

Parazitiční červi – helminti

Kmen

PLATYHELMINTHES

NEMATODA

ACANTHOCEPHALA

ANNELIDA

Třída

TREMATODA

MONOGENEA

CESTODA

SECERNENTEA

ADENOPHOREA

HIRUDINEA

MONOGENEA (Jednorodí) „ŽÁBROHLÍSTI“

Převážně **EKTOPARAZITI** vodních živočichů

Trávicí soustava ANO, slepě zakončena

Hermafroditi, oplození vnitřní

Larva volně pohyblivá – vyhledání hostitele

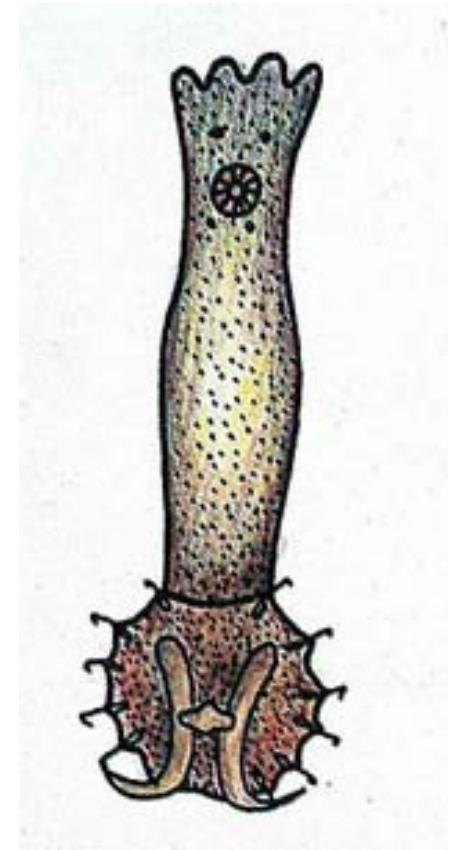
Přímý vývoj

Vysoká hostitelská a tkáňová specifita

Fixace na hostitele:

přichycovací disk na konci těla – **OPISTHAPTOR**

na haptoru: **háčky, svorky, přísavné destičky, přísavky**





ADVARSEL! WARNING! ACHTUNG!

GYRODACTYLUS SALARIS

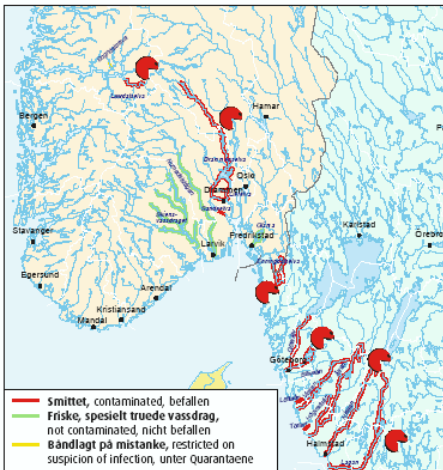


Norge, Norway, Norwegen

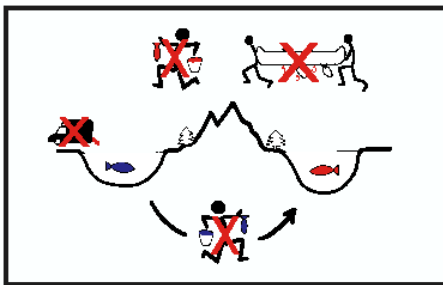


Foto: Tor Arne Mo

Lakseparasitten *Gyrodactylus salaris* (størrelse - 0,5 mm).
The salmon parasite *Gyrodactylus salaris* (size - 0,5 mm).
Der Lachseparasit *Gyrodactylus salaris* (Größe - 0,5 mm).



Utbredelsen av *Gyrodactylus salaris* i Sør-Norge.
The occurrence of *Gyrodactylus salaris* in South Norway.
Die Ausbreitung von *Gyrodactylus salaris* in Süd Norwegen.



Unngå transport av vann og/eller fisk mellom vassdrag.
Prevent transport of water and/or fish between watercourses.
Verhindern transport von Wasser und/oder Fischen.

⚠️ VÆR PÅ VAKT! SMITTSOM LAKSEPARASITT

Lakseparasitten *Gyrodactylus salaris* finnes i en rekke vassdrag i Norge. I Sør-Norge er parasitten tilstede i Drammensvassdraget med Begna og Lierelva, og i Lærdalselva. I Begna er *G. salaris* funnet på regnbueørret, som er en god vert for parasitten. Også harr og røye kan ha *G. salaris* i lang tid. Parasitten finnes også i noen svenske vassdrag. Disse forekomstene representerer en trussel for de øvrige lakseførende vassdragene i Sør-Norge. Parasitten *G. salaris* tar livet av lakseungene av den atlantiske stammen.

Hjelp oss å forhindre spredning av *Gyrodactylus salaris*

- Det er forbudt å flytte fisk og/eller vann fra vassdrag som er eller kan være smitta med *G. salaris*.
- **TORK ELLER DESINFISER** alt utstyr som har vært i kontakt med vann fra ei elv før det brukes i andre vassdrag. Dette gjelder fottøy, fiskeutstyr, båter, påhengsmotorer, beholdere med vann osv.
- Ikke vask og sløy fisk andre steder enn på langststedet.
- Ikke tøm vann i andre vassdrag enn der det ble hentet.

⚠️ WARNING! CONTAGIOUS SALMON PARASITE

The salmon parasite *Gyrodactylus salaris* is present in many Norwegian rivers. In the southern part of Norway the parasite is established in River Lierelva and river Drammenselva with Begna and in River Lærdalselva. In River Begna *G. salaris* is found on rainbow trout, who is a good host for the parasite. Grayling and char can also carry *G. salaris* for a long time. The parasite is also present in some Swedish rivers. The occurrence of *G. salaris* in these rivers is a serious threat to Atlantic salmon in all parts of southern Norway. The parasite *G. salaris* cause high mortality to juvenile Atlantic salmon.

Help us to prevent spreading of *Gyrodactylus salaris*

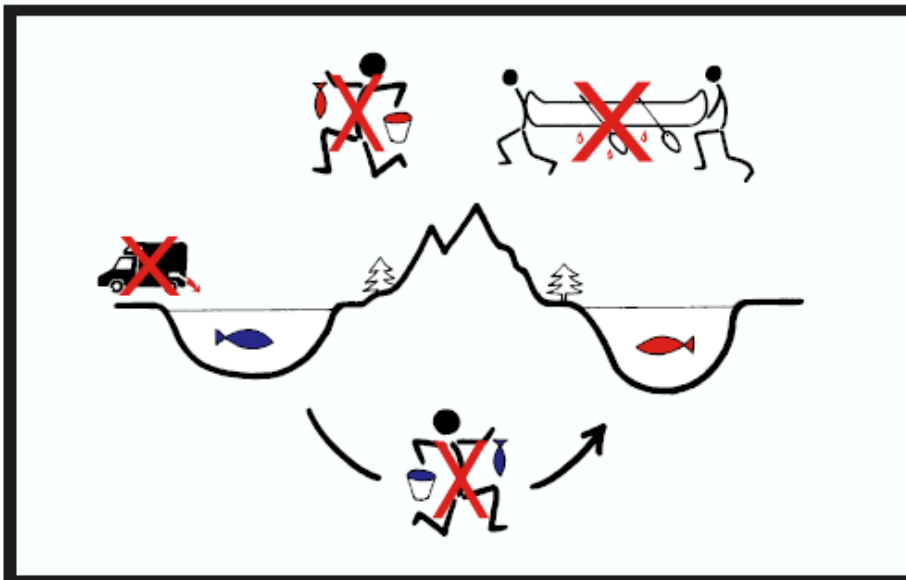
- It's forbidden to move fish and/or water from rivers or lakes that can be contaminated with *G. salaris*.
- **DRY THOROUGHLY OR DISINFECT** all fishing equipment, shoes, boats, outboards e.g. that has been in contact with freshwater before you use it in another river or lake.
- Do not clean the fish anywhere else but where it is caught.
- Do not move water or fish between rivers or lakes.

⚠️ SEI VORSICHTIG! GEFÄHRLICHER LACHSPARASIT

Der Lachs in den Flüssen Drammenselva mit Begna und Lierelva, und in Lærdalselva ist vom Parasiten *Gyrodactylus salaris* infiziert. In der Begna ist *G. salaris* an Regenbogenforellen, die für den Parasiten geeignete Wirte sind, gefunden worden. Auch Seesäbbling und Harr können *G. salaris* über längere Zeit beherbergen. Auch in einigen schwedische Flüssen kommt dieser Parasit vor. Diese Vorkommen bedeuten für andere, nicht vom Parasiten befallenen Lachsführenden Flüsse der Region Süd-Norwegen eine ernste Gefahr. Dieser Parasit tötet junge Lachse.

Hilf uns die Verbreitung von *G. salaris* zu verhindern!

- Es ist verboten Fische und/oder Wasser von einem Gewässer in ein anderes zu verbringen.
- **ALLE TEILE DER AUSRÜSTUNG DIE IN KONTAKT MIT WASSER WAREN MÜSSEN SORGSAM ABGETROCKNET ODER DESINFIZIERT WERDEN** bevor man sie in einem anderen Gewässer benutzen kann. Bedenke: Die Ausrüstung umfasst auch Stiefel, Kleider, anderes Zubehör, Fisch, Boot, Außenbordmotor, Trailer usw.
- Angel und sämtliches Zubehör sind vor Gebrauch unbedingt zu desinfizieren!
- Reinigung und ausnehmen von den Fisch ausschließlich dort wo er gefangen wurde.



