SITE

Name: Hele, Samson's and Combe Martin Bays

Parish: Ilfracombe and Berrynarbor

Local Authority: North Devon

National Grid Ref: SS 536 479 - 586 484

OS Sheets: 1:50K, 180, **1:10K**, SS44/45

Locality Description: Three distinct locations on North Devon's Coastline in the vicinity of Combe Martin.

Nature and Status of Site: Coastal cliff exposures, covering 3.5km of coastline. A Site of Special Scientific Interest (SSSI).

Summary of Geology / Geomorphological Interest: This site provides excellent exposures of sandstones and mudstones of the Ilfracombe 'Beds', formed during the Middle Devonian (Givetian). Interbedded are thin, but continuous, limestone bands which contain fossil corals and brachiopods, indicating a shallow sea floor palaeoenvironment. The limestone bands are stratigraphically important as marker-horizons, allowing correlation with inland exposures. Large folds formed during the Variscan Orogeny affect the area.

Conservation and safety Considerations: Care should be taken when accessing any part of this site. The path at Samson's Bay is steep in parts and potentially dangerous. It is particularly treacherous in wet weather. Tide tables should be consulted at all times. Please do not hammer the rock exposures or attempt to collect in-situ fossils as this can permanent damage sensitive exposures (for research work contact Natural England for advise).

Educational Age Groups: Secondary, College/6th Form, University.

Parking and Access: Parking for Location 1 is available along the Watermouth Road and for Location 2 is available in Combe Martin or in the vicinity of Lester Point and Jenny Start. The site can be viewed from the beach at low tide or from the coast path.

Access and parking for Location 3 is available at Combe Martin. The site should only to be accessed at low tide. Car parking is available along Borough Road near Cobbler's Park. Access to Wild Pear Beach is available via the coastal path. Exposure is generally good.

There are regular bus services between Ilfracombe, Combe Martin and Hele Bay. For timetable details, visit www.traveline.org.uk. Additionally, there are signed on-road cycle routes between Ilfracombe, Combe Martin Bay and Hele Bay providing good access for cyclists.

References

Edmonds, E.A., Whittaker, A. and Williams, B.J. (1985). Geology of the Country around Ilfracombe and Barnstaple. *Memoir of the British Geological Survey*, Sheets 277 and 293, 97pp., HMSO.

Evans J. W. (1922). The Geological Structure of the Country Around Combe Martin. Proc. Geol. Assoc., 33. 201-228.

Freshney, E C and Bennett, J A (2006) Report on the assessment of County Geological Sites in the North Devon Areas of Outstanding Natural Beauty: Phase 2 - Area from Saunton-Morte Point-Ilfracombe and Ilfracombe- Combe Martin (Report for North Devon Coast and Countryside Service) (Devon RIGS Group)

Scrutton, C.T. (1978) (ed.). Palaeontological Association International Symposium on the Devonian System (P.A.D.S. 78): A field guide to selected areas of the Devonian of South-West England. Palaeontological Association: 73pp.

Shearman D. J. (1962). Aspects of the Geology of the Ilfracombe Beds (Devonian) of North Devon; Structure and lithological Succession. Geol. Assoc., Circ. No. 641.

Online References:
North Devon Biosphere, (online) available at www.northdevonbiosphere.org.uk

Detailed Geology: The Ilfracombe 'Beds', are exposed between Ilfracombe and Combe Martin as slates with subordinate sandstones and limestones. The first attempted stratigraphy by Evans (1922) produced the Lester Slates-and-Sandstones and the Wild Pear Slates. Later Shearman (1962) recognised a three-fold division in the slates, the upper and lower parts characterised by the sandstones and the middle part containing most of the limestone, incorporating the marker limestones. The fossils of the Ilfracombe Beds are, in general, either badly preserved or difficult to separate from the matrix. Since the slates are heavily cleaved, all the fossils are known from the limestones, which account for only a small part of the formation. The fossils found, such as the coral fauna of the Jenny Start Limestone, indicates a Givetian age. The Rillage Limestone, at the base of the Middle Ilfracombe Beds, contains brachiopods, crinoids, orthocones, bryozoans and algae, together with fish fragments, ostracods and small gastropods and is probably the lateral equivalent of the Holey Limestone, placed with thin limestones at the top of the Lester Slates-and-Sandstones. The main sedimentary and faunal features of the Ilfracombe Beds suggest that after the marine transgression, the sediments were deposited in a muddy offshore shelf environment. The thicker coralliferous limestones (e.g. Jenny Start Limestone) indicate periodic clear shallow conditions over large areas. The stritigraphical termininology of the Ilfracombe 'Beds' was revised by Edmonds et al. (1985) and the unit is probably best now regarded as a 'formation' comprising the following members:

Kentisbury Slates Member

Combe Martin Slates Member (including, in sequence, the Jenny Start Limestone, The Coobe Martin Beach Limestone and the David's Stone Limestone)

Lester Slates-and-Sandstones Member

Wild Pear Slates Member

The Ilfracombe coastal sections represent the type locality for the Ilfracombe 'Beds' of Middle Devonian age. These dominantly clastic rocks contain a few horizons of fossiliferous limestone and are very well exposed in the vicinity of Rillage Point and Hele Bay. The lower part of the succession is well displayed in Combe Martin beach. The Ilfracombe Beds contrast strongly with beds of similar age in south Devon

(massive reef limestones) and north Cornwall (deep-water slates) and it is possible that these three regions were completely or partially isolated during the Devonian. Large folds carry smaller, parasitic folds and three orders of folds have been developed in the Ilfracombe Beds. The second and third order folds can be readily seen with direct observation (the third order being the parasitic folds). The first order folds are of a much larger size and can only be inferred on most sections, although the hinge of one is visible at Sandy Beach. Numerous faults cut the Ilfracombe Beds along the coast, most of these being the dextral wrench faults which trend NW-SE throughout the area. The largest faults, with an estimated displacement of about 2km runs through the Combe Martin Bay and is of Tertiary age. The main structures that are visible or that can be inferred are more than likely attributable to a single orogenic event of late Carboniferous age, the Variscan.

The fossils found, such as the coral fauna of the Jenny Start Limestone indicates a Givetian age. The David's Stone Limestone in the Combe Martin Beach Limestone contains a restricted tabulate coral, including Thamnopora cervicornis, a species restricted to the Givetian. On this basis the boundary between the Middle and Upper Devonian is considered to be at the top of the Combe Martin Slates or within the overlying Kentisbury Slates. The Lester Slates-and-Sandstones are exposed at Lester Cliff (SS 57924758) and Combe Martin Beach (SS 57524761). The succession comprises slates, sandstones (locally cross-bedded), gritty sandstones, siltstones and mudstones (commonly abundant with Chondrites) and, thin, crinoidal, shelly and rather nodular limestones. The Combe Martin Slates, comprising slates with three distinctive limestone beds and subordinate thin sandstones and siltstones are exposed on the coast east of Ilfracombe and include some of the more important limestone horizons. The base of the Combe Martin Slates is taken at about 10m above the top of the Holey Limestone. The intervening 10m of strata contain sandstones and siltstones with abundant Chondrites and are assigned to the Lester Slates-and-Sandstones.

The Jenny Start Limestone commonly has an oolitic texture. At most exposures there is a varied coral fauna which includes colonial rugose corals, *Disphyllum aequiseptatum*, *Endophyllum* aff. *abditum*, *Thamnophyllum caespitsum* and *Xystriphyllum* aff*. quadrigeminum.* Tabulate corals also occur, including *Alveolites suborbicularis, Pachyfavosites polymorphus* and several forms of *Thamnopora*. The Jenny Start Limestone is considered to have accumulated in shallow-water, sub-turbulent environment. Local absence of corals is attributed to the action of bottom currents inhibiting coral growth. The distinctive Combe Martin Beach Limestone has a characteristic coral fauna, predominantly of small solitary rugose corals, including *Barrandeophyllum*, associated with tabulate corals, fragmentary bryozoans, brachiopods, gastropods and crinoids. Deposition is thought to have occurred in deeper water than that of the Jenny Start Limestone. A larger fold affects the David's Stone Limestone in Sandy Bay and similar structures are present further to the west. These larger folds carry smaller, parasitic folds.

