Kristu Jayanti College
AUTONOMOUS
Bengaluru
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DEPARTMENT OF LIFE SCIENCES
UNIT OF FORENSIC SCIENCE

VERITAS

Vol. 1, Issue 2

MESSAGE FROM THE PRINCIPAL

Forensic Science is an evolving and dynamic field which is an efficient tool to support the Criminal Justice System. The nature of crimes being committed in today's world are highly improvised and have tested the limits of the scientific approaches to crime-solving. Forensic Science has advanced in the multiple branches it possesses and has ensured that no crime goes unsolved. The recent advancements in DNA Analysis, Cyber-Crime Investigation, and Forensic Anthropology are a testament to the limits to which science can be useful to the Criminal Justice System.

The unit of Forensic Science at Kristu Jayanti College (Autonomous), Bengaluru, presently runs a Bachelor's in Science (Honours) in Forensic Science programme and has also initiated a Master's in Forensic Science programme with three streamlined electives. The unit has aimed to provide a holistic and experiential growth to the students training in the unit and has regularly organized invited talks, seminars, and workshops to expose them to first-hand and recent information in the various disciplines of Forensic Science.

The Forensic Science newsletter, Veritas, is a bi-annual newsletter which contains articles written by the forensic science students on matters relating to research studies, case studies, crime statistics, etc. The first edition of Veritas had received a lot of appreciation for its content, design, and variety. It is a matter of delight to note that the students have worked on the next edition and have ensured that it has reflected their creativity and intellect.

On this occasion, I congratulate the Unit of Forensic Science and the editorial board of Veritas for the effort to ensure that the information regarding different forensic science-related matters is shared with every reader, and I am optimistic that it will add to the knowledge of each reader.

Rev. Fr. Augustine George, Principal

MESSAGE FROM THE HEAD OF THE DEPARTMENT

The impact and relevance of the role of Forensic Science in the Criminal Justice System is becoming clearer day by day with the advent of newer technology and improvements in the field. The research prospects in this field are so high and is one avenue that every forensic graduate needs to look into.

The Department of Life Sciences, Kristu Jayanti College (Autonomous), Bengaluru, has a unit of Forensic Science which runs a Bachelor's programme in Forensic Science and a Master's programme in Forensic Science. The unit has actively conducted many programmes in the field of Forensic Science to ensure that students are kept abreast with the improvements in the field whilst providing them with direct interaction with experts in the field.

One such endeavour is the bi-annual Forensic Science newsletter, Veritas, which publishes research, news updates, articles, and case studies compiled by the students. It is a platform for students to read, learn, and portray their skills.

It is a pleasure to note that this issue contains many interesting articles and is designed in a very interactive fashion which will enthral the attention of the readers. I wish the readers an informative and productive time reading the newsletter.

A special appreciation to the editorial board for organizing, reviewing, and designing the articles and craftily choosing and placing the articles in an enjoyable fashion.

Dr. Elcey C. Daniel, H.o.D

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TWO-PART WORKSHOP ON FORENSIC ODONTOLOGY

Date: 9th and 23rd October, 2021

RESOURCE PERSONS:

- Dr. Muhammad Nasir Ahmed, Anthropologist & Assistant Professor in Yenopoya Medical College.
- Dr. Akhil Shetty, Oral Pathologist and Forensic Odontologist, Yenepoya University.
- Dr. Shrivya Saloni Mahaveeran, Pedodontist, Yenepoya University.

On 9th & 23rd October 2021, The Unit of Forensic Science, Kristu Jayanti College, organized a two-part workshop on Forensic Odontology. With more than 250 participants, the workshop was to enlighten participants about the structure of teeth, to estimate the age of a given set of teeth, and also to write a report on the same along with rugae analysis and lip print analysis.

Prof. Don Caeiro, Co-ordinator, Unit of Forensic Science, gave a prelude to the workshop where he explained what the workshop entailed, and that the workshop would have 6 sessions with a wide variety of topics.

INAUGURAL SESSION:

The workshop was inaugurated by Dr. Muhammad Nasir Ahmed, a renowned forensic anthropologist with more than 10 years of experience in the practical aspect of anthropology. The presidential address during the inauguration was delivered by Fr. Augustine George, Principal, Kristu Jayanti College. The Chief Guest, Dr. Muhammad Nasir Ahmed, proceeded to explain by using a presentation, how the fields of Forensic Anthropology and Forensic Odontology were allied and why we need more experts in the same. He introduced to the participants the concept of using Forensic Science in humanitarian action using the knowledge and skills obtained from anthropology and odontology. He also enlightened the participants about why we need Forensic Anthropology and its importance in the court of law. He stated that “Forensic anthropologists focus on the origin, in terms of evolution and the origin of the specimen given to them.” He emphasized what forensic anthropologists do and the questions they try to answer when they find evidence. He further described the scope of Forensic Anthropology in India, and for students who were planning on making a career out of it, he explained ways in which to plan their career.

FIRST PART OF THE ODONTOLOGY WORKSHOP

Date: 9th October, 2021

SESSION 1: DENTITION AND DENTAL ANOMALIES - POINTS OF IDENTIFICATION OF A TOOTH

The first session was handled by Dr. Shrivya Saloni Mahaveeran. Dr. Shrivya began the session with a basic overview of 'Human Dentition and Its Forensic Significance' and emphasized how Forensic Odontology can help solve legal cases by providing valuable scientific backing. She spoke about how a detailed examination of dental evidence can be used for identification purposes as well. Dr. Shrivya further stated that dental identification is based on the principle of 'No two oral cavities are alike' and the structural and morphological features of teeth make them unique for each individual. She then went on to explain the sequence of eruption in both primary teeth and permanent teeth, and touched upon the points of identification, focusing on the maxillary central incisor, maxillary canine, and mandibular first molar. Towards the end, she briefed the participants about the common tooth anomalies seen and the specific features of each. She talked about how such anomalies can be used as unique identifying dental features.

SESSION 2: IDENTITIFICATION OF DENTITION AND ARCHES and Radiographs (IOPA & OPG)

The second session of the workshop was conducted by Dr. Shrivya Saloni Mahaveeran who continued with the workshop. She enlightened the students on the different types of dental arches and dentitions and practically demonstrated how to identify them. The workshop on dental identification was divided into two parts – Firstly the delegates were taught how to identify the arches and dentitions using casts. The students were actively engaged in exercises where they had to identify the dental arches and dentitions shown to us in the presentation and note them down. Secondly, the resource person showed the participants the dental identification using two types of radiographs – OPG (Orthopantomogram) and IOPA (Intraoral Periapical) radiograph along with the exercises on the identification of the same. Towards the end, Dr. Shrivya summarized the session by emphasizing the importance of radiography in Forensic Odontology concerning identification.

SESSION 3: AGE ESTIMATION OF A PERSON USING PRINCIPLES OF ODONTOLOGY

The resource person for this session was Dr. Akhil S Shetty, Oral Pathologist and Forensic Odontologist. During this session, Dr. Akhil provided the delegates with a detailed explanation on how to estimate the age of a person using casts and radiographs. He further taught how to identify dental anomalies using casts and radiographs and along with the orientation of OPG (Orthopantomogram). The explanation was given along with real-life examples, performed as tasks for the participants of the workshop to give us a better insight into the application of the principles of odontology in authentic crime scenarios and their study.

The tasks conducted answered questions like the ones mentioned below:

a) Was the individual a minor or a major?

b) Is he/she above 18 years of age or below?

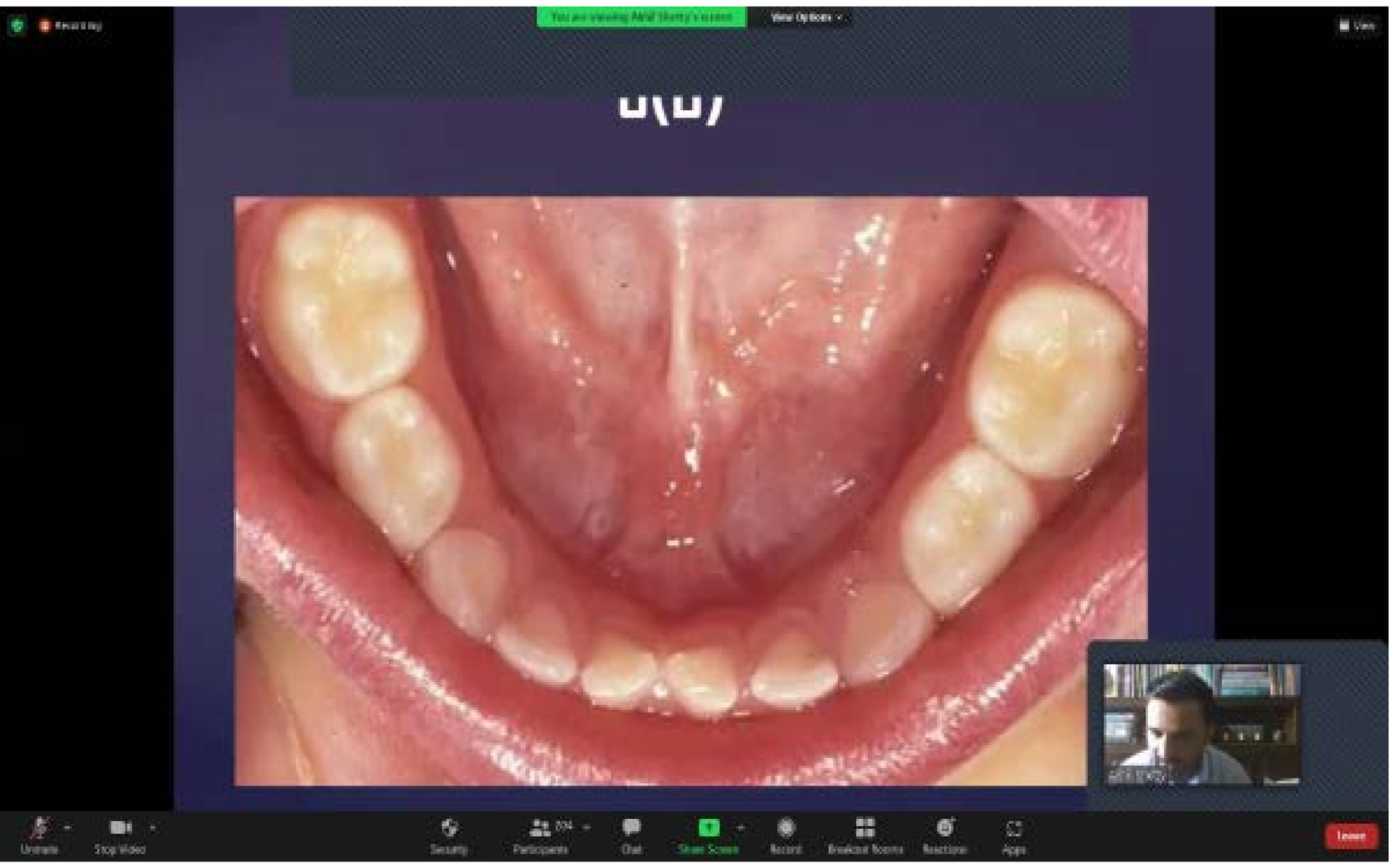
c) Is it a maxillary or mandibular cast?

d) Are there any dental anomalies? If yes, what are the anomalies? Etc.

Dr. Akhil also introduced the format of the reports of forensic odontologists. He also provided an assignment for the delegates to write a report in a case which he provided them.

PART TWO OF THE ODONTOLOGY WORKSHOP

Date: 23rd October, 2021



SESSION 4: RUGAE PATTERN - BRIEF INTRODUCTION ON TYPES OF RUGAE

The second part of the workshop on Forensic Odontology was held on 23rd October 2021. The resource person for the first session of this part was Dr. Akhil.S. Shetty, an oral pathologist and forensic odontologist started the session by defining the word “rugae pattern”, followed by its history. Students were intrigued to know that it dated long back to 1932. He had demonstrated the picture of the rugae pattern making it easily understandable for the students. In his explanation, he also mentioned what they are called otherwise along with their benefits or their role in the human body.

The resource person, thereafter, stated that the process of collecting the rugae pattern from an individual was divided into 3-4 steps. “These rugae pattern impressions that are collected are then analysed with the help of divider, cast, pencil and scale measurement”, stated Dr. Akhil. The resource person also explained the different classifications of these patterns with the help of images of the same. Before ending the session, he included an example of how the rugae patterns helped solve a case of a five-year-old.

SESSION 5: RUGAE PATTERN ANALYSIS AND REPORT WRITING

The fifth scientific session of the two-part online workshop on Forensic Odontology was a demonstration session on analyzing rugae patterns and report writing in cases involving rugae patterns. The resource person for the session was Dr. Akhil S.Shetty, Oral Pathologist and Forensic Odontologist.

Following the briefing on palatal rugae and the methods to record and trace the rugae patterns in the previous session, Dr. Akhil explained the types of palatal rugae found in the maxillary arch based on their shape, unification, and direction. He discussed the occurrence of specific types of rugae patterns depending on the topography and sexes of individuals. The use of detailed images and practice questions helped the participants comprehend the concept.

The next part of the session focused on the aspect of report writing after analyzing the rugae patterns.

Dr. Akhil guided the participants on how to prepare reports following the analysis of rugae patterns. He elaborated on the importance of preparing an organized report to explain the findings after the analysis.

The participants were also provided with practice questions to polish their skills in preparing such reports.

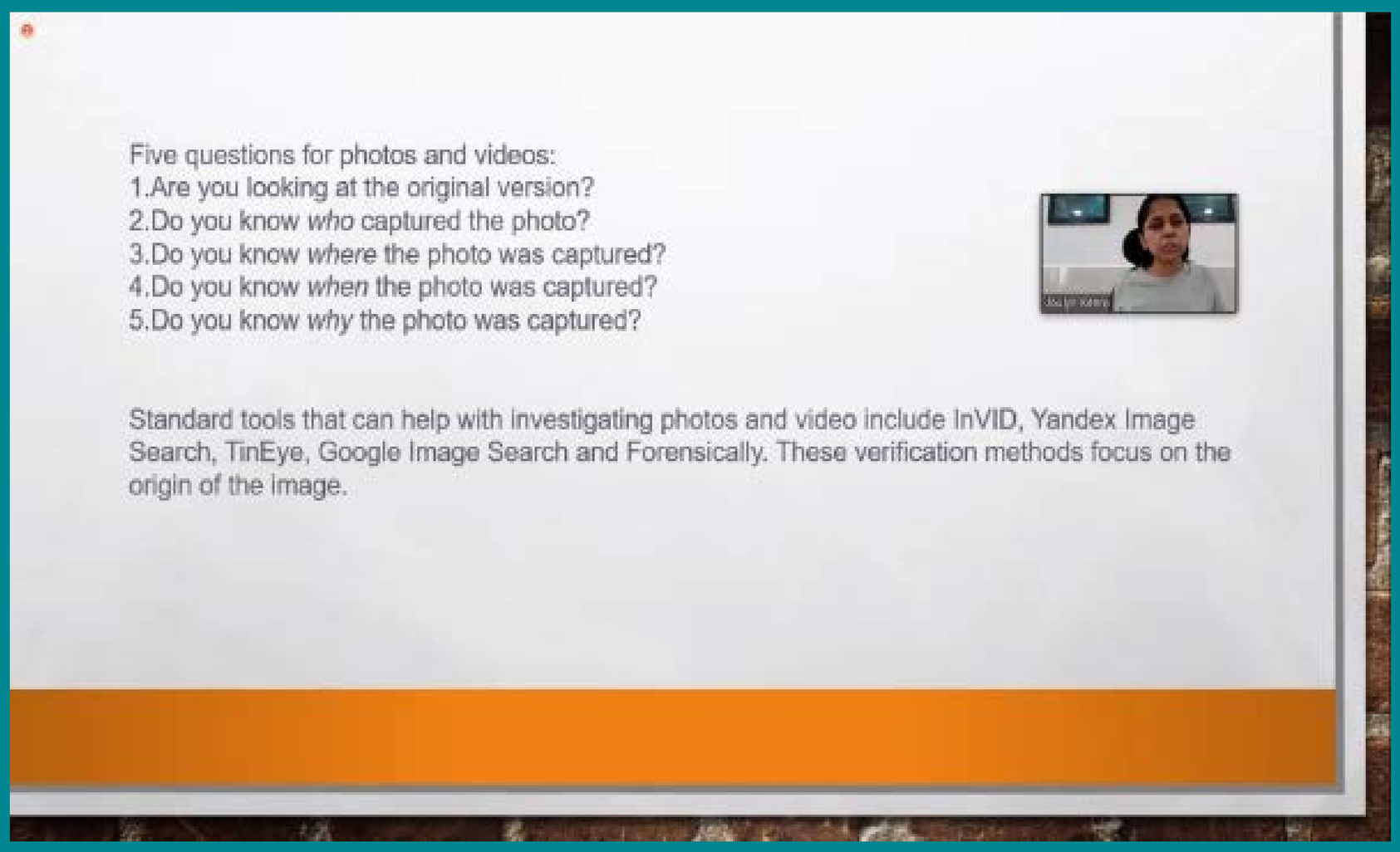
Towards the end of the session, Dr. Akhil briefed upon edentulous cast and dentures. He concluded the session by acknowledging the relevance of rugae pattern analysis in the domain of Forensic Science.

