

# THE TECHNICIAN

## IN THE POLICE LABORATORY

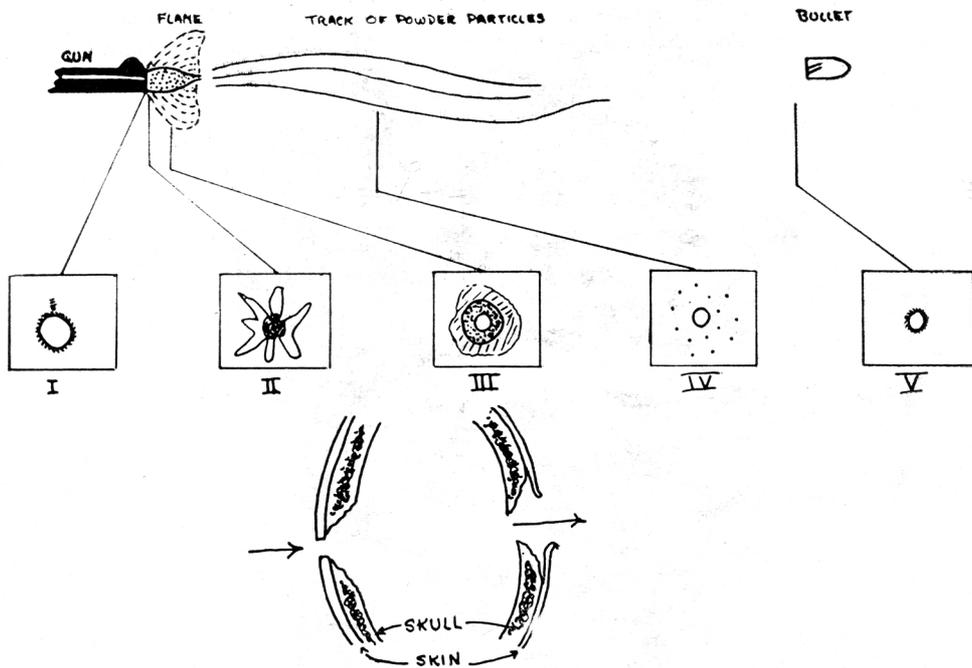


Figure I

A diagrammatic representation of the five zones of gunshot entrance wounds. The lower diagram depicts the beveling of bone in an entrance and exit wound.

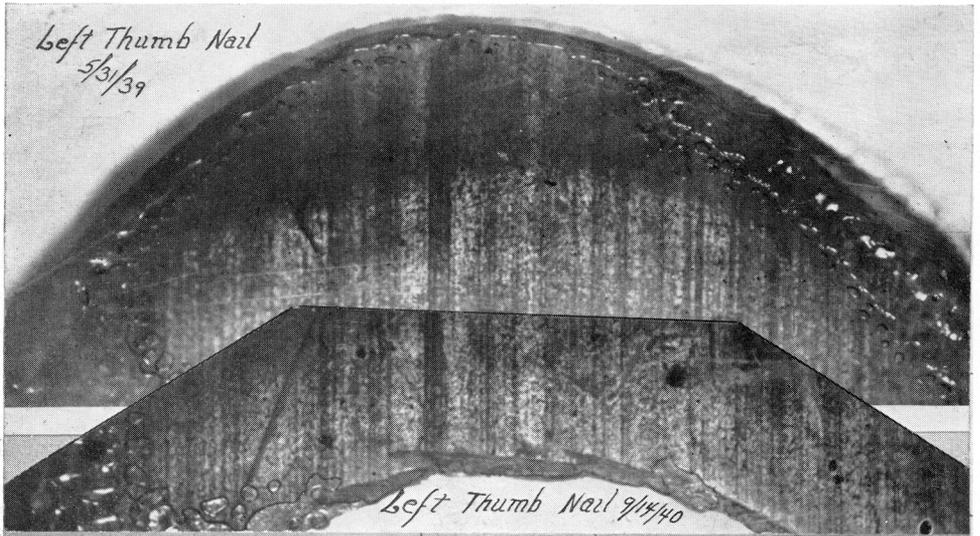


Figure II  
0.32 ACP Zone I Entrance Wound. Suicide

A scientific publication, issued monthly by the Laboratory of the Missouri State Highway Patrol, through the interest and cooperation of police laboratory technicians throughout the country. THE TECHNICIAN is a non-profit, and non-copyrighted bulletin, edited by the personnel of the M.S.H.P. Laboratory.

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This month's cover photograph accompanies the article submitted by Joseph K. Beeman, M.D. Director of the Oregon State Police Laboratory. It is a diagrammatic representation of the different types of bullet wounds, described in the article.

Other illustrations presented in this issue (with the exception of the inside front cover illustration of a finger-nail clipping) also accompany Dr. Beeman's article.

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Responsibility for all statements made in material published in this bulletin rests with the author of the particular contribution; neither that material nor the editorial comments appearing herein are to be considered as necessarily reflecting the views or opinions of the Missouri State Highway Patrol, nor the Laboratory of that Department.

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THE TECHNICIAN will be sent free of charge to individuals or departments upon request. Address all correspondence to THE TECHNICIAN, Missouri State Highway Patrol, Jefferson City, Missouri.

THE TECHNICIAN

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CONTENTS

|   | Page |
|---|------|
| The Technician. . . . .                               | 3    |
| the Editor.   |      |
| Gunshot Wounds. . . . .                               | 7    |
| by Joseph K. Beeman, M.D.                             |      |
| Technical Note. . . . .                               | 12   |
| (1) Re. Firearms Examinations.                        |      |
| The Identification of a Thumb-Nail Clipping . . . . . | 13   |
| by John E. Davis, Laboratory Technician, M.S.H.P.     |      |
| Activities Section. . . . .                           | 17   |
| Chemical Microscopy Section . . . . .                 | 19   |
| Letters From Our Readers. . . . .                     | 22   |

## THE TECHNICIAN

It has occurred to us that possibly our readers would be interested in knowing something of THE TECHNICIAN from the standpoint of its organization and publication. Although the objects and aims of the bulletin have been presented in one form or another with almost every issue, we have not made specific comment on the "How and Why" of it. Further, sufficient copies of the first issue of the publication were not available to fill all of the requests for it -- consequently some of our readers did not have opportunity to consider the introductory comments presented in that issue. Accordingly we present here a short review of the "history" of this publication.

