Figure 4). The entry of the bullets into the slightly curving skin of the torso at this point was not sufficiently tangential to elongate the wound of entry to this extent. Furthermore, any elongation due to a

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"tangential" strike, would have been in a "horizontal" direction, whereas the Governor's first wound was elongated in a "vertical" direction. During our experiments with approximately 600 rounds from all four lots of ammunition of the type Oswald used (Lots 6000, 6001, 6002, 6003, Western Cartridge Co.), none of our bullets ever tumbled before they hit something, nor did they in the F.B.I. experiments with 200 or more rounds from Lot No. 6000 and 6003.²³ While we had to be content with four rifles of the exact same model used by Oswald, the F.B.I. used his *actual* rifle, always with the same results: none of the bullets ever tumbled. They always caused only small round holes in the target (Figure 4).²⁴

The actual wound of entry into Governor Connally's back was elongated to three cm. in length,¹⁷ according to the original operative report. This is the exact length of the bullet (WC399) that the Warren-Commission alleges struck Governor Connally, after passing through President Kennedy's neck. It seems certain that the bullet which struck Governor Connally was in the act of "tumbling" after striking something between the gun and Governor Connally's back. Judging from the length of the wound of entry, the bullet was apparently travelling almost completely sideways at the moment of impact on Governor Connally's back, and this elongation was not due to a tangential strike on his body, since its elongation was in the body's vertical axis.

As indicated above, our experi-

ments with a mock-up of President Kennedy's neck showed that bullets from every one of the lots of ammunition (Western Cartridge Company Lots no. 6000, 6001, 6002, and 6003) exited from the "Kennedy" neck in a "tumbling" configuration and caused a similar elongated hole in a target made to simulate Governor Connally's back (Figure 4).

While we cannot prove that it was President Kennedy's neck that caused Bullet 399 to be tumbling by the time it had struck Governor Connally, we can definitely say that the tumbling was *compatible* with the situation, revealed by our experiment's "mock-ups" of President Kennedy's neck.

2. *Were Governor Connally's wrist and leg wounds compatible with a tumbling bullet (like Bullet WC 399)?* Both the wrist and leg wounds of Governor Connally were also compatible with a bullet of the type WC 399 (a 6.5 millimeter Mannlicher-Carcano fully jacketed military bullet) which had turned almost completely around in its process of tumbling. Again, as we have said above, only by travelling somewhat backwards could Bullet 399 leave fragments of lead in Governor Connally's wrist wound and one embedded in his femur.

These fragments were removed later from the wrist by Dr. Gregory.¹⁷ The fragments can be seen at the National Archives and are clearly made of gray lead, rather than the coppery metal of a bullet jacket,³⁰ which is made of "gilding" metal.

By striking Governor Connally's rib, the dense copper jacket of the

bullet had probably been compressed just enough to squeeze two grains of the soft lead core of the bullet out through its open rear end, like toothpaste out of a tube. The wound of exit in his wrist measured only one centimeter after it was closed²⁰ compared to the wound of entrance which had been more than two centimeters in length.¹⁷ This would appear to be further evidence that the bullet continued to turn and that the bullet was still turning as it entered the upper leg, where the open rear end of the bullet, with its protruding lead core, now deposited a fourth tiny metallic fragment on the femur of Governor Connally, at the juncture of the middle and lower thirds of his upper leg, somewhat below (distal to) the wound of entry into the skin of his leg.

3. *Are the four fragments of lead seen in the Governor's x-rays too many?* Some critics have contended that four fragments in Governor Connally are too many to be accounted for by the two grains of lead missing from Bullet 399. In our previous experiments¹⁸ we were able to make 41 such fragments from the two grain piece of lead that extruded from our test bullet (Fig. 3). We can safely say, therefore, that four fragments are by no means too many to be accounted for by the two grains missing from Bullet 399.

4. *Could Governor Connally's wrist wound have been caused by a direct hit of a bullet like 399, which had not struck anything else first?* The answer to this question is also unequivocally *no*. A direct hit, without the bullet having been markedly

slowed down by traversing something else first, would have resulted in an entirely different kind of wound of the bone. A large segment of the bone would have been completely gone, with only a gaping hole in the arm and in the x-ray, as shown by experimental wounds created in this manner²² (Figure 5). Furthermore, the bullet might have been expected to have been deformed on the nose had it hit the wrist bone directly. Bullet 399's nose was not deformed.

