



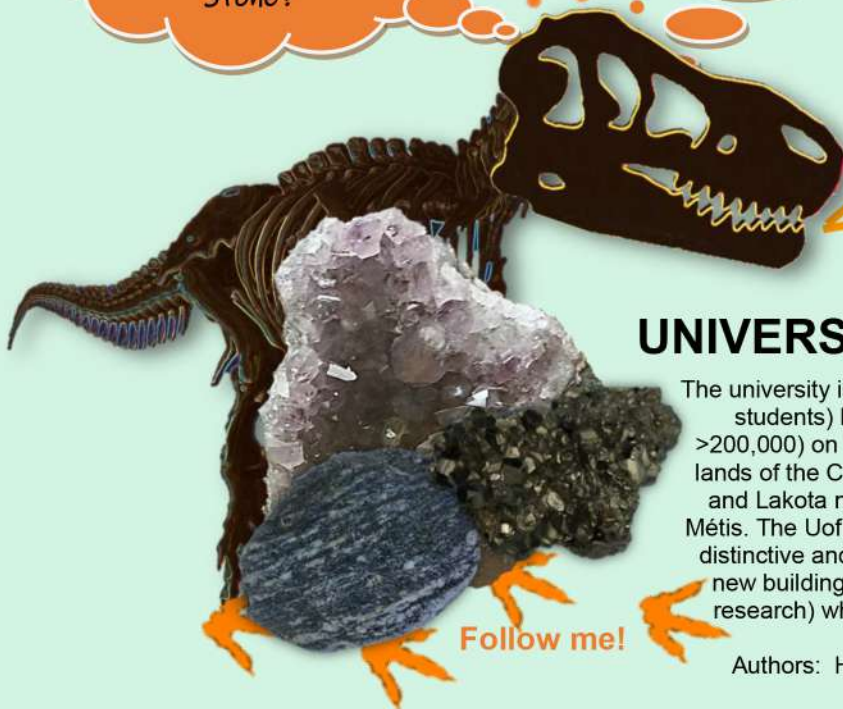
U of Rocks!

TOUR THE ROCKS ON THE UofR CAMPUS!!

LEARN ABOUT ROCKS, MINERALS & FOSSILS!!!

How do I identify
a rock or mineral?
What is Tyndall
Stone?

What rocks grab your attention?
Why do rocks look different from
each other?
What is the difference between
a rock and a mineral?



ROAR!

