

Name: \_\_\_\_\_

Grade \_\_\_\_\_/100

## GY 112L Lab Assignment 4 Stratigraphy and Paleogeography

**Note:** You get to see rocks again in this lab, so remember the labeling system that was first used in lab 1. Samples will be clearly labeled with painted numbers (in this case white). There may also be a specific RI (Rock Index) number (e.g., RI 3482). If the specimens are in boxes, the labels in the boxes should match the labels on the rocks. If not, it is quite possible that samples have been switched. Try not to mix the rocks up.



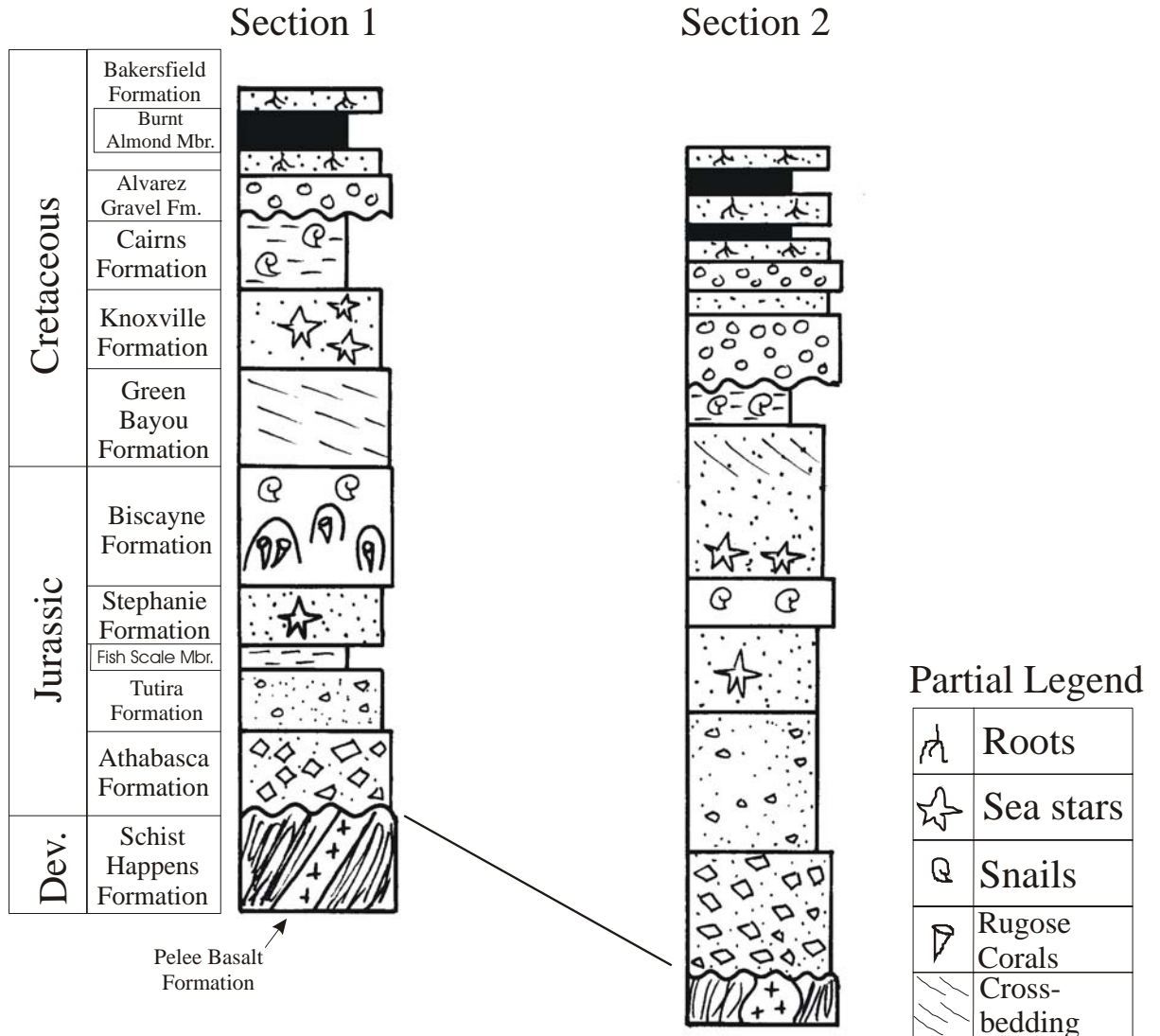
### Part A: Depositional Environments

Complete the table below summarizing depositional environments for each of the named rock layers in the stratigraphic section. The Schist Happens and Pelee Basalt Formations are composed of igneous rocks (“basement”) and can be ignored. They are here simply for completeness. In order to identify the other sedimentary rocks, you have to actually look at them. Samples of the formations are provided for you in one of the storage drawers in room 335. The numbers in the table refer to the numbers you will find on the rock specimens. Name the rocks before you describe their paleoenvironment of deposition. (example paleoenvironments include: shallow marine, deep marine, river channel, floodplain, swamp, beach, alluvial fan, delta, lagoon, shelf etc.). **[44 points]**.

#	Rock Unit	Rock name (2 points each)	Paleoenvironment (2 points each)
4-1	Schist Happens Fm.	Garnet Schist	Basement
4-2	Pelee Basalt Formation	Basalt	Basement
4-3	Athabasca Formation		
4-4	Tutira Formation		
4-5	Fish Scale Member		
4-5a	Stephanie Formation		
4-6a	Lower Biscayne Fm.		
4-6b	Upper Biscayne Fm.		
4-7	Green Bayou Fm.		
4-8	Knoxville Formation		
4-9	Cairns Formation		
4-10	Alvarez Gravel Fm.		
4-11	Bakersfield Formation		
4-12	Burnt Almond Mbr.		

**Part B: Stratigraphic correlations**

The two stratigraphic sections below summarize the geology at two different outcrops in a fictitious mountain range somewhere out west. They are approximately 40 km apart. Notice that the rock layers in Section A have all been named. Correlate the different rock units and any unconformities from Section A to Section B (I've correlated the nonconformity for you as an example to get you started). Expect to find both pinchouts and facies changes. Note: there is more than one acceptable correlation for the Bakerfield Formation. **[10 points]**



2) Refer to the correlations you made in exercise 1. Are there any changes in the thickness of any of the layers from one section to the other? Where are the pinchouts and facies changes? Where in the section do they occur? (refer to the example correlations in Figure 4-2 for help if you need it. **[3 points]**)

---

---

---

---

---

---

---

3) Can you explain the variations you have observed? (This question is tricky, so here is a hint: Which section might be closer to a “paleo-shoreline”? Assume that the reef interval of the Biscayne Formation is an outer shelf deposit) **[4 points]**

---

---

---

---

---

---

---

4) Using your interpreted paleoenvironments of deposition for each of the formations, can you identify any transgressions or regressions in the succession? If so, when did they occur? **[3 points]**

