INTERPOL

A History of Fingerprints

Pre History

Archaeologists have uncovered evidence suggesting that interest in fingerprints dates to prehistory. On a Nova Scotia cliff face, for example, there is a petroglyph (stone drawing) depicting a hand with exaggerated fingerprints – showing whorls and loops – presumably the work of prehistoric Native Americans. Fingerprints and handprint patterns have been used as a means of personal identification for thousands of years. Archaeological excavations have recovered artefacts proving their use by ancient civilizations. Early potters may have used them to "sign" their work.

Chinese Clays

China would have to be regarded as the birthplace of mans use of fingerprints. In China, the use of fingerprints dates back centuries, from the first use of clay seals to the distinctive use of ink impressions on legal documents. Records suggest the use of fingerprints and handprints as marks of authenticity in China at least 2000 years ago.

The Chinese claim the earliest recognition of a fingerprints' uniqueness and an ability to utilize fingerprints for personal identification. In ancient times, they employed a thumbprint in place of a signature on legal documents and even criminal confessions, a practical measure in an era when literacy was rare. In Babylon and ancient China, fingerprints were routinely pressed into clay tablets. It is thought that this was done perhaps for purposes of authenticating, or perhaps out of superstition. Inked fingerprints are also found on Chinese documents of the Tang Dynasty. It appears that the Chinese were aware of the individuality of fingerprints well over 5000 years ago. Even before the first century B.C., clay seals were used extensively in sealing official documents and packages. It would seem that the person who impressed a digit on a seal was

permanently bound to the contents of the documents, a clear type of certification. Clay seals were commonly used among officials during the Han Dynasty (202-220 B.C.).

One particular Chinese clay seal, dated before the third century B.C., has been the subject of considerable research and speculation for many years. A left thumbprint is deeply embedded in the seal, and on the reverse side, ancient Chinese script representing the name of the person who made the thumb imprint, is found. The imprint is so specific in pressure and placement that there can be no doubt that it was an identifying mark.

Chinese Books

In approximately 650 A.D., a law book of Yung-Hwui described the use of fingerprints to officially sign divorce matters between a man and a woman. From this, we can assume that authentication of the seal had to come from a talented person who was able to read the fingerprint by comparing it to an similar impression made in either clay or ink. The use of fingerprints as a signature proves that the Chinese understood their significance long before the Englishman Sir William Herschel (1858) collected handprints of natives in India and attempted to claim he was the father of modern fingerprinting.

In China in 12th century, a crime novel was written by Shi-Naingan, entitled The Story of the River Bank and says “Wu Sung captured two women who had killed his brother… He compelled them to ink their fingers and to record their fingerprints”. It is clear the Chinese had, undoubtedly, advanced fingerprinting to a level of acceptance in criminal matters. This, however, seems to be more a coercion of the two women into a confession as opposed to the comparison of fingerprints to fingerprint marks at a crime scene.

Nehemiah Grew

The first scientific recognition of fingerprints in the West came from writings in the late seventeenth century. In 1684, the English plant morphologist Dr. Nehemiah Grew (1641-1712) studied and described the ridges, furrows and pores of both the human hands and feet. His report was issued to London's Royal Society. In addition, he published highly accurate drawings of finger ridge patterns and areas of the palm.

Marcello Malpighi

In 1686, a professor of anatomy and plant morphologist at the University of Bologna Italy, Marcello Malpighi (1628-1694), referred to the varying ridges and patterns of human fingerprints. Malpighi was researching the role of human skin and did not further comment on the use of fingerprints, except to state that the ridge detail was drawn out into loops and whorls. These descriptors are still used today.

Johannes E. Purkinje

Prussian/Czech/Bohemian professor of anatomy and physiology Johannes Evangelista Purkinje (1787-1869) of Breslau University was the first person to create a system of classifying fingerprints. In his essay published in December 1823, he described and illustrated nine fingerprint pattern types in considerable detail; one arch, one tent, two loops, and five types of whorl. Purkinje named each pattern type and devised rules for their individual classification – many of which are still followed today. He showed that fingerprints were

unique from person to person.

William Herschel

Englishman Sir William Hershel (1833-1917) is often credited with being the first European to recognize the importance of fingerprints as a mean of personal identification. In earlier times, when literacy was rare and many could not write their own names, the examination of handprints was the only method of distinguishing one illiterate person from another.

