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ISO 9001 & ISO/IEC 17043

Final Report
(August 2022)

Proficiencytesting@forensicfoundations

Fingerprint detection, enhancement and identification 2022-FP1

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17 August 2022.
Amended 18 August 2022

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ACCREDITED FOR TECHNICAL COMPETENCE

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Introduction

Design

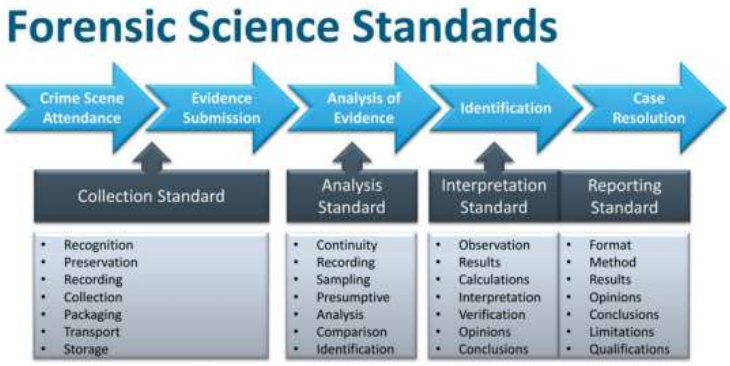
Forensic Foundations' Proficiency Tests are designed to address the following points:

- Relevance to forensic science laboratories
- Limitation of any potential context information
- The end-to-end forensic process
- Knowledge of the 'ground truth' of samples
- Importance of consistency between tests
- Cost affordability for the laboratories

In addition to this exercise being a test of laboratory procedures using controlled items, we also anticipate that it will enable participants to evaluate the quality of their analytical results against those from other laboratories and observe how other laboratories express their opinions or advise for their clients. To enable this, we requested that participants submit the following:

- An outline of the methodology used; and
- Their opinion in the format that they would provide to the court.

Forensic Foundations' Proficiency Tests are designed to test the end-to-end forensic examination process. The AS 5388 and the ISO 21043 series of Standards describe the forensic examination process from collection to reporting. This figure[1] illustrates the inter-relatedness of all steps in this process and was used as the basis of the Australian Standards' development. The figure is also used as the basis of the development of Forensic Foundations' Proficiency Tests.



Thus, all Forensic Foundations' Proficiency Tests commence with item collection and/or receipt and includes all the subsequent examination / analysis steps, culminating in the reporting of results, the process therefore reflects actual forensic casework.

Individual laboratory results remain confidential.

The Final Report of this 2022-FP1 round of Proficiency Tests is publicly available via the Forensic Foundations web site. Participating laboratories may use the report as outlined in their respective laboratory policies. Any request to review and/or appeal the evaluation of a laboratory's performance should be made via the agency responsible for the distribution of the test or directly to Forensic Foundations.

[1] James Robertson, Karl Kent & Linzi Wilson-Wilde (2013) The Development of a Core Forensic Standards Framework for Australia, Forensic Science Policy & Management: An International Journal, 4:3-4, 59-67

2022-FP1 Fingerprint Examination

The aim of this test was to review the end-to-end forensic examination, analysis, and reporting process. Thus, in addition to interpreting and reporting the examination of unknown fingermarks, testing of generic issues such as sample receipt, triage, and continuity of items for examination formed part of the overall process.

In order to minimise contextual bias in the interpretation, the information relating to the 'offence' was minimal.

This test provided a mechanism for participating laboratories to review their results and those of other laboratories to facilitate[2&3]:

- An evaluation and appraisal of their performance including:
  - comparison of a facility's performance with other facilities
  - monitoring of a facility's long-term performance
- Continuous improvement including:
  - staff education, training, and competence monitoring
  - evaluation of methods, including the establishment of method precision and accuracy
  - contribution to a facility's overall risk management process
- Corrective action (where required)
- Confidence building with interested parties (e.g. customers, accreditation bodies, regulators, specifiers).

This proficiency test was distributed to eight participants. Six laboratories submitted responses.

The participants were provided with five ten-print sets (Items 1-5) and two threatening letters (items 6-7)

Items were sealed in individual envelopes and included descriptors for continuity purposes.

Disclaimer:
The data contained in this report and any observations made are based on the material provided by the participants; however, it is understood that the laboratories may hold additional material which supported the findings reached.

