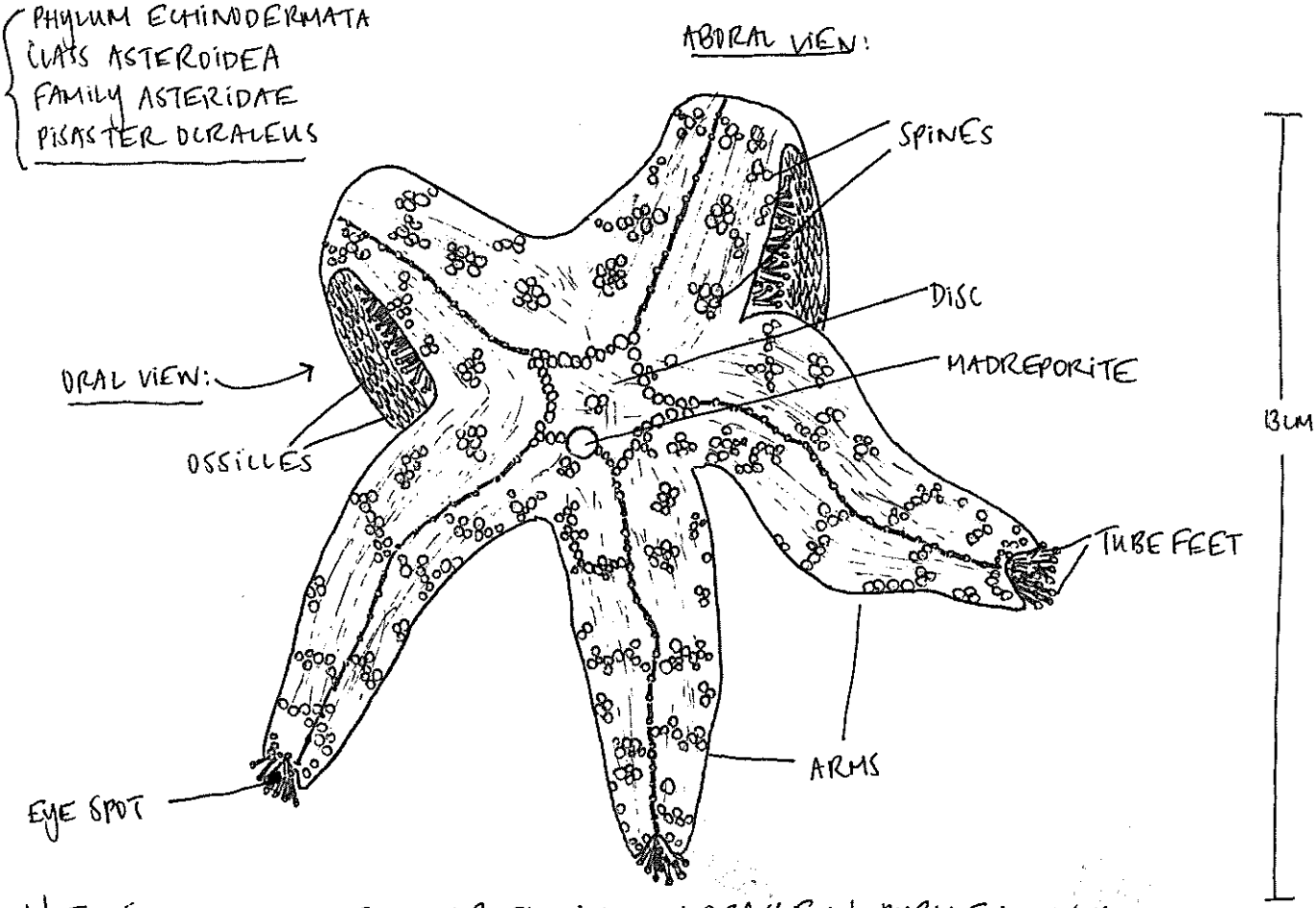
PHYLUM ECHINODERMATA: CLASS ASTEROIDEA || 05.16.17

(I) ANATOMY, DIVERSITY:

