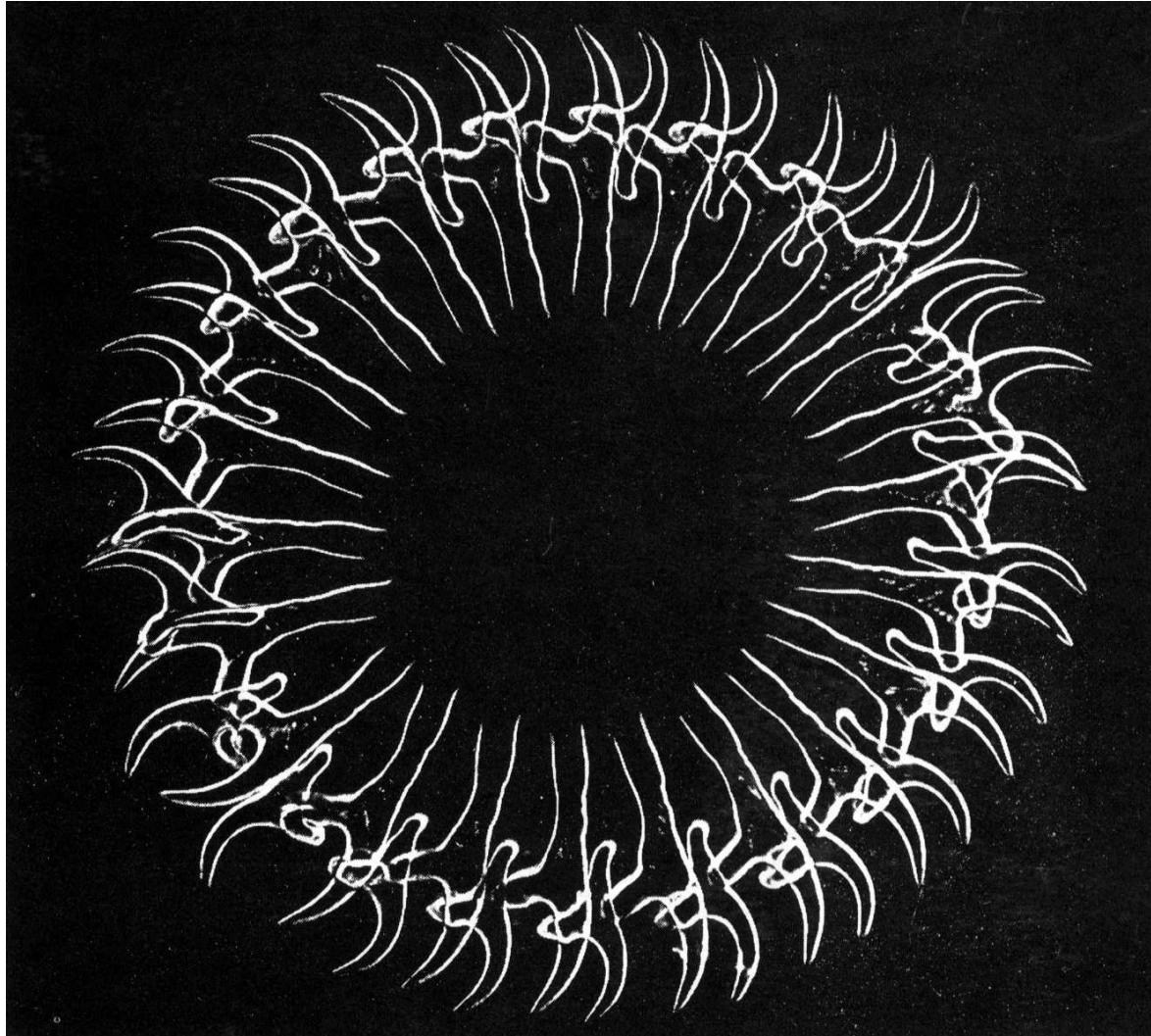


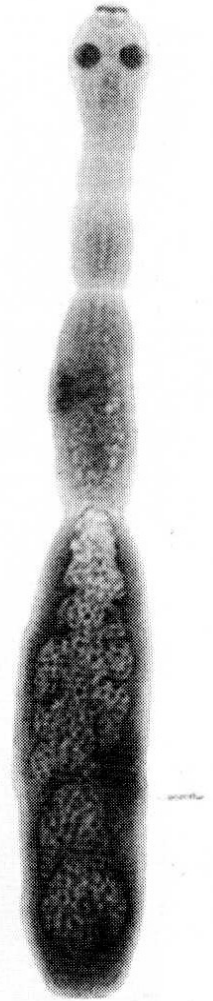
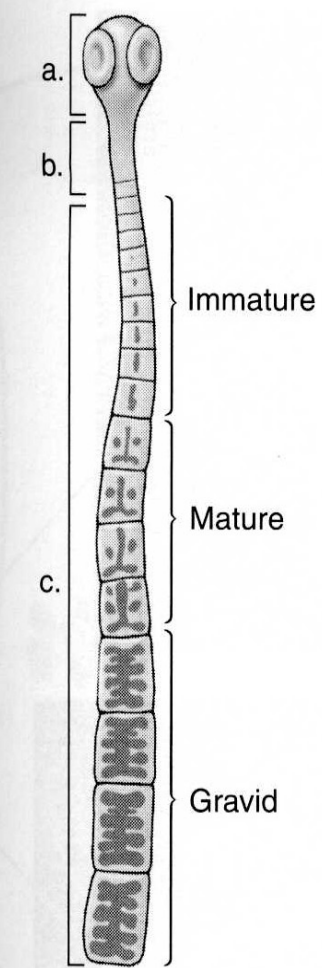
Tasemnice I



Tasemnice - charakteristika

- Výhradně parazitická skupina
- Absence střeva
- Larvy s embryonálními háčky
 - 10 lycofora - Cestodaria
 - 6 hexacanth – Eucestoda
- Medicínsky a veterinárně významné
- Popsáno přes 4000 druhů – nejvíce řádů u ryb
- Nejpočetnější řád – Cyclophyllidea – ptáci a savci

Scolex, krček, strobila



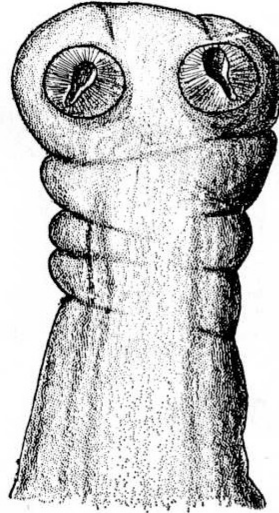
Tasemnice - morfologie

- Hlavička – scolex – přichycovací orgán
- Strobila – proglotidy (segmenty)
- Přichycovací orgány – 5 základních typů:
 - Mělké zářezy a rýhy – Caryophyllidea
 - Štěrbiny – bothrie – Pseudophyllidea
 - Svalnaté bothridie – Tetraphyllidea
 - Chapadélka – tentakule – Trypanorhyncha
 - Svalnaté přísavky - Cyclophyllidea

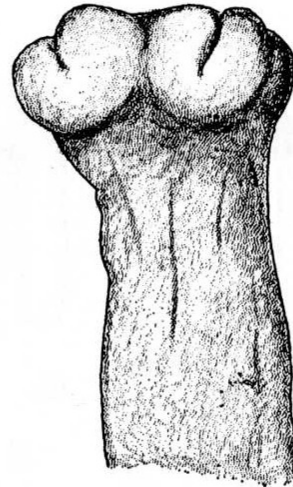
Typy scolexů tasemnic



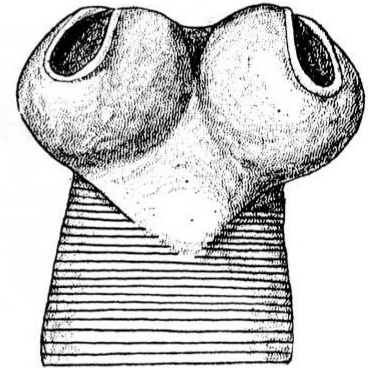
A



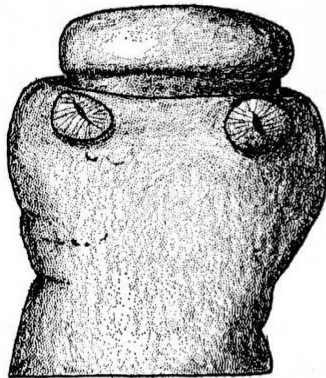
B



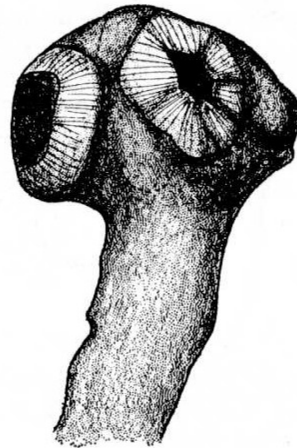
C



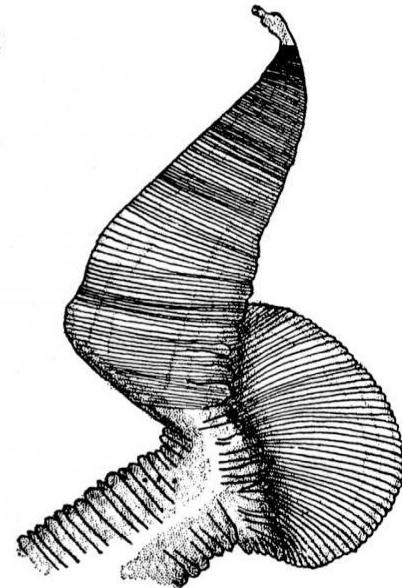
D



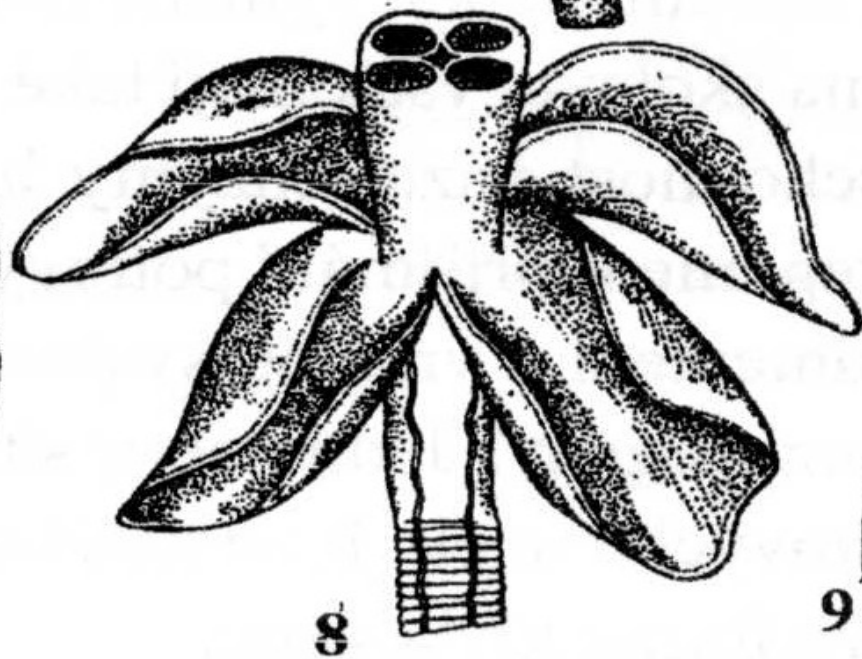
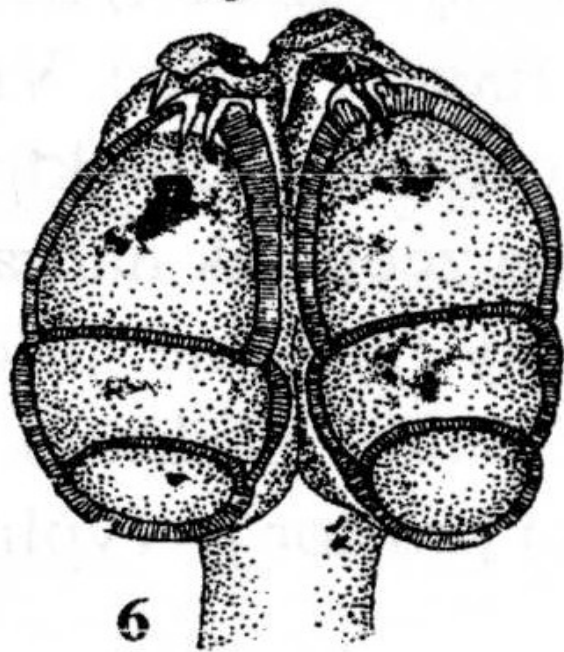
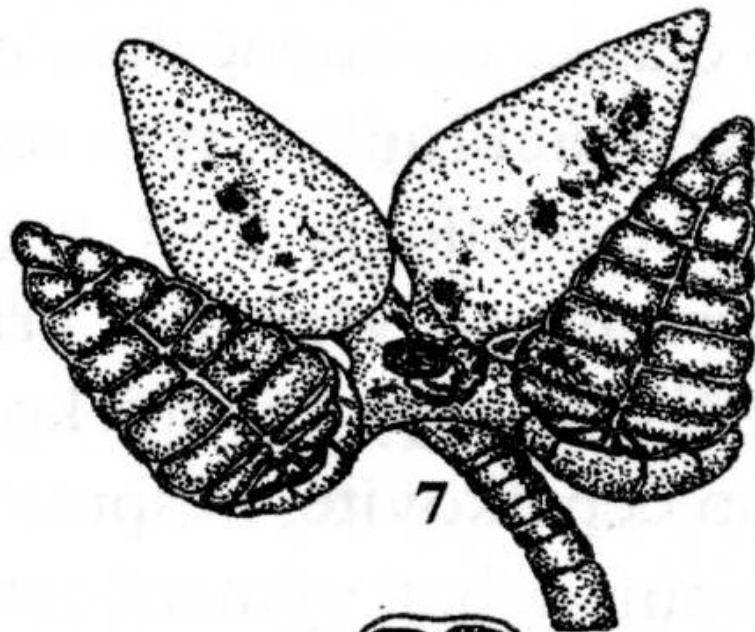
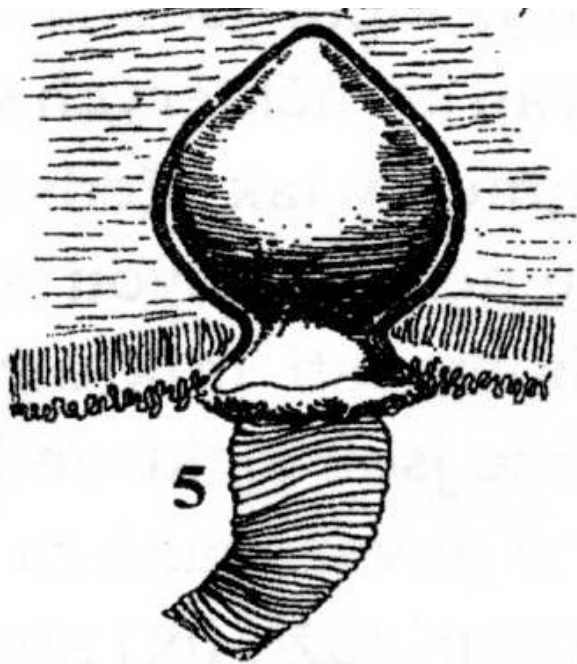
E

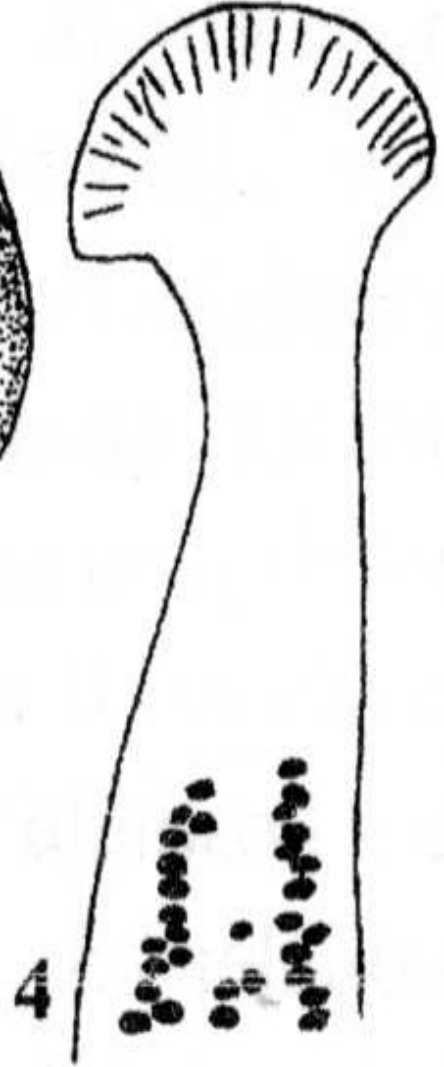
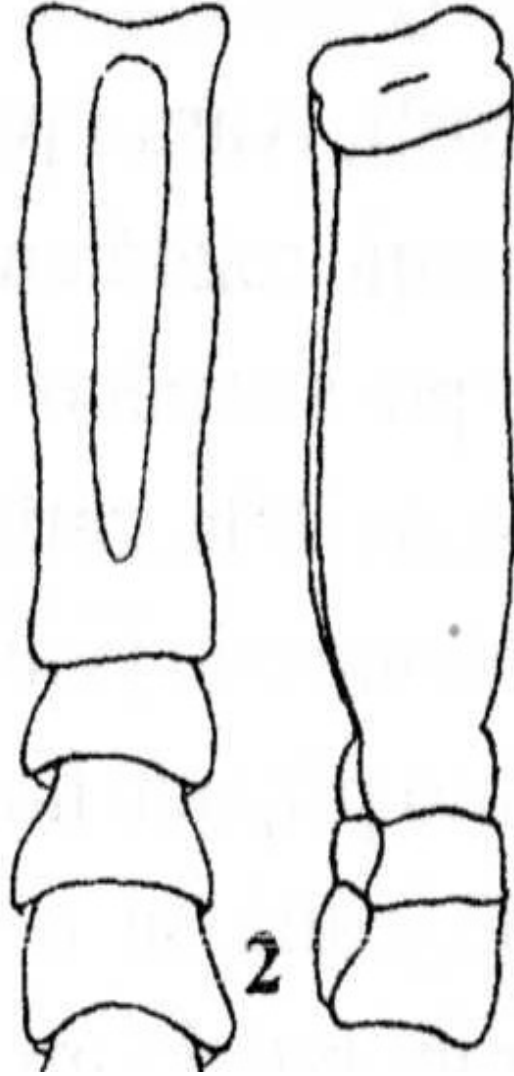
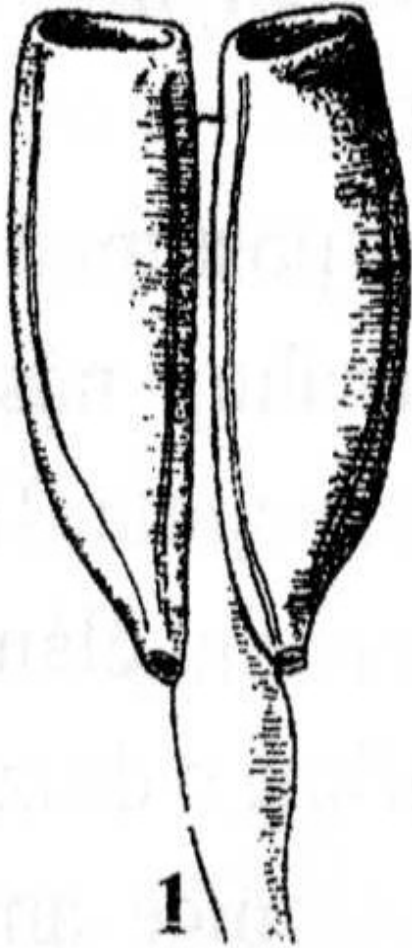


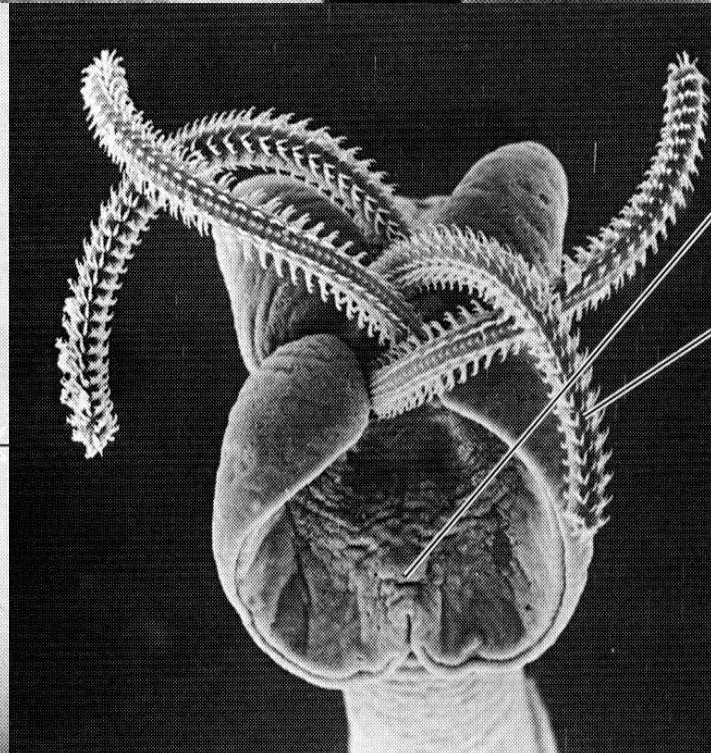
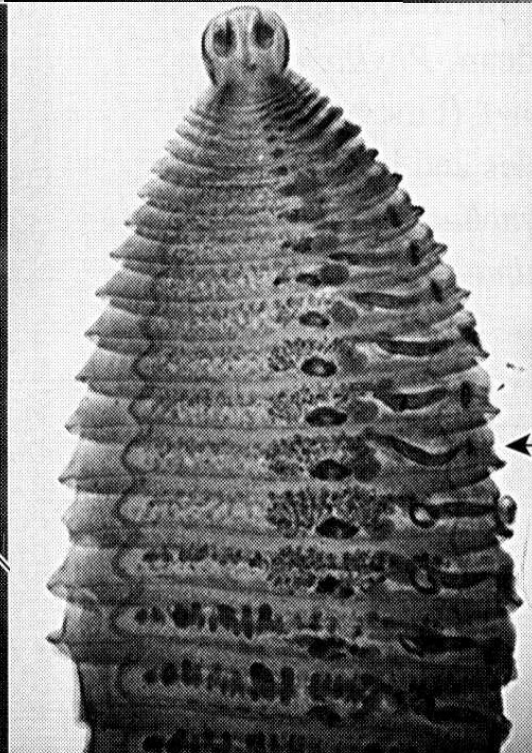
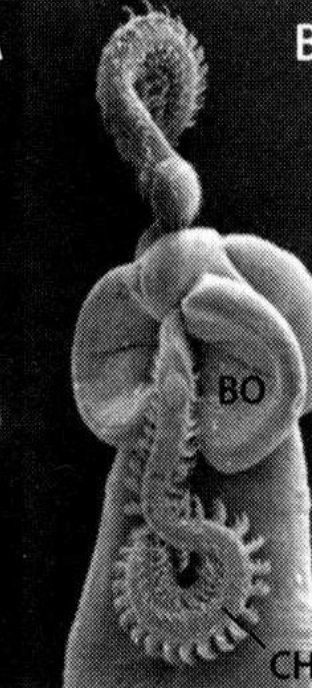
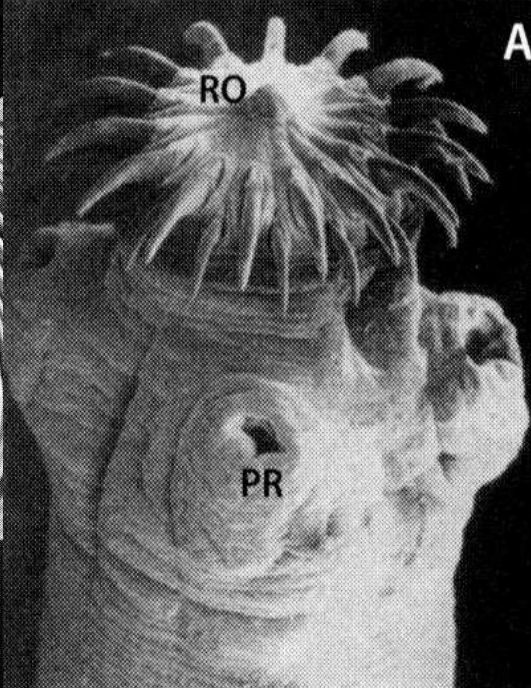
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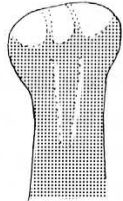
G



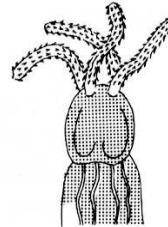




Scolexy různých řádů tasemnic



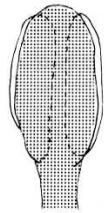
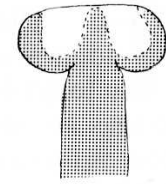
CARYOPHYLLIDEA



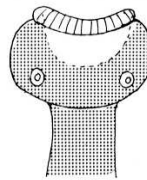
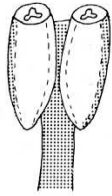
TRYPANORHYNCHA



SPATHEBOTHRIIDEA



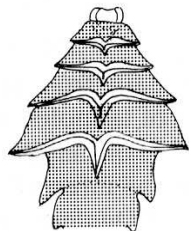
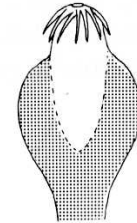
PSEUDOPHYLLIDEA



