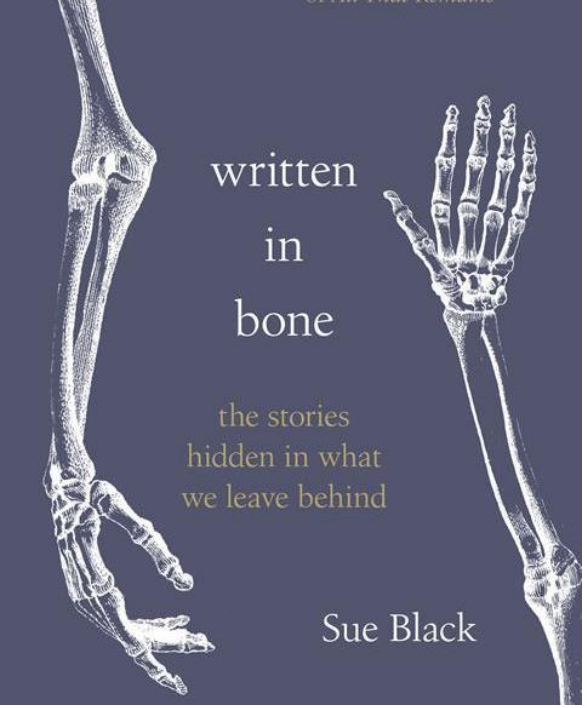
INDIVIDUAL VS COMMINGLED BURIALS

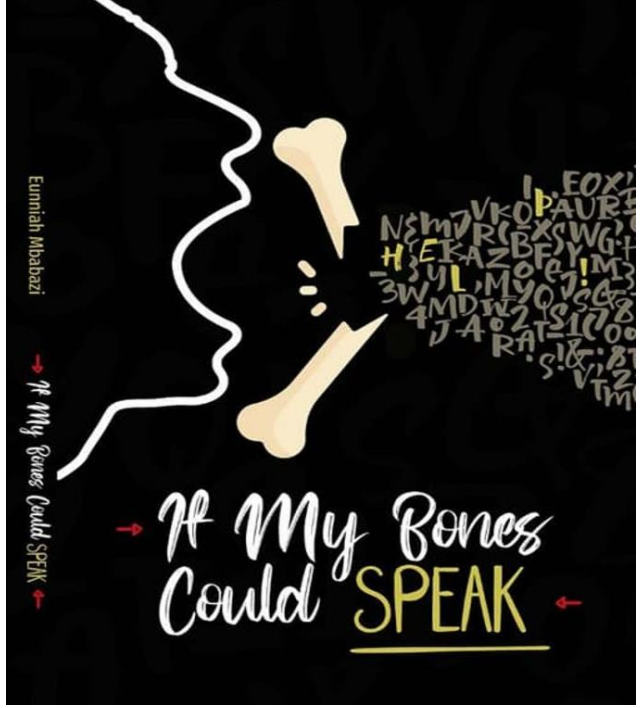
Dr Arwa Kharobi

MINIMUM NUMBER OF INDIVIDUALS: MNI

calculated by dividing the skeletal elements into right and left and using the most abundant number as the final estimate

White, 1953



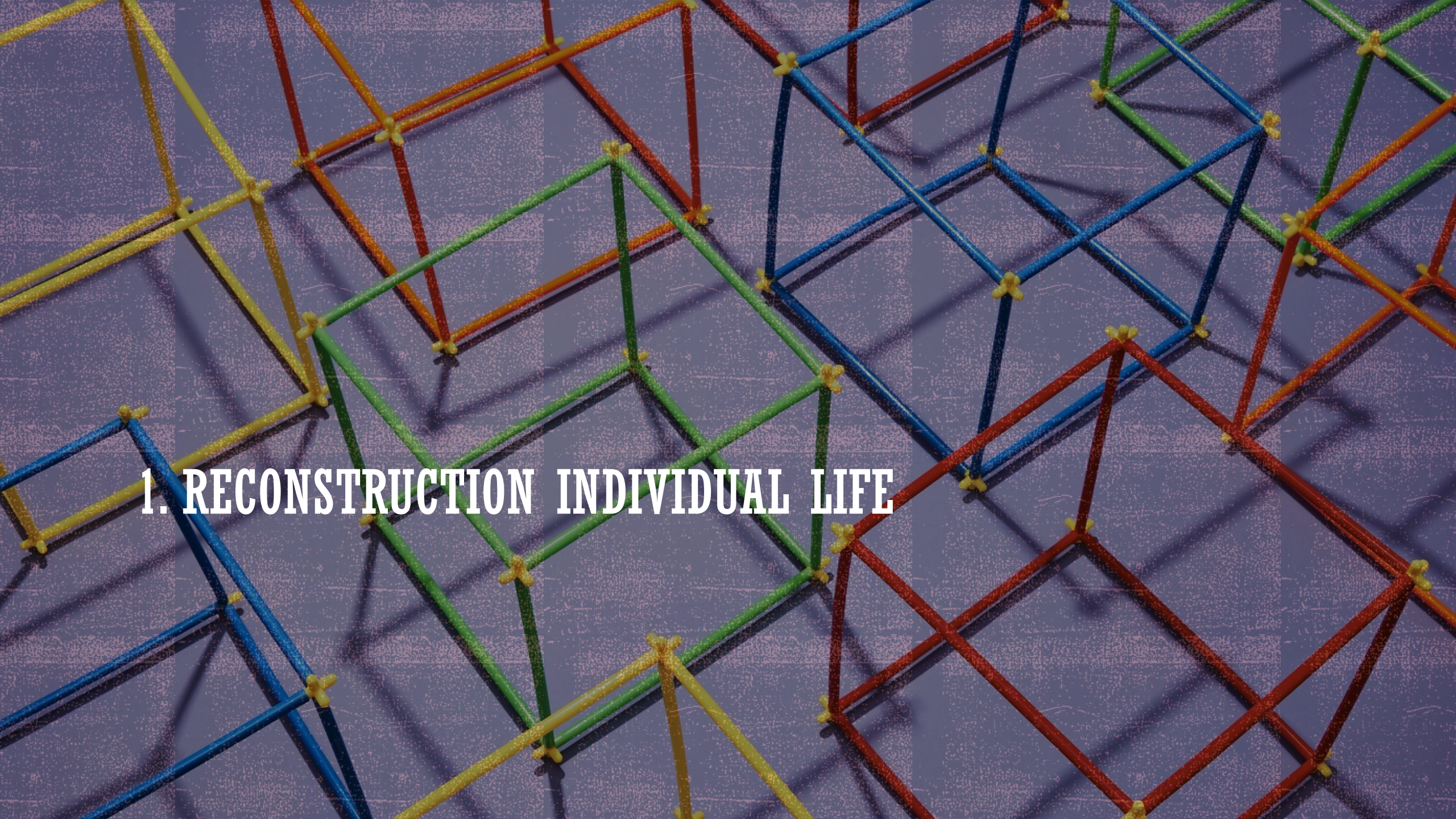


- Osteobiography

- 1976 first coined by Frank Saul

- 2002 redefined by Robb

- Currently seek to emphasize multi-dimensional aspects of the life of an individual



1. RECONSTRUCTION INDIVIDUAL LIFE

1. Reconstruction individual life

How are you?

Where have been born?

Are you from here?

How old are you?

Do you like cheese?

Have you seen the pyramids?

Vaccinated?

1. Reconstruction individual life

Contents lists available at ScienceDirect

Journal of Archaeological Science: Reports

journal homepage: www.elsevier.com/locate/jasrep

Far from home: A multi-analytical approach revealing the journey of an African-born individual to imperial Rome

Kevin Salesse [a,b,*,1], Élise Dufour [c], Vincent Balter [d], Robert H. Tykot [e], Nina Maaranen [f], Maïté Rivollat [b,g], Arwa Kharobi [b,f], Marie-France Deguilloux [b], Marie-Hélène Pemonge [b], Jaroslav Brůžek [b,h], Dominique Castex [b]

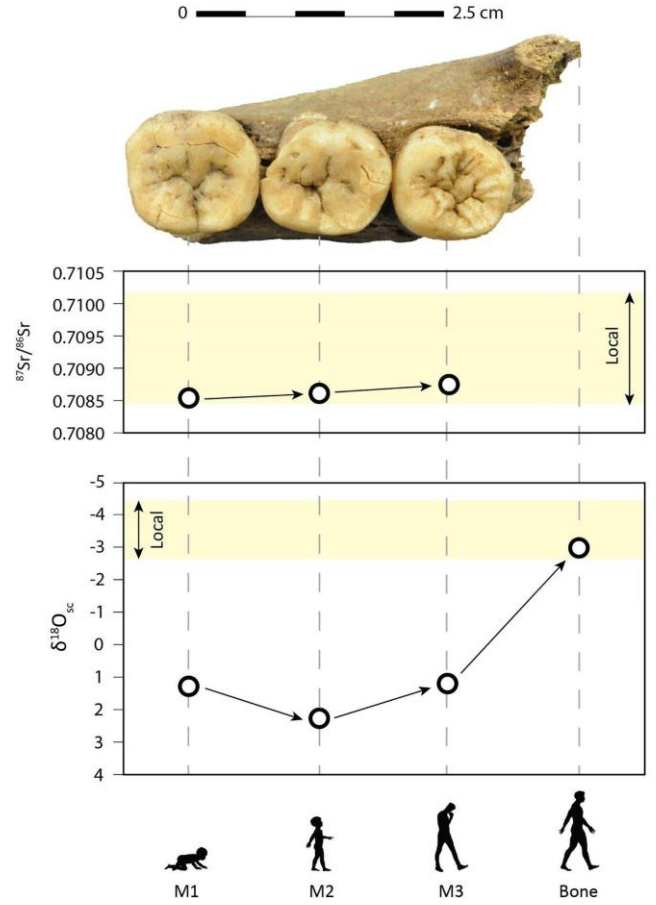
multi-tissue sampling strategy (molar tooth & mandible cortical bone)