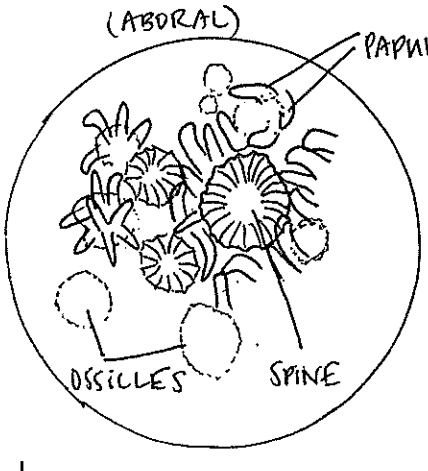
PHYLUM ECHINODERMATA
CLASS ASTEROIDEA
FAMILY ASTERIDAE
PISASTER OCHRACEUS

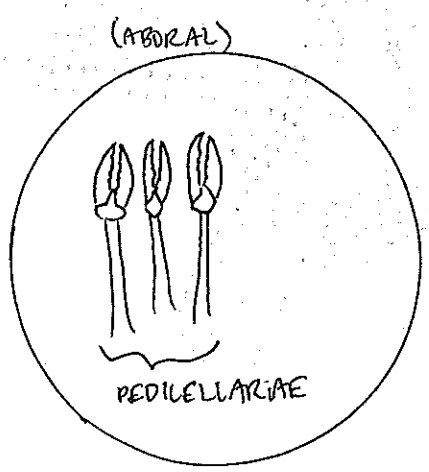


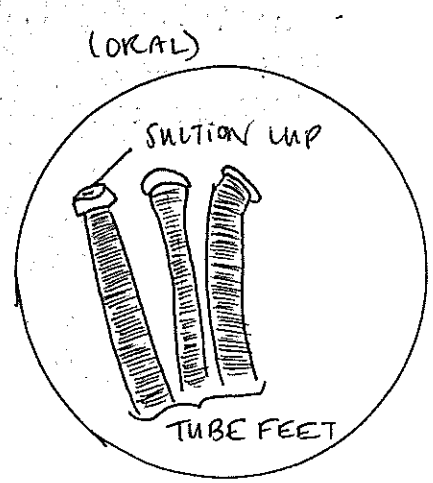
NOTES: COLOR: MOTTLED, BUT PREDOMINANTLY ORANGE W/ PURPLE ACCENTS.
SPINES BRIGHT WHITE; MADREPORITE + TUBE FEET PALE PINK.

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

(II) EXTERNAL STRUCTURES: ON ABOVE PISASTER



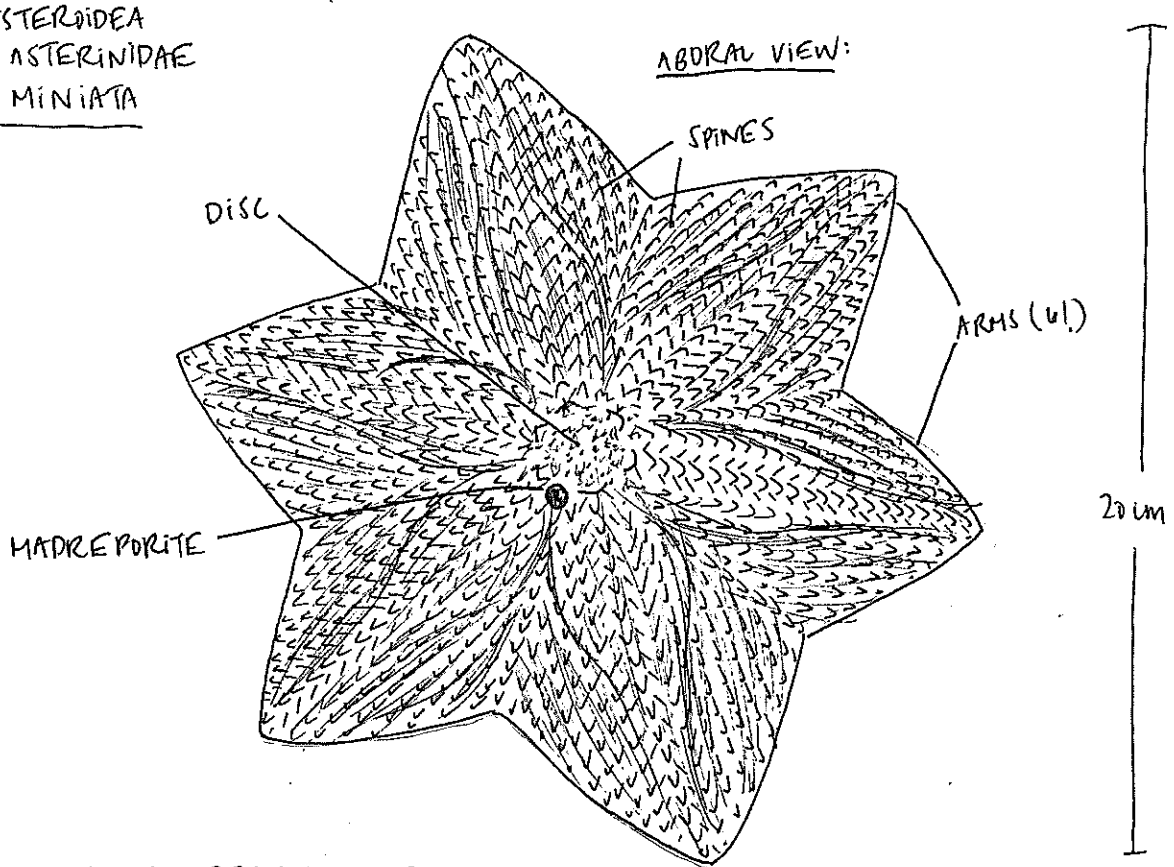




PHYLUM ECHINODERMATA
CLASS ASTEROIDEA
FAMILY ASTERINIDAE
PATIRIA MINIATA

(DIVERSITY, CON'T.)

