

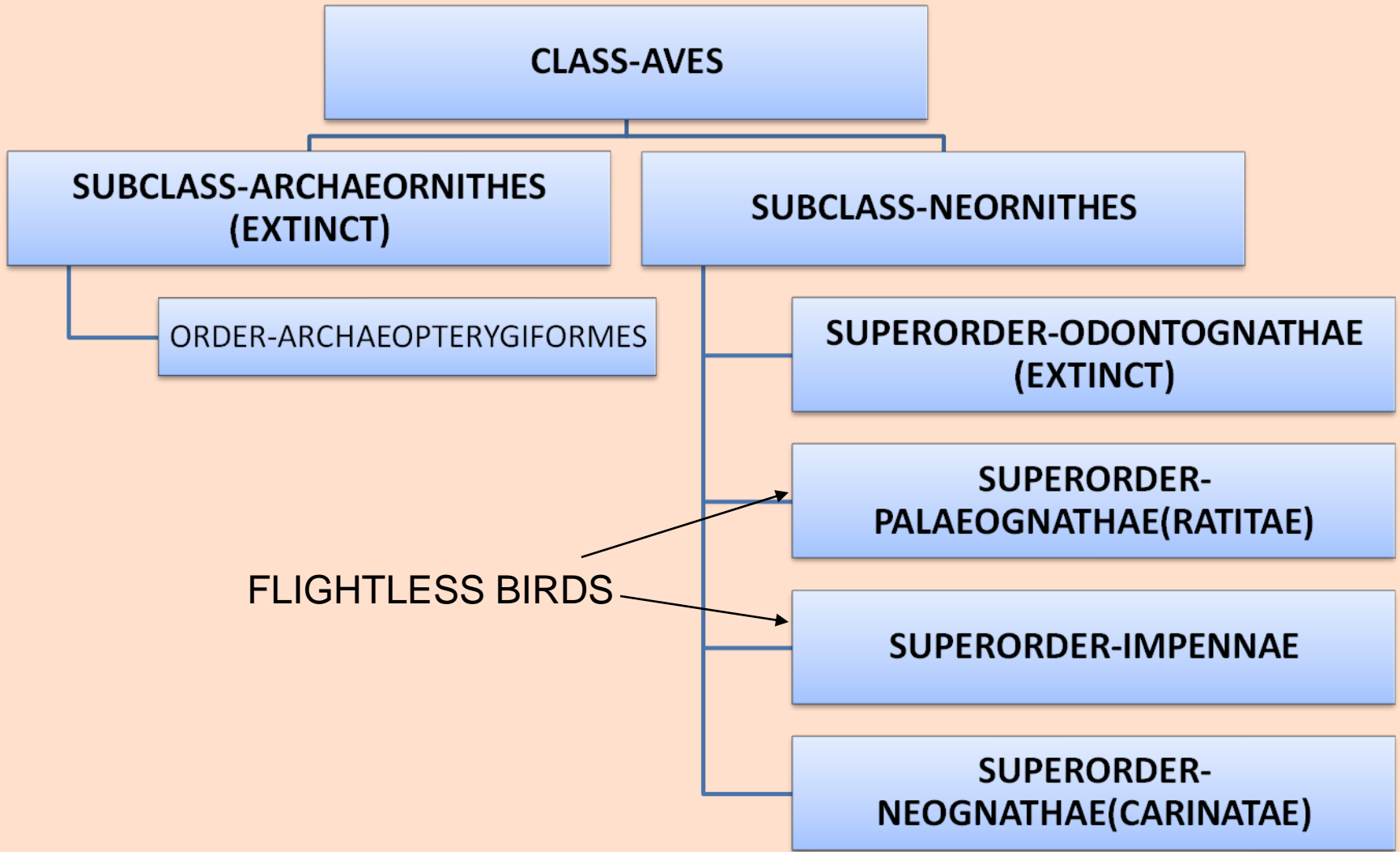


# AVES CLASSIFICATION

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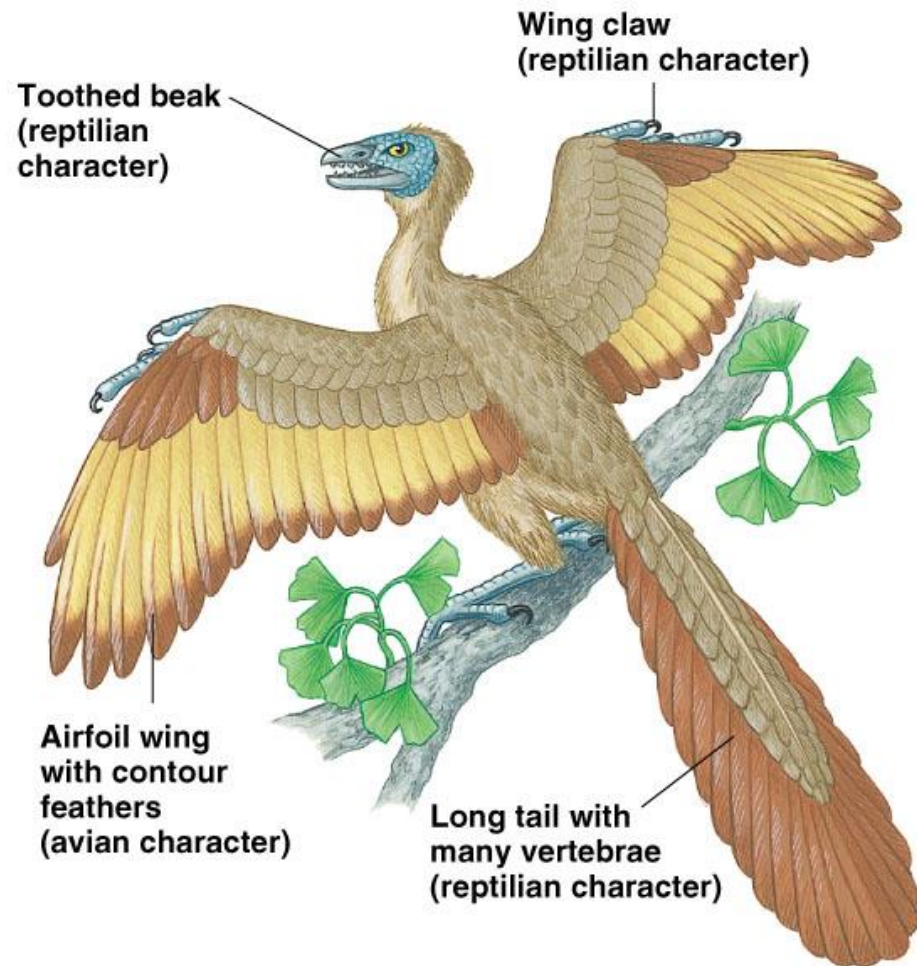
DEPARTMENT OF ZOOLOGY

POORNAPRAJNA COLLEGE, UDUPI



# ORDER – ARCHAEOPTERYGIFORMES

- Ancient crow like birds
- Extinct jurassic birds
- Teeth present
- Fossils found in Germany
- Forelimbs with 3-clawed digits
- Keel was absent
- Tail without pygostyle
- Power of flight was poor
- Connecting links between reptiles and birds
- Example- Archaeopteryx



# Fossil of archaeopteryx



SUPERORDER-  
ODONTOGNATHAE

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graph TD; A[SUPERORDER-ODONTOGNATHAE] --> B[ORDER-HESPERONITHIFORMES]; A --> C[ORDER-ICHTHYORNITHIFORMES];
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ORDER-  
HESPERONITHIFORMES

ORDER-  
ICHTHYORNITHIFORMES

# ORDER- HESPERONITHIFORMES

- Teeth present in beak
- Extinct flightless marine birds
- Sternum without keel
- Vertebrae amphicoelous
- Pleurodont teeth
- Pectoral girdles reduced
- E.g.- Hesperornis



