Opening extract from

Crimebusters

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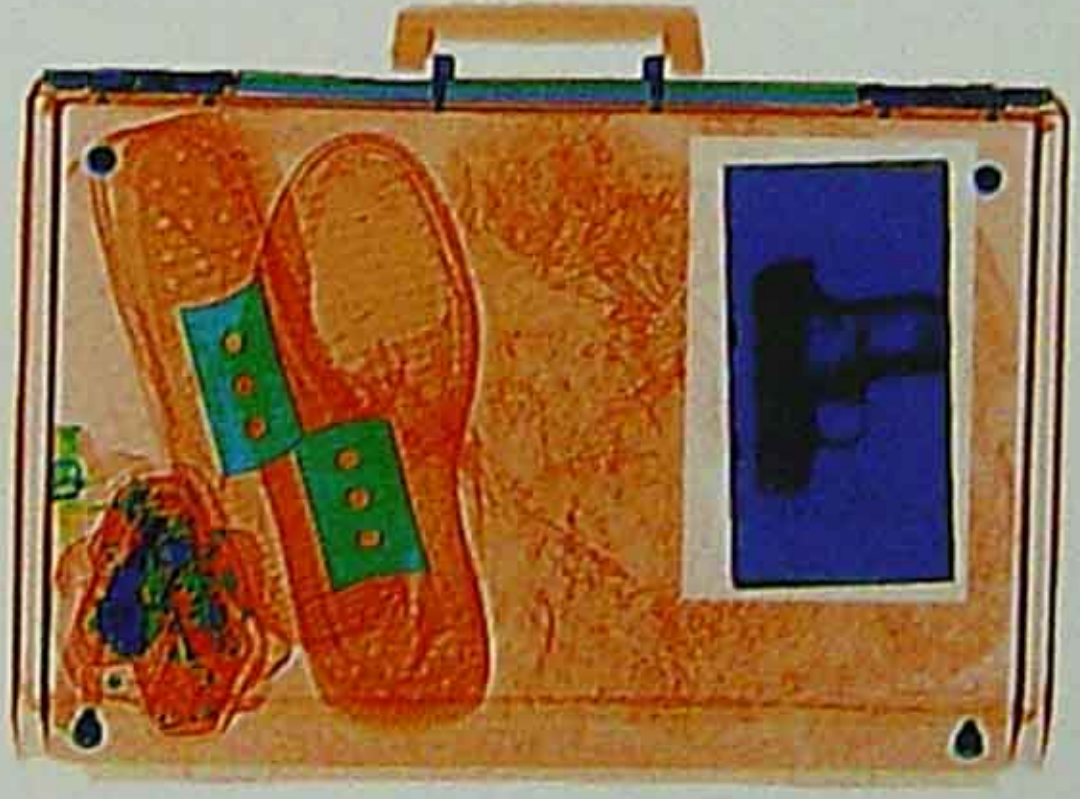
Published by

Oxford University Press

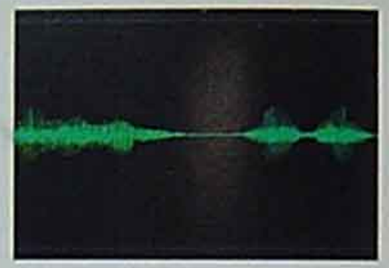
CRIMEBUSTERS

How science fights crime



What is evidence?

From an abandoned getaway car to a human hair, evidence comes in many different shapes, sizes and forms. Evidence is used by detectives in a number of ways. These include establishing identities of those at the crime scene, linking a suspect to the victim, crime or crime scene, and proof that a witness's statement is accurate. Evidence can also help rule someone out of an investigation.



▲ A voice spectrograph produces a voiceprint. People's voices are distinctive but voice analysis is only allowed as evidence in some courts.

Types of evidence

Not all evidence consists of physical objects such as clothing, bullets or shards of glass. Fingerprint and footprint evidence, crime scene photos and digital evidence taken from computer hard drives can all be crucial. Important evidence often comes from the testimonies of people who either witnessed the crime being committed or tell police about the activities of a particular person.

