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Study of the Aquatic Oligochaetes Community in Tigris River Sediment, Baghdad Iraq

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ABSTRACT
The present investigation is concerned with study the community structure of aquatic oligochaetes collected fromTigris River sediment in three sites within Baghdad province Including site (S1),is located north of Baghdad, at A- Rashydia district, site (S2) is located in middle at Al- Sarafiya District, , while the third site (S3) is located south Baghdad at Al-Za'afaraniya district. for the period from December 2018 to November 2019. A total of 1999 individual represented 13 species were sorted, seven species of them belonging to the subfamily Tubificinae , two species to the subfamily Rhyacodrillinae, two species to the subfamily Naidinae , in addition to one species of each of subfamily pristininae, and family Enchytraeidae). The result revealed presence of *Embolocephalus velutinus* (Grube,1879) and *Limnodrilus maumeensis* (Brinkhurst and Cook,1901), which are considered as new records for Tigris River fauna.. According to the Relative abundance *Limnodrilus* spp specially *L. hoffmesisteri* in all study sites. Temporally , the most species richness was recorded during Limnodrilus species were record.

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1. Introduction

Oligochaeta is a subclass of class Clitellata phylum Annelida. They are occur in marin, estuarine, freshwater, and terrestrial environs (1). Globally over 8300 species of oligochaetes described, of these over 6200 are considered to be valid species, and over 1700 of them are aquatic(2), about 1100 of these are freshwater (Martin et al, 2008). Most of freshwater oligochaeta are benthic deposit feeder and burrow in sediment ingesting large amounts of particles .They play a major ecological role in sediment , where they can occur at high density and responsible for bioturbation by their burrowing activity (3)

Oligochaeta includes many families namely Naididae , Enchytraeidae , Lumbricidae ,1 Haplotaxidae, Darydrillidae, Propappidae , and Almidae (4) The recently redefined family Naididae which includes the old family Tubificidae , family Naididae . It contains over 1,000 species, and divided into Naidid worms including subfamilies: Naidinae & Pristininae, and Tubificid worms including subfamily: Tubificinae, Rhyacodrilinae, Phallodrilinae, & Limnodriloidinae (5)

Due to the importance of oligochaeta in aquatic environment, it has been the title of many

research and studies in Iraq. Nine species of Tubificid worms , in addition to five species of subfamily Pristininae, and 19 species of subfamily Naidinae in Euphrates River were recorded by (6) The spatial and temporal distribution of benthic oligochaeta in Euphrates River , Middle of Iraq were studied by (7), the authors recorded 12 species, two species as new records on Euphrates river and one species as new record on Iraqi fauna. From Dejiala river and (8) recorded two species for the first time namely Psammoryctides barbatus (subfamily Tubificinae) and Achaeta sp. (family Enchytraeidae).

2. Materials and Methods

Three random replicates of sediment samples were collected by Ekman dredge (15X15 cm), from three sites on Tigris River through its passage in Baghdad City, during a period from December 2018 to November 2019. The first site (S1) is located at the Tigris River entry into North of Baghdad near the Baghdad Island Park, second site (S2) is located at Al- Sarafiya District, near Al-Sarafiya bridge, while the third site (S3) is located south Baghdad at Al-Za'afaraniya district. The collected sediment was washed and sieved several times by river water on mesh screen of 0.2mm to separate the worms , which were sorted carefully, The sediment residues then spread on a white tray for detection the active moved worms recognized by their red colour. The sorted worms were collected in small dish, and 5% formalin is added drop by drop to kill the worms, before they were preserved in 70% alcohol.

Temporary slide preparation using Ammans lactophenol as mounting material (prepared by combing 100g phenol ,100ml lactic acid ,200 ml glycerin, and 100 ml water). The preserved specimens transferred to 30% alcohol and then to water for short time to leach out the alcohol. The clearing process takes few hours to few days depending on size and preservation of the specimens. Gentle application of heat will speed the clearing process. The worms were identified to species level according to(10-11). The total number of Identified worms, the individual's number of each species and the number of species were recorded for each sample,

3. Results and discussion

A total of 1999 individual represented 13 species were sorted belonging to the subfamily Tubificinae (seven species), subfamily Rhyacodrillinae (two species), subfamily Naidinae (two species), subfamily pristininae (one species), and family Enchytraeidae (one species). Fig (1) show the percentages of different group of aquatic oligochaetes worm, with a tubificd worms as more abundant group, and comprised 86.19% of subfamily Tubificinae, and 10.90% of subfamily Rhyacodrillinae , while other groups recorded a percentages ranged between 2.30% - 0.45% .

Table (1) shows the Individual numbers, percentages and frequencies of each identified species in the different study sites. The genus Limnodrillus was the most diverse genus, represented by 4 species, including L. hoffmeisteri and L. claparedeians as the most frequent species, which recorded a frequency of 100% and 88% respectively. L. cervix and L. Maumeensis were also recorded with low percentages and frequencies. In addition, unidentified individuals of Limnodrillus were recorded in all collected samples during all study months. They are difficult to identify according to their immaturity phase (table 1).

