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## Police Science Notes

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# POLICE SCIENCE NOTES

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## TECHNICAL ABSTRACTS

*M. Edwin O'Neill*†

**Hypersensitization of Photographic Emulsions**—Police photographers and laboratory technicians have evidenced considerable interest in the possibilities of increasing the speed of photographic emulsions by exposure to mercury vapor. This interest is explained by the fact that quite often photographs of crime scenes or the bodies of victims must of necessity be taken under adverse lighting conditions.

In a recently published article,<sup>1</sup> comparative results are given of experimental hypersensitization of twenty emulsions by treating with mercury vapor. Each piece of film tested was cut into three one-inch strips. One of these strips served as a standard of comparison with the two remaining strips which were subjected to the action of mercury vapor, some before and some after exposure. Time of exposure to the vapor ranged from 24 to 120 hours.

Contact test strips were made from a nine step sensitometric scale, one step of which was completely opaque—thus serving as a control for the fog produced in the test strip. Comparisons of densities were made employing a modified photoelectric photometer used as a densitometer. After correcting for fog, the arithmetical mean of the remaining eight steps on each untreated test strip as compared with the mercury test strip was determined. The difference between average densities determined in this manner is a measure of the density change due to mercury hypersensitization. The antilog of the difference is the change in film speed.

A table is included which gives the relative speeds of twenty emulsions, commercially available in this country, both before and after mercury hypersensitization.

The conclusions reached by the author are as follows: "(1) Treatment with mercury vapor, either before or after exposure to light, does increase the sensitivity of most of the emulsions commonly used by the amateur, but in most cases, the degree of speed increase is not sufficient to be of practical value. (2) The effect of mercury is exceedingly irregular and unpredictable, varying widely in (a) different makes of film; (b) different types of emulsion by the same manufacturer; (c) successive batches of the same type emulsion by the same maker. Considerable divergence in performance has also been noted among films taken from the same box. (3) Eastman Super Panchro Press Film if fresh and handled under conditions of average humidity (40-50%) will be approximately doubled in speed by the two days' treatment subsequent to exposure.

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<sup>1</sup> English, F. L., "Mercury Hypersensitization," *American Photography*, 33 (2): 90-96 (February, 1939).

(4) The supersensitizing effect usually rises to a maximum in two to five days and then declines, due chiefly to excessive fog formation. With certain films, however, prohibitive fogging occurs before any increase in sensitivity can be noted. (5) Humidity is definitely an influential factor with at least one type of emulsion and probably all. (6) Unless conditions can be established which will render the effects of mercury treatment very much more consistent than at present, the practical utility of this type of hypersensitization will be negligible."—*Charles M. Wilson.*

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**Destruction of Fingerprints by Disease**—Dr. Leonidio Ribeiro, Director of the Institute of Identification of Rio de Janeiro, has just published a monograph summarizing the results of his research on the destructive effects of injury and various diseases on the papillary designs of the fingers.<sup>2</sup> The study is concerned principally with the effects of leprosy, but includes also observations in cases of radium and x-ray dermatitis, eczemas, scleroderma, hyperhidrosis, and the action of chemicals. Since various types of skin diseases produce different kinds of alterations in the fingerprints, the author suggests the possible application of such studies as an aid in medical diagnosis.

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#### LEGISLATION AND LEGAL DECISIONS

*Fred E. Inbau*

**Scientific Tests for Alcoholic Intoxication**—The States of Indiana and Maine recently passed statutes authorizing the administration of scientific tests for alcoholic intoxication on motorists suspected of driving while under the influence of alcoholic intoxication. Similar legislation is pending in Alabama, Connecticut, Montana, Iowa, and Illinois.

