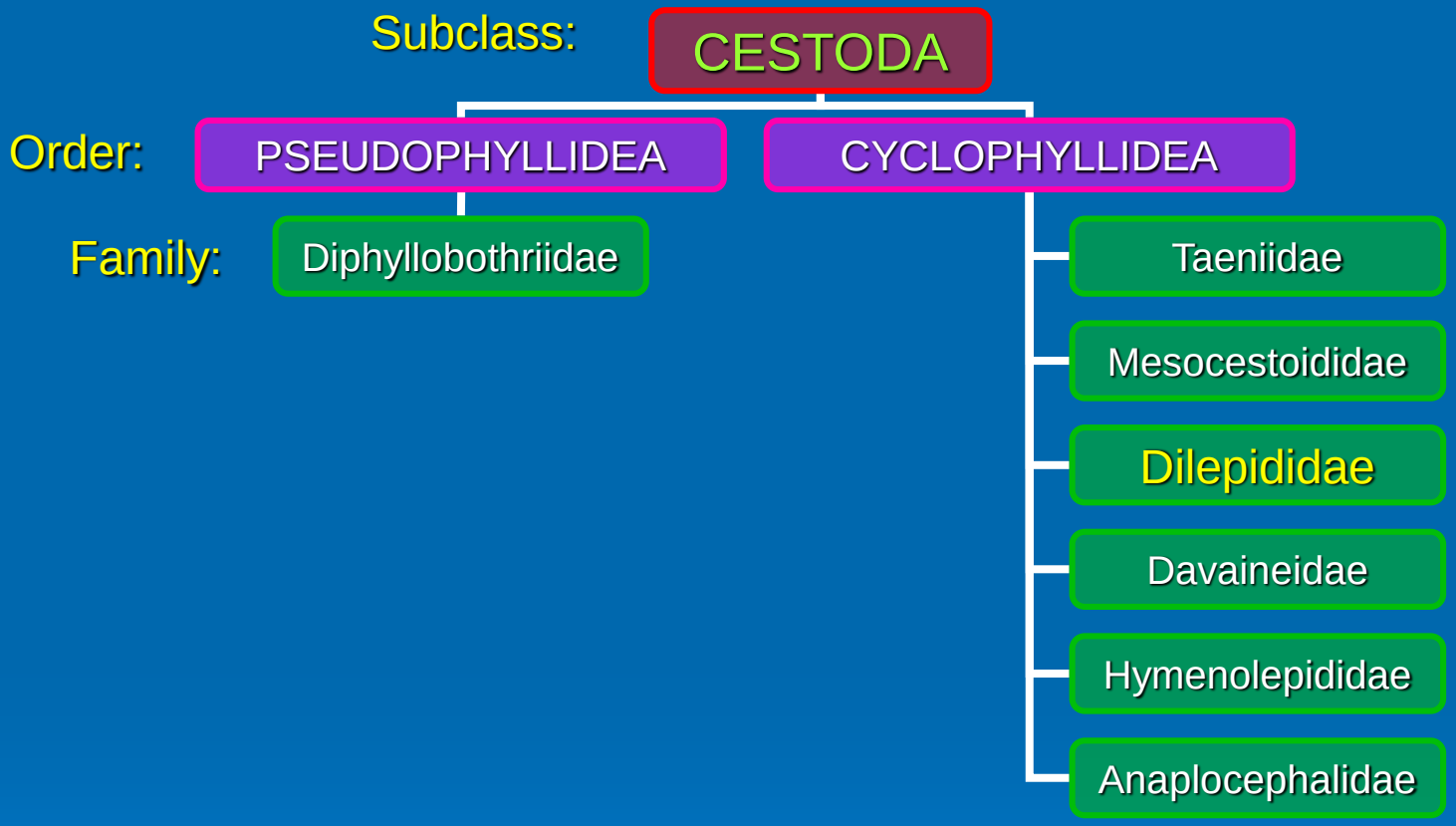
HELMINTHOLOGY

CESTODA-4


Subclass:
CESTODA
Order:
PSEUDOPHYLLIDEA
CYCLOPHYLLIDEA
Family:
Diphyllobothriidae
Taeniidae
Mesocestoididae
Dilepididae
Davaineidae
Hymenolepididae
Anaplocephalidae

Family: DILEPIDIDAE

1 **-Dipylidium caninum**

Final host: Dog, cat, wild carnivorous animals / Small intestine
Human*

Intermediate host: Cat, dog, human flea (larvae) / **Cysticercoid**
Dog lice (larvae + mature)

Distribution: common

Morphology:

- 20 – 50 cm long
- Rostellum 3 – 4 lines hooked
- The proglottids are in the form of melon / cucumber seeds
- GA in the middle on the laterals

Biology:

