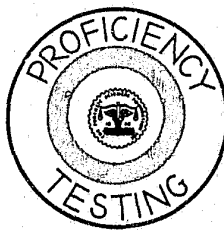# LABORATORY PROFICIENCY TESTING PROGRAM

REPORT NO. 18

HAIR EXAMINATION

THE FORENSIC SCIENCES FOUNDATION, INC.

11400 ROCKVILLE PIKE • ROCKVILLE, MARYLAND 20852 • (301) 770-2723

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FOREWORD

The analysis summarized in this report is the eighteenth of a series that will be made in conjunction with this proficiency testing research project.

In the course of this testing program participating laboratories will have analyzed and identified different samples of physical evidence similar in nature to the types of evidence normally submitted to them for analysis.

The results for Test Number Eighteen are reflected in the charts and graphs which follow.

The citing of any product or method in this report is done solely for reporting purposes and does not constitute an endorsement by the project sponsors.

Comments or suggestions relating to any portion of this report or of the program in general will be appreciated.

April 1977

BACKGROUND

This laboratory proficiency testing research project, one phase which is summarized in this report, was initiated in the fall of 1974.

This is a research study of how to prepare and distribute specific samples; how to analyze laboratory results; and how to report those results in a meaningful manner. Information is being collected for research and statistical purposes only. Such information will not be revealed or used for any other purpose. Information furnished by any person or agency identifiable to any specific person or laboratory will not be revealed or used for any purposes, other than the research and statistical purposes for which it was obtained.

Participation in the program is voluntary. Accordingly, invitations have been extended to 240 laboratories to share in the research. It is recognized that all laboratories do not perform analyses of all possible types of physical evidence.

Additional evaluations of individual tests will be published in a separate report.

The Project is under the direct control of the Project Advisory Committee whose members' names are listed on the Title Page. Each is a nationally known criminalistic laboratory authority.

Supporting the Project Advisory Committee in their efforts is the Forensic Sciences Foundation with additional support from the Collaborative Testing Services, Inc., Vienna, Virginia in the area of statistical presentation.

SUMMARY

In this test, each of 240 laboratories were sent five hair samples which were referred to as Items A, B, C, D, and E. Participants were asked: (1) Please provide species origins for each hair sample. (2) Please specify the methods used to answer Question 1. (3) Does your laboratory have a collection of hairs? If yes, is this an "in-house" collection or a commercially available collection?

Of the 240 laboratories, 90 laboratories responded with data, 49 indicated they do not perform hair analysis, and 101 did not respond. This represents a participation rate of 47%.

The information contained in the tables consists of the following:

        Table 1 - Supplier's Characteristics
        Table 2 - Responses to Question 1
        Table 3 - Responses to Question 2
        Table 4 - Responses to Question 3
        Table 5 - Summary of Laboratory Results.

FIGURE 1.

☐ CHECK HERE (AND RETURN) IF YOU DO NOT PERFORM HAIR EXAMINATION

DATE RECEIVED IN LAB _____

DATE PROCESSED IN LAB _____
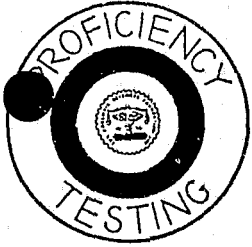
DATA SHEET
PROFICIENCY TESTING PROGRAM

TEST SAMPLE #18
HAIR EXAMINATION

The hair samples A, B, C, D and E were collected in connection with a criminal investigation.

1. Please provide species origin for each hair sample.

   Sample A

   Sample B

   Sample C

   Sample D

   Sample E

2. Please specify the methods used to answer question 1.

   1.

   2.

   3.

3. Does your laboratory have a reference collection of hairs?

☐ Yes ☐ No

If "Yes", is this your own "in-house" collection or a commercially available collection?

