Jersey Geology Topics.

Illustrated Notes on Recent Studies

Le Côtil Point Trail. **Dr. R. A. H. Nichols.**

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Le Côtil Point Geology Trail.

Granites, andesite, ignimbrite, wave-cut platform, gullies & caves.

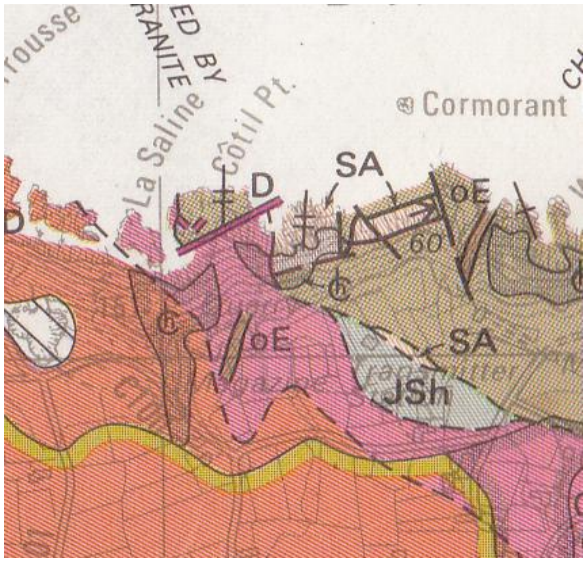


Fig. 1.

Le Côtil Point is situated on St. John's coastline just east of La Saline between La Trousse and Wolf Caves (not Wolf's see OS above) NW of the Frémont Transmitting Station **(Fig. 1).**

This may be considered a slightly dangerous trail so great care should be taken to wear good strong boots with appropriate soles for a good grip.

It lies below La Saline quarry and is approached through bushes and stunted trees down a very steep fisherman's path, generally scrambling and stepping sideways, but also via a ladder and a rope for two short c. 5m pitches.

The end of the path has steps and one walks onto the low rocks of the Point on the left hand side of the air photo **(Fig. 2)**, and then on to the other rocks, heading east. These may be slippery after high tide and the green gully is generally easier for progress. The best time for access is to start c. 1 hour before MLWS to explore the outcrops in the gullies and inlets, leaving the area c. 1 hour after low tide.

N

Fig. 2. **S**

The aerial photograph **(Fig. 2),** shows the position of Le Côtil Point on the western edge, a wide dividing inlet, and the reef (small island), off the adjacent long narrow inlets to the east, eroded into the flat wave-cut platform. The ENE-WSW striking green-floored gully in the Point and between the platform and the reef/island has been eroded along a dyke.

It was chosen because 10 references to Le Côtil Point in the BGS Report (Bishop & Bisson, 1989) show that there is a very varied geology.
A bonus for our Pleistocene geology, is a superb wave-cut platform but with several long, deep inlets eroded into it.
In addition, other geologists, Mourant and Oliver, have reported the site to contain garnets.
The geology references are as follows;

p. 14. "There is an intrusive contact between the volcanic rocks (*Bonne Nuit Ignimbrite, St. John's Rhyolite Formation.*) and the NW granite at 631563. The thermal aureole is c. 300m wide with N-S vertical foliation, granoblastic textures and porphyroblastic biotite & metasomatic andradite *(garnet)***,** diopside & epidote in veins & patches, and volcanic rocks close to the granite are metasomatically enriched in K.

p. 20. "Andesite (*St. Saviour's*) intruded by granite (see p. 52) and is overlain by ignimbrite (*Bonne Nuit Ignimbrite, St. John's Rhyolite*.). Just NE of former Mont Mado quarry, outcrops of andesite are terminated to the N by a pre-granite E-W sinistral (LHS) wrench. These andesites are thermally metamorphosed, and have pink alkali feldspars rather than plagioclase but no megascopic foliation.

p. 24 "St. John's Rhyolite. crops out from Le Côtil to La Crête (*St. John*) and is a repeat of the Bonne Nuit Bay section displaced westwards by the Frémont LHS wrench.

p. 25. "The Bonne Nuit Ignimbrite is **550 - 900 m** thick between Le Côtil & Frémont Points via Wolf Caves.

p. 26. "Between Le Côtil & Frémont, the Bonne Nuit Ignimbrite is overlain by the Frémont Ignimbrite.

p. 52. "NW granite has intrusive contacts with rhyolite (*Bonne Nuit Ignimbrite, St. John's Rhyolite,*) & andesite *(St. Saviour's Andesite)* at the eastern most end of *(the granite)* outcrop in the vicinity of Le Côtil Point. **(631562**).

