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Police Science Notes

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POLICE SCIENCE NOTES*

The Fluorescence of Human Hair
—Mr. R. L. Andrew, Assistant Dominion Analyst of the Dominion Laboratory at Wellington, New Zealand, is author of the following report, submitted to this *Journal*, on a study made of the fluorescence of human hair:

“The Auckland Branch of the Dominion Laboratory, New Zealand, was consulted by the Police Department in regard to the identification of the body of an unknown female found in an estuary. Some hair similar in colour to that on the body was found in the suitcase of a missing woman who was a half-caste Maori. According to a statement appearing in a detective journal, it is possible to detect the race of an individual from the fluorescence of the hair. From other evidence the Police thought that the body found was the body of the half-caste Maori girl, and desired to have this confirmed by examination of the two samples of hair. As the hair from the body might have been affected by the immersion, some of the hair from the suitcase was placed in sea-water mixed with an equal part of fluid from the pleural cavity of the body, and kept in the incubator.

“An investigation into the fluorescence of the samples, and hairs from various races, was made in the Dominion Laboratory, Wellington, N. Z. It was found that the most suitable arrangement for observing and comparing the fluorescence of hair was to examine it

with a microscope when illuminated by filtered ultra-violet light. The light was passed through a filter in the side-window of an analytical model ultra-violet lamp and focussed by a large flask 6 inches diameter, onto the stage of a binocular microscope. Here was placed a mirror made by silvering the inside of a portion of a hemispherical glass basin. The object to be examined was placed so that it was illuminated at the cusp of the caustic curve. In order to have a black non-fluorescent background the hairs were mounted side by side on a slide made from 3-ply veneer stained with aniline black.

“Light-coloured hairs fluoresce brightly, and grey hair shows a very brilliant fluorescence, but it was the dark hairs that were of particular interest. Samples were examined of black and dark-brown hair from various races; European, Chinese, Kaffir, American-Negro, Assyrian, Red Indian, Maori, as well as various half-castes from these races. As far as this examination went, no useful racial differences in fluorescence could be seen. The differences found corresponded simply to the visual classification of the hair colour into black and dark brown. Black hair gave a faint dull blue fluorescence, while dark-brown hair fluoresced a brighter blue.

“The hair from the body of the unknown female gave a dull blue fluorescence, while that from the suitcase was decidedly more bril-

* Edited by Fred E. Inbau and M. Edwin O'Neill of the Scientific Crime Detection Laboratory of Northwestern University School of Law.

liant, resembling some of the light brown hair examined. Although this indicated that the hairs were not from the same person, a comparison later with hair from the case, incubated for 14 days, showed that the fluorescence of the incubated samples was considerably less than before treatment, and agreed with that of hair from the body.

"It did not appear that anything further would be gained by examination of the fluorescence of cross-sections of hairs, and the technique would be more trouble. It was concluded that examination for fluorescence, at any rate by the method adopted, was of no value as an indication of race. In any case care would be necessary in using it as an aid to identification owing to the possibility of changes due to putrefactive action."

A Negative Mass for Plastic Reproductions—In the December, 1933, issue of *Archives of Pathology*, Dr. Paul Gross, of the Institute of Pathology of Western Reserve University presents a formula for a different and new negative mass which, he states, is "cheap and easily prepared, and which yields satisfactory results" in reproducing minuteness of detail.¹ It is used in the same way as the Poller negative mass. The material has the following composition (in parts by weight): agar, 100; oil soap, 100; magnesium sulphate, 40; absorbent cellulose wadding (that from sanitary napkins used), 12; water, variable, but approximately 600-800.

The preparation of the material is described by the author as fol-

¹ Gross, P., "A New Negative Mass for Making Accurate Plastic Reproductions," *Arch. Path.* 16: 869-872 (1933).

lows: "The agar is heated in about 2,000 cc. of water until it is completely dissolved. The cellulose wadding is macerated in hot water until the fibers have separated. It is then thoroughly stirred into the hot agar. The oil soap is next added, and when it is completely dissolved and incorporated into the agar mass, a concentrated solution of the magnesium sulphate is slowly poured into it. At the same time, the mass is vigorously stirred. This precipitates the insoluble magnesium soaps. The mass solidifies at about body temperature. The solid material is chopped fine or, preferably, ground in a food grinder. Since this mass contains from two and one-half to three times too much water, it is spread out thinly on paper and allowed to dry at room temperature to a state in which the crumbs are distinctly moist but no water can be expressed. The material is then ready for use."

