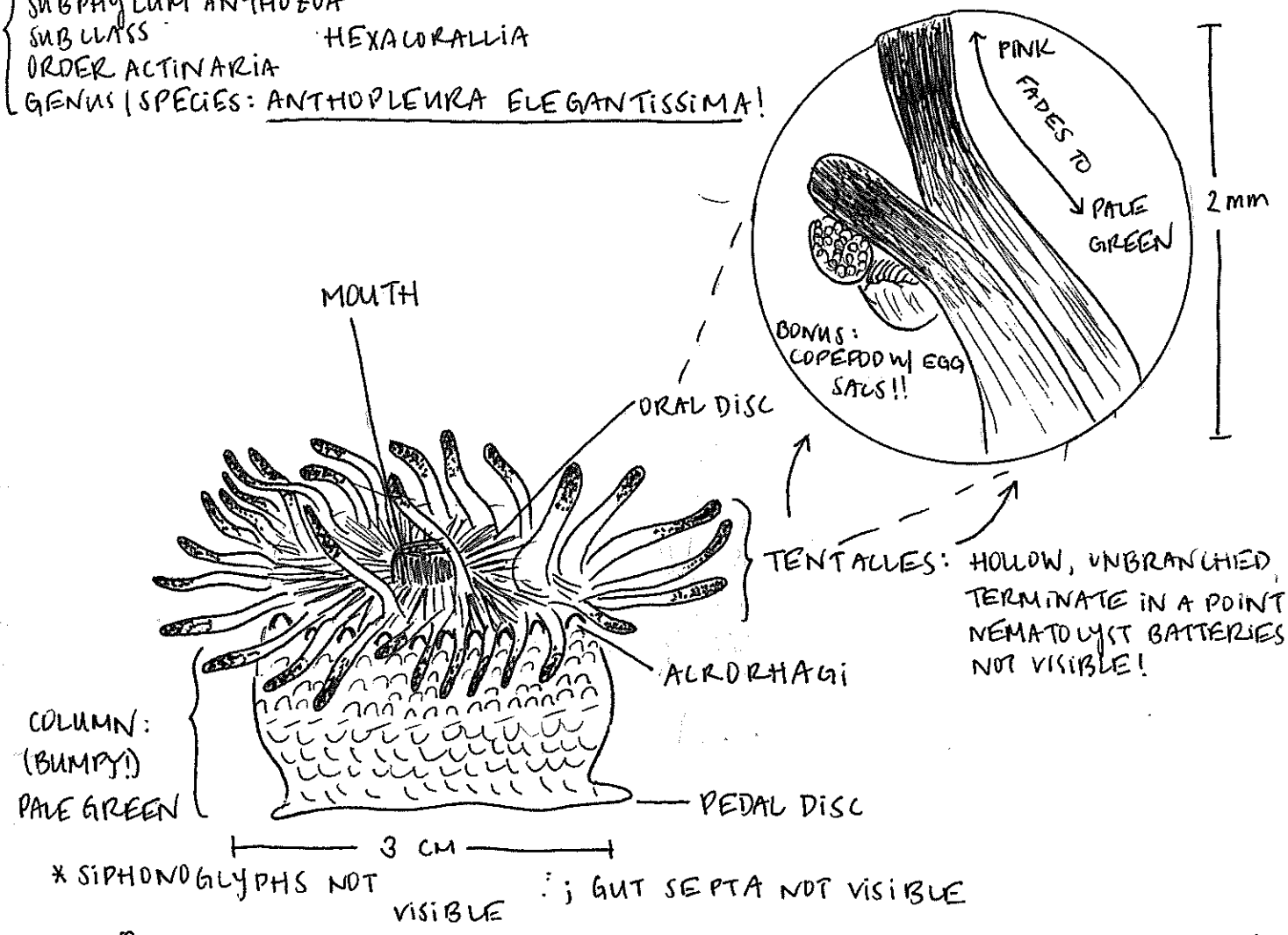
PHYLUM CNIDARIA: SUBPHYLUM ANTHOZOA // 04.04.2017

① STRUCTURE:

- PHYLUM CNIDARIA
- SUBPHYLUM ANTHOZOA
- SUBCLASS HEXACORALLIA
- ORDER ACTINARIA
- GENUS | SPECIES: ANTHOPLEURA ELEGANTISSIMA!

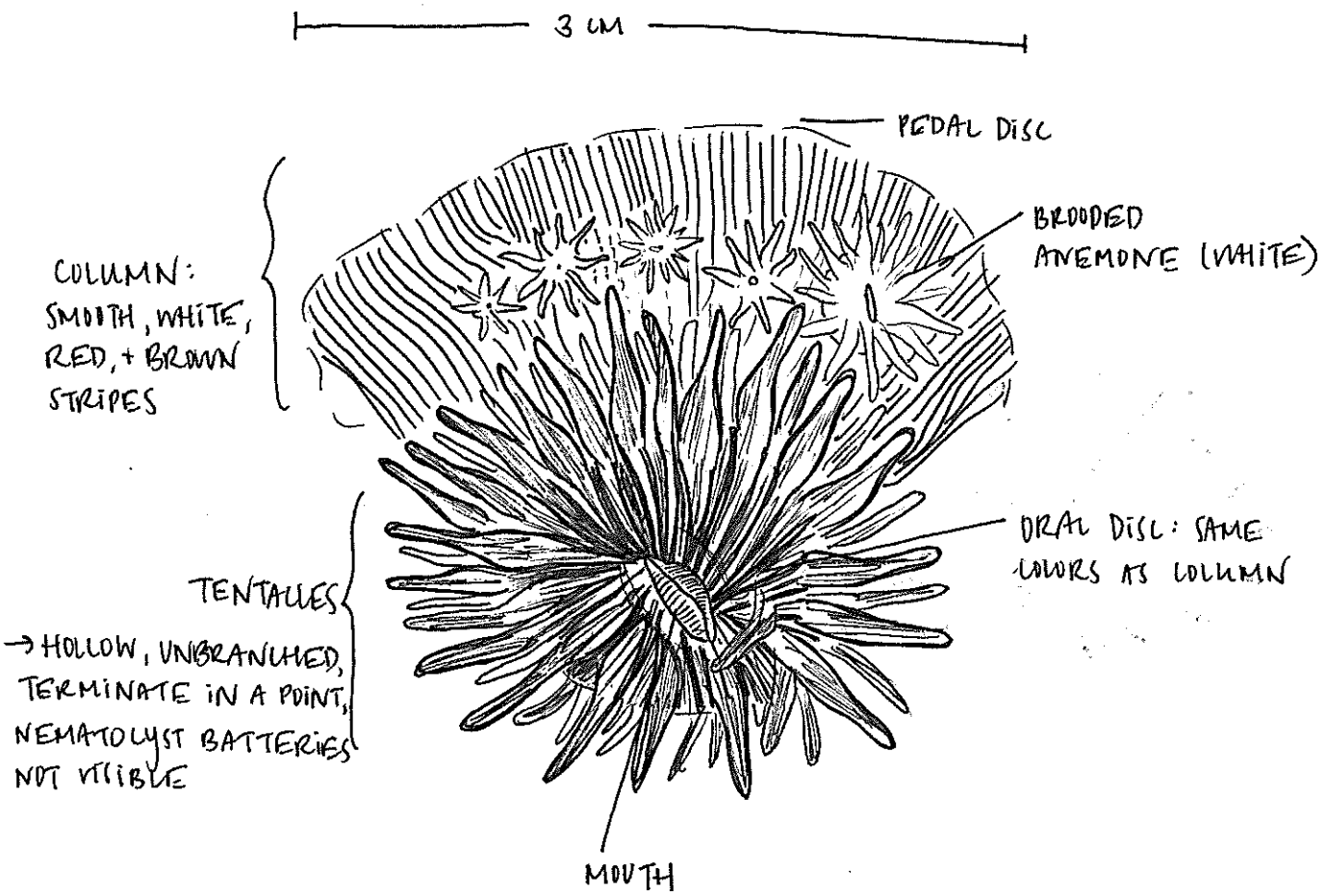


notes: · tentacles drifting (seemingly aimlessly); some are covered with sand or even small animals (see copepod drawing above)

- oral disc holds tentacles; mouth is entrance point for food + exit for excrement; tentacles are used for stunning prey (w/ nematocytes); acrorhagi used for defending territories against unspecifics; siphonoglyph cilia used to create currents of water into the pharynx; column is for support and protection when deflated); gut septa provide support and increased surface area for digestion (gastroderms); pedal disc is for attachment to substrate
- found the zooxanthellae, but not the zoochlorellae in the tentacles of this organism

STRUCTURE (CONTINUED):

- PHYLUM CNIDARIA
- SUBPHYLUM ANTHOZOA
- SUB CLASS HEXACORALLIA
- ORDER ACTINARIA
- GENUS | SPECIES: EPIACTIS PROLIFERA!



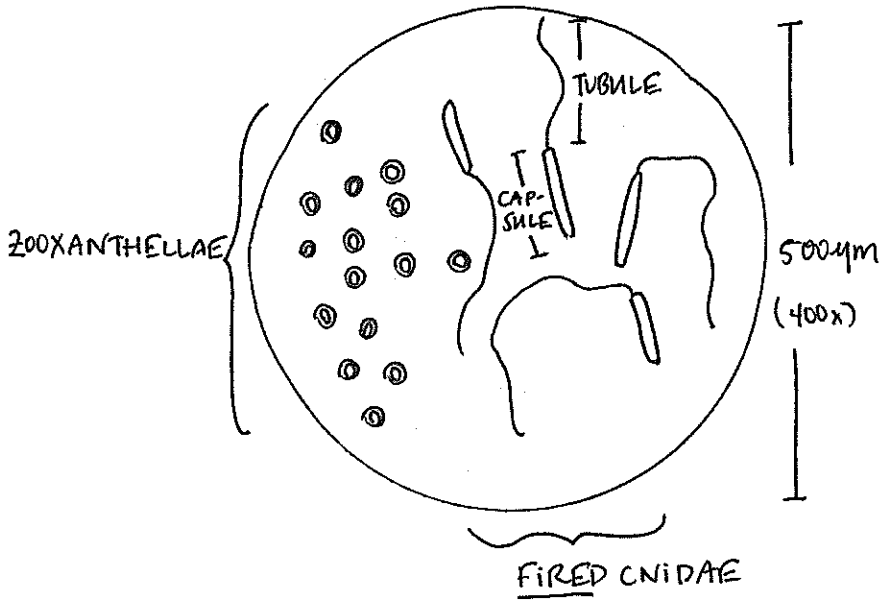
* DRAWN UPSIDE-DOWN NOT BECAUSE IT DEFIES GRAVITY, BUT BECAUSE OF PLACEMENT IN DISH!
* SIPHONOGLYPHS NOT VISIBLE; GUT SEPTA VISIBLE ON BROODS BUT NOT ADULT

Notes: see other side for functions of each of the structures *

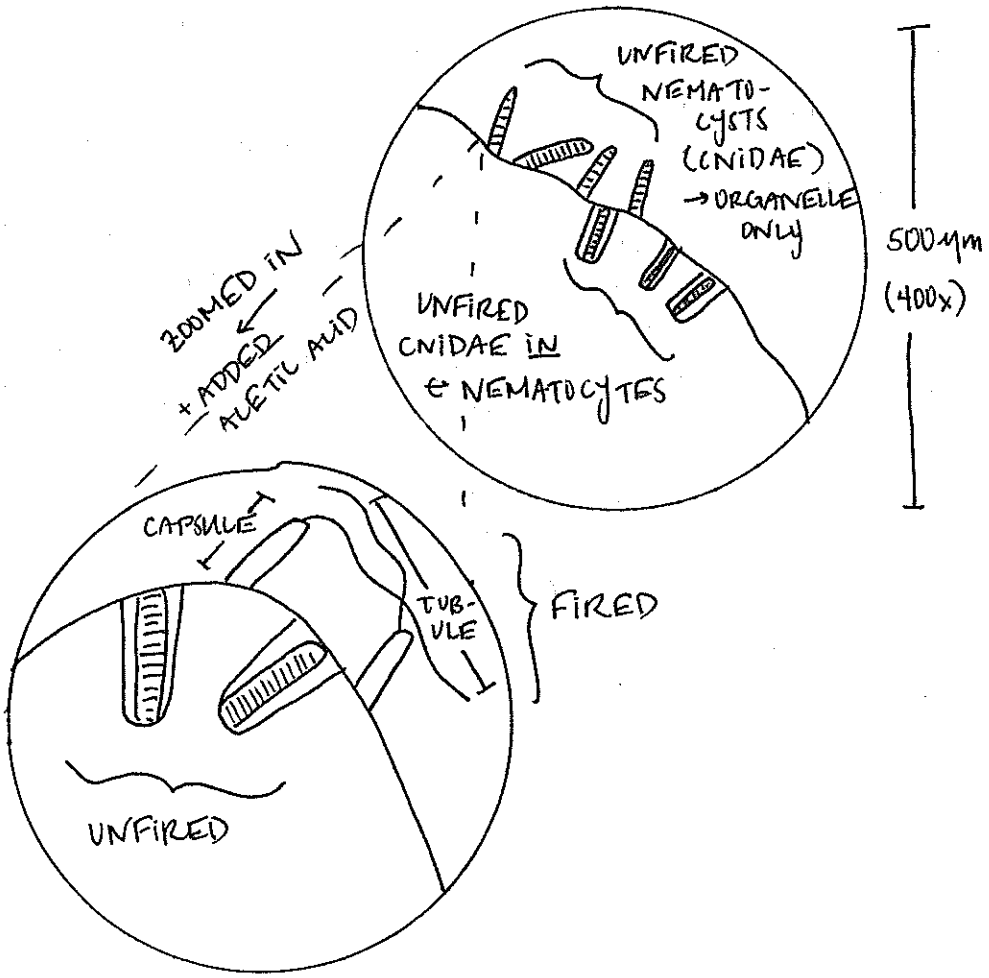
- found on a bowl of calcareous algae and other epibionts
- broods were of all different sizes
- compared to Epiactis lisbethae, this organism is much more brown-red than bright red

① NEMATOCYSTS (CNIDOCYTES):

* USED ANTHOPLEURA ELEGANTISSIMA TENTACLE:



* AND THEN METRIDIUM SPP. ACONTIA



* ADDING A DROP OF ACETIC ACID CAUSED MANY MORE! NEMATOCYSTS TO DISCHARGE THAN JUST PULLING THE ACONTIA/TENTACLE OFF

(III) FEEDING BEHAVIOR: ANTHOPLEURA, EPIACTIS, OR METRIDIUM

* FED ARTEMIA BRINE SHRIMP TO ANTHOPLEURA.

Observations: ANTHOPLEURA: Stung the Artemia (several organisms per tentacle), then purged before slowly curling the tentacle toward its mouth. This action happened fairly slowly, especially relative to the anemone being touched by a human. From the angle at which I was viewing the encounter, the siphonoglyphs were not present, but the mouth opened slowly as the tentacles retracted, almost in sync. Approximately 5 minutes after capturing a brine shrimp, the tentacle relaxed back out. Because not all of the brine shrimp were caught immediately, this process of feeding occurred for some time, approximately

ARTEMIA: Those that were not initially stung swam away. Those that were stung fought hard, but resistance was futile. Eventually, they were stung so much that they could not move off the tentacle, and ultimately were consumed. Some brine Artemia sought refuge in between the tentacles of the Anthopleura and continued to swim around, but soon met the same fate. Eventually, those that remained swam toward the right corner.

(IV) LOCOMOTION: OBSERVED POSITION OF EPIACTIS LISBETHAE, ANTHOPLEURA ELEGANTISSIMA, + METRIDIUM SENILE OVER A FEW DAYS:

	DAY 1 (04|05|17)	DAY 2 (04|06|17)	DAY 3 (04|07|16)
EPIACTIS	* ON FALCON TUBE, FORCED OFF FOR OBSERVATION TO CENTER OF GLASS DISH	* MOVED HALFWAY OUT OF SAID GLASS DISH	* MOVED BACK INTO CENTER OF DISH
ANTHOPLEURA	* IS IN CORNER OF GLASS DISH	* IN SAME PLACE; HAS NOT (SEEMINGLY) MOVED	* IN SAME PLACE; AGAIN, HAS NOT MOVED
METRIDIUM	* ON UPPER LIP|OUTSIDE EDGE OF GLASS DISH	* HAS MOVED ~1 CM TO MOSTLY OUT OF DISH.	* MOVED ~3 CM BACK INTO CENTER OF DISH

HYDROSTATIC SKELETON: Anthozoans have both circular + longitudinal muscles, and they work in opposition to create a hydrostatic skeleton. To elongate, an anemone will close its mouth (so water won't escape) and relax the longitudinal muscles while contracting the circular muscles. By doing so, the longitudinal muscles are stretched by the elevated water pressure. Conversely, to expel water and flatten, the anthozoan need only contract its longitudinal muscles while its mouth is open. This reaction can occur rapidly; in response to predation or being stepped on, for example.

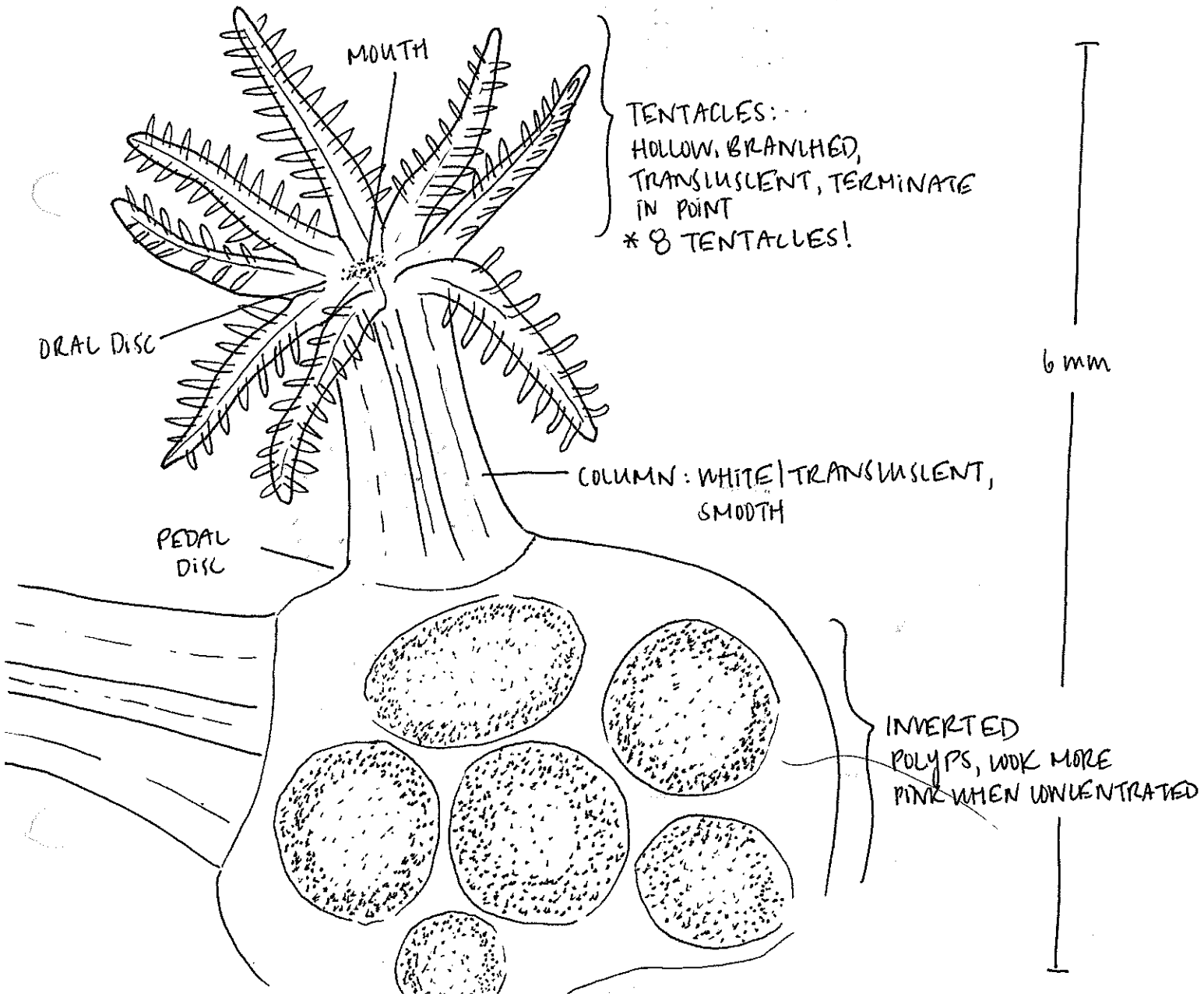
(V) SYMBIOSIS: TOOK SMALL PIECE OF A. ELEGANTISSIMA TENTACLE + SQUASHED IT ON A SLIDE. RESULTS:

- ZOOXANTHELLAE: Are distinguishably more golden brown than bright green. At high power (400x), the nucleus of these dinoflagellates are visible.
- ZOOCHLORELLAE: Are smaller (~1/4 size) of zooxanthellae, and are much more "true" green and perfectly round.

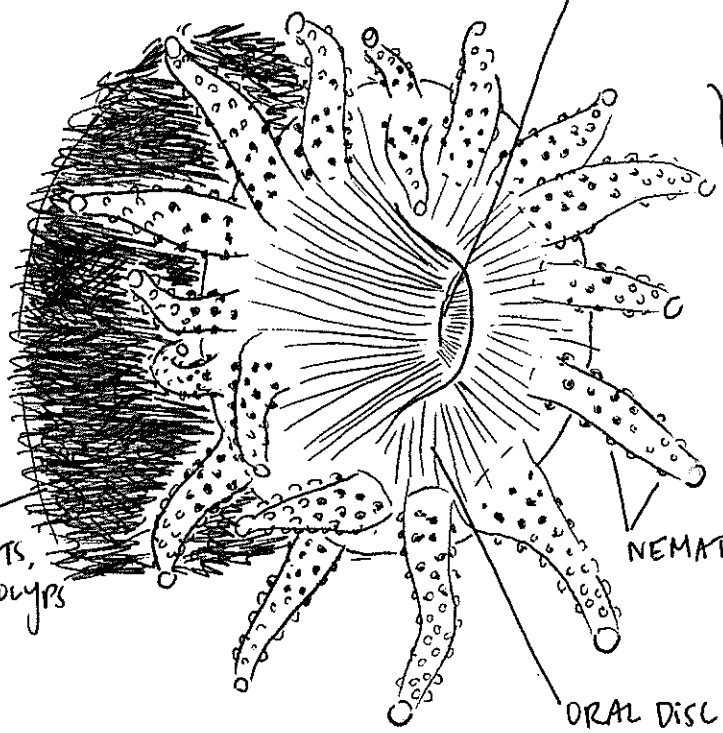
→ These photobionts provide fatty acids, glucose, and nutrients to their host, and in return the photobiont receives a protected environment and the compounds required for photosynthesis. (CO_2 + Nitrogen)

(VI) CORAL DIVERSITY:

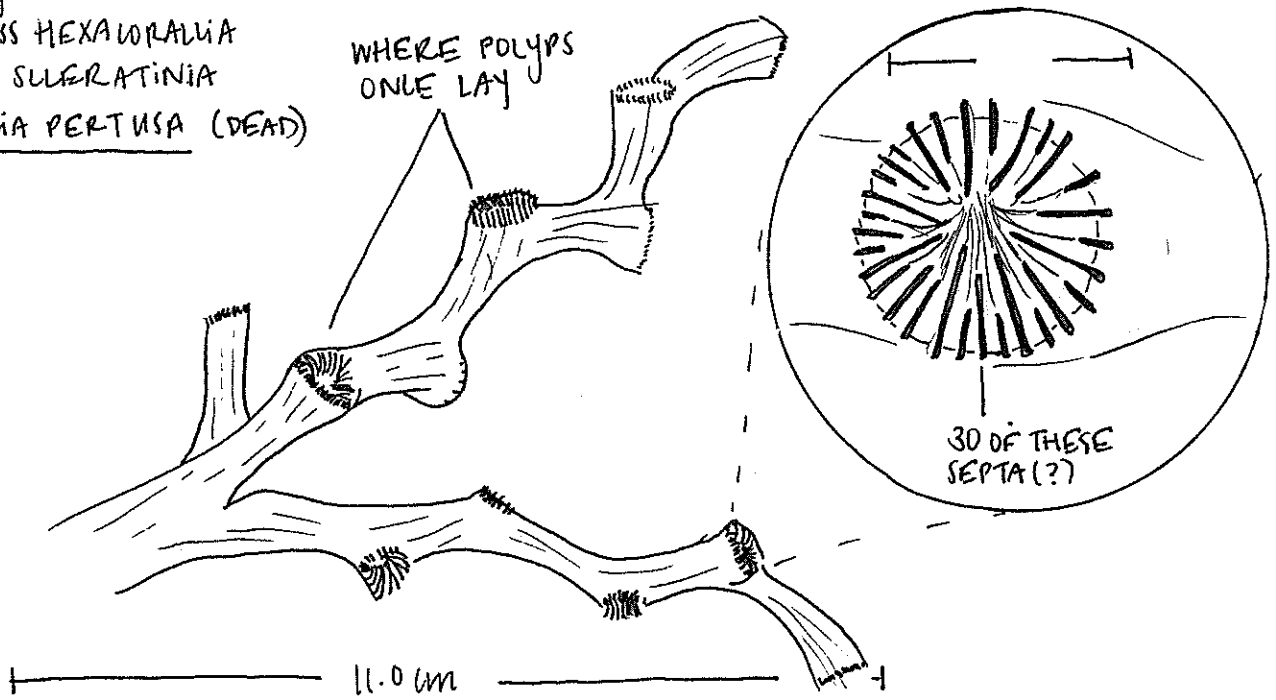
- PHYLUM CNIDARIA
- SUBPHYLUM ANTHOZOA
- SUBCLASS OCTOCORALLIA
- ORDER ALCYONACEA
- GENUS | SPECIES: DISCOPHYTON RUDYI



PHYLUM CNIDARIA
SUBPHYLUM ANTHOZOA
SUBCLASS HEXACORALLIA
ORDER SCLERATINIA
BALANOPHYLLIA ELEGANS

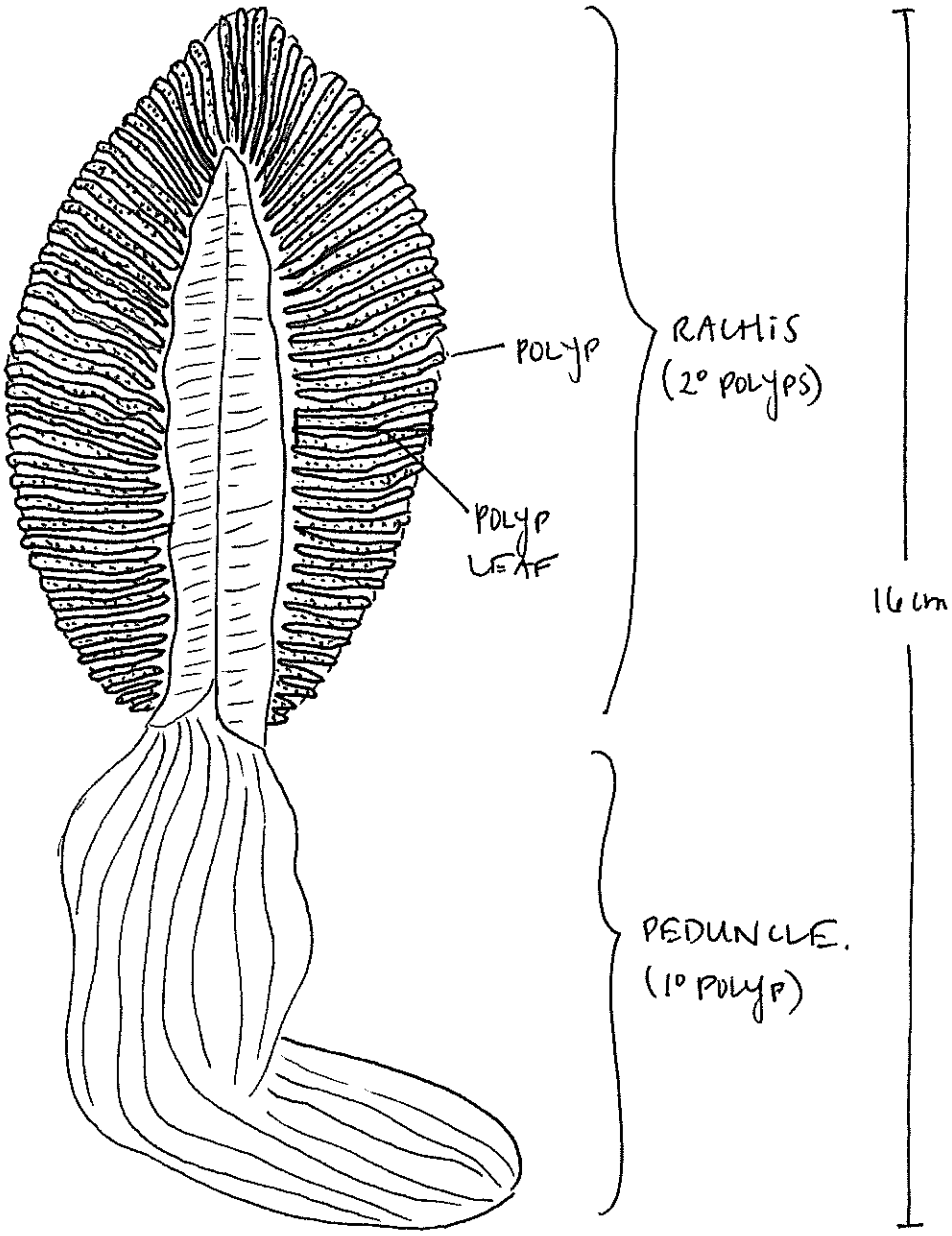


PHYLUM CNIDARIA
SUB PHYLUM ANTHOZOA
SUBCLASS HEXACORALLIA
ORDER SCLERATINIA
LOPHELIA PERTUSA (DEAD)



* BODY WHITE BOTH DEAD + ALIVE — because this organism lives in the deep sea, where light does not penetrate, it does not need to produce pigment (an energy-taking trait) or have a photobiont

PHYLUM CNIDARIA
SUBPHYLUM ANTHOZOA
SUBCLASS OCTOCORALLIA
ORDER PENNATULACEA
PTILOSARCUS GURNEYI

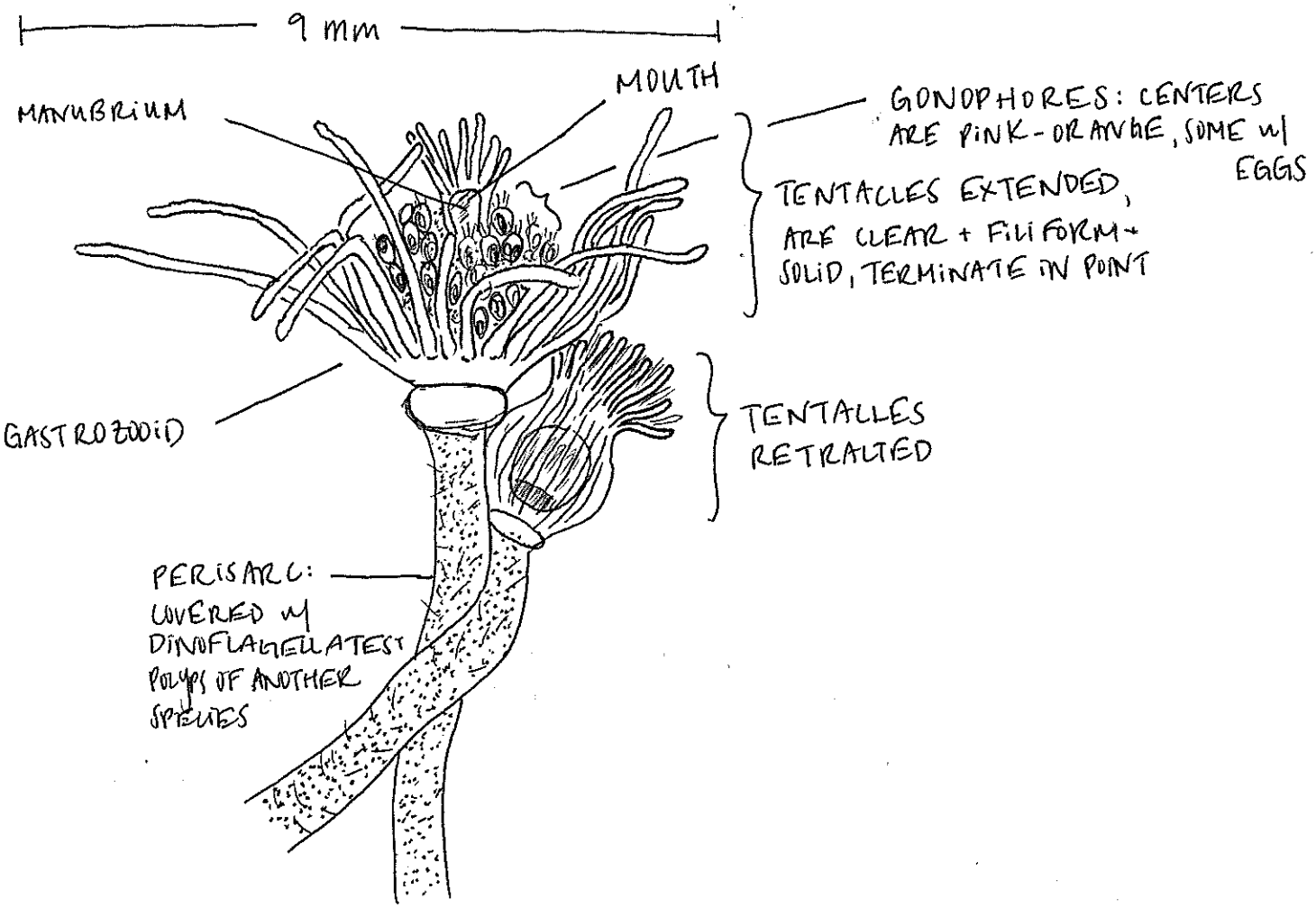


Notes: 1° POLYP: AXIAL and ANCHORING BULB
2° POLYPS: AUTOZOOIDS for feeding and SIPHONOZOOIDS for water intake and circulation!
* AS PRESERVED, TONICS light peachy pink

PHYLUM CNIDARIA: SUBPHYLUM MEDUSAZOA // 04.06.2017

PHYLUM CNIDARIA
SUBPHYLUM MEDUSAZOA
CLASS HYDROZOA
ORDER ANTHOTHECATAE
TUBULARIA * COLLECTED FROM D-DOCK, CHARLESTON BOAT BASIN

OSTRUCTURE

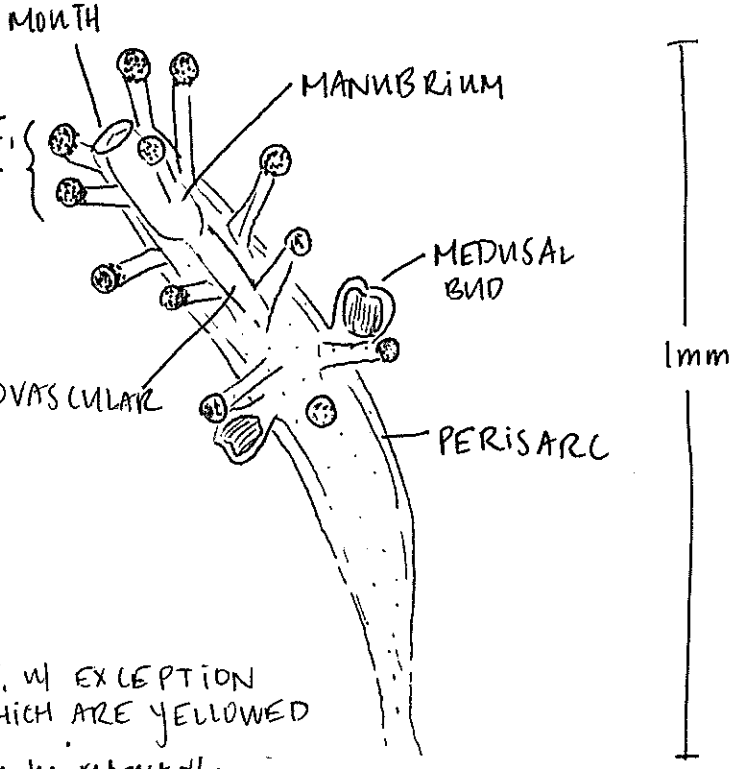


notes: * individual zooids did not respond to physical touch or light; they seemed entirely content in having their tentacles extended and feeding

* identified as a female gonozooid because the zooids have apical processes; some contain eggs
* function of structures: gonozooids/gonopores are for reproduction; tentacles are for feeding and stinging prey; gastrozooid is for feeding; apical tentacles are for moving food into mouth; manubrium is for digestion; mouth is for beginning digestion process; perisarc is for protection and support.

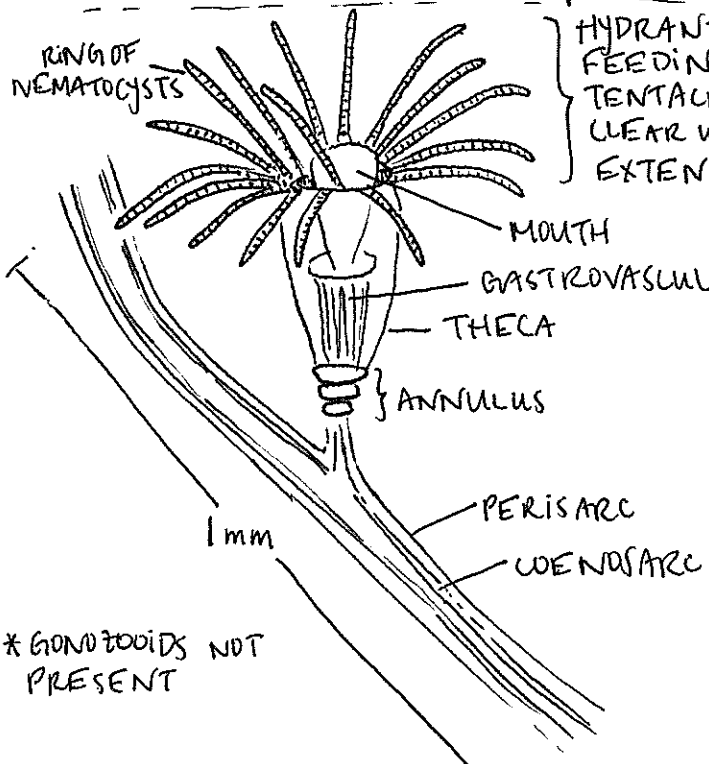
STRUCTURE (CONT.):

PHYLUM CNIDARIA
SUBPHYLUM MEDUSAZOA
CLASS HYDROZOA
ORDER ANTHOTHECATAE
CORYNE SP



notes:

* BODY CLEAR-WHITE, W/ EXCEPTION OF MEDUSAE BUDS, WHICH ARE YELLOWED
* ZOOIDS respond to touch by retracting, do not seem to respond to light
* function of structures: capitate tentacles are for delivering an especially strong sting to prey; medusa buds are reproductive organs (others are same as Tubularia)



PHYLUM CNIDARIA
SUBPHYLUM MEDUSAZOA
CLASS HYDROZOA
ORDER LEPTOTHECATAE
OBELIA SP.

GASTROZOOID

* GONOZOOIDS NOT PRESENT

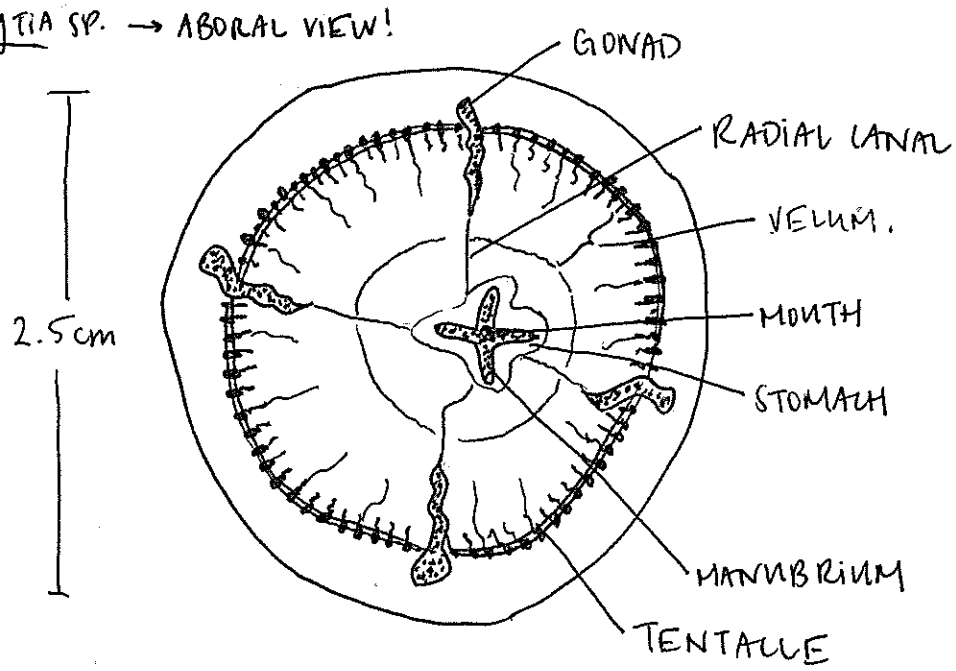
notes:

* zooids respond to touch by immediately retracting into theae, but once the tool of perturbance is removed, the polyp immediately extends back out
* up close, polyps + perisarc all appear clear, but from far away large colony looks golden-brown and feathery.
* seem to respond to light after long exposure by retracting into theae.

* function of structures: annulus are for flexibility; theca is for zooid protection; coenosarc for gastrovascular suppo

STRUCTURE (CONT.):

PHYLUM CNIDARIA
SUBPHYLUM MEDUSAZOA
CLASS: HYDROZOA
ORDER LEPTOMEDUSAE
CLYTIA SP. → ABORAL VIEW!