Furthermore, the wound of exit on the palmar side of the wrist would have been far larger than the wound of entrance whereas in Governor Connally's case, the wound of exit was smaller than the wound of entrance,²⁰ because by now, the slowed-down bullet had completed its turn and left the wrist travelling almost completely backwards, in its long axis. The wound in Governor Connally's wrist was caused, instead, by a more or less tangential blow from a bullet travelling at a greatly reduced speed, which shattered the bone but left the bone fragments in place. This specific point has been thoroughly discussed with Dr. Gregory, who operated on the Governor's wrist, and this is his own view of the matter.

5. *Could the leg wound have been caused by a direct hit from a bullet like WC 399 (or by a bullet that had traversed only the wrist before striking the femur)?* The answer again is unequivocally *no!* The bullet from this cartridge is so powerful that, had it not been markedly slowed down, as by travelling through President Kennedy's neck

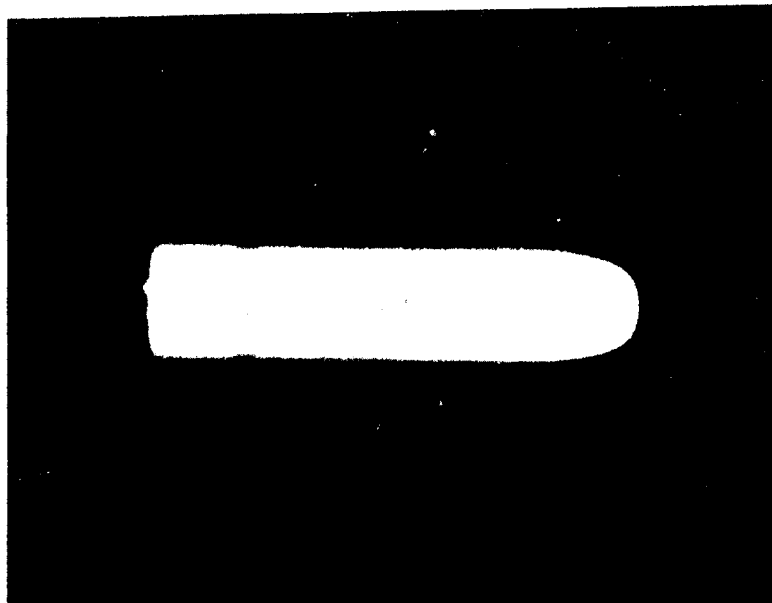
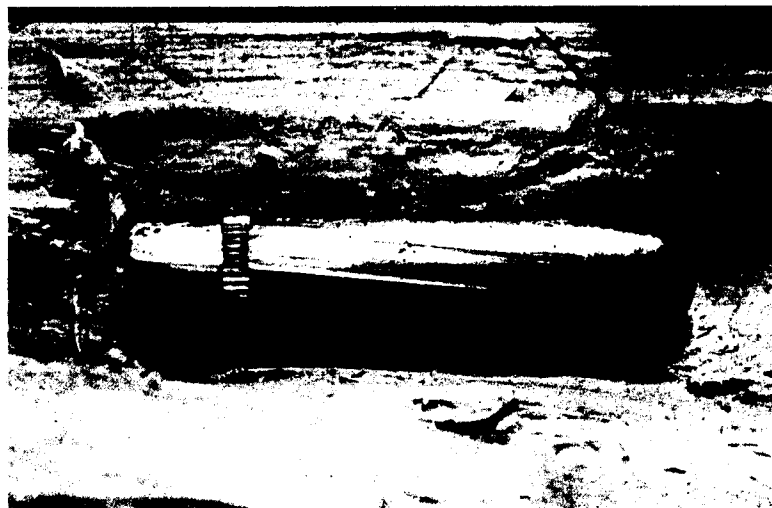


FIGURE 6—UNDEFORMED BULLETS: 6A: X-ray of a bullet which has traversed 25 inches of a block of the toughest elm wood, before being stopped. This bullet is undeformed. Nichols has shown that this bullet can penetrate 47 inches of Ponderosa pine boards without deforming. (X-ray courtesy of Dr. David Follett of Squier Urological X-Ray Dept.)



