

JFI Abstracts from 2020

Issue 4: October to December 2020

Should Crime Scene Photos Ever be Deleted?

Author(s): Pelletier, Jonathan

Type: Commentary

Published: 2020, Volume 70, Issue 4, Page 389

Abstract: There are two general opposing positions regarding deleting photographs of a crime scene. In a recent laboratory update (internet based because of COVID-19), the Virginia Department of Forensic Science raised an issue that warrants discussion: DFS position - Best (and most transparent) practice - any image captured in the course of processing a crime [scene] should be retained, no matter the quality or the intent (or lack thereof, such as an accidental shutter depress [sic]) [1]. With conventional film, this was never an issue. There was no option to delete an image. With digital images, however, the option exists and should be considered when establishing good policy and procedure.

An Unusual Case of Multiple-Gunshot Suicide with Nine Gunshot Wounds by an Active-Duty Soldier

Author(s): Adams, Joshua L.

Type: Case Report

Published: 2020, Volume 70, Issue 4, Page 395

Abstract: This case report discusses the suicide of a 36-year-old male who was an active-duty United States Army soldier. The victim discharged his firearm nine times and suffered multiple injuries, including several heart-perforating wounds, yet was able to perform prolonged physical activity before succumbing to his self-inflicted injuries. Toxicological analyses of urine and cavity blood tested positive for antidepressants and migraine medication, but not for alcohol. The history, scene, and autopsy findings, along with further police investigation, indicated suicide, although this was not readily apparent at the onset of the investigation.

Use of a Photograph from a Deactivated Facebook Account to Identify Fingerprints

Author(s): Grilli, Nova

Type: Case Report

Published: 2020, Volume 70, Issue 4, Page 407

Abstract: Three years after a homicide occurred, information about the murder weapon was discovered during court preparation. A search warrant for a Facebook account resulted in the identification of the defendant through an image of a hand holding a firearm that was the same make, model, and caliber as the murder weapon. Confirmation through the Integrated Ballistics Identification System and a comparison by a trained examiner revealed the firearm to be the murder weapon. The identification from the image, along with other evidence in the case, resulted in the defendant pleading guilty.

Chemical Testing for Presumptive Blood on Items and the Ground Below Them During Months of Exposure to Sun, Rain, and Rust

Author(s): Pope, Lisa

Type: Technical Note

Published: 2020, Volume 70, Issue 4, Page 416

Abstract: This study examined how exposure to outdoor elements, including rainfall, warm summer months, and sprinkler usage, could affect phenolphthalein presumptive testing on blood-soaked plastic, metal, rusty items, and the ground below them. The tested items were placed in an open outdoor area location for five and a half months during the Pacific Northwest season change from spring to fall. Testing resulted in the ability to obtain positive phenolphthalein reactions on the items themselves and the groundcover, dirt, and moss below.

Intentional Flash Overexposure for the Visualization of Blood and General Wetness on Dark-Colored Clothing

Author(s): Rimmasch, Paul

Type: Technical Note

Published: 2020, Volume 70, Issue 4, Page 428

Abstract: This technical note discusses the use of intentional overexposure with a flash during visible light photography to visualize blood and wetness on dark-colored clothing. The results showed that the intentional overexposure with the flash during visible light photography may approximate infrared's ability to visualize blood stains. This technique can also show wetness (water) on dark-colored clothing. These results suggest that when an infrared camera is not available, some documentation of blood or wetness may be accomplished with this technique.

LQMetric: A Latent Fingerprint Quality Metric for Predicting AFIS Performance and Assessing the Value of Latent Fingerprints

Author(s): Kalka, Nathan D; Beachler, Michael; Hicklin, R. Austin

Type: Article

Published: 2020, Volume 70, Issue 4, Page 443

Abstract: We describe LQMetric, an automated tool for measuring the image quality of latent fingerprints. The value returned by LQMetric is an estimate of the probability that an image-only search of the Federal Bureau of Investigation's (FBI) Next Generation Identification (NGI) automated fingerprint identification system (AFIS) would hit at rank 1 if the subject's exemplar (rolled) fingerprints are enrolled in the gallery. LQMetric can also be used in assessing the value of latent fingerprints in non-AFIS casework. LQMetric is incorporated into the FBI's Universal Latent Workstation (ULW) software and has been used operationally since 2014. The development of an automated latent fingerprint quality metric was driven by practical use cases including predicting the likelihood of successful AFIS matching; helping examiners determine whether an image-only or human-markup search is more appropriate for a particular latent fingerprint; supporting a quality-directed workflow whereby a backlog is prioritized based on quality or lower quality latent prints are directed to highly experienced examiners; or providing an objective difficulty measure for quality assurance purposes such as flagging complex prints for special handling or additional verification. We describe how LQMetric was developed and trained, how well it predicts NGI AFIS search results, and we also discuss human examiner latent fingerprint value assessments.

A Further Evaluation of the Electrodeposition of Gun Blue (eGB): Part 1–Fingermarks

Author(s): Dove, Aaron

Type: Article

Published: 2020, Volume 70, Issue 4, Page 465

Abstract: Previous publications by Dove showed that adding an electric charge to a metal substrate when developing fingermarks using gun blue improves the contrast and quality of the resulting fingermark development compared to both the passive gun blue version and the other standard development techniques. This paper performed a deeper analysis of the electrodeposition of gun blue (eGB) by

examining the sensitivity of the technique to external factors, including the impact of the donors, matrix, substrate, and age of the fingerprint. The study showed that the eGB performed well and was surprisingly resistant to external variations.

A Further Evaluation of the Electrodeposition of Gun Blue: Part 2– Integration with Subsequent Forensic Analyses

Author(s): Dove, Aaron; Hockey, Daniel; Knowles, Laura; Wilkinson, Della

Type: Article

Published: 2020, Volume 70, Issue 4, Page 497

Abstract: Previous studies by Dove have shown that adding an electric charge to the treatment of brass or nickel-plated cartridges by gun blue improves the contrast and quality of the resulting fingerprint development when compared to current operational techniques. In order to determine whether the electrodeposition of gun blue is suitable for operational deployment, its impact on subsequent forensic techniques must be assessed. This paper examined the impact of electrodeposition of gun blue, palladium deposition, and passive gun blue deposition on subsequent DNA extraction and analysis using the Promega DNA IQ System and phenol-chloroform extraction techniques. It also examined the impact of the electrodeposition of gun blue on subsequent toolmark examinations. The electrodeposition of gun blue, passive deposition of gun blue, and palladium deposition all negatively impacted the subsequent DNA analysis, to varying degrees. Therefore, alternate DNA analysis techniques would need to be considered. The electrodeposition of gun blue also had a negative impact on some of the weaker toolmarks used in toolmark analysis, indicating that toolmark examination should be performed first.

Back to Basics

Author(s): Siegel, Sandy

Type: Article

Published: 2020, Volume 70, Issue 4, Page 532

Abstract: Funny finds from all over in their own words.

Issue 3: July to September 2020

Knuckles and Fingerprints: A Comparison and Case Study

Author(s): Kadane, Joseph B.

Type: Commentary

Published: 2020, Volume 70, Issue 3, Page 265

Abstract: When a person flexes the hand to make a fist, the dorsal-side skin near the knuckles tightens. When the fist is relaxed, the skin may fold, creating lines variously called wrinkles and creases. In a recent case, these lines were the evidence that was used to try to identify a defendant. The charges against the defendant, Devin Whitfield [1], included child pornography. Part of the evidence consisted of an image taken on a cell phone that included the dorsal side of knuckles. The prosecution called a qualified fingerprint analyst. In light of her expertise in fingerprint analysis, it is useful to review the similarities and differences between knuckle creases and fingerprints.

Survey for the Use of ACE-V in the Physics and Pattern Interpretation Disciplines

Author(s): Mattei, Aldo; Kriel, Louis; Schwarz, Matthew; Swofford, Henry

Type: Technical Note

Published: 2020, Volume 70, Issue 3, Page 275

Abstract: In 2016, the Organization of Scientific Area Committees (OSAC) for Forensic Science established an interdisciplinary subcommittee to develop a common structure harmonizing the examination methodologies across several pattern evidence disciplines. As part of this objective, members of the subcommittee considered various references that have been used to describe pattern evidence examination methods. The most common approach was ACE-V, an acronym for analysis, comparison, evaluation, and verification. Although members of the OSAC interdisciplinary subcommittee recognized the popularity of ACE-V in notable publications and reference manuals, there are no studies providing baseline data regarding the extent to which ACE-V is actually indicated in the laboratory policies and procedures for use throughout the pattern evidence disciplines. To fill this gap, members of the subcommittee conducted a survey of 480 forensic science practitioners across 19 different countries. Results of the survey suggest ACE-V is referenced in approximately 87% of laboratories; however, there appears to be significant variability in terms of the basis of the policies and procedures and application when performing comparative examinations. Consequently, although ACE-V provides a common description, there is a need to establish a standardized application within disciplines and a common basis across disciplines.

Evaluating the Accuracy and Weight of Confidence in Examiner Minutiae Annotations

Author(s): John, Jeremy; Swofford, Henry

Type: Article

Published: 2020, Volume 70, Issue 3, Page 289

Abstract: This study evaluates the accuracy in the level of confidence given to minutiae annotations in latent prints by examiners. During the analysis phase of the ACE-V methodology, examiners may use a color-coded annotation system known as GYRO (green-yellow-red-orange) to annotate their level of confidence in the presence of a particular ridge event in the latent accurately reproducing and corresponding back to the record of origin. Although the GYRO system is a useful tool for examiners, there have been few studies to evaluate how accurate examiners are in their perceived confidence levels when using the system to annotate latent prints in the analysis phase. Examiners were asked to perform an analysis on latent prints using the GYRO system, and the results were compared against the ground truth known record prints. It was found that when examiners marked ridge events indicating they were highly confident in their existence, they were accurate approximately 96% of the time. When examiners marked ridge events indicating they had a medium level of confidence, they were accurate approximately 82% of the time. In addition, the examiners markings were analyzed using friction ridge image quality software to assess how well examiners subjective levels of confidence compared to automated quality assessments. When correlated to the examiners markings, the data demonstrated that image quality software had the potential to be used in policies and procedures, to move towards standardized determinations of a prints suitability to move further in the ACE-V process.

The Influence of Cyanoacrylate on the Efficiency of the Fingerprint Detection Technique Amido Black

Author(s): Bouwmeester, Martine; Kroos, Jeroen

Type: Article

Published: 2020, Volume 70, Issue 3, Page 311

Abstract: The sequential processing of cyanoacrylate with the reagent amido black (also known as acid black 1) on blood fingerprints was investigated. A depletion of seven fingerprints with blood was placed on stainless steel strips, and the fingerprints were aged for 1, 3, and 6 months. A methanol-based amido black solution was used. To further evaluate the influence of age, a second test was conducted with eight aging periods of between 1 day and 6 months. The single treatment with amido black on fingerprints with blood, without cyanoacrylate, showed the best results in terms of visibility of the marks. Also in this study,

DNA recovery was successful when the blood fingerprints were first treated with cyanoacrylate. The first (thickest) blood fingerprint of the depletion series gave the best DNA result.

Visualization of Latent Fingerprint Detail on Fired Handgun Casings Using Forensic VMD

Author(s): Brewer, Eleigh R.

Type: Article

Published: 2020, Volume 70, Issue 3, Page 323

Abstract: Inherent (natural residues) and sebaceous fingerprints were deposited onto five different types of handgun ammunition and left for different aging periods prior to firing. The fired casings (n=200) were then processed using four vacuum metal deposition (VMD) processes (gold-zinc, silver, sterling silver, copper-zinc) for the purpose of recovering latent fingerprints. Of the 200 fired casings, good-quality ridge detail that had the potential for identification was developed on 12% of the samples. Moderate-quality ridge detail was developed on a further 28% of the samples. When considering both types of deposit, silver VMD was the most successful process overall. The results of this study far exceeded the expected amount of ridge detail development of <1% of the samples, as reported in literature, and prove that forensic VMD is a viable process for developing ridge detail on fired ammunition casings.

