Let the Buyer Beware Field Trip

There is a map for each of the two areas we will visit today. Each map shows you the path we are following and where to stop.

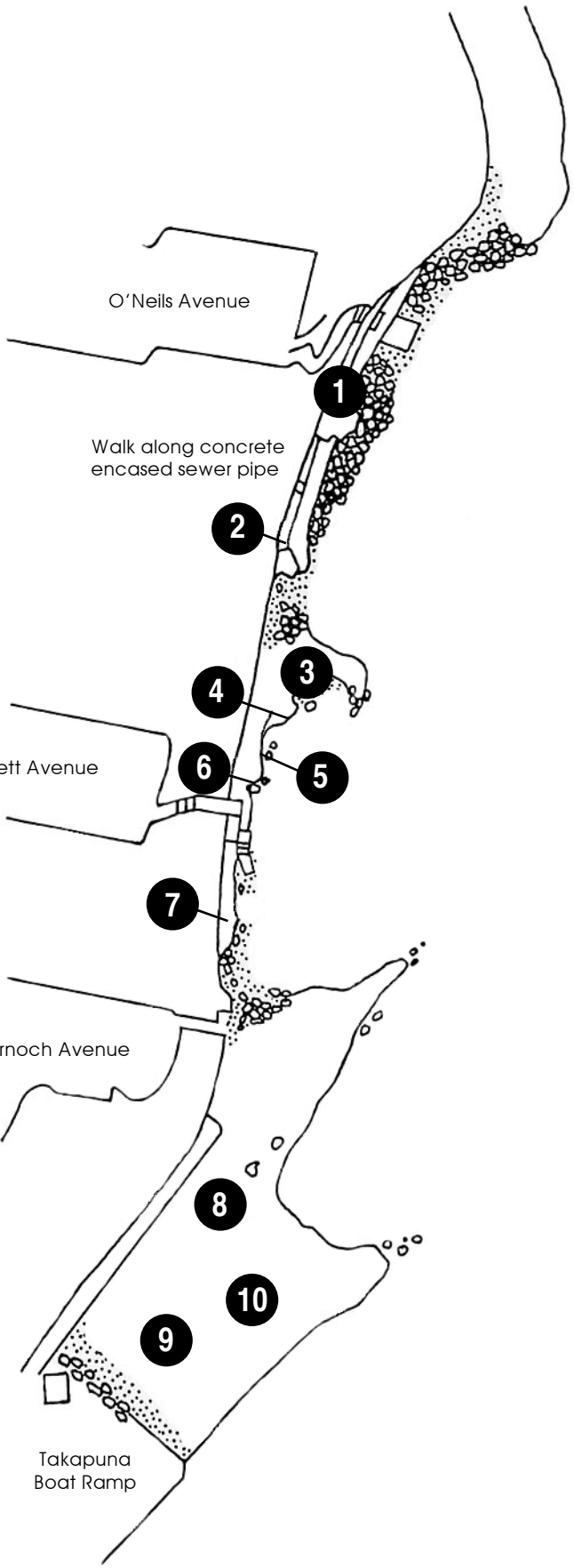
Each stop is numbered and there is text to explain about the things you are looking for. The photographs will help you identify interesting geological features of the rocks you are walking past.

