



RESEARCH PAPER

Indopotamon alipurduarens sp. nov., a new species of freshwater crab (Crustacea: Brachyura: Potamidae) from West Bengal, India

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Abstract

The potamid crab genus *Indopotamon* Mitra and Khamo 2024, is confined to India and Bangladesh. *Indopotamon* is so far represented by a single species, *Indopotamon woodmasoni* (Rathbun 1905). In the present study, a second species of the genus, *Indopotamon alipurduarens* sp. nov. is described from West Bengal, India. The new species is differentiated from *I. woodmasoni* mainly by the structure of the male gonopods and female vulvae. With the addition of this new species, the diversity of freshwater crabs in India increases to 183 species under 51 genera and 2 families. The new species inhabits inside deep burrows in the rice field. Further studies are needed to establish phylogenetic relationship of the new species with other related species of the family potamidae of India.

Keywords Decapoda · Identification key · Potaminae · Taxonomy

Introduction

Freshwater crabs are a specialized group of Crustacea found in freshwater, semi-terrestrial or terrestrial environment, and complete their life cycle in freshwater environment without migrating to brackish water (Yeo et al. 2008). They are considered as important macro-invertebrate for their roles in nutrient cycling, bio-indicator of freshwater ecosystem, disease transmission and small scale fisheries (Cumberlidge et al. 2009; Valarmathi 2017; Harhoglu et al. 2018; Kotwal and Sharma 2020). The freshwater crab diversity in India is very rich with 182 species under 51 genera and 2 families representing nearly 10% of global diversity of freshwater crabs (Pati et al. 2023; Mitra and Khamo 2024; Mitra et al. 2025; Pati 2025). In India, all the freshwater crabs belong to

two families namely Gecarcinucidae with 112 species and Potamidae with 70 species (Mitra et al. 2025; Pati 2025). The potamid crab genus *Indopotamon* Mitra and Khamo 2024 was recently introduced by Mitra and Khamo (2024) for a single species, *Lobothelphusa woodmasoni* (Rathbun 1905) in a revisionary work on potamid freshwater crabs in India (Mitra and Khamo 2024). Accordingly, the species *L. woodmasoni* has been transferred to the genus *Indopotamon* Mitra and Khamo 2024 (Mitra and Khamo 2024). *Indopotamon woodmasoni* is currently known only from northeastern India and Bangladesh (Mitra and Khamo 2024).

The northern part of the state of West Bengal in India, including Alipurduar district is a part of sub-Himalayan Dooars region, which is characterized by dense forests, tea gardens, rice fields, with several perennial rivers and streams (Rudra and Mukhopadhyay 2010; Chowdhury 2015). The proximity of this region to the Eastern Himalayas biodiversity hotspot results in a rich faunal diversity (Chatterjee et al. 2017). The freshwater crabs (family Potamidae and Gecarcinucidae) from this region, however, are poorly explored. During a faunal survey in the sub-Himalayan dooars region, some freshwater crab specimens were collected from a rice field of the Alipurduar district in West Bengal. These specimens possess most of the generic characters of *Indopotamon*, including relatively high carapace; epigastric cristae being well in advance of postorbital cristae; the rectangular antennular fossae; a convex anterolateral margin with four

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prominent epibranchial teeth; the rectangular ischium of the third maxilliped with a distinct longitudinal median groove; the cheliped merus with a subterminal spine; the setose ambulatory legs, the male first gonopod with the terminal article being relatively long, conical and lacking a dorsal flap, the subterminal article being broad basally, male second gonopod with the long distal article; and female vulvae being relatively large, ovate, located immediately below the suture between thoracic sternites 5 and 6 (Mitra and Khamo 2024). These specimens are here described as a new species, *Indopotamon alipurduarensis* sp. nov.

Materials and methods

The collected specimens were preserved in 70% alcohol and deposited in the National Zoological Collection of the Zoological Survey of India, Crustacea Section, Kolkata (ZSIK). The morphological terminologies and measurement methods of the carapace mainly were after Ng (1988) and Davie et al. (2015). The measurement methods of the vulvae and female sternum were after Pati (2021). The minimum distance between the two vulvae at the anterior part was considered. The carapace height was measured at the base of third maxillipeds. The following abbreviations are used in this study: CW, carapace width; CL, carapace length; CH, carapace height; FW, width of anterior margin of front; P2–P5, first to fourth ambulatory legs or second to fifth pereopods respectively; s1–s8, first to eighth thoracic sternites respectively; G1, male first gonopod; G2, male second gonopod; VD, minimum distance between vulvae; SW, maximum width of sternum; ca.= circa, a.s.l., above sea level; coll., collected by. All the measurement of carapace and vulval width were carried out using a digital vernier caliper. All measurements are in millimeters.

Results

Taxonomy

Superfamily Potamoidea Ortmann, 1896
 Family Potamidae Ortmann, 1896
 Subfamily Potaminae Ortmann, 1896 (Yeo and Ng 2004).
Indopotamon Mitra and Khamo 2024.
Indopotamon alipurduarensis sp. nov.
 (Figs. 1, 2, 3, 4, 5, 6A and C and 7A, C and E).

Type material

Holotype: adult male (CW 42.6 mm, CL 34.4 mm, CH 24.6 mm, FW 10.4 mm), ZSIK CR430, Uttar

Rampur, Alipurduar district, West Bengal, India (26.6026°N, 89.7352°E), elevation 93 m a.s.l., 31 May 2024, coll. R. K. Das. Paratypes: 1 male (CW 32.5 mm, CL 24.2 mm, CH 18.0 mm, FW 8.0 mm), ZSIK CR431, same collection data as for holotype; 1 female (CW 39.7 mm, CL 29.6 mm, CH 22.5 mm, FW 10.3 mm), ZSIK CR 432, same collection data as for holotype; 1 female (CW 42.4 mm, CL 31.7 mm, CH 24.8 mm, FW 10.5 mm), ZSIK CR 432, same collection data as for holotype.

