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Danien cold-water coral reefs from Faxe, Denmark - A unique preservation of aragonite faunas

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Fossil cold-water coral reefs are relatively rare in contrast to the modern ones. This is primarily because coral reef ecosystem, both in shallow and deep waters, is a geologically young phenomenon. In mid-Danien time, shortly after the mass extinction at the Cretaceous–Tertiary boundary and during a relative rise in sea level, the azooxanthellate scleractinian genus Dendrophyllia evolved and formed coral reef complexes in the epicontinental sea of the Danish Basin in northwest Europe. Deep-shelf mounded bryozoan limestone are intercalated with the cold-water reefs several places in the Danish Basin. In Faxe quarry an extremely well preserved Danian cold-water reef complex is exposed. It is situated over the easternmost part of the Ringkøbing-Fyn High. The accentuated reliefs on the seafloor made extensive colonisation of corals possible due to intensified bottom currents rich in nutrients. The degree of preservation of the fossils in the coral limestone varies markedly in the Faxe quarry. Early diagenesis of the coral limestone resulted in matrix cementation and dissolution of the aragonitic coral skeletons and many other aragonitic forms of gastropods, bivalves, cephalopods and annelids. However, commonly the fossils were preserved either as recrystalised by calcite or preserved as moulds and casts. A unique deposit consisting of an unconsolidated octocoral limestone display an extremely well preserved aragonitic fauna. The associated fossil fauna provide a rare and unique opportunity to describe the diversity and abundance of the aragonite faunas in a cold-water coral reef environment, which otherwise commonly are lost in the geological record. The diversity of the associated fauna is very high and around 250 species has been described. Among these are species from different families which have never been described as fossils before. Small aragonitic gastropods are very common and are represented by more than 120 species.