



Evaluation of Criminal Investigation with Time and New Technology

Sharma Mahesh¹ and Singh Ranjeet Kumar²

¹Anglia Ruskin University, East Road, Cambridge, CB1 1PT, ENGLAND

²Sherlock Institute of Forensic Science India, Hudson Line, Delhi 110009, INDIA

Available online at: www.isca.in, www.isca.me

Received 24th December 2014, revised 16th January 2015, accepted 24th February 2015

Abstract

The main field of criminal investigation is forensic science. This study will demonstrate the history of criminal investigation. Previous kind of controlled confirmation did not start to grow until the 18th and 19th centuries for crime, a time during which much of our modern –day chemistry understanding was just starting to be developed. Then criminal laboratories are mainly developed by agencies which have prospective purpose to criminal investigation or pushed by rising order of casework. This independent agencies increased staff to improve their facility in particular direction. New technology lead forensic scientist with various skills and application to face active participation in criminal justices system. The effect of technology in criminal sciences to prove perfect result to identify criminal. It's unable to predict correct criminal with the series of body measurements but evaluation of fingerprinting become most accurate and cheap method. Recently addition of DNA profiling and computer forensic start to predict most passable criminal identification, new technology including internet may have big contribution to further development in investigation because their aspects are endless. The aim of this study describes criminal investigation before and now due to addition of new technologies.

Keywords: History criminal investigation, crime laboratory, technique, new technique.

Introduction

The main field of criminal investigation is forensic science¹. It is most important to understand forensic science first. "Forensic science is the application of the science to the criminal and civil laws that are enforced by police agencies in a criminal justice system"²(P-5). Criminal investigation is "the collection of information and evidence for identifying, apprehending and convicting suspected offenders" Professor Ralph F. Turner of Michigan State University prefers: "A criminal investigation is the reconstruction of the past event" Either definition may be clarified further by examining the specific responsibilities of the investigator"³(P-5). This study will first demonstrate the brief history of criminal investigation then it will describe crime laboratory including their basic and operational services. Finally we will discuss some important technology. The aim of this research describes criminal investigation before and now due to addition of new technologies.

History of Criminal Investigation: "Today many believe that Sir Arthur Conan Doyle had considerable influence on popularizing scientific crime-detection methods through his fictional character Sherlock Holmes, who first applied newly developing principles of serology, fingerprinting, firearms identification and questioned-documents examination long before their value was first recognized and accepted by real-life criminal investigations"²(P-5).

Previous kind of controlled confirmation did not start to grow until the 18th and 19th centuries for crime, a time during which

much of our modern–day chemistry understanding was just starting to be developed. Then new forensic term Toxicology was described by Mathieu Orfila (1787-1853) in 1840 for his criminal investigation¹. In addition "Bresler (1992) suggests that in Brussels during 1843 the police took the first ever photograph of a criminal". In France early 1879 Alphonse Bertillon (1853-1914) was appointed for police in city of Paris to process documents file with description of photographs⁴ (P-4), He also "devised the first scientific system of personal identification in 1879" in this system he applied some "series of body measurements" to identify criminal and others. For few decades it was good method for criminal identification after it takeover by fingerprinting nearly 1900s, early his effort make him Father of criminal identification² (P-6). However it was first time in criminal investigation and now forensic scientists use this result for "combination of analytical measurement to discriminate between groups or to compare samples". Fingerprints became more successful method for personal identification. It was Sir William Herschel, a British civil servant in India and Henry Faulds got credit for "early investigation"¹(P-3). Francis Galton (1822-1911) "First definitive study of fingerprints and developed a methodology of classifying them for filing". He also published a book "Finger Prints" which contented the first statistical proof supporting the uniqueness of his method of personal identification² (P-6). On the other hand "up until 1900 it had been impossible to determine if a blood sample or stain was of human or animal origin"¹ (P-3). Then Blood groups "technique immediately applied to criminal investigation" in 1915 by Dr. Leone Letter (1887-1957). Before Dr. Karl Landsteiner discovered blood may organize in sub classes as A,

B, AB, and O, then comes to know that, it can be use full for criminal identification² (P-6). As well as in 1910, Albert S. Osborn wrote first book Questioned Documents. In this book he developed some principles of documents analysis which is recognized by court. Apart from this an advocate Edmond Locard convinced The Lyons Police department to start police laboratory. His works was identified by forensic scientist and criminal investigators then they support him and he became the founder and director of the institute of Criminalistics at the University of Lyons. He thought that when a criminal is involved in a criminal activity so he can be associated with crime by dust particles (Locard's Exchange principle: whenever two or more objects come in contact with one another, there is exchange of material between them). On the behalf of this proof criminal arrested and feel guilty himself in court. After 1st world-war, he succeeded in agreeing some countries to build police laboratory. Now Federal Bureau of Investigation (FBI) is biggest laboratory in world which is analysing up to one million cases every year² (P-8).

