CRIMINAL IDENTIFICATION

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Criminal identification is indispensable in combating crime. It is
the most potent factor in obtaining the apprehension of the fugitive who might
otherwise escape arrest and continue his criminal activities indefinitely.
Likewise, it results in the imposition of equitable sentences by the judiciary,
as more severe punishment of the individual who violates the law repeatedly or
even life imprisonment for the habitual offender becomes significant only when it
is possible to determine accurately the number of previous convictions.
Generally, the first offender can be distinguished from the recidivist or habitual
criminal only through the medium of scientific criminal identification.

HISTORICAL BACKGROUND

From the earliest annals of history it would appear that personal
identification of some character has been in vogue. Members of one savage tribe
were distinguished from those of another through distinctive attire or even bodily
decorations such as scars resulting from self-inflicted cuts or burns. In
the earlier civilizations, differences in the dress of various social classes
were clearly defined, sometimes by law but more often through the sanction of
custom. The branding of criminals and slaves was practiced also at a time when no
other method of identification was known, and various forms of tattooing were
used by the Romans to identify and to prevent the desertion of mercenary
soldiers. In our present civilization, some tradesmen or craftsmen still wear
distinctive attire while the armed forces of various nations are identified readily by uniforms. These are all forms of personal identification, so common
monplace their significance may remain unobserved unless called to our notice.

During the early part of the eighteenth century, the better organized
police departments in Europe employed officers with good visual memories who
attempted to record mentally the faces of criminals and the crimes committed
with these individuals. No doubt, effective results were attained by these officials yet it is somewhat appalling to consider the probable consequences if law enforcement officers of contemporaneous times with their shifting populations and speedy transportation facilities, were dependent solely on visual recollection to identify criminals.

It was not until the advent of photography that law enforcement agen-
cies initiated modern methods of criminal identification. This science resulted in
the establishment by the more highly organized police departments of "rogues' galleries" and bureaus containing the photographs of thousands of criminals. These collections of photographs, generally segregated according to sex, color, height and criminal specialty, for the purpose of more ready identification, thus represented a great advancement over prior attempts of effective identification. Although photography continues as an important adjunct in the detection and prosecution of criminals, its early use was hampered for the lack of a method to subdivide the pictures of criminals with definite accuracy. In addition to the
this defect the changing character of the features prevented a constant medium of comparison.

BERTILLON SYSTEM

The effectiveness of identifying criminals by means of photographs was greatly enhanced through the adoption of the Bertillon method of identification which derived its name from Alphonse M. Bertillon, noted French anthropologist and criminologist who devised and perfected the system in 1882. The need for a classification of photographs was so urgent that the Bertillon system was adopted promptly by France and later by most of the civilized countries of the world. The most important feature of the method was predicated upon the theory that the size of certain bony parts of the human anatomy remained constant or unchanged during adult life. Accordingly, measurements were taken of various bony structures of the body, i.e., length and width of the head, length of left middle and little fingers, length of left foot, length of left forearm, length of right ear, cheek breadth, height of the figure, measurement of cutstripped arms and measurement of the trunk. After these measurements were subdivided into three major groups of small, medium and large they were classified in a specified filing arrangement. In addition to the bodily or anthropometrical measurements, M. Bertillon promulgated definite rules for recording the personal description of an individual. While these descriptive data supplemented the photographs and measurements in the determination of identity, yet of themselves, they were very valuable as a medium of identity. They consisted of the noting of certain characteristics, such as weight, color of hair, color of eyes (a "shade" chart, giving illustrations of the various colors was provided for reference purposes later), complexion, shape of nose, ear and face, location with size and shape of all scars, marks, moles and tattoos. Entries as to each of these factors were made as part of each record and the photograph, showing the front and right profile view of the head was included thereon. The supplemental identifying data, such as photographs and descriptive information could be located readily when filed according to the measurements obtained. It is well to note, however, that although the Bertillon system is now obsolete in most countries, the photographs and descriptive data prepared thereon continue to afford invaluable assistance to law enforcement agencies in their identification activities.

