

A New Record of the Longtail Tadpole Shrimp, *Triops longicaudatus* (LeConte, 1846), from a Temporary Water Body in Azraq, Northeastern Jordan

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Abstract

The longtail tadpole shrimp *Triops longicaudatus* (LeConte, 1846) is recorded from Jordan for the first time. Specimens were collected from Azraq Mudflat, located within the borders of the Azraq Wetland Reserve. This represents the first record of the family Triopsidae and the order Notostraca from the country of Jordan. The current study stresses the need for additional research on the fauna of temporary pond habitats in Jordan as well as the implementation of better conservation management strategies for this important environment.

Key words: Notostraca, first record, distribution, Jordan

Introduction

The family Triopsidae (Crustacea, Branchiopoda) is represented by two extant genera in the order Notostraca: *Triops* (Schrank, 1803) and *Lepidurus* (Leach, 1819). This family is considered as a great example of “living fossils” (Mathers *et al.*, 2013). These freshwater crustaceans mainly occur in temporary water bodies, including freshwater, brackish water, and occasionally saline temporary pond habitats (Su and Mulla, 2001; Damgaard and Olesen, 1998; Brendonck *et al.*, 2008), where they can survive over long dry periods of time by producing and depositing resistant cysts in the sand or sediment that stay viable after extended periods of diapause (Aloufi and Obuid-Allah, 2014).

The *Triops* species are found on all continents except Antarctica and have a dispersed but worldwide distribution (Vanschoenwinkel *et al.*, 2012; Korn *et al.*, 2013).

Al-Oufi and Obuid-Allah (2014) recorded this species for the first time in the Kingdom of Saudi Arabia, from twelve temporary water bodies in Tabuk and Al-Madinah, which are located to the southeast of Jordan and east of Azraq.

The records made by Al-Oufi and Obuid Allah (2014) indicate that this species probably occurred in Jordan under the same conditions. Freshwater invertebrates are scarcely investigated in Jordan, and there is little information about the Notostraca fauna, despite the fact that these animals received special attention due to their conservation status because they were treated as flagships of temporary water bodies, allowing shrimp tadpoles to eliminate the mosquito larvae that were there as well. Furthermore, in many countries, including the UK, some members of this class are classified as endangered species and are protected by Schedule Five of the Wildlife and Countryside Act 1981.

Materials and Methods

On June 10, 2023, a local guide and the site researcher captured nine specimens in the Azraq mudflat, which is located within the borders of the Azraq Wetland Reserve, after a highly precipitated raining season that enhanced the formulation of the seasonally flooded area in Azraq, Eastern Jordan, known as Qa (Qa=Arabic name of the mud flat). The exact coordinates are N 31.83394°, E 36.81868°, and the altitude is 491m. All the nine specimens captured were collected and preserved in absolute ethanol. The examination and measurements were carried out in the Royal Society for the Conservation of Nature (RSCN)-HQ lab

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under a stereomicroscope equipped with a camera and were identified based on morphology according to Longhurst (1955), Alonso (1996), and Obuid-Allah *et al.* (2014). The specimens have been deposited in the Conservation Monitoring Center (CMC) at the RSCN-HQ lab, reference number 0023/TL.

Results

Systematic Treatment

Class - *Branchiopoda*

Order - *Notostraca*

Family - *Triopsidae*

Species - Longtail Tadpole Shrimp *Triops longicaudatus* (LeConte, 1846) (Figure 1)

Description of *Triops longicaudatus* (LeConte, 1846) (Figure 2, Table 1)

Six females and three males were identified among the collected nine shrimp tadpoles.

The tadpole shrimps can be recognized by their large, horseshoe-shaped dorsal carapace (Martin and Boyce, 2005, Cáceres and Rogers, 2015), and they also have a pair of dorsal compound eyes. The second maxilla was absent in all the specimens seen (Figure 2). All females were gravid. In general, the female specimens were longer than males, with a 55-mm total body length and a 52-mm total body length for males. The average carapace length in the female specimens was 14.83 mm and was 13.44 mm for the male specimens. The average carapace width in female specimens was 13.83 mm and was 12.74 mm for male specimens. The average body segment in the female specimens was 40.2, while it was 40.7 in the male specimens. The average furcal rami length in females was 18.83 mm, while it was found to be 22 mm in the male specimens; one specimen of male furcal rami was damaged.



Figure 1. Dorsal and ventral views of a male of *Triops longicaudatus* from Jordan.