# ORDER- ICHTHYORNITHIFORMES

- Extinct flightless birds
- Teeth present in beak
- Sternum with well developed keel
- Pectoral girdles well developed
- E.g.- Ichthyornis



SUPERORDER-  
IMPENNAE

ORDER-  
SPHENISCIFORMES



# ORDER- SPHENISCIFORMES

- Aquatic flightless birds
- forelimbs are paddle like
- Feet are webbed
- Thick layer of fat present beneath skin
- Found in antarctica and galapagos islands
- E.g.- Aptenodytes (penguin)



# SUPERORDER-PALAEOGNATHAE

- ORDER-TINAMIFORMES
- ORDER-AEPYORNITHIFORMES
- ORDER-DINOORNITHIFORMES
- ORDER-APTERYGIFORMES
- ORDER-CASUARIFORMES
- ORDER-RHEIFORMES
- ORDER-STRUTHIONIFORMES

*Mnemonics-TADACRS*

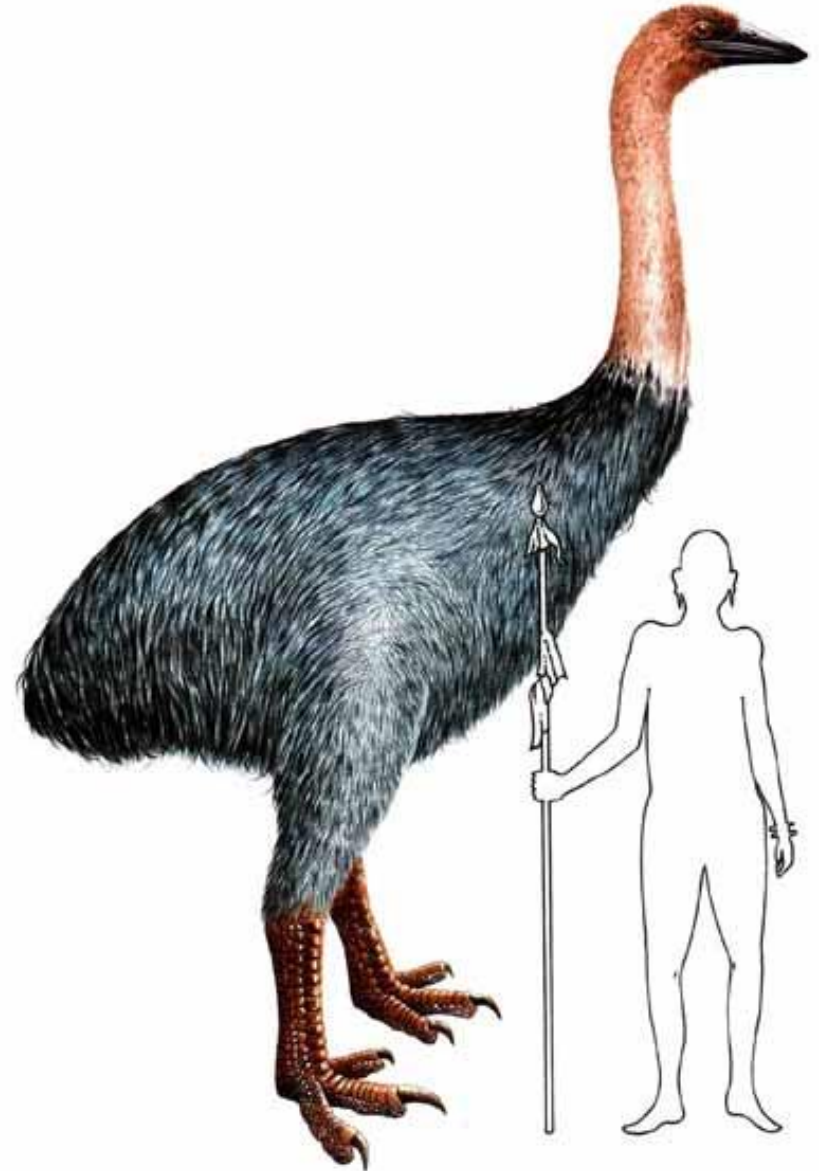
# ORDER- TINAMIFORMES

- Eggshells are glossy
- Have power of short flight due to short wings
- Cursorial terrestrial birds
- Pygostyle reduced
- Sternum with keel
- E.g.- Tinamus