6B: The same bullet shown above is also seen to be undeformed when dug out of the wood. This experiment was repeated many times, always with the same result.

and then partially sideways through Governor Connally's chest and wrist, it would have shattered Governor Connally's femur and removed a large section of it. To ask, "Was the gun and cartridge powerful enough to penetrate both President Kennedy and Governor Connally, even though

it had grazed the tip of the transverse process of President Kennedy's sixth or seventh cervical vertebra and struck "tangential blows" to Governor Connally's fifth rib and radius, is to display ignorance of the very great power of this type of military rifle and cartridge. This bul-

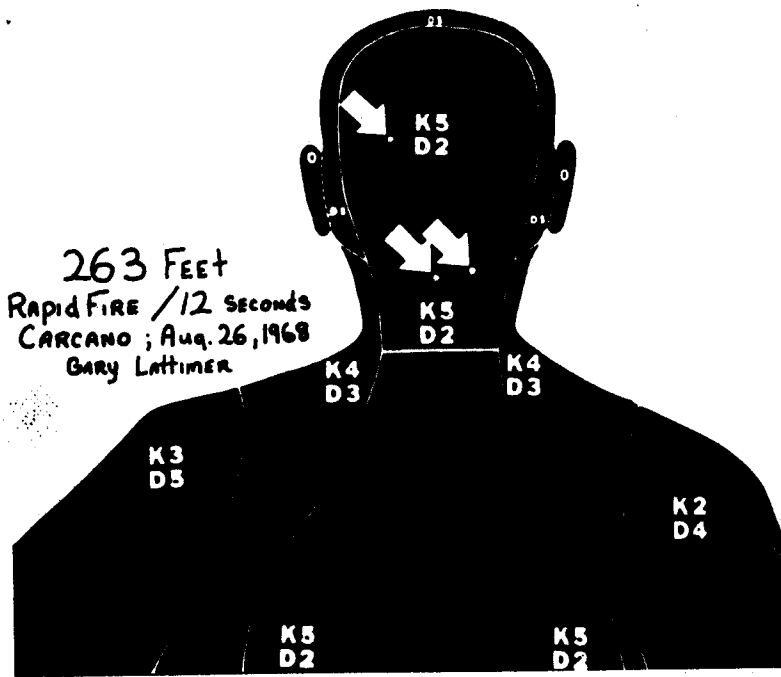


FIGURE 7—HOW GOOD A MARKSMAN DID THE ASSASSIN HAVE TO BE? "Head and Shoulders" target with three bullets placed in the head area at five or six second intervals, at 263 feet, by one of the authors (Gary Lattimer), after much practice, when he was 14 years old. A Carcano carbine, sling, rest, telescopic sight and ammunition exactly like those used by Oswald, were employed in experiments conducted by the authors to test for themselves the contentions of the Warren Commission report. (Photo courtesy I. E. Lattimer.)

let will penetrate four feet of solid ponderosa pine, as demonstrated by Dr. Nichols of the University of Kansas.²¹ We have demonstrated that it will also penetrate 25 inches of even the toughest knotty elm, when fired lengthwise into it, or it will traverse three telephone poles (sideways), and come out looking completely undeformed (Figure 6).

On the other hand, if it is fired into the thick bone of the back of a human skull, which is harder than the wood, the jacket and core of the bullet will separate, releasing a myriad of additional fragments of many different sizes, as in the Government's and other experiments^{10, 26} to simulate the head wound which President Kennedy sustained. This was repeated on ten skulls by Dr.

Olivier, with consistent results very similar to the findings in the Kennedy head wound.

6. *Was the ammunition dependable?* The ammunition that was used for the shots fired at President Kennedy and Governor Connally, plus the unfired round still in the gun, was excellent American-made ammunition. Four million rounds of this ammunition (one million in each of Lots 6000, 6001, 6002 and 6003) were made in 1954 by the Western Cartridge Company³⁵ and we were eventually able to procure substantial samples from each lot for our tests of 600 rounds.^{3, 4, 18, 19}

Our samples from all four lots of this ammunition proved to be totally dependable, with no misfires reported, during all of our various experiments and those of the govern-

ment research men, who used Oswald's rifle and at least 200 cartridges from lots 6000 and 6003. This ammunition is good American ammunition, with the primers sealed with purple lacquer. It is quite different from some of the foreign ammunition manufactured for the same gun. The bullets were well made and proved to be uniformly very stable in their flight to the target.