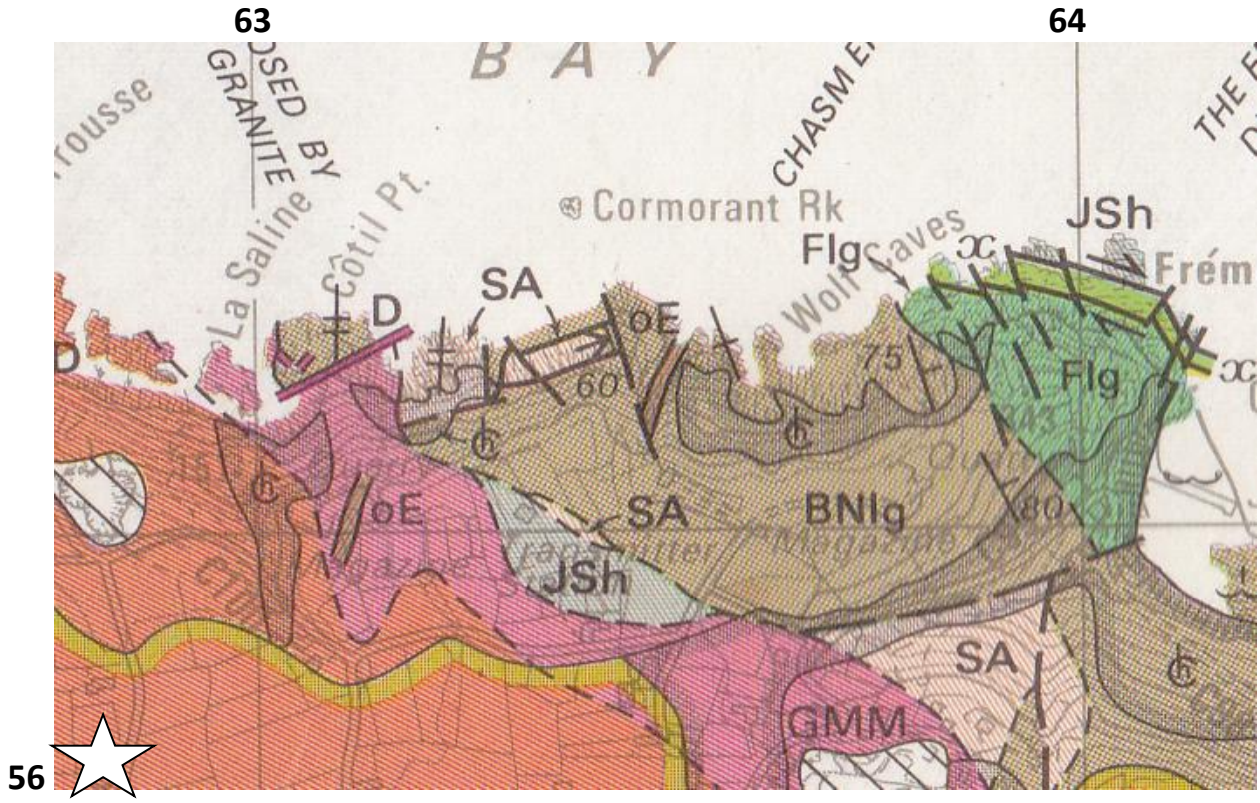
p. 53. "At Le Côtil Point sharp bounded veins of aplogranite have intruded the ignimbrite (*Bonne Nuit Ignimbrite*) & the basic dykes in it. The granite *(NW granite)* & ignimbrite*(Bonne Nuit Ignimbrite)* are so similar that there is little evidence of thermal metamorphism, but the effects of K metasomatism are seen in the coatings of muscovite on joint surfaces in the ignimbrite.

p. 54. "Small quarry *(La Saline?)* above Le Côtil Point **6305 5602**, shows contact between Mont Mado aplogranite. and the coarse St. Mary's granite with c. 1m of mafic rich granite. **Old Mont Mado quarry at 637556.**

p. 68. " Basic dykes..dolerite at Le Côtil Point **(631 562)** predate the Mont Mado aplogranite. giving an age of c. 480 Ma as part of the NW granite.

p. 69. " ...a dyke of olivine gabbro 8m wide occurs at Wolf Caves (6347 5616) and is presumed to continue S of Le Côtil Point.

The IGS Jersey, 1:25,000 Geology map (1982) **(Fig. 3)** shows the complicated geology and it is compared with the map in the BGS 1989 Report (p. 24) **(Fig. 4)** from which the page references are taken.



GSM St. Mary's gr. **GMM.** Mont Mado aplogr. **BNlg.** B. Nuit. Ignim. **SA.** St. Sav. Andesite.