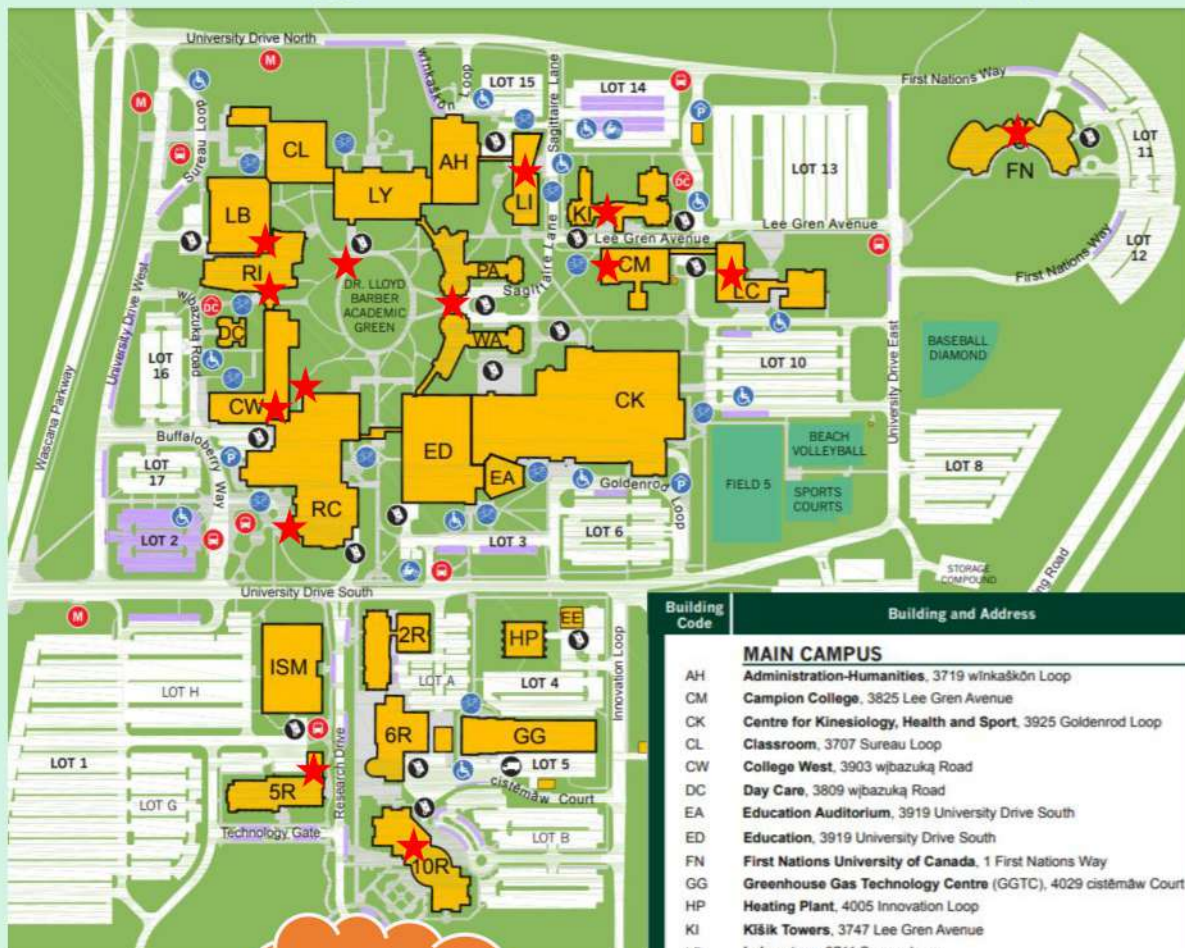
UNIVERSITY OF REGINA

The university is a comprehensive body (>15,000 students) located in Regina (population >200,000) on Treaty 4 territories, the ancestral lands of the Cree, Saulteaux, Dakota, Nakoda, and Lakota nations and the homeland of the Métis. The UofR has established a reputation for distinctive and innovative programs and many new buildings (for residences, teaching and research) which are the subject of this tour!

Follow me!

Authors: H Roemer & J Normand (2019)

Geology Rock Tour Guide Map



Building Code	Building and Address
MAIN CAMPUS	
AH	Administration-Humanities, 3719 Winkaskön Loop
CM	Campion College, 3825 Lee Gren Avenue
CK	Centre for Kinesiology, Health and Sport, 3925 Goldenrod Loop
CL	Classroom, 3707 Sureau Loop
CW	College West, 3903 Wjbazuká Road
DC	Day Care, 3809 Wjbazuká Road
EA	Education Auditorium, 3919 University Drive South
ED	Education, 3919 University Drive South
FN	First Nations University of Canada, 1 First Nations Way
GG	Greenhouse Gas Technology Centre (GGTC), 4029 Cistémaw Court
HP	Heating Plant, 4005 Innovation Loop
KI	Kiik Towers, 3747 Lee Gren Avenue
LB	Laboratory, 3711 Sureau Loop
LC	Luther College, 3829 Lee Gren Avenue
LI	Language Institute, 3727 Sagittaire Lane
LY	Dr. John Archer Library, 3715 University Drive North
PA	Paskwáw Tower, 3817 Sagittaire Lane
RC	Dr. William Riddell Centre, 3907 Buffaloberry Way
RI	Research and Innovation Centre, 3805 Wjbazuká Road
TD	Technology Development Facility, 3303 Grant Road
WA	Wakpá Tower, 3821 Sagittaire Lane
INNOVATION PLACE	
2R	2 Research Drive, 2 Research Drive
5R	Saskatchewan Disease Control Laboratory, 5 Research Drive
6R	Petroleum Technology Research Centre (PTRC), 6 Research Drive
10R	The Terrace, 10 Research Drive
ISM	ISM, 1 Research Drive

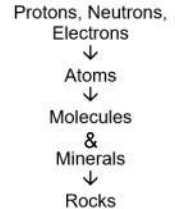
The Tour
Begins on
Page 5



Geology Basics: Minerals

What is a Mineral?

