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A new record of three tubificid species (Annelida: Oligochaeta) from Al-Hawiezah marsh, Iraq

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Abstract - This paper reports the first record of three species of aquatic oligochaete worms from Al-Hawiezah marsh, south of Iraq. It was evident that the specimens belonged to the family: Naididae, subfamily: Tubificinae, Species: *Aulodrilus pigeuti; Embolocephalus velutinus and Limnodrilus profundicola*. *A. pigueti* is a new record for Iraqi fauna. The study includes the identification and description of these species together with photographic illustrations of chaetal types of each species.

Introduction

Tubificid worms are the most common aquatic Oligochaeta in freshwater habitats. The Family Naididae, subfamily Tubificinae, with more than 1000 described species; include 582 species are considered as freshwater inhabitants (Martin *et al.*, 2008). They are most commonly found in soft, organic matter rich, sediments. Several species characteristically live at sites that receive organic pollution, as they are known to tolerate anoxic condition. Some species are deposit feeders utilizing organic detritus and its associated microflora. These Oligochaetes are hermaphrodite and reproduce by cross-fertilization, while a few species of them may reproduce asexually by architomy (Timm, 2009).

All Tubificid worms can be easily identified depending on external features. They possess no eyes and the prostomium contains no proboscis. Chaetae are the most important features for identification. These are widely varied between different species. In general the chaetae are of two types, hair chaetae and sigmoid chaetae. The sigmoid chaetae may be, bifid, pectinate or palmate, but seldom are single pointed. pectinate and palmate chaetae are found only in the dorsal bundles and usually associated with hair chaetae. Both dorsal and ventral chaetae first appear on segment II, and are indefinite numerically. Clitellum always covers few segments, usually between number X and XI, where one pair of each of the testis and ovaries are located. Spermathecae may be absent, but if present, is located on segment X. It may appear single or paired (Brinkhurst and Jameison, 1971).

In Iraq, some investigators recorded different species of Tubificid worms at different aquatic habitats. These included *Limnodrilus hoffmeisteri*; *L. claparedianus; L. profundicola; L. maumeensis; Bronchia sowerbyi, Tubifex tubifex*. (Jaweir, 1977; Jaweir *et al.,* 2002*;* Al-Dargazally, 1999; Al-Obaidy, 2000; Al-Khafaji, 2002; Al-Rubaiy, 2002; Farman, 2005; Ali, 2007; Sebti, 2009).

The present work reports the description of an additional three species of Tubificid worms from an extremely important ecological habitat in the

marshes of southern Iraq.

Materials and Methods

Surface bottom sediments were collected from two stations in the western bank of Al-Haweiza marsh by hydro-biological hand netting during the period April to June 2006. The sediments were emptied in a white examination tray, and the Tubificid worms were sorted with the aid of a magnifying lens. The isolated worms were fixed by 4% formalin solution and then preserved in 75% ethanol. For the purpose of identification, a drop of polyvinyl lactophenol on a microscopic slide was used to immerse the specimens; the cover slip was then gently pressed, and the slides were left for few days before examination under a compound microscope. The worms were identified according to Brinkhurst (1971); Brinkhurst and Jameison (1971); Timm (2009).

Results

Three species of Tubificidae were identified as they were present in the examined samples. These were *Aulodrilus pigueti; Embolacephalus velutinus;* and *Limnodrilus profundicola*. This finding is considered as a new record for Al-Haweiza marsh, and *A. pigueti* is a new record for Iraqi fauna. However, in this same area an additional four taxa of Oligochaeta: *Limnodrilus hoffmeisteri; L. claparedianus; L. maumeensis; Branchuira sowerbyi and Tubifex tubifex* were also recorded in this study, but these have already been noted by Sebtei in 2009. The following account gives a brief description of each of these three new records.

