## Horseshoe crab (*Limulus polyphemus*)

![Horseshoe crab](image)

**Photo:** Mary Hollinger, National Oceanic and Atmospheric Administration (NOAA)

<table>
<thead>
<tr>
<th>Common name(s) in English</th>
<th>Horseshoe crab. American horseshoe crab. King crab.</th>
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<tbody>
<tr>
<td>Scientific name</td>
<td><em>Limulus polyphemus</em></td>
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<tr>
<td>Organism group</td>
<td>Horseshoe crabs (Merostomata). Horseshoe crabs are marine arthropods that are most closely related to scorpions and spiders. They are not crustaceans (and not crabs), but form a taxonomic group of their own. Horseshoe crabs are also known as king crabs.</td>
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<td>Size and appearance</td>
<td>A horseshoe crab resembles a horseshoe-shaped helmet (the prosoma, or front part of the body), joined to an abdomen (opisthosoma) with a long, spike-like tail (telson; the animal uses this to right itself if it ends up on its back on land). The animal can swim upside down. In its abdominal region it has plates bearing leaf-like gills. The domed carapace is smooth and brown or brownish green. With the help of powerful front legs, <em>Limulus polyphemus</em> presses down the front edge of its carapace, enabling it to plough through sand and mud, while protecting the vulnerable underside of its body. In certain environments the animal can accumulate so much epiphytic and epizoic growth that it is scarcely visible. The males are smaller than the females. Since horseshoe crabs can live for anything from 20 to 40 years, their size varies, depending on the life stage they have reached. A fully grown male of the species <em>Limulus polyphemus</em> reaches a length of around 20 cm, measured over the carapace, and 30–35 cm including the tail. A fully grown female has a carapace measuring 30 cm and an overall length of 40–50 cm. Females, however, can grow to up to 60 cm in length and weigh up to 5 kg.</td>
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<td>May be confused with</td>
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<td>Geographical origin</td>
<td>Merostomata have existed in all the seas on earth, but the number of species declined as other marine animals developed. Some 65 million years ago members of the group were still to be found in virtually all the world’s oceans, but today <em>Limulus polyphemus</em> only occurs as a native species along the Atlantic coast of the United States, from Maine to the Gulf of Mexico, while the species <em>Tachypleus gigas</em>, <em>Tachypleus tridentatus</em> and <em>Carcinoscorpius rotundicauda</em> are found in the seas of South-East Asia.</td>
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<td>First observed in Swedish waters</td>
<td>Has not yet been observed in Swedish waters.</td>
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<tr>
<td>Occurrence in Swedish seas and</td>
<td>Has not yet been observed in Swedish waters.</td>
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<tr>
<td>coastal areas</td>
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<td><strong>Occurrence in other sea areas</strong></td>
<td>The species has been found in Danish coastal waters (Kattegat and Belt Sea), where the first discovery was made in 1953 (probably released individuals; the species is presumably not established, as later finds have mostly consisted of dead specimens that had only survived for a number of years in this environment). Horseshoe crabs have also been observed in German waters, the first in 1866. They had been imported for sale as aquarium animals, but surplus crabs were dumped near Helgoland, and occasional finds were later made in the Netherlands. See above regarding the occurrence of horseshoe crabs as native species.</td>
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<td><strong>Probable means of introduction</strong></td>
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<td><strong>Habitat(s) in which species occurs</strong></td>
<td><em>Limulus polyphemus</em> lives in estuaries and inter- and subtidal areas, preferring the more saline parts of such areas. It can cope with salinities ranging from brackish (about 11 psu) to marine conditions (up to 40 psu), but develops most favourably in the range 20–30 psu. The water temperature should preferably not be below about 12°C or above 29°C. The horseshoe crab is tolerant, however, and can survive wide fluctuations in salinity, temperature, pH and oxygen levels in sediments (including anoxic conditions). The larvae will stop growing if the temperature falls below 20°C, but can survive for several months and resume their development when the temperature rises again. Adults can burrow into anoxic intertidal sediments at low tide. They can survive without food for almost a year. During the spawning season, horseshoe crabs move out of the water and gather at the water’s edge. They require sloping sandy beaches on which to lay and cover their eggs. The animals can survive for long periods out of water, provided that their gills are kept moist. They reach sexual maturity at 10–12 years of age, the males somewhat earlier than the females. Horseshoe crabs burrow into sediments in shallow waters, living on the bivalves, worms and other benthic animals they dig up. They usually live in shallow areas, but can survive down to water depths of 50 m. The tracks of a burrowing horseshoe crab can be seen for tens of metres, and where they end the buried animal will be found.</td>
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<td><strong>Ecological effects</strong></td>
<td>The species is considered to be environmentally beneficial in American coastal areas. Its eggs provide food for many other species, and its &quot;ploughing&quot; along the seabed in search of benthic fauna to feed on aerates the sediments, helping to maintain high species richness and diversity.</td>
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<td><strong>Additional information</strong></td>
<td>Merostomata are among the oldest animals on earth, going back, as a taxon, at least 300 million years. They have not changed very much over this long period and are therefore regarded as &quot;living fossils&quot;. The genus <em>Limulus</em> has been most closely studied, and <em>Limulus polyphemus</em> is the best known species. <em>L. polyphemus</em> is believed to be the oldest surviving relative of the extinct trilobites. The different horseshoe crab species are protected under CITES. The blood of horseshoe crabs contains the copper-based respiratory pigment haemocyanin and is therefore light blue in colour. <em>L. polyphemus</em> is used in biomedicine and pharmacology. Its blood clots when it comes into contact with endotoxins, poisons produced by Gram-negative bacteria, which cause diseases such as typhus, meningitis, cholera and dysentery. Using the limulus test, the presence of such bacteria can be detected. The properties of horseshoe crabs’ compound...</td>
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eyes have also proved useful in medical research and in the development of solar collector technology.

