
MELBY

OS Grid Reference: HU166560, HU167565, HU168567, HU171572, HU173573, HU177571

Highlights

Two fish beds are present with a fauna close to that at Achanarras and they offer much potential for further study of this northernmost site of this fauna. The Melby Fish Beds at several locations in Shetland have produced excellent specimens of about ten species. These are important since some of them, particularly *Pterichthyodes milleri*, are index fossils that show that these strata are the same age as those at Achanarras in Caithness and Cruaday in Orkney. This is close to the northernmost point preserved of the great Orcadian Lake Astin, (1985, 1990).

Introduction

The Melby Fish Beds were discovered by J. Knox during Geological Survey mapping between 1931 and 1934, and they were described by Watson (1934) and Mykura and Phemister (1976). There are two fish beds, separated by 90 m of predominantly fluvial facies rocks. Spore analysis, and the presence of *Pterichthyodes milleri* (Watson, 1934), confirms that the Melby horizon correlates to the Achanarras horizon (Allen and Marshall, 1981) and is thus of basal Givetian age.

Description

The Melby Fish Beds (Figure 6.21) are in a sequence of sandstones and shales, the Melby Formation, which is an isolated Middle Devonian sequence in West Shetland: there is no Lower or Upper Devonian in the area (Westoll, *in* House *et al.*, 1977). The lower part of the Melby Formation consists of buff and red sandstones, with two outcrops, representing perhaps one or two beds, of calcareous shaly laminites and siltstones, the Melby Fish Beds. Lavas and ignimbrites appear in the upper part of the Melby Formation, and these are overlain by the thick Esha Ness sequence, which is dominated by volcanic rocks. The Foula Beds, on nearby Foula, are similar in age, and consist of 1600 m of sediments, probably deposited in the same basin as the Melby Formation, but the latter are more distal in character.

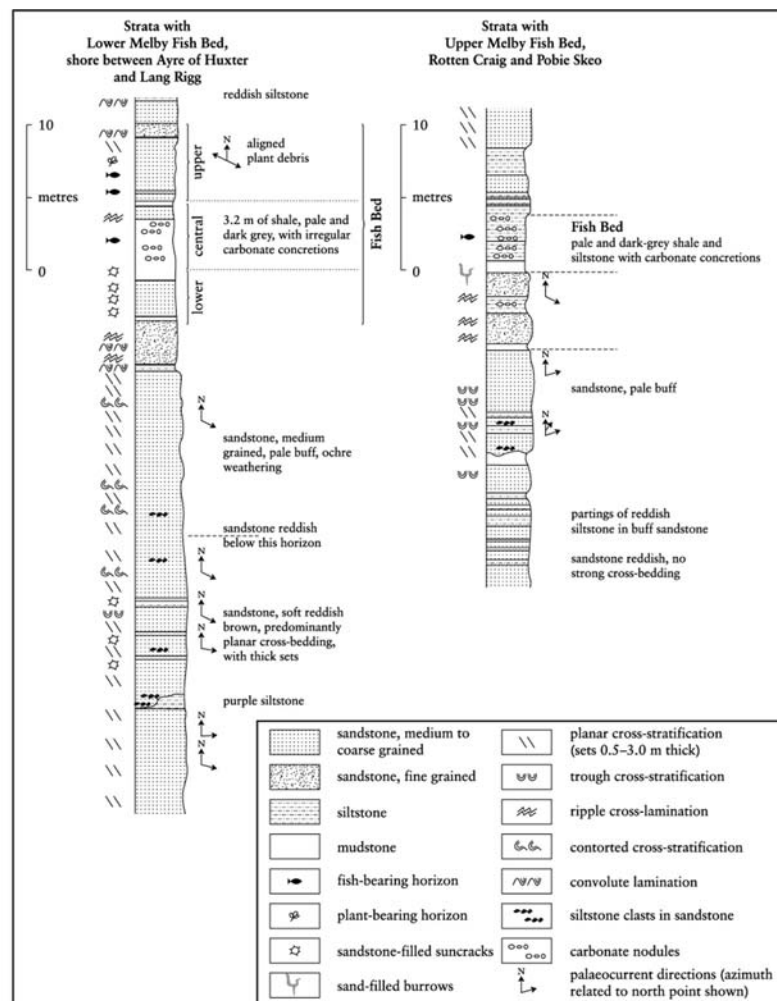


Figure 6.21: Stratal settings of the Melby Fish Beds (after Mykura and Phemister, 1976).

At first it was thought that only one fish bed was present (Watson, 1934). The area shows considerable folding, thrusting and faulting, and the fish beds show much lateral variation. Later Mykura and Phemister showed that there were in fact two fish beds (Figure 6.21). The Lower Melby Fish Bed is 13 m thick, the Upper 5 m thick, and they are separated by 80–90 m of predominantly arenaceous, mainly buff and brown cross-bedded sandstones (Mykura and Phemister, 1976). The Lower Melby Fish Bed can be divided into three units, termed lower, central and upper. The lower unit, 2.7–3 m thick, consists of mudflat siltstones and mudstones with desiccation cracks and plant remains, the central unit (3.2 m) is grey fissile shales alternating with unlaminated mudstones with carbonate-rich ribs and fish-bearing nodules, and the upper unit (4.5 m) is comprised of siltstones and mudstones with lenticular sandstone masses. Only the central unit contains fishes in any number.