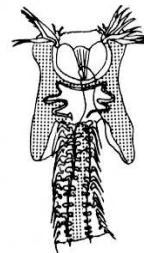
LECANICEPHALIDEA



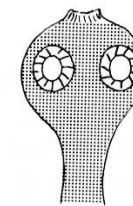
APORIDEA



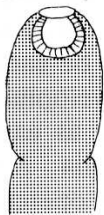
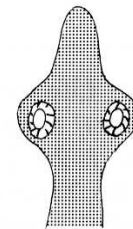
LITOBOTHRIDEA



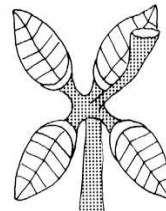
DIPHYLLIDEA



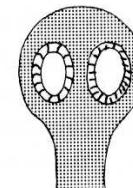
PROTEOCEPHALATA



NIPPOTAENIDEA



TETRAPHYLLIDEA



CYCLOPHYLLIDEA

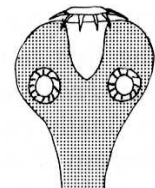
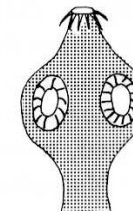
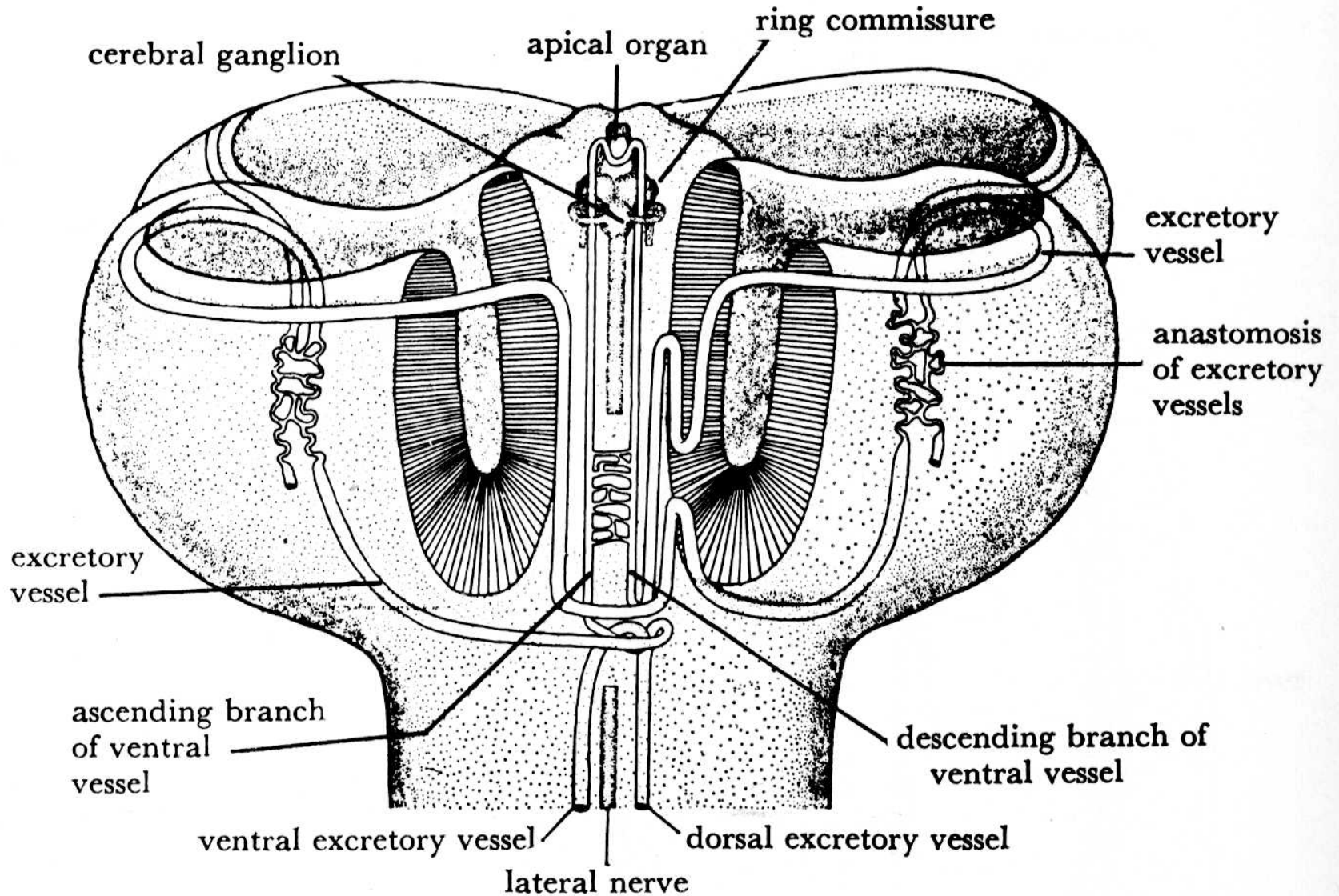


Fig. 1.48. Diagrammatic representation of scolices in different orders of tapeworm

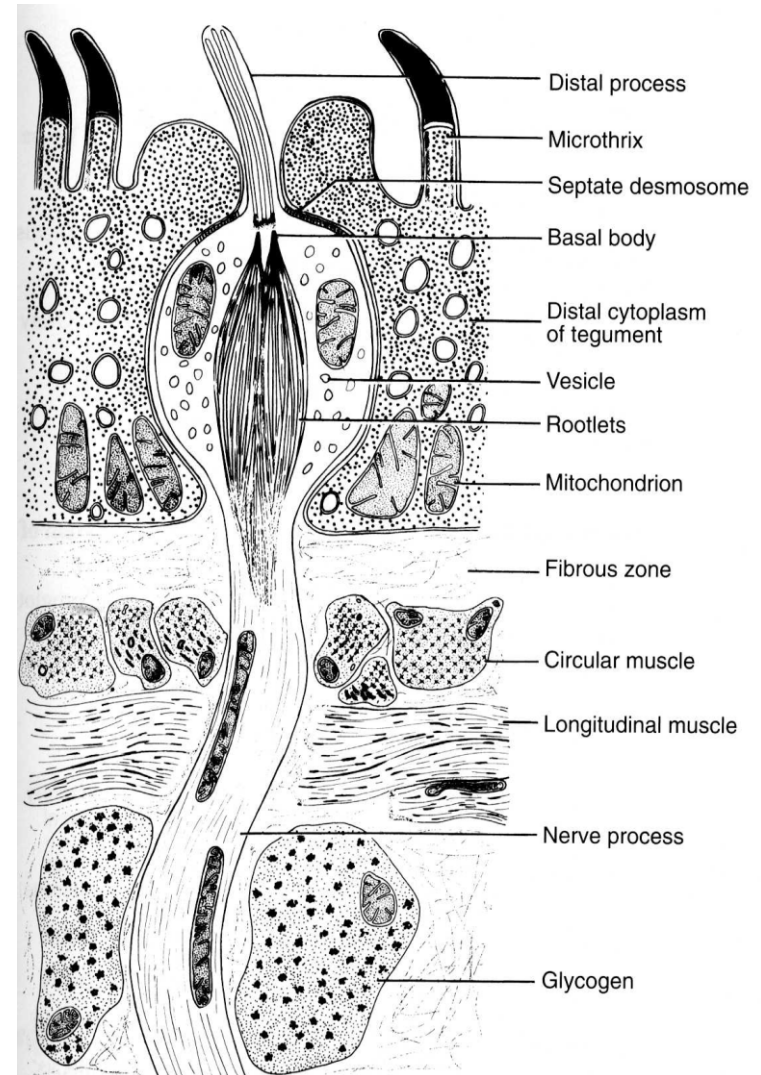
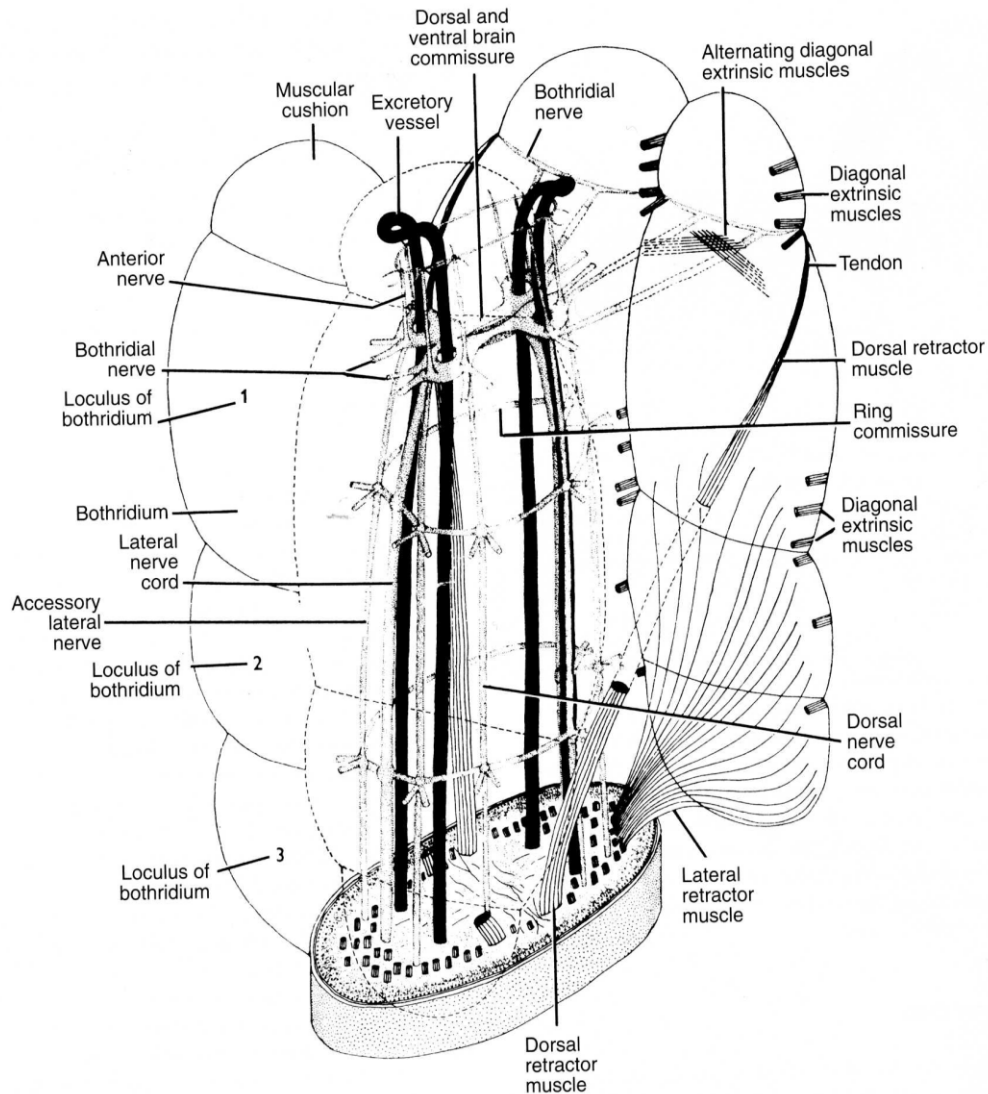
Tasemnice - anatomie

- Scolex – krček - germinativní zóna
- Strobila – proglotidy – články:
 - Apolytické články – odškrcovány články s vajíčky
 - Anapolytické články – vajíčka jsou oddělována s neoddělených článků
- Tegument – povrch těla
- Parenchym - pojivová tkáň
- Svalovina (tři vrstvy)
- Nervová soustava
- Exkreční soustava – protonefridie
- Pohlavní soustava – hermafroditi
- Příjem potravy – povrchem těla

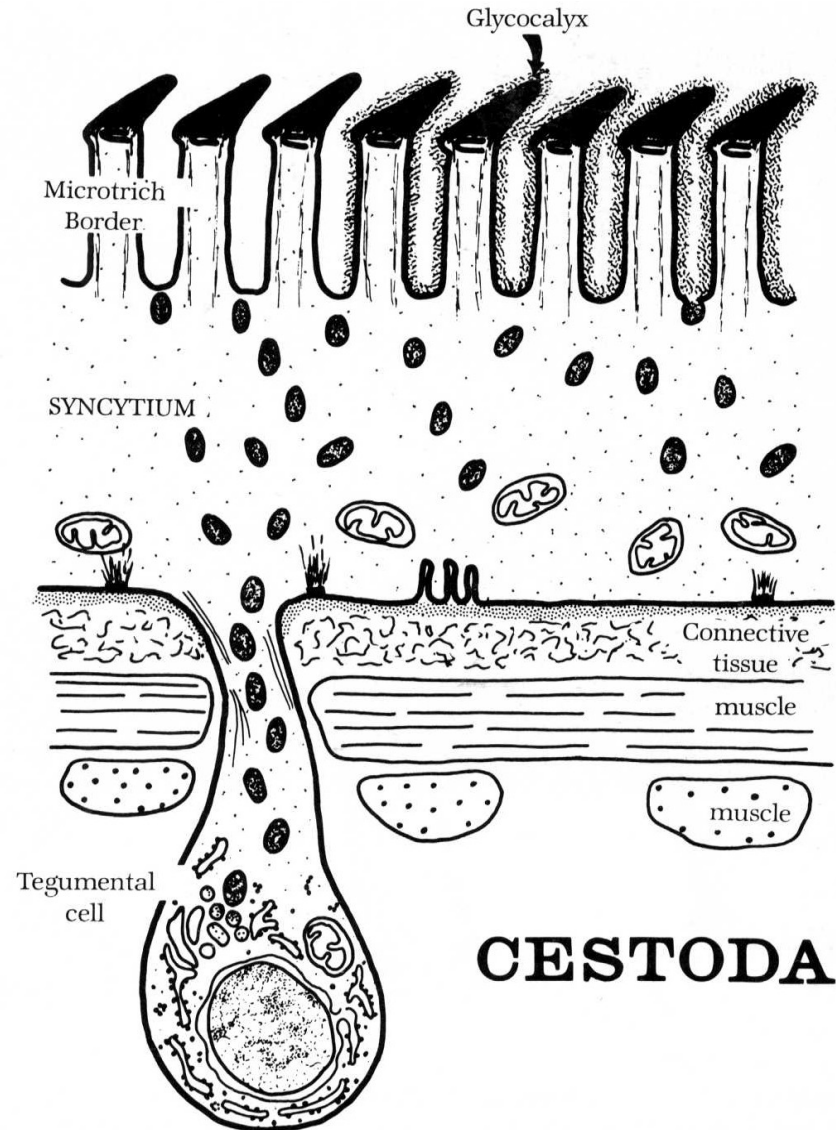
Schéma scolexu tasemnice



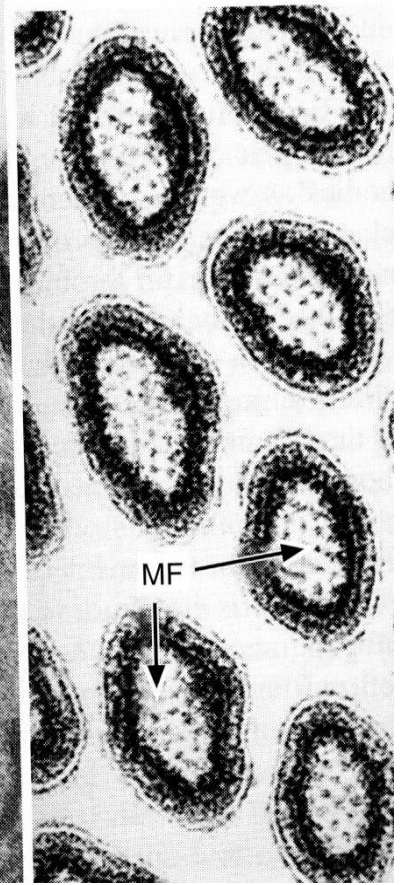
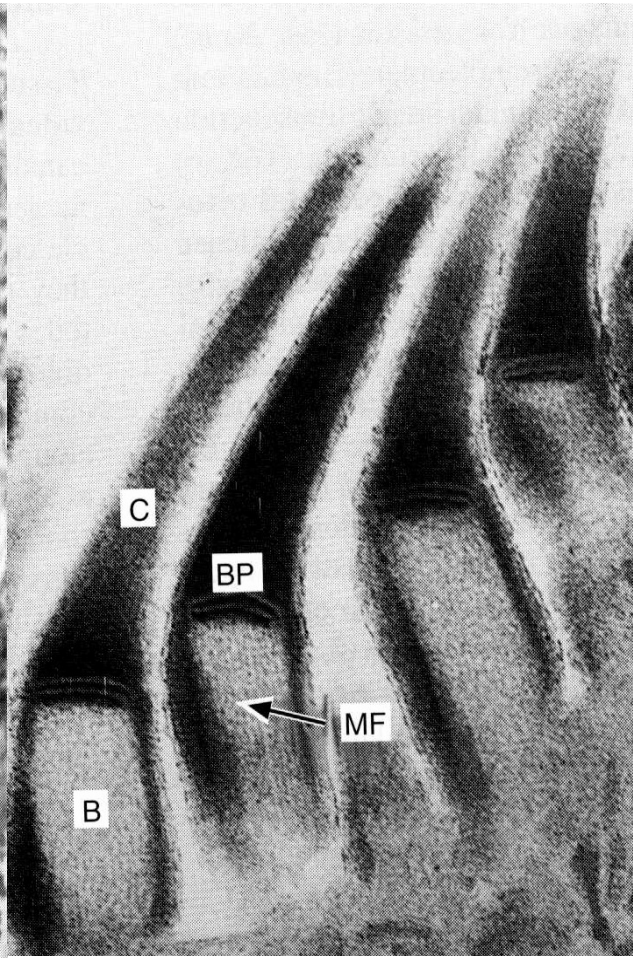
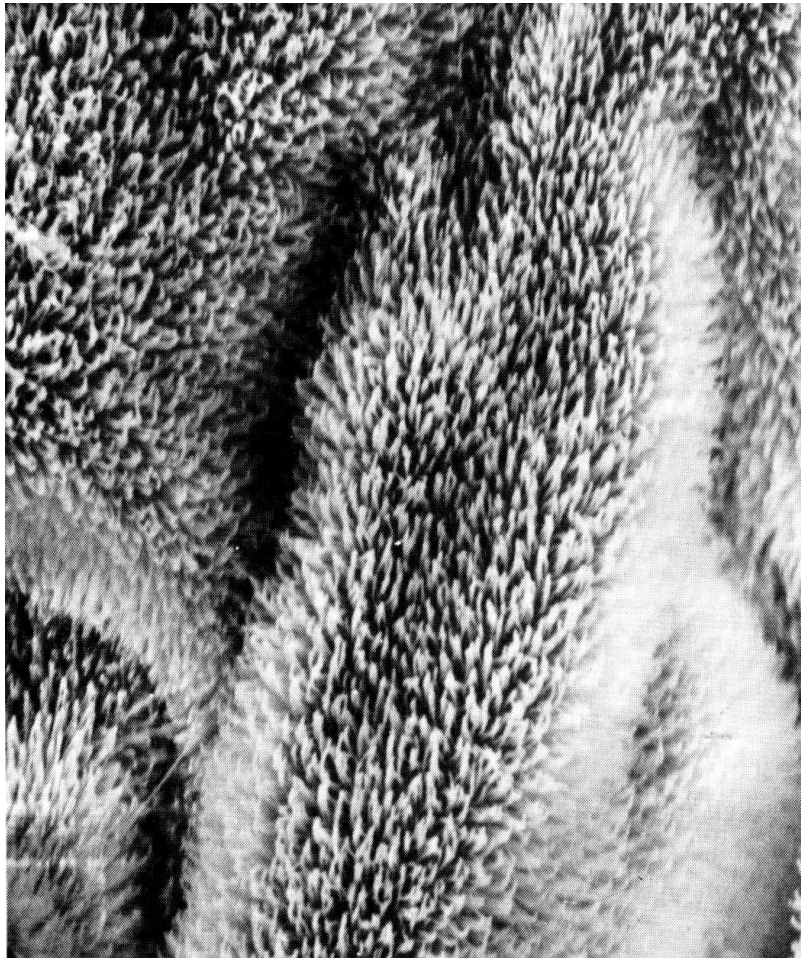
Smyslové orgány na scolexu



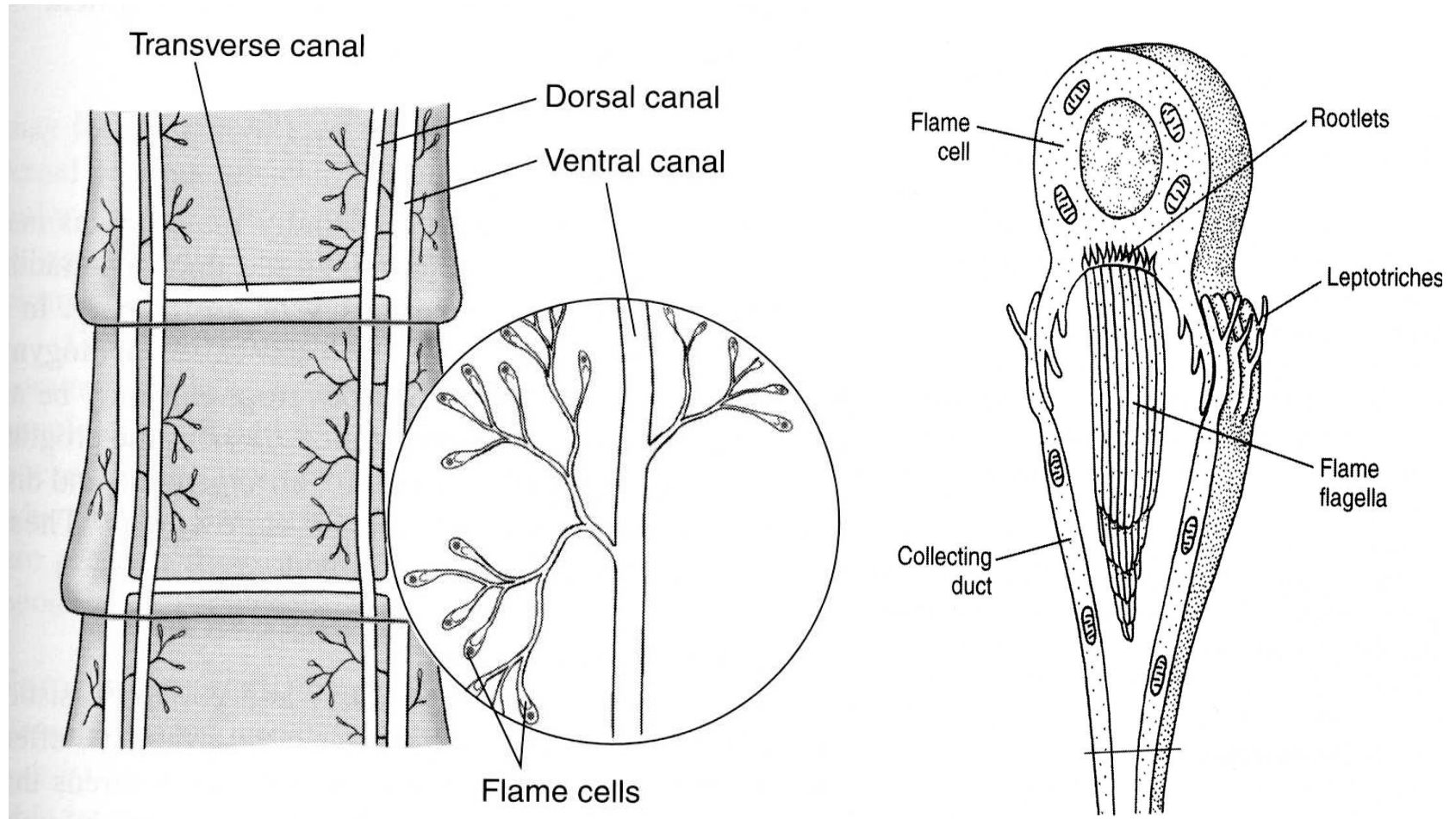
Tegument – povrch těla

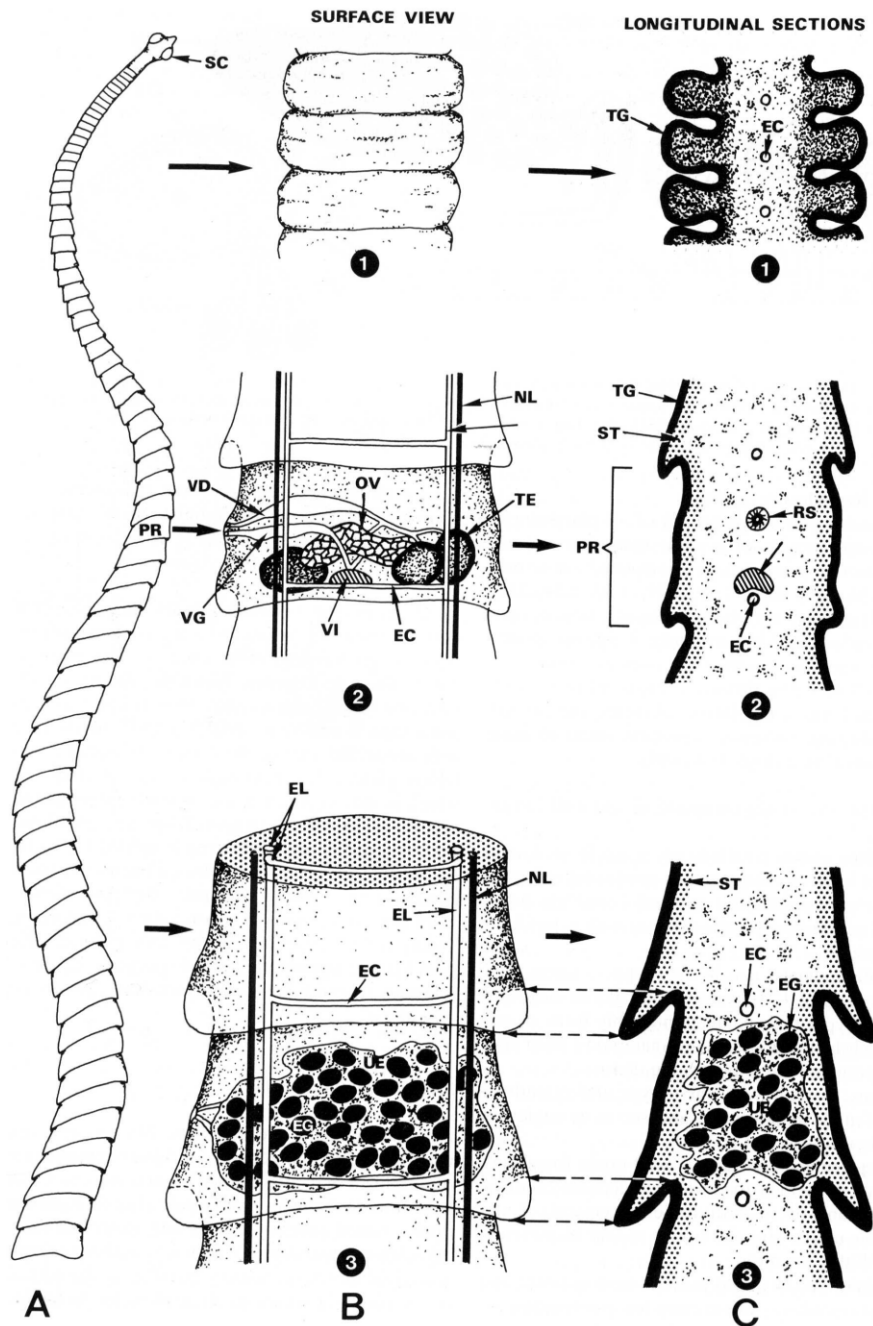


Mikrotrichy

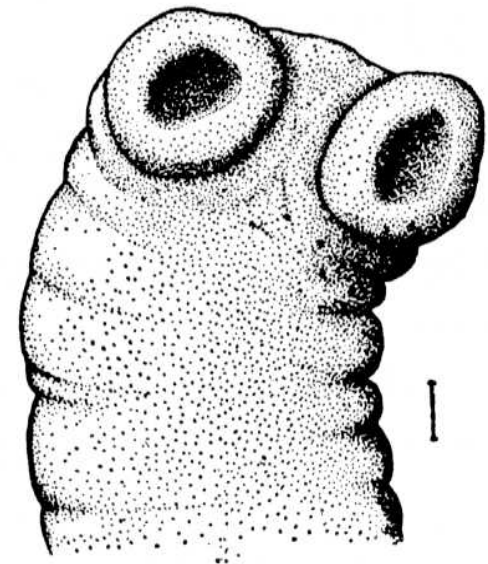


Exkreční soustava tasemnice





Anatomie strobily tasemnice



A
Fig. 3.98

B

C

Tasemnice – pohlavní soustava

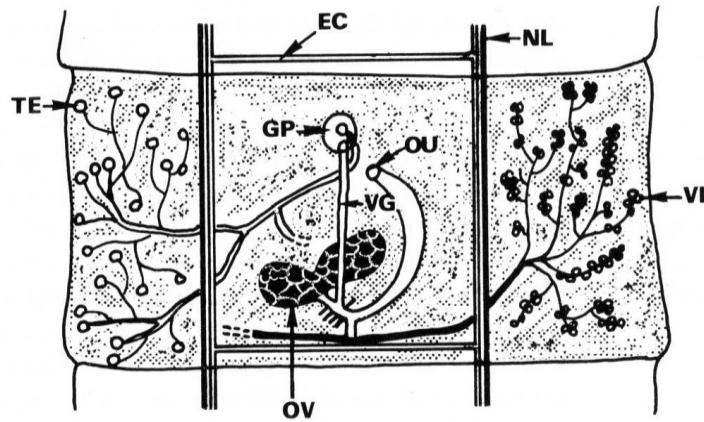
Samčí:

- Varlata – testes
- Vasa efferentia
- Vas deferens
- Vesicula seminalis
- Ductus ejaculatorius
- Cirrus a cirrový váček

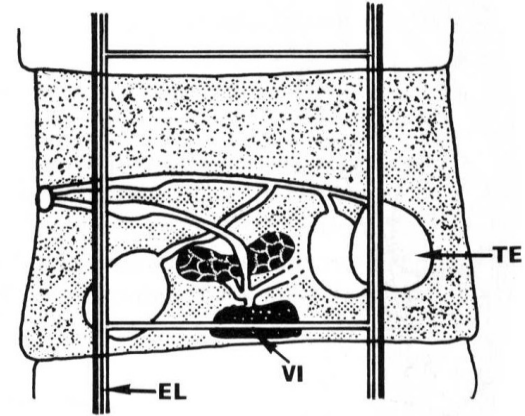
Samičí:

- Vaječník – ovarium
- Vejcovod – ovidukt
- Receptaculum seminis
- Žloutkové trsy – vitelaria
- Ootyp
- Mehlisovy žlázy
- Děloha – uterus
- Vagina

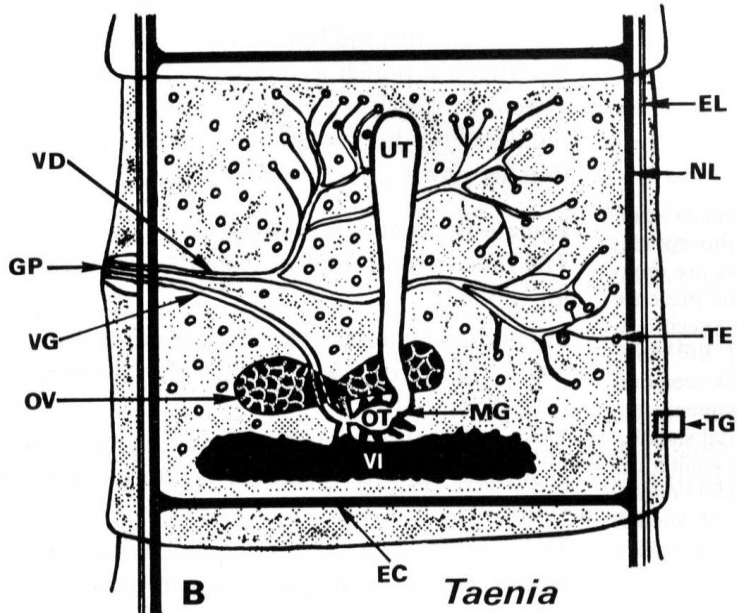
Srovnání stavby článků



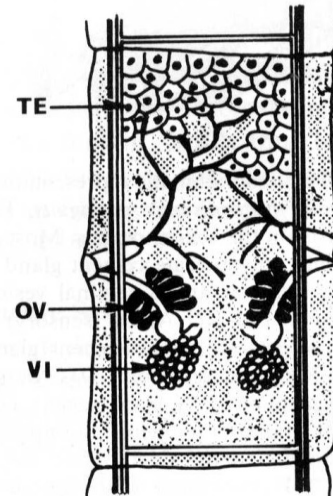
A *Diphyllobothrium*



C *Hymenolepis*

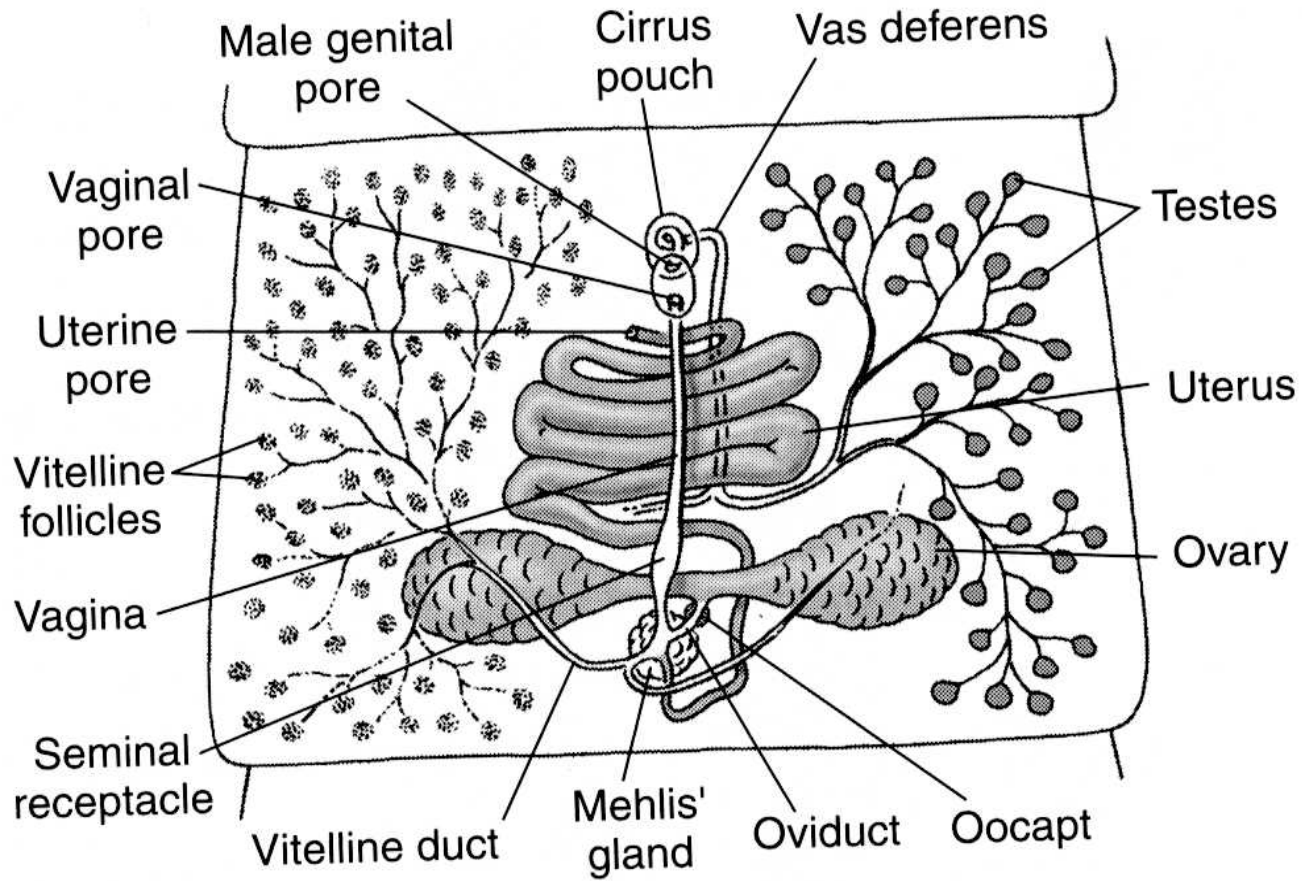


B *Taenia*

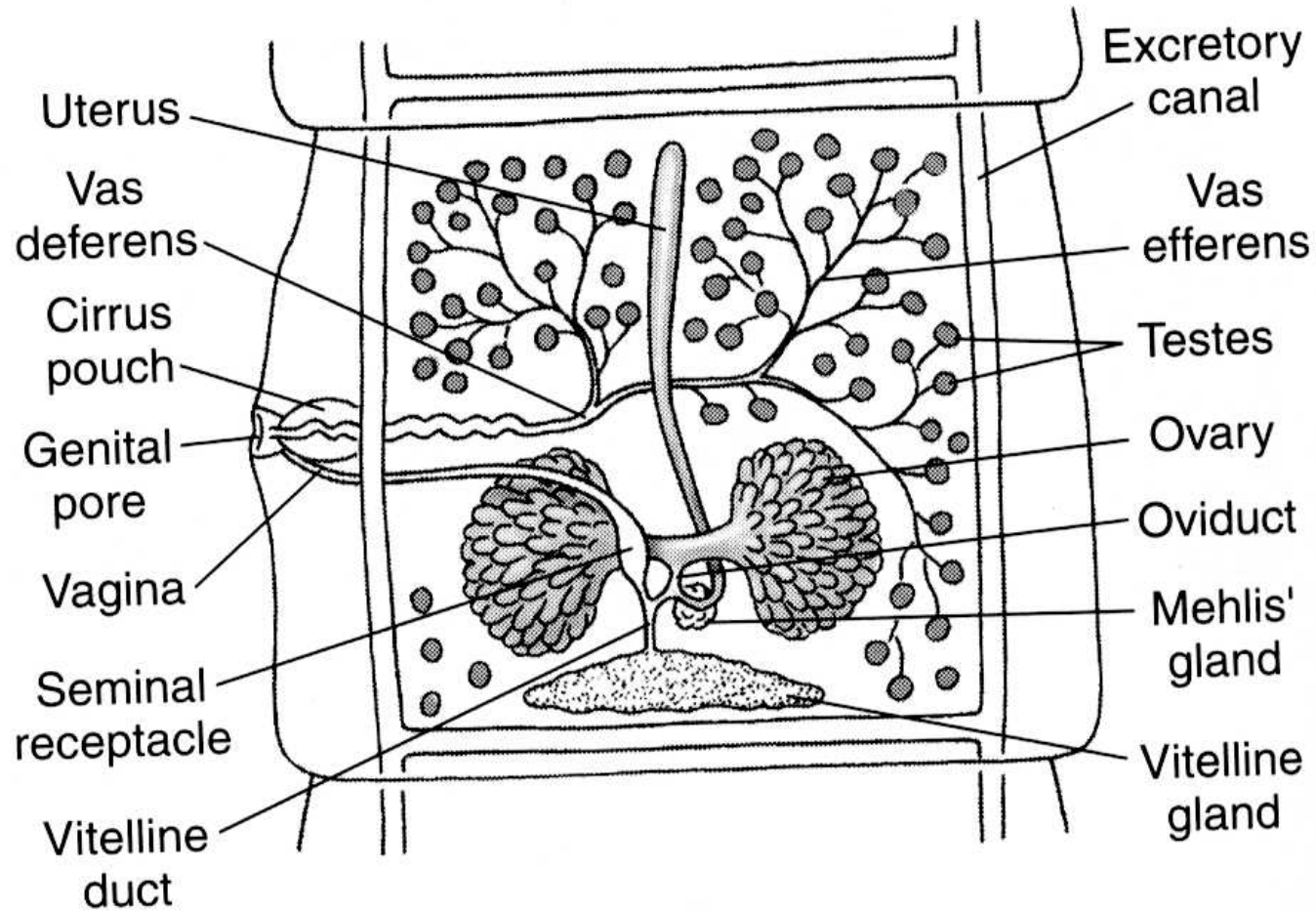


D *Dipylidium*

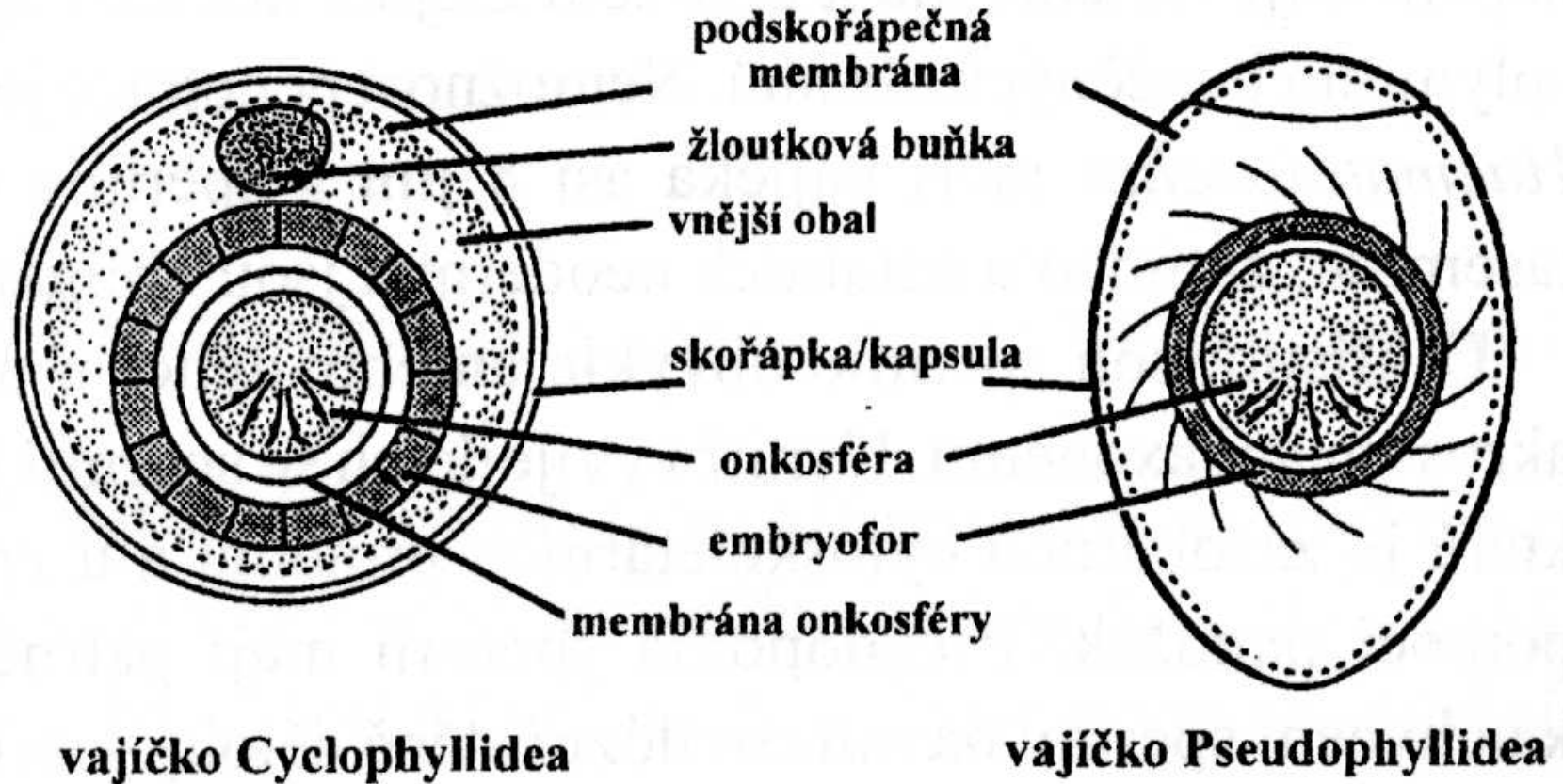
Pohlavní soustava akvatické tasemnice



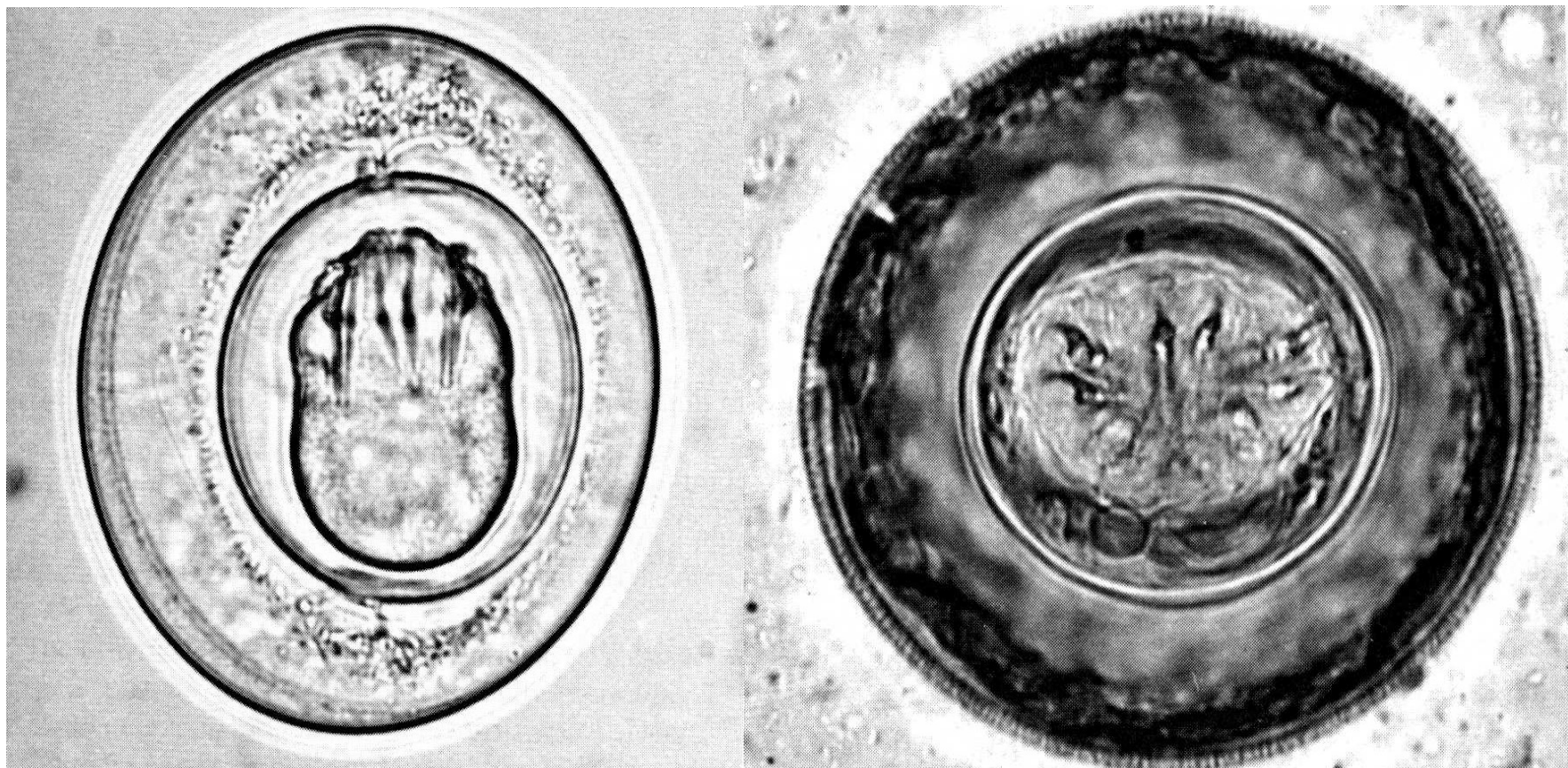
Pohlavní soustava terestrické tasemnice



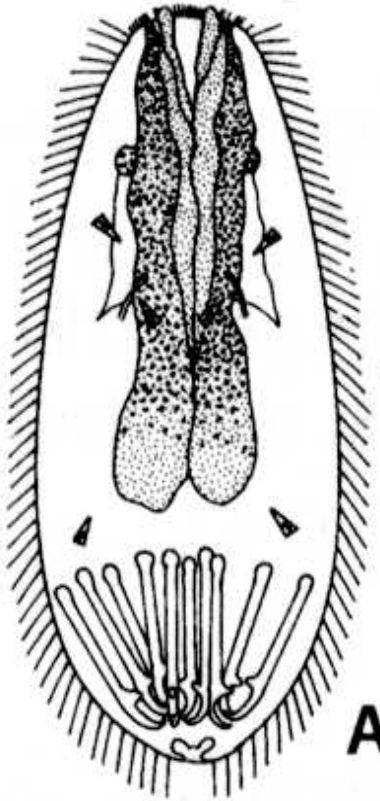
Vajíčka tasemnic



Vajíčka tasemnic



Larvální stádia tasemnic



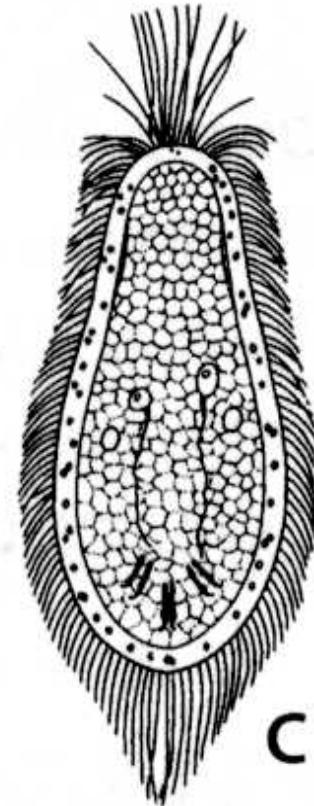
A

lycophora (A)



B

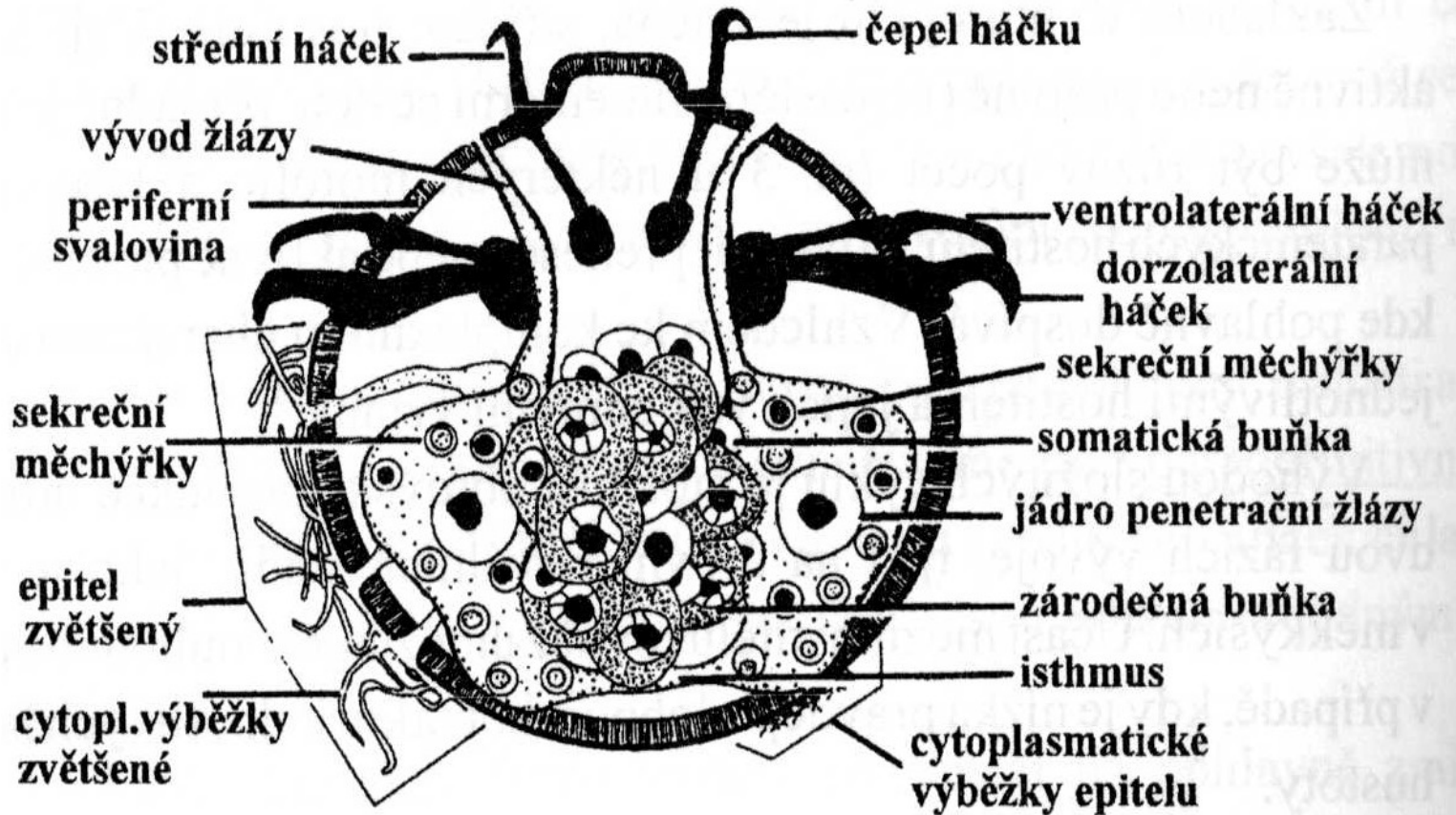
oncosphera (B)