Retinal Photography as a Means of Identification—In a paper delivered before the International Association of Chiefs of Police, at the Convention held in Atlantic City, N. J., in 1935, Dr. Carleton Simon, Criminologist of the Association, outlined a method of identification based upon the photographic recording of the blood vessel pattern and arrangement in the retina or fundus of the eye. This method, as well as earlier ones advanced by other workers, was discussed by M. E. O'Neill, of the Scientific Crime Detection Laboratory, in a note published in this Journal.² Since the appearance of these ar-

² O'Neill, M. E., "A New Method of Identification," *J. Crim. Law* 26: 608-610 (1935). Also see pp. 752-754, vol. 26.

ticles, considerable interest has arisen concerning the possibility of utilizing some system of classification of retinal patterns as a means of criminal identification, either as a distinct scheme or as an adjunct of the present fingerprint system. For this reason reference to two recent contributions on the subject may be of interest.

At the last meeting of the I.A.C.P., held at Kansas City, Missouri, in September, 1936, Dr. Simon presented another paper entitled "The Retinal Method of Identification," in which he proposes a new system of classifying the retinal patterns to supplant the method suggested in the first article. In this modification Simon employs a transparent protractor having two concentric circles about a fixed point, the circumference of each of which is divided into 100 divisions called "centigrees." This instrument is placed over the photograph of the retina with the central point over the center of the papilla, and then rotated until the zero axis, marked with an arrowpoint, touches the nasal side of the superior temporal vein or its branch. The classification formula is derived from the readings on the outer and inner (primary and secondary) circles, where the veins intersect these circles. Readings are taken at the first edge of the veins, proceeding counter-clockwise in the case of the right eye and clockwise with the left eye. The number of possible variations is said to run into millions when the two classification circles are used.

Dr. Fritz Bartmann, of the Police Institute of Berlin, in an article published in the May-June, 1936, number of the *Archiv für Kriminol-*

ogie,³ discusses the method proposed by Simon and presents the views of a number of German eye specialists who express a degree of uncertainty concerning the possibility of utilizing such a method in practical police work. The author advances the opinion that with present methods there is no possibility of any identification system being used in this connection. The following extract from Dr. Bartmann's conclusion indicates the author's skepticism of the practical applicability of identifying persons by means of retinal photography.

"The leading German eye specialists, among them the directors of the University eye clinics at Berlin and Hamburg, arrive at about the same unfavorable result which Dr. Heindl expressed in 1922. * * *

"If the possibility of this method has been discussed in criminalistic circles this was done to stimulate research among students and practitioners of criminal science in their fight against criminality in the hope that it might some day be made feasible. It has been decided not to use the method because a uniform feasible system cannot be derived from the Simon-Goldstein method. The eye background photograph is subject to all too many and too great changes because of eye diseases and changes in manner of living. The formulas suggested in connection with the eye photographs do not give a true picture of the nature of the retina. Apparently America is not convinced of the value of this 'new' method as O'Neill stated in unmistakable terms in his article on the

³ Bartmann, F., "Die Augenhintergrund-Photographie, eine neue Methode der Verbrecheridentifizierung?", *Archiv für Krim.* 98: 223-234 (1936).

subject in the *Journal of Criminal Law and Criminology*.

"Inquiries at the central identification offices in London and Washington (as published in the bulletin of the Prussian State Criminal Bureau in Berlin No. 2, p. 75) likewise show that it is not their intention to replace or even supplement the tried and tested system of fingerprints by any other method of personal identification."

