GENESIS & DEVELOPMENT OF FORENSIC SCIENCE IN INDIA

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Abstract: The present paper will investigate genesis & development of forensic science in India.With Modern times the crimes have increased and the nature, technique of the crime has also changed and advanced as per the technology. Therefore it is very important that the police machinery and the investigation machinery also use forensic science to detect crime and also are at par with the growing technology and various natures of crime.

Key Words: Criminal Justice; Evidentiary value; Forensic Science and investigation; legislative framework, Crime.

1. INTRODUCTION

Defining Forensic Science

Forensic Science is defined as "The application of science to those criminal and civil laws that are enforced by the police agencies in a criminal justice system". Forensic Science deals with the application of the knowledge and methodology of various disciplines of science to legal matters. For evidence analysis, it involves the use of multiple disciplines such as medicine, physics, forensic chemistry and biology, DNA profiling, computer science and engineering. For example, physics is used to recognize the blueprint of a blood scatter; biology helps to establish the basis of an anonymous suspect and chemistry helps us to find out the chemical composition of various drugs. Therefore, the function of forensic science in criminal justice and the legal system is often underestimated and extremely critical in nature. [1]

In the middle of 19th century natural science began to develop by leaps and bounds. The mystic theories theretofore advanced to explain the scheme of things began to lose ground as the clear, cold logic of scientific experiment gradually shed a new light on the mysteries of universe. The change in point of view from the mystic to the scientific soon became apparent not only in criminal investigation but in the different facets of the legal system. Now there emerged two facets of a single case. The facet stated and the facet proved from scientific view point. The era of forensic science had arrived.[2]

Though the use of forensic evidence has been on a spike in the judiciary system one can see restrictive use in the Indian judiciary. To date also, the court has relied majorly on non-forensic, non-scientific evidence for a judgment. According to the recent survey conducted by the Supreme court of India and the High court of Delhi showed that only 60-65 cases are solved with the involvement of forensic evidence. DNA evidence has been used

only in about 5% of murder cases and 3% rape cases. These figures are enough to show the lack of scientific evidence in a criminal investigation in the Indian scenario. There has been a cosmic endeavor for incorporating forensic science in the process of criminal investigation and judicial process. The rate of conviction has been persistently decreasing lately because of a lack of evidence. In this milieu, forensic evidence, having a clinching nature can to some extent reverse the situation.[3]

2. DEVELOPMENT OF FORENSIC SCIENCE

The ancient world lacked standardized forensic practices, which aided criminals in escaping punishment. Criminal investigations and trials relied on forced confessions and witness testimony. However ancient sources contain several accounts of techniques that foreshadow the concepts of forensic science that is developed centuries later, such as the "Eureka" legend told of Archimedes (287–212 BC).[4]

In ancient India too, medical opinion was frequently applied to the requirements of the law. By law the minimum age for the marriage of girls was fixed at 12 years; the duration of pregnancy was recognized as being between 9 and 12 lunar months with an average of 10 months and there is evidence that doctors had to opine on such cases. [5]

Sir William Herschel was one of the first to advocate the use of fingerprinting in the identification of criminal suspects. While working for the Indian Civil Service, he began to use thumbprints on documents as a security measure to prevent the then-rampant repudiation of signatures in 1858. In 1877 at Hooghly (near Calcutta) he instituted the use of fingerprints on contracts and deeds and he registered government pensioners' fingerprints to prevent the collection of money by relatives after a pensioner's death. Herschel also fingerprinted prisoners upon sentencing to prevent various frauds that were attempted in order to avoid serving a prison sentence.[5]

In 1897 a Fingerprint Bureau was established in Calcutta (Kolkata), India, after the Council of the Governor General approved a committee report stating that fingerprints should be used for the classification of criminal records. Working in the Calcutta Anthropometric Bureau, before it became the Fingerprint Bureau, were Azizul Haque and Hem Chandra Bose. Haque and Bose were Indian fingerprint experts who have been credited with the primary development of a fingerprint classification system eventually named after their supervisor, Sir Edward Richard Henry. The Henry Classification System, codevised by Haque and Bose, was accepted in England and Wales when the first United Kingdom Fingerprint Bureau was founded in Scotland Yard, the Metropolitan Police headquarters, London, in 1901. Sir Edward Richard Henry subsequently achieved improvements in dactyloscopy.[6]

In 1968, the Ministry of Home Affairs, Government of India, set up a Forensic Science Laboratory for Delhi Police and the Central Bureau of Investigation under the administrative control of the Central Bureau of Investigation. This laboratory now provides expert opinion on various aspects of Forensic Science concerning crime investigation. Apart from Delhi Police and the CBI, it also provides assistance to the Central Government Departments, State Forensic Science Laboratories, Defense Forces, Government Undertakings, Universities, and Banks etc. in criminal cases. The laboratory has are search and development set up to tackle special problems. The expertise available at the CFSL is also utilized in teaching and training activities conducted by the CBI, Lok

Nayak Jai prakash Narayan, National Institute of Criminology & Forensic Sciences, Police Training Institutions, Universities and Government Departments conducting Law Enforcement Courses etc. [6][7]

