

# GY 112L Earth History

## Lab 4

### Stratigraphy and Paleogeography

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Fifth Edition: August 2009©

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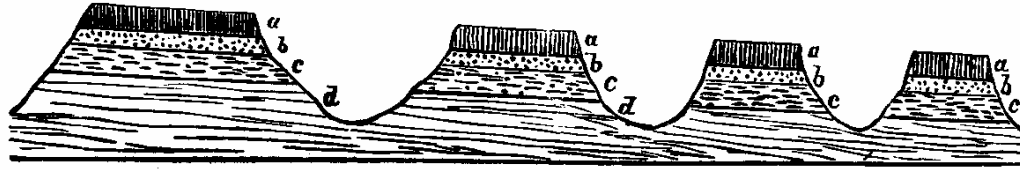
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This manual is constantly being updated and occasionally, even improved. Typos, grammatical errors and sections that make no sense whatsoever may, or may not, be intentional. If you find an error, show it to your instructor. You may get bonus points. More likely you will be told to go away

The recipes that are included in some sections are intended to prove that you can eat anything as long as you serve it with plenty of ketchup. Neither Haywick, nor the Connors are responsible for any food poisoning that might occur if you actually try them.

<http://www.southalabama.edu/geology/haywick>



# Lab Four

## Introduction to Stratigraphy and Paleogeography

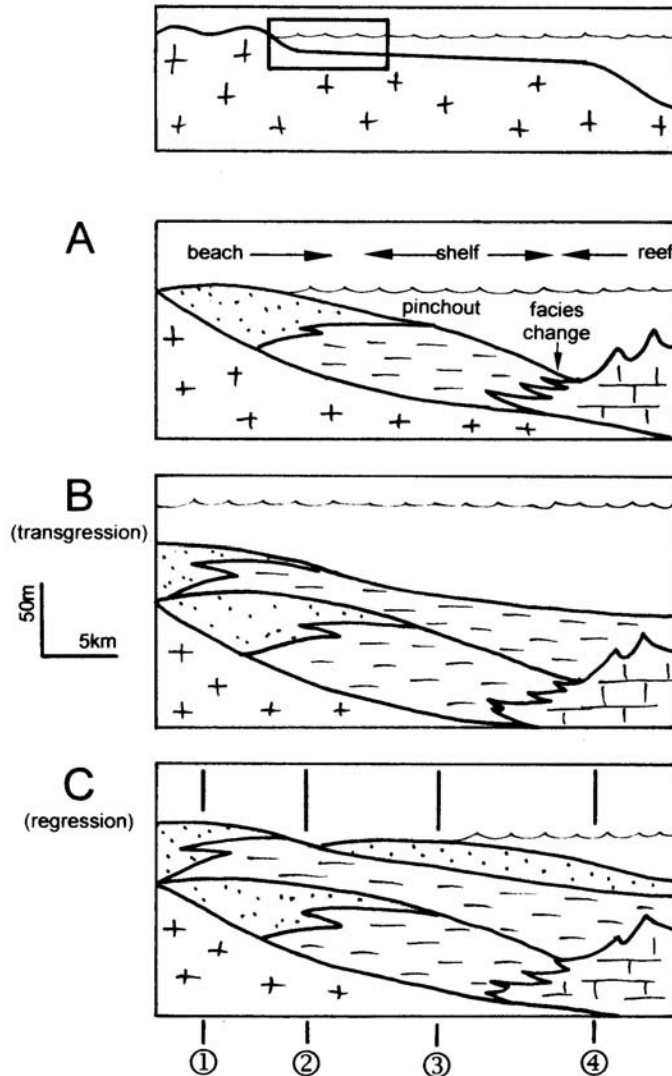
**Background:** As you have been told numerous times, stratigraphy is an important division of geology. In order to interpret earth history, you must be able to interpret stratigraphy and in order to interpret stratigraphy, you have to be able to name rock units. There is a proper stratigraphy nomenclature that all geologists must follow to do this. The basic division is a **formation**. Formations are defined as *mappable, lithologically distinct rock bodies having recognizable upper and lower contacts with other rock bodies*. Less distinct or spatially localized rock bodies may be designated as **members**. Occasionally formations will be grouped together on the basis of similar lithological content. These so called **groups** are the largest division in the stratigraphic nomenclature that you will need to know in this class.

**Stratigraphic correlations** allow geologists to visually portray lateral variations of formations, members and groups, and to determine relationships between these

*Table 4-1: Example of stratigraphic nomenclature*

Age (Period)	Group	Formation	Member
Jurassic	Hastings Group	Green Bayou Formation	
		Biscayne Formation	
	Napier Group	Tutira Formation	Fish Scale Member
		Athabasca Formation	