SESSION 6: LIP PRINTS - BRIEF INTRODUCTION OF LIP PRINTS, ANALYSIS AND REPORT WRITING

The resource person for this session was Dr. Shrivya Saloni Mahaveeran Pedodontist, Yenepoya University, Mangalore, Karnataka. She introduced cheiloscopy, which is the study of lip prints and then proceeded with the history of cheiloscopy, how it is used and sources of lip prints in a crime scene. Topics such as identification features, topographic division, position, shape and measurements of length and width of lips were also covered. The participants thereafter learnt to classify and analyse lip prints and also the method used to collect and record the lip prints. She also touched upon the lip characteristics according to gender, ethnic race and also discussed the various studies done in the field. The session continued with the introduction on report writing and after which the participants were given exercises regarding the classification and identification of shapes. Towards the end of the session, Dr Shrivya talked about how cheiloscopy proved to be emerging as a promising field in forensic odontology and concluded by answering the queries of the participants.

GUEST LECTURE ON "CAREERS IN FORENSIC SCIENCE (FORENSIC JOURNALISM)"

Dates: 11th November 2021



Resource Person:

Ms. Joulyn Kenny, independent Forensic Consultant & HOD, UG Program, Communication Education, St. Paul's Institute of Communication Education, Mumbai.

A guest lecture on the topic "Careers in Forensic Science (Forensic Journalism)" was conducted on 11th November 2021 at 3 PM by Ms. Joulyn Kenny, who is an independent Forensic Consultant and also serves as a Head of the Department of the Communication Education programmes at St. Paul's Institute of Communication Education, Mumbai.

The resource person gave the students new knowledge about the use of forensics in the field of journalism. She also gave a detailed explanation on the following topics:

- Investigative Journalism
- How media evidence is essential for Forensic Journalism.
- How forensic can assist investigative reporters.
- How to know the authenticity of an image or video.
- Usage of new digital tools.
- Discussion on famous case studies related to the topic.

The entire session was innovative and encouraged the students to have a look at the career option of Forensic Science in the field of Journalism.

FACULTY DEVELOPMENT PROGRAMME ON
MiScope MP3
Date: 20th November 2021, 10 AM

Venue: Forensic Science Laboratory, 3rd Floor, Main Block.

Participants: Faculty members of the Department of Life Sciences, Kristu Jayanti College, Bangalore.

Resource Persons: Mr. Suraj G (Director) and Mr. Senthil Kumar (Manager), Metronic Services, Bangalore.

A Faculty Development Programme (FDP) on the MiScope MP3, a digital forensic microscope was organized for the faculty members of the Department of Life Sciences at Kristu Jayanti College, Bangalore, on 20th November 2021. The session was held offline at the Forensic Science Laboratory, 3rd floor, Main Block. The resource persons for the session were Mr. Suraj G (Director) and Mr. Senthil Kumar (Manager), Metronic Services, Bangalore, which was a knowledge partner for the FDP.

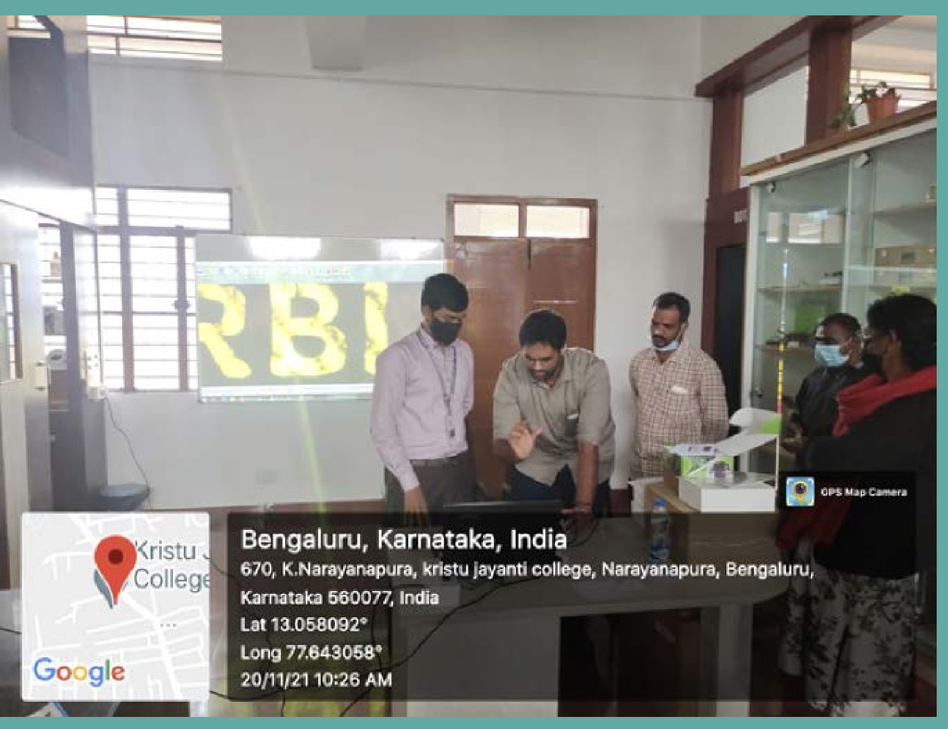
The objective of the FDP was to provide hands-on training on the use of the MiScope MP3, which is a new technology available in the field of Forensic Science.
The session started with a silent prayer, after which Prof. Jeremiah Justus M, a faculty member of the Unit of Forensic Science, welcomed the resource persons and the participants.

The resource people unboxed the MiScope MP3 instrument purchased for the Forensic Science Laboratory, Kristu Jayanti College, and went through the installation procedures with the participants. The MiScope MP3 is a Digital Forensic microscope that uses alternate light sources while magnifying images. It is highly useful in the field of Questioned Documents examination and is also suitable for studying biological specimens and physical evidence. It is a handy and portable device that can be very useful in fieldwork as well. The features, handling, and troubleshooting of the device were explained elaborately by the resource people. The participants were also given hands-on time to work and learn about the equipment in detail.

Prof. Chetna Tidke, faculty member, Unit of Forensic Science, concluded the session with a vote of thanks.

GUEST LECTURE ON "CAREERS IN FORENSIC SCIENCE (FORENSIC EXAMINER IN USA)"

Date: 27th November 2021, 9 AM



Resource Person:

Ms. Bincy Mariyam Thankachan, Forensic Examiner, Rapid City Police Department, South Dakota, USA.

A guest lecture on the topic "Careers in Forensic Science (Forensic Examiner in USA)" was conducted on 27th November 2021 at 9 AM by Ms. Bincy Thankachan, who is a forensic examiner working at the Rapid City Police Department in South Dakota, USA.

The resource person started her lecture by explaining her role as a Forensic Examiner in the Rapid Police Department in South Dakota, USA. Further, she went on to describe how her journey started in Forensic Science, and how she built her career on the same in the USA. She then highlighted the advantages and disadvantages of being a student in India and pursuing higher studies in the USA with specific relation to Forensic Science and her role. She elaborately explained the complete process of joining such programmes, how to apply for jobs, how to manage both the studies and jobs in a country like the USA by giving examples of different individuals. She also ensured to explain the various departments that are offering many working opportunities for students in the USA. She had attracted the whole gathering by explaining her efforts and hard work that made her reach the higher levels, and she also encouraged students to work hard and to perform well to build a great career in this field. At the end of the session, the resource person patiently addressed the questions that were raised by the students regarding the opportunities in the USA pertaining to Forensic Science.

INTERACTION WITH EXPERTS

- INTERACTION WITH MR. ZACKERY KOWALSKE
- INTERACTION WITH MRS. ANU SEBASTIAN
- INTERACTION WITH DR. O. MURUGESA BHARATHI

INTERACTION WITH MR. ZACKERY KOWALSKE

Ms. Prathiksha RS
Ms. Gayathri L. Nair

We are extremely honoured to have had the opportunity to interview Mr. Zackery Kowalske, who is currently employed as a Detective with the Roswell Police Department's Crime Scene Investigations Unit. Mr. Kowalske has a Master's degree in science with a Forensic Science concentration. His study is based on bloodstain pattern analysis, and he is currently pursuing a Doctorate in forensic science. His areas of expertise are bloodstain pattern analysis and shooting incident reconstruction.

Mr. Kowalske has also been a guest lecturer in the international webinar on “Future of Crime Scene Investigations”, conducted by the Unit of Forensic Science in Kristu Jayanti College, Autonomous. This interaction helped us gain more insight into the discipline of bloodstain pattern analysis and crime scene reconstruction.

1. What was the first-ever case you’ve handled?

I started as a jail officer when I was twenty years old and was really interested in the field of forensics even at that time. So my first case would probably be an investigation of the suicide of a jail inmate.

2. What is the hardest blood spatter pattern you’ve analyzed? What is the hardest blood pattern to analyze in general?

The hardest spatter pattern I’ve worked on was a secondary splash pattern found on the sole of the victim’s feet, who had been executed, and her body had been positioned. I worked on it for a month, going through various body positions consistent with the different factors and components of the scene. The hardest spatter patterns to analyze are nondescript patterns where there aren’t enough characteristics to classify them.

3. What are the routine steps followed during crime scene reconstruction?

The basic steps would be:
- *Documentation (photography, videography, or laser scanning)*
- *Collecting samples*
- *Analysis/synthesis of data*

4. How do you keep your mental health in check?

This topic is very close to me because, being a sworn detective, we come across a lot of cases such as child homicides and violent deaths, and I’ve personally been involved in a shooting as well. So there is a lot of trauma involved. If you don’t know how to process the way it impacts

you, then it can lead to a self-destructive path. I had been there, and eventually, I could comprehend how it had been affecting me so I could move forward, but that is not everyone. There has been an exponential rise in the rate of suicide of law enforcement personnel, so I believe it's important to introduce mental health awareness in training and universities to prepare new investigators.

5. Has there been any case where the modus operandi was something you had never seen before?

A double homicide of two teenagers I worked on a few years ago was brutal. There were acts that took place, which I could tell based on the blood patterns on the victims, which was something I had never encountered before.

6. What is the evidential importance of blood pattern in a case?

In most reconstructions of shootings, needing to know how exactly the shooting happened helps to understand if it was self-defence or not. And therefore, from a forensic standpoint, to provide information through blood pattern analysis to either refute or include a suspect's testimony is important. In cases where finding the area of origin is crucial, it can be shown irrefutably with physics and math how the conclusion was arrived upon.

7. Have there been any changes in the modus operandi of crimes during the pandemic?

One of the most difficult aspects, as a general law enforcement officer, is the fact that everyone wears a mask. It makes it difficult to identify people in video surveillance. So that is the biggest impact from an investigator's point of view.

8. How do you manage your work-life balance?

It is constantly hectic. I am currently working on my PhD as well. So, it feels like I'm juggling three chainsaws on fire. It helps me when I

add all my tasks and schedules in Outlook so that I can have a clear view of what my day consists of. I also constantly send myself emails when I think of ideas or get reminded of tasks to do so they can jog my memory when I get to the office the next day.

9. What are the recent developments in crime scene reconstruction?

Crime scene reconstruction has come a long way. If I had to pick one development that we should focus on and would've had the largest impact on the discipline is the implementation of Artificial Intelligence. AI is a multifaceted tool that can be used in all aspects of crime scene reconstruction, which would process all the different variables and arrive at the most probable scenario that occurred.

Myth - If a computer is found off at a crime scene, it should be switched on to analyze.

Fact - Digital evidence should always be left in the condition that they are found in, and if found in ON, RAM should be collected, and the power supply should be unplugged.

INTERACTION WITH MRS. ANU SEBASTIAN

Ms. Ann Mariya Thomas
Ms. Jocelyn Kunju John
Ms. Lorraine Tissan
Ms. Prathiksha R S

We had the opportunity to interact with Mrs. Anu Sebastian, Scientific Officer, Forensic Psychology Division, Karnataka Forensic Science Laboratory. We asked a few questions about her experience being a forensic psychologist.

1. How well is Forensic Psychology understood in India?

For that, you'll have to divide the country into two parts - the northern part and the southern. In the northern part, Forensic Psychology is quite established, and we have a lot of case inflow as well. Even the results that the Forensic Science Laboratories (FSLs) give are reliable. Coming to the southern part of the country, we don't have that many FSLs equipped with Forensic Psychology. Bangalore, Kerala, and Chennai have also only recently started, so not much case inflow is there. Even the police don't have much idea about Forensic Psychology. Psychological evidence is only corroborative, and the court accepts this only as secondary evidence.

2. Are mental illness examinations of criminals conducted in FSLs?

We don't deal with that part where we see whether the person is mentally sane or not. Whatever cases we have gotten so far, it has only

been normal individuals who have been committing crimes. We haven't gotten cases where the person has an extreme disorder like an antisocial personality disorder or other personality disorders. That is usually dealt with by NIMHANS (National Institute of Mental Health and Neurosciences) . If the court wants to see if a person is competent enough to stand trial then it is sent to NIMHANS and they do the competency test. What we do is only related to polygraph, brain mapping, and narco analysis. The other section is usually done by clinical psychologists.

3. What type of crimes are referenced to you the most?

We get different varieties of cases such as murder, theft, smuggling, and rape. Murder cases constitute 80-90% of the cases we get. We did have a theft case that involved a long list of suspects, which was quite time-consuming. Mostly it is 302 IPC (Indian Penal Code) and POCSO (Protection of Children against Sexual Offences) cases.

4. What is done when a person going on trial is suspected to be mentally ill?

If the court sees that the person is not mentally sane, then they go for a psychiatric evaluation, and as per the result, they give the ruling. Maybe they admit them into a psychiatric ward where they will be monitored often.

5. Is criminal profiling often used in India? Under what circumstances is it used?

Criminal profiling is rarely used. As far as I know, it was used in the Burari deaths case. The Delhi FSL and CBI (Central Bureau of Investigation) did the criminal profiling, and they were able to identify the cause. Similarly, a 20 - 25-year-old case in Kerala also used criminal profiling where they were able to assess how the death happened. Criminal profiling is like the autopsy of the psychological state of the person, which has led to death. Western countries do give a lot of importance to Forensic Psychology as they emphasize on men

tal wellbeing, so criminal profiling is frequently practiced. However, criminal profiling needs are yet to be discovered in India. The FSLs are not into profiling since it requires experts who have 10-15 years of experience.

6. What was the first case that you worked on?

It was a murder case, and it was quite confusing. All the teams worked on the case and talked with the suspect. And we did arrive at some interesting conclusions. It was a 302 case of murder and burning.

7. What are the psychological assessments most commonly practiced in India?

We do an extensive MSE (Mental Status Examination) on the suspect and a pre-test and post-test interview. In other FSLs, even personality tests like the Draw-a-man test, 16PF (The Sixteen Personality Factor Questionnaire) , and TAT (Thematic Apperception Test) are done. Every FSL has its own way of investigation and mode of procedure. Mostly it is personality tests; MSE and clinical interview methods, which are done before any other procedures like brain mapping, narco analysis, etc.

Myth - Test firing for a control bullet is done outdoors.

Fact - Test firing is usually done in a controlled environment such as a water tank or cotton box.

INTERACTION WITH DR. O. MURUGESA BHARATHI

Ms. Ann Mariya Thomas
Ms. Jocelyn Kunju John
Ms. Lorraine Tissan

Dr O. Murugesa Bharathi is an Assistant Professor in the Department of Forensic Medicine at Indira Gandhi Medical College & Research Institute (A Govt. of Puducherry Institution), Puducherry. He has more than eight years of experience in the field of Forensic Medicine and we had the privilege to interview him and learn about his experience as a Forensic Medicine doctor.

1. Which type of crimes do you encounter the most? And what difficulties do you face when conducting an autopsy for those cases?

Hanging is one of the most common cases we encounter in the department, Puducherry being the suicide capital of India. Hanging causing mechanical asphyxia is an extremely common form of deliberate self-harm. Though a case of hanging could be easy to handle, it is an extremely common case for masking certain important findings. Keen observation is the key to handling any case. Sometimes, the absence of ligature marks, the uncommon position and the placement of the knots in such cases can complicate comprehending or ascertaining the cause of death. Also, for cases of hanging, specific bloodless flap dissection of the neck needs to be followed. This might require more training and expertise than normal.

2. Would you summarize the general procedure of an autopsy, while emphasising the most important organs or serological samples that you retrieve or examine first?

