

Oamaru Limestone: Geology

Department

Site 6: Campus Geosites @ Otago

Location: In the quadrangle in front of the Geology Building (west side of building)

Learning outcome To gain a basic understanding of limestone, a common sedimentary rock.

Keywords: Sedimentary rock; limestone; calcium carbonate; fossils

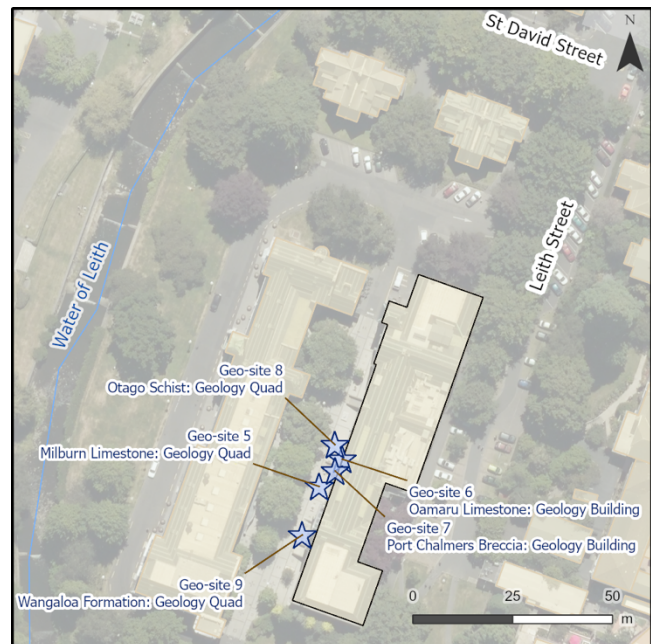


Figure 1: Oamaru Limestone is one of rock types used to build the Geology Department. The limestone is visible as light, cream-coloured rock.




“Oamaru Limestone” or “Oamaru Stone” are the common terms for the Ototara Formation, a limestone formation that can be found around the town of Oamaru in North Otago. Limestone is a sedimentary rock (sedimentary rocks are rocks that formed by the accumulation and deposition of sediments near the Earth’s surface) composed of more than 50% calcium carbonate (CaCO_3). Limestone often contains lots of shell fragments of marine organisms, which are made of carbonate. Limestone usually forms in shallow marine environments. The formation of limestone can involve accumulation of shells, coral, algal and organic materials, or direct precipitation of calcium carbonate from ocean water or lakes.

Exercises

- 1) Examine the light-coloured Oamaru Stone that is visible in Figure 1. Describe the colour of the rock. Are there colour variations?
- 2) There are many different types of shells in Oamaru Limestone. Many of these can only be seen clearly if you use a *hand lens* or *magnifying glass*. Use the photos below to help identify some of these shells, and then sketch an example.

Note that the photos below show perfect examples of each fossil. In the Oamaru Limestone, many of the fossils are broken and only partially preserved, so you will have to be careful about identifying what you find!

Fossil type	Sketch an example
 <p data-bbox="475 2049 609 2085">Bryozoan</p>	



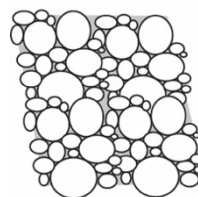
<p>Tube worms</p> 	
<p>Brachiopod</p> 	

3) Based on the images of crystalline and granular rock textures below, what is the correct textural term to describe this limestone?

A *granular rock* contains grains that were deposited. Most sedimentary and volcaniclastic rocks are granular. The areas between grains can either be empty (pore space) or filled. A very wide variety of granular textures occurs.

A *crystalline rock* is composed entirely of crystals that formed during cooling and crystallization of magma/lava, or by recrystallization during metamorphism. The crystals are often tightly-packed. A very wide variety of crystalline textures occurs.

