

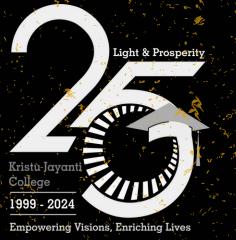


Kristu Jayanti College

AUTONOMOUS

Bengaluru

Reaccredited A++ Grade by NAAC | Affiliated to Bengaluru North University



DEPARTMENT OF FORENSIC SCIENCE

A Bi- Annual Publication



VERITAS

ISSN: 2583-7044 (Online)

Title: Veritas

Vol.3, Issue 2

MESSAGE FROM THE PRINCIPAL

Fr. Dr. Augustine George,
Principal



Forensic Science has become an inevitable discipline with its application being so vast. From solving crime to prevention of crime, Forensic Science has evolved into a discipline that requires patience, skills and scientific temperament. With the advent of technology like Touch DNA, 3D Crime Scene Scanners and advance spectral imaging, analysis of evidence has not only become quick but also very accurate.

This edition of Veritas highlights the remarkable achievements, activities and research conducted by the Department of Forensic Science at Kristu Jayanti College, Autonomous, Bangalore.

I would like to extend my heartfelt appreciation to the editorial team and all the contributors for their dedicated efforts in compiling this insightful newsletter. Their hard work and commitment have made this edition of Veritas a valuable resource for our academic community.

I encourage everyone to take the time to read through the newsletter and appreciate the dedication and passion that went into its creation. I am confident that it will inspire and motivate all of us to continue striving for excellence in the field of forensic science.

Congratulations to the faculty and students of the Department of Forensic Science on the successful release of the fifth edition of Veritas. I look forward to witnessing the continued growth and success of our department in the future.

MESSAGE FROM THE DEAN



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

I am delighted to extend my heartfelt congratulations to the Department of Forensic Science on the successful release of the Department newsletter, 'VERITAS'. This is a reflection of the hard work, dedication, and scholarly excellence that defines the department.

The compilation of insightful articles and cutting-edge research updates contributed by our talented students is truly commendable. It showcases not only the academic prowess of our students but also their commitment to advancing the field of forensic science. Your efforts to highlight the notable achievements of both the students and the department in the newsletter are greatly appreciated and serve to inspire the entire faculty.

I would like to especially acknowledge the editorial team, comprising both students and faculty members, whose collaborative efforts have resulted in the publication of this newsletter. Your diligence in curating and presenting the content deserves the highest praise.

Once again, congratulations to everyone involved in bringing this newsletter to life. I look forward to witnessing more of your exceptional work and continued contributions to the scientific community.

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Silver Jubilee of Kristu Jayanti College, Autonomous

From the Editors:



Amidst the bustling streets of Bengaluru, India, an educational institution has stood the test of time and left a lasting mark on the world of higher education. With a history of 25 years, Kristu Jayanti College is more than just an academic institution. It is a testament to the founding visionaries and the countless others who contributed to its growth.

Kristu Jayanti College was established in 1999 and is managed by the Bodhi Niketan Trust. It was founded by the members of the Carmelite Province of St. Joseph of Mary Immaculate (CMI), which is India's first indigenous religious congregation. This community is the epitome of the dreams and visions of the 19th century Indian educator and social reformer St. Kuriakose Chavara. The university started with 1 course, 9 students and 3 faculty members and has now grown rapidly to 10,000 students, 33 UG programmes, 17 PG programmes, and 3 PG diploma programmes. Over the years, Kristu Jayanti College has embarked on a journey of academic expansion. New courses and programmes are being introduced to meet the changing needs of a globalised world.



The institute's commitment to educational excellence has paid off, achieving consistently high rankings and accreditation from prestigious educational organisations. Carefully selected for their expertise and passion for teaching, our faculty has played an important role in shaping our academic community. The institute's commitment to research and innovation is evident in the numerous publications, patents, and projects undertaken by both faculty and students. The physical infrastructure of Kristu Jayanti College has developed in parallel with its academic activities. State-of-the-art classrooms, well-equipped laboratories, and modern recreational facilities have transformed the campus into a vibrant centre of learning and collaboration. In addition, the institute's eco-friendly initiatives and green spaces on campus reflects its commitment to environmental sustainability.

Beyond academic education, Kristu Jayanti College has nurtured an environment of vibrant cultural and extra-curricular activities. Annual festivals, cultural events, and sporting competitions are an integral part of campus life, providing students with opportunities to showcase their talents and foster camaraderie. What distinguishes Kristu Jayanti College is its commitment to social responsibility. A variety of outreach programs, philanthropy, and partnerships with local organisations highlight the college's commitment to making a positive impact beyond the boundaries of our campus. Students are encouraged to actively participate in these initiatives and develop a sense of empathy and social responsibility.

The college is affiliated with Bengaluru North University and was reaccredited with the 'A++' grade by NAAC in 2021. It has been an independent institution since 2013. "Light and Prosperity" is the institution's vision; its mission is to provide educational opportunities to all ambitious young people, enabling them to excel in all aspects of life. Kristu Jayanti College, celebrating its 25th anniversary, stands as a beacon of educational excellence and a testament to the transformative power of education. The college's rich history is more than just a chronicle, it is a story of resilience, growth, and an unwavering

commitment to shaping the minds and characters of the next generation. Ever-evolving, Kristu Jayanti College continues to be a dynamic force in the world of education, poised for a future filled with new milestones and achievements.

CITY HIGHLIGHTS

Friday
September 15, 2023

Quick READ

Mr. Siva Prasad Nanduri Appointed As The CEO Of DTL

Diensten Tech Ltd. (DTL), a leading Techno Staffing Organisation dedicated to empowering businesses through technology-driven solutions, has announced the appointment of Mr. Siva Prasad Nanduri as its new CEO. At DTL, Mr. Nanduri will be primarily responsible for building, nurturing, and growing the company into India's largest publicly run IT staffing organization. With a distinguished career spanning over two decades in IT Recruitment and Sales at well-known organizations

Kristu Jayanti's Silver Jubilee Celebrations; A Journey Of Empowering Youth And Enriching Lives

Kristu Jayanti College marked a significant milestone as it kicked off its Silver Jubilee celebrations on Thursday, commemorating 25 years of academic excellence. The event witnessed the presence of esteemed guests, with Shri KJ George, Minister for Energy, Government of Karnataka, serving as the chief guest and Prof Niranjan Vanalli, Vice Chancellor of Bangalore North University, as the guest of honor. In his inaugural address, Shri KJ George emphasized the pivotal role that the youth of the country play in shaping its future. He stressed, Youth are the bright future of this country. The nation's hopes and responsibilities rest upon



their shoulders. Shri KJ George also encouraged students to take a stand against corruption and highlighted the importance of respecting all forms of labor, from pourakarmikas to teachers. Furthering his commitment to societal progress, Shri KJ George emphasized the significance of women's empowerment. He proposed providing free bus passes to women, recognizing that nearly 50 percent of the population comprises women, and enhancing their access to essential services would empower them in their roles. Turning the spotlight onto Kristu Jayanti College, Prof Niranjan Vanalli, Vice Chancellor of Bangalore North University, commended the institution for its exceptional dedication to providing quality education to the younger generation.

He noted that the college's excellence in academics had been instrumental in achieving the remarkable milestone of 25 years, attributing this success to the vision and commitment of the CMI fathers towards society. In his presidential address, Fr. Dr Abraham Vettiyankal, Provincial of CMI Congregation, St Joseph Province Kottayam, reflected on the humble beginnings of Kristu Jayanti College and the overarching vision of the CMI St Joseph Province Kottayam.

Keng For R

Transport Minister Lingaraju at Thursday's long-awaited launch of the KMB Urban Bus Service. The service, which was initially planned for January, will now commence on December 1. The minister expressed his satisfaction with the smooth launch and the availability of buses across the city. He also mentioned that the service will be extended to other areas in the future.

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DEPARTMENT ACTIVITIES



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BOOKMARK MAKING COMPETITION

REPORT ON BOOKMARK MAKING COMPETITION

REPORT ON EXPERT LECTURE

TITLE: SECURITY AND RISK MANAGEMENT

ANTI-RAGGING WEEK

REPORT ON ANTI-RAGGING WEEK CELEBRATION

REPORT ON INTERNATIONAL EXPERT LECTURE SERIES

TITLE: APPLICATION OF VIBRATIONAL SPECTROSCOPY IN FORENSIC ANTHROPOLOGY

REPORT ON INTERNATIONAL EXPERT LECTURE SERIES

TITLE: PARADIGM SHIFT IN ANTIDOPING ANALYSIS

REPORT ON INTERNATIONAL EXPERT LECTURE SERIES

TITLE: NEW PROTOCOLS OF ALTERNATIVE LIGHT SOURCE FOR DETECTING LATENT BIOLOGICAL EVIDENCE ON ITEMS

REPORT ON WORKSHOP

TITLE: FTIR FOURIER TRANSFORM INFRARED SPECTROSCOPY

REPUBLIC DAY

REPORT ON COMMEMORATION OF 75 YEARS OF INDIAN REPUBLIC DAY.

REPORT ON WORKSHOP

TITLE: ARTIFICIAL INTELLIGENCE IN RESEARCH

REPORT ON ONE-DAY FDP ON FTIR/ATR HANDLING AND WORKING

TITLE: ONE DAY FACULTY DEVELOPMENT PROGRAMME ON FTIR/ATR HANDLING AND WORKING

REPORT ON ONE-DAY FDP ON FTIR/ATR HANDLING AND WORKING

Event: One day Faculty Development programme on FTIR/ATR Handling and
Working Venue: Research Unit, Science Deanery, Kristu Jayanti College
(Autonomous), Bengaluru

Time: 02:30 pm

Organized by: Department of Forensic Science, Kristu Jayanti College
(Autonomous), Bengaluru

Participants: Faculties of Sciences from the Department of Life Sciences,
Physical Sciences & Forensic Science.

On 20th of July, 2023, the Department of Forensic Science at Kristu Jayanti College (Autonomous), Bengaluru, organized a one-day workshop on "FTIR/ATR Handling and Working" for the teaching staff from the Departments of Life Sciences and Physical Sciences. The objective of the workshop was to familiarize the participants with the principles, techniques, and applications of Fourier Transform Infrared Spectroscopy (FTIR) with Attenuated Total Reflection (ATR) in various scientific fields.

The workshop commenced with a warm welcome of all the HODs, Coordinators and faculty members of the mentioned Departments by Mr. Don Caeiro, Coordinator, Dept. of Forensic science, who also then introduced the purpose of the workshop and emphasized the significance of FTIR/ATR in scientific research and forensic investigations. The session covered the basic principles of FTIR, including the interaction of infrared radiation with molecules, molecular vibrations, and the concept of wavenumbers. The participants gained a solid foundation in the fundamental concepts required to understand FTIR/ATR working principles.

The participants gained valuable insights into the theory, practical aspects, and diverse applications of FTIR/ATR in scientific research and forensic investigations. The hands-on sessions with the FTIR instrument provided them with the necessary skills to incorporate FTIR/ATR techniques into their teaching and research activities effectively. The Department of Forensic Science received positive feedback from the participants, expressing their gratitude for organizing such an informative workshop. The event successfully fostered interdisciplinary collaboration among the faculties of Life Sciences and Physical Sciences, paving the way for potential joint research projects and academic endeavors.

GEOTAGGED PHOTOS



REPORT ON BOOKMARK MAKING COMPETITION

Date: 14/08/2023 -16/08/2023

Classes Attended & Number of beneficiaries: 22 students of BSc Forensic Science

Objective: To instill the spirit of patriotism and pride among the students in commemoration of 76 years of Indian Independence.

Brief Write-up on the Programme:

The Department of Forensic Science at Kristu Jayanti College, Bangalore, celebrated the 76th anniversary of India's Independence Day by organizing a unique bookmark making competition. This competition aimed to commemorate India's struggle for freedom, foster a sense of patriotism, and engage BSc Forensic Science students in creative expressions of historical significance. The competition's theme revolved around "Indian Independence, Freedom Struggle, and Patriotism." This theme was carefully chosen to encourage participants to reflect on India's journey to freedom and to express their patriotic sentiments through art. BSc Forensic Science students from various semesters enthusiastically participated in the competition. The event garnered participation from 22 talented students who displayed their creativity and passion for history. Participants demonstrated their artistic skills by crafting bookmarks that depicted key moments from India's freedom struggle, iconic leaders, national symbols, and patriotic themes. Their creations were both visually appealing and thought-provoking. The bookmarks were judged and the best three bookmarks were awarded.



REPORT ON EXPERT LECTURE

Career Orientation Talk

TITLE: Security and Risk Management

Date: 26/08/2023

Details of participants: B.Sc. V Semester and M.Sc. III Semester Forensic Science students.

Resource Persons:

1. Mr. Paul Devassy, Head, Security, Australasia, Bangalore

Brief Summary of Expert Guest lecture

The department of forensic science, Kristu Jayanti College, Bangalore organized an career orientation expert lecture titled ‘Security and Risk Management’ on 26/08/2023. The resource person for this session was 1. Mr. Paul Devassy, Head, Security, Australasia, Bangalore. The session was conducted in Audi M3, third Floor Main Block.

The session enlightened the students on the career prospects in the field of security and risk management and auditing with the knowledge of forensic science. The resource person clearly explained the role of forensic graduates like the audience in the field of security. Providing life experiences and examples of the resource person’s career the student were enthralled on the positive side of the field of security and how they also can think of a career in this domain. The resource person further provided them the insights of building skills and expertise in every field to ensure that they survive in the field they choose.



REPORT ON ANTI-RAGGING WEEK CELEBRATION

Event: Anti-Ragging Awareness

Organized by: Department of Forensic Science, Kristu Jayanti College, Bengaluru

Date of Event: 17/08/2023

The Department of Forensic Science at Kristu Jayanti College, Bengaluru actively participated in the Anti-Ragging Week observance proposed by the University Grants Commission (UGC). The week-long event, taking place from August 12th to August 18th, 2023, aimed to create awareness about the significance of preventing ragging within educational institutions. As part of these efforts, the Department organized a series of engaging activities for the undergraduate students pursuing B.Sc. Forensic Science on August 17th, 2023. On August 17th, 2023, the Department of Forensic Science hosted a variety of activities in commemoration of Anti-Ragging Week. The events were designed to engage and educate students on the importance of maintaining a safe and respectful environment within the campus. To ensure maximum participation and streamline the registration process, a Google Form was distributed among the students prior to the event. The form allowed students to express their interest in one or more of the organized activities. The response was encouraging, with students showing eagerness to participate and contribute to the cause.

The activities included:

1. Slogan Making Competition:

A platform for students to creatively express their stance against ragging through impactful slogans. A total of 9 students enthusiastically participated, showcasing their artistic abilities and their commitment to the cause.

2. Essay Writing Competition:

An opportunity for students to voice their opinions and insights on the topic of ragging and its negative consequences. The essay writing competition saw the participation of 5 students who eloquently shared their thoughts on the subject.

3. Logo Designing Competition:

Encouraging students to design a visual representation that symbolizes the campaign against ragging. This competition attracted 5 talented participants who contributed innovative logo designs with powerful messages.

4. Poster-Making Competition:

The highlight of the event, the poster-making competition drew substantial interest, with 17 teams comprising of 3 members each. Participants were challenged to create captivating offline posters adhering to the theme of Anti-Ragging. The posters aimed to convey the message of maintaining a harmonious educational environment and the perils of ragging.

The culmination of the events was marked by an exhibition where the posters from the Poster-Making Competition were displayed and then external judges were invited to score the following posters prepared by the students. The exhibition facilitated the dissemination of the anti-ragging message to a wider audience and allowed students to appreciate the creativity and efforts of their peers.

The three best posters, which effectively conveyed the theme and message of Anti-Ragging, were selected and awarded, acknowledging the creativity, dedication, and commitment displayed by the teams.

The Department of Forensic Science's active involvement in the Anti-Ragging Week observance reflected its dedication to creating a safe and inclusive educational environment. By hosting a range of engaging activities, the Department successfully educated and engaged students in discussions about the negative impact of ragging. The participants' enthusiasm and the quality of their contributions demonstrated the success of the events in promoting awareness and fostering a culture of respect within the campus.

GEOTAGGED PHOTOS



REPORT ON INTERNATIONAL EXPERT LECTURE SERIES

TITLE: APPLICATION OF VIBRATIONAL SPECTROSCOPY IN FORENSIC ANTHROPOLOGY

Date: 19/08/2023

Details of participants: B.Sc. Third and Fifth semester Forensic Science students.

Resource Persons:

1. Mr. Calil Makhoul, PhD Scholar, University of Coimbra, Portugal

Brief Summary of Expert Guest lecture:

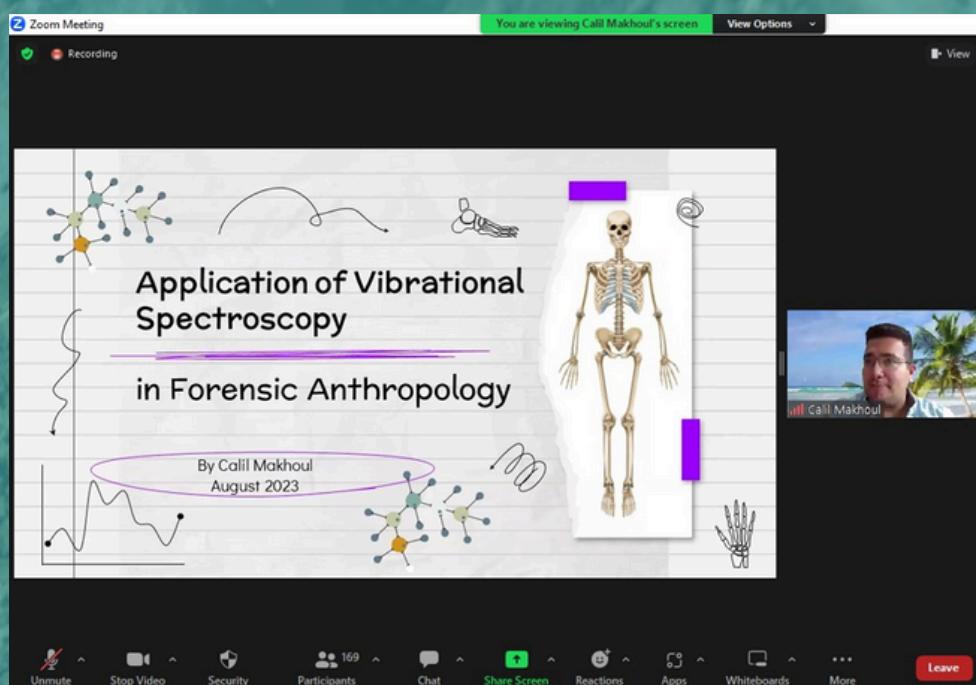
The Department of Forensic Science at Kristu Jayanti College organized a guest lecture on the topic "Application of Vibrational Spectroscopy in Forensic Anthropology" as part of its International Guest Lecture Series. The lecture was held on 19th August 2023 and featured Mr. Calil Makhoul, a distinguished PhD Scholar from the University of Coimbra, Portugal. The session was conducted online over the ZOOM platform.