The procedure for an autopsy starts with a proper requisition from the concerned officials on par with guidelines of Sec. 174 CrPC (The Code of Criminal Procedure) for Police inquest or Sec. 176 CrPC for Magistrate inquest. After due paperwork, we try to elicit a required history from the investigating officers and in dicey situations and demand inspection of the crime scene, we request the officers and take a visit. Following these, we request the investigating officers to confirm the identity of the individual and then start with an external examination. External examination includes analysing the basic morphology, build, clothing, appearance. We take note of identification marks to establish the identity of individuals for documentation as this especially comes in handy in cases of unknown or unclaimed bodies. After identification, we appreciate the changes of death that can be seen in the deceased like algor mortis, rigor mortis, or livor mortis. These changes help us ascertain the time since death in certain situations. External examination also takes into account the descriptions of external injuries which could help determine manner of death, direction and cause of injuries. We also actively search for

clues or hints that could indicate signs of struggles before death. An internal examination follows the external examination. The commonly employed technique for autopsy is Virchow's technique. Depending on the initial case history we prioritise individual organ systems and go in an orderly fashion and appreciate changes seen in individual organs. For specific cases, specific modifications are made to this process. Lastly, we preserve organs/samples for histopathological examinations and toxicological analysis. The selection of organs and the choice of preservatives keep changing on a case-to-case basis. But, the most common organs preserved for toxicological analysis include, a portion of liver, portions from both the kidneys, 10ml of blood, stomach and part of the intestine along with their respective contents, and urine. When it comes to histopathological analysis, commonly preserved organs include the heart, lungs, and liver. Considering the Union territory of Puducherry, where I practice is a hub for alcoholics, pancreas is also sent for histopathological evaluation. We also ensure to write appropriate duly signed labels for these samples, pack them and send them to the concerned labs. After the entire procedure is over, care is taken to pack the deceased body and give it a proper aesthetic appearance for the relatives/attenders to perform the appropriate send-off rituals.

3. What conditions, concerning the body, make it hard to conclude an autopsy?

The physical form in which a body is retrieved from the site of crime makes a huge impact on a successful autopsy. This physical form of the body in turn narrows down to the time at which autopsy is performed and the difference between the actual time of death. It is extremely difficult to conclude while performing autopsies on bodies that are totally decomposed or charred. Equally challenging are cases of sudden cardiac deaths in individuals with underlying multiple comorbidities. Especially cases of vagal inhibition leading to sudden cardiac deaths or unnoticed/undocumented ventricular/atrial fibrillations, metabolic poisoning with insulin/potassium can complicate reaching a definitive conclusion during autopsies.

4. Would you throw light on your experience with your first autopsy? How challenging was it mentally?

I believe, for everything, there is a first time, and irrespective of how the experience is, it always stays etched in our hearts in indelible ink. The very first case I was assigned was a brought dead case of a middle-aged man to the casualty. After all the paperwork was done, the body was positioned on the post-mortem examination table. There were mixed feelings within me. Some part of me was happy and excited to investigate the first-ever case assigned to me, while some part of me was proud of myself for landing at that position where I could contribute to serving justice to people and solving the unexplained. Equally, there was apprehension popping up, as both the responsibility associated with conducting a post-mortem examination and the heat of justice is heavy to handle. Let's never forget the anxiety that tags along with any of our first steps. As soon as I saw the deceased, I had to exert that handle of control on all my thoughts and focused on only doing my best in the best possible way. External examination revealed nothing remarkable. In such cases, considering the age of the deceased, the second-best shot was to examine the cardiovascular system. As I began exploring the thoracic cavity, I noticed the pericardial sac enlarged and the sac congested. Further, it was evident that the likely cause of death was cardiac tamponade. On dissection of the heart, it became clear that there was ventricular rupture leading to cardiac tamponade. This one experience strengthened the idea in me that a proper autopsy can solve unsolved mysteries. It was an important component for serving justice to the deceased or his/her family. It boosted my morale and added confidence in me. Handling dead bodies of deceased individuals, the endless heinous crimes and the humanity that is tossed in such situations was never mentally taxing to me. Probably one possible reason to not be affected mentally is that I came determined and was expecting these when I chose Forensic medicine as my speciality.

5. How long did it take for you to get used to the process, and did you take any measures to help you adapt it?

I feel I was pre-prepared for facing this. The adaptation phase for me did not take much longer. I knew I was going to be doing this when I chose my speciality. One reason for my easy adaptation was that I was bestowed with a conducive environment filled with an understanding family, great peers and thick friends. Apart from this, keeping your mental balance on frequent checks is the key to adapting faster. "Always expect the unexpected" has been the motto that keeps me going!

Myth - Deleting files from the recycle bin will permanently delete a file.

Fact - Deleting from the recycle bin will only delete the file entry, but the contents will still be there. Hence, deleted files can be restored while doing digital forensic analysis.

GLOBAL NEWS UPDATES RELATED TO FORENSIC SCIENCE

- DNA PHENOTYPING
- TECHNIQUE FOR DEVELOPMENT OF HIGH-RESOLUTION FINGERPRINT IMAGES FROM CURVED SURFACES
- FORENSIC JOURNALISM – AN UPCOMING FIELD OF FORENSIC SCIENCE
- THE SIGNIFICANT ROLE PLAYED BY NANOPARTICLES IN DEVELOPMENT OF FINGERPRINTS
- THE JOURNEY FROM CRIME TO JUDGEMENT

DNA PHENOTYPING

Ms. Vyshnavi

Many discoveries and inventions have led to the advancement of science and technology. Forensic was introduced during the 1830s and has gotten bigger now. Many new technologies of forensic science have been launched that have helped the crime scene investigations to go smoothly by identifying the suspect sooner than expected.
DNA phenotyping is one of the latest and advanced technologies of forensic science. This is basically a technique to predict an organism's or a person's phenotype that is nothing but the individual's characteristic features and physical appearance with the help of genetic information, that is, DNA samples.

Now, you might question how this is helpful in the forensic field.

As we are aware, DNA defines eye colour, hair colour, skin, etc. The genetic instructions for all these are written in DNA. Many violent crimes in America were backlogged, and that's when DNA phenotyping played a major role by giving useful leads for furthering investigation and narrowing down the suspect list.

It was Parabon NanoLabs that developed a software that could give information about the DNA left in the crime scene. Parabon Snapshot is a DNA phenotyping tool or more of a software that creates a face imaging sketch of a person with the help of DNA samples helping the investigator to know what a suspect looks like. The snapshot system hardly needs a nanogram of DNA, and after the collection runs it through the snapshot algorithm, it, in turn, would produce the prediction of a person.

Again, you might wonder how a snapshot system works.

Everything lies in the hands of the SNP information that is “Single Nucleotide Polymorphism”. In short, we can call it snips.

What are snips exactly?

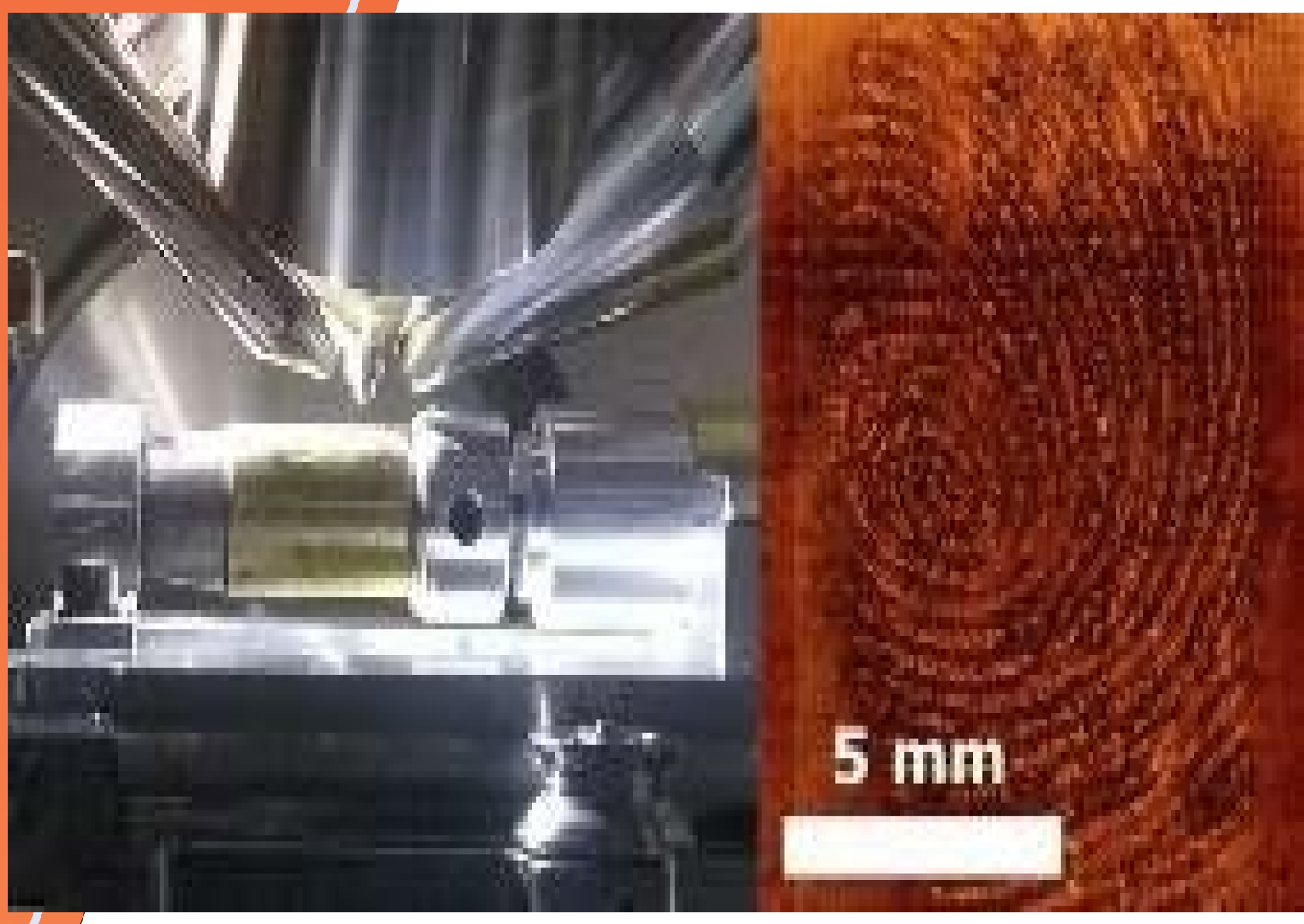
The human genome contains approximately 3 million base pairs and a variation in the single base pair is called snips. Sometimes when a genome is copied to make new cells, a single base pair is left out or added or even substituted. This leads to snips and this makes the genetic variation. This is why we all look different.

Isn’t this interesting! Just imagine how a miniature substance makes a whole lot of difference.

The snapshot interprets the SNP information from a DNA sample of an individual to identify what a suspect looks like, and this will be easier for the investigator to find the suspect.
It has been said snapshots are totally error-free and highly accurate, although some of the scientists questioned the accuracy and doubted if the system could recreate the face image sketch. More importantly, the study and analysis of an unknown person through this snapshot system requires a comparison, and if it is not possible, then the only way is to search and find the DNA database of the suspected person.
The system is more likely dependent on a pair of reference samples.
It must be kept in mind that the snapshot is way too expensive, and therefore it cannot be used for every investigation.
There are many other technologies coming up, and this latest development would definitely be a great benefit.

TECHNIQUE FOR DEVELOPMENT OF HIGH-RESOLUTION FINGERPRINT IMAGES FROM CURVED SURFACES

Ms. Blessy John Kalla



Credits: University of Nottingham

A fingerprint is one of the important pieces of evidence found in the crime scene as it helps to identify the suspect and link the suspect to the crime scene. Fingerprint plays a significant role in the field of Forensic Science, but it is not always found intact in the crime scene. It may often be distorted or partial or present on surfaces from where the images of the print cannot be obtained in a condition in order to examine partial or present on surfaces from where the images of the print cannot be obtained in a condition in order to examine it later and obtain accurate results, which are very important to convict the wrong-doer.

The University of Nottingham has worked in every aspect to develop a method to obtain high-resolution fingerprint images from curved or challenging surfaces.

James Sharp, an associate professor in the school of physics and astronomy, and his team developed a technique based on spectrometry known as the time-of-flight secondary ion mass spectrometry along with a significant creation of a rotation stage, which actually helps us to study the fingerprint deposited on curved objects bullet, metal casings, and other surfaces.

The ToF-SIMS (Time-of-Flight Secondary Ion Mass Spectrometry) is a technique in which high energy beams of positive ions are made incident on the sample surface to free secondary ions from the surface as they collide with any material. The ions are then accelerated on the ToF analyzer. They are distinguished based on the mass-to-charge ratio; it produces a spectrum that provides a very detailed image of the chemical composition on surfaces of the sample.

How does this help obtain the high-resolution images on curved surfaces like bullets or metal casing of a firearm?

Basically, when a bullet is fired, the metal casing experiences and undergoes changes due to the environment as it is subjected to factors such as high temperature, pressure, and friction. The propellant and the powder residue generates a reaction process that ejects the bullet out of the chamber.
These combined factors often result in removal, degradation, or evaporation of the volatile compounds of fingermark residue like water, lipid, amino acid, and obscuring, or smudging of the mark. The scientists of the University of Nottingham state that these factors may complicate the conventional retrieval of fingerprint marks such as cyanoacrylate fuming and fluorescent staining.

The experts in the University of Nottingham conducted research for a period of over 7 months and were able to obtain high-resolution images of the fingerprint images, ridge characteristics, and the sweat pore details, which was not the case in the conventional method such as cyanoacrylate fuming and basic yellow 40 dye. The rotation stage is a significant feature that helps study the fingerprint marks in detail.

The main aspect that we should look into is that the conventional techniques did not provide reliable and accurate detailed images. With the imaging obtained with the conventional technique, it was seen that there was a degradation of the quality of the image in a period of 8 days, whereas it would not be visible or recognizable after 3 days and gave no result after a period of 14 days. In the case of ToF SIMS, one of the advantages is that in the ion beam, they were able to detect, visualize, and examine the sample up to 26 days after collection.

According to Sharp, the experts proved that ToF SIMS provides detailed high-resolution images with accurate details on different surfaces.
The addition of the rotation stage is significant as it helped in studying the fingermarks on the surface in detail with less difficulty and covering the whole surface of the sample from which the image is to be obtained. It is even non-destructive, so it keeps the evidence intact while it is being examined. The high-resolution images provide accurate results, which help in identifying the suspect or linking the suspect to the crime scene or firearm ammunition.

Sharp is continuing to work on this technique of obtaining images from the curved surfaces on the rotation stage.
This technique, along with the rotation stage, may be a very productive contribution to the field of forensic science as it makes it easier for the experts to examine the fingerprint impression to study the characteristics, ridge details and obtain a high-resolution image which helps to narrow down and link the suspect to the crime scene.
Obtaining fingerprint impressions on curved surfaces was an aspect of difficulty when conventional methods of imaging were used.

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FORENSIC JOURNALISM – AN UPCOMING FIELD OF FORENSIC SCIENCE

Ms. J B Arsha

What is the field of Forensic Journalism?

The field of Forensic Journalism is the application of science - its principles and techniques to journalism for the purpose of justice. Journalism is the field of collecting, reviewing and presenting news to the masses. When science can be applied during the collection, reviewing and presenting news, it can be termed as Forensic Journalism.
In simpler terms, a lay journalist would be able to collect, analyze and publish news while a forensic journalist would be able to answer the 5W1H - what, when, why, where, who and how of the news.

What are the duties of a forensic journalist?

A forensic journalist must

- Look beyond the information, into the meaning, reason and relevance of news.
- Must work in accordance with the rules of journalism and the limits of science.
- Must be able to dig deep into a topic, put it in the law's perspective, form an opinion, ensure the opinion is in line with science and present it in an understandable fashion.

What are the finer rules of Forensic Journalism?

The Reporters Sans Frontiers (RSF), a NGO dedicated to safeguarding rights of journalists lists out ten golden rules of forensic journalism as follows:

1. Any issue or topic must not be routine journalism. Instead it has to be dug deeply.
2. The issue or topic that a forensic journalist is interested in must be a matter of public interest preferably of crime.
3. The work of a forensic journalist is time consuming. So patience is essential.
4. The work of a forensic journalist must be original and self-explanatory.
5. The final output must possess new information.
6. The presentation must be able to highlight the significance of the findings.
7. The output must not be based on one source alone and must be multi-sourced.
8. The work gets better results when multi-sourced and must incorporate team-work than a one person effort.
9. The report must not have a tone of bias and must not be made with a prejudice of accusing someone.
10. The work must be objective and truthful.

How is Forensic Journalism different from Investigative Journalism?

Investigative Journalism is a form of journalism which unveils a crime like political corruption which may be deliberately concealed. But an

investigative journalist uses different means like sting operations, witness testimonies etc. to expose it to the public.

Forensic Journalism on the other hand uses scientific understanding to explain a crime in a fashion that the general public understands, or sometimes even the judiciary to form an opinion. Forensic Journalism is always an essential part of Investigative Journalism.

Some myths regarding Forensic Journalism busted-

Forensic Journalism focuses only on 'bad news'.

While Forensic Journalism often helps in exposing bad news, it need not always be the case. It sometimes exposes positive news like removing a stereotype, portraying the positive effects of an approved medicine etc.

Forensic journalists give anonymous reports.

A genuine Forensic Journalism report would always be identified with the author and would only be a tool to explain facts on the basis of science, rather than being a personal document which highlights the author.

Forensic Journalism is an unregulated system and can be unethical at times.

While in some countries the statement may be true, in many nations the field is regulated and bound by an ethical code of conduct where the responsibility is fixed under legislation.

The field is driven by private media houses and therefore not a serious field.

Even though presently it is driven by the private media houses in many countries, it is government owned in many countries where it has led groundbreaking investigations. The field is also growing in many other countries where it is starting to be taken seriously.