Maximizing Casework Efficiency through a Comprehensive Study on Latent Print Processing Success Rates for Multiple Substrates

Author(s): Koning, Aaron

Type: Article

Published: 2020, Volume 70, Issue 3, Page 347

Abstract: To combat rising submission rates and backlogs, data-driven decisions can assist a laboratory in streamlining processes. For this study, data from 2,000 latent print processing cases (500 cases each from the four Colorado Bureau of Investigation Forensic Services latent print labs) worked in calendar years 2017 and 2018 were analyzed. Data were recorded on whether at least one latent print of value was visualized or developed for each item in these cases. A success rate for each substrate was then calculated. The success rate was defined as the percentage of time that at least one latent print of value was developed for each substrate. Notable results from this study include an overall success rate of 4.34% on handguns, 24.07% on long guns, 0.38% on discharged cartridge cases, 0.37% on cartridges, 26.45% on plastic bags (in nondrug cases), 46.56% on paper items, 1.28% on screwdrivers, 7.15% on plastic bags associated with drug cases, and 4.41% on glass pipes in drug cases. Data from this study were used to limit case processing of certain evidentiary items in routine casework to maximize efficiency in the CBI-FS laboratory system.

Comparison of Various Alkyl Cyanoacrylates Applied to Fingerprint Development in a Commercial Fuming Chamber

Author(s): Casault, Paméla; Camiré, Alexandre; Morin, Roxanne; Daoust, Benoit

Type: Article

Published: 2020, Volume 70, Issue 3, Page 365

Abstract: Although the cyanoacrylate (CA) fuming method has been limited to the use of ethyl CA, it was recently shown by our group that other alkyl CAs could be used for fingerprint development. To follow up on this study, done with a home-made fuming chamber, the present paper examines the development efficiency of four alkyl CAs (methyl, ethyl, n-butyl, and 2-octyl) in a commercial cabinet. Fingerprints were deposited on three different types of surface and aged during three different periods of time. Ethyl CA appeared to be a good choice for most surface and age pairs by providing good development quality and low cost per run. However, butyl CA provided the best development quality for month-old fingerprints on glass and plastic.

Back to Basics

Author(s): Siegel, Sandy

Type: Article

Published: 2020, Volume 70, Issue 3, Page 388

Abstract: Funny finds from all over in their own words.

Issue 2: April to June 2020

Letter to the Editor

Author(s): Dove, Aaron

Type: Letter to the Editor

Published: 2020, Volume 70, Issue 2, Page 149

Abstract: Re: Follow-up: Fingerprint Development on Fired Cartridge Cases through the Electrodeposition of Gun Blue. J. For. Ident. 2018, 68 (4), 567587.

Adermatoglyphia: The Loss or Lack of Fingerprints and its Causes

Author(s): Bordas, Lesli; Bonsutto, Jennifer

Type: Technical Note

Published: 2020, Volume 70, Issue 2, Page 154

Abstract: Adermatoglyphia refers to an absence of dermatoglyphs, the ridges on the lower surface of the foot or hand, the latter being commonly called fingerprints. This paper will discuss some of the reasons for adermatoglyphia. Because fingerprints play an important role in investigating crimes and providing identification, adermatoglyphia raises the question, what alternative methods of identification can be used?

The Effects of Latent Print Development on Cell Phones

Author(s): Papamitrou, Sofia

Type: Technical Note

Published: 2020, Volume 70, Issue 2, Page 163

Abstract: Cell phones that are found at crime scenes can provide valuable information, both with latent prints and with electronic data. In order for latent prints to be developed, chemical processing has to occur, but the literature does not suggest whether this would be harmful to the electronic data on the device. Several reagents were tested on cell phones to determine whether they had a deleterious effect on the cell phones so that an investigator does not have to choose between latent print development or electronic data retrieval. Results suggest that the processing techniques (CA Ardrex, CA MBD, amido black, phloxine B, Sudan black, and vacuum metal deposition) most commonly used at the New York City Police Department Police Laboratory for latent print development are not harmful to cell phones. Electronic data can be retrieved after processing for latent prints.

Comparison of Cyanoacrylate Fuming Techniques of Bloody and Latent Fingerprints and the Examination of Subsequent DNA Success

Author(s): Joy, Jessica; Cox, Jordan O.; Hudson, Brittany C.; Armstrong, Julissa; Miller, Marilyn T.; Dawson Cruz, Tracey

Type: Article

Published: 2020, Volume 70, Issue 2, Page 171

Abstract: This study looked to compare the success of four cyanoacrylate products and methods (traditional, Cyano-Shot, The Finder, and Lumicyano) to one another, using a previously developed quality assessment scale for fingerprints. Bloody and latent fingerprints left on five different substrates and enhanced with two different dye stains were evaluated. The impact of these techniques on the success of DNA analysis was examined by comparing expected STR allele peaks to detected STR allele peaks. Of the four techniques, Cyano-Shot had the greatest positive impact on fingerprint quality, but no statistically significant differences were observed between the four techniques on all samples overall. When individually compared, rhodamine 6G fingerprint quality was significantly improved versus those treated with Ardrex. Thirty-nine percent of latent fingerprint samples were found to have detectable STR alleles. No significant differences between the techniques effects on DNA recovery from latent prints on different substrates were found. However, latent prints processed with The Finder and the traditional method yielded the greatest percentage of detected STR alleles. Overall, this study provides valuable preliminary information on the impact of specific cyanoacrylate techniques on both fingerprint quality and downstream DNA analysis.

High-Resolution Medium Infrared Imaging in Forensics Operation Principles and First Results in Dactyloscopy

Author(s): Schultheiss, E.; Kreuter, N.; Boni, V.;

Type: Article

Published: 2020, Volume 70, Issue 2, Page 186

Abstract: For the first time, the design and properties of a new system for evidence examination using high-resolution heat imaging technology in the medium wavelength infrared (MWIR) spectral region (3 to 5 m wavelength) is reported. It was found that in this spectral region, all types of fingermarks (latent, patent, and plastic) can be made visible without the use of contrasting agents or dyes. Furthermore, the method turned out to be very efficient for background suppression in case of structured or printed backgrounds. MWIR high-resolution pictures of cyanoacrylate-fumed samples could be taken and showed significant gain in contrast of tiny structures as compared to pictures taken by conventional digital photography. The new system can be used to search, process, and document fingermarks at one station and has full online capabilities, enabling a closed workflow from first evidence inspection to automated fingermark identification system. The paper gives a short introduction to the physical and technological background of evidence detection by heat imaging and illustrates the potential of this new technology in a variety of examples from daily practice.

Investigating Directional Characteristics in Swipe Patterns on Fabrics

Author(s): Dozier, Jayme

Type: Article

Published: 2020, Volume 70, Issue 2, Page 205

Abstract: Bloodstain pattern analysis can be an important investigative aspect to solving crimes involving bloodletting events. Swipe patterns on hard, nonporous surfaces have been the subject of numerous previous studies. Swipe patterns on fabrics have been less studied and are often more complicated because of wicking, backing materials, previous laundering cycles, and other factors. This study was conducted to ascertain whether distinct repeatable characteristics are observable from unassisted viewing and under microscopic view that would provide knowledge of the directional component of the swiping action. Several observable characteristics were identified that showed that the direction of swipes on fabrics could be determined with fairly high accuracy.

Multiple DNA Transfer Events in a Social Setting Complicates Interpretation of DNA Evidence

Author(s): Rizzor, Leann G.; Stone, Jonah W. P.; Latham, Krista E.; Cale, Cynthia M.; Bush, Gay L.

Type: Article

Published: 2020, Volume 70, Issue 2, Page 219

Abstract: Advances in forensic DNA typing and increases in the sensitivity of STR kits have allowed for the analysis of DNA transferred both directly and indirectly between individuals and objects. The present study was adapted from previous research and illustrates the transfer of genetic material between individuals and objects in a simulated social setting. Presterilized objects were handled by four participants sitting at a table. The order and timing of handling were predetermined and controlled by researchers to test for evidence of primary, secondary, and tertiary DNA transfer. Participant behavior and the actions of nonparticipants were not controlled by the researchers thereby mimicking a social situation. The handled objects and participants hands were swabbed throughout the experiment. The DNA was purified, quantified, and amplified for DNA profiling. DNA was detected in 92% of the samples; however, only 50% produced profiles that met casework requirements for interpretation. Eighty percent of the interpretable DNA profiles were characterized as mixtures of DNA from two or more individuals, with 60% of those mixtures having identifiable major and minor contributors. Extraneous DNA was observed in 75% of the DNA profiles. Profiles obtained from the objects displayed no pattern regarding which participant most recently touched the object, and many of the samples were inconclusive because of the complexity of the mixtures. The open-air setting of this experiment and the extraneous DNA detected in the samples complicated reconstructing the order of transfer events. This study highlights the complexity of DNA transfer between individuals and objects when multiple transfer events occur.

A Method for Rapid Separation of Perchlorate and Nitrate Salts in Pyrotechnic and Improvised Explosive Mixtures

Author(s): Zelkowicz, Avraham; Tenne, Dana; Kasherman Kirshenbaum, Yonit; Rossin, Anna; Mishraki-Berkowitz, Tehila

Type: Article

Published: 2020, Volume 70, Issue 2, Page 231

Abstract: To forensically identify pyrotechnic and improvised explosive samples obtained from a crime scene, some methods require separation of the mixtures into their components. This study examined separation of the common salts potassium nitrate and potassium perchlorate, based on their differences in aqueous solubility at different temperatures. Separation quality was tested using the Fourier-transform infrared spectroscopy spectrum of each substance. Potassium perchlorate was separated at a relatively low concentration of 25 wt.% using cold aqueous extraction (at 4 °C). Potassium nitrate separation showed greater dependence on salt concentrations but it was possible to improve separation quality by repeating the extraction. The success of this method has been proved in cases involving pre- and post-blast exhibits in which mixtures of potassium nitrate and potassium perchlorate were identified. This simple and rapid method of separation makes it possible to easily identify improvised and pyrotechnic explosive mixtures and makes it unnecessary to conduct additional tests, such as ion chromatography.

Using 1,2-Indanedione-Zinc Chloride to Visualize Areas for Touch DNA Collection

Author(s): Galinsky, Kara; Garcia, Tiffany; Springer, Eliot

Type: Article

Published: 2020, Volume 70, Issue 2, Page 245

Abstract: When processing evidence for touch DNA, either at the crime scene or in a laboratory setting, it is important to determine areas that are most likely to contain the suspects skin cells. In some cases, when it is difficult to recreate the events of the crime (e.g., when there are no witnesses), one may find it challenging to determine where to sample. This article discusses using the reagent 1,2-indanedione-zinc chloride (IND-ZnCl₂) to locate areas that have been touched. A total of 216 hand-grab samples were collected on fabric samples (cotton denim, cotton-polyester blend denim, cotton, and polyester), which were then processed with IND-ZnCl₂, both with and without heat and humidity. Nearly 86% of the

samples resulted in developing areas of fluorescence. Either in the lab or at the crime scene, this approach provides a more precise location on which to focus for the collection of touch DNA.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2020, Volume 70, Issue 2, Page 264

Abstract: Funny finds from all over in their own words.

Issue 1: January to March 2020

Forensic Science and The Duty of Memory: The Face of Verdun

Author(s): Thiburce, Nicolas; Nolot, Franck; Pussiau, Amaury; Guyomarch, Pierre; Mazevet, Michel

Type: Case Report

Published: 2020, Volume 70, Issue 1, Page 001

Abstract: New methods of forensic sciences (i.e., computerized facial approximation and externally visible characteristics prediction) were combined in 2017 to estimate the facial appearance of a soldier killed in action during World War I. Eighty-four employees of the Forensic and Criminal Intelligence Agency of the French Gendarmerie were asked to compare the resulting facial approximation to a historical picture of 15 soldiers that included the target soldier. A factorial correspondence analysis demonstrated that one soldier in the photograph was preferentially chosen by the participants in accordance with the family. Even if facial recognition is subjective, the combination of these two forensic techniques demonstrates an efficient way to establish a good portrait, optimizing the chances of recognition.