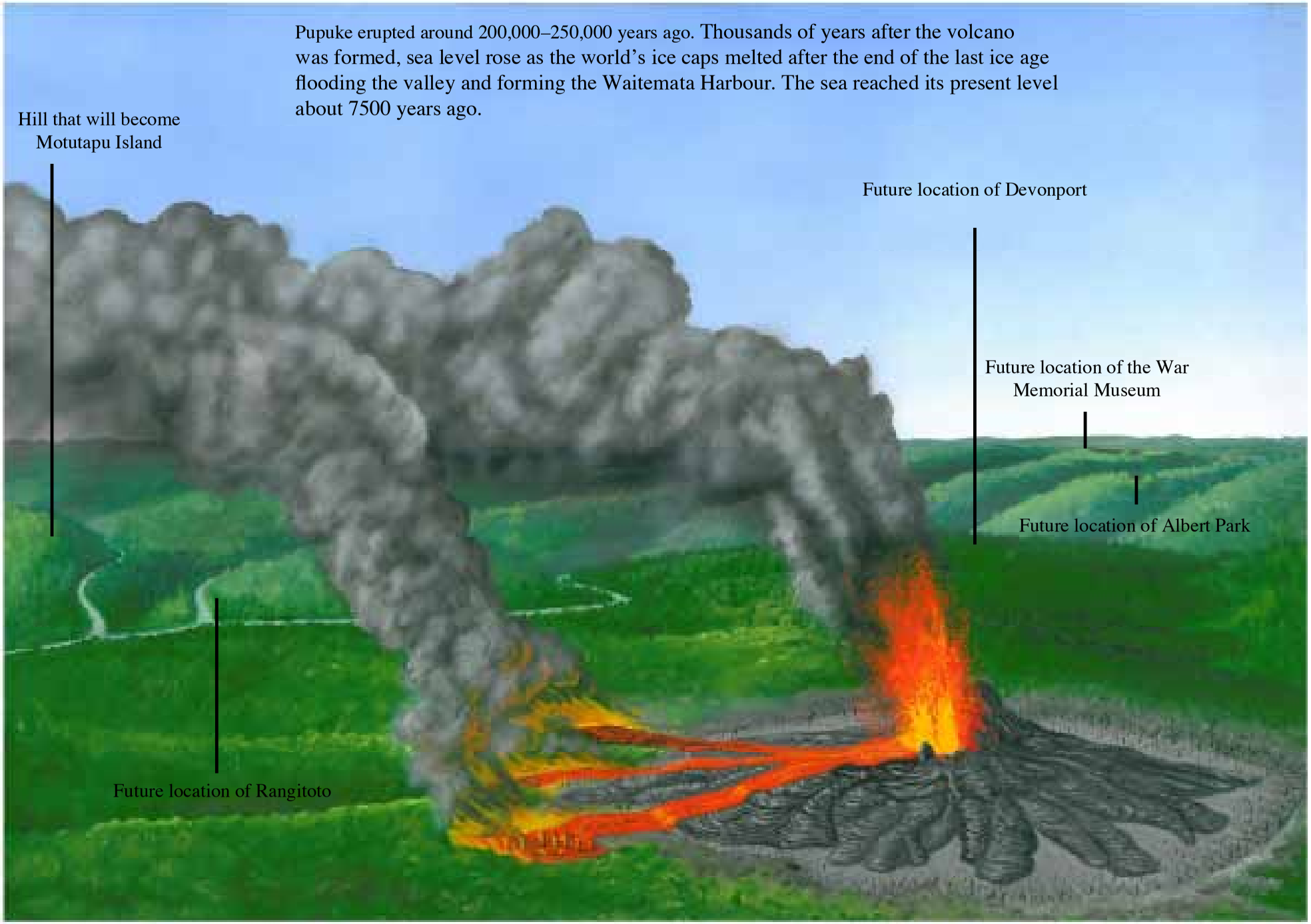
It's a good idea to collect your group around you at each stop read out the description and show the photos. Ask your group to find these features and to point out anything else they find that's interesting.

Thank you for your assistance and have a great visit.

Not to Scale

Low Tide View




Pupuke erupted around 200,000–250,000 years ago. Thousands of years after the volcano was formed, sea level rose as the world's ice caps melted after the end of the last ice age flooding the valley and forming the Waitemata Harbour. The sea reached its present level about 7500 years ago.
Hill that will become Motutapu Island
Future location of Devonport
Future location of the War Memorial Museum
Future location of Albert Park
Future location of Rangitoto

Site 1

Cracks in one lava flow have been filled by another very runny lava (dark lines through grey rock). Note holes (gas bubbles) in lava that filled in the gaps. Gas helped make the later lava very runny.


