Lecture No.19 PARASITOLOGY DR.Raad H.H.

 **Family Fasciolidae**

Characterized by:

1. Is a family of trematodes and includes several veterinary and medical important parasites.
2. Family Fasciolidae is divided into 5 genera.
3. Flukes of the family are localized in liver, gall bladder, and the intestine of ungulates.
4. The life cycle of fasciolid flukes includes one intermediate host freshwater snails from family Lymnaeidae.

 **Genus Fasciola (liver fluke )**

1. Anterior end with a conical, lobe-like cephalic process. Gonads dendritic . Ovary pre testicular, has spines.
2. 2 spp. Of vet . importance are ***Fasciola* *hepatica* ,** [***F. gigantica***](http://en.wikipedia.org/wiki/Fasciola_gigantica).



**adult *EX*, excretory bladder; *GP*, genital pore; *GÖ*, genital bulbus; *HK*, hooks, spines of *IN*, intestine; *INC*, intestine (cut off on drawing); *LC*, ; *OS*, oral sucker; *OV*, ovary (); *RS*, *TE*, *UT*, uterus with eggs; *VE*, vas efferens of *TE*; *VI*, vitellary glands *VS*, ventral sucker ()**

**life cycle**



|  |  |  |
| --- | --- | --- |
| **Character**  | ***Fasciola* *hepatica***  | [***F. gigantica***](http://en.wikipedia.org/wiki/Fasciola_gigantica)**.** |
| **Length**  | **2-3 x 1.2 cm.** | **2.5-7.5 x 1.2 cm.** |
| **Shape** | **Leaf like gray-brownish with opposite sides**  | **Leaf like gray-brownish with parallel sides**  |
| **Cecae** | **Small protrusions** | **T or Y shape** |
| **Testis site** | **Mid** | **=** |
| **Ovary site** | **In front to 1st. testis** | **=** |
| **Infective stage** | **Metacercaria**  | **=** |
| **Site of infection** | **liver, gall bladder, bile duct** | **=** |
| **Intermediate host**  | **Amphibious snail ,*****Lymenia truncatula*** | **Aquatic Snail*****Lymenia auriuleria*** |
| **Life cycle period** | **11-19 weeks**  | **=** |
| **Inside sheep** | **8-12 =** | **=** |
| **Inside snail** | **3-7 =** | **=** |

1. Fascioliasis **Pathogenesis** ; Depend on **3 factors** :
2. **Host** species , age, health status

Cattle & sheep more ↑than buffalo & goat .

Young age more ↑than older age .

1. **Degree** of infection ::

sheep when swallow 5000 cercaria →death in 2-3 days

100-200 adults found in the liver →chronic case

50 = = = = →carrier case

1. **Secondary** Complications :

Enterotoximeia bacteria ***Clostridium novyi*** →lead to death in 5-8 days

Stongylosis → increase animal susceptibility .

1. Pathological changes **causes** :
2. **Immature** flukes :

Hemorrhage, liver tissue destruction , liver cirrhosis

1. **Mature** flukes :

liver cirrhosis , bile stones, bile duct obstruction, bile retention , obstructive jaundice

1. **Fascioliasis**: liver fluke disease:
Fascioliasis is the disease caused by liver fluke (Fasciola hepatica). Sheep and cattle are most commonly affected and **sheep** are **more** **susceptible** to the disease than cattle. Horses, deer and goats may also be infected by liver fluke; humans are also occasionally infected.

