ABS ACTA BIOLOGICA SIBIRICA
A journal on the biodiversity of Siberia and the adjacent lands

Acta Biologica Sibirica 10: 395–400 (2024)
doi: 10.5281/zenodo.11183092
http://journal.asu.ru

RESEARCH ARTICLE

First record of *Lynceus brachyurus* (Branchiopoda: Diplostraca: Laevicaudata: Lynceidae) in Armenia

Susanna Hakobyan[1], Karen Jenderedjian[2], Mark Kalashian[1]

1 *Scientific Center of Zoology and Hydroecology of the National Academy of Sciences of Armenia, P. Sevak str., 7, Yerevan, 0014, Armenia*
2 *Ministry of Environment of the Republic of Armenia, Government House 3, Republic Square, 0010, Yerevan, Armenia*

Corresponding author: Susanna Hakobyan (susannahakob@gmail.com)

Academic editor: R. Yakovlev | Received 12 December 2023 | Accepted 8 May 2024 | Published 15 May 2024

http://zoobank.org/B03188A9-CA30-4A30-9769-5ECD917D3DE9

Citation: Hakobyan S, Jenderedjian K, Kalashian M (2024) First record of *Lynceus brachyurus* (Branchiopoda: Diplostraca: Laevicaudata: Lynceidae) in Armenia. Acta Biologica Sibirica 10: 395–400. https://doi.org/10.5281/zenodo.11183092

Abstract

Lynceus brachyurus was first discovered in the highland wetland of Armenia. This finding not only contributes to our understanding of the geographic distribution of *Lynceus brachyurus* but also sheds light on the ecological preferences and adaptability of this species to diverse habitats.

Keywords

Caucasus Ecoregion, clam shrimp, highland wetland, zoobenthos

Introduction

The suborder Laevicaudata Linder, 1945, or "smooth clam shrimps", is a small group of 44 described species divided into three genera namely, *Lynceus* Müller, 1776, *Lynceiopsis* Daday, 1912, and *Paralimnetis* Gurney, 1931. Despite being globally distributed, the seasonally nature of their freshwater habitat makes the group challenging to study because collecting fresh material is difficult (Sigvardt et al. 2020; GBIF 2023).

Armenia is entirely located in the Caucasus Ecoregion (Fig. 1), one of the most biologically rich regions on Earth, ranked among the planet's 25 most diverse and endangered hotspots (Williams et al. 2006). Armenia is a locked mountainous country, covering an area of 29,743 square kilometers with heights from 380 to 4090 m above sea level. In this regard, despite its small size, the climate of Armenia is diverse and includes all the climatic zones of the Caucasian Ecoregion, except for the humid subtropics.

The Holarctic clam shrimp or common lynceus *Lynceus brachyurus* Müller, 1776 is widely distributed in Holarctic Region but there is no data on the occurrence of the species in the Caucasus Ecoregion. Thus, it is the first record of the species not only for Armenia but also for the Caucasus Ecoregion.

Study area

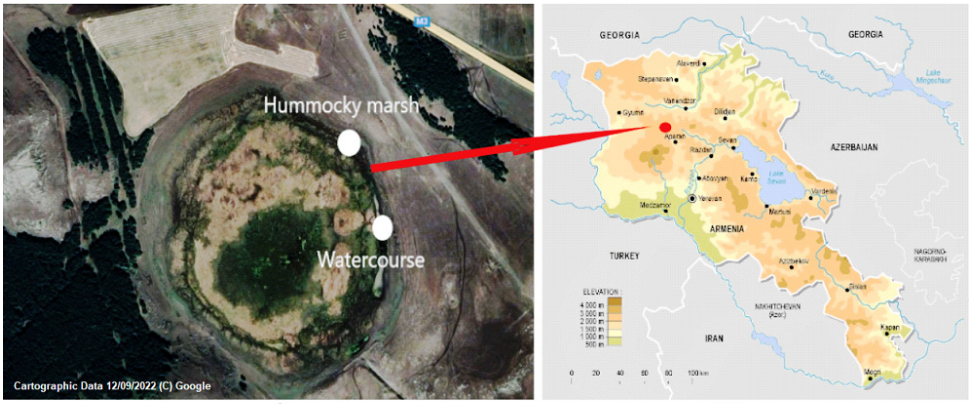
The species was found in Aragatsotn Region in a wetland located in Aparan community near the village Nigavan at an altitude 2060 m a.s.l. (Fig. 1). The wetland area is 23.1 ha, which during the dry season reduces to 8 ha. It is a hummocky marsh surrounded by a watercourse.

The wetland is distinguished by relative water clarity and species diversity of benthic invertebrates. The emergent vegetation in the central part consists of narrowleaf cattail (*Typha angustifolia*) thickets, the hummocks are formed by sedge (*Carex* sp.), where European water-plantain (*Alisma plantago-aquatica*) is most common in between. Among of submerged vegetation the threadleaf crowfoot (*Ranunculus trichophyllus*) is widespread. The composition of benthic invertebrates includes 12 orders, 16 families and 20 species, with ostracods predominating in abundance. Of waterfowl, coots (*Fulica atra*) regularly breed here, and several species of ducks and waders occur during migration. In 2021, here the nest of the marsh harrier (*Circus aeruginosus*) was observed. The southern shore of the wetland, near the outflow is used for cattle watering and grazing. The exact sample collection points are located at 40°38.316' N, 44°18.414' E (DDM) (Hummocky marsh) and 40° 38.286' N, 44°18.432' E (DDM) (Watercourse).

