



1955

Plaintiff's Exhibit 0043: Paul Leland Kirk Affidavit

Paul L. Kirk

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**PLAINTIFF'S
EXHIBIT**
43

STATE OF OHIO)
CUYAHOGA COUNTY)

EXHIBIT "A"

IN THE COURT OF COMMON PLEAS
Criminal Branch
No. 64571

STATE OF OHIO,)

Plaintiff)

-vs-)

AFFIDAVIT OF PAUL LELAND KIRK

SAMUEL H. SHEPPARD,)

Defendant)

PAUL LELAND KIRK, of lawful age, being duly sworn, states that he resides at 1064 Creston Road, Berkeley, California; that he was graduated with the highest honors from Ohio State University in 1924 with a degree of Bachelor of Arts in Chemistry; that in 1925 he was awarded a degree of Master of Science in Chemistry by the University of Pittsburgh; that in 1927 he received a degree of Doctor of Philosophy in Biochemistry from the University of California; that he was an assistant in Chemistry at the University of Pittsburgh during 1924 and 1925; taught biochemistry at the University of California in 1926 and 1927; was Research Assistant in Biochemistry at the University of California in 1927 and 1928; Research Associate at the University of California in 1928 and 1929; Instructor in Microchemistry in the Biochemistry Division from 1929 to 1933; Assistant Professor of Biochemistry at the University of California from 1933 to 1939; Associate Professor of Biochemistry from 1939 to 1945; on leave to the Radiation Laboratory directed by Ernest O. Lawrence from 1942 to 1943. This was the first organization devoted to atomic energy research; from there he was transferred to the Metallurgical Laboratory of the University of Chicago, in 1943 to 1944, which was a branch of the Manhattan Project, concerned with the development of plutonium; Technical Specialist, Hanford Engineering Works, Richland, Washington, 1944 and 1945, in charge of Microchemical Research and Development in connection with the manufacture of the atomic bomb fuel, plutonium, (explosive) used at Nagasaki, Japan; Professor of Biochemistry and Advisor in Criminalistics from 1945 to 1948; Professor of Biochemistry and Criminalistics in the University of California from 1948 to 1954; Professor of Criminalistics, School of Criminology at the University of California from 1954 to the present time;

member of the Medical School Faculty of the University of California from 1926 to 1950; Associate Professor in Physiology, Hopkins Marine Station (Stanford University), 1935; Investigative work in Criminalistics in 1935 for the Berkely Police Department in California, and investigation for the District Attorney of Alameda County, California, who was Hon. Earl Warren, now Chief Justice of the United States Supreme Court; continual investigative work in Criminalistics for various public bodies and individuals until 1942, when the work was discontinued due to services required in the Atomic Energy Research Project; from 1945 continuous investigative work for district attorneys in Alameda and San Francisco Counties and other counties throughout the northern part of the State of California, this investigative work being principally on behalf of agencies of the State.

Affiant further states that prior to World War II he was placed in charge of the training program in Criminalistics of the University of California and wrote the curriculum; that after the War he renewed his activities in criminalistics; that he was a consultant to numerous agencies, including the State Crime Commission of California, the Army, Atomic Energy Commission, and numerous industrial concerns with investigative problems, and private individuals.

Affiant further states that he has been accepted as an expert witness in Criminalistics for various Federal and State Courts, including the Federal and State Courts of California, Federal Court of Nevada, Federal Court of Oregon, State Court of Arizona, Federal Court of Idaho, and the State Court of Louisiana.

Affiant states that Criminalistics is the application of the techniques and principles of the basic sciences, particularly chemistry and physics, to the examination and interpretation of physical evidence; that he is in charge of the Criminalistics portion of the School of Criminology of the University of California, which school is concerned with the training of police laboratory technicians, crime laboratory technicians, and the

scientific investigation of crime; that the persons entering and studying in said School come from all parts of the United States and from all over the world; that many of the State Crime Laboratories are staffed with graduates of said School, which gives a degree of Bachelor of Arts and Bachelor of Science, and Master of Criminology.

Affiant has been the author of at least 150 original papers in scientific literature and many of said papers are of Criminalistics; that he is the author of "Quantitative Ultramicroanalysis", 1950 publisher, John Wiley & Company; "Density and Refractive Index" - "Their Application to Criminal Identification", 1951, publisher, Charles C. Thomas Company; "Criminal Investigation", 1953, publisher, Interscience Publishing Company. This work has international circulation among state and governmental agencies in the United States and foreign countries, and is a guide to the use of physical evidence by persons engaged in law enforcement.