(II) SWIMMING BEHAVIOR OF CLYTIA:

* Though the physical circular muscles cannot be seen on the organism (which is not shocking, considering 90% of a jellyfish is mesoglea, 95% of which is water), the contraction of these muscles is obvious. In response, the velum moves distally to medially (contracts), forcing water out of the subumbrellar part of the organism (bell). In a diffusion without circular flow, this action results in the organism moving only a few centimeters. Once the longitudinal muscles contract and the circular muscles relax, water rushes back in, reinflating the bell so that another contraction of the velum can continue to propel it forward. Generally speaking, the action looks pulse-like.

(III) FEEDING BEHAVIOR: ADDED ARTEMIA TO CORYNE, TUBULARIA, OBELIA, + CLYTIA—

Observations: * ARTEMIA: in response to being fed to all organisms, the brine shrimp immediately started to swim toward the light source if they were not stung by the nematocytes of their predator. Many of them resisted being stung by some of the organisms to which they outsized considerably (eg. CORYNE + OBELIA). However, many of them were stung continuously, and were unable to squirm out of the grips of the predator.

* CORYNE: because the Artemia were larger than the tentacles, many got away—unless they fell directly onto the tips, where the nematocytes are concentrated. All the tentacles retracted on one another, presumably to pull the Artemia toward the mouth—but they retracted so far it became impossible to visualize.

* TUBULARIA: Has two sets of tentacles: one directly by its mouth, and others surrounding the rest of the gastrozooid. Both sets of tentacles could catch the brine shrimp. They passed it up to the more apical tentacles before folding over it and consuming it through its mouth.
* OBELIA: Again, since the gastrozooids were so small, many of them struggled with capturing Artemia unless they fell directly into the tentacle or were blown into the tentacle from the pipette. The reaction of moving the Artemia to their mouth was considerably slower than the other animals observed.
* CLYTIA: The jelly was seemingly overwhelmed with the amount of Artemia I gave it. All of its tentacles were saturated with them, and so too was the manubrium. The clytia took a long time to fully ingest any respectable amount of the Artemia; the digestion process, again, was very slow.

(IV) RELATIONSHIPS: PREDATORS, COMMENSALS, SYMBIONTS ON COLONIES

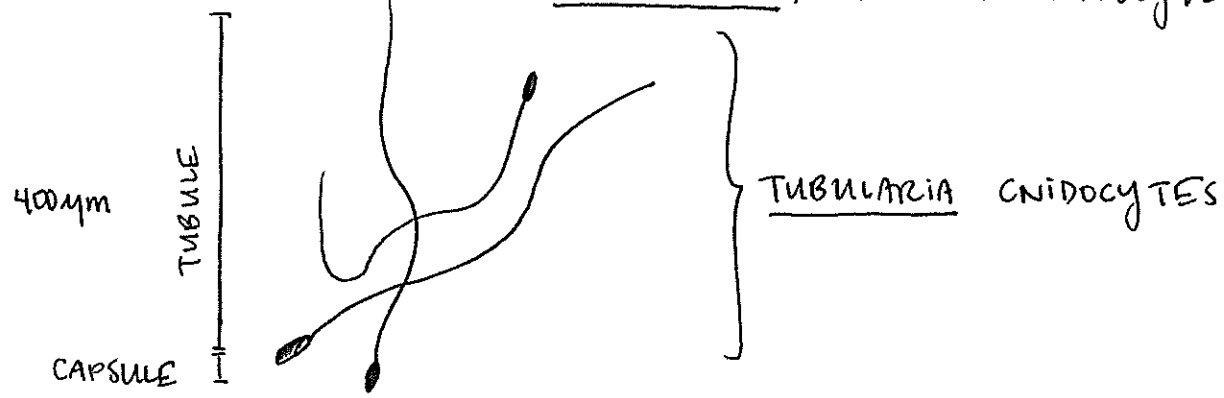
predators: * potentially flatworms! In the lab, questionably skeleton shrimp (but probably not; definitely not in the field)
* A quick google search indicates that nudibranchs are often predators of hydroids, though I did not directly observe this in the lab.

commensals: *Skeleton shrimp will use the stalks of the hydroids to perch and snatch food out of the water column
* Same for some polychaete species, it appears * several copepods are laying/brooding their young on the branches/stalks of the hydroids, too. * several types of algae growing on the stalks.

symbionts: * some hydroids have dinoflagellates as zooxanthellae, though I did not directly observe them in the lab.

(V) CNIDOCYTES:

* SEE LAB 01 SECTION 02 (ANTHOPLEURA) FOR MORE CNIDOCYTE DETAILS:

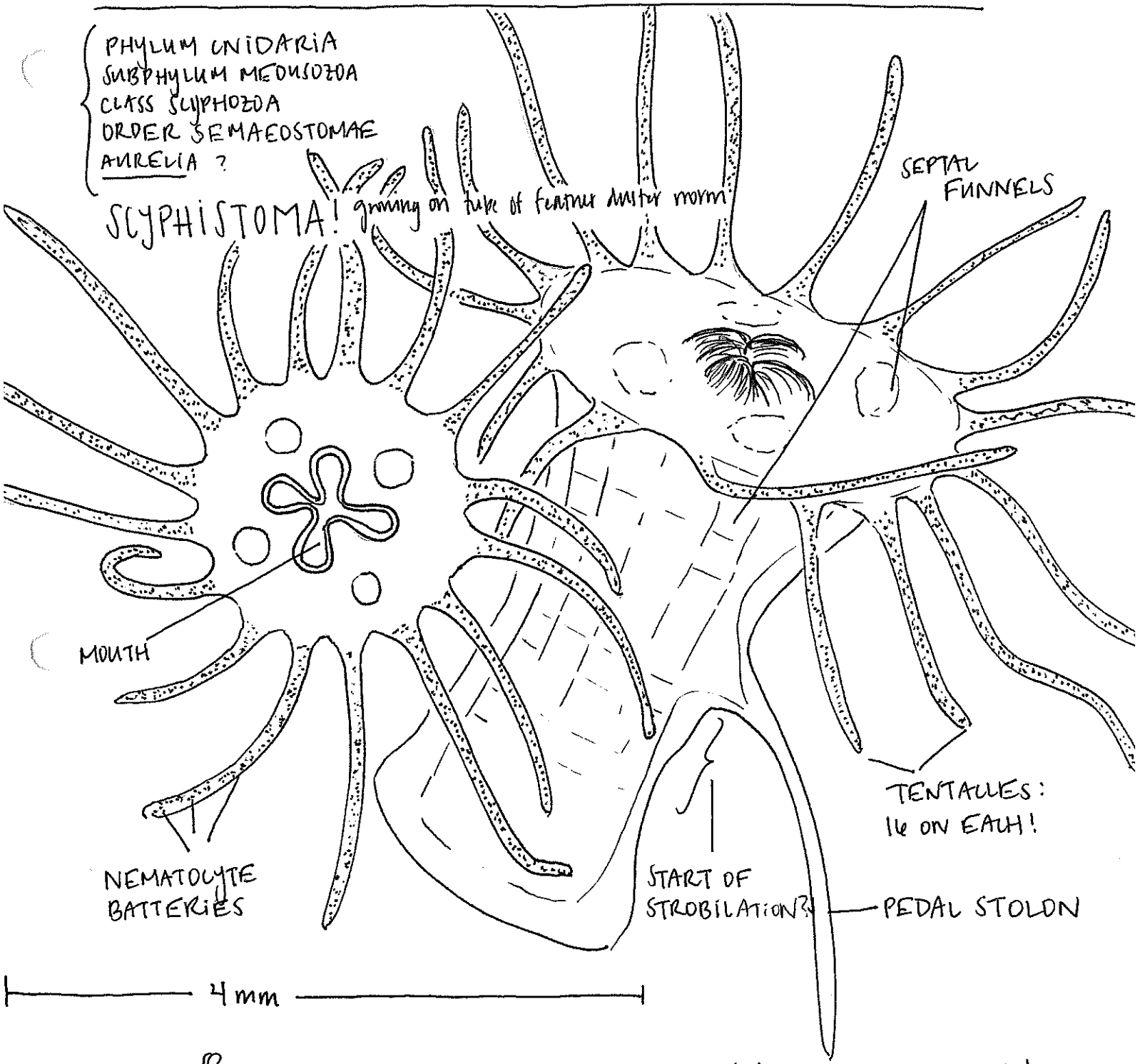


→ Relative to the Anthopleura cnidocytes, these are notably larger. And, the tubules are proportionally longer than the capsule, whereas in Anthopleura the sizes were more comparable (tubule = 2-3x length capsule)

PHYLUM CNIDARIA: CLASS SCYPHOZOA // 04.11.2017

PHYLUM CNIDARIA
SUBPHYLUM MEDUSOZOA
CLASS SCYPHOZOA
ORDER SEMAEOSTOMAE
AURELIA ?

SCYPHISTOMA! growing on tube of feather duster worm



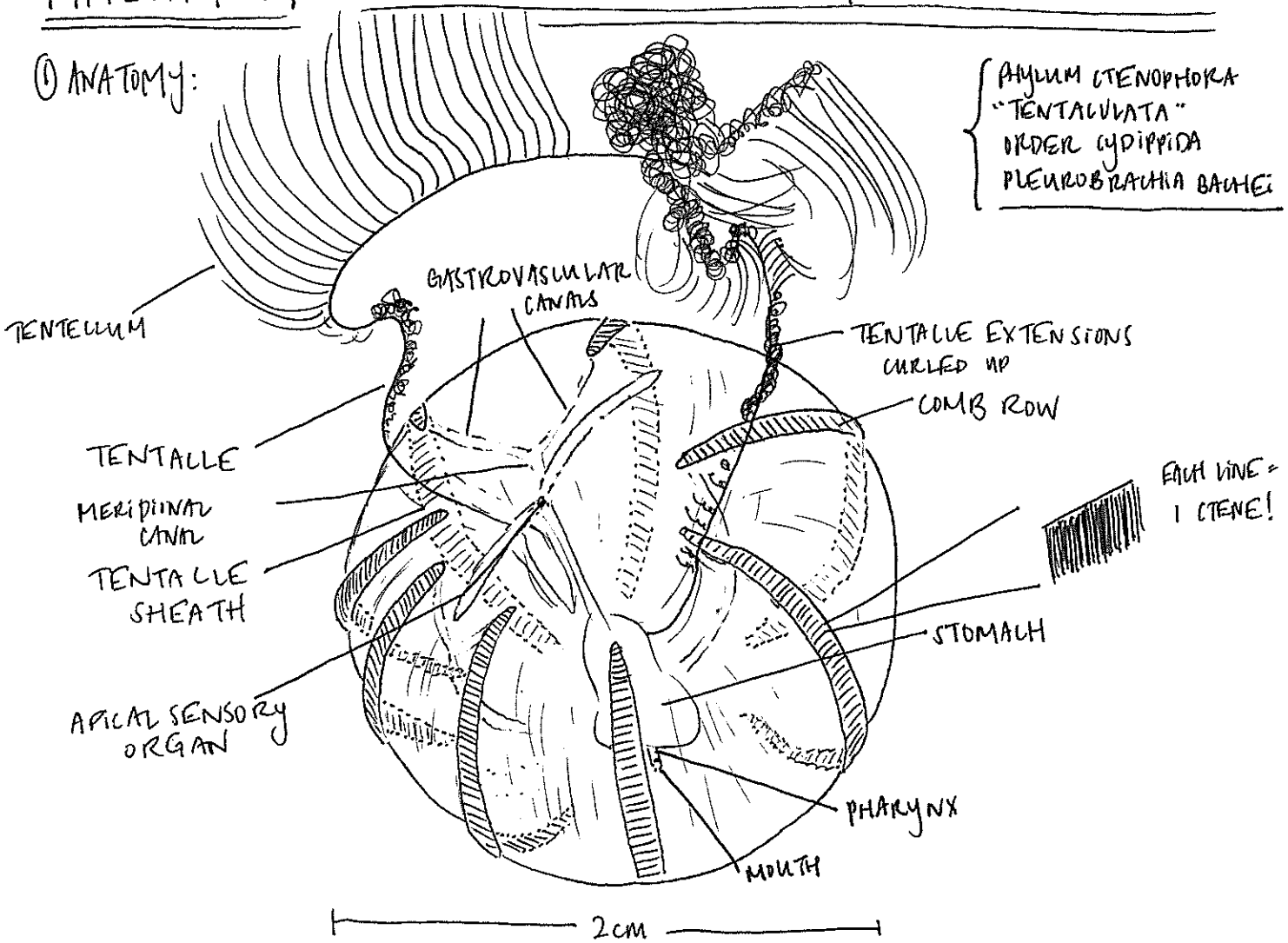
notes:

* The specimens drawn were attached to the worm tubes. I did not see evidence of budding on these organisms, but I did see some buds in the dishes, in which detached scyphistomae were placed.
* some of the gastrovascular cavities have prolapsed out of the mouth of the worm surface.
* Are opaque, look white or off-white depending on the light direction.
* Septal funnels are for gas exchange and increased surface area

PHYLUM CTENOPHORA: COMB JELLIES! // 05.09.17

(I) ANATOMY:

PHYLUM CTENOPHORA
"TENTACULATA"
ORDER CYDIPPIDA
PLEUROBRACHIA BACHEI



(II): FED ARTEMIA TO PLEURO.:

* Captured the Artemia prey with its tentacles, which were extended | stuck to the bottom of the bowl, but quickly bunched up around the brine shrimp. Their tentacles are studded with colloblasts — cells that consist of a bulbous, sticky head connected to a long, straight filament and spiral, unmovable filament. Once it had popped the brine shrimp in its tentacles, the Pleurobrachia retracted the tentacles toward its mouth. I tried to remove a tentacle and observe the colloblasts, but the tentacle was too bunched up to visualize properly.

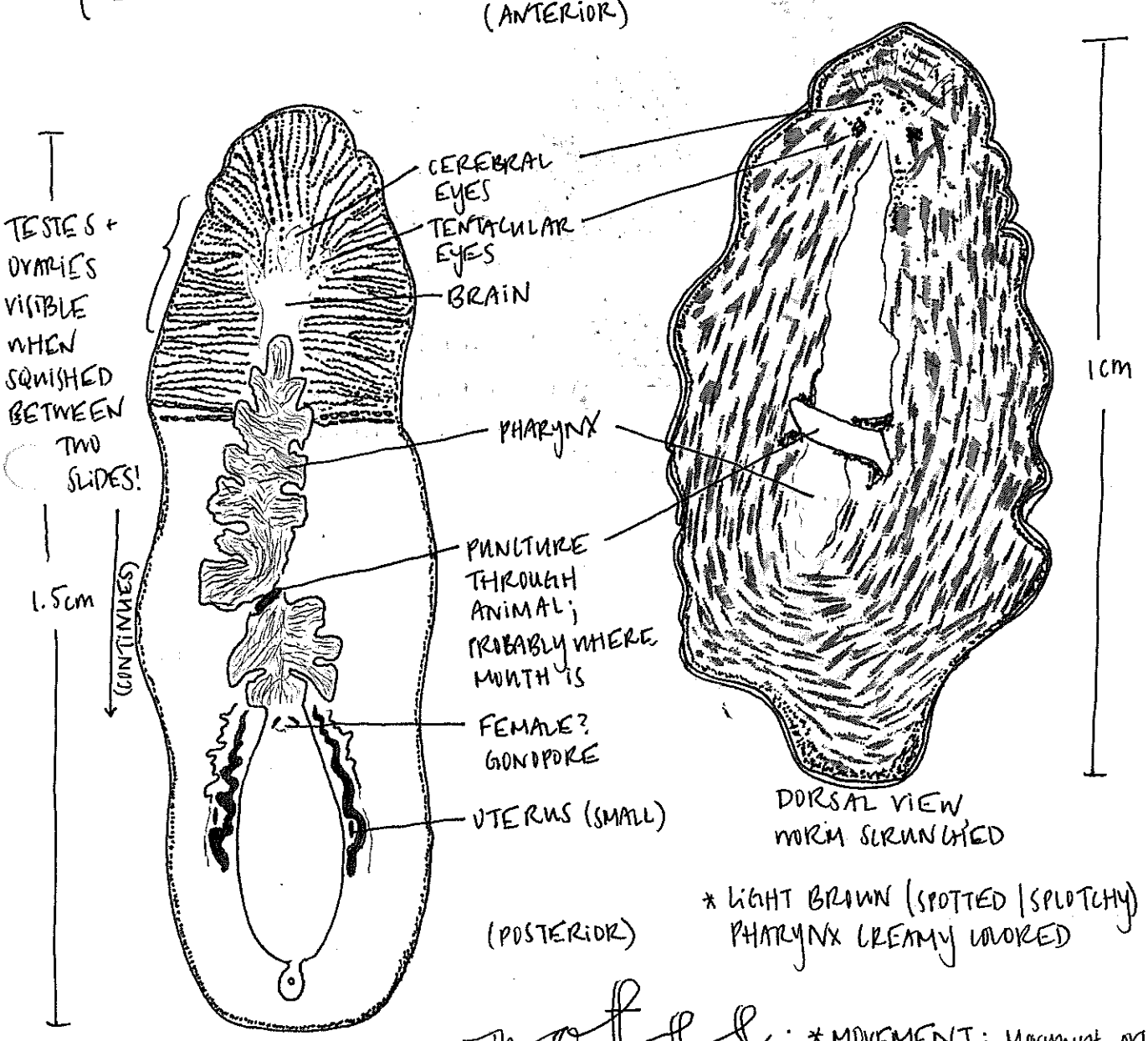
(III) SWIMMING:

* Ctenophores move via a synchronized flapping of its combs (ctenes) and muscle contraction. The apical sensory organ is paramount in this movement. A statolith lies within 4 balancing organs + ciliated furrows. When the organism tilts, the statolith pushes against the balancers; the beating of the ciliated furrow triggers the first comb, and the rest of the ctenes in the comb row transmit waves metachronally.

PHYLUM PLATYHELMINTHES: TURBELLARIAN FLATWORMS! // 04.13.17

① FREE-LIVING FLATWORMS

- PHYLUM PLATYHELMINTHES
- "CLASS" TURBELLARIA
- ORDER POLYCLADIDA
- NOTOCOMPLANA SP.



VENTRAL VIEW, WORM ELONGATED

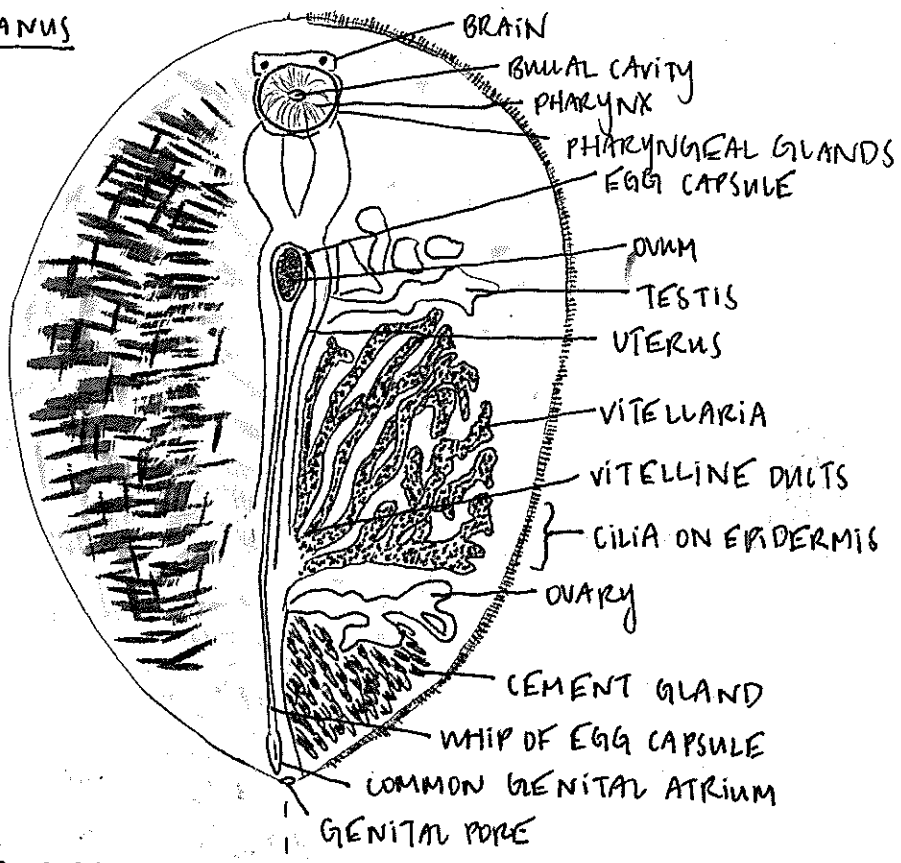
* LIGHT BROWN (SPOTTED | SPLOTCHY) IN COLOR; PHARYNX CREAMY COLORED

notes: * MOVEMENT: Movement originates from the anterior end of the animal, and looks as if the initial contraction "waves" posteriorly, a process called pedal waving. To accomplish this movement, the worm contracts its longitudinal muscles, releases its posterior end, then contracts its circular muscles to propel its body forward.

* PHOTOTAXIS: Notocomplana is negatively phototaxic (it moves away from light preferentially). Further, these organisms much prefer to be properly dorso-ventrally oriented. When flipped upside-down, they immediately turn right-side up. But, if they are on a slide (attached) and the slides invert, they exhibit no real

(11) COMMENSAL FLATWORMS:

PHYLUM PLATYHELMINTHES
"CLASS" TURBELLARIA
SYNDISYRINX FRANCISCANUS



* MANY OTHER STRUCTURES NOT VISIBLE:
  → Sperm duct, common sperm duct, spermiduct reflex, ovoviteline duct, accessory glands, female antrum, penis, bursal canal, insemination canal, bursa seminalis,

Note: *DISSECTED A PURPLE SEA URCHIN (STRONGYLOCENTROTUS PURPURATUS) TO ACQUIRE THIS ORGANISM:

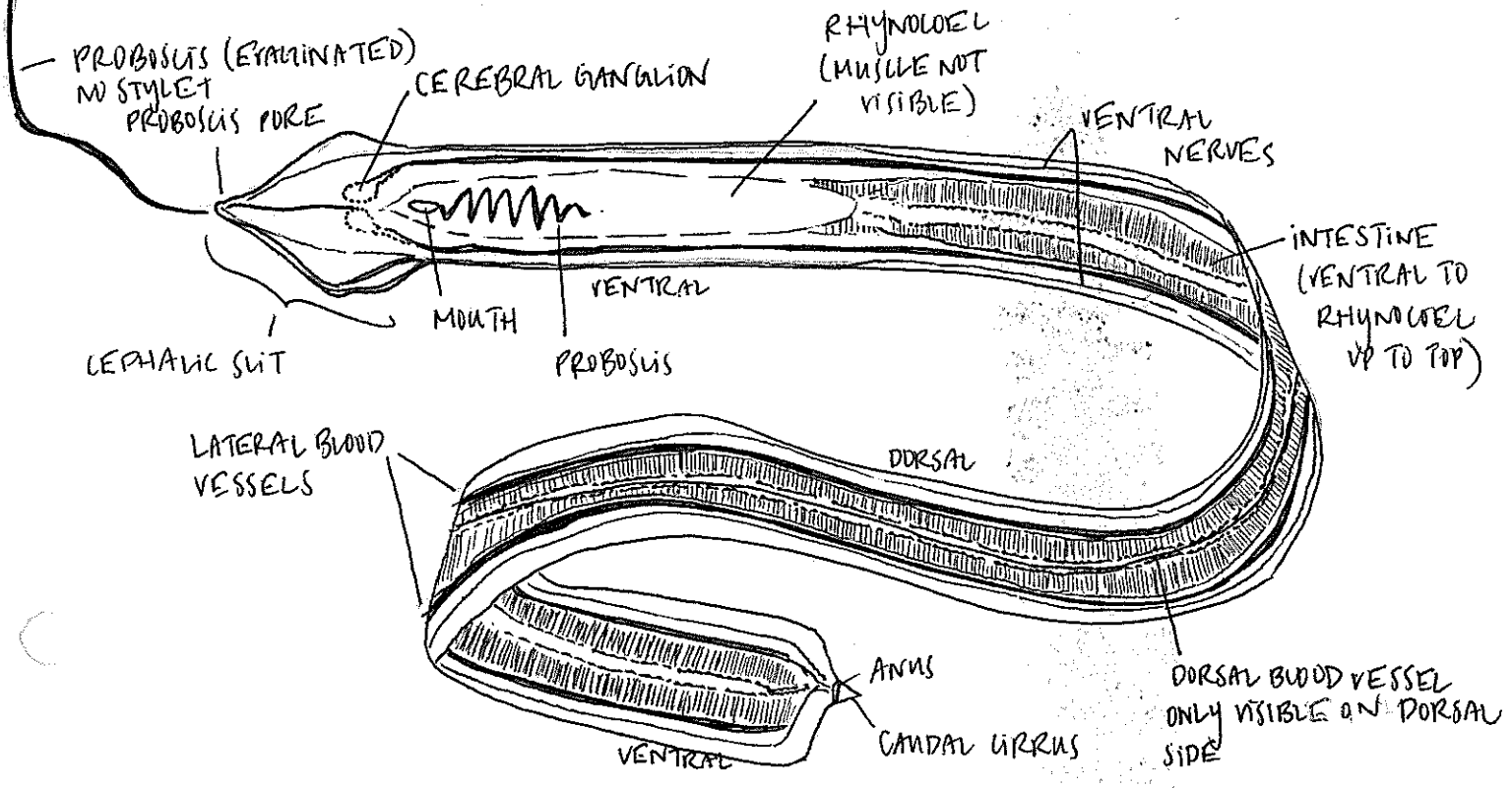
→ Another organism (turbellarian), Syndesmis, co-occurs in purple urchin intestines. However, they occupy different areas of the gut and don't affect each other's site utilization. I hypothesize that this is because they are adapted to eating different endociliates or Syndisyrinx (more posteriorly located) consumes some of the already-digested fecal matter of the urchin. That is not to say they feed on the urchin tissue, but rather the urchin by-product before it is to be removed out. A question for the Gastronomy lab to ponder, indeed!

* COLOR: Bright red, with the reproductive organs being markedly lighter than the rest of the body. Eye spots black. Pharynx opaque.

PHYLUM NEMERTEA: RIBBON WORMS! // 04.18.17

- PHYLUM NEMERTEA
- CLASS ANOPLA
- ORDER HETERONEMERTEA
- CEREBRATULUS SP.

① STRUCTURE



* BODY PINKISH / CLEAR EPIDERMIS

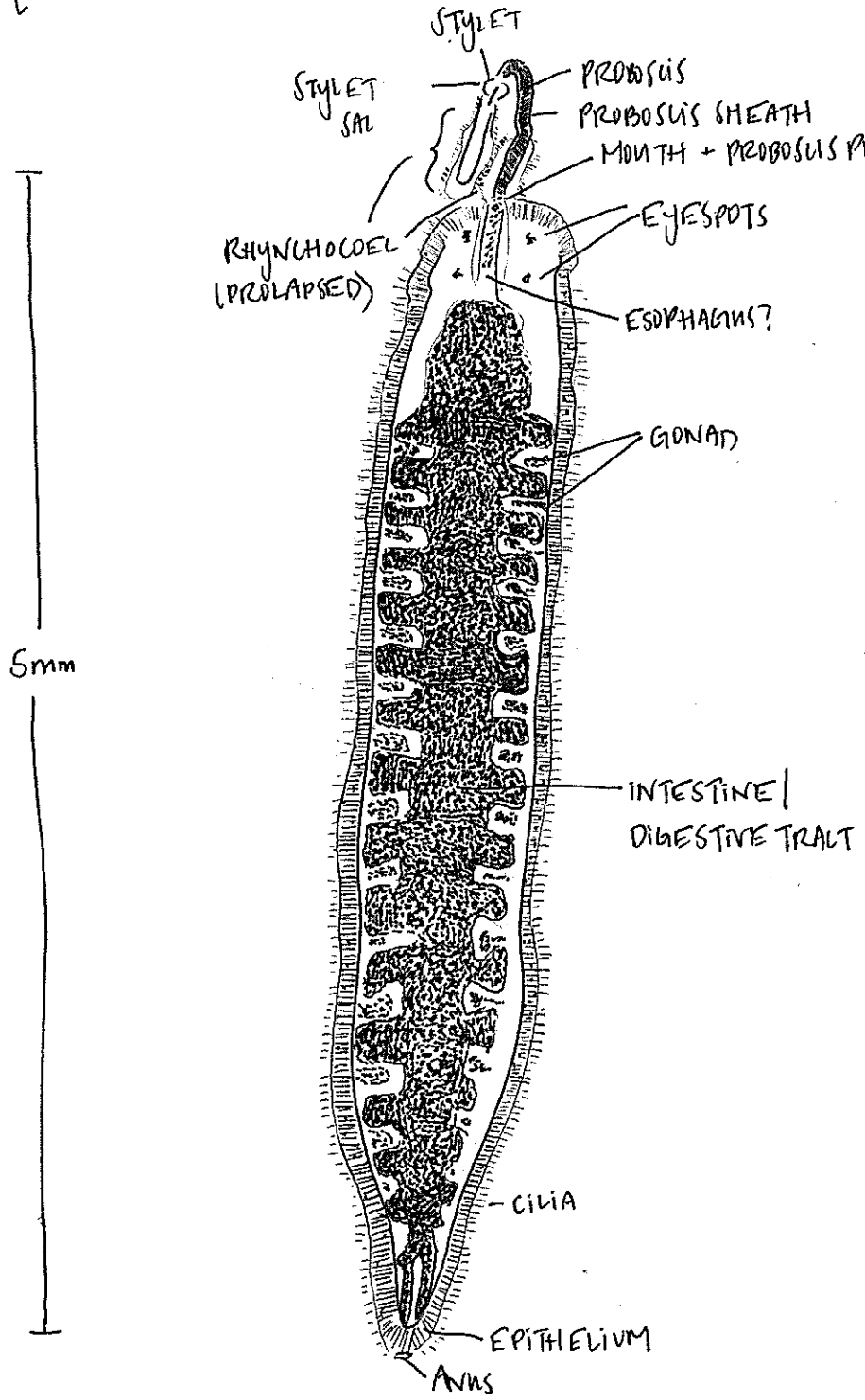
9 CM
TIP TO TAIL, UNCURLED

NOTES:

* MOVEMENT: Though this worm is dorso-ventrally flattened, it swims with this axis facing up (on its side). Much like this group's name implies, they look like a ribbon while in motion. Even after adding a considerable amount of $MgCl_2$ to anesthetize this organism, it continued to flap around. To observe more of its internal structures, I squished it between two microscope slides. Doing so made the worm angry, and it shot its proboscis out at me (pictured above). I could not see any cilia on this organism, and I thus hypothesize that the majority of its movement is muscle-dependent (described below in section (II): MOVEMENT.

* FUNCTIONS OF STRUCTURES: Proboscis for capturing prey; ganglia for interpreting sensory information; rhynchocoel for storing proboscis and musculature for ejecting + protracting it; intestine for digestion; blood vessels for oxygen delivery; cephalic slits for sensing

PHYLUM NEMERTEA
CLASS ENOPLA (HOPLONEMERTEA)
TETRASTEMMA SP.

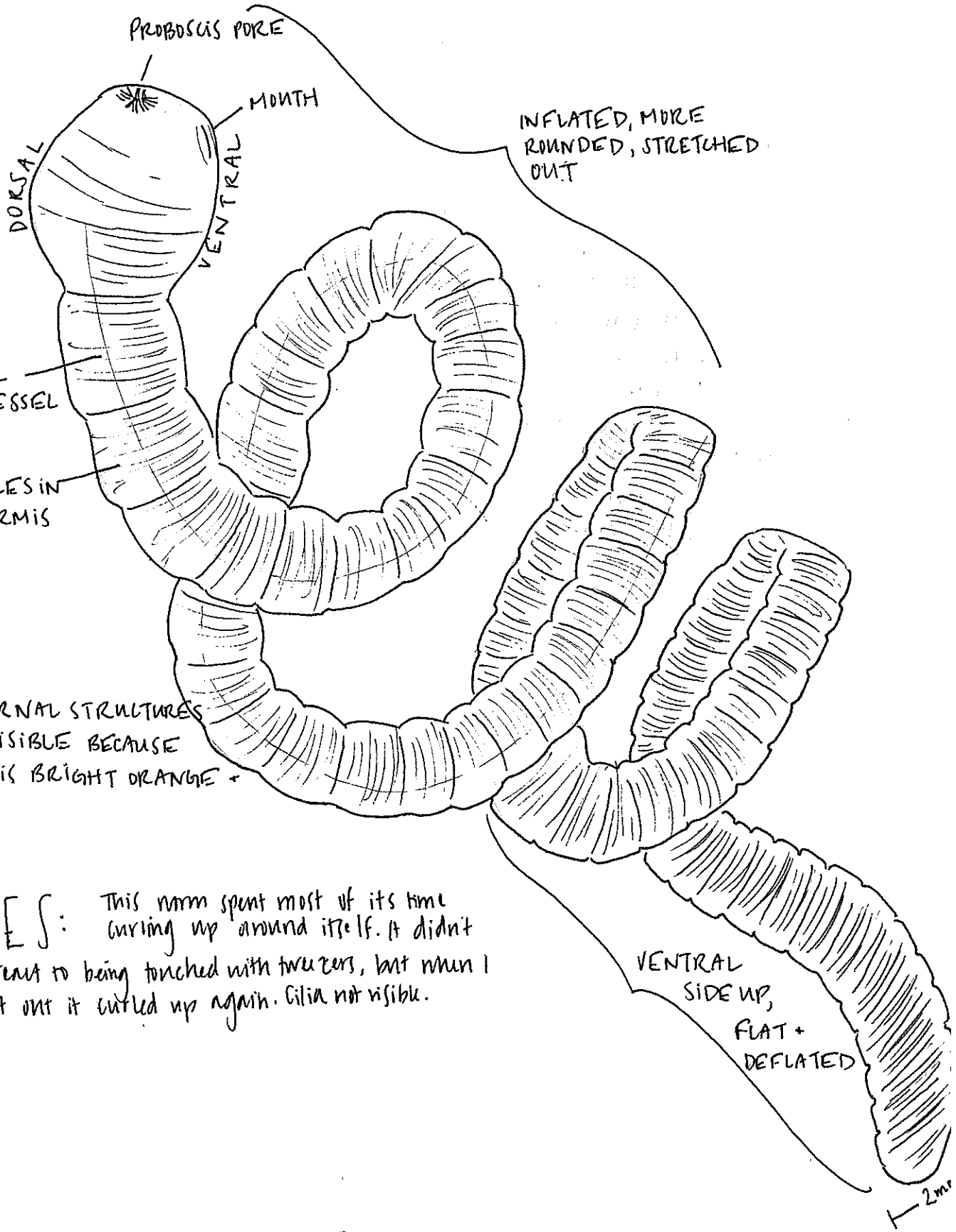


* COLLECTED FROM GUTTER OUTSIDE OUTFLOW CREEK

* WAS NOT ABLE TO WATCH MOVE; SO SMALL THAT MINUTE AMOUNT OF $MgCl_2$ MADE IT STOP MOVING

NOTES: I was able to visualize very little of the internal structure of this organism or its movement. To see the detail of the stylet and proboscis better, I mounted this worm on a slide and pushed down gently on the coverslip; the pressure caused the proboscis to prolapse. Its cilia were present, and I hypothesize they greatly aid in locomotion, provided how small it's body is. This group of nemerteans has a stylet attached to the end of its proboscis. The function of the stylet is to penetrate the epithelium of the prey and deliver a paralytic venom.

PHYLUM NEMERTEA
CLASS ANOPLA
ORDER PALAEONEMERTEA
TUBULANUS POLYMORPHUS



* MOST INTERNAL STRUCTURES ARE NOT VISIBLE BECAUSE THE WORM IS BRIGHT ORANGE + OPAQUE.

NOTES: This worm spent most of its time curling up around itself. It didn't seem to react to being touched with tweezers, but when I stretched it out it curled up again. Cilia not visible.

(II) MOVEMENT: ① Nemerteans are ciliated and secrete a mucus, which allows them to locomote with less friction. Small organisms can move solely by ciliar beating, while larger organisms must also use their musculature. ② Like other worms, they contain longitudinal and circular muscles. To move, they must contract their circular muscles — which thrusts them forward — then simultaneously relax their circular muscles and contract the longitudinal muscles, which will pull the body of the worm along.

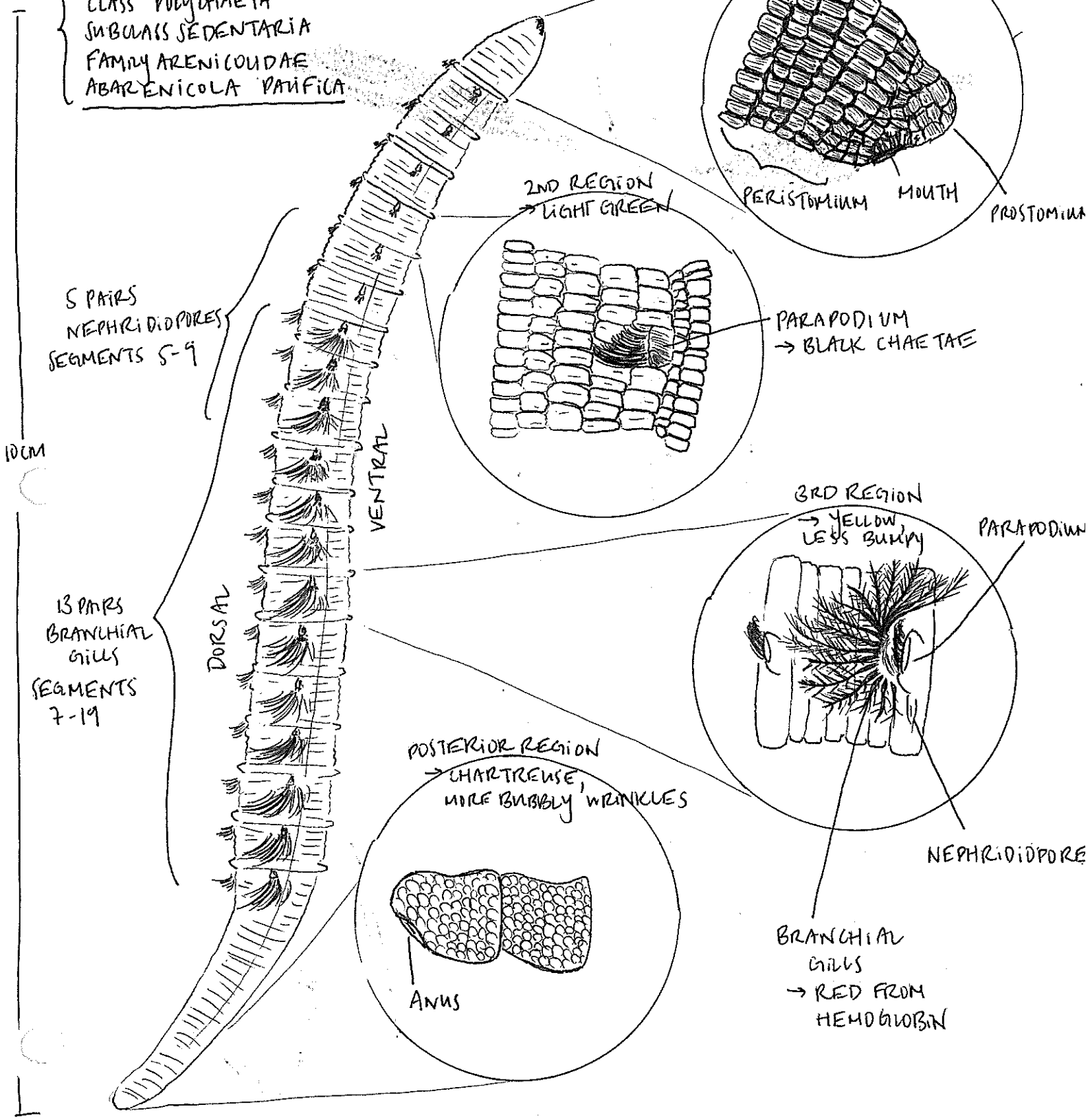
(III) MUSCULATURE: TO GET LONG AND THIN: the worm must contract its circular muscles. TO GET SHORT AND THICK: the worm must contract its longitudinal muscles.

(IV) CARNIVORY: FED A NEREIS TO PARANEMERTES PEREGRINA: We placed several of each prey and predator into a shallow ~.5m x .5m dish. When presented with a Nereis (which we had to direct toward the predator with a stick), one Paranemertes was entirely uninterested in the snack option, and simply passed underneath it. However, another sensed its presence, wound up, and aggressively shot its proboscis at the mid section of the Nereis. What ensued was a rather violent worm-brawl, where the Nereis desperately tried to rid its body of the Paranemertes' grasp. To do so, the Nereis flapped its body around, but the Paranemertes wrapped its body around the Nereis tightly. For reference, the predator was ~1/4 of the size of its prey. Ultimately, the ribbon worm effectively paralyzed the annelid. We did not watch to see the Paranemertes ingest the Nereis.