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In January of this year, at the request of the Superintendent of the Missouri State Highway Patrol, Dr. Richard C. Steinmetz, Chief Investigator with the Mill Mutual Fire Prevention Bureau, of Chicago, accepted an invitation to lecture at the Highway Patrol training school. While visiting General Headquarters, and the Laboratory of this Department, Dr. Steinmetz opened a discussion on the advisability of a greater cooperation between men employed in police laboratories generally, and expressed the thought that this cooperation could be effected by a publication such as we now have in THE TECHNICIAN. The suggestion was well received by this laboratory for various reasons. In the first place, we in the laboratory had also felt the need for a freer exchange of information, opinions, and ideas among men in the field. It seemed to us that workers in these various laboratories were all more or less isolated from each other, and were not taking advantage of the opportunities offered by such an exchange of views. Secondly, the laboratory, being centrally located, well established and equipped was in a position to initiate the procedure. Further, we desired to maintain a progressive attitude such as would be reflected in a bul-

letin of this sort, and to interest others, insofar as was possible, in the formation of a society which would facilitate a closer cooperation between the different laboratories.

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During the next few months, the idea was given a more careful consideration, and a complete report finally written up as to what the publication should embrace, how it should be handled, what its object and aims should be, and how we proposed to establish it as an acceptable police laboratory bulletin.

This report was then submitted to the Superintendent of the Patrol, for his approval. Realizing the need for such a publication, and the advantages associated with it, permission was granted the laboratory to go ahead with the plan outlined.

Already two or three outside laboratories had been contacted in regard to the idea, and material obtained for publication. The cover design had already been laid out and some investigation made as to what printing facilities were available. All "rules and regulations" of the publication were being held more or less tentative, pending the response from other laboratories. However, a subscription fee was definitely set at \$2.00 per year. The publication was to have been non-profit, but self supporting. Naturally we had no idea of just how many subscription fees would be received, nor how much interest would be shown in it; it was felt that this fee was the minimum upon which we could operate. Investigation of printing costs indicated immediately that a regular press-printing could not be used. Costs for each issue would have run as high as a hundred dollars per issue, and considering the relatively small field in which the publication would circulate, it was obvious that other methods would have to be resorted to. Even "multilith" printing exceeded thirty-five dollars per issue, would have to be done by an out-

side agency, and it was not definite that costs could be handled. Accordingly, mimeograph was finally resorted to as the most economical procedure possible, and the first issue was soon completed.

Copies of that issue were sent to many colleges and universities, to every state police agency, to the police departments of all major cities in the United States, as well as to a number of individuals whom we thought might be interested. Altogether, around 275 copies were mailed out. It was not long before letters and subscription fees began coming in. The reaction to it, as expressed in these letters was most encouraging. However, as in many new ventures, it was apparent that fees received were not covering costs of publication, handling, and mailing. If the bulletin were to be continued, another source of revenue was necessary. Commercial advertising was the logical answer. Considering the fact that the booklet was being published by a state department, however, this was not permissible. By accepting advertising space, it might have been construed that the department was competing with private enterprise in that field. Here, then, was the first serious obstacle which we had encountered. We lacked a reserve operating fund, and were without financial backing for all but the first issue. We had been aware, of course, that such a reserve fund is an "essential" in the initiation of any sort of business plan. Without it, we ran the risk of loss, yet we felt that the effort was worth that risk. We continued to receive subscription fees and favorable comments on the publication until it was obvious that the plan should not be dropped, if at all avoidable.

A second time the Superintendent of the Patrol was consulted, and the problem of continued publication presented to him. Again he realized the importance of our continuing with the plans as outlined, and made arrangements whereby the publication might be issued without charge to the readers. Without doubt, the many favorable comments we had received in regard to THE TECHNICIAN played an important part in that decision, and so the coopera-

tion of other police laboratory workers was first tangibly realized. Subscription fees which had been received were returned with an expression of thanks and appreciation for the support offered; the publication was continued, without substantial change in policy.

It was particularly interesting to note the attitude of other publications toward THE TECHNICIAN. Editorial comments on it were presented in a number of bulletins and journals in this field. A number of them wrote to express congratulations on our efforts, and some gave permission to reprint articles from their publications. All in all, the reaction and attitude shown was excellent, and gratifying to those of us whose efforts had brought forth this publication.

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THE TECHNICIAN has, from the beginning, been a laboratory publication, prepared by police laboratory workers. We intend that it shall remain so. Yet it pleases us to observe that the publication has been well received by many persons not actually engaged in the technical laboratory phase of police work. Detectives, patrolmen, fingerprint and identification men, photographers, doctors, army authorities, a number of libraries, and others have requested that they be placed on our mailing list, and have indicated that they have found the material presented in an interesting and attractive manner.

With this issue we complete the first six months of publication. Over 225 copies of this October TECHNICIAN will be sent out. We hope that the publication will continue to serve the interests of our readers, and that it will find a definite place in their libraries.

THE EDITOR

## GUNSHOT WOUNDS

By Joseph K. Beeman, M.D.\*

The following discussion of wounds produced by projectiles is confined to those caused by weapons of the revolver or semi-automatic pistol types. No claim for originality is made for any of the subleading sections; the excellent articles of Martland (1), Moritz (2), and Walker (3) will be of interest.

