

Oct. 1970

Letter #3

Paul Hoch  
Berkeley

Dear Paul:

Here I come again.

In my last letter (6 Oct 70) I said: "There is a ballistic feature which I think positively establishes that JFK was hit in the head from the front, a feature which cannot have been caused by any other means."

I hereby rescind the careless qualification "I think", for I am quite sure that this feature alone, without reference to other evidence, firmly establishes that JFK was hit from the front. I inserted that qualification because when I wrote it I was mindful of the dictum of eminent pathologists that almost anything is possible in forensic medicine. But this matter does not strictly concern forensic medicine; it concerns ballistics and nothing more, nothing except what happens to bullets in motion. In the case of the assassination, you may rightly regard it as incidental that the matter also concerns wounds, human flesh and bones, for what I have to say applies to all solid materials, whether they be soft as flesh or hard as bone, even materials that but remotely resemble the components of a human head.

In ballistics there are many things that happen with invariable regularity; conversely, there are many things that invariably fail to happen, things that cannot happen. I know that in the medical aspects of gunshot wounds there occur many things that are not predictable, some that seem impossible. But understand that what I say pertains not to medicine, with all its uncertainties, but to ballistics, with all its certainties.

The size and distribution of the tiny dust-like fragments of metal which are visible in the X-rays of JFK's head constitute the evidence in question, the ballistic feature which establishes that JFK was struck in the right-front portion of his head by a bullet delivered from a generally forward and generally rightward direction.

*Actually, this evidence (without reference to other evidence) indicates the shot originated from an area accessible to the right-front part of his head.*

Let me work this out carefully, from the beginning, with an account of my own responses to the available information. This will allow me to gather my thoughts well, so that I can lay them out in a lucid and coherent form.



2

Until the Panel Report was issued in early 1969, we knew of these fragments only through the testimonies of Humes and Kellerman, both of whom saw at least one X-ray of the head on the night of the assassination, during the course of the so-called autopsy. In their respective testimonies they describe 30 or 40 "dust-like" metallic particles (one referred to them as "tiny stars" of light on the X-ray) distributed throughout the brain. (In the head itself, there were probably many more than the 30 or 40 fragments recorded on the X-ray that Humes and Kellerman saw, a point that does not bear importantly on what I say, but perhaps should be noted.)

Even before the Panel Report was issued I felt certain that Humes's and Kellerman's description of the fragments which were visible in the X-ray did not accurately delineate the condition of the fragments in the brain itself. (Either both had lied, I thought, or had suffered a fault of memory, or saw an X-ray taken on a projection that did not properly disclose the true situation of the fragments in the brain.) For reasons which I'll explain below, it was clear that the description could not be accurate. Either the fragments were much larger than any which could reasonably be described as "dust-like", or they were concentrated near the point where the bullet struck, and not spread throughout the head. Such tiny fragments are incompatible with widespread distribution.

Since there were so many of these dust-like fragments, and since Humes failed in his efforts to find and recover even one of them in areas of the brain where, from the X-ray, he knew many were located, I reckoned that the fragments were, as described, dust-like, but that they were not distributed throughout the brain. They had to be concentrated in the area near where the bullet struck.

The next step was simple. On the basis chiefly of JFK's movements after Z312, I believed then, as I know now, that JFK was struck in the right-front part of the head. The number and size of the fragments necessarily imply that the bullet which struck him there was small in size, light in weight, unstable in construction (soft-nose or hollow point), and exceedingly fast-moving. No other situation could exist except this: the dust-like fragments were concentrated in the right-front portion of JFK's head, near the point where the bullet struck him:

*This presupposes that  
normal manufactured  
bullets were used -  
not e.g. mercury fulminate*



(I am sure that I mentioned this to Harold, although perhaps not as elaborately as here, and I believe that I described it to others.)

