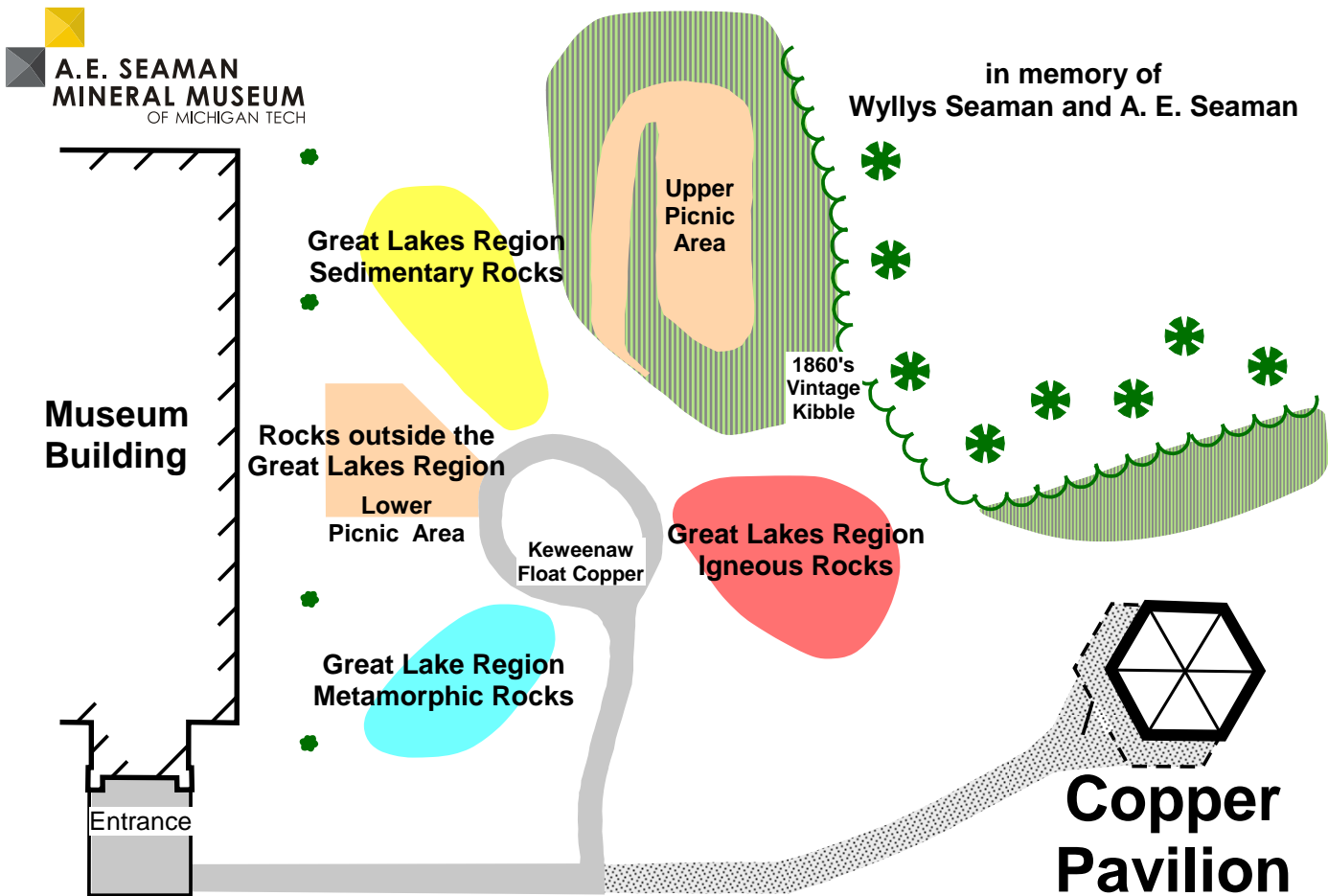


# Guide to rocks of the Phyllis and Jack Seaman Garden



The Phyllis and John Seaman Garden exhibits common to less common varieties of rocks from the Great Lakes region in an attractive setting of an ornamental garden. The Great Lakes Region rocks are organized by the rock cycle as described on the back of this guide. The rocks and some of the plants are labeled. Signs for individual rocks contain their scientific name additional information such as locality. Rocks are the building blocks of Earth although they are not normally as visually stunning as the minerals exhibited in the main museum building.