Fig. 3. IGS 1:25,000 Geology map (1982).

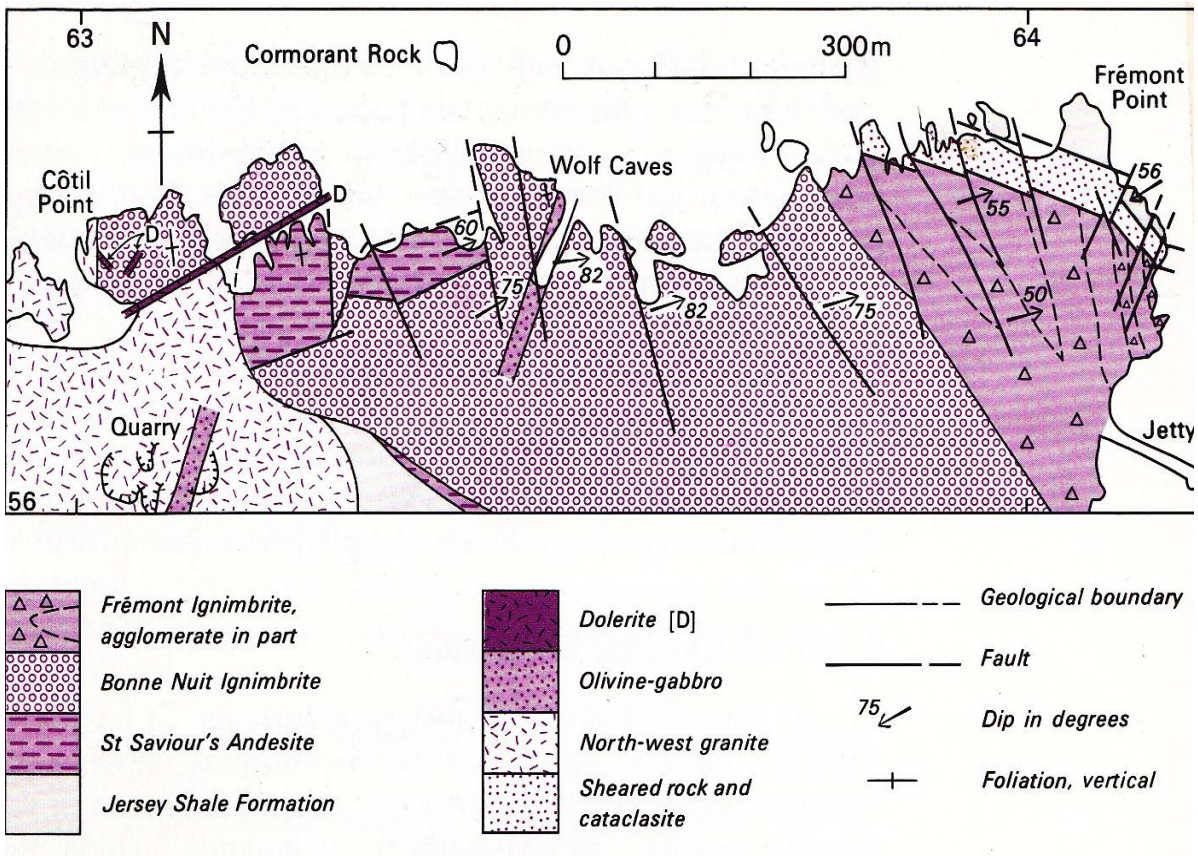


Fig. 4. BGS Report map (1989) (p. 24).

The following points should be noted;

1. The **Mont Mado type** aplogranite is **not** identified on BGS Report map (p. 24) **(Fig. 4. above).**

2. The **Bonne Nuit Ignimbrite** crops out on Côtil Pt. **and** a small reef/island (looking like a 2nd Point east) on BGS Report map; it is cut by a wide inlet dividing Le Côtil Pt. from the reef on IGS Report map, but this is **not** shown on the IGS 1:25,000 Geology map **(Fig. 3 above)** thus making the outcrop look continuous.

3. The **Bonne Nuit Ignimbrite (in the St. John's Rhyolite Formation) on Côtil Point,** the **1st Point.**

4. The **NW granite (Mont Mado type)** on the **W** of the Point, and **south** of it, separated by a dolerite dyke.

5. The **St. Saviour's Andesite, E** of the **Point in 1st inlet (**in contact with the **NW granite (Mont Mado type), south** of the dolerite. dyke).