Affiant is Associate Editor for Police Science of the Journal of Criminal Law, Criminology and Police Science, which is the official publication of the International Association of Arson Investigators, the Illinois Academy of Criminology, the Society for the Advancement of Criminology; Associate Editor of Mikrochimica Acta, which is an international journal of microchemistry, published in German, English, French and Italian.

Affiant is Vice President of the Microchemical Commission of the International Union of Pure and Applied Chemistry, a member of the National Research Council Committee on Analytical Chemistry; a member of the American Chemical Society Committee on Weights and Balances, a member of the Belgian Royal Academy, the American Chemical Society, the American Association for the Advancement of Science; the American Society of Biological Chemists, and the Society for the Advancement of Criminology.

Affiant states that he came to this County (Cuyahoga County, Ohio,) at the request of William J. Corrigan, one of the attorneys for the defendant; that he arrived on January 22nd, 1955, and departed on January 26, 1955; that his purpose in coming to this County was to examine the physical evidence that was connected with the murder of Marilyn R. Sheppard; that he examined the premises at 28924 West Lake Road, city

of Bay Village, Ohio, that he was informed that the house in which Marilyn Sheppard was murdered on the morning of July 4, 1954 had not been disturbed by anyone connected with the defense; that he was to make a careful appraisal of the technical evidence involved in said murder.

Affiant further states that said attorney agreed to pay this affiant his expenses and such other necessary fees as would compensate him for the time he would devote to his examination, investigation and research, but with the specific understanding that his work in this regard was to be entirely objective and his determinations would be without bias or prejudice to the case of the State of Ohio or the defendant, and that his work was to be on no other basis. He further states that no instructions or suggestions were made to him as to what to find, or what not to find, by the attorney representing the defendant, or by any other party interested in the cause of the defendant; that his investigation, examination and research would be strictly impersonal, and that the facts would be reported exactly as he found them to be.

Affiant states that with this understanding, he made an examination and investigation of the physical and technical evidence in the case and of the premises in which the murder was committed, and thereafter performed a number of experiments in his laboratory at the University of California, testing the significance of the facts which he found established in his examination and investigation during the period from January 22nd to January 26th, 1955, and made an interpretation of said evidence.

Affiant states that in order to properly interpret the evidence disclosed by his investigation and examination, and arrive to at ultimate facts, he examined the evidence presented in the case and determined the relation of such evidence to the facts disclosed by his examination, investigation and research.

Affiance states that he examined certain physical materials of possible evidential value, as follows:

1. Premises of the defendant, Samuel H. Sheppard, 28924 West Lake Road, Bay Village, Ohio, on January 23 and 24, 1955.

2. Materials introduced as exhibits in the case of the State of Ohio vs. Samuel H. Sheppard, and held in custody of the Criminal Prosecutor of Cuyahoga County, Ohio, on January 25, 1955, in the presence of Mr. Parrino.

Items collected and removed from the premises of the defendant on January 24, 1955 follow:

a. Top cover (ticking) of the bed on which Marilyn Sheppard was murdered. This was cut with a razor blade around the outside stitched junction.

b. The bottom sheet from the adjoining bed, carrying blood spatter.

c. The yellow pillow-case from the adjoining bed, showing blood spatter.

d. A pair of nylon stockings from the wardrobe in the defendant's dressing room.

e. Debris swept from the carpeting of the murder scene, between the bed of Marilyn Sheppard and the adjoining east wall of the room. This was removed with a vacuum sweeper and special filter attachment.

f. A number of samples of carpet fibers pulled from selected regions of the carpeting in the same general area.

Additional items received at or about the same time were a set of photographs, copied from court exhibits, 16 books of transcript covering technical and some other testimony, a copy of the inquest report, a copy of the autopsy report, certain copies of written statements made by witnesses but no part of sworn testimony, and some miscellaneous papers.

On February 18, 1955 there were received by registered mail two samples of dried blood, collected from two previously identified spots on the wardrobe door of the murder room.

Examinations and Results

Detailed analysis of the blood pattern in the bedroom in which Marilyn Sheppard was murdered constituted the bulk of the analysis of physical evidence. It is in this room and only here that the story of the actual murder is written.

