INTERNATIONAL ASSOCIATION OF SCIENTISTS & RESEARCHERS

eConference Proceedings

1ST INTERNATIONAL eCONFERENCE-2021 on

EMERGING TRENDS in FORENSIC SCIENCE

30th-31st January 2021

linktr.ee/forensicscienceinstitute

Supported by

Sherlock Institute of Forensic Science India

GREETINGS FROM THE ORGANIZING DESK

The new era post the global pandemic has affected academics, establishments, and individuals' preparedness worldwide. Forensic Science has an interdisciplinary approach and its true essence can be proved meaningful with collaborative efforts of people present around the globe functioning together as a team. With a vision to bring all the academicians, students, and professionals and share their valuable contemplations, the International eConferences are structured to lead the way through endeavors focused to take Forensic to greater heights. We welcome every science enthusiast to become a part of this revolutionizing effort and explore the technological advancements, scientific researches, and opportunities for everyone to flourish.

Dr. Ranjeet Kr. Singh
President
International Association of Scientists and Researchers

Phaneendar B N
Forensic Expert, CEO
Clue4 Evidence Foundation

THE ORGANIZER

INTERNATIONAL ASSOCIATION OF SCIENTISTS AND RESEARCHERS (IASR)

IASR is a non-profit organization focused to deliver the updated literature and research work to not only the global scientific and research society, but also to everyone. Providing open access to critically reviewed high-quality research papers and literature, it works with a mission of providing a user- friendly global platforms for researchers, scientists for sharing information, and dissemination of recent ground breaking researches and advancements in various fields working together for the betterment of the world.

About the eConference

Forensic Science has proffered techniques that have leveled up the competence of humankind and are staying up with the trend. At the outset, the International Association of Scientists and Researchers (IASR) in association with the Sherlock Institute of Forensic Science (SIFS) India organizing the 1st International eConference on "Emerging Trends in Forensic Science", 2021. With utmost enthusiasm, the organizing committee invites the young minds and professionals of various disciplines of forensic science and become a part of the first-ever convention organized with the motto of bringing the unrecognized talents, present globally. The program would follow talks by eminent national and international experts accompanied by e-paper presentations, ePoster presentations, discussions, and scientific excellence awards.

Mission Statement

"Committing towards the fact of being a lead-follower of technology with a bold spirit of risk-taking, helping us make our presence noticeable worldwide".

SPEAKER'S PROFILE

MICHAEL W. STREED

Certified Forensic Artist and Author
SketchCop Academy, USA

Police Sergeant Michael W. Streed is an internationally-recognized forensic facial imaging expert based in Southern California. His long and distinguished career as an award-winning forensic artist began concurrent to his law enforcement career. His skills as a sketch artist for police, coupled with his strong communication skills made him one of country's most sought after police sketch artists. His successful police sketches in several high-profile cases - The Samantha Runnion murder, the Anthony Martinez murder, the Baton Rouge serial killer, and Orange County's Fortune Teller murder, not to mention countless others, has led to the arrest of violent criminals nationwide. Today, he continues to serve as Baltimore Police Department's Forensic Artist, providing them and other police agencies throughout the country, with remote forensic facial imaging services which he conducts from his offices in California.

DR. HARSH SHARMA

Retd. Director
Forensic Science Laboratory, Sagar, Madhya Pradesh, INDIA

Dr. Harsh Sharma is currently serving as Director of State Forensic Science Laboratory, Madhya Pradesh. He is an eminent scholar in Scene of Crime Investigation and having a vast experience of 38 years as a skilled expert in crime scene investigation. He has experienced investigation of around 4000 scenes of crime which include homicide, suicide, accident, rape, explosion and arson cases, etc. With his outstanding skills, he proved to be 100% efficient in solving all the rape cases within the record time of 48 hours. He has been honoured for the achievement by the State Chief Minister of Madhya Pradesh and for presenting the best paper in Crime Scene Management at the All India Forensic Science Conference in Ahmedabad, Gujarat. He has also been awarded a meritorious service award in the scene of Crime Management and for the same by Chief Minister of Madhya Pradesh.

SPEAKER'S PROFILE

DR. SURBHI MATHUR

Senior Assistant Professor
National Forensic Sciences University, Gandhinagar, INDIA

Dr. Surbhi Mathur is currently working as a Senior Assistant Professor, Forensic Science at National Forensic Sciences University, Gandhinagar, Gujarat. She has completed a Certificate Course in Cyber Law as well as is well versed in the Gujarati Language. She has completed her Ph. D. in audio authentication and has a number of papers on her name published in various International and National renowned Journals. She has immense teaching experience and delivered lectures for both graduate and postgraduate students. She has also completed numerous training in various programs from the Directorate of Forensic Science, Gujarat, GEQD, Hyderabad, Central Fingerprint Bureau, NCRB New Delhi etc. She has also been awarded a national research project by the Bureau of Police Research and Development.

MA TERESA G DE GUZMAN

Associate Dean
University of the Philippines Manila, PHILIPPINE

Ma. Teresa G. de Guzman is currently serving as Associate Dean for Planning and Development at College of Arts and Sciences, University of the Philippines, Manila. She is also working as a consultant in cultural anthropologist at Lichel Technologies. She also worked as Department Chairperson at Behavioural Sciences, College of Arts and Sciences, University of the Philippines, Manila. She had enormous working experience as an Associate professor, instructor, and Senior lecturer. She has completed her Doctorate in Anthropology from College of Social Science and Philosophy, University of the Philippines, Diliman, Quezon City. She has a membership of professional associations as PI Gamma Mu International Honor Society, Philippine Alpha Chapter and Beta Chapter, Center for Social Science Research Inc (CASSRDi), and Philippine Anthropological Association (Ugnayan ng Agham Pantao UGAT). She has widespread experience in working at different countries like the Philippines, Thailand, Myanmar, and Indonesia.

SPEAKER'S PROFILE

DR. RAJESH KUMAR VERMA

Deputy Director
Regional Forensic Science Laboratory, Mandi, H.P., INDIA

Dr. Rajesh Verma has about 30 years of experience in research and analytical work out of which more than 20 years in a Forensic Science Laboratory. He is currently working as the Deputy Director, Head of the Regional Forensic Science Laboratory, Central Range, Mandi, Himachal Pradesh supervising the work of different divisions in the laboratory. He has also served as the Assistant Director (2000-2011) in the State Forensic Science Laboratory, Head of the Physics and Ballistics Division. With this, he has also served as Project Associate in the State Council for Science, Technology, and Environment, H.P. Shimla under the Solar House Action Plan for Himachal Pradesh. He has a number of publications in renowned journals in his name. He has also given training to various professionals and students related to the arenas of forensic science and has been continuously contributing and sharing his pool of knowledge with others.

DR. DENISE GEMMELLARO

Forensic Entomologist, Assistant Professor
Kean University, Union and Hillside, New Jersey, UK

Dr. Denise Gemmellaro is currently working as Assistant Professor in the School of Natural and Applied Science, Kean University, Union and Hillside, New Jersey. She excels and has outstanding experience in her academic qualifications. She has experience with an immense interest in forensic entomology, decomposition ecology, Diptera biodiversity, insect ecology, etc. She has such wide research experience for many years and examined different species of insects. She was certified as a Member of the American Board of Forensic Entomology (ABFE). She has also numerous professional affiliations under her name like American Academy of Forensic Sciences, International Association for Identification, European Association of Forensic Entomology, Italian Group for Forensic Entomology, etc. With her amazing approach, she has also involved in forensic cases related with entomological evidence in US and Italy.

SPEAKER'S PROFILE

PHANEENDAR B N

Forensic Expert, CEO
Clue4 Evidence Foundation, Bangalore, INDIA

Phaneendar B N would have been a Network Security Professional along with his Master's degree in science or a professional percussionist which he is passionate. It was when he received a life threat letter and could not find a professional to help him out to identify the author of the letter; he decided to learn Handwriting Identification. In the process of enhancing the skills, he completed the course on Forensic document Examination from American Institute of Applied Sciences, USA and he feels proud that he is being guided personally by International Handwriting Expert Ms. Katherine Koppenhaver, a Certified Document Examiner - USA and reputed author in the field of Questioned Documents. Ms. Debra Dunlap - Forensic Document Examiner of Liberty Investigative Services, Ottawa – Canada is his mentor who helps him in every step of upgradation.

DR. DR. JAYASANKAR P.PILLAI

Forensic Odontologist
Govt. Dental College and Hospital Ahmedabad, INDIA

Dr. Jayasankar P. Pillai graduated BDS from Mahatma Gandhi Institute of Post Graduate Dental Science, Pondicherry. He is presently working as a faculty in the Dept. of Oral Pathology at Govt. Dental College and Hospital Ahmedabad, Gujarat, India with more than 22 years of experience in teaching and dental research. In 2015, he underwent Fellowship training in Forensic Odontology through the Indian Board of Forensic Odontology (IBFO). He completed two years of full-time Post graduation in Forensic Odontology with Gold Medal from Gujarat Forensic Sciences University (GFSU). He has performed dental age estimation in more than 400 medico-legal cases and performed age estimation and sex determination. He is the recipient of two prestigious awards from the Indian Society for Dental Research (ISDR) for his contribution to Dental research. His research publications are published in Forensic Science International-reports, Journal of Forensic Science and Medicine, Journal of Forensic Dental Sciences, Journal of Forensic Radiology and Imaging, and Indian Journal of Dental Research.

SPEAKER'S PROFILE

DR. SUMIT KUMAR CHOUDHARY

Dean & Assistant Professor
Rashtriya Raksha University, Gujarat, INDIA

Dr. Sumit Kumar Choudhary is an established academician, researcher, author, editor, consultant and influential thought leader in the Forensic Science discipline. He is a Gold Medallist in Forensic Science and holds a Ph.D. degree in Forensic & Behavioural Science. He has led the expansion of academics & Executive Development Programmes at RRU, particularly in the field of forensics and has been accredited with his prominent role in developing the Department of Forensic Science at RRU as HoD, which has today developed into School of Forensic Science & Risk Management. He is presently serving as the founder and incumbent Dean of the School. He is also serving as Dean of Executive Development Centre at RRU. He is actively involved in Teaching, Training, Research & Forensic case consultancy. He is Managing Editor of 'International Research Journal on Police Science', Scilla Journal of Forensic Science and 'Kavach' Magazine.

Day 1: 30th January 2021

Time	Topic	Keynote Speaker
11:00 to 11:30 AM IST	Modern Techniques in Facial Imaging & Identification	Michael W. Streed
11:30 to 12:30 PM IST	Silent Witness Speakout at Scene of Crime	Harsh Sharma
12:30 to 01:00 PM IST	Emerging Trends in Multimedia Forensics	Dr. Surbhi Mathur
01:00 to 01:30 PM IST	The Cultural Challenges in Forensic Investigation	Ma. Teresa G. de Guzman

Day 2: 31st January 2021

11:00 to 11:30 AM IST	New Paradigm of Evidence Interpretation	Dr. Rajesh Kumar Verma
11:30 to 12:00 PM IST	Distribution of Forensically Important Flies along Altitudinal Gradients	Dr. Denise Gemmellaro
12:00 to 12:30 PM IST	Next Generation of Digital Forensic Laws	Phaneendar B N
12:30 to 01:00 PM IST	Current and Emerging Trends in Dental Forensics	Dr.Jayasankar P.Pillai
01:00 to 01:30 PM IST	Modern Developments & Current Trends in Questioned Documents Examination	Dr. Sumit Kr. Choudhary

Chairing Panel Day-1

30th JANUARY 2021

CHAIRPERSON

Dr. HEMLATA PANDEY
Seth GS Medical College and KEM Hospital, Mumbai

CO-CHAIRPERSON

VIJAY KUMAR YADAV
Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, Bundelkhand University, Jhansi

