

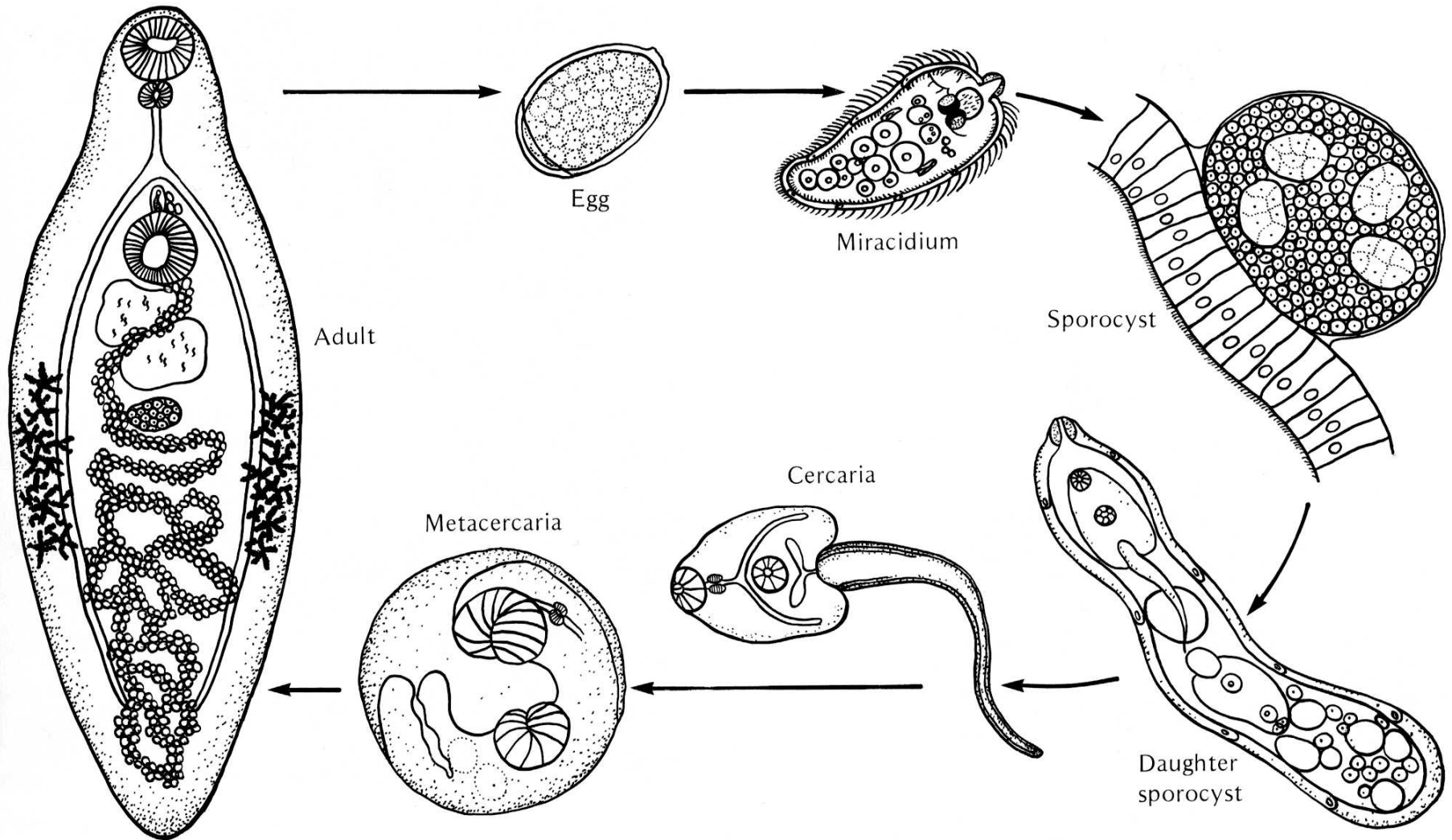
MOTOLICE II

Vývoj a životní cykly motolic

Vývoj a životní cykly motolic

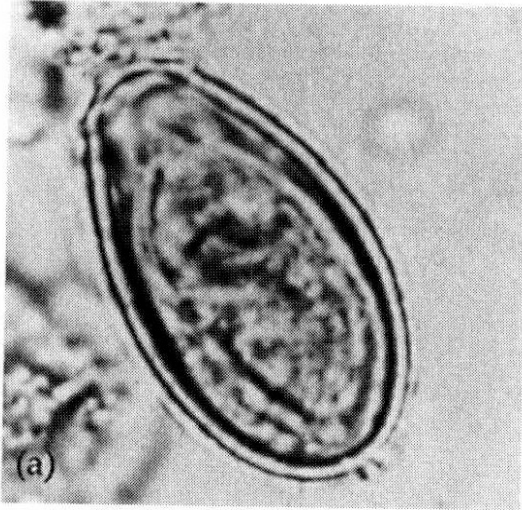
- **Vajíčko** – oválná, silnostěnná, operculum
- **Miracidium** – první larvální stádium
- **Sporocysta** – v prvním meziphostiteli asexuální množení – mateřská a dceřinná
- **Redie** – může následovat po sporocystě, více pohyblivé a migruje do hepatopankreatu plže – mateřská a dceřinná
- **Cerkárie** – základní funkcí je diseminace parazita v prostředí, morfotypy cercárií
- **Metacerkárie** – klidové stádium, encystace
- **Mesocerkárie** – přechodných typ mezi cercarií a metacercarií
- **Adultní motolice**

Vývojový cyklus motolic

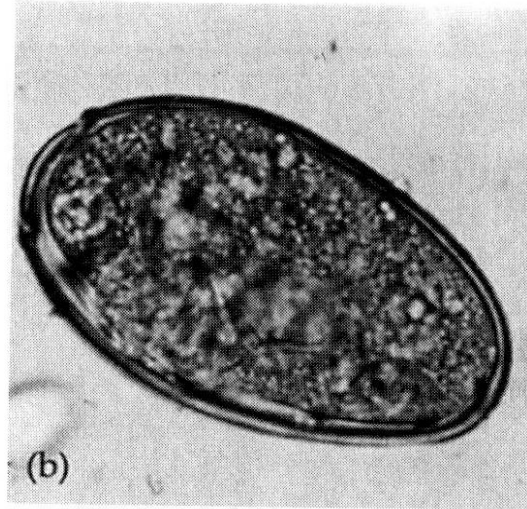


Vajíčka motolic parazitujících u člověka

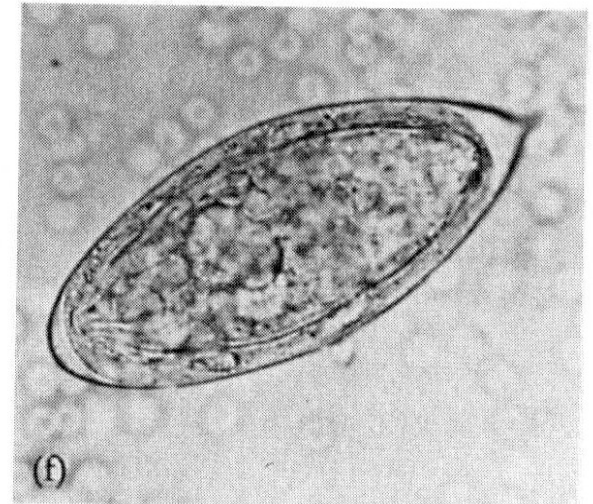
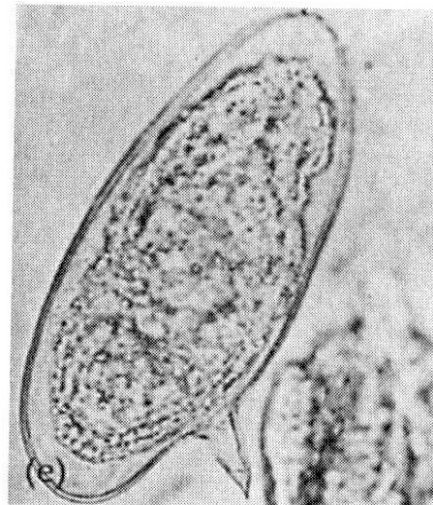
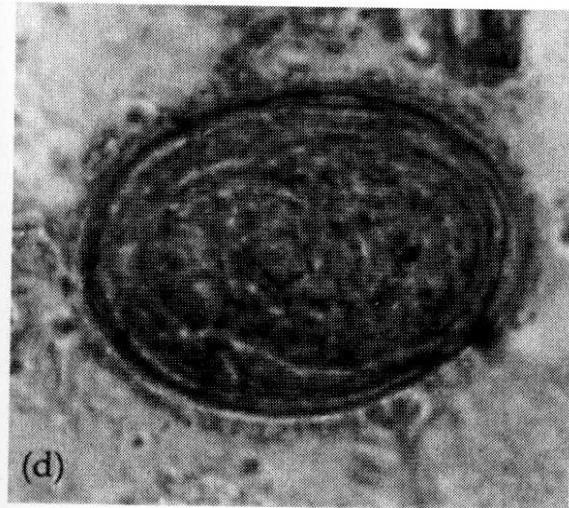
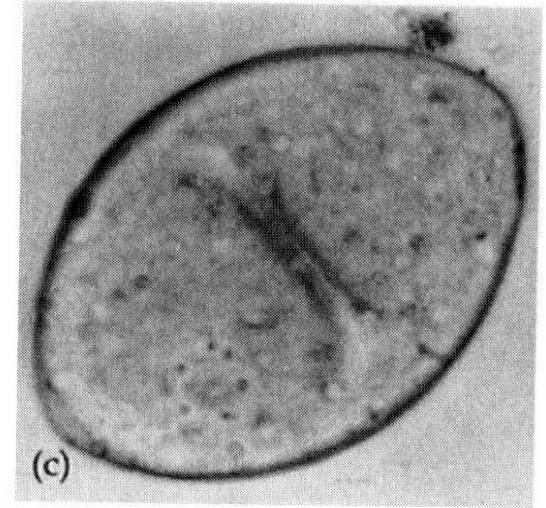
Clonorchis



Paragonimus



Fasciolopsis



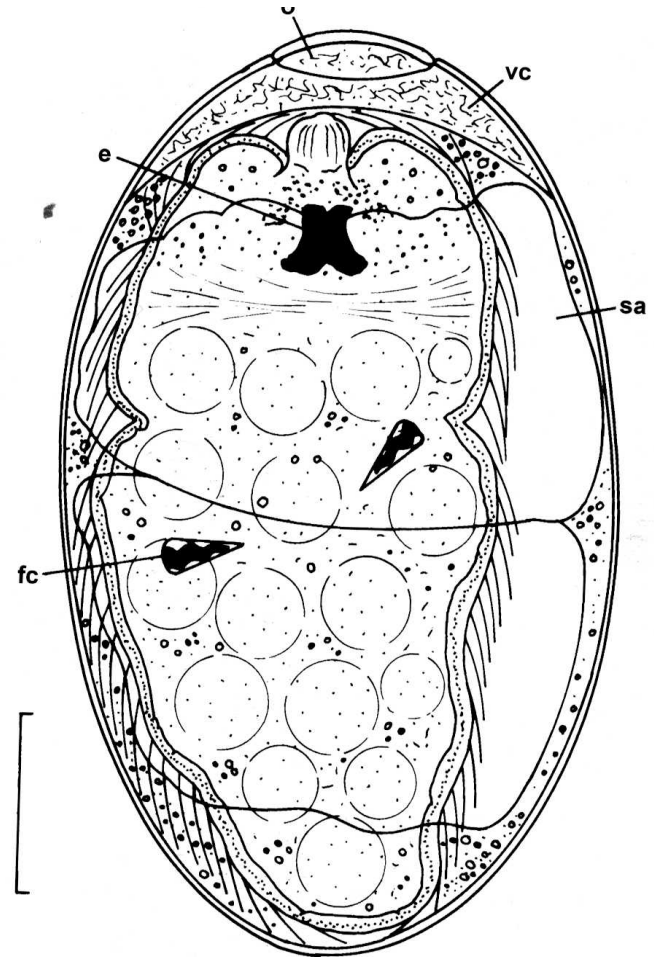
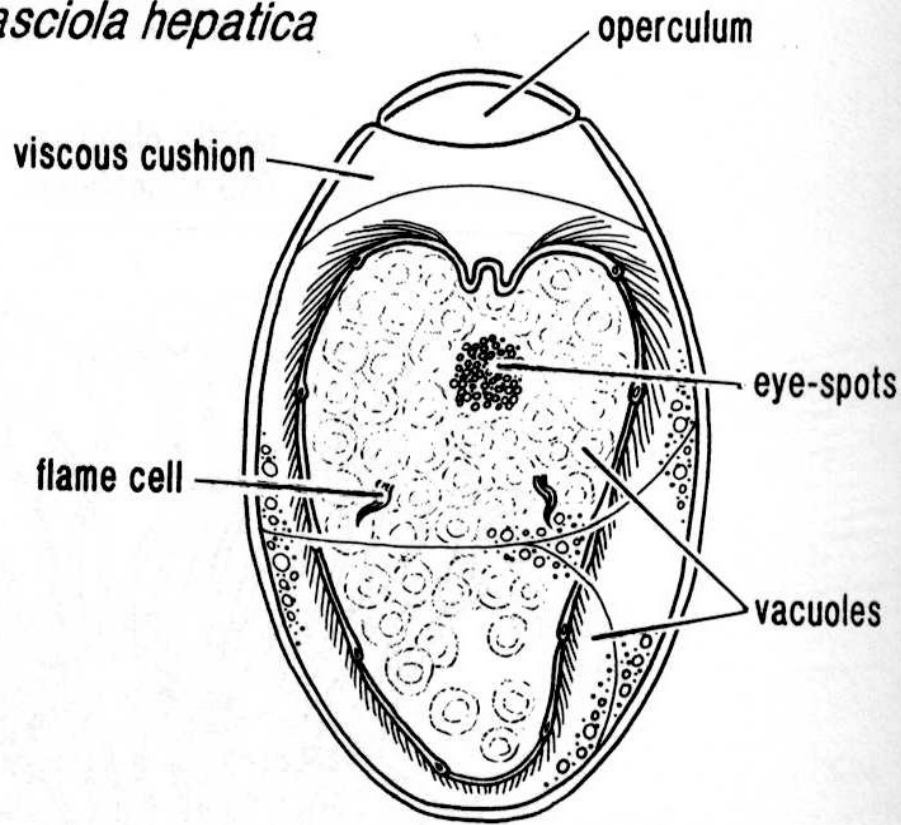
Schistosoma japonicum

S. mansoni

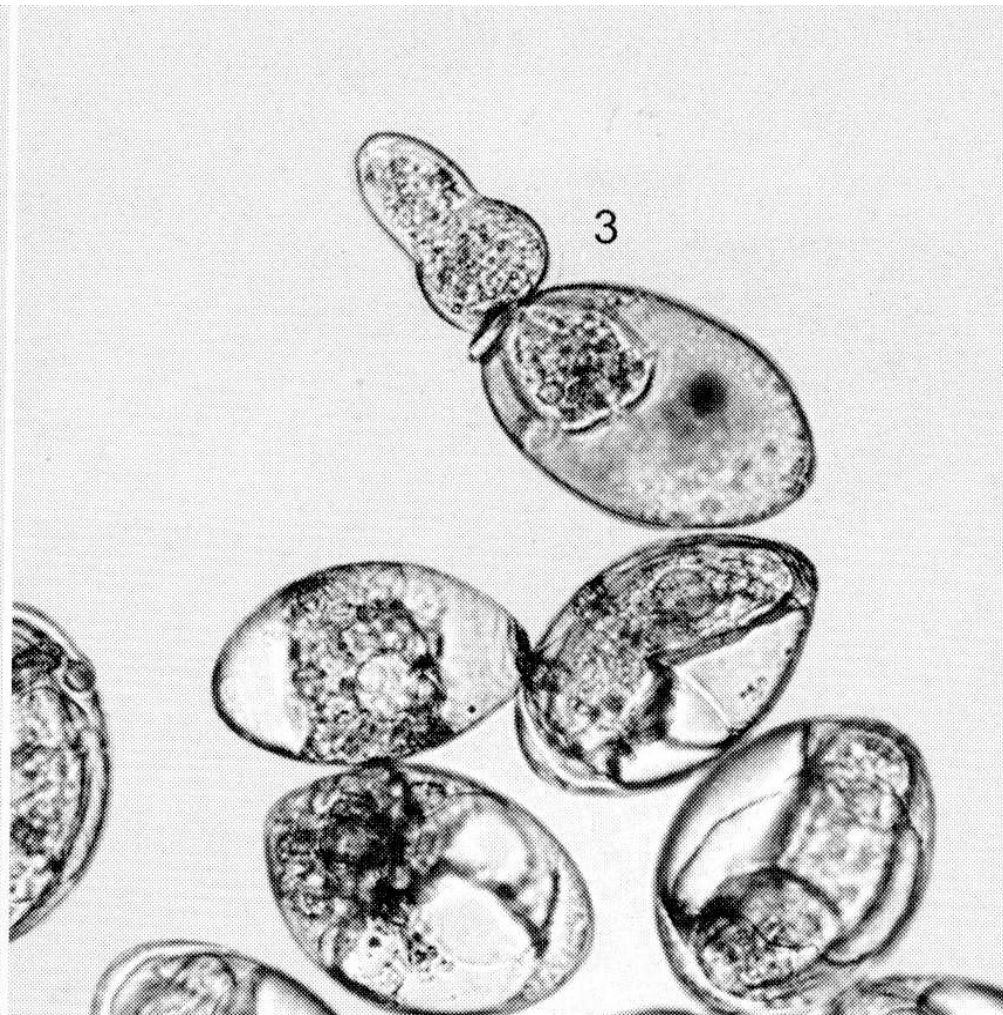
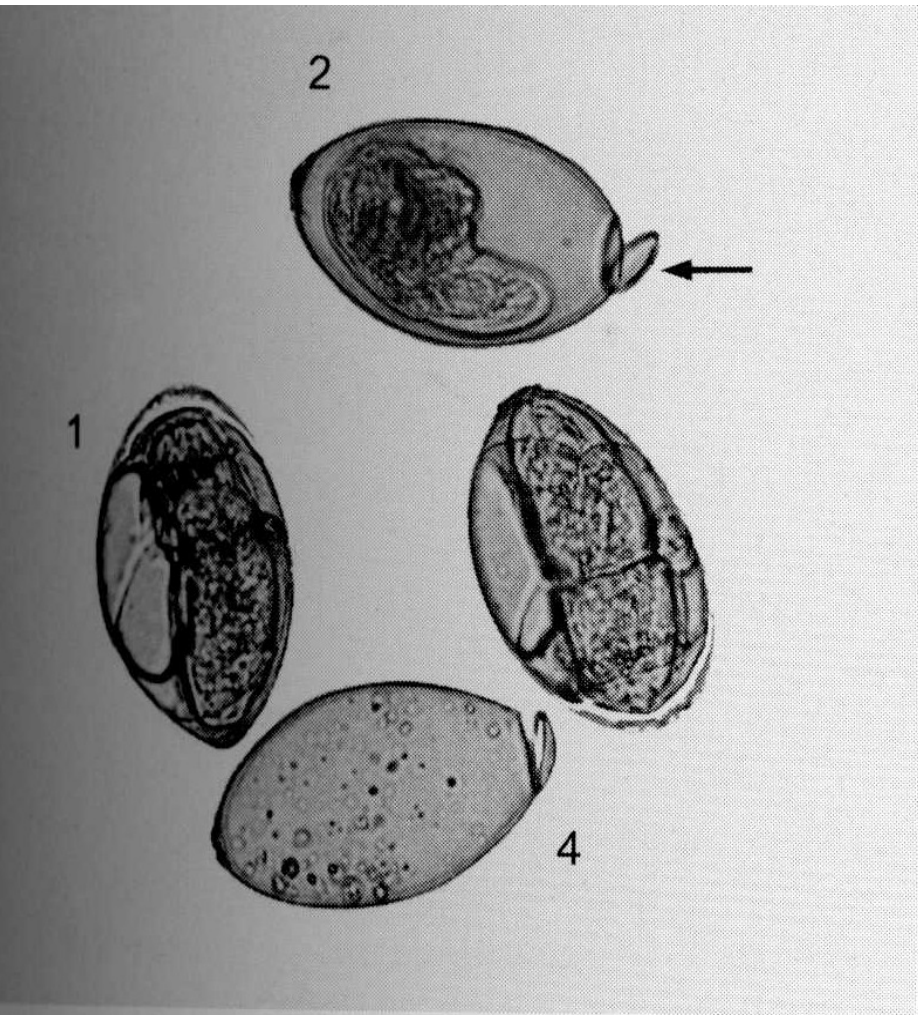
S. heamatobium