# ORDER- AEPYORNITHIFORMES

- Recently extinct
- Wings vestigial so flightless
- 4-toed legs
- Example- Aepyornis (elephant bird)



# *ORDER- DINORNITHIFORMES*

- Giant birds recently extinct
- Wings absent
- Sternum without keel
- Massive legs with 3-4 toes
- Example- Dinornis (moa) of new zealand



# *ORDER- APTERYGIFORMES*

- Hair like feathers
- Wings vestigial
- flightless
- Long bill with nostril near the tip
- Example- Apteryx (kiwi) of new zealand



# ORDER-CASUARIFORMES

- 3-toes
- flightless
- Head bears a comb like structure
- Sternum without keel
- Example- Casuaris (cassowary) of australia and Dromaius (Emu) of new zealand



# *ORDER- RHEIFORMES*

- 3 clawed toes
- flightless
- Sternum without keel
- Head and neck partially feathered
- Feathers lack aftershaft
- Example- Rhea





# *ORDER- STRUTHIONIFORMES*

- Legs with 2 toes
- Flightless
- Sternum lacks keel
- Pygostyle absent
- Feathers without aftershafts
- Pubic symphysis present
- Example- Struthio (ostrich)



# SUPERORDER-NEOIGNATHAE

- ORDER-PSITTACIFORMES
  - ORDER-PICIFORMES
  - ORDER-PASSERIFORMES
  - ORDER-COLUMBIFORMES
  - ORDER-GALLIFORMES
  - ORDER-CUCULIFORMES
  - ORDER-ANSERIFORMES
  - ORDER-CORACIIFORMES
  - ORDER-GAVIIFORMES
  - ORDER-COLYMBIFORMES
  - ORDER-PROCELLARIFORMES
  - ORDER-PELECANIFORMES
  - ORDER-CHARADRIIFORMES
  - ORDER-CICONIIFORMES
  - ORDER-GRUIFORMES
  - ORDER-FALCONIFORMES
  - ORDER-STRIGIFORMES
  - ORDER-MICROPODIFORMES
  - ORDER-CAPRIMULGIFORMES
- ARBOREAL BIRDS*
- TERRESTRIAL BIRDS*
- SWIMMING BIRDS*
- SHORE/WADING BIRDS*
- PREDATOR BIRDS*
- AERIAL BIRDS*

Mnemonics-  
CCCCCCCPPPPPGGGMAFS

## ***ORDER-PSITTACIFORMES***

- Parrot like birds
- Feathers are green, yellow, blue or red
- Feet zygodactylus (two toes in front and two toes behind)
- Beak stout and hooked at tip
- Example- Psittacula (green parrot)



## ***ORDER-PICIFORMES***

- Protrusible tongue
- Two toes in front and one behind
- Tail feathers are stiff with pointed tip
- Tough beak
- Dig insect and larva out of wood
- Example- Dendrocopos (wood pecker)



## ***ORDER-PASSERIFORMES***

- Largest order
- Feet adapted for perching and beak for cutting
- 3 toes in front and one behind
- Ex- *Passer domesticus* (house sparrow) and *Corvus splendens* (crow)



## ***ORDER-COLUMBIFORMES***

- Skin thick and soft
- Large crop produce pigeon milk to feed offspring
- Graminivorous and frugivorous
- Example- *Columba livia* (blue rock pigeon)



## ***ORDER-GALLIFORMES***

- Short flight
- Game birds
- Feathers with aftershaft
- Feet massive adapted for scratching
- Beak is short
- Example- *Gallus* (jungle fowl) and *Pavo* (peacock)



