*Forensic science 13/2017/feb*

**Forensic science** is the application of [science](https://en.wikipedia.org/wiki/Science) to [criminal](https://en.wikipedia.org/wiki/Criminal_law) and [civil laws](https://en.wikipedia.org/wiki/Civil_law_%28legal_system%29), mainly—on the criminal side—during [criminal investigation](https://en.wikipedia.org/wiki/Criminal_investigation), as governed by the legal standards of [admissible evidence](https://en.wikipedia.org/wiki/Admissible_evidence) and [criminal procedure](https://en.wikipedia.org/wiki/Criminal_procedure).

Forensic scientists collect, preserve, and analyze scientific [evidence](https://en.wikipedia.org/wiki/Evidence) during the course of an investigation. While some forensic scientists travel to the scene of the crime to collect the evidence themselves, others occupy a laboratory role, performing analysis on objects brought to them by other individuals.

 In addition to their laboratory role, forensic scientists testify as [expert witnesses](https://en.wikipedia.org/wiki/Expert_witness) in both criminal and civil cases and can work for either the [prosecution](https://en.wikipedia.org/wiki/Prosecutor) or the defense. While any field could technically be *forensic*, certain sections have developed over time to encompass the majority of forensically related cases.

In 16th-century Europe, medical practitioners in army and university settings began to gather information on the cause and [manner of death](https://en.wikipedia.org/wiki/Manner_of_death). [Ambroise Paré](https://en.wikipedia.org/wiki/Ambroise_Par%C3%A9), a French army [surgeon](https://en.wikipedia.org/wiki/Surgery), systematically studied the effects of violent death on internal organs.

 Two [Italian](https://en.wikipedia.org/wiki/Italian_people) surgeons, Fortunato Fidelis and Paolo Zacchia, laid the foundation of modern [pathology](https://en.wikipedia.org/wiki/Pathology) by studying changes that occurred in the structure of the body as the result of disease. 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 [Francois Immanuele Fodéré](https://en.wikipedia.org/w/index.php?title=Francois_Immanuele_Fod%C3%A9r%C3%A9&action=edit&redlink=1) and *The Complete System of Police Medicine* by the German medical expert [Johann Peter Frank](https://en.wikipedia.org/wiki/Johann_Peter_Frank).

As the rational values of the [Enlightenment era](https://en.wikipedia.org/wiki/Enlightenment_era) increasingly permeated society in the 18th century, criminal investigation became a more evidence-based, rational procedure − the use of torture to force confessions was curtailed, and belief in witchcraft and other powers of the [occult](https://en.wikipedia.org/wiki/Occult) largely ceased to influence the court's decisions. Two examples of English forensic science in individual legal proceedings demonstrate the increasing use of [logic](https://en.wikipedia.org/wiki/Logic) and [procedure](https://en.wikipedia.org/wiki/Procedure_%28term%29) in criminal investigations at the time. In 1784, in [Lancaster](https://en.wikipedia.org/wiki/Lancaster%2C_Lancashire), John Toms was tried and convicted for murdering Edward Culshaw with a [pistol](https://en.wikipedia.org/wiki/Pistol). When the dead body of Culshaw was examined, a pistol wad (crushed paper used to secure powder and balls in the muzzle) found in his head wound matched perfectly with a torn newspaper found in Toms's pocket, leading to the conviction.

In [Warwick](https://en.wikipedia.org/wiki/Warwick) 1816, a farm laborer was tried and convicted of the murder of a young maidservant. She had been drowned in a shallow pool and bore the marks of violent assault. The police found footprints and an impression from corduroy cloth with a sewn patch in the damp earth near the pool. There were also scattered grains of [wheat](https://en.wikipedia.org/wiki/Wheat) and chaff. The breeches of a farm labourer who had been threshing wheat nearby were examined and corresponded exactly to the impression in the earth near the pool.

