

Callinectes sapidus (Blue Crab)

Order: Decapoda (Shrimps, Lobsters and Crabs)

Class: Malacostraca (Crustaceans: Shrimps, Sand-hoppers and Woodlice)

Phylum: Arthropoda (Arthropods)

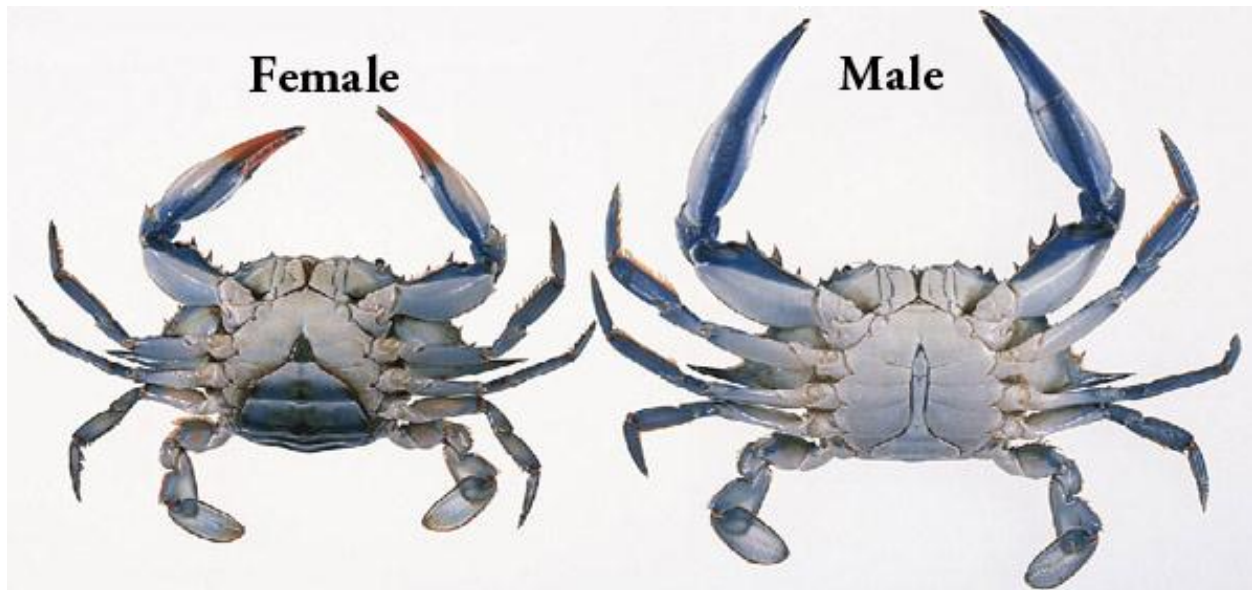


Fig. 1. Blue crab, *Callinectes sapidus*.

[<http://sursumcorda.salemsattic.com/archives/2011/07/30/how-to-tell-a-male-blue-crab-from-a-female-american-political-edition>, downloaded 20 March 2015]

TRAITS. The blue crab is a swimming crab (Family Portunidae), with its hind legs formed into paddles. These crabs have a distinct blue body colour in front and an olive/brown colour on the remainder of the body. Male chelipeds (front legs) have blue pincers whereas those of females are red (Fig. 1). Crabs of this species are somewhat dimorphic, where the sexes are distinguished by the shape of the abdomen; the male's abdomen is T-shaped and the mature female's abdomen is semi-circular (Chin, 1991). The convex carapace on either side of the crab has nine marginal teeth, one of which forms a strong lateral spine. They become fully developed after 18-20 moults and attain a carapace length of 120-170mm where growth is high in warm conditions.

DISTRIBUTION. *C. sapidus* is widely distributed and native within the western Atlantic Ocean from Nova Scotia, northern Massachusetts and Maine to northern Argentina, encompassing Bermuda, the Caribbean Sea and West Indies (Fig. 2) (Millikin and Williams, 1984). Blue crabs have also been deliberately introduced in several parts of Europe and Asia (Millikin and Williams, 1984). This species tends to migrate to deeper water when temperatures decline.

HABITAT AND ACTIVITY. *C. sapidus* is widespread in a variety of habitats ranging from freshwater to saltwater areas where their distribution is based on sex, age and season. However they are especially prevalent in estuaries and brackish coastal areas, although they may have preferences for muddy areas such as specific areas in Trinidad. Their habitat ranges from low tides

to waters 36m deep (Bodden, 2011). Blue crabs are typically diurnal species, however a study conducted by (Forward et al., 2003) stipulates that juveniles are greater in number at night as opposed to daytime. Males usually congregate in fresh waters whereas females linger along brackish regions, especially for laying eggs (Sumer et al., 2013).

