

Forensic Anthropological Examinations

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1 INTRODUCTION

This document describes handling and documentation procedures for anthropological evidence, as well as procedures for general anthropological procedures and techniques. Procedures for specific types of forensic anthropological examinations are contained in separate documents.

2 SCOPE

This document applies to Anthropology Examiners and Physical Scientists in the Trace Evidence Unit (TEU) who are involved in anthropological examinations and related procedures.

3 EQUIPMENT

- 3-dimensional digitizer (MicroScribe G2LX or equivalent)
- Digital camera
- Digital radiography unit (NorthStar X-5000 X-radiography unit, Kubtec radiography unit, or equivalent)
- FORDISC 3.0 or more recent version
- General laboratory supplies
- Human skeletal reference casts
- Microscope camera (MiScope or equivalent)
- Mandibulometer (Paleo-Tech Mandibulometer or equivalent)
- Osteometric board (Paleo-Tech Field Osteometric Board or equivalent)
- Permanent adhesive (cyanoacrylate or equivalent)
- Personal protective equipment (e.g., lab coat, gloves, eye protection)
- Reversible adhesive (Paraloid B-72 or equivalent)
- Sliding calipers capable of measuring items up to 200mm within +/- 0.5mm (Mitutoyo Digimatic Absolute Digital Calipers or equivalent)
- Spreading calipers capable of measuring items up to 300mm within +/- 0.5mm (Paleo-Tech Digital Linear Spreading Calipers or equivalent)
- Stabilizing equipment (e.g., sand, wooden struts)
- Stereobinocular microscope, magnification range from 0.5x to at least 40x
- Tape measure
- Transmitted light microscope with 10x and 20x objectives

4 PROCEDURE

4.1 Preparing Skeletal Material for Examination

- A. Skeletal remains or material present will be inventoried. Depending on the material(s) present and number of items and/or number of individuals present, this inventory may be recorded in a narrative format or on a chart or form.
- B. Each item or its primary packaging will be labeled.

- C. Photographs with scale will be taken prior to any examination or processing that may alter the evidence. Photographs may also be taken to record important features or evidence at the discretion of the examiner.
- D. Any associated debris that may require further examination (e.g., hairs, soil) will be recorded, removed, and packaged appropriately for further analysis by appropriate personnel.
- E. Fragmented bones may be reassembled to the extent possible when appropriate. In cases where reassembly will be facilitated by affixing fragments (such as extreme fragmentation or a large number of specimens), reversible adhesives and stabilizing equipment may be used.
- F. Where necessary (at the discretion of the examiner), adhering debris may be removed following ANTHRO-315: Skeletal Processing.

4.2 Anthropological Examinations

- A. The anthropological examinations performed depend on the nature of the request and/or the condition of the material present. Procedures for these examinations and how to reach possible conclusions are contained in technical procedures specific to each.
- B. The techniques used for these examinations may include visual examination, metric examination, microscopic examination, radiologic examination, or elemental analysis.
- C. Other methods may be used at the discretion of the examiner and depending on the examination needs.

4.2.1 Macroscopic (Visual) Examination

- A. An anthropological examination will include at a minimum a macroscopic (visual) examination of the material using the unaided eye and sufficient lighting. In some cases, only a macroscopic examination may be necessary.
- B. The general condition of material and relevant features will be recorded in the case notes.

4.2.2 Metric Examination

- A. Where applicable, relevant and available skeletal measurements will be taken according to published guidelines using calipers, osteometric board, tape measure, and mandibulometer.
- B. Measurements may be recorded in narrative format or using measurement forms.
- C. Measurements may be collected using a 3D digitizer following ANTHRO-316: Use of Microscribe Digitizer.
- D. Metric examination may include the use of data analysis software such as FORDISC (Jantz and Ousley, 2005).
- E. Additional measurements, such as those documenting trauma, will be included in the case notes.
- F. Where applicable and with the consent of the contributor, metric data may be submitted to the Forensic Data Bank.

4.2.3 Microscopic Examination

- A. When greater magnification is required for adequate analysis, the material may be examined microscopically.
- B. Depending on the examination needs, microscopic examination may include the use of a stereobinocular microscope, compound microscope, or microscope camera.