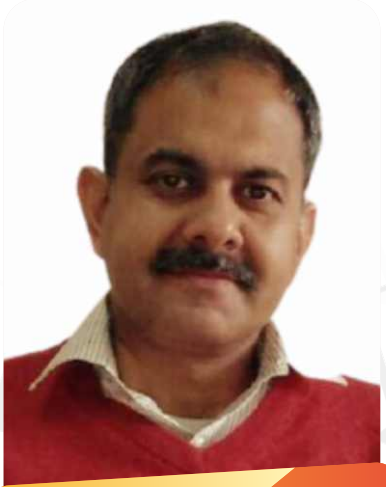
CO-CHAIRPERSON

SEEMA PATEL
Forensic Science Laboratory Patna

Chairing Panel Day-2

31st JANUARY 2021

CHAIRPERSON



Dr. VIJAY ARORA
Dr. R. P. Govt. Medical College, Kangra at Tanda

CO-CHAIRPERSON

Dr. PREETI SINGH
National Post Graduate Autonomous College, Lucknow

CO-CHAIRPERSON

JITENDRA KUMAR
Forensic Science Laboratory Patna

Chairperson for Scientific Presentations Day-1 30th JANUARY 2021

Dr. POOJA PURI
Amity University
Noida

PROFESSIONAL CATEGORY

PAPER PRESENTATION

Dr. UTSAV N. PAREKH
P S Medical college
Gujarat

PROFESSIONAL CATEGORY

ePOSTER PRESENTATION

Chairperson for Scientific Presentations Day-2 31st JANUARY 2021

Dr. RUCHI SHARMA
Forensic Science Laboratory,
Rohini,Delhi

STUDENT CATEGORY

PAPER PRESENTATION

Dr. JAGADISH PRASAD RAJGURU
Hi-Tech Dental College &
Hospital, Bhubaneswar

STUDENT CATEGORY

ePOSTER PRESENTATION

POSTGRADUATE CATEGORY

JURY MEMBERS FOR PAPER PRESENTATION

Dr. SUMIT KR. CHOUDHARY
Rashtriya Raksha University, Gujarat

Dr. RITESH SHUKLA
Ahmedabad University
Ahmedabad

Dr. ANKIT SRIVASTAVA
Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, Bundelkhand University, Jhansi

Dr. JAYASHANKAR P. PILLAI
Govt. Dental College and Hospital, Ahmedabad

JURY MEMBERS FOR ePOSTER PRESENTATION

Dr. RICHA ROHATGI
Amity University
Gurugram

Dr. SURBHI MATHUR
National Forensic Sciences University, Gujarat

Dr. ASHISH BADIYE
Government Institute of Forensic Science, Nagpur

NEERAJ VARSHNEY
Forensic Science Laboratory, Patna

UNDERGRADUATE CATEGORY

JURY MEMBERS FOR PAPER PRESENTATION

Dr. ANU SINGLA
Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, BU, Jhansi

Dr.NEETI KAPOOR
Government Institute of Forensic Science, Nagpur

Dr. MUKESH SHARMA
Forensic Science Laboratory Jaipur

VINNY SHARMA
Galgotias University Greater Noida

JURY MEMBERS FOR ePOSTER PRESENTATION

Dr. KANCHANA KOHOMBANGE
International Hand Analyzing Consultancy, Sri Lanka

Dr. AKHILESH PATHAK
All India Institute of Medical Sciences, Bathinda

Hansi Bansal
Government Institute of Forensic Science, Nagpur

MEBIN WILSON THOMAS
JAIN (Deemed-to-be University), Bengaluru

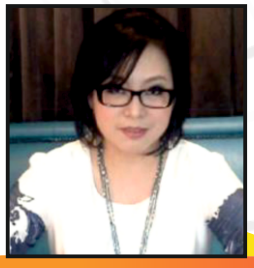
Advisory Board

EMILIO NUZZOLESE
University of Turin, Italy

Dr. RAKESH GOREA
Gian Sagar Medical College, Patiala

RAJ SRIVASTAV
Forensic Science Laboratory Sagar

MAHESH SHARMA
Forensic Expert
India

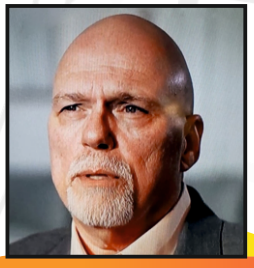


DR. EVI UNTORO
Forensic Pathologist
Indonesia

MICHAEL W. STREED
Forensic Facial Imaging Expert, SketchCop USA

DR. MOHAMMED NASIMUL ISLAM
Forensic Pathologist, Malaysia

TERRI ARMENTA
The Forensic Science Academy USA



KEVIN M. SULLIVAN
Author, USA

ORGANISING COMMITTEE

Convener in Chief
Dr. Ranjeet Singh
President
IASR

Convener in Chief
Phaneendar B. N.
Chairman
Clue4 Evidence Foundation India

Convener
Afreen Tarannum
SIFS India

Convener
Kratika Mishra
SIFS India

Convener
Sheza Azeen
SIFS India

Convener
Vaishnavi Thakre
SIFS India

Convener
Arti Varshney
SIFS India

Treasurer
Thomas T.O.

Organising Secretory
Dr. Pooja Chakraborty

Organising Secretory
Prerna Patel

Organising Secretory
Ruchika Dwivedi

Organising Secretory
Pallavi Mohanty

Organising Secretory
Taniya Jaiswal

Organising Secretory
Priya Singh

Organising Secretory
Falak Khan

Coordinator
Sarang P.

Coordinator
Amberdawn Andres

Coordinator
Anjali Uday Singh

Coordinator
Jewel Dela Ysla

Coordinator
Sheetal

Coordinator
Suchi Parihar

Coordinator
Swetang Patel

Coordinator
Aditi

Core Committee

Dr. HEMLATA PANDEY
Seth GS Medical College and KEM Hospital, Mumbai, India

Dr. RITESH SHUKLA
Ahmedabad University Ahmedabad

Dr. SUMIT KR. CHOUDHARY
Rashtriya Raksha University Gujarat

HANSI BANSAL
Government Institute of Forensic Science, Nagpur

Dr. RICHA ROHATGI
Amity University Gurugram

Dr. ANKIT SRIVASTAVA
Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, Bundelkhand University, Jhansi

Dr. NEETI KAPOOR
Government Institute of Forensic Science, Nagpur

Dr. ASHISH BADIYE
Government Institute of Forensic Science, Nagpur

Dr. KANCHANA KOHOMBANGE
International Hand Analyzing Consultancy, Sri Lanka

NITIN PANDEY
Consultant Cyber, Police Headquarters, Lucknow

Dr. SURBHI MATHUR
National Forensic Sciences University, Gujarat

RAMANDEEP SINGH
Evolve Security, USA

Scientific Committee

Dr. RUCHI SHARMA
Forensic Science Laboratory, Rohini,Delhi

ROHIT JAIN
Advocate
High Court, Indore

Dr. AKHILESH PATHAK
All India Institute of Medical Sciences, Bathinda

MAYANK KR. DUBEY
Mody University, Rajasthan

Dr. MALVIKA MEHTA
National Centre for Handwriting Studies, Pune

Dr. JAYASANKAR P. PILLAI
Govt. Dental College and Hospital, Ahmedabad

Dr. JAGADISH P. RAJGURU
Hi-Tech Dental College & Hospital, Bhubaneswar

Dr. PRAGNESH PARMAR
All India Institute of Medical Sciences (AIIMS), Bibinagar

VINNY SHARMA
Galgotias University, Greater Noida

Dr. PREETI SINGH
National Post Graduate Autonomous College, Lucknow

MADHURI VAGAL
SIFS INDIA
Mumbai

Dr. JANITA JASUJA
National Forensic Sciences University, Gujarat

JIN LEE
Lawyer
New Delhi

Dr. POOJA PURI
Amity University Noida

VIJAY ARORA
Dr. R. P. Govt. Medical College, Kangra at Tanda

VIJAY KR. YADAV
Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, Bundelkhand University, Jhansi

Dr. KALPESH SOLANKI
Rashtriya Raksha University Gujrat

Dr. UTSAV PAREKH
P S Medical College Gujarat

MEBIN WILSON THOMAS
JAIN (Deemed-to- be University), Bengaluru

Dr. MUKESH SHARMA
State Forensic Science Laboratory, Jaipur

SEEMA PATEL
Forensic Science Laboratory, Patna

JITENDRA KUMAR
Forensic Science Laboratory, Patna

NEERAJ KUMAR VARSHNEY
Forensic Science Laboratory, Patna

Dr. ANU SINGLA
Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, BU, Jhansi

GEORGE DIXON
Jamaican Constabulary Force, Jamaica

ANKESH AHIRWAR
Department of Forensic Science, Govt. Holkar Science College, Indore, MP

Dr. LALIT PRATAP CHANDRAVANSHI
CTM-IRTE, Faridabad

Call for ePoster

- The ePoster has to be presented in the PowerPoint 2013/2010 or earlier in 16:9 ratio slides.
- The presentation/ePoster should include scientific researches, review work, interesting case study, etc.
- Maximum 6 slides are allowed for an ePoster. The time limit allotted for the presentation will be 4 minutes followed by a 1-minute discussion.
- A maximum of one or two authors is allowed for an ePoster. In case of two authors, only one author out of the two would be allowed to present the ePoster whose name has to be mentioned beforehand.
- The best ePoster in the two different categories (Graduate and Post Graduate) will be duly acknowledged

Submission of ePoster

- All participants should email their respective abstract (approximate 300 words) and ePoster at iasrforensicconference@gmail.com before the mentioned deadline, 25th January 2021.

Call for Paper

The manuscript should follow the format:

- Title of the paper, Name, Position with Institute/University name, Contact no. and Email Address.
- Approximately 300 words of abstract followed by a minimum of 5 keywords along with the final paper.
- The paper should follow the font Times New Roman size 12 (Justify alignment) and heading size 14 (aligned centrally) in MS-Word Format.
- All references should follow the MLA (8th edition) style.
- All tables and figures should be appropriately numbered.

Presentation of Paper

- The paper has to be presented in PowerPoint 2013/2010 or earlier in 16:9 ratio slides.
- The time limit for the presentation will be 5 minutes followed by a 2-minute discussion.

- The presentation should include an introduction, method and methodology, information regarding collected data, major findings, conclusion, etc.
- The best paper in the two different categories (Graduate and Post Graduate) will be duly acknowledged.

Criteria for Evaluation

- The paper (in English) should be original and unpublished offering new insights, a new approach, or new knowledge to the body of literature.
- Few outstanding papers selected after a blind review process by the committee will be considered for publication in the Academic Journal of Forensic Science, IASR providing free scholarship.

Paper Submission:

- All entries should email their respective abstracts or paper at iasrforensicconference@gmail.com before the mentioned deadline, 25th January 2021.

IMPORTANT:

- No ePoster and paper will be accepted after the deadline that is 25th January 2021. The submission through e-mail would only be acknowledged.
- **All ePoster and Paper abstracts would be published in 'Souvenir' of the Interna onal Associa on of Scien sts and Researchers (www.xournals.com).**
- The 1st International eConference – 2021 would be held over Zoom and would be streamed live on the official channel of SIFS INDIA on YouTube (www.youtube.com/Forensic365 Subscribe beforehand to receive notifications).

Awards for Best Scientific ePoster/Paper

The winners in both UG and PG category will receive:

Three outstanding ePosters would receive an **eCer ficate of Excellence** with **Cash Prize** in each Category

UG Undergraduate

Postgraduate Research Scholar **PG**

Registration Details

NATIONAL ATTENDEES & PARTICIPANTS

Attendee
(Stream live on YouTube)
(No eCertificate provided)
FREE

Attendee (Student)
(Streamed on Zoom & YouTube with Participation eCertificate)
100

Attendee (Professional)
(Streamed on Zoom & YouTube with Participation eCertificate)
250

For UG/PG/Research Scholars

ePoster Presentation
(Streamed on Zoom & YouTube)
500

Paper Presentation
(Streamed on Zoom & YouTube)
500

INTERNATIONAL ATTENDEES & PARTICIPANTS

Attendee
(Stream live on YouTube)
(No eCertificate provided)
FREE

Attendee (Student/ Professional)
(Streamed on Zoom & YouTube with Participation eCertificate)
10 USD

Paper Presentation
ePoster Presentation
(Streamed on Zoom & YouTube)
10 USD

*ePoster and Paper Participants will receive **Conference Participation** and **Competition Participation eCertificate** and Winners would also receive **Prize** along with **Certificate of Excellence.***

CONTACT:

linktr.ee/forensicscienceinstitute

Social media handle:

www.youtube.com/Forensic365
www.instagram.com/Forensicscienceinstitute
www.facebook.com/iasrorg
in.linkedin.com/in/forensicscienceinstitute

Email : iasrforensicconference@gmail.com
Contact : +91-98188-77002
Website : www.forensicevents.com