▲ A police diver emerges from a river after conducting an underwater search for clues. Any potential evidence found will be taken to the crime lab for further investigation.

Building a case

It's rare for a single piece of evidence to result in a crime being solved. Usually, detectives have to build up a big picture of events before, during and after the crime was committed. Every piece of evidence has to be carefully recorded and stored so that it is admissable in a court of law.

► A forensics officer collects evidence from a broken window. The glass fragments might be matched to ones later found on a suspect's clothing. There may also be traces of the object which hit the glass.

Trace evidence

Trace evidence is an important part of every investigation. Locard's Principle, named after Dr Edmond Locard (1877–1966), a French forensics expert, states that every contact leaves a trace. This means that a criminal will both bring something into the scene (such as a footprint), and leave with something from the scene (such as mud, or a victim's hair or blood).

▲ Careful forensic examination of a computer might lead to the discovery of evidence in the form of a fingerprint, hair or fibre from the clothes of a suspect.

On the case

A coin was vital evidence that led to the capture of a major spy. In 1953, a newspaper delivery boy in New York received an odd coin as change. The nickel was hollow and contained a microphotograph in code. Four years of investigations eventually led to the unmasking of Rudolf Abel, a Soviet Union spy working in the United States.

Fingerprints

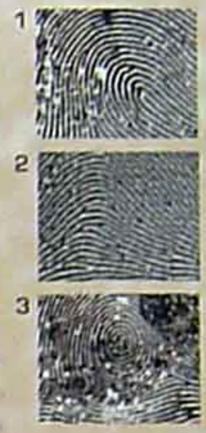
Each of your fingertips has a unique pattern of fine ridges that is different to anyone else's – not even identical twins possess the same prints. Analysing these ridges and patterns gives law enforcers a powerful tool for identifying an individual from fingerprints found at a crime scene or elsewhere.

Fingerprint pioneer

In 1901, the first Fingerprint Bureau was opened in London. Sir Edward Henry, who had developed a system of classifying prints, was put in charge of three special fingerprinting officers. The following year, house burglar Harry Jackson became the first person in the UK to be convicted with fingerprint evidence. Henry's 'ten-print' method of classifying prints was quickly adopted in the USA and many other countries.

▲ When a suspect (right) is arrested, their prints are taken. In the past fingers were inked and prints placed on cards. Today, many law enforcement forces scan the suspect's fingerprints electronically so that they can be processed immediately.

▲ Analysis of a fingerprint scan seeks out unique features of ridges such as where they end (marked in green) and where two lines join (marked in yellow), which is known as bifurcation. A number of these features must be found in the same position to produce a positive identification.



▲ Fingerprints are characterised by the patterns made by ridges. These can include loops (1), arches (2) and whorls (3). Loops are the most common pattern but they vary greatly in size and shape.

▲ A forensic scientist points out key ridge features of a fingerprint being matched with one held on a database.

Record and compare

Prints at a crime scene are matched with ones held on file by seeking out matches of ridge features in the same position on the print. Different countries require different numbers of matches for the evidence to be admissible in court. France and Australia, for example, require 12 points to match but Italy requires 16 points.

Computer power

Automated fingerprint identification systems (AFIS) speed up the process of comparing and matching prints using powerful computer databases to search and compare. The world's largest database is the FBI's Integrated AFIS (IAFIS). It holds fingerprint records of over 47 million people. An average 6,000 new records are added each day whilst as many as 3,000 searches can be performed every second.

On the case

Painkillers laced with the deadly poison, cyanide, killed two Americans in 1998. Police were closing in on their number one suspect, Stella Nickell, but needed more evidence. From her public library records, they discovered she had taken out books on poisoning – *Human Poisoning* and *Deadly Harvest*. The FBI discovered 84 of her fingerprints mainly on pages about cyanide poisoning. In 1988, she was found guilty and sentenced to 90 years in prison.