The first recorded systematic capture of hand and finger images that were uniformly taken for identification purposes was implemented in 1858 by Sir William Hershel, while working for the Civil Service of India as the chief administrator of the Hooghly District of Bengal. He recorded a right hand print on the back of a contract for each worker to distinguish employees from others who may try to impersonate another and claim to be employees when payday arrived.

Should a dispute arise, the back of the worker's contract could be compared with a new image of the same hand. Hershel popularized the notion that individuals could be recognized and distinguished, regardless of what name they used or whether they were literate. Hershel developed this use of fingerprints as a means of controlling contract fraud and false impersonations in government pension distributions.


KONAI's HANDPRINT
from the back of the contract
Bengal

Over his years of public service in India, Hershel accumulated a sizable fingerprint collection, which he offered as empirical evidence to what had often been asserted in theory: that each fingerprint was unique and also permanent to the individual.

Henry Faulds

In 1880, Scottish physician and surgeon Dr Henry Faulds (1843-1930), was responsible for a major milestone in fingerprint history and the use of inked impressions. While practicing in Taukiji Hospital in Tokyo, Faulds was also conducting research in fingerprints. He proposed that the ridge detail of any one fingerprint is unique and, because of that, can be classified and used to solve crimes. Faulds suggested that fingerprints could be used in an investigation to eliminate an accused person and also to prove identity by comparison of finger marks left at scenes of crimes by the criminal.

Faulds suggested that it was possible to name the flow of the friction ridges, a method of characterizing the pattern of the fingerprint image. His theory that fingerprint images could be used to solve crimes moved fingerprint images beyond civilian applications such as contracts, and into the forensic arena.

Like Herschel, he had discovered that oil and moisture from the pores resulted in latent (invisible) prints that could be developed with powders. Faulds utilized this technique to exonerate a man accused of theft. He was able to successfully show that the fingerprints that had been found beside the window actually belonged to another man, who was later apprehended.

There was some disagreement between Faulds and Herschel over which of the two was first to suggest fingerprint use as a means of personal identification. Believing he was the first pioneer in fingerprinting, Faulds published his research in October 1880 in Nature magazine. This provoked a letter to the editor from Herschel, who asserted his own claim. It is reasonable to say that both Herschel and Faulds were

extremely influential in introducing the concept of fingerprints to continental Europe later in the 19th century.

Francis Galton

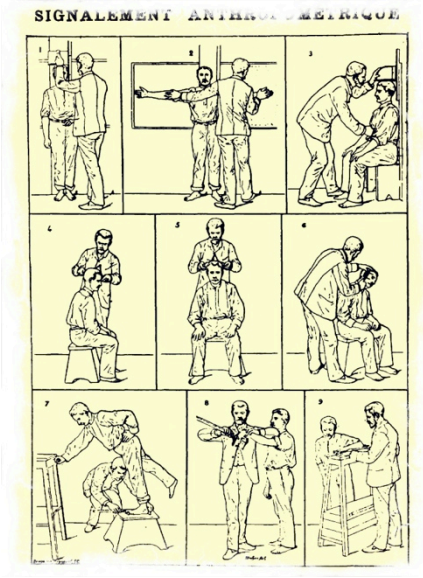
Meanwhile, in England, a distinguished anthropologist Sir Francis Galton (Charles Darwin's cousin) was working on a book on the use of fingerprints for identification. Galton, a widely travelled scientist, recognized the limitations of the Bertillon method and published his definitive work, Finger Prints, in 1892. Today, many refer to Galton as the "Father of fingerprints" for his contributions to the field. His fingerprinting work is so highly regarded that the International Association for Identification, the world's leading identification association, includes a copy of Galton's right index finger in the associations' official logo.

The year after Galton's book appeared, the British Home Office, the parent agency of the Metropolitan Police (Scotland Yard), appointed the Asquith Committee; a group created to investigate the subject of fingerprinting. The committee was impressed with Galton's laboratory and reported, in February 1894 that the United Kingdom would officially adopt fingerprinting as a complementary identification system. Scotland Yard subsequently added fingerprints to the Bertillon cards for criminals. Anthropometry would be abandoned in 1901.

In recognition of Galton's contributions, fingerprint minutiae are sometimes called Galton features or Galton details.

Alphonse Bertillon

Throughout history, fingerprints were, of course, not the only identifier being considered by the scientific community. Anthropometry was also becoming an interest. One system of anthropometry was developed by Frenchman Alphonse Bertillon (1853-1914). He devised a new method based on the physical measurements of the human body because he believed that fingerprinting was cumbersome and that fingerprint records were too difficult to review. Bertillon founded his theory based on his assertion that anatomical measurements would not change over time. The science of taking measurements of the human body is called Bertillonage or anthropometry. Anthropometry laid a foundation for the eventual acceptance of fingerprints as a scientific method for personal identification.