1. *Aulodrilus pigueti* Kovalevsky, 1914:

Synonyms: *Aulodrilus prothecatus* Chen, 1940; *A. stephensoni* Mehra Naidu, 1966. The worms have an average length of about 9 mm, with the body comprising 88 segments. The prostomium is short and conical, the body surface is smooth and covered with a simple cuticle without papillae (Fig. 1a). The Anterior dorsal bundles of segments II-III are composed of 4 Setae of about 75 μ long, in addition to one small simple pointed seta of about 32 μ. Segments IV-VII appear with 1-2 hair setae of about 80μ long and 4-5 bifid crotchets, all setae from II-VII, with upper tooth being shorter and thinner than the lower one (Fig. 1 b & c). Beyond segment VII, usually from IX, the bifid setae become oar-shaped; their tips rounded and sometimes are slightly bifid (Fig. 1e). These setae, 2-3 per bundle, occur in all bundles up to the end of the body (Fig. 1d). The anterior ventral setae, with 4-6 crotches (less in the posterior region), have their upper tooth shorter than the lower one, diverting under a cute angle, and have distal modulus (Fig. 1f). Only the immature specimens were observed.

2. *Embolocephalus velutinus* (Grube, 1879):

Scientific synonyms: *Spirosperma velutinus* (Grube, 1879); *Peloscolex velutinus* (Grube, 1879); *Spirosperma* (*Embolocephalus*) *velutinus Grube*, 1879. Body beset with so numerous papillae as to obscure the body wall between them (Fig. 2a). The Prostomium is short and conical (Fig. 2b). Dorsal bundles containing 1- 4 hair setae and 2- 4 short hair-like crotchets,