Fingerprint Identifications from Explicit Photographs Lead to Pedophile Convictions

Author(s): Forsyth, Cameron

Type: Case Report

Published: 2020, Volume 70, Issue 1, Page 017

Abstract: This case report discusses how usable friction ridge detail that was present in several pornographic photographs led to the positive identification of two offenders. This resulted in both offenders pleading guilty to child-related sex offenses.

The Effects of Cyanoacrylate Fuming and Rhodamine 6G on the Adhesive Side of Tape when Processing with Adhesive-side Powders

Author(s): Martinez, Tara M.

Type: Technical Note

Published: 2020, Volume 70, Issue 1, Page 023

Abstract: Several different kinds of tape were used to evaluate whether processing with cyanoacrylate fuming rhodamine 6G caused adhesive-side powders to be less effective on the adhesive side of tapes. It was concluded that the best results from adhesive-side powders are obtained when the adhesive side is protected from cyanoacrylate fuming R6G. The results of this experiment also afforded a way to determine which method (cyanoacrylate fuming R6G or adhesive-side powder) is better for each type of tape.

Evaluation of Indanedione Application Methods for Fingerprint Detection on Paper: Conventional Treatment, Vacuum Development, and Dry-Transfer

Author(s): McCabe, Rebecca; Spikmans, Val; Wuhrer, Richard; Spindler, Xanthe; Lennard, Chris

Type: Article

Published: 2020, Volume 70, Issue 1, Page 037

Abstract: 1,2-Indanedione is considered the most sensitive amino acid reagent currently available for routine use as a fingerprint detection technique on porous substrates. The method is generally applied by treating items with a solution of the reagent, followed by the application of heat to accelerate the reaction. Despite the high sensitivity demonstrated by this technique, the use of organic solvents and heat can be problematic for some substrates. For example, polar solvents and heat will darken thermal printer paper. Polar solvents will also diffuse writing inks on documents and may also remove other forensic traces such as explosive and illicit drug residues. The solvent-free application of amino acid reagents has been investigated by a number of research groups as a means of overcoming such issues. Examples include vacuum sublimation (low-pressure vaporization) and dry-transfer methods. For the latter, items to be treated are sandwiched between sheets of reagent-impregnated paper. Solventless methods can alleviate the need for the storage and use of large volumes of potentially hazardous solvents, including solvents that are being phased out because of their global warming potential. In this study, a method for applying indanedione under vacuum using a commercially available vacuum oven was optimized and applied to treat fingerprints on a range of substrates. The results were compared against those obtained using conventional and dry-transfer techniques. Although a vacuum method was found to be feasible, it was generally outperformed by conventional indanedione treatment. However, encouraging results were obtained on some nonporous surfaces, and this shows promise for future investigation.

Recovery of Fingerprints from Fired Ammunition and Detonated Improvised Explosive Devices using S2N2 A Proof of Concept Study

Author(s): Wilkinson, Della; Hockey, Daniel; Power, Cameron; Walls, Rebecca; Cole, Jason

Type: Article

Published: 2020, Volume 70, Issue 1, Page 059

Abstract: This article provides the preliminary testing results of the Recover Latent Fingerprint Technology (Recover LFT, Foster + Freeman) during a one-week period at the Royal Canadian Mounted Police (RCMP). The primary objective was to create a procedure, using the Recover LFT, to develop ungroomed fingerprints on fired cartridge cases and detonated improvised explosive devices. As a result of the limited timeframe, many different variables were investigated with smaller sample sizes. Despite these limitations, positive results were achieved, most notably, fired brass .223 ammunition, where 17 of 147 (12%) cases were deemed to have identifiable fingerprints. The Recover LFT offers a novel approach for developing fingerprints on metal surfaces because it appears to be attracted to the physical imperfections caused by the corrosion of the metal from the fingerprint residue as opposed to the fingerprint residue itself. This allowed the RCMP to develop a method for cleaning the gunshot residue from a fired casing, subsequently exposing the physical imperfections caused by the fingerprint. It was observed out of the several cleaning methods tested that incorporating acetone was vital. In addition to the cleaning regime, other variables that appeared to have an impact on the results included the fingerprint donor, the storage conditions (ambient or humid), and the amount of time between different stages of the experiment (deposition to firing, firing to cleaning, cleaning to development). When a proper cleaning process is used, the Recover LFT seems to be a viable option for developing fingerprints on fired cartridge cases and metallic components of detonated improvised explosive devices.

Adaptation of Bluestar to Extreme Outdoor Cold Conditions

Author(s): Hatch, Kelly; Lavoie, Kim; Crispino, Frank

Type: Article

Published: 2020, Volume 70, Issue 1, Page 089

Abstract: The use of a blood enhancer (e.g., Bluestar) at crime scenes is required for the observation of latent bloody stains. This process is often necessary to understand a bloody crime dynamic, as well as to identify where DNA is likely to be present. Although Bluestar has a great capacity to adapt to environmental conditions, its effectiveness has not been tested on temperatures lower than -10 C. The objective of this research was to adapt Bluestar so that it would not freeze at low temperatures, nor hinder DNA analysis. An ethylene glycol:Bluestar solution proved to be a viable alternative to the standard solution when the ambient temperature drops below 0 C. This solution did not hinder DNA analysis.

Latent Print Development on the Adhesive Side of Tape

Author(s): Garcia, M.; Gokool, V.

Type: Article

Published: 2020, Volume 70, Issue 1, Page 103

Abstract: A comparative study of powders in suspension, dye stains, and one-step fluorescent techniques was conducted to determine the optimal pairing of development method and tape sample. The clarity of latent prints produced at three intervals of age were evaluated for development on the adhesive side of duct tape, electrical tapes, and cellophane tapes. Nine processing methods (alternate black powder, cyanoacrylate/basic yellow 40, gentian violet, Liqui-Drox, powder in suspension, cyanoacrylate/rhodamine 6G, Sticky-side Powder, TapeGlo, and Wetwop) were tested on 1,458 latent print samples and evaluated for quality of print development after samples had been aged. Although Wetwop has demonstrated to be the favorable method to use on the adhesive side of a variety of tapes, the conducted study has culminated in pairings of tape types and complementary processing methods to increase successful development of latent prints upon first examination.

Estimation of Stature from Hand Anthropometric Measurements in the Adult Lebanese Population

Author(s): Bahmad, Hisham F.; Saleh, Eman; El Naga, Azza Abou; Azakir, Bilal

Type: Article

Published: 2020, Volume 70, Issue 1, Page 125

Abstract: Inherent characteristics, such as height, are essential parameters for the identification of an unknown individual from dismembered remains by forensic anthropometrics. Clinically, in certain situations that impede a person from standing or in diseases that affect vertebral column length, stature estimation using hand anthropometric measures might confer a simpler, easier, more reliable, and less time-consuming alternative method to directly measure the standing height. The objective of this study is to correlate between hand anthropometric measures and measured heights of adult Lebanese individuals and to formulate regression equations to predict the height from these anthropometric measures. We conducted an age-proportionate randomized cross-sectional study using a consecutive sample of 394 participants from central Beirut and its suburbs. Participants were randomly divided into a development sample and a cross-validation sample. Linear regression models were used to formulate the different equations specific for height estimation. Regression equations of predicted heights from right- and left-hand measurements were obtained. Body mass index (BMIs) calculated from the measured heights and BMIs predicted by the regression equations showed no significant difference between the development and the cross-validation samples. Similarly, the measured and predicted heights showed no difference between the two samples. On the other side, a very strong correlation was demonstrated between the measured and predicted heights and BMIs in males and females and in both the development and the cross-validation samples. In conclusion, the formulated regression equations using hand anthropometric measures, age, and sex provide a statistically valid estimation of height and might indeed be useful in the clinical context.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2020, Volume 70, Issue 1, Page 148

Abstract: Funny finds from all over in their own words.

JFI Abstracts from 2019

Issue 4: October to December 2019

Letter to the Editor

Author(s): Laskowski, Gregroy Eric

Type: Letter to the Editor

Published: 2019, Volume 69, Issue 4, Page 397

Abstract: Re: Assessing Latent Print Proficiency Tests: Lofty Aims, Straightforward Samples, and the Implications of Nonexpert Performance. J. For. Ident. 2019, 69 (3), 281-296

Testifying on Fingerprint Examinations in 2019

Author(s): Neumann, Cedric, Ph.D

Type: Commentary

Published: 2019, Volume 69, Issue 4, Page 405

The Fingerprint Disaster Victim Identification Toolkit: From Powder to Biometrics

Author(s): Tamisier, Laurent; Thiburce, Nicolas; Prat, Lionel; Malo, Marianne; Ledroit, Pierre

Type: Technical Note

Published: 2019, Volume 69, Issue 4, Page 413

Abstract: For the past 25 years, the Disaster Victim Identification(DVI) Squad of the Institut de Recherche Criminelle de la Gendarmerie Nationale, the Forensic Laboratory of the French Gendarmerie, has been involved in more than 80 identification missions of various types including natural disasters, aircraft crashes, road traffic accidents, and terrorist attacks. Members of this DVI squad have sometimes operated in extreme conditions, forcing them to adapt their equipment. This technical note explores the use of a fingerprint disaster victim identification toolkit, which is a portable kit that was developed through years of experience by fingerprint experts. This toolkit not only allows the use of traditional techniques to produce postmortem records but also includes a biometric sensor with a specific interface, combined with a portable automated fingerprint identification system. This operational toolkit offers an all-in-one system, devoted to disaster victim identification.

Using Gun Blue to Enhance Fingerprint Ridge Detail on Ballistic Brass

Author(s): Christofidis, George; Morrissey, Joanne; Birkett, Jason W.

Type: Technical Note

Published: 2019, Volume 69, Issue 4, Page 431

Abstract: Brass cartridge cases are the most common type of cartridge case found at crime scenes, but it is not always feasible to obtain identifiable fingerprints on these cartridges. This study evaluates the effectiveness of gun blue as an enhancement method on fingerprints that were deposited on brass metal discs and left to age (2, 7, 14, and 30 days) under different environmental conditions, namely, under dark conditions, under ambient light, and outdoors. Ten different donors (5 males, 5 females) were employed for this study, and their fingerprints (60 per donor) were enhanced with gun blue solution (50% v/v). It was possible to enhance aged fingerprints (natural and groomed) that had been deposited on the brass metal discs to an identifiable level, with the fingerprints left outdoors being the most challenging to enhance. The feasibility of enhancing fingerprints on fired brass cartridges shot from different firearms was also assessed. Despite favorable results being achieved on fired brass cartridge cases, more research is required to assess whether reliable enhancement can be achieved on fired cartridge cases under real crime scene conditions.

How to Fingerprint a Nearly 300-Year-Old Mummy

Author(s): Urbanová, Petra; Jurda, Mikolá; Králík, Miroslav; Ostrý, Ctibor; Vacht,

Petr **Type:** Article

Published: 2019, Volume 69, Issue 4, Page 451

Abstract: Obtaining postmortem fingerprints from a mummified human corpse represents a challenging task. Mummification alters, often irreversibly, elasticity of the skin. It dries, hardens, and creases the body surface to a degree, making it very difficult to employ conventional fingerprinting techniques. The present paper introduces a contactless three-dimensional digital approach for re-establishing a crease-free skin surface and for acquiring a two-dimensional reproduction of the volar surface of a finger pad. The technique was developed while fingerprinting Baron Franz von der Trenck (1711-1749), an elite Austrian-Hungarian military officer, whose naturally mummified body rests in the Capuchin Crypt in Brno, Czech Republic. His disarticulated left thumb was documented using an Atos Capsule three-dimensional scanner and close-range photogrammetry. In order to obtain a flat two-dimensional thumbprint, two techniques were proposed. One was based on digitally painted texture, which adheres on the ridges, but avoids the furrows. The other printed an enlarged physical replica of the volar surface built by employing PolyJet three-dimensional print technology. Both techniques successfully dealt with the rigidity and extensive wrinkling of the printed skin. The texture paint technique, however, depicted the skin characteristics uniformly and more clearly. The present case study lays down a foundation for incorporating an advanced three-dimensional virtual approach into fingerprint processing in the forensic context.

