
 Biodistance Analysis 

Nonmetric cranial traits are often used by bioarchaeologists as a way to understand population interaction in the past, primarily through a statistical technique called biodistance. Using complex multivariate statistics, biodistance can give the bioarchaeologist insight into the data that simple statistics like percentages cannot. One way to view distance data is through a cluster graph or dendrogram. In this lab, you will collect nonmetric data from up to 8 crania by noting whether the trait in question is present or absent. Using the pictures and verbal descriptions of the 15 nonmetric traits selected for this lab on the following page, note the presence or absence of each trait on your data sheet, which can be found on the last page of this handout. Following data collection, you will submit your raw data to me via a webform located here: <http://www.unc.edu/~killgrov/ANTH116/nonmetric.html>. Instructions for submission can be found on the webpage. I will then convert your data into a cluster graph and e-mail it back to you so that you can complete the lab write-up.

The lab report, as always, should be around 4 pages double-spaced and needs to include the cluster graph that I will generate for you. If you quote any sources, please cite them. Write this report as if you are explaining your data, methodology, and conclusions to the head archaeologist for this salvage project. Please address all of the following questions:

1. *Methodology*: How does biodistance work, and why did you choose to do a biodistance study? (You don't have to give me statistics, just explain in your own words how presence/absence data can tell you anything about a population.)
2. *Data*: What data did you collect to generate a cluster graph? What information other than nonmetric traits did you collect for these crania? Why?
3. *Results*: What does the cluster graph generated from your data tell you about the individuals in this cemetery?
4. *Conclusions*: What conclusions can you draw about the function of the cemetery based on the cluster graph and the archaeological context?
5. *Further Research*: Based on your conclusions and the fact that this is a 20<sup>th</sup> century cemetery, what further tests or analytical tools would you encourage the project director to use and why?

**Archaeological Context:**

A team of archaeologists has just finished excavating an unmarked cemetery in Tule Lake, California that was discovered because of encroaching construction. Although construction was halted when human remains were discovered, the bulldozer cuts destroyed most of the depositional context, making it difficult to assess chronology. The main portion of the cemetery, however, appears to date to the mid 20<sup>th</sup> century. The only undisturbed burial was Burial 1, a male found lying on his right side curled into a fetal position, with his legs drawn up to his chest. Because construction jumbled the rest of the human remains, the project director has hired you as an expert in osteology and bioarchaeology to figure out who was buried in this unmarked cemetery.

The project director tells you that a few grave goods were discovered. Four fragmented Japanese porcelain plates were found, which a ceramicist dated to the early 20<sup>th</sup> century. One copper spear was found near Burial 1, which dated to the early 19<sup>th</sup> century. The form of the spear is similar to those found among the historic Paiute Indians from northern Nevada. Other than these artifacts, there is nothing to indicate the ethnicity of the people buried here or whether or not they are related.

In the lab, you quickly assess the MNI of the cemetery at 10 based on the number of skulls (9 disarticulated skulls and 1 skull from the individual in Burial 1). cursory examination of the shape of the crania indicates you likely have several Mongoloid individuals, but the remainder of the skulls are indeterminate. The archaeological project is salvage in nature, which means there is no funding for DNA analysis. In order to see if the individuals cluster into groups, you decide to perform a biological distance study. You assess each skull for the presence or absence of 15 different nonmetric traits and, through multivariate statistics, produce a cluster graph or dendrogram. You then report your findings to the project director and give him suggestions for further analyses that could help determine exactly who these people are.



