Types of Rocks

Sandstone mudstone limestone granite basalt diorite dolerite quartzite schist gneiss oolitic limestone fossiliferous sandstone lamprophyre norite dolerite pegmatite amphibolite anorthosite ferruginous sandstone conglomerate breccia andesite giant phenocrystic basalt gabbro peridotite layered peridotite rhyolite

komatiite diabase gabbro granulite marble dunite shale phyllite ferrugenous shale orange shale purple shale augen gneiss chert flint Sandstone mudstone limestone

granite basalt diorite dolerite quartzite schist gneiss oolitic limestone fossiliferous sandstone lamprophyre norite pegmatite amphibolite anorthosite ferrugenous sandstone conglomerate breccia khondalite Charnokite

andesite giant phenocrystic basalt gabbro peridotite layered peridotite rhyolite komatiite diabase gabbro granulite marble dunite shale phyllite ferrugenous shale orange shale purple shale augen gneiss chert flint anorthosite ferrugenous

sandstone conglomerate breccia andesite giant phenocrystic basalt gabbro peridotite layered peridotite rhyolite komatiite diabase gabbro granulite marble dunite shale phyllite ferrugenous shale orange shale purple shale augen gneiss chert flint Sandston

limestone Sandstone mudstone limestone granite basalt diorite dolerite quartzite schist gneiss oolitic limestone fossiliferous sandstone lamprophyre norite dolerite pegmatite amphibolite anorthosite

ferrugenous sandstone conglomerate breccia andesite giant phenocrystic basalt diorite dolerite quartzite schist gneiss oolitic limestone fossiliferous sandstone lamprophyre norite

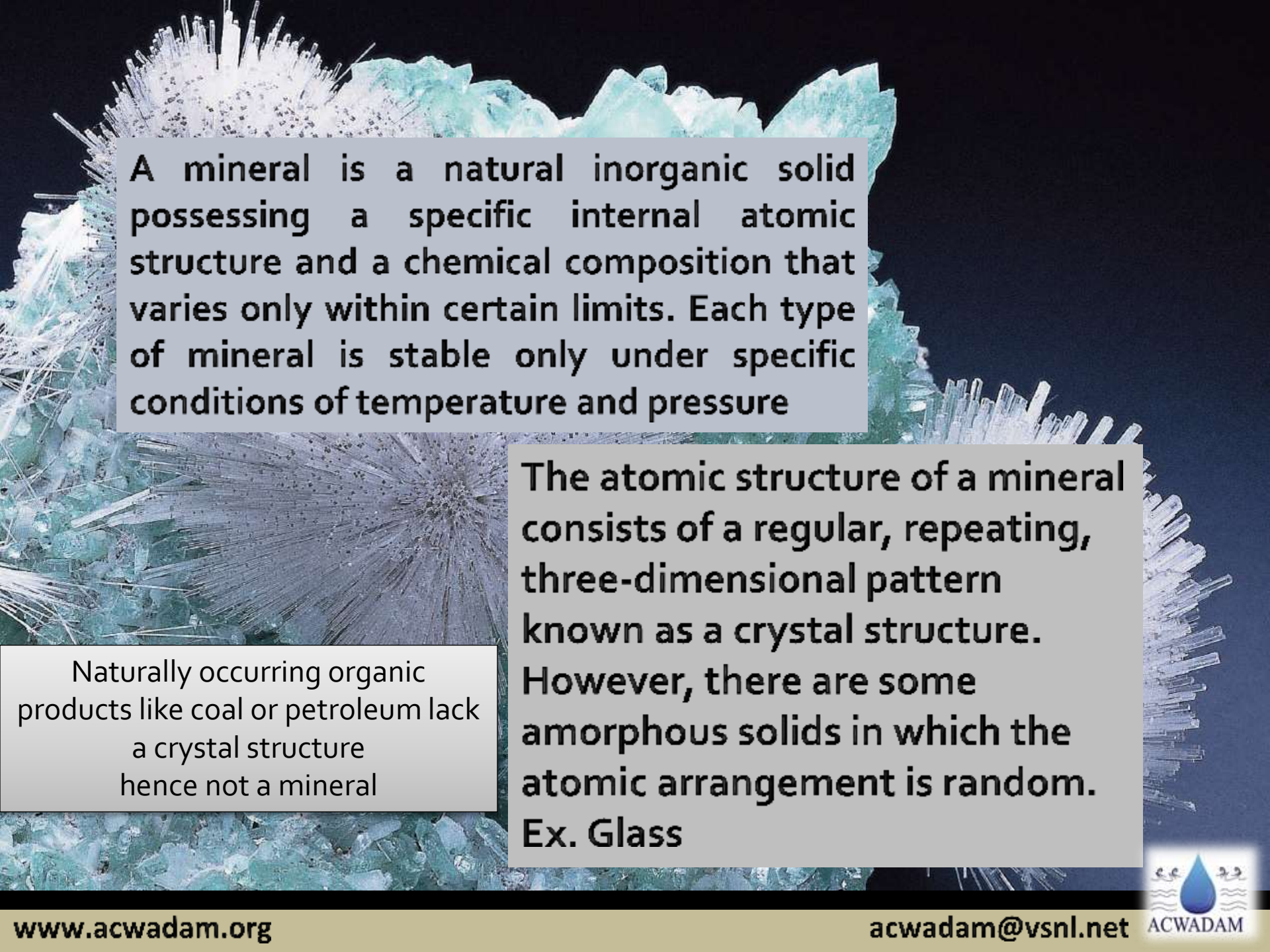
Olivine muscovite biotite K-feldspar Talc Plagioclase Pyroxene Hornblende Graphite
Magnetite Galena HematitePyrite calcite halite ACANTHITE CALAVERITE CALCIOVOL
BORTHITE nepheline conich epistilbite muscovite biotite

CALCITE CALEDONITE ADAMITE AESCHYNITE AGATE AJOITE ALEXANDRITE
Bakerite Baratovite BARITE BASALT ALLANITE ALMANDINE ALTAITE
COBALTITE KOLWEZITE kornerupine kottigite COBALTOCALCITE HIDDENITE

coconinoite coesite hemimorphitecolemanite
jamesonitecollinsite lepidoliteleucitecolumbite meta-autunite
meta-torbernite pseudoboleite pseudobrookite pseudomalachite
psilomelane meta-uranocircite goosecreekite gormanite

conich emmonsite howlite nepheline nephrite emplectite
enargite enstatite eosphorite epididymite epidote epistilbite
epsomite erionite sapphire sard sardonyx sartorite titanite (topaz
topazolite torbernite

Minerals and Rocks



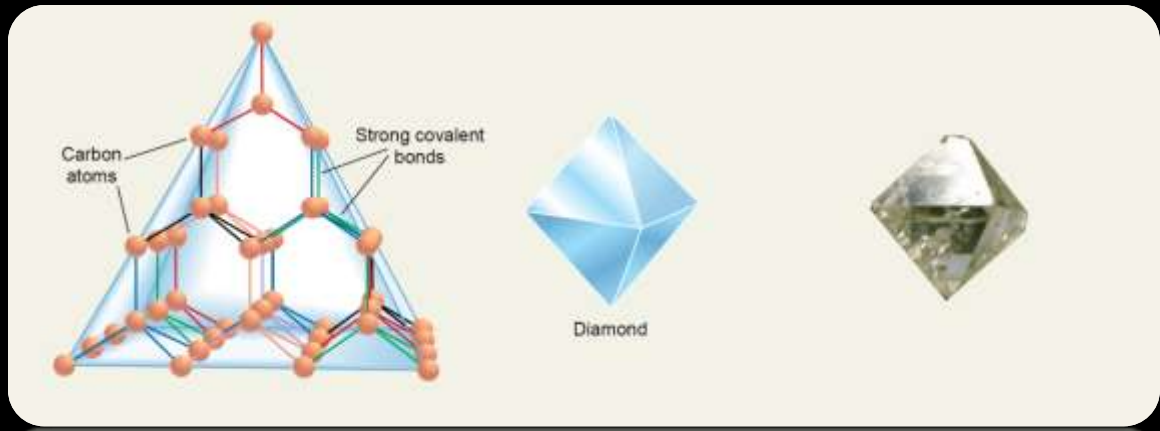
A mineral is a natural inorganic solid possessing a specific internal atomic structure and a chemical composition that varies only within certain limits. Each type of mineral is stable only under specific conditions of temperature and pressure

The atomic structure of a mineral consists of a regular, repeating, three-dimensional pattern known as a crystal structure. However, there are some amorphous solids in which the atomic arrangement is random. Ex. Glass