Direktoratet for Naturforvaltning ☎ 73 58 05 00

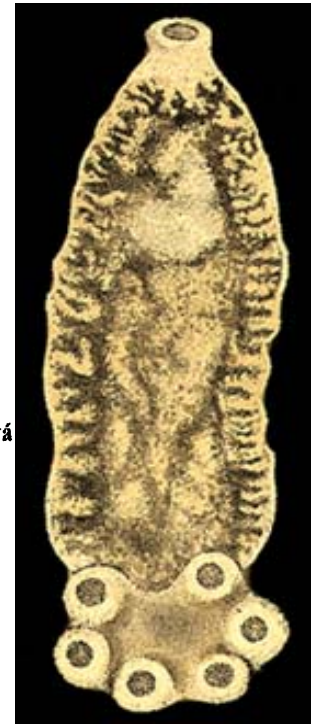
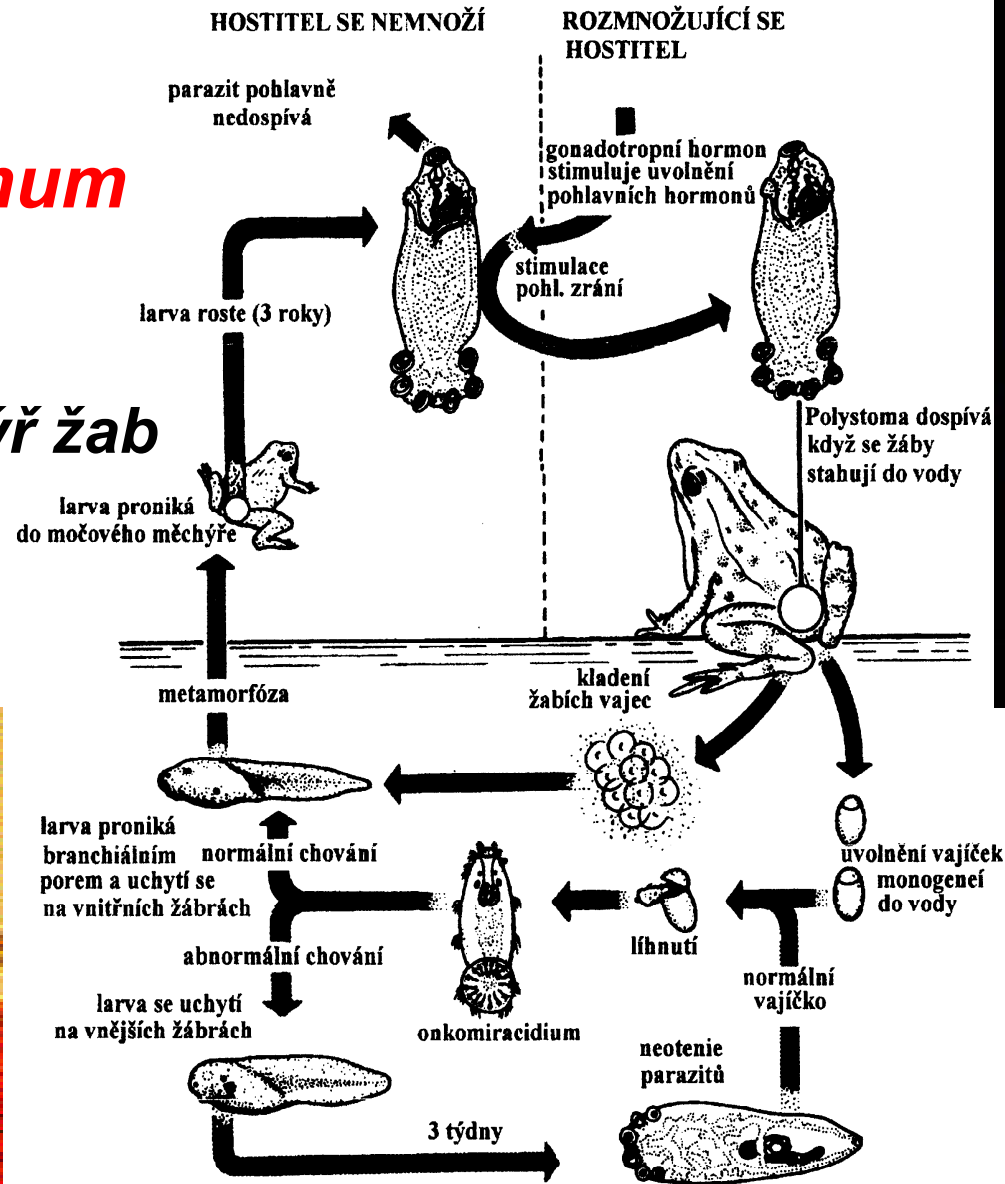
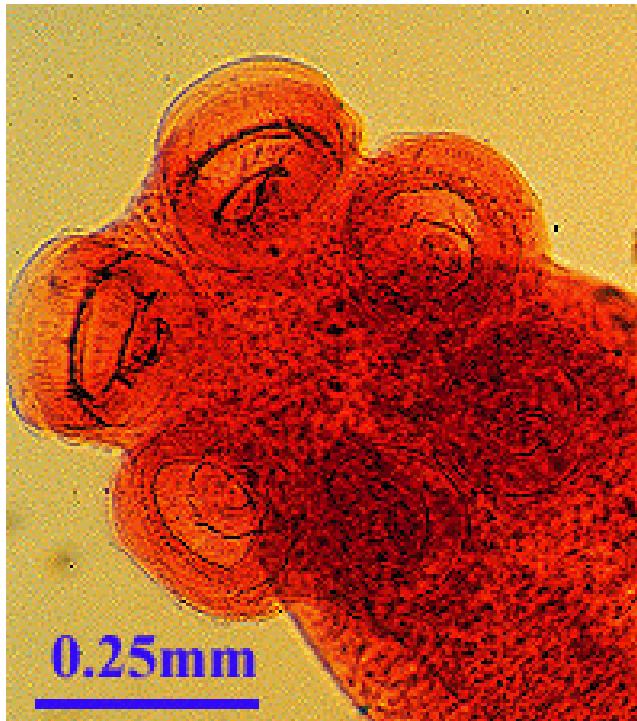
Mattilsynet (ditt distriktskontor) ☎ 06040

Mattilsynet

Polystoma integerrimum

Dospělci
– močový měchýř žab

Larvy
– žábra pulců



Obr. 53. Životní cyklus *Polystoma integerrimum* ukazující synchronizaci pohlavního zrání parazita s rozmnožovacím cyklem hostitele (Smyth 1994, upraveno)

Diplozoon paradoxum

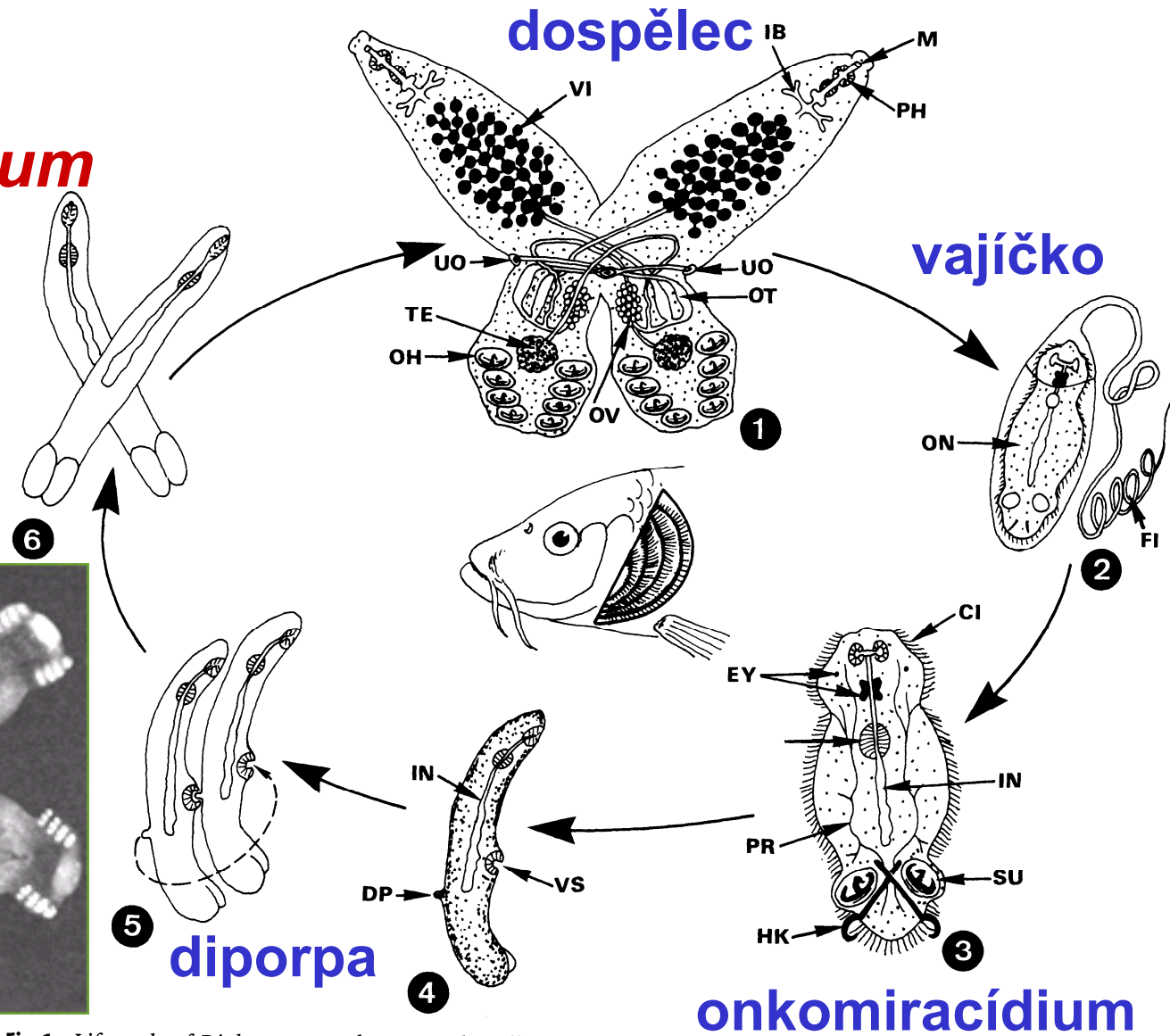
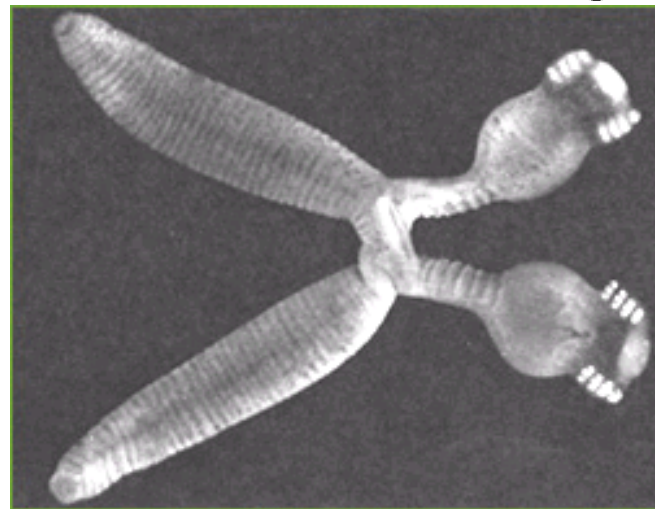


Fig. 1. Life cycle of *Diplozoon paradoxum* on the gills of cyprinid fish. 1 Adults on the gills of fish. 2 Egg with an oncomiracidium larva. 3 Free oncomiracidium. 4 After attachment to the gills of a host the oncomiracidium is transformed into the diporpas larva. 5, 6 Fusion of two diporpas on the host; each diporpa attaches its sucker (VS) to the dorsal papilla (DP) of the other. This process stimulates their maturation and cross-fertilization. The blood-sucking adults can live for years in this form of complete copulation. CI, cilia; DP, dorsal papilla; EY, eyes; FI, filament; HK, hook; IB, intestinal branch; IN, intestine; M, mouth; OH, opisthaptor with suckers; ON, oncomiracidium; OT, ootyp, OV, ovary; PH, pharynx; PR, → protonephridium; SU, sucker (clamps); TE, testis; UO, uterus opening; VI, → vitellarium (vitelline gland); VS, ventral sucker

Parazitiční červi – helminti (VERMES)

Kmen

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ANNELIDA

Třída

TREMATODA
MONOGENEA
CESTODA

SECERNENTEA
ADENOPHOREA

HIRUDINEA

Platyhelminthes

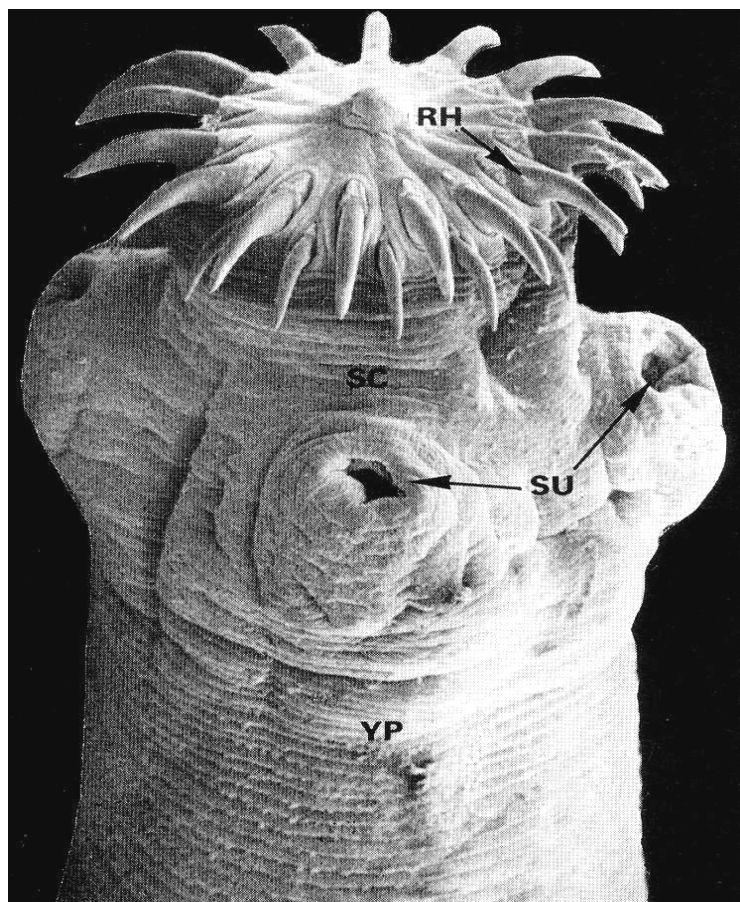
Třída **CESTODA (Tasemnice)**

(Gyrocotylida, Amphilinida, **Eucestoda**)

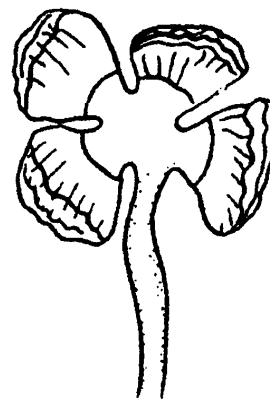
1. protáhlí endoparaziti, **především v zažívacím traktu obratlovců**
2. většinou segmentovaní, přichytné orgány na předním konci
3. **bez trávicí trubice**
4. složité vývojové cykly (přechod vývojových stádií na základě potravních vztahů MH a DH)
5. **Hermafroditi** (většinou)