FOOD AND FEEDING. The food chain relationship among blue crabs are important as they display both predator and prey qualities. They are not constantly in search of food, but they dig below the sand and wait silently, exposing only their eyes until their prey approaches. They use their vision and chemical receptors to detect the prey's scent, capturing them between their claws (Hay, 1905). Juvenile and adult blue crabs mainly prey upon crustaceans and molluscs such as oysters and clams (Fig. 3), by using their claws to entirely pry the shells apart (Hay, 1905). This species is also a voracious scavenger and cannibal; the flesh of dead, putrid animals such as stale meat and fish attracts the crabs from several metres away (Millikin and Williams, 1984). The blue crab occasionally incorporates plant material into their diet by scouring the surroundings and clinging onto aquatic vegetation such as the tender shoots of eel grass. It also devours other blue crabs by grasping and seizing them within their large claws and legs, especially those in the young stages, soft-shelled or injured state (Hay, 1905).

POPULATION ECOLOGY. *C. sapidus* like other crabs, are typically solitary predominantly because they are belligerent and challenge each other for food and burrowing holes. However, they congregate during the mating season. The average life span of blue crabs is approximately 1-2 years, primarily because many are harvested before they perish naturally. Blue crabs in the St. John's River were estimated to attain maximum longevity of 4 years (Millikin and Williams, 1984). Local blue crab populations may be decimated as a result of overfishing. For instance, Trinidad has experienced a decline in the *Callinectes sapidus* population in Westmoorings which was once a wetland delta.

REPRODUCTION. Female blue crabs mate only once, whereas males mate several times. The female crab attracts a male by discharging chemicals known as pheromones, and once identified by a male crab, he then protects the female crab until moulting occurs (Gleeson, 2009). Furthermore, mating then occurs usually in low salinity waters of estuaries and may persist for approximately 5-12 hours (Chin 1991). In the final moult, the male transfers its sperm into the receptacles of the female for storage which allows her to produce broods in the future (Millikin and Williams, 1984). Females usually become impregnated in their final moult due to their ability to attain sexual maturity during this period. The impregnated female then proceeds to more saline waters where spawning and hatching ultimately occurs after 2-9 months in the early fall or spring (Millikin and Williams, 1984). The female then fertilises its eggs with the stored sperm, producing as many as 2 million eggs per brood in the form of a dense orange sponge (Hay, 1905), hence they are highly fecund. The eggs remains closely attached to the abdomen of the female for roughly two weeks and the orange sponge gradually becomes darker as the embryos develop eyes (Millikin and Williams, 1984). Upon hatching, the zoea larvae morph into megalopae after eight zoeal stages which then metamorphs into juveniles followed by adult blue crabs after a series of moults (Fig. 4). Males portray no communication or interaction with the juveniles, however the females safeguard the young throughout the duration of hatching but does not exhibit a specific role in parental care since the eggs are abundant and the maturing period is lengthy (Hay, 1905).

BEHAVIOUR. Juvenile behaviour: Generally, juveniles are 60-90 mm in width and migrate to shallow low salinity waters where they mature through a series of moults following their hatching

(Van Heukelem, 1987). Moulting and growth cease during the winter but is resumed once summer continues. Young juveniles feed predominantly on zooplankton and then switch to diets supported by eelgrass or cordgrass (Hammerson, 2004).

Anti-predator behaviour: When blue crabs are disturbed or threatened, its initial reaction is to respond aggressively (Fig. 5), however when in its soft-bodied moulting state, it is deemed vulnerable to fend off predators. They use their primary defence mechanisms such as their powerful chelae, pincers and shell which protects and allows them to seize predators such as the blue heron (Hay, 1905). However, they are able to regenerate misplaced limbs or pincers if lost from fighting. These individuals also have the aptitude to camouflage from predators in water since their blue/grey covering is masked under water which is similar in colour. Additionally, they may also burrow under the sand seeking cover or even use their paddle shaped legs to accommodate swimming away from predators which gives them excellent manoeuvrability and speed, travelling up to 140m/hour, with an average rate of 15.5m/hour (Hay, 1905).

Communication: Olfactory Communication – Studies conducted on *C. sapidus* indicate that premoult pubertal females release a pheromone in their urine when prepared to exhibit courtship behaviour (Gleeson, 2009). Males then detect the pheromone via their distinct chemical receptors located on the outer flagella of the antennules and then proceed via stationary paddling (Gleeson, 2009).

Vocal Communication – Blue crabs emanate sounds displayed by drumming their pincers to intimidate a competitor and in courtship, however very little is known about the other types of sounds these individuals make (Chin 1991).

Visual Communication – Male blue crabs are highly visually responsive and use their visual cues and sense of colour particularly in sexual interactions. For instance, males display preferences for females with red claws as opposed to females with black or white claws (Baldwin and Johnsen, 2009).

