



Final Report (December 2018)

Proficiencytesting@forensicfoundations

Microscopic Hair Examination and Analysis 2018-2

Authorised by Anna Davey, Director, Forensic Foundations,
04/12/2018.

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Contents

Introduction	3
Design	3
Microscopic Hair Interpretation 2018-1.....	4
Laboratory Responses	5
Continuity, receipt and description of items	5
Case Analysis & Interpretation	6
Conclusions (please include the wording you would use in your court report).....	6
Conclusion and Summary of the Test	7
Comments To Test Recipient.....	7
Appendix A Form No: WEF-03-A.....	8
Appendix B.....	11
Appendix C.....	12
Appendix D.....	13

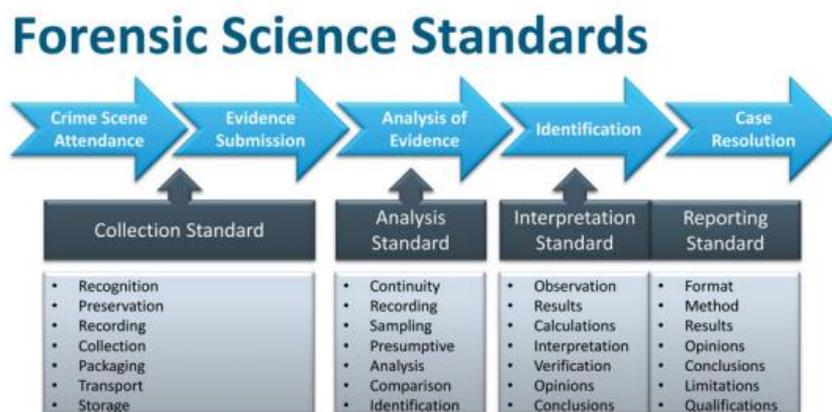
Introduction

Design

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

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

An additional feature of Forensic Foundations' Proficiency Tests is that they test the end-to-end forensic examination process. The AS 5388 Forensic Analysis series of Standards describes the forensic examination process from collection to reporting. The following figure¹ illustrates the inter-relatedness of all steps in this process and was used as the basis of the Standards' development. The figure is also used as the basis in the development of Forensic Foundations' Proficiency Tests. Thus, all Forensic Foundations' Proficiency Tests commence with item collection, and/or receipt and all the subsequent examination / analysis steps, culminating in the reporting reflects actual forensic casework. NATA states 'PT samples/items should be handled in the same way as routine casework as far as practicable. The facility's routine test procedures must be used.'²



All Forensic Foundations' Proficiency Tests are ISO 17043 compliant. These requirements include a mechanism for participating laboratories to request a review and/or lodge an appeal regarding the evaluation of their performance. With respect to this test, a request or appeal:

- from Australian laboratories should be forwarded to ANZPAA|NIFS for transmission to Forensic Foundations; or
- from all other laboratories should be forwarded directly to Forensic Foundations.

The Final Reports of this 2018 round of Proficiency Tests will be publicly available via Forensic Foundations web site. Participating laboratories may use the report as outlined in their respective laboratory policies.

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

² NATA (2018) ISO/IEC 17025 Application Document. Legal (including Forensic Science) - Appendix

Microscopic Hair Interpretation 2018-1

Two tests were distributed, however only one laboratory provided results in this round of proficiency testing. Thus, there was insufficient data for Forensic Foundations to formulate any statistical analysis.

The manufacture, distribution, assessment and reporting of this proficiency test will provide the basis for continuous improvement for both Forensic Foundations and the participating laboratory.

In addition to interpreting the results from examining unknown hair samples, testing generic issues such as receipt, triage, continuity of items for examination also formed part of the overall process.

Laboratory Responses

Continuity, receipt and description of items

Laboratory 96150 gave a full description of the packaging, item description upon initial receipt and throughout the various stages of their testing. It was noted that a photographic record had been made.

For example:

“Packaged in sealed plastic. The plastic has two labels attached marked, ‘Microscopic Hair Examination 2/2018’ and ‘Item 1’. The plastic has barcode number 234930614 attached. The plastic is marked in pen ‘FR1757518 19/7/18’”.

The report includes a detail description of each item and when necessary a photograph with a rule.

The description provided by Laboratory 96150 concurs with the packaging, labelling and samples as distributed.

Case Analysis & Interpretation

Aim: To determine if the items located on the tape lift are hair and if hair whether the hairs are non-human.

The laboratory identified all the hairs located on the tape lift and conducted a comprehensive analysis of these hairs.

Five hairs were determined to be of non-human origin and one hair of human origin.

These results are consistent with the manufacture.

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

The scope of this examination was the examination of the tape lift provided to determine if any hairs present were of animal (non-human) origin.

I retrieved the tape lift with the barcode number 234930614 from the Brisbane Scientific Section property point. The tape lift was packaged in sealed plastic and the seal was not signed or dated. For my examinations I utilised two microscopes with up to x40 and up to x400 magnification.

On the tape lift were several fibres and six hairs. The hairs were numbered one to six.