When a cartridge is fired, force explodes the primer which in turn ignites the powder charge. Expansion of the burning powder gases propels the bullet through the barrel of the firearm. As the gases leave the muzzle of the gun, a central zone of hot flame forms (Figure I) surrounded by a peripheral zone of cooler flame. Powder debris, consisting of unburned powder, powder ash, primer constituents, barrel fouling, and metallic fragments and vapors may be impressed on the target at varying distances from the muzzle. This debris may be demonstrable by visual, photographic, chemical or radiographic methods. The alterations produced on the target by the gaseous and particulate material discharged from the muzzle of the gun form the basis of determining roughly the distance at which a firearm was held from the target at the time of firing. Cleansing of the body or profuse hemorrhage may obliterate traces of value. Such traces may be present on the clothing but absent on the body.

In a rifled barrel, axial rotation of the bullet is accomplished in the passage of the bullet through the barrel. Shortly after leaving the muzzle of the gun the base of the bullet gyrates about the axis of flight; this gyration is at a minimum at the region of maximum velocity, and again increases as the bullet slows down. Such "keyholing" of a bullet may produce atypical wounds, and is more marked where a poor fit exists between the bullet and barrel. In high powered projectiles, this "keyholing" may

produce explosive entrance wounds. As the bullet loses velocity in the body, "keyholing" may occur with explosive internal injuries.

In conducting an examination of a body injured by gunshot wounds, it is necessary to carefully remove the clothing. If soiled, air drying will diminish putrefactive changes. The body should not be cleansed or embalmed. In the living patient, surgical cleansing of the wound may destroy material of interest. The bullet wounds in the body should be photographed and measured accurately in relation to the three axes of the body. If desirable, wounds may be removed in toto and preserved by refrigeration. The course of each bullet in the body should be determined, with a recording of the tissues penetrated, and the injury to each. Probing of a bullet tract is noninformatory and may be destructive. Bullets may be deflected in every conceivable direction, may drop into any of the body cavities including blood vessels, or may disintegrate. Bone fragments or bullet disintegration may cause multiple wounds from one missile. The tract of the bullet is usually surrounded by a zone of hemorrhage, and is best followed by serial sectioning of the organs while they occupy their normal positions. A wise precaution consists in placing a gauze screen over any drains from the necropsy table to catch inadvertently dropped bullets. If the bullet cannot be located by dissection, radiography will be useful. Bullets located in the body should not be handled with sharp instruments, but rather with the fingertips. The removed bullets should be marked on their base and a record kept of their disposition. Such bullets should be separately wrapped in a soft material, such as cotton or cloth. It may occasionally be difficult to determine whether a puncture wound is caused by a bullet; here recourse to analysis of the tissue edges may be illuminating.

It is important to differentiate entrance wounds from exit wounds. Atypical wounds simulating a tear may occur. (THE FOLLOWING CLASSIFICATION OF ENTRANCE WOUNDS IS USED IN THIS LABORATORY.)

ENTRANCE WOUND ZONE I: FIG II.

The gun is pressed tightly against the skin. The wound is inverted, usually circular and may have a collar of bruising about it due to pressure by the muzzle against the skin. No burning of the skin or powder debris deposition is seen externally, but upon dissection, a large "rat hole" wound is present internally, and here, powder debris is easily identified. The inner table of the skull is bevelled (Fig. I), as in all entrance wounds. Quite often, the bullet will not emerge from the skull in this type of wound.

ENTRANCE WOUND ZONE II: FIG III.

The gun is pressed loosely against the skin, or the hand firing the gun flinches at the moment of firing. This wound is stellate, with ragged torn everted edges, and superficially resembles an exit wound. Powder debris is identified in the tract of the wound, or between the skin and underlying structures. The inner table of the skull is bevelled.

ENTRANCE WOUND ZONE III: FIG IV.

The gun is held far enough away from the target to cause burning of the skin around the inverted entrance hole. Surrounding the zone of burning is a peripheral zone of smudging with singed hairs. Powder granules may be impressed in the skin adjacent to the wound. The position of the burned area may be elliptical, indicating the horizontal axis of the firearm.

ENTRANCE WOUND ZONE IV: FIG V.

The gun is held far enough away so that burning does not take place. The wound is inverted, without burning of the tissues, and is surrounded by a peripheral scattering of powder granules and debris.

ENTRANCE WOUND ZONE V: FIG VI.

The gun is held far enough away so that powder debris is not present on the target. The wound is inverted, and may sometimes have a small collar of bruising, on its immediate edges. No powder debris is identified in the depths of the wound (distinction from Zone I wound). Contrary to other expressed opinions, we have never seen an entrance wound of other zone types in which powder debris was not identifiable upon appropriate examination.

We do not feel competent to state the caliber of the firearm producing the entrance wound from an examination of the wound alone, as we have too often been chagrined to remove a 0.22 bullet from a wound we had confidently predicted would be of 0.38 caliber source. We do not attempt to accurately estimate the distance from the muzzle of the gun to the target; rather we place such distances into rough groups: the presence of variables in this type of examinations, even using the same weapon and supposedly identical ammunition has recommended conservatism in such statements.

Exit wounds have everted edges, no powder debris about them (except where the bullet course is very short), and the other table of bone is bevelled. (Distinctions from Zone II wounds). The exit wound is usually larger than the entrance, and may range from a clean everted wound (Figure VII) to an explosive wound (Figure VIII).