Minerals are the building blocks of rocks and sediments that make up the Earth and its landscapes. Earth's crust is composed of about 3000 minerals. Only 30 of these minerals are extremely common. Minerals are everywhere. For example, gypsum is used in gyprock/drywall. Minerals are naturally occurring, inorganic solids with a definite chemical composition and an ordered internal crystalline structure.



How do you Identify a Mineral?

Geologists use several different ways to identify minerals. One way is by looking at a mineral's physical properties.

- Colour** – This is the first property that most people notice of a mineral. However, it can be the least useful in its identification. Many common minerals occur in more than one colour (e.g., quartz); several minerals tarnish or oxidize, which affect their colour. For example, the Saskatchewan Legislative building recently had restoration of its beautiful copper dome, but it will slowly oxidize from its present colour to green.
- Luster** – describes the way a mineral reflects light. Minerals can be categorized as **Metallic** (looks like metal) and **Non-Metallic** (e.g., dull, earthy, glassy/vitreous).
- Streak** – The colour of finely ground powder of the mineral when using a streak plate (unglazed porcelain). The true colour of minerals that are metallic or earthy can be determined from their streak.



Metallic



- Cleavage** – describes how a mineral breaks into flat surfaces (usually one, two, three or four). Cleavage is determined by the crystal structure of the mineral, where the break occurs along plane/flat surface(s) where the bonds are weak.
- Hardness** – describes a mineral's resistance to scratching. It is measured compared to common objects such as a knife and compared to the Moh's Hardness Scale (from 1 – 10; talc is the softest at 1 and diamond is the hardest at 10).
- Many other properties can help with identifying minerals. For example, magnetite is **magnetic**. Also, calcite reacts rapidly with dilute **HCl** (or strong vinegar), while dolomite reacts weakly with dilute HCl.



Geology Basics: Rock Types

What is a Rock?

Rocks are naturally occurring materials with distinctive textures and, commonly, minerals. Rocks are classified by how they are formed.

Three Rock Types

Igneous – formed from cooling and solidification of magma (below the surface) or lava (above the surface). They can be:

- Intrusive - formed below the surface of the Earth. These rocks take longer to cool, so they develop larger crystals.
- Extrusive - formed at the surface. They cool faster, have small crystals and may be vesicular (remnants of gas bubbles).

Each can be light, intermediate or dark (e.g., granite, diorite and gabbro respectively).

Non-Clastic

Clastic



Metamorphic – formed when pre-existing rocks undergo a change due to increasing temperature and/or pressure in the Earth's crust. They can be:

- Contact - produced near a magma where heat is a major influence creating non-foliated rocks.
- Regional – produced due to mountain building where both pressure and temperature increase. The pressure will cause minerals to align creating foliated rocks (aligned minerals with or without bands as in a gneiss).



Sedimentary – formed by the compaction due to burial of sediments or precipitation. They can be:

- Clastic - made from pieces of rocks (sediments). They are identified by their grain size (e.g., sandstone made of sand-sized sediment).
- Non-Clastic - chemical and biochemical sedimentary rocks due to precipitation of minerals or the presence of fossils (e.g., travertine)

Foliated

Non-Foliated



Welcome to the Geology Department!

★ **LOCATION:** 2nd floor College West Building (CW). Go up the stairs located by the bookstore and across from UR International office, by the elevators. Turn right toward the “Rock Wall.”



The “Rock Wall” sits on Tyndall Stone (p.9) and was donated by Tubello Stoneworks in Regina. The slabs of rock from left to right are:

- **Syenite** – coarse-grained, felsic intrusive igneous rock. Major minerals include K-feldspar (pink to reddish), amphibole (black), and other feldspars (white/dark grey).
- **Marble** – non-foliated metamorphic rock. The rock is comprised of dolomite (the original – parent - rock is the sedimentary rock limestone). The rock also contains white calcite present in veins crystallized from fluids that infilled the fractures.
- **Anorthosite** – coarse grained intrusive intermediate igneous rock. More than 90% is plagioclase feldspar (black/grey/off white). Other minerals present are magnetite (magnetic), and potentially pyroxene (black, non-magnetic).
- **Gneiss** – foliated metamorphic rock (notice the light and dark banding) with round red to brown garnets and other minerals. Which direction do the bands go? Any ideas as to what other minerals are present?
- **Breccia** – has fragments (pieces) in a clastic sedimentary rock that have undergone hematization (cementation and alteration by the mineral hematite to give a red tinge). Angular fragments present are quartz (grey/white), rock altered to the mineral epidote (green), basalt (black), and diorite (black and white speckled).