Site 2

Here you can see evidence of layering. Younger flows over older flows. Many lava tubes (caves), large gas accumulations (forming small caves) and tree moulds in this area.



Site 3

Many tree moulds in this area. Some trees have fallen or been carried (floated) on top of the lava flow. A long tree mould can be seen in this area.


Site 4

Greatly contorted lava, and tree mould. Here the lava above the tree mould is full of small gas bubbles (vesicles). The burning tree was probably baked under pressure and the gas given off made the lava above bubbly. The gas was blasted out leaving a hole where it escaped.


Site 5

Dribblets can be seen at the entrance to a small lava cave (large gas bubble). Blasts of hot air remelted the lava which then dripped from the roof. Additional hot air probably came from burning peat (leaf mould) from the forest floor that the lava had covered. There are drips on the cave roof. Hot gas moving through the cave has remelted the cave wall.



Site 6

Large tree mould, probably Kauri. Pahoehoe lava, folded like rope, can be seen next to the hole. A smooth skin formed on the surface under which the lava, somewhat insulated, continued to flow and wrinkled the surface. Here the smooth skin has been weathered and is no longer smooth.



Site 7

In this area you can see cracking of the lava surface in large pieces, called bread crusting.


Site 8

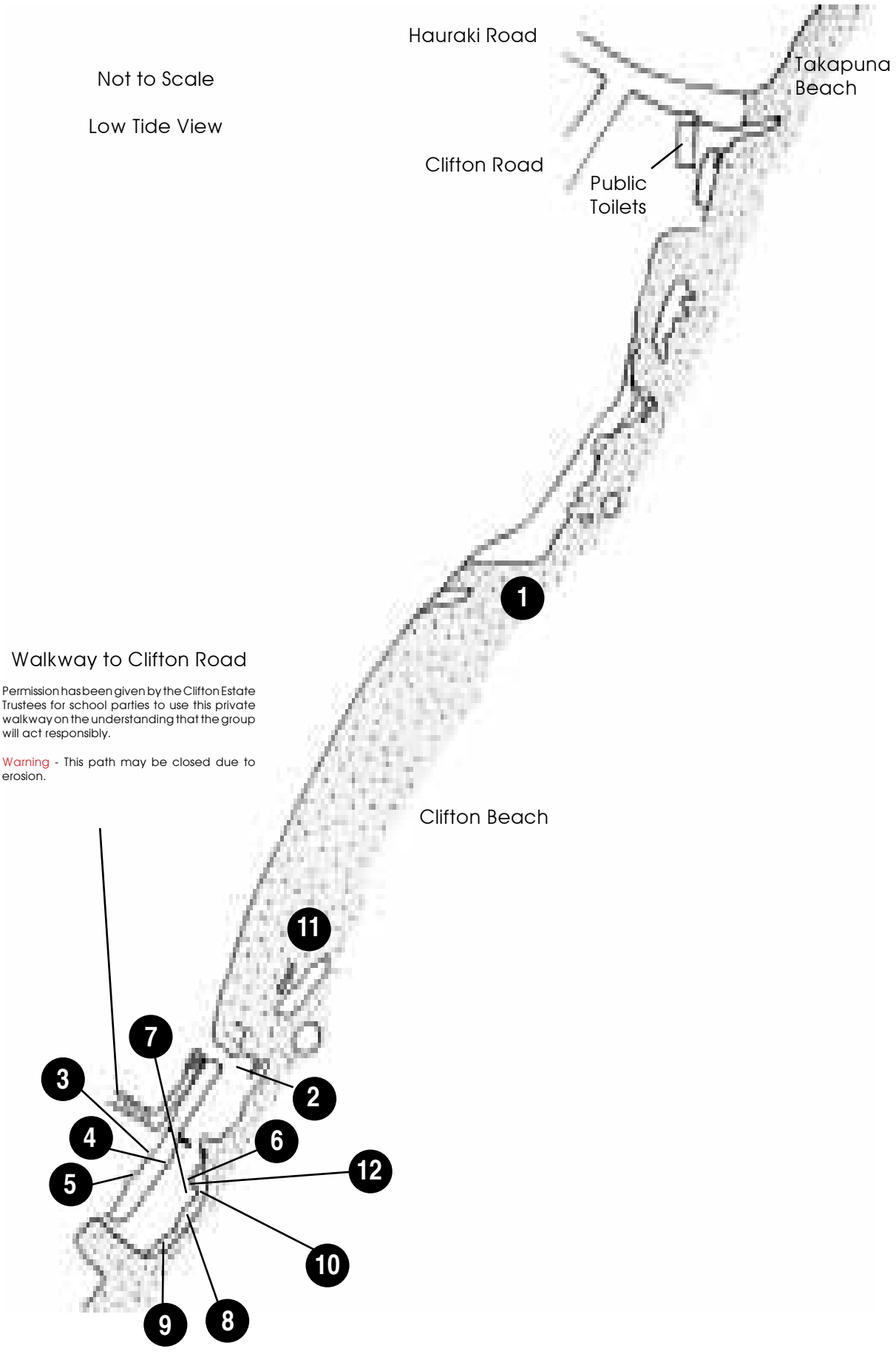
Tuff deposits, pulverised non-volcanic rock. Blasted out of the way as the magma reaches the surface. Looks like brown concrete that has fallen on the ground. Clay, sand, dust, etc. amongst the small stones, plus heat and moisture cement the material together.


