

Articulate Brachiopod Anatomy

John EB Baker



Mi rogeo

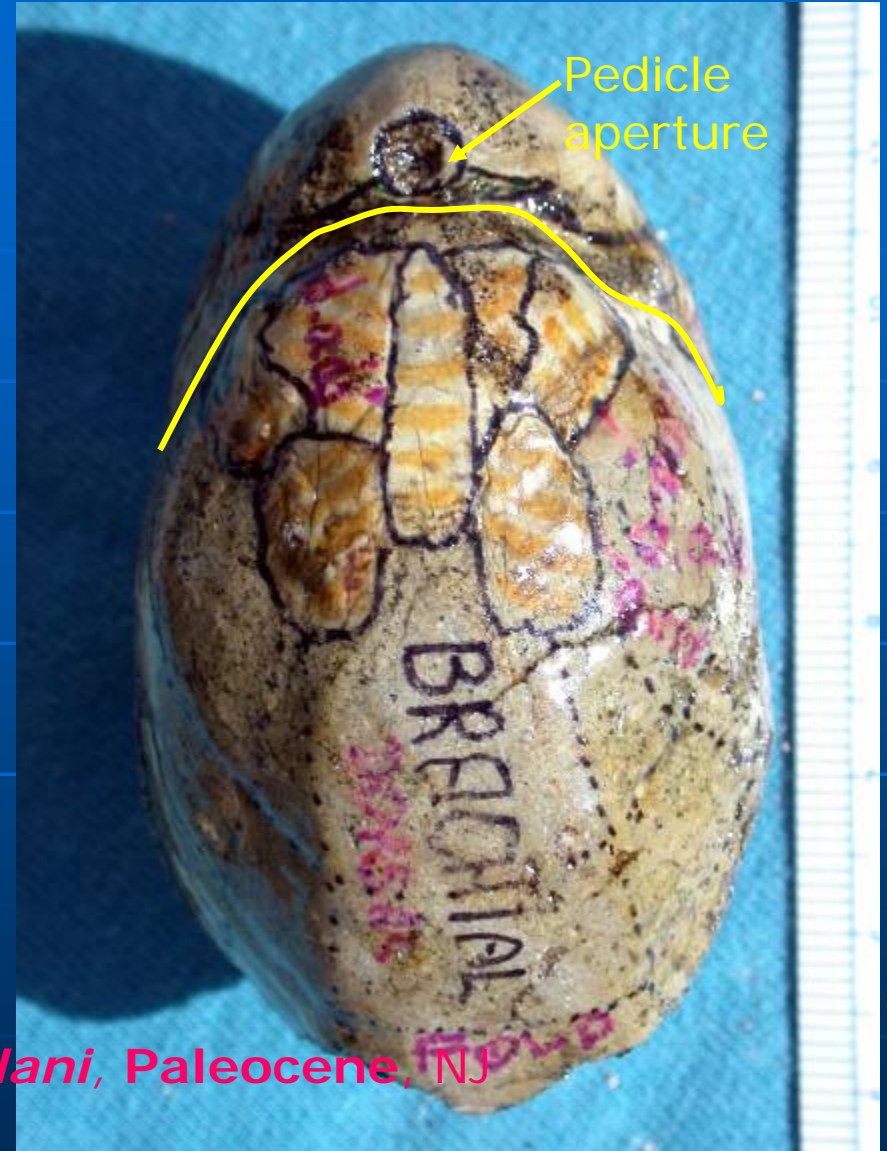


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Ventral or Pedicle Valve



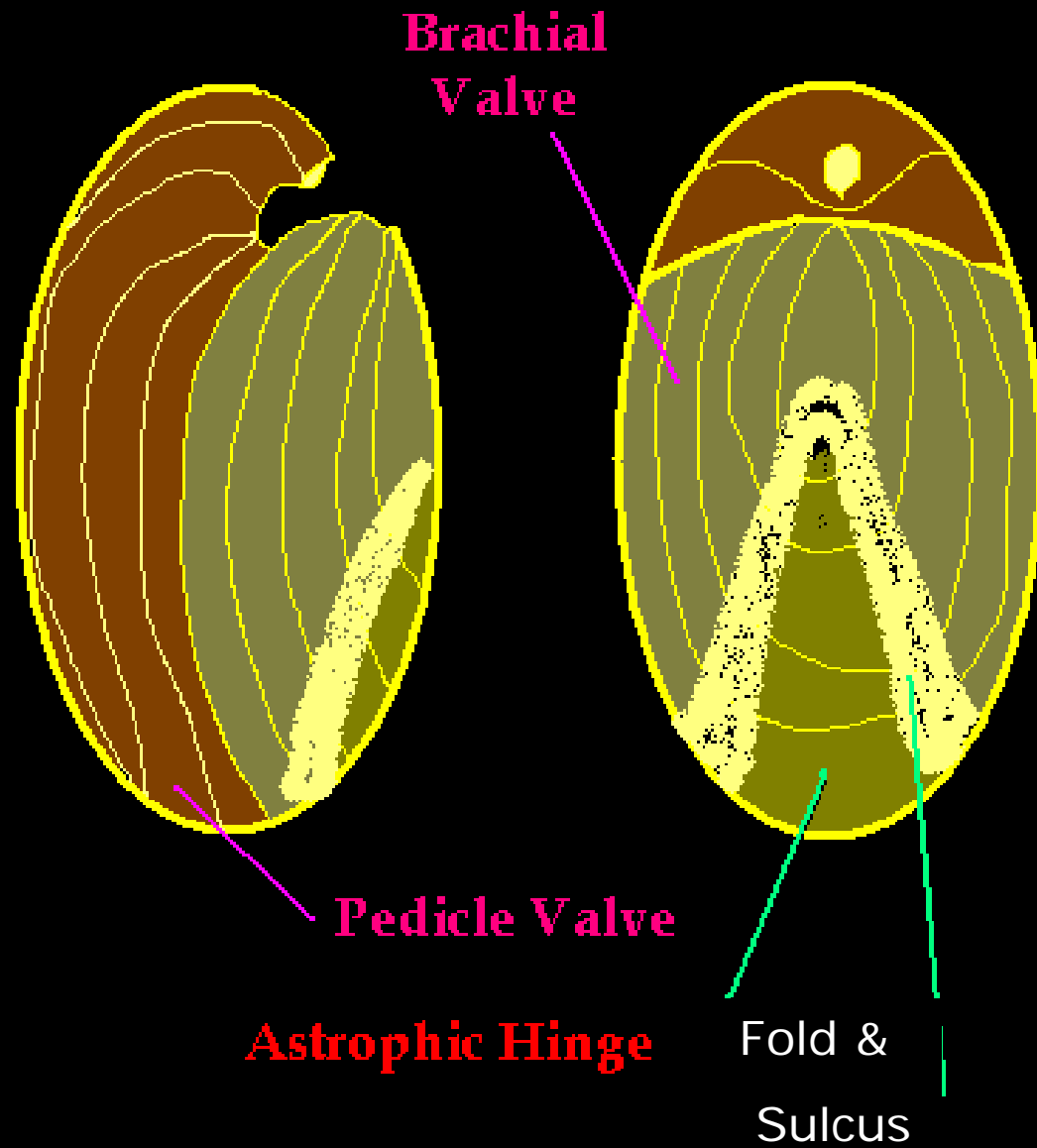
Dorsal or Brachial Valve

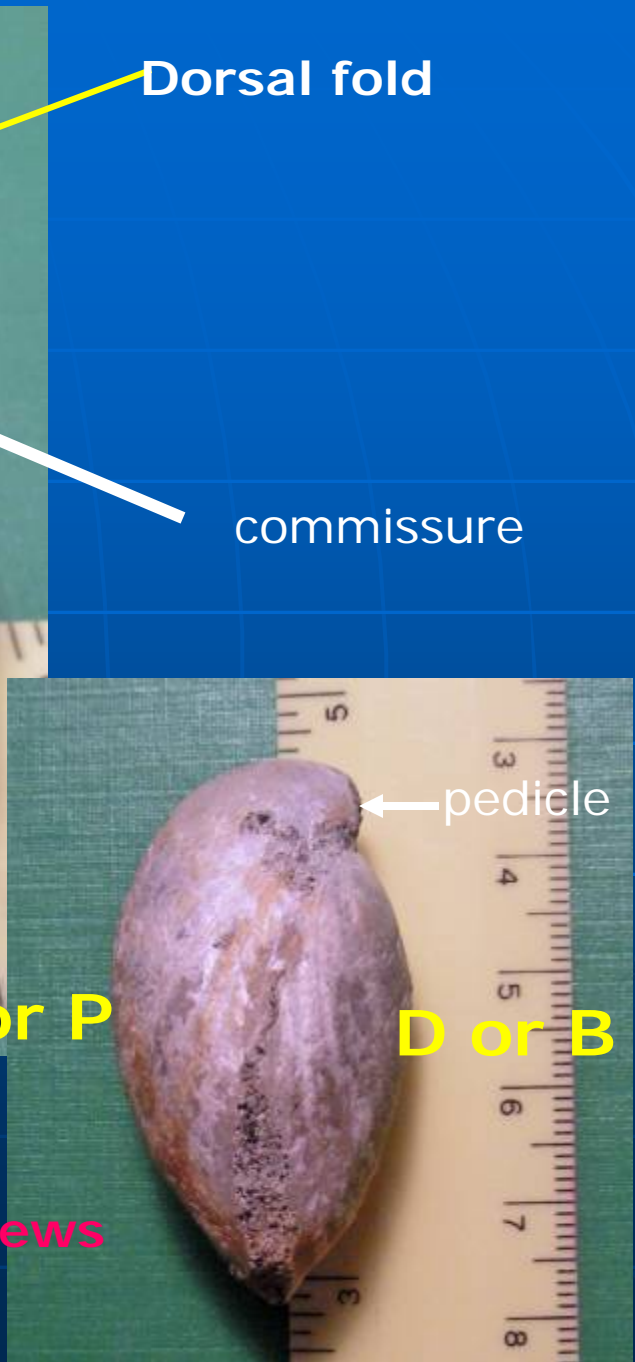
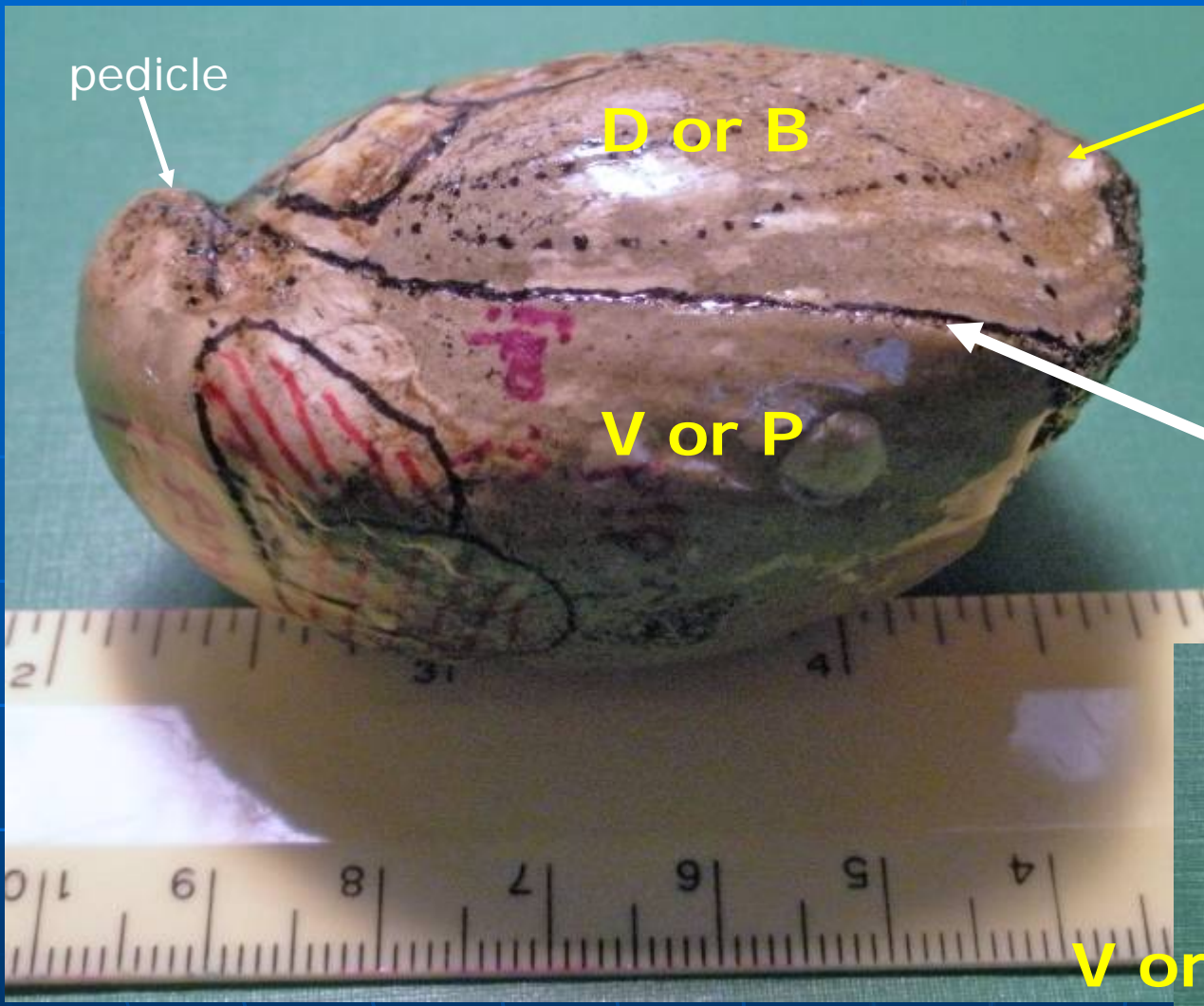


