Kristu Jayanti College
AUTONOMOUS Bengaluru
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DEPARTMENT OF FORENSIC SCIENCE

Azadi Ka Amrit Mahotsav

Celebrating 75 years of Indian Independence

VERITAS

Vol.2 Issue 1

MESSAGE FROM THE PRINCIPAL

Forensic Science is playing an important role in the criminal justice system and its impact is getting stronger each passing year. The applied field of science which caters to free and fair justice in the world is dynamic and has the scope to advance with every new advancement in the vast field of science. The improvements in the field of crime scene reconstruction, DNA evidence analysis, cyber crime investigation and multimedia forensics are driving the field into newer arenas which were not ventured before. At this juncture, information on forensic topics are multi-various and hosted on multiple platforms, making it difficult for an information-seeker to access it.

The Department of Forensic Science at Kristu Jayanti College (Autonomous), Bengaluru runs a Bachelor's and Master's in Science in Forensic Science programmes. The department has been in the forefront to provide holistic and experiential growth to the students training in the department and has regularly organized invited talks, seminars and workshops to expose them to the first-hand recent information in the various disciplines of Forensic Science.

The Forensic Science newsletter, 'Veritas' is a bi-annual newsletter which compiles articles written by the forensic science students on matters relating to research areas, case studies, newer technologies etc. The previous issues of Veritas has set a covetable standard with respect to content, design and quality. The editorial board of the newsletter comprised of teachers and students have worked hard to provide a rich and effective reading experience to the readers.

On this occasion, I congratulate the department of Forensic Science and the editorial board of Veritas for the successful and effective issue of the third edition.

Rev. Fr. Augustine George,
Principal

MESSAGE FROM THE DEAN

The ecosystem of the Department of Forensic Science provides sufficient and compelling setting for our students to learn, work together and to involve in curricular and co-curricular activities. These activities help the students to imagine, innovate and build the future in this exciting field. I am happy that The Department of Forensic Science at Kristu Jayanti College, Autonomous, is coming out with the 3rd edition of Veritas, the bi-annual Forensic Science newsletter. The present issue of Veritas is brought out with the intent to enlighten the reader on pertinent information related to the field, to highlight the activities of the Department and therefore the dynamism of its community. The appealing design and ease of access has been the strength of Veritas. Congratulations to the students and faculty members who have contributed to the content and tothe editorial team comprising of faculty members and students who have taken extreme care in reviewing the articles, designing the templates and creating this brilliant issue of the newsletter.

Wishing each of you the best!

Dr. Calistus Jude A. L.,
Dean, Faculty of Sciences

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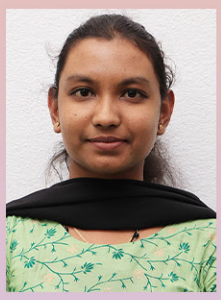

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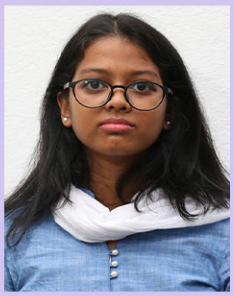

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CONTENTS

COMMEMORATING 75 YEARS OF INDIAN INDEPENDENCE

On the midnight of 15th August 1947, India marked an end to the 200-year-long struggle for Indian independence and put a permanent end to the British rule. The struggle was never easy. It took the blood and effort of millions of Indians. The movement towards becoming a free and independent nation was spearheaded by leaders like B.G Tilak, C.S Azad, Bhagat Singh, G.K. Gokhale, Mahatma Gandhi and manyothers.

The movement and the independence, however, was a result of the efforts of the leaders, the snowballing effort of several unsung heroes and the common citizens of the country have played an important role in it. India's grapple never fails to instill a sense of pride in its citizens. The Indian independence day of 2022 is remarkable. To celebrate and commemorate 75 year of Indian independence, Hon'ble Prime Minister Shri. Narendra Modi initiated a celebration -Azadi Ka Amrit Mahotsav (AKAM). The celebration commenced on 12th March 2021, with a 75-week countdown to 15th August 2022 to mark 75 years of Indian independence. The five themes of AKAM were -

- Freedom struggle: It aims to acknowledge and honour the valor of thousands of freedom fighters and unsung heroes in helping India achieve Independence. Few events observed under the theme include Birsa Munda Jayanti (Janjatiya Gaurav Diwas), Declaration of Provisional Government of Free India by Netaji, and Shaheed Diwas.
- Ideas@75: The theme Ideas@75 brings into the limelight the activities and gatherings driven by various notions and philoso-

phies that helped shape India and that will continue to do so in the next 25 years. The period from India's 75th to 100th independence year called the AmritKaal. The theme encompasses events like Kashi Utsav, a cultural and heritage festival to celebrate the legacy of Kashi, and Post Cards to the Prime Minister, where students from grades 4-12 pen their letters to the Hon'ble Prime Minister on themes like "The Unsung Heroes of Freedom Struggle" and "My Vision for India in 2047".

- Resolve@75: The theme is focused on achieving the goals and targets of the nation through good plans, collective efforts, and a vision for the motherland. Programs like Constitution Day and Good Governance Week fall under the theme.
- Actions@75: The theme centers around the efforts the Indian government is taking to help India rise on a global scale. It looks forward to the collective effort of all the people and organizations in the country to rise to its global competitors. It looks into different government policies and action plans to make the nation a better place for its citizens. Few initiatives under the theme include Gati Shakti - National Master Plan for Multi-Modal Connectivity and WEP Nxt: An Initiative to Nurture Women Entrepreneurship.
- Achievements@75: The theme Achievements@75 takes a look at the landmark achievements that the nation has witnessed up to the 75th year of independence. Swarnim Vijay Varsh and the opening of the ShreshthaYojana during MahaparinirvanDiwas are a few events recognized under the theme.

Another initiative that was part of Azadi Ka Amrit Mahotsav was "Har Ghar Tiranga". The initiative encouraged all Indian citizens to unfurl the tricolor Indian flag in their homes or workplaces. The HarGharTirangacampaign began on 13th August 2022 and continued to 15th August 2022.More than 5 crore tricolor flags have been pinned on the Indian land showing the unity and pride of Indians in their nation.

Aatmanirbhar Bharat was another initiative the Prime Minister put forth during AKAM. The notion of a self-reliant nation is what is being envisioned and is similar to the "Make In India" movement. It aims to encourage Indian nationals to stay in the nation and serve its finance and economy in many different ways possible. Through such initiatives, India seeks to achieve Independence 2.0, a path to meeting sustainable development goals and becoming the so-aspired "Nation of the future". The Prime Minister has indeed put forth a strong message for all Indians, taking inspiration from the long-drawn freedom struggle. It is one such moment in history that will never cease to inspire the youth to serve the nation.

From the Editors:

This issue of Veritas, the forensic science newsletter published bi-annually by the Department of Forensic Science at Kristu Jayanti College, Autonomous, Bangalore, is a special edition commemorating the 75 years of Indian independence. Kristu Jayanti College, Bangalore, had organized several events across all the different departments to cherish the historic day and foster patriotism in the present youth. The Department of Economics organized a celebration themed "Heroes of India's Freedom - Revisiting History" that included pledges, elocution, quiz, and polls, and the Department of English organized "The Song of Freedom" (singing competition) and "The Freedom Quiz" (quiz competition).

The Department of Forensic Science organized a poster-making competition for all the UG students. The participants were asked to create posters using only finger and palm prints (a unique element of Forensic Science) with the theme being Indian independence, freedom struggle, and patriotism. The highlights of the event have been published in the following section.

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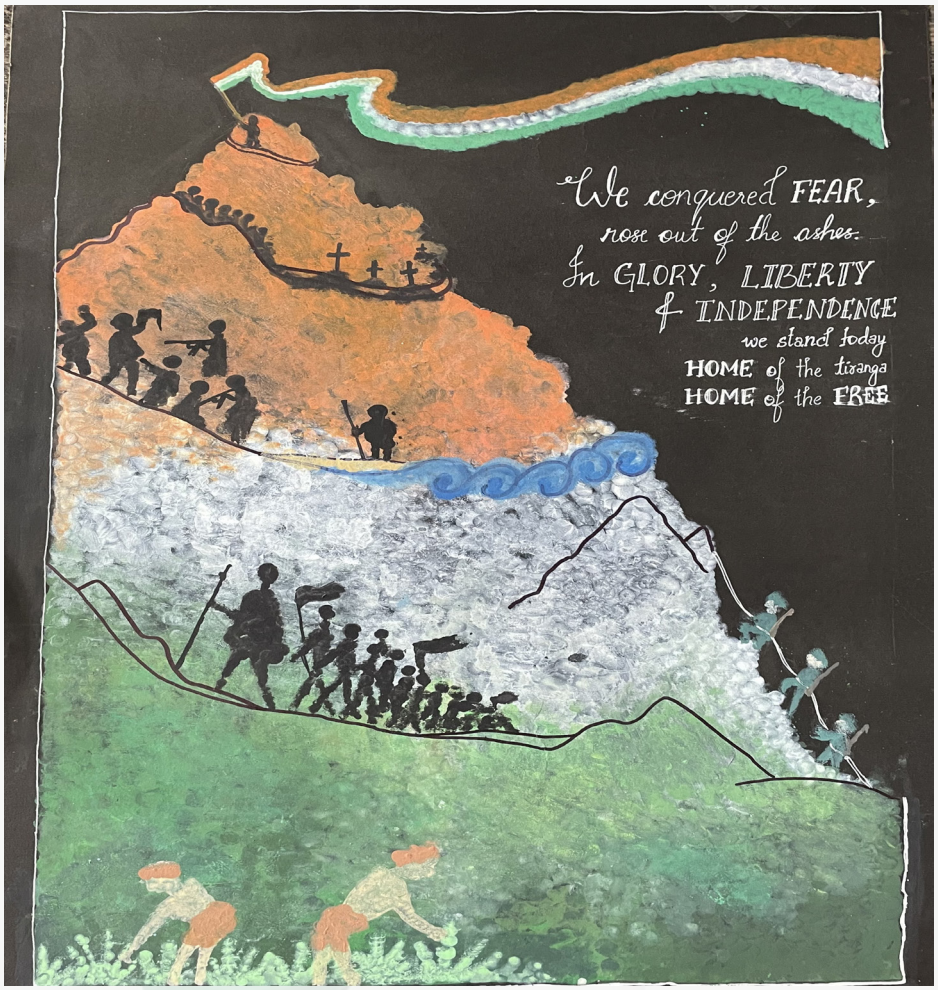
Poster by- A. Sherlin Gomez
(III Sem BSc. FS)



Poster by- Swetha Ann Mathew
(V Sem BSc. FS)

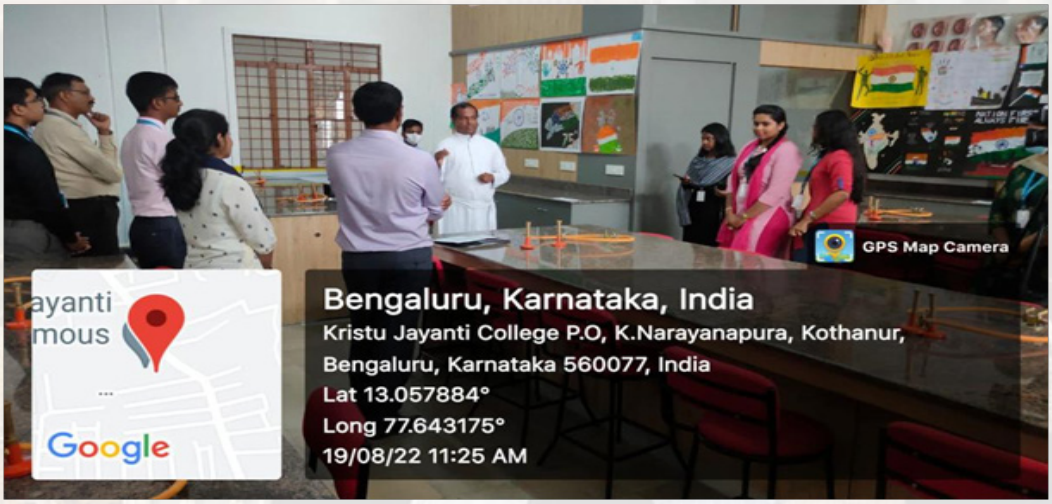
Poster by- Varun Sai S.
(I Sem BSc. FS)

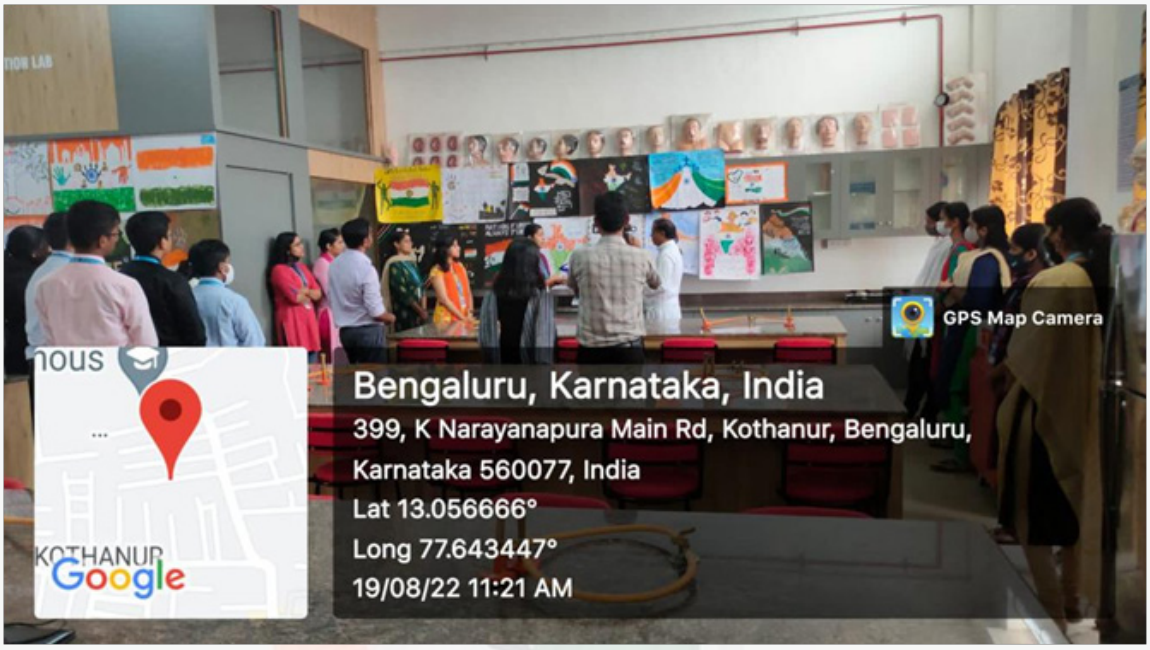
Brief Write-up on the Programme:

In tune with 'AzadikaAmritMahotsav' a GoI initiative, the Department of Forensic Science at Kristu Jayanti College, Autonomous organized a poster competition for the students belonging to the department. The call for posters was circulated on 12th August 2022. The rules of the contest were to create a poster on chart paper using fingerprints and palm prints, to have relevance to Forensic Science. The theme of the competition was the Indian Independence movement, freedom struggle and the progress India has made in the 75 years of independence.

Students from the department of Forensic Science participated in the event enthusiastically with fervor and submitted their creations. The posters were displayed in the Forensic Science Laboratory 2, third floor, main block on 19th August 2022. The Principal, Kristu Jayanti College, Rev. Dr. Augustine George graced the event with his presence. The dean, Faculty of Science, Dr. Calistus Jude A L and the faculty members of the department along with the participant students highlighted the meaning of the posters, the learning points from the activity and the impact it had on their sense of patriotism. Students and faculty members of Kristu Jayanti College visited the venue and witnessed the posters created by the students. The posters were judged and the best three posters were awarded.

Posters displayed in the venue





Principal Rev. Fr. Augustine George interacting with the participants

List of winners:

Position	Register number	Student name
First	21FRSB01	A Sherlin Gomez
Second	20LS3H1050	Swetha Ann Mathew
Third	22FRSB60	Varun Sai S

DEPARTMENT OF FORENSIC SCIENCE- ACTIVITIES

- International conference on advances in forensic science (icafs) 2022
- Inquisitor - inter-collegiate forensic science fest
- Career orientation session on cyber forensics and cyber security
- Atrium - intra-collegiate forensic science fest
- Guest lecture on practical approaches to questioned document examination
- In-house career orientation session
- Guest lecture on the role of forensic medicine in crime investigation
- Guest lecture on disaster victim identification

INTERNATIONAL CONFERENCE ON ADVANCES IN FORENSIC SCIENCE (ICAFS) 2022

On 5th and 6th May 2022, the Department of Forensic Science, Kristu Jayanti College hosted the first edition of "International Conference on Advances in Forensic Science (ICAFS)". With more than 300 participants, the conference was aimed at providing a platform for researchers, academicians, learners, and industry professionals to discuss, deliberate, and grow in the field of Forensic Science.

Inauguration

Dr. Calistus Jude A L, Dean, Faculty of Science, Kristu Jayanti College, welcomed the chief guest, resource persons, and the delegates to the conference. Sir stressed on the need for constant upskilling in this technology-oriented field of Forensic Science.

Dr. Shayani Ghosh, Assistant Professor, Department of Forensic Science and Convener of ICAFS 2022, gave a prelude to the conference and entailed that the conference would have 4 technical sessions with a wide range of topics spanning the different domains of Forensic Science and also have multiple oral and poster presentations from the registered delegates.

The conference was inaugurated by Mr. Barry A Fisher, Retired Crime Lab Director, Los Angeles County, USA, who is a renowned author and pioneer in the field of Forensic Science with more than 30 years of field experience. The resource persons included experts from the different major disciplines of Forensic science with a range of interesting topics.

The presidential address during the inauguration was delivered by Fr. Lijo P Thomas, Financial Administrator, Kristu Jayantti College who was delighted to have the chief guest and resource

persons and delegates for the conference. He quoted the recent advancements in the field and requested the delegates to make use of this platform and come up with valuable insights in the field and also requested the conveners to come up with ways in which the conference can be expanded to future years as well.

The conference was officially inaugurated by Mr. Barry A Fisher, Retired Crime Lab Director, Los Angeles County, USA, who addressed the delegates and welcomed them. The theme of sir's talk was on the recent advancements and future scopes in the field. Mr. Fisher cited many new facets, which are the talk of the future in the field and set the tone for the conference to ponder on the new unknown. He also spoke of areas that may require a lot of understanding and may promise to be challenging in the recent future and encouraged the delegates to use the two days valuably.

The session was ended with a formal vote of thanks by Prof. Don Caeiro, Coordinator of the Forensic Science programme at Kristu Jayanti College and co-convener of the conference.

Technical Session 1: Advancements in Forensic Biology: the past, present, and future.

The first technical session was addressed by Dr. Arun Sharma, Retd. Director, Directorate of Forensics Services, Himachal Pradesh, India. Sir, with his vast experience, could detail the sequence of improvement in the field of Forensic Biology from the past, beginning from the traditional means of investigating crimes using biological evidences. He quickly recapped the slow beginnings and went on to detail the present setup of the field. He explained multiple case studies, which were points of interest in the Indian context. Sir could also explain using some of his experiences on how biological evidences can be very helpful but also must be handled with care. Sir could also throw light on the future scope of the field, the expected challenges, and

how we could face them.
Finally, the session was concluded by Dr. Sharma answering a couple of queries from the delegates about the topic. This session proved to be fruitful in enhancing the delegates in the domain and could also throw light on the expected growths in the field.

Technical Session 2: Advances in Anti-doping analysis from her experience in the field of Sports Forensics.

The second technical session was handled by Dr. Shobha Ahi, Deputy Director, Drug Control Centre, King's College, London, UK, who has a vast experience in both India as well as world-wide in the field of Anti-doping in sports. Ma'am, with her experience, could explain the basics, the protocols, and the reporting mechanism in the field. The delegates were also meticulously explained the analysis behind cases involving the use of performance-enhancing drugs in sports.
Beginning from the collection of samples, ma'am explained the extraction techniques, the spot tests, the instrumental techniques available, and the interpretation involved in these cases. The use of spectrophotometry and chromatography was explained in great detail. The recent advances were highlighted, and the delegates could understand how the scope of the field is fast evolving and the relevance to forensic science and existing forensic standards in this field.
The session ended with questions from the delegates, which were patiently and detailedly explained by the speaker.

Technical Session 3: Emerging challenges in Questioned Document Examination

The third technical session was from the physical science domain and focused on the field of Questioned Document Analysis. The session was addressed by Dr. J K Semwal, Retd. Senior Faculty from the prestigious LNJN NICFS, New Delhi, India, who is an

established academician from the prestigious institution. Sir started off by explaining about the problems encountered in this field due to its subjective nature of examination and reporting. He stressed that even though this lacuna exists, it also provides for further enhancing the field by the use of careful and validated techniques.

Sir systematically handled each lacuna and broadened the delegates' thinking by pointing out the scopes available and listing the possible research areas which are emerging in the field. He explained about the use of information technology, computer systems, artificial intelligence, and statistical modelling and also included the possibility of simulated handwriting and signatures. The session was highly appreciated by the delegates and offered many of them eye-opening ideas.

The session had a round of questions that were answered by the resource person.

Technical Session 4: Advances in the Digital and Cyber Forensic domain.

The fourth and final technical session was addressed by Dr. Meenakshi Mahajan, Deputy Director, Directorate of Forensics Services, Himachal Pradesh, India, who has a good track record of handling many interesting cases involving digital evidence in India. Ma'am, with her vast experience, started with her understanding and views of the use of digital evidences and could stress on the necessity to think of future challenges in this field. She also backed her argument using cases that had been handled by her.

The session had a rich mix of case studies, theories, legal provisions, and possible emerging challenges in the field. Ma'am could also demonstrate the need for relying on digital evidences by using the internet to share a glimpse of the impact and frequency of these crimes She encouraged delegates who were

interested in the field to be aware of today's challenges and be prepared for tomorrow's problems.
The session had multiple questions being asked by the delegates, which were patiently answered by the resource person.

Oral and poster presentations

There were presentations by delegates pertaining to the fields of Forensic Biology, Forensic Chemistry and Toxicology, Forensic Chemical and Biological Sciences, Forensic Physical Sciences, and Digital Forensics. A total of 4 oral paper presentation sessions with 23 individual presentations were held. Each of them had interesting insights and new ideas, which sparked interest in delegates. The panelists reviewed and provided valuable insights to the researchers to further the field of interest.
Poster presentations happened in two different sessions with a total of 21 presentations. The posters were creatively designed, and very profound facts and findings were shared during these sessions. The panelists were highly appreciative of the posters and the quality of the findings.

Valediction ceremony

The valedictory ceremony happened at the end of the conference on the evening of 6th May 2022. Dr. Meenakshi Mahajan, Deputy Director, Directorate of Forensics Services, Himachal Pradesh, India, was the chief guest for the session and credited the delegates for their presence and attention during the conference. She praised and motivated the presenters for their research and encouraged them to get better in the field. She had words of motivation for students who attended the conference and welcomed them for more such sessions.
Dr. Calistus Jude A L, Dean, Faculty of Science, Kristu Jayanti College, thanked the resource persons and panelists for their time and expertise they shared during the conference.

Prof. Don Caeiro, Coordinator of the Forensic Science programme and co-convener of the conference, read out the prize winners for the oral and paper presentations. Each oral session had two winners, and poster presentations were valued as a whole. The winners and presenters were congratulated for their works.

Dr. Shayani Ghosh, Assistant professor and convener of the conference, proposed the vote of thanks.

INQUISITOR - INTER-COLLEGIATE FORENSIC SCIENCE FEST

The Forensic Science Club, Department of Forensic Science, organized Inquisitor 2022, the first inter-collegiate forensic fest for the undergraduate students of forensic science in other colleges based in India. This forensic fest aimed at discovering students' knowledge and understanding of the subject as it offered a wide array of science-related events.