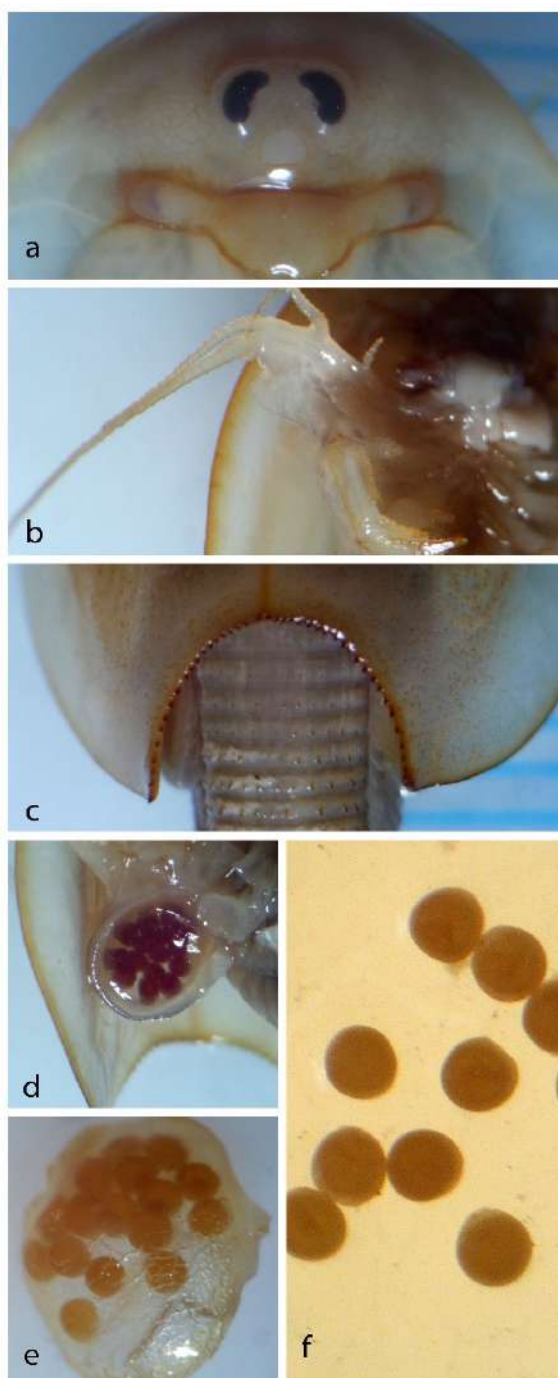


Figure 2. *Triops longicaudatus*, a: enlarged eyes and dorsal organ, b: thoracopod 1, c: enlarged sulcus (dorsal view), d: thoracopod XI (egg pouch), e: egg pouch containing sixteen eggs, f: eggs.

Discussion

According to Longhurst's (1955) review of Notostraca, there is considerable difficulty in the species identification because most species exhibit significant morphological diversity. Three features were deemed significant by Longhurst (1955) in terms of taxonomy: the telson's armature, the

second maxilla's presence or absence, and the positioning of the dorsal organ and eyes within this group. The species was identified as *Triops longicaudatus* (LeConte, 1846) based on the aforementioned characteristics and comparison with earlier research on the same species conducted by: Aloufi and Obuid-Allah, (2014) (Table 2). The researchers found that some of these characteristics, such as the carapace and telson width, fall within the range reported by Aloufi and Obuid-Allah's (2014). The ranges found in this study, however, are primarily smaller than those found in Aloufi and Obuid-Allah's (2014). Habitat, sex, or the total number of specimens analyzed might all be factors in these variations.

The current research showed some significant differences between *T. longicaudatus* females and males. The number of body lengths and the number of posterior segments not covered by the carapace were among the discrepancies. This finding is consistent with Longhurst's (1955) study, which confirms that some characteristics are connected to the sex of the specimen (sexual dimorphism).

This is the first record of *T. longicaudatus* from Jordan. Figure 3 shows the collecting site in mudflat within the Azraq Wetland Reserve. Figure 4 shows the global distribution of *T. longicaudatus* including this new record from Jordan. This species is currently known from the Kingdom of Saudi Arabia, Jordan, Hawaii, New Caledonia, Japan, the West Indies, the Galapagos Islands, and Central and South America. Members of Notostraca are widely distributed due to their passive distribution. The dried viable eggs must be blown around by wind and transported by birds because the eggs, when laid, are extremely sticky and remain so for several days while the shell hardens. Thus, they could presumably adhere to large animals. Further studies should address the life history of *T. longicaudatus*, including feeding habits and reproduction in Jordan.

