

# Point of Geological Interest: *Ponta da Lagoinha*

## Rocks and minerals of Ponta da Lagoinha

Minerals are solid natural compounds with a definite chemical composition with little changes limited by their regular crystalline atomic arrangement. Rocks are consolidated mineral aggregates. A granite, for example, is an igneous rock composed of several minerals, like quartz, feldspar and mica.

Rocks are classified in three major groups: (1) igneous, crystallized from a magma (molten rock); (2) sedimentary, formed by burial and lithification (compaction and cementation) of sediments deposited at the bottom of rivers, lakes and oceans; and (3) metamorphic. Rocks of Armação dos Búzios are predominantly metamorphic in origin. Metamorphic rocks are derived from preexistent rocks that were submitted to conditions of higher temperature and/or pressure leading to recrystallization and/or

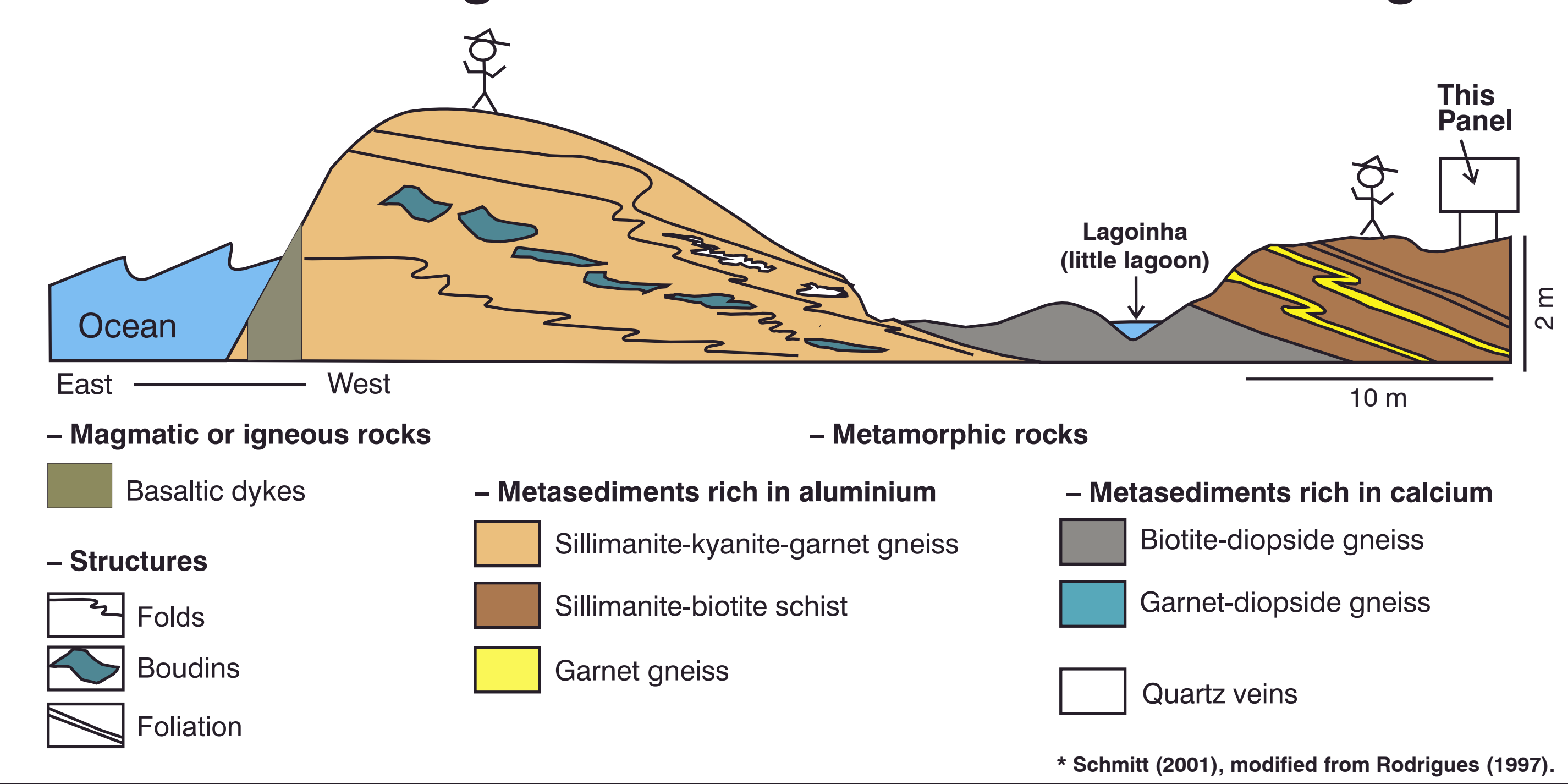
deformation, named Metamorphism.