The event was organized by the student coordinators of the Forensic Science Club at Kristu Jayanti College, Bangalore. The B.Sc. Forensic Science students at Kristu Jayanti College formed the working group and were the event and team organisers. The participants included the Forensic Science students from 5 different institutes across India.

The fest was executed with a total of 8 events and was organized at the best of quality. The fest was conducted online due to the pandemic situation using the Zoom platform. The high- spirited forensic fest started with preliminary rounds of various events on 4th April 2021.

The participants were given participant codes to ensure fairness; none of the internal students participated, and the event was open only for external participants.

8 events were organized which included - Crime Travel (Case study), Crimetoonist (Sketching), Hidden in Plain Sight (Observation test), Canvas (Poster), Trial by Trivia (Forensic Quiz), Tug of Words (Debate), Think Detective (Puzzle solving), and Sherlock Holmes (Personality contest).

The inaugural ceremony of the fest was presided over by Fr. Joshy Mathew, member of Management, Director library, and

coordinator of Dept of English at Kristu Jayanti College, Bangalore, and the guest of honour was Dr. Rakesh Gupta, Joint Director, Forensic Science laboratory, Chhattisgarh. In his presidential address, Father enlightened about the importance of Forensic Science and its scope in everyday life. Dr. Rakesh Gupta spoke about the existing avenues in Forensic Science and the future scopes. He encouraged students to take up newer domains and fields which are coming up in the field. He exhorted the faculty members to take up newer topics and help the students evolve into newer and brighter minds.

In the valedictory ceremony, Dr. Calistus Jude, Dean, Faculty of Science, Kristu Jayanti College, felicitated the winners of various events and appreciated the Forensic Science Club coordinators for having conducted the forensic fest successfully.
A total of 81 participants actively participated in the fest from the following 5 different institutes.
1. Government Institute of Forensic Science, Nagpur
2. School of Social Work (Autonomous)
3. SGT University
4. SMS College of Arts and Science
5. Garden City University, Bangalore

The participants from the Government Institute of Forensic Science, Nagpur, were declared the overall winners of the fest. Participants of the other institutes too won a good share of prizes during the fest.
The feedback for the fest was overwhelmingly positive, and students could upskill themselves through the different events that were organized.

CAREER ORIENTATION SESSION ON CYBER FORENSICS AND CYBER SECURITY

A guest lecture on the topic "Careers in Forensic Science (Cyber Forensics and Cyber Security)" was conducted on 5th February 2022, at 9 AM by the Department of Forensic Science, Kristu Jayanti College. Mr. Kishalay Masanta, Cyber Security Consultant Quantum Security Services Wellington, New Zealand, was the resource person for the session. It was conducted over the Zoom platform and had over 240 participants. The session started off by seeking the blessings of God. Dr. Shayani Ghosh, Assistant Professor, Unit of Forensic Science, welcomed the resource person, faculty members, and the students. Mr. Arvind T., Professor, Unit of Forensic Science, introduced the resource person who had completed his Bachelor's degree in Jain University, Bangalore, in B.Sc Forensic Science and Masters degree in Information Security and Digital Forensics in the Auckland University of Technology, New Zealand. The session was then taken over by the resource person, who talked about the following to the audience:

- What is Cyber Security and Digital Forensics?
- The importance of Cyber Security and Forensics
- Why should you have a career in Cyber Security and Forensics?
- Some of the Best Universities offering a master's degree in Cyber Security and similar fields
- Career paths in Cyber Security and Digital Forensics
- The skills required to be chosen by different companies and the technical skills needed for being a professional in Cyber Security and Digital Forensics field

- The free resources provided by different institutions to increase your knowledge in different areas of Cyber Security and Forensics
- Qualifications and certifications to prove your skills
- Lastly, the journey of the resource person in the field of Cyber Security

After the session, it was time for the participants to raise their queries. The discussion was very interactive, and a lot of participants came forward with their doubts. The vote of thanks was given by Ms. Geethu Suresh, Professor, Unit of Forensic Science. The ending comments were shared by Mr. Don Caeiro, Assistant Professor, Unit of Forensic Science. The session was highly informative, and the participants got to know more about Cyber Security and Cyber Forensics.

ATRIUM - INTRA-COLLEGIATE FORENSIC SCIENCE FEST

The Forensic Science Club, Unit of Forensic Science, organized Atrium 2022, an intra-collegiate forensic fest for the first and second-year undergraduate students of Forensic Science. This forensic fest aimed at discovering students' knowledge and understanding of the subject as it offered a wide range of science-related events.

The event was organized by the student coordinators of the Forensic Science Club at Kristu Jayanti College, Bangalore. The final year students formed the working group and were the event and team organisers. The participants included the first and second-year Forensic Science students.
Some of the events included were Crucipher (Crossword), Crime Travel (Case study presentation), Internal Affairs (Just A Minute), and Think Detective (Online Treasure hunt). The event named Sherlock Holmes took the participants through a series of investigative rounds.

The fest was executed with a total of 15 events and was organized at its best of quality. The fest was conducted online due to the pandemic situation using the Zoom platform. The high-spirited forensic fest started with preliminary rounds of various events on 7th February 2021.
12 teams formed by the students participated in good spirit, and the preliminary rounds and final rounds had very interesting themes and games. Team names included Sokovia, Lamentis, Vormir, Asgard, Wakanda, Ragnarok, Midgard, Kree, Titan, Sanctum, Xandar, and Quantum.

15 events were organized which included - Crucipher (Crossword), Crime Travel (Case study), Aftermath (Documentary), Crimetoonist (Sketching), Hidden in Plain Sight (Observation test), Canvas (Poster), Hostage (Roleplay), Total Recall (Report writing), Internal Affairs (Just a Minute), Oh Snap (Photography), Once Upon a Crime (Crime fiction writing), Trial by Trivia (Forensic Quiz), Tug of Words (Debate), Think Detective (Puzzle solving), and Sherlock Holmes (Personality contest).

The inaugural ceremony of the fest was presided over by Fr. Augustine George, Principal, Kristu Jayanti College, and the guest of honour was Ms. Maalini Ramalo, Director for Social Protection, Development of Human Resources for Rural Areas (DHRRA), Malaysia. In his presidential address, Father enlightened about the importance of Forensic Science and its scope in everyday life. Ms. Maalini spoke about her role in the domain of social protection and how the knowledge of forensic science helps her carry out day-to-today roles. She encouraged students to keep upskilling and following their dreams and motivated them to use opportunities provided during such fests to empower themselves.
In the valedictory ceremony, Dr. Calistus Jude, Dean, Faculty of Science, Kristu Jayanti College, felicitated the winners of various events and appreciated the Forensic Science Club coordinators for having conducted the forensic fest successfully.

GUEST LECTURE ON PRACTICAL APPROACHES TO QUESTIONED DOCUMENT EXAMINATION

A guest lecture on the topic "Practical Approaches to Questioned Document Examination" was conducted on 19th February 2022 at 9:30 AM by the Department of Forensic Science, Kristu Jayanti College. Mr. Sharwan Kumar, Case reporting officer, Central Forensic Science Laboratory, Chandigarh, was the resource person for the session. The program was conducted over the Zoom platform for the students pursuing B.Sc. Forensic Science programme at Kristu Jayanti College. The guest lecture commenced at 9:30 AM, and there were about 138 participants who actively took part in the meeting.

Questioned document examination is a major forensic discipline that involves the forensic examination of document writings, signatures, handwriting, printed documents, security documents, and many more to identify instances of fraud and cheating. Exemplars are used to compare questioned writing, and the questioned document expert is able to distinguish between genuine writing, forgery, simulated forgery, tracing, manipulated handwriting, etc. It is a field that relies on the skill of the forensic examiner, and students had a good opportunity to understand questioned document examination from a trained expert using different case experiences during the guest lecture.

The resource person shared his knowledge in the examination of questioned documents and the practical approaches in this field. He also covered various topics related to questioned document examination, including:

- What is a document?

- Different types of forgery
- Forged signature with case study and specimen
- Alterations, erasures/abrasions in documents with case studies
- Different techniques used for the examination of forged documents
- Examination of digital and typewritten documents
- The application of forensic linguists to solve the cases

During the question & answer session, students raised their doubts related to the examination of documents.
The entire session was innovative and helped the students to learn more about the practical approaches to the examination of questioned documents.

IN-HOUSE CAREER ORIENTATION SESSION

A career orientation session on “Career and prospects in Forensic Science” was organized for the second and third-year B.Sc. Forensic Science students on 24.02.2022 from 09:00 AM to 12:00 PM through the Zoom platform. The resource persons were:

1. Mr. Don Caeiro, Assistant Professor and Programme Coordinator, Forensic Science Programme, Kristu Jayanti College, Bangalore
2. Mr. Jeremiah Justus. M, Assistant Professor, Kristu Jayanti College, Bangalore
3. Ms. Chetna Tidke, Assistant Professor, Kristu Jayanti College, Bangalore
4. Dr. Shayani Ghosh, Assistant Professor, Kristu Jayanti College, Bangalore

The session was initiated by Mr. Don Caeiro, Assistant Professor, Forensic Science, at Kristu Jayanti College (Autonomous), Bengaluru. The session was focused on making decisions about higher education after earning a Bachelor’s degree in the field of forensics. The importance of drafting a plan, making accurate inquiries about one’s university/institute of choice, and how to filter out the right course of our interest by researching about the universities and the schemes that are promised by the same was the highlight of the session. Mr. Don Caeiro not only restricted his knowledge to Indian institutions but also gave a brief idea about the various courses offered in the line of forensics at universities overseas. Keeping in mind that the field of Forensic Science is newly established in many educational institutions,

Mr. Don Caeiro pointed out the categories of universities based on rankings, affiliations, reputations, and mainly, the financial needs of a student meeting the choice of program for Masters.

The second session was taken up by Mr. Jeremiah Justus. M, Assistant Professor, Forensic Science, at Kristu Jayanti College (Autonomous), Bengaluru. The session was about the different roles and designations that one could take up in the field of forensic science. Opportunities promised in public as well as private sectors were brought into the picture. Many public agencies like CBI (Central Bureau of Investigation), IB (Intelligfence Bureau), Anti-doping officials, etc., were mentioned. A statistical overview of job distribution over the years was presented in order to have a better understanding of the advancement in this branch. Sir provided a reference for doing our own search for job opportunities and learning the various rules that are a mandate for any career aspirant. Mr. Jeremiah plotted a road map that showed the steps that we can take to ensure a systematic study about the objectives we need in attaining efficiency in the path of establishing a professional career - To be an early planner, invoking the spirit of competitiveness, applying in multiple firms, etc.

Ms. Chetna Tidke initiated the third session by briefing the participants about the different All India Level examinations that are conducted pertaining to forensic science. Eligibility criteria were discussed, the qualifying percentage and interview round for various exams were mentioned, and the possibility of being recruited in the Central and State Forensic Science Laboratories as a Forensic Professional were discussed. The question paper pattern and syllabus covered in each section of the paper for the comprehensive aptitude tests of postgraduate students were brought up. The paper pattern discussed was:

- Section A: 50 questions
- Section B: 70 questions
- Type of questions: Objective and one marker
- Duration of exam: 2 hours

Ma'am also threw light on the eligibility criteria for postgraduates for FACT (Forenisc Aptitude and Caliber Test)/ FACT Plus/ NET (National Eligibility Test)/GATE (Gaduate Aptitude Test in Engineering)/GPAT (Graduate Pharmacy Aptitude Test).

The final session handled by Dr. Shayani Ghosh mainly focussed on how to get enrolled in Ph.D. and what are the advantages, qualifying criteria, the current syllabus, and paper pattern, and how to prepare for the same. Attaining a doctorate in the field that one specializes in determines the eligibility for an Assistant Professorship, Junior Research Fellowship, or both. Qualifying criteria for both general and reserved category according to the UGC (University Grants Commission) was put to light by Dr. Shayani. The current paper pattern, as discussed by ma'am, is as follows:

- Paper 1: 50 questions (general paper)
- Paper 2: 100 questions (related to the core subject)
- Duration: 3 hours
- Qualifying marks: General category - 40% and Reserved category - 35%

Preparation for the test can begin during the first semester of the M.Sc. A student can appear for the exam during the third semester of the master's program. Ma'am also mentioned the advantages of qualifying NET and JRF in the career path of a student. Dr. Shayani was kind enough to give us insights into the various institutions (public and private) that promised a Ph.D. program in their curriculum.

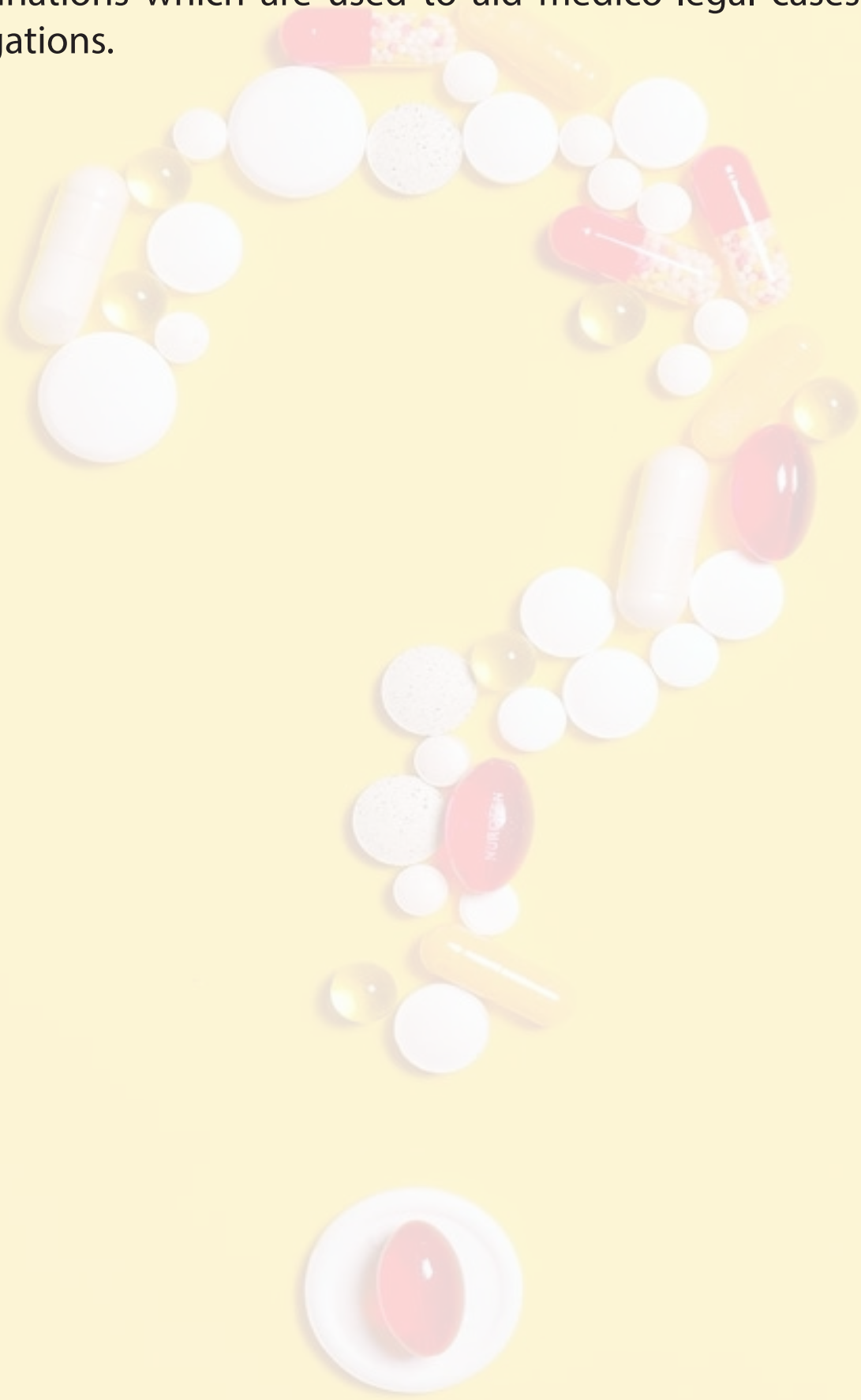
GUEST LECTURE ON THE ROLE OF FORENSIC MEDICINE IN CRIME INVESTIGATION

A guest lecture on the topic "Role of Forensic Medicine in Crime Investigation" was conducted on 26th February 2022, at 9:30 AM by the Department of Forensic Science, Kristu Jayanti College. Dr. Hareesh S Gouda, Professor and Head, Department of Forensic Medicine, Father Muller Medical College, Mangalore, was the resource person for the session. The program was conducted over the Zoom platform for the students pursuing B.Sc. Forensic Science programme at Kristu Jayanti College. The guest lecture commenced at 9:30 AM, and there were about 127 participants who actively took part in the meeting.

The resource person is presently working as Professor and also serves as a Head of the Department of Forensic Medicine at Father Muller Medical College, Mangalore. He has 18 years of experience in teaching and handling medico-legal cases. Dr. Hareesh has published in numerous national and international journals. He has also authored and contributed chapters to textbooks of Forensic Medicine.

The resource person gave the students new knowledge about the workings of Forensic Medicine and how coroners with the knowledge of medicine and law help in various reaching conclusions in investigations. He also gave explanations about certain terminologies in Forensic Medicine. He spoke about the history of Forensic Medicine. Dr. Hareesh also explained the workings of Forensic Medicine by talking about various cases he has worked on. He gave a detailed explanation about different wounds, how they are caused, and how they help in concluding the case because of their nature.

The entire session was interesting and provided students an insight into Forensic Medicine, autopsy, and other pathological examinations which are used to aid medico-legal cases and investigations.

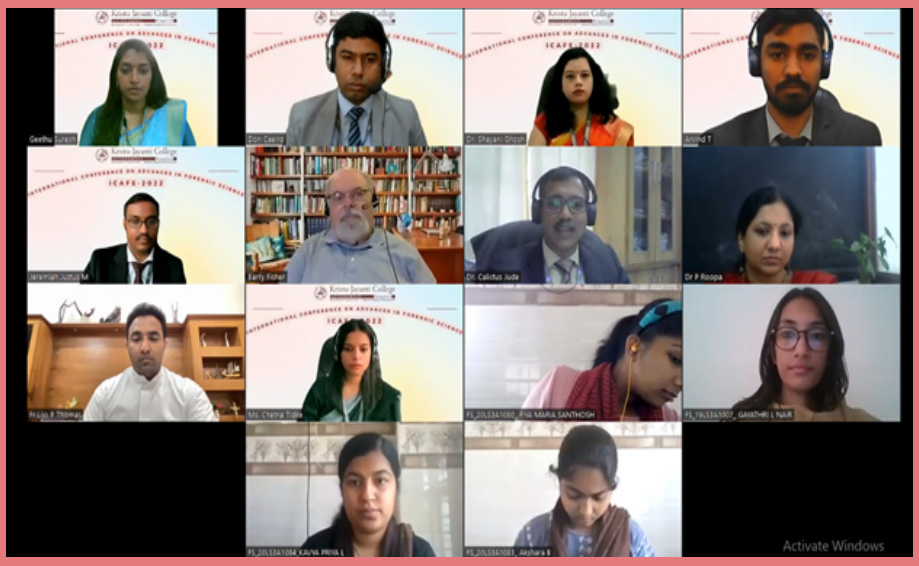


GUEST LECTURE ON DISASTER VICTIM IDENTIFICATION

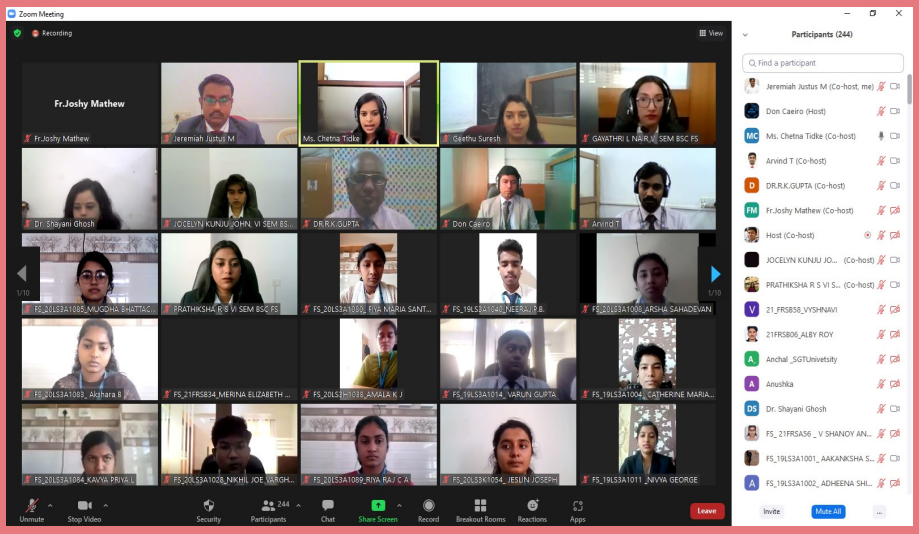
A guest lecture on the topic “Disaster Victim Identification” was conducted on 13th May 2022, at 3 PM in M3 Auditorium, Main Block, Kristu Jayanti College, Bangalore. The resource person for the session was Dr. Deepak V, Asst. Professor and Forensic Consultant, Forensic Odontology, M R Ambedkar Dental College & Hospital, Bangalore.

Disaster Victim Identification is not a crime-based scenario, but the techniques of forensic science are very much applied to this area. Anthropological analysis, DNA (Deoxyribonucleic acid) analysis, and odontological analysis are among the many approaches toward Disaster Victim Identification.

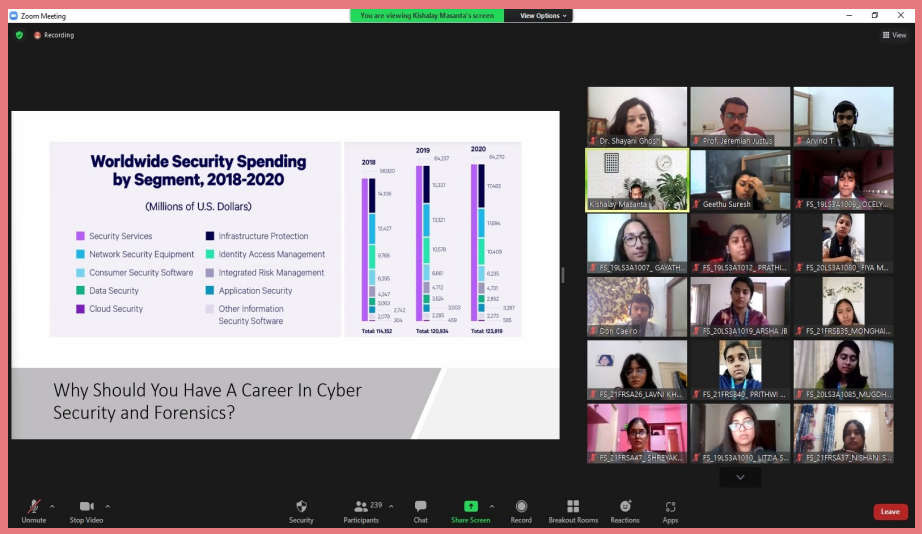
Dr. Deepak listed the many avenues where forensic expertise is required for Disaster Victim Identification. He explained the need for closure to the relatives and how this field of humanitarian forensics is a deed-based field that requires commitment and fulfilment. He motivated the students using case studies of the recent past and expressed that they must work hard to achieve their dreams in the field and promised better scenarios to emerge in the future.
The session concluded with questions from the students, and the resource person patiently and clearly explained the doubts.



