Jersey Geology Topics.

Illustrated Notes on Recent Studies.

The Beau Port Trail.

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Beauport Geology Trail.

Granite Ramparts, dykes, raised beach, loess & head.

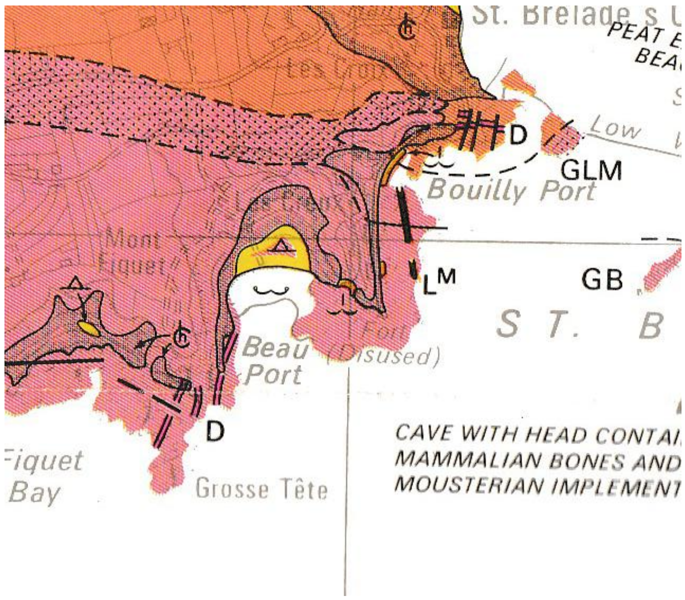

Fig. 1.

Beauport (Le Beau Port) is a small, southerly facing bay to the west of St. Brelade's Bay **(centre left Fig. 1)** in the south west of Jersey. It is a strikingly picturesque bay framed by cliffs and a varied skyline below which there are almost continuous outcrops which provide a snapshot of the changes in Jersey's geological history. It is reached from the car park on top of the cliffs, by paths winding downthe steep hill at the back of the bay, which levels out to a gentle slope covered by fern and grass on sand **(Fig. 2)** and which finish above low cliffs of angular granite fragments of all sizes set in yellow silt and sand. Steps then lead down the low cliffs onto a beach of very smoothly rounded, pink granite pebbles.

This soon gives way to a lovely yellow to pink, sandy beach in a truly sheltered, impressive bay, guarded by granite ramparts, and surrounded by orange to pink and red rocks, eroded into different shapes. It is backed by the stable slopes **(Fig. 2)** above low cliffs of yellow silt and sand, loaded with angular granite fragments of all sizes.

Fig. 2.

Not only is the scenery spectacular, with the cliffs, pinnacles, gullies, platforms, stacks and reefs, a resultof continued wave erosion, but the geology is also very interesting and easily seen in a small area. Its variety extends from uniform, red to pink microgranite with rare inclusions of diorite, to red, brown and yellow granite, the colours of which are due to chemical weathering along the many joints, and to divided grey dolerite dykes, then to a section of raised beach pebbles, loess and glacial head.

The bay has been eroded in a well-jointed, uniformly crystalline microgranite (Beau Port or St. Brelade's granite), one of three varieties in the SW Granite which crops out between La Corbière to Noirmont Points.

The bay is guarded by a low rocky platform below cliffs to the east, by a lone 'sentinel' rock, or stack in the centre, and by the battlement-like ramparts of La Grosse Tête cliffs to the west **(Figs. 3 a, b, c).**



Figs. 3a, b, c.

The granite is well jointed with three principal joint directions at right angles, but also with inclined joint planes cutting across them; these subsequently influenced weathering and erosion, being weaker parts of the rock, and thus determined the shapes of the clefts, gullies, pinnacles and stacks **(Figs. 4, 5).**

Fig. 4.

Fig. 5.

The granite was later intruded by N - S striking dykes, grey walls of rock within the granite along the beach rock platform of the western cliffs **(Figs. 6, 7)**. Interestingly, these are single examples of a period of minor intrusion, whereas others may be seen cutting across earlier E - W striking dykes to the east in nearby Bouilly Port.

Fig. 6.

Fig. 7.