7. *Was Oswald capable with a rifle of this type?* Various critics have contended that Oswald was not capable enough with a rifle to accomplish what was alleged for him by the Warren Commission Report. However, Oswald's Marine Corps rifle score book (Figure 8) shows clearly that he was *entirely adequate* to do what was alleged for him by the Warren Commission. Firing at "head and shoulders" military targets (strikingly like the profile of President Kennedy at which he fired), he scored 48 out of a possible 50 points on one day (Figure 8A) and 49 out of a possible 50 points on another day (Figure 8B) using a similar "sitting" position, at "rapid fire," with a similar type rifle, even without a telescope, and at more than twice the distance involved at Dallas. Thus, while he would not rate as an "expert" or even a highly skilled marksman, in the eyes of a Marine Corps marksmanship instructor, he was a perfectly adequate marksman to do what was claimed for him by the Warren Commission.

Reconciliation of Our Reconstruction With Governor Connally's Views

To reconcile the two apparently different versions of what happened

Kennedy-Connally One Bullet Theory

(Governor Connally's and our own—see pages 36 and 37), we suggest that Governor Connally heard a motorcycle backfire or possibly a shot which missed the car completely. (Perhaps Oswald accidentally triggered the first shot in his haste to get in firing position, just after the car had turned the corner, or perhaps he fired and hit a branch of the oak tree that was in the way for several seconds.) Having heard this sound, Governor Connally twisted his body to the right to try to see President Kennedy, leaning to his own left as he did so, in an effort to see directly backwards to where the President was sitting. (If the reader tries this for himself, he can see that leaning to the left is a natural movement.)

The Governor said that he put the heel of his right hand, in which he held his hat, on his left leg just above the knee, in an effort to push himself around further.¹² We postulate that he was still in this position, twisted to his right, even though he had begun to turn his head back with the intention of looking over his left shoulder. While still in this twisted position, with his torso still partly turned to the right and still leaning to his left, the Governor was now hit in the back, wrist, and leg by Bullet 399, which had first traversed President Kennedy's neck at or before Frame 220 in Zapruder's film.³¹ This version would reconcile Governor Connally's version of what happened with the circumstantial evidence of what actually happened. His first reflex reaction, after he was hit, may have included expostulating, "Oh! No, no no!" thus attracting or at

Wed. sitting

200 YARDS RAPID		DATE	HIT	NO.	VALUE
	ELEV. USED	6-0	5's		
	CORRECT ELEV.	6	4's		
	ZERO WIND	0	3's		
	WIND VEL.	0	2's		
	WIND DIRECTION	0	0's		
	REMARKS		SCORE	49	

16-00554-1 (47)

FIGURE 8—OSWALD'S MARINE CORPS SCORE BOOK: Oswald's Marine Corps rifle score book pages show that on a Wednesday (8A, above), Oswald scored 49 out of a possible 50 points, at rapid fire, from a sitting position at 200 yards (more than twice the distance at Dallas) with no telescopic sight. On the following Friday he scored 48 of 50 (Fig. 8B below). From this it is evident that Oswald was very definitely marksman enough to have shot President Kennedy, as alleged.

Fri. sitting

200 YARDS RAPID		DATE	HIT	NO.	VALUE
	ELEV. USED	6-0	5's	8	40
	CORRECT ELEV.	6	4's	2	8
	ZERO WIND	0	3's		
	WIND VEL.	0	2's		
	WIND DIRECTION	0	0's		
	REMARKS		SCORE	48	

16-00554-1 (49)



FIGURE 9—TIP OF PRESIDENT'S VERTEBRA STRUCK: It appears to us that Bullet 399 entered the back of President Kennedy's neck and grazed the tip of the transverse process of his sixth or seventh cervical vertebra. (Two tiny fragments of bone are visible in the x-ray of his neck). It then exited with a wobble, starting to tumble end-over-end, as a result of traversing the neck and grazing the bone. It made holes one-half inch long, in an up-and-down direction, in both layers of the overlapping part of President Kennedy's shirt-front and grazed his neck-tie knot, leaving a blood-stained nick in the cloth.

least concentrating Mrs. Kennedy's attention from looking out the other side of the car, as she stated.¹⁴ Exactly what position everyone's body was in just as the bullet struck is difficult to determine, since the car had disappeared behind the "Stemmons Freeway" sign at the very moment when the first bullet apparently struck President Kennedy in the back of the neck. The Betzner and Willis "still" photographs were probably taken a few tenths of a second before the first bullet hit the President. Exactly what Governor Connally said and did, and exactly the timing and order which he did and said them, is also difficult to determine, since he himself was certainly

dazed enough (as everyone always is dazed when so struck) that he did not know that his wrist had been shattered and his leg had been penetrated by the bullet. He himself admits that he had to ask the next morning what was wrong with his wrist and leg, and that he had no memory of having been hit in the wrist or leg.¹¹ Everyone in the automobile was in the midst of a natural panic reaction to this totally unexpected, sudden catastrophe. Under such circumstances, circumstantial evidence is almost always more accurate and sheds more dependable light on what actually happened, than the direct testimony of those who were either involved or watched

the confused actions, despite their best intentions.

