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## Black Park, Edderton

[NH 678 832]

### Highlights

The Black Park locality, in the Alness–Struie area of the Moray Firth, Highland, has produced species of fossil fishes of Mid-Devonian age. This is the best site for the Edderton Fish Bed, which is equivalent in age to the fish beds at Achanarras. It shows a somewhat different fish assemblage from that at Achanarras, being especially rich in the placoderm *Rhamphodopsis*, which is rare elsewhere.

### Introduction

The exposure on the right bank of the Allt Muigh-Bhlaraidh (described as Craigroy Burn by Geikie, 1878) near Black Park yields a fauna typical of the Achanarras horizon. In the middle of the 19th century the Rev. J.M. Joass of Edderton found the site to yield fishes. In 1861 Murchison communicated this news in a letter from Joass to the Geological Society of London. The Edderton Fish Bed was described by Roberts (1864) as 'perhaps the richest deposit of *Coccosteus* known'. *Glyptolepis* and *Diplacanthus* were also said to be common. Geikie (1878) also described Edderton and its fauna, comparing it with some of the Cromarty and Moray Firth nodule beds. Peach *et al.* (1912) gave a stratigraphical section at the site, with a faunal list compiled by Traquair (Figure 6.14).

### Description

The Edderton Fish Bed is part of the Strath Rory Group of Sutherland (Westoll, *in House et al.*, 1977). The Strath Rory Group, about 1350 m thick in all, is assumed to be entirely Mid-Devonian in age, and it is separated from the Early Devonian Struie Group by the Polinturk fault and by unconformities, and from the Late Devonian Balnagown Group by an unconformity. The lower part of the Strath Rory Group consists of the Meikle Daan Conglomerate (60 m seen), which is overlain by the Craigroy succession of red and yellow sandstones, often pebbly, and with siltstones and about six horizons of calcareous shales with concretions. One of these nodule beds, near the middle of the sequence, is the Edderton Fish Bed (Figure 6.16), a 2 m thick unit of dark grey and greenish calcareous shales with limestone nodules. The upper part of the nodule bed is the most richly fossiliferous.

About 150 mm above the nodule layer is the *Rhamphodopsis* Bed, a laminated blue-grey shale containing common bituminized flattened specimens of the ptyctodont *Rhamphodopsis*. This is the only site at which this bed occurs.

Fishes in the nodules of the Edderton Fish Bed are usually disarticulated bones, but are well preserved and three-dimensional, unlike the flattened specimens of the same species from Achanarras. Although these specimens may not look so attractive or complete as those from other sites, they allow detailed reconstructions because of the three-dimensional preservation. At Edderton, unlike any other nodule bed locality at this horizon, the bone is preserved in a robust condition, which allows bones to be completely removed from the matrix by acetic acid preparation, and this supplies great anatomical detail for work, such as that on *Coccosteus* by Miles and Westoll (1963, 1968).

Traquair (1905a) noted that *Coccosteus* and *Cheiracanthus murchisoni* were the most common forms at Edderton, and observed, like Hugh Miller, that some fishes were more abundant than others at different Middle Devonian nodule localities in the Moray Firth area.

### Fauna

Acanthodii: Climatiformes: Diplacanthidae

*Diplacanthus striatus* Agassiz, 1835

Acanthodii: Acanthodiformes: Acanthodidae

*Cheiracanthus murchisoni* Agassiz, 1835

Placodermi: Antiarchi: Asterolepidae

*Pterichthyodes milleri* Miller, 1841

Placodermi: Arthrodira: Coccosteidae

*Coccosteus cuspidatus* Miller, 1841

Placodermi: Ptyctodontida: Ptyctodontidae

*Rhamphodopsis threiplandi* Watson, 1938

Osteichthyes: Actinopterygii: Cheirolepidae

*Cheirolepis trailli* Agassiz, 1835

Osteichthyes: Sarcopterygii: Osteolepiformes: Osteolepidae

*Glyptolepis leptopterus* Agassiz, 1844

*Osteolepis macrolepidotus* Agassiz, 1835

*Gyroptychius* ?n. sp. (? syn. *Gyroptychius* sp. inc. 2; Jarvik, 1948)

Osteichthyes: Sarcopterygii: Dipnoi: Dipteridae

*Dipterus valenciennesi* Sedgwick and Murchison, 1828

The so-called '*Rhamphodopsis* Bed' was discovered by R.H. Denison in 1953–1954. It contains many specimens of *Rhamphodopsis threiplandi*, together with plants and occasional small specimens of *Pterichthyodes milleri*. *Rhamphodopsis threiplandi* (Figure 6.15) had previously only been known from Achanarras Quarry (Watson, 1934), where it is very rare. It also occurs rarely in the nodule beds of Cromarty, Lethen Bar and Tynet Burn. The species was redescribed in the light of this new material by Miles (1967), and was referred to by Ørvig (1960) and Miles and Young (1977). *Rhamphodopsis threiplandi* belongs to an unusual family of small placoderms, the Ptyctodontidae, which are distinguished by their greatly reduced head and trunk armour.

