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April 2024

Shining a spotlight on the work of the Australia New Zealand forensic science community

Message from the Director



Dr Grant Liddy
Director, ANZPAA NIFS

Welcome to the first edition of *The Forensic Exhibit* newsletter for 2024 where we present an overview of the exciting work of the Australia New Zealand forensic sciences community.

ANZFEC Meeting 27

The ANZPAA NIFS team were delighted to meet members of the Australian New Zealand Forensic Executive Committee (ANZFEC) in Perth in February for a two-day workshop with the Quality Specialist Advisory Group (SAG) followed by the ANZFEC 27 meeting and tours of the forensic facilities of ChemCentre, PathWest Laboratory Medicine WA, and Western Australia Police Force. More information on the outcomes of the ANZFEC-Quality SAG workshop can be found on page 5.

A key focus of ANZFEC 27 was to review and discuss the ANZPAA NIFS work program for the 2024-25 financial year. Key project activities discussed included the continuation of the Forensic Fundamentals project, the Enhancing Practice work program, funding endorsement for a dedicated project manager to drive the implementation of the Firearm Examination Roadmap 2023-25, and a strategic focus on reviewing forensic capability across the ANZPAA NIFS Groups.

ANZPAA NIFS will continue to deliver an extensive range of business-as-usual activities in 2024-25 such as the management of the Australia Forensic Science Assessment Body, the delivery of the After the Fact crime scene proficiency test, and the distribution of over 500 forensic proficiency tests to ANZFEC agencies.

ANZPAA NIFS Groups

Members of the ANZPAA NIFS Groups that cover over 15 different forensic disciplines and capabilities have begun meeting and delivering various workshops across Australia.

These have included a Crime Scene Reconstruction course (refer to page 6 for more information), a Toxicology Training Workshop, a Forensic Anthropology Technical Advisory Group workshop and capability mapping workshops held by the Document and Firearm Specialist Advisory Groups.

You can find out more about the support and expertise the ANZPAA NIFS Groups deliver to Australia New Zealand forensic science community on page 4.

Winston Churchill Trust (Australia) Fellowship

I have recently returned from a Churchill Fellowship funded visit with 26 agencies/organisations across North America, Europe and Asia exploring how Digital Forensics is positioned and implemented under different operating environments. I have provided a summary of my journey on page 3 and would like to take the opportunity to thank not only the people I met with but those that assisted to facilitate those meetings.

Research and Innovation

ANZPAA NIFS has been funding a variety of ANZFEC agency research projects in recent years aligned to our Research and Innovation Roadmap 2020-25. We are pleased to present the outcomes of one of these projects undertaken by Forensic Science SA titled 'Predicting probative levels of touch DNA on forensic DNA tapelifts using Diamond™ Nucleic Acid Dye' on page 7.

Welcome and Farewells

We are excited to welcome Dr Carolyne Bird and Sophie Goldsmith who recently joined the ANZPAA NIFS team as Senior Forensic Project Officers.

Regarding changes in ANZFEC representation, ANZPAA NIFS would like to welcome Inspector Gary Williams as the new Tasmania Police representative, replacing Inspector Matthew McCreadie. ANZPAA NIFS would like to acknowledge and thank Inspector McCreadie for his contributions to ANZFEC, specifically for his strategic guidance and leadership in supporting the Firearm Examination Capability Mapping project. We would also like to welcome Dr Bianca Phillips as the new ANZFEC representative for Queensland Health Forensic and Scientific Services.

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ANZPAA
Australia New Zealand
Policing Advisory Agency



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NIFS Update

Welcome

Please join us in welcoming new members to the ANZPAA NIFS Team – Sophie Goldsmith and Dr Carlyne Bird.



Sophie joined us in January and comes to ANZPAA with wealth of experience from her tenure in Federal Government. Initially as an AFP Forensic Officer, specialising in Disaster Victim Identification and post-blast scene examination during pivotal international counter- terrorism incidents. Transitioning to the Department Prime Minister and Cabinet, Sophie served as the Explosives

Adviser within National Security Science and Technology (NSST) Branch. In this capacity, she provided strategic policy advice, and managed the grants program to develop national capability in explosive detection. In a similar role with the Attorney-General's Department, Sophie was the Capability Adviser for Bomb Scene Examination, Bomb Response and Forensic Support capabilities, under the National Counter Terrorism Committee (NCTC). Her most recent roles with the Bureau of Meteorology included Product Owner for the Supercomputer Program and as the Communications Adviser in a transformative change program.



Carlyne joined ANZPAA NIFS in February as a Senior Forensic Project Officer. She has forensic science experience as a Forensic Document Examiner with Forensic Science SA, and in that role has worked with NIFS previously through chairing the ANZPAA NIFS Document Specialist Advisory Group and as a member on various project working groups including capability mapping and forensic fundamentals. Outside of Australia and New Zealand, Carlyne has also had experience collaborating with experts from other nations on working groups focused on human factors, training, and competency for forensic handwriting examination.

Celebrating the ANZPAA NIFS Best Paper Award Winners

The ANZPAA NIFS Best Paper Awards recognise the literary contribution of authors from the Australian and New Zealand forensic science community. The Awards promote scientific research and encourage the sharing of learnings within the forensic and broader communities.

ANZPAA NIFS once again would like to congratulate the recipients of the 2023 Awards. Your outstanding contributions to your field are truly commendable and reflect your dedication to excellence. The complete list of 2023 recipients in each award category are available at: www.anzpaa.org.au/nifs/awards/best-paper-award-recipients



▲ Damien Abamo, Forensic Science SA, receiving a 2023 Award from NIFS Assistant Director Dean Catoggio



▲ Julianne Henry, Felicia Bardan and Maria Bellis, Forensic Science SA, with NIFS Assistant Director Dean Catoggio



▲ Ryan Gallagher, Maddison McLaughlin and Natasha Mitchell, Forensic Science Queensland

For further information on the ANZPAA NIFS Best Paper Awards please visit:

<https://www.anzpaa.org.au/nifs/awards/best-paper-awards>

Australia Day Awards

ANZPAA NIFS would like to congratulate all the recipients of the Australia Day 2024 Awards.

Emeritus Professor Hilton John Kobus

Appointed as a Member of the Order of Australia (AM)

For significant service to forensic science through governance and administrative roles.

Catherine Quinn, Victoria Police

Awarded the Public Service Medal (PSM)

For outstanding public service to forensic science and reform in the scientific field in support of community safety.