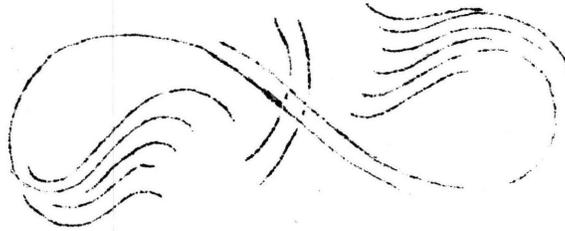
Categorical statements as to the ability of the deceased to have performed certain acts after being wounded should be treated cautiously. We have seen several instances where, by all medical standards, death should have been relatively instantaneous, but the deceased performed volitional acts, as for example, a man whose heart was torn out by a shotgun blast, ran several hundred feet and barricaded himself.

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- (1) Martland, Harrison S. : The Medicolegal Necropsy.  
Williams and Wilkins Com-  
pany, Baltimore, 1934, page  
66.
- (2) Moritz, A. R. : The Pathology of Trauma.  
Lee and Febiger, Philadel-  
phia, 1942, page 43.
- (3) Walker, J. T. : American Journal Police  
Science.  
31, 497, Nov.-Dec., 1942.

\* Joseph K. Beeman, Director of the Crime Detection Lab-  
oratory, Department of State Police, University of  
Oregon Medical School, Portland, Oregon.

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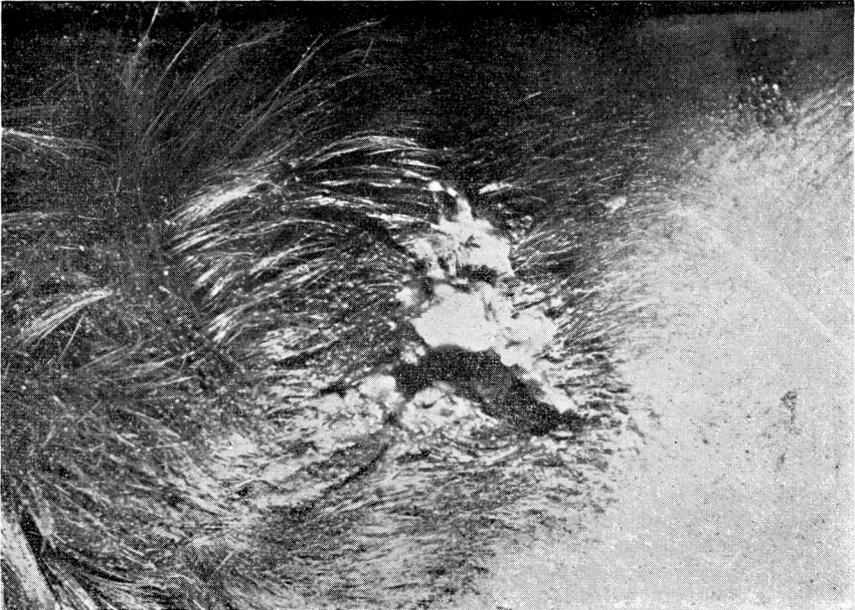


Figure III  
0.45 Zone II Entrance Wound. Homicide

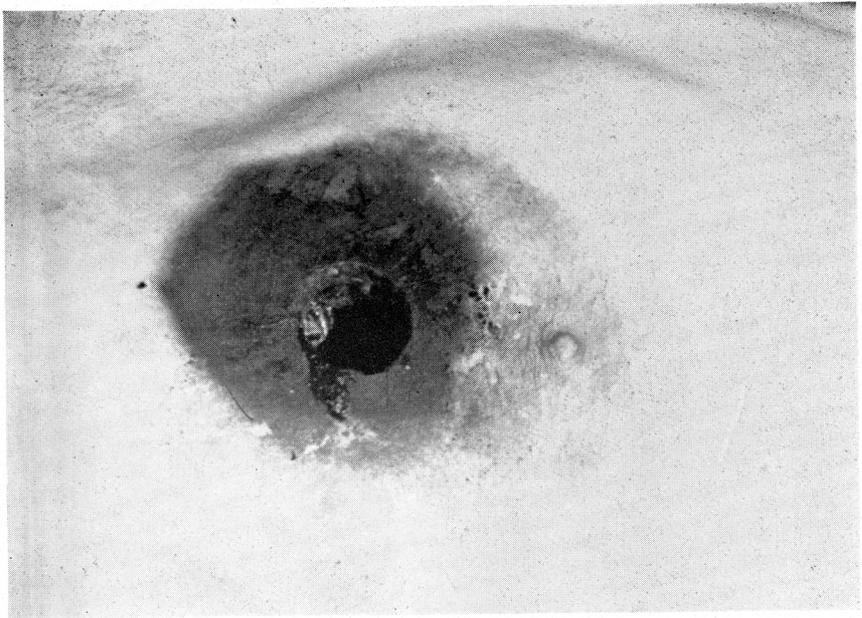


Figure IV  
0.410 Shotgun Zone III Entrance Wound. Homicide.

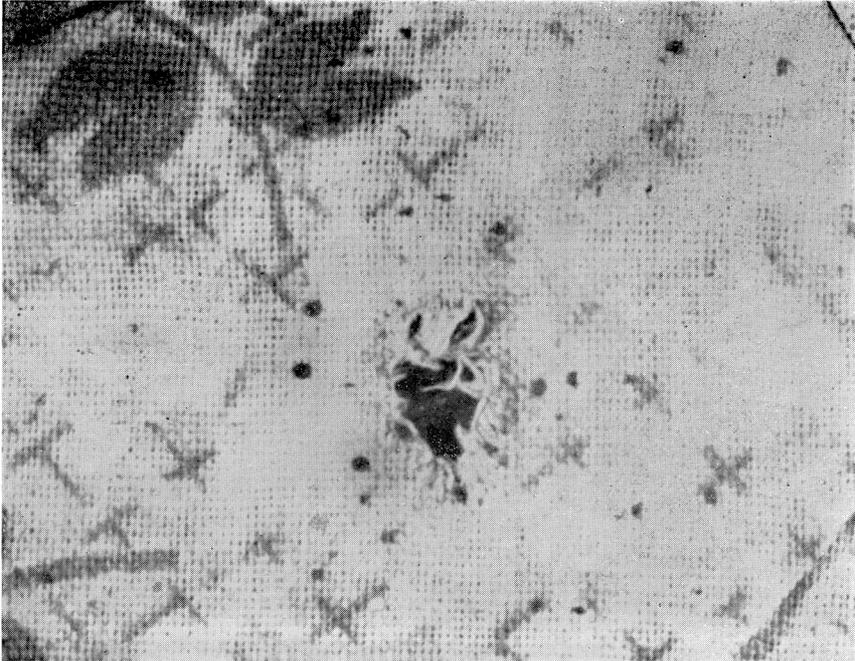


Figure V  
0.32 ACP Zone IV Entrance Wound on Dress Fabric. Homicide.



