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Q4(b)

Discuss various methods of personal identification based on skeletal remains.

UPSC Civil Services Mains 2023 · Anthropology GS 1 · 15 marks · Applications of Anthropology

12. Applications of Anthropology: Anthropology of sports, Nutritional anthropology, Anthropology in designing of defence and other equipments, Forensic Anthropology, Methods and principles of personal identification and reconstruction, Applied human genetics-Paternity diagnosis, genetic counselling and eugenics, DNA technology in diseases and medicine, serogenetics and cytogenetics in reproductive biology.

Core demand of the question

- Discuss various methods of personal identification based on skeletal remains
- Write at 15-mark length

Revision summary

The biological profile estimates sex, age, stature, and ancestry from bone.

Pelvis and Phenice traits lead for sex; Todd, Suchey-Brooks and Iscan lead for adult age.

Trotter-Gleser and Fully estimate stature.

Teeth, sinuses, and implants individualise.

Krogman standardised the forensic teaching sequence.

DNA and isotopes extend identification when bone and records allow.

Introduction

A skeleton can still be a person for the law if sex, age, stature, ancestry, and unique marks can be read. Forensic anthropology is that reading, from bone first and from DNA when bone is not enough.

Body**Biological profile**

- **Sex** is best from the pelvis, using the **Phenice** traits of the pubis, the greater sciatic notch, and then the skull; accuracy falls in children because secondary sex traits are incomplete.
- **Age** uses dental eruption and epiphyseal union in the young, then pubic symphysis methods of **Todd** and **Suchey-Brooks**, sternal rib ends after **Iscan**, and cranial suture closure with wide error in the old.
- **Stature** is estimated from long-bone length with regression formulae such as **Trotter and Gleser**, which must match population; **Fully's** anatomical method uses more of the skeleton when it is complete.
- **Ancestry** from craniofacial metrics is statistical and contested, and it is a forensic lead, not a race essence.

Unique identification

- Dental charting, restorations, and radiographs match a named person when antemortem records exist.
- Frontal sinus outline, surgical implants, and healed fractures are individualising when records or family memory exist.
- Occupational and pathological markers, such as squatting facets or chronic infection, narrow the field but rarely name a person alone.
- **Wilton Krogman's** The Human Skeleton in Forensic Medicine made this profile-plus-unique-mark sequence standard teaching.

Molecular and imaging methods

- Nuclear **STR DNA** from dense bone or tooth, mitochondrial DNA from degraded remains, and Y- or X-markers for kinship are now ordinary when a reference sample exists.
- Facial approximation from the skull is an investigative aid, not a courtroom photograph of the dead.
- Isotopes of strontium, oxygen, and carbon can speak of diet and childhood geology, which helps unidentified migrants and mass graves.

Indian and practical context

- **Mass disasters, unidentified poor, and human-rights graves use the same sequence:** inventory, profile, unique match, then DNA.
- The method is only as good as the reference collections and the antemortem file.

Flow diagram

Skeleton -> Sex age stature
Skeleton -> Teeth sinus implants
Teeth sinus implants -> Named person
DNA STRs -> Named person

Conclusion

Personal identification from bone starts with sex, age, stature, and unique dental or surgical marks, then DNA. Krogman's forensic sequence still holds, with molecular tests as the last name-tag when records exist.

Facts & figures

Phenice method

Three pubic traits used for sex estimation from the adult pelvis with relatively high accuracy.

Suchey-Brooks

Pubic-symphysis phases for adult age estimation, a standard forensic tool.

Trotter and Gleser

Regression formulae from long bones to living stature, population-sensitive.

Wilton Krogman

Classic text on the human skeleton in forensic medicine, still the teaching frame of the biological profile.

STR DNA

Short tandem repeat profiles from bone or tooth that can match a named reference or a relative.

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