Table 1. Morphometric (in mm) and meristic characters of shrimp tadpole.

The character Spec. no	Total Body length (^{tot} L)	Carapace length (Cl)	Carapace width (CW)	Length of Telson (T)	Telson width (W)	Furcal rami length	Number of posterior segments not covered by the carapace	Number of body segments
Female 1	50	16	15	2.2	3.3	18	26	42
Female 2	45	15	15	1	2	15	25	41
Female 3	41	15	15	2	2	14	25	37
Female 4	55	15	13	3	3.8	24	28	43
Female 5	45	13	11	2.1	2	20	27	40
Female 6	49	15	14	1.6	2.6	22	25	38
Male 7	52	14	12	2.6	2.3	25	23	44
Male 8	33.5	12.7	13.8	1	2	19	31	36
Male 9	31.2	13.7	12.5	1	2.5	?	28	42

Table 2: Some morphometrics of *Triops longicaudatus* compared with those confirmed by the study of Aloufi and Obuid-Allah (2014).

The character	Sex	Present study (in mm)	Aloufi and Obuid- Allah, (2014) (in mm)
Body length	Female	41- 55	19- 65
	Male	31.5- 52	20- 55
Carapace length	Female	13-16	6- 20
	Male	12.7- 14	6-18
Carapace width	Female	11-15	5- 15
	Male	12-13.8	6- 17
Number of body segments	Female	37-43	35-39
	Male	36- 42	36-39
Length of Telson	Female	1.2-2	1-2
	Male	1-2.6	1-3
Telson width	Female	2-3.8	1-3
	Male	1-2.5	1-2.5