APPLIED ECOLOGY. *C. sapidus* is not listed by IUCN. These species display commensalism relationships as they are utilized as hosts to many parasites. For example, parasites such as barnacles and leeches attach themselves to the crab's outer shell where they remain unharmed. Additionally, other parasites such as isopods linger in the stomach and gills of these organisms (Bodden, 2011). Blue crabs are also commercially and economically important to humans for food.

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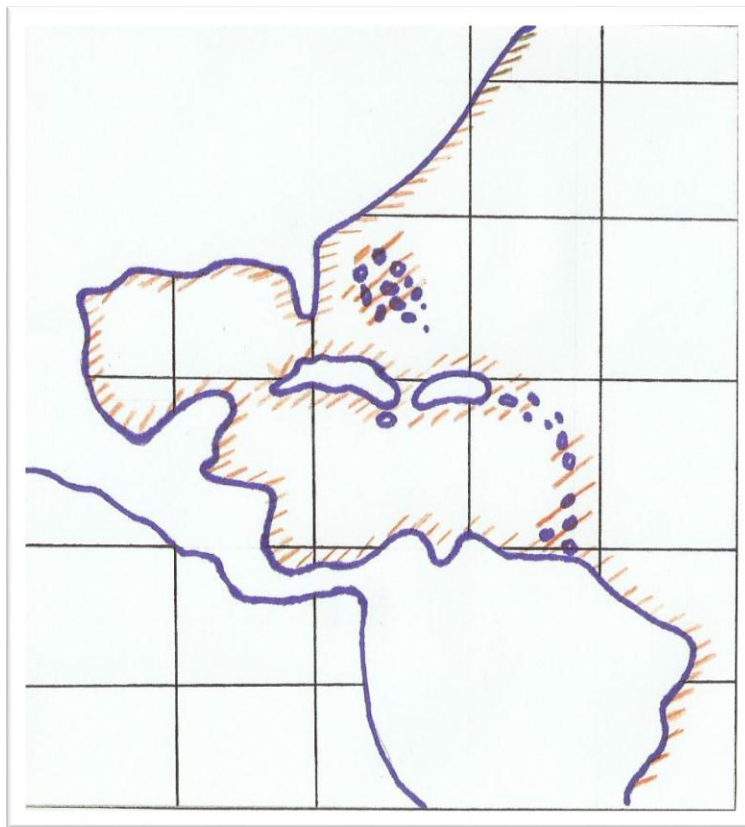


Fig. 2. Sketch map showing the distribution of *Callinectes sapidus*.

[Redrawn from Chin (1991)]



Fig. 3. *Callinectes sapidus* prying the shell of a clam apart.

[<http://video.nationalgeographic.com/video/crab-blue-predation>, downloaded 28 March 2015]

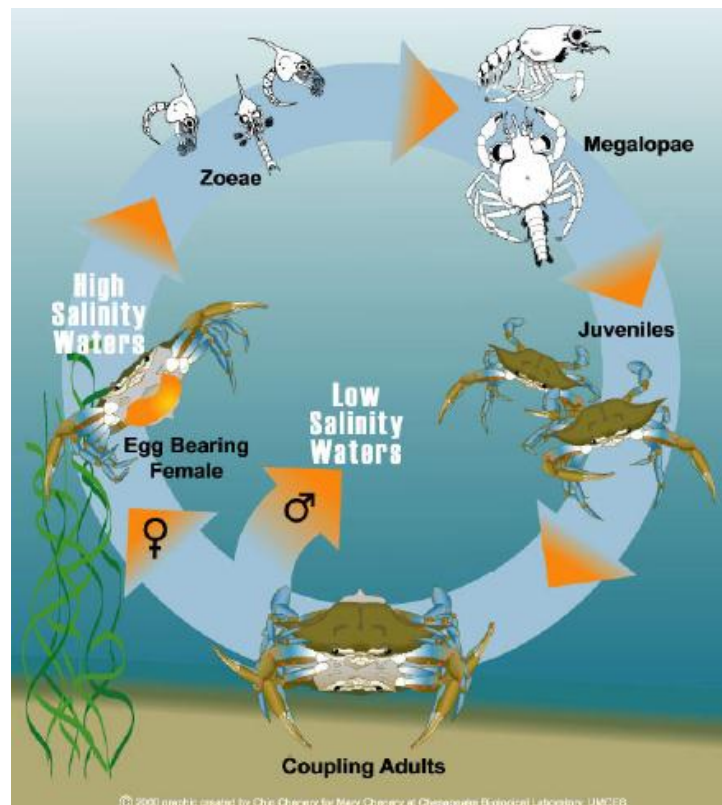


Fig. 4. Life cycle of *Callinectes sapidus*.

[http://hjord.cbl.umces.edu/crabs/docs/Chenery_02.pdf, downloaded 28 March 2015]



Fig. 5. Aggressive behaviour displayed between two *Callinectes sapidus* males.

[http://www.easttennesseewildflowers.com/gallery/index.php/Seashores/Copy_of_Crabs_Fighting, downloaded 28 March 2015]

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