Suggested Questions

1. Describe and identify the main rock types in this area.
2. Which rock shows the most deformation features? Give reasons why.

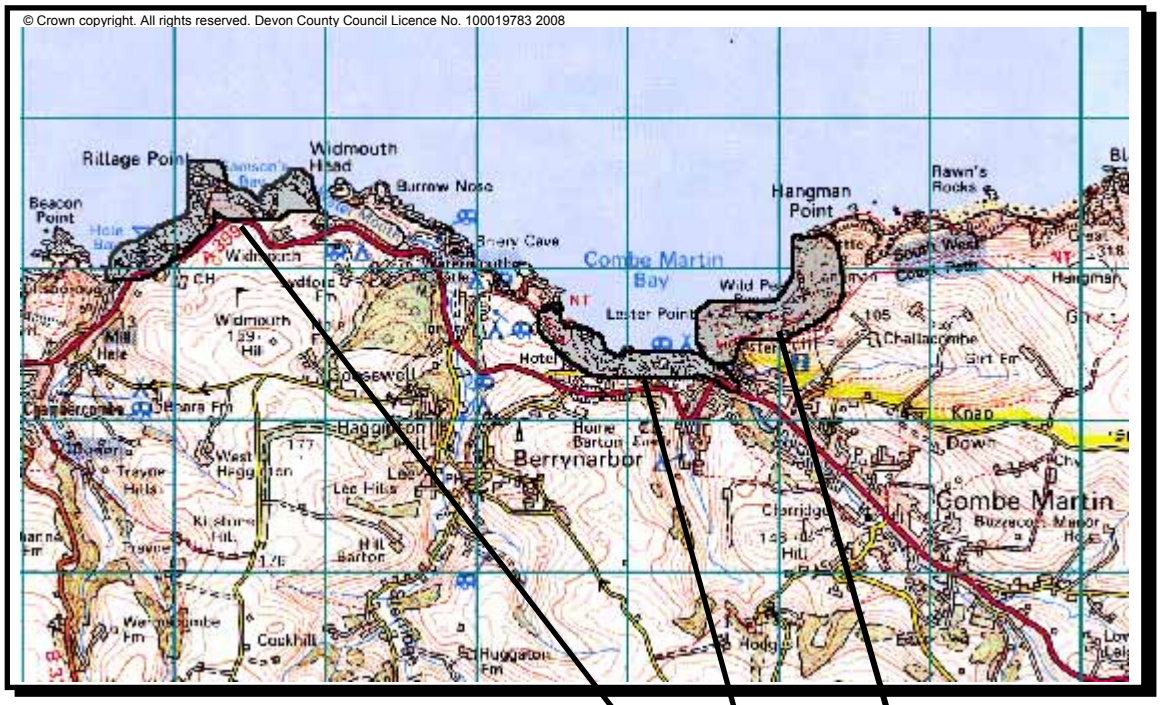
3. What structural features can be seen in the exposures? Give measurement details of the plunge and azimuth for these features.

4. What sort of environmental deposition do the fossil remains and the association of limestone indicate with several other sedimentary rock types?