Identification of Burglar's "Can Opener"—An interesting case involving the identification of a burglar's "can opener" is reported by Dr. Wladyslaw Sobolewski, Inspector of State Police at Warsaw, in the July-August, 1936, number of the *Archiv fur Kriminologie*.⁴

The exhibits submitted to the author for examination consisted of (1) a can opener with an adjustable handle, and an attached cutting head 11 cm. long, 9.6 cm. wide, and 1.1 cm. thick, and (2) a section of metal from a burglarized strong box bearing several cuts made by the criminal. The problem, of course, was to ascertain whether the cuts in question had been made by the opener found in the possession of the suspected safe-cracker.

It was found impracticable to make an absolute identification based upon the cutting marks of the blade because of the variations in the marks produced, but the presence of a nicked surface on the other arm of the opener-head provided a more convenient and more reliable basis for comparison. The nicked arm, while serving as a support for the opener in cutting,

⁴ Sobolewski, W., "Identifizierung von Werkzeugschartenspuren, Identifizierung eines Knabbers," *Archiv f. Krim.* 99: 31-43 (1936).

had penetrated considerably into the hard surface of the metal, producing an imprint which reproduced very exactly all the irregularities of the nicked surface. Photomicrographs of the evidence cuts and of test imprints made in the same piece of metal were taken under identical phototechnical conditions. When these photographs were superimposed in a manner similar to that sometimes used in establishing identity of striations on bullets or cartridge cases, the congruence of the markings of the two imprints was easily demonstrated in court, resulting in the conviction of the accused.

New Method for Proving Identity of Fingerprints—A novel procedure for demonstrating the identity of fingerprints is described by Earl O. Stephens, Superintendent of the Police Laboratory, Detroit, in the December, 1936, issue of "Sparks from the Anvil."⁵ The use of this method makes it unnecessary to point out individual characteristics, as is the usual procedure in presenting fingerprint evidence. The manner in which it is carried out is described by the author as follows:

"This can be accomplished by enlarging the ink impression as well as the latent print to 8x10-inch or larger, using a scale to insure the same degree of enlargement. Allow at least 1-in. margin all around on both prints. Next, border the enlargement of the ink impression on both sides, using anything that will make a clear impression upon the paper; then cut ink impression horizontally every ½-in., cutting from one border to the other. Now, cut vertically at the border, alter-

⁵ Stephens, E. O., "Fingerprints for Court Evidence," *Sparks from the Anvil* 4 (12):3 (1936).

nating vertical cut so that adjacent strips swing in opposite directions when lifted and folded back.

"Now take a pin and push it through a certain characteristic, then take another pin and do the same to another characteristic, and without removing the pins push them in the same place on the latent enlargement, then staple the two together above the prints but on the enlargement paper.

"If you have been accurate in the enlargements and placing of the pins you can lift each strip as a door and find the ridges of the latent and ink impression blending each other, proving both are from the same finger."

Automobile Accident Investigation

—An article dealing with the investigation of automobile accidents, with special reference to photographic procedures, appeared in the December, 1936, number of *American Photography*.⁶ Although elementary and by no means exhaustive in treatment, it should be of interest to investigators who anticipate engaging in this type of work. The author offers a number of valuable suggestions concerning the examination of the accident scene and also the proper methods of obtaining accurate photographic reproductions which will be of value as evidence. In addition to discussion of some of the problems encountered in actual practice and of the procedures to be followed in making an investigation, a number of recommendations are made concerning the necessary equipment, such as types of lenses, measuring tapes, etc. The principles and

methods discussed are illustrated by a number of photographs.

Speak-o-phone Records Admitted in Evidence—In the recent case of *Commonwealth v. Clark*, 187 Atl. 237 (Pa., 1936), in which a state senator was prosecuted and convicted for attempted extortion and bribery, the prosecution introduced as part of its evidence a "speak-o-phone" recording of certain incriminating conversation which the defendant had with the attorney general of Pennsylvania and the governor's secretary. The trial court permitted the playing of the "speak-o-phone" record (a record made on a "dictaphone or phonographic recording instrument with an aluminum metal disk instead of a wax recording disk"). The attorney general testified as to the identity of the voices, and at the time of the playing of the record in court the jurors had before them a typewritten transcript of the conversation to assist them in following the conversation on the record itself. To this part of the proceedings, however, counsel for the defense raised no objection other than the general one previously made and directed against the introduction of the "speak-o-phone" records for all purposes.

