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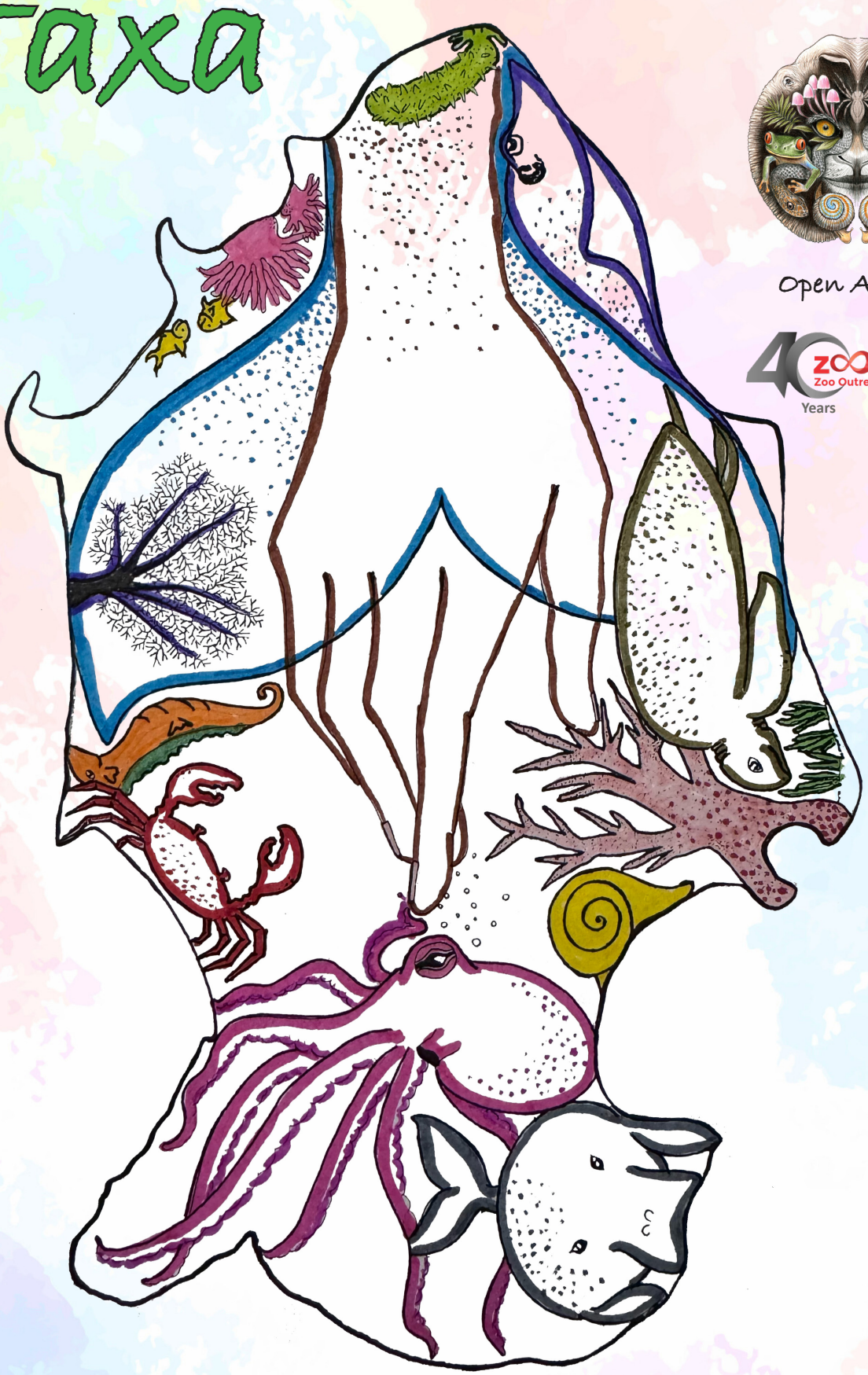

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Cover: Little Andaman is part of the island chain with incredible biodiversity, but these amazing species are threatened by development projects, and need our support. Pen and ink artwork by Priyanka Iyer.