Oleneothyris harlani, Paleocene, NJ

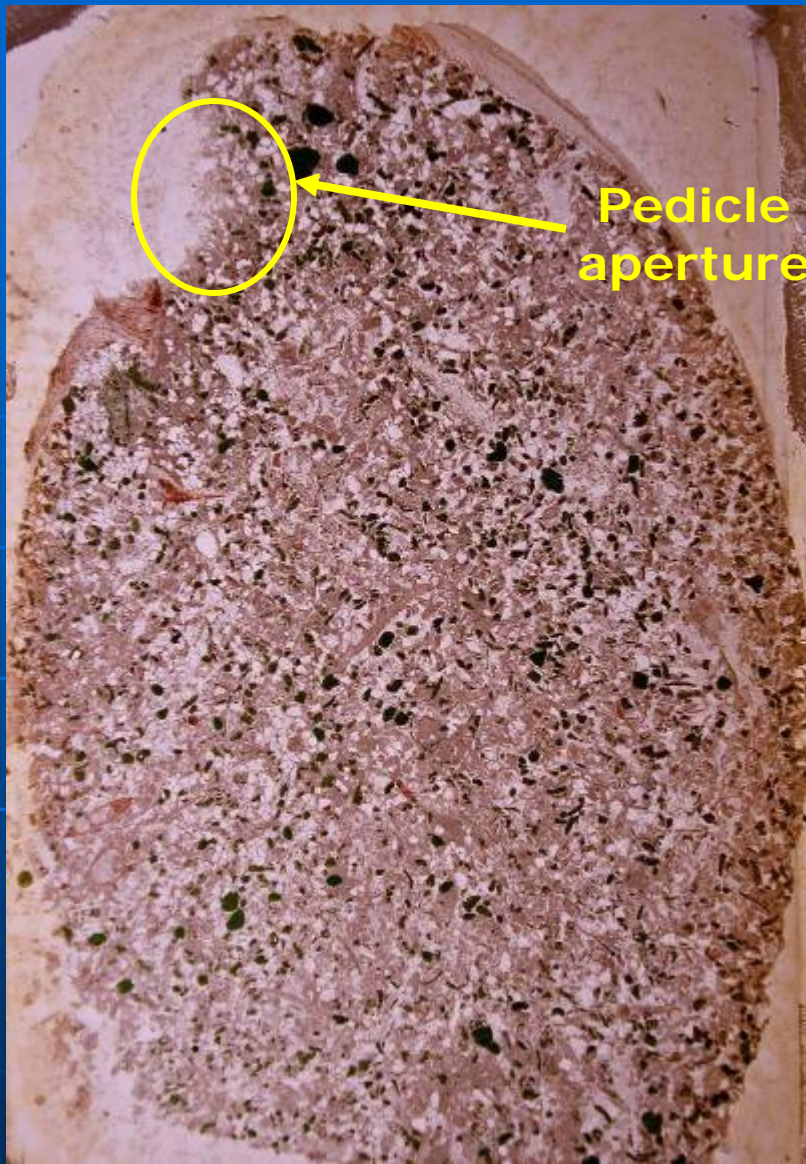
Eroded enough to demonstrate muscle scars