---

---

---

---

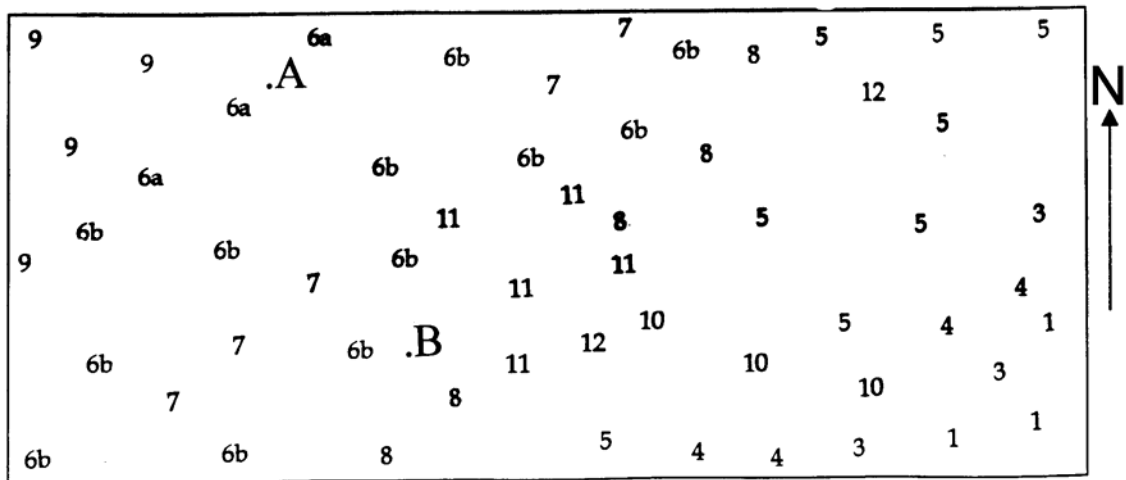
---

---

---

**Part C: A Baby Paleogeography map**

Paleogeographic maps relate the position of major geographic features such as the position of land and sea, courses of rivers, and spatial distribution of mountain ranges, at specific times in the past. It is relatively easy to reconstruct paleogeographic maps. You simply record the depositional environment for a specific formation at each place that the formation crops out over a given area. Facies changes allow you to reconstruct the paleogeography. The diagram on the next page maps out the distribution of rocks during a specific interval of time. The letters A and B show the locations of sections A and B from Part A. The numbers correspond to the rocks you looked at in Part B (We have omitted the 4- prefix to preserve clarity). Using the paleoenvironments you determined in Part B, reconstruct the paleogeography of the area during the featured time period. Use color to distinguish different environments [10 points].



2) Which way was the river flowing (compass direction please)?

\_\_\_\_\_ [2 points]

3) Do you think that there were there any mountains in the area during this time? If so, where do you think they were? (compass direction please)

\_\_\_\_\_ [2 points]