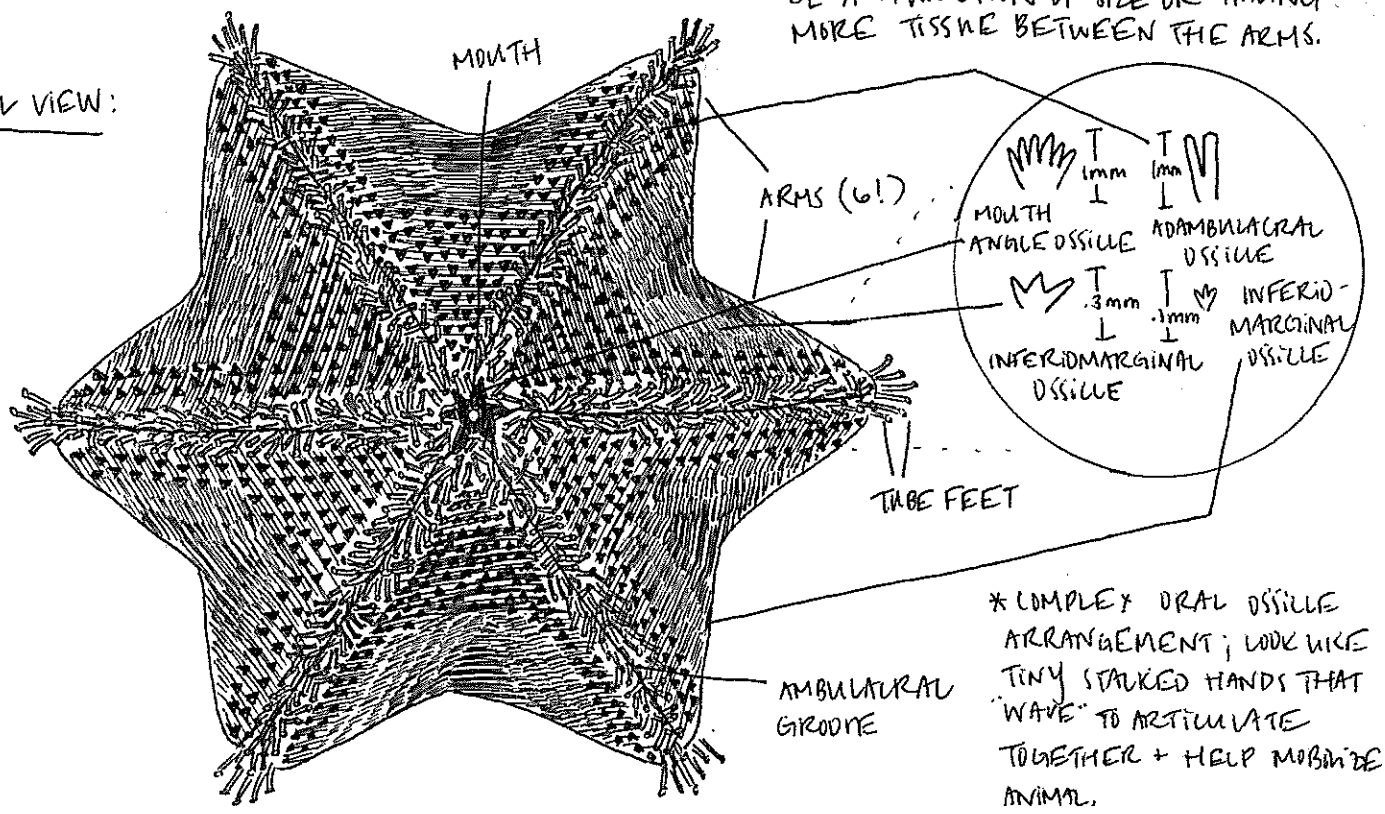
ABORAL VIEW:



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:



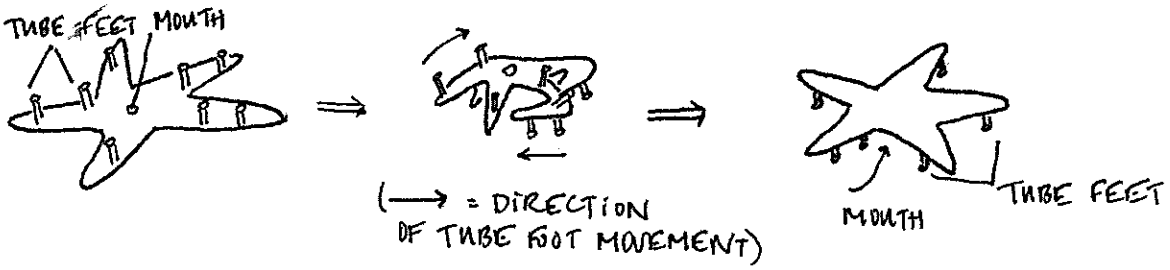
*COMPLEX ORAL OSSICLE ARRANGEMENT; LOOK LIKE TINY STALKED HANDS THAT "WAVE" TO ARTICULATE TOGETHER + HELP MOBILIZE ANIMAL.

