NEW SPECIES OF PARASITIC TAPE WORM POSTGANGESIA ARMATA N. SP. IN THE EUROPEAN CATFISH SILURUS GLANIS L. ENDEMIC TIGRIS RIVER PASSING THROUGH AL- RASHIDIYA REGION, NINEVEH, IRAQ

Bushra H. Al- Niaeemi*1, Sundus N. Al-Kallak 2 and Mohammad H. Mikael1

1Department of Biology, College of Science, University of Mosul, Iraq.
2Department of Biophysics, College of Science, University of Mosul, Iraq.

ABSTRACT
The current study dealt with re-description of parasitical tape worm Postgangesia hemispherous in European catfish Silurus glanis using the light and scanning electronic microscope. Scanning electronic microscope examination showed that the scolex of the tapeworm carries rostellum and suckers. The rostellum contains one ring of hooks. Because discovery of this feature (hooks ring), the current description is considered a new species of the genus tapeworm Postgangesia, and the former description "Postgangesia hemispherous" was considered an incomplete description (inquirinda species), so a new name for this species is devised to be "Postgangesia armata n. sp.". The examination also showed clear pores in the middle of the rostellum. The suckers contained muscles inside and filiform triches at their outer edges, as well as the presence of tegumental folds between suckers and also at the bottom of them, and existence of spiniform triches covered scolex’s tegument.

KEYWORDS: Silurus glanis, Postgangesia armata, ultrastructure.

INTRODUCTION
Fish are exposed in the aquatic environment and in fish farms, like other organisms to the various diseases such as bacterial, parasitic and viral diseases (Khan, 2009). Cestoda is one of the parasites that affects in freshwater and marine fish, it is one of the types of flatworms that are lacking to the digestive tract, and the scolex contains either suckers and rostellum with hooks, or bothria. The tapeworms bodies is monozoic or polyzoic (divided into several
segments) after the neck region, which are immature, mature and gravid segment, and whose bodies are covered with rich tegument with microtriches (Ash, 2012).

The genus *Postgangesia* worm is one of the parasitic tape worms in catfish in Russia and Iraq, which was first discovered as a new genus and species *Postgangesia orientalis* (Akhmerov, 1969) by using light microscopy, after which two species were discovered in Iraq in the European catfish passing through the Tigris river in Mosul: first type, Initially described as a *Proteocephalus hemispherous* worm by using light microscopy (Rahemo and Al-Niaeemi, 2001), it was then converted to genus *Postgangesia hemispherous* (Scholz et al., 2007) for having the characteristics of the genus *Postgangesia*, the second type, *Postgangesia inarmata* (De Chmbrier et al., 2003) by using light and scanning electronic microscope. Bilal and Abdullah (2013) also described *P. inarmata* from the large and small Zab river in the Kurdistan region of northern Iraq, by using a light and scanning electronic microscope.

The current study aims to re-describing the tape worm *Postgangesia hemispherous* by using light and scanning electronic microscope.

**MATERIALS AND METHODS**

35 samples of European catfish *Silurus glanis* were collected from the Tigris river passing through the region of Al- Rashidiya in the north of Mosul. Living fish brought to the laboratory, and for the purpose the search for internal parasites, especially tapeworm, slit has been done from the anus region to the anchored region and isolated the internal organs, including the small intestine, and placed in a petri dish containing the physiological saline solution of the fish (0.65)%%. Then the intestine were opened and their contents was examined to investigate the tapeworms. The study included two axes:

**A-Axis I (for diagnosis and study of seasonal and monthly variations)**

After obtaining the tapeworm samples from the intestine, clean the worms from the plankton using a small brush and wash with physiological saline solution and then with distilled water several times. Perform the phenotypic examination of the worm using an anatomical microscope. After the worms were cleaned from the plankton, it fixed in 10% formalin solution and dyed with Aceto carmine stain (Gurr, 1962). Then worms were dehydrated by passing
through an ascending series of alcohols, cleared in xylene, mounted in Canada balsam and examined microscopically for diagnosis.