In the 19th century, it was discovered that almost any contact between a finger and a fixed surface left a latent mark that could be made visible by a variety of procedures (e.g., the use of a fine powder). In 1894 in England the Troup Committee, a group established by the Home Secretary to determine the best means of personal identification, accepted that no two individuals had the same fingerprints—a proposition that has never been seriously refuted. In 1900 another committee recommended the use of fingerprints for criminal identification. Fingerprint evidence was first accepted in an Argentine court in the 1890s and in an English court in 1902. Many other countries soon adopted systems of fingerprint identification as well.4 Forensic Science, an amalgamation of almost all faculties of knowledge is an essential and efficient enabler in the dispensation of justice in criminal, civil, regulatory and social contexts. Historically our forefathers in India have practiced forensic application in variety of forms. Present day Indian forensics, as chronicled, owes its genesis to several British initiated ventures such as Chemical Examiner‘s Laboratory (Madras, 1849), Anthropometric Bureau (1892), Finger Print Bureau (1897), Inspectorate of Explosives (1898), Office of Government Handwriting Expert (1904), Serology Department (1910), Foot Print Section (1915), Note Forgery Section (1917), Ballistics Laboratory (1930) and Scientific Section (1936). Having subsequently undergone clubbing / regrouping / spreading, as of now, there are 28 State / Union Territory Forensic Science Laboratories (State / UT FSLs) along with their Regional FSLs (32 RFSLS) and Mobile FSLs (144 MFSLs); they are mostly with the respective Home Department either directly or through police establishment [8]

3. PRESENT DAY

The term crime has been given numerous definition by many prominent jurists like :

In India, various forensic techniques are used in the Criminal Justice system which includes DNA Analysis, NARCO, Brain Mapping, etc. DNA testing has been used in the cases where the question of succession arises in the property matters. If a property is being claimed by many, and the real successor is unknown, DNA Testing is the only way to determine the real owner of that property.[9]

Also, in the cases of Sexual assault, DNA testing proves to be a useful technique as it helps to identify that whether a rape has been committed or not. It also reduces the risk of false reporting of the cases by women.[10]

Similarly, NARCO test proves to be a useful tool to determine the guilt of the accused in case of grave offences or where the evidence is not present in substance.

4. DNA HISTORY AND DEVELOPMENT

The human hereditary material known as deoxyribonucleic acid, or DNA, is a long molecule containing the information organisms need to both develop and reproduce. DNA is found in every cell in the body, and is passed down from parent to child.

Although the discovery of DNA occurred in 1869 by Swiss-born biochemist Fredrich Miescher, it took more than 80 years for its importance to be fully realized. And even today, more than 150 years after it was first discovered,

exciting research and technology continue to offer more insight and a better answer to the question: why is DNA important?

Credit for who first identified DNA is often mistakenly given to James Watson and Francis Crick, who actually just furthered Miescher's discovery with their own ground breaking research nearly 100 years later. Watson and Crick contributed largely to our understanding of DNA in terms of genetic inheritance, but much like Miescher, long before their work, others also made great advancements in and contributions to the field.

- 1866 – Before the many significant discoveries and findings, Gregor Mendel, who is known as the "Father of Genetics," was actually the first to suggest that characteristics are passed down from generation to generation. Mendel coined the terms we all know today as recessive and dominant.
- 1869 – Friedrich Miescher identified the "nuclein" by isolating a molecule from a cell nucleus that would later become known as DNA.
- 1881 – Nobel Prize winner and German biochemist Albrecht Kossel, who is credited with naming DNA, identified nuclein as a nucleic acid. He also isolated those five nitrogen bases that are now considered to be the basic building blocks of DNA and RNA: adenine (A), cytosine (C), guanine (G), and thymine (T) (which is replaced by uracil (U) in RNA).
- 1882 – Shortly after Kossel's findings, Walther Flemming devoted research and time to cytology, which is the study of chromosomes. He discovered mitosis in 1882 when he was the first biologist to execute a wholly systematic study of the division of chromosomes. His observations that chromosomes double is significant to the later-discovered theory of inheritance.
- Early 1900s – Theodor Boveri and Walter Sutton were independently working on what's now known as the Boveri-Sutton chromosome theory, or the chromosomal theory of inheritance. Their findings are fundamental in our understanding of how chromosomes carry genetic material and pass it down from one generation to the next.
- 1902 – Mendel's theories were finally associated with a human disease by Sir Archibald Edward Garrod, who published the first findings from a study on recessive inheritance in human beings in 1902. Garrod opened the door for our understanding of genetic disorders resulting from errors in chemical pathways in the body.
- 1944 – Oswald Avery first outlined DNA as the transforming principle, which essentially means that it's DNA, not proteins, that transform cell properties .
- 1944 – 1950 – Erwin Chargaff discovered that DNA is responsible for heredity and that it varies between species. His discoveries, known as Chargaff's Rules, proved that guanine and cytosine units, as well as adenine and thymine units, were the same in double-stranded DNA, and he also discovered that DNA varies among species.