The primary objective of the guest lecture was to acquaint students and faculty members with the cutting-edge applications of vibrational spectroscopy in the field of forensic anthropology. The lecture aimed to provide insights into how advanced scientific techniques are being employed to enhance the identification and analysis of human remains, contributing to the field's accuracy and efficiency.

Mr. Makhoul commenced the lecture by introducing the concept of vibrational spectroscopy. He elaborated on the principles of this analytical technique, emphasizing its ability to study molecular vibrations and elucidate the chemical composition of materials. The speaker delved into the innovative applications of vibrational spectroscopy in forensic anthropology.

He discussed how techniques such as Fourier-transform infrared spectroscopy (FTIR) and Raman spectroscopy can be employed to analyze bones, teeth, and other biological materials, aiding in the identification of human remains and the determination of postmortem interval. The lecture explored the potential future directions of research in this field. Mr. Makhoul discussed the ongoing efforts to develop portable and field-friendly spectroscopic devices that can be used by forensic anthropologists during crime scene investigations. The session concluded with the question and answer round.

Photos of the session



REPORT ON INTERNATIONAL EXPERT LECTURE SERIES

TITLE: PARADIGM SHIFT IN ANTIDOPING ANALYSIS

Date: 29th September 2023

Details of participants: MSc. Forensic Science students.

Resource Persons:

Dr. Shobha Ahi, Deputy Director, Drug Control Centre, Department of Analytical, Environmental and Forensic Sciences School of Cancer and Pharmaceutical Sciences, King's College, London

Brief Summary of Expert Guest lecture

On September 29, 2023, an enlightening international guest lecture was hosted via Zoom, focusing on the topic "Paradigm Shift in Antidoping Analysis." The distinguished speaker for this event was Dr. Shobha Ahi, the Deputy Director of the Drug Control Centre, King's College, London. Dr. Shobha Ahi's lecture covered various aspects of the paradigm shift occurring in antidoping analysis, focusing on advancements in technology, legal implications, and the impact on sporting communities worldwide. Some key highlights of the lecture include Technological Advancements in Antidoping Analysis and Biological Passports and Athlete Biological Passport (ABP). The lecture delved into the concept of biological passports and the ABP, outlining how these innovative tools are transforming antidoping strategies. Dr. Ahi emphasized their role in providing a longitudinal profile of an athlete's biological markers, enhancing the detection of doping practices over time. The lecture concluded with a discussion on the future directions of antidoping analysis using dried blood spots (DBS), emphasizing the need for ongoing research, international collaboration, and regulatory adjustments to address emerging challenges in the field. Following the lecture, there was an interactive Q&A session where participants had the opportunity to ask questions and seek clarifications on the topics discussed. This session facilitated a deeper understanding of the subject matter.

Screenshots of the session:

Effects of prohibited drugs

Stimulants
Stimulate and incite the central nervous system, relieve physical and psychological fatigue
Bromantan, Cocaine, Ephedrine etc.

Cannabinoids
Improve concentration of attention, and determination.
Used in team sports
Derivatives of cannabis sativa such as hashish

Peptide hormones and similar substances
Increase performance ability, accelerate metabolism, increase resilience and stress resistance
Insulins, Corticosteroids, Erythropoietin etc.

Diuretics
Regulate weight, reduce body liquid
Used as masking agents to conceal other doping substances taken
Furosemide etc.

Glucocorticosteroids
Have qualities similar to adrenocortical hormones, relieve inflammation
Prednisolone, triamcinolone, dexamethasone, hydrocortisone, etc.

Aromatase inhibitors
Increase one's own testosterone secretion
Prohibited in males only
clomiphene, cycloferol, tamoxifen

Narcotics
Affect the central nervous system, relieve pain and discomfort which could arise from muscle strain
Methadone, Morphine etc.

Beta-2 agonists
Slow down heart beat, reduce tremor
Used where precise coordination is crucial – in shooting and diving
All Beta-2 agonists are prohibited except formoterol, salmeterol and terbutaline which are allowed to be taken in inhalations for treatment of asthma and asthmatic bronchitis caused by sports exercise

Selective androgen receptor modulators or SARMs
Affect androgen receptors responsible for muscular fiber growth, stimulating growth of muscle bulk and strength

Myostatin inhibitors
Block myostatin effects. Myostatin is a specific protein responsible for regulation of organic growth of muscle tissue
Muscle bulk is maintained after one stops exercising

Anabolic steroids
Increase muscle strength, resilience, help quickly recover after strenuous physical exercise, accelerate nearly all biosynthetic processes, especially protein generation
Similar in structure of male sex hormones
Nandrolone, Stanazolol, Steribolin, Dihydrotestosterone, Testosterone etc.

Dr. Shobha Ahluwalia

DBS sampling devices

Cellulose based cards (e.g. Whatman paper)

- Relatively cheap (USD 2-5, per card)
- Flat card- less space needed for transportation and storage
- Finger prick (micro- needle/lancet)
- Sample removal for analysis (hole punch)
- Effect of haematocrit on sample analysis

Volumetric Adsorptive Microsampling (VAMS™) – 20 µL volume

- Moderate cost (USD 10- 12, four sampler)
- Four sampler per clam shell - VAMS does not touch container
- Finger prick (micro-needle/lancet device)
- Sample removal easy (individualised)
- No effect from haematocrit (calibrated accurate volume device)

Tasso-M20 (Tap Device) – 17.5 µL volume

- Expensive (USD 40, 4 swabs per device)
 - Availability
 - samples collected in enclosed container
 - Non-tamper evident
 - Arm prick (lancet included in device)
- Sample removal requires tool to open casing (replaceable after removal of swab)
- Tasso Volumetric tip – haematocrit effect not expected

Dr. Shobha Ahluwalia

REPORT ON INTERNATIONAL EXPERT LECTURE SERIES

TITLE: NEW PROTOCOLS OF ALTERNATIVE LIGHT SOURCE FOR DETECTING LATENT BIOLOGICAL EVIDENCE ON ITEMS

Date: 25th September 2023

Details of participants: MSc. Forensic Science students.

Resource Persons:

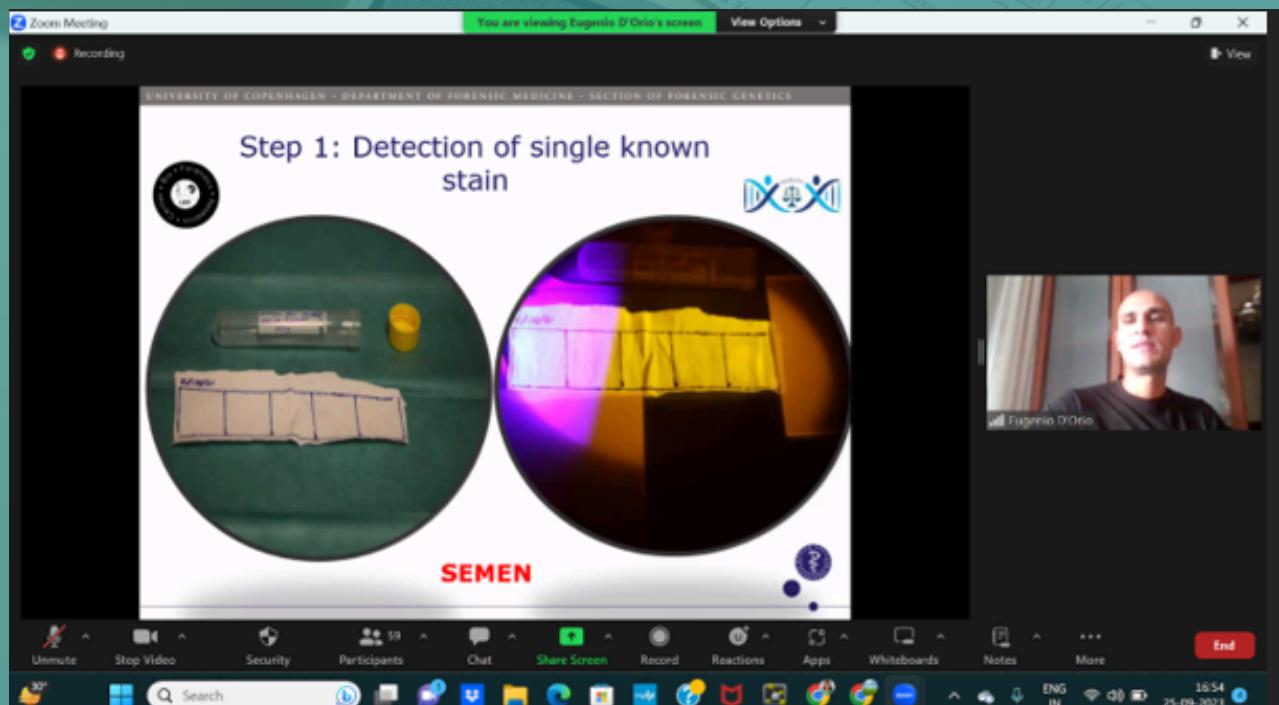
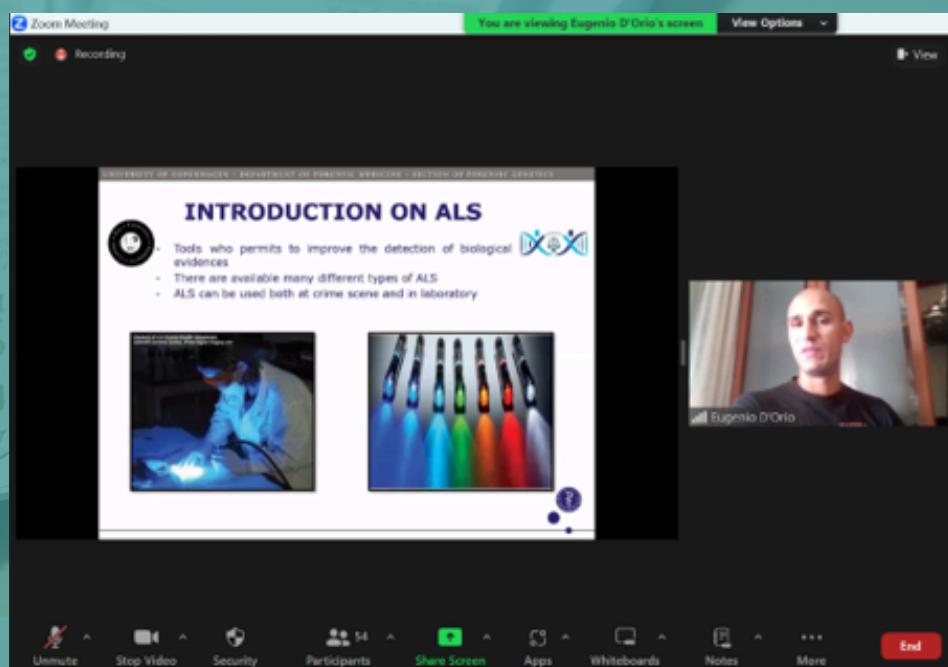
1. Dott Eugenio D'Orio, Director of Bio Forensics Research, Italy

Brief Summary of Expert Guest lecture:

On September 25, 2023, an insightful international guest lecture was held via Zoom, focusing on the theme "New Protocols of Alternative Light Source for Detecting Latent Biological Evidence on Items." The distinguished speaker for this event was Dott Eugenio D'Orio, the Director of Bio Forensics Research in Italy. Dott Eugenio D'Orio's lecture provided valuable insights into the emerging protocols and methodologies utilizing alternative light sources for detecting latent biological evidence on various items. The lecture commenced with an introduction to alternative light sources, explaining their significance and applications in forensic investigations. Dott D'Orio elucidated the different types of ALS and their varying wavelengths, emphasizing their utility in revealing latent biological evidence. Dott D'Orio detailed the principles and mechanisms underlying the use of ALS in forensic analysis. This included discussions on the interaction between biological evidence and specific wavelengths of light, enabling a better understanding of the detection process. The presentation showcased the latest protocols and techniques developed to optimize the detection of latent biological evidence using ALS. Dott D'Orio shared advancements in ALS technologies and protocols, demonstrating their efficacy in enhancing sensitivity and specificity in forensic examinations.

Dott D'Orio presented a case study illustrating real-world applications of ALS in forensic investigations. These case examples showcased successful detections of latent biological evidence, highlighting the significance of ALS in solving criminal cases and advancing forensic science. Following the lecture, there was an interactive Q&A session where participants had the opportunity to ask questions and seek clarifications on the topics discussed. This session facilitated a deeper understanding of the subject matter.

Screenshots of the session:



REPORT ON WORKSHOP

TITLE: FTIR Fourier Transform Infrared Spectroscopy

Date: 5th January 2024

Details of participants: MSc. Forensic Science and Life Sciences students

Number of Beneficiaries: 169

Resource Persons:

Dr. Devendirar, Field Application Specialist for Matchar Products at PerkinElmer (India) Pvt. Ltd., Chennai..

Brief Summary of Workshop

On January 5, 2024, a comprehensive workshop on "FTIR Fourier Transform Infrared Spectroscopy" was organized for M.Sc. Forensic Science students and Lifesciences enthusiasts at the M1 Auditorium. The workshop aimed to provide a profound understanding of the principles, applications, and advancements in FTIR spectroscopy, a crucial analytical technique in the field of chemistry and life sciences. The session was conducted by Dr. Devendirar, a distinguished Field Application Specialist for Matchar Products at PerkinElmer (India) Pvt. Ltd., Chennai. Dr. Devendirar brought a wealth of expertise and practical insights into the workshop, having a rich background in the application of FTIR spectroscopy in various domains. The workshop was meticulously structured to cover essential aspects of FTIR spectroscopy, catering to both the theoretical and practical dimensions. The speaker explained Fundamental principles and concepts of Fourier Transform Infrared Spectroscopy. He also provided an overview of FTIR instruments, key components and their functions. He also elaborated FTIR applications in Forensic Science and Life Sciences Applications. The theoretical session was followed by practical demonstration of FTIR instrument operation and sample analysis and interpretation of spectra. The event not only contributed to the academic enrichment of the participants but also served as a platform for networking and collaboration in the scientific community.

Screenshots of the session:



REPORT ON COMMEMORATION OF 75 YEARS OF INDIAN REPUBLIC DAY.

Date: 24/01/2024

Classes Attended & Number of beneficiaries: 12 students of BSc and MSc Forensic Science

Objective: To instill the spirit of patriotism and pride among the students in commemoration of 75 years of Indian Republic Day.

Brief Write-up on the Programme:

The Department of Forensic Science celebrated the 75th Republic Day by organizing a Logo Making Competition for the departmental magazine, "Aequitas." The competition aimed to engage the creative talents of students and commemorate this significant national event in a unique and artistic manner. The primary objective of the Logo Making Competition was to provide students with a platform to showcase their artistic skills and contribute to the visual identity of the department's magazine. The theme of the competition was centered on the essence of forensic science, justice, and the spirit of the 75th Republic Day. The competition witnessed enthusiastic participation from students across various academic levels within the Department of Forensic Science. Both undergraduate and postgraduate students eagerly took part in the event, showcasing their creativity and passion for graphic design.

REPORT ON WORKSHOP

TITLE: Artificial Intelligence in Research

Date: 6th January 2024

Details of participants: MSc. Forensic Science students and KJC faculties

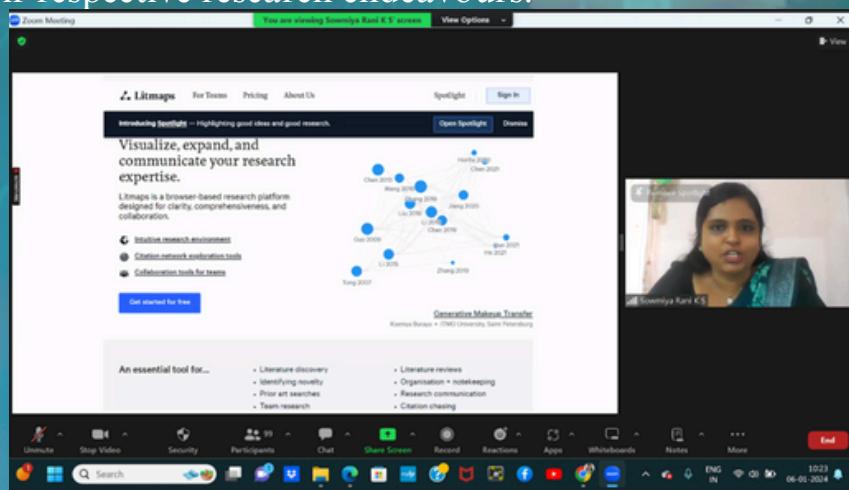
Number of Beneficiaries: 121

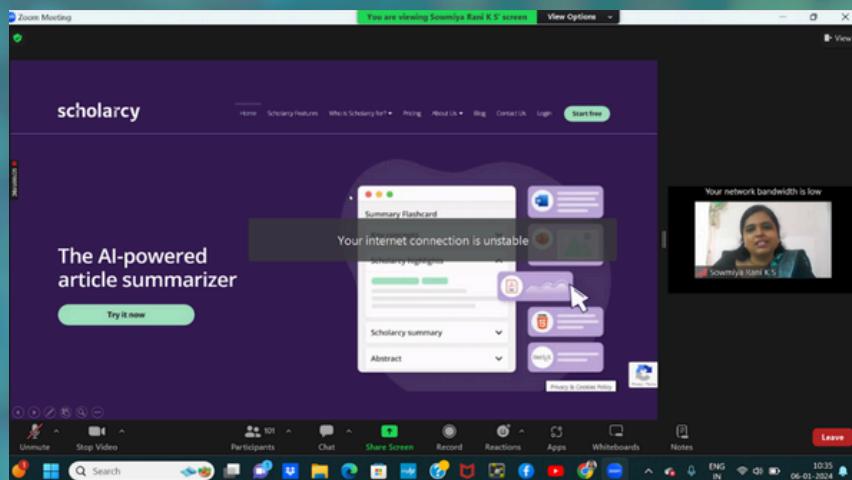
Resource Persons:

Dr. K.S. Sowmiya, editor at Editage and founder of Sowmis_AWW.