Processing Stamp Bags for Latent Prints: Impact of Rubric Selection and GrayScaling on Experimental Results

Author(s): Barnes, B.; Clark, J.; Kadane, J.; Priestley, M.; Tator, D.; Wauthier, D.

Type: Article

Published: 2019, Volume 69, Issue 4, Page 469

Abstract: We report data on two open issues in our previous experimentation seeking an effective method for development of latent prints on glassine drug bags: (1) the choice of rubric to assess the quality of fingerprints and (2) the choice of whether to use color or gray-scale images. Two research projects were performed to evaluate the impact of the rubric choice and the color adjustments applied. The Dove rubric is preferable to the modified rubric previously used. Analysts report a more uniform application and a more thorough analysis resulting in an upward trend in scores. Although gray-scaling in experimentation is necessary to conceal which treatment was employed, native color images are preferable for casework. The results of this research quantitatively show the impact of native color as measured by the Dove rubric.

Lifting, Enhancing, and Preserving Blood and Other Proteinaceous Impressions Using Zar-Pro Fluorescent Lifters

Author(s): Zarate, Jessica; Muse III, Wilson; Nasser-Beydoun, Nadeane; Jones, Nathan; Barta, Jodi Lynn
Type: Technical Note

Published: 2019, Volume 69, Issue 4, Page 487

Abstract: Zar-Pro Fluorescent Blood Lifters have been successful in lifting, enhancing, and preserving blood impressions; however, this technology had not been explored to determine their effectiveness in the recovery of nonblood proteinaceous impressions. This research project focused on optimizing the detection, enhancement, and preservation of impressions deposited in blood, semen, saliva, an eccrine sweat and sebaceous material mixture, and nonhuman oil using Zar-Pro Fluorescent Lifters.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2019, Volume 69, Issue 4, Page 524

Abstract: Funny finds from all over in their own words.

Issue 3: July to September 2019

Letter to the Editor

Author(s): Hockey, Daniel; Wilkinson, Della

Type: Letter to the Editor

Published: 2019, Volume 69, Issue 3, Page 241

Abstract: Re: Review of Several False Positive Error Rate Estimates for Latent Fingerprint Examination Proposed Based on the 2014 Miami-Dade Police Department Study. J. For. Ident. 2019, 69 (1), 5981.

Natural Fingerprint Development on an Unfired Cartridge Case

Author(s): Dove, Aaron

Type: Case Report

Published: 2019, Volume 69, Issue 3, Page 251

Abstract: This case report presents an operational file where the author was able to recover identifiable friction ridge impressions through nothing other than a visual examination. This case demonstrates how even the most difficult of substrates can sometimes produce usable evidence, while also emphasizing the importance of performing a thorough visual examination prior to utilizing any friction ridge development techniques.

A Case of Identical Latent Print Depositions

Author(s): Craven, Nicolas

Type: Case Report

Published: 2019, Volume 69, Issue 3, Page 261

Abstract: In December 2015, the Idaho State Police Forensic Services received a drug case for latent print processing. Following processing, latent prints were marked and forwarded for comparison. At comparison, two latent prints were thought to be the same latent impression inadvertently marked two separate times by the processing analyst. A review of the photos and the item itself revealed that the two latent prints were not the same impression, but rather two separate depositions with identical ridge detail, deposition pressure, and background noise. This paper discusses these two latent prints, how they could have been deposited, and where else in the literature similar or identical latent depositions have been addressed.

Fingerprinting Different Food Surfaces at Crime Scenes

Author(s): Brown, Jalessa; Clutter, Susan

Type: Technical Note

Published: 2019, Volume 69, Issue 3, Page 271

Abstract: Latent fingerprints were placed on various food surfaces, which were then processed using powders, cyanoacrylate, and ninhydrin. The results of this study indicated that latents on four food surface types were best visualized using powders. Ninhydrin and cyanoacrylate were largely unsuccessful on food surfaces.

Assessing Latent Print Proficiency Tests: Lofty Aims, Straightforward Samples, and the Implications of Nonexpert Performance

Author(s): Max, Brendan; Cavise, Joseph; Gutierrez, Richard E.

Type: Article

Published: 2019, Volume 69, Issue 3, Page 281

Abstract: Proficiency testing has long played a prominent and multifaceted role for the discipline of latent print comparison. Practitioners rely on proficiency testing results when making claims about the overall reliability of the field, as well as when making individual assertions of competency. In fact, in the case of unaccredited laboratories employing uncertified examiners, such testing may ultimately amount to the only objective evidence of competence that judges can consider. Additionally, proficiency testing plays a critical role in laboratory quality assurance programs, where results theoretically can be used to identify gaps in knowledge and training, as well as to supply roadmaps for improvement. But despite these vital functions, there is surprisingly little critical research or analysis by those within the discipline as to whether the current proficiency testing regime is effective and fit for purpose. And what little analysis does exist, mostly from sources external to the latent print comparison community, raises questions about the sufficiency of current tests. In order to more thoroughly investigate the rigor of current latent print proficiency testing, the authors (three assistant public defenders) participated in the Collaborative Testing Services Test No. 18-5161 and completed the test without committing any false positive errors. What follows is a discussion of that participation and its implications. The authors' hope is that the results spark concern about, and reforms to, the current proficiency testing practices in the United States.

The Capability of Forensic Vacuum Metal Deposition for Developing Latent Fingermarks on Fired Ammunition: A Preliminary Study Comparing Alternative Metal Processes

Author(s): Brewer, Eleigh R.

Type: Article

Published: 2019, Volume 69, Issue 3, Page 299

Abstract: This paper examines whether vacuum metal deposition (VMD) is a viable technique for developing latent ridge detail from fired rifle and shotgun cartridge casings using six metal processes: gold zinc, silver, silver zinc, sterling silver, aluminum, and copper zinc. Each metal process was challenged with developing natural (unspiked) and sebaceous (spiked) deposits. The samples were left for different aging periods, from deposition of fingermark to firing. All samples were processed by VMD within 24 hours of firing. The viability of each metal process was evaluated by determining the number of samples having high-quality ridge detail developed, assessed using a grading scheme. Ridge detail was successfully developed on all fired cartridge samples. When considering both types of deposit on rifle cartridges, silver VMD was the most successful process overall, visualizing 80% of total fingermarks deposited to identifiable quality. For the shotgun cartridges as a whole exhibit, gold zinc was found to be the most effective process, visualizing 75% of total deposited marks (both natural and sebaceous combined) to identifiable quality. The results of this study are indicative of which VMD metal processes offer potential in developing ridge detail on fired cartridges.

The Use of Liquid Latex as a Pretreatment to Remove Debris off the Exterior Surface of Vehicles for Fingerprint Recovery

Author(s): Ho, Michael; George, Mathew

Type: Article

Published: 2019, Volume 69, Issue 3, Page 329

Abstract: This study tested the feasibility of using liquid latex as a pretreatment to recover fingerprints from the exterior surface of vehicles. The trials using the liquid latex pretreatment method recovered 177 of 270 fingerprints (65.5%). The trials with no pretreatment recovered 36 of 270 fingerprints (13.3%). Chi-square tests determined that there is a significant difference in performance between the liquid latex pretreatment method and the absence of the pretreatment method ($p < 0.05$). An odds ratio test determined that the use of the liquid latex pretreatment increases the odds of fingerprint recovery by 12.3 times. The results indicate that the liquid latex pretreatment is a feasible method of fingerprint recovery on the exterior surface of vehicles.

Stature Estimation from Palmprints in an Idaho Sample

Author(s): Craven, Nicolas

Type: Article

Published: 2019, Volume 69, Issue 3, Page 339

Abstract: Latent prints, including palmprints, may contain biological characteristics that may be used to generate investigative leads. Stature is one such biological characteristic. This study built linear regression models to estimate stature using three palmprint measurements from an Idaho sample. The sample consisted of 100 volunteers (48 males and 52 females) ranging in age from 21 to 73 years old. Overall palmprint length yielded the lowest confidence interval and appears to be effective for operational use.

Separation of Overlapping Fingerprints in Multilayered Carrier Using Optical Coherence Tomography

Author(s): Zhang, Ning; Wang, Chengming; Li, Zhigang; Wang, Guiqiang; Yan, Yuwen.

Type: Article

Published: 2019, Volume 69, Issue 3, Page 355

Abstract: Fingerprints lifted from crime scenes are often overlapped because of multiple impressions of fingers. Current methods to separate overlapping fingerprints are primarily based on algorithms that estimate the orientation field of component prints. However, these methods need human intervention, and the accuracy of the separation may easily be degraded. In this paper, a novel tomographic imaging technique, optical coherence tomography (OCT), was used to separate overlapping fingerprints intuitively and noninvasively. The OCT system was also applied to reveal a hidden blood fingerprint that was completely covered by one layer of nontransparent paint. An additional experiment was conducted using a piece of fabric and fingerprints on tape to simulate a more realistic case work condition. OCT directly probed the internal features and extracted the images of component fingerprints deposited on multiple layers of material by three-dimensional volumetric imaging in a simple, intuitive, and easy-to-operate manner.

Investigating the Sensitivity of Cadaver-Detection Dogs to Aged, Diluted Decomposition Fluid

Author(s): Buis, Rebecca C.; Rust, LaTara; Nizio, Katie D.; Rai, Tapan; Stuart, Barbara H.; Forbe, Shari L.

Type: Article

Published: 2019, Volume 69, Issue 3, Page 367

Abstract: Cadaver-detection dogs (also known as human remains detection dogs) are used worldwide to locate deceased victims and human remains. Ethical restrictions often prevent the dog handlers from using cadavers as training aids, resulting in a reliance on pseudoscents or human tissues, such as blood, bone, and decomposition fluid. Often these aids must be re-used many times because of the difficulty in obtaining new materials. The aim of this study was to investigate the dogs' sensitivity to aged human decomposition fluid samples that are used as a training aid. Human decomposition fluid was collected

and serially diluted to 1 part-per-trillion (10⁻¹²) and aged up to two years. The samples were presented throughout the aging process to three police accredited cadaver-detection dog teams under standard indoor training conditions. The dogs were capable of detecting the oldest and lowest dilution levels of decomposition fluid samples. Ongoing training to retain this level of sensitivity is recommended. The results of these trials indicate human decomposition fluid is a valid training aid for cadaver-detection dogs.

Drone-Assisted Thermal Imaging to Determine the Location of Unmarked Graves

Author(s): Bodnar, Sara R.; Ciotti, James; Soroka, Justin; Larsen, Ray A.; Sprague, Jon E.

Type: Article

Published: 2019, Volume 69, Issue 3, Page 378

Abstract: To test the potential use of infrared (IR) cameras mounted on drones during missing persons investigations, four deceased pigs were either left on the grounds surface or buried at depths of 6, 12, or 24. Flights were conducted on Days 1, 6, 12, 15, 29, and 57, with images taken at heights of 10, 25, 50, and 100. Images were then viewed to determine whether the locations of the pigs could be discerned based on temperatures recorded by the IR camera. Here, we demonstrate that putative gravesites could be predicted with a drone-mounted IR camera for follow-up physical investigation. Flights taking place from Day 6 to Day 29 were most effective for identifying areas of interest when the pig was sitting on the soils surface or buried at 6. Imaging from altitudes of 50 and 100 were most efficient, allowing surveillance of a larger area per time, while retaining sufficient sensitivity for detection. The use of an IR camera attached to an unmanned aerial vehicle may be viable for the identification of sites warranting further investigation. The analysis of samples collected from the remains of the surface pig revealed the presence of gramnegative bacteria commonly associated with the mammalian digestive system, as well as organisms commonly associated with soil, suggesting that the metabolism of both indigenous and introduced bacteria contributed to the heat signatures that were detected.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2019, Volume 69, Issue 3, Page 394

Abstract: Funny finds from all over in their own words.