- **Epidemiology:**
- Fleas and lice

- **Treatment and control:**

Treatment of adult proglottid

Flea, lice and ectoparasitic drug

3-4 WEEKS

-Dipylidium sexcoronatum

The rostellum carries 6 lines of hooks –

The eggs in the egg capsule are small

1 MONTH

2 - Joyeuxiella pasqualei

- Final host: Cat, dog and other carnivores
- Intermediate host: Coprophage insects / Cysticercoid
- *LIZARD (Parathenic intermediate host)
- **Distribution:** common

- **Morphology:**
- 20 – 30 cm. long , 1 – 2 mm. large
- Rostellum with 16 rows of hooks
- GA proglottid in upper half
- Egg capsules contain only one egg

Biology / Epidemiology:

Pathogenesis / Clinic: * Complaint of dropping beads

Treatment / Control:

Joyeuxiella echinorhyncoides
(Similar to the previous species, wider (2 – 3 mm), rostellum hook row number 23 – 25)

3- Diplopylidium nölleri

Final host: Carnivore / Small intestine

Intermediate host: Various coprophage arthropoda / Cysticercoid
Reptiles (paratenic host)

Distribution: Prevalent all of the world , also in Turkey

Morphology: 9 – 12 mm long
Rostellum 3 – 4 rows hooked
(* First row is large *Taenia* hook, others are in the form of small rose thorns)
There is only one egg in cocoon

Joyeuxiella pasqualei Dipylidium caninum **Diplopylidium spp.**

4 – Choanotaenia infundibulum

Last host: Chicken, turkey and other wild poultry / Small intestine

Intermediate host: Coleoptera, mainly Musca domestica, feces eating insects and grasshoppers / **Cysticercoid**

Morphology: 20 cm long – Rostellum single row hooked – Eggs filamentous

5 – Amoebotaenia cuneata

Final host: Chicken, turkey, duck / small intestine

Intermediate host: Earthworm / **Cysticercoid**

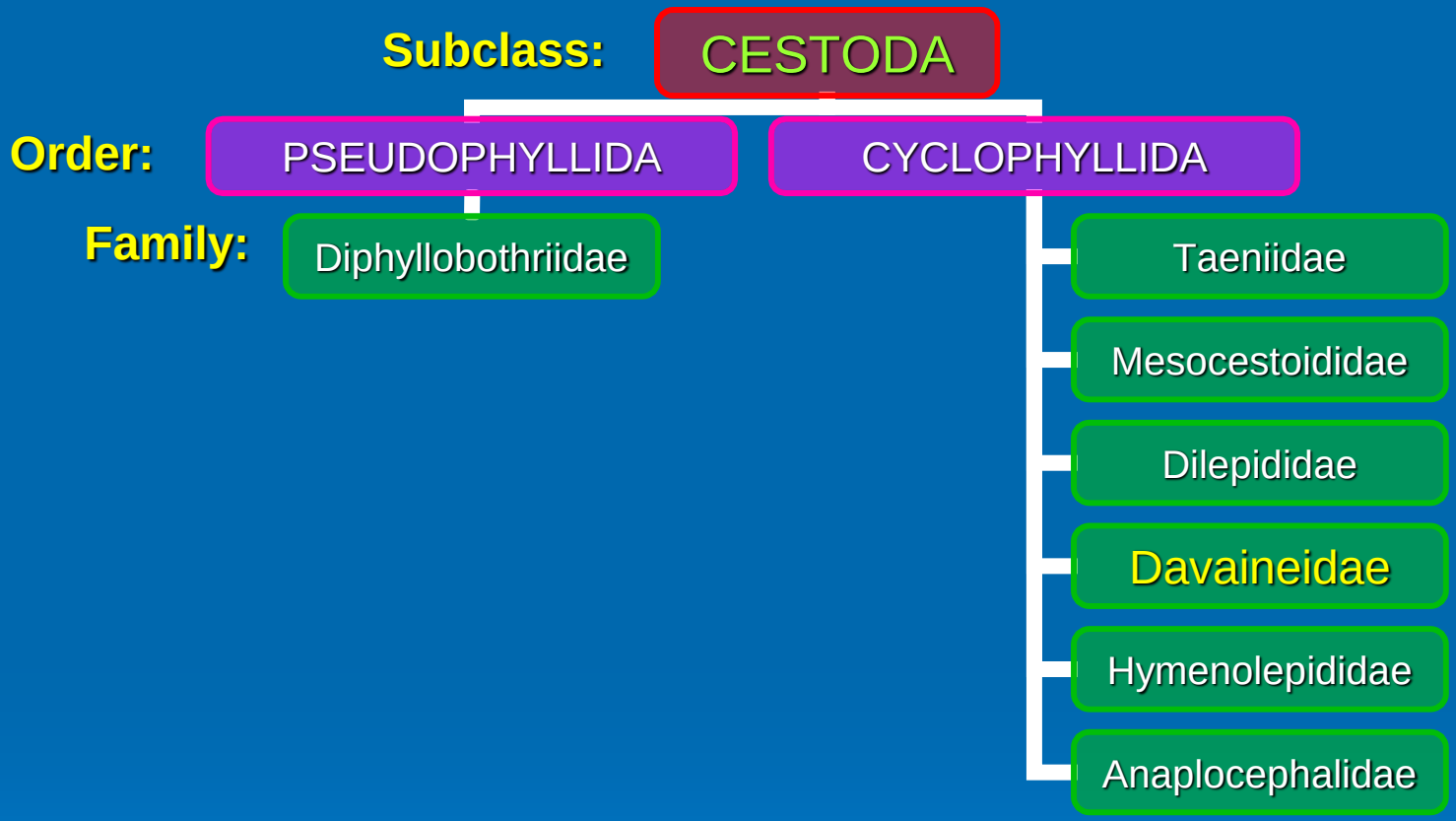
Morphology: up to 4 mm –rostellum single line of hooks