The Indiana statute reads as follows: "If it is alleged in the indictment or affidavit, or upon the trial, that the defendant was under the influence of intoxicating liquor when he committed reckless homicide, or that he was under the influence of intoxicating liquor when he drove a vehicle, the court may admit evidence of the amount of alcohol in the defendant's blood at the time alleged, as shown by a chemical analysis of his breath, urine or other bodily substance. Such evidence may be accompanied by other relevant evidence such as eye-witness testimony about defendant's appearance, speech and conduct at the time alleged. Evidence that there was, at that time, five-hundredths per cent, or less, by weight of alcohol in his blood, is prima facie evidence that the defendant was not under the influence of intoxicating liquor sufficiently to lessen his driving ability within the meaning of the statutory definitions of the offenses. Evidence that there was, at the time, from five hundredths per cent to fifteen hundredths per cent by weight of alcohol in his blood is relevant evidence but is not to be given prima facie effect in

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<sup>2</sup> Ribeiro, L., "Dactilo-diagnose," Imprensa Nacional, Rio de Janeiro, Brazil, 1939.

indicating whether or not the defendant was under the influence of intoxicating liquor within the meaning of this act. Evidence that there was, at the time, fifteen hundredths per cent, or more, by weight of alcohol in his blood, is prima facie evidence that the defendant was under the influence of intoxicating liquor sufficiently to lessen his driving ability within the meaning of the statutory definitions of the offenses."<sup>1</sup>

The Maine statute contains the following provision: "Whoever shall operate or attempt to operate motor vehicle upon any way, or in any other place when intoxicated or at all under the influence of intoxicating liquor or drugs so that his ability to operate the motor vehicle in a proper manner has been lessened, upon conviction, shall be punished by a fine of not less than \$1000 or by imprisonment for not less than 30 days nor more than 11 months, or by both such fine and imprisonment. Any person convicted of a second or subsequent offense shall be punished by imprisonment for not less than 3 nor more than 11 months, and in addition thereto, the court may impose a fine as above provided. Evidence that there was, at that time, 7/100 per cent, or less, by weight of alcohol in his blood, is prima facie evidence that the defendant was not under the influence of intoxicating liquor sufficiently to lessen his driving ability within the meaning of the statutory definitions of the offense. Evidence that there was, at the time, from 7/100 per cent to 15/100 per cent by weight of alcohol in his blood is relevant evidence but it is not to be given prima facie effect in indicating whether or not the defendant was under the influence of intoxicating liquor within the meaning of this act. Evidence that there was, at the time, 15/100 per cent, or more, by weight of alcohol in his blood, is prima facie evidence that the defendant was under the influence of intoxicating liquor sufficiently to lessen his driving ability within the meaning of the statutory definitions of the offense. The failure of a person accused of this offense to have tests made to determine the weight of alcohol in his blood shall not be admissible in evidence against him."<sup>2</sup>

Although the courts do not have to depend upon legislative enactments in order to admit in evidence the results of scientific tests for alcoholic intoxication,<sup>3</sup> such statutes serve a valuable purpose nevertheless. In the first place they supply a much needed practical definition of "intoxication." Then, too, legislative approval for such tests will undoubtedly stimulate their more frequent and widespread application in the field of law enforcement.

It will be noted that the Maine and Indiana statutes are substantially the same with regard to the presumptions attached to the various percentages of alcoholic content. The only difference is in the minimum figure, which permits the Maine motorist slightly more indulgence than the Indiana driver. Both statutes, however, are in agreement as regards the maximum figure—the .15% + group of drivers who, according

<sup>1</sup> Indiana State Highway Traffic Act, Art. 5, §54 (2), 1939.

<sup>2</sup> Maine Revised Statutes, Chap. 29, §88, as amended, 1939.

<sup>3</sup> See *State v. Duguid*, 72 Pac. (2d) 435 (1937); and *State v. Gatton*, *infra* note 5.

to a recent study, have a 55 to 1 chance of becoming involved in a personal injury accident.<sup>4</sup>

One seemingly undesirable provision of the Maine law is that which states that "the failure of a person accused of his offense to have tests made to determine the weight of alcohol in his blood shall not be admissible in evidence against him." Two recent appellate court decisions indicate that these scientific tests may be considered as not coming within the scope of the privilege against self-incrimination, and that therefore comment is permissible regarding an accused person's refusal to submit to such an examination.<sup>5</sup> In view of this encouraging judicial attitude, and the views expressed by legal scholars upon the subject,<sup>6</sup> it seems inadvisable for the legislature to incorporate any such provision as the one found in the Maine statute. In this respect, therefore, the Indiana statute seems to be the better one of these first two legislative attempts in this field.<sup>7</sup>