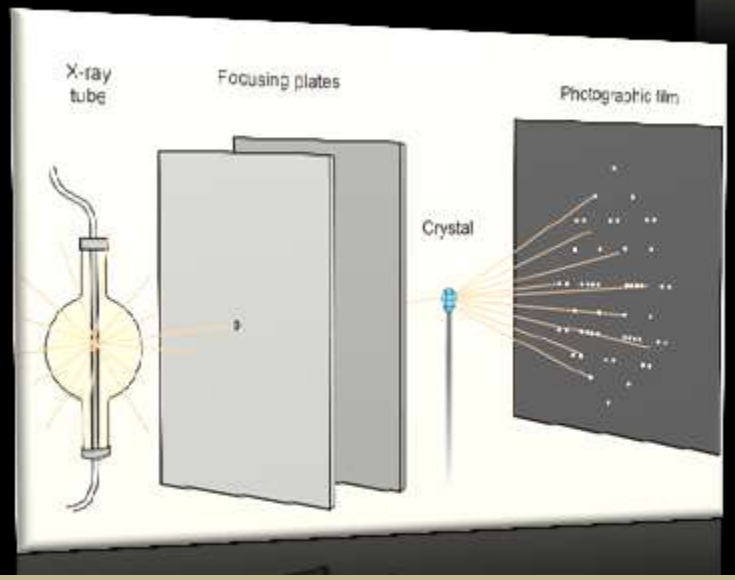
Naturally occurring organic products like coal or petroleum lack a crystal structure hence not a mineral

Crystal structure

Minerals can consist of a single element, such as gold, silver, copper, diamond,



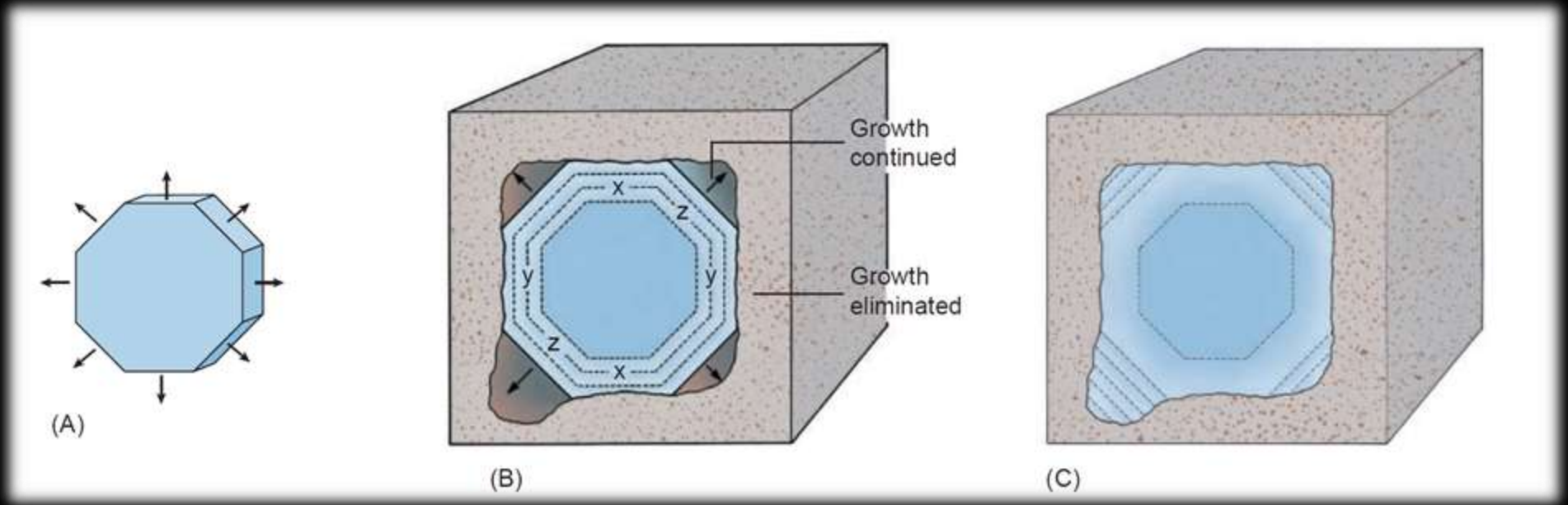
However, most are compounds of two or more elements



X-ray diffraction : studying crystal structure

Crystal structure

A crystal growing from a liquid in a restricted space assumes the shape of the confining area, and well-developed crystal faces do not form. The external form of the crystal can thus take on practically any shape, but its internal structure is in no way modified.



GK

4000 minerals have been identified,

More than 95% of Earth's crust is composed of silicate minerals, a group of minerals containing silicon and oxygen linked in tetrahedral units, with four oxygen atoms to one silicon atom.

Fewer than 20 kinds of minerals account for the great bulk of Earth's crust and upper mantle.

All specimens of a given mineral, regardless of where, when, or how they were formed, have the same physical properties (including cleavage, crystal form, hardness, density, color, luster, and streak)

So how do u identify a rock ????

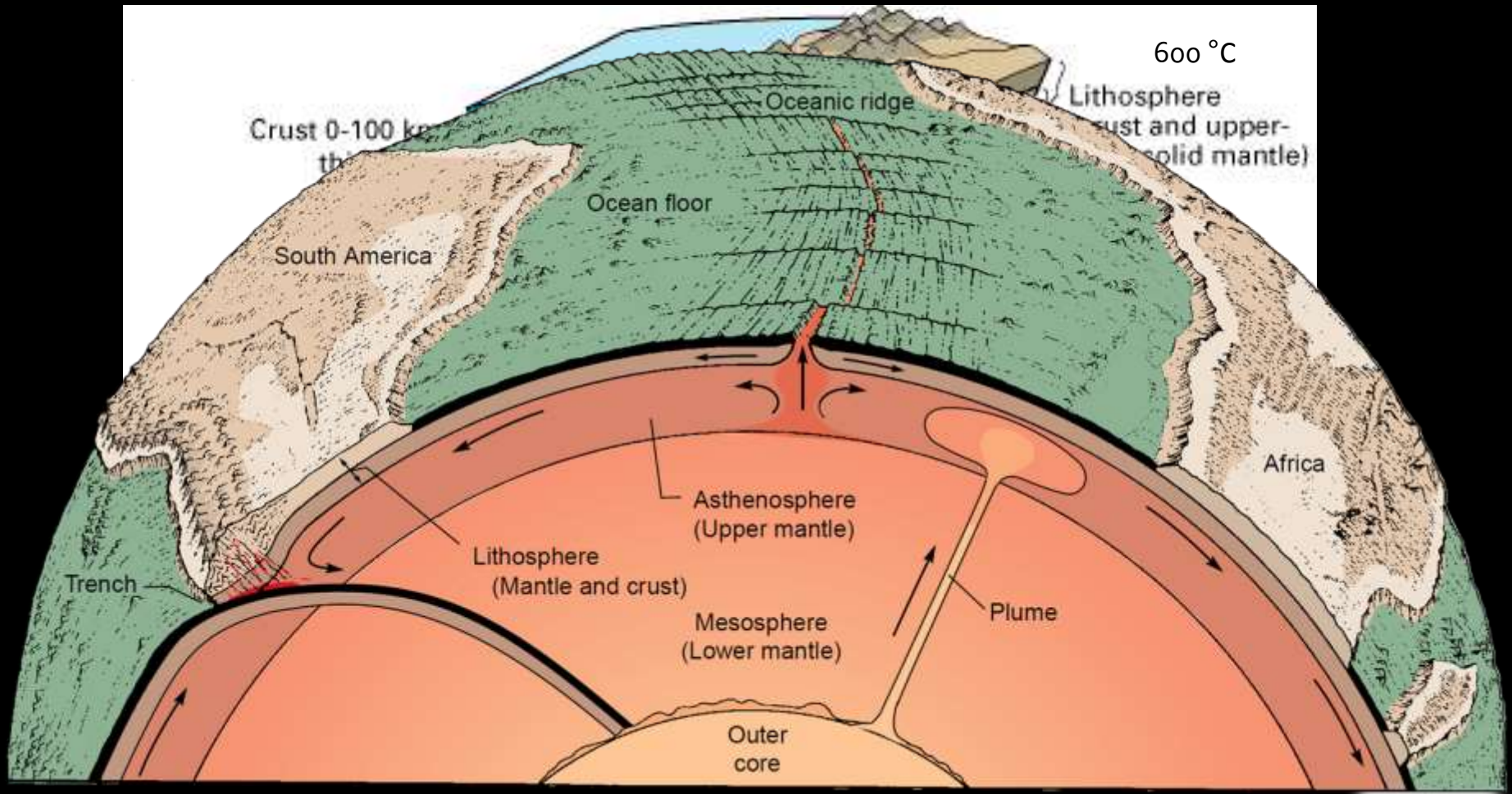
- Rocks are grouped together based on similar processes of formation to give us 3 types of rocks.

- Color
- Texture
- Minerals

Physical & Chemical properties

Interior of the Earth

Source: www.lifeinuniverse.org



Magma /lava

Photo courtesy of US Geological Survey;
Hawaiian Volcanoes Observatory,
Hawaii Volcanoes National Park, August 10, 2002

Water vapor and carbon dioxide are the principal gases dissolved in a magma. More than 90% of the gas emitted from hot magma is water (H_2O) and carbon dioxide (CO_2).