The metamorphism that affected Buzian rocks occurred 520 million years ago during the Búzios Orogeny. Mineral assemblages were recrystallized at high temperatures (at least 780°C) and pressures (over 9 kbar). These rocks show also structures similar to “thin sandwich layers” (scientifically named foliation) because their minerals grew oriented under pressure.

The metamorphic rocks of Ponta da Lagoinha are called metasediments, because they were sedimentary rocks before being metamorphosed

The main rocks and minerals of Ponta da Lagoinha are listed below (see also cross section at right).

East-West Geological Cross Section at Ponta da Lagoinha



### METAMORPHIC ROCKS

**GNEISS** – relatively coarse grained foliated rock composed predominantly of the minerals quartz and feldspar.

**SCHIST** – medium to coarse grained foliated rock rich in subparallel mica (flaky minerals, including biotite).

### MICROSCOPIC MINERALS DATED – (U-Pb method)

**MONAZITE** – (Ce, La, Th)  $PO_4$  – mineral from the phosphate group that occurs in almost all kinds of rocks. It is yellow to orange and has various shapes, from spherical to disc (like a flying saucer).

**ZIRCON** – Zr ( $SiO_4$ ) – Common mineral in all kinds of rocks. It can be clear but also pinky with a shape of a little barrel.

### MAIN MINERALS VISIBLE WITH THE UNAIDED EYE

**GARNET** – (Fe, Mg, Ca, Mn)  $Al_2(SiO_4)_3$  – dark red mineral common in metamorphic rocks. It forms generally small spherical crystals.

**KYANITE** –  $Al_2SiO_5$  – bluish tabular mineral exclusive of metamorphic rocks.

**SILLIMANITE** –  $Al_2SiO_5$  – white needle shaped mineral exclusive of metamorphic rocks.

**QUARTZ** –  $SiO_2$  – transparent white to grey mineral with a vitreous luster. Common in many rock types.

**FELDSPAR** (aluminum silicates of K, Na and/or Ca) – at Lagoinha there are two main types: plagioclase (white) and K-feldspar (pinky). The shape is similar to a brick.

**BIOTITE** – K (Mg, Fe)  $_3(Al, Si_3O_{10})(OH)_2$  – black mineral with a single direction of perfect cleavage splitting in flakes, like the leaves of a book, and a metallic luster.

**DIOPSIDE** – Ca (Mg, Fe)  $(Si_2O_6)$  – light to dark greenish mineral with a shape similar to a brick.

## Watch the pictures and compare to what you observe at the outcrop.

(Photos: Prof. Rudolph Trouw and Renata Schmitt- UFRJ)