- Late 1940s – Barbara McClintock discovered the mobility of genes, ultimately challenging virtually everything that was once thought to be. Her discovery of the "jumping gene," or the idea that genes can move on a chromosome, earned her the Nobel Prize in Physiology.
- 1951 – Roslind Franklin's work in X-ray crystallography began when she started taking X-ray diffraction photographs of DNA. Her images showed the helical form, which was confirmed by Watson and Crick nearly two years later. Her findings were only acknowledged posthumously.
- 1953 – Watson and Crick published on DNA's double helix structure that twists to form the ladder-like structure we think of when we picture DNA.[11]

The Future of DNA

The future of DNA has great potential. As researchers and scientists continue to advance what we know about the complexities of DNA and the insights it codes for, we can imagine a world with less and better-managed disease, longer life spans, and a personalized view of medicine that's specifically applicable to individuals rather than the population as a whole.

DNA insights are already enabling the diagnosis and treatment of genetic diseases. Science is also hopeful that medicine will advance to be able to leverage the power of our own cells to fight disease. For example, gene therapy is designed to introduce genetic material into cells to compensate for abnormal genes or to make a therapeutically beneficial protein.

Researchers also continue to use DNA sequencing technology to learn more about everything from combating infectious disease outbreaks to improving nutritional security.

Ultimately, DNA research will accelerate breaking the mold of the one-size-fits-all approach to medicine. Every new discovery in our understanding of DNA lends to further advancement in the idea of precision medicine, a relatively new way doctors are approaching healthcare through the use of genetic and molecular information to guide their approach to medicine. With precision or personalized medicine, interventions take into consideration the unique biology of the patient and are tailored individually to each patient, rather than being based on the predicted response for all patients. Using genetics and a holistic view of individual genetics, lifestyle, and environment on a case-by-case basis, doctors are better able to not only predict accurate prevention strategies, but also suggest more effective treatment options.

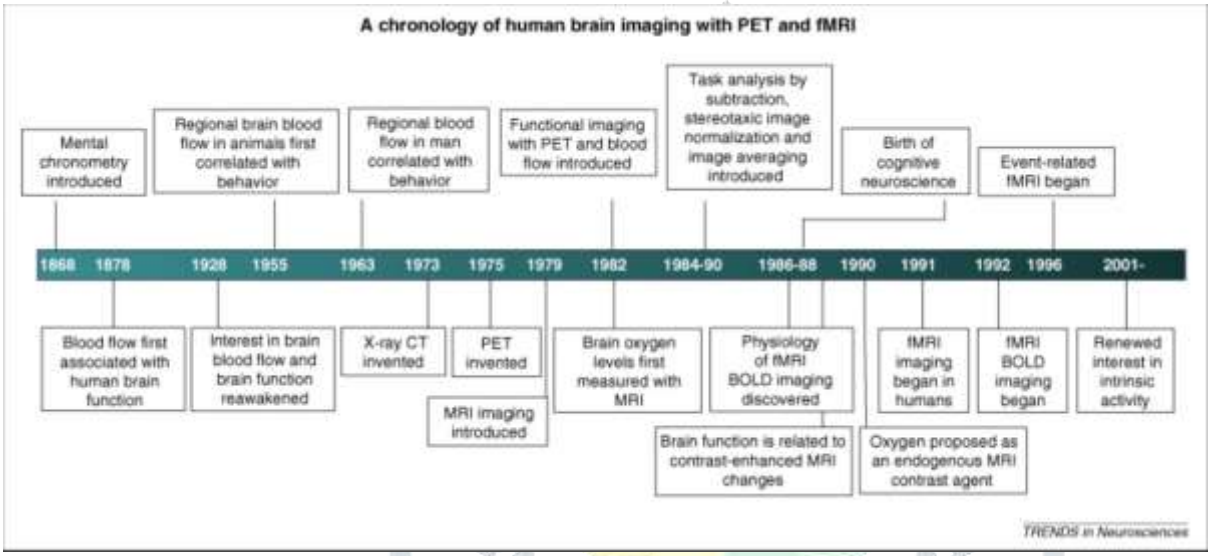
We've come leaps and bounds from where we were in terms of our understanding of DNA 150 years ago. But still, there is much to learn. And with the potential that a deeper understanding of DNA will improve human health and quality of life across our world, no doubt, the research will continue. A full understanding of DNA of and between all living things could one day contribute to solving problems like world hunger, disease prevention, and fighting climate change. The potential truly is unlimited, and to say the least, extremely exciting.

There are so many treatments and cures to diseases that are close to being discovered, and one's unique DNA data can help revolutionize the future of medicine.