☐ "in-house" ☐ commercial

Please specify_____

4. Additional Comments:

Table 1

Supplier's Characteristics

The samples are characterized by the supplier
as follows:

Sample A   - dog   (Laborador Retriever)

Sample B   - cat   (Siamese - Sealpoint)

Sample C   - deer   (White Tail)

Sample D   - cow   (Domestic Beef)

Sample E   - mink

Table 2a

Summary of Responses to Question 1* for Sample A

Response	Number of Laboratories giving Response
dog	44
cow	6
bear	5
horse	2
cat	2
rat	2
skunk	1
non-human	17
inconclusive	8
no response	3

Table 2b

Summary of Responses to Question 1* for Sample B

Response	Number of Laboratories giving Response
cat	66
dog	3
mouse	1
squirrel	1
fox	1
non-human	13
inconclusive	2
no response	3

Table 2c

Summary of Responses to Question 1* for Sample C

Response	Number of Laboratories giving Response
deer	41
elk	13
horse	9
goat	5
cow	2
pig	1
dog	1
non-human	10
inconclusive	4
no response	4

*Question 1: Please provide species origin for each hair sample.

6

Table 2d

Summary of Responses to Question 1* for Sample D

Response	Number of Laboratories giving Response
cow	31
dog	19
horse	10
human	3
opossum	1
wool	1
alpaca or llama	1
sheep or rodent or dog	1
non-human	12
inconclusive	7
no response	4

Table 2e

Summary of Responses to Question 1* for Sample E

Response	Number of Laboratories giving Response
mink	57
cat	4
rat	4
rabbit	4
mouse	3
squirrel	2
non-human	12
no response	4

*Question 1: Please provide species origin for each hair sample.

Table 3

Summary of Responses to Question 2

Question 2:   Please specify the methods used to answer
              Question 1.

Method	Number of Labs Reporting Use of this Method
Microscopic*	88
Macroscopic	9
No Response	2

*Microscopic refers to use of any one or more of
various types of microscopic examinations

Table 4

Summary of Responses to Question 3

Question 3: Does your Laboratory have a collection of
             hairs?

             If yes, is this your own "in-house"
             collection, or a commercially available
             collection?

Laboratories reporting ownership
  of a collection of hairs   86

Laboratories reporting that they
  do not own a collection of hairs   4

Laboratories reporting ownership
  of an in-house collection only   55

Laboratories reporting ownership
  of a commercial collection only   5

Laboratories reporting ownership
  of both in-house and commercial
  collections   26

Table 5

Summary of Laboratory Results

Lab Code	Question	Lab Code	Question
023	1. A - animal, B - Cat, C-deer, D - dog, E - animal 2. 1) Microscopic 3. Yes, in-house	200	1. A - dog, B - cat, C - deer, D - horse, E - mink 2. 1) Macroscopic; 2) Microscopic; 3) Microscopic - whole mount 3. Yes, in-house & commercial (Cargille-Allen)
038	1. A - inconclusive, B - cat C - deer, D - dog, E - mink 2. 1) Microscopic 3. Yes, in-house	203	1. A - bear, B - cat, C - deer, D - horse or cow, E - mink 2. 1) Microscopic comparison 2) scale casts 3. Yes, in-house and commercial (Cargille)
062	1. A - dog, B - inconclusive, C - deer, D - dog, E - mink 2. 1) Macroscopic; 2) Microscopic; 3) Scale cast 3. Yes, in-house	235	1. A - dog, B - cat, C - horse, D - inconclusive, E - mink 2. 1) Microscopic; 2) scale patterns; 3) roots 3. Yes, in-house - small
090	1. A - dog, B - cat, C - deer, D - D - beef, E - weasel, probably mink 2. 1) Microscopic; (2) Microscopic; 3) Scale cast 3. Yes, in-house	246	1. A, B, C, D, E, - not human 2. 1) Microscopic-dry mount; 2) Microscopic - permount 3. Yes, in-house - small
093	1. A - bovine, B - canine (cat), C - elk, D - canine (dog), E - mink 2. 1) Microscopic 3. Yes, in-house and commercial from Cargille	263	1. A - skunk, B - mouse, C - deer, D - dog, E - ground squirrel 2. 1) Microscopic 3. Yes, in-house
098	1. A - rat, B - dog, C - deer, D - cow E - cat 2. 1) Microscopic 3. Yes, in-house and commercial	269	1. A - bear, B - cat, C - elk, D - dog, E - mink 2. 1) Physical characteristics 2) Microscopic; 3) scale costs 4) Comparison to reference standards 3. Yes, in-house
101	Examinations not performed at this time	288	1. A - non-human, B - cat, C - deer family, D - opossum, E - rat 2. 1) Microscopic Examination 3. Yes, in-house and commercial (Cargille-Allen, F5 & H6)
106	1. A - animal, B - feline, C - animal, D - canine, E - mustela (mink) 2. 1) Microscopic Exam; 2) Scale casts 3. Yes, in-house	309	1. A - rat, B - dog, C - deer, D - cow, E - cat 2. 1) Microscope; 2) Morphology; 3) Medullary structure 3. Yes, commercial (Cargille-Allen, H6)
111	1. A - dog, B - cat, C - deer, D - dog, E - mink 2. 1) Microscopic 3. Yes, in-house	311	1. A - dog, B - squirrel, C - horse, D - inconclusive, E - mouse 2. 1) - Microscope; 2) scale pattern 3. Yes, in-house and commercial (McCrone)
119	1. A - dog, B - cat, C - horse, D - cow, E - mink 2. 1) Microscopic 3. Yes, in-house and commercial (Carbille-Allen F6 & H6)	344	1. A - dog, B - cat, C - inconclusive, D - beef, E - mink 2. 1) Microscopy; 2) Scale casts 3. Yes, in-house
129	1. A - inconclusive, B - cat, C - horse, D - beef, E - mink 2. 1) Whole mount on slide; 2) scale patterns 3. Yes, in-house	347	1. A - dog, B - cat, C - deer, D - horse, E - mink 2. 1) Microscopic Exam; 2) Scale casts 3. Yes, in-house and commercial (Cargille-Allen, H6)
132	1. A - bovine, B - cat, C - horse, D - raccoon, E - mink 2. 1) Microscopic; 2) Scale pattern 3. Yes, in-house	350	1. A-dog, B-cat, C-elk, D-beef, E-mink 2. 1) Microscopic 3. Yes, in-house
188	1. A - inconclusive, B - cat, C - deer, D - dog, E - mink 2. 1) Microscopic 3. Yes, in-house and commercial		
197	1. A - dog or cat, B - cat, C - deer, D - cattle, E - mink 2. 1) Biological keys; 2) longitudinal mount; 3) scale cast 3. Yes, commercial (Cargille-Allen H-6 & F-5)		

