

## Species

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# *Jonas bispinosus* sp. nov. (Decapoda: Brachyura: Corystidae) a new sand crab from West Bengal, India

Parimita Chowdhury<sup>1</sup>, Santanu Mitra<sup>1\*</sup>

## ABSTRACT

Sand crabs of the genus *Jonas* represent an interesting component of subtidal benthic biodiversity. A new crab species, *Jonas bispinosus* sp. nov., from subtidal mudflats off Digha Mohana, West Bengal, India, is described based on adult males. It has a densely setose, granulated ovate carapace with ten lateral spines per side, including an elongated supraorbital spine; a bifid U-shaped rostrum, distinctive carapace granulation; paired curved spines on the fifth leg merus, and a uniquely twisted, triangular-tipped male first gonopod. Comparative assessment with all known congeners supports its recognition as a distinct species based on a unique combination of morphological characters, particularly ambulatory leg spination, carapace granulation, and rostral structure. The discovery of *J. bispinosus* sp. nov. increases the number of valid species in the genus to eight worldwide and represents the fourth species of *Jonas* recorded from India.

**Key words:** Bay of Bengal, Corystidae, identification key, *Jonas bispinosus* sp. nov., sand crab

**Registration no. in Zoo bank:** urn:lsid:zoobank.org:pub:22F50CE9-F05C-4422-8044-B6D44CD52627

## 1. INTRODUCTION

Sand crabs, belonging to the genus *Jonas* Hombron & Jacquinot, 1846 (Brachyura, Corystidae), are characterized by a carapace that is longitudinally oval, distinctly longer than broad, and strongly convex, with teeth or spines along the entire length of the lateral margins. There is no distinct demarcation between the anterolateral and posterolateral margins. The rostrum is narrow and produced, with a bifurcated terminal end, and the orbits are incomplete. The antennular socket is broader than long, with the antennules folded longitudinally. The antennal flagella are long and bear elongated setae. In males, the abdomen consists of five somites, and the first abdominal somite in both males and females is visible in dorsal view.

Out of the seven species belonging to the genus- *Jonas*, only three species, namely *J. choprai*, *J. indicus* & *J. kalapakkamensis* are reported from India (Chopra 1935, Manokaran et al. 2008, Pillai & Thirumalu 2008, Barathkumar et al. 2016).

The coastline of West Bengal extends to just 157 km compared to that of India's coastline which is about a total of ~7,516 km, yet it supports remarkably rich crab diversity. A total of 153 species of brachyuran crabs was reported from this coast (Dev Roy 2010, Trivedi et al. 2018). Recently, several new species discoveries and new

distributional records of crabs enriched the known marine decapod diversity of this state (Ng & Mitra 2019; Mitra et al. 2020, 2024; Trivedi et al. 2020, 2021; Mitra & Ng 2021; Chowdhury & Mitra 2023).

In short, despite its small geographic extent relative to the rest of India, coastal region of West Bengal supports a rich diversity of crustaceans, and discoveries like *Jonas bispinosus* sp. nov. continue to highlight the ecological significance of this region. Here, we describe *Jonas bispinosus* sp. nov., the eighth species in this genus worldwide and the fourth from India, following *J. indicus* (Chopra 1935), *J. choprai* Serène, 1971, and *J. kalpakkamensis* Barathkumar, Das & Satpathy, 2016. The new species was collected as bycatch in trawls off Digha Mohana, West Bengal, from subtidal muddy substrates. Comparative morphological analysis with all known congeners supports the validity of this new species. The present work contributes to the understanding of brachyuran diversity in the Bay of Bengal and highlights the need for continued exploration of subtidal crustacean fauna in this region.

