

MILL ROCK

OS Grid Reference: SS45544311

Highlights

Five species of fossil fishes have been reported from the Pickwell Down Sandstone of Mill Rock, the only such record in north Devon. The fishes include a variety of forms that are commoner farther north within the Old Red Sandstone continent. Their value at Mill Rock is that they occur in marine beds.

Introduction

Fish remains were discovered by Inkerman Rogers in the basal beds of the Pickwell Down Sandstone at Mill Rock, Woolacombe. The geology of the site has been described by Rogers (1919, 1926), Scrutton (1978), Edmonds *et al.* (1979), and Edmonds *et al.* (1985), and the fish fossils were described by Woodward (1919a) and Miles (1971).

Description

The Pickwell Down Sandstone consists of about 1000 m of purple, red, brown and greenish grey, cross-bedded and ripple-marked sandstones with some interbedded shales (see asterisk, Figure 7.3). The base of the unit is marked in many places by a band of tuff, locally several metres thick, whose volcanic source is unknown (Edmonds *et al.*, 1985). This Bittadon 'felsite' Tuff consists of one or more bands of keratophyric tuff and was first described by Rogers (1926) from the outcrop at Mill Rock. He believed that the tuff bands could be traced throughout the outcrop of the Upper Devonian of north Devon. However, in recent years no undoubted tuff at the Mill Rock exposure has been observed.

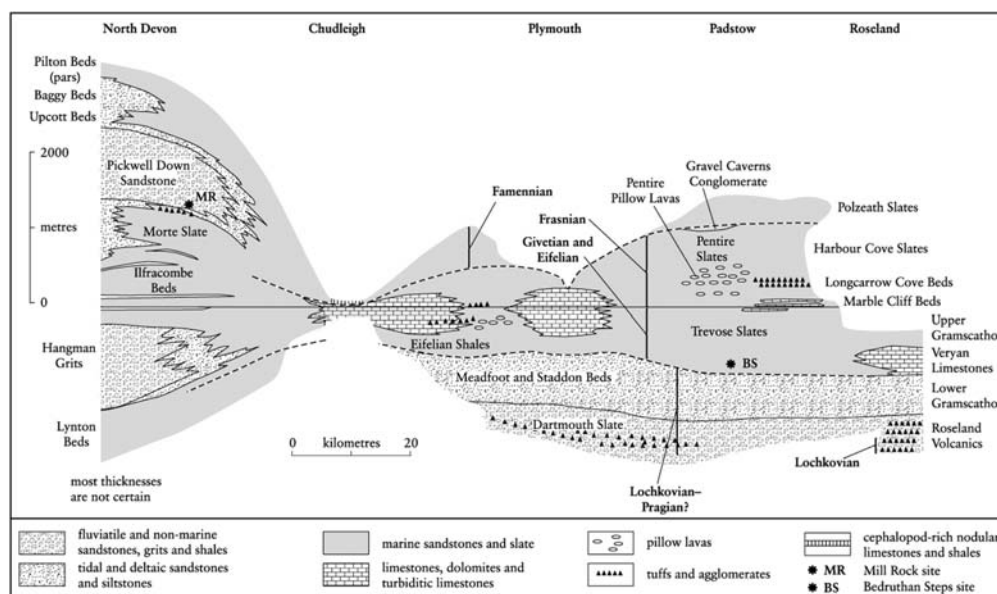


Figure 7.3: Simplified non-palinspastic facies section of Devon and Cornwall (after House, 1975).

Today the exposure at Mill Rock shows bands of strongly cleaved granular rocks, which are metamorphosed sandstones. These bands lie concordantly within greyish green, grey or purple shales, siltstones and sandstones dipping at about 60°/190°. These are right way up (Edmonds *et al.*, 1979), and are described as wavy, laminated and ripple cross-laminated siltstones and fine sandstones (Scrutton, 1978). Rogers (1919) collected from a single lenticle of tuff, no longer to be seen, which suggests either that Rogers' identification was incorrect, or that some exposures have since been buried by sand.

The fish remains consisted of scattered fragments some of which were very well preserved. The description of these fish fragments (Woodward, 1919a) intimates that a distinctive preservation has taken place, because they show all internal details of pore structures, and have apparently not been compressed. However, there have been many 'ferruginous infiltrations' in the rock, which obscure many details of microscopic structure. Woodward (1919a) also mentions an impression of a rhizodont tooth (*Polyplacodus*) within a piece of the Bittadon Tuff.

Fauna

Placodermi: Antiarchi: Bothriolepidae

Bothriolepis sp.

Placodermi: Arthrodira: Holonematidae

cf. *Holonema* Placodermi: Arthrodira: Coccosteidae

coccostean indet.

Osteichthyes: Sarcopterygii: Porolepiformes: Holoptychiidae

Holoptychius sp.

Osteichthyes: Sarcopterygii: Osteolepiformes

Polyplacodus sp.

The faunal list, from Rogers (1919) consists of the placoderms cf. *Holonema*, *Bothriolepis* sp. and a coccostean, and the sarcopterygians *Holoptychius* and *Polyplacodus*.

The *Holonema* specimens were identified as *H. cf. ornatum* Traquair, known from the Givetian of Shetland, by Woodward (1919a), basing his identification largely upon the ornament of the plates. Miles (1971) states that it is an indeterminate holonematid arthrodira. The Family Holonematidae is known from the Lower Devonian (Pragian) to Upper Devonian (Famennian) or Lower Carboniferous of North America, Greenland, Spitsbergen, Europe, Russia, Iran, India, Australia and Antarctica (Denison, 1978).

The placoderm *Bothriolepis* is a typical component of Late Devonian fish faunas, as is the porolepiform sarcopterygian *Holoptychius*. Small fragments of weathered bone may be found in the lowest bands of the Pickwell Down Sandstone, but so far cannot be identified. No other macrofossils have been discovered.

Interpretation

It is generally accepted that the Pickwell Down Sandstones were deposited in shallow sea, tidal lagoons and deltas (Goldring, 1971; Scrutton, 1978). The discovery of fishes led Rogers (1926) to conclude that the tuff bands had been laid down in water, but only further study of the sediments around the fish specimens will show whether deposition was under water or subaerial.

The Devonian rocks of the north Devon outcrop show an alternation of shallow marine and non-marine formations that would seem to be an ideal situation in which to correlate the marine Devonian of Devon and Cornwall with the continental successions farther north. In fact, this has proved to be very difficult.

The Pickwell Down Sandstones have not yielded any zonal fossils, so the fishes have been important as indicators at least of Late Devonian age. The age is further bracketed by datable units below and above. The Combe Martin Limestone of the Ilfracombe Beds below displays coral faunas of Givetian aspect (Webby, 1965b, 1966), while the Baggy Beds above have produced spores and conodonts of late Famennian age (House, *in* House *et al.*, 1977). Hence, the Pickwell Down Sandstone is dated as early Famennian, lying between the Givetian and late

Famennian date points. Unfortunately nothing closely correlating to the Mill Rock fauna is known from South Wales. The Plateau Beds faunas in Wales are dated as Famennian (Hall *et al.*, 1973).

Conclusions

The fish fossils from Mill Rock are not abundant, but they are the best in the north Devon Late Devonian, hence the conservation value of the site. The mode of preservation is uncommon in this region, being associated with tuff bands. The faunal composition is also intriguing, including as it does elements of the Upper Old Red Sandstone freshwater faunas to the north. Further study may show whether the fishes were living here in fully marine conditions, or whether they had been washed out to sea from the neighbouring land.

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