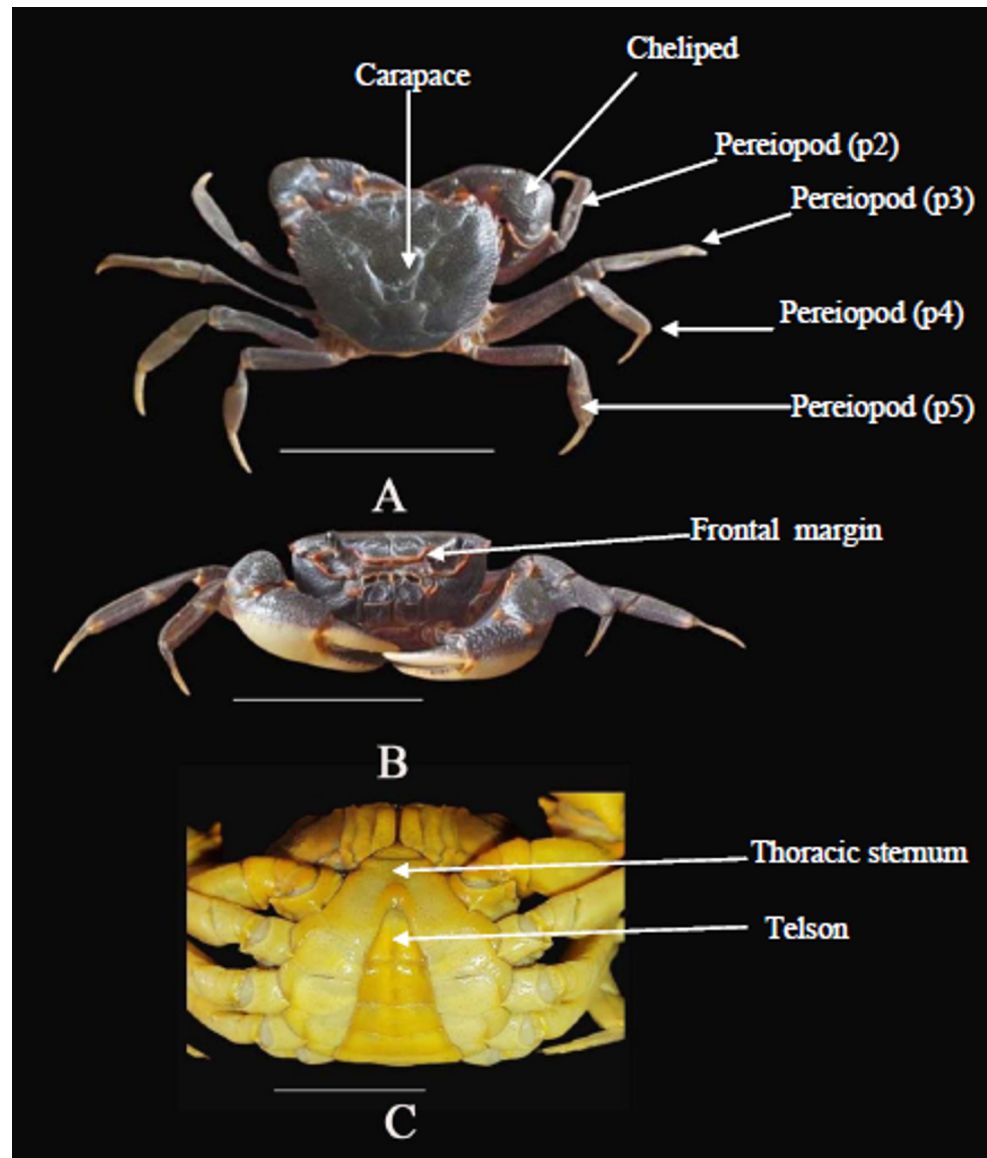
Comparative material

Indopotamon woodmasoni (Rathbun 1905), holotype, female (CW 48 mm, CL 39.6 mm), ZSIK C 6888/3, Garo hills, Meghalaya, India, coll. H. Williamson; 1 male (CW 44.4 mm, CL 34.3 mm), ZSIK C 8067/2, Darika River, Sivasagar district, Assam, India (26.59° N, 94.40° E), 10 June 2018, coll. A. Chetia; 2 males (CW 23.14–39.78 mm, CL 17.82–29.38 mm), ZSIK C 8068/2, swampy land, Harmuti, Lakhimpur district, Assam, India (27.07°N, 93.55°E), 5 August 2018, coll. A. Chetia; 2 males (CW 44.2–49.6 mm, CL 36.5–40.3 mm), ZSIK C 6417/2, Twi-pui River, Siaha district, Mizoram, India, 7 March 2015, coll. S. Mitra.

Diagnosis

Carapace hexagonal, glabrous, broader than long (CW/CL=1.2–1.3), deep (CH/CL=0.7–0.8) (Fig. 1A), frontal margin straight, broad (FW/CW=ca. 0.25) (Figs. 1B and 7A and C); anterolateral margins with four short, triangular, anteriorly directed epibranchial teeth, first tooth distinctly broader than remaining teeth (Figs. 1A and 7C), epigastric ridge prominent and extends to edge of frontal margin (Fig. 7A, C); male pleonal somite 6 trapezoidal, proximal width ca. 1.9 times of median length (Figs. 1C, 2E and 7E); male telson subtriangular, wider than long, free edge rounded, lateral margins concave medially (Figs. 1C, 2E and 7E); G1 subterminal article abruptly narrow on distal half otherwise broad, terminal article gently curved outwards, relatively stouter, relatively shorter, ca. 0.3 times length of subterminal article, tip blunt (Figs. 3A–D and 4A and B); G2 distal article relatively long, ca. 0.7 times length of basal article (Figs. 3G and 4C); telson in female broadly triangular, distinctly broader than long, lateral margins gently convex, free edge narrowly rounded (Figs. 5C and 6A), vulvae on s6, relatively widely located from each other (VD/SW=ca. 0.2), subovate, opening mesially, large, occupying half length of s6, touching suture between s5 and s6, and laterally partially covered by protruding sternal cover (Fig. 6C).

Fig. 1 *Indopotamon alipurdu-arens* sp. nov. holotype, male (42.6 × 34.4 mm) (ZSIK CR 430). (A), overall dorsal view; (B), overall frontal view; (C), overall ventral view. Scale bar: 2 mm



Description of male holotype

Carapace hexagonal, moderately large, glabrous, distinctly broader than long ($CW/CL=1.2$), deep ($CH/CL=0.7$), all the regions (branchial, cardiac, and gastric) well marked (Fig. 1A); frontal margin straight, broad ($FW/CW=ca. 0.25$) (Figs. 1B and 7A and C); anterolateral margins convex with four prominent broad based, short, stout and triangular, anteriorly directed epibranchial teeth, first tooth distinctly broader than remaining teeth (Figs. 1A and 7C); epigastric cristae prominent, extending anteriorly beyond level of postorbital cristae (Figs. 1A and 7C), epigastric groove prominent and extending up to frontal margin (Figs. 1A and 7C); postorbital cristae distinct, sharp, straight and confluent with the first epibranchial tooth in both the sides; external orbital angle well developed, tip acute, a deep cleft separate

the external orbital angle from the anterolateral margin (Figs. 1B and 7C); cervical grooves well developed, joining postorbital cristae; H shaped groove deep, well marked (Fig. 1A); supraorbital margin parallel to postorbital cristae with faint break in middle; infra orbital margin sinuous, cristate, slightly slopping downwards, suborbital and pterygostomial regions granulose, orbital region relatively broad, eyes filling up most of orbital space, eyestalk short, stout, cornea moderately large, pigmented (Fig. 1B),