Materials and methods

The samples were taken on 6 June 2021 and 31 May 2023 from 2 locations in Nigavan wetland; at the edge of hummocky marsh and in the watercourse (Fig. 1). Specimens were sampled by spatial Surber sampler, a 70 μm mesh sack with a frame size of 33x33 cm, covering an area of 0.1 m^2. The samples were fixed with 4% formalin and 70% alcohol and then processed in the laboratory. Determination of the species composition of benthic animals was carried out under the MBS-9 binocular and Trinocular (XSZ-121T) microscopes using the key of T.I. Dobrinina [1995]. Photographs of shrimps were taken using Canon EOS 800D digital camera, equipped with

the Canon MP-E65 mm f/2.8 1–5x and Irix 150mm f/2.8 macro lenses and attached to Stack Shot Macro Rail package (Cognisys Inc.); Helicon Focus Pro software were used for stacking the photos. Studied specimens are deposited in the Laboratory of Hydrobiology of Scientific Centre of Zoology and Hydroecology of National Academy of Sciences of Armenia.



a) b)

Figure 1. Location of the sampling points in wetland (a) and location of Nigavan wetland in Armenia (b).

Result

From May 2021 to July 2022 intensive sampling was carried out in frames of the ANSEF research project on biodiversity of limnic wetlands (small lakes, ponds, pools, paddles, reservoirs, swamps and marshes) located in all provinces of Armenia. The branchiopod species *L. brachyurus* was found only in Nigavan wetland in June 2021. This unexpected discovery initiated additional samplings in similar hummocky marshes near Semyonovka village in Gegharkunik Region and two more near Lake Arpi in Shirak Region, as well as in Nigavan wetland. The *L. brachyurus* again was found only in Nigavan wetland, which showed that the population is quite viable.

In June 2021 were found total 13 specimens, of which 4 males and 3 females in hummocky marsh and 4 males and 2 females in the watercourse; in May 2023 – total 8 specimens, of which 2 males and 1 female in hummocky marsh and 3 males and 2 females in the watercourse. At the time of capture in the habitat the pH of water was close to neutral (7.1–7.6) and the temperature was within 14.9-16.2oC, the velocity from stagnant up to 0.3 m/sec.

The head of female, separated from the rest of the body by a small constriction, is bent to the ventral side and equipped with a large sharp rostrum at the end (Fig. 2a). Females are larger than males: from 4.0 to 4.4 mm. The size of males ranged from 3.1 to 3.5 mm (Fig. 2b). The first pair of pectoral legs of males is equipped with

hooks for capturing the female during mating (Fig. 3a). The body of the *L. brachyurus* is enclosed in a carapace, which is almost spherical and lacks growth streaks (smooth) (Fig. 3b).

The first pair of pectoral legs of males is equipped with hooks for capturing the female during mating (Fig. 3a). The body of the *L. brachyurus* is enclosed in a carapace, which is almost spherical and lacks growth streaks (smooth) (Fig. 3b).

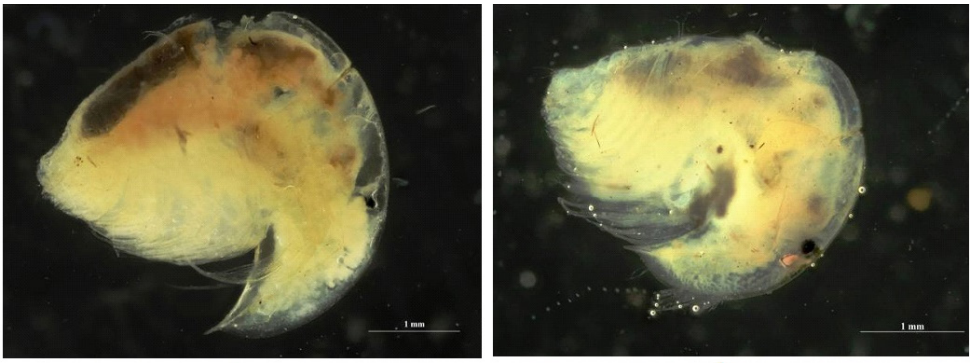


Figure 2. Female *L. brachyurus* with eggs without carapace (a) and male *L. brachyurus* from Armenia without carapace (b).