Forensic Journalism education

The following are some of the institutes offering courses on forensic journalism:

- PG Diploma in Forensic Journalism - National Forensic Sciences University, Gujarat, India
- Certificate course in forensic and investigative journalism - Bristore University, Zambia
- MA Investigative and forensic journalism - Columbia journalism school, US

Case example

A detailed case study involving forensic journalist Alison Flowers, used science to explain the shooting of Cortez Bufford by St. Louis Police in a dark tunnel is linked below.
shorturl.at/kvG03

Conclusion

If summarized, Forensic Journalism reports a crime in a more legal, scientific and evidence based manner. It is a primitive field today, with much prospect to be an advanced and sought after field in the future. While regulations are not sufficient at present in many countries, its scope is certain to bring about many reformations soon.

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THE SIGNIFICANT ROLE PLAYED BY NANOPARTICLES IN DEVELOPMENT OF FINGERPRINTS

Ms. Blessy John Kalla
Mr. Rohan Mathew

INTRODUCTION

Fingerprints are one of the most significant pieces of evidence found in the Scene of Crime (SoC) as they are unique, permanent, and can be classified by analyzing friction ridge skin found on the tip of our fingers. When in contact with a surface, it leaves a Latent Print (LP) due to the secretions of apocrine, eccrine, and sebaceous glands.

Different techniques are employed for the development of latent fingerprints found in the SoC, physical methods: dusting powder - black, magnetic, fluorescent powders, and chemical methods - iodine, cyanoacrylate fuming, silver nitrate.

Currently, a new method employed for fingerprint analysis uses nanoparticles whose sizes range between 1 to 100 nanometers as it produces high-quality images with clear ridge characteristics, increased contrast against the background, and visibility. They have properties like low size, large surface area, and optical properties that favor the interaction of fingerprint residues with porous and non-porous surfaces. The major advantage is it helps in the detection of both fresh and aged fingerprints.

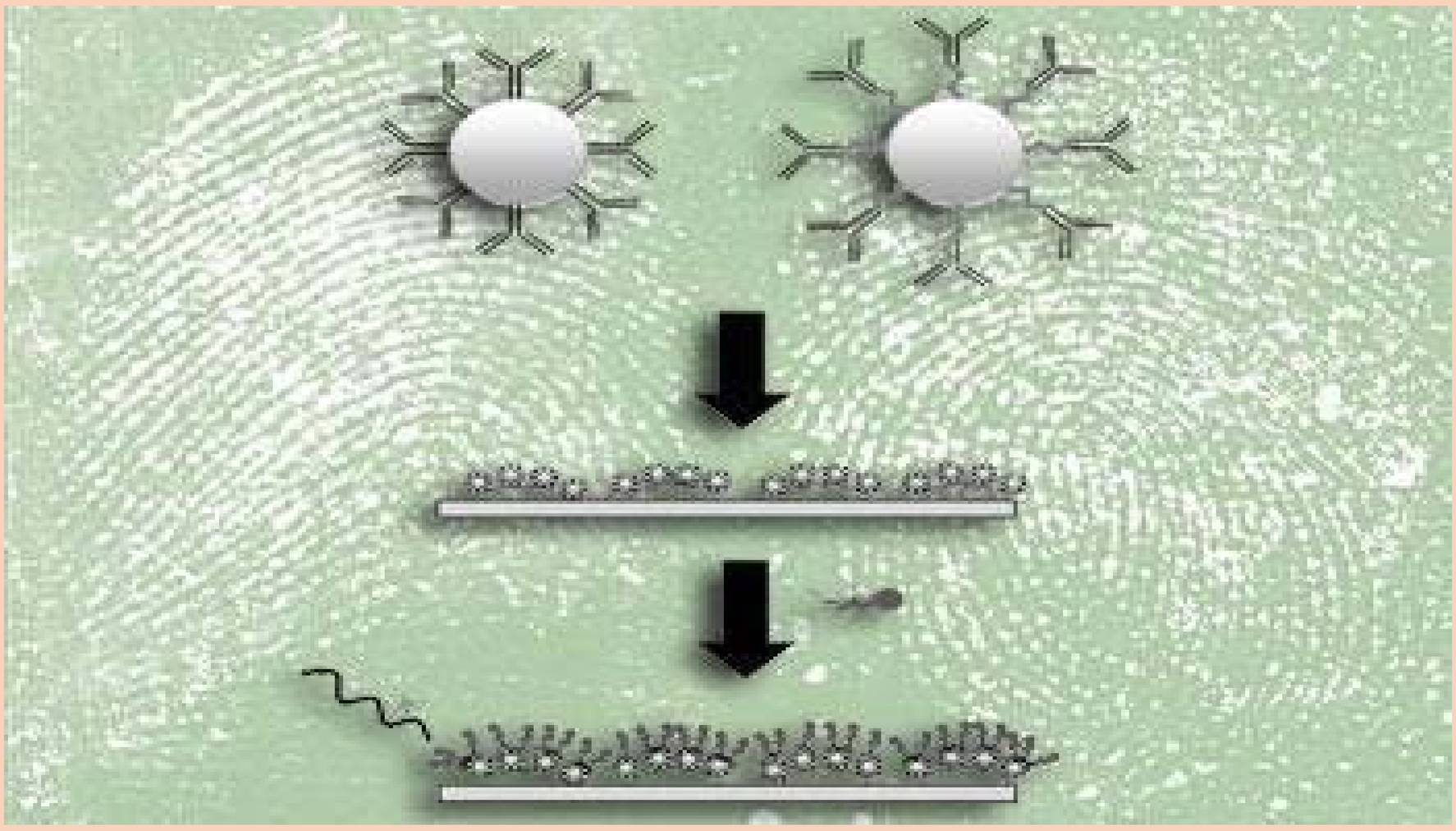

IMAGE: Nanoparticles adhering to the fingerprint residue
SOURCE: https://d2cbg94ubxgsnp.cloudfront.net/Pictures/480xA-ny/2/8/7/124287_fingerprint-350-for-tridion_tcm18-200397.jpg

Further discussing the significance of different nanoparticles in fingerprint analysis:

1. SILVER NANOPARTICLES

Silver nanoparticles have been employed since the 1970s in the UK for the detection of fingerprints. The theory behind development using the Ag-PD method was found in 1983.

- It works on the principle that colloidal silver has an affinity towards the organic components present in the fingerprint residue.
- The Ag-PD technique is known to be the best for the development of latent prints in wet conditions and on porous surfaces.
- Iron salt is used to reduce silver nitrate to colloidal silver that reacts with the organic part of the fingerprint residue to produce a black-silvery image which aids in effective visualization.

2. SILICA NANOPARTICLES

IMAGE: Developing fingerprint using Silica nanoparticle

SOURCE: https://d1otjdv2bf0507.cloudfront.net/image-handler/ts/20200203055752/ri/750/src/images/Article_Images/ImageForArticle_5427_15807274706453894.png

- The development of latent prints using silica nanoparticles creates a good contrast image showing detailed ridge characteristics due to the coating ability of the dye and ease in synthesis.
- Silica nanoparticles are mostly doped with a dye for the development on non-porous surfaces as it prevents photodecomposition, aiding in the long life of the latent print.
- Recent research has found that amphiphilic silica nanoparticles have an affinity towards amino acids in the fingerprint residue, therefore providing a good quality image.

3. GOLD NANOPARTICLES

Gold nanoparticles are unique as they have properties like long shelf-life, resistance to oxidation, chemical inertness, and a strong reactant towards metallic surfaces, which aids in fingerprint analysis.

- They were processed with thiolate cyclodextrin, and along with a dye, they were found suitable for the development of LP on porous and non-porous surfaces.
- Gold nanoparticles were also functionalized with anti-cotinine antibodies, which provided individual identity and a better way to identify drugs from fingerprints.
- When gold nanoparticles were combined with amino acid-binding antibodies and red fluorescent secondary antibodies that adheres to the LP, it aided in visualizing prints almost 12 months old.

4. ZINC OXIDE (ZO) NANOPARTICLES

- ZO nanoparticles are an effective powder for the development of latent prints as they possess fluorescence.
- As per studies conducted, zinc oxide nanoparticles show fluorescence under UV light which helps in better visualization on non-porous surfaces.
- ZO nanoparticles, when combined with silica nanoparticles, produce a good contrast fingerprint on non-porous surfaces like glass, plastic, metal.

5. QUANTUM DOTS (QDs)

- These are semiconductor nanocrystals used for fingerprint development.
- Cadmium Telluride (CdTe) QDs are fluorescent. When combined with non-toxic silica nanoparticles, they give enhanced images with good ridge details and less background staining on non-porous surfaces.

- Highly fluorescent, water-soluble CdTe QDs were processed with Mercaptosuccinic acid (MSA) at a pH of 10. The LP can be processed by immersing the non-porous and porous surface in the QD solution for 1-3 seconds.
- Fingerprints were developed on an aluminum foil surface by a dusting powder made by combining Cadmium Sulfide, which is a highly photoluminescent QD, along with Chitosan mixture and Sodium Sulfide.

CONCLUSION

Fingerprints are the unique evidence found in an SoC due to their ability to individualize and link the perpetrator to the SoC or the victim. The development methods used play a crucial role in obtaining accurate results during fingerprint analysis. The conventional methods used for development may not be efficient enough to obtain prints in wet conditions, aged prints, or detect hidden prints. Development using nanoparticles was proven to be more effective by overcoming certain drawbacks faced previously. Different nanoparticles like gold, silver, zinc oxide, silica, QDs were very effective in development on both porous and non-porous surfaces. They produced fingerprint images of enhanced contrast and less background staining, and their adhering property helped in better visualization. Therefore, development using nanoparticles has proven to be a great asset in the field of forensic science, thereby having a great applicative potential in the future.

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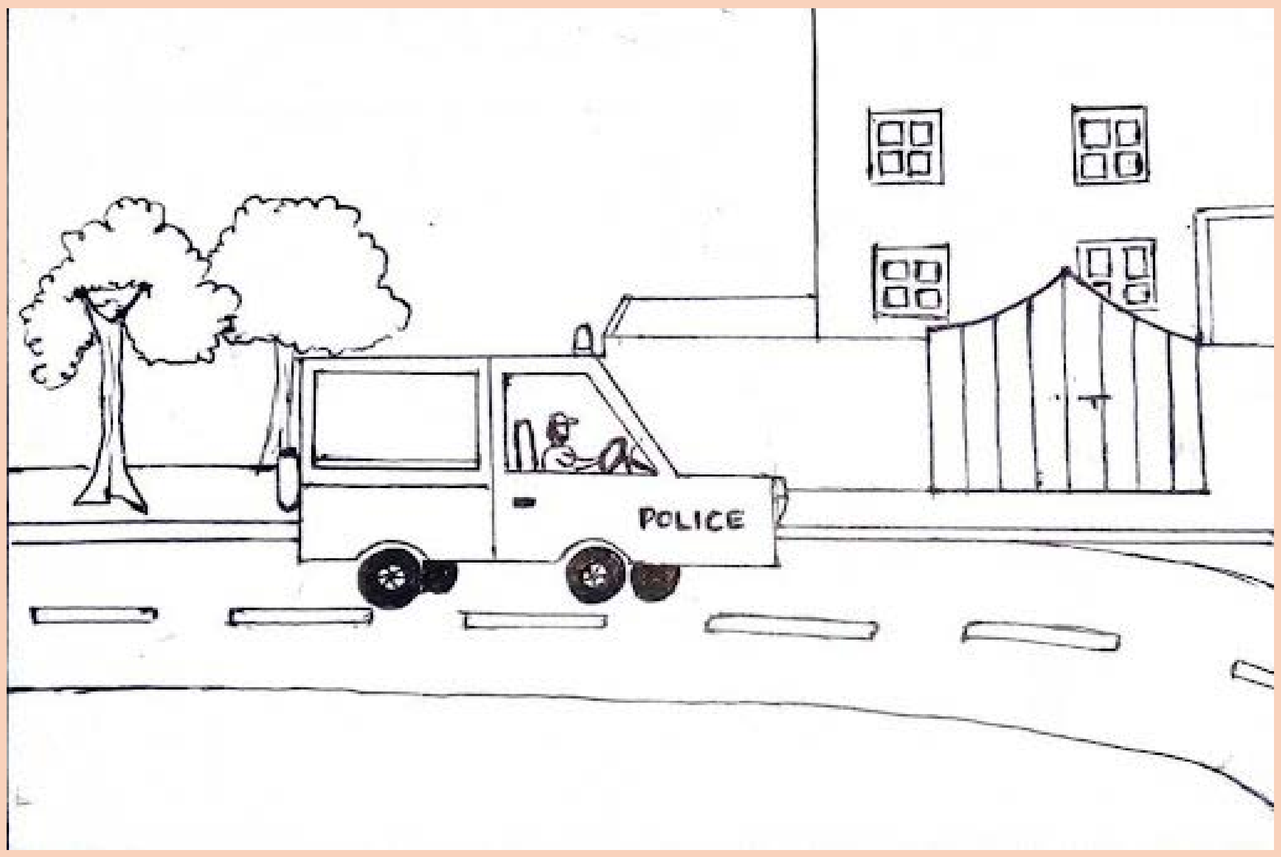
THE JOURNEY FROM CRIME TO JUDGEMENT