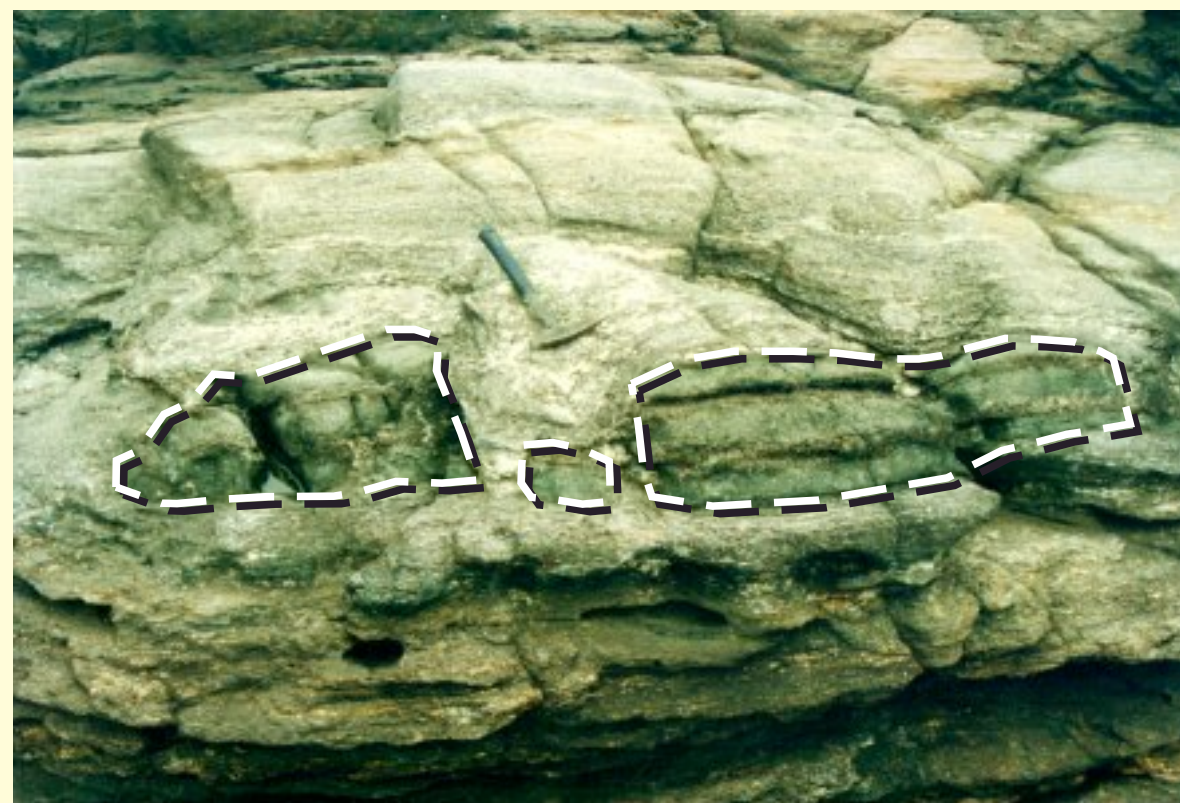
Diopside-biotite gneiss. This rock is dark colored because it is constituted of minerals with iron and magnesium, besides calcium.



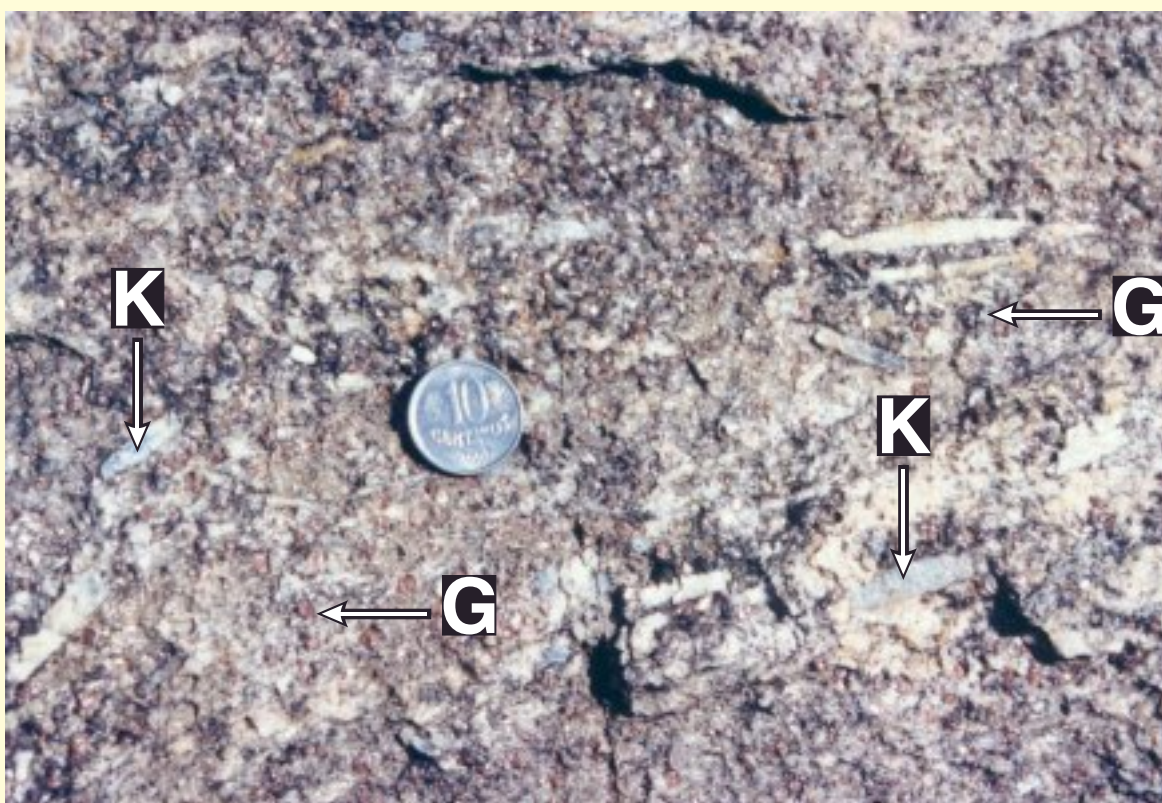
Kyanite-garnet gneiss. The foliation is inclined 20 degrees to the right (west).