6. A little further east at **6318 5620,** veins of the granite *(NW)* have intruded and bisected the St. Saviour's. Andesite, and garnets (Andradite, Ca Fe garnet) of hydrothermal origin have been recorded in this area **(Oliver, BSJ 1958, p. 181 - 183). Oliver** refers to previous reports (**Mourant, BSJ 1938, BSJ 1953).**

The trail starts by taking great care descending the path!

The first view during the descent, is a striking one not previously described, of an impressive wave-cut platform backed by cliffs to the east **(Fig. 5)** and a pebble and boulder-filled bay backed by cliffs. (This is the 8m platform and seems to be confirmed by the perched stack RHS **(Fig. 6).** A cave high in the cliffs at c. 8m at the southern end of the first inlet may also be at the former sea level).

Fig. 5.

Fig. 6.

The Mont Mado aplogranite is recognised by its small, uniform quartz and feldspar crystal size and muscovite mica also occurs along its joint surfaces.
At the bottom of the steps onto the rocks, the exposures are of the NW granite - Mont Mado type. It is well-jointed and it is on these joint faces that thin films of muscovite mica can be seen **(Figs. 7, 8).**

Fig. 7.

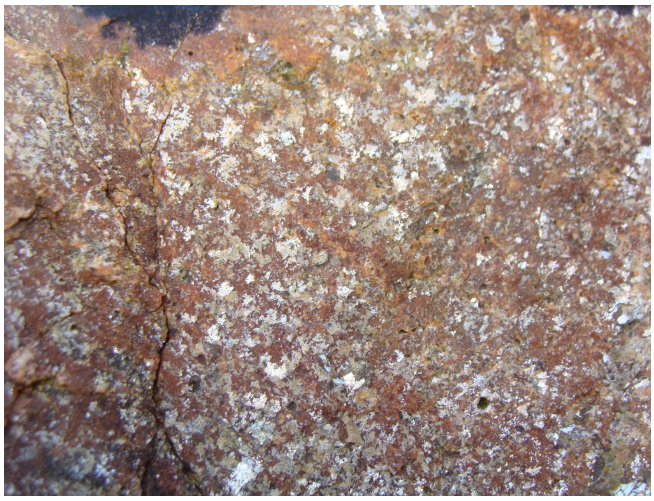


Fig. 8.

Fig. 9.

Fig.10.

In traversing east, earlier erosion in the first gully has formed a perched cave which varies from lens-shaped to generally circular inside, at about the 8m sea level in the cliffs at the southern end of the gully **(Figs. 9, 10)**. This may have been formed at the same time as the wave-cut platform further east.

The Bonne Nuit Ignimbrite, of the St. John's Rhyolite Formation, crops out on the Point and is grey to light brown in colour but exhibits the 'banded 'streaky bacon' texture, possibly of a reomorphic type, flow, with incipient spherulite formation; it also has paler brown to pink, banded and partly 'flocculated' texture **(Fig. 11).**

The St. Saviour's Andesite in contrast is medium grey with small rectangular pink to red feldspars which give it a porphyritic texture. There are several varieties of this texture and they are quite unlike the white porphyritic andesite further south around St. Helier **(Figs. 12 - 14).**

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

The junction between the granite and the St. Saviour's Andesite can be seen at the back of the second inlet with granite on the RHS and andesite on the LHS with veins and attenuated sills/dykes intruding it **(Figs. 15, 16).**

Fig. 15.

Fig. 16.

The andesite is also intruded by a rare thick aplite sill and by several dykes and veins some with anastomosing structures, seen both in the joint and fault planes forming the sides of the inlets and the base of the platform surface **(Figs. 17 – 20).**

Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

And then there are the elusive garnets described by Mourant and Oliver as follows;

Mourant (**1938**, **BSJ. p. 289)** recorded veins of **'massive brown garnet'** with 'occasional crystals in cavities', **from loose boulders in the gully just east of the granite–andesite junction at Le Côtil Pt.** Anhedral crystals of 1 cm cross the vein and extend several cm along it, and 'crystals with free faces' are up to 5mm in diameter.
Mourant (1953, **BSJ. pp. 18 - 19**) in his article entitled 'The Garnets of Jersey' at the end of the Geological Report for 1952, describes the occurrence of **'chestnut brown garnets'** associated with green patches of epidote (and other minerals) in the andesites, and cut 'cleanly across by veins of aplite', the main granite mass near the junction being almost an aplite.
Oliver (1958, BSJ. p. 181) records 'patches of **massive garnet, chestnut brown in colour** with epidote, quartz, chlorite & minor iron ore **in metamorphosed andesite close to the granite contact at Côtil Point.'** He also records that 'abundantly garnetiferous rock **is found only as loose blocks at the foot of an inaccessible cliff'.** The garnets are Andradite, Ca Fe rich, with Mourant (1953, p. 19) ascribing the Ca from 'amygdules' in the andesite, whereas Oliver thought it possibly derived from the granite along with the Fe.

