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New records of two species of oligochaetes (Naididae): *Pristina longiseta* and *P. macrochaeta* from Iraq, with notes on their morphology and reproduction

M.Y.M. Al-Abbad and S.H. Al-Mayah
College of Education, University of Basrah, Basrah - Iraq
email: mymal.clo2@yahoo.com

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Abstract- Individuals of the two species of oligochaetes: *Pristina longiseta* and *P. macrochaeta* were identified from samples of bryophyta from shallow water areas at Al-Assafia creek which is connected to Shatt Al-Arab River. This is the first report of the two species in Iraq. The characteristic features of the two species were studied, the first important of these is the presence of dorsal setae, from the second segment in *P. longiseta* and from the fourth segment in *P. macrochaeta*. The setae of the third segment in *P. longiseta* are longer than the others and called giant setae. There is a conspicuous Prostomium which extends to form proboscis. Reproduction is by transverse fission which is called Paratomy.

Key words: Basrah,, Oligochaeta, Naididae and Pristininae

Introduction

Oligochaetes are important to the water ecosystem (Fisher and Beeton, 1975) in addition to their important roles in the food chain (Loteste and Marchese, 1994). The family Naididae is considered as one of the most important of aquatic oligochaetes (Arslan and Sahin, 2003). Their individuals are feeding on debris as *Specaria josinae* or on algae like the species *Amphichaeta americana* and some of them are carnivorous or parasitic (Klemm, 1985 ; Mackie, 2001 ; Bely and Wray, 2004).

Naididae comprised 58 species belonging to 21 known genera widespread in the world (Liang and Wang, 2000). The Naididae originate from the Northern temperate zone (Timm, 1980) and adapted to wide range of environmental conditions (Brinkhurst and Jamieson, 1971).

These oligochaetes worms are predominantly free swimming (Verdonschot *et al.*, 1982) and can, therefore, exploit a wide range of habitat including sediments (Stacey and Coates, 1996 ; Alves and Strixino, 2000 ; Wetzel and Taylor, 2001), macrophytes (Neiff and Caringnan, 1997), sponges (Righi, 1984 ; Corbi *et al.*, 2005) and even dorsal of Odonata larvae (Corbi *et al.*, 2004).

Naididae is divided into six subfamilies: Naidinae, Limnodriloidinae, Telmatodrilinae, Phallodrilinae, Rhyacodrilinae and Pristininae (Erseus *et al.*, 2008).

Brinkhurst and Jamieson (1971) pointed out that members of the genus *Pristina* are characterized by well developed prostomium with or without proboscis, eyes absent, with an indefinite number of ventral bifid setae per bundle beginning from the second segment. Dorsal setae beginning from segments II, III or IV, consisting of an indefinite number of hair setae and various shapes of needle setae, and their asexual reproduction is by budding. Testis and spermatheca in segment VII, ovaries and atria in segment VIII.

In Iraq, previous studies concerning the Naididae are very limited. Al-Abbad (2009) studied the biology of *Chaetogaster limnaei* and Al-Abbad (2010) reported on two species of *Pristina*: *P. proboscidea and P. aequiseta*.

Therefore the present study aimed at throwing more light on the naidid species present in the water bodies of Basrah province.

Materials and Methods

Samples of filamentous algae and clay were collected from shallow swamps of Al-Assafia creek, North of Basrah governorate early in June 2010. Locally, samples were washed with water and past through different sizes of sieves (500, 212, and 75 µm), and brought to the laboratory.

Annelid worms were sorted with the aid of a dissecting microscope, preserved in 5% formalin and cleared by glycerol, then examined by compound microscope.

Identification was made according to Brinkhurst and Jamieson (1971).

Results

A total of 170 individuals associated with the bryophyte were collected, all of them belonging to 4 species of the family Naididae: *Pristina proboscidea, P. aequiseta, P. longiseta* and *P. macrochaeta*. Among the species identified *Pristina proboscidea* and *P. aequiseta* were previously recorded from Shatt Al-Arab river by Al-Abbad (2010), therefore the present notes were confined latter two species which were recorded for the first time in Iraq.