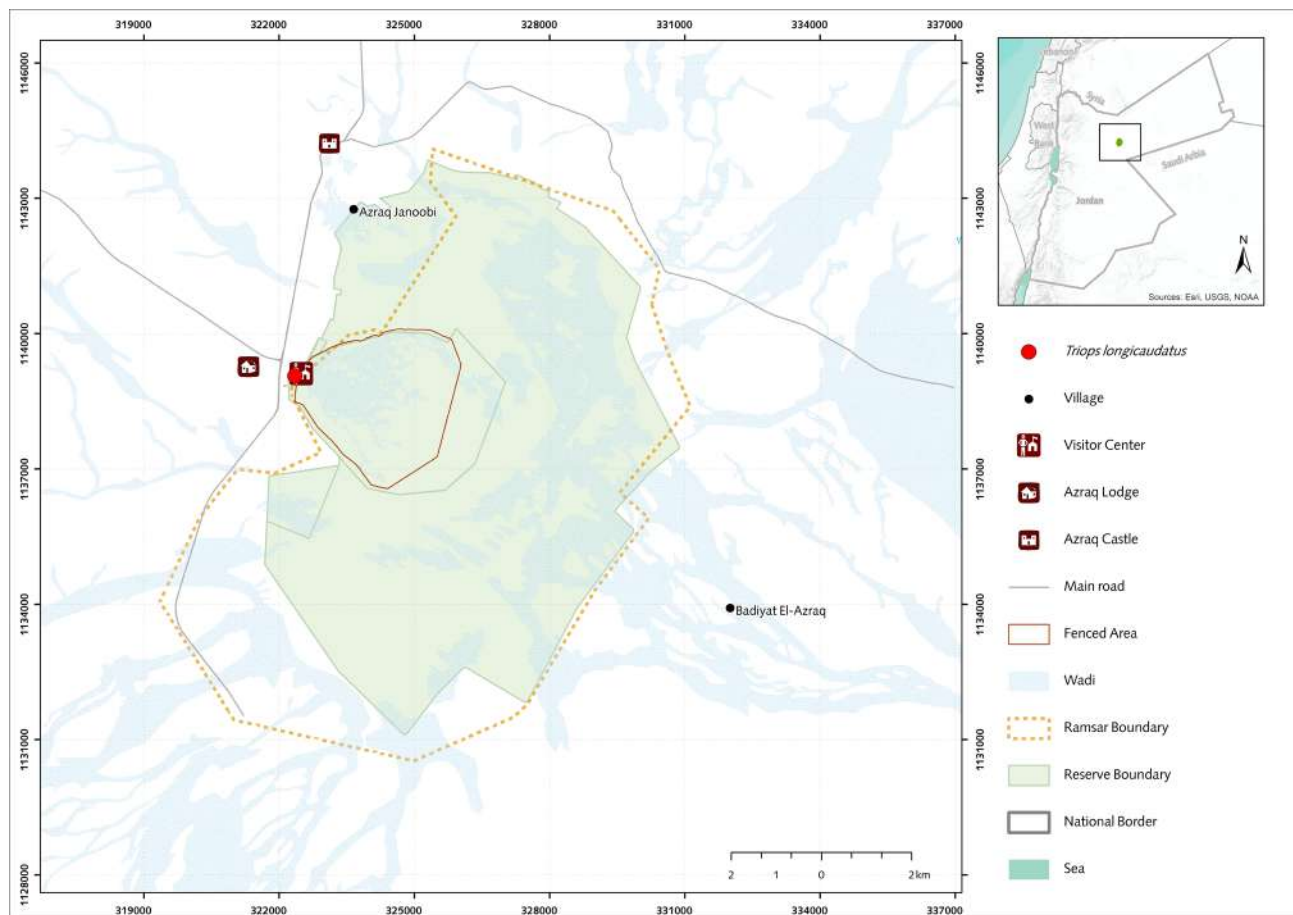


Figure 3. Collection site of *Triops longicaudatus* from Azraq, Eastern Jordan.

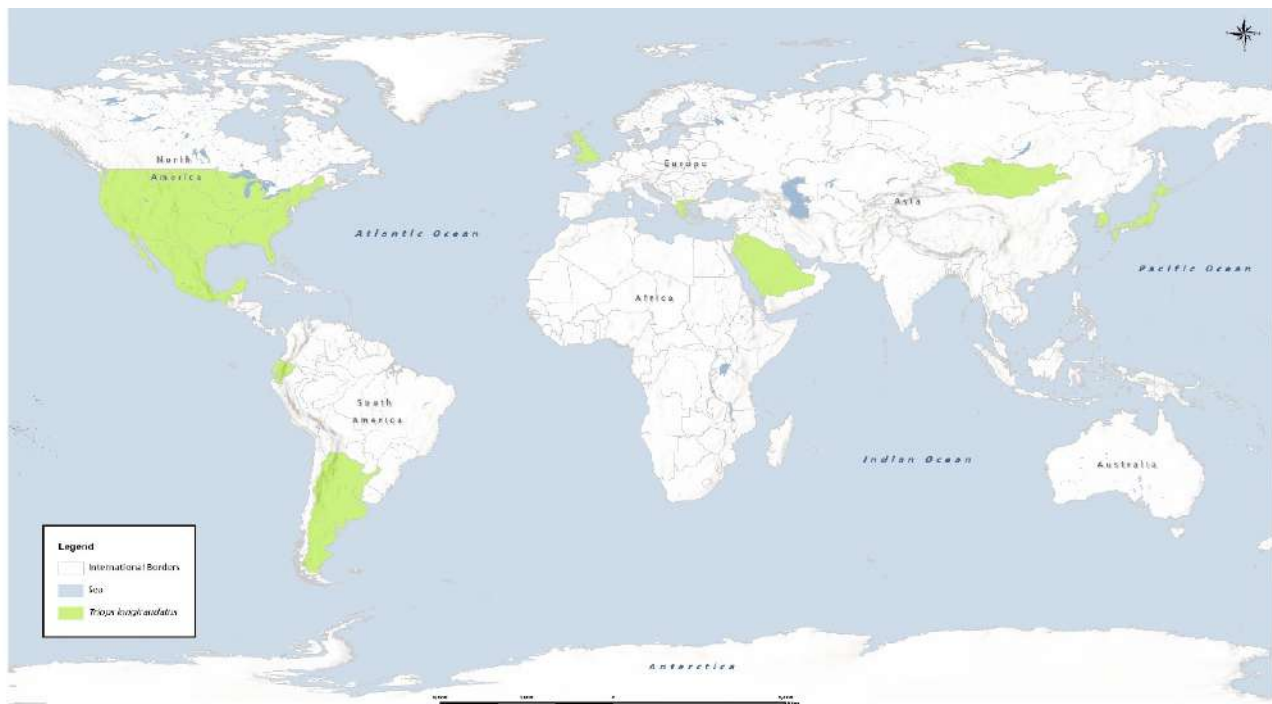


Figure 4. The global distribution of *Triops longicaudatus*

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