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ABSTRACT. – The troglobitic freshwater shrimp genus Edoneus Holthuis, 1978, is revised on the basis of a fresh collection from several caves in Luzon, the Philippines, as well as previously studied collections deposited at the National Museum of Natural History, Leiden. The revised genus is characterized by the absence of an arthrobranch on the first pereiopod, the absence of appendix interna on the endopod of the male first pleopod, the uropodal diaeresis having the outermost spinules distinctly longer than the lateral angle, the short exopodal flagellum and long endopod of the first maxilliped, the presence of a tiny posteromedian projection on the telson, and the short intermediate setae on the distal end of the telson. Morphological comparisons between Edoneus and several morphologically related genera are discussed. Three new species, namely Edoneus erwini, E. sketi and E. marulas, are described and illustrated in detail.

KEY WORDS. – Freshwater shrimp, cave, Atyidae, Edoneus, new species, Philippines.

INTRODUCTION

The cave shrimp genus Edoneus was described by Holthuis (1978), who emphasized several troglobitic characters, including the peculiar gill formula, which had no podobranch and arthrobranch present on the pereiopods or maxillipeds. Balete & Holthuis (1992) reported more specimens of the type species, Edoneus atheatus Holthuis, 1978, from the same cave in northern Luzon, with a corrected name for the type locality. No additional morphological description was added.

Examination of a recent collection from several caves in southern Luzon, the Philippines, revealed the presence of three undescribed species of atyids, which share numerous generic characters with E. atheatus, except for the presence of one arthrobranch on the third maxilliped.

In the present study, we revise the definition of the genus Edoneus to include the new species described here. The sites where the specimens were collected are located in the municipality of Atimonan, Quezon province, about 180 km southwest of Manila. Numerous caves are present in the area but only three were sampled in the present study. The meandering underground rivers and pools of the caves vary from less than a metre to a few metres wide. Samplings were conducted from near the entrance (twilight zone), at the middle, and in the innermost parts of the caves. The number of specimens collected was limited to avoid possible decline of these populations. Aside from shrimps, other aquatic animals found were fishes, leeches, crabs, and snails.

Specimens examined are deposited in Crustacean Collection of the National Museum of the Philippines, Manila (NMCR), and the Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore, Singapore (ZRC). Type material of Edoneus atheatus in the National Museum of Natural History, Leiden, Netherlands (RMNH) has also been re-examined. The rostral formula used follows Bouvier (1925). The abbreviation cl is used for the carapace length, given in millimetres (mm), and measured from the postorbital margin to the posterior dorsal margin of the carapace.
Figs. 5-i), however, showed a lamina-shaped vestigial podobranch at the base of second maxilliped. Holthuis (1978: 220) also described the telson of *E. atheatus* as follows: “short hairs are implanted on the posterior margin of the telson above the spines; the margin itself shows no median tooth.” The examination of topotypical specimens of *E. atheatus* from the type locality in the present study shows that there is a very tiny postmedian projection on the posterior margin of the telson (see Fig. 1A). This structure agrees with that of the new species described herein, and is regarded as diagnostic character for the genus. *Edoneus* thus includes four species, all of which are endemic to Luzon, the Philippines.

*Edoneus* is most similar to *Parisia* Holthuis, 1956, from Madagascar, Australia (Williams, 1964), and Luzon (Cai & Anker, 2004). It can only be differentiated from *Parisia* by the presence of a very small postmedian projection on the telson (vs. postmedian projection on telson absent), the lateral angle of the uropodal diaeresis being distinctly shorter than the outermost spinules (vs. lateral angle of uropodal diaeresis much longer than outermost spinules), and minor differences in the branchial formula, viz., no or one arthrobranch on the base of third maxilliped (vs. one or two arthrobranches). With respect to the short lateral angle of uropodal diaeresis, and the absence of one arthrobranch on the first pereiopod, *Edoneus* resembles to *Lancaris*, a genus that was recently described from highlands of Sri Lanka (Cai & Bahir, 2005). It, however, differs by the absence of an appendix interna on the male first pleopod, which is present on species of *Lancaris*; and the posterior setae on the telson, in which the median pairs of setae are much shorter than the lateral pair (vs. much longer in species of *Lancaris*).