L. hoffmeisteri is very fertile species produces numerous cocoons, and it is extremely tolerant to oxygen deficiencies ((12). L. cervix and L. Maumeensis were not recognized in the samples unless it became a fully mature individuals, which appeared in the samples during (April –May) The immature or not fully mature individuals may be confused with L.claparedeians , since, the three species have very long penis sheath (13) L. claparedeianus have a penis sheath with a narrow pear-like while in L. cervix the penis sheath is longer, with two layered penis sheath, and the outer layer disappeared distally to leave a narrow neck. The distal head bears two triangle processes. In L. Maumeensis the penial sheaths have double-walled with thicker external layer lacking near

distal end "head" with two triangular processes (fig.2A,B,C). Few specimens with short penis sheath were also identified by molecular techniques in Tigris River as L. claparedeianus - cervix (14) L. Maumeensis is considered as new record in Tigris River. It was previously recorded by (15) in Iraqi southern marshes.

Other tubificid worms, recorded in this study were Branchuira sowerbyi (subfamily Rhyacodrillinae) with a percentage. 10.75% and 72% frequency. This species is widely distributed in Iraqi water due to high water temperature which may be reached in summer above 30 °C, but always more frequent in small canals than in stronger current of large river (16)

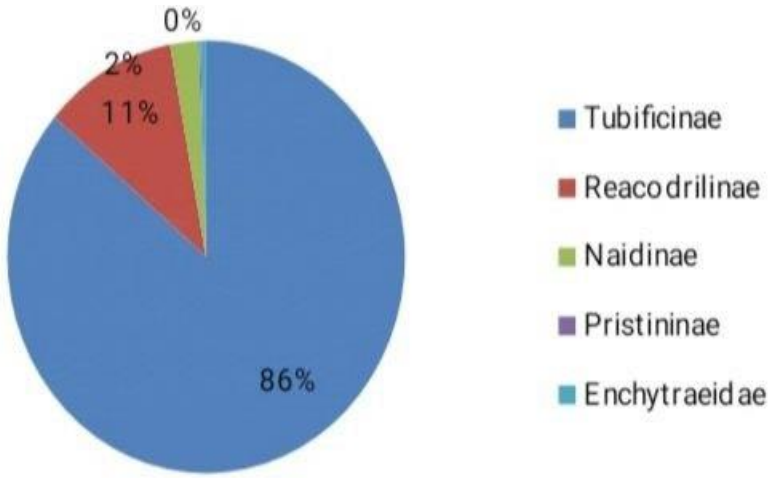

Fig.1: Percentage of oligochaeta groups
Sorted from sediment of Tigris River

Few individuals of Embolocephalus velutinus, Potamothrix hammoniensis, tubifex tubifex, and Rhyacodrilus sp. were also recorded in (April –May) samples. E. velutinus was distinguished by its body, which beset with so numerous papillae as to obscure the body wall between them, the prostomium is short and conical (Fig 3, A). Dorsal chaetal bundles containing 1-4 hair setae and 2-4 short –like crotchets with upper tooth slightly shorter and thinner than the lower one (Fig 3: B); Ventral crotchets with 1-2 bifid with reduced upper tooth , more curved posterior (Fig 3: C). In X segment , single straight , furrowed spermathecal chaeta per bundle (Fig 3: D). This species is considered as new record in Tigris River, and previously recorded in Al-Haweizah marsh, south Iraq by (17) About Naidid worms three species was recorded in this study, Amphichaeta sp ,Slavina appendiculata, and Pristina sima . Naidid worms may be found occasionally in the sediments, since these worms differ from other oligochaetes in that they inhabit the water column and graze on aquatic macrophytes, rather than burrowing in the sediment (18) Naidid worms are usually isolated from aquatic plant, and (19-22)

Spatially, it is clear from Table 1, that oligochaetes community is more divers in S1, in which the community comprised 10 species with total individual number of 573 followed by S2 with 8 species and 763 Total individual number, and S3 with 5 species with total individual number of 663.

According to the Relative abundance, the dominant whose percentage higher than 70%, and abundant species 40-70%, less abundant 10-40%, rare species <10. According to this index this study recorded L. hoffmesisteri as abundant species in S2, S3. While number of species recorded as less abundant species: L.claparedeians in S2, S3; L. hoffmesisteri in S1; B.sowebyi in S1. The other recorded as rare species (Table 1).

Temporally, table (2) show that oligochaetes community is more abundant and divers during the period (April-May) in which the community comprised 9 species with total individual number of 573. Embolocephalus velutinus , L. cervix and L. Maumeensis just recorded in this period. Potamothrix hammoniensis were recorded in the period February – September. Tubifex tubifex were recorded in the period April-September.

