GLG 430 Paleontology
Prof. Farmer Name: _____

Lab Exercise: Types of skeletal growth.

Break into small groups. Based on the introduction to skeletal growth given in lecture and in Chapter 2 of your textbook, identify the types of skeletal growth for each of the specimens provided. Make a detailed sketch of what you see! Share your observations with your group. Your grade will be based in part on how carefully you observe each specimen and convey the features you see in your drawings.

1) Examine the labeled specimens. Begin by classifying each, placing them in their correct taxonomic grouping. Be as specific as you can, preferably using both common and phylum level names.

Spec. 1.
Spec. 2.
Spec. 3.
Spec. 4.
Spec. 5.
Spec. 6.
Spec. 7.

2) Examine the skeleton of each of the labeled specimens and determine whether it is an internal (i.e., "endo-") skeleton, or an external (i.e., "exo-") skeleton. Indicate your answers by placing a checkmark in the appropriate column in the table below.

	Type of Skeleton	
	Endoskeleton	Exoskeleton
Phylum/Common Name		
Spec.# 1.		
2.		
3.		
4.		
5.		
6.		
7.		

2) For each of the specimens provided, determine the type of skeletal growth, using the criteria listed in questions (a) – (f):

a) Which of the specimens have skeletons that are of the immutable type (i.e., can't be modified once formed)?

b) Which specimens possess modifiable skeletons (can be changed during growth by skeletal resorption)?

c) Which specimens have skeletons that grew through the addition of new parts?

d) Which specimens grew by adding new skeletal materials along a growth margin (i.e., by accretion)?

e) Which specimens grew by molting?

f) Now summarize by adding a check mark in the appropriate column(s) in the table below:

Phylum	Endo/Exo?	Modifiable/Immutable	Addition/Accretion	Molting
Spec # 1.				
2.				
3.				
4.				
5.				
6.				
7.				

g) What general patterns emerge from the above comparisons? (e.g. Are there certain phyla that possess skeletal growth strategies in common? Is there any evidence that these phyla share a common ancestry?

3) For animals that grow by accretion, identify some of additional types of information you might be able extract from the skeleton?

4) What are some advantages and disadvantages of molting?

5) Describe any preservational biases that exist for organisms that grow by molting.

6) Describe what is meant by isometric growth. Did any of your specimens grow isometrically? How can you tell? (Hint: Do any of the specimens you have looked at show evidence for log-spiral growth?).

7) Describe what is meant by allometric growth? Do any of your specimens show evidence for allometric growth? (Hint: Carefully examine the clam shells, which grew by accretion. Comparing the shapes of growth lines, can you see any evidence for a change in shell shape during the transition from juvenile to adult stages of development?

8) Work in small groups and measure the shell length (L, parallel to the hinge), shell width (W, perpendicular to the hinge) and depth (D, perpendicular to L andW) for each of the brachiopod specimens provided. (Note: These specimens were drawn from a fossil population of a single species). Organize your measurements in table form below and then prepare cross plots of the data for width vs. length and length vs. depth, using the graph paper provided. Once the data are plotted, analyze the plots to determine if growth is isometric, or anisometric. If anisometric, what physiological factor(s) in development are likely to account for the disproportionate increases in size, area and volume (as represented by L, W and D)?