



## ***Babamunida debrae*, a new species of squat lobster (Crustacea: Anomura: Galatheoidea: Munididae) from the Hawaiian Islands**

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### **Abstract**

A new species of squat lobster, *Babamunida debrae*, was found in shallow waters of the west coast of Hawai‘i. It is readily distinguished from all the other species of the genus by the presence of a pair of spines on the second abdominal tergite. *Babamunida debrae* is the second species of the genus from Hawaii and seventh species of the genus from the Indo-Pacific.

**Key words:** Crustacea, Anomura, Munididae, Galatheoidea, squat lobster, *Babamunida*, taxonomy, Hawaii, shallow-water

### **Introduction**

Recently an enthusiastic team of divers has been sharing their interest in the beauty of the marine organisms of the Hawaiian Islands. An unusual squat lobster in Hawaii came to my attention through John P. Hoover, the author of the book “Hawai‘i’s Sea Creatures, a Guide to Hawai‘i’s Marine Invertebrates,” who forwarded photos of a specimen shot by his colleagues to me for identification. It was a relatively small specimen sheltering in a hole on a volcanic lava wall. Relatively short, spinose pereopods 1 with iridescent setae discernible in the photos bore resemblance to *Munida olivarae* Macpherson, 1994 as observed by Kawamoto & Okuno (2003) in holes on coral rocks/walls in shallow waters of the Ryukyu Islands. The colouration of the carapace and pereopods 2–5 of this specimen appeared to fit the colour illustration of *M. olivarae* by Macpherson (1994) but the P1 showed a different colour pattern. This squat lobster was first observed by Debra Newbery on 17 February 2010 but material was not available. At my request Dennis McCrea and Debra Newbery caught two specimens, and on examination, these turned out to be an undescribed species of *Babamunida* belonging to the family Munididae of the Galatheoidea, which is hereby described and illustrated.

### **Material and methods**

Measurements of specimens indicate the postorbital carapace length. Terminology used mainly follows Baba *et al.* (2009). Abbreviations used in the text include: Mxp3 (maxilliped 3), P1 (pereopod 1, cheliped), P2–P4 (pereopods 2–4, first to third walking legs), P5 (pereopod 5). The type material is deposited in the collection of the National Museum of Natural History, Smithsonian Institution, Maryland (USNM).

### **Systematics**

#### **Family Munididae Ah Yong, Baba, Macpherson and Poore, 2010**

## ***Babamunida debrae*, new species**

(Figs. 1–3)

**Type material.** Holotype female, 4.9 mm (USNM 1147923), paratype male, 3.3 mm (USNM 1147924); west coast of the island of Hawaii (Hawai‘i), 19°40.991’N, 156°02.192’W, 23–26 m deep, 7 April 2010, coll. Dennis McCrea and Debra Newbery.

**Description.** *Carapace*: 1.2 times as long as broad (1.7 times including rostrum), moderately convex from side to side. Dorsal surface sparsely furnished with iridescent setae, moderately strigose; 4 or 5 pairs of epigastric spines, arranged in transverse line in paratype, lateral 2 pairs somewhat posterior to level of mesial 2 pairs in holotype; mesial second pair situated behind supraocular spines, larger than remainder; 8 striae between epigastric row of spines and shallow cervical groove; first stria incomplete with several interruptions (in holotype, with 1 spine behind midpoint between mesial second and third epigastric spines on left side); second stria uninterrupted, with accompanying spine (parahepatic spine) directly lateral to it; fourth stria short, medially placed; fifth stria uninterrupted, laterally reaching cervical groove; sixth stria very short; seventh and eighth striae uninterrupted; hepatic and anterior branchial regions without dorsal spines. Mid-transverse stria interrupted behind bifurcating points of cervical groove, followed by 3 uninterrupted and interrupted striae alternately arranged. Pair of distinct postcervical spines. Branchiocardiac grooves not distinct. Frontal margin convexly oblique and minutely dentate between supraocular and antennal spines. Orbit with distinct spine on outer part slightly ventral to frontal margin. Antennal spine relatively small, subequal to anterolateral spine of carapace. Anterior branchial margins subparallel, each bearing 4 spines (posteriormost spine obsolete in paratype); posterior branchial margins convexly convergent. Rostrum spiniform, length 0.44–0.47 times that of remaining carapace; dorsal longitudinal ridge distinct and minutely dentate on rostral spine, continued onto epigastric region in paratype, barely discernible behind rostral spine in holotype; lateral margins smooth and ridged.

