

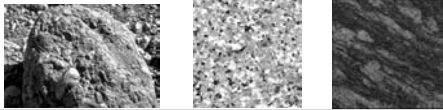
Rocks and Culture

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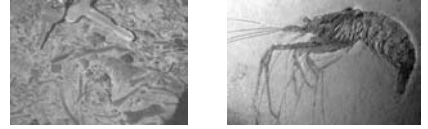
Sedimentary, Igneous, Metamorphic

- You are expected to tell the difference between rocks of these three classes.
- Consider that they are formed by processes that occur under different circumstances:
- Sedimentary rocks form from fragments;
- Igneous rocks form from a hot liquid;
- Metamorphic rocks form from heat and/or pressure acting on earlier rocks.



Sedimentary Rocks

- Because these form near or on surface, living and dead things leave traces of themselves in sedimentary rocks.



- Remember that sediments are mostly fragments from house size to microscopic, cemented together by minerals from solution.
- (Note: When the grains are sand sized, they have a gritty feel to them.)

Utility of Sedimentary Rocks

- In areas like southern Ontario, sedimentary rocks are of great value: for a variety of architectural purposes, for construction, pharmaceuticals...
- University College was built of sandstone from the same beds as those near the bottom of the Niagara escarpment.
- The rocks of the exterior have a gritty feel.

The windowsills of other campus buildings, such as Biological and Geological Sciences are limestone.



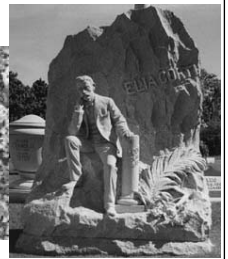
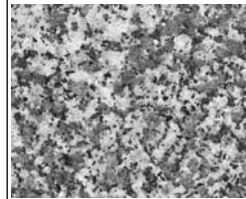
Utility of Sedimentary Rocks II

- Limestone also has especial value in neutralizing the effects of acid rain.
- Calcite, the primary component in limestone reacts with acids to neutralize them.
- Crushed limestone was used to restore lakes to healthier conditions and is used in treatment of mine tailings to eliminate acid run off.



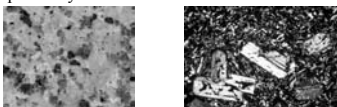
Utility of Igneous Rocks

- Due to their high durability, igneous rocks are often used to ornament the fronts of commercial buildings, and as monuments.



Igneous Rocks

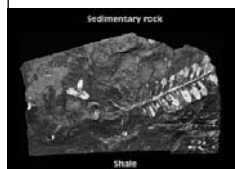
- Because these form from a hot liquid, crystals have a random orientation (except when the liquid flows).
- Igneous rocks are too hot to preserve fossils in them except in very rare circumstances.



- Igneous rocks are: "plutonic" or "volcanic" based on grain size. In plutonic rocks, all grains are in the visible size range. In volcanics the smallest grains cannot be seen without magnification. The rock on the right had to be magnified for you to be able to see the small grains.

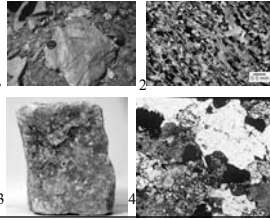
Metamorphic Rocks

- Metamorphic rocks form from earlier rocks that have been subjected to elevated temperatures and/or pressures.
- Such conditions occur during collision of crustal plates, but during rifting as well.
- Such changes almost always destroy fossils.



Metamorphic Rocks

- While regional and contact metamorphism are the two primary divisions of metamorphic rocks, we will look at them in terms of "fabric".
- "Foliated" fabric involves the alignment of platy minerals.
- 1 is a foliated rock. 2 is this rock under a microscope.
- "Granoblastic" fabric involves grains that are equidimensional.
- 3 is a granoblastic rock. 4 is a similar rock magnified.



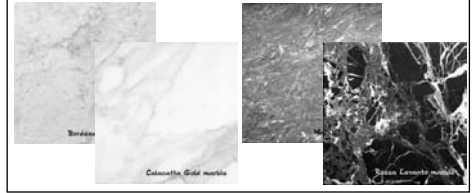
Utility of Metamorphic Rocks

- Granoblastic rocks are valuable for sculptures.
- Foliated rocks tend to be used for architectural purposes such as slate roofing.



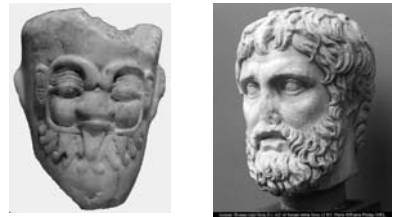
Utility of Metamorphic Rocks II

- Architecturally, marble is used to enhance the appearance of entrances and high traffic areas.
- There is a great deal of colour variation as well as structures that indicate tectonic activity as shown by these examples.



Alabaster versus Marble

- The figure at the left is Egyptian and made of alabaster.
- The one at the right is Roman and marble.
- It is possible to distinguish between these two materials.
- Alabaster is rock gypsum, while marble is made of calcite.



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Alabaster versus Marble II

- Gypsum will slowly dissolve in water and can be scratched with a thumbnail.
- Calcite will react with acid to give off carbon dioxide gas and is slightly harder than a thumbnail.
- So you can test for these minerals to determine which is which.

Sculptures – Igneous Rocks

- Igneous rocks used for sculpting include: granite and basalt.



An American reproduction in granite



A "birdman" petroglyph in basalt at Easter Island

Jade versus Soapstone

- Both jade and soapstone are formed by metamorphic processes, but their compositions are different.
- Soapstone contains enough magnesium to form talc and serpentine, while jade contains much more aluminum and silica and consists of nephrite or jadeite.
- Soapstone is softer and easier to shape than jade, yet jade can be made into delicate designs.



Sculptures – Sedimentary Rocks

- From left to right, these works of art are made of: alabaster; limestone; and chalk respectively.
- (Note that the Uffington Chalk horse is cut into the top of a hill. The lines at the upper and lower right are roads.)



Your Assignment

- Part I: your job is to classify or identify rocks that appear on campus, and in some cases, find evidence in support of the classification or identification.
- To accomplish this, you will need to walk around campus and find the evidence.
- Part II: your job is to determine answers by going over these notes and those in the hand-outs.

End of slides