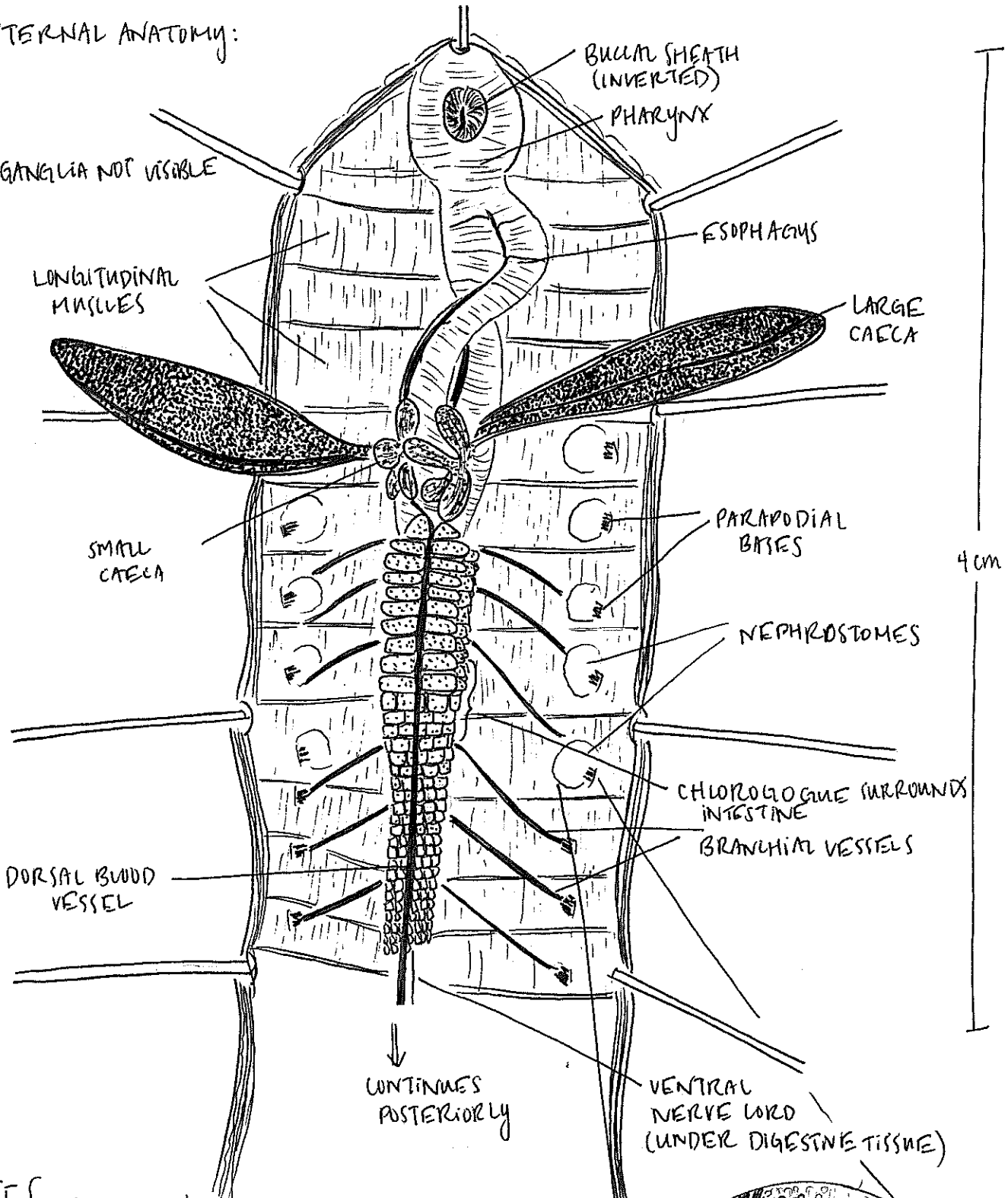
PHYLUM ANNELIDA: "CLASS" POLYCHAETA // 04.20.17

① LUGWORM DISSECTION: EXTERNAL ANATOMY

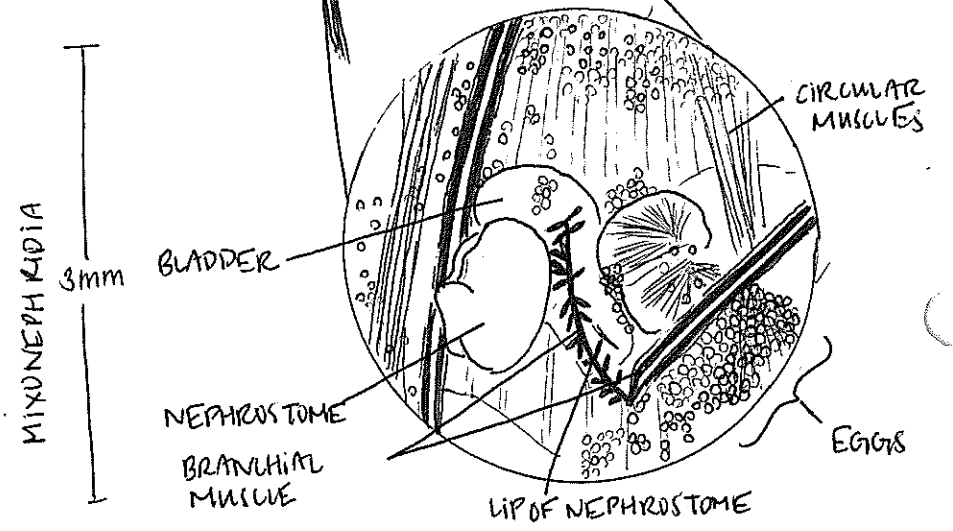
PHYLUM ANNELIDA
"CLASS" POLYCHAETA
SUBCLASS SEDENTARIA
FAMILY ARENICOLIDAE
ABARENICOLA PACIFICA



INTERNAL ANATOMY:

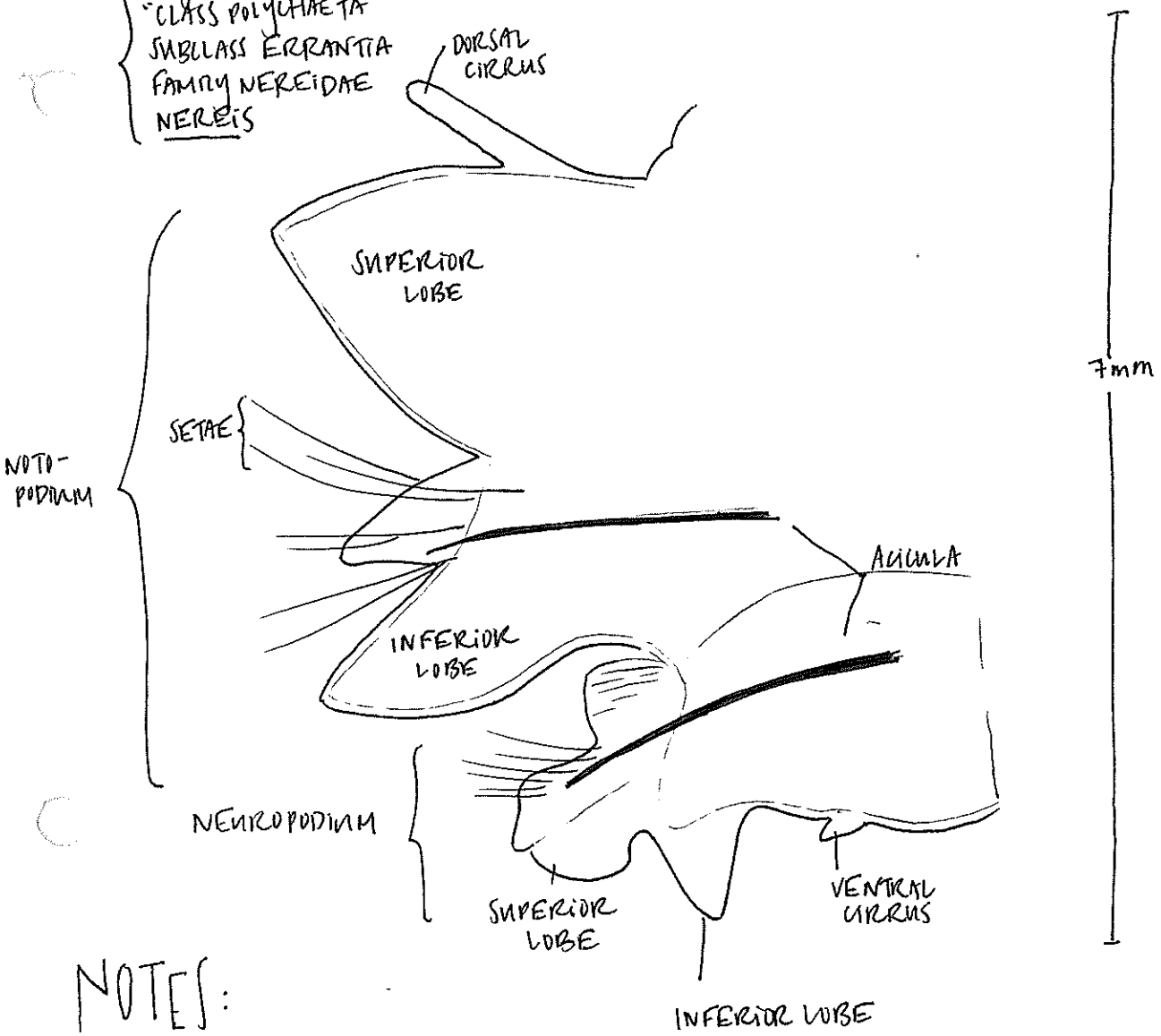


NOTES: Anesthesized in $MgCl_2$, then cut open posteriorly on the dorsal side with sharp scissors. The blood continued to pump through the dorsal blood vessel, and I could see the cilia moving inside the nephrostome.



PARAPODIUM OF NEREIS:

PHYLUM ANNELIDA
"CLASS" POLYCHAETA
SUBCLASS ERRANTIA
FAMILY NEREIDAE
NEREIS



NOTES:

FUNCTION OF STRUCTURES:

→ PARAPODIUM: Paired locomotor appendages that also increase the surface area of the worm and function in gas exchange, as they are highly vascularized.

→ ACICULA: Chitinous support rods that stiffen the lobes and aid in locomotion.

→ SETAE: Form temporary attachment sites and prevent backsliding during movement or within the substrate of burrow.

→ CIRRI: Generally have sensory functions

→ BRANCHIAL GILLS: Oxygen absorption and gas exchange

→ DIGESTION: buccal sheath, pharynx, esophagus, caecae, chlorogogue, intestine, anus

→ CHLOROGOGUE: Tissue that stores glycogen and neutralizes toxins; help with excretion

→ NEPHRIDIOPORE: Where excretion of urine occurs; MIXONEPHRIDIA: a combined nephridium and coelomoduct

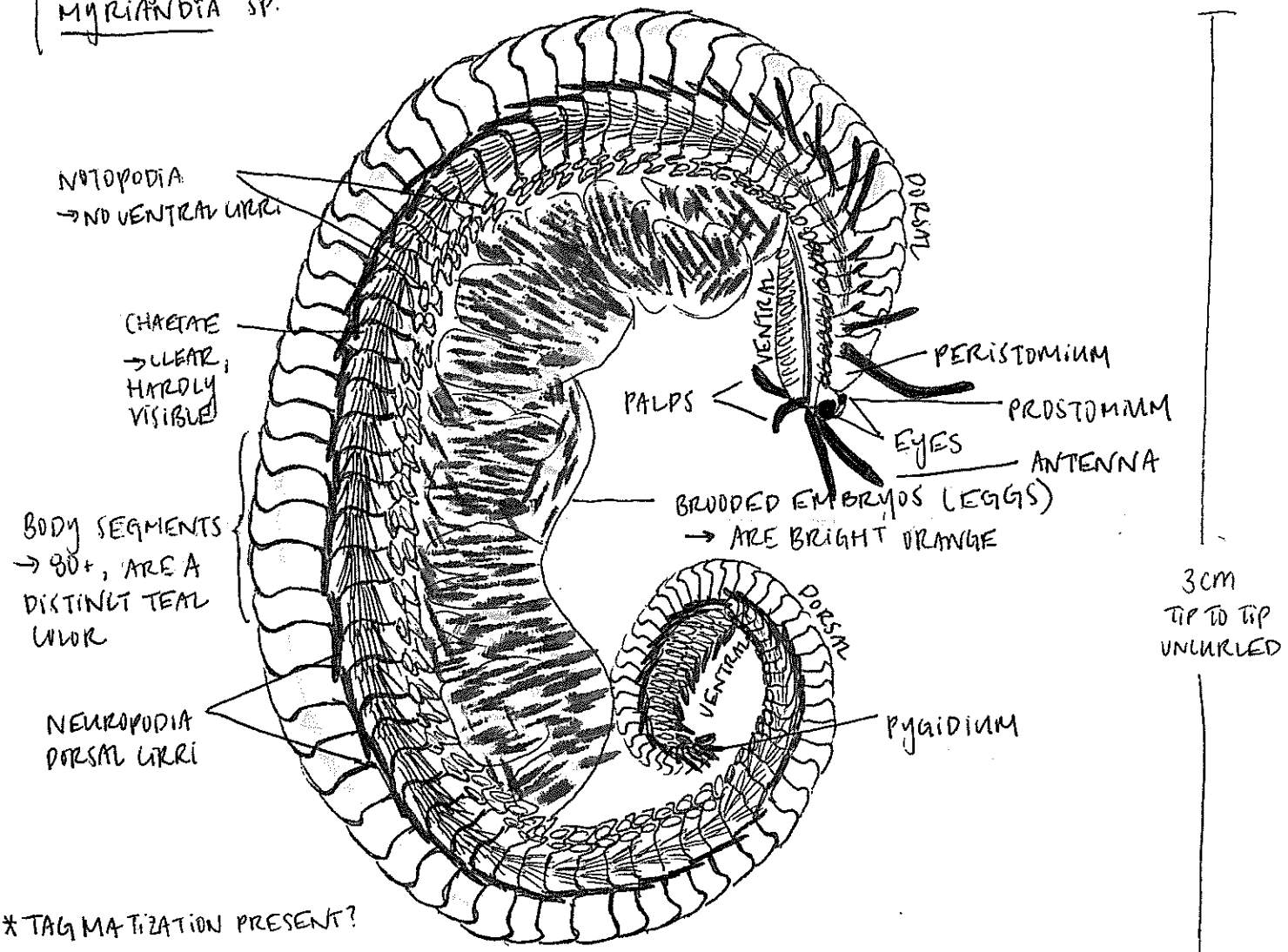
→ CIRCULATORY: Dorsal blood vessel, branchial vessels, branchial vessels

→ GIANT AXONS: Allows for rapid response (almost instantaneous), retraction into tube or burrow!

PHYLUM ANNELIDA: POLYCHAETE DIVERSITY

// 04.25.17

PHYLUM ANNELIDA
"CLASS" POLYCHAETA
SUBCLASS ERRANTIA → MOBILE! EPIFAUNAL!
FAMILY SYLLIDAE
MYRIANDIA SP.

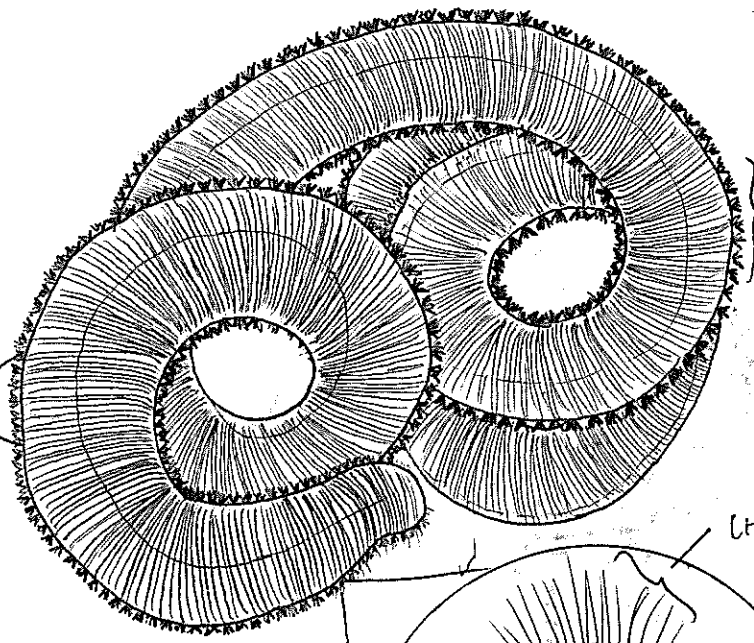


*TAGMATIZATION PRESENT?

NOTES: * MOVEMENT/BEHAVIOR: Before zapping it with MgCl2, this worm was moving quite rapidly. The body was "slithering" from side to side in the dish — so fast that I could hardly see it under the scope. When it was in a deeper dish, it was swimming up and down in the water column. After putting it in a dish of MgCl2, it immediately curled up tightly around its brood sac — a noble attempt, but the brood was considerably larger than the rest of its body. Eventually, it relaxed a bit and I was able to draw it as shown above.

PHYLUM ANNELIDA
CLASS POLYCHAETA
SUBCLASS ERRANTIA – MOBILE! INFAUNAL!
FAMILY GLYCERIDAE
GLYCERA AMERICANA

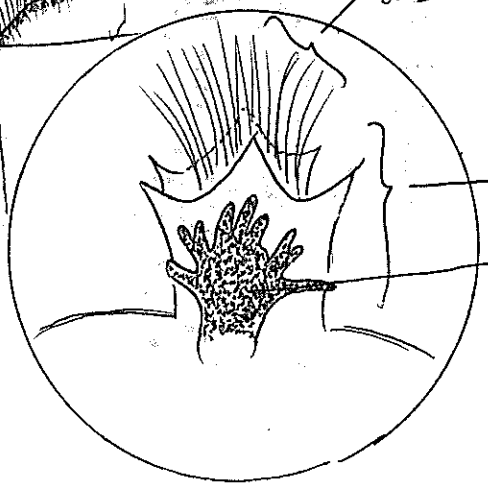
30 cm TIP TO TIP, UNCURLED



PARAPODIA BRIGHT RED FROM HEMOGLOBIN

1 SET OF PARAPODIA PER EVERY 3 SEGMENTS

CHETAE



PARAPODIUM

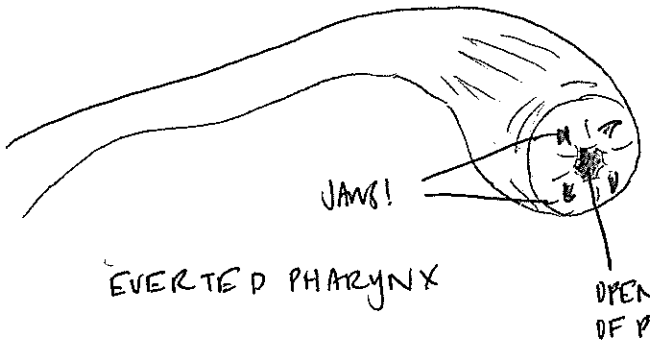
BRANCHIAE BRANCHED, WILL RETRACT WHEN TOUCHED
→ ARE EXTENSION OF PARAPODIA
→ BRIGHT RED GRANULES

1mm

* NEITHER PROSTOMIUM, PERISTOMIUM, OR PYGIDIUM VISIBLE IN THIS VIEW; WORM WAS CRANKY
* BODY NOT DIVIDED INTO DISTINCT TAGMA
→ BRANCHIA EXTEND ALL THE WAY DOWN

NOTES: COLOR: Brownish-red; in the right light, it had a iridescent sheen. The color of this organism is derived from the hemoglobin in its blood, hence – the blood worm. Though, perhaps it is called a blood worm because it can draw blood with the jaws on its pharynx?

6 cm



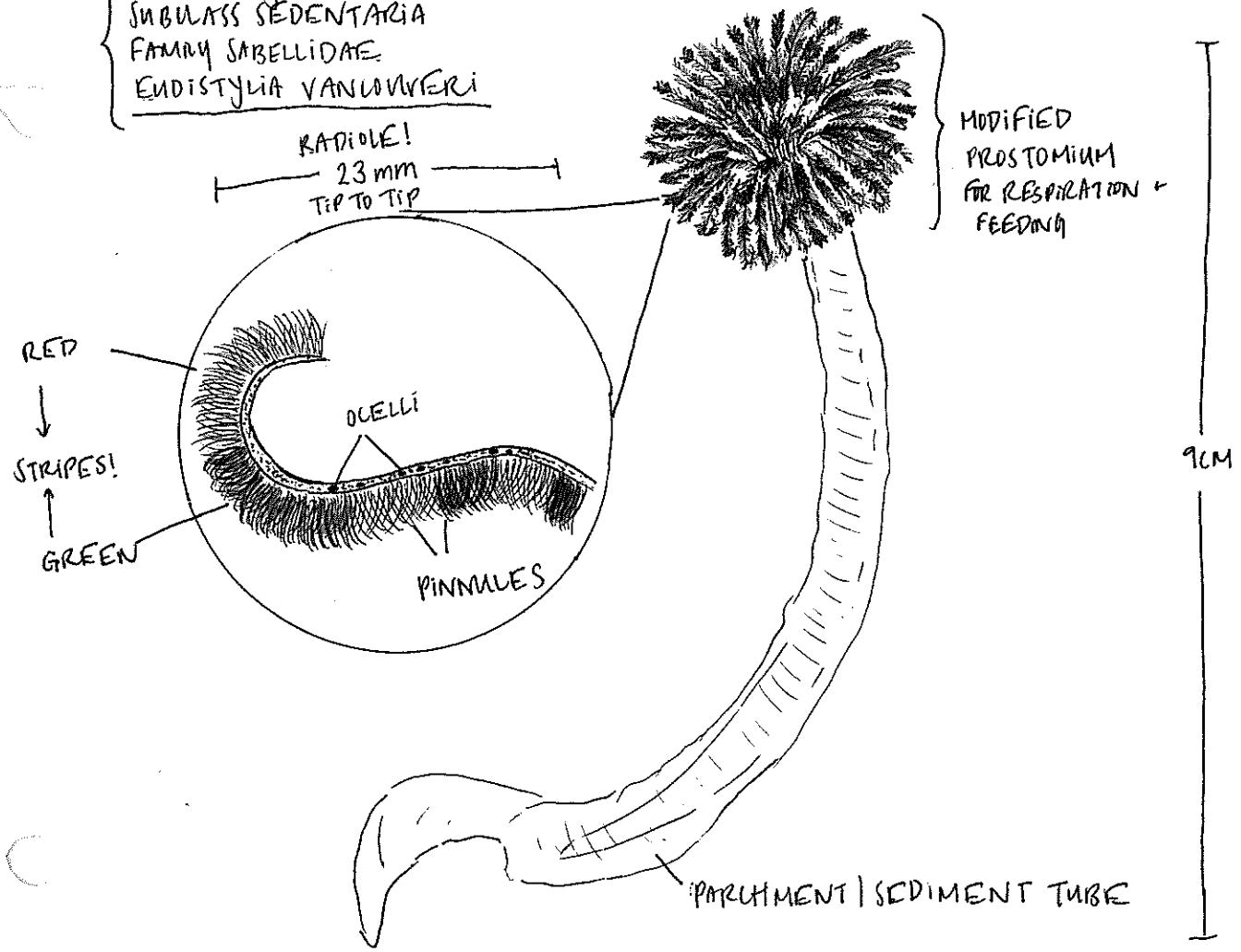
JAWS!

EVERTED PHARYNX

OPENING OF PHARYNX

BEHAVIOR/MOVEMENT: The first time I observed this organism, it would curl up tightly to defend itself (drawn above). I was unable to perturb it to the point of showing me its pharynx. But, after I let them sit for a day, I tried again – and was successful! I only needed to pick it up with forceps, and that made it angry enough to try and fight/bite me.

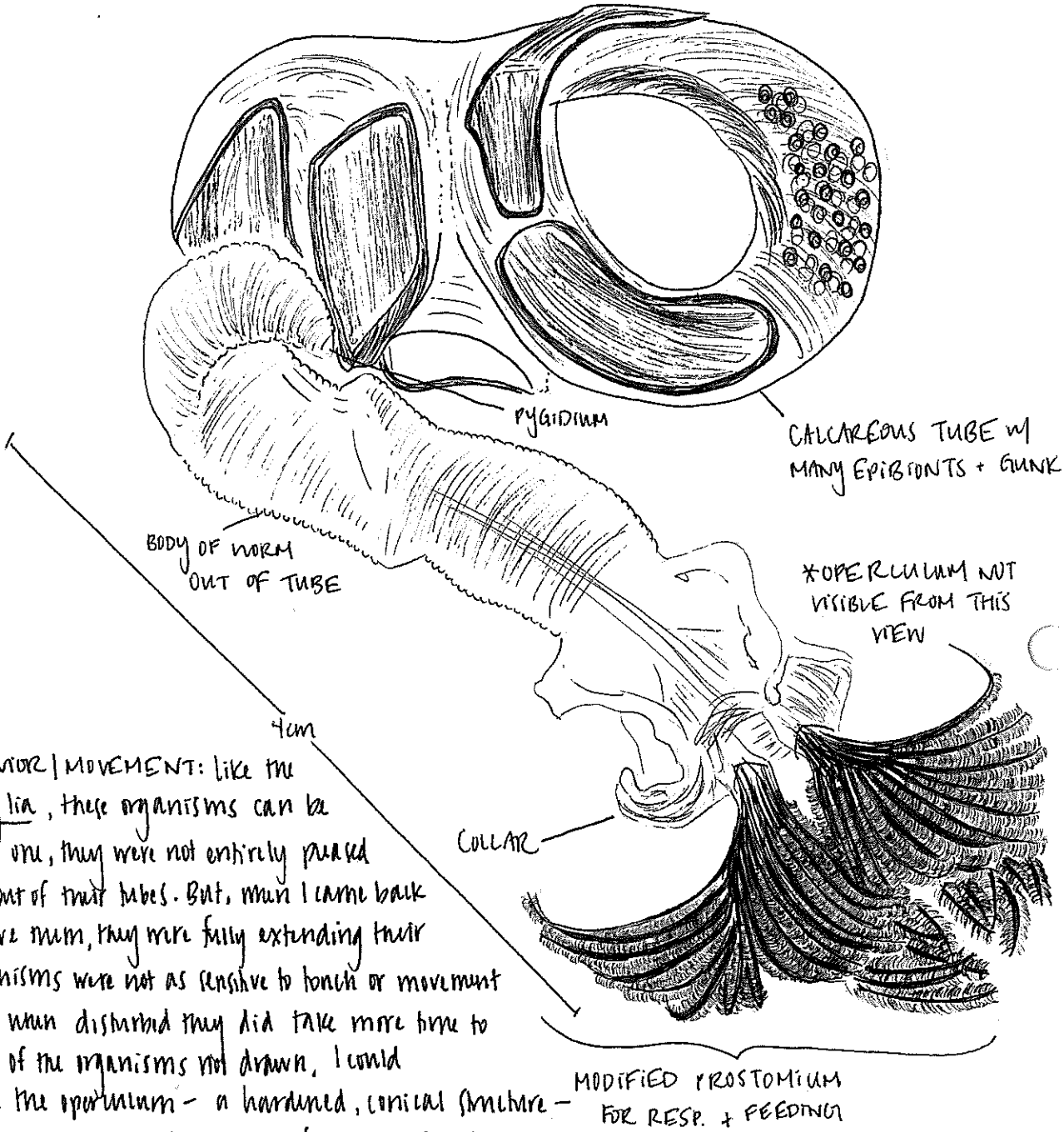
PHYLUM ANNELIDA
"CLASS" POLYCHAETA
SUBCLASS SEDENTARIA
FAMILY SABELLIDAE
EUDISTYLIA VANCOUVERI



NOTES: *BEHAVIOR/MOVEMENT: This organism responds to touch and is even sensitive to water movement in its bowl. When startled, it retracts its radioles back into its tube for protection. Interestingly, the plucked radiole continued to move autonomously even after being removed for 24+ hours! To move water and transport food (namely, plankton suspended in the water column), the individual fibers on the radiole beat, creating a flow toward the mouth. Particulates that become trapped in the radiole hairs are then drawn into the mouth by a contractile motion. In action, it almost looks like the worm is "flicking its fingers" one by one or as a clump of radioles.

* OTHER: Sedentary, epifaunal, tagmatized, i
* WASTE REMOVAL: Has "a ciliated fecal groove that runs from the ventral anus along the ventral abdomen, swinging around the body at the point of fecal inversion + continuing along the dorsal thorax to the peristomial collar" (Light's Manual).

PHYLUM ANNELIDA
"CLASS" POLYCHAETA
SUBCLASS SEDENTARIA
FAMILY SERPULIDAE
SERPULA



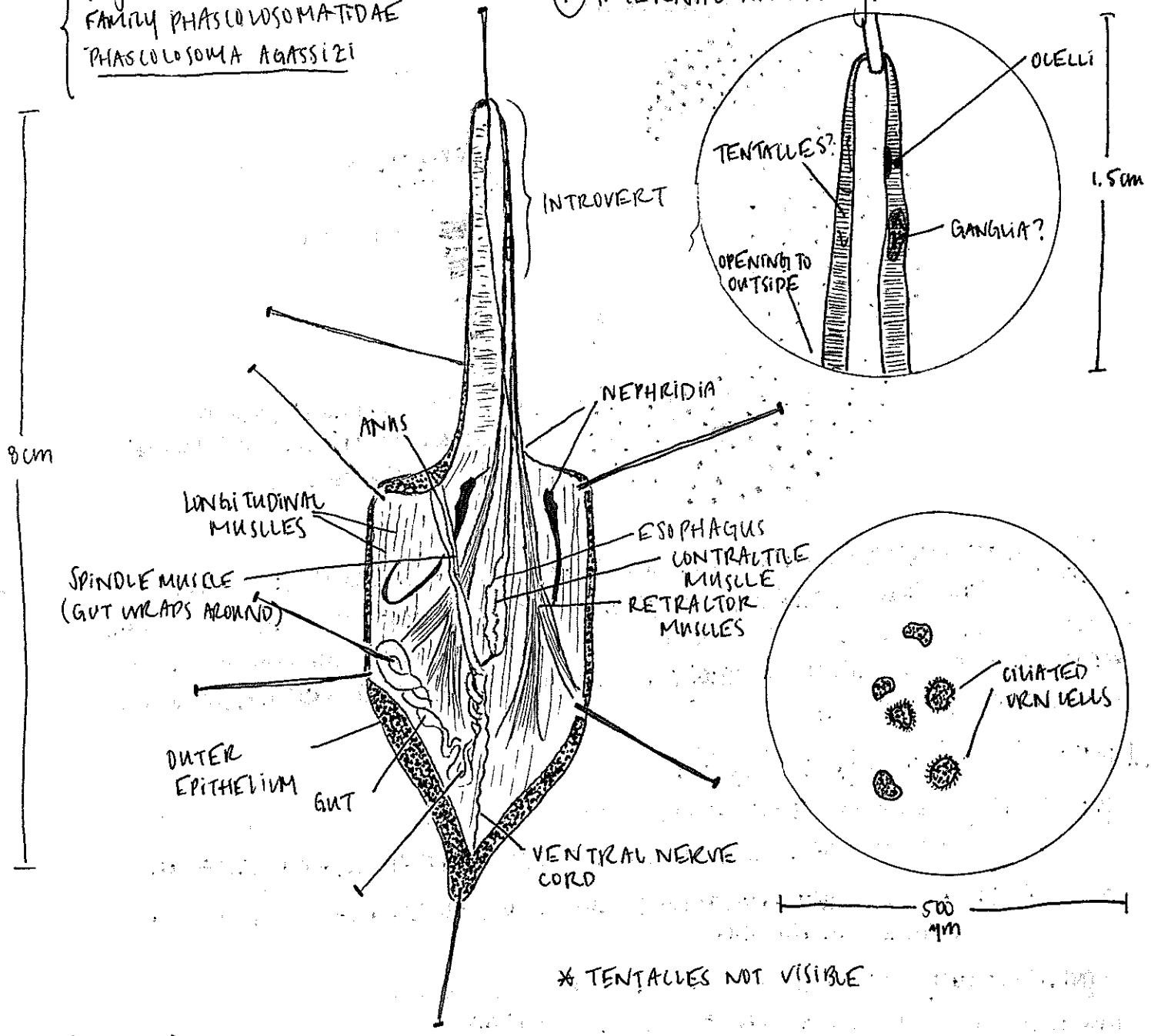
NOTES: *BEHAVIOR | MOVEMENT: like the Eudistylia, these organisms can be quite shy. On day one, they were not entirely pleased with being twisted out of their tubes. But, when I came back a day later to observe them, they were fully extending their radioles. These organisms were not as sensitive to touch or movement as Eudistylia, but when disturbed they did take more time to re-emerge. In some of the organisms not drawn, I could distinctly visualize the operculum - a hardened, conical structure - being positioned to seal the round-be opening of the worm's tube.

* COLOR: tube grey; body yellowish white; collar bright red; radioles red + white striped - other organisms in dish more white + yellow striped, pink, or orange! Brilliantly bright.
* OTHER: sedentary, epifaunal, tagmatized
* See Eudistylia for radiole detail drawing; did not see cilli on the radiole I plucked off of this organism. Serpula moves food into their mouths in a similar manner, too.

SIPUNCULANS: INTERNAL + EXTERNAL ANATOMY // 04.27.17

PHYLUM ANNELIDA > "Sipuncula"
FAMILY PHASCOLOSOMATIDAE
PHASCOLOSOMA AGASSIZI

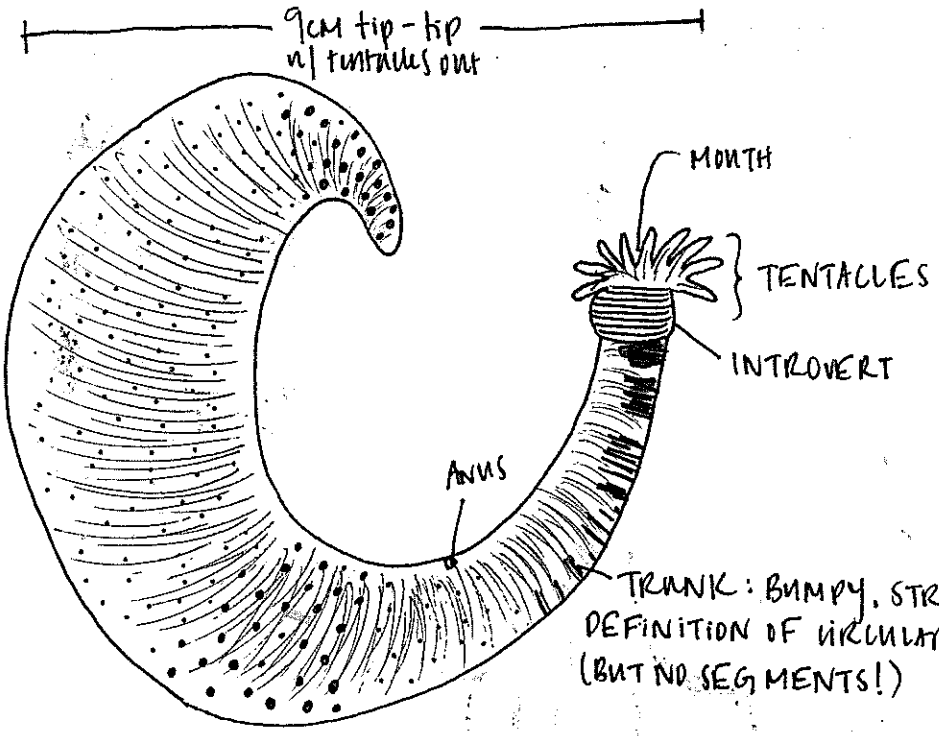
① INTERNAL ANATOMY:



* TENTACLES NOT VISIBLE

NOTES: We anesthesized the peanut worm in $MgCl_2$, then cut posterior → anteriorly, slightly ventrally to the dorsal anus. The body wall of the organism was tough, almost like leather; it was challenging to cut it gingerly. Coelomic fluid flowed out of the body readily once the first incision was made - unfortunately, it had all dissipated before we realized we needed to look at it under the compound scope. Thus, we looked at another group's. Their fluid prep was teeming with ciliated vrn cells (drawn above). As we continued our dissection, the worm contracted its muscles, especially its spindle muscle, which made for a wiggly intestine. It was impossible to push the tentacles / other soft bits out of the introvert.

(II) EXTERNAL ANATOMY:



NOTES: * MOVEMENT + BEHAVIOR: IT TOOK A LONG TIME TO ACQUIRE THIS VIEW! AFTER SEEING THE INTROVERT/TENTACLES EXTENDED, IT'S CLEAR AS TO WHY IT WAS SO CHALLENGING TO PUSH THESE STRUCTURES OUT DURING THE DISSECTION. THE WORM DID NOT MOVE AROUND IN THE BOWL/UNDER A DISH WHEN PRESENTED W ONE, EVEN AFTER A COUPLE HOURS.

(III) FUNCTIONS OF STRUCTURES:

TENTACLES: TRAP PARTICLES FROM SURROUNDING H_2O OR ARE PRESSED INTO SUBSTRATE TO TRAP MUD + DETRITUS → FEEDING + RESPIRATION

INTROVERT: CONTAINS HEAD + MOUTH PARTS (TENTACLES, GANGLION, ETC), SENSORY + FEEDING IN FUNCTION

SPINDLE MUSCLE: GUT WRAPS AROUND; KEEPS FROM TANGLING

NEPHRIDIA: ION REGULATION AND HOLD GAMETES

LONGITUDINAL + CIRCULATORY MUSCLES: CONTROL HYDROSTATIC PRESSURE; CONTRACTION OF WHICH WILL EVERT INTROVERT

RETRACTOR MUSCLES: DRAW INTROVERT BACK INTO TRUNK

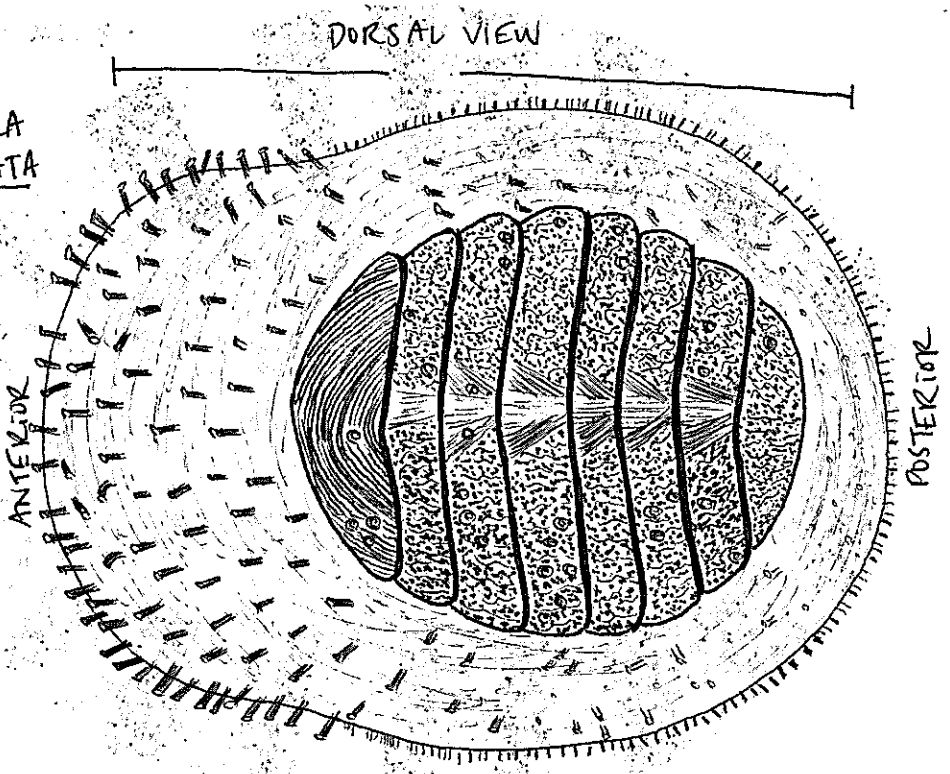
COMPENSATORY SAC/CONTRACTILE MUSCLE: CONTRACTION OF DRIVES FLUID INTO TENTACLES, BRINGING ABOUT THEIR EXTENSION.