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ARTICLE

Cypris decaryi Gauthier, 1933 (Crustacea: Ostracoda: Cyprididae): a new record for Maharashtra, India, with a note on its distribution

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Abstract: Specimens of *Cypris decaryi* Gauthier, 1933 were collected from riverine potholes in the semi-arid zone of Maharashtra, India. The species has previously been recorded from various states in India. This is the first confirmed occurrence from Maharashtra, accompanied by a detailed description and notes on its distribution.

Keywords: Basaltic rocky outcrop, diversity, freshwater, microcrustaceans, Nighoj, riverine potholes, taxonomy.

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Author contributions: YSS conceptualized and planned the work. Funding acquisition was made by SMY. SMY, RRK, collected the samples. Methodology was performed by RRK, SMY under supervision of YSS. SMY, RRK drafted the paper and YSS revised the paper. All authors have contributed, read and agreed to the published version of the manuscript.

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INTRODUCTION

Ostracods are enormously diverse bivalved crustaceans occurring in different types of aquatic habitats ranging from 0.2–3 mm in body size. The updated list of the present freshwater ostracods contains 2,420 species worldwide, under the order Podocopida Sars, 1866 (Meisch et al. 2024) belonging to superfamilies like Cypridoidea Baird, 1845 ; Cytheroidea Baird, 1850 ; Darwinuloidea Brady & Robertson, 1885; and Terrestricytheroidea Schornikov, 1969 , with the first two leading in species diversity (Meisch et al. 2019) including 154 species from India (Karuthapandi & Tilak 2023), whereas ostracod fauna of Maharashtra has 38 species belonging to 15 genera (Patil & Talmale 2005).

One of the oldest known genera *'Cypris'* from the superfamily Cypridoidea, is the most diverse group in tropical regions with the highest species diversity in Afrotropical, and Oriental regions, characterised by large body size, and sub-globular appearance as described by Müller in 1776 (Mesquita-Joanes et al. 2020). Seventeen species of the genus *Cypris* were reported worldwide (Meisch et al. 2019), whereas eight species were reported from India (Karuthapandi et al. 2014).

Cypris decaryi was described for the first time by Gauthier (1933) from Androy Island near Madagascar. It was reported from 22 localities between 1932 and 2021. The species was first reported by Victor & Fernando (1979) in India, followed by Jain (1979) from Gujarat, and Battish in 1986 (Battish 2000) from Punjab.

This paper presents the first report of *Cypris decaryi* from Maharashtra, sampled for the first time in the riverine potholes of Nighoj, including a detailed description of the species along with a note on its distribution.

MATERIALS AND METHODS

The specimens of *Cypris decaryi* were sampled from the riverine pothole (approximately 1.2 m in length, 0.7 m in width, maximum depth 0.6 m), located at coordinates 18.932° N, 74.262° E (Figure 1) in Nighoj, Maharashtra, a state in India that occupies a substantial portion of the Deccan Plateau in the peninsular part of the Indian subcontinent. Ostracods were collected during a survey on 29 September 2024 using a simple hand net with a 150 µ mesh size, stored in 100 ml containers, and fixed in 4% formaldehyde immediately in the field. Subsequently, the samples were washed with tap water and preserved in 70% alcohol. *Cypris decaryi* was observed, sorted, identified, and dissected under the Magnus MS24 stereomicroscope. Five specimens were used for the study. Dissection was carried out in polyvinyl lactophenol medium using tungsten needles, and drawings were done by camera Lucida which was attached to Lawrence and Mayo LM-52-1802 microscope. Scanning electron microscopic images were taken on JEOL analytical scanning electron microscope at the Department of Physics, Savitribai Phule Pune University, at an accelerating voltage of 10 kV. Terminologies for the soft part anatomy and chaetotaxy are after Broodbakker & Danielopol (1982) and Meisch (2000).

Specimens were deposited at the Department of Zoology, Modern College, Pune, Maharashtra.

