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ON THE HATCHING OF THE EGGS OF THE CESTODE TRIAENOPHORUS CRASSUS 1936

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ON THE HATCHING OF THE EGGS OF THE CESTODE, TRIAENOPHORUS CRASSUS

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There is hitherto one published record in Canada on the hatching of Triaenophorus crassus eggs, viz. by Newton (1932). Newton found no sexual development of the parasites during the period from May to August, the intestinal forms being indistinguishable from the intramuscular plerocercoids. He states that he obtained the mature eggs in early February and that the coracidia appeared fifteen days after the eggs were placed in the water and continued to appear over a further period of fifteen days. Newton says: "These corcidia are extremely small, measuring 6 μ in diameter." Further: "The posterior portion of the embryo appeared darker, but owing to the extremely small size it was impossible to identify this darker portion as the hook-bearing region".

The following observations of the time of maturation and the hatching of T. crassus eggs is given to clear up the misunderstanding which may appear from the data of Newton. The discrepancy in our results may be explained on the basis that Newton must have taken some other organisms (6 μ in diameter) for the coracidia of T. crassus and did not have the mature eggs at that time of the year.

The following table shows the stage of development of T. crassus in pike (Esox lucius L.) during the different months of the year, collected from different localities. The parasites mature in April and May. The new infection takes place when some of the mature parasites are still in the host. When the parasites are taken into the definitive host and become liberated

from the intramuscular cysts in ciscoes, they are not unlike the intramuscular forms, but soon the constrictions appear and the larval body is cast off.

Mature eggs, obtained in April and May, were kept at room temperature covered with a water-layer 5 to 10 mm.

Following cultures were furnished:-

April 8, 1935 - Material was obtained from the pike from Lake of the Woods. The eggs in which the embryos were not yet outlined, were placed in 10 petri dishes and under frequent examination they remained there until May 28. No development or hatching took place and finally all eggs disintegrated, the empty shells remaining on the bottom of the dish.

May 12, 1935 - Material obtained from Lake of the Woods. The embryos were outlined when taken out of the parent. The eggs washed out from the faeces of the fish showed a well advanced stage of development. The embryos, provided with 6 hooks, were well outlined and actively moving within the egg. These eggs started to hatch after 3 hours in water. The eggs taken from the parent were washed and placed in the water at 11 A.M. The first eclosions of these eggs were noticed on the second day at 8 P.M. The duration of the hatching was 2 to 6 days.

May 20, 1935 - Material obtained from Lake Nipissing. The embryos were not as well outlined as in culture 2. First movements of the embryos were noticed after 2 days. The duration of the hatching was 4 to 7 days.

May 31, 1935 - Material obtained from Lake Nipissing. The eggs were about in the same stage of development as in culture 3. Hatching took place in 3 to 8 days.

The eggs of T. crassus are 0.058 mm. long, 0.040 mm. wide. Extreme measurements are 0.054 to 0.064 mm. long, 0.036 to 0.044 mm. wide. The eggs

The occurrence of *Triaenophorus crassus* in the intestine of *Esox lucius*

Locality	Date	Stage of development of genitalia
Gimly, L. Winnipeg	28. 6/31	No trace of genitalia
Moose L., Ontario	2. 7/36	No trace of genitalia
Matlock, L. Winnipeg	20. 7/33	No trace of genitalia
Matlock, L. Winnipeg	10. 7/33	No trace of genitalia
Gimly, L. Winnipeg	15. 10/31	Early anlagen of genitalia
Gimly, L. Winnipeg	30. 10/31	Genital organs developing
Gimly, L. Winnipeg	21. 11/31	Genital organs developed, no eggs developed
Gimly, L. Winnipeg	14. 12/31	Eggs in uterus
Gimly, L. Winnipeg	9. 1/32	Eggs in uterus
Gimly, L. Winnipeg	2. 3/32	Eggs in uterus
Gimly, L. Winnipeg	1. 4/32	Eggs in uterus, embryos not yet outlined
L. of the Woods, Ont.	5. 4/35	Uterus filled with eggs, embryos not yet outlined
Gimly, L. Winnipeg	12. 4/32	Uterus filled with eggs, embryos not yet outlined
Matlock, L. Winnipeg	3. 5/33	Eggs with well developed embryos
L. of the Woods, Ont.	10. 5/35	Gravid parasites together with the new infection
L. Nipissing, Ont.	17. 5/35	Gravid parasites predominate but new infection has also taken place
L. Nipissing, Ont.	28. 5/35	Both gravid and immature parasites present

are usually white in colour but when the embryos are well developed the eggs are brown in colour. The uteri of gravid tapeworms are seen by the naked eye like a row of brown dots along the strobila.

The movements of the larvae within the eggs and the hatching of numerous eggs were observed. When the movements at first begin they are very slight and occur periodically. Gradually these movements become more energetic and before hatching the larva shows active rotating and back and forth movements. This activity was continued sometimes for several hours, although usually it took place 15 to 20 minutes before hatching only. By a sudden movement the opercle opens, the larva elongates and in a few seconds it passes through the opercular opening, and swiftly swims away. The opercule either remains open like a lid on the hinge or frequently closes after the eclosion of the larva. Sometimes it becomes detached from the shell. The larva swims about by rotating and forward movements. The rotating movements are slower than the forward movements and therefore less noticeable. The outer covering of the larva gradually begins to swell and the motions become slower. When the larvae become older they gradually lose the cilia. After three to four days they cease the motions and remain on the bottom of the dish. In several cases it was noticed that the outer covering with the cilia was cast off. This apparently is not the normal case in nature as a ciliate larva swimming about has more chances to be taken up by a copepod than a quiescent one on the bottom.

Immediately after eclosion the coracidia have approximately the dimensions of the eggshell, but in about half an hour they exceed the size of the egg, measuring 60 to 70 μ in length and 50 to 60 μ in diameter. The cilia are 10 to 15 μ long. There is a tuft of cilia 30 to 35 μ long at the anterior end of

of the larva, unlike those of Diphyllobothrium latum (Vogel, 1928) in which they gradually increase in length anteriorly. The hooks measure 13.5 to 15 μ.

Michajlow (1932, 1933) gives detailed descriptions of the coracidia of T. crassus and nodulosus in Poland and gives a number of copepods which serve as intermediate hosts. Cyclops strenuus Fischer was found to be the first host for both, T. crassus and T. nodulosus.

Diaptomus oregonensis is probably one of the copepods which serve as the first intermediate host for Triaenophorus in Canada. This copepod was found to be infested with a procercoid, apparently Triaenophorus. It was taken from shallow water in Lake Nipissing on the 16th of June. It is expected that more than one species of copepod may be the first carriers of Triaenophorus in Canada as in Europe.

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