

# Skeletal or Non-Skeletal Origin Determination

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# Skeletal or Non-Skeletal Origin Determination

## 1 INTRODUCTION

This document describes procedures for determining whether material is skeletal in origin, including osseous (bone) or dental (tooth), versus some other non-skeletal material.

## 2 SCOPE

This document applies to Anthropology Examiners in the Trace Evidence Unit (TEU).

## 3 EQUIPMENT

- Digital radiography unit (NorthStar X-5000 X-radiography unit, Kubtek radiography unit, or equivalent)
- General laboratory supplies
- Personal protective equipment (e.g., lab coat, gloves, eye protection)
- Stereobinocular microscope, magnification range approximately 2x to 40x
- X-Ray Fluorescence Spectrometer (Thermo QUANT'X X-Ray Fluorescence Spectrometer or equivalent)

## 4 STANDARDS AND CONTROLS

- National Institute of Standards and Technology (NIST) Hydroxyapatite Standard

## 5 SAMPLING

Sub-samples of the submitted material may be examined at the discretion of the examiner. The individual sub-samples may not be representative of the entire specimen. Sub-samples are chosen based on the need to identify a particular component by a specific technique, and by its availability or presence

## 6 PROCEDURE

- A. ANTHRO-300: Forensic Anthropological Examinations will be followed.
- B. The determination of whether material is skeletal or non-skeletal may involve the techniques described below. In some cases, one of the following techniques may be sufficient, while others may require the use of multiple techniques to reach a conclusion.
- C. Observations supporting conclusions will be recorded in the case notes.
- D. Material origin may be classified as:
  - Skeletal – exhibits known characteristics of skeletal material to the exclusion of other reasonable possibilities
  - Consistent with skeletal – exhibits characteristics similar to skeletal material
  - Non-skeletal or excluded as skeletal – does not exhibit characteristics of skeletal material, or exhibits characteristics inconsistent with skeletal material

- Inconclusive or undetermined – lacks sufficient characteristics to make a determination

### **6.1 Visual Examination**

- A. Visual examination involves the assessment of the material with the unaided eye for the presence or absence of features or structures that characterize skeletal material.
- B. Visually assessed features may include overall size and morphology, landmarks, trabeculae, density, color, and reflectivity.

### **6.2 Microscopic Examination**

- A. Microscopic examination involves the assessment of the material using microscopy for the presence or absence of features or structures that characterize skeletal material.
- B. Microscopically assessed features may include overall size and morphology, landmarks, trabeculae, and vascular systems.

### **6.3 Radiologic Examination**

- A. Radiologic examination involves the assessment of the material using radiology for the presence or absence of features that characterize skeletal material.
- B. Radiologically assessed features may include morphology, landmarks, and trabeculae.

### **6.4 Elemental Analysis**

- A. Elemental analysis involves the assessment of the material using X-ray fluorescence spectrometry for the presence or absence of elements that characterize skeletal material.
- B. Elements that characterize skeletal material are calcium and phosphorus.
- C. Prior to analyzing the evidence, the NIST Hydroxyapatite Standard may be analyzed as a reference.

## **7 LIMITATIONS**

The conclusions that can be reached from anthropological examinations to determine skeletal or non-skeletal origin are dependent on the condition and completeness of the submitted material. Results based on fragmentary or poorly preserved material may be inconclusive.

## **8 SAFETY**

- While working with physical evidence, laboratory personnel will wear at least the minimum appropriate protective attire (e.g., laboratory coat, eye protection, protective gloves).
- Universal precautions will be followed.
- Exposure to biological and radiological hazards may be associated with the examination techniques performed. Safety procedures related to specific

instruments or equipment will be followed. Refer to the [FBI Laboratory Safety Manual](#) for guidance.

## 9 REFERENCES

ANSI/ASB Standard 150. Standard for Determination of Medicolegal Significance from Skeletal Remains in Forensic Anthropology (current version)

ANTHRO-300: Forensic Anthropological Examinations (current version)

FBI Laboratory Safety Manual (current version)

## 10 REVISION HISTORY

Revision	Issued	Changes
03	02/10/2020	'Sample Selection' removed from Section 4 title. Updated wording used in Sections 5, 5.1, 5.1.2, 5.1.3, and 5.1.4. Changed 'forensic anthropologist' to 'Anthropology Examiner' in Scope and 'examiner' throughout.
04	01/28/2022	Formatting and language changes to conform to new template. Added classification language to conform with ANSI/ASB Standard and ASSTR. Replaced SWGANTH reference with ANSI/ASB.
05	03/15/2024	Minor administrative edits.