J Bangladesh Agril Univ 24(1): 49–56, 2026 https://doi.org/10.5455/jbau.v24i1.88806

ISSN 1810-3030 (Print) 2408-8684 (Online)

Journal of Bangladesh Agricultural University

Journal home page: http://baures.bau.edu.bd/jbau

Research Article

First records of two rotifer species (*Anuraeopsis coelata* and *Lecane ludwigii*) from Bangladesh supported by morphometric and multivariate analyses

Md. Abdula Al Sad[1, 2] ✉, Md. Mashrafi[1, 2], Md. Samir Islam[1, 2] and Humayra Hoque[1, 2]

[1]Department of Zoology, University of Chittagong, Chattogram-4331, Bangladesh
[2]Laboratory of Zooplankton Research, University of Chittagong, Chattogram-4331, Bangladesh

ARTICLE INFO

Article history
Received: 09 February 2026
Accepted: 30 March 2026
Published: 31 March 2026

Keywords
Rotifers;
faunistic record;
freshwater habitats;
morphometric analysis;
Bangladesh

Correspondence
Md. Abdula Al Sad
✉: mdabdulaalsad@yahoo.com

ABSTRACT

Freshwater zooplankton communities include diverse rotifer taxa, yet species-level documentation in Bangladesh remains limited. The present study reports the occurrence of *Anuraeopsis coelata* (Gosse, 1851) and *Lecane ludwigii* (Eckstein, 1883) from freshwater habitats within the University of Chittagong campus, Bangladesh. Zooplankton samples were collected between November 2023 and April 2024 and examined under light microscopy. Species identification was carried out using diagnostic morphological characters following established taxonomic keys, supported by morphometric measurements obtained from calibrated photomicrographs. Lorica length and width were measured for *A. coelata*, while total body length and maximum body width were recorded for *L. ludwigii*. The recorded measurements fall within the diagnostic ranges reported in previous studies, supporting the identification of the examined specimens. These observations represent the first morphologically confirmed records of both species from Bangladesh and provide baseline taxonomic information for future studies of freshwater rotifer diversity in the region. Further investigations incorporating broader sampling and molecular approaches may help refine species identification and improve understanding of rotifer diversity in Bangladeshi freshwater ecosystems.

Introduction

Zooplankton are an essential component of freshwater ecosystems and play a central role in maintaining aquatic food web structure and ecosystem functioning (Goździejewska et al., 2024; Lan et al., 2021; Li et al., 2025). As primary consumers, they facilitate the transfer of energy from phytoplankton and microbial producers to higher trophic levels, including fish and other aquatic organisms (Décima, 2022; Lomartire et al., 2021; Wang et al., 2025). Because zooplankton communities respond rapidly to environmental fluctuations, they are widely recognized as reliable indicators of ecological conditions and are frequently used in studies addressing ecosystem productivity, trophic interactions, and environmental change (Ersoy et al., 2022; Hao et al., 2024).

Among freshwater zooplankton, rotifers represent one of the most diverse and ecologically important groups of microscopic metazoans and often contribute substantially to planktonic biomass and productivity in freshwater ecosystems (Zhang et al., 2021; Phan et al., 2021). They act as efficient grazers of algae, bacteria, and suspended organic particles, thereby playing an important role in microbial food webs and the transfer of carbon and nutrients to higher trophic levels (Gilbert, 2022; Arcifa et al., 2020; Frau, 2021). Rotifers also serve as an important food source for larger zooplankton and larval fish, particularly in eutrophic and aquaculture systems where they frequently dominate zooplankton communities (Han et al., 2021; Liu et al., 2023; Mao et al., 2025). Owing to their short generation times, high reproductive potential, and sensitivity to environmental disturbances, rotifers are widely used as biological indicators of water quality and ecosystem health (Novotny et al., 2021; Bhandarkar & Bansod, 2025; Goździejewska et al., 2024).

