History and Development of Forensic Science in India

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The application of science and technology to the detection and investigation of crime and administration of justice is not new to India. Although our ancestors did not know forensic science in its present form, scientific methods in one way or the other seem to have been followed in the investigation of crime. Its detailed reference is found in Kautilya's 'Arthashastra,' which was written about 2300 years ago. Indians studied various patterns of the papillary lines, thousands of years ago. It is presumed that they knew about the persistency and individuality of fingerprints, which they used as signatures. Even Mr. KM Kata, a frequent contributor to `Nature', stated that the Chinese records proved the use of fingerprints in an ancient kingdom of southern India. The Indians knew for long that the handprints, known as the Tarija', were inimitable. The use of fingerprints as signatures by illiterate people in India, introduced centuries ago, was considered by some people as ceremonial only, till it was scientifically proved that identification from fingerprints was infallible.

Chemical Examiner's Laboratories

During the nineteenth century, when the cases of death due to poisoning posed a problem to the law enforcement agencies, a need was felt for isolating, detecting and estimating various poisons absorbed in the human system. The first Chemical Examiner's Laboratory was, therefore, set up for this purpose at the then Madras Presidency, under the Department of Health, during 1849. Later, similar laboratories were set up at Calcutta (1853), followed by one each at Agra (1864) and Bombay (1870). These laboratories were equipped to handle toxicological analysis of viscera, biological analysis of stains of blood, semen, etc. and chemical analysis of food, drugs, and various excisable materials to provide scientific support to the criminal justice delivery system within their limited means. These laboratories also provided analytical facilities to the neighbouring States and Union Territories.

Anthropometric Bureau

While some progress was made in the identification of poisons, the identification of people, specifically criminals, was still being done in a rather haphazard manner. Policemen would try to memorize convict's face so that they could recognize him if he got involved in another crime later. With the introduction of Photography, the Criminal Investigation Department (CID) maintained records of every known criminal including a detailed description of his appearance. With the invention of Bertillon's anthropometric system in 1878, India, along with the other countries of the world, adapted Bertillon's system of personnel identification and thus an Anthropometric Bureau, for maintaining anthropometric records of criminals, was established in 1892 at Calcutta.

Finger Print Bureau

William Herschel, the Collector of the District of Hooghly (Bengal) found that markings on the fingertips of a person never changed during his lifetime. Herschel applied his knowledge and skill in devising a system of registration of finger or thumb impressions of native contractors to safeguard the interests of the Govermnent against the repudiation of contracts by them. Thereafter, he extended his registration procedure to prison regulations for identifying convicted criminals. In 1877, Herschel sought the consent of his superior officers in putting his ideas into practice, but did not succeed. In 1891, Edward Richard Henry's appointment, the Inspector General of Police in Bengal, introduced the thumb impressions in the record slips, containing anthropometric data, to avoid wrong identification. Long before 1897, he introduced maintenance of duplicate criminal records with impressions of 10 fingers separately.

Henry employed few selected Indian police officers, viz. Khan Bahadur Azizul Huq and Rai Bahadur Hem Chandra Bose to work under his general supervision till the classification was evolved, which remains the basic system even today. It was Khan Bahadur Azizul Huq who evolved a mathematical formula to supplement Henry's idea of sorting slips in 1024 pigeon holes, based on fingerprint patterns. Rai Bahadur Hem Chandra Bose made further contribution to the fingerprint science by evolving an extended system of sub-classification, a telegraphic code for finger impression and a system of singledigit classification.

Henry approached the Government to seek approval for replacing the anthropometric data by fingerprints for the identification of habitual criminals. Government readily agreed, and the first fingerprint bureau in the world was officially declared open at Calcutta in July 1897, although the collection of record slips had started a few years earlier. Thus, the personnel identification solely on the basis of fingerprints commenced in India.