URN CELLS: ARISE FROM PERITONEAL LINING; COLLECT SOLID WASTES + EVENTUALLY DEPOSIT THEM IN THE BODY WALL OR EXIT VIA NEPHRIDIAL SYSTEM

PHYLUM MOLLUSCA: CLASS POLYPLACOPHORA // 04.27.17

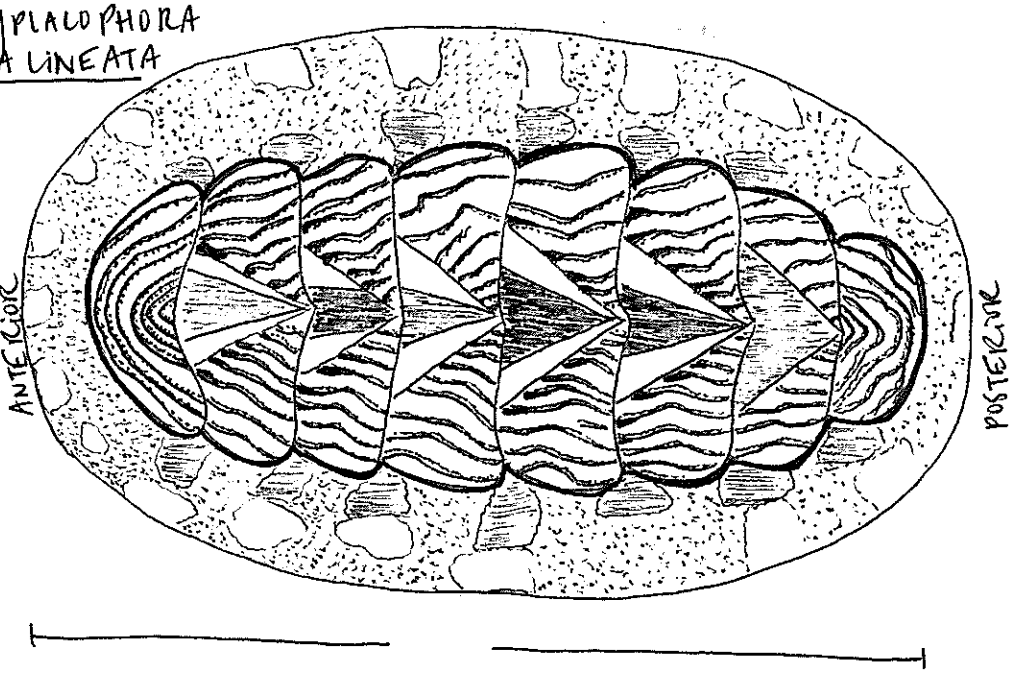
① DIVERSITY:

PHYLUM MOLLUSCA
CLASS POLYPLACOPHORA
PLACIPHORELLA VELATA



NOTES: THE "CARNIVOROUS CHITON" HAS A "VEILED" ANTERIOR GIRDLE (CREAMY WHITE); VALVES SHORT + WIDE; LONG DORSAL SCALEY HAIRS | BRISTLEY PROJECTIONS EXTENDING LATERALLY
→ TO FEED: TRAPS SMALL ORGANISMS UNDER VEIL W/ RAPID "STOMPING" ACTION

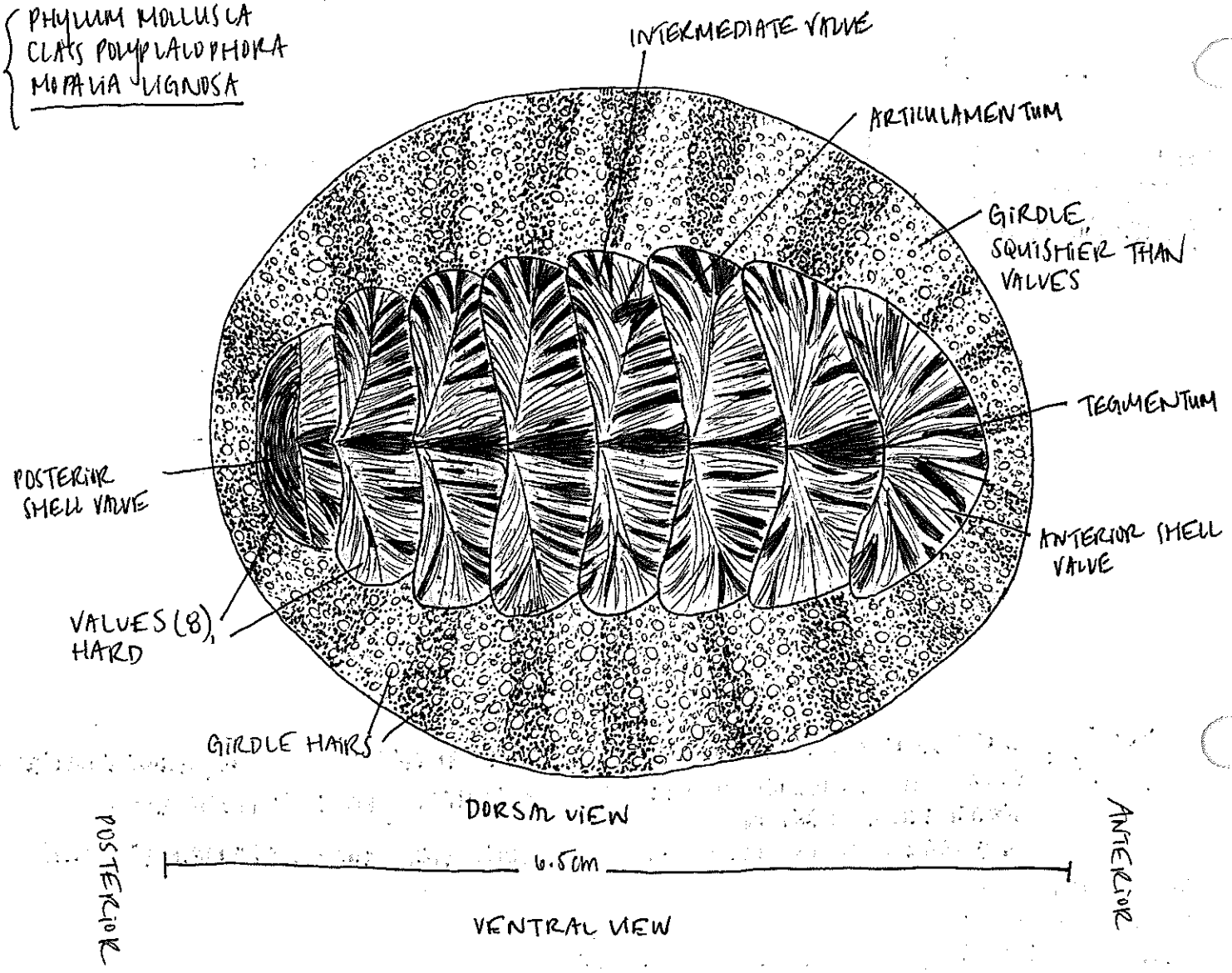
PHYLUM MOLLUSCA
CLASS POLYPLACOPHORA
TONICELLA LINEATA

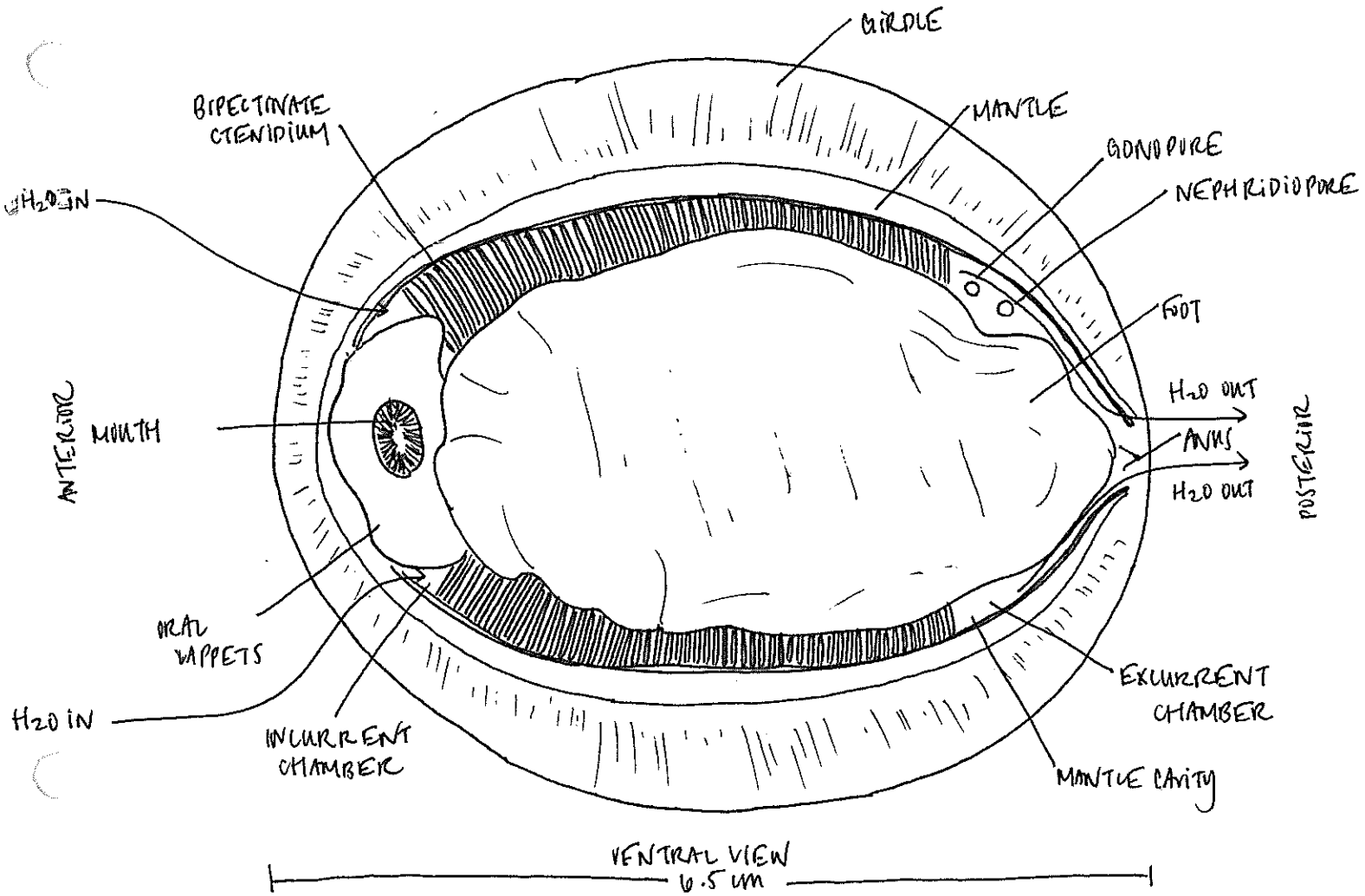


NOTES: DISTINCT BLUE | YELLOW | BROWN LINED PATTERN ON VALVES, MEDIAL PARTS OF WHICH HAVE PURPLE | BROWN TRIANGLES; GIRDLE BRIGHT PINK | PURPLE W/ YELLOW SPOTS; THIS ORGANISM WAS THE LARGEST WE COLLECTED - MOST ~1-2 CM IN FIELD

(11) MORPHOLOGY:

- PHYLUM MOLLUSCA
- CLASS POLYPLACOPHORA
- MOPALIA LIGNOSA





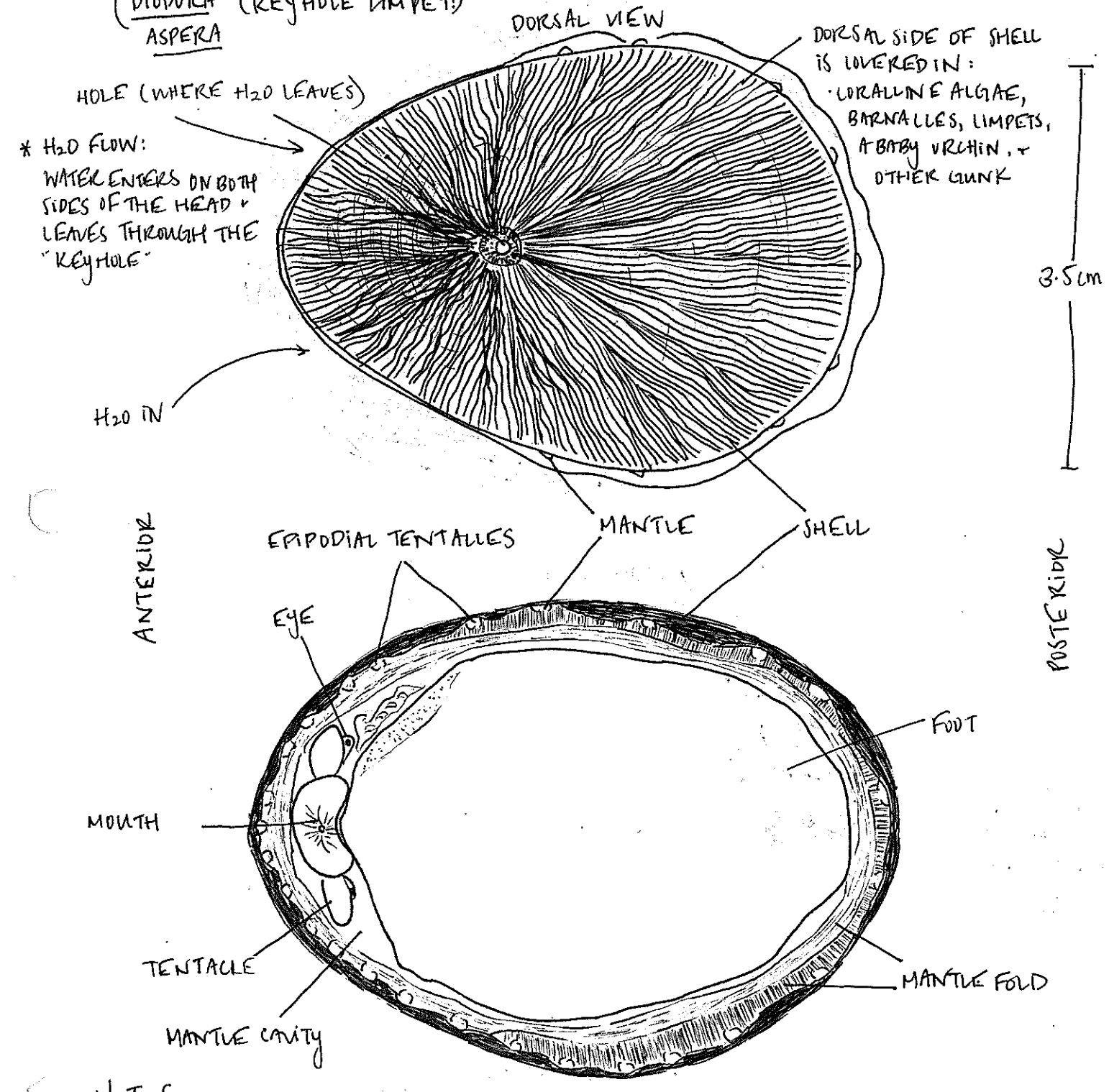
(III) MOVEMENT:

* FOOT FORMS A LARGE SUCTION CUP TO CLING TO SUBSTRATE; MY ANIMAL DIDN'T MOVE AROUND A LOT, BUT IF IT DID, MUCH OF THE MOVEMENT WOULD HAVE ORIGINATED FROM THE MIDDLE OF THE FOOT.

PHYLUM MOLLUSCA: CLASS GASTROPODA // 05.02.17

① ANATOMY

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS VESTIGASTROPODA
DIODORA (KEYHOLE LIMPET)
ASPERA



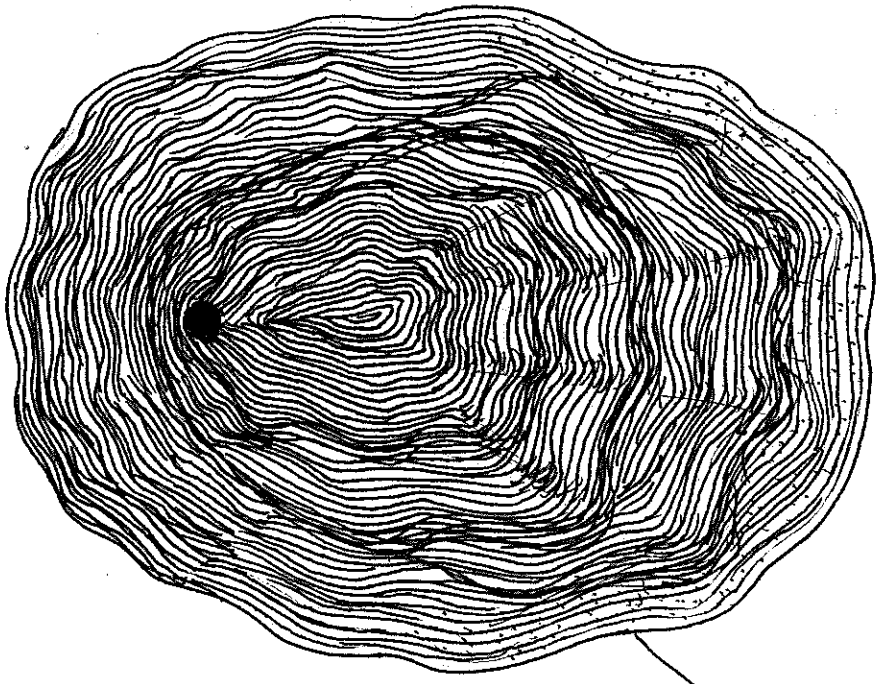
NOTES:

* HAS COMMENSAL SCALEWORM ARCTONOE LIVING IN MANTLE CAVITY (WRAPPED AROUND SIDE). ; CTENIDIA NOT VISIBLE
* 2 BIPECTINATE CTENIDIA + 2 NEPHRIDIA → PRIMATIVE

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS PATELLOGASTROPODA
LOTTIA PELTA

DORSAL VIEW

H_2O FLOW:

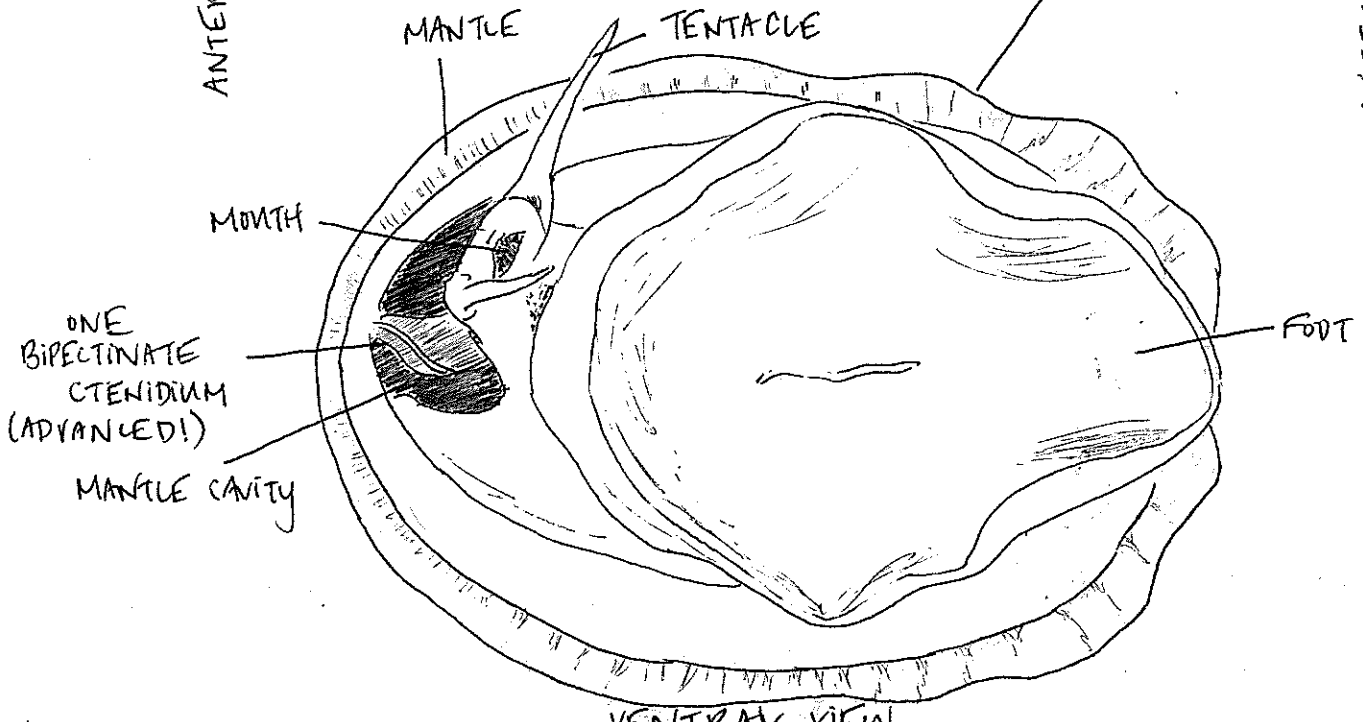


1.5cm

SHELL

ANTERIOR

POSTERIOR

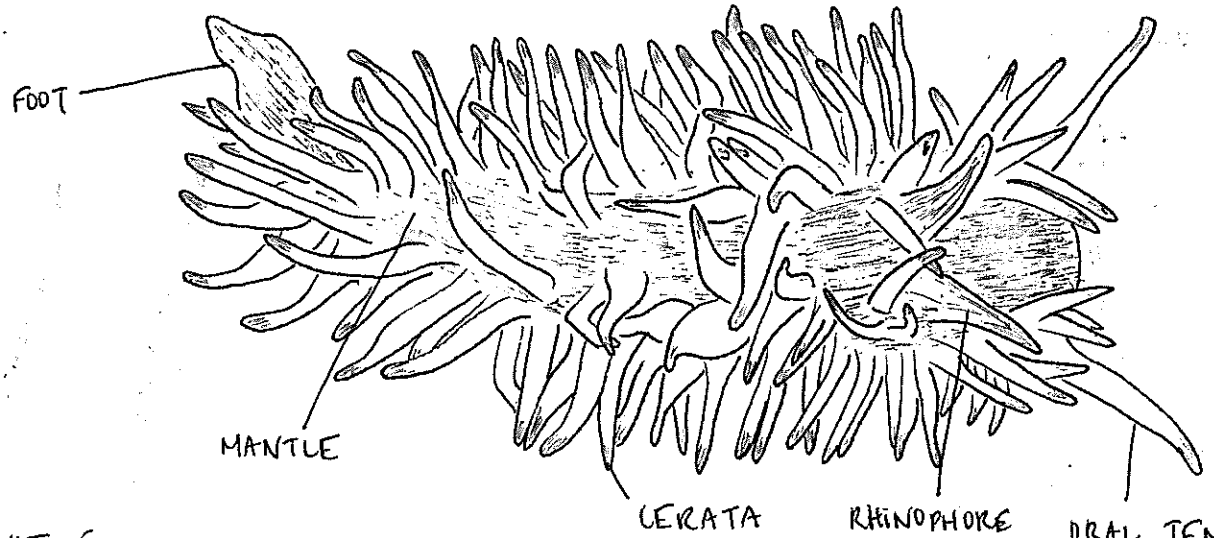


VENTRAL VIEW

NOTES: * COLOR: Shell is brown and pretty bright (like eelgrass) green! Wavy shell, almost like a mountain range in a valley — concentric "circular" bands of color moving up shell.

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS HETEROBRANCHIA
AEOLIDIA PAPILLOSA

1.8cm

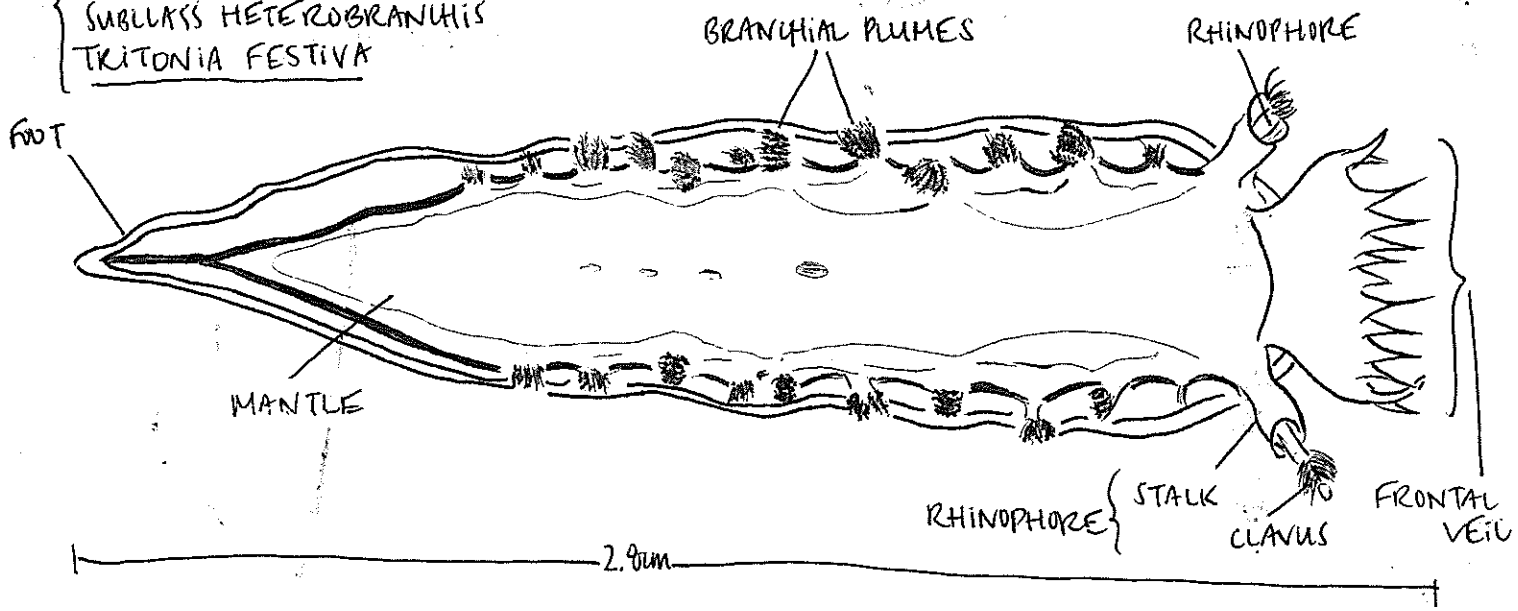


POSTERIOR

NOTES: * COLOR: TRANSLUSCENT, PINK MANTLE + PINK-TIPPED CERATAE.
→ TAKES ON COLOR OF FOOD - ANEMONES! (METRIDIUM)
* MOVEMENT: FAST! ALSO RESPONDS TO TOUCH; PREFERS EDGE OF BOWL

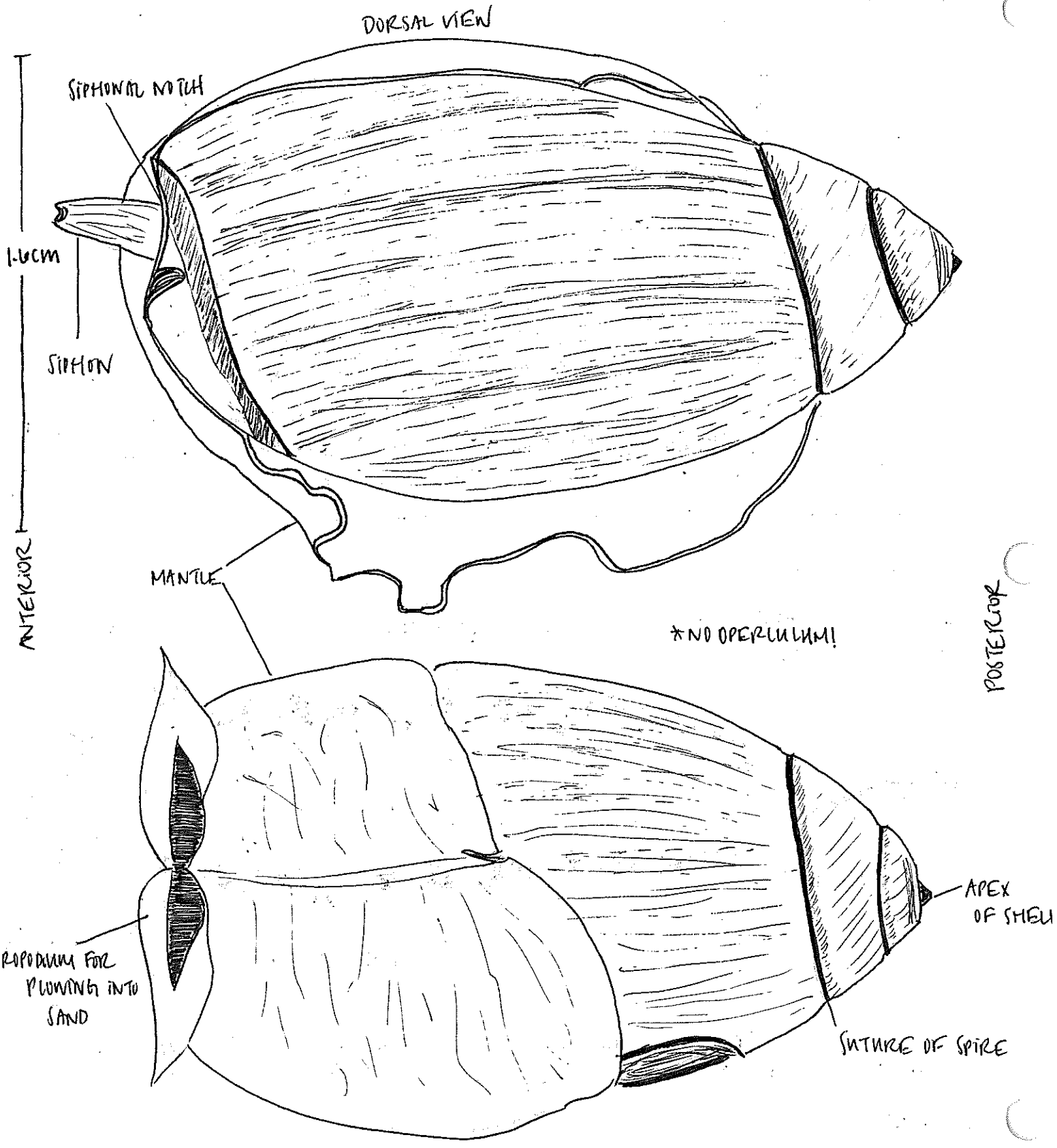
ANTERIOR

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS HETEROBRANCHIA
TRITONIA FESTIVA



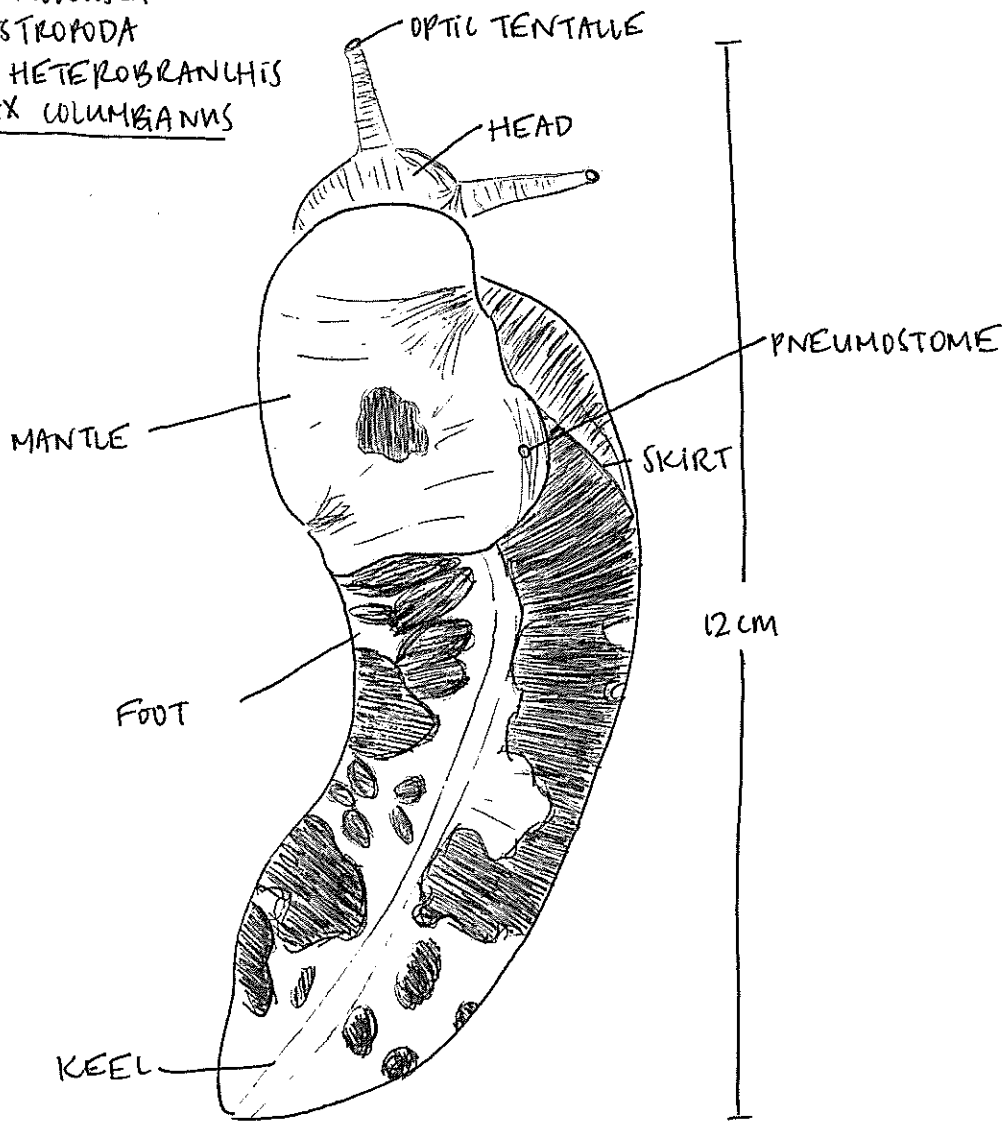
NOTES: * COLOR: CREAMY OPAQUE BODY W/ WHITE LINES + BRANCHIAL PLUMES/VEIL
* ECOLOGY: FEED ON PINK GORGONIAN + ORANGE SEA PEN (SUBTIDAL) + CLAVULARIA (INTERTIDAL)
* MOVEMENT: RESPONDS TO TOUCH; WILL MOVE IN OPPOSITE DIRECTION
* EATS W/ ORAL TENTACLES, MOUTH, RADULA; RESPIRES USING BRANCHIAL PLUMES
* COMPARED TO PROSOBRANCHS: NO SHELL! NO OPERCULUM! BODY NOT TORTED

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS CAENOGASTROPODA
OLIVELLA BIPLICATA – OLIVE SNAIL – COLLECTED @ SOUTH COVE @ A VERY LOW TIDE



NOTES: * SHELL: PURPLE LINED, W YELLOW ALLENTS; OVERALL GREYISH PURPLE – SHINY!! (ON SUTURE OF SPIRE)
*MOVEMENT: MANTLE MOVING AROUND A LOT (TRYING TO BURROW?), RESPONDS TO TOUCH

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS HETEROBRANCHIS
ARIOLIMAX COLUMBIANUS



NOTES: * COLOR: PUKE GREEN W/ DARK BROWN SPLOTCHES; SHINY SURFACE W/ SLIME
* MOVEMENT: PRETTY FAST FOR A SLUG! WILL ELONGATE ITS BODY A LOT! AND LEAVES BEHIND A LOT OF SLIME.

MORE ON BACK

(11) OTHER IDENTIFICATION/OBSERVATION:

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS VESTIGASTROPODA
HALIOTIS RUFESCENS

* NACREOUS LAYER = pearly inner surface!
* PRISMATIC LAYER = thickest part of shell → not really visible
* PERIOSTRACUM = red surface on outside!

* 5 HOLES; Function = exit point of water flow
* DISADVANTAGES: Boring organisms can penetrate the top of the shell via these holes; in intertidal could cause dessication

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS VESTIGASTROPODA
TEGULA FUNEBRALIS

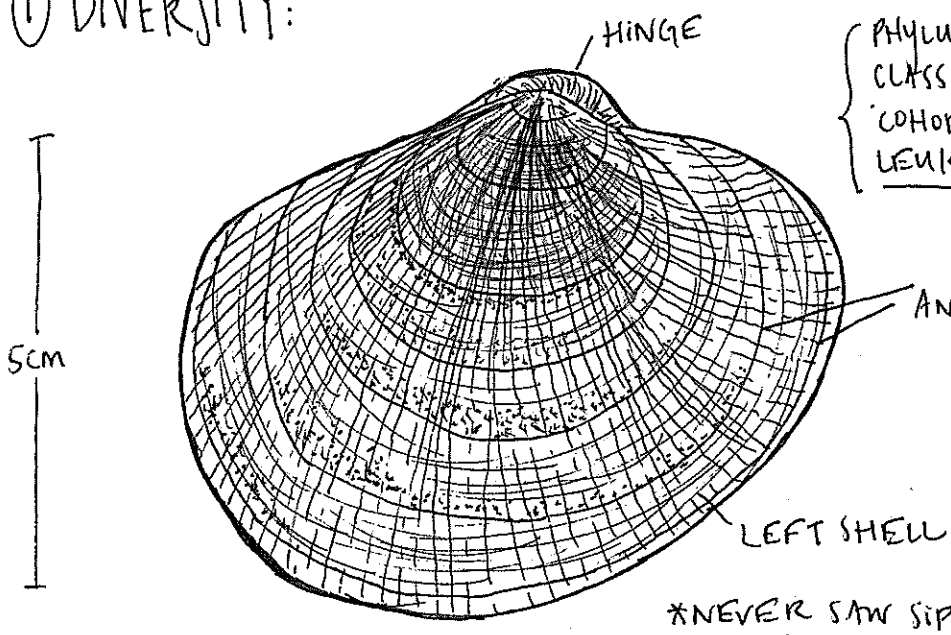
* EPIBIONTS: Organism I observed did not have any epibionts; typically, Collisella, Notoacmea, Crepidula typically found there. And, Pagurus hermit crabs inhabit dead shells.

PHYLUM MOLLUSCA
CLASS GASTROPODA
SUBCLASS CAENOGASTROPODA
FUSITRITON OREGONENSIS

* WHELK: Examined ✓; siphon/siphonal canal — for breathing, bringing H_2O into mantle cavity/across gills

PHYLUM MOLLUSCA: CLASS BIVALVIA // 05.04.17

① DIVERSITY:

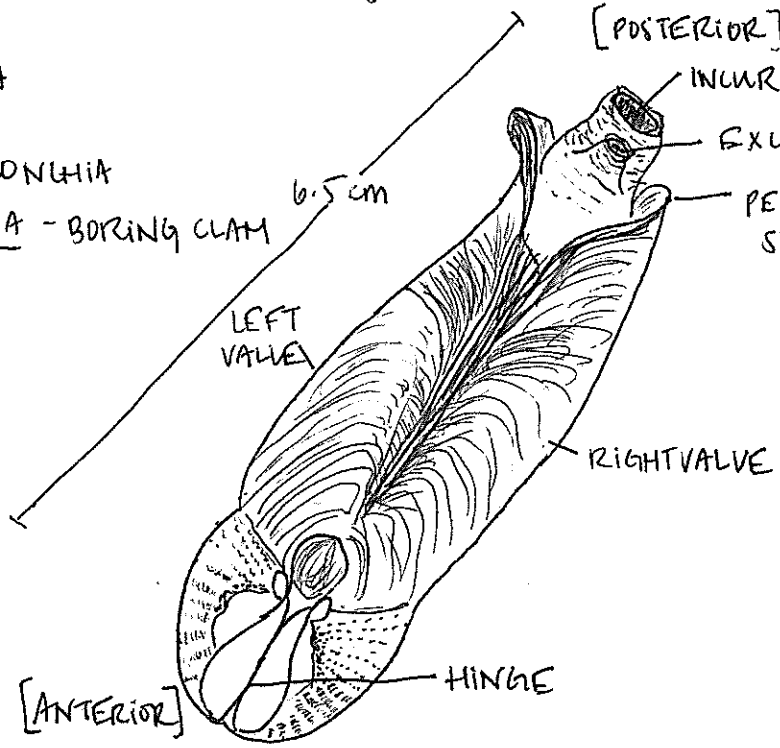


{ PHYLUM MOLLUSCA
CLASS BIVALVIA
"COHORT" HETERODONCHIA
LEUKOMA STAMINEA - LITTLE NE

*NEVER SAW SIPHONS AFTER 3+ HOURS; UNSURE OF ANTERIOR/POSTERIOR ORIENTATION

NOTES: * COLOR: TAN, WITH BLUE STRIPES AROUND ANNULI
* BEHAVIOR: AN INCREDIBLY PATIENT ORGANISM; NEVER OPENED FOR ME
*TEXTURE: CONSISTENT — LINES VERY CLEAN + DEFINED; NOT FOULED W/ EPIBIONTS

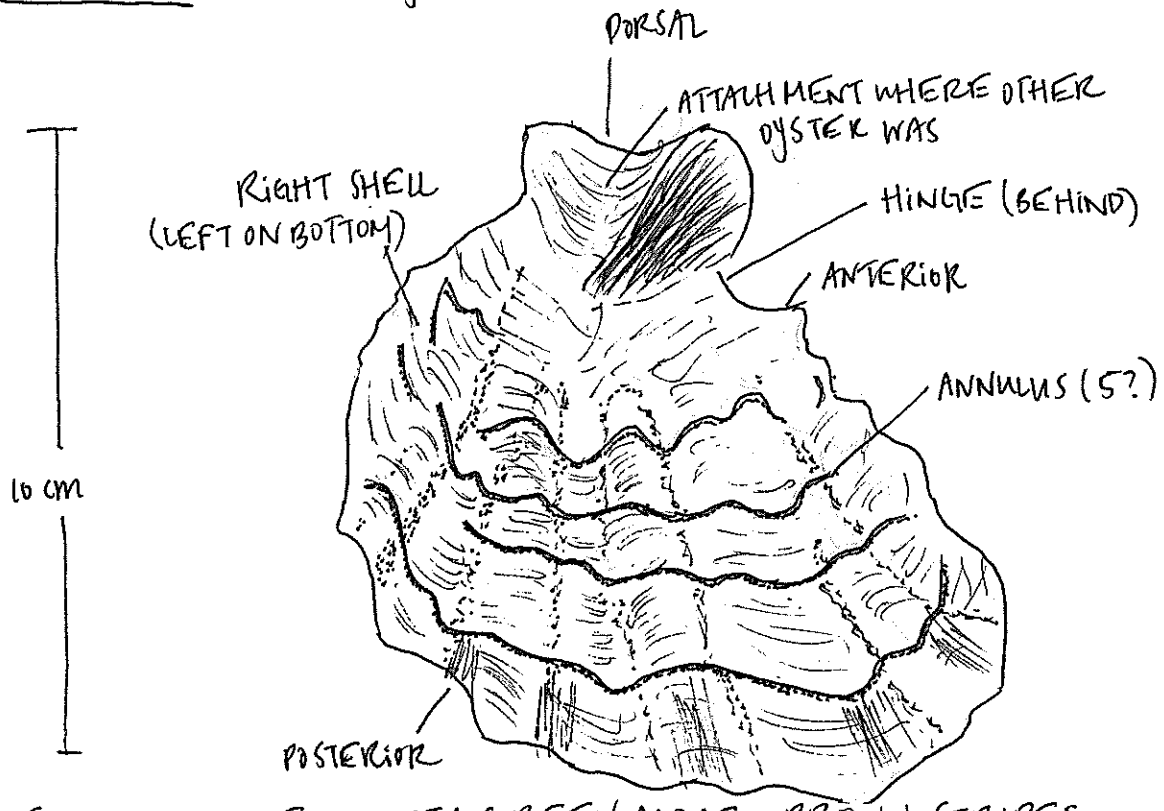
{ PHYLUM MOLLUSCA
CLASS BIVALVIA
"COHORT" HETERODONCHIA
PENITELLA PENITA - BORING CLAM



* THIS ORGANISM BORES INTO ROCKS! SUSPENSION FEEDER.