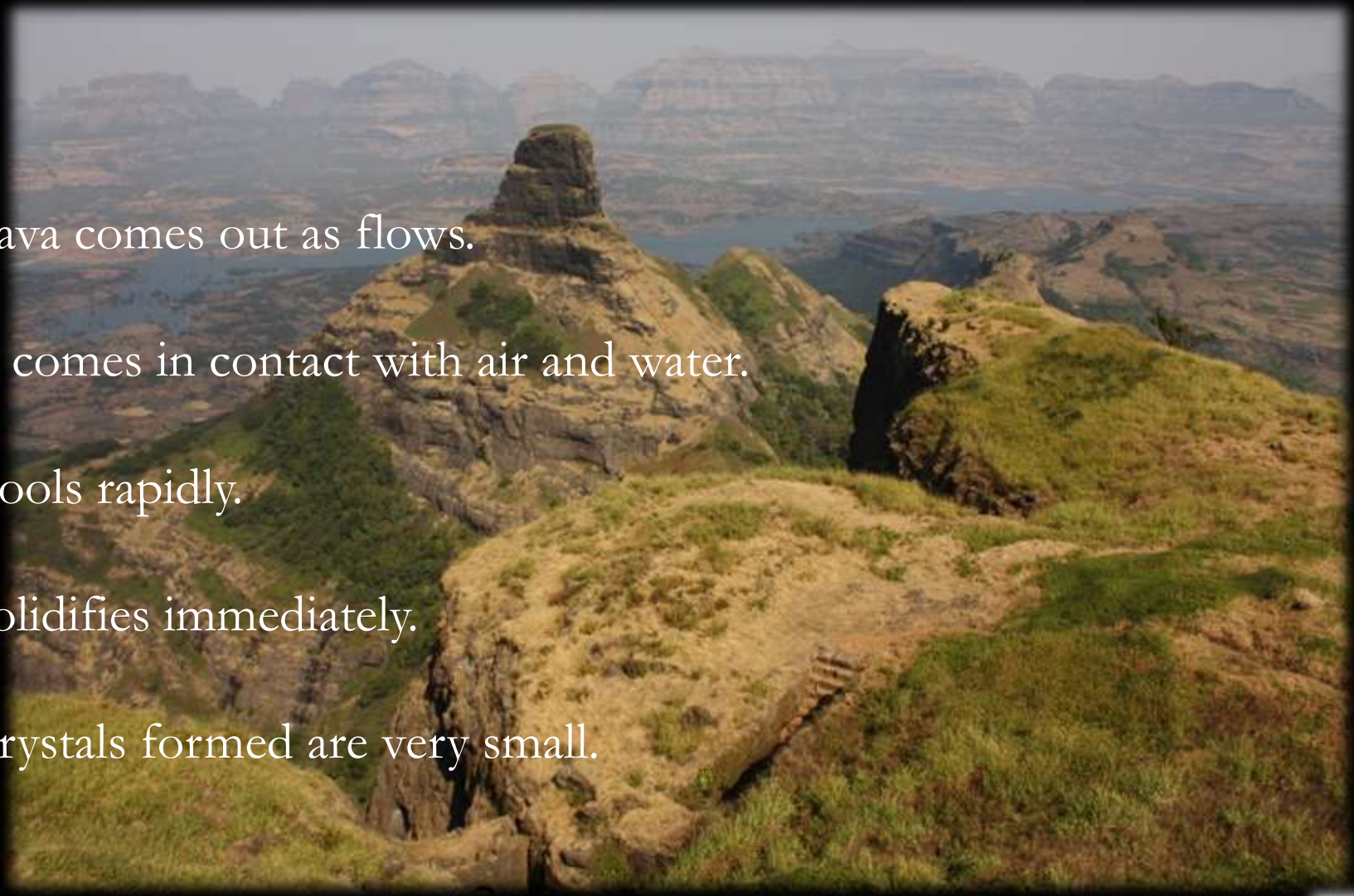
Molten Lava, Kilauea Volcano, Hawaii

Igneous Rocks

Source: www.fi.edu

- Igneous means of fire.
- They are formed of magma or lava.
- The cooling of magma under the surface gives intrusive Igneous Rocks.
- The cooling of lava on the surface gives Extrusive Igneous Rocks.

Extrusive or Volcanic Igneous rocks

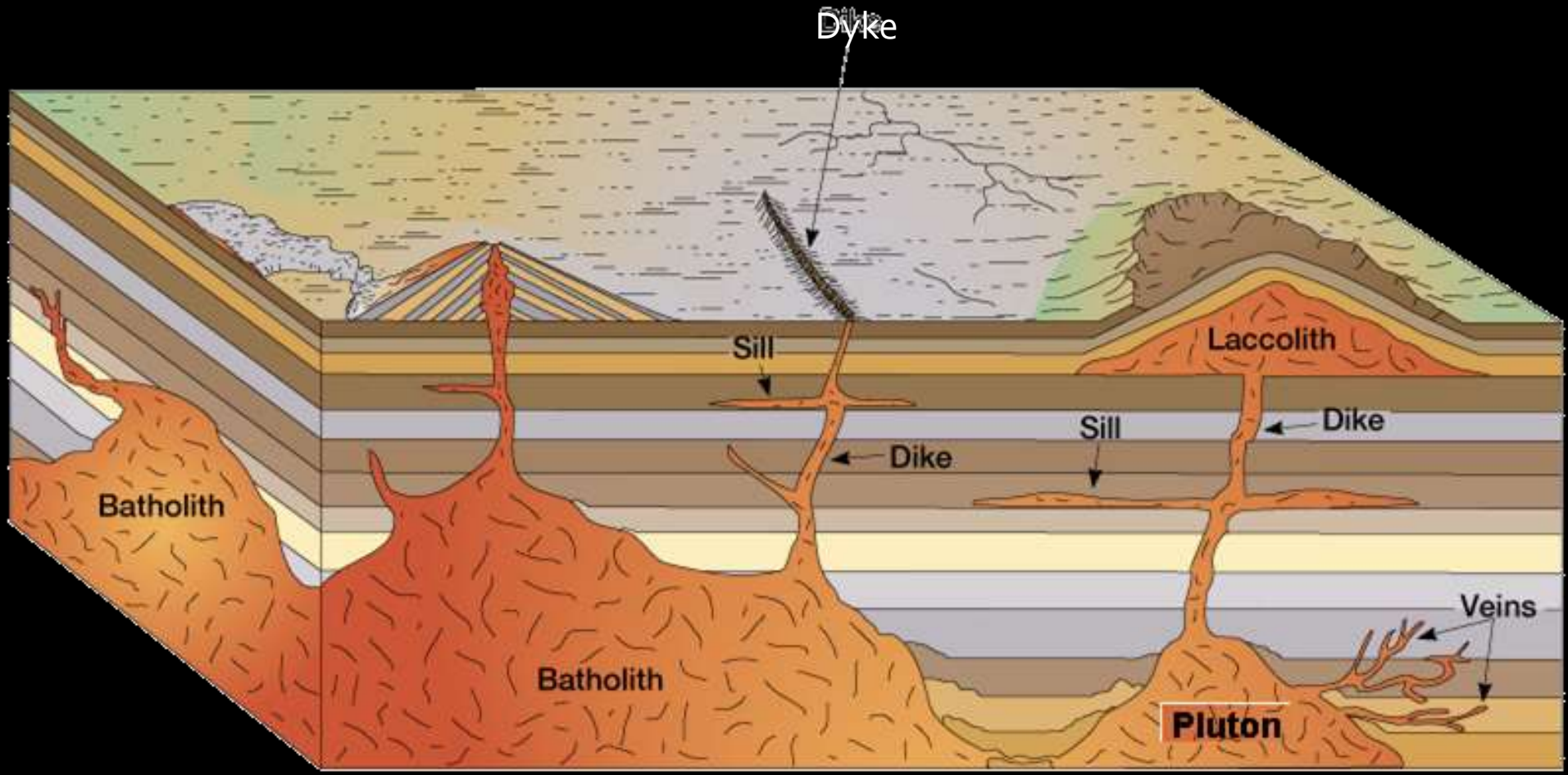


- Lava comes out as flows.
- It comes in contact with air and water.
- Cools rapidly.
- Solidifies immediately.
- Crystals formed are very small.