DNA has only come to be understood over the last century. The technology has been improving and has allowed scientists to not only map out entire genomes of many species, but they also use computers to compare those maps. By entering genetic information of different species, it is easy to see where they overlap and where there are differences.[11]

5. BRAIN MAPPING HISTORY

Human functional brain mapping as we presently know it began when the experimental strategies of cognitive psychology were combined with modern brain-imaging techniques (first positron emission tomography and then functional magnetic resonance imaging) to examine how brain function supports mental activities. Although much of this work has transpired over the past couple of decades, its roots can be traced back more than a century.[12]



Over the past 30 years the field of cognitive neuroscience has emerged as an important growth area in neuroscience. Cognitive neuroscience combines the experimental strategies of cognitive psychology with various techniques to actually examine how brain function supports mental activities. Leading this research in normal humans are the techniques of functional brain imaging: positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) along with electroencephalography (EEG), electrocorticography (ECoG), magnetoencephalography (MEG) and, most recently, optical imaging with nearinfrared spectroscopy (NIRS).[13]

The majority of functional brain imaging with PET and MRI, in addition to earlier non-tomographic techniques, is made possible because blood flow changes locally in the brain in relation to changes in cellular activity. The idea that local blood flow within the brain is intimately related to brain function is surprisingly old. Angelo Mosso, a prominent Italian physiologist of the 19th century, had ingeniously monitored the pulsations of the brain in adults through neurosurgically created bony defects in the skulls of patients. He noted that when his subjects engaged tasks such as mathematical calculations the pulsations of the brain increased locally. Such observations led him to conclude, presciently, that blood flow to the brain followed function [14]. The actual physiological relationship between brain function and blood flow was first explored in 1890 by Charles Roy and Charles Sherrington [15]. Despite this promising beginning, interest in the relationship between brain function and brain

blood flow almost ceased during the first quarter of the 20th century. Undoubtedly, this was owing, in part, to a lack of tools sufficiently sophisticated to pursue this line of research. In addition, the work of Leonard Hill, Hunterian Professor of the Royal College of Surgeons in England, was probably influential [16]. His eminence as a physiologist overshadowed the inadequacy of his own experiments that wrongly led him to conclude no relationship existed between brain function and brain circulation. There was no serious challenge to Leonard Hill's views until a remarkable clinical study of a patient Walter K. was reported by John Fulton in the 1928 issue of the journal Brain [17]. During the course of his evaluation and treatment for a vascular malformation lying over his visual cortex, Walter K. remarked to his physicians that a noise that he perceived in the back of his head increased in intensity when he was using his eyes.

It was not until the close of World War II that Seymour Kety and his colleagues (University of Pennsylvania and National Institutes of Health) opened the next chapter in studies of brain circulation and metabolism. Kety developed the first quantitative method for measuring wholebrain blood flow and metabolism in humans [18]. Because their measurements were confined to the whole brain they were not suitable for 'brain mapping'. However, their introduction of an in vivo tissue autoradiographic measurement of regional blood flow in laboratory animals [19] provided the first glimpse of quantitative regional changes in blood flow in the brain related directly to brain function. Derivatives of this technique many years later became important for the measurement of blood flow in humans when PET provided a means of quantifying the spatial distribution of radiotracers in tissue without the need for invasive autoradiography (see later). Following on the heels of the work by Kety and colleagues, David Ingvar (University of Lund, Sweden), NeilsLassen (University of Copenhagen, Denmark) and their Scandinavian colleagues introduced methods applicable to humans that permitted regional blood-flow measurements to be made using scintillation detectors arrayed like a helmet over the head. They demonstrated conclusively that brain blood flow changed regionally in normal human subjects during task performance.[20]

6. THE HISTORY OF FORENSIC BALLISTICS

ballistics is the study of the flight path of projectiles. And when used in criminal investigations, forensic ballistics or ballistic fingerprinting (also called forensic firearm examination) helps in the reconstruction of a crime scene involving a firearm. It also enables the tracing of the weapon used and thus provides significant leads to identify the suspect(s). Forensic ballistic relies heavily on evidence such as bullets, gunpowder residues, shell casings, firearms, etc. recovered from the crime scene.

Forensic ballistic professionals are adept at examining such evidence to draw conclusive inferences on the exact weapon used, the distance, velocity, and angle of firing, and ultimately the shooter himself. In crime scene investigations, forensic ballistics has now become synonymous with the matching of the recovered bullets and their casings to the firearms from which they were discharged. However, while the modern-day crime drama series may make the application of such techniques look quite contemporary, the fact is that such ballistic work has its roots way back in time.

First Use of Ballistics in Forensics

Before the mass manufacturing of guns began, barrels and bullet molds were handmade by gunsmiths. Thus, the exclusivity of each firearm was unavoidable. This meant that the bullets fired always bore some exclusive impressions which were unique to a specific firearm. Thus began the first instances of the careful examination of a bullet in order to trace it back to the gun used to fire it. And this laid the foundation of what is now called as forensic fingerprinting – the forensic examination of firearms and other evidence (bullets, cartridges etc.) recovered from the crime scene to link them to suspects or the specific weapons used in a crime.

The first case of forensic firearm examination to be documented was in 1835. That was when Henry Goddard applied ballistic fingerprinting to link a bullet recovered from the victim to the actual culprit. On careful inspection, he found that the bullet had a defect on its surface which did not seem to be from the barrel or the result of an impact. It seemed more like a defect acquired during its manufacturing. Anticipating that the shooter would have made the bullet himself, he realized that recovering the bullet mold would easily help him confirm the shooter. He was thus able to exactly zero in on the shooter when the mold found at the suspect's home matched the marks on the bullet. This proved as a crucial evidence in convicting the shooter though he did also confess to the crime eventually.