Antennular fossae narrowly subrectangular; antennules stout, long, folded (Figs. 1B and 7A). Antennae slender, slightly shorter than eyestalk (Fig. 1B); Mandibular pulp with 3 segments, terminal segment simple, Maxillipeds 1–3 each with long flagellum on exopod, Maxilliped 3 glabrous, ischium subrectangular, ca. 1.8 times longer than broad, prominent longitudinal groove present medially, merus

Fig. 2 *Indopotamon alipurduarens* sp. nov. holotype, male (42.6 × 34.4 mm) (ZSIK CR 430). (A), 3rd maxilliped; (B), right cheliped, inner view; (C), right cheliped, outer view; (D), P3; (E), pleon and telson; (F), sternopleonal cavity showing gonopods. Scale bar: 1 mm

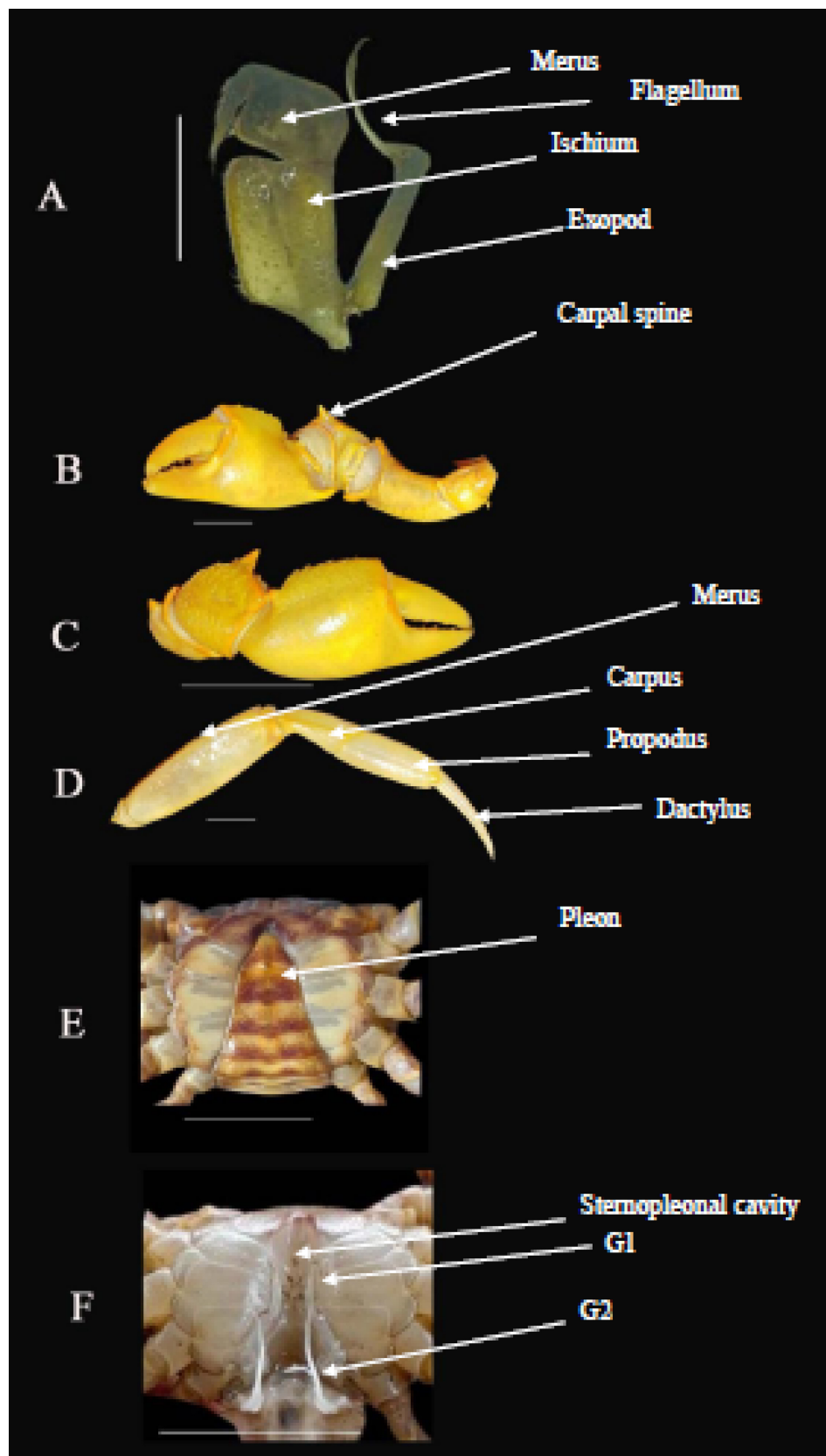
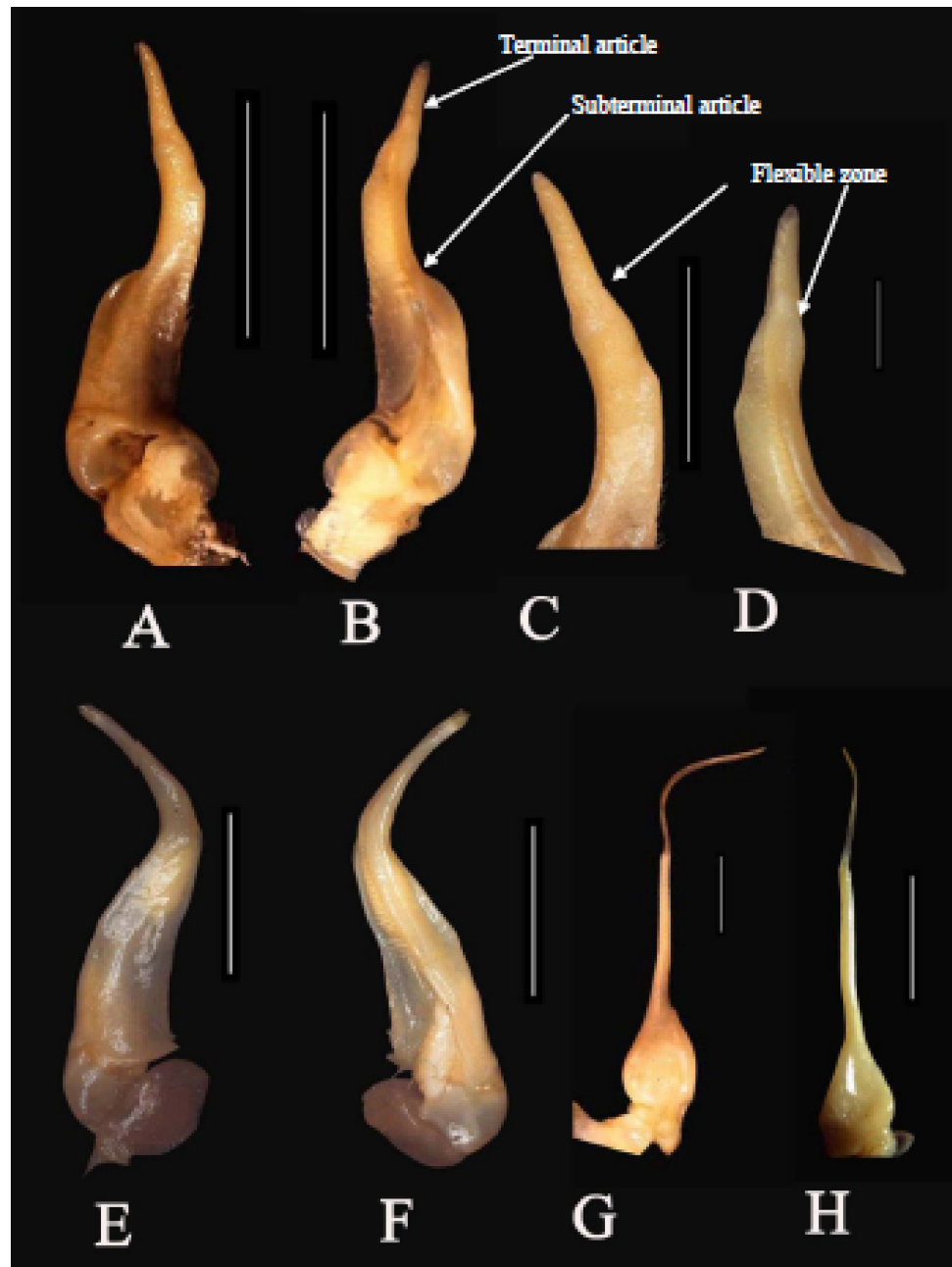