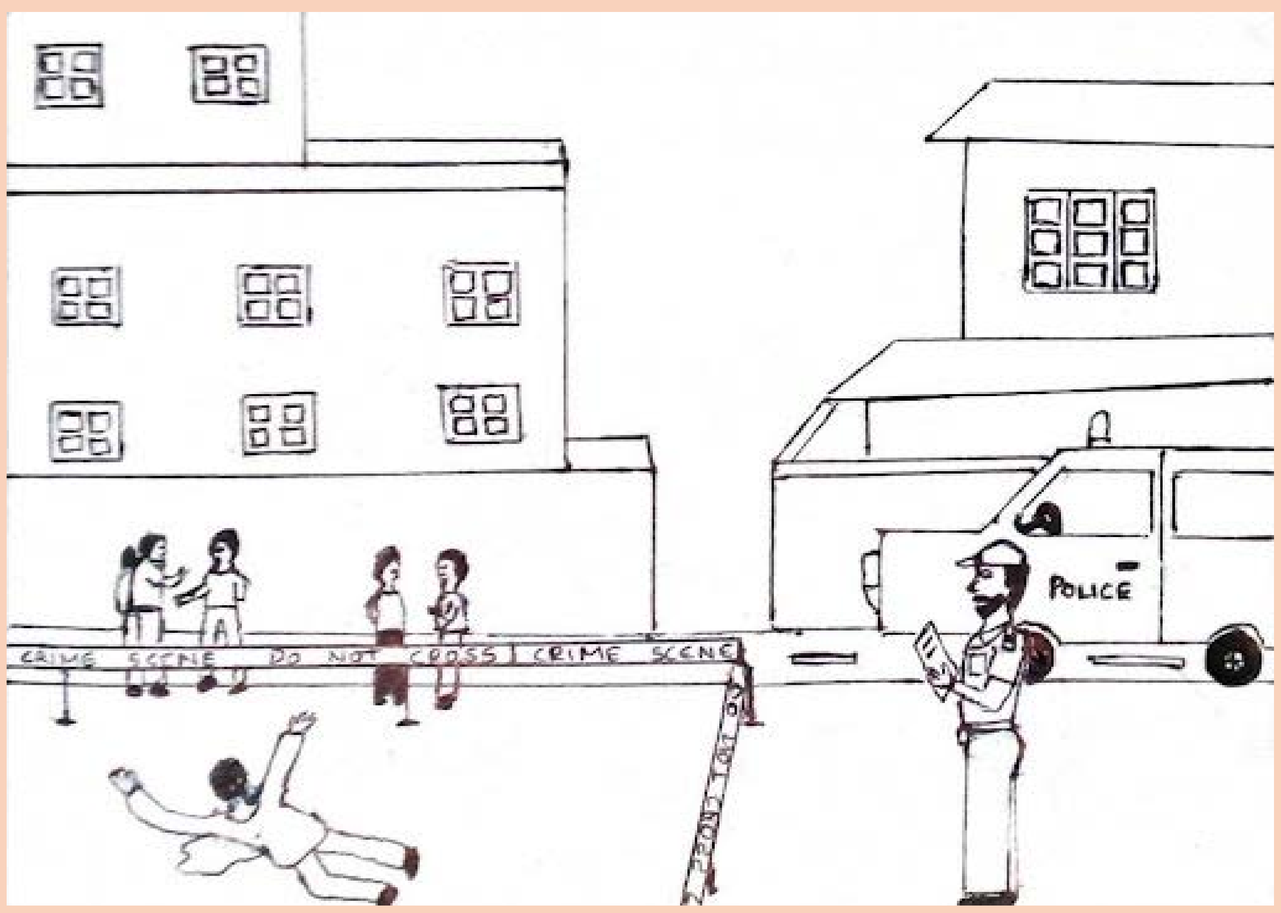
Ms. Catherine Maria Johny

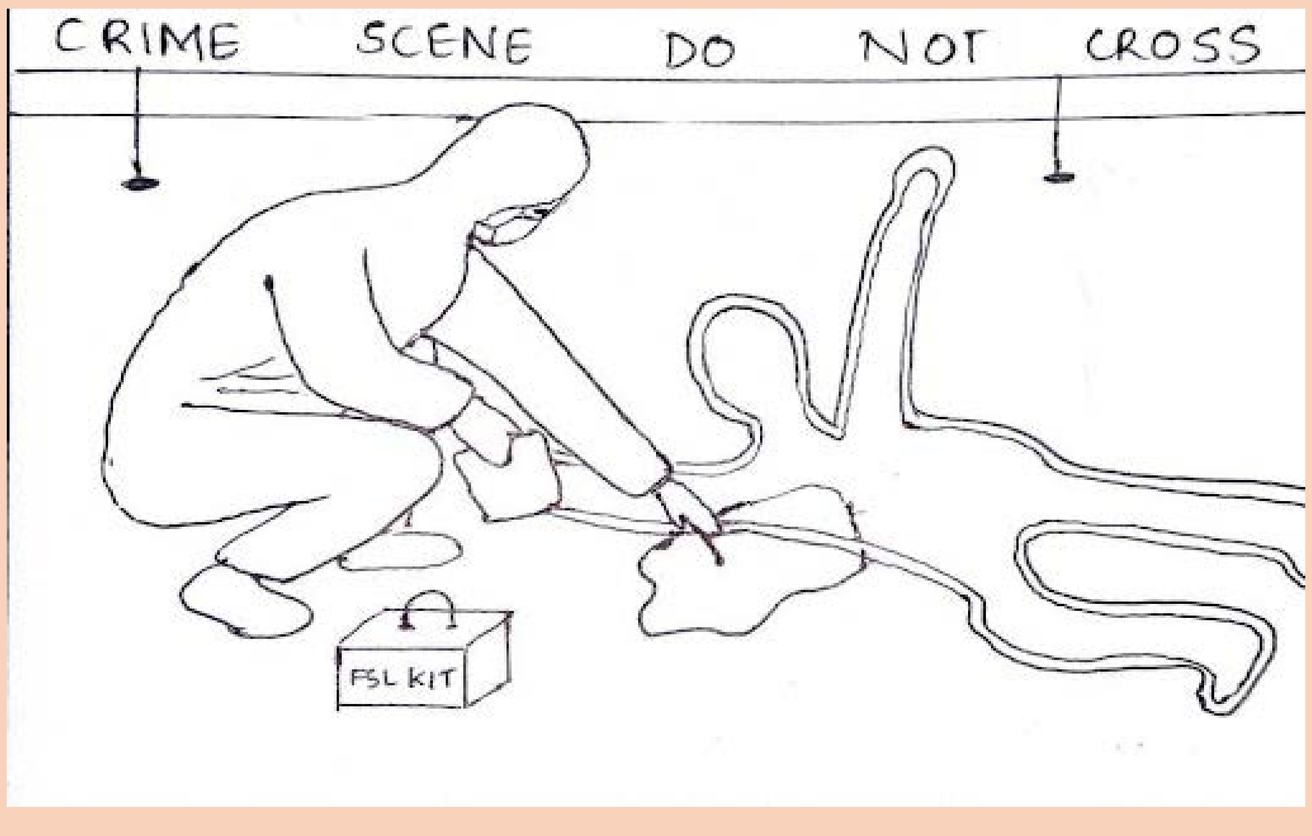
When a crime takes place, it should be first reported to the police station. The first responder needs to record the initial receipt of information. It should include:

- Date and time.
- Method of transmission.
- Identity of the person giving information.
- Weather condition.
- Location of dispatch.
- Brief details.



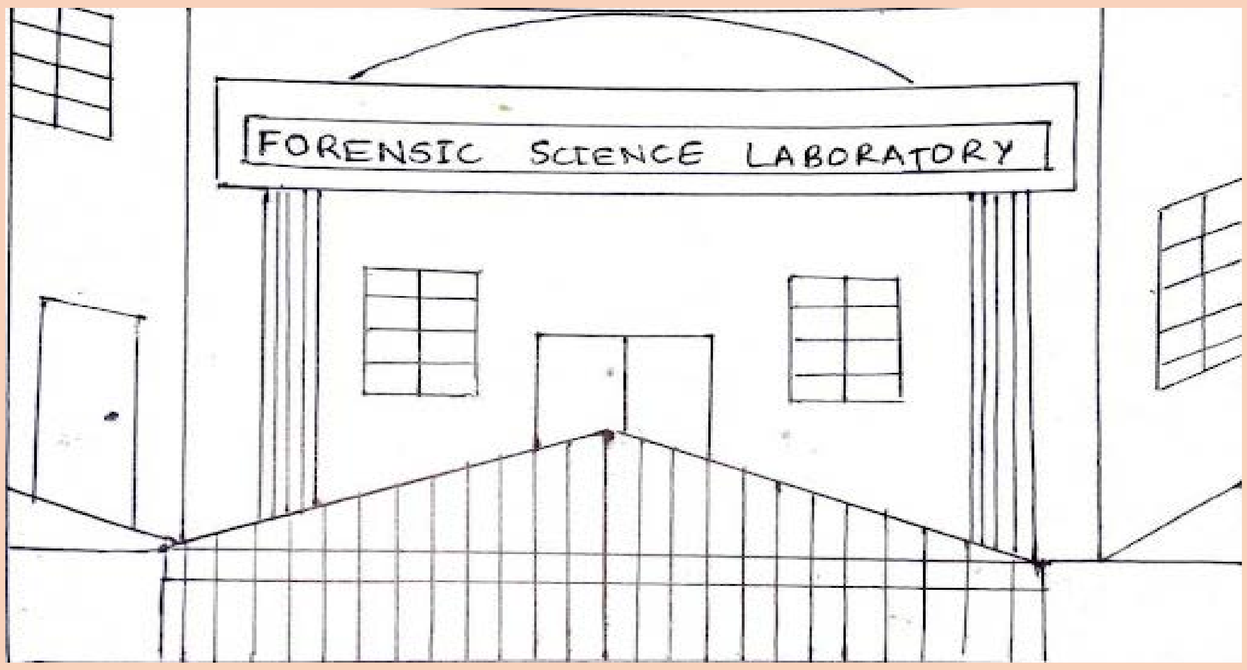
After arriving at the scene, the primary responsibility is to assist the victim and give necessary aid. He should then protect the crime scene by removing unnecessary people like relatives, media, curious or unauthorized people etc. and implement strict security measures like taping off the area, assigning security officers etc. He should separate the witnesses and avoid interaction among them. Then he can proceed to record other details such as time of arrival, location, scene description, weather conditions. He should also be aware of the people present: police personnel and non-police personnel.

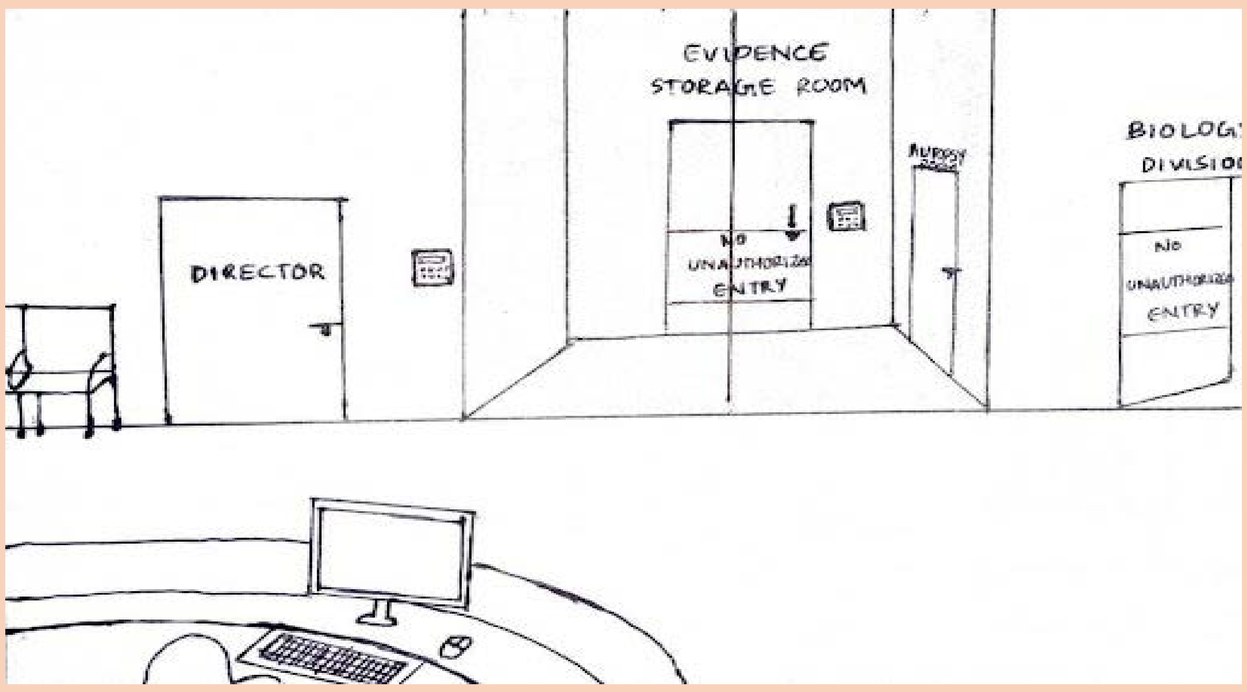


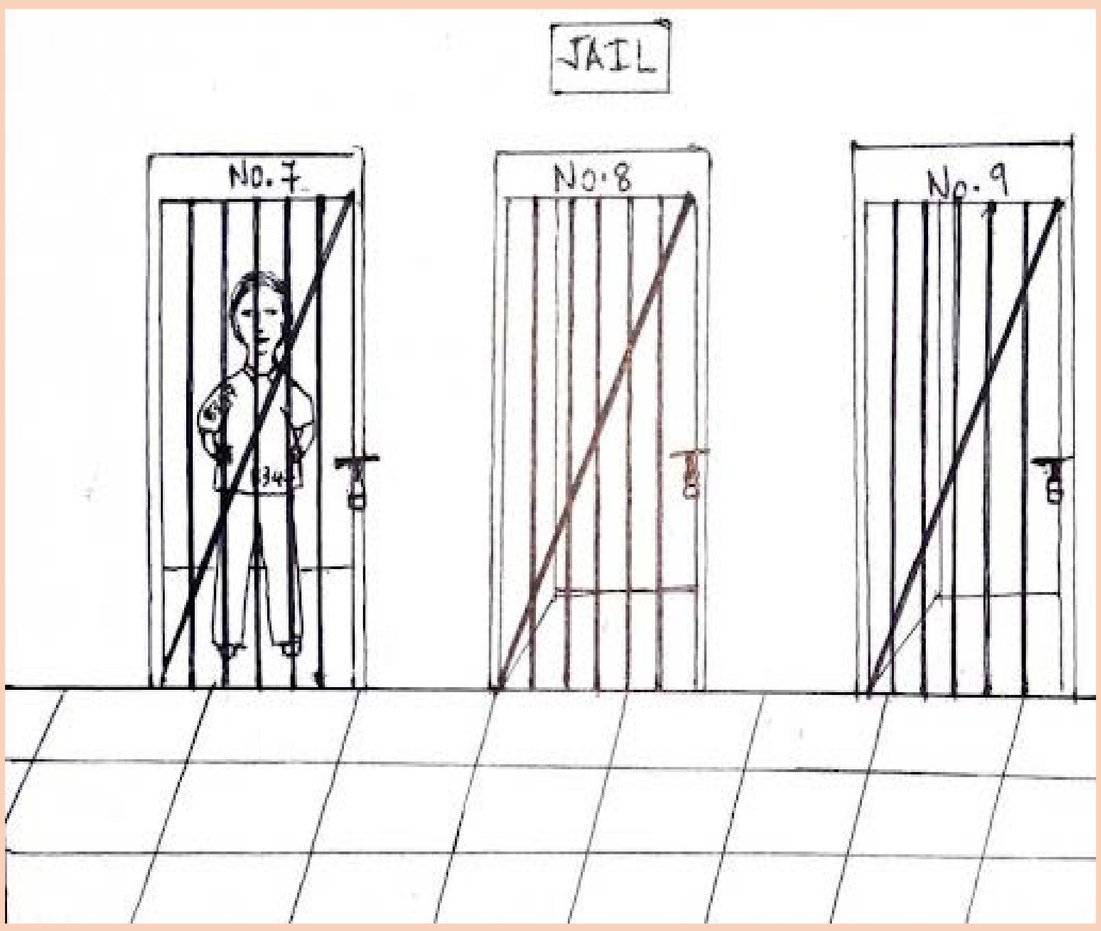


He should have a crime scene log having the information of the people who entered the scene with the time of arrival and their qualification. He should record the scene as it is using photography equipment. He should identify the evidence and preserve it according to the situation. When the forensic team arrives, he should inform the details of the crime and the present status. All information should be communicated to the investigating officer. Then the evidence can be collected and analyzed in the Forensic Science Laboratory.

Based on the evidence collected, each of them is transferred to its respective department, like hair to the biology division, guns to the ballistics division etc. The evidence is carefully preserved and analyzed in the laboratory to avoid tampering and the seal placed on the evidence covering should be intact while it is received. Any kind of tampering should be noted by the forensic department and should be mentioned in the report.







After receiving the report it is submitted to the court. The forensic scientist may be called upon to give expert testimony in court. Based on the investigation conducted the culprit may be identified from the suspects and the judge may give sentences based on the seriousness of the crime and serve justice to the victim and their family.

For every case, proper handling of the crime scene, determination and observation skills of the investigator and personal inferences are necessary to solve it. Remember, “Every contact leaves a trace”

-Sir Edmund Locard

CASE STUDIES

- THE AMERICAN TRAGEDY
- BTK: THE KILLER'S FETISH
- MURDER OF CHERISH PERIWINKLE
- THE ZODIAC KILLER
- KARNATAKA BITCOIN SCAM

SNIPPET - CROSSWORD PUZZLE

THE AMERICAN TRAGEDY

Ms. Akshara B
Ms. Kavya Priya L

It is a mystery case of Gabrielle Venora Petito (March 19, 1999 – late August 2021), an American woman who along with her fiancé, Brian Laundrie, planned for a four-month cross-country road trip in their van. They started their journey in early July 2021. This case captured the great attention of the whole world as Gabby was a travel influencer, who was active around all sorts of social media (Instagram, YouTube, TikTok, etc). This case is also known as the American Tragedy.

Almost after two months of travel, Brian Laundrie came back to his native. It's been so strange that this case remains unsolved.

- Gabby and Brian began their journey on July 4th, 2021.
- On August 12, an unknown man called 911 to Moab, Utah Police, and reported about the dispute between the influencer and her fiancé which he had witnessed. Later police reached the spot and interrogated them; all that footage was recorded by a body camera.
- Gabby was crying; she was uncomfortable as well and she explained her struggles with mental health.
- Brian was also questioned about those visible scratches over his face and arm for which he told that those were made by Gabby with her phone.
- From the interrogation, police simply concluded that it was not a case of domestic violence, it was just because of mental and emotional stress.
- Police insisted Brian stay in a hotel that night and Gabby went back to their van.

- Till 25th August she posted pictures and videos about the trip but later no more posts.
- On September 1st Brian returned to North Port, FL in their van without her and later he went for a hike in a wildlife reserve in Florida.
- Ten days later Gabby's parents reported her missing
- On September 15th Brian's attorney stated that neither Brian's family nor he would speak on any matters regarding this case.
- But on September 17th police went to Brian's house to question his parents, but it was of no use because they were worried about their son's missing.
- Later on September 19th after a long search over Bridgerton National Forest in Wyoming police found human remains. The report shows that the person died 3 -4 weeks before.

According to Teton County Coroner's Officer – Dr. Brent Blue, the manner of death is homicide (1st-degree murder) and the cause of death is strangulation. Laundrie's remains were found on a Florida nature preserve one month after Petito's body was found. His reports show a clear-cut suicide (he shot himself).

CONCLUSION

This case would not have happened as such if the police would not have made those unintentional mistakes during the interrogations. As well as even if Brian's family had informed the police about any clues that they knew about Gabby's missing. If such had happened it could be a turning point for the case.

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BTK: THE KILLER'S FETISH

Ms. Siddhi Pant

Dennis Rader, under the moniker **BTK**, illustrating for **BIND**, **TORTURE**, AND **KILL**, murdered 10 people from 1974 to 1991.

The fancy idea of serial killers as acquired through society was counteracted when it was found that Dennis had no childhood trauma. He was a parishioner, the congregational president of his church, and he also had a full-time job that made him nothing less than a normal citizen of the society.

Where did it all begin?

The brutal series of events commenced with the killing of the Otero family where Dennis murdered all 4 members of the family. This brutal murderer showed no mercy to children and women.
Dennis strangled both Joe and his wife Julie (the Oteros) and then the 9-year-old, Joey. He killed him by putting a plastic bag over his head and suffocating him. He took Josephine, the 11-year-old girl, to the basement and hung her.
Or in Dennis' words:

"I put a plastic bag over his head, then ropes and pulled him tight. First of all, Mr. Otero was strangled; a bag was put over his head and strangled. And then I thought he was going down. Then I went to strangle the lady, and I thought she was. Then I strangled Josephine, I thought she was down, and I went to Junior and put the bag on his head. After that, Mrs. Otero woke up again and you know, she was pretty upset, what's going on? So, I went back, and at that moment I strangled her to a suffocating death."

