

The Story of a Rock

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Introduction

Contrary to popular belief a geologist doesn't just identify rocks for the satisfaction of giving the rock a name; a geologist identifies rocks in order to put the pieces of the earth's history together like a puzzle. This puzzle will enable the geologist to develop a narrative that paints a picture of what the area of interest may have been like millions or even billions of years in the past.

Definitions

Stratigraphy: the branch of geology concerned with all characteristics and attributes of rocks as strata (layers); and their interpretation in terms of mode of origin and geologic history. Stratigraphy is based on three laws:

1. Law of Superposition: In undeformed stratigraphic sequences, the oldest strata will be at the bottom of the sequence.
2. Principle of Original Horizontality: Layers of sediment are originally deposited horizontally under the action of gravity.
3. Principle of Lateral Continuity: States that layers of sediment initially extend laterally in all directions; in other words, they are laterally continuous.

Objective

To use features identified in hand samples of rock to develop a narrative description of the depositional environment for the stratigraphic section of rocks assigned to your group. The narrative description will be presented by your group in order to create a mental visualization of your depositional environment for the rest of the class.

Materials

Hardness Test Kit

National Audubon Society Field Guide to North American Rocks and Minerals

Rock Identification Charts

The Rock Key

Evaluation

Teacher Notes

Rock Suites from different environments. You can mix and match from the rock samples in your rock boxes or the Nevada Division of Minerals can help you obtain samples.

Map of Select Geologic Localities in Nevada

Procedure

Select a stratigraphic section of rocks. Use the rock identification charts and the National Audubon Society Field Guide to North American Rocks and Minerals to fill out the Rock Identification Work Sheet, and identify the rocks. Answer the questions on the work sheets; they will help you to write your narrative on the depositional environment for your section of rocks. Work through as many different stratigraphic sections as you can.

Each group will present the narrative for the first group of rocks they completed. The completed narrative will be presented to the class. The narrative should be descriptive enough to paint a mental picture of the depositional environment to the class. The rocks will be plotted on the Map of Select Geologic Localities in Nevada to give everyone spatial reference.

Narrative Example

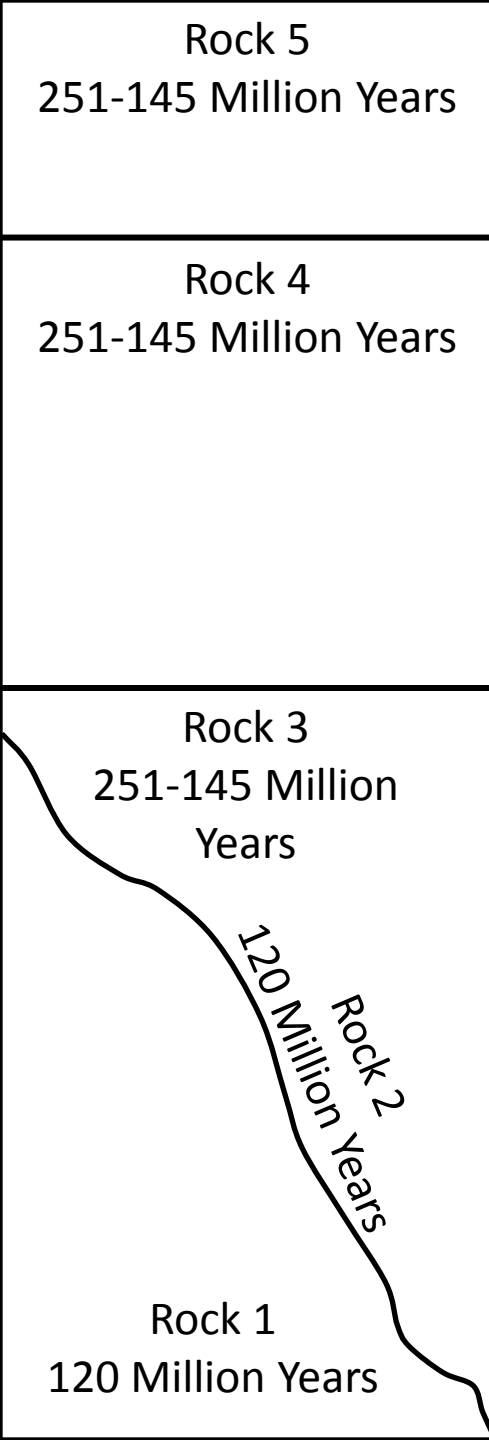
"Our first and oldest rock in our stratigraphic section is a siltstone. Siltstones are deposited low energy environments such as lakes. Our second rock up the section is basalt. Basalt is a rock that is volcanic in origin and mafic as well. Our third rock up the section is a siltstone that has interbeds of tuff. Siltstone is deposited in low energy water environments and tuff is consolidated ash fall from a volcano.