6 – Metroliasthes lucida

Final host: Chicken, poultry such as turkey / Small intestine

Intermediate host: Various grasshopper species / **Cysticercoid**

Morphology: 20 cm ↑ - no rostellum - Hooked pullers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Anaplocephalidae

Family: DAVAINEIDAE

1- Davainea proglottina

Final host: Poultry / Duodenum

Intermediate host: Crustacean, crustacean slugs / **Cysticercoid**

Distribution: common

Morphology: 4 mm long (4 – 9 proglottids)

rostellum (carries 6 lines of hooks)

**There are hooks in suckers

GA ring in upper half

Biology:

Proglottids phototropic / active

1-2 WEEKS

Their eggs are unstable

(It can stay alive for 4 – 5 days)

3WEEKS

Cysticercoid / can survive for 1 year

Davainea proglottina

Pathogenicity: It is the most pathogenic among the bird tapeworms.

- Lots of small space
- It has rostellum / Hooked suckers
- Embedded deep in the intestine

Hemorrhagic inflammation ⇨ necrosis ⇨ death

- **2- Railliettina tetragona**
- **Last host: Poultry / small intestine**
- **6 – 25 cm long**
- **Rostellum / Suckers carry hooks (weak)**
- **Eggs 6 – 12 in a cocoon**