*Epistomal ridges*: Laterally ending at point distantly anterior to excretory pore of antennal article 1.

*Sternum*: Slightly broader than long. Surface smooth. Sternite 3 with anterior margin bilobed, separated by indistinct median notch; lateral margins laterally expanded on posterior half. Sternite 4 subtrapezoid, 2.3 times as broad as sternite 3, anterior margin relatively broad but slightly narrower than posterior margin of sternite 3; lateral margins convexly divergent posteriorly; surface with pair of obsolescent striae in posterior portion.

*Abdomen*: Somites 2–4 with sparse, stiff, iridescent setae. Tergites 2–6 with 2 transverse striae, each stria preceded by groove; tergites 5 and 6 with 2 posteriorly convex striae, anterior stria short on tergite 5, interrupted into 4 parts on tergite 6, posterior stria uninterrupted on tergite 5, interrupted medially on tergite 6; anterior stria of tergite 2 with pair of submedian spines; lateral portions with few short striae near pleura. Telson 1.5–1.6 times broader than long, subdivision incomplete.

*Eyes*: Cornea globular, somewhat broader than and more than half as long as ocular peduncle, overreaching distal third of rostral spine; breadth 0.4 distance between antennal spines. Short eyelashes present along mesial half of ocular peduncle.

*Antennule*: Article 1 moderately elongate; distomesial spine longer than distolateral spine; 2 lateral spines, distal spine slightly overreaching distomesial spine.