Oleneothyris harlani

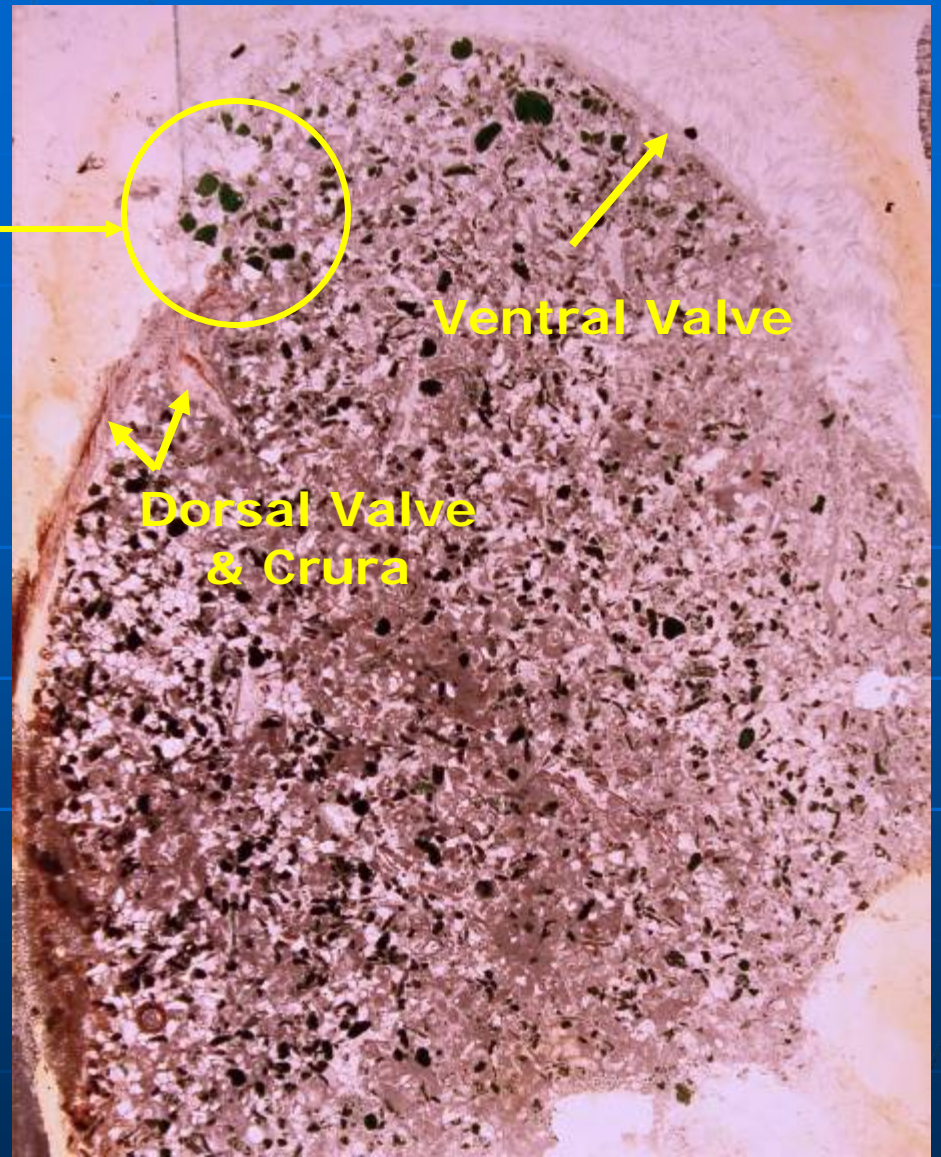




Oleneothyris harlani, Paleocene, NJ: lateral views



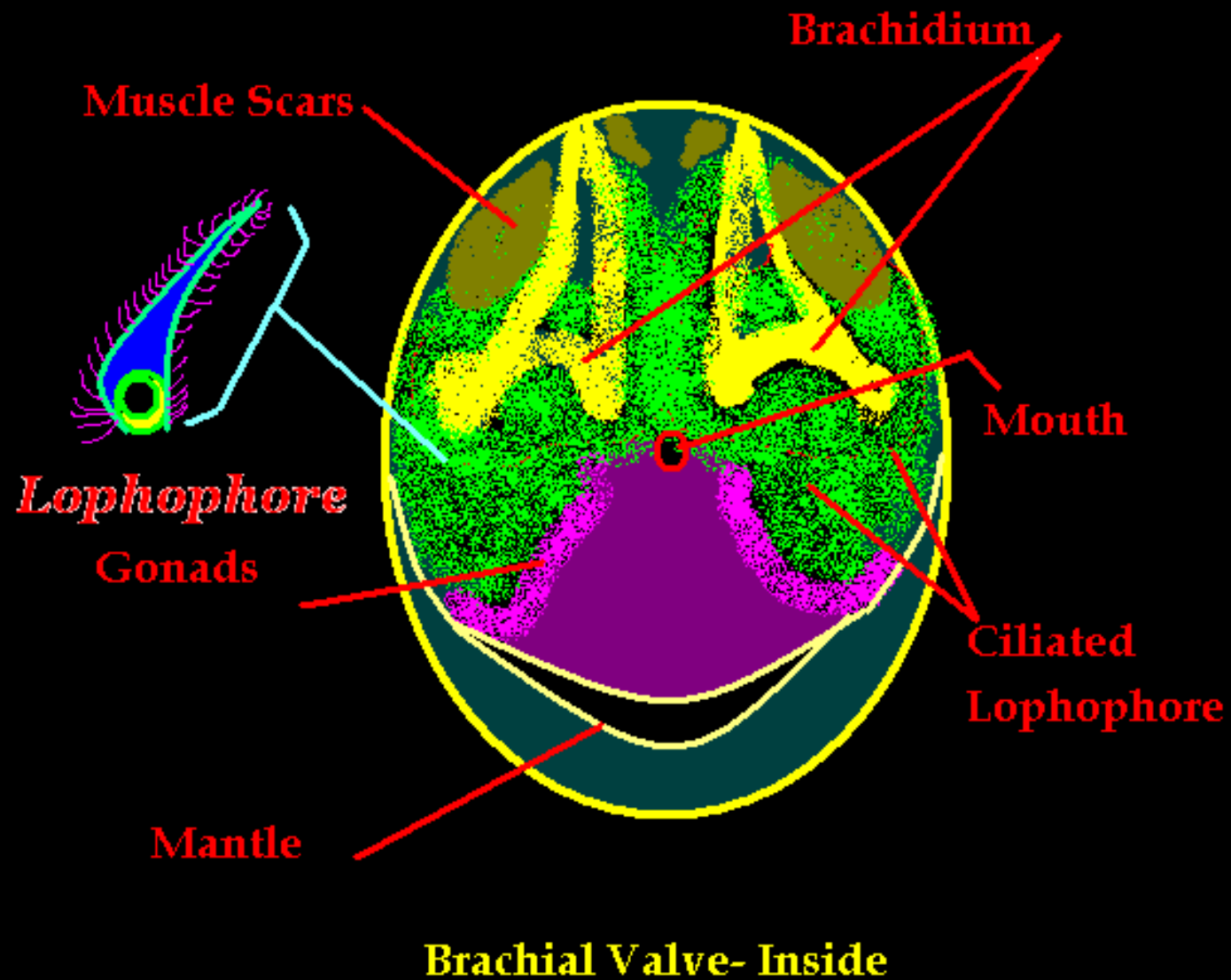
Pedicle
aperture

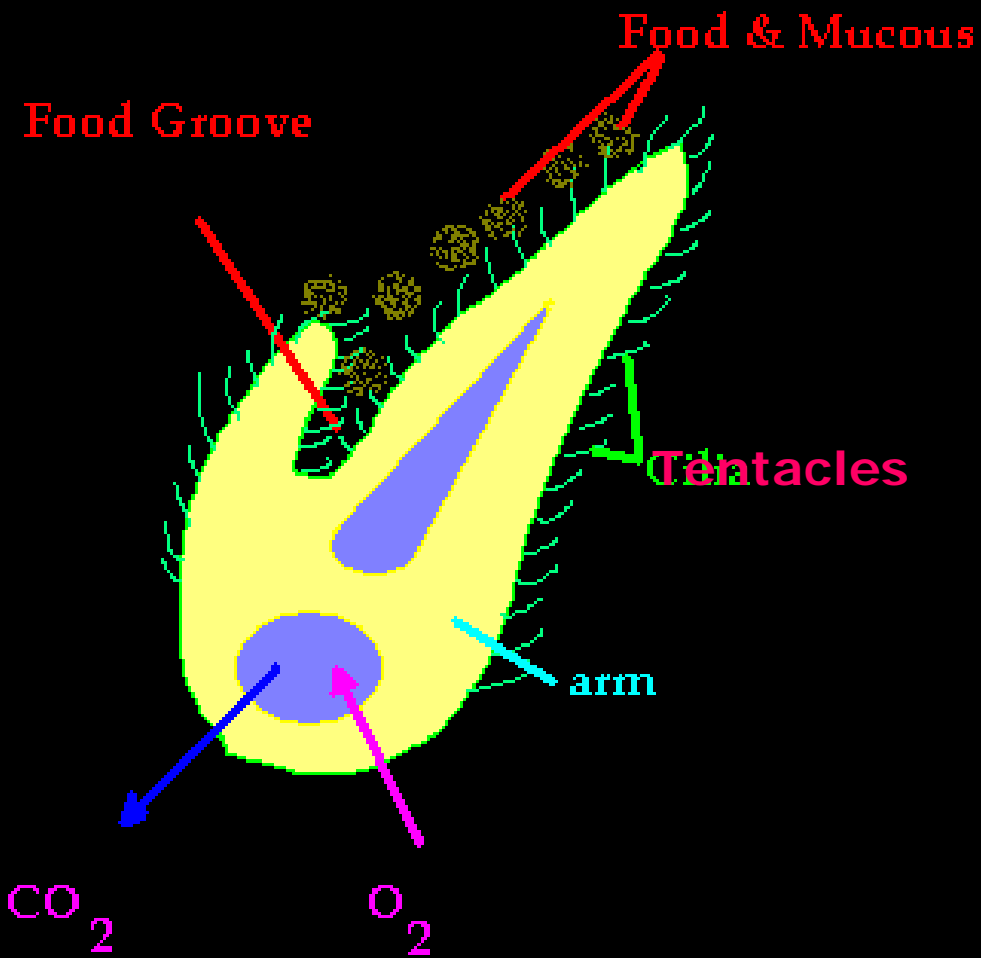


Ventral Valve

Dorsal Valve
& Crura

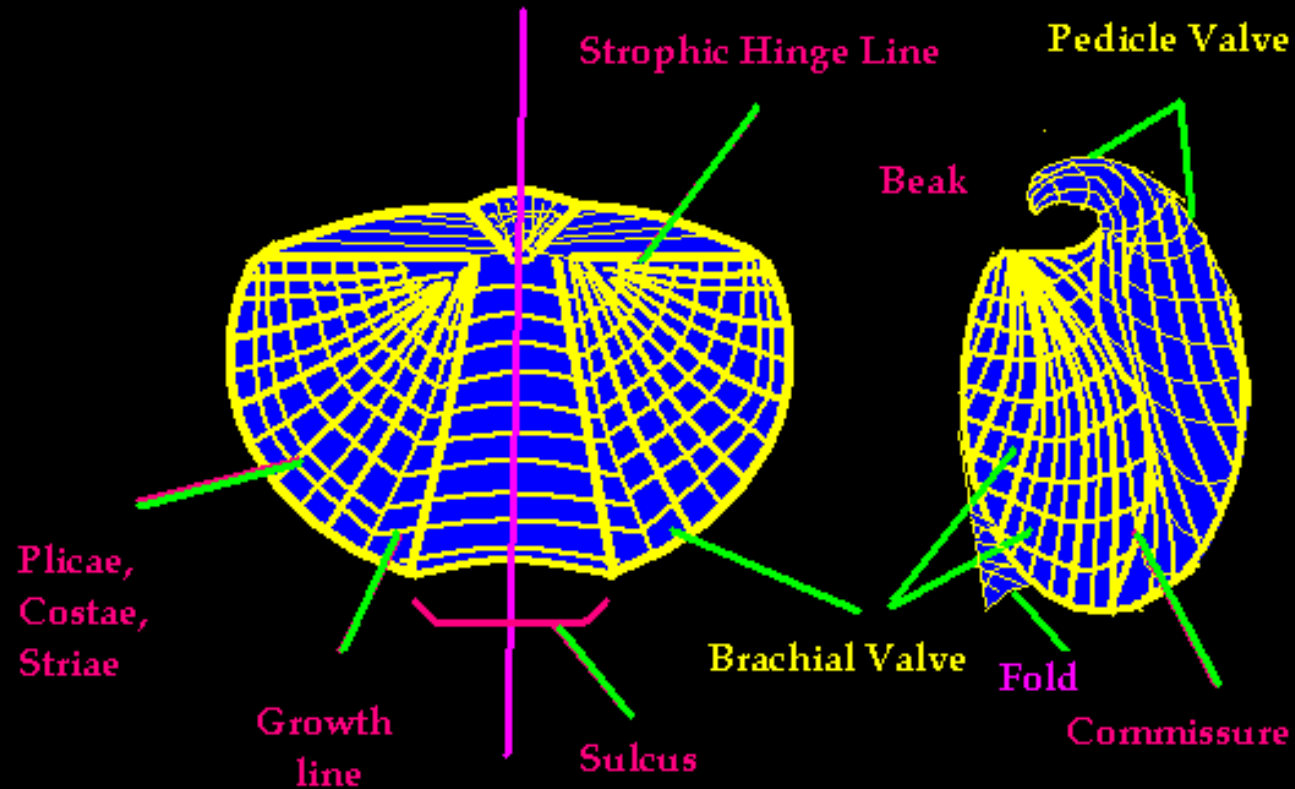
Glauconite-filled *Oleneothyris harlani*, Paleocene, NJ – **THIN SECTION**





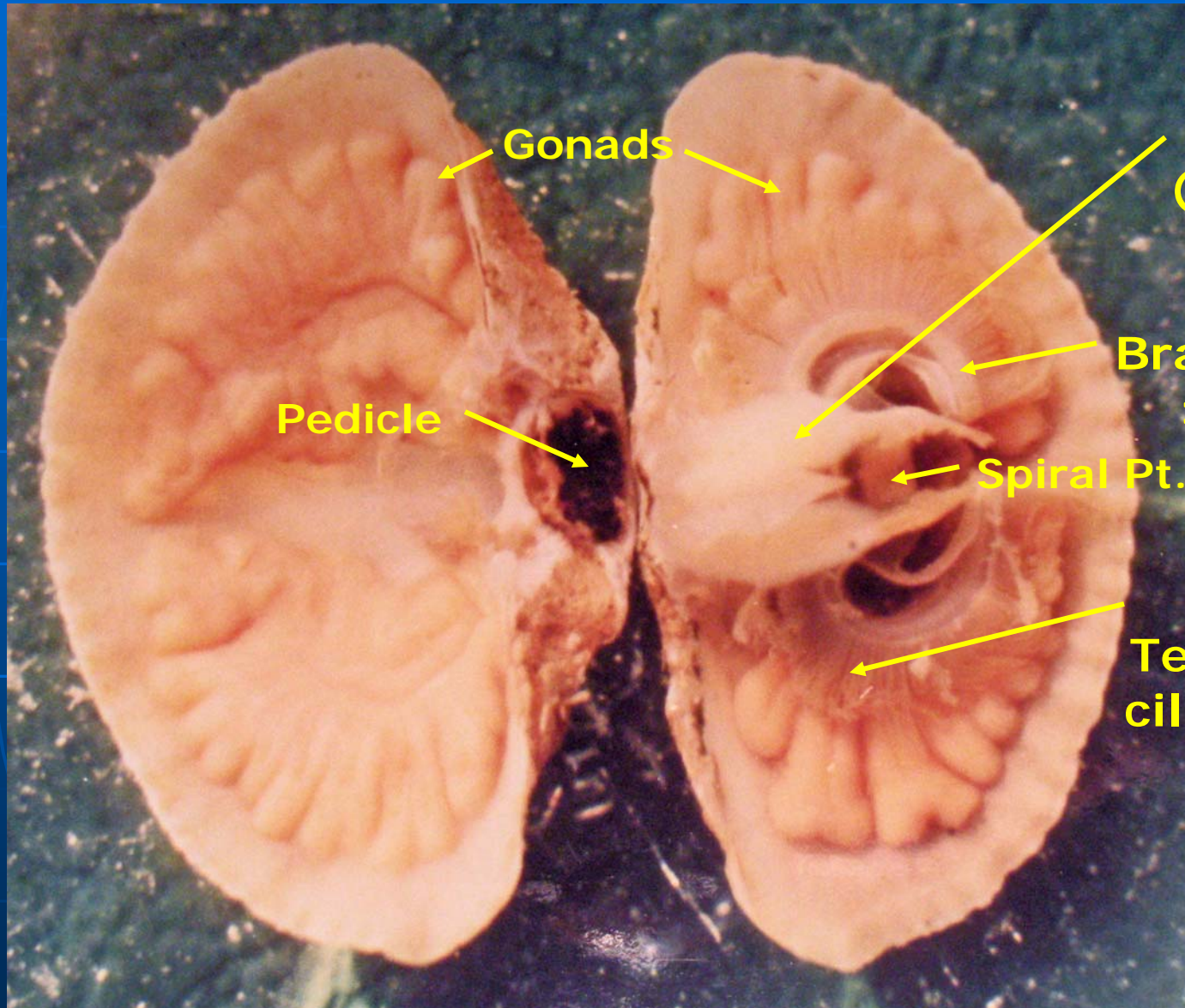
Basic Brachiopod Morphology

Plane of Symmetry



Ventral or Pedicle Valve

Dorsal or Brachial Valve



Gonads

Crus
(crura)

Pedicle

Brachidium
: 'arm'

Spiral Pt. of Loph

Tentacles:
ciliated-on
'arm'

