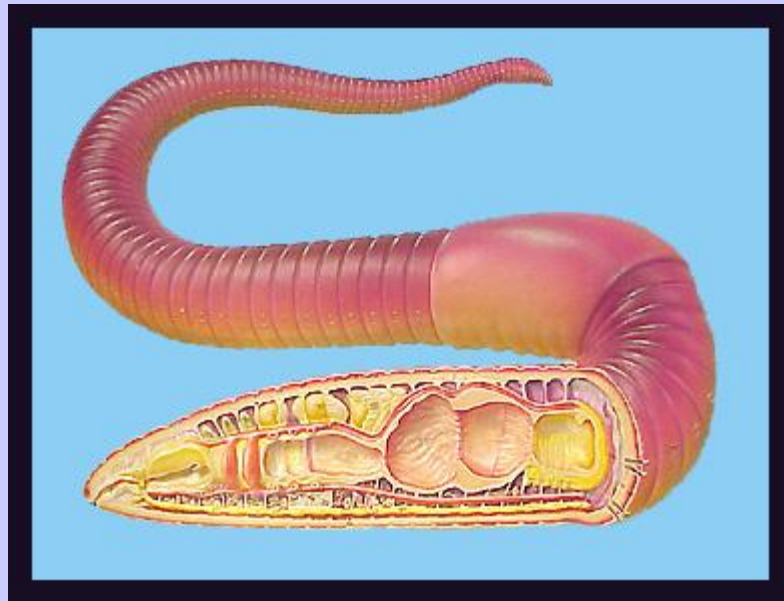
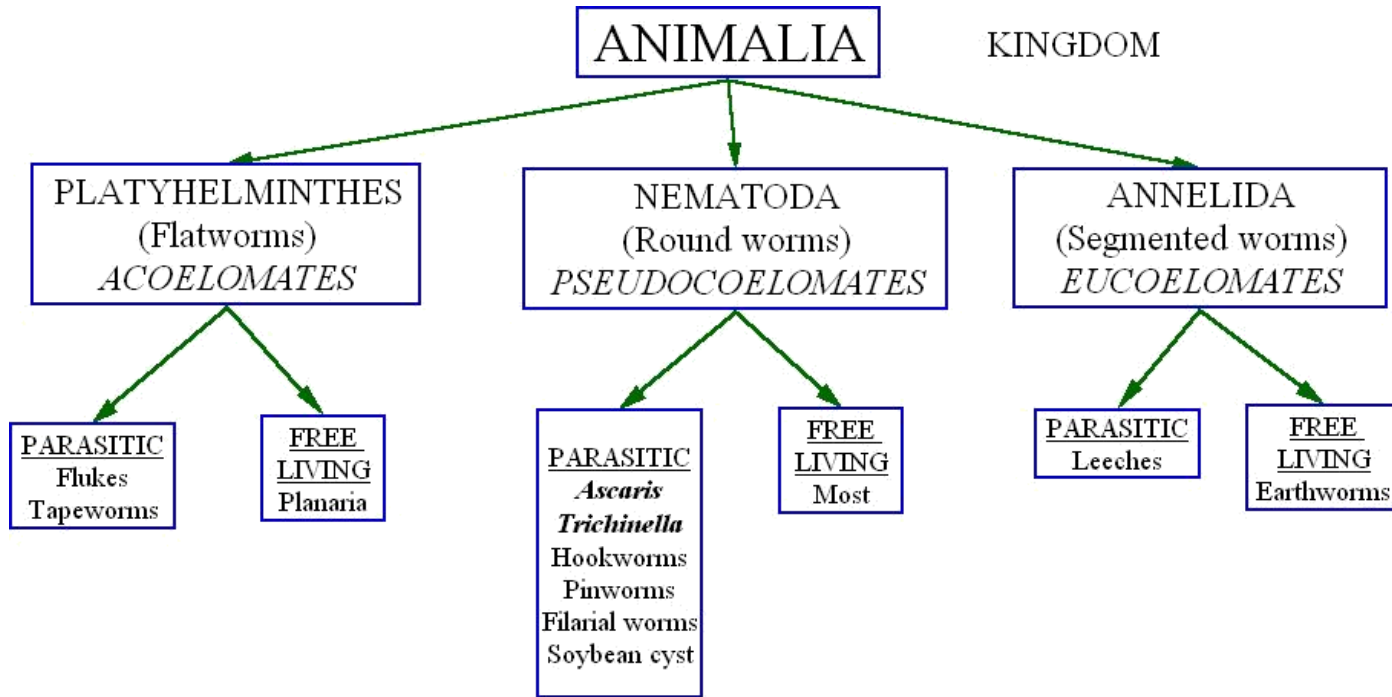


WORM DISSECTION





PHYLUM

CHARACTERISTICS OF ALL WORMS
 Invertebrate protostomes
 Elongated bodies
 Bilateral symmetry
 Cephalization
 Cerebral ganglia "brain"
 Breathe through skin

NAMING

Kingdom: ANIMALIA

Phylum: Annelida
“little rings”

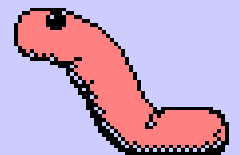
Class: OLIGOCHAETA
“few bristles”

SETA (*plural: setae*)

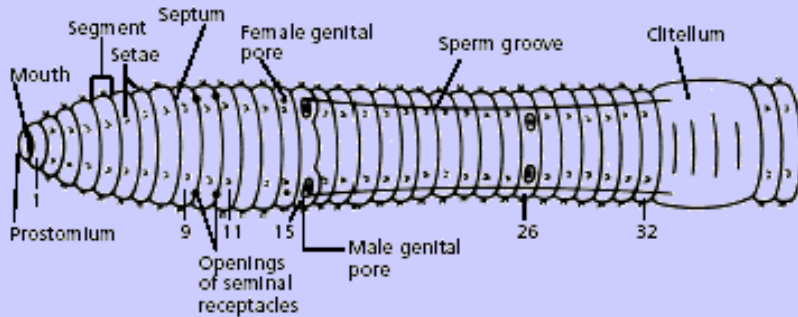
BRISTLES on VENTRAL surface



SETAE- Provide traction

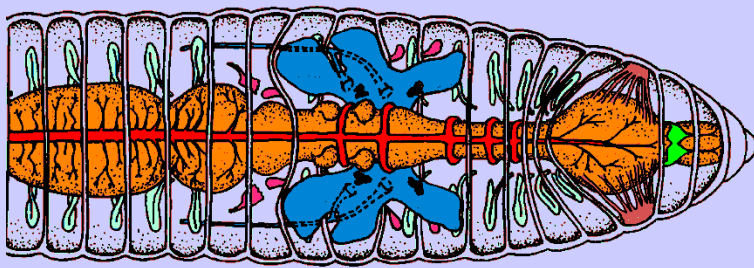


Segmentation



Compartments allow individual parts to move independently

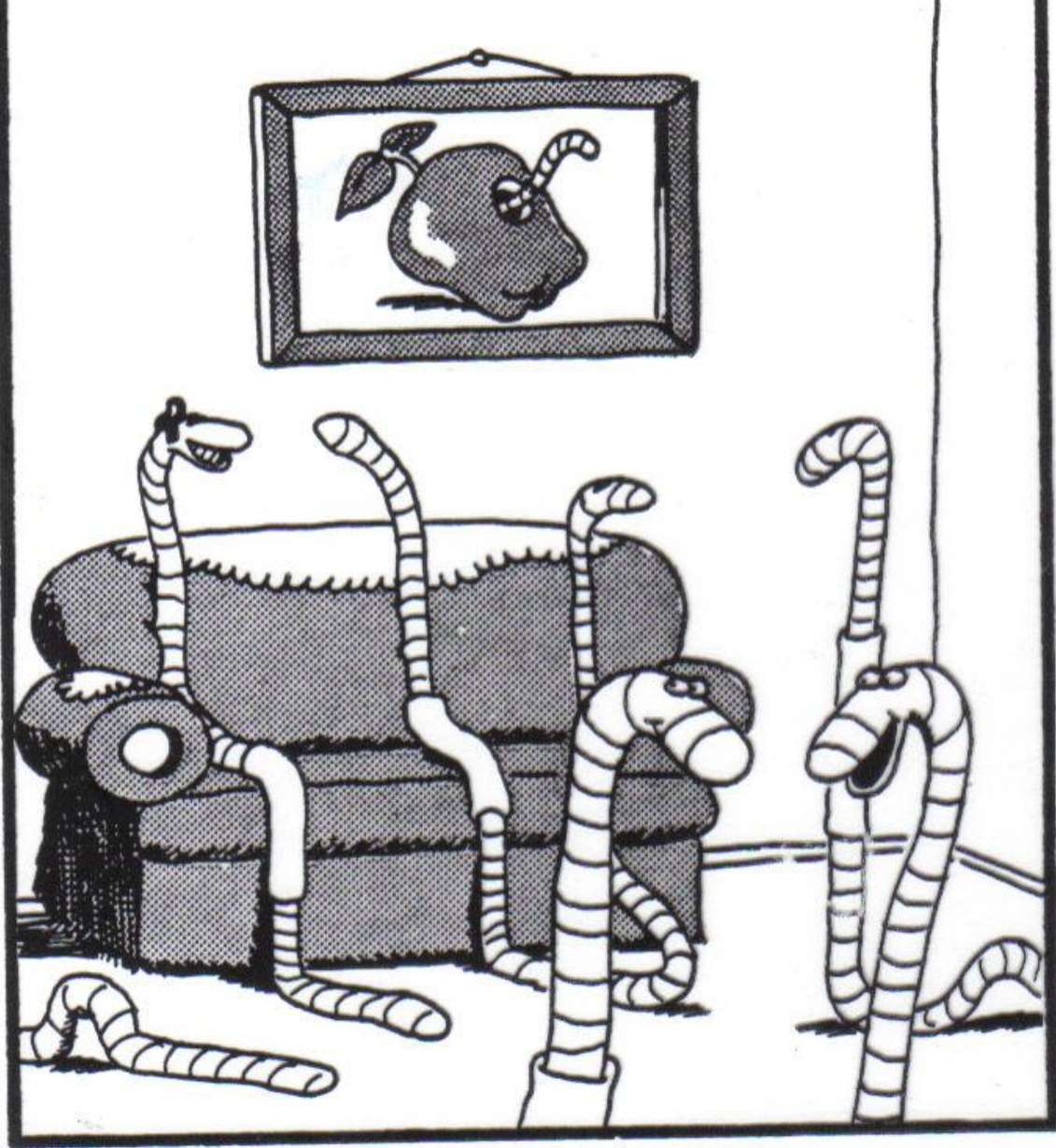
http://sps.k12.ar.us/massengale/earthworm_dissection.htm



J. Sauer © BIODIDAC
BIODIDAC

Damage insurance

If one section is damaged, others can still function



"You gotta check this out, Stuart. Vinnie's over on the couch putting the moves on Zelda Schwartz—but he's talkin' to the wrong end."

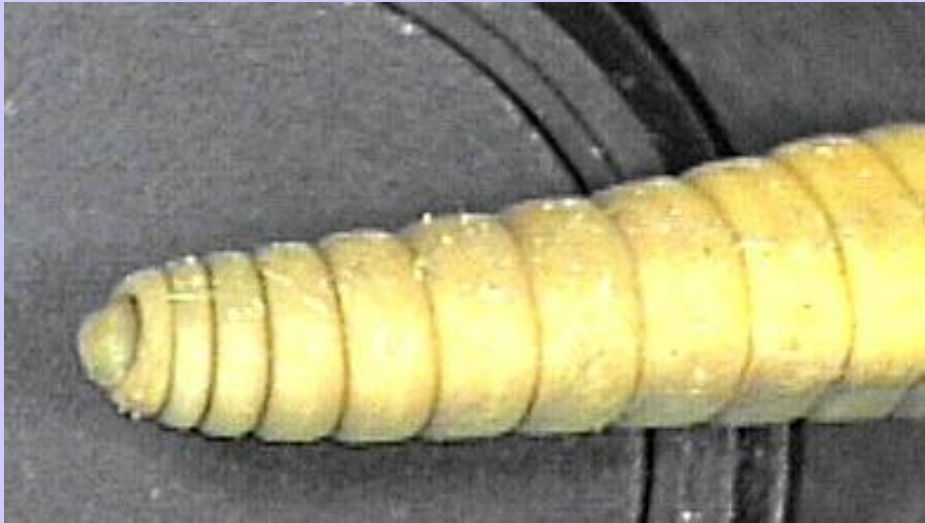
WHICH END IS WHICH?