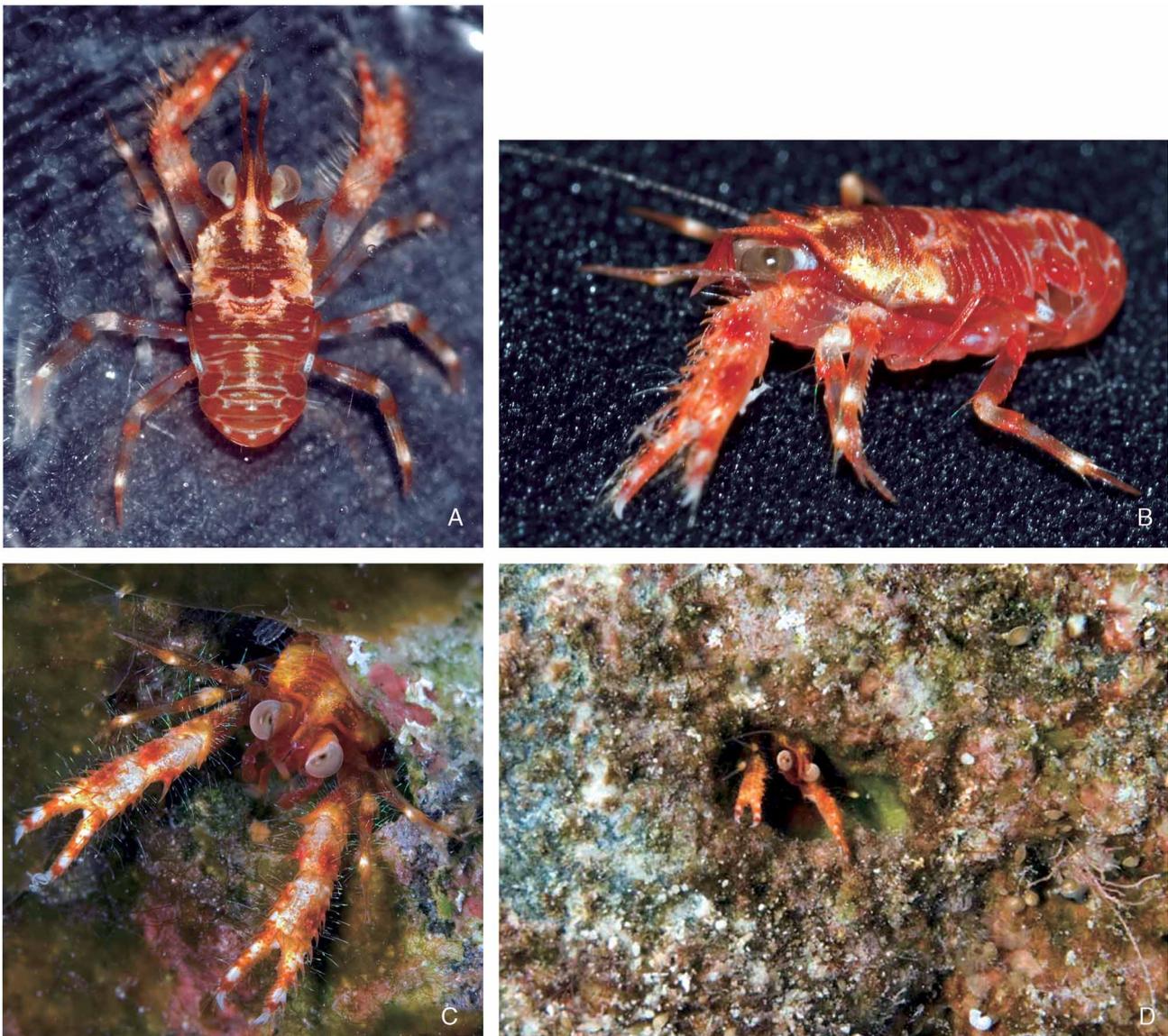
*Antenna*: Article 1 with distomesial spine barely reaching end of article 2; article 2 with distomesial and distolateral spines, distomesial spine reaching end of article 3, distolateral spine terminating in midlength of article 3; article 3 unarmed.

*Mxp3*: Lateral surface nearly glabrous. Basis with distinct terminal denticle, proximally followed by rudimentary denticles. Ischium with flexor distal spine well developed, extensor distal spine much smaller than flexor distal; crista dentata with 20–23 small denticles along entire length. Merus 1.5 times as long as ischium, as long as propodus and dactylus combined; flexor margin with 3 strong spines equidistant from one another, proximal spine situated at proximal third (median spine very small on right side in holotype, rudimentary in paratype); extensor margin with small but distinct distal spine. Carpus unarmed.

