Cheese Bay

[NT 492 856]

Highlights

Cheese Bay, Lothian, is the type locality for *Rhadinichthys formosus* Traquair, 1904, a small actinopterygian. The fish fauna consists of 15 species, some of which lived in highly saline drying pools.

Introduction

The Cheese Bay (or Gullane) section is only occasionally exposed at low tide. The so-called 'Shrimp Bed' and associated black shales have yielded a rich and diverse assemblage of fishes. The beds occur in the Lower Oil Shale Group of the Calciferous Sandstone Series, dated (George *et al.,* 1976, p. 49) as Asbian (late Viséan). The discovery of fish in this section by Macconochie was first reported by Traquair (1904) and described in detail by Traquair (1907), Briggs and Clarkson (1983) and Hesselbo and Trewin (1984).

Description

The section at Cheese Bay consists of 5 m of laminated dolomites and mudstones that are truncated by faulting and lack of exposure (Hesselbo and Trewin, 1984). Fishes occur at three horizons (Traquair, 1907; (Figure 9.22)). They are common in the shales below the 'Shrimp Bed', but rare within it. Large specimens are represented in the assemblage by scales of *Rhizodus* from just below the Shrimp Bed, which must have been from an animal of up to 10 m in length (Andrews, *in* Hesselbo and Trewin, 1984).

Besides the fish fauna, the 'Shrimp' Bed contains numerous specimens of crustaceans, with *Tealliocaris* particularly numerous, and in various stages of growth. Many of these are preserved whole (Traquair, 1907) or only partly dis-articulated. Most of the in-situ 'Shrimp Bed' is reported recently to have been removed by person(s) unknown (R.L. Paton, pers. comm., 1995).

Fauna

Acanthodii: Acanthodiformes: Acanthodidae

Acanthodes sp.

Osteichthyes: Sarcopterygii: (Actinistia)

Rhabdoderma sp.

Coelacanthus sp.

Osteichthyes: Sarcopterygii: Rhizodontida

Rhizodus hibberti (Agassiz and Hibbert, 1836)

Osteichthyes: Actinopterygii: Elonichthiidae

Gonatodus punctatus (Agassiz, 1835)

E. robisoni (Hibbert, 1835)

E. robisoni sub. var. *intermedius* Traquair, 1907

E. striatulus Traquair, 1907

Osteichthyes: Actinopterygii: Cosmoptychiidae

Cosmoptychius striatus (Agassiz, 1835)

Osteichthyes: Actinopterygii: Pygopteridae

Nematoptychius greenocki (Traquair, 1867)

Osteichthyes: Actinopterygii: Rhadinichthyidae

Rhadinichthys brevis Traquair, 1881

R. elegantulus Traquair, 1881

R. formosus Traquair, 1904 Type locality

R. ornatissimus (Agassiz, 1835)

Osteichthyes: Actinopterygii: Platysomidae

Wardichthys cyclosoma Traquair, 1875

TETRAPODA

Tetrapod *incertae sedis:* an unidentified postranial skeleton (RSM; M. Coates, pers. comm.)

New material of small coelacanths have been found here by S.P. Wood, either *Coelacanthus* or *Rhabdoderma* (T.R. Smithson, pers. comm., 1992).

Rhadinichthys formosus is described by Traquair (1904) as being similar to *R. ferox* (from Wardie, q.v.) in scale ornamentation, but resembling *R. brevis* (also from Wardie) in its general shape. It is 140 mm long and deeply fusiform, with a large dorsal and anal fins. The moderate-sized scales are ornamented with sharp ridges separated by a diagonal across the scale. The posterior border of the scale is delicately denticulated. The cranial roof bones are marked with fine contorted and interrupted striae.