Credits: Image provided by the Sedgwick County Sheriff's office

Credits: Photo by Jeff Tuttle-Pool/ Getty Images

The Otero family-

Credits: Image from bizarrepedia.com

Dennis's subsequent murders included:

- 5. Katherine Bright - Aged 21- Died on April 4th, 1974
- 6. Shirley Vain - Aged 24 - Died on March 17th, 1977
- 7. Nancy Fox - Aged 25 - Died on December 8th, 1977
- 8. Marine Hedge - Aged 53 - Died on April 27th, 1985
- 9. Vicki Wegerle - Aged 28 - Died on September 16th, 1986
- 10. Dolores Davis - Aged 62 - Died on January 19th, 1991

Role of BTK in forensics

After the vicious killing spree from 1974 to 1991, BTK went silent During this time, he mocked the law enforcement through disreputable hidden notes, ads, newspapers, so as to achieve their recognition.

In March 2004, the Wichita television station received a letter containing clues of the BTK murder. Alongside the letter was a box containing a graphic description of The Otero murder.

Use of forensic techniques

DNA analysis:
Dennis Rader's daughter offered up a DNA swab when she suspected her father had something to do with it. The DNA was a close match to the semen found at the crime scenes. A forensic serologist was brought in to collect the DNA for processing and comparison.

Handwriting analysis:
The police brought in a handwriting specialist to study the letters BTK sent in and matched them to the original one. This helped distinguish the suspect who was suspected of the BTK murder but wasn't.

Technology:
The police had to use the forensic technology specialist to hack into the diskette that Rader sent to the police. When they hacked it, they found the name "Dennis" and a few church documents. This was the pivotal proof that helped in locking up BTK.

Utilization of digital forensics:
Through the use of the EnCase software, in unveiling the details regarding the recent activities involved in the floppy disk, there has been a whole lot of room to sue Dennis. The EnCase software, in this case, turned out to be a very important tool. The software is designed for forensics, cyber security, and e-recovery. The section of e-recovery is accustomed to recovering deleted electronic evidence that may be used to document concrete evidence of crimes; electronic evidence in most cases is free from doubt. This explains why Dennis could finally have confessed to committing crimes.

Therefore, computer forensics plays a major role in tracking down evidence, especially those that have some digital concepts or links. It is possible to trace all crimes through the use of forensic techniques.

Sentencing:
In February 2005, Dennis was convicted. He confessed all his monstrous

work and murders. He was charged with 10 murders and sentenced to life in prison for all ten. The overall term for his punishment is 175 plus years with no chance of obtaining parole.

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Myth - If the skin on the finger is scraped off, the fingerprint will change.

Fact - Unless the deep layer is damaged, the fingerprint will grow back in the same pattern.

MURDER OF CHERISH PERIWINKLE

Ms. Hennah Jennifer

“STRANGER=DANGER”

Cherish is an eight-year-old girl from Jacksonville, Florida. She was born on December 24, 2004, to Rayne Perrywinkle (mother) and Billy Jarreau (father), who were never married.

On 21st June 2013, it was not a normal day for Cherish Perrywinkle. She was so happy because the next day she needed to fly to California to spend her summer with her father. Cherish was living with her mother Rayne, Rayne’s boyfriend and Cherish’s two younger sisters in Florida.

On 21st June, Rayne made Cherish ready for the trip by packing things, like dresses. She wanted to buy some new clothes for Cherish, so she decided to go to the shop. She didn’t have a car, so she decided to walk to the Dollar General Store on Edgewood Avenue with her three daughters.

She only had $100, with which she needed to buy household items, some clothes and travel to the airport. Furthermore, she didn't have any more money to buy new clothes for Cherish's trip. At this time, Cherish took a little white dress with red hearts on it. She realized that she couldn't afford it, so she put back the selected dress.

A man was watching every move of Rayne and her daughters. The man was waiting outside the store and struck up a conversation with Rayne when she came out. He said that he was waiting for his wife and claimed that they had a gift card for Walmart and that it would be helpful for Rayne to buy new clothes for her children. The man who was named Don introduced himself to Rayne. After some time, he said, "You can meet my wife at Walmart." At that time, it started to rain, so Rayne thought about whether she could walk in the rain or take a lift from Don to get to Walmart and buy some clothes using the gift card.

Rayne was a little hesitant, but later she agreed to the lift. Rayne and her three daughters got into a white van, and they arrived at Walmart. Rayne went into Walmart with her three children, and she started shopping for the clothes for Cherish, meanwhile Don, the old man was waiting outside. Later, he joined her, and he added a bundle of rope to the cart. He had a different intention for Cherish. Don told Rayne that he would get some cheeseburgers from McDonald's. While going, Cherish also went with him. Rayne thought that McDonald's was inside Walmart, so she was fine with that. After 20 minutes, Rayne began to worry and Walmart announced that they were going to close the store soon. There was no sign of Don, his wife, or Cherish. She searched the whole store and car parking. At 11:20 PM, she called 911, as she didn't know much about Don. She described to the police whatever she knew about him. Then the police came to know he was a familiar criminal. Don, a.k.a Donald Smith, was 61 years old and a sex offender with offences from the 70s. He had been released from jail three weeks before. The police didn't search for

him that night. At 9 A.M, 911 got a call. A suspicious van was standing near the bushes, and the police were searching for him. He drove past in the van, and he was arrested. The van was empty, and Cherish wasn't in the van. Police came to know that he was wearing the same clothes - jeans and a black t-shirt, and his lower body was wet.
Police went to the woods, and they looked for water with the help of a police dog where Cherish's body was found in the water.

Autopsy Report:

- Brutal injuries all over the body
- Raped many times
- Traumatic injuries on her genitalia
- Blunt force trauma on her head
- Ligature marks around her neck
- Strangulation marks which lead her blood vessels to burst in eyes, face, throat, and her eyeball bled

This shows that Cherish had undergone such a terrible incident. The injuries revealed that she fought for her life with the kidnapper.

Evidence:

- CCTV (Closed circuit television) footage of Donald leaving Walmart with Cherish
- He was wet when arrested
- A witness who saw his van parked near bushes
- DNA evidence - his DNA was found in Cherish's body, and Cherish's DNA was found on his penis

Trial:

Donald Smith was convicted of murder and has been on death row since 2018.
Smith is guilty of kidnapping, sexual battery of a person under twelve years old, and first-degree murder.

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THE ZODIAC KILLER

Ms. Jismi Mathew
Ms. Prarthana Nagesh

BACKGROUND

An era of trepidation was invoked in the citizens of Northern California in the 1960s and 70s. This was the result of a killer on the loose, who claimed to be the 'Zodiac Killer'. He was found to be operating his murderous schemes on young people and couples in the secluded areas of California and Nevada. He manipulated and threatened the media, mainly the local newspapers like San Francisco Chronicle, the Vallejo Times-Herald and the San Francisco Examiner. The letters he sent included Cryptogams - ciphers in which he claimed that he was killing people to make them his slaves in the afterlife. He used the San Francisco Chronicle as his literary outlet. His first letter to the chronicle was attached with a cipher. In the letter, the anonymous killer taunted the police by giving them gory details about the murders he had recently committed. It included facts of his murder that were obscured from the public eye. Most of its readers believed that the man wanted attention from the media or had a thirst for fame. He was referred to as the 'Zodiac Killer' after the arrival of his second letter in which he attested to the same. He signed the letter with the symbol marking the crosshair of a gunshot. In one of his last taunting letters to the news media, the Zodiac Killer claimed he had 37 victims to show for his five years of terrorizing the San Francisco Bay Area.

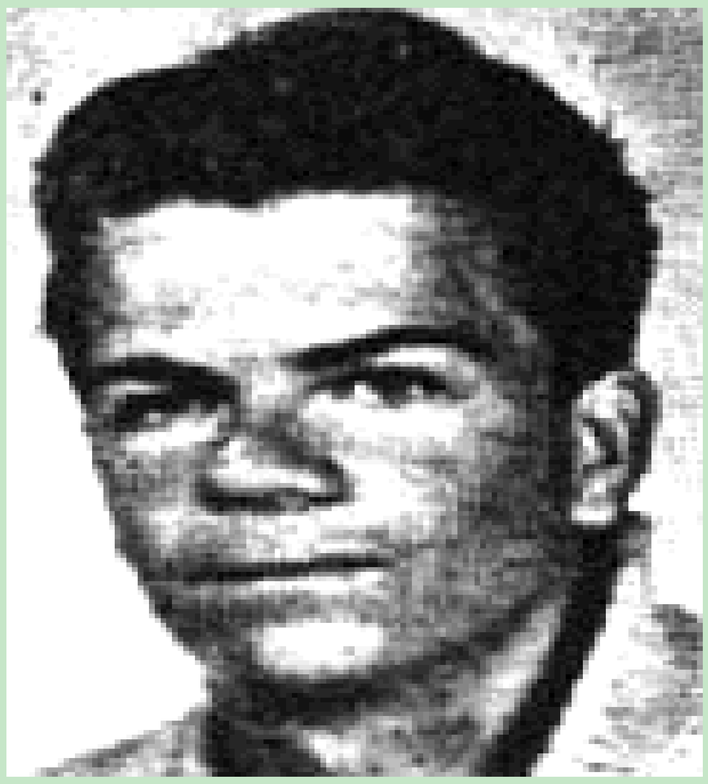
VICTIMS

DAVID FARADAY AND BETTY LOU JENSEN - Dec. 20, 1968

courtesy: https://zodiackiller.com/FaradayJensen.html

David Faraday, age 17, was shot once in the head at point-blank range and died within minutes. Betty Lou Jensen, age 16, was shot five times in the back and killed instantly. There was no indication of robbery or molestation. The incident occurred at a gravel parking area along remote Lake Herman Road on the eastern outskirts of Vallejo, Calif at approximately 11:15 PM.

DARLENE FERRIN AND MIKE MAGEAU - July 5, 1969



Courtesy: https://zodiackiller.com/FerrinMageau.html

The shooting occurred at 12:10 AM in the parking lot of secluded Blue Rock Springs Park on the eastern outskirts of Vallejo, Calif. Darlene Ferrin, age 22, was shot five times. Mike Mageau, age 19, was shot four times. The weapon was a 9mm semi-automatic pistol. There wasn't a single witness. Mike somehow survived the shots and briefed the

police regarding the physical features of the perpetrator. The killer informed the police about his role in the crime committed in December and July. On July 31st, 1969 letters were sent to the Vallejo Times-Herald, San Francisco Examiner, and San Francisco Chronicle. The letters claimed to be from the killer of Faraday, Jensen, and Ferrin. Each letter contained one-third of a cipher that, if solved, supposedly contained the killer's identity and also revealed the details of the crime which only the killer would have known.

CECILIA SHEPARD AND BRYAN HARTNELL - Sept. 27, 1969

Courtesy: https://zodiackiller.com/ShepardHartnell.html

Shepard was stabbed 10 times, both front and back, with a knife, 10 to 12 inches long and Bryan, six times in the back at approximately 6:15 PM in the shoreline of Lake Berryessa near Napa, Calif. The Napa County Sheriff's Department deputies responded to the crime scene where they found that the attacker had written a message on the victim's car door.

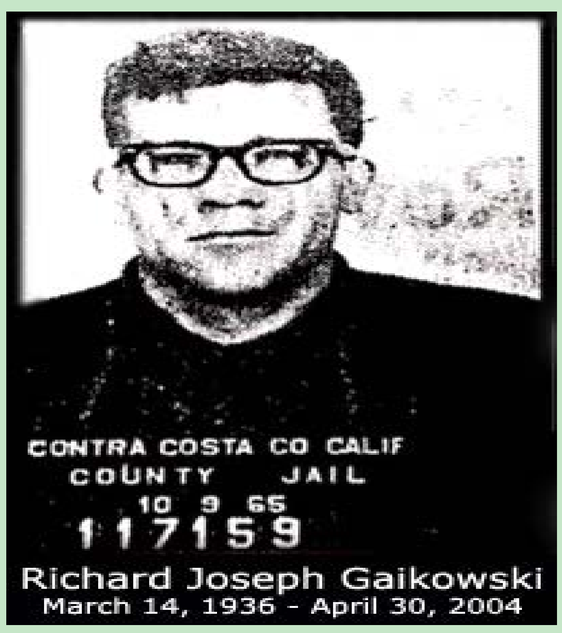
PAUL STINE - Oct.11th , 1969

Courtesy: https://zodiackiller.com/zodiac-killer-victim-paul-stine/

The place of attack was the northeast corner of Washington and Cherry Streets in the Presidio Heights neighbourhood of San Francisco, Calif at approximately 9:55 PM. Cab driver Paul Stine, age 29, was shot once in the head at point-blank range. The weapon was a 9mm semi-automatic pistol and unlike the other killings, this one had three witnesses. On Oct. 13, 1969, the San Francisco Chronicle received a letter from Zodiac containing a portion of a bloody shirt and him taking credit for the killing. However, in early 2004, the decision was made to close the case.

SUSPECTS

There have been over a thousand suspects in this case since 1968. Four of the high profiles include :



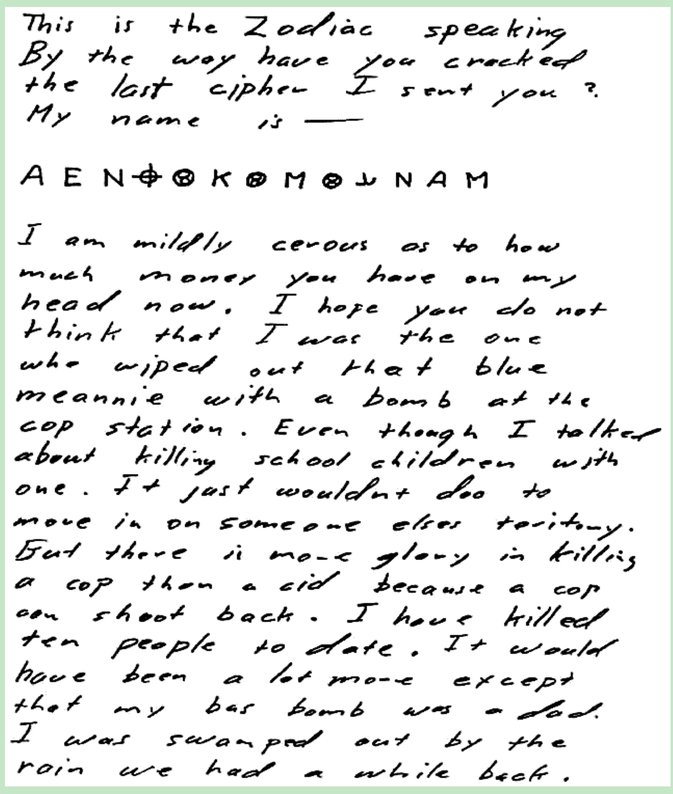
Richard Gaikowski

Arthur Leigh Allen

Rick Marshall

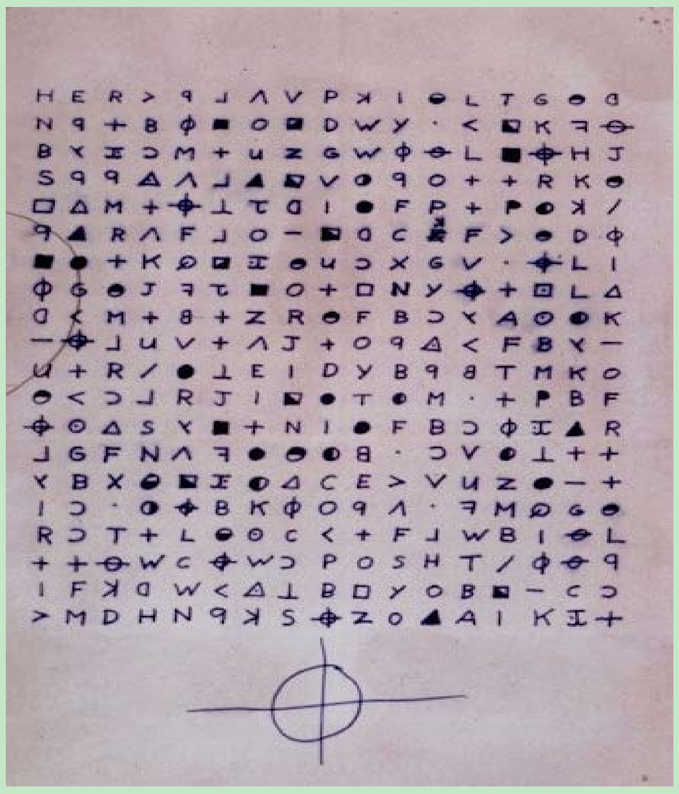
Lawrence Kane

ZODIAC'S LETTERS


This is the Zodiac speaking
By the way have you cracked
the last cipher I sent you ?
My name is —

A E N ⊕ ⊗ K ⊗ M ⊗ ⊥ N A M

I am mildly cerous as to how
much money you have on my
head now. I hope you do not
think that I was the one
who wiped out that blue
meannie with a bomb at the
cop station. Even though I talked
about killing school children with
one. It just wouldnt do to
move in on someone elses territory.
But there is more glory in killing
a cop than a cid because a cop
can shoot back. I have killed
ten people to date. It would
have been a lot more except
that my bas bomb was a dud.
I was swamped out by the
rain we had a while back.