Ants are intermediate host / Cysticercoid

Railliettina cesticillus

Last host: Poultry, small intestine

13cm long

Rostellum semicircular shape, flat

Single egg in egg capsule

Coprophage insects are intermediate host / Cysticercoid

Railliettina echinobothrida

Last host: poultry, small intestine

25cm long

Rostellum / Suckers carry hook

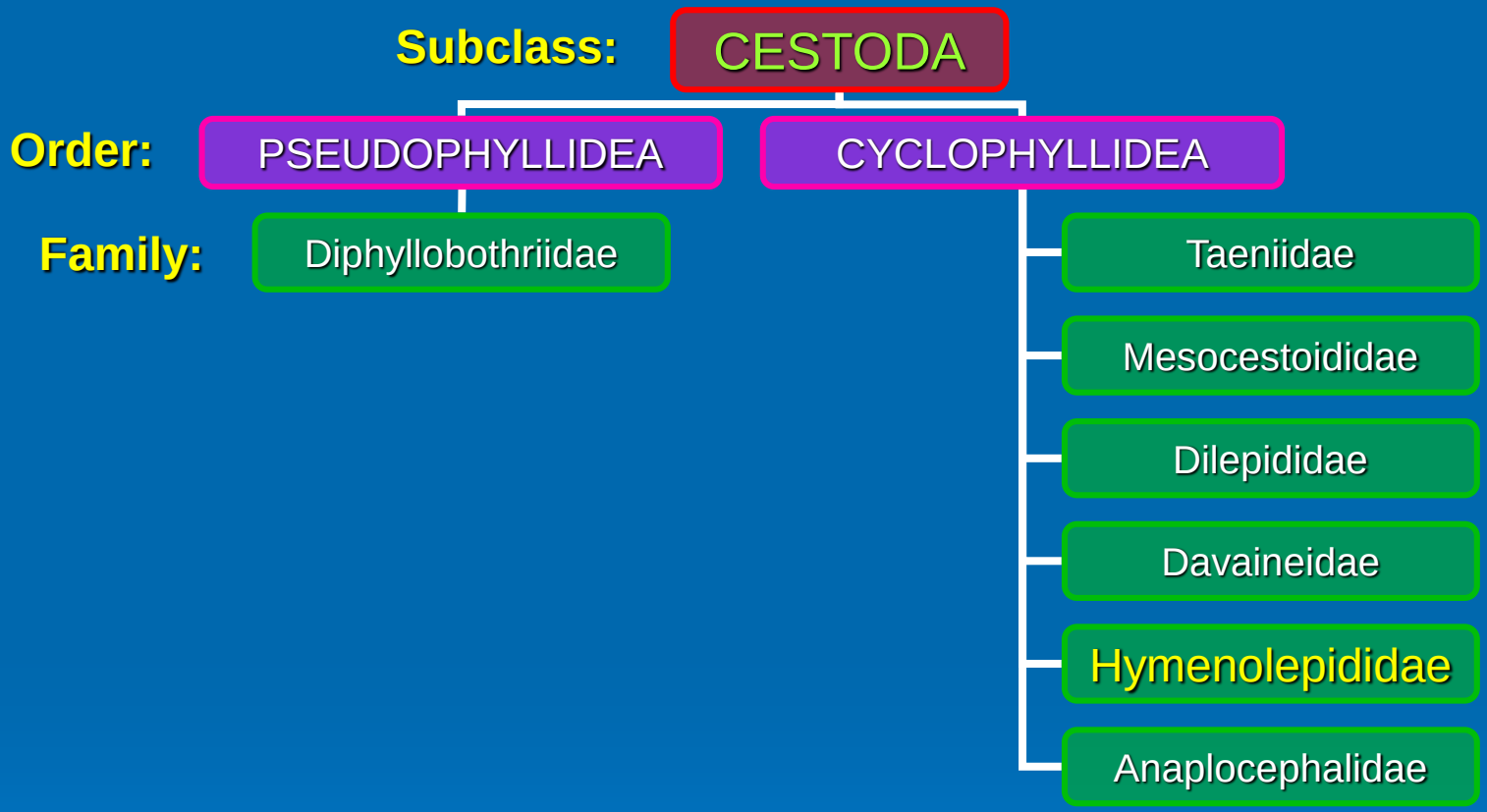
Eggs in 6 – 12-in-one capsules

Ants are intermediate host / **Cysticercoid**

★ The most pathogenic among the Railliettina species

Causes nodule formation, Causes HYPERPLASTIC ENTERITIS

(Mixed with tuberculosis)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Anaplocephalidae

Family: HYMENOLEPIDIDAE

1- Hymenolepis nana

Final host: Rodent, primate, human / Small intestine

Intermediate host: Coleoptera, flea species / **Cysticercoid**

- can also develop without intermediate host.

Distribution: common

Morphology: 2.5 – 4 cm long

1mm wide

- "THE DWARF TAPEWORM"

It have rostellum

- **Biology:**
- With intermediate host (Indirect)
- Without Intermediate host (Direct)

AUTOINFECTION
- INNER
- OUTER

Pathogenicity and clinical signs:

Light infections:

Asymptomatic

Heavy infections:

H.nana can cause weakness, headaches, anorexia, abdominal pain, and diarrhea.

Diagnosis: Diagnosis is made by identifying dwarf tapeworm eggs in stool/feces.

Treatment: Niclosamide 200 mg/kg

Praziquantel 25 mg/kg

Mebendazole 30 mg/kg x 3 days

Hymenolepis diminuta

Final host: Rodent, human / Small intestine

Intermediate host: Various arthropods / Cysticercoid

Morphology: 45 cm long
no rostellum

Biology: Indirect (Many arthropod species)

Hymenolepis microstoma (rodent / gallbladder, ducts)

Hymenolepis carioca (Chicken, small intestine / Coprophage insects and flour beetles are intermediate hosts).

Hymenolepis lanceolata (Duck, goose(waterfowl) , small intestine / Aquatic crustacea intermediate host)