Site 9

Collapsed areas where the crust on top of the lava flow has collapsed as lava drained away underneath.

Site 10

Over thirty tree moulds in this area. Trees here have had very runny lava flow around their trunks. There are bridges of lava which probably formed where lava crust jammed between the trunks of trees that were growing close together, then the main lava flow drained away.



Hauraki Road
Takapuna Beach
Not to Scale
Low Tide View
Clifton Road
Public Toilets
1
Walkway to Clifton Road
Permission has been given by the Clifton Estate Trustees for school parties to use this private walkway on the understanding that the group will act responsibly.
Warning - This path may be closed due to erosion.
Clifton Beach
11
7
3
2
4
6
5
12
10
9
8

Site 1

Clifton Beach is the next beach around the rocks at the southern end of Takapuna Beach. Sedimentary sandstones and mudstones are the rocks found naturally in this area. Geologists call these the Waitemata Formation.

Site 2

The rocks at the southern end of Clifton Beach is the best place to see the features of these sedimentary rocks.

Site 3

The sandstone layers were quickly layed down by undersea avalanches while the mudstone layers took much longer to accumulate.

Site 4

Wetting and drying results in slaking in the mudstones, forming loose chips. This undercuts the sandstone layer, resulting in rock slides.

Site 5

Loose chips of mudstone. Wetting and drying results in slaking in the mudstones, forming loose chips. This undercuts the sandstone layer, resulting in rock slides.

Site 6

As the sand avalanches rushed forward they sometimes picked up assorted debris of shell, or other rocks (at Clifton pieces of soft mudstone are evidence of this rip-up) nearly always in a jumble and seldom in a neat layer.

Site 7

Fossil Sites

The main fossil location at Clifton Beach is just past the Clifton steps and an old iron storm water pipe. Most of the fossil types can be seen quite clearly on the flat lower surfaces.

Site 8

Fossilization – Trace Fossils

There are a number of different types of trace fossils at Clifton Beach.

A Trace fossil is a disturbance of the sediment before it turned into rock, usually caused by a moving animal.