Department of Explosives

When the use of explosives for subversive activities became common, it was found necessary to detect the causes of explosion, either accidental or intentional. The foundation of the Department of Explosives was laid when the first chief inspector of explosives was appointed in the year 1898, with his headquarters at Nagpur. Later, five regional offices at Calcutta, Bombay, Agra, Madras and Gwalior, and three suboffices at Shivkashi, Gomia and Asallsol were opened. They developed competence to provide scientific clues in respect of explosives as well as the possible causes of explosions. Their expertise came handy in police investigations in the crimes related to explosions and for evolving various provisions under the Explosives & Petroleum Act.

Government Examiner of Questioned Document, Shimla

The British Government of Bengal felt the necessity of identifying the handwritings on the secret documents connected with the Indian independence movement and, therefore, created the post of Government Handwriting Expert of Bengal. Mr. CR Hardless, the then Superintendent in the A.G.'s office in Bengal, was appointed to this post in 1904. This setup was shifted to Shimla in the year 1906 and was placed under the control of the Director, CID.

A post of Handwriting Expert for the Government of India was created and Mr. CR Hardless was appointed to this post. He was replaced by Mr. F Brewester, a police officer from the West Bengal CID, and was designated as the Government Examiner of Questioned Documents (GEQD). At first, the work of this office was mainly confined to the identification of writings on secret documents. Later, as the application of this branch of science was felt in many other cases, the services of this office were thrown open to criminal as well as civil court cases. During the World War II, this organization took up the additional work of secret censorship, including the detection of invisible writings and training of military personnel in this field of science.

Serologist to the Government of India

When the science of examining human blood developed in India, it became possible to examine blood and seminal stains in criminal investigations. Realising the importance of Forensic Serology, an institute named as Serology Department' was established In Calcutta in 1910. The head of this institute was designated as Imperial Serologist to the Government of India. Dr. Hankin helped in establishing this department. Though the scientific techniques for serological examination were at the infancy stage, this institute provided valuable scientific support by analyzing biological materials for crime investigations. After independence, the department was renamed as `Office of the Serologist and Chemical Examiner to the Government of India'.

Footprint Section of Criminal Investigation Department

During the year 1915, a Footprint Section was established under the CID, Government of Bengal, which helped the police authorities to identify criminals through the examination of footprints collected from the scene of crime. SM Edwardes recorded the following instance in his book `Bombay City Police' showing the use of the footmarks in police work. `On several occasions, Indian constables distinguished themselves by acts of bravery and examples of professional acumen. The detection of a burglary in the showroom of an English firm was entirely due to the action of a Hindu constable, who noticed on a piece of furniture the marks of a foot possessing certain peculiarities, which he remembered having seen before in the foot of an exconvict.'

Note Forgery Section in Criminal Investigation Department

During 1917, a Note Forgery Section was set up under the CID, Government of Bengal, to undertake the examination of forged currency notes. The Revenue Department also started its own laboratory for identification of opium and narcotics, liquor analysis and estimation of purity levels of precious metals like gold, silver, etc. Similarly, Government Mint and Security Printing Departments at Nasik also established their own laboratories for detecting cases of counterfeit and forged currency notes.

Ballistics Laboratory

In 1930, an Arms Expert was appointed and a small ballistic laboratory was set up under the Calcutta Police to deal with the examination of firearms. As the menace of firearms grew,

other State CIDs also established small ballistics laboratories to help them in the criminal investigation.

Scientific Sections in the Criminal Investigation Department

During 1936, a Scientific Section was set up under the CID in Bengal and facilities were created for examination of bullets, cartridge cases, firearms, etc., used in committing crime. Few other states also started scientific sections in their CID, where investigations on fingerprints, footprints, firearms and questioned documents were also carried out. Gradually, more and more branches of science were embraced and the laboratories gained maturity over the years.

State Forensic Science Laboratory, Calcutta

The first state forensic science laboratory in India was established in the year 1952 at Calcutta. This laboratory became fully operational in the year 1953. The Medicolegal Section of the Chemical Examiner's Laboratory was also transferred to this laboratory. During the year 1955, a small unit of Physics was established in the West Bengal State Forensic Science Laboratory to deal with various physical examinations of exhibits encountered in crime investigation. During the year 1957, the Physics unit developed into a fullfledged Physics Section. In the same year, the Footprint and the Note Forgery Sections of Criminal Investigation Department were transferred to this laboratory and in the following year General Chemistry Section of the Chemical Examiner's Laboratory was also transferred to this laboratory. Thus the first multidisciplinary forensic science laboratory came into existence in the country.