Figure VI  
Multiple 0.22 Zone V Entrance Wounds. Homicide.

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\* TECHNICAL NOTE \*  
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\* In examining the breech facing of various automat- \*  
\* ic pistols, and revolvers, we have noted that there is \*  
\* frequently left there an "impression" of the last cart- \*  
\* ridge fired in the gun. This imprint may be seen as an \*  
\* image of the cartridge head, reproduced in the oil film \*  
\* over the metal of the breech block. Such an impression \*  
\* depends on the presence of an oil or grease film for \*  
\* its existence, and is easily wiped off. An examination \*  
\* of that region of an arm might well be made when it is \*  
\* received into the laboratory for firearms tests. The \*  
\* quality of the image is often good enough to permit an \*  
\* identification of the make of the cartridge involved. \*  
\*  
\*  
\*  
\* E.I.H. \*  
\* MSHP \*  
\*  
\* \* \* \* \*

THE IDENTIFICATION OF A THUMB-NAIL CLIPPING

By John E. Davis <sup>17</sup>

Technician with the Laboratory of the Missouri <sup>46</sup>  
State Highway Patrol

There are many factors and characteristics which have been advocated as satisfactory for use in "personal identification" procedures. Of those, of course, fingerprint impressions has been, and shall probably remain, the most effective single characteristic in this class. The other factors, generally speaking, while valuable as identification characteristics, do not lend themselves so well to utilization under various circumstances as do fingerprints. However, each does have its place and importance, and may provide the criminal investigator with a means of identification which would not otherwise be possible.

The writer, a few years ago, became interested in the possibility of identifying finger-nail clippings. It is common knowledge that fingernails are marked by the presence of ridges which extend from the base to the tip, and which are generally quite continuous along the surface of the nail. It was on the basis of this character that an identification was considered to be a likely probability. In contrast to the frequent reference in the literature to other methods of personal identification -- fingerprints; poroscopy; retinoscopy; portrait parle, and the various specific characteristics under that system -- little or no mention has been made of fingernail identification. It is true that the practical value, from the utilitarian standpoint, of an identification peculiarity of this sort, is relatively small. However, there are instances in which it might be of importance to know whether it would be possible to effect an identification on such evidence, and the length of time which could pass before an identification would no longer be possible.

With this in mind, the author, on May 31, 1939, cut and preserved fingernail clippings from each hand. Those from the right and left hands were kept separately, and later mounted on a microscope slide, under cellulose scotch tape. A second similar set was taken on September 14, 1940. Thus, between the two sets of clippings there had elapsed almost sixteen months time.

These nails were only recently compared, and it was found that there existed a marked similarity between corresponding nails collected on the two different dates. Some of the nails were not prominently marked with ridges, and it was not considered likely that a positive identification would be possible.

The thumb-nails, being larger and rather prominently marked, were more easily lighted for observation and comparison purposes. Accordingly, these were selected for purposes of the experiment. The nails, as mentioned above, had already been mounted on glass slides, under transparent tape. By using an oblique light source, and observing the image on the ground-glass of a reflex camera it was possible to emphasize the ridges and grooves on the nail surfaces. Oddly enough, it was found that an oblique light in which the rays were directed with the ridges was more effective than one in which the light was directed across them. (This may have been due to the layer of scotch tape through which the light had to pass.) Each nail was placed separately under the lens (10 cm. "Milar") carefully lighted, and photographed on a  $3\frac{1}{2} \times 4\frac{1}{4}$  plate.

Prints were then made from these negatives, and the lines in each compared. It was found that a different degree of enlargement was necessary between the two in order to compensate for varying degrees of "curl" in the two nails. When properly enlarged, however, comparison showed a definite similarity in the contour of the specimens. A number of the finer lines did not match, but that was to be expected. Some of the larger ridges were slightly different in width and prominence, but on the whole,

the contour was sufficiently consistent in both to indicate an identity. Considering the time which had passed between the collection of the two specimens, that similarity was interesting to say the least.

On the inside front cover of this issue is presented a reproduction\* of the "match" which was obtained in this comparison. The (largest) diameter of the nails represents approximately three-eighths of an inch on the original clippings.

The practical value of this determination is not great. In the first place, much more work would have to be done on the problem before any very definite conclusions could be drawn as to the value of the procedure. Determinations as to the consistency in the ridges on the nails of a number of different persons; demonstration of the possibility of finding a similarity between two non-identical nails; determinations as to the relationship between the prominence of the ridges and the length of time over which an identification could be effected, etc. Secondly, the types of cases in which such an identification would be possible are few and indefinite. It would be rare that fingernail clippings would be found at the scene of an offense. However, it is possible that evidence of this sort might be found at an abandoned hideout of a yet, unidentified offender, or at the scene of almost any type of offense as a result of an accident. The broken nail of a victim of an attack might be found in the clothing of the offender, and vice versa. In any event, the evidence would be of definite identification value. Generally speaking, suspects in such a case would be picked up within six months time if at all. Under these circumstances, the likelihood that an identification could be effected, would be much greater than it was in this particular experimental comparison.