**Edoneus atheatus** Holthuis, 1978

(Fig. 1)


**Material examined.** – Holotype: Male, cl 4.6 mm, RMNH D 31898, the Philippines, Luzon, Isabela Province Maddela district, Cave near Santiago [recte: the Philippines, Luzon, Quirino Province, Aglipay Municipality, Barrio Palasian, cave (no. 6) near Sitio Disiluad, (see Balete & Holthuis, 1992; Fransen et al., 1997)]; coll. F. Brandsma, 1974.

Paratypes: Two females, cl 4.7–4.9 mm, RMNH D 31899, data same as holotype.

Other materials: One male, cl 3.3 mm, 2 females, cl 3.5–3.6 mm, RMNH D 41183, the Philippines, north Luzon, Quirino Province, Aglipay Municipality, Barrio Palasian, Sitio Disiluad. Cave no. 6, coll. D. S. Balete, 30 Dec.1985.

**Diagnosis** – Rostrum short, triangular in lateral view, unarmed, reaching nearly to end of eyes. Eyes small, unpigmented; pterygostomian margin broadly rounded; telson with a very tiny postmedian projection; distal margin with intermediate pairs of setae much shorter than lateral pair of spines; carpus of first pereiopod moderately

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**TAXONOMY**

**Atyidae De Haan, 1849**

*Edoneus* Holthuis, 1978


**Diagnosis.** – Body moderately robust, eyes developed or reduced; rostrum short; pterygostomian margin broadly rounded; supraorbital spine absent; ventral margin of pleura rounded; telson with a very tiny postmedian projection; distal margin with intermediate pairs of setae much shorter than lateral pair of spines; palp of first maxilliped ending in finger-like projection, flagellum of the exopod very short, endopod high, as long as or distinctly exceed the flagellum of exopod in length; pereiopods without exopods; first and second pereiopods with chelae monomorphic, palm well developed, fingers tipped with brushes of long setae, carpus of first pereiopod moderately excavated anteriorly, twice longer than broad; carpus of second pereiopod much slender than previous one, not excavated anteriorly; branchial formula incomplete, with 6 or 7 pairs of gills, no arthrobranch on pereiopods; no arthrobranch, or with only one very small arthrobranch on base of third maxilliped; podobranch of second maxilliped less developed or vestigial; epipods present on first 4 pereiopods; first pleopod of male with endopod sub-rectangular, no appendix interna at endopod; second pleopod of male with appendix masculina rod-shaped, slender, spinose on inner surface; Uropodal diaeresis bearing 14–24 movable spinules, with outermost one distinctly longer than lateral angle. Ovigerous females with large eggs, sized 0.90–1.10 × 0.55–0.60 mm.

**Distribution.** – Known only from several caves in Atimonan, Quezon province and the northern part of Luzon, the Philippines.

**Habitat.** – All four species reported here were found in the subterranean water in caves of Luzon Island, northern Philippines.

**Remarks.** – Three undescribed species of atyids from a recent collection from caves in Luzon, the Philippines, share numerous characters with *Edoneus atheatus* Holthuis, 1978, except for the presence of one arthrobranch on the third maxilliped in the former three. This difference is attributed to interspecific variation. Interspecific variation of the number and size of arthrobranches in the third maxilliped have also been found in the genus *Parisia* (Holthuis, 1956a, b). We redefine the genus *Edoneus* here to include the newly discovered species. In the original description, Holthuis (1978) described the branchial formula as follows: “In all, five pleurobranchs are present at the bases of the pereiopods; no other pleurobranch were observed, neither were any arthrobranches or podobranches.” His figures (Holthuis, 1978: Figs. 5-i), however, showed a lamina-shaped vestigial
excavated anteriorly, twice as long as high; chela 1.7 times as long as broad; fingers as long as palm; carpus of second pereiopod much slender than previous one, not excavated anteriorly, 6.2 times as long as high; chela 2.3 times as long as broad; fingers distinctly longer than palm; branchial formula incomplete, with 6 pairs of gills; no arthrobranch on pereiopods and maxillipeds; podobranch of second maxilliped lamina-shaped; uropod with diaeresis bearing about 15–24 movable spinules, lateral angle much shorter than movable spinules.