Following the perfection of the Bertillon system it was adopted by many law enforcement agencies in the United States although it was not long before deficiencies in the method were discovered. It should be observed that the success of the system depended primarily upon the anthropometrical classification attained and it was realized that while one or two measurements "loose" another would take then "close", thus resulting in different classification. Even intensive training in the approved method of taking measurements did not correct the methodological deficiencies indicated. Furthermore, the Bertillon system was not an effective means of identifying persons under twenty-one or over sixty years of age, for, as a general rule, in the ages mentioned the measurements of the bony structures of the body change. This second deficiency in the Bertillon system would be of material consequence today when youthful criminals commit a large percentage of crimes. Additional problems were inherent in the Bertillon system. In the first place the physical process of recording the data was somewhat costly and too expensive for universal usage. Next, there existed the necessity for considerable special training and instructions so the operator would be proficient in taking the measurements and understand fully the tables followed in searching the files. A further problem existed in that the three major subdivisions of the groups, i.e., small, medium and large, did not afford an even distribution of records of the individuals measured because the measurements of persons of one nationality, physically larger than those of another, would not fall within the subdivisions, thus affecting the standardized, universal application of the system.

Despite the defects outlined and the added fact that in very rare cases it was found a mistake in identity could be made under the Bertillon system it rendered valuable service to society until it was replaced by scientific fingerprint identification. To this day, the Bertillon system is oftentimes a compliment to the value of the work of Bertillon. To know that although fingerprints and "Bertillone" are entirely different systems of identification, the influence of the word "Bertillon" was so strong many persons believe it to be the same as the fingerprint system.

EVOLUTION OF FINGERPRINT IDENTIFICATION

During the ages when man was seeking a method of personal identification, he was carrying on the inside of the "bulb" or nail joint of each finger, numerous ridge formations or patterns, each possessing definite, distinctive outlines, by which positive identification could have been made. Physiologists are not in agreement why nature provided these distinctive formations of ridges and depressions on the fingertips. They occur elsewhere on the human body, notably on the soles of the feet and palms of the hands but with far less regularity or pattern outline and contour. Some authorities submit that the ridges offset and lessen wear while others contend they assist the sense of touch; create a "friction" surface to the skin, enabling an object to be grasped more readily than would be the case were the fingertips smooth; and elevate the pores enabling the ducts to discharge perspiration more freely. Regardless of the reason for their existence the fact remains that these ridge formations, permanently a part of the body, discernible as a rule about three months before birth, remain unchanged during life itself. Usually, no two individuals possess the same patterns and even if the same pattern is found elsewhere on the body the pattern is different. Insofar as science has been able to determine, these ridges do not indicate definitely character, race, sex or heredity. The ridges, as stated, remain constant through life although they may be affected through deep cuts or burns going beneath the tissues to the ducts. In this regard, the history is replete with references to prove that even in ancient times man was aware of the peculiar permanent lineations described by the ridges of the fingertips. On the face of a cliff in Nova Scotia, for instance, can be found an Indian carving or "picture writing" of the fingers or "fingertip" ridges and patterns that are nearly the same as those found today. The Chinese also had used fingerprints in various forms centuries ago and many references thereto can be found in authoritative writings. In fact, the Chinese even
to have employed finger and hand impressions for sealing documents and for other purposes although the exact symbolism of their action is unknown. The inspiration of the English wood engraver, Bewick, was apparently aroused by a realization of the possibilities of utilizing finger impressions to establish the genuineness of his work, for late in the eighteenth century, he resorted to the practice of imprinting the impression of his finger on his woodcuts.

The first known scientific observation, particularly relating to finger imprints, was made in 1686 by Marcello Malpighi, professor of anatomy at the University of Bologna, Italy, who alluded to the ridges which "describe diverse figures". This comment was followed in 1823 when J. E. Purkings, a professor of anatomy at the University of Breslau, published a treatise or commentary wherein he cited the diversity of ridge patterns connected with the organs of touch and even evolved a differentiation of these patterns into nine varieties.

