



Aves (AVES)

Block Description

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For Palaeontology GCR block descriptions and GCR site lists,
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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 Aves [birds] GCR Block represent the British fossil record of Aves from the emergence of the group in the Jurassic Period (which ranged from about 200 to 130 million years ago (Ma)), through the remainder of Mesozoic Era (ending 65 Ma) and through the Tertiary sub-Era (65–1.81 Ma). Important British fossil bird sites of the Pleistocene Epoch are encompassed by the Pleistocene Vertebrata GCR Block. **See Pleistocene Vertebrata (PCN-VTB).**

Palaeontological characteristics

It seems likely that birds are a subgroup of Dinosauria, with closest relatives being modest-sized theropod dinosaurs such as the dromaeosaurids and troodontids, forms with bulbous heads, good eyesight and elongate forelimbs. The evidence for this proposed relationship is extensive and focuses on cladistic analysis of character information on skeletal structures in the forelimb, pelvis, hindlimb and skull. The main alternative view, that birds evolved in the Triassic Period directly from basal archosaur reptiles is not yet supported by evidence.

The oldest fossil bird is Archaeopteryx, from the late Jurassic Period of Germany, although an older, controversial form, Protoavis, from late Triassic deposits of Texas, has been proposed.

The phylogeny of birds is not yet fully established. Cladistic studies of the fossils of different ages, where a search is made for shared derived characters (those that uniquely link groups together), show that the majority of Mesozoic birds formed side branches from the line to modern birds (Neornithes). Whereas Archaeopteryx retains primitive reptilian characters, such as teeth, separate fingers with claws on its forelimb, an unfused wrist, a low sternum, an unfused lower leg and ankle and a long bony tail, modern birds lack all these structures. Cretaceous fossils record the loss of these primitive features and the acquisition of 'modern bird' characters. Modern birds radiated in the latest part of the Cretaceous Period (140–65 Ma) and divided in the Tertiary sub-Era (65–2 Ma) into around 20 main lineages. Fossils of most of the orders are known from at least the Eocene Epoch, some 50 Ma, especially from the British sites in the London Clay Formation.

An evolutionary tree of birds shows how a number of small groups branched off in the Cretaceous Period, and one of them, the Enantiornithes, became relatively abundant and diverse. However, the Enantiornithes, and the others, disappeared by the end of the Cretaceous Period, and the Neornithes prevailed thereafter. Most neornithine orders remained at low diversity in the early Tertiary Period and built up to modern diversities during mid- and late Tertiary times. The main change in the Tertiary Period was the huge radiation of the perching birds or songbirds – the Passeriformes – from the Miocene Epoch onwards. Today, the songbirds make up about half the overall diversity of some 7000 living bird species.

Palaeogeography

The different depositional environments that developed in Britain during Mesozoic (post-Jurassic) and Cainozoic times are summarised on the following pages:

See Aptian-Albian (APT-ALB); Berriasian, Valanginian, Hauterivian, Barremian (BER-BAR); Palaeogene (PGN); Neogene (NEO).

GCR site selection

Owing to the rarity of fossil bird material, this GCR Block represents something of a special case with regard to including all of the sites yielding, or that have yielded, significant types and quantities of scientifically important material that help elucidate the evolution of birds.

Fossil birds are much less well-represented compared to fossil mammals, with equivocal Mesozoic remains and good materials from the early Tertiary Period and the Pleistocene Epoch, but with a Miocene–Pliocene gap. Although some Mesozoic birds have been reported from Great Britain, most have turned out to be equivocal, and the valid reports are relatively unimportant finds, so no GCR sites for Mesozoic birds could be established. For example, supposed bird remains have been described from the Cambridge Greensand (Albian–Cenomanian) of Cambridge – isolated limb elements named *Enaliornis barretti* and *E. sedgwicki*.