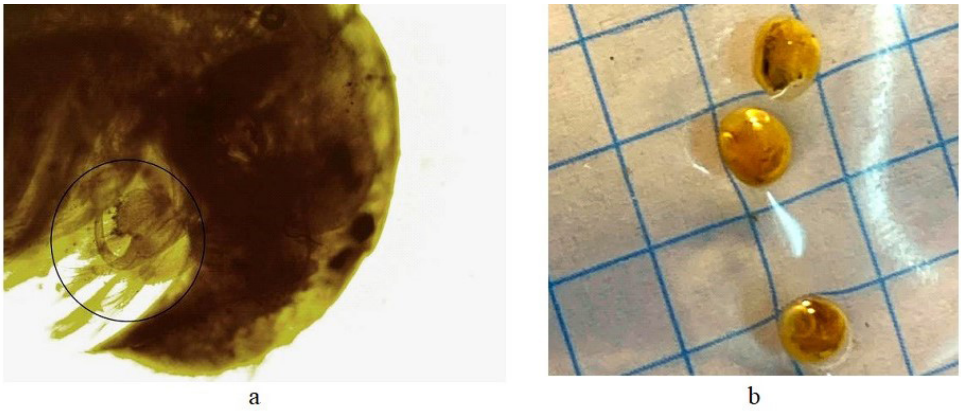


Figure 3. First thoracic leg of a male (a) and general view of *L. brachyurus* (b).

Discussion

L. brachyurus is widely distributed in Holarctic Region, it is known from Europe, Asia and North America, mainly in continental and Polar Regions (Brtek & Thiéry 1995; Rabet et al. 2005; Zavadil et al. 2013). According to Zavadil et al. (2013) it is missing from the southern parts of this region though in North America it is

known from California, and in Palearctic the species was recently discovered in Japan (Takahashi 2020). Besides, there is old report for Indian Subcontinent (North Pakistan: Gurney, 1907, quoted by (Rogers & Padhye 2015). No data exist on the presence of *L. brachyurus* in Caucasus. Thus, the discovery of *L. brachyurus* in Armenia expands our understanding of the distribution of this species and contributes to the rich biodiversity of the country's wetlands. It not only enriches the existing literature data, but also serves as an incentive for more extensive studies of regional branchiopods. In addition, the existence of *L. brachyurus* in a vulnerable wetland ecosystem highlights the need for appropriate measures to conserve and protect this and possibly other as yet undiscovered species from the threat of habitat degradation.

Unfortunately, the habitat of *L. brachyurus* is threatened by watering and grazing of cattle from May to October (currently around 250 animals – Fig. 4), which could have a negative impact on the ecological condition of the wetland and, consequently, on the conditions of the species.

Figure 4. Nigavan Wetland.

Acknowledgements

This study was supported by the Armenian National Science and Education Fund (ANSEF) under Grant number 21 AN: NS-zoo-2430 ("Biodiversity Studies of Limnic Wetlands with Special Reference to Aquatic Invertebrates – a Key for Assessing the State of Their Habitats".).

Special thanks to Tigran Ghrejyan (Scientific Center of Zoology and Hydroecology NAS RA) for photographs of male and female of *L. brachyurus*.

References

Brtek A, Thiéry J (1995) The geographic distribution of the European Branchiopods (Anostraca, Notostraca, Spinicaudata, Laevicaudata). Hydrobiologia 298: 263–280. https://doi.org/10.1007/BF00033821

Dobrinina TI (1995) Conchstraca. In: Tsalolikhin TJ (Ed.) Key to Freshwater invertebrates of Russia and adjacent lands, Saint-Petersburg 2: 30–33 p. [in Russian]

GBIF (www.gbif.org/species/7640)

Rabet N, Cart J-F, Montero D, Boulekbache H (2005) First pecord of *Lynceus brachyurus* Müller, 1776 (Branchiopoda, Laevicaudata, Lynceidae) in France. Crustaceana 78 (8): 931–940.

Rogers DC, Padhye S (2015) Review of the Large Branchiopod Crustacean Fauna of the Indian Subcontinent (Anostraca, Notostraca, Laevicaudata, Spinicaudata, Cyclestherida). Journal of Crustacean Biology 35 (3): 392–406. https://doi.org/10.1163/1937240X-00002327

Sigvardt ZMS, Shu S, Alonso M, Ventura M, Sanoamuang L, Rogers DC, Palero F, Olesen J (2020) A new Northeast Asian *Lynceus* (Crustacea: Branchiopoda: Laevicaudata) with uniquely modified thoracopods and an evaluation of DNA barcoding for clam shrimp species identification. Journal Nauplius 28: e2020013. https://doi.org/10.1590/2358-2936e2020013

Takahashi N (2020) A new record of *Lynceus brachyurus* Müller, 1776 (Laevicaudata: Lynceidae) from the Shiretoko Peninsula, Northeast Japan. Plankton and Benthos Research 15(4): 334–336. https://doi.org/10.3800/pbr.15.334

Williams L, Zazanashvili N, Sanadiradze G, Kandaurov A (Eds) (2006) An Ecoregional Conservation Plan for the Caucasus. Second Edition. WWF Caucasus Programme Office. Tbilisi, 226 pp.

Zavadil V, Král D, Reiter A (2013) Large branchiopods (Crustacea: Anostraca, Notostraca, Spinicaudata, Laevicaudata) of the middle Dyje river area, Czech Republic. Acta Musei Moraviae, Scientiae biologicae (Brno) 98 (1): 1–40.