UG CBCS Semester-II (Chordata)
Reptilia

General Characters

Reptiles represent the first class of vertebrates fully adapted for life in dry places on land. They have no obvious diagnostic characteristics of their own that immediately separate them from other classes of vertebrates. The characters of reptiles are in fact a combination of characters that are found in fish and amphibians on one hand and in birds and mammals on the other. The class name refers to the mode of locomotion (L,, *repere* or *reptum,* to creep or crawl), and the study of reptiles is called *Herpetology* (Gr., *herpeton,* reptiles).

1. Predominantly terrestrial, creeping or burrowing, mostly carnivorous, air-breathing, cold-blooded, oviparous and tetrapodal vertebrates.
2. Body bilaterally symmetrical and divisible into 4 regions—head, neck, trunk and tail.
3. Limbs 2 pairs, pentadactyle. Digits provided with horny claws. However, limbs absent in a few lizards and all snakes.
4. Exoskeleton of horny epidermal scales, shields, plates and scutes.
5. Skin dry, cornified and devoid of glands.
6. Mouth terminal. laws bear simple conical teeth. In turtles, teeth replaced by horny beaks.
7. Alimentary canal terminates into a cloacal aperture.
8. Endoskeleton bony. Skull with one occipital condyle (monocondylar). A characteristic T-shaped interclavicle present.
9. Heart usually 3-chambered, 4-chambered in crocodiles. Sinus venosus reduced. 2 systemic arches present. Red blood corpuscles oval and nucleated. Cold-blooded.
10. Respiration by lungs throughout life.
11. Kidneys metanephric. Excretion uricotelic.
12. Brain with better development of cerebrum than in Amphibia. Cranial nerves 12 pairs.
13. Lateral line system absent. Jacobson's organs present in the roof of mouth,
14. Sexes separate. Male usually with muscular copulatory organ.
15. Fertilization internal. Mostly oviparous. Large yolky meroblastic eggs, covered with leathery shells, always laid on land. Embryonic membranes (amnion, chorion, yolk sac and allantois) appear during development. No metamorphosis. Young resemble adults.
16. Parental care usually absent.

Classification

According to Bogert, there are more than 7,000 living and several extinct species of reptiles, grouped into approximately 16 orders of which only 4 are living. The class Reptilia is first divided into 5 major groups or *subclasses* on the basis of presence or absence of certain openings through the posterolateral or temporal region of the skull (Fig. 1).

Subclass I. Anapsida

Primitive reptiles with a solid skull roof. No temporal openings.

Order 1. Chelonia or Testudinata (Gr., *chelone,* turtle; L., *testudo,* turtle)

Body short, broad and oval. Limbs clawed and/or webbed, paddle-like. Body encased in a firm shell of dorsal carapace and ventral plastron, made of dermal bony plates. Thoracic vertebrae

and ribs usually fused to carapace. Skull anapsid, with a single nasal opening and without a parietal foramen. Quadrate is immovable. No sternum is found. Teeth absent. Jaws with horny sheaths. Cloacal aperture a longitudinal slit. Heart incompletely 4-chambered with a partly divided ventricle. Copulatory organ single and simple. About 400 species of marine turtles, freshwater terrapins and terrestrial tortoises.

Examples: *Chelone, Chrysemys, Testudo, Trionyx, Dermochelys.*

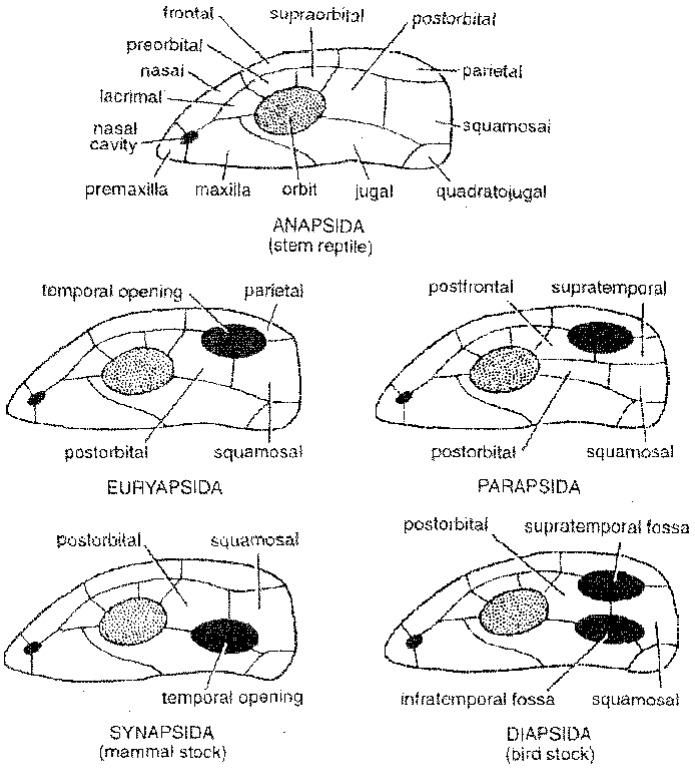

Fig. 1. Five types of skulls in lateral view in 5 subclasses of reptiles.

Subclass II. Eurvapsida (extinct)

Skull with a single dorso-lateral temporal opening on either side, bounded below by postorbital and squamosal bones.

Subclass III. Parapsida (extinct)

Skull with a single dorso-lateral temporal opening on either side bounded below by the supratemporal and postfrontal bones.

Subclass IV. Synapsida (extinct)

Skull with a single lateral temporal opening on either side bounded above by the postorbital and squamosal bones.

Subclass V. Diapsida

Skull with two temporal openings on either side separated by the bar of postorbital and squamosal bones.