Intrusive or Plutonic Igneous rocks

- Ma
- It l
- Big

Igneous rock systems



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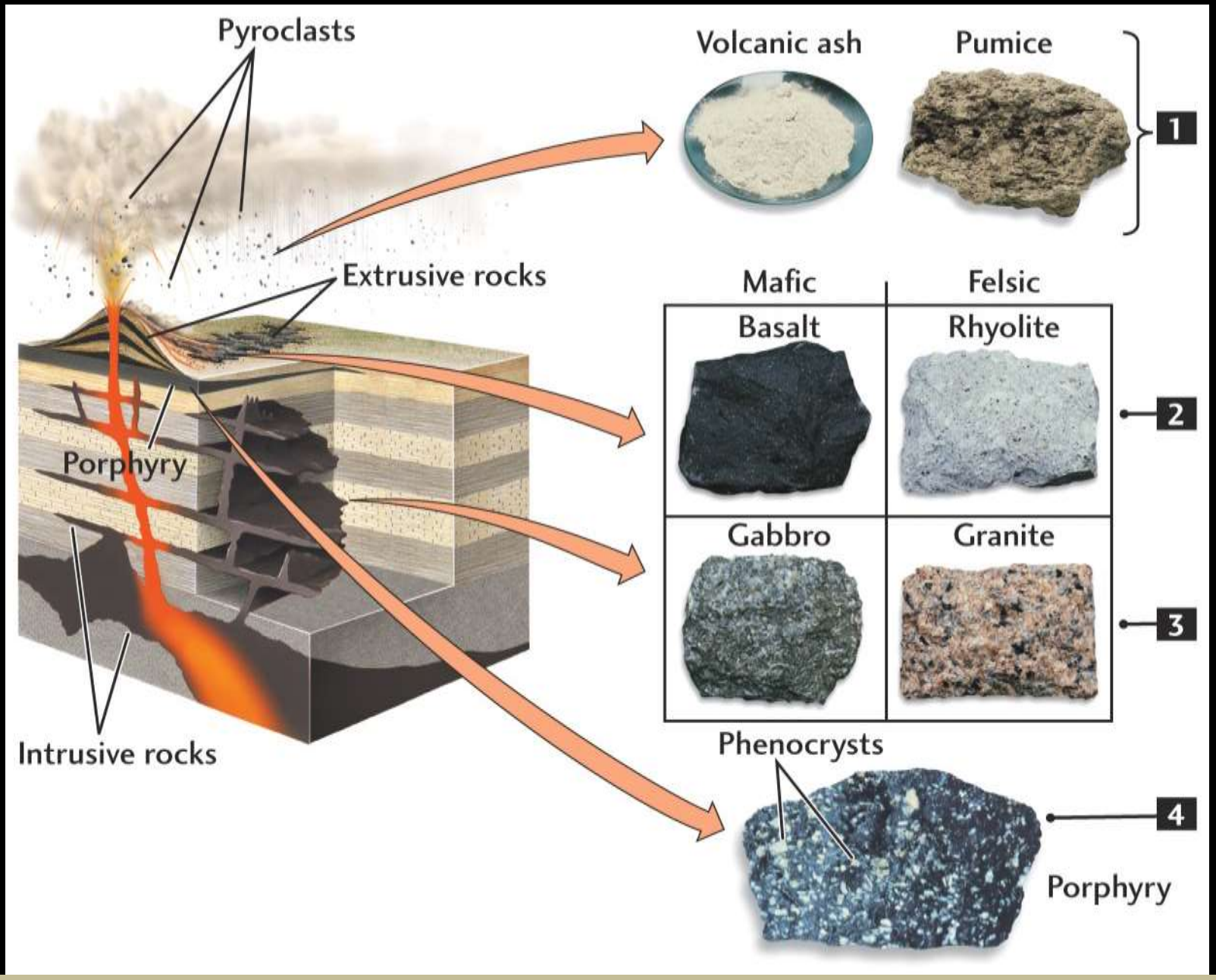


Source: hays.outcrop.org

Igneous textures

The texture of a rock provides important insight into the cooling history of the magma.The major textures of igneous rocks are (a) glassy, (b) aphanitic, (c) phaneritic, (d) porphyritic, and (e) pyroclastic.

A glassy texture develops when molten rock cools so rapidly that the migration of ions to form crystal grains is hampered. Glassy texture typically forms on the crust of lava flows and in viscous

Igneous textures

The texture of a rock provides important insight into the cooling history of the magma.The major textures of igneous rocks are (a) glassy, (b) aphanitic, (c) phaneritic, (d) porphyritic, and (e) pyroclastic.

An aphanitic texture consists of mineral grains too small to be seen without a microscope. A few grains are large enough to be seen. Most are microscopic.Aphanitic texture results from rapid cooling.

Igneous textures

The texture of a rock provides important insight into the cooling history of the magma.The major textures of igneous rocks are (a) glassy, (b) aphanitic, (c) phaneritic, (d) porphyritic, and (e) pyroclastic.

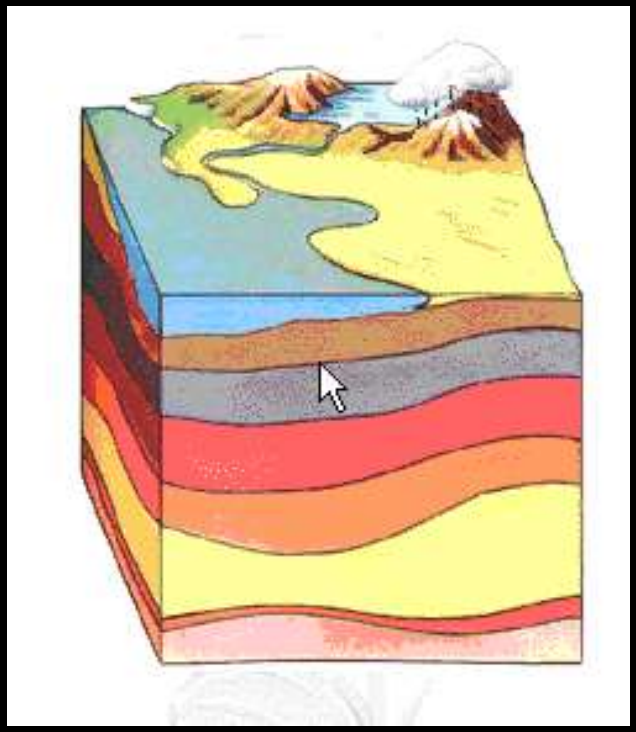
A phaneritic texture consists of grains large enough to be seen with the unaided eye. All grains are roughly the same size, and they interlock to form a tight mass.The large crystals suggest a relatively slow rate of cooling.

