

# New record of *Baruna species* (Crustacea: Decapoda: Camptandriidae) in Indonesian waters

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**Abstract**. The genus *Baruna* Stebbing, 1904, is characterized by its subquadrangular carapace, smooth or granulated surface often covered with setae, and distinct male first gonopod and ambulatory legs. Four species of *Baruna* have been recognized, all found in the Indo-West Pacific, with only *Baruna trigranulum* (Dai & Song, 1986) recorded in Indonesian waters. This paper reports two species collected from muddy and mangrove areas in West Nusa Tenggara, *Baruna socialis* Stebbing, 1904, and *Baruna trigranulum* (Dai & Song, 1986). The presence of *Baruna socialis* in the mangrove area of Dompu, Sumbawa, is the first record for this species in Indonesia. The findings emphasize the broader distribution of *Baruna socialis* and the extended range of *Baruna trigranulum* within Indonesia. In this paper, these two species are diagnosed and analyzed. A morphological comparison of the four species known in the genus is provided.

Key Words: Baruna socialis, Baruna trigranulum, mangrove crab, a new record, Indonesia.

**Introduction**. Brachyuran crabs, commonly called true crabs, constitute a highly diverse and ecologically significant infraorder within Decapoda. These crabs are essential to coastal and estuarine ecosystems, influencing sediment dynamics, nutrient cycling, and trophic interactions. Brachyuran crabs of the family *Camptandriidae are* commonly found in estuarine environments, mangrove-associated mudflats, and open mudflat habitats within the Indian Ocean and Western Pacific region (Jones & Clayton 1983). Globally, this family comprises approximately 42 species distributed across 24 genus (Ng et al 2008; Ahyong 2014; Naruse et al 2015).

The brachyuran crabs of Indonesia comprise 437 species belonging to 196 genus, with the family *Camptandriidae* represented by four genus: *Baruna, Cleistostoma, Paracleistostoma,* and *Takedellus* (Rahayu & Setyadi 2009; Suharsono 2014; Rahayu & Widyastuti 2018; Gesang et al 2021; Murniati et al 2022). The genus *Baruna* Stebbing, 1904, comprises small estuarine crabs commonly found in intertidal and coastal environments, with a particular prevalence in mangrove forests, mudflats, and sandy shorelines across the Indo-Pacific region. In a recent collection around Sumbawa and Lombok Island, two species of camptandriid crab of the genus *Baruna* Stebbing, 1904, were gathered. They are *B. socialis* and *B. trigranulum. B. socialis* was first discovered by Stebbing in 1904 in Ceylon (Sri Lanka) and is also found in Madras, India, and Peninsular Malaysia (Harminto & Ng 1991). Its presence in Dompu, Sumbawa (West Nusa Tenggara) is a new record for Indonesia. *B. trigranulum*, previously known from Maluku and Papua in eastern Indonesian waters (Rahayu & Ng 2003), extended its distribution to the west (Lombok Islands).

At present, four species included in the genus *Baruna*, *Baruna socialis* Stebbing, 1904, *Baruna trigranulum* (Dai & Song, 1986), *Baruna minuta* Harminto & Ng, 1991 and *Baruna sinensis* Tan & Huang, 1995 (Ng et al 2008) distributed in the Indo-West Pacific. This study aims to enhance the identification and classification of *Baruna* species by providing a comparative analysis of their morphological characteristics. Furthermore, it investigates the habitat distribution of *B. socialis* and *B. trigranulum*, particularly in environments that deviate from previously documented records. By integrating morphological comparisons with habitat assessments, this research contributes to a more

comprehensive understanding of species differentiation and ecological adaptability within the genus Baruna.

**Material and Method**. This study was conducted in the mangrove areas of Dompu, Sumbawa, West Nusa Tenggara (8° 34′ 55,73″ S; 118° 23′ 41,78″ E), on May 15, 2022. It was also conducted in an earth pond for sea cucumber at Lungkak, East Lombok, West Nusa Tenggara (8° 47′ 23,5″ S; 116°30′ 11,39″ E) (Figure 1) on January 5, 2022, and February 5, 2022.