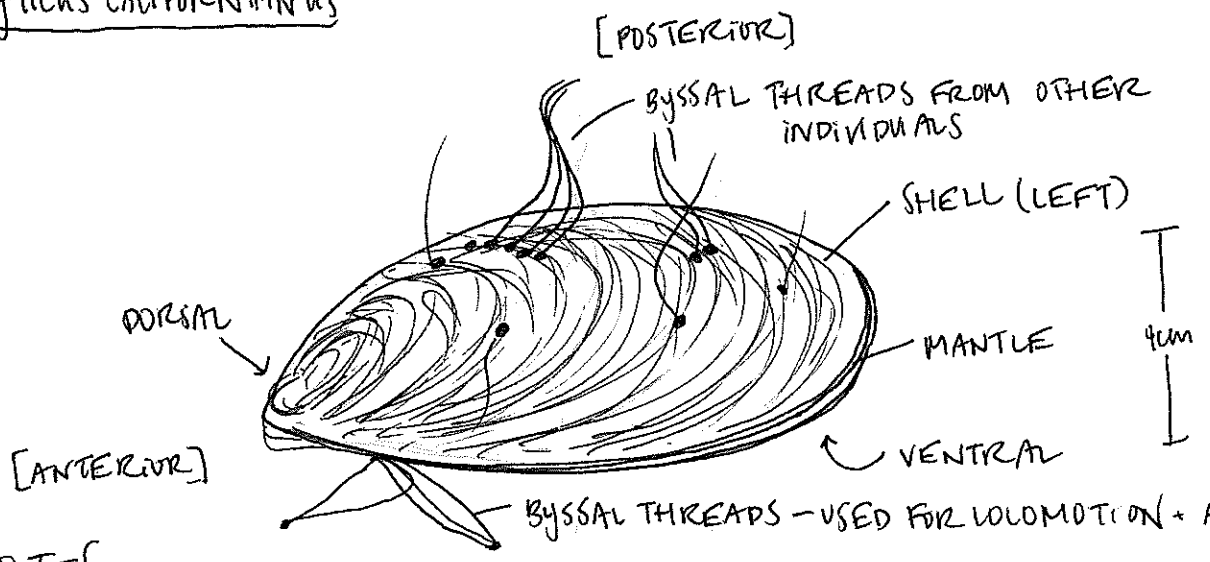
NOTES: * COLOR: SHELL WHITE; PERIOSTRACAL SIPHONOPLAX OPAQUE BROWN; SIPHONS CREAMY TAN W/ REDDISH BROWN LINES + SPOTTING
* BEHAVIOR: HAPPILY STICKING ITS SIPHONS OUT BUT WILL RETRACT WHEN TOUCHED. IDENTIFIED SIPHONS BY INJECTING W/ FLOUROSINE + WATCHING FLOW.

PHYLUM MOLLUSCA
CLASS BIVALVIA
"COHORT" PTERIOMORPHA
CRASSOSTREA GIGAS: JAPANESE OYSTER



NOTES: * COLOR: CREAM, WITH GREEN ALGAE + BROWN STRIPES
* TEXTURE: WAVY, IRREGULAR; ANNULI WELL DEFINED

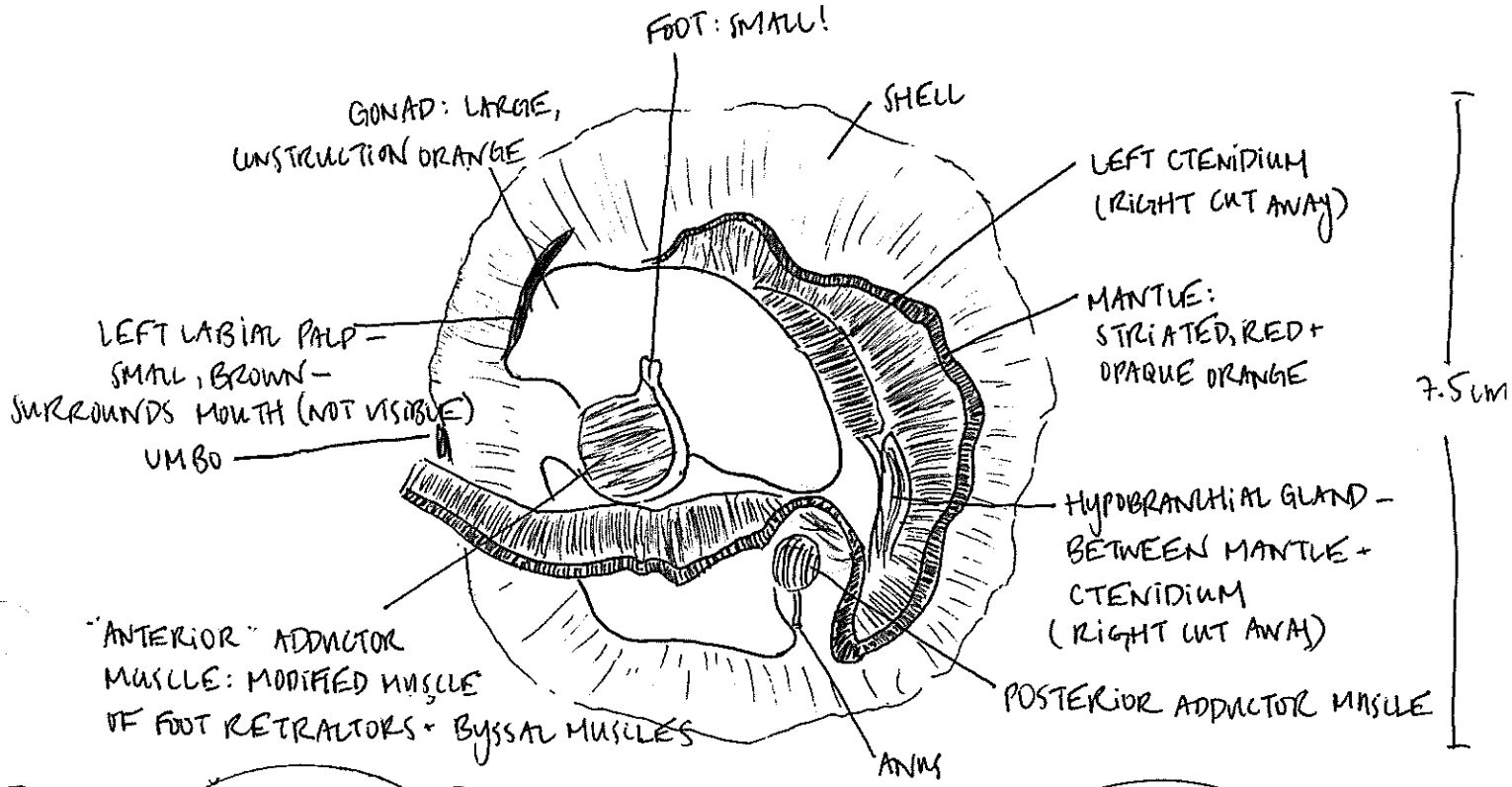
PHYLUM MOLLUSCA
CLASS BIVALVIA
"COHORT" PTERIOMORPHA
MYTILUS CALIFORNIANUS

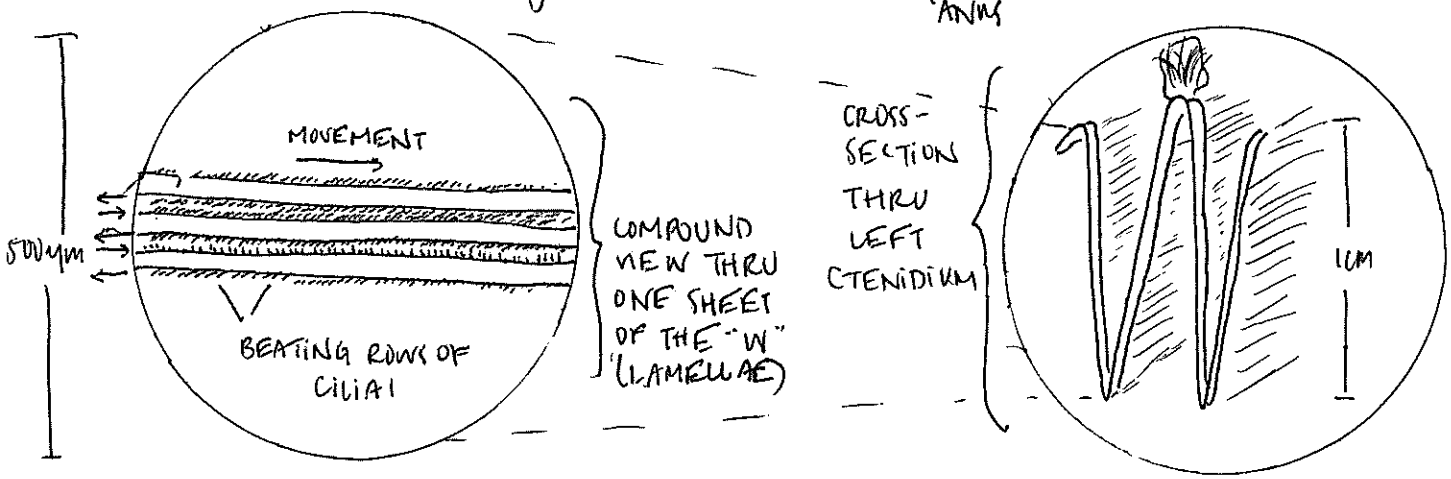


NOTES: * COLOR: DARK BROWN SHELL, ALMOST BLACK, w/ ORANGE MANTLE "LIPS"
* TEXTURE: FAIRLY SMOOTH; BYSSAL THREADS TOUGH
* BEHAVIOR: CAN SEE THE VERY SLOW "REACHING" MOVEMENT OF THE BYSSAL THREADS

⑪ DISSECTION:

PHYLUM MOLLUSCA
CLASS BIVALVIA
"COHORT" PTERIOMORPHA
PODESMUS MACROCHISMA "JINGLE CLAM"



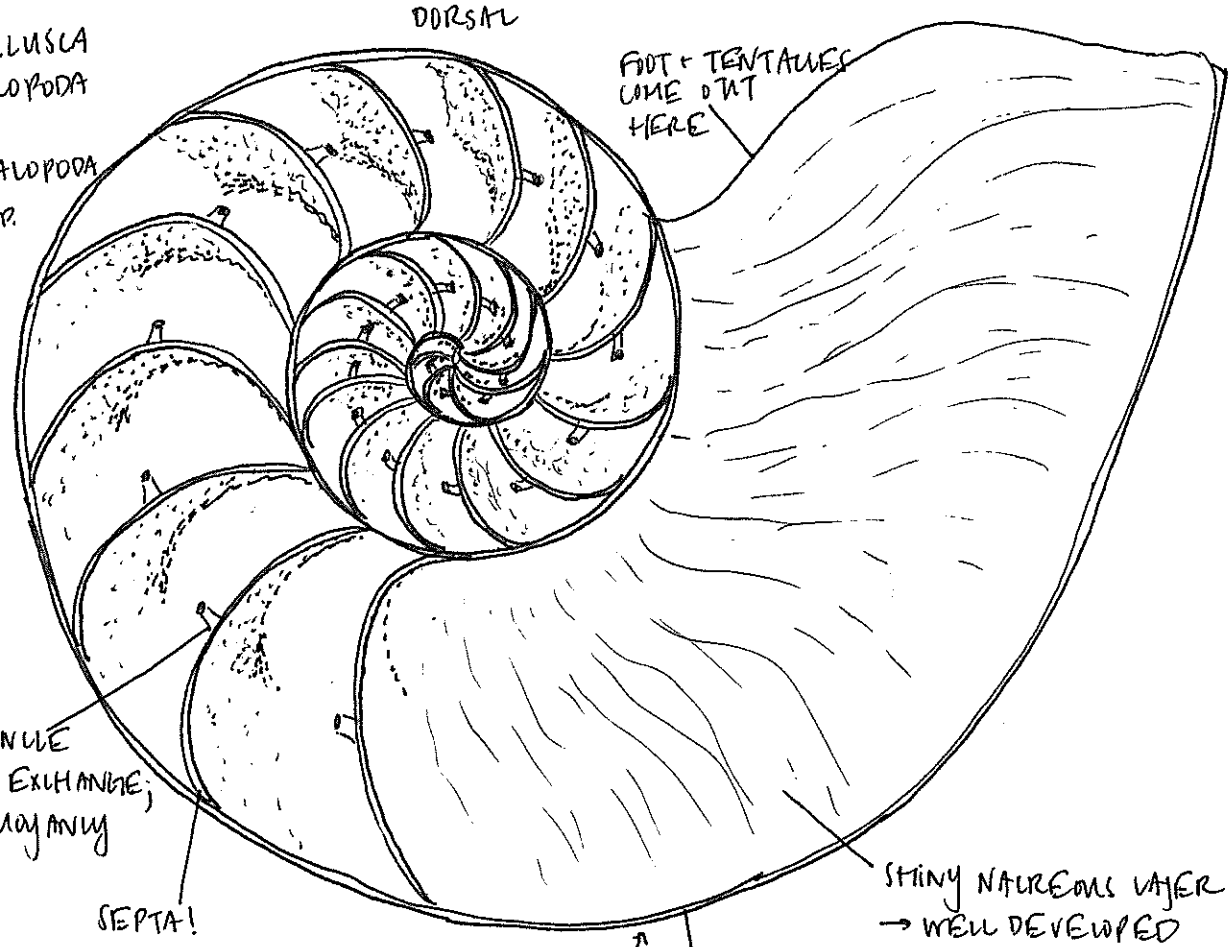


NOTES: * COLOR: SEE DESCRIPTIONS ABOVE; SHELL DISTINCTLY "PEARLY"
* BEHAVIOR: SHELL WAS ALREADY SMASHED — DID NOT GET TO OBSERVE H_2O FLOW. STRUCTURES WERE MUCH MORE CRYPTIC/LESS PRONOUNCED THAN IN OTHER BIVALVES I'VE DISSECTED HOWEVER, MUSCLES STILL RESPONDED (BY CONTRACTION) TO STIMULI.

* COMPARISON TO COHORT HETERODONTIA REPRESENTATIVE (TRESUS CAPAX): TRESUS'S FOOT MUCH LARGER (BIG USED FOR LOCOMOTION); HEART/PERICARDIAL CAVITY PRESENT + OBVIOUS; SIPHONS PRESENT; ARRANGEMENT OF INTERNAL DIGESTIVE FEATURES NOT ANT → POST; INFAUNAL, NOT EPIFAUNAL; GONAD LESS % OF VISCERA

PHYLUM MOLLUSCA: CLASS CEPHALOPODA // 05.04.17

PHYLUM MOLLUSCA
CLASS CEPHALOPODA
SUBCLASS PALEPHALOPODA
NAUTILUS SP.



(I) AMMONITES / NAUTILUS: ↑

* AMMONITE: COILED SHELL; CHAMBERS + SEPTA IDENTIFIED ✓

(II) CUTTLEFISH:

PHYLUM MOLLUSCA
CLASS CEPHALOPODA
SUBCLASS NEOCEPHALOPODA
COHORT COLEOIDEA
ORDER SEPIIDA
SEPIA

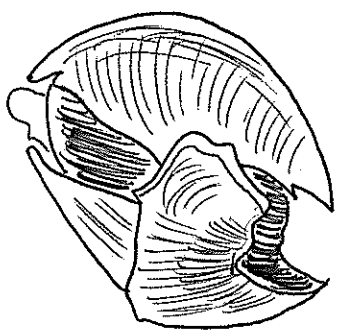
⇒

* CUTTLEBONE: REMNANT OF CUTTLEFISH
  → FUNCTION: BUOYANCY
  → LOCATION: IN THE MANTLE!

(III) SQUID + OCTOPUS:

PHYLUM MOLLUSCA
CLASS CEPHALOPODA
SUBCLASS NEO-CEPHALOPODA
ORDER TEUTHOIDEA
DOSIDICUS GIGAS

→ BEAK!



* PAPERED NAUTILUS: NOT NAUTILOIDS; EGG CASE FROM PELAGIC OCTOPUS, WHICH DOES NOT BEAR A SHELL

* OBSERVED CHITINOUS RINGS:
  → FUNCTION = GRIPPING PREY
  → PRESENT? = NOT SURE; FORGOT TO LOOK ...

* PEN:
  → FUNCTION = SUPPORT MUSCULAR TISSUES + ORGANS
  → LOCATION: VENTRAL PART OF MANTLE WALL

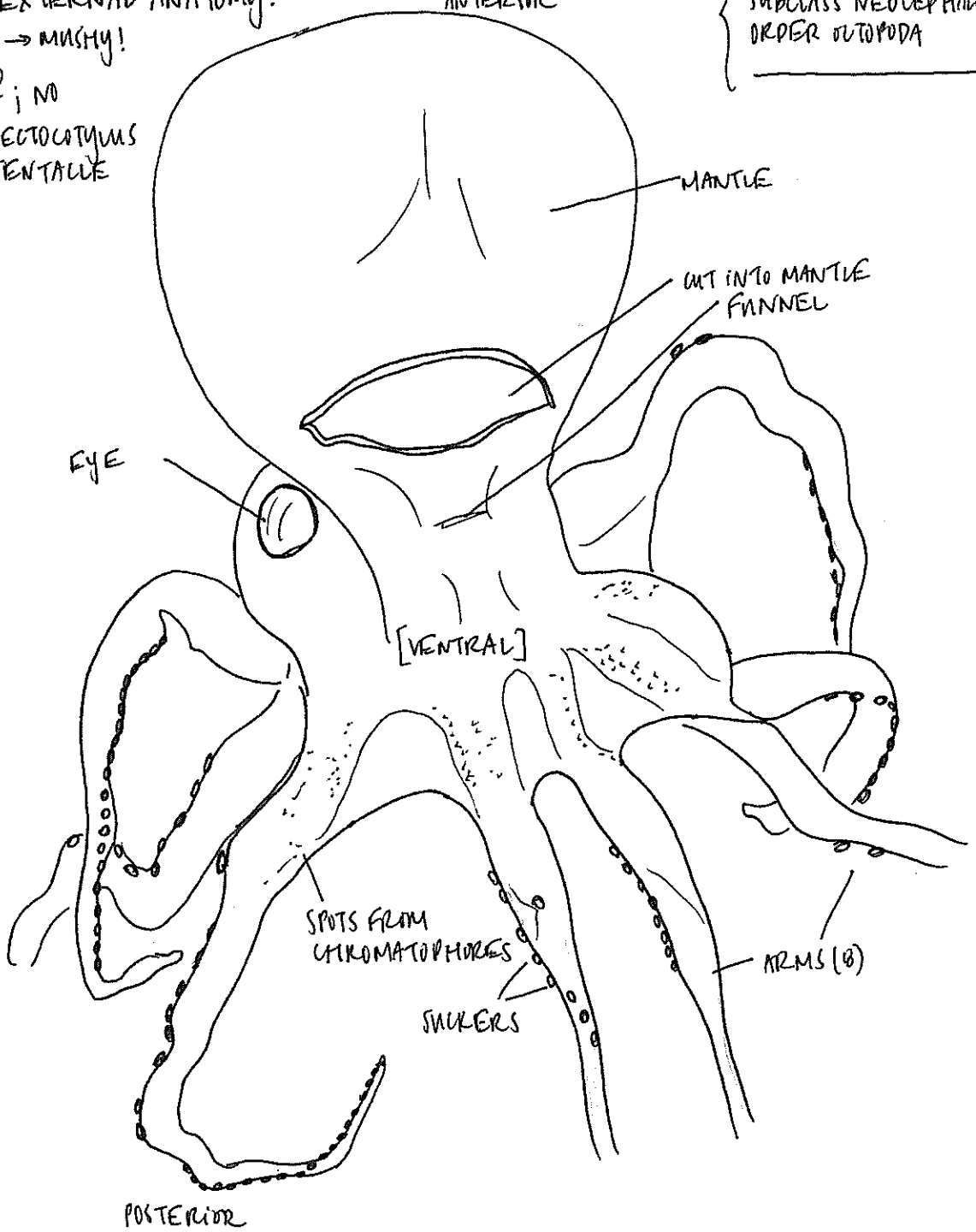
(IV) OCTOPUS DISSECTION!:

PHYLUM MOLLUSCA
CLASS CEPHALOPODA
SUBCLASS NEOCEPHALOPODA
ORDER OCTOPODA

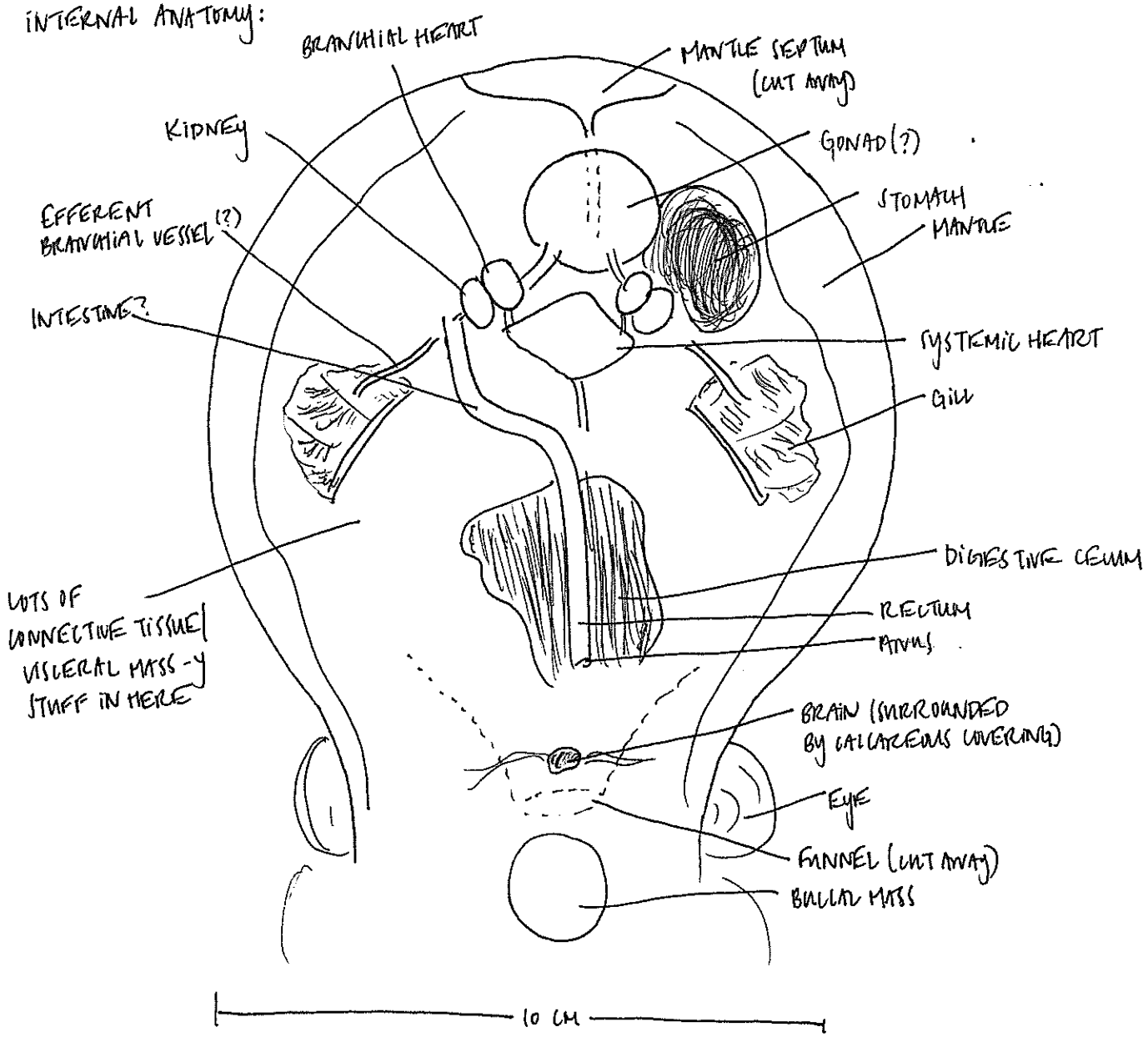
10 CM

EXTERNAL ANATOMY:
→ MUSHY!

♀; NO
HECTOCOTYLUS
TENTACLE



INTERNAL ANATOMY:

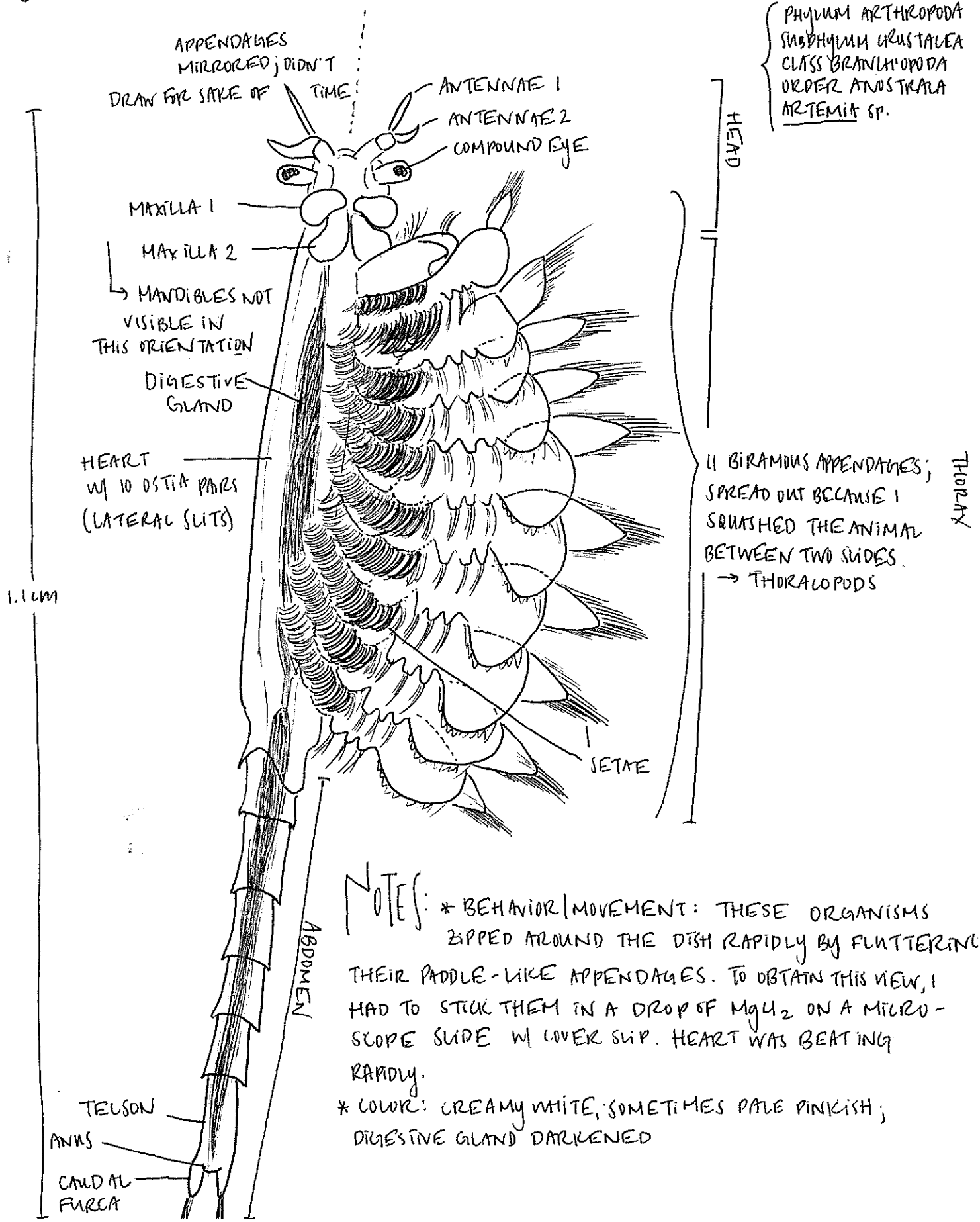


NOTES: *ANSWERS TO QUESTIONS: ANAL FLAPS: Octopus did not seem to have (from what we could see); but, they are involved in the release of ink. INK SAC: we could not seem to confidently locate - somewhat the story of much of this dissection — a squishy octopus, mixed! Made for quite the messy dissection. MUSCLES: Again, not obvious; much of what we saw was covered with connective tissue, making it challenging to keep all the structures straight. But, that is clearly an adaptation for keeping a complex internal anatomy sorted.

PHYLUM ARTHROPODA: SUBPHYLUM CRUSTACEA CLASS BRANCHIOPODA // 05.09.17

① ADULT BRINE SHRIMP: ♀ ; ♂ HAS ELONGATED HEAD STRUCTURES

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS BRANCHIOPODA
ORDER ANOSTRACA
ARTEMIA SP.



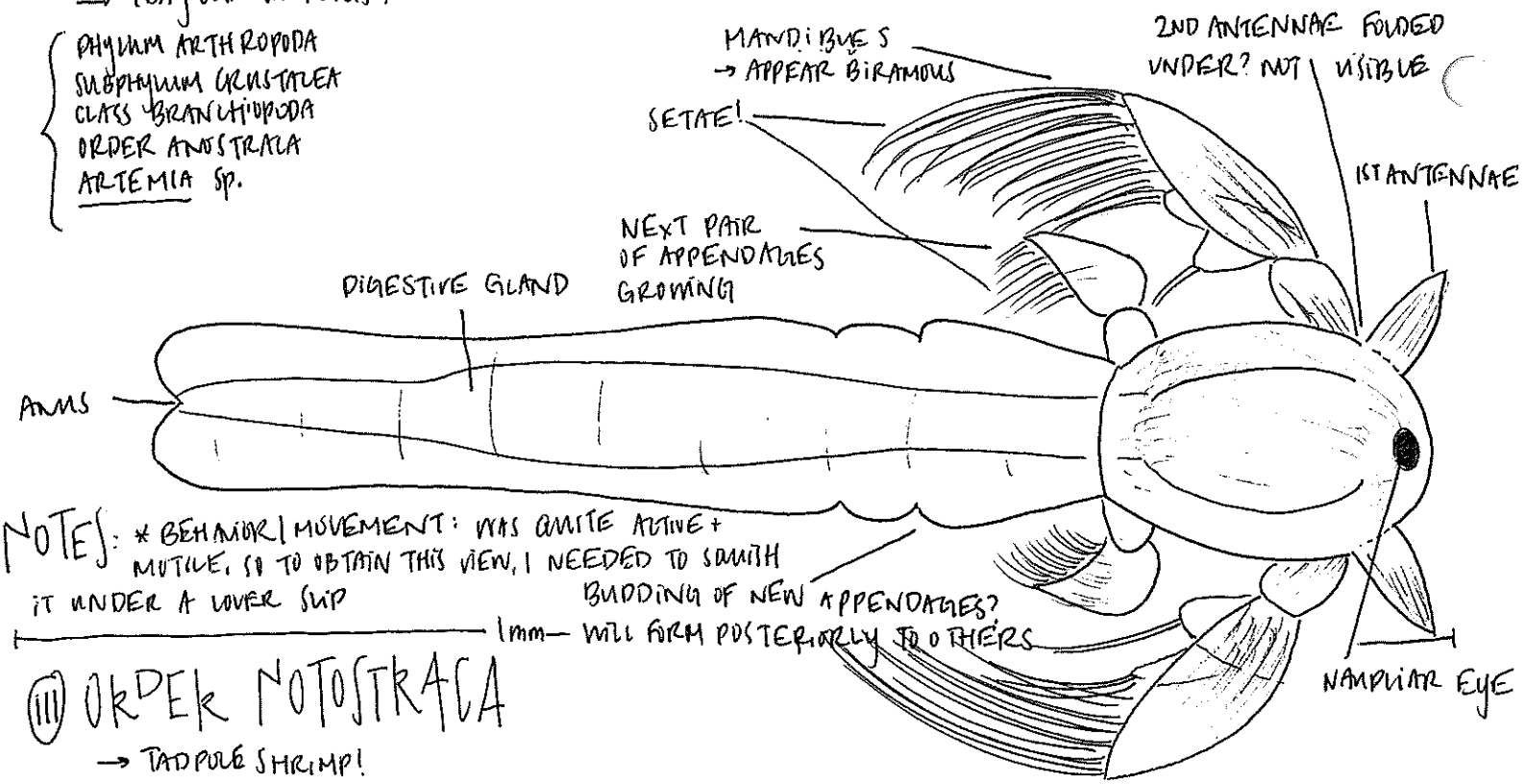
NOTES: * BEHAVIOR/MOVEMENT: THESE ORGANISMS ZIPPED AROUND THE DISH RAPIDLY BY FLUTTERING THEIR PADDLE-LIKE APPENDAGES. TO OBTAIN THIS VIEW, I HAD TO STICK THEM IN A DROP OF MgH_2 ON A MICRO-SCOPE SLIDE W/ COVER SLIP. HEART WAS BEATING RAPIDLY.

* COLOR: CREAMY WHITE, SOMETIMES PALE PINKISH; DIGESTIVE GLAND DARKENED

(II) NEWLY HATCHED ARTEMIA:

→ 4 DAY OLD NAUPLIUS!

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS BRANCHIOPODA
ORDER ANOSTRACA
ARTEMIA SP.



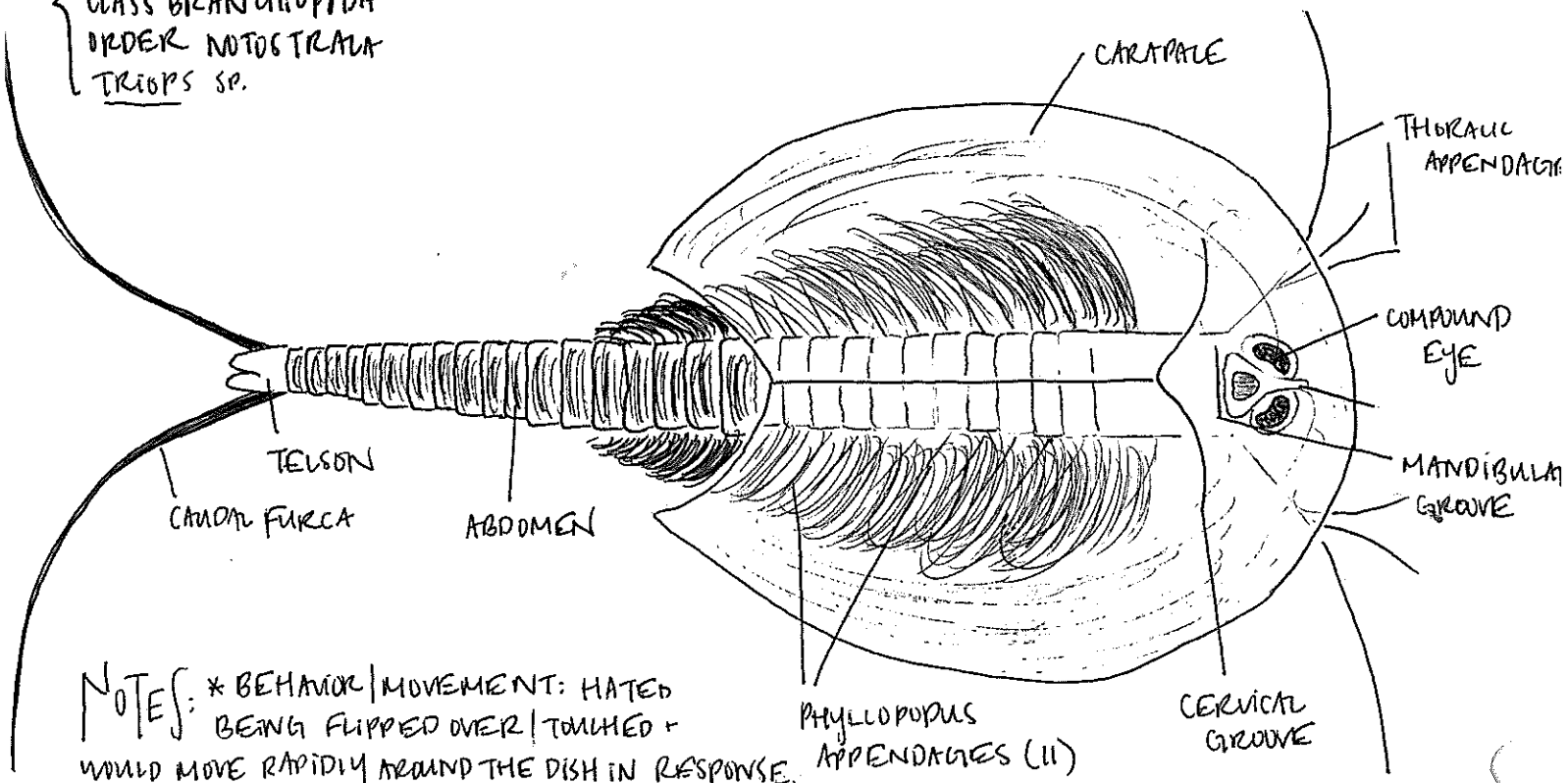
NOTES: * BEHAVIOR/MOVEMENT: WAS QUITE ACTIVE + MOTILE, SO TO OBTAIN THIS VIEW, I NEEDED TO SQUISH IT UNDER A COVER SLIP

1mm

(III) ORDER NOTOSTRACA

→ TADPOLE SHRIMP!

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS BRANCHIOPODA
ORDER NOTOSTRACA
TRIOPS SP.

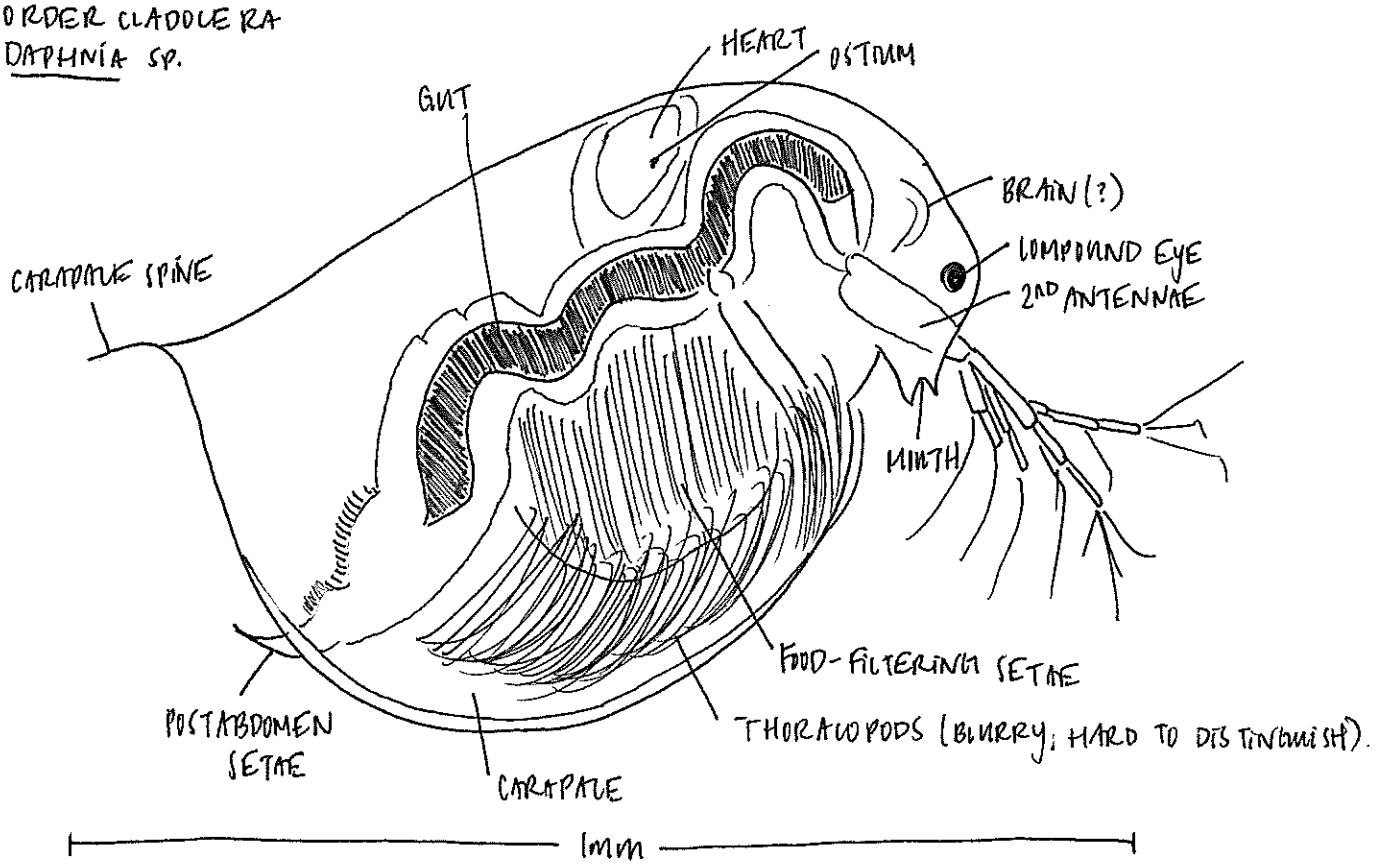


NOTES: * BEHAVIOR/MOVEMENT: HATED BEING FLIPPED OVER/TOUCHED + WOULD MOVE RAPIDLY AROUND THE DISH IN RESPONSE.
* COLOR: PEACHY RED; CARAPACE TRANSPARENT; RED COLOR RESULTING FROM HEMOGLOBIN!

1.7cm

(IV) CLASS DIPLOSTRACA:

- PHYLUM ARTHROPODA
- SUBPHYLUM CRUSTACEA
- CLASS DIPLOSTRACA
- ORDER CLADOCERA
- DAPHNIA SP.