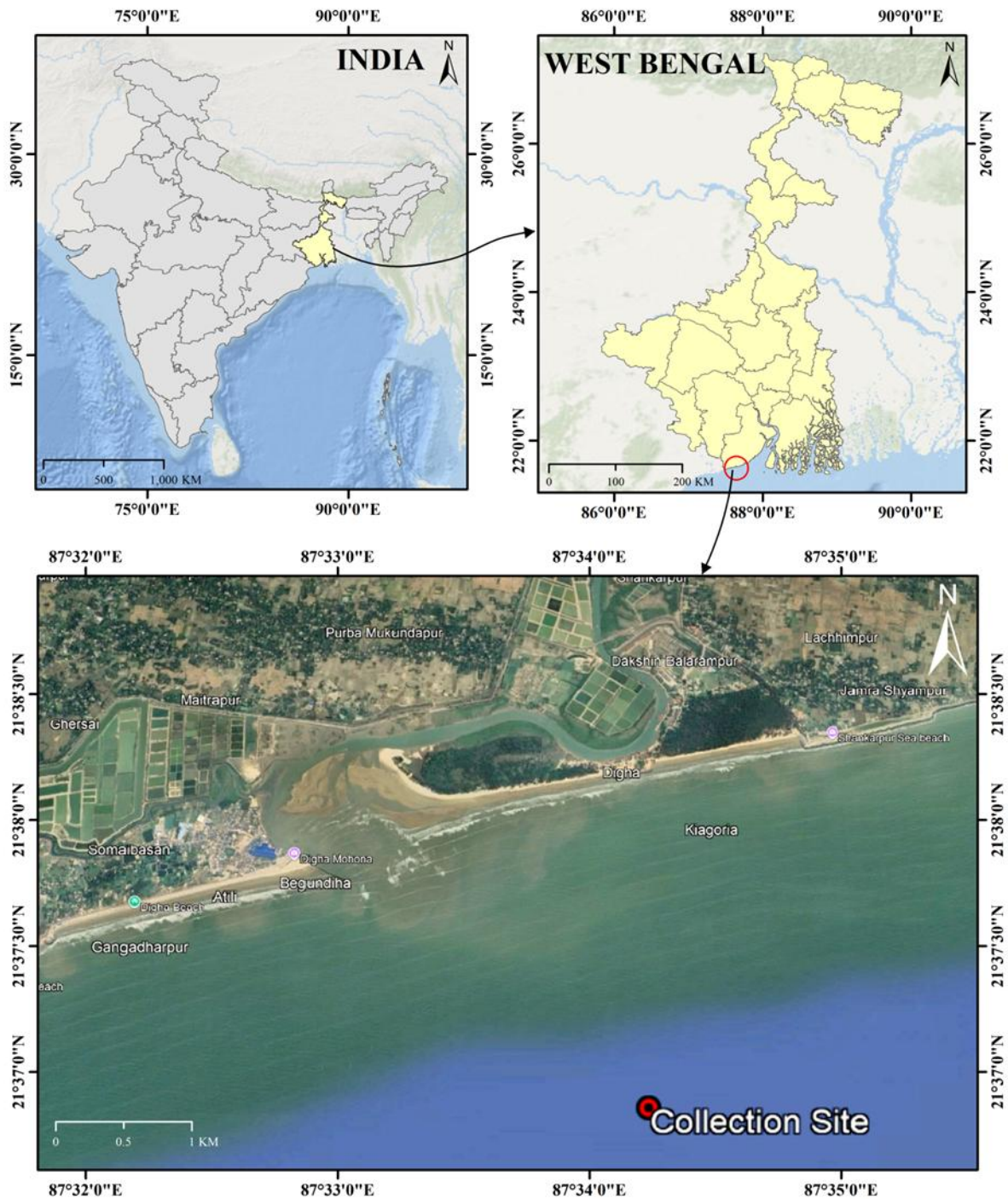


Figure 1. Collection locality of *Jonas bispinosus* sp. nov.

## 2. MATERIAL AND METHODS

Specimens were collected as bycatch from trawl nets and landed at Digha Mohana, a major fishing harbour on the east coast of India (Fig. 1). They were caught approximately 5 km offshore (approximate depth range 20-30 mt.) over soft, muddy seafloor. Fresh specimens were photographed in the field using a Nikon P900 camera and subsequently preserved in 70% ethanol. Carapace measurements were taken with a Vernier calliper: length (CL) measured from the tip of the rostrum to the posterior margin, and width (CW) measured including the spines. Specimens were identified under a Leica EZ4 stereo-zoom binocular microscope, using key references (Chopra 1935, Serène 1971, Ng et al. 2000, Davie 2002, Barathkumar et al. 2016). All type specimens have been deposited in the Crustacea Division of the Zoological Survey of India, Kolkata. Abbreviations used throughout the text are: CL = carapace length, CW = carapace width, CH = carapace height, G1 = first gonopod, and G2 = second gonopod, P2-5= pereopod 2-5.

## 3. RESULTS

### *Systematics*

Superfamily Corystoidea Samouelle, 1819

Family Corystidae Samouelle, 1819

Genus Jonas Hombron & Jacquinot, 1846

*Jonas bispinosus* sp. nov.

(Figs. 2-5)