Evidence introduced in the trial was examined at the County Prosecutor's office. Only visual examination was possible since no alteration whatever of the materials there was allowed, and no samples were allowed to be removed. Numerous items in custody in that office should be examined thoroughly, which apparently was not done previously. These include particularly:

- a. The lower bed sheet from Marilyn Sheppard's bed
- b. Pillow slip from Marilyn Sheppard's bed

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THE MURDER SCENE

The bedroom in which the murdered body of Marilyn Sheppard was found is shown in approximate scale diagram in accompanying photograph No. 1. The diagram represents the condition at the time it was examined by the undersigned. The two twin beds and bureau, shown in the drawing are in the same position as indicated in prosecution photographs. The drawing omits the rocking chair in the northeast corner of the room, which carried no visible blood or other significant evidence, and the small telephone stand between the two beds which did not figure in testimony, or in this investigation.

Blood Distribution

By far the most significant evidence to be found was the blood distribution in the murder room. Proper interpretation of this distribution must give the reconstruction of the crime because every blow struck placed its signature in the room in blood. It is also the most significant, and possibly the only significant evidence that can be offered based on blood studies. It was virtually disregarded by the earlier investigators as determined by examination of the trial transcript.

Blood spots were present on every wall of the room, and were distributed over all of defendant's bed. The extent of blood on the floor, and on the items of furniture could not be determined at the time of this investigation, but some indication is available from testimony and exhibits of the prosecution.

Distribution on the walls. The east wall of the room, and particularly the wardrobe door and the open hall door at the south end of that wall showed blood spatters in very large numbers, as indicated in trial exhibits and in accompanying photographs. The distribution was most significant, being roughly triangular on the two doors, and discontinuing completely at the north end of the wall for a distance of nearly four feet. Nearly all spots on the wardrobe door were below the level of the door handle. On the open hall door, the spots ranged almost to the top of the door on the edge nearest the hall. The approximate limitation of blood spots on the doors is shown in photograph No. 2. The last of the blood spots north of the wardrobe doors are approximately 8 inches from the door jamb facing. A photograph of the most concentrated portions of these spots is given in No. 3. No spots were present on the north portion of the east wall for a distance of about 4 feet.

The south wall had on it a limited but considerable number of spots which were heaviest in the vicinity of the head of the bed on which the victim was found.

The west wall had almost no spots except that the window blind on that side of the room had a few small ones. This was not because many drops did not start in that direction as indicated by the very large number on the adjoining bed, but merely because of the considerable distance which allowed only a very few high velocity droplets to reach that far.

The north wall was very significant in respect to blood spots. On the west offset there were approximately 10 spots which were relatively large and retained high velocity up to the time of impact. They had been thrown 10 feet or more. A similar number was also present and scattered over the east side offset on the north wall (see Photograph No. 4 showing a

few of these). The spots in both locations showed the beading around their periphery that is characteristic of a drop impacting with a considerable velocity. On the extreme east end of the wall, past the offset, for about 2 feet there was an area containing no spots, and a continuation of the corresponding space on the east wall.

This single region in the entire periphery of the room in which no blood had travelled through the air must by necessity be the region in which the attacker stood, since it is the only place in which the blood drops have been intercepted. It is shown in the photograph of the sketch of the room, appended No. 1, and in photographs No. 5 and 6. Close to the edge of the bed and slightly overlapping it, the width of the cone would be about 2 feet which approximates the width of a man's body. It places the attacker very close to the foot of the bed on the east side. Other details of the analysis will place him more precisely.

Defendant's bed. At the time of viewing this bed, the covers had been arranged to correspond with the arrangement shown in the exhibits of the prosecution, viz. the bloody side of the pillow upward, the pillow occupying the blood-free region of the lower sheet, and the top covers turned back so that all the exposed area showed blood spotting. On the bed, chiefly on the exposed portion of the lower sheet, and the turned-back portion of the upper sheet, and on the top of the pillow, were a large number of small blood spots. On the side nearest to Marilyn's bed there was a region of larger spots, none over $\frac{1}{4}$ inch in diameter. Over the remainder of the bed the spots were much smaller, and showed by their shape that the droplets were moving at relatively high velocity and numerous drops moved in an arc approaching the horizontal. Many of them had dropped more nearly vertically, representing higher arcs of flight.

The Radiator. On top of the radiator were several blood spots. All of these had approached nearly horizontally and at high velocity. One in particular had been at so low an angle and with so high a velocity that it had "skipped" like a stone

or water, leaving a series of about 8 spots extending in a line 1 ft. $3\frac{1}{4}$ inches in length.