B- Axis II (to study the ultrastructure of the tapeworm scolex)
Depending on method of Hayat (1987) for study the ultrastructure of the tapeworm scolex using a scanning electronic microscope. The tapeworm samples were washed with 0.65% physiological saline solution and then with distilled water several times. Then the samples were fix in the first fixative (3% Gluterald in 0.1 molar sodium phosphate pH 7.2) and then washed with the regulated solution (0.1 molar sodium phosphate pH 7.2) for 3 hours. Then the samples were transferred to the second fixative (Osmium tetroxide at 1% concentration) for 1-2 hours at 4 ° C. Then wash with distilled water twice for 10 minutes in every time.

Samples were dehydrated by passing through an ascending series of alcohols (30%, 50%, 70%, 90%) and 100% twice for 10 minutes in every time. The samples were dried in air for 20 minutes and carried after drying on the aluminum stub holder using carbon adhesive tape. Samples were transferred to the vacuum evaporator and were covered with a thin layer of gold in a sputter coater coating with a thickness of 10-30 nm. Then the samples were placed in the specified place to them and examined by microscope.

RESULTS AND DISCUSSION
Classification and Morphology
Phylum : Platyhelminthes
Class : Cestoda
Order : Proteocephalidea
Suborder : Proteocephalata
Super family : Proteocephaloidea
Family : Proteocephalidae
Sub family : Gangesiinae
Genus : Postgangesia (Akhmerov, 1969)
Species : Postgangesia (hemispherous) armata n.sp. (Rahemo and Al-Niaeemi, 2001).

The worm is white color, its length between (43-75) mm and its maximum width (1.10-1.63) mm. The scolex is convex in shape from the anterior end, its length between (0.22-0.31) mm and width is between (0.29-0.40) mm. Scolex contains four spherical suckers and ovaidal Rostellum in the middle of the scolex. rostellum contains hooks ring when examined with the
scanning electronic microscope. The diameter of the single sucker is between (0.12-0.19) mm, while the diameter of the rostellum is between (0.17-0.27) mm. The neck is a long, undivided, length is between (1.79-4.23) mm and width is between (0.21-0.61) mm. The body of the worm consists of several segments (immature, mature and gravid). The length of the immature segment is between (0.14-0.31) mm and width is between (0.51-1.14) mm, while the length of the mature segment is between (0.53-1.15) mm and width between (0.90-1.21) mm.

The mature segment contains ovary consisting of two lobes with a length of one lobe between (0.291-0.473) mm and width (0.184-0.245). Vagina is a tubular, its length between (0.25-0.30) mm and opens with a common genital pore. Numerous spherical testes are distributed in all parts of the segment, each with a diameter of (0.071-0.091) mm and the vasa efferntia extending from the testes. The vesicles glands are vesicular shaped and located on both sides of the segment. The cirrus sac is ovoid, its length between (0.15-0.28) mm and width between (0.07-0.13) mm in the front third of the segment, it contains the ejaculatory duct, which opens with an irregular general genital pore. The length of the gravid segment is between (0.90-1.17) mm and width (1.11-1.52 mm) and contains uterus, which consists of lateral branches extending from the center of the segment, ranging from (10-14) on each side. There are many spherical eggs within the branches. The diameter of the egg is between (10.02-10.3) mm (Figs. 1 and 2). (measurements are based on eight samples in millimeters).
Figure 1: tape worm *Postgangesia armata*.

Figure 2: Lucida drawings of *Postgangesia armata*. 
Abbreviation: Cgp= Common genital pore; Cs= Cirrus sac; Ec= Excretory canals; Ed=Ejaculating duct; Eg= Eggs; Ne= Neck; O= Ovary; Ro= Rostellum; Su= Sucker; Te=Testes; U= Uterus; Ud= Uterine diverticula; Va= Vagina; Ve= Vasa efferentia; Vg=Vitelline glands

The ultrastructure

Using the scanning electron microscopy, the worm body is made up of the convex-shaped scolex in the anterior end and the undivided long neck (Fig. 3). The scolex consists of spherical rostellum and oval suckers, as well as many tegumental folds between and within the suckers (Fig. 4). The presence of folds plays an important role in increasing the surface area of absorption as well as increasing the susceptibility of the worm to the expansion, this is what Swarnakar et al. (2014) referred to it in the study of the ultrastructure for the digenia worm Cotylophoron cotylophorum, from the presence of tegumental folds around the oral and genital sucker. In this study, the hooks ring was also observed in the rostellum region and the presence of hooks as in figure (5).