Brief Summary of Workshop:

The Department of Forensic Science successfully organized an online workshop on "Artificial Intelligence in Research" on January 6, 2024, via the Zoom platform. The workshop, designed to explore the applications of artificial intelligence tools in research with a focus on scientific writing and publishing, featured Dr. K.S. Sowmiya, an esteemed editor at Editage and the founder of Sowmis_AWW, as the resource person. The workshop aimed to provide valuable insights into leveraging artificial intelligence tools to enhance research practices, particularly in scientific writing and publishing. The speaker gave brief explanation on introduction to artificial Intelligence in Research, further she provided exhaustively covered list of AI tools for improving quality and efficiency of research writing. The workshop provided a dynamic learning environment, offering participants a unique opportunity to interact with a leading expert in the field. Attendees were encouraged to apply the knowledge gained in their respective research endeavours.





REPORT ON ONE-DAY FDP ON FTIR/ATR HANDLING AND WORKING

TITLE: ONE DAY FACULTY DEVELOPMENT PROGRAMME ON
FTIR/ATR HANDLING AND WORKING

Date: 05/01/2024

Venue: Research Lab, Main block, Kristu Jayanti College (Autonomous),
Bengaluru

Time: 01:00 pm

Organized by: Department of Forensic Science, Kristu Jayanti College
(Autonomous), Bengaluru

Participants: Faculty of Sciences from the Department of Life Sciences, &
Forensic Science.

Number of beneficiaries: In-house: 15

Write up about the programme

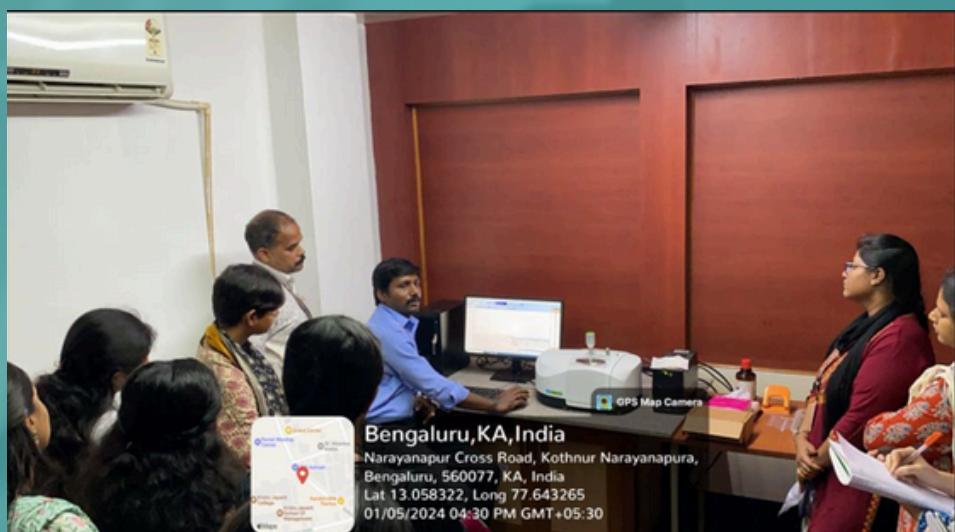
On 5th of January, 2024, the Department of Forensic Science at Kristu Jayanti College (Autonomous), Bengaluru, organized a one-day workshop on "FTIR/ATR Handling and Working" for the teaching staff from the Departments of Life Sciences and Forensic Sciences. The objective of the workshop was to familiarize the participants with the principles, techniques, and applications of Fourier Transform Infrared Spectroscopy (FTIR) with Attenuated Total Reflection (ATR) in various scientific fields.

The workshop commenced with a warm welcome of all the HODs, Coordinators and faculty members of the mentioned Departments by Mr. Don Caeiro, Coordinator, Dept. of Forensic science, who also then introduced the purpose of the workshop and emphasized the significance of FTIR/ATR in scientific research and forensic investigations. The session covered the basic principles of FTIR, including the interaction of infrared radiation with

molecules, molecular vibrations, and the concept of wavenumbers. The participants gained a solid foundation in the fundamental concepts required to understand FTIR/ATR working principles. The participants gained valuable insights into the theory, practical aspects, and diverse applications of FTIR/ATR in scientific research and forensic investigations. The hands-on sessions with the FTIR instrument provided them with the necessary skills to incorporate FTIR/ATR techniques into their teaching and research activities effectively.

The Department of Forensic Science received positive feedback from the participants, expressing their gratitude for organizing such an informative workshop. The event successfully fostered interdisciplinary collaboration among the faculties of Life Sciences and Physical Sciences, paving the way for potential joint research projects and academic endeavors.

GEOTAGGED PHOTOS:



RESEARCH ARTICLES



STEGANOGRAPHY

STEGANOGRAPHY AND VARIOUS METHODS OF DECIPHERMENT



STEGANOGRAPHY AND VARIOUS METHODS OF DECIPHERMENT

INTRODUCTION

Steganography, also known as secret writing, refers to any written information technique done by a spy to conceal the real text, which can be decoded by using different materials.

Steganography is the Greek word in which ‘Steganos’ means covered or hidden and ‘Graphein’ means to write. Secret writing cannot be seen with the naked eye, but it can be revealed through various methods, such as keeping it under appropriate light, applying heat to the writing, and spraying specific chemicals onto the writing.

Invisible inks are used to do secret writing, these writings are done using various inks such as vinegar, lime juice, saliva, sweat, etc., These solutions absorb the paper, and the writings made through them turn transparent in colour.

Invisible inks can be categorised into three types: writings, which can be deciphered by heat mechanisms, chemicals, and ultraviolet rays.

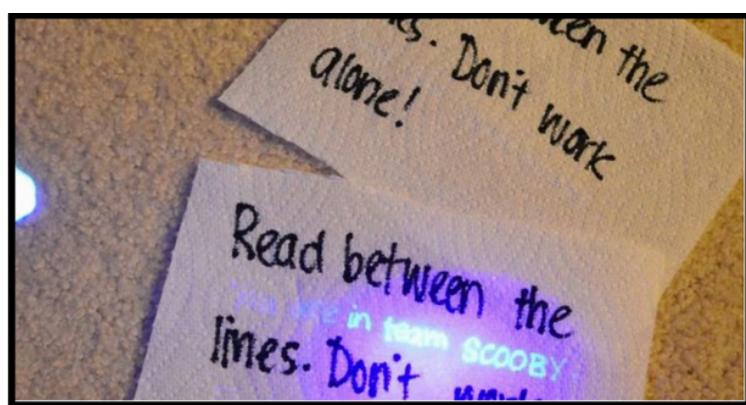


Image1: Hidden writing

<https://rsd2-alert-durden-reading-room.weebly.com/hidden-writing.html>



Principle of Invisible Writing

The principle behind secret writing is that the carbohydrates present in various invisible inks such as lime juice, milk, vinegar, fruit juices, and vegetable extracts and in biological fluids such as sweat, saliva, urine, etc. are absorbed into the paper, and when the writings are subjected to heat application, the carbohydrates start to carbonise. This leads to the release of carbon atoms, which in turn react with oxygen atoms, and an oxidation reaction occurs. This oxidation process produces a yellow-to-brown colour, which is imparted to the writings. Thus revealing the information.

MATERIALS REQUIRED

1. Invisible inks such as milk, lime juice, baking soda, and saliva.
2. Heat applications include candles, heat burners, and electric irons.
3. Miscellaneous-Q-Tips Buds, Paper, and Pencil.

METHODOLOGY

A total of three samples containing hidden messages were inked using different inks, including saliva and milk (biological fluid), baking soda (chemical fluid), and lime juice (vegetable fluid). The writings were created by dipping cotton swabs or earbuds in different types of fluids. After being kept at room temperature for a while, the samples were analysed. These samples were then deciphered using different physical and chemical methods.

Samples-

Types of Fluids Used-

Methods of decipherment-

1. Sample (Milk)
Biological Fluid
UV light, heat, and chemical methods.

3. Sample (Baking soda)
Chemical Fluid
UV light, heat, and chemical methods.



4. Sample (Saliva)
- Biological Fluid
- UV light, heat, and chemical methods.

Results & Discussion

Each sample was visualised by heat, UV light, and chemical methods. A brownish colour appeared after the sample samples were heated with an electric iron, revealing the secret information in the writings. After observing samples under UV light, the hidden message was decrypted by producing a blue fluorescence. Samples were treated with different chemical methods, such as:

Samples

Chemical methods used

Observations

1. Sample (Milk)

Phenolphthalein

Iodine

No Change

The writing revealed a brown colour.

2. Sample (Lime Juice)

Phenolphthalein

Iodine

No Change

The writing revealed a purple colour.

3. Sample (Baking soda)

Phenolphthalein

Iodine

No Change

The writing revealed a pink colour.

4. Sample (Saliva)

Phenolphthalein

Iodine

No Change

The writing revealed a brown colour.



CONCLUSION

Secret writing is the art of transmitting a secret message to an individual that cannot be read by a third person. These messages can be deciphered by a variety of methods, such as the application of heat, the observation of the document under UV light, and the treatment of the document with chemicals such as phenolphthalein and iodine. In this study, the writings were deciphered by visualising them under UV light and heat.

Hidden messages were only revealed in the chemical treatment of secret writings when treated with iodine solution, and no changes or results were observed in the treatment of the paper with phenolphthalein.

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CASE STUDIES



**TERROR BEHIND THE TASTY
A CASE STUDY ON WILDLIFE POACHING.**

**THE GEORGI MARKOV CASE
A CASE REVOLVING AROUND RICIN POISONING USING UMBRELLA
GUN.**



TERROR BEHIND THE TASTY

INTRODUCTION

Illegal poaching generally refers to the unlawful hunting, capturing, or killing of wildlife animals that are protected by law. Endangered species are poached for meat due to cultural beliefs and traditions, exotic delicacies, and the illegal wildlife trade, in which the animals are killed, and their meat is sold on the black market to meet the demand from consumers.

Continuous poaching of species is a major threat to biodiversity, which may lead to further endangerment of species. Mostly, pangolins, cape pangolins, turtles, sharks, tokay geckos, tortoises, eagles, hawks, owls, ducks, geese, songbirds, parrots, quails, pheasants, and other exotic birds are illegally poached for meat. To control such illegal poaching, law enforcement agencies appointed many volunteers to collect information on illegal wildlife trade and trafficking, and they often raided restaurants and markets to identify the selling and use of illegally poached meat.

However, the major issue they face during such raids is the species identification of meat. It is sometimes a challenge for officials to identify the species using morphological traits, especially when the samples are too old, degraded, or cooked. Generally, DNA-based identification using mitochondrial genes like Col, Cytochrome B, 16S rRNA, and 12S rRNA is a useful tool for species identification.

Here's a case study in which species identification was done from a sample of cooked meat.



CASE DETAILS:

A restaurant located in the Murshidabad district of West Bengal, India, was accused of using poached meat, and so the officials of the Eastern Regional Office of the Wildlife Crime Control Bureau (WCCB), West Bengal, seized a sample of fully cooked meat from the restaurant. The suspect (the restaurant owner) was booked under the charges of the Wildlife Protection Act, 1972, suspecting the seized meat was of STL origin (a species of target concern) since the officials received reports of illegal poaching of STL in the last few years for local consumption. The fully cooked meat sample was sent to the Zoological Survey of India, Kolkata, for species identification.

STEPS INVOLVED:

- The meat is washed with 1× sterile phosphate buffered saline (PBS) overnight to remove all the remains of spices and condiments.
- A small pinch of flesh from the innermost layer of the sample is taken.
- Isolation of genomic DNA is carried out through the QiAmp DNA-investigator kit (Qiagen Germany).
- Universal primer sets of Cytochrome b and 12S rRNA genes are used to amplify approximately 400 bp fragments of both mitochondrial genes.
- Sanger sequencing, also known as chain-termination sequencing, which is a method used to determine the sequence of nucleotides in a DNA molecule, was carried out on the Genetic Analyzer 3730. Sequence quality was checked and validated using sequencer V4.7.
- Homologous sequences were downloaded from the NCBI/BLAST database, and multiple sequence alignment was performed by the CLUSTALW algorithm in MegaX.
- Best fit models were identified using Bayesian Information Centre (BIC) values for all the downloaded and generated sequences, and maximum likelihood trees were constructed in MEGA X using the Hasegawa-Kishino-Yano model (HKY + G) and Tamura-Nei model with a gamma distribution for cytochrome b and 12S rRNA gene sequences.
- The generated sequences were submitted to the GENBANK/NCBI database with accession numbers MH423749 and MH423716.



- The sequence lengths of the confiscated material for both genes were 287 bp (Cyt b) and 360 bp (12S rRNA).
- The suspected material was compared with STL, but the similarity was just 79%, which was only for cytochrome b, and no further data was available for the 12S rRNA gene sequence in the database. But on the contrary, there was a 99% similarity of the suspected material's generated sequences with Common Quail (Coturnix).
- The results from these databases indicated that the suspected material was a Common Quail and not the STL.

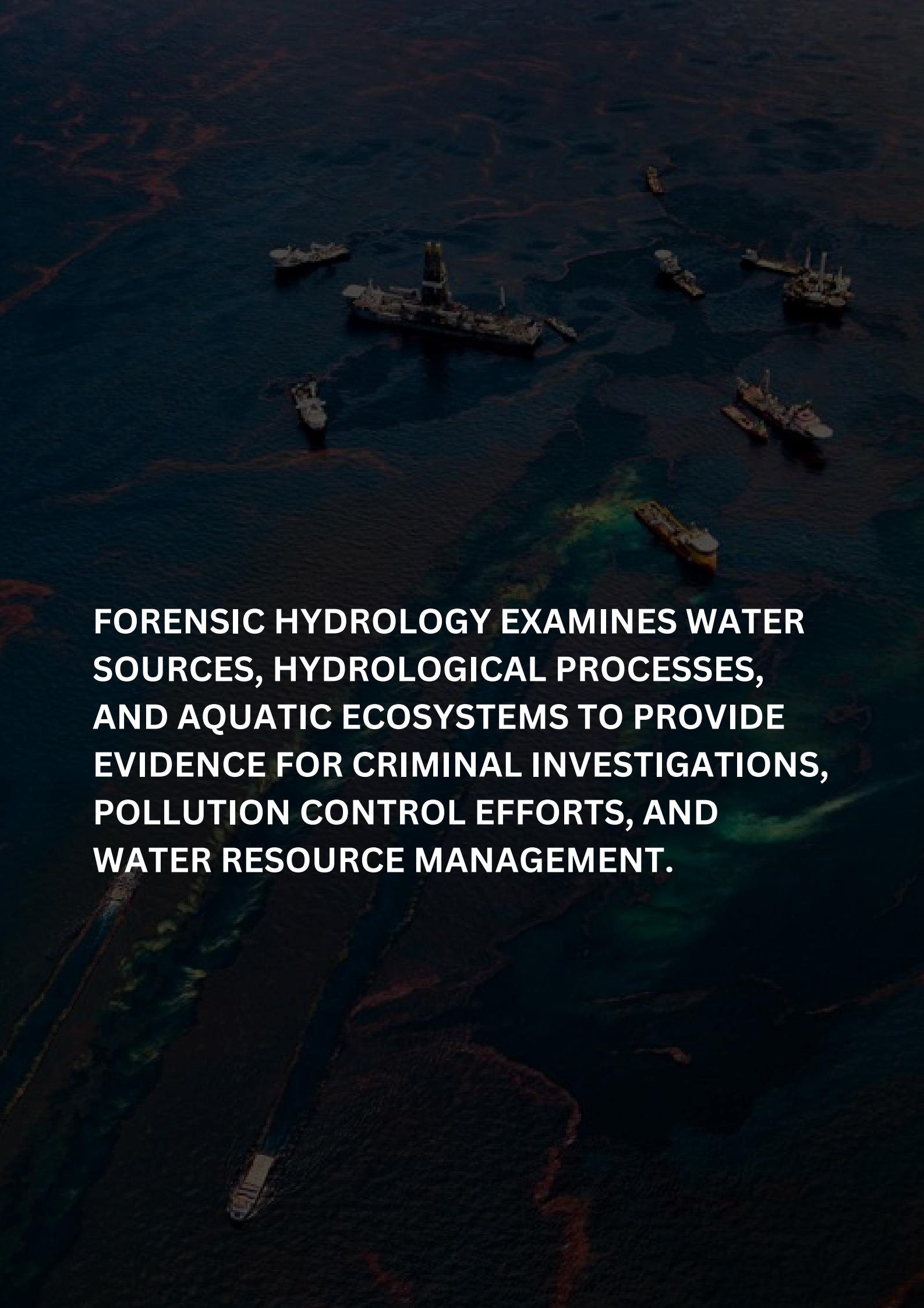
FURTHER PROCEEDINGS AND IMPORTANCE OF MOLECULAR DIAGNOSTICS :

Since the genetic analysis proved that the suspected material was not STL, the statement of the suspect was found to be true, and the allegations against him proved to be wrong.

Thus, the molecular diagnostics tool in species identification helped law enforcement officials withdraw the charges of illegal poaching against the suspect.

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Year – 2019
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FORENSIC HYDROLOGY EXAMINES WATER SOURCES, HYDROLOGICAL PROCESSES, AND AQUATIC ECOSYSTEMS TO PROVIDE EVIDENCE FOR CRIMINAL INVESTIGATIONS, POLLUTION CONTROL EFFORTS, AND WATER RESOURCE MANAGEMENT.



THE GEORGI MARKOV CASE

INTRODUCTION

Georgi Ivanow Markov, born on March 1, 1929, in Knyazhevo, was a Bulgarian writer and novelist in his native country. Later, he shifted to London and worked as a journalist and broadcaster for BBC World Services (1972). Between the years 1975 and 1978, Markov worked on his *In Absentia Reports*, an analysis of life in Communist Bulgaria.



Image 1: Georgi Ivanow Markov

He used such forums to conduct a campaign of criticism against the obligatory Bulgarian Soviet regime. In 1978, he was killed in London, reportedly by an agent connected to the Bulgarian secret police under Zhivkov. After the end of the Communist government, his *In Absentia Reports* were published in 1990, in Bulgaria.

Markov was posthumously awarded the Order of Stara Planina, Bulgaria's most prestigious honor, for his "significant contribution to the Bulgarian literature, drama and non-fiction and for his exceptional civic position and confrontation to the Communist regime", in 2000.

Image 2: Information regarding the victim.



Assassination

On September 7, 1978, Markov was waiting near Waterloo Bridge in London to catch a bus. While waiting for the bus, all of a sudden he felt a harsh pain in his right leg, like an insect bite or sting. When he turned around, he saw a man picking up his umbrella from the ground, hurriedly crossing the road, and taking a cab. Later, when he arrived at his workplace, he noticed a small red pimple in the place where he got stung earlier, and the pain hadn't lessened or stopped. He told the morning incident to one of his friends, Theo Lirkov, who works at BBC World Services with him.

Later on in the evening, Markov developed a high fever and was taken and admitted to the hospital, where he died four days later, on September 11, 1978 (49 years old).