Descriptions:

1-Pristina longiseta

Elongate, thread-like and yellowish to transparent worms, 1-5 mm in length and 0.11–0.13 mm in width, bear setae on both ventral and dorsal sides (Fig. 1).

The dorsal setae start from the second segment. There are 2-3 hair setae and 1-3 needle setae per bundle in all segments.

The hair setae of the second segment are 175 µm in length, but the setae of the third segment are larger than the others, and called giant setae, which are 425 µm in length, ending in simple pointed tips (Fig. 2).

The hair setae of the other segments are ranging between 187-250 μm in length, ending in simple pointed tips.

In general, the needle setae are ending in simple pointed tips, the needle of the third segment are 75 μm in length, but those of the other segments are from 22-25 μm in length (Figs. 3 and 13)

The ventral setae are started from the second segment. They range in length from 38-63 μm, consist of 4-6 setae per bundle, ending in a slightly crotchet tips. The ventral setae are bifid, and the upper teeth is longer than the lower one (Figs. 4 and 13).

2- *Pristina macrochaeta*

Elongate, thread-like worms, ranging in length from 1.7-2.1 mm with a width of 0.12-0.13 mm, bearing dorsal and ventral setae (Fig. 10).

The dorsal setae start from the fourth segment (Fig. 5). It consists of two hair setae and one needle setae per bundle (Fig. 6).

The hair setae are with simple pointed end, and range in length from 125-175 μm in the fourth segment, but they become longer in the followed segments, and reached 250 μm long in the posterior segments.

The needle setae are ending in simple pointed tips. There is one needle seta per bundle and is 20 μm in length in the anterior segments but is 40 μm in the posterior segments.

The ventral setae range in length from 12.5 to 25 μm. There were 4-6 setae per bundle. They are bifid. Usually the dorsal teeth are longer than the lower ones (Figs. 7 and 13), in the anterior segments, but are equal in length in the posterior segments.

Some notes on the body segments, movement, and reproduction of *P. longiseta* and *P. macrochaeta* are given here.

Movement

The worms move on different bodies in the water by the use of the ventral setae, while the hair setae are used for swimming.

Body segments

The worms had no conspicuous head; the prostomium is elongated, forming a long proboscis which is about 8.5 % of the total length of the body in some worms.

The body of the worm consists of 11-29 segments in *P. longiseta* and of 11 segments in *P. macrochaeta*. The segments are separated from each other by septa, which extend between the body wall and the wall of the digestive canal.

The digestive canal is tubular in shape, the stomach is large semispherical in shape, lie in the anterior part of the body of the worm between the seventh and eighth segments (Fig. 8).

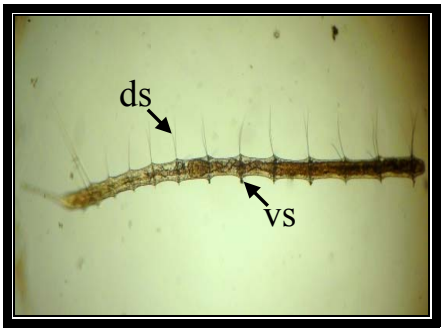

Fig. 1. *Pristina longiseta.* ds-dorsal setae, vs-ventral setae.

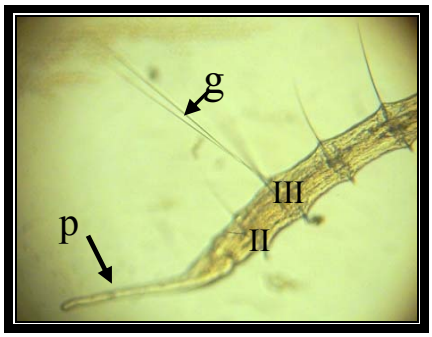

Fig. 2. *Pristina longiseta.* g-giant setae, II, III-body segments, p-proboscis.