You can anticipate the rest. When I read the Panel Report, I was not the least surprized to learn what the X-rays viewed by the Panel disclosed: that the dust-like particles were concentrated only in the right-front portion of the head; and, what's expecially important, that there were none of these dust-like particles near the area where the hole in the back of the head is located.

How "right on"! I confess without shame that I felt very smug. I was surprized, however, that the Panel disclosed this exceedingly relevant information, for it absolutely clinches the case for a bullet delivered from the front. Well, those four Panel raskals are experts in medicine, not in ballistics; they could not be. If they knew the significance of what they saw, and were honest men, they would have revealed the significance; if they knew what they saw, and were dishonest, they would have entirely suppressed the information. They were simply ignorant of the aspect of ballistics that applies in this case.

(If you re-read the portion of the Panel Report that describes matalic fragments in the head, disregard what does not pertain specifically to the dust-like fragments, for information about the other fragments bears on a question which is essentially separate and distinct from the question of the dust-like fragments. Here I merely want you to know that I am mindful of the larger-than-dust-size fragments, and of the large fragment located near the hole in the back of the head. In order very briefly to justify this request, I point out that the Panel itself describes two separate sets of fragments which are distinct from one another both in size and in distribution: one set consists of relatively large fragments distributed randomly throughout the area where they occur; the other set consists of the dust-like fragments concentrated in the right front portion of the head. All this tells a story-- two stories, really, that are in essence separate. One does not bear importantly on the other.)

Panel, p. ?



So much for history. Now let's get down to ballistics and, in so far as my meager knowledge can be applied, to science. Throughout this exposition I urge you to bring the resources of science to bear in parts where I could apply them only deficiently. You will, I am sure, note that the phenomena which I discuss occur strictly in accordance with well-known physical principles which, regretably, I may not be able to delineate in scientific terms. I hope, in any case, that I can set forth my thoughts clearly.

It is not true that a bullet is a bullet is a bullet. There are many, many types of bullets, each of which type differs distinctly from the other types in ways that directly determine how individual bullets within those types behave-- how they pass through air, and what happens to them when they strike an object. Commonly-used center-fire rifle bullets differ widely and in many respects, such as, for example, exterior design (flat-nose, round-nose, spire-point), construction (fully jacketed hard-nose, semi-jacketed soft-nose, unjacketed lead, jacketed hollow-points), diameter (.22 to .40 caliber), weight (50 to 300 grains), muzzle velocity (2000 to 4000 feet per second), and others. An important determinant of what happens to individual bullets is their so-called on-target velocity, the velocity at which they are moving when they strike an object. Depending on these many factors and more, bullets respond in various ways to the physical forces that act upon them.

At the extremes in the scale of performance, with reference to the effect on bullets, one can predict the outcome of bullet-impact with perfect accuracy. Less accurately predictable effects occur in between the extremes, but at the extremes there is no doubt.

At the unspectacular end of the scale of performance, the bullet which strikes soft material (e.g., flesh) plows through and emerges from the ordeal unscathed, in virtually the same condition after impact as before. Bullets that perform like this are hard, heavy, and slow-moving. Ramming against steel plate, such a bullet at least becomes somewhat blunted, but otherwise it does not suffer great damage. The same applies, of course, when it strikes thick, hard bone.



At the other end of the scale, the bullet bursts into numerous tiny fragments immediately when it comes in contact with any substance, hard or soft. Bullets that perform like this are soft (Often their cores, exposed at the tip, are composed of pure lead, not a hardened lead alloy.), light, and exceedingly fast-moving. The damage which they do invariably occurs on or just below the surface of the target at the point of initial contact. They never penetrate deeply, for when such a bullet bursts it is rendered into many tiny projectiles, each of which is affected individually by inhibiting forces which resist penetration.

