

Metamorphosis: a change in form

Metamorphic rock:

rock that is **CHANGED** from its original form by **heat** and **pressure**



Metamorphic Rocks are:

Formed when **source** rocks are changed.

Rocks that are formed **deep in the lithosphere** under **high heat** & **intense pressure**

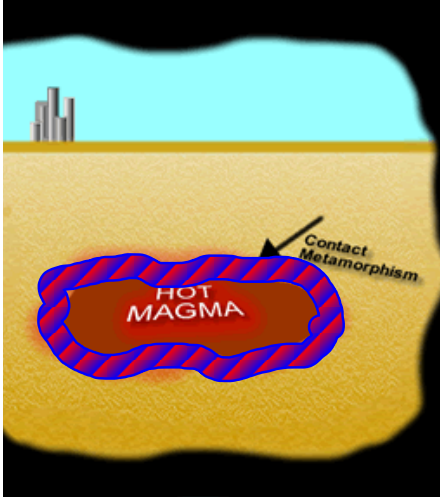
Less **porous** and more **dense** than the original rocks

Source Rocks:

*Can be igneous, sedimentary OR metamorphic!

Two Kinds of Metamorphism:

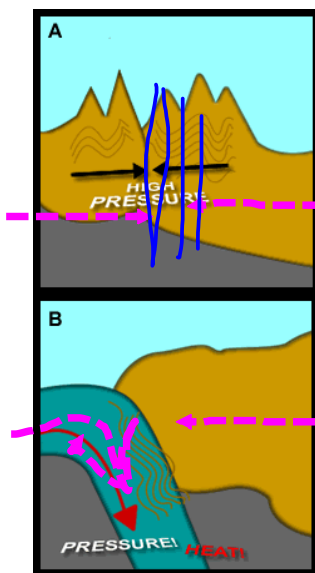
1. **CONTACT** metamorphism



Magma **intrudes** into an area and **heats** up the rocks around it.

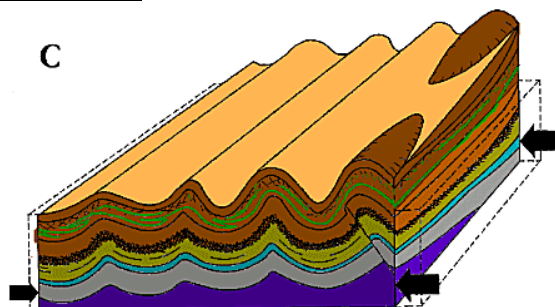
Nearby rocks are **changed** by the heat and pressure of the **magma**.

2. **REGIONAL** metamorphism



Plates of the Lithosphere **collide** and create high temperature and **pressure**

Large areas of **bedrock** are metamorphosed.



Metamorphic Rocks are classified by
TEXTURE

Foliated:

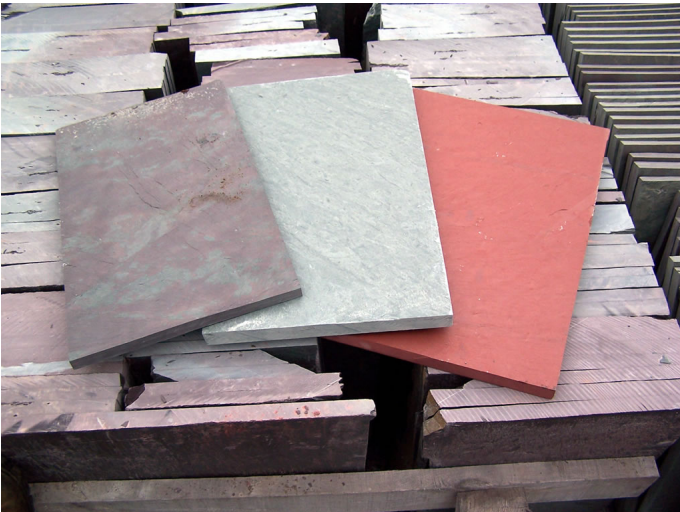
layers of mineral crystals are formed
by ***high pressure***