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#### POLICE SCIENCE BOOK REVIEWS

Edited by *Paul V. Trovillo*†

**Recent Advances in Forensic Chemistry.** (Second Edition.) By *Sydney Smith* (Regius Professor of Forensic Medicine, University of Edinburgh) and *John Glaister* (Regius Professor of Forensic Medicine, University of Glasgow). P. Blakiston's Son and Co. (Philadelphia, 1939.) Pp. 264, with 85 illustrations. \$4.50.

Fortunate are those divisions of scientific investigation which can have their progress summarized periodically in concise and accurate fashion. This book by two eminent British authorities is the second edition of such a review of their field of forensic medicine. The first edition published eight years ago was some 70 pages shorter. The increase is largely due to inclusion of new material on "Larval Infestation and Putrefaction," "Individuality of the Blood," and "Ultra-violet and Infra-red Rays," as well as some interesting work by Professor Alan Moritz on the making of cellulose acetate impressions of surface characteristics of hairs and fired bullets. The chapters on alcoholic intoxication and on spark spectrography have been revised and supplemented.

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<sup>4</sup> See Holcomb, R. L., "Alcohol in Relation to Traffic Accidents," Jour. Am. Med. Ass'n III:1076 (Sept., 1938). Also, 1938 Report of Committee on Tests for Intoxication (made to the Street and Highway Traffic Section, National Safety Council, Chicago, Ill.).

<sup>5</sup> *State v. Gatton*, 20 N. E. (2d) 265 (Ohio Court of Appeals, 1938); and *Schmidt v. District Atty.*, 255 App. Div. 353, 8 N. Y. S. (2d) 787 (1939).

<sup>6</sup> Ladd, M., and Gibson, R. B., "The Medico-Legal Aspects of the Blood Test to Determine Intoxication," Iowa L. Rev. 24 (2): 191 (1939); Inbau, F., "What Can an Accused Person Be Compelled to Do?" J. Criminal L. and Crim. 28 (2): 26 (1937).

<sup>7</sup> The statute was drafted by Professor J. J. Robinson, Director of the Indiana Institute of Criminal Law and Criminology, with the cooperation of Dr. R. N. Harger of the University of Indiana School of Medicine.

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The remainder of the book does not differ materially from the earlier edition, which would lead one to conclude that, in the opinion of the authors, these phases of forensic medicine had not made any substantial progress during the past eight years.

The chapter on "The Identification of Firearms" may represent current criminalistic practice in Great Britain, but American experts would undoubtedly take serious exception to many of the statements which are made. The manufacture of cartridges is not so extensively standardized that appreciable differences in the setting of primers, explosion pressures, and bullet composition do not occur. The imprinting of breech face characteristics on the soft copper of the primer cap (p. 32) is seriously impaired by the current use of harder nickel plated primers. It is interesting to read of cartridges fitted with bullets of "steel" (pp. 36, 56 and 61), or even "nickel-steel" (p. 62), and one wonders how the rifling grooves of a gun barrel would appear after firing a few rounds of such ammunition. Certainly steel bullets for small arms are unknown on this side of the Atlantic. The method of rolling a bullet on a flat sheet of plasticine or even of making a cellulose acetate impression would undoubtedly give some valuable information from fired bullets which are as nearly cylindrical as those shown on pp. 38, 39 or 57. The sad fact is that most bullets involved in criminal cases are rather badly bashed from contact with bone or other hard substance, and the firearms identification expert may count himself fortunate in any case where the fatal bullet contains more than two reasonably perfect "land" or "groove" impressions. With proper artificial illumination, much greater detail of characteristic markings can be obtained by photographic means than by the suggested use of plasticine or cellulose acetate casts.

Certainly most of our firearms experts would heartily disagree with these authors when they state that "identification from the fired cartridge case is infinitely more certain than from the bullet" (p. 35). And this reviewer, before accepting the statement on page 27, would like to see a hole, made by the passage of a bullet through a glass pane which was smaller in diameter than the bullet that produced it.