The beauty of these exposures is that they show variations in the relationship of the dyke to the granite and the variation from partial and incomplete which took place during the intrusion, so that attenuated dolerite slivers interdigitate with the granite **(Fig. 8),** and parts of the dyke are still under a roof of granite **(Fig. 9)**.

Fig. 8.

Fig. 9.

On the eastern side of the bay, the trail begins with the outcrops of pink, uniformly crystalline quartz and feldspar microcrogranite, which has incorporated rare xenoliths of an earlier black and white speckled diorite, stained brown by the oxidation of the iron in the hornblende, seen on the eastern raised cliff platform **(Fig. 10)**.

Fig. 10.

Prolonged weathering and erosion have removed the surrounding and overlying country rock during millions of years (as there are now no overlying roof rocks) and we can see how the granite has been affected by exposure to the elements.

Chemical weathering effects are localised around joints. These included oxidation and hydration, two types of chemical weathering, which affected the iron in the feldspars and produced very varied and striking structures or patterns, a form of Liesegang banding not yet seen elsewhere **(Figs. 11, 12).**

Fig. 11.

Fig. 12.

In the cliffs at the back of this platform, is a raised pebble beach overlain by angular head and lenses of loess. This an example of the 8m beach which crops out in many cliff sections around the island **(Figs. 13, 14).** It was caused by a rise in sea level which also produced 8m wave-cut notches in the steeper cliffs. Three periods are known from their deposits, during which beaches were produced at 30m, 18m and 8m in the island, but only the 8m one is seen here.

Here, the uneven nature of the erosion surface (unconformity) below the raised beach can be seen as well as the varied brown, sandy and gritty matrix in which the pebbles are embedded. Even eroded joints in the platform have been filled with pebbles in some cases **(Fig. 15).**


Fig. 13.


Fig. 14.


Fig. 15.


Fig. 16.

The yellow-brown, silty loess above, was deposited during falls in sea level (regression) which produce dry, wind-dominated, terrestrial landscapes when the bedrock broke into angular fragments under freeze-thaw conditions. These were deposited to form glacial head during gelifluction **(Fig. 16)**.

The sequence of head seen at the back of the bay continues on the western side **(Fig. 17)** but neither reveals any raised beach deposits. This may be because the deposits were unevenly deposited or because subsequent erosion removed them...or both may have happened. The greatest thickness of head is recorded as c.15m here (Bishop & Bisson, 1990, p.87, 89).

Fig. 17.

Brief geological history.

The granite is the second of three granites to have formed from the intrusion of the SW granite mass into the Jersey Shale Formation, its small uniform crystals showing that it cooled quickly.
No evidence of the subsequent SW to W striking dolerite dyke swarm, seen nearby, has been found, but the Beau Port granite was intruded later by other N-S striking dolerite dykes which were emplaced unevenly along joint planes.
Later again, prolonged weathering and erosion removed the surrounding and overlying country rock during millions of years, as no overlying roof rocks can be seen.
Later still, more chemical weathering occurred, especially during the more tropical climatic regimes when the Cretaceous (Mesozoic) seas caused the deposition of chalk to the north and west of us, and later again, when the Eocene (Cenozoic) seas caused the deposition of fossiliferous limestone partly surrounding us.
This weathering included oxidation and hydration, two types of chemical weathering which affected the iron in the feldspars and produced the varied and strikingly coloured patterns.
Periods of sea level rise and fall (marine transgression and regression) then followed during the Ice Ages of the last two million years, until c.12000 years ago (c. 10,000 BC). The withdrawal produced a dry, wind-dominated, terrestrial landscape when yellow-brown, silty loess was deposited and the bedrock broke into angular fragments, under freeze-thaw conditions, which were deposited to form glacial head during gelifluction. Erosion by wave action during the last 5,000 years when the low flat-topped hills became the islands they are today, has accentuated the bay and wave refraction round the headlands has caused longshore drift of sand alongside the cliffs which was deposited to produce the beautiful beach. Accompanying wind action transported the blown sand seen along the pathways (Bishop & Bisson, op.cit. p. 93).

References.

Bishop, A. C. & Bisson, G. 1989. Classical areas of British geology. Jersey. Description of the 1:250 000 Channel Islands Sheet 2. British Geological Survey. HM Stationery Office, London.