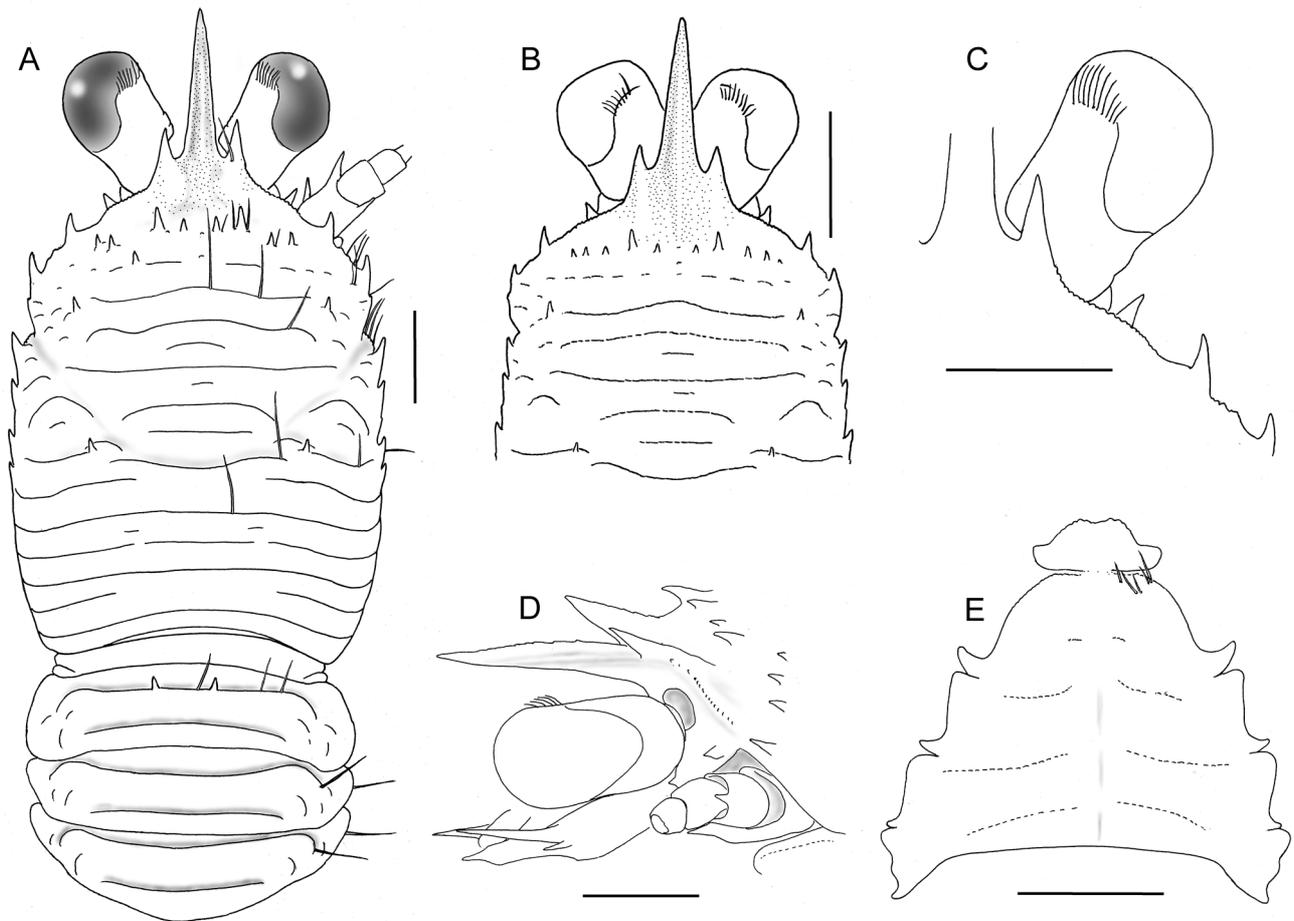
*PI*: Stout, spinose, bearing relatively long, stiff, iridescent setae especially along mesial and lateral margins; length 2.2–2.5 times postorbital carapace length (1.6–1.7 times carapace length including rostrum). Ischium unarmed. Merus as long as carpus and palm combined; with 4 distal spines, distomesial spine prominent, reaching midlength of carpus; dorsal surface with a few scattered small spines on distal portion. Carpus 1.2 times as long as broad, with 3 rows of dorsal spines and row of 3 large mesial marginal spines (median spine prominent but smaller than distomesial spine of merus); lateral margin unarmed. Palm 1.5–1.6 times as long as broad, 1.2–1.3 times length of carpus; 5 rows of spines: lateral row of strong spines continued onto fixed finger, 3 rows of dorsal spines,

all acute (in holotype, additional small spines in line with dorsal midline of movable finger), and ventromesial row of 3 strong spines. Fingers 1.3 times as long as palm, distally ending in strong, incurved spines to cross each other when closed; movable finger with row of 6 spines on mesial margin; opposable margins not gaping, each with obtuse denticles along entire length, and that of fixed finger with somewhat larger process at proximal fourth.

