IJABR

International Journal of Advanced Biotechnology and Research (IJABR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-14, Issue2, 2023, pp16-21
http://www.bipublication.com

Research Article

First report of Palaeozoic freshwater *Eucypris cisternina* (Ostracod;Podocopid) from Coimbatore district, Tamil Nadu, South India

Bala Mohan[1*], Duraisamy Prabha[1], Sheela Priyadarshinee[2], Saravana Bhavan[3] and Narasimman Manickam[4]

[1]Department of Environmental sciences,
Bharathiar University, Coimbatore- 641 046, Tamil Nadu, India
[2]Department of Zoology, Government Arts College,
Coimbatore- 641 018, Tamil Nadu, India
[3]Department of Zoology, Bharathiar University,
Coimbatore- 641 046, Tamil Nadu, India
[4]Department of Marine Sciences, Bharathidasan University,
Tiruchirapalli -620024 Tamil Nadu, India

***Corresponding author:**
Bala Mohan, Department of Environmental sciences,
Bharathiar University, Coimbatore- 641 046, Tamil Nadu, India.
E-mail: mohannethu300@gmail.com ORCID ID:0000-0003-3735-275

[Received 20 April-2023, Accepted 07 May-2023, Published 08 May-2023]

Abstract

In this study, we report *Eucypris cisternina* (Ostracoda: Cyprididae) for the first time in Valankulam Lake, Tamil Nadu, India. *Eucypris cisternina* was described based on their based on its morphological characteristics. In addition, physicochemical parameters such as water temperature, pH, dissolved oxygen, total dissolved solids, and electrical conductivity were also analyzed during the study period.

Keywords: New record,*Eucypris cisternina*, Valankulam lake

Introduction

Ostracods are small, bivalved organisms and belong to the phylum Arthropoda. They mainly inhabit the lake bottom and among macrophytes and feed on detritus and dead phytoplankton communities [6]. Ostracods are in turn consumed by planktonivours fishes and benthic macroinvertebrates. These are bivalved arthropods enclosed within low magnesium calcite that are easily fossilized and are present over 450 million years including evidence from the Ordovician[16]. They are omnipresent and are wide habitats from tropical warm waters to polar environments and are abundantly found in both fresh and marine water ecosystems [3,9]. Most species reproduce sexually but some of them reproduce asexually by parthenogenesis. Ostracods are sensitive to a range of environmental factors including habitat type, nutrient status, and the salinity, temperature, and chemical composition of their

host water [17]. Furthermore, the trace element (especially Mg and Sr) content and their shells reflect important limnological variables such as water temperature, water chemistry, and productivity [2]. More recent geochemical applications of Ostracod shells include their use in $^{87}Sr/ ^{86}Sr$ analyses and radiometric dating, including radiocarbon and uranium series. Overall, Ostracods have excellent potential in paleolimnology [6]. In the aquatic environment, Ostracods are acted as biological indicators since the Palaeozoic era [19]. The Ostracods in freshwater habitats are more sensitive to environmental conditions in their territory. Therefore, freshwater ostracods are of great interest as biological indicators of the environment and changes in the climate of the quaternary past and modern studies.

The class Ostracoda within the subphylum crustacea contains both marine and nonmarine forms; the order Podocopida, which contains the extant nonmarine ostracode taxa (including strictly freshwater species) within the superfamilies Cypridoidea, Darwinuloidea, and Cytheroidea. The family Cyprididae (Baird, 1845) [1] is the dominant group in open freshwater ecosystems, accounting for more than half of the circa 2000 freshwater species described so far [10]. The family comprises over 20 subfamilies most of which have a global distribution. Generally, endemism across zoogeographical provinces on the subfamily level is very rare in Ostracods [14]. In the family Cyprididae, a handful of families (i.e. Batucyprettinae, Herpetocyprellinae, Liocypridinae, Ngarawinae, Pelocypridinae) are each restricted to one zoogeographical province. This may, however, be the result of the lack of research or unresolved phylogenetical relationships. During 250 years since the first Cyprididae Ostracod, *Cypridopsis vidua*[15,7] was described, the systematics of this family became more complex, and in recent years several taxonomic and phylogenetic studies attempted to revise a few subfamilies and genera. For example, Martens [11] and Martens et al. [12] revised Eucypridinae and proposed several important taxonomic characters (such as, for example, the presence of “c” seta on L5 and the length ratio between d1 and d2 setae on L6) for distinguishing between genera; Martens et al.,[12] revised Megalocypridinae and Cypridinae; Savatenalinton and Martens [18] revised Cypricercinae, while Martens [13] revised Herpetocypridinae. All these revisions were based on the morphological characters (both the carapace and soft parts).However, several studies included representatives of various Cyprididae subfamilies in the attempt to resolve phylogenetic relationships within Ostracods in general or the positions of various genera within their respective subfamilies. In the present study, *Eucypris cisternina*was identified for the first time in Valankulam Lake, Coimbatore district, Tamil Nadu, India. They were described on their morphological features, and this freshwater species further enriches the Ostracoda floristic diversity of freshwater lakes in India.