[2] ISO17025 (2017) General requirements for the competency of testing and calibration laboratories.
[3] NATA (2021) General Accreditation Criteria Proficiency Testing Policy

Report Summary

Continuity, receipt, and description of items

As the receipt and chain of custody for items, subject to forensic examination and analysis, is significant to the final outcome, information pertaining to receipt, continuity and a description of the items formed part of this test.

All the participating laboratories provided information which concurs with the packaging, labelling and samples as distributed, to different degrees of thoroughness.

Notes were made by a number of laboratories regarding the incorrect numbering of the questioned documents.

Examination / Analysis

All participating laboratories started their examination using optical lighting techniques.
5 of the 6 laboratories then used Indandione followed by Ninhydrin to chemically enhance the print.
Laboratory 17141 used Ninhydrin but did not use indandione.

The print on the second evidentiary document was purposefully unidentifiable and no laboratories identified the print.

Interpretation and Conclusions

5 of the 6 laboratories provided their interpretation and conclusions.

All 5 of the reporting laboratories correctly identified that the fingerprints on the first questioned document were from Jake Ryan.

These findings are consistent with the expected findings.

Laboratory Responses

Continuity, receipt, and description of items

Laboratories were requested to provide information, with respect to the continuity, receipt, and description of each of the items received, using a supplied proforma table. This facilitated both consistent responses and the collation and comparison of responses. Laboratories were requested to respond to each statement with a 'Yes' or 'No' and 'Comments' where appropriate. The fist column of the table contained in this test's results sheet was incorrectly labelled.

Laboratories 19478 and 52414 noted the discrepancy with respect to the numbering of the threatening letters in this table. See Table 1 for a collation of data with respect to continuity, receipt and description of items.

Laboratories 17141 and 66080 indicated that the prints provided from Mark Lee (Item 4) were of poor quality.

Forensic Foundations Comments

With the exception of the incorrect labelling of the items as described, all the laboratories indicated that the samples were received intact and the continuity details were as expected.

The prints provided by Mark Lee (Item 4) were deliberately of poor quality as this reflects the situation when poor prints are submitted with genuine casework, however the quality of these prints did not impact on the ability of the laboratories to undertake this test nor obtain the correct results.

Examination / Analysis

Enhancement / Recovery

Laboratories were requested to provide information with respect to the methods used for latent mark enhancement using a supplied proforma table. This facilitated both consistent responses and the collation and comparison of responses. Table 2 summarises the results – tests appearing in the proforma table which were not applied by any laboratory have been removed.

The sequence of examination and analysis and the results obtained was either recorded by the laboratory or inferred from the material provided.

Examination sequence

17141	**19478**	**30297**
• Optical • Ninhydrin	• Visual using fluorescent light source • 1,2-Indanedione & Zinc • Ninhydrin	• Visual daylight examination with white light and oblique white light • Fluorescent examination • 1,2-Indanedione • Ninhydrin • Physical developer
52414	**66080**	**88626**
• Lightsearch • 1,2-Indanedione • Ninhydrin • Physical developer	• Optical • 1,2-Indanedione • Ninhydrin	• Optical • 1,2-Indanedione • Ninhydrin • Physical developer

Results obtained

17141	19478	30297
• Item 6 (Page 1 on the side with text printed) – Mark L1 • Item 6 (Page 2 on the side without text printed) – Marks L2 and L3 • Item 7 (Page 3 on the side with text printed) – Mark L4	• Item 6 recto (side with threatening text) named FM1 • Item 6 verso named FM2 and FM3 • Item 7 recto (side with threatening text) named FM4	• Item 6 front side named 2022-FP1 A • Item 6 reverse side named 2022-FP1 B • Item 7 no friction ridge detail disclosed.
52414	**66080**	**88626**
• Item 6 – 1A, 2A and 2B • Item 7 – 3A	• Front of item 6 – Mark 1 • Rear of item 6 – Mark 2 and 3 • Front of item 7 – Mark 4	• Front of item 6 – L1 • Back of Item 6 – L2 and L4 • Front of Item 7 – L3