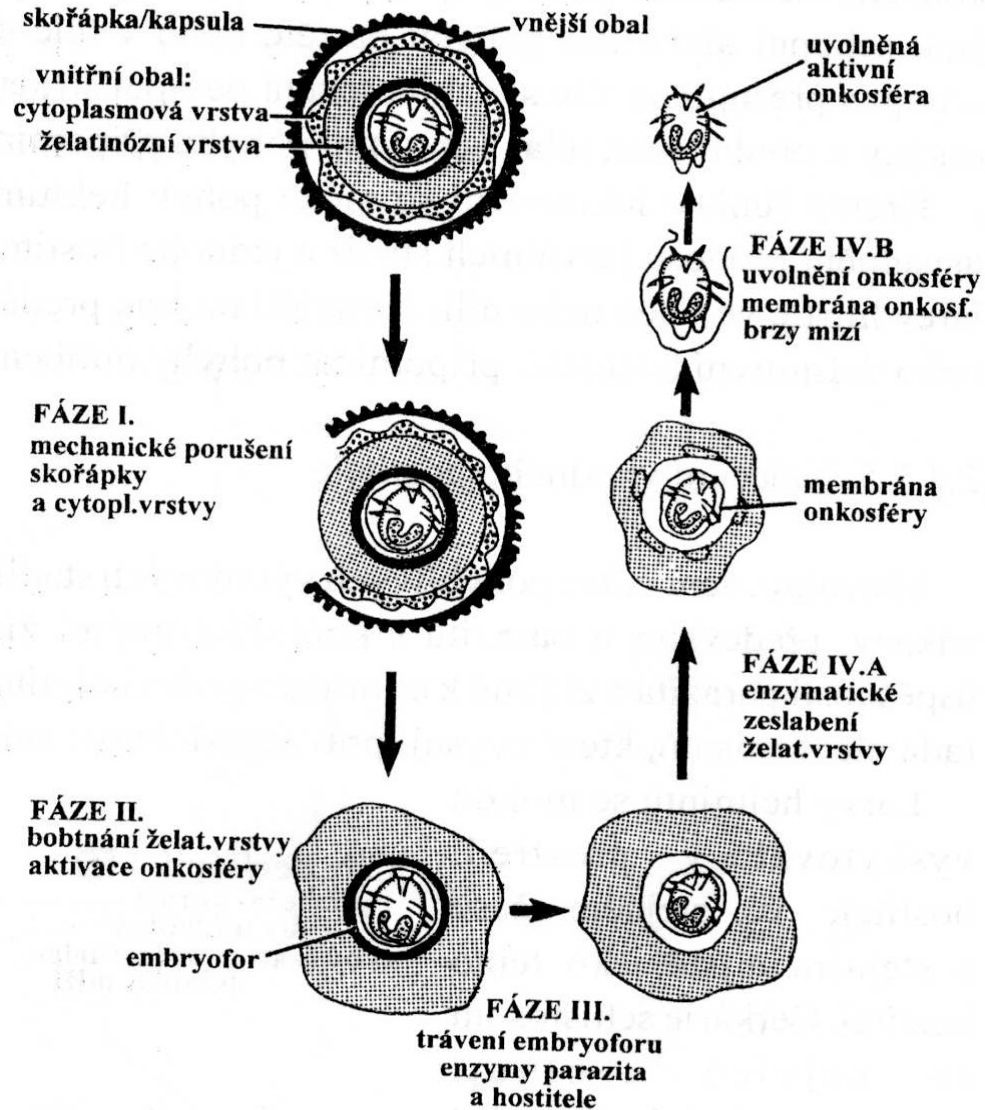
C

coracidium (C)

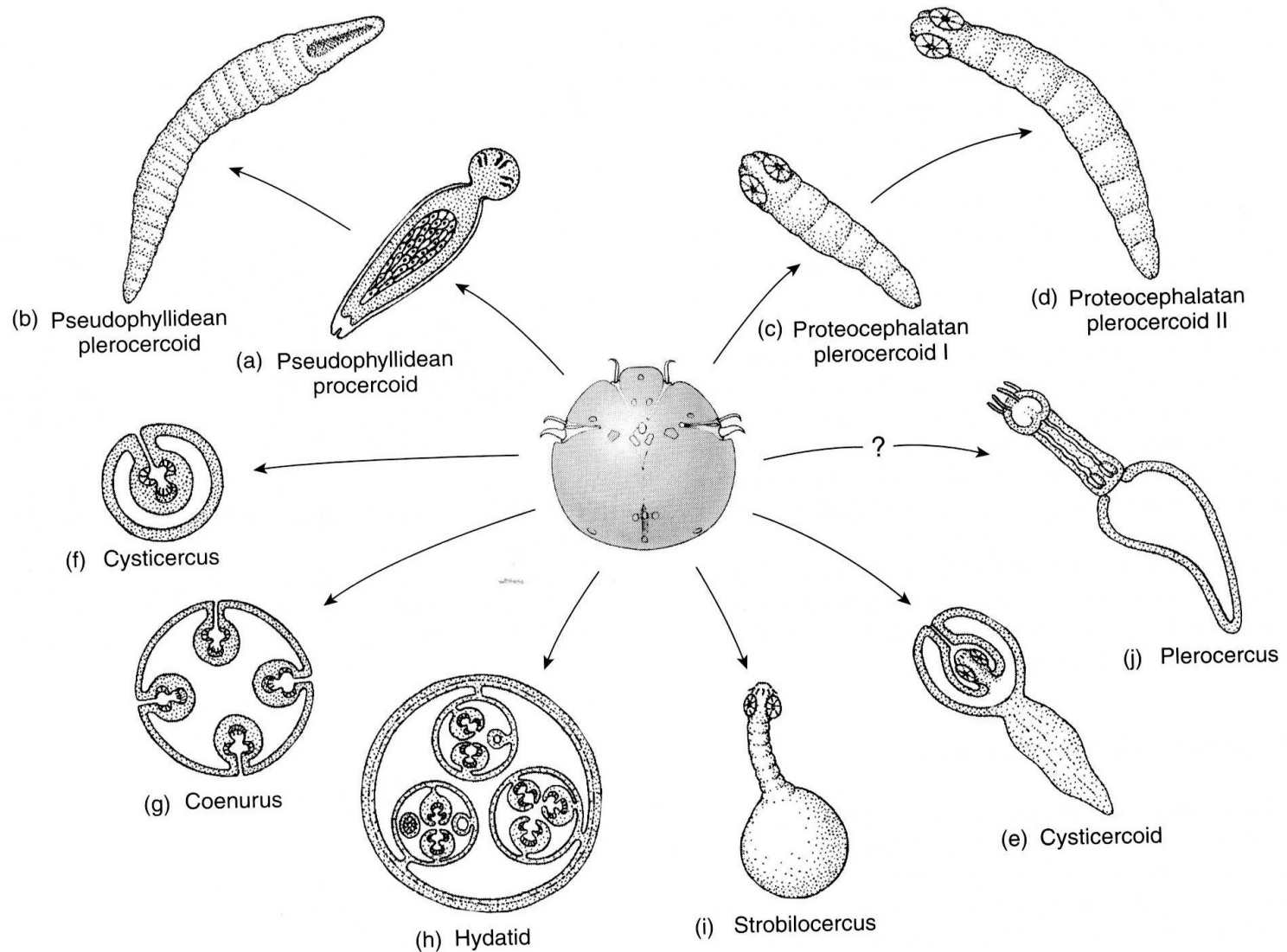
Anatomie onkosféry



Stádia líhnutí onkosféry



Základní typy metacestodů

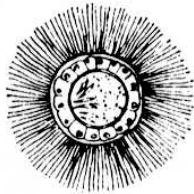


Larvální stádia – akvatický cyklus

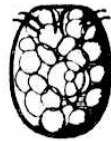
PSEUDOPHYLLIDEA



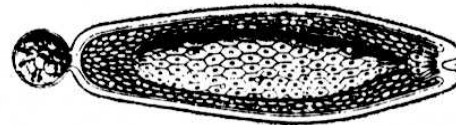
EGG



CORACIDIUM



ONCOSPHERE

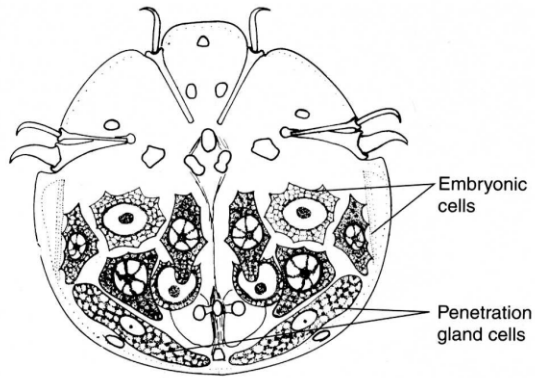


PROCERCOID LARVA

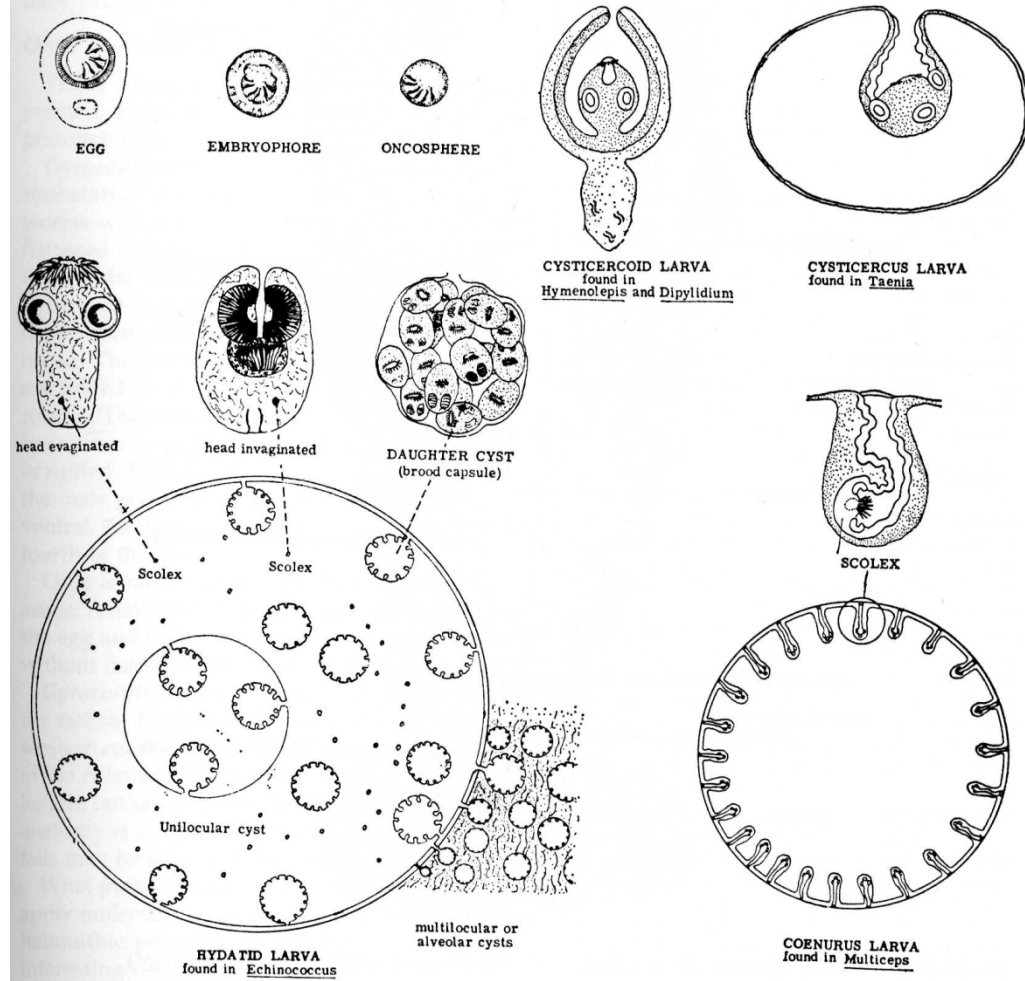


PLEROCERCOID OR
SPARGANUM LARVA

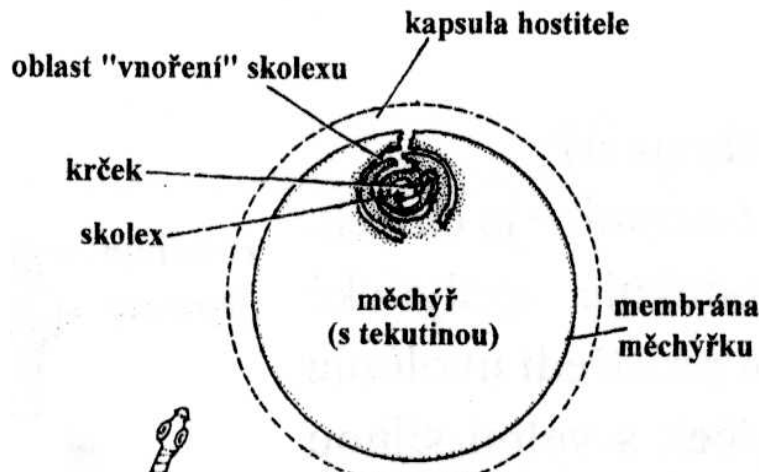
Larvální stadia – terestrický cyklus



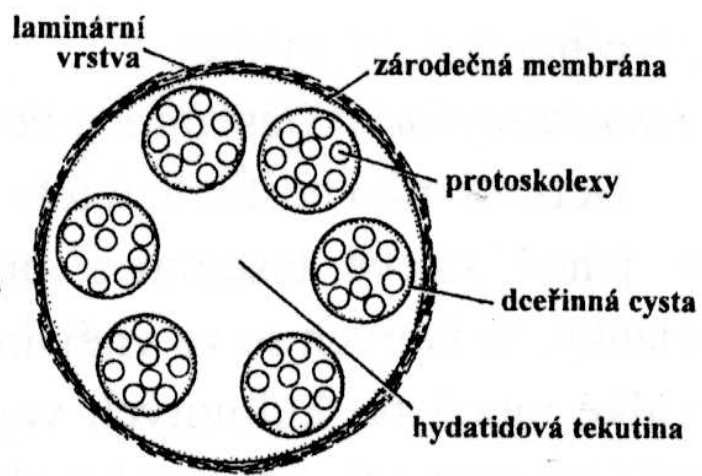
CYCLOPHYLLIDEA



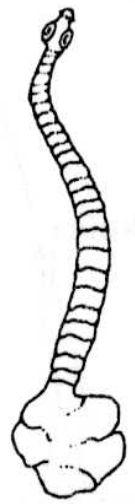
Cystická larvální stádia



CYSTICERKUS(*T.solium*)



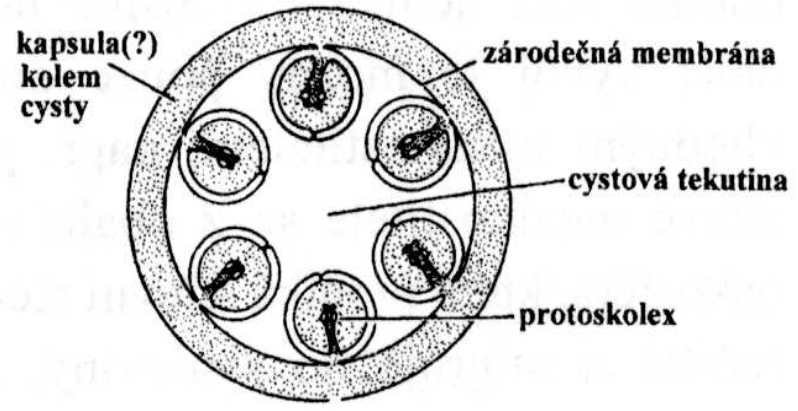
HYDATIDA(*E.granulosus*)



STROBILOCERKUS
(*T.taeniaeformis*)



CYSTICERKOID(*H.nana*)



COENURUS(*T.serialis*)

Typy vývojových cyklů

- **Jednohostitelský** – monoxenní – *Archigetes sieboldi*
- **Dvojhostitelské** - dixenní – *Taenia saginata*
- **Trojhostitelské** – trixenní – *Hymenolepis nana*
- **Čtyřhostitelské** – tetraxenní –
Diphyllobothrium latum



HLÍSTICE

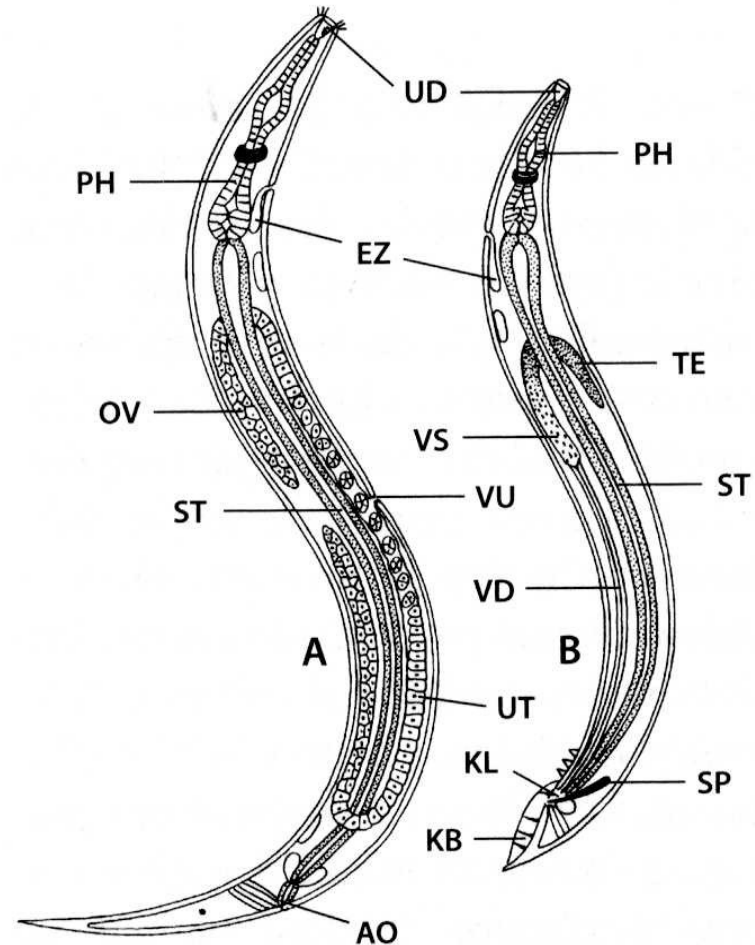
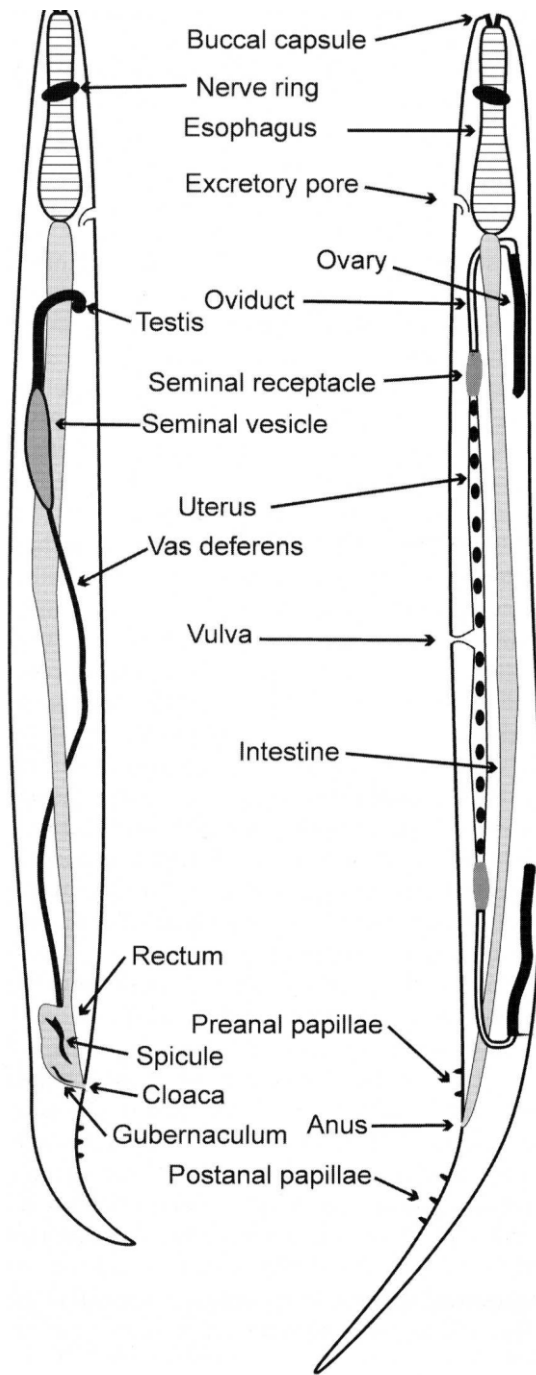
Nematoda - charakteristika

- Velmi rozmanitá skupina
- Cizopasnící x volně žijící (půda, voda)
- Paraziti – živočichové (bezobratlí), rostliny
- Adaptace k parazitismu
- Význam – původci onemocnění člověka zvířat

Nematoda – morfologie I

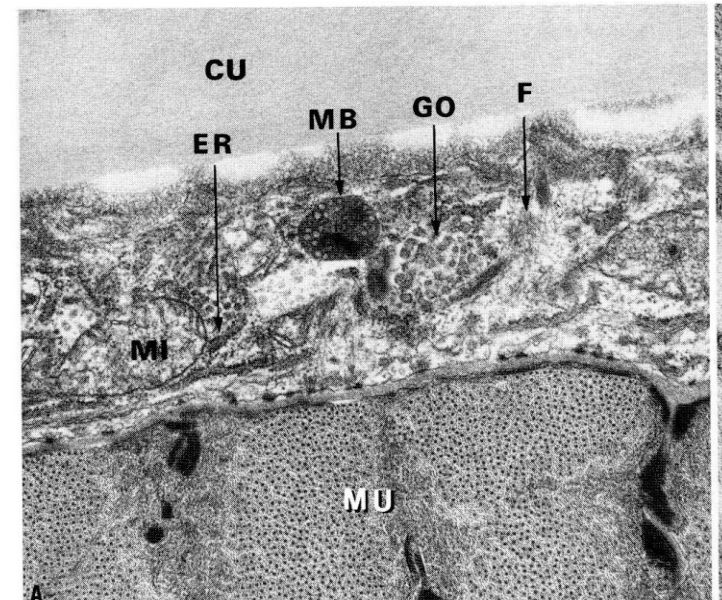
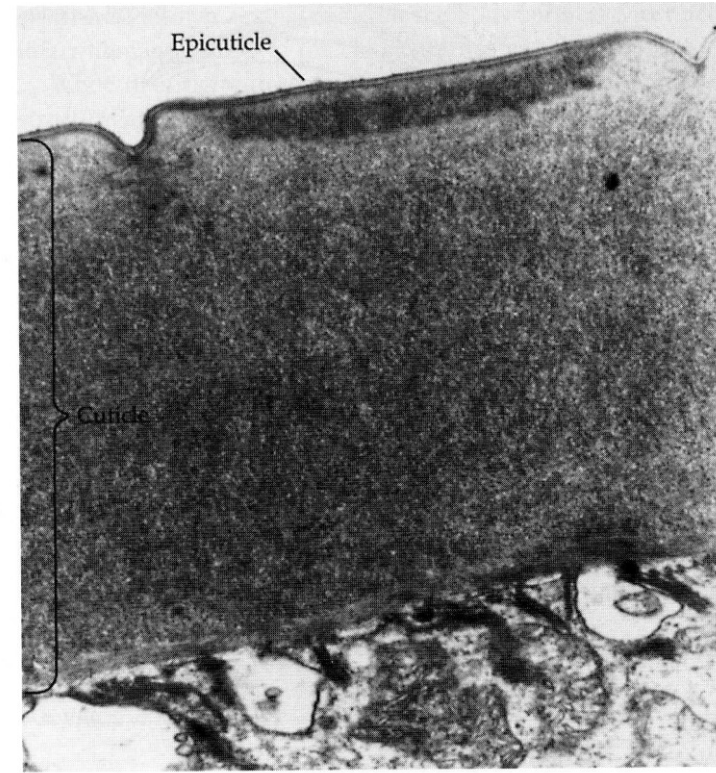
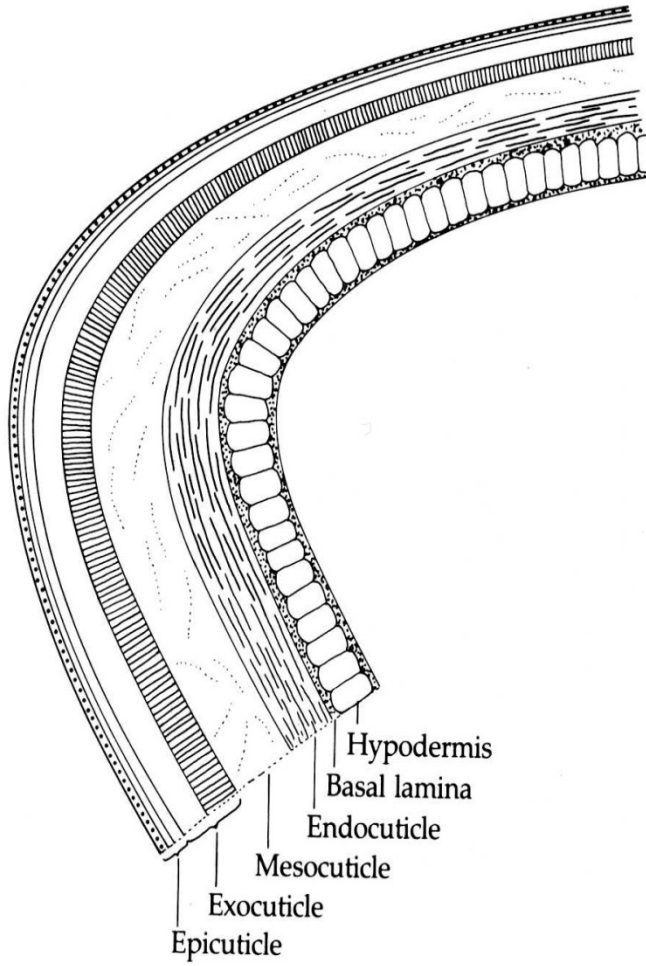
- Protáhlé až niťovité tělo
- Nesegmentované
- Velikost – až 8 m (*Placentonema gigantissima*)
- Povrch těla – **kutikula** - mnohovrstevný útvar – exoskelet
- **Hypodermis** – pod kutikulou
- Podpovrchová **svalovina** – tři typy uspořádání:
 - 1) **polymyární** – *Ascaris* – mnoho výběžků v každém kvadrantu
 - 2) **meromyární** – *Oxyuris* – malý počet svalových buněk v kvadrantu - max 2
 - 3) **holomyární** – *Trichuris* – velký počet svalových buněk – tvoří jednolitou vrstvu