(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).

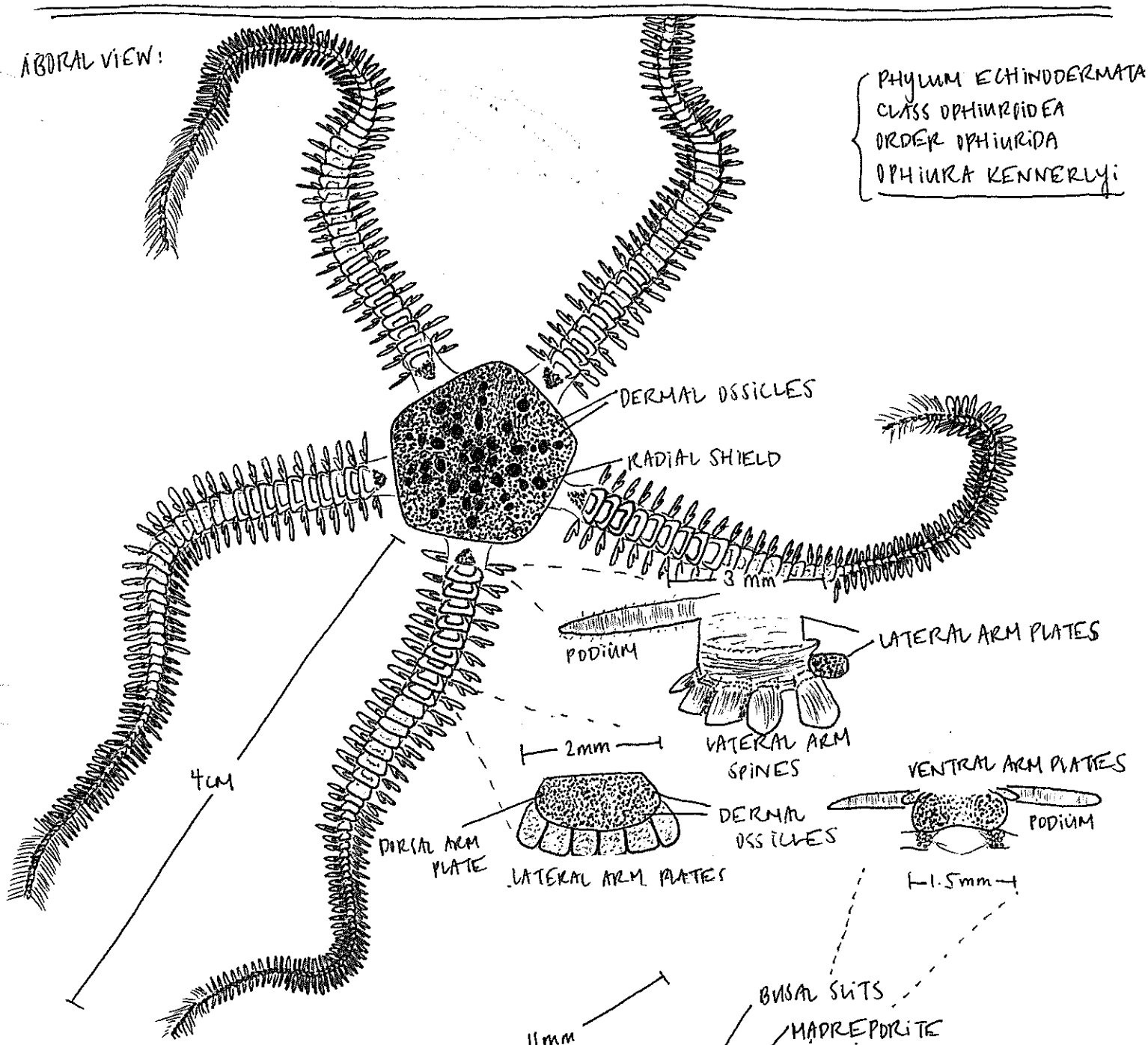
5) ARCTONIE IN DIODORA: COULD NOT SUCCESSFULLY ELICIT A RESPONSE FROM ARCTONIE AGAINST PISASTER OR PYCNOPODIA.

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.

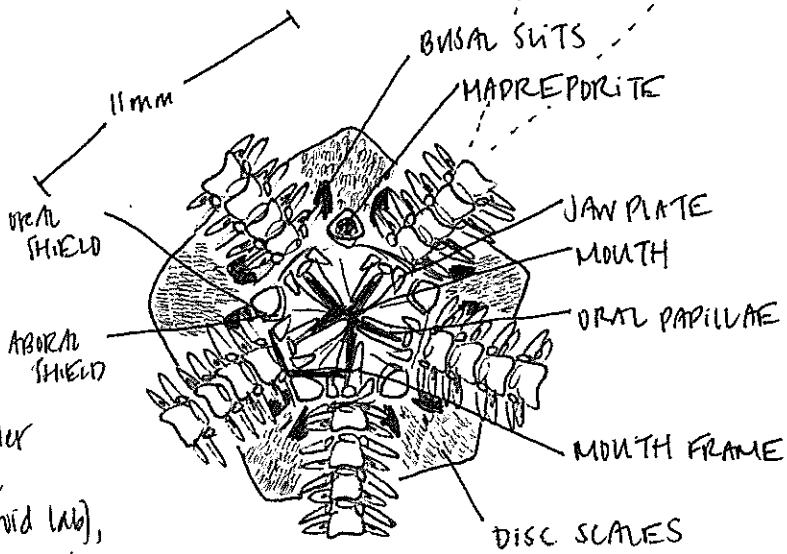
PHYLUM ECHINODERMATA: CLASS OPHIUROIDEA // 05.23.17.

