Westerdale Quarry

[ND 126 517]

Highlights

Complete fishes are very common in Westerdale Quarry; Highland. This is a rare inland exposure of one of the earliest occurrences of a fish bed within the Orcadian sediments of the north of Scotland. The quarry is important because of its age, and because of the presence of the early bony (osteichthyan) fishes *Thursius* and *Dipterus* ((Figure 6.5)A–D).

Introduction

This small, flooded quarry exposes dark grey lacustrine siltstones of Eifelian age. Miles and Westoll (1963) place the Westerdale quarries 'no more than 850 ft below the Achanarras band' on the basis of regional dip. However, inland exposure is very poor in Caithness because of a thick cover of drift, and information from the faunal assemblage at the site is enigmatic, so that the stratigraphical position of the quarry remains uncertain.

Description

Fish specimens occur in a 1 m thick bed of poorly fissile, laminated, calcareous grey siltstone within a sequence of dark grey laminated siltstones with subaqueous shrinkage cracks (Wick Flag type of Crampton and Carruthers, 1914, p. 64). This is detailed in the following section:

	Thickness (m)
Dark grey laminated flagstones with shrinkage cracks	0.9
Light grey laminated siltstone Irregular surface	0.12
Light grey, calcareous siltstone, rare fishes	0.25
Mudstone parting	0.01
Dark grey, poorly fissile, varved calcareous siltstone; very fossiliferous, containing much disseminated scale material, plus ?coprolitic concentrations of scales; complete small *Thursius* sp. are common	0.75
Dark grey laminated flagstones, with shrinkage cracks	3+

The beds dip to the north at a low angle, and the fish bed is thus exposed in the north-northeastern part of the quarry, where a bench has been formed by its removal.

Fauna

Osteichthyes: Sarcopterygii: Dipnoi: Dipterida: Dipteridae

Dipterus valenciennesii Sedgwick and Murchison, 1828

Osteichthyes: Sarcopterygii: Osteolepiformes: Osteolepidae

Thursius macrolepidotus (Traquair, 1888a; Saxon, 1978)

Complete fishes are very common, but only two osteichthyan species of fish are recorded from here. Jarvik (1948a, p. 212) referred the specimens of *Thursius* to a new species, *T. moythomasi,* which occurs at only one other site, namely Sandside, the type locality for the species. This species is common at Westerdale; *Dipterus* is rare ((Figure 6.5)A–D).

