Mr. GREGORY. No.

Mr. LIEBELER. Would it be fair to say, Mr. Gregory, that it was through Oswald's contact with you that he subsequently made the association with and contact with the other members of the Russian community in Dallas and Fort Worth?

Mr. GREGORY. I think that would be a fair statement, yes.

Mr. LIEBELER. I have no more questions.

The CHAIRMAN. Congressman?

Representative FORD. I have one more, Mr. Gregory.

I believe Marina has testified when she first met Lee Harvey Oswald it was approximately 17 months after he had arrived in the Soviet Union. She testified, also, that she could not tell whether he was a native born resident of the Soviet Union or a foreigner by the way he spoke.

Mr. GREGORY. Yes.

Representative FORD. Is that unusual?

Mr. GREGORY. Well, frankly, I don't know. You see, Congressman, the city of Minsk is what we call, they call it, not we call, they call it in the White Russia Republic. You know they called this the Union of Republics, you know, in the White Russian Republic, and Minsk, I guess, is the capital of it.

It is fairly close to Poland, and there are all sorts of people, Poles, Lithuanians, probably Latvians, that lived in that part of the country, and none of those people speak pure Russian.

Now, whether she had reference, whether that had anything to do with her statement——

Representative FORD. Her observations?

Mr. GREGORY. Right; I don't know.

Now, I thought that Lee Oswald spoke with a Polish accent, that is why I asked him if he was of Polish descent.

Representative FORD. But leaving——

Mr. GREGORY. But, otherwise, I would say it would be rather unusual, rather unusual for a person who lived in the Soviet Union for 17 months that he would speak so well that a native Russian would not be sure whether he was born in that country or not.

Representative FORD. That would be a very unusual kind of a person?

Mr. GREGORY. It would be, yes.

Representative FORD. Or a person who had unusual training?

Mr. GREGORY. Right, or unusual ability or training, yes, that is right.

Representative FORD. That is all, Mr. Chairman.

The CHAIRMAN. Thank you very much, Mr. Gregory. You have been very helpful.

(Whereupon, at 1 p.m., the President's Commission recessed.)

Monday, March 16, 1964

TESTIMONY OF COMDR. JAMES J. HUMES, COMDR. J. THORNTON BOSWELL, AND LT. COL. PIERRE A. FINCK

The President's Commission met at 2 p.m. on March 16, 1964, at 200 Maryland Avenue NE., Washington, D.C.

Present were Chief Justice Earl Warren, Chairman; Senator John Sherman Cooper, Representative Gerald R. Ford, John J. McCloy, and Allen W. Dulles, members.

Also present were J. Lee Rankin, general counsel; Francis W. H. Adams, assistant counsel; Norman Redlich, assistant counsel; Arlen Specter, assistant counsel; and Charles Murray, observer.

The CHAIRMAN. The Commission will be in order.

Commander Humes, will you please step up. You know, Commander, what we have met for today to take your testimony concerning the autopsy and anything else you might know concerning the assassination of the President.

Would you raise your right hand, please?

Do you solemnly swear the testimony you give before this Commission will be the truth, the whole truth and nothing but the truth, so help you God?

Commander HUMES. I do.

The CHAIRMAN. Will you be seated?

You may proceed.

Mr. SPECTER. Dr. Humes, will you state your full name for the record, please?

Commander HUMES. James Joseph Humes.

Mr. SPECTER. And what is your profession or occupation, please?

Commander HUMES. I am a physician and employed by the Medical Department of the United States Navy.

Mr. SPECTER. What is your rank in the Navy?

Commander HUMES. Commander, Medical Corps. United States Navy.

Mr. SPECTER. Where did you receive your education, Commander Humes, please.

Commander HUMES. I had my undergraduate training at St. Joseph's College at Villanova University in Philadelphia. I received my medical degree in 1948 from the Jefferson Medical College of Philadelphia.

I received my internship and my postgraduate training in my special field of interest in Pathology in various Naval hospitals, and at the Armed Forces Institute of Pathology at Walter Reed in Washington, D.C.

Mr. SPECTER. What do your current duties involve?

Commander HUMES. My current title is Director of Laboratories of the Naval Medical School at Naval Medical Center at Bethesda. I am charged with the responsibility of the overall supervision of all of the laboratory operations in the Naval medical center, two broad areas, one in the field of anatomic pathology which comprises examining surgical specimens and postmortem examinations and then the rather large field of clinical pathology which takes in examination of the blood and various body fluids.

Mr. SPECTER. Have you been certified by the American Board of Pathology?

Commander HUMES. Yes, sir; both in anatomic pathology and in clinical pathology in 1955.

Mr. SPECTER. What specific experience have you had, if any, with respect to gunshot wounds?

Commander HUMES. My type of practice, which fortunately has been in peacetime endeavor to a great extent, has been more extensive in the field of natural disease than violence. However, on several occasions in various places where I have been employed, I have had to deal with violent death, accidents, suicides, and so forth. Also I have had training at the Armed Forces Institute of Pathology, I have completed a course in forensic pathology there as part of my training in the overall field of pathology.

Mr. SPECTER. Did you have occasion to participate in the autopsy of the late John F. Kennedy on November 22, 1963?

Commander HUMES. Yes, sir; I did.

Mr. SPECTER. What was your specific function in connection with that autopsy?

Commander HUMES. As the senior pathologist assigned to the Naval Medical Center, I was called to the Center by my superiors and informed that the President's body would be brought to our laboratories for an examination, and I was charged with the responsibility of conducting and supervising this examination; told to also call upon anyone whom I wished as an assistant in this matter, that I deemed necessary to be present.

Mr. SPECTER. Who did assist you, if anyone, in the course of the autopsy?

Commander HUMES. My first assistant was Commander J. Thornton Boswell, whose position is Chief of Pathology at the Naval Medical School, and my other assistant was Lt. Col. Pierre Finck, who is in the wound ballistics section of the Armed Forces Institute of Pathology.

When I ascertained the nature of the President's wounds, having had the facilities of the Armed Forces Institute of Pathology offered to me by General Blumberg, the commanding officer of that institution, I felt it advisable and would be of help to me to have the services of an expert in the field of wound ballistics and for that reason I requested Colonel Finck to appear.

Mr. SPECTER. Tell us who else in a general way was present at the time the autopsy was conducted in addition to you three doctors, please?

Commander HUMES. This, I must preface by saying it will be somewhat incomplete. My particular interest was on the examination of the President and not of the security measures of the other people who were present.

However, the Surgeon General of the Navy was present at one time or another. Admiral Galloway, the Commanding Officer of the National Naval Medical Center; my own commanding officer, Captain John H. Stover of the Naval Medical School, Dr. John Ebersole, one of the radiologists assigned to the Naval Hospital, Bethesda, who assisted with X-ray examinations which were made. These are the chief names, sir: that I can recall.

Mr. SPECTER. What time did the autopsy start approximately?

Commander HUMES. The president's body was received at 25 minutes before 8, and the autopsy began at approximately 8 p.m. on that evening. You must include the fact that certain X-rays and other examinations were made before the actual beginning of the routine type autopsy examination.

Mr. SPECTER. Precisely what X-rays or photographs were taken before the dissection started?

Commander HUMES. Some of these X-rays were taken before and some during the examination which also maintains for the photographs, which were made as the need became apparent to make such.

However, before the postmortem examination was begun, anterior, posterior and lateral X-rays of the head, and of the torso were made, and identification type photographs, I recall having been made of the full face of the late President. A photograph showing the massive head wound with the large defect that was associated with it. To my recollection all of these were made before the proceedings began.

Several others, approximately 15 to 20 in number, were made in total before we finished the proceedings.

Mr. SPECTER. Now were those X-rays or photographs or both when you referred to the total number?

Commander HUMES. By the number I would say they are in number 15 to 20. There probably was ten or 12 X-ray films exposed in addition.

Mr. SPECTER. What time did this autopsy end?

Commander HUMES. At approximately 11 p.m.

Mr. SPECTER. What wounds did you observe on the late President, if any?

Commander HUMES. The wounds which we observed on the President were—excuse me, at this point might I use the charts which I have prepared?

Would that be appropriate?

Mr. SPECTER. Yes; would you like to start with the neck wound?

Commander HUMES. All right, sir.

I might preface my remarks by stating that the President's body was received in our morgue in a closed casket. We opened the casket, Dr. Boswell and I, and the President's body was unclothed in the casket, was wrapped in a sheet labeled by the Parkland Hospital, but he was unclothed once the sheet was removed from his body so we do not have at that time any clothing.

Mr. SPECTER. Dr. Humes, before you identify what that represents let me place Commission Exhibit No. 385 on it so it may be identified.

(The drawing was marked Commission Exhibit No. 385 for identification.)

Commander HUMES. When appraised of the necessity for our appearance before this Commission, we did not know whether or not the photographs which we had made would be available to the Commission. So to assist in making our testimony more understandable to the Commission members, we decided to have made drawings, schematic drawings, of the situation as we saw it, as we recorded it and as we recall it. These drawings were made under my supervision and that of Dr. Boswell by Mr. Rydberg, whose initials are H. A.

He is a hospital corpsman, second class, and a medical illustrator in our command at Naval Medical School.

Mr. SPECTER. Did you provide him with the basic information from which these drawings were made?

Commander HUMES. Yes, sir.

Mr. SPECTER. Distances, that sort of thing?

Commander HUMES. Yes, sir. We had made certain physical measurements of the wounds, and of their position on the body of the late President, and we provided these and supervised directly Mr. Rydberg in making these drawings.

Mr. SPECTER. Have you checked the drawings subsequent to their preparation to verify their accuracy?

Commander HUMES. Yes, sir.

Mr. SPECTER. And proportion?

Commander HUMES. I must state these drawings are in part schematic. The artist had but a brief period of some 2 days to prepare these. He had no photographs from which to work, and had to work under our description, verbal description, of what we had observed.

Mr. SPECTER. Would it be helpful to the artist, in redefining the drawings if that should become necessary, to have available to him the photographs or X-rays of the President?

Commander HUMES. If it were necessary to have them absolutely true to scale. I think it would be virtually impossible for him to do this without the photographs.

Mr. SPECTER. And what is the reason for the necessity for having the photographs?

Commander HUMES. I think that it is most difficult to transmit into physical measurements the—by word the—exact situation as it was seen to the naked eye. The photographs were—there is no problem of scale there because the wounds, if they are changed in size or changed in size and proportion to the structures of the body and so forth, when we attempt to give a description of these findings, it is the bony prominences, I cannot, which we used as points of references, I cannot, transmit completely to the illustrator where they were situated.

Mr. SPECTER. Is the taking of photographs and X-rays routine or is this something out of the ordinary?

Commander HUMES. No, sir; this is quite routine in cases of this sort of violent death in our training. In the field of forensic pathology we have found that the photographs and X-rays are of most value, the X-rays particularly in finding missiles which have a way of going in different directions sometimes, and particularly as documentary evidence these are considered invaluable in the field of forensic pathology.

Mr. SPECTER. Will you now proceed to show us what Commission Exhibit 385 depicts, please?

Commander HUMES. Actually, I think, sir, at this time the view from the posterior aspect would also be of value to the Commission.

This is——

Mr. SPECTER. Doctor, I hand you the second exhibit which is marked Commission Exhibit No. 386.

(Commission Exhibit No. 386 was marked for identification.)

Commander HUMES. I believe at this point I would like to have, if you have my gross autopsy description because I will give the dimensions of these wounds at this time.

Mr. SPECTER. We will use the Commission Exhibit No. 387 and I will ask you first of all, for the record, to identify what this document is, Dr. Humes.

(The document referred to was marked Commission Exhibit No. 387 for identification.)