Cite This Article
Sad, M.A.A., Mashrafi, M., Islam, M.S. and Hoque, H. 2026. First records of two rotifer species (*Anuraeopsis coelata* and *Lecane ludwigii*) from Bangladesh supported by morphometric and multivariate analyses. *Journal of Bangladesh Agricultural University,* 24(1): 49-56. https://doi.org/10.5455/jbau.v24i1.88806

Despite their ecological importance, rotifer diversity in Bangladesh remains only partially documented. Although zooplankton surveys have been conducted in various freshwater habitats across the country, detailed taxonomic studies focusing on rotifers are still limited. In particular, morphological documentation necessary for reliable species identification has received little attention, which may lead to the omission of certain species from existing faunal records. Consequently, the current understanding of rotifer diversity in Bangladesh is likely incomplete. Similar gaps in taxonomic documentation have been reported from other tropical regions, where insufficient morphological studies have resulted in underrepresentation of rotifer diversity in regional inventories (Maiphae et al., 2023; Sarma et al., 2021).

The rotifer species *Anuraeopsis coelata* (Gosse, 1851) and *Lecane ludwigii* (Eckstein, 1883) have been reported from a wide range of freshwater habitats across several continents, including Asia, Europe, and North and South America (Sarma et al., 2021). Both species possess distinctive morphological features; however, reliable identification generally requires careful examination of lorica structure, body shape, and other diagnostic morphometric traits. For this reason, detailed morphological observation remains an essential approach in faunistic studies of rotifers, particularly when documenting species occurrences and assessing intraspecific variation within natural populations (Maiphae et al., 2023).

In view of the limited taxonomic information available for rotifers in Bangladesh, the present study investigates the occurrence of these species in freshwater habitats within the University of Chittagong campus. Based on detailed morphometric examination and multivariate analysis, this study reports the first morphologically confirmed occurrence of *Anuraeopsis coelata* and *Lecane ludwigii* in Bangladesh. These findings provide verified taxonomic documentation of the species and contribute to improving the current understanding of rotifer diversity in the country, highlighting the need for further systematic surveys of freshwater microinvertebrates across diverse habitats.

Materials and Methods

Study area and sampling

Zooplankton samples were collected monthly from November 2023 to April 2024 from two freshwater bodies within the University of Chittagong campus, Chattogram, Bangladesh: Mazar Pond (22.47254° N, 91.79956° E) and Palm Garden Lake (22.46354° N, 91.78612° E). Mazar Pond is a semi-managed pond, whereas Palm Garden Lake is intensively maintained for landscape and recreational purposes. Sampling was carried out in the littoral zones of both water bodies using a plankton net with a mesh size of 50 µm. Horizontal and vertical hauls were performed following standard freshwater zooplankton sampling procedures (Edmondson, 1959; APHA, 2017). Immediately after collection, the samples were preserved in 6–7% formalin and transported to the laboratory for further examination.

Microscopy and morphometric measurements

Rotifer specimens were examined and identified using a trinocular compound microscope (Euromex OXION; Model NIS-EU 1640407) under magnifications of 40×, 100×, and 400×. Species identification was carried out using standard taxonomic keys and original species descriptions (Koste, 1978; Segers, 2007). Photomicrographs of representative specimens were captured using a digital camera attached to the trinocular port of the microscope. Prior to measurement, the imaging system was calibrated with a stage micrometer to ensure measurement accuracy.

Morphometric measurements were obtained from calibrated images using ImageJ (Schneider et al., 2012). To minimize observer bias, each morphometric variable was measured once per individual. For *Anuraeopsis coelata*, lorica length (LL) and lorica width (LW) were measured, whereas for *Lecane ludwigii*, total body length (TBL) and maximum body width (MW) were recorded following established rotifer morphometric protocols (Koste, 1978; Segers, 2007). Seven individuals of each species, pooled from the sampling sites, were included in the morphometric analysis. All measurements are expressed in micrometers (µm) following standard SI unit conventions.

