



CRIMINAL INVESTIGATION: A BRIEF REVIEW OF IMPORTANCE OF BIOLOGICAL EVIDENCE

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Article history:	Abstract:
Received: 26 th June 2021 Accepted: 10 th July 2021 Published: 3 rd August 2021	In any society, crime is ingrained in each social experience. All crimes are investigated within the legal framework, and the criminal justice system seeks to apprehend the perpetrator and compensate the victims based on evidence beyond a reasonable doubt and Criminal investigative evidence is critical in this process. The Prime intention of this study is to discuss the concepts of Biological evidence in Criminal Investigation and its Positive Impact on the criminal investigation procedure. Attention will also be drawn to the importance of the Biological evidence; secondary resources related to the criminal investigation field were reviewed for this article. As the concepts of the study, evidence, Locard's exchange principle, circumstantial evidence, physical evidence, and biological evidence were classified; under biological evidence, 11 distinct types of evidence have been identified, including blood, semen, vaginal secretion, saliva, urine, sweat, tears, faeces, nasal secretion and hair. Accordingly, Modern technology enables the identification of true perpetrators through the use of biological evidence discovered during a criminal investigation. The application of DNA analysis techniques has heightened the value of biological evidence. Biological evidence, in general, can be considered an important type of evidence in the modern criminal investigation process.

Keywords: Circumstantial evidence; Biological evidence; Criminal investigation; Criminology; Criminal Justice

INTRODUCTION

Criminal investigation can be defined as both a concept and a procedure in the criminal justice system. Osterburg and Ward (2010) described in the book 'Criminal Investigation: A Method for Reconstructing the Past' that there are two approaches to criminal investigation. Specifically, presenting data on resource utilisation, psychological knowledge and information, the offender's previous behaviour, conduct during the crime, post-crime behaviour, and desire to commit the crime; Utilize technology and scientific information to assist in the resolution of crimes and to present the court with the evidence necessary to establish a charge [1]. Orthmann and Hess (2013) outlined in the book 'Criminal Investigation' that a criminal investigation is a procedure that entails determining who committed a crime and what evidence was left at the scene of the crime by examining criminal investigation as a process. These are just a few examples of available goal-setting shareware; detection, collection, Processing, Identification and Evidence Proofing [2]. Five of the acts mentioned above will be used to reconstruct the manner in which the crime occurred, allowing for a better understanding of the crime's central points [3]. Additionally, reconstructing the manner in which a crime was committed is a conclusive argument that will aid in determining the truth about the crime [4].

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Accordingly, the criminal investigation process can be divided into several distinct phases - from the initial report of a crime or incident to the conclusion of the investigation and presentation of the charge to the court. A criminal investigation unearths previously unknown information about a crime, and it entails gathering legal evidence to determine whether a crime has been committed or is being committed. In its simplest form, the criminal investigation is the applied science of ascertaining the crime facts. This practical science intervenes to ascertain the crime scene's veracity and the criminal's guilt [5].

This study is entirely based on secondary sources, and the article was written using academic books and research papers on criminal investigation; the study's primary objective is to discuss the concepts of biological evidence in criminal investigation and its beneficial effect on the criminal investigation process

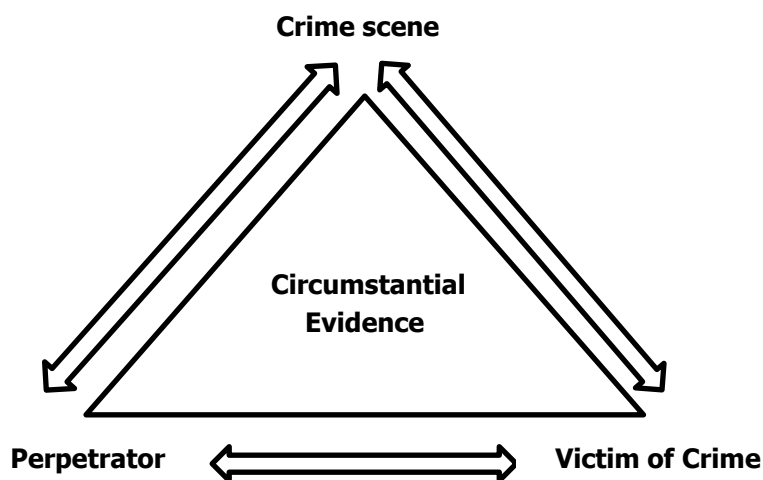
EVIDENCE

The criminal investigation's primary objective is to gather the evidence necessary for a fair trial. As such, it is necessary to comprehend the nature of the evidence. In Sri Lankan law, evidence refers to anything that can be used to establish the truthfulness of a statement. Evidence refers to theorems that are supposed to be philosophically false but can be used to support another position. In various fields, such as policy, scientific research, criminal investigation, and legal discourse, evidence has a distinct meaning. Thus, what can be applied to a case is referred to as evidence. The term "evidence" is defined in Section 03 of the Evidence Ordinance No. 14 of 1895 as follows; Oral evidence refers to all statements made by witnesses before the court concerning the matters under investigation that are ordered or permitted by the court. Additionally, all documents submitted to the court for examination are referred to as written evidence [6].