TASEMNICE (CESTODA)

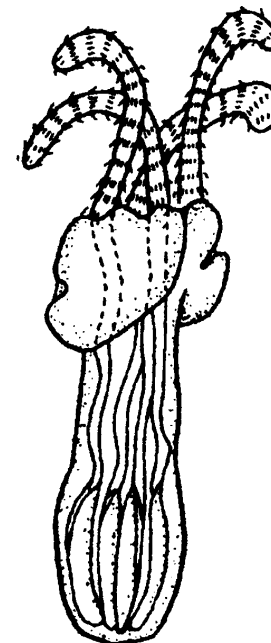
Typy hlaviček (skolex)



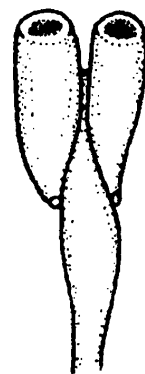
PSEUDOPHYLLIDEA
(*Diphylobothrium latum*)



TETRAPHYLLIDEA
(*Phyllobothrium*)



TRYPANORHYNCHA
(*Otobothrium*)



PSEUDOPHYLLIDEA
(*Bothridium*)



DIPHYLLIDEA
(*Echinobothrium*)



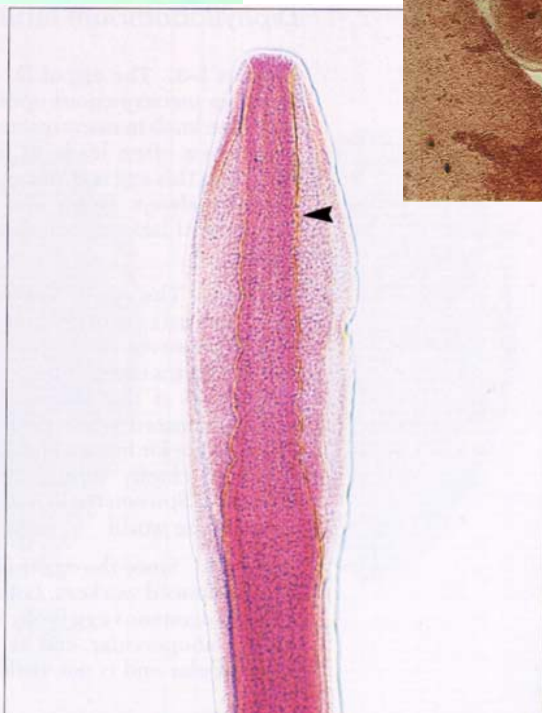
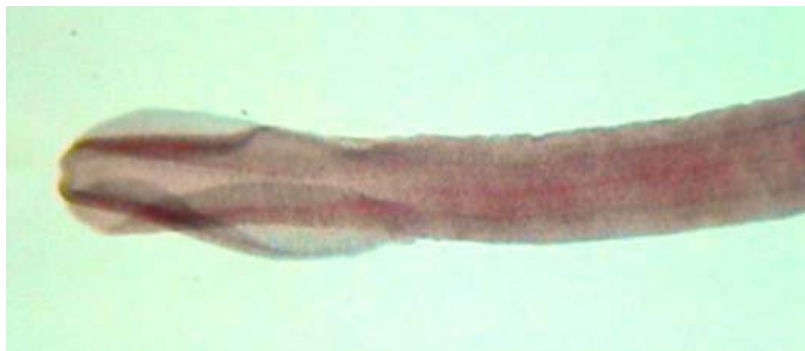
CYCLOPHYLLIDEA
(*Taenia solium*)

Obr. 5. Různé typy skolexů taseenic s přichycovacími orgány (Smyth 1994, upraveno)

Pseudophyllidea

(štěrbínovky)

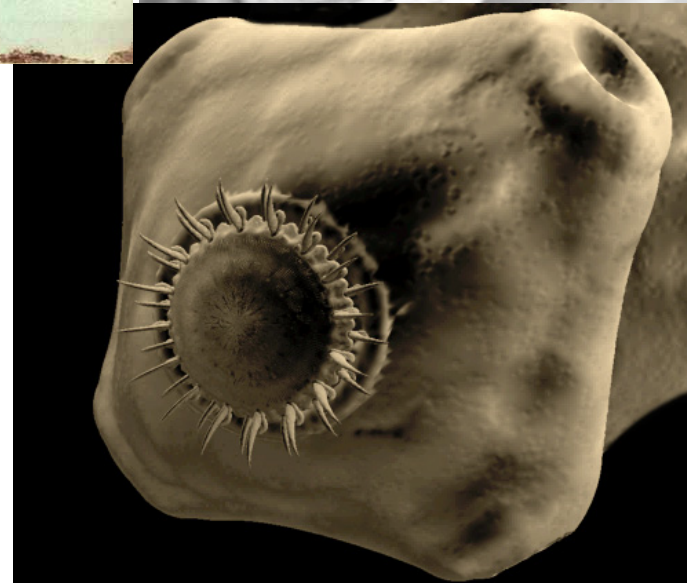
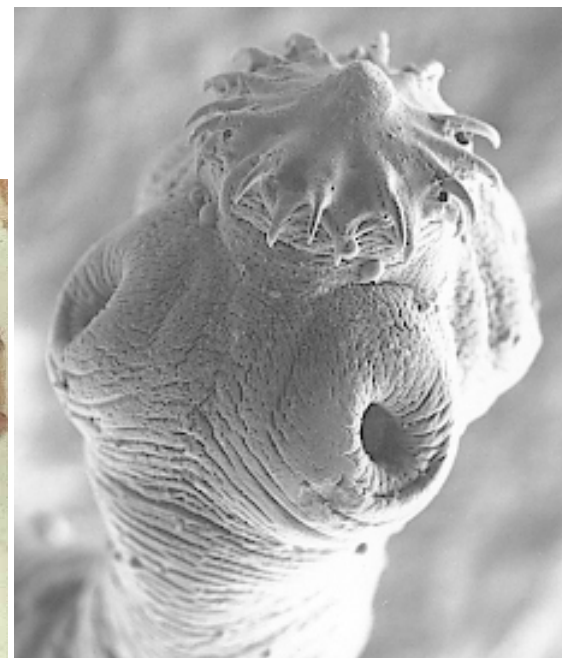
Štěrbiny = BOTRIE



Cyclophyllidea

(kruhovky)

4 přísavky



STROBILUM
(článkované tělo)

Proglotidy
PG
- články

články

Hymenolepis nana

Hlavička
SKOLEX

rostellární háčky

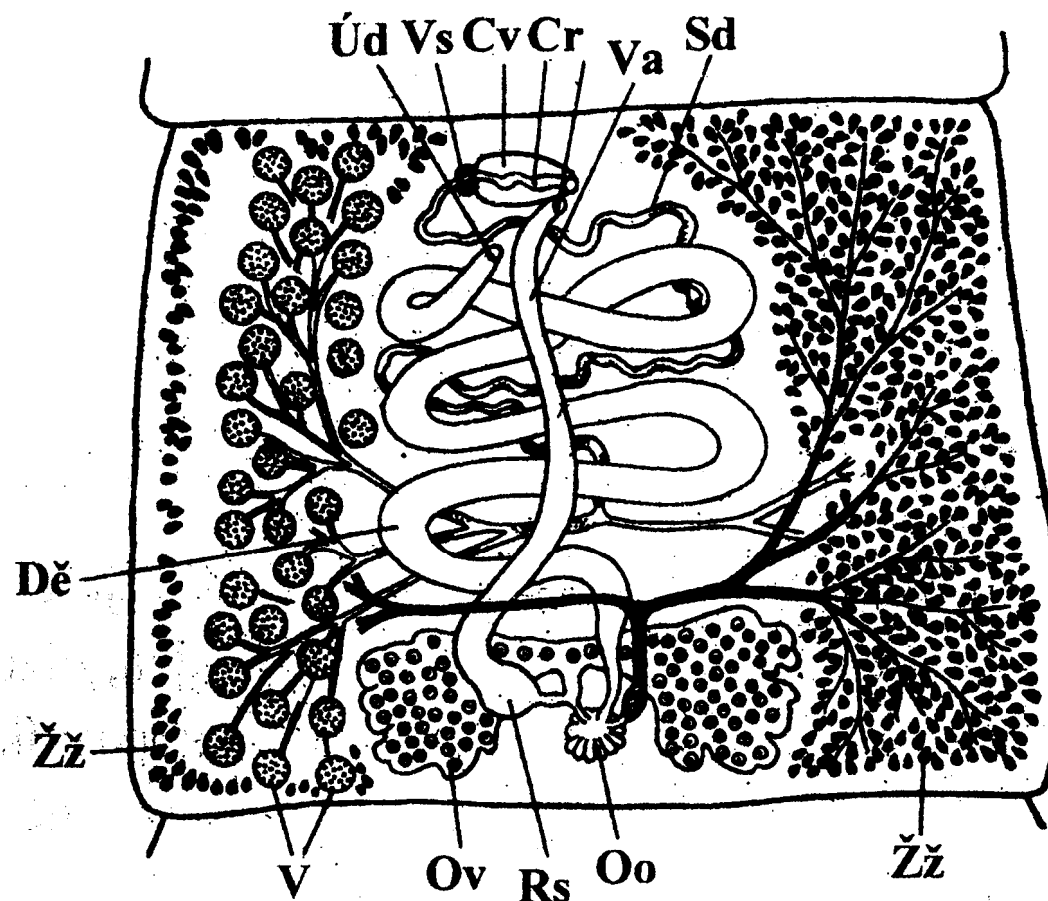
rostellum

4 přísavky

krček

Taenia sp.

el.
la.
os



Obr. 58. Schéma pohlavní soustavy v článku tasemnice skupiny Pseudophyllidea (Šulc a Gvozděv 1970, upraveno)

Cr-cirrus; Cv-cirrový váček; Dě-děloha; Oo-ootyp;
Ov-ovarium; Rs-receptaculum seminis; Sd-spermatický
kanál; Úd-vyústění dělohy; V-varlata; Va-vagina;
Vs-vesicula seminalis; Žž-žloutkové žlázy.

Pseudophyllidea

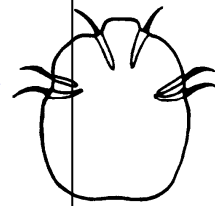
vajíčko

koracídium (obrvené)

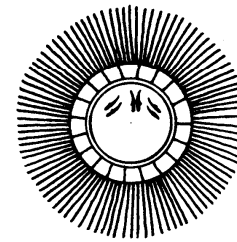
procerkoid (1. MH)

plerocerkoid (2. MH)

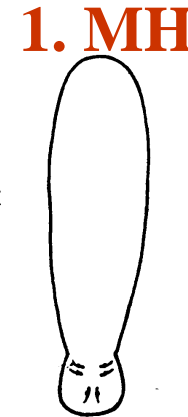
dospělá tasemnice (DH)



ONKOSFÉRA



KORACÍDIUM



PROCERKOID



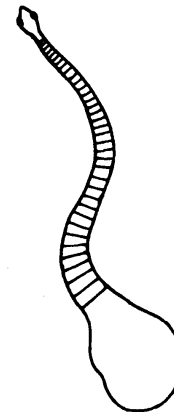
PLEROCERKOID

1. MH

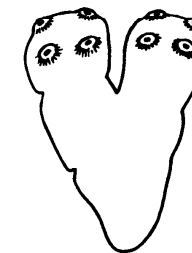
2. MH



CYSTICERKOID



STROBILOCERKUS



TETRATYRÍDIUM

Cyclophyllidea

vajíčko

larvocysty (boubele) v MH:

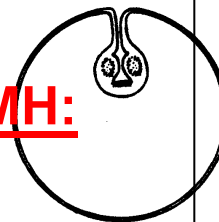
cysticercus

cysticerkoid

cenurus

echinokokus

dospělá tasemnice (DH)