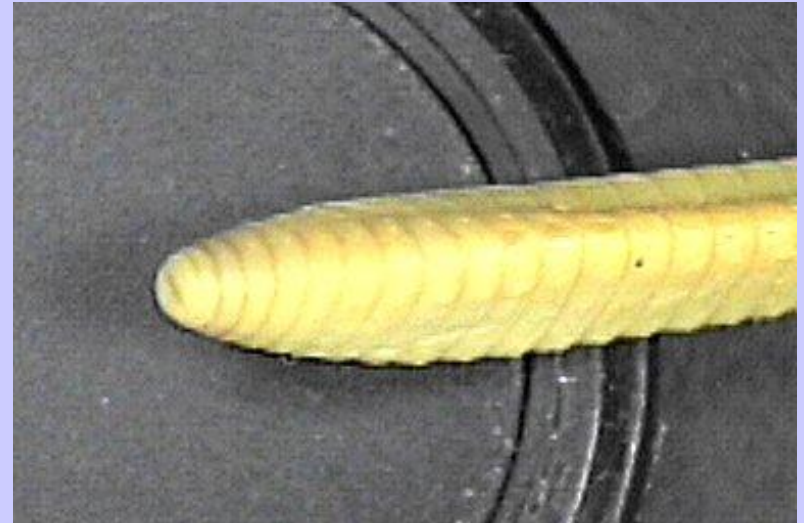
CLITELLUM = ring

- **Doesn't go all the way around**
- **Closest to anterior end**
- **Makes mucous for reproduction**

2 opening digestive system



MOUTH

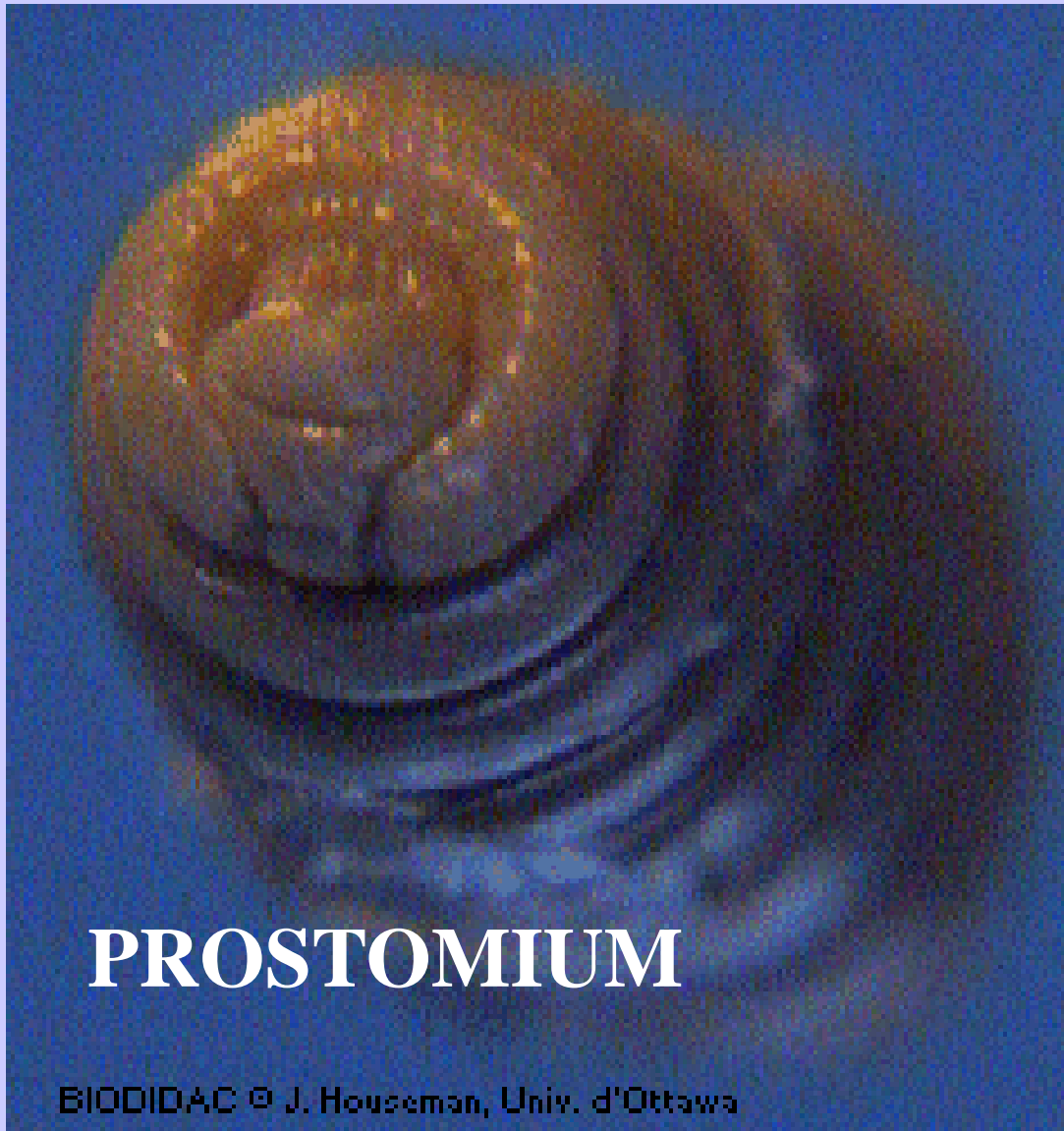


ANUS

Prostomium

**covers/protects mouth opening
senses light and dark/chemicals (food)**

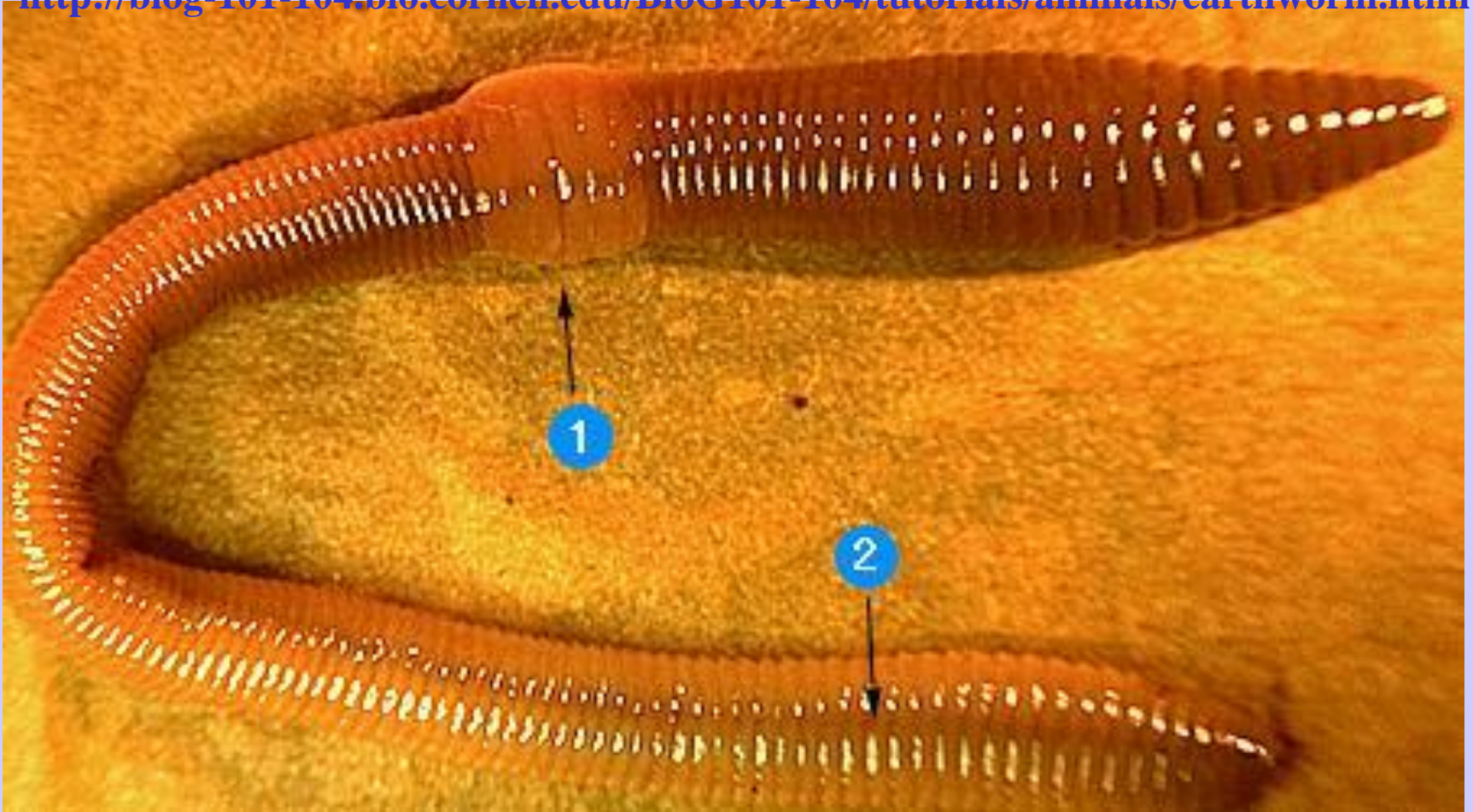
EXTERNAL STRUCTURES



PROSTOMIUM

EXTERNAL STRUCTURES

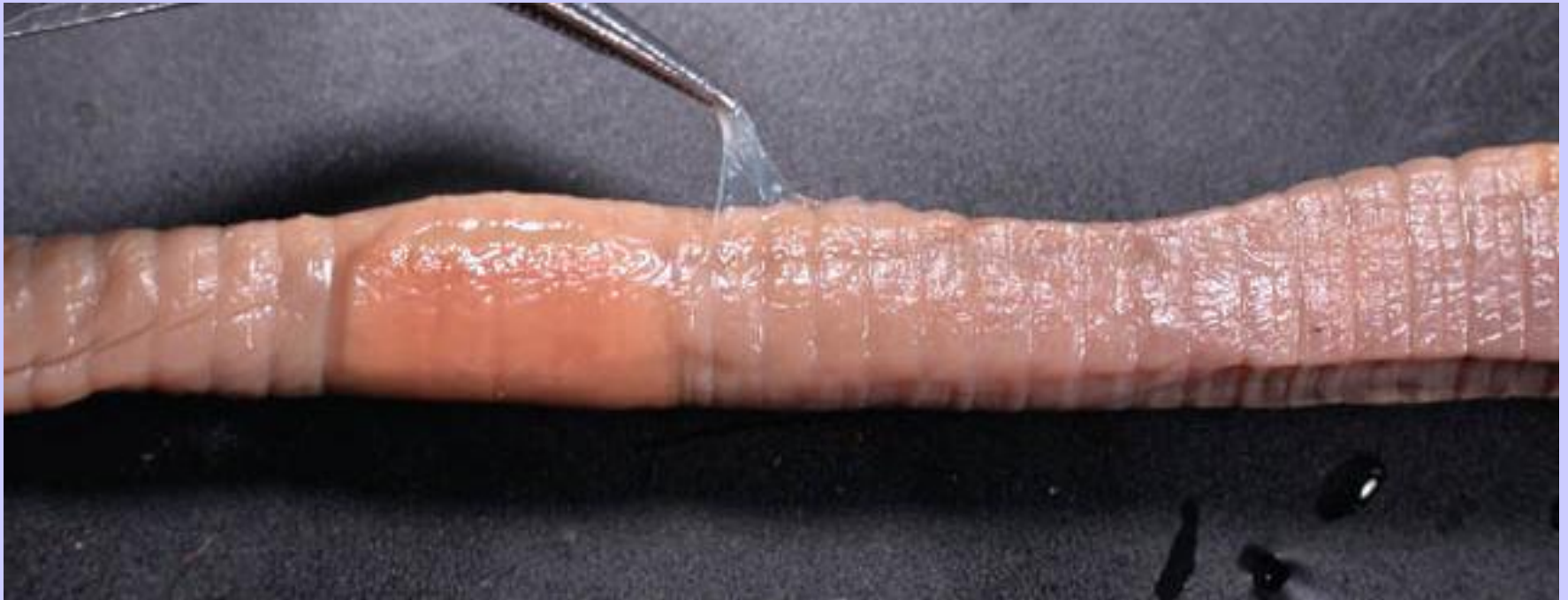
<http://biog-101-104.bio.cornell.edu/BioG101-104/tutorials/animals/earthworm.html>