LOCARD'S EXCHANGE PRINCIPLE

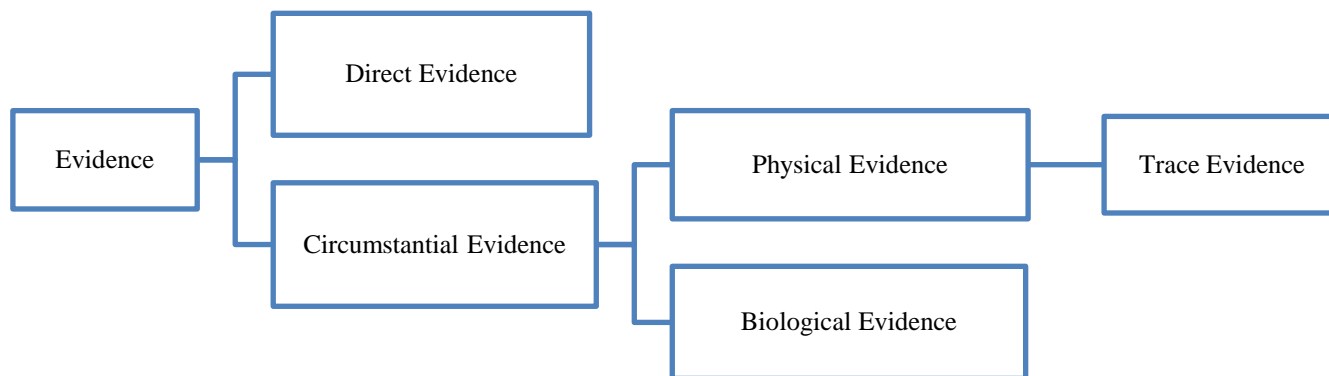
Edmund Lockard (1920), a professor of criminology at the University of Lyon in France, proposed the theory, arguing that whenever two objects came into contact with one another, there was an exchange of matter from one object to another [7].

Figure 01: Locard's Exchange Principle [8].



As illustrated in Figure 01, criminal evidence is always exchanged from the crime scene to the victim, from the perpetrator to the victim, from the crime scene to the perpetrator, and from the perpetrator to the crime scene. As a result, every time a criminal steps foot on the crime scene or touches something on the crime scene, some evidence is created against him unintentionally [9].

Figure 02: Classification of Evidence [10].



Circumstantial evidence is a highly nominalized form of evidence that falls under the evidence classification depicted in the figure. Circumstantial evidence enables certain conclusions to be drawn about the issues at hand. As a result of the examination of circumstantial evidence, conclusions can be drawn. Evidence is frequently heard and seen during the commission of a crime such as murder. Circumstantial evidence is used to resolve such cases. That is, circumstantial evidence is used in the absence of audible or visual evidence or when the evidence is insufficient [11].

A criminal investigation's success is contingent upon the collection and analysis of various types of evidence. Forensic scientists have classified evidence in a variety of ways; there is a significant distinction between physical and biological evidence. Physical evidence is any substance that originates from inanimate sources. Biological evidence is always initiated by a living individual. Fingerprints, tire marks, footprints, shoe prints, fibers, paint, and building materials, as well as weapons, bullets and shell casings, are all precedents of physical evidence. The term "trace evidence" refers to physical evidence such as fingerprints on glass or footprints in the yard [12].

BIOLOGICAL EVIDENCE

Blood, semen, vaginal, secretion, saliva, urine, sweat, tears, faeces, nasal secretion and hair can be pointed out as biological evidence. Accordingly, the field of forensic science that studies body fluids and dried stains is forensic serology [13].

BLOOD

Blood is a fluid called blood cells and blood plasma. Blood is biologically attached to connective tissue, and 90% of its content is water. The remaining 10% are proteins, glucose, minerals, hormones, carbon dioxide, platelets, and blood cells; Blood circulates throughout the body through blood vessels. A pumping process does this by the heart. Arteries carry oxygenated blood to body tissues, while veins carry carbon dioxide to the lungs. The composition of a healthy adult is 4.5-5 million clots of blood per millimeter, 7000-10000 white blood cells and 0.2-0.4 million platelets [14]. (Alberts, 2012). The chemical composition of blood can be measured from a single drop of blood, and much valuable information can be obtained by analyzing the morphological features. It is vital in a criminal investigation to identify whether any bloodstain at a primary or secondary crime scene is human blood or animal blood; this is done by pretreatment, which is essential to identify before DNA testing. Accordingly, after confirming that the blood is of a human, DNA analysis of the bloodstains is performed. Blood staining tests can determine the age of bloodstains. DNA testing can confirm an individual's identity and determine the nature of the crime according to the Bloodstain shape, intensity, Spread pattern, Location of the bloodstain. Analyzing the bloodstains at the crime scene can determine whether it is a murder or a suicide. It is also possible to identify the number of stab wounds inflicted in an attack and the nature of the blood-spattered by examining the clothing.