Geology Department (Continued)

★ **LOCATION:** 2nd floor College West Building (CW). Go up the stairs located by the bookstore near the elevators. Turn right twice (past the rock wall) and walk up the ramp.



'Ore Rock'

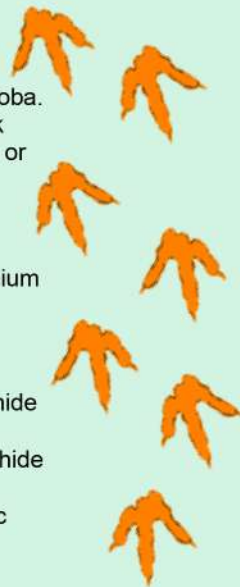
This ore is from the Flin Flon Mine in Manitoba. It weighs 680kg (1500 lbs). An ore is a rock that contains economically valuable metals or minerals.

Metals recovered:

- Major – **Copper & Zinc**
- Minor – Gold, Silver, Cadmium, Selenium & Tellurium

Minerals Present:

- **Pyrite** – large amounts of this fine-grained pale-yellow metallic iron sulphide
- **Chalcopyrite** – small amounts of this metallic brass-yellow copper iron sulphide
- **Sphalerite** – small amounts of this coarse-grained shiny brown/black zinc sulphide



Check out – the glass display cases filled with different kinds of minerals, rocks and fossils. Which one is your favourite and why? Also, check out all the posters on the walls. There might even be some research posters on the walls created by geology students and professors.



The “Three Musketeers”

★ **LOCATION:** Downstairs from College West turn right towards the restaurant and then go left through the first set of doors. Outside, follow the walkway to where it turns.
GPS Coordinates* 13U 0529035 5585112

* All coordinates are based on NAD84.

What rock types are these?

What causes the lines in rock 1?

Is there banding in rock 2?

What causes the banding in rock



-Spoilers-

Rock 1 is a felsic intrusive (granitic) igneous rock that has been slightly metamorphosed. Minerals present include K-Feldspar (pink), biotite (flaky and dark), quartz (grey white), and other feldspars (white). The lines (or glacial striae) on top of the rock were produced by glaciation.

Rock 2 is a metamorphic rock. It does not have light and dark bands of minerals present in a gneiss, but the minerals are still aligned and coarse making the rock a schist.

Rock 3 is also a metamorphic rock, but this one has banding of light and dark minerals caused by lots of pressure (and some heat) that squeezed the rock. There are also some larger white feldspars



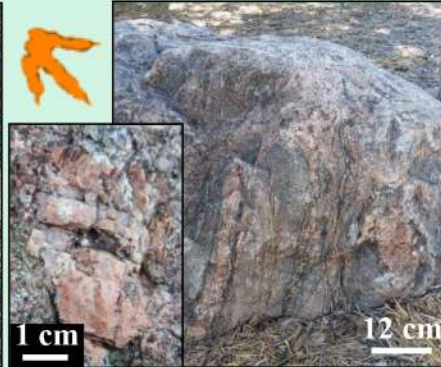
Check out

The outdoor area where lots of different types of rocks and slabs are stored. Some of the rocks are being carved by artists (refer to photo at left). It is near (to the east of) where you are standing.

GPS Coordinates 13U 0529088 5585108

Rock Garden

- ★ **LOCATION:** On the left side of the Academic Green by Archer Library (LY). There is a garden patch very close to the location of the rocks.
GPS Coordinates 13U 0529075 5585230



Most of the 'garden rocks' are similar (alkali granite), but they may have different grain sizes and different states of weathering.

I Spy

Nearby there is a rock that is very different from the other rocks. Can you find it?

Hint – it is surrounded by three wooden posts.

It is a Gneiss!

This gneiss contains different minerals than the other one.

Pegmatite & Gneiss

This rock contains large (≥ 2.5 cm) K-feldspars in a pegmatitic area. It has undergone metamorphism to produce the banding and folding of the mafic minerals (overall it is a gneiss). Pieces of garnet (red/brown) are also present.