**Clinically 3 forms**:

1. **Acute** fascioliasis:
Acute fascioliasis occurs as an **outbreak** of disease following a massive but relatively short-term intake of metacercariae. This high intake is often the result of certain seasonal and climatic conditions combined with a lack of appropriate fluke control measures. It typically occurs when stock are forced to graze in heavily contaminated wet areas as a result of over-stocking and/or drought. Animals suffering from acute fascioliasis may display **no clinical signs prior to death**; some may display abdominal pain and discomfort and may develop jaundice. Death usually results from blood loss due to **haemorrhage** in the liver caused by the migration of the immature fluke through the liver.
2. **Sub-acute** fascioliasis:
Sub-acute fascioliasis is characterised by **anaemia**, **jaundice** and ill-thrift. The migrating fluke cause extensive tissue damage, haemorrhage and, in particular, liver damage. The result is severe anaemia, **liver failure** and **death in 8-10 weeks**
3. **Chronic** fascioliasis:
Chronic fascioliasis is the **most common** clinical **syndrome** associated with liver fluke infection in **sheep** and **cattle**. It occurs when the parasites reach the hepatic bile ducts. The principle effects are **bile duct obstruction**, **destruction of liver tissue**, **hepatic fibrosis (scarring) and anaemia**.
The onset of clinical signs is slow. Animals become gradually anaemic and inappetent, as the adult fluke become active within the bile ducts; signs may include dependent **oedema** or swelling under the jaw (‘**bottle** **jaw’**). Affected animals are reluctant to travel. Death eventually occurs when anaemia becomes severe. Additional stress upon anaemic animals, such as droving, may lead to collapse and death. **Cattle** typically **present** with signs of **weight** **loss**, **anaemia** and **chronic diarrhoea.**Chronic fascioliasis provides the right environment in the liver for the germination of the spores of the bacterium, **Clostridium novyi Type B**, which cause **Black disease**. Vaccines against C.novyi are available and should be given to all animals, particularly those at risk of fascioliasis
4. **Diagnosis**
a. symptoms :

Acute Fascioliasis should be considered when there are cases of death, anaemia, or chronic Fascioliasis diarrhoea or ill thrift in sheep or cattle grazing on fluke-prone country.

In the live animal, chronic fascioliasis is indicated by the presence of fluke eggs in a faecal sample **sedimentation** test (faecal samples may be sent to a veterinary laboratory for diagnosis ; size of eggs , diffrentitaed from Paramphistomum ).

b. P.M. :

1. A dead animal can be quickly diagnosed by the presence of mature or immature fluke in the liver; the autopsy will also identify any other conditions that may be contributing to the problem. Emaciated, anaemic or edematous carcass in severe chronic infestations
2. Presence of flukes in enlarged and thickened bile ducts and in the liver parenchyma
3. Hepatic abscesses and secondary bacterial infection
4. Calcification of bile ducts
5. Black parasitic material (excrement) in the liver, lungs, diaphragm and peritoneum 6. Haemorrhagic tracts of migratory immature flukes in the lungs and liver in an acute infestation ,Black lymph nodes of the lungs and liver due to fluke excrement
6. Icterus due to liver damage
7. Treatment
8. The treatment recommended will depend upon the nature of disease. **Some of the available anthelmintics are not effective against immature fluke and so are not recommended in acute fluke outbreaks.** In addition, they are less efficient for the strategic control of fascioliasis.
9. **At least 2 treatments annually** with **anthelmintics** required on sheep and beef properties where liver fluke occurs. The initial dose should be administered in **spring** to remove any fluke that have been present in the animals during the winter. This is followed by a **second dose in** **early summer** to remove fluke picked up during the spring. **A third treatment, in autumn**, may be required on properties heavily infested with liver fluke.
10. (**closantel** + **oxfendazole**), **benzimidazole** is registered for use in sheep and it is a suitable rotational product to be used with (**triclabendazole**), to delay the onset of resistance. (closantel + oxfendazole), will kill a high proportion of fluke aged 4 weeks and is highly effective against fluke aged 6 weeks or older. The very early immature fluke will be retarded in their development and egg production will not commence for several weeks, thus reducing the level of pasture contamination.
11. **Molluscicides** for snails e.g. CuSO4.
12. Control of wild **rabbits** as carrier host.

 **Genus Fascioloides**

***Fascioloides magna***, also known as **giant liver fluke**, **large American liver fluke** or **deer fluke**, is an important parasite of a variety of wild and domestic [ruminants](http://en.wikipedia.org/wiki/Ruminant) in North America and Europe. **Encapsulated** Adult flukes occur in the liver ,bile ducts of the definitive host and feed on blood. Mature flukes measure 4 to 10 cm in length × 2 to 3.5 cm in width, and have an oval dorso-ventrally flattened body with oral and [ventral](http://en.wikipedia.org/wiki/Ventral) [sucker](http://en.wikipedia.org/wiki/Sucker).

It may **differentiated** from Fasciola hepatica by the **absence** of **an anterior cone like projection**.