Sedimentary Rocks

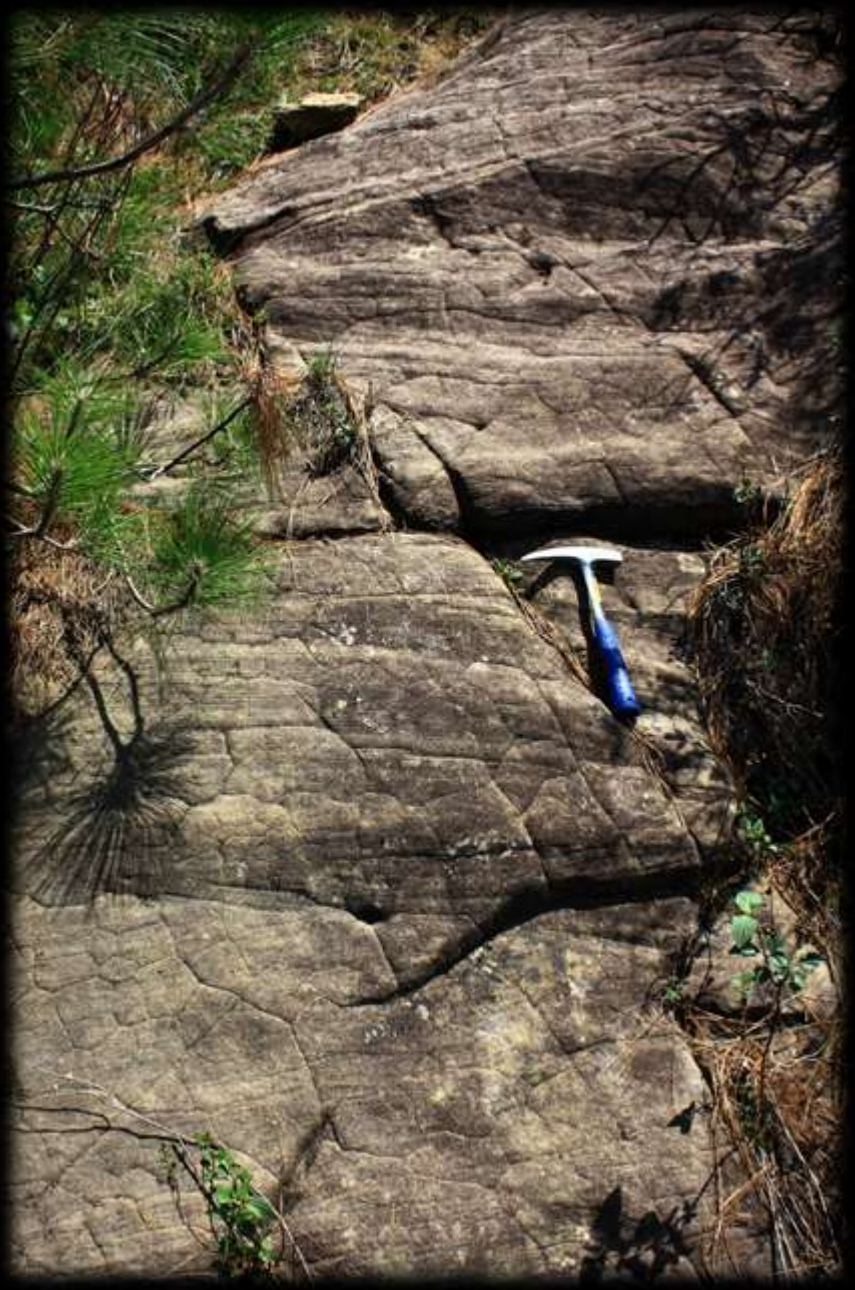
- The bedded rocks

- Rocks formed by processes that cause material to …

  - Settle
  - Accumulate
  - Precipitate



Source: www.fi.edu

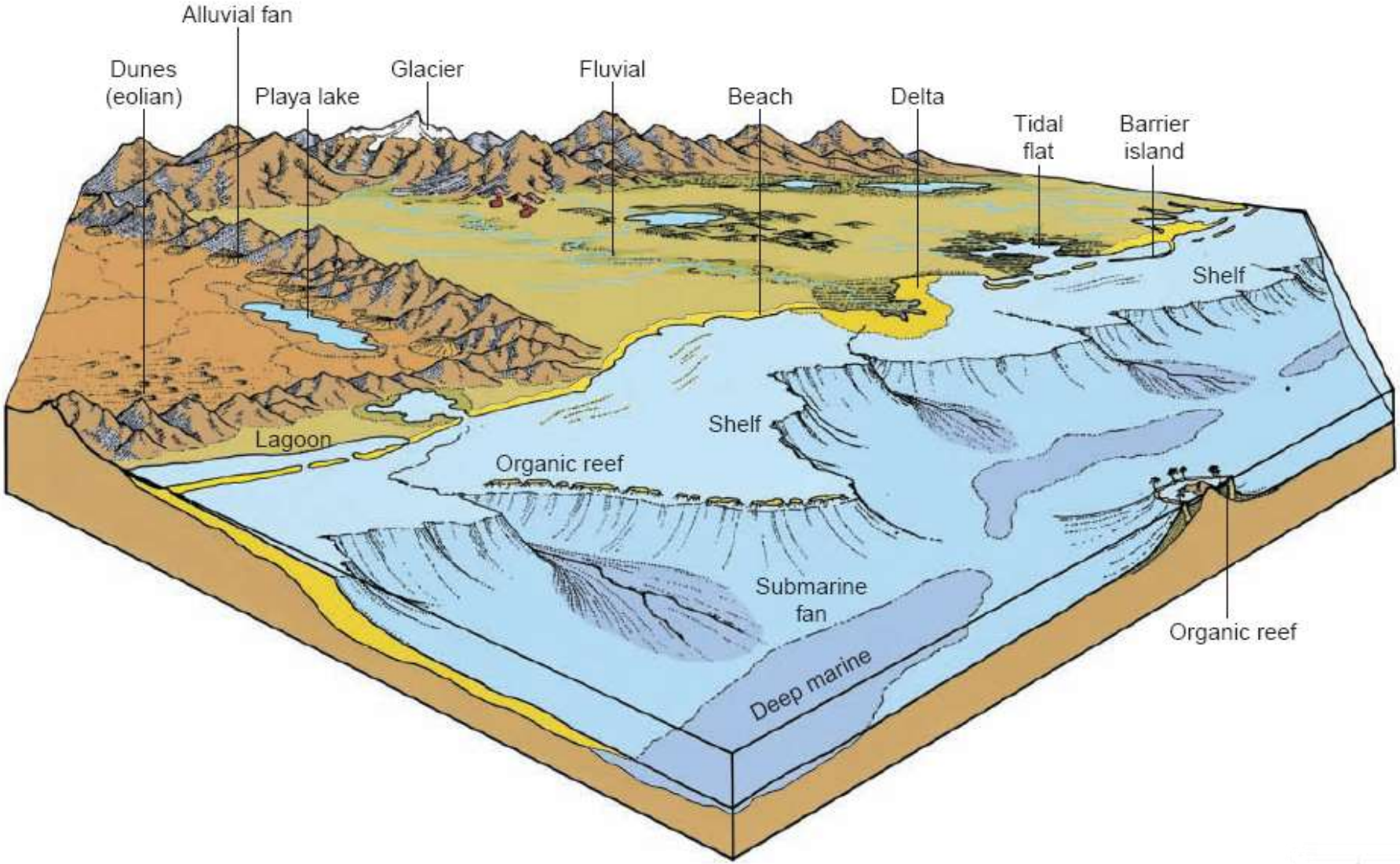


Sandstone

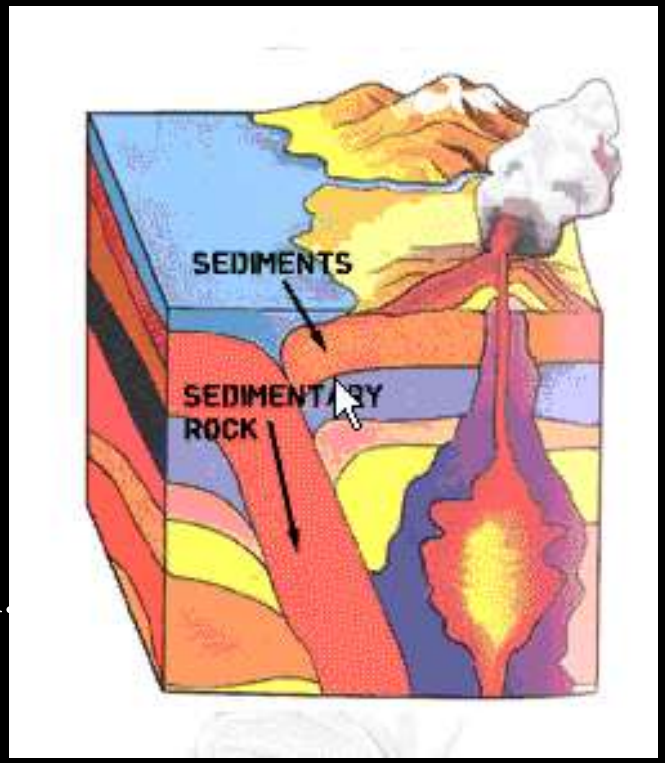
Limestone

Conglomerate

Sedimentary systems



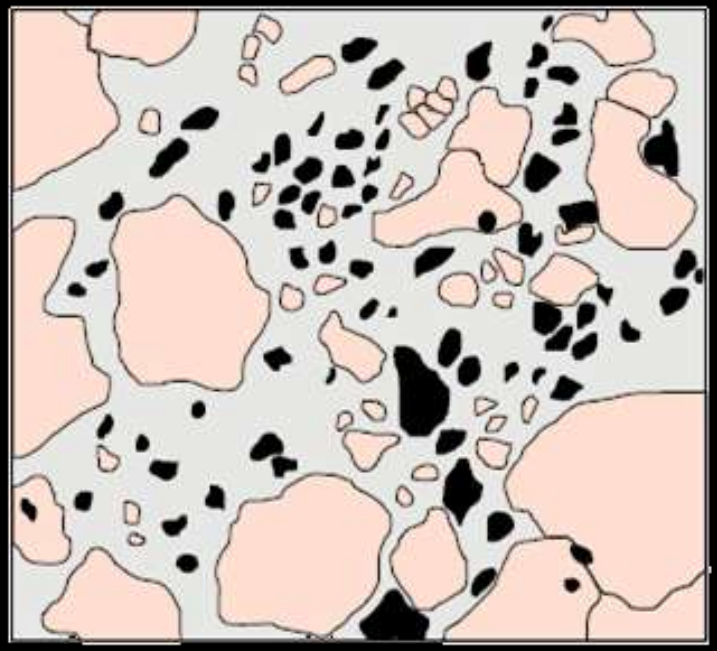
Metamorphic Rocks



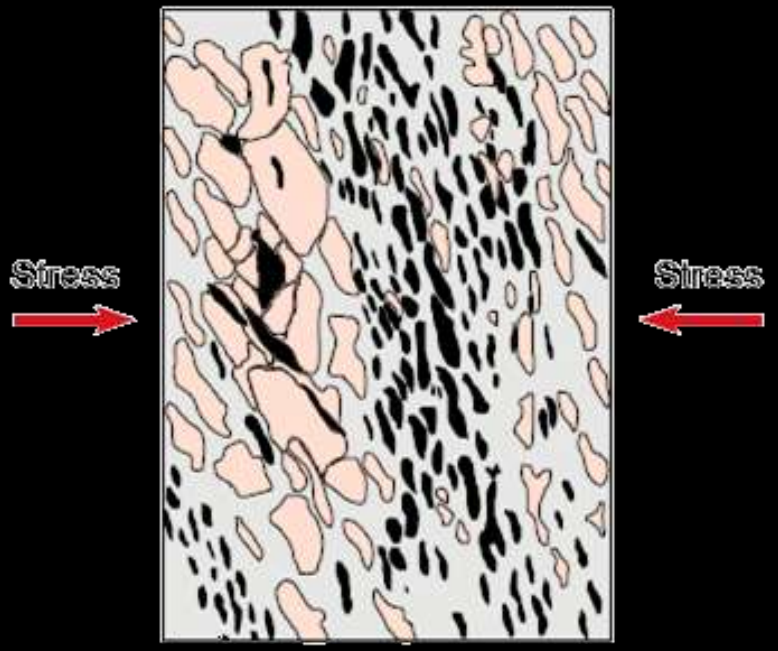
Source: www.fi.edu

- Change in form.
- Caused by Temperature, Pressure or Solution.
- Usually the rocks become harder and
- more compact due to metamorphism.
- Realignment of grains along the weak planes.

Formation of metamorphic rock



Granite



Gneiss

Formation of metamorphic rock

Granite

Gneiss

Gneiss

So the types of rocks are.....

Igneous Rocks

THE BURNT ROCKS

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Sedimentary Rocks

THE BEDDED ROCKS

Rocks formed by processes that cause material to ...

- Settle
- Accumulate
- Precipitate

Metamorphic Rocks

THE DIFFERENTIATED ROCKS

Change in form.
Caused by Temperature, Pressure or Solution.