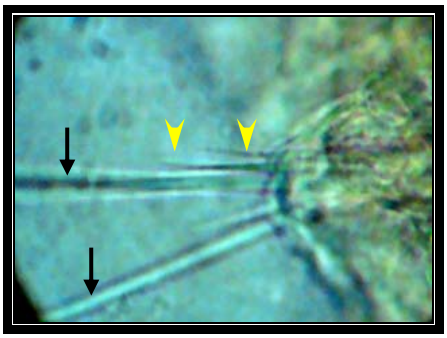

Fig. 3. *Pristina longiseta.* Hair setae (arrows) and needle setae (arrow's heads) of dorsal bundle.

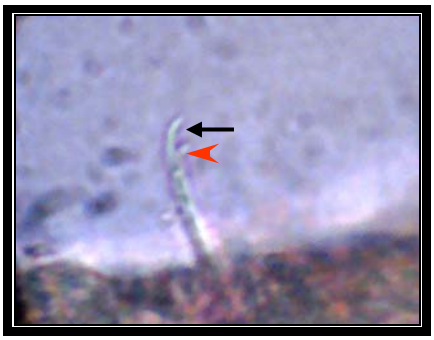

Fig. 4. *Pristina longiseta.* Bifid ventral Setae, dorsal tooth (arrow) longer than the ventral tooth (arrow's heads).

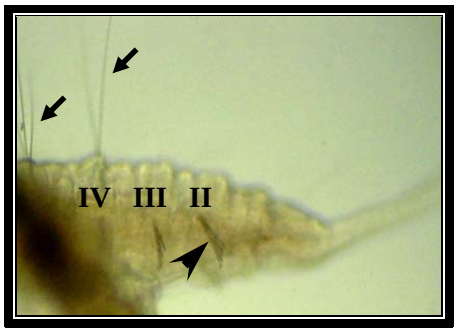

Fig. 5. *Pristina macrochaeta.* Dorsal setae (arrows) and ventral setae (arrow's head), II, III, IV-body segments.

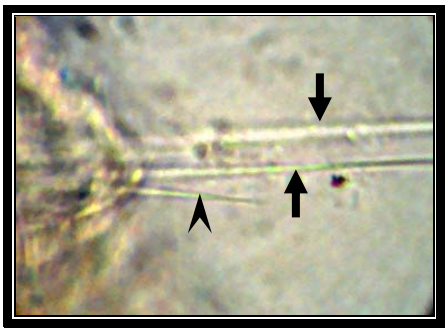

Fig. 6. *Pristina macrochaeta.* Dorsal bundle, hair setae (arrows) and needle setae (arrow's head).

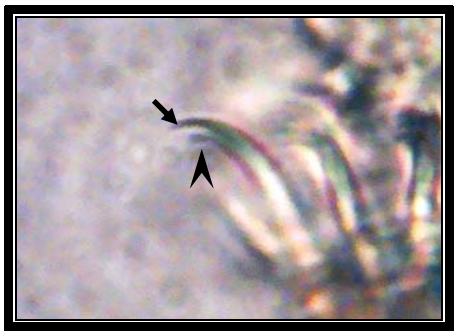

Fig.7. *Pristina macrochaeta.* Bifid ventral Setae, dorsal tooth (arrow) longer than the ventral tooth (arrow's head).

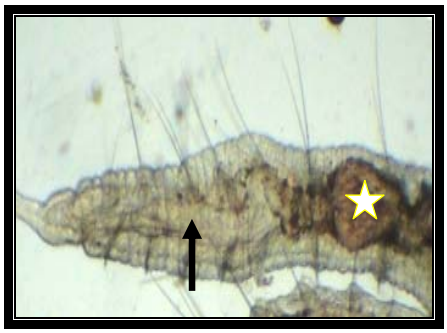

Fig. 8. *Pristina longiseta*. Digestive tract (arrow), and stomach (star) between segments VII and VIII.