International Conference on
Adavnacement in Forensic Science

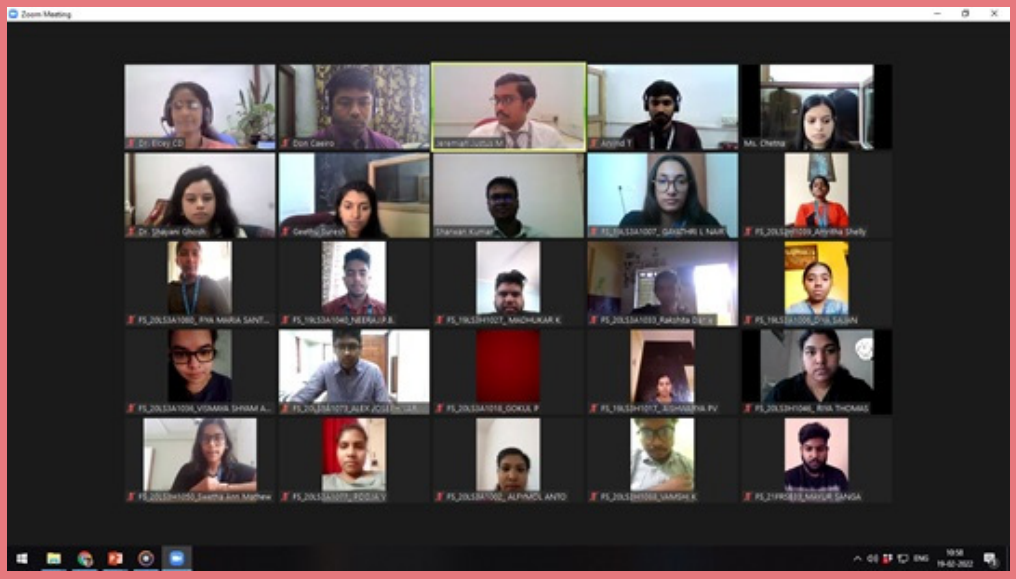


A snapshot from Inquisitor

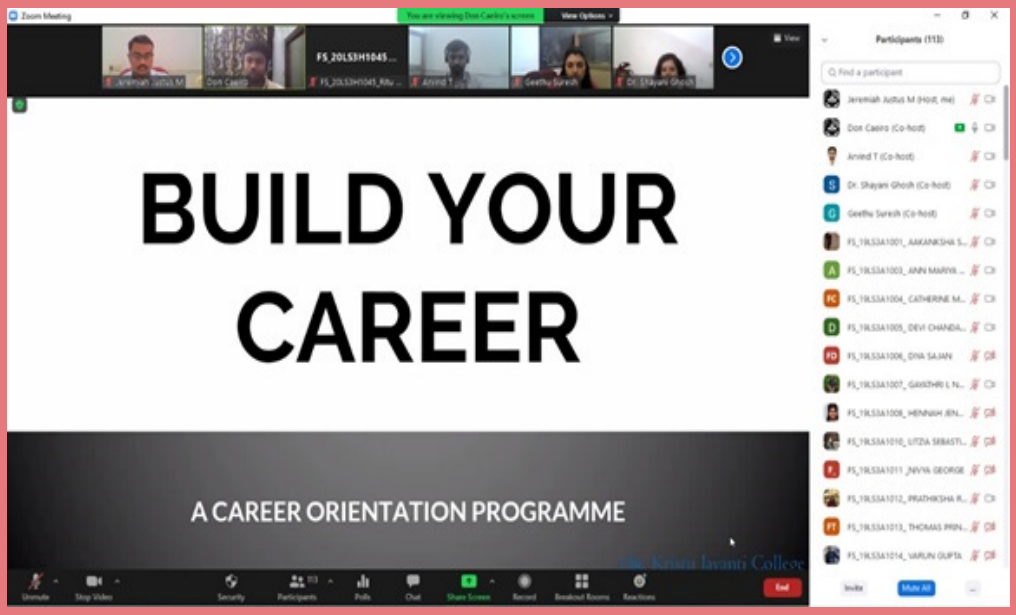


A snapshot of Cyber Forensics
Expert Lecture

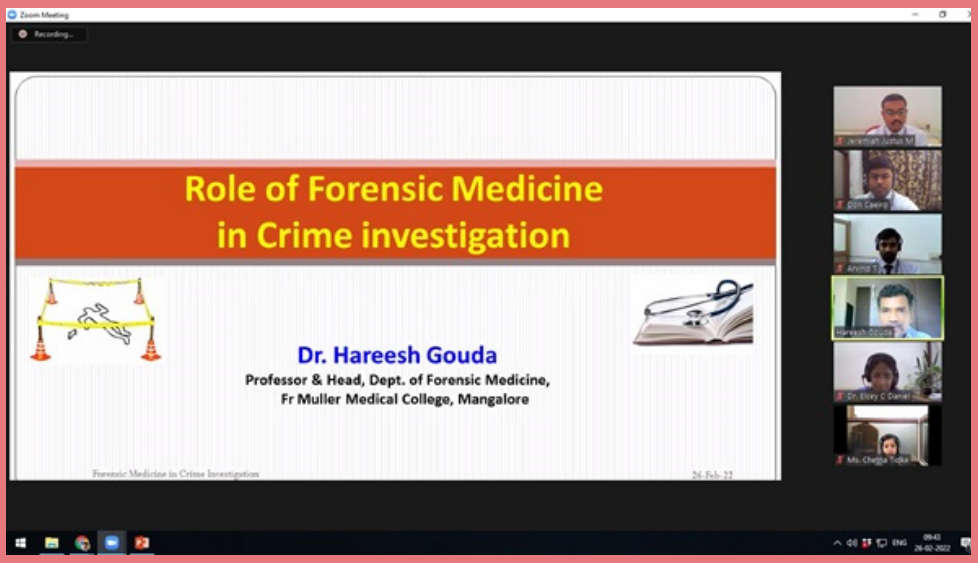
A snapshot from Atrium



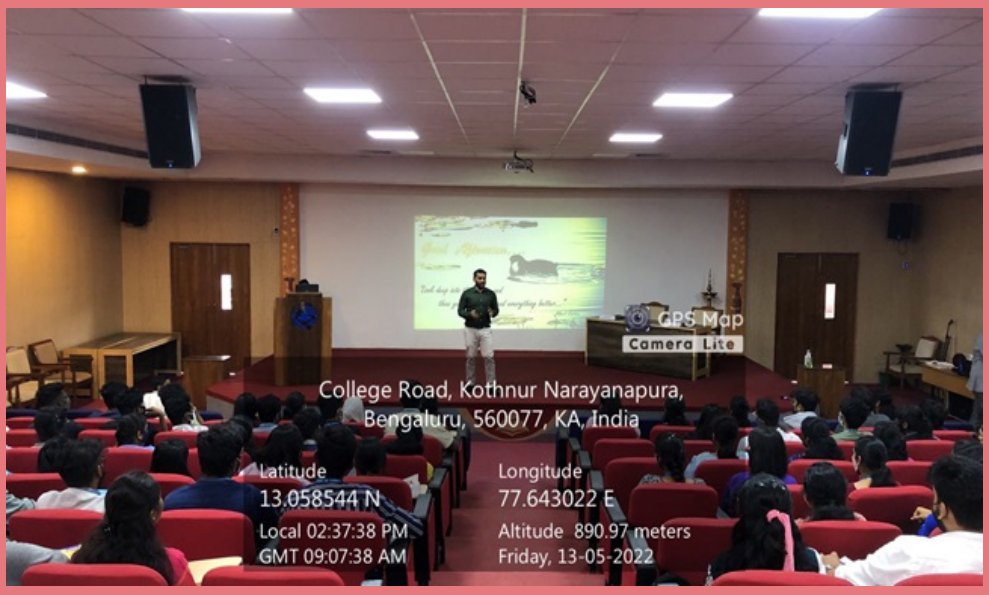
Guest Lecture on Questioned Document Examination



In-House Career Orientation Session



Guest Lecture on Role of Forensic Medicine in Crime Investigations



Guest Lecture on
Disaster Victim Identification

INDUSTRIAL VISITS

JSS Medical College, Mysore

Axxonet, Bangalore

RESEARCH ARTICLES

- Detection of hidden files and finding out its hiding mechanism
- Effect of stereotypes on the identification of criminals
- Detection of pesticides in common fruits or vegetables available in different regions of bangalore city
- A study to identify commonly employed methods of disguise
- A study to estimate the extent of inefficacy of existing presumptive tests on blood stains contaminated with common contaminants encountered in southern india
- To contrive artificial blood for use in demonstration of blood pattern analysis
- Appropriate steps a forensic scientist should follow at the scene of crime

DETECTION OF HIDDEN FILES AND FINDING OUT ITS HIDDEN MECHANISM

Ms. Jocelyn Kunju John
Ms. Catherine Maria Johny
Mr. Thomas Prince Kuruppen Parambil
Mr. Justin Babu

INTRODUCTION

Digital forensics, on a broad spectrum, can be defined as a complete understanding and analysis of digital data present on the computer or laptop. Digital forensics can also be explained as the investigation of digital artefacts from the scene of the crime for certain facts and information. It deals with the recovery of legal evidence within the digital devices and the digital storage media. The procedure is carried out by the usage of digital tools, which enables us to retrieve the desired information. Imaging is a technique where the bit-by-bit storage space along with the data present in the device is replicated onto another device. The suspect device is not used for further analysis, but its image file is used.

AIM AND OBJECTIVES OF THE STUDY

- To determine the hidden data in a device.
- To understand the mechanism behind the hidden data and thus deduce a technique to recognize the same.
- To identify and study if the already existing tools could detect the hidden data within the computer system.

METHODOLOGY

An external storage device (SanDisk Cruzer Blade Pen drive) was formatted using the New Technology File System (NTFS). Ten files with different file extensions were selected and copied onto the USB device.

The 10 files of different file formats were as follows:

1. .AVI
2. .DOC
3. .DOCX
4. .MP3
5. .MP4
6. .PDF
7. .PNG
8. .JPEG
9. .WAV
10..TXT

Using different hiding methods, such as lockdir, lockbox, etc., the data were hidden, which was followed by subjecting the pen drive to the imaging process in order to find the hidden data.

FINDINGS

From the study, it could be concluded that using imaging tools, it is possible to find the hidden data.

With the properties hiding method and hiding using different software, the files were detected without modifications to the metadata and hash values.

With the file signature and file extension change, there was a change in the metadata as well as the hash value.

The file signature detected in the image file was not of the original file format but the one that was changed to. When the details of the files are checked, the details correspond to

the details of the original file format. This proves that the file has been altered.

Hence, no matter what the data is or how it is hidden by cybercriminals, it can be recovered and used as court evidence.

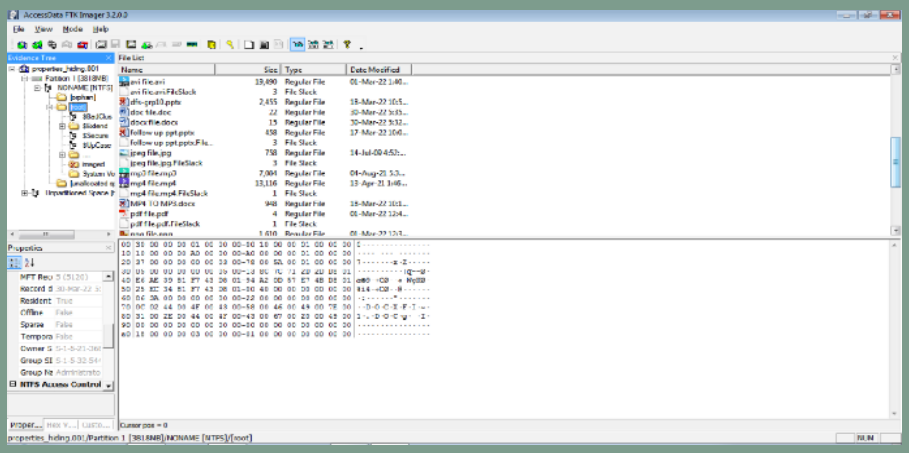


Fig 1. AccessData FTK Imager screenshot

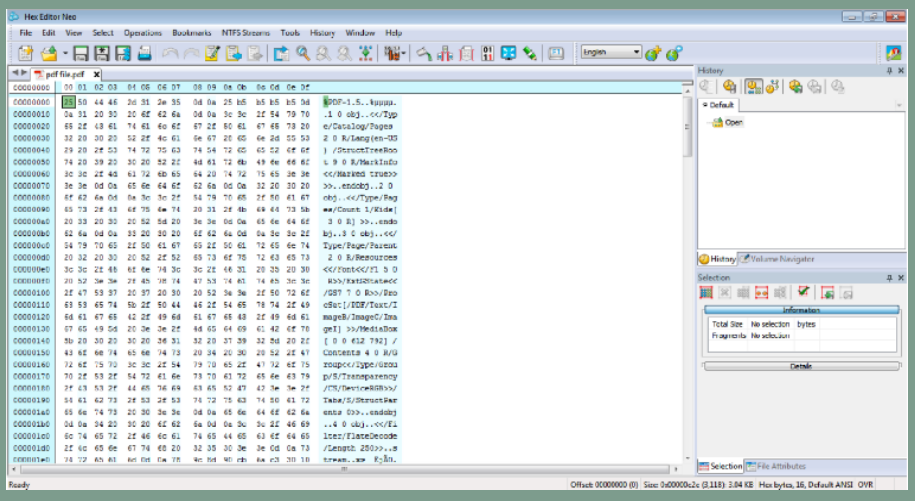


Fig2. Hex Editor Neo screenshot

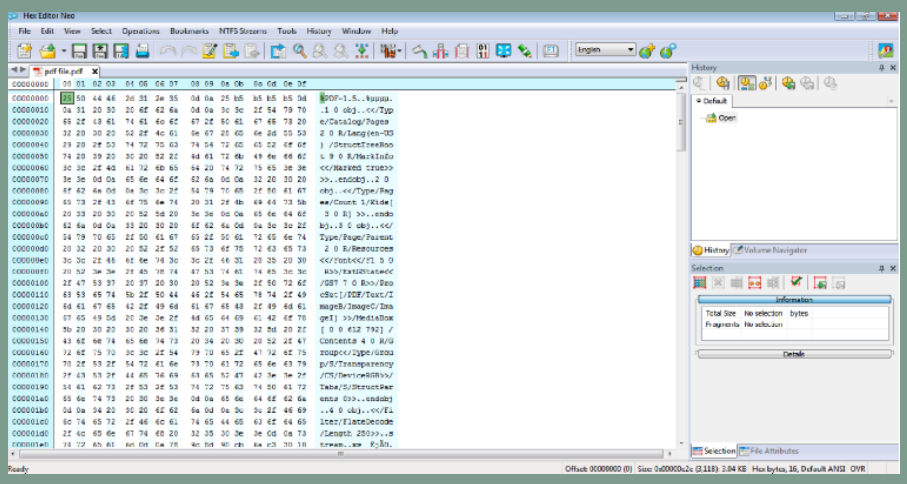


Fig 3. AccessData FTK Imager identifying the hidden PDF file.

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DID YOU KNOW?

Which crime lab unit is responsible for examining body fluids and organs for the presence of drugs and poisons?

Answer: Toxicology Unit

EFFECT OF STEREOTYPES ON THE IDENTIFICATION OF CRIMINALS

Ms. Aakanksha Sunil
Ms. Adheena Shibu
Ms. Ann Mariya Thomas
Ms. Lorraine Tissan
Mr. Sharath Richard

INTRODUCTION

Stereotypes are preconceived and prejudiced notions that we form which can help us access and categorize information in our brain easily. While stereotypes help in facilitating information processing, they can also interfere with forming judgements which can lead to and inaccurate decisions. In the judicial arena, there have been incidents where someone was wrongfully accused of committing a crime due to underlying prejudices such as race and gender. This research focused on the study of society's perception of criminals.

AIM

This study aimed to determine if any visual characteristics found in suspects can be stereotypically used by people/systems to define criminals and whether factors like the type of crime and physical appearance/traits of the criminal can influence the subject's decision.

The study also aimed to see if certain demographic factors of the subject like their age, gender, and occupational status would influence their perception of a criminal.

METHODOLOGY

For this study, a questionnaire was prepared which entailed 10 hypothetical case studies that were based on 5 types of crime – murder, drug trafficking, sexual assault, money laundering, and hacking. The case studies were followed by a photo line-up which had the images of 2 suspects provided to the subjects, in which one fit the stereotype of a criminal of that type of crime while the other did not. A link was generated, and the questionnaire was distributed via the social media platform. People of various age groups and occupational backgrounds were provided with the questionnaire for collecting responses. A total of 318 responses were collected and analyzed. The responses were segregated and arranged based on different parameters and the results were tabulated. Pie charts and bar graphs that showed the distribution of responses based on different parameters were generated using MS Excel.

OBSERVATIONS

Findings showed that an individual's stereotype about a criminal can vary depending on the type of crime given. The study also showed that other factors like age, race, and sex of the suspect can also trigger stereotypes affiliated with a criminal of that particular type of crime. For example, one of the hypothetical scenarios given was a household poisoning case where a man was found dead on his couch because of poisoning. The suspect line-up provided was that of two suspects, one male, and the other female. The majority of the participant pool chose the female to be the probable suspect and from this response, we learned that people often associate crimes like poisoning with females stereotypically.

CONCLUSION

Further in this study, after observing the results we were able to conclude that demographic factors of the subjects like their age, gender, and occupational status did not have any significant impact on their choice of suspect in each case study/scenario that was provided.

Ultimately, this study was done to show that an individual can hold such stereotypes unconsciously and these stereotypes can influence the person's decision-making.

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DETECTION OF PESTICIDES IN COMMON FRUITS OR VEGETABLES AVAILABLE IN DIFFERENT REGIONS OF BANGALORE CITY

Ms. Gayathri L Nair
Ms. Amulya M

INTRODUCTION

Toxicology is primarily concerned with the study of the harmful consequences that any physical, chemical, or biological agent may have on humans, animals, and the environment in general. Forensic toxicology, a subdivision of toxicology, focuses on the utilization of regular toxicological methods and procedures to aid in the medico-legal examination of cases involving death, poisoning, and drug abuse. It includes analyzing numerous biological samples such as blood, urine, and other bodily fluids to detect the presence of any toxin, as well as individualizing the toxin discovered and determining the amount of toxin present in the individual's system. Among the toxins usually encountered are pesticides that are used to deter pest infestation in crops. These pesticides can cause serious health issues in the individuals who are exposed to them, which include confusion, lack of appetite, disorientation, and much more.

OBJECTIVE

The objective of this study was to detect the possible presence of pesticides in the vegetables and fruits available in

different regions of Bangalore city as well as in the ones purchased through online platforms by performing Thin Layer Chromatography or TLC. Five different vegetables and fruits were chosen, which included cabbage, carrot, tomato, grape, and spinach. Sample collection was done by dividing the city into four main regions, North, South, East, and West. A prominent online grocery shopping platform was also chosen along with these regions. The collected samples were then extracted by grinding their peels in a mortar and pestle in the presence of a hexane- acetone mixture. Since the control carbofuran pesticide was available in the granular form, extraction was carried out for carbofuran as well by grinding them in a mortar and pestle in the presence of methanol. The extraction was then followed by the preparation of the TLC chambers for which two different solvent systems were used as the control pesticides (hexane-acetone for malathion and hexane-chloroform-ethyl acetate-acetone for carbofuran).

While the prepared chambers were left for saturation, the spotting was done on the TLC plates using microcapillary tubes. The spots of the vegetable and fruit samples, along with the standard pesticide sample, were placed equidistant from each other on the spotting line, marked approximately 1 cm above the base of the plate. The spots were allowed to dry, after which the plates were carefully placed in the respective chambers. The TLC was run for 15-20 minutes, which was sufficient for the solvent to cover 80% of the run, after which visualization was done using Tollen's reagent (for malathion) and alkaline Fast Blue B reagent (for carbofuran). Spot formation was observed and the distance traveled by them was measured and used to calculate the Rf (Retention factor) values (ratio of the distance traveled

the solute to the distance traveled by the solvent) obtained for the vegetable and fruit samples which were then compared to the Rf of the standard pesticides and the results were interpreted. The values obtained were tabulated according to their regions.

RESULTS

The observations indicated that the Rf values of samples that were tested for the presence of carbofuran corresponded with the Rf values of the standard pesticide samples, indicating the possible presence of the pesticide in them. While the samples that were tested for malathion did not give results or values that corresponded to the value obtained for the standard pesticide. Since TLC is a screening method, sophisticated techniques such as GC-MS (Gas Chromatography-Mass Spectrometry) may be used for the confirmation and quantification of pesticides in vegetable and fruit samples.

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A STUDY TO IDENTIFY COMMONLY EMPLOYED METHODS OF DISGUISE

Ms. Krishnapriya
Ms. Litzia Sebastian
Ms. Nivya George

INTRODUCTION

Disguised handwriting is the willful modification of a person's natural writing to conceal the identity. When a person is called to give his handwriting sample for investigation, he /she tends to disguise the handwriting to conceal their identity. Disguised writing is always superficial and leads to an inferior quality of writing. According to the principle of handwriting, individual characteristics remain constant. Individuals change their class characteristics to disguise their handwriting, and the individual characteristics will not change. Common methods of disguised writing include change of style of writing, change of pen pressure, change of slant, use of unskilled hand, change of pictorial effects, change of shading and spacing, change of line quality, presence of pen pause, tremors, and hesitation, change of diacritics, etc.

AIM AND OBJECTIVES OF THE STUDY

- To distinguish the disguised handwriting from the original handwriting
- To find the methods used for disguising the handwriting
- To determine the commonly used methods for the disguise

of handwriting

- To calculate the percentage of each method used for disguising the handwriting

METHODOLOGY

1. Sample collection and procedure

- The samples were collected from 100 subjects aged between 17 to 25 years.
- The subjects were asked to write on an A4 white sheet of paper using a ball blue pen. The paper and pen were provided by the researchers to the subjects
- The subjects are restricted from looking into other writing while giving the standard and disguised writing sample and to use any other pen, paper, and other supporting materials like paper, books, or writing pads under the A4 sheet.
- Subjects were selected with fewer external factors that affect the writing. They were instructed not to use their unskilled hand to disguise writing
- A control passage was dictated to the subjects.
- The following samples were collected from each of the subjects – 1. Standard handwriting (slow speed), 2. Standard handwriting (moderate speed) and 3. Disguised handwriting.
- The subjects were asked to take as much time as they wanted to disguise the writing.
- The 3 samples collected from each subject were considered as one sample for comparison.
- 15 characteristics were fixed to compare in the samples
- A comparison between the disguised handwriting with the original handwriting was performed.
- The changes in the 15 characteristics in the sample were recorded in a table.