*P2–4*: Slender, with scattered, iridescent, stiff setae along extensor margins. Meri successively shorter posteriorly; *P2* merus  $\frac{2}{3}$  length of carapace, 1.1 times longer than *P3* merus, 1.5 times length of *P2* propodus; extensor margin with fine plumose setae, distally ending in distinct spine on *P2* and *P3* (proximally followed by 2 or 3 spines on *P2* in holotype), unarmed on *P4*; flexor lateral margin distally ending in strong spine much larger than extensor distal spine, proximally followed by 3 successively diminishing spines; flexor mesial margin with distal spine as large as flexor lateral distal spine. Carpi subequal in length on *P2–4*; extensor margin with 2–4 spines (terminal larger) on *P2* and *P3*, small terminal spine only on *P4*; flexor margin with acute distal spine. Propodi subequal in length; 4.3–4.6 times as long as broad; extensor margin unarmed; flexor margin ending in fixed spine, with 9 movable slender spines on *P2* and *P3*, 7 or 8 spines on *P4*; terminal movable spine contiguous to fixed terminal spine. Dactyli subequal on *P2–4*, slender and distally curved; length 0.8 that of propodus; extensor margin with long simple stiff setae, row of short plumose setae in proximal half; flexor margin with 7 movable spines along entire length.



**FIGURE 1.** *Babamunida debrae*, n. sp., colour images taken by D. McCrea. A, holotype, female, 4.9 mm (USNM 1147923). B, same, lateral view. C, in situ image of a squat lobster in a lava hole, 26 m deep, west coast of Hawai'i, not collected. D, same.



**FIGURE 2.** *Babamunida debrae*, n. sp., A, C–E, female holotype (USNM 1147923); B, male paratype (USNM 1147924). A, carapace and abdomen, dorsal. B, anterior half of carapace, dorsal. C, anterior part of cephalothorax, right, dorsal. D, same, left, lateral. E, sternal plastron. Scales = 1 mm.