Fig. 3 Comparison of G1 and G2 of two species of *Indopotamon*. *Indopotamon alipurduarensis* sp. nov. holotype, male (42.6 × 34.4 mm) (ZSIK CR 430). (A), left G1, dorsal view; (B), left G1, ventral view; (C), left G1 terminal article, dorsal view; (D), left G1 terminal article, ventral view; (G), left G2; *Indopotamon woodmasoni* (Rathbun 1905), male (44.4 × 34.3 mm) (ZSIK C 8067/2). (E), left G1, dorsal view; (F), left G1, ventral view; (H), left G2. Scale bar: 1 mm



subquadrate, ca. 1.35 times wider than long, exopod with long flagellum reaching two third of merus (Fig. 2A).

The chelipeds are distinctly asymmetric, right cheliped distinctively stouter than left cheliped, glabrous, merus with a subterminal spine, carpus with 2 strong, sharp, unequal subterminal spine, propodus and dactylus with small teeth on cutting edges, tip pointed, small gap is created when fingers closed (Fig. 2B, C).

Ambulatory legs slender, long, generally glabrous, P3 longest, P5 shortest, P2-P5 merus elongated, dactylus with sharp chitinous spines (Fig. 2D).

Pleon triangular, pleonal somites 1 and 2 rectangular, pleonal somite 3 broadest, pleonal somites 3–6 trapezoidal, width progressively reduced from pleonal somite 3, pleonal somite 6 broader than long, proximal width ca. 1.9 times of median length, telson narrowly triangular, wider than long, ca. 1.4 times of median length, lateral margins concave medially (Figs. 1C, 2E and 7E).

Sternopleonal cavity deep, reaching to imaginary line joining to median edges of cheliped coxae (Fig. 2F), s1 and s2 fused, suture between thoracic sternite s2/s3 prominent, s3 and s4 fused except for notch visible on lateral margins, suture between thoracic sternites s4/s5, s5/s6 and s6/s7

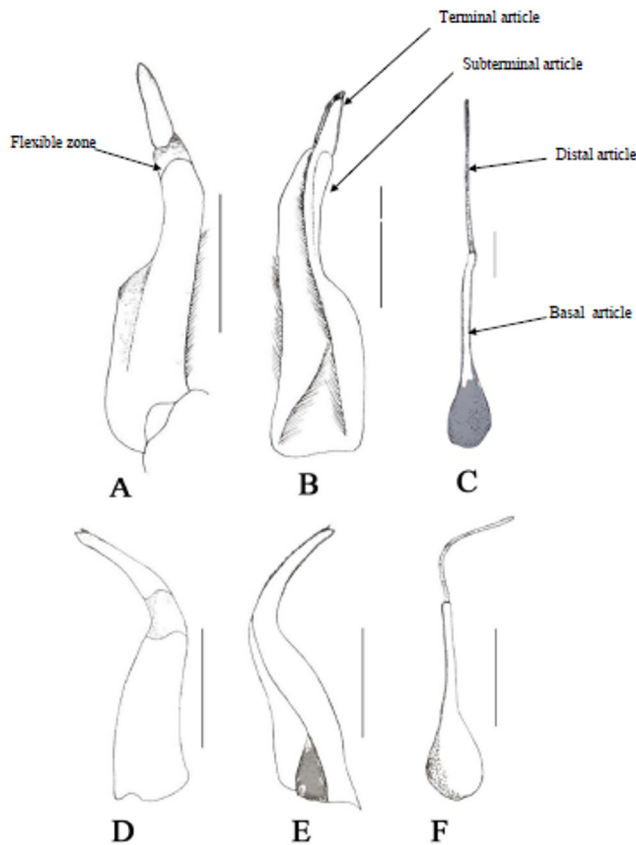


Fig. 4 Comparison of G1 and G2 (line drawing) of two species of *Indopotamon*. *Indopotamon alipurduarens* sp. nov. holotype, male (42.6 × 34.4 mm) (ZSIK CR 430). (A), left G1, dorsal view; (B), left G1, ventral view; (C), left G2; *Indopotamon woodmasoni* (Rathbun, 1905), male (44.4 × 34.3 mm) (ZSIK C 8067/2). (D), left G1, dorsal view; (E), left G1, ventral view; (F), left G2. Scale bar: 1 mm

discernible, prominent sternal plate in between s7 and s8 in sternopleonal cavity (Fig. 2F).

