

## VERTEBRATES.

The more prominent characteristics of the six classes of Vertebrates are the following:—

1. *Mammals.*

Species that suckle their young; breathe by means of lungs; have a heart of four cavities. There are three prominent subdivisions: (1) The true *Viviparous*, as Man, ordinary Quadrupeds, Bats, Whales, Seals. (2) The *Semi-oviparous*, the young of which are more immature at birth (the birth, therefore, intermediate between the oviparous and viviparous), and which are passed into a pouch where they are suckled until maturity: as the *Marsupials*, of which the Kangaroo of Australia and the Opossum of North America are examples. (3) The *Oviparous*, or Monotremes, as the Ornithorhynchus of Australia and Tasmania, and the Echidnæ of Australia, Tasmania, and New Guinea, which produce true eggs. The Ornithorhynchus, or Duckbill, has the bill of the Duck, and lives along streams in holes entered below the level of the water. It has the bones that in Marsupials support the pouch, but not the pouch.

2. *Birds.*

Oviparous; breathing by lungs; heart of four cavities; covered with feathers, and having wings mostly adapted for flying. All existing birds have bills without teeth; but geological discovery has made known the existence in Mesozoic time of birds with a full set of teeth.

3. *Reptiles.*

Oviparous; breathing by lungs; a heart of three or four cavities; naked or covered with scales: as Crocodiles, Lizards, Turtles, Snakes.

4. *Amphibians.*

Oviparous; breathing when young by gills, afterward by both gills and lungs, or by lungs alone; a heart of three cavities; naked or covered with scales: as Frogs, which lose the tail as well as gills on becoming adults; and Salamanders, the tailed (or lizard-like) Amphibians. The modern species are naked-skinned and often toothless; but many ancient kinds had scales like Reptiles and stout teeth.

5. *Fishes.*

Usually oviparous; heart usually of two cavities; breathing by gills, which take air from the water, and are situated in front of one or more openings in the sides of the throat that let out water which enters by the mouth; skin naked, or covered with scales or bony plates. Locomotion chiefly a process of sculling by means of the posterior or caudal extremity of the body.

Under Fishes there are the following prominent divisions:—

PALÆICHTHYES, or Fishes of ancient type, including the Sharks and Gars, characterized by a heart with the arterial bulb contractile and the intestine having a valve between it and the stomach, both characters showing relations to the Amphibians. The three grand divisions are:—

1. *Selachians.*—The group includes the Sharks (Fig. 355) and Rays—Fishes having a cartilaginous skeleton; usually several gill openings or slits (*g*); no gill-cover, and gills attached to the skin by the outer margin instead of being free; embryo with deciduous external gills; no air-bladder; usually no proper scales, but a rough skin (shagreen). The ordinary Sharks have the mouth underneath and separate from the nostrils, with the teeth sharp-edged (Figs. 358, 359, 360); another group, the *Hybodonts*, have the teeth of