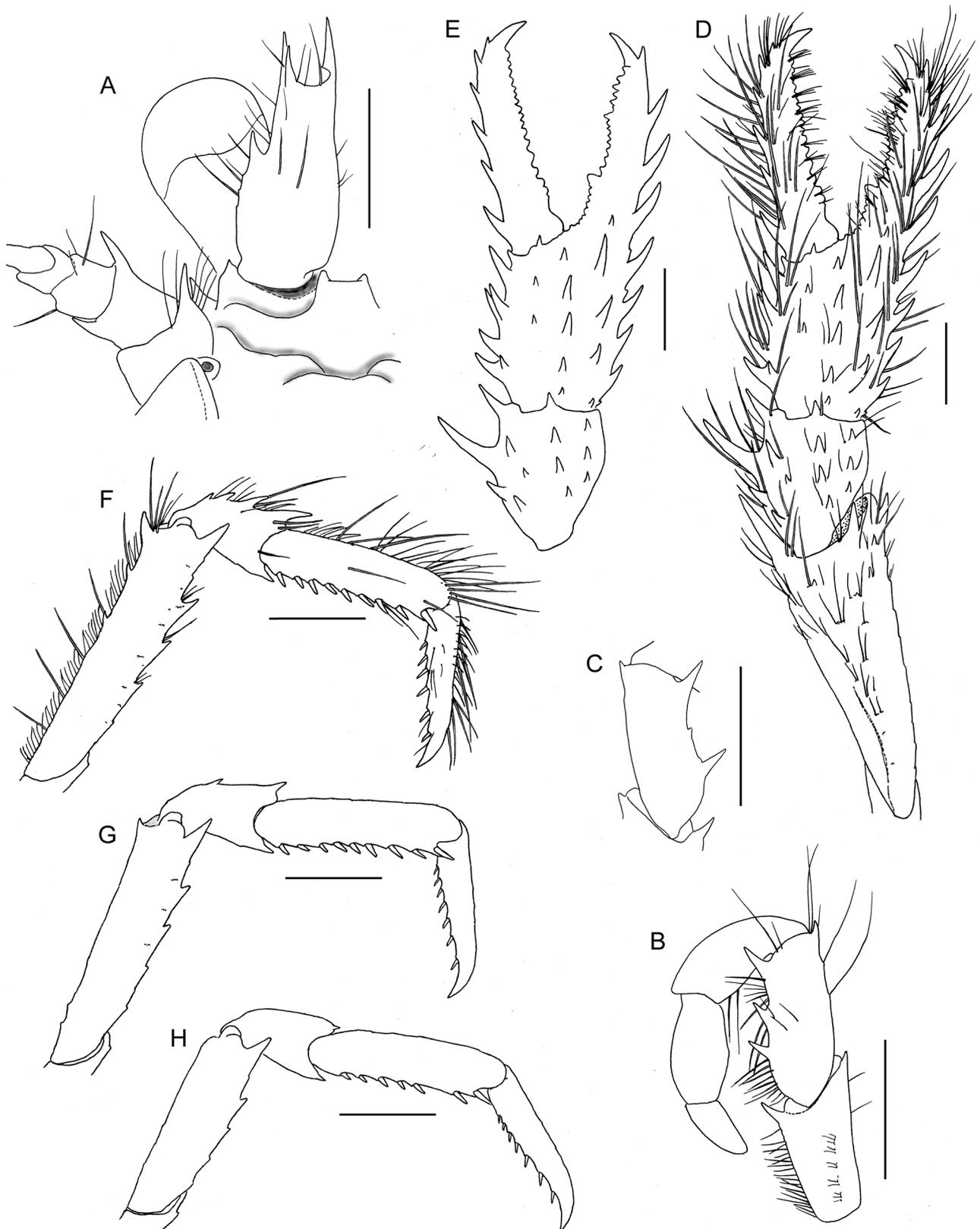
**Colour in life (based on photos provided by Dennis McCrea).** Base colour deep red on body and appendages. Carapace with longitudinal pale orange stripe in midline from base of rostrum to midpoint of gastric region; hepatic, anterior branchial and anterior cardiac regions pale orange. Abdomen with 3 whitish spots arranged transversely on each anterior part of somites 2–4. P1 merus pale orange on median part; carpus and palm dorsally pale orange along mesial surface; fingers with 2 pale orange bands (alternating red and pale orange, distal part pale). P2–4 with pale orange bands on median part of merus, around junction of merus and carpus, and distal part of propodus. P5 merus whitish on proximal half.

**Habitat.** Notes by Dennis McCrea (personal communication, 28 Apr 2010): the squat lobsters were usually found at a depth of 23 to 26 meters, always found sheltering in holes in lava rocks/walls that face west or southwest. There was usually water movement—surge and current in the area, and quite frequently a mixing of freshwater as a result of seepage of rainwater through slits/crevices in the volcanic rocks of the island. The water temperature at time of collections was 22.2°C, with local summer water temperature as high as 25.5°C.

The female (holotype) was enticed out using a small piece of tuna, and then captured. The male specimen (paratype) was captured by threatening with a finger and then blocking the hole with a toothpick.

**Etymology.** The name is dedicated to Debra Newbery, who first recognised the existence of the species.

**Remarks.** Schnabel *et al.* (2009) described *Babamunida kanaloa* from French Frigate Shoals and south of Molokai of the Hawaiian Islands, possibly the seventh species of Hawaiian galatheoidean squat lobsters (including three species of *Munida* with no morphological description reported by Titgen (1988) and Chave & Malahoff (1998)) and the first species of the genus *Babamunida* from Hawaii.