Materials and methods

Valankulam Lake is located in (Lat. 10.59° N and Long.76.57° E) of Coimbatore city, Tamil Nadu, India, and is fed by canals derived from Noyyal River and Selva Chinthamani Lake located upstream in the north (Figure 1). The surface water samples were collected during the early morning hours between 5.00 am to 7.00 AM at sampling sites of Valankulam Lake, to analyze physical and chemical characteristics like water temperature, p^H, dissolved oxygen, total dissolved solids, and electrical conductivity. At the same time, zooplankton (Ostracoda) samples were collected at a depth of 1.5 meters by using a standard plankton net (mouth diameter 0.35 nm) made up of nylon bolting cloth (mesh size 50 m). The collected specimens were transferred to 70% ethanol for storage and transport back to the lab. Ostracods were dissected in a mixture of distilled water and glycerol (1: 1) with fine entomological needles (size 000). Appendages were dissected and mounted in Hydromatrix mounting medium or glycerine. In this study appendages of*Eucypris*

cisternina were mounted on slides in glycerol, while their valves are kept on micropaleontological slides or in glass test tubes in 70% alcohol. All non-dissected material is preserved in 70% ethyl-alcohol in glass test-tubes e and drawn with the aid of a camera lucida.The taxonomic identification was done under the compound light microscope at a magnification of 40 X to 100 X and they were photomicrographed by using, Inverted Biological Microscope (Model Number INVERSO 3000 (TC-100) CETI) attached to the camera (Model IS 300). The *Eucypris cisternina* (Ostracoda) species were identified based on morphological features the by referring to the standard manuals, textbooks, and monographs[5,4,21].