Statistical analysis

Descriptive statistics, including mean, standard deviation (SD), and range, were calculated for all morphometric variables using Microsoft Excel (version 2021). Relationships between morphometric traits were assessed using Pearson's correlation analysis. Patterns of morphometric variation were further examined through principal component analysis (PCA) performed on standardized data using PAST software (version 5.1). Interpretation of PCA results was based on eigenvalues and the proportion of variance explained by the principal components. Although the sample size was limited (n = 7 per species), it is considered appropriate for exploratory taxonomic morphometric analyses of rotifers, where species identification relies primarily on diagnostic morphological characters and specimen availability is often constrained.

Results

Anuraeopsis coelata

Morphometric measurements of *Anuraeopsis coelata* obtained in the present study are summarized in Table 1. Lorica length of the examined individuals ranged from 78 to 108 µm (mean ± SD = 92.3 ± 10.2 µm), while lorica width varied from 43 to 50 µm (mean ± SD = 46.5 ± 2.5 µm). These measurements fall within the established diagnostic range of the species and are comparable to values reported for Asian populations, where lorica lengths of 74–112 µm and widths of 42–50 µm have been documented (National Institute for Environmental Studies, n.d.). Morphologically, *A. coelata* is characterized by an elongate to oblong lorica that is widest at the mid-body and gradually narrows posteriorly (Fig. 1).

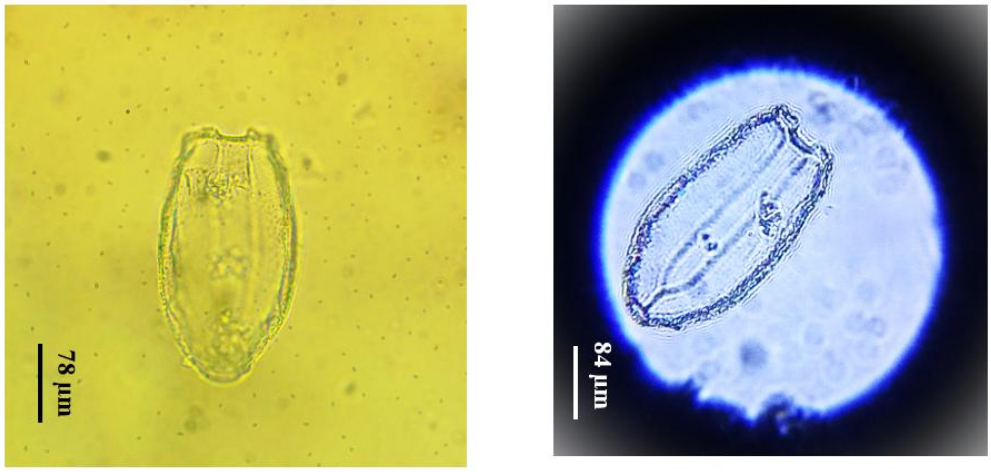

Fig. 1. Photomicrographs of *Anuraeopsis coelata* from Bangladesh showing overall lorica morphology. Scale bars = 78 µm (left), 84 µm (right).

The anterior margin bears two distinct anterolateral lobes separated by a shallow median indentation, forming a broad head aperture. The lateral margins of the lorica are thickened and slightly curved, and the lorica surface appears finely sculptured with faint reticulations or striations under light microscopy. The posterior end is broadly rounded to weakly tapering and terminates in a small foot aperture, with the foot not prominently extended in the examined specimens. These features are consistent with published descriptions of *A. coelata* and further support the species identification.

Table 1. Descriptive statistics of lorica length (LL) and lorica width (LW) of *Anuraeopsis coelata* (n = 7).

Parameter	Lorica length (LL, µm)	Lorica width (LW, µm)
Mean	92.25	46.5
Standard error	3.61	0.87
Standard deviation	10.22	2.45
Minimum	78	43
Maximum	108	50

Pearson's correlation analysis revealed a strong positive relationship between lorica length and lorica width in *Anuraeopsis coelata* ($r = 0.9984$, $p < 0.001$, $n = 7$), indicating a very close linear association between the two variables and a high degree of proportionality in lorica dimensions among the examined individuals.