Using a multi-analytical approach: isotopic, dental morphology & ancient DNA

Reconstructing the journey and lifeway patterns of an individual buried in the mass grave from the catacombs of Saints peter and Marcellinus

REFINED THE ORIGIN & LIFE HISTORY

- born beyond the southern *limes*, possibly in the vicinity of the Nile Valley or within the central Sahara Desert
- experienced diachronic changes of residence during its early life due to a nomadic condition



Variation of the $^{87}Sr/^{86}Sr_{enamel}$, $\delta^{18}O_{sc\ (enamel)}$ and $\delta^{18}O_{sc\ (bone)}$ values in US215/Mand1. Note: 'M1', 'M2' and 'M3' stands for permanent molars 1, 2 and 3, respectively. The yellow area corresponds to the local range defined as one standard deviation from the SSPM population mean. The standard deviation between replicates is inferior to size of dots.

Salesse et al.2021

Reasons behind such a long journey?

A slave? undergone forced migration & eventually transported to Rome

A free person? settling in Rome for specific family or business affairs

THIS BIOANTHROPOLOGICAL STUDY

shows a unique case of long-distance migration across the Empire of a non-Roman

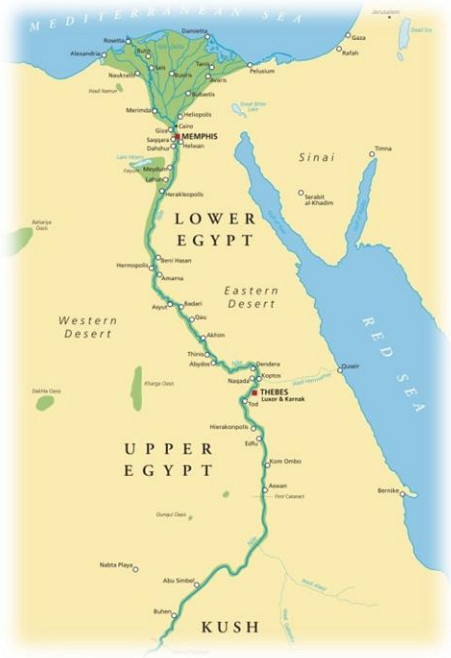
highlights for the first time the journey of a North African-born individual who died in Rome

illustrates and confirms the cosmopolitan character of Rome

restates the importance and usefulness of multi-proxy investigations for reconstructing the identities of past human individuals recovered in archaeological contexts

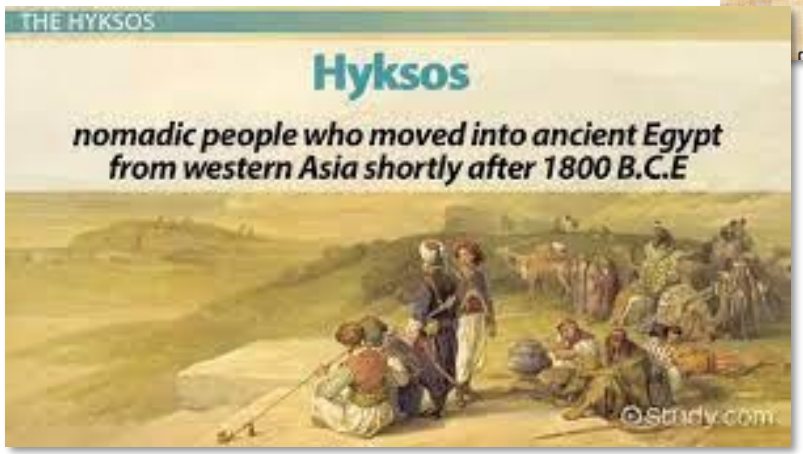
2. RECONSTRUCTION POPULATION TRAJECTORY

HYKSOS, A FOREIGN DYNASTY



where the Hyksos came from ?

how they rose to power?



2. Reconstruction population trajectory

PLOS ONE

PUBLISH ABOUT BROWSE

OPEN ACCESS PEER-REVIEWED

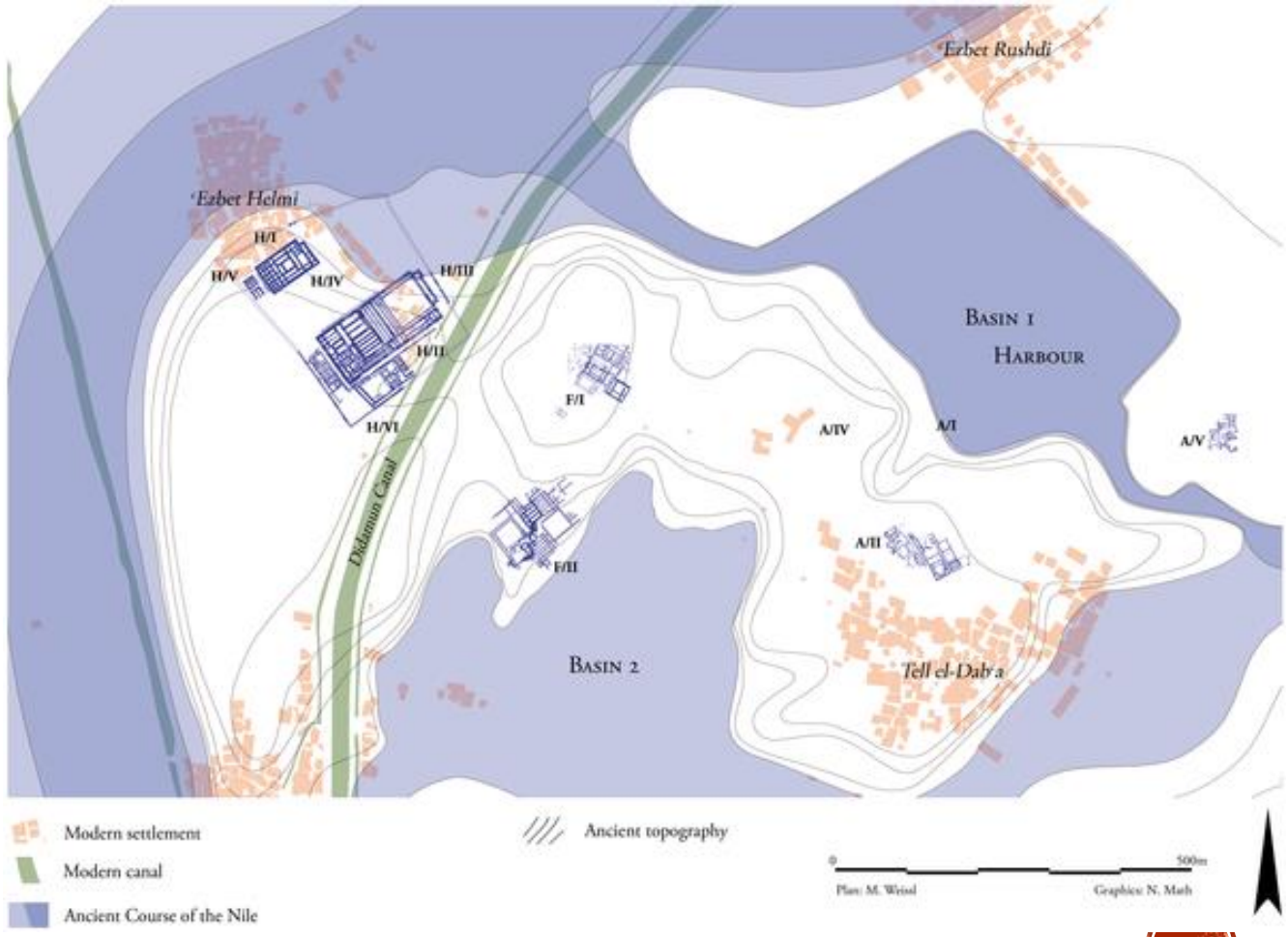
RESEARCH ARTICLE

Who were the Hyksos? Challenging traditional narratives using strontium isotope ($^{87}Sr/^{86}Sr$) analysis of human remains from ancient Egypt

Chris Stantis, Arwa Kharobi, Nina Maaranen, Geoff M. Nowell, Manfred Bietak, Silvia Prell, Holger Schutkowski †