**Zoobank new species registration number:-** urn:lsid:zoobank.org:act:84555EE2-AFBB-4AE1-8035-760A98DF02DE

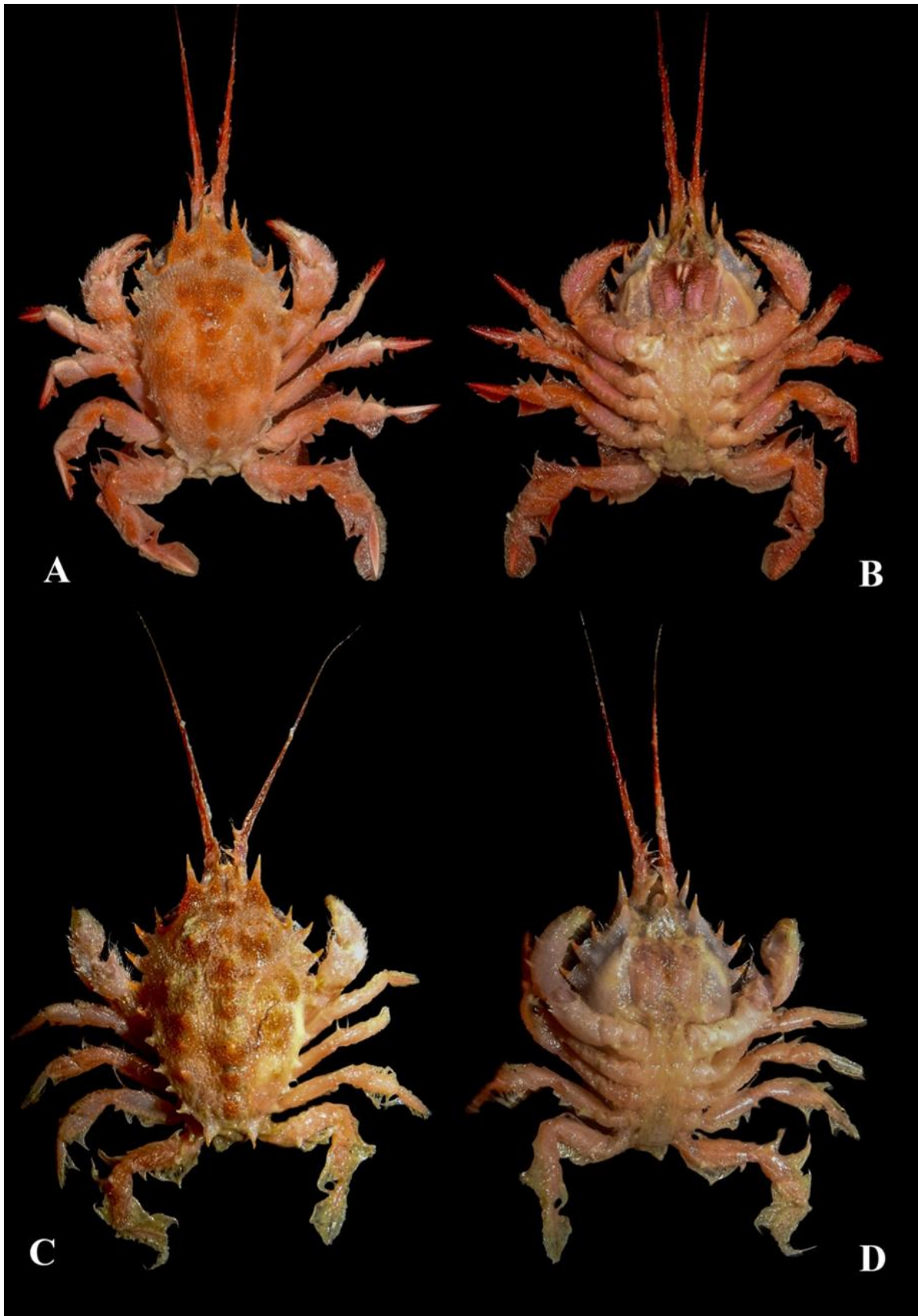
**Type materials:** Holotype male (CL 27.6 mm, CW 15 mm, CH 11.3 mm); Reg. no. CR822; Loc. lat. 21°36'55.43" N, 87°34'6.68" E (trawling location), Digha Mohana, East Midnapore District, West Bengal, India. Collected from Trawl by catch materials, sub tidal collection, Date of Collection: 30.viii.2024, Collected by S. Mitra & Md. Shahbaz. Paratype three males, largest (CL 28.1 mm, CW 14.9 mm, CH 12.1 mm), medium (CL 27.5 mm, CW 15.6 mm, CH 11.4 mm), and smallest (CL 18.5 mm, CW 10.6 mm, CH 7.9 mm), Reg. no. CR823, collection data same as holotype.

**Etymology:** The species name is derived from the distinct morphological character, i.e., 2 distinct spines on the merus of the last ambulatory legs. The species name, '*bispinosus*' (Latin, adjective, "two-spined") agrees with the genus - '*Jonas*', which is masculine.

