

GENERAL SCIENCE

Warren Commission Report

The Warren Commission Report on the assassination of President John F. Kennedy indicates that modern scientific techniques for catching criminals are not always foolproof.

► A NEW WAY to fight crime, called neutron activation analysis, uses penetrating neutron radiation to help catch a criminal from only a speck of evidence.

The Warren Commission included the results of a neutron activation analysis test of Lee Harvey Oswald in their recent assassination study. The tests, however, could not prove that Lee Harvey Oswald fired the rifle.

An invisible bit of powder wiped from a suspect's hand or face will show during activation analysis not only whether he fired a gun recently, but the number of bullets fired and the type of ammunition used.

Recent advances in this new method of crime detection were reported by Dr. Vincent P. Guinn, technical director of the activation analysis program at the general atomic division, General Dynamics Corporation, San Diego, Calif. Dr. Guinn made his latest report at the Third International Conference on the Peaceful Uses of Atomic Energy at Geneva, Switzerland. Activation analysis may replace the old chemical "paraffin test" that law enforcement officials have found unreliable and which is no longer accepted in court, Dr. Guinn reported.

In the activation technique a sample of an unknown material is first irradiated (activated) by bombardment with neutrons in a nuclear reactor.

All the elements contained in the sample are converted into radioactive isotopes, each with its own established lifetime and its own identifying "fingerprint."

After the radioactive samples are removed from the reactor, an electronic counter is used to identify the "fingerprints." At the same time the jagged peaks and valleys of an oscilloscope tell graphically how much of each element is present in the sample.

In the analysis of gunshot residues, the principal elements sought are barium and antimony, deposited on the hand from the primer in the gunshot blowback. A person who has fired a rifle has traces of these elements on his face as well as the gunhand.

It may be possible to tell not only whether a person fired a gun, but also if he were wearing a gold ring at the time. If he were, the tests can show whether it was 14 or 18 carats, explained Dr. Guinn.

In crime detection the activation technique offers three major advantages over conventional microscopic and chemical testing methods:

1. The ultra-sensitivity permits identification and measurement of parts per million and in the case of some elements, parts per billion.

2. Very minute samples of evidence can be analyzed.

3. This technique will not damage the samples in most cases.

Los Angeles police, in association with General Dynamics, have used activation analysis experimentally in actual crime investigations. They have detected traces as small as ten-billionths of a gram of powder residue on the hand of a person who had fired a gun.

Activation analysis can match human hair, tiny grease spots or flakes of paint that a killer may unknowingly have carried away with him from a murder scene.

Samples of plastics, automobile tire fragments, glass and soils can be analyzed in the same way.

Since this technique will not damage samples, evidence can be preserved for admission into court. Last March marked the first time that data from neutron activation analysis was introduced in a United States court.

Using the new atomic approach, one hair or piece of hair may be sufficient to point the finger at a murderer.

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Paraffin Test Unreliable

► THE PARAFFIN TEST, used by police to find out whether or not a suspect has fired a gun recently, was called "completely unreliable" in the Warren Commission Report on the assassination of President John F. Kennedy.

Since gunpowder residues contain nitrates, the test is used to measure the presence of nitrates on the skin.

The test, which was administered to Lee Harvey Oswald during questioning by Dallas police after the assassination, has often been erratic in its findings, however.

Although tests on Oswald showed that there were traces of nitrates on the skin, experts pointed out that contact with tobacco, cosmetics, kitchen matches, fertilizers or soils, among other things, could also cause a positive reaction in the test.

The unreliability of the paraffin test was also shown in FBI tests. In an experiment before the assassination, paraffin tests were performed on 17 men who had just fired five shots with a .38-caliber revolver.

Eight of the men tested showed no traces of nitrates in both hands. Three showed traces on the idle hand and none on the firing hand. Four showed nitrate traces on both hands. Only two of the 17 tested had signs of nitrates on the gun hand and no traces on the idle hand.

In a second experiment, paraffin tests were given to 29 persons—20 of them had



JOHN FITZGERALD KENNEDY
35th President of the United States
May 29, 1917—Nov. 22, 1963

not fired a weapon. All 29 persons, however, tested positive on either or both hands.

In an experiment after the assassination, an FBI agent was given the paraffin test after firing three rounds of ammunition using Oswald's C2766 rifle. The test showed no trace of nitrates on either hand nor on the right cheek.

To perform the test, first liquid paraffin is painted on the suspect's skin. As the paraffin hardens to form a cast, its stickiness picks up any dirt or foreign material on the skin surface.

The cast is then taken off and processed with diphenylamine or diphenylbenzidine, chemicals that turn blue in the presence of nitrates. If blue dots appear on the cast, the suspect supposedly recently fired a weapon.

The problem is, however, that diphenylamine or diphenylbenzidine will react not only with nitrates from gunpowder residues, but also nitrates from many other sources. In addition, the Warren Commission Report states, the mere handling of a weapon may leave nitrates on the skin.

Also, when a person fires a revolver, nitrate-bearing gases escape through a space between the cylinder and the barrel. In a rifle, however, there is no gap between the chamber and the barrel, thus no escape for nitrates. This means that if a person fired a rifle recently, it may not show up on a paraffin test.

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