Chihuahuan Desert Education Coalition

Triops longicaudatus – Desert Shrimp

Order: Notostraca

Class: Branchiopoda

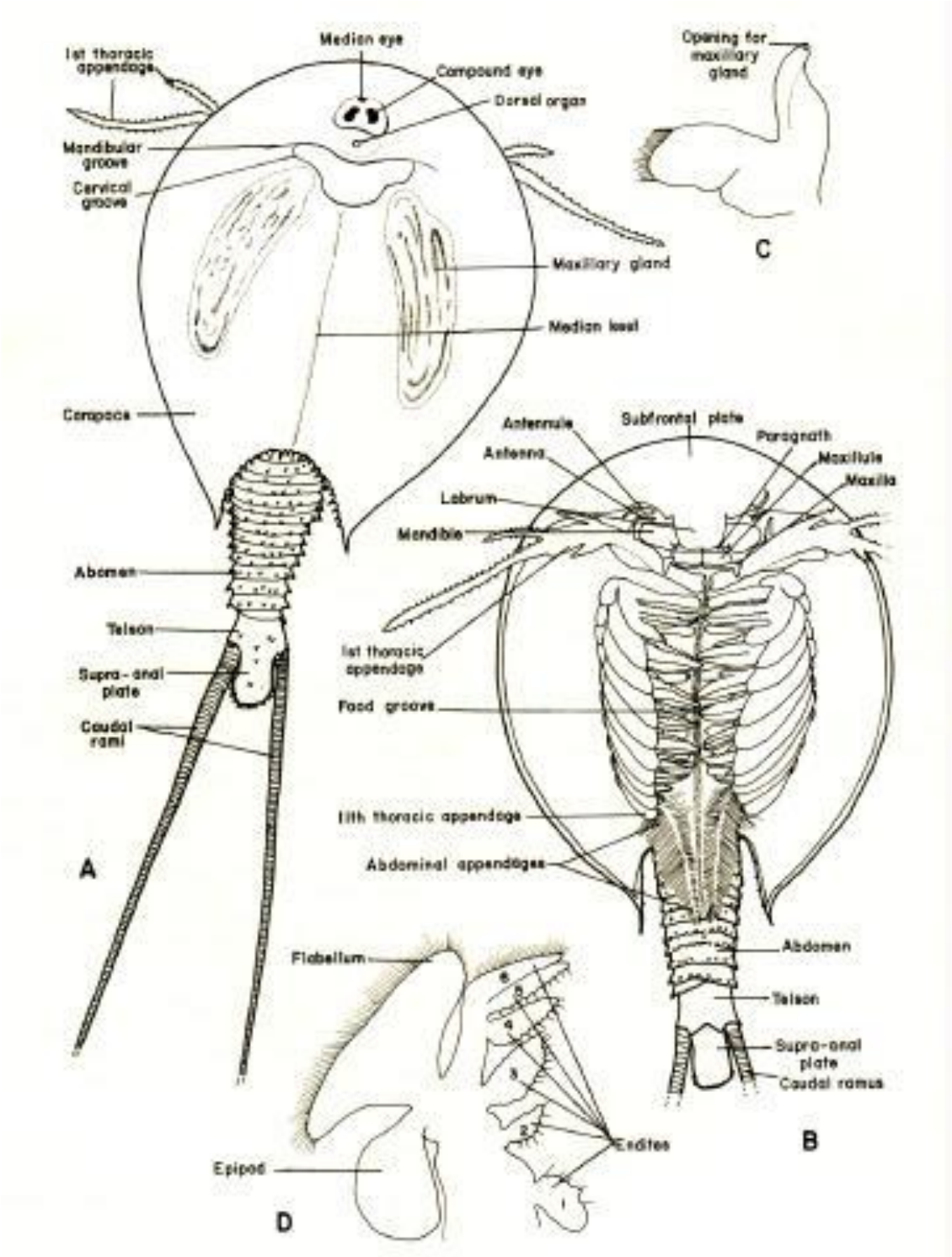
Triops are small (1-1.5 inches or up to 40 mm) freshwater crustaceans, known to be living on earth since the Devonian period, about 350 million years ago. Therefore they are considered as “living fossils”. *Triops* is the genus of the family Triopidae: small crustaceans with a small third median eye, the Naupliar eye behind the two Compound eyes. In the Greek Mythology, Triopas was the human representative of the Argive Zeus, who is sometimes represented with a third eye on his forehead.