Associated with **REGIONAL**
metamorphism



General Rules for Foliated Metamorphic Rock

1. Larger crystals = higher heat & pressure



slate = low-grade metamorphism



gneiss = high-grade metamorphism

Nonfoliated:

no mineral layers are present

crystals are intergrown and may be any size

Associated with ***CONTACT OR REGIONAL*** metamorphism



Scheme for Metamorphic Rock Identification

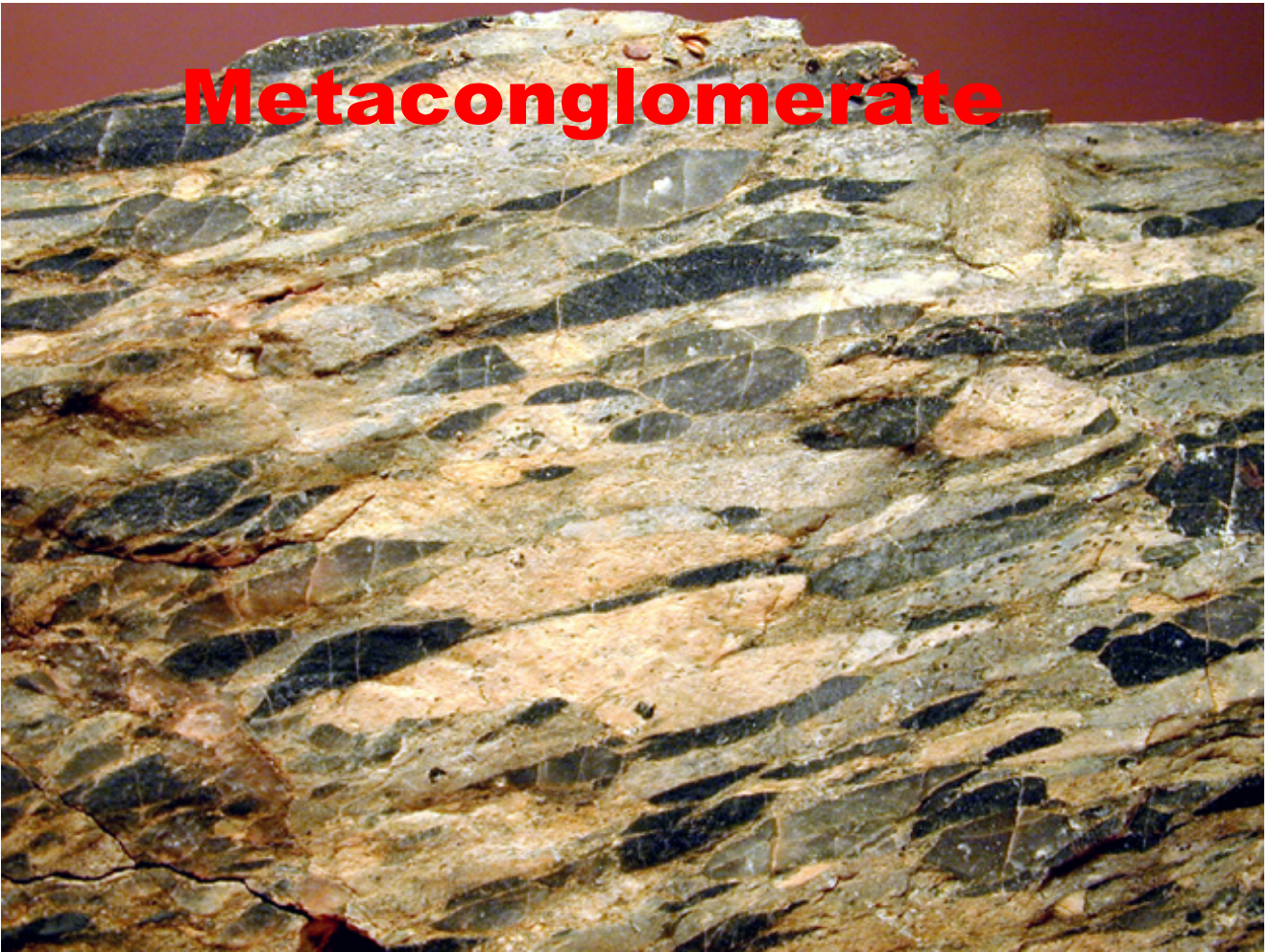
TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	<div style="display: flex; justify-content: space-around; font-size: 8px;"> MICA QUARTZ FELDSPAR AMPHIBOLE GARNET PYROXENE </div>	Regional (Heat and pressure increases) 	Low-grade metamorphism of shale	Slate	
		Fine to medium			Foliation surfaces shiny from microscopic mica crystals	Phyllite	
	BANDING	Medium to coarse			Platy mica crystals visible from metamorphism of clay or feldspars	Schist	
		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			