The elongated wound of entry into Governor Connally's back and the lack of a third bullet in the car or in its occupants, plus the experimental evidence that the wounding of both men by a bullet of the type used is perfectly feasible, are impressive support for the Warren Commission version of what actually happened.

The only apparent weakness in this theory, as proposed here, is the failure of anyone visible in the photographs, except for Governor Connally's statement,¹¹ to turn around and look backwards, after the *first* loud noise which attracted the Governor's attention. In fact, very few people looked back, even after the shot that hit President Kennedy in the neck. Only two out of the dozen or so Secret Service men visible in the pictures, looked back, along with the daughter of photographer Willis, who can be seen to stop running and look "back," about the time the President was hit.

We believe that President Kennedy was hit in the neck at about Zapruder frame 220, just before he emerged from behind the Stemmons Freeway sign. Our reason is that his right hand and elbow can be clearly seen to be just starting their spastic upward jerk which carried his right elbow to an extremely high level. It is our belief, after consultation with neurological surgeons and neurophysiologists knowledgeable in these matters, that this was a reflex reaction to the trauma of this bullet transmitted to his spinal cord (from the hitting of the tip of the trans-

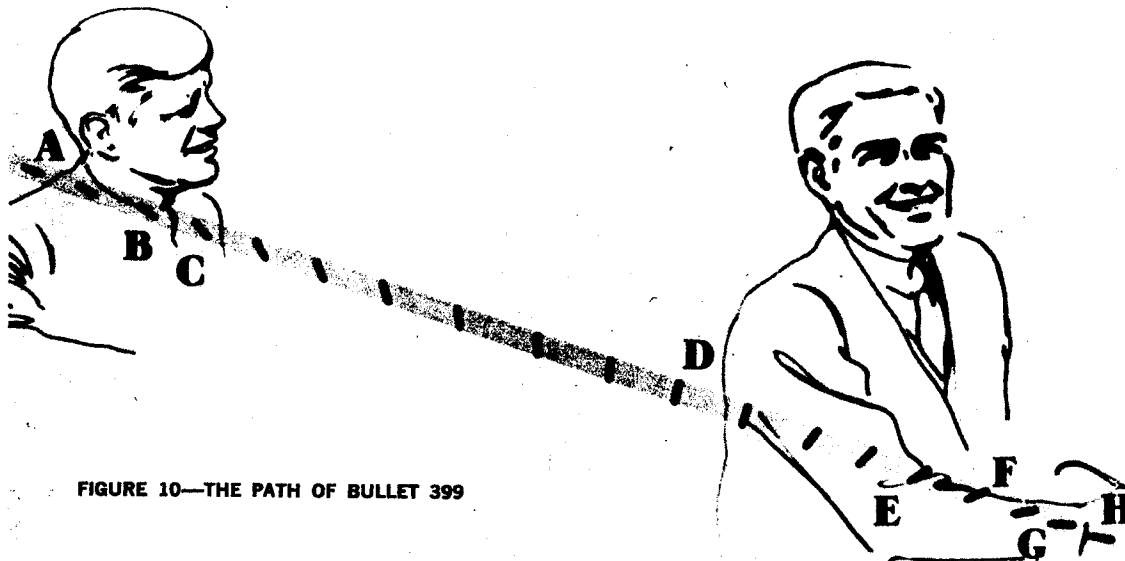


FIGURE 10—THE PATH OF BULLET 399

A row of actual 6.5 mm. Carcano bullets glued to a strip of lucite, showing the position of Bullet 399 at various points in its flight path through the two men, as determined by the size of the bullet hole at each of those points on the two bodies, where each bullet hole was measured. Visualizing the bullet's path all at one time, in this way, made it easier to understand why the lead fragments were only found at the end of its rotation, when the bullet was travelling backwards.

A: The wound of entry into the back of President Kennedy's neck was almost round and approximately 6.5 mm. in diameter ($\frac{1}{4}$ inch), with a black rim characteristic of a wound of entry. The bullet then grazed the tip of a vertebra in the President's neck, knocking off two splinters of bone.

B: The wound of exit from President Kennedy's neck was destroyed by the tracheotomy incision, but was not very large (testimony of Dr. Perry), probably due to the support of the shirt collar band which held the skin firm and did not permit it to bulge and tear ahead of the bullet.