Commander HUMES. This document is a copy of the gross autopsy report which was prepared by myself, Dr. Boswell, and Dr. Finck, and completed within approximately 48 hours after the assassination of the President.

Mr. SPECTER. Does that report bear your signature at its end?

Commander HUMES. It bears my signature on the first or covering page as well as on my last page, sir.

Mr. SPECTER. Will you now proceed to tell us what you observed with respect to the wound which is marked as appearing in the upper back or lower neck?

Mr. MCCLOY. Have you identified that?

Mr. SPECTER. The one on the side is 385 and the one of the rear view is 386. And that one is 387. For purposes of our record, if you will, put them in as 385 and 386 for our printed record. You might want to put them in chalk above them so you will see the one on the left is 385 and on the right is 386.

Commander HUMES. These exhibits again are schematic representations of what we observed at the time of examining the body of the late President.

Exhibit 385 shows in the low neck an oval wound which—excuse me, I wish to get the measurements correct. This wound was situated just above the upper border of the scapula, and measured 7 by 4 milimeters, with its long axis roughly parallel to the long axis of vertical column.

We saw—I would rather not discuss the situation of the anterior neck at this time or would you prefer it?

Mr. SPECTER. How would you prefer to do it, Dr. Humes?

Commander HUMES. I would prefer to discuss the wounds, two wounds, we saw posteriorly and the wound, other wound, of the skull before going to that.

Mr. SPECTER. That is fine, Dr. Humes, do it any way you find convenient. I will give you the other drawing and you can do them both together. Let the third drawing be marked as Commission Exhibit No. 388.

(The drawing referred to was marked Commission Exhibit No. 388 for identification.)

Commander HUMES. The wound in the low neck of which I had previously begun to speak is now posteriorly—is now depicted in 385, in 386 and in 388.

The second wound was found in the right posterior portion of the scalp. This wound was situated approximately 2.5 centimeters to the right, and slightly above the external occiptal protuberance which is a bony prominence situated in the posterior portion of everyone's skull. This wound was then 2½ centimeters to the right and slightly above that point.

The third obvious wound at the time of the examination was a huge defect over the right side of the skull. This defect involved both the scalp and the underlying skull, and from the brain substance was protruding.

This wound measured approximately 13 centimeters in greatest diameter. It was difficult to measure accurately because radiating at various points from the large defect were multiple crisscrossing fractures of the skull which extended in several directions.

I have noted in my report that a detailed description of the lines of these fractures and of the types of fragments that were thus made were very difficult of verbal description, and it was precisely for this reason that the photographs were made so one might appreciate more clearly how much damage had been done to the skull.

Mr. SPECTER. Were the photographs made available then, Dr. Humes, when Exhibit 388 was prepared?

Commander HUMES. No, sir.

Mr. SPECTER. All right.

Commander HUMES. The photographs, to go back a moment, the photographs and the X-rays were exposed in the morgue of the Naval Medical Center on this night, and they were not developed, neither the X-rays or the photographs. They were submitted to the, and here, if I make a mistake I am not certain, to either the Federal Bureau of Investigation or to the Secret Service, I am not sure of those.

Mr. SPECTER. Did you submit those yourself immediately after they were taken, Dr. Humes?

Commander HUMES. Again, one of the senior people present, I believe my own Commanding Officer, Captain Stover, took care of turning this material over to these authorities, and receiving a receipt for this information, for this material. It was—I supervised the positioning of the body for various of these examinations but as far as beyond that, I did not consider that my responsibility.

These, then, were the three wounds which were quite obvious at the time of the examination.

I could expand further on the general appearances of these wounds or I could

turn to the anterior portion of the body and describe various other wounds which were present.

Mr. SPECTER. You were focussing on 388 before I last asked a question, Dr. Humes. Why don't you describe in general terms the nature of the wound which was present at the top of the head of the late President?

Commander HUMES. With your permission, sir, and Mr. Chief Justice, I think I might describe those two wounds together, and describe the defects in the scalp and in the skull in each instance.

Mr. SPECTER. That would be fine.

Commander HUMES. Would that be appropriate?

Mr. SPECTER. Yes.

Commander HUMES. Turning now to Commission Exhibit 388, where we have depicted in the posterior right portion of the skull a wound which we have labeled "in" or a wound of entrance and a large roughly 13 cm. diameter defect in the right lateral vertex of the skull. I would go into some further detail in describing these wounds.

The scalp, I mentioned previously, there was a defect in the scalp and some scalp tissue was not available. However, the scalp was intact completely past this defect. In other words, this wound in the right posterior region was in a portion of scalp which had remained intact.

So, we could see that it was the measurement which I gave before, I believe 15 by 6 millimeters.

When one reflected the scalp away from the skull in this region, there was a corresponding defect through both tables of the skull in this area.

Mr. SPECTER. Will you describe what you mean by both tables, Dr. Humes?

Commander HUMES. Yes, sir.

The skull is composed of two layers of bone. We will put the scalp in in dotted lines.

The two solid lines will represent the two layers of the skull bone, and in between these two layers is loose somewhat irregular bone.

When we reflected the scalp, there was a through and through defect corresponding with the wound in the scalp.

This wound had to us the characteristics of a wound of entrance for the following reason: The defect in the outer table was oval in outline, quite similar to the defect in the skin.

Mr. SPECTER. You are referring there, Doctor, to the wound on the lower part of the neck?

Commander HUMES. No, sir; I am speaking here of the wound in the occiput.

The wound on the inner table, however, was larger and had what in the field of wound ballistics is described as a shelving or a coning effect. To make an analogy to which the members of the Commission are probably most familiar, when a missile strikes a pane of glass, a typical example, a B–B fired by a child's air rifle, when this strikes a pane of glass there will be a small, usually round to oval defect on the side of the glass from whence the missile came and a belled-out or coned-out surface on the opposite side of the glass from whence the missile came.

(At this point, Mr. Dulles entered the hearing room.)

Commander HUMES. Experience has shown and my associates and Colonel Finck, in particular, whose special field of interest is wound ballistics can give additional testimony about this scientifically observed fact.

This wound then had the characteristics of wound of entrance from this direction through the two tables of the skull.

Mr. SPECTER. When you say "this direction," will you specify that direction in relationship to the skull?

Commander HUMES. At that point I mean only from without the skull to within.

Mr. SPECTER. Fine, proceed.

Commander HUMES. Having ascertained to our satisfaction and incidentally photographs illustrating this phenomenon from both the external surface of the skull and from the internal surface were prepared, we concluded that the large defect to the upper right side of the skull, in fact, would represent a wound of exit.

A careful examination of the margins of the large bone defect at that point, however, failed to disclose a portion of the skull bearing again a wound of—a point of impact on the skull of this fragment of the missile, remembering, of course, that this area was devoid of any scalp or skull at this present time. We did not have the bone.

In further evaluating this head wound, I will refer back to the X-rays which we had previously prepared. These had disclosed to us multiple minute fragments of radio opaque material traversing a line from the wound in the occiput to just above the right eye, with a rather sizable fragment visible by X-ray just above the right eye. These tiny fragments that were seen dispersed through the substance of the brain in between were, in fact, just that extremely minute, less than 1 mm. in size for the most part.

(At this point, Senator Cooper entered the hearing room.)

Mr. SPECTER. Dr. Humes, this would be a good juncture to produce two photographs.

May it please the Commission, Mr. Chief Justice Warren, I have identified as Commission Exhibits 389 and 390 which will at a later time be identified as being two frames from the motion picture camera operated by one Abraham Zapruder, being the amateur photographer who was on the scene, which I think would assist in evaluating the angle of the President's head corresponding to that exhibit designated as 388.

I will hand those to you, Dr. Humes, and ask you if you would state for the record the relative position of the President's head in 389 which is a frame about one-sixteenth of a second before the point of impact shown in Exhibit 390.

(The frames referred to were marked Commission Exhibits Nos. 389 and 390 for identification.)

Commander HUMES. It will be noted in Exhibit 389 that the President's head is bent considerably forward and perhaps somewhat to the left in this frame of the photograph 389.

Mr. SPECTER. Is that in approximately the same position as the angle of the head depicted in Commission Exhibit No. 388?

Commander HUMES. Yes, sir; it is.

Mr. SPECTER. Mr. Chief Justice, at this time I would like to move for admission in evidence of Exhibits 385 through 390.

The CHAIRMAN. They may be admitted under those numbers.

(Commission Exhibits Nos. 385, 386, 387, 388, 389, and 390, previously marked for identification, were received in evidence.)

Mr. SPECTER. Will you proceed now, Dr. Humes, to continue in your description of the head wound?

Commander HUMES. Head wound—a careful inspection of this large defect in the scalp and skull was made seeking for fragments of missile before any actual detection was begun. The brain was greatly lacerated and torn, and in this area of the large defect we did not encounter any of these minute particles.

I might say at this time that the X-ray pictures which were made would have a tendency to magnify these minute fragments somewhat in size and we were not too surprised in not being able to find the tiny fragments depicted in the X-ray.

Mr. SPECTER. Approximately how many fragments were observed, Dr. Humes, on the X-ray?

Commander HUMES. I would have to refer to them again, but I would say between 30 or 40 tiny dustlike particle fragments of radio opaque material, with the exception of this one I previously mentioned which was seen to be above and very slightly behind the right orbit.

Mr. DULLES. Were these all fragments that were injected into the skull by the bullet?

Commander HUMES. Our interpretation is, sir, that the missile struck the right occipital region, penetrated through the two tables of the skull, making the characteristic coning on the inner table which I have previously referred to. That one portion of the missile and judging by the size of the defect thus produced, the major portion of the missile, made its exit through this large defect.

A second portion of the missile or multiple second portions were deflected, and

traversed a distance as enumerated by this interrupted line, with the major portion of that fragment coming to lodge in the position indicated.

Perhaps some of these minor fragments were dislodged from the major one as it traversed this course.

To better examine the situation with regard to the skull, at this time, Dr. Boswell and I extended the lacerations of the scalp which were at the margins of this wound, down in the direction of both of the President's ears. At that point, we had even a better appreciation of the extensive damage which had been done to the skull by this injury.

We had to do virtually no work with a saw to remove these portions of the skull, they came apart in our hands very easily, and we attempted to further examine the brain, and seek specifically this fragment which was the one we felt to be of a size which would permit us to recover it.

Mr. SPECTER. When you refer to this fragment, and you are pointing there, are you referring to the fragment depicted right above the President's right eye?

Commander HUMES. Yes, sir; above and somewhat behind the President's eye.

Mr. SPECTER. Will you proceed, then, to tell us what you did then?

Commander HUMES. Yes, sir. We dissected carefully in this region and in fact located this small fragment, which was in a defect in the brain tissue in just precisely this location.

Mr. SPECTER. How large was that fragment, Dr. Humes?

Commander HUMES. I refer to my notes for the measurements of that fragment.

I find in going back to my report, sir, that we found, in fact, two small fragments in this approximate location. The larger of these measured 7 by 2 mm., the smaller 3 by 1 mm.

To make my presentation of this wound of the skull more logical to the Commission, I would like to go forward in time that evening to at a later hour. I apologize—time and what happened exactly at what moment escapes me at this time.

I mentioned previously that there was a large bony defect. Some time later on that evening or very early the next morning while we were all still engaged in continuing our examination, I was presented with three portions of bone which had been brought to Washington from Dallas by the agents of the Federal Bureau of Investigation.

These were——

Mr. SPECTER. Might that have been by a Secret Service agent?

Commander HUMES. It could be, sir; these things——

Mr. SPECTER. At any rate, someone presented these three pieces of bone to you?

Commander HUMES. Someone presented these three pieces of bone to me, I do not recall specifically their statement as to where they had been recovered.