Alkali Granite

This is a felsic igneous intrusive rock. It contains minerals similar to those in granites, but with much more K-feldspar (pink). Also, it exhibits glacial polish and striae (refer to the line on the photograph).





Tyndall Stone Construction

What is Tyndall Stone?

-Spoiler-

Tyndall Stone is a non-clastic sedimentary rock made up of limestone (calcite; cream coloured) and dolomite (darker mottling).

The stone contains many different fossils. In fact, the mottled appearance is from burrowing of marine creatures and are a trace fossil (show evidence of the existence without the body fossil). This distinctive mottling/burrowing pattern is called *Thalassinoides*. We will explore other fossils later.



Mottled (burrowed) Tyndall Stone



Research & Innovative Centre

Uses

Tyndall Stone has been quarried in Garson, Manitoba, since 1895, when it was first used as a building stone. The rock formed 445 million years ago in a tropical environment when there was a shallow sea. Today, it is a popular decorative stone used for construction.

Many buildings across Canada were constructed with Tyndall Stone such as:

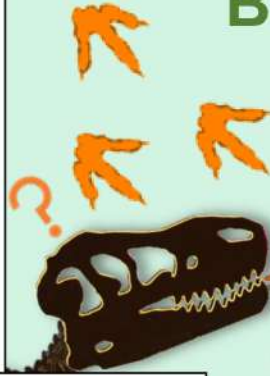
- Canada Parliament Buildings
- Saskatchewan Legislative Building
- University of Saskatchewan
- Canadian Museum of History

Many buildings and some signs at the UofR are made of/contain Tyndall Stone.

Also, artists carve the stone (Refer to figure on the left).



Tyndall Stone Buildings



Can you spot any
Tyndall Stone
Buildings?

-Spoilers-

Language Institute
Classroom & Laboratory Buildings
Research and Innovative Centre
Luther College Kisik Towers
First Nations University of Canada
The Terrace Building
Petroleum Technology Research
Sask. Disease Control Lab
Paskaw & Wakpa Towers



Language Institute



Paskaw Tower & Wakpa Tower



First Nations University of Canada



Kisik Tower



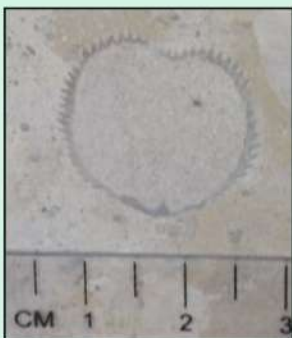
Amazing Tyndall Stone Fossils!

★ **LOCATION:** There are amazing fossils along the 2nd floor terrace wall of the Classroom Building which extends to the Laboratory Building (LB) and Research and Innovative Centre (RIC). Note: Fossils are also found inside the RIC building.

GPS Coordinates 13U 0529061 5585301

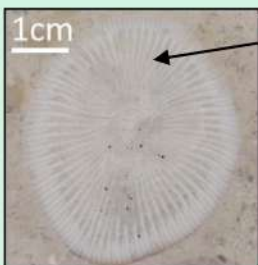


2nd Floor Terrace wall

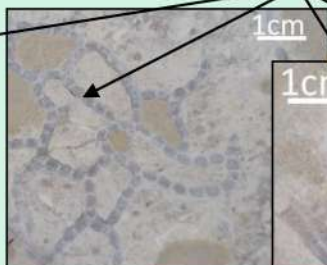


The Brachiopods are shellfish with two shells that look like those you would find on the beach today. However, there are differences. Brachiopods are not common at present times but were dominant in the Devonian.

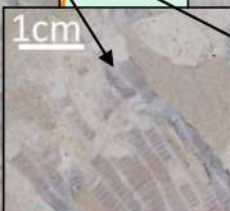
The Cnidaria (Corals)



Rugosa have a distinctive radial pattern. This one is solitary (alone).



Tabulata (Chain Coral) are reef builders, especially in the Silurian. They are colonial (form colonies) with chainlike structures.



Tabulata (Honeycomb Coral) are reef builders, especially in the Silurian. They are also colonial with polygonal structures.



Others

Receptaculites
Some call this the Sunflower Coral. It is not a coral, but a marine calcareous algae. It is now extinct but was a reef builder during the Paleozoic.