4) What was the paleoclimate of the area during this time? Note: it may not have been consistent across the whole map area. How do you know? [2 points]

\_\_\_\_\_  
\_\_\_\_\_

**Part D: A Big Paleogeography map**

Ready for another paleogeographic map? How about a big one? How about the entire state of Alabama? Using the key and data on the next page reconstruct the paleogeography for Alabama during the late Mississippian period. The map you will produce is a fair representation of Alabama paleogeography about 330 million years ago. You might also learn the locations of some of Alabama's more obscure counties [20 points]

Using the following symbols, plot all the data given on the map showing as much detail as possible. Do not use a symbol to label the mountainous areas on your map (i.e., leave this blank), but color it red with the other terrestrial environments.

blank – Mountainous areas	C - coal beds (swamps)	∴ - shallow marine sandstone
+ - mixed limestone & shale	-- - deep marine shale	# - lithic (deltaic) sandstone
- - - shallow marine limestone	○ - oolitic limestone	● - conglomerate (river)
◆ - Arkose & breccia	□ - reef limestone	* - quartz arenite (beach)

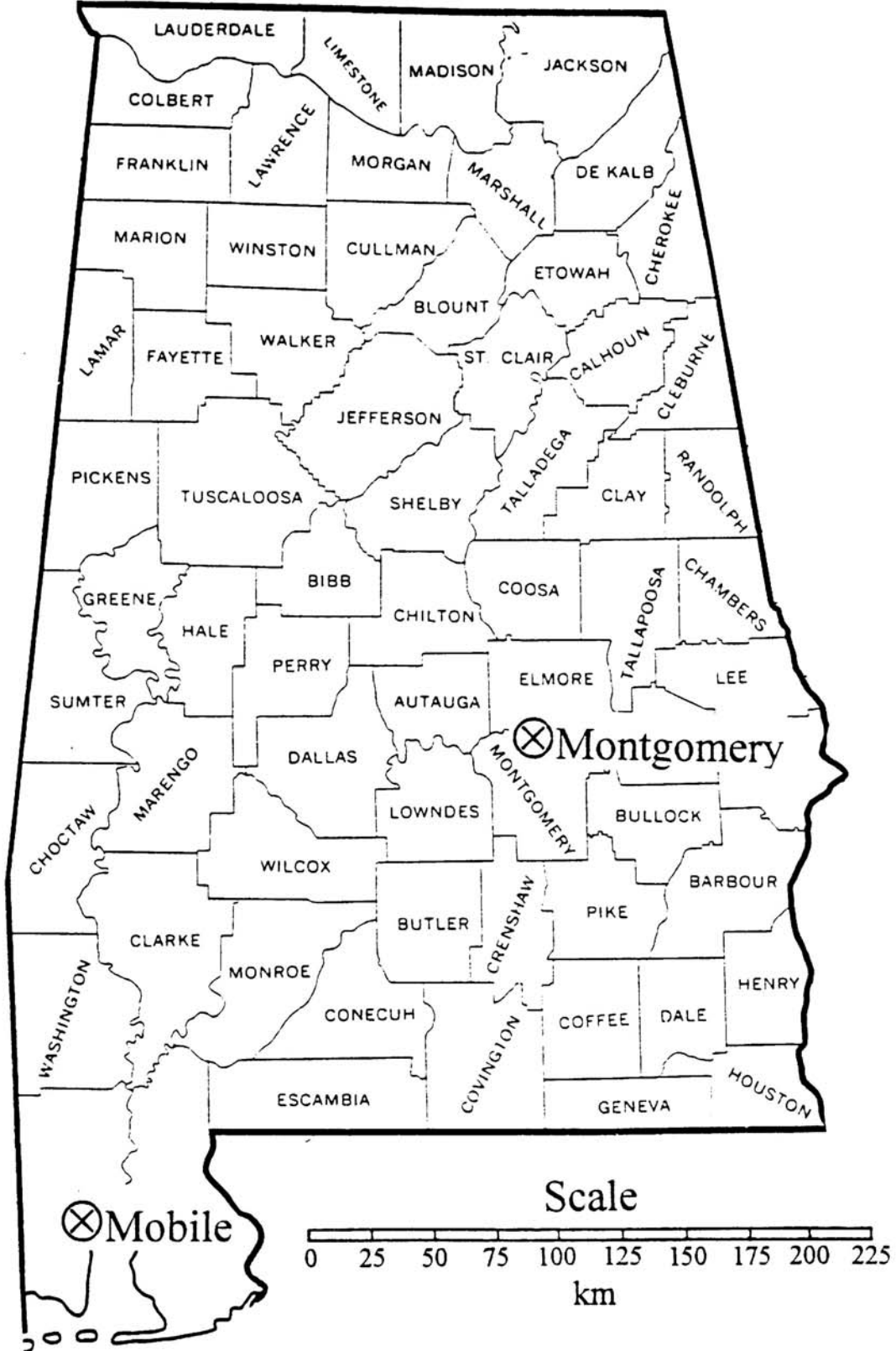
Complete the map by shading the various environments with the following colors:

<b>Red</b> - Terrestrial (land) areas	<b>Green</b> - Swampy areas	<b>Blue</b> - Marine areas
---------------------------------------	-----------------------------	----------------------------

**Data by counties:**

- Autauga: deep marine shale
- Baldwin: mountainous (county name hidden beneath Mobile label)
- Barbour: shallow marine sandstone
- Bibb: deep marine shale
- Blount: mixed limestone and shale
- Bullock: shallow marine sandstone
- Butler: shallow marine sandstone
- Calhoun: mixed limestone and shale
- Chambers: deep marine shale
- Cherokee: mixed limestone and shale
- Chilton: deep marine shale
- Choctaw: shallow marine sandstone
- Clarke: shallow marine sandstone except southeastern area – arkose & breccia
- Clay: deep marine shale
- Cleburne: deep marine shale
- Coffee: north 1/3<sup>rd</sup> – Quartz arenite; south 2/3<sup>rd</sup> - conglomerate
- Colbert: oolitic limestone
- Conecuh: shallow marine sandstone except extreme SW ¼ - arkose and breccia
- Coosa: deep marine shale
- Covington: arkose and breccia
- Crenshaw: shallow marine sandstone
- Cullman: mixed limestone and shale
- Dale: north 1/2 – Quartz arenite; south 1/2 - conglomerate
- Dallas: deep marine shale
- Dekalb: quartz arenite
- Elmore: deep marine shale

Escambia: arkose and breccia  
Etowah: mixed limestone and shale  
Fayette: deep marine shale  
Franklin: mixed limestone and shale  
Geneva: arkose and breccia  
Greene: deep marine shale  
Hale: deep marine shale  
Henry: north 1/3<sup>rd</sup> – Quartz arenite; south 2/3<sup>rd</sup> – conglomerate  
Houston: arkose and breccia  
Jackson: south – lithic sandstone; north; coal  
Jefferson: deep marine shale  
Lamar: deep marine shale  
Lauderdale: shallow marine limestone  
Lawrence: oolitic limestone except for central portion – reef limestone  
Lee: deep marine shale  
Limestone: shallow marine limestone  
Lowndes: deep marine shale  
Macon: deep marine shale (county name hidden beneath Montgomery label)  
Madison: west – shallow marine limestone; east; quartz arenite  
Marengo: north - deep marine shale; south – shallow marine sandstone  
Marion: deep marine shale  
Marshall: quartz arenite  
Mobile: mountainous (county name hidden beneath Mobile label)  
Monroe: shallow marine sandstone except southwest 1/3 –arkose and breccia  
Montgomery: deep marine shale  
Morgan: oolitic limestone  
Perry: deep marine shale  
Pickens: deep marine shale except extreme southwest – shallow marine sandstone  
Pike: shallow marine sandstone  
Randolph: deep marine shale  
Russell: deep marine shale (county name hidden beneath Montgomery label)  
Shelby: deep marine shale  
St. Clair: mixed limestone and shale except for extreme south – deep marine shale  
Sumter: shallow marine sandstone  
Talladega: deep marine shale  
Tallapoosa: deep marine shale  
Tuscaloosa: deep marine shale  
Walker: mixed limestone and shale  
Washington: arkose and breccia except southern 1/3<sup>rd</sup> - mountainous  
Wilcox: shallow marine sandstone  
Winston: mixed limestone and shale