Central Finger Print Bureau

On the recommendations of the Royal Police Commission of 1902-03, the first Central Finger Print Bureau (CFPB) in India was established in 1905 at Shimla. It, however, suffered a setback and was abolished in 1922 as a result of retrenchment proposals of the Inchape Committee. The CFPB restarted functioning from 1955 in Delhi under the administrative control of Intelligence Bureau (IB). The major role envisaged for CFPB was to coordinate the activities of State FPBx in tracing/locating interstate criminals. During August 1956, the CFPB was shifted to Calcutta and remained under the administrative control of IB. During September 1973, it was transferred to the Central Bureau of Investigation and during July 1986, the administrative control of the CFPB was transferred to the National Crime Records Bureau (NCRB) and was again shifted to New Delhi.

Central Detective Training School at Calcutta

CDTS, Calcutta, a premier detective training school in India, was established during 1956 and was colocated (in the same premises) with the CFPB, Calcutta. The aim of establishing such a school was to impart training in scientific investigation of crimes like drug abuse, terrorism, explosion, crime against women, investigation of road accidents and enforcement of traffic laws, etc.

Central Forensic Science Laboratories

The first Central Forensic Science Laboratory was established at Calcutta during 1957. To begin with, this laboratory was organised into four basic disciplines viz. Forensic Physics, Forensic Chemistry, Forensic Biology and Forensic Ballistics. For application of nuclear methods of analysis to criminal investigation, the Neutron Activation Analysis Unit of CFSL, Calcutta was set up in 1970 at the Bhabha Atomic Research Centre, Trombay. During the year 1965, the second central forensic science laboratory was established at Hyderabad, The CFSL, Hyderabad initially established analytical facilities in the disciplines of Forensic Physics, Forensic Chemistry and Forensic Biology. The Central Forensic Science Laboratory, Chandigarh, was established, in the year 1933 at Lahore was shifted to Chandigarh during 1961. Over the years many fullfledged forensic science laboratories were established in various states.

Central Forensic Institute, Calcutta

With the establishment of CDTS and CFSL, (later on GEQD also) in the same premises, under the control of Intelligence Bureau, the whole set up was named as the Central Forensic Institute (CFI), Calcutta. A post of Commandant was created during 1958 to look after the overall functioning of all these establishments, which had different roles but with the common larger goal of providing appropriate scientific inputs to the criminal investigation process and administration of criminal justice in the country.

CDTS at Hyderabad & Chandigarh

The Central Detective Training School, Hyderabad was established in 1964, on the pattern of the CDTS, Calcutta, followed by another one at Chandigarh, during 1973. Their main objective was to train the operational police personnel in modern scientific techniques of crime investigation, with a view to improve their professional standard and efficiency.

The Role of Central Advisory Committees

The Union Government, during 1959, appointed two committees for the purpose of giving a lead to all the States in establishing new forensic science laboratories and improving the existing ones, and for improving the study and application of Forensic Medicine. These committees were (i) Central Forensic Science Advisory Committee and (ii) Central Medicolegal Advisory Committee. The Central Medicolegal Advisory Committee was to advise the Central and the State Governments on matters pertaining to medicolegal procedures and practices. The Central Advisory Committee on Forensic Science considered the issues related to the sphere of Forensic Science (excluding forensic medicine). The Central Medicolegal Advisory Committee was discontinued whereas the Central Forensic Science Advisory Committee was converted into Standing Committee on Forensic Science during the year 1972, which is functional even today in BPR&D.

Indian Academy of Forensic Science

The Indian Academy of Forensic Sciences (IAFS) was established in the year 1960. This academy started a biennial scientific journal, which served as a forum for the exchange of ideas in forensic science with the other international bodies. The role of the Academy was

also to hold annual scientific meetings/seminars or assist in holding seminars in forensic science. In fact, it was at the instance of this Academy that the Government of India established the Neutron Activation Analysis Unit to cater for the forensic needs in the country.