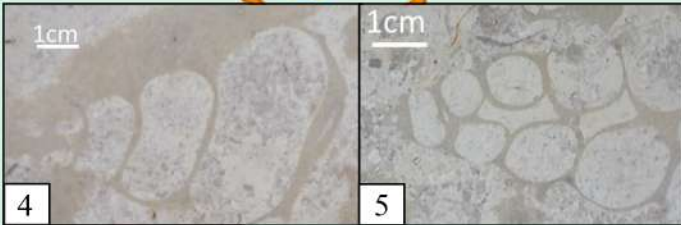
Amazing Tyndall Stone Fossils!

★ **LOCATION:** Walk down Research Drive and explore the outside of the Tyndall Stone Buildings, especially Saskatchewan Disease Control Laboratory (5R) and The Terrace (10R).

Terrace GPS Coordinates 13U 0529135 5584653

Sask. Lab GPS Coordinates 13U 0529035 5584784

The Mollusks



Gastropods are snails with shells that grew in spiral form (photos 4, 5, and 7). Only the shell is fossilized as seen in the photos.



Cephalopods are a group of animals that include the nautilus, squids and octopuses. The shell divided into chambers (photo 6).

Geologic Time Scale

	Age (myr)
Cretaceous	66 T-Rex
Jurassic	138
Triassic	205
Permian	240
Carboniferous	290
Devonian	360
Silurian	410
Ordovician	435
Cambrian	500
Pre-Cambrian	570

Organism



Which fossil is your favourite and why?



The Terrace Building



Campion College "Benefactors Wall"

★ **LOCATION:** Inside toward the west entrance of Campion College (CM)



Benefactors Wall

Are all of the slabs the same?
What is the name of the rock?

Hint 1 - All the same rock type.
Hint 2 - They all have the same rock name.

Hint 3 - You have seen this before.

I Spy

There is another rock type close to the Benefactors Wall.
Can you find it?

It is travertine, a non-clastic sedimentary rock.



K-Feldspar (pink lines) replacing another feldspar



The blue reflection is the labradorescence of plagioclase feldspar (K-feldspar also present)



Mostly feldspar (usually K-feldspar) with very little quartz



Coarse grained rock containing mostly feldspar



-Spoiler-

The Benefactors Wall should be called the "Syenite Wall". You saw syenite at College West. Remember, that syenite is an igneous rock that is intrusive giving its coarse-grained texture. It is similar to granite, but the major difference is that syenite has very little quartz.



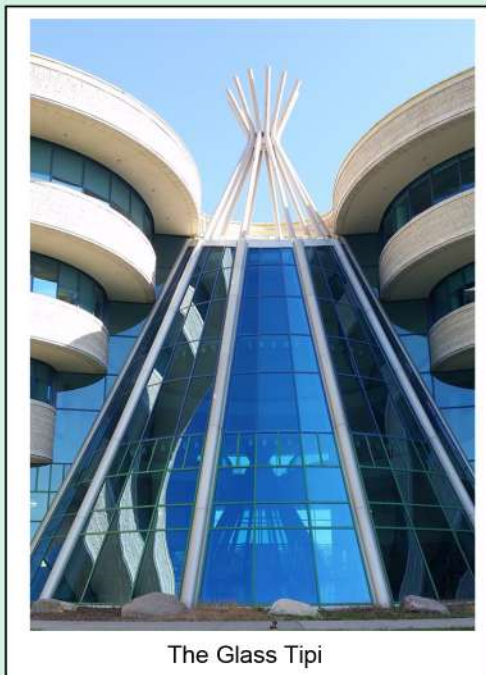
First Nations University of Canada



While at FNU (FN), you are standing on First Nations land. The building was designed to reflect nature by Douglas Cardinal (a world-renowned Indigenous architect). It is covered in Tyndall stone and so it exhibits amazing fossils.

Glass Tipi

Rocks around the outside of the tipi had tobacco placed under them while Elders prayed. Hence, they are a living entity that protects FNU and we need to be respectful of them. Rocks are sacred in First Nations culture, spirituality, and identity. They are used in many ceremonies such as in the sweat lodge and to make sacred pipe bowls.



The Glass Tipi

Four Directions Medicine Wheel

The wheel was envisioned by a female Elder from the Anishnabe Nation.