It seems to me they felt it had been recovered either in the street or in the automobile, I don't recall specifically.

We were most interested in these fragments of bone, and found that the three pieces could be roughly put together to account for a portion of this defect.

Mr. SPECTER. How much remained unaccounted for, Dr. Humes?

Commander HUMES. I would estimate that approximately one-quarter of that defect was unaccounted for by adding these three fragments together and seeing what was left.

This is somewhat difficult, because as back to when we were actually looking for the fragments of metal, as we moved the scalp about, fragments of various sizes would fall to the table, and so forth, so it was difficult to put that exact figure into words.

However, the thing which we considered of importance about these three fragments of bone was that at the margins of one of them which was roughly pyramidal in shape, there was a portion of the circumference of what we interpreted as a missile wound. We thus interpreted it this because there was, the size was, sufficiently large for us, for it to have the curve of the skull still evident. At the point of this defect, and I will draw both tables of the bone in this defect, at the area which we interpreted as the margin of a missile wound, there was a shelving of the margin.

This would, to us, mean that a missile had made this wound from within the skull to the exterior. To confirm that this was a missile wound, X-rays were made of that fragment of bone, which showed radio-opaque material consistent and similar in character to the particles seen within the skull to be deposited in the margins of this defect, in this portion of the bone.

Mr. SPECTER. Then what conclusion did you reach as to what caused that hole reconstructed from the three portions of the late President's scalp?

Commander HUMES. We reached the conclusion a missile entered the left—the right posterior inferior portion——

Mr. SPECTER. Doctor, perhaps it would be helpful if you would refer to that as letter "A" and the exit as letter "B", so that the record is clear on those two points and perhaps it will be helpful to your description as well.

And would you mark them as well, with a pencil?

Commander HUMES. That is not entry for the second.

Mr. SPECTER. Exit for the second?

Commander HUMES. I will label 388 with the letter "A" to indicate our opinion as to the wound of entrance into the skull.

I will label as Point "B" the area of exit of a portion of the missile that entered posteriorly, I say a portion because a small fragment was seen in the position previously noted which was recovered.

However, we concluded that a very significant portion, perhaps the largest portion, made its exit and accounted for this very large defect for the multiple fractures of the skull and for the loss of brain and scalp tissue at this point.

Mr. SPECTER. Will you describe at this juncture the damage which was inflicted upon the brain, please?

Commander HUMES. May I refer at this point to the gross description of the brain prepared separately?

Mr. SPECTER. Certainly, Dr. Humes, if you prefer to do it in that order.

Commander HUMES. I believe you have that. It is the second portion of the report.

Mr. SPECTER. Yes, sir. I can make that available to you here.

Commander HUMES. While that is being provided, when we reflected the scalp away from the badly damaged skull, and removed some of these loosened portions of skull bone, we were able to see this large defect in the right cerebral hemisphere. It corresponded roughly in size with the greatest diameter of the defect in the scalp measuring some 13 cm.

Mr. SPECTER. May the record now show I am handing to you, Dr. Humes, an exhibit marked Commission Exhibit 391, and will you identify what that is, please, Doctor?

Commander HUMES. Exhibit 391 is listed as a supplementary report on the autopsy of the late President Kennedy, and was prepared some days after the examination.

This delay necessitated by, primarily, our desire to have the brain better fixed with formaldehyde before we proceeded further with the examination of the brain which is a standard means of approach to study of the brain.

The brain in its fresh state does not lend itself well to examination.

From my notes of the examination, at the time of the post-mortem examination, we noted that clearly visible in the large skull defect and exuding from it was lacerated brain tissue which, on close inspection proved to represent the major portion of the right cerebral hemisphere.

We also noted at this point that the flocculus cerebri was extensively lacerated and that the superior sagittal sinus which is a venous blood containing channel in the top of the meninges was also lacerated.

To continue to answer your question with regard to the damage of the brain, following the formal infixation, Dr. Boswell, Dr. Finck and I convened to examine the brain in this state.

We also prepared photographs of the brain from several aspects to depict the extent of these injuries.

We found that the right cerebral hemisphere was markedly disrupted. There was a longitudinal laceration of the right hemisphere which was parasagittal in position. By the saggital plane, as you may know, is a plane in the midline which would divide the brain into right and left halves.

This laceration was parasagittal. It was situated approximately 2.5 cm. to the right of the midline, and extended from the tip of occipital lobe, which is the posterior portion of the brain, to the tip of the frontal lobe which is the most anterior portion of the brain, and it extended from the top down to the substance of the brain a distance of approximately 5 or 6 cm.

The base of the laceration was situated approximately 4.5 cm. below the vertex in the white matter. By the vertex we mean—the highest point on the skull is referred to as the vertex.

The area in which the greatest loss of brain substance was particularly in the parietal lobe, which is the major portion of the right cerebral hemisphere.

The margins of this laceration at all points were jagged and irregular, with additional lacerations extending in varying directions and for varying distances from the main laceration.

In addition, there was a laceration of the corpus callosum which is a body of fibers which connects the two hemispheres of the brain to each other, which extended from the posterior to the anterior portion of this structure, that is the corpus callosum. Exposed in this laceration were portions of the ventricular system in which the spinal fluid normally is disposed within the brain.

When viewed from above the left cerebral hemisphere was intact. There was engorgement of blood vessels in the meninges covering the brain. We note that the gyri and sulci, which are the convolutions of the brain over the left hemisphere were of normal size and distribution.

Those on the right were too fragmented and distorted for satisfactory description.

When the brain was turned over and viewed from its basular or inferior aspect, there was found a longitudinal laceration of the mid-brain through the floor of the third ventricle, just behind the optic chiasma and the mammillary bodies.

This laceration partially communicates with an oblique 1.5 cm. tear through the left cerebral peduncle. This is a portion of the brain which connects the higher centers of the brain with the spinal cord which is more concerned with reflex actions.

There were irregular superficial lacerations over the basular or inferior aspects of the left temporal and frontal lobes. We interpret that these later contusions were brought about when the disruptive force of the injury pushed that portion of the brain against the relative intact skull.

This has been described as contre-coup injury in that location.

This, then, I believe, Mr. Specter, are the major points with regard to the President's head wound.

Mr. SPECTER. Do you have an opinion, Dr. Humes, as to whether there were dumdum bullets used specifically on this wound which struck point "A" of the head, on 388?

Commander HUMES. I believe these were not dumdum bullets, Mr. Specter. A dumdum bullet is a term that has been used to describe various missiles which have a common characteristic of fragmenting extensively upon striking.

Mr. SPECTER. Would you characterize the resultant effect on this bullet as not extensive fragmenting?

Commander HUMES. Yes. Had this wound on point "A" on Exhibit 388 been inflicted by a dumdum bullet, I would anticipate that it would not have anything near the regular contour and outline which it had. I also would anticipate that the skull would have been much more extensively disrupted, and not have, as was evident in this case, a defect which quite closely corresponded to the overlying skin defect because that type of a missile would fragment on contact and be much more disruptive at this point.

Mr. SPECTER. At this point would you state for the record the size and approximate dimension of the major wound on the top of the head which you have marked wound "B"?

Commander HUMES. This was so large, that localization of it in a descriptive way is somewhat difficult.

However, we have mentioned that its major—its greatest dimension was approximately 13 cm. The reason it was difficult to measure is that various

fracture lines extend out from it in a quite irregular fashion, but it was approximately 13 cm.

Mr. McCLOY. This red that is marked on 388 on the base of the skull, is that seepage or what?

Commander HUMES. No, sir; that is to depict the musculature at the base of the neck.

Mr. McCLOY. I see.

Commander HUMES. That is not taken to depict the blood, sir.

Mr. SPECTER. On the reconstruction of the three portions of the scalp which you described——

Commander HUMES. Skull, sir.

Mr. SPECTER. Skull, which enabled you to reconstruct a point of exit of the bullet, will you state at this point of the record that size of opening or exit path of the bullet?

Commander HUMES. As I mentioned previously, at one angle of this largest pyramidal shaped fragments of bone which came as a separate specimen, we had the portion of the perimeter of a roughly what we would judge to have been a roughly circular wound of exit. Judging from that portion of the perimeter which was available to us, we would have judged the diameter of that wound to be between 2.5 and 3 cm.

Mr. SPECTER. Doctor Humes, have you now described the major characteristics and features of the wounds to the late President's head?

Commander HUMES. I believe that I have, sir.

Mr. SPECTER. All right. Will you now turn your attention, please to the wound which is noted on 385 and 386 being at the——

Mr. McCLOY. Before we leave that, could I ask a question?

When you talk about dumdum bullets, do you include the ordinary type of soft nose sporting bullets, maybe this is something that Colonel Finck would be more expert on, but was that, was the bullet, could it possibly have been a sporting type of hunting bullet that has a soft nose but is still somewhat firm?

Commander HUMES. From the characteristics of this wound, Mr. McCloy, I would believe that it must have had a very firm head rather than a soft head.

Mr. McCLOY. Steel jacketed, would you say, copper jacketed bullet?

Commander HUMES. I believe more likely a jacketed bullet because of the regular outline which was present.

Mr. McCLOY. All right.

Mr. DULLES. Could I ask a question?

The CHAIRMAN. Mr. Dulles.

Mr. DULLES. Believing that we know the type of bullet that was usable in this gun, would this be the type of wound that might result from that kind of a bullet?

Commander HUMES. I believe so, sir.

Mr. DULLES. If my question is clear——

Commander HUMES. Yes, sir; it is.

Mr. DULLES. We think we know what the bullet is, we may be wrong but we think we know what it was, is this wound consistent with that type of bullet?

Commander HUMES. Quite consistent, sir.

Mr. McCLOY. There is no evidence of any keyholing of the bullet before it hit, before the point of impact?

Commander HUMES. I don't exactly follow your question.

Mr. McCLOY. Was the bullet moving in a direct line or had it begun to tumble?

Commander HUMES. To tumble?

That is a difficult question to answer. I have the opinion, however, that it was more likely moving in a direct line. You will note that the wound in the posterior portion of the occiput on Exhibit 388 is somewhat longer than the other missile wound which we have not yet discussed in the low neck. We believe that rather than due to a tumbling effect, this is explainable on the fact that this missile struck the skin and skull at a more tangential angle than did the other missile, and, therefore, produced a more elongated defect, sir.

Senator COOPER. May I ask a question there? Perhaps you have done this,

but if not, how would you explain the difference of the courses of the fragments which you traced and described as, I think, being discovered behind the right eye?

Commander HUMES. Yes, sir.

Senator COOPER. And the course of the fragment which was believed caused the large defect?

Commander HUMES. Caused the large defect?

Senator COOPER. How do you explain——

Commander HUMES. The discrepancy?

Senator COOPER. The difference in the courses.

Commander HUMES. Yes, sir.

As this missile penetrated the scalp, it then came upon a very firm substance, the hard skull, and I believe that this track depicted by the dotted lines on Exhibit 388 was a portion of that missile which was dislodged as it made its defect in the skull. And that—that another portion, and, as I say, presumably, by the size of the defect, a more major portion made its exit through the right lateral side of the skull.

Mr. MCCLOY. Is this piece of pyramidal bone that was brought in to you subsequently as I understand it——

Commander HUMES. Yes, sir.

Mr. MCCLOY. Was that part of the outer table or the inner table?

Commander HUMES. It was both tables, sir.

Mr. MCCLOY. Both tables?

Commander HUMES. Yes, sir; had it only been one it might have been difficult to ascertain whether it was.

Mr. MCCLOY. Shelving or not?

Commander HUMES. Yes, sir; in or out, but it encompassed both tables, sir.

Mr. DULLES. Is the angle of declination that you—one sees there from in and out approximately the angle you think at which the bullet was traveling at the time of impact and exit?