Vývojová stádia - vajíčko

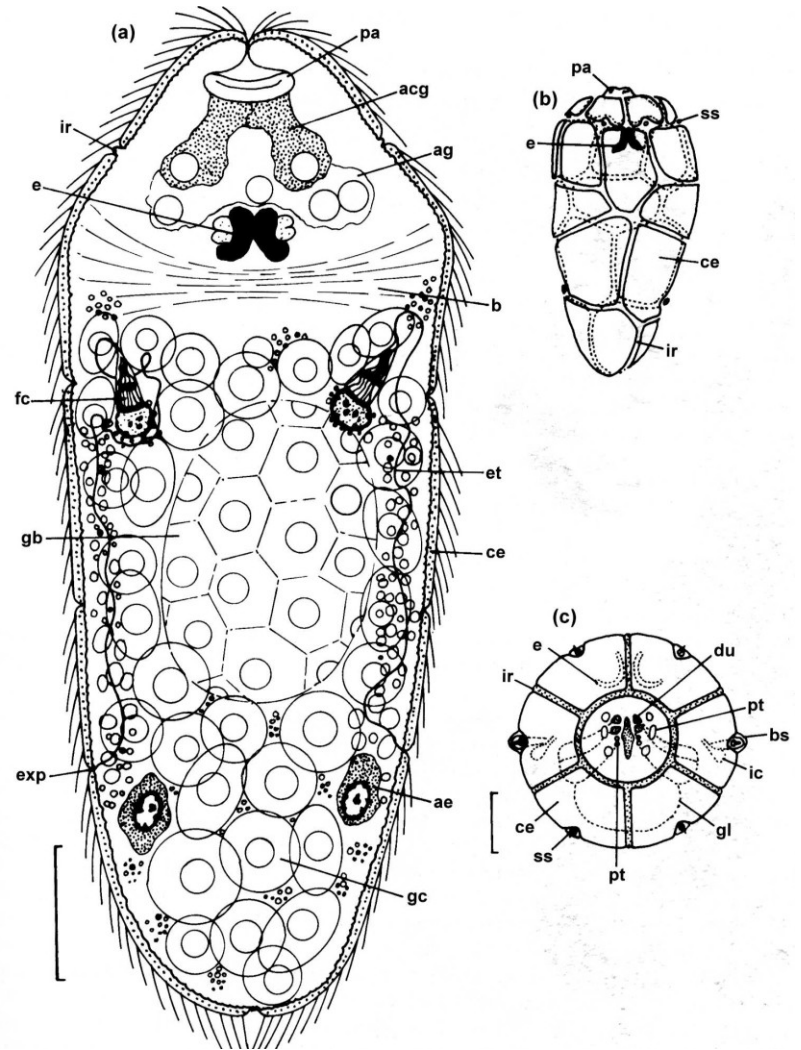
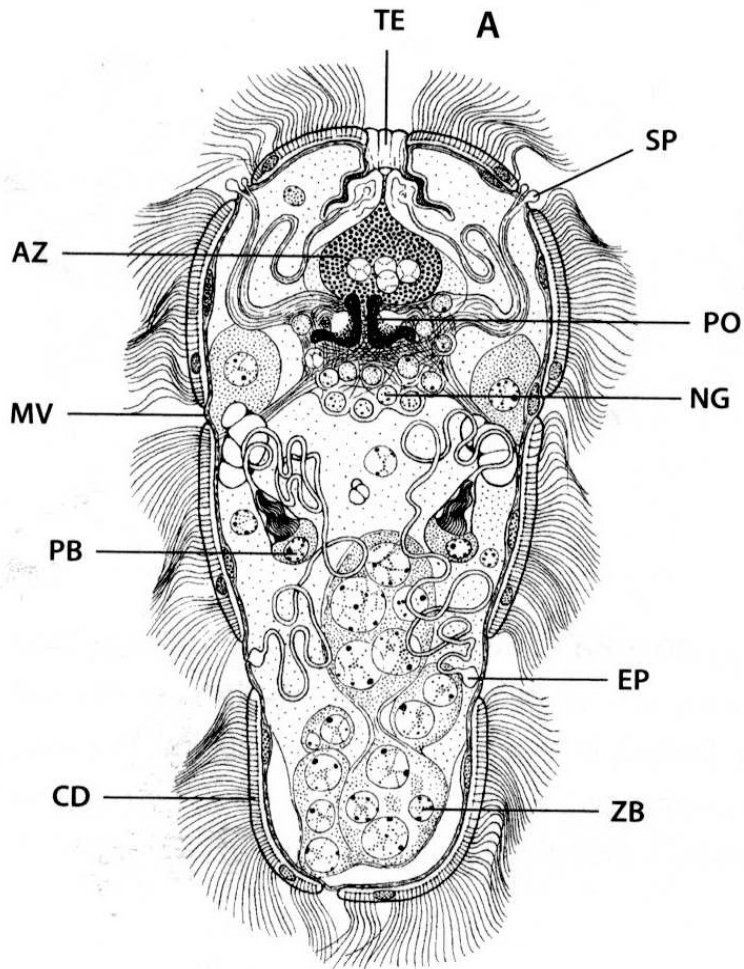
Fasciola hepatica



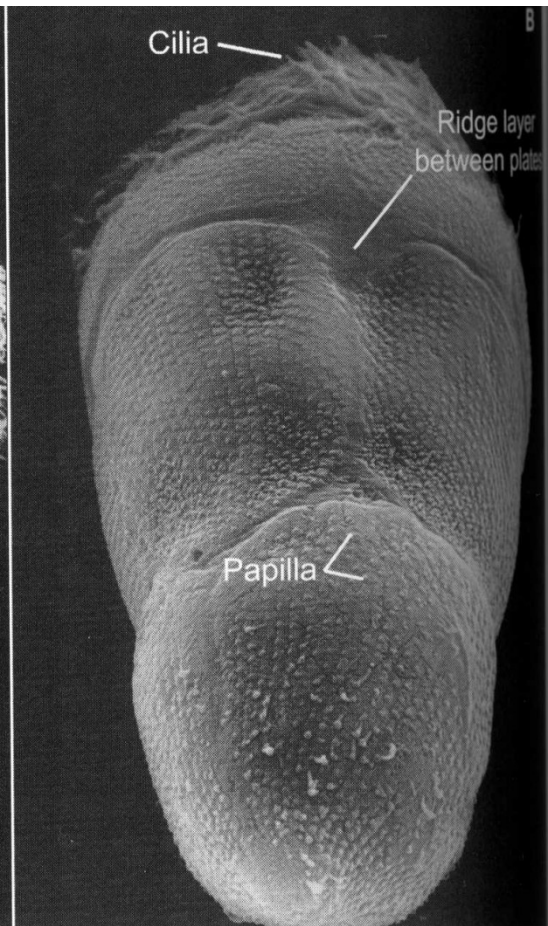
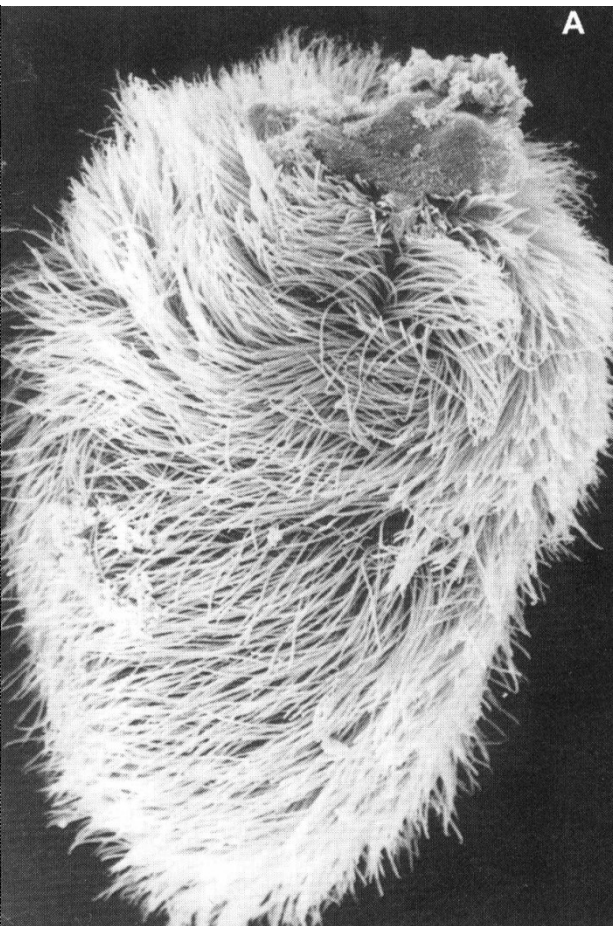
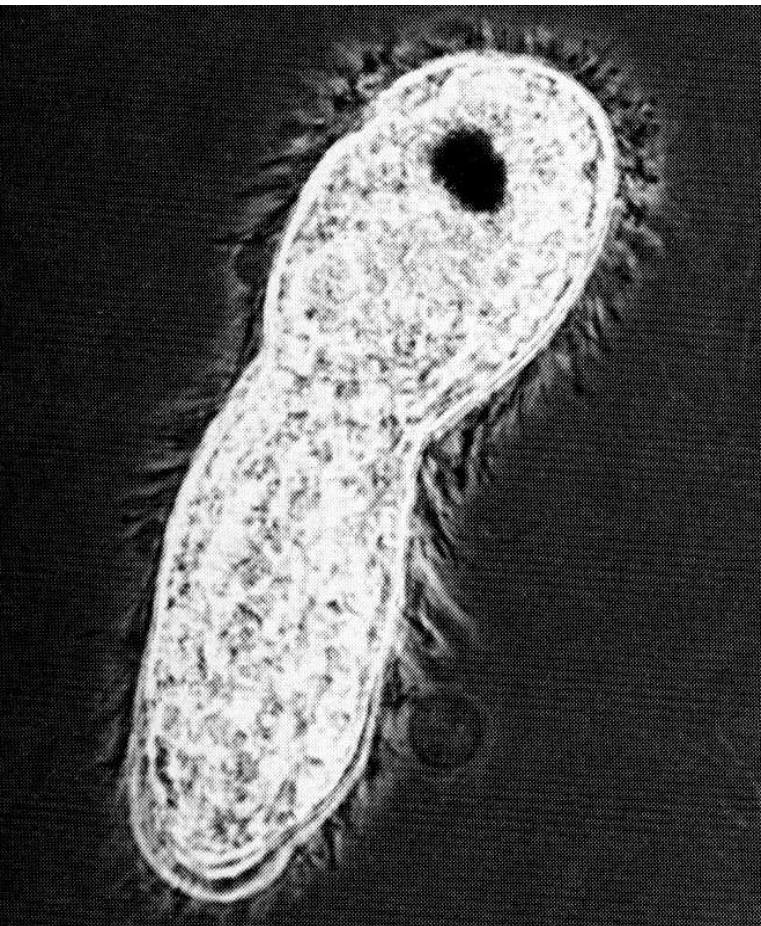
Líhnutí vajíček motolic