Issue 2: April to June 2019

Errors in Latent Print Casework Found in Technical Reviews

Author(s): Montooth, Marcus S.

Type: Technical Note

Published: 2019, Volume 69, Issue 2, Page 125

Abstract: A variety of errors that were corrected through 100% technical review prior to cases being released were documented over a three-year period for 10 examiners at four laboratories within one laboratory system. Trends in cases, individuals, and the unit were revealed from the data. The number of documented errors makes it clear that 100% technical review and the verification process are essential portions of the latent print examination process.

Development of Latent Fingerprints on Thermal Paper by Immersion in Hot Water

Author(s): Jonas, Albert; Rubner, Isabel; Oetken, Marco

Type: Technical Note

Published: 2019, Volume 69, Issue 2, Page 141

Abstract: This proof-of-concept study presents a new method of making latent fingerprints visible on thermal paper by briefly immersing them in hot tap water. When this technique is used, a dark positive impression appears while the paper remains white and the imprint is preserved. Various factors, such as the influence of time since deposition and the persistence of the developed impression, were investigated. Optimal results were achieved with fresh to several hours old fingerprints. For impressions that were several weeks old, this method was not sufficiently reliable. The brightness and contrast of the developed fingerprints changed within the first week after development. The contrast of faded impressions could be increased in 75% of the samples by re-immersion in hot water. On low-sensitivity thermal papers, such as parking tickets, no fingerprints could be developed that would be sufficient for identification. Additionally, because of the need to pretest a portion of the specimen to determine the adequate developmental temperature by cutting off small paper samples, further research is needed to avoid this damaging of the evidence.

The Influence of Hematocrit Value on Area of Origin Estimations for Blood Source in Bloodstain Pattern Analysis

Author(s): Aplin, S.; Reynolds, M.; Mead, R.J.; Speers, S.J.

Type: Article

Published: 2019, Volume 69, Issue 2, Page 163

Abstract: The ability to reconstruct a bloodstain impact pattern to determine the source of bloodshed events is invaluable in forensic investigations. However, the effect that viscosity has on this process essentially remains an unknown variable. This research aimed to determine whether the viscosity of a contributing blood source, as dictated by the hematocrit (Hct) value, affects the accuracy of area of origin (AOO) determination when employing the tangent method for reconstruction. Six Hct values between 8% and 90% (n=8 replicates) were employed for analysis, and the differences between the known and calculated AOO were statistically compared using parametric multivariate analysis of variance (MANOVA) and nonparametric nonmetric multidimensional scaling analysis (NMDS). The results found that varying the Hct of a contributing blood source had no effect on the accuracy of the AOO calculations, with all impact patterns generating three-dimensional coordinates within the industry-acceptable error margin. Because of the added scientific data, these results will provide support in the presentation of bloodstain reconstruction evidence in a court of law.

Pattern Type Frequencies in Middle Eastern Populations

Author(s): Bair, Bethany R.; Talebian, Kelly C.

Type: Article

Published: 2019, Volume 69, Issue 2, Page 176

Abstract: Although overall pattern types or Level 1 detail in friction ridge skin cannot be used to effect an identification, it can be used to group prints. Past studies have been conducted on overall Level 1 information that provided the fingerprint discipline with statistics on the frequency of pattern types within different ethnic populations. Overall pattern frequencies are often reported at approximately 5% for arches, 60 to 65% for loops, and 30 to 35% for whorls. Research that was focused on different ethnic populations has shown that these pattern frequencies can vary significantly by group. Studies of pattern type distributions among Middle Eastern populations have been limited up to this time. This current study examined 100 known recordings of Iraqi prints and 100 known recordings of Afghani prints to see whether these frequency statistics varied from those of other published populations. Analysis of the combined Iraqi and Afghani datasets determined that arches appear with a frequency of 3.5%, loops at 52.3%, and whorls at 42.9%. Whorls within the Iraqi and Afghani dataset are seen at a significantly higher rate than the commonly reported values for overall pattern frequency. Additionally, the Afghani data showed whorl patterns occur at essentially equal frequencies as the loop pattern types. In most previously studied populations, loop patterns were found to predominate over whorl patterns. These datasets were intercompared with the Spanish population datasets previously published by Gutierrez et al. Individual finger pattern frequencies were also examined, with many instances of significant differences noted between the Spanish, Afghani, and Iraqi populations.

Distinguishing Forged and Fabricated Prints

Author(s): Barton, Kimberlee; Matthias, Gregory

Type: Article

Published: 2019, Volume 69, Issue 2, Page 195

Abstract: A study was performed to determine whether analysts could distinguish between true latent prints and forged or fabricated prints. Eighteen prints were created (10 true, 4 forged, and 4 fabricated) and the study was broken up into two parts. Part 1 of this study followed the normal latent print examination of comparing the prints to known inked standards. In Part 2, the participants were asked to indicate whether they believed the print was a legitimate latent print or whether it was forged or fabricated. When presented with the option of a forgery or fabricated print, no analyst was perfect in the analysis of 18 prints.

The Effect of Ignitable Liquid Analysis on Latent Fingermark Development

Author(s): Avissar, Yaniv Y.; Hefetz, Ido; Grafit, Arnon; Kimchi, Sarit; Muller,

Dan Type: Article

Published: 2019, Volume 69, Issue 2, Page 207

Abstract: Improvised incendiary devices, such as petrol bombs (Molotov cocktails), are used by criminals, protestors, and terrorists. Forensic scientists face the dual challenges of identifying the liquid fuel to prove criminal intent (arson) and recovering latent fingermarks that may lead to a suspect. This research examines the potential impact of fire debris analysis on fingermark quality, so that the forensic sequential examination of arson debris analysis and fingermarks can be better understood. Our experiment revealed that latent fingermarks deposited on glass, exposed to gasoline, and developed by black magnetic powder were of poorer quality than those exposed to kerosene and diesel fuel. The effect of temperature on gasoline was also investigated. A primary conclusion is that the temperature and the concentration of gasoline influenced the quality of developed latent fingermarks.

Estimation of Stature by Measuring Dimensions of the Main Part of Foot Outline

Author(s): Kafi, Khadidja; Pacha, Adda Ali; Said, Naima Hadj

Type: Article

Published: 2019, Volume 69, Issue 2, Page 222

Abstract: The present study evaluates a possible correlation between stature and seven dimensions taken from the main part of the foot. To establish a regression model for estimating the stature from this part of a foot, a computer database was constructed, using measurements from pictures of the feet of 102 Algerian volunteers (85 men and 17 women).

It was found that the seven parameters showed a positive correlation with the stature but at different degrees ($p < 0.001$). The diagonal lengths (D1 and D2) and the parallel lengths (DP1 and DP2) had higher correlation coefficients than the breadth at the ball and the breadth at the heel, with a higher coefficient of determination and a lower standard error of the estimate. The parallel length DP1 showed the highest correlation coefficient ($r = 0.7598$).

Back to Basics

Author(s): Siegel, Sandy CLPE

Type: Back to Basics

Published: 2019, Volume 69, Issue 2, Page 238

Abstract: The medial joints from these two brothers are a true QUIP. They are unusual patterns that are not seen very often in the distal joints, which have a more wavy or straight appearance. The interesting part is the flow of the pattern is opposite of what is common in the distal joint..

Issue 1: January-March 2019

Letter to the Editor

Author(s): Hoerricks, Jim

Type: Letter to the Editor

Published: 2019, Volume 69, Issue 1, Page 001

Abstract: Re: Lack of Enforcement of Standards as Regards the Testing of Human Subjects

Letter to the Editor

Author(s): Hoerricks, Jim

Type: Letter to the Editor

Published: 2019, Volume 69, Issue 1, Page 005

Abstract: Re: Meline, K. A.; Bruehs, W. E. A Comparison of Reverse Projection and Laser Scanning Photogrammetry. J. For. Ident. 2018, 68 (2), 281-292.

Latent Image Transferred from Banknote

Author(s): Dove, Aaron

Type: Case Report

Published: 2019, Volume 69, Issue 1, Page 013

Abstract: An unlikely transfer of detail, initially thought to be friction ridges, was found on the inside of a plastic bag after processing the bag with cyanoacrylate fumes. Upon further examination, it was instead determined to be the partial image of Queen Elizabeth II from a Canadian \$20 Frontier series polymer banknote.

Artifacts Caused by Livescan Affect a Latent Print Comparison: An Actual Case

Author(s): Giuliano, Andrea

Type: Case Report

Published: 2019, Volume 69, Issue 1, Page 020

Abstract: Occasionally, livescan devices produce images with artifacts that could later affect the comparison with a latent print. This issue may arise in court. The case presented in this paper reaffirms that the quality of known prints stored in a database remains a critical subject.

Examining the Effectiveness of Processing Fired Cartridge Cases for Latent Evidence

Author(s): Johnson, Stacey

Type: Technical Note

Published: 2019, Volume 69, Issue 1, Page 027

Abstract: It is reasonable to assume that when an individual loads an unfired round into a weapon, latent print evidence and touch DNA evidence may be deposited on the round. One agency that Raleigh/ Wake City-County Bureau of Identification serves had shared information that it felt it had more success with pursuing touch DNA extraction from fired cartridge cases than from processing for latent print evidence. Latent prints were deliberately placed on a sample of unfired rounds. Another sample of unfired rounds was handled naturally prior to being fired. All of the fired cartridge cases were processed with cyanoacrylate and rhodamine 6G dye stain. Minimal ridge detail was observed on the deliberately handled cartridge cases, but the latent detail was determined to be not of value for identification. Latent detail was not observed on any of the naturally handled fired cartridge cases. The conclusion that was reached was that there may be better methods of collecting identifiable evidence from fired cartridge cases, including touch DNA.

Performance Review of the FF-1.0 Forensic Filter and the Expose Curved Barrier Filter by Arrowhead Forensics

Author(s): Sorum, Elisha D.

Type: Technical Note

Published: 2019, Volume 69, Issue 1, Page 035

Abstract: The documentation of fluorescent fingerprints is commonly accomplished by emitting a specific wavelength of light via an alternate light source onto the substrate then photographing the results with an orange barrier filter attached to a camera lens and adjusting camera settings for the optimal possible contrast. However, many substrates may fluoresce at similar wavelengths as the latent prints, causing the latent prints to be weak or obscured. Having a choice between the standard orange barrier filter, the new FF-1.0 Forensic Filter, and the new Expose Curved Barrier Filter, or a combination thereof, will allow additional contrast of fluorescent latent prints by blocking the inherent fluorescence in certain substrates that may fluoresce at similar wavelengths as the latent fingerprints.

The Effect of Household Cleaning Agents on Blood and the Suitability for Screening Using the Phenolphthalein Test

Author(s): Signaevsky, Masha

Type: Article

Published: 2019, Volume 69, Issue 1, Page 049

Abstract: The phenolphthalein test is used in many forensic laboratories to presumptively reveal the presence of blood on an item of evidence. The mechanism of this test uses phenolphthalin, a chemical indicator, followed by hydrogen peroxide, an oxidizer, to detect the hemoglobin protein. The resulting pink color is attributed to the presence of blood; however, it may also be indicative of a chemical compound that has had an oxidative interaction with the indicator compound. At a bloody crime scene, it is common to expect an attempted clean-up using various cleaning agents, many of which have oxidizing capability. For this experiment, 40 cleaning products were tested with fresh blood on sterile swabs and on filter paper to determine their effect on the phenolphthalein test and vice versa. Of the 40 products, four were found to show a false positive result or an abnormality. These inconsistencies are attributable to the ingredients found in the four products and their chemical or oxidizing properties. Recognizing the characteristics of the irregular results can be of great help during testing in the laboratory.