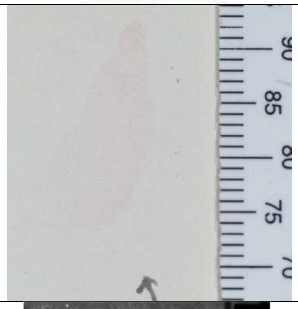
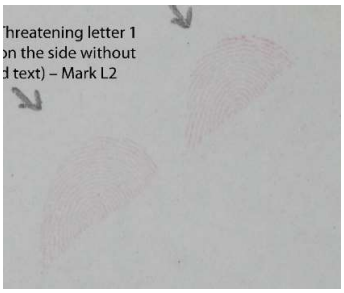
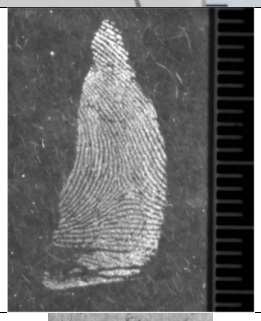
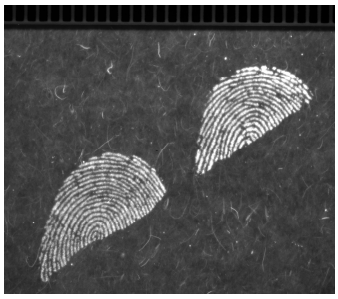
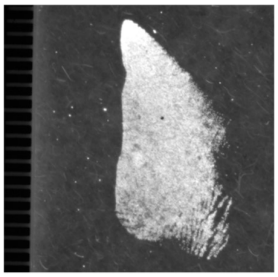
Forensic Foundations' comments

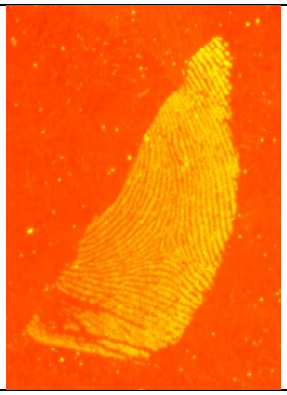
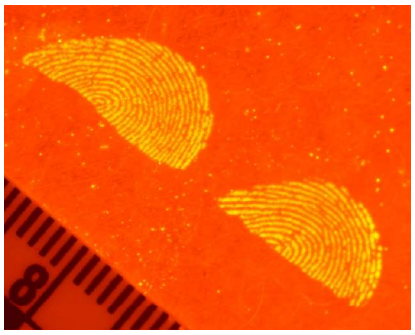
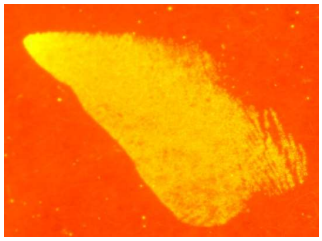
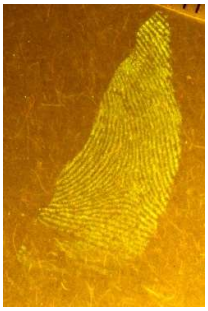
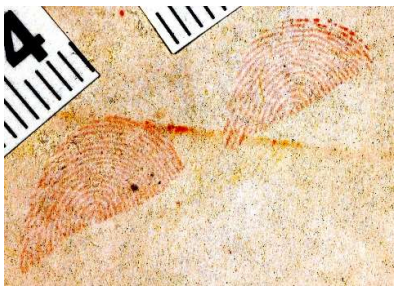
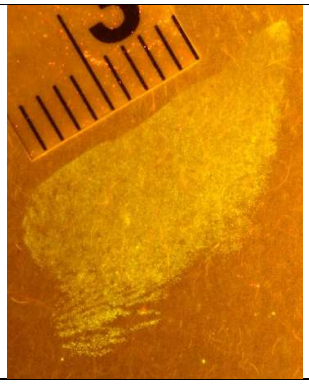
All participating laboratories commenced their examination using optical lighting techniques.

Laboratory 17141 enhanced the latents using Ninhydrin.
The remaining laboratories used 1,2-Indanedione / Zinc followed by Ninhydrin, however no improvement in fingerprint detail was obtained with the use of Ninhydrin.
Laboratories 30297, 52414 and 88626 attempted further development with physical developer.

Results

The following images were copied from the participants' results sheets and edited for insertion into the table below.