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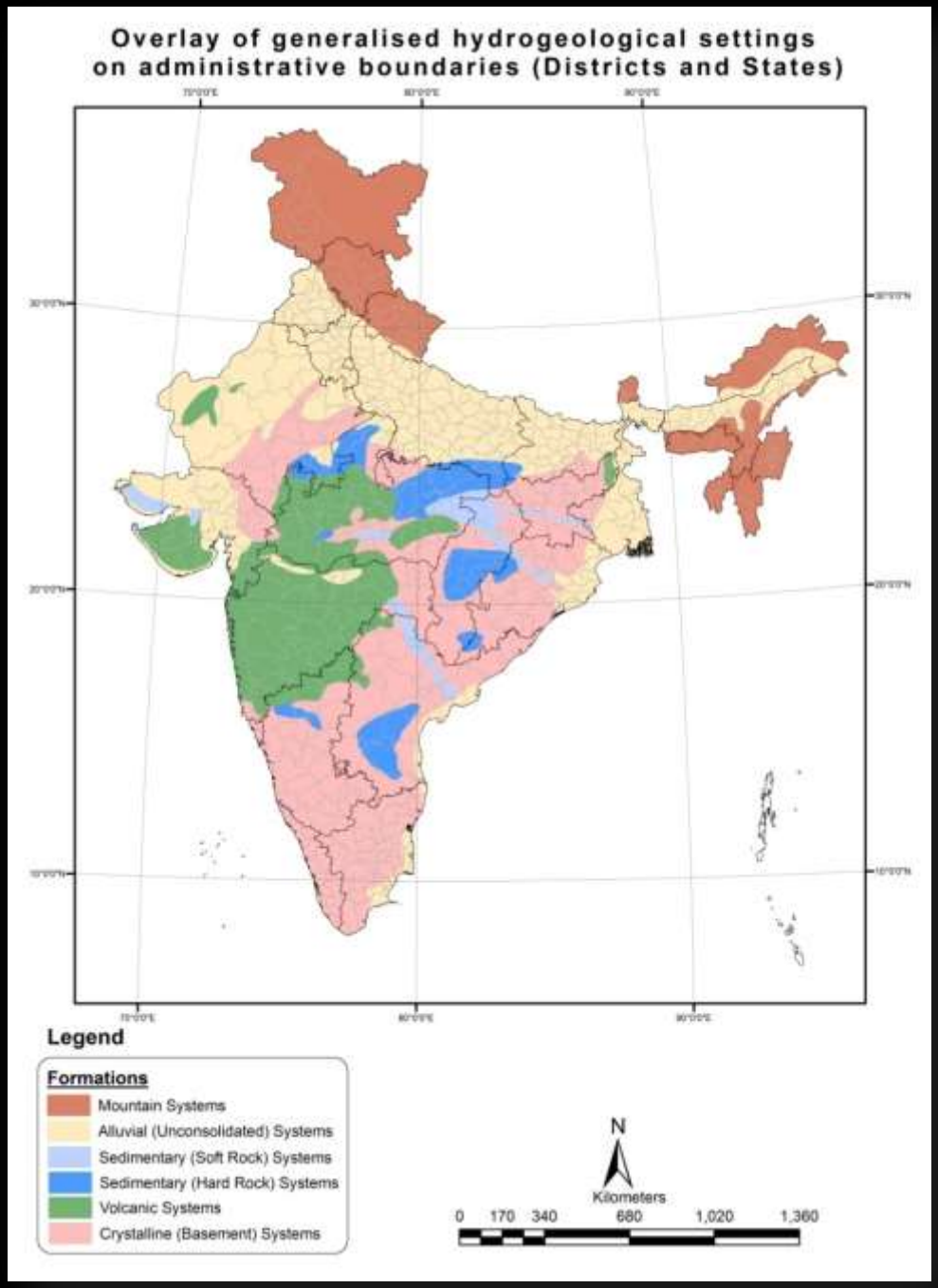
Realignment of grains along the weak planes.



Mountain Systems
- All 3 types of rocks.
- Structure plays a significant role.

Alluvial (Unconsolidated) Systems
Water in sand and silt lenses.

Sedimentary (Soft Rock) Systems
- Coarse sandstone, grit, coal, fossil rocks.
- Usually contain large number of openings and water travels through them quickly.

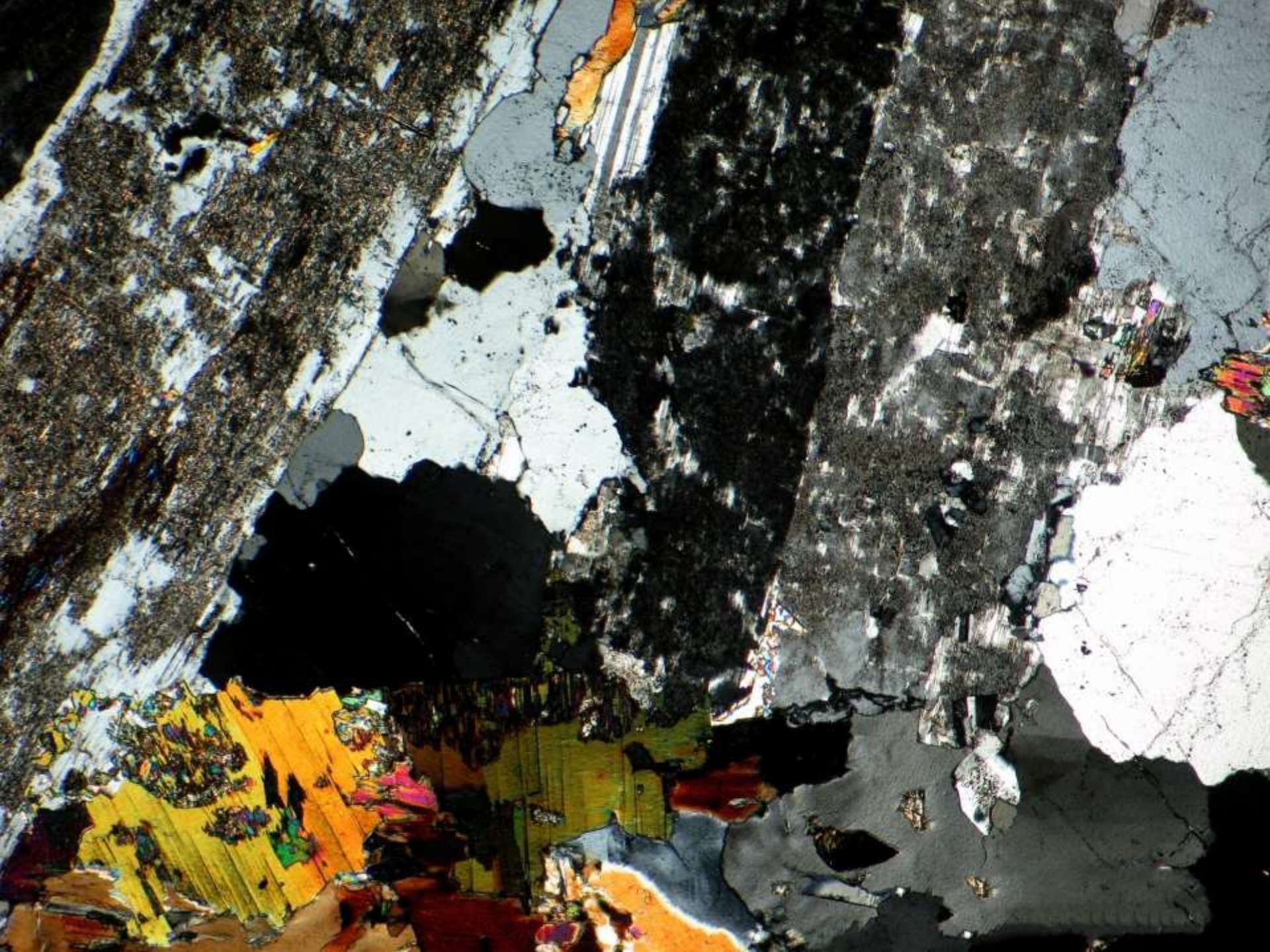
Sedimentary (Hard Rock) Systems
- Sandstones, limestones, siltstones.
- Contain lesser water than soft sedimentary rocks.
- Bedding, fractures and joints may play a significant role.

