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FIRST RECORD OF THE FRESH WATER SNAIL GYRAULUS LAEVIS (ALDER) NATURALLY INFECTED WITH PARAMPHISTOMUM CERCARIAE FROM TURKEY

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Paramphistomum serkerleri ile doğal enfekte tatlısu sümüklüsü Gyraulus laevis (Alder) in Türkiye'den ilk bildirilişi

Özet: *Türkiye'de trematod larva dönemleri ile enfekte* Gyraulus laevis'*lere rastlandığıyla ilgili daha önce bir kayıt bulunmamaktadır. Bu çalışmada Eskişehir Çifteler Harasında Paramphistomum serkerleri ile enfekte* G. laevis'*lere rastlandığı ilk kez bildirilmektedir. Mayıs* 1986'*da yöreden toplanan* G. laevis'*ler saydam olan kabuk yapısından ötürü laboratuvarda binoküler disseksiyon mikroskobunda sporokist, redi, serker gibi trematod gelişme dönemleri yönünden kontrol edilmiştir. Daha sonra deklorinize çeşme suyu içeren petri kutularına yerleştirilerek kuvvetli ışık kaynağı altında serker çıkarmaları sağlanmıştır. Serker çıkarmıyanlar ise erken gelişim dönemlerini saptayabilmek için disseke edilmiştir. Kontrol edilen* 1226 G. laevis'*ten (Kabuk çapı* 0.30-0.60 *mm)* 53'ünün (% 4.32) *Paramphistomum gelişme dönemleri ile enfekte olduğu saptanmıştır.*

Gyraulus laevis *bağlı olduğu Planorbidae familyası genel özelliklerini taşımaktadır. Çalışmada* G. laevis *ile Paramphistomum serker ve metaserkerlerinin morfolojik tanımları yapılmıştır. Bu sümüklüböcek muhtemelen Türkiye'de bulunan Paramphistomum türlerinden bir veya birkaçı için arakonakçılık yapmaktadır.* Gyraulus laevis'*in hangi Paramphistomum türlerinin arakonakçısı olduğunun ve bu türlerin kesin konaçılarının belirlenmesi için yeni çalışmalara gerek vardır.*

Summary: *A review of the literature shows that* Gyraulus laevis *infected with trematodes larval stages has never been recorded in Tur-*

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key. In this paper the first record is made from Eskişehir Çifteler State farm, west of Ankara, Turkey. The snail harbour Paramphistomum cercariae. The percentage of infected snail during May, 1986 *was found to be* 4.32 %.

Morphological description of the snail Gyraulus laevis, *Paramphistomum cercariae and metacercariae is given. The snail possibly acts as an intermediate host of Paramphistomum species in Turkey. Further studies are needed to observe the exact type of Paramphistomum in which* Gyraulus laevis *acts as an intermediate host in the life cycle and to determine the definitive host.*

Introduction

It has been indicated before that molluscs are of considerable medical and economical importance as they act intermediate host of many trematodes of man and his domestic animals (10). The importance of the snails as hosts and carriers for certain trematodes, though recognized early, has been overshadowed by the role of snails in the life cycle of economically important trematodes. In recent years, however, snails have received some attention as hosts for certain trematodes producing important zoonoses in some parts of the world.

There is a high degree of specificity of trematode in general to their snail intermediate hosts. Trematodes have become adapted to a single or a few species of snails. In the latter case, however, these species belong to the same genus or family. A miracidium of a certain fluke may penetrate several species of snails but its fate in the tissues of the snails is determined by a physiological adaptation to certain strains. They might develop and produce cercariae in some species and are walled off in others as a result of strong host reaction (11,15) .The presence of susceptible snail is the primary requirement for the establishment of endemicity of the trematode infection.