4.2.4 Radiologic Examination

- A. When radiologic examination of the material is necessary, (e.g., to reveal the internal structure of skeletal material, look for the presence of foreign material, or for personal identification) digital radiography may be used.
- B. Digital radiology will follow the Chemistry Unit-Metallurgy Digital Radiography procedure or other appropriate instrument-specific procedure.

4.2.5 Elemental Analysis

- A. Material may be analyzed for its elemental constituents to determine whether it is osseous (bone) or dental (tooth) in origin (versus some other nonosseous or non-dental material).
- B. Elemental analysis will typically involve x-ray fluorescence spectrometry (XRF).
- C. Elemental analysis will follow the Chemistry Unit-Metallurgy Operation of the Thermo QUANT'X X-Ray Fluorescence Spectrometer procedure or other appropriate instrument-specific procedure.

4.3 Verification

- A. Identification comparisons will be verified by a second qualified examiner (see ANTHRO-307: Personal Identification).
- B. Any other anthropological conclusion may be verified by a second qualified examiner at the discretion of the primary examiner or technical reviewer.
- C. Verifications will be recorded in Forensic Advantage (FA).

4.4 Odontological Examinations

In cases where an odontological examination is requested and/or deemed appropriate by the examiner, the odontological examination will be performed by a competent subcontractor.

5 CALCULATIONS

Calculations carried out as part of a biological profile will be performed according to appropriate reference data.

Calculations may be carried out in accordance with the prescribed method in the reference literature, or through the use of FORDISC. The source(s) of the formula(e) and calculations used will be recorded in the case notes.

6 MEASUREMENT UNCERTAINTY

The measurement uncertainty with calipers is approximately ± 0.02 mm or better, depending on the calipers used. Refer to instrument manuals for uncertainty for a particular caliper. This degree of uncertainty of measurement does not significantly affect anthropological conclusions and is not detrimental to the results of anthropological examinations.

The measurement uncertainty with an osteometric board is approximately ± 0.5 mm. This degree of uncertainty of measurement does not significantly affect anthropological conclusions and is not detrimental to the results of anthropological examinations.

The measurement uncertainty with the MicroScribe digitizer is less than 0.3 mm. This degree of uncertainty of measurement does not significantly affect anthropological conclusions and is not detrimental to the results of anthropological examinations.

7 LIMITATIONS

The conclusions that can be reached from anthropological examinations are dependent on the condition and completeness of the submitted material. Limitations specific to particular examination may be found in the relevant procedures.

8 SAFETY

- While working with physical evidence, laboratory personnel will wear at least the minimum appropriate protective attire (e.g., laboratory coat, safety glasses, protective gloves).
- Universal precautions will be followed.
- Exposure to physical, biological, and chemical hazards may be associated with the examination techniques performed. Safety procedures related to specific materials, instruments, or equipment will be followed. Refer to the [FBI Laboratory Safety Manual](#) for guidance.

9 REFERENCES

ANTHRO-307: Personal Identification (current version)

ANTHRO-315: Skeletal Processing (current version)

ANTHRO-316: Use of Microscribe Digitizer (current version)

Digital Radiography, Chemistry Unit-Metallurgy (current version)

FBI Laboratory Safety Manual (current version)

Operation of the Thermo QUANT'X X-Ray Fluorescence Spectrometer, Chemistry Unit-Metallurgy (current version)

Ousley, S.D. and Jantz, R.L. FORDISC 3.0: Personal Computer Forensic Discriminant Functions. The University of Tennessee, Knoxville, Department of Anthropology, 2005.

10 REVISION HISTORY

Revision	Issued	Changes
04	08/02/2021	Retitled Section 5.1 Deletion of portions of 5.1.3 which are now captured in a new procedure. Section 5.2 revised to reflect changes to procedure titles and new procedures. Revision of 5.2.3 to reflect compound microscopy with histomorphological examination. Added limited to last sentence in 5.3. Addition of new procedures to References. Removed statement regarding relevant settings in Sections 5.2.3 through 5.2.5. Changed standard operating procedures to technical procedure, procedure, or document throughout
05	01/28/2022	Formatting and language changes to conform to new template.
06	03/15/2024	Clarified procedure in 4.2.2C. Reference added to 4.2.2D. Section 4.3 and reference to ANTHRO-307 added. Minor administrative edits.