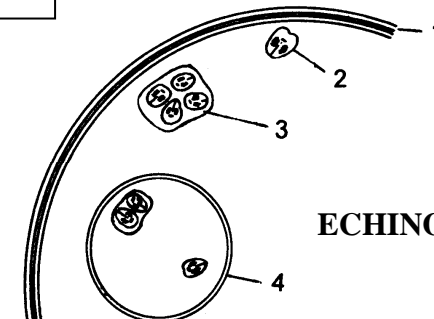


CYSTICERKUS



CÉNURUS

MH

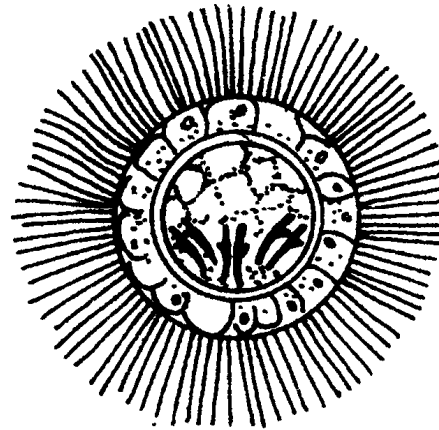


ECHINOKOKUS

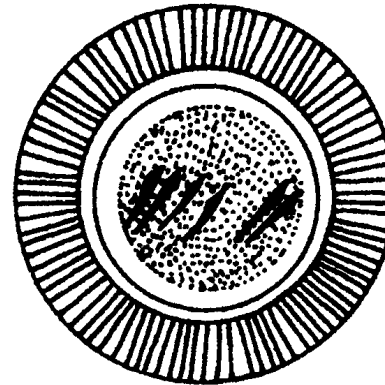
Pseudophyllidea

(štěrbínovky)

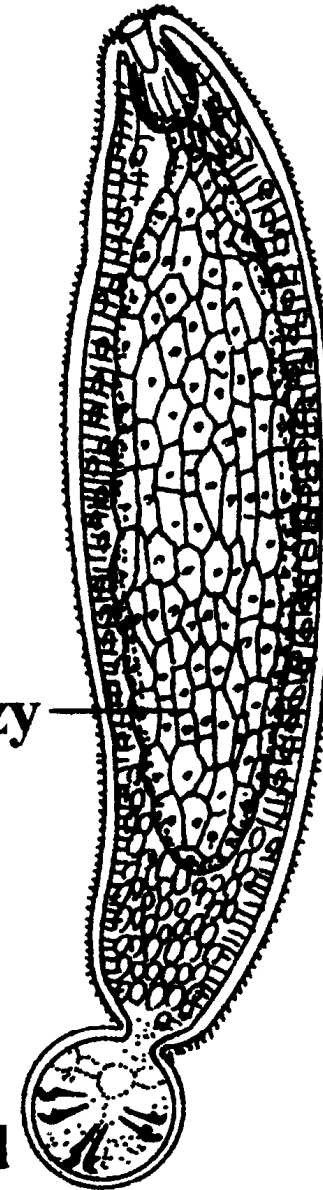
koracidium
(obrvená onkosféra)



onkosféra
(ve vajíčku)



žlázy



procerkoid

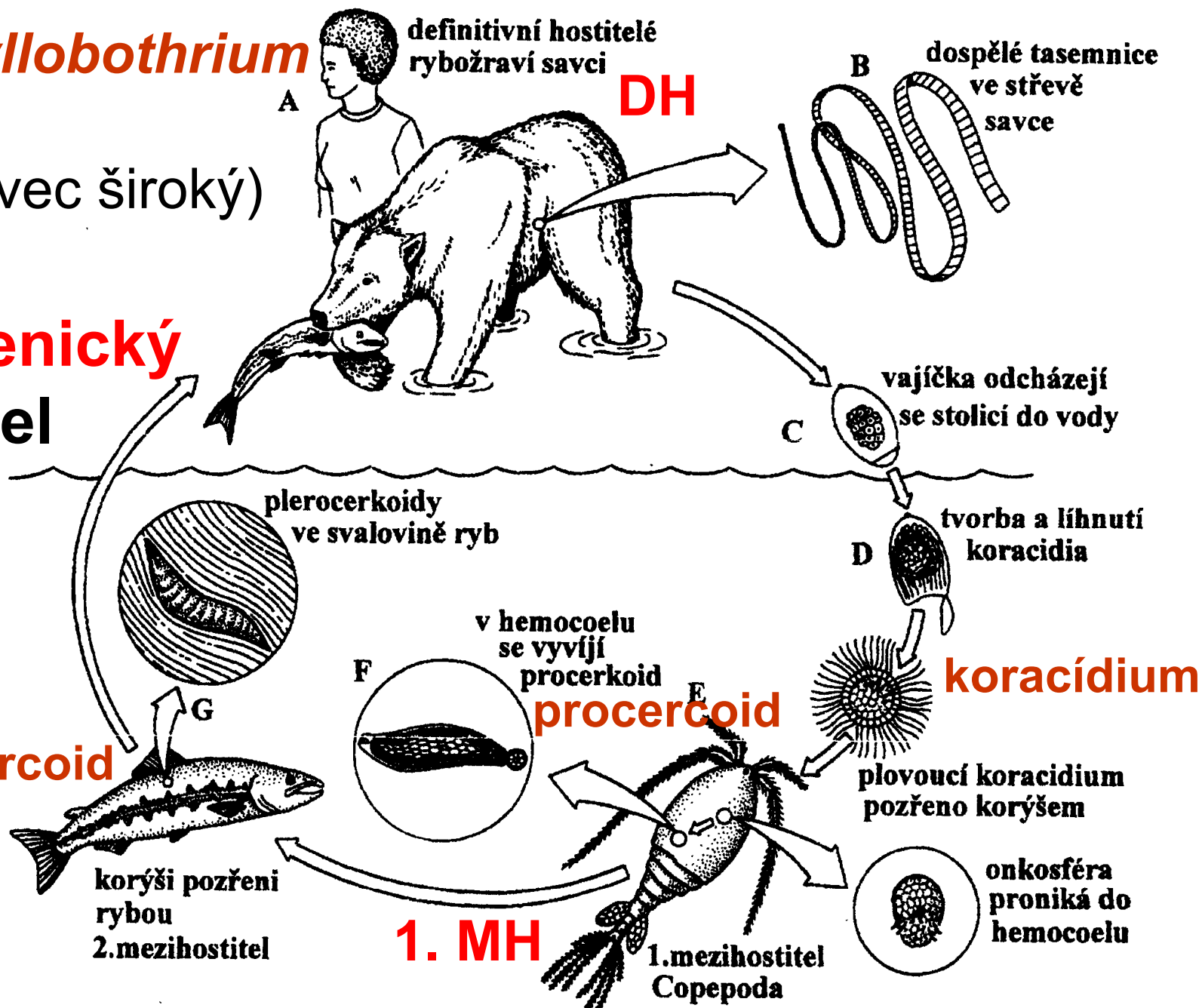
Obr. 59. Larvy skupiny Eucestoda s larválními háčky (Ax 1996, upraveno)

Diphyllobothrium latum
(škulovec široký)

