



Carboniferous - Permian Fish/Amphibia (C-P-FA)

Block Description

Visit <https://jncc.gov.uk/gcr-site-list>, for more information on GCR blocks and sites
For Palaeontology GCR block descriptions and GCR site lists,
visit <https://jncc.gov.uk/gcr-blocks-palaeontology>

Introduction

In contrast to the manner in which most invertebrate fossils are represented in the GCR, fossils of vertebrates, arthropods (except trilobites) and terrestrial plants do have their own dedicated GCR Blocks, because of the relative rarity of the fossil material. The GCR sites selected for the Carboniferous-Permian Fish/'Amphibia' GCR Block represent the British fossil record of fishes and stem Tetrapoda and Amphibia of the last two periods of the Palaeozoic Era, from about 354 to 251 million years ago (Ma). At the end of the Devonian Period (preceding the Carboniferous Period) and at the end of the Permian Period (= end of Palaeozoic Era) significant, global, mass extinctions took place, enabling this 'unit' of the fossil record to have a characteristic faunal distinctiveness.

Palaeontological characteristics

The term 'fishes', unlike 'mammals' or 'birds' includes a range for aquatic vertebrates across several taxonomic classes. It refers to the living bony fishes (the teleosts) and cartilaginous sharks, rays and skates (the chondrichthyans), as well as a number of surviving representatives of older groups that were much more common in the past, such as the coelacanth, dipnoans (lungfishes), myxinooids (hagfishes) and petromyzontids (lampreys). The hagfishes and lampreys are jawless (agnathan) fishes. There are also two other groups of 'fish-like' aquatic chordates, which are not strictly 'fishes'. These are the living lancelets (cephalochordates) and the extinct conodonts, which are both important for understanding fish evolution and are considered within this GCR Block.

Following the appearance of fishes in Ordovician-Silurian times (**see Silurian - Devonian Chordata (SIL-DEV-CH)**), when the group were entirely marine, non-marine environments are represented in British Devonian rocks. The Devonian Period had been unmistakably an 'Age of Fishes' with its proliferation of species in the marine realm and the entry into fresh waters on all continents. In Carboniferous and Permian times the record is for both marine and non-marine forms. In Carboniferous time ray-finned fishes emerge as the dominant group; in the Permian Period, the fish faunas are dominated by sharks as well as ray-finned fishes.

The end-Devonian mass-extinction event (c. 354 Ma) involved the total demise of all the older groups of agnathans. Only the myxinooids (hagfishes), lampreys and most of the gnathostomes survived. The disappearance of so many vertebrate types made way for the gnathostomes, in particular, to radiate and expand the group.

The end-Permian mass extinction event (c. 251 Ma) led to a burst of evolution and diversification in the Cenozoic Era comparable to the Devonian radiation.

As well as displaying the evolution of fossil fishes during Carboniferous and Permian time, Britain continues to yield invaluable material that helps elucidate the origins and early evolution of tetrapods; the localities yielding important 'Amphibia' material are few in number, but are also globally rare. The first tetrapods entered the stratigraphical record in Late Devonian times; there are bones and teeth and their footprints from well before that period was ended.

Palaeogeography

The different depositional environments that developed in Britain during late Palaeozoic times are summarised on the following pages:

See Dinantian of Devon & Cornwall (DIN-DV-CW); Dinantian of Northern England & North Wales (DIN-N-E-WL); Dinantian of Southern England & South Wales (DIN-S-E-WL); Dinantian of Scotland (DIN-SC); Marine Permian (MAR-PER); Namurian of England & Wales (NAM-E-WL); Permian - Triassic (PER-TRI).

GCR site selection

For the purposes of site evaluation and selection, the GCR sites can be grouped into three principal themes or 'networks':

- British Carboniferous fossil fishes
- British Permian fossil fishes
- British Carboniferous-Permian stem Tetrapoda and Amphibia

Within the overall rationale of the GCR, sites were assessed with the following weightings in mind:

- sites of international significance because they have yielded fossils that are the 'type' material.
- sites yielding an assemblage (number and variety) of species that are significant to the understanding of early vertebrates
- sites where the fossils are exceptionally well preserved, showing features not seen elsewhere
- best-available sites for major fish/early tetrapod–amphibia assemblages necessary to represent evolutionary succession
- sites with particular significance to science and history of palaeontology in the development of studies of early vertebrates
- sites enabling the interpretation of the environments in which the animals lived.