Crime Laboratory for Criminal Investigation

Criminal laboratories are mainly developed by agencies which have prospective purpose to criminal investigation or pushed by rising order of casework. This independent agencies increased number of staff one employee to more than hundred and improved their facility in particular direction. New technology lead forensic scientist with various skills and application to face active participation in criminal justice system. There are two main basic and optional services provided by forensic laboratories. In basic services, firstly physical science unit analyses principle of geology, physic and chemistry to find out criminal with the help of crime-scene proof (drugs, paint, soil, glass and explosive). Second is biology unit which is now a day's mainly responsible for DNA Profiling. They took DNA from various sources (like hair, blood, skin, saliva and more) and lead to arrest correct criminal. Thirdly firearms unit, they look for target of angle, which arms have been used. Then documents examine unit, analyse handwriting, relation between paper and ink. Finally photography unit, new technique like x-ray, ultraviolet and digital photography brings invisible things to in an evidence. Other operational services are Toxicology unit, Latent fingerprinting unit, polygraph unit, voiceprint analysis unit and crime scene investigation² (P-13). We will discuss in detail in the next few paragraphs that how it has changed with time.

Process and technology involved in criminal invigoration and how it developed with time: "Forensic evidence starts at the scene" if proofs are unrecognized or handle without care at the scene, most of laboratory analysis will be unable to identify truthful proof for crime and scene can't be revisit for more effort to documented other proof. There are some people involved for responsibility this task, which are police officers, detectives, crime scene examiner, scientific support officer, or forensic scientist. In 19th century, technical supports were rising

because of first most important work was identified and documented by Gross in a book "Criminal Investigation" for the importance of systematic approaches then his work was also influences this time for art of crime detections. Importance of "content" proof was first see by Locard. Which can give links in series of proof and because of him in 20th century, the big jump forward in analytical technique and electronic revolution in every branch of science to facilitate Locard trace proof which can be glass, fibres, soil, blood, hair, and many more? This proof we can include as physical evidence¹ (P-21). But it is unfeasible to collect all things from crime site. The experienced investigator well-known to recognized important object and how it can be used as a proof of crime and how field expert can analysis this thing in laboratory. There is some common types of physical evidence, firstly blood, semen and saliva; with this samples they identify it's human or animal in past but now with this proof a biologist can describe correct criminal with the help of DNA. Second is, documents, to analyze handwriting, relation between paper and ink and some more aspects. There are many physical evidence like this which are; explosive, drugs, fibres, fingerprinting, firearms, glass, hair, impressions, paint, petroleum product, plastic and other polymers, serial number, vehicle light, wood and many more. This all physical evidence has their piece of history² (P-70). To identify this all physical evidence microscope have big contribution. Microscope is a device which can expand and resolve the physical evidence to identify fact behind crime. Most of physical evidence is identify in crime laboratory by microscope and it was the earliest method for forensic science so in a history of criminal investigation it has major contribution to solve many crimes from light microscope to new Modern electron microscope. If any expansion in powerful scanning, then Modern electronic microscope secure attach new aspect in forensic science. Help of the microscope, forensic scientists analyses hair, fibre and paint² (P-180).

As according to Locard, physical evidence distorted among people and during the time of crime. This physical evidence is analyzed in criminal laboratory to find out criminal. So hair is also a physical evidence to describe criminal, with hair we can find DNA of criminal. Then fibre can be source for criminal identification. Finely paint, environment have uncountable item whose surfaces are painted. It's not shocking to recognized paint. That's why it's most established kind of physical evidence by the forensic laboratory² (P-208 and 233). Some students of Orfila's come back in 19th century to United Kingdom. They stabilised toxicology subject in their home university under authority of forensic medicine. A toxicology service given by university forensic medicine department and it is still accurate in most case today. Toxicology is most important concerned analyze from blood or urine to identify poison and it can be evidence for crime¹ (P-318). On the other hand DNA verification is now extensively acknowledged as a forensic technology for open range of criminal investigations. It promote police to criminal by identify DNA profiling. DNA profiling is a database or information about human and every

human have unique information in their DNA. This technique also can describe suspect² (P-19). DNA application purpose to criminal case was quick through some renowned cases in the eyes of everyone. DNA profiling is approximately occupied for established now and "DNA profiling is one of the most powerful tool in forensic science". It allows identifying "very strongly" to criminal. Before this technique (DNA profiling) fingerprinting was used. DNA can be found at crime side by hair, saliva, skin, lip-prints, tissue, bone, urine and more. This evidence is analyzed in criminal laboratory and outcome is satisfactory criminal. DNA has big area of information so it is impossible to describe everything about it in this writing work⁵(P-138). However it is suggested that only two people have matching set of fingerprint in many million. That's why is an successful path to recognized criminal. This method was found so far away. Now we have many new technology, most of them very expansive but is very economical. It is not possible to describe more about it because it has many different pattern systems and this project has some words limits⁴ (P-68).