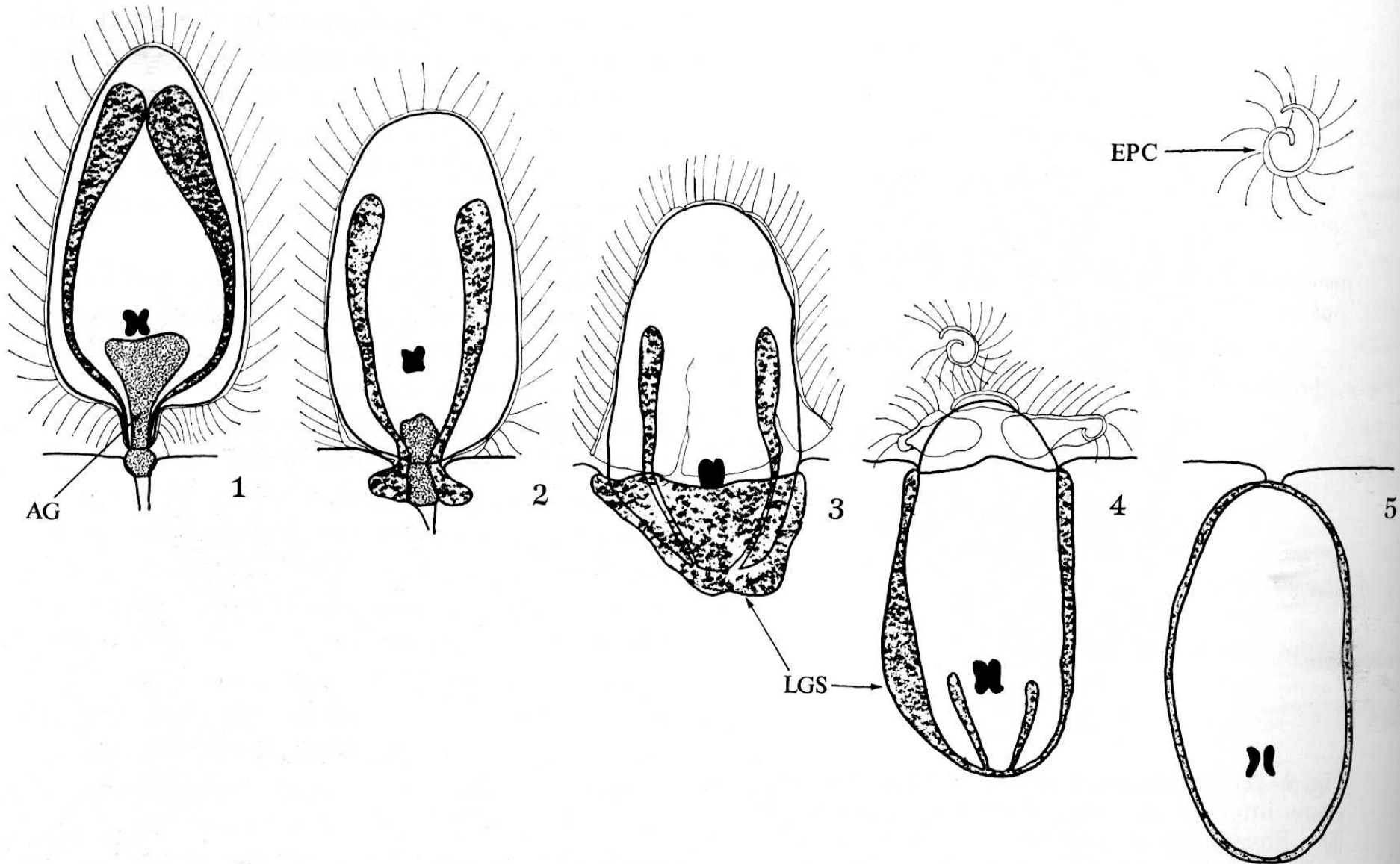
Miracidium



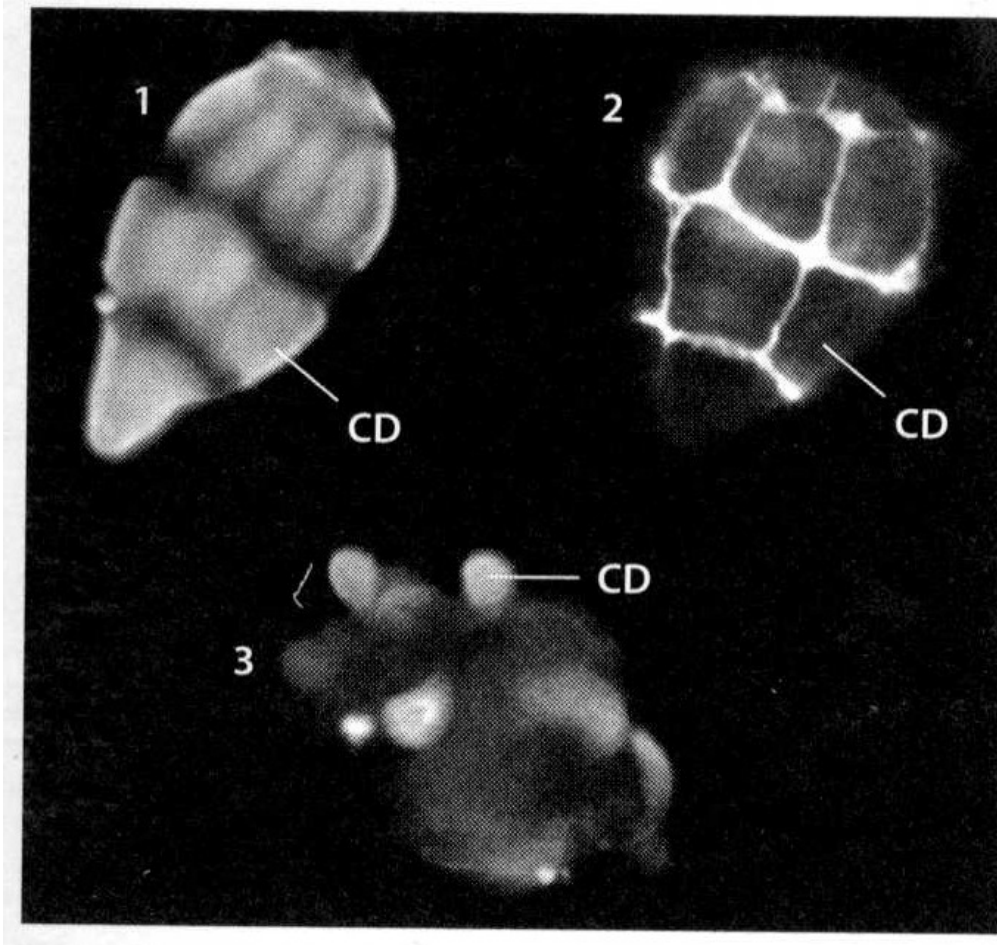
Miracidia motolic



Penetrace miracidia do prvého meziphostitele

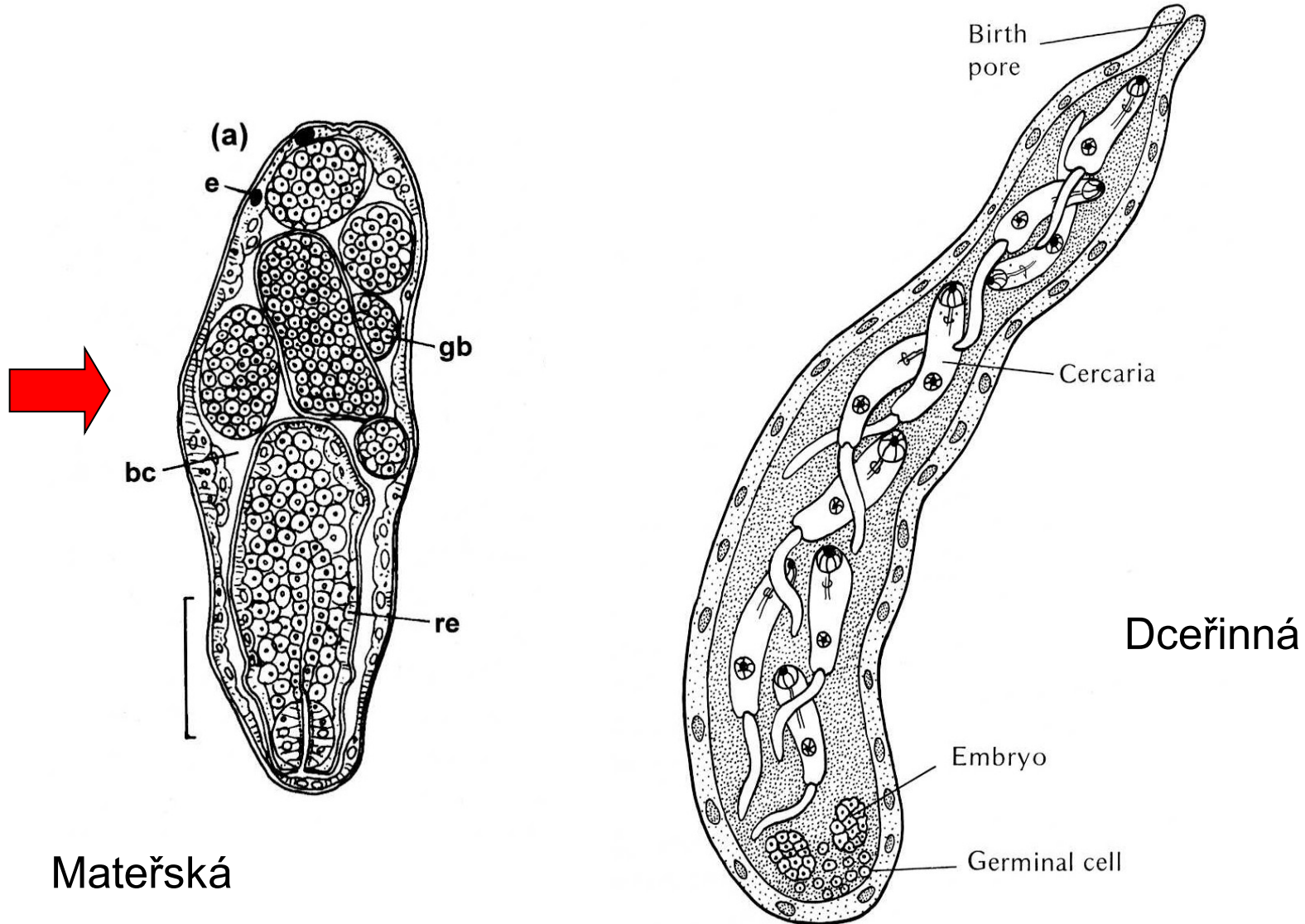


Miracidium → mateřská sporocysta

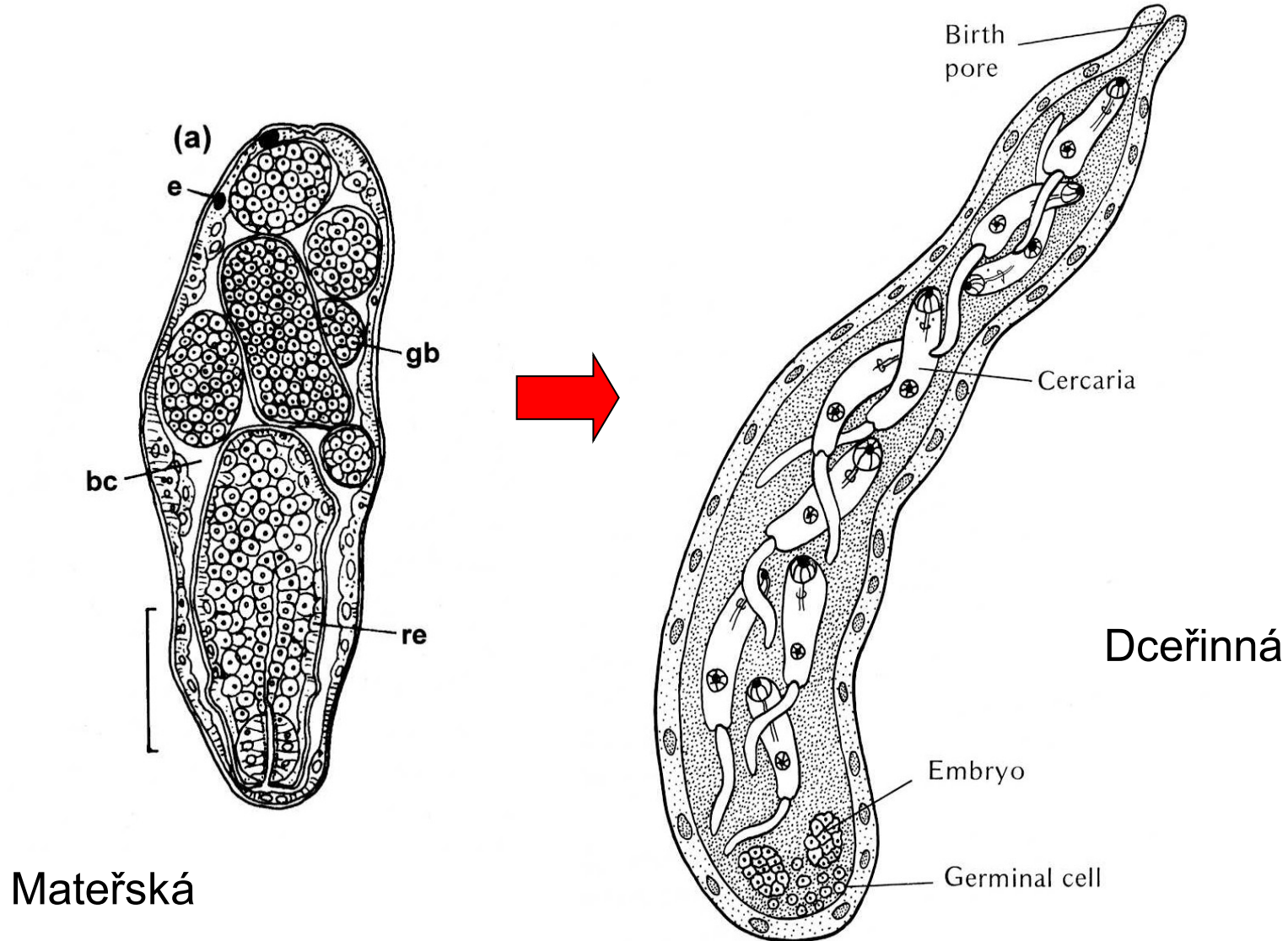


Obr. 3–10 Digenea. Proces svlékání ciliárních destiček při přeměně miracidia na mateřskou sporocystu (vizualizováno značenými lektiny ve fluorescenčním mikroskopu). 1 – označené ciliární destičky na povrchu miracidia, 2 – označené mezibuněčné valy na povrchu miracidia, 3 – odvrhování označených ciliárních destiček při procesu vzniku dceřiných sporocysty. CD – ciliární destička (foto P. Horák a L. Mikeš).

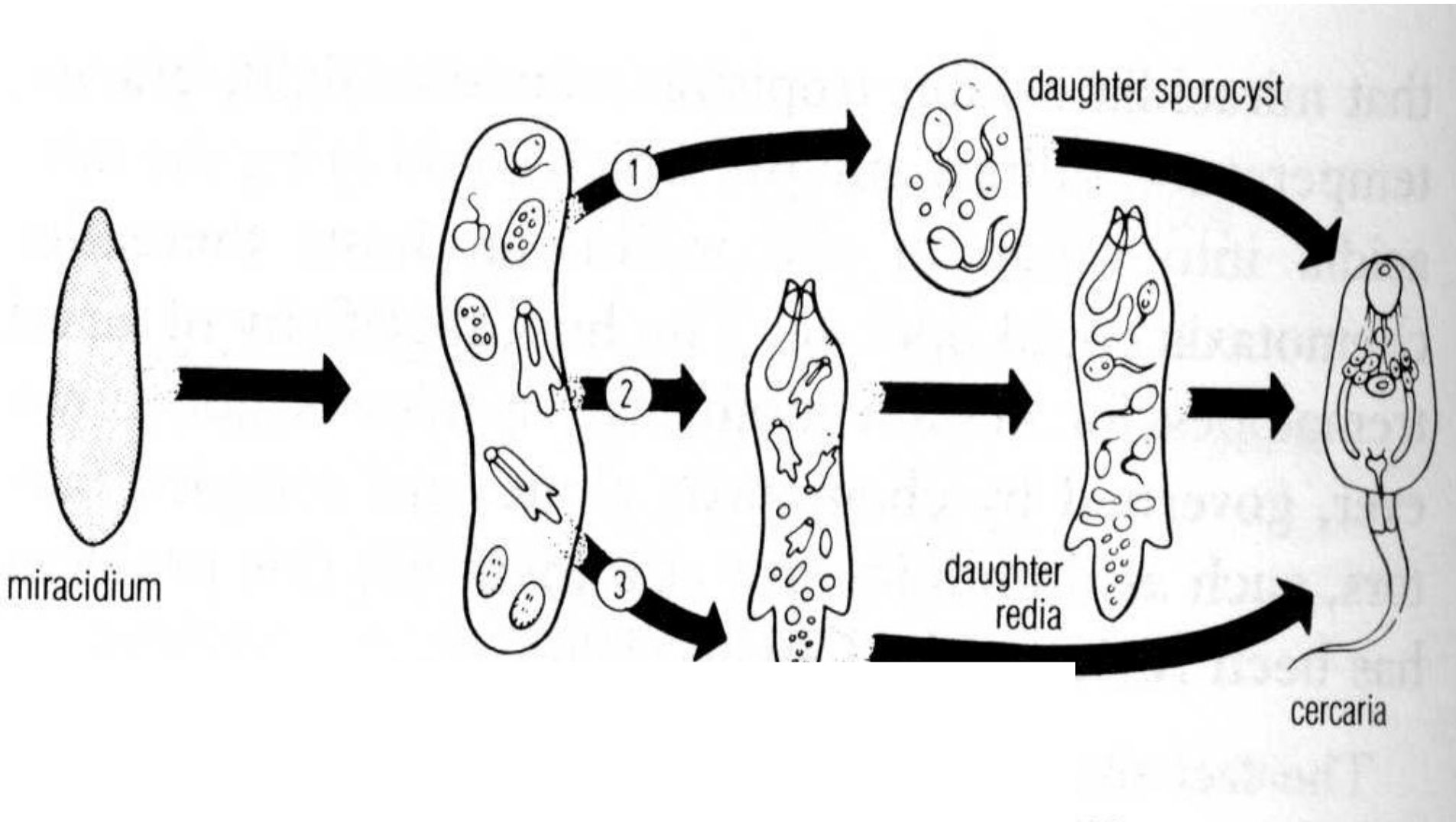
Sporocysty



Sporocysty



Nepohlavní reprodukce larválních stádií



Nepohlavní reprodukce larválních stádií

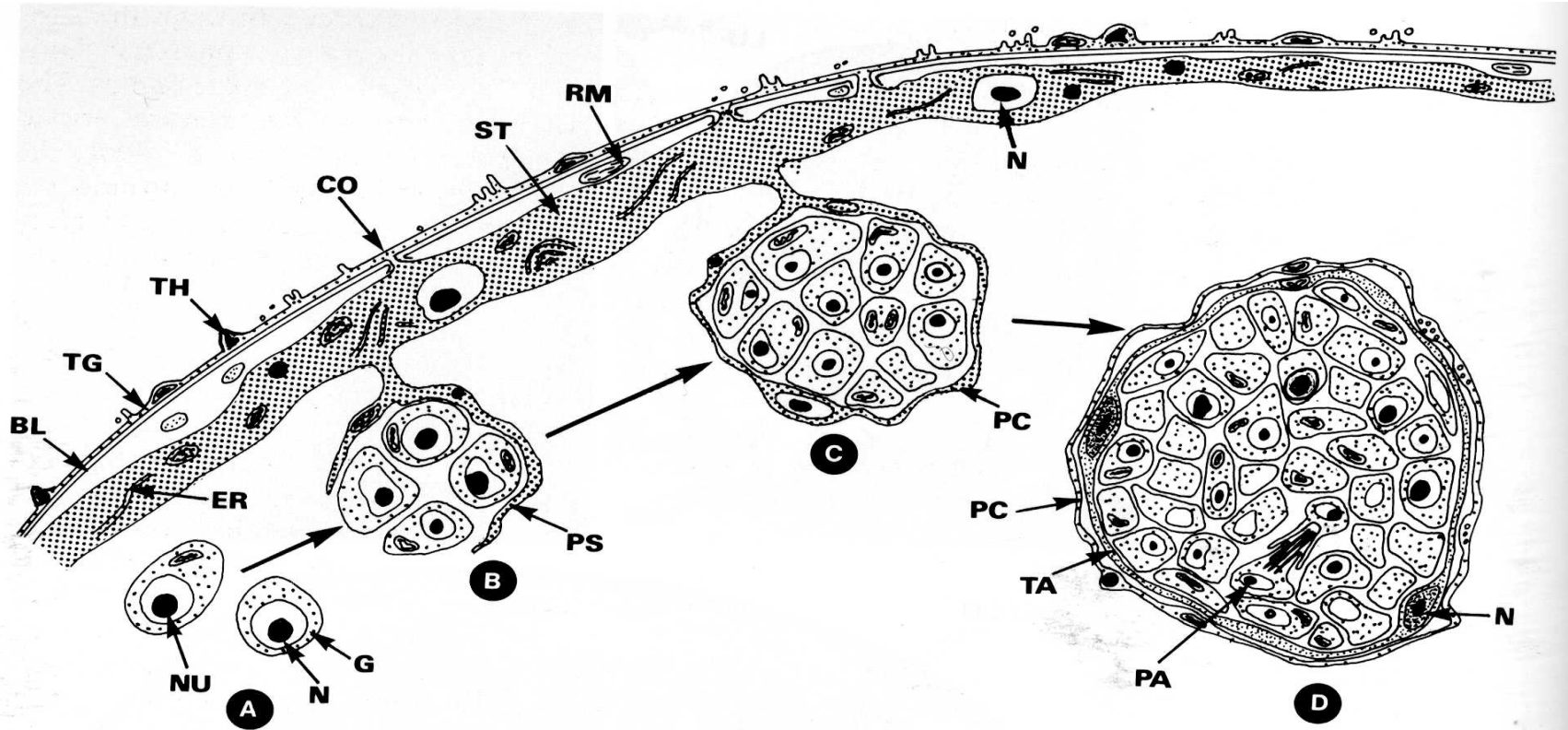


Fig. 4.29 A-D. Diagrammatic representation of the formation of daughter individuals in digenean trematodes. **A** Germinal (undifferentiated) cells are found singly inside the lumen of the mother individual (mother sporocysts, daughter sporocysts, rediae). **B** Protruding parts of the syncytial subtegumental layer surround the dividing germinal cells. **C** Now the subtegumental layer has completely surrounded the dividing cells. **D** The growing daughter organism increases in size. It is covered by a smooth primary layer, under which a new syncytial tegument is formed by fusion of undifferen-

tiated cells. Stages in **C** and **D** are also described as “germ balls”. *BL*, Basal lamina; *CO*, connection between tegument and subtegumental layer; *ER*, endoplasmic reticulum; *G*, germinal cell; *N*, nucleus; *NU*, nucleolus; *PA*, proto-nephridial anlage; *PC*, primary cover (formed by *ST*); *PS*, protruding part of subtegument; *RM*, remnant of muscle; *ST*, subtegumental layer; *TA*, tegument anlage; *TG*, tegument (differs in the different developmental stages); *TH*, thorn (hook)

Multiplikace germinativních buněk larválních stádií motolic - sporocysty

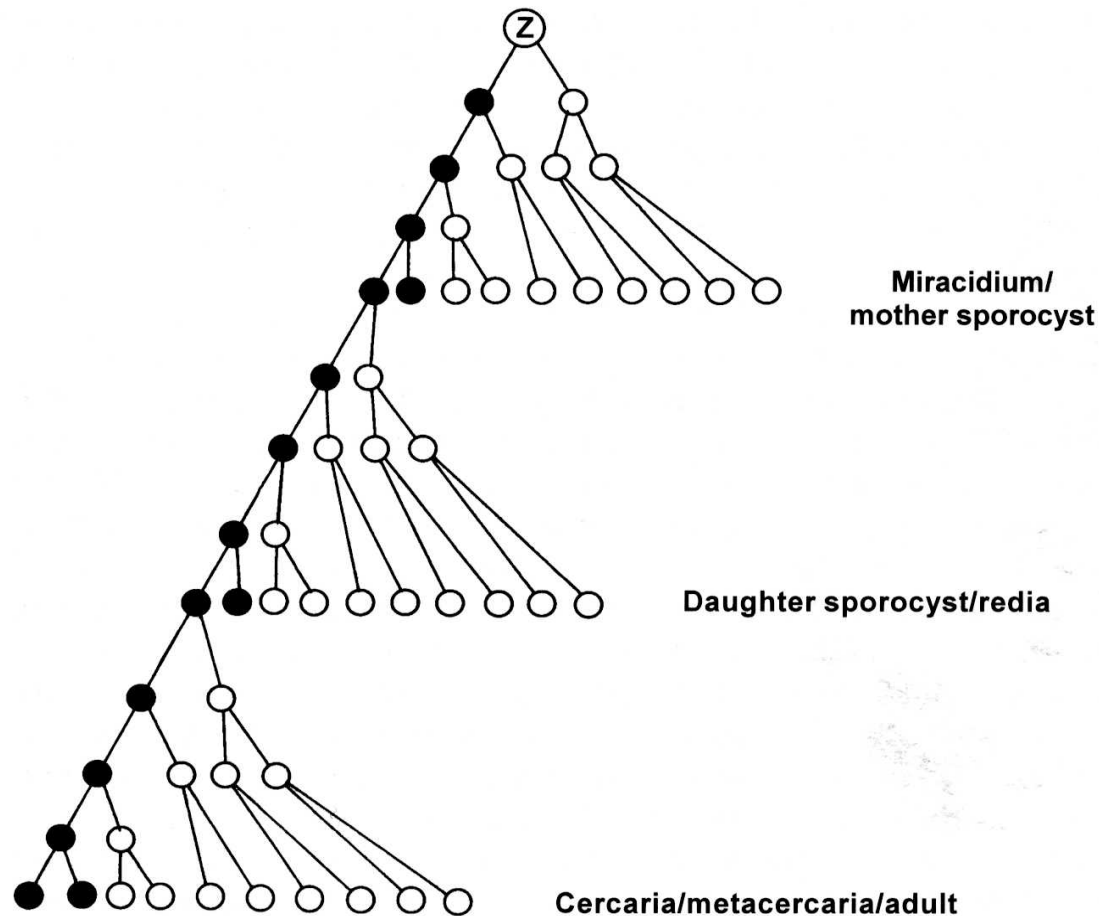
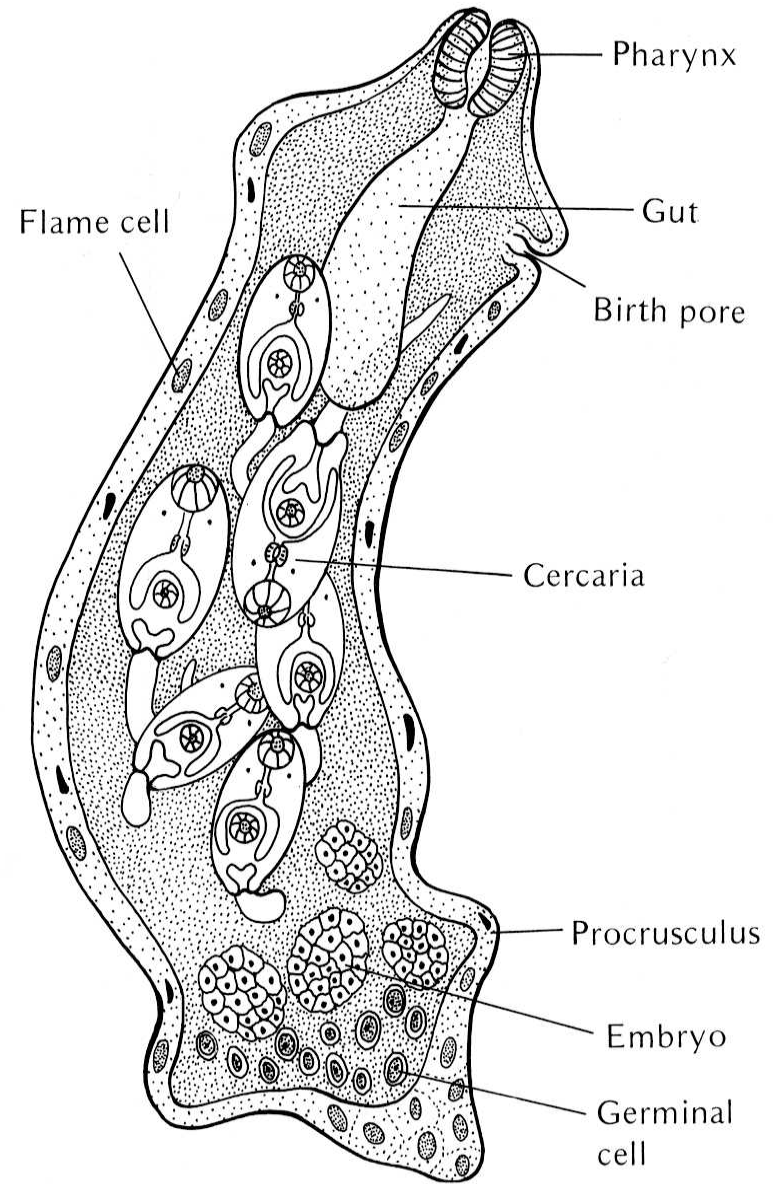
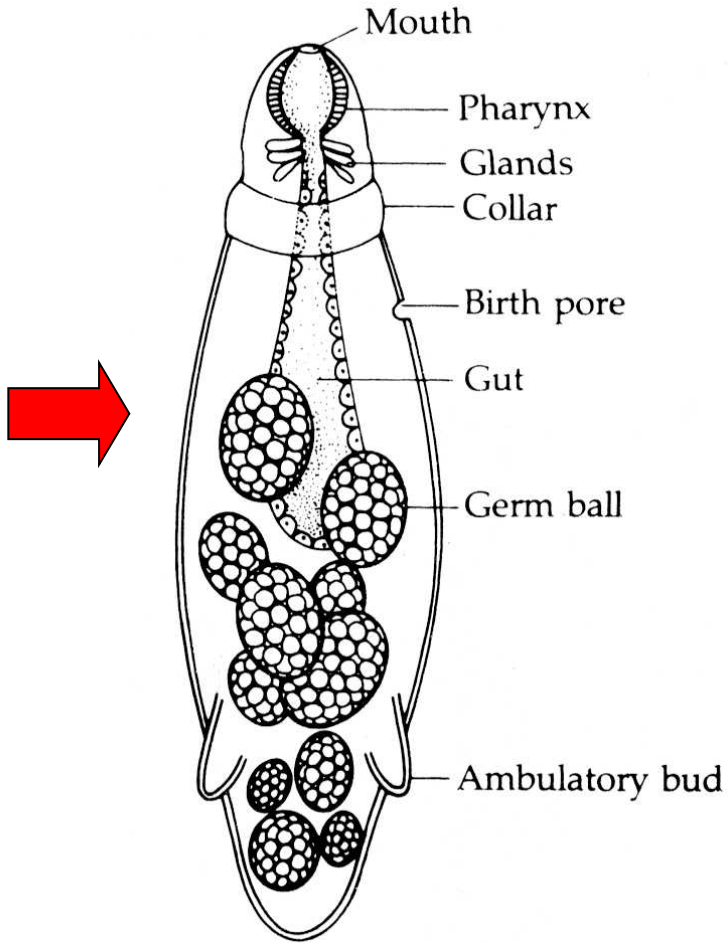
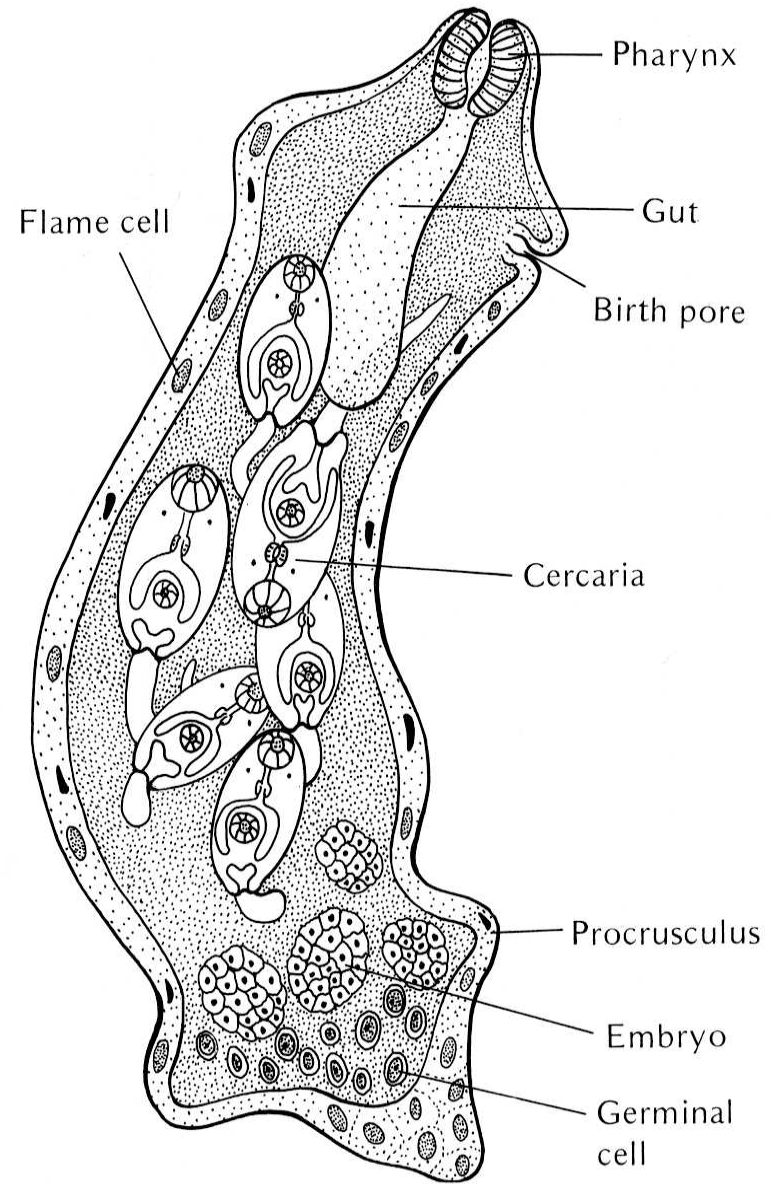
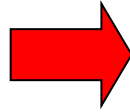
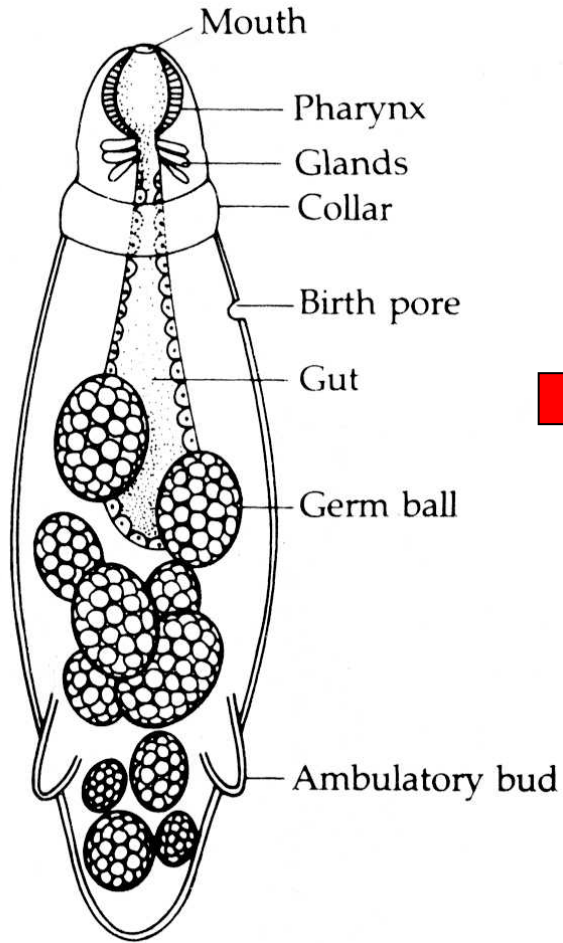