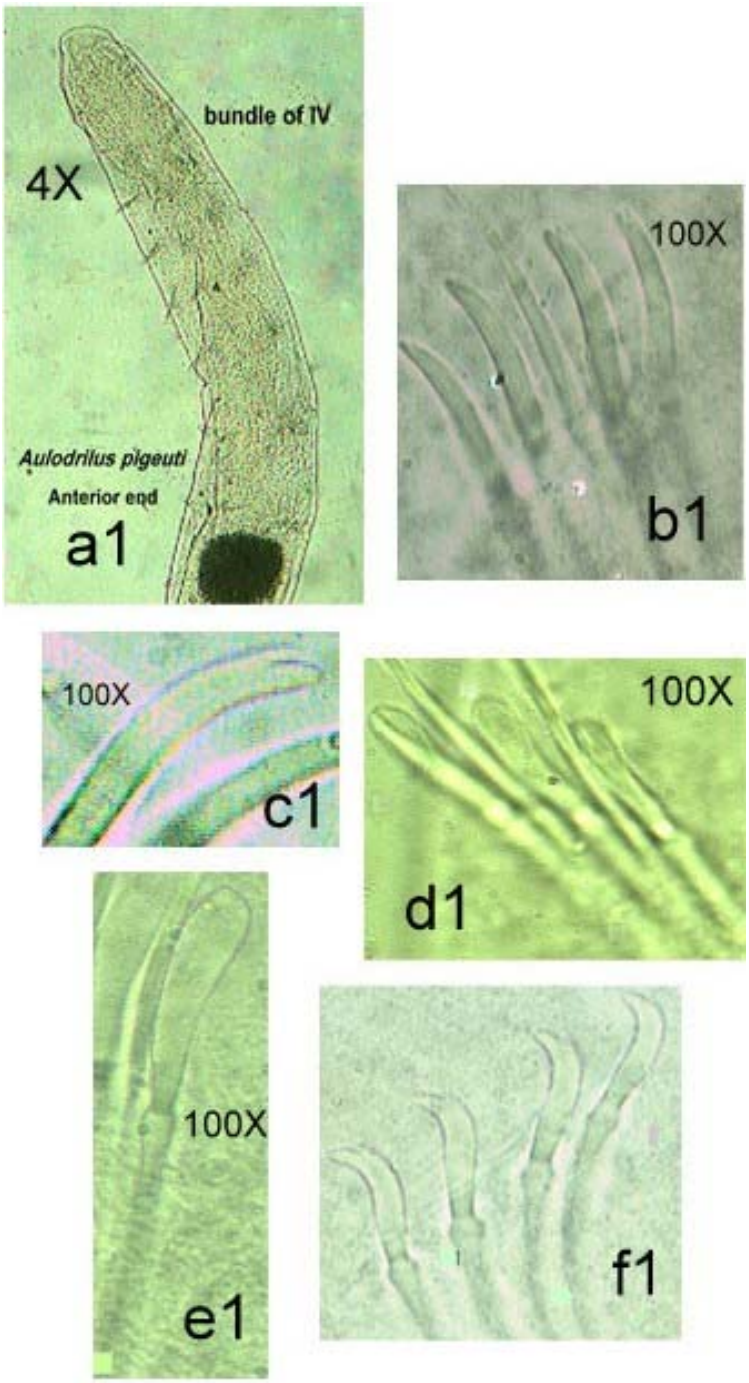

Figure 1. *Aulodrilus pigueti* - a1, anterior end of the worm; b1, dorsal bundle of IV; c1, dorsal setae of II; d1, dorsal bundle of X; e1, oar-shaped seta; f1, ventral bundle.

with upper tooth slightly shorter and thinner than the lower one, (Fig. 2c); Ventral crotchets with 1-2, bifid with reduced upper tooth, more curved posterior (Fig. 2d). Dorsal and ventral setae are covered by dense dark secretary papillae (Fig. 2d). The posterior end is straight with a square pigidium (Fig. 2e). The Average length is about 29 mm, with 45 segments. Only the Immature specimens were observed.

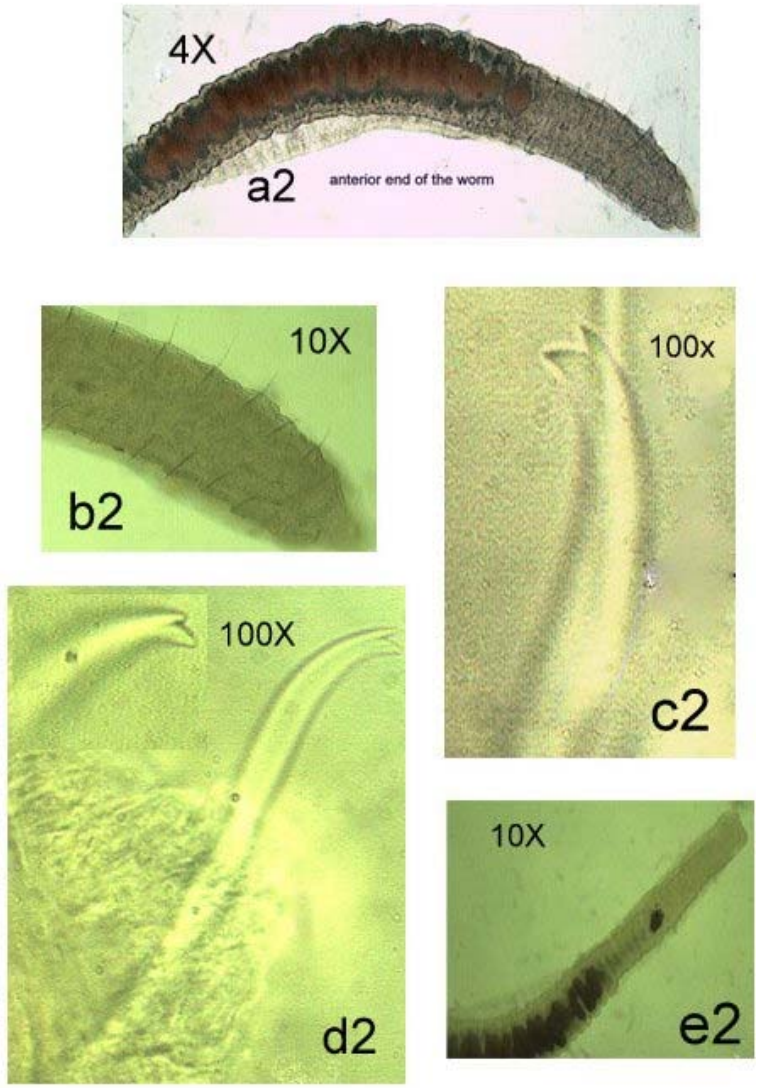

Figure 2. *Embolocephalus velutinus* - a2, anterior end of the worm; b2, anterior segments; c2, dorsal bundle; d2, ventral bundle; e2, posterior end of the worm.