TABLE OF CONTENT

Paper Category

PA 10	Anuja Jain Lalit Prasad	Nano Forensics: Advance Techniques And Its Significance
PA 11	Amit Mishra	Comparison Of Various Pattern Marks On Country-Made Firearms
PA 12	Puneet Puri Neha Tomar R. K. Sarin S. K. Shukla	Identification Of Shooter Using X-Ray Fluorescence
PA 13	Dr.Preeti Singh	A Comparative Study Of Anthropometric Variations Of Cephalo-Facial Dimensions
PA 14	Vaishali Malik Karpagavalli Shanmugasundaram Ranjeeta Mehta	Pertinence of 3D Printing In Forensic Odontology
PA 15	Dr. Shuchi Srivastava	Mobile Forensics: An Emerging Field Of Forensic Science
PA 16	Dr. Deepak Kumar Dr. Deepak Goel Dr. Vijay Arora	Role of OMICS in Forensic Medicine
PA 17	Pankti Patel	DNA Identification and Forensic Odontology
PA 18	Supraja O D Rida Tabassum Harshitha Y J Nithyashree S Prashanth Kumar H P	Metabolomics in Methanol Toxicity
PA 19	Shreyashee Pandey	Dentition As Marker For Establishing Individual Identity
PA 20	Preeti Kiran Dr. Ranjeet Kr. Singh	Privacy and Security Issues on Social Media
PA 21	Rupal Roy	Ted Bundy: A Case Related to Bite Marks

PA 22	Arsha Ajith A K	Forensic Investigation Techniques of Drowning Related Deaths
PA 23	P H S D Venkatesh	Fingerprints from Fired Ammunition Casings and Purposely Washed Clean Items by RECOVER Latent Fingerprint Technology (RECOVER LFT)

ePoster Category

ePOSTER Code	Author and Co-authors	Title
EP 01	Dr. Sunita R Melwani Prof.(Dr.) Rupinder Singh Dhall	Emerging Trends In Forensic Odontology: Solving Crime – One Tooth At A Time
EP 02	Dr. Surbhi Garg Dr. Mukul Mathur	Metamorphosis of Forensic Odontology
EP 03	Shalvi Suman Kanak Lata Verma	Recent advancement on determination of Arsenic traces via electrochemical sensors-an approach towards lab on Chip
EP 04	Vandana Prasad Lalit Prasad Sally Lukose Prashant Agrawal	The Significance of Nanomaterials in Forensic Fingerprinting
EP 05	Dr. Molly Banerjee	A Case Report Of Death Due To Choking Mimicking Café Coronary
EP 06	Dr. Tweesa Kalariya	Delve into The Third Dimension: Pertinence of 3D Printing in Forensic Odontology
EP 07	Dr. Siddharth Modi	Saliva As Diagnostic Tool in Forensic Odontology
EP 08	Dr. Shivani Sonaiya	Significance of Orodental Tracing in the Identification of Human Body
EP 09	Dr. Pooja Chakraborty	PALE'ODONTOLOGY' : The Whispers of The Carrion

EP 10	Dr. Narendra G. Hadiyal	Tooth - An Important Source of 'DNA' in Forensic Odontology
EP 11	Vikas Razdan	Cyber Terrorism A Detailed Case Study of Investigation: Methodology/ Software/Tools Key to Cyber Forensic Investigation
EP 12	Pradnya Sulke	Forensic Necropsy Of Wildlife
EP 13	Harshitha J Y Nithyashree S Prashanth Kumar H P	METABOLOMICS: An Aid In Cyanide Toxicity
EP 14	Shruti Mishra	Forensic Linguistics- An Emerging Tool For Investigation
EP 15	Jenvita Castelino S.M.G. Jafar Dr. Rajesh Verma	The Likelihood Ratio Classifier For A Binary Classification In Forensic Identification Sciences
EP 16	Sukriti Ghanash Gaurav Kumar Pandey	Fingerprint: A Forensic Tool To Unveil Crime
EP 17	Agnishekhar Chail	Emerging Trends In Forensic Science
EP 18	Priya Singh	Domestic Violence – The Silent Epidemic
EP 19	Diptismita Priyadarshini Kratika Mishra	Poroscopy: A Method Of Identification
EP 20	Bijaylaxmi Jena Kratika Mishra	Hand Geometry Biometrics
EP 21	Muskan Tanveer Arti Varshney Preeti Kiran	Mobile Forensics: An Overview, Tools And Challenges

EP 22	Vishal Khandelwal	Forensic Genealogy: An Emerging Forensic Domain
EP 23	Nishu	Questioned Document And Handwriting Examination

PAPER CATEGORY

RECOGNIZING SUICIDAL TENDENCIES THROUGH HAND ANALYSIS

Dr. Kanchana Kohombange[1]

[1]International Hand Analyzing Consultancy, Sri Lanka
Email – dr.kanchana123@gmail.com

Abstract

Suicide signifies a major category of preventable death in many countries and communities. Suicide is dramatically different, as are its causes. In most cases, there's no single cause, but rather a large number of contributing factors. Suicide, addiction, and depression have a close and interconnected relationship with each other. Depression and drug abuse combine to make a vicious circle that each one too often ends up in suicide. Many of them who experience such severe depression frequently address drugs, alcohol, gambling, and other risky behaviours to numb their pain and/or alleviate their negative feelings. The main objective of this study was to provide the prior identification of suicide tendencies of a person through hand analysis. Obtaining two types of clear handprints who already attempt to suicide several times. Also studied the hands of people who fall victim to suicide. Examined the handprints. Their various aspects were observed under four main streams. Findings can help to speculate about how the death occurred. For example, murders can be made to resemble suicides. Sometimes if the antagonist is cunning enough, suicide could be staged to look like a murder. Hands of people who fall victim to suicide denote drooping headline or abnormal headline, many crisscross lines over the palm area and islanded heart line, dark spots, abnormal finger lengths very commonly. Dermatoglyphic findings and its elemental texture of the friction ridge skin show a significant connection between preferred suicide methods. Results indicated that suicide completers had significantly higher scores on the personality dimension of introversion. Individuals with a substance abuse disorder are most likely to attempt suicide at some point in their life. The results will help mental health professionals to more accurately assess and diagnose any underlying mental health concerns so that they can be properly treated.

Keywords*:* Chirognomy, Chiromancy, Dermatoglyphics, hand gestures, hand analyzing

HAND INDEX OF THE MALE KHATRIS OF DELHI (INDIA)

Deepika Kakkar[1], Dr. K.P.S Khushwaha[2]

[1] Defence Institute of Physiology and Allied Science (DIPAS), DRDO, Timarpur, New Delhi-110054.

[2] Senior Faculty at LNJN –NICFS, Ministry of Home Affairs, Government of India, Rohini, New Delhi.

Abstract

Human Hand being a sensory and motor organ is a versatile part of human body. Hand measurements are used in the fields of, forensic anthropology, biometrics, ergonomics, and reconstructive surgeries, mechanical studies and clinical practice. Studies have been conducted to correlate hand index with the personality of the person and also to the predisposition to certain diseases. To study and classify Hand Index of the male Khatris. The study was conducted on 160 apparently healthy male Khatris of age group 18-50yrs residing in Delhi. Using sliding caliper hand length was measured from interstylion to dactylion of middle finger and hand breadth was measured from metacarpal radialis to metacarpal ulnare. Data was statistically analyzed and compared with that of other Indian populations as well as of the populations of other countries reported earlier. Hand lengths ranged from 15.20 cm to 22.10 cm (mean value =18.29±1.12) and hand breadth from 6.50 cm to 9.60 cm (mean value of 8.05 ± 0.49) .The mean hand Index of males belonging to Khatris was 44.13 falling in the category Mesocheir as per classification proposed by Martin and Seller (1957). The results of the present study show that Khatris can be classified as Mesocheir who have long fingers with short palm. The results of the present study show that Khatris can be classified as Mesocheir who have long fingers with short palm. The morphological characteristic of hand depends on gender, ethnicity, socio-cultural domain, environment & genetic factors which differ from region to region. These studies greatly help in forming human anthropometric Atlas useful in the fields of criminal investigation and evolutionary studies. Hand dimensions are also useful in the identification of mutilated remains in disaster cases, in tracing the ethnicity and geographical origin of the person.

Keywords: Hand index, Ergonomics, Human identification, Criminal investigation, Hand Classification

TONGUE PRINT AS BIOMETRIC AUTHENTICATION

Dr. Sonal Saigal[1]

[1]Institute, RIMS, Ranchi
Email Address- drsaigalop@gmail.com

Abstract

Biometrics refers to a real-time identification system that is used in the identification of a person using a specific physical or behavioural characteristic which is compared with a library of characteristics of many other people. Tongue has unique features which differ from the individual to individual and in between the twins also. Every tongue is different in terms of aspects like shape and texture. The purpose of this review is to understand the morphological shape, classification, texture of the tongue also to assess the usefulness of tongue replica for personal identification in forensic science. Even though many biometrics have been used and developed, there is not much work done on Tongue replica for personal identification. The dorsal surface of the tongue provides significant details from a morphological and structural point of view due to: a. Genetic independence - no two tongues are same in its shape and surface textures. b. Stability over time. c. Physical protection. Therefore, this could serve as a database and a guide for personal identification purposes. The lingual photographic image can enhance personal identification along with other techniques in forensic science.

Keywords*:* Tongue print; Biometric, Identification, Forensic odontology, Tongue code.

DEVELOPMENT OF ANALYTICAL METHOD OF HPLC-UV FOR IDENTIFICATION OF KETAMINE DRUG IN FORENSIC SAMPLES – BLOOD, LIVER AND INJECTION

Adarsh Mishra[1], Amarnath Mishra[1], Bhoopendra Singh[2]

[1] Amity Institute of Forensic Science, Research Scholar, Amity University, Uttar Pradesh, India

[2] Rajendra Institute of Medical Sciences, Associate Professor, Ranchi, India

Abstract

Ketamine is a dissociative anesthetic drug that rapidly induces the patient into unconscious state, its recreational use and abuse has been recognized in many cases and moreover, the high dosage of ketamine drug intravenously during peri-operative by anestheologists emerged a concerned issue. The ketamine drug was extracted from forensic samples such as blood, viscera (liver) and injection by modifying the analytical conditions of HPLC. The aim of the present study is to modify the analytical method of HPLC-UV instrumentation for qualitative and quantitative determination of ketamine in forensic samples such as blood, liver and injection. The modified method is future consideration for the forensic toxicologists in forensic science laboratories for identification of anesthetic drugs in forensic samples. A high performance liquid chromatographic (HPLC) equipped with Ultraviolet Detector was developed for qualitative and quantitative analyses of ketamine drug in forensic samples. The HPLC-UV method was found precise (RSD <0.30) and accurate with mean recovery of 97% which is applicable on all three forensic samples used in the present study. The linearity curve for the ketamine drug presented a good regression line with a coefficient of determination, $r^2 = 0.997$. The method was sensitive which has ability to detect at 0.002 mg/mL of ketamine drug in forensic samples and precise to quantify the lowest limit of analyte. The LOD and LOQ was found to be 0.06 and 0.18. The modified conditions of HPLC-UV analytical method able to identify the ketamine drug at lowest concentration in forensic samples which can be used for future consideration in forensic science laboratories.

Keywords: Ketamine, High Performance Liquid Chromatography, Anesthetic drugs, forensic toxicology, forensic samples

VALIDATION AND CONFIDENCE INTERVAL ESTIMATION FOR THE DETERMINATION OF HEIGHT OF PERSON FROM CCTV FOOTAGE USING REVERSE PROJECTION PHOTOGRAMMETRY

Navdha Bhardwaj[1], Dr.Rajesh Verma[2], Dr. Arnav Bhavsar[3]

[1]Project Engineer, School of Computing & Electrical Engineering, Indian Institute of Technology, Mandi
Contact: +919306454690, Email address: navdhabhardwaj001@gmail.com

[2]Deputy Director, RFSL Mandi, Himachal Pradesh

[3] Associate Professor, School of Computing & Electrical Engineering, Indian Institute of Technology, Mandi

Abstract

The use of video camera surveillance has risen sharply over the past few years. But it is not always possible to enhance a recording to the level that a person can be conclusively identified. Nevertheless, CCTV footage can still be useful in providing lead about the suspect from his physical features like height. Reverse projection photogrammetry, a method to estimate height, requires revisiting the scene and obtaining footage with a calibrated object in place of the suspect. It is important to ensure that the same camera is in place with its position and angle intact. We present a study in determining the height of a person using the reverse project photogrammetry. The effect of the location of the person with respect to the camera is studied and the associated errors are quantified. The intra and inter-examiner errors are quantified to provide the confidence intervals with which the height of the person can be estimated.

The study concludes that the reverse projection method is a simple and efficient way of estimating the height of suspects from the CCTV footage. But there is an overestimation of height at points closer to the camera and underestimation at far off points. The quantum of over or underestimation depends on the height of the subject. It is also inferred that different examiners tend to have different intervals of confidence for the mean height, but these intervals can be narrowed down with practice in locating the line used to estimate height. This study has shown that if the distance of the subject is reasonable far from the camera along the line of axis of the camera the height estimates tend to be accurate. In this study, a distance of more than 3 meters gives a good estimate.

