The Archirondel - St. Catherine's Trail.

Palaeozoic volcanic rocks, conglomerate, Pleistocene raised beaches, mid-tide grit & sandstone beds.

N

Fig. 1.

The view north from the Archirondel breakwater and tower (centre IGS Channel Islands Jersey 1:25,000 map **Fig. 1**) reveals the sweeping curve of La Mare Sainte Catherine (St. Catherine's Bay)

From Archirondel northwards, the seawall forming the first part of the coastline has been built over several outcrops of rhyolitic volcanic rocks both on the land and in the pebble beach for c. 400m to the small headland called Le Malade in the south central part of the bay. From here, the bay continues towards St. Catherine's slipway and tower with beach outcrops of Rozel Conglomerate.

This Trail was prompted by Arthur Mourant's paper on spherultic rhyolites (Mourant, 1932, p.228, 232;1933, p. 285) but there is the bonus of fine exposures of other igneous rocks and Pleistocene deposits along this part of the coast not mentioned specifically, for example, by Mourant (1933,1935) or Keen (1978) or Bishop & Bisson (1989).

Following the geological principle of studying rocks from oldest to youngest, one should start along the beach, where a variety of striking textures and structures can be seen in the volcanic rocks towards Le Malade. By ascending the sea all, one can see a raised beach strand line of pebbles of different rock types overlain by loess and possible head deposits, resting on the eroded volcanic bedrock.

At the start of the seawall, the first outcrop is strikingly cut by white quartz veins of different thickesses **(Fig. 2),** striking c. N - S and this is followed by outcrops of maroon, partly columnar-jointed rhyolites best seen from the top of the sea wall adjacent to the start of the path; these are striking but less so than those to the south at La Crête Point **(Fig. 3).**.

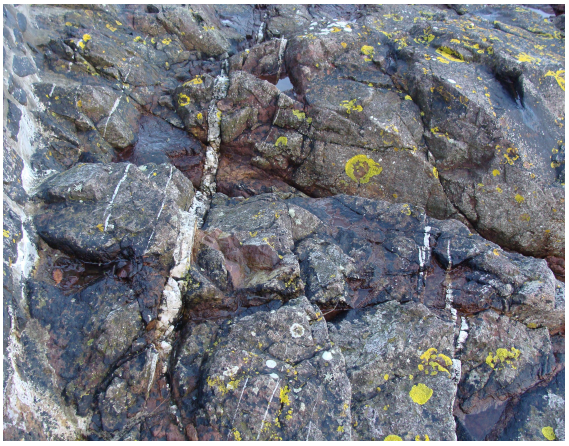

Fig. 2.

Fig. 3.

Then, descending and continuing along the beach there are striking textures and patterns to be seen in scattered outcrops of flow-banded rhyolites with streaked ignimbrite intervals, breccia beds, tuffs and flow-folded intervals **(Fig. 4)**, and there are scattered exposures of spherulitic rhyolite in addition to those around Arthur Mourant's sites **(Fig. 5).**

Fig. 4.

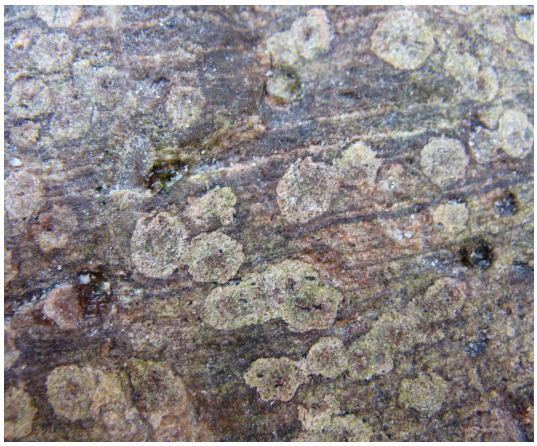

Fig. 5.

Outcrops of spherulitic rhyolites are rarer than at Bouley Bay and La Tête des Hougues on the north coast, and beach specimens can not always be related to an outcrop. In between the central and northern outcrop of Le Malade, there is the bonus of a c.1m wide mica lamprophyre dyke, striking N-S, which has been eroded to form a shallow gully in the beach, the low sides of which show the contacts are both vertical and curved **(Figs. 6, 7).**

Fig. 6.

Fig. 7.

Then here, there are the raised beach and loess deposits.. By climbing onto the seawall by the easiest route, one is confronted on the landward side, by a series of exposures, almost continuous, of a thin, raised beach strand with rounded pebbles of pink granite, black and white speckled diorite and maroon rhyolite **(Figs. 8, 9).**

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11 .

