Name:_____

Lab Exercise 9 Microfaunas and Past Environments

Objectives

- To identify different skeletal elements.
- To use a key to identify skulls and mandibles to species.
- To infer the environment the owl lived in based on the species composition in the pellets.
- To analyze microfaunal data from Delaware Canyon, Oklahoma

NOTE: The last part of this exercise dealing with the microfaunal data from Delaware Canyon will probably have to be completed after this lab session, which will be largely consumed by sorting and studying the remains from owl pellets, so do not rush either task.

Materials: Owl pellets
Tweezers
Hand lens

Grading	Sorting of microfauna from owl pellets	20 points
	Questions, as shown	55 points

Owl Pellet Sorting and Microfaunal Analysis

The table below lists the percentages of the prey found in owl pellets from different parts of the US. The Northwest has cool climate; the climate in the Southeast is warm.

	Southeast		**Northwest**	
	Texas	**Mississippi**	**Oregon**	**Washington**
Rats	32	44	1	1
Voles	2	11	58	55
Mice	40	23	20	30
Shrews	15	17	11	5
Moles	1	1	1	1
Gophers	4	0	7	6
Rabbits	3	1	1	1
Birds	3	3	1	1

Working in pairs, sort out the skeletal material from the fur in your owl pellet. Sort the skeletal material into different elements (e.g., femurs, tibias, skulls, etc.). Place them in anatomical order on your tray.

Count the number of each of the elements that you have in your pellet. (***20 points***)

Element	**Count**
Skull	
Mandible	
Scapula	
Humerus	
Ulna	
Radius	
Innominate	
Femur	
Tibia/Fibula	

1. Are most of the epiphyses of the long bones fused? Does that mean the animals eaten were adults or juveniles? (***5 points***)

Keys are important tools for identification in any science. In biology, keys are used to identify different species of animals. Keys identify the important characteristics of an object that allow you to differentiate one object from another. You will use a dichotomous key to help you identify your skulls to species. The illustrations of three key taxa, which are usually well represented in these owl pellets, will be useful for *Microtus* (Voles), *Sigmodon* (Cotton Rat) and Pocket Gopher (*Geomys*/*Thomomys*)

Using the key, determine the species represented by the skulls. List and count the species in the table below.

Taxon	Count

After you have determined what species are in your pellet, add your data to class list on the board.

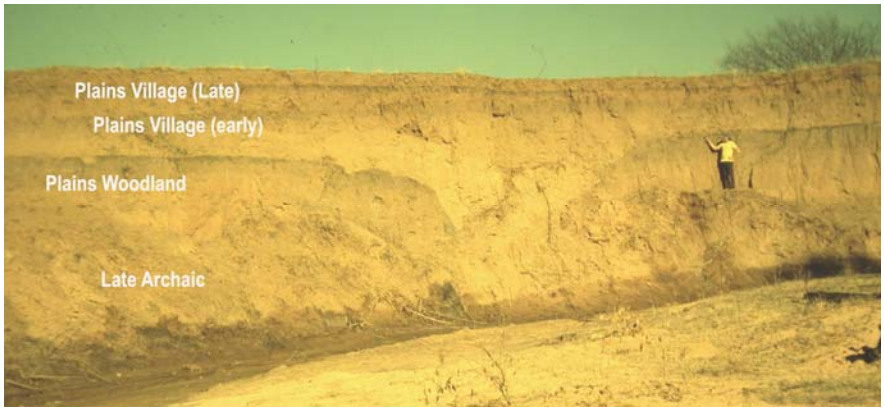
Examine the class totals. List the three most common taxa for the left side and the right side of class.

Left Side	Right Side
1.	1.
2.	2.
3.	3.

2. Which region did the owl pellets for the left side and the right side of the class come from? What kind of climate is represented for each side of the class? How did you figure these things out? (***10 points***)

	Left Side	Right Side
Location		
Climate		

Delaware Canyon Microfaunas



You were introduced to the archaeological record from Delaware Canyon in the last lab. In that exercise you considered the evidence for changing faunal exploitation practices based on the key mammalian and reptilian taxa. Now we will revisit the locality, this time investigating its microfaunal data. We use the term microfauna, since both insectivores and rodents are included in our review. These data are presented in the table below. As you can see the size of the samples varies considerably, in part because of excavation areas but also because of differences in rates of sedimentation. Duration of occupations, which was an issue for the density of larger taxa, would only be an issue here if some of these microfauna had actually been concentrated through acquisition and use as food resources. Otherwise, we assume that the density of microfauna would be much more the result of environmental change and rate of

Delaware Canyon Microfaunas

		Archaic	Plains Woodland		Plains Village	
			Lower	Upper	Lower	Upper
Insectivores						
	Shorttail Shrew		21	5	1	4
	Least Shrew		8			1
	Eastern Mole	**1**	**190**	**31**	**17**	**78**
Rodents						
	Pocket Gopher	**15**	**1231**	**250**	**130**	**112**
	Pocket Mouse	5	49	10		19
	Kangaroo Rat	2	64	1		8
	Harvest Mouse		8		2	5
	White Footed Mouse		91	26	6	36
	N. Grasshopper Mouse		40	12	4	13
	Hispid Cotton Rat		**95**	**23**	**24**	**25**
	Wood Rat	2	46	10	9	8
	Vole	**7**	**448**	**117**	**15**	**43**
NISP SUM		32	2291	485	208	352
TAXA SUM		6	12	10	9	12
Voles%		21.9	20.3	24.1	7.2	12.2
Gopher %		46.9	53.7	51.5	62.5	31.8
Cotton Rat %		0	4.1	4.7	11.5	7.1
Mole %		3.1	8.2	6.4	8.2	22.1

sedimentation (or its correlate, surface stability). This issue will require your thinking after you examine the data.

First look at the overall data, including the summary frequencies for several key taxa already calculated for you below the table. Notice the dominance of Pocket Gophers (*Geomys*) throughout the sequence. Recall the very sandy nature of the sediments and their soil horizons at Delaware Canyon. Pocket Gophers love sand.

The voles are particularly interesting, especially since they are extremely rare today in the region today. Notice the significant drop in their frequencies between the Archaic/Woodland periods and the Plains Village horizons here.

Recall from the earlier discussion of Cotton Rats (*Sigmodon hispidus)* that their populations react quickly and often quite dramatically to changes in precipitation, which is facilitated in part by their phenomenal reproduction rates.

The insectivores here are obviously dominated by the Eastern Mole (*Scalopus aquaticus*), which is of interest as well, because it prefers moist (not wet) sandy soils. But compared to Cotton Rats these moles are very slow reproducers, having only one small (2-5) litter per year; instead of 40 days to puberty for Cotton Rats, these moles require a full year before the females can reproduce.

3. What role do you think habitats played in the overall composition of microfaunas at Delaware Canyon? Why? (***5 points***)

4. Which of the microfaunal assemblages is most different from the others, and what do think is the probable explanation for this? (***10 points***)

Critical Thinking Questions

5. Which patterns in the Delaware microfauna best track environmental change? Why is caution needed in comparing the frequencies of large game to microfauna when the samples come from archaeological sites? (***15 points***)

6. Now, what similarities and differences do you see in the taxa represented by the Delaware Canyon microfaunas, overall, compared to the Northwest and Southeast faunas? Comment on possible explanations. (***10 points***)