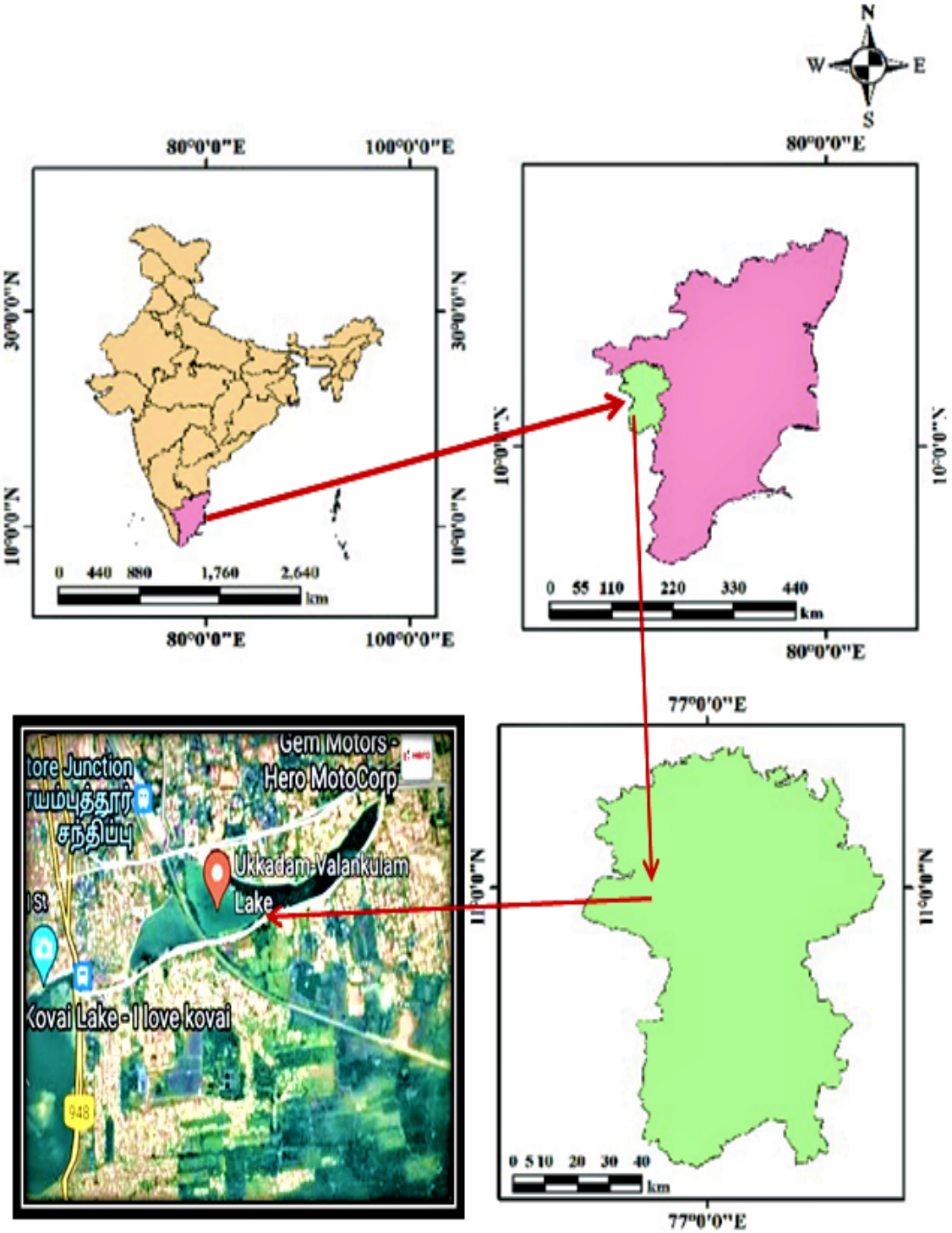

Figure 1. Geographical description of Valankulam lake, Coimbatore district, Tamil Nadu.

Results:

district, Tamil Nadu, India, and described based on their morphological features (Figure 2, & 2A).

Class: Ostracoda (Latreille, 1802)
Subclass: Podocopa
Order: Podocopida (Sars, 1866)
Suborder: Cypridocopina (Jones, 1901)
Family: Cyprididae (Baird, 1845)
Genus: *Eucypris* (Vávra, 1891)
Species: *Eucypris cisternina* (Furtos, 1936)

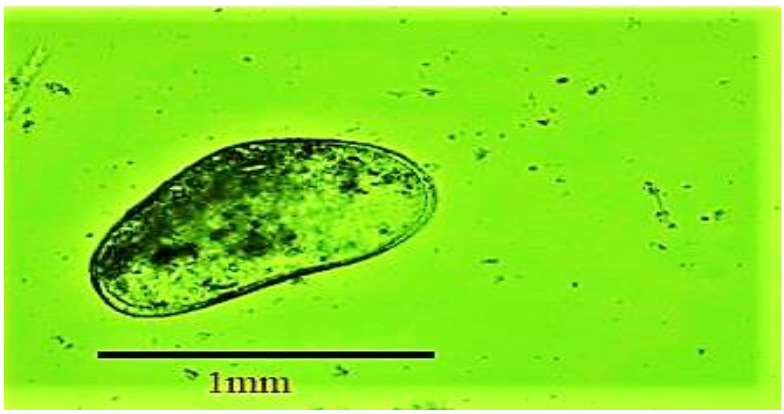

Figure 2. Inverted Biological Microscope image of *Eucypris cisternina* (400X) from Valankulam lake

