

2.25-27

## Bioarchaeology (Continued from before midterm)

### Individual Life History

- “Occupational Markers” – you can reconstruct what an individual’s habitual activities were
- Individual life histories from the skeleton
  - Repetitive actions leave a signature on the bones
  - The more you use a muscle, the stronger the attachments to the bone
  - Ex. Squatting “facets” (flattening at knee and ankle bones from being in the squatting position for a long time)
  - Ex. Auditory Exostosis (Swimmer’s Ear; bony growth in the inner ear caused by frequent exposure to water)
  - Ex. Bone biomechanics (bone tissue placed where skeleton needs it; more demand on bone leads to a more robust bone)

### Case Study: The Pounder from Ubaid

- Adult female skeleton
- Ubaid, Iraq 2700 BC
- Unusually broad sternum and clavicle and massive pectoralis major
  - These result from activities that require stabilization of shoulder when arms and body are close together
- Strongly developed adductor muscle (thigh muscle) attachments
- Very robust jaw muscles from clenching of teeth
  - Associated with using chest muscles to exert downward force
- Believed that she was a grain grinder, as there are people today who do this same activity and have the same results in skeletal structure
- Was she standing or kneeling? The skeleton’s first metatarsal (big toe) has an extended joint, which shows she was kneeling

### Case Study: La Florida

- Mission Indians: ate more corn and less fish, had a very simplified diet
  - Corn lacks niacin, 3 amino acids
  - Phytate in corn binds with iron and pulls iron out, making people not have enough iron in their diet (this leads to anemia)
- Mission skeletons had:
  - Porotic hyperstosis (from poor diets and parasites)
  - Tooth decay
  - Enamel hypoplasias
  - More retzius lines
  - More tibial periostosis
  - Overall: Much more biological stress when the indians came under Spanish rule

- However, they also had stronger bones because of new mechanical demands being placed on the skeleton
  - Such as agricultur

Biodistance – the biological (genetic) distance between populations or individuals

- Old way – look at the shape of the skull (craniometric)
  - A lot of what determines skull shape is inherited from parents
  - Measure cranial landmarks are proxies for genetic distance
- Now, we look at DNA
  - mtDNA (mitochondrial DNA) inherited from mother, has a constant rate of mutation
  - Can compare mtDNA to establish time of divergence of populations
  - Did humans evolve from Neanderthals? Humans only evolved 200,000 years ago, while Neanderthals were much earlier. The humans would have to account for the 600,000 years difference (AKA Neanderthals may have a common ancestor, but Neanderthals are not one of our ancestors)

Population Placement

- How did agriculture spread to prehistoric Europe?
- Were Mesolithic hunter-gatherers swamped by colonizing Neolithic farmers from the Middle East

Molecular paleopathology

- Detecting fragments of infected DNA and RNA
- Identifies:
  - Leprosy
  - TB
  - Plague
  - Malaria
  - Syphillus
- Difficulties: very low concentrations, does does not preserve well, depends on soil conditions; Diagenesis; Danger of contamination

Case Study: Eleonora of Toledo (1522-1562)

- Spanish noble woman
- Married Cosimo de Medici
- Suffered from stomach problems, appetite lost, and persistent cough
- She and her two sons died in rapid succession during fevers spending time in Tuscany
- Legend: She died of grief when her son was killed by her husband
- But in 1652 she had an autopsy, which showed she had died from long disease
- What do the bones say?
  - Comparing the bones of two noble houses: Medici (Florence) and Aragonese (Naples)

- o Medici's ate more meat
- However, Eleanor was considered "Immoderate" in diet but this was more of a slander

### Molecular Analysis

- DNA results show if there's:
    - o Malaria,
    - o Antibodies,
    - o Leishmaniasis (black fever)
    - o Protozoa in saliva of saline fly
    - o 60,000 deaths per year
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### Paleodemography

- 3 periods:
  - o Hunting/gathering (lived 200,000 – 10,000 years ago)
  - o Agriculture and village life (10,000 years ago)
  - o Development of cities (urbanism), around 5,000 years ago
- Hunter-gatherers (h/g)
  - o Old views: h/g's are very healthy, but low in disease loads
  - o More recent view: Food contained TB, botulism, viruses (from wild animals) parasites (worms, flukes, nematodes)
  - o H/g infant mortality
    - Why use infant mortality to assess health of a population?
    - An infant is a segment of population at most risk, particularly at the age of weaning (1.5 – 4 years); this is dangerous because if anything infants use their mother's immune system when breast feeding
  - o Infant mortality (0-3 years)
    - 11-20 percent, as high as 33%
    - Life expectancy at 15 years is around 35-40 years (if you make it to 15, you're likely to live another 35-40; but many do not make it to 15)
    - However, h/g are *healthier* than early agricultural populations

### Amelagos Article

- 1.
2. "Damaged goods" hypothesis
  - a. Individuals stressed early in life have decreased life expectancy
  - b. 1 enamel hypoplasia reduces life expectancy by 4 yrs, and 2 hypoplasia is a reduction by 10 yrs
  - c. Permanent damage to immune system?

### Neanderthal Death

- The first deathways
- Non-human deathways