From 1878, trained staff would measure each arrested individual, recording eleven specific measurements; the length of the left arm (from elbow to tip of middle finger), length and breadth and diameter of skull, width of outstretched arms, height sitting and standing, length of the left middle and little fingers, length of the left foot, and length of the right ear. Additionally, other physical characteristics such as eye colour and distinctive features were noted. Finally, both full-face and profile photographs were taken. This was, however, a tedious and somewhat complicated process. Making identification required a significant amount of time and money. These key measurements were recorded on standardized cards. The process was indeed extraordinarily complex and labour intensive. Bertillon calculated

that the variations in these eleven measurements gave odds better than 286 million to one against two individuals having the same measurements.

In 1883, Bertillon began to create a database of criminals in Paris using these measurements, which focused on features that could not be easily disguised or altered. The system would identify anyone who had undergone the measurement process, making it relatively easy to identify repeat offenders. He began to gain public recognition for his process later the same year, when he positively identified an imposter. In only one year, Bertillon's system identified approximately three hundred criminals. This success, at the time, vindicated anthropometry and assured Bertillon of continued acceptance in France and other countries.

He went on to become director of the identification bureau of the Paris police, and other police agencies began using his system. Bertillonage was ultimately undone by clear evidence that different individuals can have the same anthropometric measurements.

West Case

In the United States of America on May 1, 1905, a young African American man named Will West was admitted to Leavenworth Penitentiary in Kansas. His Bertillon measurements were taken. The records clerk thought he looked familiar, although West denied having been there before. When the files were checked, a card was discovered with similar measurements and bearing photographs of what looked like the

same man. The name on the card was "William West". After initial confusion, they brought both Will West and William West together in the same room- they looked identical, although they were said to be unrelated. This was just the case fingerprint advocates were looking for. They quickly demonstrated that they could infallibly distinguish one individual from the other. This case marked the beginning of the end of 'Bertillonage'.

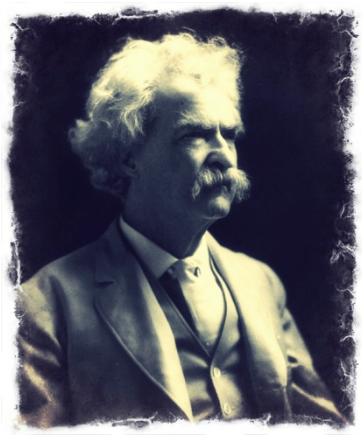
Juan Vucetich

Juan Vucetich was a fingerprint pioneer from the Western Hemisphere who devised a classification system for fingerprints that was used in Argentina and throughout South America. While working at La Plata Police Department in Argentina, Vucetich became convinced that fingerprints were a valuable tool in criminal identification. He wrote a book on the subject in 1894.

By 1896, the Argentine police had abandoned 'Bertillonage' in favour of fingerprints in criminal records. The first recorded case in which fingerprints were used to solve a crime took place in Argentina in 1892. The illegitimate children of a woman named Rojas were murdered June 18, 1892. Rojas had acted distraught and accused a man called Velasquez, whom she said committed the act because she had refused to marry him. However, Velasquez had an alibi and maintained his innocence. Alvarez, an investigator from La Plata who had been trained by Vucetich, assisting with the case, discovered that another of Rojas's boyfriends had made statements about being willing to marry Rojas if only she did not have children. Alvarez collected a bloody fingerprint at the scene and compared it with Rojas's prints; the crime scene print

matched her right thumb. When confronted, Rojas confessed to the murder of her children.

Mark Twain Novels



Well known American novelist Mark Twain made a significant contribution to the promotion of fingerprints as a means of identification through his crime novels. Twain's novel Pudd'nhead Wilson (1893) features a fictional detective who makes use of fingerprints in a criminal proceeding. Pudd'nhead, an attorney, identifies a set of twins by their fingerprints and assures the jury he will use them to convict the murderer. This novel was written two years after Vucetich's fingerprint classification system was proven effective enough to be placed in service.

Edward Henry

Sir Edward Henry (1850-1931) had closely followed the work of Bertillon and his method. Henry contributed to the Bertillon measurements by adding the left thumbprint to each anthropometric card. He realized that such an impression yielded a more effective print for identification.