The locations cited by those authors were examined several times and possible examples found, but weathered samples were uncertainly identified. Other possible examples were found later in the boulders of the pebble beach to the west. They occur in narrow elongate cavities in light grey, weathered and abraded, possible andesite, and though they match the description in colour (chestnut brown) and their shape or form seems to be naturally crystalline, identification is as yet uncertain as they could not be extracted **(Figs. 21**, **22).** The colour was thought to be superficial differential Fe staining of quartz as with certain weathered samples **(Fig. 23)** (Dr. Hill pers. com.)
The honey colour of foreign specimens (ref. the Internet) is shown below for comparison **(Fig. 24)**.

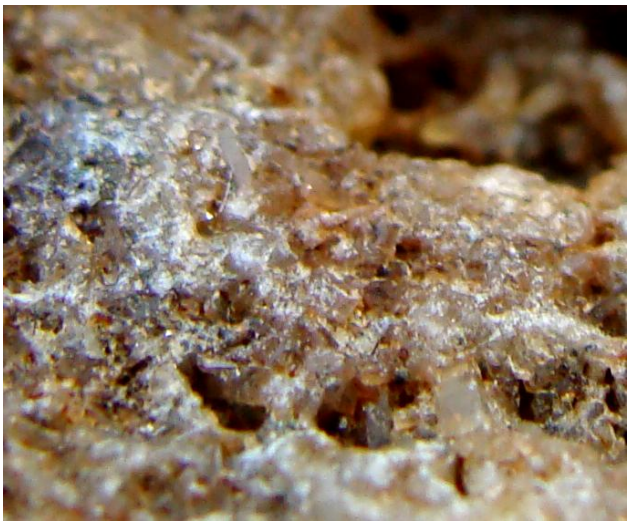


Fig. 21.

Fig. 22.

Fig. 23.

Fig. 24.

Returning to the foot of the cliff path and the steep climb out, exploration of the beach pebbles in La Saline bay to the west reveals a variety of beach pebbles, both local, andesite and granite **(Figs. 25, 26),** and from further along the coast to the west, diorite and granite with xenoliths of diorite **(Figs. 27, 28).**

Fig. 25. St. Saviour's Andesite, porphyritic.

Fig. 26. Mont Mado (micro) aplogranite.

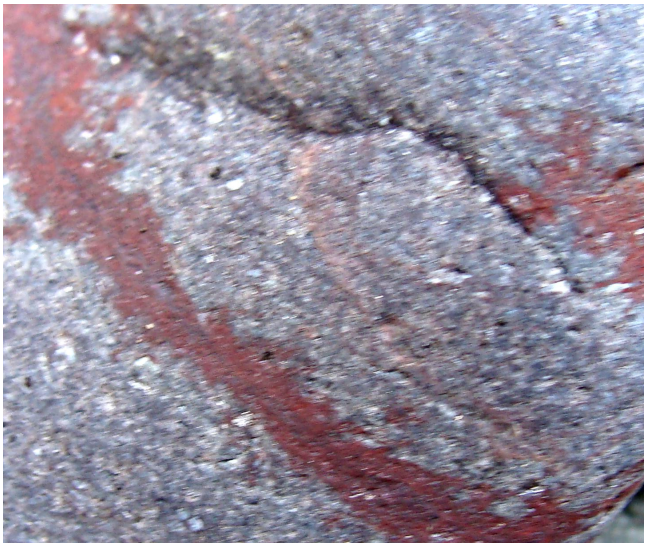


Fig. 27. Heamatite vein in diorite.

Fig. 28. Diorite xenoliths in granite.

Brief Geological History.

After the deposition, uplift and folding of the Jersey Shale Formation, volcanic action produced the St. Saviour's Andesite disconformably on its eroded surface. This was followed by further volcanic activity when various types of volcanic rock, such as the Bonne Nuit Ignimbrite, flowed over the andesite and made up the St. John's Rhyolite Formation.
This period was followed by intrusion of the gabbros and diorites of Sorel and Ronez , and then followed by the NW granites of which the coarse St. Mary's granite and the Mont Mado type aplogranite of Bishop & Bisson (1989) were the most recent c. 450 Ma ago.
Subsequent sea level changes produced the erosional features such as the platform, stack and the cave while more recent powerful marine erosion as the sea level has risen, formed the narrow, steep-side inlets eroded into the platform. Modern shingle deposits in the contact inlet have reduced the exposed height of the wave-cut platform.

References.

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Ralph Nichols, 2014.