

Horsehair worms (Nematomorpha: Gordioidea) from Hazarost mountains stream, Kurdistan region, Iraq.

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ABSTRACT:

Horsehair worms were recorded for the first time in Hazarost mountains streams, Kurdistan, Iraq. As appeared from its morphological criteria such as cuticular sculpture, measurements, histology of a cross section, it belong to genus: *Gordius*. It is very difficult to determine the species in the time being but in the light of recent use of sophisticated techniques such as combined large-subunit and small-subunit rRNA gene sequences it will be possible to identify the species.

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INTRODUCTION

About 300 species of nematomorphs have been described worldwide (Wetzel, 1995; Thomas et al.2002). In Britain for example four species only occurs of one belong to genus *Gordius* and three to the genus *Parachordedes*. The classification mainly depends on cuticular patterns prepared by Cameranos method of skin preparation (Goodey, 1963), while in the united states there are two common varieties, *Gordius rubustus* and *Paragordius varius* (Hegner and Engemann, 1968). In Europe, the common species is *Gordius aquaticus* (Hegner and Engemann, 1968).

In Iraq, several species of nematodes have been described or recorded in Iraqi vertebrates including fishes (Al-Hadithi and Jawad, 1975; Rahemo, 1978; Moravec and Rahemo, 1993; Rahemo and Nawab Al-Din,1999), amphibians (AL-Zaco, 2000), reptilians (Hassan and Abdella,1989; Salih, 1994; Al-Zubaidy, 1996; Rahemo et al.2002), birds and mammals (Al-Barawi and Nasir, 1983). In spite of these researches and many other vertebrate nematodes, no any finding concerned with nematomorph to be recorded from Iraqi territory whether from freshwater habitat or as parasitic forms. As there is a major project designed to investigate the habitat of Hazarost mountain streams, this finding of this nematomorph made this research possible.

MATERIALS AND METHODS

Several knot specimens were collected from the Hazarost mountains streams (N 36° 48' 15": E 044° 48'45"), fixed in 10 % formalin, and brought to the laboratory for general examination but only eight were measured and examined with glycerine jelly under microscope for cuticular sculpture. Some others were dehydrated , embedded in paraffin sections 5-10 microns, then stained with Haematoxylin-eosin, examined under microscope for structural details.

RESULTS AND DISCUSSION

The eight specimens measured were as following: They are about 7.5 cm (the smallest), 14, 17, 24, 25, 25, 25, 30 (the longest) in length. They are slender and coiled, long worms, brown red in color. No distinction between male and female specimens were possible but in *Paragordius* sp., the female has a two finger like projection in females and two in males (Hickman et al., 2004). After examining the whole mount of the smallest specimens in glycerine jelly, no digestive tract

could be traced. By examining the cuticular sculpture of these worms, the tegument appear as low power microscope as oval or polygonal circles (**fig.1a & 1b**). When serial transverse sections of these worms were examined , the outermost body wall is intensely stained which is of highly compact layer representing the cuticle which is similar to that of nematodes followed by less compact layer representing the hypodermis which is also present in nematodes (Hickman et al.2004), and underneath them a condensed area of musculature is seen. Nerve cord and reproductive organs such as testis were also noticed (**fig.2**) in addition to a small body cavity (pseudocoel) surrounded by mesenchymatic tissue and very primitive intestine.



Fig (1a)

Fig (1b)

Fig. (1a). photographs of the horsehair worms (both sexes) collected from Hazarost mountains streams, Erbil.
(1b) tail end of female horsehair worms.

If the above characters are compared to the species of the horsehair described, it seems that the present species is similar to the members of genus *Gordius* and possibly *G. aquatica* but as stated by Wetzel (2000) identification of species has been difficult in many cases because characteristic features have been limited to microscopic surface pattern and sculpturing of the cuticle. Recently light and scanning electron microscopical studies by several researchers have contributed important

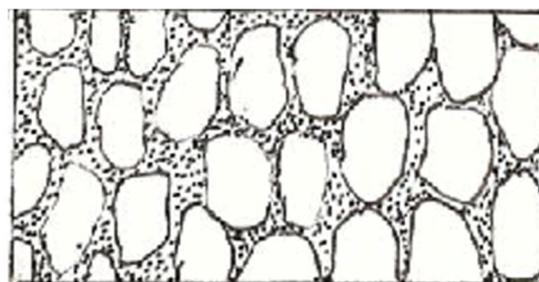


Fig (2). Camera lucida drawing of the cuticular sculpture of the horsehair worm collected from Hazarost mountains Streams.X40.

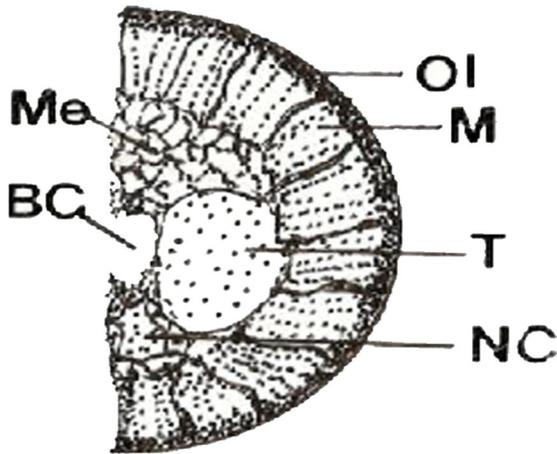


Fig. (3). A camera lucida drawing of a transverse section passing through the middle of the horsehair worm.

Showing the outer layer (OI) of the body wall, underneath it a muscle layer (M), then the mesenchymatic tissue (Me), and a small body cavity (BC), testis (T), filled with sperms and the ventral nerve cord (NC).

systematic information to the study and classification of this group.

The life cycle of the worm has been a subject of much debate, anyhow the adults are not parasitic but the larval stages may stay in one or more of intermediate host to reach the juvenile stage, then emerges from the host to mature (Glogoza, 2002). Very interesting experiments were carried out by Thomas et al. (2002) to confirm that insects (cricket, *Nemobius sylvestris*) parasitized by hairworms commit "suicide" by jumping into an aquatic environment needed by an adult worm for the continuation of its life cycle.

It is obvious from the above observations that the present species of horsehair worm is reported for the first time in Iraqi territory. Furthermore, species identification needs more morphological investigation specially to distinguish male and female specimens, cuticular sculpture using scanning electron microscopy, and some information about life cycle. Anyhow, after experiments of Thomas et al. (2002), it seem necessary to collect insects available at the collection area (Hazarost stream) in order to know the intermediate hosts of this species, and to trace the shape of the larval stages.

It is noteworthy that combined-subunit and small-subunit of rRNA gene sequences were used

to classify the Protostomes and among them the nematomorph (Mallatt and Winchell, 2002). Such technique is required also to identify the species of the present horsehair worm.

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