The Gorey Harbour – Le Petit Portelet BayTrail.

Granite, Diorite, Shale, Lamprophyre dykes, Raised beach & Loess .

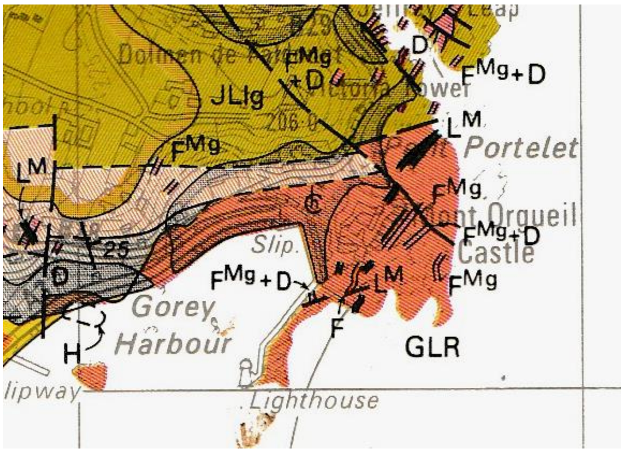

Fig. 1.

Gorey Harbour.

The Jersey Shale Formation in the west of Jersey with its various sedimentary structures and its contact with the NW Granite at Le Pulec are well known, but the outcrops pictured below are parts of the Jersey Shale Formation which occur as far east as Gorey Harbour **(Fig. 1, IGS 1:25,000 map 1982)** and show various other types of contact and structures. They crop out at the western end of Gorey harbour north wall. The various structures and natures of their contacts are shown below.

Here, the shale is in contact with the Gorey granite, a browner, less quartzose variation of La Rocque granite of the SE granite (Bishop & Bisson, 1989, p. 57), and also with the black and white speckled diorites found on the south eastern coast in the SE Granite Complex (Brown et al, 1990, p.196) from La Motte (Green Is.) to Seymour Tower.

Fig. 2.

Fig. 3.

The Jersey Shale Formation consists of dark grey, siltstone and greywacke, possibly metamorphosed to a hornfels near the contact with the granite. It has both laminations and interbeds of lighter coloured greywacke dipping NE, the outcrops occurring as enclaves of the Jersey Shale **(Fig. 2)**. It is well - jointed and is intruded by granitic dykes and veins of different width and shape **(Fig. 3)**, some bifurcating. There are two sets, one cutting the other nearly at right angles, demonstrating their differences in age **(Figs. 4 & 5)**.


Fig. 4.


Fig. 5.

Yet others, have a ptygmatic (lobate) shape due to the varying competence of the host rock, and others are planar, and have formed by intrusion at different angles along various joint planes in the shale (hornfels) **(Figs. 6, 7).**


Fig. 6.


Fig. 7.

Some other narrow dykes have a uniform contact along one edge and an uneven contact with angular changes of direction along the other, suggesting very localised joint control during intrusion, while others show minor displacements due to small-scale faulting **(Figs. 8, 9)**.


Fig. 8.


Fig. 9.

These granite and shale (greywacke) outcrops and relationships differ from those at Le Pulec because of the variety of their contacts, and because the granitic dykes and veins are also different, ie. there is an absence of felsitic, porphyritic and composite types **(Figs. 10, 11)**. In addition, the contacts here are more important because actual shale contacts with the SE granites are clearer than the one with the SW granite which occurs

in La Belcroute Bay and is described as crushed and grey near the contact (Bishop & Bisson, 1989, p. 55), after the work of Henson, 1956, p. 266 - 295).
These outcrops allow one to see the nature of the contacts very clearly and the changes in texture in the rocks adjacent to them.

Fig. 10.

Fig. 11.

For example, here too, the shale has greywacke laminae and may also be a hornfels, having been thermally metamorphosed by the intrusion of granite veins and dykes of varying thickness **(Figs. 12, 13).**

Fig. 12.

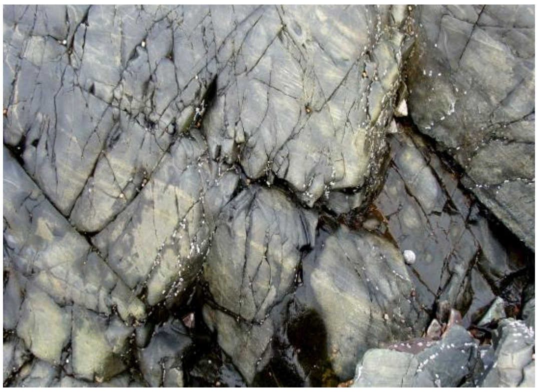

Fig. 13.

The exposure of diorite occurs at the western end of the outcrop and is labelled H on the IGS 1:25,000 map (1982). It is more finely crystalline than the diorite further south between La Motte (Green Is.) and Seymour Tower **(Figs. 14, 15)**, but has a black and white speckled appearance with the white crystals (plagioclase feldspar) being more yellow in parts. The black hornblende crystals are also smaller than those in the southern outcrops and there are no large acicular (needle shaped) crystals or appinite (porphyritic - like) textures.

Fig. 14.

Fig. 15.

Granite magma has intruded the diorite here and forms narrow undulating veins of varying widths, and striking examples of small vugs also occur one from a narrow feeder vein and one with large white, quartz and feldspar crystals and minor black hornblendes **(Figs. 16, 17).**

Fig. 16.

Fig. 17.

The sequence of intrusion is shown in one part of the outcrop where the structures reveal the diorite intruding the oldest Jersey Shale and the younger granite veins intruding both the shale and the diorite **(Fig. 18)**.