Figure 14.3 Generalized scheme of germinal lineage in the Digenea. Multiplication of germinal cells in the cercaria–metacercaria–adult generation gives rise to the germarium and testes. See text for further explanation. Z=zygote; filled circle=germinal cell; empty circle=somatic cell. Source: redrawn from Whitfield and Evans, 1983.

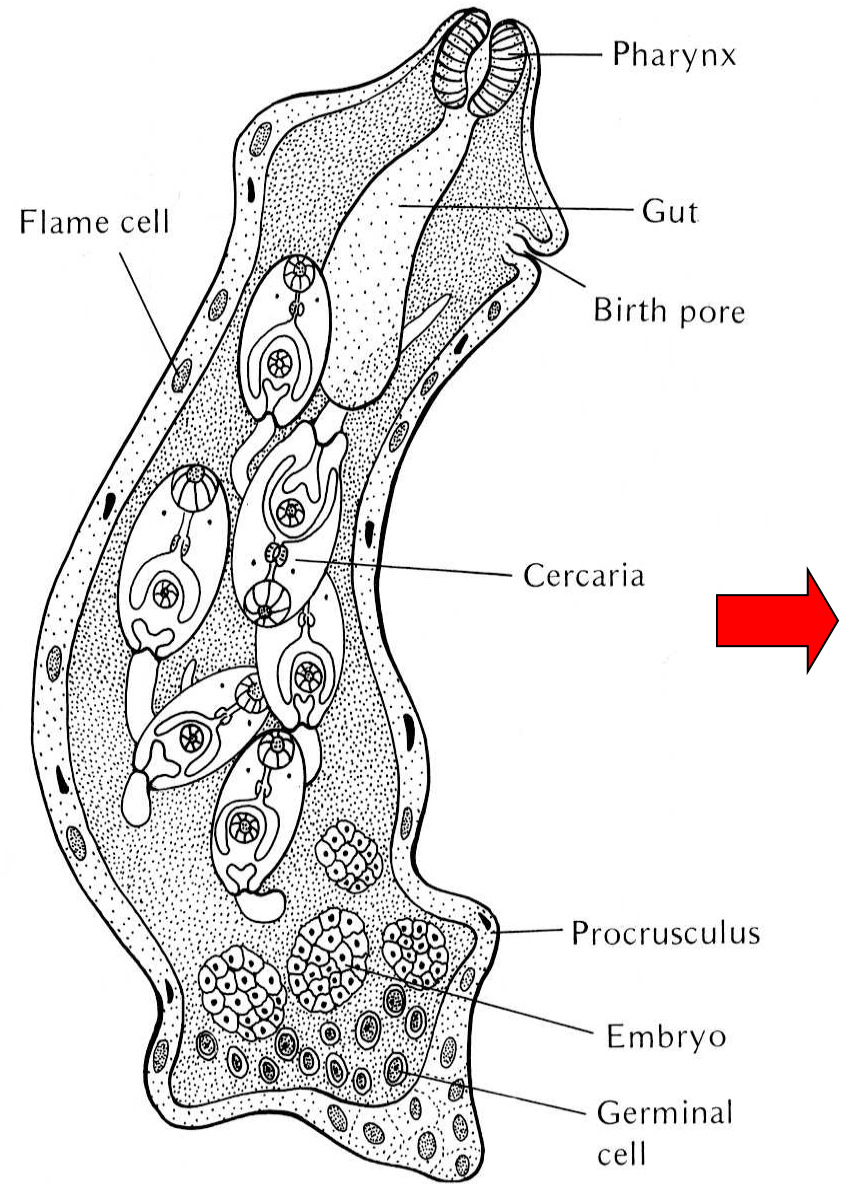
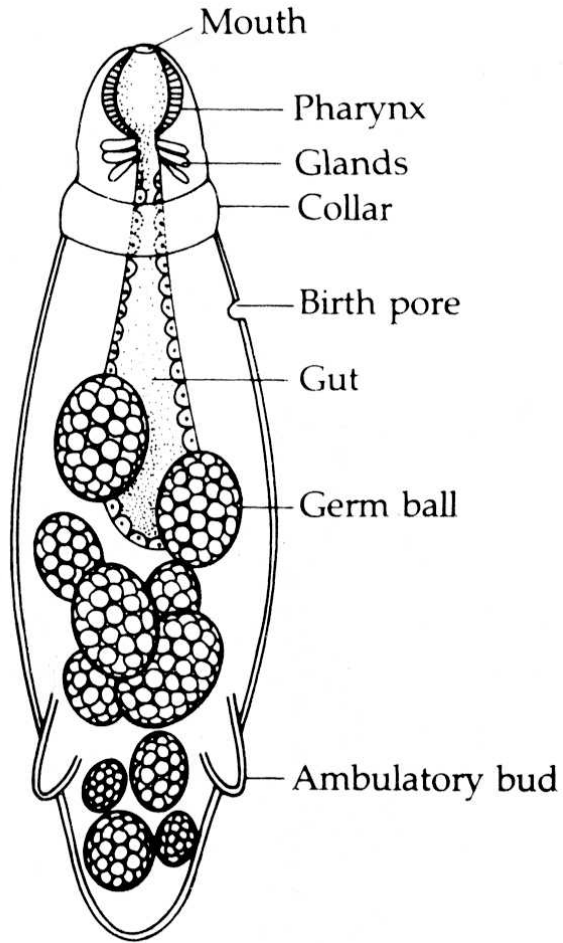
Rédie



Rédie



Rédie



Sekvence vývoje redií

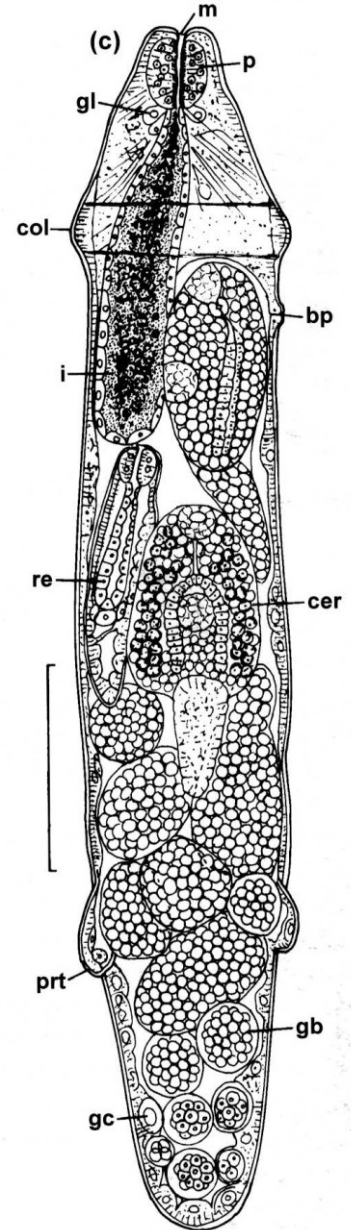
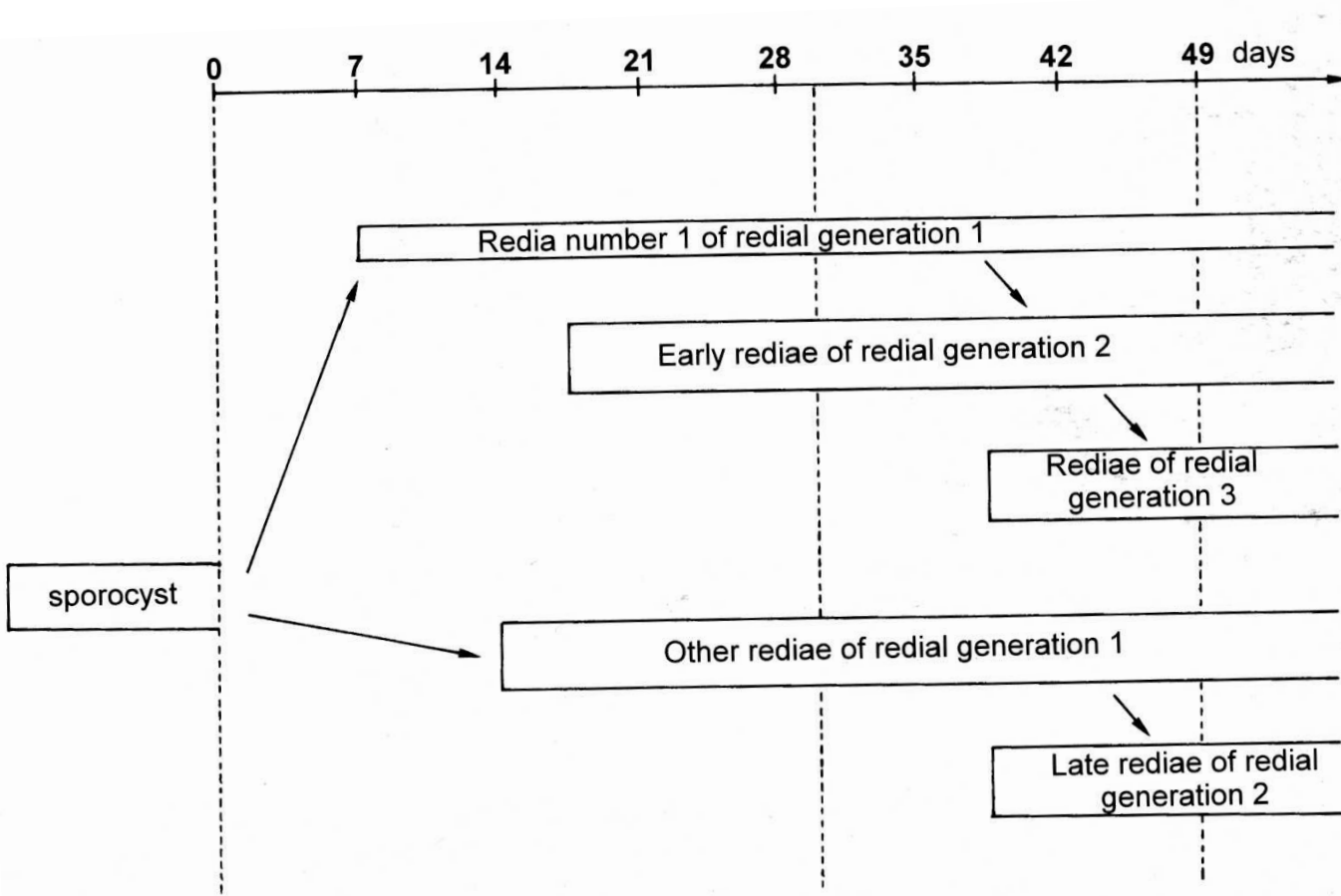


Figure 13.11 Sequence of development of rediae from a single sporocyst of *Fasciola hepatica*. The left-hand edge of each box indicates the date when the first rediae of the generation in question became independent. Source: redrawn from Rondelaud and Barthe, 1982.