Principal component analysis (PCA) was performed in PAST using a correlation matrix; no supplementary variables or bootstrap resampling were applied. PCA based on standardized lorica length and lorica width revealed that morphometric variation in *Anuraeopsis coelata* was predominantly structured along the first principal component (PC1) (Fig. 2).

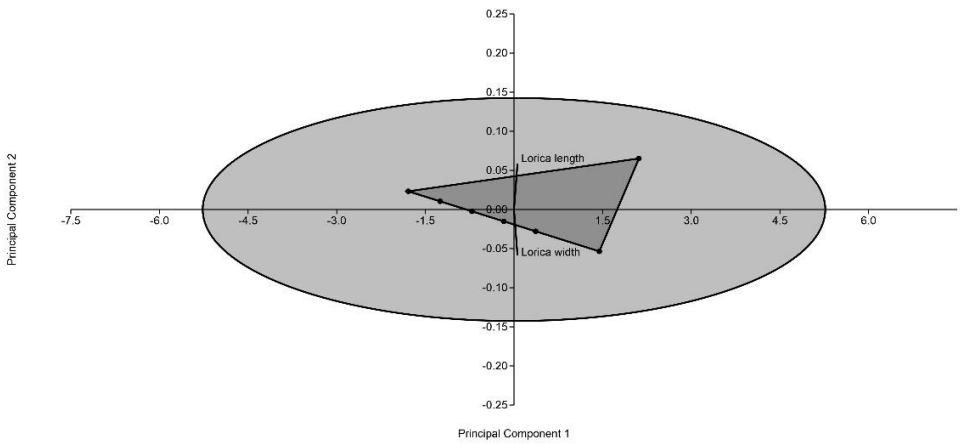

Fig. 2. Principal component analysis (PCA) ordination of *Anuraeopsis coelata* based on standardized lorica length and lorica width.

Individuals exhibited a wide dispersion along PC1, whereas variation along the second principal component (PC2) was comparatively limited, indicating that inter-individual differences were primarily associated with overall lorica size rather than shape. Both lorica length and lorica width contributed positively and nearly collinearly to PC1, reflecting their strong covariation. The PCA ordination showed a continuous distribution of individuals without distinct clustering, as illustrated by the convex hull encompassing all specimens. This multivariate pattern is consistent with the strong positive correlation between lorica length and lorica width (r = 0.9984), indicating proportional scaling of lorica dimensions. Overall, morphometric variation was primarily size-related rather than shape-related; however, these results should be interpreted cautiously given the limited sample size.

Morphometric characteristics of Lecane ludwigii

Morphometric measurements of *Lecane ludwigii* obtained in the present study are summarized in Table 2. Total body length of the examined individuals ranged from 145 to 162 µm (mean ± SD = 153 ± 5.97 µm), while maximum body width varied from 70 to 78 µm (mean ± SD = 74 ± 2.65 µm). Morphologically, *Lecane ludwigii* exhibited an oval to elongate body shape that was widest at the mid-region and gradually tapered toward both the anterior and posterior ends (Fig. 3).

