Tenby Cliffs, Dyfed

[SN 132 001]–[SN 138 004]

Introduction

The Tenby Cliffs GCR site includes the cliffs of the South Sands from Castle Sands [SN 138 004] south-west to the cliffs below the Esplanade [SN 132 001]. The locality is important for exposing the only complete section of Chadian, Arundian and Holkerian strata in eastern Pembrokeshire. The Holkerian foraminiferal assemblages here are particularly diverse and abundant. Although there is no detailed recent description of the whole site, the fullest account of the geology is to be found in the [British] Geological Survey memoir (Dixon, 1921). The Holkerian part of the succession has been described by Scott (1988).

Description

The site runs across the axis of the eastwards-plunging Tenby Anticline, the northern limb of which is cut out by a fault through Castle Sands [SN 138 004]. A section from Chadian dolomites almost to the top of the Holkerian Stage, dipping southwards at 65°–70°, is present on the southern limb of the fold. In the core of the anticline, the lowest beds seen are dolomites, which have been compared to the Laminosa Dolomite of Gower by Dixon (1921). They consist of well-bedded dark-grey fine-grained dolomites with pockets of white coarsely crystalline calcite and dolomite (Dixon, 1921). The only easily visible primary constituents are crinoid fragments, although in the report of a field excursion, Leach (1909) recorded *Syringopora* cf. *reticulata* and *Fasciculophyllum omaliusi* from the dolomites.

The overlying Caswell Bay Oolite is quite thin (*c.* 25 m) compared to the section at its type locality, but recognizable by its very pale colour and fine oolitic texture. As at many localities farther east in South Wales, the top of the Caswell Bay Oolite is a palaeokarst with a soil developed above, and calcrete features, such as rhizocretions, within the top of the limestone (Spalton, 1982). The Caswell Bay Mudstone ('*Modiola*' or 'lagoon-phase' of Dixon, 1921) consists of alternating fine-grained limestones and dolomites, with some brecciated beds (Figure 9.19). According to Spalton (1982), the

Caswell Bay Mudstone at this site is 19 m thick and shows its thickest development in South Wales. It is softer than the surrounding limestones and has been eroded to form a cave with its north wall the top of the Caswell Bay Oolite (Dixon, 1921) (Figure 9.19).

The Arundian High Tor Limestone is in the order of 100 m thick and consists of medium-bedded dark-grey limestones with a fauna including crinoids, corals, brachiopods and *Bellerophon.* Detailed faunal lists are supplied by Dixon (1921); the corals include *Caninia cornucopiae, Siphonophyllia cylindrica, Syringopora* and *Michelinia megastoma.* The Holkerian Hunts Bay Oolite is at least 150 m thick and comprises bioclastic limestones at the base succeeded by light-grey, thickly bedded oolites. The upper part consists of bioclastic and peloidal limestones interbedded with carbonate mudstones (Scott, 1988). The fauna is described by Dixon (1921) and includes *Composita ficoidea.* In their report of a field excursion to the site, Owen *et al.* (1971) noted a particularly large colony of *Siphonodendron martini in* the Hunts Bay Oolite.

Strank (1981) studied the foraminiferal faunas of the Holkerian part of the succession at Tenby (called the 'Stackpole Limestone' by her, using the nomenclature of south-west Pembrokeshire), initially to confirm its age. She discovered the richest and best preserved Holkerian foraminiferal assemblages from anywhere in the British Isles, which contain all the forms commonly found in areas such as the Askrigg Block, Derbyshire and north Cumbria, together with many other species. Among the distinctive foraminifera she recorded here are *Eostaffella irenae, Archaeodiscus longus, Brunsia irregularis, Florennella, Spinobrunsiina landeliesi, Dainella holkeriana, Endothyranopsis utahensis, Nevillella tetraloculi, N. dytica* and a new species assigned to 'cf. *Koskinobigenerina*', a genus which in other regions is not generally recognized below the latest Asbian sequence.