Multiplikace germinativních buněk larválních stádií motolic - redie

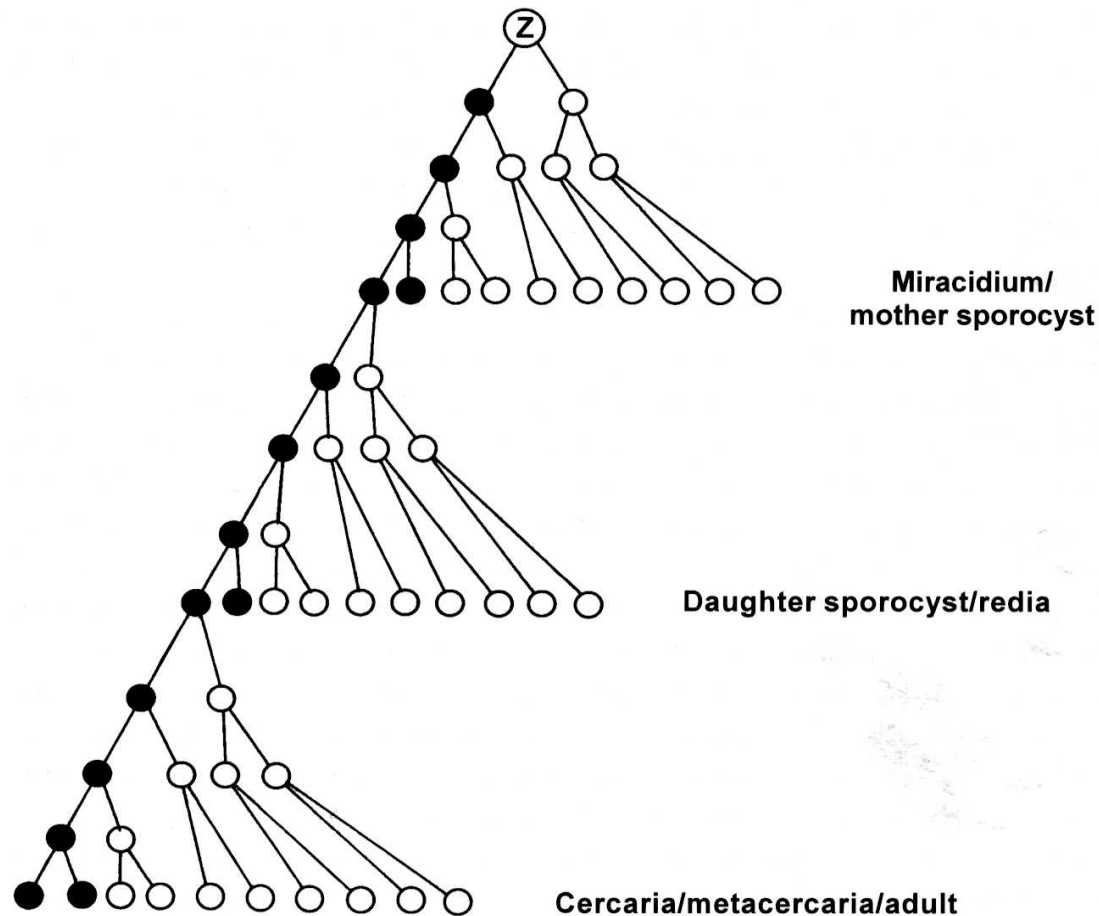
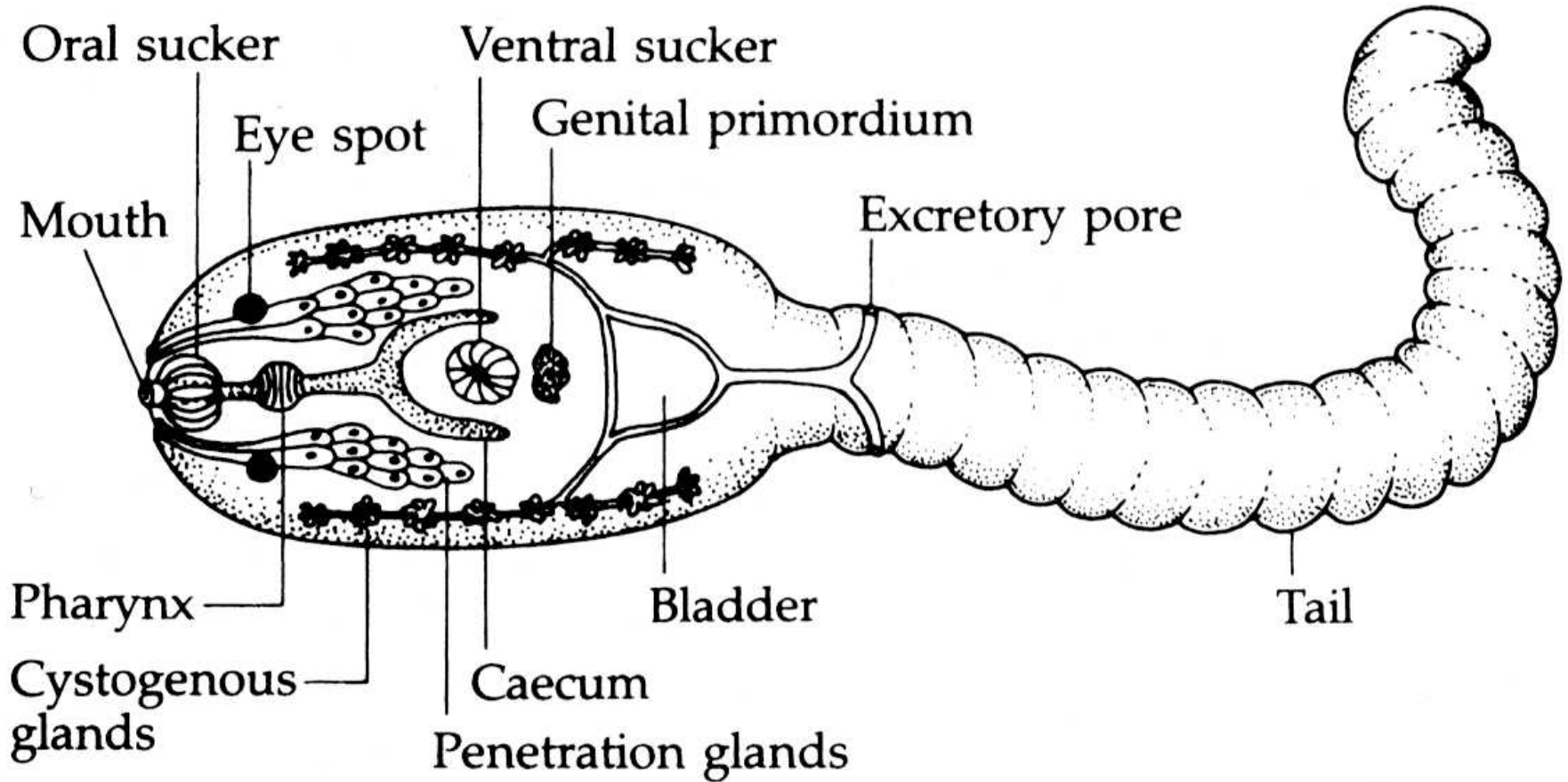
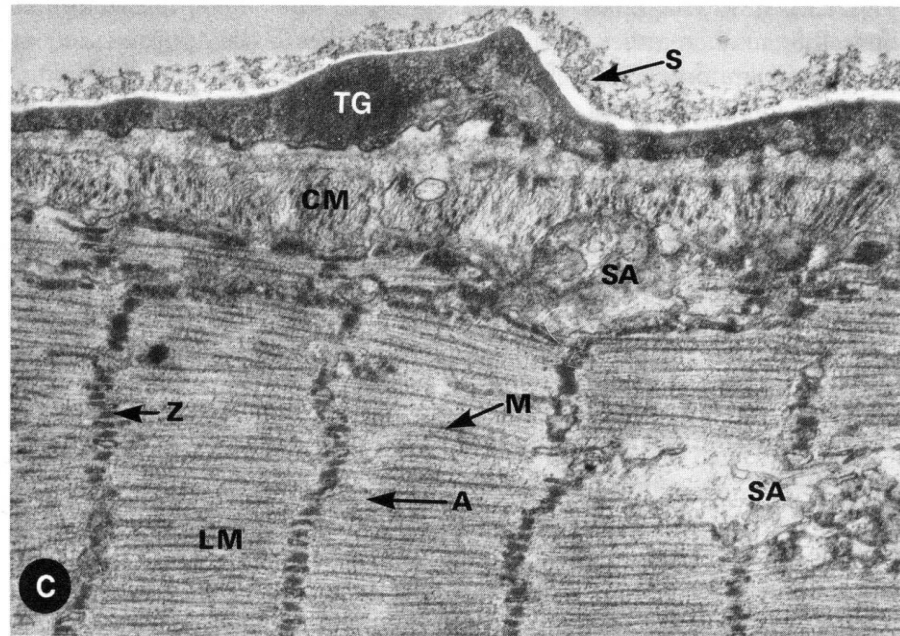
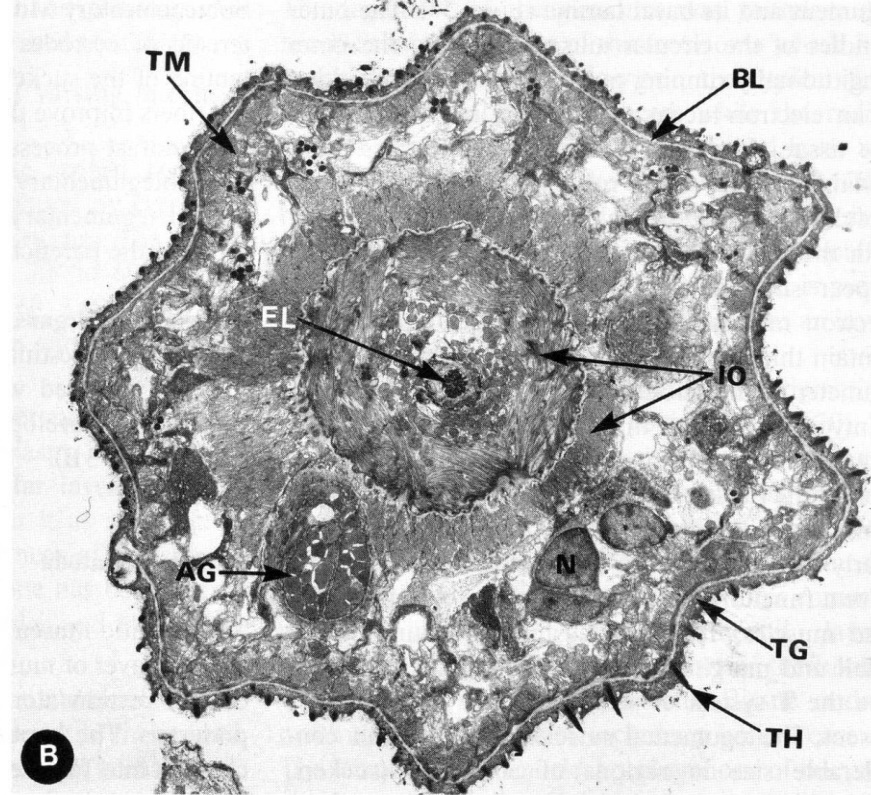
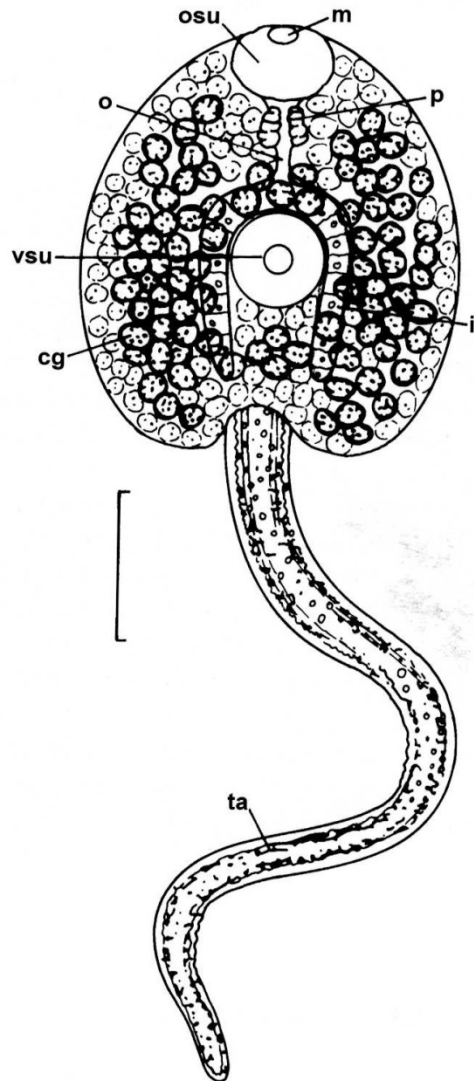
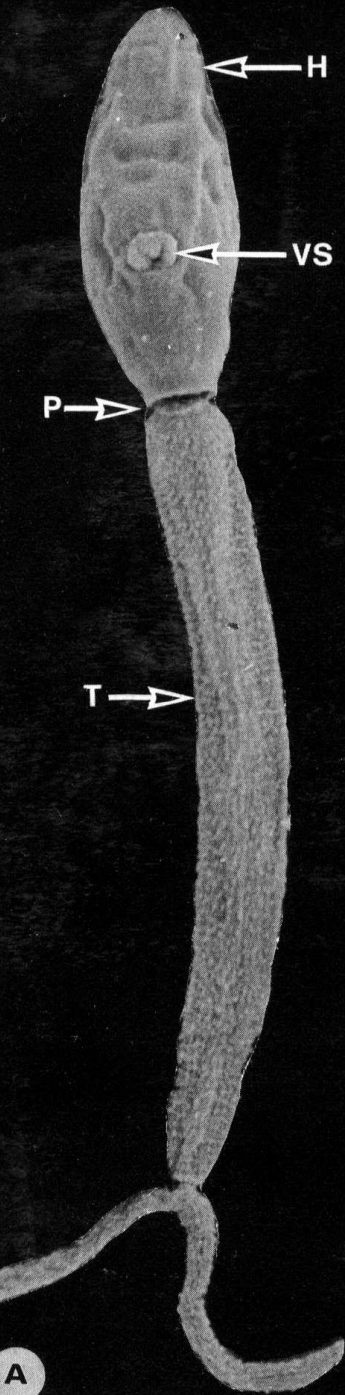


Figure 14.3 Generalized scheme of germinal lineage in the Digenea. Multiplication of germinal cells in the cercaria–metacercaria–adult generation gives rise to the germarium and testes. See text for further explanation. Z=zygote; filled circle=germlinal cell; empty circle=somatic cell. Source: redrawn from Whitfield and Evans, 1983.

cerkárie



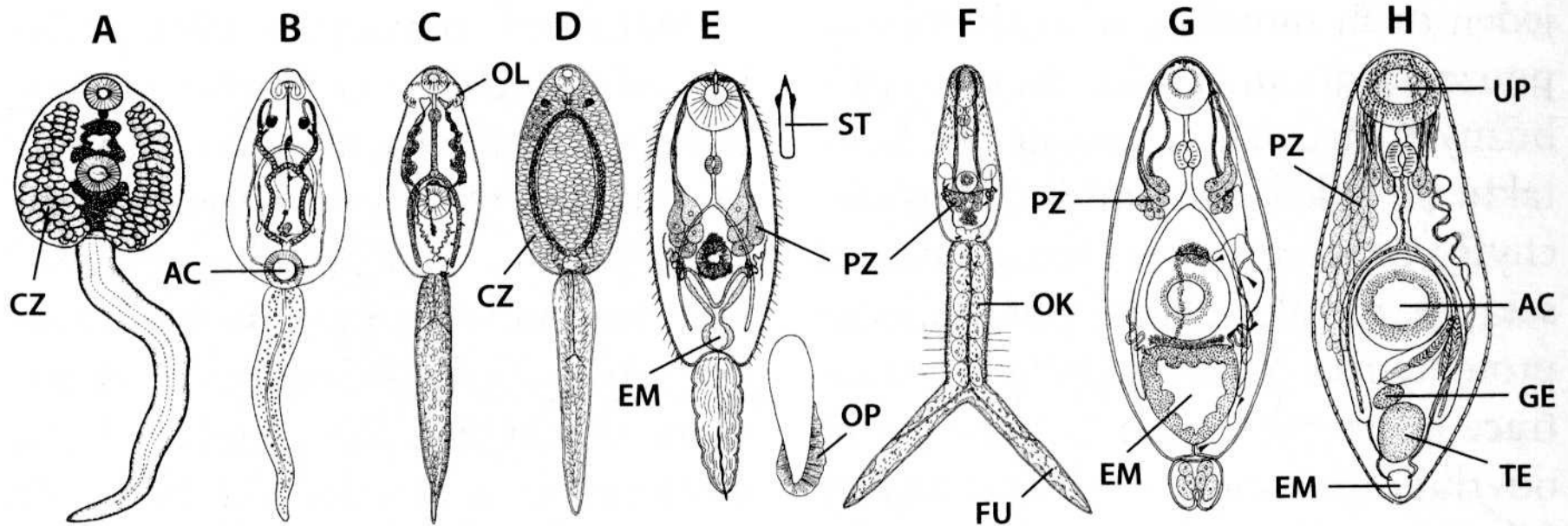
Cerkárie



Morfologické typy cerkarií

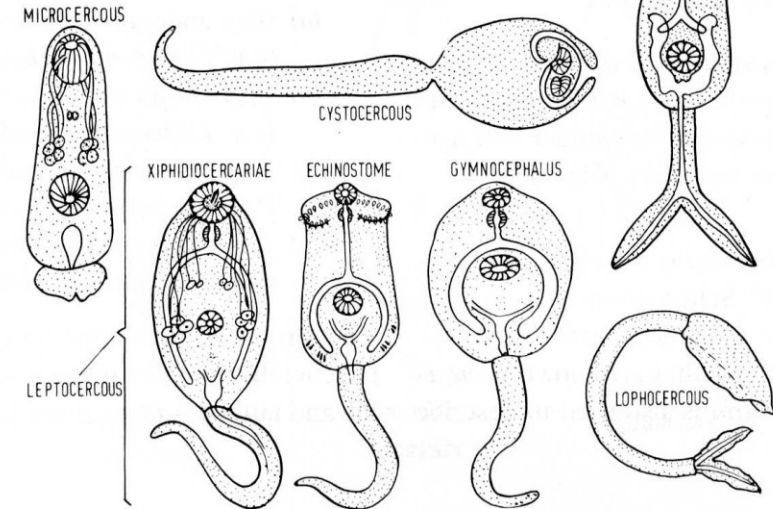
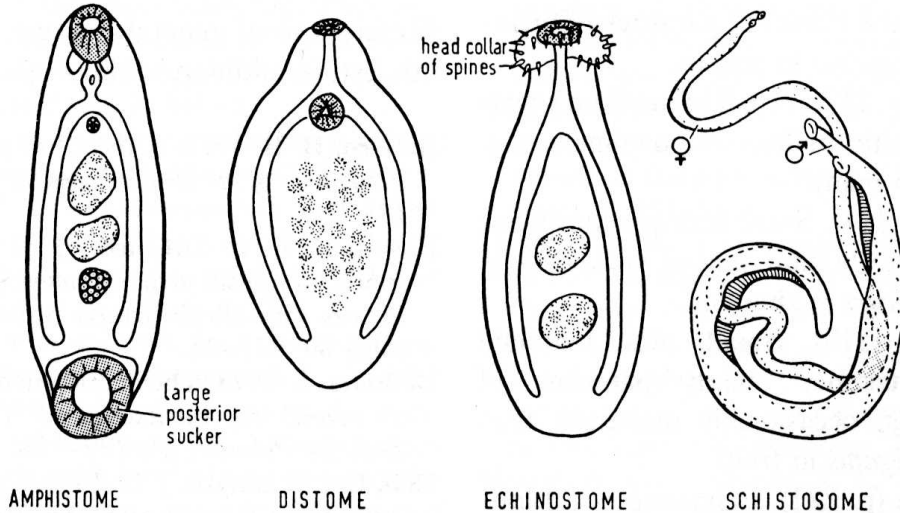
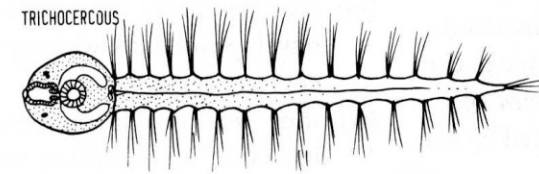
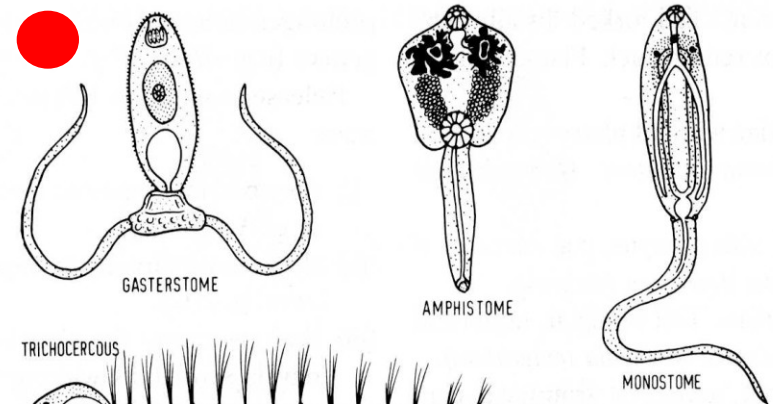
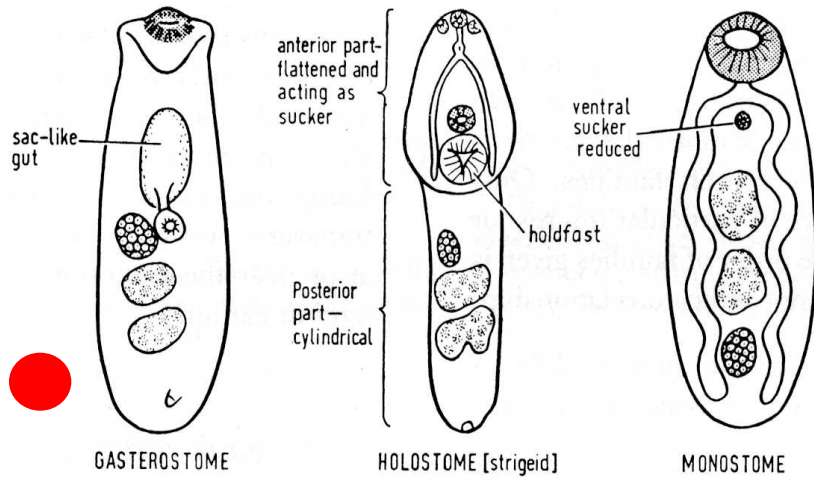
- Ahistomní
- Monostomní
- Gymnocephalní
- Pleurolophocerkárie
- Echinostomní
- Cystophorní
- Trichocerkárie
- Mikrocerkárie
- Furkocerkárie
 - Bucephalní
 - Strigeidní
 - Skupina vivax
 - Skupina ocellata
- Xiphidiocerkarie
- Ophthalmoxiphidiocerkarie
- Cercarieum

Morfologické typy cercárií

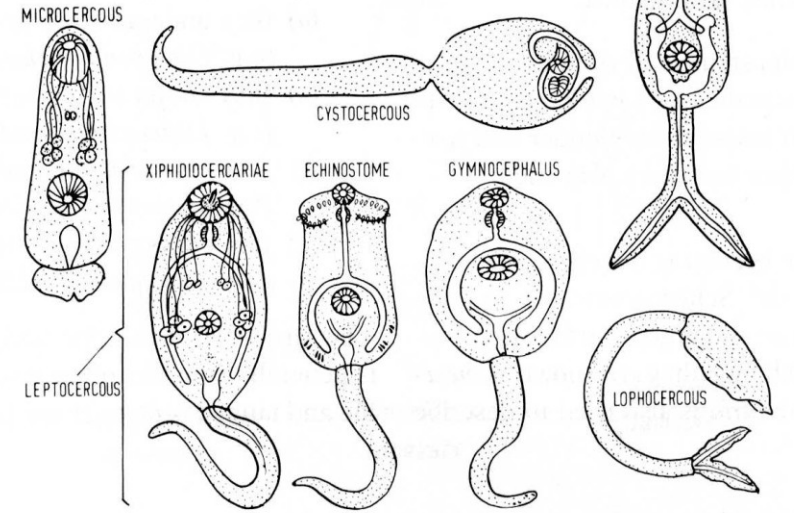
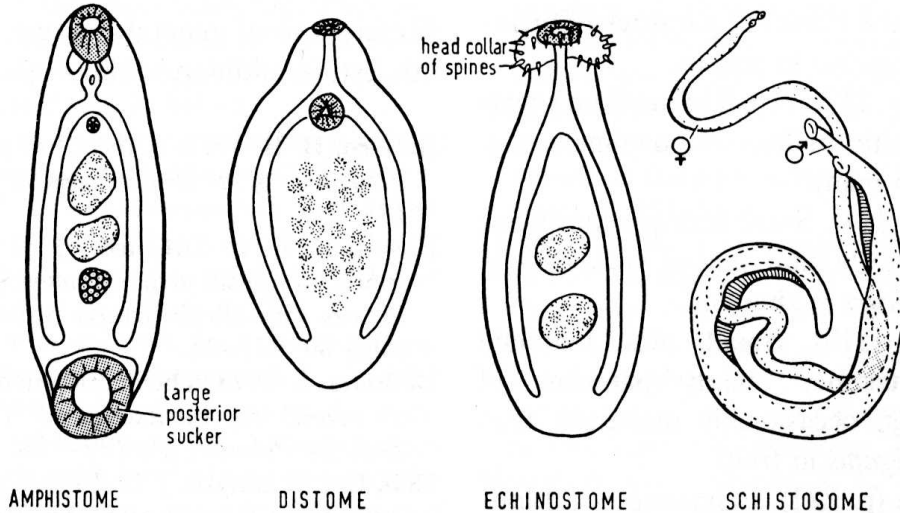
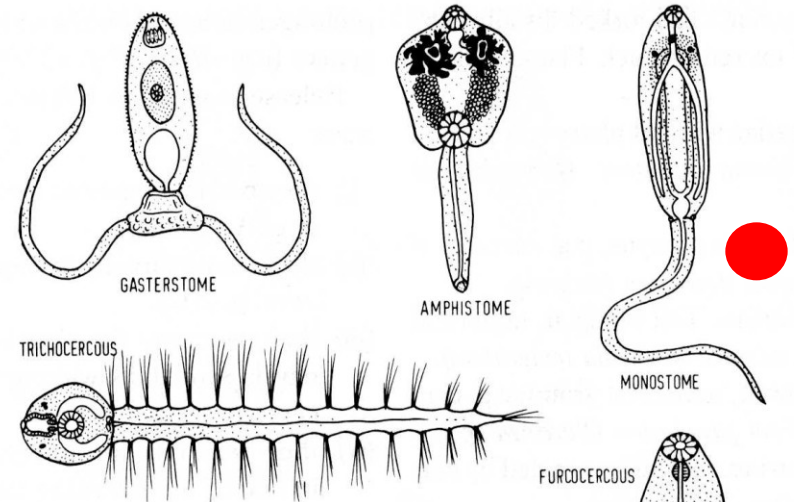
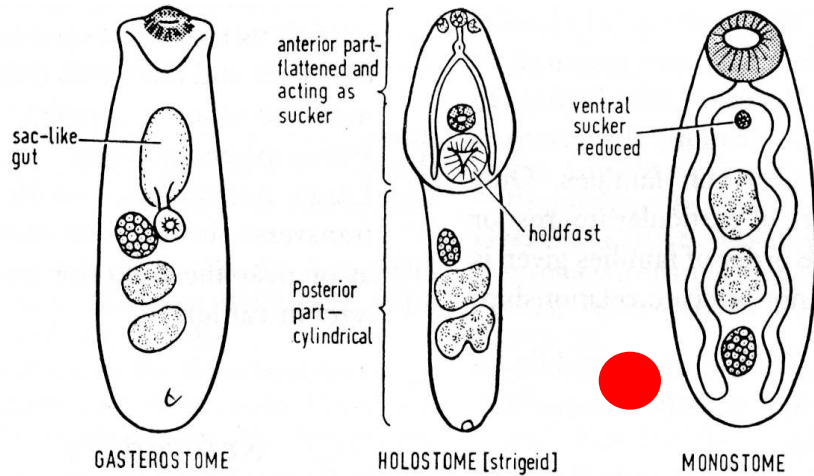


Obr. 3–11 Digenea. Vybrané morfologické typy cercárií. A – gymnocefalní, B – amfistomní, C – echinostomní, D – monostomní, E – xifidiocerkárie, F – furkocerkárie, G – mikrocerkárie, H – cercarieum (progenetické stadium). CZ – cystogenní žlázy, AC – acetabulum, OL – otrněný límec, ST – stylet, PZ – penetrační žlázy, OP – ocasní ploutvička, OK – ocasní kmen, FU – furka, EM – exkreční měchýř, UP – ústní přísavka, GE – germarium, TE – testis (A dle Swales, 1935, upraveno; B–H dle Našincová, 1992, upraveno).