Three possible species of *Triops* are thought to be present in the American Southwest:

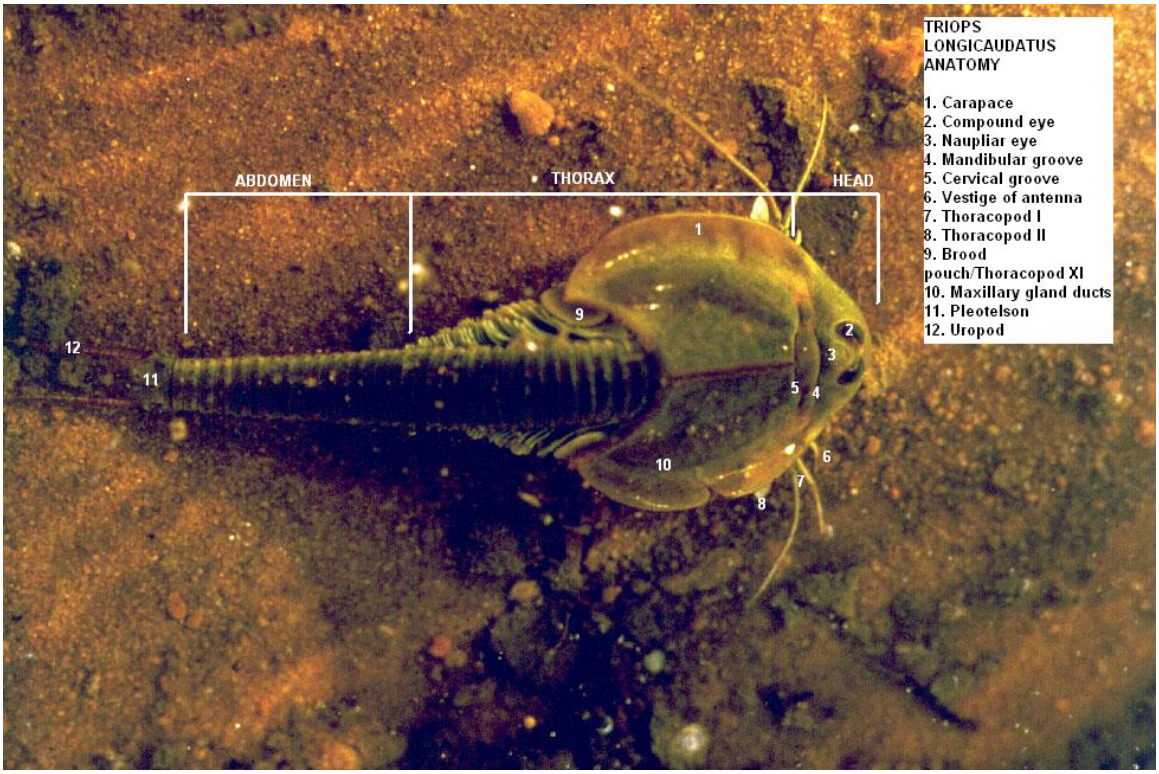
1. *T. newberryi*, which carries 8.5 mean legless rings on the abdomen. Its populations consist predominantly of ovisac-bearing individuals, with mean per pond proportion of males ranging from 0.0 to 0.26.
2. *T. longicaudatus* ‘‘short’’, which carries 6 mean legless rings on the abdomen. Populations consist of only ovisac-bearing individuals; all seem to be hermaphroditic.
3. *T. longicaudatus* ‘‘long’’ with 10 mean legless rings on the abdomen. The populations generally have equal sex ratios.

Crustaceans are a subphylum of the Arthropods. They have an exoskeleton, which they have to shed regularly (moult), in order to grow. Crustaceans have two-parted limbs (biramous) and a form of larvae called Nauplius. Their body is segmented and grouped into three main regions: head (cephalon), thorax, and abdomen (pleon). Head and thorax may fuse and then form a carapace. The body segments usually bear appendages: on the

head two pairs of antennae, the mandibles and maxillae; the thorax usually bears legs, pereiopods (walking legs) and maxillipeds (feeding legs); the abdomen has pleopods (swimming legs) and ends in a telson.



The circulatory system is open, where the heart pumps the blood (containing hemoglobin in Branchiopoda) into the haemocoel. Kidney like structures are found near the antennae. The brain is made up by a pair of ganglia, and more ganglia are found near the gut. The gut is a straight tube with two digestive glands.