Table 5 (continued)

Lab Code	Question	Lab Code	Question
358	1. A - horse, B - cat, C - deer, D - cow, E - mink 2. 1) Cross-section; 2) Scale pattern; 3) Comparison w/known 3. Yes, in-house	500	1. A, B, C, D, E - non-human 2. 1) Macroscopic and Microscopic Air mount; 2) Microscopic - Xylene mount; 3) Microscopic - MaOH mount 3. No
363	1. A - inconclusive, B - cat, C - deer, D - dog, E-mink 2. 1) Microscopic; 2) Scale casts; 3) Cross-section 3. Yes, in-house	517	1. A - beef, B - cat, C - elk, D - horse, E - mink 2. 1) Microscopy - drymount; 2) Microscopy - wetmount; 3) Microscopy - scale cast 3. Yes, in-house
366	1. A - dog, B - cat, C - deer, D - horse, E - mink 2. 1) Microscopic whole mount; 2) Scale casts;) Compare to known 3. Yes, in-house	527	1. A - dog, B - cat, C - deer, D - horse, E - rabbit 2. 1) Microscopic 3. Yes, in-house
375	1. A - dog, B - cat, C - goat, D - cow, E - mink 2. 1) Microscopic; 2) Morphology; 3) Comparison w/knowns; 4) Hair identification guides 3. Yes, in-house	530	1. A - dog, B - cat, C - goat, D - cow, E - rodent (squirrel or mink) 2. 1) Macroscopic & Microscopic; 2) Microscopy - medulla, cortex, cuticle and pigment; 3) Scale casts 3. Yes, in-house
383	1. A - dog, B - fox, C - deer family, D - cow, E - mink 2. 1) Macroscopic & Microscopic; 2) Scale cast; 3) Key to hair identification 3. Yes, in-house	532	1. A, B - non-human, C - deer family, D - non-human, E - mink 2. 1) Microscopic; 2) Scale pattern 3. Yes, in-house
385	1. A - inconclusive, B - cat, C - elk, D - beef, E - mink 2. 1) Microscopy - scale; 2) Microscopy - whole 3. Yes, in-house	540	1. A - inconclusive, B - cat, C - deer, D - cow, E - mink 2. 1) Microscopic 3. Yes, in-house & commercial (Cargille)
386	1. A - dog, B - cat, C - deer, D - dog, gibbon ? E - mink 2. 1) Macroscopic; 2) Microscopic - cuticle patterns; 3) Microscopic - cross-section; 4) Microscopic - media and comparison w/knowns 3. Yes, in-house	561	1. A - dog, B - cat, C - deer, D - human, E - mink 2. 1) Wet and dry mounts; 2) Morphological characteristics 3. Yes, in-house & commercial (Cargille-Allen, F5)
404	1. A - dog, B - cat, C - deer, D - dog family, E - cat family 2. 1) Microscopic Exam; 2) Scale cast 3. Yes, in-house and commercial	564	1. A - dog, B - cat, C - elk, D - dog, E - animal 2. 1) Microscopy; 2) Visual 3. Yes, in-house
413	1. A - dog, B - cat, C - elk, D - beef, E - mink 2. 1) Microscopic Exam; 2) Scale casts 3. Yes, in-house	568	1. A - dog, B - cat, C - goat or Elk, D - horse, E - mink 2. Microscopic - whole mount; 2) Scale cast 3. Yes, in-house
433	1. A, B, C, D, E - not human, not synthetic 2. 1) Polarizing microscopy 3. Yes, in-house	574	1. A, B, C, D, E, - non-human 2. 1) Microscopic 3. Yes, in-house and commercial (Cargille-Allen)
444	1. A, B, C, D, E - animal 2. 1) Microscopic 3. Partial reference collection, in-house	575	1. A - canine, B - cat, C - deer, D - cattle, E - rabbit 2. 1) Microscopy - scale pattern and medulla; 2) Comparison w/knowns 3. Yes, in-house
446	1. No Response. 2. No Response. 3. No.		
466	1. A - dog, B - cat, C - deer, D - bovine, E - mink 2. 1) Contour, width, length, color, roots; 2) Medulla; 3) Cutex 3. Yes, in-house and commercial (Cargille)	601	1. A - beef, B - cat, C - horse, D - wool, E - mink 2. 1) Microscopy; 2) Scale costs 3. Yes, in-house & commercial (Cargille)