Interpretation

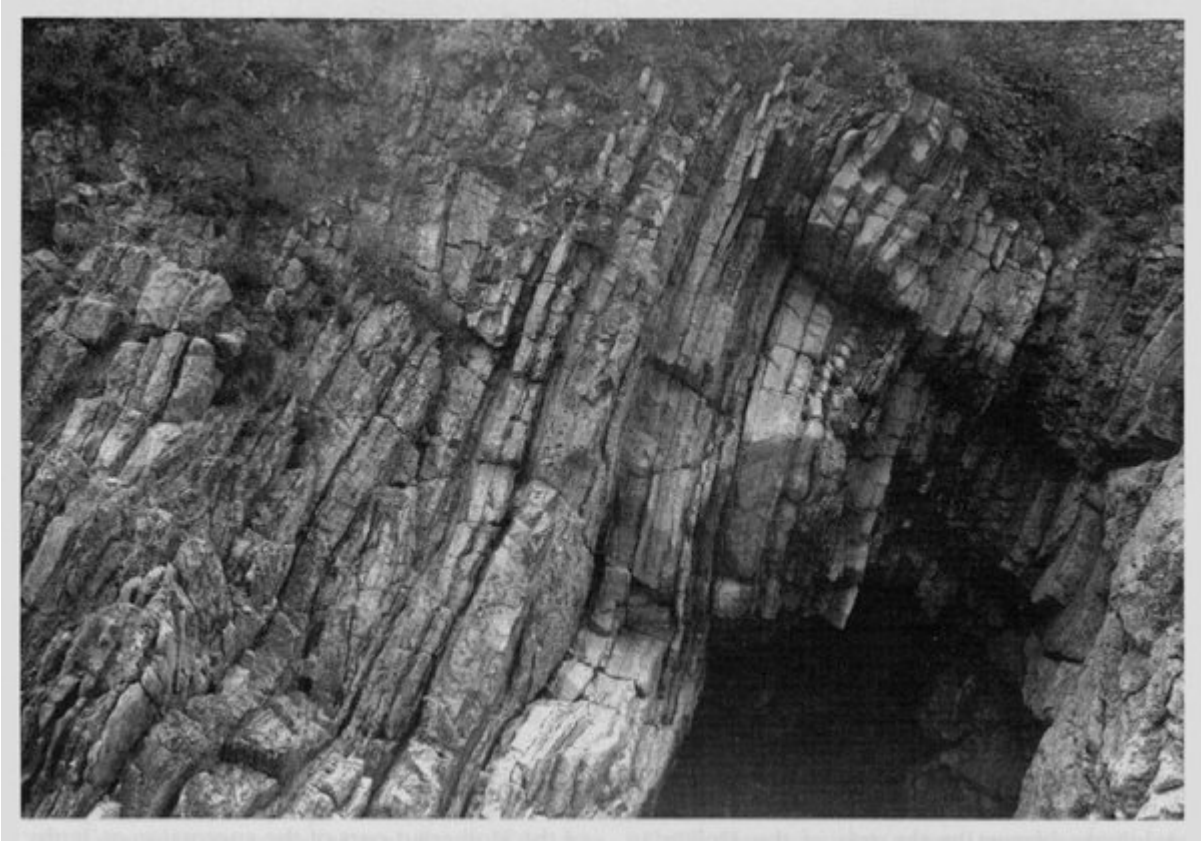
The lithological succession at Tenby is broadly similar to that on the Gower Peninsula described and interpreted by Ramsay (1987), although with the exception of the Caswell Bay Mudstone, units are thinner at Tenby. This has been taken to indicate that the locality lies farther shoreward on a carbonate ramp compared to Gower (e.g. Wright, 1986a). The Chadian succession records shallowing, from dolomi-tized bioclastic limestones to oolite shoals (Caswell Bay Oolite), followed by emergence and soil development. The overlying Caswell Bay Mudstone records the establishment of tidal-flat environments. This unit is regarded as being either Chadian or Arundian in age in South Wales. The thick development of the Caswell Bay Mudstone indicates that peritidal conditions persisted longer in the Tenby area than in Gower, although this thickening appears to be very local (Simpson, 1985a). An Arundian transgression led to the deposition of further bioclastic limestones represented by the High Tor Limestone.

The lower part of the Holkerian Hunts Bay Oolite records the establishment of an oolitic barrier and this is succeeded by finer-grained back-barrier deposits (Scott, 1988). Strank (1981) suggested that the exceptionally rich Holkerian foraminiferal faunas might indicate slightly deeper, less restricted waters compared to the Holkerian shelf carbonates of the Pennines.

Conclusions

The Tenby Cliffs site provides the best Dinantian exposure in the Tenby area and shows a succession intermediate in thickness between the thick successions of Gower and South Pembrokeshire and the attenuated successions of the north crop. Although most units are thinner than on Gower, the locality is notable for its thick development of the Caswell Bay Mudstone. It is also important for its exceptionally rich Holkerian foraminiferal faunas. There has been little modern work in the area and the site offers considerable potential for future research.

References



(Figure 9.19) Steeply dipping section of the thinly bedded Caswell Bay Mudstone overlying the top of the Caswell Bay Oolite (bottom right) at the Tenby Cliffs GCR site. (Photo: British Geological Survey, No. A327, reproduced with the permission of the Director, British Geological Survey, NERC, all rights reserved (IPR/19–39C).)