**DORSAL BLOOD VESSEL
CAMOUFLAGE**

CUTICLE

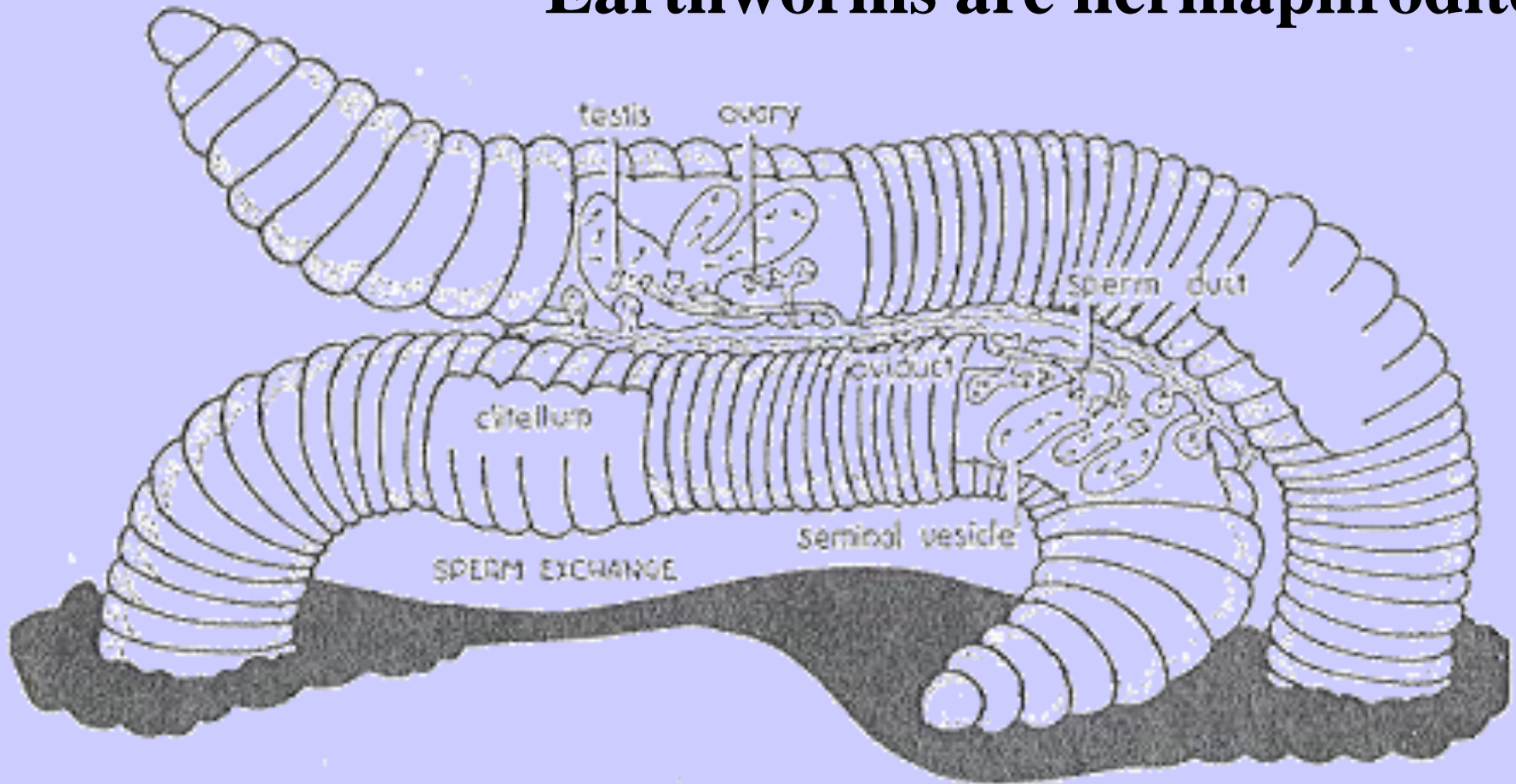
(non-cellular protective layer)