Point of Origin. Because of the characteristic shape of blood spots striking in different directions and at different velocities, it is possible to trace the direction of a drop through the air, and to estimate the velocity with considerable certainty. Utilizing the spots on the defendant's bed, it was noted that all those that gave elongated patterns had originated at a single center of origin which corresponded exactly with the region of Marilyn Sheppard's mattress on which the blood intensity was greatest, and which was occupied by her head at the time she was found. It can therefore be stated with certainty that her head was in essentially the same position during all of the blows from which blood was spattered on the defendant's bed. This distribution is illustrated in Photographs Nos. 7 to 11.

One further point is evident from the blood on the defendant's bed, viz. Marilyn Sheppard's head was on the sheet during most, if not all of the beating that led to the blood sports. This is shown by the presence of nearly the same intensity of blood on the lower edge of the pillow on the defendant's bed, below the seam, as above the seam. The pillow must have been in normal position, with this portion forming an actual undercut on the end surface, or there would be folded regions free of blood on the top, which do not occur. For blood to spatter to this portion of the pillow requires that the head be close to the same level as the mattress. The conclusion is further confirmed by the "skipping" drop on the top of the radiator. Since the blood travels in a trajectory which is essentially parabolic, its rate of drop due to gravity would be considerable at the distance of the radiator (about 8 feet). To give the "skipping" effect would require an angle of incidence on the radiator of less than 15° which could only occur if the origin of the trajectory were lower than the radiator top. No blood drops were present on the ceiling, nor were there any high on the walls with the exception of a few on

the hall door that were close to the top of the door.

Blood spots on the north wall, the spots that were thrown to both the east and west offsets in that wall, were examined for their trajectory and origin. They also originated at the same point as the spots on the defendant's bed, or very close to that spot.

Blood spots on the south wall (some spots illustrated in Photograph No. 12) were of more than one origin. Many of them were direct spatter from impact, and these aligned also with the position of Marilyn Sheppard's head when found. Others were thrown at a flat angle to the wall, and did not originate from impact spatter, but impinged tangentially to the arc of the weapon.

Blood spots on the east wall were exceptional in their indications. Nearly all of them contrasted sharply with other spots in the room in that they were placed by low velocity drops. Most of them impacted the wall nearly at right angles to it as is clearly demonstrated from their essentially round shape (Photograph No. 13), and the fact that the edge of the open door shows an exact pathway of one drop whose impact point is also clearly shown on the other door. Other drops in a minority, impacted at a variety of angles, and without any clear pattern, such as is shown by nearly the entire remainder of the room. (Photographs Nos. 14 and 15).

These drops with low velocity and mixed pattern of impact, predominantly horizontal, could not have originated in the same manner as the remainder of the blood in the room, and gives the clue to the entire pattern of the event.

Extensive experiments show that many, and probably nearly all of the blood drops on the east wall, were thrown there by the back swing of the weapon used, since this is the only method by which low velocity drops could have reached that wall, and it is the only way in which they would have been predominantly at right angles in impact direction. It can be stated very positively that they did not originate as impact spatter, which is the source of most of the drops that impacted other parts

of the room. The low and triangular distribution of the drops on the two doors corresponds with the swing of the weapon which started low in a left hand swing, rising through an arc, and striking the victim a sidewise angular blow rather than one brought downward vertically. The absence of blood on the ceiling at a time when blood was thrown in other directions from the weapon demonstrates that no vertical "chopping" blows were used. A swing similar to that used with a baseball bat with a left handed batter is the only one consistent with the blood spot distribution.

Cause of Distribution. It is established where the attacker stood during the murder. It is also established that Marilyn Sheppard's head, which was the source of most of the blood in the room, was down on the bed throughout most of the beating, and that its position was essentially constant during that time. It follows that any reconstruction of the crime must account for all of the blood spot distribution on the basis of the physical events that threw blood. It must also account for the location and character of the wounds insofar as they are independent of the exact nature of the weapon, which is not known.

Extensive experiments on the nature of blood thrown by different events were made (See Appendix I). It was shown that fine, high-velocity drops were formed ahead of some bloody weapons when they were used to strike an object. These were from throw-off from the rapidly moving weapon. They were also formed from a certain set of conditions as impact spatter, in front of the weapon when struck vertically, or in the direction of movement of the weapon when struck angularly. At no time were any significant numbers obtained on the opposite side of an angular blow. The predominance of such fine, high velocity drops that struck the defendant's bed, the radiator, and even the window shade at the opposite end of the room means that the blows were struck toward that end of the room, regardless of the particular origin of the fine spatter. Such blows could be struck in two ways only:

1. By a right handed person striking vertical blows, and situated slightly to the left of Marilyn Sheppard's head, i.e., toward the hall doorway. This is not possible, because the attacker did not intercept blood spots at this location; and vertical blows would have placed some blood on the ceiling.