Back in 1860, the case of Regina v Richardson showcases another example of the early application of firearm identification. The major evidence, in this case, was a newspaper wadding. Back in the era before cartridges came into existence, such wadding was used to create a seal between the bullet and the gunpowder. The wadding that was found in the two-barreled muzzle-loading pistol recovered from the murder site matched the wadding found in the victim's wound. Additionally, a wadding that was discovered at the suspect's home was found to be made up of the same material (London Time's newspaper) as the waddings recovered before. This helped to confirm that he was the shooter and led to his conviction.

7. THE BIRTH OF MAGNIFICATION

Over time, as the mass production of guns and ammunition gained pace, the process of rifling became standardized. Thus, whereas a forensic examiner could specifically match the rifling marks on a bullet recovered from the crime scene to those on the firearm's barrel, it became increasingly difficult to match a bullet to a specific firearm made by a specific manufacturer through simple observation. And as they say, necessity is the mother of invention! So eventually, this paved the way for the magnified observation of bullets.

In 1902, Oliver Wendell Holmes, who later became the justice of the US Supreme Court, is said to have used a magnifying glass to examine a test bullet that he fired into cotton wool to compare its striations with those found on the bullet recovered from the victim during an autopsy.

Later in Paris (1912), Professor Balthazard took numerous photographs of the circumferences of the bullet found at the crime scene. He then enlarged these photographs to compare the markings with those obtained on the bullet that he had test-fired from the suspect's weapon.

Development of Comparison Microscope

Eventually, magnification became a crucial part of firearm examinations. However, even though microscopes did exist back then, it was quite challenging to compare two bullets simultaneously. While examining one bullet under the microscope, forensic examiners had to retain the mental image of the other bullet meant for comparison. This posed obvious risks to the validity and reliability of the investigations.

In fact, a major flaw involving ballistic fingerprinting almost led to the conviction of an innocent Charles F. Stielow in 1915 in the United States. He was convicted and sentenced to death for shooting his employer and employer's housekeeper using a pistol of 0.22 caliber. However, when investigator Charles E. Waite reevaluated the evidence with microscopy expert, Dr. Max Poser, he confirmed that the bullets recovered from the crime scene couldn't have been fired from Stielow's gun. Stielow was then acquitted and released.

Embarrassed and perturbed at the possibilities of such blunders in the future, Waite began cataloging the manufacturing data on guns and ammunition. He also made sure to include foreign sources upon realizing that a majority of firearms back then were imported. In due course, Waite along with physicist John Fisher, Major Calvin Goddard, and chemist Philip Gravelle, established the Bureau of Forensic Ballistics in New York City. Philip Gravelle eventually developed the comparison microscope (two microscopes connected by an optical bridge) solving the challenges of simultaneous comparison.

The first significant application of this microscope was in the investigations of the Saint Valentine's Day Massacre in 1929. By examining the bullets and cartridge cases recovered from the site, he was able to identify the exact weapons used – a 12-gauge shotgun and two Thompson submachine guns. Furthermore, he was led to the suspect by matching the evidence recovered to the gun retrieved from his home. In 1932, when the FBI laboratory was established, Goddard got to train its first firearm identification professional.

8. NARCO HISTORY

The term Narco analysis was first introduced in India in 1935 in the process of investigation. It was used to put a person in trance like state and subject him to queries. In the later period it was unheard of as an investigating tool in many years. It again surfaced in the Godhra carnage probe(Inter-communal violence in Gujarat following the burning of a train in Godhra on 27 February 2002, which caused the deaths of 58 Hindu pilgrims and religious workers returning from Ayodhya in 2002). Thereafter it is consistently being used as an investigating tool in many cases. Narco-analysis has been conducted in some major cases like, Godhra Carnage Probe in Gujarat, Multi Crore Rupee fake stamp murder, Shashi murder case, Noida serial murder i.e the infamous Nithari case, Abu Salem, The Arushi Murder Case in May 2008, Malegaon Bomb Blast Case, Mumbai train blast, Mohammed Ajmal Amir Kasab, a Lashkar-e-Taiba militant case etc.

Legality

The Narco analysis test has no evidentiary value in courts. Till recently it was used as an investigation tool. But the Supreme Court decision in Selvi & others vs. State of Karnataka &Anr (Criminal Appeal No. 1267 of 2004 SC) has held that no Narco analysis tests should be administered except on the basis of consent of the accused as

it contradicts Art. 20(3), Art. 21 and some sections of Cr.P.C. This researcher has identified the following constitutional issues that surround the test.

1. Whether the involuntary administration of the impugned techniques violates the `right against self-incrimination' enumerated in Article 20(3) of the Constitution? Whether the investigative use of the impugned techniques creates a likelihood of incrimination for the subject?

2. Whether the results derived from the impugned techniques amount to `testimonial compulsion' thereby attracting the bar of Article 20(3)?

3. Whether the involuntary administration of the impugned techniques is a reasonable restriction on `personal liberty' as understood in the context of Article 21 of the Constitution?

9. THE HISTORY OF FINGERPRINTS

Prehistoric

Ancient artifacts with carvings similar to friction ridge skin have been discovered in many places throughout the world. Picture writing of a hand with ridge patterns was discovered in Nova Scotia. In ancient Babylon, fingerprints were used on clay tablets for business transactions.