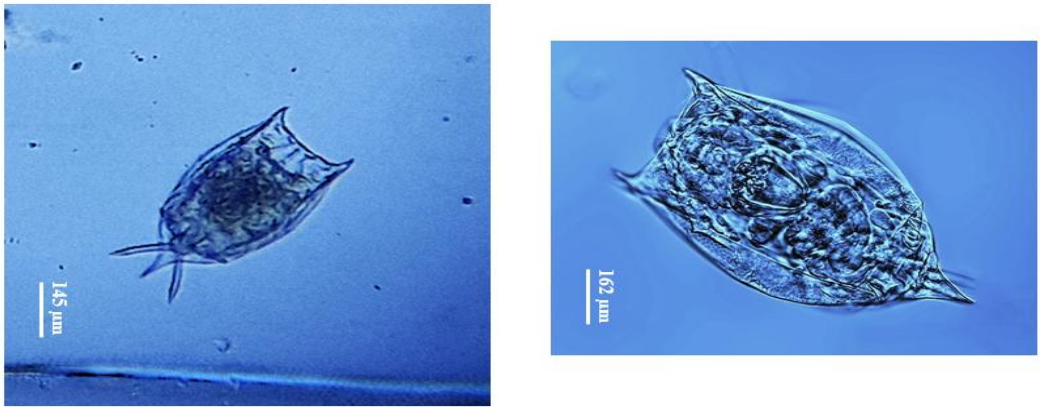

Fig. 3. Photomicrographs of *Lecane ludwigii* from Bangladesh showing body shape and foot with two toes. Scale bars = 145 µm (left), 162 µm (right).

These measurements fall within the established diagnostic range of *Lecane ludwigii* and are comparable

to values reported in previous studies, where total body length generally ranges from approximately 120 to 180 µm, with occasional larger individuals, and maximum body width typically varies between 65 and 78 µm (National Institute for Environmental Studies, n.d.).

The anterior margin formed a broad head aperture with slightly produced lateral corners. The body was weakly loricate and dorsoventrally flattened, with a semi-transparent integument through which internal structures were visible under light microscopy. The posterior end narrowed into a distinct foot bearing two elongated, slender, and slightly divergent toes. These morphological features are consistent with diagnostic descriptions of *L. ludwigii* and support the morphometric identification of the species.

Table 2. Descriptive statistics of total body length (TBL) and maximum width (MW) of *Lecane ludwigii* (n = 7).

Parameter	Total body length (TBL, µm)	Maximum width (MW, µm)
Mean	153	74
Standard error	2.26	1
Standard deviation	5.97	2.65
Minimum	145	70
Maximum	162	78

Pearson's correlation analysis revealed a strong positive relationship between total body length and maximum width in *Lecane ludwigii* (r = 0.89, p = 0.008, n = 7), indicating that increases in body length are accompanied by proportional increases in body width.

Principal component analysis (PCA) based on standardized total body length and maximum body width showed that morphometric variation in *Lecane ludwigii* was predominantly explained by the first principal component (PC1) (Fig. 4).

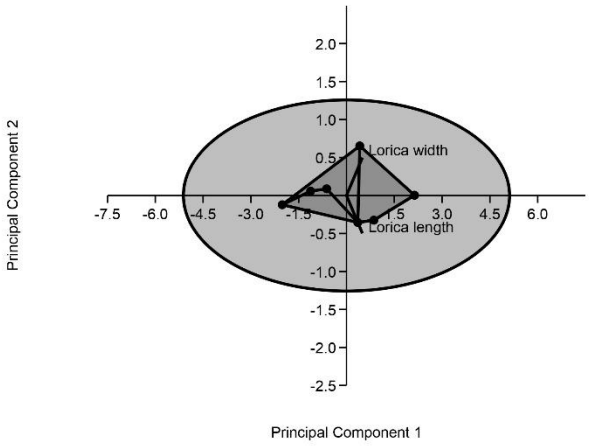

Fig. 4. Principal component analysis (PCA) ordination of *Lecane ludwigii* based on standardized total body length and maximum body width.

Both variables loaded positively on PC1, indicating that inter-individual variation was mainly associated with overall body size rather than shape-related differences. Variation along the second principal component (PC2) was comparatively limited, representing minor residual variation, and the ordination revealed a continuous distribution of individuals without distinct clustering. These results suggest that intraspecific morphometric variation in *Lecane ludwigii* is largely size-related; however, they should be interpreted cautiously given the small number of specimens analyzed.