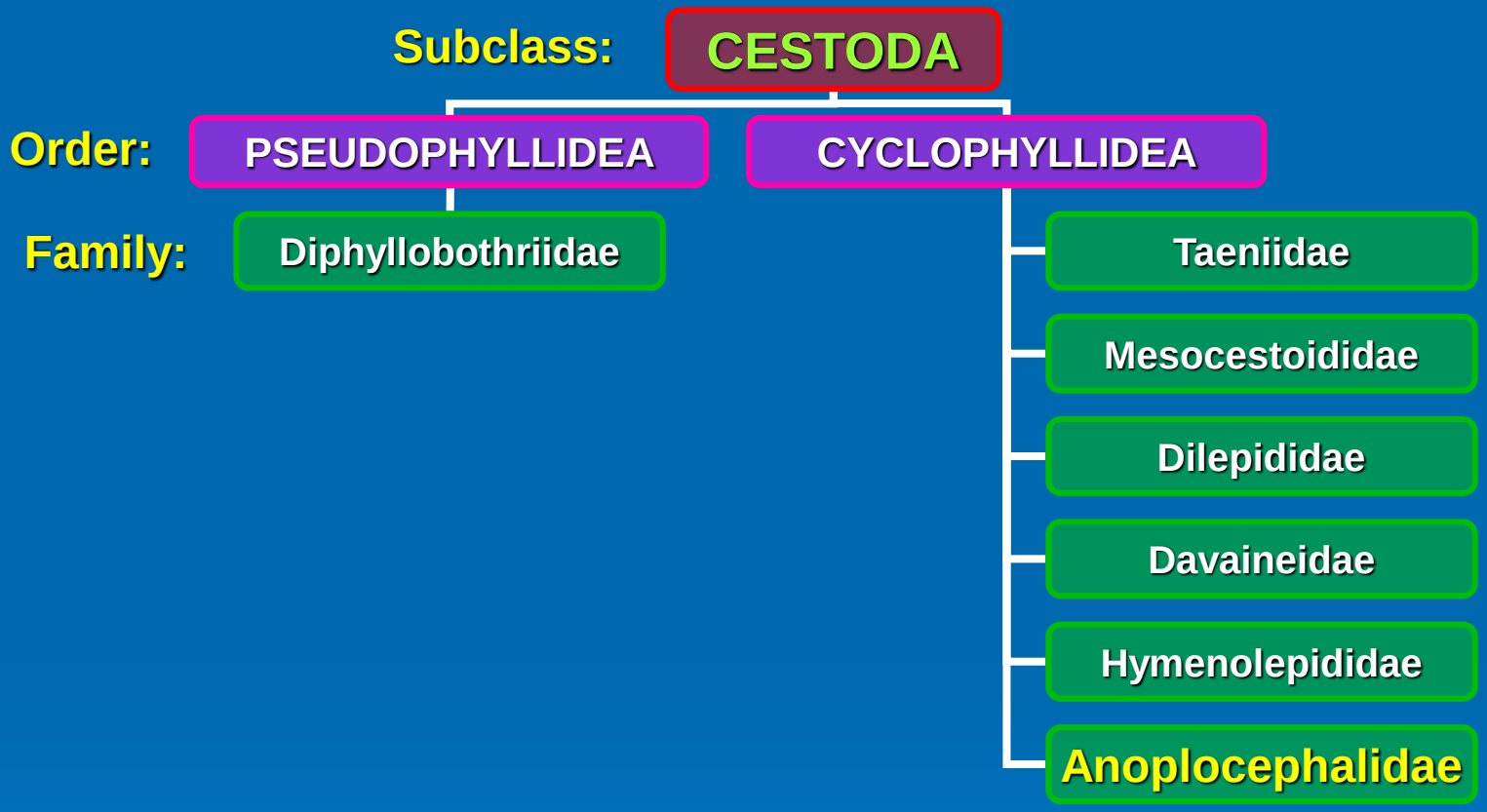
Hymenolepis cantaniana (Chicken, turkey, small intestine / Coprophage insects intermediate host)

2- Fimbriaria fasciolaris

Final host: Goose, duck (waterfowl) / Duodenum

Intermediate host: Copepod crustacea

- 15 – 30 cm long
- Scolex small, have rostellum
- carries pseudoscolex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Hymenolepididae
Anoplocephalidae

- Family: **ANOPLOCEPHALIDAE**
- **HORSE TAPEWORM**
- Last host: Equides
- Location: Small intestine and caecum
- Intermediate host: Mites of the family Oribatidae
- Scolex: No rostellum (and hook),
- They have 4 suckers attach to the digestive sistem

1. Anoplocephala perfoliata

- The most common species
- Live at around ileo-caecal valve
- Lappets are present behind each of the 4 suckers

Last host: Equidae/ Lower parts of small intestine, caecum, colon (ileosecal orifice)
Intermediate host: Oribatid mites / **Cysticercoid**
Distribution: Widespread. There is also Turkey.
The most common equide tapeworm
Morphology: 2.5-5 cm long 8 cm5-14mm wide
Scolex: 2-3 mm in diameter
no rostellum
4 suckers
LAPPET (earring) carries

Anoplocephala magna

Last host: Equidae

Location: small intestine, jejunum, rarely stomach

Intermediate host: Oribatid mites/ **Cysticercoid**

Morphology: 80 cm long (largest) 2.5cm wide

Scolex 4 – 6 mm in diameter (largest)

4 suckers (without earrings/ No lappet)

2. **Paranoplocephala mamillana**

Final host: Equidae
Location: small intestine, duodenum, rarely stomach
Intermediate host: Oribatid mites / **Cysticercoid**

Morphology: 10-40 mm long (smallest)
2-6mm wide
scolex small
4 suckers (slit format with openings)

General Biology: (A. perfoliata, A.magna, P.mamillana + M. pallida)

Life cycle: Soil mites eat tapeworm eggs from feces, horse eats mites containing cysticercoids, attach to the ileo-cecal junction, mature into adults, shed eggs and proglottids in feces

Prepatent period……1-2 month

Oribatid mite ➡ *intermediate host*

- *Cysticercoid* is intermediate stage
- in oribatid mite

Clinical signs and patogenesis:

Young horses (3-4 years) are more susceptible. There does not appear to be an acquired or age resistance to this parasite in horses. All ages, including older ones, can be infected.