Nematoda základní morfologie



Obr. 3-53 Nematoda. Základní anatomie

Kutikula



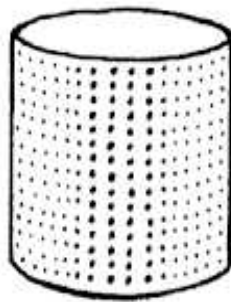
Hypodermis

Typy kutikulárních útvarů

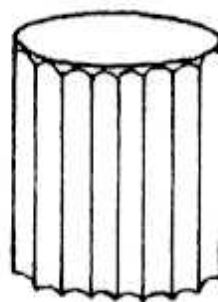


D

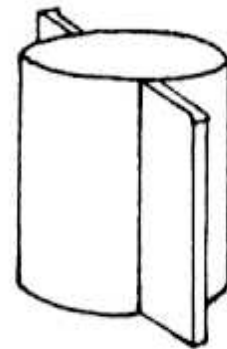
1



2

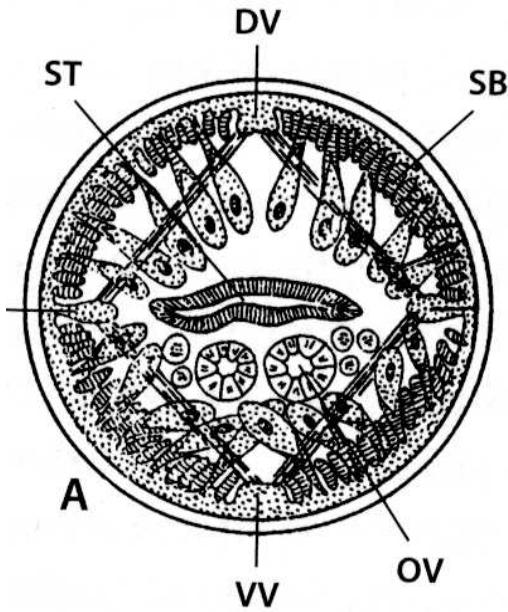


4

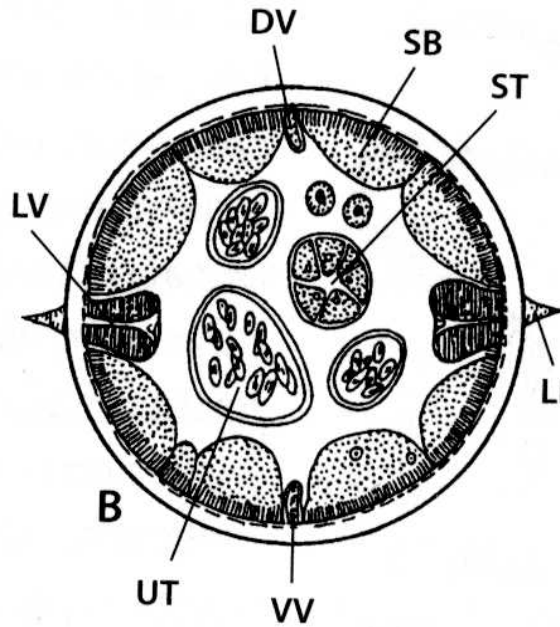


5

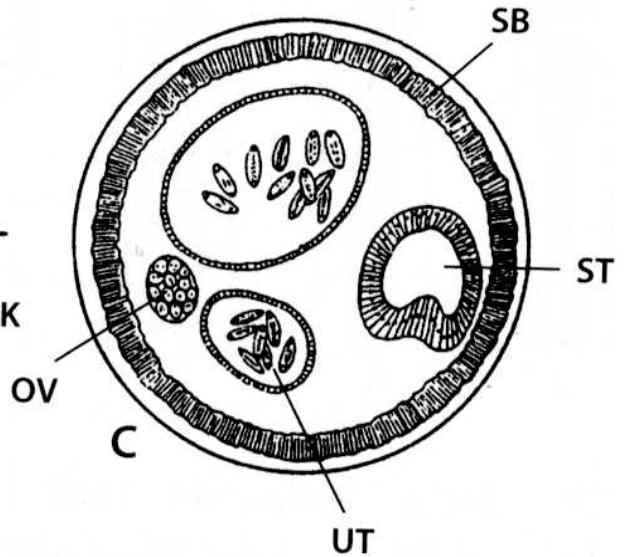
Organizace svaloviny



Polymyární



Meromyární



Holomyární

Nematoda – morfologie II

- **Nervová soustava** – 2 páry nervových vláken, spojky, jícnový prstenec
- Nervová zakončení:
 - amfidy** – na ústních papilách
 - dereidy** – po stranách hlavového konce
 - fazmidy** – senzorické žlázy ústící pórem (Aphasmida, Phasmida)
 - smyslové **papily** a **sety**

Nervová soustava

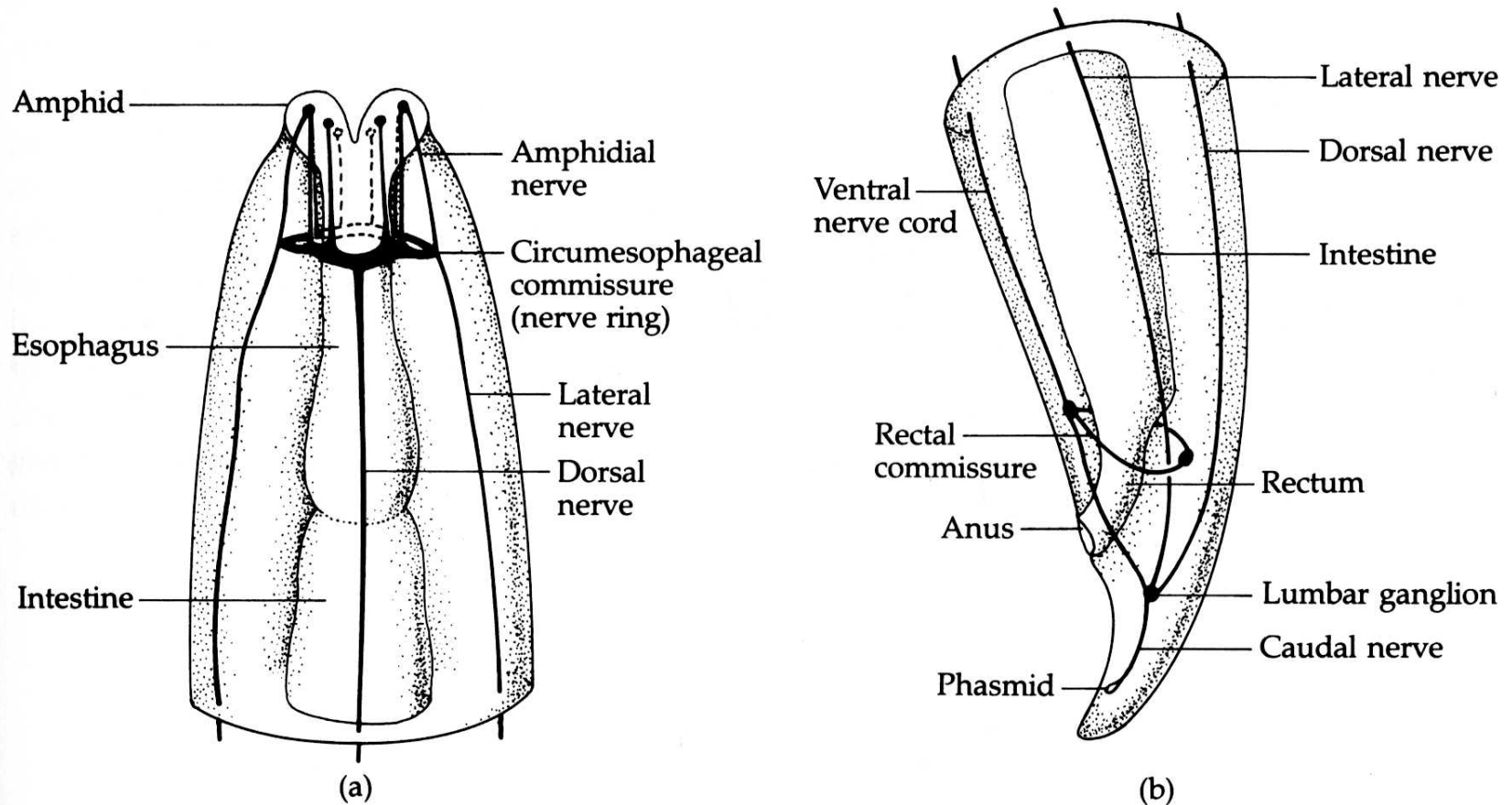
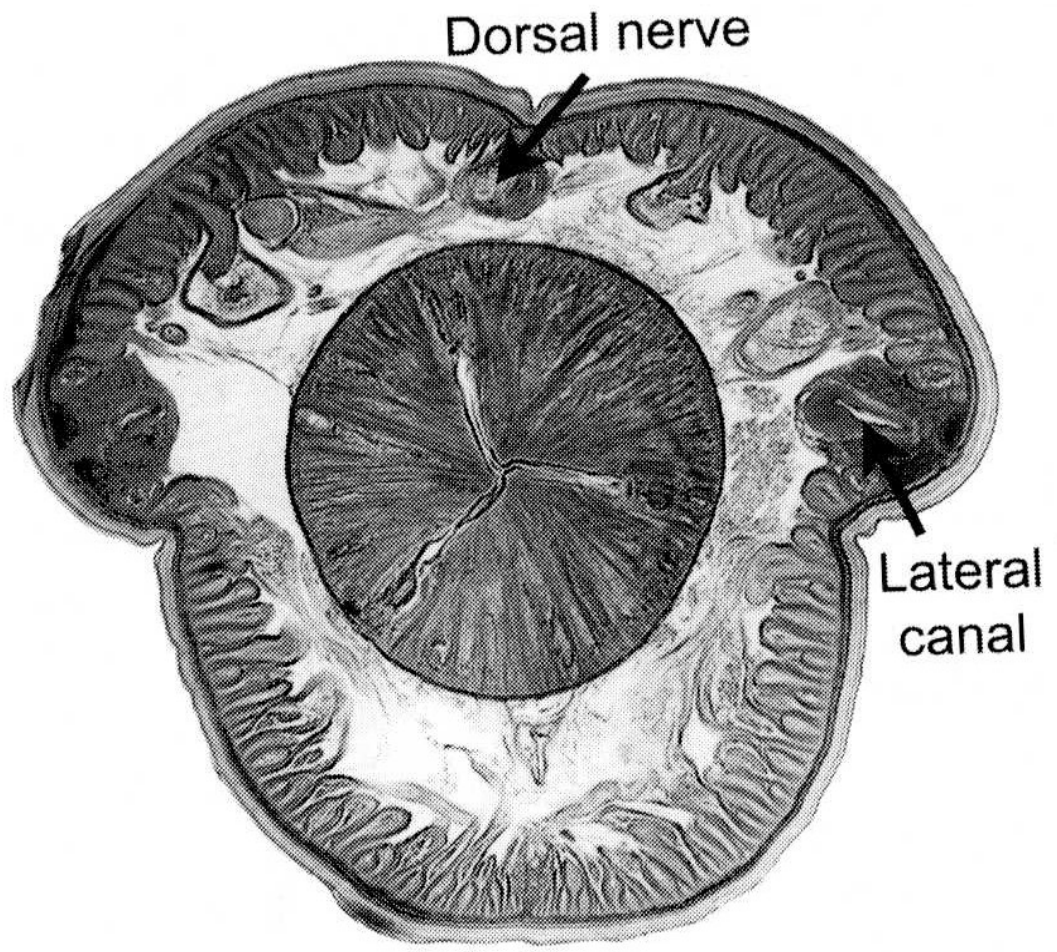
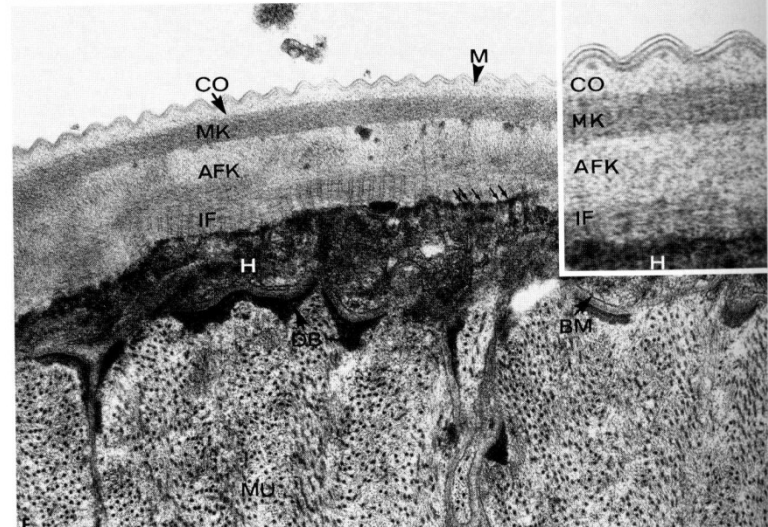
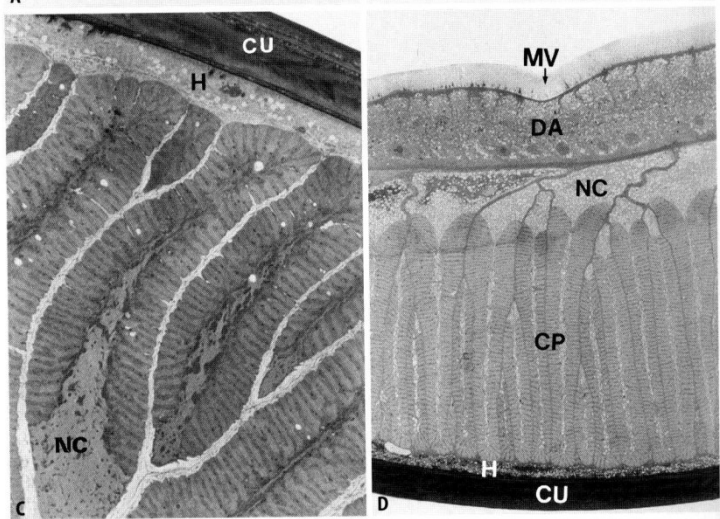
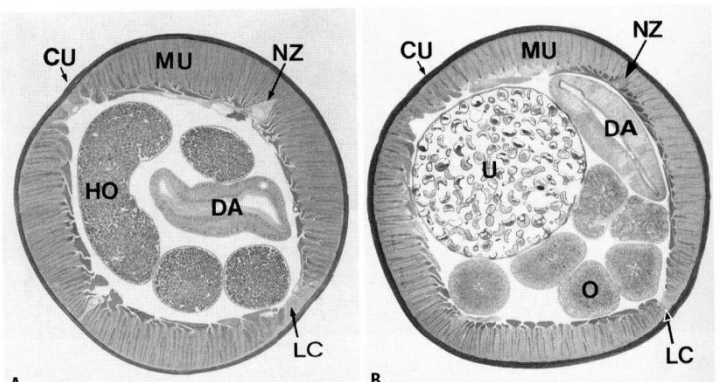


FIGURE 15-8

Nematode nervous system.

(a) Anterior end. (b) Posterior end.

Příčný řez tělem



Propojení SS s nervovou soustavou

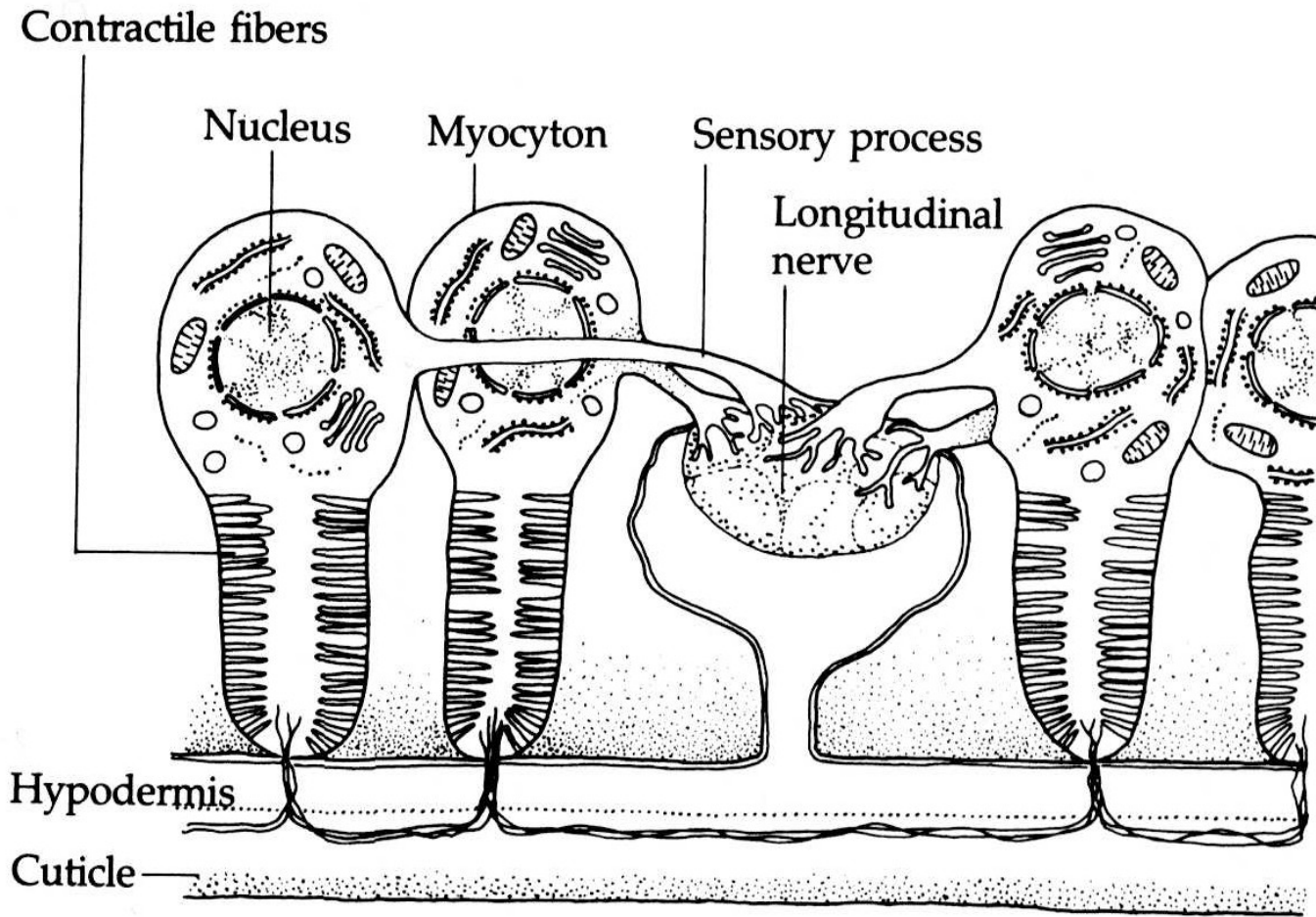
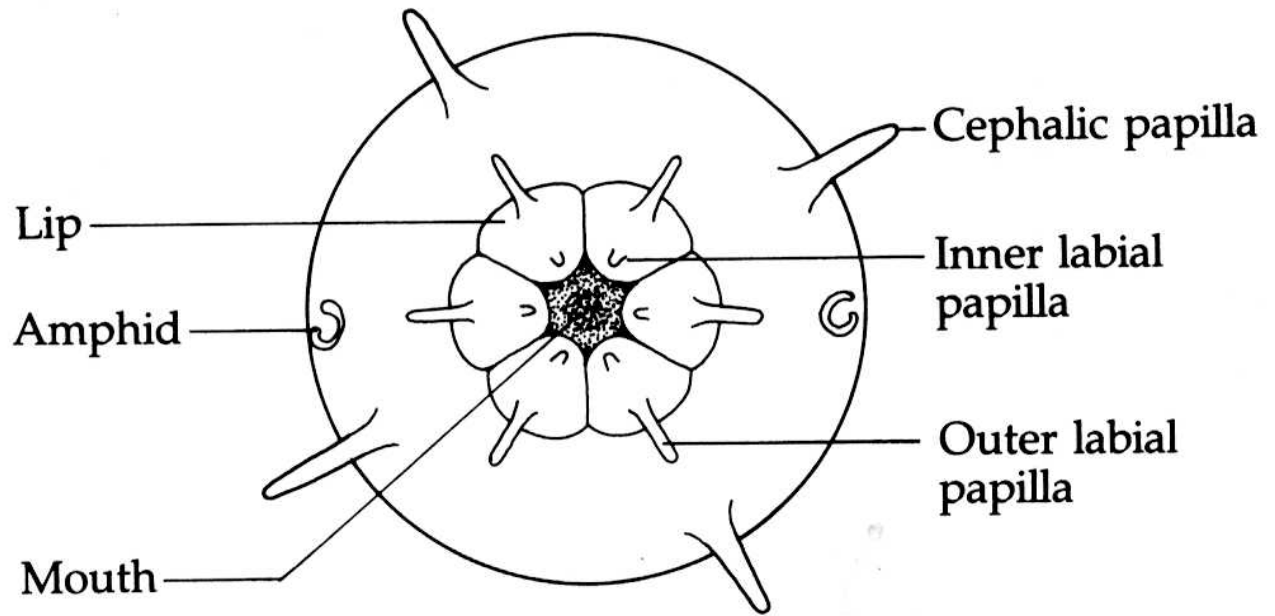


FIGURE 15-6
Arms of four myocytes forming junctions with a nerve.

Smyslové orgány hlístic

FIGURE 15-9
Labial and cephalic papillae.