Keywords: CCTV, reverse projection, projective geometry, ImageJ, R software, image analysis

APPLICABILITY OF DEMIRJIAN'S 7-TEETH METHOD USING ITS ABRIDGED METHOD OF AGE ASSESSMENT IN GROWING CHILDREN OF NCR POPULATION: A PILOT STUDY

Ravshish Kaur Kohli[1], S.K.Shukla[2], Ikramul Haque[3], Priyanka Kapoor[4], Aman Chowdhry[5]

[1] Amity Institute of Forensic Sciences, Research Scholar, Amity University, Uttar Pradesh, India

[2]Amity Institute of Forensic Sciences, Head of the Department, Amity University, Uttar Pradesh, India

[3] Central Forensic Science Laboratory, Deputy Director, Chandigarh

[4] Department of Orthodontics and Dentofacial Orthopedics, Faculty of Dentistry, Jamia Milia Islamia, New Delhi, India

[5] Department of Orthodontics and Dentofacial Orthopedics, Faculty of Dentistry, Jamia Milia Islamia, New Delhi, India

Abstract

Estimation of age is one of the crucial aspect in the identification of an individual. Dental age estimation by radiographic methods is commonly used to determine a person's age in the absence of chronological age. The assessment has been standardized utilizing various radiographic methods including demirjian method. An abridged version of demirjian's method has been already applied in Haryana population but not specifically on NCR region. The present study aims to determine the applicability of original Demirjian 7-teeth method (DAEcc7) on growing children aged 8-16 years of NCR population and establish the correlation between dental age and chronological age. In this study, orthopantomograms (OPG's) of 20 children aged 8-16 years were randomly assessed and evaluated for applicability of Demirjian dental age method using DAEcc7 comprehensive chart. Collected data was statistically analyzed and estimated dental age was compared with the chronological age. For all tests, the p-value of <0.05 was considered for statistical significant. The study shows significant results and a strong correlation between dental age estimated by the Demirjian 7-teeth method with the chronological age. The reasonably good results obtained in the present study assert the use of Demirjian 7-teeth method as this method is comprehensively easy to operate and less time consuming. This pilot study supports the use of Demirjian 7-teeth method in NCR population and paves way for further in large sample in same population to accurately establish the correlation of dental age and chronological age.

Keywords: Demirjian's method, forensic odontology, dental age estimation, DAEcc7, forensic science

"SANAN AMPHIBIOUS INCIDENCE RESPONSE UTILITY- DEVELOPMENT OF LIGHTWEIGHT LIVE ACQUISITION TOOL"

Shubhansh Shrivastava[1] Ragini Pandey[2]

[1] Forensic Science Lecturer, Gujarat Police Academy, Karai, Gandhinagar.

[2] Guest Faculty Forensic Science, Sardar Patel University of Police, Security and Criminal Justice, Jodhpur.

Abstract

Digitalisation all over the world is increasing exponentially. From the past two decades computer technology has taken a huge leap, and so does digital crimes. Now it is fairly common to have a storage of 1Terabyte storage, as for seizure or acquisition of evidence bit by bit copy of the evidence is a must as investigators should not work on original evidence. Traditionally, pull the plug method was employed resulting in huge loss of crucial volatile data, which included established connections, running processes, fileless malware, unencrypted keys, ongoing transactions, open ports and many more. Moreover, in cases of big servers we cannot put the whole system down and even in systems which are BitLocker enabled, live imaging of logical partitions or physical drives is to be performed while taking account for changes in registry, memory footprints. This research work focuses on scripting a new tool for live acquisition of Windows device, a standalone utility that can acquire data in accordance with parameters of CFTT, NIST, and thereby strengthening the chain of custody. The author has also compared some parameters in existing commercial as well as freeware tools and also tried to provide solutions to the existing problems. The proposed tool proved to be better than existing tools like Access Data FTK Imager, ProDiscover, and Helix3 etc. in almost all the proposed parameters.

Keywords: Live Acquisition, Standalone tool, Volatile Data, NIST, Digital Forensics.

UNKNOWN JEWELS OF FORENSIC SCIENCE

Ragini Pandey[1], Shubhansh Shrivastava[2]

[1] Guest Faculty Forensic Science, Sardar Patel University of Police, Security and Criminal Justice, Jodhpur

[2] Forensic Science Lecturer. Gujarat Police Academy, Karai, Gandhinagar

Abstract

At primitive level the ABC of investigation is **A**ssume nothing, **B**elieve no one and **C**heck everything. It's clear that forensic science has shaped the world of justice and enhanced the crime investigation while giving significant modern technology. Advancements are quickly taking over every aspect of lives including solving crimes. Forensic science is all about processing the evidences using different forensic equipment to identify the criminal, thereby solving crime. Technology made our knowledge improved as an ability to detect and solve crime using those techniques and evidences which many people think they don't even exist. With all this knowledge it is no wonder that this field is one of the fastest growing fields round the globe. As compared to other evidences, DNA forensic or DNA evidence is the best known for its role in solving crimes and today it is being used in number of areas including biodefence, health care, personal security and yeah of course in law enforcement. But Forensics is also no longer limited to just DNA, new technology and analysis of underdog evidences has allowed for usage of other living and non-living materials beside DNA. There are so many potential pieces of evidences which are extremely common in our daily life but their use in Forensic science has not received much attention. Apart from all the common types of evidences and techniques which are being used in criminal investigation, we in this paper have thrown some light on some evidences and new techniques which are quite new and everyone is not aware of them. Some highlights of the paper include importance of cerumen as an evidence, Use of fingerprints for drug analysis, re-hydration of body tissues for identification, importance of fungi in criminal investigation etc.

Keywords- Advanced forensic, Cerumen, Fungi, Fingerprints, Mummified bodies.

ANALYTICAL APPROACH FOR PRE-BLAST AND POST-BLAST FIREWORK RESIDUES

Ankit Gupta[1], Abhimanyu Harshey[2], Vijay Kumar Yadav[3], Dr. Ankit Srivastava[3], Dr. Kriti Nigam[3]

[1]M.Sc. Forensic Science, Dr. A.P.J. Abdul Kalam Institute of Forensic Science and Criminology, Bundelkhand University, Jhansi

[2]Research Scholar, Dr. A.P.J. Abdul Kalam Institute of Forensic Science and Criminology, Bundelkhand University, Jhansi

[3]Assistant Professor, Dr. A.P.J. Abdul Kalam Institute of Forensic Science and Criminology, Bundelkhand University, Jhansi

Abstract

Gun Shot Residue (GSR) serves as one of the crucial evidence associated with the shooting incidences. Since the use of chemigraphic colour tests for the analysis of GSR it is believed that chemigraphic colour test is most validated method for GSR analyses. Most of the laboratories results related to GSR is based on the chemigraphic colour test. In the past research it was being targeted that the fireworks produce particles which may be similar to gunshot residues. Fireworks are categorized as small display pyrotechnic devices that are utilized for a multitudinous occasion in our community for entertainment in festivals, a commemoration, cultural and religious events due to their properties of being creating excessive noise, lights, smoke, and confetti, etc. As it is believed that the chemical components of both the pyrotechnics as well as the gunshot residues are almost similar, for the confirmation of that, in this research the analysis of fireworks has been done primarily by the same chemical tests which are being used for the analysis of gunshot residues in the laboratory. These chemical tests include tests such as Walker test, Dermal Nitrate test, Harrison Gillroy test, and Sodium Rhodizonate test. To increase the sensitivity and precision, XRF instrumental technique is used since the implementation of lead-free ammunition has been introduced in this study for the examination of both GSR and fireworks residues. The results of both the sample are positive and quite similar. Therefore, it is a challenge towards the application of these instruments as well as chemical tests which are giving positive and exactly similar results for both, the samples of GSR as well as that of fireworks.

Keywords: Gunshot Residue, chemiographic color test, pre-blast residue, post-blast residue

NANO FORENSICS: ADVANCE TECHNIQUES AND ITS SIGNIFICANCE

Anuja Jain[1], Lalit Prasad [2]

[1] Forensic Science Department, School of Basic and Applied Sciences, Galgotia's University, Greater Noida, Uttar Pradesh, India.

[2] Chemistry Department, School of Basic and Applied Sciences, Galgotia's University, Greater Noida, Uttar Pradesh, India.

Abstract

Forensic Science is a branch where it's very important to be efficient whereas with the changing world it is very difficult to stay advanced and updated. Nano- technology is one of the vital units to insight advance results that with in small time. Therefore, its collaboration with some basic sciences is proving to be a boon in forensics. In 1959, Sir Richard Feynman was the very first person to talk nano in his lecture "There's Plenty of Room at the Bottom," without even naming it as nano. Since 1959 to till now, humans have developed some tools and techniques to benefit mankind. Various methods and specific techniques are now a days being used to investigate and analyze the trace evidences found on crime scene. In divisions such as ballistics, questioned documents, fingerprints identification, toxicology, bio-serology etc. the conventional approaches of investigation are in use, forensic experts collect various evidences such as blood, semen, fingerprint, hair etc. and send them to laboratory for examination. Touching every single domain nano has aided us in accuracy, efficiency, sensitivity and even in time management. Fingerprint identification, explosive detection, DNA analysis, illicit drug sensing, counterfeiting etc. are some of the listed examples where nano has given satisfactory results. To extract DNA from blood, hair, skin, semen and saliva magnetic nano particles are being used. In upcoming era fluorescent nano particle will be used to measure concentration of vitreous humor which would be able to determine TSD. Various drugs such as morphine etc. can also be detected using functionalized nano particles. Nano forensic, if explored in right direction may help mass from various criminal activities also is able to serve the justice. This review article targets to enlighten various unsighted achievements in the field of nano forensics and its significance.

Keywords- Forensic science, nano- technology, fluorescent nano-particle, evidences, conventional approaches.

TITLE COMPARISON OF VARIOUS PATTERN MARKS ON COUNTRY-MADE FIREARMS

Amit Mishra[1]

[1]University of Lucknow, Lucknow, Uttar Pradesh.

Abstract

In current scenario, a wide variety of firearms including factory and country made firearms are illegally used for committing prevalent crimes like murder, armed robbery, riot, poaching etc. Following the examination of such factory made and country-made firearms, discernment is made that each firearm is unique following their design, loading pattern and cocking mechanism. Such firearms are also different from standard firearms and due to insufficient literature; a complete research is being required in the field to compare and use for further analyses. This study discuss about the anatomy of country made firearms including their action, individual characteristics as well as the unique pattern of marks. Therefore, it focuses on the analyzing the individual marks present on cartridge after firing i.e. chamber marks, breech face marks, firing pin marks, extractor and ejector marks. Approximately 400 samples were collected from the State Forensic Science Laboratory, Agra (Uttar Pradesh) and were compared by observing the characteristics using hand magnifier and comparison microscope. Out of these 400 samples, it was observed that 120-150 of them had the same pattern of marks and 130-160 of the country-made firearm/improvised country-made pistol had different patterns of the marks that comprised of breech face marks, chamber marks, firing pin marks, extractor marks and ejector marks. Approximately 30-40 have brusted breech of the cartridge therefore, no major marks were obtained for further comparison.

Keywords: Country-Made Firearm, breech face, chamber marks, poaching, firing pin marks

IDENTIFICATION OF SHOOTER USING X-RAY FLUORESCENCE

Puneet Puri[1], Neha Tomar[2], R. K. Sarin[3], S. K. Shukla[4]

[1]Research Scholar, Amity Institute of Forensic Science, Amity University, UP, Noida

[2]Assistant Professor, Amity Institute of Forensic Science, Amity University, UP, Noida

[3] Director, Forensic Science Laboratory, Amaravati, Andhra Pradesh.