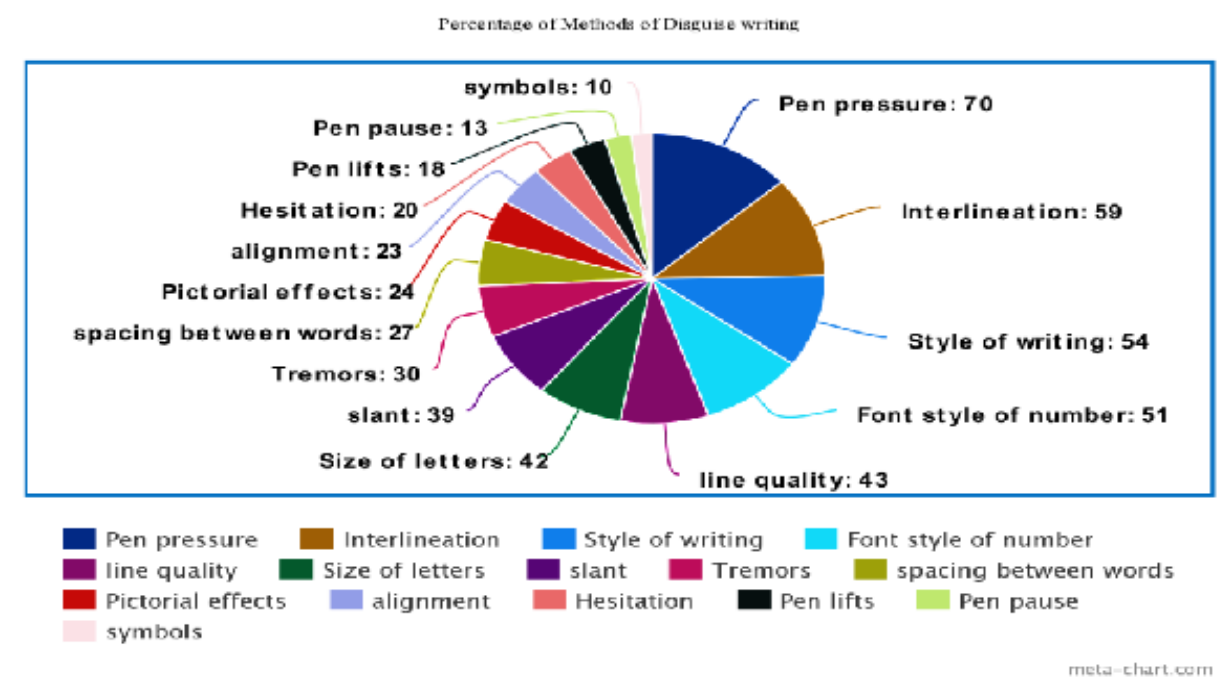
- The commonly used methods of disguise were observed and recorded

The 15 characters which were looked for and graded were:

1. Style of writing – changed / same
2. Spacing between words – increased/decreased/same
3. Slant – changed / same
4. Alignment – changed / same
5. Pen lifts – present/ absent
6. Pen pause – present/absent
7. Pen pressure – increased/ decreased/ same
8. Interlineation – increased/ decreased/ same
9. Size of letters – increased/ decreased/ same
10. Line quality – changed/ same
11. Hesitation – present/ absent
12. Tremors – present/ absent
13. Pictorial effects – present/ absent
14. Font style of numbers – changed/ same
15. Symbols – changed/ same

FINDINGS

Sl.no	Characteristics	No. of people who changed the characteristic in disguise writing
1	Pen pressure	70
2	Interlineation	59
3	Style of writing	54
4	Font style of Numbers	51
5	Line quality	43
6	Size of letters	42
7	Slant	39
8	Tremors	30
9	Spacing between words	27
10	Pictorial effect	24
11	Alignment	23
12	Hesitation	20
13	Pen lifts	18
14	Pen pause	13
15	Symbols	10



- 70 people changed their pen pressure and only 10 people changed or used the symbols in disguised writing
- Most people increased or decreased their pen pressure along with other methods of disguise.
- The subjects used more than one method while disguising.
- 15 out of 100 subjects used more than 8 methods of disguise.
- 19 subjects out of 100 only used 3 and a lesser number of methods of disguise.
- 66 subjects out of 100 used 4 to 8 methods to disguise writing.

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A STUDY TO ESTIMATE THE EXTENT OF INEFFICACY OF EXISTING PRESUMPTIVE TESTS ON BLOOD STAINS CONTAMINATED WITH COMMON CONTAMINANTS ENCOUNTERED IN SOUTHERN INDIA

Ms. Umme Salma Razak
Ms. Aishwarya P.V
Ms. Arya K.S
Mr. Neeraj P.B
Mr. Joseph J. Kachappally

INTRODUCTION

Blood is the most common evidence in crimes and is many a times crucial in fixing the corpus delicti, proving the modus operandi and also the actus reus during a crime. Presumptive testing of suspected blood stains is the first step in the forensic examination of blood. Presumptive tests are usually performed at the scene of the crime and form the basis on which a stain is collected for further examination in the FSL. The common presumptive tests performed for identification of blood are Benzidine and Kastle Meyer tests.

Even though the efficacy of presumptive tests is highly reliable, in the presence of certain contaminants, their efficacy

is altered. In South India, the common practise of using beautifying skin and hair additives is predominantly observed. This study attempts to identify the extent to which common contaminants, namely turmeric, kumkum, and coconut oil, reduce the efficacy of the presumptive tests (Benzidine and Kastle Meyer tests) for blood.

OBJECTIVE

- To identify if contaminants (turmeric, kumkum, and coconut oil) have a negative impact on the performance of the presumptive tests, Benzidine and Kastle Meyer Tests, used for forensic identification of dried blood stains.
- To identify how many among the three contaminants (turmeric, kumkum, and coconut oil), have a negative impact on the presumptive tests.
- To identify if the negative impact on the presumptive tests is quantifiable.

METHODOLOGY

To analyse the effect of each of the contaminants on the presumptive tests, the entire study was split into three phases:

Phase 1 – Conceptualization

In this phase, attempts were made to test contaminated blood in increasing concentrations of the 3 different contaminants. The threshold concentration at which each contaminant gave a false negative result for each presumptive test was identified in this phase.

Blood was serially diluted up to the 6th dilution, and the specific contaminant was added to each of the 6 dilutions in the following concentrations and tested against Benzi-

dine and Kastle Meyer tests separately.

The results were as follows:

It was decided to discontinue the use of the Kastle Mayer test for turmeric and kumkum contaminants as they gave false positive results even in the absence of blood.
However, in the case of coconut oil, both Benzidine and Kastle Mayer tests were performed.

Concentration	TURMERIC		KUMKUM		COCONUT OIL	
	Benzidine test	Kastle-Meyer test	Benzidine test	Kastle-Meyer test	Benzidine test	Kastle-Meyer test
Blood 0.05 ml% Contaminant – 4g%	Blue green colour	Faint pink colour	Blue green colour	Faint pink colour	Blue Green colour	Faint pink colour
Blood – 0.025 ml% Contaminant – 4g%	No colour change	Faint pink colour	No colour change	Faint pink colour	Blue green colour	Faint pink colour
Blood – 0.0125 ml% Contaminant – 4g%	No colour change	Faint pink colour	No colour change	Faint pink colour	Faint blue green colour	No colour change
Blood – 0.00625 ml% Contaminant – 4g%	No colour change	Faint pink colour	No colour change	Faint pink colour	No colour change	No colour change
Blood – 0.00313 ml% Contaminant – 4g%	No colour change	Faint pink colour	No colour change	Faint pink colour	No colour change	No colour change
Blood – 0.00156 ml% Contaminant – 4g%	No colour change	Faint pink colour	No colour change	Faint pink colour	No colour change	No colour change

Phase 2 – Replication
In this phase, the identified threshold concentration of contamination was prepared, and the presumptive tests were performed 30 times to check the accuracy of the findings.

TURMERIC	KUMKUM	COCONUT OIL	
Benzidine Test (Blood – 0.025 ml% Contaminant – 4g%)	Benzidine Test (Blood – 0.025 ml% Contaminant – 4g%)	Benzidine Test (Blood – 0.00625 ml% Contaminant – 4g%)	Kastle – Mayer Test (Blood – 0.0125 ml% Contaminant – 4g%)
No colour change in all 30 attempts	No colour change in all 30 attempts	No colour change in all 30 attempts	No colour change in all 30 attempts

In all the replicated attempts, the result proved to be the same - negative for blood.

Phase 3 – Validation:

In this phase, the findings were statistically analysed to identify the validity of the identified results.

As the results in all the replicated attempts were found to be false negative, the need for statistical validation was absent.

FINDINGS

- When turmeric was used as a contaminant, it was found that the Benzidine test did not detect the presence of blood in a dilution mixture of Blood – 0.025 ml% + Contaminant – 4g% and above.
- When kumkum was used as a contaminant, it was found that the Benzidine test did not detect the presence of blood in a dilution mixture of Blood – 0.025 ml% + Contaminant – 4g% and above.
- The Kastle Meyer test could not be interpreted as the pink colour was due to interference of turmeric and kumkum (false positive results were noted in the presence of trace amounts of turmeric and kumkum).
- When coconut oil was used as a contaminant, it was found that the Benzidine test did not detect the presence of blood in a dilution mixture of Blood – 0.00625 ml%+

- Contaminant – 4g% and above.
- When kumkum was used as a contaminant, it was found that the Benzidine test did not detect the presence of blood in a dilution mixture of Blood – 0.025 ml% + Contaminant – 4g% and above.
- The Kastle Meyer test could not be interpreted as the pink colour was due to interference of turmeric and kumkum (false positive results were noted in the presence of trace amounts of turmeric and kumkum).
- When coconut oil was used as a contaminant, it was found that the Benzidine test did not detect the presence of blood in a dilution mixture of Blood – 0.00625 ml% + Contaminant – 4ml% and above, and the Kastle Meyer test did not detect the presence of blood in a dilution mixture of Blood – 0.00125 ml% + Contaminant – 4ml% and above.

CONCLUSION

In cases where scientific evidence was heavily relied on, false positive/false negative results can be of major concern. They can lead to a rampant rate of acquittal.

Presumptive tests are relied on by field scientific officers to decide whether the evidence needs to be collected and forwarded to the Forensic Science Laboratories. When these tests provide false positive/false negative results, this can adversely affect the progress of the investigation.

This study addresses the extent to which common contaminants can lead to a false interpretation of the commonly used presumptive tests. This study can be a basis on which a more extensive study can be performed to understand the

impact of these contaminants as well as similar contaminants on presumptive tests at large.

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DID YOU KNOW?

Bugs can help solve a crime. It's actually called forensic entomology. While bugs can't actually solve a crime, investigators are able to look inside of an insect's (typically a maggot) stomach and is able to determine how long a body has been decomposing.

TO CONTRIVE ARTIFICIAL BLOOD FOR USE IN DEMONSTRATION OF BLOOD PATTERN ANALYSIS

Ms. Sruthi Evangeline Kali
Ms. Harshitha M V
Ms. Faiza Farheen
Mr. Fahed Bin Abdul Aziz K

INTRODUCTION

Blood pattern analysis is the concept of blood behaviour which acts in a unique and different way when it is forced to emerge. It deals with the interpretation of bloodstains at the crime scene to recreate the caused bloodshed. It helps the investigator in drawing conclusions about the modus operandi, nature and the timing of crime, the direction of attack, the angle of attack, the probable distance between the victim and assailant, nature of force, nature of weapon, number of blows, the position of the suspect and the victim, description of the perpetrator such as height, which hand was used, the approximate time of crime committed, mens rea and actus reus, manner of crime like violent crime, act of defence, etc, and the sequence of events can be determined which eventually leads to the reconstruction of the crime. This happens because of the properties of blood. Blood has different properties such as viscosity, inertia, surface tension, as their physical characteristics and it also shows biological properties such as vascular spasm,

platelet plug, and clotting or agglutination. The composition of blood also plays a role in blood spatter. They altogether play a prominent role in deciding the spatter. And also, blood has a changing behaviour due to various factors and circumstances like velocity, pressure, force, weapon, surface, height, angles, etc. All these aspects are combined and studied in relation to each other and this study is called blood pattern analysis which is emerging as a vast subject in forensic science by playing a role in helping to solve a crime. Hence the examination of blood is vital in blood pattern analysis as well as academic research studies. For academic purposes, blood is hardly used because blood has its own problems such as both animal blood and human blood are expensive, have low marketability, i.e., rarely available to buy, blood decomposes; it is hazardous in nature causing blood poisoning and HIV (Human Immunodeficiency Virus), etc.

It has an offensive smell that could be intolerable to many and blood lysed with time and agglutinates which leads to false results in analysis. Hence academic and research studies cannot always rely on blood. And for this reason, many institutions, organisations, and scientists have formulated alternatives for blood. Theatrical blood was the most used blood, and this can be easily prepared by internet formulations. But they failed as they showed clots, pools, scales etc. And later, standard substitutes were formulated and got approved to only meet a few properties of blood. There is no current theatrical blood as such. However, NFBS, oxycyte, Awlata dye, and Millington substitutes are available and suitable for blood pattern analysis but the problem is, all of them are very expensive.

METHODOLOGY

So, the present study was conducted to develop a forensic blood substitute that is similar to human blood and of low cost. The objectives of this study are to develop an alternative of blood in a simpler way with few components which are cheap and also to validate their suitability for blood pattern analysis. The methodology of this study was designed in three steps. They are

- Preliminary development
- Evaluation
- Validation

1. Preliminary development:

In preliminary development, by referring to many articles, a mixture of multiple components such as starch, cellulose, waitrose, lyles, colouring dyes, albumin, etc, which were already present in existing alternatives, was developed in different ratios. Upon multiple attempts, the combination of albumin serum bovine, cellulose starch, and gram's safranin worked out well. Further, numerous substitutes with these three components in different ratios were developed. Six standard substitutes were formulated with different compositions. Each of them was tested at least 20 times to ascertain the nature of blood formed in a perpendicular drop and angled drop. The results with substitute no. 6 showed promise as the nature of drop in both perpendicular and angled drops were found to be similar to that of blood. This substitute 6 was regarded as the best suitable substitute for the study and the test was replicated.

2. Evaluation:

For evaluation, the chosen substitute was tested repeatedly

For evaluation, the chosen substitute was tested repeatedly several times against blood patterns for the correctness. The procedure was, each time, the blood and substitute comparison has been performed in 4 different patterns.

- The perpendicular falls at 2 different heights one at 40 cm and the other at 70 cm height.
- The angled fall from 2 different angles, i.e., 20 degrees and 60 degrees

The comparison was done in the span of three days.

On Day 1: 8 trials were performed with both blood and substitute

On Day 2: 40 repeats were done with 1 drop of blood against 40 drops of substitute.

And on the final day, 15 repeats were performed with 15 drops of substitute against 1 drop blood

Fig no.1.Day 1- Drop 1 from 40cm height

Fig no.2. Day 1- Drop 2 from 70cm height

Fig no.3.Day 1- Drop 3 from 40cm height

Fig no.4. Day 1- Drop 4 from 70cm height

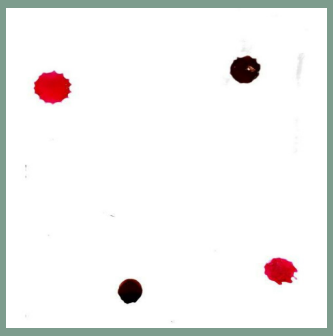

Fig no.5. Day 1- Drop 1 from from 20^{o} angle

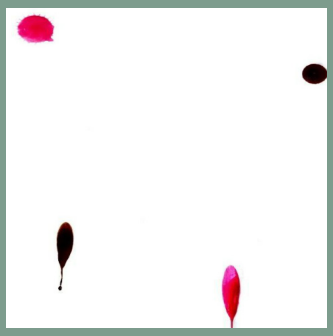

Fig no.6. Day 1- Drop 2 60^{o} angle

Fig no.7. Day 1- Drop 1 from from 20^{o} angle

Fig no.8. Day 1- Drop 2 60^{o} angle

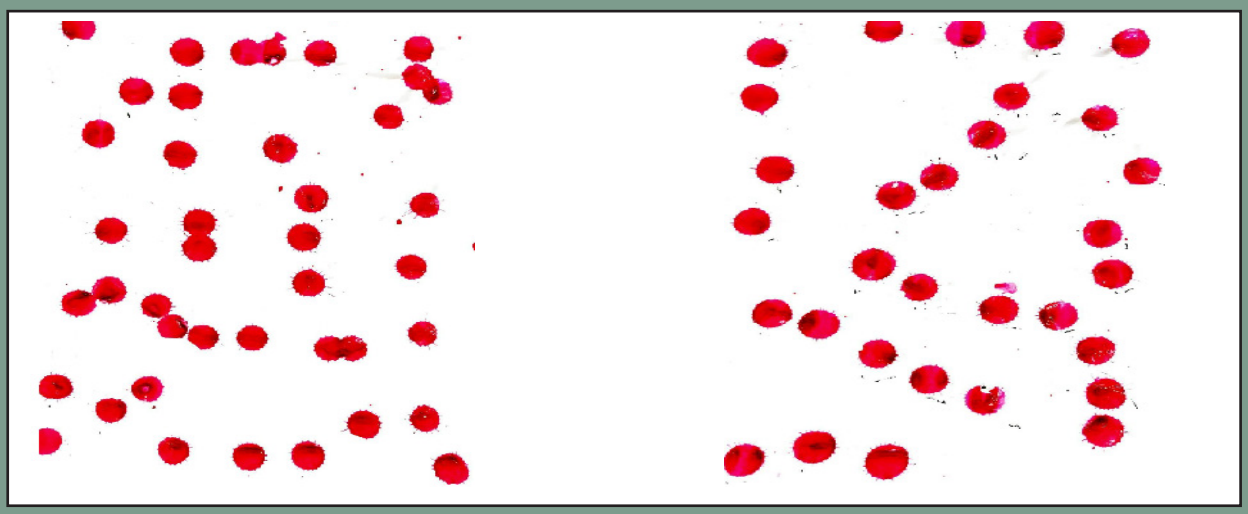

Fig no. 9. Day 2- 40 drops from 40cm height

Fig no. 10. Day 2- 40drops from 70cm height

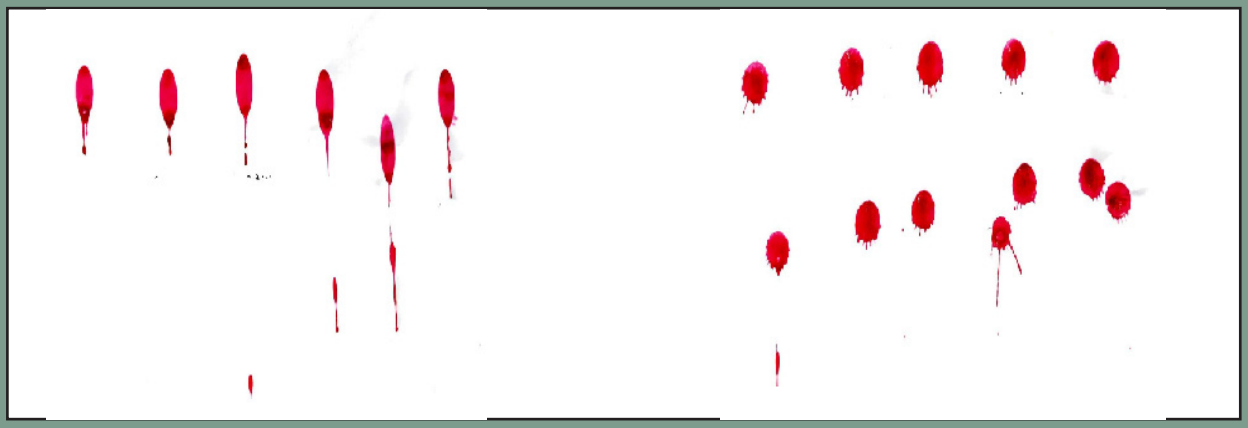

Fig no. 11. Day 2- 40 drops from 20^{o} angle

Fig no. 12. Day 2- 40drops from 60^{o} angle

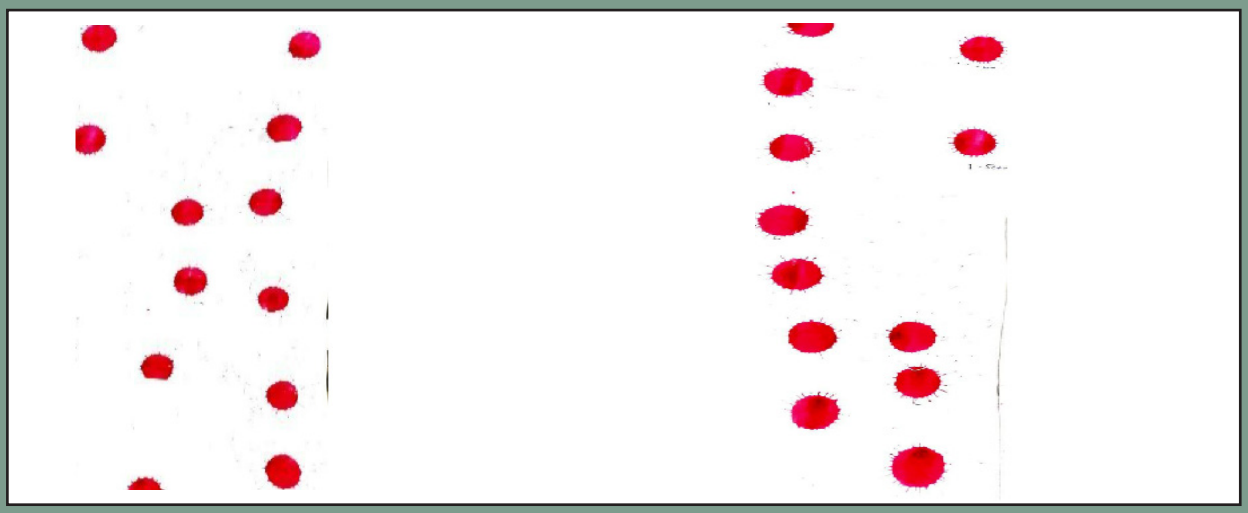

Fig no. 13. Day 3- 15 drops from 40cm height

Fig no. 14. Day 3- 15 drops from 70cm height

Fig no. 15. Day 3- 15 drops from 20degree angle

Fig no. 16. Day 3- 15 drops from 60degree angle

3. Validation:

Under validation, the length and width of each drop were measured and noted for all the trials and compared with blood drops. The mean diameter for perpendicular drops was calculated and the mean width by length ratio and mean estimated angles were calculated for angled drops. The average of different attempts, different heights and angles. And also, deviation between the values was also observed and calculated.

Day	Perpendicular Drop 40 cm		Perpendicular Drop 70 cm	
	Mean Diameter with Blood	Mean Diameter with Substitute	Mean Diameter with Blood	Mean Diameter with Substitute
1	1.25	1.25	1.42	1.49
2	1.43	1.41	1.55	1.55
3	1.41	1.44	1.58	1.58
Mean	1.36	1.37	1.52	1.54
Standard Deviation	0.10	0.10	0.09	0.04

Table 1. Validation of perpendicular drops

Validation of 20 degree drops

Day	20 degrees Perpendicular drop 70cm			
	Mean W/L ratio with blood	Mean W/L ratio with substitute	Mean estimated angle with blood	Mean estimated angle with substitute
1	0.45	0.45	26.83	26.71
2	0.41	0.45	24.22	26.45
3	0.41	0.34	24.32	20.09
Mean	0.42	0.41	25.13	24.42
Standard Deviation	0.02	0.06	1.48	3.75

Table 2. Validation of 20 degree angled drops

Validation of 60 degree drops

Day	60 degrees Perpendicular drop 70 cm			
	Mean W/L ratio with blood	Mean W/L ratio with substitute	Mean estimated angle with blood	Mean estimated angle with substitute
1	0.73	0.84	47.06	57.15
2	0.87	0.83	61.43	56.32
3	0.91	0.89	65.59	63.19
Mean	0.84	0.85	58.02	58.89
Standard Deviation	0.09	0.03	9.72	3.75

Table 3. Validation of 60degree angled drops

RESULTS AND ANALYSIS

The above results and tables reveal the average of values in each parameter chosen with respect to blood and the substitute. In perpendicular drops of 20 cm and 70 cm height, the study reveals that both with blood and substitute the diameter is more or less the same with a negligible standard deviation. In angled drops of 20 degree angle, the study reveals that the width/length ratio has more or less the same value for both blood and substitute, but the estimated angle has a wide variation. This can be due to the crude means used to arrive at an angle of 20 degree during the performance of the test. Similarly, in angled drops of 60 degree angle, the study reveals that the width/length ratio has more or less the same value for both blood and substitute, but the estimated angle has a wide variation. This can be due to the crude means used to arrive at an angle of 60 degree during the performance of the test.

CONCLUSION

In this study, the relation between the height of fall and the shape of the drop as well as the angle of fall and the size of the drop was demonstrated and established. The diameter of the drop increased with the increase in height and the tailing of the drop increased with the decrease in the length. Based on the results and validation of findings, it can be concluded that the fictitious blood developed here can be employed as a preliminary working alternative for additional research and academic studies especially for demonstration and understanding of blood pattern analysis with further development and standardization. It was manufactured in a few products which

were inexpensive and readily available and it could be prepared by anyone with no special equipment. It can also be stored and not harmful.

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FACTS !