Colic, diarrhea, enteritis, dehydration, loss appetite, weight loss, poor growth

Anoplocephala perfoliata ➡ ulsers, perforation, granulation tissue, partial intestinal obstruction of ileo-caecal valve, death

A. magna* ➡ hemorrhagic enteritis, obstruction of the intestinal lümen (most pathogenic)

Paranoplocephala mamillana ➡ less significant (generally apathogenic)

Detection: Eggs in feces by flotation, mature segments in feces, ELISA test on blood
Not finding tapeworm eggs in feces does not mean these parasites are actually absent in a horse.
The discharge of proglottids is sporadic, a single fecal examination may not be diagnostic.

Egg; 60-80 μ diameter
Nearly spherical, sometimes flattened at one or several
sides (triangular and vary in appearance)
Greyish color
Contain hexacanth embryo, surrounded by a chitinous piriform (pear-shaped) apparatus

Treatment:

Praziquantel…1 mg/kg p.o.

Pyrantel pamoate…13.2 mg/kg p.o. X 2 or 3 days

Niclosamide….80-100 mg/kg p.o.

Fenbendazole…10 mg/kg p.o. X 3 days

Mebendazole…20 mg/kg p.o.

They should be preferred

Pasture-born infection

Control is difficult, because mites are widespread on pasture.

Eggs can survive for 1 year in environment

Treatment should be necessary 1 or 2 times a year (end of summer and autumn season)

Pasture management may be possible (pasture cleaning, alternate grazing of pasture by ruminant…)

ADULT

Anoplocephala perfoliata
Anoplocephala magna
Paranoplocephala mamillana
Moniezia pallida

LARVAE

Hydatid cyst
Cysticercus tenuicollis
Coenurus cerebralis

Treatment of HORSE TAPEWORM

Active Ingredient	Dose (mg/kg)	Commercial Drug Names
Niclosamide	75 - 150	Şeridif - Şerivet - Tenyavet - Şeriten - Niclovet
Praziquantel	15	Droncit enj -Droncit tab - Cestocid enj - Cestodan enj - Mansonil Paratak plus (Praziquantel + Pyrantel pamoate + Oxantel pam.) Drontal plus (Praziquantel + Pyrantel embonate + Febantel) Pramectin (Praziquantel + Bulmectin)
Albendazole	10	Anavert fort - Anaverm fort - Vetalben sus. - Vetalben bol - Albezol S - Valbazen S
Mebendazole	10	Mebenzol, Mebanvet, Vermazol
Oxfendazole	10	* There's no single active ingredient drug. Okzavet, Okzan: (Oxfendazole + Oxyclosanide) Benzolmin oral pasta *, Equcide * Synanthic*, Systamex*
Fenbendazole *	10	Panacur
Bithional	7 - 10	Actamer
Resorantel *	65	Terenol
Dichlorophene *	100	Dicestal - Diphanthene 70
Bunamidine hydroxynaphthoate *	25 - 50	Buban

RUMINANT TAPEWORMS

•Host: Ruminants
•Location: Small intestine
•Intermediate host: Mites of the family Oribatidae
•Scolex: No rostellum and hook
•They have 4 suckers attach to the digestive sistem

These are long tapeworms (2 m or more length)
•***Moniezia expansa***…2-6 m long (sheep, goat occasionally cattle)
•***Moniezia benedeni***……»…… (more frequent in cattle)
•***Thysaniezia ovilla***……2 m long…… (all ruminants)
•***Stilesia globipunctata***….60 cm long…….. («)
•***Avitellina centripunctata***…1-3 m long…… («)
•***Thysanosoma actinioides***…35-60 cm long… («)

•Segments are broader than they are long. They contain 2 sets of genital organs and pores. Two species are common among ruminants.