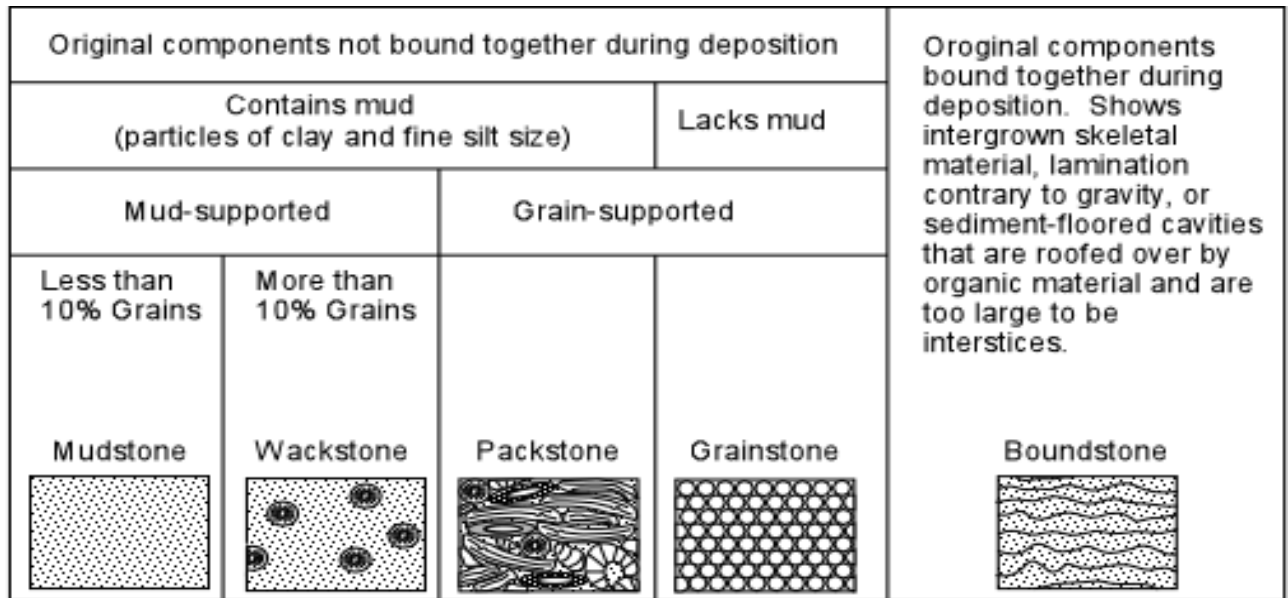
Granular



Crystalline



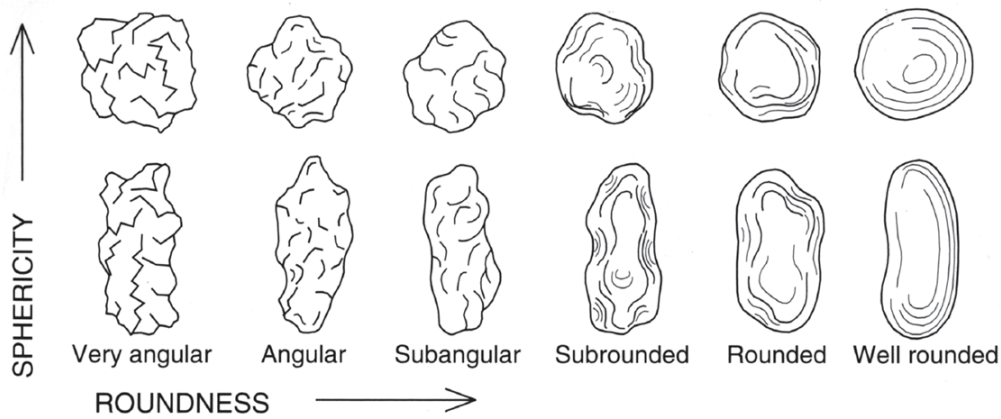
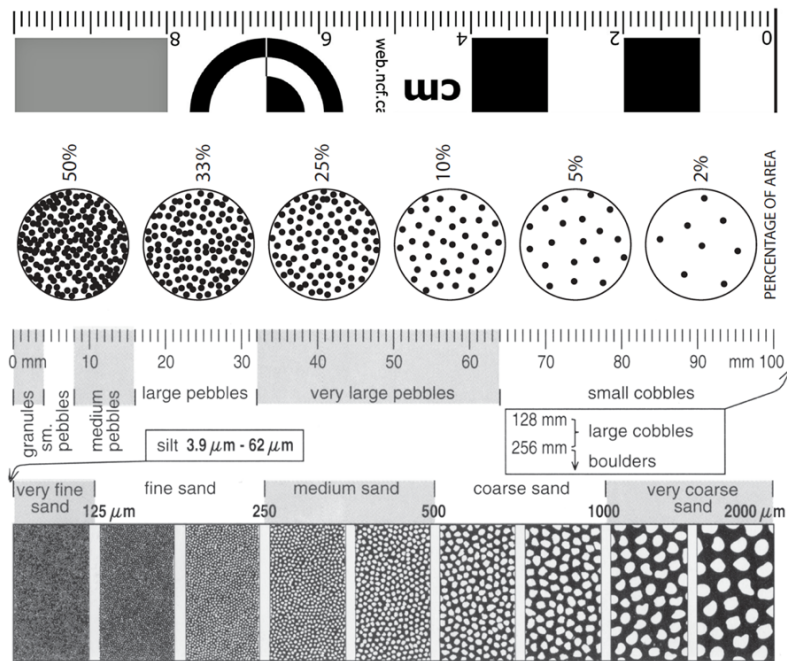
- 4) The following diagram shows the Dunham classification scheme for limestones. Use this classification scheme to determine the type of limestone represented by the Oamaru Stone.



After Dunham, 1962, *Am. Assoc. Petrol. Geol. Mem.*, 117

- 5) This rock is not only composed of fossil fragments, but it also contains <1% dark volcanic grains. Try to find at least one of them and describe the colour and shape. (*Hint*: refer to the grain characteristics charts at the end of the exercise)
- 6) Think about the specific processes and environments in which limestone and volcanic clasts may have been deposited together. You can infer quite a lot about the depositional setting based on this unusual combination of components.





SORTING