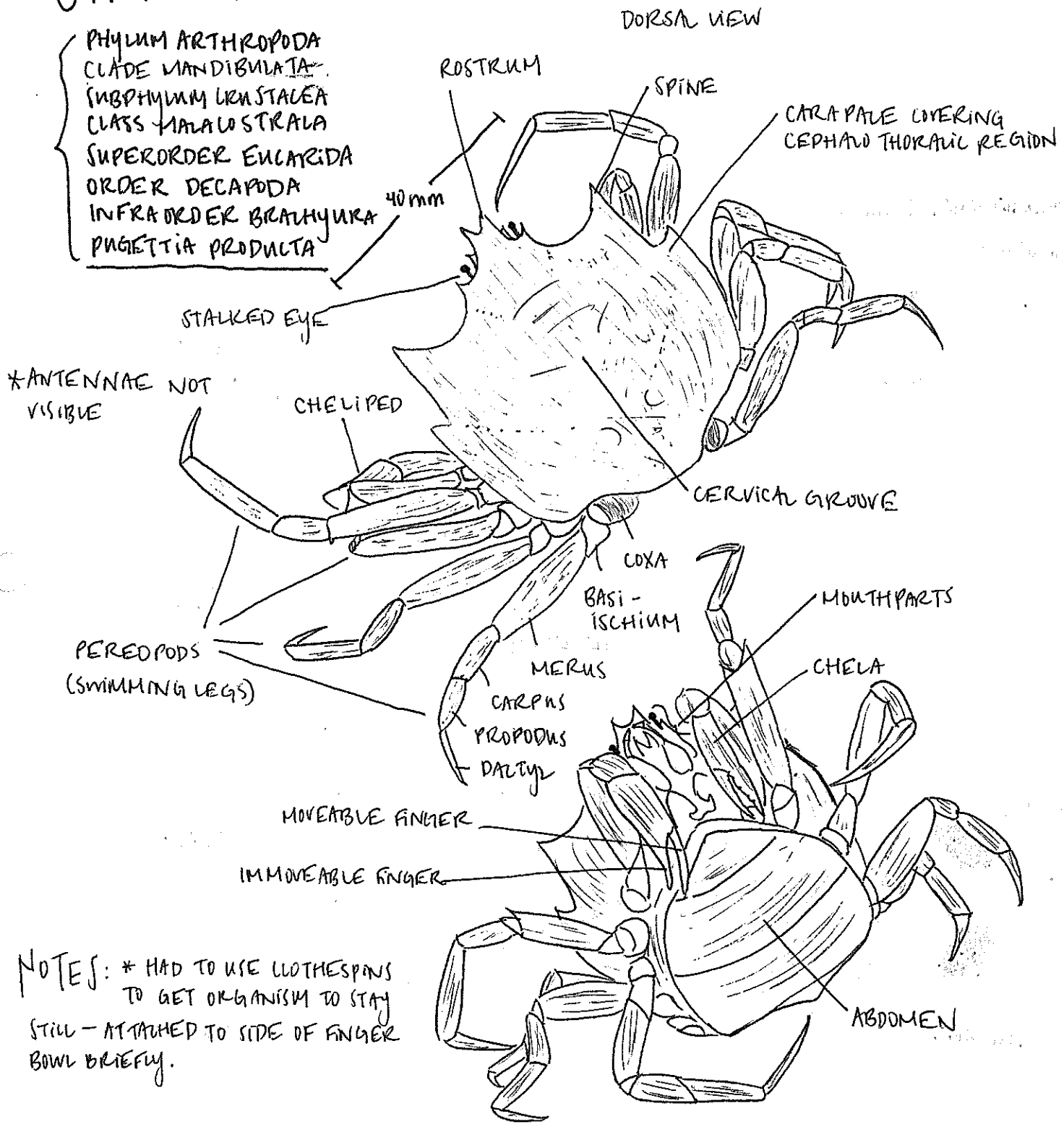


NOTES: * BEHAVIOR/MOVEMENT: OBSERVED HEART BEATING VERY FAST! ORGANISM STAYED PUT WELL. COULD SEE COMPOUND EYE MOVING AROUND, AS IF IT WERE LOOKING AT ME - QUITE BIZARRE.

PHYLUM ARTHROPODA: SUBPHYLUM CRUSTACEA CLASS MALACOSTRACA || 05.11.17

① BRACHYURA:

- PHYLUM ARTHROPODA
- CLADE MANDIBULATA
- SUBPHYLUM CRUSTACEA
- CLASS MALACOSTRACA
- SUPERORDER EUCARIDA
- ORDER DECAPODA
- INFRAORDER BRACHYURA
- PUGETTIA PRODUCTA

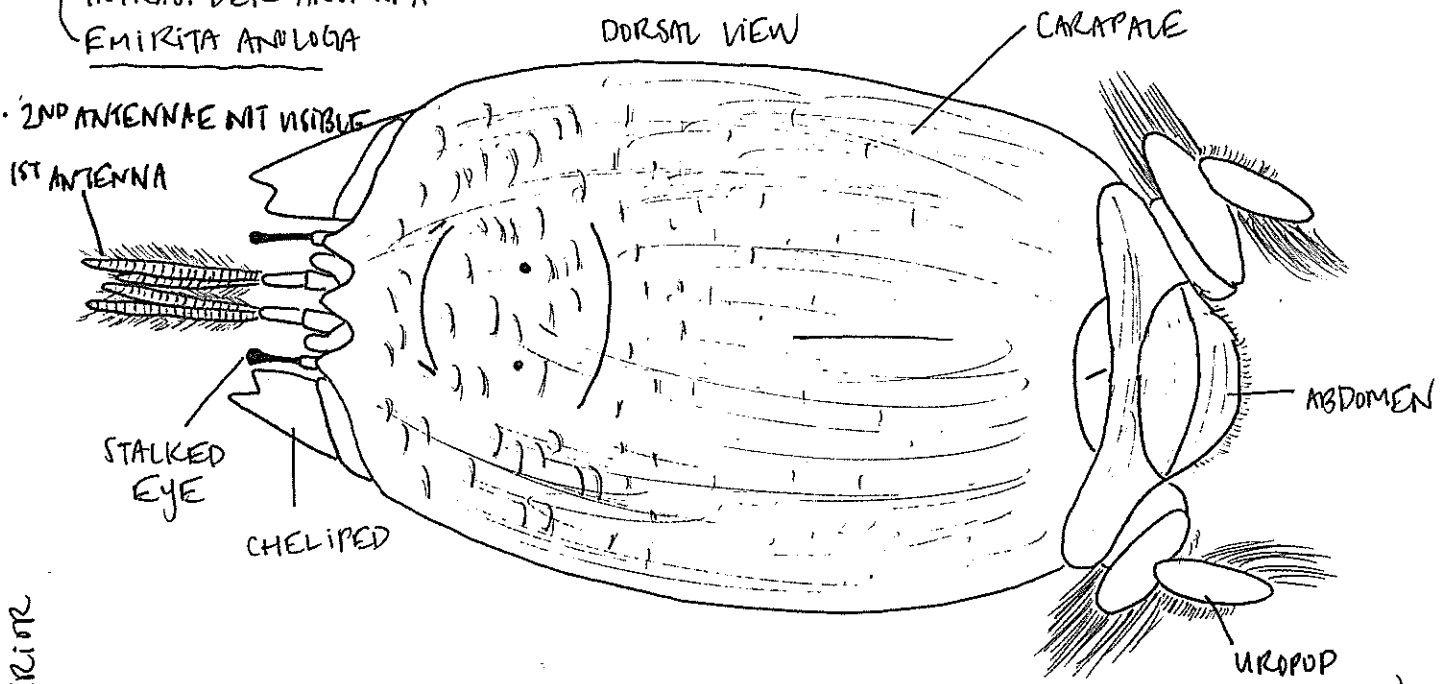


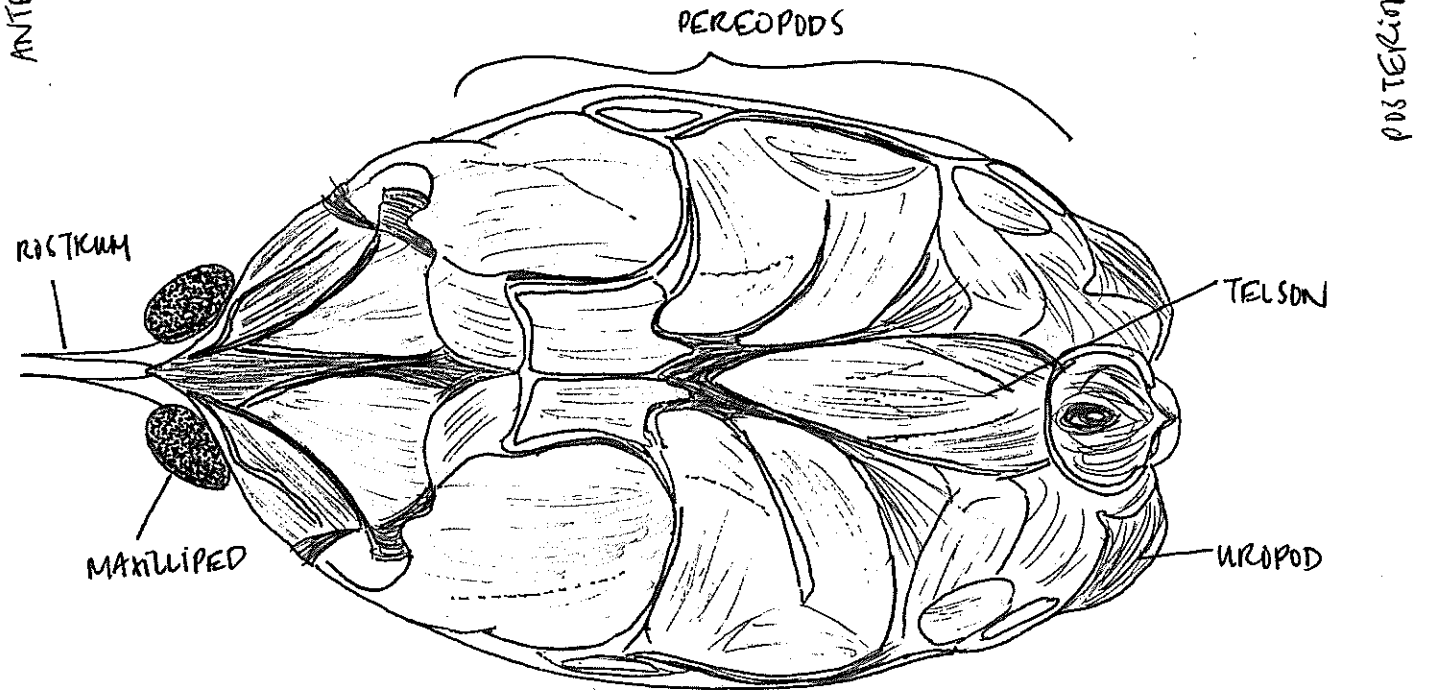
NOTES: * HAD TO USE CLOTHESPINS TO GET ORGANISM TO STAY STILL – ATTACHED TO SIDE OF FINGER BOWL BRIEFLY.

(11) ANOMURA:

- PHYLUM ARTHROPODA
- CLADE MANDIBULATA
- SUBPHYLUM CRUSTACEA
- CLASS MALACOSTRACA
- SUPERORDER EUCARIDA
- ORDER DECAPODA
- INFRAORDER ANOMURA
- EMIRITA ANOLOGA

NOTES: ANOTHER ACTIVE ORGANISM; HAD TO PLACE BETWEEN TWO BOWLS TO GET IT TO SIT STILL IN THIS VIEW. IT OTHERWISE KEPT ATTEMPTING TO BURROW ITSELF INTO THE GLASS BY WIGGLING ITS BUTT (PADDLING ITS UROPODS) – A FUTILE ATTEMPT, INDEED.





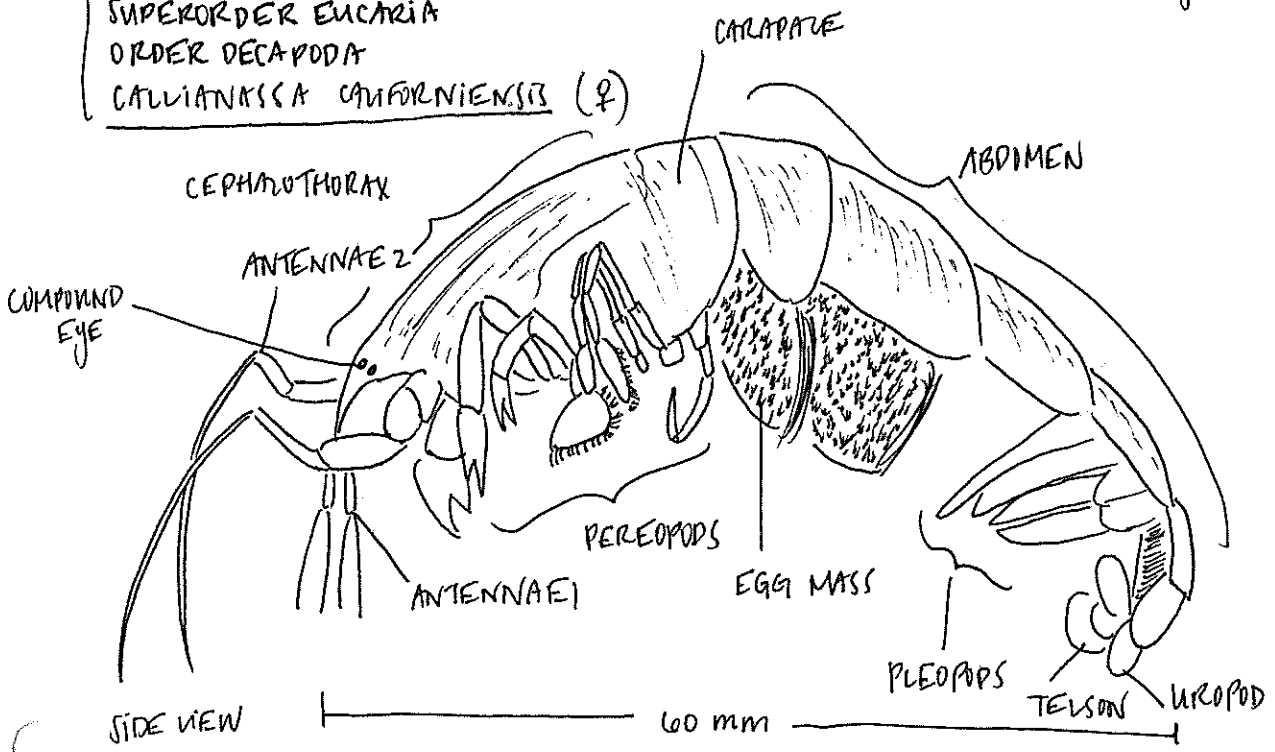
VENTRAL VIEW

31mm

(III) LOBSTER-LIKE DECAPOD:

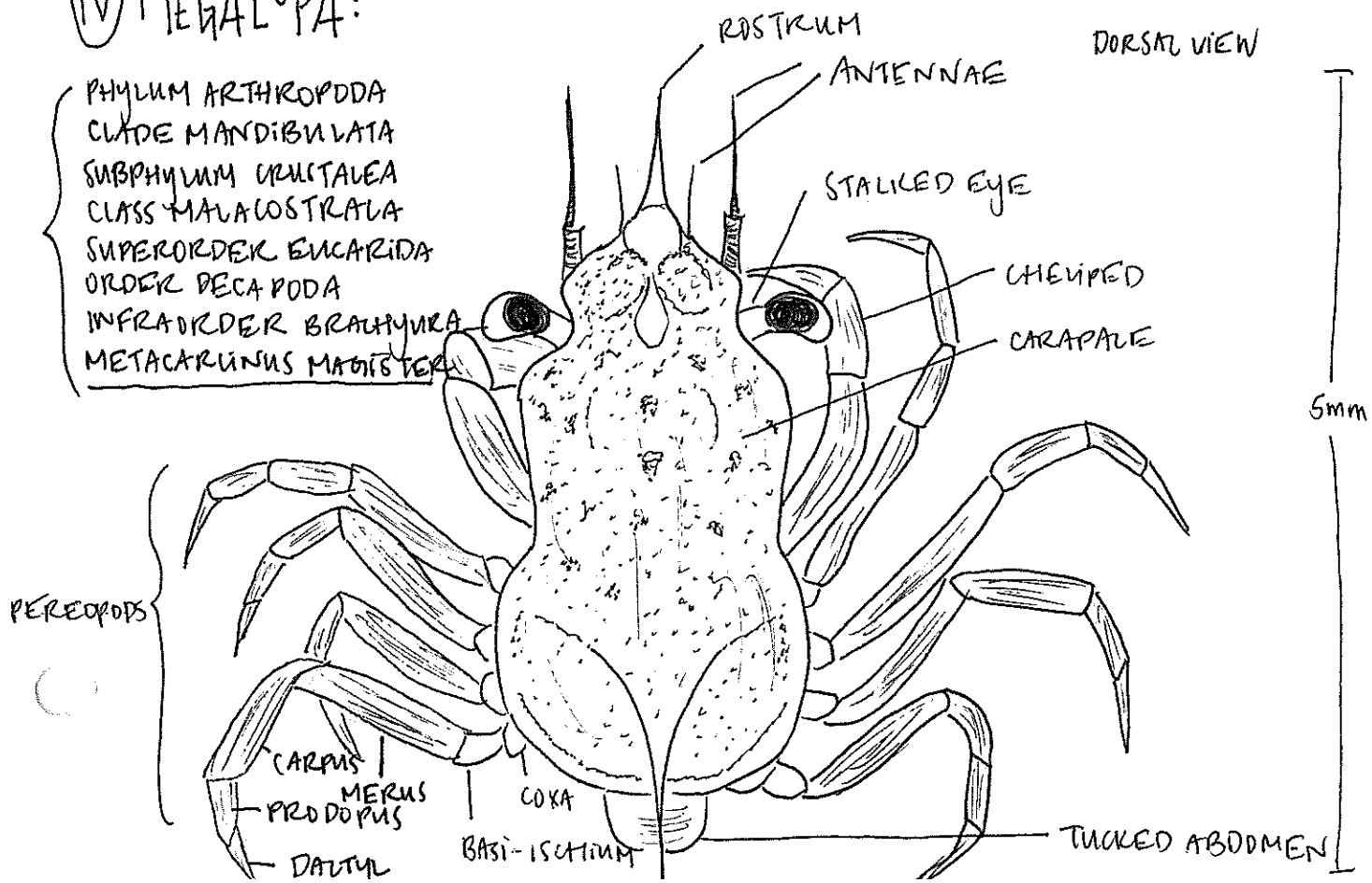
PHYLUM ARTHROPODA
CLADE MANDIBULATA
SUBPHYLUM CRUSTACEA
CLASS MALACOSTRACA
SUPERORDER EUCARIA
ORDER DECAPODA
CALLIANASSA CALIFORNIENSIS (♀)

NOTES: * LITTLE LADY WAS PRETTY MANGLED, BUT WAS CARRYING PRETTY HIGHLY DEVELOPED EGGS — COULD SEE THEIR EYES!



(IV) MEGALOPA:

PHYLUM ARTHROPODA
CLADE MANDIBULATA
SUBPHYLUM CRUSTACEA
CLASS MALACOSTRACA
SUPERORDER EUCARIDA
ORDER DECAPODA
INFRAORDER BRACHYURA
METACARCINUS MAGISTER

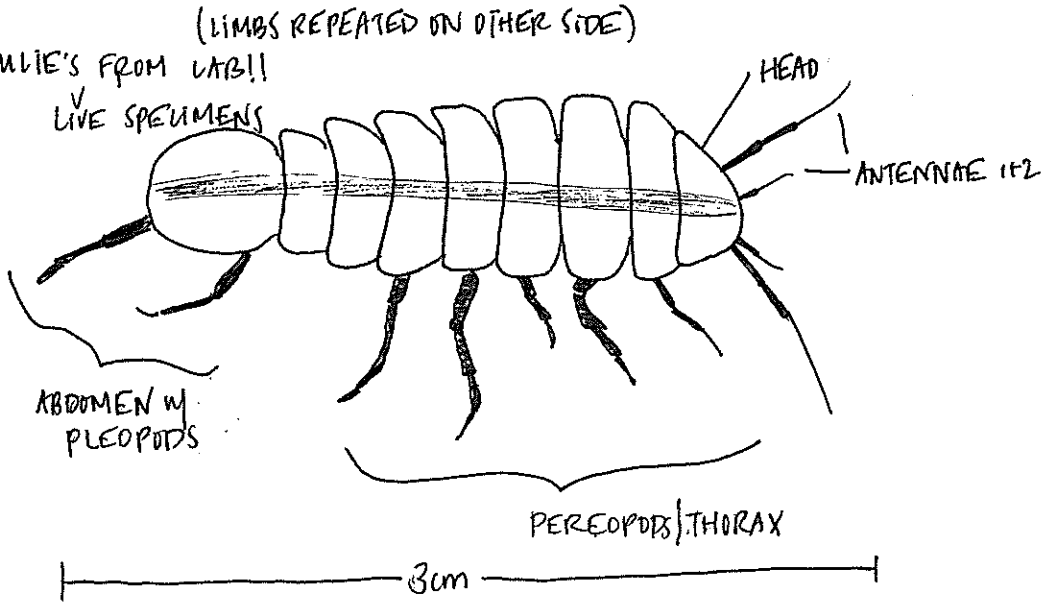


(V) CRAB IDENTIFICATION:

WE IDENTIFIED: OREGONIA GRACILIS (BRACHYURA), PAGURUS BERINGANUS, PAGURUS SAMUELIS, + PAGURUS GRANISOMANUS (ANOMURA)

(VI) ISOPOD: → USED ONE OF JULIE'S FROM LAB!!

- PHYLUM ARTHROPODA
- CLADE MANDIBULATA
- SUBPHYLUM URUSTACEA
- CLASS MALACOSTRACA
- SUPERORDER PERACARIDA
- ORDER ISOPODA
- IDOTEA



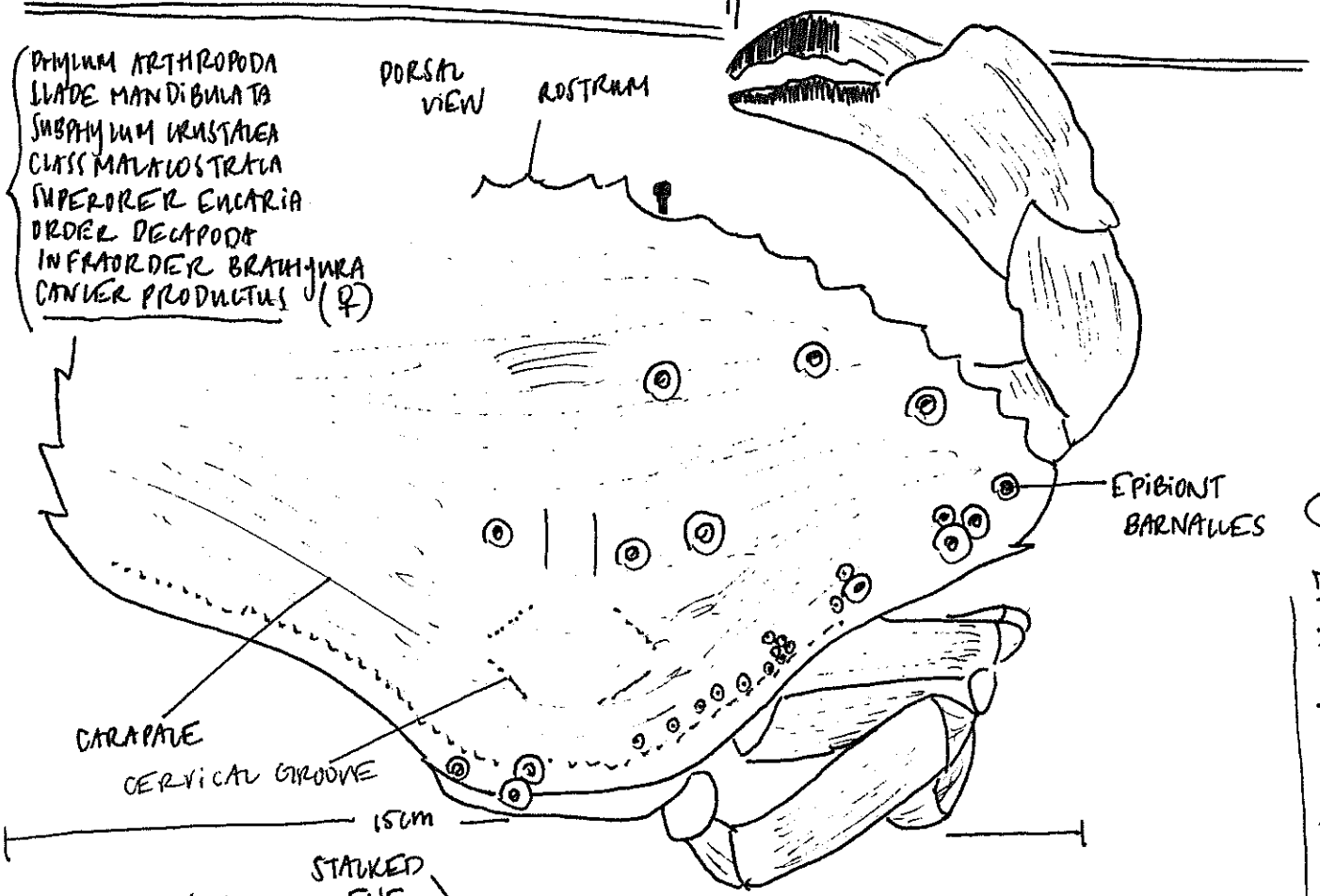
PHYLUM ARTHROPODA : CRAB DISSECTION!

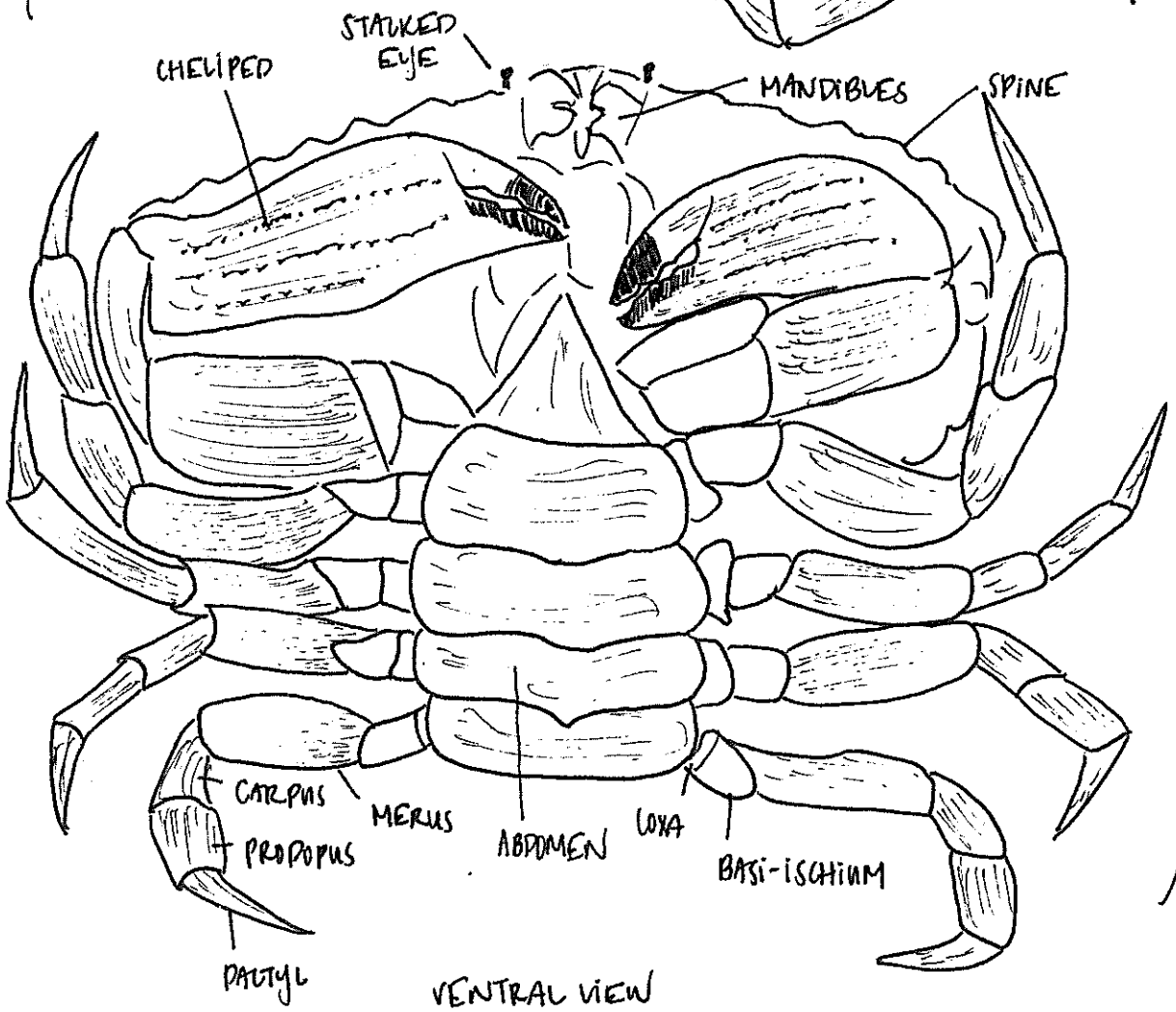
05. 11. 17

PHYLUM ARTHROPODA
CLADE MANDIBULATA
SUBPHYLUM CRUSTACEA
CLASS MALACOSTRACA
SUPERORER EUCARIA
ORDER DECAPODA
INFRAORDER BRACHYURA
CANCER PRODUCTUS (♀)

① EXTERNAL ANATOMY

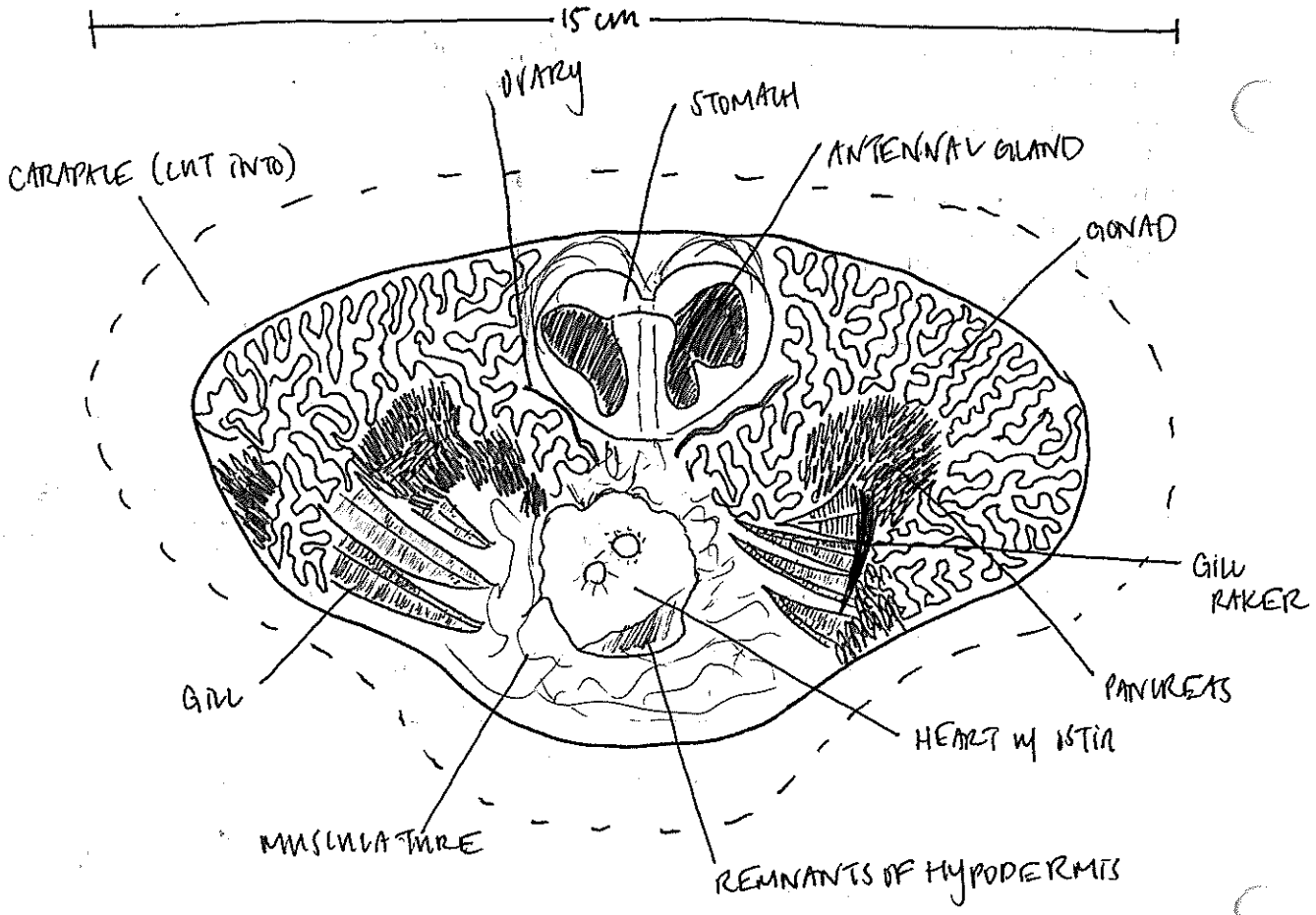
DORSAL VIEW



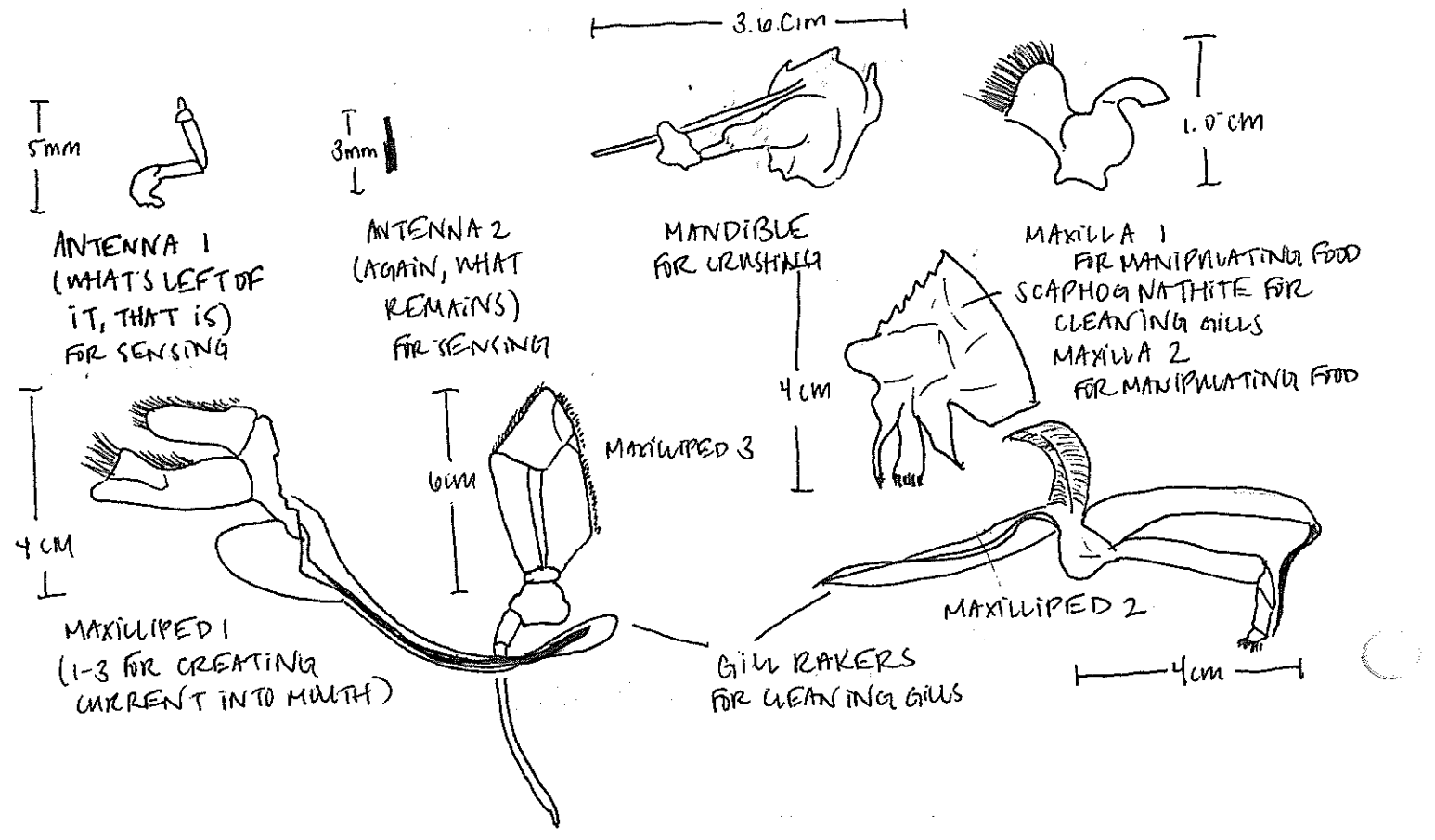


VENTRAL VIEW

(II) INTERNAL ANATOMY:



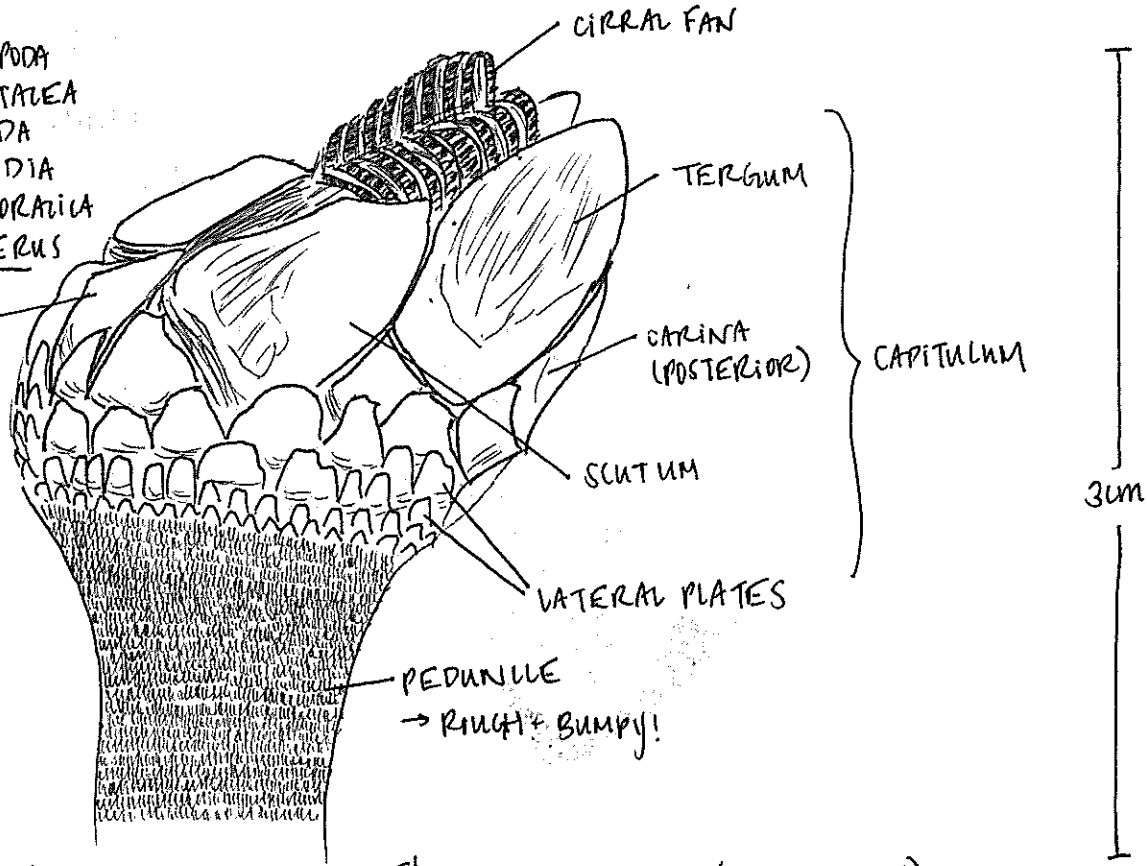
(III) APPENDAGES:



PHYLUM ARTHROPODA:

① GOOSENECK BARNACLE:

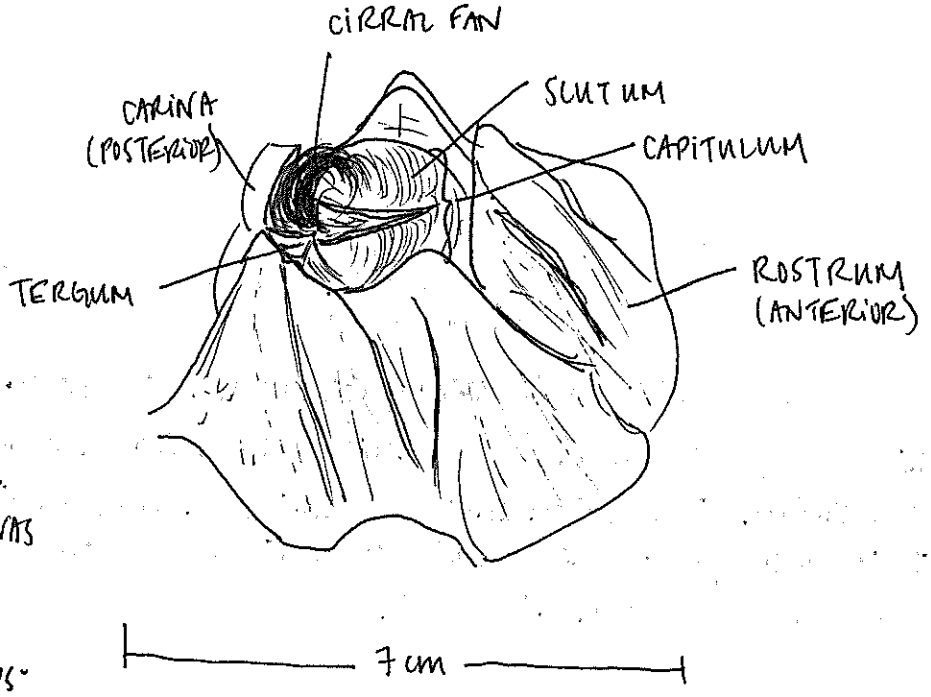
PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS MAXILLOPODA
SUBCLASS CIRRIPEDIA
SUPERORDER THORACICA
POLLICIPES POLYMERUS



NOTES: JUVENILES SETTLED ON PEDUNCLE/STALK IN A CLUMP (NOT DRAWN). INDIVIDUAL NEVER COMPLETELY UNCURLED ITS CIRRI, OF WHICH IT HAS 20 TOTAL, AND DID NOT RESPOND TO BEING FED.