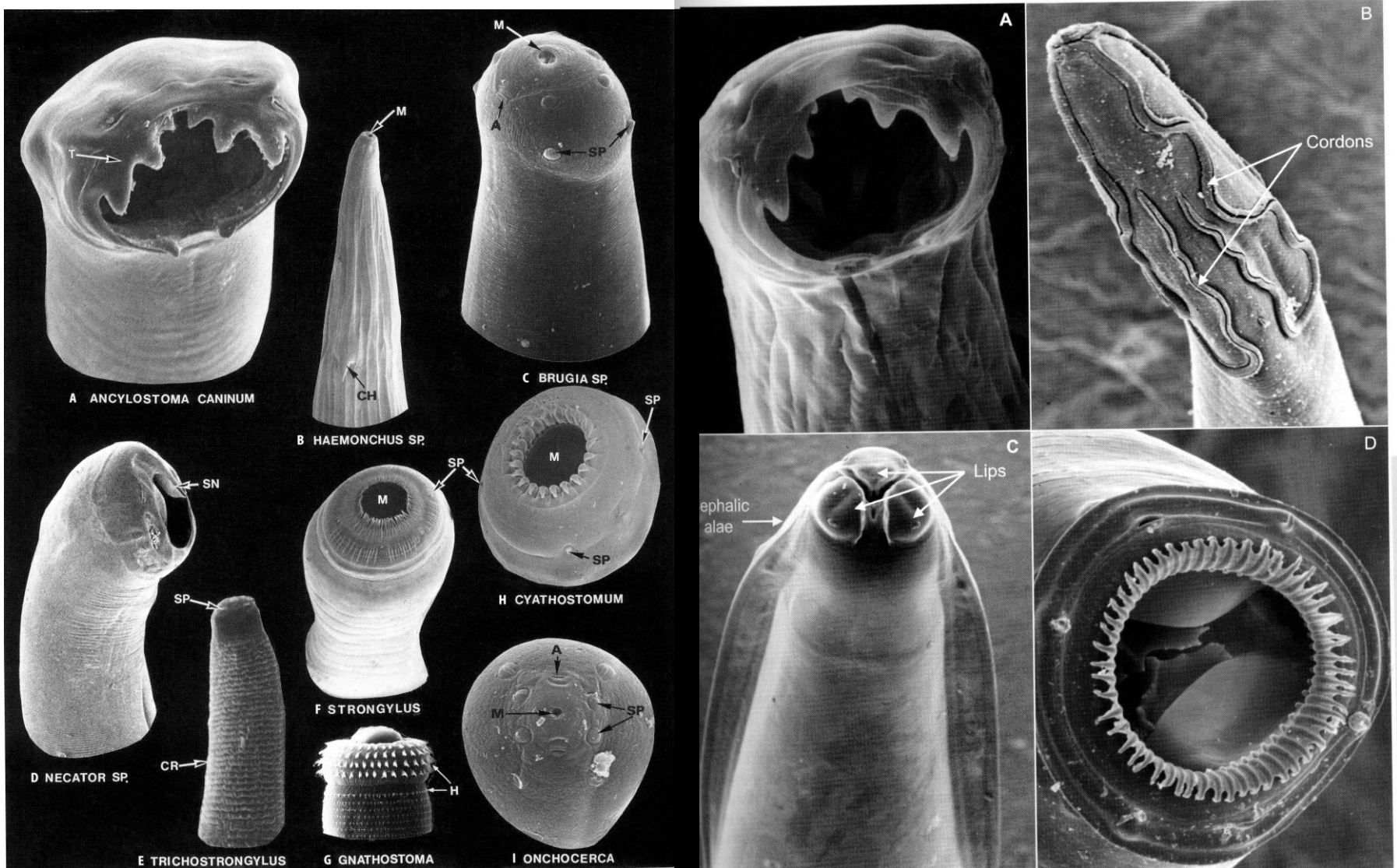
En face view of nematode showing relationship of mouth, lips, amphids, and papillae.



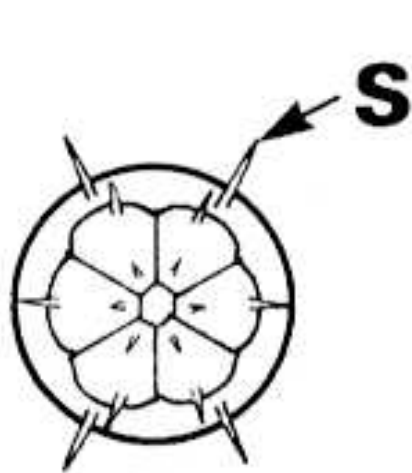
Nematoda – morfologie III

- **Trávicí soustava** – dobře vyvinutá
 - **Ústní otvor** - na předním konci těla
 - **Ústní aparát** – ústní kapsula, papily, pysky, trny, zuby nebo sklerity
 - **Jícen** (oesophagus) žlaznatý a svalnatý – typy: dorylamoidní, oxyuroidní, rhabditoidní – bulbus – změna během ontogeneze
 - Trubicovité **střevo** – **anální otvor**
- **Vylučovací soustava** – **exkreční buňky** (renety) – **exkreční kanálky** (chordy) – **exkreční sinus** ústící na povrch – morfologické typy – „U“ „H“

Typy předního konce těla hlístic



Organizace ústního otvoru



6 pysků

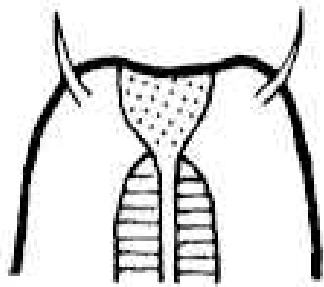


3 pysky

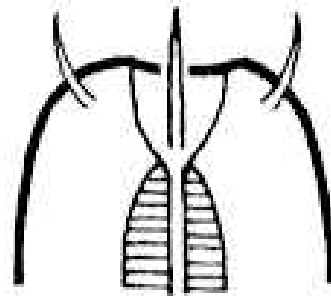


Bez pysků

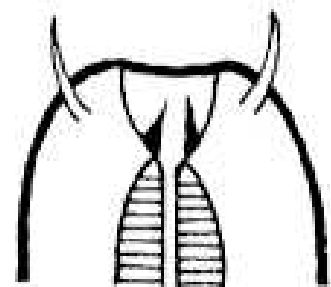
Organizace ústní dutiny



Neozbrojený

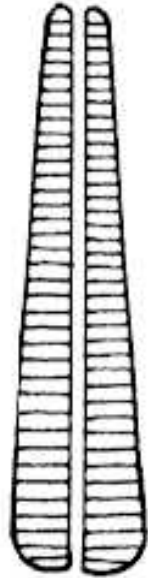


Stylet

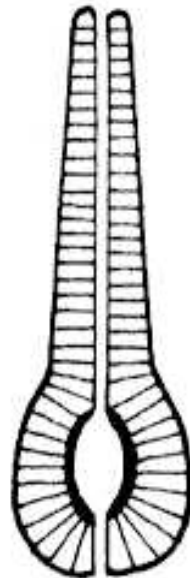


Zuby

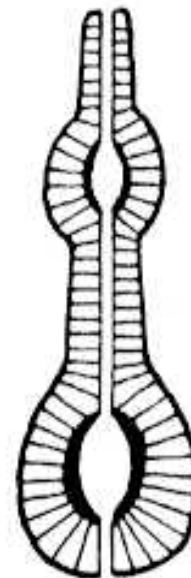
Morfotypy svalnatého jícnu



Nedělený

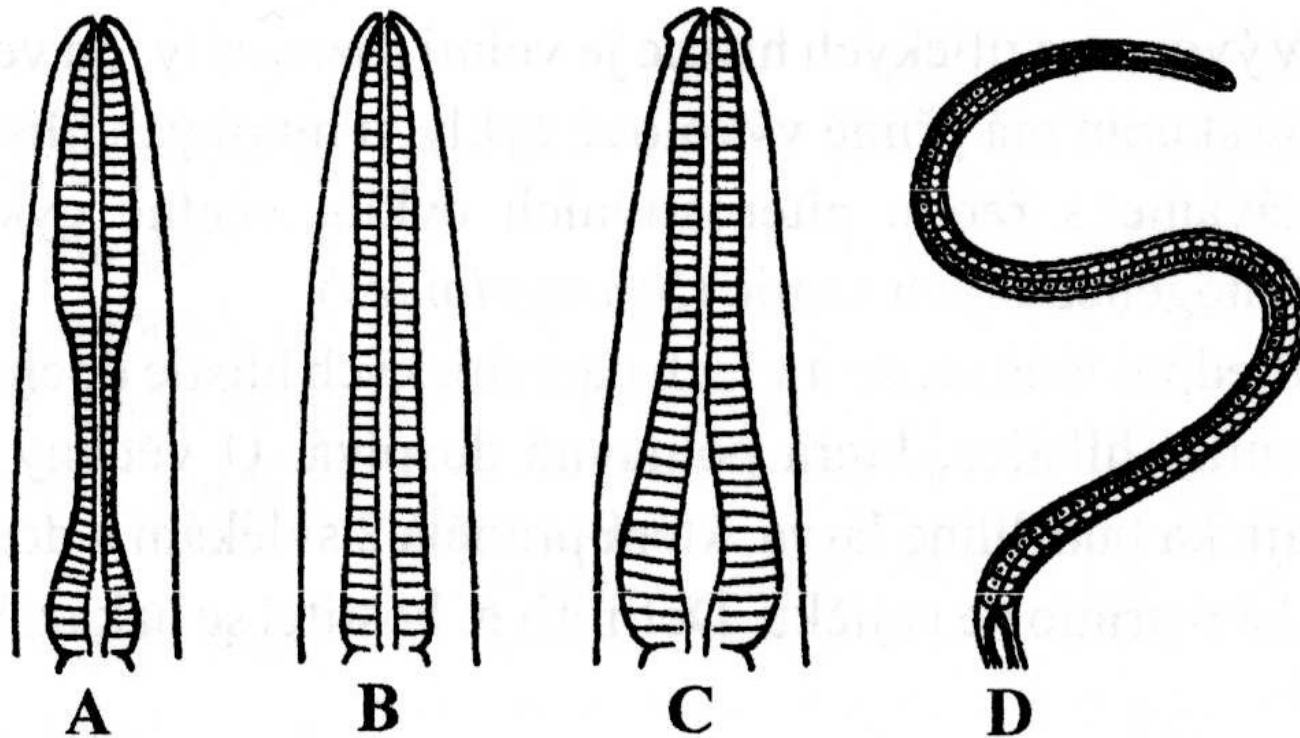


Bulbus



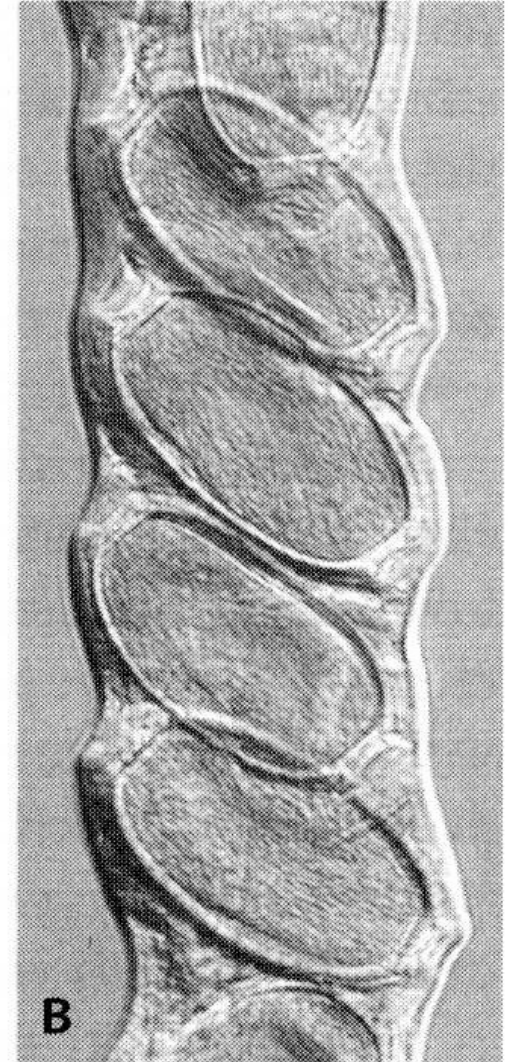
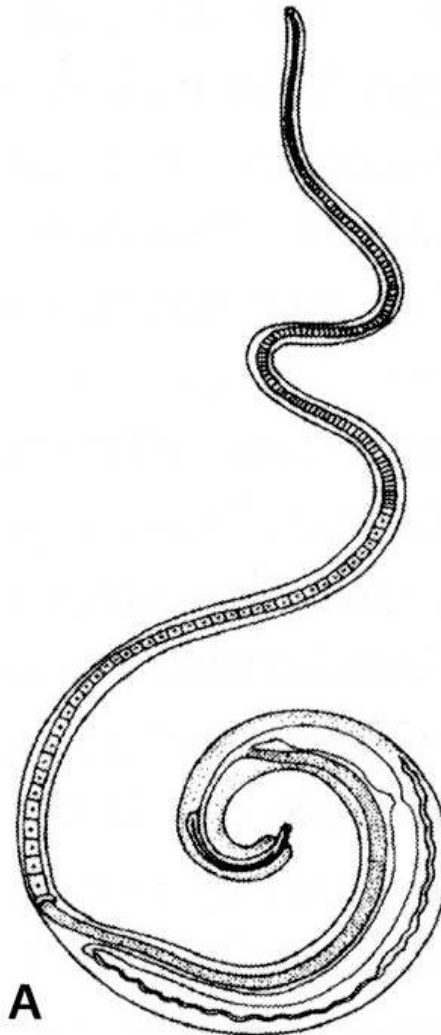
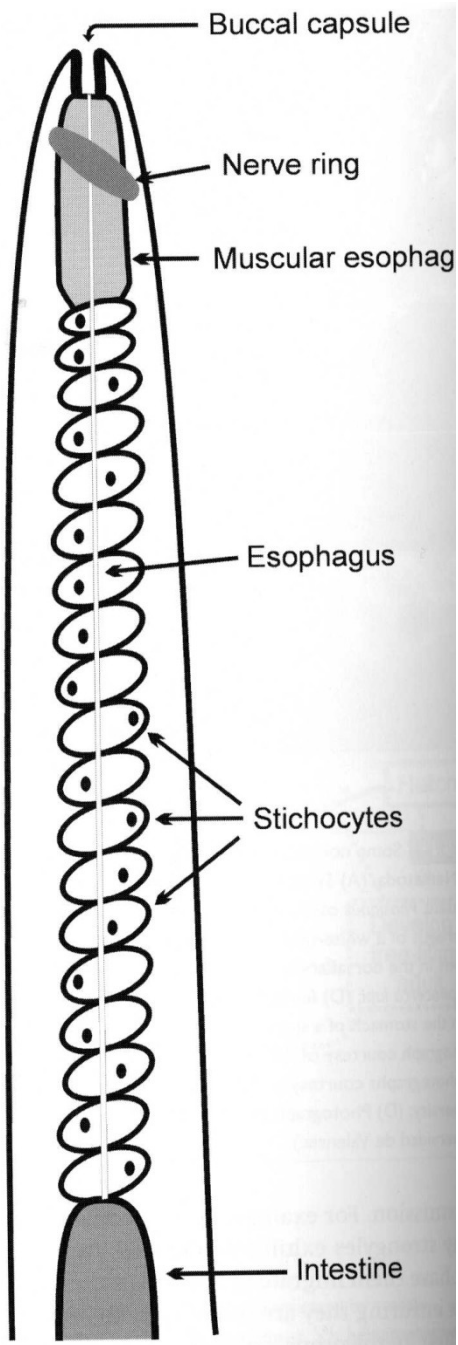
2 Bulby

Terminologie morfotypů jícnu



Obr. 68. Základní typy jícnu hlístic (Hiepe 1985, upraveno)
A-rhabditoidní (rhabditiformní); B-strongyloidní (filariformní);
C-oxyuroidní; D-trichuroidní.

Jícen se stichocyty



Systematický význam tvaru jícnu

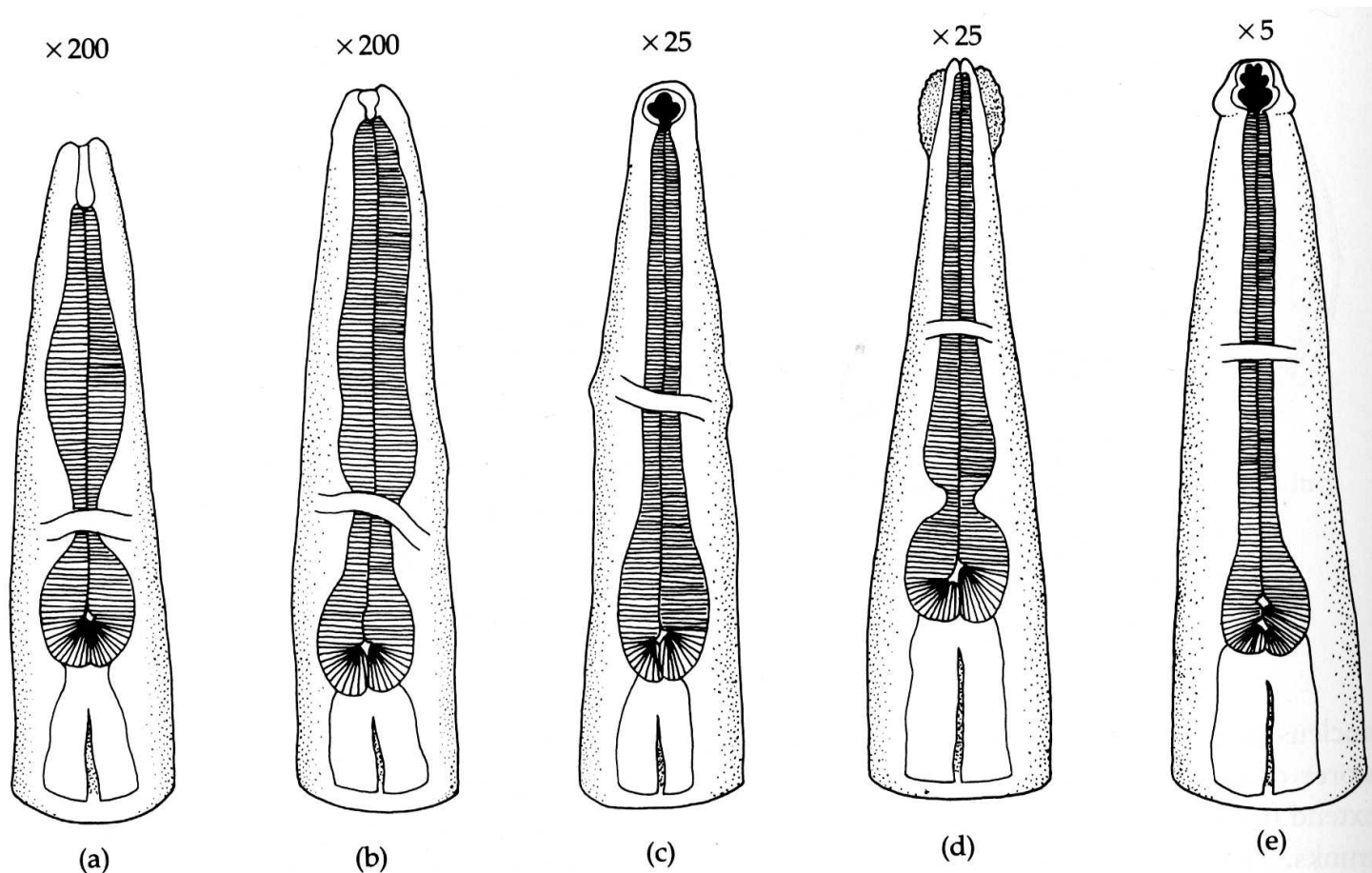


FIGURE 15-7

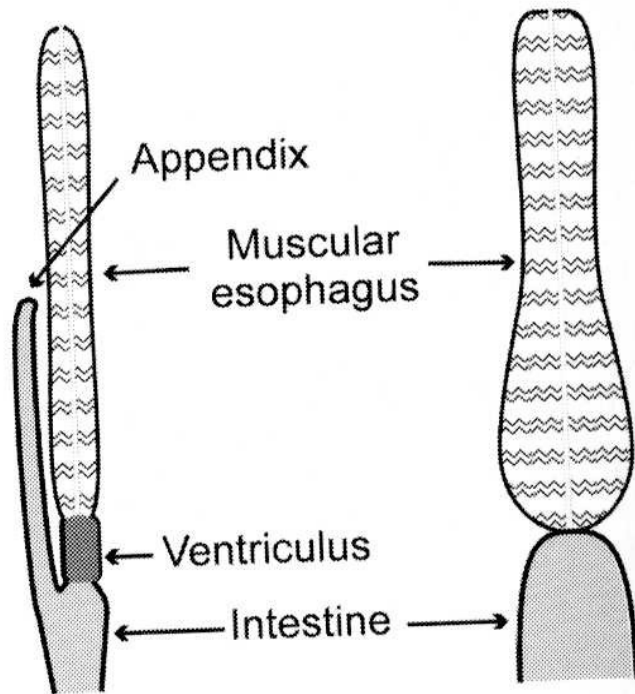
Variations in foregut of some nematodes.

(a) *Rhabditis hominus*. (b) *Strongyloides stercoralis*. (c) *Ancylostoma duodenale*. (d) *Enterobius vermicularis*. (e) *Ascaris lumbricoides*.

Typy napojení jícnu na střevo

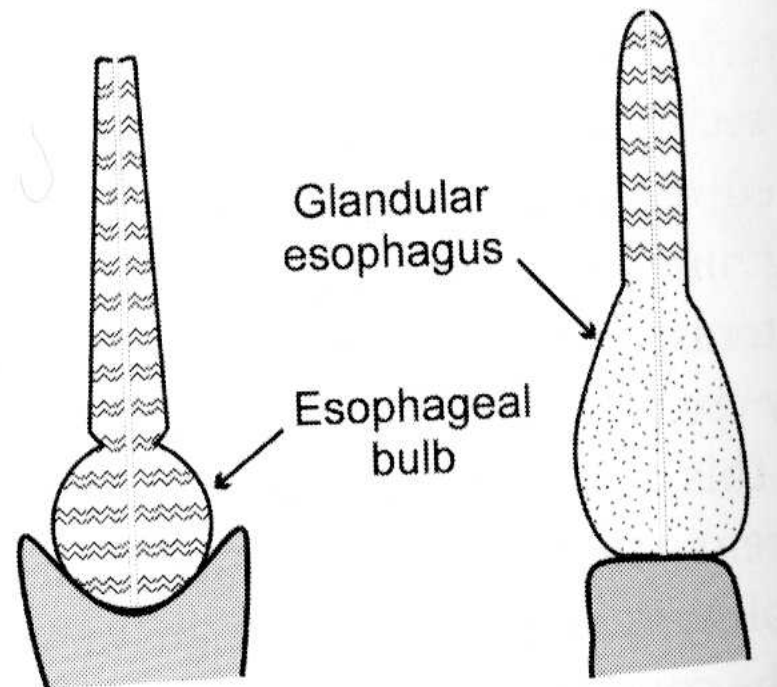
Ascaridida

Strongylida



Oxyurida

Spirurida



Napojení jícnu na střevo

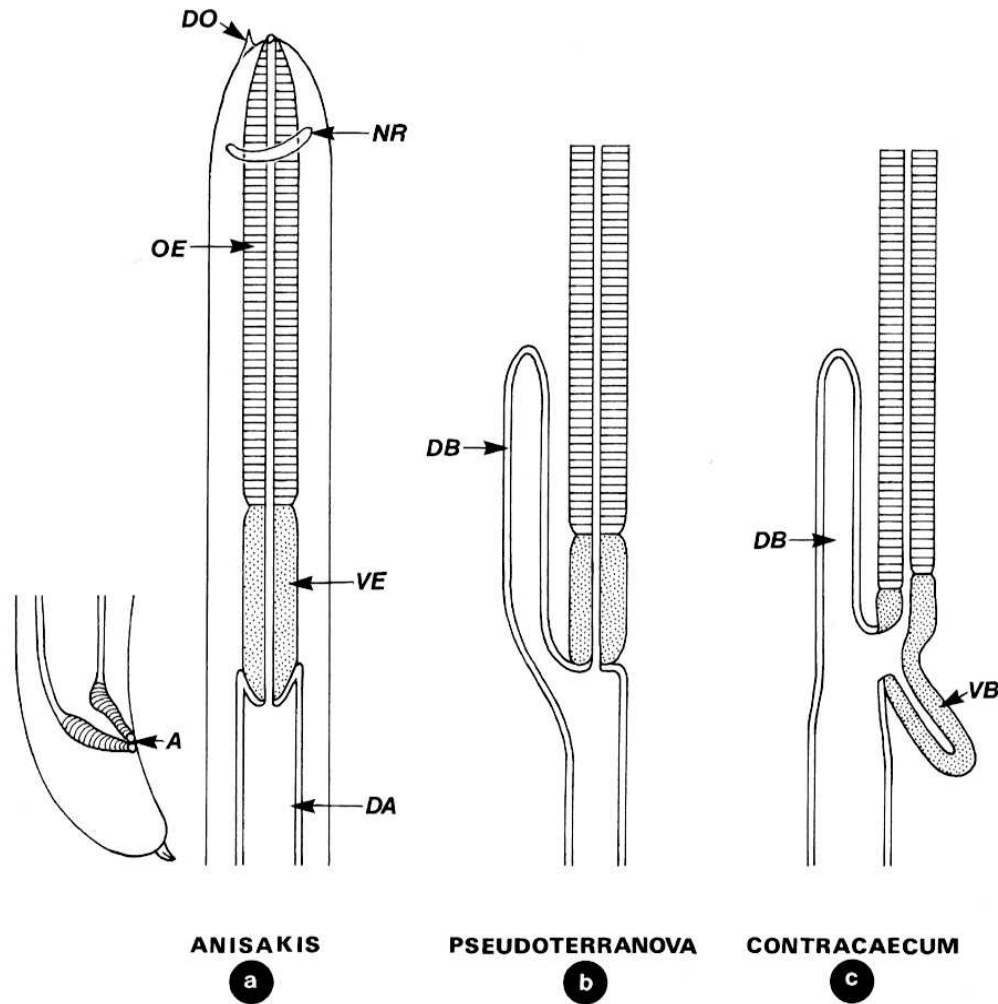


Fig. 2. Schematic representation of diagnostically useful intestinal features of human pathogenic marine ascarids (a-c). A, anus; DA, intestine; DB, intestinal enlargement; DO, thorn; NR, nerve ring; OE, esophagus; VB, enlarge-

Vylučovací soustava hlístic

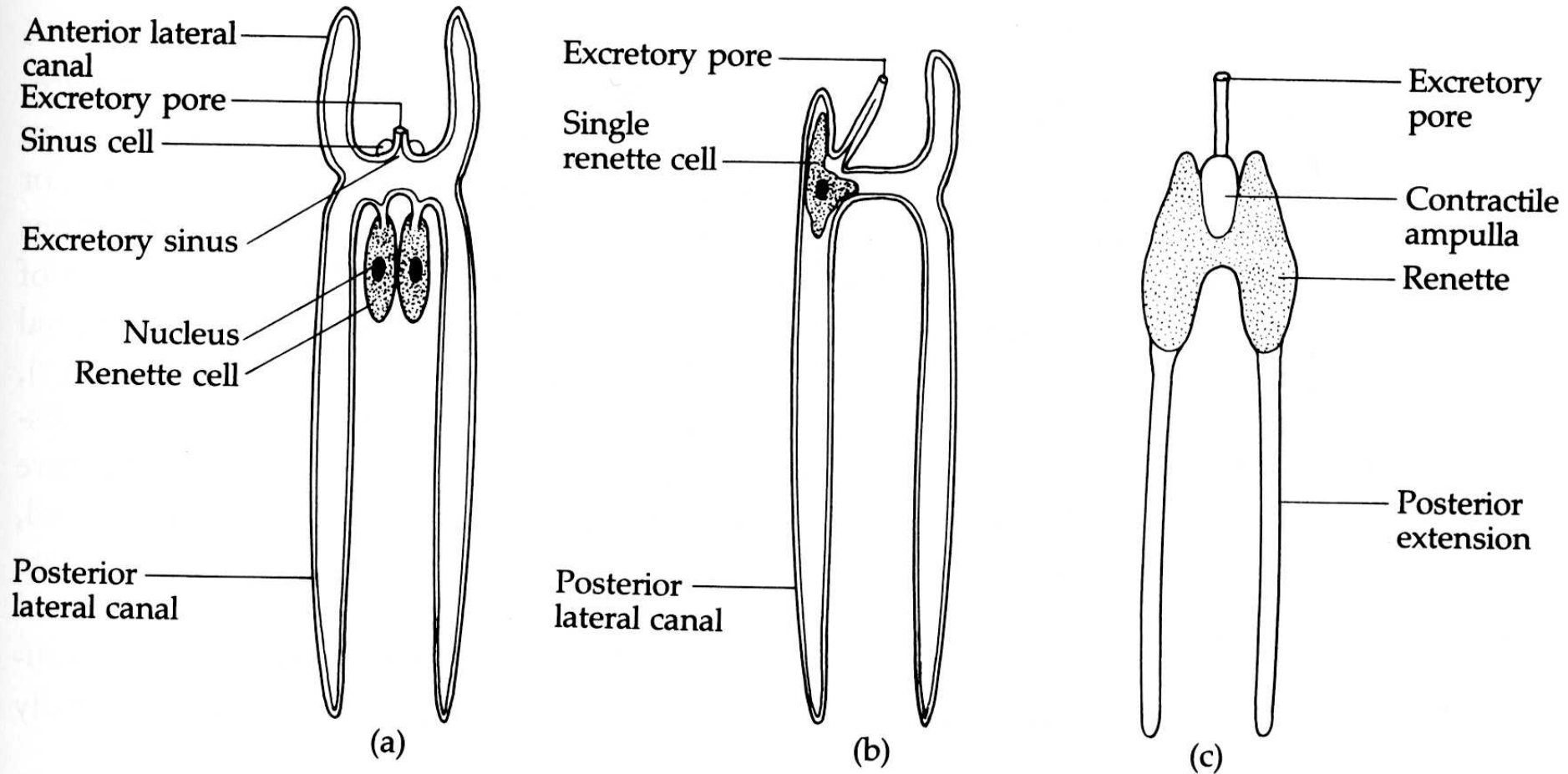


FIGURE 15-10

Nematode excretory systems.