These lie on the eroded surface of the underlying rhyolite bedrock and also contain concentrations of angular rhyolite fragments and in some places are overlain by deposits of mixed loess and head **(Fig. 10).** The last exposure of note in this section is a small section of uniformly yellow-brown loess above the raised beach deposit in the bank on the north side of the drainage channel through the seawall **(Fig. 11).** All these exposures not only reveal the uneven nature of the unconformity between the rhyolites and the superficial deposits due to differential erosion along the fracture lines of the joints and faults, but also

the variety of rocks types from different source areas in Jersey and the more recent deposits below the soil horizon.

At the southern end of St. Catherine's Bay, just north of Le Malade (SW centre), in the upper part of the present beach, thicker outcrops of yellow-brown silts, clays, sands and grits occur (**Figs. 12, 13)**, possibly preserved in and on the eroded junction between the Bouley Rhyolite and the Rozel Conglomerate Formations. These too may be covered by present day beach deposits after certain tides. They are stratified and the layers vary in thickness but the depths to bedrock have not been measured, nor have stratigraphic sections been drawn.

Fig. 12.

Fig. 13.

2. To Le Houguillon.

In the north central part of St. Catherine's Bay, Le Hougillon is approached along the coastal cliff path over outcrops of the Rozel Conglomerate from the slipway at St. Catherine's Tower **(Figs. 14, 15)** and also cropping out on the beach to the south. Here, excellent examples of different local rocks are exposed, especially of the shale and the rhyolites. Interestingly, none of the granite pebbles is of a local granite and they are thought to be from a granite since eroded or presently unexposed. The pebbles vary in shape, size and angularity, and represent a flash flood deposit within a desert environment after uplift and folding of Jersey's older rocks.

Fig. 14.

Fig. 15.

There are more 8m raised beach deposits of rounded pebbles in yellow sand and grit resting in eroded hollows and crevices of the eroded underlying Rozel Conglomerate **(Figs. 16 - 19).** These are presumed to be near the one mentioned at Bel Val Cove further north by Keen (1978, p. 6-7). Overlying, the raised beach deposits are mixed head and dark grey soil containing oyster shells and scattered charcoal. These are thought to be slumped deposits from the time of the roadworks above the outcrop, when the coast road was constructed to St. Catherine's harbour.

Fig. 16.

Fig. 17.

Fig. 18.

Fig. 19.

3. St. Catherine's Viviers.

This raised beach is part of a mixed section where loess, head and the beach pebble strand are exposed on the south east side of Le Verclut hill, immediately alongside the western side of the Viviers building. The raised beach **(Fig. 20, 21)** occurs in the lower part of the outcrop and is overlain by the thickness of head and loess **(Figs. 22, 23)** . The distribution of angular fragments and the yellow-brown sand, silt and clay of the loess is variable in contrast to some other head deposits which are more stratified.

Fig. 20.

Fig. 21.

Fig. 22.

Fig. 23.

Brief Geological History.

The volcanic rocks of breccias, ignimbrites and flow-banded rhyolites were formed during obvious volcanic episodes of acid volcanic activity during the Lower Palaeozoic c. 477 – 450Ma (Ordovician). The flows were then uplifted, folded and eroded during a period of mountain building and then overlain by the conglomeratic deposits of the Rozel Conglomerate to the north also during the Lower Palaeozoic, c.450 – 427 Ma (Silurian). The time interval between the folding and erosion of the volcanic rock formations and the deposition of the raised beach and loess deposits seems to have been enormous. If any rock units other than those of the Rozel Conglomerate were deposited, there is no trace of them, not even of any of the Eocene limestones (56 - 35 Ma) which occur nearby forming the bedrock of La Déroute channel to the east.
The raised beach deposits form part of an 8m sea level rise during the last interglacial (Ipswichian, c.130 – 115,000 years ago) while the loess and head deposits form part of the wind-blown and gelifuction deposits, formed during the last glacial of the Pleistocene (Devensian, c.115 – 10,000 years ago).

References.

Bishop, A. C. & Bisson, G. 1989. Classical areas of British Geology: Jersey: description of 1:25,000 Channel Islands Sheet 2. (London HMSO for British Geological Survey).

Keen, D. H. 1978. The Pleistocene deposits of the Channel Islands. Rep. Inst. Geol. Sci. No. 78/26.

Mourant, A. E. 1932. The spherulitic rhyolites of Jersey. Mineral. Mag. Vol. 23. pp. 227 – 238.

Mourant, A. E. 1933. The geology of eastern Jersey. Q. J. Geol. Soc. London. Vol. 89. pp. 273 - 307.

Mourant, A. E. 1933. The raised beaches and other terraces of the Channel Islands. Geol. Mag., Vol. 70, pp. 58-66.

Mourant, A. E. 1935. The Pleistocene deposits of Jersey. Ann. Bull. Soc. Jersiaise. Vol. 12, pp. 489-496.