Inspector Wayne Grant Martin, Victoria Police

Awarded the Australian Police Medal (APM)

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NIFS Update

Winston Churchill Trust (Australia) Fellowship Tour



Dr Grant Liddy
Director, ANZPAA NIFS

Last year I was fortunate to receive a **Winston Churchill Trust (Australia)** Fellowship to explore how Digital Forensics (DF) is placed in the judicial chain at other organisations around the world and benchmark best practice approaches and strategies to inform future operating models for Australia and New Zealand.

With the demand on DF resources and capabilities for all law enforcement agencies increasing exponentially, at the end of February I embarked on the journey to understand how different organisations (police, science, research, academia) deliver DF within various legislative frameworks, geographical considerations and partnerships within a context of rapid technological change.

I was able to visit with 26 agencies/ organisations across six countries (US, Canada, England, Netherlands, Switzerland and Singapore), navigating through 10 flights, 5 hire cars, and various trains and buses over 5.5 weeks. During meetings we discussed operating and service delivery models, legislation, data analysis/evidence review, training, people, standards and validation, partnerships, as well as innovation and challenges being faced.

I saw some great examples of agencies adapting their workforce to current policing and operating environments (e.g., encryption), recognition of the need for and commitment to innovation and partnerships, and national approaches. I am currently preparing my report and hope to provide recommendations for our agencies to ensure they can respond to the current and ever increasing reliance on digital evidence.



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NIFS Update

An appreciation of the ANZPAA NIFS Groups

ANZPAA NIFS plays a pivotal role in advancing forensic science capabilities on a national scale. Its focus is on positioning the community for the future, reducing risk and creating efficiencies through the cross-agency projects, promoting research, information exchange, education and training and promoting quality.

Among its crucial structures are the ANZPAA NIFS Groups including the Specialist Advisory Groups (SAGs) and Technical Advisory Groups, which serve as the essential foundation in guiding and supporting forensic practices across various disciplines.

The governing body, Australia and New Zealand Forensic Executive Committee, consisting of directors/heads of the government forensic services providers, rely on the membership of these groups to drive the outcomes of the ANZPAA NIFS work program.

These advisory groups consist of leading experts and practitioners across the more traditional, established forensic fields such as crime scene, fingerprints, biology and chemical criminalistics, to the emerging areas like forensic intelligence, digital forensics, systems and technology. Their primary function is to provide authoritative advice, share best practices, and facilitate collaboration among forensic professionals across Australia and New Zealand.

One of the key roles of these groups is to contribute to the development of standards and guidelines, promoting consistency and reliability in forensic procedures and evidence analysis. Not an easy task given the disparity in legislation seen between jurisdictions.

The groups are also tasked with staying abreast of emerging technologies and methodologies in forensic science, ensuring Australia and New Zealand's forensic capabilities remain at the forefront of innovation.

Most recently, with opportunities being seen for cross discipline information sharing, the ANZPAA NIFS Groups are encouraged to also collaborate across SAGs/TAGs. For example, validation activities and building quality culture are not discipline specific, so has been of great interest to practitioners across multiple groups. It is this unique overview of the Australian and New Zealand forensic landscape and the participation of the SAGs/TAGs that give the greatest oversight of issues both within disciplines and across forensic science services.

The dedication and expertise of the ANZPAA NIFS Groups are commendable. Their tireless efforts in providing valuable guidance, sharing knowledge and fostering collaboration among forensic professionals remains instrumental in

continuing to advance the field of forensic science.

The ANZPAA NIFS Groups are essential components of the broader forensic landscape. Through their diligence and expertise the forensic community is able to continually improve and evolve, ultimately contributing to the pursuit of justice and the safety of our communities.



Research and Innovation Roadmap

The purpose of the ANZPAA NIFS Research and Innovation Roadmap 2020-2025 is to promote the investment of funding and resources in research that is operationally relevant and of vital importance to forensic science service provision in Australia and New Zealand. ANZPAA NIFS developed the Roadmap through extensive engagement with the forensic community. It defines research areas that are important to strengthening current forensic science processes and building future capability. The figure right summarises the Roadmap research areas aligned to the ANZPAA Strategic Priorities.

Promoting Research in Forensic Science

ANZPAA Strategic Priority	Research Area	
Address Risk →	Forensic Fundamentals Human Factors	Strengthening underpinning science Improving objectivity & practice
Enhancing Practice →	Data Sets New Tools	Developing activity level reporting Automating processes & creating new capabilities
Shaping Stronger Connections →	Forensic Intelligence	Using forensic data for broader purposes

You can find more information on the Roadmap via the following link:
<https://www.anzpa.org.au/nifs/services/research-innovation>

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Workshops and Meetings

ANZFEC-Quality SAG Workshop - Operationalising the principles of authentic quality culture in forensic science service provision

Paula Hawthorne¹ and Anna Heavey²

¹Northern Territory Police Fire and Emergency Services, Quality SAG Chair
²Pathwest, Former Quality SAG Chair



Following a successful workshop in 2023 on transparency in forensic science, the Quality Specialist Advisory Group (SAG) developed a set of guiding Principles for authentic quality culture in forensic science service provision ('the Principles'). The objective of the Principles is to promote the demonstrated organisational values which contribute to the effective development and delivery of quality outcomes in forensic science. The Principles cover four key components of Quality in forensic science service provision: Independence, Governance, Leadership and Quality Culture. Following consultation with ANZFEC, the Principles were approved at the end of 2023 for publication on the ANZPAA NIFS website in 2024.

On 27-28 February 2024, a two-day hybrid workshop was held at ChemCentre WA in Perth, with ANZFEC and Quality SAG representatives from almost all agencies in attendance. The workshop aimed to develop practical strategies towards operationalising the Principles of Quality Culture throughout Australian and New Zealand forensic service providers.

Following the opening of the workshop by Det Supt Damian Powell (SAPOL) ANZFEC Chair, and Dr Paula Hawthorne (NTPFES) Quality SAG Chair, the workshop was led by Quality SAG member Anna Heavey (PathWest). The workshop was structured around four themes: Independence, Governance, Leadership, and Quality Culture, with presentations introducing each theme preceding workshop discussions. International



presenters included Dr Peter Stout, CEO of the Houston Forensic Science Center and Dr Sarah Chu, Director of Policy and Reform from the Perlmutter Center for Legal Justice at Cardozo Law, New York. Local presenters included Adjunct Professor Linzi-Wilson Wilde, CEO, and Karen Grogan, Director of Culture and Wellbeing, both from Forensic Science Queensland.

