

ORIGIN AND ANCESTRY OF BIRDS

From the study of Comparative anatomy, Embryology and Palaeontology of reptiles and birds it is confirmed that birds originated from some extinct stock of reptiles during the Mesozoic period. The evolution of birds from reptile is rather startling, since reptiles are cold-blooded and earth-bound creatures, while birds are highly organised warm blooded and feathered animals. Yet the two groups show morphological similarities and also similarities in their early embryonic development.

But we have no detailed evidence of the stages, by way of fossils, by which the cold-blooded terrestrial reptiles were transformed into active warm-blooded flying birds. The delicate structure of birds skeleton and their arboreal nature did not favour their preservation. But two fossil specimens from the upper Jurassic rocks of Bavaria show us one intermediate stage linking birds with reptiles.

Oldest Fossil Birds (Archaeopteryx)

In 1861 an important fossil bird was discovered from the Jurassic rocks of Bavaria and was named Archaeopteryx lithographica. This is the oldest known fossil bird that shows a number of remarkable avian and reptilian features. Another fossil bird, Archaeosaur was discovered from the same place. Some of the reptilian features possessed by these birds are - jaws with teeth, scales, lizard like long tail abdominal ribs etc. while the avian features include feathers, wings etc. These fossil birds represent the intermediate and transitional stage between reptiles and birds. Only during the Eocene period birds became diversified and well established as a successful group of vertebrates.

Ancestry of Birds

① Archosaur ancestors - The Archaeopteryx with its mixture of reptilian and avian characters has been regarded to represent a perfect intermediate between reptiles and birds. But which reptiles are its intermediate ancestors? In order to answer this question the zoologists have turned their attention to a

important groups of stem reptiles known as Archosauria or Coleosauria which possesses several characters similar to birds. In all archosaurs the hind limbs were longer than fore limbs, the acetabulum formed a cup, open below, so that the legs were held vertically below the body. The Ischium and pubis were elongated to allow for attachment of muscles producing a fore limb for movement. The femur has a lateral head and the long and strong tibia is sometimes fused with proximal tarsals. The distal ~~part~~ may fuse with metatarsals as in birds and the digits are reduced to four, three are turned forward and the first turned back.

The fossil history of the Archosauria suggests that in course of time they led to the evolution of birds and mammals, as well as many other types of reptiles. The Crocodylians and primitive mammals branched off early. The reptilian group like the Ichthyosauria and Plesiosauria flourished for some time and then became extinct. The other branch from the stem reptiles is known as the Thecodonta and it gave rise to the Crocodylia, the Saurischia, the Ornithischia, the flying pterosauria and birds. But the position of birds in the archosaur family tree is not fully established and is open to controversy.

(ii) PROAVES - But all these potential avian ancestors did not have a clavicle or wish bone. The fact that all flying birds including Archaeopteryx, possess a V-shaped wish bone means that the immediate ancestors could hardly have been without it. Moreover all these ancestral reptiles were highly specialized in several other characters which were not bird like. This disqualifies ~~from~~ them as ones on the ancestral stock of birds. They are too specialized to be on the direct-line and some of their similarities to birds appear to be convergences. Probably avian stock arose much earlier, in Permian or even earlier, from a more ancestral type. Heilmann gives the name Proavis to this hypothetical connecting link between

after generalized pseudo-suchians and the first birds.
Diphyletic Origin of Birds - The earliest-known fossil birds include both flying (*Archaeopteryx*, *Ichthyornis*) as well as flightless (= *Hesperornis*, *Diatryma*) types. The recently extinct Moas and elephant birds were also flightless. The most primitive living birds or Ratitae (ostrich, Rhea, cassowary etc) and penguins are also flightless. This led some authors, notably P.R. Lowe, to believe in the diphyletic (two lines of descent) origin of birds. They maintain that the flightless and flying birds of today have descended from different flightless ancestors. According to Lowe the present-day flightless birds were never capable of flight, and their wings are not degenerate now, but better developed than at any time in their past history.

(iv) Mono phyletic Origin of Birds -

In Ratitae, the legs are well-developed and powerful, the wings vestigial, and the feathers are ~~just~~ fluffy. But a recently discovered fossil of Eleutherornis, a probable ancestor of the present-day ostrich from the Eocene of Switzerland, shows closer affinities to flying forms than does the present-day ostrich, and ~~poses~~ poses a serious blow to the concept of diphyletic origin of birds. Today most palaeontologists believe that the Carinatae are more primitive. Presumably the Ratitae evolved from flying ancestors but readapted to a terrestrial mode of life in areas with abundant food and a few competitors or enemies. The more usually accepted view today maintains that birds have a monophyletic (one line of descent) origin, i.e. all birds have evolved from a single ancestor, perhaps close to *Archaeopteryx*. Accordingly, the flightless birds have evolved by loss of flight from flying ancestors. The weight of the known evidence also favours this view.