**paratenický
hostitel**

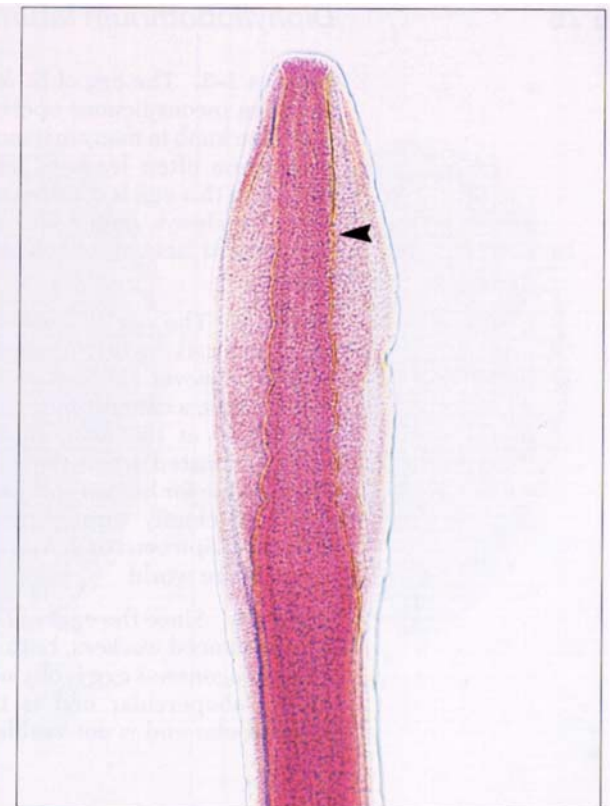
plerocercoid

2. MH

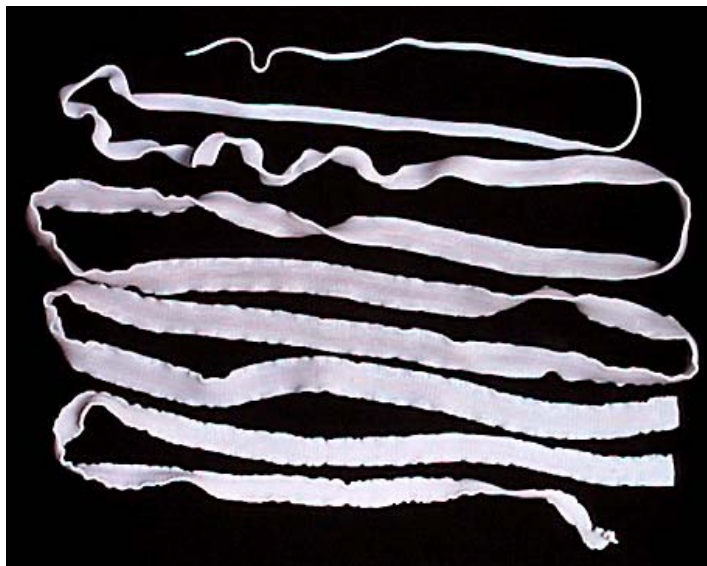


Obr. 64. Příklad tříhostitelského cyklu - *Diphyllobothrium latum*

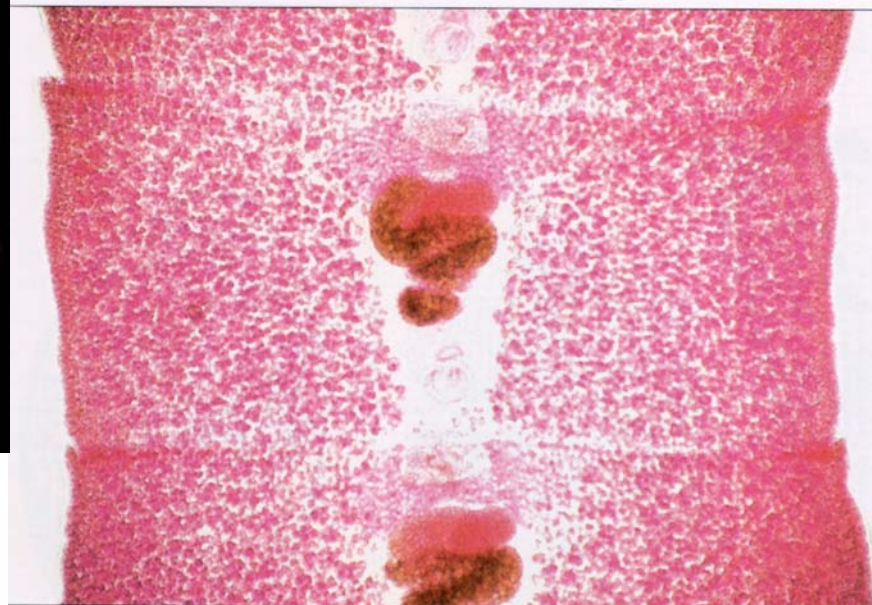
Diphyllobothrium latum



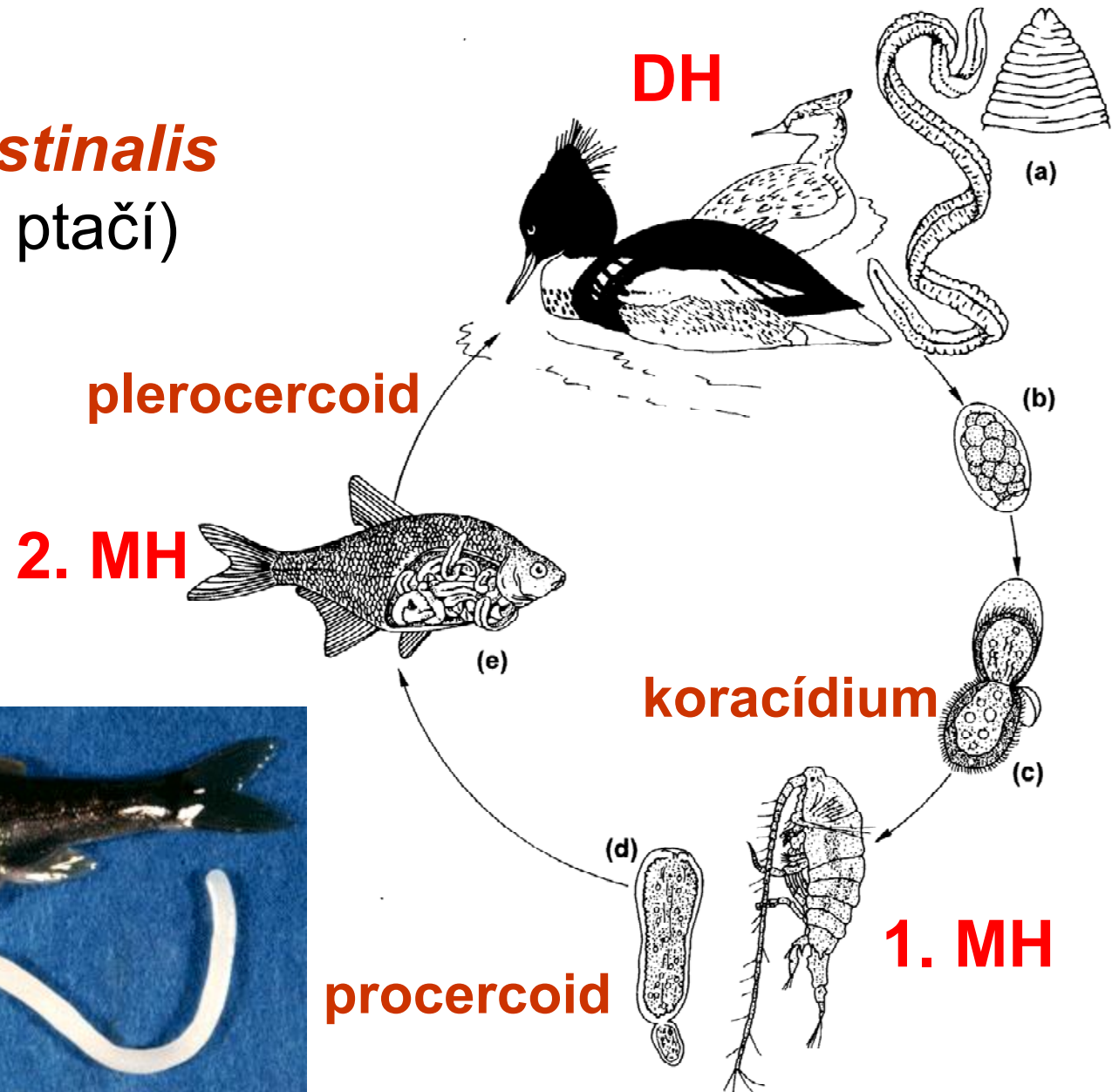
2



Délka až 12 metrů

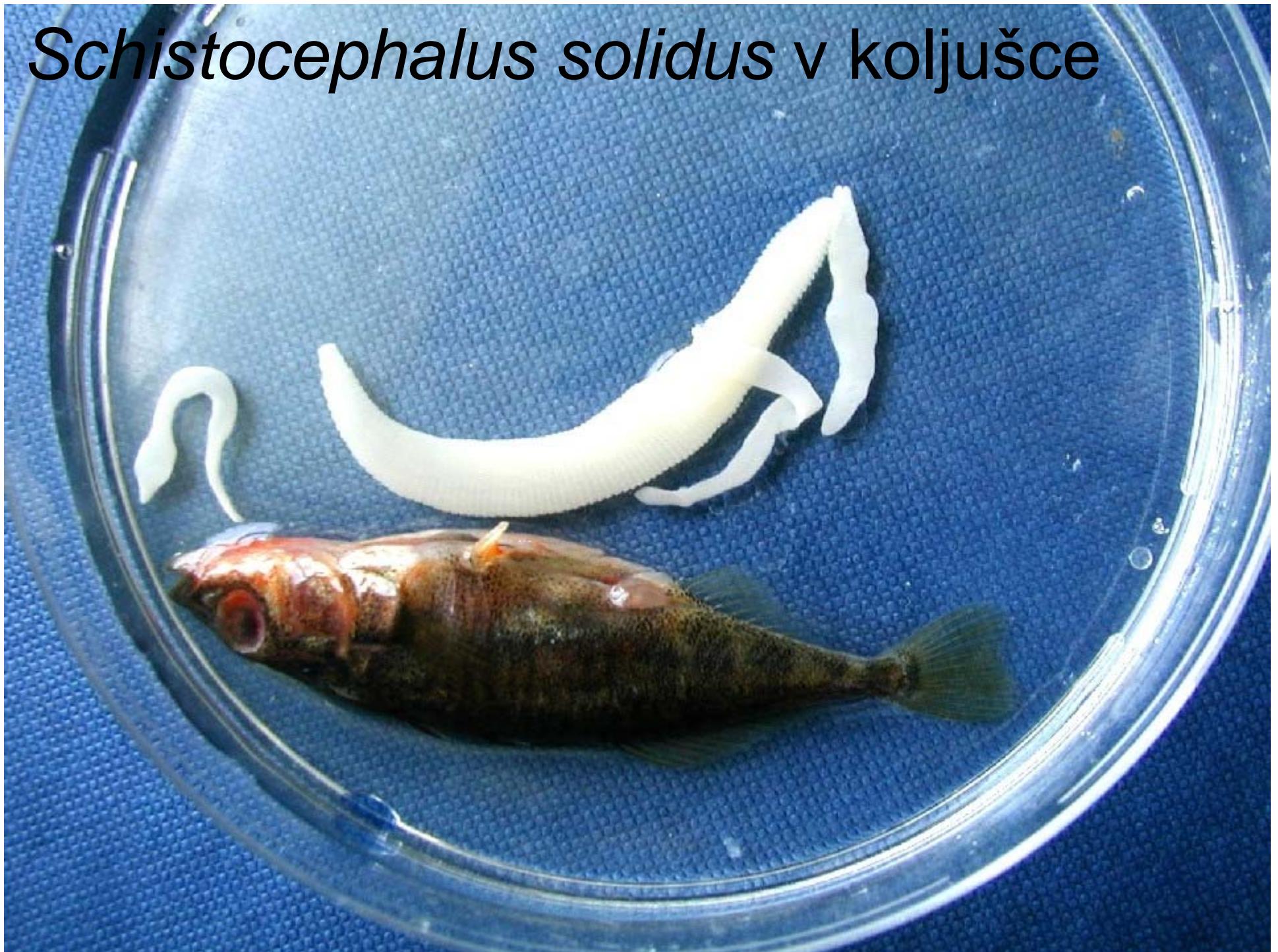


Ligula intestinalis
(řemenatka ptačí)



Life cycle of the pseudophyllidean cestode *Ligula intestinalis*. Adult (a) in fish faeces in water liberates a coracidium (c), which is eaten by a copepod. The copepod is eaten by a planktonivorous fish. Plerocercoids (e) in body cavity eaten by a bird. (McLeod, 1952; Loveux and Baer, 1961 and Petrushevski and Shulman, 1958)

Schistocephalus solidus v koljušce



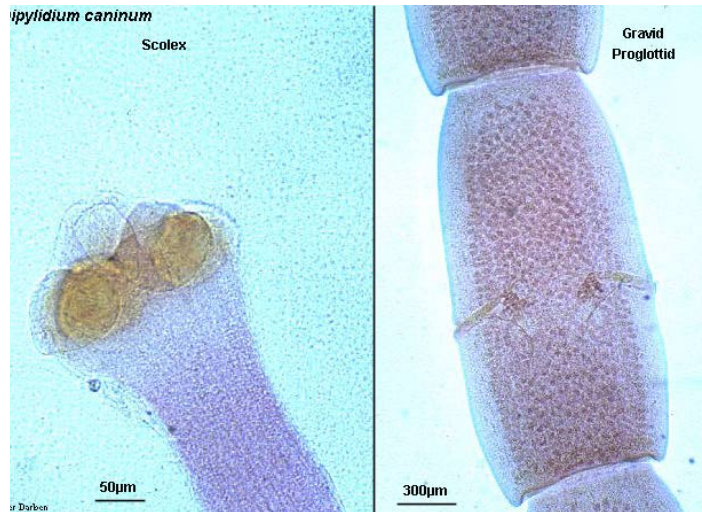
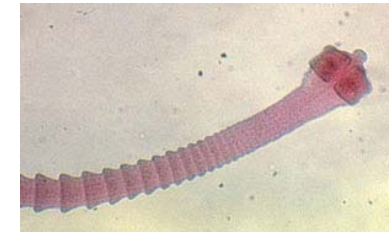
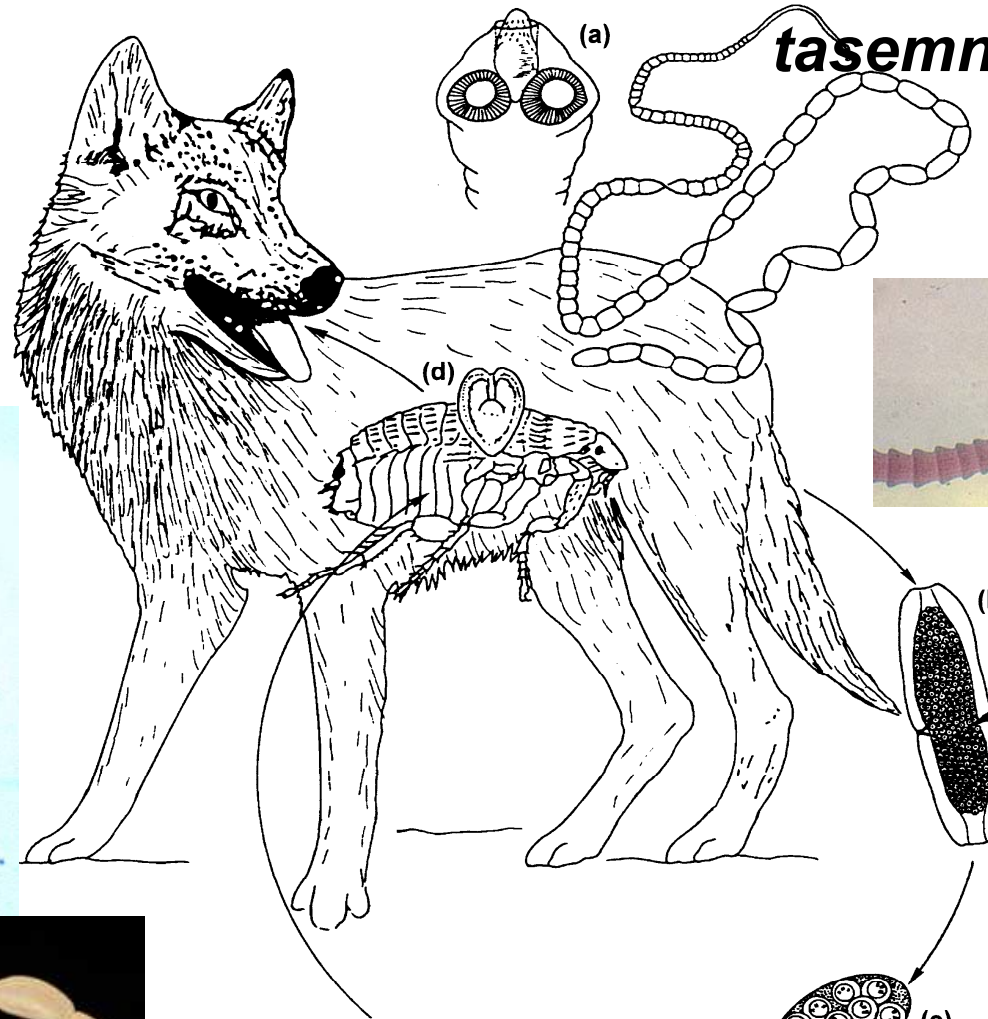
Cyclophyllidea

(kruhovky)