BC 200s - China

Chinese records from the Qin Dynasty (221-206 BC) include details about using handprints as evidence during burglary investigations. Clay seals bearing friction ridge impressions were used during both the Qin and Han Dynasties (221 BC - 220 AD).

The 14th century Persian book "Jaamehol-Tawarikh" (Universal History), attributed to Khajeh Rashiduddin Fazlollah Hamadani (1247-1318), includes comments about the practice of identifying persons from their fingerprints.

1600s

In the "Philosophical Transactions of the Royal Society of London" paper in 1684, Dr. Nehemiah Grew was the first European to publish friction ridge skin observations.

1685 - Bidloo

Chinese

Dutch anatomist Govard Bidloo's 1685 book, "Anatomy of the Human Body" included descriptions of friction ridge skin (papillary ridge) details. In 1686, Marcello Malpighi, an anatomy professor at the University of Bologna, noted fingerprint ridges, spirals and loops in his treatise. A layer of skin was named after him; the "Malpighi" layer, which is approximately 1.8 mm thick. No mention of friction ridge skin uniqueness or permanence was made by Grew, Bidloo or Malpighi.

German anatomist Johann Christoph Andreas Mayer wrote the book Anatomical Copper-plates with Appropriate Explanations containing drawings of friction ridge skin patterns. Mayer wrote, "Although the arrangement of

skin ridges is never duplicated in two persons, nevertheless the similarities are closer among some individuals. In others the differences are marked, yet in spite of their peculiarities of arrangement all have a certain likeness" (Cummins and Midlo, 1943, pages 12-13). Mayer was the first to declare friction ridge skin is unique.

In 1823, Jan Evangelista Purkinje, anatomy professor at the University of Breslau, published his thesis discussing nine fingerprint patterns. Purkinje made no mention of the value of fingerprints for personal identification. Purkinje is referred to in most English language publications as John Evangelist Purkinje.

German anthropologist Hermann Welcker of the University of Halle, studied friction ridge skin permanence by printing his own right hand in 1856 and again in 1897, then published a study in 1898.

The English began using fingerprints in July 1858 when Sir William James Herschel, Chief Magistrate of the Hooghly District in Jungipoor, India, first used fingerprints on native contracts. On a whim, and without thought toward personal identification, Herschel had Rajyadhar Konai, a local businessman, impress his hand print on a contract.

Herschel's FPs recorded over a Herschel's fingerprints recorded over a period of 57 years. However as Herschel's fingerprint collection grew, he began to realize the inked impressions could, indeed, prove or disprove identity. While his experience with fingerprinting was admittedly limited, Sir William Herschel's private conviction that all fingerprints were unique to the individual, as well as permanent throughout that individual's life, inspired him to expand their use.

1892 - Sir Francis Galton, a British Anthropologist and cousin to Charles Darwin, publishes the first book on fingerprints.In his book, Galton identifies the individuality and uniqueness of fingerprints. The unique characteristics of fingerprints, asidentified by Galton, will officially become known as minutiae, however they are sometimes still referred to as Galton’s Details.

1896 - International Association of Chiefs of Police (IACP), Establish National Bureau of Criminal Identification, for the exchange of arrest information

1901 - Sir Edward Henry, an Inspector General of Police in Bengal, India, develops the first system of classifying fingerprints. This system of classifying fingerprints. This system of classifying fingerprints was first adopted as the official system in England, and eventually spread throughout.

1903 – The William West – Will West Case at a Federal Prison in Leavenworth, Kansas, changed the way that people were classified and identified. When a man named Will West entered the Leavenworth Prison inmates. His face was photographed, and his Bertillion measurements were taken. Upon completion of this process, it was noted that another inmate, known as William West, who was already incarcerated at Leavenworth, had the same name, Bertillion measurements, and bore a striking resemblance to Will West.

The first trial in England that relied on fingerprint evidence involved Inspector Charles Stockley Collins of Scotland Yard. Collins testified to an individualization made in a burglary case. That 1902 trial and subsequent conviction marked the beginning of fingerprint evidence in the courts of England (Lambourne, 1984, pp 67–68). In October 1902, Alphonse Bertillon, made an individualization in Paris, France, with fingerprints: On October

17, 1902, he [Bertillon] was called to aid the investigation of the murder of Joseph Reibel. A glass panel from a nearby cabinet had been broken, and some bloody fingerprints were discovered on one of the broken pieces.

These were dutifully photographed and preserved. After determining that they did not match the victim's prints, Bertillon began a search of his anthropometric cards, upon which, by that late date, he had added fingerprint impressions as a routine matter in addition to his measurements. Eventually he found a card which contained fingerprint impressions that showed areas that matched the prints taken from the crime scene. The report of the case describes the isolation of three points of resemblance in the thumb-print, four in the index and middle finger, and six in the print from the ring finger. The murderer, Henri Leon Scheffer, was apprehended and brought to justice. (Kingston and Kirk, 1965, p 62)

The incident called the reliability of Bertillion measurements into question, and it was decided that a more positive means of identification was necessary. As the Bertillion System began to decline, the use of fingerprints in identifying and classifying individuals began to rise. After 1903, many prison systems began to use fingerprints as the primary means of identification.