 **Family Dicrocoeliidae**

A [family](http://www.biology-online.org/dictionary/Family) of flattened, [translucent](http://www.biology-online.org/dictionary/Translucent) [flukes](http://www.biology-online.org/dictionary/Flukes) (trematoda) , with shape as lancet ,had oral and ventral suckers ,occurring in the [gut](http://www.biology-online.org/dictionary/Gut), [gallbladder](http://www.biology-online.org/dictionary/Gallbladder), [bile ducts](http://www.biology-online.org/dictionary/Bile_ducts), [liver](http://www.biology-online.org/dictionary/Liver) or [pancreatic](http://www.biology-online.org/dictionary/Pancreatic) [ducts](http://www.biology-online.org/dictionary/Ducts) of [amphibians](http://www.biology-online.org/dictionary/Amphibians), [reptiles](http://www.biology-online.org/dictionary/Reptiles), [birds](http://www.biology-online.org/dictionary/Birds), and [mammals](http://www.biology-online.org/dictionary/Mammals).

 **Dicrocoelium dendriticum
 (Lancet fluke, Lesser liver fluke)**

typically lives in the **bile ducts** of the livers of grazing animals (and **sometimes humans**). It has a rather typical trematode (fluke) life cycle with **three different hosts** but, interestingly, it clearly **alters** the **behavior** of one of them, making it more likely to reach the next host.

**Dicrocoelium dendriticum Life Cycle**

* **Adult** produce **eggs** exit from the **bile**, mixed with the **stool**.
* **Land snails** the **Helicella** or **Zebrina** as **1st**. intermediate host ingest the eggs, then hatched , releasing **miracidia**.
* Miracidia migrate through the gut wall into the snail’s digestive gland, where they multiply asexually. **Developed** to **1st. &2nd.** **Sporocysts** which are **produced** **Cercariae**.
* **No redia produced .**
* **Cercariae** gathered ( up to 400 ) and leave the snail’s tissues in **slime ball** .
* **Formica** **ants** **2nd**. intermediate host eaten slime balls, **Cercaria** in **brain** **encysted** after 35 days to **metacercaria**( **infective stage**) which profoundly influences the ant’s behavior .
* Infected ants crawl on grass in the cool evenings and early mornings . This is the time when herbivores are grazing—the ant’s strange behavior makes the insect much more likely to be eaten by a grazing.
* **Metacercariae** in final host **migrate** up the **bile** **duct** into the liver and **mature** to **adult** flukes in under two months. At about three months after infection, the worms begin producing eggs.

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*EY*, *EX*, excretory bladder; *GB*, *GP*, genital pore; *HD*, head; *IN*, intestine; *MC*, metacercaria; *MI*, miracidium; *OP*, *OS*, oral sucker; *OV*, ovary; *TA*, tail; *TE*, *UT*, uterus; *VI*, *VS*, ventral sucker

**Pathology & Clinical sings**

***Dicrocoelium******dendriticum*** can **infect** the **bile ducts** ; Because the bodies of these parasites are **long and narrow**, infections are generally **confined** to the more **distal** **parts** of the bile ducts. infections of the biliary tree produce **only mild symptoms**. These symptoms can include **biliary colic** and general **digestive** **disturbances**, including **bloating** and **diarrhea**. However, in **heavier** **infections**, **bile** ducts and the biliary **epithelium** may become **enlarged** in addition to the generation of **fibrous** tissue surrounding the ducts, and as a result, causing an enlarged liver ([**hepatomegaly**](http://en.wikipedia.org/wiki/Hepatomegaly)) or inflammation of the liver ([cirrhosis](http://en.wikipedia.org/wiki/Cirrhosis)).

**Postmortem findings** : In cattle, sheep and swine, the lancet fluke causes **moderate** **thickening of the bile ducts**, with slight damage to liver **parenchyma**. Upon close examination, the parasites can be seen in the bile ducts.

**Differential diagnosis**: ova 35 x45 u oval with one side rectilinear brownish colour and complete miracidium (fully embryonated ) ;see Fascioliasis.

In addition, in 2007 the WHO included *Dicrocoelium dendriticum* on its list of organisms to target with its Foodborne Disease Burden Epidemiology Reference Group.