In Turkey little work has been done on the field of fresh water snails as an intermediate hosts of many digenetic trematodes. The only available work is that of Güralp and Simms (8) on *Lymnaea trancatula* as an intermediate host of *Fasciola hepatica* in Turkey. The snails were occured in many, if not all, areas of the Anatolian Plateau. Also *Fasciola gigantica* is widespread in some region of Turkey. The fresh water snail *Lymnaea auricularia* has been found to be a snail host of *Fasciola gigantica* (9). *Lymnaea auricularia* were found

widespread in western and southern parts of Turkey and on the Anatolia Plateau.

Recently, Burgu (3) recorded that the fresh water snail *Planorbis planorbis* is the intermediate host of *Paramphistomum cervi* in Eskişehir Çifteler State Farm, Turkey.

The present study is the first record of infected fresh water snail *Gyraulus laevis* with Paramphistomum cercariae in Turkey. The snail could be of great economical as well as medical importance.

Materials and Methods

Snails used in the present investigation were collected during May, 1986 from Eskişehir Çifteler State Farm, about 250 kilometers west of Ankara, Turkey. Snails were transported to the laboratory where they were kept in plastic aquaria half filled with dechlorinated tap water. Snails were fed on fresh lettuce leaves.

Parasitized snails with transparent shells can be identified and separated from unparasitized specimens by detecting the different developing stages of the parasite such sporocysts, rediae and cercariae through the transparent shell using binocular dissecting microscope (Figs. 1 and 2).

Parasitized snails were separated and examined for cercarial shedding by placing them individually in small petri dishes half filled with dechlorinated tap water and subjected them to strong illumination for one hour to encourage emergence of cercariae. Shedding cercariae from parasitized specimens were collected for subsequent observations.

In order to find non-emerged cercariae and their parthenites (rediae and sporocysts), snails were gently crushed and after removing the broken shell, the tissues, especially the digestive gland in the spire of the shell, were macerate in water and examined microscopically.

Results

Collected specimens from Eskişehir Çifteler State Farm, were identified according to the shell morphology and the internal anatomy by Dr. N.J. Evans From Mollusca Section, British Museum (Natural History), London, England (5).

Fig. 1. Uninfected *Gyraulus laevis*.

Three species of fresh water snails namely *Lymnaea truncatula* (Müller), *Aplexa hypnorum* (Linnaeus) and *Gyraulus laevis* (Alder) were identified. Special attention was paid to the fresh water snail *Gyraulus laevis* (Gastropoda, Pulmonates, Planorbidae, Planorbinae) because of its abundance in the above mentioned area as well as it harbour trematode larval stages.

Lymnaea truncatula and *Aplexa hypnorum* collected from Eskişehir Çifteler State Farm during May, 1986, were found free from infection. They do not shed any cercariae by expossing them individually to light. Also no parthenites of any kind were observed.

On the other hand, a total of 1226 specimens of *Gyraulus laevis* (average shell diameter between 0.30–0.60 mm) were examined for

Fig. 2. Infected *Gyraulus laevis.*

infection. Out of this number only 53 specimens were found infected with Paramphistomum cercariae (4.32 %).

Gyraulus laevis belongs to the family Planorbidae which considered as one of the most medically important family in phylum mollusca. The shell is discoidal (Fig. 3) The animal is sinistral having its pulmonary and genital openings on the left side. The tentacles are long, filiform and cylindrical, their eyes are placed at their inner base. Snails have small shells much depressed with four rapidly increasing whorls with rounded periphery. All whorls visible from above and below and shells are transparent. The shell aperture is oblique (Fig. 4).

Paramphistomum cercariae are Amphistome type of cercariae having a large ventral sucker situated at the posterior margin of the body. Oral sucker small, body large and tail is simple, globular and refractile excretory concretions in main excretory canal. Cercariae develop in rediae.