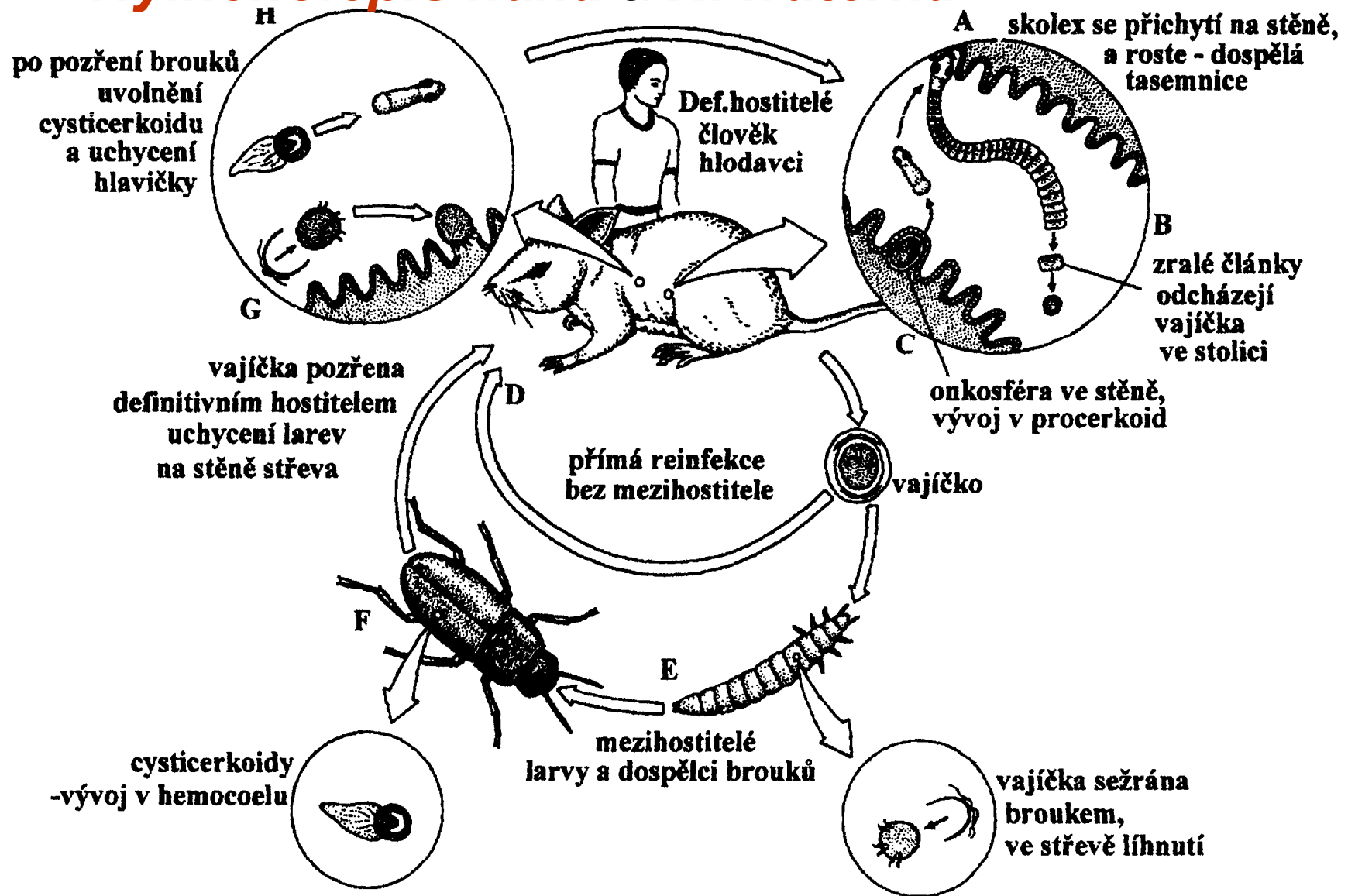
Dipylidium caninum

tasemnice psí



Life cycle of *Dipylidium caninum*. Adult worm (a) in dog intestine. Gravid proglottides (b), capsules enclosing several eggs, pass out in faeces. Uterine capsules (c) eaten by flea when it enters haemocoel. At metamorphosis adult flea associates with dog and encysted in its body. Irritation of flea bite leads to ingestion of infected flea by dog.

Hymenolepis nana a H. fraterna



Obr. 63. Příklad alternativního jedno- nebo dvojhositelského cyklu - *Hymenolepis nana/fraterna* (Roberts a Janovy 1996, upraveno)

Taenia solium

t. dlouhočlenná

- háčky

- prase

- člověk DH i MH

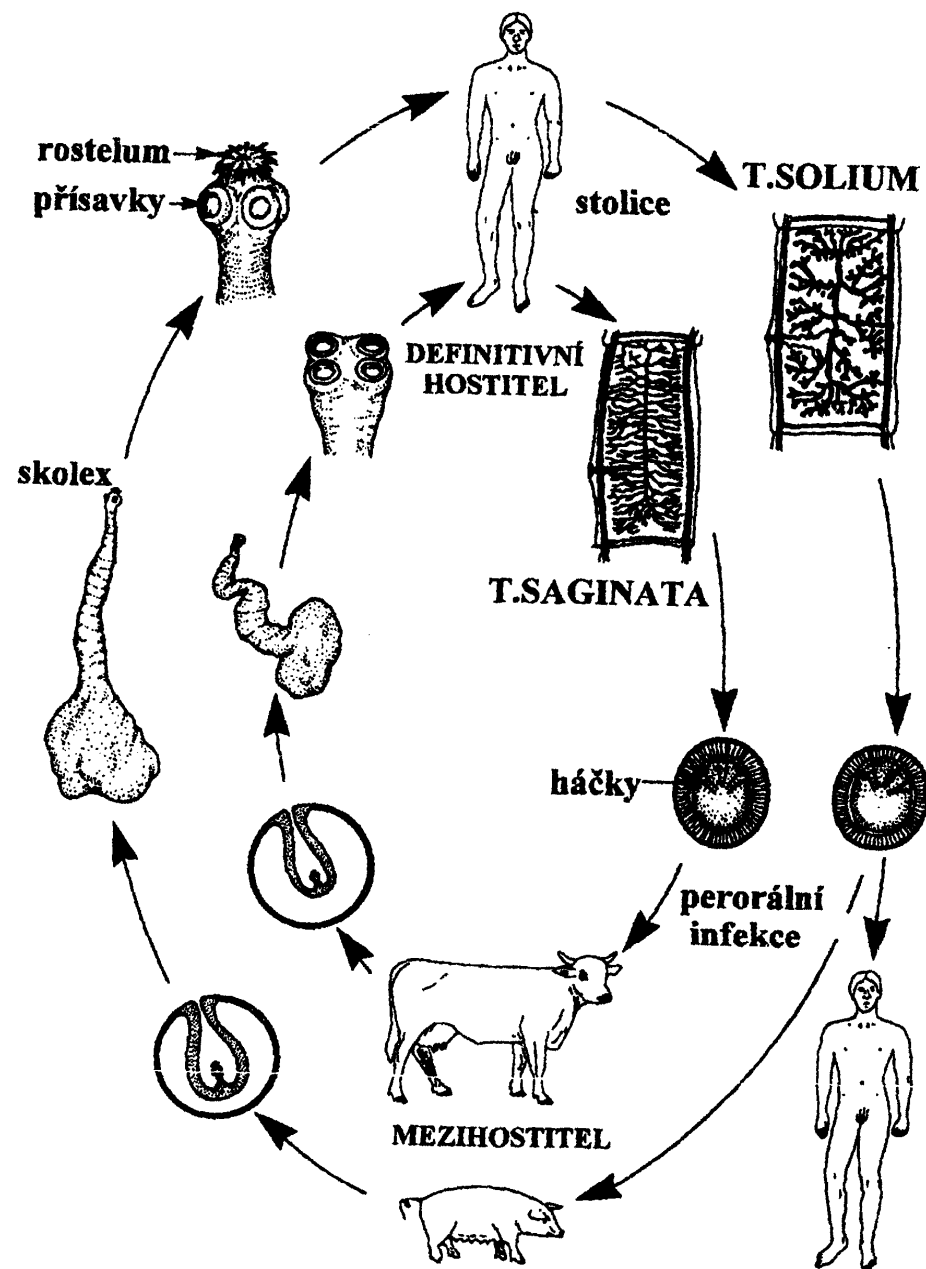
Taenia saginata

t. bezbranná

- bez háčků

- skot (ovce, kozy)

- člověk DH



Obr. 62. Příklad dvojhositelského cyklu - *T. saginata* a *T. solium* (Mehlhorn 1988, upraveno)

Taenia saginata

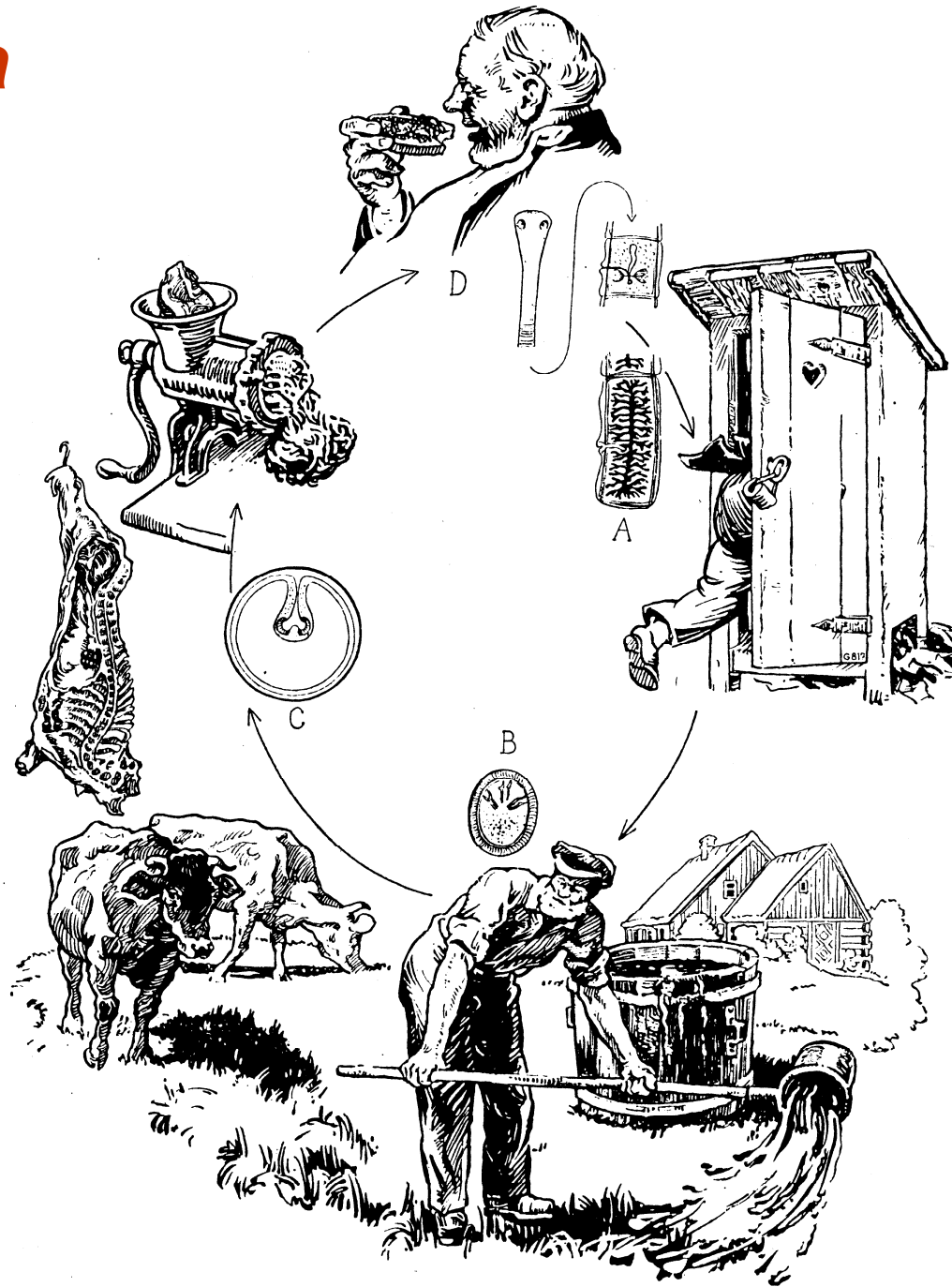


Abb. 70. Entwicklungsgang des erwachsenen Bandwurms und des Zwischenwirtes

Taenia solium



worm The adult worm

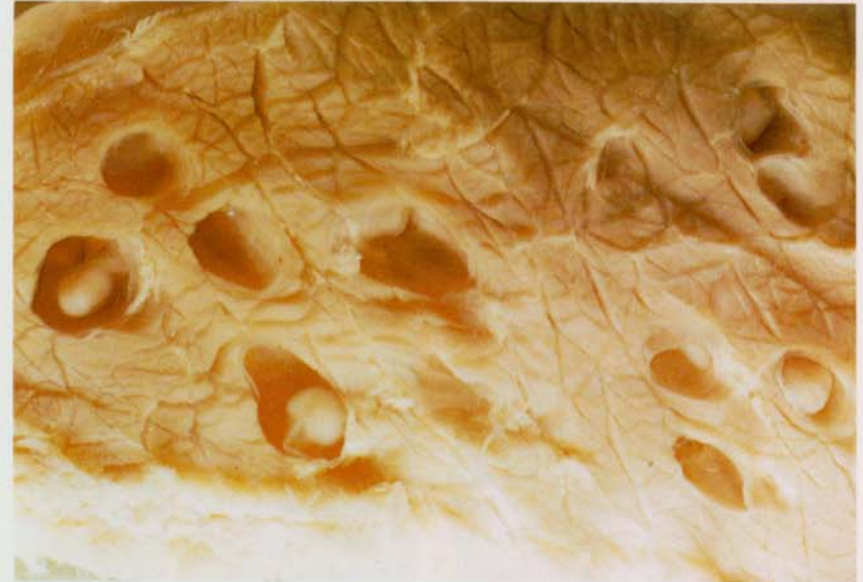
stage occurs in the pig.