Finely two more important additions are computer forensic and internet in criminal investigation. From 1990, hardly any field progressed as quickly as computer technology. It turns out to be an essential basis of evidence for criminal analysis. It provides very faster response to analysis of criminal identification. Computer forensic concerned to storage data, gaining data and explanation of computer data. Data stored in some devices like iPods, camera, memory stick, smart cards, and others. Technique to get data from these devices is more not easy but it is unique. Now only we can use data to identify crime but we can also operate many task. Like cybercrime, mail box, and others so it is a newest technology which is involved in many areas of forensic science. Related to computer forensic we can also talk about forensic science and internet² (P-524). Besides internet is main source of communication now. Anyone can get millions of information on internet. "No subject or profession remain untouched by the internet, including forensic science" every week many information are uploaded about forensic science. So we can have lots of information from internet about it. Apart from this all forensic science agency exchange their information from internet² (P-553).

Conclusion

The aim of this study was to evaluate the effect of technology in criminal sciences to prove perfect result to identify criminal. It was unable to predict correct criminal with the help of series of body measurements but evaluation of fingerprinting become most accurate and cheap method. Then recently addition of DNA profiling and computer forensic start to predict most passable criminal identification, this new technology including internet may have big contribution to further development of criminal investigation because their aspects are endless. DNA, fingerprinting and computer forensic are very big area but it described briefly due to worlds limits. Finely as I have shown there is clear difference between traditional and modern criminal investigation.

References

1. White P, Crime scene to court, Cambridge : The Royal society of Chemistry, (2008)
2. Saferstein R., Criminalistics : An introduction to forensic science, New Jersey : Person Education Ltd, (2007)
3. Osterburg J.W. and Ward H.R., Criminal Investigation, Cincinnati : Anderson Publishing Co, (2000)
4. Pepper L.K., Crime scene investigation : Method and procedures, Maidenhead : Open University Press, (2005)
5. Jackson A.R.W. and Jackson M.J., Forensic Science, Essex : Pearson Education Limited, (2008)
6. Li R., Forensic Biology, Boca Raton : CRC Press Taylor and Francis Group, (2008)
7. Newburn T., Williamson T. and Wright A., Hand Book of Criminal Investigation, Devon : Willan Publishing Ltd, (2007)
8. Koo Y.K., the autopsy is dead, Pathological Society, University College London, (2010)
9. Campobasso C.P., Falamingo R. and Vinci F., Ballistic Wounds and Shooting Reconstruction: Current Challenges for Forensic Pathologists in Criminal Investigations, Shunderson Communications, *Inc The Forensic Scientist Online Journal*, 13-5-020907/030524 (1-5), (2003)
10. Inman K. and Rudin N., Principles and Practice of Criminalistics : The Profession of Forensic Science, CRC Press, (2000)
11. Miller T.M., Crime scene investigation, CRC Press, 155-134 (2001)
12. Burgess W.A. and R.R.H., Practical aspects of rape investigation : A multidisciplinary approach, London : CRC press, (2009)
13. D'Apuzzo N., Human Body Measurement Publication of Homometrica Consulting, Switzerland, 1(2), 1-6 (2005)
14. McCormack J. and Slaght J., Extended Writing and Research Skills : Course Book, Southern court, Reading : Garnet publishing ltd, (2009)
15. Germerott T. et al., A new approach in virtopsy : Post-mortem ventilation in multislice computed tomography, *Elsevier: Legal Medicine*, 12, 276-279 (2010)
16. Grabherr P. et al., Estimation of sex and age of "virtual skeletons" : A feasibility study, *European Society of Radiology Journal* : Austria, 19, 419-429 (2009)
17. Jackson A.R.W. and Jackson M.J., Forensic Science, Essex : Pearson Education Limited, (2008)
18. Khairul A.A. and Mohd F.S., Technological innovation and firm development : The case of infovalley digital autopsy system commercialization, *Asian Academy of*

- Management Journal* : Malaysia, **13(2)**, 79-109 (2008)
19. Levy D.A. et al., Radiology, Department of Radiologic Pathology, Armed Forces Institute of Pathology, Alaska and Fern Streets NW, Washington, **240**, 522-528 (2006)
 20. Levy G. et al., Post-mortem Computed Tomography in Victims of Military Air Mishaps : Radiological-Pathological Correlation of CT Findings, *Israel Medical Association Journal (IMAJ)*, **9**, 699-702 (2007)
 21. Li R., Forensic Biology, Boca Raton : CRC Press Taylor and Francis Group, (2008)
 22. Newburn T., Williamson T. and Wright A., Hand Book of Criminal Investigation, Devon, Willan Publishing Ltd, (2007)
 23. Osterburg J.W. and Ward H.R., Criminal Investigation, Cincinnati : Anderson Publishing Co, (2000)
 24. Patowary J.A., Virtopsy : One Step Forward In the Field Of Forensic Medicine : A Review, *Journal of Indian Academy of Forensic Medicine*, **30(1)**, 32-36 (2008)
 25. Peter and White, Crime scene to court, Cambridge : The Royal society of Chemistry, (2004)
 26. Richard and Saferstein, Criminalistics : An introduction to forensic science, Upper Saddle River, N.J : Pearson Prentice Hall, (2007)
 27. Saferstein R., Criminalistics : An introduction to forensic science, Boston Mass., London : Pearson Education, (2011)
 28. Townley L and Ede R., Forensic Practice in criminal case, London : The Law Society, (2004)