

# ORIGIN OF AVES

DEGREE - I

Origin of Birds

Birds has been regarded as master of air just like as fish regarded as master of water. Undoubtedly aves has been evolved from reptile, but tracing of their ancestry has remained a very challenging job. Their origin may be traced as follows.

## Archosaur ancestry

Although *Archaeopteryx* is considered as a connecting link between reptiles and birds, but the gap between it and the actual reptilian ancestors remains yet to be filled. The Mesozoic era was the era of great adaptive radiation for several groups of reptiles, especially the diapsid archosaurians or ruling reptiles. One ruling diapsid was called *Pseudosuchia* or *Thecodontia*. e.g., *Saltoposuchus*, *Euparkeria*. They were small, bipedal, carnivores having hind limbs much longer than that of forelimbs, 3 toes forward and one (hallux) backward, large orbits with sclerotic ring and teeth set in sockets of elongated jaws. They were the probable distant ancestors of birds.

Only three groups from pseudosuchians — *Pterosauria*, *Saurischia* and *Ornithischia*—may be picked up as potential ancestor of aves. Some members of each group shared bird like features. Formerly, it was considered that birds originated from pterosaurs or pterodactyls, that were light-boned, and membrane-winged flying reptiles. But this view is no longer held today. Some of the early Ornithischians, such as *Iguanodon* and *Camptosaurus*, were bipedal animals, but the bipedalism was marked to a greater extent in some Saurischians, such as *Struthiomimus* and *Ornithomimus*. These were exceedingly bird-like in form that walked on

3 toes and had 3 digits that were in much reduced hand, one opposable and used for grasping. Their skull was lightly built and teeth were absent in the beak-like mouth, probably due to an egg-eating habit. At present, such wingless forms

are usually regarded as the ancestors of birds that somehow developed feathers and took to flight. -

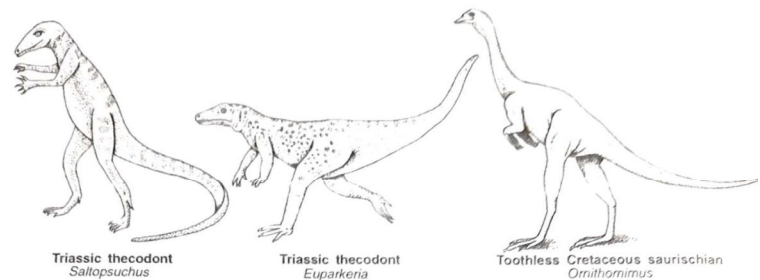


Figure 1 Some Thecodontia of Mesozoic era

The pterodactyles, supposedly evolved at a later stage from a somewhat similar ancestor, never enjoyed the luxury of feathers but simply glided around on leathery bat-like wings.

### Proaves

But all these potential avian ancestors lack a clavicle or wishbone. All flying birds including *Archaeopteryx*, have a V-shaped wishbone means that the immediate ancestors could hardly have been devoid of it. Moreover, all these ancestral reptiles were highly specialized in several other characters that were not avian. This is against their 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 the rather generalized pseudosuchians and the first birds

### Diphyletic origin of birds

The earliest known fossil birds include both flying - *Archaeopteryx*, *Ichthyornis*, as well as flightless (*Hesperornis*, *Diatryma*). The recently extinct. 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.

### Monophyletic origin of birds

In Ratitae, the legs are well-developed and powerful, the wings are vestigial, and the feathers are fluffy. But a recently discovered fossil of *Eleitherornis*, 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. This poses a major 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 area with abundant food and few competitors or enemies. The most accepted view today is that birds have a monophyletic (one line-of-descent) origin, i.e., all birds have evolved from a single ancestor. Accordingly, the flightless birds have evolved by loss of flight from flying ancestors.