[4] Professor & Director, Amity Institute of Forensic Science, Amity University, UP, Noida

Abstract

Presently shooter Identification is carried out by various instrumental techniques like Scanning Electron Microscope coupled with Energy Dispersive X-rays (SEM-EDXA), Atomic Absorption Spectrophotometer (AAS), Induced Coupled Plasma (ICP) etc. The SEM-EDXA is a very costly instrument and running cost is also very high. With AAS and ICP-MS there is a problem of occupational contamination and sometimes comparison of amount of GSR present on the hand of shooter and control are nearly same and it became difficult to give opinion whether a person has fired the gun or not. The present paper suggests a simple and reliable method of identification of shooter. Ten cartridges of 7.65mm were fired by using pistol 7.65mm caliber (manufacture- Indian Ordnance Factories) and GSR were lifted from back and palm of shooting hand by using plastic applicator tipped with tape having adhesive on both the sides .These samples were then irradiated under XRF .The results shows that after firing the amount of GSR (Pb, Sb, Ba &Cu) are considerably larger on back and palm of shooting hand than in control(matrix) and it can be concluded that person had fired the firearm

Keywords: Shooter, Identification, SEM-EDX, GSR, XRF

A COMPARATIVE STUDY OF ANTHROPOMETRIC VARIATIONS OF CEPHALO-FACIAL DIMENSIONS

Dr.Preeti Singh[1]

[1]Assistant Professor, Department of Anthropology, National P.G. College Lucknow
preetisinghtomar@yahoo.com

Abstract

Since the very beginning of anthropology, anthropometry has played a vital role in acknowledging human evolution and variations. It is a technique used to measure somato-metric dimensions of a body whether living, dead or a cadaver. Anthropometry had its importance in population variation and racial classification, but its newer applied magnitudes have gained heights in various other fields ergonomically. The present study focuses on the cephalo- facial aspects of two group of females- the Brahmin and the Rajput of Lucknow district which are endogamous in nature, having common gene pool. Thus, are Mendelian populations? 600 individuals were randomly selected as sample for the study (300 for each group). These types of studies are significant in India because India exhibits varied forms of castes, creeds, religions, culture, and customs. It is seen that the two group of females under study have more differences for their cephalo- facial measurements. The similarities or say insignificant differences in two endogamous groups can be attributed to parallelism and their adaptive environments.

Keywords: - Anthropometry, Mendelian population, Cephalometry, Females, Brahmin and Rajput.

PERTINENCE OF 3D PRINTING IN FORENSIC ODONTOLOGY

Vaishali Malik[1], Karpagavalli Shanmugasundaram[1], Ranjeeta Mehta[1]

[1] Department of Oral Medicine & Radiology, Seema Dental College & Hospital, Rishikesh, Uttarakhand, India. HNB Garhwal University, Srinagar

Abstract

Three-dimensional (3D) printing is the forerunner in today's digital dentistry. It has revolutionized the field of healthcare and is making critical in roads today in forensics, driven primarily by its superior customization propensity. In dentistry it is used to create study models for surgery and orthodontics, surgical stent, and metal prosthetic frameworks. The technology that was originally known as Rapid prototyping (RA), is now referred to as additive manufacturing, which is popularly known as 3D Printing has brought about a complete revolution in the process of prototyping and manufacturing in every field. 3D printing enables creation of accurate physical models that may minimize the previously encountered errors during forensic analysis. The major application of 3D printing in forensic odontology includes bite mark analysis, 3D facial reconstruction, dental age estimation, gender determination, chelioscopy, and physical models. The technology of 3D printing can be boon to forensic odontology, the biggest advantage being the noninvasive reconstruction of detailed anatomic structures which can be used to solve cases which could be accepted in court of law. As increasing resolution and better software become available, and as costs decreases, this technology is taken up by more users in all fields.

Keywords: 3D printing and three dimensional, additive manufacturing, bite mark analysis, forensic odontology, rapid prototyping

MOBILE FORENSICS: AN EMERGING FIELD OF FORENSIC SCIENCE

Dr. Shuchi Srivastava[1]

[1]Assistant Professor, Department of Anthropology, National Post Graduate College, Lucknow
E mail: shuchi.anthro@gmail.com

Abstract

Digital forensics, a branch of forensic science, focuses on the recovery and investigation of raw data from electronic or digital devices. Its various branches are computer forensics, network forensics, mobile forensics, and so on. Mobile forensics is related to the recovery of digital evidence from mobile devices. The present paper deals with the various aspects of mobile forensics. Mainly the secondary sources of data have been used here for the study. It is found that as the world is speedily witnessing technology and user migration from computers to mobile phones, so the emerging field of Mobile Forensics is becoming an unavoidable part of forensic investigations. The main stages of mobile forensics process are seizure, acquisition and examination or analysis. However, there are various challenges in the recovering digital evidence from mobile phones like hardware differences, mobile operating systems, mobile platform security features, lack of resources, preventing data modification, anti-forensic techniques, dynamic nature of evidence, accidental reset, device alteration, passcode recovery, communication shielding, lack of availability of tools, malicious programs and legal issues etc. but it is rare to conduct a digital forensic investigation that does not include a mobile phone.

Keywords: Forensic Science, Mobile Phones, Forensic Investigations, Mobile Forensics, Digital Forensics,

ROLE OF OMICS IN FORENSIC MEDICINE

Dr. Deepak Kumar[1], Dr. Rajeev Goel[2], Dr. Vijay Arora[3]

[1]Junior Resident, Department of Forensic Medicine.

[2] Professor and Head, Department of Biophysics.

[3] Professor and Head, Department of Forensic Medicine &Toxicology, Dr. Rajendra Prasad Government Medical College, Kangra at Tanda (H.P.)

Abstract

The field of Forensic Medicine is aligned to other branches of science like Forensic Science, Toxicology, Psychiatry, Genetics and many more. Forensic Science shares a common scientific methodology with other science disciplines, so OMICS emerge as an uprising step in Forensic Medicine and Forensic Science. Role of OMICS in various branches of medical fields became a hot topic and has seen a rising trend in last few years. Now various Forensic studies are being conducted in OMICS with future perspective. The branch of science known informally as OMICS basically means various branches in biology whose names end with the suffix OMICS like genomics, proteomics, metabolomics, transcriptomics etc. OMICS aims at the collective characterization and quantification of pool of biological molecules like metabolites, proteins, and genomes etc. that translate into the structure, function, and dynamics of an organism or organisms. With the development of technology ,OMICS based study becomes cost effective, faster and very enlightening and gives an idea for alternatives to conventional techniques. Metabolomics, proteomics, genomics, transcriptomics, and their subdivisions interact with each other. This close relationship amongst the OMICS provide more reliable and useful information when it is used in combination and the data achieved from at least two OMICS is used. These novel approaches in Forensic Medicine and Science are of high importance to promote and reinforce evidence-based evaluation of medico-legal questions in trauma cases, crime scene related issues and the issues related to cause, mechanism and the manner of death. Further advanced studies need to be performed to incorporate OMICS into routine medico-legal investigation of death in autopsy cases.

Keywords: OMICS, Genomics, Metabolomics, Transcriptomics, Proteomics.

DNA IDENTIFICATION AND FORENSIC ODONTOLOGY

Pankti Patel[1]

[1] PG student, Department of Oral Medicine and Radiology, Ahmedabad Dental College and Hospital, Ahmedabad.

Abstract

DNA identification is an advanced tool in the field of forensic odontology and it is mainly used when the conventional inspection method fails due to very little human remnants or they are extremely damaged. Dental Pulp or crushed teeth can provide nuclear or mitochondrial DNA that helps to identify a person. Tooth pulp is considered as the best source of dental DNA. With the use of Polymerase Chain Reaction technique, multiple identical copies can be generated from trace amount of original DNA evidence and then can be analysed using various DNA Profiling Tests. The currently employed DNA profile tests are reliable methods for human identification. . Some of the advanced techniques in DNA profiling are Restriction Fragment Length Polymorphism Typing, Short Tandem Repeat (STR) Analysis, Y-Chromosome Analysis, X-Chromosome STR, Single Nucleotide Polymorphism Analysis, mtDNA Analysis, Gender Typing and DNA methylation analysis. Hence, DNA analysis can provide highly accurate identification if used correctly.

Keywords: DNA, Forensic Odontology, Polymerase Chain Reaction, Recent Advances, Human Identification, DNA Profiling.

METABOLOMICS IN METHANOL TOXICITY

Supraja O D[1], Rida Tabassum[1], Harshitha J Y [1], Nithyashree S[1], Prashanth Kumar H P[2]

[1] BE Biotechnology, Sapthagiri College of Engineering (Affiliated to VTU, Belagavi)

[2]Assistant Professor, Sapthagiri College of Engineering (Affiliated to VTU, Belagavi)

Abstract

The field of "omics" which deals with the study of metabolites (small molecules) within the living cells, tissues or organisms is known as Metabolomics. These metabolites are still able to interact with biological system and this interaction is understood as Metabolome. The product of metabolism are influenced by environmental and genetic factors. Metabolomics best represents the molecular phenotype. This field studies small molecules at the range of 50-1500 Da. It is evaluated that, in plants there are around 200,000 metabolites while in humans it is evaluated that there are 3,000 common metabolites. These evaluations are approximates since it is difficult to work out the low-abundance molecules. Overall, it provides, valuable information about what causes changes in our health. Metabolomics in forensic toxicology is of much importance, since it provides an in-dept analysis of altered metabolic pathways that are targeted by harmful chemicals. One such chemical is discussed in this context, that is methanol toxicity. Methanol is an extremely weak base and it exists in all living organisms starting from bacteria to humans. Methanol itself is not toxic, while its metabolites, formic acid and formaldehyde are responsible for its toxicity. It is potentially toxic when the concentration is more than 340 mg/L. The concentration of methanol in blood is 400 - 1000 times less than the toxic concentration. Metabolomics plays a major role in identifying these metabolites through a number of the detection techniques such as NMR, GC-MS, HPLC, etc. The methanol toxicity shows visible signs during a postmortem. Thus, metabolomics is involved in toxicology testing, drug compliance, genetic disorder tests, drug phenotyping and eventually, it also facilitates the understanding of direct cellular phenotypes that are induced by the toxic chemicals such as methanol, arsenic, cyanide, etc.

Keywords: Omics, metabolomics, metabolites, methanol toxicity, postmortem appearances.

DENTITION AS MARKER FOR ESTABLISHING INDIVIDUAL IDENTITY

Shreyashee Pandey[1]

[1] MSc Anthropology, University Of Allahabad
Email id- shreyapandey1617@gmail.com

Abstract

Forensic odontology is the scientific discipline that utilizes the principles of dentistry to aid in the positive identification of human remains. Forensic anthropologist work very closely with forensic odontologists who apply their knowledge of dentition, dental appliances and dental work in the realm of positive identification and bite mark analysis. Dental features such as tooth morphology, variation of shape and size, wear patterns, color and position of the tooth and other dental anomalies give every individual a unique identity. Thus, the assistance of forensic odontologists is often requested when human remains are decomposed, buried, skeletonized, or beyond the point of clear facial recognition due to severe facial disfigurement. The role and importance of odontology in the judiciary is fast growing and hence a depth knowledge of the same is justified. This paper aims at providing an overview of dental evidence and their use in forensic identification. It highlights the importance of the dental records in the efficient identification of the conflict victims. A case study has also been given to better understand the application of odontology in establishing individual identity.

Keywords- Forensic odontology, positive identification, bite-marks, facial disfigurement, dental anomalies.

PRIVACY AND SECURITY ISSUES ON SOCIAL MEDIA

Preeti Kiran[1] Dr. Ranjeet Kr. Singh[2]

[1]Kurukshetra University

[2] Sherlock Institute of Forensic Science, SIFS INDIA

Abstract

In recent years, with the evolution of digital era, the use of internet is increasing. Its use is not only limited for the purpose of commerce or education but is widely used for maintaining the connection among people. Social media has become a part of daily life of humans as it helps to communicate people all over the world. As it has an advantage of creating connection among people, it also has a major disadvantage which is a threat to privacy of users. Every one of us loves to upload and showcase our lives to all our near and dear ones but only few of us know the basic threat that can lead to breach of information out of our social accounts. There is a large amount of identity theft, theft of personal information, defamation, cyber stalking and many other cyber criminals' activities on social media. All these cybercrimes that occur on social media is a great challenge for a forensic investigator. In this paper, we will study the types of issues an individual can face on social media regarding the privacy and security and the amount of awareness an individual has about the privacy policy of the social networking sites. Along with the privacy awareness of the users, we will acknowledge the forensic challenges on social media for the investigation.

Keywords: Social Media, Privacy, Social Networking sites, Threats, Risk factors, Privacy Awareness.

TED BUNDY: A CASE RELATED TO BITE MARKS

Rupal Roy[1]

[1] Student of Forensic Sciences, Amity University

Abstract

Basically, now a day's committing crime is a normal thing. So, for that the good knowledge of evidences help us to deal with the heinous crimes such as sexual assault, rapes, homicides, child abuse cases etc. As Bite marks is encountered as one of the most important and valuable evidence in these types of cases. Location, size, and number of bite marks can be used as a beneficial indicator of which type of crime and shows feasible group of suspects. As this paper aims that how bite mark is act as an important evidence in different cases and how it helps to find out the actual culprit. But bite mark analysis is really a very challenging task for forensic odontologists. The science of bite mark identification basically links suspect to a crime. These bite marks are seen when teeth are used as weapons of anger, excitement, destruction and even it also talks about the type of abuse.