Many different types of medicine wheels exist with different meanings - made up of rocks, plants, and pathways. This wheel has rocks placed in four directions - to honour the oldest thing we have, the four directions. We seek knowledge and get power from them. The pathways represent all the nations in the world coming together to learn. The seven stones represent growth, order, adequacy, love, security, social approval, and self-esteem.

Medicine Wheel
13U 0529604 5585345



Buffalo Outline 13U 0529710 5585423



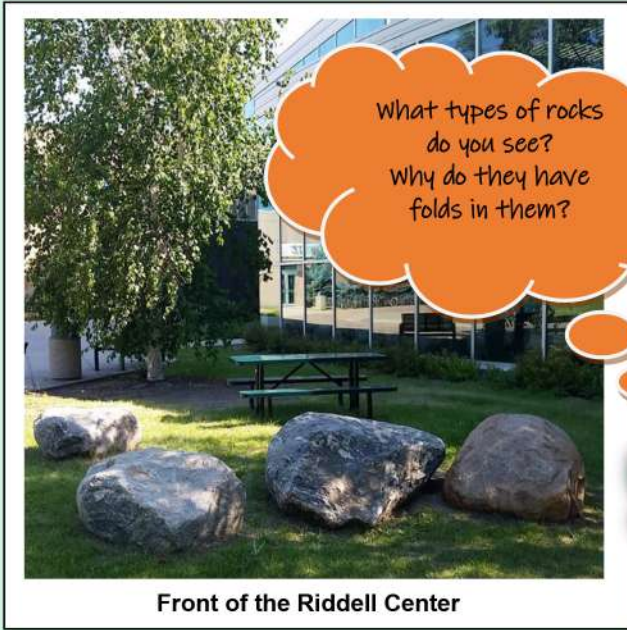
Buffalo Rock & Outline

Buffalo Rocks are shiny from Buffaloes rubbing against them. The rock outline of a buffalo was created in 2014 during the North American Indigenous Games. You are encouraged to bring offerings (rocks) to fill in the buffalo. People often pray and make offerings to large rocks, as they are humbling and have knowledge and memory from when the Earth was young. Hence, they are often called grandfathers. Lastly, please do not take rocks from FNU.



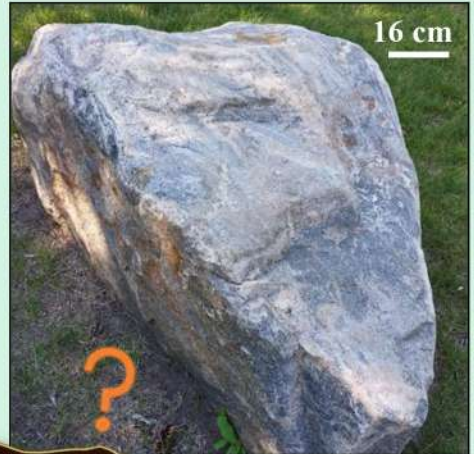
Dr. William Riddell Center

★ **LOCATION:** Outside in-front of the Riddell Center (RC) towards the left side there is a group of four rocks. **GPS Coordinates** 13U 0529021 5584980



Front of the Riddell Center

What types of rocks do you see? Why do they have folds in them?



-Spoilers -
These are metamorphic rocks. The folding is a result of lots of pressure that caused the light and dark minerals to align and then bend (fold).



Additional Resources

EDUCATIONAL RESOURCES

Rock and Mineral Identification sets for Loan!
Identification of rocks, minerals, & related materials!
School presentations & visits!
 Contact us at Geology@uregina.ca

For more detailed educational material associated with the U of Rocks Tour refer to the Department of Geology website at <http://www.uregina.ca/science/geology>



DEPARTMENT OF GEOLOGY

EARN A PROFESSIONAL DEGREE!

Expertise within the department includes carbonates, environmental geology, geochemistry, geomorphology, igneous petrology and volcanology, mineralogy, mineral deposits, palaeontology, petroleum geology, Precambrian geology, Quaternary geology, sedimentology, stratigraphy, structural geology, and tectonics.

INFORMATION & APPLICATIONS

Information on admissions and application forms can be obtained from www.uregina.ca/admissions & unconnected.uregina.ca. Students wishing to transfer should contact the Faculty of Science and the Department of Geology. For the graduate program refer to the graduate studies website or contact us.



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Faculty of
Science

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