<http://www.flushing.k12.mi.us/srhigh/tippettl/biology/lum/cuticle.html>

SEXUAL REPRODUCTION

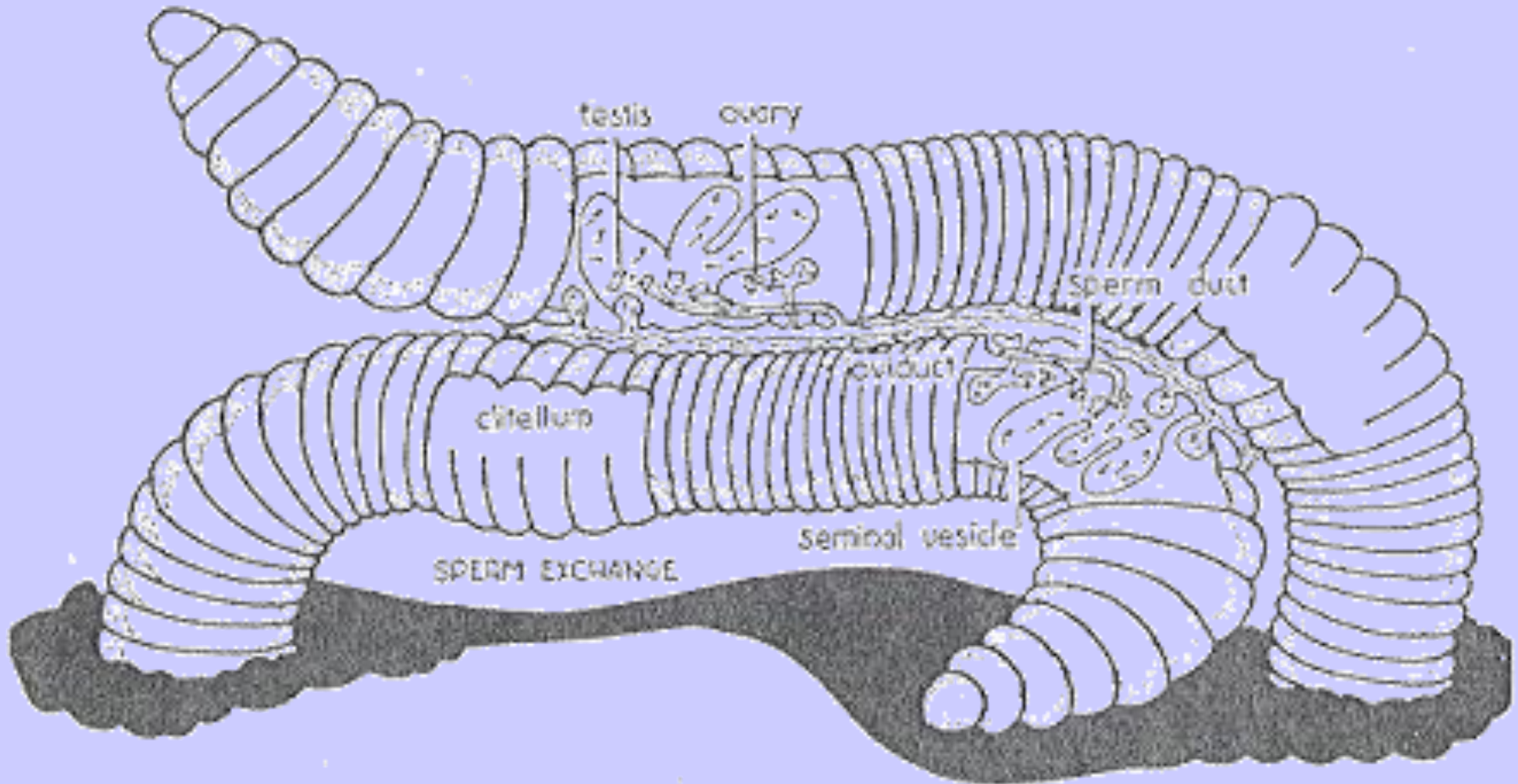
Earthworms are hermaphrodites



HAVE BOTH MALE & FEMALE

REPRODUCTIVE ORGANS in same worm

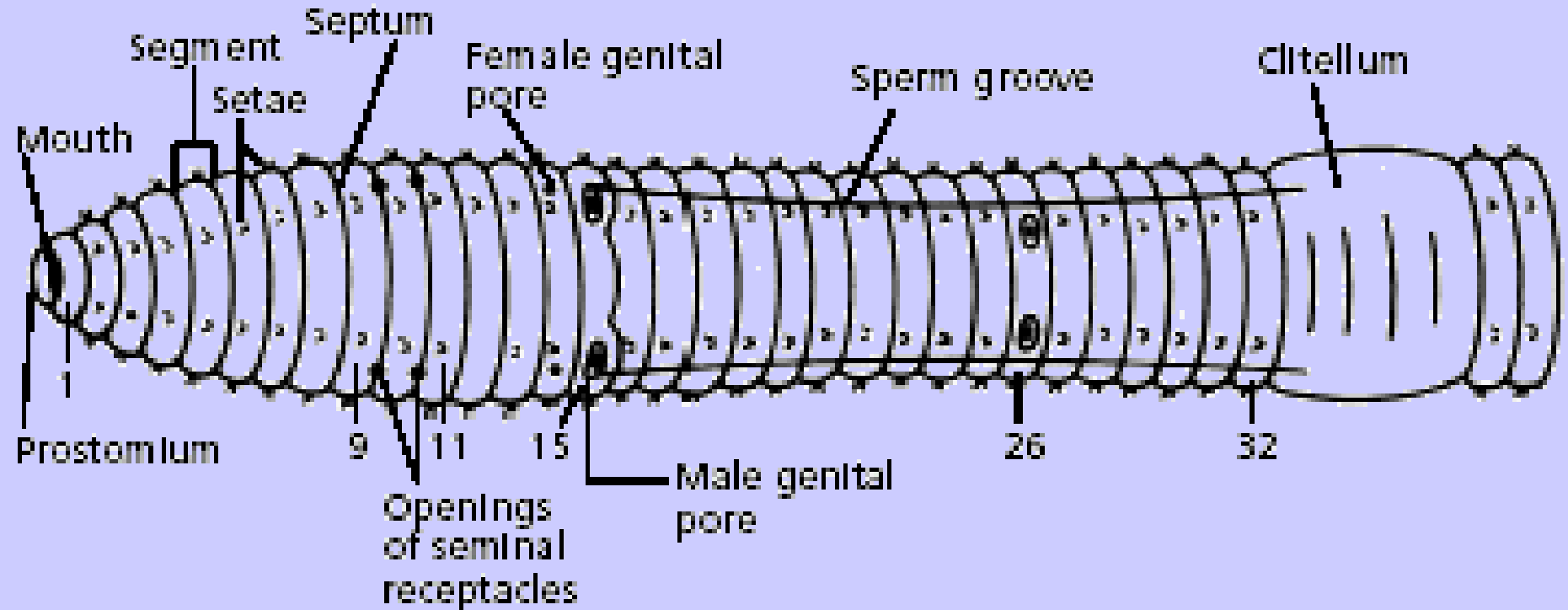
SEXUAL REPRODUCTION



OVARY – makes eggs

TESTES- makes sperm

EXTERNAL STRUCTURES

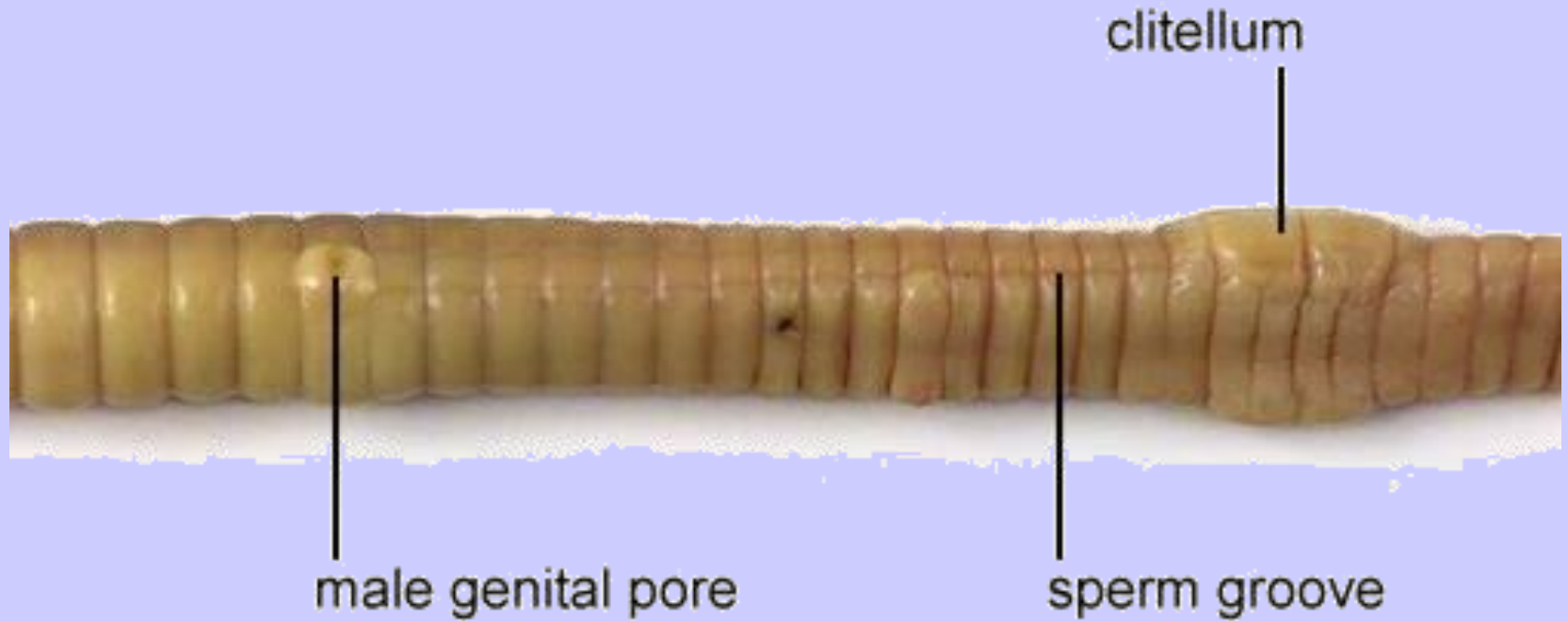


MALE GENITAL PORE- releases sperm to give away

FEMALE GENITAL PORE- releases eggs

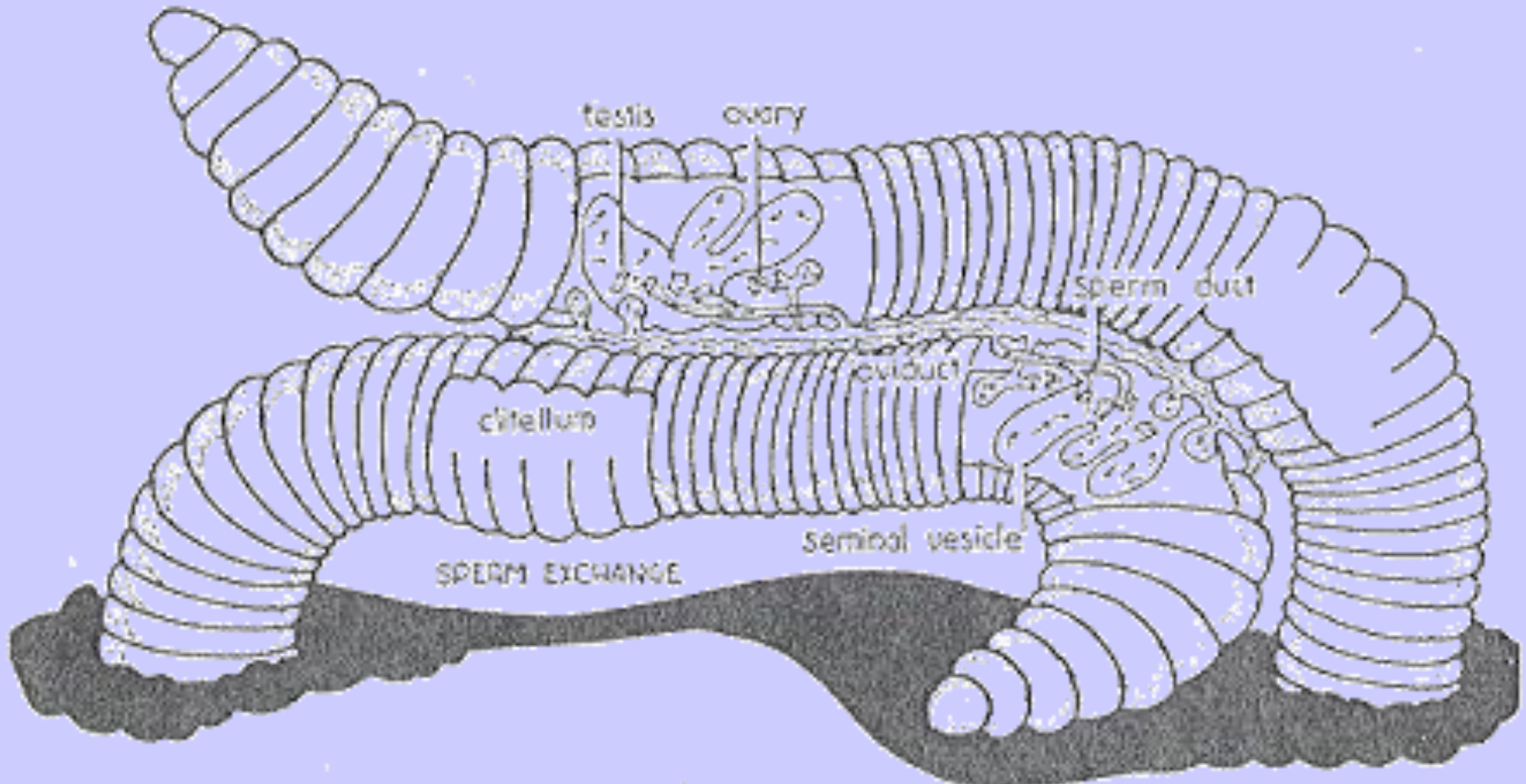
OPENINGS to SEMINAL RECEPTACLES- receive sperm from other worms when trade

EXTERNAL STRUCTURES



SPERM GROOVE- carries sperm from
MALE GENITAL PORE down to
CLITELLUM

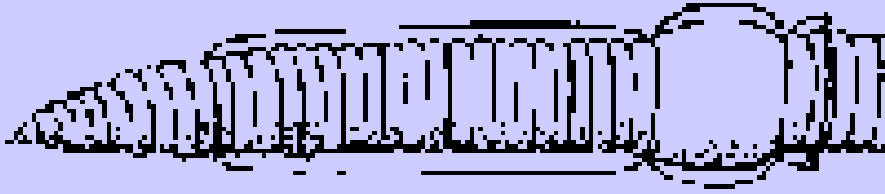
SEXUAL REPRODUCTION



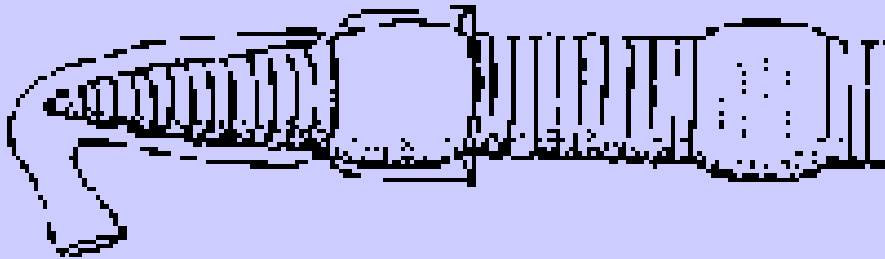
**Earthworms are HERMAPHRODITES
BUT... DON'T fertilize themselves!**

SEXUAL REPRODUCTION

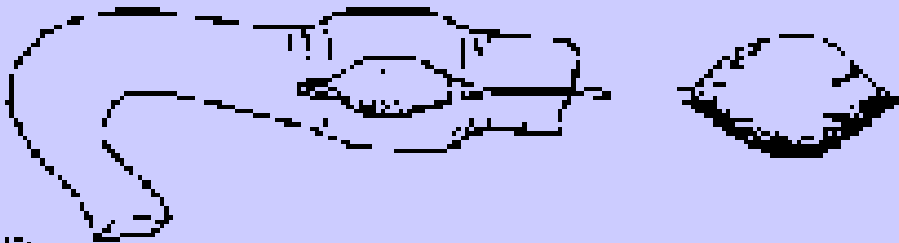
EXTERNAL FERTILIZATION



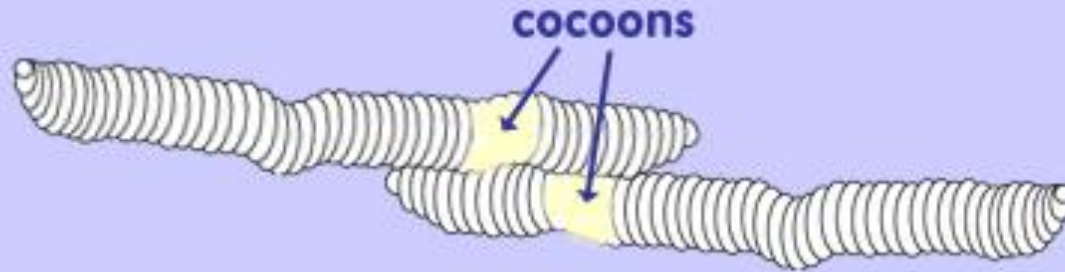
Produce a
COCOON
made of **MUCOUS**
and **CHITIN**
(tough carbohydrate)



Baby worms hatch
after a few weeks



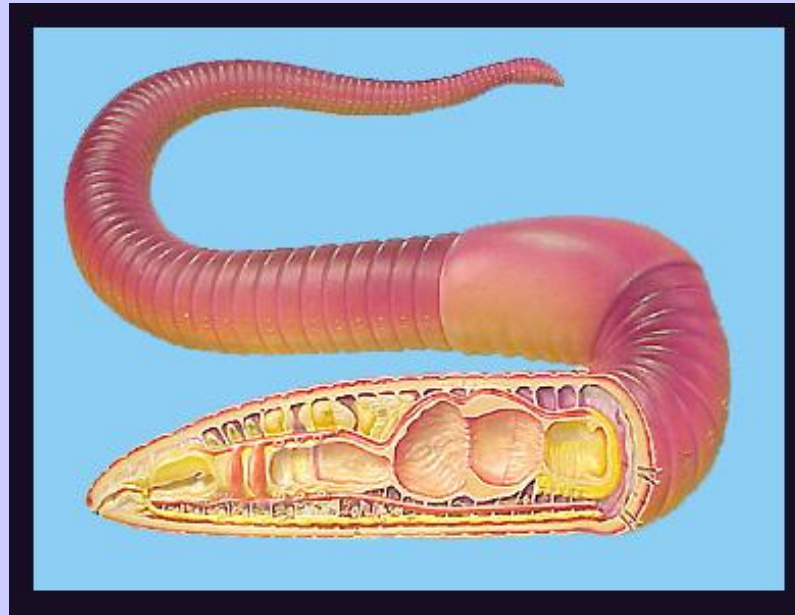
DIRECT DEVELOPMENT



Images from:

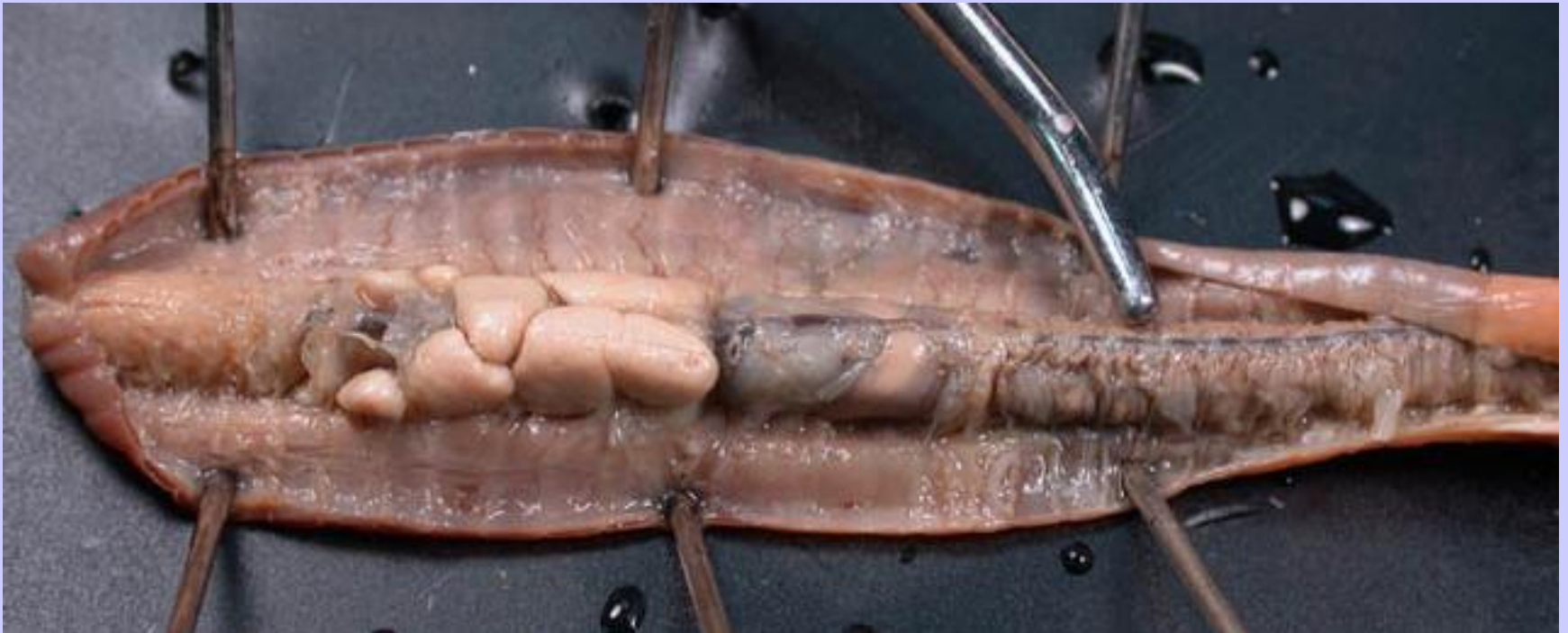
<http://www.urbanext.uiuc.edu/worms/anatomy/anatomy5.html>

LOOK INSIDE



COELOM

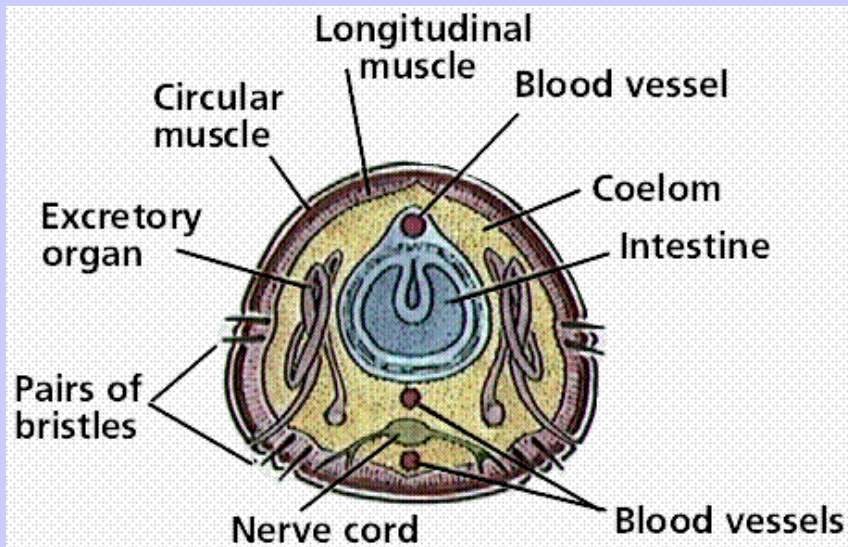
= space around organs



<http://www.flushing.k12.mi.us/srhigh/tippettl/biology/lum/vessel.html>

INTERNAL STRUCTURES

<http://www.biologie.uni-hamburg.de/b-online/library/onlinebio/annelidbodyxs.gif>