Keywords: Bite mark, Forensic odontologist, homicide, weapon

FORENSIC INVESTIGATION TECHNIQUES OF DROWNING RELATED DEATH

Arsha Ajith AK[1]

[1] MSc Forensic Science, Jain (Deemed to be University), Kochi
Email: arshaajithak@gmail.com

Abstract

Drowning is a form of violent asphyxia death, caused by aspiration of fluid in to air passages, caused by complete or partial submersion in water or other fluids. Thus, death occurs either due to entry of the fluid in the respiratory passages or due effects of severe water and electrolyte imbalance. In significant number of water related deaths are attributed to accidental drowning, other possibilities must be considered in the investigation of these manner of death while a smaller but significant number represent suicidal or homicidal drowning. Accidental drowning is the commonest manner of death followed by suicidal drowning. Homicidal drowning is rare but if occurs be associated with other findings like associated injuries. Homicidal drowning, the hand and feet of the victim may be tied with weights. Determine the cause of death in bodies found in water is quite challenging which can be achieved with thought investigation. The experts in the field of forensic medicine are facing difficulties in estimation of time, cause, manner and mode of death. And able to explain biological changes affecting water related death victim and recognize pathological findings associated with water deaths and to explain the challenges associated with investigation and autopsy findings. Review of literature: In this study was included detailed history related to the case of incident, mode of death, investigation techniques, manner of death and other relevant findings were obtained from the study records. Conclusion: In this study focus to improve the different techniques of investigation of bodies found in water focuses on victim identification, evaluation of autopsy findings and determination of the cause and manner of death.

Keywords: Drowning related investigation techniques, Biological changes of body, Types of drowning, Pathological findings, the challenges associated with investigation and autopsy findings.

FINGERPRINTS FROM FIRED AMMUNITION CASINGS AND PURPOSELY WASHED CLEAN ITEMS BY RECOVER LATENT FINGERPRINT TECHNOLOGY (RECOVER LFT)

Pappu Hima Sai Durga Venkatesh[1]

[1] Student, School of Forensic Science and Risk Management (SFSRM), Rashtriya Raksha University, Gujarat

Abstract

Fingerprints are considered as the versatile and easily encountered type of evidence on the field of forensic investigation. Fingerprint investigation can help to link the offender to the crime because of the basic characteristic of fingerprints which includes uniqueness, permanency and consistency. Fingerprints are still considered as the most widely established forms of forensic evidence used by law to certainly identify an individual. Criminal offenders have a fundamental goal not to leave any traces at the crime scene. Some may suppose that bullets after firing and items recovered from water will have no forensic value, therefore, they try to destroy the traces by cleaning items in water. These traces are subjected to the destructive environmental effects. This can represent a challenge for forensic experts investigating fingerprints. The RECOVER Latent Fingerprint Technology (RECOVER LFT) study was conducted to determine the latent fingerprints on Fired Ammunition Casings and Purposely Washed Clean Items at different time interval. The quality of the developed fingerprints depending on the used method was assessed. The latent fingerprints deposited on metallic, plastic and glass objects and submerged in fresh and sea water for 1- 10 days can be recovered. After recovery, the prints were examined under **DCS 5** Fingerprint Imaging Workstation and **CSU-2** (Cylindrical Surface Unwrapper) technique. Each print was evaluated according to fingerprint quality assessment scale. RECOVER Chemical Vapor Enhancement technique develop latent prints that have the highest mean visibility score after firing of bullet and also after submersion in water for 1- 10 days. Mean visibility score of prints developed shows significant decline after 10 days of submersion. ***RECOVER LFT*** is an ideal process for the treatment of all metallic and washed items. Whilst developing finger marks on fired ammunition and washed items may be standout applications, the **RECOVER LFT** technique is capable of delivering exceptional results on a wide range of metallic and washed items.

Keywords: Latent Fingerprints, Recover Latent Fingerprint Technology, Fired Ammunition Casings, Washed Clean Items, Dcs 5 Fingerprint Imaging Workstation, Csu-2 Technique.

EPOSTER CATEGORY

EMERGING TRENDS IN FORENSIC ODONTOLOGY: SOLVING CRIME – ONE TOOTH AT A TIME

Prof.(Dr.) Rupinder Singh Dhall[1], Dr. Sunita R Melwani[2]

Abstract

Forensic medicine is the application of medical and paramedical scientific knowledge to certain branches of law, both civil and criminal. It is a vital instrument during investigation of a crime and administration of justice. It provides crucial information found at the crime scene. Forensic dentistry allows the participation of a dentist in identification of the victim and is a fascinating branch of forensic medicine that involves the application of dental sciences through comparison of ante- and post-mortem records. The use of human teeth for identification dates back to as early as 49 AD. Ever since, forensic dentistry has evolved. Apart from dental record maintenance, dental imaging techniques, bite-mark analysis, DNA analysis using oral tissues, cheiloscopy, and rugoscopy, recent additions include facial reconstruction, denture identification, tongue prints and implants. This ePoster is aimed at providing an overview of the emerging trends in forensic odontology with presentation of a few landmark cases that were solved with the help of a forensic dentist. The landmark cases include the famous bite mark case of Theodore Robert Bundy, Nirbhaya case solved by Dharwad dental college and identification of a headless man through facial reconstruction. Forensic odontology has a lot of scope for development and every dental surgeon must be made aware of the available technologies in this field. Researches and incorporation of new technology must be encouraged in this field to learn and understand human identification.

Keywords: Paramedical, Forensic Odontology, Dentist, Post-mortem Records

METAMORPHOSIS OF FORENSIC ODONTOLOGY

Dr. Surbhi Garg[1], Dr. Mukul Mathur[1]

[1] Post Graduate, Rajasthan Dental College & Hospital, Jaipur, Rajasthan, India

Abstract

Teeth are the most indestructible part of the human body. They survive not only after death but remain unchanged for many thousands of years, even if the deceased, burnt or dismembered. One of the unique characteristics of human morphology is the human dentition that withstands the test of time and temperature. Uniqueness is also due to variety of treatment given by the dentist. Forensic odontology has three major areas of utilization includes diagnostic and therapeutic examination and evaluation of injuries to jaws, teeth, and oral soft tissues. The identification of individuals, especially casualties in criminal investigations and/or mass disasters. Identification, examination, and evaluation of bite marks which occur with some frequency in sexual assaults, child abuse cases, and in personal defence situations. The technique applied in modern dentistry has evolved through the evolution of humankind, starting way back from the Garden of Eden to the modern scenario in the identification of the accused in the rape case in state capital of India. Hence, an insight in the metamorphosis of forensic dentistry is a prerequisite in understanding the evolution of forensic odontology and forensic medicine, to establish understanding, awareness and importance in medicolegal matters for the fabrication of justice and trust in the society for the future generations.

Keywords: Human Dentition, Forensic Odontology, Teeth, Justice

RECENT ADVANCEMENT ON DETERMINATION OF ARSENIC TRACES VIA ELECTROCHEMICAL SENSORS-AN APPROACH TOWARDS LAB ON CHIP

Shalvi[1], Suman[2], Kanak Lata Verma[3]

[1]Amity institute of Forensic Sciences (Research Scholar)

[2]Amity institute for Advanced Research and Studies (Materials & Devices) Amity University, Noida, U.P 201301

[3]Regional Forensic Science Laboratory, Chanakyapuri, New Delhi

Abstract

In this paper we are dealing with the Arsenic heavy metal, where arsenic naturally occurs in the environment, Region specific rises in arsenic concentrations in soil caused by human activities are indeed the consequence of humans transporting and allocating naturally produced arsenic. For generations, Arsenic has maintained everyone's fondness, partly because it has long been known for its poisonous properties. This was also called a "feasible" method of killing a person, even not only for human but also veterinaries since arsenic after death was so difficult to detect as well as it is cheaply available in the general market areas. Murder through arsenic nowadays is easier to discern, however the current forensic problem has been the detection of sources of arsenic in the environment because since we are in the urge of industrialization we are keep ignoring the consequences of pollution in environment which leads to the heavy metal deposition in the ground water, as per the guidelines via WHO the permissible amount of arsenic in water is 10 µg/L while in India it is 50 ppb. Since, sensor term is been widely used by many sectors. There are lots of studies going on at nano level to determine the traces of Arsenite/Arsenate such as colorimetric determination by the presence of AuNPs, AgNPs weather as a particles or star capping. While talking about creating a probe which are capable to determine the metal ion as well as quantify on the spot here we take a look on Electrochemical based sensors such as CNTs, rGO etc. capped on gold nanoparticles, enzyme based biosensors etc. voltammeters as DPV, ASV, CV are now days become trend to detect metal ion from the surface at micro level. So studies are at bloom to determine a metal at nano levels without using chemical procedures which are able to skip the traditional chemical fiasco and well equipped laboratories.

Keywords: Arsenic, Feasible, Industrialization, Gold nanoparticles

THE SIGNIFICANCE OF NANOMATERIALS IN FORENSIC FINGERPRINTING

Vandana Prasad[1], Lalit Prasad[2], Sally Lukose[3], Prashant Agrawal[4]

[1] Forensic Science Department (School of Basic and Applied Sciences), Galgotias University, Greater Noida, Uttar Pradesh

[2] Chemistry Department (School of Basic and Applied Sciences), Galgotias University, Greater Noida, Uttar Pradesh

[3] School of Allied Health Sciences and Research, Sharda University, Greater Noida, Uttar Pradesh

[4] College of Traffic Management (Institute of Road Traffic Education), Faridabad, Haryana

Abstract

The demand for a selective and effective method for developing fingerprints are indeed needed in daily routine case work. Since, more than a decade, the use of nanomaterial has shown a better and smarter way of identifying fingerprints. Because fingerprints are very fragile, especially latent fingerprint which are invisible to the naked eyes. Therefore, it loses quality and stability over course of time. However, nanomaterial acts on the fingerprint component that remains intact with them by some chemical or physical interaction. Thus, nanomaterial can be used as a fingerprint detector, which holds an immense future potential towards latent fingerprint identification on different porous and non-porous surfaces.

Keywords: Latent fingerprints, Nanomaterials, Porous surface, Non-porous surface, Fingerprint detector

A CASE REPORT OF DEATH DUE TO CHOKING MIMICKING CAFÉ CORONARY

Dr. Molly Banerjee[1]

[1] Department of FMT, R G Kar Medical College, Kolkata
Email: drmolly.fmtnrs@gmail.com

Abstract

Choking is complete obstruction of the airway by foreign body to obstruct the lumen of the trachea - leading to Violent Mechanical Asphyxial Death. It mostly accidental, very rarely homicidal. The common victims are children, elderly, lunatics and those excessive alcohol intake before eating food. The objective is to report a rare case of sudden death detected during autopsy and to ascertain the cause and manner of death. The material and methodology includes Information from Police Inquest, History from the family members, Medico Legal Autopsy and Reports of Viscera from FSL. A cases study of 23 year old, male subject, was taken to R G Kar Medical College and Hospital where he was declared brought dead by the on-duty medical officer, advised post-mortem examination to determine the actual cause of death. He had an H/o drinking alcohol before eating food in a restaurant, where he suddenly fell down from his seat onto the ground, unconscious. The Medico Legal Autopsy reveals Sub – Conjunctival haemorrhage revealed bilaterally, Cyanosis, Non-specific physical signs, all organs including lungs and heart congested, petechial haemorrhages over visceral surfaces of the pleurae and pericardium, evidence of congestion and a lining of thin mucus over the walls of the tracheal and laryngeal lumen, a small oval black seed like structure of size 1.5 cm x 1 cm and usual Viscera preserved. The conclusion include death due to choking is sudden in onset giving a very little time to treat.

Key Words: - Choking, Cafe Coronary, Trachea, Asphyxia and Seed

DELVE INTO THE THIRD DIMENSION: PERTINENCE OF 3D PRINTING IN FORENSIC ODONTOLOGY

Dr. Tweesa Kalariya[1]

[1] PG Student, Oral Medicine and Radiology, Ahmedabad Dental College and Hospital

E-mail:tweesakalaria5@gmail.com

Abstract

Three dimensional (3D) printing is the forerunner in today's digital dentistry. It has revolutionized the field of healthcare and is making critical in roads today in forensics, driven primarily by its superior customization propensity. The major application of 3D printing in forensic odontology includes bite mark analysis, 3D-computed tomography facial reconstruction, dental age estimation, sex determination, and physical models. 3D image capture devices minimize the amount of angular distortion, therefore such a system has the potential to create more robust forensic evidence for use in courts and medico-legal cases. The use of 3D digitizing systems such as laser scanners, structured light scanners, photogrammetry, etc. has revolutionized the field of forensic sciences. Application of this technique allows presentation of any evidence of human origin without any bias, with minimal degradation thereby reducing subjective errors.