At Clifton in the mudstone layers there are disturbances about the width or diameter of a 50 cent coin, where heart urchins have burrowed. When each mudstone layer was still soft (over 15 million years ago) it formed part of a soft muddy bottom in deep water, off-shore where there was no wave action to disturb it. Fine mud steadily settled out over hundreds/thousands of years forming many micro layers (up to 1mm thick). These can be seen clearly today. Where an animal e.g. the burrowing heart urchin ploughs through this soft mud, it churns the mud destroying the neat layers. These patterns are still visible in the mudstone layers at Clifton – where the soft mud has turned to soft mudstone rock. No hard parts of the sea urchins have been preserved.

These rust stained impressions superficially resemble fern fronds however they are more likely to be trails left by animals working their way through sediment.

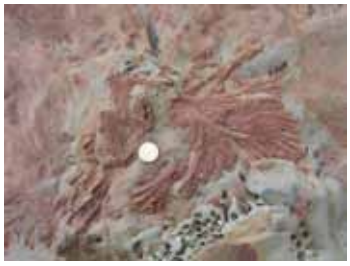
Heart urchins have moved through the sediments disturbing the layers and leaving trails. Seen here in cross section they appear as smooth circular areas in the rock.

Thse are difficult to find particularly if the rock is wet.

Heart urchin burrowing through the sediment leaving a disturbed/mixed substrate that will become a trace fossil.

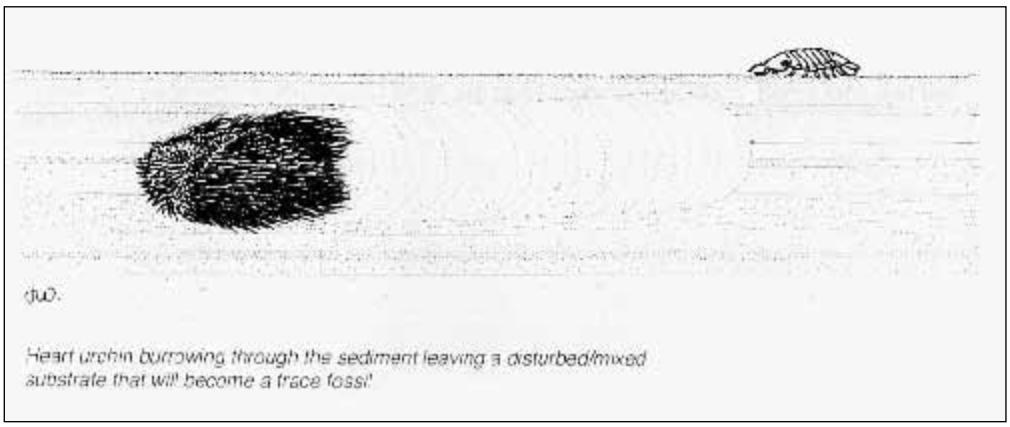
Branched brown ribbon fossils. These might be animal trails left in the muddy bottom of the Great Waitemata Basin.

Clumps of brown ribbon fossils. These might be animal trails left in the muddy bottom. The animal seems to have moved out from a central point to feed then withdrawn and moved out in another direction.



Site 9

Fossilization – Trace Fossils



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Site 10

Fossilization – Plant Fossils

Plant fossils of carbonised wood. Although this wood can sometimes be found in large pieces it is more usual to see very fine pices that have given the rock a stained or smoky appearance.

Plant material was swept off the land and deposited on the sea floor with the sandy and muddy sediments. Numerous fragments from large to small are quite common at Clifton Beach. Some look remarkably like modern wood.


Site 11

Modern Animal Trails

When walking along the beach at low tide you will sometimes see animal trails in the sand. Although these are not the same as the fossils (they were formed in the sediments deep under the sea) they should help the students understand how the fossil trails were formed.


Site 12

Swirling patterns in mudstone layers. Sometimes before separate adjacent sand(stone), mud(stone) layers have fully hardened into rocks, one may move across the other. This may distort the neat parallel layers and cause visible waves and folds in the rock. Some of the patterns developed are easily seen at Clifton.