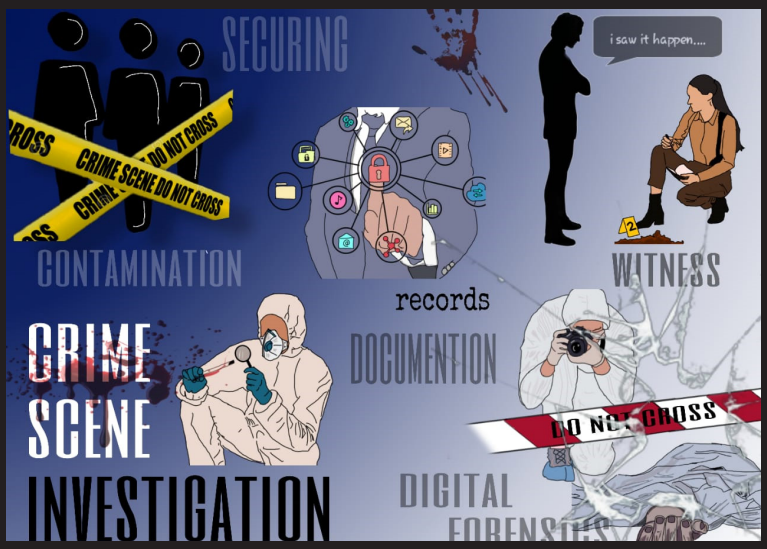
Teeth are typically the most reliable identifiers when it comes to identifying a corpse. Teeth are bones, and bones last a long time so that's why teeth are typically used to identify bodies — they are correct around 93% of the time.

A PICTORIAL REPRESENTATION OF THE ROLES OF A CRIME SCENE EXPERT

Artwork by Nishani Sahoo

INTRODUCTION

Crime scene is the only place we know for certain that the accused and victim were in direct proximity with each other. It is a rich source of physical evidences related to the crime and proper investigation of the crime scene can be of great benefit to the investigation of the crime.

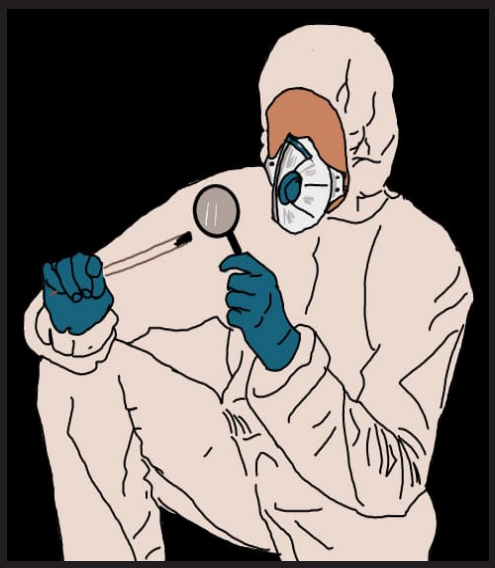


Step 1
Check on victims. Provide medical assistance if necessary.

Step 2
Secure and Protect the Scene. The crime scene should be properly barricaded and protected from unauthorized personnel. Usually, the radio dispatch message is brief and seldom reveals the full nature of the incident.

Step 3
Document the scene – Photography is a essential part of scene documentation.

Step 4
Survey the scene and evaluate evidences and prepare a narrative and list of evidences to be collected.



Step 5
Collect evidences individually, following the collection protocol for each of them.

CONCLUSION

As pointed out earlier, the crime scene is a very important entity in crime investigation. It is of primary importance in all crimes.
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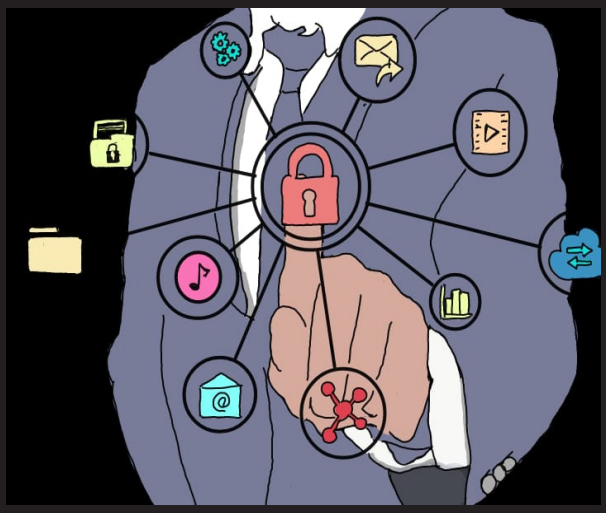

GLOBAL NEWS UPDATES RELATED TO FORENSIC SCIENCE

- Forensic proteomics
- Virtopsy

FORENSIC PROTEOMICS

Ms. Kavya Priya.L

Proteins are naturally occurring highly complex substances that consist of amino acid residues joined by a peptide bond. Protein is the major component of all biological evidence, where it can be used to identify body fluids and tissues, as well as convey genetic information in the form of single amino acid polymorphism. Proteomics is the study of proteomes (i.e, the total proteins of a given sample such as cultured cells, tissues, or an organism). It is a powerful approach to studying biological systems.

Compared with immunological methods, proteomics may reduce time and overall costs. Forensic Proteomics directly analyzes proteins in blood cells, clothing fibers, medication, etc, for the applications like microbial characterization, protein toxin detection, and forensic fluid analysis.

PROTEOMICS METHODS

Proteomics methods can be separated into top-down, middle-down, and bottom-up approaches.

In top-down proteomics, intact proteins are extracted from samples that are directly separated and analyzed by LC-MS/MS (Liquid Chromatography-Mass Spectrometry). This approach is widely used in sports anti-doping to identify banned proteins or peptides. In the bottom-up approach, proteins are digested into thousands of peptides such as trypsin and LysC. In the middle-down approach, protein digestion is carried out but the real aim is to yield large peptides. The

bottom-up method is the most used method of the three approaches. The steps of the approach are shown here:

i. Sample preparation: includes sample pre-treatment, protein extraction, proteolytic digestion, and peptide purification

- Sampling and sample pre-treatment: Samples can be collected from human bodies (if there is) and crime scenes. The techniques include wipes, dry swabs, aspirating needles, air vacuums, and filters. After collection, for short-term storage and -20 degree or -80 degree celsius for long-term storage. Pre-treatment methods are selected depending on the sample type, if the sample-containing proteins are exosomes, serum, plasma saliva, etc they don't require lysis pre-treatment, instead an amount of buffer is added to favor enzymatic digestion steps. If the samples are cells, a lysis step is applied to break the cell membrane.
- Protein extraction: They are extracted by simultaneous removal of contaminants. Protein precipitation is the common method in which proteins are precipitated by organic solvents and their mixtures with acids or sodium deoxycholate. After precipitation, the protein pellets are collected and washed with pre-chilled acetone ahead of proteolytic digestion.
- Proteolytic digestion: Methods that are widely used are in-gel, in-solution, on- bead, and filter-aided sample preparation (FASP). In in-solution digestion, protein pellets are mixed with 8M urea, which can increase protein stability and denature protein structures, these are reduced and then alkylated. Then proteins are digested with enzymes. The resultant peptides have the preferred size for MS Sequencing.

- Peptide purification: pellet-purification is conducted using reversed-phase solid-phase extraction (SPE). The eluted peptide from the extraction is subjected to lyophilization or vacuum drying.
- Sample fractionation: It is the rare step that can reduce the complexity of pellets before LC-MS/MS Analysis. It is a 3D fractionation required to achieve a proteome profile.

ii. Data acquisition: Depending on data acquisition types, there is targeted and untargeted proteomics, where the untargeted aims to collect data in large numbers and is used to profile the proteome of the sample, the targeted only detects and quantifies a small number of peptides. It is carried out in a triple-quadrupole mass spectrometer.

iii. Data analysis: Database search is one method where the theoretical spectra are generated from peptide sequences via silico-digestion. Another approach is MS/MS spectra library search. The next method is de novo peptide identification, which uses spectra to determine sequences without databases.

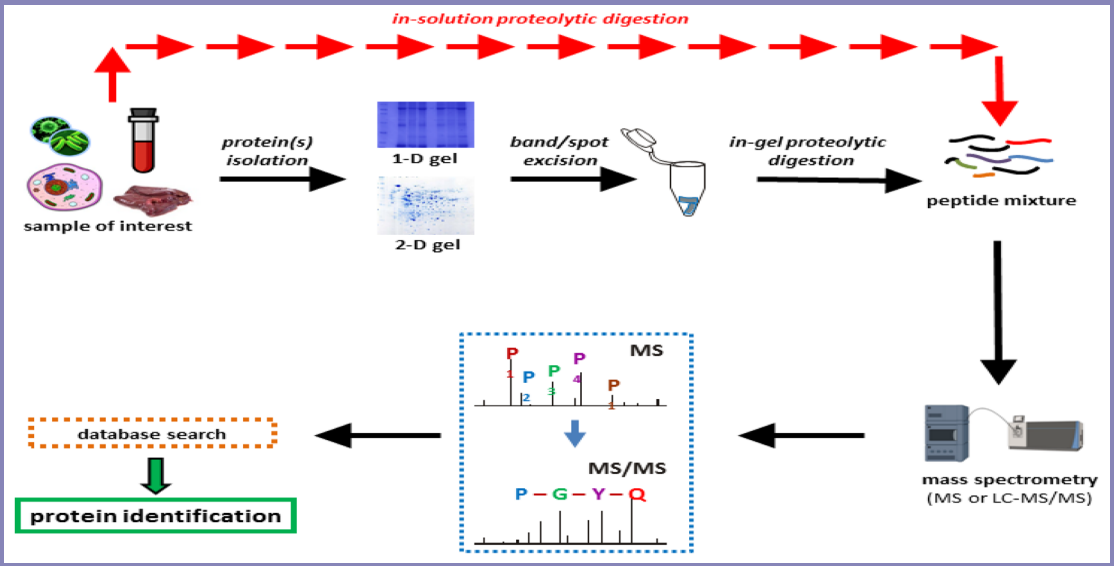

Figure: Processes of the bottom-up approach
(https://images.app.goo.gl/U1WizdGSR5sJ2XCh7)

APPLICATIONS OF FORENSIC PROTEOMICS

- Hair proteome: Human hair proteins are extracted by the shotgun-proteomics approach, which demonstrates a large extractability and variety of hair proteins after detergent extraction.
- Bone proteome: This can be used to study biomarkers and therapeutic procedures in osteoporosis, bone marrow aging linked to genetic changes in the proteome, and also about bone cancer.
- Organ identification: The study found highly discriminating proteins in different organs. The proteomics analysis of the tissue can be further investigated for future applications.
- Brain and cerebrospinal fluid (CSF): CSF is used to determine the time of death by comparing the proteome profiles of antemortem and postmortem CSF, which is performed by 2D gel electrophoresis and MS.

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VIRTOPSY

Ms. Nishani Sahoo

Virtopsy is a term extracted from two words “virtual” and “autopsy.” It employs imaging methods that are routinely used in clinical medicine, such as computed tomography and magnetic resonance imaging in the field of the autopsy, to find the reason for death.

Virtopsy is a multi-disciplinary technology that combines forensic medicine and pathology, roentgenology (radiology), computer graphics, biomechanics, and physics. The branch of forensics has made exemplary and path-breaking contributions to help solve these problems. This approach has been recently used by forensic odontologists but has yet to make its own mark in the field.

AUTOPSY V/S VIRTOPSY

Conventional autopsy involves invasive procedures that are the traditional means of post-mortem examination in humans. Contrary to it, virtopsy is a minimally invasive emerging technology in the field of forensic medicine that incorporates imaging technology of radiologists and forensic clinicians to reflect an ethical face in forensic examination.

AIIMS (All India Institute Of Medical Science) and ICMR (Indian Council of Medical Research) are working together on a technique for post-mortem without incising/ dissecting the body. This technique is likely to become functional in a few months. Health Minister Harsh Vardhan highlighted to Rajya Sabha that it is likely to be possible soon to carry out

autopsies without dissecting the body.

HISTORY

S. No	Name of scientists	Credit	Year
1.	Erasistratus and Herophilus	Dissected on dead bodies to study organs and nerves	1700
2.	Giovanni Morgagni	Published book on "The seats and causes of disease"	1761
3.	William Osler	Taught autopsy as part of medical education	1800
4.	Wilhelm Rontgen	Initiated the first X-rays experiment	1895
5.	Group project (unknown)	Conducted the first body scan for a high-profile case through project names like "digital autopsy" or "scalpel-free autopsy"	1999

EQUIPMENT FOR AUTOPSY

Virtopsy utilizes powerful scanning and radiographic technology with the power and resolution of modern computers. Virtopsy includes the following tools:

- 3D surface scan using a 3D photogrammetry-based optical surface scanner
- Post-mortem Computed Tomography (PMCT) with adjuvants such as PMCT-guided biopsy
- Post-mortem MRI (Magnetic Resonance Imaging)

PROCEDURE

1. Prepare the corpse for imaging.
2. Place small disks along the body's exterior so that the surface scan and the interior scans can easily be aligned. These disks mark points that can be used for rendering the images into a single cohesive image.
3. Use virtibot to avoid inaccuracies while placing the markers on the surface of the body.
4. The markers are used to calibrate the exterior scan of the corpse and match it with internal imaging processes.
5. A 3D color model of the corpse is accomplished.
6. 0.02 mm resolution stereoscopic cameras are used to capture the color image.
7. The body is brought to the CT and MRI workplace, usually double-covered inside a blue bag through which X-rays can easily pass, and then the body is laid on the sliding table of the CT, MRI, and MRS (Magnetic Resonance Spectroscopy) equipment.
8. A pathologist has the freedom to peel through the layers of virtual skin and muscle with the click of a computer mouse.
9. Internal and surface scans and a needle biopsy can be done if internal body samples are needed.

ADVANTAGES OF VIRTOPSY

- 3D illustration
- Easy accessibility
- Allows for a digital re-examination of the body after the liberation of the crime scene and burial or rot of the corpse even decades later
- Less time-consuming, aids in better diagnosis, and renders respect to religious sentiments, and

- Can be used for telemedicine/teleforensic/telepathology

https://www.researchgate.net/figure/Virtopsy-equipment-From-left-to-right-camera-surface-scanner-biopsy-tool-and-CT-scanner_fig1_329444591

FIRST VIRTUAL AUTOPSY IN SAUDI ARABIA

Case description

The deceased was a female stillbirth. A virtual autopsy was conducted to determine the cause of death. The post-mortem scan was performed by a

- General Electrical (GE) lightspeed 16 multi-detector computerized tomography scan
- The PMCT specifications were 180 mAs, 120 kVp, and a measured FOV (Field of View) of 50 cm.
- This was reconstructed to images of 0.625 mm slice thickness at 1.375:1 pitch.

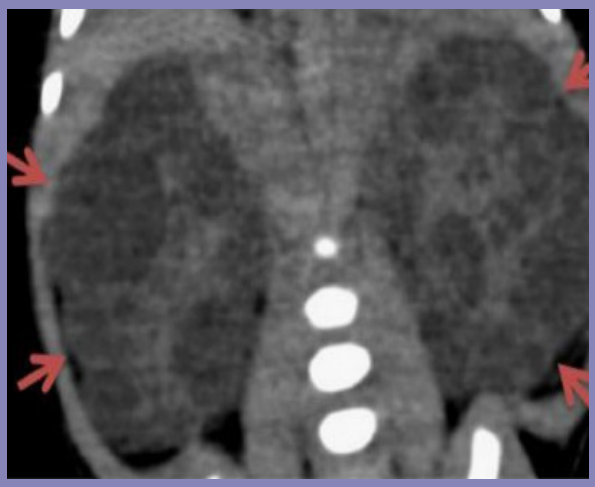
Observation

- The CT images revealed significant enlargement of both kidneys with numerous bilateral cystic hypodense lesions,-mainly in peripheral areas, causing destruction of the normal renal parenchyma.
- The renal pelvis was under-developed, and mild flank distention was observed.

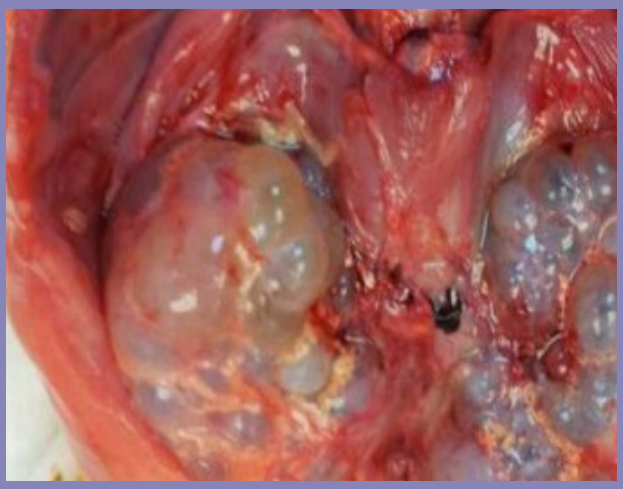
- Following this, a forensic pathologist, using standard dissection and tissue analysis, conducted a manual autopsy with a biopsy of kidney tissue for laboratory analysis. The diagnosis was multicystic dysplastic kidney disease (MCDK), as there was evidence of renal dysplasia.

CONCLUSION

The procedure shows a relatively good degree of accuracy, but it may fail to stand on its own without the aid of minimally invasive procedures (biopsies). However, the degree of invasiveness is small and therefore still acceptable under cultural limitations.



Coronal mid-abdomen cross-sectional CT image showing enlargement of both kidneys with diffuse hypodensity.



gross kidney structure with bilateral presentation showing dysplastic ducts.

https://www.researchgate.net/figure/Images-showing-the-a-gross-kidney-structure-with-bilateral-presentation-and-b-a_fig2_268690557

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DID YOU KNOW?

Which forensic unit studies handwriting and typewriting on questioned documents, also analysing paper or ink?

Answer: Questioned Documents Unit

The first graduating batch (UG batch of 2019-22) of the Department of Forensic Science, Kristu Jayanti College, Bangalore

Department of Forensic Science at Kristu Jayanti College, Bangalore initiated the MSc Forensic Science programme from the academic year 2022-23.

CASE STUDIES

- Pegasus
- The grim sleeper serial killer
- The unabomber or the psycho genius?
- Gauri lankesh assassination

PEGASUS

Ms. Merien Abraham

Pegasus is the spying software built by the Israeli NSO (Niv, Shalev and Omri, names of the company's founders) group (the cyber agency that deals with all the cyber problems straight from the central or federal government) to spy on the digital groups to keep a check on the terrorist and all those criminals who are harmful to their country. It has been named after the horse in Greek Mythology, Pegasus which looks like a unicorn. It was used to get all the documents, information and small to small things from your phone, even the ongoing conversation with just this software without the help of any human intervention or help.

https://www.kaspersky.com/blog/

At that time whoever were residing in Israel were told to put this software on their devices so that they can keep a check on those people and whoever used to go against its use to declare them as terrorist or a threat to the country.

But later stages a news came out from the media that Pegasus was being given to the US officials but then later it was again taken back. Earlier through apps, they used to install it but nowadays with just messages, it will get installed on your phone without your notice.
But after all this incident a complaint was filed from the US, that some of their officials' devices were hacked and many other neighboring countries also complained that even Israel used this software to spy on their enemy countries by getting their personal or secret information. Many other complaints were filed from other countries and even famous companies like Facebook, iOS, Blackberry, and WhatsApp.

There were around 121 attempts done but still, 20 were successful according to the report given by WhatsApp. They even said that it was really difficult to find out what was the information taken by the attacker and how much, it's just that they used to send some messages before attacking. And usually, the victims who are targeted will be an activist or the politicians or leaders or journalists, or any known person.

Now if we come to how Pegasus affected India, it targeted mainly the Politician and the socialists especially. E.g., Rahul Gandhi, Prashant Kishor, Alok Verma, Umar Khalid, etc. Many complaints were put down by other common people also who got targeted by Pegasus to
CERT-In (Indian Computer Emergency Response Team) to look after this thing seriously. According to media and the journal reports, they said that this matter is very serious and needs to be dealt with as soon as possible as the software which is attacking the devices is been dealt with by

the people who don't have any relation with our country and have no authority to be dealing with the information of ours and even the peeping into someone else's private matters is practically illegal.

But because of this many illegal things and crimes done by these higher officials were caught red handed so the case was denied by the central government. There are still no proper actions taken from any government against it as it is still run by NSO even though in some interviews they said that now they don't have any direct connection with Pegasus.

The only way to be secured from all these spying software is to not allow or accept any foreign or unknown or fraud messages. Always keep an anti-virus software app on your phone or computer and regularly do the proper cleaning (internal) of the devices. If any unnatural act you feel is happening on your device immediately complain to the police.

"One single vulnerability is all an attacker needs"

Quote by -Window Snyder
Chief Security Officer, Fastly

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MYTH BUSTERS

Myth: Advanced DNA testing gives immediate results of a suspect or an individual.

Fact: DNA analysis takes several hours to give results. In a typical laboratory scenario it takes more than 30 days.

THE GRIM SLEEPER SERIAL KILLER

Ms. Anumita Mazumdar

Overview:

Lonnie David Franklin Jr, also given the nickname the Grim Sleeper, was held liable for more than 10 murders committed in California. It is believed that his killing spree was between the mid-80s till 2007. Due to large durations of time between his murders and underutilized DNA evidence found from the scene of the crime, it was nearly impossible to hunt down a suspect. Franklin was finally arrested in the year 2010 after forensic scientists used familial DNA searching to link the DNA evidence found at the crime scene to that of Franklin's relative. Through the following questions, we will try to understand this case in detail!

https://www.rollingstone.com/culture/culture-features/grim-sleeper-serial-killer-everything-you-need-to-know-252246/

Why was he the terror of L.A?

Though he was held responsible for more than 10 murders, it is believed that he has murdered more than 25 women. After exactly 6 years, and three and a half months of trial he was sentenced to death on August 10th, 2016. His first victim was named Debra Jackson whom he shot 3 times in the chest with a .25 caliber gun. He used to take pictures of his victims and keep them in his home as souvenirs. There are various doubts raised as to why it took so long for LAPD (Los Angeles Police Department) to catch this man. Many had the theory that it went unnoticed with the fact that most of his victims were black women prostitutes and drug-addicted women.

What do we know about him?

Franklin was a sanitation worker and had access to various landfills and waste dumping grounds. During the investigation, several questions were asked to Franklin's neighbor, as to what he was like in person. Most of them said that he was "friendly and quiet". He used to talk to everyone and was quite social which does not fit the description of a serial killer. His murders were going unnoticed because at that time the use of drugs and related crimes were common in L.A. In addition to this, due to the racial discrimination practiced in America, most of these black women murders were being ignored. As a result, an association called the Black Coalition Fighting Back Serial Murders (1989) was formed. The main purpose of forming this association was to raise awareness about these murders taking place and to protect black women in South and Central L.A.

A not-so-simple question - How was he caught?

It is well known that no crime is perfect. Something is always left behind and if the investigation is carried out swiftly and strictly, it will be a lot easier to catch the perpetrator. Enietra Washington, the only survivor of these killings, testified against him. Her bullet wounds were matched with the previously collected evidence. Enietra was shot and raped in 1988. She went on to explain how he asked her to get into his car when she denied he shot her because she was being disrespectful.

Familial DNA testing was enough for Franklin to be charged with murder. The collected DNA evidence was matched with his relative's DNA present in the system, a person called Christopher (his son) who was arrested for felony weapons possession in 2009. Soon after obtaining the DNA, undercover cops followed him to a birthday party being held in L.A. They collected the plates and pizza leftovers which had enough DNA to land him behind the bars.

A shocking discovery!

After a thorough search of his house, investigators found nearly more than 1000 photos of black women and adolescent girls. Some of them were unconscious, naked while many were bleeding and seemed to be dead. At this discovery, the police wondered if there were more victims than they initially thought…

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DID YOU KNOW?

Even if you move a file to the trash on your computer, it remains in a hidden file that a digital forensic investigator can find.

THE UNABOMBER OR THE PSYCHO GENIUS?