G1 is stout, almost straight, subterminal article basally broad, distal half abruptly narrower than basal half, terminal article gently curved outwards, stout, short, ca. 0.3 times of length of subterminal article, tip blunt (Figs. 3A–D and 4A and B); G2 long, sinuous, distal article relatively long, ca. 0.7 times length of basal article (Figs. 3G and 4C).

Etymology

The species epithet refers to the Alipurduar district of West Bengal, India where these crabs are residing.

Type locality

Uttar Rampur village of Alipurduar district, West Bengal, India (26.6026°N, 89.7352°E).

Colour in life

The carapace is grey in colour (Figs. 1A and 8D). The antero-lateral margins (including the epibranchial teeth), frontal margin, supra- and infra orbital margins, and some parts of the chelipeds (including the carpal spines) are orange red in colour (Fig. 1B). The pleon, most of the thoracic sternum, the ventral surface of the cheliped propodus, the cheliped dactyli, and the ambulatory leg dactyli all are yellowish in colour (Figs. 1C and 2E).

Paratypes

The male paratype is a sub-adult male and similar to the holotype in most of the carapace and gonopod features. However, the carapace is comparatively broader (CW/CL = ca. 1.3) in the male paratype than that of the holotype.

The female paratypes includes two adult females. The non sexual characters states of these specimens are similar to those of the holotype. Their carapace is relatively broader (CW/CL = ca. 1.3) and deeper (CH/CL = ca. 0.8) than in the holotype (Fig. 5A–C). The pleon of each female paratype is ovate, and covers entire thoracic sternum except for s1 and lateral edges when closed. Their pleonal somite 1 is the shortest, pleonal somites 2–5 are progressively longer, pleonal somite 6 is the longest, and the telson is broadly triangular, distinctly broader than long, lateral margins gently convex, with the narrowly rounded apex (Figs. 5C and 6A). The vulvae on s6 of the female paratypes are relatively widely located from each other (VD/SW = ca. 0.2), subovate, opening mesially, large, occupying half of length of s6, touching suture between s5 and s6, and laterally partially covered by a protruding sternal cover (Fig. 6C).

Ecological note

Crabs of the new species were collected from rice fields (Fig. 8). The habitat is fully covered by small grasses. Despite having some low lying areas of the rice field, the surface is more or less flattened. They reside inside deep burrows (1 to 1.5 m) of the rice fields (Fig. 8A–C). These crabs can only be seen during rainy seasons (May to August). They hide inside the burrows and do not come out during the remaining months.

Geographical distribution

Indopotamon alipurduarens sp. nov. is currently known only from the type locality i.e., Uttar Rampur village of Alipurduar district, in the West Bengal state of India.

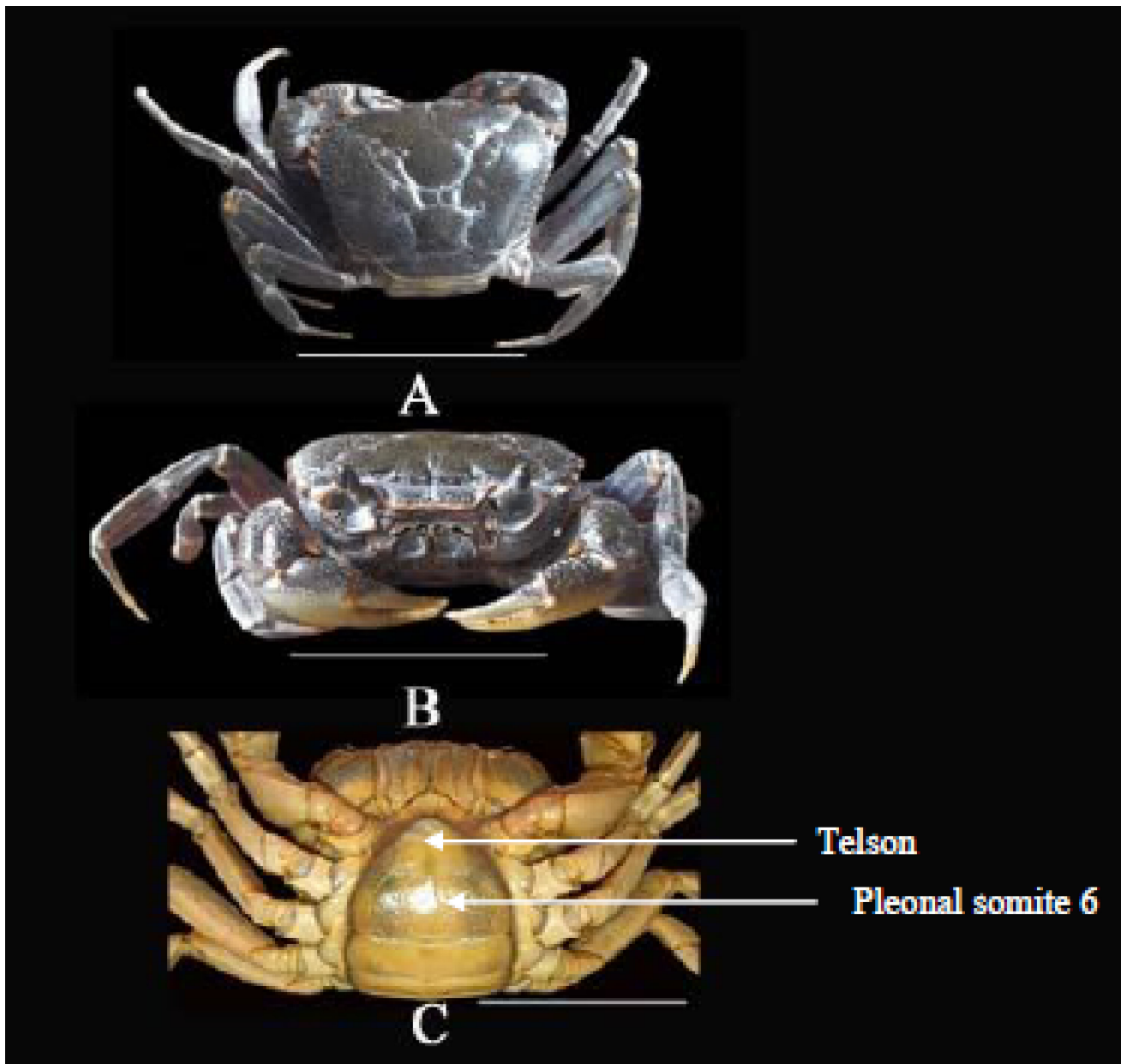


Fig. 5 *Indopotamon alipurduarens* sp. nov. paratype, female (39.7 × 29.6 mm) (ZSIK CR432). (A), overall dorsal view; (B), overall frontal view; (C), overall ventral view. Scale bar: 2 mm

Discussion

Despite having some similarities, *Indopotamon* Mitra and Khamo 2024 is clearly differentiated from the two related genus, *Lobothelphusa* Bouvier 1917 and *Paratelpusula* Alcock 1909 (Mitra and Khamo 2024; Yeo and Ng 2007).