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

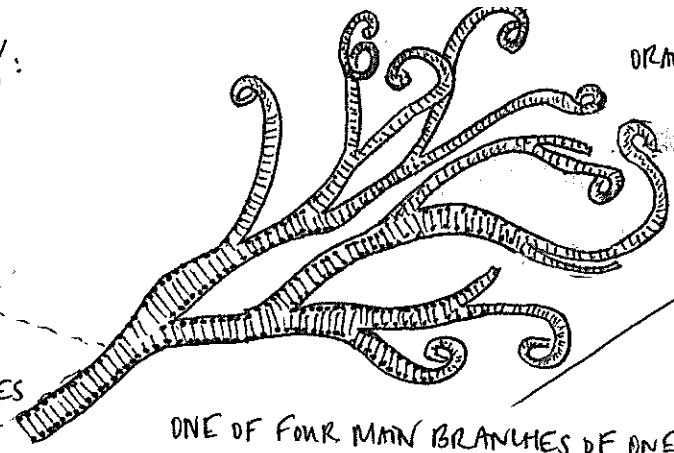
ORAL VIEW
4mm

ABORAL VIEW

DERMAL OSSICLES

4mm

ORAL VIEW:

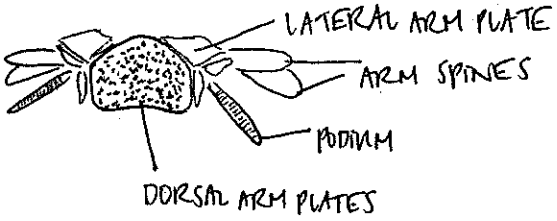


ONE OF FOUR MAIN BRANCHES OF ONE OF FIVE ARMS; HIGHLY BIFURCATED ORGANISM!