## What is the difference between a mineral and a rock?

- **Minerals** are natural, homogenous, inorganic chemical compounds.
- **Rocks** are generally made up of one or more minerals although a few rocks are composed of natural materials that are not minerals.

## Types of rocks

- **Rocks** are divided into three main types based on the process of formation

**Igneous** - formed from cooling of molten rock called magma.

Volcanic rocks - when magma cools quickly on or near the surface of the Earth.

Plutonic rocks - when magma cools slowly beneath the surface of the Earth.

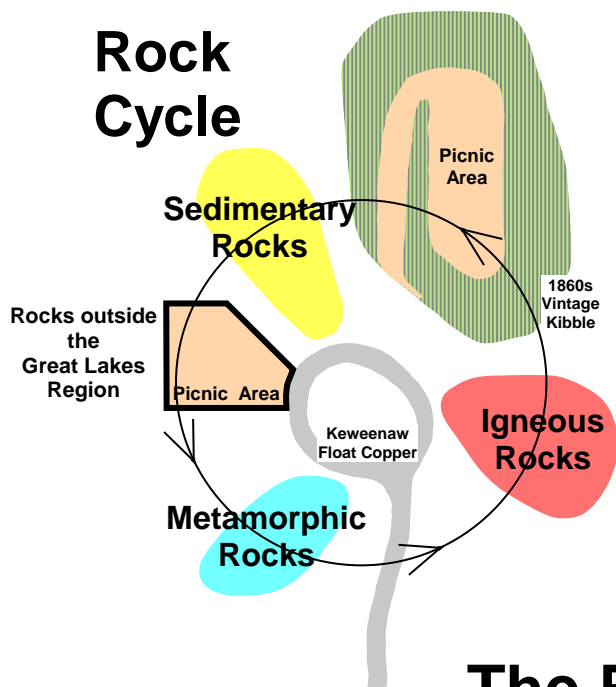
**Sedimentary** - formed of fragments of pre-existing rocks that are cemented together or from precipitation of dissolved pre-existing rocks

**Metamorphic** - formed from pre-existing rocks that are changed in texture, structure, or minerals by application of heat and pressure

## Names of rocks

Rocks are named using a combination of the minerals in them, the texture, and the internal structure

# Rock Cycle



# Rocks in the Garden

Most rocks in the Phyllis and John Seaman Garden are from the Great Lakes region following the focus of the museum's mineral collection. The rocks located around the lower picnic area are from outside of the broader Great Lakes region.

In addition to rocks, there is a beautiful mass of glacially transported and smoothed native copper from the Keweenaw Peninsula and an 1860s vintage kibble used in a Keweenaw native copper mine.

# The Rock Cycle

The rock cycle provides an overview of the slow transition from one rock type to another over geologic time promoted by plate tectonics. The cycle begins with molten rock, called **magma**, which forms as deep as 250 km (150 miles) below the surface. Upon cooling, magma solidifies into **igneous rock**; those solidifying at the surface are called *volcanic* rocks and those below the surface are called *plutonic* rocks. Igneous rocks at the surface are subjected to weathering by the action of water, wind, and ice. Weathering converts the rock into fragments or dissolves it into water. The loose fragments or precipitates from water, called sediment, are buried and lithified, by processes such as cementation and compaction, into **sedimentary rock**. As the sedimentary rock is deeply buried it is subjected to elevated temperature and pressure. The elevated temperature and pressure changes the minerals, texture, and/or the internal structure of the sedimentary rock and this changed rock is called a **metamorphic rock**. If the temperature and pressure continues to increase the metamorphic rock would melt to form a magma and begin the rock cycle again.

The simple rock cycle is more complicated as short cuts are common. Igneous rocks can be changed by elevated temperature and pressure into a metamorphic rock, skipping the sedimentary step. By increasing the temperature and pressure even more the rock could melt producing a magma. Crystallization of the magma would form an igneous rock once again. A sediment can be lithified into sedimentary rock during shallow burial, can be uplifted to the surface by faulting, weathered into sediment and lithified into another sedimentary rock. Metamorphic rocks can be uplifted to the surface by faulting too, undergo weathering and then form into sedimentary rock. This sedimentary rock derived from weathering of a metamorphic rock can be buried and changed into a new metamorphic rock. A metamorphic rock can be subjected to a second episode of elevated temperature and pressure, but not melted, and the original metamorphic rock can be changed into a new metamorphic rock. One rock becomes another in the rock cycle.