Hair one was a dark brown non-human hair. This hair was determined to be of non-human origin due to the appearance and size of the medulla being greater than 1/3 of the width of the hair shaft.

Hair two was a red brown to brown non-human hair. This hair was determined to be of non-human origin due to the size of the medulla being greater than 1/3 of the width of the hair shaft.

Hair three was a brown to red brown non-human hair. This hair was determined to be of non-human origin due to the appearance and size of the medulla being greater than 1/3 width of the hair shaft.

Hair four was a red brown to dark blonde non-human hair. This hair was determined to be of non-human origin due to the size of the medulla being greater than 1/3 width of the hair shaft and the presence of colour banding.

Hair five was a red brown non-human hair. This hair was determined to be of non-human origin due to the appearance and size of the medulla being greater than 1/3 width of the hair shaft and the appearance of the root.

Hair six was a blonde human hair. This hair was determined to be of human origin due to the appearance and size of the medulla being less than 1/3 width of the hair shaft.

At the completion of my examination I repackaged the tape lift and returned it to the xxxxx property point.

Conclusion and Summary of the Test

The aim of this test was to examine the end-to-end forensic examination and analysis process. To minimise extraneous elements influencing the interpretation, limited contextual information was provided to the participating laboratories.

The test items comprised one tapelift containing 6 hairs. One hair was human, and 5 others were animal, including dingo, cat, mouse and horse. All hairs were collected in the same manner and placed on the tapelift in the same conditions.

The tapelift was sealed in a tamper evidence bag.

The expected response to the test is “that there are 5 non-human hairs and one human hair.” Had the examiner identified the species of non-human hair, they may have been able to infer some intelligence information as horse hairs are not as ubiquitous as the other animals.

Comments To Test Recipient

The test 96150 recipient correctly recorded the packaging in a manner that traceability could be achieved.

The test 96150 recipient correctly determined that one of the hairs was a human hair. Furthermore, they correctly determined that the other 5 hairs were non-human.

A microscope was used at x40 and x400 magnification.

The test 96150 recipient correctly characterized the test items with regards to their physical make-up, including their packaging and other chain of custody details.

PROGRAM PLAN

Program	Microscopic Hair Examination	
Round	2018-2	
Advisory Group		
Program Coordinator /Technical Manager	Mrs Anna Davey Director Forensic Foundations PO Box 2279 North Ringwood, Victoria 3134	
Discipline specific expert(s)	Dr Sandy Ingleby Collections Manager, Mammals Australian Museum 1 William Street Sydney NSW 2010	
Supplier(s)	Initial sample sources	Provision of Hair Samples
	Results interpretation. Forensic Foundations PO Box 2279 North Ringwood, Victoria 3134	Australian Museum 1 William Street Sydney NSW 2010
Aims/Objectives	The aim of the program is to assess the laboratories' ability to detect the presence of hair and to identify the species of the hair detected.	
Purpose	To assist the laboratories by ensuring their methods/procedures are performing adequately.	
Program Design		
Tests	1	
Number of samples	1 tape lift containing 6 hairs from 5 species	
Type of sample	Samples will be provided as tape lifts. The hairs will originate from commonly encountered mammals	
Levels	Each hair will be at least 1cm long. Hairs will be shed and comprise root to tip where possible	
Range of values/assigned values	The expected answers are binary. A hair is either detected or not detected, and if detected is correctly identified or not.	
Traceability/origin of assigned values	The hairs will be removed directly from preserved and live animals	
Methods	Hairs will be gently brushed from the coat of the animal using clean brushes, simulating gentle friction. Hairs will then be placed on tape lift using forceps and placed in a pattern so that the location of the hairs on the tape lift is identical. The tape will then be placed, adhesive side down on cellulose acetate (or similar) sheet.	

Design	The sample will mimic a tape lift taken from a picnic rug. Rug fibers will also be present.
Selection Criteria	Hairs will be obtained from commonly encountered species
Potential Major Sources of Error	Failure to detect the presence of hair and/or to identify the species source of the hair.
Participants	
	Forensic Biology Laboratories
Reporting Criteria, Accuracy	NA
Analysis	Correctly locate all hairs and correctly identify the species.

Pre-testing	
Homogeneity Testing	Hairs will be collected from the sample animal and checked for suitability.
Stability Testing	Hairs are stable at room temperature.
Homogeneity/Stability Acceptance Criteria	NA
Technical Review (internal)	
Participant Instructions	Provide copy of Instructions and evidence of Technical Review
Results Sheet	Provide copy of Results Sheet and evidence of Technical Review
Report	Include copy of Report and evidence of Technical Review

Sample Preparation	
Storage requirements	Room Temperature
Distribution requirements	Distributed via Forensic Foundations
Sample checks	NA

Program Dates	
Invitation letter	1 st February 2018
Sample distribution	First week July 2018
Results due	7 th September 2018
Manufacturing Information to be sent	October 2018
Final report due date	First week November 2018

Statistical Analysis	
Homogeneity Testing	NA
Stability Testing	NA
Data Entry	Include evidence of data entry checks in file
Normality	NA
Review by Statistician	NA

Reporting	
Report No:	2/2018
Master copy	Reports folder
Availability	Website

Program Coordinator signature:

Date: | 31/1/2018 |

Items collected on: 30/5/2018, 13/6/2018 and 16/6/2018

Items collected by: | KAD & BJD |

Checked by: | KAD & BJD |

Samples produced on: 3/7/2018

Samples produced by: | BJD |

Checked by: | KAD |

Samples packed on: 5/7/2018

Samples packed by: | KAD |

Checked by: | BJD |

Result data input by: |

Data checked by: |

Statistics and report collated by: |

Report checked by: | DP |



Proficiencytesting@forensicfoundations **Microscopic Hair Examination** **2/2018**

Thank you for participating in this Proficiency Test. We hope that you find this test useful and welcome any feedback on the design of further tests.

