

## The secret life of freshwater Shrimp *Caridina fernandoi* in Karnataka's subterranean realms

Freshwater habitats account for less than 1% of the Earth's surface but support nearly 10% of the world's species, with invertebrates making up to 85% of this diversity (Strayer & Dudgeon 2010). Among these, freshwater decapod crustaceans, particularly shrimps and crabs are the most diverse (Balian et al. 2008).



Live colouration of *Caridina fernandoi*. © Mahim Bhat.

Freshwater shrimps play a crucial role in tropical and subtropical ecosystems, where many species are harvested for the aquarium trade or cultivated for food. In Western Ghats, only four genera of freshwater shrimps have been identified: *Troglindicus*, *Eurindicus*, *Caridina*, and *Macrobrachium*. The *Caridina* and *Macrobrachium* genera display a wide variety of sizes and colours, contributing significantly to ecological

and economic functions, particularly in the processes of macro decomposition through scavenging and shredding debris and leaf litter (Moulton et al. 2010).

*Caridina* species thrive in various environments, including lowland reservoirs, slow-flowing rivers, and subterranean habitats (Holthuis 1956; Jalihal et al. 1984). Their presence in the

Western Ghats emphasizes the need for further exploration of stygobiotic shrimp species in this biodiversity hotspot. Research on *Caridina* species in underground environments in India is limited, due to inadequate exploration of these species (Sankolli & Shenoy 1979; De Grave et al. 2018). As a result, our understanding of their ecological roles remains limited. This study aims to

# Bugs R All

Newsletter of the  
Invertebrate Conservation & Information Network of South Asia (ICINSA)



Sampled wells: A—well 1 | B—well 2. © Maclean Santos.

investigate whether any *Caridina* species inhabit the subterranean habitats in the central Western Ghats by examining homestead wells, often seen as gateways to subterranean environments. From May 2023 to July 2024,

a study was conducted in two homestead wells, well 1- (13.2573 N; 74.8787 E) and well 2 – (13.2553 N 74.8821 E), located in Ninjoor Village, Karkala Taluk, Udupi District. The wells were chosen for their laterite soil, which

provides ideal conditions for subterranean species (Raghavan et al. 2021). Constructed over 150–200 years ago and minimally utilized in recent years, these wells were suitable for our study. Sampling primarily involved custom-made minnow traps, and during summer, when water levels dropped, we accessed the wells using ropes and rocky steps. Inside the wells, we attempted to collect specimens using scoop or drag nets, but these methods were largely unsuccessful. Instead, we deployed minnow traps baited with MaOrn pellet feed, leaving them overnight. Success was observed only in traps left overnight, indicating nocturnal behavior typical of crustaceans and a strategy to avoid predators.

The traps were deployed over 50 times, and we accessed the wells five times during the study. Despite extensive efforts, only five specimens

# Bugs R All

Newsletter of the  
Invertebrate Conservation & Information Network of South Asia (ICINSA)

(male and female) were collected, highlighting the challenges of sampling in such habitats. Interestingly, a small stream adjacent to the wells carried water only during the monsoon season. During this time, numerous juveniles of the *Caridina* species were found in the stream, and a few adults were observed.

A notable concentration of juveniles near both the wells, indicates a possible underground connection between the wells and the stream. Given that *Caridina* species typically have free-floating larval stages, it is plausible that larvae are flushed into the stream from the wells. This was further supported by the collection of berried specimens from the well.

The species was identified as *Caridina fernandoi*, using primary literature (Arudpragasam & Costa



Stream during different seasons: C—during summer | D—during monsoon.  
© Maclean Santos.



A specimen captured using minnow traps (deceased). © Maclean Santos.

1962) which is known from Karnataka, Kerala, and Telangana across various habitats, including rivers and streams. This study represents the first record of *C. fernandoi*

inhabiting well environments. The species exhibits robust morphology and strong legs, enabling it to walk on land and climb obstacles, which may explain its presence in

# Bugs R All

Newsletter of the  
Invertebrate Conservation & Information Network of South Asia (ICINSA)



Custom-made minnow traps. © Maclean Santos.

well environments. Initially, we considered the possibility that the shrimps originated from nearby permanent water bodies during monsoon overflows, but this was dismissed due to the absence of such water bodies near the study site. The collection of berried females indicates that the species is successfully thriving and breeding in well environments. *C. fernandoi* is highly adaptable, having been found in polluted sewage water in the Mangaluru region (Maclean Antony Santos pers. obs.). The beautiful colouration and hardy nature make this shrimp have high ornamental potential if introduced to the aquarium trade.