The workshop utilised in-session surveys and small and whole group discussions, covering key areas such as:

- development of agreed definitions of terms such as 'Independence' and 'Quality';
- expectations around the accreditation process in the assurance of Quality, and
- challenges and approaches to accurately quantify resources and budgetary costs of Quality in forensic science service provision and how to integrate these costs into business models and service level agreements.

Discussion and engagement from all participants across the two days showed a commitment to authentic quality culture as a common goal for all. Dean Catoggio, Acting Director of ANZPAA NIFS, closed the workshop with a detailed summary of the discussions and future direction.

The workshop outcomes will feed into ongoing items for strategic discussion for both ANZFEC and the Quality SAG. Future work includes the continual promotion of the Principles and their implementation across other ANZPAA NIFS Groups and ANZFEC agencies via ANZPAA NIFS Group representatives, and the Principles document being developed further for publication on the ANZPAA NIFS website.

The presentations and valuable discussions on the Principles, coupled with high attendance from ANZPAA NIFS, Quality SAG and ANZFEC members, highlight the commitment from Australian and New Zealand forensic senior leadership to the delivery of quality forensic science services and ongoing enhancement of Quality Culture to support that objective. The Quality SAG would like to thank ANZPAA NIFS and ANZFEC for their ongoing support of the Principles and approval to hold the workshop, and ChemCentre WA for hosting the event.

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Workshops and Meetings

Enhancing Crime Scene Reconstruction expertise: Insights from the ANZPAA NIFS 'Train the Trainer' course

Tracy Starr¹ and Gregory Moon²

¹Victoria Police

²New South Wales Police Force

The ANZPAA NIFS Train the Trainer course in Crime Scene Reconstruction (CSR) recently convened in Sydney and Melbourne. Eighteen months of collaboration and input from Victorian and NSW subject matter specialists (SMSs) and input from International SMS Ross Gardiner, from Gardiner Beville & Associates (USA), the course was designed and delivered to SMSs across the ranks of Constable to Senior Sergeant. This course will serve as a pivotal platform for SMSs across Australia and New Zealand. Designed to increase expertise in CSR and ensure consistency in Crime Scene investigative procedures, the course gathered representatives from all Australian states and territories, Australian Federal Police as well as representatives from New Zealand's North and South Islands. Sponsored by ANZPAA NIFS and facilitated by Detective Senior Sergeant Moon of NSW Police and Sergeant Starr of Victoria Police, the course amalgamated lectures, PowerPoint presentations, and practical exercises, culminating in a comprehensive learning experience.

Sydney Session

In Sydney, the ANZPAA NIFS Train the Trainer course unfolded offering 13 delegates a conducive environment for learning and collaboration. Through a series of meticulously curated lectures, interactive PowerPoint presentations, participants delved into various aspects of crime scene reconstruction, ranging from forensic techniques to legal considerations and report writing. The presence of subject matter specialists from diverse jurisdictions fostered lively discussions and knowledge sharing, enriching the learning experience.

Practical exercises formed the cornerstone of the Sydney session, providing participants with hands-on experience in applying theoretical concepts to real life scenarios. Under the guidance of experienced facilitators, attendees honed their skills in evaluating evidence, analysis, and documentation, gaining invaluable

insights into the intricacies of crime scene reconstruction. The collaborative nature of the exercises facilitated networking opportunities, enabling delegates to forge professional connections and enhance best practices.



Melbourne Session

The Melbourne leg of the ANZPAA NIFS Train the Trainer course, was delivered to 15 participants against the vibrant backdrop of the city, again a new set of SMSs from all states and territories of Australia, Australian Federal Police, and a representative from New Zealand. All participants immersed themselves in a dynamic learning environment. Leveraging the expertise of the two trainers, delegates engaged in thought-provoking discussions and interactive sessions, exploring innovative approaches to CSR. The incorporation of practical exercises and syndicate work allowed participants to apply their newfound knowledge in simulated crime scenes, refining their investigative techniques and validating their decision-making abilities.



Networking Opportunities

Beyond its educational offerings, the ANZPAA NIFS Train the Trainer course served as a nexus for networking and collaboration. Representatives from various jurisdictions seized the opportunity to connect with counterparts from across Australia and New Zealand, fostering unity and camaraderie within the policing and forensic community. The exchange of ideas and experiences not only enriched the learning process but also laid the groundwork for future collaborations and partnerships.

Consistency in CSR

A key objective of the course was to promote consistency in the conduct of crime scene reconstruction across jurisdictions. By equipping SMSs with standardised methodologies and best practices, the course aimed to enhance the quality and reliability of CSR outcomes. Through rigorous training and knowledge exchange, participants were empowered to uphold the highest standards for forensic crime scene investigation, ensuring justice and accountability in criminal proceedings.

Conclusion

The ANZPAA NIFS Train the Trainer course in Crime Scene Reconstruction emerged as a resounding success, incorporating the spirit of collaboration and excellence within the Policing and forensic community. With delegates from diverse backgrounds coming together to share insights and expertise, the course exemplified the power of collective learning and collaboration. Feedback was extremely positive and provided opportunity to enhance future course content. As participants return to their respective jurisdictions armed with enhanced knowledge and skills, they are best poised to elevate the practice of CSR to their own jurisdictions and strengthen the fabric of Crime Scene Reconstructive Investigation.

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News from the forensic community

Predicting probative levels of touch DNA on tapelifts using Diamond™ Nucleic Acid Dye

Dr Julianne Henry
Forensic Science SA

Tapelifting is a common strategy to recover touch DNA deposits from porous exhibits in forensic DNA casework. However, it is known that only about 30% of tapelifts submitted for DNA analysis in operational forensic laboratories yield profiles suitable for comparison or upload to a searchable database. A reliable means to identify and remove tapelifts from the workflow that are unlikely to produce useful DNA profiles would reduce sample backlogs and provide significant cost savings. In this study, we investigated whether the amount of macroscopic or microscopic fluorescence on a tapelift following staining with Diamond Nucleic Acid Dye (DD) could predict the DNA yield and/or the DNA profiling outcome using controlled (saliva), semi-controlled (finger mark) and uncontrolled (clothing) samples.