RESULTS

Systematic account

Class Ostracoda Latreille, 1802
Subclass Podocopa G.W.Müller, 1894
Order Podocopida Sars, 1866
Suborder Podocopina Sars, 1866
Superfamily Cypridoidea Baird, 1845
Family Cyprididae Baird, 1845
Subfamily Cypridinae Baird, 1845
Genus *Cypris* O.F.Müller, 1776

Cypris decaryi Gauthier, 1933

1933, *Cypris decaryi* Gauthier, 1933: Gauthier 209–215
1979, *Cypris decaryi* Gauthier, 1933: Victor & Fernando 162–163
1990, *Cypris decaryi* Gauthier, 1933: Martens 136–139

Synonymies

Cypris ravenala Brehm, 1934(7): (Martens & Behen 1994)
Cypris labiata Rome, 1962 (128–132): (Martens 1990)

Measurements (µm)

Carapace (n = 5) L(length) = 1680–1685, W(width) = 1230–1245.

Left valve (n = 5) L = 1514–1640, H(height) = 1050–1150.

Right valve (n = 5) L = 1510–1640, H = 1000–1150.

Carapace (Figure 1A–F) — globular, subovate, valve surface covered with fine granules and hairs, valve margin hairy. The dorsum was highly arched, the ventral margin somewhat sinuated, the anterior margin broadly rounded than the posterior, the greatest height situated in the mid or slightly in front of the mid-length. Right

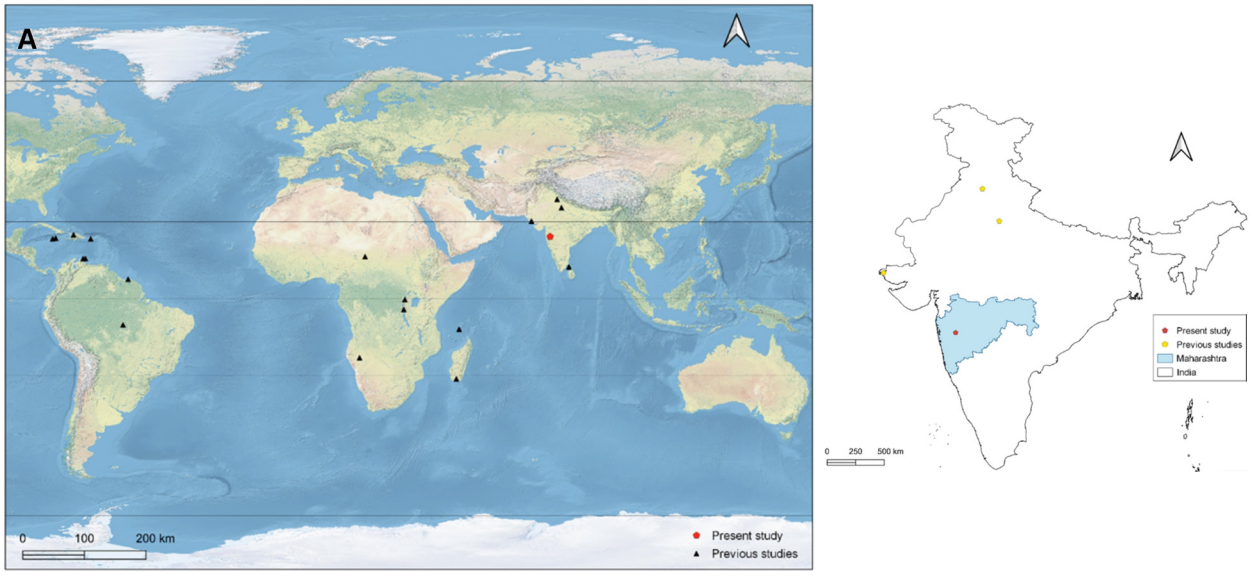

Image 1. a—map showing global distribution of the *Cypris decaryi* | b—distribution of *Cypris decaryi* in India.

valve (RV) was larger than left valve (LV), both valves with flange, and selvage displaced inwardly from the dorsal view, and the anterior end appears beak-like while the posterior LV slightly overlaps RV.