Ptyctodontids are found in the Lower to Upper Devonian of the Russian Arctic, Iran, North America, Europe and Australia, usually as fragments or tooth plates. *Rhamphodopsis*, together with *Ctenurella* from the Upper Devonian of Germany and Australia, are the only two ptyctodont genera that are known from more or less complete specimens.

## Interpretation

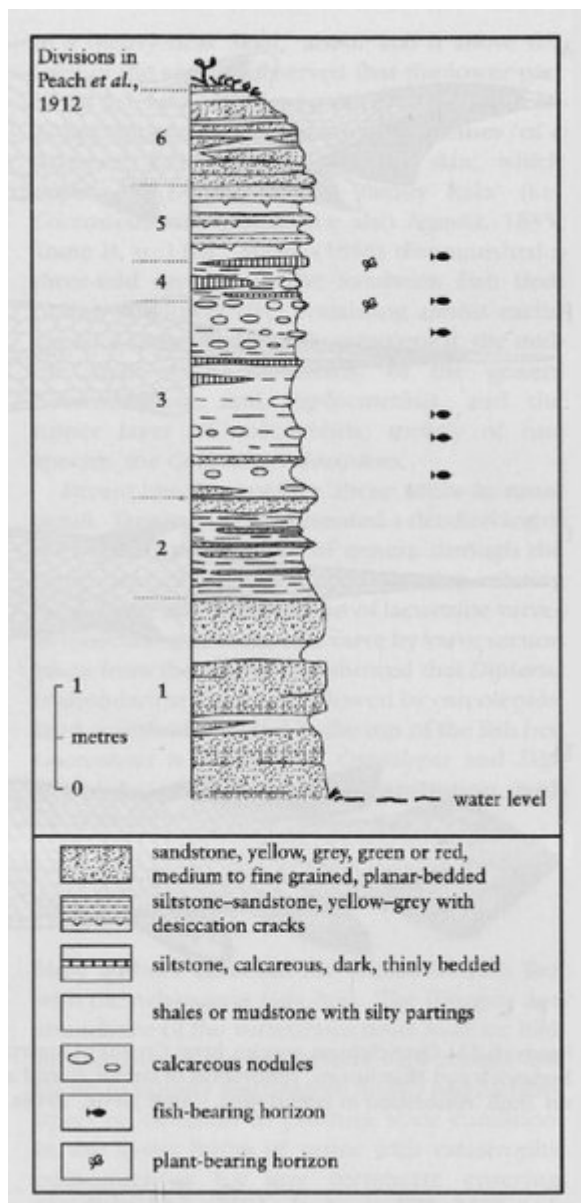
The fauna in the Edderton vertebrate-bearing layers has a remarkable number of gnathostomes and placoderms of presumed carnivorous habit. The nature of the prey is obscure. The cause(s) of mortality are not known, but seem not to include anoxia. One of the most interesting features about *Rhamphodopsis* is evidence of sexual dimorphism in the pelvic region, with the presence of claspers in males (Miles, 1967). This is important in evolutionary terms, because claspers are known otherwise only in holocephalans and elasmobranchs. It implies that these ptyctodonts were able to twist about one another during copulation, as do modern-day selachians. The reduced body armour in ptyctodonts in comparison with other placoderms may have permitted such activity. It is also likely that ptyctodonts were ovoviviparous or oviparous, even possibly viviparous. The female's large-scaled pelvic fins may have been associated with some form of parental care or assisted in copulatory grip.

