

## THE UPPER DEVONIAN FISH LOCALITY OF MIGUASHA, QUEBEC, CANADA.

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At Miguasha, Québec (earlier referred to as Scaumenac Bay), the Escuminac Formation, lowermost Upper Devonian, yields an abundant and diverse fish fauna and flora. Both vertebrates and plant fossils from the locality are renowned throughout the world. The excellent preservation, including that of endocranial anatomy, enabled Jarvik to describe and illustrate fine anatomical details of the osteolepiform *Eusthenopteron*. That gives the wrong impression that Miguasha is throughout the Escuminac Formation an outstanding Konservat Fossil-Lagerstätte.

The cliffs at Miguasha bear fishes throughout the approximately 120 m thick Escuminac Formation. The lithology of the sediments changes throughout the sequence. Close to the base of the formation, acanthodians and anaspid-like agnathans occur in laminites, sometimes hundreds on one horizon. In these laminites, soft tissue preservation may occur (anapsid-like agnathans), and diagenetic transformations of acanthodians into organic substance led to misinterpretations and recognition of the "larval chordate *Scaumenella*." Most common within the sequence are limy concretions with different fish fossils, most commonly *Bothriolepis*. Three-dimensionally preserved fishes occur within the sandstone-siltstones and sometimes within the concretions. In all these cases, dermal bone is preserved, and in few cases chondral bone too, as in *Eusthenopteron*. One can characterize these fossiliferous sections of the Escuminac Formation as Concentration Fossil-Lagerstätte, whereas the laminites are Konservat Fossil-Lagerstätten.

The depositional environment was previously interpreted as an intermontaneous basin, based on tectonic and paleogeographic position. More recent paleogeographic reconstructions show a connection with Scottish deposits and to marine deposits in the present day North Sea. The lack of invertebrates and of marine plant remains, and the occurrence of vertebrates in other localities were used as additional indicators for freshwater deposition.

The sedimentological features are ambiguous, the turbidites, such as those found at Miguasha, can occur in marine or large freshwater bodies. Conchostracans occur, sometimes in the thousands on a single plane, in the basal part of the Escuminac Formation. They occur today in freshwater or brackish environments; the same species as the one in the Escuminac Formation is reported from lower Upper Devonian marine deposits in the Baltic (Koknese, Latvia). A detailed comparison of the fish fauna with other lower Upper Devonian fish faunas indicates a coastal marine environment. That is supported by rare trace fossils and by different chemical analyses of the sediments and  $^{87}\text{S}/^{86}\text{S}$  analysis of *Bothriolepis* bones.

In conclusion, earlier interpretations of the paleogeographic position of the Escuminac Formation at Miguasha and chemical and faunal indicators contradict each other in the interpretation of the paleoenvironment of the formation.