KEYWORDS: 3D printing and three dimensional, additive manufacturing, bite mark analysis, forensic odontology, rapid prototyping

SALIVA AS A DIAGNOSTIC TOOL IN FORENSIC ODONTOLOGY

Dr. Siddharth Modi[1]

[1]Ahmedabad Dental College and Hospital

Abstract

Forensic odontology or forensic dentistry is a branch of dentistry science which applies dentistry knowledge in law reinforcement process by examining living or dead body, including saliva analysis in crime and other investigation. In recent years, saliva has attracted much interest among researchers especially in the field of forensic sciences. This complex body fluid is gaining popularity due to its ease of collection, safety in handling and its close relationship with plasma. Saliva is used as a diagnostic tool for teeth and oral cavity structure identification. Saliva is often detected in scenes of crime along with bite marks or lip prints where the oral cavity may have been involved. Saliva is usually deposited in bite marks found in many homicides, assault and other criminal cases. Saliva has also been used for biologic profiling to determine age, gender, and personal characteristics of individuals for reconstructive identification.

Keywords: Saliva, Biologic Profiling, Forensic odontology, forensic dentistry

SIGNIFICANCE OF ORODENTAL TRACING IN THE IDENTIFICATION OF HUMAN BODY

Dr. Shivani Sonaiya[1]

[1] Department of Oral Medicine and Radiology Ahmedabad Dental College and Hospital, (Gujarat) India.

Abstract:

Identification is an establishment of individuality of a person either dead or living. Identification may be required in living persons in the case of absconding criminals, soldiers, missing persons, impostors, escaped prisoners, lunatics, etc. Identification may be essential where unclaimed dead bodies are found, bodies which are decomposed beyond recognition and in cases where highly mutilated bodies or skeletal remains are found. Forensic dentistry has a very important role in identification of the unidentified body. Forensic odontology is a branch of forensic medicine which, deals with the proper examination, handling and presentation of dental evidence in court of law. The most common role of the forensic dentist is the identification of deceased individuals. Dental identification of human being plays an important role in criminal, monetary disputes marital, social, burial, and identification of individual missing for prolonged periods. Teeth and other orodental structures play a crucial role in the process of identification. Every person has peculiar dental arch, structure of the rugae area and palatal vault. Size and shape of the teeth are not identical in human beings. An expert odontologist analyses all aspect in the identification process. So, my poster presentation is to review the significant aspects of the orodental tracing in the identification procedure.

Keywords: Antemortem, DNA, Forensic Dentist, Odontology, Postmortem

PALE'ODONTOLOGY': THE WHISPERS OF THE CARRION

Dr. Pooja Chakraborty[1]

[1] Department of Forensic Odontology, National Forensic Sciences University, India.
Mail ID: pooja14asd@gmail.com

Abstract

A forensic odontologist not only serves as crime solvers but can also aid in reconstructing the past. Teeth excavated from archaeological sites around the world give us insights into dietary trends of the past. Wear and markings on specific areas of teeth helps us to figure, what a person or population was accustomed to eating when they died. Teeth showing normal wear and markings may indicate a diet predominance. Caries show us that starch had been incorporated into the diet. Research has shown that dental issues became more prevalent as humans began to farm. While this information is quite exciting, there are many other facts we can learn about ancient times through archaeology. Due to their ubiquitous nature in Archeological sites, teeth are like treasure troves of ancient human remains. Thousand years ago, hunter-gatherers caught fish using teeth. Scientists know this owing to handful of ancient teeth, whose plaque revealed microfossils of fish scales, fish flesh and starch granules. That calcified bacterial gunk helped researchers understand the diet of the hunter-gatherers—once thought to be a nearly impossible task, since there are so few human remains from the time period, and foodstuff doesn't generally survive in the fossil record. Archaeological miracles that are teeth. Teeth are disproportionately prevalent in archaeological sites: scientists often find dozens or hundreds for every sample. That's because the enamel covering a tooth is 97 percent mineral, and teeth are stronger than bones, so they're more likely to survive. Dental bio archaeology is the connection of the past in present. This review poster is to help understand the role of teeth and a forensic odontologist in deciphering the skeletal remains information.

Keywords: Paleodontology, Bioarchaeology, Paleogenomics, Dental modifications, Paleodemography

TOOTH-AN IMPORTANT SOURCE OF 'DNA' IN FORENSIC ODONTOLOGY

Dr. Narendra G. Hadiyal[1]

[1]Department of Oral Medicine and Radiology, Ahmedabad Dental College & Hospital

Abstract

With the ever-increasing crime rate in our society, the field of forensic sciences has become highly evolved. Forensic dentists play a pivotal role in various areas of crime scene investigations and thereby help solve innumerable mysteries. Teeth appear to be vital pieces of evidence in several such investigations. Teeth are preserved in the closed cavities of the mouth and are generally resistant to the threatening environmental conditions that may be associated with the death of an individual, making them very useful in postmortem analysis. Teeth thus obtained may be useful in age estimation of the deceased victim or in determining his blood group. Identification of individuals in mass disasters can also be performed based on the unique morphological characteristics of the human dentition and through dental DNA fingerprinting. Thus, teeth prove to be an important adjunct in forensics. Its scope is ever-increasing with time, and a great amount of research is being carried out to implement the same. My poster is on DNA from tooth. Teeth prove to be very helpful adjuncts in forensic dentistry. Owing to their properties and characteristics, they can be readily available and easily processed for several investigations.

Keywords: DNA Fingerprinting, Human Dentition, Forensic Dentistry

CYBER TERRORISM A DETAILED CASE STUDY OF INVESTIGATION: METHODOLOGY/ SOFTWARE/TOOLS KEY TO CYBER FORENSIC INVESTIGATION

Vikas Razdan[1]

Abstract

Digital forensics Seizure, Acquisition and Analysis, Forensic methodologies used to investigate terrorist laptop at the XYZ place provided us with the information that the terrorist use of chat rooms and mails to be in constant touch with their associates and this provided us the information about their associates working in other parts of the state/country. Cache files and temporary internet files provided the information the website used by the terrorist to access their organizational website. Images of various terrorist camps obtained from laptop seizure gave lot of information that where the terrorist camps were located as forensic examination of images using exif data extractor gave the GPS coordinates of terrorist training camps. MS Word, Excel, PDF, Images files (jpeg, giff, bmp, tiff), video files (avi, mpeg, dat, mov) and audio files (mp3, wav and rm) related to the case, MS Outlook contacts, email messages, messenger chat history, cache files, Temporary Internet files, contact lists from Outlook Documents related to "How to make chemical bomb", "How to prepare for Jihad", "How to be a suicide bomber" along with other materials were also recovered. "How to plant bomb and how to spread terror" was obtained from Laptop & other valuable information for the security agencies in getting the information about the terrorist organizations and their counterparts, funding sources, terrorist training camps and their locations? This was the case of cyber terrorism and the cyber forensic investigation played a vital role in getting the valuable information.

Keywords: Digital Forensic Seizure, Cache files, GPS, Terrorism

FORENSIC NECROPSY OF WILDLIFE

Pradnya Sulke[1]

[1] M.Sc. Forensic Science, Government Institute of Forensic Science, Nagpur

Abstract

Necropsy refers to post-mortem examination of wild animals to determine the cause, mode and the manner of death. Forensic necropsy is the application of necropsy in legal settings for investigation of animal related crimes. They are conducted by trained veterinary pathologists. Performing necropsy is recommendable where the cause of death is uncertain. The tissue samples are collected and are sent for histopathologic examination by the pathologist, if the cause of death could not be concluded from gross necropsy. Necropsy has its major role in investigating the cases of protected species. Another application lies in maintaining health records of the endangered species and thus has valuable importance in National surveillance. Necropsy also has its application in finding species, sex and age of the animal. Necropsy helps to find out post-mortem interval which has its prime role in investigations in suspected wildlife crime cases. Besides these, it has many other applications and thus need attention of the researchers for more advancements in the field.

Keywords: Forensic, necropsy, investigation, pathologist, endangered species, autopsy.

METABOLOMICS: AN AID IN CYANIDE TOXICITY

Harshitha J Y[1], Nithyashree S[1] and Prashanth Kumar H P[2]

[1] BE Biotechnology, Sapthagiri College of Engineering (Affiliated to VTU, Belagavi), Hesaraghatta Main Road, Bengaluru, Karnataka

[2]Assistant Professor, Sapthagiri College of Engineering (Affiliated to VTU, Belagavi), Hesaraghatta Main Road, Bengaluru, Karnataka.

Abstract

Any chemical can be harmful when taken in large quantity or in certain conditions. Toxicity is the degree to which an organism can be damaged or harmed by a particular substance. For the forensic toxicology, a mechanism of toxicity provides perception as to how a chemical or physical agents can cause death or incapacitation. To understand the mechanism of such toxic compounds, metabolomics plays a major role. Metabolomics is the field of "omics" which deals with the study of small molecules/ metabolites within the living cells, tissues or organisms. It is influenced by environmental and genetic factors providing in depth analysis of altered metabolic pathways that are targeted by harmful chemicals in forensic toxicology. Acute toxicity may harm an organism in short term exposure. A true poison like arsenic and cyanide is lethal if consumed in very small amounts also. Metabolomics helps in detection of cyanide concentration by understanding the metabolic pathway of electron transport chain in mitochondrial cells. Cyanide refers to a chemical containing carbon- nitrogen bond (C-N bond) having negatively charged ion. It causes arrest of aerobic metabolism in living beings as CN binds to the iron atom in cytochrome C oxidase in mitochondria of cells. Its exposure most often occurs via inhalation or ingestion.One of the cyanide case study discussed in this context is about a 41 year old man who was intoxicated by cyanide in a metal chrome plating shop. Though the patient was given the cyanide antidote kit, he was declared dead due to the prolonged CNS failure. The methodology used were GC-MS and HPLC chromatographic techniques upon which the cyanide concentration is determined. Some of the treatment procedures include intravenous injection of sodium nitrite, sodium thiosulphate, and sodium glyoxyate and so on to cure cyanide toxicity in humans. The metabolite concentrations, physical characteristics, phenotypic changes and the postmortem appearance are discussed in detail.

Keywords: Metabolomics, Forensic toxicology, Metabolite, Phenotype, Chromatography, Cyanide.

FORENSIC LINGUISTICS- AN EMERGING TOOL FOR INVESTIGATION

Shruti Mishra[1], Kratika Mishra[2]

[1] P.G Student, Centurian University

[2] Senior Scientific Officer, Sherlock Institute of Forensic Science, SIFS India

Abstract

Now-a-days forensic science has become an integral and important part in crime scene investigations which applies natural, physical and social sciences to resolve legal matters. Among the many subfields of forensic sciences; forensic linguistics is relatively new subfield that studies the different intersection between language and legal field. It is the application of linguistics knowledge, methods and insights to the forensic context of law, language, crime investigation, trial and judicial purpose. Forensic linguistics is divided into two sub-branches. First one is the spoken language and the second one is the written language. The discipline of forensic linguistics is not homogenous; it involves a range of experts and researchers in different areas of field i.e. understanding language of written law, understanding language use in forensic and judicial process, the provision of linguistic evidence. It also includes the study of forensic stylistics, discourse analysis, linguistics dialectology, forensic phonetics and author identification etc. One of the main goals of forensic linguistics is to provide a careful and systemic analysis of language because 'language really matters' as language is the largest medium for communication. Forensic linguistics used in crimes like plagiarism, terrorism, kidnapping, suicide, blackmailing, threatening etc. It also helps in identifying a criminal or a person. But the most important thing is to remember about forensic linguistics is that it is not only used to find the guilty but also to protect the innocent.

Key words: - Forensic sciences, Linguistics, Forensic linguistics, crime scene investigations, Judicial purpose, Context of law.