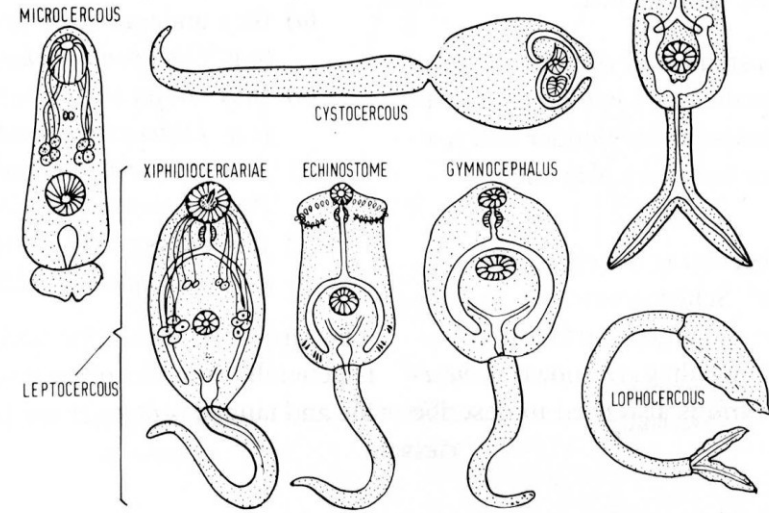
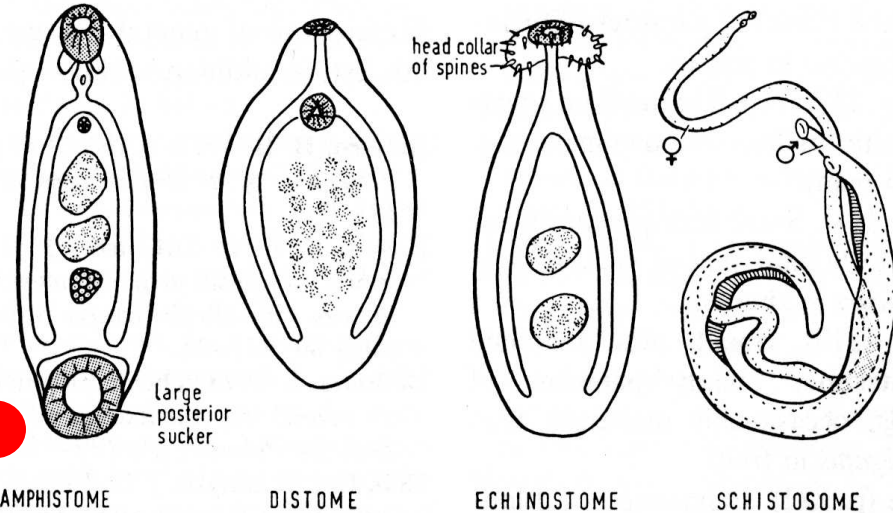
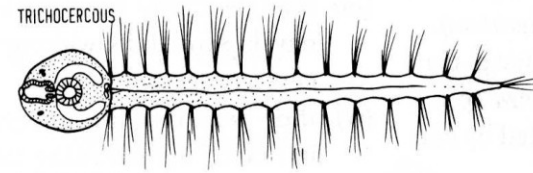
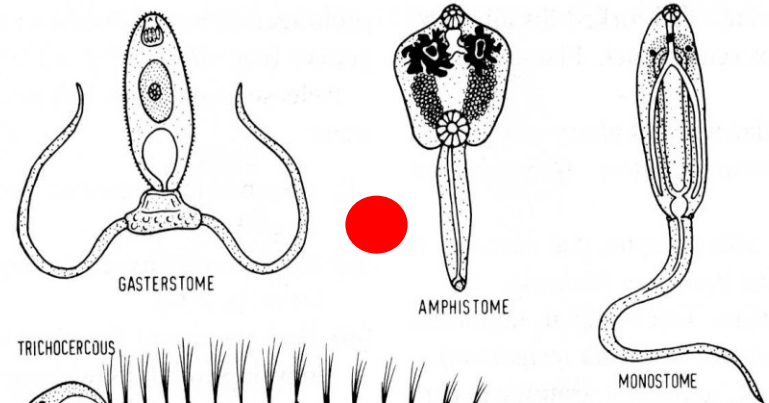
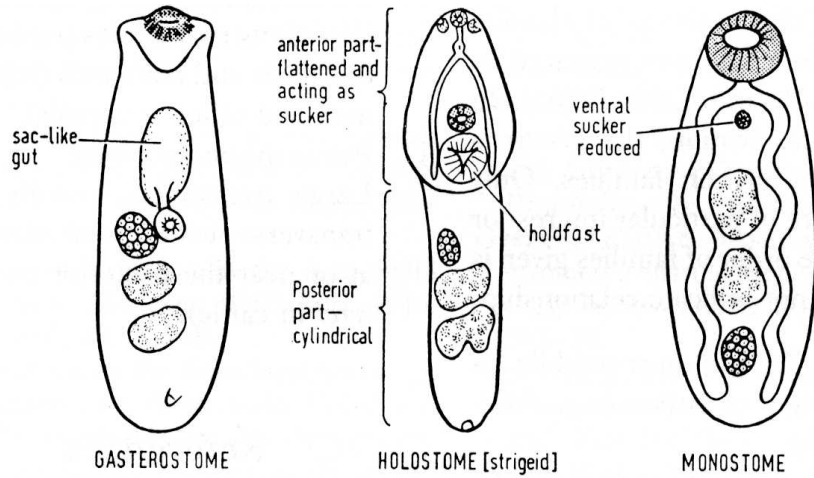
Morfologické typy motolic a cercárií



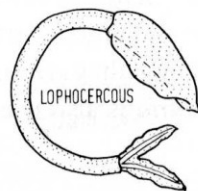
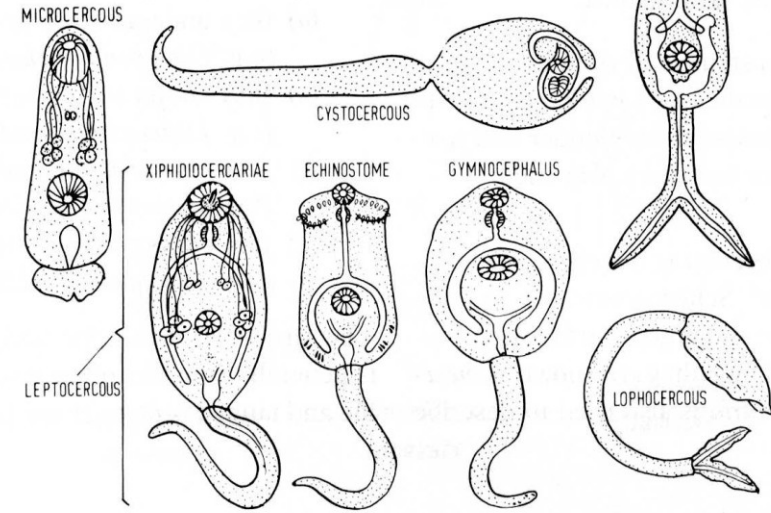
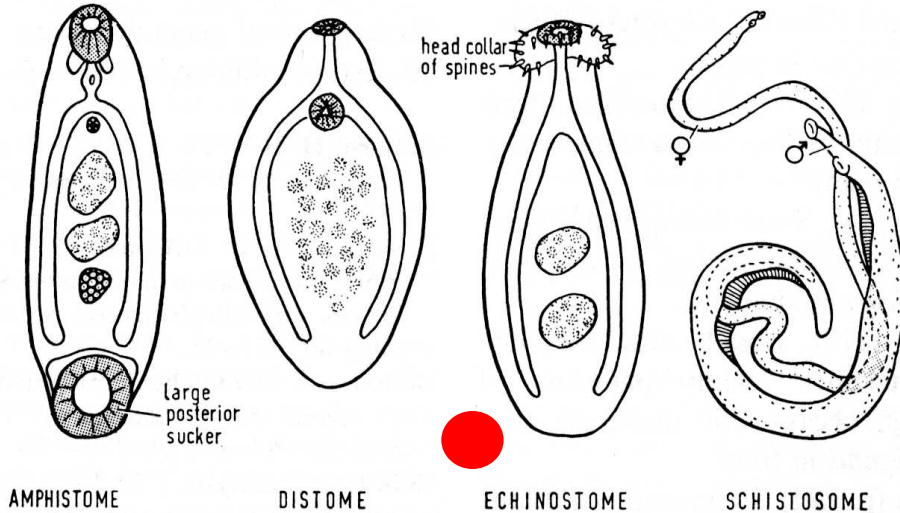
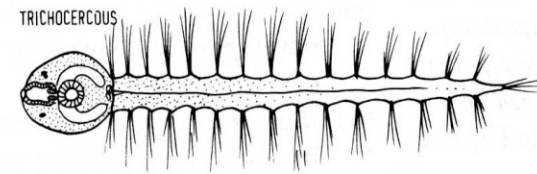
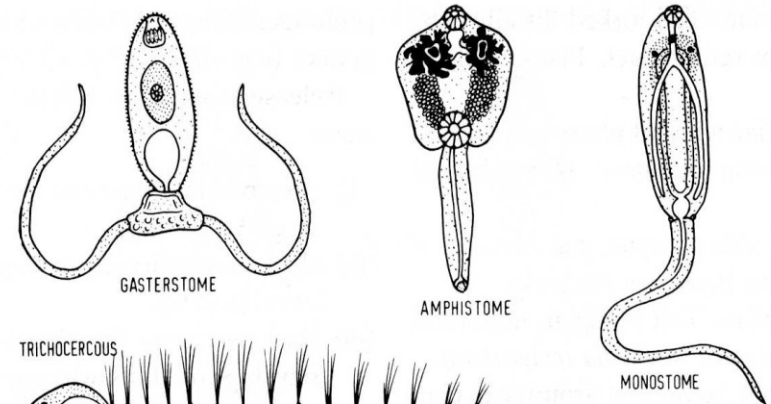
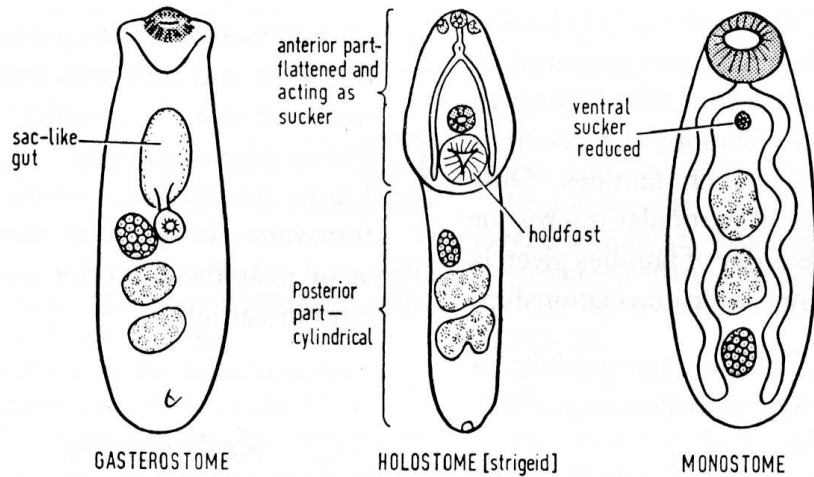
Morfologické typy motolic a cercárií



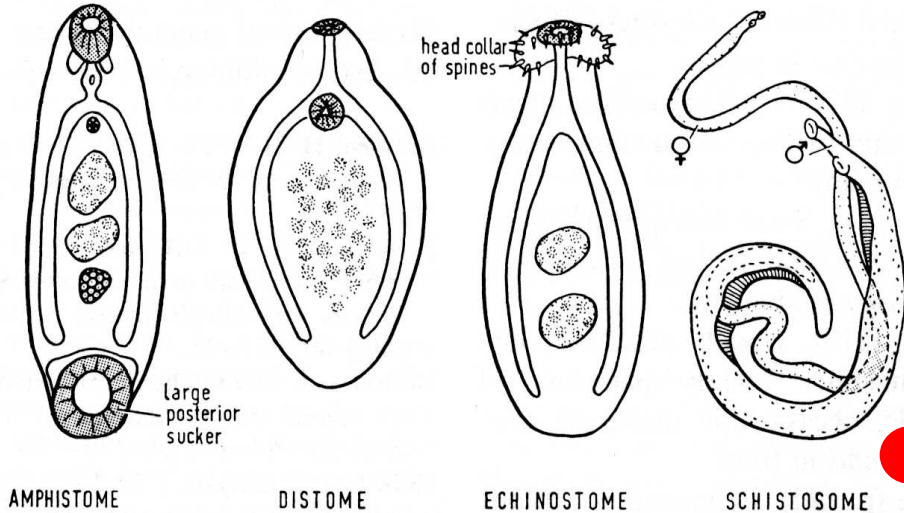
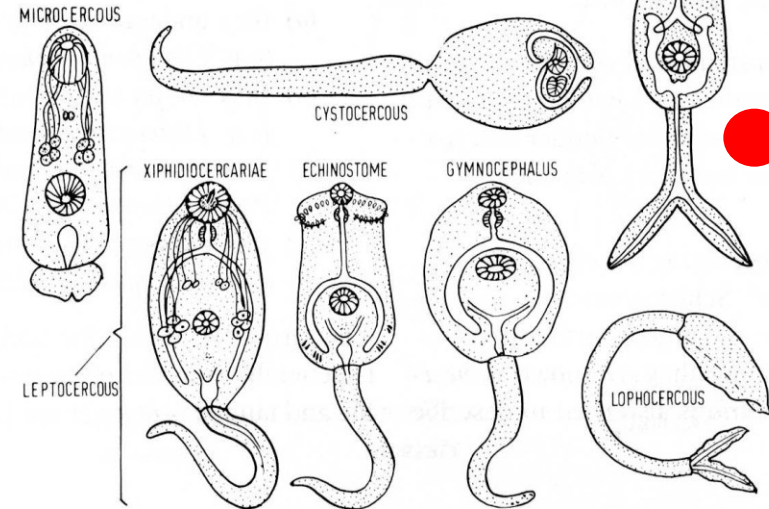
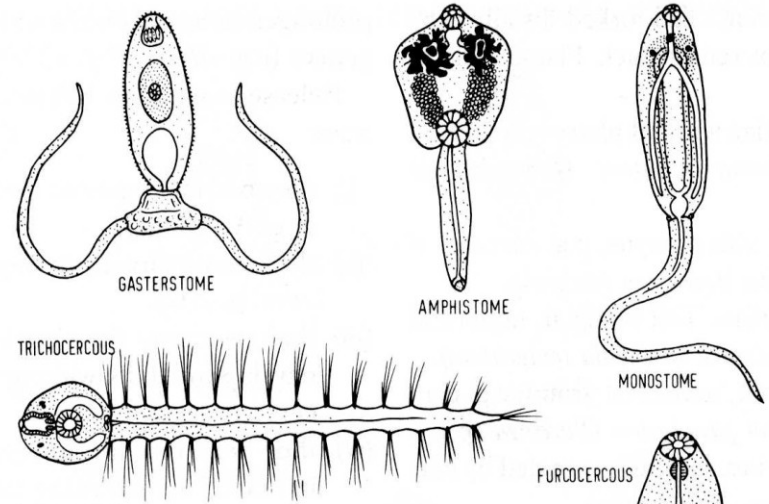
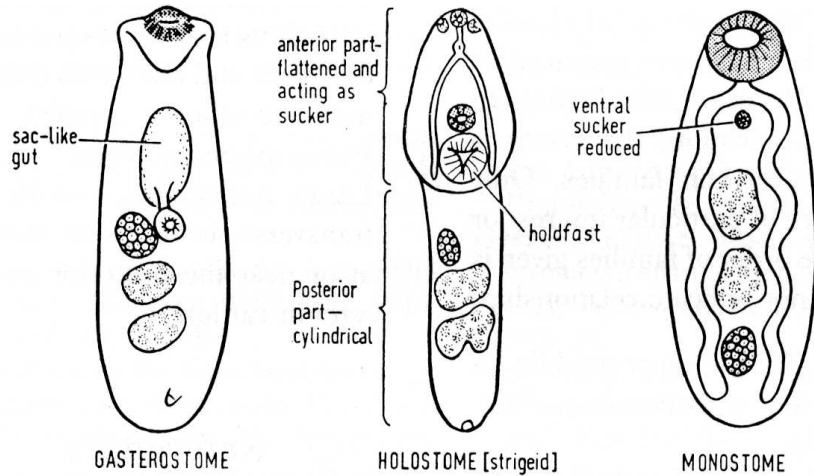
Morfologické typy motolic a cercárií