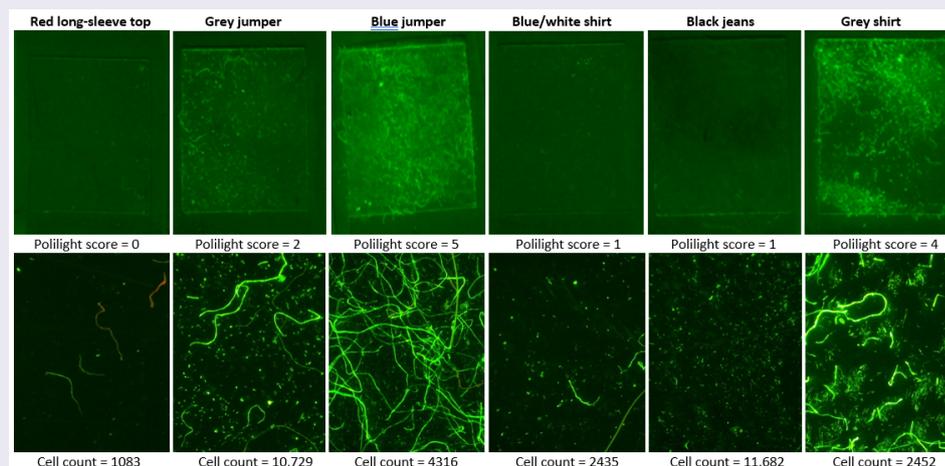
Controlled (saliva) samples were prepared by placing 10 µL of diluted saliva (neat through to 1:100) on the adhesive side of a tapelift in replicates of 10 (70 samples total). Semi-controlled (finger mark) samples were prepared by having individuals press their thumbs onto the adhesive side of tapelifts after various periods of DNA loading and post-handwashing (a total of 90 samples of varying DNA amounts across 4 donors). Uncontrolled (clothing) samples were created by taking a variable number of lifts from worn clothing items (a total of 50 samples). Each tapelift was sprayed with 20X DD using a mini air compressor and examined macroscopically using a Polilight at 490 nm with 555 nm interference goggles. A fluorescence score (0 to 5) was assigned to each tapelift based on comparison to a reference image where 0 = no fluorescence, 1 = very weak, 2 = weak, 3 = moderate, 4 = strong and 5 = very strong. The same tapelifts were also examined microscopically at 480 nm using a Dino-Lite fluorescent microscope and three images were captured at 100X magnification from random areas of each tapelift. The average number of corneocytes across the three images was used to extrapolate the estimated total number of DD-stained corneocytes across the entire tapelift. DNA was extracted from each tapelift and underwent Quantifiler

Trio and Globalfiler PCR analysis. The DD results were compared to DNA yields and profiling outcomes where a probative DNA profile was defined as one which was suitable for upload to NCIDD.

Polilight fluorescence was able to significantly model microscopic cell counts across saliva, finger mark and clothing tapelift samples. This inferred that an increase in Polilight fluorescence occurred in response to an increase in abundance of cellular material on a tapelift. However, the predictive power of Polilight fluorescence for microscopic cell counts was weakest for clothing tapelifts. For tapelifts of clothing, Polilight fluorescence scores were significantly impacted by clothing fibres and other non-cellular debris and could not be used to identify samples which were likely to yield a probative DNA profile. Compared to Polilight fluorescence scores, microscopic cell counts of clothing tapelifts were much more reliable at predicting an uploadable profile. A cell count of approximately 3000 cells typically produced an uploadable DNA profile. To minimise the false negative rate of such a threshold in operational practice, a 95% lower bound probability

interval could be applied, which reduces the value to approximately 500 cells. However, even with this additional conservatism, implementation of such a threshold would require the laboratory to tolerate a proportion of informative samples being excluded from analysis. It would also require the laboratory to accept an increased risk of the tapelift becoming inadvertently contaminated during the screening process, as microscopy is more time consuming than Polilight examination and would require the tape to be mounted on a glass slide (or similar) for examination. A broader examination of the reliability of this threshold using a casework trial is recommended. Due to the labour intensiveness of microscopic cell counting, and the increased risk of inadvertent contamination, automation of this process using image software in conjunction with artificial neural networks (ANN) should be explored.

We thank ANZPAA NIFS for funding this project and further details can be found in our recent publication in Forensic Science International: Genetics doi.org/10.1016/j.fsigen.2024.103024.



▲ Examples of macroscopic and microscopic DD fluorescence for tapelifts taken from six clothing items. The top panels are photographs of the entire tapelift observed under Polilight. The Polilight score assigned to the tapelift is presented below the image. The bottom panels are microscopic images taken at 100X magnification using a Dino-Lite fluorescent microscope. The cell count assigned to the entire tapelift is given below the image. The impact of fluorescent fibres on the Polilight fluorescence score is demonstrated.

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News from the forensic community

Sequencing DNA sampling and fingerprint development using DNA-free consumables: fingermark obliteration versus DNA recovery is not a zero-sum game

Julie Gardiner, Michael Banasiak, Matt N. Krosch

Queensland Police Service

The dual recovery of DNA samples and fingerprints from touched objects and surfaces is highly desirable for many criminal investigations as it can provide greater probative value to investigators than either alone. Fingerprint evidence is crucial in forensic investigations due to its durability and reliability. Furthermore, modern digital workflows for latent fingerprint image capture, upload, database comparison and result reporting facilitate the provision of rapid intelligence to investigators. Alongside this, the techniques for recovering trace DNA have advanced significantly in recent years, allowing forensic scientists to extract and amplify DNA from increasingly smaller samples. Whilst this improved sensitivity has widened the scope of forensic investigations, it has come with the trade-off of higher contamination risk. Consequently, in many jurisdictions, DNA sampling is prioritised over fingerprint examination to minimise contamination, even though the mechanical action of DNA sampling is generally thought to obliterate fingerprint residues.

This project intended to strengthen decision-making around sequencing fingerprint and trace DNA examinations by: a) assessing whether any fingerprint ridge detail remained after DNA sampling had occurred, and b) evaluating whether DNA-free fingerprint brushes and powders were fit for purpose (e.g., developed high quality fingerprints, but did not contribute extraneous DNA or interfere with DNA extraction and profiling). The results of this study will empower forensic practitioners to collect all available evidence by informing decision-making about the optimal examination sequence for a specific exhibit.