There is a diversity of opinion as to the first practical application of fingerprints as a means of positive identification. Certain it is, however, that the imperfect impressions left on cliffs and woodcuts and the Chinese finger and hand signatures were not sufficiently clear for close comparison and they serve but as manifestations of the early belief, which to some extent pervades the law of sealed instruments today, that personal contact conveys some nebulous essence to the thing touched from the person touching it, thereby elevating it in dignity and binding effect. Certain it is, also, that the comments of Malpighi and Purkings were little more than scholarly or physiological treatises on the phenomenon of ridge diversity from a factual basis and lacked the concluding conception of their practical value as media of identification.

It remained for Doctor Henry Faulda, an English authority on the subject of dactylography, to write the first article on the practical use of fingerprints for the identification of criminals. In 1880, Doctor Faulda, who was connected at that time with the Tsukil Hospital at Tokyo, Japan, conducted experiments which established that the varieties of individual fingerprint patterns were very great and that the patterns remained unchanged. Doctor Faulda published the results of his experiments in a letter appearing in the magazine "Nature", under date of October 28, 1880. Shortly after the appearance of his article, Sir William Herschel, chief administrative officer in the Coorg district of Bengal, India, wrote an article in the same magazine commenting upon the success with which he had utilized fingerprinting for twenty years in identifying government pensioners in preventing impersonation and repudiation and in identifying prisoners convicted of new offenses. It appears, therefore, that Doctor Faulda was the first to write concerning the practical use of fingerprints and that Sir William Herschel was the first to make extensive use of them. However, neither developed a method of classification suitable for general use and the intensive application of fingerprint identification.

The first authentic evidence of the use of fingerprints in the United States reveals that Mr. Gilbert Thompson of the United States Geological Survey utilized his thumb impression to prevent the forgery of commissary orders during his superintendence of a new military post in New Mexico in 1884. The first practical introduction of fingerprints for criminal identification in the United States was claimed by the prison system of New York State, based on the adoption of the system at Sing Sing Prison on June 5, 1903, although the files of the Department of Corrections may contain fingerprints of state prisoners from the institutions at Sing Sing, Napano, Auburn, Auburn and Clinton, which show that they were classified as early as March, 1903, by Captain James H. Parke, employed in the office of the then Superintendent of Prisons, Cornelius V. Collins. Then, on September 24, 1904, Mr. R. W. McCauley, Warden of the United States Penitentiary at Leavenworth, Kansas, appointed authority of the Attorney General to undertake sufficient expenditures for equipment to take fingerprints of Federal prisoners, which authorization was granted him November 2, 1904, only five days after the system was introduced in the police department of St. Louis, Missouri, by an officer of Scotland Yard, who was guarding the Gibbon's Jubilee presents, on exhibition at the St. Louis Exposition in that year.

Subsequently the use of dactylography for the identification of criminals rapidly increased until today it is the most important factor in identification at home and abroad. Police departments, FBI, army, navy, and other governmental agencies, federal, state, and local, use fingerprints as a means of verifying the identity of applicants for jobs, to establish the identity of witnesses or suspects, and to identify criminals when the traditional methods have proven ineffective. The use of fingerprints is not only a useful tool in law enforcement, but it is also an important means of positive identification in a vast number of other fields, such as insurance, banking, and other business transactions. The use of fingerprints has become an essential part of modern crime detection and prevention.
identifying criminal offenders. In 1892, the first fingerprint classification was done in the United States, and fingerprint records were used to identify individuals.

The International Association of Chiefs of Police, which in 1920 organized the Division of Identification, was established to handle fingerprinting issues. The National Bureau of Criminal Identification was founded in 1894 to provide a central repository for fingerprint records. In 1924, the National Bureau of Criminal Identification was transferred to the Department of Justice. The bureau was later renamed the Federal Bureau of Investigation.

The bureau's fingerprint database consists of over 80 million individual records, including fingerprints, photographs, and other personal identifiers. The bureau uses these records to help solve crimes and identify suspects.

The bureau's fingerprinting process involves taking fingerprints from suspects, comparing them with the bureau's database, and using the results to identify and prosecute criminals. The bureau also provides fingerprinting services to other law enforcement agencies and foreign governments.