SEMEN

Semen, a biological piece of evidence that can be identified in a criminal investigation, is a suspension of sperm and sperm plasma, which is also the male reproductive tract. It is known as the male reproductive cell; it carries the male genetic information to the photogenic ovum, which contains about 60-10 × 10⁶ sperm per 01 sperm of a healthy person. One emission contains about 01-06 sperm, with an average of about 03. Sperm plasma also contains a specific enzyme, sperm acid phosphatase, and two specialized proteins, phosphoryl choline and epithelial and immune cells, which contain Mo 30 DNA molecules [15]. Semen is the most frequently used biological indicator of rape and other types of sexual abuse. It is deposited in clothing, on the victim's body, and through body openings. DNA analysis is used to verify the sperm's identity. True guilt can be established. As a result, sperm can be considered the most important piece of evidence in a rape and other types of a sexual abuse investigation.

SALIVA

The saliva is an aqueous fluid secreted by the salivary glands in the mouth, which contains three enzymes. This helps to carry food to the mucous membranes. The tylenic starch is converted to amylose by the saliva, and the amylose is digested into sugars by the saliva. Saliva also contains DNA because it contains nucleus cells [16]. Human saliva contains approximately 99.5 percent water. Electrolytes, mucus, glycoproteins, enzymes, and antibiotic compounds such as immunoglobulin and lysozyme make up the remaining 0.5 per cent. As a result, the cell discovered at the crime scene is used as biological evidence to ascertain the perpetrator's identity by examining the DNA contained in the cell's nucleus.

HAIR

Hair is a biological specimen that can be identified during a criminal investigation. It is composed of a protein called keratin. It ascends to the scalp's surface via a tube-like structure called the 'Follicle', which rises from the base of the skull to the scalp's surface and is composed of a group of living cells called the 'Papilla' at the base [17]. Hair is a biological substance that is derived from mammals' skin. It is composed of a root and stem; that is entirely composed of a protein called keratin. Hair can be classified physiologically into three components [18]. That is Cuticle, Cortex and Medulla [19]. The 'papilla' in the hair shaft's centre, Surrounded on all sides by an outer cortex, a thin layer called the apex is located on the outside. After it was discovered that mitochondria exist in the cells of the hair shaft, hair became one of the most important pieces of forensic evidence. Each day, a significant amount of hair falls out of the average human head. Hair can be characterized as an easily exchangeable substance even during physical contact. Additionally, the crime incident can be reconstructed between the victim of the crime, the suspect, and the crime scene. Such supplementary evidence is especially beneficial in cases involving violent crimes involving physical contacts, such as rape, murder, or assaults.

TISSUES

In criminal investigations, tissues that have been identified as biological evidence are structures designed to perform a specific function by combining a group of cells of the same origin and the intercellular fluid. The superficial genus's tissues can be classified into four distinct types; those are classified based on their fundamental structure and function as epithelial tissue, connective tissue, muscle tissue, and nerve tissue. Thus, human tissues are used for DNA testing, which is used to determine an individual's identity [20]. .

BONES

Bones are important as identifiable biological evidence in criminal investigations. Accordingly, of the 206 bones contained in the human skeleton, 126 belong to the limb skeleton. Functionally, they aid in the movement of the axillary skeleton (lower limbs) and the handling of objects in the environment (upper limbs). Osteoarthritis of the endocrine glands causes cartilage to grow, thereby forming the vascular structure [21]. Using bones in criminal investigations, the gender of the deceased, at the time of death, many symptoms such as age and height can be determined. The human pelvis is the most reliable means of determining sex. The female pelvis is designed to provide the optimal chance of having a baby; it is reflected in its morphology and the relationship of its parts to each other. A girl retains characteristics such as the smoothness of her skull from puberty to adulthood. But the male skull shows more strength and square wide jaws. Determining sex can be difficult if the skull and pelvis are not at the crime site. Although measurements can also be taken to determine the gender of the body, an experienced anthropologist can often tell it simply by visual inspection; the skull can also be used to determine a person's gender.

Teeth

In criminal investigations, teeth are critical as identifiable biological evidence. A typical human being has twenty primary teeth and thirty-two permanent teeth; teeth can be classified as incisors, canines, premolars, molars, and third molars. Also, Teeth have features that distinguish them from other teeth [22]. Dental records and comparisons of abnormalities in the teeth, as well as bite marks, can be used in criminal investigations to ascertain a person's age, sex, race, occupation, habits, and cultural practices

CONCLUSION

As study concepts, evidence, Locard's exchange principle, circumstantial evidence, physical evidence, and biological evidence were classified; 11 distinct types of biological evidence were identified under biological evidence, including blood, semen, vaginal, secretion, saliva, urine, sweat, tears, faeces, nasal secretion and hair. The beneficial effect of biological evidence on the criminal investigation has been identified; through the use of modern technology, biological evidence that can be identified during a criminal investigation is used to identify the true perpetrators. The use of DNA analysis techniques has increased the importance of biological evidence. Biological evidence in general can be considered a type of evidence that contributes significantly to the modern criminal investigation process.

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