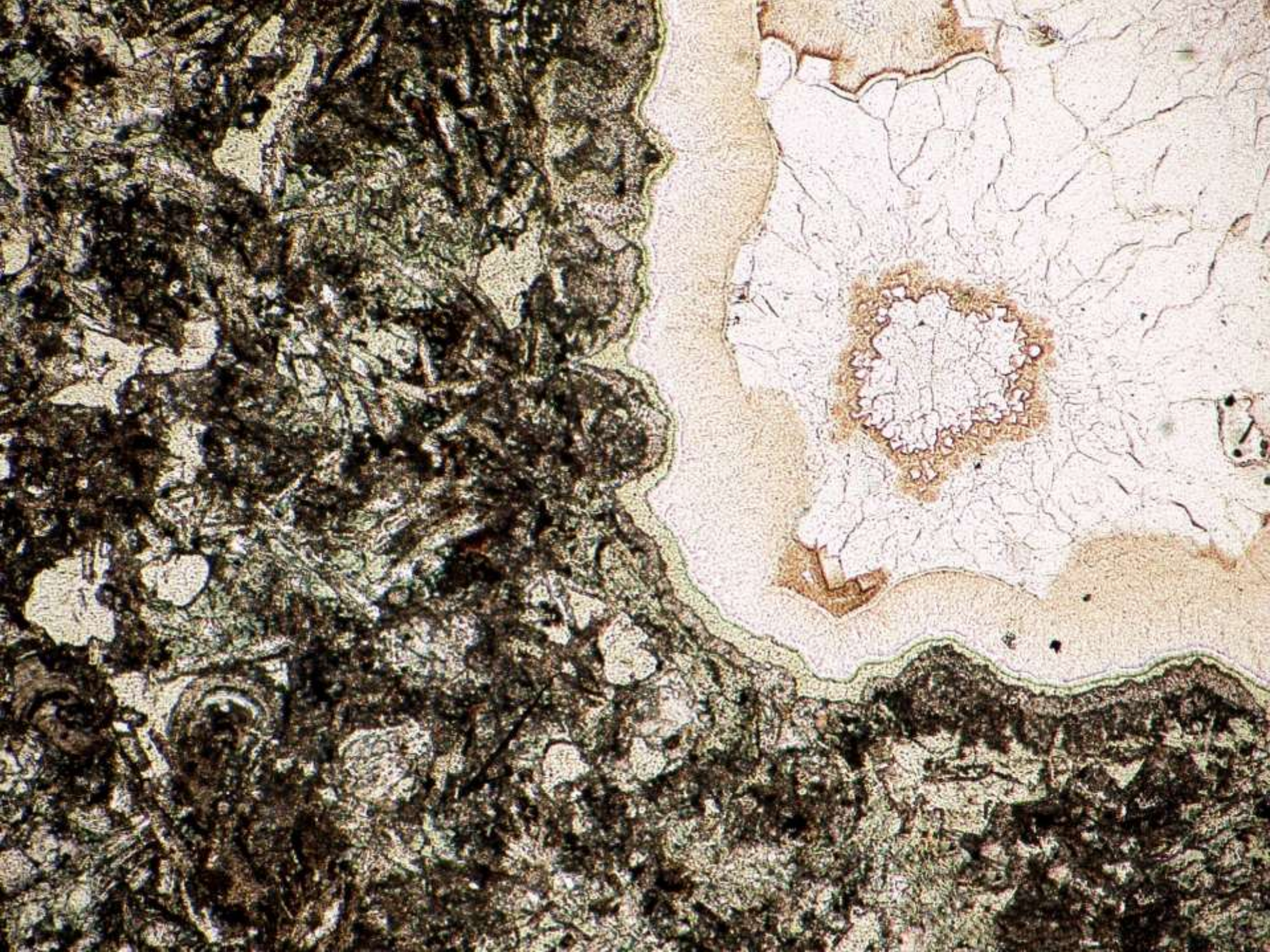
Volcanic Systems
- Mostly basalt.
- Dykes.
- Water stored in vessicles and weathered zones
- Movement mostly through joints .

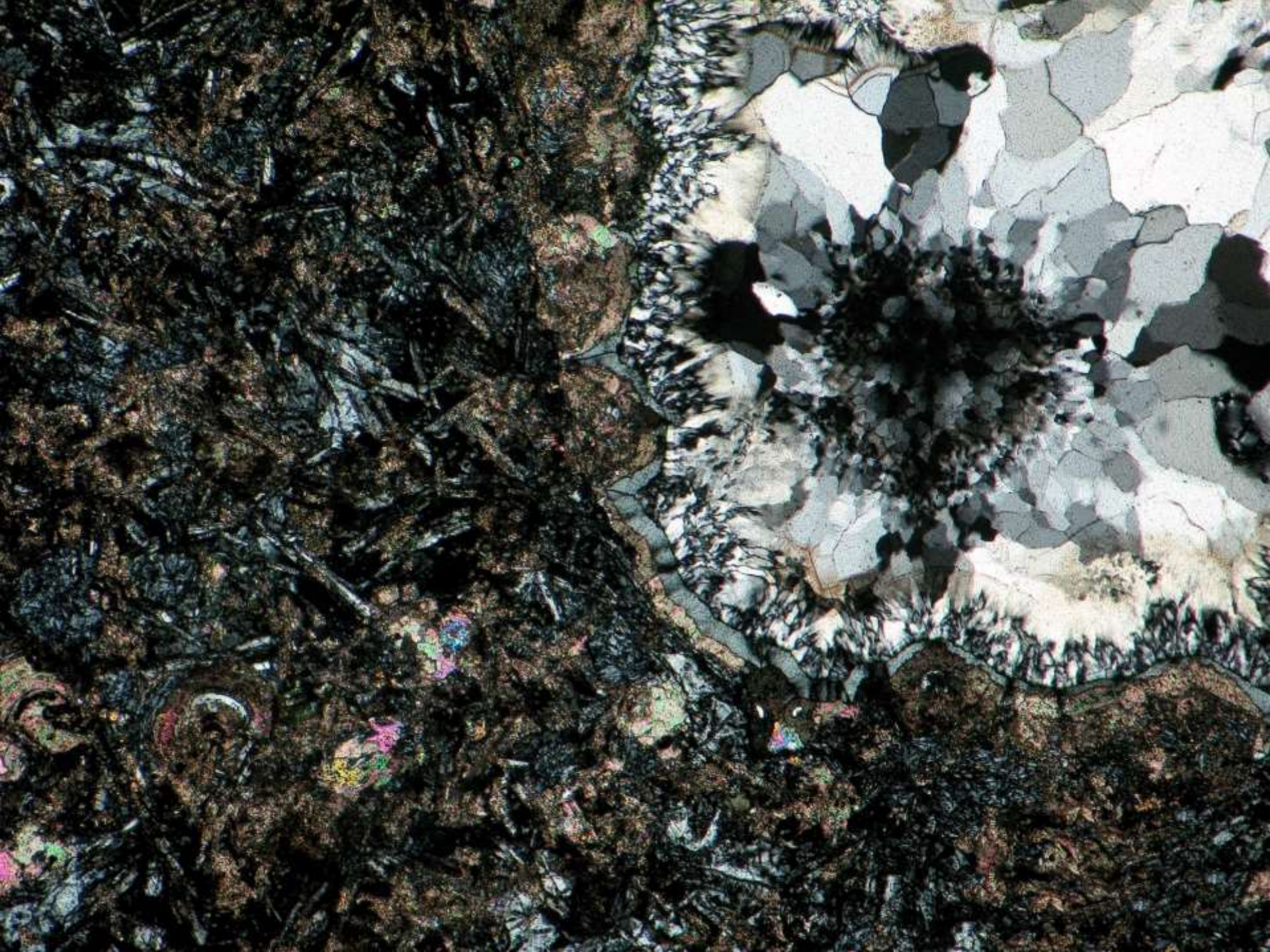
Crystalline (Basement) Systems
- Granites, schists, gneisses.
- Water moves through weathered zone,
- joints and fractures.

