

Metamorphic Rocks

How do we classify metamorphic rocks?



Phenomenon: *Metamorphic Rocks*



Metamorphic Rocks

- ♦ Metamorphic Rocks - parent rocks that have been altered or deformed by increases in temperature and/or pressure
- ♦ Parent Rock - preexisting rock from which metamorphic rocks are formed

Metamorphic Rocks

- ♦ Methods to classify metamorphic rocks:



Metamorphic Rocks

1. Texture - the description of its minerals along with their arrangement and size



Metamorphic Rocks

- ♦ Foliation - when minerals rearrange in flat layers due to extreme pressure
- ♦ Banding - type of foliation where pressure separates minerals into alternating light and dark layers



Metamorphic Rocks



Foliation - Slate



Banding - Gneiss

Metamorphic Rocks

- ♦ Non-foliated - when minerals rearrange and change form, but do not form layers



Metamorphic Rocks



Non-foliated - Marble



Non-foliated - Quartzite

Metamorphic Rocks

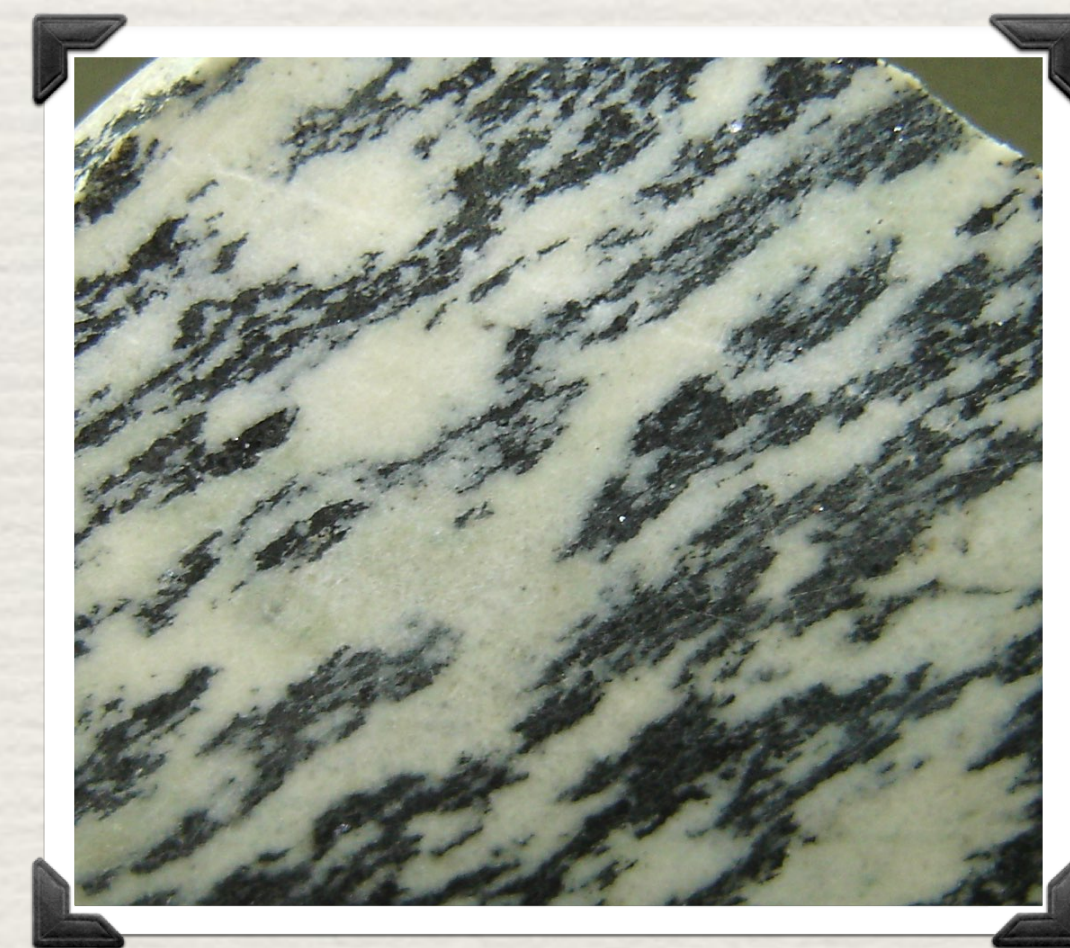
2. Grain Size - size of the individual grains in the rock