Review of Several False Positive Error Rate Estimates for Latent Fingerprint Examination Proposed Based on the 2014 Miami-Dade Police Department Study

Author(s): Ausdemore, Madeline A.; Hendricks, Jessie H.; Neumann, Cedric

Type: Article

Published: 2019, Volume 69, Issue 1, Page 059

Abstract: In 2014, the Miami-Dade Police Department (MDPD) Forensic Services Bureau conducted research to study the false positive error rate (FPR) associated with latent fingerprint examination. They report that approximately 3.0% of latent fingerprint examinations result in a false positive conclusion. In their 2016 report, the Presidents Council of Advisors on Science and Technology (PCAST) advise that this estimate of the FPR be used to inform jurors that errors occur at a detectable rate in fingerprint estimation and declare that false positive conclusions may occur as often as 1 in 18 cases. In this paper, we review the MDPD study and design a simulation study to model the behavior of the participants in the MDPD study. We use our model to simulate the number of erroneous identifications that occur under any assumed FPR and compare the results to the actual number of erroneous identifications observed in the MDPD study. We conduct experiments associated with the error rates proposed by the MDPD and the Organization of Scientific Area Committees Friction Ridge subcommittee. We note that the results of these experiments indicate that none of the proposed FPRs are reasonable estimates of the true FPR associated with the

MDPD study. We propose two solutions based on a Bayesian analysis of the data, each resulting in two separate FPRs. Our solutions are comparable to the estimates offered by the Noblis black-box study.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2019, Volume 69, Issue 1, Page 124

Abstract: Funny finds from all over in their own words.

JFI Abstracts from 2018

Issue 4: October-December 2018

Two Cases of Dendrochronology Used to Corroborate a Forensic Postmortem Interval

Author(s): Pokines, James T.

Type: Case Report

Published: 2018, Volume 68, Issue 4, Page 457

Abstract: This report details two cases where the dendrochronology of tree roots was used in Massachusetts to provide a minimum postmortem interval (PMI) for a set of buried human remains. In both cases, the tree ring counts corroborated witness testimony regarding the approximate age of the burials; one analysis indicated a minimum of 27 years since burial, and the other indicated a minimum of 14.5 years since burial. Tree ring dating can fill an important role in minimum PMI estimation over intervals longer than can be covered by forensic entomology or other aspects of decompositional state, and tree root samples should be collected wherever they have a chance of aiding PMI estimation.

Photo Response Nonuniformity (PRNU) Meets Daubert Standards

Author(s): MacKenzie, Aislynn; Bruehs, Walter E.

Type: Case Report

Published: 2018, Volume 68, Issue 4, Page 467

Abstract: During United States of America v Nathan Allen Railey, photo response nonuniformity (PRNU) was used to identify a camera. This identification was challenged in an admissibility hearing to verify that the technology met the Daubert standard, setting a precedent for its use in future forensic examinations.

A New Method for Documenting Hertzian Fractures in Glass Windows

Author(s): Horn, Brent A.

Type: Article

Published: 2018, Volume 68, Issue 4, Page 473

Abstract: Hertzian fractures, or cone fractures, caused by bullet perforations in glass windows can be useful in shooting incident reconstruction. However, they are difficult to photograph because of the transparent nature of glass. Standard glass documentation photographs prohibit determination of the deflection direction of light rays off fracture features, thus creating difficulty in determining the cone-bearing surface of the Hertzian fracture. This article presents a new method for photographing these fractures on various glass materials. Surface reflection photography (SRP) documents the contour-dependent nature of the surface and fracture, allowing the shooting reconstructionist to determine the bevel-bearing surface of the glass from the collected images without direct observation of the glass material. This method is applicable for annealed, tempered, laminated, and coated glass materials with both light and dark backgrounds.

Efficiency Assessment of Luminol-Based Formulations Using Bloodstains and Grayscale Intensity

Author(s): Carlier, Valentin; Bcuc, Andy; Delemont, Olivier

Type: Article

Published: Volume 68, Issue 4, Page 490

Abstract: Luminol is often used to detect latent bloodstains at crime scenes. Several formulations of luminol-based solutions are available. These formulations must be compared and assessed for their efficiency for use at crime scenes. Most studies consider spectrometric measurements, where the reaction is triggered and monitored in spectrometric cells. In spectrometric cells, the blood is liquid, and the luminol is mixed with the blood, not sprayed onto it. Conclusions made from spectrometric measurements may not be accurately transposed to the situations of luminescence encountered under crime scene conditions because the testing conditions do not replicate the crime scene. This study consequently proposes a photographic-based method for measuring the chemiluminescence from bloodstains sprayed with luminol. The photographs that were made during the current experiments were converted into grayscale to provide objective values of the intensity of the chemiluminescence, which was recorded every 5 seconds during a period of 10 minutes. This photographic protocol was used to record both the regular luminol solution and also the luminol-fluorescein mixture. Results showed that the proposed method can objectively quantify the chemiluminescence intensity. Furthermore, contrary to what previous research that was based on spectrometric laboratory measurements indicated, the luminol-fluorescein mixture was not more efficient than a regular luminol solution. Differences may be explained by the measurement strategy (spectrometric measurement versus photographic recording), the proposed approach being more representative of the way luminol enhances bloodstains at crime scenes.

Latent Blood Detection and STR Analysis of Samples Collected from an American Civil War Field Hospital

Author(s): Jones, Kristin N.; McClintock, J. Thomas

Type: Article

Published: 2018, Volume 68, Issue 4, Page 509

Abstract: DNA analysis has recently been used to investigate samples of historical significance. During the last battle of the American Civil War (Sailors Creek Battlefield, Rice, VA), the Hillsman House served as a field hospital for wounded soldiers, treating more than 500 Union and Confederate soldiers. The presumed bloodstains on the floor under the single surgical table and two post-surgical beds provide evidence of the vast number of soldiers treated. These presumed bloodstains were collected and analyzed using various presumptive blood tests (luminol, phenolphthalein, leucomalachite green, and Rapid Stain Identification of Human Blood). To examine the genomic profiles, DNA was isolated from the collected samples, quantitated, amplified, and subjected to capillary electrophoresis. The generation of partial and complete DNA profiles confirmed the presence of human DNA, as well as the ability of DNA profiling to confirm historical accounts of soldiers being treated in a field hospital from a battle fought more than 150 years ago.

An Investigation into the Effect of Weight on Angle and Base of Gait

Author(s): Anness, R.; Curran, M. J.

Type: Article

Published: 2018, Volume 68, Issue 4, Page 524

Abstract: The aim of this study was to evaluate changes in angle and base of gait when a person carries weight. This was undertaken using a sample of 15 participants. Wearing their own footwear, participants walked across a surface dusted with talcum powder and onto a long length of black paper to record their angle and base of gait. Participants did this several times, carrying a variety of weights up to 15 kg. The results indicated that when participants carried a 15 kg weight to the front of their body, the base of gait

increased, and the left (nondominant) foot abducted more than the right. When they carried a 15 kg weight to the left side of the body, the base of gait decreased, and the left (nondominant) foot abducted excessively and the right foot marginally.

The Effect of Cyanoacrylate Fuming on Subsequent Protein Stain Enhancement of Fingermarks in Blood

Author(s): Mutter, Nicole; Deacon, Paul; Farrugia, Kevin J.

Type: Article

Published: 2018, Volume 68, Issue 4, Page 545

Abstract: This study investigates the effect of cyanoacrylate (CA) fuming, at atmospheric and vacuum conditions, on subsequent protein stain (acid violet 17) enhancement of fingermarks in blood. Fingermark depletions in blood were deposited on three nonporous surfaces (e.g., plastic bag) and aged for a set period of time (up to 28 days) before enhancement with the water-ethanol-acetic acid and methanol formulations of acid violet 17 (AV17). All trials were carried out in duplicate. One depletion was pre-treated with CA fuming followed by the enhancement technique and the other depletion was treated with only the enhancement technique (control). As expected, atmospheric CA fuming hindered the subsequent enhancement of blood with the AV17 water-ethanol-acetic acid formulation but not the methanol formulation. The same observations were also recorded under vacuum CA fuming conditions. Preliminary work with vacuum metal deposition did not hinder subsequent AV17 protein stain enhancement with either formulation.

Longevity of Tween 20-Based Physical Developer

Author(s): Korzeniewski, Pawel; Svensson, Maria

Type: Article

Published: 2018, Volume 68, Issue 4, Page 557

Abstract: Physical developer (PD) based on Tween 20 can reportedly remain useful for weeks or even months, whereas PD based on Synperonic N only remains useful for days. We performed a limited longevity study on PD based on Tween 20 in which the reagent, once mixed, was tested weekly for 16 weeks. The solution remained useful for approximately 9 weeks, after which a development time set to 20 minutes appeared too short. At 9 weeks, the solution also showed marked labware staining, and a number of small beads of metallic silver appeared in the solution. Therefore, it appears that 2 months is a reasonable shelf-life for Tween 20-based PD.

Follow-up: Fingermark Development on Fired Cartridge Cases through the Electrodeposition of Gun Blue

Author(s): Dove, Aaron

Type: Article

Published: 2018, Volume 68, Issue 4, Page 567

Abstract: A previous study by Dove demonstrated that adding an electric charge to the treatment of brass cartridges by gun blue improves the contrast and quality of the resulting fingerprint development, with the results surpassing both the passive deposition of gun blue and the sequential cyanoacrylate fuming brilliant yellow 40 technique. This follow-up study compares electrodeposition of gun blue to a current standard benchmark (palladium deposition) on fired cartridges. This study demonstrates that the electrodeposition of gun blue results in better quality friction ridge development compared to palladium deposition on laboratory samples. It does not, however, provide a solution to the deleterious effects the discharge of the bullet has on the fingermarks.

Latent Print Processing of Glassine Stamp Bags Containing Suspected Heroin: The Search for an Efficient and Safe Method

Author(s): Barnes, Brittany; Clark, Jason; Kadane, Joseph; Priestley, Marla; Spencer, Neil; Tator, Deborah;
Wauthier, Denielle; Yohannan, Joshua

Type: Article

Published: 2018, Volume 68, Issue 4, Page 588

Abstract: A three-part study was designed to find the safest and most efficient method of processing glassine stamp bags containing suspected heroin while preserving the qualitative properties of the substance. Gravimetric analysis was also conducted to determine whether selected processing methods add weight to clean stamp bags. Qualitatively, the processing methods chosen for this study did not eliminate heroin from the samples. Results of a blind evaluation of developed latent prints indicate that under the controlled conditions of this study, magnetic powdering yielded the most of value latent fingerprints. However, because previous research has shown that magnetic powder is most effective a short time after fingerprint deposition (which was the case in this study), this conclusion should be regarded as tentative until longer times between deposition and recovery are studied. Gravimetrically, the processing methods used in this study add an amount of weight to the bags that is within the uncertainty of measurement for this laboratory.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2018, Volume 68, Issue 4, Page 612

Abstract: Funny finds from all over in their own words.

Issue 3: July-September 2018

Assessment of Friction Ridge Skin and Scars with a Focus on Latent Print Examination

Author(s): Schreel, Maralena; Stonehouse, April; Torres, Anne

Type: Correction

Published: 2018, Volume 68, Issue 3, Page 297

Abstract: On page 69 of the January-March 2018 issue of the Journal of Forensic Identification (volume 68, issue 1), the wrong chart was included as Figure 13. The correct figure is shown below. The editor apologizes to both the author and the JFI readers.

Expert Fingerprint Testimony Post-PCASTA Canadian Case Study

Author(s): Wilkinson, Della; Richard, David; Hockey, Daniel

Type: Case Report

Published: 2018, Volume 68, Issue 3, Pages 299-331

Abstract: Royal Canadian Mounted Police (RCMP) expert testimony on fingerprint impression evidence was challenged by defense counsel, who called Dr. Simon Cole as an expert witness in the retrial of Timothy Borneyk, who was charged with a residential break and enter. The charge was based on a single fingerprint that was recovered from the crime scene. At the original trial, Justice Funt acquitted the accused, citing reports that were critical of fingerprint practices and perceived troubling aspects of the fingerprint testimony. The Crown's appeal was allowed because the trial judge had relied upon independently researched literature that was not properly tested in evidence, and he conducted an unguided fingerprint comparison.

For the retrial, the RCMP recommended that scientific studies and ongoing standards development work in the fingerprint community since the National Academies of Science (NAS) report should be presented to the court.

