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**Standard for Skeletal Preparation and Sampling in
Forensic Anthropology**

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Standard for Skeletal Preparation and Sampling in Forensic Anthropology

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410 North 21st Street
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Foreword

This standard provides requirements for practitioners on sampling and preparation of skeletal remains for forensic analyses and curation. Continued research and scholarly debate are encouraged to improve skeletal preparation and sampling in forensic anthropology.

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This document was revised, prepared, and finalized as a standard by the Anthropology Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Anthropology 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@aafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

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Keywords: *forensic anthropology; skeleton; sampling; maceration*

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Standard for Skeletal Preparation and Sampling in Forensic Anthropology

1 Scope

This standard provides requirements for documenting, preparing, sampling, and preserving skeletal remains for examination and curation. These requirements are used to prevent contamination, unnecessary destruction, and/or adverse alteration of the remains.

2 Normative References

There are no normative reference documents.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1 forensic anthropology laboratory

Any facility used in the analysis of human skeletal remains of medicolegal significance.

NOTE "laboratory" is used in this document instead.

3.2 entomological preparation

The removal of soft tissue from skeletal remains using carrion beetles (typically *Dermestes maculatus*).

3.3 maceration

The removal of soft tissue from skeletal remains through immersion in a liquid bath.

3.4 mechanical preparation

The removal of soft tissue and other materials from skeletal remains using mechanical force.

3.5 sampling

The selective removal of skeletal remains, or portions thereof, for testing.

3.6 skeletal preparation (processing)

The removal of soft tissue or other materials from skeletal remains through mechanical, maceration, or entomological means.

3.7 skeletal reconstruction

The reassociation of bone and tooth fragments that originated from the same skeletal portion.

35 **3.8**
36 **skeletal remains**
37 Osseous, cartilaginous, and/or dental tissues.

38 **4 Requirements**

39 **4.1 General**

40 **4.1.1** To make skeletal remains and features more accessible for analyses, and to procure
41 material that may have additional investigative value, it is sometimes necessary to prepare or
42 sample skeletal remains or other tissues associated with skeletal remains.

43 **4.1.2** The condition of the remains upon arrival at the laboratory and throughout the process of
44 preparation and sampling (and any resulting alterations/damage) shall be documented.

45 **4.1.3** Skeletal preparation and sampling shall be done in a manner that limits or prevents
46 contamination, unnecessary destruction, or adverse alteration of the remains.

47 **4.2 Procedure**

48 **4.2.1 General Requirements**

49 **4.2.1.1** All remains shall be handled with personal protective equipment to ensure the safety of
50 the practitioner and limit contamination of the evidence and laboratory environment.

51 **4.2.1.2** Photographic documentation shall be taken before and after any preparation or sampling
52 of remains.

53 **4.2.1.3** All applicable data collection procedures (e.g., visual examination, metric analyses) shall
54 be completed before remains undergo sampling.

55 **4.2.1.3.1** Sampling may be necessary before preparation dependent upon case circumstances.

56 **4.2.1.4** The practitioner shall maintain close coordination and collaboration with the medicolegal
57 authority, particularly for unexpected non-skeletal evidence (e.g., tattoos, finger or palm prints,
58 projectiles) and destructive testing.

59 **4.2.1.5** Deleterious practices to the conservation of skeletal evidence shall be avoided, including
60 the indiscriminate use of chemicals that damage or destroy skeletal remains; excessive maceration;
61 unnecessary alteration or destruction of skeletal remains; and unnecessary skeletal reconstruction
62 or stabilization of skeletal remains (e.g., plastic-based, synthetic stabilizers).

63 **4.2.1.6** Equipment and instruments used in preparation and sampling should be documented.

64 **4.2.2 Skeletal Preparation**

65 **4.2.2.1** Medical imaging (e.g., radiography) shall be taken prior to skeletal preparation to detect
66 or visualize objects such as foreign material as well as features related to development, variation,
67 trauma, surgical intervention or pathological conditions, when possible.

68 **4.2.2.2** Decisions regarding skeletal preparation method(s) shall include considerations of the
69 condition of the remains, the types of analyses anticipated, and whether long-term curation is
70 needed.

71 **4.2.2.3** Engineering controls (e.g., drain strainers, trays/containers) shall be in place to prevent
72 the loss of small skeletal remains or other evidentiary items.

73 **4.2.2.4** When rinsing with water or dry brushing remains is not sufficient for visualization, there
74 are three general approaches for effective skeletal preparation: mechanical, maceration, and/or
75 entomological.

76 **4.2.2.4.1** Mechanical preparation shall minimize the risk of alteration to the skeletal remains.
77 Instruments such as scalpels or scissors should be utilized in a manner that mitigates damage.

78 **4.2.2.4.2** Boiling temperatures ($\geq 212^{\circ}\text{F}/100^{\circ}\text{C}$) shall be avoided during maceration.

79 **4.2.2.4.2.1** Immersion times and temperatures shall be monitored throughout the maceration
80 process to maintain the integrity of the skeletal remains.

81 Note: Chemical detergents and additives may be used to facilitate the breakdown of adhering soft tissues,
82 degreasing, and protein degradation.

83 **4.2.2.4.3** When conducting entomological preparation, exposure time to the dermestid colony shall
84 be monitored to achieve denuded skeletal remains and to prevent damage and the loss of skeletal
85 remains.

86 **4.2.2.5** Disposition of soft tissue shall follow appropriate jurisdictional regulations (e.g.,
87 biohazard waste, medical cremation).

88 **4.2.3 Sampling**

89 **4.2.3.1** Sampling shall be conducted with the permission of the relevant jurisdictional authority
90 and with a specific investigative objective (e.g., DNA testing, stable isotope analysis, histology).

91 **4.2.3.2** Samples shall be taken from regions of skeletal remains that are not analytically relevant
92 (e.g., used to establish a biological profile, analyze trauma, or support a personal identification),
93 when possible.

94 **4.2.3.3** Equipment (e.g., new, disinfected, and/or sterilized) shall be employed to reduce and
95 control contamination of the sample.

96 **4.2.3.4** Resulting samples shall be treated according to laboratory evidentiary procedures or
97 internal operating procedures (e.g., packaging to prevent loss, tampering, contamination, or
98 deleterious change; labeling to include a unique case identifier; chain of custody).

99 **4.3 Post Sampling and Preparation Considerations**

100 **4.3.1** If skeletal remains are labeled, labels shall be removable (e.g., utilizing a removable acrylic
101 base coat when labeling using permanent ink).

102 **4.3.2** Skeletal remains retained for extended periods of time should be labeled.

103 **4.3.3** In the event that skeletal remains require reconstruction or stabilization, the process and
104 materials used shall be documented and reversible.

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