Fig. 18.

Le Petit Portelet Bay.

A striking view of the Le Petit Portelet beach area, with its two dykes, is seen from the Castle battlements and introduces this part of the trail **(Figs. 19, 20)**. The beach is reached by returning to the steps up to the harbour sea front, walking up the little lane, La Petite Ruelle Muchie, crossing the Castle Green and descending the path to the beach.

Fig. 19.

Fig. 20.

The beach consists of a pebble strand at the back with sand forming a shore line area. Rock outcrops occur at the northern and southern ends with isolated masses in the middle. The rocks in the northern part of the bay form part of the St. John's Rhyolite Formation and consist of maroon ignimbrite, Jeffrey's Leap Ignimbrite **(green, Fig. 21. IGS map 1982**), with interbeds of brown, flattened pumice and ash **(Fig. 22),** some with small pyroclasts and xenoliths **(Fig. 23).**
These have been intruded by dolerite dykes **(pink, Fig. 21. IGS 1982),** striking NE – SW **(grey, Fig. 24)** but sometimes covered**.**

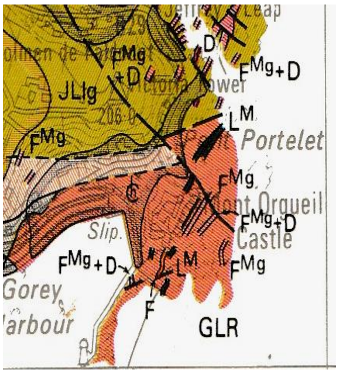

Fig. 21.

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 25.

Another interesting feature is a narrow vein of white to pink baryte (photo & pers. comm. Dr. A. Hill) striking SE - NW in a crevice and gully in the big headland at this northern end of the beach **(Fig. 25)**.

Fig. 26 a.

Fig. 26 b.

The ignimbrites are assumed to be faulted against the granite of the southern rocks which forms the Gorey section of the La Rocque granite, a part of the South-east granite (Bishop & Bisson, 1989, p. 57), also named the Igneous Complex (Brown et al, 1990). This granite is browner in colour, not as coarse, and contains less quartz than around La Rocque. Examination of the contact between the two rock types can be seen in the centre of the bay in some of the isolated exposures and seems to be un - faulted and irregular in shape, without brecciation, and with possible xenoliths in the granite **(Figs. 26 a, b).**

Within the granite at the southern end, is a softer, mica lamprophyre dyke which bifurcates and has been eroded into two gullies one of which strikes c. SE towards the sea wall **(Fig. 27),** whilst the other has been displaced by a small tear fault. Both branches contain a medium to dark brown mica lamprophyre with excellent medium to large bronze biotite mica crystals **(Fig. 28)**.

Fig. 27.

Fig. 28.

There are striking yellow cliffs at the back of beach, which are predominantly made of yellow glacial head and loess. They have been eroded at the base and together with occasional land slip this has revealed a raised beach extending along much of the exposure **(Figs. 29 - 31).**

The pebbles vary in size, rounding and composition, an interesting type being **andesite (Fig. 32),** presumably from the exposure further west (IGS 1: 25,000 Channel Islands Sheet 2, 1978/82), as are the boulders, revealed at times within the pebble beach **(Fig. 33).** It is thought unlikely to be an outcrop as it does not appear below the rhyolite at the junction between the rhyolite and the granite further down beach **(Figs. 26 a, b above).**

Fig. 29.

Fig. 30.

Fig. 31.

Fig. 32.

Fig. 33.

Brief Geological History.

The Jersey Shale Formation is the oldest of the rock types and was deposited as a sequence of silts, sands and greywackes from turbidites in a deltaic environment. Named as Brioverian, it is upper Precambrian (Proterozoic) in age (c. 700Ma).
The shale formation was then uplifted and folded several times indicated by the dips in the laminated parts. Vulcanism followed, producing the overlying andesites and rhyolites with further folding. The diorites were intruded during the following Cambrian period, and although the dates are unreliable, they seem to span a period during 570 – 550 Ma. These outcrops may be the northern part of the diorites and suspected gabbros cropping out along the south coast from St. Helier to Seymour Tower, separated from them by Le Hocq - La Rocque Granite and the Gorey Granite - Mont Orgeuil Granite of the SE Granite Complex (Brown et al. 1990, p.196).

The red – pink granite then intruded the shale and diorite units and also the rhyolites as ‘there are a few inclusions of rhyolite’ (Bishop & Bisson, 1989, p. 57), making it younger than them, but it is dated, again with some uncertainty, to 550 – 509 Ma (the possible age of the diorites). It was intruded in the way shown in these outcrops, possibly during a late folding phase of the Cadomian Orogeny. It is also considered to be a variation of the coarser La Rocque granite, with the usual felsic and mafic minerals, but with less quartz, and not as brown as the nearby granite of Mont Orgueil (Bishop & Bisson, 1989, p. 57).
There is no evidence of later Palaeozoic and Mesozoic rocks on the island although they occur nearby on the sea bed overlain by Eocene limestones.
The raised beach, loess and glacial head deposits, lying unconformably on the bed rock, represent a change from an interglacial period of high sea level, which produced the 8m raised beach when Jersey became an island, to a glacial period when the sea retreated, leaving it as a small plateau on a coastal plain, subject to cold, out-blowing, loess - laden winds from the northern ice sheet. The angular glacial head section represents a freeze - thaw or gelifluction deposit.

References.

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Ralph Nichols, 2011, 2020.