Ms. Siddhi Pant

The famed wound collector or the Unabomber Ted Kaczynski is responsible for the gathering of mail bombings, killing 3 people. son to Polish-Americans Theodore and Wanda Kaczynski. He modified right into a prodigy, excelling at mathematics at an early age. Funding himself with uncommon jobs and economic help from his family, Kaczynski studied survival skills collectively with match-to-be-eaten plant identification, tracking, and primitive construction.

https://tse1.mm.bing.net/th?id=OIP.kClr87WxiTFb3Jw5EYodkQHaEK&pid=Api&P=0&w=274&h=154

The math prodigy becomes the Unabomber

Between 1978 and 1995, the Unabomber terrorized the mail with domestically made bombs that killed three people and injured 23 others. Each device the Unabomber sent out was uniquely made. Many of the devices had been made of, or with, timber. In most cases, the explosives had been

made from gunpowder, match heads, and other common available items. One resembled a cigar box and was left in a North-western University, now no longer an unusual place. Another, disguised as a wooden board with protruding nails, appeared withinside the front of a computer shop.

Industrial Society and Its Future

Kaczynski's 35,000-word essay called "Industrial Society and Its Future" is a social critique opposing industrialization and a herbal ode to nature-focused anarchism. The essay contends that the Industrial Revolution commenced a harmful approach of natural destruction delivered upon through the manner of the era, whilst forcing human beings to comply with machinery, growing a socio-political order that suppresses human freedom and potential.

Demand high, supply low for Unabomber manifesto

By JOHN NIYO
NEWS STAFF REPORTER

SEP 2 0 1995

The Unabomber had no immediate audience in Ann Arbor on Tuesday.

"Believe it or not," said Tim Martin at Little Professor Book Centers Inc., "nobody in town — as far as we can tell — carries the Washington Post. I know that's hard to believe in Ann Arbor, but it's true."

The Washington Post on Tuesday published the entire 35,000-word political manifesto of the terrorist known as the Unabomber, whose 16 bombs have killed three and injured 23 others since 1978.

One of the Unabomber's targets was University of Michigan psychology Professor James V. McConnell. A letter bomb was sent to his Scio Township home in November 1985 and injured an assistant who opened it.

Borders Books and Music, 612 E. Liberty St., was inundated with calls Tuesday — about 30 by midmorning — as people tried to get their hands on a copy of the Post. But the Ann Arbor store does not carry the paper, according to Gail Grigsby, a Bor-

See BOMBER, Back Page

INSIDE

▶ Upbeat FBI officials said Tuesday that publishing the Unabomber's manuscript could help break the case.

UNABOMBER

▶ Regret was the general reaction by the news media Tuesday to the decision to publish the manifesto.

See stories, Page A3.

https://tse2.mm.bing.net/th?id=OIP.rCQhqNahxFdCLchGTEK-megHaC5&pid=Api&P=0&w=470&h=184

Modus operandi

Kaczynski's bombs were handmade pipe bombs and typically contained handcrafted additives of timber. Also, bits of timber or bark had been frequently covered withinside the constructions. He taught himself the manner to make the explosives out of quantities of scrap material and

timber that were modified into untraceable materials. The construction was completed manually, without the assistance of power systems to make the smooth system he needed.

https://tse4.mm.bing.net/th?id=OIP.8_biQW7N1jGnZFKc1lF3-AHaD7&pid=Api&P=0&w=306&h=162

The surge to save humanity

Kaczynski stated he went after figureheads, massive and small, of the digital revolution as a fashion of "revenge" and approach to stop humanity from itself. Kaczynski's first victim on May 25, 1978, modified into Terry Marker, a police officer on-responsibility at North-western University.

On November 15, 1979, he located a bomb within the cargo of American Airlines Flight 444. The bomb caused "a sucking explosion and a loss of pressure".

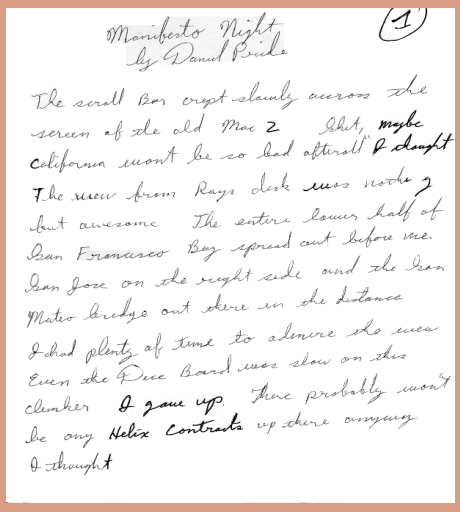
On June 10, 1980, a parcel was modified and sent to the residence of United Airlines president Percy Wood. The bomb was rigged withinside the book "Ice Brothers" through the manner of the way of Sloan Wilson. He suffered from essential burns and cuts all over his body.

Forensic linguistic: The breakthrough

Forensic Linguistics provides a careful and systemic

assessment of language. The Unabomber's writing style was examined through his family members, who, after investigating on their end, sadly determined that their findings had to be reported. Ted's brother, David, found out his brother was the Unabomber through the written words modified but needed to be reinforced through extra methods. The linguistic assessment was done by FBI (Federal Bureau of Investigation) agents. FBI used a smooth computational approach looking at word frequencies and spelling versions to build up a linguistic profile to observe and match the authors. For example, similarities covered every author using "analyse" for "analyze," "licence" for "license," "wilfully" rather than "willfully," "instalment" rather than "installment," and so forth.

The FBI profiler, James Fitzgerald, recognized a weird version of the idiom "you can't have your cake and eat it too!" - Kaczynski and the Unabomber inverted it into "you can't eat your cake and characteristic it too". There had been many exceptional similarities in content, style, and expression between Ted Kaczynski's work and that of the Unabomber's manifesto.



Manifesto Night
by David Price (1)

The scroll Bar crept slowly across the screen of the old Mac 2. Shit, maybe California wasn't be so bad afterall I thought. The view from Ray's desk was nice, but awesome. The entire lower half of San Francisco Bay spread out before me. San Jose on the right side and the San Mateo Bridge out there in the distance. I had plenty of time to admire the view. Even the Price Board was slow on this climber. I gave up. There probably won't be any Helix Contracts up there anyway I thought.

http://www.unabombers.com/images/MNight1.gif

The end of the manhunt

With the help of Ted's brother, David, and the assessment performed by the FBI profiler, James Fitzgerald, using forensic linguistics, the genius criminal was behind the bars for the bombings. As a result, the wound collector pleaded accountable for all the bombings. He was sentenced to eight terms with no parole.

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GAURI LANKESH ASSASINATION

Ms. Neha Elsa John

https://www.indiatoday.in/india/story/gauri-lankesh-s-murder-was-planned-a-year-before-exclusive-details-of-the-killing-1326868-2018-08-29

"I will do what I can, and I will say what I should. These intolerant voices find strength in our silence. Let them learn to argue using words instead of threats." ~ Gauri Lankesh

Gauri Lankesh, born in Karnataka on 29th January 1962, was an Indian journalist and activist who was the editor of Lankesh Patrike. She started her journalism life in the Times of India. Gauri Lankesh was a fearless journalist who openly criticized the caste system and Hindu nationalists.

Assassination

On 5th September 2017, Gauri Lankesh was shot dead in front of her residence in South Bangalore by two people who

arrived on a motorcycle. The autopsy report revealed that three bullets pierced through her body. One of the bullets entered her body from behind her left shoulder, and the other two from the front damaged her lungs and heart. Police revealed that they were able to find four cartridges and fragments of bullets, and the fourth bullet, which missed the target, was recovered from the wall. On November 23rd, 2018, a charge sheet was prepared, and 18 persons were accused of her murder. Parashuram Waghmare was the shooter, and others like Amol Kale, Amit Degwekar, and Sujith Kumar were the masterminds behind the crime. Once Parashuram Waghmare even confessed that he didn't know who he was killing. He was told that he had to kill someone to save his religion. The statement given by Parasuram Waghmore was as follows:

"I was told in May 2017 I had to kill someone to save my religion. I agreed. I didn't know who the victim was. Now I feel that I should not have killed the women."

He also said that he was brought to Bengaluru on September 3 and made him practice shooting using an air gun.

On examining the gun used to shoot Gauri Lankesh, the investigators were able to find out that the same gun was used to kill M.M. Kalburgi, who was a Kannada scholar, and Leftist thinker Govind Pansare, in the year 2015. The SIT (Special Investigation Team) has said in the charge sheet that the Hindu extremist organization, Sanatan Sanstha, was responsible for the murder of Gauri Lankesh. The SIT also said that the murder of Gauri Lankesh was linked to the murders of other left-leaning activists and

rationalists, Professor MM Kalburgi, Narendra Dabholkar, and Govind Pansare. The SIT had stated in court that Gauri Lankesh was targeted for opposing Hindutva vehemently in her writing and speeches.

Other related cases:
Narendra Dabholkar, M.M Kalburgi, Govind Pansare, and Gauri Lankesh were four activists who openly criticized caste systems and Hindutva politics.
Narendra Achyut Dabholka, an Indian physician, activist, and author from Maharashtra, was shot to death on 20 August 2013 while out on a morning walk. Malleshappa Madivalappa Kalburgi, an Indian scholar of Vachana Sahitya (Vachana literature) in the Kannada language and academic who served as the vice-chancellor of Kannada University in Hampi, was shot to death on 30th August 2015, by two men who came in a motorcycle in point-blank range striking his chest and forehead, and on 16th February 2015, the veteran communist leader, rationalist thinker, senior labor lawyer, and prolific writer Govind Pansare was shot at close range outside his house and was pronounced dead on 20th February.

Some of the key findings from the Gauri Lankesh investigations have a bearing on the other cases as well:

- The murder of Lankesh outside her front door by two men on a motorcycle shows a resemblance to the August 30, 2015 murder of Kalburgi at the doorstep of his home in Dharwad in north Karnataka.
- Nine day after the murder, the Karnataka Police SIT was provided with a significant forensic finding: the 7.65 mm country-made gun that was used to kill Lankesh was

the same one that was used to shoot Kalburgi two years previously, said a ballistics report from the state forensic lab.

- The ballistic evidence from the Kalburgi case had already linked the Kannada scholar's murder to those of Pansare, 81, in Kolhapur, Maharashtra, on February 16, 2015, and Dabholkar, 67, in Pune on August 20, 2013, and the SIT concluded that one group or gang was involved in all the three murders. Investigations in Maharashtra by the CBI (Central Bureau of Investigation) in the Dabholkar case had revealed the involvement of members of the Sanatan Sanstha.

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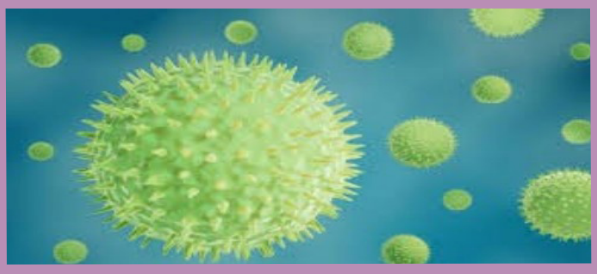
FEATURE ARTICLES

- How pollen is a silent witness in crime
- Forensic radiology in post-mortem investigation
- A new dimension in forensics

HOW POLLEN IS A SILENT WITNESS IN CRIME

Ms. Supriya PV
Ms. Aditi S Pai
Ms. Natasha Jennifer Easu

The pollen grain is not frequently encountered at a crime scene, but if encountered, it can lead to an investigation.
Palynology is the study of pollen grains, spores, etc., while forensic palynology refers to the application of palynology to investigate civil and criminal cases.



https://gapp.org/how-does-the-pollen-grain-develop/

Pollen is a fine powder discharged from the male reproductive organ of a flower. The size of a pollen grain ranges from 10 to 150 micrometres (i.e., it cannot be seen with the naked eye) that is protected by a cell wall consisting of cellulose, pectin, and sporopollenin, making it resistant to decomposition. Pollen grains are transferred by wind, water, insects, butterflies, etc., for better propagation.
They get attached to most surfaces and are deeply embedded in clothing. Hence, even washing clothes with detergents cannot remove all pollen grains attached. The first case where the pollen was used to solve the case was in Austria in 1959. In this case, a man had gone missing, and the police arrested a suspect who had a motive to kill the man, but they

had no evidence to prove so. On searching the suspect's belongings, they found a pair of muddy boots. The mud sample was given to palynologist Wilhelm Klaus for analysis.
The result showed that it contains a variety of species of pollen grain which can be found only near a small area around Vienna. When these findings were briefed to the suspect, he willingly confessed all about the murder and led authorities to the site of both murder and body, which were exactly in the area pinpointed by Dr. Klaus.
Pollen collected from a person can match the scene of the crime, which suggests that the person might have visited that particular area recently, but it doesn't mean they have committed the crime.
Images of pollen grains can be obtained by three methods, namely:
1. Transmitted-light microscopy (TLM),
2. Widefield fluorescent method, and
3. Structured illumination (Apotome) method.
These methods are semi-automated traditional methods that are used to detect pollen grains.

APPLICATIONS OF PALYNOLOGY
Pollen grain provides a link between the victim, suspect, and crime scene. Pollen grains can help in reconstructing the crime, understanding the modus operandi, and identifying the molecular level using DNA (Deoxyribonucleic acid) typing. It can determine primary and secondary crime scenes. It will determine the movement history of materials, including drugs. It will give information on the geographic condition of the pollen grain.

COLLECTION

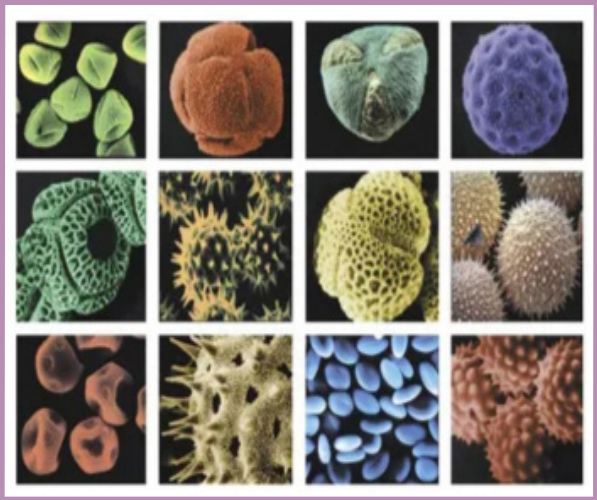
It is important to follow a simple method to collect pollen grains from clothes. The adhesive tape method is most suitable for recovering pollen from clothes. It is simpler, faster, and less expensive than other methods.

A pollen fingerprint is the number and type of pollen grains found in a geographic area at a specific time of the year.

Low temperature decreases the rate of cell growth. Hence, pollen grains are preserved in liquid nitrogen at -196^{o}C. This is known as cryopreservation.

EXAMINATION

Structures of exine, the polar and equatorial shape, size, dispersal form, and other morphology of pollen are examined, and conclusions are made.



https://www.vcbio.science.ru.nl/en/virtuallessons/pollenmorphology/

POLLEN PRESERVED AS FOSSILS

The exine of a pollen grain is constituted by sporopollenin, which is found to be one of the most resistant organic materials. Organic compounds such as long-chain fatty acids, phenylpropanoids, phenolics, and traces of carotenoids are

chemically cross-linked to give sporopollenin its rigid structure. This rigid structure can withstand high temperatures and strong alkalis and protect the pollen grain under harsh conditions. This leads to resistance against microbial and chemical decomposition, which is why pollen grains are well preserved during fossilisation.

With time, some pollen grains fall into lakes, where it gets accumulated with other sediments forming layers with each passing year. Due to a lack of oxygen (which is required for decomposition) in the lake sediments, the pollen grain remains as is. If the land remains wet, the pollen grains will perdure for millions of years.

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FORENSIC RADIOLOGY IN POST-MORTEM INVESTIGATION

Ms. Rainelle R. Dennesen

A post-mortem (autopsy) examination, carried out on the body of a deceased person - conducted in cases of suspicious/unnatural deaths or MLCs (Medico-Legal Cases), is performed by doctors specialized in Forensic Medicine. It is conducted systematically and aids in:

- Determining decedent's identity
- Determining mechanism of death
- Determining medical history
- Correlating wounding and object producing the wounds
- Determining the time interval between wounds received and death
- Establishing the sequence of events
- Retrieving evidence and article(s) involved in death
- Obtaining specimens for toxicology and other relevant information

The conventional method of examination is carried out within 2-3 working days following death. There is no fixed time as to how long it will take. The full postmortem examination can be described in the following stages:

1. Receiving a request letter
2. Identification
3. External examination

4. Internal examination (inspection of internal organs of the body)
5. Special examinations/tests
6. An account of the findings

Modern imaging techniques are of increasing importance in post-mortem investigations due to multiple advantages; data can be stored digitally and accessed at any time; 3D images can be reconstructed and can explain complex cases to non-forensic persons. However, the limitations of the same depend on the technique employed.

Plain X-Rays

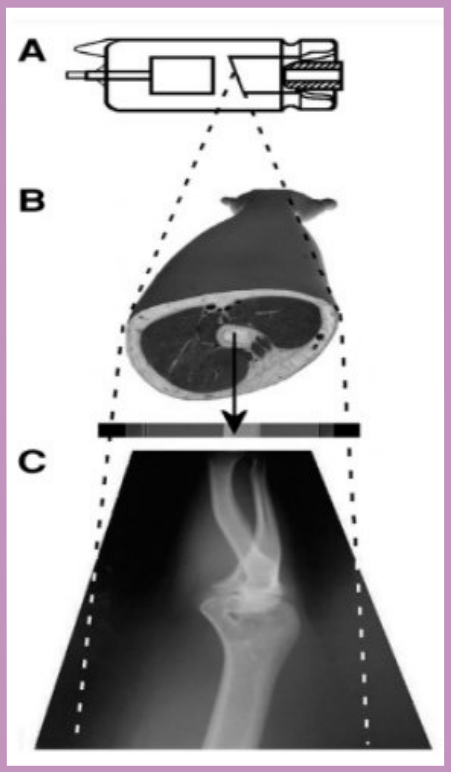

Fig. 1. Schematic diagram of a roentgenogram; the X-ray beam is produced by the cathode (A), focused through the tissue in question allowing differing densities of the tissue to produce a greyscale mosaic (B) When the plate is fully exposed, creates the roentgenogram, or "plain X-ray" (C). Photo via Forensic Pathology Reviews, Vol. 4.

The application of radiology in cases of medicolegal interest originated with Wilhelm Roentgen's discovery of X-rays (1895). The radiological assessment of the body is produced by collimated X-ray beams (possessing wavelength in the range of 10–8m) focusing on the anatomical region in question, creating an image through the reaction between the beam and silver emulsion present on a photographic plate.

The reduced silver particles produce black areas (radiolucency), and the inability to penetrate tissues results in the absence of reduction and hence, a white (radiopaque) area. The result is a greyscale mosaic (the roentgenogram image) known commonly, although incorrectly, as an "X-ray" (Fig. 1). Plain X-rays have been used for the purpose of identification, determining the cause of death, evidence of non-accidental injury, and locating foreign objects. Another advantage includes the ability to produce multiple copies. A major disadvantage is that the image is 2D.

Fluoroscopy

Fluoroscopy is a mobile, rapid means of examining bodies, offering real-time examination. The units produce a continuous, low-power X-ray beam focused on the region in question, employed during cadaver examination, bone trauma, metal projectiles, fragments, etc. The fluoroscopic fields of view are however, narrow, have low resolution, and don't have the ability to create "copies".

Angiography

Angiography is a technique used to visualize the lumen of blood vessels and organs (with a particular interest in arteries, veins, and the heart chambers), done by injecting a radiopaque agent into blood vessels and imaging it using X-ray based techniques. However, images are difficult to interpret and may not provide any information that cannot be gleaned through CT (Computed Tomography)/MRI (Magnetic Resonance Imaging). The process is slow, time-consuming, and operator-dependent.

Ultrasonography

Like fluoroscopy, it allows real-time examination through the production of sound waves within the ultrasound range (3.5-7 MHz). When the wave contacts an interface between tissues of differing densities, the wave is reflected, refracted, or absorbed, received through a probe unit and processed to form an image. Although user-safe, portable, and inexpensive, the technique has only been applied in research and is superseded by MRI. It occasionally plays a role in forensic pathology.

Computed Tomography

CT was developed in 1972 as a means of radiologically producing thin transverse sectional images through a body. It requires a collimated X-ray beam to be passed and detected using a circular array of photomultiplier tubes. The narrower the scan diameters, the more accurate the image. The result is a rapidly-produced full body scan image (Fig 2). The disadvantages include radiological exposure risk, cost, and digital image streaking caused by the presence of metal in the body.

Fig.2.Scanograms -
rapidly produced body scan of large anatomical regions, produced through by the computed tomography scanner Photo via Forensic Pathology Reviews, Vol. 4

Magnetic Resonance Imaging (MRI Scan)

Developed in 1980 by P. Lauterbur and P. Mansfield, MRI utilizes the natural, rotational behavior of H+ ions and employs the application of two strong, perpendicular, external magnetic fields. The changes in frequency are detected, producing a magnetic resonance signal, forming the basis of the image.

The technique holds no radiation exposure risk, although it must be certain that the body examined does not contain metal. The degree of image resolution provided is excellent.

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A NEW DIMENSION IN FORENSICS

Ms. Blessy John Kaalla

3D printing or additive manufacturing is a method for creating a three-dimensional object layer-by-layer using a computer-created design.
The application of 3D printing in the field of medicine and dentistry has skyrocketed in recent years because of its ability to produce highly realistic physical 3D Structures of the computer- aided design model.

How does a 3D printer work?

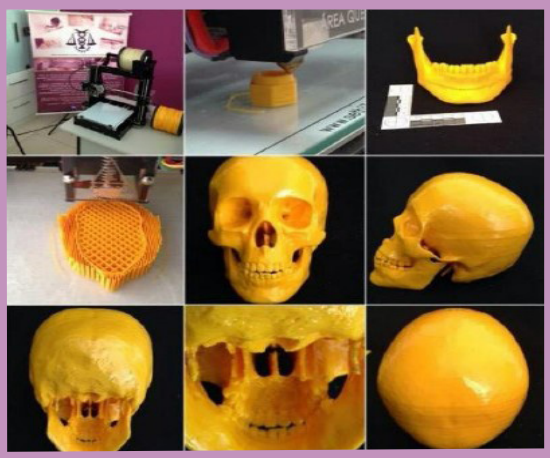
MODELING: Digital imaging and communications in medicine images are used to create 3D printed models using different modeling softwares. 3D printers accept standard tessellation language file format that defines surfaces like a collection of triangles that fits together like a puzzle. We can design our model by using basic shapes and structures. The additive manufacturing file format is a newer format approved by ASTM(American Society for Testing and Materials) International to incorporate surface texture color and material properties.

SLICING: The 3D printing software scans and slices the model so that the printer understands the shape and how to print it.
The filament is the material that the models are printed from such as plastics, metals and ceramic.

The printer has a printing plate that moves up and down. The print head that moves in any direction has a heating element when the filament is fed, it melts and draws the first slice outline and then fills it in. Layers are deposited to generate the 3D model.
The quality of 3D printers depends on the technology. Stereolithography was considered to be the most accurate as it provides better resolution by utilizing a scanning laser to fuse fine powder material generating a layer-by-layer structure, and the light-sensitive polymer is cured and hardened in a UV oven.

APPLICATIONS:

1. DOCUMENTATION
Human remains offer conclusive proof in the area of forensics, the documentation is mostly done in the form of photographs and electronic copies owing to legal and ethical problems. 3D printing of human remains can convey important details to the court and jury.