Reproduction

P. longiseta and *P. macrochaeta* reproduced asexually by Paratomy (or budding) in which a new head and tail are intercalated in the middle of a worm's body before it physically separates into two individual worms (Figs. 9 and 10). Proboscis of daughter worms is formed as projections which grew progressively until they take the final form before separation (Fig. 11). Paratomy produce the unusual worm chains in which multiple individual temporarily linked end to end, while being physiologically and behaviorally coordinated (Fig. 12).

Remarks

Oligochaetes classification depends on same external morphological features, among these the color of the body, segment numbers, size and body appendages or on the anatomy of digestive and reproduction system as well as some features concerning the movement and habitat nature (Harman, 1980). The setae are considered as a very important feature for the identification of genera and species of Naididae as they are relatively stable in this family, such characters as the segment on which dorsal setae commence, the number of setae per bundle, relative sizes of teeth of bifid setae and lengths of major, as well as minor setae are of special importance in this respect (Loden and Harman, 1980). Moreover, the distribution of testes and ovaries in the body segments may have taxonomic considerations (Harman and Loden, 1978).

Harman (1980) stated that the characteristic features used in the taxonomy of the Naididae are morphological in general like the proboscis and setae as well as the internal segmentation and the variation between species of Naididae is either a qualitative such as the presence of needle setae with bifid and crotchet end as opposed to needle setae with simple pointed end, the presence of serrate setae as opposed to unserrate setae or asexual reproduction by fragmentation as opposed to budding, or quantitative as the tooth length or the proboscis length.

The present results reflect this. The two species recorded here contain ventral and dorsal setae and hairs and needle setae but there are variation in the shape and measurements of these setae, such as the length of the hairs of the 3rd segment in *P. longiseta*, also the distribution of the dorsal setae on the body segments of *P. macrochaeta*.

The species of the genus *Pristina* usually carry dorsal hair setae from the 2nd segment until the end of the body except the species *P. macrochaeta* which is characterized by the absence of dorsal setae on the first two or three segments (as recorded in the present study). While *P. longiseta* carried dorsal hair setae on the 3rd segment which are longer than the others and called giant setae (Brinkhurst and Jamieson, 1971).

Occupation of bryophyte substrate by these naidid species (*P.longiseta* and *P. macrochaeta*) may be related to factors that facilitate the development of such fauna, such as feeding opportunities, increased mobility and protection against disturbances and predation risk (Tokeshi, 1993) reduced current speed, and the presence of shelter (Vlckva *et al*., 2002).

Fig. 9. *Pristina longiseta.* Two individuals chains, posterior daughter worm (arrow) consist of four segments (I, II, III, IV).

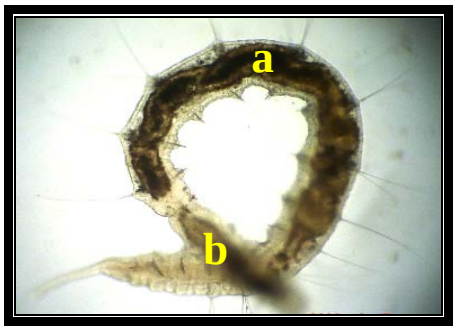

Fig. 10. *Pristina macrochaeta.* Chain of two individual (a-parental, b-daughter worm).

Fig. 11. *Pristina longiseta.* Proboscis (arrow) growth as a lateral projection before separation of the two individual chains.

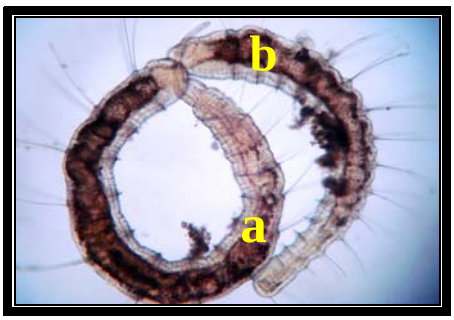

Fig. 12. *Pristina longiseta.* Two individual chains, late stage of budding (a parental, b-daughter worm).