Sir [William Herschel](https://en.wikipedia.org/wiki/Sir_William_Herschel%2C_2nd_Baronet) was one of the first to advocate the use of fingerprinting in the identification of criminal suspects. While working for the [Indian Civil Service](https://en.wikipedia.org/wiki/Indian_Civil_Service_%28British_India%29), he began to use thumbprints on documents as a security measure to prevent the then-rampant repudiation of signatures in 1858.



Fingerprints taken by [William Herschel](https://en.wikipedia.org/wiki/William_Herschel) 1859/60.

In 1877 at Hooghly (near Calcutta), Herschel 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.

 In 1880, Dr. [Henry Faulds](https://en.wikipedia.org/wiki/Henry_Faulds), a Scottish surgeon in a [Tokyo](https://en.wikipedia.org/wiki/Tokyo) hospital, published his first paper on the subject in the scientific journal [*Nature*](https://en.wikipedia.org/wiki/Nature_%28journal%29), discussing the usefulness of fingerprints for identification and proposing a method to record them with printing ink. He established their first classification and was also the first to identify fingerprints left on a vial. Returning to the UK in 1886, he offered the concept to the [Metropolitan Police](https://en.wikipedia.org/wiki/Metropolitan_Police) in London, but it was dismissed at that time.

Faulds wrote to [Charles Darwin](https://en.wikipedia.org/wiki/Charles_Darwin) with a description of his method, but, too old and ill to work on it, Darwin gave the information to his cousin, [Francis Galton](https://en.wikipedia.org/wiki/Francis_Galton), who was interested in anthropology. Having been thus inspired to study fingerprints for ten years, Galton published a detailed statistical model of fingerprint analysis and identification and encouraged its use in forensic science in his book *Finger Prints*.

He had calculated that the chance of a "false positive" (two different individuals having the same fingerprints) was about 1 in 64 billion.

 [Juan Vucetich](https://en.wikipedia.org/wiki/Juan_Vucetich), an Argentine chief police officer, created the first method of recording the fingerprints of individuals on file. In 1892, after studying Galton's pattern types, Vucetich set up the world's first fingerprint bureau. In that same year, Francisca Rojas of [Necochea](https://en.wikipedia.org/wiki/Necochea) was found in a house with neck injuries whilst her two sons were found dead with their throats cut. Rojas accused a neighbour, but despite brutal interrogation, this neighbour would not confess to the crimes. Inspector Alvarez, a colleague of Vucetich, went to the scene and found a bloody thumb mark on a door. When it was compared with Rojas' prints, it was found to be identical with her right thumb. She then confessed to the murder of her sons.

A Fingerprint Bureau was established in Calcutta ([Kolkata](https://en.wikipedia.org/wiki/Kolkata)), India, in 1897, after the Council of the Governor General approved a committee report 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](https://en.wikipedia.org/wiki/Azizul_Haque_%28police_officer%29) and [Hem Chandra Bose](https://en.wikipedia.org/wiki/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](https://en.wikipedia.org/wiki/Edward_Henry).

 The [Henry Classification System](https://en.wikipedia.org/wiki/Henry_Classification_System), co-devised by Haque and Bose, was accepted in England and Wales when the first United Kingdom Fingerprint Bureau was founded in [Scotland Yard](https://en.wikipedia.org/wiki/Scotland_Yard), the [Metropolitan Police](https://en.wikipedia.org/wiki/Metropolitan_Police) headquarters, London, in 1901. Sir Edward Richard Henry subsequently achieved improvements in dactyloscopy.

In the United States, Dr. Henry P. DeForrest used fingerprinting in the [New York Civil Service](https://en.wikipedia.org/wiki/New_York_Police_Department) in 1902, and by December 1905, [New York City Police Department](https://en.wikipedia.org/wiki/New_York_City_Police_Department) Deputy Commissioner Joseph A. Faurot, an expert in the [Bertillon](https://en.wikipedia.org/wiki/Alphonse_Bertillon) system and a fingerprint advocate at Police Headquarters, introduced the fingerprinting of criminals to the United States.