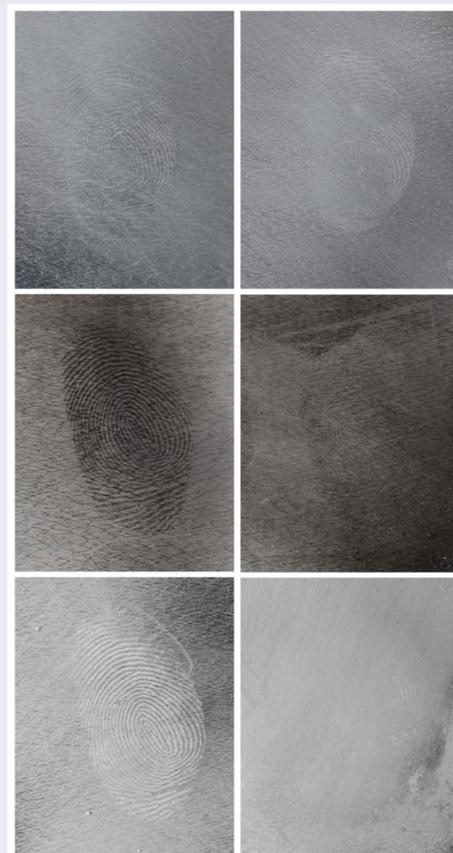
Part A of the study provided some insight into how much latent fingerprint residue was left after DNA sampling was conducted and whether an identification could still be made. This involved depositing charged latent fingerprints onto a clean, layflat plastic sheet. The latent impressions were subjected to trace DNA sampling techniques using either a tapelift

or a sterile rayon swab moistened with 70% ethanol. Following this, all fingerprints were developed with traditional black powder (non-DNA free). Part B of the study tested whether the DNA-free powders and brushes were fit-for-purpose. This involved depositing charged latent fingerprints onto a sheet of clean, layflat plastic. All fingerprints were developed using DNA-free fingerprint powders and brushes and were subsequently sampled for DNA using tapelifts or swabs. Digital photographs of developed latent fingerprints were recorded and quality scored by a fingerprint expert.

The results demonstrated that DNA sampling and powder fingerprint development are not necessarily a zero-sum game. High quality fingerprints were developed using DNA-free consumables without any evidence of contamination. Further, DNA sampling using tapelifts was shown to leave sufficient latent material to develop a fingerprint suitable for comparison whilst also generating a high-quality DNA profile. DNA samples were collected after fingerprint powder development showed significant differences in DNA quantification and profiling results between the two fingerprint powders but not between DNA collection methods. Samples collected following treatment with black powder recovered significantly more DNA than those enhanced with white powder. These results can be distilled to some key operational recommendations as follows:

- Where fingerprint development must precede DNA sampling, use DNA-free black powder followed by tapelifting.
- For the reverse scenario, use tapelifts for DNA collection.

This study provides valuable insight toward evidence-based decision-making by forensic examiners for the optimal sequential examination and collection of critical fingerprint and DNA evidence. Additionally, the results will contribute to the growing body of knowledge about using DNA-free fingerprint brushes and powders to develop latent fingerprint impressions prior to DNA examinations and the potential impacts or contamination that may incur on subsequent trace DNA sampling.



▲ Figure 1. Exemplar images of powder-developed impressions. Top left and right: ridge detail that remained post-DNA sampling with tapelifts, developed with white powder; both the fingerprints and DNA profiles were suitable for comparison. Middle left and right: black powder development of an impression pre- and post-DNA sampling with a tapelift. The DNA profile was suitable for comparison, but DNA sampling obliterated the impression. Bottom left and right: white powder development of an impression pre- and post-DNA sampling with a tapelift. No alleles were recovered from this impression, and the ridge detail was mostly obliterated by DNA sampling.

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News from the forensic community

AFP DVI Team present training in Solomon Islands

Merrilyn Hurst

Australian Federal Police

The Royal Solomon Islands Police Force (RSIPF) have continued their preparations for the Pacific Games by completing two week-long Disaster Victim Identification (DVI) courses. Solomon Islands had the privilege of hosting the first international DVI courses run by the Australian Federal Police (AFP) since the restrictions of COVID. The courses in September and October trained more than 30 participants in the INTERPOL DVI processes used to identify victims of a mass casualty event.

Two DVI experts from the AFP travelled to Honiara in September and October to present the training. Senior Constable Mark Grima and Scott White have extensive experience in DVI, Policing and Forensic Roles, and were happy to share their experiences. This continues the long relationship between the RSIPF and the AFP in providing DVI training, the most recent of which involved Officers from the RSIPF travelling to Canberra to complete a DVI Phase Coordinator course earlier in the year.

Throughout the current training courses, participants were instructed on all phases of the DVI process, which involved case studies, desktop exercises, and practical scenarios where they put their skills to the test in simulated car crashes and restaurant explosions.

Speaking on behalf of the participants in the first course, Dr Stephen Tanihorara, Senior Registrar in Paediatric Dentistry, working at the National Referral Hospital, said: "As we reflect on this week, we have



▲ Course 1 Participants with AFP DVI Experts Scott White and Senior Constable Mark Grima, RSIPF AC Patricia Leta, RAPPP Superintendent Adam McCormack and RAPPP Forensic Advisor Merri Hurst



▲ Course 2 Participants with AFP DVI Experts Scott White and Senior Constable Mark Grima, RAPPP Superintendent Adam McCormack and RSIPF AC Patricia Leta

done theories and lots of case scenarios. We team up into groups to attend to the scenes to do cordoning, gridding, recording and recovery of the dummies. Post and ante mortem investigation was also very interesting in this training with lots of forms to fill in. I also want to commend my fellow participants for your hard work, perseverance, and dedication. We have trained together, learned from each other, and formed bonds that will last a lifetime. I am confident that each one of us will go on to make a significant impact in the field of DVI."

These were collaborative courses, with participants coming from different departments within the RSIPF, including Forensics, Investigators, the Fire Department, Traffic and the Police Response Department, as well as the AFP, and local medical experts. Collaboration is a big part of a DVI response. As Senior Constable Grima said "No single jurisdiction, globally, has the resources to manage a large DVI incident without the assistance of others"

RSIPF Assistant Commissioner Patricia Leta closed the courses and thanked the AFP, through the RSIPF and AFP Policing Partnership Program (RAPPP), for providing the training to upskill RSIPF Officers and other participants. "Training in DVI is an important part of RSIPF's preparation for upcoming major events, including the Pacific Games and National General Election. The current training is aligned to the INTERPOL standard, ensuring Solomon Islands will be adequately prepared should an incident occur in the future. I would like to encourage all the participants to share your knowledge with other Officers."



▲ Participants preparing to search their scene



▲ Participants search during the response to a car crash



▲ Completing a gridding exercise and searching



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News from the forensic community

Dip and detect: Drug discovery made easy

Dr Clark Nash
Forensic Science SA

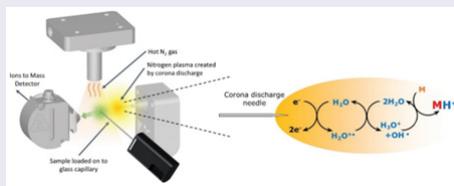
Forensic Science SA (FSSA) clients (namely SAPOL and ODPP) are always looking to obtain information at the earliest possible opportunity to assist them in their investigations and/or court proceedings. For illicit drug and clandestine laboratory cases simple preliminary analysis techniques can be used to provide intelligence towards South Australian Police (SAPOL) investigations and allow the South Australian Legal Service (ODPP) to progress these cases through the courts.