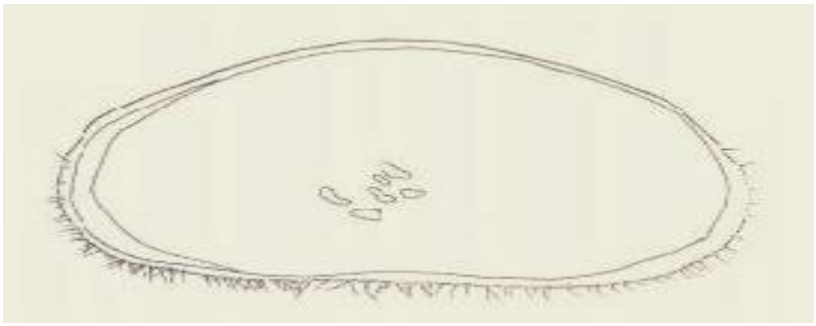

Figure 2A.*Eucypris cisternina*n. sp. Right Valve view; (Female). Scale = 0.1 mm

Dimensions: female; 1 mm in length, 0.75mm in height, **Diagnosis:** Holotype, actively mobile, Relatively small organisms, Carapace elongated with dorsal margin slightly arched. The greatest height is located in the middle. The surface of the carapace is smooth. The ventral margin is straight but a little convex at the mouth region. Anterior and posterior margins are broadly rounded and covered by sparse setae. The posterior margin is slightly narrower than the anterior one. The ventral margin is almost straight, except in the mouth region where it is slightly convex.Calcified inner lamella equaling 6.3% anteriorly and 3.2% posteriorly of the total length of the carapace.Marginal pore canals are straight and denser anteriorly than posteriorly.Muscle scars imprints consist of four small and compact scars medially and two slightly elongated scars located more anteroventral. The ventral margin is almost straight, except in the mouth region where it is slightly convex. Swimming setae slightly overpassing the tip of claws, with small and bare, serrulate, pappose, and the basal segment bare relatively short, not reaching the distal end of the following segment. No marginal tubercles are present. The surface of the carapace is smooth.

Distribution: Freshwater species recorded from Northen neotropical region [21], and fossil record found in Marshall Islands, Ralik Chain, Ujelang Atoll, Raej Islet from old well.

Distribution in India: New record

The Ostracods in Freshwater habitats are more sensitive to environmental conditions in their territory. In the aquatic environment, ostracods act as biological indicators since the Palaeozoic era and are therefore involved in the whole fossil record of any present arthropod group [16]. Freshwater Ostracods obtained from permafrost areas are valuable biological indicators of the aquatic environment since permafrost deposits have a high conservation potential, fossil Ostracod assemblies provide comprehensive perceptions into past environmental situations if current reference data sets of limnological data and species archives are available for evaluation. This obligation highlights the requisite for additional organized studies of present environmental underlying forces and Ostracod assemblages [20]. Therefore, freshwater Ostracods are of great interest as biological indicators of the environment and changes in the climate of the Quaternary past and in modern studies [8]. The new record of Ostracod reported from the freshwater Valankulam Lake of Coimbatore city will act as a bioindicator of the ecosystem and it will implicate the importance of continuous assessment of Ostracod diversity in India, for exploring new taxa and new records. The floristic study of Ostracoda at the regional scale will provide information regarding the endemism in Ostracods. To understand the distribution of *Eucypris cisternina* presently reported, detailed and systematic studies are required in different aquatic ecosystems that will further enrich the biodiversity list of freshwater Ostracods in India.

Acknowledgment
The authors are thankful to the Department of Environmental Sciences, Department of Zoology, Bharathiar University, Coimbatore – 641 046, Tamil Nadu, India and Department of Zoology, Government of Arts College, Coimbatore – 641 018, Tamil Nadu, India.

Conflicts of interest: Authors declared No conflict of interest.

