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Class - Aves & its General Features and Classification:

I. Introduction: Birds are easily recognized group of vertebrates which are included under the class Aves. In many aspects birds are the most highly specialized craniate class. Almost every part of their organization is modified in accordance with their aerial life. They are essentially 'glorified reptiles' and the discovery of the fossil of Archaeopteryx, unequivocally speaks about the reptilian origin of birds.

III. Salient features of Class Aves:

(A) Habit:

- i) Birds are homoiothermic animals, or more accurately endothermic animals, with a prevalent territorial behaviour.
- ii) Birds possess the habit of seasonal movements to obtain the advantages of the favourable conditions - a phenomenon called migration.

(B) Morphology:

- i) Aves are craniata in which the epidermal exoskeleton takes the form of 'feathers' over the greater part of their body, including the surface of wings and tail. The feathers play the role of heat regulation, help in flight (by being light) and exhibits protective colouration and sexual display.
- ii) The skin is thin, loose and dry. Skin glands are absent, and the only large cutaneous gland present is in the uropygial gland or preen gland at the base of the

tail. The bird cleans its feathers with its ~~beak~~ beak (a process called 'preening'), obtaining oil from this gland, which is ~~feathers with~~ its ~~beak~~ (a process called 'preening') specially well-developed in aquatic birds.

(iii) The fore-limbs are modified to form wings, ~~etc.~~ usually provided with large feathers for the support of the during flight.

(iv) Body is spindle-shaped and thus offers least resistance during flight. ~~Absence of teeth to~~

(v) Absence of teeth has made the skull light.

(c) Anatomy:

(i) Body is considerably light due to the presence of pneumatic pneumaticity in bones. The bones are light (pneumatic bones) and often of tubular form.

(ii) The sternum is broad plate covering the ventral side of the thorax and part of abdomen. ~~In case~~ The sternum bears its ventral side an antero-posterior 'keel' for the attachment of the pectoral 'keel' for the attachment of the pectoral muscles. In ratites, the keel is either absent or represented as a vestige and thus appears raft-like.

(iii) Both the girdles and limbs are greatly modified for flying and walking.

(iv) The flight muscles (Particularly the breast and wing muscles) are greatly developed in Carinates. The muscles of other active regions, such as legs (especially in the ratites), neck and tail are also highly developed.

(v) The voice is produced in a 'Syrinx' situated at or near the junction of the trachea and the bronchi.

(vi) The heart is four-chambered, and the right aortic arch is present alone in the adult. The renal portal system is reduced.

vii) Urino-genital system opens into cloaca. A pair of ureters, originated from the kidneys, open into cloaca.

Males possess 'penis' as the 'intromittent' organ. In females, the ovary and oviduct of the right side are more or less completely atrophied. However, in some birds (eg. Hawks) both the ovaries are functional.

(D) Physiology:

(i) Respiration is effected by lungs, accompanied by the air-sacs.

(ii) The urine contains little quantity of water with high concentration of uric acid. Birds are thus uricotelic.

(iii) Fertilization is internal and all birds lay eggs. Reproductive in birds is usually a seasonal phenomenon.

(E) Embryology:

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- (i) Birds are all oviparous, and the large ovum, containing much food-yolk, becomes invested with albumen, a double-shell-membrane, and a calcareous shell, in its passage down the oviduct.
- (ii) The embryo has an amnion, an allantois, and a large yolk-sac.

Note: The newly-hatched young may be able to run or swim and to obtain their own food, in which case they are said to be 'precocial' or 'nidifugous'; or may be more or less naked and dependent for a time upon the parents for their food supply, which ~~they~~ when they are said to be 'altricial' or 'nidicolous'.

III. Classification of birds:

The present day classification of birds is based mostly on anatomical features, though some extinct forms are considered for establishing phylogenetic relationship.

The scheme of classification adopted here is based mainly on the classification plan given by J. Z. Young (1981).

Class Aves:

Subclass 1: Archaeornithes (ancient birds)
Jurassic period.

Subclass 2: Neornithes (new birds)
Cretaceous
& Cretaceous - Recent period.

Subclass 1: Archaeornithes [Jurassic]

This subclass includes the fossil birds.

Morphology:

- (i) They had both primary and secondary feathers, and their forelimbs were modified as wings. The hand had three clawed digits.
- (ii) The tail was long and was provided with two lateral rows of feathers.
- (iii) The beak was well-developed.

Anatomy:

- (i) Enamelled-crowned teeth were present in both jaws. Thirteen pairs of conical teeth are present in the upper jaw and three pairs of similar teeth were present in the lower jaw.
- (ii) The tail was composed of about twenty free caudal vertebrae gradually tapering to the distal end, as in most reptiles. The pygostyle was absent.
- (iii) Flat sternum was devoid of keel.

Example: Archaeopteryx sp. (lithographica)
Archaeornis Siemensi

Subclass 2: Neornithes: [Cretaceous-Recent]

The subclass includes remaining fossil and living birds.

Morphology:

- (i) In most of the birds, the greatly shortened tail usually ends in a pygostyle, around which the rectrices (tail feathers), when

present, are arranged in a semicircle. (6)

(iii) Except in a few extinct forms, there are no teeth.

Anatomy:

- (i) The sternum is well-developed and usually keeled or carinate.
- (ii) The metacarpals are fused with the distal carpals to form a carpo-metacarpus.

Examples:

Struthio camelus

Casuarus casuarus

Podiceps sp.

Egretta sp.

Anas sp.

Vultur sp.

Columba livia

Corvus splendens

Passer domesticus

The subclass Neornithes includes four superorders, which are summarized as follows:

(a) Superorder Odontognathae —

extinct Cretaceous birds, flourished to explore the sea, teeth were present.

e.g: Hesperornis sp.

Baptornis sp.

Ichthyornis sp.

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b) Superorder Palaeognathae :-

All birds (excepting Tinamus) are flightless and are of large size - the 'ratites'.

eg: Struthio (Ostrich)

Casuarus (Cassowary)

Rhea (Rhea)

Apteryx (kiwi)

Tinamus (Tinamous)

c) Superorder Impennae :-

Includes all the penguins, which are flightless birds capable of swimming by paddles.

eg: Aptenodytes

Endiptes

Endiptyla

d) Superorder Neognathae :-

Majority of the birds in this Superorder are able to fly and are called the 'Carinates'. It includes twenty two orders, of which ~~one~~ one order is completely extinct.

eg: Podiceps (Grebe) Corvus (Crow)

Pelecanus (Pelican) Passer (House-sparrow)

Egretta (Egret)

Vultur (Vulture)

Grus (Cranes)

Columba (Pigeon)

Tyto (Barn owl)