

RESEARCH PAPER

First record of *Erpobdella borisi* Cichocka & Bielecki, 2015 (Annelida: Hirudinida: Erpobdellidae) from Hazar-Merd Caves, Sulaimaniyah Province, Iraq.

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ABSTRACT:

The present investigation based on the morphometric and morphologic characterization of five leech specimens were collected from the water spots and springs of Hazar-Merd Caves serious near the Hazar-Merd Village during May-June of 2022. The examinations of these annelid worms (morphological and anatomical) ensured evident for the first appearance of an erpobdelloid cave leech *Erpobdella borisi* and adding this species to Iraqi fauna.

KEY WORDS: *Erpobdella borisi*, Hazar-Merd, Cave, Sulaimaniyah, Iraq.

DOI: <http://dx.doi.org/10.21271/ZJPAS.35.5.18>

ZJPAS (2023) , 35(5);190-194 .

1. INTRODUCTION:

The family Erpobdellidae is one of the important freshwater benthic fauna in Northern Hemisphere. Erpobdellid leeches left their ancestors blood feeding habit and are mostly predators on smaller invertebrate animals (Toman and Dall, 1997; Siddall, 2002; Bilal et al., 2017). *Erpobdellidae* mostly inhabiting freshwater bodies, but also including some amphibiotic (i.e. semi-aquatic) species. The abundant representatives of erpobdellid leeches are *Dina* and *Erpobdella* genera that known to inhabit various environmental conditions (Cichocka et al., 2015; Koperski, 2017). The taxonomic status of the family Erpobdellidae till now bears a warm scientific debates because of the variable morphological, Trontelj and Sket (2000) as well as Siddall (2002) synonymed the seven genera included in this family (because of their similar morphology)

to only two valid ones (*Croatobranthus*, *Dina*, *Mooreobdella*, *Trocheta* and *Nephelopsis* synonymed into the genus *Erpobdella* and genus *Motobdella* possibly a sister group), this statement was not accepted by most scientific community (Trajanovski et al., 2010). Recently, the most acceptable taxonomy for the family including three genera *Erpobdella*, *Dina* and *Motobdella* (Siddall, 2002; Ahmed et al., 2013; Hallaq, 2020; Hallaq and Ali, 2020).

The genus *Erpobdella* members have three to four pairs of eyes (mostly lost or degenerated in cave species), no true jaws, medium sized helminthes. Not all members are blood feeders, hence, are hollow predators of small aquatic invertebrates (swallow the prey as whole) (Hallaq, 2020; GBIF, 2023).

Previously, a number of species belonging to Erpobdellidae were recorded in Iraq, namely: *Dina lineata*, *D. punctata*, *Erpobdella bocera*, *E. mestrovi* (the only cave species recorded in Iraq) and *E. oculata* (Ali and Jaweir, 2013; Bilal et al., 2017; Hallaq, 2020).

The present work is the first one observing and reporting the cave leech *E. borisi* collected in

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Article History:

Received: 05/02/2023

Accepted: 26/03/2023

Published: 25/10 /2023

Hazar-Merd Cave in Sulaymaniah, Kurdistan Region- Iraq.

2. MATERIALS AND METHODS

2.1. DESCRIPTION OF THE STUDY AREA

Hazar-Merd Cave is a serious of Paleolithic site, located 13 Km south-southwest of Sulaymaniyah Province, Kurdistan Region- Iraq with 35° 31' 12" N Latitude and 45° 21' 34" E Longitude (Fig. 1). The cave lies near to the local valley and close to a small spring (that originate from these caves) and a village with the same name in Kurdish. Local villagers naming the cave as "Ashkawty Tarik" that means the Dark Cave or "Hazar-Merg" that mean thousand water eyes, since it characters by watery nature and small water eyes and the spring water rich fauna of insects, worms, and snails, exactly the species *Helix salomonica* (Asouti et al., 2020).

2.2. SAMPLE COLLECTION AND EXAMINATION

Leech specimens (n=5) were collected from the spring water originating cave in May to June 2022. Helminthes were seen partially submerged in water surface in crooks of the wall and beneath of medium sized stones. The collected specimens were fixed, examined and dissected following Bielecki (1997) and Kutschera and Shain (2019) by anaesthetizing them in Ethanol (10% / 30 min.) that preventing the strong body contractions, then the secreted mucus washed off with Ethanol (50%/ 3 times) and preserved in Ethanol (75%). For studying their genitalia (male and female reproductive systems), helminthes opened dorsally from anus to the mouth (Ahmed et al., 2015). Finally, using dissecting microscope for morphology characters and taking photograph by Nikon Z9 camera- Japan (45-megapixel sensor).

2.3. MORPHOLOGICAL AND MORPHOMETRIC PARAMETERS

The parameters used in the present work according to Cichocka et al. (2015).