The Lower Melby Fish Bed is exposed at three sites on the coast: Long Rigg (HU 177571), Ayre of Huxter (HU 173573) and Quilva Taing (HU 171572). Ayre of Huxter has the longest exposure, and has been collected most extensively. It is the only Lower Melby Fish Bed site recognized by Watson (1934). Beds at the western end of the exposure at Ayre of Huxter have been disrupted by folds and faulting such that fossils are broken up or lost in some places. The bone itself forms shear planes along which movement took place. Fishes are mainly found within calcareous nodules that occur in the dark grey laminated lacustrine siltstones. Disarticulated pieces mainly of *Coccosteus* exist within the calcareous ribs. Uncommon fragments of fishes also occur in the plant-bearing green-grey siltstones in the top part of the lower unit, and also within the thin siltstones that separate the calcareous bands.

Watson (1934), Mykura and Phemister (1976) and Hemmings (1978) record the following species from the three sites: *Coccosteus* sp. and *Pterichthyodes milleri* from Long Rigg, *Coccosteus cuspidatus*, *Dipterus valenciennesi*, *Glyptolepis* cf. *leptopterus* and *Gyroptychius*

agassizi from Ayre of Huxter, and *Coccosteus cuspidatus* Miller 1841, *Dipterus valenciennesi* Sedgwick and Murchison, 1828 and *Gyroptychius agassizi* Traill, 1841 from Quilva Taing. The faunal differences among these sites respond to lateral lithological variations traceable along the Lower Melby Fish Bed, but also probably reflect collecting bias, because Ayre of Huxter is the only one of the three where

collecting is easy.

The Upper Melby Fish Bed varies along strike, containing local lenticular masses of siltstone. It is almost continuously exposed along the top of the cliff from Foglabanks (HU 168568) to Rotten Craig (HU 167565), and then is repeated on the upthrown side of an ENE-trending fault. The southermost outcrop is at Matta Taing (HU 166561), where a complete section through the fish bed may be seen, with a 1 m thick lower unit 2.5 m below the main fish bed also available for collection. The most accessible sections are at Pobie Skeo (HU 168567) and Matta Taing. The section at Pobie Skeo is given by Mykura and Phemister (1976, p. 146), and that at Matta Taing by Hall and Donovan (1978, p. 291).

Two of Watson's (1934) localities are in the Upper Melby Fish Bed (his localities 1 and 3), but it is not clear which sites these are precisely. Locality 1, also known as 'Brough of Huxter' (Hemmings, 1978), is described as 'Shore 1,600 ft W 38° S of Brough of Huxter, and is very close to Pobie Skeo. Fishes occur in carbonate ribs and nodules within grey shales and siltstones', and Watson (1934) recorded *Homosteus milleri*, *?Coccosteus cuspidatus* and *Pterichthys* sp. (= *P. milleri* Hemmings 1978), but the original specimens are lost. Locality 3, described as 'shore 2720 ft S 39° W of Brough at Loch of Huxter' is at HU 167564, near Rotten Craig and is close to Mykura and Phemister's (1976) second locality. Watson (1934) records *Homosteus milleri* from this site (Figure 6.22).