## ***ORDER-CUCULIFORMES***

- Tail long
- Toes 2 front and 2 behind
- Show brood parasitism (female lays eggs in nest of other birds)
- Example- *Eudynamis* (koel)

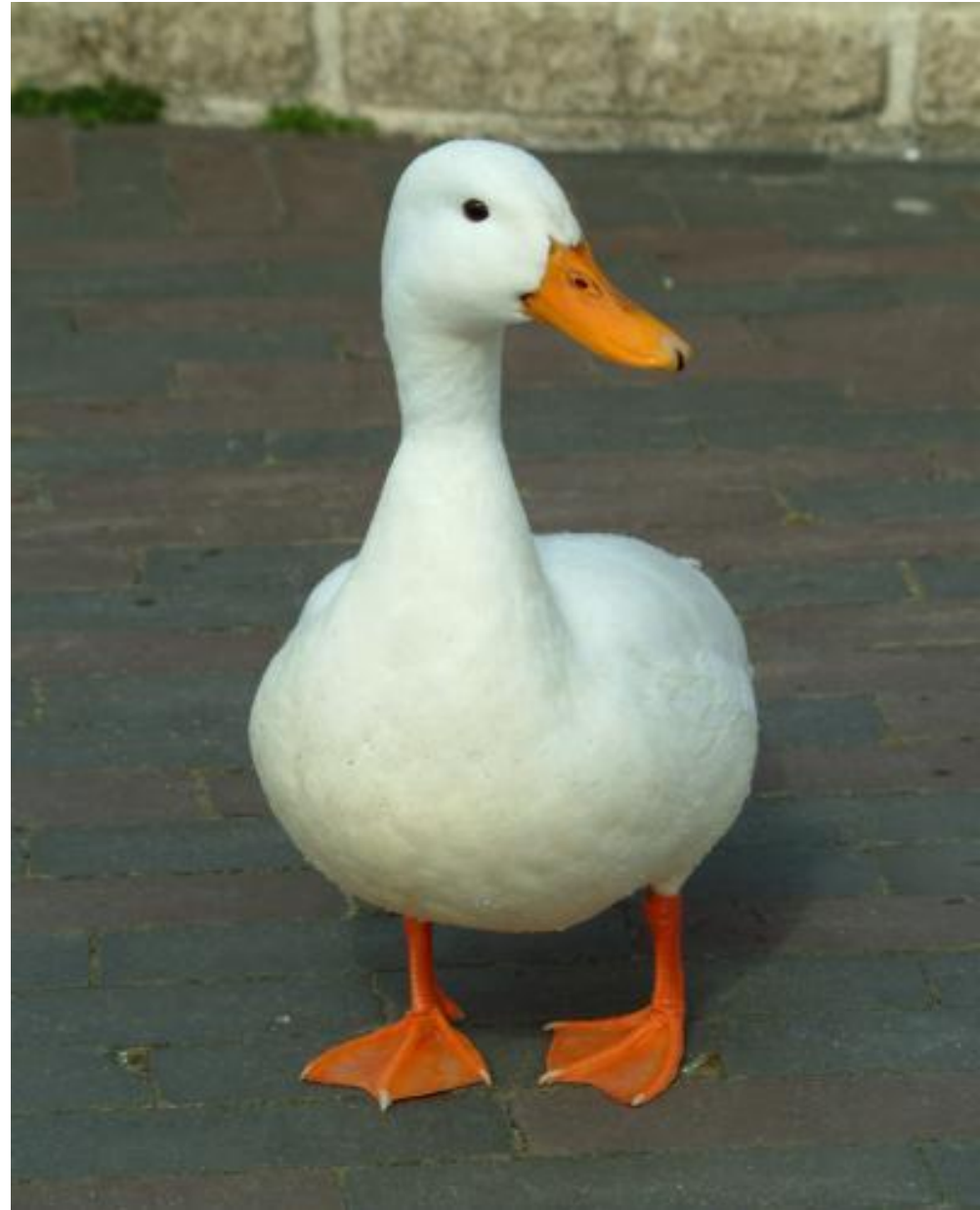
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## ***ORDER-ANSERIFORMES***