2. By a left handed person, situated at the known position of this attacker, striking either angular or vertical blows (The latter excluded). This is completely consistent with observed facts.

It was further shown that large drops (predominantly less than $\frac{1}{4}$ inch diameter) could be formed by:

1. Impact spatter of any type of weapon. The direction of flight is determined by the shape of the weapon and its relation to the surface struck. A flat object like a hammer, striking a flat surface throws such drops in every direction. A bar throws them only to the right and left, etc. The great preponderance of the blood thrown by impact consisted of low-velocity, large drops which were thrown from a few inches up to about 2 feet from the point of impact. So much more blood constituted this local low-velocity spatter than traveled in any other way as to be striking. Some weapons produced almost nothing else. This corresponds to most of the blood in the immediate vicinity of the head, excluding the blood which simply flowed from the wounds to the bed, leaving a pool.

2. Throw-off from weapon. Large drops were regularly formed when a bloody weapon was swung through an arc, the predominant throw-off occurring at the ends of the stroke. The less energetic back stroke threw backward the largest drops at the lowest velocity. The vigorous movement of striking an object rarely threw large drops, and any drop thrown was at high velocity.

The spots on the doors in the bedroom are predominantly the size described above, most of which correspond only with back-throw of a weapon, or with local low-velocity spatter. The latter is ruled out completely by the distance between the location of the victim's head and the door (about 7 feet). The distance from the weapon to the door on the back-throw is only about $1\frac{1}{2}$ feet which allows low velocity throw-off to travel readily to the door.

High velocity relatively large drops could be formed in one of two ways:

1. Impact spatter from a very low angle or from a very flat impact by the weapon. These were always ahead of the direction of movement if the surfaces did not meet flat (e.g., hammer head on flat block).

2. Throw-off in a violent movement of a bloody instrument. This is difficult to produce because most of the blood is removed in the backthrow, and the necessary velocity of movement is difficult to get on any but a forward throw. In attempting to get these spots, usually the large drops leave at low velocity on the back-throw, and small, high velocity ones are only formed on the forward. Blood spots, relatively large (about 1/8 inch diameter) on the north wall offsets correspond to high velocity impact spatter from a left handed blow. Both their direction and distribution are different than could be obtained by a right handed throw-off spatter by a right handed blow.

Very large spots (greater than 1/2 inch diameter) were not obtained by weapon throw-off, even from a weapon dipped in blood and swung while still dripping, though a scoop shaped weapon might collect and hold enough blood if properly applied. Such spots were never accumulated from impact spatter at greater than about 1 foot from the point of impact.

The only method by which such very large spots could be placed was to take blood into the cupped hand and toss it at low velocity. In no case was it possible to obtain a very large spot from higher velocity blood because the larger volume broke up into smaller drops. The requirements for obtaining very large spots are:

1. Accumulation of relatively large volume - greater than will adhere to a surface, however irregular; and
2. Movement which imparts only a low velocity, and delivered very near to the surface impacted by the blood. No large volume of blood can be thrown far, because higher velocities break up the drops, and a low velocity blood volume does not travel far. One or two feet is about as far as it can be kept intact and delivered.

One very large blood spot was present on the wardrobe door. (Photograph 14, 16). It measured about 1 inch in diameter at its largest dimension. It was essentially round, showed no beading, and had impinged almost exactly perpendicular to the door, i.e.

horizontally and at right angles to the door. This spot could not have come from impact spatter. It is highly improbable that it could have been thrown off a weapon, since so much blood would not have adhered during the back swing for so long a distance, and then separated suddenly at just the right moment to deposit as it did. This spot requires an explanation different from the majority of the spots on the doors. It almost certainly came from a bleeding hand, and most probably occurred at a time different from the time that hand was wielding a weapon. The bleeding hand could only have belonged to the attacker. The origin of the injury is dealt with elsewhere, as is supplementary confirmation of the different origin of this spot. It should be noted that this spot is probably not unique in origin, and other spots on the east wall and possibly elsewhere may have had the same origin, but this spot was unique in size and appearance and was consequently selected for more extensive study.