Later investigation and aftermath

Bernard Riley, the assisting physician for Markov, suggested many causes of his death, including a venomous snake bite. Due to circumstances and suggestions given by Markov, the doctors had a suspicion that he had been poisoned; hence, the metropolitan police ordered an autopsy on Markov's body, which resulted in finding out that acute poisoning was the reason for his death.

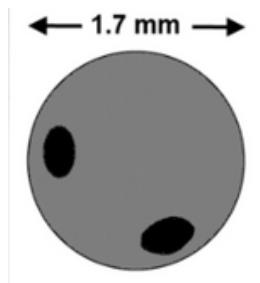


Image 3: The diameter of the pellet is shown.

Where the umbrella had pierced his leg there was a minute 1.70mm in diameter pellet, this tiny pellet had a composition of 90% platinum and 10% iridium, with 2 tiny holes drilled through it of 0.35mm, producing an X shaped cavity. The scientist also included that a sugary substance was used to cover the tiny holes that trapped the poison inside the cavities, with a specially crafted coating which melts at 37 °C (99 °F); human body temperature.

Image 4: Detailed information about the findings.



Ricin
bullet. For
comparison
*
a pin head
is about 2
mm.

Image 5: Regarding the Ricin bullet.



Image 6: A newspaper article about the case.

They said that when the pellet was inside Markov's body, the coating might have melted and the poison must have entered the bloodstream and kill him. It was suspected to be ricin poisoning, even if the doctors who were treating Markov knew about this then also the results would have been same as there are no antidotes existing for ricin.

Image 7: Information about the suspected ricin poisoning.

Ricin Poison: It is naturally produced by castor plants, and it acts as a natural pesticide for plants. It can be used in the form of pellets, powder, dissolved in water, or as a weak acid. Death can occur 36–72 hours after ingestion or exposure to it. A 0.2-milligram dose was used to kill Markov.



Image 8:Umbrella Gun



Based on the situation Markov faced with the man with an umbrella on the bus stop, the experts and investigators finalized that an umbrella weapon was used to commit the crime.

According to the forensic experts the pellet was not shot from a normal gun as there is no sign of tearing on his jeans and on the pellet.

This was a strong circumstantial evidence.

Image 9: Information regarding the murder weapon.



Image 10: Umbrella Gun.

Motive

Markov made broadcasts mocking dictator Todor Zhikov while he was writing for BBC World News.

Which made the communist government upset.

Suspect

Francesco Gullino was the primary suspect who was tracked down after 35 years of murder in Austria. Investigators suspected him at that time because he was the only agent at the time of Markov's murder. He left the place after the day of Markov's murder and later received a payment of 30,000 euros from the agency he worked for. He didn't admit the accusation. Hence, the case is still open, and no one was arrested in this case.



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FEATURE ARTICLES



FORENSIC LINGUISTICS

A STUDY ON LANGUAGE'S ROLE IN INVESTIGATION.

DEEPMODEL TECHNOLOGY

AI CREATED FAKE VIDEOS

COUNTER - DRONE TECHNOLOGY IN FORENSIC SECURITY

A TECHNOLOGY TO DETECT AND NEUTRALIZE UNAUTHORIZED DRONE THREATS

CORPORATE FRAUD CASES

LESSONS LEARNED AND PRECAUTIONS

CHEMOMETRICS

AN ADVANCED ANALYTICAL TECHNIQUE IN FORENSIC SCIENCE

FORENSIC ODONTOLOGY

ROLES AND TECHNIQUES USED

NAVIGATING THE DEPTHS OF TRAVEL DOCUMENT FRAUDS

TRAVERSING THE MAZE OF DECEPTION

UNRAVELLING MYSTERIES THROUGH BONES

THE APPLICATION OF FORENSIC ANTHROPOLOGY IN MASS DISASTERS AND COLD CASES



FORENSIC LINGUISTICS

Linguistics is the methodical learning of speech, with an attention on the methodical exploration of the rates of precise speech together with the general aspects of speech. A forensic linguist analyses language in written or recorded accoutrements to help in the disquisition of crimes. To evaluate genuineness and guarantee clarification, a forensic linguist examines vernacular, grammar, phonetics, sentence form, and other verbal disciplines. Forensic linguistics is categorised into three primary fields of study: The language employed in legislation (for example, the connotation of a legislation might influence someone's judgement).

The language engaged in the legal and forensic processes (for example, did the police use leading questions during questioning?). Linguistic evidence (for example, collating writing styles in given evidence to the accused's writing styles).

LINGUISTIC EVIDENCE

A content with smatter valid importance might get hold of many numerous shapes for police officers, private detectives, private investigators, certainty professionals, intelligence analysts, attorneys, and commoners. Well-defined category of linguistic evidence, such as logos, label marks, and copyright applications, are thoroughly associated with exceptional civil litigations. Smatter category of linguistic affirmation are also seen in particular criminal plots: a bank pilfering note, a warning letter, a self-murder note, or a pay-off note. It is noticeable from these types of papers that linguistic evidence may play a remarkable part in inquiring a crime, and the litigation with which such a legal paper is associated is also obvious (although this type of document is at times used to conceal a different sort of crime). In real situations, for example, a self-murder note has been made to distort or conceal a murder; a warning letter has been issued to reroute investigators away from intriguers.



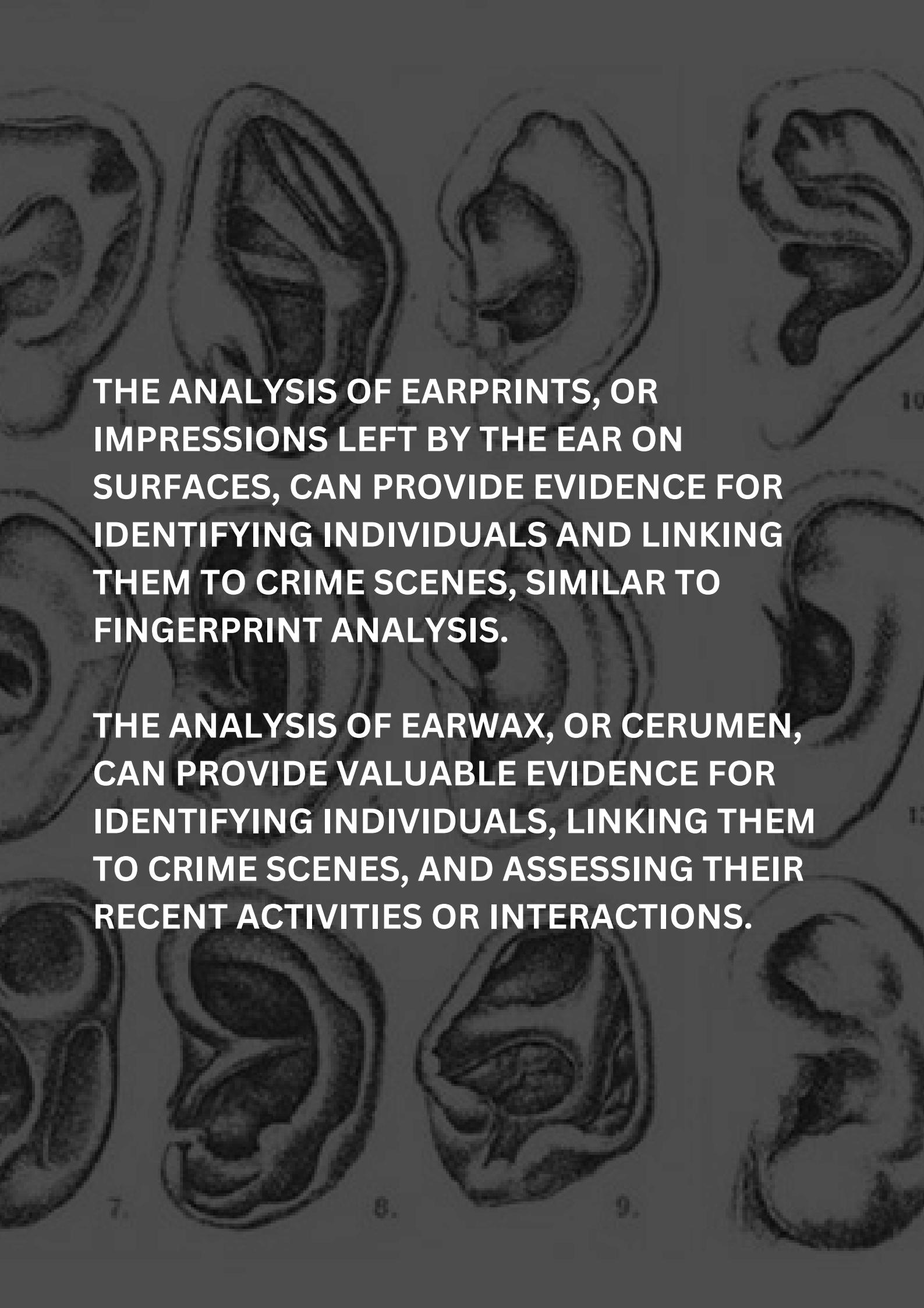
The terms themselves, whether in civil or criminal contexts, are vital pieces of proof in demonstrating some constituent of the crime or civil infringement.

PROBLEMS FACING FORENSIC LINGUISTICS

- Short stretch time restricts assessed by a lawsuit, as an alternative to
- The further friendly deadline entertained in daily pedagogical tracking
- A spectator utterly unheard of our discipline
- Attenuations on what we can give utterance to and when we can give utterance
- Attenuations on what we can put in writing
- Attenuations on how to put in writing
- The necessitate to stand for multiplex specialised apprehension in strategies that
- Can be grasped by individuals who do not know anything of
- Our discipline while perpetuating our part as specialist who have intense
- Awareness of these multiplex specialised goals
- Continuous switches or administrational incongruities in the legal field itself
- Sustaining an ideal, non-backing station in a sector where backing is the most
- Common type of giving.

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THE ANALYSIS OF EARPRINTS, OR IMPRESSIONS LEFT BY THE EAR ON SURFACES, CAN PROVIDE EVIDENCE FOR IDENTIFYING INDIVIDUALS AND LINKING THEM TO CRIME SCENES, SIMILAR TO FINGERPRINT ANALYSIS.

THE ANALYSIS OF EARWAX, OR CERUMEN, CAN PROVIDE VALUABLE EVIDENCE FOR IDENTIFYING INDIVIDUALS, LINKING THEM TO CRIME SCENES, AND ASSESSING THEIR RECENT ACTIVITIES OR INTERACTIONS.



DEEPCODE TECHNOLOGY

“Existential risk of what happens when this artificial intelligence gets more intelligent than us.”

These are the words of Godfather of AI, Dr. Geoffrey Hinton has quit google to convey about the dangers of AI. In Kerala an old friend called a man, requesting for money through WhatsApp video call. There was no doubt because he spoke face to face but it was actually a fake video call made by a scammer using Deepfake Technology. The age of artificial intelligence demands that you should be suspicious of even video calls from an acquaintance. Deepfake is creating videos with audio content using AI and spreading through social media. The people believe it as original but it's actually a fake video. In the majority, cybercriminals are making this video to spread false information and undermine celebrities, political leaders as well as friends or common people. The videos created through the deep fake technology is impossible to identify whether it's real or fake.

HOW IS IT DONE?

The photos or videos posted on social platforms will be taken by subversive and create the deepfake. Using neural network technology transforms analog information of face from the photo into digital information and swapping it with other original files. And decode voice of the person using voice recognition technology will make it similar to original content.



DEEFAKE TECHNOLOGY RENDITIONS

Delhi police recently arrested a person who created deepfake video of actress Rashmika Mandana entering lift wearing swimsuit which indeed a video was of British actress Zara Patel. Oscar award honour film maker Jordan Peele and BuzzFeed CEO Jonah Peretti, the filmmaker's brother-in-law together initiated a Public Service Announcement (PSA) of earlier American President Barack Obama conveying a clear message about sham news. The pair want the project to spread awareness to the people of the ever evolving threat that the digital world poses in 2018.

In Kerala a youtuber named Tom Antony who creates Deepfake video on the Hollywood classic drama The Godfather features actors from Kerala Mammootty, Mohanlal and Fahadh Faasil as a persona. This video gets viral through social media, but this content creator was warning people about the risks associated with artificial intelligence techniques as in by his own video and stated that he declined in make such videos anymore using another person's face without permission.

LAWS AGAINST DEEFAKE

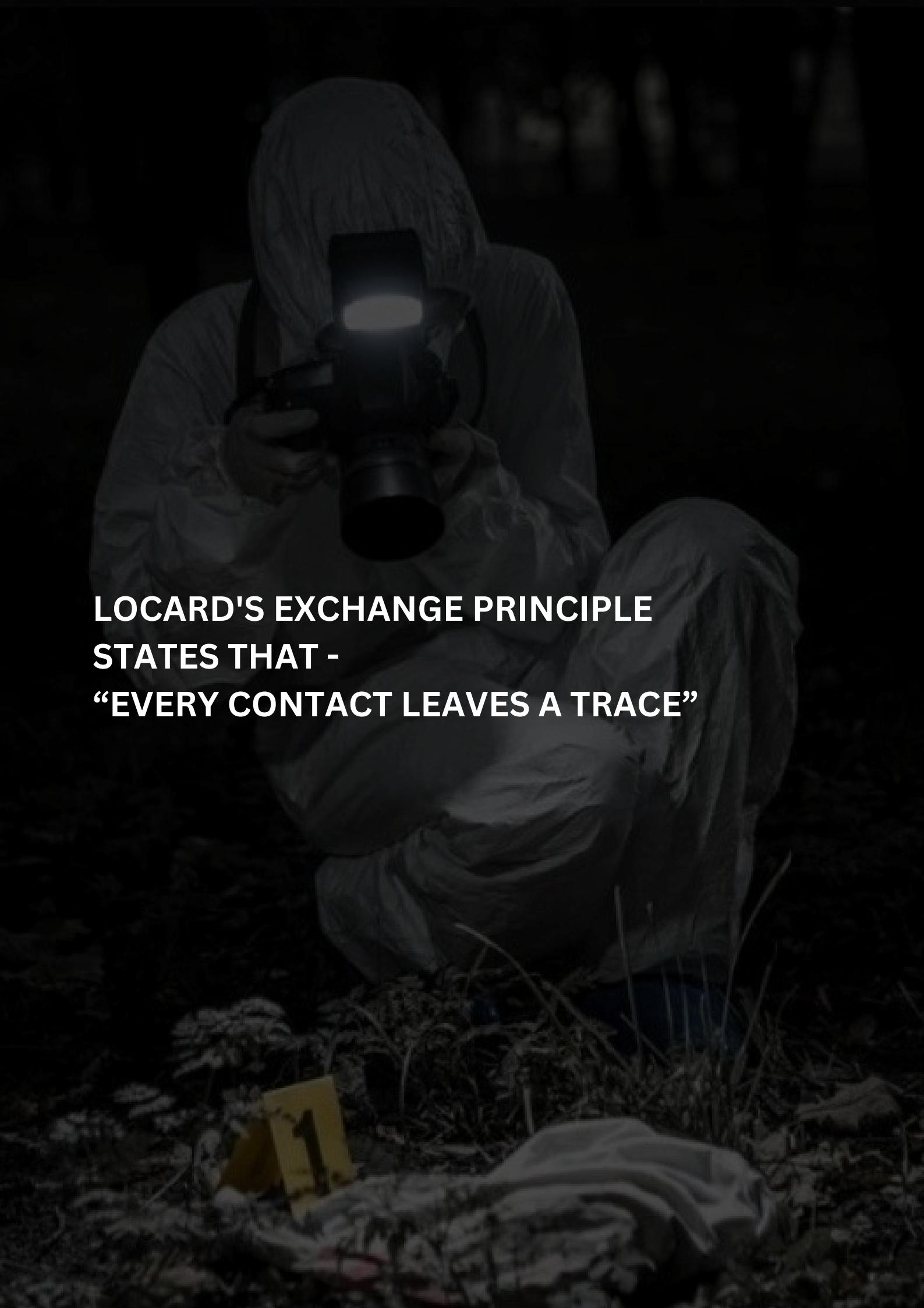
Currently, Deep fake cybercrime is not specifically covered by any law in India, but it can be addressed by combining several existing laws.

- Section 66-D20 of the Information Technology Act,2000 as cheating by personation using computer resource, shall be dealt with three year detention or penalty of fine up to one lakh rupees.
- Section 66E of the IT Act,2000, as person's privacy got infringement when someone takes, publishes, or transmits their image in the media, this offence carries a three- year detention or a penalty of not less than two lakhs rupees.
- Section 51 of the Copyright Act, it is infringement to use any property that is possessed by another person and over which they have the exclusive right.



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A dark, grainy photograph showing a person in a hooded jacket crouching over a body lying in a field of tall grass at night. The person is holding a black evidence bag. In the foreground, a yellow evidence marker with the number '1' is visible on the ground.

**LOCARD'S EXCHANGE PRINCIPLE
STATES THAT -
“EVERY CONTACT LEAVES A TRACE”**



COUNTER-DRONE TECHNOLOGY IN FORENSIC SECURITY



Image 1: A picture of a drone

INTRODUCTION

Drones, once celebrated as remarkable technological advancements with applications ranging from aerial photography to search and rescue missions, have taken an unexpected turn in recent years. The innovation that brought convenience and efficiency is now at the forefront of security concerns due to the emergence of rogue drones. These unmanned aerial vehicles, when deployed for malicious purposes, present a myriad of security threats that demand urgent attention. This article delves into the pressing issue of rogue



drones and the pivotal role that counter-drone technology plays in the realm of forensic security. Drones, or unmanned aerial vehicles (UAVs), initially captured public fascination with their ability to provide aerial views for photographers, aid in surveying landscapes, and assist in various industries. However, this once-benign technology has evolved into a potential threat as individuals with malicious intent exploit the capabilities of drones for illicit activities. The term "rogue drones" refers to unmanned aerial vehicles that are utilized for unauthorized and often nefarious purposes. This misuse has escalated beyond simple privacy concerns to more severe security threats, including industrial espionage, smuggling of contraband, and even potential terrorist attacks. The ability of rogue drones to operate discreetly and in areas difficult to access by conventional means elevates their threat level, necessitating robust countermeasures.

In response to the escalating risks posed by rogue drones, the field of forensic security has emerged as a critical player in safeguarding against these potential threats. Forensic security involves the application of scientific methodologies to analyze, interpret, and secure evidence related to criminal activities. In the context of rogue drones, forensic security plays a pivotal role in developing and deploying technologies that can detect, mitigate, and investigate unauthorized drone activities.