(a) Rhabditoid type. (b) Ascaroid type. (c) Juvenile *Ancylostoma*.

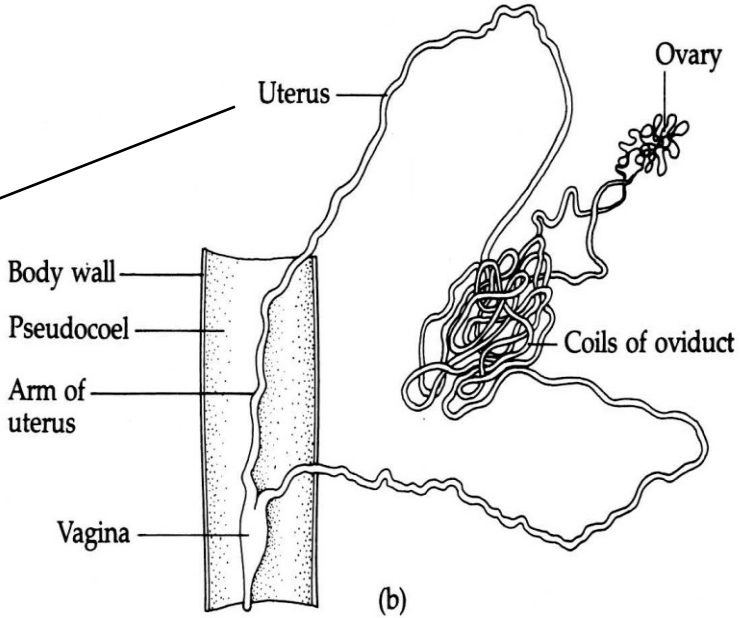
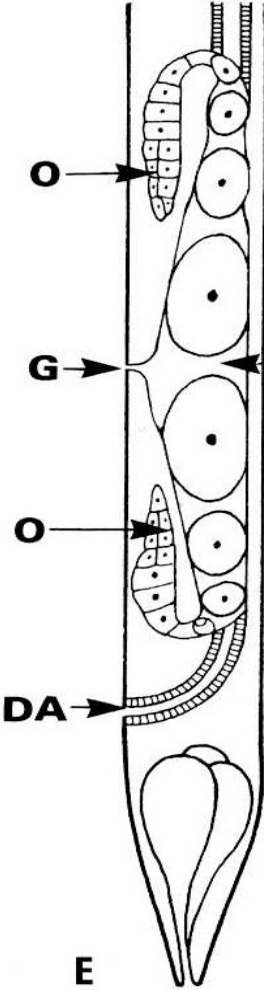
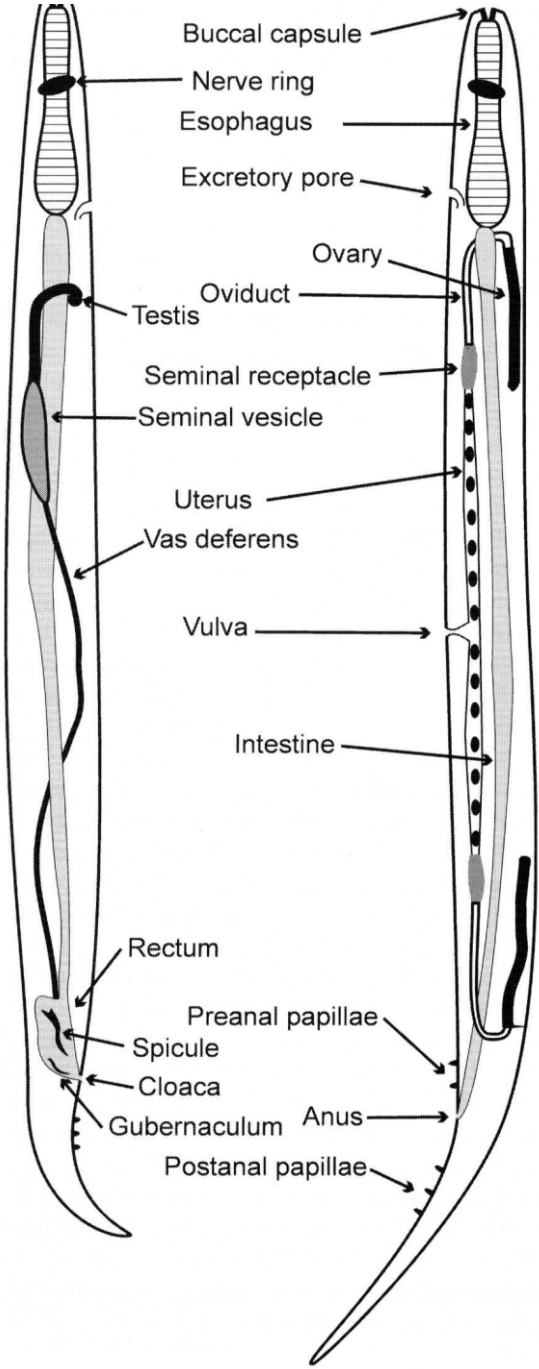
Nematoda – morfologie IV

- **Pohlavní soustava** – dobře vyvinuta
- **Gonochoristi**
- Partenogenetické generace a hermafroditi (u některých skupin)
- Většina hlístic – **oviparie**, méně často **ovoviviparie** (L1 se rodí v děloze samice)

- **Samičí soustava** – většinou 2 vaječníky – trubicovitá děloha - svalnatá vagina (vajíčka) - vulva ústící na porch těla

- **Samčí soustava** – nepárové varle – velká a malá ejakulární žláza a kloaka, zadní konec těla samce – bursa copulatrix – morfologie - žebra, papily – spikuly – gubernakulum (telamon)

Samičí pohlavní soustava



Vajíčka hlístic

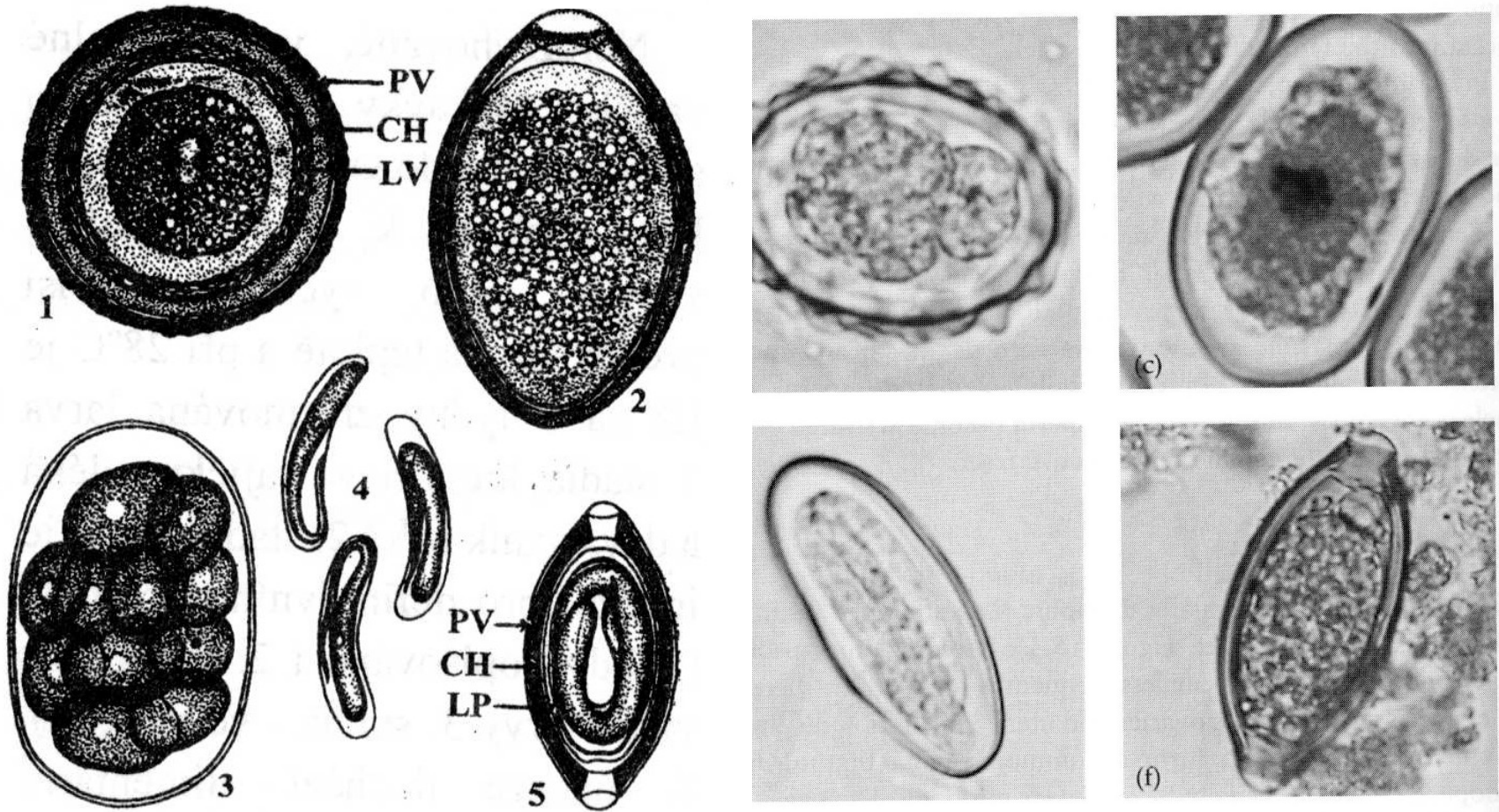
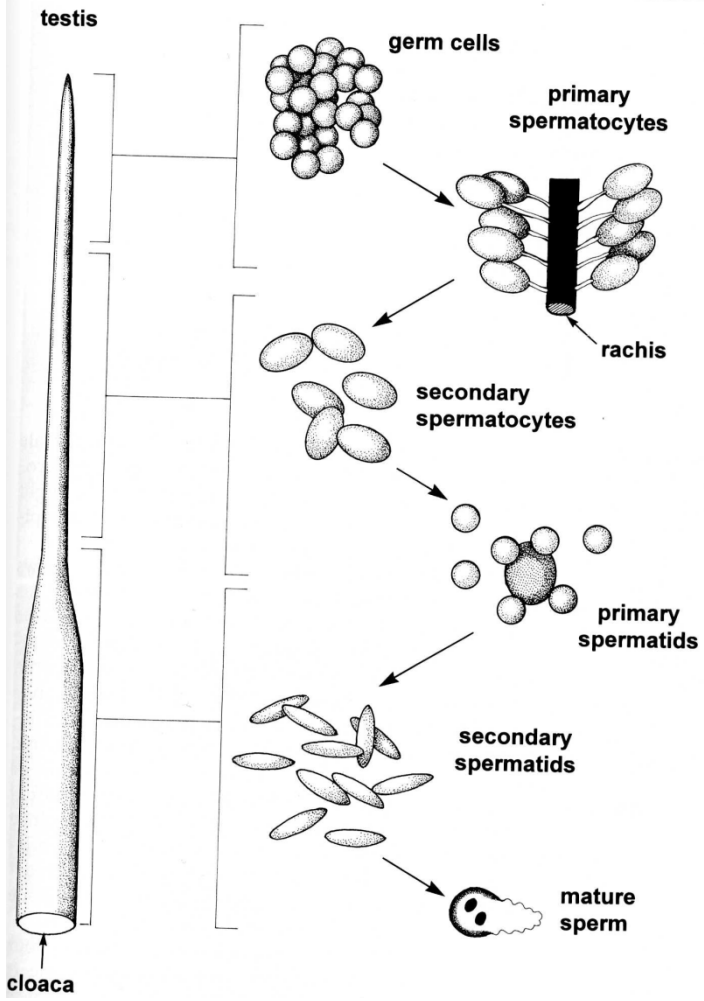
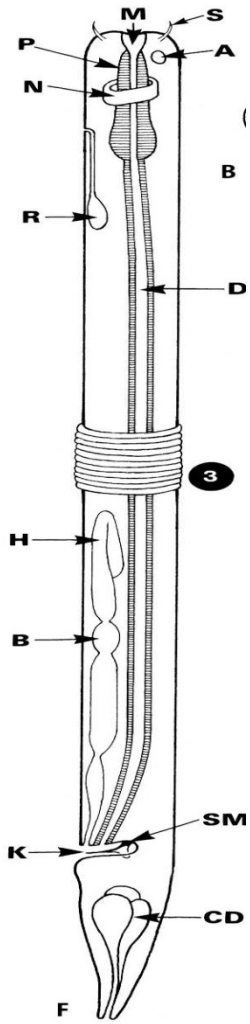
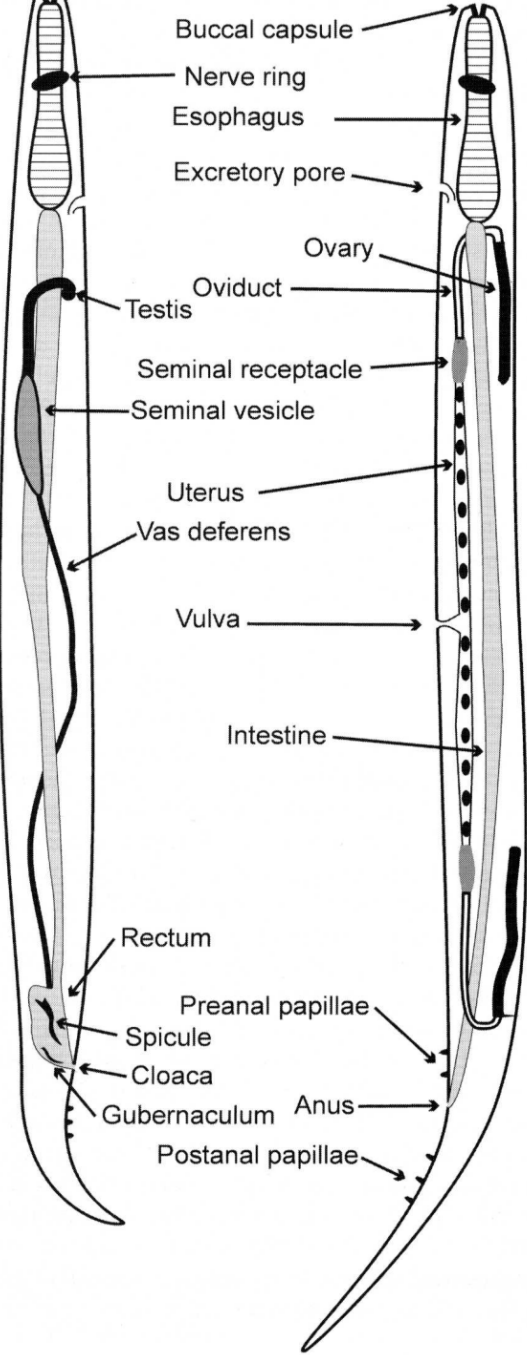


FIGURE 15-15

Some nematode eggs and larvae.

(a) *Strongyloides stercoralis* rhabditiform larva. (b) *Ascaris lumbricoides* normal fertilized egg with developing larva. (c) *Ascaris lumbricoides* unfertilized egg. (d) Hookworm egg. (e) *Enterobius vermicularis* egg. (f) *Trichuris trichiura* egg.

Samčí pohlavní soustava



Spermiogeneze hlístic

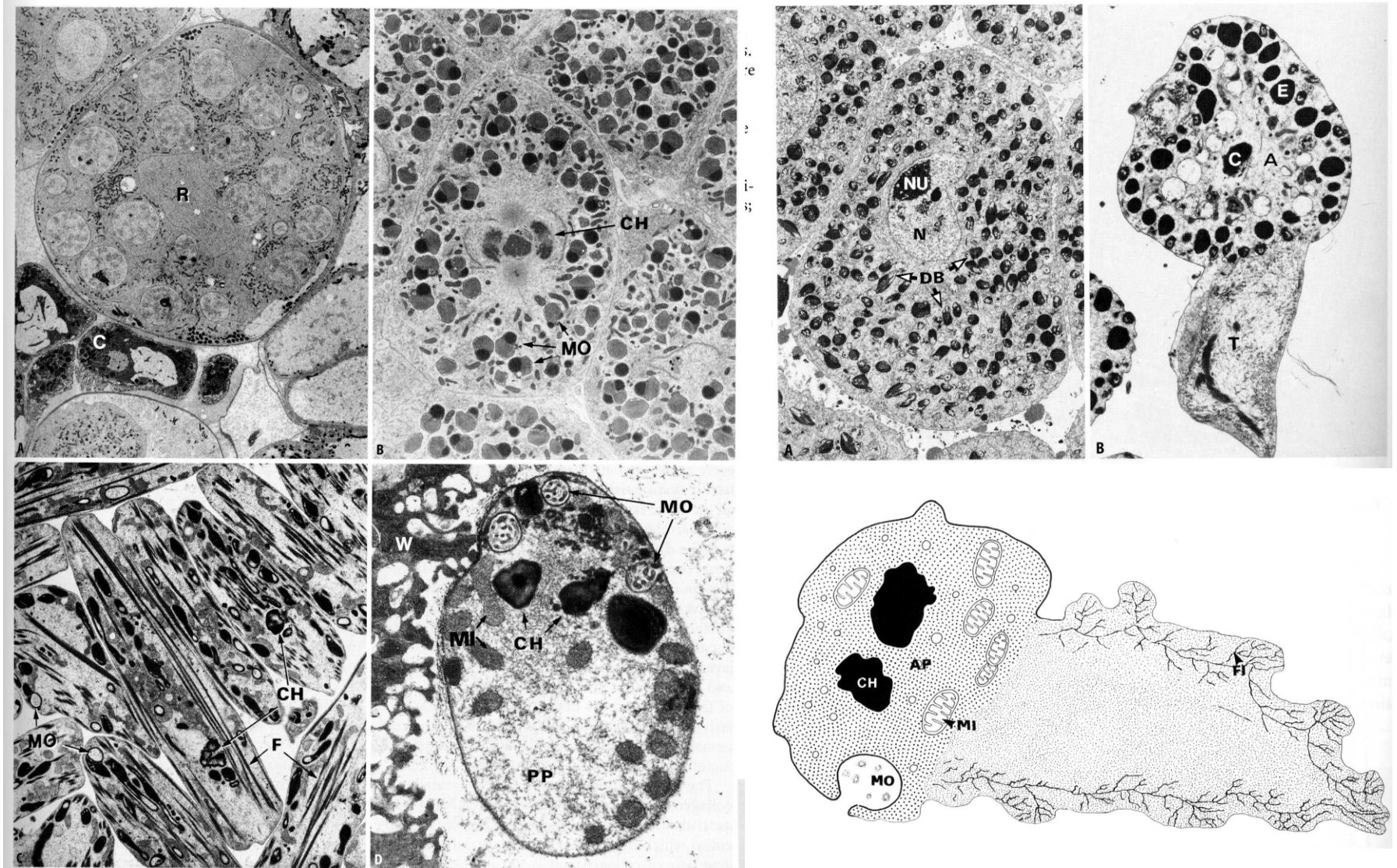


Fig. 5 A-D. Spermatogenesis. A Cross section through the germinal zone of the testis of → *Heterakis spumosa*. x 1.400. C,