I. alipurduarens sp. nov. is similar to its only congener, *I. woodmasoni*, in having the essential generic characters but can easily be distinguished from the latter species mainly by the structure of male gonopods and female vulvae.

Subterminal article of G1 basally broad, distal half abruptly narrower than basal half, terminal article gently curved outwards, relatively stouter, relatively shorter, ca. 0.3 times of the subterminal article, tip blunt (Figs. 3A–D and 4A and B) (versus, subterminal article of the G1 gradually narrower towards the distal end, terminal article strongly curved outwards, relatively slender, relatively longer, ca. 0.4 times the length of subterminal article, tip triangularly pointed in *I. woodmasoni* see Figs. 3E and F and 4D and E; Mitra and Khamo 2024; Fig. 14J, K; Chetia et al. 2019; Fig. 3A–C); G2 distal article relatively longer, ca. 0.7

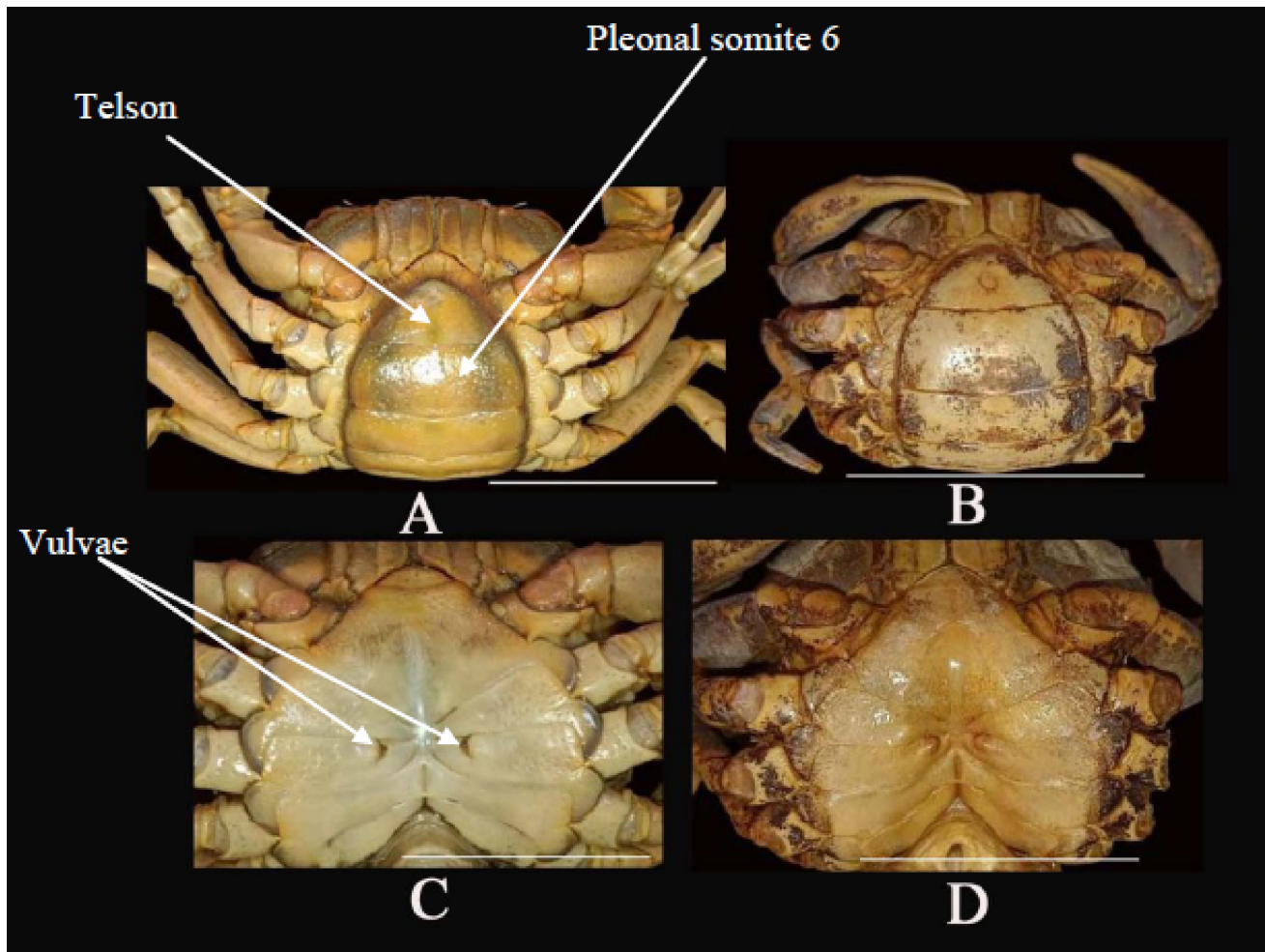


Fig. 6 Comparison of female pleons and vulvae of the two species of *Indopotamon*. *Indopotamon alipurduarensis* sp. nov. paratype, female (39.7×29.6 mm) (ZSIK CR432). (A), pleon; (C), vulvae; *Indopotamon*

woodmasoni (Rathbun 1905), holotype, female (48.0×39.6 mm) (ZSIK C 6888/3). (B), pleon; (D), vulvae. Scale bar: 1 mm

times of basal article (Figs. 3G and 4C) (versus, the G2 distal article relatively shorter, ca. 0.5 times of basal article in the *I. woodmasoni* see Figs. 3H and 4F; Chetia et al. 2019; Fig. 3D); the vulvae on s6 are relatively widely located from each other (VD/SW=ca. 0.2), relatively large, occupying half the length of s6, and laterally partially covered by a protruding sternal cover (Fig. 6C) (versus, the vulvae on s6 are relatively close to each other (VD/SW=ca. 0.1), occupying less than half the length of s6, and laterally completely covered by a protruding sternal cover in *I. woodmasoni* see Fig. 6D; Mitra and Khamo 2024; Fig. 13G; Chetia et al. 2019; Fig. 2E).

