
PAPA STOUR

OS Grid Reference: HU186605

Highlights

This unusual fossil fish site in Shetland lies in the midst of Devonian-age volcanic rocks. Sandstones formed by denudation of the volcanic landscape entombed rare plants and fishes, and these fossils indicate a Mid-Devonian age, equivalent to the Achanarras horizon, a time of maximum size of the great Orcadian Lake. The site is important for its location with respect to the ancient lake margins, and for the evidence of a mix of volcanic and habitable environments.

Introduction

Fossil fishes have been discovered recently in Middle Devonian sediments on the small island of Papa Stour. The site, and the fishes, await further detailed study. The geology of Papa Stour has been described by Geikie (1878), Peach and Horne (1884), Finlay (1930), Mykura (1976) and Mykura and Phemister (1976). Most of this earlier work focused on the volcanic sequences on the island, and it is only recently that fossil fishes have been reported (J.E.A. Marshall, pers. comm.) from thin sedimentary strata on top of the lavas.

Description

Papa Stour, lying off the west coast of Shetland, opposite Melby, is mainly composed of extrusive igneous rocks, rhyolites, basalts and tuffs. The centre of the island is dominated by a lava platform of rhyolite, with underlying doleritic basalts appearing in some coastal locations (Finlay, 1930). The sedimentary rocks are of minor significance, being noted simply as 'a few feet of grey and red ashy sandstones which overlie the basalts of Papa Stour' by Finlay (1930, p. 673), and regarded by him as lateral equivalents of the mainland Melby Formation. The sandstones are exposed in a narrow strip across the eastern extremity of Papa Stour, closest to the mainland, at an inlet called Housa Voe.

The sedimentary beds lie between the basalt and rhyolite, and they are grey, red, brown and purple in colour, and commonly contain fragments of lava, and layers and lenticles of tuff. Mykura and Phemister (1976) recorded sandstones in a unit 0–30 m thick. The sandstones dip southwards at a low angle (7–12°). These sandstones appear to be the basement beds of the Melby Formation, and they were formed in part by denudation of an earlier Old Red land surface produced by volcanic activity. One sandstone is possibly bioturbated (Mykura and Phemister, 1976, p. 161).

Fauna

Acanthodii: Acanthodiformes

acanthodians indet.

Placodermi: Arthrodira: Coccosteidae

Coccosteus cuspidatus Miller, 1841

A thin bed of black shales, with volcanic detritus, contains broken fish remains. These fossils suggest that the fish bed is at Achanarras horizon level.

Interpretation

The Papa Stour fishes were interred in lake sediments deposited soon after the end of a major phase of volcanism. The fossils are in sediments containing volcanic ash and eroded lava fragments; the habitat may have been somewhat hostile. The deposit may correlate in age to the Lower Melby Fish Bed, or be somewhat older, thus it appears to be equivalent to the

extensive Achanarras Fish Horizon. The two Melby fish beds, separated by about 85 m of predominantly arenaceous beds bear some resemblance to the lacustrine rocks of Orkney and Caithness. Fannin (1970) showed that the lake depositing these fish beds may at one stage have been as deep as 50 m. Possibly this was the same lake that is recorded by the Achanarras Fish Horizon. The Melby Fish Beds contain the 'Achanarras fauna', but *Osteolepis* is totally absent.

Conclusions

The fossil fishes from Papa Stour were discovered in the 1980s. Their conservation value resides in their unusual situation, which warrants further study, being in sediments that are closely associated with extensive local volcanic rocks.

Reference list

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