THE RISE OF ROGUE DRONES

The rise of rogue drones signifies a paradigm shift in the use of technology for purposes beyond their intended design. Once hailed for their innovative applications across various sectors, drones have now become tools of choice for individuals with malicious intent. This section delves into the multifaceted aspects of the increasing misuse of drones and how these unmanned aerial vehicles have been transformed from instruments of convenience to potential threats to security and privacy. The evolution of drones into rogue entities is marked by their adaptation for illicit purposes, ranging from covert surveillance to activities that breach legal and ethical boundaries. This unprecedented misuse has been fueled by the accessibility and affordability of drones, allowing even non-experts to acquire and operate these devices for unauthorized activities.



TYPES OF COUNTER-DRONE TECHNOLOGY

- Drone Detection Systems: These are like our superhero senses, helping us see and hear when a rogue drone is nearby.
- Radio Frequency (RF) Jamming: This tool disrupts the communication between a drone and its operator by essentially pressing a "pause" button on the drone.
- Directed Energy Weapons and Capture Technologies: These are superhero gadgets that either use special beams to disable a drone without hurting it or physically catch the drone using nets or other drones.

DRONE DETECTION SYSTEMS:

- Radar (like superhero eyes): Radar watches the sky and tells us if there's a drone flying where it shouldn't be. It even gives us details, like how fast it's going and how high it is.
- Acoustic Sensors (like superhero ears): These sensors listen to the sounds drones make. If a drone is sneaking around, these sensors can pick up its noise.
- Radio Frequency Scanners (like superhero spy gadgets): These scanners eavesdrop on the signals drones use to talk with their controllers. They help us locate where the drone operator might be.
- Superpower: They help us know when and where rogue drones are flying.

RADIO FREQUENCY (RF) JAMMING:

RF jammers emit signals that mess with the communication between a drone and its operator, confusing the drone's navigation systems. However, just like superheroes have rules, using RF jamming comes with rules too. It can't be used everywhere because it might also affect other devices nearby, like phones or radios.



DIRECTED ENERGY WEAPONS AND CAPTURE TECHNOLOGIES:

These tools are like superhero gadgets that physically stop a rogue drone without causing much damage. Directed Energy Weapons (like a superhero laser): These weapons use special beams to disable a drone without destroying it. Capture Technologies (like superhero nets): Nets or other drones are used to catch a rogue drone in mid-air, bringing it down gently. Superpower: They offer a precise way to stop rogue drones without causing too much harm.



Image 2: A picture of a flying drone

Each of these tools has its strengths. Some are good at spotting drones, while others are better at stopping them. But, like all superheroes, these tools have limits. For example, RF jamming might interfere with other devices, and directed energy weapons work better in certain conditions. In summary, counter-drone technology is like our superhero team, equipped with different tools to protect the sky from rogue drones.



Each tool has its own unique role and strengths, contributing to a comprehensive defence strategy against the misuse of drones.

FORENSIC ANALYSIS OF CAPTURED DRONES

Forensic analysis of captured drones is a crucial process that involves the systematic examination of drone hardware, software, and data to extract information for investigative or legal purposes. This analysis can provide valuable insights into the drone's origin, purpose, and operator, aiding law enforcement, the military, or other authorities in understanding the circumstances surrounding the drone's capture.

1. Physical Examination: Frame and Components: Inspect the physical structure of the drone, including the frame, motors, propellers, and other components. This examination may reveal serial numbers, manufacturing details, or modifications made to the drone.
2. Payloads and Attachments: Examine any payloads, cameras, or other attachments mounted on the drone. Analyzing these components may provide information about the drone's intended use.
3. Flight Data: Retrieve flight data stored on the drone's internal memory or flight controller. This data can include GPS coordinates, altitude, speed, and other telemetry information, providing details about the drone's flight history.
4. Camera Data: Analyze images or videos stored on the drone to identify locations, capture times, and potentially recognize individuals or objects of interest.
5. Communication Logs: Examine communication logs to understand the drone's interactions with remote control devices, ground stations, or other communication infrastructure.
6. Firmware Examination: Analyze the drone's firmware to identify its make and model, as well as any custom modifications. This can also reveal vulnerabilities or evidence of tampering.
7. Operating System Analysis: If the drone uses an operating system, examine its files and configurations for any relevant information. This analysis may reveal traces of malware or unauthorized software modifications.



8. Communication Analysis: Investigate the communication protocols used by the drone to communicate with remote control devices or other networks. This may help trace the origin of commands or data transmissions.
 9. Wi-Fi or RF Analysis: If applicable, analyze Wi-Fi or radio frequency signals used for communication. This can provide insights into the drone's communication range and identify any unauthorized access points.
 10. Metadata Analysis: Examine metadata in files for accurate dates and time stamps. This information can be crucial in establishing a timeline of events related to the drone's operation.
-



Image 3: A picture of the crime scene investigation.

CONCLUSION

Drone forensic technology has become a critical component in countering the evolving threats posed by unmanned aerial vehicles (UAVs). As the utilization of drones continues to proliferate across various sectors, including both civilian and military domains, the need for effective countermeasures has grown exponentially.



Drone forensics plays a pivotal role in investigating and analyzing UAV incidents, helping authorities identify malicious activities, perpetrators, and potential vulnerabilities. The evolving landscape of drone technology requires an equally sophisticated approach to forensic analysis, encompassing aspects such as data recovery, signal analysis, and geo-location tracking. By advancing drone forensic capabilities, authorities can enhance their ability to mitigate security risks, protect critical infrastructure, and ensure the responsible and lawful use of UAVs. As the threat landscape continues to evolve, the continuous development and integration of drone forensic tools are imperative for maintaining a robust and proactive stance against potential misuse of drone technology.

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**FORENSIC ENGINEERING DETERMINED
THAT UNAUTHORIZED STRUCTURAL
MODIFICATIONS AND OVERLOADING WERE
THE PRIMARY CAUSES OF THE SAMPOONG
DEPARTMENT STORE COLLAPSE IN SOUTH
KOREA.**



CORPORATE FRAUD CASES: LESSONS LEARNED AND PRECAUTIONS

Corporate fraud is the term used to describe any unethical, unlawful, or deceitful acts carried out by a corporation or by a person working for the firm. Consumers or clients, creditors, investors, other firms, and ultimately the crime's originating company and its staff are the victims of corporate fraud. Fraudulent accounting techniques are a common component of corporate fraud schemes, which aim to inflate a company's perceived profitability. Corporate fraud may also result from product flaws or issues that a company seeks to conceal. The government's regulatory agencies work to prevent, identify, and penalise corporate fraud through laws and regulations. Corporate fraud incidents have been reported on a number of occasions as a result of the growth of massive, multinational organisations and conglomerates.

The Satyam Computer (Satyam) Case: The Satyam fraud exposed the gaps in India's corporate governance laws once more, and SEBI's negligence once more proved to be disastrous for small investors. Here, B Ramalinga Raju, the company's founder and previous chairman, and his brother B Rama Raju deceived the board, investors, and other shareholders. The company's financial situation and investment were misrepresented in its accounts. By falsifying the amount in the books of accounts, Mr. Ramalinga embezzled money from the firm and invested in real estate around the country. As a result, the company's share price skyrocketed but its core values stayed the same. Mr. Ramalinga was eventually found guilty of this because he was unable to sell the properties he held to close the gaps in the books of account due to the real estate market's decline in value. Rs. 7,136 crores were lost in the Satyam scam. The fraud revealed a network of individuals, ranging from auditors to the board of directors, who helped to enable the crime.



The 2009 Satyam Computers books of accounts revealed a profit of Rs. 5,200 crores, although the actual profit was only Rs. 4,100 crores, with a growth percentage of 3% as opposed to 24% as shown in the company's books. Investors were drawn to purchase a part in the firm due to its remarkable improvement in the fundamentals, which at the time appeared to be highly promising. Following his confession, Mr. Ramalinga and his brother were sentenced to seven years in prison and a fine of Rs. 5 crores.

LESSONS LEARNED :

Some key takeaways from the Satyam include::

- Absence of ethical leadership: The senior executives at Satyam participated in a culture of greed, dishonesty and immorality.
- Ineffective board of directors: The board of directors exhibited impartiality and was unable to effectively supervise the management.
- Regulatory shortcomings: At the time, the regulatory framework was insufficient to stop the companies' misconduct.
- The relevance of independent directors: The significance of independent directors on the board of directors was brought to light by the Satyam controversy.

Need for whistleblowing techniques: Whistleblowing strategies are necessary since it is imposed upon employees to disclose unethical behavior.

PRECAUTIONS THAT CAN BE TAKEN :

- Establish an anti-fraud policy and ensure that all staff members are informed about it.
- Regularly check your financial accounts through audits.
- Encourage staff members to report any unusual activities.
- Stay up to date on any legal developments that might impact your business.



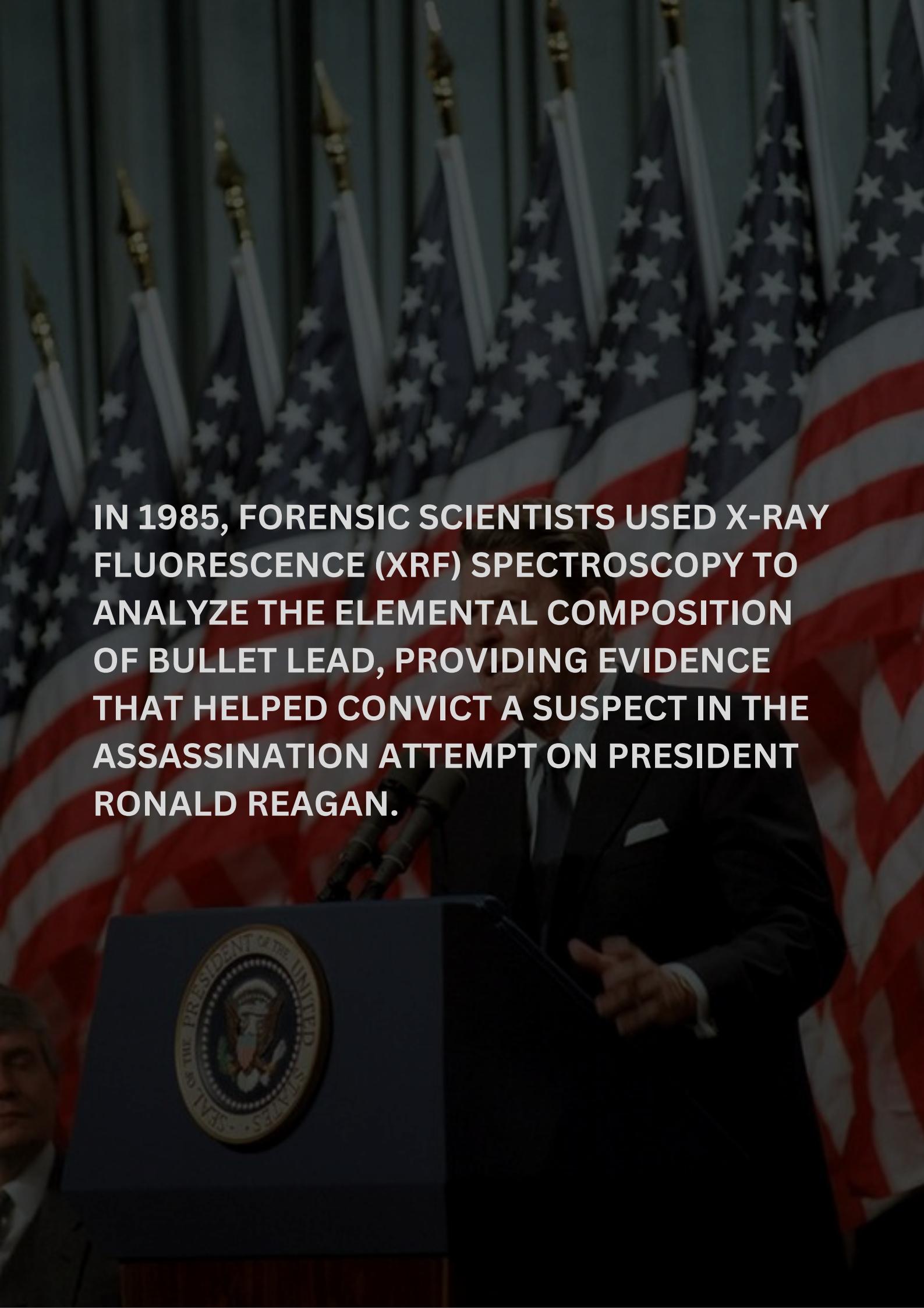
- Watch out for warning signs, such as odd activity in your bank accounts or staff members who appear to be living over their means.
- Understand your company's financial situation so you can take prompt action when an issue occurs.
- Make sure that your hiring practices don't unintentionally foster a fraud-friendly atmosphere.
- Establish documentation guidelines and practices that will reduce the likelihood of fraud.

CONCLUSION :

The field of corporate governance and leadership is intricate and multifaceted. Although it is the CEO's and chairman's responsibility to lead their company to success, they risk serious repercussions if they act unethically or illegally. Corporate frauds and scandals have the potential to cause losses in the billions of dollars, legal troubles, and a decline in the company's reputation. Many nations have responded by putting legislative frameworks and controls in place to attempt and stop corporate wrongdoing, although these steps are not always successful. Corporate scandals have an international influence and can have serious repercussions for the firm as well as its stakeholders, workers, clients, and investors.

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IN 1985, FORENSIC SCIENTISTS USED X-RAY FLUORESCENCE (XRF) SPECTROSCOPY TO ANALYZE THE ELEMENTAL COMPOSITION OF BULLET LEAD, PROVIDING EVIDENCE THAT HELPED CONVICT A SUSPECT IN THE ASSASSINATION ATTEMPT ON PRESIDENT RONALD REAGAN.



CHEMOMETRICS: AN ADVANCED ANALYTICAL TECHNIQUE IN FORENSIC SCIENCE

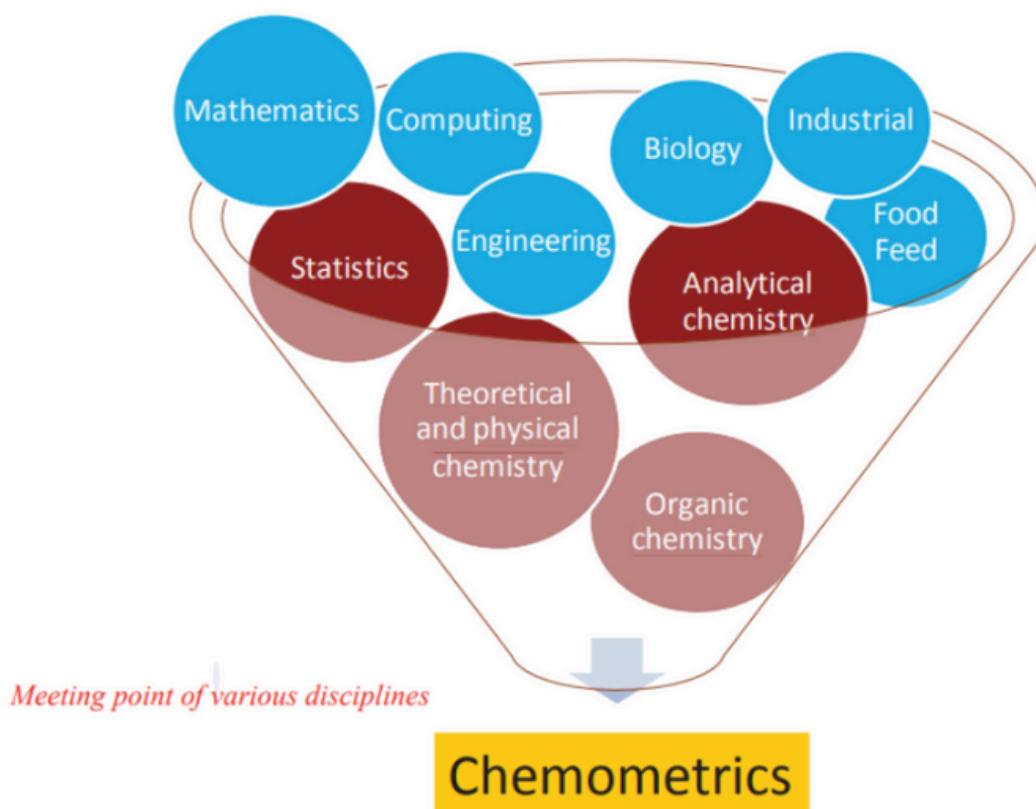


Image 1: Definition of Chemometrics

1. INTRODUCTION

Solving crime often relies on physical evidence collected during investigation. While there are numerous techniques for evidence interpretation, along with



conscious procedures for handling, storing and analysing, there requires a more reliable approach. The continuous efforts made in recent decades in establishing a widely accepted approach has resulted in this fruitful method called Chemometrics which involves statistical inference, allowing more improved probabilistic interpretation. It can help visualise complex analytical data in a simpler and more convenient manner. As we evolve into the modern world, the amount of data that is generated everywhere is vast. Almost every process is computerised and visualised, and there is necessity for the forensic scientist to understand these complex tools for viewing the collected data more seamlessly. In simple words chemometrics is the integration of statistics, mathematics and computational methods to extract relevant chemical information from complex data obtained during investigation.

2. CHEMOMETRIC METHODS

Techniques in chemometrics varies based on the application on which it is being used. There are three different methods, Pattern Recognition, which is subdivided into Unsupervised and Supervised method, Regression Technique and Experimental Design met

2.1 Pattern Recognition:

2.1.1 Unsupervised Pattern Recognition

This method mainly involves detecting patterns in the datasets of the collected samples without any predefined labels or outcomes, with the help of algorithms which largely decreases human error. This method also allows comparative analysis with a process of projecting the new samples onto the previously collected samples. Hierarchical Cluster Analysis (HCA) which involves merging data into large clusters based on special distance and relative similarities, Principal Component Analysis (PCA) which uses dimensionality reduction technique to offer visual representation of the data are examples of Unsupervised Pattern Recognition technique.

2.1.2 Supervised Pattern Recognition

In a supervised method, data used involves labelled data. As the name suggests it involves human intervention which makes it more reliable and acceptable in the court of law as there is a proof that the process has been done under authorised supervision.



It involves methods such as k-Nearest Neighbour (kNN) and Linear Discriminant Analysis (LDA), which works on the principle of classifying samples based on their characteristics. Support Vector Machines (SVM), Decision Tree and Random Forests method which works on rule-based classification, and Artificial Neural Network (ANN). Together all these methods play their roles in applications ranging from entomology to velocity detection and reconstruction.