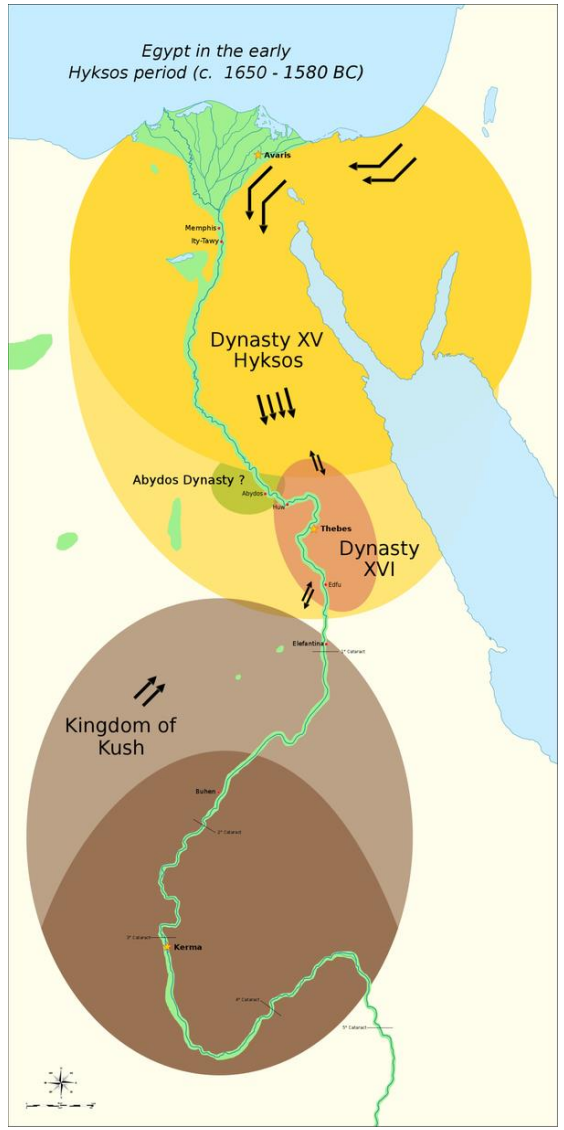
Published: July 15, 2020 • https://doi.org/10.1371/journal.pone.0235414

- strontium isotope ($^{87}Sr/^{86}Sr$) ratios of human tooth enamel (n = 75) from Tell el-Dab^{c}a,
- focusing on comparing pre-and during Hyksos rule and sex-based differences



Stantis et al. 2020. Site plan of Tell el-Dabca and nearby sites of ʿEzbet Helmi and ʿEzbet Rushdi.

2. Reconstruction population trajectory



pre-Hyksos period (constitution of town)

- influx of non-locals & preponderance of non-local females

Hyksos period

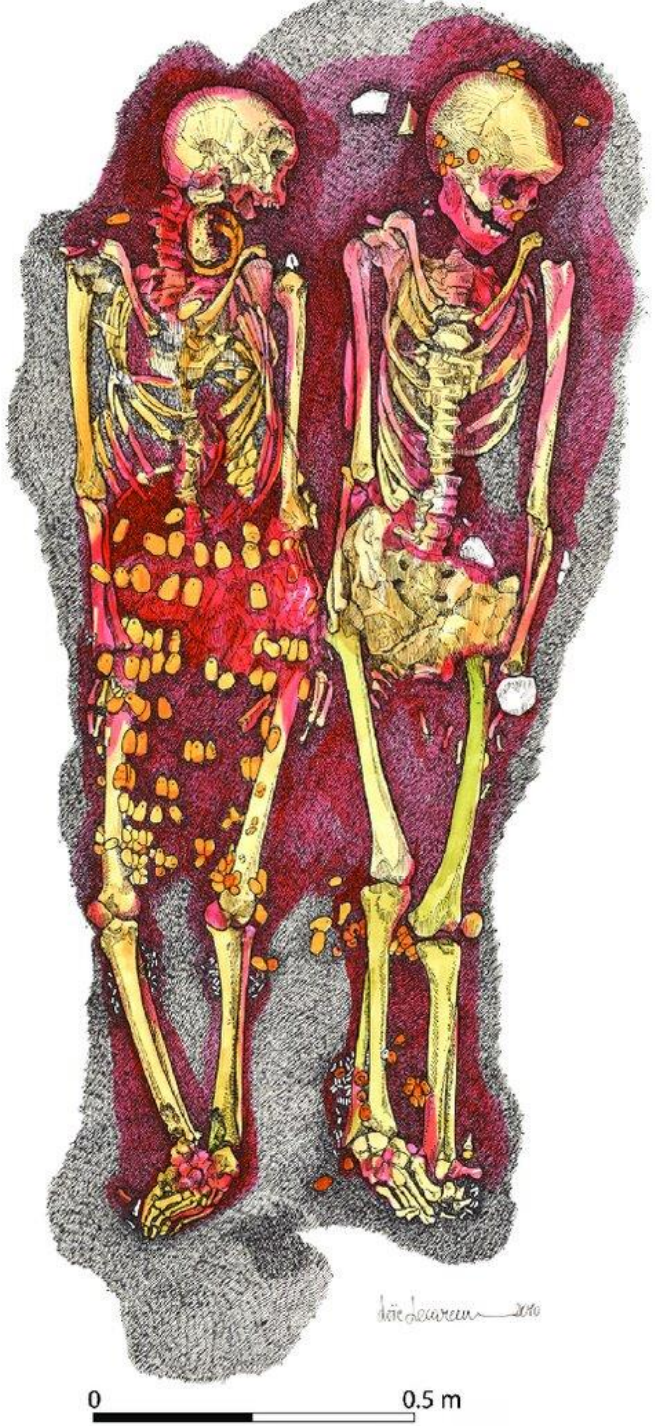
- number of individuals already born in the Delta is large

- patrilocal residence
- not a result of an invasion, as popularly theorized
- but an internal dominance & takeover of foreign elite

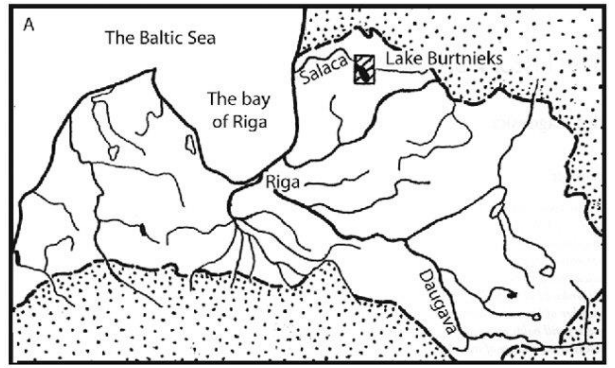
SINGLE/INDIVIDUAL BURIAL:

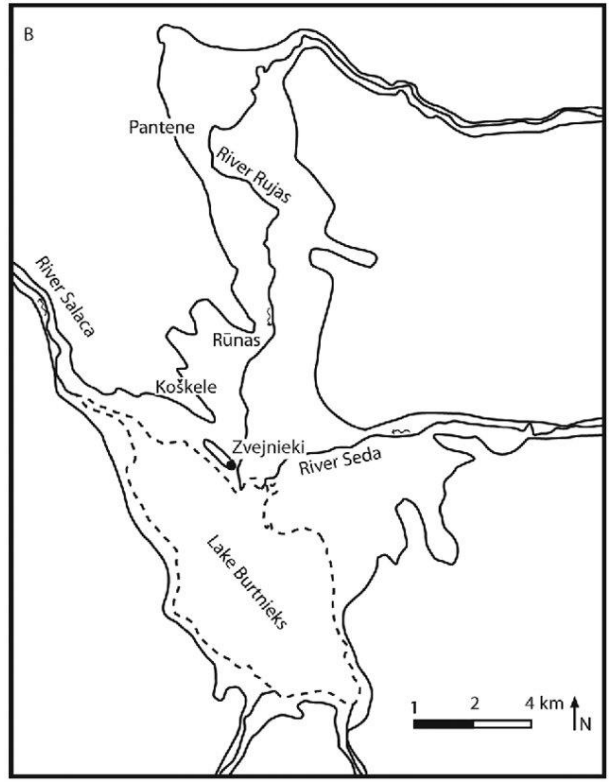
ONE GRAVE = ONE INDIVIDUAL

Human remains from Shahne Poshte, Iran- Soltysiak et al. 2019



DOUBLE/ DUAL BURIAL





Zvejnieki site, Latvia
© Larsson 2018

LOVERS' TOMB

- China, dates to the Northern Wei dynasty (386-534).“,”
- skeletons of a man and woman in one tomb (in an eternal embrace)
- one of 600 found in the ancient cemetery

An illustration of the ancient Chinese couple buried embracing during the Northern Wei dynasty (386-534). Photo courtesy of the International Journal of Osteoarchaeology