Discussion

The present study documents the first morphologically confirmed records of *Anuraeopsis coelata* and *Lecane ludwigii* from Bangladesh, expanding the known distribution of these rotifers in South Asia. Both species have been reported from diverse freshwater environments across several continents (Sarma et al., 2021), suggesting that their previous absence from Bangladeshi records likely reflects limited species-level documentation rather than true absence. Similar

situations have been reported in other regions where rotifer diversity has been underestimated due to insufficient taxonomic resolution in zooplankton surveys (Maiphae et al., 2023).

The morphometric characteristics observed in the present study are consistent with previously published descriptions of these species. For example, the lorica length of *A. coelata* recorded here (78–108 µm) falls within the range reported from other regions, where values of approximately 74–112 µm have been documented. Similarly, the lorica width observed in the present study (43–50 µm) corresponds closely with measurements reported for Asian populations (National Institute for Environmental Studies, n.d.). The morphometric measurements of *L. ludwigii* also agree with published data. The total body length observed in the present specimens (145–162 µm) lies well within the range of approximately 120–180 µm reported in earlier studies, while the recorded body width values are likewise consistent with previously described diagnostic ranges. These comparisons confirm that the specimens examined in this study correspond closely with established morphological descriptions of the species (Koste, 1978; Segers, 2007).

The predominance of size-related variation observed in both species is consistent with patterns widely reported for rotifers. Morphometric variability in rotifers is often influenced by environmental factors such as food availability, temperature, and habitat conditions, resulting in phenotypic plasticity within species (Maiphae et al., 2023; Sarma et al., 2021). However, when morphometric measurements remain within recognized diagnostic ranges and are supported by characteristic morphological features, morphology-based identification remains reliable for documenting species occurrences in faunistic surveys.

The occurrence of these rotifers in managed urban freshwater habitats also highlights the ecological importance of such systems as reservoirs of microinvertebrate diversity. Small ponds and lakes within urban or semi-managed landscapes are often overlooked in biodiversity studies, yet they can support diverse plankton communities and may contribute significantly to regional biodiversity (Goździejewska et al., 2024). As rotifers are widely recognized as sensitive indicators of freshwater ecosystem condition (Bhandarkar & Bansod, 2025), documenting their species composition can provide valuable baseline information for future ecological monitoring and biodiversity assessments.

Although molecular approaches such as DNA barcoding have increasingly been used to refine rotifer taxonomy and detect cryptic species, morphology-based identification remains widely applied in faunistic studies where diagnostic characters are well established. In the present study, the observed morphological features and morphometric measurements correspond closely with published descriptions and diagnostic ranges reported for both species, supporting the reliability of the identifications. The findings therefore provide important baseline documentation of rotifer diversity in Bangladesh. Nevertheless, future investigations integrating molecular techniques with detailed morphological analyses would further improve taxonomic resolution and enhance understanding of rotifer diversity and distribution patterns in the region.

Conclusion

This study reports the first morphologically confirmed occurrence of *Anuraeopsis coelata* and *Lecane ludwigii* in Bangladesh based on detailed morphological observations and morphometric analysis. The recorded measurements fall within the diagnostic ranges previously reported for these species, supporting the reliability of morphology-based identification in faunistic documentation. These findings extend the known distribution of both species and suggest that rotifer diversity in Bangladesh remains incompletely documented. The study provides baseline taxonomic information that will be valuable for future biodiversity assessments and ecological monitoring of freshwater ecosystems in the region. Further investigations encompassing a wider range of habitats and incorporating molecular approaches would help refine species identification and improve understanding of rotifer diversity and distribution patterns in Bangladesh.

Acknowledgments

The authors acknowledge the Department of Zoology, University of Chittagong for logistical and technical support.

Author Contributions

Md. Abdula Al Sad planned and designed the research, conducted field sampling, performed morphometric and statistical analyses, and wrote the manuscript. Md. Mashrafi assisted in morphometric analysis, sample collection, and laboratory work. Md. Samir Islam assisted in laboratory analysis. Humayra Hoque contributed to data interpretation and revised the manuscript. All authors read and approved the final manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability Statement

All data generated or analyzed during this study are included in this published article.