Table 5 (continued)

Lab Code	Question

609
1. A - dog, B - cat, C - elk,
   D - horse, E - mink
2. 1) Microscopic; 2) Scale casts
3. Yes, in-house

626
1. A - bear, B - feline, C - deer,
   D - squirrel, E - mink
2. 1) Microscopic; 2) Comparison
   w/standards
3. Ye, in-house & commercial (Cargille)

627
1. A - dog, B - cat, C - elk, D - dog,
   E - mink
2. 1) Microscopic; 2) Scale cast
3. Yes, in-house and commercial
   (Cargille-Allen)

634
1. A, B, C, D, E - animal
2. 1) Single stage microscope;
   2) Comparison microscope
3. Yes, in-house

679
1. A - cow, B - cat, C - goat, D - dog,
   E - mink
2. 1) Microscopic; 2) Scale casts
3. Yes, in-house

680
1. A - bear, B - cat, C - inconclusive,
   D - dog, E - mink
2. 1) Microscopy
3. Yes, in-house & commercial (Cargille-Allen
   and McCrone)

691
1. Species origin not performed
2. No response
3. Yes, in-house

697.
1. A - dog, B - cat, C - deer, D - cow,
   E - mink
2. 1) Microscopic
3. No

701
1. A, B, C, D, E, - animal
2. 1) Microscopic
3. Yes, in-house

716
1. A - cattle, B - cat, C - goat,
   D - horse, E - rabbit
2. 1) Microscopic
3. Yes, in-house

717
1. A, B, C, D, - inconclusive, E - mink
2. 1) Microscopic; 2) Scale casts
3. Yes, in-house & commercial (Cargille-Allen)

725
1. A - dog, B - cat, C - deer, D - cow,
   E - mink
2. 1) Macroscopic; 2) Microscopic;
   3) Scale casts
3. Yes, in-house

726
1. A - dog, B - cat, C - elk or deer
   family, D - Unidentified, E - mink
2. 1) Macroscopic; 2) Microscopic;
   3) Scale casts
3. Yes, in-house

729
1. A, B - animal, C - deer, D - cow,
   E - Genus Mustela
2. 1) Microscopic
3. Yes, in-house

733
1. A - dog, B - cat, C - horse,
   D - cow, E - mouse
2. 1) Comparison w/knowns;
   2) Scale, medulla, cortex, root
3. Yes, in-house & Commercial (McCrone)