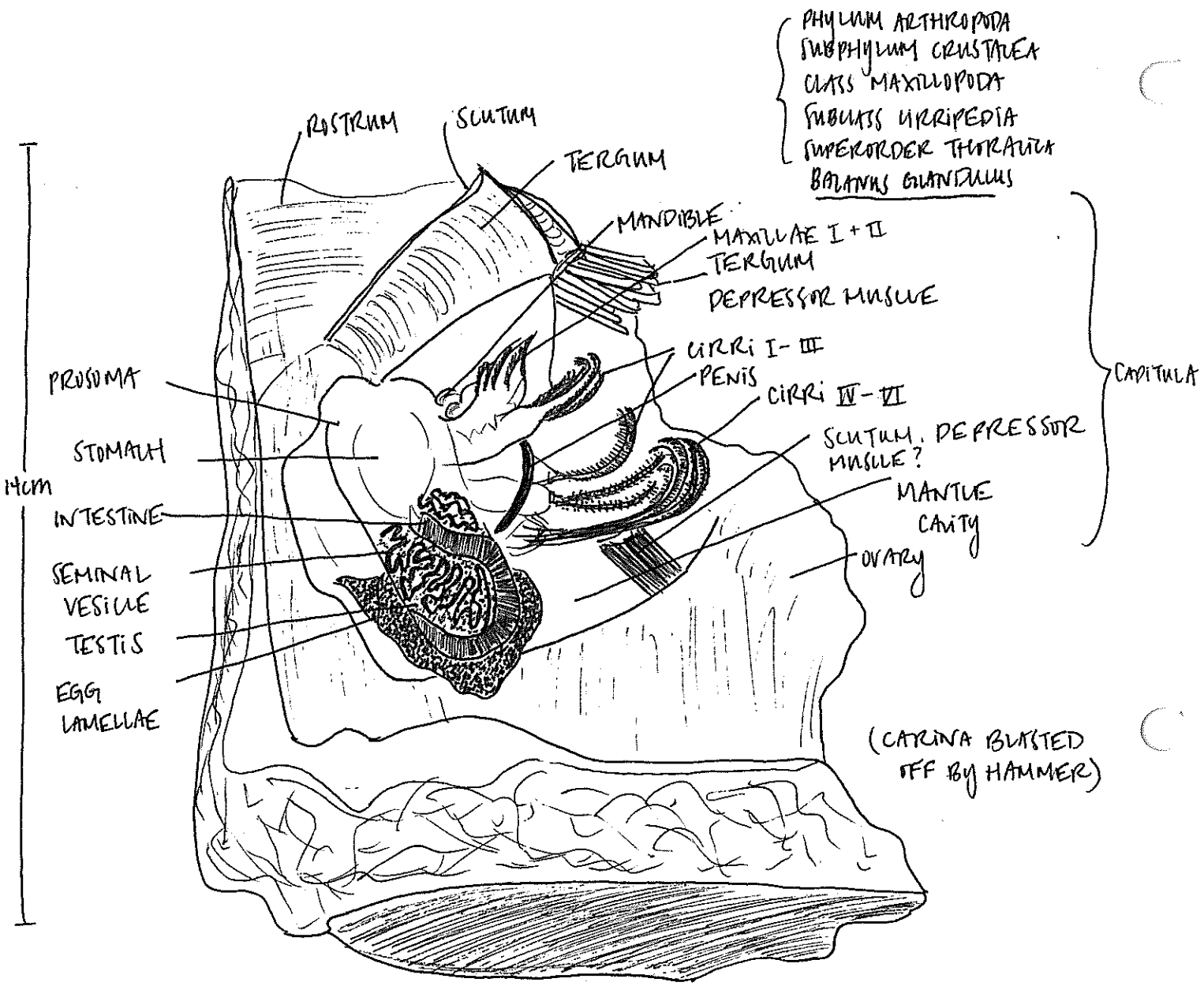
II ACORN BARNACLE:

PHYLUM ARTHROPODA
SUBPHYLUM CRUSTACEA
CLASS MAXILLOPODA
SUBCLASS CIRRIPEDIA
SUPERORDER THORACICA
BALANUS GLANDULUS



NOTES: HAD 2 JUVENILES GROWING ON IT. AS WELL AS A SMALL MERIDIUM! A VERY ACTIVE BARNACLE; WAS TWISTING ITS CAPITULUM AROUND A LOT, AS WELL AS SHOWING OFF ITS BEAUTIFUL PURPLE CIRRI + YELLOW "LIPS"

III BARNACLE DISSECTION:



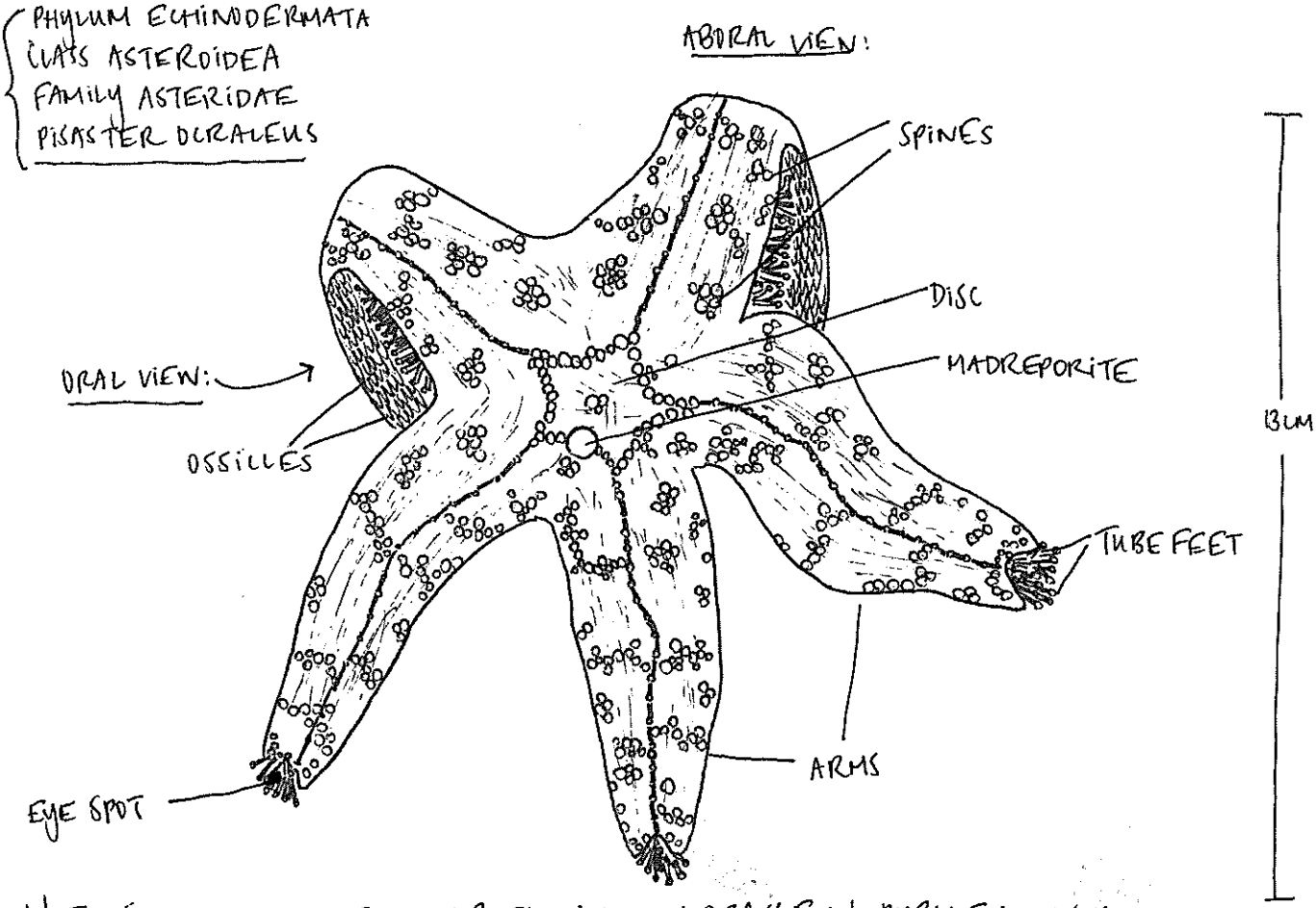
NOTES: SMASHED OPEN THIS LARGE BARNACLE W/ A HAMMER. LOTS OF OVARY PRESENT, WHICH WHEN GENTLY CUT AWAY REVEALED EGG LAMELLAE ON THE OUTSIDE OF THE MANTLE CAVITY. THE ORGANISM WAS WIGGLING AROUND IN THE MANTLE CAVITY FOR THE DURATION OF THE DISSECTION. ALL MOUTHPARTS / CIRRI WERE CLEAR AND DISTINGUISHABLE. MANY ORGANS YELLOW, W/ EXCEPTION OF PROSOMA — PINK, W/ DARK GREEN INTESTINE, WHITE SEMINAL VESICLE + PURPLE CIRRI. MUSCLES OPAQUE.

IV BEHAVIOR: WHEN PRESENTED W/ FOOD, POLLICIPES SHOWED NO REACTION. THE BALANUS I OBSERVED WAS ALREADY QUITE ACTIVE, AND SEEMED ENTHUSIASTIC ABOUT THE FOOD FALLING FROM THE SKY — THE CIRRI PROTRUDED TO COLLECT THE BITS OF ARTEMIA + MUSSEL JUICE. COMPARED TO A CLOSED CONTROL, THIS ORGANISM WAS MUCH MORE ACTIVE.

PHYLUM ECHINODERMATA: CLASS ASTEROIDEA || 05.16.17

(I) ANATOMY, DIVERSITY:

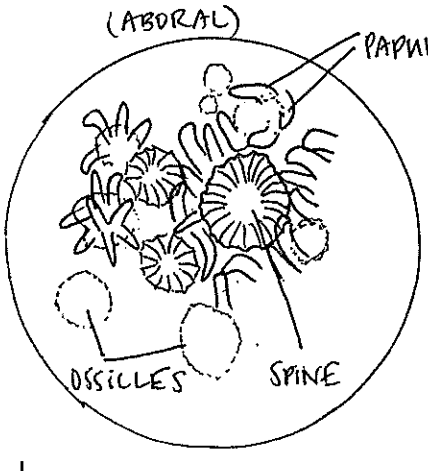
PHYLUM ECHINODERMATA
CLASS ASTEROIDEA
FAMILY ASTERIDAE
PISASTER OCHRACEUS

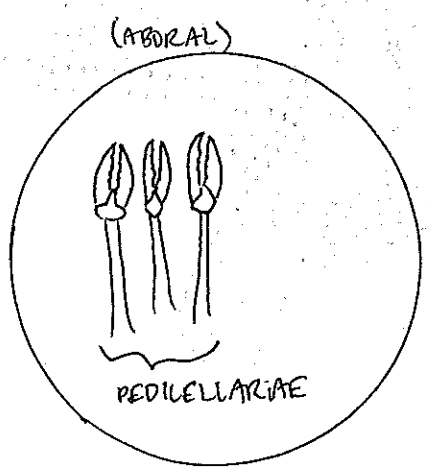


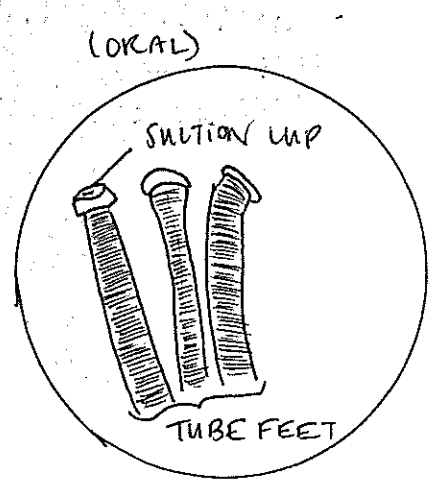
NOTES: COLOR: MOTTLED, BUT PREDOMINANTLY ORANGE W/ PURPLE ACCENTS.
SPINES BRIGHT WHITE; MADREPORITE + TUBE FEET PALE PINK.

SEE BEHAVIOR SECTION FOR NOTES ON MOVEMENT. SPINES ON ORAL + ABORAL SURFACE LOOK DISTINCTLY DIFFERENT.

(II) EXTERNAL STRUCTURES: ON ABOVE PISASTER



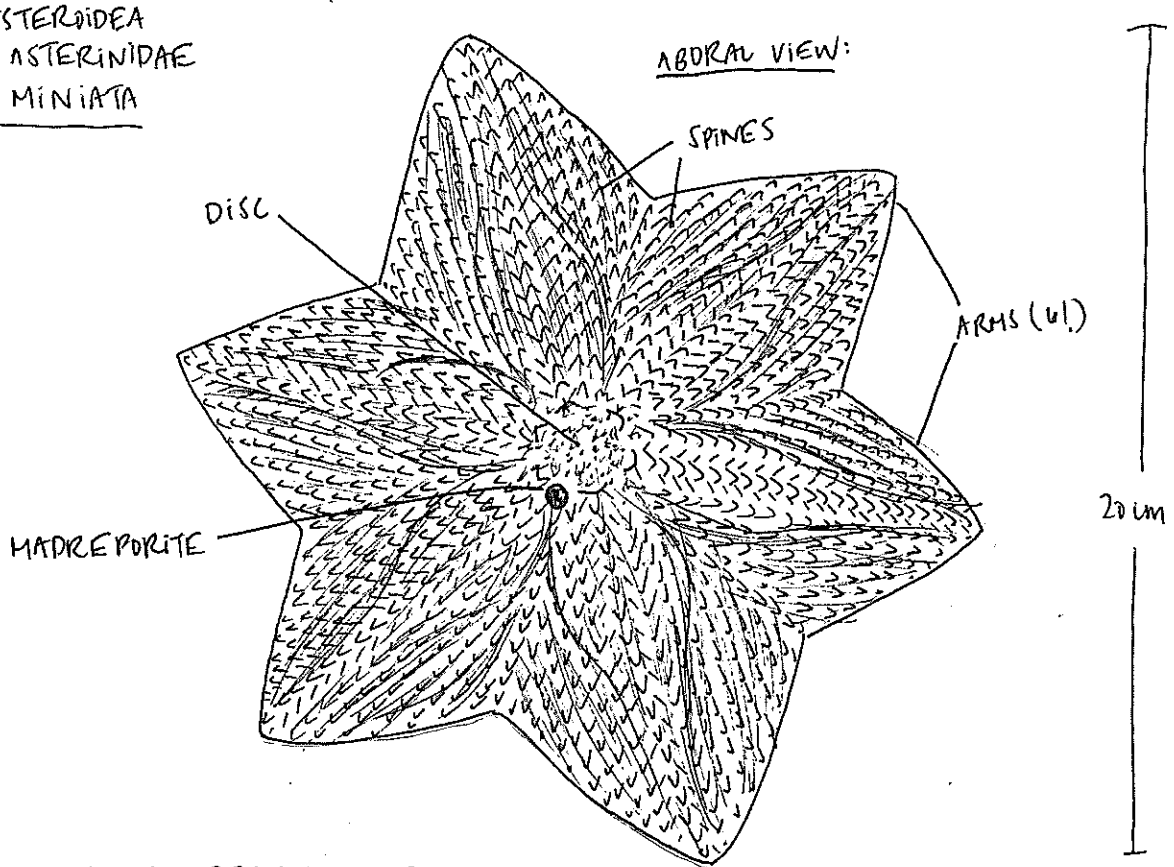




PHYLUM ECHINODERMATA
CLASS ASTEROIDEA
FAMILY ASTERINIDAE
PATIRIA MINIATA

(DIVERSITY, CON'T.)

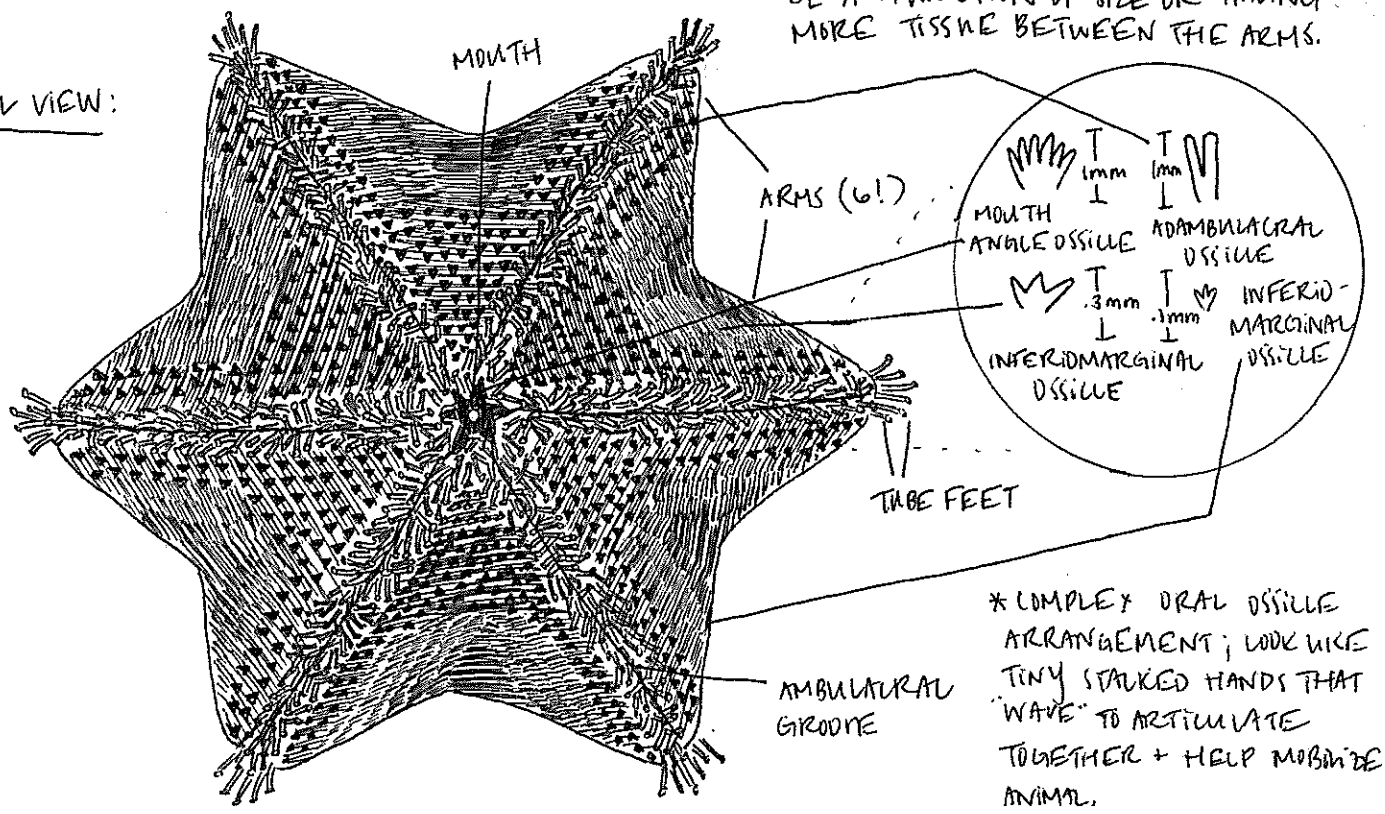
ABORAL VIEW:



NOTES: COLOR: DESPITE THE COLORATION AS DRAWN, THE ORAL SIDE IS A PALE PINK WITH DARKER TUBE FEET, AND THE ABORAL SIDE IS A DARK MAROON WITH REDDISH SPINES ON THE DISC; MADREPORITE BEIGE.

MOVEMENT | BEHAVIOR: TOOK A BIT LONGER TO RIGHT ITSELF THAN PISASTER, WHICH COULD BE A FUNCTION OF SIZE OR HAVING MORE TISSUE BETWEEN THE ARMS.

ORAL VIEW:



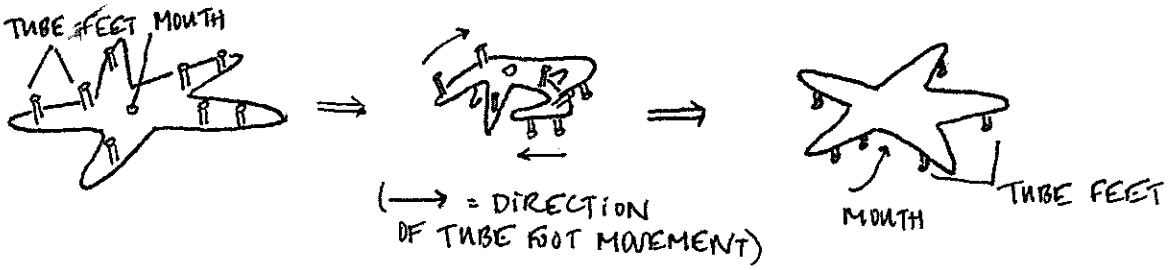
*COMPLEX ORAL OSSICLE ARRANGEMENT; LOOK LIKE TINY STALKED HANDS THAT "WAVE" TO ARTICULATE TOGETHER + HELP MOBILIZE ANIMAL.

(III) MOVEMENT:

* OBSERVED LUIDIA FORBESI: (COLLECTED FROM PLUTEUS BOAT TRIP ON 06.01.2017) –

1) LOCOMOTION: TUBE FEET HAVE NO SUCKERS(!), AND THUS THE LOCOMOTION LOOKS MORE DAINTY (LIKE A BALLERINA EN POINTE) THAN, SAY, PISASTER, WHICH SORT OF CLUNKS ITS WAY AROUND ON HARD SUBSTRATES. BECAUSE IT HAS NO SUCKERS, THIS STAR CAN'T CLIMB VERTICAL WALL SURFACES. ON SANDY BOTTOMS, THOUGH, THE FEET MOVE SYNCHRONISTICALLY TO "PUSH" THE STAR ALONG. A FOOT FOOT WILL EXTEND OUT, PENDULUM BACK IN THE DIRECTION FROM WHENCE IT CAME, MEET THE SUBSTRATUM, PROPELLING THE BODY ABOVE FORWARD, THEN FOLLOW THROUGH IN THE DIRECTION IT WAS SWINGING. WHEN ~1000 (2 ROWS/ARM; ~100 FEET/ROW) FEET COMPLETE THIS MOVEMENT, THE RESULT IS A SPEEDY SEA STAR.

2) RIGHTING BEHAVIOR: LUIDIA RIGHTS ITSELF FAIRLY QUICKLY RELATIVE TO PATRIA, PISASTER. IT LOOKS ABOUT THE SAME AS A HUMAN GETTING INTO A "WHEEL" YOGA POSE AND THEN KICKING ITS LEGS OVER IN BACK-HANDSPRING MOTION, BUT WITH AN EXTRA APPENDAGE. TWO ARMS "TWIST" OVER, IN THE SAME DIRECTION, SO THE TUBE FEET CAN HELP PUSH THE ARM FURTHER UNDER ITSELF. THE OTHER 3 ARMS GET ONTO THEIR "TIPPY TOES" (EDGES OF THEIR ARMS). PERHAPS TO CREATE A FLAPPING MOMENTUM, THE TUBE FEET "WAVE" LATERALLY → MEDIALLY ON THESE 3 ARMS. EVENTUALLY, THE 3 LEGS KIND OF FLOPPED OVER SO THE STAR WAS IN THE PROPER ORAL/ABORAL ORIENTATION.



WHEN CHALLENGED WITH THE TASK A SECOND TIME, THE INDIVIDUAL USED THE SAME 2 "TWIST" | 3 "WALKOVER" ARMS. FOR THE THIRD TIME, IT USED DIFFERENT ARMS, THOUGH IT MOVED SLOWER AND THE 2|3 WERE ALWAYS ADJACENT ARMS.

3) PYLNOPODIA + STRONGYLOCENTROTUS: WHEN PLACED NEXT TO ONE ANOTHER, THE IMMEDIATE REACTION WAS, PERHAPS, NOT AS DRAMATIC AS IT WOULD HAVE BEEN IF THE STAR (PYLNO) WEREN'T A FRACTION OF THE SIZE OF THE URCHIN (STRONGYLO.). NEVERTHELESS, THE URCHIN TRIED TO SLOWLY CREEP AWAY AS THE STAR REMAINED DISENGAGED. THE URCHIN, WHEN PLACED EVEN CLOSER, PUT ITS ABORAL SPINES DOWN FLAT, FLUSH WITH ITS TEST'S SURFACE. IT ALSO PUT UP ITS 3-PRONGED PEDICELLARIAE, WHICH SNAGGED OFF A FEW TUBE FEET OF THE STAR WHEN WE PUT THE STAR ON THE URCHIN.

4) PYLNOPODIA + PARASTICHOPUS: AGAIN, THE STAR REMAINED RELATIVELY DISENGAGED, THOUGH THE CUCUMBER (PARA.) MADE A SLUGGY, YET VALIANT, EFFORT TO MOVE AWAY. THE CUCUMBER CONTRACTED ITS MUSCLE WALLS TO TRY AND WIGGLE AWAY, BUT UNFORTUNATELY THIS MOVEMENT ULTIMATELY RESULTED IN IT ROLLING TOWARD THE STAR (WOMP WOMP).

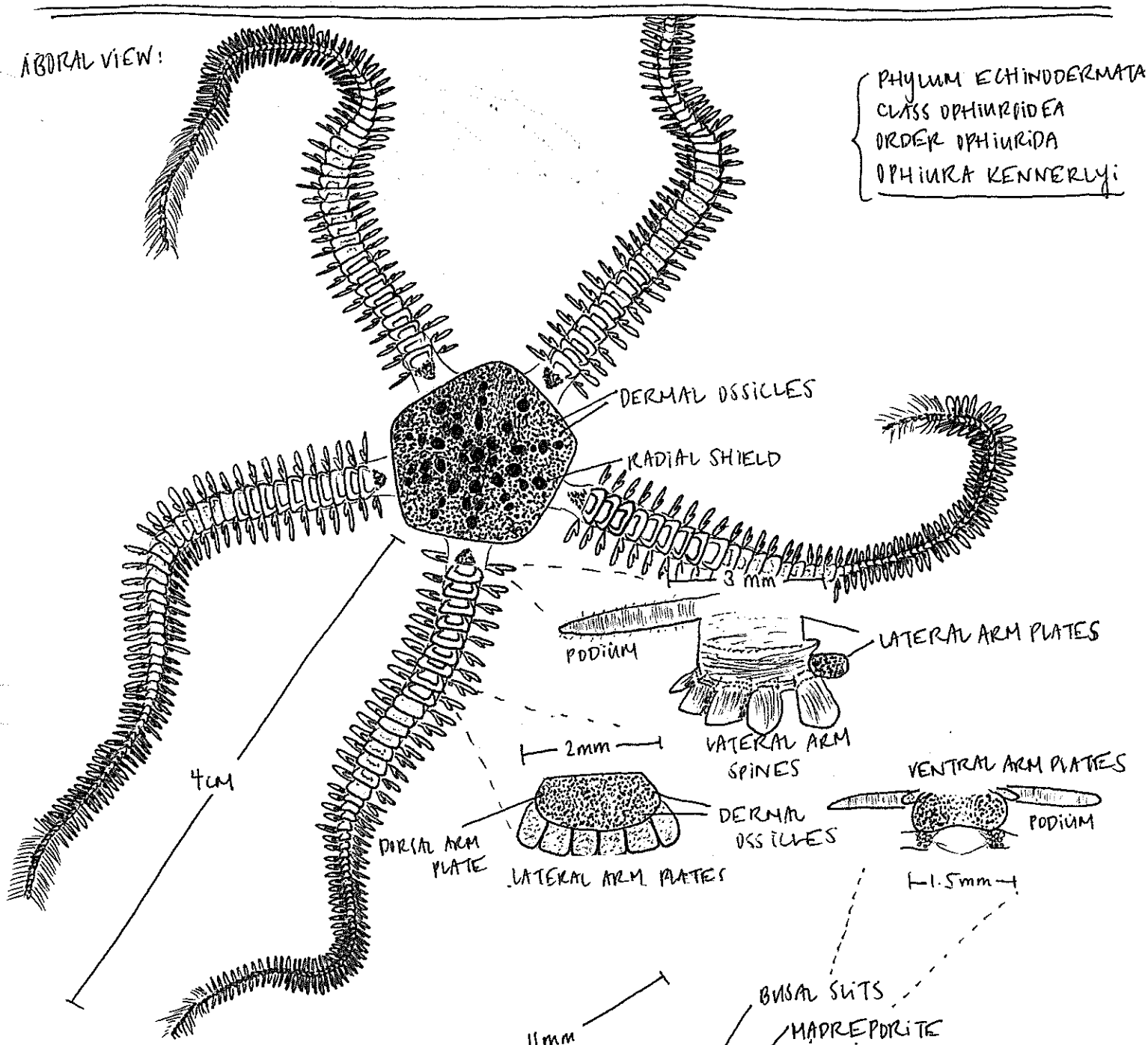
5) ARCTONIE IN DIODORA: COULD NOT SUCCESSFULLY ELICIT A RESPONSE FROM ARCTONIE AGAINST PISASTER OR PYCNOPODIA.

6) PISASTER FEEDING BEHAVIOR: ① Attach podia to shell + conform star body + arms to shell; ② form arch centering over the seam between the two valves; ③ stiffen the mutable collagenous tissue in dermal tissue to make arch rigid + pull with tube feet; ④ when shell gapes, extrude cardiac stomach into soft tissues; ⑤ digest extracellularly; ⑥ ciliated gastric epithelium moves digested prey back into pyloric stomach for distribution into pyloric caecae.

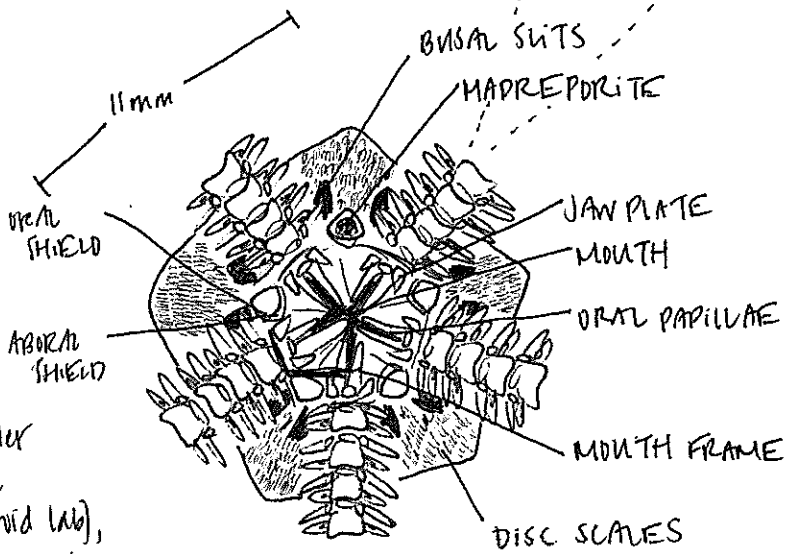
PHYLUM ECHINODERMATA: CLASS OPHIUROIDEA // 05.23.17.

PHYLUM ECHINODERMATA
CLASS OPHIUROIDEA
ORDER OPHIURIDA
OPHIURA KENNERLYi

ABORAL VIEW:



(1) OPHIUROID ANATOMY:



ORAL VIEW:

NOTES: MOVEMENT | BEHAVIOR:

When turned on its aboral surface, the brittle star quickly righted itself in a manner quite comparable to the asteroid Luidia (see elaborate notes on that behavior in Asteroid Lab), but with considerably more twisting of the arms. Also, the ophiuroid tended to rely on the sides of the disk it was on for support more than the asteroid.

(II) OTHER OSSICLE MORPHOLOGY:

PHYLUM ECHINODERMATA
CLASS OPHIUROIDEA;
ORDER EURYALIDA
GORGONOCEPHALUS EUCNEMIS

VENTRAL ARM PLATE

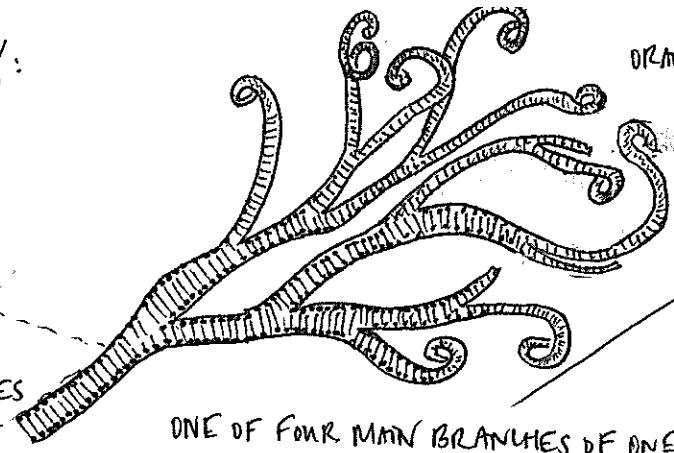
ORAL VIEW
4mm

ABORAL VIEW

DERMAL OSSICLES

4mm

ORAL VIEW:

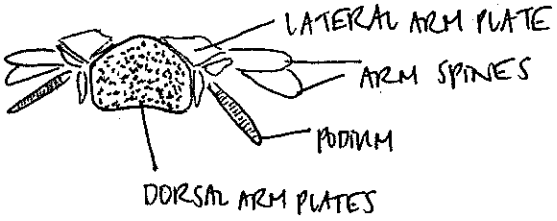


ONE OF FOUR MAIN BRANCHES OF ONE OF FIVE ARMS; HIGHLY BIFURCATED ORGANISM!

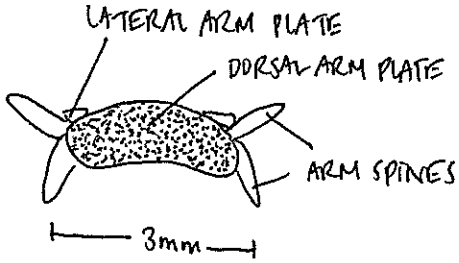
9cm

* PODIA ABSENT; OBSERVED DECEASED + DRIED ANIMAL
* ALSO COULDN'T VISUALIZE GROWTH RINGS ..?

PHYLUM ECHINODERMATA
CLASS OPHIUROIDEA
ORDER OPHIURIDA
AMPHIODIA OCCIDENTALIS

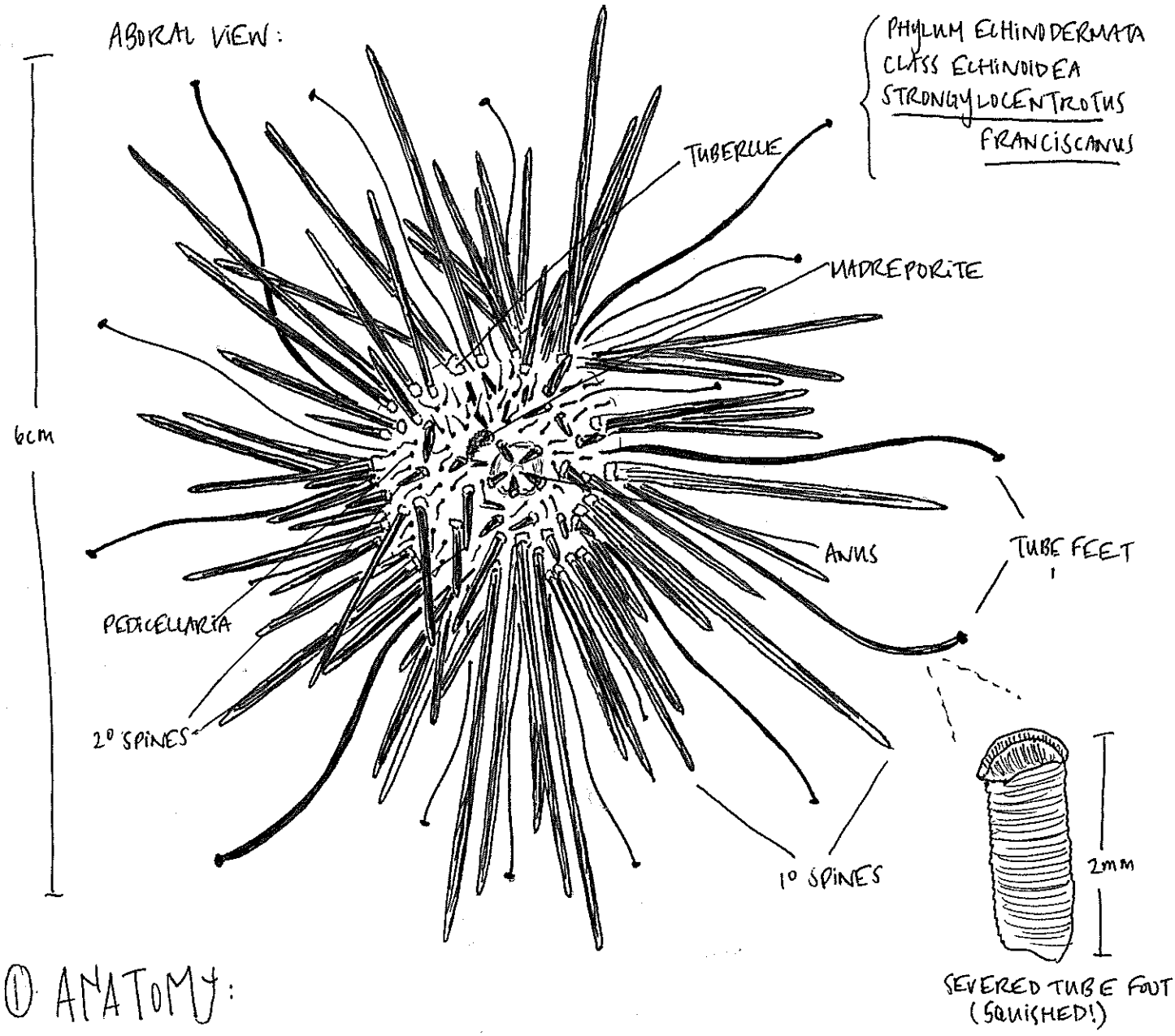


2 mm



3mm

PHYLUM ECHINODERMATA: CLASS ECHINOIDEA // 05.23.17

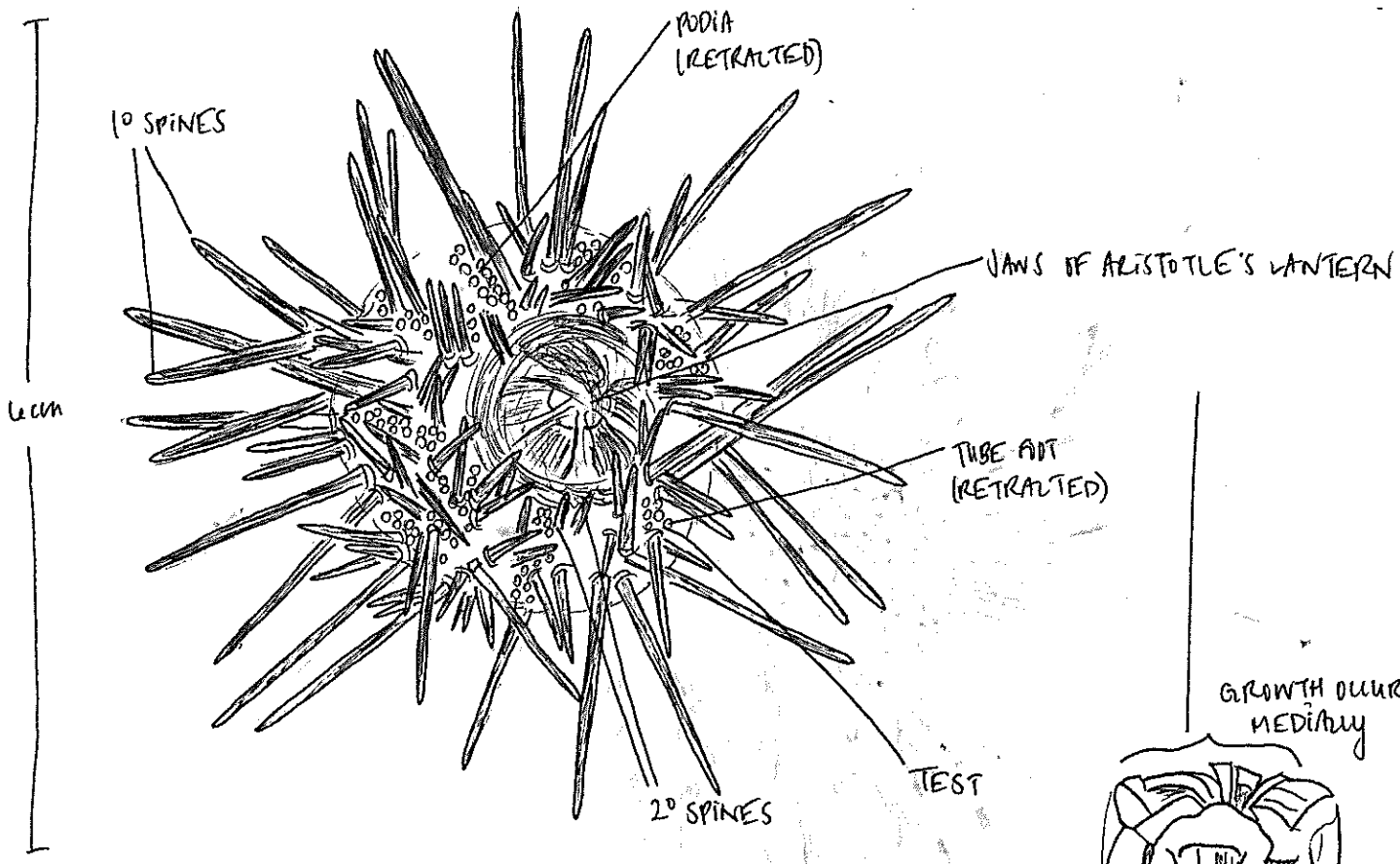


① ANATOMY:

NOTES: *MORPHOLOGY: I DIDN'T DO THE ORGANIZATION OF THE SPINES + TUBE FEET JUSTICE IN THE ABOVE DRAWING. A YOUNGER RED URCHIN, THIS ORGANISM'S SPINES WERE A FINELY LONGITUDINALLY LINED PINK COLOR WITH A RED TEST + RED TUBE FEET. MADREPORITE + ANUS WERE CLEAR — PARTICULARLY THE ANUS, AS THE URCHIN POOPED WHILE I WAS OBSERVING IT.