In 2022, the illicit drug group (IDG) of FSSA introduced preliminary analysis reports into their workflow to provide that information to both SAPOL and the ODPP. This implementation has been successful to the point that this service has been retained and the timeframe for the provision of the final Certificate of Analysis report has been considerably extended.

Currently, the techniques that are used to generate these preliminary reports are presumptive and are also limited in the amount of information they can provide our clients. As the IDG is always looking to continually improve its service delivery to its clients, the Waters Radian Atmospheric Pressure Solids Analysis Probe (ASAP) Direct Mass Detector was trialed to determine if the accuracy and additional information could be significantly enhanced for these reports.

The Radian ASAP is a direct analysis system which is specifically designed for rapid, easy, and low-cost analysis of liquids and solids. The probe allows for samples to be introduced into a corona discharge region. The sample is then volatilized using a stream of hot nitrogen and the gas phase constituents of that sample are ionized and guided into the mass spectral detector, through the quadrupole and detected by the photomultiplier (Figure 1). [1]

The suitability of the Radian ASAP instrument for the preliminary analysis of various classes of illicit drug compounds was tested using certified reference materials, illicit drug proficiency tests,



▲ Figure 1. Overview of the Radian ASAP Ionization Process

intelligence-based samples and IDG's internal technical assessment materials. For each sample testing included touching the material directly with the glass capillary probe without any further sample preparation. The probe is loaded into the Radian instrument tray and within a matter of minutes all compounds of interest that had been included within its associated mass spectral library are indicated and displayed (Figure 2).

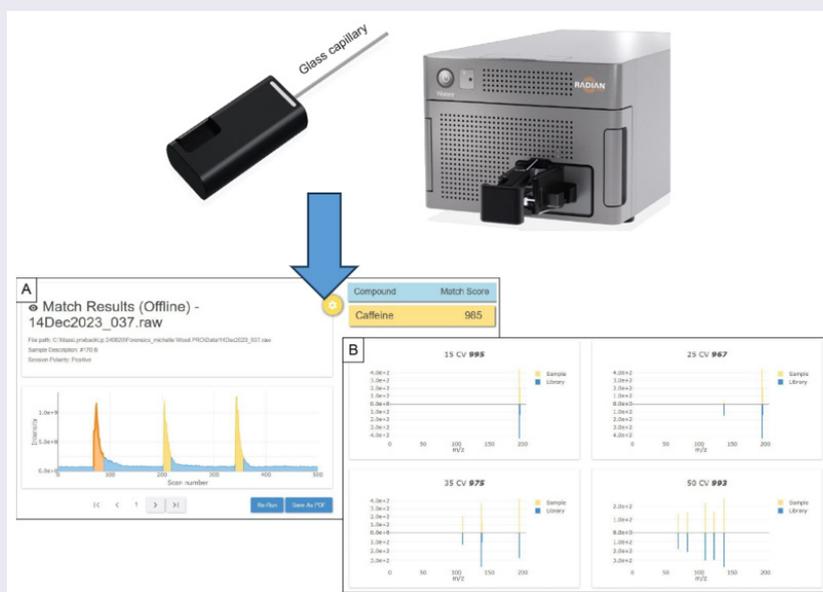
Common Illicit drug materials tested included:

- Powders (methylamphetamine, cocaine and heroin)
- Liquids (1,4-butanediol and 4-hydroxybutanoic acid (GHB))
- Tablets (MDMA and clonazolam)
- Tickets (lysergic acid diethylamide (LSD))
- Mushrooms (psilocybin/psilocin)
- Cannabis plant material (THC/THCA)

Due to the sensitivity of the Radian ASAP instrument, there were no issues identified in obtaining an indication, or a full identification of the controlled substances listed above within the varying sample matrixes tested. However, as the illicit drug materials were directly sampled with the glass capillary probe it was determined that completion of a 'bake out' acquisition (approximately 2 minutes) should be performed in between sample acquisitions. Dilution of the suspected illicit drug material in an appropriate alcohol-based solvent prior to acquisition would be expected to produce the best results. Whilst not directly tested due to the associated health risks, this instrument due to its sensitivity, would be ideal for an immediate indication of low-dose illicit substances such as fentanyl and nitazenes.

Due to the capability enhancement of the Radian ASAP direct mass spectrometer in the provision of a substantial amount of additional information, and the increased accuracy regarding the preliminary identification of controlled substances, it is expected that the IDG of FSSA will now aim to incorporate this technique into our current workflow arrangements in the near future.

[1] RADIANT ASAP Direct Mass Detector | Single Quadrupole Mass Spectrometer | Waters



▲ Figure 2. Overview of the Radian ASAP Workflow [1]

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News from the forensic community

The analysis of methylamphetamine and its metabolites in hair

Dylan Mantinieks and Dimitri Gerostamoulos

Victorian Institute of Forensic Medicine

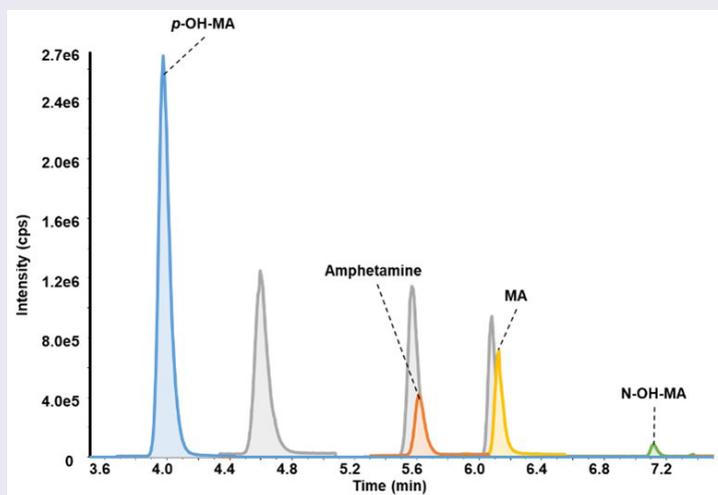
Methylamphetamine (MA) is a highly addictive stimulant drug, colloquially known as crystal MA or ice. Increases in MA-related harms over the previous decade have been attributed to recent rises in the supply of amphetamine-type stimulants and the more frequent smoking of crystal MA [1]. Hair analysis for drugs in medico-legal investigations potentially shed light on historical exposure; however, external contamination remains a key interpretative limitation only more relevant within the context of higher rates of MA smoking. The Society of Hair Testing recommends decontamination procedures and the analysis of metabolites in hair to help identify drug users, for example, the hydroxy-cocainics must be considered to confirm cocaine use [2]. That said, specific metabolites of MA in the current guidelines are lacking. We have developed an analytical method using liquid chromatography-tandem mass spectrometry with the requisite sensitivity to detect para-hydroxy-methylamphetamine (p-OH-MA) in hair to assist in the differentiation of MA use and external contamination.