Template			
17141			
19478			
30297			
52414	This laboratory did not submit images		

66080			
88626			

Interpretation and Conclusions (please include the wording you would use in your report)

17141

- Mark L1 is suitable for identification. Mark L1 is identified with the fingerprint impression of the Left Thumb of Ryan Jake
- Mark L2 is suitable for identification. Mark L2 is identified with the fingerprint impression of the Left Ring of Ryan Jake
- Mark L3 is suitable for identification. Mark L3 is identified with the fingerprint impression of the Left Middle of Ryan Jake
- Mark L4 is of No Value for identification

19478

- The findings provide extremely strong support in favour of the view that the mark FM1 originates from the …left thumb… of Jake Ryan
- The findings provide extremely strong support in favour of the view that the mark FM2 originates from the… left ring… of Jake Ryan
- The findings provide extremely strong support in favour of the view that the mark FM1 originates from the…left middle… of Jake Ryan

By extremely strong support we mean that the findings are at least a billion times more likely under the proposition of common source.

30297

After comparison with the elimination prints and the suspects, Mark A on item 6 was identified for the left thumbprint of Jake Ryan and Mark B on item 6 was identified for the left middle and ring fingerprints of Jake Ryan.

52414

Did not provide an interpretation or conclusion

66080

- Mark 1 has been deposited by the left thumb reproduced in documentation JR—220118, recorded on 18th Jan. 2022 by West Beach Police Station at name of Jake Ryan born 05.02.1991
- Mark 2 has been deposited by the left ring reproduced in documentation JR—220118, recorded on 18th Jan. 2022 by West Beach Police Station at name of Jake Ryan born 05.02.1991

- Mark 3 has been deposited by the left middle reproduced in documentation JR—220118, recorded on 18th Jan. 2022 by West Beach Police Station at name of Jake Ryan born 05.02.1991

88626

Lophograms identified with the review in the name of Jake RYAN

Item 6: Threatening letter 1. Lophogram L04 is identified with the left ring finger, lophogram L02 is identified with the left middle finger and lophogram L01 is identified with the left thumb.

The lophogram L03 of item 7 does not have sufficient identification value.

Forensic Foundations' comments

All reported identifications were correct.

The fingermark on Item 7 was deliberately unidentifiable.
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APPENDIX A

EXAMINATION REQUEST AND ITEM SUBMISSION	EASTERN AUSTRALIAN POLICE SERVICE

OFFENCE:	Sending a threatening letter
DATE OF OFFENCE	12th January & 16th of January 2022

BRIEF STATEMENT OF FACTS

Alice Richards has received two threatening letters. The first was slipped under her front door on the 12th of January when she returned from work and the second on the 16th of January after she had been out shopping.

They appear to have been printed on a regular home printer and have been submitted for fingerprint examination.

ITEM SUBMITTED FOR EXAMINATION

Item 1 – 10 print set from Paula Grant
Item 2 – 10 print set from Alice Richards
Item 3 – 10 print set from Jake Ryan
Item 4 – 10 print set from Mark Lee
Item 5 – 10 print set from Brendan Chambers
Item 6 – Threatening letter 1
Item 7 – Threatening letter 2

High resolution reference sets of fingerprints can be downloaded from:
https://www.forensicfoundations.com.au/download/

EXAMINATION REQUESTED

An examination of the threatening letters for possible latent fingermarks.

A comparison of any fingermarks located on the threatening letters with reference fingerprints obtained from the four suspects and the homeowner.

An evaluation of the weight which can be assigned to any match, if any match is found

APPENDIX B

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PROFICIENCYTESTING@FORENSICFOUNDATIONS
FINGERPRINT EXAMINATION – 2022-FP1

MANUFACTURER'S INFORMATION
Issued 23/06/2022

Introduction

The test was designed to replicate the deposit of latent fingermarks on two threatening letters.

Scenario

Alice Richards has received two threatening letters. The first was slipped under h front door on the 12th of January when she returned from work and the second or the 16th of January after she had been out shopping.

They appear to have been printed on a regular home printer and have been submitted for fingerprint examination.

Aim

The aim of the program is to assess the laboratories' ability to competently treat, locate and identify fingermarks and assess their significance.

Program design and assessment

The test was designed, coordinated, and assessed by Forensic Foundations.

Test production

The tests were produced at Forensic Foundations' facilities and at the University Technology, Sydney.

Reference 10 print cards

Rolled fingerprints were collected from adult donors using ink. The rolled prints were then scanned at 1200 dpi.

The scanned prints were then inserted into ‘Eastern Australian Police’ 10 print cards to produce the reference 10 print cards.

The prints were viewed using a fingerprint magnifier and Forensic Comparison Software to ensure sufficient detail was present in the prints, which required comparison. Four reference sets were designed to replicate the range of quality of fingerprints routinely received by fingerprint examiners.