747
1. A - dog, B - cat, C - deer,
   D - cow, E - squirrel
2. 1) Microscopic
3. No

749
1. A, B, C, D, E, - Animal
2. 1) Microscopic
3. Yes, in-house

755
1. A - dog, B - cat, C - horse,
   D - cow, E - cat
2. 1) Microscopy
3. Yes, commercial (McCrone)

766
1. A - dog, B - cat, C - deer,
   D - inconclusive, E - mink
2. Microscopic
3. Yes, in-house

781
1. A, B, C, D, E - non-human
   (no species identification for
   non-human hairs)
2. 1) visual and microscopic
3. No

790
1. A - dog, B - cat, C - deer,
   D - horse, E - mink
2. 1) Microscopic; 2) Scale cast;
   3) Medullary proportions
3. Yes, in-house

809
1. A - dog, B - cat, C - deer,
   D - inconclusive, E - rat family
2. 1) Microscopic (scales);
   2) Microscopic - morphology
3. Yes, in-house

828
1. A - dog, B - cat, C - elk,
   D - bovine, E - mink
2. 1) Microscopic; 2) Scale casts
3. Yes, in-house

833
1. A - dog, B - cat, C - deer,
   D - cattle, E - mink
2. 1) Visual; 2) Microscopic;
   3) Scale cast
3. Yes, in-house

834
1. A, B - non-human, C - deer,
   D - non-human, E - mink
2. 1) Microscopic-longitudinal
   2) Microscopic - scale patterns
3. Yes, in-house

855
1. A - animal, B - cat, C - deer,
   D - cow, E - animal
2. 1) Scale structure; 2) Medulla
   structure; 3) Comparison w/known
3. Yes, commercial (Cargille, H6, F5)

859
1. A - dog, B - cat, C - goat,
   D - inconclusive, E - mink
2. 1) Microscopic); 2) Scale casts;
   3) Comparison w/known
3. Yes, in-house

Table 5 (continued)

Lab Code	Question
861	1. A - dog, B - cat, C, D, E, - no response 2. 1) Microscopic; 2) Macroscopic; 3) Scale casts 3. Yes, in-house
864	1. A - dog, B - cat, C - deer, D - cow, E - mink 2. 1) Microscopic (longitudinal mounts, cross-sections, scale casts) 3. Yes, in-house
884	1. A - dog, B - cat, C - horse, D - dog, E - mink 2. 1) Microscopic (stereomicroscope); 2) Microscopic (brightfield); 3) Scale costs 3. Yes, in-house & commercial (Cargille-Allen and McCrone)
892	1. A - non-human, B - cat, C - deer, D - dog, E - mink 2. 1) Microscopic; 2) Scale casts 3. Yes, in-house and commercial (Cargille)
910	1. A - dog, B - cat, C - inconclusive, D - alpaca or llama, E - mink 2. 1) Scale casts (microscopic); 2) Whole mounts (microscopic) 3. No, small in-house collection
913	1. A - horse, B - rodent or cat, C - cow, D - sheep or rodent or dog, or mouse 2. 1) Macroscopic; 2) Microscopic; 3) 100-400$_x$ transmission microscopy; 4) Scale cast 3. Yes, in-house
919	1. A - inconclusive, B - cat, C - deer, D - dog, E - mink 2. 1) Microscopic Exam; 2) Scale casts; 3) Cross-Sections 3. Yes, in-house
920	1. A - dog, B - cat, C - pig, D - human, E - rodent 2. 1) Comparison microscopy; 2) Scale casting 3. Yes, commercial (McCrone & Cargille)
923	1. A - cat, B - inconclusive, possibly skunk, C - elk or deer, D - human, E - mink 2. 1) Microscopy 3. Yes, in-house
951	1. A - bear, B - cat, C - large dog, D - small dog, E - mink 2. Microscopic 3. Yes, in-house

Lab Code	Question
976	1. No species of origin established 2. 1) Microscopic 3. Yes, in-house and commercial (Cargille)
983	1. A - cat, B - dog, C - dow, D - non-human, E - rabbit 2. 1) Microscopic 3. Yes, in-house
993	1. A - dog, B - cat, C - deer family (elk) D - cattle, E - rat 2. 1) Microscopic 3. Yes, in-house

END