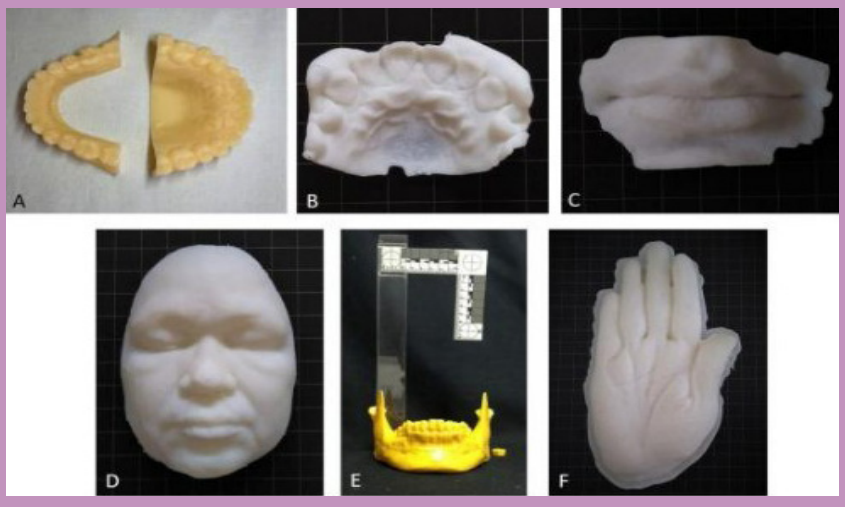


3D Printed models of mandible and skull for documentation
Credits:https://ars.els-cdn.com/content/image/1-s2.0-S2666964121000011-gr1.jpg

It can be transported for consultation without transporting the remains. During a virtual autopsy, files are acquired in DICOM(Digital Imaging and Communications in Medicine) files and 3D models in their hands, and forensic experts can revisit the case without exhumation. Printed models may soon be a part of ante-mortem for comparative human identification.

2. HUMAN IDENTIFICATION

An accurate model of the maxilla and mandible dentition may be useful in age estimation and sex determination. A 3D model obtained from postmortem computed tomography helps to minimize difficulties in traditional autopsies such as examination due to rigor mortis or lack of proper visualization. 3D models of skull, sinuses, face, fingerprints, lip prints ,and palatal aid in identification and can serve as evidence in the future.

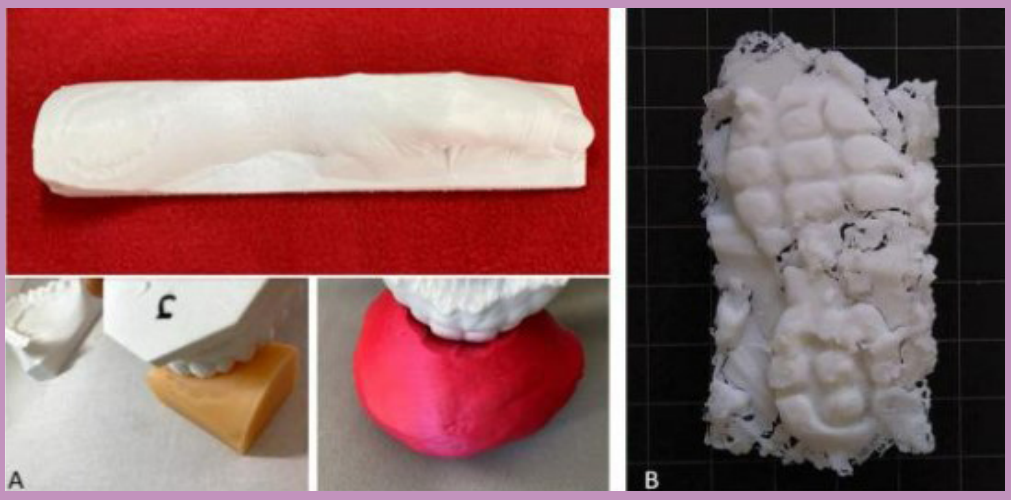


A) 3D printed upper and lower dentition for morphometric analysis, (B)3D printed rugae (C) 3D printed lips for coloscopy (D)3D printed face for future referral (E) 3D printed mandible (F) 3D printed Palm.

Credits:https://ars.els-cdn.com/content/image/1-s2.0-S2666964121000011-gr2.jpg

3. BITEMARKS AND PATTERN ANALYSIS

Bite marks analysis is evaluated on a comparative basis in which morphological features of dentition and bite marks are matched. 3D printing enables storage of alleged suspect dentition which can be used for future analysis by retrieving it. Bite marks might be scanned from the skin, foodstuff ,and objects enabling 3D or printed comparisons. Impression evidence recovery like tire, footwear impression, tool mark analysis 3D model can be scaled up and printed to aid in the investigation and can be used for courtroom presentation.



(A) 3D printed bite-mark on hand(top) analysis of bite-mark(bottom)

(B) 3D printed footwear pattern impression.

Credits:https://ars.els-cdn.com/content/image/1-s2.0-S2666964121000011-gr4.jpg

4. FACIAL RECONSTRUCTION

A method of recreating an individual's face from skeletal remains by utilizing tissue markers. Printing skulls from computed tomography enables reconstruction of the face without damage to the original skull of anthropological or archaeological value.

5. BALLISTIC RECONSTRUCTION

Fired bullets can be scanned and 3D printed. They can be compared to check for deformation. Bullet trajectories can be generated using digital imaging techniques, which can be printed for presenting as evidence and demonstrating a case scenario.

3D printed bullets unfired bullets and fired and deformed bullets(left right)
credits:https://ars.els-cdn.com/content/image/1-s2.0-S2666964121000011-gr5.jpg

6. DISASTER VICTIM IDENTIFICATION

CT(Computed Tomography) scan of severely charred remains of maxillary and mandibular teeth can be used for identification in disaster victim identification. 3D scanning of the remains will facilitate the handling and analysis of burnt remains and court presentation.

7. CRIME AND ACCIDENT SCENE RECONSTRUCTION

3D printing of various vehicle models in case of accident reconstruction can aid in demonstrating the relationship between the collided vehicles.

ADVANTAGES:

1. Visual representation of anatomy in court.
2. 3D printed evidence can be revisited and re-evaluated in case of decomposition, burial ,or destruction of original evidence.
3. Better visualization

DISADVANTAGES:

1. The accuracy of 3D prints leads to issues of admissibility in court.
2. Easily accessible as it can be shared, downloaded, modified ,and printed.
3. Typical characteristics cannot be replicated.

CONCLUSION:

3D Printing allows for better visualization, interpretation ,and understanding. It is a humanitarian approach as the evidence is reconstructed without touching or damaging the evidence.3D printing technology in India is still in the initial stages but newer methods can transform its application in the field of forensics.

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LITERATURE REVIEW

- Prostitution is a “profession”: recommendations and directions by the supreme court
- The relation between gunshot residue particle size and boltzmann distribution

PROSTITUTION IS A "PROFESSION": RECOMMENDATIONS AND DIRECTIONS BY THE SUPREME COURT

Ms. Swetha Ann Mathew

Prostitution, the oldest profession in the world, was never an unfamiliar concept to the Indians. Questions regarding dignity, poverty, rights, diseases, and unemployment have always been prevalent in the area. It's been more than a decade since the first time the apex court set out to improve the lives of sex workers after the case of Budhadev Karmaskar v State of West Bengal, 2011.

"Sex workers are entitled to equal protection of the law. Criminal law must apply equally in all cases on the basis of age and consent. When it is clear that the sex worker is an adult and is participating with consent, the police must refrain from interfering or taking any criminal action. It

need not be gainsaid that notwithstanding the profession, every individual in this country has the right to a dignified life under Article 21 of the Constitution," quoted the three-bench judge consisting of L Nageswara Rao, BR Gavai, and AS Bopanna. Hence on the 19th of May, 2022 the Supreme court recognised sex work as a "profession" and issued commendable guidelines to give these sex workers equal protection under the law.

So, what is this profusion of processes ordered by the supreme court to uplift these women?

https://www.nbcnews.com/think/opinion/end-sex-trafficking-stop-arresting-sex-workers-ncna869156

- Firstly, the supreme court suggested that; A sex worker, who is a victim of sexual assault should be treated the way any sexual assault victim is treated, in accordance with Section 357C of CrPC (Criminal Procedure Code).
- The court also suggested that children of sex workers should not be forcibly separated from their mothers merely on the basis that she's engaged in the sex trade. A test could be conducted to prove the parentage of the minor before making stigmatised assumptions.

- Since “voluntary sex work is not illegal [Immoral Traffic (Prevention) Act,1956] and only running the brothel is unlawful”, sex workers should not be arrested, penalised, harassed, or victimised during police raids on a brothel.
- The fourth suggestion pertained to involve sex workers or their representatives while formulating policies for them. The central and state governments have to ensure the involvement of these workers in the decision-making panel.
- Furthermore, it also suggested employing the Legal Services Authority to conduct workshops to educate the sex workers about their rights, obligations to the police, and their access to the judicial system.
- The directions endorsed by the court to the law enforcement agencies require them to be sensitised to the right of sex workers.
- The police should not verbally or physically abuse sex workers. The basic protection of human decency and dignity will extend to sex workers and their children. They will not be deprived of their right to live a dignified life.
- Also, measures that a sex worker employs for their health and safety must neither br construed as an offence or as evidence of commission of that offence.
- Another direction was aimed at the Press Council of India stating that “utmost care should be taken to not reveal the identities of sex workers, during arrest, raid and rescue operations, whether as victims or accused and not publish or telecast any photo that would result in disclosure of such identities”, failing at which will

be punishable under Section 354C of IPC (Indian Penal Code).

The apex court also added that the orders so passed [under article 142 of the constitution] would hold the field until the time the Union Government comes up with a legislation. The union govt. is expected to give its response to these recommendations at the next hearing, dated 27th of July 2022.

This decision by the Supreme Court is truly historic indeed. Even though the aspect of 'legal sex work' has been in ambiguity, examples of countries like Germany, Netherlands, France, Greece that have legalised the profession gives us hope that one day, India too will have better living conditions for sex workers. Implementing and enforcing the laws will help us get past the brunt stigma and discrimination long cemented with the profession of prostitution.

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THE RELATION BETWEEN GUNSHOT RESIDUE PARTICLE SIZE AND BOLTZMANN DISTRIBUTION

Ms. Akshara B

Gunshot residue (GSR) is also commonly known as cartridge discharge residue (CDR) or gunfire residue (GFR) or firearm discharge residue (FDR). GSR is an important form of trace evidence that would pave the way for investigation. GSR is found in solid, liquid, or gaseous state under high exothermic reactions due to high temperature and pressure and is any mixture of burnt and unburnt materials that originate from a firing gun and get deposited on the hands, or clothes of the person who discharges the firearm. The residue can include substances from primer, projectile, cartridge cases, etc. Gunshot residue can travel over 3-5 feet (0.9-1.5m).

GSR analysis is majorly done to determine whether a firearm has been used. Determination of the structural distribution of GSR would help in its analysis. Primer particles contain lead (Pb), barium (Ba), and antimony (Sb) and hence they are analyzed by using sodium rhodizonate test scanning electron microscopy with energy dispersive x-ray detection. According to various studies, it is found that GSR consists of spherical particles as a result of random distribution. But under this study, it describes GSR

particles based on a specific distribution function. The Boltzmann distribution function is the most basic and probable principle, the dimensional size distribution of GSR particles was analyzed according to this principle.

METHOD USED AND ANALYSIS

Sarsilmaz Kilinc (9mm)2000 mega-brand semiautomatic pistol was used for test firing, with full metal jacket cartridges that were produced by a 9 mm x 19 mm Parabellum-type MKE, Geco, S&B, WIN, and LIBRA. The samples were collected from the shooter's right hand (especially from regions of the thumb and index finger) with the help of double-sided adhesive tape glued to aluminum stubs. Before each shot, the weapon barrel was cleaned by mechanical cleaning or even in an ultrasonic bath of ethanol and deionized water before being dried with dry nitrogen gas. The collected GSRs were analyzed using the specified techniques.

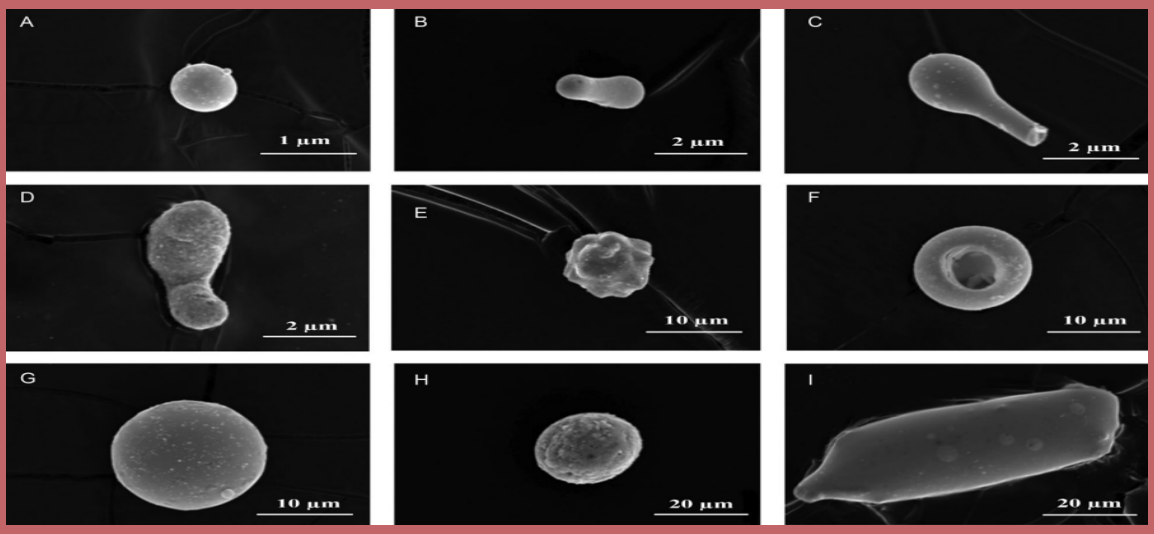

Figure 1. GSR particles of different sizes formed by fragmentation splitting and external factors.
https://www.tandfonline.com/doi/full/10.1080/20961790.2020.1713433

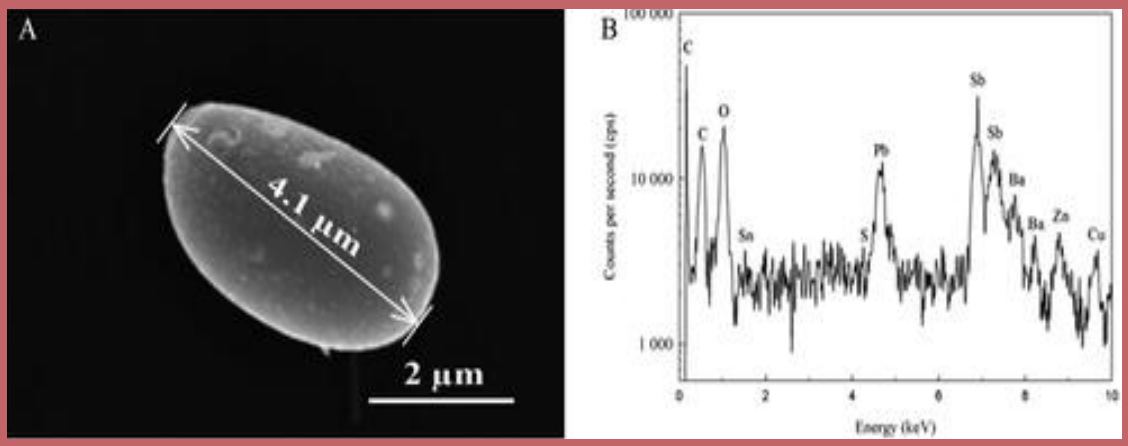

Figure 2 .GSR particle size measurement(A), EDS spectrum(B). https://www.tandfonline.com/doi/full/10.1080/20961790.2020.1713433

DIMENSIONAL ANALYSIS

The dimensional classes of GSR are obtained using the sizes (r_1) of the primary particles of the GSR and the total number of particles (m_1). The density of the primary class can be determined from r_k = r_1 based on basis of Enskog–Boltzmann's theory, the dimensional distribution ratio of the GSR particles depends on splitting–merging and external factors.

According to the study the size distribution of the dimensional classes was found to be similar to that of the inverse square method (Boltzmann distribution).

The results are based on:

- merging effect of adhesion forces.
- the effect of unbalanced forces split due to excess surface energy
- fragmentation because of external.

BOLTZMANN DISTRIBUTION

The basic equation for the number of molecules with variable velocities and energies is found in the Boltzmann

distribution. Gas molecules move at various velocities and in various directions for the model as it is based on kinetic molecular theory. The distance of each molecule to its starting point is proportional to the magnitude of the molecular velocity, and hence the molecule behaves isotropically.

If molecules are small then their velocity increases rapidly, therefore, the velocities of molecules at the same temperature are inversely proportional to the square root of molecular masses. The results experimentally prove Graham's law.

MATLAB COMPUTER PROGRAM

The result obtained through the experiment was transformed into data that are converted as model curves. The data in the intervals showed behavior that conformed to the inverse square method (Boltzmann distribution).

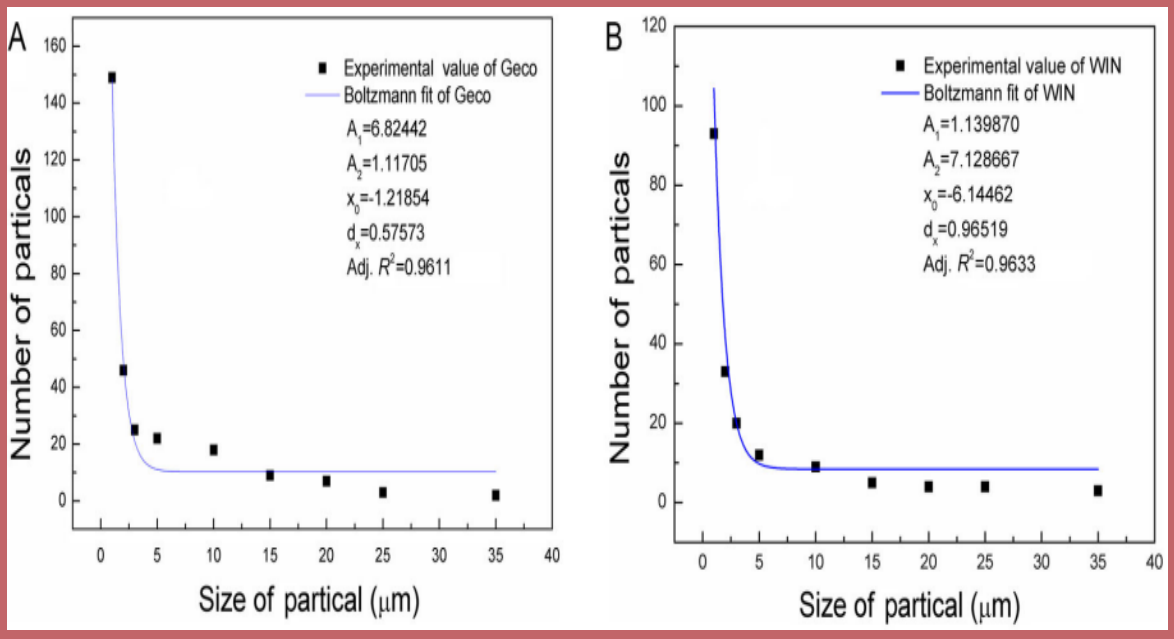

Figure 3. Fit curve of variation of GSR particle.
https://www.tandfonline.com/doi/full/10.1080/20961790.2020.1713433

CONCLUSION

This was an experimental study that gave a briefing about the quantitative analysis of particle size distribution properties of GSR. A GSR model was created strictly based on Boltzmann distribution. The data obtained through analysis in a simplified system were made into different groups. The particle size distribution was found to be consistent according to Boltzmann kinetic equation. The data created were analyzed using the MATLAB program wherein the results gave an overall outline for all GSR particles. If further improvements are made to this study, then that would help us to compare different brands and scales of ammunition.

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STATISTICAL DATA

- A study to identify the factors influencing suicide in different states of India
- Trend analysis of incidents involving drugs/narcotics as per NIBRS data

A STUDY TO IDENTIFY THE FACTORS INFLUENCING SUICIDE IN DIFFERENT STATES OF INDIA

Ms. Ashritha S M
Mr. Riki Leadingson Siangshai
Mr. Abhishek M Sasi

INTRODUCTION

Suicide is defined as a conscious try to harm oneself with a fatal result. This can be break-free attempted suicide during which a selected try to kill was made but was unsuccessful and self-harm, which could be a blanket term for self-inflicted non-fatal injury irrespective of the purpose.

The male-female ratio has remained constant at roughly 1.4 to 1. Suicide rates differ dramatically throughout the country. Every year, India loses around 100,000 individuals to suicide. Suicide rates have risen from 7.9 to 10.8 per 100,000 during the previous twenty years.

AIM AND OBJECTIVES OF THE STUDY

1. To determine the factors affecting females and males to commit suicide
2. To determine the factors affecting males to commit suicide
3. To determine the factors affecting females to commit suicide

METHODOLOGY

Web databases were searched for cases registered in Delhi,

Karnataka, and Maharashtra under section 309 of the Karnataka, and Maharashtra under section 309 of the Indian Penal code.

Cases during the period 2000 to 2021 were chosen. A total of 50 cases of attempts to suicide were studied per state.

Each factor behind the attempt of suicide was listed.

All the factors were studied in a tabulated form.

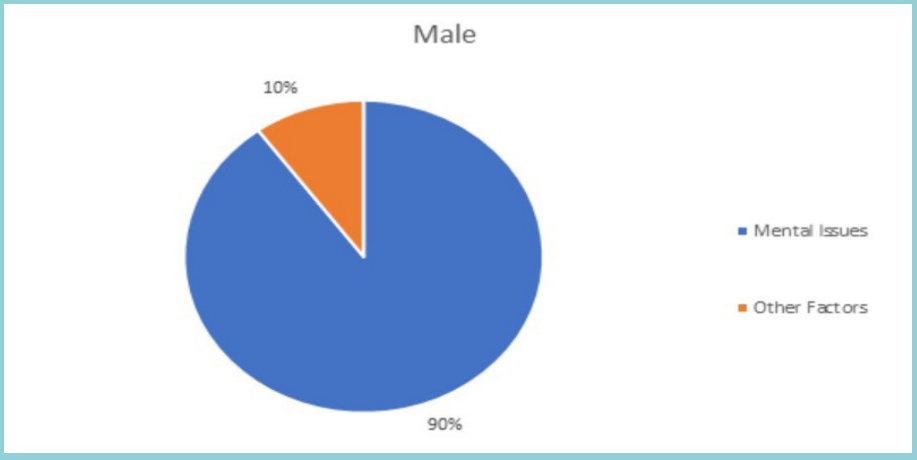
The cases were studied on the following basis:

- Gender
- Reason for attempting suicide
- Method of suicide attempted
- Material used for attempting suicide
- Factors affecting suicide
- The year the suicide was attempted

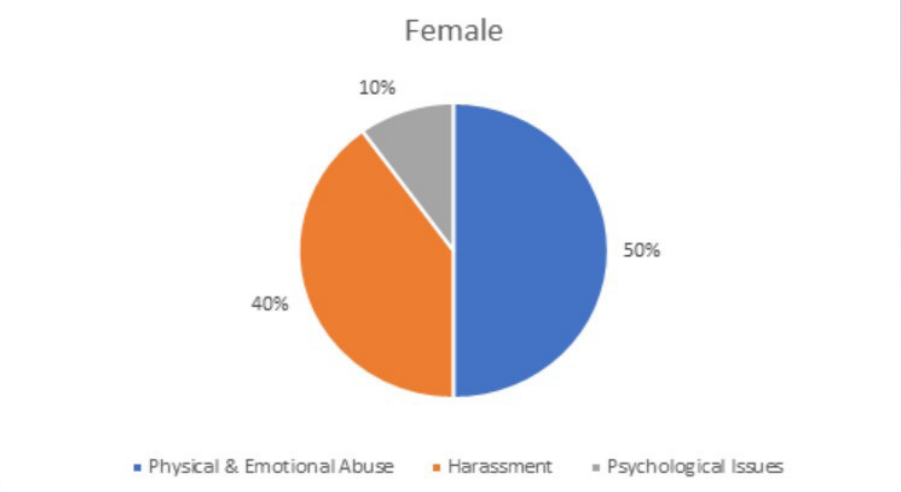
These details help us to understand the factors and which gender is more prone to attempt suicide.

