

4. CLASS AVES

All birds are included in this class. Both birds and mammals are considered to be evolved from reptilian ancestors. Scales on the legs and claws are the reptilian characters which are still very prominent in birds.

EVOLUTIONARY HISTORY

Evolutionary history of birds is very interesting. In 1861 from the rocks of Jurassic period, fossil of a bird was found which was given the name of 'Archaeopteryx', the lizard tailed bird. It is of the size of a crow. Interesting fact about it is that it has characters of both reptiles and birds so can be considered a transition species between the two groups.

BIRD LIKE CHARACTERS OF ARCHAEOPTERYX

Some of the bird like characters of archaeopteryx are:

1. well developed contour and flight feathers covering the body.
2. forelimbs modified into flying wings.
3. tail with two rows of feathers.
4. skull large with a single occipital condyle.
5. jaws elongated to form a beak.

REPTILIAN CHARACTERS OF ARCHAEOPTERYX

They include:

1. presence of scales on the legs
2. bones solid and heavy without air spaces.
3. jaws with teeth present in sockets
4. a long, tapering lizard like tail consists of 20 caudal vertebrae.
5. nine to ten cervical vertebrae.
6. sternum not keeled. Free cervical and abdominal ribs are also present.
7. Simple brain with cylindrical cerebral hemisphere and unexpanded cerebellum.
8. forelimbs with three clawed fingers.

The above evidences prove that Archaeopteryx was a 'connecting link' b.w reptiles and birds. Birds gradually evolved and became one of the most successful group of vertebrates.

DISTINGUISHING CHARACTERS OF BIRDS

The major distinguishable characters of birds include:

HOMIOOTHERMIC

They are homoiothermic i.e

Warm blooded animals bcz they can maintain their body temperature.

EXOSKELETON

The body is covered by different coloured feathers which are epidermal exoskeleton. Most of the birds ^{FLIGHT} can fly due to the presence of feathers except flightless birds (e.g. Ostrich).

FUSIFORMED BODY

Body is fusiform (streamlined) to allow better movement in air with less resistance.

BODY PLAN

Body usually spindle shaped, with four divisions: head, neck, trunk and tail.

NECK

Neck is disproportionately long for balancing and food gathering.

FORELIMBS / WINGS

Forelimbs are modified into wings for flight.

HINDLIMBS

They have adopted a bipedal life and hind limbs are ~~adapted~~ used for perching, walking and swimming. They have feet with ^{or clasping the tree branches}

four toes.

SKIN

Skin is without epidermal glands. No sweat glands are present. There are no glands except the uropygial gland (oil glands) present at the base of the tail.

ENDOSKELETON

Endoskeleton is fully ossified (bony) and the long bones are hollow with air cavities (pneumatic) which make them light in weight. Sternum is well developed into a keel which not only helps in cutting the air during flight but also provide additional area for the attachment of muscles.

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BEAK

Jaws are without teeth and modified into a beak. Each jaw is covered with a keratinized sheath, forming a beak. Teeth are absent.

SYRINX

Vocal cords are not present in larynx but a special sound box syrinx is present at the junction of trachea and bronchi.

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EYES / NICTITATING MEMBRANE

Eyes are provided with a third eyelid, the 'nictitating membrane' which can be drawn across the eye.

PINNA

(not fully developed)

A rudimentary pinna is present outside the external auditory opening. There is a single bone in middle ear.

DIGESTIVE SYSTEM

The digestive tract of birds have additional chambers, the crop and gizzard. The 'crop' is used to store the food and the 'gizzard' is used to grind it.

CIRCULATORY SYSTEM

Heart is four chambered with two auricles and two ventricles. A single aortic ~~arch~~ arch is present which curves to the right side. Blood is red due to haemoglobin contained in oval, nucleated RBCs.

EXCRETORY SYSTEM

Excretory organs are metanephric kidneys. Ureters open in common cloaca and nitrogenous wastes are excreted in the form of semi solid urates.

RESPIRATORY SYSTEM

Birds have evolved an extremely specialized respiratory system including lungs with openings at both ends and air sacs to help in movement of air through the lungs. The lungs are provided with extra air sacs. These air sacs are extended into viscera.

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NERVOUS SYSTEM

Nervous system is well developed, with 12 pairs of cranial nerves and brain with large cerebellum and optic lobes.

REPRODUCTION

Sexes are separate and sexual dimorphism is found in many birds. Fertilization is internal. Testes are paired, with the vas deferens opening into the cloaca. Females have only left ovary and oviduct is well developed. Females have shell secreting glands.

Birds produce offsprings by laying eggs which are fertilized through sexual reproduction. ~~They are~~ Some birds, such as hens, lay eggs even when not fertilized, though unfertilized eggs do not produce offspring.

OVIPAROUS

Birds are oviparous i.e.

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lay eggs. They are usually laid in a nest and incubated by the parents. Most birds have an extended period of parental care after hatching.

AMNIOTES

Birds are amniotes and have all the four extra embryonic membranes i.e. amnion, chorion, yolk sac and allantois.

SOCIAL BEHAVIOUR

Birds are social, communicating with visual signals, calls, and bird songs, and participating in such social behaviours as cooperative breeding and hunting, flocking, and mobbing of predators.

MIGRATION

Many species of birds annually migrate great distances.

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TYPES OF BIRDS

Birds are of two types:

1. Flightless Birds
2. Flying Birds.

1. FLIGHTLESS BIRDS

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Flightless birds are those which do not fly in the air. They are called running birds as instead of flying they secondarily has adapted a running mode of life. Their bones are not hollow and sternum is not keeled. Tail feathers are irregularly arranged.

EXAMPLES

Ostrich, Emu, Kiwi, Cassowary, Penguin, Hen etc.

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2. FLYING BIRDS

Flying birds are the birds with strong wings for flight and keeled sternum. Their bones are hollow. Tail feathers are well developed and are used for steering the bird in air during flight.

EXAMPLES

Pigeon, Sparrow, Parrot, Eagle, Owl etc.

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