It is our hypothesis that the siltstone was being deposited in a lake, deep enough in the lake so there wasn't any wave action. Then, a volcano that was nearby began to erupt. The lava didn't spend much time in the crust waiting to erupt as is evidenced by its mafic composition. The lava flowed into the lake. Then the lava flows stopped and the volcano started intermittently spewing out ash that gently fell into the lake. This is evidenced by the interbeds of siltstone and tuff."

Suite 1

Rock Identification Work Sheet

ID	Color? (Light, medium, dark)	Visible grains? Yes or no	If YES, is grain size fine, medium, or coarse?	Layers? If yes are they flat or wavey?	Can it scratch glass?	Other identifiers (gas bubbles, reaction to acid)	Is it: Igneous, Sedimentary, or Metamorphic	Name
1								
2								
3								
4								
5								
Example	light	yes	medium	yes-flat	yes	none	sedimentary	sandstone



Suite 1

Draw what your rock looks like in the space provided to the left. Sometimes drawings help to make interpretations.

What type of rock is Rock 5?

Under what conditions do you find Rock 5 in?

What type of rock is Rock 4?

Under what conditions do you find Rock 4?

Looking at the textures – did Rock 4 experience *lower* or *higher* temperatures than Rock 5?

What type of rock is Rock 3?

What does the hardness and apparent relic bedding tell you about where this rock was formed?

How does Rock 3 conditions differ from Rock 4?

What type of rock is Rock 2?

Is there any resemblance of Rock 2 to either the rocks above or below it?

What type of relationship is shown in Rock 2?

What type of rock is Rock 1?

How does Rock 1 differ from all the other rocks?

Is there anything to hint at Rock 1 was emplaced before/after the other rocks were emplaced?

Hypothesize on the next page as to what caused this rock sequence to develop the way it did and give a narrative description of depositional environment to create a mental visualization for others.

Suite 1 Hypothesis

Suite 2

Rock Identification Work Sheet

ID	Color? (Light, medium, dark)	Visible grains? Yes or no	If YES, is grain size fine, medium, or coarse?	Layers? If yes are they flat or wavey?	Can it scratch glass?	Other identifiers (gas bubbles, reaction to acid)	Is it: Igneous, Sedimentary, or Metamorphic	Name
1								
2								
3								
4								
5								
Example	light	yes	medium	yes-flat	yes	none	sedimentary	sandstone

Rock 4
190 Million Years

Rock 3
225 Million Years

Rock 2
230 Million Years

Rock 1
255 Million Years

Youngest



Oldest

Suite 2

Draw what your rock looks like in the space provided to the left. Sometimes drawings help to make interpretations.

What type of rock is Rock 4?

In what environments do you find Rock 4 in (think beyond water transport/deposition)?

What type of rock is Rock 3?

In what environments do you find Rock 3?

Is Rock 3 from a higher or lower energy environment than Rock 4?

What type of rock is Rock 2?

In what environments do you find Rock 2 in?

What unique clues do you see to its depositional environment?

Is Rock 2 from a higher or lower energy environment than Rock 3?

What type of rock is rock 1?

In what environments do you find Rock 1 in?

Is Rock 1 from a higher or lower energy environment than Rock 2?

Hypothesize on the next page as to what caused this rock sequence to develop the way it did and give a narrative description of depositional environment to create a mental visualization for others.

Suite 2 Hypothesis

Suite 3

Rock Identification Work Sheet

ID	Color? (Light, medium, dark)	Visible grains? Yes or no	If YES, is grain size fine, medium, or coarse?	Layers? If yes are they flat or wavey?	Can it scratch glass?	Other identifiers (gas bubbles, reaction to acid)	Is it: Igneous, Sedimentary, or Metamorphic	Name
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4								
5								
Example	light	yes	medium	yes-flat	yes	none	sedimentary	sandstone

Rock 4 318.1 Million Years
Rock 3 359.2 Million Years
Rock 2 416 Million Years
Rock 1 418 Million Years

Youngest



Oldest

Suite 3

Draw what your rock looks like in the space provided to the left. Sometimes drawings help to make interpretations.

What type of rock is Rock 4?

In what environments do you find Rock 4 in?

What type of rock is Rock 3?

In what environments do you find Rock 3?

Is Rock 3 from a higher or lower energy environment than Rock 4?

Is there any energy fluctuation? How do you know?

What type of rock is Rock 2?

In what environments do you find Rock 2 in?

Is Rock 2 from a higher or lower energy environment than Rock 3?

What type of rock is Rock 1?

In what environments do you find Rock 1 in?

Is Rock 1 from a higher or lower energy environment than Rock 2?

Hypothesize on the next page as to what caused this rock sequence to develop the way it did and give a narrative description of depositional environment to create a mental visualization for others.