References

American Public Health Association. (2017). *Standard methods for the examination of water and wastewater* (23rd ed.). APHA Press.

Arcifa, M., De Souza, B., De Morais-Júnior, C., & Bruno, C. (2020). Functional groups of rotifers and an exotic species in a tropical shallow lake. *Scientific Reports, 10*, 1–12. https://doi.org/10.1038/s41598-020-71778-1

Bhandarkar, S., & Bansod, S. (2025). The role of Rotifera as sentinel organism of trophic structure on freshwater ecosystems. *International Journal of Scientific Research in Biological Sciences.* https://doi.org/10.26438/ijsrbs.v12i2.677

Décima, M. (2022). Zooplankton trophic structure and ecosystem productivity. *Marine Ecology Progress Series.* https://doi.org/10.3354/meps14077

Edmondson, W. T. (1959). *Fresh-water biology* (2nd ed.). John Wiley & Sons.

Ersoy, Z., Abril, M., Cañedo-Argüelles, M., Espinosa, C., Vendrell-Puigmitja, L., & Proia, L. (2022). Experimental assessment of salinization effects on freshwater zooplankton communities and their trophic interactions under eutrophic conditions. *Environmental Pollution.* https://doi.org/10.1016/j.envpol.2022.120127

Frau, D. (2021). Grazing impacts on phytoplankton in South American water ecosystems: A synthesis. *Hydrobiologia, 849*, 833–860. https://doi.org/10.1007/s10750-021-04748-x

Galir, A., Maronić, D., Stević, F., Pfeiffer, T., Prašnikar, F., Bek, N., Penava, E., & Križevac, P. (2025). Effects of azithromycin on the functioning of the food web in freshwater plankton. *Journal of Xenobiotics, 15*. https://doi.org/10.3390/jox15050145

Gilbert, J. (2022). Food niches of planktonic rotifers: Diversification and implications. *Limnology and Oceanography, 67*. https://doi.org/10.1002/lno.12199

Goździejewska, A., Cymes, I., & Glińska-Lewczuk, K. (2024). Zooplankton functional diversity as a bioindicator of freshwater ecosystem health across land use gradient. *Scientific Reports, 14*. https://doi.org/10.1038/s41598-024-69577-z

Han, C., Hagiwara, A., Lee, J., & Sakakura, Y. (2024). Species-specific responses to trace elements in rotifer reproduction: A critical review. *Aquaculture.* https://doi.org/10.1016/j.aquaculture.2024.741933

Hao, L., Zhang, Y., Shen, Y., Liu, Y., Gao, H., & Guo, P. (2024). Driving mechanism of land use and landscape pattern on phytoplankton and zooplankton communities and their trophic interactions in river ecosystems. *Journal of Environmental Management, 370*, 122691. https://doi.org/10.1016/j.jenvman.2024.122691

Hossain, M., Ullah, M., Sultana, S., Hasan, M., Pramanik, M., Hasan, M., Paray, B., Arai, T., & Hossain, M. (2024). Exploring phyto- and zooplankton community structure, spatial variation, and driving forces shaping the community from a large-scale freshwater dominated estuary. *Environmental Research Communications, 6*. https://doi.org/10.1088/2515-7620/ad8f1f

Koste, W. (1978). *Rotatoria: Die Rädertiere Mitteleuropas* (Vols. 1–2). Gebrüder Borntraeger.