Commander HUMES. That is our impression, sir.

Mr. DULLES. So then the shot would have been fired from some point above the head of the person hit?

Commander HUMES. Yes, sir.

Mr. SPECTER. Dr. Humes, would you elaborate a bit on the differences in the paths, specifically why the bullet went in one direction in part and in part in the second direction, terminating with the fragment right over the right eye?

Commander HUMES. Yes, sir.

I will make a drawing of the posterior portion of the skull showing again this beveling which we observed at the inner table of the skull.

Our impression is that as this projectile impinged upon the skull in this fashion, a small portion of it was dislodged due to the energy expended in that collision, if you will, and that it went off at an angle, and left the track which is labeled 388, which is labeled on Exhibit 388 from "A", point "A" to the point where the fragment was found behind the eye.

Why a fragment takes any particular direction like that is something which is difficult of scientific explanation. Those of us who have seen missiles strike bones, be it the skull or a bone in the extremity, have long since learned that portions of these missiles may go off in various directions and the precise physical laws governing them are not clearly understood.

Mr. SPECTER. Would the angle be accentuated in any way if you were to assume the President was in a moving automobile going in a slight downhill direction?

Commander HUMES. There are many variables under these circumstances. The most—the crucial point, I believe, to be the relative position of the President's head in relation to the flight of the missile.

Now, this would be influenced by how far his head was bent, by the situation with regard to the level of the seat in the vehicle, off of the horizontal, and so forth.

Mr. SPECTER. How about a decline in the path of the road itself?

Commander HUMES. I think that that would have a tendency to accentuate this angle, yes, sir.

Mr. SPECTER. Mr. Chief Justice, I would like to move for the admission in evidence now of Exhibit 391, which is the exhibit on the brain report.

The CHAIRMAN. It may be admitted.

(The document heretofore marked for identification as Commission Exhibit No. 391 was received in evidence.)

Mr. SPECTER. Dr. Humes, would you now move over to the wound which appears on the lower part of the neck and upper part of the back?

Mr. DULLES. Could I ask one more question before we get to that, I am sorry.

Mr. SPECTER. Certainly.

Mr. DULLES. Could one say as to what portion of the bullet was found in all these fragments, I mean arrive at an estimate, was it a tenth of the bullet, was it, how much was it, assuming the type of bullet that we believe was used in this particular rifle.

Commander HUMES. Sir, I have not had the opportunity to personally examine the type of bullet which is believed to have been represented by this injury.

However, I would estimate—if I understand you correctly the total amount that was present in the President's skull and brain?

Mr. DULLES. Yes.

Commander HUMES. Including the fragment?

Mr. DULLES. Including all the fragments.

Commander HUMES. Including all these minute particles. I would say there was something less than one-tenth of the total volume of the missile.

Mr. SPECTER. Dr. Humes, do you make that calculation on the assumption that the bullets used here were 6.5 mm. Mannlicher-Carcano rifle bullet weighing 158.6 grams?

Commander HUMES. Yes, I do; sir.

Mr. SPECTER. Had I brought that particular fact to your attention prior to the time you started testifying here today?

Commander HUMES. Yes, sir. One point I intended to make clear these fragments which I recovered from this position were turned over to the Secret Service.

I presume that they have made physical measurements including the weight of them, and could give a much more intelligent estimate of the proportion than I. I would say, however, that we did not deliver these minute fragments because they were so small as to be essentially unrecoverable.

So, obviously they were of a very small portion of the major missile.

Mr. DULLES. These minute fragments were part of the bullet, emanations from the bullet?

Commander HUMES. Yes, sir.

Mr. DULLES. They were not from the head?

Commander HUMES. No, sir, they were small, dust, of the size of dust particles, however.

Mr. DULLES. Is the posture of the head of that figure there, the inclination of it, roughly the inclination that you think the President's head had at the time from the other photographs?

Commander HUMES. Yes, sir. From the photographs and based on the physical examination of this wound, yes, sir.

Mr. DULLES. That is all I have.

Mr. MCCLOY. Perhaps this was something that Colonel Finck could testify to exactly, but, he would be quite competent. Is there anything to indicate that this was, might have been a larger than a 6.5 or smaller than a 6.5?

Commander HUMES. The size of the defect in the scalp, caused by a projectile could vary from missile to missile because of elastic recoil and so forth of the tissues.

However, the size of the defect in the underlying bone is certainly not likely to get smaller than that of the missile which perforated it, and in this case, the smallest diameter of this was approximately 6 to 7 mm., so I would feel that that would be the absolute upper limit of the size of this missile, sir.

Mr. MCCLOY. Seven would be the absolute upper limit?

Commander HUMES. Yes, sir; and, of course, just a little tilt could make it a little larger, you see.

Mr. DULLES. I have one other question, if I may.

Is the incidence of clean entry as indicated there, and then great fragmentation on exit, is that a normal consequence of this type of wound?

Commander HUMES. Sir, we feel that there are two potential explanations for this.

One, having traversed the skull in entrance in the occiput as depicted on 388, the missile begins to tumble, and in that fashion it presents a greater proportion of its surface to the brain substance and to the skull as it makes its egress.

The other and somewhat more difficult to measure and perhaps Colonel Finck will be able to testify in greater detail on this, is that a high velocity missile has tremendous kinetic energy, and this energy is expanded against the structures which it strikes, and so that much of this defect could be of the nature of blast, as this kinetic energy is dissipated by traversing the skull.

Is that the sense of the question, sir?

Mr. DULLES. Yes.

Senator COOPER. I will ask a question, and perhaps this isn't in your field.

But assuming that the shot which struck President Kennedy at point A was fired by a gun from the window of the Texas School Book Depository, and which has been testified to, and assuming that you could locate the position of the President at the time he was struck by a bullet, you could then, could you not, establish the degree of the missile?

Commander HUMES. The degree of angle?

Senator COOPER. The angle, yes, the degree of angle of the missile from the building.

Commander HUMES. Yes, sir; there is one difficulty, and that is the defect of exit was so broad that one has to rely more on the inclination of the entrance than they do connecting in this instance entrance and exit because so much of the skull was carried away in this fashion.

Senator COOPER. That was my second question.

My first question was would it be possible physically to establish the degree of angle of the trajectory of the bullet?

Commander HUMES. Within limited accuracy, sir.

Senator COOPER. Within limited accuracy.

That being true then my second question was whether the point of entry of the bullet, point A, and the, what you call the exit——

Commander HUMES. Exit.

Senator COOPER. Did you establish them so exactly that they could be related to the degree of angle of the trajectory of the bullet?

Commander HUMES. Yes, sir; to our satisfaction we did ascertain that fact.

Mr. DULLES. Just one other question.

Am I correct in assuming from what you have said that this wound is entirely inconsistent with a wound that might have been administered if the shot were fired from in front or the side of the President: it had to be fired from behind the President?

Commander HUMES. Scientifically, sir, it is impossible for it to have been fired from other than behind. Or to have exited from other than behind.

Mr. MCCLOY. This is so obvious that I rather hesitate to ask it. There is no question in your mind that it was a lethal bullet?

Commander HUMES. The President, sir, could not possibly have survived the effect of that injury no matter what would have been done for him.

The CHAIRMAN. Mr. Specter.

Mr. SPECTER. What conclusions did you reach then as to the trajectory or point of origin of the bullet, Dr. Humes, based on 388?

Commander HUMES. We reached the conclusion that this missile was fired toward the President from a point above and behind him, sir.

Mr. SPECTER. Now, on one detail on your report, Dr. Humes, on page 4, on the third line down, you note that there is a lacerated wound measuring 15 by 6 mm. which on the smaller size is, of course, less than 6.5 mm.?

Commander HUMES. Yes, sir.

Mr. SPECTER. What would be the explanation for that variation?

Commander HUMES. This is in the scalp, sir, and I believe that this is explainable on the elastic recoil of the tissues of the skin, sir. It is not infre-

quent in missile wounds of this type that the measured wound is slightly smaller than the caliber of the missile that traversed it.

Mr. SPECTER. Would you proceed, now then to the other major wound of entry which you have already noted and described?

Commander HUMES. Yes, sir.

Mr. SPECTER. Its point of origin, where it hit the President.

Commander HUMES. I—our previously submitted report, which is Commission No. 387, identified a wound in the low posterior neck of the President.

The size of this wound was 4 by 7 mm., with the long axis being in accordance with the long axis of the body, 44 mm. wide, in other words, 7 mm. long.

We attempted to locate such wounds in soft tissue by making reference to bony structures which do not move and are, therefore, good reference points for this type of investigation.

We then ascertained, we chose the two bony points of reference—we chose to locate this wound, where the mastoid process, which is just behind the ear, the top of the mastoid process, and the acromion which is the tip of the shoulder joint. We ascertained physical measurement at the time of autopsy that this wound was 14 cm. from the tip of the mastoid process and 14 cm. from the acromion was its central point—

Mr. SPECTER. That is the right acromion?

Commander HUMES. The tip of the right acromion, yes, sir, and that is why we have depicted it in figure 385 in this location.

This wound appeared physically quite similar to the wound which we have described before in 388 "A," with the exception that its long axis was shorter than the long axis of the wound described above. When the tissues beneath this wound were inspected, there was a defect corresponding with the skin defect in the fascia overlying the musculature of the low neck and upper back.

I mentioned previously that X-rays were made of the entire body of the late President. Of course, and here I must say that as I describe something to you, I might have done it before or after in the description but for the sake of understanding, we examined carefully the bony structures in this vicinity as well as the X-rays, to see if there was any evidence of fracture or of deposition of metallic fragments in the depths of this wound, and we saw no such evidence, that is no fracture of the bones of the shoulder girdle, or of the vertical column, and no metallic fragments were detectable by X-ray examination.

Attempts to probe in the vicinity of this wound were unsuccessful without fear of making a false passage.

Mr. SPECTER. What do you mean by that, Doctor?

Commander HUMES. Well, the defect in the fascia was quite similar, which is the first firm tissue over the muscle beneath the skin, was quite similar to this. We were unable, however, to take probes and have them satisfactorily fall through any definite path at this point.

Now, to explain the situation in the President's neck, I think it will be necessary for me to refer back to Exhibit 385, I believe the number is correct.

Mr. SPECTER. Yes; please do, that is 385.

Commander HUMES. Now, as the President's body was viewed from anteriorly in the autopsy room, and saying nothing for the moment about the missile, there was a recent surgical defect in the low anterior neck, which measured some 7 or 8 cm. in length or let's say a recent wound was present in this area.

This wound was through the skin, through the subcutaneous tissues and into the larynx. Or rather into the trachea of the President.

Mr. SPECTER. To digress chronologically——

Commander HUMES. Yes.

Mr. SPECTER. Did you have occasion to discuss that wound on the front side of the President with Dr. Malcolm Perry of Parkland Hospital in Dallas?

Commander HUMES. Yes, sir; I did. I had the impression from seeing the wound that it represented a surgical tracheotomy wound, a wound frequently made by surgeons when people are in respiratory distress to give them a free airway.

To ascertain that point, I called on the telephone Dr. Malcolm Perry and discussed with him the situation of the President's neck when he first examined

the President, and asked him had he in fact done a tracheotomy which was somewhat redundant because I was somewhat certain he had.

He said, yes; he had done a tracheotomy and that as the point to perform his tracheotomy he used a wound which he had interpreted as a missile wound in the low neck, as the point through which to make the tracheotomy incision.

Mr. SPECTER. When did you have that conversation with him, Dr. Humes?

Commander HUMES. I had that conversation early on Saturday morning, sir.

Mr. SPECTER. On Saturday morning, November 23d?

Commander HUMES. That is correct, sir.