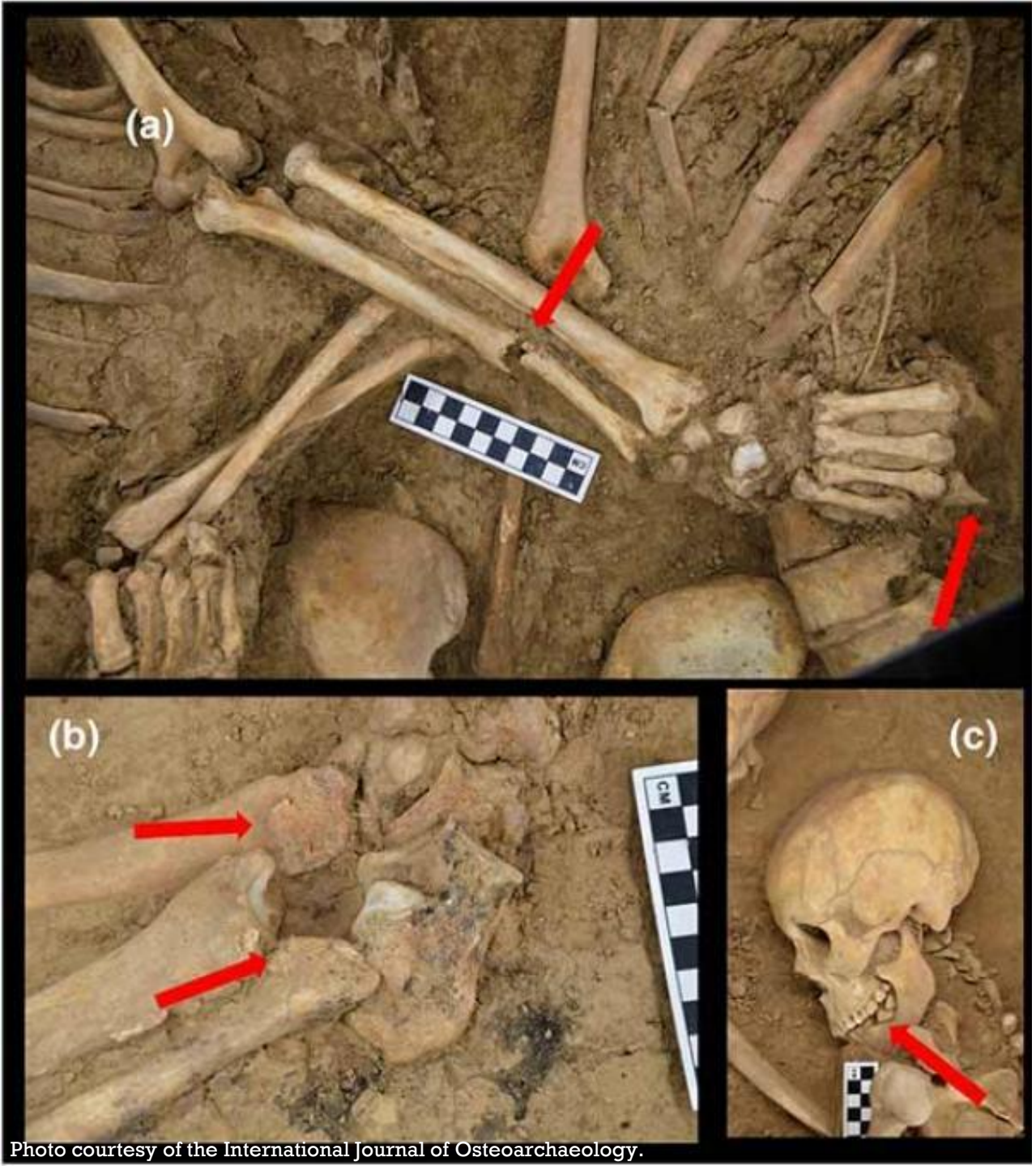


Photo courtesy of the International Journal of Osteoarchaeology.

SKELETAL MANIFESTATIONS

Pathological & trauma signs on the skeletons:

- (a) An unhealed ulnar fracture and missing part of the fourth digit on the right hand (male individual)
- Slight development of the marginal osteophytes on the lumbar vertebrae could be detected in the female skeleton;
- (b) Osteophytosis on the distal end of the lower limbs (male individual)
- (c) Antemortem tooth loss (female individual)

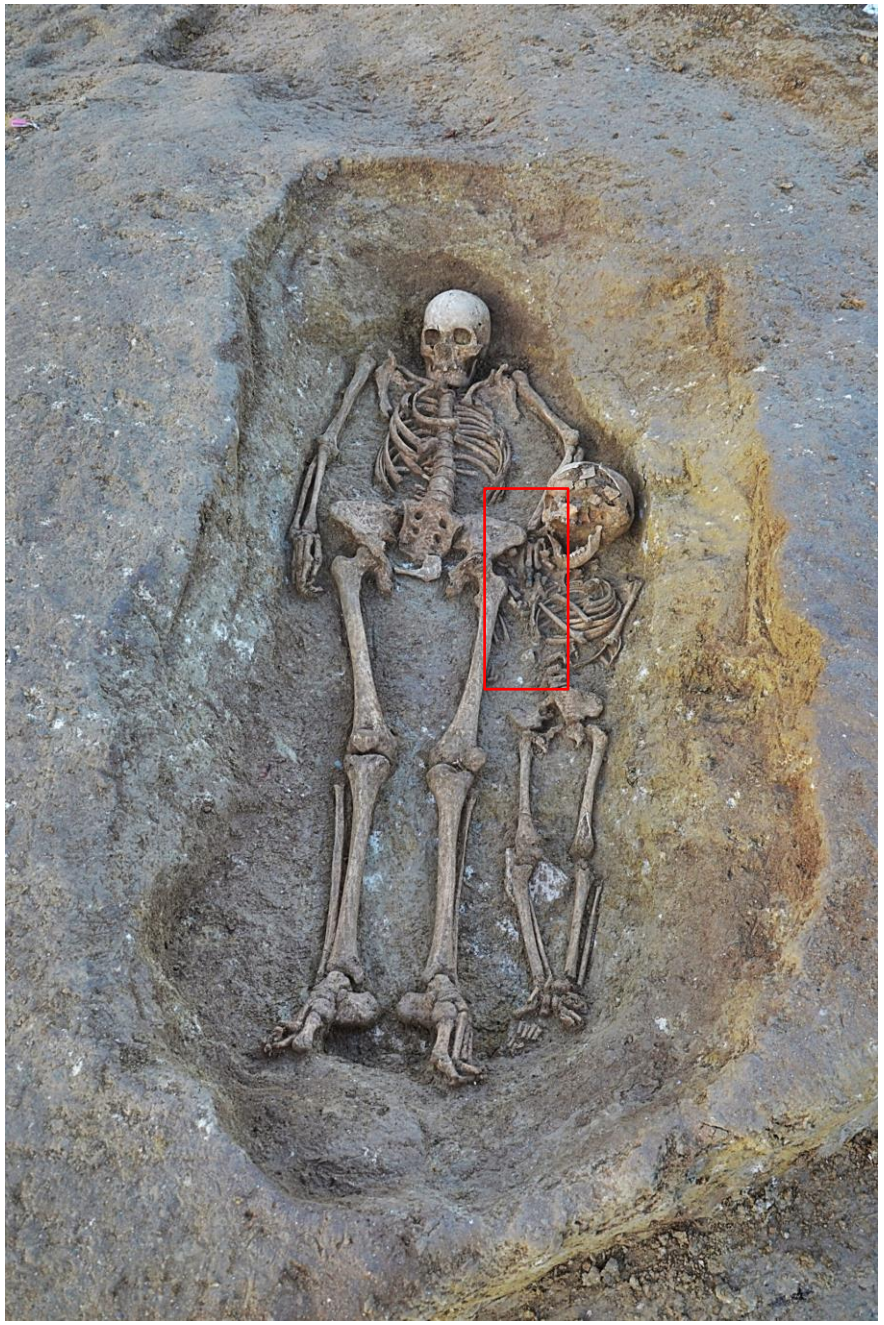
CAUSE OF DEATH

1. the man—whose body showed signs of an unhealed traumatic injury on his right arm—died, and that the woman died by suicide to be buried with him.
2. a double death by suicide,
3. both died of illness at the same time

DOUBLE/DUAL BURIAL

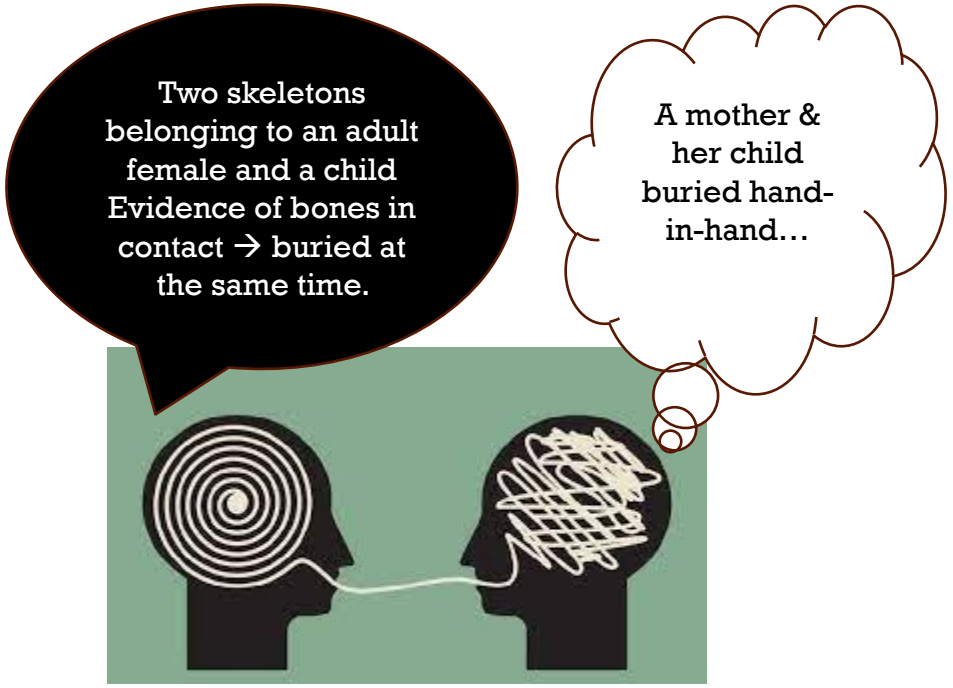
be aware of (LIMITS)

1. *reconstructing the inhumation*
2. *reconstructing the identity*



Bouches-du-rhône, France © Nicolas Weydert, Inrap

DOUBLE/DUAL BURIAL



Anthropologists vs journalists

DOUBLE/DUAL BURIAL

- Lovers of Modena, 4-6th Century AD. Italy
- Discovered in 2009 and called the lovers of Modena
- Badly preserved skeletons → sex indeterminate
- 10 years later ……
- Using a new technique (Protein on tooth enamel) → 2 males

2 AND MORE...

commingled

collective

multiple

mass grave

plural

gathering

COMMINGLED HUMAN REMAINS

- defined as the *mixing of the elements of multiple individuals into a single archaeological or forensic context*.