*MOVEMENT: MANY MORE TUBE FEET ON ORAL SIDE, WHICH "WALK" ALONG THE BOTTOM OF THE BOWL IN SYNC. THE ABORAL TUBE FEET SEEM TO DO MORE WORK IN SENSING THE SPACE AROUND THE URCHIN. GOT A "HUG" FROM THE SPINES WHEN I PROBED IT WITH MY FINGER. TO RIGHT ITSELF, THE URCHIN SELECTIVELY STRAIGHTENED + FLATTENED ITS SPINES UNTIL IT FLOPPED OVER.

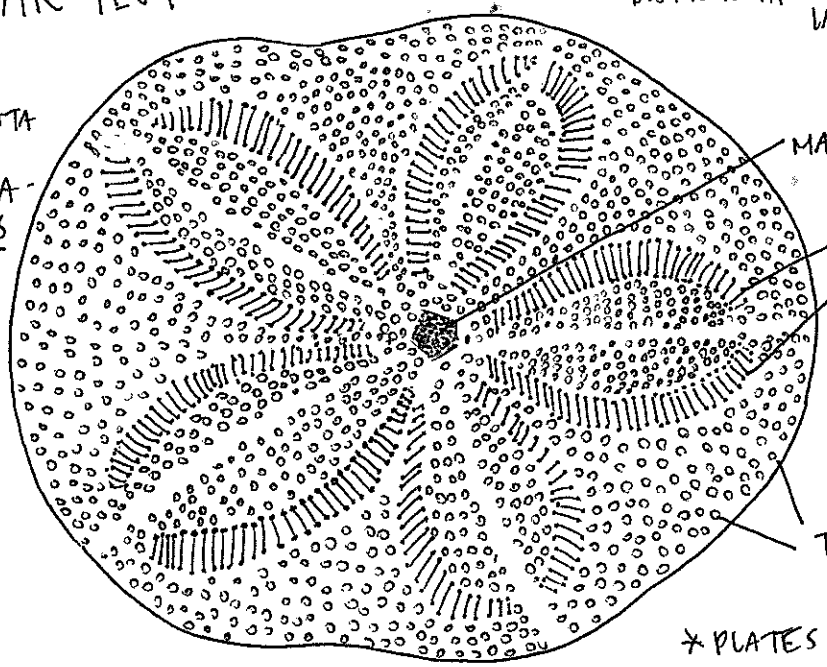
ORAL VIEW:



(11) SAND DOLLAR TEST:

PHYLUM ECHINODERMATA
CLASS ECHINOIDEA
ORDER CLYPEASTEROIDA
CLYPEASTER ROSACEUS

(TROPICAL)



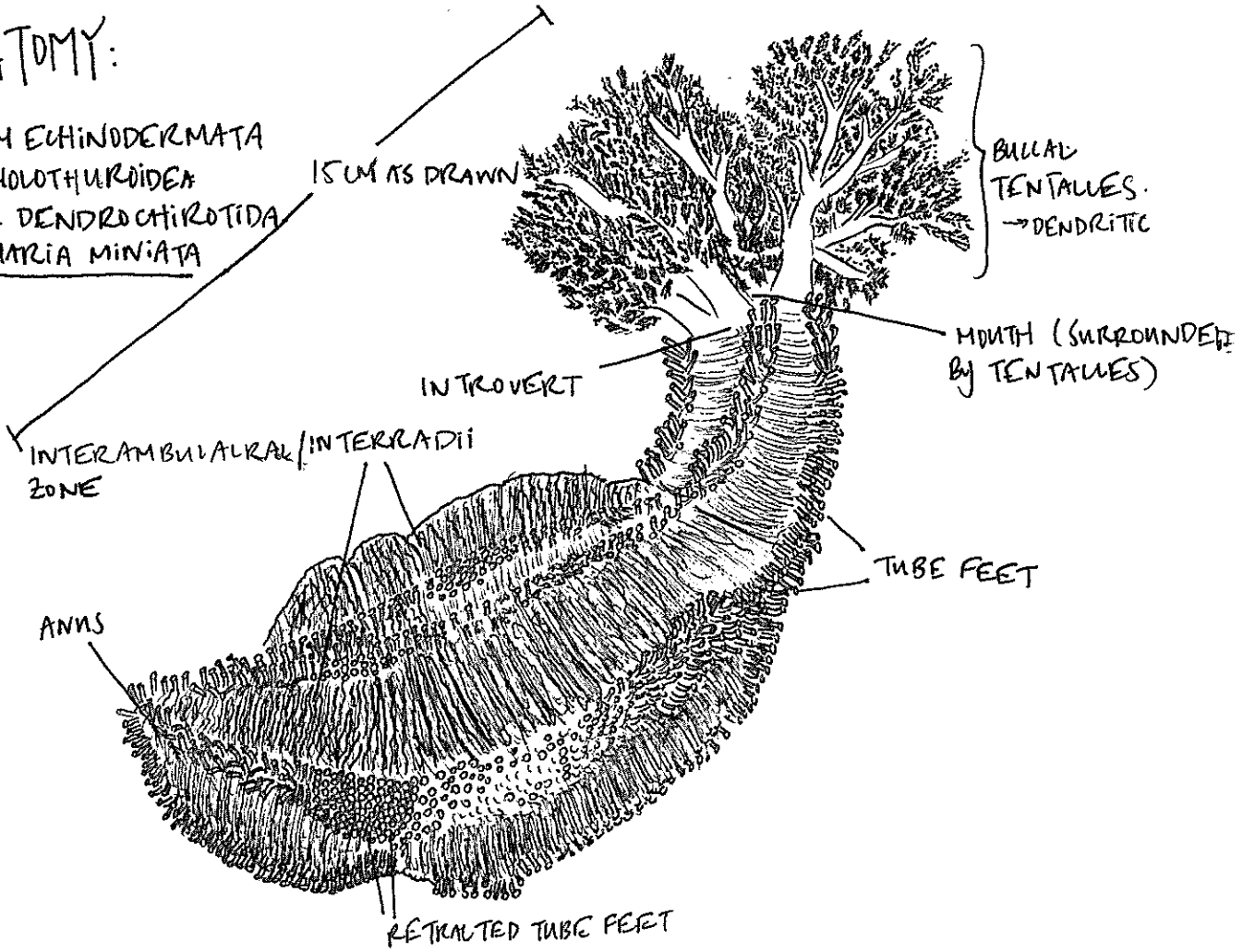
* PLATES NOT WELL DEFINED AT ALL!

15 cm

PHYLUM ECHINODERMATA: CLASS HOLOTHUROIDEA // 05.25.17

① ANATOMY:

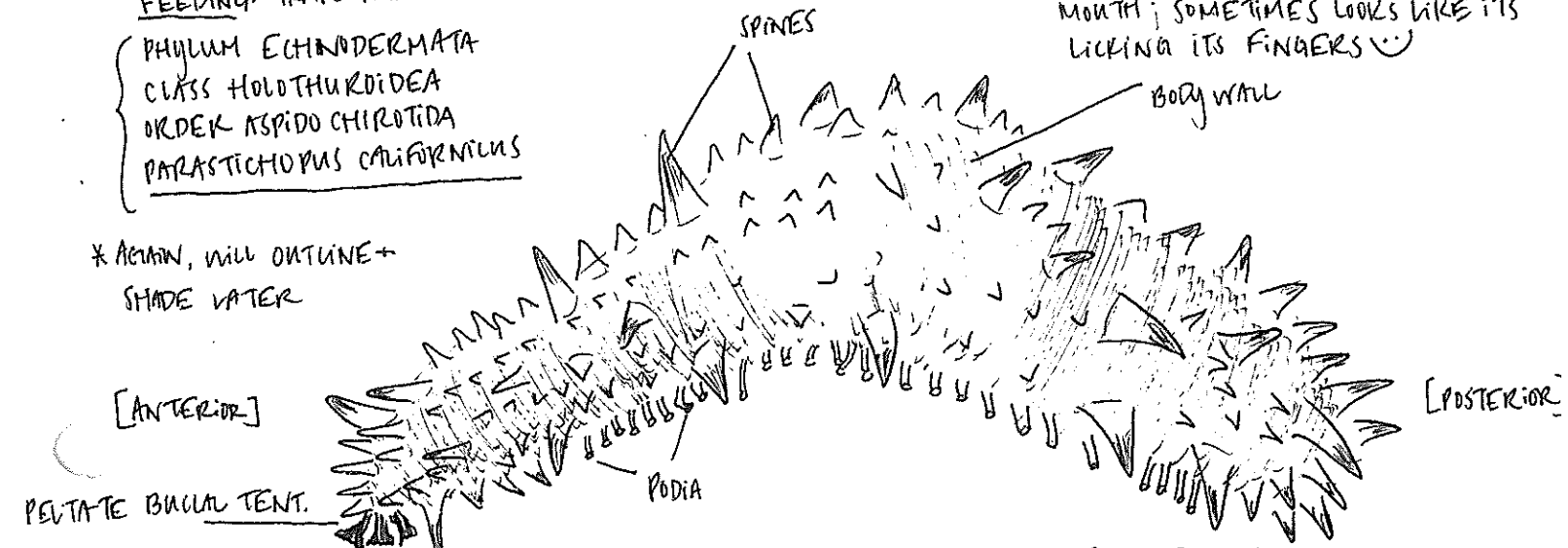
- PHYLUM ECHINODERMATA
- CLASS HOLOTHUROIDEA
- ORDER DENDROCHIROTIDA
- CUCUMARIA MINIATA



NOTES: COLOR: BODY WALL DARK BROWN; BUCCAL TENTACLES + INTROVERT BRIGHT ORANGE; BEHAVIOR/MOVEMENT: DOESN'T SEEM TO MOVE USING ITS PODIA AS MUCH AS PARASTICHOPUS (RATHER, USES THEM TO STICK TO THEIR SUBSTRATE) — INSTEAD, IT MOVES BY ALTERNATING WHAT SIDE OF ITS BODY WALL IT CONTRACTS/RELAXES, RESULTING IN A "WIGGLING" BEHAVIOR; FEEDING: TRAPS FOOD IN EXTENSION OF ITS BUCCAL PODIA, WHICH IT THEN CONTRACTS + DRAWS TOWARD ITS MOUTH; SOMETIMES LOOKS LIKE ITS LICKING ITS FINGERS ☺

- PHYLUM ECHINODERMATA
- CLASS HOLOTHUROIDEA
- ORDER ASPIDOCHIROTIDA
- PARASTICHOPUS CALIFORNICUS

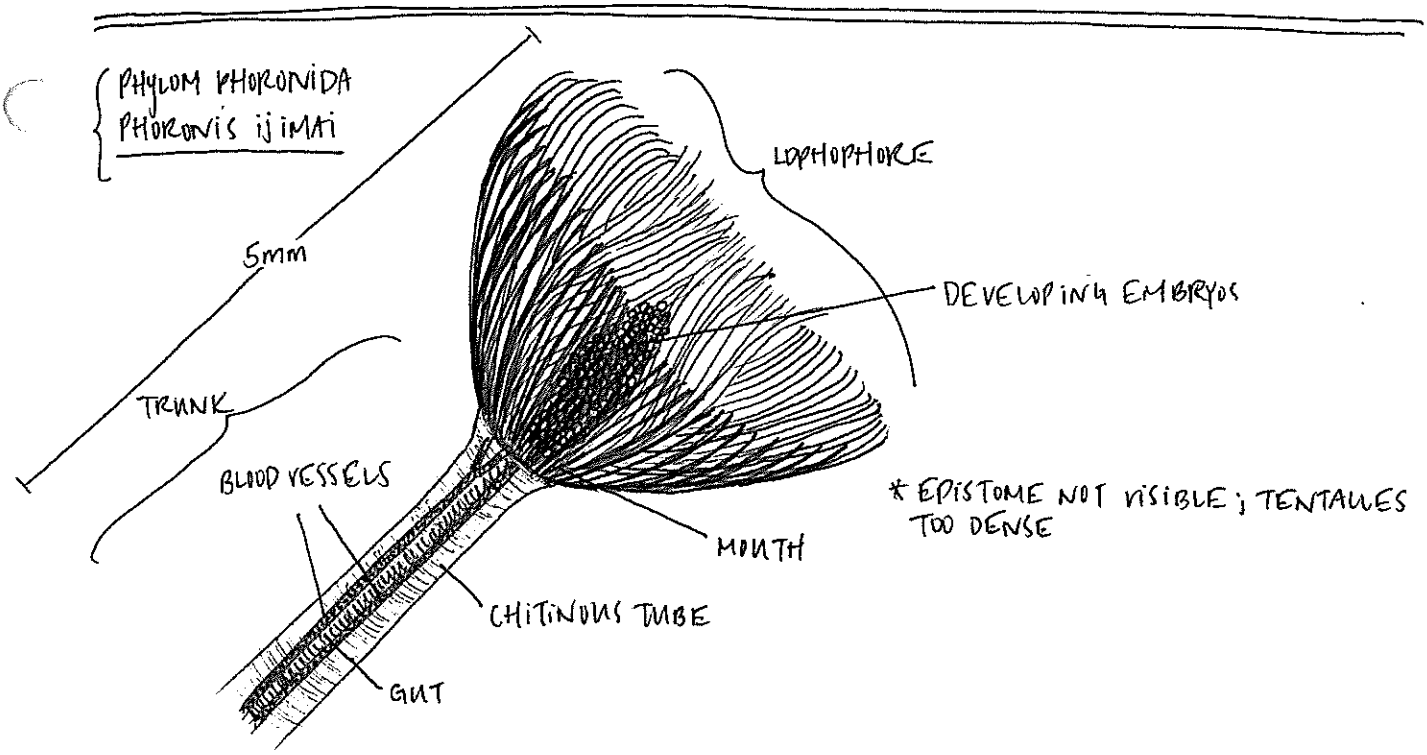
* AGAIN, WILL OUTLINE + SHADE LATER



NOTES: COLOR: BRIGHT ORANGE SPINES; RED BODY WALL; HABITAT: LOWER INTERTIDAL → 250 M; BEHAVIOR: FEEDS ON DETRITUS BY SWEEPING ITS MOPLIKE BUCCAL TENTACLES ACROSS THE SUBSTRATE; MOVEMENT: USES ITS TUBE FEET (2 ROWS ON "VENTRAL" SIDE) TO MOVE

PHYLUM PHORONIDA // 06.06.17

PHYLUM PHORONIDA
PHORONIS IJIMAI

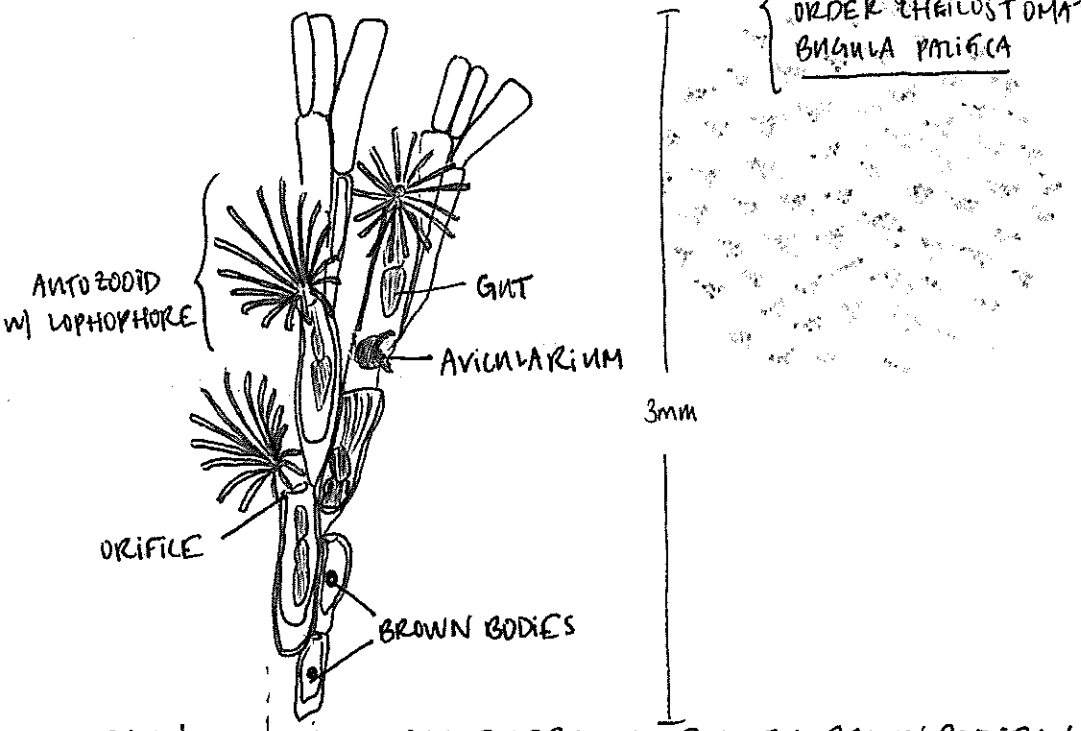


NOTES: PRAWN ABOVE IS ONE ZOOID IN A LARGE COLONY (~50 ZOOIDS) ON A ROCK. COLOR: CLEAR, W/ RED BLOOD (HEMOGLOBIN-COLORED) IN BLOOD VESSELS OF MAIN BODY AND TENTACLES; GUT PINK, AS ARE EGGS. BEHAVIOR | MOVEMENT: WILL RETRACT WHEN TOUCHED OR TABLE BUMPED EXCESSIVELY. BLOOD MOVES UPTHROUGH A TENTACLE, THEN BACK DOWN (MOVEMENT IS UNIDIRECTIONAL AT ANY GIVEN TIME, BUT OVERALL BIDIRECTIONAL). HABITAT: COLLECTED FROM CHARLESTON BOAT BASIN; BURROWING INTO A ROCK IN CALCIFIED TUBES. FEEDING: CILIARY ACTION DRIVES H_2O INTO THE RING OF TENTACLES ABOVE THE LOPHOPHORE AND OUTWARD THROUGH THE NARROW SPACES BETWEEN THE TENTACLES. SUSPENDED FOOD PARTICLES CAN BE CAPTURED BY THE TENTACULAR CILIA + MUCUS, TRANSFERRED TO THE CILIA OF THE FOOD GROOVE, THEN TO THE MOUTH FOR DIGESTION.

PHYLUM BRYOZOA // 06.06.17

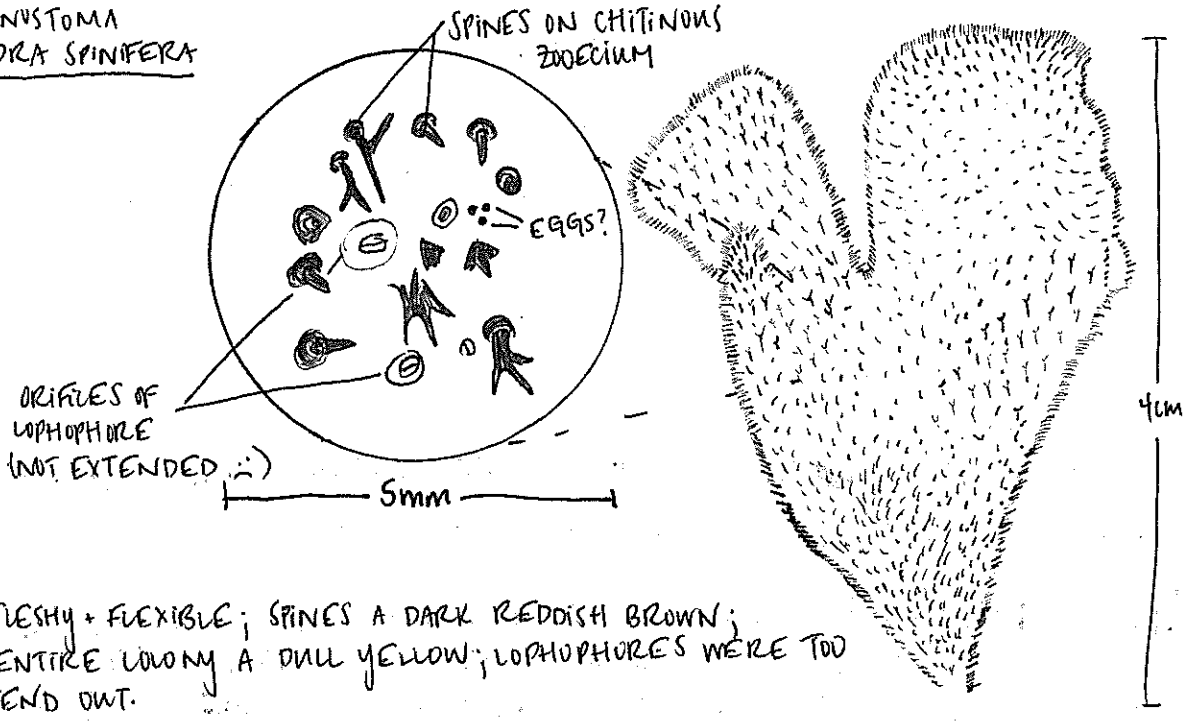
(1) DIVERSITY + ANATOMY:

PHYLUM BRYOZOA
CLASS GYMNOLAEMATA
ORDER CHEILOSTOMATA
BUGULA PATIFICA



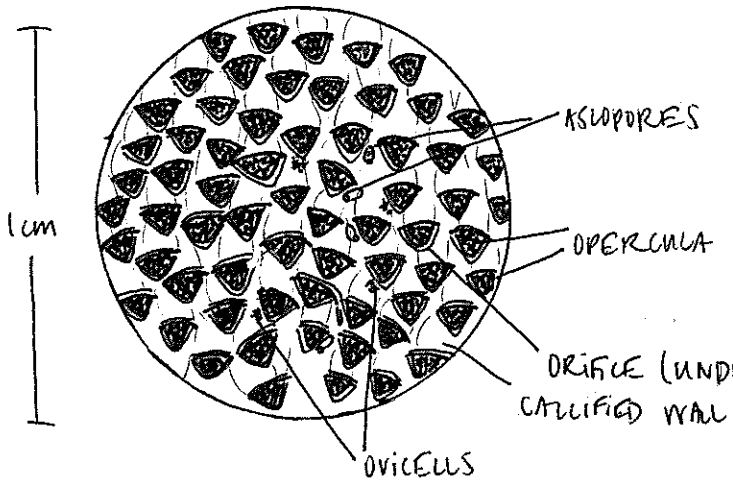
NOTES: BODY CLEAR | YELLOWED, WITH EXCEPTION OF GUT + BROWN BODIES (BROWN); AVICULARIA PRESENT, CAN SEE "JAWS" CHOMPING AT SKELETON SHRIMP. 10 TENTACLES | LOPHOPHORE. WILL RETRACT WHEN PERTURBED.

PHYLUM BRYOZOA
CLASS GYMNOLAEMATA
ORDER CTENOSTOMA
FRUSTELLIDRA SPINIFERA



NOTES: FLESHY + FLEXIBLE; SPINES A DARK REDDISH BROWN; ENTIRE COLONY A DULL YELLOW; LOPHOPHORES WERE TOO SHY TO EXTEND OUT.

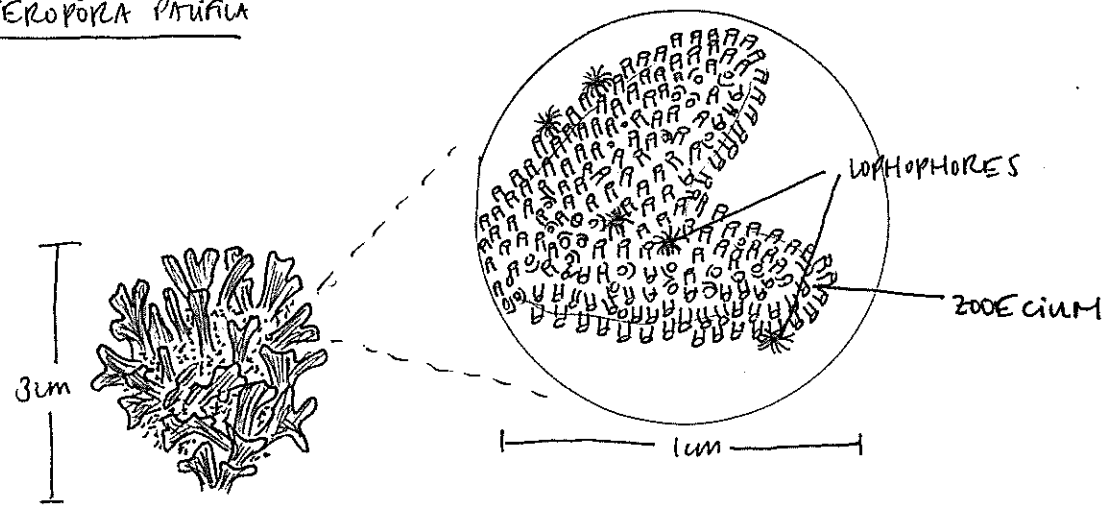
PHYLUM BRYOZOA
CLASS GYMNOLAEMATA
ORDER CHEILOSTOMATA
ERYSTOMELLA BILABIATA



* FOUND *MYRIANIDA INERMIS* LIVING IN A TUBE ON THE SURFACE OF THE ERYSTOMELLA!

NOTES: COLOR: BRIGHT PINK! OPERCULUM DARKER, W/ PALER PINK CALCIFIED WALL
BEHAVIOR: NONE :(NO LOPHOPHORES CAME OUT TO PLAY TODAY. ALSO TRIED OBSERVING *PENDROBEANIA*, ALSO NO DICE.

PHYLUM BRYOZOA
CLASS GYMNOLAEMATA
SUBCLASS STENOLAEMATA
ORDER CYCLOSTOMATA
HETEROPORA PATIFICA



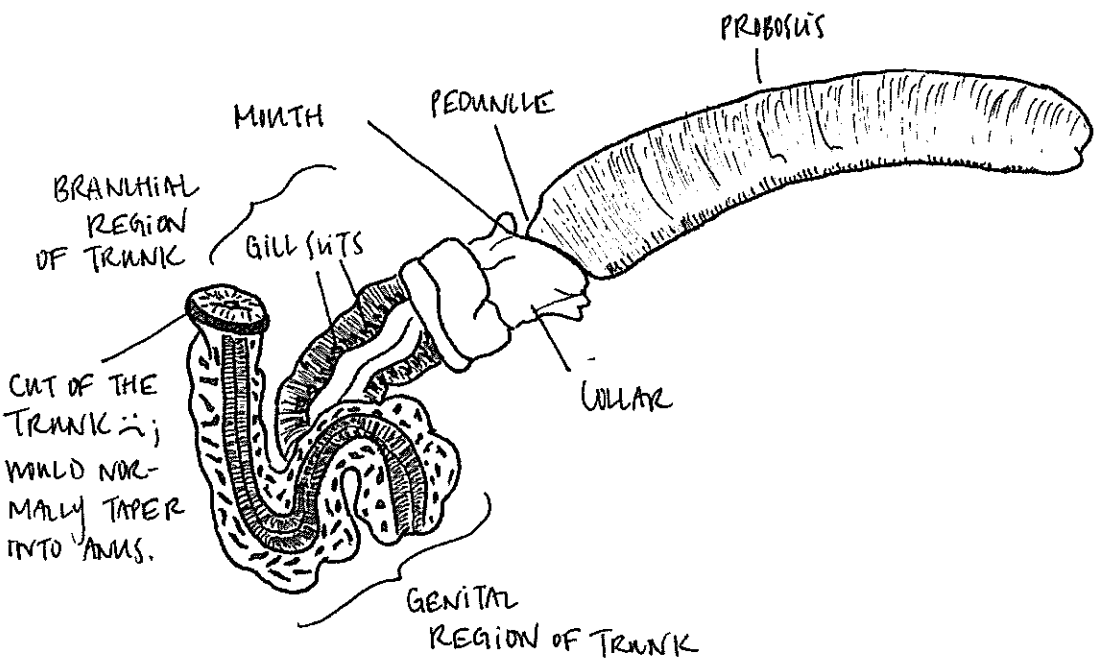
NOTES: COLOR: YELLOW ERECT + TUBULAR CALCIFIED ZOOECIUM; BEHAVIOR: A FEW LOPHOPHORATES WERE OUT, BUT RETRACTED WHEN TOUCHED.

(11) HABITAT + BEHAVIOR: HABITAT: LIVE ATTACHED TO ROCKS, MACRO ALGAE, WOOD, + OTHER SUBSTRATA. ONE PELAGIC ARCTIC SPECIES. FEEDING: SUSPENSION FEEDERS – USE H_2O-FLOW SUCTION CREATED BY LATERAL CILIA TO DRAW PARTICLES TOWARD THEIR TENTACLES, WHICH IS BROUGHT DOWNWARD TO THE MOUTH BY FRONTAL CILIA, WHICH ALSO AID IN FOOD CAPTURE

PHYLUM HEMICHORDATA // 06.01.17

ANATOMY:

PHYLUM HEMICHORDATA
CLASS ENTEROPNEUSTA
SAXIGLOSSUS PUSILLUS

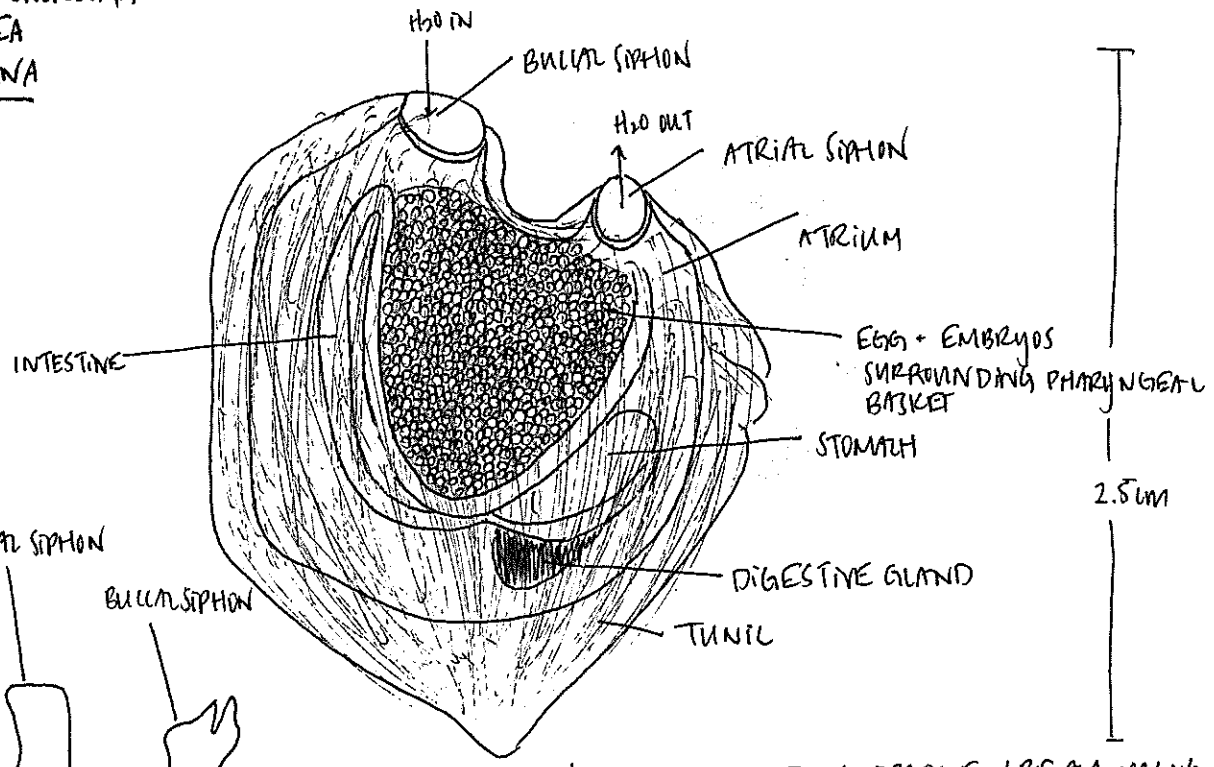


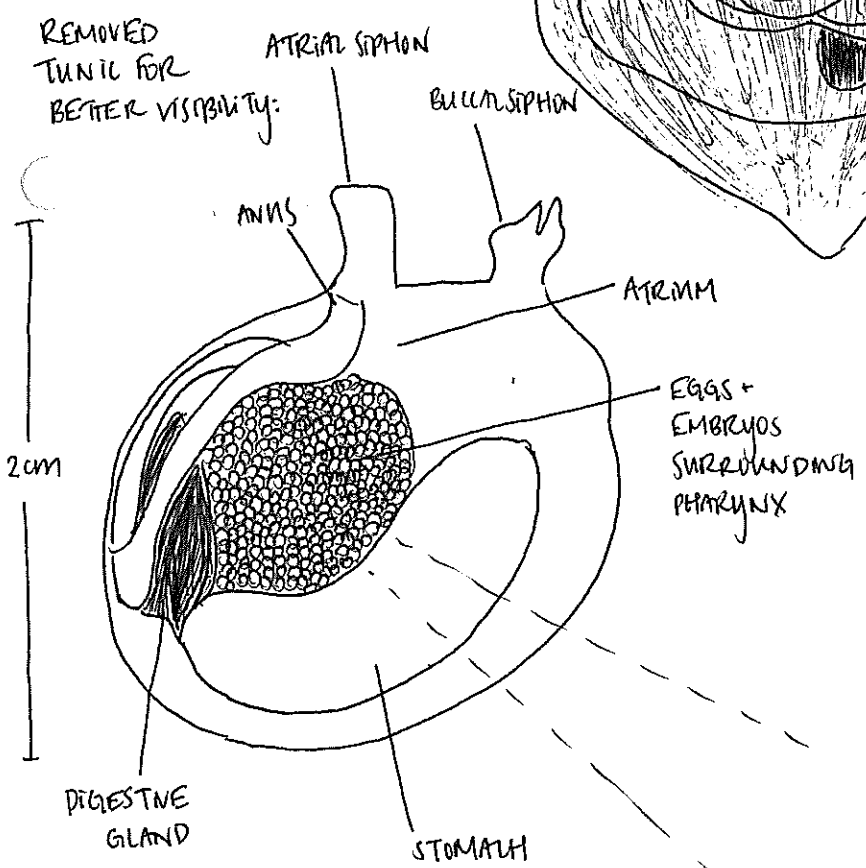
NOTES: COLLECTED FROM NORTH COVE IN SANDY SUBSTRATUM; ARE INFAUNAL. COLOR: BRIGHT ORANGE; GENITAL REGION OF TRUNK IS MORE PALE GREEN. BEHAVIOR/MOVEMENT: INCREDIBLY FRAGILE ORGANISMS — WHEN COLLECTED, MOST OF THEM BROKE FROM US LOOKING AT THEM, HENCE THE BUSTED TRUNK. AFTER COLLECTION, SUBMERGED THEMSELVES IN MUCUS, WHICH MADE THE SAND AROUND THEM EXCEPTIONALLY CHALLENGING TO CLEAN OFF. TRUNK REMAINED COILED EVEN WHEN THE PROBOSCIS EXTENDED + RETRACTED.

PHYLUM CHORDATA: CLASS ASCIDIACEA // 05.30.17

① SOLITARY:

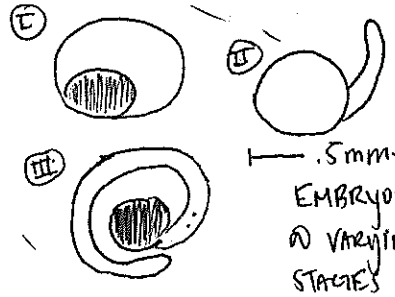
PHYLUM CHORDATA
SUBPHYLUM UROCHORDATA
CLASS ASCIDEACEA
MOLGULA LITICINA





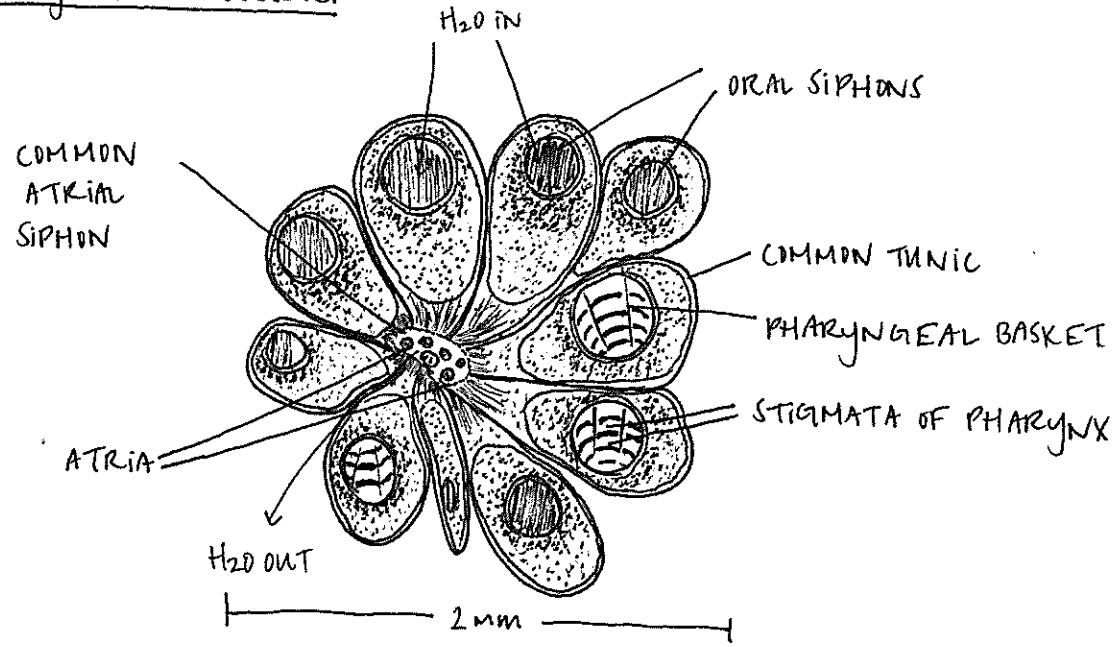
NOTES: COLOR: TUNIC OPAQUE CREAM, MAKING VISIBILITY OF INTERNAL STRUCTURES LIMITED; EMBRYOS BRIGHT PINK; DIGESTIVE GLAND BROWN; EVERYTHING ELSE YELLOWED-WHITE.

PHARYNGEAL SLITS: AGAIN, CHALLENGING TO SEE BECAUSE TONS OF EGGS + EMBRYOS WERE SQUISHING THE PHARYNGEAL BASKET. I DISSECTED THEM AWAY, SOMEWHAT MANGLING THE PHARYNGEAL SLITS, BUT I COULD STILL VISUALIZE THE W FOLDS THAT LIGHT'S MANUAL USES TO DISTINGUISH THIS SPECIES; COULD NOT MAKE AN UNFOLDED TISSUE PREP TO OBSERVE STIGMATA



(II) COLONIAL - COMPOUND:

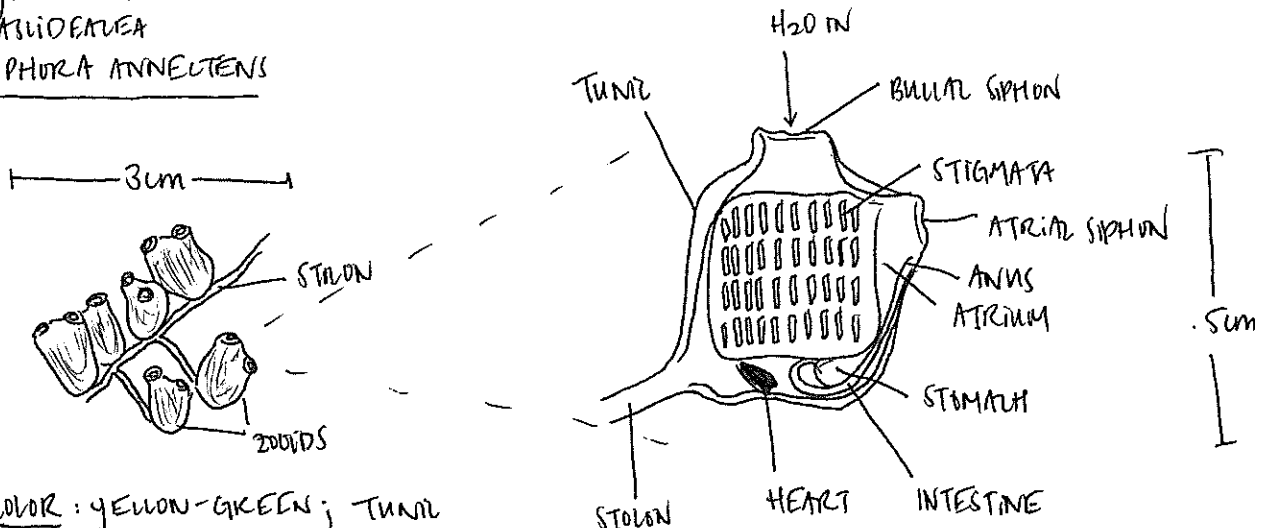
PHYLUM CHORDATA
SUBPHYLUM UROCHORDATA
CLASS ASCIDIACEA
STOLIDOBRANCHIA
BOTRYLLUS SCHLOSSERI



NOTES: COLOR: ORANGE, W/ WHITE + DARKER ORANGE SPECKS ON TUNIC ^MANY COLOR MORPHS AVAILABLE!
BEHAVIOR/MOVEMENT: RESPOND TO TOUCH BY RETRACTING THEIR ORAL + ATRIAL SIPHONS. WILL CLOSE SIPHONS WHEN TABLE IS BUMPED, TOO.

(III) COLONIAL - SOCIAL:

PHYLUM CHORDATA
SUBPHYLUM UROCHORDATA
CLASS ASCIDIACEA
PEROPHORA ANNECTENS



NOTES: COLOR: YELLOW-GREEN; TUNIC CONSIDERABLY MORE TRANSLUSCENT THAN OTHER SPECIES I OBSERVED