Teaching of Forensic Science in the Universities

The question of introducing criminology and forensic science as the courses of study at the university level in India was taken up with the ViceChancellors of various universities during 1950, but the progress made in this direction was not encouraging. The need for university teaching of criminology and forensic science was also stressed in various annual meetings of the Central Advisory Committee on Forensic Science. A deputation headed by Shri KF Rustamji met the Chairman, University Grants Commission in August 1961 and the matter was again taken up by Shri DP Kohli, the then Director, Central Bureau of Investigation in 1967. As a result of these discussions, Dr DS Kothari, the then Chairman, University Grants Commission set up a high level committee to advise the Commission on the steps to be taken for introduction of Criminology and Forensic Sciences in university education. It recommended that universities should be encouraged to introduce courses in Criminology at the undergraduate level and postgraduate courses in Criminology and Forensic Science should be started only in a central autonomous institution, which should be affiliated to a university. Consequently three Universities viz., University of Sagar, Madras and Patiala started undergraduate and postgraduate courses in forensic science. It was further suggested that, as an initial step in this direction, one institute under the Central Government should be established in Delhi. The Committee recommended those two courses viz. Master's Degree in Criminology and Master's Degree in Forensic Science should be organised in this Institute, besides Diploma courses for inservice personnel. The institute should also be developed as a center for research in Criminology and Forensic Science and should act as a clearinghouse of uptodate information in these fields.

Institute of Criminology & Forensic Science at New Delhi

After a series of debates at the Government level, it was decided that initially the Institute of Criminology and Forensic Science should be established only for training the inservice personnel and for conducting research in the field of forensic science. It was felt that unless the State governments and the consumer organizations agreed to participate in the scheme, it would not be wise to start courses for granting postgraduate degrees. However, the ultimate objective of the Institute was to develop into a fullfledged academic institution affiliated to a university. With the above aim in view, the Institute of Criminology and Forensic Science (ICFS) was established in Delhi during 1971 with the limited objectives of imparting training to the inservice personnel and conducting research in Criminology and Forensic Science. It was also envisaged that the Institute should have two distinct faculties viz. the Faculty of Criminology and the Faculty of Forensic Science and both should have a number of eminent teachers and researchers with adequate background and field experience.

Creation of Forensic Science Division at BPR&D

On an invitation from the Government of India, Dr. VK Street, an eminent forensic scientist from the Department of Forensic Medicine, University of Edinburgh, UK, visited different

Indian forensic science institutions during 1972 and submitted a report to the Ministry of Home Affairs, Government of India. He strongly recommended for creation of a post of Chief Forensic Scientist in the Ministry of Home Affairs to look after its forensic science activities and to pay whole time attention for the development of this science in India. The Standing Committee on Forensic Science, during 1973, also recommended for the creation of a post of Chief Forensic Scientist so that the activities, which needed scientific inputs at the Union Government level, could be properly coordinated. The post of Chief Forensic Scientist was finally sanctioned during 1983, and the Forensic Science Directorate was created in BPR&D.

Recommendations of Scientific Advisory Committee to the Cabinet

During 1983, the then Scientific Advisory Committee to the Cabinet (SACC) under the overall guidance of an Expert Committee chaired by Prof. M. M. Sharma, FRS, recommended that the laboratories in Delhi, Calcutta and Hyderabad must be developed as S & T institutions, functioning in an autonomous fashion, with complete modernization of equipment and manpower capabilities. In pursuance of these recommendations, the Government of India declared the forensic science institutions, at the central Government level as Science and Technology institutions.