"Triops anatomy new" by Crustaceanguy at en.wikipedia - Obtained from Image:Triops longicaudatus 3.jpgTransferred from en.wikipedia to Commons by User:Magnus Manske using CommonsHelper.

During the summer, *Triops* can be found in the desert in temporary pools after a rain. They develop from eggs that can remain in stasis (diapause) for several years, until a rainwater pool allows them to continue their development. Since these pools are usually drying out quickly, the *Triops* have a very short lifespan of 2-4 weeks or until the pool dries up. During this time they lay their eggs, usually one clutch per day. They carry their eggs around in brood pouches on their swimming appendages until they find a proper spot to deposit them. There they “cement their eggs on various structures (twigs, grass, etc.) in their ponds”. Most adult *Triops* are hermaphrodites (male and female) that can fertilize their own eggs. Males are rare and mate with the hermaphrodites. The adult *Triops* live on the pool bottom and filter the mud for small crustaceans, plant and animal debris. Sometimes they even eat each other. With the two large mandibles they grind up the food particles.

T. longicaudatus "long" in a temporary pool, photographed at Hueco Tanks, El Paso, Texas.
(Gertrud Konings)

Triops are edible like shrimp. In some areas they are used as biological agents, since they feed on mosquito larvae and weeds. Frogs and birds are their predators.

The life cycle of *Triops* (20-40 days)

White or pink eggs – remain in stasis (diapause) for years or even decades as cysts and can sustain extreme heat or cold. After a summer rain, eggs in temporary pools are rehydrated and the embryo hatches. Within several hours the embryo develops into a Nauplius (larval stage) and go within two weeks through several naupliar stages = instars (growth stages) through moult, where they shed their exoskeleton. During this time they are filter feeders and feed off the water column dead material (detritus). Juvenile *Triops* show already the typical features of the adult.

T. longicaudatus Nauplius. Photographed at Hueco Tanks, El Paso, Texas.

Dried eggs of *Triops longicaudatus* can be bought with a kit and hatched and raised in an aquarium. How to hatch the eggs and keep *Triops* in the aquarium learn at:

- The *Triops* Project
  http://homebiology.blogspot.com/2008/11/triops.html

A worksheet for the project is available at:

http://store.triops.com/CMS/UploadedFiles/web%20nycur3.pdf
Science 21: Science for the 21st century

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By: Gertrud Konings, 2016

Questions to the *Triops* Teaching Module

1. **To which animal phylum and subphylum do the *Triops* belong?**

2. **How big is an adult Triops?**

3. **Where does *Triops* live in the Chihuhahuan Desert? When can you find them?**

4. **Where does their name originate from and what is it referring to?**

5. **Why do Crustaceans regularly mold during their larval stages?**

6. **How are the larval forms of crustaceans called?**

7. **How are adult crustaceans built? Name the three major parts.**

8. **Which appendages are found on the different parts?**

9. **What is a carapace?**

10. **Why is *Triops* called a "living fossil"?**

11. **Can you think of a good use for *Triops* in desert cities?**

Questions & Answers to the *Triops* Teaching Module

1. **To which animal phylum and subphylum do the *Triops* belong?**
   Phylum: Arthropods
   subphylum: Crustaceans

2. **How big is an adult Triops?**
   1-1.5 inches or up to 40 mm

3. **Where does *Triops* live in the Chihuhahuan Desert? When can you find them?**
   Everywhere in the desert; but only found after a summer rain in standing freshwater pools.

4. **Where does their name originate from and what is it referring to?**
   To the Naupliar eye behind the two Compound eyes – the third eye

5. **Why do Crustaceans regularly mold during their larval stages?**
   They have a hard exoskeleton.

6. **How are the larval forms of crustaceans called?**
   Nauplius

7. **How are adult crustaceans built? Name the three major parts.**
   Head (cephalon), thorax, and abdomen (pleon)

8. **Which appendages are found on the different parts?**
   a. on the head - two pairs of antennae, the mandibles and maxillae;
   b. the thorax usually bears legs, pereiopods (walking legs) and maxillipeds (feeding legs);
   c. the abdomen has pleopods (swimming legs) and ends in a telson.

9. **What is a carapace?**
   Head and thorax are fused and then form a carapace.

10. **Why is *Triops* called a "living fossil"?**
    They are known to be living on earth since about 350 million years ago.

11. **Can you think of a good use for *Triops* in desert cities?**
    As biological agents, since they feed on mosquito larvae.