Burial 1: Flexed male inhumation



Japanese porcelain, c. 1920



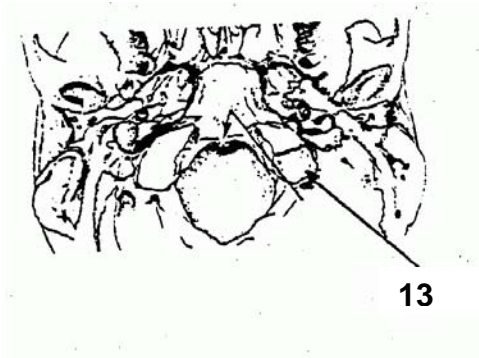
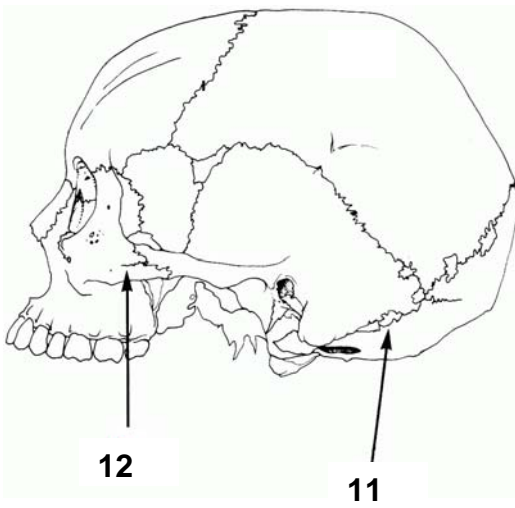
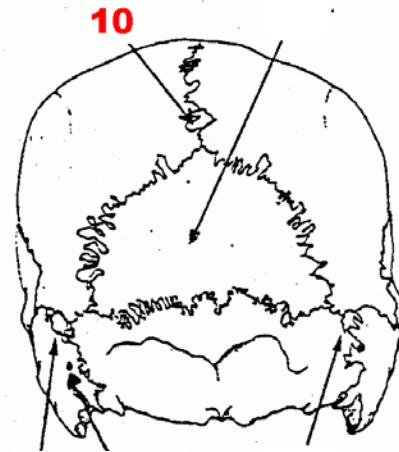
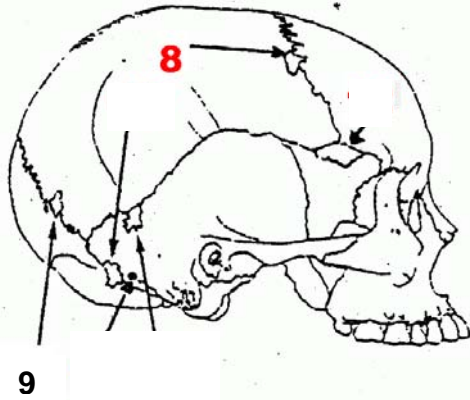
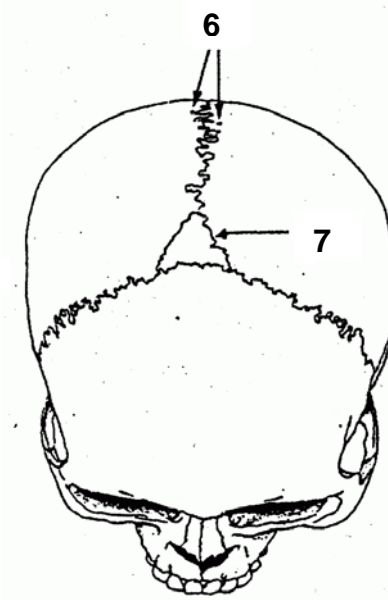
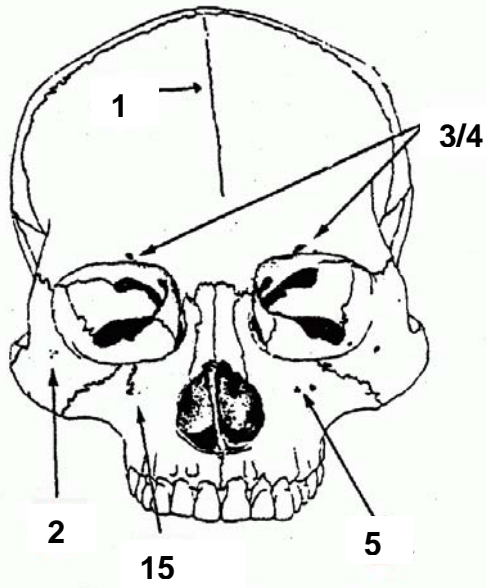
Detail of maker's mark



Burial 1: Copper Spear, c. 1800

### Nonmetric Traits:

- |                                     |   |
|-------------------------------------|---|
| 1. metopic suture present           | In a few individuals, the medio-frontal suture which usually disappears within the first two years of life persists into adulthood. |
| 2. zygomatico-facial foramen double | Two or more foramina occurring on the external surface of the lateral portion of the zygomatic.                                     |
| 3. supraorbital notch present       | Incomplete foramen or notch immediately below the supraorbital ridge on the bony ridge of the upper eye socket.                     |
| 4. supraorbital foramen present     | Complete foramen immediately below the supraorbital ridge on the bony ridge of the upper eye socket.                                |
| 5. multiple infraorbital foramina   | The foramen that allows passage of the infraorbital nerve is sometimes divided by a bar of bone or occurs as two separate foramina. |
| 6. parietal foramen present         | The parietal foramen pierces the parietal bone near the sagittal suture a few centimeters in front of lambda.                       |
| 7. bregmatic bone present           | Presence of an ossicle at bregma, at the intersection of the coronal and sagittal suture.   |
| 8. coronal ossicle(s)               | Presence of an ossicle in the coronal suture.   |
| 9. lambdoidal ossicle(s)            | Presence of an ossicle in the lambdoidal suture.  |
| 10. sagittal ossicle(s)             | Presence of an ossicle in the sagittal suture.  |
| 11. occipito-mastoid ossicle(s)     | Presence of an ossicle along the occipito-mastoid suture.   |
| 12. os japonicum                    | Presence of a horizontal suture that divides the zygomatic into superior and inferior portions.                                     |
| 13. condylar facet double           | Division of the articular surface of the occipital condyle into two distinct facets.  |
| 14. divided hypoglossal canal       | Division of the hypoglossal canal into two parts for passage of the hypoglossal nerve.  |
| 15. infraorbital suture             | Presence of a suture running from the middle of the zygomatic/maxilla down to the infraorbital foramen.                             |



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Burial 1															
Skull 2															
Skull 3															
Skull 4															
Skull 5															
Skull 6															
Skull 7															
Skull 8															

Data Entry Key: 1 = present, 0 = absent