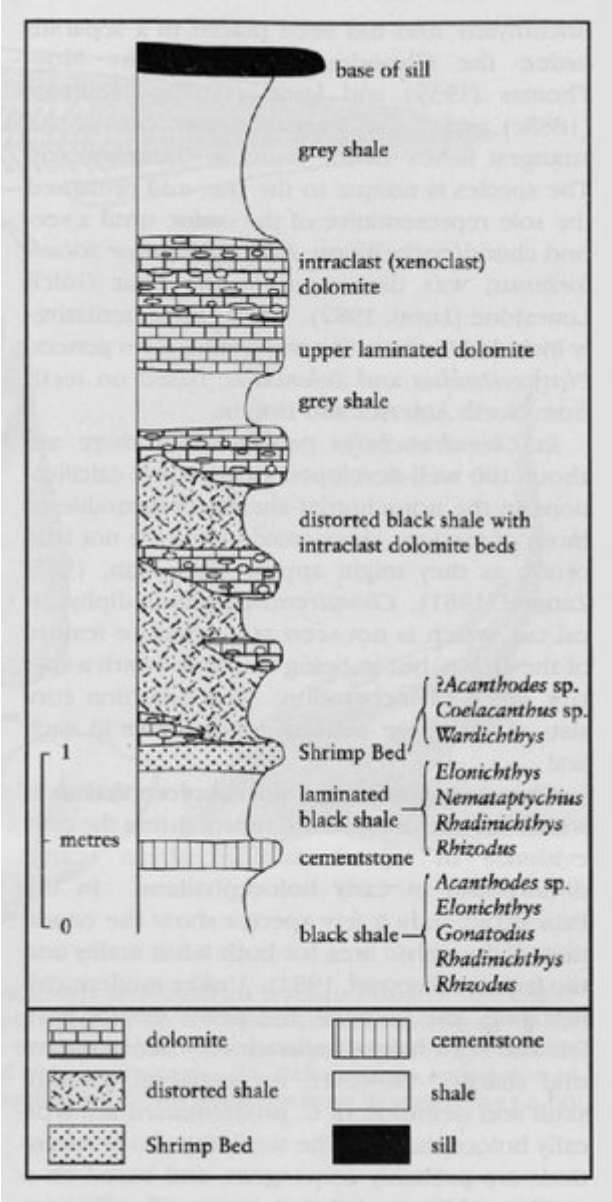
Interpretation

Briggs and Clarkson (1983) compared the Cheese Bay Shrimp Bed with the Granton Shrimp Bed, and suggested that conditions were similar between the two sites, which they described as 'stromatolite communities', having been preserved on tidal flats in nearshore intertidal or subtidal conditions where the fossil concentrations may represent dried-out pools. The fishes would have been periodic introductions. Study of the whole Granton sequence showed fluctuating salinity conditions within a stagnant pool caused by marine incursions that also caused mass mortalities of the indigenous fauna (Cater, 1987). Thus the faunal assemblage at Granton, and by implication in the Shrimp Bed, is envisaged as having consisted of marine forms, which were brought in by incursions of the sea, plus a specialized indigenous fauna that lived in brackish waters with possibly fluctuating salinities. Cater (1987) interpreted the Granton Shrimp Bed as representing periodically exposed mud flats with pools, and the shales above and below as low-energy stagnant lagoons. By implication, the faunal assemblages from Cheese Bay can be separated into coelacanths, the actinopterygian *Wardichthys,* and the acanthodian *Acanthodes* occurring in the fluctuating salinity plus marine incursion beds, and the other actinopterygians occurring within the lagoons. The fish fauna is similar to that from the Wardie Shales which is of slightly younger age (Cater, 1987).

Conclusion

The conservation value of the Cheese Bay site results from the production of a good fauna of fossil fishes of mid-Dinantian age, associated with crustaceans and other fossils including the important discovery of tetrapod remains. Recent sedimentological study has enhanced understanding of the unusual periodically evaporitic conditions. Detailed logging and collecting could provide information about the environments in which the fishes lived, because the assemblage is probably at least two communities mixed together *post mortem,* and further confused by indiscriminate collecting. The discovery of tetrapod remains demonstrates the continuing potential of the site.

References



(Figure 9.22) Section of the Cheese Bay GCR site.