3. **Moniezia expansa**

Last host: Sheep, goats, infrequently cattle
Location: small intestine
Intermediate host: Oribatid mite / **Cysticercoid**
Distribution: Widespread (also in Turkey)
Morphology: - 2 m. long 6m. X 1.5 – 2 cm wide
Scolex without rostellum
4 suckers

- There are 2 GAs in each ring (Bilateral)
- - Interproglottidal glands = Vitelline glands along the posterior edge of the proglottid
- - Eggs; 55 x 75 µ
- Grey, white, angular, round,
- Three double hooked oncospheres
- Pear-like structure

Interproglottidal glands are spread over the width of the proglottid (in the middle of the posterior border of each segment)

Moniezia benedeni

Last host: Mostly cattle, rarely sheep, goats

Location: Small intestine

Intermediate host: Oribatid mite / Cysticercoid

Morphology: Similar to previous species.

(Different interproglottidal glands are only posteriorly in the middle area

Interproglottidal glands are concentrated in the middle (in whole breadth of posterior border of each segment)

4. Thysaniezia ovilla (Helictometra giardi)

Final host: Sheep, goat, cattle

Location: Small intestine

(widesparet in Ankara region cattle)

Intermediate host: Oribatid mites and Psocid insects / **Cysticercoid**

Morphology: 2m long, 1cm wide

Scolex; without rostellum,

4 suckers

In each proglottid; There is 1 GA

Testes outside the excretory ducts

their eggs; 3 to 8 of them collectively in the paruterine organ

20 – 25 µ

No pear-like structure

Segments are wider than they are long.

Single genital pore irregularly.

Several paruterin organs are present in each proglottid.

5. Stilesia globipunctata

Final host: Sheep, goat, cattle / Small intestine

Intermediate host: Oribatid mite / Cysticercoid

Morphology: 60cm long2 – 3 mm wide (FROM THIN STRIPS)

Scolex is without rostellum and has 4 suckers

Segmentation is poorly visible in strobila.

In proglottids; There is only one GA, Testes inside and outside the excretory ducts, There are 2 paruterine organs in pregnant proglottids

Eggs; Numerous eggs in the paruterine organ,small, oval, No pear-like structure

Paruterine organs filled with eggs when viewed externally, opaque double line

Stilesia hepatica

Short-thin tapeworms, single genital pore irregularly. Two paruterin organs are present in each gravid proglottid.

Sheep, goat, cattle / Bile and pancreatic ducts

20 – 50 cm long x 3 mm wide not in Turkey

6. **Avitellina centripunctata**

Final host: Ruminants

Location: Small intestine

Intermediate host: Psocid insects / **Cysticercoid**

Morphology: 1 – 3 m long3 mm wide (FROM THIN STRIPS)

Segmentation is poorly visible in strobila.

In proglottids; There is only one GA Uterus turns into paruterine organ in the middle(One opaque line in the middle that can be noticed even from the outside)The testicles are mostly on the inner side of the excretory ducts.

Eggs; In the paruterine organ

6 – 12 in one

Small and no oval/pyriform structure

- Long-thin tapeworm, single genital pore irregularly. One paruterin organ is present in each gravid proglottid.

7. **Thysanosoma actinioides**

Final host: Sheep, goat, cattle

Location: Small intestine, bile, pancreatic duct

Intermediate host: Psocid insects / **Cysticercoid**

Morphology: 35 – 60 cm long

2 – 3mm 8mm wide

In the proglottids;

There are 2 GAs

Fringe shaped structure (**FRINGED STRIP**)

eggs;

In the paruterine organ (A few hundred in each ring)

1 – 33 eggs (in each paruterine organ)

- Segments short and fringed posteriorly containing two sets of genital organs. Several paruterin organs are present in each proglottid.

Anoplocephalidae in ruminant animals size and morphological characteristics of parasites

Parasite species	Size	Characteristics
Moniezia expansa	**2- 6 m x 1.5- 2 cm**	Interproglottidal glands are spread over the width of the proglottid (in the middle of the posterior border of each segment)
Moniezia benedeni	**0.5 - 4 m x 2 cm**	Interproglottidal glands are concentrated in the middle (in whole breadth of posterior border of each segment)
Thysaniezia ovilla	**2 – 4.5 m x 1 cm**	Segments are wider than they are long. Single genital pore irregularly. Several paruterin organs are present in each proglottid.
Stilesia globipunctata	**60 cm x 2 – 3 mm** ***THİN**	Short-thin tapeworms, single genital pore irregularly. Two paruterin organs are present in each gravid proglottid.
Avitellina centripunctata	**1- 3 m x 3mm** ***THİN**	Long-thin tapeworm, single genital pore irregularly. One paruterin organ is present in each gravid proglottid.
Thysanosoma actinioides	**35 – 60 cm x** **2 – 3 mm→ 8 mm**	Segments short and fringed posteriorly containing two sets of genital organs. Several paruterin organs are present in each proglottid.

The adults of Moniezia species lay eggs in the intestine of the final hosts, and eggs are shed with the feces. In other species the gravid segments containing the eggs are shed out and release the eggs only outside the host.