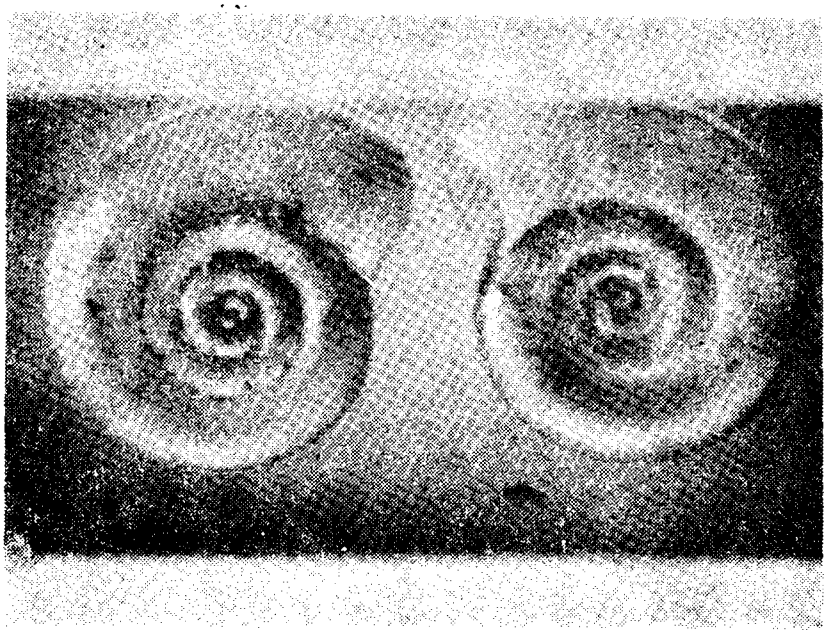

Fig. 3. Shell of *Gyraulus laevis*.

Fig. 4. Shell aperture of *Gyraulus laevis*.

When the cercariae are released from the rediae they are in an immature state and they continue their development in the tissue of snail for sometime before being shed. The mature cercariae examined in the present investigation were dark brown to black in colour and possess two marked eye-spots. The eye-spots can be seen when cercariae are within the rediae. The mature cercariae (Figs. 5, 6) are vigorously swimming and its body made relaxation and contraction movements. It has a pear-shaped body and its posterior part is wider than its anterior.

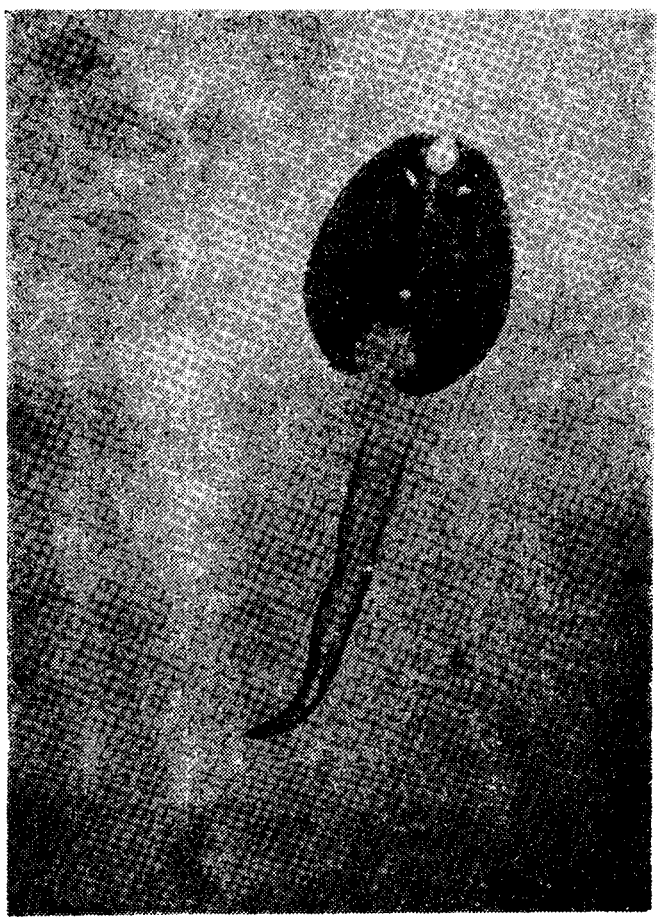

Fig. 5. Mature Paramphistomum cercaria.