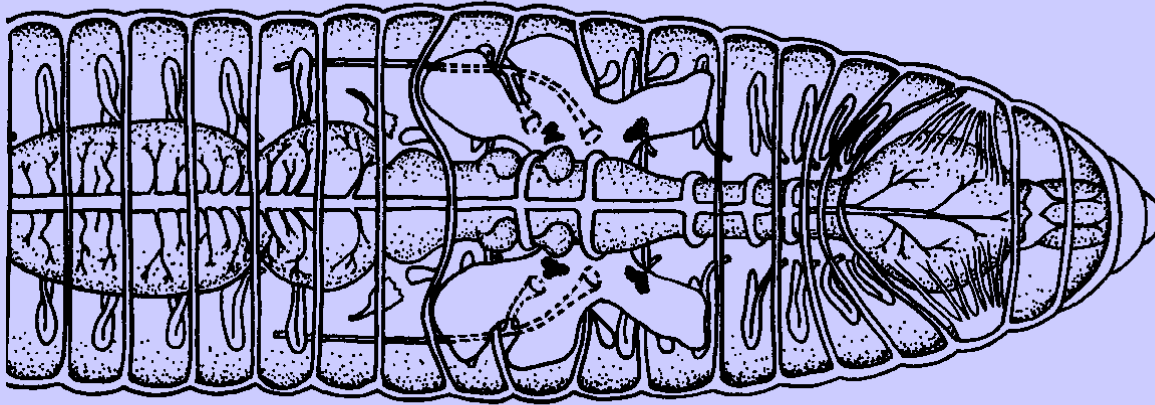


EUCOELOMATES

“true” coelom

SEPTUM (*pl.* SEPTA)