Reading your Reference Table

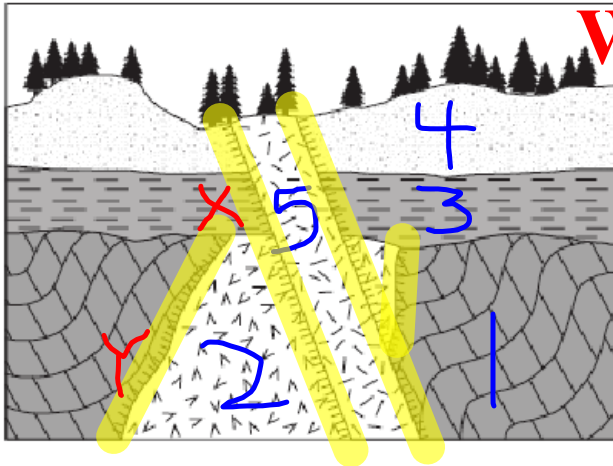
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TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	MICA QUARTZ FELDSPAR AMPHIBOLE GARNET PYROXENE	Regional (Heat and pressure increase with depth) ↓	Low-grade metamorphism of shale	Slate	
		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	
	BANDING	High-grade metamorphism; some mica changed to feldspar; segregated by mineral type into bands			Gneiss		
NONFOLIATED	Fine	Variable	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 in particles and matrix		Pebbles may be distorted or stretched	Metaconglomerate		

Metaconglomerate



Which rock is oldest?



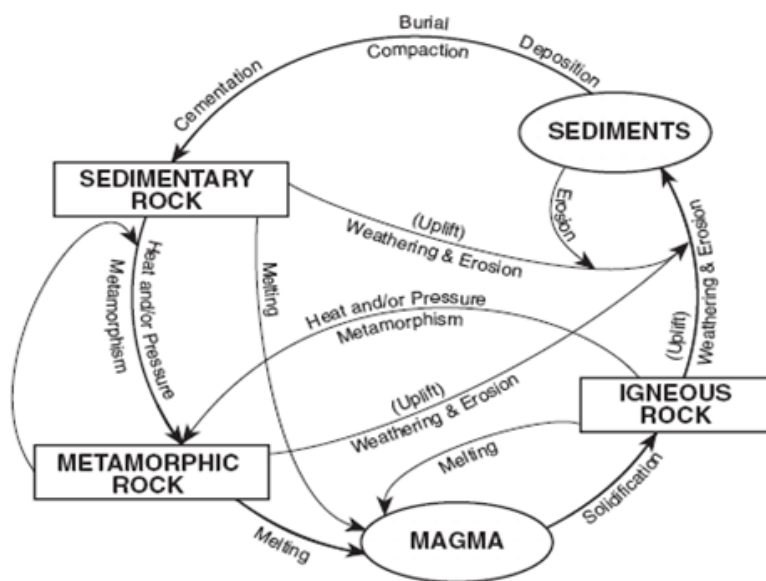
1 = Oldest
5 = Youngest

Shale by letter X will be metamorphosed into sandstone.
Folded limestone by letter Y will be metamorphosed into marble.

Key to Rock Symbols

	Sandstone		Folded limestone		Granite
	Basalt		Shale		Contact metamorphism

Rock Cycle in Earth's Crust



New York

Environments of Rock Formation:

1. Western NY:
sedimentary evaporites--crystalline
(salt flats and gypsum)
2. Adirondacks:
bent, twisted metamorphic rocks
(gneiss, marble, slate)
3. Allegheny Plateau:
crystalline sedimentary precipitates
(limestones)
4. Long Island:
piles of sediments from glaciers
contains different kinds of rocks
eroded from other areas of the state.