The bureau's fingerprinting capabilities have been used in a variety of cases, including identifying terrorist suspects, solving murder cases, and identifying victims of identity theft. The bureau's fingerprinting services are available 24 hours a day, 7 days a week, and are used by law enforcement agencies around the world.

In conclusion, fingerprinting is an important tool for law enforcement agencies, and the bureau's fingerprinting services are critical to solving crimes and identifying criminals. The bureau's fingerprinting capabilities continue to evolve and improve, and the bureau is committed to providing the best possible service to its customers.
the characteristics. The comparison of such prints with actual fingerprint impressions of suspects forms one of the most interesting and valuable branches of the science. The United States Bureau of Investigation is often called upon to establish identifications from latent prints furnished by its contributors and in this way has been successful in assisting in the solution of many crimes where the only clues were the latent fingerprint impressions left by the criminals. Single fingerprint files, wherein individual prints are classified by various systems, serve as a medium for the rapid identification of criminals found at the scene of crimes, and such a file has been inaugurated in the Bureau recently as a further service to law enforcement agencies. This file at present is limited to the single impressions of known kidnappers and extortionists and is an adjunct to the main files wherein the ten impressions are classified as a unit. It is hoped eventually to expand the single fingerprint files to include other groups and thus permit ready identification of criminals who have left their impressions at the scenes of crimes, without the necessity of reference to the actual impressions of suspects to establish identity.

PALM AND FOOT PRINTS

Identification by means of palm impressions has progressed to a great extent. Many persons have been convicted upon testimony following the discovery of their palm impressions at the scenes of crimes. Police organizations in the United States, for obvious reasons, have not given great consideration to impressions of the soles, their principal use being confined to the practice of taking foot impressions of children in maternity hospitals.

INTERNATIONAL EXCHANGE

The United States Bureau of Investigation has arranged with the identification bureaus of foreign countries to exchange criminal identifying data in cases of mutual interest. Fingerprint and criminal records of persons arrested in this country are routed to the appropriate foreign bureaus in cases wherein the interested agency in the United States has reason to believe the individual in custody may have a record in or be wanted by the other nation. Similarly, the fingerprints of persons arrested outside the continental United States are referred by the foreign bureaus to the United States Bureau of Investigation for search in its files, when it would appear a record may be disclosed by a search of the Bureau's records. Numerous identifications, some of fugitives, have been effected in this manner and it is believed that the complete development of this project will lead to more effective law enforcement throughout the world. On June 1, 1933, bureaus in the following countries, territories and possessions were cooperating in this activity: Argentina, Australia, Austria, Bahamas, Barbados, Brazil, Belgium, Canada, Canal Zone, Chile, Colombia, Cuba, Czechoslovakia, Egypt, England, Finland, France, Germany, Greece, Hawaii, Holland, Ireland, Italy, Mexico, Norway, Peru, Philippines, Poland, Portugal, Puerto Rico, Rumania, Southern Rhodesia, Spain, Sweden, Switzerland and Turkey. Through the further development of this project, the United States Bureau of Investigation hopes to maintain an effective surveillance on criminals of an international character and assure the collection, in a centralized agency, of criminal identifying data of value throughout the world.

CRIMINAL IDENTIFICATION IN FOREIGN COUNTRIES

Generally speaking, the methods of criminal identification employed in the United States are similar to those utilized by law enforcement agencies in foreign countries. Fingerprint, photography, modus operandi files, ballistics, handwriting, scientific laboratory analyses, single fingerprints and anthroponmetry are used in various combinations to form the basis of criminal identification in almost all parts of the world. Various code systems have been devised for the detailed analysis of fingerprints and it is sometimes possible to identify criminals when code classifications are transmitted by telegram, wireless or similar means. However, it is usually necessary to have actual fingerprint impressions available to establish positive identifications and it is now possible to transmit full sets of fingerprints to various states and nations by means of the telephone and radiograph. Comments relative to some of the foreign bureaus follow.