**Habitat.**—Collected from large flowing river inside a cave in northern Luzon.

**Remarks.**—Found only from the type locality (Holthuis, 1978; Balete & Holthuis, 1992). Holthuis (1978) described the new genus and new species *Edoneus atheatus*, on the basis of three specimens. Balete & Holthuis (1992) reported some more specimens and provided more detailed information on the type locality, as well as detailed habitat information.

**Distribution.**—Luzon, the Philippines.

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**Fig. 1.** *Edoneus atheatus*. A, telson; B, second maxilliped; C, fist pereiopod; D, second pereiopod; E, uropodal diaeresis. Scale bars: A, E = 0.1 mm; B–D = 0.3 mm. (male, cl 2.9 mm, RMNH).
E. erwini, new species
(Figs. 2, 3)

Material examined. – Holotype: Ovigerous female, cl 5.1 mm, eggs 0.92 × 0.55 mm, NMCR, Bantakay Cave station 2, Luzon, the Philippines, coll. D. E. Husana, 14 Dec. 2002.

Paratypes: Six males, cl 3.7–4.3 mm, 1 female, cl 5.0 mm, 1 ovigerous female, cl 4.4 mm, ZRC 2007.0479, Bantakay Cave station 2, Luzon, the Philippines, coll. D. E. Husana, 14 Dec. 2002.

Other materials: Five males, cl 4.0–4.5 mm, 4 females, cl 4.0–4.8 mm, 1 ovigerous female, cl 4.4 mm, eggs 0.90 × 0.55 mm, ZRC 2007.0480, Bantakay Cave station 2, Luzon, the Philippines, coll. D. E. Husana, 14 Dec. 2002; 3 males, cl 2.8–3.2 mm, 2 females, cl 2.6–4.3 mm, QM Cave station 3, Luzon, the Philippines, coll. D. E. Husana, 14 Mar. 2003; 5 males, cl 2.5–3.2 mm, 5 females, cl 3.2–3.5 mm, QM Cave station 2, Luzon, the Philippines, ZRC 2007.0481, coll. D. E. Husana, 14 Mar. 2003; 1 male, cl 3.3 mm, 4 females, cl 3.6–4.4 mm, 2 ovigerous females, cl 3.9 mm, eggs 1.1x0.6 mm, ZRC 2007.0482, QM Cave station 1, Luzon, the Philippines, coll. D. E. Husana, 14 Mar. 2003; 3 males, cl 3.1–3.7 mm, 4 females, cl 3.5–4.3 mm, 1 ovigerous female, cl 3.4 mm, eggs 0.9 × 0.6 mm, ZRC 2007.0483, QM Cave station 4, Luzon, the Philippines, coll. D. E. Husana, 14 Mar. 2003; 1 male, cl 3.8 mm, 9 females, cl 3.3–4.0 mm, ZRC 2007.0484, QM Cave station 4; Luzon, the Philippines, coll. D. E. Husana, 14 Mar. 2003.

Description. – Rostrum short (Fig. 2A), slightly sloping down anteriorly, reaching to or slightly beyond end of basal segment of antennular peduncle, to near end of second segment, rostral formula 0–2+8–13/2–5, ventral teeth closely placed at anterior portion. Inferior orbital angle acute, below antennal spine; pterygostomian margin sub-rectangular.

Sixth abdominal somite 0.50–0.53 times length of carapace, 1.7 times as long as fifth somite, slightly shorter than telson. Telson (Figs. 2B, C) 3.0 times as long as wide, distal margin rounded, with a very tiny median projection, with 5 pairs of dorsal spinules, and one pair of dorsolateral spinules; distal end with 3–4 pairs of spines, lateral pair longer than intermediate pairs; sublateral pair shortest. Preanal carina (Fig. 2D) low, lacking spine.