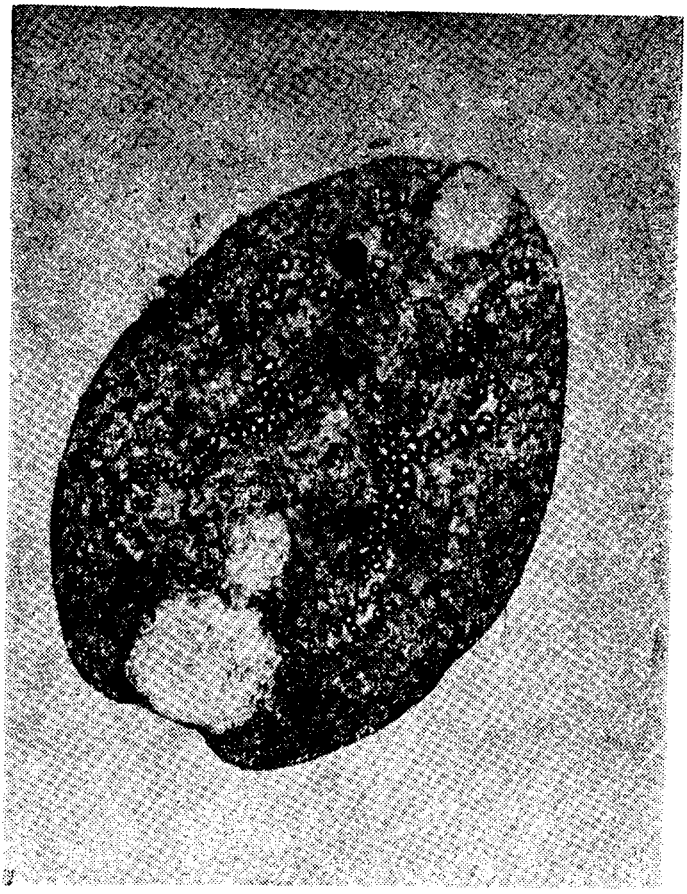

Fig. 6. Body of Paramphistomum cercaria.

The mature cercariae were large, the body was 350–480 microns long and 200–350 microns wide. While the tail was 400–500 microns long and 70–80 microns wide.

Cercariae always appeared from parasitized snails within 30 minutes when stimulated by strong light. Liberated cercariae were active for minutes (10–15 minutes) before encystment when they selected a suitable surface, mostly on the side of petri dish and rarely at the bottom, and attach themselves by means of the posterior sucker. Cystogenous material then appears around the body and as the cyst wall develops the tail becomes less firmly attached. Within 20–30 minutes metacercariae were in the form of halfsphere and were surrounded by a

thick layer of a cyst wall. The metacercariae were measured 200–250 microns in diameter and darkening with age to black colour (Fig. 7).