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BLOOD GROUPS AND INDIVIDUALITY

No serious question can be raised that the origin of most of the blood in the murder room came from the victim. This assumption was evidently made by the prosecution investigators who did little or nothing toward analysis of blood in that room, assuming that all of it was from the victim. It was established by them that the victim was of universal group O, and carried the M factor. It should be noted that nearly half the population is of group O, about 40 - 45%, and that a large majority, about 80%, carry the M factor. At no time was the group of Dr. Sam Sheppard determined or mentioned as determined during the trial. His group was determined as to A and B factors in this investigation. It was found that Dr. Sam is group A, probably A₂. The subgroup is inferred only from the weakness of the reaction when inhibition of agglutination by dried blood extract was used in the grouping. Only dry blood could be studied under the available circumstances.

Blood removed from the mattress, unquestionably the blood of the victim, was grouped and found to be devoid of A and B factors.

The same results were found with a second rather large spot (½ inch diameter) (Photograph No. 14 and 14A.) from the same door panel as the very large spot discussed above. [REDACTED]


Grouping of the large spot was performed simultaneously with the same sera and cells and in identical manner. [REDACTED]

this blood was also O group, [REDACTED]

It may be of interest that blood on both watches was stated to contain M factor but was never assigned a universal group in the prosecution testimony. This would be entirely understandable if the blood on those items was from the same source as the large spot on the wardrobe door. Since A and B factors are ordinarily more readily determined in dry blood than is the M factor, the testimony is inexplicable otherwise.

The Weapon

Some indications of the nature of the weapon are available from consideration of the details of the crime, as well as from the nature of the wounds. When a person is struck in the region



of the face, they automatically and instinctively lower and turn the head away from the blow as a protection for the face and especially the eyes. Further, they automatically and instinctively raise the hands in a protective gesture to shield the face, and they may grab other objects in the vicinity that may add to the shielding. The evidence is completely clear that the victim's hands were employed in this manner, resulting in severe injury to them. It is because of this fact that a straight type of weapon like a bar is most improbable, since the injuries to the victim's forehead are parallel to the axis of the head which would require that she face the attacker directly and without defensive reflex action - a virtual impossibility.

This fact, and the nature of the wounds, indicates that the actual edge that cut through the scalp was at approximately right angles to the axis of the weapon. If the victim's head were turned to her right, essentially as she was found, and assuming this type of injuring edge, nearly every one of the injuries visible in the photographs of the autopsy photographer can be accounted for on the basis of left hand blows. They cannot, on the basis of right hand blows, though some of them are consistent with right handed blows only if her head were turned sharply to her left. The latter idea is inconsistent both with her final position, and with some of the injuries, notably those on the right of her head.

The weapon was short, as shown by the reconstruction diagram (Photograph No. 18). Having fixed the position of the attacker and knowing the position of the victim's head, the length of arc is exactly what would be true of a man's arm wielding a weapon less than one foot in length, i.e., about 36 inches. Naturally, the torso and arm lengths influence weapon length calculation, because the distance that can be established is the sum of the arm and weapon length. Even with a short arm, the length of 1 foot covers the available and necessary distance.

This investigator did not view the wounds themselves, and the photographs of them are possibly misleading. It is still clear that the injuring edge of the weapon was more or less angular, or possibly rounded with a small radius. This is necessary to produce the injuries as described in testimony, which are not sharply cut, but were parted through to the bone, and beyond. A small bar type instrument could have produced this effect, but only if bent at a sharp angle from its axis. The necessary narrowness of such an instrument argues against it having enough weight to shatter the skull and separate the individual bones at the sutures.

A larger cylindrical instrument like a piece of pipe flared on the end is more reasonable, and consistent with the type of injury and the reconstruction of its mode of application.

If the weapon was carried into the room to be used as it eventually was used, a wide variety of possibilities exist. If it was acquired at the time it was needed, it would have to have been present in the bed room prior to the murder which is improbable. A third possibility exists, viz. that it was an object carried for another purpose, but serving as a murder weapon when needed. Such an item is a heavy flashlight, several designs of which fill nearly all of the necessary specifications. The most serious argument against this possibility is the (presumed) absence from the room of glass which would be likely to have broken. A plastic lens might answer this objection. There still remains a puncture type wound on the right side of the victim's head which is difficult to explain unless the rim had collapsed so as to form a sharp angle which could puncture.

With the available limited information, it is not possible to infer an exact weapon, but certain of its characteristics are quite definite and can be safely assumed.

/s/ PAUL I. KIRK

SWORN TO before me and subscribed in my presence, this
26th day of April, 1955

/s/ WILLIAM J. CORRIGAN
Notary Public