The rostellum container a hook ring that is a new distinguishing characteristic of the current worm, as demonstrated by the scanning electronic microscope in this study, which was not observed when the worm was examined by the light microscope, and also did not notice this feature in the study of De Chambrier et al. (2003) and Bilal and Abdullah (2013) for parasitic tapeworm Postgangesia inarmat in European catfish intestines using light and scanning electron microscopy. This characteristic is one of the characteristics subfamily Gangesiinae, whose characteristic features the rostellum container on the hooks ring, and the presence of hooks in one row, two or more compared with sub family Proteocephalinae missing the rostelluml (Freze, 1969).

The current description of the tapeworm Postgangesia was described by Rahemo and Al-Niaeemi (2001) as an incomplete description (species inquirinda), so the name of the new species was developed to be Postgangesia armata based on the discovery of this new feature which is a hooks ring as well as the previous features. In the same figure (5) distinct pores have been observed at the top of the rostellum in the scolex and are thought to be openings that may return to the excretory canals as proven in most tapeworms.
The properties mentioned above, except tegumental folds and pores, are almost identical with some features of the worms types for sub family Gangesiinae, which studied by Ash et al. (2012) by using light and scanning electronic microscope.

In the current study, there is a single row of filiform triches on the outer edge of the suckers, which are auxiliary structures for adhering to the host tissue, as well as showing the muscle clarity in the internal lining of the suckers as found in all the suckers (fig. 6).

In this study, the microtriches, which are found on the surface of the tapeworm tegument, were also discussed. In their studies, most researchers have focused on the structure of tegument and microtriches on the surface of parasitic worms in vertebrates because of the importance of tegument. It is a layer used for metabolic activity, in which the parasite absorbs food and excretes wastes, and is a protective cover (Mondal et al. 2009). The knowledge of microtriches types, which are important structures to increase the surface area of the body and increase the absorption efficiency of tapeworms that lack the digestive system and help them in the adhesion process in the host, is a modern classification characteristics of helminths because each species of worm has different forms and sizes for the microtriches.

It was found in this study that the type of microtriches on the tegument of the scolex is a spiniform triches (Fig. 5), which corresponds to the study of De Chambrier et al. (2003) and Bilal and Abdullah (2013) who referred to the presence of the spiniform triches on the tegument of the tapeworm Postgangesia inarmata when studying the worm by using a scanning electron microscopy.

The shapes and sizes of microtriches differ depending on the species of worms. In the study of Zdarska and Nebesarova (2005) of the tapeworm Silurotaenia siluri for the order Proteocephalidea isolated from the European catfish, Silurus glanis, where they found the filiform triches in the scolex region, as for the neck, it contains three types of microtriches are the filiform, spiniform and bladeform, While Al-Naftaji (2006) indicated that there were filiform microtriches on the tegument of the parasitic tapeworm Bothriocephalus sp. in fish Barbus luteus. These microtriches are similar to those in the mucosa of the vertebrates intestine.

Levron et al. (2008) noted that there are four different types of microtriches on the tegument of the tape worm Paraechinophallus japonicus, isolated from fish Psenopsis anomala; the first
two are conoid and spinous on the surface of the scolex tegument and two others types covering the segments, which are spinous and tusk-like microtriches.

Figure 3: Scanning electron micrograph of the worm scolex appears scolex (Sc) and Neck (Ne).

Figure 3: Scanning electron micrograph of the worm scolex appears Rostellum (Ro), Sucker (Su), Hooks ring (Hr) and Tegumental folding (Tf).
Figure 5: Magnifier part from the tape worm scolex appears Hooks ring (Hr), Hooks (H), Filiform triches (Ft) on the outer edge of suckers and Spiniform triches (St) on the scolex tegument.

Figure 6: Scanning electron micrograph of the worm scolex appears Filiform triches (Ft) on the outer edge of suckers, Muscles (Mu) existing inside the suckers and Hooks ring (Hr) in the rostellum.
REFERENCES