Other morphological features also separate these two species; carapace comparatively more deep (CH/CL=0.70) (Figs. 1B and 7A) (versus, carapace less deep (CH/CL=0.47) in *I. woodmasoni*; see Fig. 7B; Mitra and Khamo 2024; Fig. 13E); the epigastric ridge is prominent and extends to the edge of the frontal margin (Fig. 7A, C)

(versus, epigastric ridge prominent but not reaching the frontal margin in *I. woodmasoni* (Fig. 7B, D; Mitra and Khamo 2024; Fig. 13E; Chetia et al. 2019; Fig. 2A); epibranchial teeth are relatively stouter (especially first epibranchial tooth), triangular and directed anteriorly (Figs. 1A and 7C) (versus, epibranchial teeth relatively slender, claw like, with the anterior two teeth being directed anteriorly, remaining posterior two teeth directed anterolaterally see Fig. 7D; Alcock 1910; Fig. 50; Rathbun 1905; Fig. 12; Bott 1970; Figs. 24 and 26; Mitra and Khamo 2024; Fig. 13A; Chetia et al. 2019; Fig. 2B); the male pleonal somite 6 is relatively broader, proximal width ca. 1.9 times the median length, with the straight lateral margins (Figs. 1C, 2E and 7E) (versus, male pleonal somite 6 relatively narrower, proximal width ca. 1.7 times the median length, with the strongly convex lateral margins in *I. woodmasoni*; see Fig. 7F; Mitra and Khamo 2024; Fig. 13D; Chetia et al. 2019; Fig. 2C); the male telson has concave lateral margins (Figs. 1C, 2E and

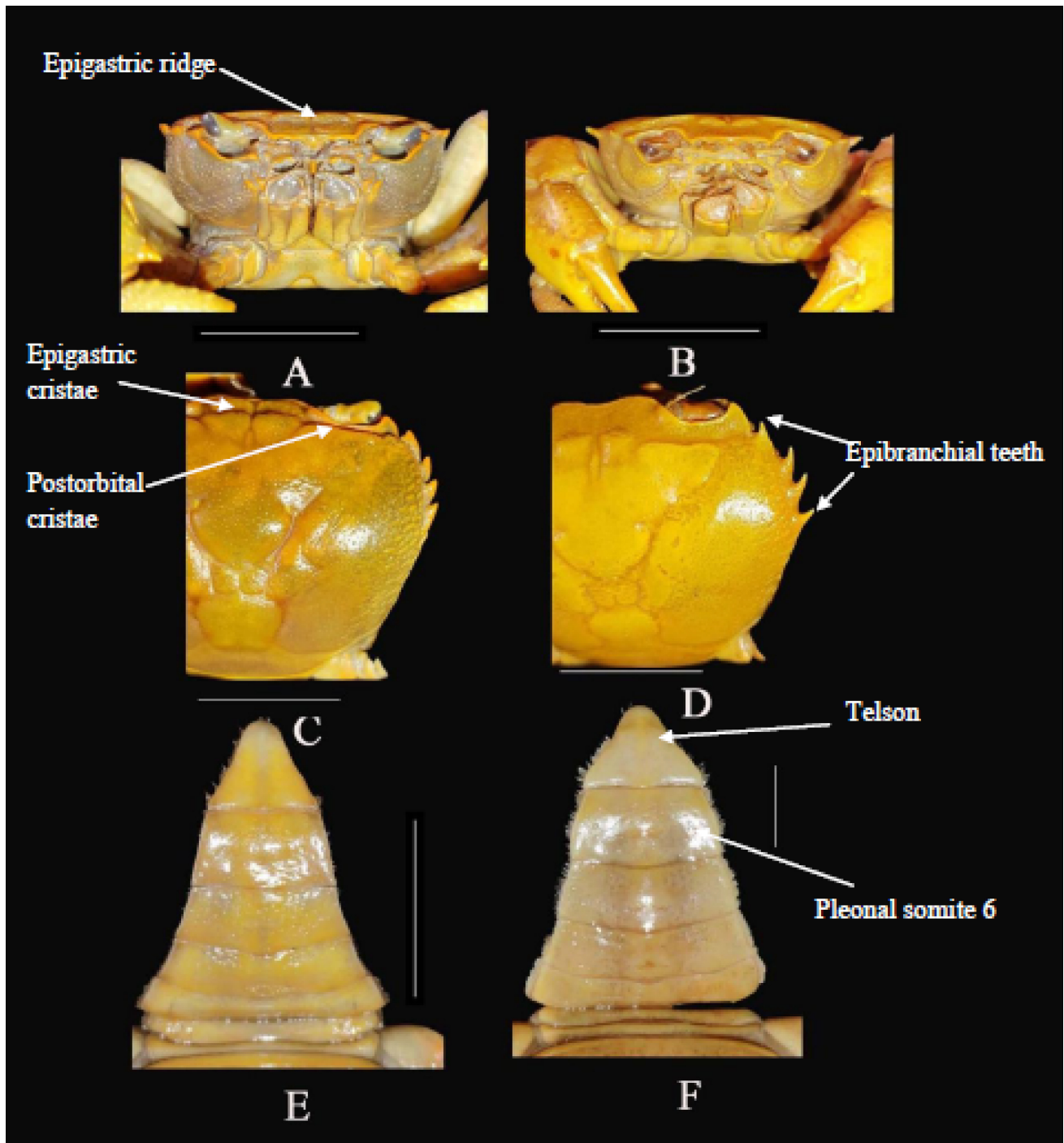


Fig. 7 Comparison of frontal views, lateral margin of carapace, pleon of male of the two species of *Indopotamon*. *Indopotamon alipurduarensis* sp. nov. holotype, male (42.6×34.4 mm) (ZSIK CR 430). (A), frontal views; (C), lateral margin of carapace; (E), pleon of male;

Indopotamon woodmasoni (Rathbun 1905), male (44.4×34.3 mm) (ZSIK C 8067/2). (B), frontal views; (D), lateral margin of carapace; (F), pleon of male. Scale bar: 1 mm

7E) (versus, male telson with almost straight lateral margins in *I. woodmasoni*; see Fig. 7F; Mitra and Khamo 2024; Fig. 13D); the female telson is broadly triangular, apex narrowly rounded (Fig. 6A) (versus, the female telson is subcircular, apex broadly rounded in *I. woodmasoni* see Fig. 6B).