Dividing walls separate coelom into compartments

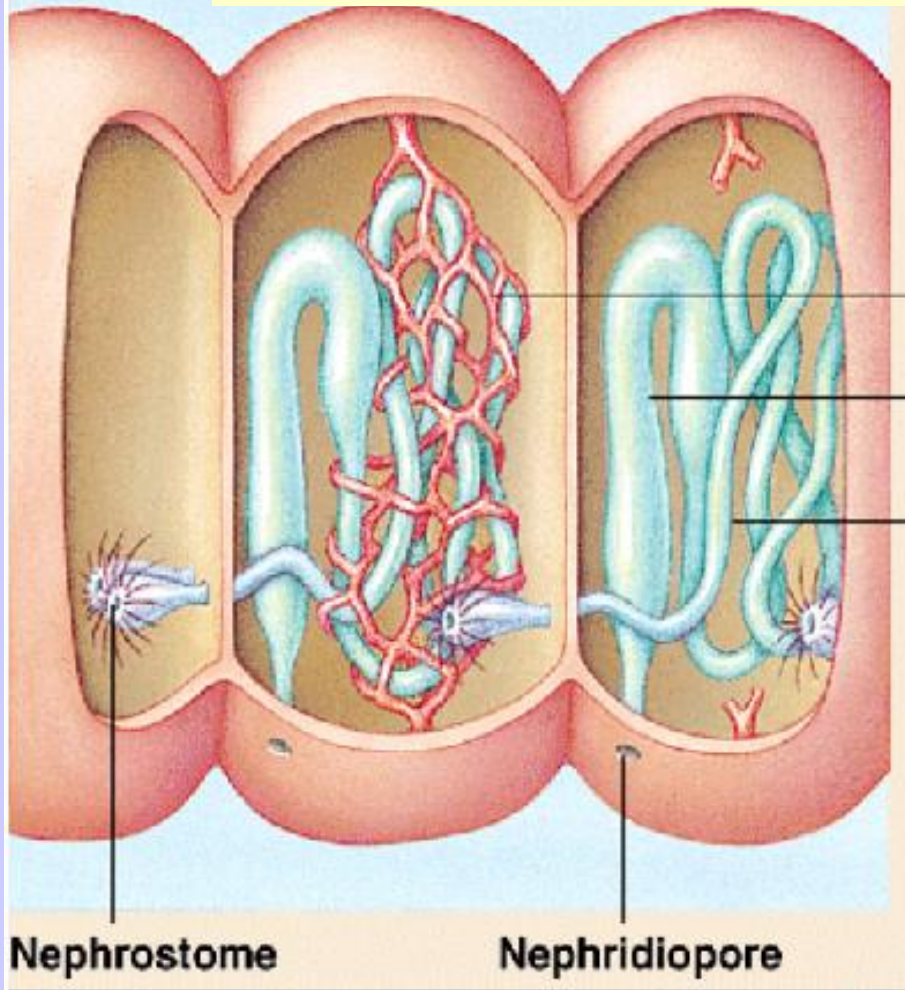


J. Soucie © BIODIDAC

**Fluid in coelom provides support
= HYDROSTATIC SKELETON
(water skeleton)**

EXCRETORY SYSTEM

<http://www.pleasanton.k12.ca.us/avhsweb/thiel/apbio/review/excretory.html>



Collect & excrete
**NITROGEN
WASTE**

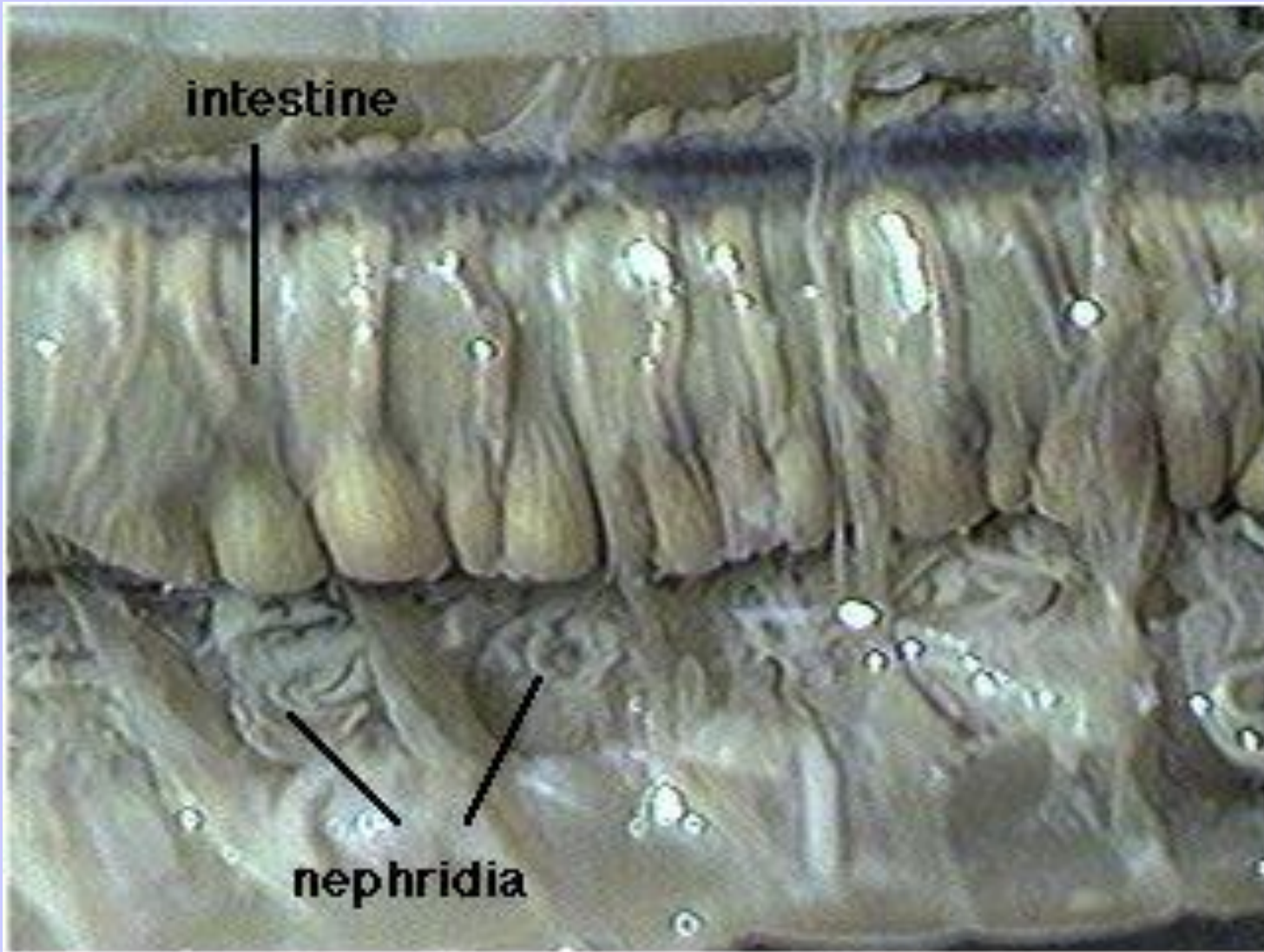
Osmoregulation

NEPHRIDIUM

pl. **NEPHRIDIA**

EXCRETORY TUBULES

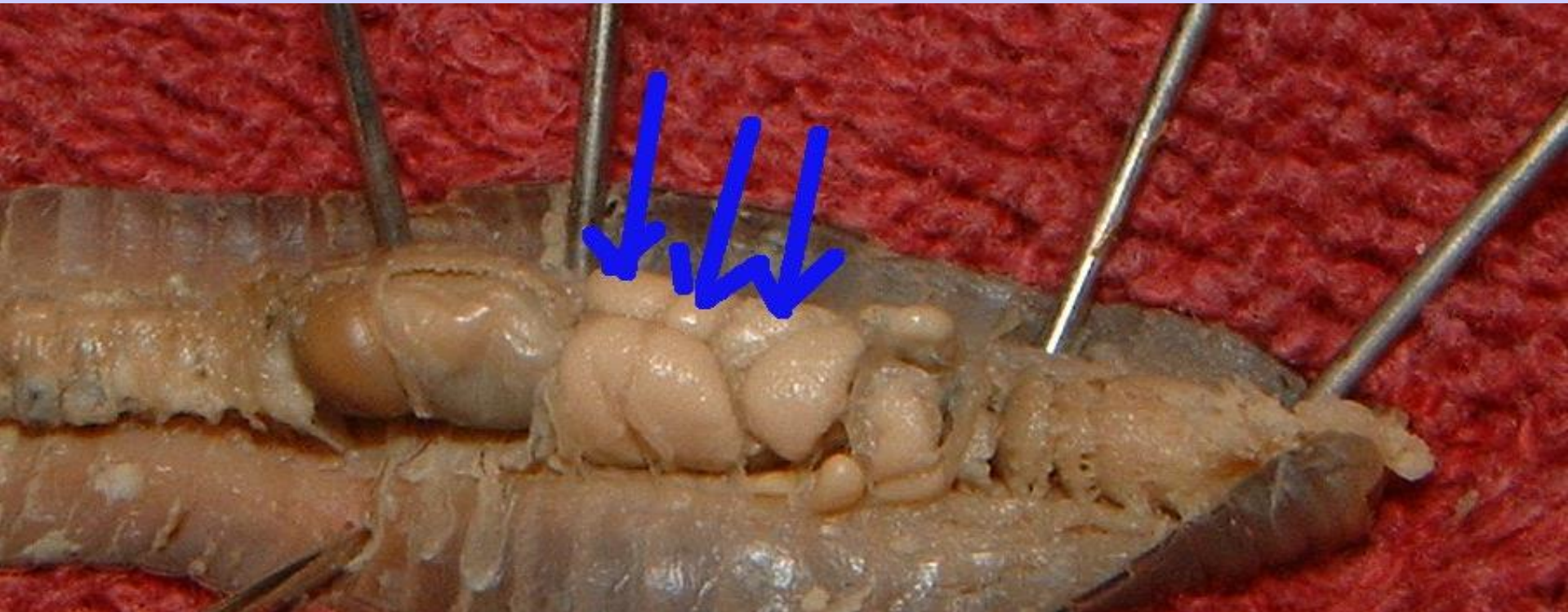
INTERNAL STRUCTURES



REPRODUCTIVE SYSTEM

SEMINAL VESICLES

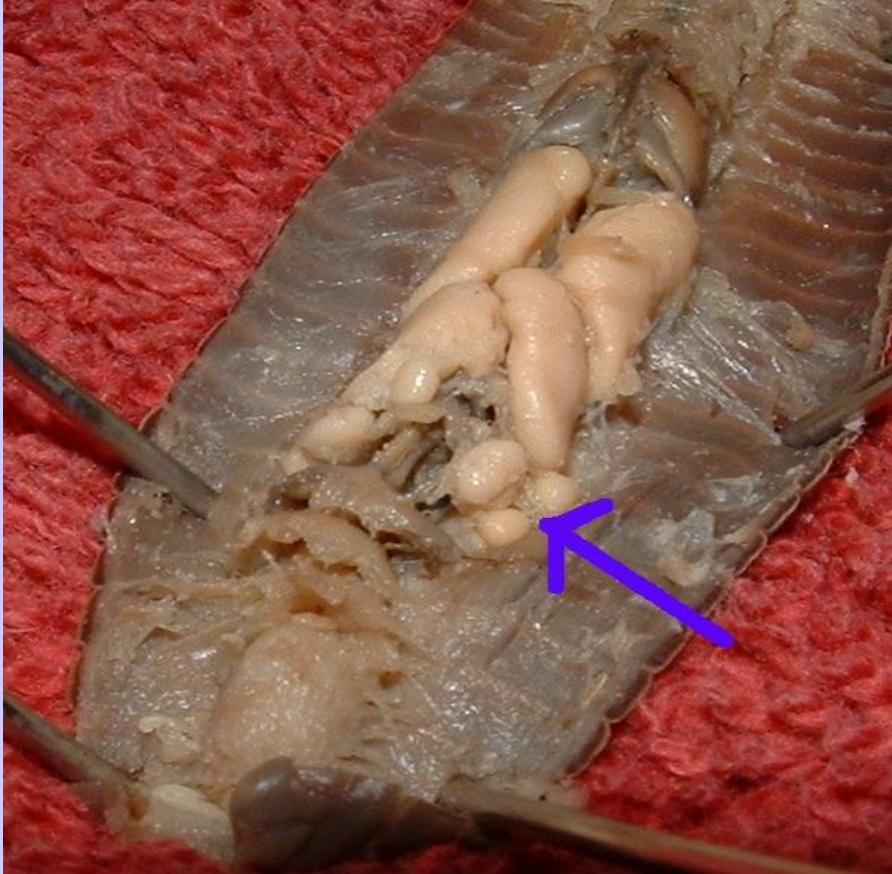
Image by Riedell/Vanderwal©2005



STORE SPERM TO GIVE AWAY

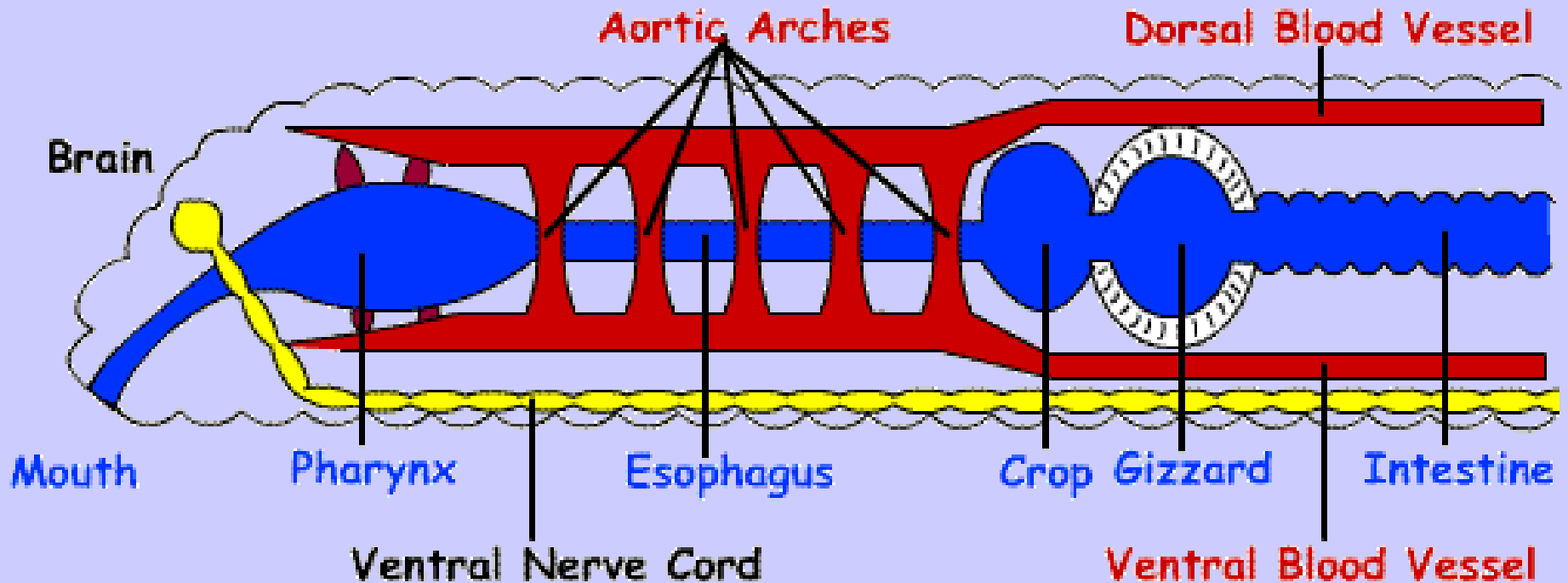
REPRODUCTIVE SYSTEM

Image by Riedell/Vanderwal©2005



**SEMINAL
RECEPTACLES**
store sperm received
from other worms

CLOSED circulatory system



DORSAL BLOOD VESSEL
VENTRAL BLOOD VESSEL

DORSAL BLOOD VESSEL

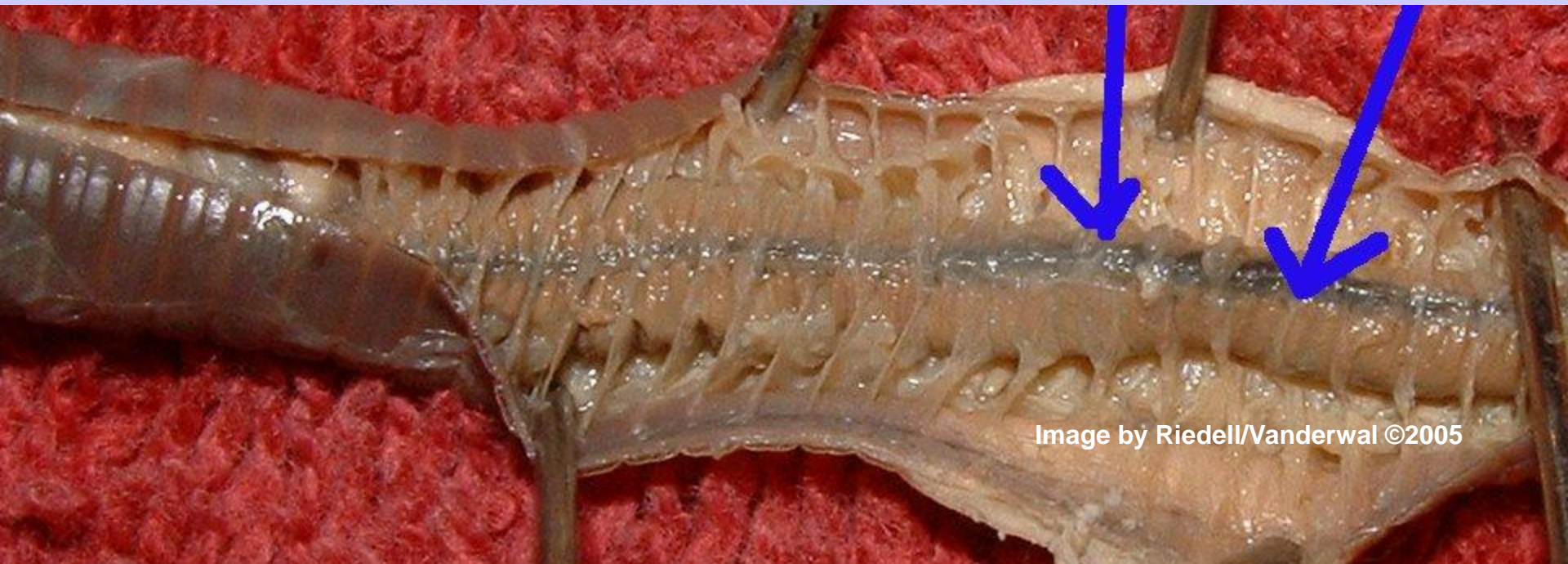
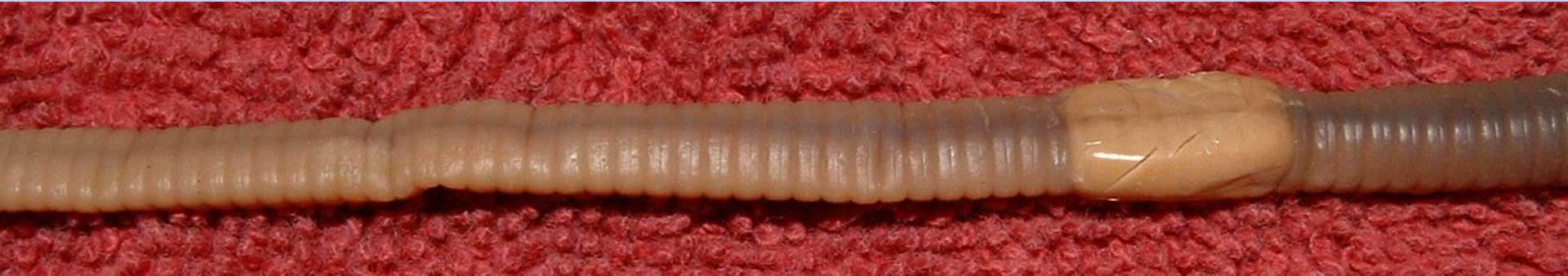


Image by Riedell/Vanderwal ©2005

5 AORTIC ARCHES act as “heart”
to pump blood

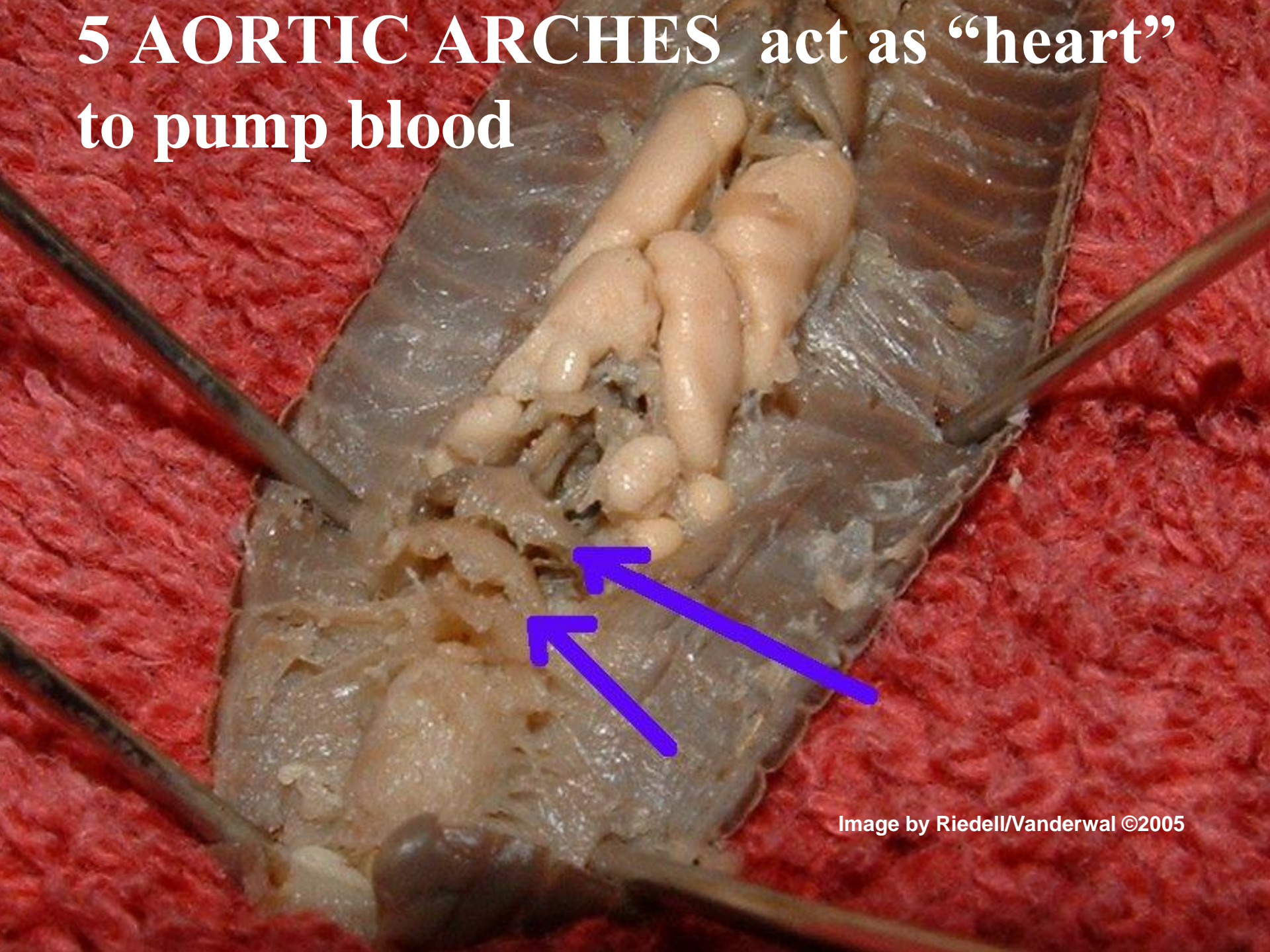
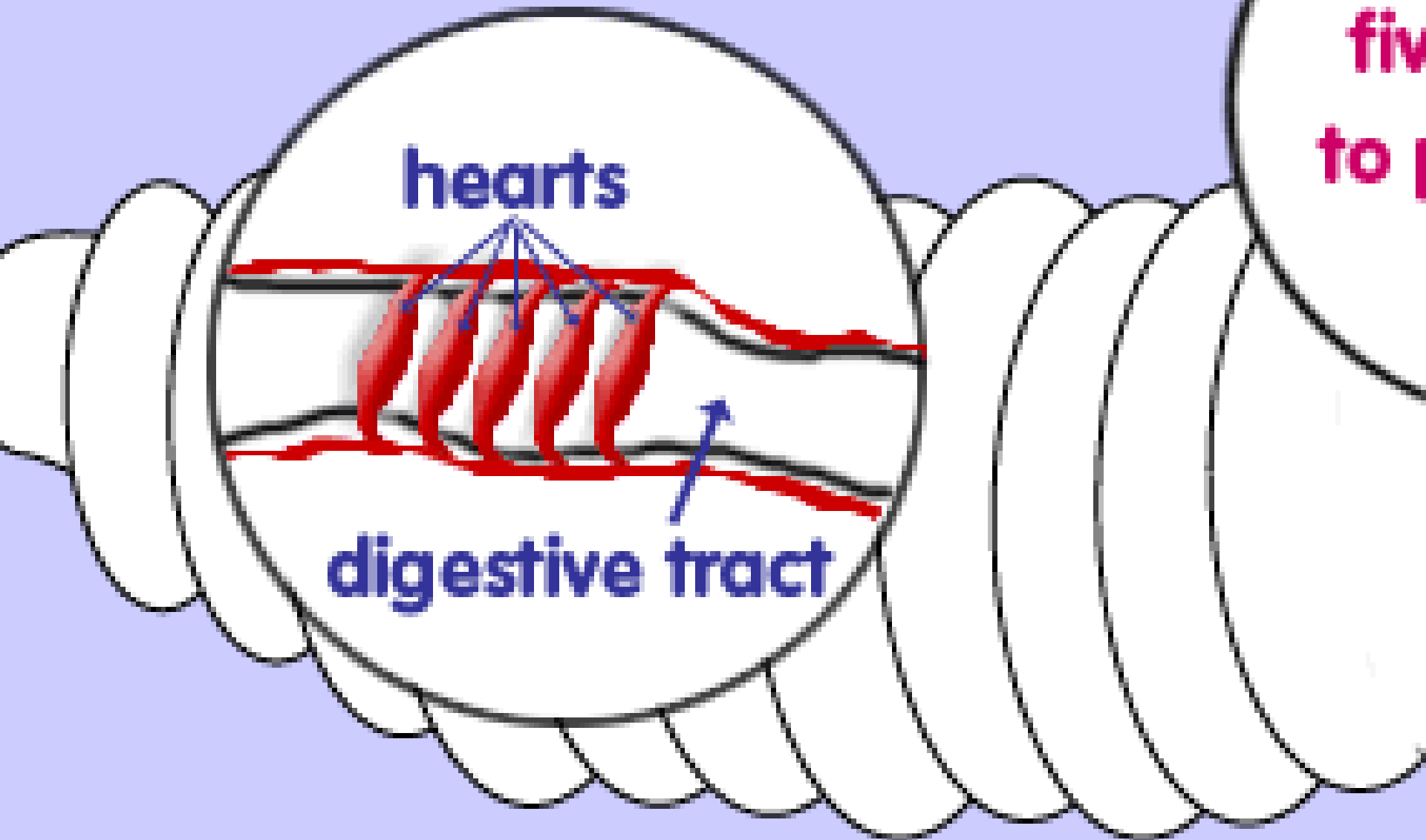