Not unexpectedly, there were several method development challenges. To maximise sensitivity, flow-injection analysis

was used to optimize the electrospray ionization conditions whereby ion spray voltage and source temperature had noticeable impacts on peak area. Endogenous interferences, presumably due to biogenic amines, were difficult to chromatographically separate using phases like C18 or biphenyl. However, an aqueous C18 analytical column with improved retention of polar metabolites and specially designed LC program achieved acceptable selectivity. Lastly, our in-house method using a methanolic micro-pulverization for sample preparation showed minimal additional recovery using repeat extractions of the hair. The final method is depicted in Figure 1.

Validation experiments were conducted in accordance with the American Academy Standards Board Standard 036, Standard Practices for Method Validation in Forensic Toxicology and the result were satisfactory [3]. The lower limit of quantitation of MA, amphetamine, and p-OH-MA were 0.01, 0.01, and 0.001 ng/10 mg of hair, respectively, while N-OH-MA proved to be unstable in the reconstitution solvent (95:5, 5 mM aqueous ammonium formate (pH 3.5):0.1% formic acid in methanol). Future studies will apply this analytical method to determine the hair concentrations of MA and its metabolites in a representative cohort of medico-legal investigative casework, thereby determine their utility to discriminate use and external contamination.

- [1] Degenhardt L, Sara G, McKetin R, Roxburgh A, Dobbins T, Farrell M, et al. Crystalline methamphetamine use and methamphetamine-related harms in Australia. *Drug Alcohol Rev.* 2017;36(2):160-70.
- [2] Favretto D, Cooper G, Andraus M, Sporkert F, Agius R, Appenzeller B, et al. The Society of Hair Testing consensus on general recommendations for hair testing and drugs of abuse testing in hair. *Drug Test Anal.* 2023;15(9):1042-6.
- [3] American Academy of Forensic Sciences Standards Board. Standard practices for method validation in forensic toxicology. American Academy of Forensic Sciences; 2019.



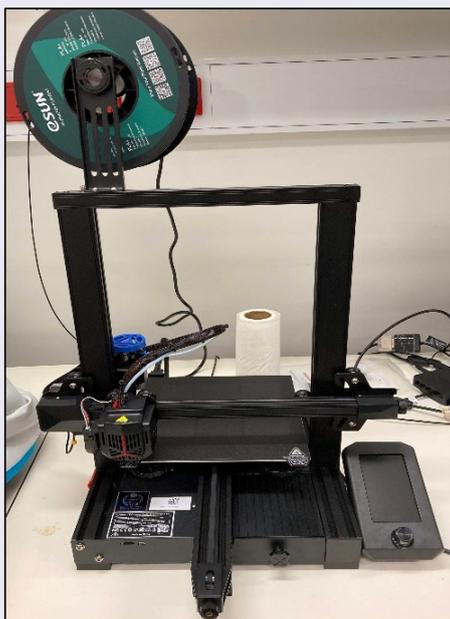
▲ Figure 1: Representative extracted ion chromatogram of MA and its metabolites in hair in an unextracted system suitability mix. Grey shaded peaks are isotopically labelled internal standards.

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News from the forensic community

AFP Additive Manufacturing Working Group

Matthew Bolton
Australian Federal Police



Australian Federal Police Forensics has created an Additive Manufacturing Working Group (AMWG) that seeks to address the similar threat environment seen in the US, Canada and Europe, which has seen an increase in illegal firearm manufacture. This increased firearms production is being enabled, in part, through the accessibility of technology and affordable desktop lathes and improvements in 3D printer hardware as well as online platforms and chat groups.

Recent statistics provided by INTERPOL identified 142 cases involving 3D firearms in 2023 globally, with 60% of the criminal groups involved being identified to far-right organisations. The improvement in 3D manufactured firearms was also highlighted by INTERPOL, with 80% of the firearms seized in 2023 in Sweden being 'functional', compared to a 50% functionality rate in 2021. Whilst in Canada, there has been a 900% increase in cases involving 3D firearms between 2018–2022.

To assist in meeting this threat, the AFP created the AMWG with the aim of centralising the diverse disciplines within AFP Forensics that have active investigative, technical and research roles associated with additive manufacturing under a common group. The scope of the AMWG includes:

- Sharing technical and intelligence information between forensic disciplines.
- Co-ordinating joint projects to fill any identified capability gaps.
- Pool AM resources currently available at AFP Forensics to assist with investigations.
- Collaboration with other committees, particularly in the firearms and intelligence spaces.
- Provide a single point-of-contact within AFP Forensics regarding AM investigations, technical advice, and research.

- Provide liaison with international and academic institutions, students and other select persons undertaking relevant AM research and projects.

Currently, the AMWG is comprised of members from Firearms and Toolmark Identification, Crime Scenes, Digital Forensics, Chemical Criminalistics, Biology, Fingerprints, Facial Recognition and Forensic Intelligence. The AMWG is also seeking to provide written guides and SOPs to assist evidence recovery at crime scenes, laboratory based examinations and court statements involving additive manufacturing for AFP forensic sections.

To date, the AMWG has shared information amongst the relevant sections, for cases involving 3D firearms being investigated by ACT Policing and Australia Border Force. The AMWG is also expanding into research projects being undertaken the University of Technology Sydney, exploring the production and reproducibility of toolmarks in 3D printed samples and DNA transference and collection techniques. If other jurisdictions wish to know more about the group's work or would like to collaborate, contact can be made in the first instance with Matthew Bolton at Firearms and Toolmark Identification, AFP (matthew.bolton@afp.gov.au).

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News from the forensic community

South Australia Police Forensic Quality, Innovation and Capability Section

Sgt Bernadette Williamson

South Australia Police

In 2020 the South Australia Police (SAPOL) Forensic Services Branch (FSB) commenced a review to ensure they were structured for the future of forensic capabilities and were able to maintain a dedicated and strategic focus on core business.