Based on the observations of the Expert Group of the SACC, BPR&D evolved a master plan for restructuring each CFSL of the BPR&D into fifteen scientific divisions. In the first phase, the three Central Forensic Science Laboratories at Calcutta, Hyderabad, and Chandigarh were restructured into six scientific division viz. Biology, Ballistics, Chemistry, Explosive, Physics, and Toxicology. Similarly, the offices of the Government Examiners of Questioned Documents at Shimla, Calcutta, and Hyderabad were strengthened in terms of manpower. Besides augmentation of staff, all the BPR&D laboratories registered significant progress in the acquisition of sophisticated analytical equipment and updating/modernizing the laboratory and library facilities for smooth working of these institutions.

A New Mandate to the CFSLS OF BPR&D

During mid 1990's, it was realised that most of the States have established their own forensic science laboratories and hence the role of CFSLs to provide forensic analytical support to different states has got diluted. Hence the utility of three CFSLs at the national level was questioned.

During 1997, this realization led to the process of defining the role of the CFSLs of BPR&D, de novo. The justification for the existence of the three Central Forensic Science Laboratories under the BPR&D was thought to be two folds. One, they should act as epitomes of quality and high standards for the State Laboratories to emulate. They should not only set visibly higher standards in quality of analytical processes and reporting accuracy, but also should be the repository of Standards and benchmarks against which the performance of all the State FSLs can be judged. BPR&D should, therefore, have a decisive say in the process of accreditation, not only of its own CFSLs/GEsQD, but also of all the State FSLs. Secondly, since forensic science is one of the most dynamic sciences, CFSLs should provide R&D support to this field of science. Every new research, development and invention in any discipline of science should have a potential of application in forensic science. Newer, better and more

reliable technologies developed in all the disciplines need to be harnessed for the fight against crime. The BPR&D CFSLs should scout around for new developments outside the realm of forensic science and adapt them for use in Ms, standardize the processes and disseminate them to the State FSLs. In order to perform this yeomen service, the CFSLs need to maintain very high standards and specialization, way beyond what is possible in the State FSLs.

Strategy was evolved to bring about a complete paradigm change in the structure of the three BPR&D CFSLs and provide them a new focussed mandate of R&D and specialized training. It emerged that while preserving their composite structure, the three laboratories should have subjectspecific exclusiveness and be developed as the `Centers of Excellence' for research and development and specialized training in the designated fields. Consequently, during 1998, the three CFSLs were reorganized with an aim to generate synergy and focus attention on research and development activities in the thrust areas of forensic science. This was possible only if all the available resources are pooled in the designated Centers of Excellence, rather than spread them very thin on the whole ground. Besides focussing on their core activity of R&D and specialized training in the designated field of forensic science, these laboratories also undertake crime case examination in all the fields of forensic science. However, the routine forensic analysis case work has now been restricted to those received from the Central Government organizations and State Governments/Union Territories, which have not yet established their own forensic science facilities. These laboratories also act as the referral centers for handling forensic analysis of crime cases requiring extensive investigation and high expertise, received from the courts of law, state and central forensic science institutions and other crime investigating agencies in India. The designated fields were chosen as follows:

CFSL, Calcutta Forensic Biological Sciences

CFSL, Hyderabad Forensic Chemical Sciences

CFSL, Chandigarh Forensic Physical Sciences

The Neutron Activation Analysis Unit of CFSL, Calcutta, operating at the BARC, Mumbai, was brought under the administrative control of CFSL, Hyderabad.

Establishment of DNA Typing Laboratory at CFSL Calcutta

In response to the rising demands of providing high technology to the crime investigation process, BPR&D established the first Forensic DNA Typing facility at CFSL, Calcutta, during 1998. The implementation of this stateoftheart technique represents significant advancements in the forensic biology in the country. The DNA Typing Unit at CFSL Calcutta is equipped with the most contemporary techniques of DNA typing, namely, Polymerize Chain Reaction (PCR) based method, HLADQ alpha and Polymarker technique, and Locus Specific Restricted Fragment Length Polymorphism technique. This laboratory, after being functional, has been referred many crime cases pertaining to murder, rape, rape and murder, paternity disputes, organ transplant, exchange of babies in hospitals etc. DNA Typing facility has further been upgraded to conduct `Short Tandem Repeats Sequence based DNA Typing.

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