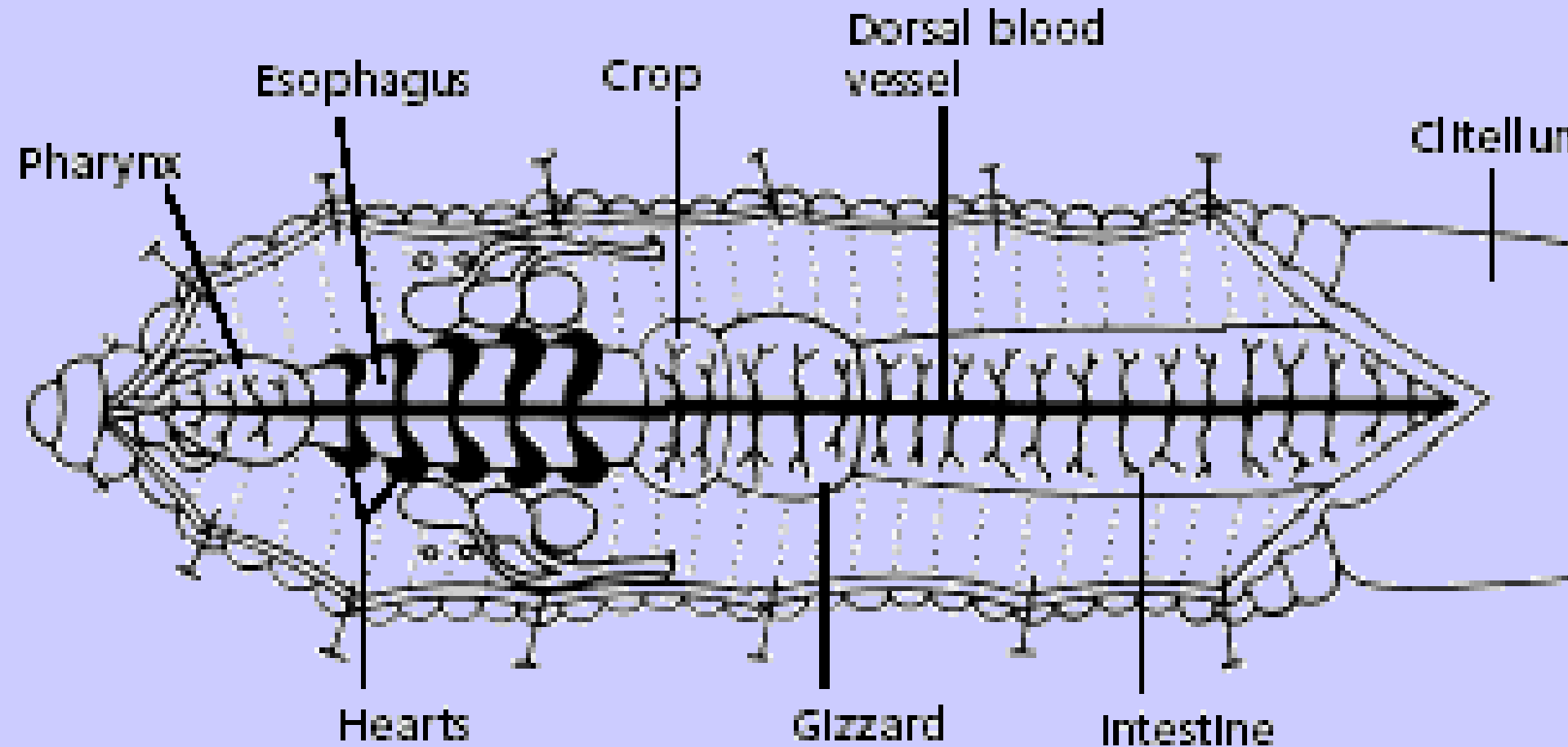
Image by Riedell/Vanderwal ©2005

Image from:

<http://www.urbanext.uiuc.edu/worms/anatomy/anatomy6.html>

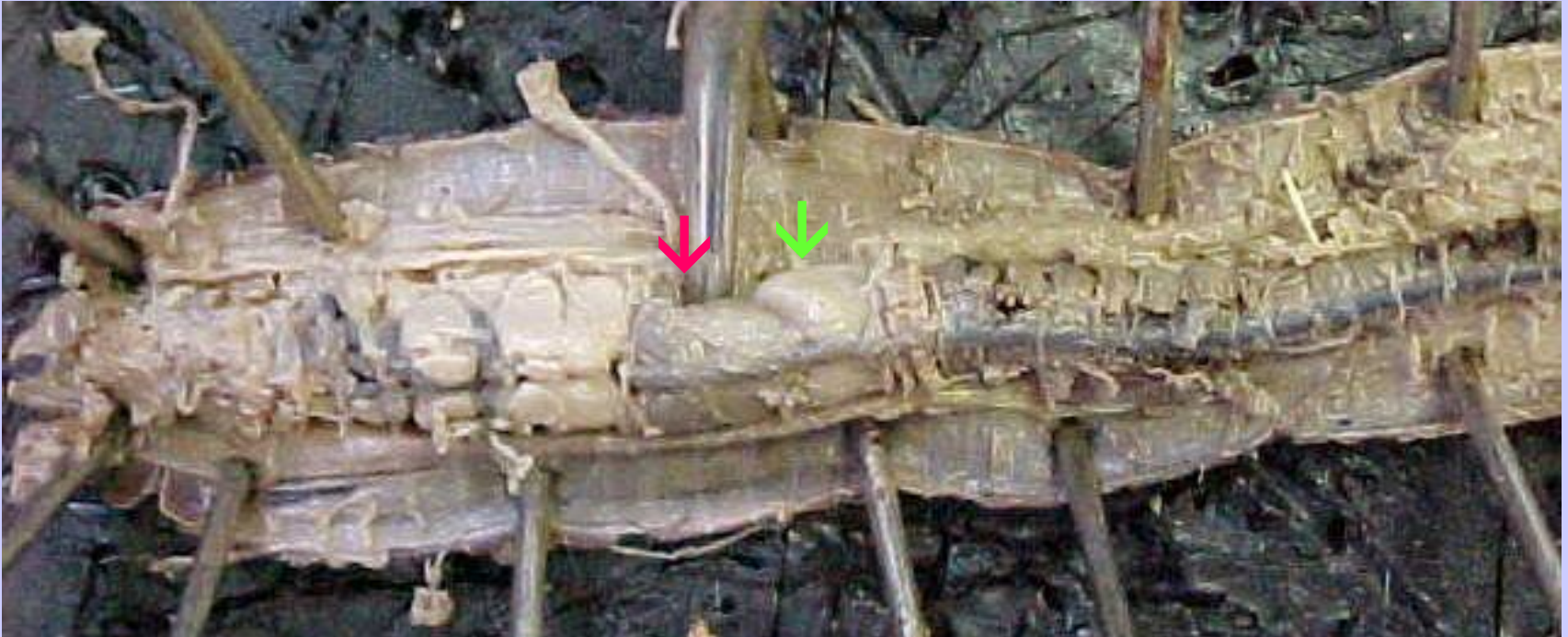


INTERNAL STRUCTURES



http://sps.k12.ar.us/massengale/earthworm_dissection.htm

INTERNAL STRUCTURES



CROP-stores food waiting to be digested
GIZZARD- grind and mash food

INTESTINE- absorbs nutrients



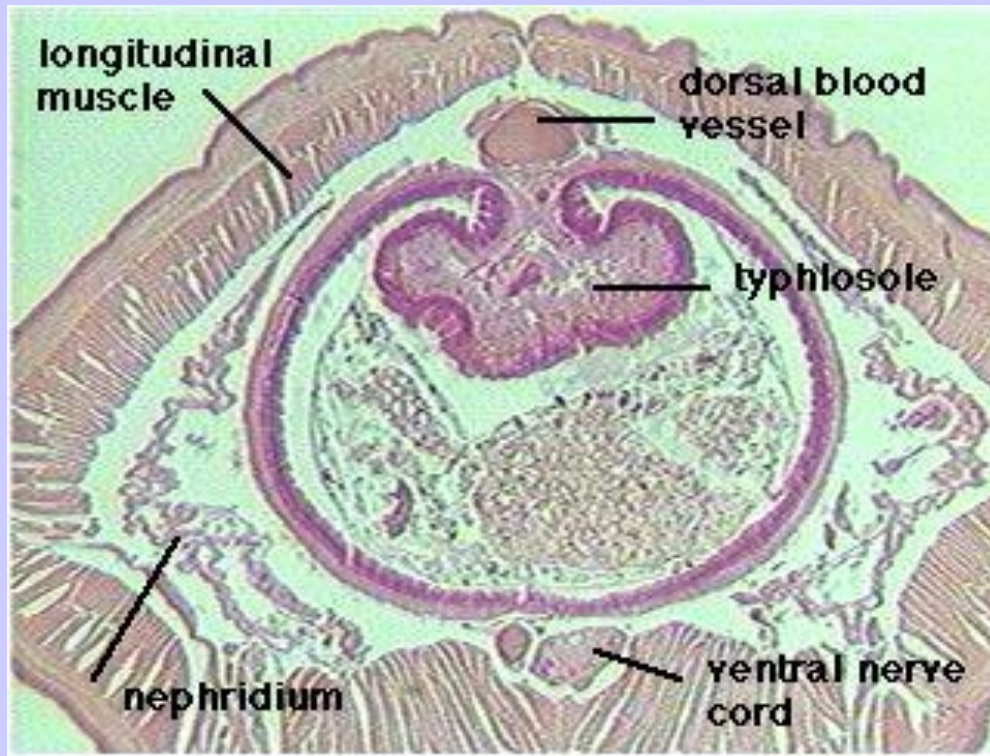
WORMS HAVE ADAPTATIONS for eating “SOIL”

