Phyllite Encyclopedia Article

Phyllite

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Phyllite

Phyllite is an intermediate-grade, foliated **metamorphic rock** type that resembles its sedimentary parent **rock**, shale, and its lower-grade metamorphic counterpart, **slate**. Like slate, phyllite can be distinguished from shale by its foliation, called slaty cleavage, and its brittleness, or fissility. Both slate and phyllite are generally dark-colored; their most common color is dark gray-blue, but dark red and green varieties also exist. Unlike slate, phyllite has a characteristic glossy sheen, its foliation is usually slightly contorted, and it rarely retains traces of the original sedimentary **bedding**. Phyllite also lacks the large, visible mica **crystals** and high-grade index **minerals** diagnostic of **schist**, its higher-grade metamorphic cousin.

Heating and compression of clay-rich, bedded **sedimentary rocks** called shales creates a series of rock types of increasing metamorphic grade: slate, phyllite, schist, and **gneiss**. During **metamorphism** of shales, and occasionally volcanic ash layers, metamorphism transforms platy **clay** minerals into small sheets of mica. As the intensity of heating and compression, the so-called metamorphic grade, increases, the mica sheets align themselves perpendicular to the direction of stress, and they grow larger. In phyllite, the crystals of sheet-silicate minerals like chlorite, biotite, and muscovite are large enough to give the rock its distinctive satin sheen and slaty cleavage, but not large enough to be visible to the unaided eye. The amount of heat and pressure required to transform shale to phyllite is generally sufficient to destroy any original sedimentary layering. Additional metamorphism transforms phyllite to schist; all the original clay and small mica crystals transform into large mica crystals, any remaining organic material is destroyed, and high-grade metamorphic index minerals like garnet and staurolite grow in the micaceous matrix.

Slates and phyllites typically form along the edges of regional metamorphic belts where clay-rich, marine sedimentary rocks have been caught between colliding continental plates, or scraped off the seafloor into an accretionary wedge above a **subduction zone**. Slates and phyllites may also form in sedimentary basins where marine muds have been extremely deeply buried. The assemblage of minerals usually present in phyllite is referred to as greenschist facies, and includes chlorite, muscovite, sodium-rich **plagioclase feldspar**, and a small amount of **quartz**. Greenschist metamorphism of shales requires moderate amounts of both heating and compression, consistent with the conditions present in accretionary wedges, shallow continental fold belts, and very deep sedimentary basins.

See Also

Greenstone Belt