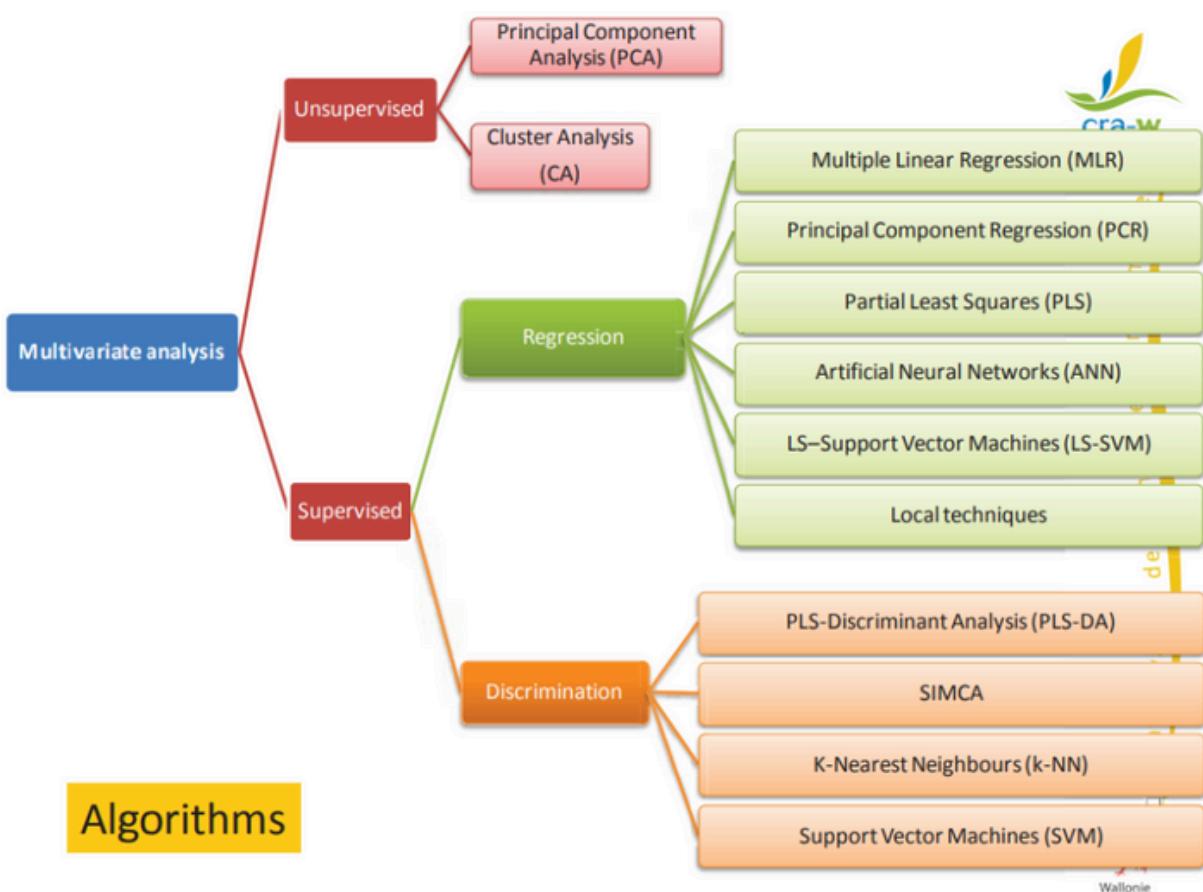


Image 2: Diagram illustrating Multivariate Analysis

2.1. Regression Technique

Multivariate regression techniques being the most dependent method, it works by establishing connections between various factors and components along with a dependent outcome. MLR (Multiple linear Regression) one of the most famous methods under Multivariate regression method, helps the forensic scientist by generating linear equations of the provided datasets by incorporating various predictor variables. PCR (Principal Component Regression) replaces MLR as its effectiveness is limited by various factors such



as dimension, model accuracy, etc. PLSR (Partial Least Square Regression) is also another notable method which is largely helpful in cases of differentiating authentic and counterfeit products.

2.2 Experimental Design Techniques

The result of any chemometric method largely depends on the input data that has been put in the beginning. Choosing the required parameters and analytical data from large sample evidences with at most care is crucial for the final output. Here comes the role of Experimental Design Techniques, offering various tools and techniques such as sample preparation, sample storage, parameters for instrumental analysis, etc. which helps in identifying, optimising data and modelling factors that are involved in effective completion of the process.

3. APPLICATION IN FORENSIC SCIENCE

- Identifying impurities and contaminants in Drugs and Pharmaceuticals, one of the most important fields of application.
- Chemometrics combined with spectroscopy such as ATR-FTIR spectroscopy.
- Utilising chemometrics in acquiring more accurate results in analysing seized rugs with techniques such as DR-NIR spectroscopy and PLSR.
- Identifying source and quantifying cocaine samples.
- Detecting counterfeit products, etc.

4. DRAWBACKS OF CHEMOMETRICS

- It is quantitative in nature.
- One cannot predict what is present.
- Majorly used only for visualisation of data.
- Subjectivity in data evaluation.
- Uncertainty estimation.
- Multicollinearity and Model Complexity, etc.



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**IN 1974, FORENSIC SCIENTISTS USED A
PROCESS CALLED "LASER ABLATION" TO
REVEAL A HIDDEN FINGERPRINT ON A
PIECE OF EVIDENCE, MARKING A
SIGNIFICANT ADVANCEMENT IN
FINGERPRINT DETECTION TECHNIQUES.**



FORENSIC ODONTOLOGY: ROLES AND TECHNIQUES USED

Forensic odontology is a branch of dentistry that deals with the appropriate handling, inspection, and presentation of dental outcomes in the service of justice, as well as the appropriate appraisal and treatment of dental evidence. By analysing dental evidence in various circumstances, the forensic odontologist supports law enforcement agencies. Each person's dental pattern is different. Therefore, if data are available for the purpose, a person's dentition can be used for individual identification and comparison. The main benefit of this evidence is that, similar to other hard tissues, it is frequently maintained until death. When it comes to decomposing, burned, or skeletonized remains, forensic odontology is indispensable when standard identification techniques like fingerprints and visual recognition are not possible. In recent times, forensic dentistry has become a developing science and is very important to society.

ROLE OF FORENSIC ODONTOLOGY:

Forensic odontology has various roles, such as:

Identification of human remains: Dental records should preferably be collected and matched to those of the unidentified person in order to identify human remains based on their teeth. Age and tooth eruption are somewhat correlated, thereby providing a preliminary victim estimate.

Age estimation: The degree to which crown and root structures have formed, the eruption stage, and the intermixture of primary and adult dentitions are all taken into consideration when determining an individual's age.



Identification following mass fatalities: The procedure for identifying a deceased person in a mass disaster is similar to that of ordinary dental identification, but is much more complicated. In situations involving fire or severe trauma, physical features are often destroyed. Teeth can resist fire and a great majority of traumas as they are heavily calcified.

Assessment of abuse cases: When faced with uncommon oral injuries, the dentist should be on the lookout for signs of abuse of children, the elderly, or spouses. The dentist should keep accurate and thorough records of all findings for review by law enforcement authorities.

TECHNIQUES USED IN FORENSIC ODONTOLOGY:

In forensic dentistry, various techniques are used, such as:

- **Bite mark analysis:** Bite marks can be used to identify suspects in criminal cases. Recent techniques that have improved bite mark identification include the use of electron microscopy and computer enhancement technique.
- **Teeth prints:** Ameloblasts lay down the enamel rods in an undulating and intertwining path. The ends of a sequence of neighbouring enamel rods are reflected in patterns on the enamel's surface. Amelography is the study of these enamel rod patterns. Enamel can withstand deterioration, so it can be used as an identification tool for burned or decomposed bodies.
- **Radiography:** If sufficient antemortem records are available, using radiographs for identification is valuable. From the radiographs, several morphological and pathological changes may be examined. Identity is aided by the morphology of the root and crown.
- **Dental DNA analysis:** Teeth can be an excellent source of DNA. The use of the technique based on Polymerase Chain Reaction, that enables a minute quantity of DNA to be amplified, has acquired great importance in post-mortem analysis in forensic cases.
- **Dental record:** Dental records must be maintained and kept up to date. This is a dentist's responsibility, as it provides patients and dentists with information for administrative, forensic, and medico-legal needs. Dental data were effectively used in several disasters, including the December 2004 tsunami in the Indian Ocean and the World Trade Center tragedy.



- **Cheiloscopy:** In forensic dentistry, the examination, recording, and categorization of lip imprints is known as cheiloscopy. Lip prints are sufficient for forensic investigations since they also have grooves and furrows on the surface.
- **Rugoscopy:** The study of the patterns of the grooves and ridges (rugae) of the palate to identify individual patterns is called Rugoscopy. These rugae are thought to be unique to individuals, and the pattern can be a credible indicator in postmortem situations.

CONCLUSION:

A relatively new area of dentistry with a lot of prospective for growth is forensic odontology. Forensic odontologists are crucial in the examination and analysis of dental evidence at the crime scene. It is imperative for every practitioner to understand the forensic implications of their profession. It is one of the emerging fields of dentistry that supports several medico-legal investigations as well as the identification of victims of mass disasters. Therefore, forensic odontology is becoming a crucial component of the dental and medical sciences.

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A dark, grainy aerial photograph of a coastal town. In the foreground, there's a field with some sparse vegetation and a few small structures. Behind it, several houses with dark roofs are visible, some appearing to be damaged or destroyed. A large, dark, hazy area covers the upper half of the image, suggesting smoke, dust, or a lack of light from the sun.

**FORENSIC ODONTOLOGISTS PLAYED A
CRUCIAL ROLE IN IDENTIFYING VICTIMS OF
THE 2004 INDIAN OCEAN TSUNAMI BY
MATCHING DENTAL RECORDS TO
RECOVERED REMAINS, AIDING IN THE
REPATRIATION EFFORTS AND CLOSURE
FOR FAMILIES OF THE DECEASED.**



NAVIGATING THE DEPTHS OF TRAVEL DOCUMENT FRAUDS

Travel document fraud grants criminals and terrorists the ability to cross borders secretly which is a grave risk to immigration and worldwide security systems. Due to those trying to take advantage of weaknesses in passport and visa systems, there is a greater chance of travel document fraud as a result of the growth in international travel. The use of forged or fraudulent documents to fool immigration officials and obtain unapproved entry into or travel within a nation is known as travel document fraud. Passports, visas, and other identity documents are the travel documents that are most frequently falsified. Travel document fraudsters frequently try to make counterfeits or modify authentic documents by taking advantage of holes in these documents' security measures. To identify and stop travel document fraud, authorities around the world use a variety of strategies, such as cutting-edge document authentication technologies, biometric verification, and international collaboration. Improvements to travel document and border control system security are important due to the constant development of fraudulent schemes.

METHODS USED BY OFFENDERS TO PERFORM TRAVEL DOCUMENT FRAUD

1. Counterfeit Travel Documents: The unauthorized replication of a legitimate document is known as counterfeiting.
2. Forgery: Forgery is the forging or falsification of a genuine document and the unauthorized alteration of a document to provide misleading information about the ownership or validity of a passport.
3. Identity theft : Identity fraud refers to the illicit use of legitimate papers, involving impersonation and illegally obtained documents.



4. Pseudo Documents: These documents seem authentic but do not attempt to recreate the original.

Pseudo documents commonly take the form of:

- Fake documents issued by fake states or organisations.
- A document from a dissolved or renamed state.
- Fabricated papers that utilise the name of a real state or institution but lack a valid counterpart.

The most commonly used document to commit travel document fraud is the passport, in a survey conducted in 2019 shows 73% of document frauds committed were on passports.

Security agencies use various methods to detect travel documents frauds, which includes technological advancements such as biometric verification and machine-readable characteristics, have improved the detection of fake papers. Making it difficult for fraudsters to perform travel document frauds. And traditional methods where the Passport check personnel use visual examination and manual scrutiny to detect travel document fraud. This procedure, however, has numerous barriers and is not a very effective method to detect and prevent travel document fraud. For example; if the person looks different in real life and the photo, due to maybe the picture was clicked a few years ago and he/she may claim to have had a glow-up and changed over time, it can either be a genuine case but there might be instances the traveller has some criminal intent.

CASE STUDY

A 26-year-old cab driver from Meerut, Uttar Pradesh, has been detained for falsifying his 22-year-old brother's paperwork in order to get a fake passport and a study visa to Singapore. The accused a native of Mirzapur village under Badgaon police station, was motivated to pursue an abroad education, but his academic gap years (he finished class 12 in 2013) made it difficult for him to secure a visa appropriately. Sachin obtained a counterfeit passport using his brother Gautam's credentials in April 2022, and then got a study visa to Singapore. He left for Singapore in June 2022. The counterfeit was discovered last year, in March, when Gautam filed for a passport to visit Dubai. But, astonishingly, he discovered that a passport had already been granted in his name. He reported the scam to the regional passport office in Ghaziabad, which transferred the case to the Saharanpur police. Sachin was charged in



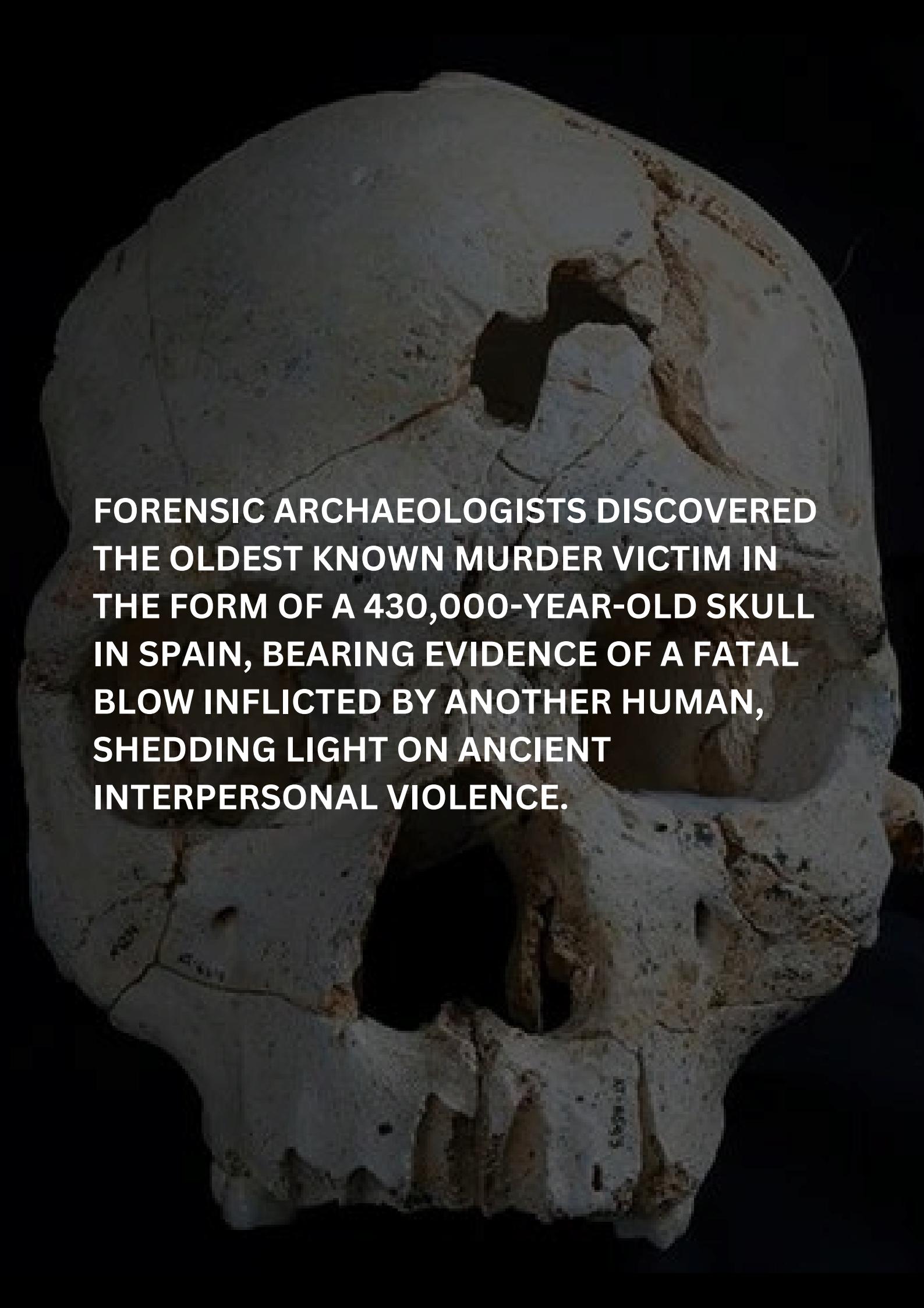
May under several provisions of the Indian Penal Code (IPC), including cheating, fabrication of valuable papers, and fraudulent use of authentic documents.

CONCLUSION

Travel document fraud is a chronic and multidimensional issue that poses severe dangers to global security and border control systems. The changing terrain of fraudulent operations continuously tests authorities' attempts to detect and prohibit the unauthorised use of passports, visas, and other identity papers. International collaboration, information exchange, and the implementation of standardised identification methods are all critical components of a strong defence against cross-border criminal networks. To dismantle these networks, law enforcement authorities throughout the world must work together. Finally, combating travel document fraud is a communal effort that necessitates the dedication and participation of governments, international organisations, and technological innovators.

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**FORENSIC ARCHAEOLOGISTS DISCOVERED
THE OLDEST KNOWN MURDER VICTIM IN
THE FORM OF A 430,000-YEAR-OLD SKULL
IN SPAIN, BEARING EVIDENCE OF A FATAL
BLOW INFILCTED BY ANOTHER HUMAN,
SHEDDING LIGHT ON ANCIENT
INTERPERSONAL VIOLENCE.**



UNRAVELLING MYSTERIES THROUGH BONES THE APPLICATION OF FORENSIC ANTHROPOLOGY IN MASS DISASTERS AND COLD CASES

Forensic anthropology, a specialised department of Scientific studies, has emerged as a pivotal discipline in the investigation of mass disasters and cold cases involving missing or misidentified human remains. The discipline of forensic anthropology is essential to disaster relief efforts because it offers expertise and tools that boost the precision and efficacy of techniques used to identify victims of large-scale casualties. Generally speaking, a mass disaster is defined as an incident (air, marine, railway, or motorway accident, flooding, earthquake, etc.) that leaves a huge number of victims that require identification and medical-legal inquiry. The victim's remains obtained from a mass disaster will be in a dreadful condition often burned or dismembered. Forensic anthropologists have been using their knowledge of disaster victim identification (DVI) for more than a century. However, in recent years, several catastrophic incidents have led to an increased role for forensic anthropologists in these investigations the objectives are to support human remains identificatio



and to figure out what had occurred to the remains, particularly in light of any possible foul play evidence. The material analyzed typically comprises of mostly or entirely skeletonized remains, or skeletal evidence that has been extracted from fleshy remains. The forensic anthropologists can use their specialised knowledge and techniques to re-examine skeletal remains and provide crucial insights into the circumstances surrounding an individual's death. The applications of forensic anthropology in mass disasters and cold cases are therefore vital in ensuring justice, closure, and accountability. From a medical-legal standpoint, the study of human remains has three primary goals: a well-executed crime scene investigation, including appropriate methods for recovering and registering human remains and applying appropriate identification protocols. To verify the identities of people and speed up the repatriation process, they use methods like skeletal analysis, DNA testing, dental record comparison, and facial reconstruction. The application of this field in mass disasters can be traced back from the identification of victims during the 1950 Korean War.

