inhabit the veins, especially those of the urinary bladder and mesentery ; extravasations of blood and villous growths or ulcera­tions of the mucous membrane of the bladder present themselves, and thus the eggs of the parasite find their way into the urine, in which they are evacuated, and can be detected by microscopic examination. With the characteristic presence of the eggs are associated colic, anaemia, and great prostration of the vital powers, more particularly in the later stages ; the disease when once fairly established is almost always fatal ; see Cobbold (1).

From a practical point of view by far the most important Trema­tode is *Fasciola (Distomum) hepatica,* which gives rise to the disease known as “liver rot” in sheep. It is always more or less abund­ant in certain districts, and it is estimated that in the United Kingdom the annual loss of sheep due to it is not less than 1,000,000. The symptoms are said to be emaciation, tenderness in the loins, harshness and dryness of the wool, and a scaly con­dition of the skin. On post-mortem examination fluid is found in the peritoneal cavity and the viscera have a blanched appearance ; the liver is dark chocolate or sometimes pale in colour, nodular, and uneven, the ducts are thickened and Distomes are found within them. Dead flukes have been known to furnish the nuclei of gall-stones in the gall-bladder. Briefly stated, the principal preventive measures seem to be as follows :—(1) destruction of the eggs, and especially abstention from putting manure of rotten sheep on damp ground ; (2) slaughter of sheep which are badly fluked ; (3) adequate drainage of pastures ; (4) an allowance of salt and a little dry food to the sheep ; and (5) dressings of lime or salt on the ground to destroy the embryos (Thomas, 25). A series of wet seasons increases the prevalence of the malady, and animals which have been allowed to graze in low-lying ill-drained lands arc specially liable to infection—facts which are readily explicable on a consideration of the life-history given above.

*Systematic Arrangement.—*The *Trematoda* may be classified as follows :—

I. MONOGENEA, Van Beneden ; development direct, that is, without the media­tion of nurse forms.

(i.) Tristomeæ, Leuckart; body roundish or elongate; posterior extremity never specially developed. Two adoral suckers often present: a large ventral sucker often armed with chitinoid structures. Sexual apertures on the left side or admedian. Laurer-Stieda canal single or double. Ova with a filament at one pole only.

1. Tristomidæ, Van Beneden.—1. *Tristοmum,* Cuvier; about a dozen

genera of previous writers are here included; over 14 species are known, all parasitic on fishes ; Taschenberg (30).

2. Monocotylidæ, Taschenberg.—1. *Calicοtyle,* Diesing; only species *C.*

*kröyeri* (31). 2. *Pseudocotyle,* Taschenberg. 3. *Monocotyle,* Taschen­

berg ; only one species, *Μ. myliobatis,* on the gills of the eagle-ray *(Myliobatis aquila).*

3. Udonellidæ, Johnston.—1. *Udonella,* Jhnst.; five species, the type being

*U. caligarum,* parasitic on a crustacean *(Caligus),* which in its turn in­fests the holibut *(Hippoglossus vulgaris).*

(il.) Poltstomeæ, Leuckart; body elongate, pointed and narrow anteriorly; broad behind and generally provided with special organs of adhesion in the shape of suckers or chitinoid hooks, of suckers or claspers with chitinoid structures. Two adoral suckers in some instances. Sexual apertures median. Laurer-Stieda canal single or double. Male sexual aperture often armed with chitinoid hooks. Ονο frequently provided with two long appendages.

1. Octobothriidæ, Taschenberg.—1. *Octobothrium,* Nordmann; about a

dozen genera of various authors are here included by Taschenberg (30), containing fourteen species, parasitic on fishes, and almost invariably on the gills. 2. *Anthocotyle,* Hesse and Van Beneden ; one species *(A. merlucii),* found in the hake. 3. *Phyllocotyle,* Hesse and Van Beneden; one species, from the gurnard. 4. *Platycotyle,* Hesse and Van Beneden ; one species, from the gurnard. 5. *Pleurocotyle,* Gervais and Van Beneden *( = Grubea cochlear,* Dies.); one species, from the gills of the mackerel. 6. *Diplozoon,* Nordmann (see below). 7. *Hexacotyle,* Blainville ; one species, from *Thynnus brachypterus.* 8. *Plectanocotyle,* Dies.; from the gills of *Labrax mucronatus.*

2. Polystomidæ, Van Beneden.—1. *Polystomum,* Zeder; two species, best

known *P. integerrimum* (see below) ; *Hexathyridium* is probably a synonym. 2. *Onchocotyle,* Dies.; five species, from the gills of sharks and rays. 3. *Erpocotyle,* Hesse and Van Beneden; one species, from the gills of *Mustelus lævis.* 4. *Diplobothrium,* F. S. Leuckart; one species, from the gills of a sturgeon.

3. Microcotylidæ, Taschenberg.—1. *Axine,* Abildgaard ; two species. 2.

*Microcotyle,* Van Beneden ; about half a dozen species, all parasitic on the gills of fishes (see below). 3. *Gastrocotyle,* Hesse and Van Bene­den ; one species, from the gills of *Caranx trachurus. 4. Aspido- gaster,* Von Baer (see below). 5. *(Cotylaspis,* Leidy ; one species, occurring in *Anodonta.* 6. *Aspidocotyle,* Dies.