- Aquatic birds
- Beak is broad
- Tongue is fleshy
- Tails and feet are short
- Feet are webbed
- Example- Anas (duck)



## **ORDER- CORACIIFORMES**

- Beak is strong
- Third and fourth toes are fused at the base
- Long tail
- Example- *Halcyon* (kingfisher)



## ***ORDER-GAVIIFORMES***

- Marine birds
- Legs are at the end of the body
- Toes are webbed
- Powerful flight
- Example- *Gavia*



## ***ORDER- COLYMBIFORMES/PODICIPEDIFORMES***

- Good divers
- Patella is large
- Legs are placed far back at body
- Example- Podiceps  
(GREBES)



# ***ORDER- PROCELLARIFORMES***

- Long and oily wings
- Tubular nostril
- Large nasal glands
- Marine birds
- Example- Diomedea  
(albatross)



## ***ORDER- PELECANIFORMES***

- Aquatic fish eating birds
- Nostrils are vestigial
- Presence of gular pouch on the throat
- 4 toed webbed feet
- Beak long with wide gap
- Example- Pelicanus (pelican)



## ***ORDER-CHARADRIIFORMES***

- Mud probing beaks
- Webbed feet
- Dense wings
- Hind limbs are slender and elongated
- Example- Larus (gull)



## ***ORDER- CICONIIFORMES***

- Snake like neck
- Long legs
- Pincer like beak
- Toes without web
- Feathers are decorative
- Example-  
Phonicopterus  
(flamingo)





## ***ORDER-GRUIFORMES***

- Long legs
- Feathers with aftershafts
- Beaks heavy
- Show migration
- Example- Antegona  
(sarus crane)



## ***ORDER- FALCONIFORMES***

- Sharp hooked beak
- Strong curved claws
- Diurnal
- Example- Aquila (eagle)



## ***ORDER- STRIGIFORMES***

- Nocturnal birds
- Huge frontal yellow eyes
- Example- Bubo (owl)



# ***ORDER-MICROPODIFORMES/APODIFORMES***

- Smallest birds
- Legs are very short
- Pointed wings
- Long slender beak
- Example- Humming birds



## ***ORDER-CAPRIMULGIFORMES***

- Nocturnal
- Insectivorous birds
- Legs are small
- Mouth is with long bristle like sensory feathers
- Example- Caprimulgus (goat sucker)



## **Subclass1: Archaeornithes [Gk. Archios = ancient + ornithos = bird]**

- most primitive and extinct fossil birds of the Jurassic period.
- had a reptile-like and elongated body.
- They had non-pneumatic bones i.e. less specialized for flight.
- Forelimb had three unfused and clawed digits.
- had well developed wings by which they could fly for a shorter distance.
- Tail long and pointed like a lizardtail with 1820 free caudal vertebrae and was provided with feathers.
- had a well-developed beak. Teeth (Thecodont) present on both jaws.
- Sternum without a keel.
- Abdominal ribs present.
- They had a small brain and eyes.

**Eg: Archeopteryx-** *Archaeopteryx macrura*(London),  
*Archaeornissiemensii*(Berlin)

## **Subclass2: Neornithes**

- modern birds belong to the subclass Neornithes.
- appeared in the Cretaceous period of the Mesozoic Era.
- This subclass includes few extinct birds.
- a well-developed sternum, which is usually keeled or carinate.
- Tail short and small. Tail feathers are arranged as a fan.
- They do not have teeth on both jaws. The teeth are replaced by horny rhamphotheca over the bill, but extinct forms had teeth.
- The forelimbs become modified to wings and can fly well.
- Vertebrae heterocoelous type.
- Few caudal vertebrae free, rest fused into a pygostyle.
- Abdominal ribs absent. Thoracic ribs with uncinat process.
- Subclass Neornithes include living **superorders** viz., Palaeognathe (Ratitae), Impennae and Neognathae (Carinatae).