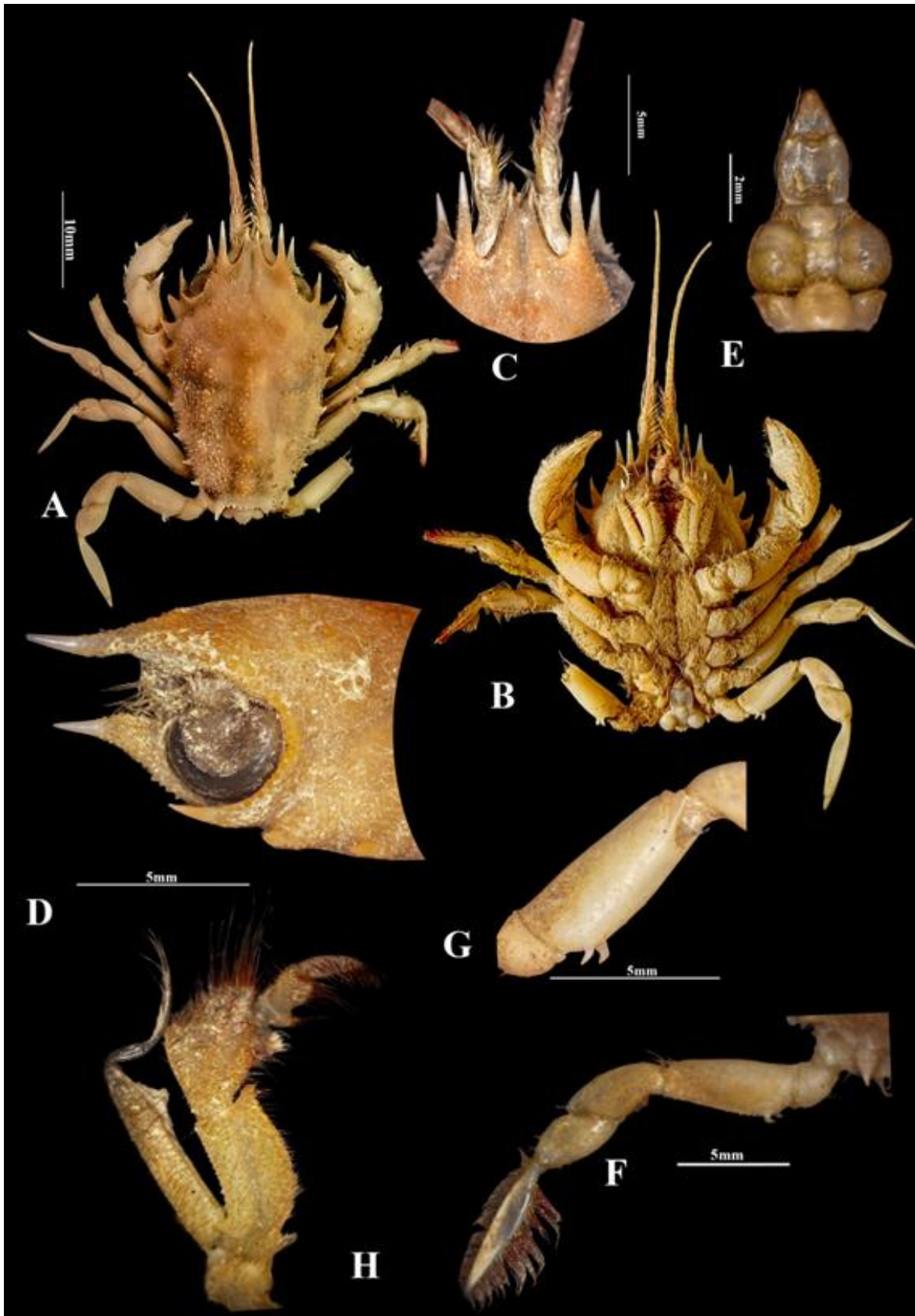
**Diagnosis:** Carapace longitudinally ovate, distinctly high; densely covered with fine setae and clusters of pearliform granules, bearing 10 lateral teeth on each side, including one prominent supraorbital spine and last spine straight, backwardly pointed, supra-orbital spine longer than bifid rostrum, prominent mesobranchial groove, and serrated posterior margin (Fig. 2A, C). Antennal flagellum nearly equal in length to carapace and heavily setose (Fig. 2A-D). Third maxilliped elongated and granular (Fig. 3F, 5G). P5 broader and more stout than other ambulatory legs, with 2 sharp claw-like spines on proximal flexor margin of merus (Fig. 3G). P3-5 coxae each with single spine on outer-lateral margin, directed anteriorly. Pleonal structure compact, with somites 3-5 fused into subtriangular plate, somite 6 longitudinally concave medially, telson triangular (Fig. 3E, 4C). Male first gonopod (G1) long, slender, and twisted in distal third, the pair of G1 cross each other when the pleon is opened (Fig. 4E). Distal tip triangular with granules at lateral margin (Fig. 4F). The second gonopod (G2) comparatively short and spatulate (Fig. 4G), equal in length basal broader part of the G1.

**Description of holotype male:** Carapace longitudinally ovate, (CL: CW=1.84), deep (CH: CL=0.4), densely covered with small setae & series of pearliform granules scattered in small clusters all over the carapace (Fig. 2A, 3A). Supraorbital spines 1.5 times longer than bifid rostrum (Fig. 3C, 4A). External orbital spines 1.5 times longer than first epibranchial spine (Fig. 3D, 4B). Mesobranchial groove prominent. Cervical & cardiac groove superficial. Cornea fills most of the orbital space. Lateral margin of carapace with 10 teeth on each side, including orbital spine. First one being largest, second to fourth decreasing in size, fifth to ninth equal in size smaller than the fourth, tenth large almost equalling with third, pointed backwardly (Fig. 3A). Posterior margin lined with sharp granules.