## Conclusion

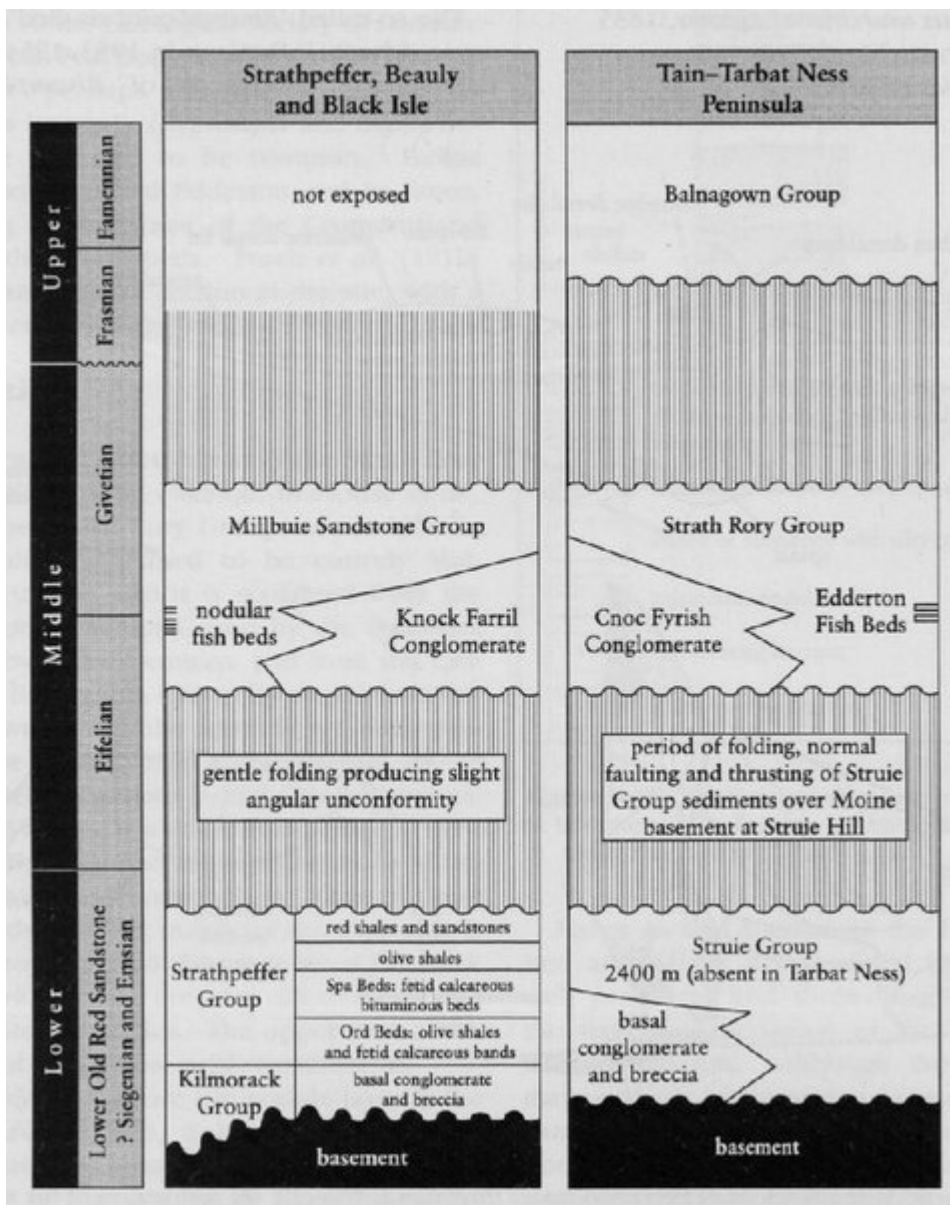
Edderton is not a type locality for any of its fishes, which is an accident of history, in that these species were discovered and described from other sites before Edderton was discovered. Material from Black Park has been heavily used for new reconstructions of Achanarras horizon species, such as *Coccosteus cuspidatus* (Miles and Westoll, 1968), *Pterichthyodes milleri* (Hemmings, 1978) and *Cheirolepis trilli* (Pearson and Westoll, 1979). The conservation value of Edderton lies in the quality of preservation of the fishes in three dimensions, and as the only site where the extraordinary placoderm *Rhamphodopsis* is relatively common. It remains a site of considerable potential, easily accessed and with good exposure.

The Edderton fish beds are in a horizon within the local succession which is stratigraphically similar to that of the fish beds in the Middle Devonian of the Strathpeffer–Beauly area (Figure 6.16). The faunas are similar, as were the habitats.

