Activity Patterns in Three Mid-1800's Illinois Populations:

An Analysis of Biomechanical Stress on the Skeleton

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Labor-Activity Studies

Examination of skeletal remains for pathological patterns related to lifestyle or occupation [1, 2]

Repetitious or strenuous activities often manifest on the skeleton [1, 2]

- Relevance [1, 2]
 - Bioarchaeology
 - Forensic anthropology
- Limitations [1]
 - Sample sizes and fragmentary remains
 - Unknown variables

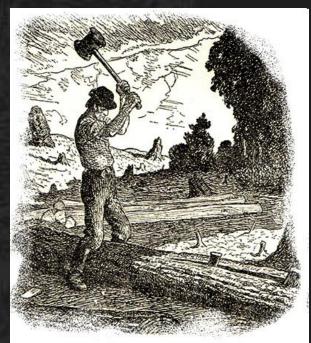


Image 1

Activity-Related Pathologies

- Arthritis [2, 3, 4]
 - Lipping
 - Porosity
 - Osteophytes



- Enthesopathies [1, 2, 5]
 - Irregular Margins
 - Porosity
 - Enthesophytes





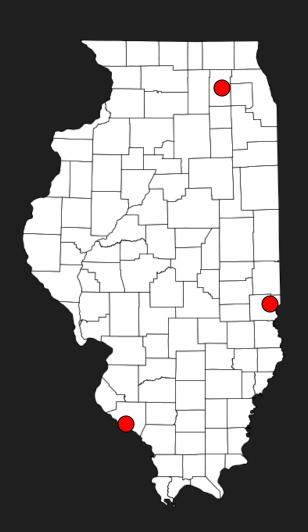
• Bilateral Asymmetry [6]

Populations

- Channing School, Elgin
 - 2 individuals

- Old Darwin Cemetery
 - 3 individuals

- Kaskaskia Island Cemetery
 - 7 individuals



Methods: Skeletal Analysis

• Sample selection [1]

• Data collection of pathologies according to standard methods, and consultation with a professional in the field [1, 2, 3]

• Analysis of skeletal data in Excel

Methods: Historical Records

• U.S. Federal Census Records [7, 8, 9]

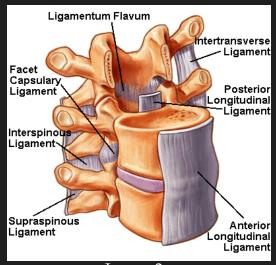
• Historical references [10, 11]

• Analysis of census data in Excel

Most common pathologies

Enthesopathy of the Ligamentum Flavum

- -ligament that runs along inside of vertebrae
- -aids in resuming upright posture after flexion







Schmorl's Nodes

-compression of vertebral body due to stress on the spine



Pectoralis Major Enthesopathy

-Movement of the shoulder: raising arm, twisting arm

Brachialis Enthesopathy

-Flexation of the elbow, assists the biceps brachii muscle

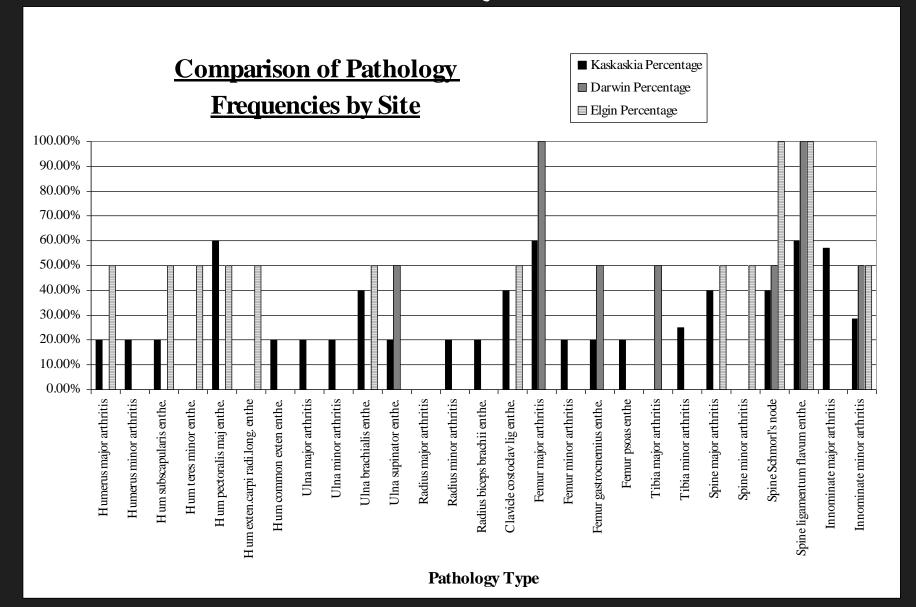
Costoclavicular ligament Enthesopathy

-Limits movement, stabilizes the shoulder joint



Most prevalent pathologies:

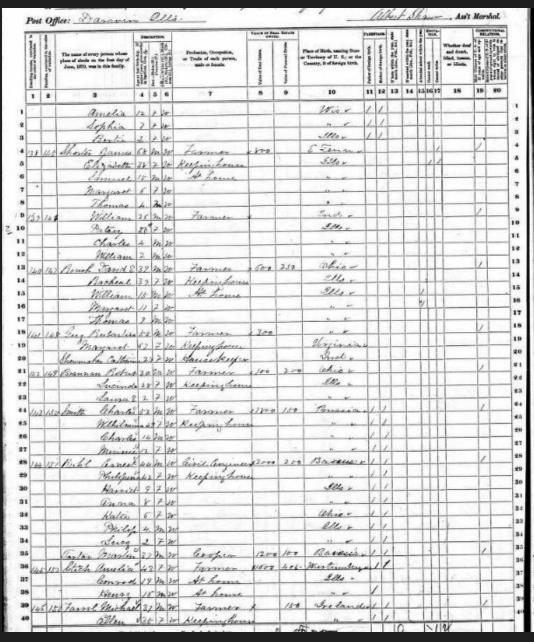
Pathology Type	Percentage
Spinal enthesopathy of the ligamentum flavum	87% (N=8)
Moderate arthritis of the femur joints	62% (N=8)
Spinal Schmorl's nodes	55% (N=9)
Enthesopathy of the pectoralis major muscle	44% (N=9)
Mild to moderate arthritis of the hip joints	40% (N=10)
Enthesopathy of the brachialis muscle	37% (N=8)
Enthesopathy of the costoclavicular ligament	37% (N=8)



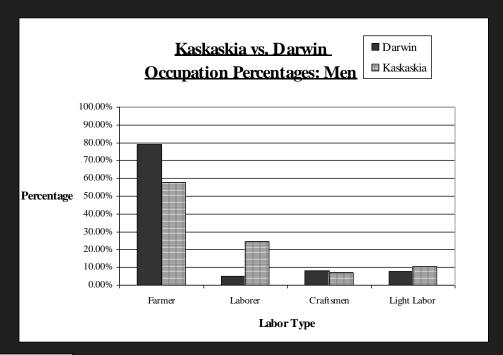
• 100% of comparable elements from all samples showed bilateral asymmetry of pathologies

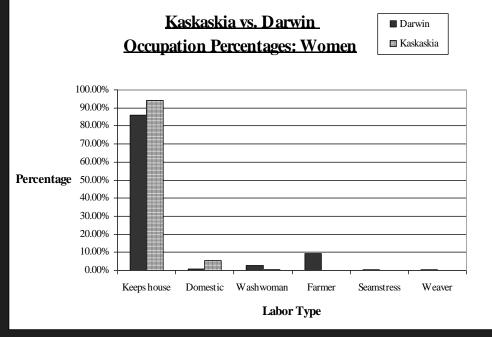
Census Records

- Recorded each occupation listed and number of repetitions
- Lumped into four categories according to innate groupings and labor types:
 - I. Farmers
 - 2. Laborers
 - 3. Craftsmen
 - 4. Light labor
- Women were grouped according to occupations listed when available



Population Comparison





Elgin Records

• Identity of individuals known [12]

- Mary Ann Kimball [10]
 - Strong activity markers
 - Second family to move to Elgin (pioneers)

- Calvin "Deacon" Carr [11]
 - Strong activity markers
 - Moved frequently
 - No set occupation

Conclusion

- Populations were very active
 - All types of pathologies found in all samples
- Asymmetry is further support that pathologies were labor-caused
- Even distribution
 - Probably due to the high prevalence of heavy labor in the populations
- Information about the lifestyle of an average person living in Illinois during the mid-1800's

References

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- [2] Robb, J. 1994. Skeletal Signs of Activity in the Italian Metal Ages: Methodological and Interpretive Notes. Human Evolution 9(3): 215-229
- [3] Mann, R.W. and S.P. Murphy. 1990. Regional Atlas of Bone Disease: A Guide to Pathologic and Normal Variation in the Human Skeleton. Springfield: Charles C. Thomas.
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- [5] Scheuer, L. and Black, S. 2000. Developmental Juvenile Osteology. San Diego: Elsevier Academic Press.
- [6] Özener, B. 2010. Fluctuating and Directional Asymmetry in Young Human Males: Effect of Heavy Working Condition and Socioeconomic Status. American Journal of Physical Anthropology 143: 112-120
- [7] 1850 1870 U.S. Federal Census Records. Darwin, Clark, Illinois. http://www.ancestry.com
- [8] 1850 1870 U.S. Federal Census Records. Elgin, Kane, Illinois. http://www.ancestry.com
- [9] 1850 1870 U.S. Federal Census Records. Kaskaskia, Randolph, Illinois. http://www.ancestry.com
- [10] History of Kane County. 1904. Ed. Wilcox, J. Chicago: Munsell Publishing Company. (Transcribed on http://genealogytrails.com/ill/kane/elgin.html)
- [11] Alft, E.C. 1992-2000. Elgin: Days Gone By. Carpentersville, IL: Crossroads Communications. Online Version: http://www.elginhistory.com/dgb/
- [12] Kullen, D. et al. 1999. Report on the Discovery of Human Skeletal Remains at Channing Memorial School, Elgin, Kane County, Illinois. Allied Archaeology, Aurora Illinois.

Images

Image 1: The Daziel Barn. 2012. Essential Tools of the 19th Century Farmer. http://www.dazielbarn.com/pages/TheFarm/Tools.html

Image 2: Aspiring Surgeons Program. 2005. Lumbar Laminectomy. http://www.emoryasp.com/som/laminectomy/index.html

Image 3: 1870 U.S. Census Record. Darwin, Clark, Illinois. http://search.ancestry.com/Browse/View.aspx?dbid=7163&path=Illinois.Clark.Darwin.1

All other images used in this presentation were taken during data collection by the presenter.

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