3. *Limnodrilus profundicola* (Verrill, 1871):
Synonyms: *Limnodrilus helveticus* Piguet, 1913. All setae with teeth of about equal length, and are similar on both dorsal and ventral bundles. Sometimes the anterior-most ventral crotchets can reveal slightly longer tooth. Usually, 5-7 setae in dorsal bundles, and 4- 6 in ventral bundle, are observed (Fig. 3a & b). The Penis sheath was 3.6 times as long as their proximal width, usually with symmetrical mushroom-like hood reflected back over shaft (Fig. 3c). Body wall is smooth with an average length of about 42 mm, with 87 segments.

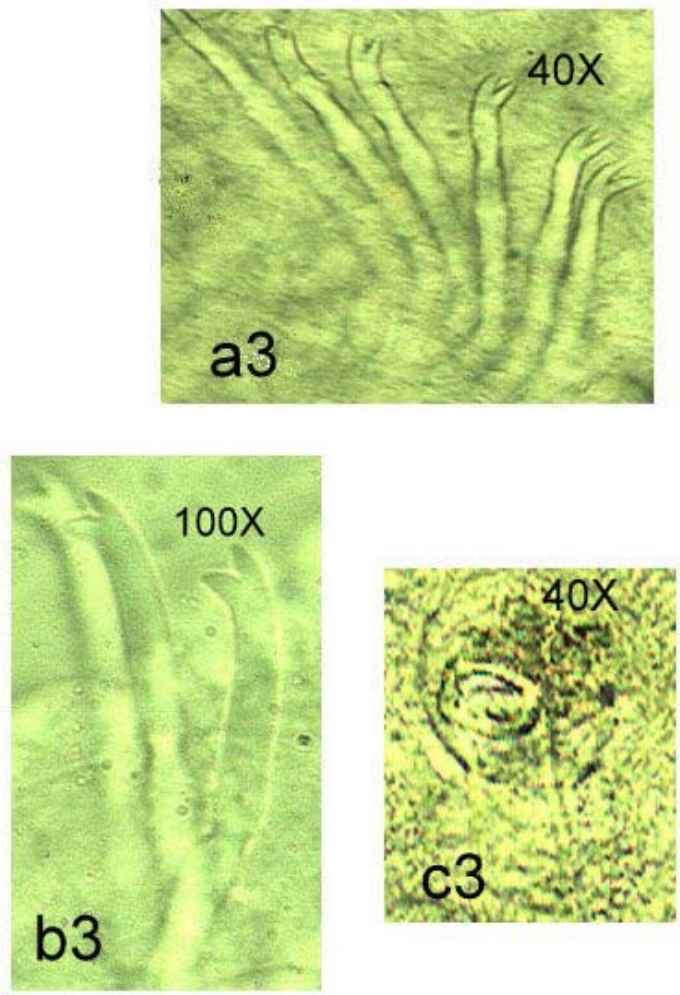

Figure 3. *Limnodrilus profundicola* - a3, anterior dorsal bundle; b3, posterior dorsal bundle; c3, penis sheath.

Discussion and Conclusion

1. *Aulodrilus pigueti* Kowalewski, 1914:

This species is characterized by the presence of oar-shaped setae in the dorsal bundle, beyond segment VII, and the absence of hair setae in the first few bundles (Brinkhurst and Jameison, 1971). It is a small tubificid worm (2-28 mm), with segment numbers of up to 100. Asexual reproduction by budding and fragmentation is common. The dorsal bundles with hair and bifid chaetae, but no pectinate setae, present. The oar-shaped setae are spoon-shaped in facial view and compressed in lateral view. The anterior bifid chaetae have a reduced upper tooth and may look simple pointed, according to Brinkhurst (1971), the anterior dorsal bundles may have up to 10 simple-pointed or bifid crotchets. It may start from segments IV-VII. Sexually, mature individuals are usually rare, since this species reproduce asexually by architomy (Brinkhurst and Jameison, 1971; Finogenova and Arkhipova, 1994; and Timm, 2009). In mature individuals, penial setae, 1-2 per bundle, may appear in segment VII , curved, hollow spoon- shaped, with longitudinal furrow and sharp tip; large eversible pseudopenis open via a median inversion of the body. Clitellum is located in segments VII-VIII (Timm, 2009).