THE LIKELIHOOD RATIO CLASSIFIER FOR A BINARY CLASSIFICATION IN FORENSIC IDENTIFICATION SCIENCES

Jenvita Castelino[1], S.M.G. Jafar[2], Dr Rajesh Verma[3]

[1] Ex-student, Department of Forensic Science, Amity University (Dubai), UAE.
Email: jenvita.c@gmail.com

[2] Ex-student, Dr. A.P.J. Abdul Kalam Institute of Forensic Science & Criminology, Bundelkhand University Jhansi, Email: smgjafar04@gmail.com

[3] Regional Forensic Science Laboratory, Mandi -175001 (H.P) India
Email: rkumar.65@gmail.com

Abstract

Likelihood ratio is an expression of the strength of evidence. In various comparative forensic disciplines such as voice comparison and DNA, the likelihood ratio framework is currently considered as the logically correct approach to evidence interpretation. The key concept of this approach is that it incorporates the similarity of evidence (how similar is the questioned evidence to the reference) as well as typicality i.e. how common or rare is the evidence in a larger population, to provide the strength of evidence. Consequently, absolute "matching" or "identification" is not possible and only the quantitative strength of evidence should be given. The likelihood ratio (strength of individual evidence) is to be considered by the trier of the fact, in view of other circumstantial evidence to arrive at a decision of identity or exclusion. The likelihood ratio is the ratio of the probabilities of the evidence for two competing hypotheses; one the prosecutors hypothesis and the other defense hypothesis. Here, we need to know the probabilities for two competing hypothesis; one would be, given that the accused is the offender; what is the probability of recovering the evidence; and the other one, given that some other person than the accused is the offender; what is the probability of recovering the evidence? The ratio of these probabilities will be the likelihood ratio. Whether the likelihood ratio is greater or less than '1', would determine which of the two competing hypotheses is favored. Higher the likelihood ratio higher will be the strength of evidence. This paper shows that the likelihood ratio with its threshold at '1' can be used as a classifier when there are only two classes. The likelihood ratio can be constructed from the mean and standard deviation values for the attributes of the two classes. Intuitionally the likelihood ratio classifier is similar to the naive bayesian classifier as it involves two conditional probabilities. Preliminary comparisons with other classifying algorithms reveals that the performance of the likelihood ratio classifier is equal to the logistic regression classifier and can sometimes surpass that of the naive bayesian classifier.

Keywords: Forensic science; Identification; DNA; facial comparison, voice comparison; Likelihood Ratio classifier

FORENSIC: A FORENSIC TOOL TO UNVEIL CRIME

Sukriti Ghanash[1], Gaurav Kumar Pandey[1], Arti Varshney[2]

[1] B.Sc. Forensic Science, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj

[2] Jr. Scientific Officer, Sherlock Institute of Forensic Science, SIFS India

Abstract

Fingerprint is an impression left by the friction ridges of a human finger. A fingerprint is an individual characteristic, no two fingers have yet been found to poses identical ridge characteristics. A fingerprint remains unchanged during an individual's lifetime. Fingerprints have general ridge pattern that permits them to be systematically classified. Due to these important features fingerprints have been the benchmark for personal identification in the legal community. In March 1990 in Virginia, the body of a 22 years young female Dawn Bruce was discovered in her home, who had been sexually assaulted and stabbed to death. Unfortunately the only piece of evidence seemed useful was a blood stained pillow case found adjacent to its body. During close examination of bloodstains, a faint stain seemed to express ridge details. Furthermore, it was believed that some of the stains appeared to have been transferred from the blade of a knife. As no knife had been found at the scene of the murder, Investigators focused on the potential fingerprint detail and transferred the evidence to Virginia division of forensic science. Where 1, 8 -Diazafluoren-9-one (DFO), which was relatively new chemical developer at the time, was applied to bloodstain to make fluoresce. Due to the poor quality of print culprit couldn't identified. A relatively new image enhancement technique was used to improve the image of the latent print and the image was successfully enhanced to the extent for identification purposes. But due to plain prints it 'didn't match to the suspects' prints. Further during the post mortem examination another evidence semen was found on victim's leg. The initial serological report got matched with the suspect. Later the rolled prints were compared with the partial prints where the left thumb of Robert knight got matched. On 18th June 1991 on the basis of serological report and fingerprints Robert knight was found guilty for the murder of Dawn Bruce and given for life sentence. According to Dr. Edmond Locard's principle of exchange it is true that whenever two objects come in contact, a transfer of material occurs.

Keywords: Fingerprint, Bloodstains, Post-Mortem, Serological Report

EMERGING TRENDS IN FORENSIC SCIENCE

Agnishekhar Chail[1]

[1] SIFS India, Forensic Science Institute

Abstract

It is important to secure the crime scene because anyone that isn't a trained professional can possibly containment or even destroy the evidence. Physical evidence consist of tangible objects, such as biological material, fibre and latent fingerprints. In most cases those are preserved potentially, but with time, mostly in outdoor crime scene, the position of the object (evidences), are altered and many unnoticed potential evidences are lost, due to natural phenomena. As per Indian super court's recent decision, towards a giant leap towards digitisation of criminal investigation, police in six major cities, including Delhi, and Mumbai, will mandatory conduct videography of a crime scene. Taking a step ahead, proposing the idea of using omnidirectional camera and presenting it in a VR experience. The scene can be captured using a camera set up 8 micro four thirds sensor consisting of catadioptric optical system. The crime scene can be presented digitally and be preserved for further use. Concluding the above mentioned abstract using an omni-directional camera to make a VR experience and further to an AR presentation, can benefit investigator, as the next investigator, no matter after how long after the crime, can witness the crime scene as witnessed by the first investigating officer. In such way, problems arises by alteration of the position of the objects from a crime scene due to natural phenomena can be avoided. And further the AR presentation can be used to train new forensic investigators and the VR presentation for preservation and further reconstruction of the scene

Keywords: Natural phenomena, Omnidirectional camera, Cat dioptric

DOMESTIC VIOLENCE – THE SILENT EPIDEMIC

Priya Singh[1]

[1] M.Sc Forensic Science, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P

Abstract

Domestic violence (also named domestic abuse or family violence) is violence or other abuse in a domestic setting, such as in marriage or cohabitation. Domestic violence is often used as a synonym for intimate partner violence, which is committed by one of the people in an intimate relationship against the other person, and can take place in heterosexual or same-sex relationships, or between former spouses or partners. The grasp of domestic violence perpetrators has tightened in times of the pandemic in India. Abuse victims are distanced from their regular support systems making it difficult for them to call out for help. As, the Prime Minister of India on 24 March 2020 announced a nationwide lockdown to contain the spread of the Novel Corona virus. Within a fortnight, the National Commission of Women (NCW) reported a 100% rise in complaints of domestic violence cases. The situation of increase in cases of domestic violence is not restricted to only India. The lockdown has brought the world to a standstill. The lives of women across the globe, who are in an abusive relationship have also come to a halt. The same violence is repeated and perpetrated frequently, and on a regular basis during the lockdown. Various domestic violence helplines and organizations all over the world are working constantly to deal with this global issue.

Keywords: Domestic violence, Heterosexual, Pandemic, Abuse victims, Global Issue

HAND GEOMETRY BIOMETRICS

Diptismita Priyadarshini[1], Kratika Mishra[2]

[1]P.G Student, Centurian University
[2]Senior Scientific Officer, Sherlock Institute of Forensic Science, SIFS India

Abstract

Biometric is used for verification purposes and it is widely used for security purposes as it provides a high degree of accuracy in recognizing an individual. Biometric systems are automated methods of verifying the identity of a living person based on some physiological as well as behavioral characteristics. Among all the types of biometric systems, the Hand geometry biometric system is one of them. This biometric system comes under physiological biometric. Hand geometry is a part of dactyloscopy. In this system, the measurement of dimensions of a person's hand is done. The recorded data of the person's hand is compared to the data stored in the database and then an individual can be verified. This system can be used only for verification not for identification. Nowadays this system is used in forensic sciences in crime scene investigation; by using this system an individual can be verified. It is used in case of a mass disaster, used to determine the sex and age of the person, used to determine the palm print whether belongs to a human or animal, used to detect the palm print left on the document while signing. This system is storage efficient, easy to collect samples and computations are also very easy.

Keyword- Biometric, Hand geometry system, person verification, forensic sciences, security purpose

POROSCOPY: A METHOD OF IDENTIFICATION

Bijaylaxmi Jena[1], Kratika Mishra[2]

[1] P.G Student, Centurian University

[2]Senior Scientific Officer, Sherlock Institute of Forensic Science, SIFS India

Abstract

Fingerprints are the prints which are formed by the papillary ridge at the distal position of finger and thumbs. Poroscopy is a method of identifying of a person from a fingerprint through the comparison of the impression of the sweat pores. Like ridge characteristics the pores are also permanent, immutable and individual. In this method rolled and plain fingerprints of person along with their palm prints were obtained. It can be classified on the basis of size of the pores, inter-spacing, shape of the pores, position of the pores and number of pores per unit area etc. These prints were developed by various standard method such as powder method, iodine fuming, ninhydrine and silver nitrate method. Due to the microscopic nature of the pores, they are seen in powdered image occasionally, but they are revealed in chemically developed image more often. The result achieved in the present study indicates that the identification with the help of poroscopy is as reliable and accurate as ridge characteristics. It is an auxiliary science of papiloscopy, since it participates in one of the stages of the process carried out for the identification of a person through the study of papillary ridges of the pores. It is also called as the third level details and also reliable. The study of poroscopy may provide useful information about sweat pores present on friction ridges and their utilization for personal identification up to an extent in the cases where very few ridges will be encountered on the crime scene. These data can further be used in forensic research involving individual identification from poroscopy.

Keywords- Poroscopy, Fingerprint, Individual identification, Papiloscopy.

MOBILE FORENSICS: AN OVERVIEW, TOOLS AND CHALLENGES

Muskaan Tanveer[1], Arti Varshney[2], Preeti Kiran[2]

[1]Amity Institute of Forensic Science, Amity University, Noida, Uttar Pradesh

[2] Junior Scientific Officer, Sherlock Institute of Forensic Science, SIFS India

Abstract

Digital forensics deals with the recovery of data and other important information from the electronic devices. Mobile forensic is one of the branches of digital forensics which deals with recovery of information from the mobile phones. In mobile forensics, usage of tools or softwares is done to analyse the mobile devices found at the crime scene having an evidentiary value. This is noticed with the increased usage of mobile phones and acquisition of daily usage data. Investigation has lead to know the involvement of sharing uncensored pictures or unethical images. This in turn increased the potential for data stored on mobile phone handsets to be used as evidence in civil or criminal cases. This work presents the information that can become potential evidence on mobile phones. It also discusses some of the recovery and acquisition tools used in mobile forensics. It also highlights some of the challenges of mobile forensic. Moreover chain of custody and laws related to it will be discussed here.

Keywords: Mobile forensic, cyber, digital, oxygen forensic, hash value, evidence.

FORENSIC GENEALOGY: AN EMERGING FORENSIC DOMAIN

Vishal Khandelwal[1], Arti Varshney[2], Kratika Mishra[2]

[1]Department of Forensic Science, Parul University, (Vadodara) Gujarat

[2] Sherlock Institute of Forensic Science, SIFS India, New Delhi

Abstract

Forensic technology has rapidly gained popularity as an investigation tool for law enforcement. Forensic DNA profiling identifies unique pattern in alleles, STRs (short tandem repeats) at specific locations (called loci) on an individual's genome. This allows for DNA matching between two individuals. A DNA sample is analysed where DNA sequences at 13 specific locations create a DNA profile of an individual revealing their identity. When the DNA profile is matched from the database, it matches with all 13 similar locations of the DNA with the identical DNA sequence in the data base. In case of not an exact match or having enough similarities, indicates that the sequence belongs to related individuals, suggesting a partial match. Forensic Genealogy is the process of using DNA matches to reverse engineer a family tree. It is use to identify unknown, missing persons and it is also help to identifying family members in cases of adoption and guardianship.

In recent years, jurisdiction of United States is showing interest to aiding criminal investigation through the use of familial DNA searching. Combined DNA Index system (CODIS) ,FBI manage the system of database between jurisdictions across the countries California, Colorado, Texas and Virginia—use this procedure for familial searching and partial match analysis.

Familial DNA searching identifies relatives of the offender or perpetrator. A familial DNA search result of a lead that is follow up and investigated until a DNA sample of the suspect or offender is collected or tested.

Keywords: Forensic, DNA, familial DNA, CODIS, DNA profile

QUESTIONED DOCUMENT AND HANDWRITING EXAMINATION

[1] Nishu

Abstract

A questioned document is any document whose authenticity is disputed. Investigators often need to examine or verify the authenticity of a document that could be used as evidence in court or aid is an investigations. Such documents are known as Questioned Documents. Handwriting analysis falls into the questioned documents section of forensic science. Handwriting analysis is looking for small differences between the writing of sample where the writer is unknown. Handwriting analysis between questioned document and known handwriting. A key element of document examination focuses on handwriting. The proper care and handling of document evidence, such as forged checks, anonymous letters, and comparison specimens ("standards") of a suspect's writing, is as much the responsibility of investigating officers as is the original investigation conducted for the purpose of obtaining or discovering these documents. Documentary evidence must be preserved in the same conditions in which it was found in order to maintain its integrity. The damage might diminish the legibility of the writing and therefore reduce the value of the evidence.

Keywords: Questioned Document, Forensic Science, Investigators, Standards

In Association with

SFSRM