

EDITORIAL

FORENSIC SCIENCE - THE INTERSECTION OF SCIENCE AND LAW

Briefed to commonly known as “Forensics” is the application of scientific knowledge to find answers required by the legal systems. It has vast application in criminal as well as civil laws. The word *forensic* comes from the Latin adjective *forensis*, meaning "of or before the forum" or with regard to debate or discussion in the court. Forensic science lies at the intersection of science and the law. Forensic scientists work to find answers to legal queries by applying scientific methods. Forensic scientists use chemistry, physics, biology, mathematics, and even psychology to help protect people, serve justice and promote better public health. In addition to working with law enforcement to help solve crimes, these scientists investigate environmental contamination, doping by athletes, and drug abuse.

Health care providers in this field include doctors, dentists, and toxicologists. Scientists from other fields also play an important role. There were no standardized forensic practices in the past and criminals use to escape punishment. Sometimes law enforcing agencies relied on forced confessions and witness testimony. However ancient sources contain several accounts of techniques that foreshadow the concepts of forensic science which was developed centuries later. The available literature dates back to 287-212 BC.¹ The first written account of using medicine and entomology to solve (separate) criminal cases is attributed to the book of Xi Yuan Lu (translated as "Washing Away of Wrongs"), also written in Song Dynasty China by Song Ci (1186-1249) in 1248. There are many historic writings about identification of murder weapon and to access manner of unnatural death.²

During the 16th century Europe medical practitioners in army and university settings, began to gather information on cause and manner of death. Ambroise Paré, a French army surgeon, systematically studied the effects of violent death on internal organs. In the late

18th century, writings on these topics began to appear. These included *A Treatise on Forensic Medicine and Public Health* by the French physician Fodéré and *The Complete System of Police Medicine* by the German medical expert, Franck. There are many examples of using scientific evidence and logic to solve legal queries. However for the first time in 20th century British pathologists including Bernard Spilsbury, Francis Camps, Sydney Smith and Keith Simpson, established the field of forensic science in Britain. In 1909 Rodolphe Archibald Reiss founded the first school of forensic science in the world: the "Institute de police scientifique" at the University of Lausanne (UNIL). The recent interest in Forensics has exploded with the popularity of television series including “CSI” and “Bones.” There are many branches of forensic sciences and many new are developing. The main subdivisions include^{3,4}:

FORENSIC PATHOLOGY

The experts in this field are called Forensic pathologists. Forensic pathologists, or medical examiners, are specially trained physicians who examine the bodies of people who died suddenly, unexpectedly, or violently. The forensic pathologist is responsible for determining the cause (the ultimate and immediate reasons for the cessation of life) and manner of death (homicide, suicide, accidental, natural, or unknown). They also help to determine the identity of the victim and the time, manner and cause of death. The forensic pathologist studies the medical history, evaluates crime scene evidence including witness statements, performs an autopsy to uncover evidence of injury or disease, and collects medical and trace evidence from the body for further analysis. They are qualified pathologists with postgraduate fellowship in the field of histopathology and forensic pathology.

Medical jurisprudence or forensic medicine deals with matters which may bring the physician into contact with the law. In brief it deals with, questions of the legal and

ethical duties of physicians, questions affecting the civil rights of individuals with respect to medicine; and, medicolegal assessment of injuries to the person. It deals with competence or sanity in civil or criminal proceedings. Forensic medicine also deals with assessment of illness or injuries that may be work-related or otherwise compensable. Also addresses injuries of minors that may relate to neglect or abuse. Forensic medicine deals with certification of death or the assessment of possible causes of death. Presently in most of the countries the identification of causes of death is a matter of forensic pathology.

FORENSIC BIOLOGY

This branch of Forensics deals with examination of blood and other bodily fluids, hair, bones, insects, plant and animal remains, to help identify victims and support criminal investigations. This field makes use of leading-edge technology in the laboratory and in the field to collect and analyze biological evidence found on clothing, weapons and other surfaces to determine the time and cause of death. In addition to biology, forensic biology also deals with DNA analysis. Forensic DNA analysis is presently playing a very important role in legal investigations; it has got multi facet application⁶.

FORENSIC TOXICOLOGY

Forensic toxicology deals with the scientific tests on bodily fluids and tissue samples to identify any drugs or chemicals present in the body. Toxicology and other disciplines such as analytical chemistry, pharmacology and clinical chemistry, aid medical or legal investigation of death, poisoning, and drug use. The primary concern for forensic toxicology is not only the legal outcome of the toxicological investigation but also to obtain and interpret the results. A toxicological analysis can be done

on various kinds of samples. As part of a team investigating a crime, a forensic toxicologist will isolate and identify any substances in the body that may have contributed to the crime, such as, alcohol, illegal or prescription drugs, poisons, metals and gases, such as carbon monoxide

CRIME SCENE INVESTIGATION

The branch of Forensics has many sub-branches such as Crime scene investigation (CSI), Trace evidence, Criminalistics, Forensic photography, fingerprints analysis, footprints analysis, hair and fibers damage analysis. Other fields included in forensic sciences are: Forensic anthropology, Forensic entomology, Forensic botany, Biological chemistry, Forensic odontology. All these newly emerging branches of forensics are providing more and more accurate and logical answers with scientific evidence to various legal questions. This branch of science is vitally contributing towards the requirements of justice⁷.

REFERENCES

1. Schafer, Elizabeth D. "Ancient science and forensics". In Ayn Embardson, Allan D. Pass (eds.). *Forensic Science*. Salem Press. p. 40. 2008.
2. Kind S, Overman M *Science Against Crime*. New York: Doubleday. pp. 12-13. 1972.
3. K. Hunter, Justice and medicine: The rare art of forensic pathology. *Can Med Assoc J*, 1977; 116(4): 397-403,.
4. Ferris J. Forensic science and the justice system in the late twentieth century. *J Forensic Sci Soc*; 1987; 27(3):147-55.
5. Curran WJ. Forensic Medical Science: The continued problems of judges and juries. *N Engl J Med*. 1976; 6; 294 (19):1042-3.
6. Brownlie AR. Blood and the blood groups, a developing field for expert evidence. *J Forensic Sci Soc* 1965; 5(3):124-74.
7. Knight's *Forensic Pathology*, (3rd Ed) Saukko P. and B. Knight, Arnold Publishers, 2004.

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