Eyes developed, anterior end reaching to 0.7 times length of basal segment of antennular peduncle. Antennular peduncle 0.5 times as long as carapace; basal segment of antennular peduncle as long as combined lengths of second and third segments, anterolateral angle 0.3 times length of second segment, second segment distinctly longer than third segment. Stylocerite reaching 0.8 times length of basal segment of antennular peduncle. Scaphocerite (Fig. 2E) 3.2 times as long as wide.

Incisor process of mandible (Fig. 2F) ending in a row of small teeth, molar process truncated. Lower lacinia of maxillula (Fig. 2G) broadly rounded, upper lacinia elongated, with numerous distinct teeth on inner margin, palp slender. Upper endites of maxilla (Fig. 2H) subdivided, palp short, scaphognathite tapering posteriorly with numerous long, curved setae at posterior end. Distal end of palp of first maxilliped (Fig. 2I) triangular, with a finger-like projection; flagellum of the exopod very short, endopod high, distinctly exceed the flagellum of exopod in length. Second maxilliped (Fig. 2J) typical, except the slightly reduced podobranch. Third maxilliped (Fig. 2K) reaching to middle of third segment of antennular peduncle, with ultimate segment as long as penultimate segment.

Epipods well developed on first four pereiopods. First pereiopod (Fig. 3A) reaching to anterior end of eye; merus 2.0–2.2 times as long as broad, as long as carpus; carpus excavated anteriorly, shorter than chela, 1.2–1.7 times as long as high; chela 1.7–1.9 times as long as broad; fingers varying from distinctly shorter than palm to occasionally as long as. Second pereiopod (Fig. 3B) reaching to end of second segment of antennular peduncle; merus as long as carpus, 5.0 times as long as broad; carpus 1.2 times as long as chela, 4.7 times as long as high; chela 2.3 times as long as broad; fingers1.6 times as long as palm. Third pereiopod (Figs. 3C, D) reaching beyond scaphocerite by 1/3 of propodus, propodus 10 times as long as broad, 6.5 times as long as dactylius; dactylius 2.8 times as long as wide (spines included), terminating in one long claw, 4 or 5 accessory spines on flexor margin. Fourth pereiopod reaching to end of antennular peduncle, similar in form as third one. Fifth pereiopod (Figs. 3E, F) reaching to end of antennular peduncle, propodus 14.4 times as long as broad, 4.0 times as long as dactylius; dactylius 3.3 times as long as wide (spines included), terminating in one claw, with 47–53 spines on flexor margin.

Endopod of male first pleopod (Figs. 3G, I) subtriangular, 2.3 times as long as wide, 1/3 length of exopod, no appendix interna. Appendix masculina of male second pleopod (Figs. 3H, J) sub-cylindrical, reaching slightly beyond half length of endopod. Appendix interna very small, only about 1/5 length of appendix masculina.

Uropodal diaeresis (Fig. 3K) with 16–21 movable spines, outermost one distinctly longer than lateral angle.

Ovigerous females with eggs sized 0.90–1.10 × 0.50–0.60 mm.