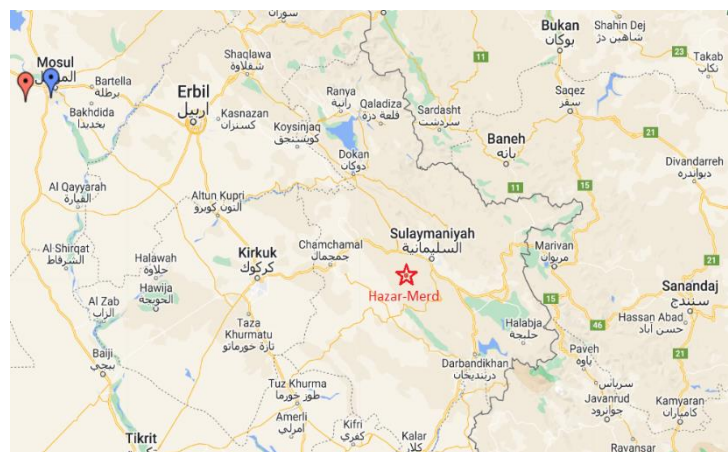


Figure 1: Map of study area, from google map. Star showing the studied point, Hazar-Merd in Sulaymaniah Province.

3. RESULTS AND DISCUSSION

3.1. Taxonomy

Family Erpobdellidae Blanchard, 1894

Genus *Erpobdella* de Blainville in Lamarck, 1818

Erpobdella borisi Cichocka & Bielecki, 2015

3.2. Descriptions

The examination of preserved specimens showed these characteristics; length 23.30-25.56 mm (24.62mm) and width 4.87-5.01 mm (4.93 mm). Both suckers anterior and posterior elliptical in shape (transversally elongated 1.83-2.04 width X 0.89-0.93 length and 2.51-2.73 width X 3.02-3.27 mm length respectively), hence, the posterior sucker is narrower than that of the body (Fig. 2 F). Living specimen's coloration showed a unique form, the dorsal side carry light to dark gray irregular spots (Fig. 2 A; C; D), while the ventral side is lighter and without spots (Fig. 2 B). The anterior part of dorsal side not showed a distinctive coloring pattern (Fig. 1 C). The