Specimens were collected by hand, preserved in 70% ethanol, and deposited at the Museum Zoologicum Bogoriense (MZB) under the National Research and Innovation Agency (BRIN) in Cibinong, Indonesia. Measurements are in mm and refer to the carapace width (measured at the broadest point) and length (measured from the tip of the frontal margin to the posterior margin of the carapace). The abbreviation G1 denotes the male first gonopod. Specimen identification was performed using the taxonomic keys and morphological descriptions provided by Harminto & Ng (1991) and Tan & Huang (1996).

#### Material examined

**Baruna socialis Stebbing, 1904**. 11 males  $(3.4 \times 2.8 \text{ mm} - 6.4 \times 4.5 \text{ mm})$ , 5 females  $(3.4 \times 2.6 - 5.8 \times 4.1 \text{ mm})$ , 6 ovigerous females  $(4.7 \times 3.6 \text{ mm} - 6.3 \times 5.6 \text{ mm})$  (MZB Cru 5891); Dompu, Sumbawa, West Nusa Tenggara;  $8^{0}34'55,73''$  S;  $118^{0}23'41,78''$  E; coll. SAP. Dwiono, 15 May 2022.

**Baruna trigranulum** (Dai & Song 1986). 4 males  $(3.8 \times 2.8 \text{ mm} - 4.1 \times 3.1 \text{ mm})$ ; 5 females  $(3.7 \times 2.8 \text{ mm}-6.9 \times 5.6 \text{ mm})$ ; 1 ovigerous female  $(7.9 \times 6.8 \text{ mm})$  (MZB Cru 5892), Lungkak, East Lombok, West Nusa Tenggara,  $8^047'23,50''$  S;  $116^030'11,39''$  E coll. SAP. Dwiono, 5 January 2022. — 9 males  $(2.5 \times 1.3 \text{ mm} - 6.2 \times 4.5 \text{ mm})$ ; 10 females  $(3.4 \times 2.8 \text{ mm} - 7.2 \times 5.6 \text{ mm})$ ; 1 ovigerous female  $(7.6 \times 6.3 \text{ mm})$  (MZB Cru 5893), Lungkak, East Lombok, West Nusa Tenggara,  $8^047'23,5''$  S;  $116^030'11,39''$  E; coll. SAP Dwiono, February 2022.

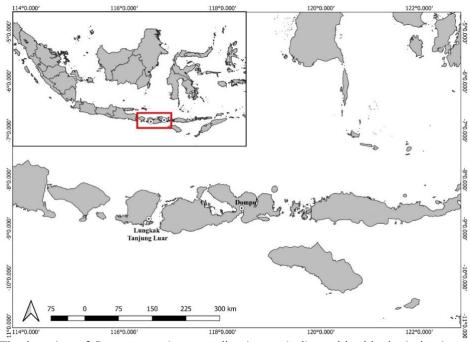


Figure 1. The location of *Baruna* specimens collection as indicated by black circles in a mangrove ecosystem location of Dompu and Lungkak, West Nusa Tenggara, Indonesia.

**Results**. Twenty-two *B. socialis* and 30 *B. trigranulum* specimens were collected from mangrove areas in Dompu, Sumbawa, West Nusa Tenggara, and the earth pond at Lungkak, East Lombok, and West Nusa Tenggara, respectively. The results of the comparative analysis of morphology and the habitat of the four species known so far in the genus *Baruna* are given below (Tables 1 and 2).