Upon appeal to the Superior Court of Pennsylvania the introduction of the "speak-o-phone" records was alleged as error, but the appellate court held the allegation to be "without merit," and stated in the following language its reason for so holding: "The phonograph, the dictaphone, the talking motion picture machine, and similar recording devices, with reproducing apparatus, are now in such common use that the verity of their recording and reproducing sounds,

⁶ Waters, L. A., "Photography and Criminology," *American Photography* 30 (12) 794-804 (1936).

including those made by the human voice in conversation, is well established; and as advances in such matters of scientific research and discovery are made and generally adopted, the courts will be permitted to make use of them by way of presenting evidentiary facts to the jury."

Scientific Evidence in a Bombing Case: Identification of Wire, Tape, etc.; Determination of Type of Explosive Used—The Supreme Court of Illinois recently affirmed the conviction of two bombers in the case of *People v. McDonald et al.* (Docket No. 23805, October, 1936), where a considerable amount of scientific evidence constituted the major part of the state's case against the defendants.

At the trial, members of the Scientific Crime Detection Laboratory of Northwestern University School of Law testified as to the results of comparisons made between the die marks on certain copper-clad wire attached to the alarm key of a clock forming part of the bomb mechanism and the die marks on similar specimens of wire found in the workshop of the defendants; between the pieces of adhesive tape found on the wire attached to the alarm key and the portion of a spool of tape discovered in the defendants' workshop. The die marks on the wire specimens were considered identical, and photomicrographs were introduced in court illustrating the common features in both, supplemented with testimony to the effect that in the technician's opinion the wire specimens had been drawn through the same die—which opinion was based upon the same general principle constituting the basis for firearms iden-

tification, etc. As regards the tape specimens, those on the bomb mechanism were found to contain the same thread count as the remainder of the torn portion on the spool in the workshop, in addition to a duplication of peculiar thread arrangements in the specimens, as well as a general fitting together of all specimens. Enlarged photographs were admitted to illustrate testimony regarding the comparisons. Examinations were also made of string and insulation on the bomb mechanism, which material was compared with specimens found in possession of the defendants. This analysis, however, indicated only similarity, since the nature of the material precluded any accurate determination of identity itself.

Photographs of the scene of the explosion, illustrating the general condition of the destroyed building (the power house of the Valier Coal Mine) as well as the apparent focus of the explosion, formed the basis for expert testimony to the effect that a "high explosive" was responsible for the destruction—an important fact to be established in view of the question raised by the trial court as to the possibility of a coal dust explosion, etc. The testimony showed that the localized shattering effect of the explosion precluded the possibility of a "low explosive," such as coal dust, gunpowder, gases or gasoline vapor as the causative agent.

A detailed and illustrated article concerning the scientific evidence in this case will appear in an early issue of this *Journal*. For a discussion of other decisions on the subject of comparative micrography see "Outline of Scientific Criminal Investigation," pp. 67-70

(published, 1936, by the Scientific Crime Detection Laboratory of Northwestern University School of Law).

Document Examination: Qualifications of Expert Witnesses—

A very good appellate court opinion concerning the forensic qualifications of handwriting experts is to be found in the recent case of *Commonwealth v. Snyder et al*, 187 Atl. 254 (Pa., 1936). The trial judge in this case, one involving a prosecution for forgery, refused to permit an alleged handwriting expert to testify in behalf of the defendants in a forgery prosecution, on the ground that the witness did not possess the necessary qualifications. Upon appeal to the Superior Court of Pennsylvania, the trial court's ruling was affirmed, since, in the language of the appellate court, "the qualifications of the witness were not so apparent that we can hold that the court below committed reversible error in excluding his testimony as a handwriting expert."