RV (Figure 1B,C) — with large flange, selvage largely displaced inwardly, at the posteroventral side, fine small tubercles present. The inner calcified lamella at the posterior end is broad.

LV (Figure 1A,D) – with a small flange, selvage displaced inwardly, posteroventral tubercles are absent, additional inner list present, inner calcified lamella at the posterior end slightly shorter than RV.

Antennule (A1) (Figure 1A,A′) — seven segmented, first segment with one dorso-subapical seta, wouters organ absent, on proximal side at ventro-apical two long setae present. The second segment is short and wide, with one seta dorso-apically reaching half the length of the next segment; on the other side, a short Rome organ is present. The third segment is the longest among all the segments, carrying two setae, one dorso-apical reaching beyond the fourth segment, and one ventro-apical short, slightly hairy, reaching the tip of the fourth segment. The fourth segment dorsally has two long setae, ventrally two setae of unequal length (inner most is short reaching tip of the next segment other one is long, reaching beyond the sixth but not reaching up to the tip of the terminal segment). Fifth segment with four long setae: two dorsally, two ventrally. The sixth segment with four long and one short seta. The seventh segment has two long setae, aesthetasc Y, and one short seta.

Antenna (A2) (Figure 1B,B′) — first protopodal segment consists of three setae (one most proximal and two situated ventro-laterally). The second protopodal segment has one seta situated ventro-apically reaching the tip of the first endopodal segment. Exopod reduced plate-like structure having three setae (one long, two short setae).

Endopod — first endopod segment with two segmented aesthetasc Y (position unclear), ventro-apical setae reaching the tip of the penultimate segment and with 5+1 natatory setae (five long feathered setae reaching just behind the tip of the terminal claw and one short accompanying seta, length of this accompanying seta reaching halfway along the length of the penultimate segment. The penultimate segment, undivided medially on the ventral side four “t” setae (t1–t4) (t1 reaching beyond the tip of the terminal segment, and t4 reaches the base of the z2 seta, t2 and t3 are very long and reach around 90% of the length of claw G3 and on dorsal side at the same position two setae of unequal length. Distally of the same segment, three serrated claws (G1, G2, G3). G1 is the longest among all, behind these claws, three long z setae (z1, z2, z3), z3 is the longest of all, reaching just beyond the tip of the apical claw. Terminal segment with two serrated claws, claw Gm is more than half the length of GM, presence of long g seta, and aesthetasc Y3, which is half the length of g seta.

Mandible (Figure 1C) — as shown in the figure.

Mandibular palp (Figure 1D,D′) — four segmented. The first segment has two long hairy S1 and S2 setae, one long and one short, slim, slender, smooth, called alpha seta. The second segment dorsally has three apical