- Two causes:

1. Natural
2. Cultural mechanisms

- Three categories:

1. Long-term usage
2. Episodic usage
3. Lab commingling

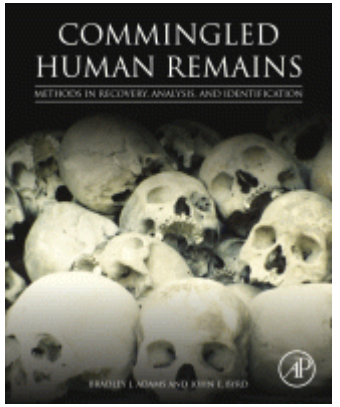
- Several methodologies

Causes:
1. *Natural*
2. *Cultural mechanisms*

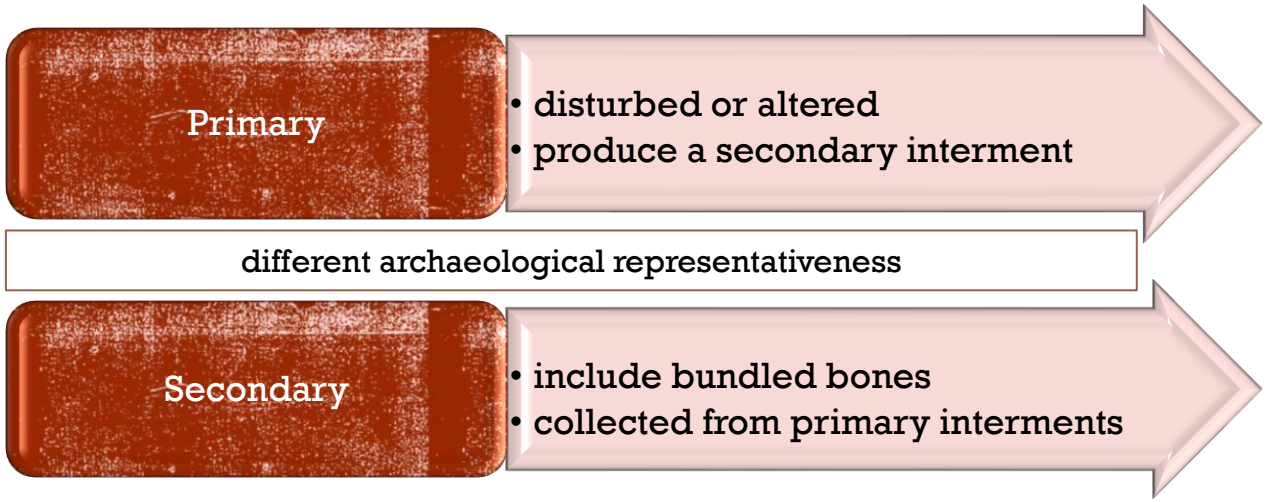
Categories:
1. *Long-term usage*
2. *Episodic usage*
3. *Unintentional*

Methodologies

1. LONG-TERM USAGE ASSEMBLAGES



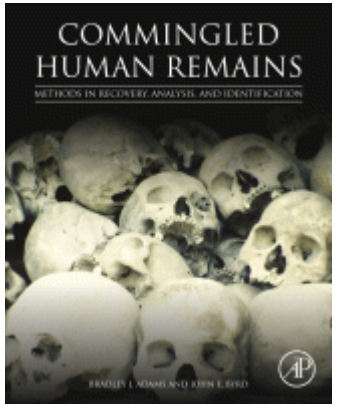
- *Used for multiple depositional episodes across generations*
- *Results of primary & secondary interments from community groups*



1. LONG-TERM USAGE

different archaeological representativeness

a. Primary assemblages



Based on:

- the placement of primary burials into a plural tomb or grave
- with the addition of more primary burials on top of previous burials

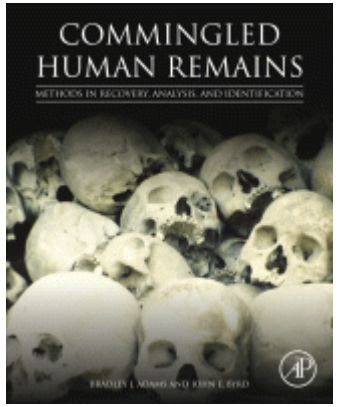
Reopening

will have an <u>adequate representation</u> of smaller elements

1. LONG-TERM USAGE

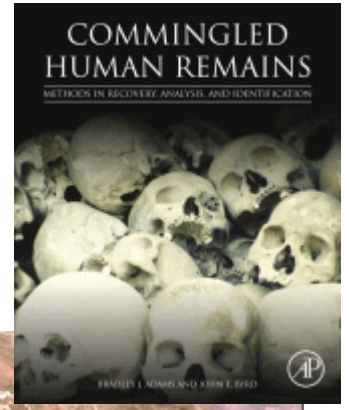
different archaeological representativeness

b. Secondary assemblages

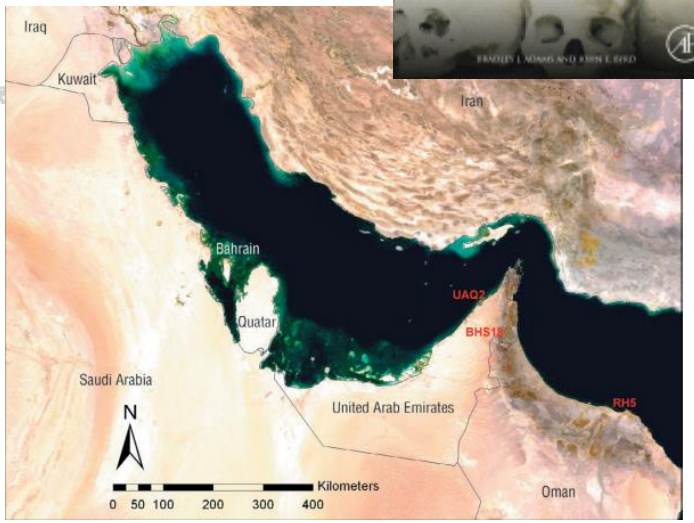


- Resulting from the gathering of skeletal elements for deposition in a secondary burial = fewer small elements/ difficult to recover
- Smaller elements (hands & foot bones) may filter to the bottom of the assemblage or may be poorly represented as they might not have been collected from primary burials

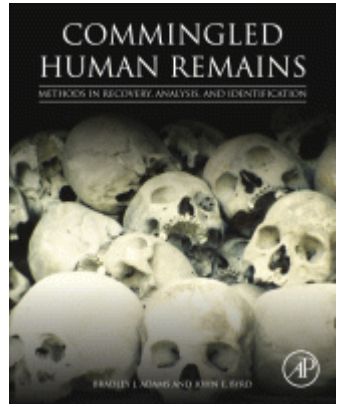
1. LONG-TERM USAGE ASSEMBLAGES



- Often, a mixture of primary & secondary burials will be present in a long-term use assemblage



- **Tell Abraq**
  - Bronze Age ossuary
  - 2200–2100 BCE
  - United Arab Emirates.

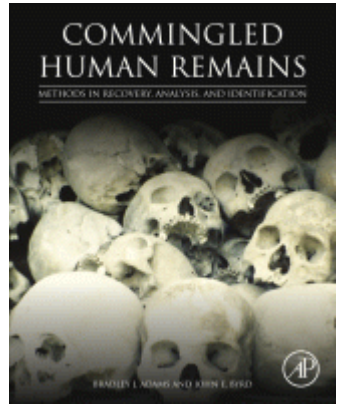


2. EPISODIC USAGE ASSEMBLAGES

- Used for a single depositional event
- Resulting from the deposition of multiple individuals at a single time in a single deposit:
- Mass graves-Black Death-Euirope

Skeletons unearthed in London Crossrail excavations are Black Death victims from the great pandemic of the 14th Century

2. EPISODIC USAGE ASSEMBLAGES



- Result of plague, sacrifice, or warfare, any activity that will **result in the death of multiple individuals at a single time**
- Episodic in nature, **vs** a longer-term usage assemblages
- **Characteristics**: commingling depending on the natural processes

Little or no ----

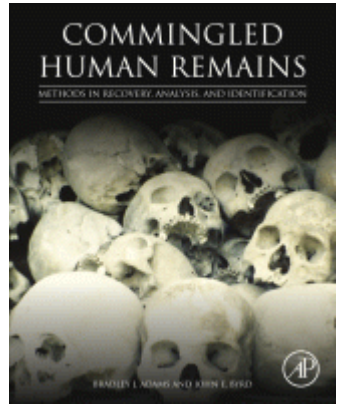
location close to the surface or with heavy bioturbation (disturbance by living organisms: insects, scavengers)

commingling

No significant earth pressure or earth movement

Severe ++++

2. EPISODIC; EPIDEMICS

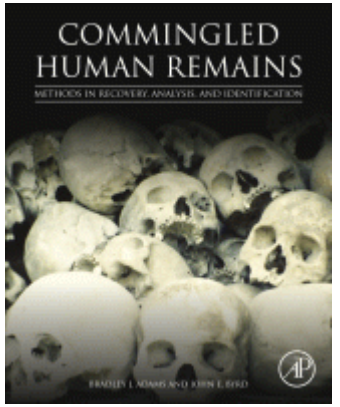


The way elements are represented usually aligns with the demographics of the buried population