FINDINGS FOR THE STATE OF DELHI

There were an equal number of male and female instances in Delhi. 90% of males attempted suicide for reasons such as mental problems, while 10% attempted suicide due to psychiatric disease and other factors such as fear of being prosecuted by the high court for theft, rape, and other crimes.

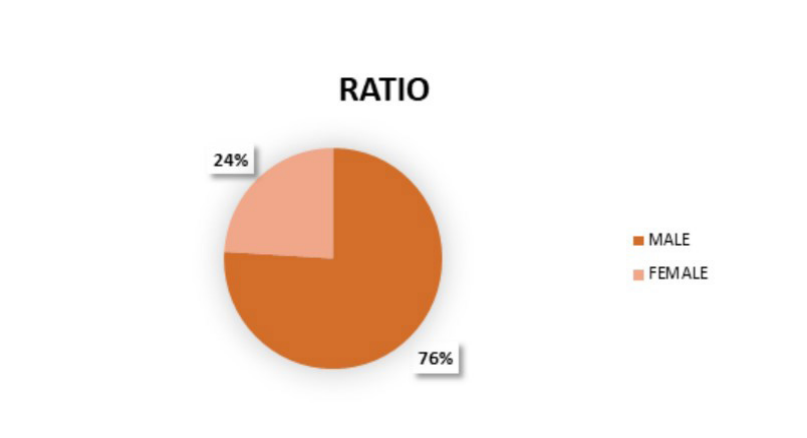


50% of females attempted suicide as a result of physical and emotional abuse from coworkers, landlords, etc. 40% attempted suicide due to harassment from spouses, in-laws, false accusations of extra-marital affairs, etc., and 10% were due to psychological issues and exam stress.

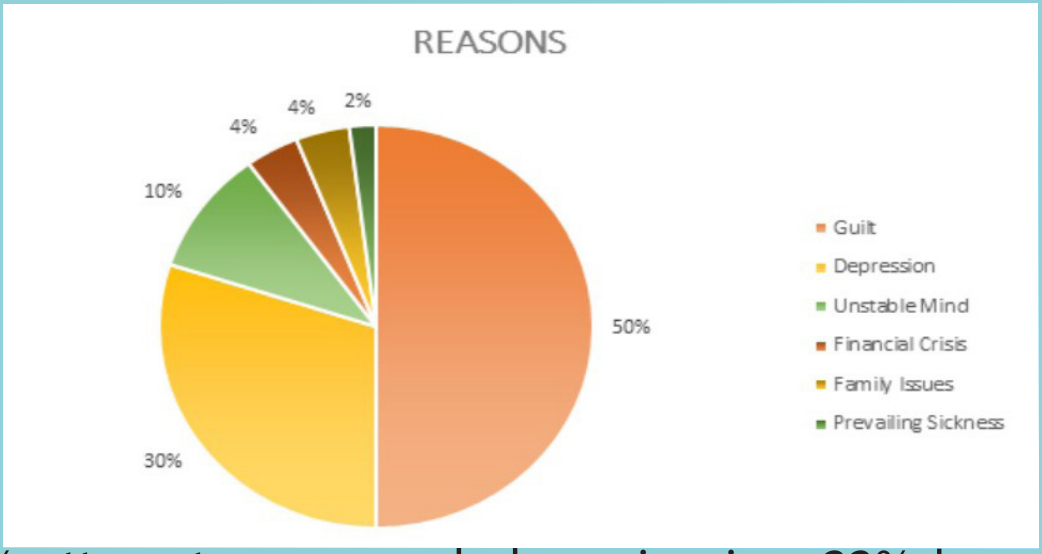


3% attempted suicide by slitting the neck and wrist with a knife, 1% attempted suicide by jumping into ricer, 10% by overdosing on drugs, 7% by consuming poison, 3% by consuming phenyl, 5% by jumping on metro tracks, 6% by hanging, 9% by jumping from tall buildings, 6% by self-immolation, 2% by self-strangulation, and 1% by shooting using a firearm.16% of victims tried to commit suicide due to depression, 14% due to mental stress, 2% due to the work and new rules brought about by the government, 4% due to being sexually harassed, 1% due to psychiatric problems, 7% due to being mentally disturbed, 1% were in jail due to getting caught in crimes, 2% due to false accusations, and 1% due to having a break up with their spouse.

FINDINGS FOR THE STATE OF KARNATAKA
76% were males, and 24% were females.

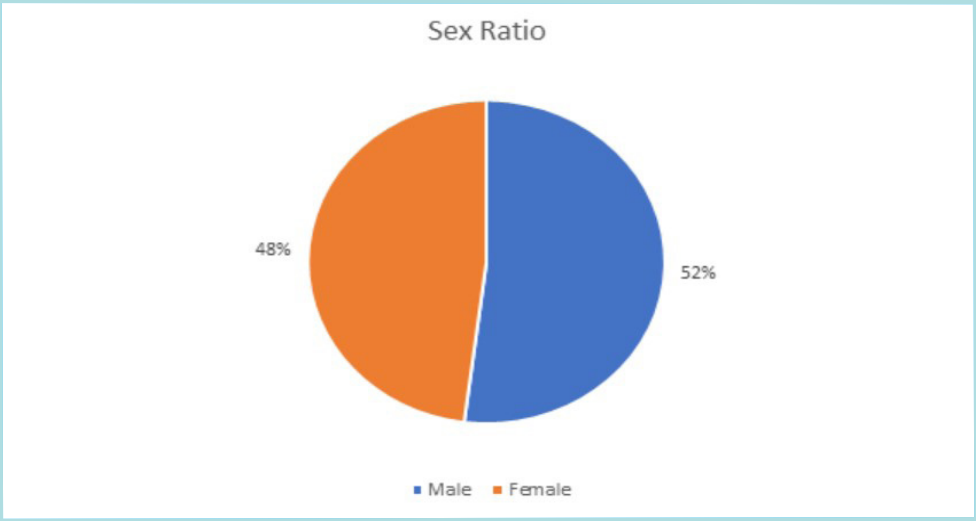


50% of victims attempted suicide due to guilt after the commission of a heinous crime, 30% were due to depression, 10% were due to an unstable mindset during the attempt, 4% due to financial crisis, 4% due to family issues, and 2% due to prevailing sickness.

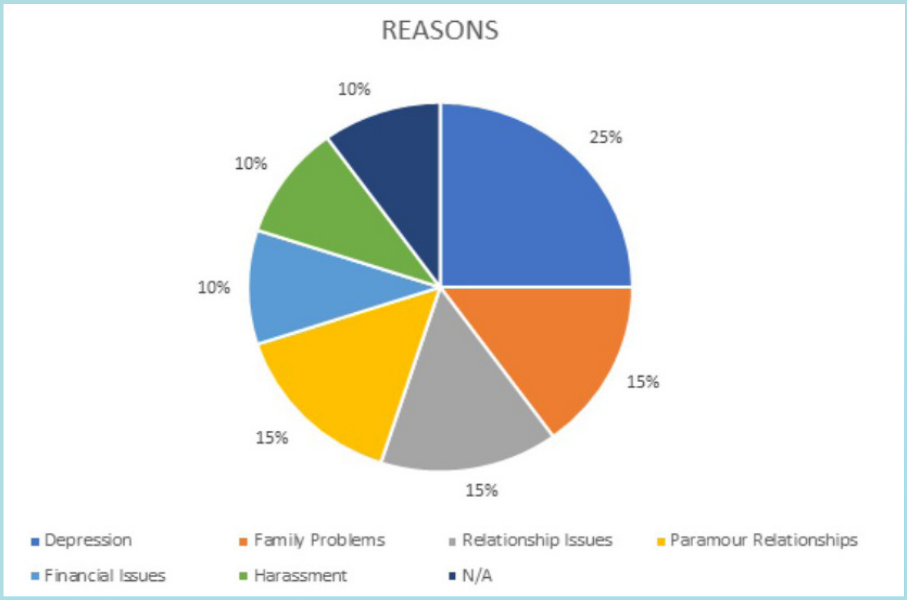


24% attempts were made by poisoning, 22% by self-stabbing, 18% by cutting wrist and neck, 14% by hanging, 8% by jumping into rivers, 8% by jumping in wells, 2% by self-injection of drugs, and 4% reason was unknown.

FINDINGS FOR THE STATE OF MAHARASHTRA
52% were males, and 48% were females.



25% were due to depression, 15% due to family problems, 15% due to relationship issues, 15% were due to paramour relationships, 10% were due to financial problems, 10% were due to harassment, and 10% reasons were not clearly stated.



41% of suicide attempts were committed by hanging, 32% by intoxication with drugs, 9% by jumping from tall buildings, 6% were by jumping in front of vehicles, 6% by cutting wrist or neck, and 6% were by unclear means.

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MYTH BUSTERS

Myth: For detection of blood in scene of crime, investigators use blue light.
Fact: Usually in television only the use of blue light is showcased. In fact luminol along with special lighting (Alternative light source) is required for the samples to get detected.

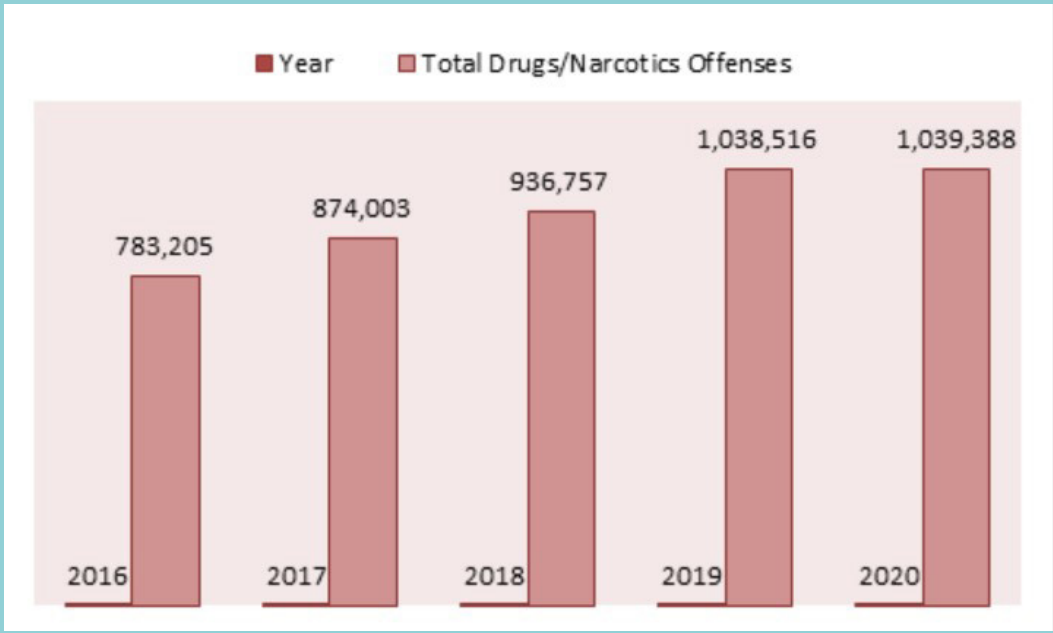
TREND ANALYSIS OF INCIDENTS INVOLVING DRUGS/NARCOTICS AS PER NIBRS DATA

Ms. Arsha Sahadevan

The National Incident-Based Reporting System (NIBRS) is a data collation system provided by the Federal Bureau of Investigation (FBI) to serve as a national crime database for the United States. It aims to report crime incidents while also looking into the context of such crimes to identify information like the day and time of the crime, the victim-offender relationships, and so forth. The data contained in NIBRS is a collective effort of the various law enforcement agencies placed across several states in the U.S. NIBRS works in pursuit of providing better-policing strategies, filling in gaps in existing data, and creating safer communities. It is a part of the FBI's Uniform Crime Reporting (UCR) program. NIBRS issues the report annually. A broad classification of the crimes reported includes crimes against persons, crimes against property, and crimes against society.

Following are the statistics concerning incidents involving seized drugs/narcotics for the years 2016, 2017, 2018, 2019, and 2020 as per NIBRS reports:

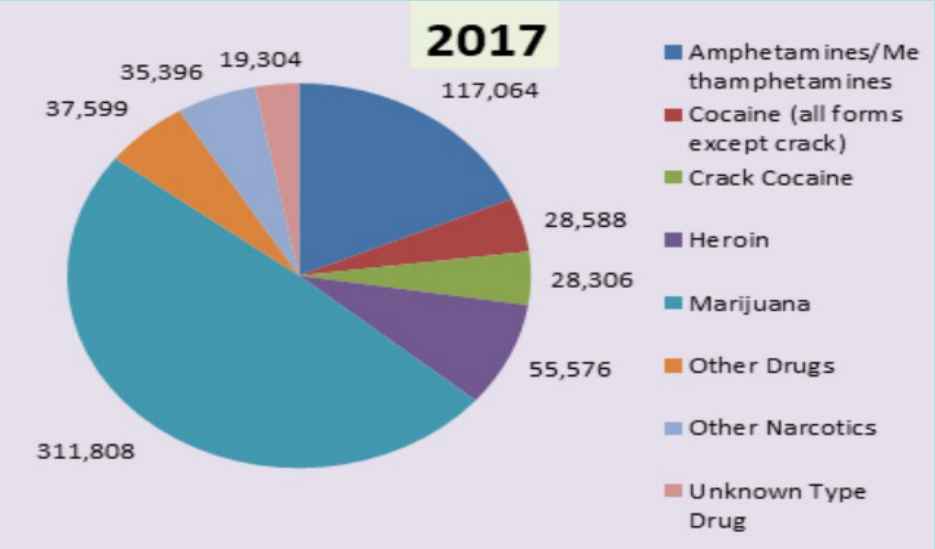
- In 2016, the total offenses concerning drugs/narcotics amounted to 783,205 cases. This count increased to 874,003 for the year 2017. A total of 936,757 cases were reported in the year 2018. The year 2019 saw an increase in the drug/narcotic offenses reported, with 1,038,516 being the total count. The recently published report for the year 2020 showed a total of 1,039,388 offenses concerning drugs/narcotics.



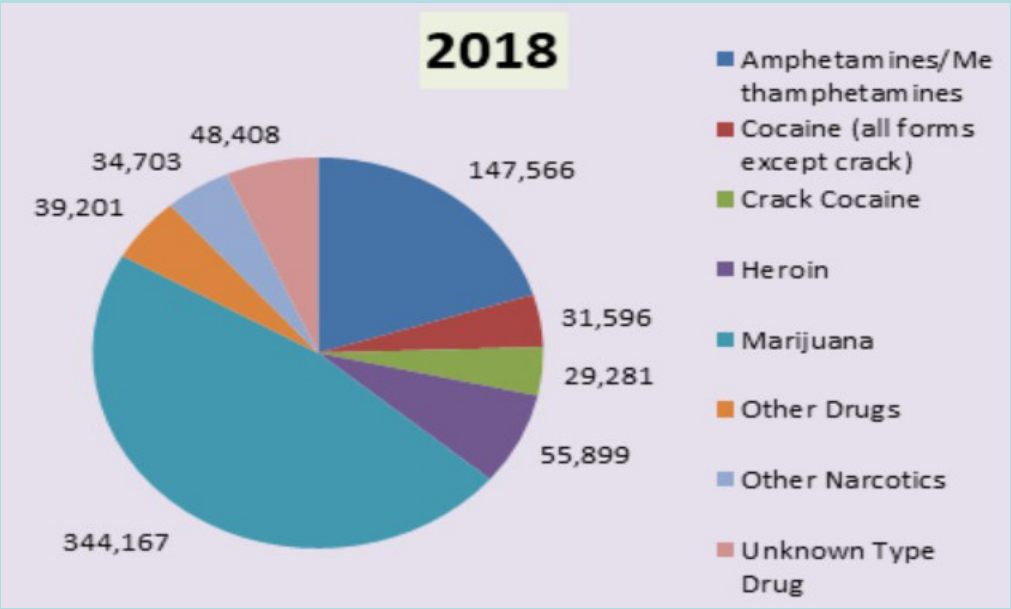
The above chart shows a constant increase in the total reported offenses throughout the five-year timeline.

The below series of pie charts depict the trends concerning the suspected drug type seized in the reported drug/narcotics cases.

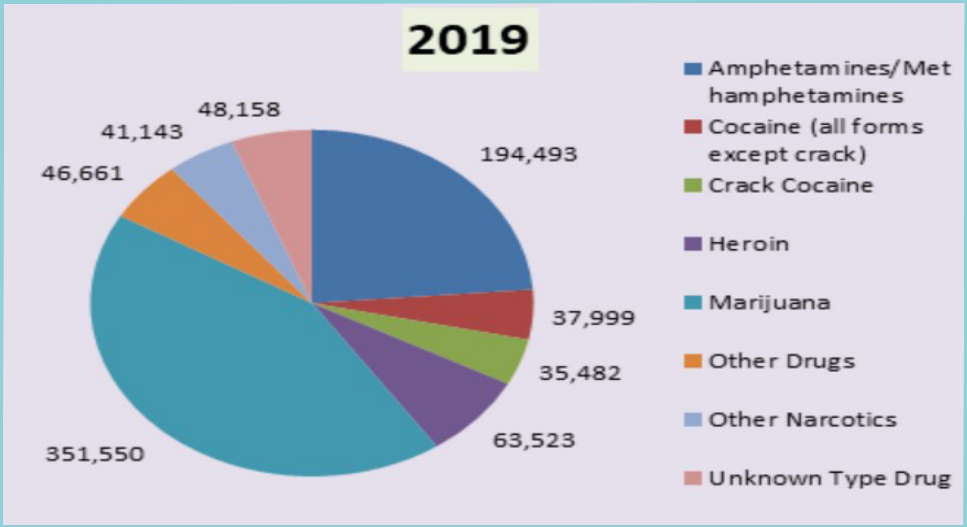
In 2017, out of the total 594,625 incidents involving drugs/narcotics seized by their suspected drug type, marijuana accounted for 311,808 cases. 117,064 cases involved amphetamines, 55,576 involved heroin, and 56,894 involved cocaine of different forms.



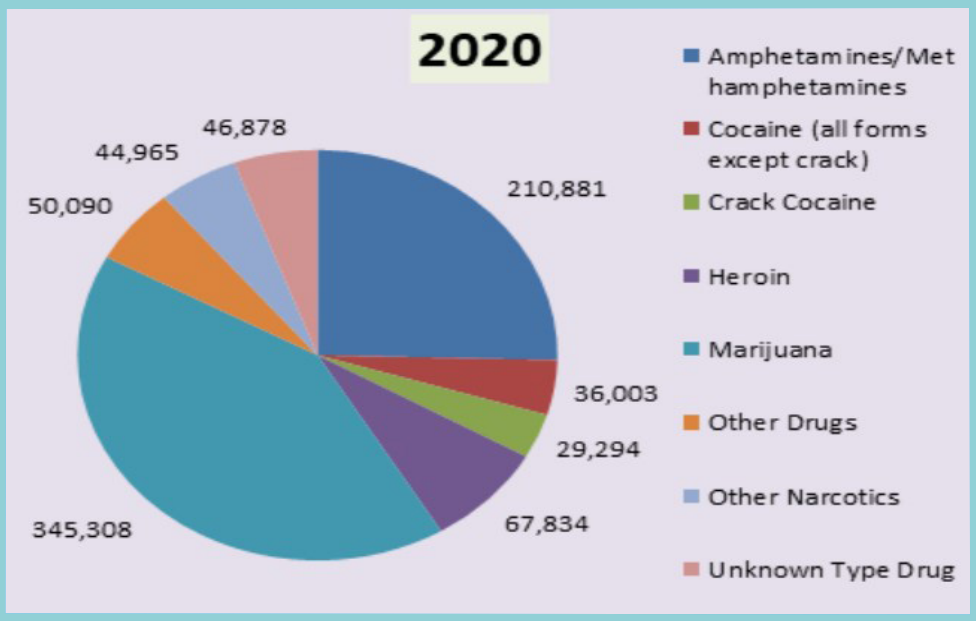
In 2018, there were 643,890 incidents involving seized drugs/narcotics. Among these, 344,167 cases involved marijuana, 147,566 involved amphetamines, 55,899 involved heroin, and 60,877 involved cocaine of different forms.



In 2019, there were 710,812 incidents involving seized drugs/narcotics, out of which 351,550 cases involved marijuana, 194,493 involved amphetamines, 63,523 involved heroin, and 73,481 involved cocaine of different forms.



The recent 2020 report showed a total of 708,513 incidents involving seized drugs/narcotics, out of which 345,308 cases involved marijuana, 210,881 involved amphetamines, 67,834 involved heroin, and 65,297 involved cocaine of different forms.



On analyzing the data regarding the suspected drug type seized in such cases involving drug/narcotics, a substantial increase in the number of unknown type drugs seized can be observed. This is indicative of the rise in the synthesis of New Psychoactive Substances (NPS) or designer drugs, as is commonly known.

Concerning the juvenile age group's involvement in drug/narcotic offenses, the following points were deduced:

- In 2016, juveniles (anyone below 18 years of age) accounted for 7.9% of the offenses involving drugs/narcotics, while adults accounted for the rest.
- In 2017, juveniles accounted for 7.6% of the reported offenses that involved drugs/narcotics.
- The year 2018 saw a marginal decrease in the involvement of juveniles in drugs/narcotics offenses, with the age group being accountable for 7.0% of the total offenses.
- In 2019, 6.83% of the offenses involved juveniles, and this reduced to 5.4% in 2020.
- As for the overall trend, there was a constant decline in the number of juvenile offenders in cases involving drugs/narcotics.

The above data is not an accurate measure of the crimes since, even now, many or few states do not provide a complete account of the cases being reported. The FBI is persistently working to increase the rate of reporting crimes, enabling them to provide valid and valuable data to law enforcement personnel.

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FACTS !

Hair roots can help identify gender? Hair found at a crime scene can be very helpful in terms of evidence, but only the hair root contains a person's DNA and that can help determine a person's gender.

WORD SEARCH

Ms. Supriya P V
Ms. Aditi S Pai
Ms. Natasha Jennifer Easu

Z	R	H	U	M	A	N	N	S	P	U	R	P	L	E	R
I	A	O	S	D	K	G	H	N	E	T	A	L	U	X	O
T	C	M	T	U	N	T	A	Y	L	O	R	B	M	P	H
C	X	I	D	C	H	A	R	R	E	D	Z	S	I	E	T
I	J	C	L	K	A	R	E	C	S	I	V	R	N	R	L
L	T	I	P	V	R	F	D	R	U	G	S	A	O	T	A
E	I	D	O	I	L	D	N	A	H	Y	K	L	X	O	S
D	N	E	T	R	E	T	R	O	L	D	U	P	L	P	K
S	X	P	Y	T	Y	G	N	R	I	Z	S	M	A	I	C
U	A	S	U	O	F	W	I	K	F	T	A	E	T	N	O
P	R	U	D	P	O	H	N	S	T	Q	N	X	E	I	R
R	H	F	A	S	B	P	A	G	B	T	S	E	N	O	O
O	T	O	J	Y	G	O	L	O	C	I	X	O	T	N	O
C	N	I	O	I	S	C	E	V	I	S	I	B	L	E	A
R	A	L	L	U	D	E	M	O	M	A	H	A	Z	A	R

Hidden Words

1. The essential facts that prove that a crime has been committed
2. Section 45 of Indian Evidence Act
3. Proof of procedures observed in revenue case
4. Bones are collected in containers containing _____
5. Virtual autopsy is also called _____
6. Ninhydrin reacts with amino acids present in the fingerprint residue to form a dye called _____
7. Detection and identification of presence of drugs and poisons in body fluids, tissues and organs comes under which branch of forensic science?
8. _____ are known handwriting samples used for comparison with questioned documents
9. Killing of one human being by another
10. Polyvinyl acetate is used to strengthen edges of _____ documents
11. Fingerprints that cannot be seen
12. Ratio of distance traveled by solute to distance traveled by solvent
13. Innermost layer of hair shaft
14. _____ refers to the internal organs of the abdominal, thoracic and pelvic cavities.
15. A bioweapon released in US in 2001

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