



INDIANAPOLIS-MARION COUNTY FORENSIC SERVICES AGENCY

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EVIDENCE SUBMISSION GUIDELINE #6

FORENSIC FIBER AND HAIR EVIDENCE ANALYSIS

INTRODUCTION

Many crimes involve direct physical contact between victim and suspect. Whenever such contact occurs, there is almost always an inadvertent transfer of microscopic evidence. This transfer usually includes hairs and fibers. However, this type of evidence, which can be microscopic in form, may often be overlooked by investigating officers because they are not easily observed. Hairs are readily available for transfer, easily transferred, and resilient. Hair examination may be used for associative and investigative purposes and to provide information for crime scene reconstruction. Even though the most common encountered fibers are white and/or blue polyester, cotton, or blends of these, this type of evidence should be collected and submitted for evaluation. Fibers can be classified as animal (e.g. hair and silk), vegetable (e.g. cotton and linen), mineral (e.g. asbestos), or synthetic (e.g. polyester and nylon), and often identified by sub-classification through laboratory examination.

TYPES OF CASES IN WHICH FIBER AND HAIR MAY BE OF VALUE AS EVIDENCE

ASSAULT AND HOMICIDE - These types of crimes usually involve personal contact of some sort. Therefore, clothing fibers and hair may be interchanged between victim and suspect; that is, fibers/hairs from victim's clothing may be found on suspect's clothing and vice versa. Weapons and fingernail scrapings may also be important sources of fiber evidence. Bindings, such as rope, may also leave distinct fibers if a person was tied up.

RAPE - The nature of this crime can result in the cross transfer of fibers and hairs between clothing of victim and suspect and such articles as blankets or automobile seat covers. If a victim goes to the hospital for an exam, the hair combs may be good sources of hair and fiber evidence. Weapons and fingernail scrapings may also be sources of fiber evidence.

BURGLARY - Clothing fibers will frequently be found at the point where the burglar crawled through a window or other opening or climbed over a fence. If no head covering was used, hairs may also be found.

HIT-AND-RUN - Due to the forceful contact between victim and automobile, clothing fibers and hair can generally be found adhering to the fenders, grill, door handles, or parts of the undercarriage. Fabric impression patterns may also be observed on surfaces with which the fabric came into contact.

COLLECTION, PRESERVATION AND MARKING OF FIBER EVIDENCE

Before attempting specific procedures listed below, note the following general precautions:

1. The size of the container should correspond to the size of the object.
2. Do not package wet evidence. Fibers or objects containing fiber evidence should be air dried before being placed in sealed containers. Biological stains degrade with time. This process is accelerated when items are wet and sealed in airtight containers.
3. Do not package items on a surface without first thoroughly cleaning that surface. Avoiding cross contamination between all evidence and standards is imperative!
4. All seams of the packaging must be sealed to prevent the loss of trace evidence.
5. Label all evidence containers with submitter's initials, ID/badge number, agency name, case number, item number, source, and date.

COLLECTION PROCEDURES

1. Where fibers are visible and firmly attached to an inanimate object to be transported to the lab:

Leave fibers intact.

- (a) Diagram and note exact location and approximate number of fibers adhering to each object (photograph if possible).
- (b) Label object and package in a container so that fibers cannot become dislodged in transit.
- (c) Label packaging with appropriate information.

2. Where fibers are visible and not firmly attached, or if firmly attached and object is too large to send to the lab:

- (a) After diagramming and noting each location and the number of fibers present, carefully remove with clean tweezers and package.
- (b) Place fibers in a small pill box, glass vial or other tightly sealed container. Fibers may also be placed in small folded paper bindles.
- (c) Label packaging with appropriate information.

3. Where fibers are possibly transferred to clothing of victim or suspect:

- (a) Be sure clothing is dry before packaging.
- (b) Keep each item separate.
- (c) Avoid disturbing soil, dust, blood, seminal stains, or other foreign materials adhering to clothing.
- (d) If any of the aforementioned are apparent, see appropriate Evidence Submission Guideline for special instructions.
- (e) Place ID mark on each item in an easily located area that does not damage the clothing.
- (f) After allowing wet apparel to air dry, carefully fold and wrap each article separately, package, and label with appropriate information (layers of clean wrapping paper and new paper bags are suitable for this purpose).