Mr. SPECTER. And have you had occasion since to examine the report of Parkland Hospital which I made available to you?

Commander HUMES. Yes, sir; I have.

Mr. SPECTER. May it please the Commission, I would like to note this as Commission Exhibit No. 392, and subject to later technical proof, to have it admitted into evidence at this time for the purpose of having the doctor comment about it.

The CHAIRMAN. It may be so marked.

(The document referred to was marked Commission Exhibit No. 392, for identification.)

Mr. SPECTER. What did your examination of the Parkland Hospital records disclose with respect to this wound on the front side of the President's body?

Commander HUMES. The examination of this record from Parkland Hospital revealed that Doctor Perry had observed this wound as had other physicians in attendance upon the President, and actually before a tracheotomy was performed surgically, an endotracheal tube was placed through the President's mouth and down his larynx and into his trachea which is the first step in giving satisfactory airway to a person injured in such fashion and unconscious.

The President was unconscious and it is most difficult to pass such a tube when the person is unconscious.

The person who performed that procedure, that is instilled the endotrachea tube noted that there was a wound of the trachea below the larynx, which corresponded in essence with the wound of the skin which they had observed from the exterior.

Mr. SPECTER. How is that wound described, while you are mentioning the wound?

Commander HUMES. Yes, sir.

Mr. SPECTER. I think you will find that on the first page of the summary sheet, Dr. Humes.

Commander HUMES. Yes, sir. Thank you.

This report was written by doctor—or of the activities of Dr. James Carrico, Doctor Carrico in inserting the endotracheal tube noted a ragged wound of trachea immediately below the larynx.

The report, as I recall it, and I have not studied it in minute detail, would indicate to me that Doctor Perry realizing from Doctor Carrico's observation that there was a wound of the trachea would quite logically use the wound which he had observed as a point to enter the trachea since the trachea was almost damaged, that would be a logical place in which to put his incision.

In speaking of that wound in the neck, Doctor Perry told me that before he enlarged it to make the tracheotomy wound it was a "few millimeters in diameter."

Of course by the time we saw it, as my associates and as you have heard, it was considerably larger and no longer at all obvious as a missile wound.

The report states, and Doctor Perry told me in telephone conversation that there was bubbling of air and blood in the vicinity of this wound when he made the tracheotomy. This caused him to believe that perhaps there had been a violation of one of the—one or other of the pleural cavities by a missile. He, therefore, asked one of his associates, and the record is to me somewhat confused as to which of his associates, he asked one of his associates to put in a chest tube. This is a maneuver which is, was quite logical under the circumstances, and which would, if a tube that were placed through all layers of the wall of the chest, and the chest cavity had been violated one could remove air that had gotten in there and greatly assist respiration.

So when we examined the President in addition to the large wound which

we found in conversation with Doctor Perry was the tracheotomy wound, there were two smaller wounds on the upper anterior chest.

Mr. DULLES. These are apparently exit wounds?

Commander HUMES. Sir, these were knife wounds, these were incised wounds on either side of the chest, and I will give them in somewhat greater detail.

These wounds were bilateral, they were situated on the anterior chest wall in the nipple line, and each were 2 cm. long in the transverse axis. The one on the right was situated 11 cm. above the nipple—the one on the left was situated 11 cm. on the nipple, and the one on the right was 8 cm. above the nipple. Their intention was to incise through the President's chest to place tubes into his chest.

We examined those wounds very carefully, and found that they, however, did not enter the chest cavity. They only went through the skin.

I presume that as they were performing that procedure it was obvious that the President had died, and they didn't pursue this.

To complete the examination of the area of the neck and the chest, I will do that together, we made the customary incision which we use in a routine postmortem examination which is a Y-shaped incision from the shoulders over the lower portion of the breastbone and over to the opposite shoulder and reflected the skin and tissues from the anterior portion of the chest.

We examined in the region of this incised surgical wound which was the tracheotomy wound and we saw that there was some bruising of the muscles of the neck in the depths of this wound as well as laceration or defect in the trachea.

At this point, of course, I am unable to say how much of the defect in the trachea was made by the knife of the surgeon, and how much of the defect was made by the missile wound. That would have to be ascertained from the surgeon who actually did the tracheotomy.

There was, however, some ecchymosis or contusion, of the muscles of the right anterior neck inferiorly, without, however, any disruption of the muscles or any significant tearing of the muscles.

The muscles in this area of the body run roughly, as you see as he depicted them here. We have removed some of them for a point I will make in a moment, but it is our opinion that the missile traversed the neck and slid between these muscles and other vital structures with a course in the neck such as the carotid artery, the jugular vein and other structures because there was no massive hemmorhage or other massive injury in this portion of the neck.

In attempting to relate findings within the President's body to this wound which we had observed low in his neck, we then opened his chest cavity, and we very carefully examined the lining of his chest cavity and both of his lungs. We found that there was, in fact, no defect in the pleural lining of the President's chest.

It was completely intact.

However, over the apex of the right pleural cavity, and the pleura now has two layers. It has a parietal or a layer which lines the chest cavity and it has a visceral layer which is intimately in association with the lung.

As depicted in figure 385, in the apex of the right pleural cavity there was a bruise or contusion or ecemymosis of the parietal pleura as well as a bruise of the upper portion, the most apical portion of the right lung.

It, therefore, was our opinion that the missile while not penetrating physically the pleural cavity, as it passed that point bruised either the missile itself, or the force of its passage through the tissues, bruised both the parietal and the visceral pleura.

The area of discoloration on the apical portion of the right upper lung measured five centimeters in greatest diameter, and was wedge shaped in configuration, with its base toward the top of the chest and its apex down towards the substance of the lung.

Once again Kodachrome photographs were made of this area in the interior of the President's chest.

Mr. SPECTER. Would you mark the point on Exhibit 385, the one on the rear of the President as point "C" and the one on the front of the President as point "D" so we can discuss those, Dr. Humes?

Now, what conclusion did you reach, if any, as to whether point "C" was the point of entry or exit?

Commander HUMES. We reached the conclusion that point "C" was a point of entry.

Mr. SPECTER. What characteristics of that wound led you to that conclusion?

Commander HUMES. The characteristics here were basically similar to the characteristics above, lacking one very valuable clue or piece of evidence rather than clue, because it is more truly a piece of evidence in the skull. The skull as I mentioned before had the bone with the characteristic defect made as a missile traverses bone.

This missile, to the best of our ability to ascertain, struck no bone protuberances, no bony prominences, no bones as it traversed the President's body. But it was a sharply delineated wound. It was quite regular in its outline. It measured, as I mentioned, 7 by 4 mm. Its margins were similar in all respects when viewed with the naked eye to the wound in the skull, which we feel incontrovertibly was a wound of entrance.

The defect in the fascia which is that layer of connective tissue over the muscle just beneath the wound corresponded virtually exactly to the defect in the skin.

And for these reasons we felt that this was a wound of entrance.

Mr. SPECTOR. Did you search the body to determine if there was any bullet inside the body?

Commander HUMES. Before the arrival of Colonel Finck we had made X-rays of the head, neck and torso of the President, and the upper portions of his major extremities, or both his upper and lower extremities. At Colonel Finck's suggestion, we then completed the X-ray examination by X-raying the President's body in toto, and those X-rays are available.

Mr. SPECTER. What did those X-rays disclose with respect to the possible presence of a missile in the President's body?

Commander HUMES. They showed no evidence of a missile in the President's body at any point. And these were examined by ourselves and by the radiologist, who assisted us in this endeavor.

Mr. SPECTER. What conclusion, if any, did you reach as to whether point "D" on 385 was the point of entrance or exit?

Commander HUMES. We concluded that this missile depicted in 385 "C" which entered the President's body traversed the President's body and made its exit through the wound observed by the physicians at Parkland Hospital and later extended as a tracheotomy wound.

Mr. SPECTER. Does the description "ragged wound" which is found in the Parkland report shed any light in and of itself as to whether point "D" is an exit or entry wound?

Commander HUMES. I believe, sir, that that statement goes on, ragged wound in the trachea. I don't believe that refers to the skin. And you might say that it is a ragged wound is more likely to be a wound of exit.

However, the trachea has little cartilaginous rings which have a tendency, which would be disrupted by this, and most wounds of the trachea unless very cleverly incised would perhaps appear slightly ragged.

Mr. SPECTOR. Now, what was the angle, if any, that you observed on the path of the bullet, as you outlined it?

Commander HUMES. The angle which we observed in measuring, in comparing the point of entrance, our point of entrance labeled "C" on 385 and "D" point of exit is one that the point of exit is below the point of entrance compared with the vertical.

Mr. SPECTOR. Have you had an opportunity to examine the clothing which has been identified for you as being that worn by the President on the day of the assassination?

Commander HUMES. Yes; yesterday, just shortly before the Commission hearing today was begun, Mr. Chief Justice, we had opportunity for the first time to examine the clothing worn by the late President.

In private conversation among ourselves before this opportunity, we predicted we would find defects in the clothing corresponding with the defects which were found, of course, on the body of the late President.

Mr. SPECTER. Mr. Chief Justice, may it please the Commission, I would like to have identified for the record three articles on which I have placed Com-

mission Exhibits Nos. 393 being the coat worn by the President, 394 being the shirt, and 395 being the President's tie, and at this time move for their admission into evidence.

The CHAIRMAN. It may be admitted.

(The articles of clothing referred to were marked Commission Exhibits Nos. 393, 394 and 395 for identification, and received in evidence.)

Mr. SPECTER. Taking 393 at the start, Doctor Humes, will you describe for the record what hole, if any, is observable in the back of that garment which would be at or about the spot you have described as being the point of entry on the President's back or lower neck.

Commander HUMES. Yes, sir. This exhibit is a grey suit coat stated to have been worn by the President on the day of his death. Situated to the right of the midline high in the back portion of the coat is a defect, one margin of which is semicircular.

Situated above it just below the collar is an additional defect. It is our opinion that the lower of these defects corresponds essentially with the point of entrance of the missile at Point C on Exhibit 385.

Mr. SPECTER. Would it be accurate to state that the hole which you have identified as being the point of entry is approximately 6 inches below the top of the collar, and 2 inches to the right of the middle seam of the coat?

Commander HUMES. That is approximately correct, sir. This defect, I might say, continues on through the material.

Attached to this garment is the memorandum which states that one half of the area around the hole which was presented had been removed by experts, I believe, at the Federal Bureau of Investigation, and also that a control area was taken from under the collar, so it is my interpretation that this defect at the top of this garment is the control area taken by the Bureau, and that the reason the lower defect is not more circle or oval in outline is because a portion of that defect has been removed apparently for physical examinations.

Mr. SPECTER. Now, does the one which you have described as the entry of the bullet go all the way through?

Commander HUMES. Yes, sir; it goes through both layers.

Mr. SPECTER. How about the upper one of the collar you have described, does that go all the way through?

Commander HUMES. Yes, sir; it goes all the way through. It is not—wait a minute, excuse me—it is not so clearly a puncture wound as the one below.

Mr. SPECTER. Does the upper one go all the way through in the same course?

Commander HUMES. No.

Mr. SPECTER. Through the inner side as it went through the outer side?

Commander HUMES. No, in an irregular fashion.

Mr. SPECTER. Will you take Commission Exhibit 394 and describe what that is, first of all, please?

Commander HUMES. This is the shirt, blood-stained shirt, purportedly worn by the President on the day of his assassination. When viewed from behind at a point which corresponds essentially with the point of defect on the jacket, one sees an irregularly oval defect.

When viewed anteriorly, with the top button buttoned, two additional defects are seen. Of course, with the shirt buttoned, the fly front of the shirt causes two layers of cloth to be present in this location, and that there is a defect in the inner layer of cloth and a corresponding defect in the outer layer of the cloth.