Terebratulina septentrionalis

NE US

Posterior

Anterior

Line of dorsal valve

Adductor Muscles

Arm or brachidium

Blind intestine

Digestive Cecum

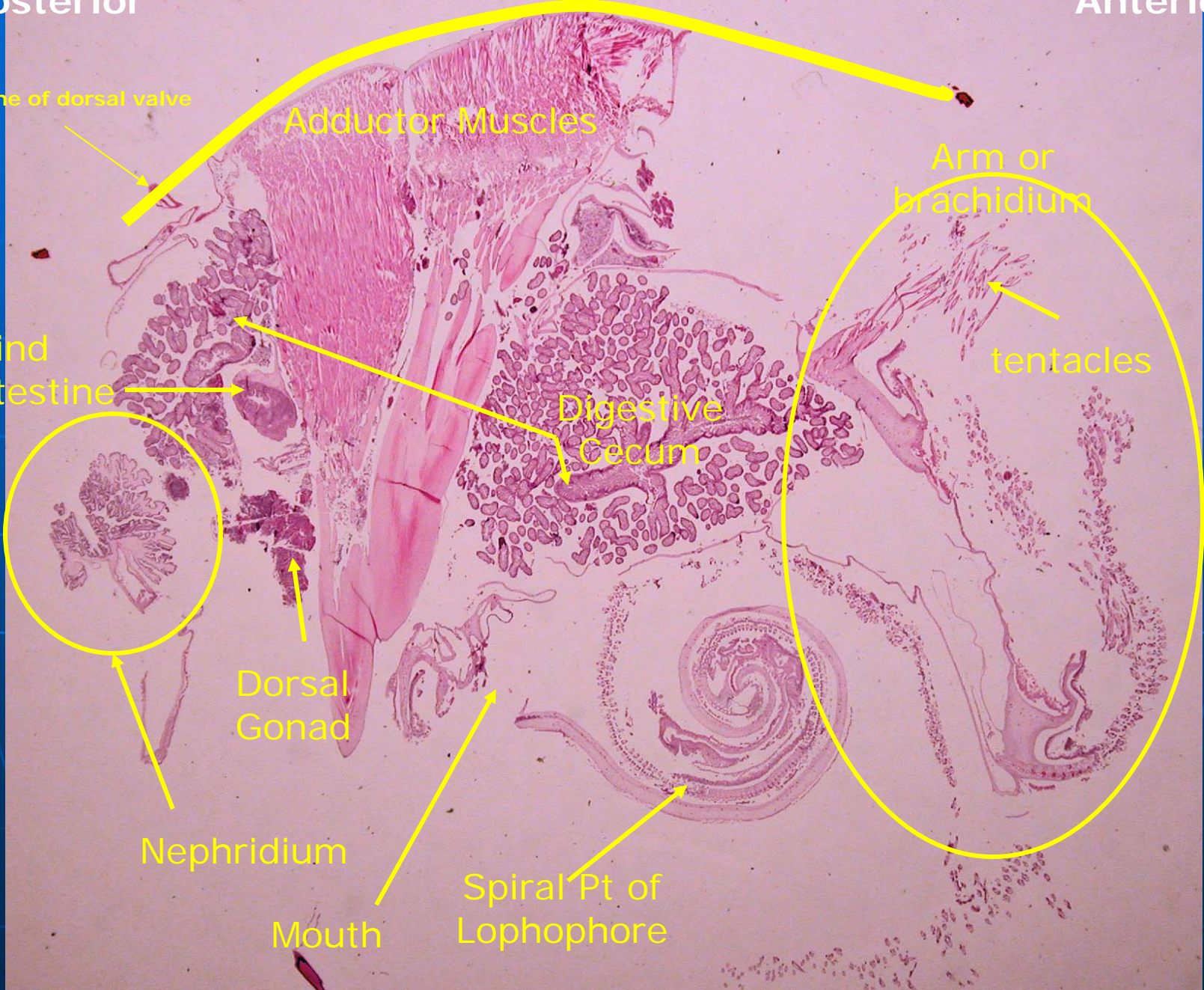
tentacles

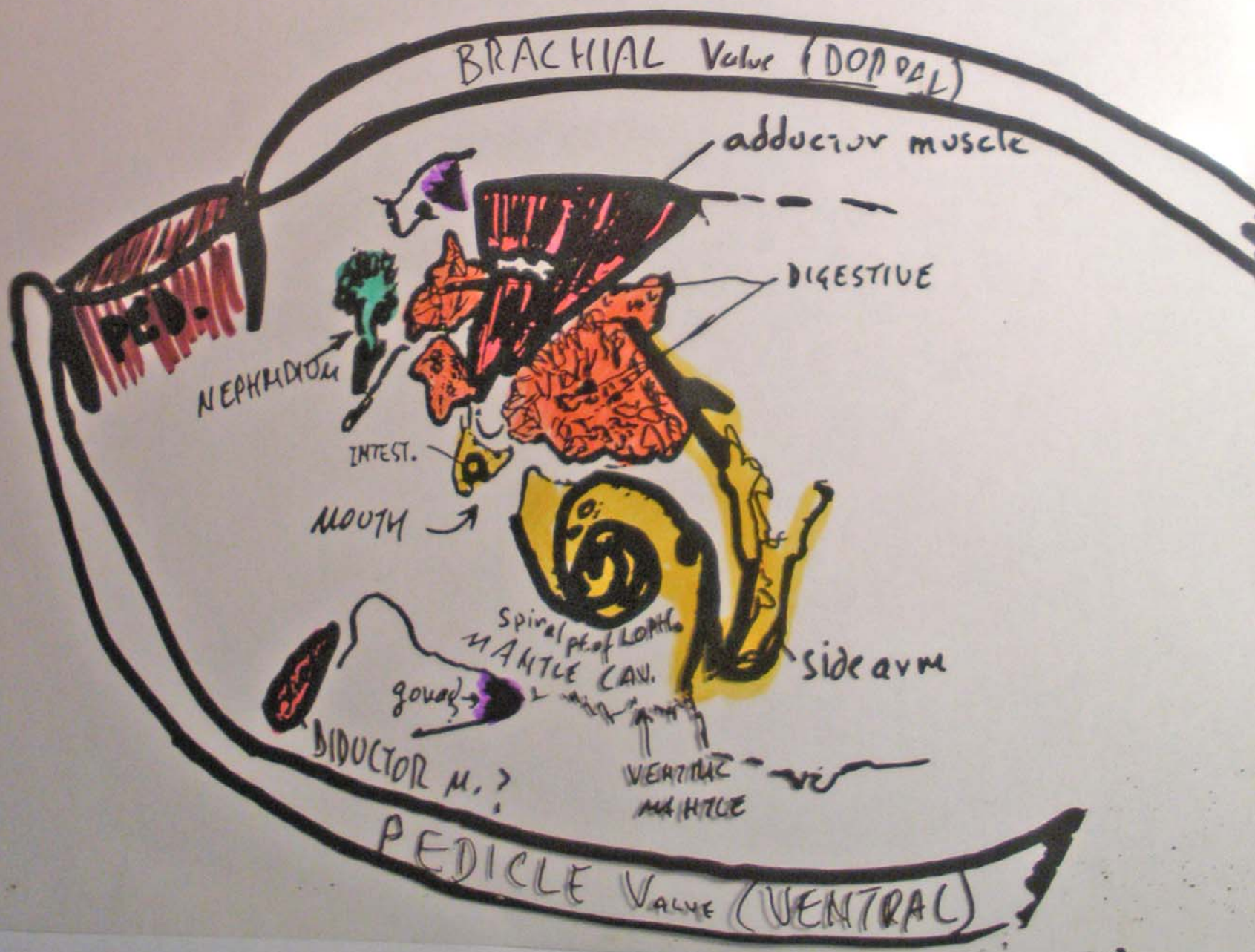
Dorsal Gonad

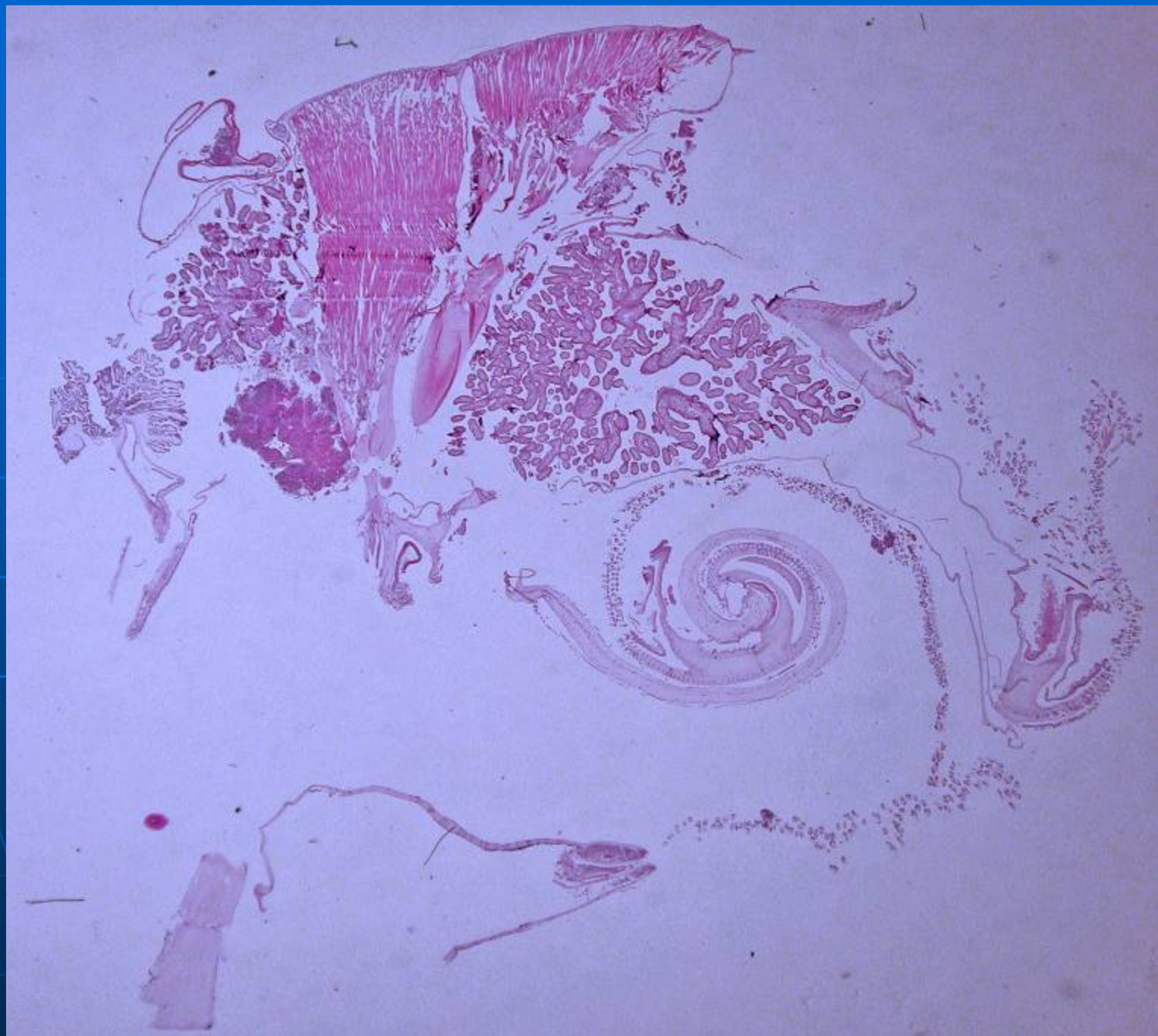
Nephridium

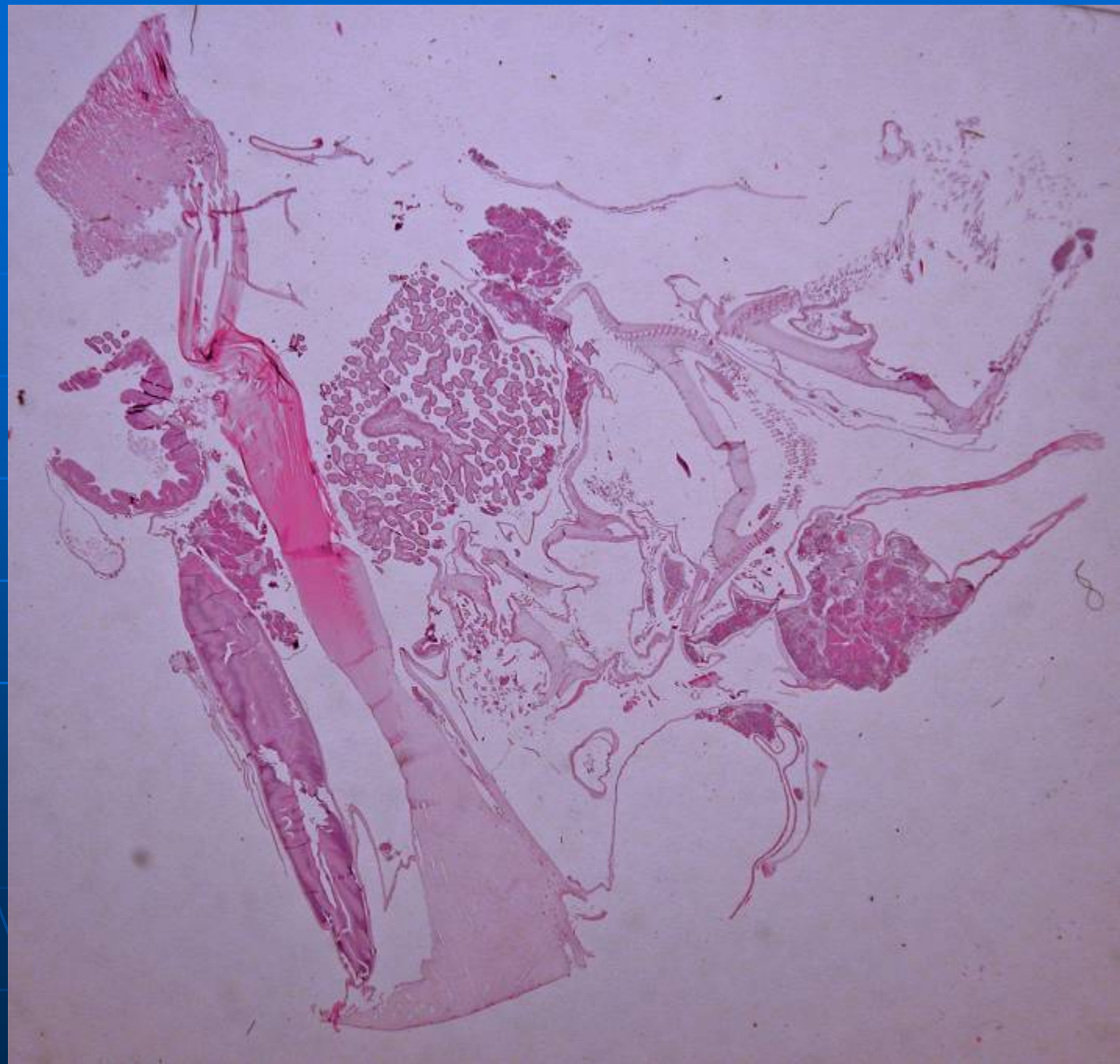