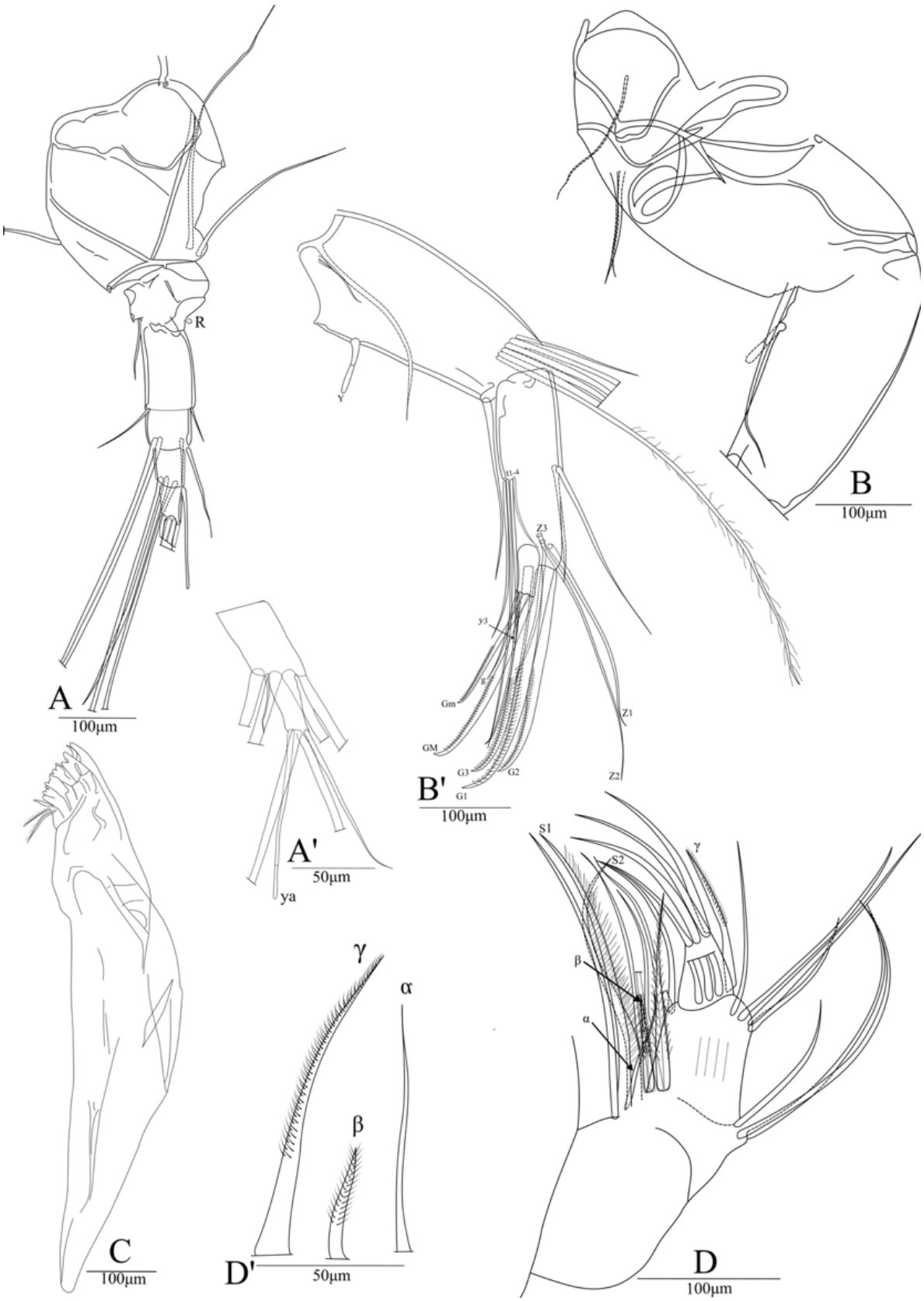

Figure 2. ***Cypris decaryi*****: A—maxillula | B'—first thoracopod | C—second thoracopod | C'—details of last segment of second thoracopod | D—third thoracopod | D'—details of distal part of third thoracopod | E—caudal ramus | F—caudal ramus attachment. Scale bar: B, C, C', D, E, F—100 µm | A, D'—50 µm.**

Image 2. a—study area riverine potholes from Nighoj | b & c—*Cypris decaryi* sampled from these potholes.

setae of unequal length (innermost is shorter), ventrally with group of three long smooth setae of varying length, one long hairy seta, and one very short hairy seta with pointed tip known as beta setae. On the third segment, there is a group of three setae, on the dorsal side four subapical setae (two short and two long setae), ventrally two subapical setae, laterally with three apical smooth setae and gamma setae, gamma setae approximately twice as long as the fourth segment. The fourth segment has four claws and one seta.

Maxillary palp (Figure 2A) — two- segmented, basal segment with a group of six apical setae, one medial seta reaching beyond the tip of the terminal segment, and one dorso-subapical seta, all setae are long. The second segment is longer than twice the width. There are three maxillary endites present, Zahnborsten (tooth-bristles) of the third endite are strongly serrated

First thoracopod (T1) (Figure 2B) — Protopodite with two proximal "a" seta, two long "b" and "d", and distally a group of 14 apical setae, and two subapical setae. Endopodite with three unequal apical setae.