Schéma spermie

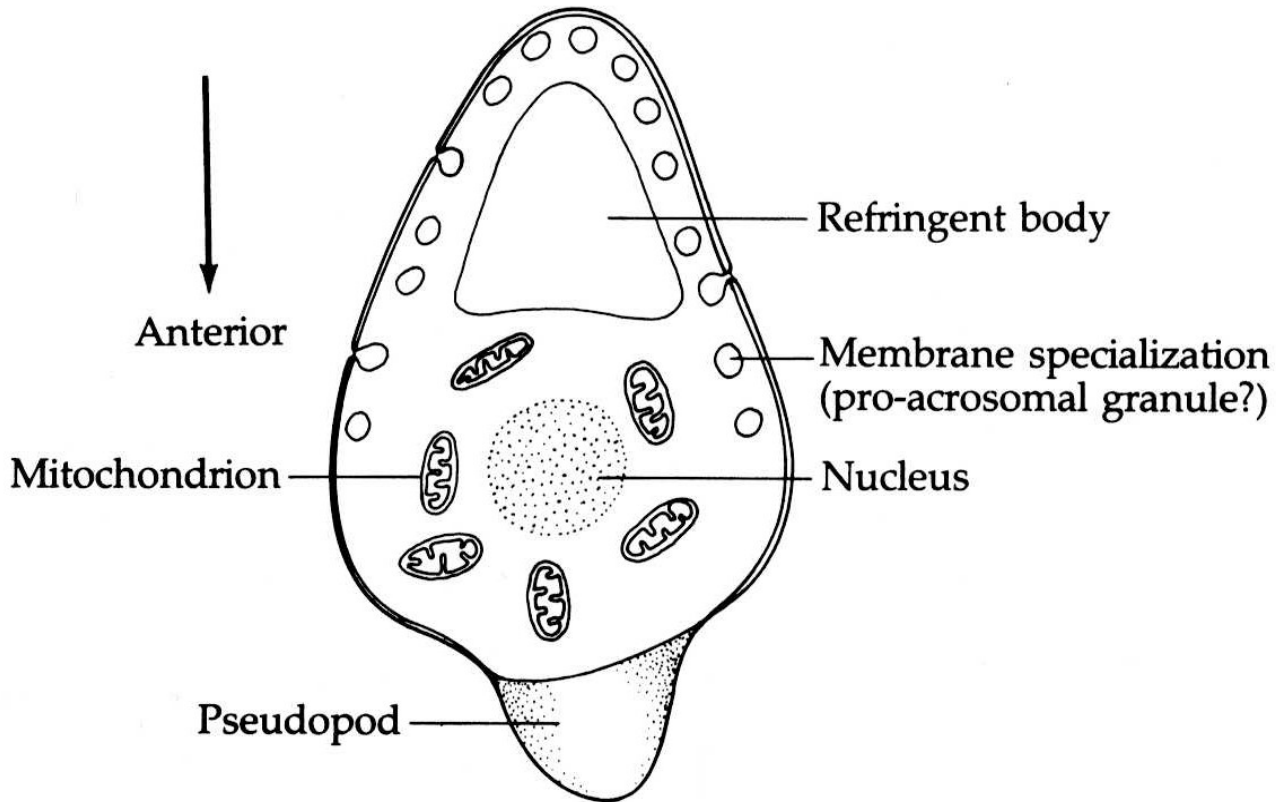
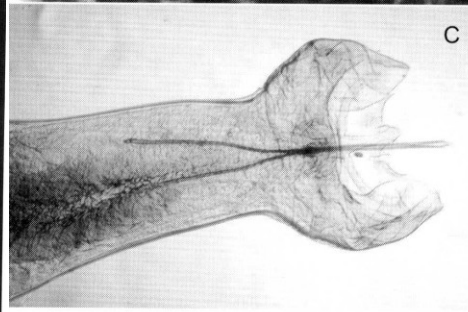
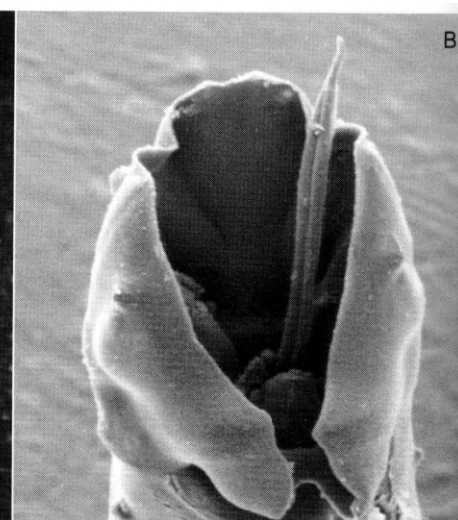
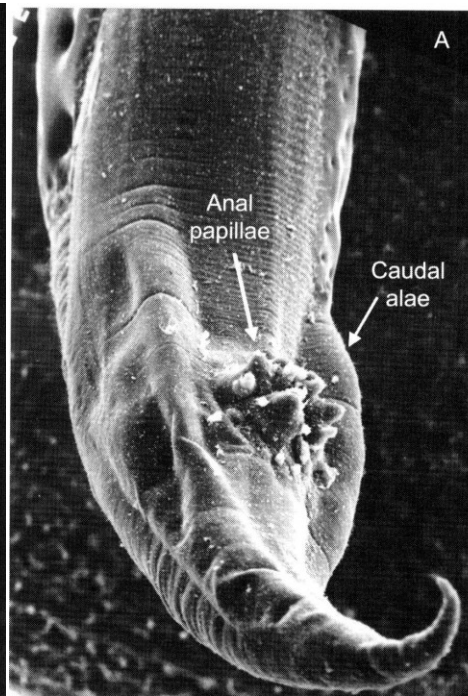
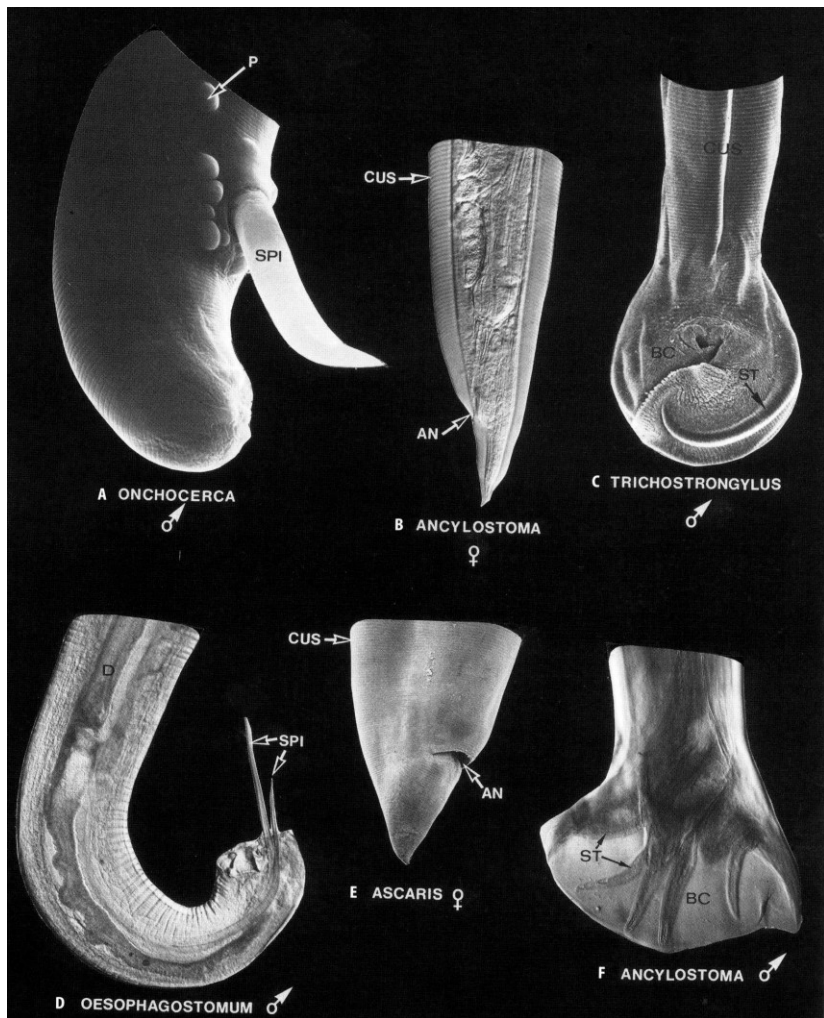
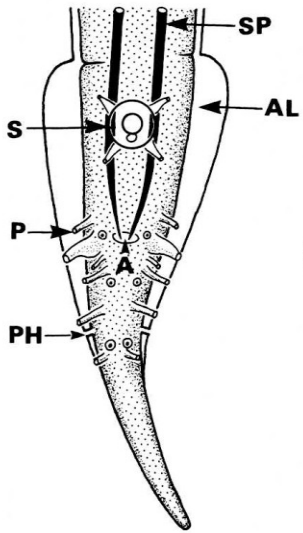


FIGURE 15-12
A generalized
diagram of a
nematode sperm.

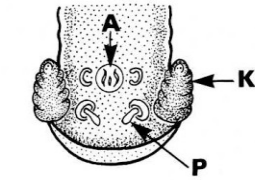
Morfologie zadního konce těla samce



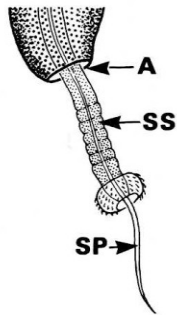
Morfologie zadního konce těla samce



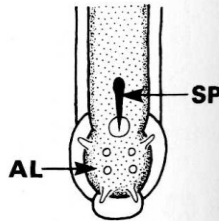
A *HETERAKIS*



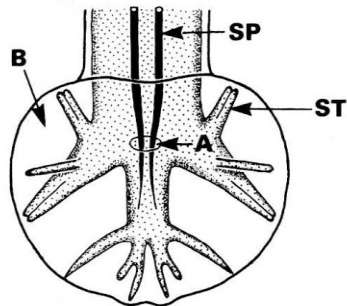
B *TRICHINELLA*



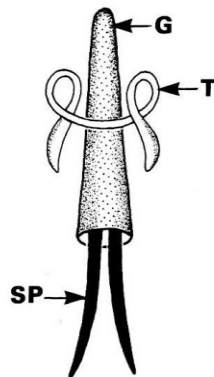
C *TRICHURIS*



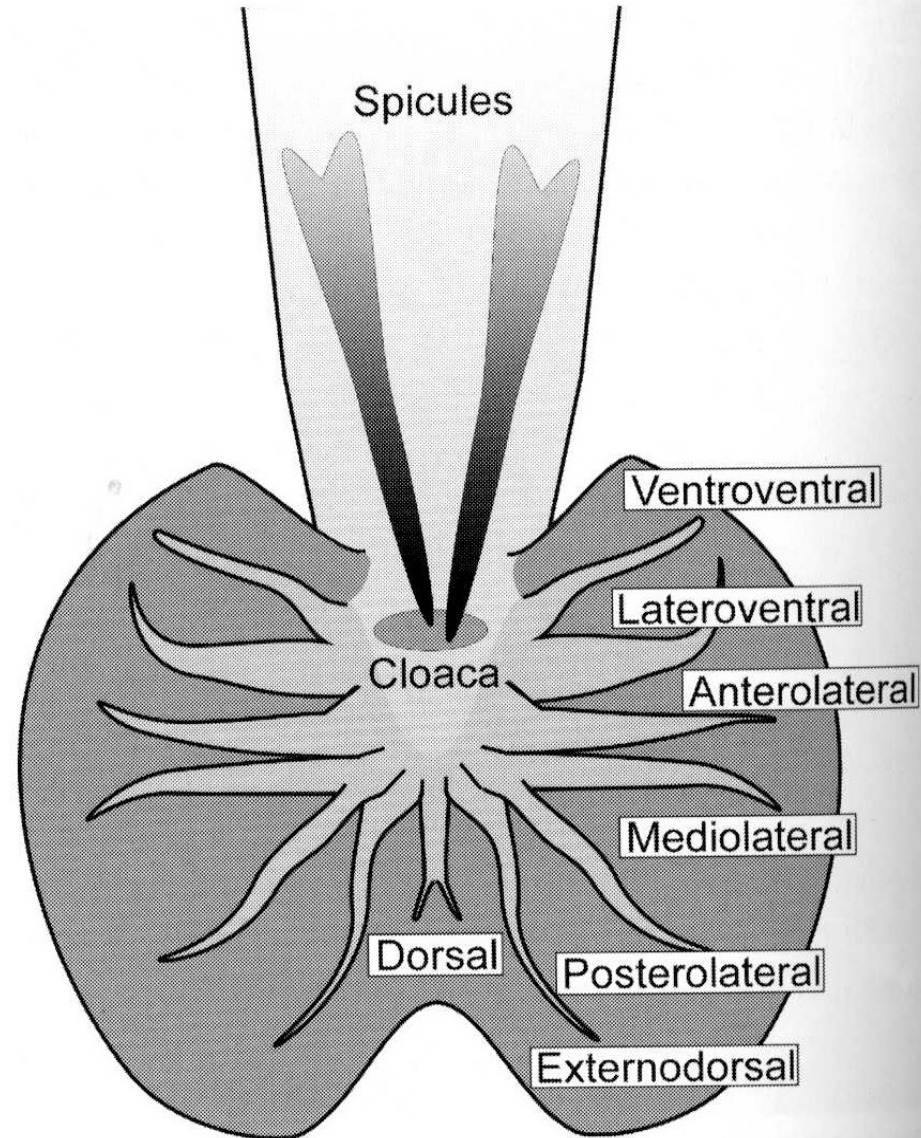
D *ENTEROBIUS*



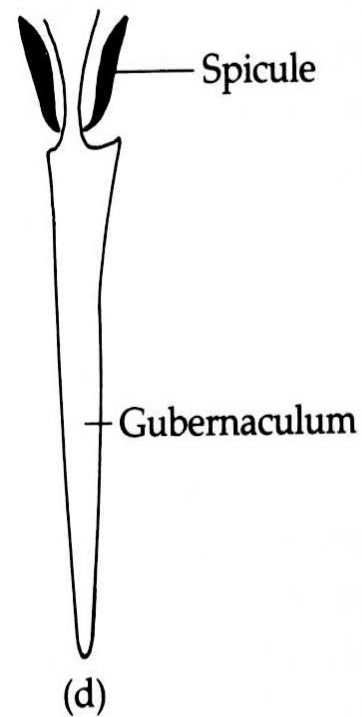
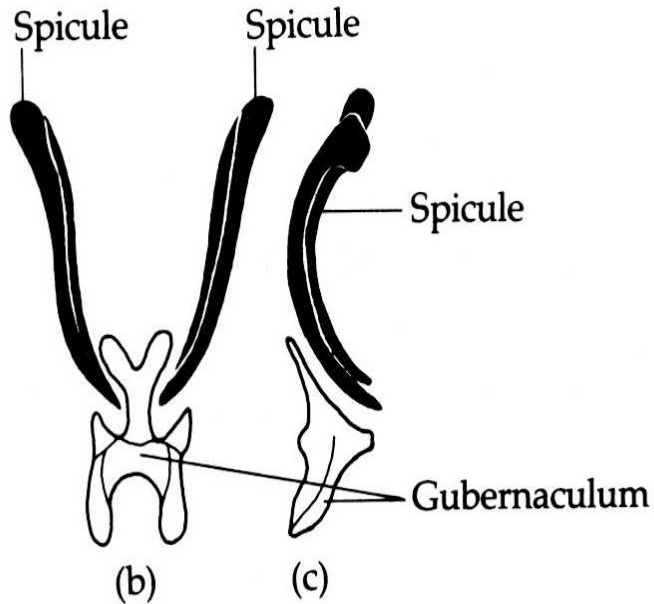
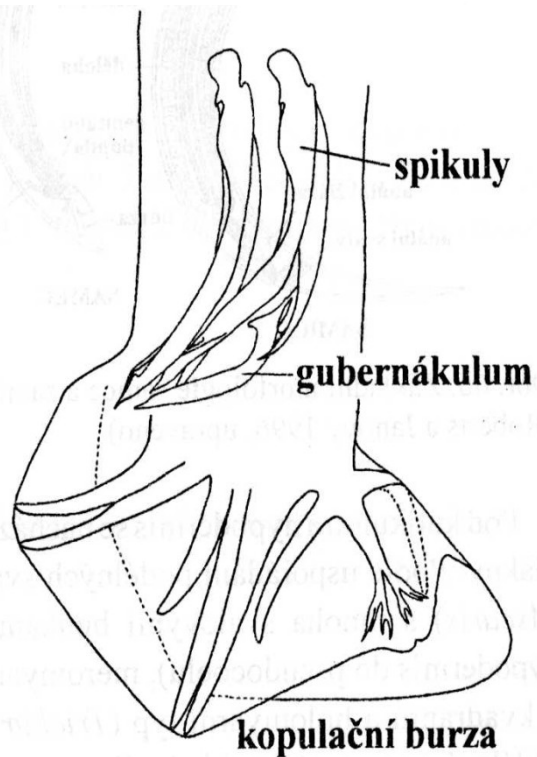
E *OESOPHAGOSTOMUM*



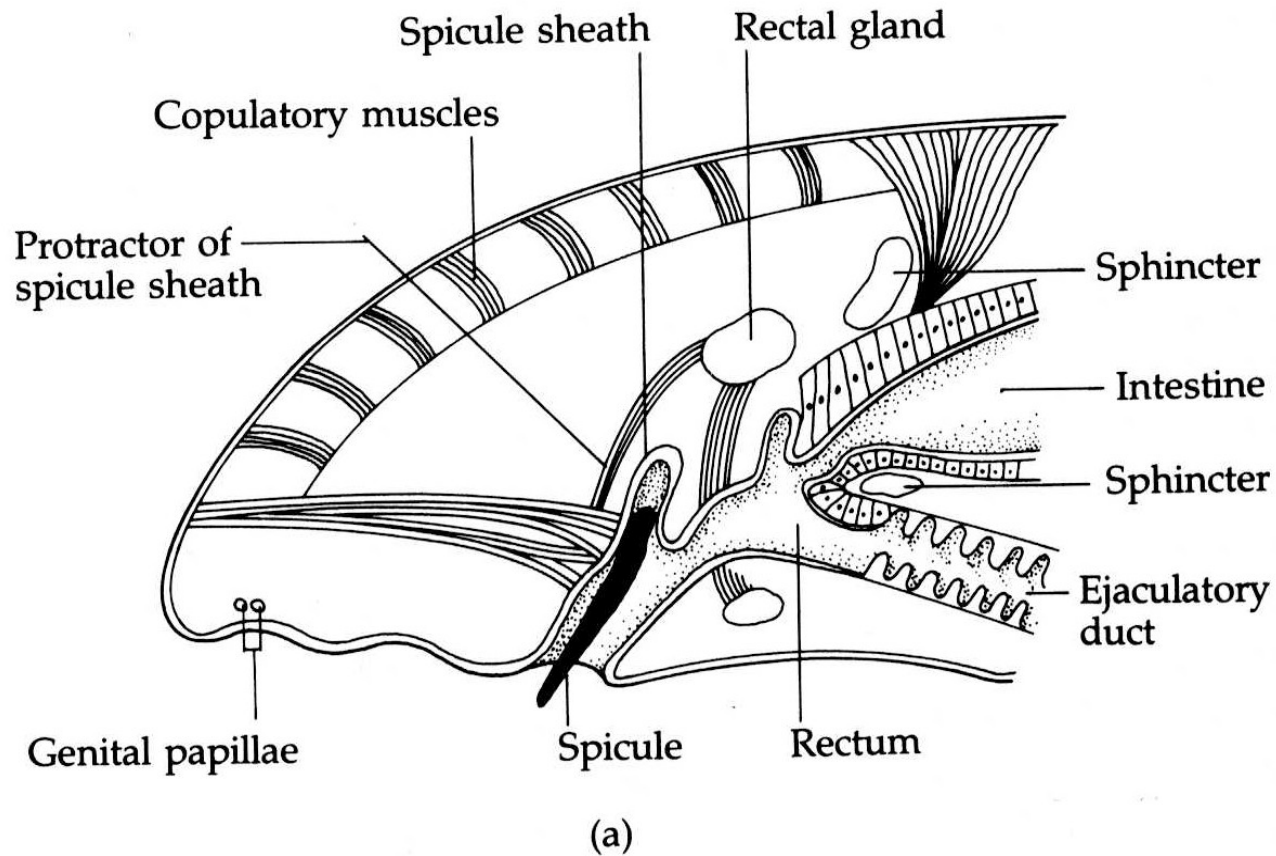
F



Spikuly a gubernakum



Funkce spikul a gubernakula



Nematoda - vývoj

- Životní cykly **přímé** x **nepřímé**
- Často alternativní střídání generací
- Sexuální generace x partenogenetické
- Geohelminti x biohelminti
- Většina prodělává čtvero svlékání (L1, L2, L3 a L4)

- **Geohelminti** – vajíčko – larva (2 svlékání) –
invazní larva L3 – do DH proniká: 1) perorálně (kontaminace potravy, vody)
2) perkutánně – aktivně přes pokožku

Velký význam paratenických hostitelů

- **Biohelminti** – alespoň jeden mezihostitel zde se vyvíjí L3
Mezihostitelé – kroužkovci, korýši, měkkýši, hmyz apod.

Význam paratenických, postcyklických, paradefinitivních a dalších typů fakultativních hostitelů

Schéma vývoje a růstu nematodů

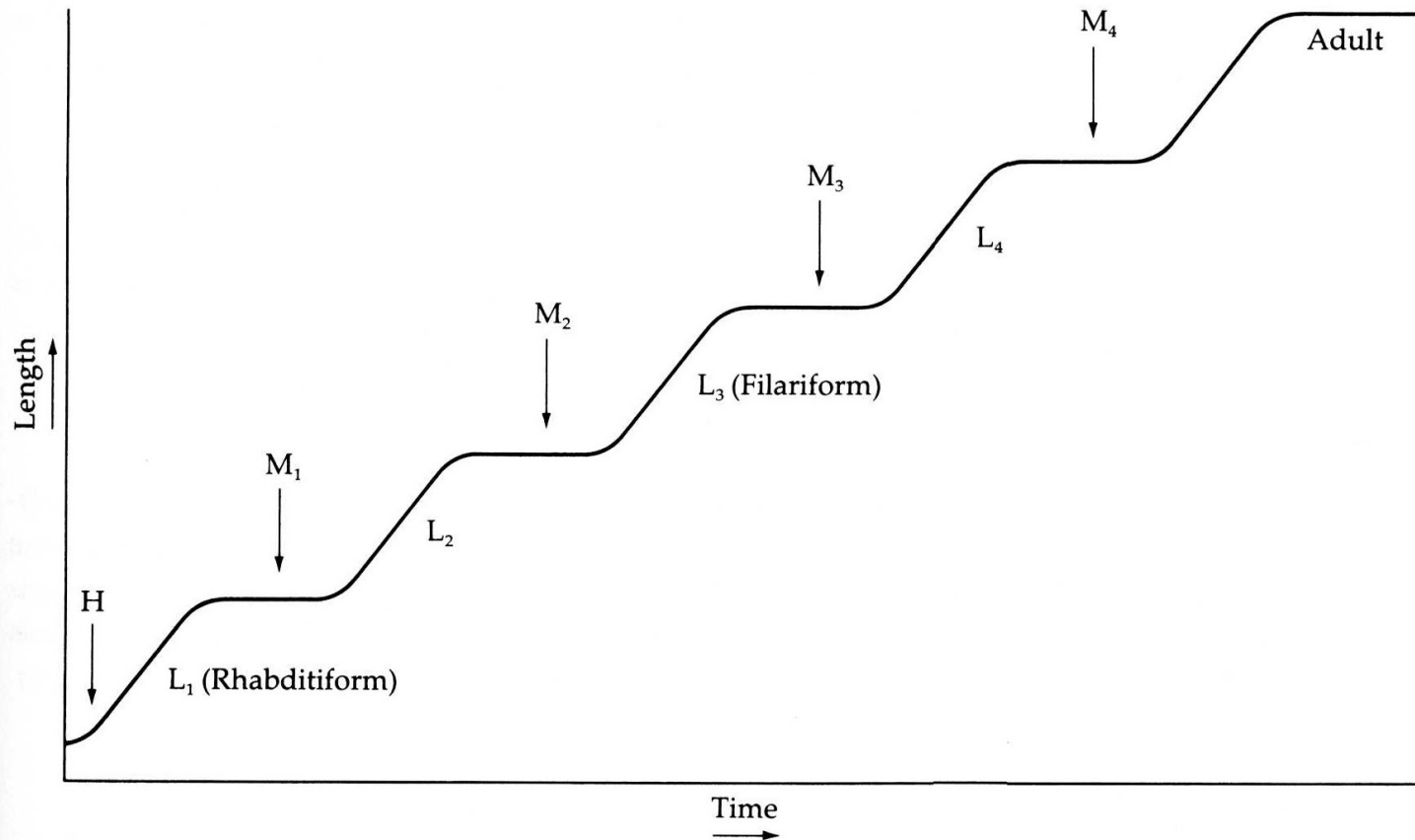


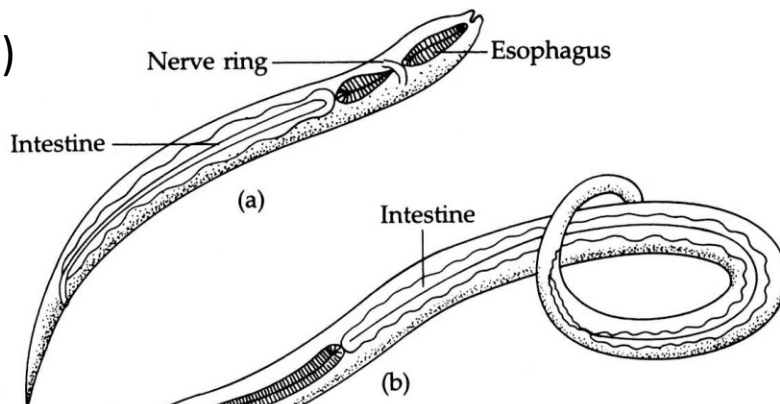
FIGURE 15-14

Nematode growth pattern.

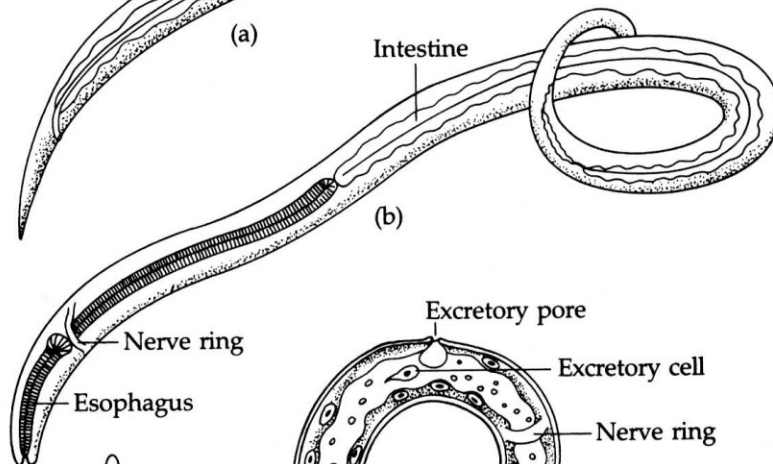
H, hatch; M, molt; L, larva.

Larvální stádia nematodů

Rhabditiformní (L1)



Filariformní (L3)



Mikrofilarie

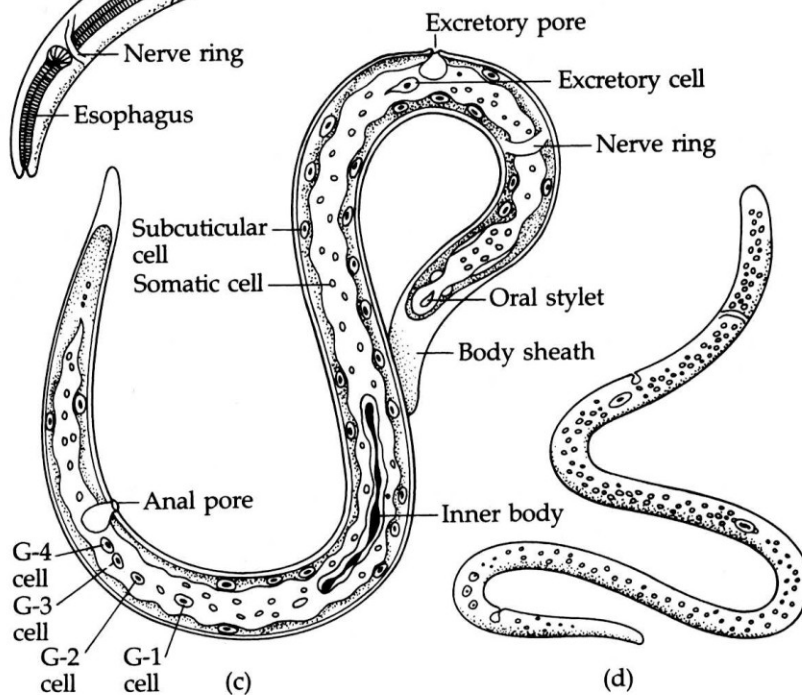


FIGURE 15-15
Nematode larvae.
(a) Rhabditiform larva. (b) Filariform larva. (c) Sheathed filariform larva of *Wuchereria*. (d) Unsheathed microfilaria of *Onchocerca*.

Vývojové cykly vybraných zástupců

- **Přímé vývojové cykly**

- **Trichinella spiralis** – zjednodušení cyklu – DH plní zároveň roli meziphostitele
- **Ascaris lumbricoides** – složitá migrace larev L3 – nahrazuje část cyklu v chybějícím meziphostiteli
- **Strongyloides stercoralis** – existence dvou fází VC – parazitická generace (endogenní, partenogenetická) x volně žijící (exogenní, gonochoristická)

- **Nepřímé vývojové cykly**

- **Wuchereria bancrofti** – krevsající členovec jako MZ a vektor (L3)
- **Dracunculus medinensis** – vodní prostředí – MZ – buchanka (Copepoda)
– perorální nákaza Mz – do DH opět perorálně

Nematoda - fylogeneze