The examination of the alleged expert disclosed a number of "varied activities": "He went to an art school in Philadelphia, in 1894, for a period of two years, where he worked on pen and ink script. He then became a newspaper cartoonist. He subsequently worked for an engraving company, for several newspapers, for the United States Coast Geodetic Survey, for the United States Department of Agriculture, for the Interstate Commerce Commission, for the Bureau of Internal Revenue of the Treasury Department, and for the hydrographic office of the United States Navy. He was engaged in these various duties until two years previous to the time of his

appearance in this case. While so engaged he studied law, and was admitted to the Bar of the District of Columbia in 1905, to the Bar of Union County, Pennsylvania, in 1908, and to the Supreme Court of Pennsylvania in 1926. He testified that he had also studied and read several works on handwriting that for two years he had held himself out as an examiner of questioned documents. He maintains a law office in his residence in Washington, D. C. His last employment was with the United States Navy Department, where he had worked for six years. During his spare time he also studied photography. He stated that he had testified in court as a handwriting expert on one occasion in the District of Columbia. He also found time to do some magazine writing on semilegal subjects."

The trial judge was of the opinion that the fact that the witness "had so many occupations caused a serious doubt as to his being a specialist or expert," and primarily for that reason refused to accept his qualifications.

This critical attitude should prevail more often in cases involving expert testimony. Unfortunately many trial courts adhere to the view that they should permit anyone possessing any semblance of qualifications to testify and then let the jury be the judge of his qualifications in evaluating his testimony—a thoroughly unsound position.

Photography — Admissibility of Photograph of Crime Scene, as Affected by Change in Conditions between Commission of Crime and Taking of Photograph — Five months after the commission of

the crime for which the defendant was prosecuted in *Caveney v. State*, 4 N. E. (2d) 137 (Ind., 1936), photographs were taken of the crime scene and introduced in evidence at the trial. In laying the foundation for their admissibility the photographer, testifying for the state, was asked a question as to whether or not the "objects and the dwellings and the fences and the conditions" were "substantially the same" at the time of the taking of the photographs as when the crime was committed. (Apparently the photographer had been familiar with the scene upon both occasions.) An objection was made by the defense to the witness answering this question on the ground that "the answer to the question was contrary to the laws of nature, contrary to the physical facts of seasonal changes, and . . . change in foliage and vegetation." The court overruled the objection and permitted the witness's answer of "yes" to stand. Upon appeal the trial court's ruling was affirmed in the following language: "The question propounded asked if the conditions were 'substantially' the same. Appellant was given ample opportunity to cross-examine witnesses fully upon the question of seasonal changes as affecting foliage and vegetation, and witnesses testified as to the difference in the appearance of the two seasons of the year. The objections go more to the weight of the evidence than to its competency. The fact that the pictures were made at a time remote from the killing and at another season of the year would affect the weight to be given to the photographs."

For a collection of appellate court decisions concerning the ad-

missibility of photographs of crime scenes see "Outline of Scientific Criminal Investigation" pp. 76-79.

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Admissibility of Reasons and Reasoning in Expert Testimony—A Document Examination Case—In the recent case of *State v. Young*, 210 N. C. 452, 187 S. E. 561 (1936), involving a prosecution of forgery, the trial court refused to permit a document examiner testifying for the defense to state the reasons and reasoning for his opinion regarding the authenticity of a specimen of handwriting. Upon appeal to the Supreme Court of North Carolina this ruling was held to constitute reversible error. "Our holding," stated the Supreme Court, "is based upon the fact that the conclusion of a handwriting expert as to the authenticity or nonauthenticity of a signature, standing alone, might be of little or no probative force, but if his conclusions be supported by cogent reasons, it would be strengthened and its value as evidence correspondingly enhanced. When the reasons of the witness are given, the jury are afforded a better opportunity to determine the soundness of his conclusion."

In this connection see the excellent article by Albert S. Osborn in *Law and Contemporary Problems* (Vol. 2, pp. 488-495)—abstracted in *Police Science Notes*, 26 *Jour. of Crim. Law* 754-755 (1936)—in which the author argues very ably for the admissibility of reasons and reasoning in expert testimony, which some few courts still deny. Unquestionably, the decision in the instant case represents the more desirable view, in accord with Mr. Osborn's opinion in the matter.