4. Gyrodactylidæ, Van Beneden.—1. *Gyrodactylus,* Nordmann (see below).

2. *Dactylogyrus,* Dies.; about twenty species, all parasitic on fishes, mostly on the gills. 3. *Tetraonchus,* Dies.; three species, on the gills of freshwater fishes. 4. *Diplectanum,* Dies. 5. *Calceostomum,* Van Beneden ; one species, on the gills of *Sciæna aquila.* 6. *Sphyranura,* Wright(34, 45) ; one species, from the mouth of *Menobranchus lateralis.*

II. DIGENEA, Van Beneden ; one or more non-sexual forms intervene between two successive sexual forms.

(i.) Monostomidæ, Van Beneden; elongate, oval, or rounded in shape ; one oral sucker.—1. *Monostomum,* Zeder; fifty to sixty species in mammals, birds, and fishes ; type, *Μ. mutabile,* Zeder, found in the body-cavity and eye of water-birds. 2. *Notocotyle,* Dies. ; *N. triseriale,* Dies. *(= Monostomum verrucosum).*

(ii.) Distomidæ, Van Beneden; body flattish, more or less leaf-like or elougate ; an oral and a ventral sub-median or posterior sucker.—1. *Distomum,* Retzius (see below). 2. *Fasciola,* Linn.; three species are known ; *F*. *hepatica* is described above ; *F. gigantea* inhabits the liver of the giraffe. 3. *Bilharzia,* Cobbold ( = *Gynæcophorus,* Dies.); one species (see below). 4. *Echinostomum,* Dujardin ; *E. gadorum,* Van Beneden, in the intestine of *Gadus carbonarius* (the coal-fish), and twenty-five

other species in the alimentary canal of mammals, birds, and fishes.

5. *Amphistomum,* Rudolphi; about twenty species in different Verte­brates ; *A. subclavatum* (Göze) in the rectum of the frog. 6. *Gastrodis- cus* (?), Leuckart (see also 37). 7. *Homalogaster,* Poirier (38). 8. *Gas-*

*trothylax,* Poirier. 9. *Eurycœlium,* Brock (44), has the excretory vessels dilated into wide chambers (? coelom).

(ili.) Gasterostomidæ, Von Siebold ; oral sucker sub-median and ventral; also an anterior sucker.—1. *Gasterostomum,* Von Siebold ; eight species, all in fishes; larval form *Bucephalus* (see below).

(iv.) Holostomidæ, Claus (43); body flattened, and divided into an anterior and posterior part, the former bearing an anterior and ventral sucker; two adoral lobes with glands in connexion, or a circumoral fold with lobes.—1. *Holostomum,* Nitzsche; twenty-three species, most in water­birds; *II. variabile,* in various raptorial birds; larval forms *Tetracotyle* and *Diplostomum.* 2. *Hemistomum,* Dies.; three species, one in the wild-cat, two in birds. 3. *Eustemma,* Dies.

The true position of the following is doubtful :—*Nematobothrium,* Van Bene­den (9); *Didymozoon,* Von Linstow (30); *Stichocotyle,* Cunningham (39).

*Diplozoon paradoxum* (18) infests the gill of the minnow in large numbers. The eggs hatch in the water, continuing to be attached to the gill by a filament at one extremity. The embryo is elongated oval in shape, and ciliated all over ; on its back are two eyes, consisting of a cup-shaped mass of pigment, with a spheroidal lenticular body. It presents also the mouth with two peculiar suckers, the oeso­phagus and intestine, and the two claspers of the *Diporpa.* The embryo swims vigorously about until it finds its way to the gill of a minnow, failing which it dies in about six hours. Attached to its host it may live isolated for a considerable time, increasing in size; usually, however, it unites with another individual in a kind of reciprocal copulation (fig. 3, A). One individual by means of its ventral sucker seizes the dorsal papilla of another, and then the two twist across each other so that the sucker of the second seizes the papilla of the first. After this a complete fusion of the individuals takes place, the papillæ and suckers growing together so firmly as to be anatomically’ inseparable. Both individuals continue to grow and develop a second, third, and sometimes a fourth pair of claspers.

In *Polystomum integerrimum* (18), which inhabits the bladder of the frog, the eggs are developed during the winter and are laid in the spring, when the frogs resort to the water. It appears probable that the worm protrudes its body from the frog and thus deposits the egg directly in the water. The young worm, as it escapes from the egg, which takes place after a lapse of six or eight weeks, measures about 0∙3 mm. in length, and swims vigorously about by the aid of a coating of cilia. At its posterior extremity is a rounded disk (fig. 3, B, round the margin of which sixteen delicate hooks are placed at equal intervals. Above the four hindmost of these are two others still smaller and more delicate. Upon the back are situated four eyes disposed in pairs. The mouth is wide and leads into a pharynx, and this into the intestine ; two excretory’ vessels are present, but there is no trace of generative organs. The hindermost pair of suckers is the first to be developed, and they enclose those two hooks which lie at the outer side of the very delicate ones mentioned above, which eventually become the strong terminal hooks of the adult. The other two pairs of suckers are formed in a similar manner, the development of all three being usually completed during the month of July. The young *Polystomum* attacks not the full-grown frog but the tadpole, entering the gill-cavity and subsequently proceeding to the bladder. Like the frog it requires four or five years to attain sexual maturity. In certain cases the *Polystomum* does not migrate ; it then becomes prematurely sexual and dies when the tadpole undergoes metamorphosis ; under these circumstances the sexual organs are simpler than usual: the testis is simple; the germarium is long and coiled ; there is neither prostate nor Laurer-Stieda canal ; and the oviduct has no dilated anterior portion.

*Microcotyle mormyri,* Lorenz (21) (fig. 3, C), has no penis, the semen issuing by an opening posterior to the spiked birth-opening ; the vagina opens medially, not