Visitor's Guide to the Stone Slabs

Earth Sciences Building
2077 Main Mall
University of British Columbia

The stone slabs outside of the Earth Sciences Building at UBC represent one of several unique ways that teaching and learning about earth sciences was integrated with construction of the building. The slabs are used as an outdoor laboratory for students who are learning about minerals, rocks, and rock-forming processes. Twenty-one different stone slabs were incorporated into three outside walls surrounding the Ross Beaty Lecture Hall, and a path around three sides of the building provides access to the slabs for detailed examination. Each stone slab is identified by name.

What's in a name?

Shakespeare got it right when he posed that question. The names on the slabs identify a variety of different common rocks that are used in building or decorative stone applications, but the slabs are important for more than just their names. At first glance they all are beautiful to look at. Closer examination reveals that they contain intriguing minerals as well as fascinating shapes and colour combinations. Understanding the properties of the minerals and rocks and the processes that formed them is important to our society. For example, the relationship between mineral grains in a rock, called rock texture, is used by professional geoscientists and engineers to determine the suitability of certain rocks for tunnels or building foundations. Other features visible in the stones help geoscientists determine how rocks deform at high pressures and temperatures at depth in the Earth's crust, which may lead to a greater understanding of the tectonic forces that shape continents. Fossils in some of the sedimentary rocks yield clues about past life and ancient environments on Earth.

Where do the stone slabs come from?

Companies can be secretive about the origins of commercially available stone slabs for competitive reasons. Major sources include quarries in North America, Europe, China, and India. The courtyard located south of the Earth Sciences Building incorporates additional rocks from localities in British Columbia and the rest of Canada.

Stone Slabs (listed in order counter-clockwise)

1. Marble

Marble forms when a limestone is subjected to high temperatures and/or pressures in the crust. Marble is typically white and composed of the mineral calcite. This marble is coloured because the limestone originally contained some silicate mineral impurities in addition to calcite, and this caused new minerals to form during metamorphism.

2. Gneiss

Gneiss (pronounced 'nice') is a metamorphic rock formed from a pre-existing rock that subsequently is subjected to high pressures and temperatures at depth. This causes the original minerals to recrystallize and coarsen, new minerals to grow, and colour banding to develop.

3. Gneiss

All gneisses do not look the same, due to varying percentages of different minerals as well as variations in colour banding.

4. Granite

To the building stone industry, granite is any rock made of hard silicate minerals. To a geoscientist, granite is an igneous rock composed mostly of visible crystals of quartz, potassium feldspar, and plagioclase feldspar that forms from slow cooling deep in the Earth's crust. Most "true" granites form in continental crust.

5. Granite

Four minerals in this rock can be distinguished with the naked eye: quartz (grey), potassium feldspar (pink), plagioclase feldspar (white), and biotite (black).

6. Gneiss

Another *nice* rock!

7. Gabbro

What is a gabbro? It is an igneous rock composed of variable amounts of visible crystals of plagioclase feldspar, pyroxenes, and olivine that forms from slow cooling deep in the Earth's crust. If magma of gabbroic composition erupted at the surface, it would form a lava flow of basalt.

8. Gabbro

Look closely and you will see crystals of a highly reflective brown mineral called orthopyroxene in this gabbro.

9. Gneiss

Gneiss is a popular building stone because it is durable, polishes well, and is resistant to weathering.

10. Gneiss

Colour banding is well developed in this gneiss. At the quarry this slab was cut at an angle to the layers, so it forms interesting patterns.

11.Meta-conglomerate

An amazing story of multiple events is recorded in the features of this rock! It started out as a sedimentary deposit composed of cobbles and pebbles of igneous and metamorphic rocks, but later was hardened by high temperature and pressure at depth in the crust before being brought back to the surface.

12. Meta-conglomerate

This meta-conglomerate's history is in part the same as and in part different from the one to its left. The reddish-brown bands formed from iron that was dissolved out of the rock by groundwater and later re-deposited.

13. Gneiss

The red-brown mineral found in the white layers in this rock is garnet.

14. Migmatite

What is a migmatite? It is a “mixed” rock containing both metamorphic and igneous components.

15. Migmatite

The lighter-coloured layers in this migmatite are thought to have formed by melting of lower-temperature components of the original rock during metamorphism at depth. But the melt (magma) was trapped in the rock, and cooled within the residual dark metamorphic layers to form lighter layers of igneous rock.

16. Gneiss

Can you spot the red garnet crystals in this rock? They grew during metamorphism.

17. Sandstone

Look closely to see the individual sand grains that naturally were cemented together to form this rock. The wild irregular bands formed after deposition of the sand grains, from movement of soluble iron throughout the rock.

18. Travertine

Travertine forms when hot or cold springs precipitate layers of carbonate minerals such as calcite.

19. Quartz monzonite

Not all coarse-grained igneous rocks are true granites! This rock contains less quartz and more feldspars than granite. Rocks like this one are common in the nearby Coast Mountains.

20. Travertine

Travertine is a variety of limestone. Can you spot the fossilized snails in this rock?!

21. Dolostone

This rock consists of a mineral called dolomite, a calcium-magnesium carbonate. Fossils within it are used to determine the environment where it was deposited and they may help determine the age of the rock.

If you are interested in learning more about local building stones, please see the free online guide called Downtown Vancouver Geotour, published by the Mineral Resources Education Program of BC, which contains detailed information on over twenty building stone localities in the downtown area. The Geological Association of Canada also sells a softcover book Geology Tours of Vancouver's Buildings and Monuments (2003) by Mustard, Hora and Hansen, which may be ordered through their online bookstore.

For more information, please contact:
Department of Earth, Ocean, and Atmospheric Sciences
2020-2207 Main Mall
University of British Columbia
Vancouver, B.C. V6T 1Z4
604-822-2449
www.eos.ubc.ca

Author: Mary Lou Bevier