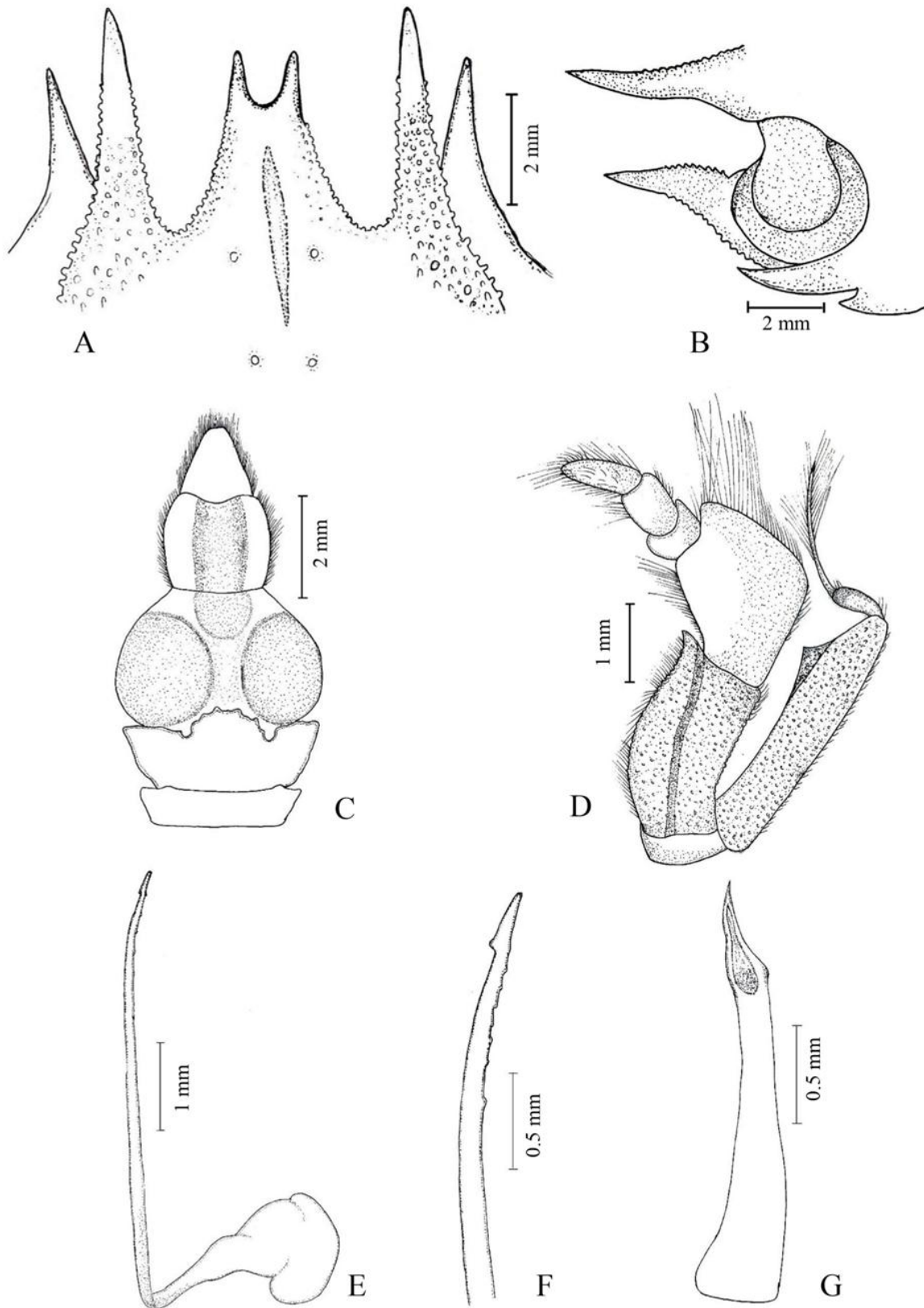
Antennal flagellum almost equal to carapace length, strongly setose (Fig. 3A). Third maxilliped elongated with granular surface. Ischium rectangular, length twice as long as width, submedian longitudinal groove prominent covered with short white setae. Merus, slightly shorter than ischium, rhomboidal, covered with long red setae, anterior margin with tuft of long setae. Exopod with granular surface, reaching half of merus length, with plumose flagellum about half length of exopod (Fig. 3H, 4D).



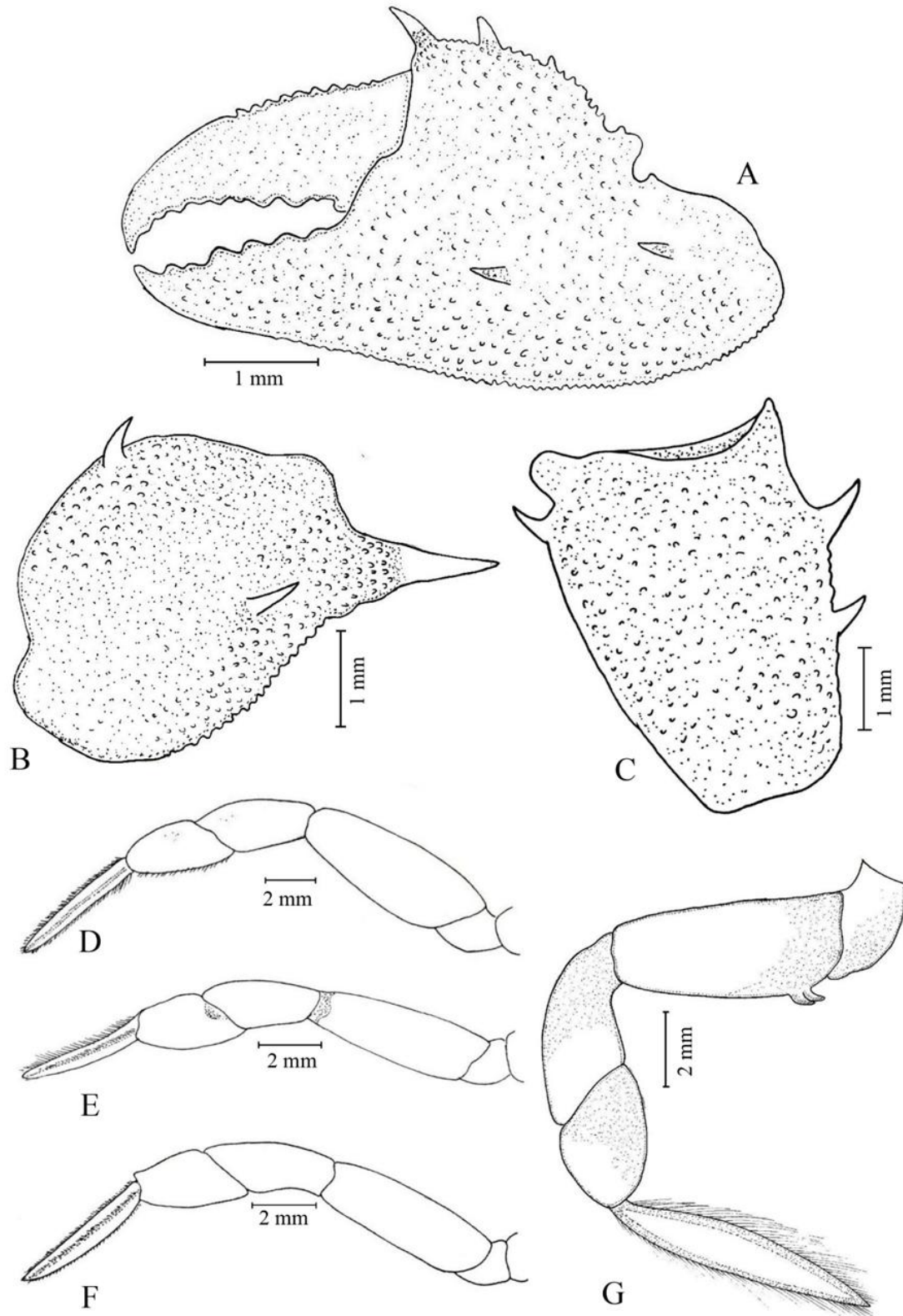
**Figure 2.** *Jonas bispinosus* sp. nov.; holotype male (27.6 mm × 15 mm), reg no. CR822  
A. dorsal view, B. ventral view; paratype male (18.51 mm × 10.58 mm), reg. no. CR823, C. dorsal view, B. ventral view