C: The "wounds of exit" in the front of President Kennedy's shirt were one half inch long in a vertical direction, in both layers of the overlapping part of the President's shirt-front.

D: The wound of entry into Governor Connally's back was three cm. ($1\frac{1}{4}$ inches) long (the exact length of Bullet 399) and was approximately 28 inches away from President Ken-

ned's neck, indicating that the bullet was now tumbling end-over-end. It struck his fifth rib a tangential blow and the shattered fragments cut the lung severely.

E. The wound of exit from the front of Governor Connally's chest was below and medial to his right nipple and was large and ragged, measuring about 5 cm. in diameter. (The unsupported skin of his chest had obviously bulged and then burst open in an irregular fashion (as is usual) ahead of the exiting, tumbling bullet.

F. The wound of entrance into the top of Governor Connally's wrist measured three-quarters of an inch in length, showing that the bullet was now turned almost entirely around, so that it was now travelling almost backwards. It shattered his radius and left three fragments of lead in it.

G. The wound of exit from the underside of his wrist measured only one half inch in length. (The bullet was still turning.)

H. The wound of entrance into the top of Governor Connally's left thigh measured about $\frac{3}{8}$ inch and looked "punctate," indicating that the bullet had now practically completed its 180° "tumble." One fragment of lead was left in this wound.

verse process of his sixth or seventh cervical vertebra) and disrupting his right brachial plexus.³⁴

Another photographer, Mr. Willis, who took a picture from the opposite curb-side just at Zapruder frame 202, said that a loud noise had occurred, and was so loud that, "In fact, the shot caused me to squeeze

the camera shutter," even though he had not intended to do so just at that moment.³⁵ This photograph was taken just prior to the time the Warren Commission believed the President was hit, and the backfire or the shot-that-missed, which the photographer heard, may have been the same sound that made the Governor

try to turn to look over his right shoulder at the President. The daughter of still another photographer, Miss Tina Towner, said that she heard the shots, thought to herself that "some dummy is lighting firecrackers,"³⁷ and did not bother to look further towards the source of the noise. As Mrs. Kennedy said,

there is always so much backfiring and noise from a motorcycle escort that it is understandable that very little attention would be paid to a *first* loud noise, thus the fact that Governor Connally and Linda Willis were the only ones of whom we know, who turned towards the first loud noise, is not too surprising and does not necessarily weaken our reconstruction.

Some of the arguers against the claim that Bullet 399 could have penetrated both men, have adopted the argument of a thoughtful architect, Robert Cutler,⁶ who postulated that the two men (President Kennedy and Governor Connally) were sitting like rigid statues in the automobile, either immobile, or rotating very slowly, as statues might be rotated, in the car. The angles of the bullet holes which were then calculated to exist through the two statue-like bodies were thought to be slightly out of line with Oswald's window, if one "looked back through the bullet holes, towards the window." Governor Connally's holes were thought to be a little too far to the right, and the angles of downward passage (declination), were thought to be slightly different. This led to the postulation that the bullet holes in Governor Connally might have been made by a bullet fired from a different (additional) window in the same Book Depository Building as Oswald's, but slightly farther to the right than Oswald's, five (or less) seconds later. Other critics have picked up this argument. They ignore the fact that both bullets recovered from the car and its passengers came from Oswald's rifle, to the

exclusion of all other guns. Also that all 3 empty cartridge cases came out of Oswald's gun, and only his gun.

The fallacy in this argument is the fact that the exact positions of the two men at the moment they were hit, are not known, because no photographs were taken just at the critical moment. Furthermore, the two men were not acting like rigid statues at the moment they were hit. President Kennedy had his hand up waving and was looking slightly to his right. Governor Connally stated that he was trying hard to twist around as far as he possibly could, to see the President over his right shoulder, and had undoubtedly leaned to his left, in his effort to see directly backwards. Having twisted around as far as he could, he stated that he was in the process of starting to twist back towards the front, so that he could then look over his left shoulder, when he was hit. While his head may have started the turn, his body may not have turned (See Zapruder Frame No. 223), as he emerged from behind the Stemmons Freeway sign.

That sign unfortunately blocked the view of Mr. Zapruder's movie camera just as President Kennedy was hit, so we do not have the same detailed views of the moment this bullet may have struck both men, as we do of subsequent events. Therefore we do not know the exact positions of their bodies relative to each other at that instant nor can we see if Governor Connally reacted in a reflex manner, at that very moment.