In the chapter on "Examination of the Weapon," directions are given for the systematic examination of a firearm. This consists first of a visual examination, followed by washing the gun barrel with hot water to remove water-soluble residues. Subsequently the barrel is swabbed out with cotton tampons moistened with alcohol for the purpose of removing any water-insoluble debris. This water-insoluble material is then tested for camphor, diphenylamine, barium nitrite, potassium nitrate, potassium bichromate, etc. As to the value of making a sulphur cast of a rifled gun barrel, the reader is left in somewhat of a quandary by the statements (both occurring on p. 83) that "it is usually better to get a permanent cast of the barrel," and "but as a matter of fact it is rarely necessary to go to the trouble of getting a cast at all." We are inclined to agree with the latter viewpoint.

In the chapter on "Identification of Hairs" the authors are unquestionably in more familiar territory than is the case in the chapters concerning firearms, bullets and powders. The work of Professor Moritz in

extending Hausmann's classification of hairs on the basis of the cuticular scales is interesting. In many points, however, the discussion in this chapter might be misleading. For example, it might be inferred from a reading of pages 120-121, that one can always determine whether or not a hair has been bleached or dyed. To draw such conclusions with the degree of certainty required as proof in criminal cases is oftentimes impossible. Also, one wonders whether or not the authors of the book would be willing to take the witness stand and testify under oath concerning the age or sex of a person on the basis of a few hairs. In this day of short bobbed haircuts for women and long-haired male artists and musicians, the length of hair loses its significance as a reliable indication of sex.

The chapter on the "Individuality of the Blood" represents the most extensively revised and augmented section of this second edition. The forensic aspects of blood grouping are presented simply and adequately. It contains most of the latest developments and can fairly be classified as representative of "Recent Advances" in the field.

The new additions to the chapter on "Spectroscopy in Medico-legal Work" consist largely of a discussion of spark spectrography taken from the publication of the Gerlaths ("Die chemische Emissions-spektralanalyse"). The eight pages on the use of "Ultra-violet and Infra-red Rays in Medico-legal Investigations" are largely new.

The chapter on "Alcoholic Intoxication" is probably representative of British opinion concerning the utility and reliability of the chemical analysis of breath and body fluids in determining whether or not a person is "under the influence" of alcohol. Widmark's work is reviewed and his method of blood analysis given. In the "Preface to the Second Edition," the authors state, "The time has come when authorities must pay attention to the only test which provides proof whether a definite quantity of alcohol has been taken, whatever effect that quantity of alcohol may have had on the individual." The accuracy of such a statement is open to question. From blood analyses, one may judge with a fair degree of certainty (variation  $\pm$  10-15%) the *stage* or *degree* of alcoholic intoxication but may not even estimate the quantity of alcohol ingested. The inference that the terms " $\alpha$ " and " $\beta$ " of Widmark's equation are constants is not even approximately true. Widmark's own publications show that the former value varies from 0.46 to 0.90, while the latter ranges from .0016 to .0040. Refined methods of analysis are available which eliminate acetone, acetoacetic acid, chloral, formaldehyde, etc., as interfering agents. These remove the objection to the cruder Widmark micro-analytical procedure.

Perhaps the most serious criticism of this book is its failure to measure up to its title. This appears to be due in part to lack of information concerning the recent literature of forensic medicine and partly to the provinciality of the authors. Of the 143 dated references to original sources, only 25 represent work published since the issuing of the previous edition of "Recent Advances in Forensic Medicine" (1931). Of these 25, about half are from British sources. The recent non-British references consist of seven on blood grouping, and two each on firearms,

hairs and alcohol. One might infer that there had been very little recent advance in the field of Forensic Medicine, and that most of it is concentrated in Great Britain. Needless to say, such an inference would be grossly in error. It is interesting to note that in the entire book there are only two references to papers published in the "Deutsche Zeitschrift für die gesamte gerichtliche Medizin," admittedly the foremost journal in the field of forensic medicine since its inception in 1922. Many standard texts or handbooks in specialized fields are not mentioned. Among these are the works on Firearms Identification by Hatcher (1935), and by Burrard (1934), and Kronacher and Lodemann's book on the examination of hairs (1930). Of a total of about 160 references given in the book, at least 48 are either incorrect or incomplete in some respect, and in 34 of these instances, the same errors appeared in the first edition as well. These suggest careless preparation of the manuscript or else inexorably poor proof-reading.

