Clovelly Coast

Highlights

The Clovelly Coast shows the best fossiliferous sequence through the upper Crackington Formation, and combines extensive outcrop with good biostratigraphical control.

Introduction

Foreshore exposures between Wood Rock and Gallantry Bower, 1 km north-west of Clovelly, Devon [SX 314 255]–[SX 305 262], show part of the upper Crackington Formation. It includes a number of biostratigraphically significant horizons, and is part of a complex east–west trending anticlinorial structure (Figure 3.6). A detailed account of the geology is provided by Edmonds *et al.* (1979).

Description

Lithostratigraphy

The exposed sequence consists of 360 m of shales, siltstones and sandstones (Figure 3.7). The strata appear to represent the latter phases of basin infill by turbidites, typical of the upper Crackington Formation. The sandstones are thin to medium bedded and the siltstones predominantly laminated. Ripple-drift cross lamination is common and, at some points, slumping and sandstone volcanoes are present (Burn, 1969, 1970). Petrographic analysis has revealed a lower proportion of lithic fragments than in the overlying Bude Formation, which may explain the greater resistance to weathering of the former (Edmonds *et al.,* 1979).

The sequence includes six fossil-bearing shales, which have been identified in a number of the coeval exposures in north Devon and north Cornwall. These are assigned names as shown in (Figure 3.7).

Biostratigraphy

The lowest horizon in this sequence to yield fossils is the Clovelly Court Shale, from which Edmonds *et al.* (1979) report the ammonoids *Verneuilties sigma* (Wright), *Cancelloceras* cf. *lineatum* (Wright) and an unnamed anthracoceratid. They also mention conodonts (*Hindeodella* sp.), ostracods (*Cypridina?*) and bivalves (*Dunbarella* sp.). According to Ramsbottom *et al.* (1978) and Edmonds *et al.* (1979) the ammonoids belong to the *Donetzoceras sigma* Subzone, indicating the topmost Marsdenian Stage.

The Skittering Rock Shale yields poorly preserved fossils, reportedly including ammonoids of the *Cancelloceras cancellata* Zone (Freshney and Taylor, 1972; Edmonds *et al.,* 1975, 1979; Ramsbottom *et al.,* 1978). However, the only published taxonomic list merely records the bivalves *Caneyella* sp. and indeterminate ammonoids possibly belonging to *Gastrioceras* (Edmonds *et al.,* 1979).

Another poor fossil assemblage occurs in the Deer Park Shale, including the bivalves *Caneyella* sp. and *Dunbarella* sp., and ammonoid fragments with fine lirae (Edmonds *et al.,* 1979). Ramsbottom in Edmonds *et al.* states that the ammonoid fragments are consistent with the Cumbriense Marine Band in South Wales, but no specific or even generic identifications are given.

A rather more diagnostic assemblage occurs in and immediately below the Embury Shale. Edmonds *et al.* (1979) record *Gastrioceras subcrenatum* (Frech) and *G.* spp. nov., and it is widely assumed that this level correlates with the Subcrenatum Marine Band in the South Wales and Pennines coalfields. If correct, the Embury Shale is the level of the Namurian–Westphalian boundary in the Crackington Formation.

The Gull Rock Shale yields another diverse fossil assemblage, including the ammonoids *Gastrioceras listeri* (Sowerby), *G. circumnodosum* Foord and *G. coronatum* Foord and Crick, together with the bivalves *Dunbarella papyraceae* (Sowerby) and *Caneyella* cf. *multirugata* (Jackson) (Edmonds *et al.,* 1979). This clearly invites comparison with the deeper-water assemblages from the Listed Marine Band of the Pennines coalfields (Calver, 1968), and thus suggests a position in the lower part of the Langsettian Stage.