Mouth

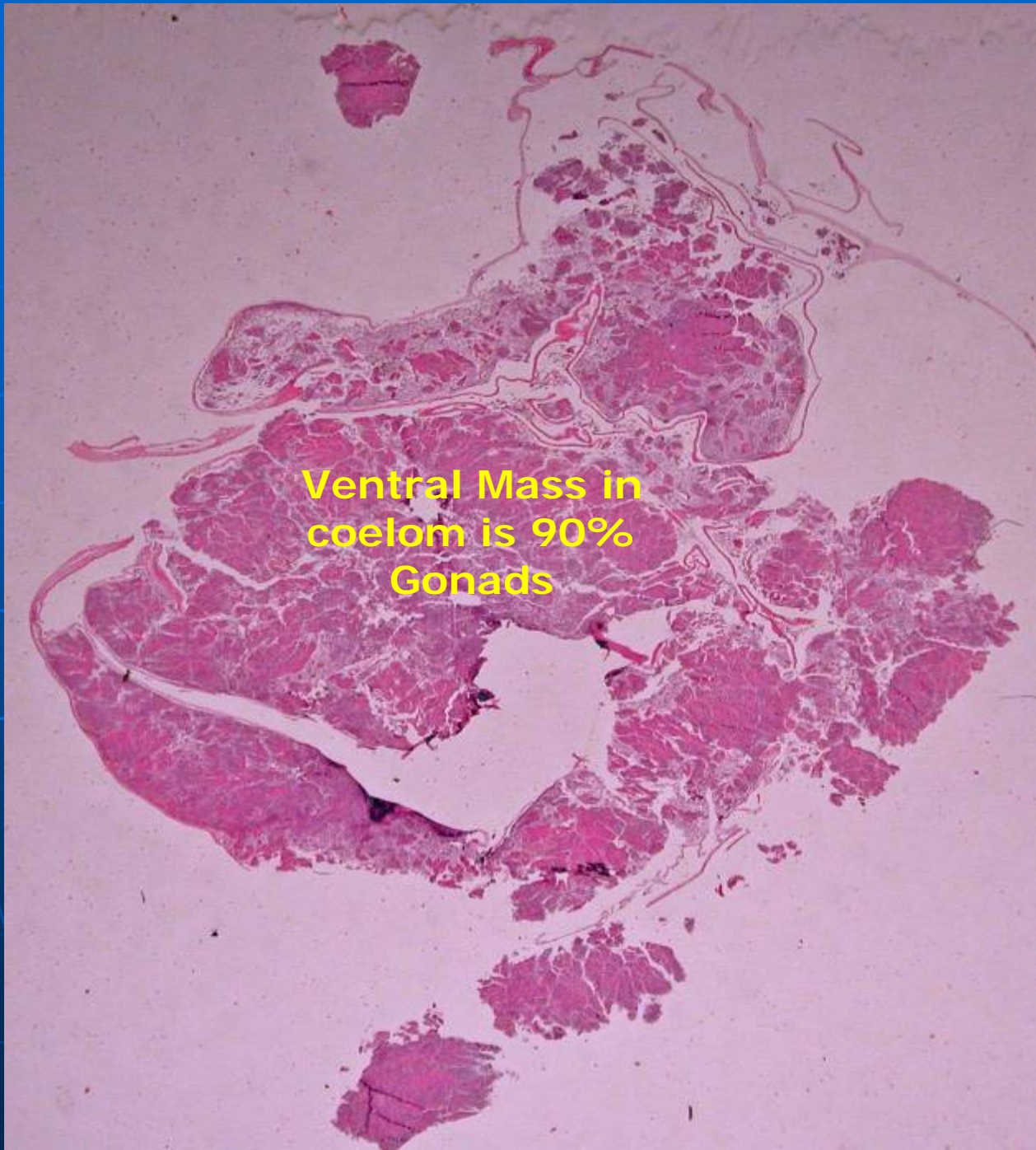
Spiral Pt of Lophophore



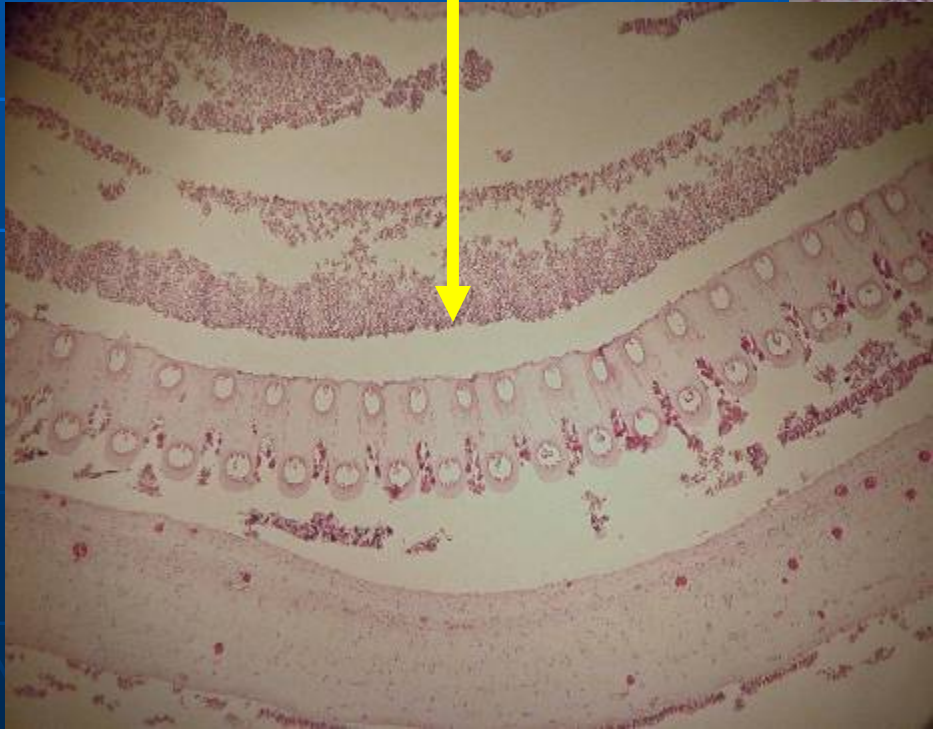
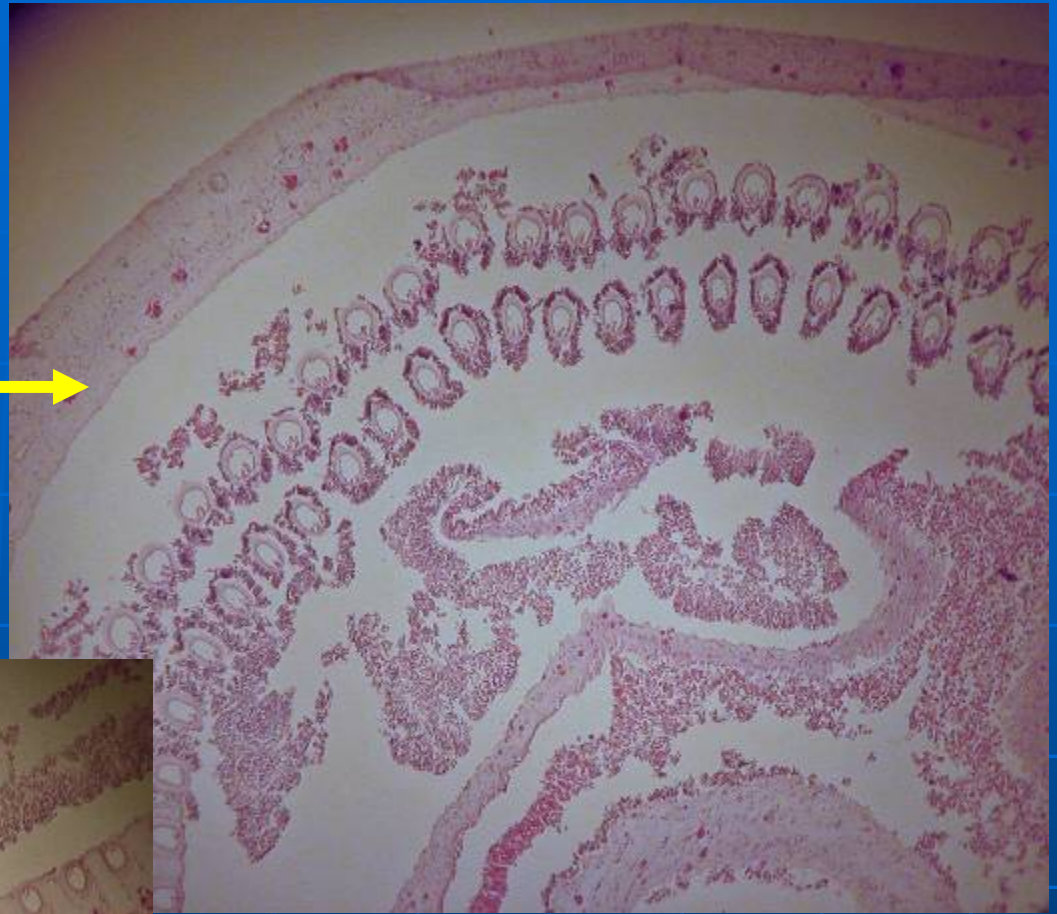
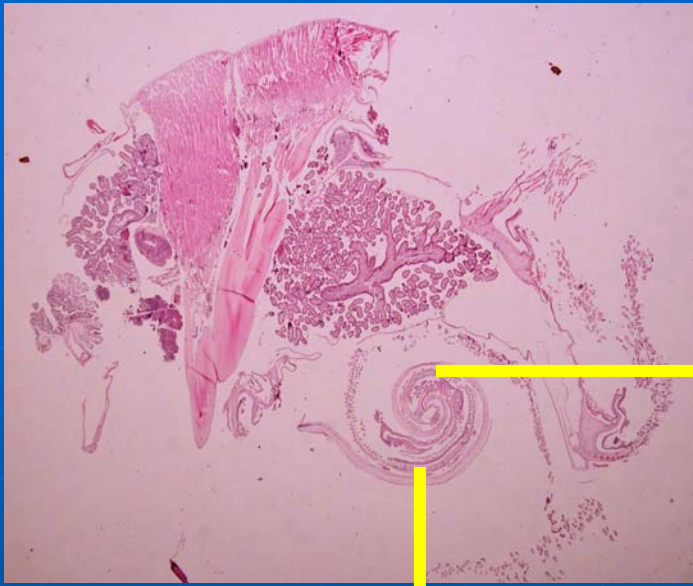




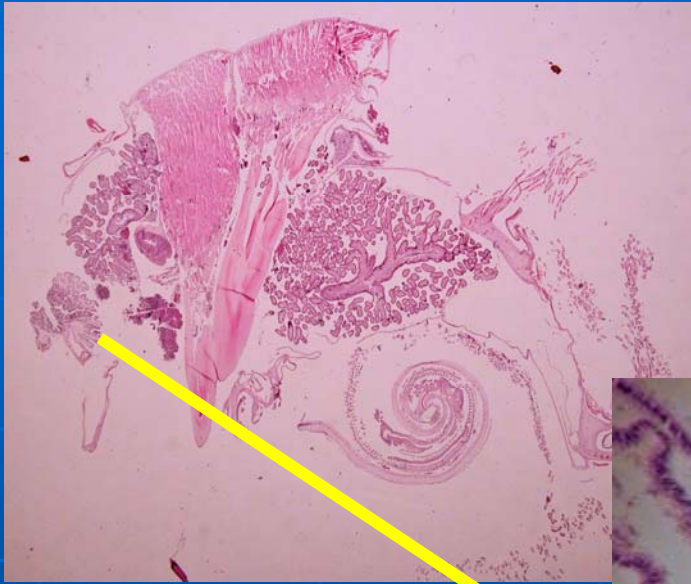




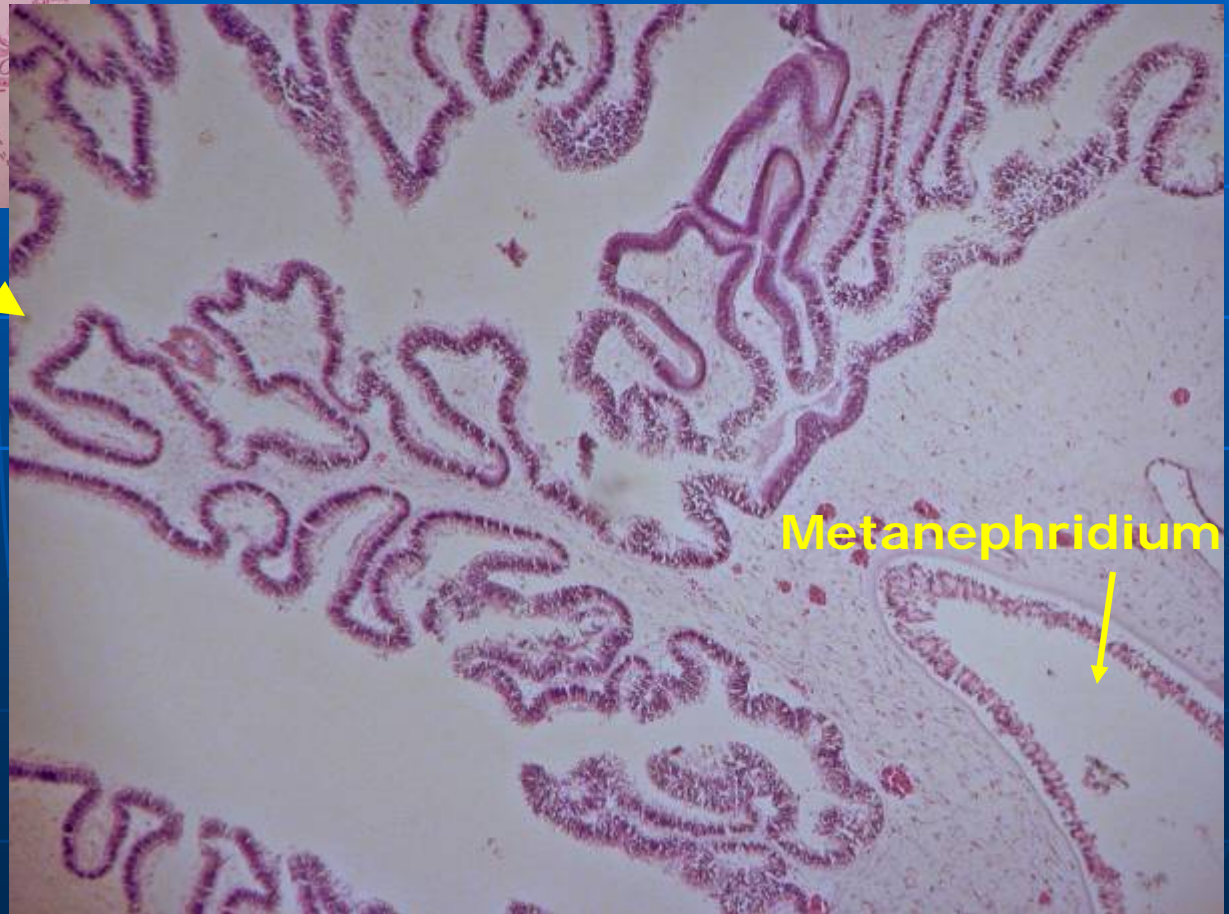
**Ventral Mass in
coelom is 90%
Gonads**