LOCATION PLAN

HELE, SAMSON'S & COMBE MARTIN BAYS
ILFRACOMBE/BERRYNARBOR, NORTH DEVON

National Grid Ref: SS 536 479 - 586 484



Scale 1:50,000

Site localities

Coast land in three distinct locations between Hele Bay and Hangman Point

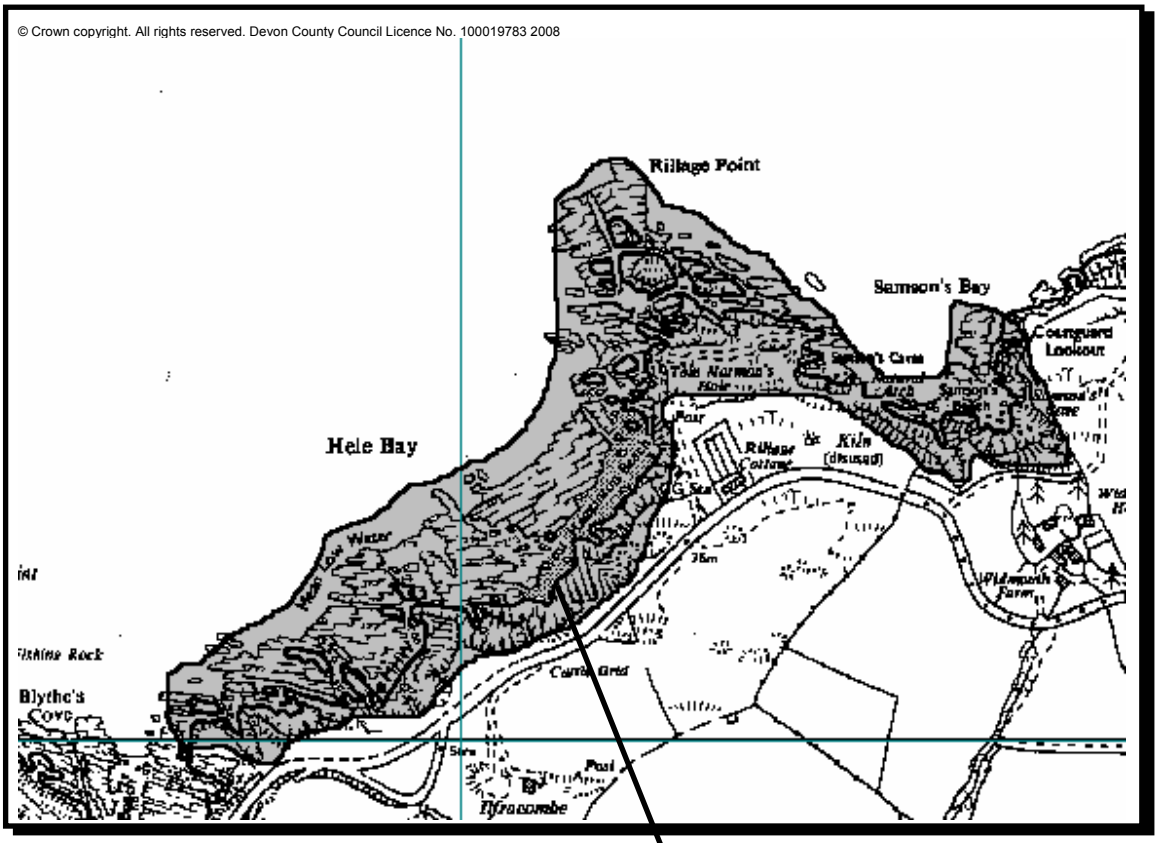
Parking and Access

- **Car parking in Hele along Watermouth Road. Rillage Point is best accessed at low water tide from Hele Beach.**
- **Parking at Combe Martin in vicinity of Lester Point and Jenny Start. Site can be viewed from the beach at low water tide or coastal path.**
- **Note the restrictions on site, and do not hammer or collect from the rock exposures.**
- **Car parking along Borough Road near Cobbler's Park. Access to Wild Pear Beach via coastal path.**
- **Please do not hammer the rock exposures.**