Factors in the creation of the assemblage:

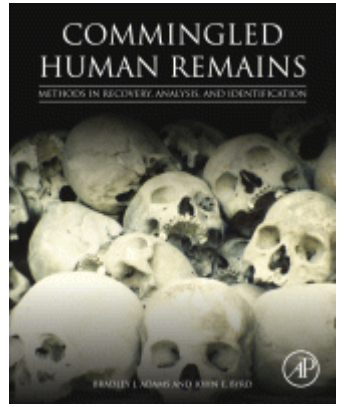
1. Demography : **epidemics** are expected to affect the very young & very old more than young adults
2. Fears of contamination : epidemic burials may only be given rudimentary burial rites:

- placed in a communal grave without coffins
- without any other signs of social rank (grave goods)
- hurried and make use of existing pits or unused structures (mine shafts)



2. EPISODIC; EPIDEMICS

- 1,500 Human Remains
- 19th -Century
- Osaka Burial Site
- Victims of Historic Epidemic

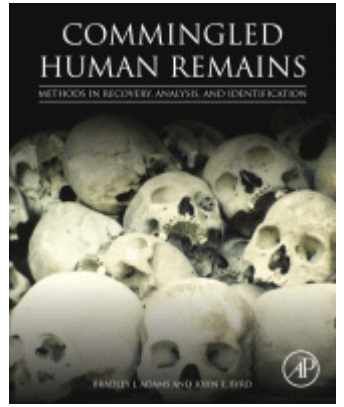


2. EPISODIC; EPIDEMICS

- Hamin Mangha settlement site in northeast China
- 97 individuals in a small dwelling
- Bodies placed in the dwelling before it burned
- Cause of death: epidemic or disaster

The skeletons in the northwest are relatively complete, while those in the east often [have] only skulls, with limb bones scarcely remaining,"….. "But in the south, limb bones were discovered in a mess, forming two or three layers."

(Zhou et al. 2022. Courtesy Chinese Archaeology)

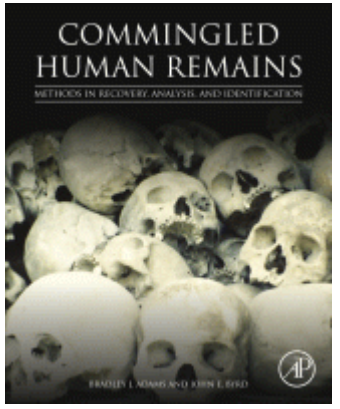


2. EPISODIC; WARFARE

- Increased levels of commingling due to intentional postmortem mutilation or processing of the remains

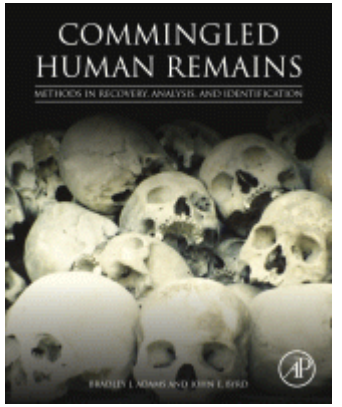
- Demography of such assemblages will also vary depending on combatants;
- more adult and adolescent males than females

Battle of Little Bighorn/Greasy Grass (19th century, America)



Battle of Towton
(15th century, Yorkshire)

2. EPISODIC; ETHNIC CLEANSING & GENOCIDE



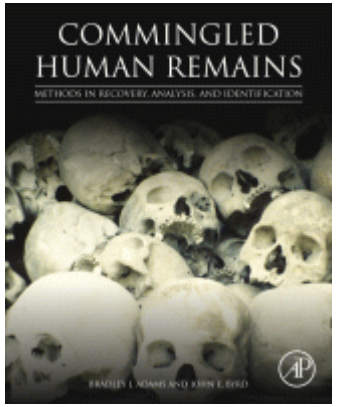
- *The Convention defines genocide as any of five "acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group." These five acts were: killing members of the group, causing them serious bodily or mental harm, imposing living conditions intended to destroy the group, preventing births, and forcibly transferring children out of the group (1948)*

- Demography = key to an identification → expected to contain all individuals /or a specific selection regarding age or sex

- Skeletons may contain

1. perimortem injuries
2. postmortem processing

2. EPISODIC; ETHNIC CLEANSING & GENOCIDE



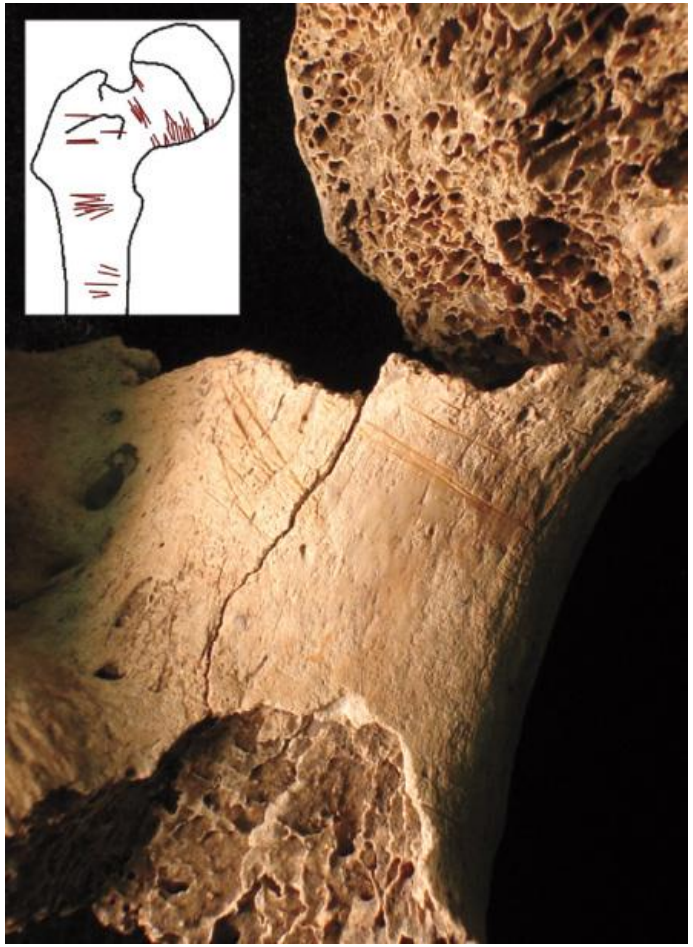
- case studies

1. Man Corn: Turner & Turner's (1999)
2. The Sacred Ridge assemblage (Osterholtz 2013)

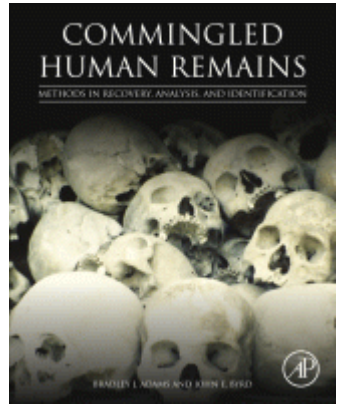
- signs of defleshing & dismemberment
- ++ extensive commingling of individuals

- Interpreted as indicative of :

1. cannibalism (e.g., White 1992)
2. witchcraft executions (e.g., Darling 1998)
3. terrorism (e.g., Turner & Turner 1999)

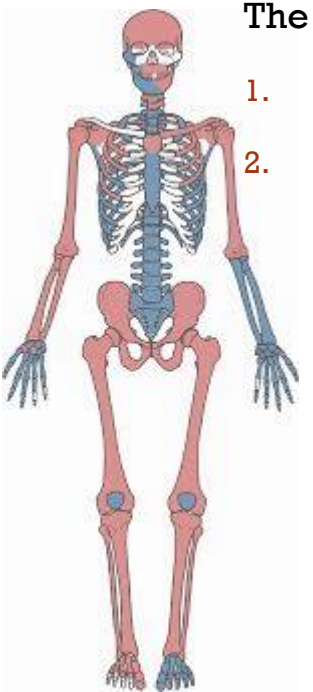


TOOL MARKS Bone fragments recovered from Sacred Ridge (including this hip bone) show signs of tool marks, suggesting bodies were mutilated.