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\* In examining photographic reproductions of this type,

if the illustrations do not always seem to bear out the contentions of the author, the reader should remember that detail present in the original print, is sometimes lost in the reproduction. In a publication such as this, in which so limited a number of copies are printed, photographic cuts hardly have time to become "broken in" to the printing before the press is stopped.

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\* TECHNICAL NOTE \* \* \* \* \*

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\* Laboratory instruments such as microscopes, re- \*  
\* gardless of how clean the laboratory may be kept, are \*  
\* likely to collect dust and other foreign material which \*  
\* settles onto moving parts. This material, plus con- \*  
\* stant friction of those moving parts results in the \*  
\* formation of a gummy deposit which should be cleaned \*  
\* off from time to time. \* \* \* \* \*

\* By removing the body tube, and the condenser, the \*  
\* sliding surfaces are exposed and easily cleaned. We \*  
\* have found that Hoppe's No. 9, nitro solvent serves an \*  
\* excellent cleaner for these parts, is easily applied \*  
\* with a cotton swab or small brush, and has no apparent \*  
\* effect on the black "enamel" finish on the instruments. \*  
\* It would probably dissolve the finish off of lacquered- \*  
\* brass instruments and should be tested in that respect \*  
\* before being used. After cleansing, a small amount of \*  
\* white vaseline may be placed on the metal surface to \*  
\* serve as a lubricant. \* \* \* \* \*

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\* J.E.D. \* \* \* \* \*

\* MSHP \* \* \* \* \*

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## ACTIVITIES

This section is devoted to a presentation of informal comment on the activities of various laboratories and their personnel. Information on the educational work which may be carried on by such laboratories, including schools, lectures, talks, writings, or anything else which would be of interest to other laboratories, and which might encourage an increased activity on their part would be appreciated.

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The Crime Detection Laboratory of the Oregon State Police, under the direction of Joseph K. Beeman, M.D., has recently issued, for the benefit of the uniformed members of that department, a mimeographed manual outlining the functions and available services of that Laboratory. Subject matter of the pamphlet includes comment on:

- The Preservation and Transmission of Evidence.
- Autopsies.
- Toxicological Examinations and Blood-Alcohol Determinations.
- Photography.
- Maps and Diagrams.
- Casts and Moulage Impressions.
- Examinations of Biological Materials.
- Firearms Examinations.
- Chemical and Physical Examinations.

The manual is written in an interesting manner, and contains material (particularly with regard to autopsies) not ordinarily included in such pamphlets.

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From October 4 to 18, the Missouri State Highway Pa-

trol, in conjunction with the University of Missouri, (1) held a training school for peace officers of the State.(2) This was the first school of its kind held in Missouri and is intended to be held each year hereafter. Under the direction of Lieutenant Kenneth K. Johnson, Officer in Charge of Training, the school offered lectures in the many phases of criminal investigation work. Included, were twelve hours of lecture and demonstration work presented by the personnel of the Missouri State Highway Patrol Laboratory. Of these, five hours were offered by Lieutenant Edmund I. Hockaday, Director of the Laboratory, on fingerprints, firearms, blood-alcohol, photography, and laboratory procedures generally. Three hours, with practical demonstration and experiment, were given by Trooper Oren S. Liley, Chemist with the Laboratory, on Plaster Casting and Toxicology. Four hours of lecture work were presented by John E. Davis, Laboratory Technician, on Blood; Hairs & Fibers; Semen and other stains; Soil, Dust, and Fingernail Scrapings; and Evidence generally.

Following this, the officers visited General Headquarters and the Laboratory where the instruments and methods of the laboratory were explained in detail.

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- (1) It is of interest to note that in recent years Universities and Colleges are cooperating more and more with state police agencies in regard to educational programs. Not only are training schools such as these facilitated, but there are offered regular undergraduate curricula in Police Science work.
  - (2) The Patrol also holds training and retraining schools for members of the department. Retraining schools are held once a year, and training schools for new recruits as necessity demands. Lectures on laboratory procedures are presented by members of the Department.

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## CHEMICAL MICROSCOPY

THE CHEMICAL MICROSCOPIST FREQUENTLY ENCOUNTERS CURIOUS AND INTERESTING REACTIONS WHILE CARRYING ON ROUTINE TESTS. CRYSTALS OBTAINED IN THESE REACTIONS ARE OFTEN PECULIARLY "CHARACTERISTIC" AND NOTEWORTHY. MANY OF THEM WOULD HAVE NO IDENTIFICATION VALUE. OTHERS, HOWEVER, MIGHT HAVE IDENTIFICATION VALUE WHICH WOULD BE OF IMPORTANCE AT SOME LATER DATE. IN THIS FIELD, CRYSTALLINE TESTS HAVE BEEN VERY WELL WORKED OUT FOR THE VARIOUS ANIONS AND CATIONS IN INORGANIC CHEMISTRY, AND FOR VARIOUS OF THE ORGANICS, PARTICULARLY DRUGS. SOMETIMES THE TESTS WHICH HAVE BEEN DEVELOPED AND UNSATISFACTORY UNDER THE CONDITIONS OF THE TEST. IN THESE CASES, AND IN OTHERS TOO, POSSIBLY SOME OF THE VARIOUS REACTIONS WHICH OCCUR BUT HAVE NOT BEEN REPORTED NOR CONSIDERED AS "SPECIFIC" COULD SERVE AS AN INDICATION, OR EVEN PROOF OF THE PRESENCE OF VARIOUS IONS AND COMPOUNDS.

WE SHOULD LIKE TO CARRY EACH MONTH, IN THE TECHNICIAN, A SPECIAL SECTION ON SUCH REACTIONS AS THIS.