TECHNIQUES USED IN FORENSIC ANTHROPOLOGY

One might think of mass disasters as either "open" or "closed" systems. The first is a method where a predetermined number of people are known to be involved, like in the case of an airline accident involving a passenger list. In this instance, the effort mostly entails comparing postmortem (PM) data from the victims with antemortem (AM) data of the people on the passenger list. Conversely, managing an open system is far more challenging. This is the situation, for example, when an explosion occurs in a train station or underground, or when a sinking ship has illegal immigrants on board (and so no official passenger list). Hence, keeping the classification of mass disasters in mind, Forensic Anthropologists will accordingly decide on how to go about with victim identification. One of the preliminary methods used for victim identification in mass disasters and cold cases is Osteometric techniques wherein the experts estimate the height and body mass of individuals based on skeletal remains. These techniques involve the measurements of various bones such as the cranial bones to establish the correlations between the bone lengths and body dimensions. Other procedures involve the Comparison and superimposition of Skeletal remains. In this process, the skeletal remains are subjected to a



postmortem radiograph, which is orientated in a position comparable to the antemortem image using progressive approximations. The goal is to obtain equivalent ratios between lines drawn between various places on a transverse and coronal plane. Next, the ratios are computed. Until a placement is determined that yields ratios that can be superimposed to those of the antemortem radiological picture, the skeletal remains are radiographed in various postures, similar to those of the antemortem plate.

CONCLUSION

The multidisciplinary nature of forensic anthropology involves collaboration with forensic pathologists, odontologists, geneticists, and law enforcement agencies to ensure comprehensive analysis and interpretation of evidence. There have been numerous instances where Forensic Anthropology was used as a tool for investigation and victim identification, for eg., the 9/11 World Trade Centre Attack, 2002 Bali bombing, 2004 Tsunami and so on. The knowledge of forensic anthropologists is essential for conducting accurate and timely victim identification during large-scale disasters, which frequently results in the closure to the victims families.

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LITERATURE REVIEW



**TOXINS PRESENT IN LIPSTICKS AND ITS FORENSIC
SIGNIFICANCE**
A MAKEUP TRAGEDY

ROLE OF VIRTUAL AUTOPSY IN FORENSIC INVESTIGATION
A NEW BETTER PHASE OF AUTOPSY

FORENSIC TAPHONOMY
DECODING THE SECRETS OF DECOY

INSURANCE FRAUDS
TACTICS AND TRENDS IN THE INDUSTRY



TOXINS PRESENT IN LIPSTICKS AND ITS FORENSIC SIGNIFICANCE

ABSTRACT

Lipstick is one of the most widely used products in the cosmetics industry for providing additional color, protection, moisturization, and lip texture. Lipsticks are made up of wax, emollients, and oil, and several pigments are used to impart pigments to them. But nowadays, harmful substances like petroleum-based chemicals, preservatives, and antioxidants are present as ingredients in lipsticks. Lipsticks are one of the most crucial pieces of trace evidence in the field of forensic science. Lipstick samples can be categorized and analyzed using ATR-FTIR spectroscopy, Raman spectroscopy, and other multivariate statistical methods.

INTRODUCTION

Skincare and cosmetics are some of the latest trends. And when it comes to cosmetics, lip cosmetics like lipsticks and lip balms are used by both men and women. Lipsticks are made up of both organic and inorganic substances. It is a major part of everyone's routine, but the sad reality is that the majority of the substances used in lipsticks are not safe to use. Lips are one of the sensitive parts of the human body and they absorb the products applied to it through the skin layers. The lips are not protected by hair, wax, or sweat glands making it less vulnerable to natural defences like other parts of the body. When continuously exposed to these substances it could lead to long-term health issues. The majority of the time lipsticks are ingested to the body by unknowingly licking it and the carcinogenic ingredients are also ingested.



The emergence of medicated and herbal lipsticks is due to the realization of how many toxins are present in them. Criminal identification in different cases like rape, burglary, and murder is done with the help of biological, physical, and trace evidence. Stains like blood, saliva, semen, and lipstick marks are also common evidence present in the crime scene on the clothes of the victim or culprit, tissues left behind, skin, different surfaces, and even on cigarette buts. When it's compared, we will be able to form an indirect proof of contact and link it to the culprit.

Ingredients present in lipsticks :

Ingredients	Used as	Used for
Methylparaben	antifungal and preservative	prevent fungal growth
2. Polyparaben	preservative	prevents the growth of harmful bacteria and mold
3. Retinyl palmitate	antioxidant	synthetic preservation
4. Tocopheryl acetate	antioxidant	skin conditioning
5. Lead	byproduct	breaks the unpleasant smell of lipstick
8. Synthetic dyes	coloring agent	diversity in lip color



INGREDIENTS: CERA ALBA, ETHYLHEXYL PALMITATE, ISOPROPYL MYRISTATE, OZOKERITE, POLYBUTENE, CERESIN WAX, TOCOPHERYL ACETATE, PROPYL PARABEN, BHA, FRAGRANCE, MAY CONTAIN CI 42090:2, CI 19140:1, CI 45410:1, CI 77891, CI 15850, CI 77742, CI 15850:2

Image 1: List of ingredients present in lipstick

The majority of the ingredients present in lipstick contain harmful toxins. For example, methylparaben is restricted in Europe because of the cancer risks it poses. But these ingredients often fall under the category of hidden ingredients which means it's impossible for consumers to be aware of the toxic substances present in them.

FORENSIC PERSPECTIVES LIPSTICK

Earlier cosmetic smears were considered futile and ineffective but now it is considered major physical evidence since it's easily transferred during crimes.

Analytical techniques used in the examination of lipsticks are:

- Thin layer chromatography (TLC)
- Atomic Absorption Spectroscopy(AAS)
- High-performance liquid chromatography (HPLC)
- Inductively coupled plasma mass spectroscopy (ICP-MS)
- High-resolution continuum source graphite furnace atomic emission spectroscopy (ICP-OES)
- Gas chromatography-mass spectroscopy (GC-MS)
- Neutron activation analysis (NAA)
- Raman spectroscopy
- ATR-FTIR



Most of these are used for elemental analysis which depicts the threshold value of heavy metals present in it except FTIR and Raman spectroscopy.

The majority of these techniques have limitations like TLC, GC-MS, and NAA are destructive in nature. Lip prints can have saliva DNA in the print. Lip cosmetics are an excellent source of salivary DNA analysis which shows the biochemical and proteins found in blood. It can also provide information on the diseases present in the body and the mouth of the host including diabetes and heart diseases.

LIMITATIONS

Previous research works on this topic contain insufficient data and require a detailed study of lipsticks to effectively characterize them. And to link an unknown sample there is a need for databases of lipstick samples or a statistical model. However, no studies have been done on the lipstick samples from the Indian market for the local brands available.

CONCLUSION

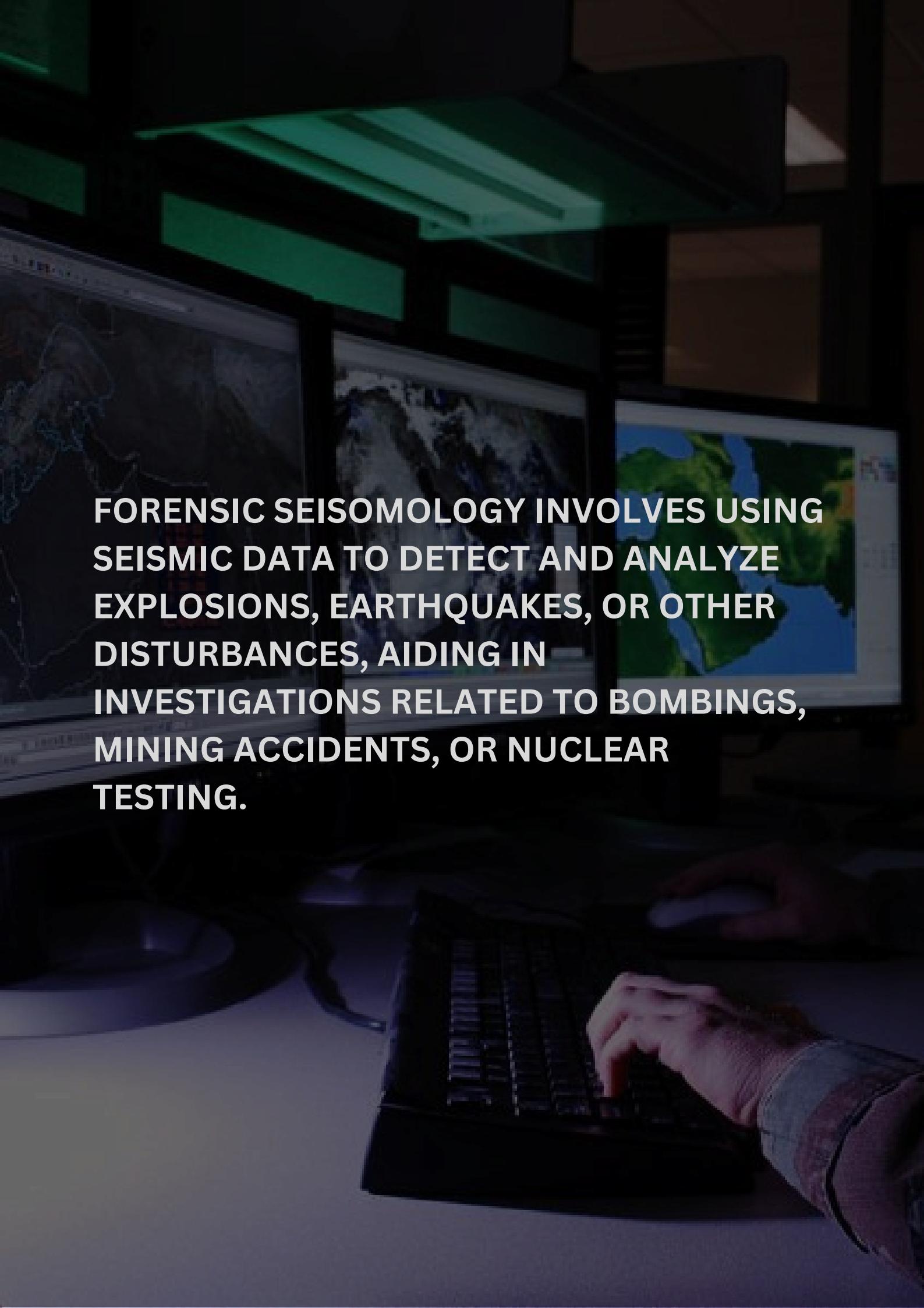
Exposing yourself to a small amount of lipstick is not harmful, but if you are someone who uses it regularly and frequently reapplies, it can cause harm. When lipstick samples were analyzed using ATR-FTIR spectroscopy, which is a non-destructive process, results were obtained and were able to predict their respective brands, proving discrimination of lipstick samples is possible.

In the future, there are chances of creating a database of lipstick samples, which will help in identifying lipstick samples and establish connections between the culprit and victim to solve a crime.



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A dark, low-light photograph of a person sitting at a desk, viewed from behind. They are wearing a light-colored hoodie and are focused on a computer screen. The monitor displays a complex, multi-layered map or data visualization, likely seismic or geological in nature, with various colors and patterns. To the left of the main monitor, there is another screen showing a similar but less detailed view. A small portion of a third screen is visible on the right side. The overall atmosphere is one of a professional scientific or technical workspace.

**FORENSIC SEISMOLOGY INVOLVES USING
SEISMIC DATA TO DETECT AND ANALYZE
EXPLOSIONS, EARTHQUAKES, OR OTHER
DISTURBANCES, AIDING IN
INVESTIGATIONS RELATED TO BOMBINGS,
MINING ACCIDENTS, OR NUCLEAR
TESTING.**



ROLE OF VIRTUAL AUTOPSY IN FORENSIC INVESTIGATION

ABSTRACT

This article explores how virtual autopsy entails employing cutting-edge imaging methods to examine the body without surgery. This has advantages and disadvantages for forensic investigations. The advantages of this field are that they are non-invasive and do not involve cutting the body. They save time by eliminating the need for autopsy and tissue sampling, they allow for remote analysis by multiple experts. But on the same side the downside is that virtual autopsies can be expensive, they do not allow the collection of tissue samples. The challenges of interpreting image results from virtual autopsies require expertise in radiology and forensic pathology.

Keywords: Virtual Autopsy, Images, Dead bodies, 2D and 3D, Medico- legal, Forensic, Death,

INTRODUCTION

An autopsy is a very specific and specialised surgical procedure that determines the cause, manner and time of death, sometimes providing more information. Virtual autopsy or Virtopsia, on the other hand, is a specialised machine-assisted autopsy that helps determine the cause, manner, etc. Virtual autopsy (VIRTOPSY) is a non-invasive forensic examination. It can objectively and accurately reflect bone fracture, soft tissue injury, injury extent and organ damage and provides intuitive and effective evidence for forensic identification.



SUB-TOPICS

Process of Virtual Autopsy

Virtual Autopsy process begins with the acquisition of non-invasive image data. These scans collect information about internal structures, including organs, bones and tissues. Once the picture information is obtained it is prepared by a computer program and an advanced reproduction of the body is made. Through the powerful combination of these research methods, it was possible to justify the most appropriate approaches to standardizing viropsis results for effective crime investigation.

Advantages of Virtual Autopsies

They are non-invasive which diminishes the require for obtrusive methods and minimizes the hazard of defilement or harm to the body. In expansion virtual post-mortem examinations can give a more intensive and point by point examination of a body. The high-resolution images created by virtual. Virtual autopsies also allow for detailed 3D reconstructions of the body allowing forensic experts to examine the anatomy from different angles and potentially uncover evidence that may have been missed during a traditional autopsy.

Limitations of Virtual Autopsies

One of the most important limitations is the need for expensive equipment and specially trained technicians for imaging and data processing. They may not be able to diagnose certain types of natural deaths. In addition, the detail and accuracy of virtual autopsies may not yet match the level of traditional autopsies especially when it comes to identifying subtle tissue changes or performing histological studies.

Legal Considerations

The use of virtual autopsy evidence in research is still relatively new and raises several legal considerations. Therefore, there is a need to establish standards for the acceptability and authentication of virtual autopsy evidence. Courts must determine the reliability and validity of virtual autopsy techniques and ensure that they meet the necessary legal standards.

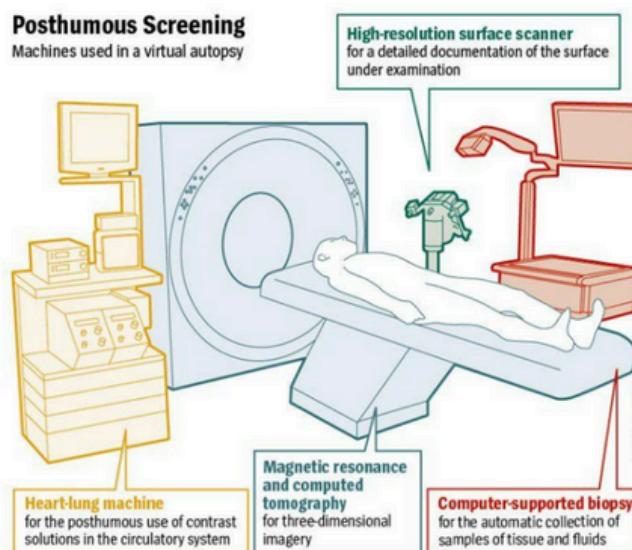


DISCUSSION

Virtual autopsies have received considerable attention and recognition in forensic science due to their various advantages. Remote access to virtual autopsy data allows forensic findings from different locations to be collaboratively analysed and provide insights without being physically present. Although further development and standardization are needed to address current limitations the evolving role of virtual autopsy in forensic practice is a promising development that warrants continued investigation and research.

CONCLUSION

Virtual autopsies represent a significant advancement in forensic science and offer a non-invasive alternative to traditional autopsies. Although virtual autopsies have several advantages, including their non-invasive nature and ability to provide detailed imaging they also have limitations. However, ongoing research and the development of virtual autopsy techniques promise to improve forensic science and provide valuable information about the cause and time of death.