**Figure 3.** *Jonas bispinosus* sp. nov.; holotype male (27.6 mm × 15 mm) reg no. CR822, A. habitus dorsal view, B. habitus ventral view, C. fronto-orbital region (dorsal view), D. frontal region (lateral view), E. pleon (setae denuded), F. left fourth ambulatory leg (P5) (dorsal view), G. left fourth ambulatory leg (P5) merus (ventral view), H. right third maxilliped (external view).



**Figure 4.** *Jonas bispinosus* sp. nov.; holotype male (27.6 mm × 15 mm) reg no. CR822, diagrams, A. frontal region (dorsal view), B. fronto-orbital region (lateral view), C. pleon, D. left third maxilliped, E. right G1, F. distal tip of right G1, G. left G2.



**Figure 5.** *Jonas bispinosus* sp. nov.; holotype male (27.6 mm × 15 mm), Reg no. CR822, diagrams, A. right palm (dorso-lateral view), B. left cheliped carpus (dorso-lateral view), C. left cheliped merus (dorso-lateral view), D-F. left 1<sup>st</sup> to 3<sup>rd</sup> ambulatory legs (P2-4) (dorsal view), G. left 4<sup>th</sup> ambulatory leg (P5) (dorsal view)

Chelipeds equal in length, covered with sharp granules (Fig. 5A), long setae, merus with one sharp spine on distal edge of dorsal margin followed by series of sharp granules, two strong spines on subdistal and median part of outer lateral margin (Fig. 5C). Inner lateral margin of carpus with 2 strong spines at the subdistal end, median part of inner and outer lateral margin with single spine each side (Fig. 5B). Outer median part of palm with 2 curved spines, inner lateral margin with 2 long and 4-5 sharp spine-like teeth. Pollex dentary edge with 5 triangular teeth. Movable finger dentary edge with relatively small 5 triangular teeth (Fig. 5A).

Ambulatory legs (P2-P4) equalling size (Fig. 5D-F) and as long as cheliped and fringed with setae. P5 broader, more developed than the other ambulatory legs. Outer lateral margin of P5 merus with 2 strong curved spines at the lower basal part (Fig. 3F, 5G). All P2-P5 merus lower border mildly serrated. P5 dactylus spatuliform with pointed terminal tip. P3-P5 coxae with single sharp spine each on upper edge with increasing size from P3-P5.

Pleon short. telson triangular, free edge rounded, lateral margin fringed with long setae, slightly longer than proximal width. Sixth slightly wider than long, lateral margin gently convex. Terminal edge medially concave. Proximal edge sinuous. Slightly depressed along the sides of medial region. Sixth segment flat. Segment 3-5 fused forming a large subtriangular segment with distinctly swollen outer margin (Fig. 3E, 4C).

G1 slender and long (Fig. 4E). Distal part visible in ventral view even if the pleonal cavity is closed. Basal part distinctly broad and almost half length of the distal segment. Distal part twisted to form a crisscross structure between the two G1s from either side. Tip of distal segment distinctly triangular and relatively narrowed towards the tip (Fig. 4F). Row of small posteriorly directed sharp triangular granules on outer margin. G2 relatively short, as long as the basal part of G1, distal end spatulate (Fig. 4G).

