

Phylum Chordata

Subphylum Vertebrata

CLASS AVES (8,600 spp)

1. Endothermic
 2. Feathers, horny scales on feet
 3. Pneumatic bones, keeled sternum, caudal vertebrae fused (PYGOSTYLE)
 4. Eyes & visual brain center large
 5. Teeth absent
 6. One-way air passage in unusual pattern of air sacs
 7. 4-chambered heart
 8. Uric acid, no bladder
 9. Oviparous, only one ovary & oviduct, calcareous egg
 10. Amniote
-

Subclass ARCHAEORNITHES

Archeopteryx - clawed fingers on forelimbs, teeth in sockets, reptile scales & tail, heavy skeleton, but with a FURCULA (fused clavicles important to flight), feathers.
(Comphognathus)

Subclass NEORNITHES

Superorder ODONTOGNATHAE (extinct)

Cretaceous birds with teeth

Superorder PALEOGNATHAE

Ratites (w/o keel on sternum)

E.g. tinamouse, ostrich, rhea, casuary

Superorder NEOGNATHAE

Carinates (w/ keel on sternum)

Birds As Flying Machines

< WEIGHT (less to lift), but maintain structural RIGIDITY

> power output (THRUST)

< DRAG

> LIFT

Considerations:

- 1) propulsion mechanism
- 2) control surfaces
- 3) center of gravity
- 4) trade-offs - speed/maneuverability/high lift

Adaptations of flight:

Feathers (CALAMUS, RACHIS, BARBS, BARBULES)

Skeleton

Very flexible neck (arms dedicated to flight)

Backbone fused (SYNSACRUM), few back muscles

Bones hollow, lightly structured, & trussed

Pygostyle - moveable - tail feathers (control surface)

UNCINATE PROCESS - decrease flexibility of thoracic basket

Sternum keeled - attachment site for large depressor muscles of wings

Furcula fused ("wish bone") - attachment of Pectoralis and supracoracoideus muscles

3 digits - fusion of carpometacarpus

Scapula < in size

Coracoid > in size

Clavicle < in size

5th (& some cases 4th) toe lost

Metatarsals > in length (> spring)

Fusion of tibia and some tarsals

Pelvis - no ventral fusion of pelvic symphysis - egg

Breathing - 2X the tidal volume of sized mammal

- no dead air space (1-way air flow)

- low ventilation rate (17 cycles/min vs 54 for sized mammal)

Circulation - 400-500 heart beats/min

- countercurrent system to feet (3°C & body at 40°C in ice water)

Voice - SYRINX - two sound structures - complex songs

MATING SYSTEMS

Monogamy (1_:1_)

Polygamy (asymmetrical sex ratio)

 Polygyny (1_: >1_)

 Polyandry (1_: >1_)

 Promiscuity

90% of bird species appear to be monogamous

CENOZOIC

PERIOD	EPOCH	YEARS
Tertiary	Paleocene	66 - 58
	Eocene	58 - 37
	Oligocene	37 - 24
	Miocene	24 - 5
Quaternary	Pleistocene	2 - ___

Recent

— - now