1. REALLY LONG INTESTINE-

so food spends long time passing through

2. TYPHLOSOLE-

ridge inside increases surface area for more absorption



**It increases
surface area so
more nutrients
are absorbed**

<http://www.uleth.ca/bio/bio1020/images/worm2.jpg>

TYPHLOSOLE
Ridge inside intestine

SEGMENTED WORMS

Earthworms play an important role in soil fertility



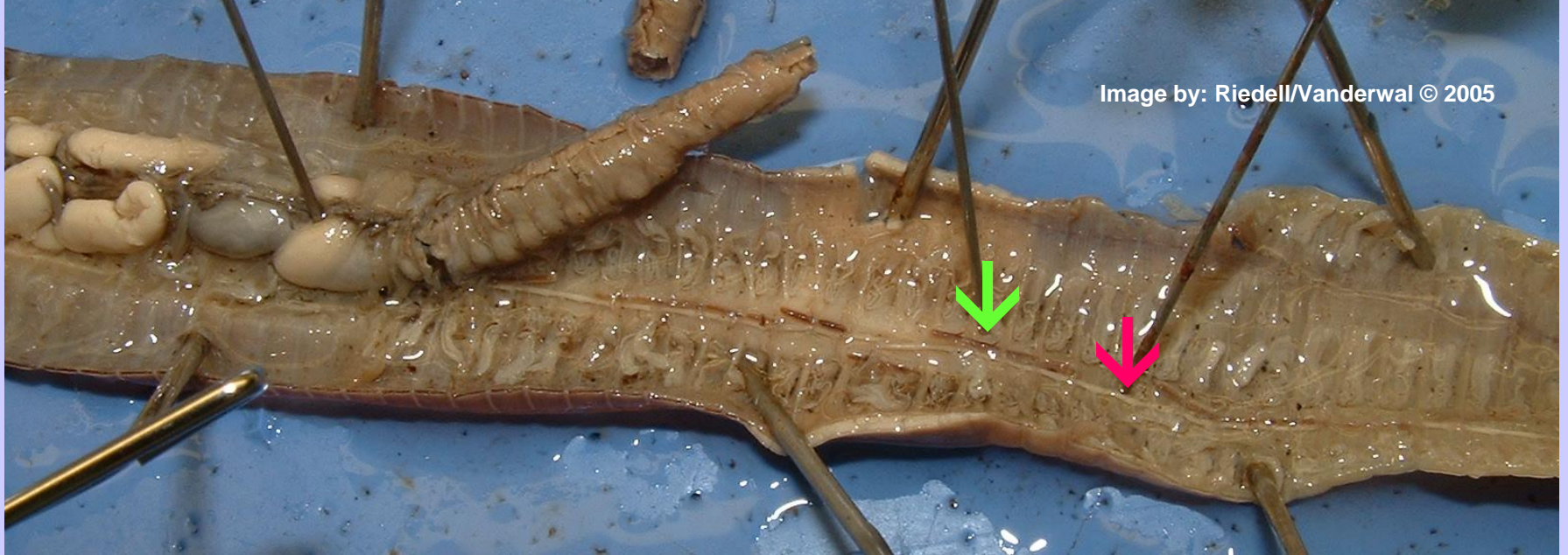
“intestines of the earth”

-Aristotle

Return nutrients to soil by decomposing dead leaves and organic matter

Burrowing allows air and water to penetrate to roots

Tunnels loosen soil so roots can grow more easily



UNDERNEATH DIGESTIVE SYSTEM

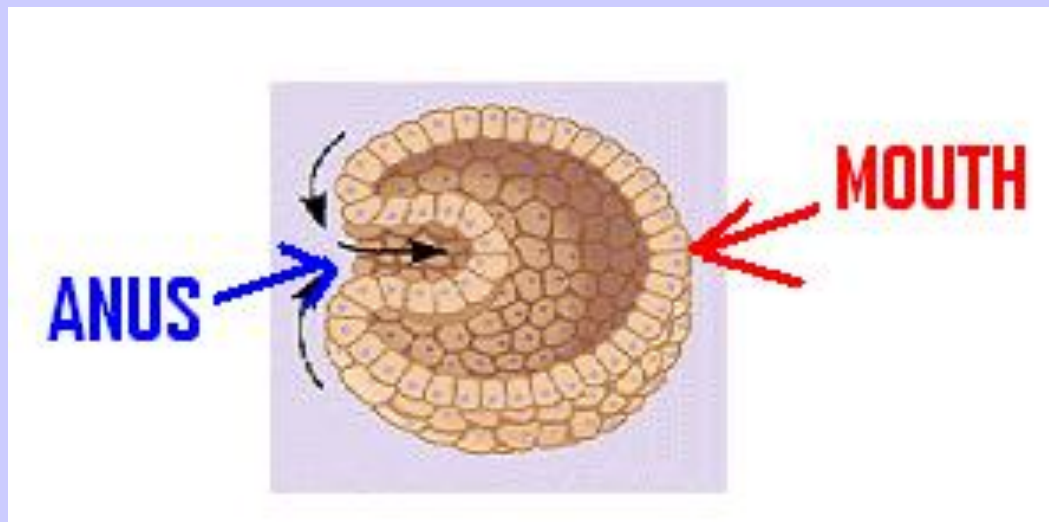
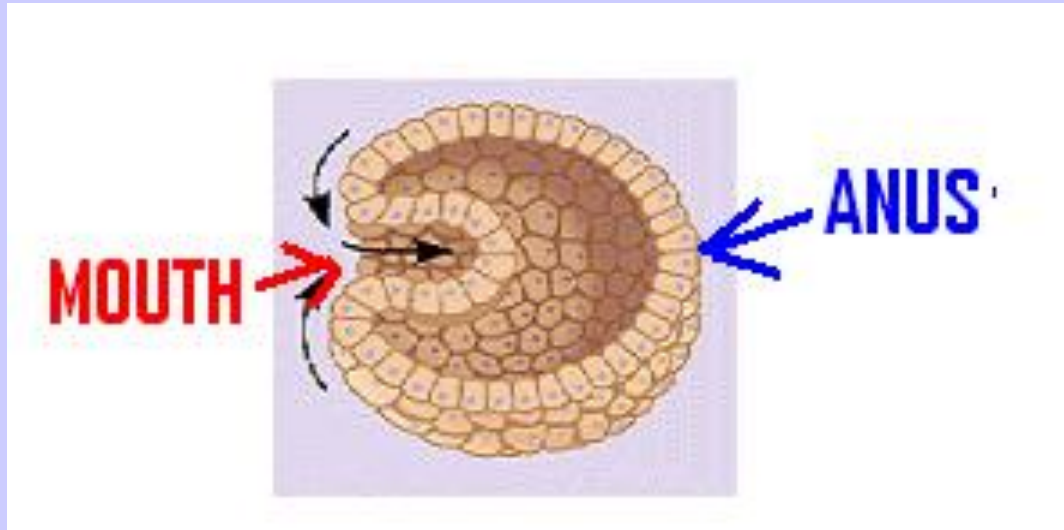
VENTRAL NERVE CORD

(nerves usually white)

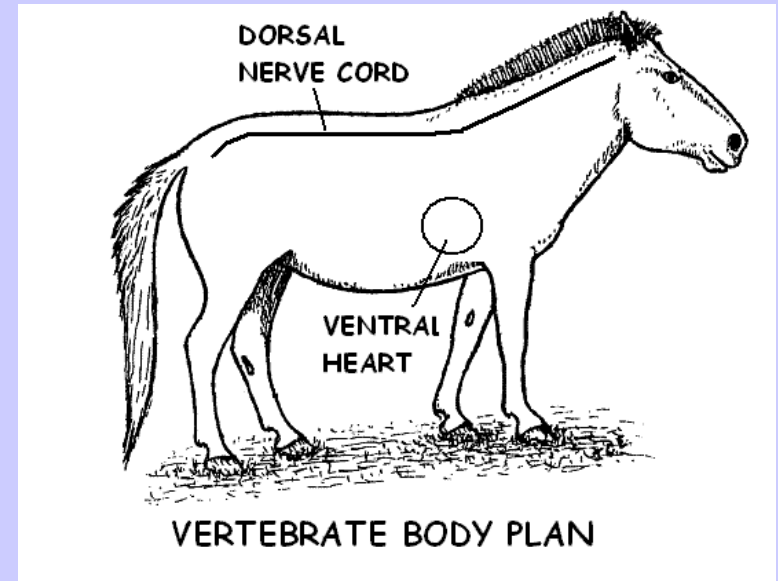
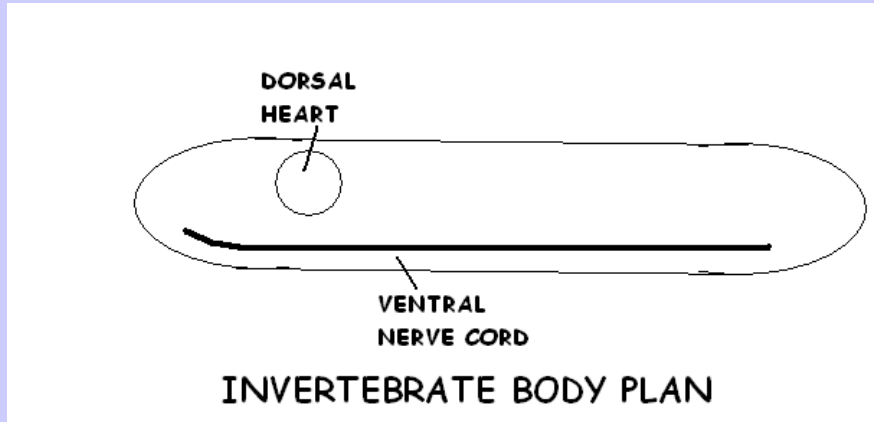
VENTRAL BLOOD VESSEL

(usually dark)

REMEMBER embryo orientation is flipped in vertebrates and invertebrates!



BODY PLANS are also flipped!



Most **INVERTEBRATES** have a **DORSAL HEART**
and a **VENTRAL NERVE CORD**

ALL VERTEBRATES have a **DORSAL NERVE CORD**
and a **VENTRAL HEART**.

GANGLIA= nerve center

**If in located in head and acting as “brain”
= CEREBRAL GANGLIA**



MUSCULAR SYSTEM

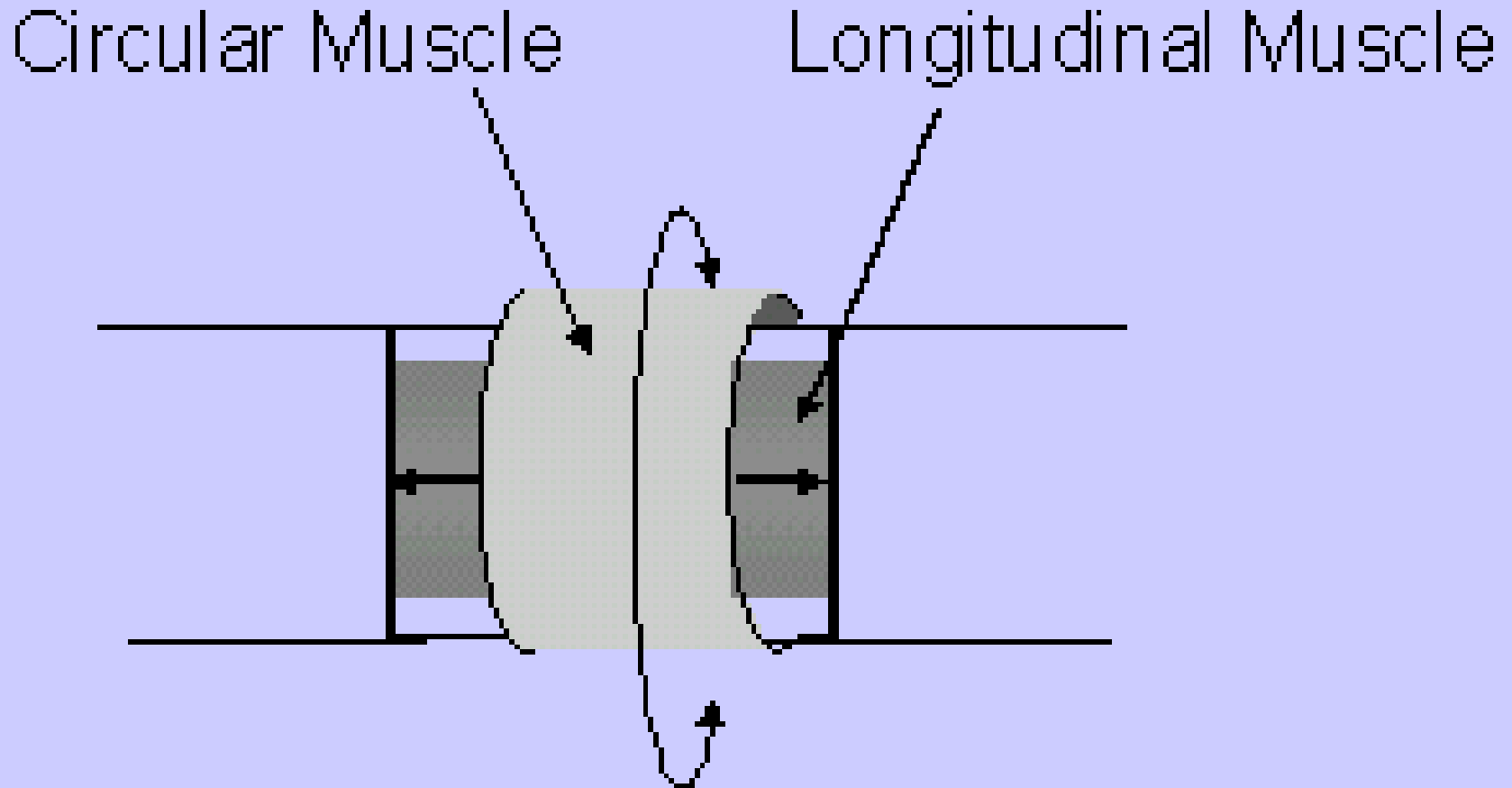


Image from:

[http://faculty.clintoncc.suny.edu/faculty/Michael.Gregory/files/Bio%20102/Bio%20102%20lectures/Animal%20Diversity/Protostomes/mollusks.htm#Chelicerates%20\(subphylum%20Chelicerata](http://faculty.clintoncc.suny.edu/faculty/Michael.Gregory/files/Bio%20102/Bio%20102%20lectures/Animal%20Diversity/Protostomes/mollusks.htm#Chelicerates%20(subphylum%20Chelicerata)



Image from: <http://www.urbanext.uiuc.edu/worms/anatomy/anatomy8.html>