**FIGURE 3.** *Babamunida debrae*, n. sp., female holotype (USNM 1147923). A, anterior part of cephalothorax, showing epistome, antennule, antenna and eye, right, ventral. B, endopod of left Mxp3, lateral. C, merus of right Mxp3, lateral. D, right P1, dorsal. E, same, denuded, proximal articles omitted, dorsal. F, right P2, lateral. G, right P3, setae omitted, lateral. H, right P4, setae omitted, lateral. Scales = 1 mm.

The genus *Babamunida* now contains the following species: *B. brucei* (Baba, 1974) from the east coast of Kenya and Mauritius, in 37–119 m; *B. callista* (Macpherson, 1994) from New Caledonia, Chesterfield Islands, Wallis Islands and Tonga, in 327–590 m; *B. debrae* new species; *B. hystrix* (Macpherson & de Saint Laurent, 1991) from French Polynesia, in 100–300 m; *B. javieri* (Macpherson, 1994) from New Caledonia, Matthew and Hunter Islands, Chesterfield Islands, Fiji, Vanuatu, in 280–460 m; *B. kanaloa* Schnabel *et al.*, 2009 from the Hawaiian Islands, in 223–255 m; and *B. plexaura* (Macpherson & de Saint Laurent, 1991) from French Polynesia, in 110–540 m. The material reported under *Munida brucei* from Hawaii by Chave & Malahoff (1998) is in all probability referable to *B. kanaloa* (see Schnabel *et al.*, 2010).

*Babamunida* was recently transferred to the family Munididae Ahyong *et al.*, 2010. The genus is distinct from *Munida* Leach, 1820 in the epistomal ridge with the lateral end distantly anterior to the excretory pore of the antennal peduncle (Cabezas *et al.* 2008). The dorsal ridge of the rostrum diagnosed for the genus as continuing onto the epigastric region is discernible in the paratype, but obsolete behind the base of the rostral spine in the holotype.

Morphologically, *B. debrae* can be distinguished from all the other species of the genus by having a pair of spines on the second abdominal tergite, which is absent in all congeners. The dorsally less spinose carapace with only a row of epigastric spines, one parahepatic and one postcervical spine on each side as displayed by *B. debrae*, is also possessed by *Babamunida javieri*, *B. callista* and *B. plexaura*. These species share a P1 movable finger that is shorter than 1.5 times the length of the palm. The remaining congeners bear numerous spines on the anterior half carapace and the P1 movable finger more than 1.5 times length of the palm. *Babamunida debrae* differs from the three species above in having four instead of three spines on the branchial margin, the distomesial spine of the antennular basal article distinctly longer than, instead of subequal to, the distolateral spine, the Mxp3 merus 1.5 times longer than, instead of at most subequal to, the ischium, and the P2–4 dactyli 0.8, instead of 0.5 times, as long as the propodus. The new species is somewhat closer to *B. javieri* than *B. callista* and *B. plexaura* in having the thoracic sternite 4 of roughly trapezoid-shape with broad anterior margin and the P2–4 meri with less spinose extensor and more spinose flexor margins, and *B. callista* is unique in having numerous interrupted striae on the dorsal surface of the carapace.