4. **For fingernail scrapings/clippings:**

- (a) Take scrapings/clippings from both suspect and victim.
- (b) Use either a clean knife, clippers, or other instrument such as a fingernail file or toothpick.
- (c) Use a separate folded paper bindle for each hand to collect scrapings/clippings.
- (d) Place the folded and labeled bindles (i.e. "left hand", "right hand") in a pill box, glass vial or other small tightly sealed container and label with appropriate information.

5. **Where fibers are in hair of suspect or victim:**

Comb the individual's hair over clean white paper using a clean fine-tooth comb. Carefully fold the paper together with the comb and combings inside a bindle to prevent loss of any trace evidence. Place the bindle in an envelope and label with appropriate information.

COLLECTION OF FIBER AND HAIR STANDARDS FOR COMPARISON

FIBER STANDARDS: It will not always be known to the investigating officer whether there are fibers present in the submitted evidence. For this reason, care must be exercised when handling any item that could shed fibers and thereby cause cross contamination between items from suspects and victims.

When fibers have been collected by the investigating team, it is imperative that appropriate and adequate standard samples also be submitted. For example, if fibers are found on the soles of the robbery suspect's shoes, standard samples of the carpet or carpets at the crime scene should also be submitted. The standard samples should be a representative sampling and include variations due to color, style, type, fading, or staining. Standard samples with a minimum size of a quarter should be submitted.

HAIR SAMPLE STANDARDS: Whenever hair is collected the roots should be included because considerable information can be obtained from the root material.

HEAD OR SCALP HAIR The hair should be representative of the center, front, back (including nape of the neck), and both sides of the scalp. Approximately 50 head hairs should be collected. The sample should include both pulled and combed hairs and include any variations in color and length. If additional facial hairs are collected (i.e. sideburn or beard hairs), these should be packaged separately.

PUBIC HAIR: When indicated by the circumstances, collect pubic hair. Approximately 30 pubic hairs should be collected. The sample should be collected and packaged in the same manner described above.

ANIMAL HAIRS: Comb and pull hair; pulling is necessary as roots are needed for species identification in some animals. While a minimum number of hairs is difficult to determine, good judgment should be used in collecting enough hairs to represent the various types and colors of hairs found on the animal. Hair should be collected from various areas of the animal to include the head, back, belly, tail, etc. Each sample should be packaged separately and labeled with the body area from which it was collected.

RESULTS POSSIBLE FROM LABORATORY EXAMINATION OF FIBER AND HAIR EVIDENCE

1. **Fibers**

- a. Fiber classification (i.e. animal, vegetable, mineral, or synthetic) and sub-classification (e.g. polyester, nylon, acrylic).
- b. Determination as to whether questioned fibers are the same type and similar color as the standard. Determination as to whether questioned and standard fibers share similar microscopic characteristics. (Note: Color and microscopic characteristics of fibers may vary within a garment, carpet, drape, rope, etc. due to many factors such as wear or fading.)
- c. Whether the fibers are common or uncommon.
- d. An opinion as to whether questioned fibers could have originated from the same source as the standard.

2. **Hairs**

- a. Of animal or human origin
- b. If human:
 1. Possible race of the person from which it originated.
 2. Body area where the hair originated (i.e. head, pubic, body).
 3. Possibly how the hair was removed from the body (e.g. naturally, forcibly removed).
 4. Whether hair has been altered by having been cut, bleached or dyed.
 5. Whether a questioned hair could share common origin with a particular hair standard. When two hair samples have no significant macroscopic or microscopic differences. The ideal situation is to find one or more hairs in the known sample that correspond in all respects (no significant differences) with the questioned hair.
 6. Whether a questioned hair could not share common origin with a particular hair standard. When significant differences exist in the macroscopic and/or microscopic characteristics exhibited by the questioned and known hairs, the questioned hairs cannot be associated with the source of the known hairs.
 7. The results of a microscopical hair comparison can be inconclusive. Situations when an inconclusive result may be reached include, but are not limited to, the following: an inadequate known hair sample, questioned and known hair samples that exhibit similarities and unexplained dissimilarities and hairs that do not exhibit sufficient distinguishing microscopical characteristics (e.g., broken, fragmented, too short, colorless, opaque).

For further information you may wish to consult with the I-MCFSA Laboratory in Indianapolis. The laboratory phone number is: 1-317-327-3670.

Evidence Submission Guideline #6 adapted from the Indiana State Police Laboratory Physical Evidence Bulletins.