

ASB Standard 028, Second Edition
202X

Standard for Wildlife Forensics Morphological Analysis



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ASB Approved XXXXXX 202X

ANSI Approved XXXXXX 202X



410 North 21st Street
Colorado Springs, CO 80904

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Foreword

This document provides assistance to wildlife forensic practitioners in developing protocols and procedures in the field of morphology.

Morphology is the study of form. In a wildlife forensic context, it is the discipline that uses physical comparison to identify wildlife parts and products, typically to the order, family, genus, or species source. Depending on the nature of the evidence, a variety of macroscopic and microscopic comparison techniques may be employed. Macroscopic examinations evaluate gross morphology seen without visual enhancement. Microscopic examinations are used to document details of external structures, internal structures, or cross-sectional profiles of structures that are too small for gross external examination.

Most analyses performed by a forensic wildlife morphologist are based on class characteristics (e.g., general characters shared by a group of animals), not characters unique to a particular individual. Shared quantitative or qualitative morphological characteristics are used by scientists to specify or define taxonomic groups, such as orders, families, genera, and species. Frequently, morphological characters may be reliably associated with evolutionary lineages down to the species level. Individualization, in contrast, requires the recognition of characters that uniquely identify a specific individual. Individualization based on morphological characters is rarely attempted in wildlife cases.

Morphological comparison has been used for centuries as the basis for classic studies of biological structure and evolution, and is essential in the scientific work of taxonomists, anatomists, paleontologists, archaeologists, and forensic anthropologists. A substantial body of peer-reviewed literature exists that supports the scientific rigor and utility of morphological comparison techniques.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity, and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Wildlife Forensics Consensus Body of the AAFS Standards Board. The draft of the first edition of this standard was developed by the Wildlife Forensic Biology Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aaafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

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Keywords: *wildlife forensics, taxonomic identification, reference collections, morphology, animal hair identification, feather identification, osteology, class characteristics*

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Standard for Wildlife Forensics Morphological Analysis

1 Scope

This document provides minimum requirements for developing protocols and procedures for wildlife forensic analysts in the subdiscipline of morphology.

2 Normative References

The document contains no normative references. See Annex A, Bibliography for other references.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1

analyst

A qualified individual who conducts or directs the analysis of forensic casework samples, interprets data, reaches conclusions, or issues reports concerning conclusions.

3.2

anthropogenic

A change to nature that has origins in human activity.

3.3

3.4

interspecific

Occurring among different species.

3.5

intraspecific

Occurring within the same species.

3.6

morphological

Refers to the physical shape, structure, color, and internal anatomy of an organism.

3.7

reference material

Biological specimens of known identity or data derived from them, or from published sources.

3.8

reference specimen

Biological specimens of known identity.

NOTE Voucher specimens are a subset of reference material (see voucher specimen).

3.9

taxonomic identification

An analysis to establish the classification of an organism to family, genus, species, etc.

NOTE This analysis is based on class characteristics diagnostic for the taxonomic level in question.

3.10

taxonomy

The science of identifying and naming species with the intent of arranging them into a classification.

3.11

voucher specimen

A biological specimen that is representative of its species in accordance with the relevant taxonomic authority.

NOTE Voucher specimens are of known identity, and are curated with available associated geographic, field collection and life history data.

4 Requirements

4.1 General

4.1.1 The analyst shall examine, interpret, and document morphological characters between the evidence item and specimens of known species source, using information from voucher specimens, reference materials, and other scientific references as appropriate.

4.1.1.1 If relevant reference specimens are limited, or not available within a laboratory's reference collection, attempts shall be made to access or obtain reference specimens from other laboratories.

4.1.2 Instruments required for morphological measurements shall be subject to calibration and verification of calibration as recommended by the manufacturer, with documentation and records retained.

4.1.3 The analyst shall consider the diagnostic value and inter- and intraspecific variability of the characters being analyzed.

4.1.4 Scientific references used in morphological examinations shall be cited in case work documentation.

NOTE Scientific references can include: primary scientific literature, taxonomic monographs, morphometric datasets, dichotomous keys, field guides, and scientifically accurate (curated) image databases.

4.1.5 In making a taxonomic identification based on morphological characters, the analyst shall document the following in the bench notes:

a) type of material received as evidence;

NOTE Description of the type of material includes whole or partial organism, bone, tooth, feather, hair, ivory carving, leather, crafted item.

b) intactness and condition of the item;

c) morphological characters used to make the taxonomic identification;

d) reference materials identified by taxonomic name and reference or catalogue number; and

e) data sources used to verify taxonomic identification.

4.1.6 Documentation of the interpretation shall follow the hierarchy of taxonomy, with characteristics of the order noted first, followed by family-specific characters, and finally those diagnostic to particular genera and species, as the item allows.

4.2 Process of Morphological Examination – External Remains

4.2.1 The analyst shall document the completeness and condition of the item and the presence or absence of taxonomically informative characters to determine the appropriate taxonomic level to which assessments can be made.

4.2.1.1 Documentation:

a) shall begin with a detailed description and examination of the remains as submitted; should include a description or photograph of the shipping container and packing materials; and

b) shall include a description of taphonomic indicators, and traits to assist in the establishment of the biological profile, to include sex, life stage, and age, as the evidence allows.

4.3 Process of Morphological Examination – Osteological Remains

4.3.1 Skeletonization shall not be undertaken without consulting the submitting agency.

4.3.2 Item documentation shall include a description of the osteological elements examined, their physical condition, and any taphonomic or anthropogenic alterations.

4.3.3 If sufficient material is available (i.e., containing osteological landmarks), the analyst shall determine life history stage, such as adult, subadult, juvenile, or neonate, by evaluating age-informative characters for the taxon in question.

NOTE An example is the epiphyseal fusion of skeletal elements or relative completeness of dental eruption or wear in mammals.

4.3.4 If sufficient material is available (e.g., pelvis, baculum, skull), the analyst shall determine the sex of the animal by evaluating sex-informative characters for the taxon in question.

4.4 Process of Morphological Examination – Microscopic Structures

4.4.1 Detailed examination of integumentary structures, such as hair and feathers, shall begin with documentation of gross features such as color, pattern, size, length and completeness, or shape.

4.4.2 Examination findings shall be made based upon validated laboratory protocols for comparison of taxon-specific characters with documentation of:

a) reference materials used (e.g., mounted hairs or feather barbs);

b) taxonomic name and reference or catalogue number of a known comparison specimen;

- 104 c) data sources used to verify taxonomic assessments (e.g., published literature); and
- 105 d) instrumentation and magnification used (e.g., comparison microscope, electron microscopy).

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Annex A (informative)

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or endorsement of literature on this topic. The goal of the bibliography is to provide publications cited informationally, and publications relevant to the standard.

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