## Baruna socialis Stebbing, 1904

**Identification**. The specimens agree well with the description of the lectotype of Baruna socialis by Harminto and Ng (1991) except for the slight difference in the tip of G1, as the spines on the tip are short in this study (Figures 3D, E) versus the long spine in the lectotype (Harminto & Ng 1991: Figures 2c, d). The characteristics that easily separated B. socialis from three other species in the genus are as follows: the carapace is subquadrate, broader than long, with three lobes on the anterolateral margin (Figure 2A). The first lobe, closest to the orbit, is the largest, with seven small marginal granules; the second lobe has four small granules, and the last lobe is the smallest, with one blunt tooth. Male chelae are large, swollen, equal, or sub-equal in size, with smooth dactyls and hairless palms (Figure 3A). The frontal margin is slightly depressed, covered with soft hairs, with a smooth or slightly granulated edge. Orbits large, eyestalks stout. The buccal cavern is very large, broader than long, and somewhat transversely oval; the Ischium of the third maxilliped subquadrat is longer than the merus, the margin of the merus rounded, the carpus longer than propodus longer than the dactylus. Exopod reaching the distal margin of merus, slightly swollen medially, flagellum long (Figures 3B, 3C). Ambulatory legs are short, robust, and covered with dense, stiff hairs obscuring the armature ischio-basis with several welldeveloped granules on the ventral margin (Figures 2A and 4A). Male pleon is relatively narrow, telson longer than somite 6, distal margin rounded (Figure 2B). G1 forms a large curve, slightly dilated medially, and with several spines on the tip (Figures 3D and E). In the female, the lobes on the anterolateral margin have stronger granules; the pleon is broad and subrectangular, the telson is broadly triangular (Figure 4B); the vulva is large and ovate (Figure 4C).



Figure 2. Baruna socialis Stebbing, 1904: male,  $6.4 \times 4.5$  mm: A) overall dorsal view; B) male thoracic sternum and pleon.

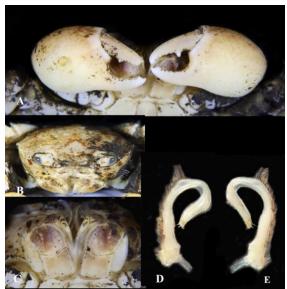


Figure 3. Baruna socialis Stebbing, 1904: male, $6.4 \times 4.5$  mm: A) chelipeds; B) front; C) third maxilliped; D; E) G1.

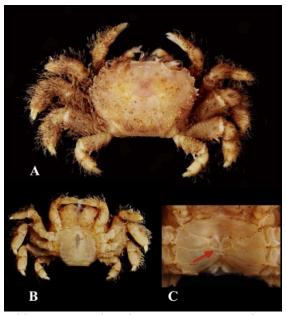


Figure 4. Baruna socialis Stebbing, 1904: female,  $4.3 \times 3.1$  mm: A) overall dorsal view; B) female thoracic sternum and pleon; C) sterno-abdominal cavity and vulva.

## Baruna trigranulum (Dai & Song 1986)

**Identification**. The species has the following specific characteristics: The carapace is subquadrangular, broader than long, and has an entire anterolateral margin (Figures 5A, 7A). The posterolateral margin is smooth or with very small granules, Orbits large, and eyestalks stout (6B). The outer surface of the third maxilliped has short hairs. (Figures 5B, 6C). Ischium of third maxilliped subquadrat, longer than merus, merus rounded. The carpus is longer than the propodus, and the propodus is longer than the dactylus. Exopod reaching the distal margin of merus, slightly slender medially, flagellum long (Figure 6C). Male chelae are swollen, equal to subequal, outer surface smooth, without bristles of hairs (Figures 5A, 6A). Ambulatory legs short, stout, with short bristles and woolly hairs; ischiobasis smooth on ventral surfaces; male pleon relatively broad, telson longer than broad, longer than somite 6, with rounded distal margin (Figure 5B). G1 tip is rounded, with several long, stiff subapical spines on one edge and a single long subapical process on the other (Figures 6D, E).

In the female, the carapace surface is gently granulated, with a posterolateral margin with numerous small and large granules (Figure 7A). Merus of ambulatory legs with scattered small granules. The female pleon is broad, elongated, telson broad with a distal margin (Figure 7B); the vulva is large, rounded, and positioned close to each other (Figure 7C).



Figure 5. Baruna trigranulum (Dai & Song 1986): male,  $5.3 \times 4.3$  mm: A) overall dorsal view; b) male thoracic sternum and pleon.