## Superorder 1: Palaeognathae

- Mostly flightless birds. Some anatomical features like reduced keel on the sternum; reduced wing bones; small or poorly developed pygostyle ; absence of Syrinx, furcula...etc are associated with flightlessness.
- The flat, raft-like sternum is present.
- Wings are absent; if present, they are vestigial or reduced in size.
- They have primitive types of feathers that do not bear hooked barbules.
- The rectrices or flight feathers are absent or irregularly arranged.
- Teeth are absent
- Caudal vertebrae are free.
- The males have an erectile penis and the females with the clitoris.
- They show unusual mating system such as polygynandry / promiscuity.
- During reproduction, the male provides parental care.
- All species of tinamous can fly, but they are very terrestrial.
- Ex: **Struthiocamelus** (Two toed African Ostrich); **Rhea americana** (three toed American ostrich); **Casuarius** (Cassowaries); **Dromaeus**(Emu); **Aepyornis** ; **Dinornis** (extinct Moas); **Apteryx** (Newzealand bird Kiwi ); **Tinamus**.



## Superorder 2: Impennae:

- This includes flightless aquatic birds commonly known as penguin
- Their forelimbs (wings) are modified into paddles, which are used for both swimming and flight.
- The feathers are small, scale-like, and continuous.
- Long and often laterally compressed bills are present.
- The skeleton is poorly pneumatized with the carinate sternum.
- The legs are short, which are placed far posterior on the body.
- Hindlimbs have palmate feet with 4 pointing toes, which are strongly webbed and modified for swimming.
- Below the skin thick layer of fat (Blubber) will be present.
- The oil gland is present, which is tufted.
- They are monogamous and the mature female lays only one egg at a time.
- All birds are carnivorous and mainly feed on fishes, crustaceans, squids...etc.

**Ex:** Emperor penguin (*Aptenodytes forsteri*), Adeli penguin (*Pygoscelis adeliae*), Crested penguin (*Eudyptes calauina*), Little penguin (*Eudyptes minor*), Magellanic penguin (*Spheniscus magellanicus*)... etc.

**Superorder 3: Neognathae**(Greek 'neo' meaning new and 'gnathos' meaning jaw).

- This superorder includes all modern living flying birds.
- Neognathae have well-developed wings which are fully adapted for flight.
- The beak does not contain any teeth.
- The forelimbs have fused metacarpals with an elongated third finger.
- Pygostyle is present, and the tail is composed of 5-6 vertebrae.
- The sternum is well-developed with the keel.
- Rectrices (larger feathers in a bird's tail) are organized in a semicircular manner, which helps in flight.
- They have a neognathous type skull where the palatines are protruded posteriorly and come in contact with the base of the cranium.
- Flight muscles are well developed.

Ex: **Gavia immer** (Common loon); **Podiceps** (Petrels, Diomedea, Wandering albatross); **Puffinus** (Petrels); **Pelecanus** (Pelecan); **Phonocopterus** (flamingo); **Ardea** (great blue heron); **Anser domesticus** (Duck); **Cygnus** (swan); **Mihmsmigrans** (Kite); **Pseudogyps** (Vulture); **Gaous** (Jungle Fowl); **Pavocristatus** (Peacock); **Grus** (crane); **Larus** (Gull); **Columbia livia** (Pigeon); **Sterptopelia** (Dove); **Cuculus** (cuckoo); **Eudynamis** (Koel); **Psittaculaeupatra** (Parrakeet); **Bubo bubo** (green horned owl); **Caprimulgus** (Night jar /goat sucker); **Swift** (Humming bird); **Cobus** (Mouse bird); **Akedo king fisher**; **Hornbill**; **Brachypternus** (Wood pecker); **Dinopium** (Wood pecker); **Passer domesticus** (Sparrow); **Corvussplendens** (Crow); **Acridotherus** (Myna).