1905 – U.S. Military adopts the use of fingerprints – soon thereafter, police agencies began to adopt the use of fingerprints.In 1905, Inspector Charles S. Collins of Scotland Yard testified to the individualization of a suspect's fingerprint on a cash box. The case involved the murder of a man and his wife. Two brothers, Alfred and Albert Stratton, were the defendants. Collins explained to the jury the classification of fingerprints and how to effect an individualization. Then, he demonstrated the characteristics he had marked on a chart as matching Alfred Stratton's right thumb. Collins claimed that in all his years of experience, he had never found two prints to have more than three characteristics in common. In this case, there were 11 characteristics in common. Supplementing eyewitness statements, the individualization of Alfred Stratton's right thumb impression was the strongest piece of evidence in the case. Both brothers were found guilty of the murders and sentenced to death. This case is referred to as the Deptford Murder Trial, in reference to the address of the crime, and it was the first murder trial in England in which fingerprints were used as evidence. Also in 1905, in the case of Emperor v Abdul Hamid, a court in India decided that no expert was required to testify to the individualization of prints, and an appellate court agreed. They believed that participants in the court could just as easily make a comparison as anyone else and that an expert was not necessary (Cole, 2001, p 170). Other courts would later disagree with the position that no expertise is required to individualize fingerprints.

1908 – The first official fingerprint card was developed

1911 - Fingerprints are first accepted by U.S. courts as a reliable means of Identification.

- Dec. 21, 1911, The Illinois State Supreme Court upheld the admissibility of fingerprint evidence concluding that fingerprints are a reliable form of identification.

Thomas Jennings was the first person to be convicted of murder in the United States based on fingerprint evidence.

Jennings appealed his conviction to the Illinois Supreme Court on the basis of a questionable new scientific technique. The Illinois Supreme Court cited the historical research and use of fingerprints as a means of reliable identification in upholding the conviction, and thus establishing the use of fingerprints as a reliable means of identification.

Jennings was executed in 1912.

1917 - First Palm print identification is made in Nevada. The bloody palm print, found on a letter left at the scene of a stage coach robbery and murder of its driver, was identified to Ben Kuhl. (State v. Kuhl 42 Nev. 195 175 PAC 190 (1918).

1924 – Formation of ID Division of FBI

1980 – First computer data base of fingerprints was developed, which came to be known as the Automated Fingerprint Identification System, (AFIS). In the present day, there nearly 70 million cards, or nearly 700 million individual fingerprints entered in AFIS.

1995: At the International Symposium on Latent Fingerprint Detection and Identification, conducted by the Israeli National Police Agency, at Neurim, Israel, June, 1995, the Neurim Declaration was issued. The declaration, (authored by Pierre Margot and Ed German), states "No scientific basis exists for requiring that a pre-determined minimum number of friction ridge features must be present in two impression in order to establish a positive identification." The declaration was unanimously approved by all present, and later, signed by 28 persons from the following 11 countries: Australia, Canada, France, Holland, Hungary, Israel, New Zealand, Sweden, Switzerland, United Kingdom, and United States.

2012: INTERPOL's Automated Fingerprint Identification System repository exceeds 150,000 sets of fingerprints for important international criminal records from 190 member countries. Over 170 countries have 24 x 7 interface ability with INTERPOL expert fingerprint services.

2015 - The International Association for Identification celebrated it's 100th Anniversary

2020 - America's Largest Databases

Department of Homeland Security Seal

The Department of Homeland Security's Office of Biometric Identity Management (OBIM was formerly US-VISIT), contains over 120 million persons' fingerprints, many in the form of two-finger records. The US Visit Program has been migrating from two flat (not rolled) fingerprints to ten flat fingerprints since 2007. "Fast capture" technology currently enables the recording of ten simultaneous fingerprint impressions in as little as 15 seconds per person.

10.RELATED CASE LAWS

Brain mapping and narco analysis

(i) State Of Rajasthan v. JasveersinghJat (2017)

- The trial of the respondent accused Jasveer Singh and some other accused is underway in the Court of the Additional Sessions Judge, Didwana for the offences under Sections 147, 149, 363, 366, 376(g) and 201 IPC.
- The trial court further held that allowing the tests to be conducted was essential for providing a fair chance of defence to the accused who was facing trial for the offences involving capital punishment.

(ii) Jaichand v. State (2016)

Learned counsel for the appellant/applicant further argued that even during the course of trial, the appellant specifically gave his consent for.../applicant under Section 482 Cr.P.C for issuance of directions for conducting Narco, Brain Mapping and Polygraph test of the appellant/applicant.

(iii)Sidhu Yadav Siddharth Petitioner v. State OfNct Of Delhi (2017)

Narco Analysis Test at the instance of an accused was conducted, the Bombay High Court in its order...dated 27July, 2016 passed in Crl.W.P.2420/2016 titled as Yogesh @ Charu Ananda Chandane v. The State of Maharashtra, observed that the evidence recorded in the course of Narco Analysis is not an admissible evidence.