The head of *T. solium* has suckers (see lateral branches. The 10)

580



581



582

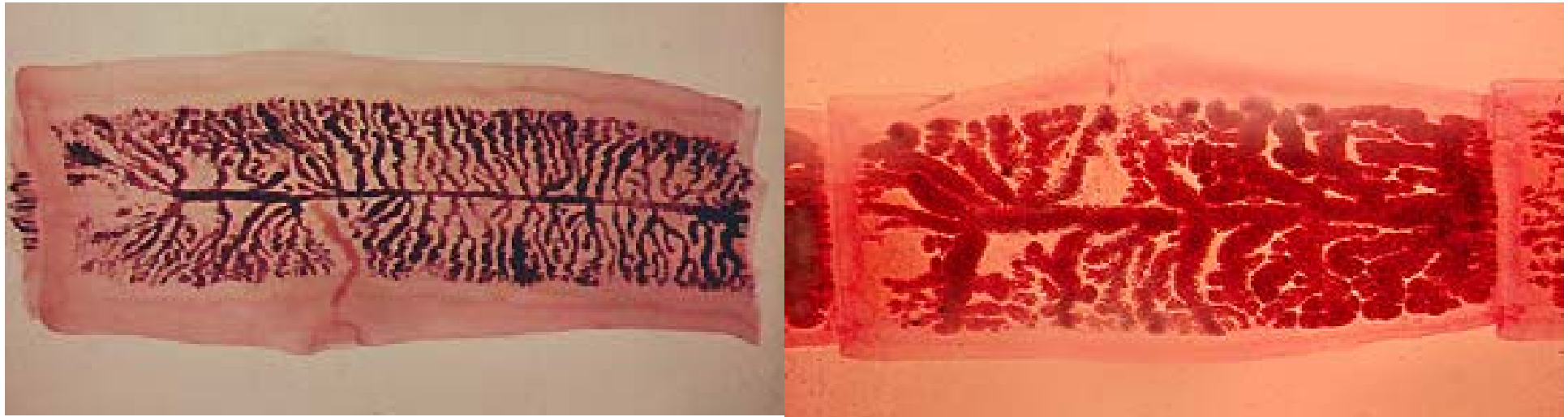


T. solium

583



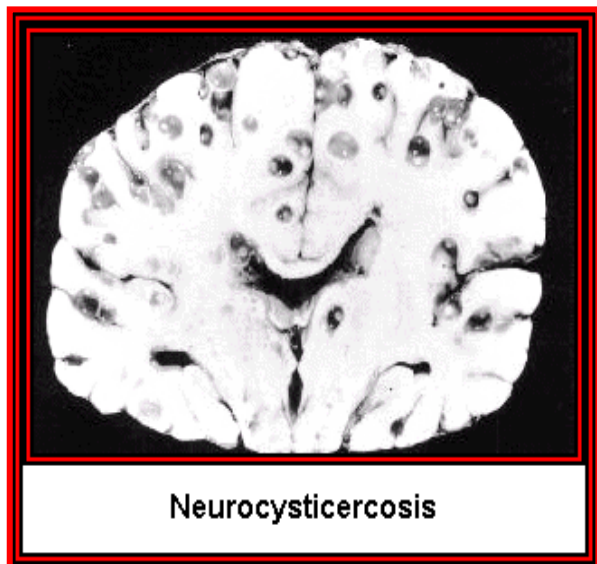
T. saginata



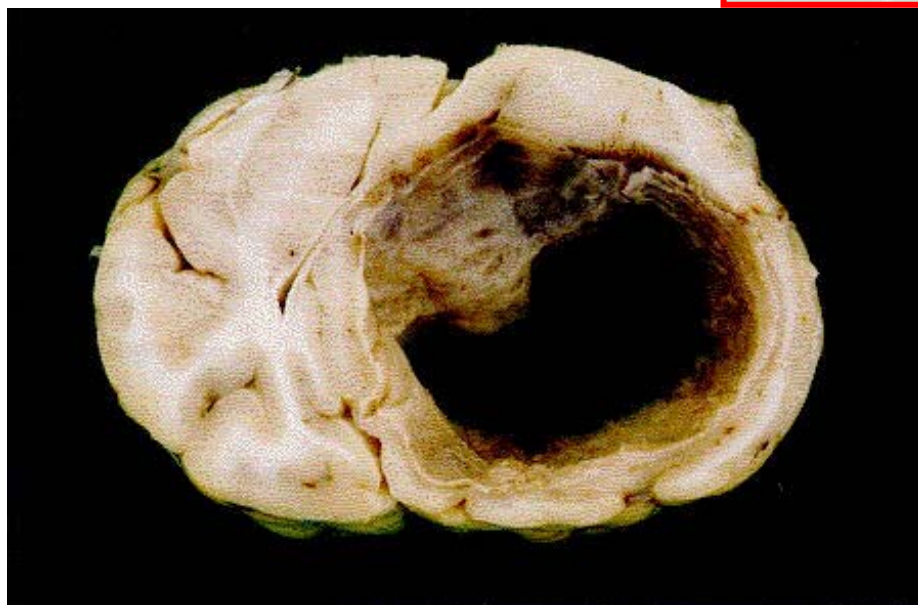
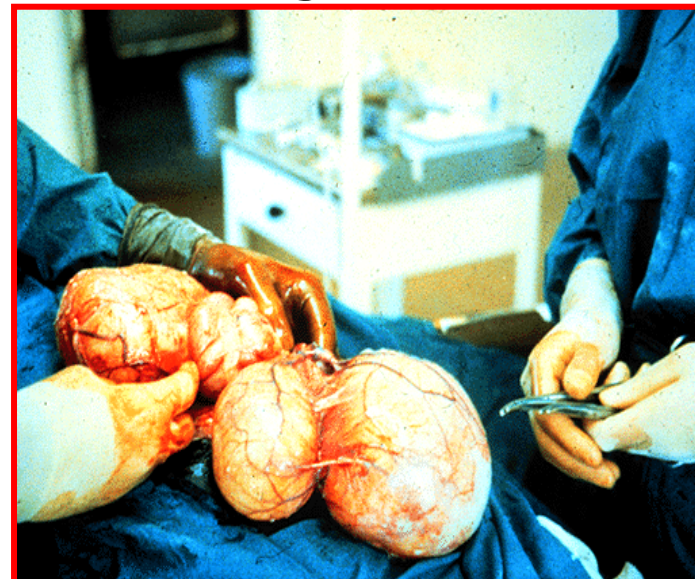
Taenia saginata (beef tapeworm) ***Taenia solium*** (pork tapeworm)