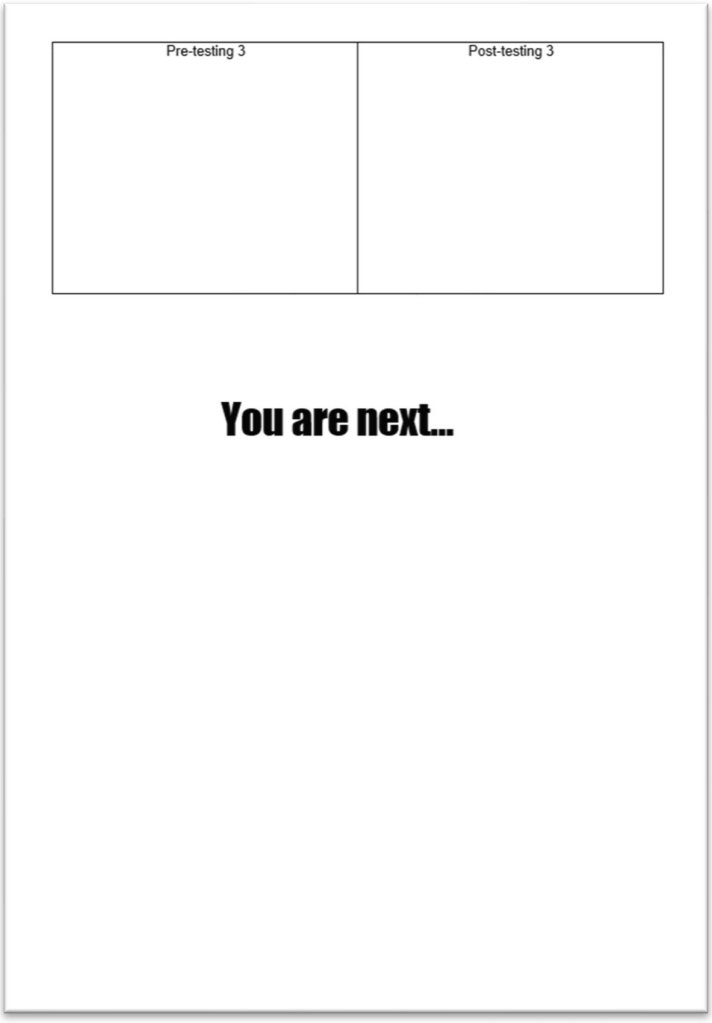
High-resolution copies of the reference 10 print cards were made available electronically from the Forensic Foundations website.

Items of Interest

Substrate

Each substrate comprised a page of one of the threatening letters and included two test squares as shown (see right) for checking purposes. Each substrate was uniquely numbered.

The substrates were printed using black ink.



Production of fingermarks

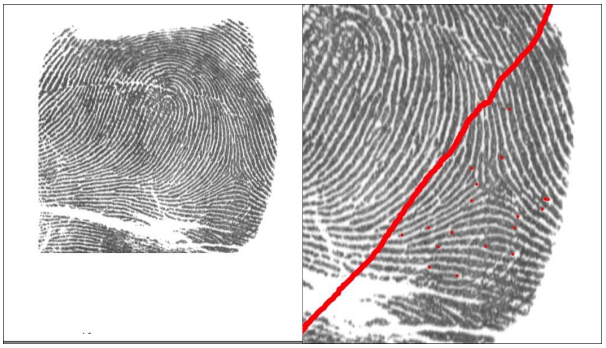
3 fingerprint images were selected from the rolled sets described previously, specifically the left thumb of Jake Ryan, a combined print of the left middle and left ring of Jake Ryan and the left index of Alice Richards. The images were edited using photo editing software to create the four fingermarks.

The fingermarks were assessed for suitability using a fingerprint magnifier and Forensic Comparison Software.

The original and edited fingermarks are shown below together with the cropping suggestion.