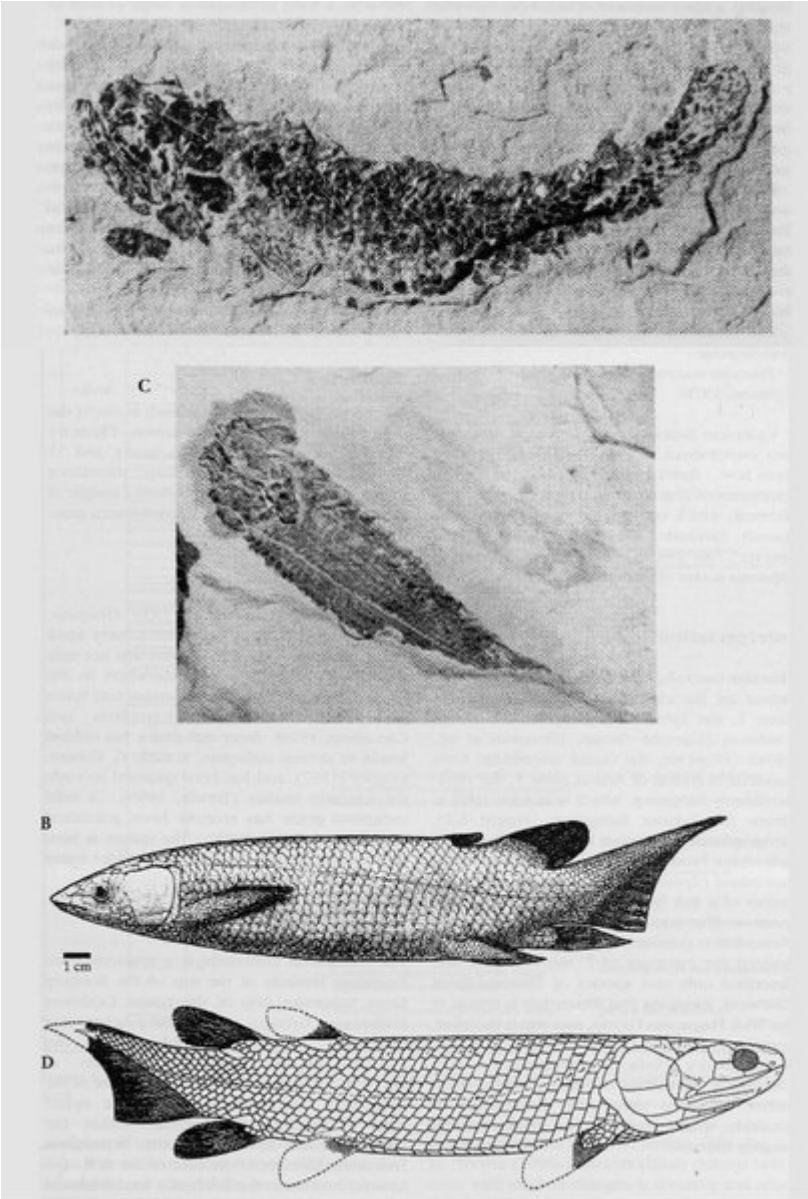
Interpretation

Thursius macrolepidotus and *Dipterus valenciennesi* are the characteristic fossils for Faunal Zone 1, the Lybster Subgroup of the Lower Caithness Flagstone Group. (Donovan *et al.,* 1974). However, the faunal assemblage from Sandside is typical of Faunal Zone 5, the Ham-Scarfskerry Subgroup, which is at least 1000 m above the Lybster Subgroup (Figure 6.2). Geographically, it is more likely that Westerdale falls within Faunal Zone 1, in which case this is a rare inland exposure of one of the earliest occurrences of a fish bed within the Orcadian sediments. The restricted fauna that occurs at Westerdale is consistent with this. Saxon (1978) ignored the existence of *T. moythomasi,* and described only two species of *Thursius* from Caithness, assuming that Westerdale is typical of the Wick Flagstones Group, and that it therefore contains *T. macrolepidotus.* However, it is likely that Jarvik's (1948a) identification of a small *Thursius* at Westerdale indicates a new species, rather than the same one that occurs at Sandside, which would imply a relatively long-ranging species.

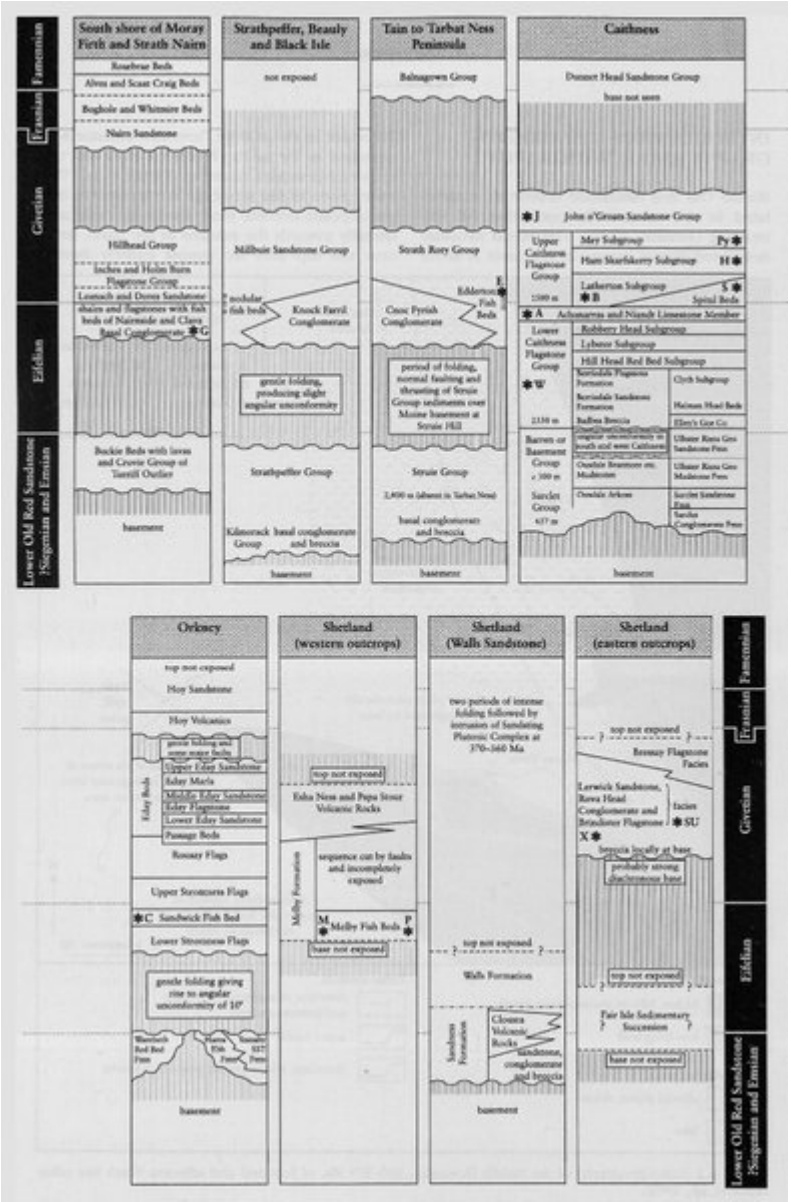
Conclusion

Westerdale Quarry probably reveals one of the oldest fish-bearing horizons in the Orcadian Basin. Consequently its conservation value lies in its fish fauna, which heralds the beginning of a major phase of fish evolution through the Mid-and Late Devonian in the north of Scotland. The site is still open, and has the potential for further research.

References



(Figure 6.5) Fossil fishes from Westerdale Quarry (A) The lungfish Dipterus valenciennesi Agassiz (Photo: courtesy The Natural History Museum, London, T00826/A), approximately natural size.Fossil fishes from Westerdale Quarry (B) D. valenciennesi in restoration by Ahlberg and Trewin (1995); (C) the osteolepid Thursius (Photo: courtesy The Natural History Museum, London, T00448/A), c. 12 cm; (D) T. macrolepidotus (Sedgwick and Murchison) (from Jarvik, 1948a).



(Figure 6.2) Stratigraphical sections of the Middle Old Red Sandstone of Scotland, Orkney and Shetland, with GCR sites shown. A, Achanarras Quarry; B, Banniskirk Quarry; C, Cruaday Quarry; D, Dipple Brae; E, Blackpark; F, Edderton; G, Gamrie, Den of Findon, Tynet Burn; H, Holburn Head Quarry; J, John o'Groats; M, Melby; P, Papa Stour; Py, Pennylands; S, Spital Quarry, Su, Sumburgh Head; W Weydale Quarry; X, Exnaboe (after Mykura (1991), Donovan et al. (1974) and others).