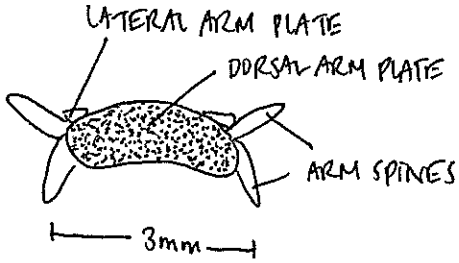
9cm

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

PHYLUM ECHINODERMATA
CLASS OPHIUROIDEA
ORDER OPHIURIDA
AMPHIODIA OCCIDENTALIS

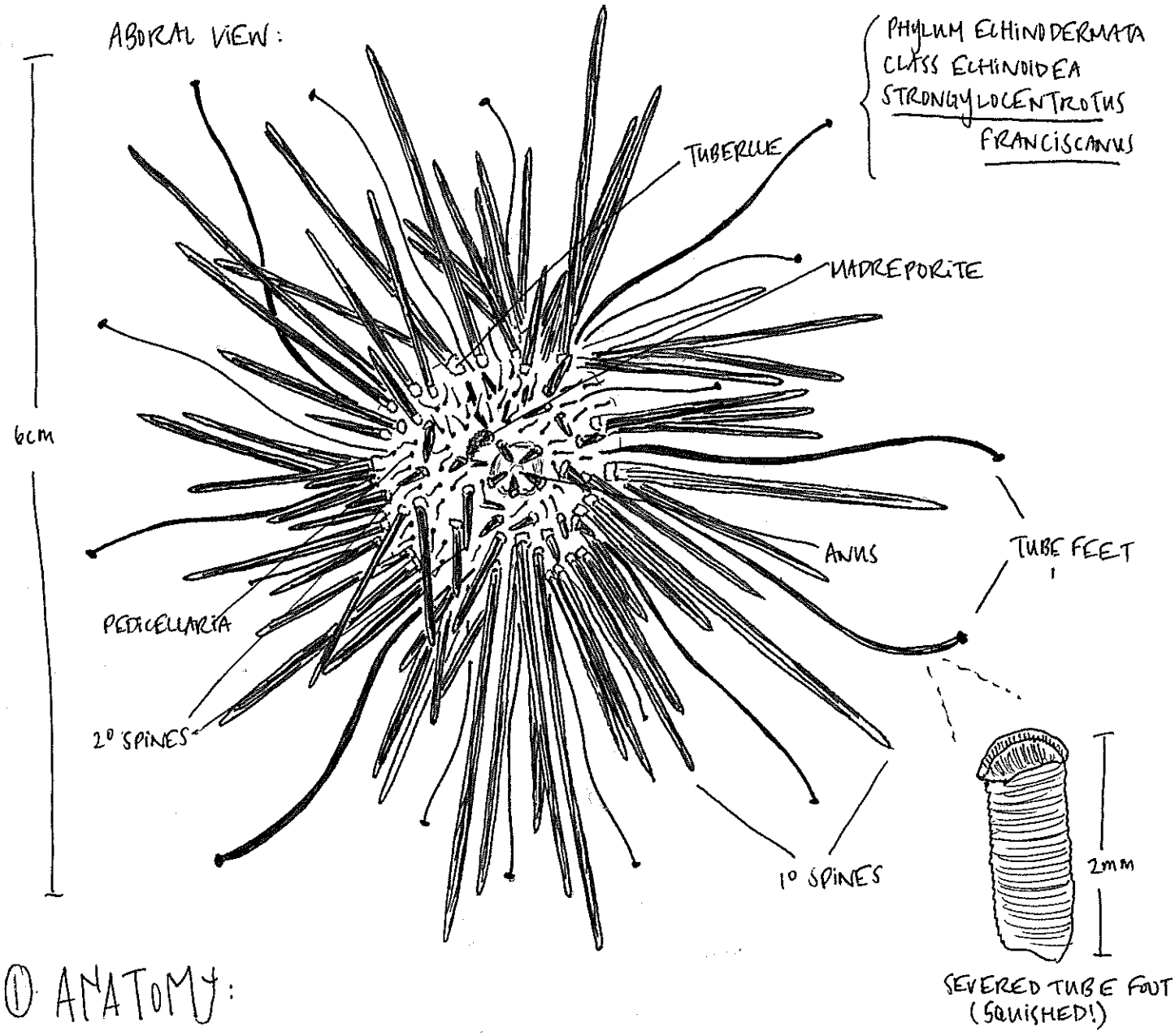


2 mm



3mm

PHYLUM ECHINODERMATA: CLASS ECHINOIDEA // 05.23.17

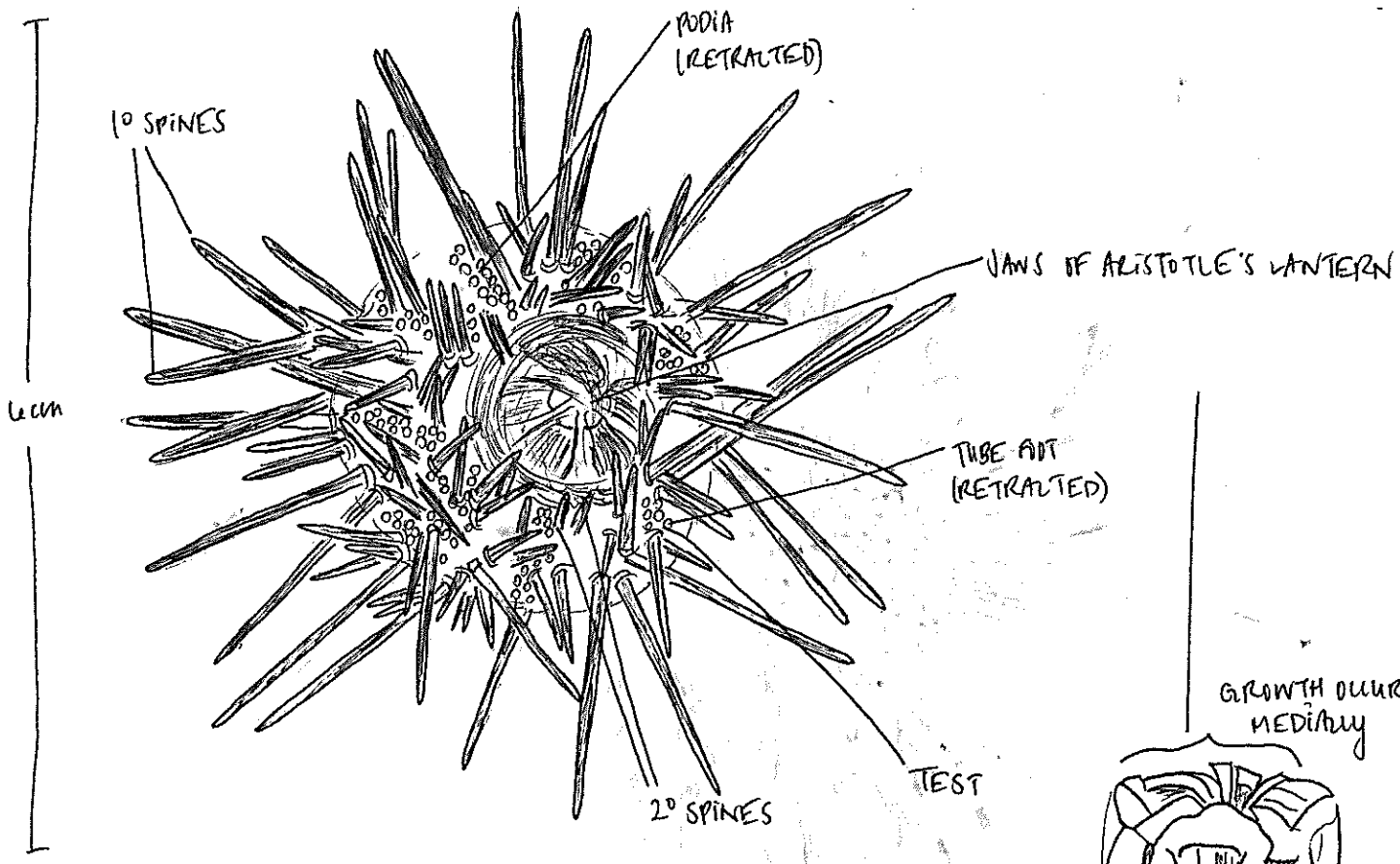