EUROPE

In France, the Service de l'Identite Judiciaire, which is maintained in Paris, employs practically all of these methods and acts as a central clearing house of information pertaining to criminals for France and its colonial possessions. The entire police organization of France cooperates with this bureau, forwarding the fingerprint records of all persons arrested. The records numbered about 1,610,000 on December 31, 1931. While a separate Bertillon file is not maintained now by the Paris bureau, some of the Bertillon measurements are employed to amplify the fingerprint classifications of the larger groups. An alphabetical name and alias file, with cross references to fingerprints and photographs is maintained in this bureau. The Paris bureau possesses medical, physical, and photographic laboratories to assist in the scientific investigation of crime. In these laboratories, ballistics, latent fingerprint impressions, and a large range of services of a microscopic, chemical and other scientific nature receive intensive study.

In the British Empire and all of its possessions, both photography and fingerprint records are in use. In the British Isles, the police of Scotland Yard uses a large file of fingerprints and photography form the basis of criminal identification in the United Kingdom. Both the Newfoundland and the South Africa police have a large number of fingerprint files. The New Zealand Police, have a comprehensive fingerprint bureau, which they maintain in cooperation with the Metropolitan Police of London. The police of the South African Union, now known as the Union of South Africa, also has a large file of fingerprints.

In Asia, the police of India and Pakistan have developed large files of fingerprint records, as well as police laboratories equipped in every possible way so that the science of criminal identification is available in those countries. In the Far East, the Bureau of Identification of the Japanese police has developed into a large and comprehensive bureau.

In South America, the police of Argentina, Brazil and Mexico are developing large fingerprint bureaus and are using the fingerprint method as an effective tool in the detection of criminals.

Since the Conference of the German States in 1912, anthroponmetry has been discussed as a method of criminal identification. Various codes of finger-print identification has assumed a position of foremost importance with photography playing an important but subordinate part. The laws of Germany do not provide for a national bureau of identification but in practice, the headquarters of police at Berlin acts as a national bureau and furnishes information concerning professional offenders. About 600,000 prints are in its files. A combination of the Galton and Henry fingerprint classification systems predominates throughout the country but many cities in Germany maintain independent bureaus.
exchanging fingerprints with Berlin and have their own method of classifying fingerprint impressions. In 1903, the State of Hamburg adopted a system of classification devised by Mr. Roscher, who was, at that time, the chief of the Police at Hamburg. The Roscher system was later adopted by Japan and Russia.

Italy utilizes all the known methods of criminal identification, excepting anthropometry, and maintains a national bureau of criminal identification in Rome, which, on March 1, 1933, numbered 405,705 prints in its files. All police departments are compelled by statute to submit to the national bureau the fingerprints and record of each subject. The system of fingerprint classification employed throughout Italy is known as the "Gesti" system, which derives its name from the Professor who devised and perfected it.

In 1926, the police officials of Finland organized the Central Bureau of Criminal Identification, located at Helsinki. On March 3, 1933, 64,180 fingerprint cards were in the files, a modified form of the Henry system being utilized. Fingerprints, photography and anthropometry are used for identification purposes in Norway. A national bureau is maintained at Oslo in which there were contained 49,797 fingerprint records on March 1, 1933.

The fingerprints of all persons arrested in Poland are forwarded to a central identification bureau located at Warsaw, which is under the direction of the Minister of the Interior. The records of this bureau comprising 474,709 prints on December 31, 1932, are classified according to the Kisti system. In the scientific field the Polish authorities perform laboratory work relating to firearms and handwriting identification as well as other technical duties.

The extensive bureau maintained at Vienna under the jurisdiction of the Federal Police, which has collected records of criminals of various nationalities for some time past, numbered 604,610 prints on March 1, 1933.

The Criminal Identification Bureau under the jurisdiction of the Federal Police at Mexico City has nearly 1,000,000 fingerprint records in its files and receives daily about 300 cards from the outlying districts. Attention also is given to scientific investigation work.

The Canadian bureau at Ottawa on January 31, 1933, numbered 266,619 sets of fingerprints in its files. The Canadian officials have cooperated fully with the United States Bureau of Investigation for years.  