Second thoracopod (T2) (Figure 2C,C') — first segment with two seta, "d1" and "d2" ("d1" is larger than "d2"). The second segment has a long "e" seta reaching beyond the mid length of the next segment, third segment has a medial long "f" setae reaching the tip of the terminal segment, and apically has a short "g" seta reaching just beyond the tip of the terminal segment. The terminal segment is short and triangular with two setae ("h1" and "h3") and one claw ("h2" serrated at the distal end). Seta "h1" is larger than "h2" (length of seta 'h1' compared with claw i.e., 'h2').

Third thoracopod (T3) (Figure 2D,D') — known as the cleaning limb. First segment with three setae ("d1, d2, d3") of different lengths. The second segment with long apical e setae reaching two-third of the next segment. The third segment bears "f "setae reaching the tip of the segment. On the terminal segment, the "h2" setae are transformed into the pincer organ, there is also one short "h1" seta, and subapical h3 (reflected) seta.

Caudal ramus (CR) (Figure 2E) — well developed and symmetrical, with two claws ("Ga" and "Gp") and two setae ("Sa" and "Sp").

Caudal ramus attachment (CR attachment) (Figure 2F) — strong and distally bifurcated.

Taxonomic remarks

Cypris decaryi varies from other species in valve

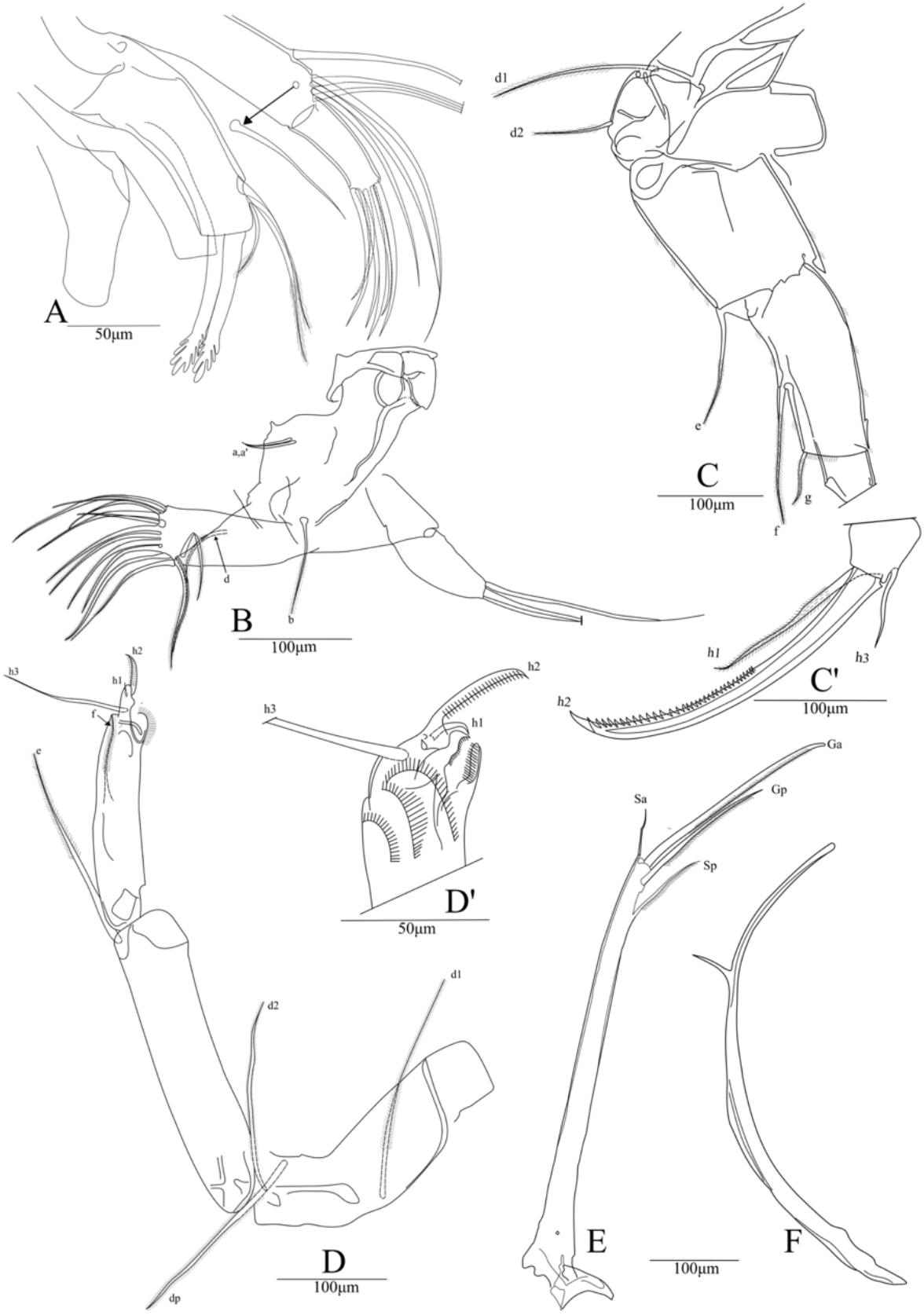

Figure 2. ***Cypris decaryi*****: A—maxillula | B'—first thoracopod | C—second thoracopod | C'—details of last segment of second thoracopod | D—third thoracopod | D'—details of distal part of third thoracopod | E—caudal ramus | F—caudal ramus attachment. Scale bar: B, C, C', D, E, F—100 µm | A, D'—50 µm.**