① ANATOMY:

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.

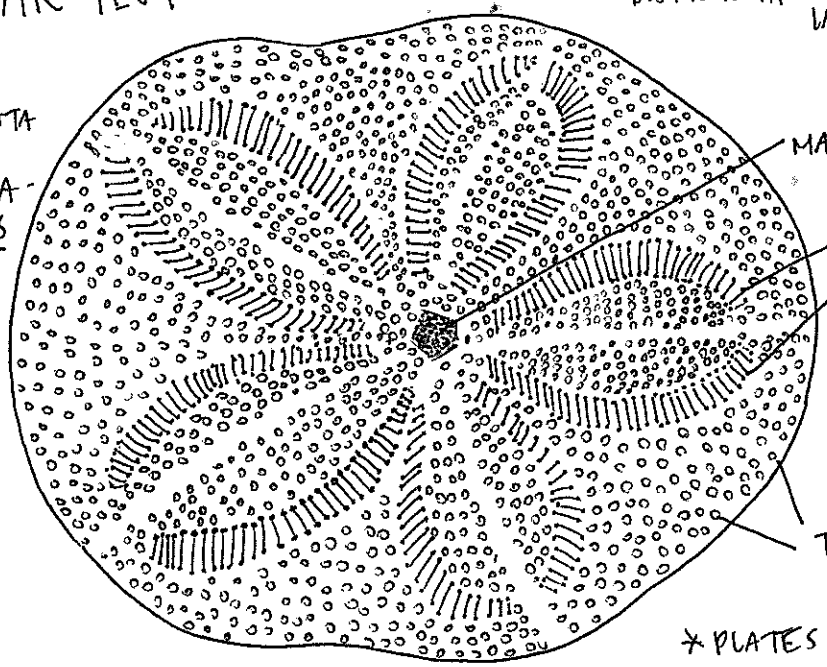
ORAL VIEW:



(11) SAND DOLLAR TEST:

PHYLUM ECHINODERMATA
CLASS ECHINOIDEA
ORDER CLYPEASTEROIDA
CLYPEASTER ROSACEUS

(TROPICAL)



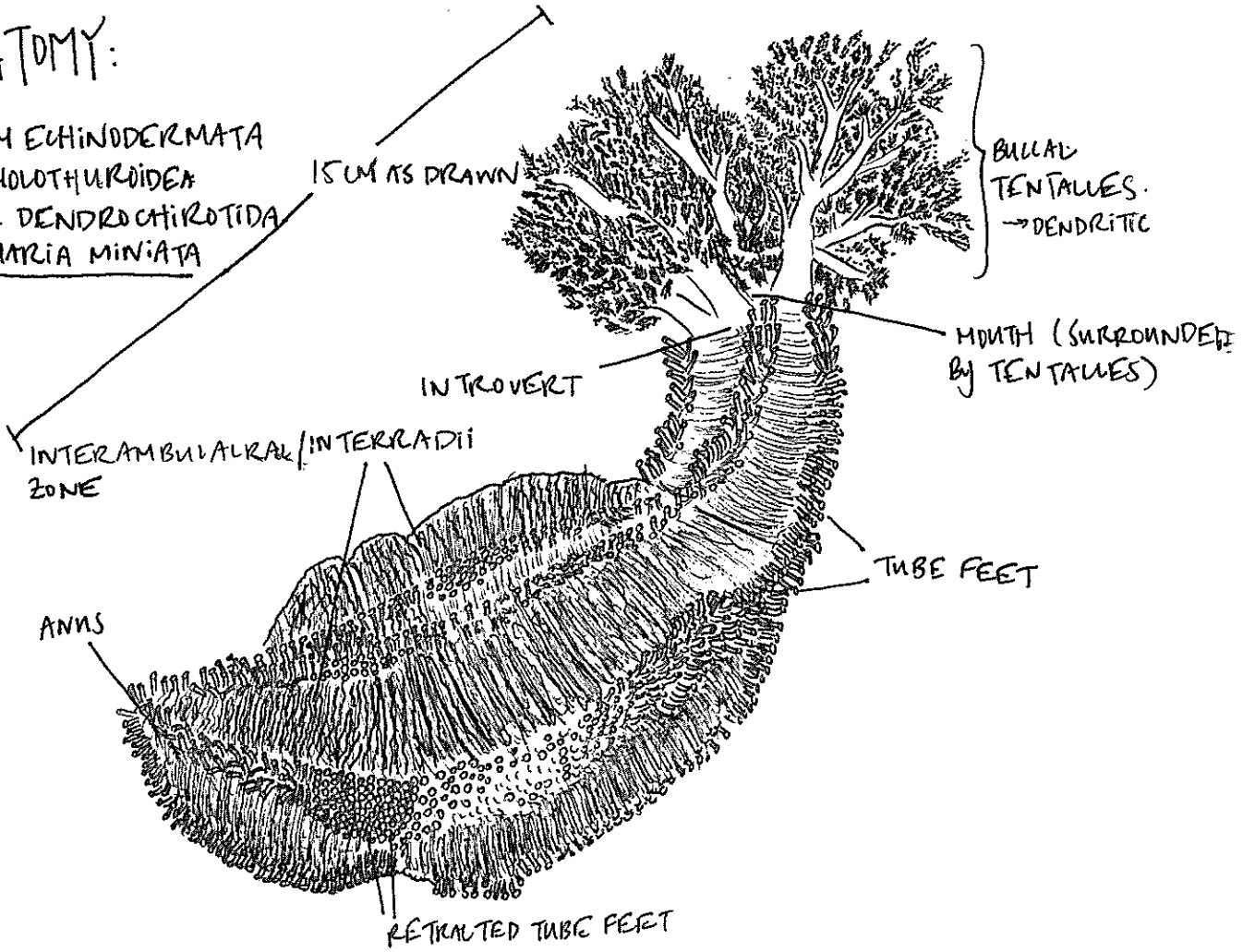
* PLATES NOT WELL DEFINED AT ALL!

