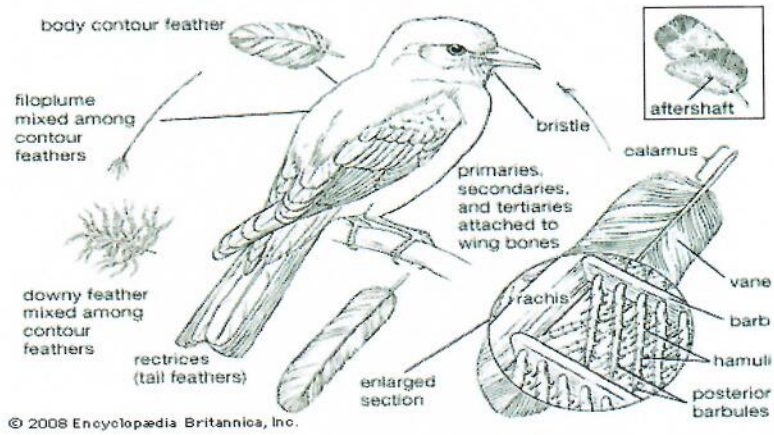
Archaeopteryx is believed to have been the earliest known ancestor of modern bird species. *Archaeopteryx* differed from modern bird species in that evidence showed that whilst it had feathers it also had teeth, claws, and a bony tail consistent with being descendant of reptiles and /or dinosaurs. As a hybrid between two animals, an intermediate species, it supported the theory of Charles Darwin of evolutionary intermediate species.

There are two theories as to the evolutionary origin of birds. The arboreal model supports that birds developed from tree-dwelling reptiles who evolved feathers from scales to allow them to glide. A *Sinornithosaurus* raptor dinosaur fossil has been identified. It had feathers but is not believed to have been an ancestor of birds because it did not fly. The feathers were solely for insulation.



Feathers may be predominately adapted for insultation rather than for the purpose of flight. The varied nature and multi-layers of feathers better supports this purpose.

The cursorial theory supports that birds evolved from bipedal theropods. In the 1970's palaeontologist John Ostrom dispelled the theory that birds evolved feathers for flight. He identified that stocky short limbed terrestrial theropod dinosaurs, such as T Rex shared a similar skeletal history supporting a shared ancestry. Flight may be an adaptation of therapods flapping arms when they travelled bipedally at speed to aid its ability to catch its prey, or to avoid predators.

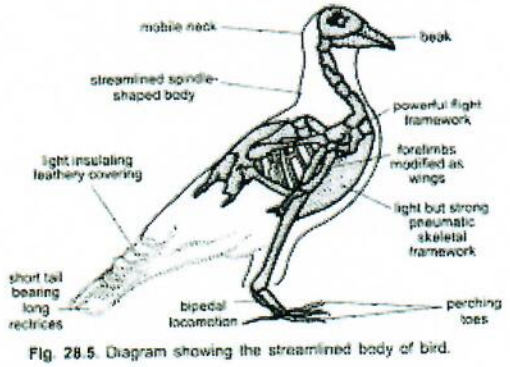


Fig. 28.5. Diagram showing the streamlined body of bird.

Similarly, birds fly from danger with a further adaption of increased chest muscles that allow them to power their wings. In the same way, descendent birds have developed hind limbs that allow them to take off and in turn to manage the forces upon their bodies when they land. They adapted to have hollow bones to be efficiently light to aid lengthy flight. Birds however have adapted feathers to aid their manoeuvrability and ability to glide in flight

Therapods had small heads and eyes in comparison to their size. Birds adapted to have large comparative eyes with keen sight important to locate safe places to land and food sources.

Further there is evidence from recent research of Keith Dial that ground based birds such as partridges when 'flying' into trees in fact do not fly but use their wings in conjunction with their hind legs to vertically climb trees. Bipedal limb adaption is even seen in those bird species that are flightless. Bipedal function has enabled them to walk to forage, and in turn have further developed their limbs to enable them to swim efficiently.

Birds and dinosaurs have similar respiratory systems. They have anterior air sacs alongside fixed lungs. Air sacs allow birds to store and 'pump' air through fixed rigid lungs like bellows. Unlike mammals, air flows in one direction allowing them to maintain the volume of air in their lungs and to take up oxygen during exhalation. This optimises metabolic function and increases their respiratory efficiency.