

Scientific Police Work Traced Bullets to Rifle Oswald Owned

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WASHINGTON, Sept. 27—The Warren Commission's conclusion that Lee Harvey Oswald killed President Kennedy rests in large part on scientific evidence painstakingly established through modern technology.

On the basis of the scientific evidence alone it was possible to establish that the shots were fired by a rifle owned and possessed by Oswald, that the shots were fired from the sixth-floor window of a building in which Oswald worked, and that the fatal wound could have been caused by the bullets from the high-powered rifle.

These crucial points were established through scientific detective work that combined

the techniques of handwriting, ballistics, fiber and wounds analysis. Among the devices used were microscopes, spectroscopes, X-rays, surveying instruments and skulls filled with gelatin.

Even nuclear science was employed. Paraffin casts from Oswald's hands and face were put into a nuclear reactor at the Oak Ridge (Tenn.) National Laboratory in an unsuccessful attempt to see if radiation would show up traces of gun powder. One major question left unanswered by this scientific an-

alysis was which of three shots—No. 1, No. 2, or No. 3—killed the President.

Eyewitness reports were conflicting, but the Commission concluded that three shots were fired. The conclusion was supported by the fact that three spent cartridges fired by the rifle were found on the sixth floor of the Texas School Book Depository Building.

The shot passed through President Kennedy's neck and the "most probably" passed through the chest of Texas Gov. John B. Connally Jr. A subsequent shot—the fatal one—hit the back of the President's head. Another shot probably missed the Presidential limousine and its occupants altogether. The evidence is inconclusive as to whether the missed shot was the first, second or third shot.

The first step in this scientific work was to determine

the rifle. A man-made Mannlicher-Carcano rifle, found behind a door on the sixth floor, was purchased by Oswald. This was established by handwriting experts of the Treasury Department and Federal Bureau of Investigation.

A March, 1963 order coupon to Klein's Sporting Goods Company of Chicago, signed by A. Hidell—an alias used by Oswald—was determined to be in his handwriting.

Data Tied Oswald to Rifle

The next step was to establish that the 6.5-m.m. rifle was in the possession of Oswald. The evidence was accumulated in a variety of ways, some involving microscopic analysis of fingerprints, fibers and human hairs. By itself, each piece of evidence was not conclusive, but fitted together they supported the conclusion that the rifle was in Oswald's possession at the time of the assassination.

There were no identifiable fingerprints on the rifle. The rifle's wooden stock was too rough to retain fingerprints. The metal parts had absorbed the moisture of the skin, thus making fingerprints undetectable.

But a palm print was found on the underside of the barrel, which is covered over by the wooden foregrip of the stock when the rifle is assembled. Sebastian F. Latona, supervisor of the F.B.I.'s Latent Fingerprint Section, and Arthur Mandella, fingerprint expert of the New York City Police Department, found that the palmprint was the right palmprint of Oswald.

Palm prints, like fingerprints, are the result of perspiration exuded by the sweat pores in the ridges. Oswald's palmprint apparently was protected against evaporation by the wood stock.

The palmprint demonstrated that Oswald had handled the rifle when it was disassembled, and thereby provided additional proof it had been in his possession.

Tuft of Fibers Matched

In a crevice between the butt plate of the rifle and the wooden stock, a tuft was found of several cotton fibers of dark blue, gray-black and orange-yellow shades. Paul M. Stombaugh of the F.B.I.'s Hair and Fiber Unit found that the colors, shades and twist of the fibers in the tuft matched those in the shirt Oswald was wearing at the time of his arrest.

Furthermore, the relative

freshness of the fibers was strong, evidence that they had been caught on the rifle on the morning of the assassination or during the preceding evening.

On the basis of fiber analysis it was not possible to state with scientific certainty that the fibers had come from Oswald's shirt and to exclude the possibility they had come from another identical shirt. The evidence, however, was strong enough to lead the Commission to conclude that the fibers "most probably" had come from Oswald's shirt, thus adding to its conviction that Oswald owned and handled the rifle.

The fiber analysis illustrates the high degree of scientific sophistication that has been

reached in criminal detection. Like human hair, various types of natural and artificial fibers can be distinguished under a microscope.

A major characteristic used to identify fibers is color. Under the microscope many different shades of a color—as many as 100 shades with green and blue, for example—can be differentiated.