Courtesy: https://en.wikipedia.org/wiki/Zodiac_Killer

CONCLUSION

On October 6, 2021, The Case Breakers, an independent team of 40 former law enforcement investigators, military intelligence officers and journalists, identified the Zodiac Killer as Gary Francis Poste, but the information was not confirmed by the Vallejo Police Department. The Case Breakers have requested that police test the Zodiac Killer's DNA evidence to confirm if it matches the DNA of Gary Francis Poste. The police stated that the case is not yet solved and, "The Zodiac Killer case remains open."

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Myth - Handwriting is passed down from the parents.

Fact - Handwriting is an acquired skill which means that it is learnt through practice and observation.

KARNATAKA BITCOIN SCAM

Ms. Amulya M

INTRODUCTION

International hacker Srikrishna Ramesh alias Sriki (26) is the face of the multi-crore bitcoin scam. Sriki, a habitual criminal, claims to have hacked online gaming websites, foreign company portals and the state government's e-procurement portal.

On November 4, 2020, Bengaluru's Central Crime Branch (CCB) police arrested hacker Srikrishna under the Narcotic Drugs and Psychotropic Substances Act for allegedly obtaining drugs using bitcoins via the darknet and peddling it to high-profile clients. On investigation, CCB determined that Sriki was involved in illegal hacking, including that of the Karnataka government's e-procurement portal.

Before going further, we should now understand some terms like Cryptocurrency and how Crypto Mining and exchange take place.

Cryptocurrency: Cryptocurrency is a virtual asset used as a medium of exchange through a network of computers. The currencies are decentralized structures that use blockchain technology and distributed ledgers across numerous computers, also called non-official cryptocurrencies. They are no longer patronized by any government authority and in most cases are without any tangible, physical assets.

How is cryptocurrency earned?

Crypto-mining: Bitcoin mining is the technique of creating new bitcoin by solving computational puzzles. The mining process also confirms transactions on the cryptocurrency's network and makes them trustworthy.
Crypto buying and exchange: Basically, crypto exchanges permit the conversion of one crypto to another and the buying and selling of cryptocurrencies. These platforms set the price of digital assets (both coins and tokens), based on trading activities. Cryptocurrency can be brought from trading platforms like Bitfinex and coinbase. And exchange can be taken by offering to accept cryptocurrency in exchange for service.

Attack Methodology: In his voluntary declaration to the CCB police, Sriki said he had hacked the Bitfinex exchange twice. "Bitfinex became his first largest Bitcoin exchange hack." And the second instance was a simple spear-phishing attack that led to two Israeli hackers operating for the army and getting access to the computers of one of the employees, which gave them access to the AWS cloud account. He exploited a bug in the data centre which gave them KVM (Kernel-based virtual machine) access to the server. They rebooted the server into GRUB (GNU Grand Unified Bootloader) mode, reset the password, logged in, reset the withdrawal server passwords and routed the money via bitcoin to his bit-coin address. And he had made a profit of around 20,008 BTC (bitcoin).

In August 2019, authorities at the e-procurement cell filed charges with the State Police Cyber Crime Branch, professing that an unknown person took Rs 11.5 crore and the officials were able to prevent the theft of another Rs 7.37 crore.
Sriki also admitted he had hacked into the Karnataka government's e-procurement portal in 2019. The accused alleged that he acquired access to the procurement site in June 2019 by exploiting "a remote code execution vulnerability", that gave him access to tender bid details such as transaction details, bid reference, payment amount, IFSCs (Indian

Financial System Code) and bidders account numbers.
Cyber forensic role in Bitcoin Scam Investigation: Four laptops have been recovered from hacker Srikrishna Ramesh. The analysis of hard disks from a laptop has discovered data of a hack carried out at an e-procurement cell of the state government where Rs 11.5 was stolen by a hacker gang.
According to the Cyber forensics report, one hard disk "fragment 01" recovered from a MacBook belonging to Sriki contains hacking data for alleged hacking of the e-proc.gov.in of the e-governance cell of the State Government.
The Cyber forensics team analyzed data held in a cloud server by the hacker and found that Sriki had as much as 76.13 lakh public addresses for Bitcoins and as many as 26 e-wallets. Sources said these could have been acquired by hacking or through data trading on the dark web as part of hacker groups to steal cryptocurrency.

Challenges facing the crypto-landscape in India

Indeed as the government is drafting a bill on cryptocurrency, around five million people are formally using it. But you cannot regulate people holding the cryptocurrency, as the system works on blockchain technology which provides privacy to its users. The government can regulate the trading exchanges or platforms.
In India, Bitcoins are not a legal tender and are not accepted for payment. There are however websites where you can redeem the cryptocurrencies for vouchers from Amazon, Flipkart or other leading brands. It is only an investment that the people are holding.
The government's move to introduce GST (Goods and Services Tax) for crypto trading through the bill would impact the investor and not help curb hacking, experts say.
India is coming up with a new vulnerability disclosure policy. If you are a security researcher or a hacker, you can report the vulnerabilities to the Computer Emergency Response Team.

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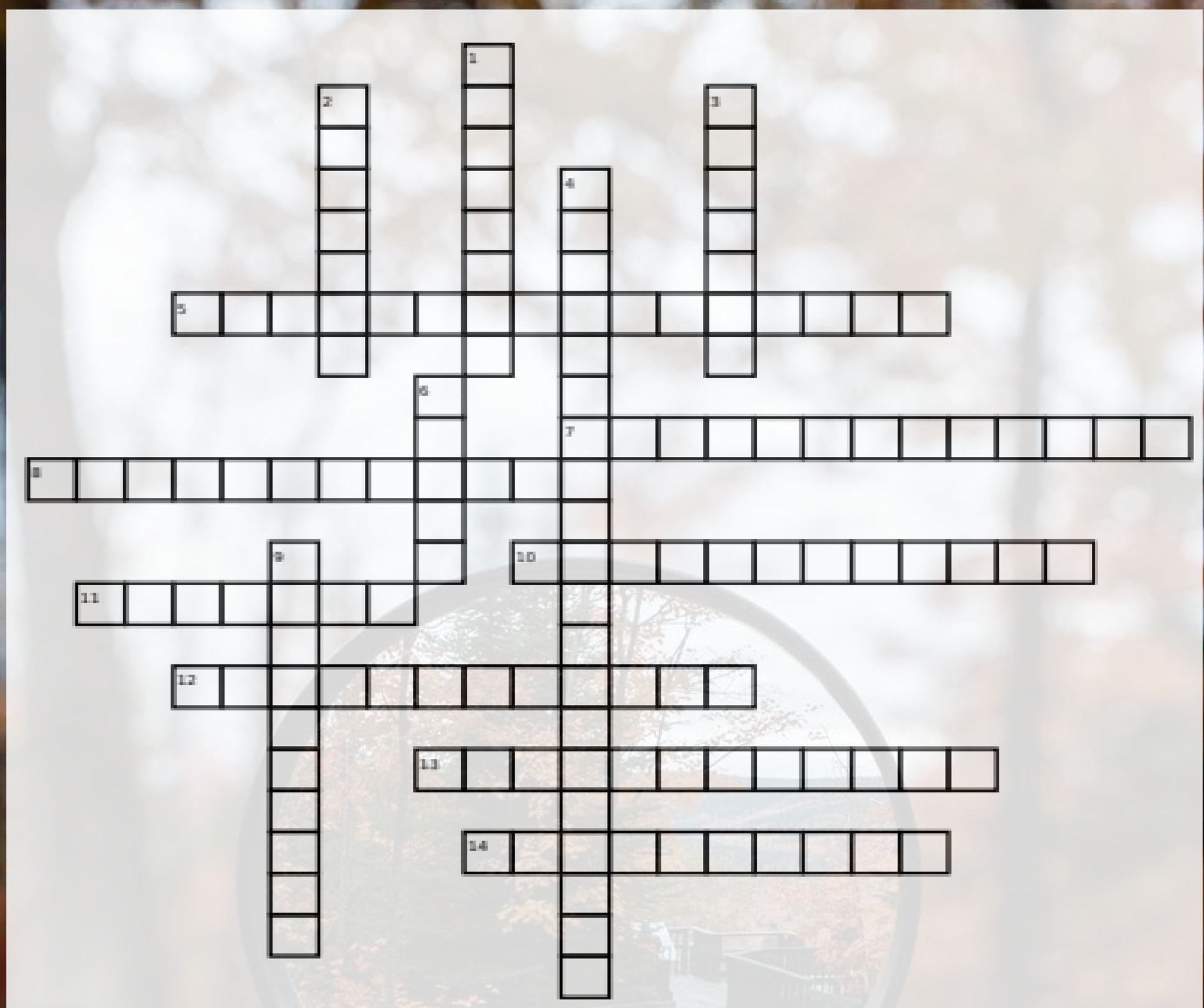
CROSSWORD PUZZLE

Mr. Nikhil Joe Varghese



Down -

1. The act of one human killing another
2. The arrangement of spiral grooves on the inside of a rifle barrel
3. Examination of a dead body
4. Instrument used for comparison of test and fired bullets
6. A claim that one was elsewhere when a crime occurred
9. The physical location where a crime has occurred

Across -

5. Father of Forensic Science
7. The process of questioning the suspects
8. Unique patterns found on the fingertips
10. A forensic technique in criminal investigation and paternity testing
11. The mental element of a person's intention to commit a crime
12. Sherlock Holmes of France
13. A person who studies the branch of zoology concerned with insects
14. To commit the same crime twice

FEATURE ARTICLES

- HOW INSECTS REVEAL THE TIME OF THE DEATH OF A CORPSE
- INMATE NEEDS OF PREGNANT PRISONERS
- THE SCIENCE OF TOUCH DNA
- DO WE SEE IT ALL? ARE THE WORDS ENOUGH?

HOW INSECTS REVEAL THE TIME OF THE DEATH OF A CORPSE

Ms. Anchal Ojha

When a suspicious death occurs, forensic entomologists are called to assist the crime scene. It is because of the presence of insects in the crime scene, especially the insects present near the corpse. Insects have the ability to reveal information about a corpse's time of death.

Insects are one of the major clues present in the crime scene. It is because insects colonize the corpse in a predictable sequence, also known as insect succession. The very first to arrive on the corpse are necrophagous because of the strong scent of decomposition. Then comes blowflies and flesh flies, as they can invade a corpse within a minute after the death. Soon after the death, approx. 30 minutes after, other insects, including house flies, dermestid beetles, and other predatory and parasitic insects, arrive to feed on the mag gots and beetle larvae. Eventually, as the corpse dries, hide beetles and cloth moths find the remains.

Here comes the role of forensic entomologists; they collect the samples from the corpse including fresh and latest representatives of each and every species. It's because the development of arthropods is linked directly to the temperature that they also gather daily temperature data from the nearest available weather station.

In the lab, the scientists try to identify each insect to their species and determine their exact developmental stage.

If it is not possible, they raise some of the maggots to adulthood to confirm their species. Blowflies and flesh flies are the most useful insect species for determining the Post-Mortem Interval (PMI) or time of death.

Through lab studies, scientists have determined the developmental rates of necrophagous species based on the constant temperature in the lab environment. These databases provide entomologists with a measurement called Accumulated Degree Day (ADD). ADD represents physiological time.

Using the known ADD, it is easy to calculate the age of the specimen from the corpse. Working backwards through physiological time, a forensic entomologist can provide investigators with a specific time period when the body was first colonized by these insects.
Since these insects find the corpse within a minute or half an hour, they reveal the almost exact time of death or PMI.

REFERENCE:

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INMATE NEEDS OF PREGNANT PRISONERS

Ms. Juel Mariam Mathew

Every person is treated equally before the law. But, when it comes to people with special needs like pregnant and lactating women, the disabled and people who need medical support, they are given some sort of special care and considerations according to their physical, social, and mental wellbeing.

Let's talk about the special needs given to a woman during her gestation period (pregnancy period) and about the post gestation period (parturition). According to the NATIONAL EXPERT COMMITTEE ON WOMEN PRISONERS 1987, pregnant women need to be given special care and special consideration. These women cannot be given death penalty until their delivery. Most of their needs are minimally met by the prison systems, and thus most of the time the mother remains at high risk due to the unavailability of nursing and other needs.

The law prohibits using handcuffs on pregnant women unless they possess any sort of harm to themselves or others. Therefore to ensure the mother's and child's safety, the provisions of the NATIONAL MODEL PRISON MANUAL must be followed strictly to make arrangements for the temporary release for delivery of the child in a hospital. Information on the state of women should be made to the court that has ordered detention, to enable the court to grant bail. The birth certificate of the child will not have the prison's name as the place of birth rather will have any hospital's name to avoid any future social stigma. The pregnant woman should be given special diet plans, separate accommodation to maintain hygiene so as to protect her infant from any sort of contagion for at least a year after the child is born. She should also be arranged with treatments for a safe delivery and pregnancy, which is free of cost. The mothers should be given adequate information to make a suitable choice (medical terminations). Aadhaar cards must be provided to both mother and the child.

After parturition (delivery), the child should be kept in the prison along with the mother in a manner in which they don't feel like a prisoner. NGOs, schools, paediatricians can be engaged to ensure the basic facilities of those children to practise a healthy lifestyle. Ideally, no child should be kept in a prison along with the mother after the child is six years old. In case no family or friends are available to take care of the child, then the child will be sent to child care institutions. Overnight visits must be allowed at least once a quarter for minor children living outside the prison to maintain a bond with their mother.

REFERENCE:

- Retrieved from www.prisonlegalnews.org

THE SCIENCE OF TOUCH DNA

Image courtesy- Image by Gerd Altmann from Pixabay

Ms. Arsha Sahadevan

Deoxyribonucleic acid (DNA) is an organic, self-replicating molecule that acts as the carrier of genetic material in organisms. It aids the growth, development, and reproduction of organisms. Besides identical twins, all individuals possess unique sequences of DNA. The significance of DNA evidence arises from this individualistic nature. In a forensic setting, the conventional sources of DNA include blood, semen, saliva, urine, bone, and hair.

What is the concept of touch DNA?

The concept of "touch DNA" began gaining acceptance in 1997, when Roland A. H. Van Oorschot and Jones discovered that DNA profiles could be generated from touched surfaces. Touch DNA, also called trace DNA or contact DNA, is the DNA obtained from shed skin (epidermal) cells transferred onto a surface during physical contact like touching. The amount of touch DNA on a surface of contact can vary between a few nanograms.

What is the forensic significance of touch DNA?

As per the exchange principle proposed by the French criminologist Edmund Locard, whenever two objects come in contact, there occurs a transfer of material between them. This principle highlights the significance of touch DNA as trace evidence. Touch DNA is highly effective in generating DNA profiles when biological fluids like blood, semen, saliva are unavailable for DNA extraction. Therefore, it finds importance in sexual assault, murder, homicide, burglary, and questioned documents cases.

What are the possible substrates on which touch DNA could be deposited?

Essentially, physical contact with any items like clothing, steering wheels, mugs, door handles, knobs, windows, ropes, ligatures, documents, firearms can leave behind touch DNA.

What factors affect the amount of touch DNA transferred?

- **Shedder status - Shedder refers to the individual handling an object, causing transfer of touch DNA. Individuals who left behind adequate amounts of touch DNA capable of generating complete DNA profiles immediately after washing hands are termed "good shedders" (tend to shed skin cells at a greater rate than others). The distinction between "good" and "bad" shedders remains debatable as the shedding of skin cells can depend on certain environmental factors or age, leading to a different shedding status each day.**
- **Perspiration - Sweat can contain epithelial cells from the sweat glands, contributing to more touch DNA on a surface of contact. It may also carry away certain cells from the skin surface, increasing the amount of transfer DNA. Additionally, when individuals touch their face, eyes, nose, or hair, there occurs a transfer of DNA from that area which Wickenheiser (2002) termed as "loading" of fingers with DNA.**
- **Type of contact - Studies conducted by Goray and others (2010) led to findings that increased pressure applied on the surface along with the friction that comes into play increased the amount of transferred DNA.**

- Substrate - Rough and porous surfaces like wood, concrete, and grooved surfaces increase the friction between the skin and surface, leading to greater amounts of touch DNA than smooth, non-porous surfaces.
- Time of contact - Existing research on handling time and the amount of DNA transferred during contact did not view significant variations among different handler times and the amount of touch DNA extracted from surfaces.

How can touch DNA be collected?

The most commonly equipped technique to retrieve touch DNA from surfaces is collection using sterile cotton swabs (wet/dry). However, this method has been found to cause significant sample loss (~20–76%) during extraction. Other methods include cutting out the area for soft surfaces like garments. The most effective technique is found to be tape lifting since it could extract DNA without significant sample loss.

What are the possible limitations to using touch DNA as evidence?

- Though touch DNA can be recovered from surfaces like doorknobs, multiple people come into physical contact with such surfaces leading to a mixture of DNA profiles. This would increase the workload in the laboratory.
- Contamination by the personnel handling evidentiary items cannot be overlooked when dealing with touch DNA.
- It has been found that DNA profiling from touch DNA samples on improvised explosive devices (IEDs) post-detonation has poor success rates.
- Evidence like fingerprints complicate the process of fingerprint development as some development techniques hamper DNA recovery.
- Individuals need not always transfer DNA upon touching surfaces. Furthermore, touch DNA is capable of secondary transfer. For instance, if a person uses a towel and the same is later used to wipe a gun, there occurs an indirect transfer of touch DNA to the gun. Thus, touch DNA can get transferred to a surface without direct physical contact with the surface.