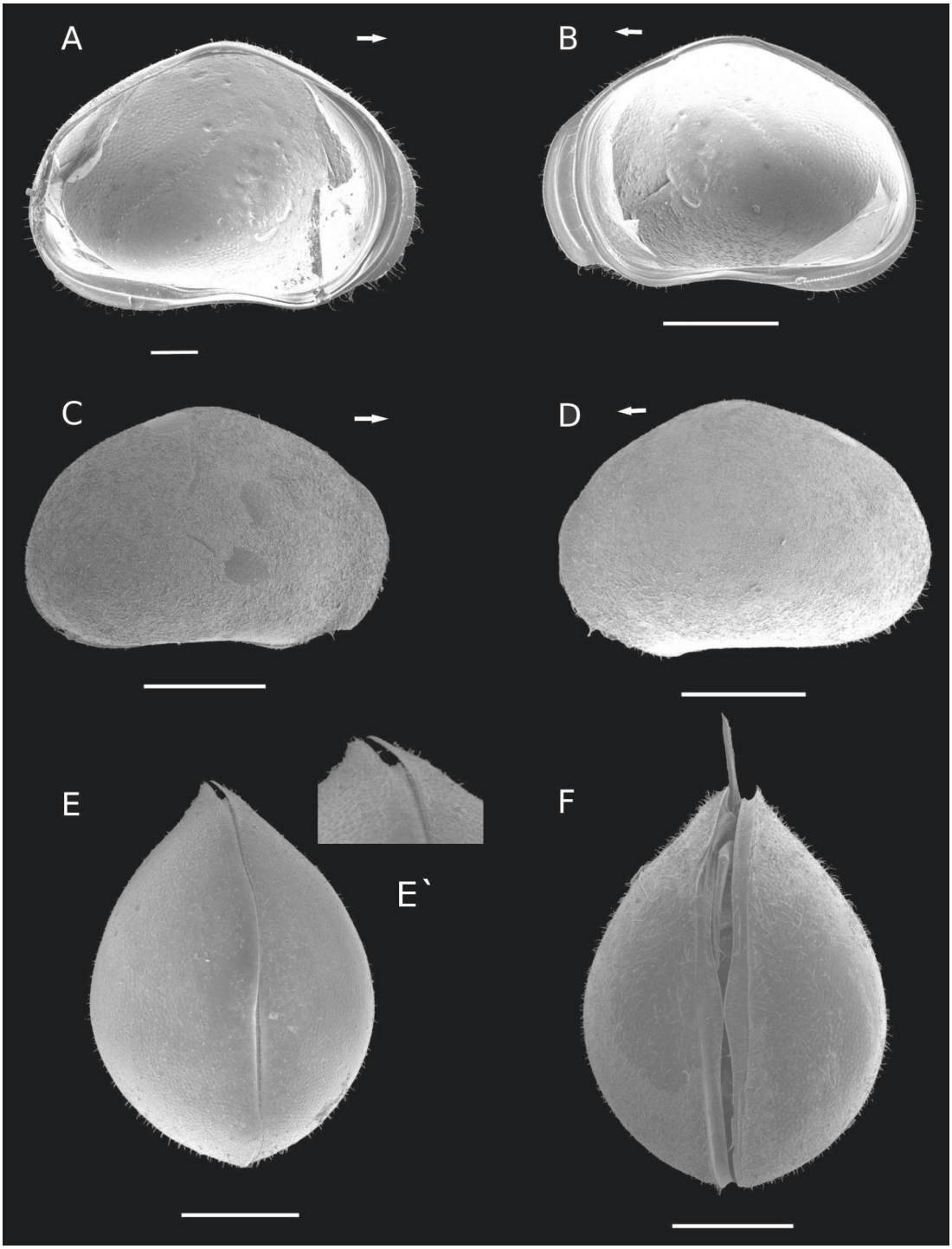

Image 3. SEM images of *Cypris decaryi* Gauthier 1933, female: A—LV internal view | B—RV, internal view | C—RV, external view | D—LV, external view | E—carapace, dorsal view | E`—carapace, anterior valve margin | F—carapace, ventral view. Scale bar: A—200 µm | B–F—500 µm. The arrow indicates the anterior region.

morphology by its characteristic shape and smooth surface. The species is relatively closer to *C. pretusi*, as both have anterior beak-like appearance but the width: length and height: length ratio of the two species make them different. It differs from type species *C. pubera* by the presence of large spines on the posterior margin of its carapace, and from *C. granulata* in valve ornamentation. In contrast to *C. protubera*, *C. decaryi* differs due to

the granulated surface on the valve and its margins, which are hairy except for the dorsal margin, and by a prominent anteroventral protuberance. Both the claws are serrated along the dorsal margin in *C. protubera*, while claws in *C. decaryi* are serrated only upto half part.

Distribution

Cypris decaryi was first described from Androy, Madagascar by Gauthier in 1933. It was later reported by Brehm (1934) from Paramaribo, Suriname of northern South America, by Gauthier (1939) from Lake Fitri, by Klie (1944) from Lake Edward, Kiss (1960) from Burundi, Triebel (1961) from Caribbean