Order 2. Rhynchocephalia (L., *rhynchos,* snout + Gr., *kephale,* head)

Body small, elongated and lizard like. Limbs pentadactyle, clawed and burrowing. Skin covered by granular scales and mid-dorsal row of spines. Skull diapsid. Nasal openings separate. Parietal foramen with vestigeal pineal eye present. Quadrate is fixed. Vertebrae amphicoelous or biconcave. Numerous abdominal ribs present. Teeth acrodont. Cloacal aperture transverse. Heart incompletely 4-chambered. No copulatory organ in male.

Example: Represented by a single living species, the "tuatara" or *Sphenodon punctatum* of New Zealand.

Order 3. Squamata (L., *squama,* scale or *squamatus,* scaly)

Advanced, small to medium, elongated. Limbs clawed, absent in snakes and lizards. Exoskeleton of horny epidermal scales, shields and spines. Skull diapsid. Quadrate movable.

Vertebrae procoelous. Ribs single—headed. Teeth acrodont or pleurodont. Heart incompletely 4-chambered. Cloacal aperture is transverse. Male with eversible double copulatory organs (hemipenes). About 6,800 species of lizards and snakes. These are divided into 2 distinct suborders— Lacertilia and Ophidia—-with contrasting characters, as shown in the Table 1.

Table 1. **Differences between Snakes and Lizards.**

	Suborder 1. Lacertilia or Sauria (Lizards)		Suborder 2. Ophidia or Serpentina (Snakes)
1.	Body elongated, lizard-like.	1.	Body slender, narrow, snake like.
2.	Limbs and girdles usually well-developed.	2.	Absent, vestigial hind limbs and pelvic girdle in boa, python, etc.
3.	Eyelids movable. Nictitating membranes present.	3.	Eyelids fixed. Nictitating membranes absent.
4.	Ear openings and tympanum present.	4.	Auditory openings and tympanum lost.
5.	Maxillae, palatines and pterygoids fixed.	5.	These skull bones freely movable helping in biting mechanism.
6.	Two rami of mandible firmly united anteriorly. Mouth non-expansible.	6.	Mandibular rami joined by an elastic ligament and can be widely separated during swallowing of large prey.
7.	Sternum, episternum and urinary bladder usually present.	7.	These are absent.
8.	Premaxillae bear conical teeth.	8.	Premaxillae are toothless.
9	Tongue rarely notched or extensile.	9.	Tongue slender, bifid and extensile.
10.	Caudal autotomy with regeneration in some.	10.	Caudal autotomy does not occur.
11.	Both lungs equally developed.	11.	Left lung greatly reduced.
12.	About 3,800 living species.	12.	About 3,000 living species.
13.	Single occipital condyle.	13.	Occipital condyle distinctly triple.
14.	Jugal bone present.	14.	Absent.
15.	Cerebral hemispheres are short.	15.	Extremely elongated and project between the eyes.
16.	Cranial nerves 12 pairs.	16.	10 pairs only.
	Examples : *Hemidactylus, Calotes, Uromastix, Varanus, Chamaeleon, Draco, Heloderma, Iguana, Ophisaurus,* etc.		Examples : *Typhalps, Python, Boa, Lycodon, Eryx, Naja, Bungarus, Vipera, Hydrophis, Crotalus,* etc.

Order 4. Crocodilia (G,, *krokodeilos,* Crocodile)

Large-sized, carnivorous and aquatic reptiles. Tail long, strong and laterally compressed. Limbs short but powerful, clawed and webbed. Skin thick with scales bony plates and scutes. Skull diapsid. Quadrate immovable. No parietal foramen. A pseudopalate present. Ribs bicephalous. Abdominal ribs present. Teeth numerous, thecodont, lodged in sockets. Heart completely 4-chambered. Cloacal aperture is a longitudinal slit. Male with a median, erectile, grooved penis. Examples: *Crocodylus, Gavialis. Alligator.*

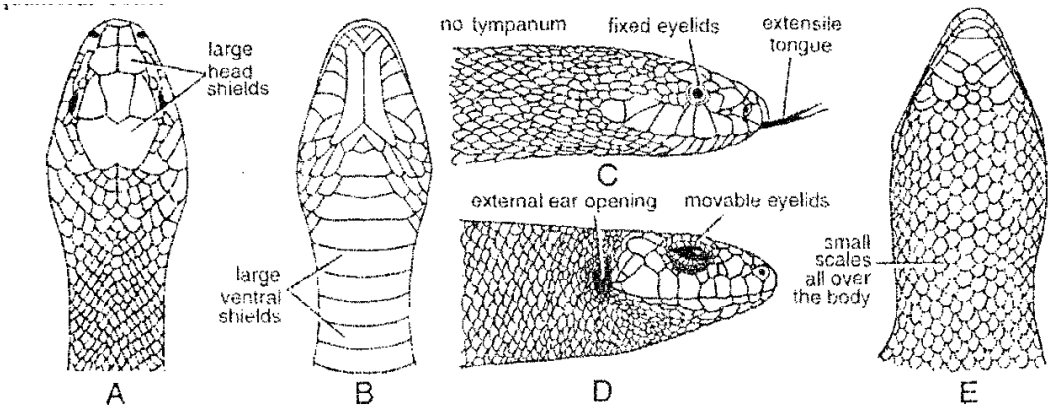

Fig. 2. Comparison of snakes and lizards. Head of a snake in dorsal (A), ventral (B) and lateral (C) views. Head of a lizard in lateral (D) and ventral (E) views.

References:

Kotpal RL (2009-2110). Modern Text Book of Zoology: Vertebrates (Animal Diversity – II). Rastogi Publications, India.