THE TECHNICIAN WHO PERFORMS TESTS OF THIS NATURE OFTEN DOES NOT HAVE TIME TO INVESTIGATE THE CRYSTALS OBSERVED, TO DETERMINE THEIR NATURE, NOR TO ASCERTAIN EXACTLY WHAT IONS OR COMPOUNDS USED WERE ESSENTIAL TO THE REACTION NOTED. HE MAY NOT HAVE TIME TO DETERMINE HOW SPECIFIC THE REACTION IS, NOR HOW SENSITIVE. YET ANOTHER LABORATORY WORKER MIGHT HAVE THAT TIME, AND SUFFICIENT INTEREST IN THE PROBLEM TO MAKE FURTHER INVESTIGATION OF IT.

ACCORDINGLY, WE WOULD APPRECIATE RECEIVING FOR NOTATION IN THESE PAGES, INFORMATION ON ANY SUCH REACTIONS AS ARE NOTED ALONG THIS LINE. INFORMATION SUBMITTED SHOULD INCLUDE THE EXACT CONDITIONS UNDER WHICH THE CRYSTALS FORMED AND A DESCRIPTION OF THEIR APPEARANCE, COLOR, SIZE, ETC.

IT IS NOT NECESSARY THAT THE REACTION BE A NEW ONE, PREVIOUSLY UNREPORTED IN THE LITERATURE. IT CANNOT BE EXPECTED THAT ANY ONE TECHNICIAN SHOULD BE AWARE OF ALL TESTS OF THIS NATURE WHICH HAVE BEEN DEVELOPED. IN FACT, PREVIOUSLY REPORTED TESTS MAY BE PRESENTED, PROVIDED THE ORIGINAL SOURCE IS GIVEN. MODIFICATIONS OF ALREADY PUBLICIZED TESTS OR OTHER "SHORT-CUTS" TO TESTING WOULD ALSO BE OF INTEREST.

THE REACTIONS AND COMMENTS MADE WILL BE ASSIGNED A NUMBER, BEGINNING WITH (1) IN THE OCTOBER, 1943 ISSUE, AND CONTINUING INDEFINITELY THEREAFTER. REFERENCE TO PREVIOUSLY PUBLISHED NOTES WILL THEN BE POSSIBLE MERELY BY A MENTION OF THE NUMBER OF THAT COMMENT.

THE EDITOR

## CHEMICAL MICROSCOPY

- (1) Gold Chloride (chlor-auric acid) gives with WAGNER'S reagent, or with Florence reagent, numerous light brown crystals of diamond shape. The crystals are not permanent, lasting for only a few minutes. They may be replaced by small yellow plates and clusters. In a highly concentrated solution, the original brownish crystals may assume a feathery form, or may appear as feathery and fern-like radiates, and persist for a longer time.

The crystals were not obtained with gold-chloride and zinc-chlor-iodide reagent.

J.K.B.  
J.E.D.

- (2) Phenylhydrazine hydrochloride gives with KRAUT'S reagent, crystals quite similar to those described above. They are a light brown color, and of hexagonal form, or diamond shape. The hexagons may be quite elongated. Rectangular crystals, as well as a number of other varieties (some resembling Florence selenite crystals may be seen.) The reaction does not occur when Florence, Wagner's, or Zinc-chlor-iodide, reagents are used. With the latter, dark brown oily drops form. Concentrated solutions do not give the feathery xls. obtainable with gold-chloride and Wagner's reagent.

J.E.D.

- (3) A number of substances, when treated with the various "iodine-iodide" reagents (Florence, Wagner's, etc.) result in a precipitation of crystalline iodine within the test drop. These iodine crystals are generally of a hexagonal shape, "coffin" shape, diamond shaped,

## CHEMICAL MICROSCOPY

or rhombohedral, and are usually preceded by the formation of oily droplets or globules within the drop.\* Barbiturates and other organics result in such crystals, as do dehydrating agents such as calcium chloride and sodium sulphate (anhydrous). These crystals might be confused with the anticipated products of a reaction. Comparison with sublimed iodine will generally suffice to indicate their nature.

\* This description also fits the crystals mentioned in (1), & (2) above. However the latter are much larger, somewhat lighter in color, and while there is some resemblance in appearance it is thought that they are not being confused with iodine crystals in this case. However, one indication that they may be iodine is seen in a test of the following nature.

Pyridine, in very small amounts, is capable of producing a precipitate in any of these iodine-iodide reagents. An empty pipette, through which pyridine has just been drawn, is "expelled" over the surface of the iodine-iodide test drop. The "odor" of pyridine present is sufficient to produce an immediate precipitate of globular and crystalline material, much of which resembles the crystals previously described. Examined with the naked eye, the surface of the drop appears coated with a dark purplish blue crust, identical in appearance to iodine crystals. Zinc-chlor-iodide particularly gives good crystals.

J.E.D.

Letters From Our Readers --

ED. NOTE: The following material is taken from a letter received by the Editor. The comments are those of the writer, and are not to be taken as necessarily representing the views of the department which he represents. The remarks should be of definite interest to every police laboratory worker, and may well be given serious thought.

The writer has for many years been engaged in the study of questioned documents, and in the various phases of photography and photomicrography as well as having considerable experience in firearms identification procedures. He has written a number of articles on such methods, and is well qualified to offer the opinions set forth here.

Editor THE TECHNICIAN  
Missouri State Highway Patrol  
Jefferson City, Missouri

Dear Sir:

I have been reading your little publication with much interest since you first began it. In reply to your request for an expression of views and opinions, I offer a few comments on a subject which has been somewhat neglected---namely the presentation of expert testimony.