Moniezia spp.	Avitellina spp.,Stilesia spp., Thysaniezia spp., Thysanosoma spp.
50 – 80 µm Tri- or quadrangle to pyramidal shape Dark grey Thick shell Embryo surrounded by a piriform apparatus	20 – 45 µm No piriform apparatus Eggs are contained in capsules in the paruterin organ/organs in each proglottid Thysaniezia.....3-8 eggs Thysanosoma....1-33 eggs Avitellina.....6-12 eggs Stilesia.....a lot of eggs

•Biology:

•Indirect (indirect development)
•Intermediate host: Mite (Oribatidae, Psocidae)
0.5 – 1.5mm
Feeds on organic residue in humus soil
Cysticercoid development 1–4 months
Prepatent period 1–2 months

The adults of Moniezia species lay eggs in the intestine of the final hosts, and eggs and proglottids are shed with the feces. In other species the gravid proglottid containing the eggs are shed out and release the eggs only outside the host. The oribatid mites ingest the eggs, and cysticercoids develop in the body cavity of the mites. They are infective for the final hosts. Cysticercoids can survive for months inside the mites. The final hosts become infected after ingesting contaminated mites while grazing. The mites are digested and release the cysticercoids. They attach to the gut's wall and develop to adult tapeworms within a several weeks, depending on the worm species and the final host. The adult worms live for up to 18 months inside their final host.

Prepatent period…. 3-4 months

Clinical signs:

Infection is common in lambs,
calves during their first year of life, less common in older animals.

There is an acquired or age resistance to this parasite in ruminants after 1 age, and there is founded few parasites.

Generally asemptomatic but, it can negatively affect productivity (production of meat and wool)

Diarrhoea, enteritis, dehydration, respiratory signs, uncoordinated movements, convulsion, loss appetite, weight loss, poor growth, intestinal obstruction, death

Diagnosis:

Detection: Moniezia eggs (by flotation) and mature proglottid in feces, presence of gravid segments (in other cestodes) on fecal examination, ELISA test on blood or PCR

Eggs: For Moniezia sp.
Triangular, quadrangular to pyramidal shape / with thick-shelled
With six hooked hexanth larva
Pyriform apparatus

Protection and control:

Prevention of pasture contamination
Infected flocks must be treated
Relocation of infected flocks should be prevented
(Foreign herds should not be brought into the pasture)

Prevention of continuation of infection in pasture
Animals should not be taken to pasture at risky times.
Dry grass should be given to the animals in the barn.
Contaminated pastures should be devoted to agriculture for several years

- **Points to consider in treatment:**

•Treated animals should not be taken to pasture for 3 days.
•Spraying should be done in the barn
•The best treatment time for final hosts is April and May.

Treatment:

Praziquantel…15 mg/kg p.o.
Niclosamide….75-150 mg/kg p.o.
Fenbendazole…5 mg/kg p.o.
Mebendazole…20 mg/kg p.o.
Albendazole… 10 mg/kg p.o.
Cambendazole…20 mg/kg p.o.
Oxfendazole….5 mg/kg p.o.

ADULT

Moniezia expansa
Moniezia benedeni
Thysaniezia ovilla
Stilesia globipunctata
Stilesia hepatica
Avitellina centripunctata
Thysanosoma actinioides

LARVAE

Cysticercus bovis
Cysticercus ovis
Cysticercus tenuicollis
Coenurus cerebralis
Echinococcal cysts

Treatment of Ruminant Tapeworms

Active Ingredients	Dose (mg/kg)	Commercial Drug Names
Niclosamide	75 - 100	Şeridif – Şerivet – Şeriten – Niclovet – Tenyazilin - Tenyavet
Praziquantel	3.75 - 15	Droncit –Mansonil – Cestocid enj – Cestodan enj – Paratak plus (Praziquantel + Pyrantel pamoate+ Oxantel pam.) Drontal plus (Praziquantel + Pyrantel embonate + Febantel) Pramectin (Praziquantel + Bulmectin)
Oxfendazole	5	There's no single active ingredient drug. Okzavet, Okzan, Oksapan, Oksfort, Oxsamisol, Oksinil: (Oxfendazole + Oxyclozanide) Synanthic*, Systamex*: (Oxfendazole)
Mebendazole	15 – 20	Mebenzol, Vermazol
Fenbendazole *	10 - 15	Panacur
Albendazole	10	Anavert fort – Anaverm fort – Vetalben sus – Vetalben oblet – Albezol K – Albezol S – Valbazen S – Atazol
Febantel	5 – 10	Rintal
Netobimin	20	Hapadex
Bunamidine hydroxynaphthoate *	25 – 50	Buban
Dichlorophene *	100	Dicestal – Diphanthene 70
Resorantel *	65 – 75	Terenol