However a most persuasive argument *against* the "rigid statue," "third bullet" version, is the fact

that it requires *three* bullets in the targets. Only *two* bullets could be accounted for in the car or in the victims, despite a detailed and vigorous search for the purpose of trying to find a third bullet or bullet hole. Both of the bullets found, came out of Oswald's rifle, without any doubt.

If Governor Connally had been sitting like a rigid statue, facing front, directly in front of President Kennedy, and only 28 inches away from him, when the first bullet to hit President Kennedy traversed his neck, then the bullet would have hit Governor Connally in the *left* side of his back rather than the right side. Even if it had managed to have missed Governor Connally, it would have hit the back of the driver's seat and made an obvious hole. As our experiments showed (Figure 4), such a bullet would almost certainly have been starting to "tumble" after it left the neck of President Kennedy and would have made a large and obvious wound in either Governor Connally or in the back of the driver's seat, which would not be likely to be missed during the thorough search of the car for evidence of another bullet wound conducted by the F.B.I.¹⁵

The rigid statue concept, when applied to living, moving human bodies, is not nearly as appropriate as thinking of the human torso as a soft bag full of jelly, with a few ribs and a spine, on which it is suspended. The accuracy of trying to pinpoint windows, 200 feet away, by "looking-back" through bullet holes in the bodies of living men who were waving or twisting

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around, when hit, does not turn out to be at all precise.

Summary

There are the following items of circumstantial evidence about Governor Connally's wounds.

1. All three of Governor Connally's wounds were undoubtedly caused by the same bullet.

2. The two grains of lead missing from the bullet (WC 399) which the Warren Commission alleges wounded Governor Connally, are compatible with the lead fragments seen in the x-rays and recovered from the wounds. Our experiments confirmed this.^{3, 4, 18, 19} (Figures 1, 2, 3)

3. Both of the bullets recovered in the car or its victims (WC 399 and WC 569) came out of Oswald's Mannlicher-Carcano carbine and no other gun. This gun had his palm print on it.^{28, 29}

4. The holes in the back of President Kennedy's coat were round (punctate) but the holes of exit in his shirt-front were elongated half-inch slits, in a vertical direction.⁸

5. The wound of entry into Governor Connally's back was three centimeters long, in a vertical configuration and matched exactly the length of Bullet WC 399. This wound could not have been caused by a bullet coming directly out of the muzzle of Oswald's gun. The bullet had to have hit something else first, and the most likely thing was President Kennedy's neck. Because the wound of entry into Governor Connally's back was elongated in a vertical direction, the elongation could not have been due

to a tangential strike into the curving edge of his thorax.

6. Our experiments showed that such bullets, when they go downward through a neck like President Kennedy's, begin to tumble as they leave the neck. (Figure 4)

7. The wound of entrance into the dorsum of Governor Connally's wrist was two centimeters in length, yet the wound of exit from his wrist was smaller. These facts are compatible with our demonstration that such a "tumbling" bullet could have been "tumbling" on its long axis at a rate so that it left the wrist travelling even more backwards than when it entered the wrist, thus making a smaller wound of exit. (Figure 10)

8. The back half of this bullet (399) is slightly but definitely flattened.¹⁸ We postulate that this happened as it continued its rotation, striking tangential blows not only to the Governor's fifth rib, but then to the thick part of his radius (bone), while travelling sideways and then backwards.

9. Bits of gray lead were recovered from the wrist wound at operation.³⁰ The bullet showed gray lead extruding from its rear end (Figure 1) as a result of the bullet being flattened. Our similar experimental bullets likewise had the gray lead squeezed out of their rear ends, like toothpaste out of a tube. Gray lead particles could only have been scraped off on the bone of Governor Connally's wrist, if the bullet was travelling somewhat backwards. Our experiments confirmed this.

10. The wound of entry into Governor Connally's thigh was

small and "punctate." A fragment of metal, looking similar on the x-ray to those in the Governor's wrist, was embedded in his femur below the point of this punctate wound in the skin of his thigh (Figure 2). These findings are compatible with our theory that the bullet had now completed its "end-over-end" turn and was now travelling completely backwards. Only in this way could it have made a punctate wound and also deposited a fragment of metal on the femur, distal to the wound of entry into the skin.

11. The power of the ammunition was very great. The ammunition was found to impart tremendous penetrating capability to this bullet, so that the fact that two men were traversed by a single bullet is not at all surprising. Neither did we find it surprising that the bullet might stay relatively undeformed, if it only struck a rib and wrist tangentially (Figures 6A & 6B).