Fine - Phyllite



Medium - Schist



Coarse - Gneiss

Metamorphic Rocks

3. Composition - the minerals that make up the rock



Composition: Calcite
Rock: Marble



Composition: Mica
Rock: Slate

Metamorphic Rocks

4. Type of Metamorphism -
the different conditions
which exist for a
metamorphic rock to form



Metamorphic Rocks

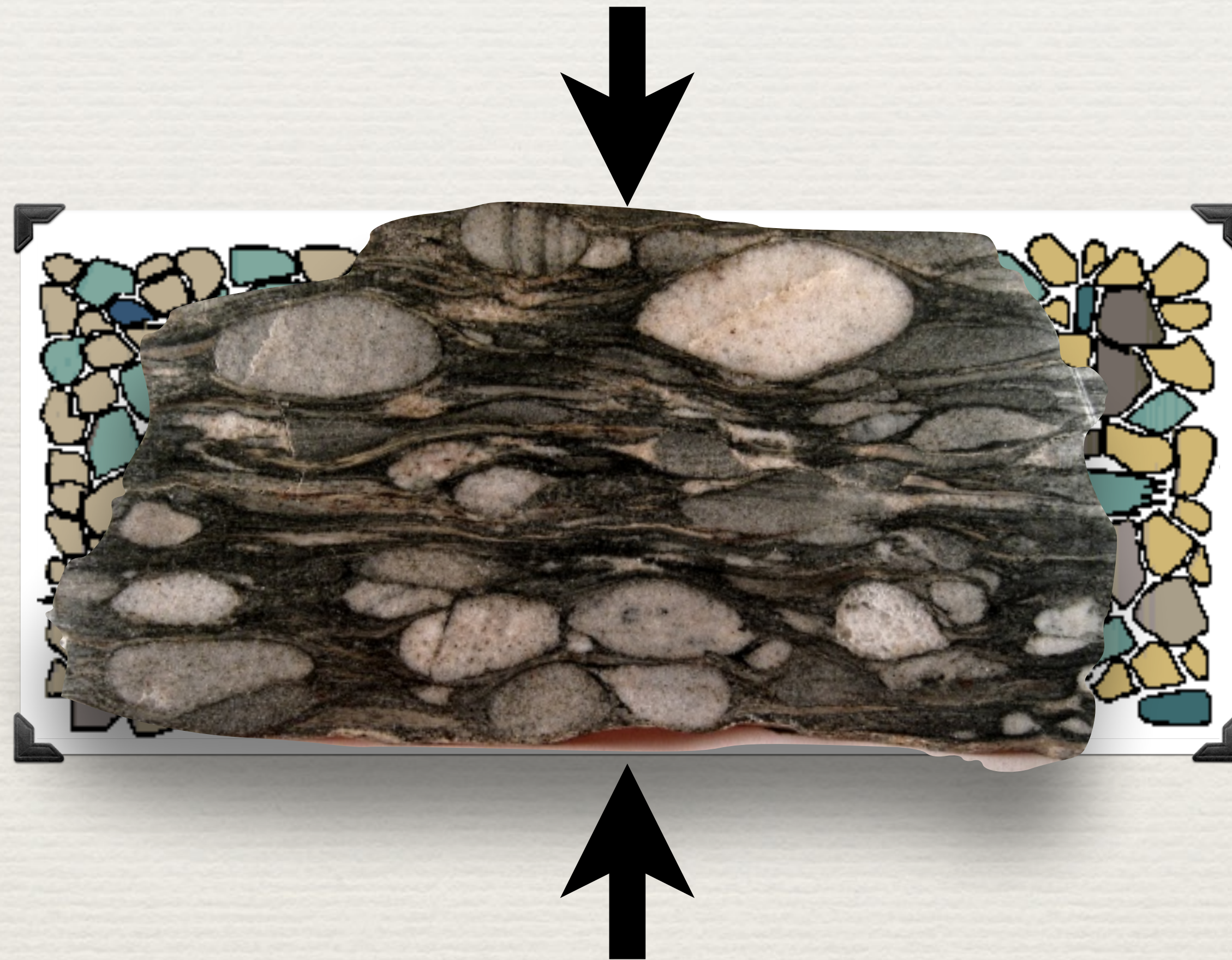
- ♦ Regional Metamorphism - process in which metamorphic rocks are formed over large areas due to temperature and pressure increases



Metamorphic Rocks

- ♦ Heat from geothermal gradient and/or magma causes minerals to flow [not break] and cause the minerals to rearrange, realign and become elongated
- ♦ Pressure from overlying rock squeezes the pore spaces out between the minerals within the rock and cause it to become more dense

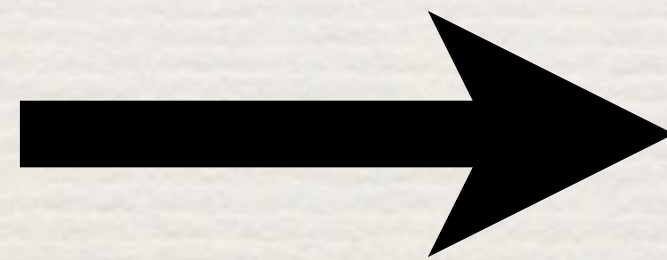
Metamorphic Rocks



Metamorphic Rocks



Conglomerate
Sedimentary



Metaconglomerate
Metamorphic

Metamorphic Rocks

- ♦ Contact Metamorphism - process in which preexisting rock changes when heat from magma or lava rearranges the minerals



Metamorphic Rocks

- ♦ Heat from magma or lava causes minerals to rearrange

NO PRESSURE



Sedimentary

Metamorphic

Igneous

Contact Metamorphism

TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	MICA QUARTZ FELDSPAR AMPHIBOLE GARNET PYROXENE	Regional (Heat and pressure increases) ↓	Low-grade metamorphism of shale	Slate	
		Fine to medium			Foliation surfaces shiny from microscopic mica crystals	Phyllite	
		Medium to coarse			Platy mica crystals visible from metamorphism of clay or feldspars	Schist	
	BAND-ING	High-grade metamorphism; mineral types segregated into bands			Gneiss		
NONFOLIATED	Fine	Carbon	Regional	Metamorphism of bituminous coal	Anthracite coal		
	Fine	Various minerals	Contact (heat)	Various rocks changed by heat from nearby magma/lava	Hornfels		
	Fine to coarse	Quartz	Regional or contact	Metamorphism of quartz sandstone	Quartzite		
		Calcite and/or dolomite		Metamorphism of limestone or dolostone	Marble		
	Coarse	Various minerals		Pebbles may be distorted or stretched	Metaconglomerate		