*Callinectes sapidus*

Blue Crab Dissection

Purpose: To understand and describe the structure and biology of a crustacean. To compare the anatomy of the crustacean with other animals and our own.

Procedure:

External Inspection:

1. Place your crab dorsal side up. The carapace has two long lateral spines and several strong teeth on each anterolateral margin. The lateral extensions of the carapace, enclose large branchial chambers, which house the gills.
2. On the anterior edge of the carapace, on each side of the midline are two shallow, notched excavations. These are the orbits, from which the eyestalks pro­trude. Each has a compound eye at its distal end.   Anteriorly the cephalothorax bears a small anterior, median process, the rostrum.
3. Crossing the midline of the carapace, just posterior to the middle, is a short, shallow, transverse groove. This is the cervical groove and it is the cross-bar of an H-shaped set of grooves. It marks the approximate division between head and thorax.
4. Flip your crab so that the ventral side is facing up. On the ventral surface locate the abdomen flexed beneath the thorax. The abdomen is also called the pleon, its segments are pleomeres, and its appendages are pleopods.   In true crabs the abdomen is a small segmented structure whose shape varies with sex and maturity.   In mature females it is broad with convex sides and covers most of the posterior ventral surface of the thorax (rounded).   In immature females the abdomen is a nearly equilateral triangle whereas the abdomen of males is very narrow although it has a broad base.   Determine the sex of your specimen from the shape of the abdomen.
5. Extend the abdomen so it is no longer flexed but points posteriorly from the thorax as it would in a crayfish or shrimp.
6. In dorsal view most of its segments are easily seen and can be counted, especially in females.   The small, triangular, terminal portion is the telson, which is not a true segment.   Most blue crabs have six abdominal segments plus the terminal telson.   In female blue crabs the six segments are independent of each other and five of them are visible, the first being hidden by the carapace.   In males, segment 1 is hidden under edge of the carapace, segment 2 is visible and wide, and 3, 4, and 5 are visible but fused together and narrowed posteriorly. Segment 6 is separate, slender, and has the telson attached to its end.
7. The transparent, membranous intestine runs along the ventral midline of the abdomen, under the thin membranous ventral exoskeleton, and terminates at the anus on the telson .   It may be filled with dark feces in which case it is easier to see.   Press its posterior end with a probe to extrude feces from the anus (may or may not be present), thereby confirming its position.
8. On the ventral surface of the thorax is a median, longitudinal groove hidden by the abdomen.   The abdomen of the male occupies this groove and in females the gonopores are in its walls.   The female gonopores are large triangular openings in the sternites of the sixth thoracic segment, in line with the third pair of legs.   Male gonopores are located at the tip of the inconspicuous penis on the last leg and will be seen later.
9. Study the appendages (legs) without removing them from the animal. Each section of an arthropod limb is known as an article.
10. Although appendages are numbered from anterior to posterior it is easier to study them in reverse order, from posterior to anterior.   Begin with the pleopods, or abdominal appendages, and work your way forward through the pereopods, maxillipeds, and mouthparts, to end with the antennae.
11. Extend the abdomen again, look at its ventral surface, and find the abdominal appendages (pleopods). Like the abdomen itself, the pleopods are sexually dimorphic (different in males and females)
    1. Males have only two pairs of pleopods and they are located anteriorly on the abdomen, on segments 1 and 2.   Both function in the transfer of sperm to the female during copulation.  They are hidden under the flexed abdomen, which must be extended to reveal them. The long, curved, tubular first pleopod is the gonopod.   It, not the penis, is the organ used to deliver spermatophores to the female gonopore.   The second pleopod is much smaller and functions as a piston to push spermatophores through the hollow core of the gonopod.
    2. Females have paired pleopods on abdominal segments 2-5 and, as in the male, they are hidden under the flexed abdomen which must be extended to reveal them.   The first article, or coxa, of a female pleopod is attached to the body by a soft and flexible articulating membrane.   The coxa is small and poorly calcified but the next article, the basis, is large and conspicuous.   Two rami, the exopod and endopod, arise from the basis.   After release from the gonopores, the eggs attach to the long setae of the pleopods where they are ventilated by movements of the abdomen and the pleopods.
12. The first pair of legs is called the cheliped and the pincer at its distal end is the chela.   The cheliped is larger and more robust than the other pereopods (legs) and is constructed so that the dactyl is a movable finger that opposes an immovable finger. This arrangement creates a prehensile chela. Note the teeth on the fingers.
13. Note the slight asymmetry of the two chelipeds.   The left, or cutter cheliped, is smaller and its teeth are a little smaller and sharper.   The right, or crusher cheliped, is a bit larger and has larger and slightly more rounded teeth.   This dimorphism (difference) may be reversed in some individuals.
14. The large opening in the carapace dorsal to the coxa of the cheliped is the inhalant aperture leading into the branchial chamber where the gills are located.
15. If your crab is missing any of its legs, they were probably deliberately autotomized (severed) by the crab as a defense mechanism.
16. Locate the swimming legs. Notice and identify all the segments from the figure.
17. Locate the maxillipeds. These are found by the mouth region. Look at the crab *en face*, with magnification as needed, and find the quadrate mouth field including the mouth, the area around it, and the mouthparts.   The third maxillipeds cover the mouth field. They resemble a pair of doors protecting the mouth field and hiding the other
18. Move one of the third maxillipeds and note its mobility.   It is attached to the body by its protopod. If you move the maxilliped, the flabellum will move also, making it easier to recognize.   The flabellum is used to clean the gills.
19. Anterior to the first maxillae are the large, hard mandibles. Push the mandibles back and forth and watch their motion
20. Locate the two short, thick eyestalks. A large compound eye, located at the end of each eyestalk is composed of hundreds of independent photoreceptive units, or ommatidia.

Internal Inspection

1. Turn the crab so its dorsal side is up.   Insert the tip of a heavy scissors beneath the lateral, posterior edge of the carapace, and make a cut around the periphery of the carapace on its *dorsal* surface. Be careful that you cut only the heavy calci­fied exoskeleton and not the organs beneath it.   Keep your scissors about 5 mm from the edge of the carapace and cut completely around it.   Use a scalpel to separate it (by scraping, not cutting) from the underlying tissues.   Care­fully remove the carapace, in pieces if necessary, with minimal disturbance to the underlying tissues.
2. The thin, dark body wall, which is little more than the epidermis, lies immediately beneath the carapace and as much of it as possible should be removed with the carapace. The exoskeleton and epidermis *are* the body wall, as there is no musculature or connective tissue.
3. Notice two small, calcareous processes on the inner surface of the carapace almost exactly in its center.   These are apodemes for the origin of muscles running to the gut.   These muscles must be disconnected to remove the carapace.
4. If your specimen is a mature female, the orange ovaries may cover and obscure other structures.   The smaller, white testes of the mature male do not obscure other structures.   It may be necessary to remove the ovary (but *nothing* else) from one side in order to see the stomach and digestive ceca beneath.
5. The stomach is a large, bulging, transparent, thin-walled sac lying dorsally on the midline in the anterior thorax. The digestive ceca are large, soft, amorphous (shapeless), yellow or greenish organs occupying the periphery of the dorsal thorax.   They may be completely obscured by the ovary in mature females.
6. Find the large, triangular, firm, beige or greyish mass of gills. The triangular mass of gills is covered by a very thin, transparent membrane which you should avoid damaging.
7. The soft, white or gray heart lies on the midline posterior to the stomach and between the flancs.