Henry had been posted to India as the Commissioner of Police in 1873, and while working with Bengali officers Khan Bahadur Azizul Haque and Rai Bahaden Hem Chandra Bose, he developed an entirely functional and workable system with 1, 024 primary classifications. Sadly, these contributions were overlooked for many years after.

But Henry went on to publish Classification and Uses of Fingerprints in 1900 and slowly his classification method for fingerprints gradually replaced the anthropometric records of bertillonage. Soon after his return to the UK around 1900, Henry was appointed Commissioner of Metropolitan Police and Criminal Identification at Scotland Yard, and his classification system with both primary and secondary references became the international standard for fingerprint classification. Henry held this role until 1919. The Henry Classification System remained the standard until the introduction of AFIS.

Mona Lisa Case

Alphonse Bertillon distinguished himself in 1902 as the first person in Europe to solve a murder using fingerprint evidence. Edward Henry's earlier successes solving murders with his fingerprint system took place in India. Bertillon met with failure, however, in trying to solve the outstanding theft of the Mona Lisa, stolen from the Louvre on August 21, 1911. The thief had left a clear thumbprint on the glass that had covered the priceless painting, but Bertillon had no system of classification for his thousands of cards with fingerprints. He and his assistants searched in vain through the files for several months. Then when the thief, Vicenzo Perugia, was arrested in Florence more than two years later, Bertillon learned that he had Perugia's fingerprints after all – those of his right hand – but the print at the scene had been from Perugia's left thumb!

Into the 20th Century

Fingerprinting for criminal identification was established in England (Scotland Yard) and the United States at the beginning of the twentieth century. By 1903 in North America, fingerprints were in use by the New York City civil service (to prevent impersonations). Around the same

time, fingerprints were introduced to the New York State prison system as a means of identifying all the inmates. The US Army converted to fingerprinting in 1905, the US Navy followed in 1907, and the Marine Corps in 1908.

By 1915, fingerprint technicians were so numerous that the International Association for Identification was created. In 1924, the US Congress funded and created, at the then Bureau of Investigation (now known as the FBI), the Identification Division responsible for a central repository of fingerprint files. Another aim of this Division was to standardize the use of fingerprinting in the USA.

Edmond Locard

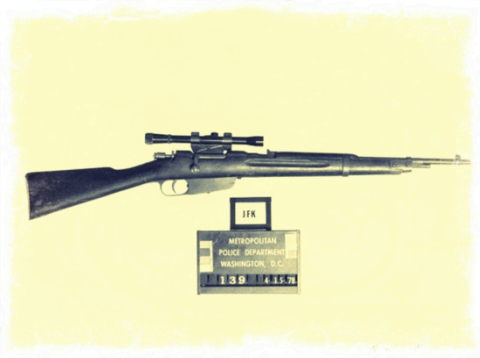
Edmond Locard was qualified in both medicine and law and was also a student of Bertillon. In 1910, Locard was appointed as head of what was then a little police laboratory in Lyon, France. Locard proceeded to create this laboratory into a highly skilled and innovative facility. In 1918, he established the first rules for the minimum number of ridges that must concur before a fingerprint match might be declared, that is, to prove the identity of an individual by his/her fingerprint.

Locard stated that if twelve compatible points are present in a sharp, clear print, the identity is certain. Locard proclaimed also the "principle of interchange", still cited today, which states that a person committing a crime always leaves trace evidence behind at the scene and always carries something away. The Locard Exchange Principle is the cornerstone of forensic science: "Wherever he steps, whatever he

touches, whatever he leaves, even unconsciously, will serve as a silent witness against him".

JFK Case

Fingerprints have played a very significant role in modern crime detection. One example comes from the assassination of US President, John F. Kennedy on November 22, 1963. During examination by the Dallas Police crime lab, the Mannlicher-Carcano rifle that had been found on the 6th floor of the Texas Book Depository, revealed a latent partial palm print belonging to Lee Harvey Oswald.



In 1968, latent fingerprints on a rifle led to the arrest of James Earl Ray for the assassination of Dr. Martin Luther King Jr.

AFIS

The Automated Fingerprint Identification System, better known as AFIS, is an automated identification process many countries currently use. AFIS does this through the use of computer technology and specially coded digital images that can be searched and compared. It is not easy to give just one answer in regard to who exactly implemented the very first AFIS, though there are widely accepted milestones along the path of AFIS development.

In 1977, the Royal Canadian Mounted Police began operation of the first AFIS system. Meanwhile, San Francisco also claimed to have the first AFIS, but its AFIS only became operational in 1984.