3. UNINTENTIONAL COMMINGLING

- *occurs in the laboratory or field during analysis or curation*
  - loss of excavation information & context
  - limited bioanthropological analysis



The use of excavation photos & notebooks can be useful in:

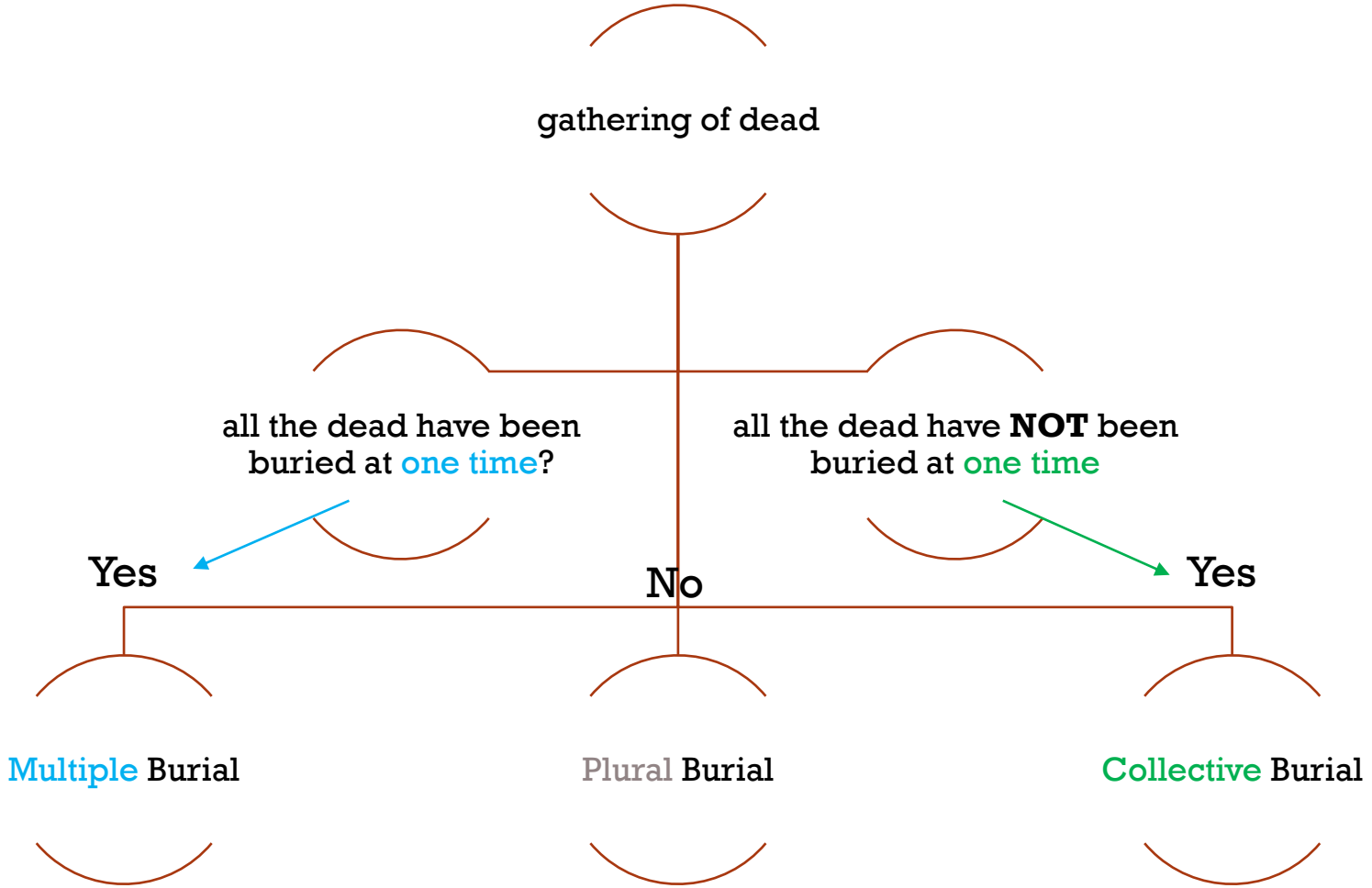
1. determining the degree of lab commingling
2. untangling of lab commingled deposits

LONG-TERM

- Familial tombs
- Tumulus
- Ossuary

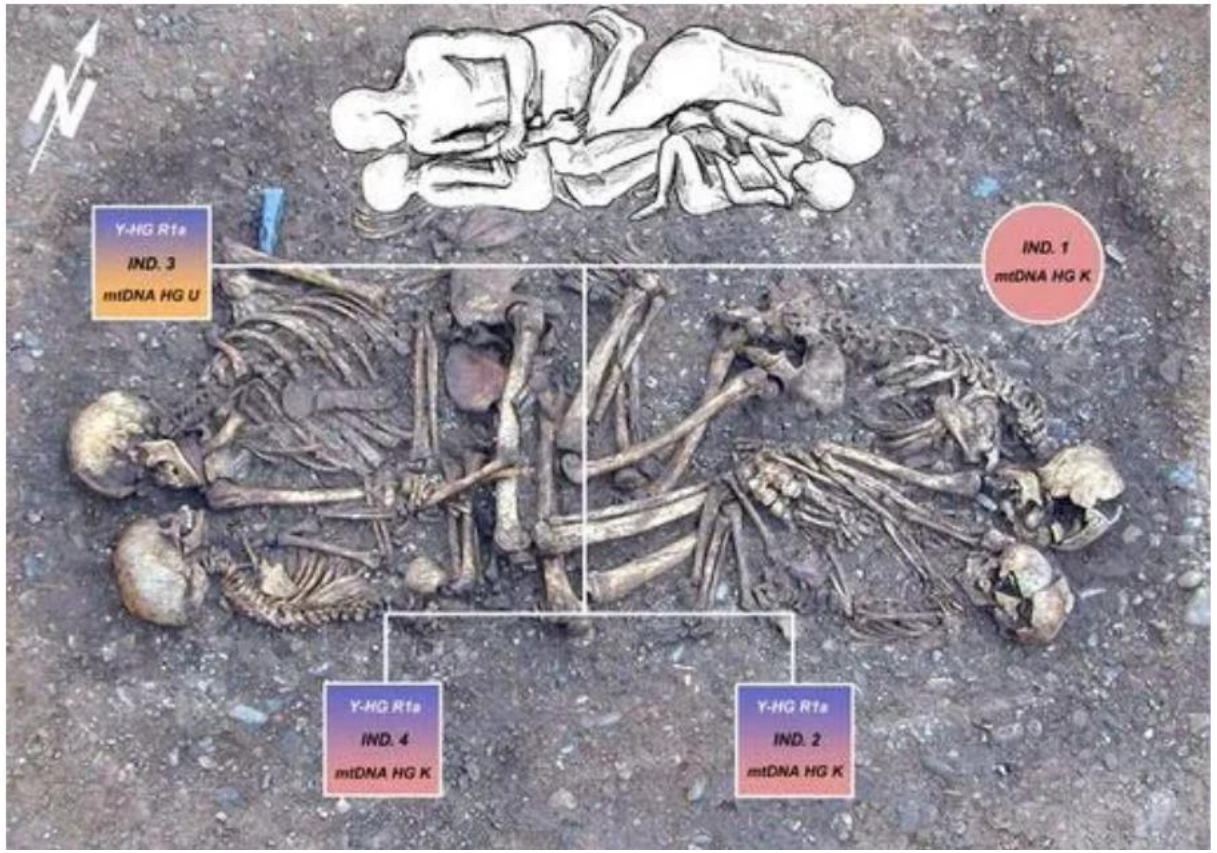
EPISODIC

- Epidemic
- Warfare
- Ethnic cleansing & genocide



Adapted from Bolestin & Courtaud in Knusel & Schotsmans 2022

GRAVE REVEALS VIOLENT DEATH OF ANCIENT FAMILY



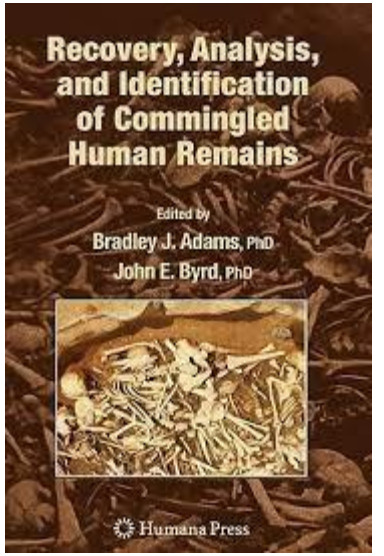
(Image credit: courtesy of the National Academy of Sciences, PNAS (2008).)

- Germany , dated to 4,600 years ago
- Wounds on all skeletons
- Genetic analysis: The mother (right side of image) is facing her son, while the father (left) is facing the other son
- Isotopes analysis : the females spent their childhoods in different regions from the males and children in the grave, → the females "married out," moving to the location of the males for marriage

OSSUARY

METHODOLOGIES

varies based on the research questions



- Due to the nature of the assemblages:

I. baseline data must first be determined

MNI
demography (age & sex)

difficult to determine → but useful in the overall interpretation of the assemblage

❖ MNI & Demography are complicated processes, particularly in assemblages with significant fragmentation

But remember!

Identification of the Demography & Bioanthropology → identification of epidemic mass graves

Approximately1/3 of the population of Europe is believed to have died during the event of the Black Death.