### Key to species of *Babamunida* (modified from Cabezas *et al.* 2008)

1. Abdominal somite 2 with pair of spines on anterior stria ..... *B. debrae* n. sp.
- Abdominal somite 2 unarmed ..... 2
2. Dorsal surface of carapace with numerous small spines on anterior half ..... 3
- Dorsal surface of carapace with row of epigastric spines, pair of parahepatic spines and pair of postcervical spines only ... 5
3. Extensor margins of P2–4 propodi with row of spines along entire length ..... *B. kanaloa* Schnabel *et al.*, 2009
- Extensor margins of P2–4 propodi unarmed or with some proximal spines ..... 4
4. P1 fingers more than 2.5 times as long as palm. Antennular basal article with distomesial spine as long as distolateral spine ..  
..... *B. brucei* (Baba, 1974)
- P1 fingers barely 2 times as long as palm. Antennular basal article with distomesial spine shorter than distolateral spine .....  
..... *B. hystrix* (Macpherson & de Saint Laurent, 1991)
5. Whole posterior margin of third thoracic sternite contiguous to fourth sternite ..... *B. javieri* (Macpherson, 1994)
- Median part of third thoracic sternite contiguous to fourth sternite ..... 6
6. Carapace with numerous striae (ca. 14 on posterior half, including interrupted striae). Anterolateral spine of carapace reaching  
the level of the sinus between rostral and supraocular spines. Carpus of first walking leg with 1 spine on dorsal crest .....  
..... *B. callista* (Macpherson, 1994)
- Carapace with moderately dense striae (ca. 10 on posterior half, including interrupted striae). Anterolateral spine of carapace  
falling short of level of the sinus between rostral and supraocular spines. Carpus of first walking leg with 3 spines on dorsal  
crest ..... *B. plexaura* (Macpherson & de Saint Laurent, 1991)

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## References

- Ahyong, S.T., Baba, K., Macpherson, E. & Poore, G.C.B. (2010) A new classification of the Galatheoidea (Crustacea: Decapoda: Anomura). *Zootaxa*, 2676, 57–68.
- Baba, K. (1974) *Munida brucei* sp. nov., a new galatheid (Decapoda, Anomura) from the east coast of Africa. *Annotationes Zoologicae Japonenses*, 47, 55–60.
- Baba, K., Macpherson, E., Lin, C.-W. & Chan, T.Y. (2009) *Crustacean Fauna of Taiwan: Squat Lobsters (Chirostylidae and Galatheidae)*. National Taiwan Ocean University, Keelung, 311 pp.
- Cabezas, P., Macpherson, E. & Machordom, A. (2008) A new genus of squat lobster (Decapoda: Anomura: Galatheidae) from the South West Pacific and Indian Ocean inferred from morphological and molecular evidence. *Journal of Crustacean Biology*, 28, 68–75.
- Chave, E.H. & Malahoff, A. (1998) *In deeper waters. Photographic studies of Hawaiian deep-sea habitats and lifeforms*. University of Hawai'i Press, Honolulu, viii + 125 pp.
- Kawamoto, T. & Okuno, J. (2003) *Shrimps and crabs of Kume Island, Okinawa*. Hankyu Communications, Tokyo, 174 pp.
- Leach, W.E. (1820) Galatéadées. In: *Dictionnaire des Sciences Naturelles*. F. G. Leveault, Paris, pp. 49–56.
- Macpherson, E. (1994) Crustacea Decapoda: Studies on the genus *Munida* Leach, 1820 (Galatheidae) in New Caledonia and adjacent waters with descriptions of 56 new species. In: Crosnier, A. (Ed.), *Résultats des Campagnes MUSORSTOM, Volume 12. Mémoires du Muséum national d'Histoire naturelle, Paris*, 161, 421–569.
- Macpherson, E. & de Saint Laurent, M. (1991) Galatheid crustaceans of the genus *Munida* Leach, 1818, from French Polynesia. *Bulletin du Muséum national d'Histoire naturelle, Paris*, (4e série) Section A, 13, 373–422.
- Schnabel, K.E., Martin, J.W. & Moffitt, R.B. (2009) Additions to the decapod crustacean fauna of the Hawaiian Islands, III. A new species of the genus *Babamunida* (Crustacea: Galatheidae) from Hawaii based on morphological and molecular evidence. *Zootaxa*, 2130, 21–30.
- Titgen, R.H. (1988) New decapod records from the Hawaiian Islands (Crustacea, Decapoda). *Pacific Science*, 41, 141–147.