With funding from the FBI, NIST began to develop national standards relating to the transmission of finger images. These standards were

adopted by the American National Standards Institute (ANSI) to become ANSI/NIST and provided a guide for agencies to follow in the development of their own AFIS's. The value of standards for transmission of finger images and related data was recognized not only in North America, but also in European countries. INTERPOL adopted the ANSI/NIST standards with only minor modifications in 1996, a process that continues with each succeeding revision of the ANSI/NIST standards. In 1997, the ANSI/NIST transmission standard was reviewed and updated to include distinguishing features; scars, marks and tattoos. At the same time, the National Automated Fingerprint Identification System (NAFIS) became operational in the United Kingdom.

Today, AFIS processing makes it possible to search latent fingerprints found at crime scenes against an entire collection of fingerprints files. In one case, a serial killer who had terrorized Los Angeles with fifteen murders was identified in just twenty minutes once AFIS was introduced to the investigation. It was estimated that manual searching would have required a technician, searching manually through LA's 1.7 million fingerprint cards, which would have taken some sixty-seven years to achieve the same results.

Timeline

3000 BC
- Petroglyphs (stone drawings) the Mic-Mac indians depicting a hand with exaggerated fingerprints – showing whorls and loops.

200 BC
- Clay seals were commonly used among officials during the Han Dynasty in China.

650
- A law book of Yung-Hwui described the use of fingerprints to officially sign divorce matters between a man and a woman.

1160
- A crime novel by Shi-naingan, entitled *The Story of the River Bank,* refers to the use of fingerprints related to a murder trial.

1684
- The first scientific recognition of fingerprints in the West. The English plant morphologist Dr. Nehemiah Grew, studied and described the ridges, furrows and pores of both the human hands and feet. His report was issued to London's Royal Society.

1686
- A professor of anatomy and plant morphologist at the University of Bologna Italy, Marcello Malpighi, referred to the varying ridges and patterns of human fingerprints.

1823
- Prussian/Czech/Bohemian professor of anatomy and physiology Johannes Evangelista Purkinje of Breslau University was the first person to create a system of classifying fingerprints. In his thesis published in December 1823, he described and illustrated nine fingerprint pattern types in considerable detail.

1858
- The first recorded systematic capture of hand and finger images that were uniformly taken for identification purposes was implemented in 1858 by Sir William Hershel, while working for the Civil Service of India as the chief administrator of the Hooghly District of Bengal.

1880
- Scottish physician and surgeon Dr Henry Faulds proposes that fingerprint images could be used to solve crimes. This moved fingerprint images beyond civil applications such as contracts, and into the forensic arena.

1888
- A new identification method based on the physical measurements of the human body (Bertillonage) devised by Frenchman Alphonse Bertillon is approved in France and later in other european countries.

1892

- English anthropologist Sir Francis Galton (Charles Darwin's cousin) published a book on the use of fingerprints for identification, *Finger Prints*, creating the basis for the fingerprints classification.
- The first recorded case in which fingerprints were used to solve a crime took place in Argentina.

1896

- The Argentinean police had abandoned 'Bertillonage' in favour of fingerprints in criminal records based on a classification system for fingerprints created by the Argentinean Juan Vucetich. His classification system was used throughout South America.

1900

- Sir Edward Henry, a Commissioner of Police in India, develops a classification method for fingerprints that gradually replaces the anthropometrical records of bertillonage. The Henry Classification System becomes the international standard for fingerprint classification and remains the with this role until the introduction of AFIS.

1915

- Fingerprint technicians were so numerous that the International Association for Identification was created.

1918

- Frenchman Edmond Locard, qualified in both medicine and law and also a student of Bertillon, established the first rules for the minimum number of ridges that must concur before a fingerprint match might be declared.

1924

- The US Congress funded and created, at the then Bureau of Investigation (now known as the FBI), the Identification Division responsible for a central repository of fingerprint files.

1963

- After the assassination of US President, John F. Kennedy, and during examination by the Dallas Police crime lab, the Mannlicher-Carcano rifle which had been found on the 6th floor of the Texas Book Depository, revealed a latent partial palm print belonging to Lee Harvey Oswald.

1968

- Latent fingerprints on a rifle led to the arrest of James Earl Ray for the assassination of Dr. Martin Luther King Jr.

1977

- The Royal Canadian Mounted Police began operation of the first AFIS system. Meanwhile, San Francisco also claimed to have the first AFIS when its AFIS only became operational in 1984.

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