The carapace is grey in colour (Figs. 1A and 5A), the anterolateral margins (including the epibranchial teeth), frontal margin, supra- and infra orbital margins, and some parts of the chelipeds (including the carpal spines) are orange red in colour (Figs. 1B and 5B), the pleon, most of

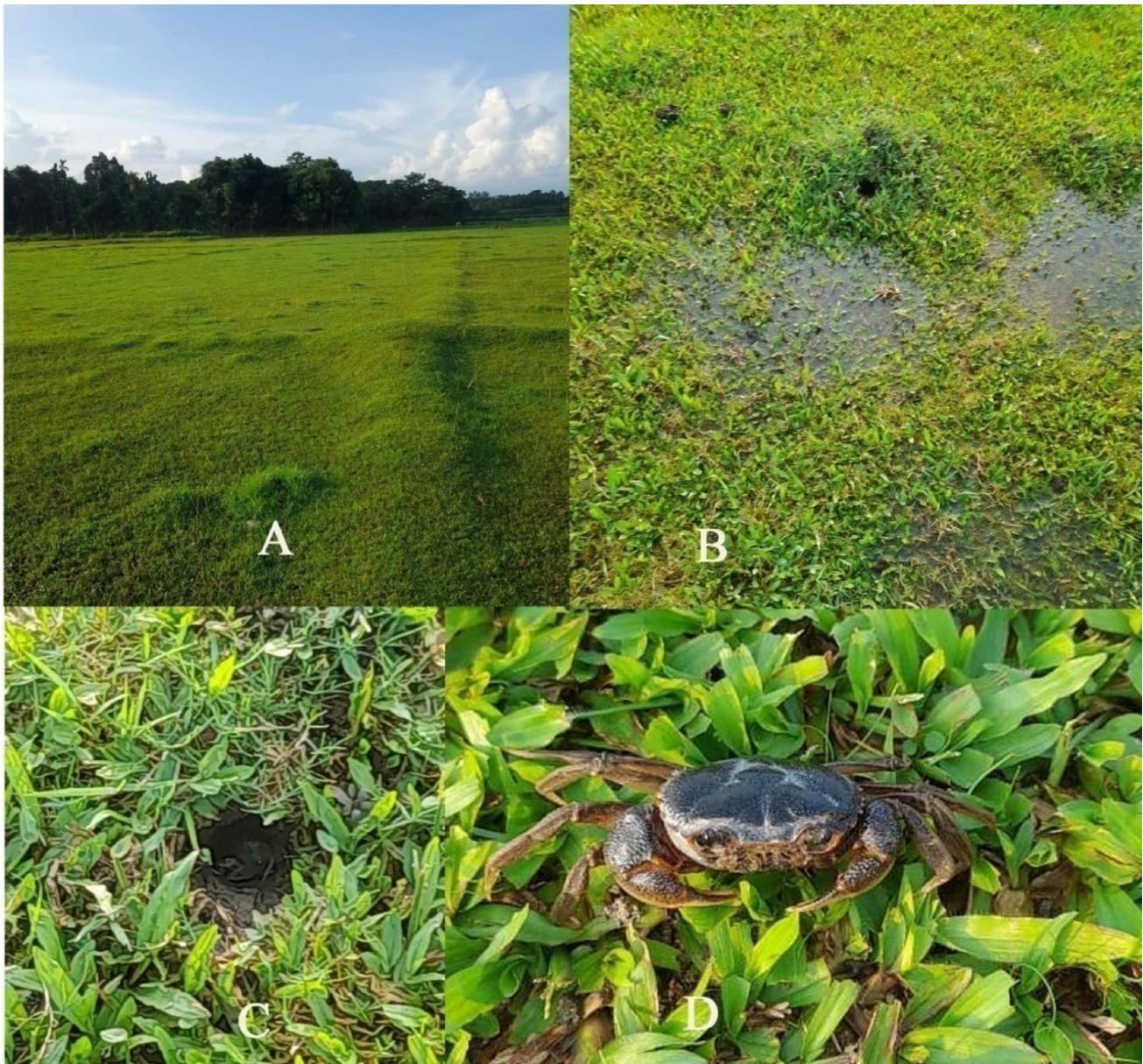


Fig. 8 Habitat (A–C) and colour in life (D) of *Indopotamon alipurduarensis* sp. nov

the thoracic sternum, the ventral surface of the cheliped propodus, the cheliped dactyli, and the ambulatory legs dactyli all are yellowish in colour (Figs. 1C and 2E) (versus, the colour of the anterolateral margin including epibranchial teeth, frontal margin and carapace are yellowish–green in *I. woodmasoni* see Mitra and Khamo 2024; Fig. 13A, Chetia et al. 2019; Fig. 2B).

The distribution of the two species is also very distinct. The new species, *I. alipurduarensis* is restricted in the Dooars region of the West Bengal state of India only. Whereas, *I. woodmasoni* has a wide range distribution, ranging from Garo hills of Meghalaya, Assam and Mizoram of India, to the northern territory of Bangladesh.

Key to the species of *Indopotamon* Mitra and Khamo 2024

G1 with subterminal article gradually narrow distally, terminal article strongly curved outwards, relatively slenderer, relatively longer ca. 0.4 times length of subterminal article, tip triangularly pointed; G2 distal article relatively shorter, ca. 0.5 times length of basal article; vulvae relatively close to each other (VD/SW = ca. 0.1) *I. woodmasoni* (Rathbun 1905).

G1 with subterminal article abruptly narrow on distal half, terminal article gently curved outwards, relatively stouter, relatively shorter, ca. 0.3 times length of subterminal article,

tip blunt; G2 distal article relatively longer, ca. 0.7 times length of basal article; the vulvae relatively widely located from each other (VD/SW=ca. 0.2) *I. alipurduarensis* sp. nov.

Conclusion

In the present study, we described a new species of the genus *Indopotamon* Mitra and Khamo 2024 from Alipurduar district of West Bengal, India. The new species *I. alipurduarensis* sp. nov. has been well illustrated to include in the genus *Indopotamon* Mitra and Khamo 2024. Further study is needed to establish phylogenetic relationship of the new species, *I. alipurduarensis* sp. nov. with other related species of the family potamididae in India.

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Author contributions Ram Krishna Das- Investigation, Preparation of manuscript; Santanu Mitra- Supervision, Editing of the manuscript.

Declarations

Conflict of interest Both the authors declare that there is no competing of interest.

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