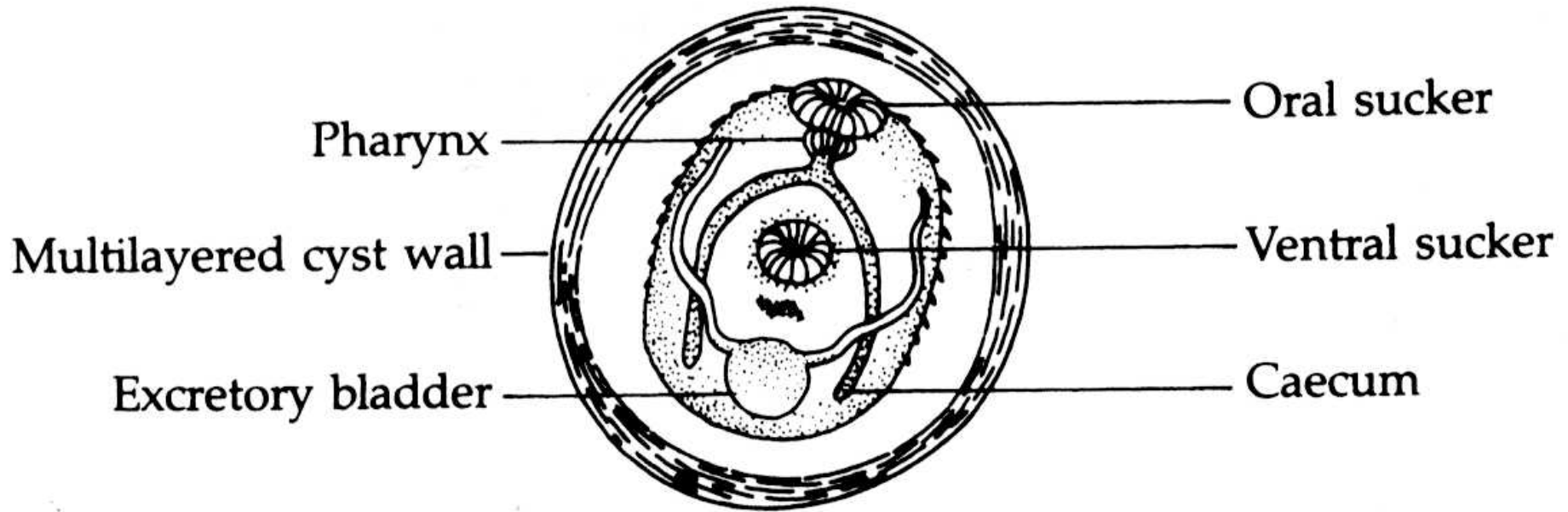
Morfologické typy motolic a cercárií



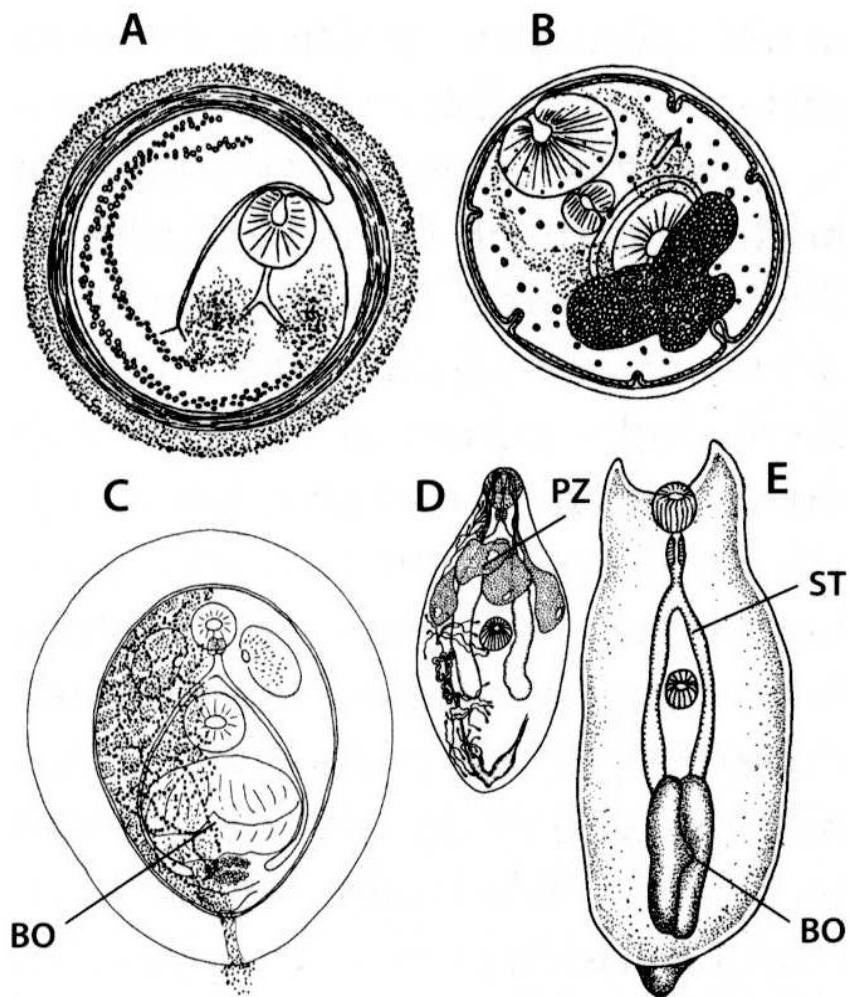
Morfologické typy motolic a cercárií



Metacerkárie - morfologie

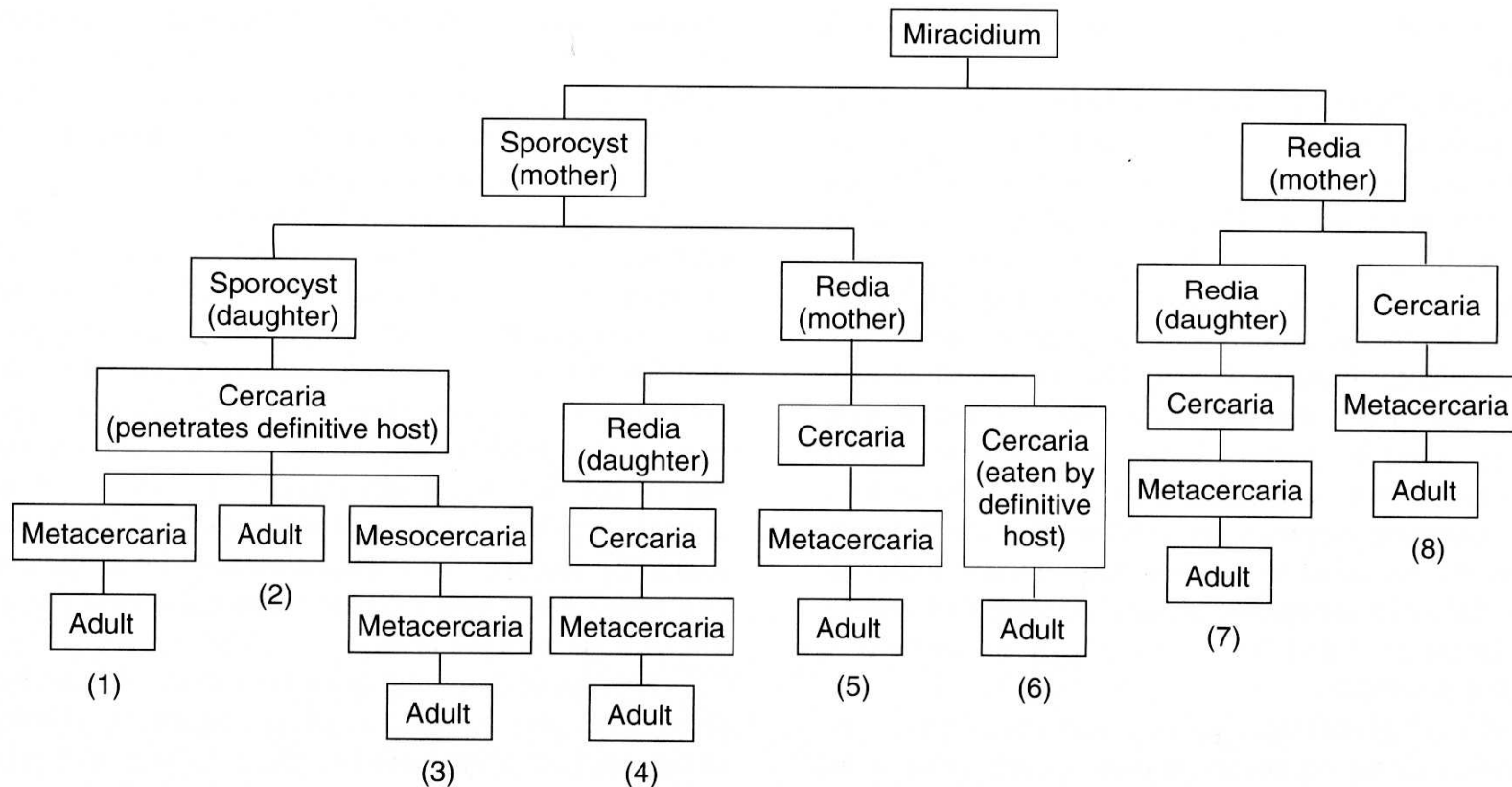


Metacerkárie



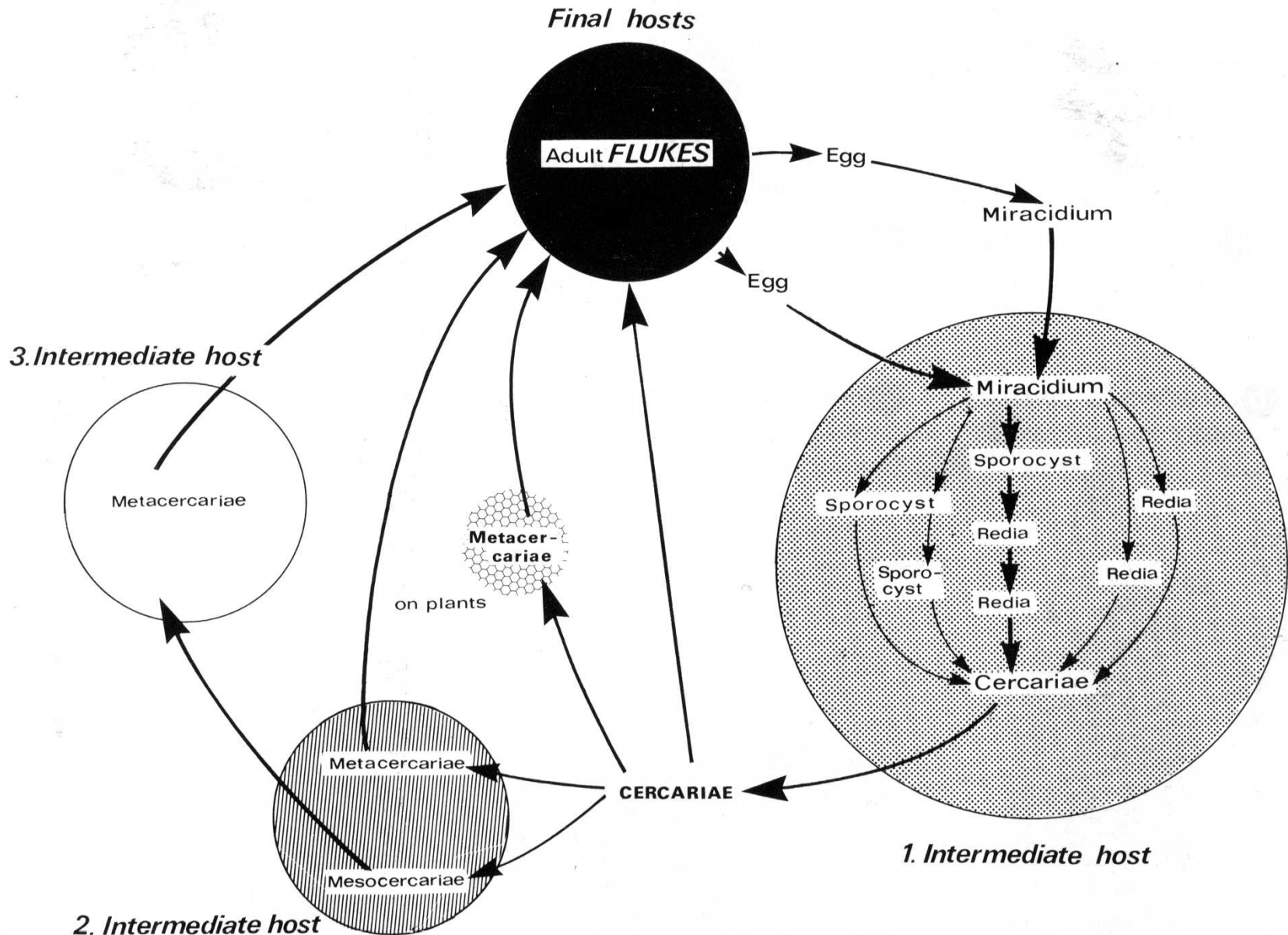
Obr. 3–12 Digenea. Vybrané typy metacerkárií. A – metacerkárie *Notocotylus attenuatus*, B – metacerkárie *Plagiorchis maculosus*, C – tetrakotyle *Cotylurus cornutus*, D – mezocerkárie *Alaria alata*, E – diplostomulum *A. alata*. BO – Brandesův orgán, PZ – penetrační žlázy, ST – střevo (A–C dle Našincová, 1992, upraveno; D, E dle Giňecinskaja, 1968, upraveno).

Typy vývojových cyklů motolic



- (1) *Diplostomum flexicaudum* (Cort and Brooks 1928)
- (2) *Trichobilharzia physellae* (Talbot 1936)
- (3) *Alaria mustelae* Bosma 1931
- (4) *Fasciola hepatica* Linnaeus 1758
- (5) *Metorchis conjunctus* (Cobbold 1860)
- (6) *Proterometra dickermani* Anderson 1962
- (7) *Stichorchis subtriquetrus* (Rudolphi 1814)
- (8) *Caecincola parvulus* Marshall and Gilbert 1905

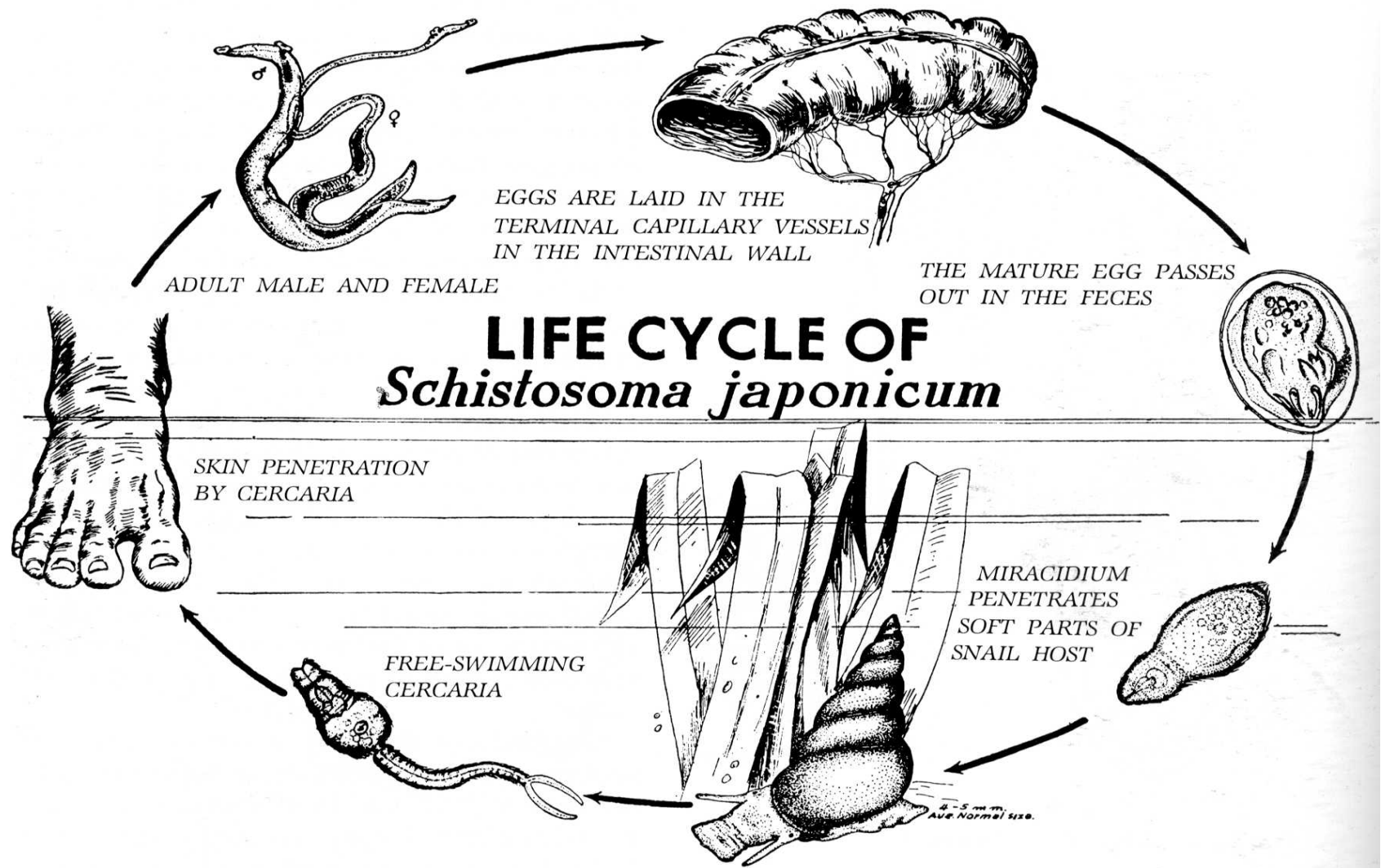
Životní a vývojové cykly motolic



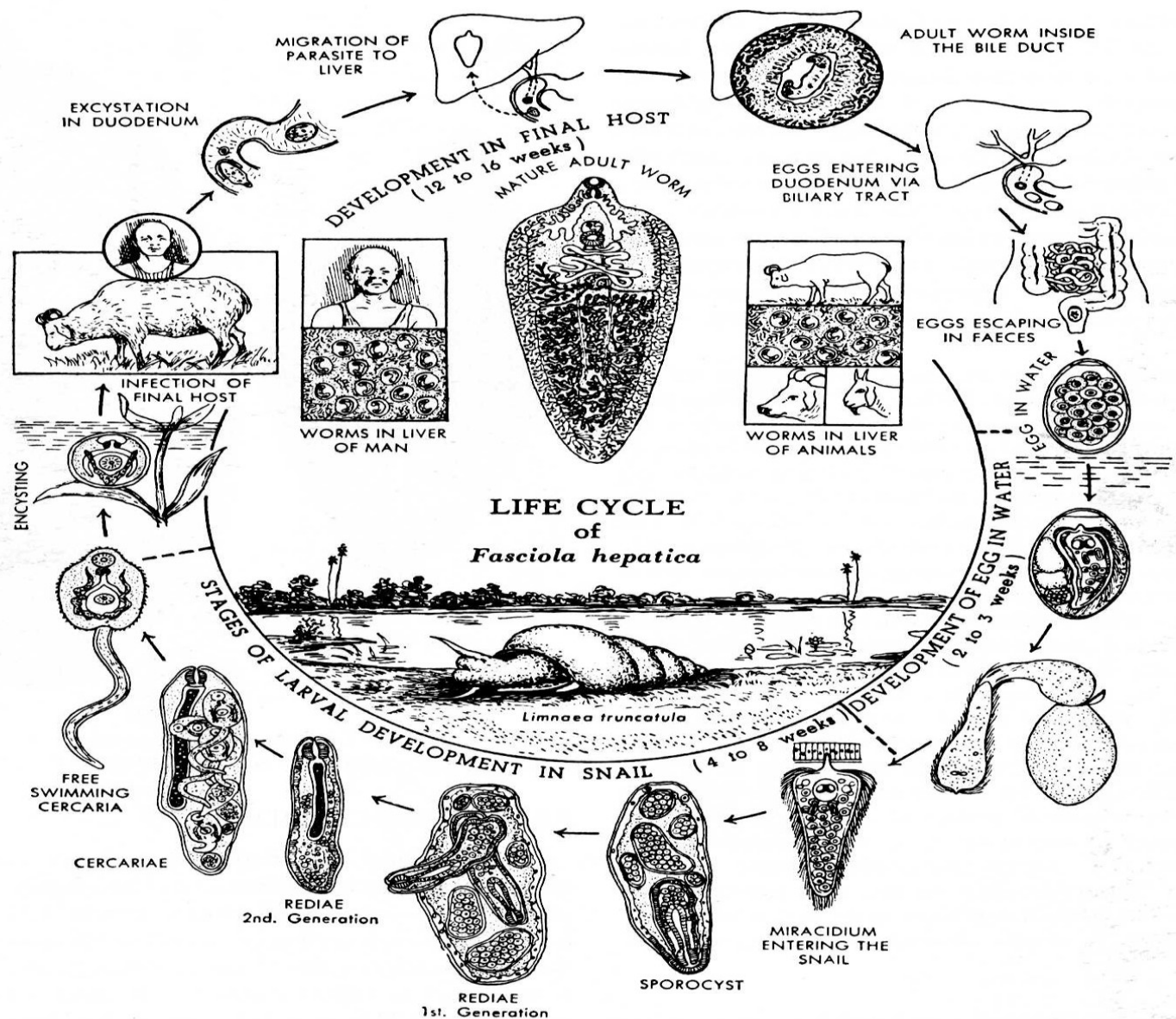
Vývojové cykly motolic

- Jednohostitelský – monoxenní
- Dvouhostitelský (dixenní) s přímou penetrací cercárií – **Schistosoma hematobium** ●
- Dvouhostitelský (dixenní) s adoleskárií – **Fasciola hepatica** ●
- Tříhostitelský (trixenní) – (savec - měkkýš – členovec) – **Paragonimus westermani** ●
- Tříhostitelský (trixenní) – savec – měkkýš – obratlovec – **Clonorchis sinensis** ●
- Čtyřhostitelský - tetraxenní

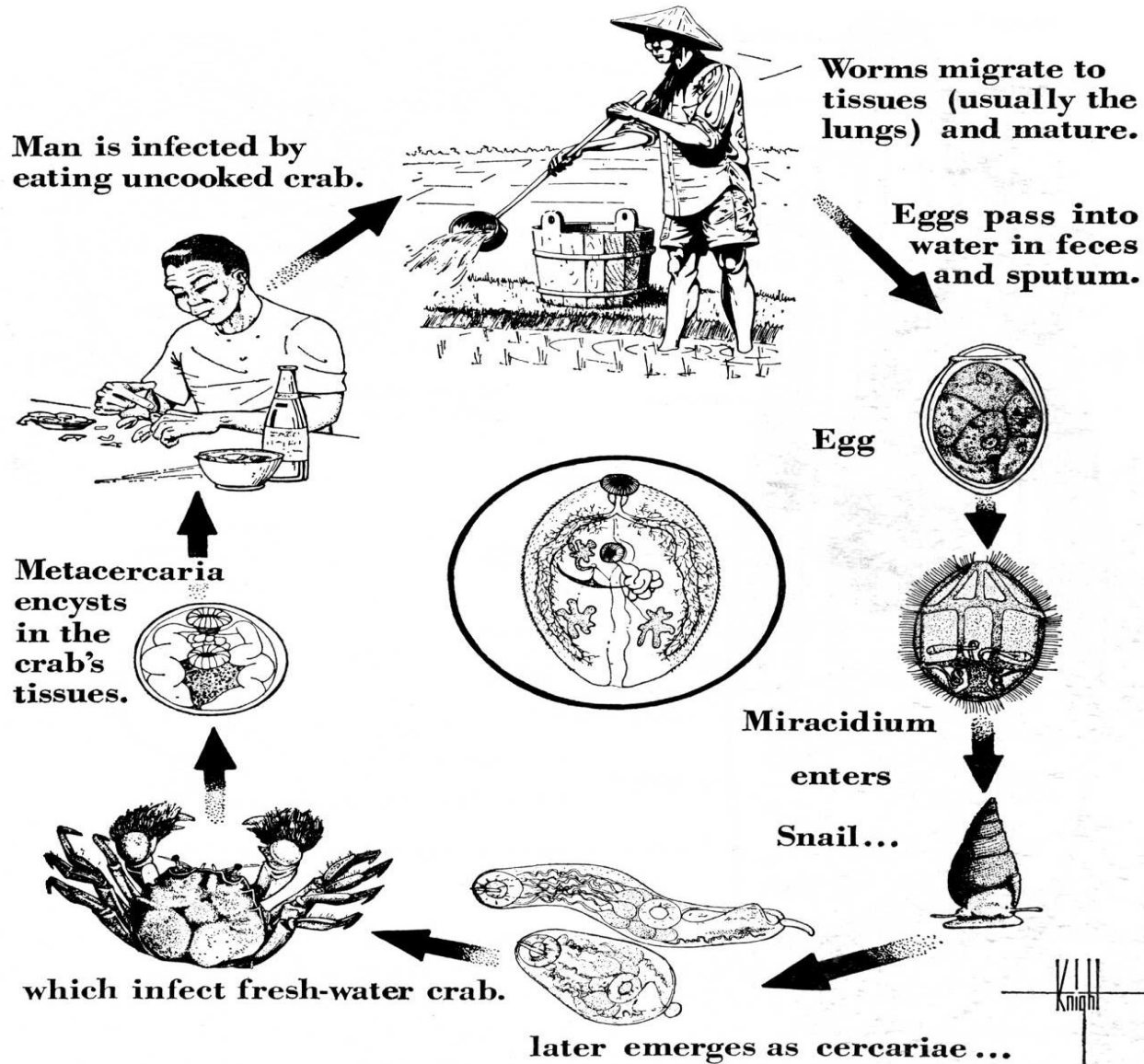
Dvouhostitelský (dixenní) s přímou penetrací cercárií – *Schistosoma japonicum* ●