Central, Spiral Part of Lophophore



Nephrostome



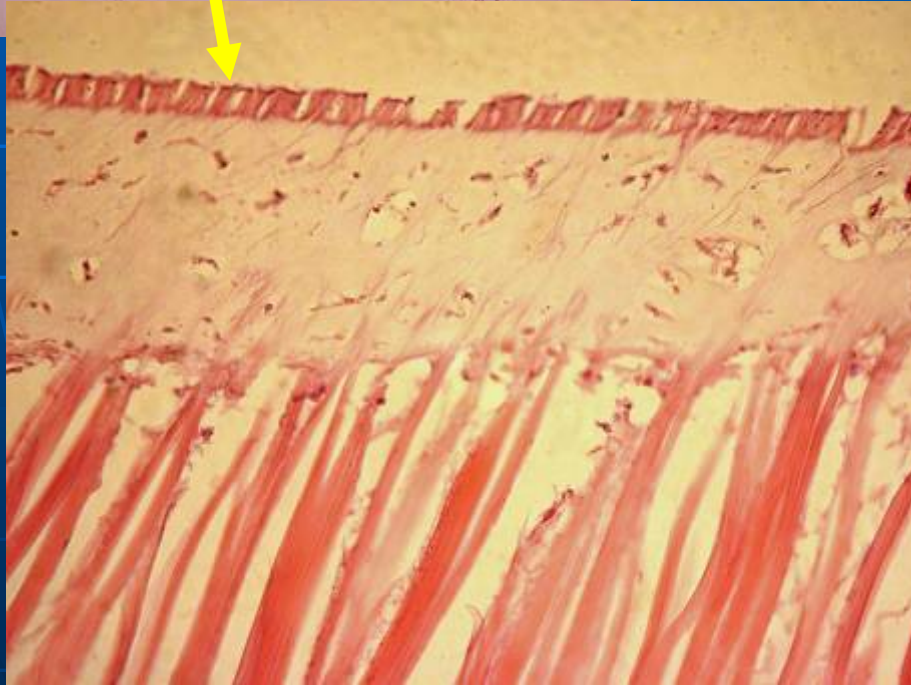
Metanephridium



Digestive Cecum

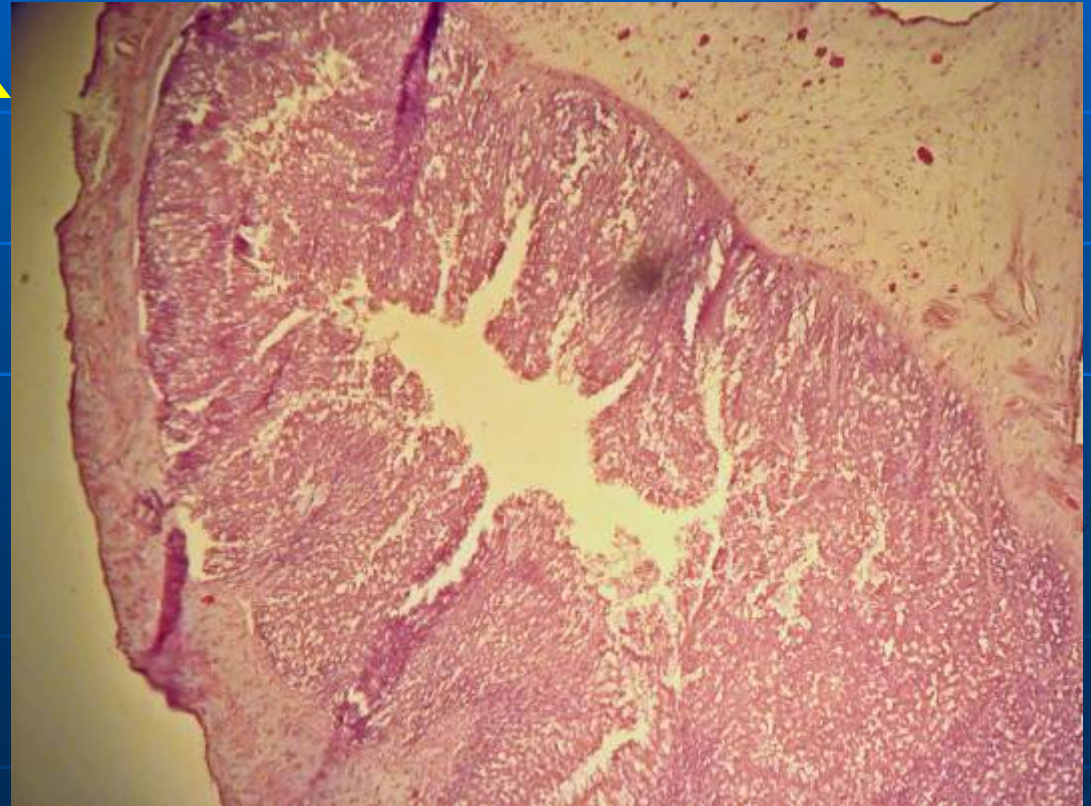


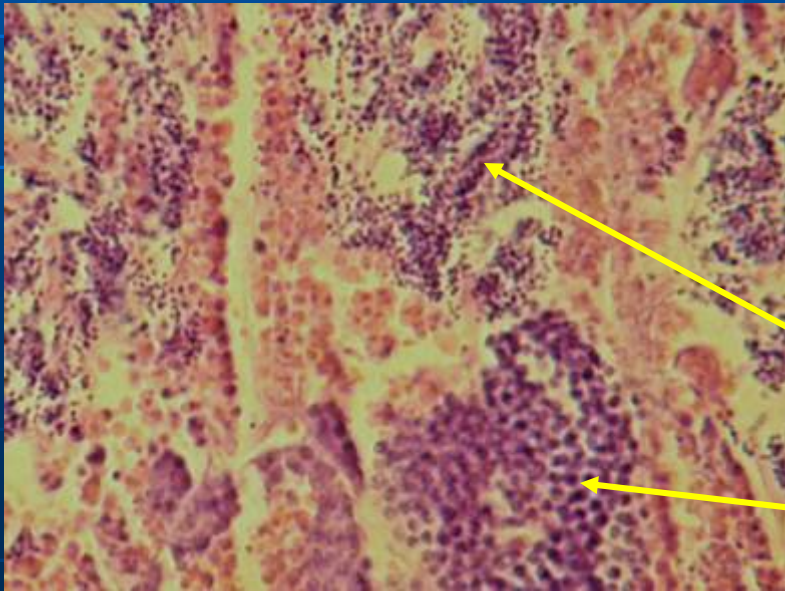
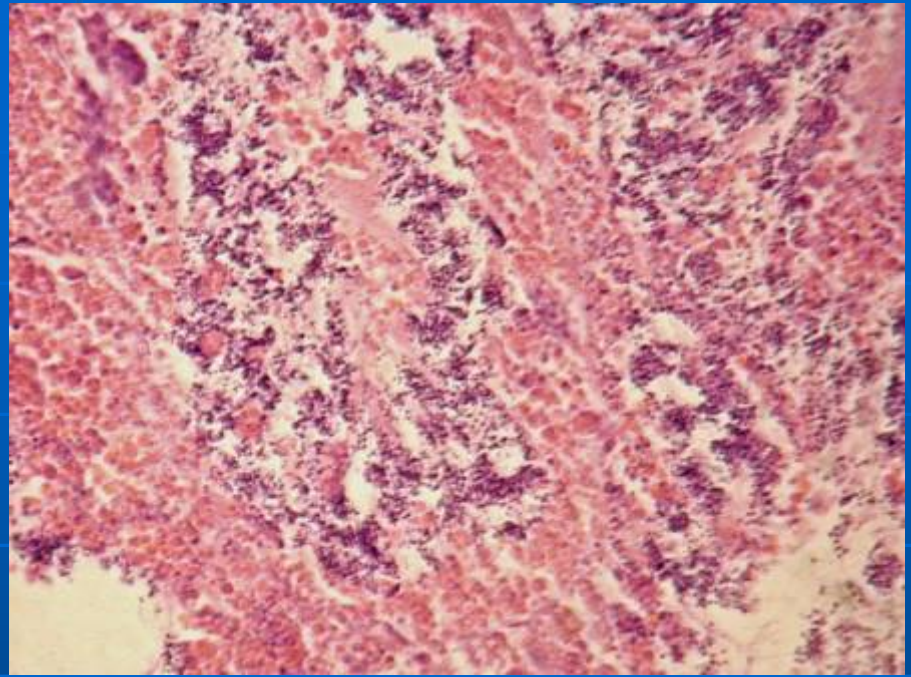
Adductor Muscles





'Blind' Intestine – no anus

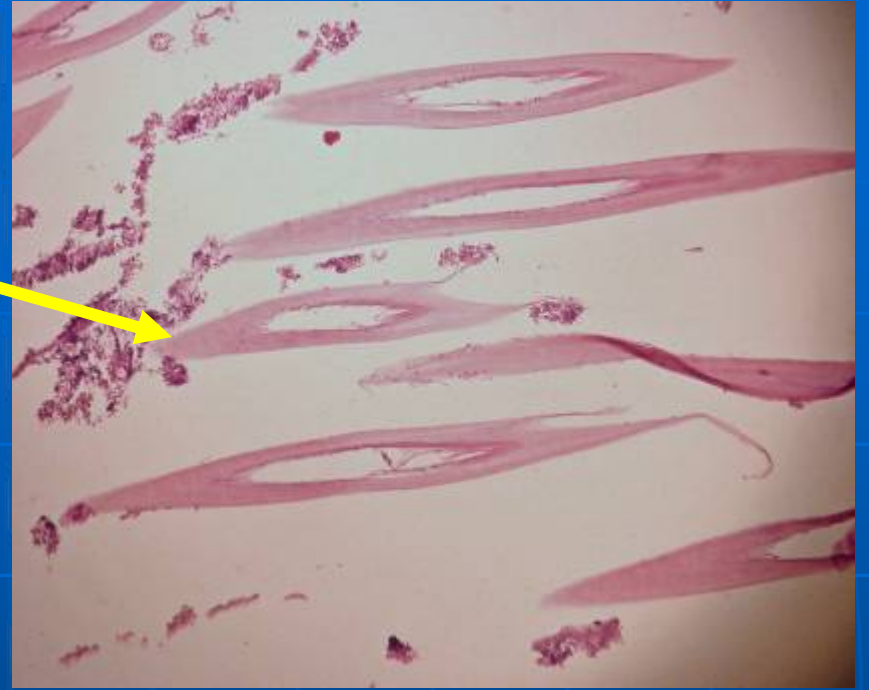




Gonads (Testes)