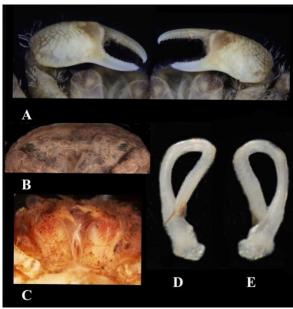


Figure 6. Baruna trigranulum (Dai & Song 1986): male, 5.3 × 4.3 mm: A) cheliped; B) front; C) third maxilliped; D; E) male G1.



Figure 7. Baruna trigranulum (Dai & Song, 1986): female,  $3.9 \times 3.1 \text{ mm}$  A) overall dorsal view; B) female thoracic sternum and pleon; C) female sterno-abdominal cavity and vulva.

**Discussion**. The genus Baruna was characterized by the presence of seven distinct, free male abdominal segments, whereas in *Leipocten*, the second and third male abdominal segments are fused. As a result, both genera have been confirmed as synonymous, with Baruna having taxonomic priority, as reported by Harminto and Peter (1991). The genus *Baruna* comprises four species: *B. minuta, B. sinensis, B. socialis*, and *B. trigranulum*, with their morphological differences presented in Table 1 (Stebbing 1904, Kemp 1915, Harminto & Ng 1991, Tan & Huang 1995). *Baruna socialis* and *B. trigranulum* can be easily distinguished by the form of the anterolateral margin of the carapace, which has three lobes on the anterolateral margin (without any lobe in *B. trigranulum*), ischio-basis of ambulatory with several well-developed granules on ventral margin (without any granules on ischio-basis of ambulatory legs in *B. trigranulum*). The shape and position of the female vulva for the two species are described and figured for the first time in this study.

In this study, the two species were collected from Lesser Sunda Island (Sumbawa and Lombok Island). Based on a comparative analysis of the distribution and habitat of four species of Baruna (Table 2), the discovery of Baruna socialis in the mangrove area of Dompu, Sumbawa, marks the first recorded occurrence of this species in Indonesia. B. socialis were collected on rotten wood and among oysters that attached to rocks on muddy substrates. Baruna socialis was previously found in the waters of Sri Lanka, Chilka Lake Madras Kerala, India, and Trengganu, Malaysia. It occupies habitats such as brackish or saltwater lakes, cavities within marine laterite blocks, and areas among shells in mangrove oyster beds (Stebbing 1904, Kemp 1915, Harminto & Ng 1991; Sreeraj et al 2023; Valarmathi 2024). B. trigranulum is widely distributed in the Indo-West Pacific Region, Andaman Sea (Naiyanetr 1980); Taiwan (Sakai 1939, 1976); Malaysia, Singapore, Thailand, Australia (Tweedie 1937, Snelling 1959, Barnes 1967, Lundoer 1974, Frith et al 1976, Harminto & Ng 1991), Papua and Maluku, Indonesia (Rahayu & Ng 2003) and Brunei Darussalam (Hossain et al 2014). Baruna trigranulum was collected in an earth pond for the sea cucumber near the mangrove area in Lombok waters. This report extends the distribution of Baruna trigranulum to the western part of Indonesia. Baruna trigranulum is very common in or under rotten wood and under loose bark of prop roots and crevices (Harminto & Ng 1991).