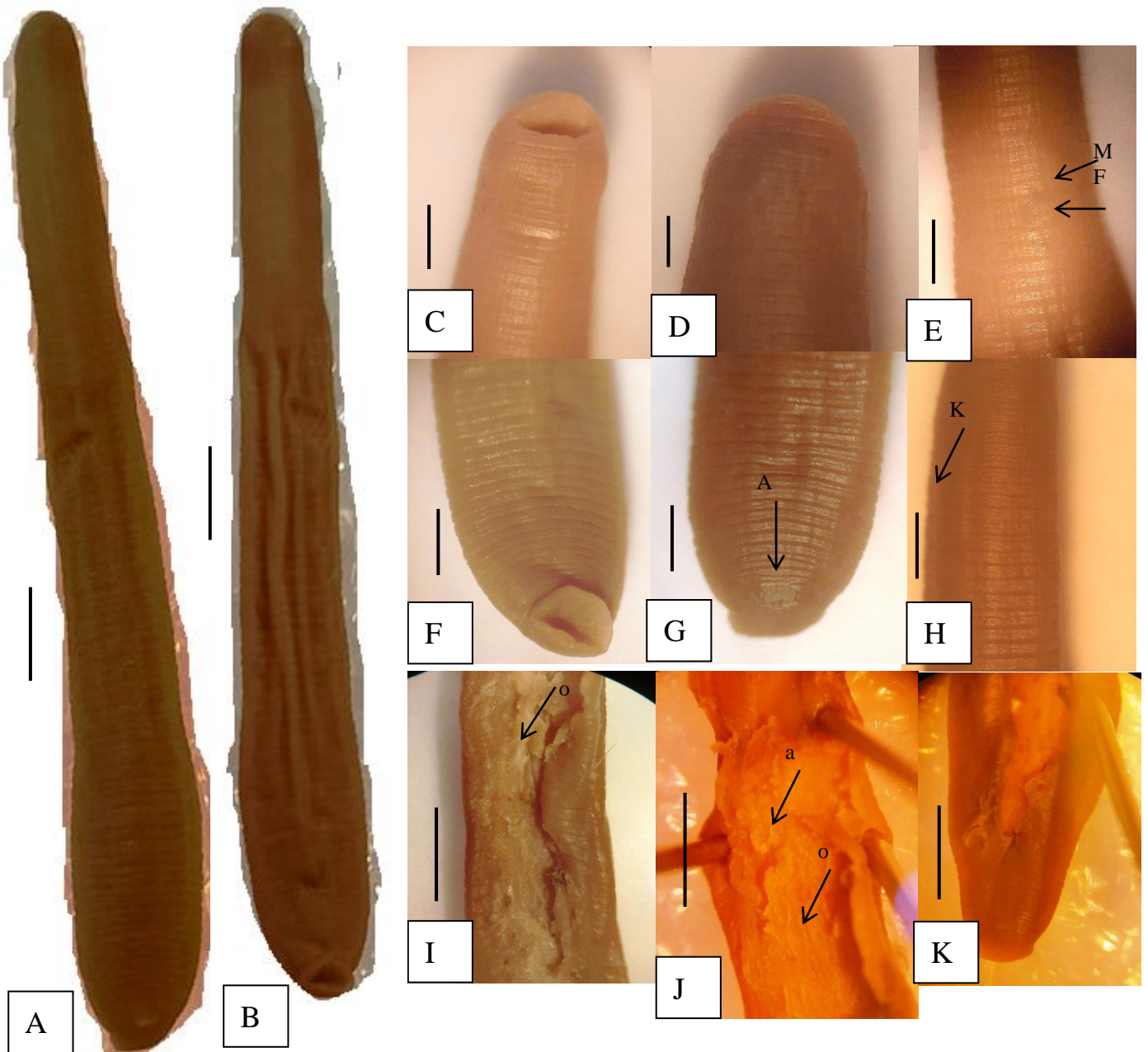


Figure 2: Photomicrograph of *Erobdeella borisi*.

A- Whole body, dorsal view, scattered dark points on the posterior part. B- Whole body, ventral view. C- Anterior end, ventral view showing mouth without lips or teeth. D- Anterior end, dorsal view showing lacking of eyes. E- Clitellar region, ventral view showing male and female gonopores. F- Posterior end, ventral view, showing elliptical posterior sucker. G- Posterior end, ventral view, showing anus. H- Clitellar region, dorsal view showing lateral keels. I- Dissected dorsal view, showing ovisac. J- Dissected clitellar region, dorsal view showing atrium and ovisac. K- Dissected posterior end, showing direct opening of the simple caeca in the anus. Scale bar= 1mm. A= anus, a= atrium, F= female gonopore, M= male gonopore. K= keel, o= ovisac.

posterior part of dorsal side, showed a dark medial smudge line (Fig. 2 G).

No eyes (even trace of eye pigments) were seen (Fig. 2 D). The post-clitellar region bears short lateral keels (Fig. 2 H). Opposite sexes gonopores separate by 2.5 – 3 annuli (in one specimen the female gonopore lies on the mid of annulus, while in other four it lies on the suture between two annuli), the male gonopore is clearly seen on XII b1/b2 annulus, while the female gonopore is somewhat misty lies in furrow XII b5/c11 (Fig. 2 E). The studied specimens showed a typical erpobdellid digestive system, pharynx reach the ganglion of annulus X, no jaws or stylets, even pseudognaths were seen (Fig. 2 C; D; I; J). Intestine simple, without caeca, opens directly in the anus on the dorsal side five annuli previous to the margin of caudal sucker. Numerous globular testes were noticed (Fig. 2 I). The atrium is located at the ganglion XII, ovisacs fine and highly curved (Fig. 2 J).

The present investigation and results fitting that of Cichocka et al. (2015) that described *E. borisi* as a new species from Sahoolan Cave in Mahabad Province in Iran.

The Iraqi leech fauna is rich with species belonging family erpobdellidae, five species were reported, namely: *D. lineata* from Greater Zab River (Ali and Jaweir, 2013), *D. punctata* from Lesser Zab River near Qashqole (Bilal et al., 2017), *E. octulata* from Al-Hindyia River in Babil Province (AL-Ameen and Jawair, 2019) and finally, *E. bocera* from Sarchnar and Qliasan and *E. mestrovi* (the first cave species recorded in Iraq) from Zalm Stream near Ahmad Awa (Hallaq, 2020).

The classification of Erpobdellidae undergoing changes due to their variable morphological characterization shown by specimens collect from different localities. In the other way, the studies of diversity of leech and confirming by molecular phylogeny are poorly. AL-Ameen and Jawair (2019) misreported both *D. lineata* and *D. punctata* as *E. lineata* and *E. punctata* respectively and the evidence was the molecular investigation of Iraqi specimens by Hallaq (2020). This scientific truth also reported in Iranian fauna, Salimi et al. (2011) discussed the opinion of Sawyer (1986) and Grosser & Pešić (2006) that discussed the poorly explored fauna of Iran and many species were reported with different synonymes.

The description and measurements of the present specimen are differ with recorded previously in Iraq, for example *E. bucera* (three pairs of large eyes, first pair located on large labials of annulus III and two pairs of small buccals situated on both sides of IV) also no pigmentations or color pattern of the body (Siddall, 2002; Hallaq, 2020). Concerning *E. mestrovi*, both species lack eyes, but instead of long conspicuous lateral alae of *E. mestrovi* (expected gills) that not seen in *E. borisi* that have lateral keels on post-clitellar region (Cichocka et al., 2015; Hallaq, 2020).

The geographic distribution of *E. borisi* collected from the cave spring water and on clay sediments surface of (Sahoolan Cave-Iran). Hence, the species is a troglobiont or troglophile habitant organisms (Cichocka et al., 2015).

4. CONCLUSIONS

The present work is the first record for the cave leech *Erpobdella borisi* in Iraq, which regarded as the second cave leech species recorded in Kurdistan and Iraq. From present study facts, it can be concluded that leech fauna in Iraq needs more studies.

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