Spermatocytes

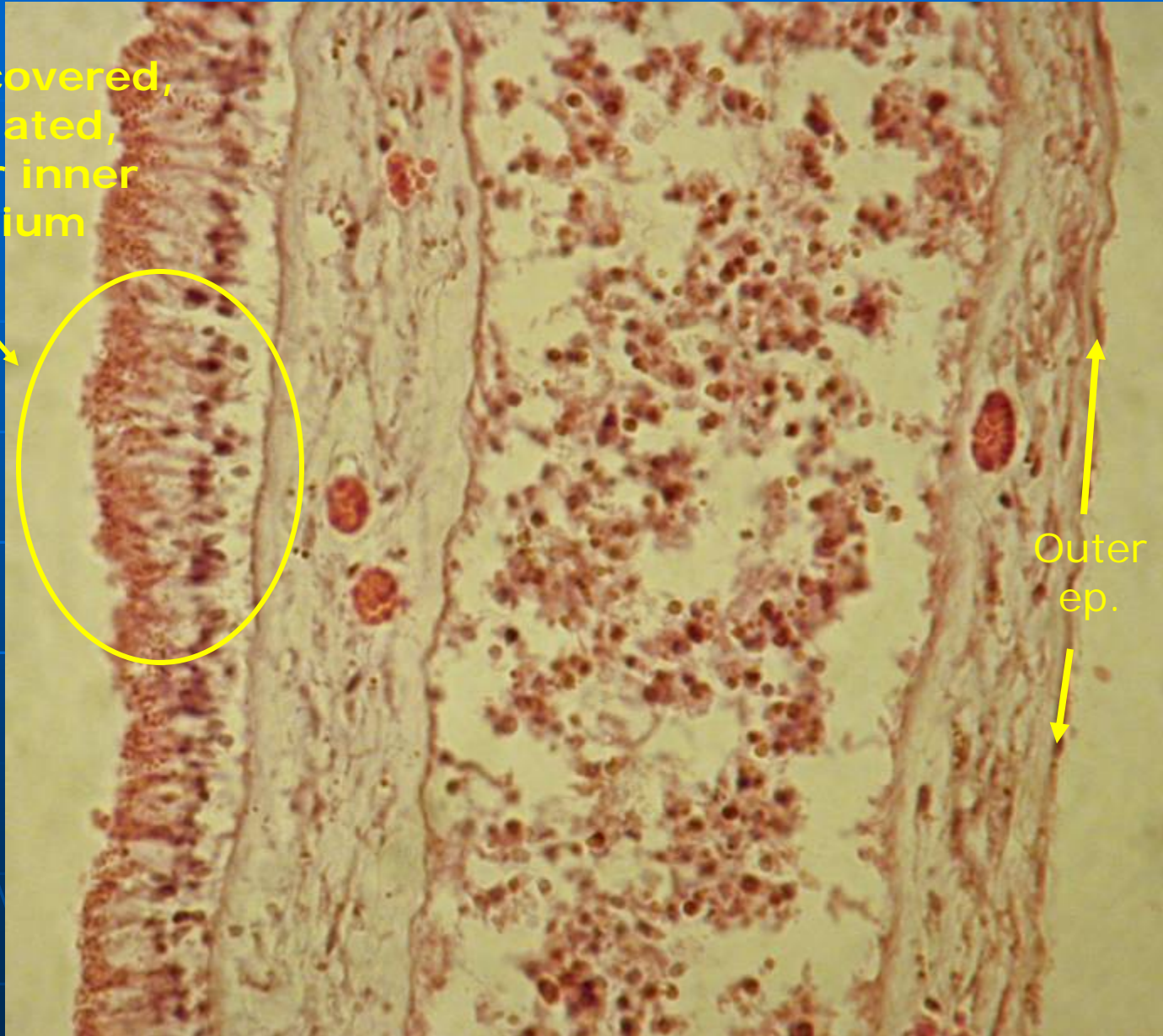
Spermatogonia



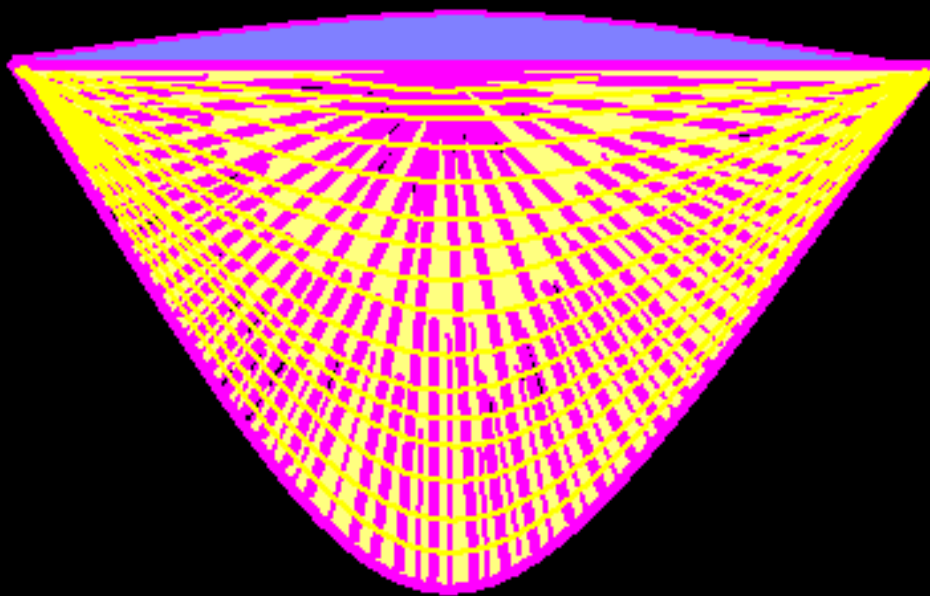
**Arm or Brachidium of
Lophophore with
Tentacles**

Mantle- secretes shell or valves

**Microvilli-covered,
monociliated,
glandular inner
epithelium**



**Outer
ep.**

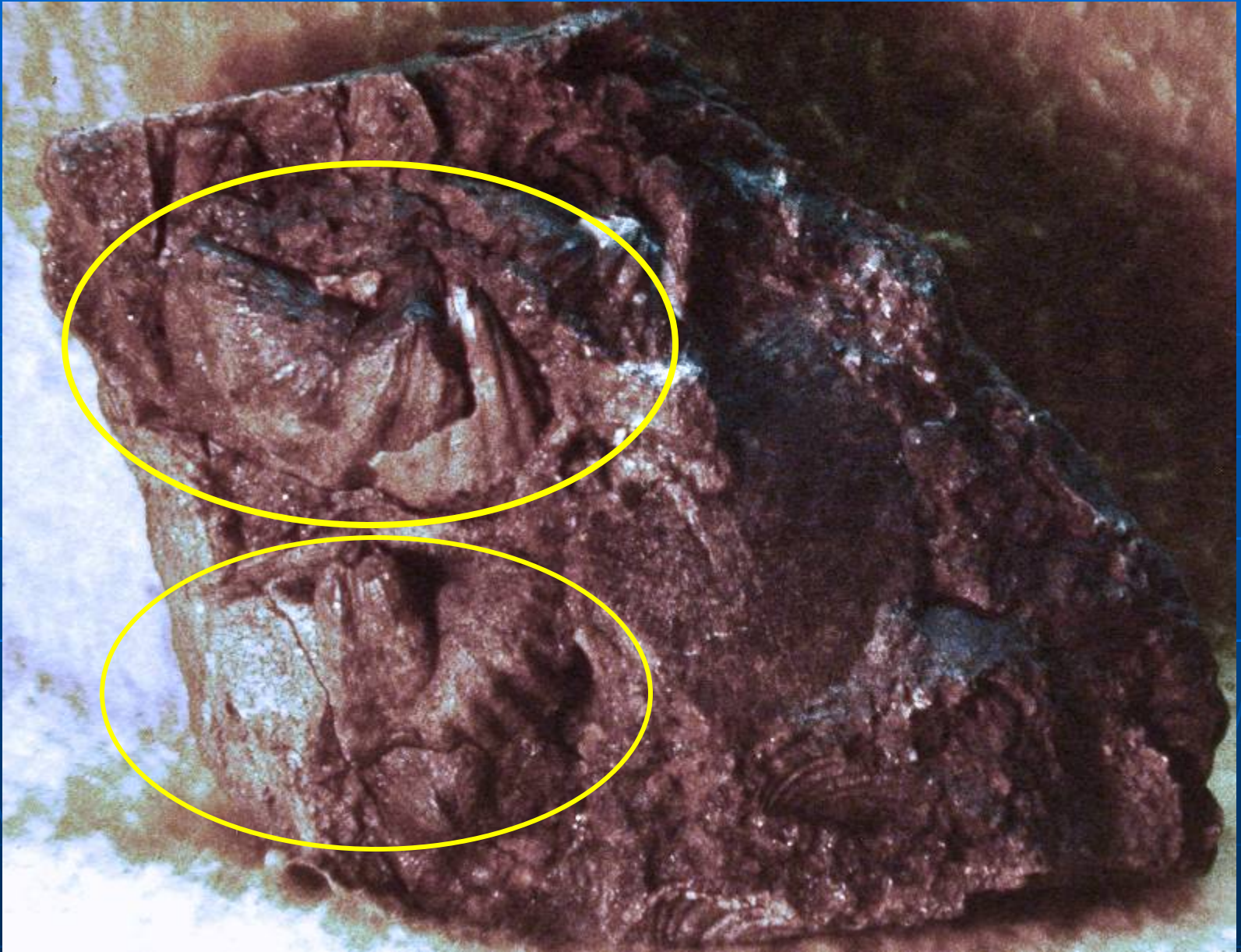


Megakozlowskiellina perlamelosa: Lower Devonian New
Scotland Fm., NY,NJ, PA





Lower Devonian New Scotland Fm., NY, NJ, PA:
Macropleura macropleura



Acrospirifer murchisoni: Lower Devonian Oriskany Fm., NY, NJ, PA



Lower Devonian Coeymans Fm., NY,NJ, PA:
Gypidula coeymanensis

Atrypa reticularis

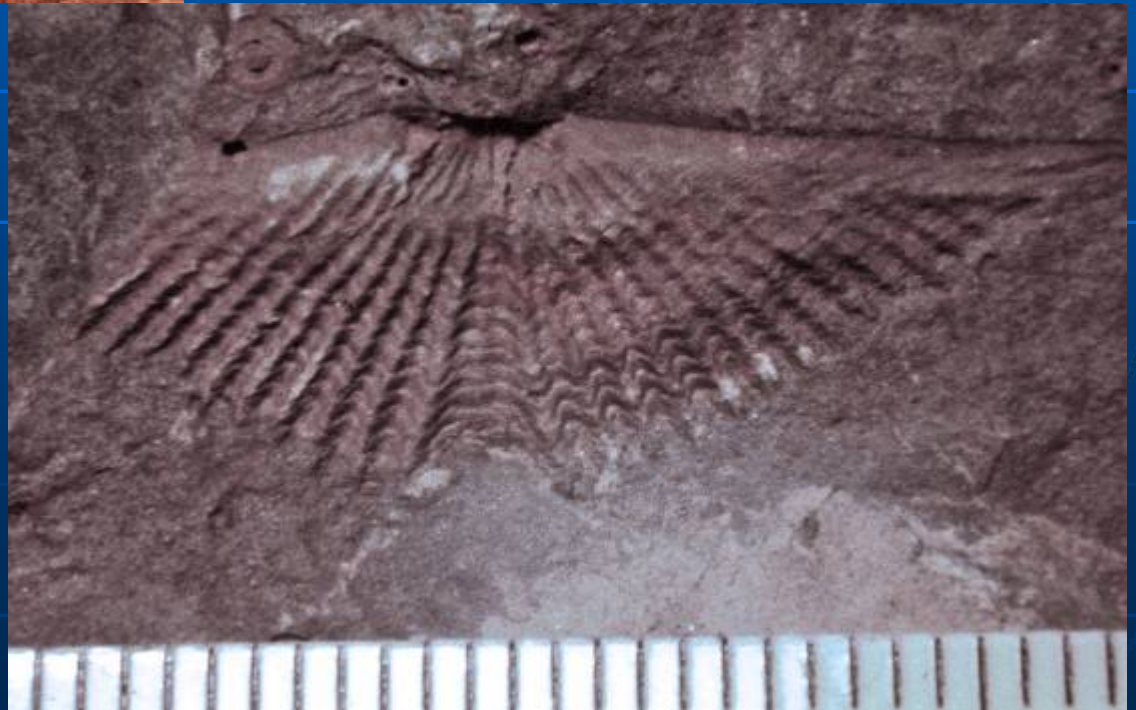




Leptaena rhomboidalis: Lower
Devonian New Scotland Fm., NY, NJ,
PA



Mucrospirifer mucronatus
Mahantango Fm., PA, M.Dev.



Devonchonetes sp. Mahantango Fm., PA, M.Dev





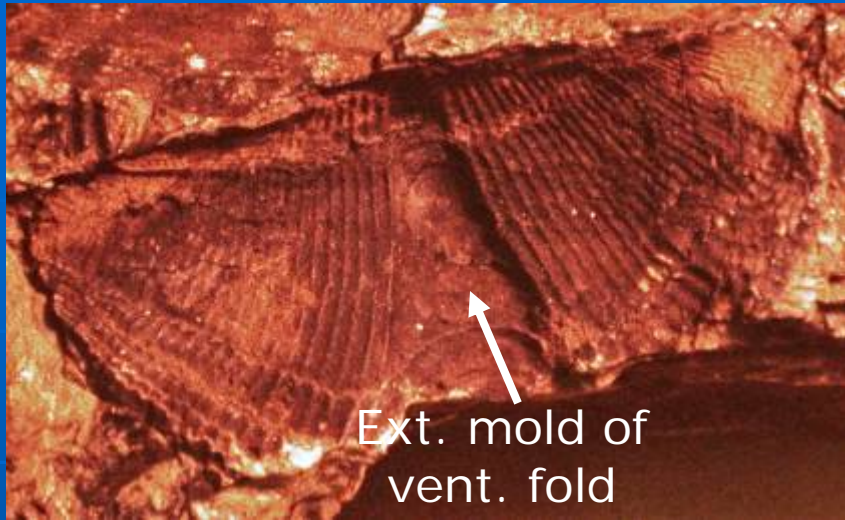
Lower Devonian New Scotland Fm., NY, NJ, PA

Camerotoechia sp.
Note zig-zag
commissure





Middle Devonian *Mediospirifer* sp.



Middle Devonian
Mediospirifer sp.
Mahantango Fm., PA



2 cm

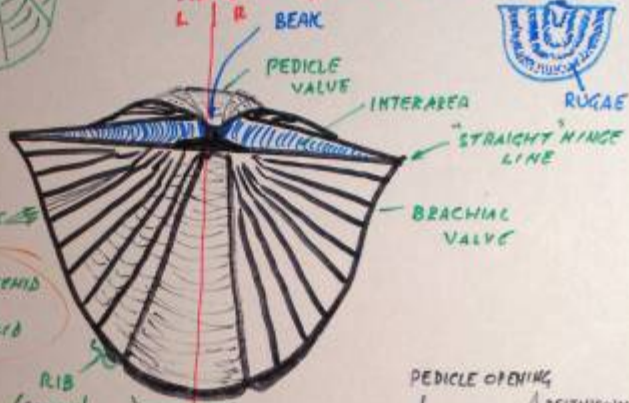


Choristothyris plicata;
Late Cretaceous
Navesink Fm., NJ

BRACHIOPODS



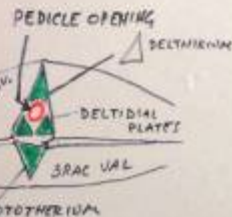
NO STRAIGHT HINGE LINE
SYMMETRY - OPPOSITE OF CLAMS



