Archy 205. Adam Lab 2

Name: _____ October 6, 2011
Section:

LAB #2: HYPOTHESIS CONSTRUCTION AND TESTING: ÖTZI

Graded out of 50 pts

Lab Activity

The Iceman (also known as "Ötzi") was discovered in September 1991 by hikers in the high Alps on the border between Austria and Italy. The amazing preservation of this 5,300 year old individual has allowed archaeologists to test numerous hypotheses about him and the period in which he lived. During the lab, you and your team members will discuss the Iceman evidence and will generate hypotheses for how and why he died. In addition, you will brainstorm further tests that will allow you to reject or support your hypotheses. Work in discussion groups, but turn in individual answers on Monday in class.

Below is a list of facts and evidence currently associated with Otzi:

Ötzi Vital Statistics

- Male
- About 30 years old
- Found half naked but wearing leggings and boots
- Warm clothes (suitable for alpine hiking) found near him

Archaeological Assemblage (All items are strewn over the landscape within a 10 meter diameter around the iceman)

- Copper axe
- Chipped stone dagger hafted into handle (blade encased in a woven fiber sheath)
- Unfinished bow and bow strings
- Quiver with 12 arrow blanks and 2 complete but broken arrows
    - DNA blood residue analysis shows the blood of 2 people on one arrow. The blood does not match Ötzi's DNA.
- Bone projectile points
- Needle
- Wooden rucksack frame
- 2 birchbark containers
- Chipped stone tools in pouch (hide scraper, awl, etc.)
- Net
- Piece of ibex horn
- Marble pendant
- Birch fungus (medicinal)
- Small ember of charcoal
- No food with him, but grains of wheat attached to his clothing
- Clothing: grass matting (cape, rain protection device); goat hide coat; goat loincloth; bearskin cap; deerskin leggings; shoes (deerskin outer, grass netting inner); calfhide belt and pouch.

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Physical Condition

- Arthritis (neck, lower back, hip)
- Wounds:
  - Gash on hand
  - Puncture wound in back shoulder (stops short of lungs)
  - Craniocerebral trauma and skull fracture at back of head
  - Several broken ribs
- Tattoos on back and right leg (in positions suitable for acupuncture to relieve the arthritis symptoms)

Internal samples

- Stomach was empty (at least 8 hours since last meal)
- Last meal was composed of red deer meat and einkorn wheat, likely eaten in form of bread
- Lungs were full of smoke characteristic of hearths in Neolithic houses
- Pollen from hornbeam tree
  - Only grows in valley 6-8 hours walk to the south
  - Had to be ingested between March and June, when hornbeam trees pollinate
- Eggs of whipworm (a common parasite)

PART 1

Write down three (3) hypotheses about how Ötzi died and what methods you could use to test them.

a) What known information supports this idea
b) What new information could contradict this idea
c) What additional information you would want to obtain to provide further support for the hypothesis

10/10 ✓

Hypothesis 1
Ötzi may have died from being in poor health and not being able to make the trek through the Alps.
a) Ötzi had arthritis in many different areas of his body, making travel over rough terrain and up and down mountains rather difficult. His tattoos imply that he was being treated for these arthritis symptoms, validating that he was in physical pain. Lungs full of smoke couldn't have been good for hiking at a high altitude either. He also could have had low energy from not having a meal recently.
b) If we were to find that the tattoos weren't actually for acupuncture then he could have been a strong individual who maybe wasn't in pain from arthritis at all.
c) If there was some way to test if his lungs were a factor in his death, then that would be helpful.

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Hypothesis 2

Otzi may have died from the parasite that was found in his body.
a) the parasite could have come from the meat he had in his body. It may have been taking over his body if it was laying eggs, and this may have weakened him. His stomach was found empty, so he didn't have much energy to sustain him. Parasites tend to make you physically sick, and being sick combined with the altitude and his arthritis probably didn't help.
b) If the type of parasite was determined, and it didn't have an effect on his health at all then my hypothesis would be wrong.
c) Since the parasite eggs were found, it would be great to figure out what type of parasite it was as well as its impact on human health. Also finding out where the parasite originally came from would be helpful in determining his cause of death.

10/10 Hypothesis 3

Lastly, I think Otzi may have been attacked by other hunters.
a) He had no food with him which may be due to degradation over time or the other hunters could have stolen all of his food. The arrows that were found with him (with other blood on them) could have had the blood of the hunters who attacked him on it. His puncture wounds could have also been from the attack and the way he was found (face-down with his arm flat across his body) implies that he was attacked.
b) If the puncture wounds were found to be post-mortem then that would contradict signs of an attack.
c) Finding out if the puncture wounds were from wear and tear over time or if they were from a specific tool/weapon would be helpful in determining the cause of death.

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Forgot to do it!! Sorry...

PART 2

Now let's see what archaeologists have suggested caused Ötzi's demise. Please find and read one of the peer-reviewed articles listed on the next page either at the library or from an online source. Write a paragraph that identifies the hypothesis used to explain Ötzi's death. Also note what forms of evidence the author uses to test his/her hypothesis. Don't forget to write which article you chose.

If you need help finding one of the articles, either visit your TA or instructor during office hours (or make an appointment) or contact **Anne Davis**, the anthropology librarian.

Anne Davis
Email: adavey@u.washington.edu
Office: Odegaard Undergraduate Library
Phone: (206) 616-1969

Article: _____

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Article List:

Gostner, Paul et al.
2011 New radiological insights into the life and death of the Tyrolean Iceman. *Journal of Archaeological Science* in press, p. 1-7.

Hoogewerff, Jurian and Wolfgang Papesch
2001 The Last Domicile of the Iceman from Hauslabjoch: A Geochemical Approach Using Sr, C and O Isotopes and Trace Element Signatures. *Journal of Archaeological Science* 28: 983-989.

Oeggl, Klaus et al.
2007 The reconstruction of the last itinerary of "Otzi", the Neolithic Iceman, by pollen analyses from sequentially sampled gut extracts. *Quaternary Science Reviews* 26:853-861.

Pabst, M.A. et al.
2009 The tattoos of the Tyrolean Iceman: a light microscopial ultrastructural and element analytical study. Journal of Archaeological Science 36:2335-2341.

Rollo, Franco et al.
2002 Otzi's last meals: DNA analysis of the intestinal content of the Neolithic glacier mummy from the Alps. Proceedings of the National Academy of Sciences 99(20):12594-12599.

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