In view of the increasing interest in Forensic Medicine, it is unfortunate that this book, the only one of its kind in the English language, does not represent a more complete, accurate and adequate survey of its field.

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**Recruitment of Policemen.** By *Donald C. Stone* (Executive Director, Public Administration Service, Chicago). International Association of Chiefs of Police (Chicago, 1938). Pp. 28. \$0.50.

"Recruitment of Policemen" is bulletin No. 1 of a series of pamphlets on police problems to be published by the I. A. C. P. The first paragraph of this bulletin states: "Competent personnel is the most pressing need of every police department. With the growing complexity of crime, traffic, and other police problems, it is increasingly important that policemen be of superior mental and physical ability and that more vigorous efforts be taken to attract such persons to the force. Modern police work requires men of intelligence with an aptitude for police work, men who can work together in a disciplined organization, men of physical stamina, and above all men of high character."

Stone, in this Bulletin, very clearly indicates how we might obtain the best possible material for our recruit schools. In view of the fact that under present economic conditions many more men are now available to take police examinations, an application of these requirements would raise the standards of police personnel to a noticeable degree. The author suggests that in the written test relative weights be assigned in the ratio of their importance. He proposes aptitude tests to help detect the presence or absence of qualities in candidates which are needed in a good police officer. How can you determine, he asks, whether a man will make a good policeman by a spelling test, or by asking the locations of a few city buildings or the definitions of a few simple crimes?



Stone suggests the following as necessary qualifications for all recruits: High School education; age 21 to 28; height 5 feet 7 inches to 6 feet five inches; weight 135 to 180 pounds, minimum according to height; weight 175 to 235 pounds maximum according to height; residence—no requirement except that recruit reside in city after becoming member of department.

Perhaps Stone would be criticized for not stressing the use of such intelligence tests as the O'Rourke, Otis, and Army Alpha, or for proposing a minimum height of less than 5 feet 9 inches. Some will feel that a man who is 6 feet 5 inches tall and weighs 235 pounds is too tall and too heavy and may be approaching undesirable proportions.

The author suggests that the tests be given in the following order in view of the fact that medical and physical examinations are expensive to administer: (1) written; (2) medical and physical; (3) oral. The oral test is designed to appraise such traits as personal appearance, bearing, poise, expression, mannerisms, attitude, forcefulness, and other characteristics of the applicant which have a bearing on how he will fit into the departmental organization, but which cannot be determined through written tests alone.

There has been a great need for suggestions such as these for a long time. In most cases Civil Service Commissions conduct the examinations. Some of our Chiefs may be able to persuade the commissions to adopt some or all of the suggestions made in this bulletin. If they do, they undoubtedly will be rewarded with a better disciplined and much improved rank and file. Some heads of departments may scoff at intelligence tests for police officers, and short form answer tests on a large scale, but they will come to adopting suggestions such as those indicated here if any degree of improvement is to be expected in recruit personnel in the future.

*John I. Howe*

Captain,  
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*Les troublantes révélations de l'empreinte digitale et palmaire.* By *Henri Mutrux-Bornoz* (Captain of Police, Lausanne, France). F. Roth & Cie (Lausanne, 1937). (Fingerprints and Palmprints of Humans and Animals: Some Startling Disclosures.) Pp. 285, with 64 plates prepared by the author.