The new structure, implemented on 24 August 2023 was organised into strategic and operational portfolios with a significant investment made into forming a new Quality, Innovation and Capability Section (QICS) under the leadership of the newly created Strategy & Support Inspector position.

QICS brings together the Training, Development and Quality Assurance capabilities under the leadership of one manager. With a strong focus on quality assurance and forensic capability, this new section plays a central role in ensuring SAPOL Police Forensic capabilities and services are maintained and future ready.

QICS has an allocation of seven sergeants and two technical grade officers. QICS will be the nucleus of Forensic Services Branch, driving forensic capability and quality assurance across a state wide Crime Scene Response. The core functions for QICS in achieving this includes:

- Maintaining forensic quality standards, policies, and practices
- Liaison with regional Local Service Area Commanders and Crime



▲ *Quality, Innovation & Capability Section members:*
Standing (left to right): Sgt Bernadette Williamson, Sgt Katherine Brown, Sgt Paul Manns, Sgt Kristin Enman
Sitting (left to right): Senior Sergeant Jason Wynne, Inspector Cassie Broadbent, Sgt Jason Herr.

Scene Investigation Units, including professional development and quality culture

- Early identification of capability risks and development of mitigation strategies
- Research and development of police forensic capability
- Co-ordination of skills enhancement, professional development, and training
- Supervision of SAPOL's forensic photographic capability
- Providing a Crime Drafting response to crime scenes

On 19-20 March QICS ran an establishment workshop. The workshop was opened by Chief Superintendent Scott Allison and FSB Strategy and Support Inspector, Cassie Broadbent. The purpose of the workshop was to:

- Develop a QICS vision linked to the FSB Vision of Delivering Excellence in Forensic Services in support of police operations and investigations.
- Identifying current and future projects
- Current disposition of portfolios
- Capability maintenance, development and risk
- Forward Planning
- Standing up the regional CSI liaison model

FSB section managers were invited to speak at the workshop discussing their current and future needs. Presentations included:

- Serious and Declared Major Crime Scene Investigation (Forensic Response Section)
- Metropolitan Crime Scene Investigation response
- Identification and Evidence Section
- Regional Crime Scene Investigation

The information provided invaluable perspectives on the current status of capabilities and risk across FSB. Collaboration was instant, as exemplified

by QICS preparing to host AFP and QPOL Forensics to run a joint AFP and FSB Chemical, Biological, Radiological and Nuclear (CBRN) Forensic Skills Enhancement workshop and a SAPOL Disaster Victim Identification (DVI) co-ordinators workshop in the coming months.

For QICS to succeed it was important to develop a vision. QICS members identified the section was viewed as a centralised support area for future readiness whilst ensuring quality control and culture. The vision was effortlessly established as;

Leading, supporting and developing Forensic Services Branch Capabilities by fostering a quality culture.

The vision is supported by key underlying principles including;

- Embracing technology
- Encouraging a Speak Up culture
- Collaboration
- Capability development

Discussion topics identified the various portfolios QICS can support, as well as current and future projects. Portfolios include

- Quality Culture and Assurance
- DNA and Evidence Management Unit
- DVI
- Forensic Register
- Fingerprint Bureau
- Forensic Response Section
- Regional CSI Liaison model
- Training – including capability and professional development.

The workshop was successful, with excellent support and enthusiasm from QICS members. QICS has quickly become a close team with some projects on track to be completed by the end of the year. The stand-up of QICS provides a unique opportunity to promote Forensic Services Branch within SAPOL and Nationally.

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ANZPAA Police Conference 2024 - Registrations Open

PC/ 2024

19-20 NOVEMBER
ANZPAA
POLICE
CONFERENCE
**POLICING
REIMAGINED**

Presented by the Australia and New Zealand Police Commissioners', this two day conference will explore the theme Policing Reimagined.

PC24 will bring together over 500 police personnel, members of the law enforcement community and industry to exchange ideas and foster collaborations for safer communities.

- OUR ROLE
- OUR PEOPLE
- OUR COMMUNITY



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ANZPAACONFERENCE.COM.AU

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Events Calendar

2024

JUNE

2024 Global Forensic Science Symposium, hosted by the Global Forensic and Justice Center at FIU

4 - 7 June 2024

Miami, Florida, United States of America

► <https://gfjc.fiu.edu/symposium/>

15th European Network of Forensic Handwriting Experts Conference

17 - 20 June 2024

Stockholm, Sweden

► <https://enfsi.eu/agenda/15th-enfhex-conference-in-stockholm-save-the-date/>

13th Conference on Forensic and Anthropological Genetics and Mayo Clinic Lectures in Individualized Medicine

17 - 20 June 2024

Split, Croatia

► <https://isabs.hr/>

NATA Accreditation Matters Conference

25 - 26 June 2024

Sydney, Australia

► <https://nataevents.nata.com.au/am2024>

AUGUST

82nd Annual Conference of the American Society of Questioned Document Examiners

26 - 28 August 2024

Atlanta, Georgia, United States of America

► <https://www.asqde.org/2024.html>

September

61st Annual Meeting of the International Association of Forensic Toxicologists

2 - 6 September 2024

St. Gallen, Switzerland

► <https://tiaft2024.org/frontend/index.php>

Clandestine Laboratory Investigators Association Conference (hosted by NSW Police Force)

17 - 24 September 2024

Sydney, Australia

► cliaoz2024@police.nsw.gov.au

NOVEMBER

PC24 ANZPAA Police Conference - Policing Reimagined

19 - 20 November 2024

Melbourne, Australia

► <https://anzpaaconference.com.au>

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More information

Acknowledgement of Country

ANZPAA NIFS acknowledges Aboriginal and Torres Strait Islanders are Australia's first peoples and the traditional owners and custodians of the land on which we work. ANZPAA NIFS is committed to fulfilling the principles of New Zealand's founding document The Treaty of Waitangi (Te Tiriti o Waitangi). Central to the principles is a common understanding that all parties will relate and participate with each other in good faith with mutual respect, co-operation and trust.

The Forensic Exhibit is committed to fulfilling the intent of international treaties and human rights legislation applicable to the various jurisdictions in which we operate, our obligations to Aboriginal and Torres Strait Islander peoples, and the principles of the New Zealand (Aotearoa) Treaty of Waitangi (Te Tiriti o Waitangi).

Newsletter contributions

If you would like any further information on ANZPAA NIFS or would like to contribute to the next edition of *The Forensic Exhibit* please contact ANZPAA NIFS Secretariat: secretariat.nifs@anzpaa.org.au

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