**Male paratypes:** Morphometric measurements of all the male paratypes are almost similar. CL: CW of these three (largest to smallest) are respectively 1.87, 1.76 and 1.74; CH: CL are respectively 0.43, 0.41 and 0.43. Largest 2 males are similar to the holotype in morphological characters (except in largest male paratype where the supraorbital spine on both sides damaged) and smallest one (Fig. 2C-D) is little bit differing from the holotype in the following characters; dorsal granules, ridges on carapace are more sharp in the small male paratype (Fig. 2C) where as these are little bit less sharp in the holotype as well as the large paratypes. Bifid 'U' shaped rostral groove mildly forked (Fig. 2C) in small paratype whereas it is deeply forked in holotype and other paratypes.

**Colour in life:** The live colouration of carapace is mostly pale orange with irregular patches of darker orange-red markings scattered across the back around the ridges and clusters of granules, giving it a mottled appearance. Chelipeds and ambulatory legs are of light pinkish-orange in appearance with some translucent areas, and dactylus with fine reddish tip. The antennae are distinctly reddish-orange, becoming darker toward the tips (Fig. 2A-D).

**Habitat and distribution:** *Jonas bispinosus* sp. nov. was collected from the subtidal habitat (20-30 mt depth) near the Digha Coast (Fig. 1). The subtidal floor of this coast is covered with mud, which implies that this species may prefer the muddy bottom.

So far this species was only found in the type locality, Digha, East Midnapore district of West Bengal, India which is a part of the Bay of Bengal.

#### 4. DISCUSSION

Genus *Jonas* is represented by 7 species worldwide, viz. *Jonas choprai* Serène, 1971, *Jonas distinctus* (De Haan, 1835), *Jonas formosae* (Balss, 1922), *Jonas indicus* (Chopra, 1935), *Jonas kalpakkamensis* Barathkumar, Das & Satpathy, 2016, *Jonas leuteanus* Ward, 1933, *Jonas macrophthalmus* Hombron & Jacquinet, 1846 (Ng et al. 2008, Barathkumar et al. 2016). Only 3 species were recorded so far from India, i.e. *J. choprai*, *J. indicus*, and *J. kalpakkamensis*.

Superficially, the new species has some similarity with *Jonas distinctus* as both species have the dorsal carapace surface with large granules clustered at the highest point of each region and the surrounding areas having small, uniformly distributed granules. Despite their morphological similarity, the new species differs from the formers by several characters, i.e. G1 short, distal article shorter than basal broader article in *J. distinctus* (Ng et al. 2000: fig. 7. a-e) (G1 comparatively longer, distal article long and filamentous in *J. bispinosus* sp. nov.) (Fig. 4E-F); merus of last ambulatory legs with one postero-proximal spine Ng et al. 2000: fig. 7. f) (vs. merus of last ambulatory leg with 2 strong curved spines at the lower basal part) (Fig. 3F-G; 5G).

*Jonas indicus* (Chopra, 1935) was described from the mouth of the Hooghly River which is very close to Digha Coast, but that species was described on the basis of a juvenile female specimen (type deposited in ZSI Kolkata). We examined the 'Type' of the *Jonas indicus* at

ZSI, Kolkata (C1766/1), measuring as, CL 6.1 mm, CW 4.6 mm, and the description of the type species does not provide any prominent species characters in the modern taxonomical context regarding this genus (Chopra 1935, Ng et al. 2000). The status of that species is still doubtful as there is no mature male specimen available for that species till date. Still the new species *Jonas bispinosus* is distinctly different from *Jonas indicus* (Chopra, 1935) in having a longitudinally oval carapace (Fig. 2A, 3A), the CL: CW=1.8 (vs. Carapace relatively broader, CL: CW =1.3, Naderloo 2017: fig. 6.1 ); supraorbital spine distinctly longer than bifid rostrum (Fig. 3C, 4A) (vs. supraorbital spine as long as bifid rostrum in *Jonas indicus*, Naderloo 2017: fig. 6.1); eyes are prominently visible on dorsal view (2A,C; 3A) ( vs. non visibility of eyes on dorsal view as the orbital region is relatively wider, Naderloo 2017: fig. 6.1). Recently Kumar et al. (2024) reported *Jonas indicus* from the coast of Andhra Pradesh, but their figures and description do not clarify the identity of that specimen with the description of type specimen of *Jonas indicus* (Chopra, 1935).

*Jonas bispinosus* sp. nov. is also superficially similar to *Jonas choprai*, but they differ in several morphological characters. Supra orbital spine distinctly longer than the rostrum in *Jonas bispinosus* sp nov. (Fig. 3C, 4A) (vs. supraorbital spine hardly reaching rostrum or shorter than rostrum (Ng et al. 2000: fig. 9. b). Basal antennal segment is not granulated (vs. Basal antennal segment is strongly granulated in *Jonas choprai* Ng et al. 2000: fig. 9. c). Ventrolateral margin of P5 merus with 2 spines (Fig. 3F-G, 5G) (vs. P5 merus with 3 spines Ng et al. 2000: fig. 10. a).