Towards the top of the sequence is the Hartland Quay Shale. At Clovelly, it has only yielded a single calcareous nodule with anthracoceratid ammonoids. Elsewhere, however, this bed has yielded *Gastrioceras* cf. *amaliae* Schmidt (e.g. Elmscott Beach south of Hartland Point — Freshney *et al.,* 1979) which suggests that it can be correlated with the Amaliae Marine Band of South Wales.

Interpretation

The Clovelly Coast exposes a complete and fossiliferous sequence through the upper Crackington Formation, ranging from the upper Marsdenian to lower Langsettian. Of the other exposures of this interval, the best are to be found near Embury Beach, between Hartland Point and Bude (Freshney *et al.,* 1979). At Embury Beach, there are fossiliferous exposures similar to the Westphalian part of the Clovelly section, but the lower (Namurian) strata appear to be poorly represented there.

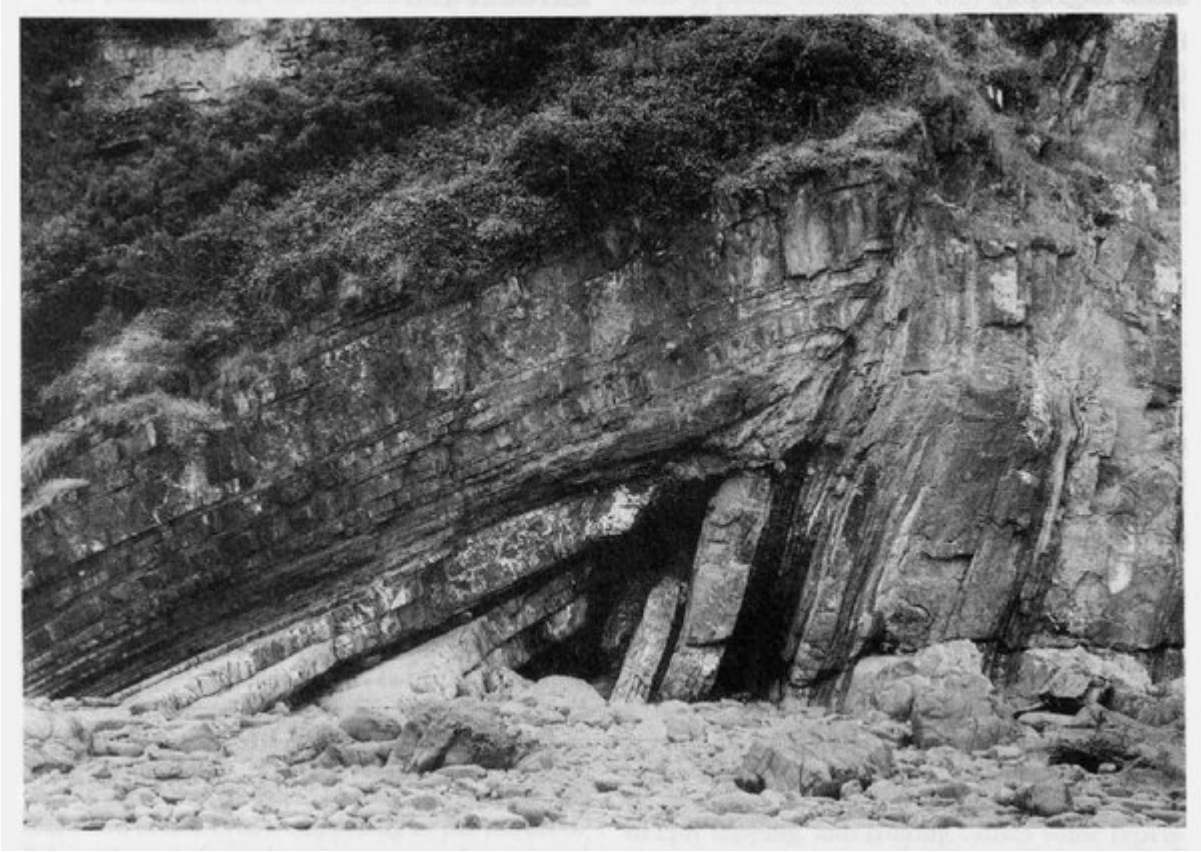
Coastal exposures at Westward Ho! are probably partly coeval with the Clovelly sequence, but yield little in the way of fossils (Edmonds *et al.,* 1979). They are probably shallower water sediments than those seen near Clovelly and De Raaf *et al.* (1965) classified them as the Westward Ho! Formation. However, the Westward Ho! Formation is now usually included within the Crackington Formation (Edmonds, 1974).