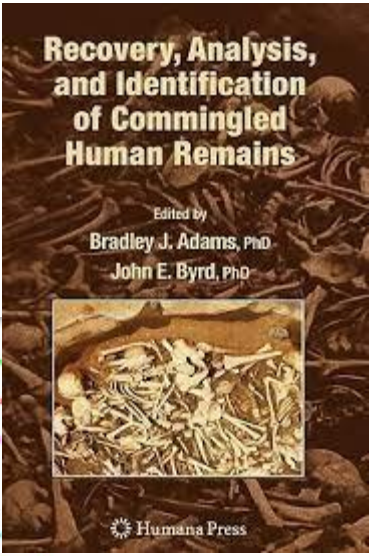
METHODOLOGIES

varies based on the research questions

I. baseline data must first be determined

II. then this can be used for secondary analyses:

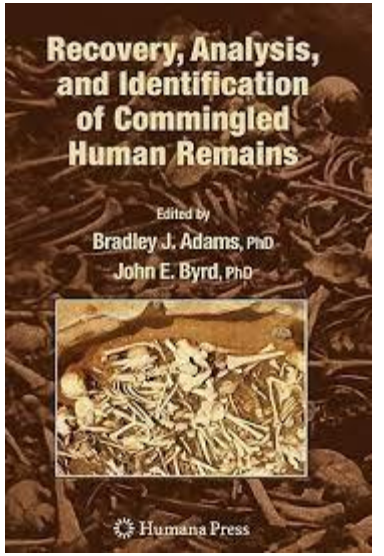
1. Non-human material
2. Spatial analysis
3. Visual pair matching
4. Osteometric sorting
5. DNA
6. Elemental composition



METHODOLOGIES:
1. NON-HUMAN MATERIAL

Any non-human material should be removed

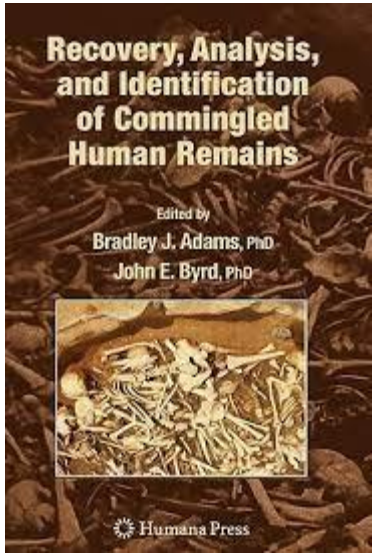
- animal bone
- organic materials
- personal effects

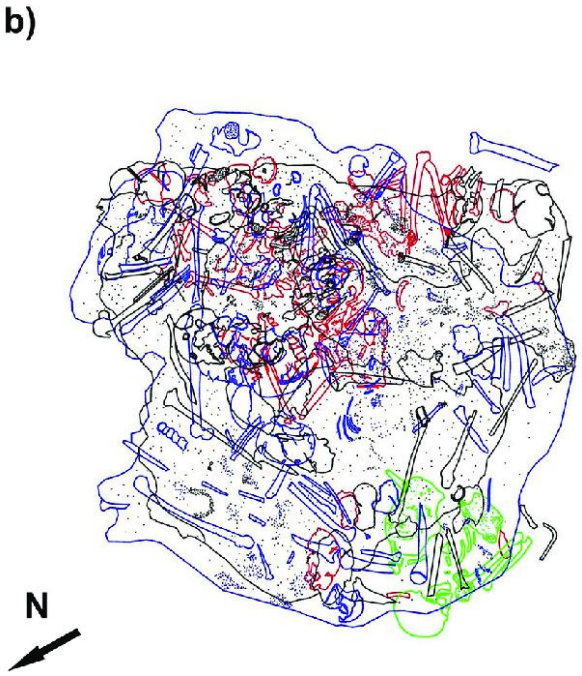


METHODOLOGIES:
2. SPATIAL ANALYSIS

Relies on the assumption that **parts of a body will remain close to each other**

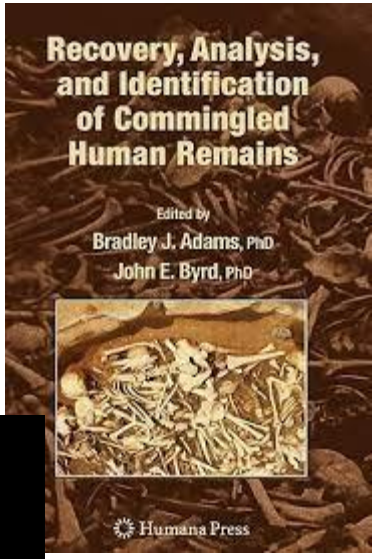
= minimum distances between matching body parts can suggest a relationship.





The Potočani mass burial. (A) The upper layers of the pit showing numerous commingled skeletons. (B) Schematics of the middle layer of the pit with different colors marking individual skeletons. https://doi.org/10.1371/journal.pone.0247332.g002

METHODOLOGIES:
3. VISUAL PAIR MATCHING



Based on the notion that l**bones from a given individual will show size, shape and colour similarities** (long bones, most used this approach)

But remember!

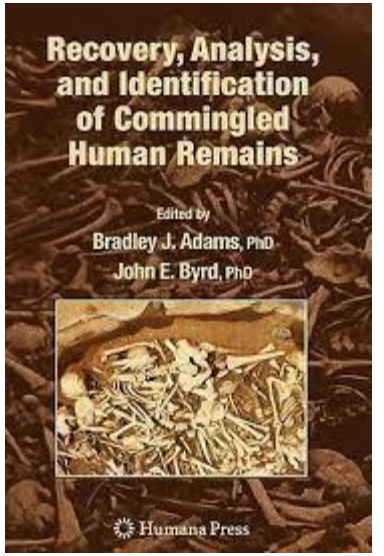
1. asymmetric bones at some individuals (e.g. one leg shorter than the other)

2. the soil staining may differ across a single skeleton.

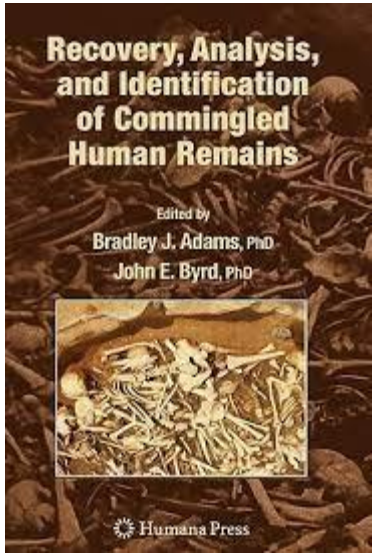
METHODOLOGIES:
4. OSTEOMETRIC SORTING

Based on that

1. The human skeleton is largely symmetrical → bones from the left and right side of the body will be approximately the same size
2. That articulating bones will be of comparable size in order to 'fit' together.

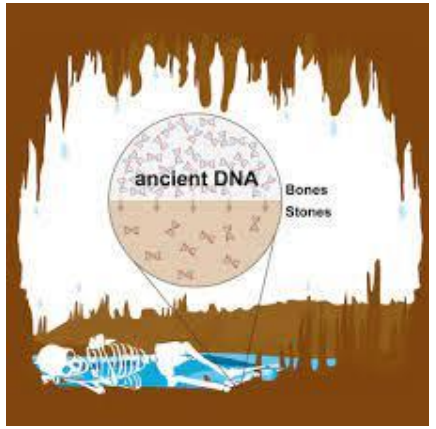


METHODOLOGIES:
5. DNA

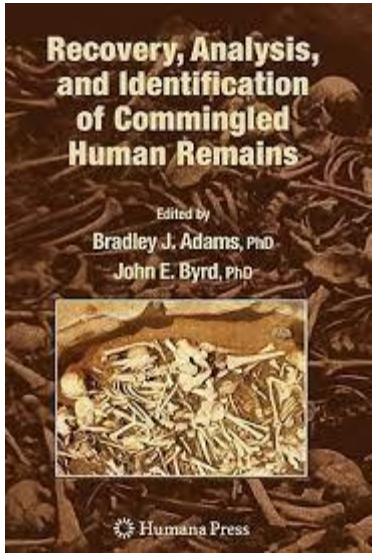


Challenging to use due to

1. Cross-contamination
2. Expensive
3. Destructive



METHODOLOGIES:
6. ELEMENTAL COMPOSITION



analysis of the distinctive chemical element compositions in bones in order to separate the bones of individuals forensic practitioners have been interested in the potential of portable x-ray florescence :

- + a non-destructive method
- X-ray florescence in a method that fires radiation into a sample and captures the energy released by the electrons from the atoms when excited
- The energy released correlates with elemental composition
- Usually a lab-based method, but the portable variety allows application in the field

Powdered bone and soil samples to test for chemical element composition using XRF.

TAKE-HOME MESSAGE

- If only one dead person has been deposited in this volume, one uses ‘individual deposit’.
- If at least two people have been deposited in this volume over a same phase of use, one uses ‘gathering’ .
- A gathering is termed ‘multiple’ whenever it is possible to demonstrate that all the individuals have been gathered at the same time.
- A gathering is termed ‘collective’ whenever it is possible to demonstrate that all the individuals have not been gathered at one time.
- A gathering is termed ‘plural’ whenever it is not possible to demonstrate its multiple or collective nature, in other words if it gathers at least two people without further precision.
- In more complex commingled contexts, it would be common to use a range of methods to re-associate body parts.

READING

1. Moutafi & Voutsaki 2016. Commingled burials and shifting notions of the self at the onset of the Mycenaean era (1700–1500BCE): The case of the Ayios Vasilios North Cemetery, Laconia. Journal of Archaeological Science: Reports. 10. 10.1016/j.jasrep.2016.05.037.
2. Varas & Leiva 2012. Managing commingled remains from mass graves: considerations, implications and recommendations from a human rights case in Chile. Forensic Sci Int. 10;219(1-3):e19-24. doi: 10.1016/j.forsciint.2011.11.035. Epub 2011 Dec 20. PMID: 22192578.
3. Bourgeois et al. 2021. A four-stage approach to re-associating fragmented and commingled human remains. Journal of Archaeological Science: Reports, Volume 37