15 cm

PHYLUM ECHINODERMATA: CLASS HOLOTHUROIDEA // 05.25.17

① ANATOMY:

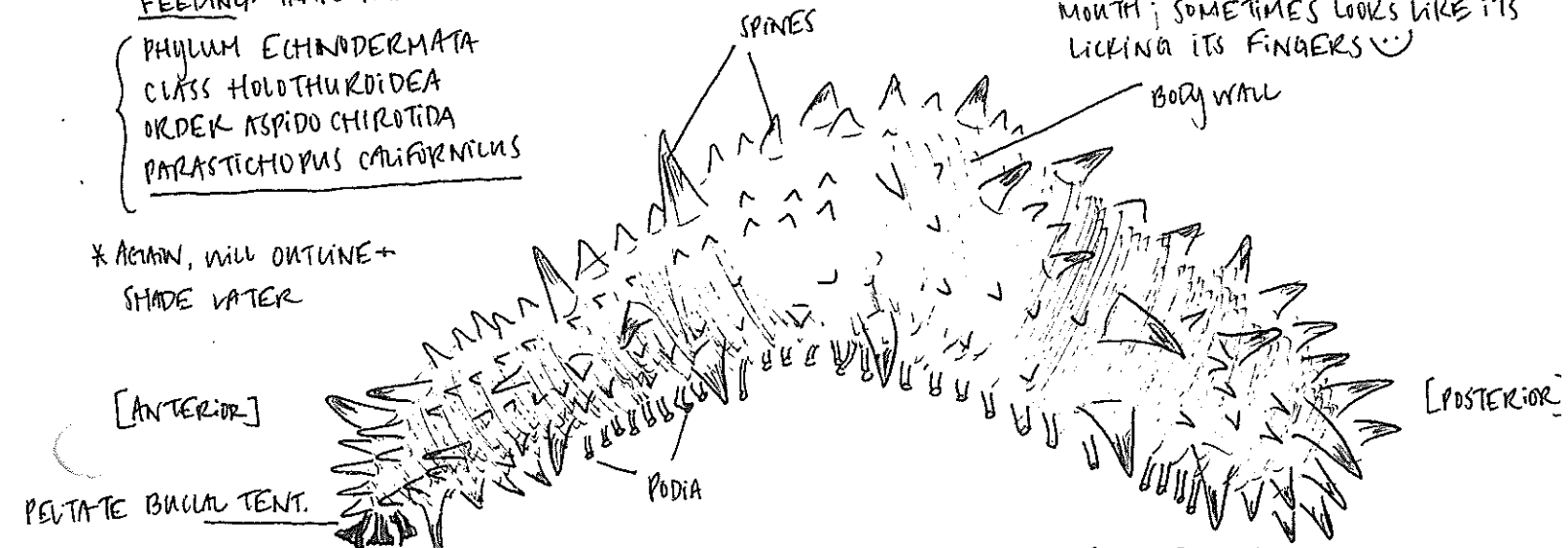
- PHYLUM ECHINODERMATA
- CLASS HOLOTHUROIDEA
- ORDER DENDROCHIROTIDA
- CUCUMARIA MINIATA



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