cysticerkóza a echinokokóza

Taenia solium

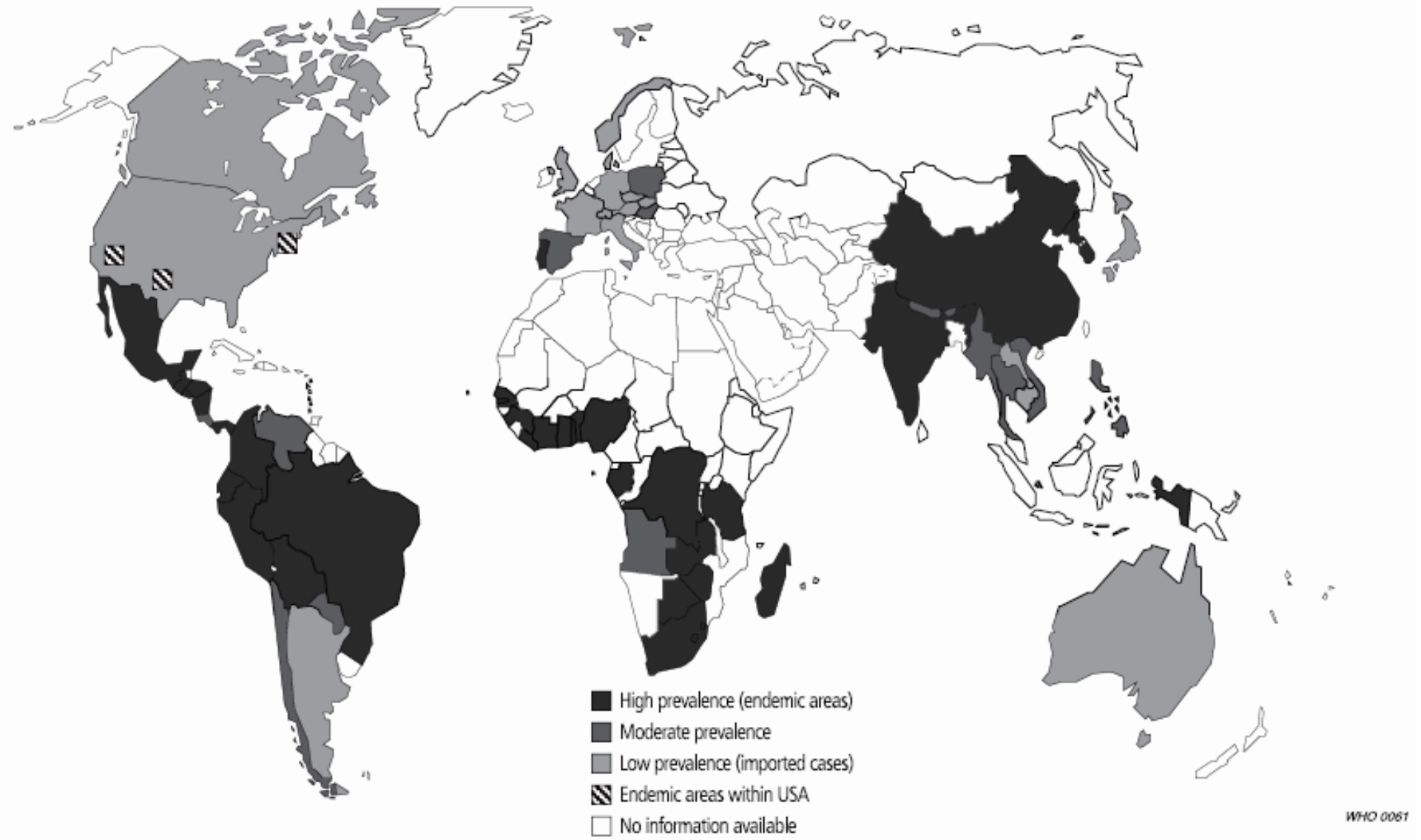


Echinococcus granulosus

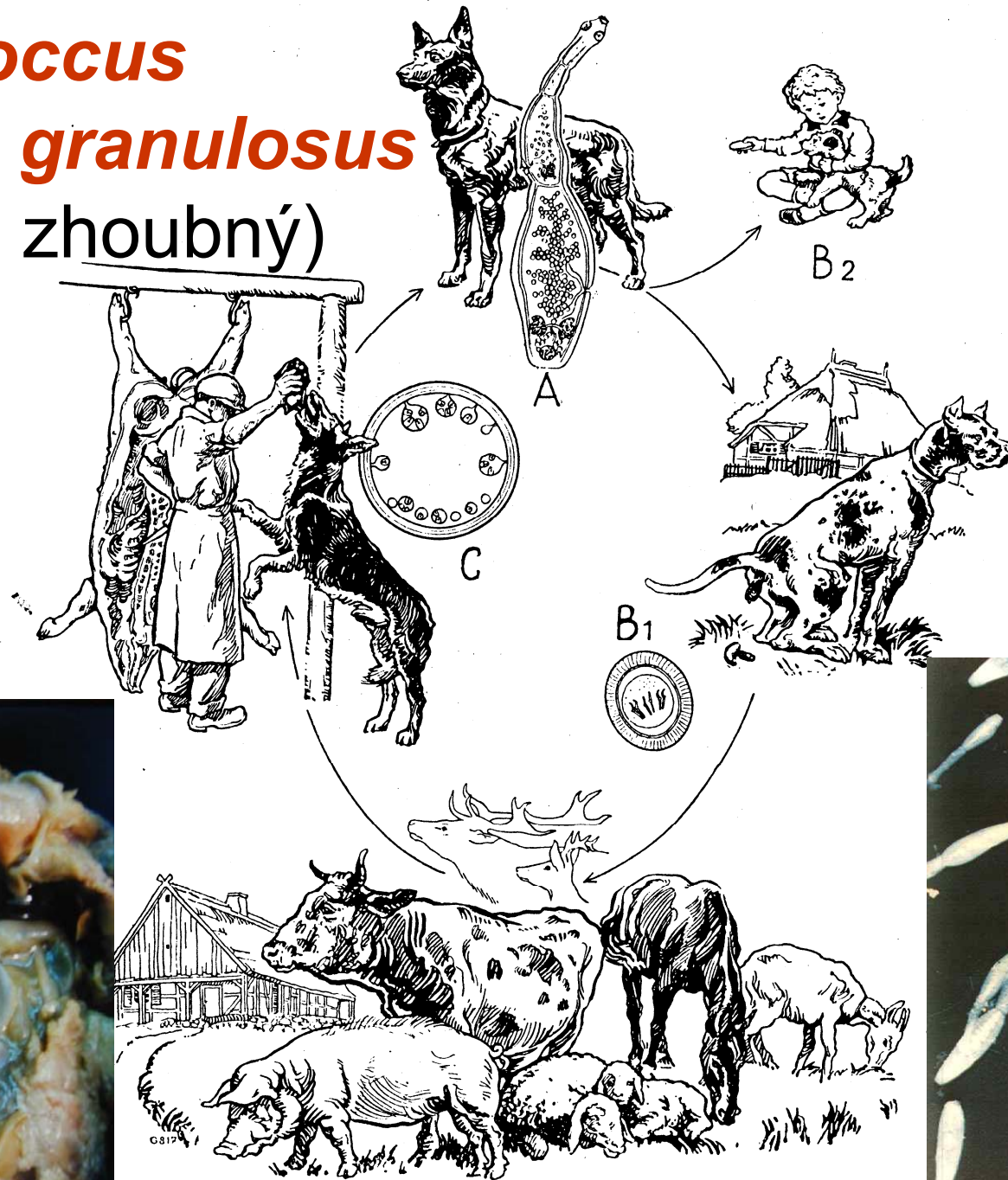


Multiceps multiceps
(tasemnice vrtohlavá)
mozek ovce
– boubel typu cenurus

Fig. 1. **Map showing areas where cysticercosis is endemic.** Countries in black represent countries where cysticercosis is endemic; countries in grey represent those where cases have been reported

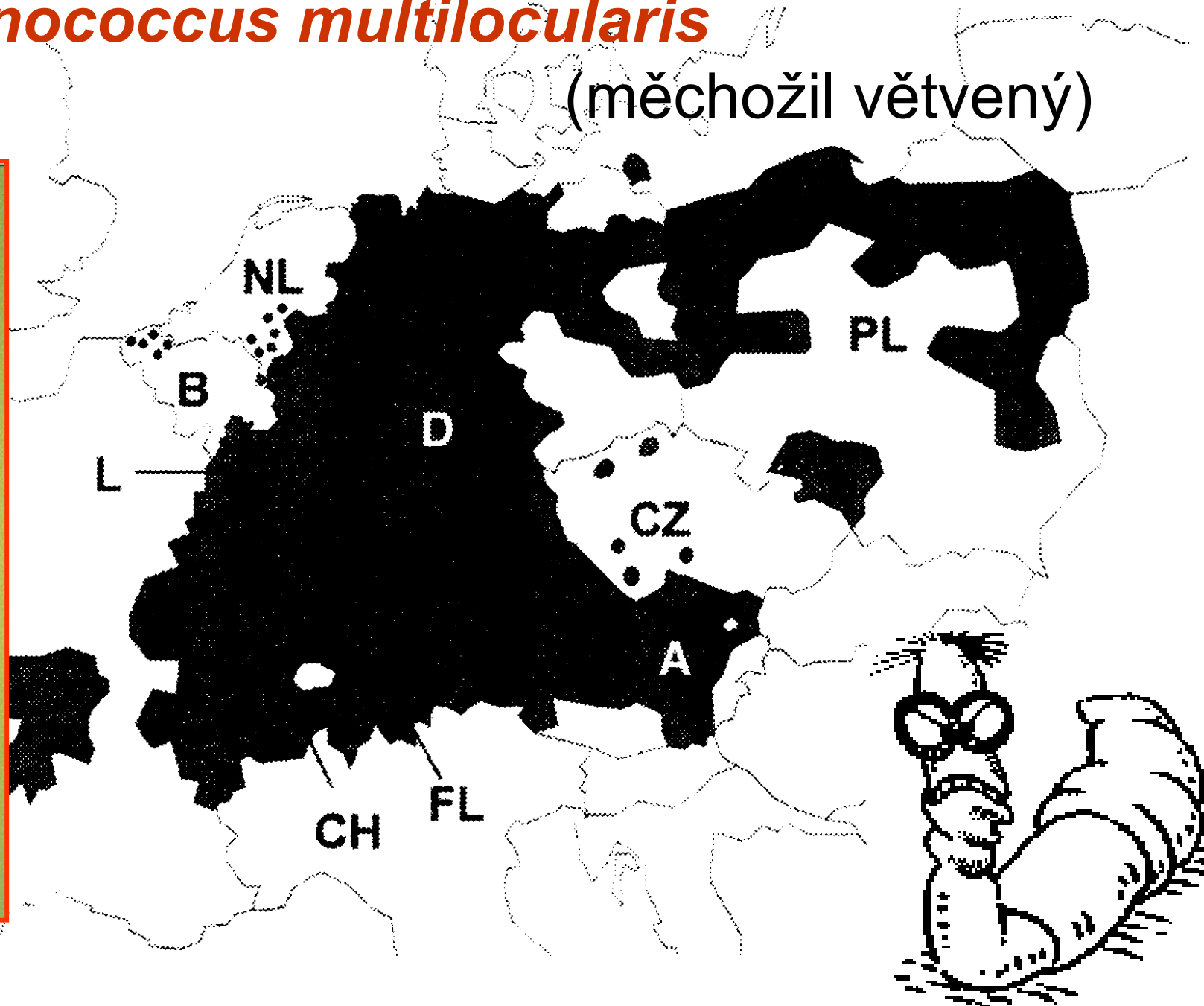
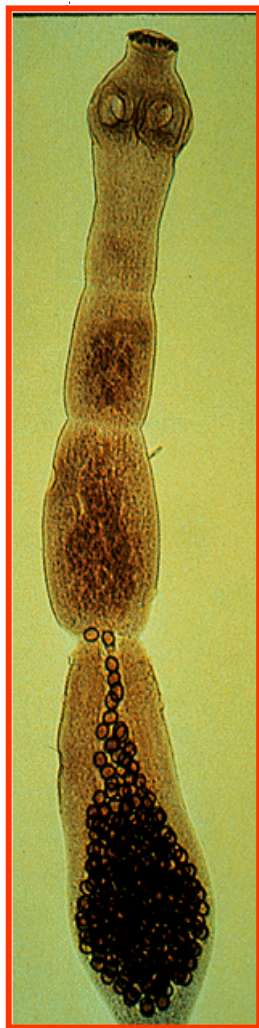


Echinococcus *granulosus* (měchožil zhoubný)



Echinococcus multilocularis

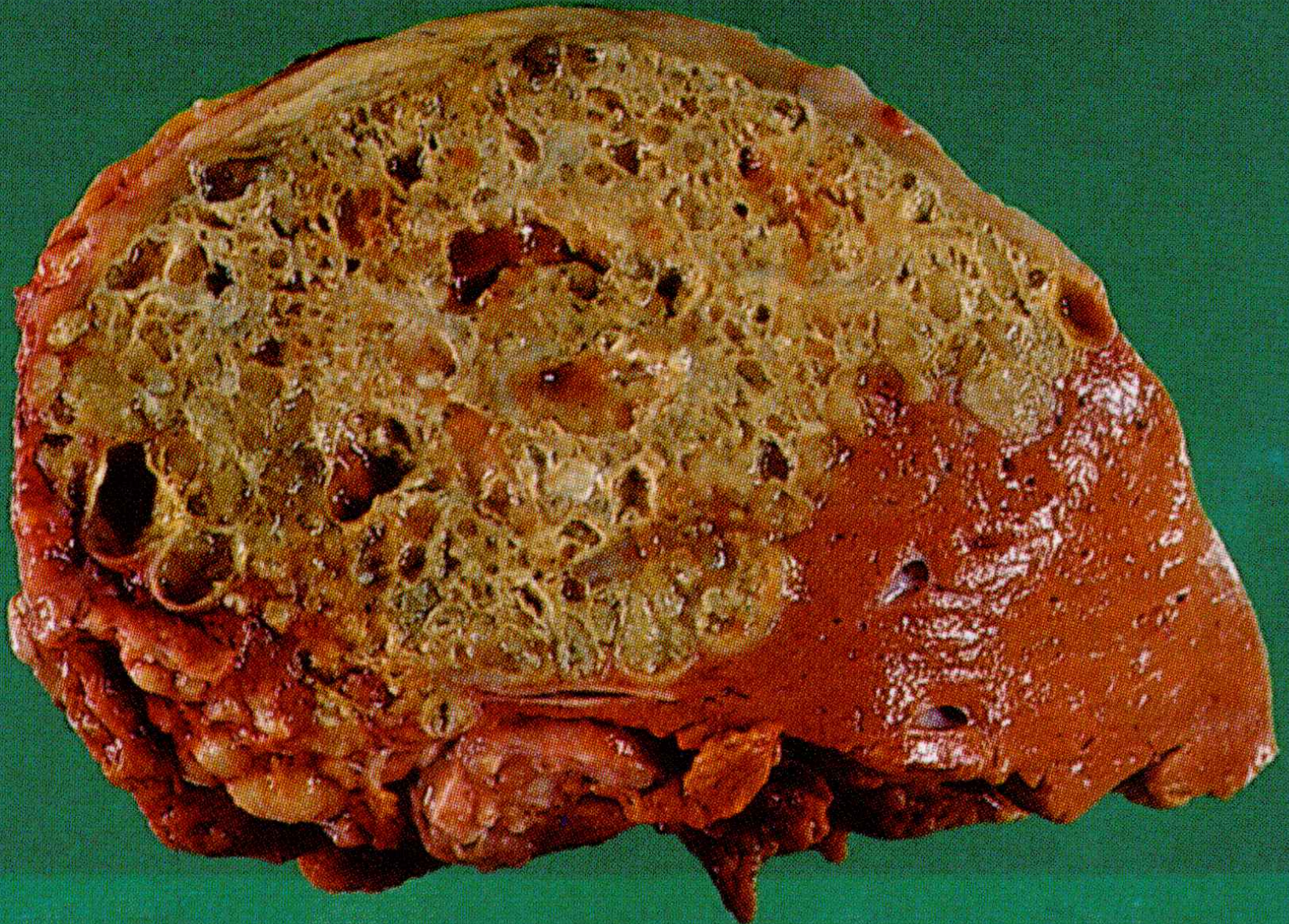
(měchožil větvený)



Hydatidóza – *Echinococcus multilocularis*

játra člověka





Hlášená parazitární onemocnění (helmintózy) v České republice:

	1996	1997	1998	2004	2005	2006	2007
echinokokóza	0	0	1	0	0	0	0
taenióza (<i>T. saginata</i>)	30	25	24	37	34	28	25
hymenolepidóza	5	0	0	12	3	1	1
ankylostomóza	3	3	12	56	23	12	10
askaridóza	79	57	52	123	82	42	61
trichuróza	21	12	12	92	39	18	14
enterobióza	1759	1568	1439	2382	1695	1227	1270
toxokaróza	92	115	73				