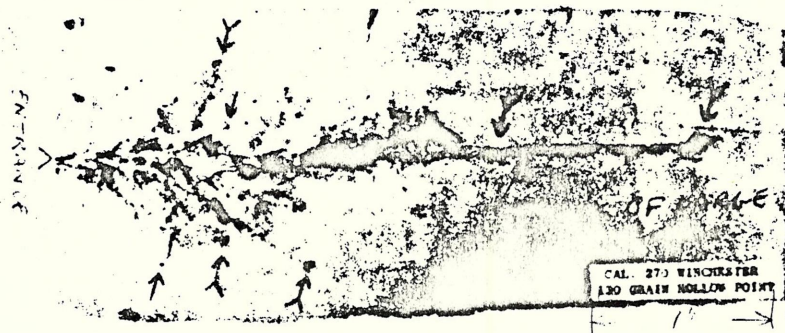
even this may be  
too large to regard  
as dust-like

Imagine the course of a single particle of lead weighing but a single grain. It begins its flight from the rifle barrel as part of a bullet, melted in with all the other potential fragments of the bullet. As part of a whole bullet, it reaches the target at a speed of, say, 3500 fps, more than enough to blow the bullet asunder. The bursting of the bullet on impact thrusts the particle apart from the many others that devolve from the burst bullet. (Would it also be momentarily melted by the heat generated by impact?) It now penetrates in accordance with the same physical factors that affected the whole bullet, but the quantitative values associated with those factors change enormously. The trajectory of the bullet as a whole began in the rifle barrel and ended on the target, when it ceased to be a bullet, and became many "bullets". The initial velocity of the now-detached particle is less than the on-target velocity of the whole bullet, for the forces inherent in the impact have already slowed the bullet. The particle is almost weightless now, only a single grain, and it is small in size. The same repressive forces which would not have been sufficient to inhibit deep penetration of the whole bullet, if it had not burst, now come to bear on that tiny particle and quickly bring it to a halt. It does not have sufficient speed to penetrate far, and, most important, it does not have sufficient weight. (And has it melted?) The repressive forces apply to all the tiny fragments individually, and they are all kept from penetrating deeply.

This, I imagine, is the reason (or part of the reason) why bursted bullets always deposit fragments of themselves near the point of initial contact. Although I am not sure of the reason why there is always but slight penetration of tiny particles, I am sure of the fact of it.



The following copy of a picture illustrates the point well. It shows the penetration of a 130-grain hollow-point bullet in .270 caliber (muzzle velocity: 3140 fps) which burst when it was fired into a soft gelatin block. This is a fairly heavy bullet which burst into both small and large fragments. The larger fragments (some of which are indicated by double arrows: ↘ ) penetrated deeply into the gelatin, whereas the smaller fragments (~~some are indi-~~ (SCATTERED) eated by single arrows: ↘ ) penetrated very slightly. NEAR ENTRANCE AND ALONG TRACK)



Scale 1" = 2 1/2" (?)

If this bullet had first struck some hard substance (e.g., masonite) before it passed into the gelatin, there would have been no large fragments, and all the particles would have come to rest near the point of entry.

The point <sup>that the picture illustrates</sup> then, is this: the smaller the fragment, the nearer the point of entry it is likely to occur. (Some tiny fragments may penetrate more deeply than others if they travel along the empty channel that opens up momentarily behind a larger fragment, but they will not go far.)

So much for that.

You know the condition of the dust-like fragments in JFK's head: 30 or 40 in number (probably many more); dust-like in size (which implies minuscule weight); and concentrated in the right-front portion of the head. Can you perceive the significance of that information? Or have I not made it clear?

Can you perceive the significance of the information that there were no dust-like fragments in the back of the head? We know from the very nature of the fragments that the bullet from which they originated "went to dust". (Believe it or not, that expression is legitimate shooters' jargon for a bullet which bursts in a manner that produces minute fragments.) Can a bullet which burst in that fashion at the back of a head cast all those many fragments into the front of the head and not leave any behind--not one? Not one, mind you, in the place where we would

Unmarked copy of picture attached here in letter to H. C. H.



reasonably expect all of them to be located? In my own experience, in the experience of other gun buffs with whom I have spoken, and after a course of considerable reading about firearms and ballistics, I know of no instance when such a phenomenon has happened in the past, nor do I anticipate that it will ever happen in the future. Moreover, common sense tells us that it cannot happen.