### Bonus: Another Big Paleogeography map

Ready for the biggest paleogeographic map of them all? This one comes to you courtesy of Dr. Wayne Ispording and Ms. Carolyn Davis (two other instructors of GY 112). Using the key below and the data on the next page reconstruct the paleogeography for United States for a fictional time in the past. Careful. The rocks types this time are not necessarily the same as the last map, however, some things are consistent. For example, as before, do not use a symbol to label the mountainous areas on your map, and color it red with the other terrestrial environments. [5 point bonus].

blank – mountainous areas	C - coal beds (swamps)	.: - marine sandstone
■ - evaporites	-- - marine shale	# - desert sand dunes
- -  - limestone	• - conglomerate	◆ - arkose & breccia

Complete the map by shading the various environments with the following colors:

<b>Red</b> - Terrestrial (land) areas	<b>Green</b> - Swampy areas	<b>Blue</b> - Marine areas
---------------------------------------	-----------------------------	----------------------------

#### Data by States:

Alabama:	southern 2/3s -marine sandstones, northwest 1/3 -marine shale
Arizona:	western 1/3 -conglomerate, central 1/3 -coal, eastern 1/3 -marine sandstone
Arkansas:	marine limestone
California:	mountainous
Colorado:	western half marine shale, eastern half marine limestone
Connecticut:	mountainous
Delaware:	mountainous
Florida:	mountainous
Georgia:	northern 1/2 shale, remainder mountainous
Idaho:	western half conglomerate, eastern half marine sandstone
Illinois:	southern 2/3s -marine limestone, northern 1/3 - marine shale
Indiana:	marine limestone
Iowa:	marine shale
Kansas:	marine limestone
Kentucky:	eastern 1/3 marine sand, rest shale except for limestone in western corner
Louisiana:	southern half marine sandstone, northern half marine shale
Maine:	mountainous
Maryland:	mountainous
Massachusetts:	mountainous
Michigan:	evaporites; except for upper peninsula - arkose and breccia
Minnesota:	northern 1/3 desert dunes, middle 1/3 arkose & breccia, southern 1/3 marine sand
Mississippi:	southern half marine sandstone, remainder marine shale
Missouri:	marine limestone
Montana:	conglomerate innorthern half , remainder marine sandstone
Nebraska:	northern half marine shale, remainder limestone
Nevada:	conglomerate in eastern half, remainder -mountainous
N. Hampshire:	mountainous
New Jersey:	mountainous
New Mexico:	western half marine shales, eastern half limestone
New York:	arkose and breccia in western half, remainder - mountainous

No. Carolina: western half marine sandstones, eastern half -mountainous  
No. Dakota: northern half desert sands, southern half arkose and breccia  
Ohio: western half marine shales, eastern half marine sandstone  
Oklahoma: limestone  
Oregon: mountainous  
Rhode Island: mountainous  
So. Carolina: western tip marine sandstones; remainder -mountainous  
So. Dakota: northern half marine sandstone, southern half marine shale  
Pennsylvania: marine sandstone in western third, remainder -mountainous  
Tennessee: eastern 2/3s -marine shale, western 1/3 -limestone  
Texas: limestone  
Utah: southwest corner coal beds, remainder -marine sandstones  
Vermont: mountainous  
Virginia: western third marine sandstones, remainder -mountainous  
Washington: mountainous  
West Virginia: marine sandstone  
Wisconsin: arkose and breccia except for marine shale in southern third  
Wyoming: western third marine sandstones, remainder -marine shales



Notes

Name: \_\_\_\_\_