*Jonas bispinosus* sp. nov. is readily differentiable with *J. macrophthalmus* Hombron & Jacquinot, 1846, *Jonas formosae* (Balss, 1922) & *Jonas leuteanus* Ward, 1933 as all these three species have a single spine on the merus of last ambulatory leg (vs. 2 hooked spines on the merus of last ambulatory leg in the *J. bispinosus* sp. nov.) (Fig. 3F-G, 5G); all the granules on carapace are small, uniformly distributed, similar sized (see Ng et al. 2000: fig 6, b; 8, g for *J. formosae*; Hombron & Jacquinot, 1846: pl. 8, fig 4 for *J. macrophthalmus*; Ward 1933: pl. 23 for *Jonas leuteanus*). (vs. large granules clustered at the highest point of each region and the surrounding areas having small, uniformly distributed granules in the *J. bispinosus* sp. nov.) (Fig. 2A-B, 3A).

*J. bispinosus* sp. nov. is superficially most closely associated to *J. kalpakkamensis* Barathkumar, Das & Satpathy, 2016 as supraorbital spine just ahead of rostral spine in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 2, c; 4, a) (vs. relatively longer than rostral spine in *J. bispinosus* sp. nov.) (Fig. 3C; 4A); supraorbital spine slightly anterolaterally projected in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 2, a, c; 4, a) (vs. supra orbital spine distinctly straight in *J. bispinosus* sp. nov.) (Fig. 3D, 4B); post orbital spine shorter than 3 anterolateral spines in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 2, c; 4, a) (vs. post orbital spine i.e., first anterolateral spine longer than others in *J. bispinosus* sp. nov.) (Fig. 2A, C; 3A); bifurcated rostral spine makes a 'V' shape in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 2, c; 4, a) (vs. bifurcated rostrum 'U' shaped in *J. bispinosus* sp. nov.) (Fig. 3C; 4A); posterolateral spines very short like a sharp granule in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 2, a; Sureandiran et al. 2024: fig. 2) (vs. posterolateral carapace spines with sharp terminal end bent in *J. bispinosus* sp. nov.) (Fig. 2A, C; 3A); in lateral view, terminal end of postorbital spine hardly reaches up to the length of eye ball in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 4, b) (vs. in lateral view, terminal end of posterolateral spine distinctly longer than the length of eye ball in *J. bispinosus* sp. nov.) (Fig. 3D, 4B); tenth or last posterolateral spine pointing obliquely backwards in *J. kalpakkamensis* (Barathkumar et al. 2016: fig. 2, a) (vs. posterolateral spine almost straight, posteriorly directed in *J. bispinosus* sp. nov.) (Fig. 2A-C; 3A); last ambulatory leg merus with 3 spines (Barathkumar et al. 2016: fig. 2, e) (vs. last ambulatory legs with 2 spines) (Fig. 3F-G; 5G).

#### Taxonomic key to the species:

1. G1 distal segment short hook-like, last ambulatory leg merus with single spine... ***Jonas distinctus* (De Haan, 1835)**
  - G1 distal segment long, filamentous, last ambulatory leg merus without spine or one to three spines...2
2. Supraorbital spine distinctly longer than the bifid rostrum...3
  - Supraorbital spine as long as or shorter than bifid rostrum...5
3. Merus of the last ambulatory legs with three spines ...4
  - Merus of the last ambulatory legs with two spines...***J. bispinosus* sp. nov.**
4. Carapace dorsal surface uniformly granulated... ***Jonas choprai* Serène, 1971**
  - Carapace dorsal surface not uniformly granulated, large granules clustered on elevated part only... ***Jonas kalpakkamensis* Barathkumar, Das & Satpathy, 2016**
5. Last ambulatory legs merus without any spines...6
  - Last ambulatory legs merus with single spine ... ***Jonas formosae* (Balss, 1922)**
6. Anterolateral and posterolateral teeth prominent... ***Jonas indicus* (Chopra, 1935)**
  - Both anterolateral and posterolateral teeth are relatively reduced in size...7

7. First three anterolateral teeth only distinct, posterolateral teeth almost obsolete... *Jonas macrophthalmus* Hombron & Jacquinot, 1846

- Posterolateral and anterolateral spines are visible ... *Jonas leuteanus* Ward, 1933

## 5. CONCLUSION

The discovery and description of *Jonas bispinosus* sp. nov. from the subtidal mudflats off Digha Mohana, West Bengal, add a new taxon to the family Corystidae and represent the eighth valid species of the genus *Jonas* worldwide. The species is clearly separable from all its congeners. This record constitutes the fourth species of *Jonas* known from India and further emphasizes the rich yet underexplored brachyuran diversity of the Bay of Bengal. The present study highlights the significance of detailed morphological investigations and continued sampling of subtidal habitats to improve our understanding of crustacean biodiversity along the Indian coast.

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### Author Contributions

SM conducted field studies, collected & identified the specimen. SM & PC jointly drafted the manuscript & prepared the photo plates.

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### Conflict of Interest

The authors declare that they have no conflicts of interests, competing financial interests or personal relationships that could have influenced the work reported in this paper.

### Informed consent

Not applicable.

### Ethical approval & declaration

In this article, as per the mandate animal ethical guidelines followed in the Zoological Survey of India, the authors reported a new species (*Jonas bispinosus* sp. nov. (Decapoda: Brachyura: Corystidae)) from India. The ethical guidelines for the collections of specimens are followed in the study. The Animal ethical guidelines are followed in the study for species observation, identification & experimentation.

### Data and materials availability

All data associated with this study are present in the paper.

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