Island, Rome (1962) from surrounding of the Lake Tanganyika, McKenzie (1971) from Aldabra islands. Broodbakker (1983) reported it from Bonaire, Curacao and Puerto Rico Island, from two localities from Sri Lanka by Neale (1984); from Namibia by Martens (1990), from Jamaica by Little & Hebert (1994), from Brazil by Martens et al. (1998) and Balearic Islands by Zamora et al. (2005). The first report from India was made by Victor & Fernando (1979), followed by Jain (1979) from Kachchh, Gujarat, and by Battish in 1986 (loc. cit.) from Patiala, Punjab. In the present study, *C. decaryi* is reported from the riverine potholes of Nighoj, Maharashtra.

DISCUSSION

South America, India, and Madagascar were connected during the late Cretaceous period (Krause et al. 2006). Zamora et al. 2005 reported *C. decaryi* from the Balearic Islands, Spain, and predicted the presence of the species due to the transportation of rice. Rice fields are considered ideal habitats for introducing and establishing alien species (Rossi et al. 2003). Species originally endemic to South America, Asia, and Africa might have been introduced into Italy through rice seeds (Smith et al. 2018). We assume that *C. decaryi* has originated from Madagascar, possibly the drifting of the continents led to establishment of the species in various areas of previously known Gondwana.

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