Dvouhostitelský (dixenní) s adoleškárií – Fasciola hepatica ●



Tříhostitelský (trixenní) – (savec - měkkýš – členovec) – *Paragonimus westermani* ●



Tříhostitelský (trixenní) – savec – měkkýš – obratlovec – **Clonorchis sinensis** ●

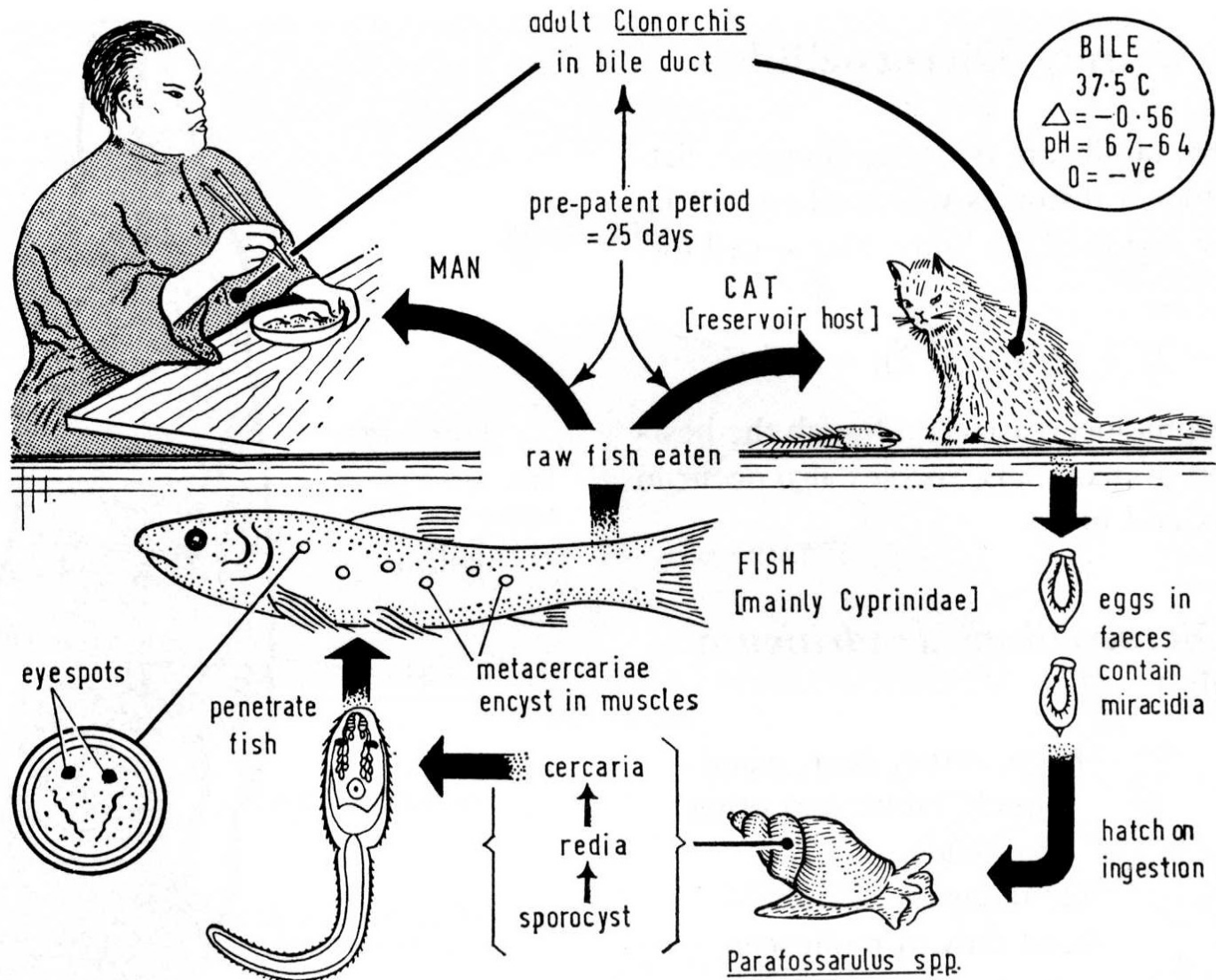


Schéma životních cyklů motolic napadajících člověka

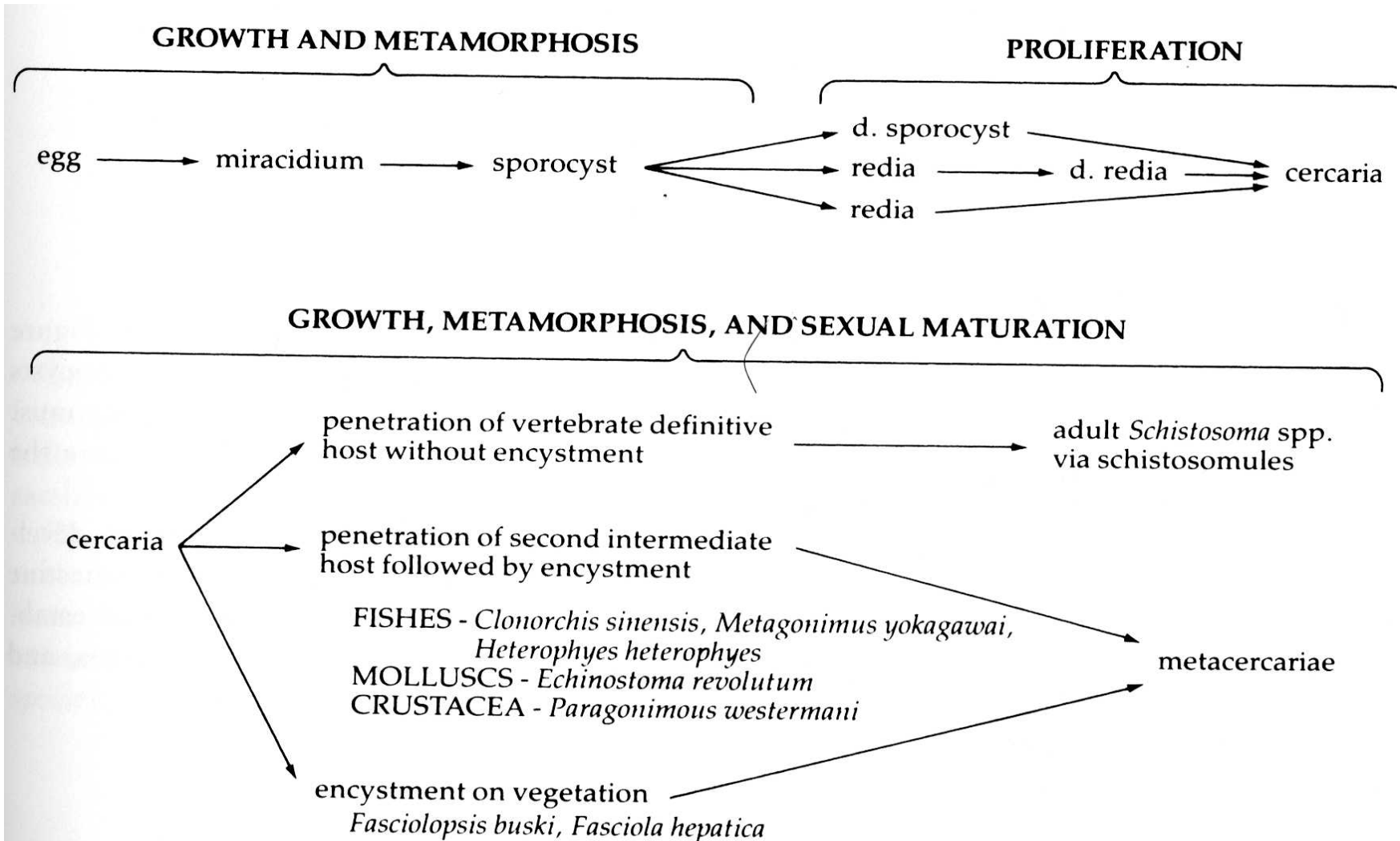


FIGURE 9-17

Flowchart showing life cycles of trematodes that infect humans.

Klasifikace – přehled hlavních skupin I

- Sanguinicolidae
- Aporocotylidae
- Transversotrematidae
- Paramphistomatidae
 - **Gastrodiscoides hominis**
- Paragonimidae
 - **Paragonimus westermani**
- Plagiorchidae
- Dicrocoellidae
 - **Dicrocoelium dentriticum**

Klasifikace – přehled hlavních skupin II

- Fasciolidae
 - **Fasciola hepatica**
 - **Fasciolopsis busci**
- Heterophyidae
 - **Heterophyes heterophyes**
 - **Metagonimus yokogawai**
- Opistorchidae
 - **Opistorchis felinus**
 - **Opistorchis viverrini**
 - **Clonorchis sinensis**
- Echinostomatidea
 - **Echinostoma revolutum**
- Troglotrematidae
- Notocotylidae
- Bucephalidae

Klasifikace – přehled hlavních skupin III

- Didymozzoidea
- Hemiuridae
- Strigeidní motolice
- Strigeidae
- Diplostomatidae
- Schistosomatidae
 - **Schistosoma haematobium**
 - **Schistosoma mansoni**
 - **Schistosoma japonicum**
 - **Schistosoma intecalatum**
 - **Schistosoma mekongi**
 - **Trichobilharzia**
 - **Ornithobilharzia**

Hypotetická fylogeneze Digeneí

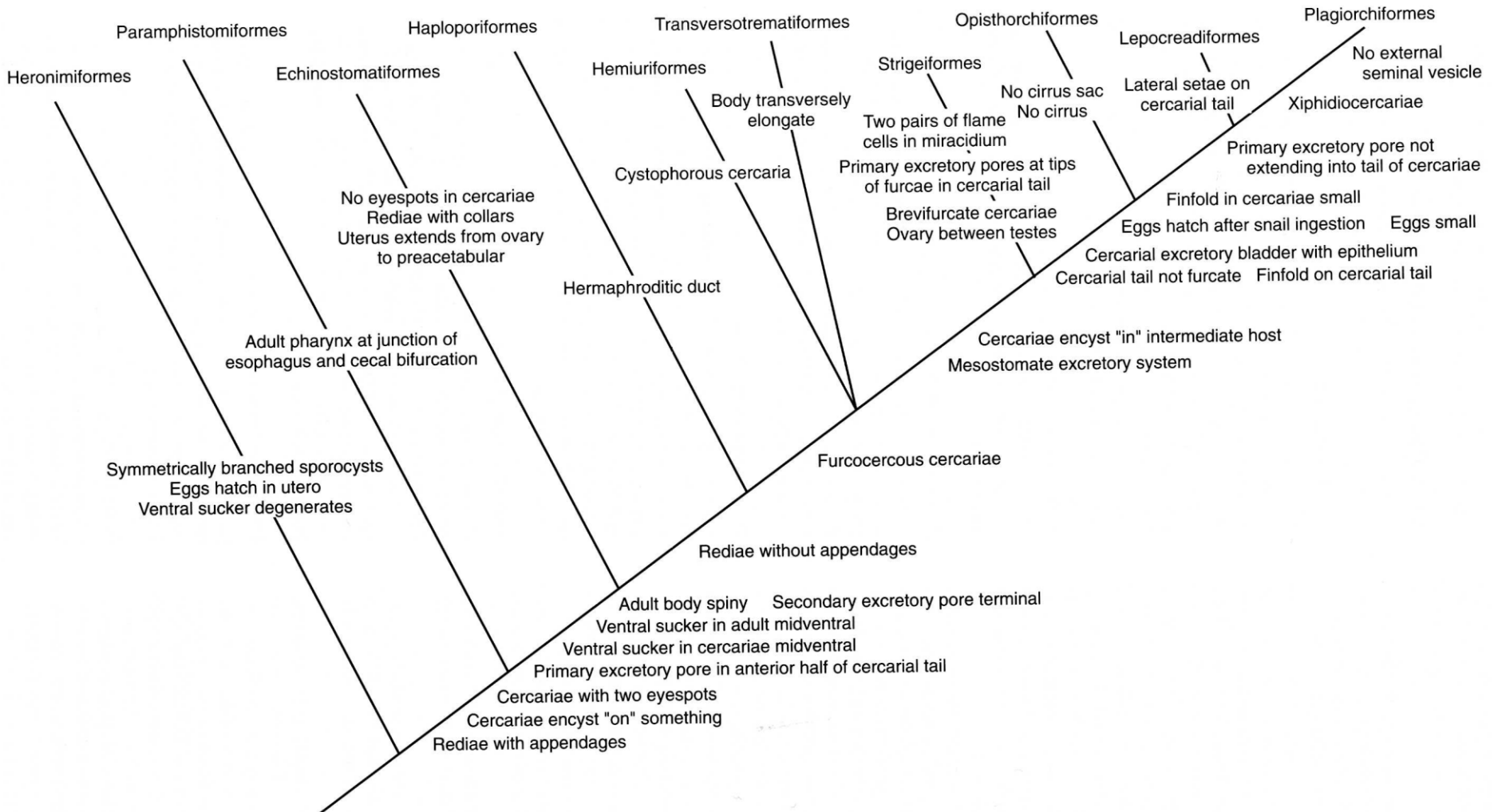


Figure 15.28 A hypothetical phylogenetic tree for the orders of Digenea.

Redrawn from Daniel R. Brooks and Deborah A. McLennan, *Parascript: Parasites and the language of evolution*. Copyright © 1993 by the Smithsonian Institution. Used by permission of the publisher.

Vývoj tegumenmtu - schisto

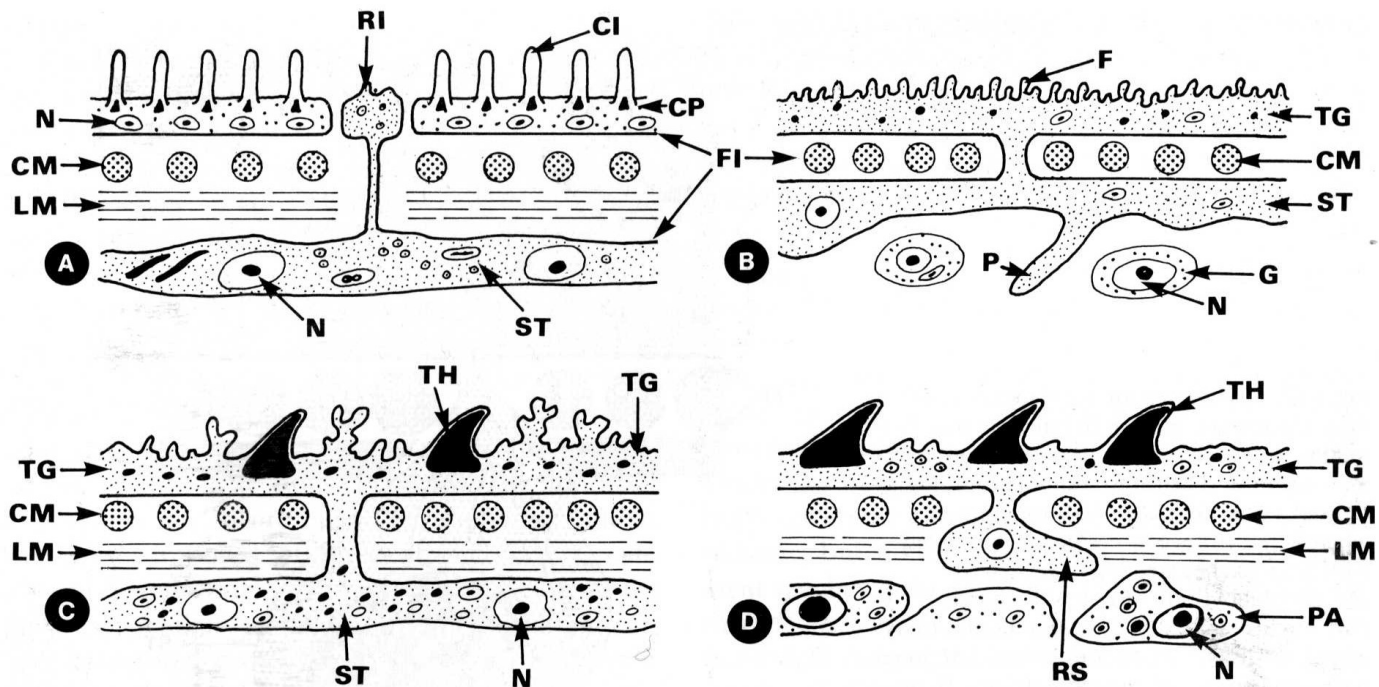


Fig.3.58 A-D. Diagrammatic representation of the development of the syncytial tegument in digeneans (*Schistosoma mansoni*). **A** Miracidium which is covered by ciliary plates and ridges formed by the subtegumental layer. **B** Mother sporocyst after detachment of ciliary plates. **C** Daughter sporocysts are covered by a syncytial tegument, which is connected by bridges with the subtegumental layer. **D** Cercariae: the subtegumental layer becomes reduced, and later paren-

chymal cells will contact the syncytial tegument. *CI*, Cilia; *CM*, circular muscles; *CP*, ciliary plate; *F*, foldings; *FI*, fibrous layer; *G*, germinal cells; *LM*, longitudinal muscles; *N*, nucleus; *P*, protruding subtegument; *PA*, parenchymal cell; *RI*, ridge; *RS*, remnants of the subtegument; *ST*, subtegumental layer; *TG*, tegument; *TH*, tegumental thorn (hook)

Samičí reprodukční soustava schisto

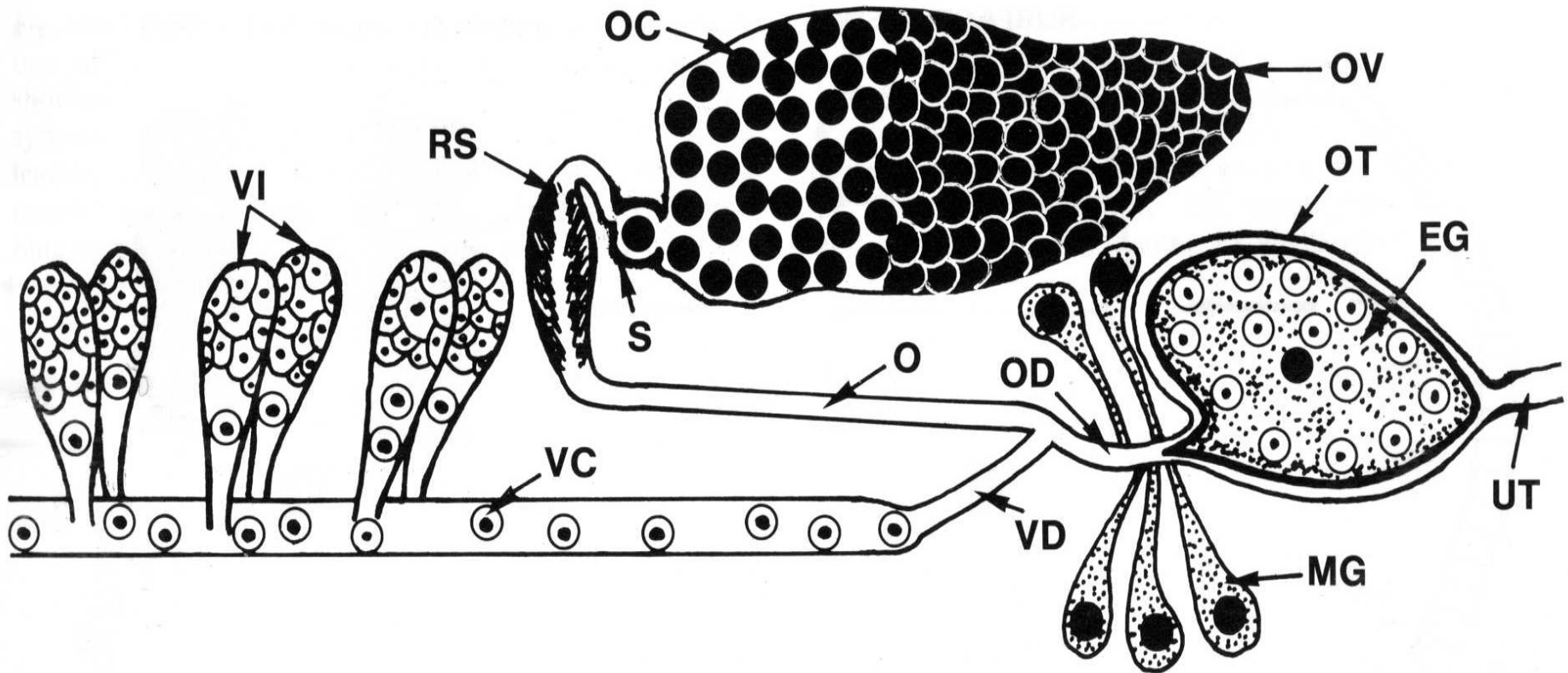


Fig.3.97. Diagrammatic representation of the reproductive organs of a female of *Schistosoma mansoni* (after Gönner 1955 and Mehlhorn and Piekarski 1981). *EG*, Egg (containing the zygote and vitellary cells); *MG*, Mehlis's glands;

O, oviduct; *OC*, oocyte; *OD*, ovovitellary duct; *OT*, oocyte; *OV*, ovary; *RS*, receptaculum seminis; *S*, sphincter; *UT*, uterus; *VC*, vitellary cell; *VD*, vitellary duct; *VI*, vitellarium