With all that-- with common sense and experience dictating the answer (not to mention science)-- ask now whether this is what happened: that the bullet which produced those dust-like fragments in the front of JFK's head burst at the back of his head. It most assuredly did not; it burst in the front, on the right side.

We cannot be in the least sure that the dust-like particles which were in the head at the time when it was X-rayed constitute all the remnants of the bullet that burst on JFK's head. I strongly suspect that they do not, for there are a few means by which many other fragments may have terminated elsewhere than in the head: some may have been carried away in the impact debris that was cast from JFK's head; some undoubtedly were embedded in portions of the brain that spilled from the skull in the car and on the operating table at Parkland Hospital; and the bullet may have struck the head at a sharp angle, sending parts of itself into the head, and scattering other parts elsewhere. I mention this lest you object that the existing dust-like fragments would not make up an entire bullet. They need not, and I think that in fact they do not. It is sufficient merely to know that they constitute a part of the bullet that struck JFK in the head. From them we know beyond doubt that the bullet burst very severely, and we know too that it burst in a place that was inaccessible to any bullet that might have been fired from behind. It burst on the right-front portion of the head.

By reference to authorities, by the application of scientific knowledge, and by physical testing, you have the means whereby easily to verify everything that I say here-- or, if you think that you can do it, to refute what I say. I invite you to apply any reasonable test, no matter how rigorous-- although, in light of the inadequacies of your recent test-firings, I would be pleased if you tell me the components and conditions of your tests before you fire them.

The intent would be to produce dust-like fragments, and to see where they are located in the target. Any fragmentable bullet will do -- although the heavier ones will have somewhat different results for the lighter.

The important factor is the ammo, not the target, though use of certain targets would enhance results.



I am willing, indeed eager, to submit my recent correspondence to the scrutiny of the same people to whom you sent your memo. It's fair, I think, to let them decide whether your memo exemplifies the worst kind of well-intended sculduggery imaginable, or whether I am a fool for thinking so.

I lack the means whereby to communicate with them, so if you do not think it improper, please send me a list of their names and addresses, for I would like to send them my recent three letters. Better yet, since you can send copies much faster and cheaper than I can, you copy and send them. I'll gladly sustain the cost, for it cannot be but small in comparison with the cost of letting your hypothesis go out unscathed-- like good old 399, crashing on through and making bony hamburger all the way, then coming up honey pure. (Imagine it-- the magic memo! The single-memo theory!)

*by withholding  
or editing criticism*

Since you know who are the recipients of your memo, you have the option unfairly to shield it from public assault, or to submit my comments to the judgment of those whom you trust. I presume that you trust their judgment, since otherwise you would not have sent them your memo.

I consider that your hypothesis is dead, but, regretably, not buried. I'll speak accordingly, as though I know you and you know me. You must be its undertaker; you must inter it, and issue to interested persons the information that it has found its proper resting place; most important, you must insure that grave-robbers do not seek to disinter the corpse and send it out among the living.

It is not sufficient for you merely to discard your hypothesis. It is not sufficient for you merely to repudiate it. It is not sufficient for you merely to denounce and condemn it. Your responsibility (yours alone, since it is your good repute among our mutual friends that draws serious attention to the hypothesis, your good repute that seemingly imbues it with a measure of decency that in fact it does not possess)-- your responsibility is to see to it that the memo is not used illicitly.

*This does not  
really describe  
the situation.  
Poor choice of  
words.*

That means but one thing: stop Alvarez now. Know that he is setting up a straw-man, and stop him.

*(suckling the  
doves who  
pooped the  
Warren Report*

I have not shot my load yet. If more is needed, more is forthcoming. I await your response.

Still,  
Dick

Dick Bernabei

cc. Weisberg, Roffman, Schoener