Horseshoe Crab

Dorsal View

Ventral view

Phylum: Arthropoda
Subphylum: Chelicerata
Class: Merostomata
Order: Xiphosura
Family: Limulidae

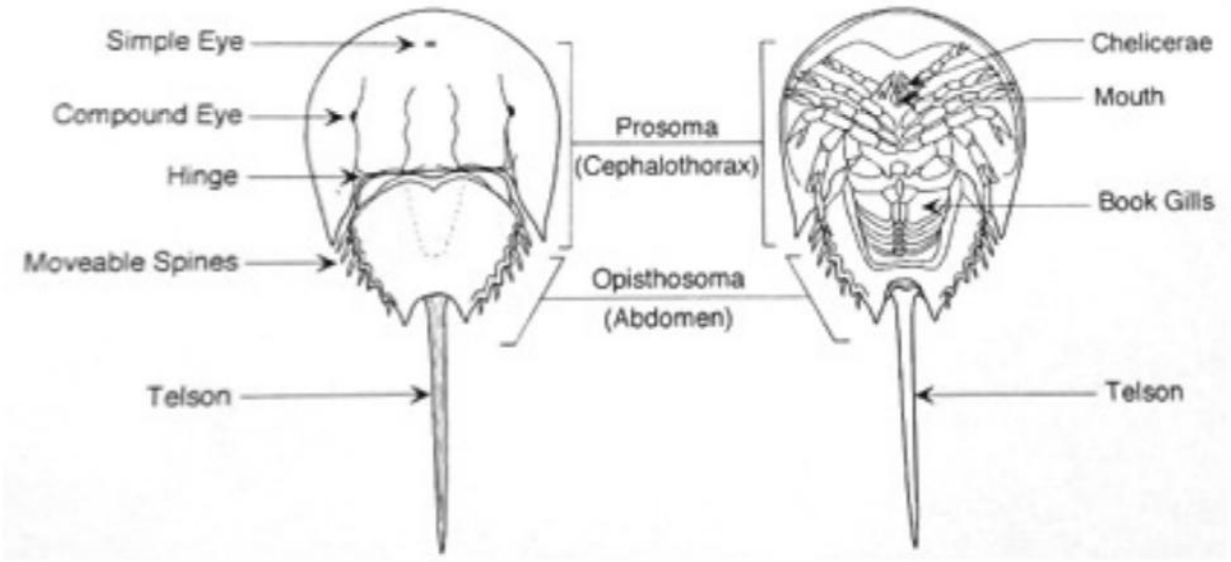
Horseshoe crabs resemble crustaceans, but belong to a separate subphylum, Chelicerata. They are closely related to arachnids such as spiders, scorpions and ticks. Horseshoe crabs are fascinating creatures. They live primarily in and around shallow ocean waters on soft sandy or muddy bottoms. Theyoccasionally come onto the shore to mate. In recent years, a decline in the population has occurred as a consequence of coastal habitat destruction in Japan and overharvesting along the east coast of North America. Because of their origin 450 million years ago, horseshoe crabs are considered as living fossils. The Limulidae are the only recent family of the order Xiphosura, and contain all four living species of horseshoe crabs:

1. *Carcinoscorpius rotundicauda,* the mangrove horseshoe crab, found in Southeast Asia.
2. *Limulus polyphemus,* the Atlantic horseshoe crab, found along the American Atlantic coast and in the Gulf of Mexico.
3. *Tachypleus gigas*, found in Southeast and East Asia.
4. *Tachypleus tridentatus,* found in Southeast and East Asia.

Tachypleus gigas and *Carcinoscorpius rotundicauda* are found within Indian limits. The distribution of *T. gigas* and *C. rotundicauda* is restricted to north-east coast of Orissa and Sunderbans area of the West Bengal, respectively. The occurrence of both species at the same place has not been observed. Mature pairs of both speices, in amplexus, migrate towards the shores for breeding purpose, throughout the year. *C. rotundicauda* prefers nesting in mangrove swamps whereas, *T. gigas* breeds on a clean sandy beach (Chatterjee and Abidi, 2001). The larger female horseshoe crab can reach up to 60 cm in length and can weigh up to 5 kg. The 'U' or horseshoeshaped Carapace (shell) is smooth and brown, although in some environments the Carapace is covered with epiphytic plants and epizooic animals. This is usually observed toward the end of the horseshoe crab's lifespan of approximately 19 years. During its formative years,

the horseshoe crab sheds its Carapace periodically, or molts, to accommodate its growing body. The new skeleton is flexible so that it can accommodate the increased body size. The new Carapace then hardens and its color forms during tanning of its protein component.

The body is divided into an anterior cephalothorax and a posterior abdomen. The spike-shaped tail, or telson, functions as a tool for digging in sand and a lever if the animal finds itself upside down. The tail might not always be effective however. The horseshoe crab is equipped with 4 pairs of jointed walking legs (pedipalps) each ending in a claw. The fifth pair is larger and allows the animal to lurch forward. The middle segment of each leg is covered with spines used to chew food before it is passed forward and into the mouth located at the base of the legs. Interestingly, locomotion and feeding are closely related, since the animal can chew only when it moves. Horseshoe crabs have 10 eyes located all over their bodies, most located on the back or sides of the animal. Some contain only photoreceptors such as the eyes located on their tails. The eyes found on the back each have about 1,000 photoreceptor clusters or ommatidia, each with a lens, cornea and photoreceptor cells. Horseshoe crabs have the largest rods and cones of any known animal that are about 100 times the size of humans'. In spite of the number of eyes, horseshoe crabs still have "poor" eyesight used only to sense light and locate mates. Horseshoe crabs' respiration is conducted through 6 pairs of appendages attached to the underside of the abdomen called gill books. The first pair, called the operculum, protects the other five pairs, which are respiratory organs and houses the opening of the genital pores through which eggs and sperm are released from the body.



Horseshoe crab Anatomy

Exploitation

Humans capture the horseshoe crabs primarily for bait and to use in fertilizer. A protein found in the blood of horseshoe crabs is used to detect impurities in intravenous medications; the animals are apparently not harmed during blood extraction. Horseshoe crab blood has also been used in cancer therapy research, leukemia diagnosis and to detect vitamin B12 deficiency. Another interesting fact is that horseshoe crabs are quite literally "blue blood." Oxygen is carried in the blood of the horseshoe crab by a molecule that contains haemocyanin, which contains copper causing the blood to turn blue when exposed to air. Most red-blooded animals carry oxygen in

ironrich hemoglobin causing their blood to turn red when exposed to air. This valuable creature is a potential source of bioactive substance, a diagnostic reagent, the Limulus Amoebocyte Lysate (LAL) from its blue blood. The reagent is highly sensitive and useful for the rapid and accurate assay of gram negative bacteria even if they are present in a very minute quantity. The indiscriminate exploitation of horse shoe crab for medicinal and other purposes, has threatened it with extinction all over the world. In USA, large numbers of brooder crabs are sacrificed every year for the preparation of LAL on commercial scale. In addition to this, the LAL is also useful in lipopolysaccharides assay and water quality research. These resulted in considerable depletion of the population of horse-shoe crab in USA. Japan was the first country to realise the declining trend and subsequently took measures for conservation by declaring horse shoe crab as a national monument (Chatterjee and Abidi, 2001).

Harvesting of blood from Horseshoe Crab

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