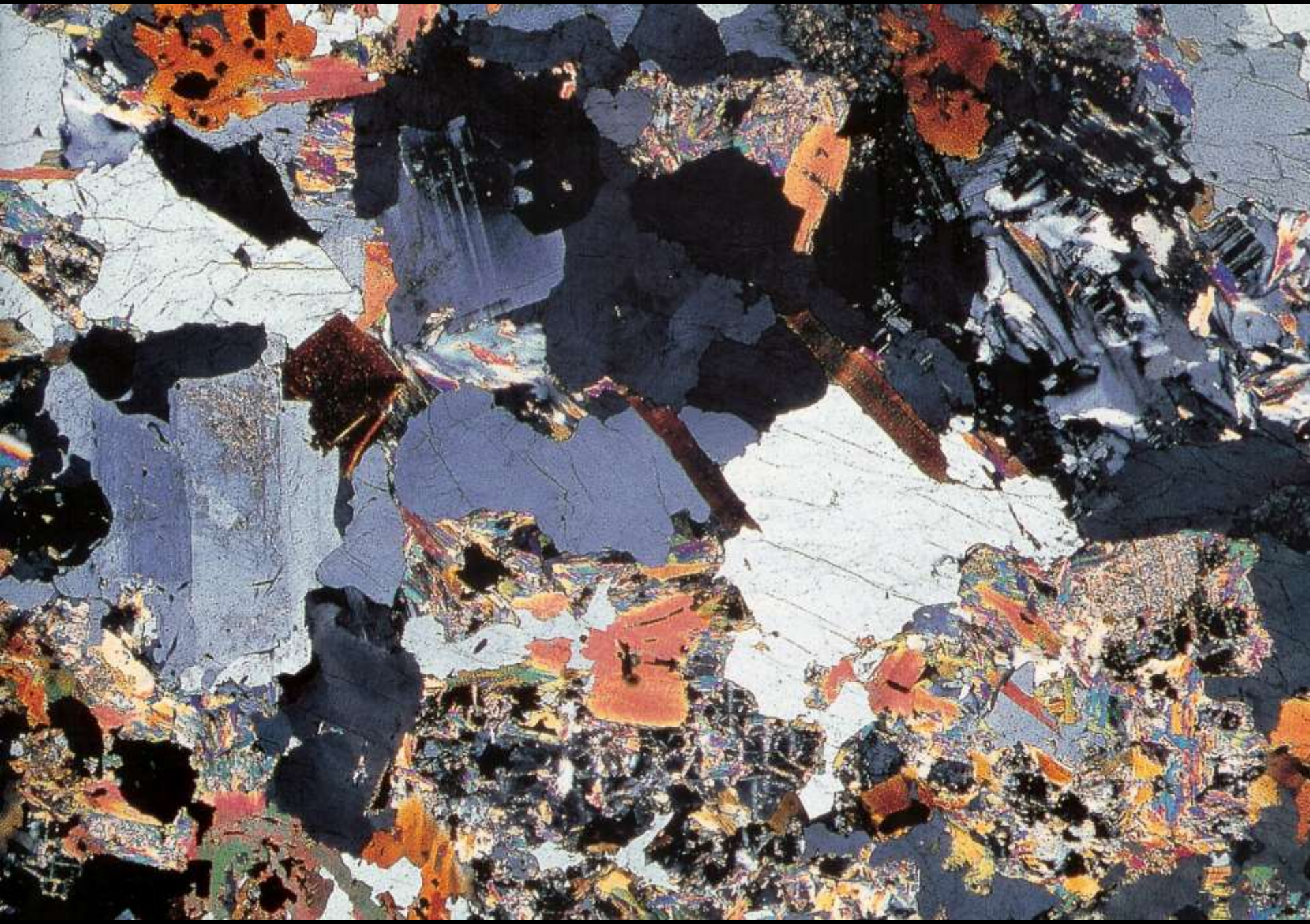
Rocks

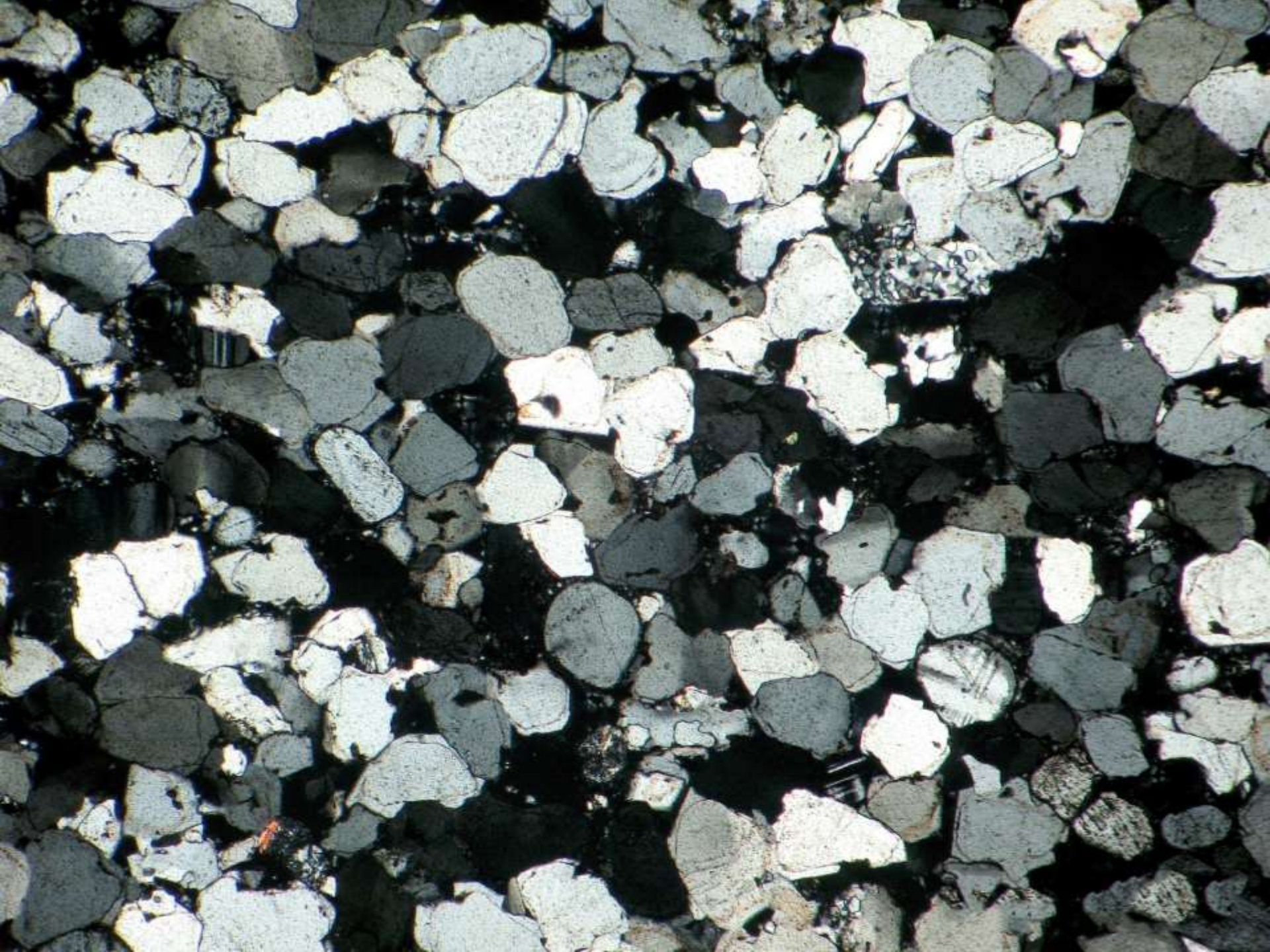
Igneous Rocks	Sedimentary Rocks	Metamorphic Rocks
Granite	Sandstone	Gneiss
Basalt	Shale	Schist
Obsidian	Limestone	Quartzite
Pumice	Conglomerate	Slate
Rhyolite	Grit	Marble
Gabbro		Amphibolite
Dolerite		

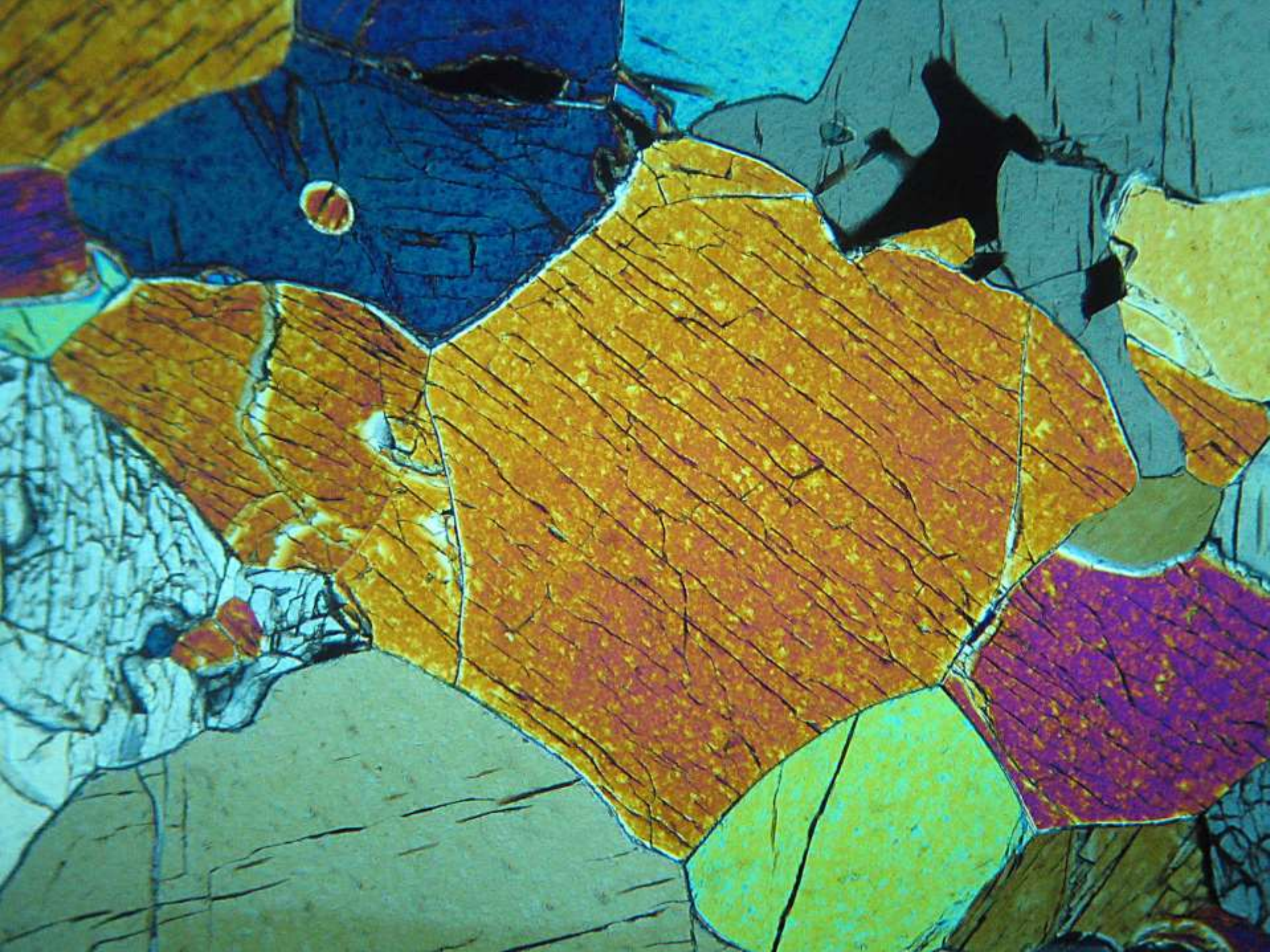













Quartz
Biotite mica
Pink feldspar

Thank you

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