Habitat. – This new species were found from two caves, Bantakay Cave and QM (Quezon Mining) Cave. Collection of specimens from the two localities was conducted on 14 Dec. 2002 and 16 Mar. 2003, respectively. QM Cave is located at 14º01'0.06"N 121º47'46.5"E, 156 m above sea level and 8 km away from the sea to its northeast. Its underground river stretches for more than 750 m. The epigean stream that supplies freshwater to this subterranean river sinks into the cave’s main entrance by dropping a height of about four metres before it reaches the first pool, which is about 34 m away from the entrance of the cave. All the specimens coexist in the area and almost evenly distributed from outside to the inside cave except for the light coloured shrimps which were found in the inside pools only. They usually nibble on the skin if you are in the water in contrast to the behaviour of E. atheatus which “seems not to be attracted to human skin...” (Balete & Holtus, 1992: 100). Bantakay Cave, on
Fig. 2. Edoneus erwini, new species: A, cephalothorax and cephalic appendages, lateral view; B, telson; C, distal portion of telson; D, preanal carina; E, scaphocerite; F, mandible; G, maxillula; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped. Scale bars: A, E = 1 mm; B, K = 0.5 mm; C = 0.1 mm; D, F–J = 0.3 mm. (male, cl 4.5 mm, paratype, ZRC).
Fig. 3. *Edoneus erwini*, new species: A, first pereiopod; B, second pereiopod; C, third pereiopod; D, dactylus of third pereiopod; E, fifth pereiopod; F, dactylus of fifth pereiopod; G, male first pleopod; H, male second pleopod; I, edopod of male first pleopod; J, appendix masculina of male second pleopod; K, uropodal diaeresis. Scale bars: A–C, E = 0.5 mm; D, F, K = 0.1 mm; G, H = 0.3 mm; I, J = 0.2 mm (male, cl 4.5 mm, paratype, ZRC).
the other hand, is probably the most complex and the longest explored cave in the karstic area of Atimonan-Pagbilao towns. It has two entrances; one is dry and located at the bank of the main river while the other supplies the water of the other smaller stream at the southwest. The water that comes out from the cave entrance drops through a series of waterfalls at the side of the mountain. With a total of more than one kilometre of meandering underground river system, its origin is unknown. This cave is located at 14°01’48.01”N 121°47’05.8”E, 100 m above sea level, and about 8 km away from the sea in its northeast. The dry entrance of the cave gives direct and easy access to the small pool (134 m away) followed by another (164 m away) where most of the unpigmented shrimps (Edoneus sketi, new species) were collected. These shrimp are more abundant in these two pools than in the underground streams and were found outside the cave.

**Colouration.** – Dark gray with red spots, grayish-green with dark red spots, light coloured with red spots and light gray with red spots.

**Etyymology.** – The new species is named after Mr. Erwin Husana, the dedicated field assistant and brother of the second author.

**Remarks.** – *Edoneus erwini*, new species, can be easily separated from *E. atheatus* by the well-developed eyes (vs. eye small, unpigmented), the toothed rostrum (vs. rostrum unarmed), and the much stouter carpus of first pereiopod (1.2–1.7 times as long as high vs. 2.0 times in *E. atheatus*). The large egg size of this species suggests that larval development of this species is most probably of abbreviated or directed types (Shokita, 1981).

**Edoneus sketi, new species**
(Figs. 4, 5)


Other materials: Eight males, cl 3.5–4.0 mm, 1 female, cl 3.6 mm, 2 ovigerous females, cl 4.0–4.6 mm, eggs 1.0–1.1 × 0.6 mm, ZRC 2007.0488, small pool in Bantakay Cave, Luzon, the Philippines, coll. D. E. Husana, 14 Dec. 2002; 7 males, cl 3.7–4.0 mm, 9 females, cl 3.2–4.7 mm, 1 ovigerous female, cl 4.9 mm, eggs 1.0 × 0.6 mm, ZRC 2007.0489, QM cave station 5, Luzon, the Philippines, coll. D. E. Husana, 14 Mar. 2003; 4 males, cl 3.5–4.4 mm, 11 females, cl 3.5–4.6 mm, NMCR, QM cave station 7, Luzon, the Philippines, coll. D. E. Husana, 14 Mar. 2003.

**Description.** – Rostrum short (Fig. 4A), straight, reaching near to or slightly beyond end of basal segment of antennular peduncle, rostral formula 0–2 (mode 0)+2–8 (mode 0+2)/1–4, ventral teeth closely placed at anterior portion. Inferior orbital angle acute, indistinctly separated from antennal spine; pterygostomial margin sub-rectangular.

Sixth abdominal somite 0.55 times length of carapace, 1.7 times as long as fifth somite, as long as or slightly longer than telson. Telson (Figs. 4B, C) 2.5 times as long as wide, distal margin rounded, with a very tiny median projection, with 5 pairs of dorsal spinules, and one pair of dorsolateral spinules; distal end with 3–4 pairs of spines, lateral pair longer than intermediate pairs; sublateral pair shortest. Preanal carina (Fig. 4D) low, lacking spine.