**FIND OUT MORE**

- **North European and Baltic Network on Invasive Alien Species: Limulus polyphemus**
- **Baltic Sea Alien Species Database: Limulus polyphemus**
- **Johnny Jensen's Photographic Library: Limulus polyphemus** (Dolkhale)
  - http://www.jjphoto.dk/animal_archive/limulus_polyphemus.htm
- **Biopix: Dolkhale**
  - http://www.biopix.dk/Photo.asp?Language=da&PhotoId=28627
- **www.paleo.de: Limulus - Der kleine, schielende Cyclop**
  - http://141.84.51.10/palaco_de/edu/lebfoss/limulus/
- **Bundesanstalt für Gewässerkunde: Neozoa (Makrozoobenthos) an der deutschen Nordseeküste: Eine Übersicht**
- **Nationalat Natuurhistorisch Museum: Non-indigenous marine and estuarine species in The Netherlands: Limulus polyphemus**
- **Smithsonian Marine Station at Fort Pierce: Limulus polyphemus**
  - http://www.sms.si.edu/IRLSpec/Limulu_polyph.htm
- **University or Delaware College of Marine Studies: Horseshoe Crab**
  - http://www.ocean.udel.edu/horseshoecrab/
- **Ecological Research and Development Group: Horseshoe Crab**
  - http://www.horseshoecrab.org/
- **Marine Biological Laboratory, Woods Hole: Limulus site: The Horseshoe Crab**
  - http://www.mbl.edu/animals/Limulus/
- **University of California: Museum of Paleontology: Xiphosura - Horseshoe crabs**
  - http://www.ucmp.berkeley.edu/arthropoda/chelicerata/xiphosura.html
- **Chesapeake Bay Programme: Horseshoe crab**
  - http://www.chesapeakebay.net/Info/horseshoe_crab.cfm
- **U.S. Fish and Wildlife Service: The Horseshoe Crab**
- **University of Delaware Graduate College of Marine Studies, and the Sea Grant College Program: What is a horseshoe crab?**
  - http://www.ocean.udel.edu/horseshoecrab/History/biology.html
- **ARKive - Images of Life on Earth: Horshoe crab**
  - http://www.arkive.org/species/GES/invertebrates_marine/Limulus_polyphemus/
- **Assateague Island: Horseshoe crab**
- **National Geographic News: Horseshoe crabs remain mysteries to biologists**
- **Indian River Lagoon Photo Gallery: Horseshoe Crabs**
  - http://www.sms.si.edu/irlspec/images/06PhotoContest/06ThomsonR2.jpg
- **NOAA Photo Library: Limulus polyphemus**
  - http://www.photolib.noaa.gov/coastline/line0682.htm
- **Global Classroom: The Horseshoe Crab**
  - http://www.globalclassroom.org/hshoe.html

**PHOTO CREDIT**

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