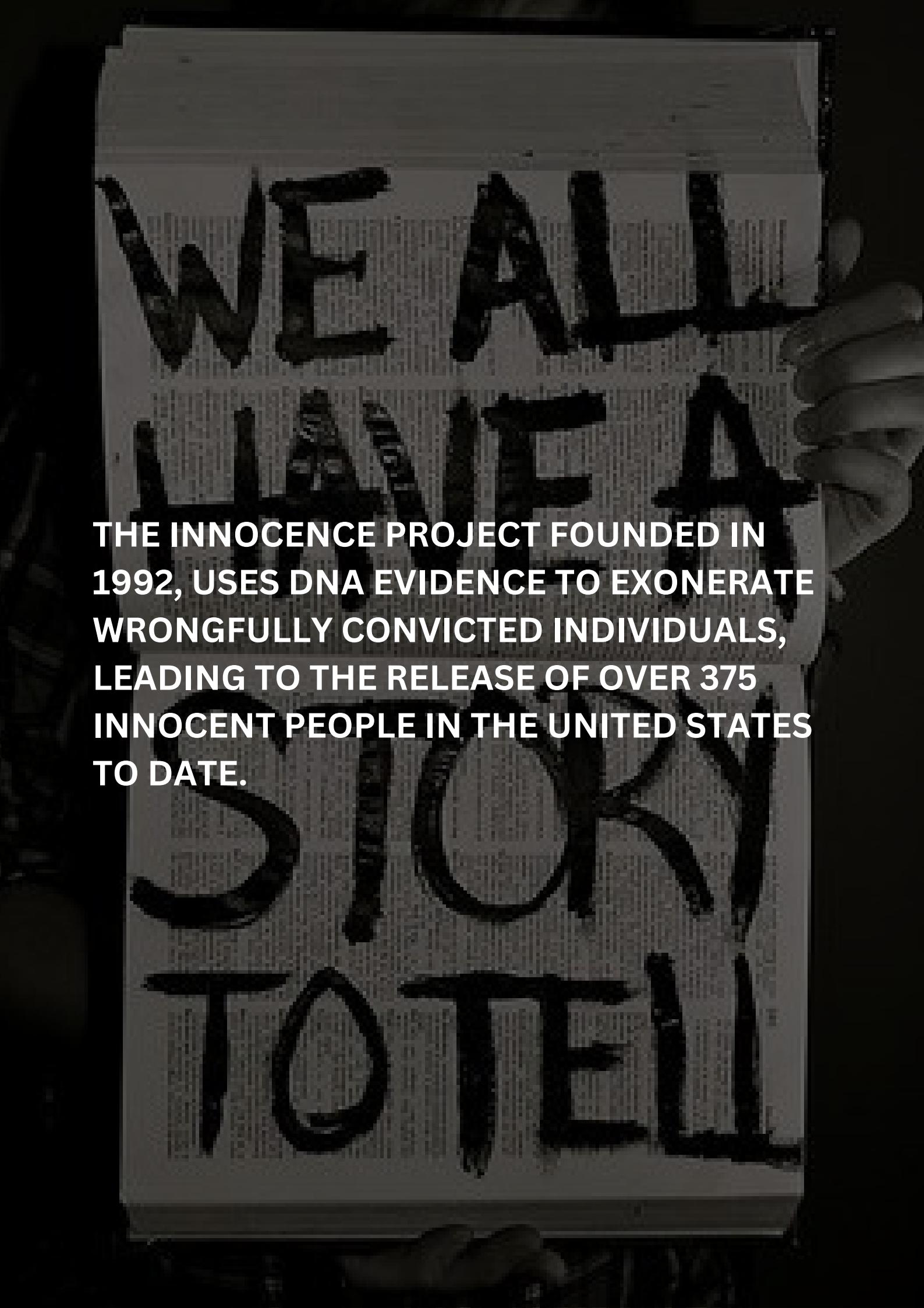


(IMAGE: A VIRTUAL LOOK AT THE CAUSE OF DEATH)



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**WE ARE
TO TELL**

THE INNOCENCE PROJECT FOUNDED IN 1992, USES DNA EVIDENCE TO EXONERATE WRONGFULLY CONVICTED INDIVIDUALS, LEADING TO THE RELEASE OF OVER 375 INNOCENT PEOPLE IN THE UNITED STATES TO DATE.



FORENSIC TAPHONOMY

Abstract:

Forensic Anthropology can be defined as the application of Anthropological methods and theory in legal matters, especially in recovery and analysis of skeletons. A scientific approach to examining human remains found from crime scenes is called Forensic Taphonomy ,a branch under Forensic Anthropology. Forensic Taphonomy is therefore essentially the study and analysis of postmortem modifications to the body. It helps in reconstruction of events that occurred between the deposition of remains and their recovery. It can be described as the integration of Archeology and Forensic science expertise.The estimation of postmortem interval can be done by using Forensic Taphonomic techniques.It is also known as time since death,which is a time period between death and recovery and examination of body.It can give informations such as when crime was committed and helps investigators to reconstruct the death scene.Several researches are happening in the field of forensic taphonomy since it has an important role in solving a crime. This paper deals with advancements in forensic taxonomy and their impact on forensic analysis.

Keywords: Forensic Anthropology ,Forensic Taphonomy,reconstruction of events ,Archeology ,Forensic science ,postmortem interval, crime

Introduction:

Consider a scenario that a person finds a putrefied body from the woods and informs the nearest police station. The police arrives at the scene for investigation.Even though the examination of body should be done by a person who is expert in that field. Here comes the role of forensic taphonomy. The term “taphonomy” was derived from two Greek words “taphos” which means burial and “onomy” meaning the system of rules or law.It was first coined by a Russian paleontologist Ivan Efremov in 1940s.



The main purpose of studying taphonomy is to explain how and why fossilised skeleton conglomerations end up in the context they were found. It refers to the study of processes that happens to biological organisms from the time of death to the time of finding it. The study of taphonomy has become incorporated into forensic anthropology ,which helps to reconstruct And interpret the events associated with deposition and changes That happens to human remains. Forensic taphonomy is the term used in medico legal context, which studies the postmortem processes, its preservation, recovery, which aids in reconstructing the factors or circumstances that may lead to death. Human remains go through certain series of taphonomic processes which are affected by various factors.The major environmental factors which affects the decomposition of a body includes temperature, humidity and pH of soil. By applying forensic taphonomic techniques,An investigator can determine postmortem interval, perimortem and postmortem processes and also in distinction of natural from human induced trauma. Approach to forensic taphonomy can be done through two aspects. It includes geological aspects, which studies how a person who buries a body affects the surrounding environment and how the body gets affected by surrounding geological environment[Geotaphonomy] and Biological aspects to study how the body remains' tissues get decomposed[Biotaphonomy].

Decomposition of Body after Death:

Decomposition can be described as a natural process in which body organs and its assemblages breakdown into less complicated organic matters.Soft tissues are the first to become modified after death. The postmortem changes occurring to soft tissues can be denoted by 3 stages; Algor mortis, Livor mortis and Rigor mortis.

Algor mortis: It is the process of cooling of body after death. The rate at which temperature cools down depends on temperature differential between the body and the environment, but in general body cools at the rate of about 0.8 degrees Celsius per hour during the first 12 hours after death.



Livor mortis: This stage is also called as hypostasis. It is recognised by the pooling of blood in the body due to gravity and also lack of blood circulation due to failure in cardiac activity. It results in purplish-red discolouration in skin. This stage begins around 30 minutes to 4 hours after death.

Rigor mortis: This stage is characterised by muscle stiffening caused by the binding together of fibres of muscles. Typically seen first in the small muscles of Jaw and face. After death the ATP molecules, which is responsible for muscle relaxation are exhausted ,the muscles remain contracted until they start to decompose. This stage peaks around 12 hours after death.

Certain terminologies in Postmortem Stages

Term	Description
Autolysis	<p>Autolysis is also known as self digestion. It is the complete destruction of cells through their own enzyme action. Autolysis occurs most rapidly in pancreas and stomach</p>
Putrefaction	<p>It is the deterioration of tissue caused by the Microbial or Bacterial invasion. Putrefaction results in the discolouration of body[Shades of green, purple and brown]. Bacteria increase throughout the circulatory system by the process called intravascular hemolysis and results in darkening of vessels. Gases released during putrefaction causes bloating in abdomen area.</p>



Term	Description
Skin Slippage	It is the process of shedding of the epidermis from the body caused by the destruction of junction between dermis and epidermis
Artifactual Preservation	It refers to the preservation of tissues of a dead body by naturally or using chemical substances or by destruction of bacteria. Preservation is also facilitated by body coverings [Clothing, plastic or airtight caskets]
Mummification	It is the preservation of body remains by desiccation. This process requires low humidity and happens to individuals having low body fat
Saponification	The process of conversion of fatty tissues in dead body to Adipocere[grave wax], happens in unoxygenated, Alkaline, wet environment [remains that deposited in water]



Term	Description
Differential Decomposition	<p>The irregular or disoriented decomposition which may happen when an injury exposes lot of blood provides a site for scavengers, exposure to any physical or chemical agents or any bacterial infections. It gives the informations about the health condition of particular dead individual prior to death and also suggests any trauma suffered by that person</p>
Skeletonization	<p>Refers to complete soft tissue destruction, leaving only hard tissues of skeletal mass.</p> <p>The term Diagenesis is used in Taphonomy to refer any change, it may be chemical, physical or biological, to a bone after its initial deposition</p>

DISARTICULATION AND MOVEMENT OF BODY AFTER DEATH:

When a body is deposited on a surface or submerged instead of burying it, may get disarticulated and skeletal elements get dispersed due to the action of scavengers and animals, gravity, water and fluvial sediment process which may leads to incomplete recovery. Carnivores usually drag the limbs apart from the body and results in scattering.

Estimation of PMI in Forensic Taphonomy:

The estimation of Post Mortem Interval is very crucial since it can narrow the pool of descendants, helps in identification, confirms or refuse reports and also circumstances that lead to death. As the time period increases[months years], it may cause errors in finding the potential cause of death. In this case, the PMI can be estimated by analysing the decomposition of soft tissues and hard tissues of skeleton. Post mortem interval can be estimated through following ways;



1. With reference to ADD:

Since temperature is the major factor which affects decomposition rate, the PMI can be estimated with reference to Accumulated Degree Days [ADD]. It refers to the sum of average daily temperature usually in °C for a given number of days with reference to a threshold temperature. Usually 0°C is considered as the threshold temperature for decomposition study. In these calculations of ADD and estimation of PMI, any temperature below 0°C threshold is considered as 0 [freezing temperature inhibits bacterial growth].

2. By quantifying the degree of decomposition using scoring system:

PMI can be estimated by quantifying the degree of decomposition using scoring system based on certain features such as discoloration, bloating, purging and amount of soft tissues remaining. Different scoring system is designated to different areas of body Which gives a summed score called Total Body Score or TBS. With the help of this score an analyst can estimate ADD. If you have Total Body Score the ADD can be find out using the following equation. PMI can be estimated with the reference to ADD.

$$\text{ADD} = 10(0.002 \text{ TBS} + 1.81) \pm 388.16$$

Advancements in Forensic Taphonomy:

Although automation is not a new idea in the field of forensic sciences, there is currently no integrated system available for gathering a variety of data on a wide range of variables in forensic taphonomy research, and certainly not one that provides a truly quantifiable way to monitor the decomposition process. Developments in this area have been essential for comprehending postmortem procedures and supporting law enforcement inquiries. Among the most recent developments are:

Microbial Forensics: It is becoming more and more crucial to comprehend how bacteria function in the processes of degradation. Scholars are investigating the microbial communities linked to decomposition in order to devise more precise techniques for postmortem interval estimation.

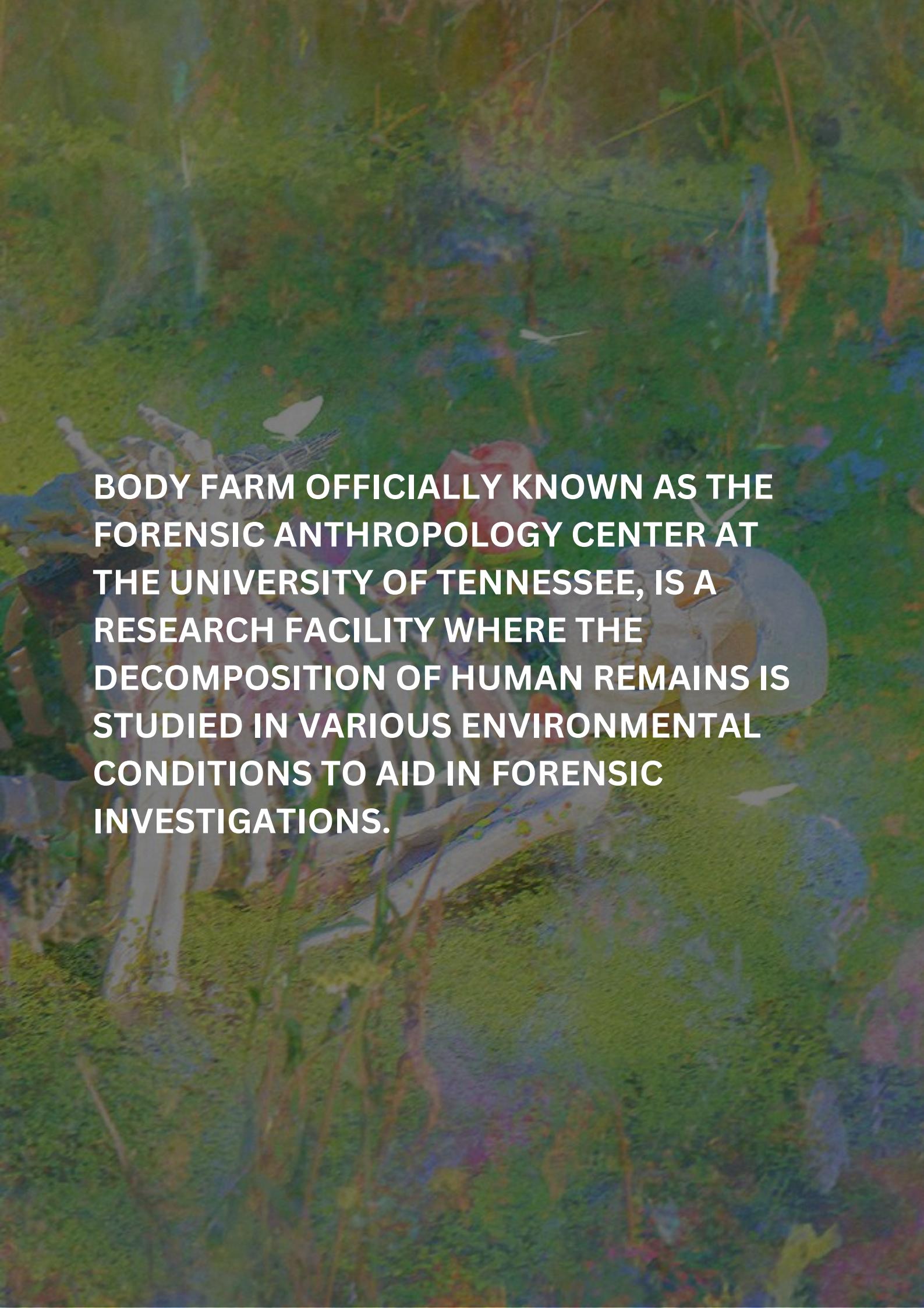


Environmental DNA (eDNA): species found in environmental materials have been found and identified by eDNA analysis. This method can be used in forensic taphonomy to detect particular bacteria or other creatures linked to decomposition, which can help with forensic investigations.

Isotopic Analysis: Isotopic analysis of ambient and tissue samples can provide details about a person's diet, place of origin, and manner of movement. Isotope analysis in forensic taphonomy can assist in reconstructing a body's postmortem trip, which can be vital in figuring out how a crime was committed or what conditions led to the death.

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A photograph showing several human skeletons partially buried in a field of green grass and brown soil. The skeletons are in various stages of decomposition, with some bones more exposed than others. The scene is outdoors in a rural or semi-rural setting.

BODY FARM OFFICIALLY KNOWN AS THE FORENSIC ANTHROPOLOGY CENTER AT THE UNIVERSITY OF TENNESSEE, IS A RESEARCH FACILITY WHERE THE DECOMPOSITION OF HUMAN REMAINS IS STUDIED IN VARIOUS ENVIRONMENTAL CONDITIONS TO AID IN FORENSIC INVESTIGATIONS.



INSURANCE FRAUDS: TACTICS AND TRENDS IN THE INDUSTRY

Abstract:

This article investigates how protections extortion could be an inescapable issue within the industry, costing billions of dollars each year. There are different strategies that fraudsters utilize to misdirect protections companies and policyholders, driving to expanded premiums for legitimate clients. One common strategy is arranging mishaps or wounds to form wrong claims for financial gain. Another strategy is expanding the esteem of misplaced or harmed property in arrange to get the next payout from the protections company. To address this developing issue, protections companies are contributing in innovation and information analytics to distinguish suspicious claims and patterns of false behaviour. It is basic for all partners within the protections industry to work together to combat extortion and ensure genuine policyholders from the budgetary results of misleading hones.

Keywords: Exaggerated damage, Staged accidents, False documentation, medical billing fraud, Insurance fraud, Identity theft, Phantom vehicle claims, Workers' compensation fraud

INTRODUCTION

Protections extortion may be a noteworthy issue that impacts both safeguards and policyholders, driving to expanded premiums and potential money related misfortunes. In spite of these endeavours, protections extortion remains a tireless challenge that requires ongoing vigilance and development in location and avoidance strategies. This deceptive conduct leads to expanded premiums for all policyholders, as protections companies pass on the costs of false claims to their clients.



Protections extortion can take numerous shapes, counting arranged mischances, fake wounds, and expanded property harm claims. These fraudulent exercises not as it were fetched protections companies billions of dollars each year but to weaken the keenness of the complete insurance industry. It not as it were impacting the monetary steadiness of insurance companies but too drives up premiums for legitimate policyholders.

SUB-TOPICS

Strategies Utilized in Protections Fakes

1. False Claims
2. Organized Mischances
3. Overstated Wounds
4. Concealment of Fabric Data

Patterns in Insurance Fakes

1. Technology-Driven Fakes
2. Organized Extortion Rings
3. Cross-Industry Fakes
4. Workers' Stipend Extortion
5. Catastrophe Extortion

Effect of Protections Frauds

The predominance of client protections fakes has critical suggestions for the protections industry, policyholders, and society at huge. Budgetary misfortunes brought about by insurance companies due to false exercises contribute to expanded operational costs, higher premiums for policyholders, and potential impediments in scope and benefits. Besides, the disintegration of belief and judgment coming about from insurance frauds undermines the elemental standards of insurance, impacting the generally stability and adequacy of the protection's framework.



Methodologies to Combat Protections Fakes

A few successful methodologies to combat client protections fakes incorporate:

1. Improved Information Analytics
2. Industry Collaboration
3. Extortion Mindfulness and Instruction
4. Administrative Framework and Requirement
5. Information Analytics
6. Investigative Strategies
7. Collaboration:
8. Extortion Prevention Programs

Despite these endeavours, protections extortion remains a determined challenge, requiring proceeded carefulness and advancement in discovery and anticipation strategies. The rise of social building assaults custom-made to control individuals into divulging confidential data has checked a stressing slant. On the other hand, protections companies are leveraging AI and information analytics to recognize designs characteristic of false action more effectively.

DISCUSSION

Protection extortion may be a far-reaching issue that influences both protection companies and policyholders alike. The strategies utilized by fraudsters are continually advancing, making it troublesome for protection companies to distinguish and anticipate extortion. In expansion to personal fraudsters, organised wrongdoing bunches have moreover been known to commit protection extortion on a bigger scale. These bunches frequently target particular protection approaches or businesses, such as healthcare or auto protections, in order to maximise their benefits. Generally, protections extortion could be a complex and challenging issue that requires participation between protections companies, law requirement offices, and policymakers in order to viably combat.



CONCLUSION

In conclusion, extortion proceeds to be a squeezing issue within the industry with fraudsters utilising advanced strategies and leveraging rising patterns to misdirect safeguards. By remaining watchful and embracing progressed extortion discovery measures, companies can better secure themselves and their policyholders from falling casualty to false exercises. Through proactive measures, improved analytics, and a collective commitment to combat extortion, the protection industry can moderate the effect of client protection fakes and defend the interface of policyholders and partners. The fight against extortion is progressing and complex, with both fraudsters and the protections industry ceaselessly creating unused strategies and countermeasures.



(IMAGE: INSURANCE FRAUD)

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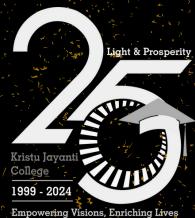


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