Mark 1

Left thumb of Jake Ryan

	
Cropped image charted	Original fingermark, cropping suggestion

Mark 2A
Left middle finger of Jake Ryan

Cropped image charted

Mark 2B
Left ring finger of Jake Ryan

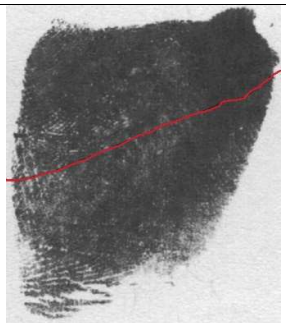
Cropped image charted

Original fingermarks, cropping suggestion

Mark 3

Left index finger of Alice Richards was purposefully unidentifiable

Cropped image



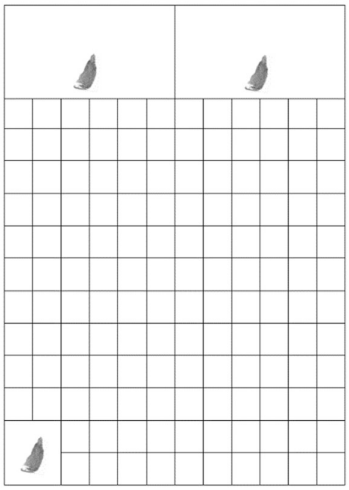
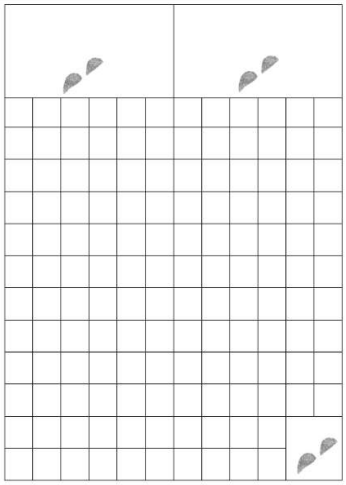
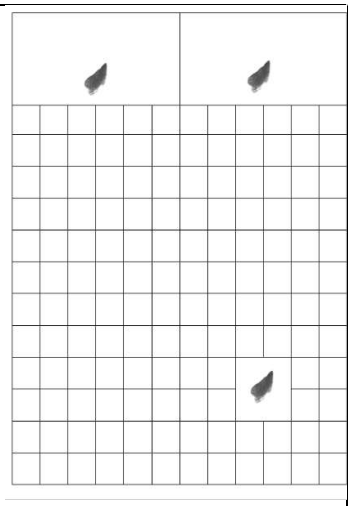
Original fingermarks, cropping suggestion

Deposition of fingermarks

An amino acid solution was used to replicate fingermarks.

Templates were created, ensuring the correct location of the ‘fingermarks’ on the substrate.

The amino acid solution was loaded into a printer cartridge and the fingermarks printed onto the relevant substrate.

		
Template used to produce Letter 1, front	Template used to produce Letter 1, back	Template used to produce Letter 2

Substrates were over-printed using the templates and the amino acid solution. The following printing regime was used:

Validation sample	Retention sample	4 sets of test items	Validation sample	Retention sample

Until sufficient tests were produced

Pretesting

All the validation samples and the pre-testing square from each test item were treated with 1,2-Indanedione and/or Ninhydrin and recorded using a Canon EOS 750 camera equipped with a 60mm macro lens. Excitation light was at 530 nm and a 590nm bandpass filter was used for visualisation of the luminescence of 1,2-Indanedione, Ninhydrin results were recoded under filtered green light.

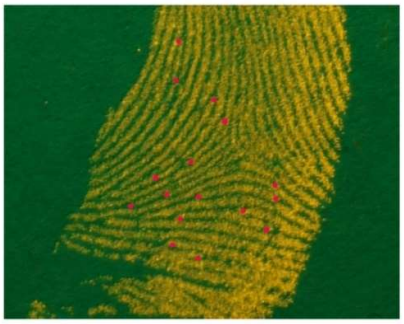
	Letter 1, front	Letter 1, back	Letter 2
	Mark 1A	Mark 2A (left) and 2B	Mark 3
Template			
Result after 12-indandione			
Result after ninhydrin			

Homogeneity – all validation and pre-test samples demonstrated uniform amino acid deposition.

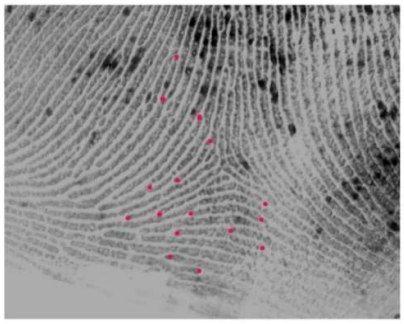
The developed fingermarks were assessed for suitability using a fingerprint magnifier and Forensic Comparison Software.