SITE PLAN

HELE, SAMSON'S AND COMBE MARTIN BAYS
Location 1
ILFRACOMBE, NORTH DEVON

National Grid Ref: SS 536 479 to 547 485



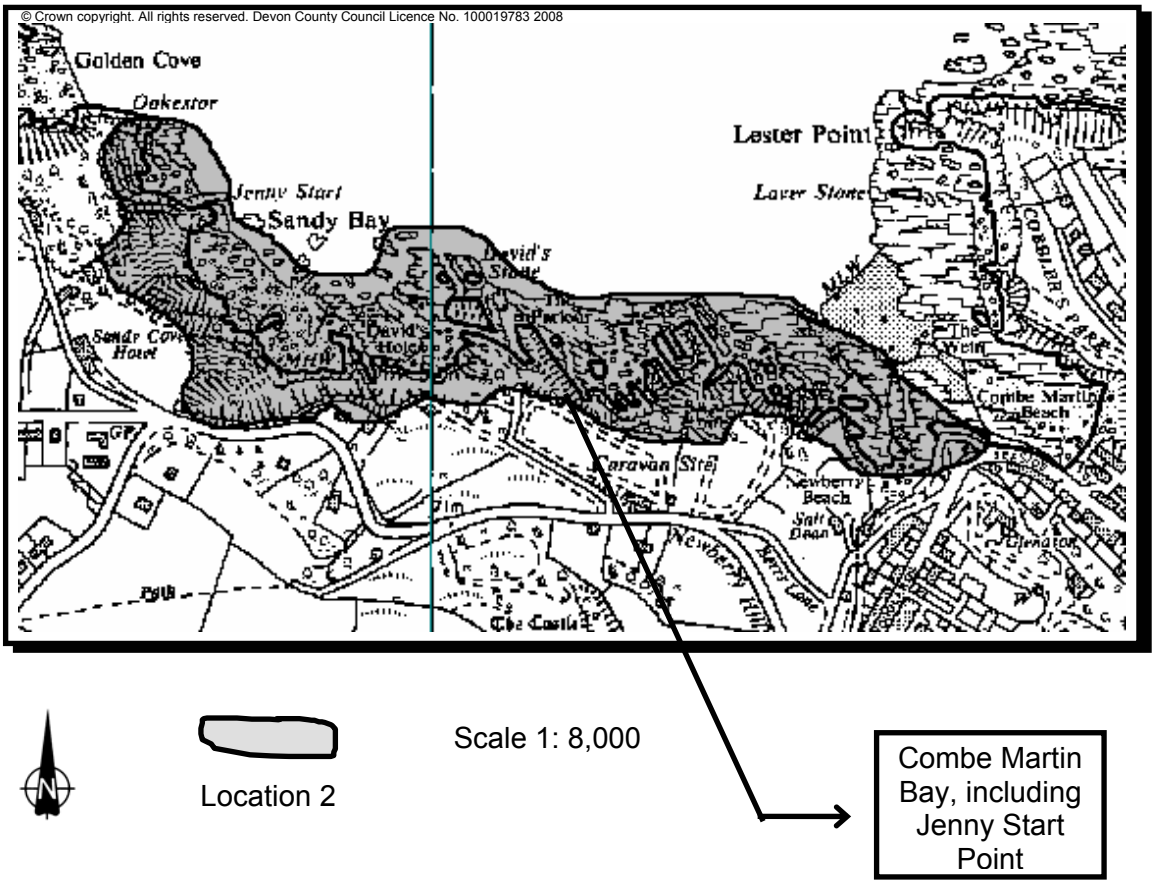
Main Points of Interest:

- Excellent exposures of Middle Devonain rocks (i.e. Ilfracombe Beds consisting of sandstones, mudstones and occasional limestone beds.)
- Thin limestone bands contain fossil corals and brachiopods.
- Please do not hammer or collect from the rock exposures.

SITE PLAN

HELE, SAMSON'S & COMBE MARTIN BAYS
Location 2
BERRYNARBOR, NORTH DEVON

National Grid Ref: SS 567 476 to 576 473



Main Points of Interest:

- Excellent displays of the lower part of the Ilfracombe Beds, namely the 'Lester Slates and Sandstones' and 'Combe Martin Slates'.
- Development of thin limestones within sequences, dominated by nearshore sediments.