Mr. SPECTER. Is there any observable indication from the fibers on the front side of the shirt to indicate in which direction a missile might have passed through those two tears?

Commander HUMES. From an examination of these defects at this point, it would appear that the missile traversed these two layers from within to the exterior.

Mr. SPECTER. Would it be accurate to state that the hole in the back of the shirt is approximately 6 inches below the top of the collar and 2 inches to the right of the middle seam of the shirt?

Commander HUMES. That is approximately correct, sir.

Mr. SPECTER. Now, how, if at all, do the holes in the shirt and coat conform

to the wound of entrance which you described as point "C" on Commission Exhibit 385?

Commander HUMES. We believe that they conform quite well. When viewing—first of all, the wounds or the defects in 393 and 394 coincide virtually exactly with one another.

They give the appearance when viewed separately and not as part of the clothing of a clothed person as being perhaps, somewhat lower on the Exhibits 393 and 394 than we have depicted them in Exhibit No. 385. We believe there are two reasons for this.

385 is a schematic representation, and the photographs would be more accurate as to the precise location, but more particularly the way in which these defects would conform with such a defect on the torso would depend on the girth of the shoulders and configuration of the base of the neck of the individual, and the relative position of the shirt and coat to the tissues of the body at the time of the impact of the missile.

Mr. SPECTER. As to the muscular status of the President, what was it?

Commander HUMES. The President was extremely well-developed, an extremely well-developed, muscular young man with a very well-developed set of muscles in his thoraco and shoulder girdle.

Mr. SPECTER. What effect would that have on the positioning of the shirt and coat with respect to the position of the neck in and about the seam?

Commander HUMES. I believe this would have a tendency to push the portions of the coat which show the defects here somewhat higher on the back of the President than on a man of less muscular development.

Mr. SPECTER. Mr. Chief Justice, may it please the Commission, I would like to mark for identification Exhibit 396, which later proof will show is a picture of President Kennedy shortly before the first bullet struck him, and ask the doctor to take a look at that.

Will you describe, Doctor Humes, the position of President Kennedy's right hand in that picture?

Commander HUMES. Yes. This exhibit, Commission Exhibit No. 396, allegedly taken just prior to the wounding of the late President, shows him with his hand raised, his elbow bent, apparently in saluting the crowd. I believe that this action——

Mr. SPECTER. Which hand was that?

Commander HUMES. This was his right hand, sir. I believe that this action would further accentuate the elevation of the coat and the shirt with respect to the back of the Presideent.

Mr. SPECTER. Now, Doctor Humes, will you take Commission Exhibit No. 395——

Mr. MCCLOY. Before you go, may I ask a question? In your examination of the shirt, I just want to get it in the record, from your examination of the shirt, there is no defect in the collar of the shirt which coincides with the defect in the back of the President's coat, am I correct?

Commander HUMES. You are correct, sir. There is no such defect.

Mr. SPECTER. As to Commission Exhibit 395, Dr. Humes, will you identify what that is, please?

Commander HUMES. We had an opportunity to examine this exhibit before the Commission met today, sir. This is Commission Exhibit No. 395, and is the neck tie purportedly worn, purportedly to have been worn, by the late President on the day of his assassination.

Mr. SPECTER. What defect, if any, is noted on the tie which would correspond with the path of a missile apparently passing through the folds of the shirt which you have already described?

Commander HUMES. This tie is one of those—this tie is still in its knotted state, as we examine it at this time. The portion of the tie around the neck has been severed apparently with scissors or other sharp instrument accounting for the loop about the neck.

The tie is tied in four-in-hand fashion but somewhat askew from the way a person would normally tie a four-in-hand knot.

Situated on the left anterior aspect of this knotted portion of the tie at a point approximately corresponding with the defects noted previously in the

two layers of the shirt is a superficial tear of the outer layer only of the fabric of this tie which, I believe, could have been caused by a glancing blow to this portion of the tie by a missile.

Mr. SPECTER. Mr. Chief Justice, I move at this time for the admission into evidence of Exhibits 393 through Exhibit 396, the three articles of clothing and the photograph which we have just used.

The CHAIRMAN. They may be admitted.

(Exhibits Nos. 393 through 396 were received in evidence and may be found in the Commission files.)

Mr. MCCLOY. Commander, did you say left or right?

Commander HUMES. No, sir. In fact, the way this bow is tied now it would appear to be on the left of this tie, but it is kind of twisted out of shape.

Mr. MCCLOY. Yes. It is twisted. It is not too clear.

Commander HUMES. It is not too clear, it is not clear how that might have been in position with the shirt, sir.

Mr. SPECTER. Now, Doctor Humes, at one point in your examination of the President, did you make an effort to probe the point of entry with your finger?

Commander HUMES. Yes, sir; I did.

Mr. SPECTER. And at or about that time when you were trying to ascertain, as you previously testified, whether there was any missile in the body of the President, did someone from the Secret Service call your attention to the fact that a bullet had been found on a stretcher at Parkland Hospital?

Commander HUMES. Yes, sir; they did.

Mr. SPECTER. And in that posture of your examination, having just learned of the presence of a bullet on a stretcher, did that call to your mind any tentative explanatory theory of the point of entry or exit of the bullet which you have described as entering at Point "C" on Exhibit 385?

Commander HUMES. Yes, sir. We were able to ascertain with absolute certainty that the bullet had passed by the apical portion of the right lung producing the injury which we mentioned.

I did not at that point have the information from Doctor Perry about the wound in the anterior neck, and while that was a possible explanation for the point of exit, we also had to consider the possibility that the missile in some rather inexplicable fashion had been stopped in its path through the President's body and, in fact, then had fallen from the body onto the stretcher.

Mr. SPECTER. And what theory did you think possible, at that juncture, to explain the passing of the bullet back out the point of entry; or had you been provided with the fact that external heart massage had been performed on the President?

Commander HUMES. Yes, sir; we had, and we considered the possibility that some of the physical maneuvering performed by the doctors might have in some way caused this event to take place.

Mr. SPECTER. Now, have you since discounted that possibility, Doctor Humes?

Commander HUMES. Yes; in essence we have. When examining the wounds in the base of the President's neck anteriorly, the region of the tracheotomy performed at Parkland Hospital, we noted, and we noted in our record, some contusion and bruising of the muscles of the neck of the President. We noted that at the time of the postmortem examination.

Now, we also made note of the types of wounds which I mentioned to you before in this testimony on the chest which were going to be used by the doctors there to place chest tubes. They also made other wounds, one on the left arm, and a wound on the ankle of the President with the idea of administering intravenous blood and other fluids in hope of replacing the blood which the President had lost from his extensive wounds.

Those wounds showed no evidence of bruising or contusion or physical violence, which made us reach the conclusion that they were performed during the agonal moments of the late president, and when the circulation was, in essence, very seriously embarrassed, if not nonfunctional. So that these wounds, the wound of the chest and the wound of the arm and of the ankle were performed about the same time as the tracheotomy wound because only a very few moments of time elapsed when all this was going on.

So, therefore, we reached the conclusion that the damage to these muscles on the anterior neck just below this wound were received at approximately the same time that the wound here on the top of the pleural cavity was, while the President still lived and while his heart and lungs were operating in such a fashion to permit him to have a bruise in the vicinity, because that he did have in these strap muscles in the neck, but he didn't have in the areas of the other incisions that were made at Parkland Hospital. So we feel that, had this missile not made its path in that fashion, the wound made by Doctor Perry in the neck would not have been able to produce, wouldn't have been able to produce, these contusions of the musculature of the neck.

Mr. DULLES. Could I ask a question about the missile, I am a little bit—the bullet, I am a little bit—confused. It was found on the stretcher. Did the President's body remain on the stretcher while it was in the hospital?

Commander HUMES. Of that point I have no knowledge. The only——

Mr. DULLES. Why would it—would this operating have anything to do with the bullet being on the stretcher unless the President's body remained on the stretcher after he was taken into the hospital; is that possible?

Commander HUMES. It is quite possible, sir.

Mr. DULLES. Otherwise it seems to me the bullet would have to have been ejected from the body before he was taken or put on the bed in the hospital.

Commander HUMES. Right, sir. I, of course, was not there. I don't know how he was handled in the hospital, in what conveyance. I do know he was on his back during the period of his stay in the hospital; Doctor Perry told me that.

Mr. DULLES. Yes; and wasn't turned over.

Commander HUMES. That is right.

Mr. DULLES. So he might have been on the stretcher the whole time, is that your view?

The CHAIRMAN. He said he had no view. He wasn't there, he doesn't know anything about it.

Mr. DULLES. Yes. I wonder if there is other evidence of this.

Mr. SPECTER. There has been other evidence, Mr. Dulles. If I may say at this point, we shall produce later, subject to sequential proof, evidence that the stretcher on which this bullet was found was the stretcher of Governor Connally. We have a sequence of events on the transmission of that stretcher which ties that down reasonably closely, so that on the night of the autopsy itself, as the information I have been developing indicates, the thought preliminarily was that was from President Kennedy's stretcher, and that is what led to the hypothesis which we have been exploring about, but which has since been rejected. But at any rate the evidence will show that it was from Governor Connally's stretcher that the bullet was found.

Mr. DULLES. So this bullet is still missing?

Mr. SPECTER. That is the subject of some theories I am about to get into. That is an elusive subject, but Dr. Humes has some views on it, and we might just as well go into those now.

Mr. MCCLOY. Before he gets into that, may I ask a question?

The CHAIRMAN. Surely, go right ahead.

Mr. MCCLOY. Quite apart from the President's clothing, now directing your attention to the flight of the bullet, quite apart from the evidence given by the President's clothing, you, I believe, indicated that the flight of the bullet was from the back, from above and behind. It took roughly the line which is shown on your Exhibit 385.

Commander HUMES. Yes, sir.

Mr. MCCLOY. I am not clear what induced you to come to that conclusion if you couldn't find the actual exit wound by reason of the tracheotomy.

Commander HUMES. The report which we have submitted, sir, represents our thinking within the 24–48 hours of the death of the President, all facts taken into account of the situation.

The wound in the anterior portion of the lower neck is physically lower than the point of entrance posteriorly, sir.

Mr. MCCLOY. That is what I wanted to bring out.

Commander HUMES. Yes, sir.

Mr. McCLOY. May I ask this: In spite of the incision made by the tracheotomy, was there any evidence left of the exit aperture?

Commander HUMES. Unfortunately not that we could ascertain, sir.

Mr. McCLOY. I see.

Mr. DULLES. There is no evidence in the coat or the shirt of an exit through the coat or shirt.

Commander HUMES. There is no exit through the coat, sir. But these two, in the shirt, of course—excuse me, sir—there is. The entrance by our calculations—

Mr. DULLES. The entrance I know.

Commander HUMES. Posteriorly.

Mr. DULLES. What about the exit?

Commander HUMES. The exit wounds are just below.

Mr. DULLES. But there was no coat to exit through.

Commander HUMES. No; anteriorly the coat was quite open.

Senator COOPER. May I ask a question?

Commander HUMES. Yes, sir, Senator.

Senator COOPER. Assuming that we draw a straight line from Point "C" which you have described as a possible point of entry of the missile, to Point "D" where you saw an incision of the tracheotomy——

Commander HUMES. Yes, sir.

Senator COOPER. What would be the relation of the bruise at the apex of the pleural sac to such a line?

Commander HUMES. It would be exactly in line with such a line, sir, exactly.

Senator COOPER. What was the character of the bruise that you saw there?