Suite 3 Hypothesis

Suite 4

Rock Identification Work Sheet

ID	Color? (Light, medium, dark)	Visible grains? Yes or no	If YES, is grain size fine, medium, or coarse?	Layers? If yes are they flat or wavey?	Can it scratch glass?	Other identifiers (gas bubbles, reaction to acid)	Is it: Igneous, Sedimentary, or Metamorphic	Name
1								
2								
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4								
5								
Example	light	yes	medium	yes-flat	yes	none	sedimentary	sandstone

Rock 4
23-13 Million Years

Rock 3
23-13 Million Years

Rock 2
23-13 Million Years

Rock 1
23-13 Million Years

Youngest



Oldest

Suite 4

Draw what your rock looks like in the space provided to the left. Sometimes drawings help to make interpretations.

What type of rock is Rock 4?

Compositional classification or Rock 4 (Circle one)? Felsic Intermediate Mafic Ultramafic

What makes this rock different from Rocks 3, 2, & 1 and why?

What type of rock is Rock 3?

Compositional classification or Rock 3 (Circle one)? Felsic Intermediate Mafic Ultramafic

What is the most compelling clue for what Rock 3 is?

What type of rock is Rock 2?

Compositional classification or Rock 2 (Circle one)? Felsic Intermediate Mafic Ultramafic

What type of rock is rock 1?

Compositional classification or Rock 1 (Circle one)? Felsic Intermediate Mafic Ultramafic

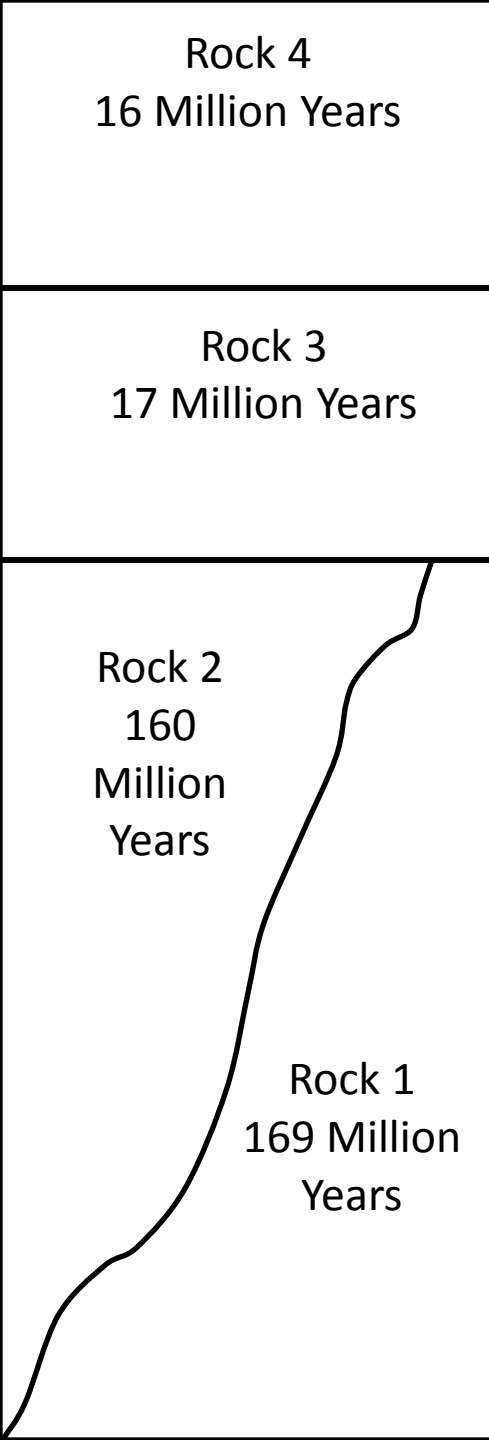
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Suite 4 Hypothesis

Suite 5

Rock Identification Work Sheet

ID	Color? (Light, medium, dark)	Visible grains? Yes or no	If YES, is grain size fine, medium, or coarse?	Layers? If yes are they flat or wavey?	Can it scratch glass?	Other identifiers (gas bubbles, reaction to acid)	Is it: Igneous, Sedimentary, or Metamorphic	Name
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Example	light	yes	medium	yes-flat	yes	none	sedimentary	sandstone



Suite 5

Draw what your rock looks like in the space provided to the left. Sometimes drawings help to make interpretations.

Though similar, this rock is not Chalk. Please read page 110 in the “Roadside Geology of Nevada” book to learn more about this rock.

What type of rock is Rock 4?

What evidence do you see to support the hypothesis that rocks 1 and 2 are older than Rock 3?

What type of rock is Rock 3?

Compositional classification or Rock 3 (Circle one)? Felsic Intermediate Mafic Ultramafic

What evidence do you see to support the hypothesis that Rock 1 is older than Rock 2?

What type of rock is Rock 2?

Compositional classification or Rock 2 (Circle one)? Felsic Intermediate Mafic Ultramafic

What type of rock is rock 1?

Compositional classification or Rock 1 (Circle one)? Felsic Intermediate Mafic Ultramafic

Hypothesize on the next page as to what caused this rock sequence to develop the way it did and give a narrative description of depositional environment to create a mental visualization for others.

Suite 5 Hypothesis