Sillimanite-biotite schist. The foliation of the rock is well defined by subparallel biotite flakes.



The green rectangles are boudins of garnet – diopside gneiss within the aluminous metasediment.



Close up of the Kyanite-garnet gneiss. The coin serves as scale to give a notion of size. The kyanite is the aligned bluish mineral (K); the garnet is the rounded reddish mineral (G). The others minerals are smaller and are part of the matrix of the rock, composed of biotite, quartz and feldspar.



The white lenses are quartz (Q) veins that show a lineation generated by deformation. This alignment is about north-south.

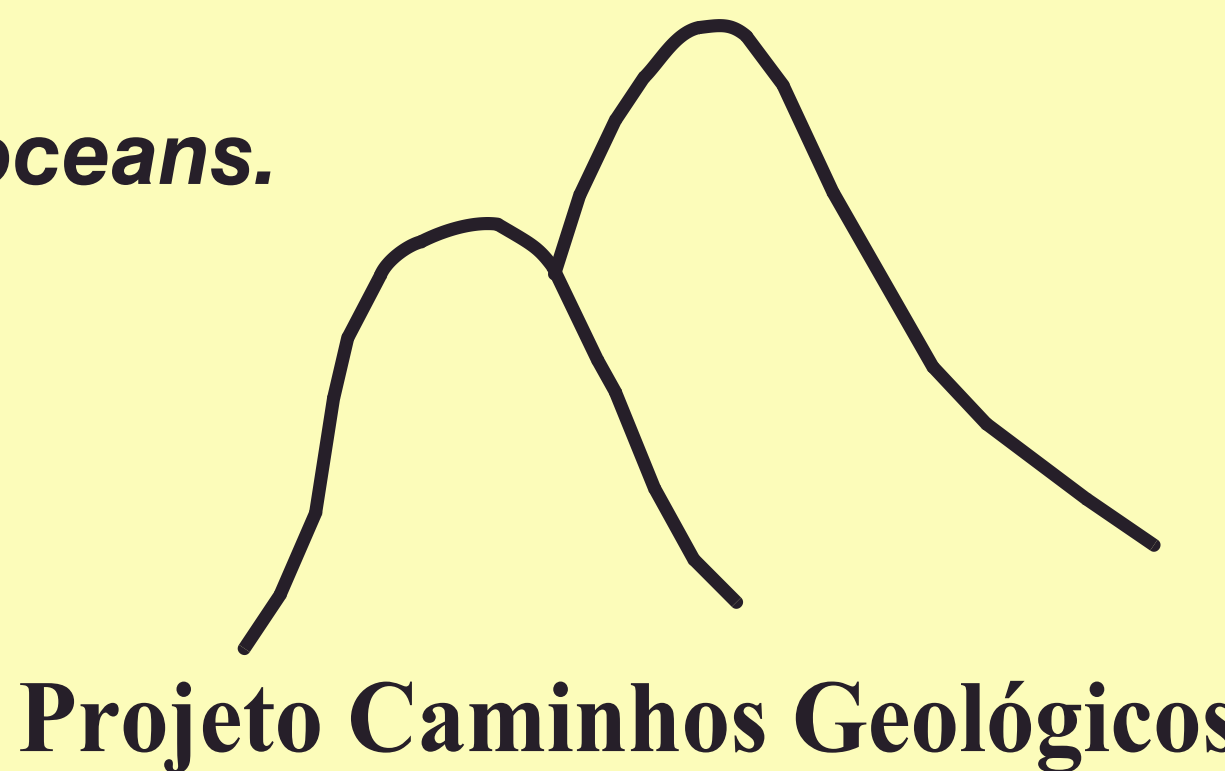
Layers of garnet gneiss folded by deformation.



FAZENDO NOSSO POVO MAIS FELIZ



(\*) Data extracted from the PhD Thesis of Renata da Silva Schmitt (2001) – Geology Department – UFRJ – CNPq grant.



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