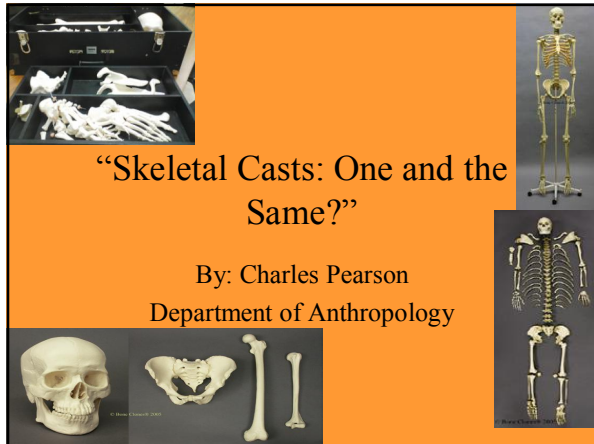




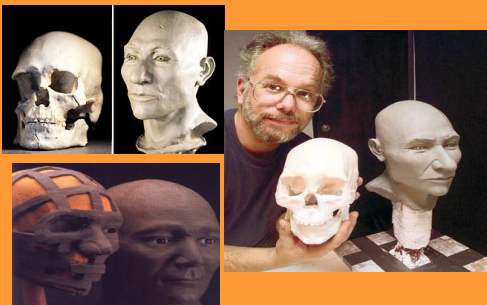
“Skeletal Casts: One and the Same?”

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Why Skeletal Casting?

- Skeletal remains are physical records that can help determine the adaptations/biological features of a species or an individual.
- Casting protects original materials and makes new material available for people or research. Casting and molding are processes that duplicate fossil and also recent skeletal material.

Prime example-Kennewick Man



What is it I want to know?

- Are casts reproduced from a single skeleton metrically similar enough to be considered equivalent reproductions?
- Would two casts that should be identical really be the same? [e.g., similar enough in stature to be considered the same person?]
- Or should it be the standard to make one universal skeletal cast with special cast made for specific reasons?

Is it significant?

- Yes, many items that undergo casting or any replication processes are perishable items.
- If they are not copied we risk losing records of their existence.

Casting processes?

- “The art of molding and casting is what ultimately makes the difference between a good cast and a bad cast....Technique is immeasurably important in molding and casting.” –Michael Black

Why is this casting process important?

- Since the cast are man-made they are supposed to be made to exact scale.
- In the special case that a cast does not meet its metric requirements it is either patched, thrown out, or distributed for non-research purposes.
- With so much emphasis placed on the creation of the cast you would think there would be no later issues?

Wrong!

- Like anything of value preservation does become important... "If it was paid for with your money".
- Deformation/warping, shrinkage, loss of detail? –these are all possibilities dependant on the environment and degree of usage.

The Cast

- The casts at Southern Illinois University at Edwardsville are handcrafted polyurethane resin teaching quality skeletons available through science teaching products suppliers, e.g., Wards Natural Science.

Materials

- (4) boxes with casts–teaching quality
- Osteometric board
- Digital sliding calipers



Methods

- Two sets of two ‘paired’ skeletal casts
 - Each set identified as reproduced from the same original individual
 - Each were identified visually by comparing long bone features and size
 - Performed an inventory/sorted bones from each box
- Compared cast and identified two pairs of metrically similar casts
- Using Bass Human Osteology manual selected standardized measurements

Measurements

- Humerus
- Radius
- Ulna
- Femur
- Tibia
- Fibula
- Sacrum
- Hip innominate
- For long bones maximum length is measured proximal-distal
 - Osteometric board
- Sacrum maximum anterior height & breadth is measured
 - Sliding calipers
- Hip innominate maximum breadth is measured (anterior-superior iliac spine to posterior-superior iliac spine)
 - Osteometric board

Measurements (cont)

MEASUREMENT (left)	BOX 13	BOX 14	DIFFERENCE	BOX 9	BOX 15	DIFFERENCE
Humerus: maximum length	304	305	1	304.5	297.5	7
Radius: maximum length	236	237	1	234	240.5	6.5
Ulna: maximum length	264.5	262	2.5	253	264.5	11.5
Femur: maximum length	445	444	1	444	445	1
Tibia: maximum length	356	356	0	350.5	389	15.5
Fibula: maximum length	352	353	1	349	363.5	14.5
Sacrum: maximum length	132	116	16	127	117	10
Sacrum: maximum width	124	117	7	123.5	117.5	6
Hip innominate	156	152	4	156	151	5
			0			
			0			
Average			3.722222222			7
MEASUREMENT (right)						
Humerus	308	307.5	0.5	308.5	301.5	7
Radius	238	238	0	237	240	3
Ulna	263	264	1	255	264.5	9.5
Femur	437.5	443	5.5	443	443.5	0.5
Tibia	348	348	0	350.5	378.5	2
Fibula	354.5	353.5	1	353.5	371.5	18
Sacrum: length	132	116	16	127	117	10
Sacrum: width	124	117	7	123.5	117.5	6
Hip innominate	152.5	154.5	2	153.5	155	1.5
Average			3.066666667			6.38888889

Measurement Error?

- Lack of well-defined measurement landmarks
- Flexibility of structures
- Experience of researchers in making measurements
- Variation between observers or within observers across measuring sessions
- The precision of the measuring device
- The conditions under which measurements are made

Conclusion

- I do believe that both sets of cast were metrically similar at the time of purchase and during the course of research.
- The average difference in the boxes does not exceed 10mm. Meaning warping and shrinkage is a definite possibility.

Acknowledgements

- <http://www.duke.edu/~mtb3/castingmanual/titlepage.html>
- <http://www.evergreen.edu/library/govdocs/photogallery/washington/indians/kennewickman.jpeg>
- <http://www.indianerweb.de/gegwart/kennewickMan.jpg>
- Yezerinac, Stephen. 1992. Measurement Error and Morphometric Studies: Statistical Power and Observer Experience. Systematic Biology. 41(4): 471-482.