Lan, B., He, L., Huang, Y., Guo, X., Xu, W., & Zhu, C. (2021). Tempo-spatial variations of zooplankton communities in relation to environmental factors and the ecological implications: A case study in the hinterland of the Three Gorges Reservoir area, China. *PLoS ONE, 16*. https://doi.org/10.1371/journal.pone.0256313

Li, B., Li, Q., Wang, P., Song, X., Li, J., Han, M., & Zhou, S. (2025). From river to reservoir: The impact of environmental variables on zooplankton assemblages in karst ecosystems. *Sustainability.* https://doi.org/10.3390/su17094240

Liu, P., Wang, T., Li, H., Zhang, X., Wang, L., Jeppesen, E., & Han, B. (2023). Functional diversity and redundancy of rotifer communities affected synergistically by top-down and bottom-up effects in tropical urban reservoirs. *Ecological Indicators*. https://doi.org/10.1016/j.ecolind.2023.111061

Lomartire, S., Marques, J., & Gonçalves, A. (2021). The key role of zooplankton in ecosystem services: A perspective of interaction between zooplankton and fish recruitment. *Ecological Indicators, 129*, 107867. https://doi.org/10.1016/j.ecolind.2021.107867

Maiphae, S., Saetang, T., Jantawong, N., Wongkamhaeng, K., & Piyasaengthong, N. (2023). Diversity of zooplankton in the rice fields in Suphan Buri Province, Thailand, with a new record of cyclopoid copepod. *Diversity.* https://doi.org/10.3390/d15101054

Mao, C., Li, X., Dunthorn, M., Xu, W., Luo, X., Xiong, X., Al-Farraj, S., & Huang, J. (2025). Diversity and assembly mechanisms of zooplankton communities in freshwater aquaculture ponds. *Marine Life Science & Technology, 7*, 549–564. https://doi.org/10.1007/s42995-025-00297-7

Nahiduzzaman, M., Karim, E., Nisheeth, N., Bhadra, A., & Mahmud, Y. (2023). Temporal distribution of plankton and fish species at Mithamoin Haor: Abundance, composition, biomass and ecosystem-based management approach. *Heliyon, 9.* https://doi.org/10.1016/j.heliyon.2023.e22770

National Institute for Environmental Studies. (n.d.). *Anuraeopsis coelata—Morphology and measurements*. Rotifera database. Available at: https://www.nies.go.jp/chiiki1/protoz/morpho/rotifera/r-anurae.htm (Accessed 12 March 2024).

National Institute for Environmental Studies. (n.d.). *Lecane ludwigii—Morphology and measurements*. Rotifera database. Available at: https://www.nies.go.jp/chiiki1/protoz/morpho/rotifera/r-lecan1.htm (Accessed 13 March 2024).

Novotny, A., Zamora-Terol, S., & Winder, M. (2021). DNA metabarcoding reveals trophic niche diversity of micro and mesozooplankton species. *Proceedings of the Royal Society B: Biological Sciences, 288.* https://doi.org/10.1098/rspb.2021.0908

Phan, N., Duong, Q., Tran-Nguyen, Q., & Trinh-Dang, M. (2021). The species diversity of tropical freshwater rotifers (Rotifera: Monogononta) in relation to environmental factors. *Water, 13*, 1156. https://doi.org/10.3390/w13091156

Sarma, S., Jiménez-Santos, M., & Nandini, S. (2021). Rotifer species diversity in Mexico: An updated checklist. *Diversity.* https://doi.org/10.3390/d13070291

Schneider, C. A., Rasband, W. S., & Eliceiri, K. W. (2012). NIH Image to ImageJ: 25 years of image analysis. *Nature Methods, 9*, 671–675.

Segers, H. (2007). Annotated checklist of the rotifers (Phylum Rotifera). *Zootaxa, 1564*(1), 1–104. https://doi.org/10.11646/zootaxa.1564.1.1

Wang, S., Zhang, F., Zhang, S., Yang, D., & Song, S. (2025). Evaluation of zooplankton community and energy transfer efficiency: A case in the coastal waters of Shandong, China. *Marine Environmental Research, 212*, 107511. https://doi.org/10.1016/j.marenvres.2025.107511

Zhang, Y., Xu, S., Huang, Q., Liu, P., & Han, B. (2021). Application of COI primers 30F/885R in rotifers to regional species diversity in (sub)tropical China. *Diversity.* https://doi.org/10.3390/d13080390