Another identifying characteristic is the microscopic appearance of different types of fiber. Cotton, for example, resembles a twisted soda straw, and the degree of twist is an additional identifying characteristic.

Viscose, an artificial fiber, can be identified from its color and diameter. Another identifying characteristic is the size and pattern of the millions of tiny spots on the outside of the fiber, created when a delustering agent is added to cut down the luster of the fiber.

Paper Bag Examined

Scientific evidence linked the rifle and Oswald to a handmade bag of wrapping paper and tape found in the southeast corner of the sixth floor, alongside the window from which the shots were fired. It was this long, bulky bag that Oswald, according to the Commission, used to carry the rifle to Dallas from the Paine home in Irving, Tex., where the firearm had been wrapped in a blanket in the garage.

Prints of Oswald's right palm and left index finger were found on the bag. The palmprint on the bottom of the bag indicated that it contained a heavy or bulky object, and not "curtain rods" as Oswald had contended.

Fiber analysis and spectrographic examination showed that the wrapping paper and tape were identical to samples of the paper and tape taken from the Depository's shipping room on the day of the assassination.

Furthermore, detailed exam-

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ination by the F.B.I. disclosed a single brown, delustered viscose fiber and several light green cotton fibers in the bag. Under microscopic examination, the fibers corresponded to those of the blanket in which the rifle had been wrapped.

Paraffin Tests Made

Scientific analysis could not specifically prove that Oswald had fired the rifle. Shortly after his arrest, Oswald was given a paraffin test in which warm, sticky paraffin was brushed onto his hands and cheeks to pick up any nitrate remnants of gunpowder. Oswald's hands reacted positively but the test of his right cheek showed no reaction.

The paraffin test, however, is now regarded as unreliable in determining whether a person recently fired a weapon. Nitrates from other sources than the residues of gunpowder can become attached to the skin. Furthermore, in this case, the residues on the hands could have come from the revolver Oswald used in killing Patrolman J. D. Tippit.

An attempt was made to use a more conclusive recently

developed test, called neutron activation analysis, which is capable of detecting infinitesimal traces of shot residue on the hands and face of a person who has recently fired a rifle.

This new form of nuclear detection, which has provided corroborative evidence in recent criminal trials, uses neutron radiation to make radioactive certain elements in gunpowder residues, such as barium and antimony.

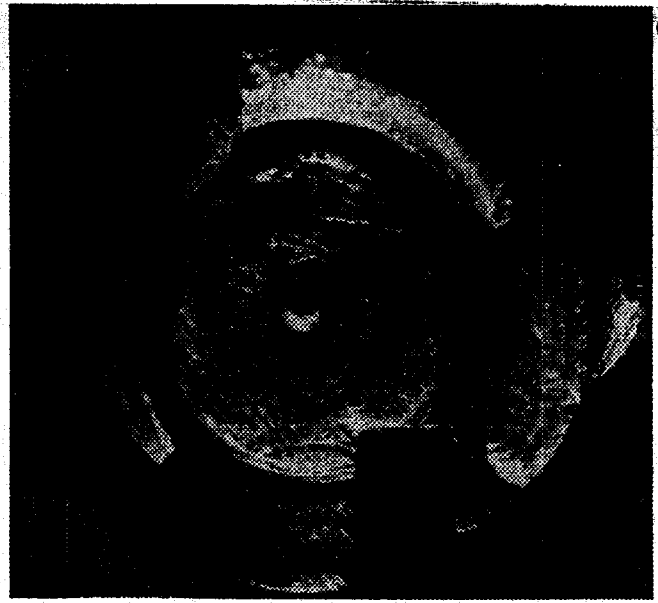
The activated elements give off identifying "fingerprints" of gamma ray radiation, thus permitting gunpowder traces as tiny as 10 billionths of a gram to be detected, identified and measured.

At the suggestion of Dr. Vincent P. Guinn of General Dynamics, who developed the nuclear crime detection technique for the Atomic Energy Commission, the paraffin casts were secretly activated in a test reactor at the Oak Ridge laboratory and examined by the neutron activation technique.

The tests, however, were inconclusive, partly, it appears, because in the handling of the paraffin casts some of the residues were transferred to the casts outer surfaces. On the chief cast, for example, about as much barium and antimony was found on the outside surface, where none should have been present, as on the inside surface.