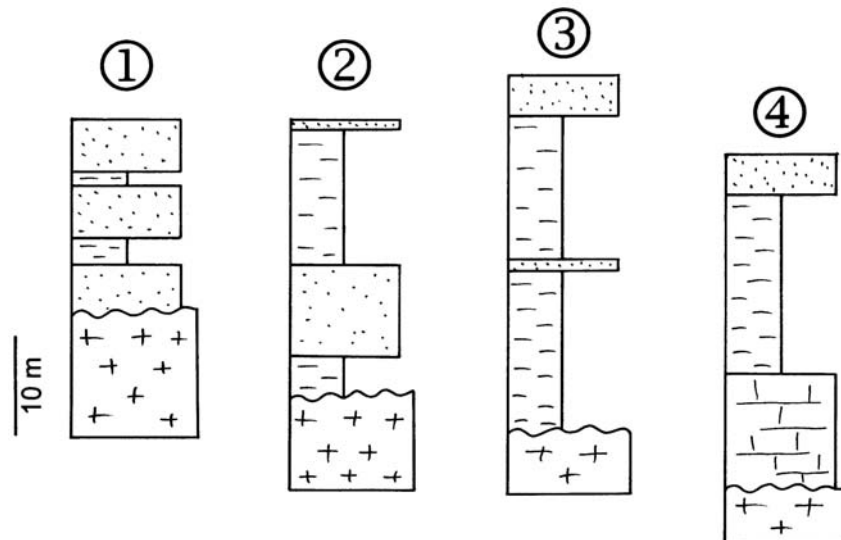
strata. Some rock units are **laterally continuous** and display little thickness variation over long distances. Others thicken or thin laterally, sometimes even **pinching out** entirely (See Figure 4-1). Lateral **facies changes**, where lithologies change from place to place, are ubiquitous in sedimentary successions and can be caused through a number of different processes including transgressions and regressions. The best way to illustrate facies changes and **pinchouts** is with cartoons. Figure 4-1 shows the types of sedimentological variations that you might expect to see along a coastal environment following a transgression (Figure 4-1B) and a regression (Figure 4-1C).



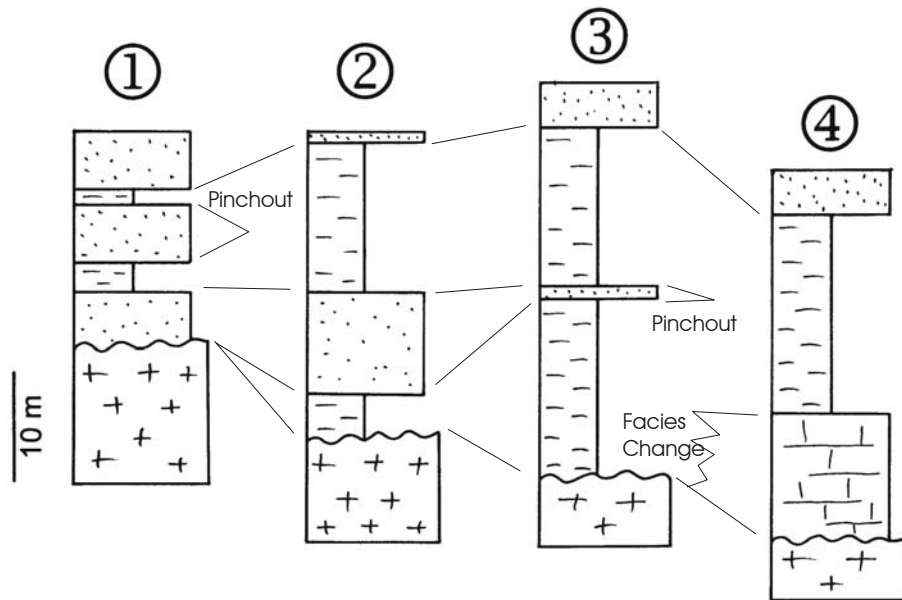
**Figure 4-1:** Schematic illustrations of sedimentological changes along a shoreline environment. A: Beach sediment (quartz arenite) pinches out into shale away from the shoreline. Further offshore, the shale passes laterally into reef limestone (facies change). B: After a transgression, shale deposition moves towards the shoreline. C: After a regression, sand deposition moves away from the shoreline into deeper water. Numbers refer to stratigraphic section locations for Figure 4-2.

The main purpose of this laboratory is to give you some experience with stratigraphy and correlation of rock units. It will also familiarize you with some more sedimentary rocks (I just know that thrills you!) and introduce you to the concept of **paleogeography**. Paleogeography reconstructs the geographical distribution of rock types that existed in the past. Essentially, you make a map that records the distribution of **depositional environments** when the rocks were originally deposited. Most students find this fun, but there is a certain amount of "artistic interpretation" to the exercise. In other words, you and your neighbors may end up getting slightly different maps, but you may all be geologically "correct".

Stratigraphic correlations also involve a certain amount of interpretation because of the potential complexity of depositional environments (e.g., pinchouts, facies changes etc.). Consider the sequence of events depicted in Figure 4-1. The transgression (Figure 4-1B) forced a change to deeper water sedimentation. Beach sedimentation would still occur, but inland from where it was happening before sea-level rose. The regression (Figure 4-1C), shifted beach sedimentation seaward. The net result is a fairly complex series of lateral and vertical changes. A clever geologist can resolve both types of change if they are careful with their correlations. Figure 4-2 is a generalized series of sections measured at the 4 points identified in Figure 4-1C. They aren't really stratigraphic sections because we have omitted formation names and rock ages, but they are close. Some rock units are very easy to correlate because they are blatantly obvious (e.g., the nonconformity atop the granite). Others are trickier. Figure 4-1 helps us to make the correlations in this exercise (our interpretation is on the next page), but geologists do not normally have this information ahead of time. Barring additional information (e.g., fossil content or age data), some stratigraphic correlations can only be approximated.



**Figure 4-2:** Very simplified sections showing the basic vertical relationship between rock units at sections 1, 2, 3 and 4 in Figure 4-1. The correct correlation appears on the next page.



*Figure 4-2 (modified): Our stratigraphic correlations.*

Notes