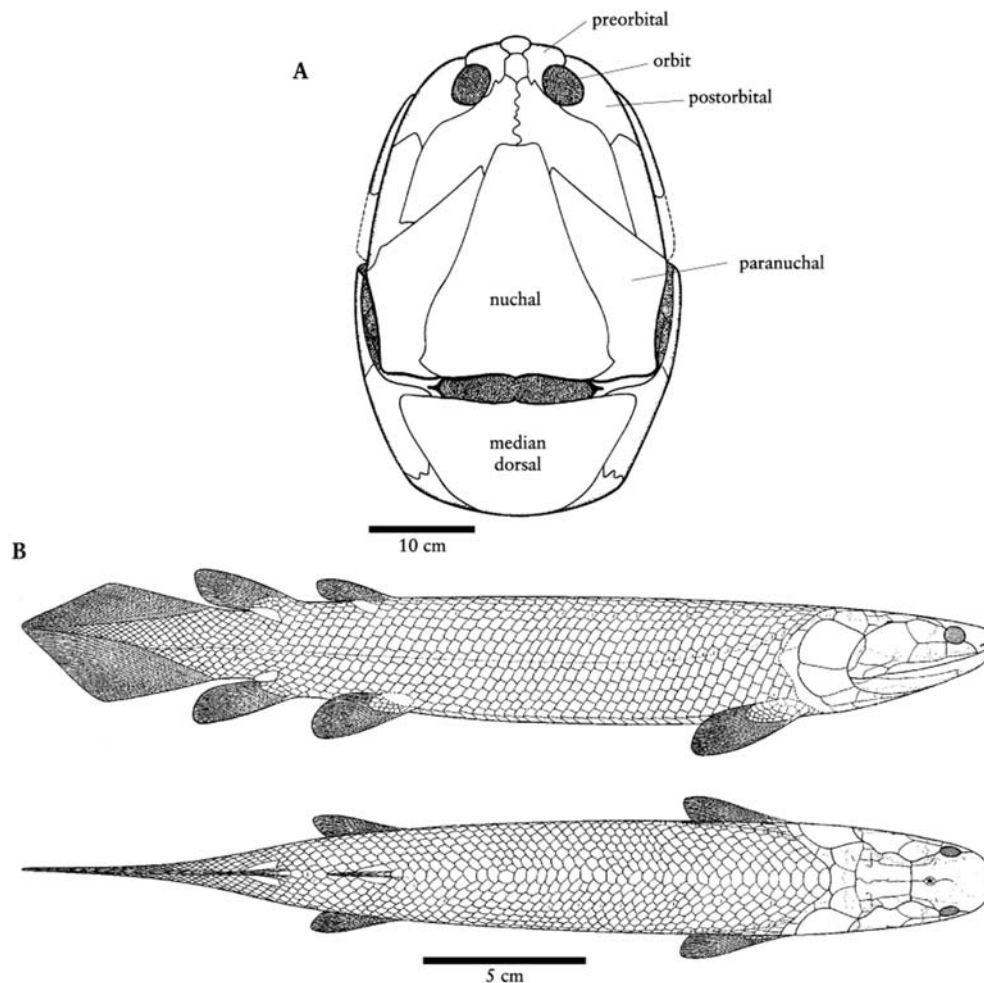


Figure 6.22: Fishes from Melby: (A) dorsal view of the head and pectoral shield of the arthrodire *Homosteus* (after Moy-Thomas and Miles, 1971); (B) the osteichthyid *Gyroptychius* in dorsal and lateral view (after Jarvik, 1948a).

Fish species listed by Mykura and Phemister (1976) from the Upper Melby Fish Bed sites include *Cheiracanthus* sp., ?*Coccosteus cuspidatus* and *Homosteus milleri* from Pobie Skeo, *Coccosteus cuspidatus* and *Mesacanthus* sp. from the coast north of Matta Taing (HU 167563), and *Cheiracanthus* sp., *Coccosteus cuspidatus*, *Gyroptychius*?, *Mesacanthus* sp., and *Homosteus milleri* from Matta Taing (HU 166561).

Fauna

Placodermi: Arthrodira: Coccosteidae

Coccosteus cuspidatus Miller, 1841

Coccosteus sp.

Placodermi: Arthrodira: Homosteidae

Homosteus milleri Traquair, 1888 Placodermi: Antiarchi: Asterolepidae

Pterichthyodes milleri Miller, 1841

Osteichthyes: Sarcopterygii: Osteolepidae

Dipterus valenciennesi Sedgwick and

Murchison, 1828

Acanthodii: Acanthodiformes: Climaetidae

Cheiracanthus sp.

Acanthodii: Acanthodiformes: Acanthodidae

Mesacanthus sp.

Interpretation

The fish beds are thick, pale grey, sandy siltstones and shales with carbonate-rich fish-bearing ribs and nodules and indicate the existence of lacustrine conditions within an otherwise predominantly fluvial environment. The Melby laminites are different from other Orcadian Basin laminites (e.g. at Achanarras; q.v.) in that the clastic laminae often consist of green clay rather than silt, which is probably derived from nearby volcanics (Hall and Donovan, 1978). The nodules themselves indicate a lake margin setting similar in environment to that represented by the Moray Firth nodule beds (Den of Findon, Tynet Burn; q.v.).

The laminites of the Upper Melby Fish Bed at Matta Taing show varved complex sulphide nodules in the lacustrine shales of the fish bed (Hall and Donovan, 1978). Tectonic activity has deformed and fractured these nodules, and they may show cone-in-cone structure and veins. These authors concluded that the complex mineralogical development of the nodules was controlled by lacustrine regression and transgression, and by groundwater enriched because of nearby volcanic activity.

Conclusions

The Melby Fish Beds are the northernmost expression of the Achanarras horizon, and they appear to show a lake-marginal environment, similar to that seen at Den of Findon (q.v.) and Tynet Burn (q.v.). In addition, however, there is strong evidence for local volcanism at Melby. The fish fauna is typical of the Achanarras horizon, as shown particularly by finds of *Pterichthyodes milleri*, but seems to lack *Osteolepis* which is so common in Caithness. The sites are worth conserving as the best locations in Shetland showing fish-bearing Orcadian lake sediments, and further collecting is possible from coastal exposures.

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