Bullets Are Identified

Using standard firearms identification techniques, it was possible to establish that the bullets had been fired by the rifle.



From the Warren Report

EVIDENCE: This is the bolt face of the weapon that Oswald fired, a 6.5 mm. rifle. Ballistic tests established the connection between the rifle and the bullets that killed President Kennedy and wounded Governor Connally.

This identification technique relies on the fact that every individual weapon has certain distinctive markings, created during the making and use of a weapon, on its barrel, firing pin and bolt face. When a round is fired, the cartridge and the bullet are engraved with these markings.

In addition to the three cartridges on the sixth floor, two relatively large bullet fragments were found in the Presidential limousine as well as a nearly whole bullet, discovered almost by accident when a hospital engineer bumped Governor Connally's stretcher.

Analysis by four different firearms experts showed that the cartridges and the bullets could have been fired only by the rifle found on the sixth floor. It was not possible, however, to determine whether the two bullet fragments were from the same bullet.

Secret Service Re-enactment

As further proof that the shots were fired from the sixth-floor window, the assassination was re-enacted by the Secret Service at the direction of the Commission.

Using movies that had been taken by three bystanders, it was possible, through frame-by-frame analysis, to establish the location of the limousine when the President was first hit in the neck. A surveyor then determined the precise angle from the wound in the President's neck to the muzzle of the rifle in the sixth-floor window.

The angle was found to be consistent with the trajectory

of a bullet passing through the President's neck, striking Governor Connally's back and exiting through his right chest.

Through similar procedures, it was established that the President was 265.3 feet from the rifle when he was hit by the fatal bullet.

Wounds Are Simulated

The final step in this scientific analysis was establishing that the rifle and the ammunition used could have caused the observed wounds in President Kennedy and Governor Connally in view of the doubts raised by some ballistic experts.

The experiments were conducted by the Wounds Ballistic Branch at the Edgewood Arsenal in Maryland, using the assassination rifle and the same Western Ammunition. It was found that the rifle had "terrific penetrating ability," with its bullet retaining substantial velocity even after it had passed through portions of the human body.

This indicated that the same bullet could have wounded President Kennedy and Governor Connally. To establish this point, further tests were conducted simulating the neck wounds of President Kennedy and the chest wounds of Governor Connally.

The Edgewood scientists simulated the portion of the President's neck through which the bullet passed by constructing three blocks: one with a 20 per cent gelatin composition, a second from animal meat and a third from other animal meat. They were covered with mater-

ial and clipped animal skin to duplicate the human skin.

Little Velocity Lost

From these tests it was concluded that the bullet lost little of its velocity in penetrating the President's neck. In addition, they indicated that the bullet retained most of its stability.

To simulate the chest wound of Governor Connally, an animal was shot several times with the assassination rifle, with the bullets having about the same velocity as the one that came from the President's chest. One of the shots produced a wound in the animal remarkably similar to that shown in the X-rays of Governor Connally's chest.

From these tests, the ballistics wounds experts concluded that one bullet had caused all the wounds to Governor Connally and that the bullet most probably has passed first through the President's neck.

After passing through the President's neck, the bullet has concluded, began to wobble or turn on its longitudinal axis—slightly, accounting for the relatively large wound on the Governor's back. The bullet lost substantial velocity in passing through the Governor's chest. But it still retained sufficient velocity to tumble through the Governor's right wrist and slightly penetrate his left thigh.

Gelatin-Filled Skulls

To simulate the fatal wound to the President, the rifle was fired from a distance of 270 feet at skulls filled with 20 per cent gelatin solution and coated with additional gelatin to approximate the soft tissue overlying the skull.

One of the bullets hitting the skull on a point close to the estimated entry point into the President's head, blew out the right side of the skull in a manner very similar to the wounds of the President.

The results surprised Dr. Alfred G. Oliver, who supervised the experiments. Prior to the tests he had some doubt that such a stable bullet would cause a massive head wound and thought it more likely that the bullet would make small entry and exit holes.

The tests showed, however, that the bones of the skull were sufficient to deform the bullet, causing it to expend considerable energy and to blow out the side of the skull.

From the tests it was concluded that the bullet found on and under the seat of the President's car probably came from the bullet that struck the President's head.