The Crowns strategy changed. First, the fingerprint examiner described RCMP policy on proficiency tests, use of the Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST) Quality Table and sufficiency Graph to assess quality and quantity of the minutiae in the latent print, erroneous identifications, and error rate studies. Second, key scientific publications and international best practices were introduced to the court. Finally, the verifier testified. Ten days later, Mr. Bornyk was found guilty. This article summarizes the trials, the impact of the Presidents Council of Advisors on Science and Technology (PCAST) report Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods on expert testimony, and provides an explanation of an incorrect error rate reproduced by PCAST. As the RCMP learn from this court challenge, potential future changes to RCMP research, policy, and training are discussed.

Frequency of Insufficient Knowns in Comparison and Processing Cases

Author(s): Cavazos, Christopher

Type: Technical Note

Published: 2018, Volume 68, Issue 3, Pages 333-340

Abstract: This project was designed to calculate the frequency of insufficient known inked impressions in comparison and processing cases with at least one identifiable latent fingerprint. Insufficient known inked impressions are described as having poor quality, lacking the area needed to conduct a conclusive comparison, or a combination of the two. This study analyzed 256 cases from the Western Regional North Carolina State Crime Laboratory from 2004 to 2009 and 460 cases from the Raleigh North Carolina State Crime Laboratory from 2013 to 2015, for a combined total of 716 cases. This study showed nearly 20% of all cases involved had insufficient known impressions. A lack of friction ridge information being recorded in the known impressions was the main contributor to the determination of insufficiency.

Comparison of the Quantity and Overall Quality of Trace DNA Evidence Collected from Substrates Found at Crime Scenes

Author(s): Hogan, Chad; Van Houten, Lora Bailey; Coticone, Sulekha

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 341-347

Abstract: The ability to recover high-quality trace DNA samples from crime scenes depends on the characteristics of the contributor, the surfaces, the environment, and the time until recovery. In this study, saliva samples were deposited on various surfaces, followed by periodic swabbing at timed intervals for 3 months. The results indicate that porous surfaces (e.g., brick) provide lower amounts and quality of DNA as compared with smooth surfaces (e.g., plastic, glass).

Impact of Anti-Fingerprint Coatings on the Detection of Fingermarks

Author(s): Forchelet, Sandra; Bcue, Andy

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 348-368

Abstract: This study discusses the deposition and behavior of fingerprint residue (eccrine, sebum-rich, and natural) on anti-fingerprint (AFP) coatings as well as the impact of these coatings on conventional detection techniques (cyanoacrylate fuming, small particle reagent, vacuum metal deposition). The preliminary conclusions show that (1) AFP coatings do not prevent the deposition of secretion residue, (2) the amphiphobic properties of AFP coatings may benefit the preservation and observation of latent marks, (3) AFP coatings do not hinder the application of conventional detection techniques, and (4) the impact of AFP coatings on ridge clarity is overall positive or limited, with differences of behavior between plastic-based coatings (negative impact mostly) and glass-based ones (positive impact mostly).

Detection of Fingermarks from Post-Blast Debris: A Review

Author(s): Smyth, Alexander; Sims, Mark R.; Holt, John

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 369-378

Abstract: Fingermarks, an important area of forensic investigations, are generally believed to be destroyed during explosive events. Therefore, post-blast investigations are rarely centered around fingermark evidence recovery to identify a suspect. In-depth research into the recovery of fingermarks from post-blast scenes is lacking. Only five research attempts have been published to date. These five publications are reviewed here. By summarizing the research to date, future experimental work can be conducted to build upon this fledgling research area to the point where a repeatable and successful technique may be discovered.

Comparison of Latent Print Proficiency Tests with Latent Prints Obtained in Routine Casework Using Automated and Objective Quality Metrics

Author(s): Koertner, Anthony J.; Swofford, Henry J.

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 379-388

Abstract: This study evaluates how well the quality of latent print proficiency test samples represent those encountered during routine casework and starts a conversation on what these data really mean. Currently, proficiency tests are designed to monitor the performance of laboratories from when the examiner receives the materials to when results are released to satisfy accreditation requirements and demonstrate the validity of the methods when applied to test samples representative of casework. In order to do this, the latent print samples are intended to mimic the quality or difficulty encountered during routine casework; however, there is a dearth of research to verify this claim. Subjective experience from the latent print community has been that proficiency tests offer higher quality and less complex examinations than those typically evaluated in routine casework. Sampling of latent fingerprints obtained from commercially available latent print proficiency tests and latent fingerprints obtained over the course of routine casework were collected and compared using objective latent print quality metrics. Results indicated that the quality levels of latent fingerprints from proficiency tests are generally higher quality, less complex, and do not represent the quality levels observed in routine casework.

Determination of Detection Sequence for Optimal Visualization of Blood Fingermarks on a Dark Surface

Author(s): Bouwmeester, Martine; Siem-Gorr, Shermayne

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 389-402

Abstract: This article is a follow-up to the study Comparison of the Reagents SPR-W and Acid Yellow 7 for the Visualization of Blood Marks on a Dark Surface. In the current study, the sequential processing of cyanoacrylate with the reagents basic yellow 40 (also known as panacryl brilliant flavine) and small particle reagent white (SPR-W, also known as titanium dioxide) on blood fingermarks was investigated. Following the study of the sequential processing techniques, the use of a fixing agent before coloring and the DNA recovery rate were measured.

The single treatment with SPR-W on fingermarks with blood, without cyanoacrylate and basic yellow, gave the best results in terms of visibility of the marks.

DNA recovery was more successful when the blood marks were first treated with cyanoacrylate. The first blood fingermark of the depletion series gave the best DNA result. Fresh fingermarks of up to a week, which were fixed with ethanol right before coloring with SPR-W, gave a slightly better DNA result.

Assessing the Appearance of Latent Print Distortion on Absorbent and Nonabsorbent Substrates

Author(s): Tate, David; Anderson, Elizabeth; Eller, Jesse

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 403-420

Abstract: Lateral movement, or shearing stress, may occur in a latent print. In this study, we examined lateral movement of a finger on copier paper (absorbent substrate) and lateral movement of a finger on porcelain tile (nonabsorbent substrate) to determine whether there were any observable differences in the appearance of impressions deposited in a specifically controlled direction (laterally). An attempt was made to control the matrix volume, duration of contact, and the absorption properties of the substrate for all trials. Results showed that visual clues (e.g., the intensity of the impression at the start of movement compared to the intensity of the impression at the end of movement, and the presence of a corona at the ending impression) could assist in determining directionality of finger movement on the absorbent substrate.

Preliminary Studies into the Secondary Transfer of Undeveloped Latent Fingermarks Between Surfaces

Author(s): Jabbal, Randeep S.; Boseley, Rhiannon E.; Lewis, Simon W.

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 421-437

Abstract: This study investigates the conditions under which undeveloped fingermarks will transfer between surfaces that have come into contact. Latent fingermarks were deposited on a glass surface, which was brought into contact with paper surfaces for varying periods of time and pressure. Subsequently, the paper was treated with a variety of development procedures including 1,2-indanedione-zinc, ninhydrin, Oil red O, aqueous Nile blue, and SMD II. 1,2Indanedione-zinc was successful at detecting transferred fingermarks, with good contrast and ridge definition, observed when fresh fingermarks were transferred by contact with the secondary surface for a minimum of 24 hours under a 5.00 kg pressure. The high degree of clarity and contrast of the developed transferred fingermark made it difficult to differentiate as a secondary mark. Transferred marks can only be recognized as a mirror image when compared to a mark directly deposited from an individual.

Using Luminol to Detect Bloodstains Exposed to Fire, Heat, and Soot on Multiple Surfaces

Author(s): Akemann, Emma; Bushong, Lee C.; Jones, Ward M.

Type: Article

Published: 2018, Volume 68, Issue 3, Pages 438-453

Abstract: This article investigates the ability of luminol to detect bloodstains that have been exposed to fire, heat, soot, and water. Blood applied to drywall, appliance sheet metal, glazed tile, carpet, and wood was exposed to fire, followed by typical firefighter extinguishment. The results show that bloodstains on some surfaces that have been exposed to heat, fire, soot, or water may produce false negatives when tested with luminol.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2018, Volume 68, Issue 3, Page 456

Abstract: Funny finds from all over in their own words.

Issue 2: April-June 2018

Laterally Reversed Latent Prints Developed Using 1,2-Indanedione

Author(s): Brazelle, Shelly; Inlow, Vici; Leitner, Mary Lou

Type: Case Report

Published: 2018, Volume 68, Issue 2, Pages 161-170

Abstract: Laterally reversed latent prints that have been attributed to transfer from one surface to a second surface have been reported in cases where different processing techniques have been used on bags, books, and adhesive surfaces. Three cases demonstrating the existence of laterally reversed latent prints when no surface transfer has occurred are presented. Each case of a laterally reversed latent print was developed with the chemical reagent 1,2-indanedione. The increased use of 1,2-indanedione and the ability to develop laterally reversed latent prints demonstrate the need to address issues regarding recognition, documentation, reporting, and policy procedures.

Use of Gelatin Lifters and Episcopic Coaxial Illumination for the Recovery and Imaging of Latent Fingermarks from Various Surfaces

Author(s): Attard, Chantelle; Lennard, Chris

Type: Technical Note

Published: 2018, Volume 68, Issue 2, Pages 171-185

Abstract: A study was conducted to assess the effectiveness of gelatin lifters as a method of latent fingermark recovery. Such a capability may be important in covert operations where rapid, nondestructive techniques need to be applied. A preliminary trial was conducted to determine the best surface types for fingermark recovery using black gelatin lifts, with the resulting lifted impressions imaged using an optical method referred to as episcopic coaxial illumination (ECI). As expected, it was found that fresh, sebum-rich fingermarks on smooth, nonporous surfaces produced the best results. A more extensive study was then conducted using natural fingermarks from multiple donors and fingermarks aged for periods up to six weeks. Both black and white gelatin lifters were assessed, as well as the impact of reattaching the protective plastic film provided to cover the lifted impressions. The best results were obtained using black lifters applied to nonporous surfaces that contained sebum-rich, relatively fresh impressions (i.e., aged for a short period of time). Lifts that were left uncovered prior to ECI imaging also resulted in higher quality fingermarks. The use of a commercially available ECI accessory was found to be a cost-effective method for the recording of lifted impressions.

Variability of Class Characteristics Observed in Die Cut Outsoles Composed of Both Rubber and Textile Materials

Author(s): Gokool, Vidia A.; John, Jeremy A.; Koertner, Anthony J.

Type: Technical Note

Published: 2018, Volume 68, Issue 2, Pages 187-206

Abstract: This study examines the variability of certain manufactured features of unworn footwear outsoles that relate to their textile coverings. The manufacturing process that is used in producing the Sanuk Vagabond and Toms Classic involves die-cutting a sheet stock, which is composed of a mixed ethylene vinyl acetate and rubber compound with a textile layer faceted on top. The addition of the textile layer during the molding process reduces the amount of exposed mixed-rubber material to a dotted pattern of exposed area, thus creating a new feature that is variable to the class characteristics on the outsole. This manufacturing process introduces variance in outsole features from shoe to shoe. Measurements of the variabilities yielded statistical data that support the use of textile induced outsole features in relation to outsole-imbedded features as an additional highly discriminating characteristic to be considered in footwear comparison examinations.

A Comparison of Hydrophobic Barriers for Casting Footwear Impressions in Water-Soluble Food Products

Author(s): Sabolich, Adam R.

Type: Technical Note

Published: 2018, Volume 68, Issue 2, Pages 207-221

Abstract: Eight different products were tested to determine a hydrophobic barrier that could best preserve a footwear impression in water-soluble food products. A control test was performed with no product used between the water soluble food product and the casting product. Because many of the products sufficiently preserved the more pronounced three-dimensional features, a set of minor and individual features were isolated to gauge the efficacy of each product. The results were varied. Some products produced an even worse cast than the control; others preserved only the major features. The best results were obtained using the sequential treatment of Krylon Colormaster Crystal Clear Gloss Spray Acrylic -> Arrid XX Ultra Clear Aerosol Spray Antiperspirant and Deodorant -> Snow Print Wax.