(iv)Rajni Vishram Patil v. State Of Maharashtra Others

Narco Analysis test of Raju Sonavane was performed on 27.12.2006. However, in view of the illness of another accused said test could not be performed.

DNA test

(v) NandlalWasudeoBadwaik v. Lata NandlalBadwaik And Another (2014)

DNA test revealed that the child was not born to the husband.

(vi)BanarsiDass v. Teeku Dutta (Mrs) And Another(2005)

It was noticed that the scopeo of the enquiry was very little and the trial court should have left the parties to provr their respective cases by such evidence produced during trial, rather than creating evidence by directing dna test.

(vii) Bhabani Prasad Jena v. Convenor Secretary, Orissa State Commission For Women And Another (2010)

High Court of Orissa was justified in issuing direction for deoxyribonucleic acid (**DNA**) **test** of the child and the appellant. DNA test of Smt Nayak will be conducted through SP, Nawarangpur and report sent to OSCW for future reference. 3 of the order passed by the State Commission but clarified that directions regarding maintenance and DNA test are not stayed.

(viii) Dipanwita Roy v. Ronobroto Roy . (2014)

The petitioner wife accordingly sought the dismissal of the application filed by the respondent husband for a DNA test of himself child. Dissatisfied with the order passed by the Family Court on 27-8-2012, the respondent husband approached the High Court of Calcutta.

Forensic evidence

(ix) Manish Kumar v. State Of Bihar

in absence of any scientific or **forensic evidence** petitioners were admitted provisionally.

(x) Rahul v. State Of Uttarakhand

No forensic evidence was relied upon by the prosecution. The incident allegedly occurred in a busy road in Dehradun at about 12.34 PM. Material like forensic evidence in terms of CCTV footage, which has been filed by the applicant himself before this Court alongwith supplementary affidavit.

(xi) Mayur Lalasaheb More v. State Of Maharashtra

opposed the application by contending that the prosecution has established the offence by forensic evidence as well as by former statement of the prosecutrix made before the learned Judicial Magistrate...turned hostile to the prosecution and has not deposed anything incriminating against the present applicant/accused. The conviction is recorded on the basis of forensic evidence as well previous...absence of substantial evidence, the learned trial court ought not to have used corroborative pieces of evidence to convict the applicant/accused and impose harsh sentence on him.

(xii) SUMIT @ SITTU v. STATE OF HARYANA

lthough, a detailed reply has been filed, however, attention of the Court has not been...drawn to any scientific or forensic evidence collected by the police to prove involvement of the petitioner. CRM-M-29573-2020(O&M). The petitioner is in custody for more than 3 years.

(xiii) Vasu v. Santha 1975 (Kerala)[35]

In the above cases the court has laid down certain guidelines regarding DNA tests and their admissibility to prove parentage.

(1) That courts in India cannot order blood test as a matter of course;
(2) Wherever applications are made for such prayers in order to have roving inquiry, the Forensic evidences in Criminal Trial: Need of the Hour prayer for blood test cannot be entertained
(3) There must be a strong prima facie case in that the husband must establish non-access in order to dispel the presumption arising under Section 112 of the Evidence Act.
(4) The court must carefully examine as to what would be the consequence of ordering the blood test; whether it will have the effect ofbranding a child as a bastard and the mother as an unchaste woman.

(xiv) Tandoor Murder Case (1995) Delhi[36]

This was the first criminal case in India solved by the help of forensics. In this case Shusil Sharma murdered his wife at home by firing three bullets in to his wife NainaSahni‘s body. He killed his wife believing that she had her love affair with her classmate and fellow congress worker Matloob Karim. After murdering his wife Sharma took her body in his car to the Bagiya restaurant, where he and restaurant manager Keshav Kumar attempted to burn her in a tandoor there. Police recovered Sharma‘s revolver and blood-stained clothes and sent them to Lodhi Road forensic laboratory. They also took blood sample of Sahni's parents, Harbhajan Singh and Jaswant Kaur and sent them to Hyderabad for a DNA test. According to the lab report, "Blood sample preserved by the doctor while conducting the post mortem and the blood stains on two leads recovered from the skull and the neck of the body of deceased Naina are of 'B' blood group." Confirming that the body was that of Sahni, the DNA report said, "The tests prove beyond any reasonable doubt that the charred body is that of NainaSahni who is the biological offspring of Mr. Harbhajan Singh and Jaswant Kaur." And finally Mr. Shusil Sharma was found guilty with the help of forensic evidences.

11. CONCLUSION

It can be evaluated that forensic science plays an very key role in the investigation of Crime. With Modern times the crimes have increased and the nature, technique of the crime has also changed and advanced as per the technology. Therefore it is very important that the police machinery and the investigation machinery also use forensic science to detect crime and also are at par with the growing technology and various natures of crime. Intelligent criminals have been quick to exploit science for their criminal acts on the other hand police investigator are no longer able to rely on his ageâ€“old art of intelligence. The Barbaric and torturous methods of detecting the crime have no place also no place in a civilized society. Therefore it is necessary that forensic science be used in the criminal investigation to evaluate the nature and type and detection of the crime.

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