Regardless of these limitations, touch DNA is still an emerging concept in the forensic field. Presently, several studies and researches are conducted, all aiming to examine the various aspects of touch DNA and its probative value in the justice system. Such analysis widens the scope of using touch DNA evidence for individualization in criminal cases.

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DO WE SEE IT ALL? ARE THE WORDS ENOUGH?

Ms. A. Sherlin Gomez

We all would have heard, watched or read about the greatest detective of all times, Sherlock Holmes, a fictional character brought to life by writer Sir Arthur Conan Doyle. Out of many things that intrigued us about him was the way he could see things in people that the others did not- knowing the facts about the people even before they spoke. This talent or we can say technique is called non-verbal communication. In this article, I would like to bring forth a few things about the same.

Many times we confuse deception and non-verbal. Just because a person is nervous, choking and scratching his neck while giving a testimony doesn't make him a culprit. Crimes have evolved, criminals have evolved, so they needn't always fail at the lie detector tests. But the unconscious actions can't be controlled. If a person wears two perfumes at the same time, it is clearly understood that he sweats a lot. Folding hands while talking means the person has taken a defensive stature. Raising an eyebrow when talking shows doubt in the listener. The basic tears would be either happiness or sadness. But this isn't always accepted in court, they rather provide leads.

Nonverbal communication is not something added to criminal justice, but rather it is the essence of criminal justice. These results suggest that nonverbal communication is the foundation of a successful relationship/encounter between criminal justice personnel and suspects or criminals, as well as being a powerful method that cannot be feigned.
“There is nothing more deceptive than an obvious fact.” Let’s not see anymore, let’s observe more from now on.

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Myth - Dried bloodstain can be reconstituted with distilled water.

Fact - Water will lyse the blood cells and destroy them. Hence, normal saline should be used to reconstitute dried blood stains since it has a similar osmotic value as blood.

LITERATURE REVIEW

- COMPARISON STUDY OF SECURITY FEATURES ON OLD AND NEW 500 RUPEE DENOMINATION CURRENCY NOTE

SNIPPET - QUIZ

COMPARISON STUDY OF SECURITY FEATURES ON OLD AND NEW 500 RUPEE DENOMINATION CURRENCY NOTE

Ms. Harshitha M V

INTRODUCTION

Currency notes reflect the nation's rich and diverse culture. The Reserve Bank gets its role from the Reserve Bank of India Act, 1934. The Government, on the advice of the Reserve Bank, decides the various denominations of banknotes that should be used. The Reserve Bank also coordinates with the Government in designing banknotes and their security features. The security features include - watermark, security thread, latent image of denomination numeral, numeral in colour shifting ink, number panels, see-through register, electro-type, bleed lines, etc. These features continue to remain but their relative positions may have been changed in the new design notes.

Before going further, we should now understand the term demonetization :
Demonetization is the process of removing a currency of its status as legal tender. It occurs whenever there a is change in national currency. The current form of money is taken off circulation and is

being replaced with new ones. Demonetization is often used as a tool in modernizing a cash-dependent developing economy and to eradicate corruption and crime (counterfeiting and tax evasion). In 2016, the Indian government decided to demonetize the 500 and 1000 rupee notes, the two biggest denominations in its currency system; these notes were almost 86% of the country's circulating cash.
The government's goal (and rationale for the abrupt announcement) is to combat India's underground economy on several fronts: eradicate counterfeit currency, fight tax evasion (only 1% of the population pays taxes), eliminate black money gained through money laundering, and terrorist financing activities, and to promote a cashless economy.

Comparison study of security in 500 rupee denomination :
The various security features are:

1. Security Thread-

The security thread is a plain, non-readable fully embedded continuous line. All the currency notes possess a security thread. When notes are held against the light, the security thread present on Rs.2000, Rs.500 and Rs.100 can be seen.

Comparison :
Old 500 rupee note - The security thread appears to the right of the Mahatma's portrait.
New 500 rupee note - The security thread appears to the left of the Mahatma's portrait.

2. Watermark-

The Mahatma Gandhi Series of banknotes contain the Mahatma Gandhi watermark, with a light and shade effect and multi-directional lines in the watermark window.

Comparison:

Old 500 rupee note – The watermark appears to the right of the Mahatma's portrait.
New 500 rupee note - The watermark appears to the left of the Mahatma's portrait.

3. Latent Image-
It is a security feature based on the optical effect under light produced by a special arrangement of lines printed in the intaglio technique. The picture is visible only when the note is held at eye level against the source of light.

Comparison :
Old 500 rupee note – latent image on the vertical band next to the right-hand side of Mahatma Gandhi`s portrait.
New 500 rupee note – latent image on the horizontal band on the right side of Mahatma Gandhi's portrait.

4. Identification Mark-
To help the visually impaired a special feature in intaglio has been introduced on the left of the watermark window on all notes.
This feature is in different shapes for various denominations. For Rs. 500 it is a Circle.

Comparison:
Old 500 rupee note – I.M is present above the Ashok emblem situated on the bottom left corner of the note.
New 500 rupee note – I.M is present above the Ashok emblem situated on the bottom right corner of the note.

5. See-through Register-
This feature will show up numbers when the note is held against the light.

Comparison:
Old 500 rupee note - The small floral design printed both on the front and back of the note in the middle of the vertical band next to the watermark has an accurate back to back registration.
New 500 rupee note – See-through register with denominational number 500 is present on the extreme left side of the 500 rupees.

Other differences seen in new notes excluding the security features are:

- Number Panel and numerals in Devanagari
- Dimension: 150mm*66mm
- Swachh Bharat Logo and Symbol
- Year of printing
- Image of Red fort.

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Myth - There can never be blood transfusion between negative and positive blood groups.

Fact - Negative blood can actually be transfused to a positive blood group, but positive blood can never be transfused to a negative blood group person.

QUIZ

Ms. Jismi Mathew

1. Not all surfaces are alike. Why are clothing, carpet, fabric, and other textile surfaces difficult to obtain fingerprints from?

A - Because textiles are super absorbent
B - Because there isn't enough oil on the fingers for them to imprint
C - Because suspects never touch fabric or carpets
D - Because fingerprints evaporate on textiles

2. The introduction of certain bugs and their developmental phases can help determine a cadaver's stage of decomposition. Which insects are the first to appear?

A - Blowflies
B - Flesh flies
C - Beetles
D - Maggots

3. Who is the father of Ballistics?

A - Calvin Goddard
B - Francis Galton
C - Albert Osborn
D - Bertillon

4. Probably the best known detector of bloodstains not visible to the eye is?

A – Warfarin
B – Ninhydrin
C – Luminol
D – Resolve

5. Which of these prefixes mean "relating to blood"?

A – Allo
B – Naturo
C -Hema
D - Soma

STATISTICAL DATA

- A GRAPHICAL REPRESENTATION OF THE CRIME DATA IN INDIA - 2020

A GRAPHICAL REPRESENTATION OF THE CRIME DATA IN INDIA - 2020

Ms. Niveditha L.S
Ms. Anumita Mazumdar

NATIONAL CRIME RECORDS BUREAU (NCRB)

NCRB is an Indian Government agency responsible for collecting and analyzing crime data, as defined by the Indian Penal Code, special and local laws. NCRB is headquartered in New Delhi and is a part of the Ministry of Home Affairs, New Delhi. NCRB was set up in 1986 to function as a repository of information of the MHA task force, 1985, and the National Police Commission, 1977, by merging the Directorate of Coordination of Police Computer (DCPC) and the Interstate Criminal Database of CBI.

The general objective of the report is to provide statistics on crime that can be used as a tool in helping law enforcement officials in its control. Data-based policing can help focus on a specific area and allow police resources to be used more effectively. The purpose of the publication "CRIME IN INDIA" by NCRB is to provide a comprehensive overview of the crime situation in the country state-wise and thereby enable police and other law enforcement agencies to chalk out intervention strategies for dealing with crime and criminals appropriately and to minimize crimes from the society.

NCRB brings out annual reports, i.e., Crime in India and "Accidental Deaths and Suicides in India". These reports are principal reference points for police officers, researchers, media, and policymakers. NCRB has digitized "CRIME IN INDIA" since 1967 and "ACCIDENTAL DEATHS AND SUICIDES IN INDIA" since 1998.

Scope of NCRB report:

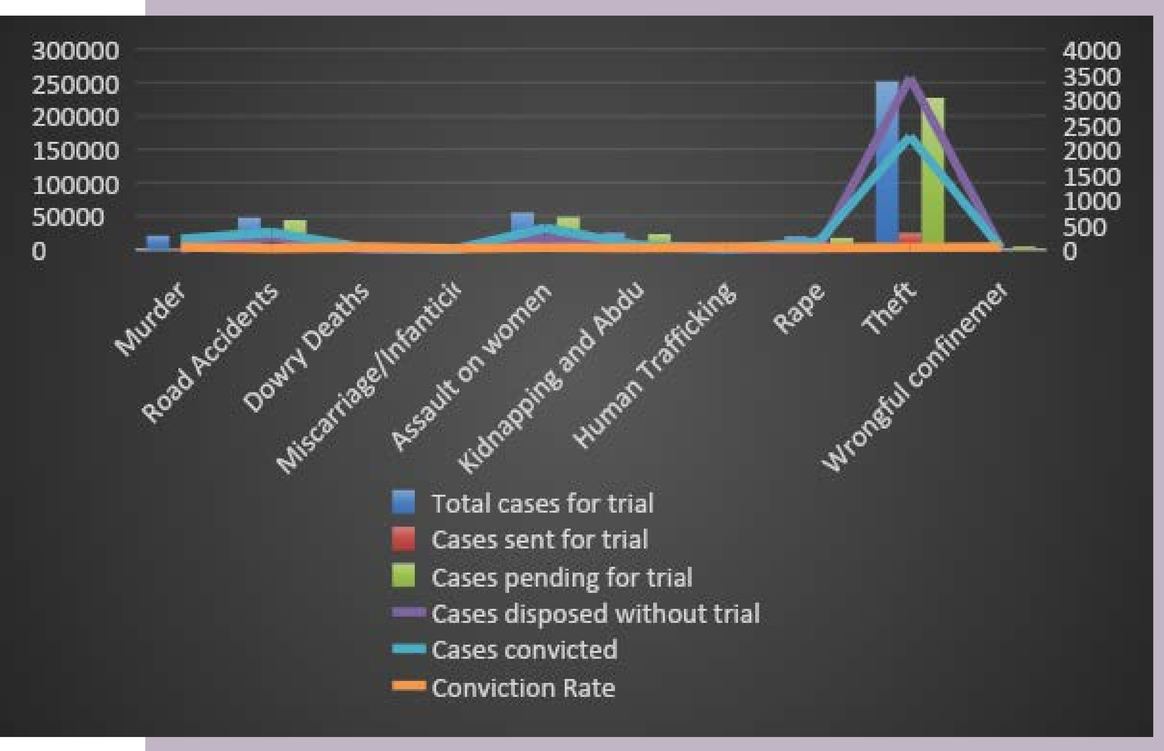
- Cases registered and their disposal
- Persons arrested and their disposal

These reports are further categorized age-wise/sex-wise. The reports also concentrate on minor groups like SC/ST. The reports are available in tabular as well as map formats.

THE STATISTICAL DATA NCRB -2020

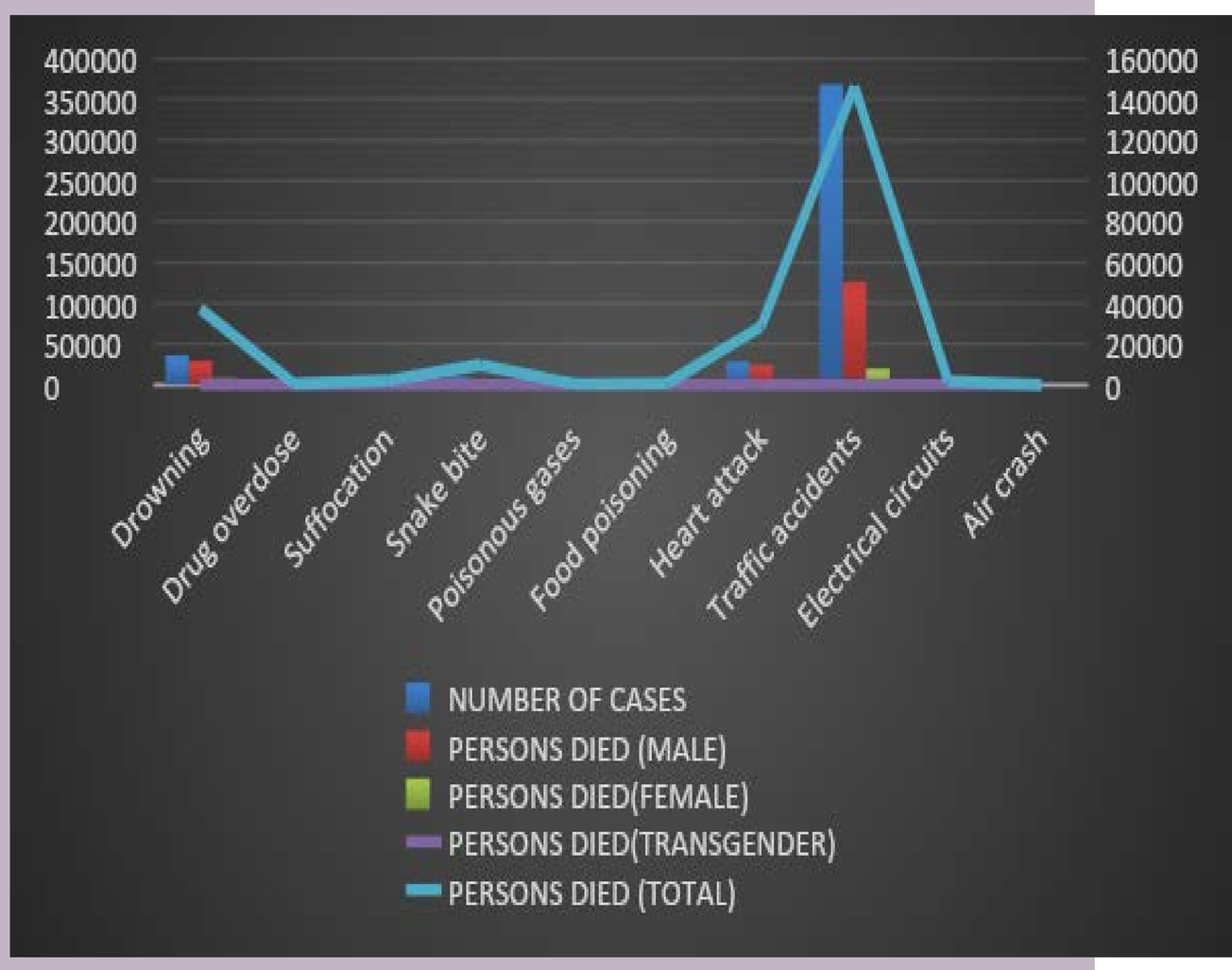
- Crime in India: - According to the data, the highest number of cases are reported in theft with a conviction rate of 37.4% and the lowest in miscarriages and infanticides with a conviction rate of 20%. The conviction rate is highest for murder cases with 50% and lowest for miscarriages and infanticides with 20%.

S No	Crimes	Total cases for trial	Cases sent for trial	Cases pending for trial	Cases disposed without trial	Cases convicted	Conviction Rate
1	Murder	20811	1664	19147	11	204	50
2	Road Accidents	47673	3483	44190	254	343	25.6
3	Dowry Deaths	3633	362	3271	4	39	43.3
4	Miscarriage/Infanticide	397	54	343	0	1	20
5	Assault on women	55066	6665	48401	230	430	37.8
6	Kidnapping and Abduc	25174	1924	23250	70	92	27.8
7	Human Trafficking	712	152	560	1	10	45.5
8	Rape	19646	2224	17422	26	162	33.3
9	Theft	251963	25059	226904	3418	2258	37.4
10	Wrongful confinement	4996	324	4672	23	25	48.1



- Accidental Deaths and Suicides in India: - According to the data, the highest number of deaths have been recorded from traffic and road accidents and the lowest from air crashes. As per the trends in the graph, there is a systematic increase in deaths from food poisoning, heart attacks, and electric circuits as well.

S.NO	CAUSES	NUMBER OF CASES	PERSONS DIED (MALE)	PERSONS DIED(FEMALE)	PERSONS DIED(TRANSGENDER	PERSONS DIED (TOTAL)
1	Drowning	36354	29178	8059	1	37238
2	Drug overdose	513	431	83	0	514
3	Suffocation	2083	1584	512	0	2096
4	Snake bite	9829	6149	3673	0	9822
5	Poisonous gases	282	208	67	0	275
6	Food poisoning	780	526	261	0	787
7	Heart attack	28579	24343	4335	2	28680
8	Traffic accidents	368828	126737	19617	0	146354
9	Electrical circuits	1943	1505	307	0	1812
10	Air crash	4	15	11	0	26



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