Captain Mutrux, in a monograph elaborately documented and severely scientific, has certainly opened the door to some of the most novel and startling vistas of zoological and devolutionary possibilities. His work is based on a study of the fingerprints of some 6600 degenerates found in the asylums or the prisons of nearly every country in the world (except the United States, whence he received no responses from the officials to whom was sent his request for information), as well as on some 500 palmprints of that class of persons (Chaps. I-VI), and on a like study (Chaps. VIII-XIII) in the comparison of the fingerprints and palmprints of several hundred animals (found in zoological gardens) of

the primate order,—lemurines, apes, cynocephalics (baboon, etc.), anthropoids (gibbon, orang-utang, gorilla, chimpanzee). These chapters are followed (Chaps. XIV-XVIII) by a study of other deformations (for there are scores of kinds) of the hands of degenerates, as accessory features for consideration with the fingerprints and the palmprints.

The correspondences, in various combinations of these several classes of data, seem to indicate the possibilities of inferring a correspondence in character-traits. To quote the author's comment on certain correspondences (p. 252): "A degenerescent type [of human], or even one totally degenerate, who reproduces in striking fashion some combinations strictly animal, ought to behave psychologically and (in some respects) physically, like a primitive. He adjusts himself badly in our civilization. The savage corresponds exactly to the type known as criminaloid, i. e., a human whose instinctive but incomplete delinquency is brought to light only by certain opportunities. He is unacquainted with moral principles, and if he violates them it is without any discernment. He goes fishing and hunting, he kills, robs, and plunders; his motive, often out of all proportion to the deed, is found primarily in his environment and secondarily in his individual circumstances." So, as a possibility of the future, the author imagines (p. 246) a murder inquiry at which the psychiatric expert might be able to report as follows, on some suspect, to the magistrate in charge of the inquiry: "This man's hand-marks and finger-prints are not those of a normal human, in the following respects: (a) the general form is that of a degenerescent; the large palm-lines are those of a lemur (maki) or a cynocephalic (hamadryas); (c) the thenar-muscle region has a whorl which is found only among certain lower families of apes; (d) the bays of the hypothenar muscles are identical with those of a cynocephalic baboon; (e) the position of the finger-palm deltas is abnormal, for they are subordinate to the unusual hilly whorls; (f) the finger-design has accessory features typical of animals; (g) the flesh-design is in type markedly that of an ape. In a word, this print is that of a human, but it has all the characteristics of an ape." And so, continues the author, "these features being so concrete, so readily verifiable, and so revelatory, it is impossible to suppose that an intelligent magistrate would not give some consideration to them."

The learned author does not claim that such precise analysis is yet feasible. But he does believe and claim that the generalizations yielded by his data indicates a connection between palmary features and innate character, and that the biological relations revealed by his study between human degenerates and the simian primates may by later studies become more precisely known and practically utilized.

His generalizations, of course, deal in a new fashion with one aspect of a well-known field of science,—that of devolution (the opposite of evolution), or retrogression, or degeneracy. If a class of animals—say, the elephant—should be found to have lost, in the course of eons, some of the physical attributes of the mastodon, this change would be an example of "devolution" or "retrogression." So, too, if an institution—say, democratic self-government as developed in the earlier Greek city-

states—were found by the time of Alexander the Great to have lost some of its elements making for efficiency and prosperity. But when, not a whole class, but a single member of a class, e. g., a single sheep-dog or a single modern human, is found to have been born without the characteristics of its class, and to possess only the characteristics of that class as it existed at an earlier stage of its evolution, that dog or human exemplifies "degeneration." (At least, that is what the reviewer understands to be the distinction.) Now the generalizations that Captain Mutrux offers us are examples of the degeneration of certain individual humans into types of lower forms of primate animals; that is, the human individual has not degenerated during his growth in his lifetime, but was born as of the lower type. And the author's special contribution to this discovery is that the correspondence is revealable by the physical features of the hand.

The extensive range of the author's search for data, his minute and exhaustive analysis, and his comprehensive knowledge of finger-print literature and somatologic science, entitle his work to serious consideration. As a competent devotee of police science, he has here made his name.

The Preface by his teacher, the great Edmond Locard, director of the Scientific Police Laboratory at Lyon, and the Introduction by his chief, Col. J. A. Guillard, Cantonal Chief of Police at Lausanne, show that the author possesses the confidence of the best authorities in his chosen profession.

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