Commander HUMES. The bruise here, photographs are far superior to my humble verbal description, but if I let my hand in cup shaped fashion represent the apical parietal pleura, it was an area approximately 5 cm. in greatest diameter of purplish blue discoloration of the parietal pleura. Corresponding exactly with it, with the lung sitting below it, was a roughly pyramid-shaped bruise with its base toward the surface of the upper portion of the lung, and the apex down into the lung tissue, and the whole thing measured about 5 cm., which is a little—2 inches in extent, sir.

Senator COOPER. What would be the—can you describe the covering around the apex of the pleural sac, the nature of its protection. My point is to get your opinion as to whether some other factor, some factor other than the missile could have caused this bruise which you saw.

Commander HUMES. A couple of ways we might do this, sir. One with regard to temporal, it was quite fresh. When examined under the microscope, the lung in this area had recent hemorrhaging in it. The red blood cells were well-preserved, as they would be if it happened quite recently before death, as was the red blood cells where they had gotten out into the lung tissue near there.

The discoloration was essentially of the same character as the discoloration in the muscles adjacent thereto, which would roughly again place it temporally in approximately the same time since bruises change color as time goes by, and these appeared quite fresh.

This is with regard to time—I don't know whether that is the right parameter in which you wished to study it, Senator.

Senator COOPER. My question really went to this point: Considering the location of the bruise at the apex of the pleural sac——

Commander HUMES. Yes, sir.

Senator COOPER. And of the tissue or muscles around it, was there any other factor which you could think of that might have caused that bruise other than the passage of a missile?

Commander HUMES. It was so well localized that I truthfully, sir, can't think of any other way.

Senator COOPER. That is all.

Mr. McCLOY. May I ask you one question which, perhaps, the answer is quite obvious. If, contrary to the evidence that we have here, that anterior wound was the wound of entry, the shot must have come from below the President to have followed that path.

Commander HUMES. That course, that is correct, sir.

Mr. SPECTER. Dr. Humes, can you compare the angles of declination on 385, point "C" to "D", with 388 "A" to "B"?

Commander HUMES. You will note, and again I must apologize for the schematic nature of these diagrams drawn to a certain extent from memory and to a certain extent from the written record, it would appear that the angle of declination is somewhat sharper in the head wound, 388, than it is in 385.

The reason for this, we feel, by the pattern of the entrance wound at 388 "A" causes us to feel that the President's head was bent forward, and we feel this accounts for the difference in the angle, plus undoubtedly the wounds were not received absolutely simultaneously, so that the vehicle in which the President was traveling moved during this period of time, which would account for a difference in the line of flight, sir.

Mr. SPECTER. Aside from the slight differences which are notable by observing those two exhibits, are they roughly comparable to the angle of decline?

Commander HUMES. I believe them to be roughly comparable, sir.

Mr. SPECTER. Could you state for the record an approximation of the angle of decline?

Commander HUMES. Mathematics is not my forte. Approximately 45 degrees from the horizontal.

Mr. SPECTER. Would you elaborate somewhat, Doctor Humes, on why the angle would change by virtue of a tilting of the head of the President since the basis of the computation of angle is with respect to the ground?

Commander HUMES. I find the question a little difficult of answering right off, forgive me, sir.

Mr. SPECTER. I will try to rephrase it. Stated more simply, why would the tilting of the President's head affect the angle of the decline? You stated that was——

Commander HUMES. The angle that I am making an observation most about is the angle made that we envisioned having been made by the impingement of the bullet in its flight at the point of entry. This angle we see by the difference of the measurement of the two wounds.

Therefore, this is—we have several angles we are talking about here, unfortunately, this is—the angle of which we speak in this location, "A" to "B", and it is difficult.

I have to retract. Since we feel from their physical configurations, wounds 385 "C" and 388 "A" are entrance wounds, if there wasn't some significant change in the angulation of the President's head with respect to the line of flight from these missiles, the physical measurements of 385 "C" and this 388 "A" should be similar. They aren't, in fact, dissimilar in that there is a greater angulation in 388 "A". Therefore, there has to be either a change in the position of the vehicle in which the President is riding with respect to the horizontal or a change in the situation of the President's head. I believe that the exhibits submitted earlier, the photograph——

Mr. SPECTER. I believe the ones were given to you so far—excuse me, you are right, 389.

Commander HUMES. 389, in fact at this point shows the President's head in a slightly inclined forward position, and I am not enough aware of the geography of the ground over which the vehicle was traveling to know how much that would affect it.

Mr. SPECTER. If you were to be told that there was a distance traversed of approximately 150 feet from the time of Point "C" on 385 to Point "A" on 388, and you would assume the additional factor that there was a slight angle of decline on the street as well, would those factors, assuming them to be true, help in the explanation of the differences in the angles?

Commander HUMES. I think that they would make the figure as depicted in 388 quite understandably different from 385.

Mr. DULLES. Was it possible, in view of the condition of the brain to point with absolute accuracy to the point of exit there? I can see that the point of exit in 385 can be clearly determined. Is it equally possible to determine the point of exit in 388?

Commander HUMES. No, sir; it was not, other than through this large defect because when——

Mr. DULLES. Therefore, that angle might be somewhat different.

Commander HUMES. Might be somewhat different, sir. I think we made reference to that somewhat earlier. The fragments were so difficult to replace in their precise anatomic location——

Mr. DULLES. That is what I thought, but I wasn't sure.

Commander HUMES. That is correct.

Mr. MCCLOY. I would like to ask a question in regard to 385 similar to that I asked as to 388. In your opinion, was the 385 wound lethal?

Commander HUMES. No, sir.

Mr. DULLES. With the wound in 385, would it have affected the President's power of speech?

Commander HUMES. It could have, sir. The wound caused a defect in his trachea which would most usually have caused at least some defect in the proper phonation, sir.

(Discussion off the record.)

The CHAIRMAN. On the record.

Mr. SPECTER. In response to Mr. Dulles' question a moment ago, Doctor Humes, you commented that they did not turn him over at Parkland. Will you state for the record what the source of your information is on that?

Commander HUMES. Yes. This is a result of a personal telephone conversation between myself and Dr. Malcolm Perry early in the morning of Saturday, November 23.

Mr. SPECTER. At that time did Doctor Perry tell you specifically, Doctor Humes, that the Parkland doctors had not observed the wound in the President's back?

Commander HUMES. He told me that the President was on his back from the time he was brought into the hospital until the time he left it, and that at no time was he turned from his back by the doctors.

Mr. SPECTER. And at the time of your conversation with Doctor Perry did you tell Doctor Perry anything of your observations or conclusions?

Commander HUMES. No, sir; I did not.

(A short recess was taken.)

The CHAIRMAN. Gentlemen, the Commission will be in order. We will continue with the examination.

Mr. SPECTER. Doctor Humes, as to points of entry on the body of the late President, how many were there in total?

Commander HUMES. Two, sir, as depicted in 385–C and 388–A.

Mr. SPECTER. And to points of exit, how many were there?

Commander HUMES. Two, sir, as depicted in 385–D and the vicinity of 388–B. I make the latter remark as was developed earlier, in that the size of the large defect in the skull was so great and the fragmentation was so complex that it was impossible to accurately pinpoint the exit of the missile in the head wound.

Mr. SPECTER. Now as to that last factor, would the X-rays be of material assistance to you in pinpointing the specific locale of the exit?

Commander HUMES. I do not believe so, sir. The only path that the X-rays show in any detail are of the minor fragments which passed from point A to point B.

Mr. SPECTER. Now that you have finished your major descriptions of the wounds, can you be any more specific in telling us in what way the availability of the X-rays would assist in further specifying the nature of the wounds?

Commander HUMES. I do not believe, sir, that the availability of the X-rays would materially assist the Commission.

Mr. SPECTER. How about the same question as to the pictures?

Commander HUMES. The pictures would show more accurately and in more detail the character of the wounds as depicted particularly in 385 and 386 and in 388–A. They would also perhaps give the Commissioners a better—better is not the best term, but a more graphic picture of the massive defect in 388.

Mr. SPECTER. Going back for a moment, Doctor Humes——

The CHAIRMAN. Before we get off that, may I ask you this, Commander: If we had the pictures here and you could look them over again and restate your opinion, would it cause you to change any of the testimony you have given here?

Commander HUMES. To the best of my recollection, Mr. Chief Justice, it would not.

The CHAIRMAN. Mr. McCloy.

Mr. MCCLOY. May I ask this question?

The CHAIRMAN. Go right ahead.

Mr. MCCLOY. Do you have any knowledge as to whether or not any photographs were taken in Dallas?

Commander HUMES. I have none, sir, no knowledge.

Mr. MCCLOY. No knowledge that any were taken?

Representative FORD. May I ask what size are the pictures to which you refer?

Commander HUMES. We exposed both black and white and color negatives, Congressman. They were exposed in the morgue during the examination. They were not developed. The kodachrome negatives when developed would be 405. They were in film carriers or cassettes, as were the black and white. Of course they could be magnified.

Representative FORD. Have those been examined by personnel at Bethesda?

Commander HUMES. No, sir. We exposed these negatives; we turned them over. Here I must ask the counsel again for advice—to the Secret Service.

Mr. SPECTER. Yes; it was the Secret Service.

Commander HUMES. They were turned over to the Secret Service in their cassettes unexposed, and I have not seen any of them since. This is the photographs. The X-rays were developed in our X-ray department on the spot that evening, because we had to see those right then as part of our examination, but the photographs were made for the record and for other purposes.

Representative FORD. But they had never been actually developed for viewing.

Commander HUMES. I do not know, sir.

Mr. SPECTER. Doctor Humes, back to the angles for just a moment.

Commander HUMES. Yes, sir.

Mr. SPECTER. Hypothesize or assume, if you will, that other evidence will show that the wound inflicted on Commission Exhibit 385 at point C occurred while the President was riding in the rear seat of his automobile approximately 100 feet from a point of origin in a six-floor building nearby, and assume further that the wound inflicted in 388 at point A occurred when the President was approximately 250 feet away from the same point.

With those assumptions in mind, there would be somewhat different angles of declination going from C to D on 385 and from A to B on 388.

Commander HUMES. I would expect there would.

Mr. SPECTER. You have already testified earlier today that you were unable to pinpoint with precision angle A to B on 388 because of the reconstruction of the scalp.

Now my question to you, in that elongated fashion, is from what you know and what you have described, are the angles, as you have expressed them to be in your opinion, consistent with a situation where the two wounds were inflicted at the angles and at the distances just described to you?

Commander HUMES. I believe they are consistent. I would state that the path outlined on 388–A to B is to a certain extent conjectural for the reasons given before.

Mr. SPECTER. Now, Doctor Humes, I hand you a group of documents which have been marked as Commission Exhibit No. 397 and ask you if you can identify what they are?

Commander HUMES. Yes, sir; these are various notes in long-hand, or copies rather, of various notes in long-hand made by myself, in part, during the performance of the examination of the late President, and in part after the examination when I was preparing to have a typewritten report made.

Mr. SPECTER. Are there also included there some notes that you made while you talked to Doctor Perry on the telephone?

Commander HUMES. Yes, sir; there are.

Mr. SPECTER. Are there any notes which you made at any time which are not included in this group of notes?

Commander HUMES. Yes, sir; there are.

Mr. SPECTER. And what do those consist of?

Commander HUMES. In privacy of my own home, early in the morning of Sunday, November 24th, I made a draft of this report which I later revised, and of which this represents the revision. That draft I personally burned in the fireplace of my recreation room.

Mr. SPECTER. May the record show that the Exhibit No. 397 is the identical document which has been previously identified as Commission No. 371 for our internal purposes.

Is the first sheet then in that group the notes you made when you talked to Doctor Perry?

Commander HUMES. That is correct, sir.

Mr. SPECTER. And do the next 15 sheets represent the rough draft which was later copied into the autopsy report which has been heretofore identified with an exhibit number?