12. The ammunition proved to be highly reliable, with no misfires in any of the 600 rounds fired during our experiments, nor in the 200 or more rounds fired by the F.B.I. Samples from all four lots manufactured, were tested by us.

13. The rifle proved to be entirely accurate enough to permit the placing of three bullets in the head, quite consistently at the distances involved. After sufficient practice, the first author (G.L.) was able to accomplish this, even though only 14 years old at the time (Figure 7). Both of the other authors were also able to acquire this capability after several days of "dry" and "actual" firing practice with this rifle.

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14. Oswald's Marine Corps capability with a rifle of this general type was found to be entirely adequate to do everything the Warren Commission alleged he did. (Figures 8A & 8B).

15. No third bullet was found in Governor Connally nor in the car. Without this third bullet in the car or its occupants, the thesis that President Kennedy and Governor Connally were hit by separate bullets from a "second rifleman" becomes untenable.

16. Even the direct testimony of the participants (which is not ordinarily as dependable as the circumstantial evidence), is compatible with our postulations.

17. Connally, in his original sworn testimony, stated that he was hit, and *then* expostulated "Oh! No, no, no!" (after he was hit).

18. Mrs. Kennedy testified that she was looking out to the left of the automobile and that only after Governor Connally cried "Oh! No, no, no!" did she look towards him and President Kennedy. In the Zapruder movie, she can be seen looking to her left as the automobile approaches the Stemmons Freeway sign, but can be seen looking to her right as the car emerges from behind the sign. This suggests that Governor Connally was hit and cried out sometime *before* the car emerged from behind the sign.

19. We believe President Kennedy was hit while the car was behind the Stemmons Freeway sign. His hands and elbows were only *starting* to jerk upwards towards his neck as he emerged from behind the sign.

20. We postulate that Governor Connally heard either a loud backfire or an earlier shot that missed the car. He then twisted his body to the right, to try to look directly backwards over his right shoulder, in an effort to see the President. To do this, he would ordinarily lean to his left, thus exposing the right side of his back to the bullet that now came through President Kennedy's neck. We postulate that Governor Connally was hit at the same moment as President Kennedy, that he reflexly cried out the Oh! No, no, no! and then lapsed into a semidazed state for a fraction of a second, until Frame 236 of the Zapruder movie. He then probably tried to take a breath, and winced from the severe pain and the inability to draw in a good breath, due to his collapsed lung and opened chest.

21. As he flinched with the pain of the first conscious breath, Mrs. Connally saw him stiffen, realized he was hurt and started to pull him over backwards into her lap.

22. The Governor then reflexly pulled his arm back and twisted to his right to splint the painful rib ends by pressing his right arm over the area.

23. Governor Connally's sensorium then cleared enough so that he was aware of being spattered by President Kennedy's brain tissue as Mrs. Connally pulled him over into her lap, but not enough to let him realize that he had also been shot through the wrist and in the leg.

Our reconstruction, with an integrated mechanical model of the flightpath of Bullet 399, "tumbling" (rotating end-over-end) at a rate of

one-half turn in five feet, after it left President Kennedy's neck, coincides with the Warren Commission's thesis that a single bullet (Warren Commission Exhibit 399) struck both President Kennedy and Governor Connally. The nature and dimensions of the wounds, bone and bullet fragments in the two men, fit this reconstruction with reasonable certainty (Figure 10).

The hard facts are that Governor Connally was clearly hit by a tumbling bullet that had hit something else first, that his hand can be readily seen to have already risen out of the line of the bullet at the point he thinks he was hit, and there was no sign of a third bullet in the car or any of its passengers. Had there been a third bullet hitting the car, Governor Connally would have been hit twice, and he was not. Both of the bullets that hit the occupants of the car (five seconds apart) both came out of Oswald's rifle, to the exclusion of all other guns. Oswald's handprints were on the gun. These facts effectively destroy the "second rifleman" theory. Our reconstruction of the flightpath of Bullet 399 through both men, demonstrated as a mechanical model (Fig. 10), fits all the wound sizes and autopsy findings in a reasonable manner. These factual, circumstantial and experimental pieces of evidence (quite apart from the additional direct testimony and pictorial evidence of when and why Mrs. Kennedy turned to look towards the President) make it next to impossible to refute the Warren Commission's contention that both men were hit by a single bullet. ≈ ≈

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