Mark 1

Left thumb of Jake Ryan



Developed image charted

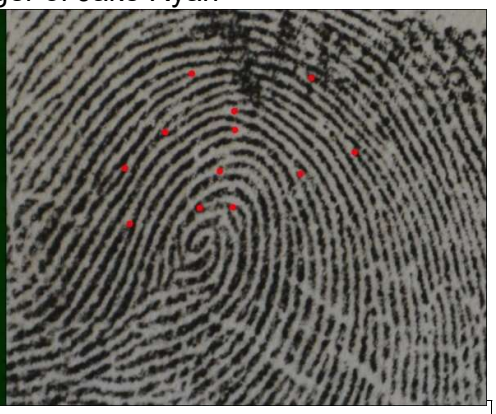


Original mark

Mark 2A

Left middle finger of Jake Ryan

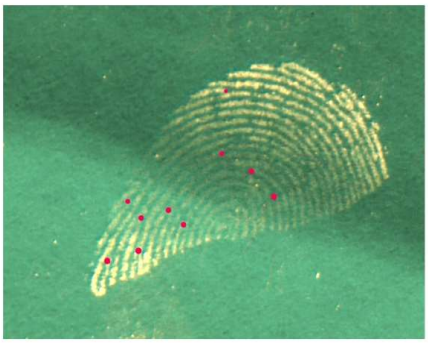
Developed image charted



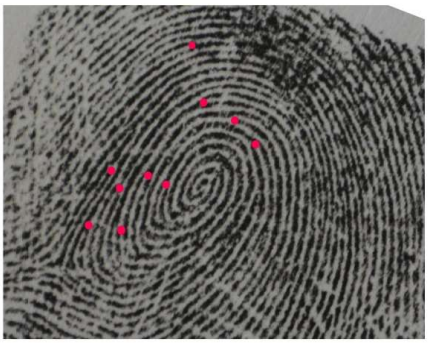
Original mark

Mark 2B

Left ring finger of Jake Ryan



Developed image charted



Original mark

Mark 3
Mark 3 (left index of Alice Richards) was purposefully unidentifiable

Expected results

- Letter 1 - front
  - One finger mark should be located.
  - Mark 1 should be identified as the left thumb of Jake Ryan

- Letter 1 - back
  - Two finger marks should be located.
  - Mark 2A should be identified as the left middle finger of Jake Ryan
  - Mark 2B should be identified as the left Ring finger of Jake Ryan

- Letter - 2
  - One finger mark should be located.
  - Mark 3 is unidentifiable

END OF DOCUMENT

Fingerprint detection, enhancement, and identification 2022-FP1

Feedback

Forensic Foundations prides itself in providing flexible fit-for-purpose forensic programs. The manufacture, distribution and assessment and reporting of this test has provided and will provide the basis for continuous improvement for both Forensic Foundations and the forensic laboratories. To this end we would appreciate your comments to assist us to improve the tests.

Please tick the appropriate box and make any relevant comments.

	Strongly Agree	Agree	Disagree	Strongly Disagree	NA
1. The test was too basic for our facility	☐	☐	☐	☐	☐
2. The samples supplied were suitable	☐	☐	☐	☐	☐
3. The results required were not outlined sufficiently	☐	☐	☐	☐	☐
4. The final report provided suitable detail	☐	☐	☐	☐	☐
5. The tests involved should be more challenging	☐	☐	☐	☐	☐

Please comment briefly on the following:

6. Are there additional aspects which could be included in the test?

……
……
……
……

7. Any additional comments

……
……
……
……

8. Facility (optional)

……
……
……
……

9. Would you like us to contact you to discuss your feedback?

……
……
……
……

Forensic Foundations' Proficiency Tests are required to be fit-for purpose. To assist us to provide the relevant tests, please use the following form to suggest further tests for development.

Recommendation for Proficiency Test development

Contact	Name	
	Email	
	Phone	
Discipline/ subdiscipline		
Specific issues(s) to be addressed*. Note: The tests can be designed to be multidisciplinary.		
Suggested technical advisor (if known)		
Suggested manufacturer (if known)		

* All Proficiency Tests will include the end to end process (receipt & continuity, triage, description, examination, analysis, data generation, interpretation, reporting) but one aspect may be of particular interest/focus.

This form can be emailed to quality@forensicfoundations.com.au or you can discuss your suggestions on either 03 9018 8919 or 0429 966 012.