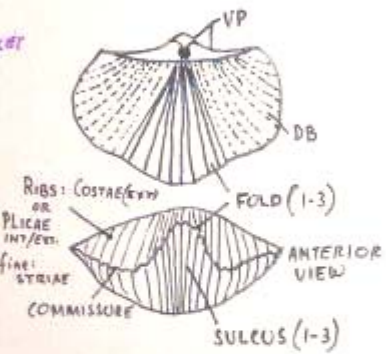
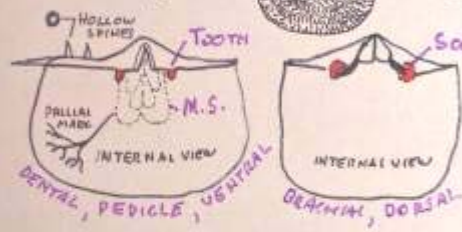
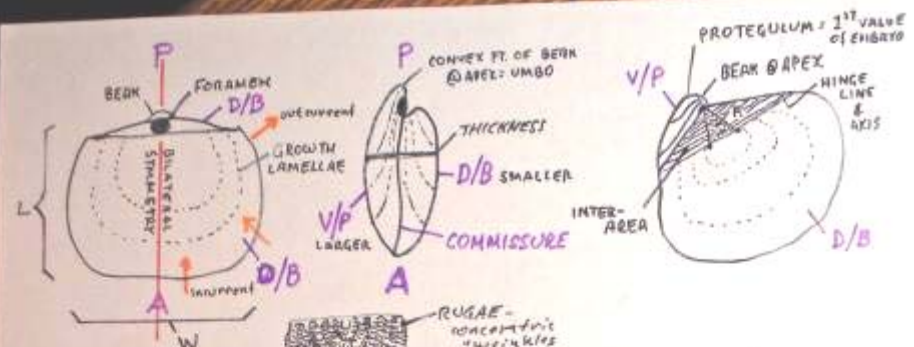
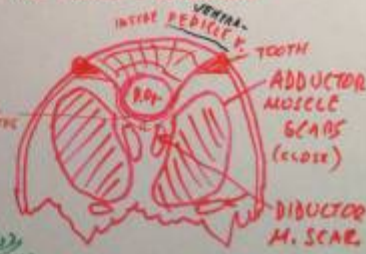
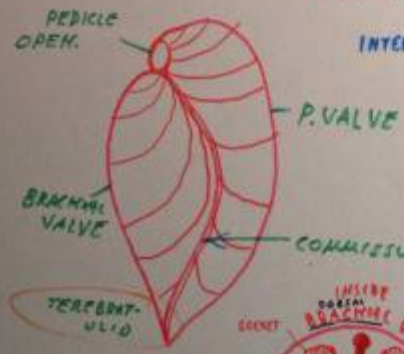
STROPHOMENID & SPIRIFERID

RIB (COSTAE) IF FINE STRIAE

fold-out sulcus-in



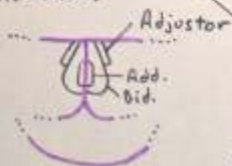
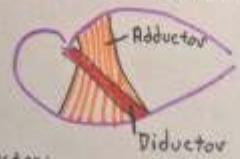
HINGE STRAIGHT = STROPHIC
HINGE CURVED = ASTROPHIC



not @ prominent
NOTOTHELIUM
D/B
V/P
DELTHYRIUM
most prominent due to pedicle
common in Lo. Paleozoic



Articulate Muscles:

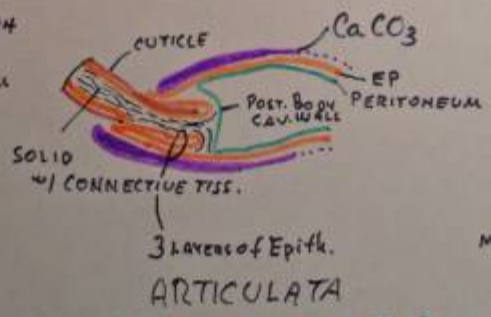
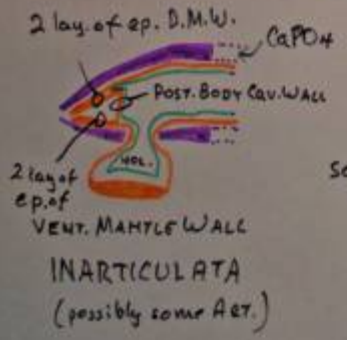
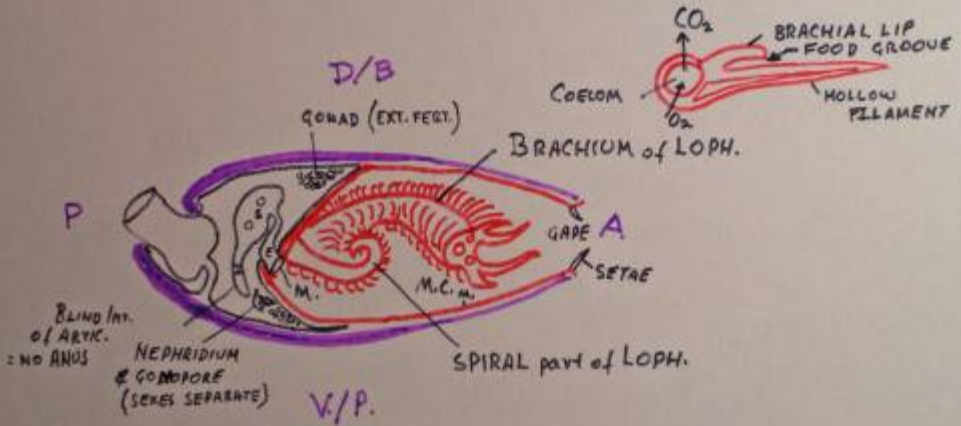
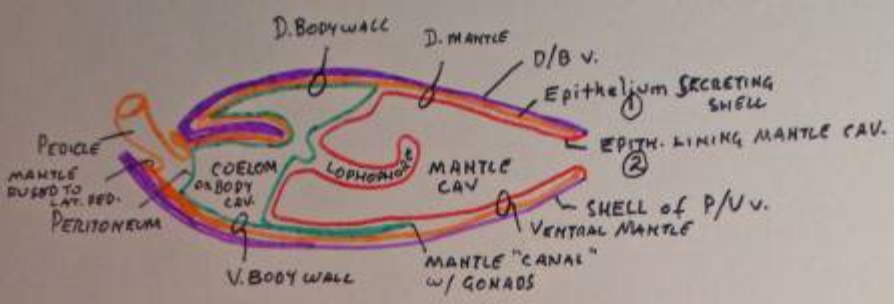


Adductor:
near midline, close valves, extend dorso-ventrally; insertion in V/P valve = 1 pair; origin in D/B v. = 2 pair.

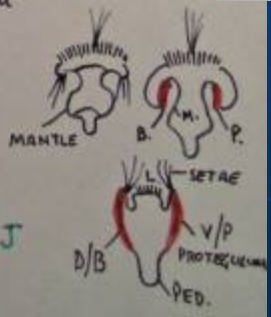
Diductors: close shell; lg. scars lateral to Add.; sometimes smaller secondary pair behind. insert on D/B v., origin on V/P.

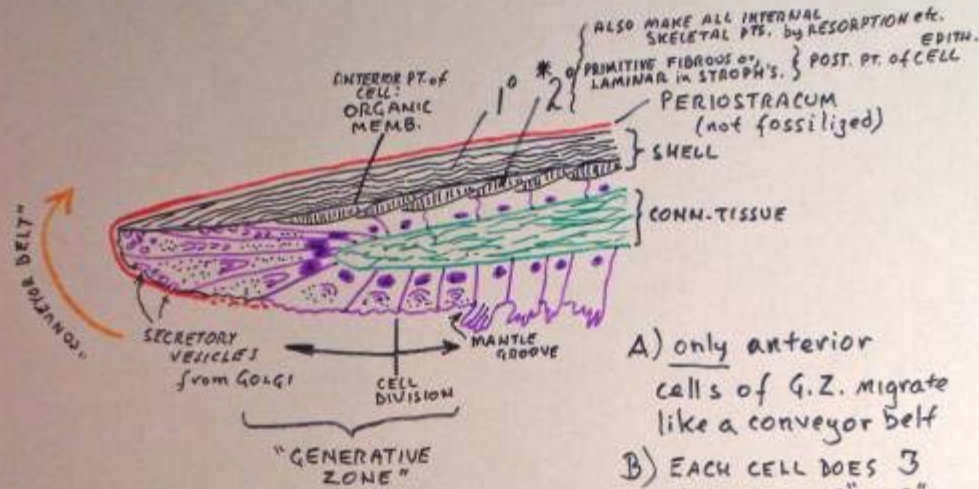
- Inarticulate Musc.
- 1) no hinge mechanism
 - 2) ANY # POST PAIRS of Add. inserted near MARGINS of Body Cav. = close/rotate shells;
 - 3) No Diductors!!
 - 4) OBLIQUES pull anterior body wall into body cavity = pressure to OPEN shells; 2 or more pairs

Pedicle Adjustors:
allow shells to rotate about PEDICLE.



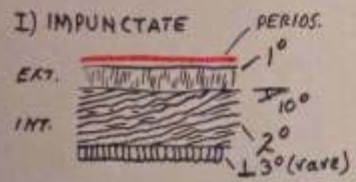
DIVERSITY Hi's in O, D, P; J



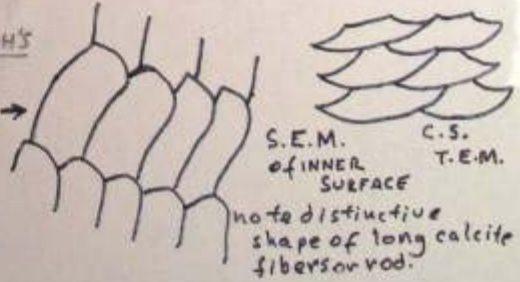


- A) only anterior cells of G.Z. migrate like a conveyor belt
- B) EACH CELL DOES 3 JOBS ON ITS "TRIP"
- 1) SECRETES PERIOSTRACUM
 - 2) 1° LAYER (PRIMARY)
 - 3) a) ORGANIC MEMB.
b) 2° LAYER

3 CALCAREOUS SHELL TYPES IN ART'S.



II) PSEUDOPUNCTATE (2° layer) STROPH'S

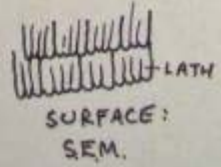



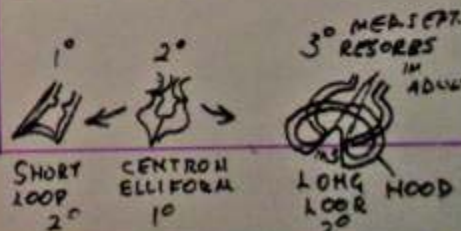
III) PUNCTATE - NOT IN LAMINAR TYPES!



"CAECA" in punctae store proteins & lipids that prevent predation, parasitism & boring; not very successfully! UPPER "BRUSH BORDER" (EXTERNALLY IN PERIOS.)

LAMINAR



ORDER	FIBR. / LAM.	ASTROPH. / STRO	SHAPE	INTERAREA & V/P. VALVE	CARINALIA of D/B V.	OTHER NOTES
1 ORTHIDA E.E - L.F	FIBROUS IMP/PUNC	STROPH. / L	w/ RIBS UNEQUALLY BICONVEX V/P VALVE DEEPER	INTERAREA WELL DEVELOPED IN BOTH VALVES	LOBED CARDINAL PROCESS; VARIABLELY COMPLEX; w/ NOTO THYRIAL PLATFORM THICK; BLADELIKE BRACHIOPHORE & MEDIAN BLADE	OLDEST ARTICULATES of MIDDLE LOWER E; SIMPLE LOPHOPHORE SUPPORTS. NO SPINES; SMALL TEETH ON V/P LATERAL TO DELTHERIUM.
2 STROPHOMENIDA O-R	LAMINAR (fibrous) PSEUDO- PUNCTAE	STROPH. / L	V/P = CONVEX D/B = CONCAVE	VARIED	VARIED	4 SUBORDERS: STROPHOMENIDINA; CHONETIDINA; PRODUCTIDINA; OLDHAMIDINA. SPINES COMMON;
3 PENTAMERIDA E-D	FIBROUS IMPUNC.	STROPH OR ASTROPH	BICONVEX w/ INCURVED BEAMS (PARINTROPE)	OPEN DELTYRIUM SOCKETS w/ PLATES	BRACHIOPHORES ON PLATES TO FLOOR OF D/B VALVE; LATER BRACHIOPHORES w/ LONG PROCS TO SUPPORT LOPH.	SPONDYLION USUALLY PRESENT ON V/P VALVE AS A "SPOON-SHAPED" DEPRESSION BETWEEN DENTAL LAMINAE  SP.
4 RHYNCHONELIDA O-R *	FIBROUS IMPUNC.	ASTROPH.	BICONVEX D/B HAS FOLD V/P HAS SULCUS	INT. ON V/P VALVE ONLY & LOW; DELTYDIAL PLATES	"OUTER PLATES SEPARATE INNER SOCKETS FROM CRURA	DENTAL LAMINAE ON V/P VALVE; SPIROLOPHOUS LOPH; PEDICLE BASE "SOOK" IN V/P VALVE IN RECENT FORMS.
5 SPIRIFERIDA OJ	FIBROUS PUN/IMPUNC	STROPH OR ASTROPH	BICONVEX RIBS FOLD/SULCUS	INT. IN V/P VALVE ONLY	SPIRALIA w/ JUGUM	JUGUM - A BRIDGE LIKE STRUCTURE CONNECTING PRIMARY WHORLS OF ANTEROMEDIAN SEGMENTS OF "LOOP" 
6 TEREBRATULIDA E.D - R *	FIBROUS PUNCTATE	MOSTLY ASTROPH some STROPH	BICONVEX	INT IN V/P VALVE ONLY; DELTYDIAL PLATES	LOOP SUPPORTS LOPHOPHORE	3-LOOPS  1° SHORT LOOP 2° CENTRON ELLIFORM 3° LONG LOOP HOOD 3° MEAS. CRT. RESORBS IN ADULT

CL. ARTICULATA

Inarticulate Brachiopods



Inarticulata:

Orbiculooides discus
– Lower Devonian
New Scotland Fm.,
NY, NJ, PA



Phosphatic Inarticulate Brachiopod from Pliocene of FI:

Disciniscus lugubris