In addition to this exercise being a test of your 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 advice to clients. To enable this, we request that participants submit the following:

- An outline of the methodology used;
- Their findings as they would be communicated to the investigator; and
- their opinion in the format that they would provide to court (if required).

Attached you will find the case 'Examination Request and Item Submission' form and the test commences with the receipt of the items followed by your routine processes - item description, examination, analysis and interpretation. The information submitted to the laboratory on the examination request form will direct what testing needs to be undertaken. Please use the attached results sheets. Additional pages may be added if required.

The attached results sheets should be returned to Forensic Foundations by 7th September 2018.

Qualitative feedback will be provided to participants. Feedback will be both participant-specific (i.e., whether a particular laboratory "got the right answer") and group specific (e.g., which techniques seemed to perform better than others).

Following the conclusion of the testing participants, will be advised of the expected results and details regarding the production of the test.

Appendix C

PROFICIENCY TESTING @ FORENSIC FOUNDATIONS	
<p>EXAMINATION REQUEST AND ITEM SUBMISSION</p>	 <p>forensic FOUNDATIONS™ ISO 9001 certified</p>

OFFENCE:	Homicide
DATE OF OFFENCE	20/01/2018
BRIEF STATEMENT OF FACTS	
<p>A body has been located in a shallow grave in a woodland area. The body was wrapped in a rug. An examination of the rug indicated that there were a number of hair/fibres adhering to the rug.</p> <p>A 'tape lift' of the rug was performed.</p>	
ITEM SUBMITTED FOR EXAMINATION	
<p>Item 1 – A lift taken from the rug.</p>	
EXAMINATION REQUESTED	
<p>Police request an examination of the lift to determine if any of the debris present can be microscopically identified as animal hair. The identification of animal hair may provide intelligence information relating to the location of primary or secondary scenes.</p>	

Appendix D



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PROFICIENCY TESTING @ FORENSIC FOUNDATIONS MICROSCOPIC HAIR ANALYSIS 2-2018

MANUFACTURER'S INFORMATION

Introduction

The test was designed to represent a tape lift which collected hairs from a number of sources. Identification of the species of animal, from which the hair originated can be used for intelligence information which can be used by investigators. The species used were determined on the basis of:

- Their ubiquity; and
- The distinctive characteristics of their hair.

Scenario

A body has been located in a shallow grave in a woodland area. The body was wrapped in a rug.

Hair

The hair was gently removed from the following:

- Mounted dog preserved at the Australian Museum;
- Mounted cat preserved at the Australian Museum;
- Mounted mouse preserved at the Australian Museum;
- Live warmblood/thoroughbred cross horse; and
- Live 23-year-old Caucasian male.

Hairs collected at the Australian Museum were examined microscopically to ensure suitability.

All hairs were stored at room temperature.

Preserved dog	Preserved cat	Preserved mouse	Horse
			

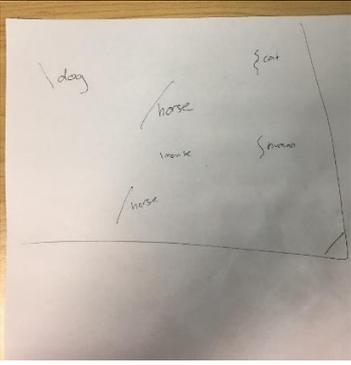
Item production

The test items were set up in the School of Biosciences, Melbourne University.

'P. S. Industry Finger Print Lifters' Lot N: 12160W were pressed firmly onto a new 'Colman' brand picnic rug.

Individual hairs were examined microscopically, to ensure the presence of identifying characteristics, before being placed on the lifter. Their location was predetermined using a 'map'. Thus, all tests are almost identical in terms of placement of animal hairs. The bottom right corner was cut very slightly to be able to determine direction of the lifter.

The lifter was then placed on the black background and packed into tamper evident bags.

Picnic rug	Map used for hair placement	Final lift
		

Expected results

The examiner should be able to locate the 6 hairs and differentiate them from the fibres lifted from the rug.

The examiner should be able to identify the species origin of the hairs from the structure of the hair.

The presence of the horse hair may provide some intelligence information to the police investigators, as horses are not as ubiquitous as other animals.

END of REPORT

Please comment briefly on the following:

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

.....
.....
.....

7. Any additional comments

.....
.....
.....

9. Facility (optional)

.....

10. 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 and 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.