Commander HUMES. That is correct, sir.

Mr. SPECTER. And what do the next two sheets represent?

Commander HUMES. The next two sheets are the notes actually made in the room in which the examination was taking place. I notice now that the handwriting in some instances is not my own, and it is either that of Commander Boswell or Colonel Finck.

Mr. SPECTER. And was that writing made at the same time that the autopsy report was undertaken; that is, did you review all of the markings on those papers and note them to be present when you completed the autopsy report?

Commander HUMES. Yes, sir. From the time of the completion of this examination until the submission of the written report following its preparation, all of the papers pertinent to this case were in my personal custody.

Mr. SPECTER. Have you now described all of the documents which were present in that 397, Exhibit No. 397?

Commander HUMES. Yes, sir; with the exception of the certification to the fact that I, in fact, detailed them in my custody, and a certification that I had destroyed certain preliminary draft notes.

Mr. SPECTER. And these represent all the notes except those you have already described which you destroyed?

Commander HUMES. That is correct, sir.

Mr. SPECTER. Now, just one point on the notes themselves. Page 14 of your rough draft, Doctor Humes, as to the point of origin, the notes show that there was a revision between your first draft and your final report.

Commander HUMES. Yes, sir.

Mr. SPECTER. Will you first of all read into the record the final conclusion reflected in your final report.

Commander HUMES. I would rather read it from the final report. The final report reads:

"The projectiles were fired from a point behind and somewhat above the level of the deceased."

Mr. SPECTER. And what did the first draft of that sentence as shown on page 14 of your rough draft state?

Commander HUMES. It stated as follows:

"The projectiles were fired from a point behind and somewhat above a horizontal line to the vertical position of the body at the moment of impact."

Mr. SPECTER. Now would you state the reason for making that modification between draft and final report, please?

Commander HUMES. This examination, as I have indicated, was performed by myself with my two associates. The notes which we have just admitted as an exhibit are in my own hand and are my opinion, was my opinion at that time, as to the best way to present the facts which we had gleaned during this period.

Before submitting it to the typist, I went over this with great care with my two associates. One or the other of them raised the point that perhaps this sentence would state more than what was absolutely fact based upon our observations, pointing out that we did not know precisely at that time in what position the body of the President was when the missiles struck, and that therefore we should be somewhat less specific and somewhat more circumspect than the way we stated it. When I considered this suggestion, I agreed that it would be better to change it as noted, and accordingly, I did so.

Mr. SPECTER. Mr. Chief Justice, I move now for the admission into evidence of Exhibit No. 397.

The CHAIRMAN. It may be admitted.

(The documents, previously marked Exhibit No. 397 for identification, were received in evidence.)

Mr. MCCLOY. May I ask one question about the notes? The notes that you made contemporaneously with your examination, you said you put those down and then you put some in later. How much later were the notes, within the best of your recollection of the final notes made, not the final report, but the final notes that you made in your own handwriting?

Commander HUMES. The examination was concluded approximately at 11 o'clock on the night of November 22. The final changes in the notes prior to the typing of the report were made, and I will have to give you the time because whatever time Mr. Oswald was shot, that is about when I finished. I was working in an office, and someone had a television on and came in and told me that Mr. Oswald had been shot, and that was around noon on Sunday, November 24th.

Mr. SPECTER. Mr. Chief Justice, I have now marked another photograph as the next exhibit number, Commission Exhibit 398. May I say to the Commission that this is a photograph which, subject to later proof, will show it to be taken immediately after the President was struck by the first bullet.

The CHAIRMAN. It may be marked.

(The photograph was marked Commission Exhibit No. 398 for identification.)

May I move for its admission into evidence at this time for this purpose?

The CHAIRMAN. It may be admitted.

(The photograph, previously marked Commission Exhibit No. 398 for identification, was received in evidence.)

Looking at Commission Exhibit 398, Doctor Humes, with that as a background, have you had an opportunity to review the medical reports on Governor Connally at Parkland Hospital in Commission Exhibit 392?

Commander HUMES. I have.

Mr. SPECTER. Have you noted the wounds which he sustained on his right wrist, that is, Governor Connally's right wrist?

Commander HUMES. Yes, sir; I have noted the report of it in these records.

Mr. SPECTER. What does the report show as to those wounds on the right wrist?

Commander HUMES. The report shows a wound of entrance on the dorsal aspect of the right wrist. Let's get the precise point here. The wound of entry is described as on the dorsal aspect of the right wrist above the junction of the distal fourth of the radius and the shaft. It was approximately two centimeters in length and rather oblique, with the loss of tissue, and some considerable contusions at the margins. There was a wound of exit along the volar surface of the wrist about two centimeters above the flexion crease of the wrist in the midline.

Mr. SPECTER. Doctor Humes, I show you a bullet which we have marked as Commission Exhibit No. 399, and may I say now that, subject to later proof, this is the missile which has been taken from the stretcher which the evidence now indicates was the stretcher occupied by Governor Connally.

I move for its admission into evidence at this time.

The CHAIRMAN. It may be admitted.

(The article, previously marked Commission Exhibit No. 399 for identification, was received in evidence.)

Mr. SPECTER. We have been asked by the FBI that the missile not be handled by anybody because it is undergoing further ballistic tests, and it now appears, may the record show, in a plastic case in a cotton background.

Now looking at that bullet, Exhibit 399, Doctor Humes, could that bullet have gone through or been any part of the fragment passing through President Kennedy's head in Exhibit No. 388?

Commander HUMES. I do not believe so, sir.

Mr. SPECTER. And could that missile have made the wound on Governor Connally's right wrist?

Commander HUMES. I think that that is most unlikely. May I expand on those two answers?

Mr. SPECTER. Yes, please do.

Commander HUMES. The X-rays made of the wound in the head of the late President showed fragmentations of the missile. Some fragments we recovered and turned over, as has been previously noted. Also we have X-rays of the fragment of skull which was in the region of our opinion exit wound showing metallic fragments.

Also going to Exhibit 392, the report from Parkland Hospital, the following sentence referring to the examination of the wound of the wrist is found:

"Small bits of metal were encountered at various levels throughout the wound, and these were, wherever they were identified and could be picked up, picked up and submitted to the pathology department for identification and examination."

The reason I believe it most unlikely that this missile could have inflicted either of these wounds is that this missile is basically intact; its jacket appears to me to be in tact, and I do not understand how it could possibly have left fragments in either of these locations.

Mr. SPECTER. What wounds did Governor Connally sustain in his chest area, based upon the records of Parkland Hospital, which you have examined, Doctor Humes?

Commander HUMES. Governor Connally received in his chest a wound of entrance just—this is again from 392—"just lateral to the right scapula close to the axilla which had passed through the lattisimus dorsi muscle, shattered approximately ten centimeters of a lateral and anterior portion of the right fifth rib, and emerged below the right nipple anterially."

These were the wounds of the chest of Governor Connally.

Mr. SPECTER. Now assuming that there were only three missiles fired, and bearing in mind the positions of President Kennedy and Governor Connally from the photograph marked Commission Exhibit 398, do you have an opinion as to the source of the missiles which inflicted the wound on President Kennedy marked 385–C to D, and the wound in Governor Connally's chest which you have just referred to?

Commander HUMES. Yes. I would preface this statement by the following: As I testified earlier in the afternoon, as much as we could ascertain from our X-rays and physical examinations, this missile struck no bony structures in traversing the body of the late President. Therefore, I believe it was moving at its exit from the President's body at only very slightly less than that velocity, so it was still traveling at great speed.

I believe in looking at Exhibit 398, which purports to be at approximately the time the President was struck, I see that Governor Connally is sitting directly in front of the late President, and suggest the possibility that this missile, having traversed the low neck of the late President, in fact traversed the chest of Governor Connally.

Mr. SPECTER. How much of the velocity, if any, or would there be an appreciable diminution of the velocity of the projectile on passing through the portions of President Kennedy's body which you have described?

Commander HUMES. I would have to defer to my associate, Colonel Finck, for an opinion about this.

Mr. SPECTER. Fine. As to any damage to the rib which you described Governor Connally sustained, would that impact or trauma be consistent with the markings which are shown on Exhibit 399?

Commander HUMES. I think it quite possible. Here I think if this point were to be explored further, a most valuable piece of evidence would be an X-ray of the chest of Governor Connally, because I believe that this missile could have struck the rib a glancing blow.

The rib is a rather rigid structure, and the missile would not have to strike it directly to cause the fracture that was described, and the fracture is not very clearly described to me, and if an X-ray, for instance, showed no metallic fragments in the chest of the Governor, I would think it quite likely that this was the missile that had traversed his chest, because I doubt if this missile would have left behind it any metallic fragments from its physical appearance at this time.

Mr. SPECTER. Could that missile have traversed Governor Connally's chest without having him know it immediately or instantaneously?

Commander HUMES. I believe so. I have heard reports, and have been told by my professional associates of any number of instances where people received penetrating wounds in various portions of the body and have only the sensation of a slight discomfort or slight slap or some other minor difficulty from such a missile wound. I am sure he would be aware that something happened to him, but that he was shot, I am not certain.

Representative FORD. Would that have been the potential reaction of the President when first hit, as shown in 385?

Commander HUMES. It could very easily be one of some type of an injury—I mean the awareness that he had been struck by a missile, I don't know, but people have been drilled through with a missile and didn't know it.

Mr. SPECTER. Dr. Humes, under your opinion which you have just given us, what effect, if any, would that have on whether this bullet, 399, could have been the one to lodge in Governor Connally's thigh?

Commander HUMES. I think that extremely unlikely. The reports, again Exhibit 392 from Parkland, tell of an entrance wound on the lower midthigh of the Governor, and X-rays taken there are described as showing metallic fragments in the bone, which apparently by this report were not removed and are still present in Governor Connally's thigh. I can't conceive of where they came from this missile.

Representative FORD. The missile identified as Exhibit 399.

Commander HUMES. 399, sir.

Mr. SPECTER. Doctor Humes, would you have an opinion as to whether the wounds on Governor Connally's wrist and thigh were caused by the same bullet?

Commander HUMES. In reading the description of the fragmentation that was found, fragments were found in the wrist, one fragment was found imbedded in his femur, I would feel it was definitely within the realm of possibility that the same missile could have produced both of those injuries.

Mr. SPECTER. Those are all my questions, Mr. Chief Justice.

The CHAIRMAN. Are there any other questions? If not, thank you very much, Commander. You have been very helpful to us, indeed.

Commander HUMES. Thank you very much, sir.

The CHAIRMAN. Thank you.

Mr. SPECTER. Commander Boswell.

Mr. MCCLOY. May I ask one more question?

The CHAIRMAN. Of course you may.

Mr. MCCLOY. Earlier in the afternoon we had taken out of cellophane bags here the clothing of the President.

Commander HUMES. Yes, sir.

Mr. MCCLOY. And amongst them was the shirt.

Commander HUMES. Yes, sir.

Mr. MCCLOY. From your examination of the wounds, of the defects, I guess you would call it in the shirt——

Commander HUMES. Yes, sir.

Mr. MCCLOY. Would you from examining the tissues of that shirt have any conclusions as to how that wound, how that missile passed through the shirt? Was it from the rear to the front, or from the front to the rear?

Commander HUMES. As I examined that exhibit today, sir, the threads are fragmented and distorted in such a fashion which would indicate to me that the missile passed through the shirt from the rear to the front.

TESTIMONY OF COMDR. J. THORNTON BOSWELL, MEDICAL CORPS, U.S. NAVY

The CHAIRMAN. Commander Boswell, will you raise your right hand and be sworn, please?

Do you solemnly swear the testimony you give before this Commission will be the truth, the whole truth, and nothing but the truth, so help you God?