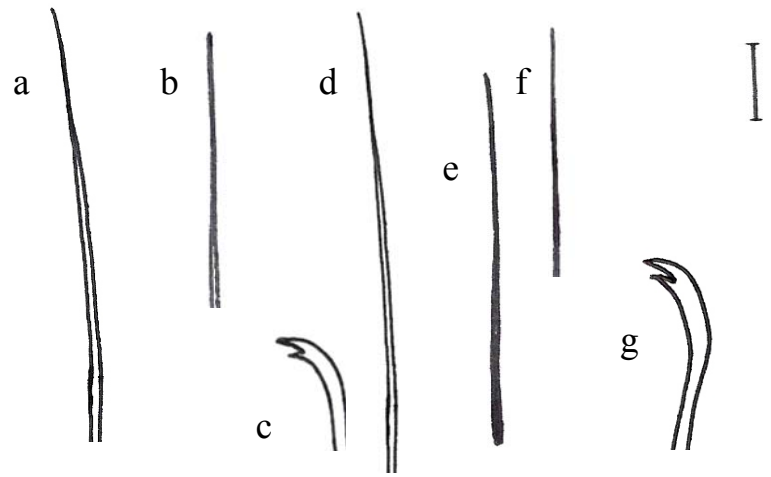

Fig. 13. *Pristina macrochaeta.* a-dorsal hair setae, b-needle setae, c-ventral setae. *Pristina longisetae.* d-giant setae, e-hair setae of segment II, f-needle setae, g-ventral setae). scales (μm): a-25, b-5.5, c-8.4, d-69.7, e-40, f-6.9, g-16

Asexual reproduction in Naididae takes place by paratomy or architomy, architomy is far less prevalent than paratomy (Brinkhurst and Jamieson, 1971). The particular forms of paratomy, and the exact location along the body axis at which fission takes place, are widely different among naidids (Bely and Wray, 2004). In some species the fission zone always forms in the same segment number within the worm (naidian fission) whereas in others new fission zones are formed at progressively more anterior location (stylarian fission) causing the parental worm to become progressively shorter after each fission, until it eventually stops fissioning temporarily to replace the lost segments through growth (Dehorne, 1916).

It is apparent from the present results that the pattern by which the paratomy takes place in the two species studied (*P. longiseta* and *P. macrochaeta*) is stylarian fission because the fission zones are formed in different segment numbers. Moreover, the mature worms resulting from paratomy are very different in length and number of body segments.

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تسجيل جديد للنوعين *Pristina longiseta* و *P. macrochaeta* في العراق ودراسة (Oligochaeta: Naididae) خصائصهما المظهرية والتكاثرية

مرتضى يوسف العباد و صبيح هليل المياح
كلية التربية، جامعة البصرة، البصرة - العراق

المستخلص - تم تشخيص أفراد النوعين *Pristina longiseta* و *P. macrochaeta* في عينات من الطحالب الخيطية bryophyte المأخوذة من مناطق المياه الضحلة على جانبي نهر العسافية المرتبط مع شط العرب وهذا هو التسجيل الأول لهذين النوعين في العراق. وصفت الخصائص المظهرية لهذه الديدان وكان من أهم هذه الخصائص وجود الأهلاب الظهرية التي تتواجد ابتداءً من الحلقة الثانية بالنسبة للنوع *P.longiseta* وابتداءًا من الحلقة الرابعة بالنسبة للنوع*P. macrochaeta*. وتكون أهلاب الحلقة الثالثة أكبر طولاً من بقية الأهلاب بالنسبة للنوع الأول وتسمى بالأهلاب العملاقة giant setae. يظهر الفص الأمامي المسمى قبل الفم Prostomium بشكل واضح والذي يمتد مكوناً الخطم Proboscis ، أما التكاثر فيتم من خلال الانقسام العرضي أو ما يسمى بالتبرعم Paratomy.