References

1. Baird, W. (1845). Arrangement of the British Entomostraca, with a list of species, particularly noticing those which have as yet been discovered within the bounds of the club. Trans. Berwicks Nat. Club 2, 145–158.
2. Bajpai, S., Holmes, J., Bennett, C., Mandal, N., & Khosla, A. (2013). Palaeoenvironment of Northwestern India during the Late Cretaceous Deccan volcanic episode from trace-element and stable-isotope geochemistry of intertrappean ostracod shells. Global and Planetary Change, 107, 82-90.
3. Boomer, I., Horne, D.J., & Slipper, I.J. (2003). The use of ostracods in palaeoenvironmental studies, or what can you do with an ostracod shell?. The Paleontological Society Papers, 9, 153-180.
4. Deb, M. (1983). Brief descriptions of new species of Ostracoda: Crustacea from Maharashtra State (India). Records of the Zoological Survey of India, 81(1-2), 135-166.
5. Furtos, N. (1936). On the Ostracoda from the cenotes of Yucatan and vicinity. Carnegie Inst. Wash. 457, 89–115.
6. Gibson, J.J., Edwards, T.W.D., Birks, S.J., St Amour, N.A., Buhay, W.M., McEachern, P., & Peters, D.L. (2005). Progress in isotope tracer hydrology in Canada. Hydrological Processes: An International Journal, 19(1), 303-327.
7. Gusakov, V.A., Makhutova, O.N., Gladyshev, M.I., Golovatyuk, L.V., & Zinchenko, T.D. (2021). Ecological role of Cyprideis torosa and Heterocypris salina (Crustacea, Ostracoda) in saline rivers of the Lake Elton basin: abundance, biomass,

production, fatty acids. Zoological Studies, 60.
8. Holmes, J.A., & Chivas, A.R. (2002). Ostracod shell chemistry---overview. Washington DC American Geophysical Union Geophysical Monograph Series, 131:185-204.
9. Karanovic, I., & Brandão, S.N. (2015). Biogeography of deep-sea wood fall, cold seep and hydrothermal vent Ostracoda (Crustacea), with the description of a new family and a taxonomic key to living Cytheroidea. Deep Sea Research Part II: Topical Studies in Oceanography, 111, 76-94.
10. Karanovic, I. (2012). Recent Freshwater Ostracods of the World. Crustacea, Ostracoda, Podocopida. Springer, Berlin.
11. Martens, K. (1989). On the systematic position of the Eucypris clavata-group, with a description of Trajancypris gen. nov (Crustacea, Ostracoda). Arch. Hydrobiol. 2, 227–251
12. Martens, K. (1992). Taxonomic revision of african cypridini part II. Description of Ramotha gen. nov. Ann. S. Afr. Mus. 102, 91–130.
13. Martens, K. (2001). Taxonomy of the herpetocypridinae (Crustacea ostracoda). Crustaceana 74, 295–308.
14. Martens, K., Schön, I., Meisch, C., & Jorne, D.J. (2008). Global diversity of ostracods (Ostracoda Crustacea) in freshwater. Hydrobiologia 595, 185–193.
15. MD uller, O.F. (1776). Zoologie danicae prodromus, seu animalium Danie et Norvegie indigenarum characters, nomina, et synonymy imprimis popularium. I–XXXII, 198–199.
16. Parameswari, E., Davamani, V., Kalaiarasi, R., Ilakiya, T., & Arulmani, S. (2020). Utilization of Ostracods (Crustacea) as bioindicator for environmental pollutants. International research journal of pure and applied chemistry, 21(7), 73-93.
17. Ramos, L., Epele, L.B., Grech, M.G., Manzo, L.M., Macchi, P.A., & Cusminsky, G.C. (2022). Modelling influences of local and climatic factors on the occurrence and abundance of non-marine ostracods (Crustacea: Ostracoda) across Patagonia (Argentina). Hydrobiologia, 849, 229-244.
18. Savatenalinton, S., & Martens, K. (2009). Generic revision of Cypricercinae McKenzie 1971 (Crustacea, Ostracoda), with the description of three new genera and one new species and a phylogenetic analysis of the subfamily. Hydrobiologia 632, 1–48.
19. Schneider, A., Wetterich, S., Schirrmeister, L., Herzschuh, U., & Pestryakova, L. (2015). Freshwater ostracods (Crustacea) and environmental variability of polygon tundra in the Indigirka Lowland (northeast Siberia). Polar Research, 35(25225).
20. Schneider, A., Wetterich, S., Schirrmeister, L., Herzschuh, U., Meyer, H., & Pestryakova, L.A. (2016). Freshwater ostracods (Crustacea) and environmental variability of polygon ponds in the tundra of the Indigirka Lowland, north-east Siberia. Polar Research, 35(1):25225.
21. Yoo, H., Cohuo, S., Macario-Gonzalez, L., & Karanovic, I. (2017). A new freshwater ostracod genus from the northern Neotropical region and its phylogenetic position in the family Cyprididae (Podocopida). Zoologischer Anzeiger, 266, 196-215.