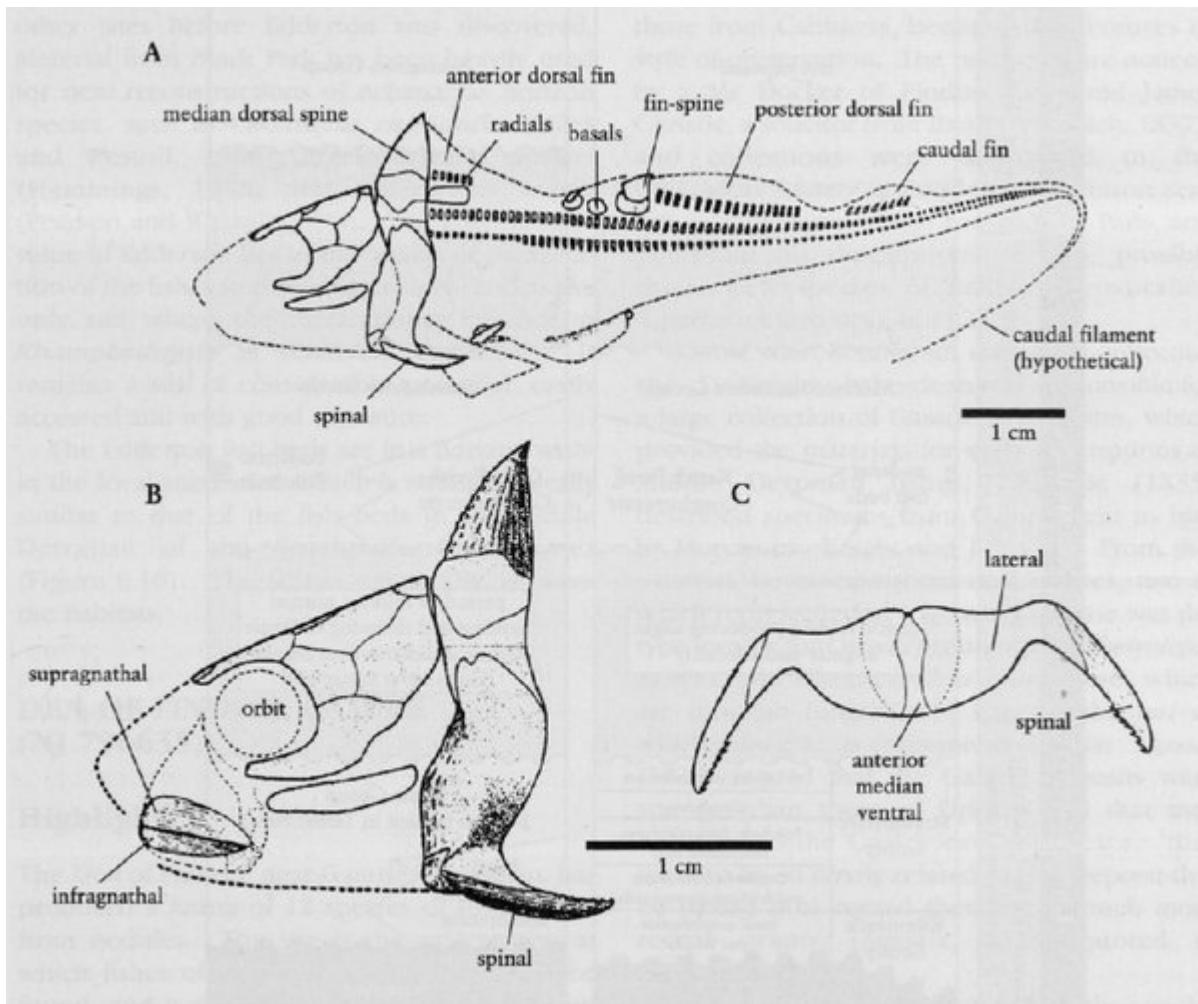
## References



(Figure 6.14) The stratigraphical section in the brook at Edderton. The fish are confined to units 2, 3 and 4. (After Peach et al., 1912.)



(Figure 6.16) Correlation of the area Strathpeffer-Black Isle-Tarbat Ness, showing the central position of the Nodular Fish Beds and the Edderton Fish Beds (after Donovan, 1978).



(Figure 6.15) The Edderton ptyctodont *Rhamphodopsis threiplandi* Watson. (A) restoration of the skeleton in lateral view; (B) restoration of the skull in lateral view; (C) restoration of pectoral girdle in ventral view (after Miles, 1967).