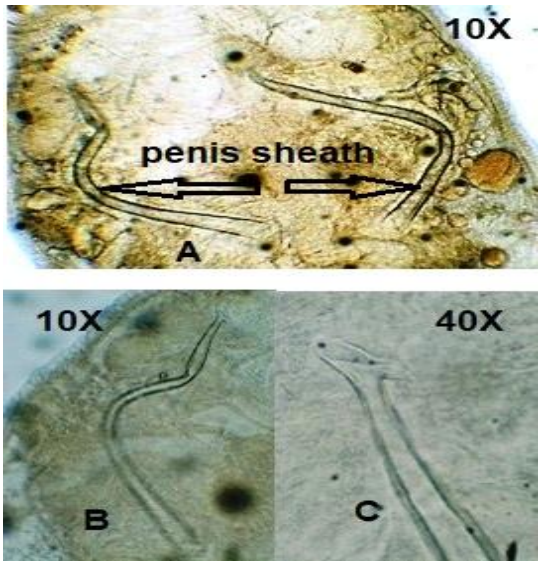

Fig .2: Limnodrilus maumeensis Penial sheath

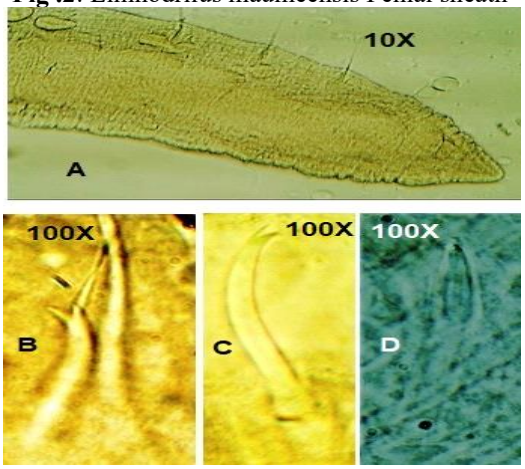

Fig .3.: Embolocephalus velutinus: A, anterior end of the worm; B, dorsal bundle;
C, ventral chaeta; D: spermathecal chaeta

Table .1: Individual number of each aquatic oligochaes species with its relative abundance index, percentages and occurrence frequency in different sites of Tigris River/ Baghdad-Iraq.

species	Study sites			Total individual .No	Percentage	Frequency %
	S1	S2	S3			
Embolocephalus velutinus	0 -	2 +	0 -	2	0.10	5.5
Limnodrilus cervix	- 0	+ 9	- 0	9	0.45	5.5
L.claparedeians	+ 9	156 ++	185 ++	350	17.50	88
L. hoffmeisteri	225 ++	315 +++	298 +++	838	41.92	100
L. maumeensis	- 0	+ 3	- 0	3	0.15	5.5
Limnodrilus sp	116 ++	206 ++	173 ++	495	24.76	100
Potamothrix hammoniensis	+ 3	+ 13	+ 1	17	0.85	33.3
Tubifex tubifex	+ 2	+ 5	+ 2	9	0.45	22.2
Branchiura sowerbyi	157 ++	+ 54	+ 4	215	10.75	72.2
.Rhyacodrilus sp	+ 3	- 0	- 0	3	0.15	5.5
Amphichaeta sp	+ 32	- 0	- 0	32	1.60	5.5
Slavina appendiculata	14 +	- 0	- 0	14	0.70	5.5
Pristina sima	+ 3	- 0	- 0	3	0.15	5.5
.Hemifridericia sp	9 +	0 -	0 -	9	0.45	5.5
total	573	763	663	1999		

Table :2 Individual number of each aquatic oligochaes species in different sites of Tigris River/ Baghdad-Iraq for the period from December – 2018 November .2019

species	Dec.2018-Jan.2019	Feb.-.Mar	Apr. - May	June - July	Aug .-.Sep	Oct.-.Nov	Total
Embolocephalus velutinus	0	0	2	0	0	0	2
Limnodrilus cervix	0	0	9	0	0	0	9
L.claparedeians	80	38	119	29	22	62	350
L. hoffmeisteri	178	118	224	95	93	130	838
L. maumeensis	0	0	3	0	0	0	3
.Limnodrilus sp	40	51	187	105	61	51	495
Potamothrix hammoniensis	0	10	4	1	2	0	17
Tubifex tubifex	0	0	6	2	1	0	9
Branchiura sowerbyi	67	47	16	24	39	22	215
.Rhyacodrilus sp	0	0	3	0	0	0	3
.Amphichaeta sp	32	0	0	0	0	0	32
Slavina appendiculata	0	14	0	0	0	0	14
Pristina sima	0	3	0	0	0	0	3
.Hemifridericia sp	0	0	0	0	0	9	9
Total oligochaeta	397	281	573	256	218	274	1999
Number of species	4	6	9	5	4	4	13

CONCOCTION

This study highlights the community structure of aquatic oligochaetes in Tigris River, showing that the genus Limnodrillus was the most divers and frequent genus, specially L. hoffmeisteri and L. Claparedianus, while L.cervix and L. Maumeensis can be only recognized when become fully mature during the period from April-May.

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