This species is recorded to the first time for Iraqi fauna; although it was recorded to the first time for Turkish fauna by Arslan and Sahin (2002). Sporka (1996) recorded the species to the first time in river Morava in Slovakia. Finogenova and Arkhipova (1994) have studied the morphology of some species of the genus *Aulodrilus* including the setal apparatus of *A. pigeuti* in Russia. They indicated that, beside the peculiar bifid setae, the dominance of asexual reproduction is regarded as a primary synapomorphy of the genus and is accompanied by an anterior shift of the whole reproductive system, and a tendency to doubling the gonads. Their cocoons contain a single egg.

Time (2009) recorded lengths ranging only between 5-12 mm, with 40-60 segments. While Brinkhurst (1971) record was 2-23 mm and up to 100 segments. Arslan and Sahin (2002) examined too small individuals of about 3mm. long and 0.2 mm diameter, with 30 segments. Ohtaka and Usman (1997) recorded a new species *A. acuta* which resembles *A. pigueti* by sharing oar-shaped chaetae, globular atria and median male bursa, but it distinguished by the presence of tapering distal ends oar-shaped chaetae and the lacking of the penial chaetae and its associated glands.

2. *Embolacephalus velutinus* (Grube, 1879):

This species is characterized by their body wall incrust with a small papillae (Brinkhurst, 1971). Usually, with two circles of large secretary papillae per segment, besides numerous small ones (Timm, 2009). No mature individuals were detected. These should usually have modified single, straight, furrowed spermathecal setae in segment X only and with no penis sheaths (Brinkhurst, 1971), the last author referred to some specimens being without papillae, which may have been shed periodically. The setae are however sufficiently distinct to make identification possible. This species was previously recorded by Ali (2007) in the middle sectors of Greater Zab River, Northern Iraq as *Peloscolex velutinus*.

3. *Limnodrilus profundicola* (Verrill, 1871):

Limnodrilus spp. in general are tubificid worms without hair setae, the dorsal and the ventral setae are quite similar in shape, but decrease numerically toward the posterior end. The region dissimilarity of setae was noticed only in *L. udekemianus,* where the anterior bundles have setae with upper tooth thicker and at least twice as long as the lower, bent almost at a right angle and the posterior setae with equal teeth. All setae, dorsal and ventral, are of about equal length in *L. profundicola, L. hoffmeisteri; L. claparedianus, L. maumeensis* and *L. servi* (Timm, 2009).

Penis sheath is useful to differentiate between *Limnodrilus spp.,* thus, it is difficult to identify immature specimen to spec*ies* level (except for *L.* udekemianus), no penial or other ventral setae found in XI; male ducts terminating inside the body with chitinous cylindrical penal sheath. In *L. profundicola*, the penis sheath is always cylindrical. The relation of penal length to width, and the shape of its distal hood are almost important criteria in identifying species. Penis sheath of *L. profundicola* is about 2-7 times as long as their proximal width, usually with symmetrical mushroom-like hood reflecting back over the shaft. This feature improved the identification of our samples which have a penis sheath of about 3.6 times as long as it's width, while Timm (2009) recorded a penis sheath of 5 times as long as its width.

In *L. udekimianus,* the penis sheath is cylindrical, tub or conical, 1-4 times longer than broad, seldom longer with simple plate-like hood. In *L. hoffmeisteri* however, the penis sheath is variable in length, but almost 8-14 times as long as their proximal width, with thin wall, and its distal end bearing asymmetrical plate-like hood of variable form usually set at right angle to the long axis of sheath. Penis sheath found in *L. claparadeanus* is up to 30 times longer than broad with thin walled and small triangle distal hood set at an angle to the shaft, while in *L. cervix,* the length is more than 20, usually 20-30, sometimes reach up to 48 times longer than broad, with double walled shaft. The worm length range between 20-45 mm, with 50-90 segments (Brinkhurst and Jeimson, 1971).

In Iraq *L. profundicola* was only recorded by Ali (2007) in Grater Zab, River in northern Iraq.