Other foreign identification agencies are the central bureau at Stockholm, Sweden, which had 54,170 fingerprint cards on March 1, 1933, the Henry system being employed in its classification work; the central bureau at Berne, Switzerland, with 170,000 prints on March 1, 1933; the bureau at Prague, Czecho-slovakia, with its records of 109,000 prints; the central bureau at Lisbon, Portugal, which collection numbers 150,093 prints, the Italian (Gesti) system being utilized for classifying; the bureau at Sydney, New South Wales, which contained 112,126 prints in its files on March 1, 1933; the bureau at Athens, Greece, which contained the fingerprints of 156,714 individuals on March 1, 1933; the bureau at Dublin, Ireland, which on March 1, 1933, had 30,760 prints in its collection; and the bureau at Bridgetown, Barbados, British West Indies, with 2,319 fingerprint records on March 1, 1933.

The majority of the above bureaus also report progress in the development of single fingerprint systems since their recent installation.

**SOUTH AMERICA**

In connection with the different methods of fingerprint classification employed in foreign countries, it is important to mention again the Vocatich system which was devised by Juan Vocatich, noted Argentine dactyloscopist. This system has been adopted by the national bureaus of the various South American countries. Of the several important collections of fingerprints, Argentina, at Buenos Aires, has by far the largest bureau. The fingerprint system of identification there has been extended not only to persons having police records but to those obtaining passports, certificates of identity, government bank and commercial positions as well as those engaged in other occupations. Over two million prints are in the files, one of the largest collections in the world.

**IDENTIFICATION BY SCIENTIFIC ANALYSIS**

The United States Bureau of Investigation, aware of the necessity of utilizing every scientific and advanced means available in combating crime, has established a research laboratory wherein attention is given to the development of all projects considered to be of assistance in this work. Announcements of the results of the Bureau's endeavors in this particular are made from time to time for the information of all law enforcement agencies.

Through the application of scientific laboratory processes of analysis considerable progress has been made in the development of methods of identifying persons who were present at the scenes of crimes. These methods have been principally developed in the sciences of chemistry, physics and medicine. The methods used are adaptations and developments of analytical devices heretofore used in these sciences in the procurement of information regarding the properties of matter.

This application to criminal work developed gradually at first, as experts were called upon in individual cases. The methods applied to a particular situation have a greater probability of success if they are based on the particular article under examination. The particular interest of the police in the detection of criminals and the co-ordinated initiative to develop new methods until the multiplication of cases indicated clearly the value of the aid which was being rendered.

Because police agencies in the United States are organized in entirely distinct jurisdictions and have developed separately within those jurisdictions, the exchange of information has been limited to that which is undertaken voluntarily, being in the beginning confined to fingerprint and criminal record data. The development of scientific methods, therefore, has occurred in but few of the police departments, primarily those in the largest cities which, at most, have employed only one or two individuals whose activities have been limited to certain applications of scientific work only. Outside of the police departments individual experts have made a profession of supplying these services, and they also have specialized in particular methods of scientific work. At times laboratories of this nature are authorized to extend their services for a fee. Other scientific assistance has been utilized for assistance in individual cases. In the last few years there have developed several laboratories employing more than one expert, these laboratories undertaking to report upon any task of this kind required in the case referred. Some of these laboratories have established a connection with law enforcement agencies.

Scientific assistance in the field of criminal investigation consists in the analysis of objects which are used in the commission of the crime; which are present at and bear marks or indications of the crime; which are left behind by the criminals; and which, being found upon the criminals, bear evidence of their connection with the crime.

The development of the scientific examination of firearms has progressed to the point of being regarded as a vocation. The term forensic ballistics has been adopted as a name for this procedure. Forensic ballistics has for
its object the procurement of evidence as to the firearms from which bullets used in the commission of a crime have been fired. By microscopic examination of the bullet or of the cartridge, it is possible in some cases to state whether a certain firearm was used, and to procure collateral data which are important in identifying the criminal. It was found that bullets bear surface irregularities caused by the travel through the barrel of the gun. Test bullets fired from the same gun bear similar irregularities. Similarly, the cartridge case is impressed with minute irregularities existing on the firearm in which it was fired, caused by the blow from the firing pin, the pressure against the breach block, or blows from the ejector. Before a suspected firearm is obtained for the purpose of conducting such a test, the make and caliber of the gun to be sought are frequently ascertained through the examination of the bullet. In this science instruments specifically designed for this work have been developed, such as the comparison microscope, which enables the microscopic image of two bullets to be examined in juxtaposition to each other, and the holiscameter, which enables the examination and measurement of the inside of a gun barrel. In the field of chemistry special methods of analysis have been developed for the determination of characteristics of minute quantities of poisons, blood, stains and other substances.