Morphological difference between the four species of *Baruna* 

Table 1

	Baruna minuta	Baruna sinensis	Baruna socialis	Baruna trigranulum
Carapace	1.1–1.2 times as broad as long	1.3-1.4 times as broad as long	1.4-1.5 times as broad as long	1.2-1.3 times as broad as long
Third maxilliped	Outer surface with short hairs.	Outer surface sparsely setose	Outer surface with short hairs	Outer surface with short and danse hairs.
Cheliped male	Chelae swollen, outer surface with median longitudinal row of granules	Chelae large, not swollen, outer surface with median line of granules	Chelae swollen, upper outer surface with small granules	Chelae swollen, outer surface smooth.
Cheliped female	na	na	Chelae less robust and not swollen, outer surface covered with numerous bristles and hairs, without any granules	Chelae less robust and slender outer surface covered with numerous bristles and hairs, wit three rows of sharp granules ar tubercles on dorsal margin
Ambulatory legs	short, stout, with long woolly hairs but no bristles; surface smooth	Short, stout, with dense, long hair; surface granular	Short, robust, covered with dense, stiff hairs obscuring armature	Short, stout, with short bristles and woolly hairs
G1	tip cone-shaped, with two or three stiff large subapical spines on one edge, other tip pointed with long spine	Tip tapering, with one strong pointed subapical process.	Tip lobiform, with several spines on one subapical edge, other lobe long, gradually tapering	Tip rounded, with several long stiff subapical spines on one edge; other edge with one long subapical process
Vulva	na	na	Large, ovate, well separated	Large rounded, closed to each other
Habitat	Cavities of marine laterite blocks, soft and coralline rocks; in clumps of mud on rocks	Estuaries: sandy mud with shell	Brackish water or salt water lakes; cavities of marine laterite blocks; among shells in mangrove oyster-bed	Mangrove area: under rotten wood, under loose bark of proprosts and crevices, as well as among clumps of clams (Isognomon) or mussels (Pernoviridis, Mytilopsis sallei) growin on mangrove roots, rocks, on the floor of mangrove swamps or other substrates
Distribution	Singapore; Peninsular Malaysia; Philippines.	Tainan County,Taiwan; Fujian, China;	Sri Lanka; Chilka Lake, Madras, India; Trengganu, Malaysia; Dompu, Sumbawa, Indonesia	Singapore;Peninsu-lar Malaysia Thailand; Andaman Sea; Australia; Taiwan; Brunei Darussalam; Halmahera and Irian Jaya, Indonesia; Lombok Indonesia
Source	Harminto & Ng 1991	Tan & Huang 1995	Stebbing 1904; Kemp 1915; Harminto & Ng 1991	Harminto & Ng 1991

Species	Distribution	Habitat	Source
<i>Baruna minuta</i> Harminto & Ng 1991	Singapore; Peninsular Malaysia; Philippines.	Cavities of marine laterite blocks, soft and coralline rocks; in clumps of mud on rocks	Harminto & Ng 1991
<i>Baruna sinensis</i> Tan & Huang 1995	Tainan County,Taiwan; Fujian, China; Hong Kong	Estuaries: sandy mud with shell	Tan & Huang 1995; Wong et al 2024
<i>Baruna socialis</i> Stebbing 1904	Sri Lanka; Chilka Lake, Madras, and Kerala, India; Trengganu, Malaysia; Dompu, Sumbawa, Indonesia(In this study)	Brackish water or salt water lakes; cavities of marine laterite blocks; among shells in mangrove oyster-bed	Stebbing 1904; Kemp 1915; Harminto & Ng 1991; Sreeraj et al 2023; Valarmathi 2024
<i>Baruna</i> <i>trigranulum</i> (Dai & Son 1986)	Singapore;Peninsu-lar Malaysia; Thailand; Andaman Sea; Australia; Taiwan; Brunei Darussalam; Halmahera and Irian Jaya, Indonesia; Lombok, Indonesia	Mangrove area: under rotten wood, under loose bark of prop roots and crevices, as well as among clumps of clams (Isognomon) or mussels (Perna viridis, Mytilopsis sallei) growing on mangrove roots, rocks, on the floor of mangrove swamps or other substrates.	Tweedie 1937; Sakai 1939; Snelling 1959; Barnes 1967; Lundoer 1974; Sakai 1976; Frith et al 1976; Naiyanetr 1980; Dai & Song 1986; Harminto & Ng 1991; Rahayu & Ng 2003; Hossain et al 2015

**Conclusions**. The presence of *B. socialis* in the mangrove area of Dompu, Sumbawa, is the first record for this species in Indonesia. It showed that the distribution of this species is broader than previously reported. The presence of *B. trigranulum* in Lombok, Nusa Tenggara Timur, is unsurprising since this species has a wide distribution in the Indo-West Pacific. However, the habitat is different. The study found the presence of *B. trigranulum* lives among rotten wood or crevices, it inhabits the bank of the earth pond of sea cucumber's culture, among oysters and rotten wood.

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**Conflict of interest**. The authors declare no conflict of interest.

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