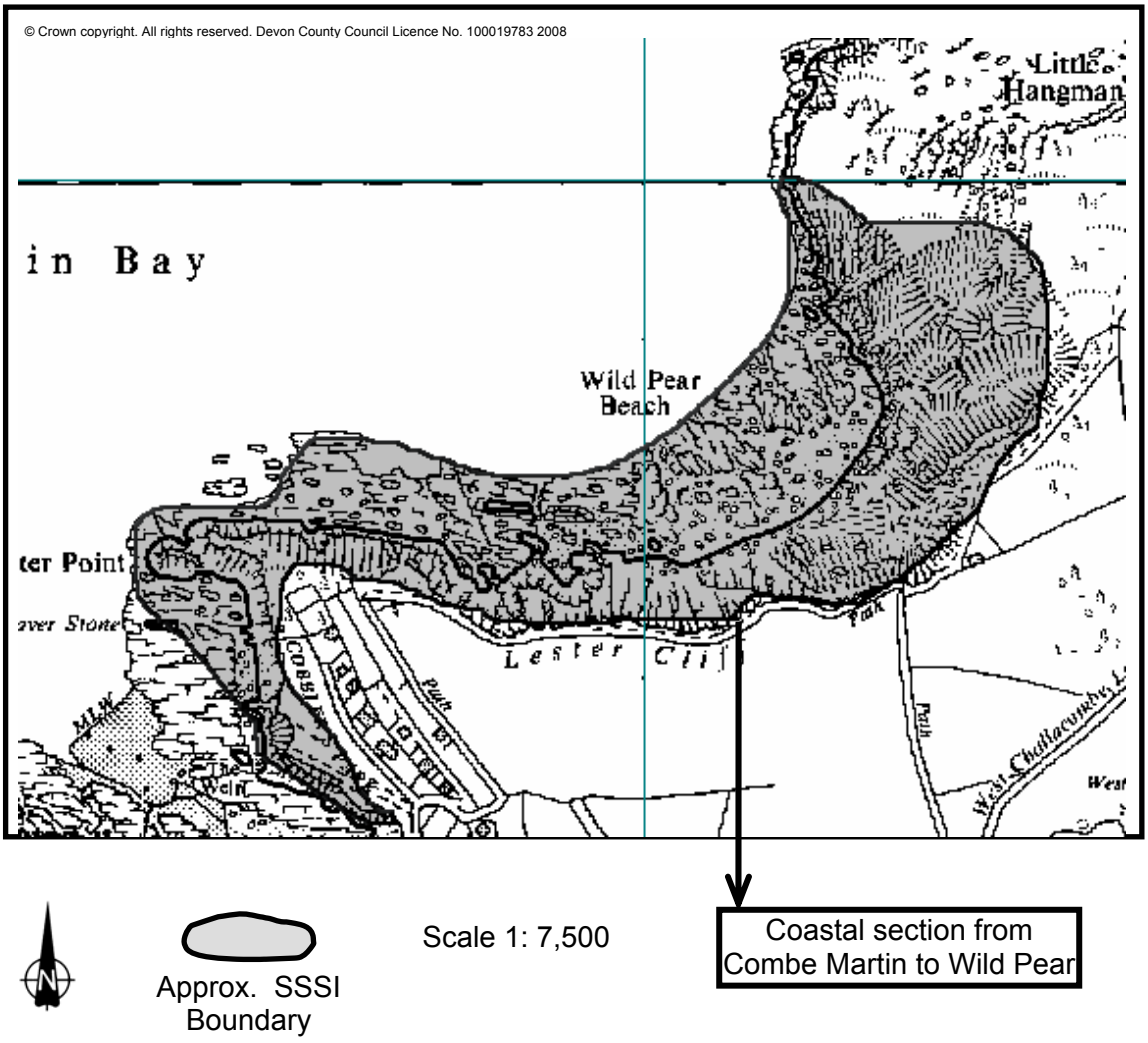
SITE PLAN

HELE, SAMSON'S & COMBE MARTIN BAYS

COMBE MARTIN, EXMOOR NATIONAL PARK

Location 3

National Grid Ref: SS 582 480



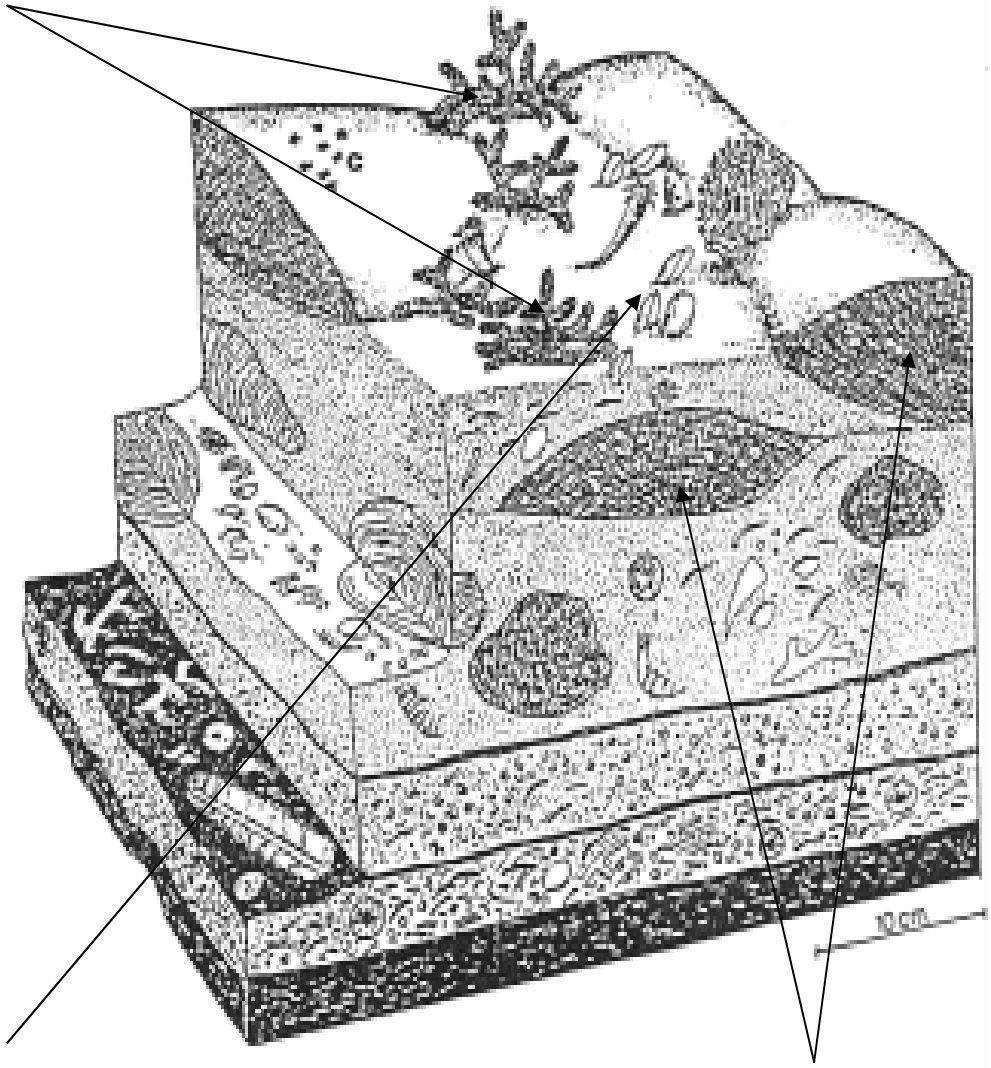
Main Points of Interest:

- Excellent sections displaying large-scale fold structures.
- These range from small 'fish-hook' folds of the thinnest limestones to folds larger than the scale of the cliffs.

Hele, Samson's and Combe Martin Bays SSSI

Diagram Showing a possible reconstruction of a typical shallow marine environment, responsible for the formation of the limestone beds around 380 million years ago, that can be found around Rillage Point

corals



brachiopods

coralline sponges (stromatoporoids)

From: GOLDRING, R. (1978). Devonian. In: MCKERROW, W.S. (ed.) *The ecology of fossils – an illustrated guide*. Duckworth, 384pp.

HELE BAY

Folded sandstone beds showing relationship to well developed cleavage in Middle Devonian slates at Hele Bay near Ilfracombe.

Rotation of cleavage across shear zone mineralised with quartz and ferruginous calcite

General view of the coastline NE of Combe Martin, including Little Hangman and Great Hangman: spectacular exposures of the Ilfracombe Formation in the middle ground with Hangman Grits ‘Formation’ beyond.

Colonial coral in the Ilfracombe Formation limestones at Rillage Point (Middle Devonian) [colony is around 40cm across]