Similarly, particular methods by which organic and mineral substances may be identified have been developed. Particularly is this true in the microscopic examination of fibers and crystalline structures, it being sometimes possible not only to describe many characteristics which are identical with those of similar specimens in the possession of suspected individuals, but to offer definite proof of the connection of that person with the crime, because the specimen found on his person could have been obtained in no other manner. This study is in its infancy, and its importance is well recognized as criminals, in their efforts to remove evidence of a crime, frequently overlook such minute evidence.

An additional method of identification, developed in the science of physics, is that of employing the use of light of wave lengths other than the visible range, such as the rays of ultra-violet or the rays of black light, from which all visible light has been excluded, materials may be identified with the naked eye, even in minute quantities. Counterfeits may be exposed and many things which are invisible in normal white light are readily observed.

The testing of another electrical device, has been found to be of value by enabling the safe examination of packages which contain bombs.

One of the oldest of these scientific methods is that by means of which handwriting is utilized to establish the identity of an individual. The handwriting is subjected to a minute and painstaking examination, resulting in the determination of numerous characteristics. The handwriting of the suspect is then similarly examined and compared with the questioned document, resulting in an identification when a sufficient number of similar characteristics is found. The ink or pencil with which the writing is made may frequently assist in such a determination, and the paper also many times yields evidence of value.

In recent years the application of methods of examining handwriting to the examination of typewriting has resulted in the development of a procedure by which positive identifications are made. Here again the method is to make a minute examination for the purpose of determining characteristics. The writing of typewriters is distinctive because each type undergoes a life history, dependent upon conditions by which it is surrounded, and these conditions are different for each machine. This results in distinctive features of individual type, such as physical defects in the letters and peculiarities of spacing and shading.

In this procedure the questioned document is first compared with known standards, which enables the determination that the document was written on a typewriter of a particular company. It is sometimes possible to determine the approximate date of manufacture of the machine. This accomplished, it is only necessary to look for a machine of this kind in order that a test specimen may be prepared. This is then compared in detail with the questioned document, resulting in complete identification if it was the same machine.

**MODUS OPERANDI**

In addition to fingerprint records, many police organizations maintain what are called modus operandi files to assist in determining the identity of persons committing crimes. These records are files of data concerning individuals who come under investigation, so subdivided and classified as to show the manner in which the crimes committed have been accomplished. An habitual criminal in this manner may be identified when he later employs the same method. These records of crimes similar to the one under investigation are examined, resulting in the obtaining of information as to suspects. Photographs of the suspects are then submitted to victims or witnesses for identification. These photographs are either incorporated in the modus operandi records, or maintained as an independent unit in which are called "rogue" galleries", where witnesses may examine the features of past offenders to determine if they were involved in the present crime.

**COOPERATION**

Effective results have been obtained in criminal identification in the United States and abroad and the benefits following scientific methods in this important phase of police work have been established definitely. Through its collection and "clearing house" of criminal fingerprints described herein, the largest in the world, the United States Bureau of Investigation is able to furnish valuable aid to all peace agencies. However, it is obvious that complete records are required to secure the maximum efficiency. Without full cooperation in this respect the progress of criminal identification would be retarded. The Bureau is glad of the opportunity to serve law enforcement agencies in their identification activities and is pleased to render every possible assistance not only in current matters but in the solution of special problems.
The object of the present study is to determine the factors that influence the growth of certain plants. In particular, we examine the role of light in the development of plants. We observe that the length of the growing season, the intensity of sunlight, and the duration of exposure to light all play significant roles in plant growth. Our findings suggest that optimal growth occurs when these factors are balanced. Further studies are needed to explore the exact relationship between light exposure and plant development.