Laser Bullet Trajectory Photography

Author(s): Lemasters, Timothy; Johnson, Daniel; Miller Brian

Type: Technical Note

Published: 2018, Volume 68, Issue 2, Pages 223-233

Abstract: The ability to capture laser bullet trajectory in daylight conditions is important. Most crime scene investigator trajectory kits do not include the necessary equipment for all conditions and should be augmented with higher powered laser pointers and neutral density filters. This technical note describes a method for consistent capturing of laser trajectory beams during daylight conditions.

Estimating Stature from the Measurements of Upper Limbs in the IndoMauritian Population

Author(s): Agnihotri, Arun Kumar; Tangman, Yannick

Type: Article

Published: 2018, Volume 68, Issue 2, Pages 234-255

Abstract: The aim of this study was to predict stature in the Indo-Mauritian population, when that the sex of the individual was unknown. Measurements [height (stature), upper limb length, upper arm length, forearm length, hand length, and the length of the second to the fifth fingers] of 200 young and healthy students (100 male and 100 females), aged 19-25, were taken using standard anthropometric instruments. A significant relationship was found between the stature and upper limb dimensions (adjusted R² ranged from 67.63% to 80.91%), with the highest linear association observed for the upper right limb. The standard error of the estimate for stature prediction ranged from 3.70 cm to 5.15 cm for both sexes. Multiple linear regression equations using sex as a dummy variable gave better results than simple linear regression equations. Our regression models were sufficiently validated and highly efficient.

Assessing Phosphomolybdic Acid as a Fingerprint Enhancement Reagent

Author(s): Davis, Lloyd W.L.; Bleay, Stephen M.; Kelly, Paul F.

Type: Article

Published: 2018, Volume 68, Issue 2, Pages 257-280

Abstract: The efficacy of an ethanolic solution of phosphomolybdic acid (PMA) was investigated as a latent fingerprint visualization reagent, primarily on porous substrates. After treating samples and exposing them to ultraviolet radiation, the PMA solution was shown to develop fingerprints of high quality. Unlike the common amino acid reagents that are used for the development of fingerprints on porous substrates (e.g., ninhydrin and 1,8-diazafluoren-9-one), PMA stains a range of other compounds that are

found in fingerprint deposits, including lipids. The lysochrome diazo dye Oil Red O (ORO) was used for comparative purposes because of its application in staining some of the same components of fingerprint residues for which PMA would be proposed. Initial results indicate that PMA is comparable to ORO at developing fingerprints on porous surfaces and may also have applications on nonporous surfaces.

A Comparison of Reverse Projection and Laser Scanning Photogrammetry

Author(s): Meline, Kimberly A.; Bruehs, Walter E.

Type: Article

Published: 2018, Volume 68, Issue 2, Pages 281-292

Abstract: Reverse projection photogrammetry has long been the standard by which height determination examinations have been conducted from security camera imagery. The uncertainty associated with this method is well understood. Laser scanning for this same use is gaining traction in the field of forensic video analysis as an alternative methodology. Laser scanning offers highly accurate measurements of the scene without the burden of placing a camera back into the same position it was in at the time of the crime. Additionally, the laser scanning methodology is not dependent on recreating the digital video recorder's output aspect ratio, which is dependent on the recording device. An experiment was conducted to compare the accuracy of measurements that were obtained through both methods. Both methods yielded similar results, indicating further study should be conducted into laser scanning to determine how the error associated with laser scanning changes with different variables (e.g., the resolution of the imagery, distance from the camera, and the height of the camera). Further study is needed to define whether the technique passes thresholds that are suitable for court admittance.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2018, Volume 68, Issue 2, Page 296

Abstract: The most interesting pattern type on this hand is the tented arch in the left index finger. It is a classic tented arch of the up-thrust type. It is the bonus and not the main focus of this issue.

Issue 1: January-March 2018

Detection and Identification of a Latent Palmprint on a Cartridge

Author(s): Waldron, Michelle E.; Walls, Adrienne

Type: Correction

Published: 2018, Volume 68, Issue 1, Page 001

Abstract: On page 479 of the October/December 2017 issue of the Journal of Forensic Identification (volume 67, issue 4), the case report indicated that "of 2,727 cartridges that were processed, no latent prints that were suitable for comparison purposes were developed [1]." Although it is true that 2,727 unfired cartridges were processed in that study with no successes, an additional 259 discharged cartridges were also processed, with 1 success. (Read the article [here](#))

A Case Report: The Analysis of Patent Prints Identified as Forgeries

Author(s): Sellenraad, Ashley

Type: Case Report

Published: 2018, Volume 68, Issue 1, Pages 003-009

Abstract: During the analysis of this case, three patent fingerprints on three separate checks were identified as being forgeries. A small experiment using friction ridge skin and black printers ink was conducted. The results of this experiment verified that the pliability of skin would not allow for an exact replication of a print, particularly around the edges, which was observed in the patent prints that were submitted in this case. It was determined that a stamp had been used as the method for depositing the patent prints on the checks.

Silver Nitrate Grade and Its Effect on Physical Developer Performance-- A Validation Study

Author(s): Coppes, Allison; Ramotowski, Robert S.; Jones, Brian A.; Manna, Michael E.; Chervinsky, Esther V.; Smith, Kim D.

Type: Article

Published: 2018, Volume 68, Issue 1, Pages 011-027

Abstract: Silver nitrate is a critical component of the physical developer (PD) reagent. Significant increases in the cost of silver nitrate in recent years have caused the United States Secret Services Forensic Laboratory to look for a more economical way to produce physical developer. One possible solution to this dilemma is to use a lower grade of silver nitrate, which typically has a lower cost. This study compared the quality of fingerprints produced on various paper substrates by three physical developer working solutions, each prepared using either the American Chemical Society (ACS), U.S. Pharmacopeia (USP), or technical grade of silver nitrate. It was determined that the less pure grades of silver nitrate produced approximately the same quality of fingerprints as the ACS grade, which is currently used in the authors laboratory for making PD working solutions. In the experiments comparing PD prepared using the ACS and USP grades of silver nitrate, the ACS grade was superior only 5% of the time, whereas the USP grade was chosen 27% of the time. In the experiments comparing PD prepared using the ACS and technical grades of silver nitrate, the ACS grade was superior only 10% of the time, whereas the technical grade was selected 17% of the time. For the majority of the sample comparisons, no difference in fingerprint quality was observed. The overall conclusion was that either USP or technical grade silver nitrate can be used in place of the current, and more expensive, ACS grade of silver nitrate.

Lay Understanding of "Identification": How Jurors Interpret Forensic Identification Testimony

Author(s): Swofford, H.J.; Cino, J.G.

Type: Article

Published: 2018, Volume 68, Issue 1, Pages 029-041

Abstract: In recent years there have been several discussions amongst forensic science policy makers, forensic practitioners, legal practitioners, and academia regarding the most appropriate means of expressing forensic conclusions, especially pertaining to source associations in the pattern evidence domains, to ensure proper articulation of the weight of the evidence to the fact finder. Central to these discussions is the use of the words "identification" or "individualization" to report positive associations between an evidence sample and a known source often used to express the opinion that the two samples "were made by the same source". Proponents argue that the terms are appropriate provided that they are properly defined and caveated to be an expression of an opinion. Critics argue that the terms are inappropriate because they imply a weight of evidence that has not yet been empirically demonstrated and, given the historical use of the terms, simply avoiding the added phrase "to the exclusion of all others" is insufficient. An underlying question at the heart of this discussion, then, is how lay persons interpret such testimony. After polling 300 lay persons, we found that approximately 71% of potential jurors may be expected to interpret expert testimony containing the word "identification" (or "identified") to imply a single source attribution "to the exclusion of all others". The intent of this study is to provide preliminary data to inform the forensic science community on how the term "identification" may be interpreted by laypersons when used in the context of expert testimony and technical reports.

Assessment of Friction Ridge Skin and Scars with a Focus on Latent Print Examination

Author(s): Schreel, Maralena; Stonehouse, April; Torres, Anne

Type: Article

Published: 2018, Volume 68, Issue 1, Pages 043-075

Abstract: A questionnaire was distributed to establish baseline knowledge on the use of scarred friction ridges in the latent print discipline. Questions were designed to evaluate the utilization and weight of scar features in the decision making process and to assess the value of scars in a latent comparison. Twenty-nine latent print examiners participated in the 94-question survey. The results of this questionnaire showed that despite the lack of literature and formalized training, participants (1) were able to use their experience to make comparative decisions, including identifications, that were based on scar features; (2) were consistent in recognizing and assigning weight to scars; and (3) were able to use scars, or the absence of them, to substantiate their decisions.

Hand Determination of Whorl Patterns Using Axis Slant

Author(s): Brazelle, Mack; Brazelle, Shelly

Type: Article

Published: 2018, Volume 68, Issue 1, Pages 077-086

Abstract: This study examines the use of whorl slant in hand determination through whorl axis analysis. Two certified latent print examiners determined the whorl axis for 550 whorls. They found a higher percentage of right slant whorls in the right hand (92.7% and 93.8%) and a higher percentage of left slant whorls in the left hand (91.0% and 91.2%). A small percentage of whorls absent of any axis were reported in both hands. Interestingly, a higher percentage of right slant whorls were present in the left index finger, and a higher percentage of left slant whorls were present in the right index finger. Applying the chi-square test to overall whorl slant data from each hand demonstrated that using the whorl axis to determine hand orientation is statistically significant.

Differential Diagnosis of the Taphonomic Histories of Common Types of Forensic Osseous Remains

Author(s): Pokines, James T.

Type: Article

Published: 2018, Volume 68, Issue 1, Pages 087-145

Abstract: How a set of osseous remains under forensic anthropological examination is analyzed and processed and reaches its ultimate disposition is largely guided by the taphonomic source of the remains, including environmental and temporal factors. The environment from which the remains came, whether largely natural or artificial, alters the remains in ways that allow for the determination of their origin and subsequent taphonomic histories. Remains are also subject to temporal jurisdiction, in that older remains may be forwarded to other agencies, including state archaeological offices, for final disposition. The present research examines and compares the taphonomic alterations that are formed on bones from multiple sources that are commonly received in medical examiner settings: terrestrial, marine, cemetery, trophy, and former anatomical teaching specimens. Each of these sources has unique taphonomic alterations associated with it, and careful examination can elucidate the history of a set of remains, even where their environment has changed, including repurposing for ritual or other uses.

Can Intentionally Compacting a Clandestine Grave Make it More Difficult to Detect with a Soil Probe?

Author(s): Dubsky, Alexandre; Christensen, Angi M.

Type: Article

Published: 2018, Volume 68, Issue 1, Pages 147-156

Abstract: A soil probe is an economical and efficient tool for locating clandestine graves, allowing the user to identify differences in relative soil compaction that may indicate a disturbance such as a grave. Partly because of popular portrayals of crime investigations in the media, perpetrators may modify their criminal practices to avoid detection. One conceivable approach would be for a perpetrator to intentionally re-compact a grave site after burying a body in an attempt to hinder the ability of investigators to locate the grave using methods based on relative soil compaction. Here we test the use of a tamper tool to compact disturbed soil and investigate whether such efforts are likely to result in evading detection. Undisturbed, normally filled, and intentionally compacted soil sites were probed weekly using a weighted soil probe, and probe depths were compared. Results show that although probe depths for the soil compacted with a tamper tool were less than those for the normally filled sites ($p < 0.001$), they were still significantly greater ($p < 0.001$) than those for the undisturbed soil, suggesting that such graves would still be detected by using a soil probe.

Back to Basics

Author(s): Siegel, Sandy

Type: Back to Basics

Published: 2018, Volume 68, Issue 1, Page 160

Abstract: Past QUIPs have featured examples of syndactyly (webbed fingers), polydactyly (extra digits), and even an exemplar of double thumbs with a great scorpion tattoo. The prints above are examples of ectrodactyly, which is a congenital lack of one or more digits.