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First: If technical evidence offered by various types of experts working for law enforcement agencies is to command the respect of the courts and public, then such experts must be extremely careful that all of their evi-

dence is given without any bias: That is, they must remember that they are not working to convict anyone. What they are doing is to first record certain facts that they have observed, secondly to explain clearly to the court what those facts mean in the light of their experience, and thirdly to be very careful not to imply that their evidence should have more weight than the actual value which it has.\*

As an example: Consider a long typewritten letter (anonymous) and a number of specimens from various suspected machines. If the machine has seen even a small amount of use, the peculiarities of alignment, spacing, type-defects, etc., will be so evident in an enlarged photograph that the testimony of the expert can be very positive as to the identity of the machine and he can convey this positiveness to the court and jury in good faith. BUT, suppose the anonymous letter has been block-printed in pencil on cheap "5 & 10" paper, and there is very little hand printed matter from any suspect (as is usually the case), then the technician should be very careful about his findings. In such a case, unless the expert has had very long experience, it is all too easy to permit a letter style (the formation of the letter as taught by some engineering school, etc.) to seem to be an individual characteristic, and to say that a certain one of the suspects made it.

Take your own example in your foreword on page 20 (of the September TECHNICIAN) where you are talking about bullet identification. If there is room for doubt in a bullet identification, it is my opinion that the duty of the technician is to call the attention of the attorney to this doubt, and further, if called on to testify in court, to make sure that the testimony is so given that the court will be aware of the doubt. We had a case in this state a number of years ago, in which a certain "expert" testified to a positive identification of a fatal bullet in a homicide case, and caused the conviction of a poor farm-laborer. Some years later, circumstances came up which caused the Governor to appoint a special investigator to look in-

to the case. This investigation showed all question that the farm-hand was innocent. For many years after that, firearms evidence wasn't worth a dime in this area. I never saw the bullets in the case, nor the photographs (if any) and cannot say what they really showed. However, the technician must certainly have been wrong, for the crime was later proved to have been committed with a rifle and not with a revolver.

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In addition to the above comments, I would like to suggest the following: Have an association or club in which everyone engaged in our line of work can be a member on the payment of a nominal sum for dues. This is to allow "junior assistants" to belong, where larger dues might prevent their joining. Have a senior group, to which all who have had at least five years ACTUAL EXPERIENCE working along technical investigation lines for police, attorneys etc, may belong on payment of larger dues.

Have the association publish information on how to do the various things required by our departments, and offer a course of study in various lines. Have these courses prepared by men who are recognized experts in the particular line, and give an examination at the end of the course. Award a certificate to the men who complete any course satisfactorily and be sure that such certificates go only to men who have really shown themselves to be fully qualified.

Try always to impress on all members the idea that they are working to discover and reveal the TRUTH, not to convict some particular person. Have them understand that in the long run (regardless of any ethical view) the best way to secure high regard for the testimony of police laboratory technicians is to make it clear to the courts and the public that they do confine themselves to the truth.

Avoid the mistake of trying to have one man be an expert on all subjects. He cannot be truly such an expert,

and sooner or later this will be discovered to the detriment of the profession. (I find that in my own case, the handwriting and other document work which I have done for twenty-five years, still requires constant study and experiment.)

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Testimony offered by "experts" on subjects which have not yet been thoroughly established as reliable procedures constitute a definite menace to the security of our profession. As an example, a certain expert \_\_\_\_\_ recently testified in one court proceeding, a few evidence hairs MUST positively have come from the head of a certain man, and could not have come from any other person. Mr. \_\_\_\_\_ and myself\*\* have both studied the subject very carefully, and made a series of independent tests, and have both concluded that as far as we would go is to say that the suspected hair MIGHT have come from this person, that it was the same in color, diameter, texture, etc.; or we will testify positively that the hair did NOT come from a certain head. Suppose that, later on, by other evidence which cannot be controverted, it is shown beyond any doubt that the man convicted on the basis of the testimony of the "expert" referred to above, was innocent. What is the result as to the weight of all such technical evidence in the future?

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Sincerely

Louis A. Waters  
Syracuse, N. Y.

\* Underscoring by the Editor.

\*\* ED. NOTE:-(and many other police technicians)

- # -

(25)

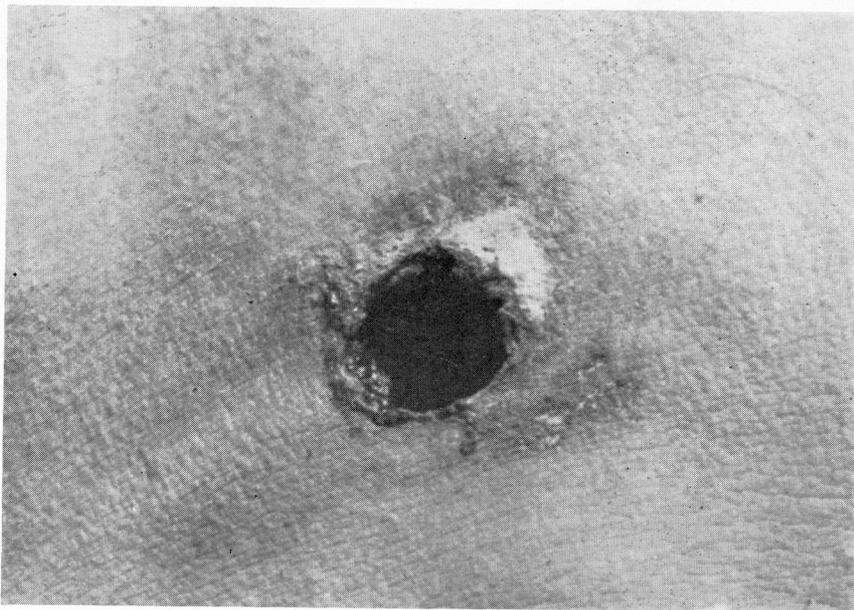


Figure VII  
0.38 Exit Wound. Note Everted Margins.



Figure VIII  
Explosive Exit Wound of Head. Homicide.