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References

Al-Dargazally, M.A. 1999. Experimental and field study of the population dynamics of *Tubifex tubifex* (Annelida : Oligochaeta). Ph.D. Thesis, College of Science, Univ. of Babylon.

Ali, L.A.Q. 2007. A study of macroinvertebrates community in the middle sector of Greater Zab River, Iraq. Ph.D. Thesis, College of Science for Women, Univ. of Baghdad, Iraq.

Al-Khafaji, N.F. 2002. A study of population structure and some biological aspects of *Branchiura sowerbyi,* Beddard, Iraq.

Al-Kuti, S.S.I. 2000. Use of Annelida, Oligochaeta as bioindicators in evaluation of pollution in Al-Diwania River. M.Sc. Thesis, College of Education, Univ. Of Al-Qadisiya, Iraq.

Al-Rubaiy, H.H. 2002. The toxic effects of the herbicides Glyphosate and Propanil on *Limnodrilus claparedeanus,* Ratzl, 1868. (Annelida: Oligochaeta) M.Sc. Thesis, College of Science for Women, Univ. of Baghdad, Iraq.

Arslan, N. and Sahin, Y. 2003. Two new records of *Aulodrilus* Bretscher, 1899 (Oligochaeta: Tubificidae) for Turkish fauna. Turk. J. Zool., 27: 275-280

Brinkhurst, R.O. 1971. A Guide for the identification of British aquatic oligochaeta. Freshwater biological association. Sci. Publ., No.: 22.

Brinkhurst, R.O. and Jamieson, B.G. 1971. The Aquatic Oligochaeta of the world. Edinburgh, Oliver and Boyd. XI, 860 pp.

Farman, K.S. 2005. Effects of salinity and sediment on toxicity of heavy metals on survival of *Limnodrilus claparedeanus* Ratzl, 1868. M.Sc. Thesis, College of Science for Women, Univ. of Baghdad, Iraq.

Finogenova, N.P. and Arkhipova, N.R. 1994. Morphology of some species of the genus *Aulodrilus* Bretscher. Hydrobiologia, 278(1-3): 7-15.

Jaweir, H.J., Al-Lami, A. and Hassan, L.A. 2002. Study of population structure of *Limnodrilus* hoffmeisteri (Annelida: Oligochaeta) in one of the muddy pond of Al-Zaafarania fish farm. Journal of College of education for Women, Univ. of Baghdad, Iraq, 3(4): 772-778.

Martin, P., Martinez-Ansemil, E., Pinder, A., Timm, T. and Wetzel, M.J. 2008. Global diversity of *oligochaetous clitellates* (Oligochaeta: Clitellata). In: Freshwater animal diversity assessment. Development in Hydrobiology, 198: 117-127.

Sebtie, H.A. 2009. An ecological study of the benthic macroinvertebrates community in the southern marshes of Iraq. Ph.D Thesis, College of Science for Women, Univ. of Baghdad, Iraq.

Sporka, F. 1996. First record of *Aulodrilus pigueti* (Oligochaeta: Tubificidae) from the river Morava in Slovalia. Biologia, Bratislava, 51: 494.

Timm, T. 2009. A guide to freshwater oligochaeta and polychaeta of northern and central Europe. Lauterbornia, 66: 1-23.

تسجيل جديد لثلاثة أنواع من الديدان الحلقية من هور الحويزة، جنوب العراق

هيفاء جوير

كلية العلوم للبنات، جامعة بغداد، بغداد - العراق

المستخلص - تعد هذه الدراسة أول تسجيل لثلاثة أنواع من الديدان الحلقية المائية قليلة الاهلاب في هور الحويزة. تعود هذه الأنواع للعائلة Niadidae: العائلة الثانوية Tubificinae وهي: *Aulodrilus pigueti; Embolocephalus velutinus and Limnodrilus profundicola*. يعد النوع *A. pigueti* أول تسجيل له ضمن الفونة في العراق. ولقد تضمنت الدراسة تشخيص ووصف لهذه الأنواع مع الصور الفوتوغرافية لأنواع الاهلاب لدى كل نوع.