Reports of similar accidental discoveries in other regions of the Western Ghats reinforce the idea that many more surface-dwelling or stygobiotic shrimp species may inhabit these environments. Often, these species are overlooked, discarded, or added to home aquariums. Although some images shared in the social media posts suggest these species might be *C. fernandoi*, coloration and morphological characteristics in *Caridina* are too plastic for reliable identification, (Mazancourt et al. 2017) particularly for specimens from well habitats.

Discoveries of these species often rely on chance, and traditional sampling methods may not effectively capture them. Local enthusiasts are more likely to encounter these species, as evidenced by recent subterranean fish discoveries in Kerala (Britz et al. 2019). We also anticipate more fascinating insights into freshwater shrimps in the future.

## References

- Arudpragasam, K.D. & H.H. Costa (1962).** Atyidae of Ceylon - I. *Crustaceana* 4(1): 7–24.
- Balian, E.V., H. Segers, C. Leveque & K. Martens (2008).** The freshwater animal diversity assessment: an overview of the results. *Hydrobiologia* 595: 627–637.
- Britz, R., V.K. Anoop, N. Dahanukar & R. Raghavan (2019).** The subterranean *Aenigmachanna gollum*, a new genus and species of snakehead (Teleostei: Channidae) from Kerala, south India. *Zootaxa* 4603(2): 377–388.



# Bugs R All

Newsletter of the  
Invertebrate Conservation & Information Network of South Asia (ICINSA)

**De Grave, S., C.P. Arjun & R. Raghavan (2018).** The discovery of *Euryrhynchidae* (Crustacea: Decapoda) in India, with the description of a new genus and species. *Zootaxa* 4462(3): 367–378.

**Holthuis, L.B. (1956).** An enumeration of the crustacea Decapoda *Natantia* inhabiting subterranean waters. *Vie et Milieu* 7(1): 43–76.

**Jalihah, D.R., S. Shenoy & K.N. Sankolli (1984).** Five new species of freshwater Atyid shrimps of the genus *Caridina* H. Milne Edwards from Dharwar area (Karnataka State, India). *Records of Zoological Survey of India* 69: 1–40.

**Mazancourt, V de., G. Marquet & P. Keith (2017).** The “Pinocchio-shrimp effect”: First evidence of variation in rostrum length with the environment in *Caridina* H. Milne-Edwards, 1837 (Decapoda: Caridea: Atyidae). *Journal of Crustacean Biology* 37(3): 249–257.

**Moulton, T.P., S.A.P. Magalhaes-Fraga, E.F. Brito & F.A. Barbosa (2010).** Macroconsumers are more important than specialist macroinvertebrate shredders in leaf processing in urban forest streams of Rio de Janeiro, Brazil. *Hydrobiologia* 638(1): 55–66.

**Raghavan, R., R. Britz & N. Dahanukar (2021).** Poor groundwater governance threatens ancient subterranean fishes. *Trends in Ecology and Evolution* 36(10): 875–878.

**Sankolli, K.N. & S. Shenoy (1979).** On a new genus and a new species of a subterranean prawn *Troglindicus phreaticus* (Caridea, Palaemonidae). *Bulletin of the Fisheries Faculty, Konkan Agricultural University, India* 1: 83–91.

**Strayer, D.L. & D. Dudgeon (2010).** Freshwater biodiversity conservation: Recent progress and future challenges. *Journal of the North American Benthological Society* 29(1): 344–358.

## Acknowledgments

MAS expresses gratitude to the local community for their support and for granting permission to collect specimens from the wells. SP is thankful to the authorities of Sathyabama Institute of Science and Technology, Chennai for the necessary facilities.

## Funding

Funding support in terms of Dr. A.P.J. Abdul Kalam Young Research Fellowship has been provided by TERRE Policy Center to MAS.

## Maclean Antony Santos<sup>1</sup> & S. Prakash<sup>2</sup>

<sup>1</sup> Silverline Apt, Flat No-2, Mangaldevi Cross Road, Bolar Main Road, Mangaluru, Karnataka 575001, India.

<sup>2</sup> Center for Climate Change Studies, Sathyabama Institute of Science and Technology, Rajiv Gandhi Salai, Chennai, Tamil Nadu 600119, India.

Email: <sup>2</sup>prakash.ccs@sathyabama.ac.in (corresponding author)

**Citation:** Maclean, A.S. & S. Prakash (2025). The secret life of freshwater Shrimp *Caridina fernandoi* in Karnataka’s subterranean realms. *Bugs R All* #287, In: *Zoo’s Print* 40(3): 01–05.

Bugs R All is a newsletter of the Invertebrate Conservation and Information Network of South Asia (ICINSA)



**zooreach**  
Zoo Outreach Organisation



South Asian Invertebrate  
Specialist Group  
IUCN SSC