The Instow Fish Bed, exposed along the Torridge estuary near Bideford, is probably a correlative of the Gull Rock Shale at Clovelly and has yielded a more diverse fossil assemblage (Prentice, 1960a). However, the rest of the upper Crackington Formation is only poorly exposed at Instow.

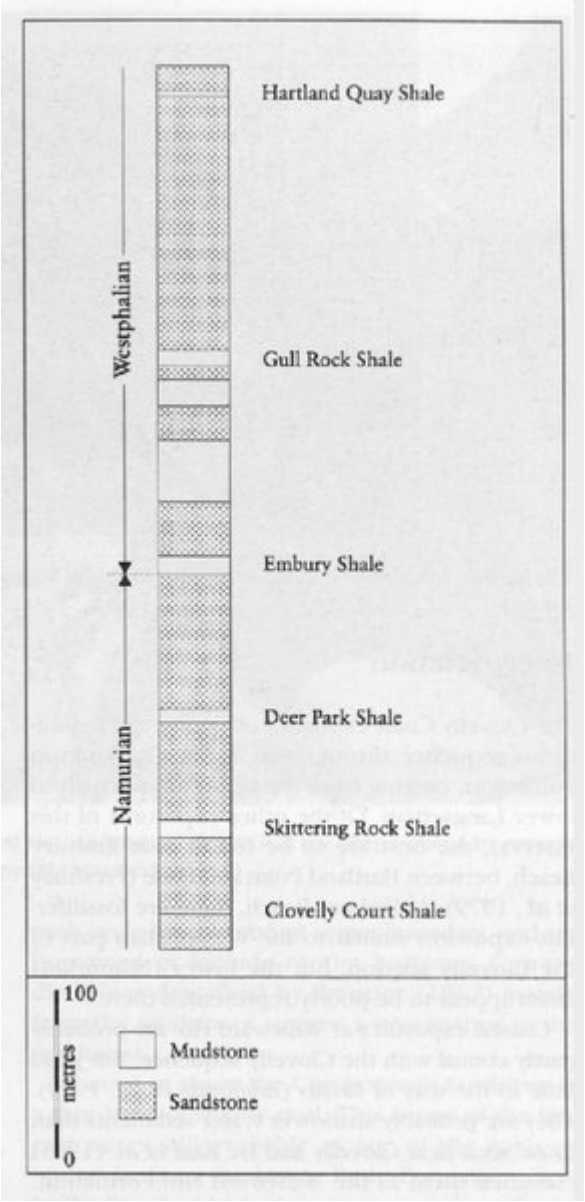
Conclusions

The Clovelly Coast provides the best fossiliferous exposures of rocks known as the upper Crackington Formation, thought to be about 315 million years old. They represent the later phases of the haling of a marine basin known as the Clam Trough, which extended from Ireland through south-west Britain to northern Germany. The rocks exposed here are especially important as they include beds containing diverse assemblages of marine animal fossils, which allow detailed correlations with other successions of similar age in the rest of Britain, and elsewhere in northern Europe and eastern North America.

References



(Figure 3.6) Folded sandstones exposed 90 m NW of Clovelly Harbour, Clovelly Coast GCR site. Reproduced by permission of the Director, British Geological Survey: NERC copyright reserved (A5925).



(Figure 3.7) Stratigraphical log of the upper Crackington Formation exposed in the Clovelly Cow GCR site. Based on Edmonds et al. (1979, fig. 11(7)).