Skeleton Keys

Case Study Simulations in Forensic Anthropology

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Background Information

A single humerus washes up on a beach in New England. Hikers stumble upon a pile of bones in the Great Smoky Mountains. The family dog brings a human clavicle in through the doggy door in a rural town. Each of these cases could end up in a forensic anthropologist's laboratory.

A single bone can reveal a great deal of information about someone. Did this bone belong to a male or a female? A young person or an old person? Someone of European or Asian ancestry? How tall was this individual? How did these bones end up where they did? With a thorough understanding of human skeletal development, variation, and training in forensic methods, an anthropologist may be able to answer many of these questions.

About the Deck

You will generate a forensic case study using 7-10 playing cards. If you are using these cards in a classroom, your teacher may assign you the cards to use. If not, you can randomly choose 7 cards from the Skeleton Keys card deck.

Each card corresponds to artifacts, skeletal remains or locations which you can view in detail by choosing the corresponding playing card on the Skeleton Keys website: bit.ly/ncssmskeletonkeys

You may occasionally encounter cards on the website with links to 360-degree views of skulls and other artifacts. Be sure to click the links that correspond to these cards. The combination of artifacts, remains, context, etc., on the cards make up your case study.

As you use the corresponding Skeleton Keys website, you may try opening a new tab in your browser for each card you choose, so as to create a virtual "collection" of evidence.

Your goal, and the goal of forensic anthropology, is ultimately to work towards identification of the decedent, or person who has died. You should aim to determine the age, sex, ancestry, and stature of the case study provided by your cards. Identifying features, trauma or pathology, artifacts, and context can yield additional information about your case.

Use the cards to reveal demographic features about the skeletal remains and complete one of the following activities:

- write a forensic report detailing your findings
- create an infographic or presentation detailing your findings.
- write a creative work detailing and contextualizing your findings.

Before starting, you may want to read over the "Helpful Resources" on the Skeleton Keys website.

How to Use Skeleton Keys in the Classroom

One of the most difficult aspects of teaching forensic anthropology stems from the scarcity of available skeletal samples for comparison. This activity was developed as a digital resource for teachers with limited access to skeletal remains or adequate casts. All you need for this activity is a standard deck of playing cards, a computer with internet access, and instructional materials in forensic anthropology.

About the Cards

2-9 of Hearts	Sex determination of skeletal remains. These images/resources include skulls or pelves with defining features characteristic of sexual dimorphism.
10-Ace of Hearts	Identifying features for a skeletal case study. These images/resources include various anomalies and other features that may be useful in identifying an individual.
2-9 of Clubs	Age estimation of skeletal remains. These images come from various regions of the skeleton that have long been associated with age-related change: sternal rib ends, cranial sutures, pubic symphyses, and dental eruption.
10-Ace of Clubs	Artifacts associated with skeletal remains. These images may provide context for the case studies. For example, an image of a stone arrowhead might indicate that the bones belong to someone from the distant past while modern coins would indicate that the individual died in recent times.
2-9 of Diamonds	Ancestry estimation of skeletal remains. These images and rotating skull animations provide a variety of angles from which to view various features of the craniofacial skeleton that are suggestive of ancestry such as eye orbit shape, cranial suture complexity, and prognathism of the lower mid-face.
10-Ace of Diamonds	Trauma and/or Pathology for a skeletal case study. These images and diagrams can provide some clues as to what might have happened to the individual in question. Photos and radiographs may represent healed injuries that occurred antemortem or unhealed injuries that occurred perimortem or postmortem. Injuries represented might include sharp force, blunt force, projectile, or crushing trauma consistent with wounds that you would expect among humans from prehistory to modern times.
2-9 of Spades	Stature calculation from skeletal remains. These images provide long bones with maximum length measurements that can be used to calculate stature using published formulae. When possible, head diameter of the radius, femur, or humerus have been provided and could also aid in sex determination from metric dimensions.
10-Ace of Spades	Environmental Context for a skeletal case study. These images represent the macroenvironment in which the remains were recovered. The environment can range from isolated areas such as a barren desert to a bustling city.

This exercise could be approached in several ways:

I. Case Study Assignment

- **Option 1**: Shuffle the deck of cards and randomly deal each student a selection of seven cards. Students write down the cards they've been dealt and then look up the image or resource that corresponds to each of the seven cards.
- **Option 2**: Select one card from each category listed in the table and assign the selection of cards to each student. Students write down the cards they've been dealt and then look up the image or resource that corresponds to each of the cards.
- **Option 3**: Print out the forensic anthropology card deck, shuffle, and randomly deal each student or pair of students a selection of seven to ten cards. Students keep the cards for reference and additionally have the option to look up the image or resource that corresponds to each card.

II. Case Study Research Project

The goal of forensic anthropology is ultimately to work towards identification of the decedent. Thus, students should aim to determine the age, sex, ancestry, and stature of each case study using the resources provided. Identifying features, trauma or pathology, artifacts, and context can yield additional information about each case.

- **Option 1**: Students use the assigned resources to reveal demographic features about the skeletal remains and write a forensic report detailing their findings.
- **Option 2**: Students use the assigned resources to reveal demographic features about the skeletal remains and create an infographic or presentation detailing their findings.
- **Option 3**: Students use the assigned resources to reveal demographic features about the skeletal remains and write a creative work detailing and contextualizing their findings.

You may wish to use this recording chart for your findings:

Sex Determination: _____

Feature	Male Characteristic	Female Characteristic	Notes
Pelvis: Sub-pubic angle	less than 90 degrees	greater than 90 degrees	
Pelvis: Greater Sciatic Arch	narrow	wide	
Pelvis: Pelvic Inlet	narrow, heart-shaped	broad, oval-shaped	
Skull: Nuchal Crest	large, rugged	small/absent	
Skull: Mastoid Process	long, large	short, small	
Skull: Brow Ridge	large, rugged	small/absent	
Skull: Frontal Bone	slanted, sloping	vertical	

Ancestry Estimation: _____

Feature	European Characteristic	Asian Characteristic	African Characteristic
Interorbital Distance	narrow	intermediate	wide
Nasal Opening	narrow, tear-drop shaped	intermediate, triangular	wide, heart-shaped
Internasal Area (Nasal bone shape)	pointed, steepled	moderate, tented	rounded, half-moon shape
Eye Orbits	angular	rounded	rectangular
Prognathism (projection of lower face)	none	moderate	significant
Incisors	spatulate	shovel	spatulate

Age Estimation: _____

Feature	Young Adult (18-30)	Middle Adult (30-60)	Older Adult (60+)
Pubic Symphysis	lots of grooves, cloud-like appearance, irregular rim	smoother surface, oval outline, regular rim	pitted surface, erosion of rim, extra bone formation
Sternal Rib End	lots of grooves, cloud-like appearance, small and irregular rim	smoother surface with slight depression, moderate rim	deeply depressed surface, irregular rim with extra bone formation
Cranial Sutures	All sutures visible	Some sutures obliterated or fading	Many/most/all sutures obliterated or fading

Stature Estimation: _____

Bone	Measurement (cm)	Formula (Sex and Ancestry-specific)	Stature Estimate
Femur			
Tibia			
Humerus			