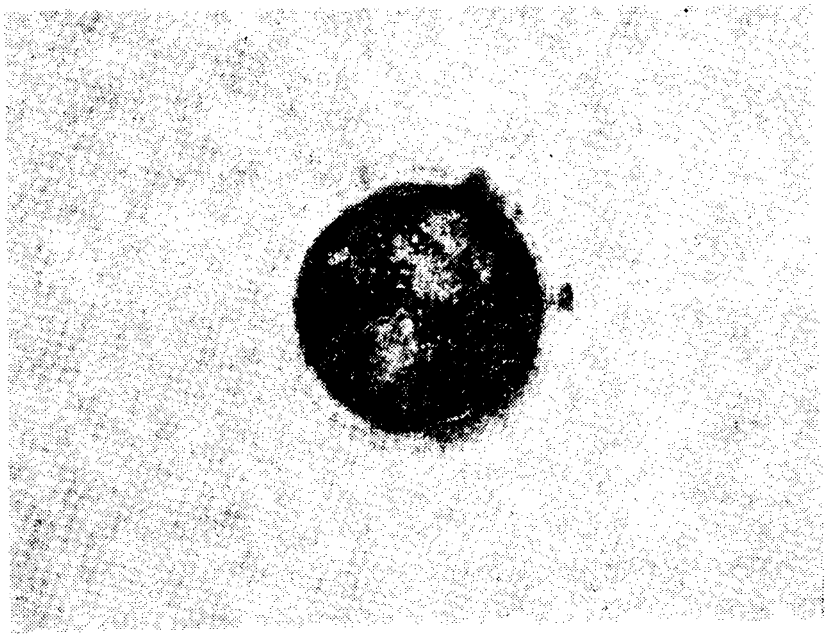

Fig. 7. Paramphistomum metacercaria.

Discussion and Conclusion

The gastropoda is not only numerically the largest of the molluscan classes but its members have been the most successful in spreading out to occupy many kinds of habitates in the sea, in fresh water and on land. They are also the major host group for flukes. Numerous fresh water snails have been reported as intermediate hosts for various parasites. In Turkey little work has been carried on parasitized gastropods with trematode larval stages. This work was carried out in order to investigate various snail hosts which are of some economic importance.

Burgu (3) recorded seven species of fresh water snails from Eskişehir Çifteler State Farm namely *Planorbis planorbis*, *Valvata macrostoma*, *Aplexa hypnorum*, *Lymnaea truncatula*, *Planorbis carinatus*, *Lymnaea auricularia* and *Succinea pfeifferi*. Only *Planorbis planorbis* was found infected with *Paramphistomum cervi* cercariae (1.57 %).

During the present study at the same area, three species of fresh water snails, were recorded namely *Gyraulus laevis* (Alder), *Aplexa hypnorum* (Linnaeus) and *Lymnaea truncatula* (Müller). Only *Gyraulus laevis* was found infected with Paramphistomum cercariae. Out of 1226 specimens of *G. laevis*, 53 specimens were infected (4.32 %).

A number of obvious inter-related factors such as environmental conditions and the behaviour of the intermediate and final hosts, may be expected to account for the different types of snails collected from the area as well as the incidence of infection with larval trematodes.

The range of intermediate hosts of flukes is narrow comparing with the range of their definitive hosts. The intermediate hosts of known Paramphistomidae are very specific and varies with the Paramphistomum species and their geographical distributions(1,2,4,12,13,14,15).

Güralp (1974) reported that Çiftеler State Farm and the surrounding area is one of the areas where Paramphistomum species are widespread in sheep from Turkey. Recently, different Paramphistomum species were recorded in Turkey included *Paramphistomum cervi*, *P. microbothrium*, *P. ichikawai*, *P. clavula* and *Calicophoron daubneyi* (6,7). Out of these Paramphistomum species, only the complete life cycle of *P. cervi* was successfully done through experimental infection. The intermediate host of *P. cervi* is found to be the fresh water snail *Planorbis planorbis*. A morphological description of the sporocysts, rediae, daughter rediae, cercariae and metacercariae as well as the adult worm was given by Burgu (3).

Gyraulus laevis presented in this paper from Eskişehir Çiftеler State Farm from Turkey, harbour Paramphistomum cercariae. The complete life cycle and the definitive host of Paramphistomum species is still unknown. Whether *G. laevis* acts as an intermediate host of *P. cervi* or other Paramphistomum species in Turkey, still awaits investigation.

Animal production in Turkey is not satisfactory, although Turkey has a great potential for livestock production. A number of factors do affect the low production level. One of the main factors is that a large number of parasites have been observed and described from various vertebrates animals in Turkey. The life cycle and the intermediate hosts of some of these parasites are still obscure. To fill this gap in the knowledge pertaining to the Turkish parasitic fauna, extensive survey studies on larval stages borne by different snails in Turkey are basically essential.

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