Eyes strongly reduced, cornea only partially present, pigment reduced to a tiny dot or totally disappear; anterior end reaching to half length of basal segment of antennular peduncle. Antennular peduncle 0.5 times as long as carapace; basal segment of antennular peduncle as long as combined lengths of second and third segments, anterolateral angle 0.3 times length of second segment, second segment distinctly longer than third segment. Styllocerite reaching 0.8 times length of basal segment of antennular peduncle. Scaphocerite (Fig. 4E) 3.0 times as long as wide.

Incisor process of mandible (Fig. 4F) ending in a row of small teeth, molar process truncated. Lower lacinia of maxillula (Fig. 4G) broadly rounded, upper lacinia elongated, with numerous distinct teeth on inner margin, palp slender. Upper endites of maxilla (Fig. 4H) subdivided, palp elongated, scaphognathite tapering posteriorly with numerous long, curved setae at posterior end. Distal end of palp of first maxilliped (Fig. 4I) triangular, with a finger-like projection; flagellum of the exopod very short, endopod high, as long as flagellum of exopod in length. Second maxilliped (Fig. 4J) typical, except the slightly reduced arthrobranch. Third maxilliped (Fig. 4K) reaching to middle of third segment of antennular peduncle, with ultimate segment slightly longer than penultimate segment.

Epipods well developed on first four pereiopods. First pereiopod (Fig. 5A) reaching to anterior end of eye; merus shorter than penultimate segment. Second pereiopod (Fig. 5B) long, reaching to middle of second segment of antennular peduncle; merus shorter than carpus, 6.7 times as long as broad; carpus 1.4 times as long as chela, 6.5 times as long as high; chela 2.6 times as long as broad; fingers 1.7 times as long as palm. Third pereiopod (Figs. 5C, D) reaching beyond end of antennal peduncle, with ultimate segment slightly longer than penultimate segment.

Epipods fourth pereiopod (Fig. 5A) reaching anterior end of eye; merus shorter than penultimate segment. Second pereiopod (Fig. 5B) long, reaching to middle of second segment of antennular peduncle; merus shorter than carpus, 6.7 times as long as broad; carpus 1.4 times as long as chela, 6.5 times as long as high; chela 2.6 times as long as broad; fingers 1.7 times as long as palm. Third pereiopod (Figs. 5C, D) reaching beyond scaphocerite by 1/5 of propodus, propodus 11.6 times as long as broad, 4.1 times as long as dactylus; dactylus 3.4 times as long as wide (spines included), terminating in two claws, 4–5 accessory spines on flexor margin. Fourth pereiopod reaching to end of antennular peduncle, similar in form as third one. Fifth pereiopod (Figs. 5E, F) reaching to end of antennular peduncle, propodus 16.8 times as long as broad, 3.7 times as long as dactylus; dactylus 4.0 times as long as wide.
Fig. 4. *Edoneus sketi*, new species: A, cephalothorax and cephalic appendages, lateral view; B, telson; C, distal portion of telson; D, preanal carina; E, scaphocerite; F, mandible; G, maxillula; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped. Scale bars: A = 1 mm; B, K, E = 0.5 mm; C = 0.1 mm; D, F–J = 0.3 mm. (male, cl 4.1 mm, paratype, ZRC).
Fig. 5. Edoneus sketi, new species: A, first pereiopod; B, second pereiopod; C, third pereiopod; D, dactylus of third pereiopod; E, fifth pereiopod; F, dactylus of fifth pereiopod; G, male first pleopod; H, male second pleopod; I, uropodal diaeresis. Scale bars: A–C, E = 0.5 mm; D, F, I = 0.1 mm; G, H = 0.2 mm; (male, cl 4.1 mm, paratype, ZRC).
Edoneus marulas, new species
(Figs. 6, 7)


Paratypes: Seven males, cl 3.4–4.0 mm, 3 females, cl 4.5 mm, ZRC 2007.0490, at middle of Marulas Cave, Luzon, the Philippines, coll. D. E. Husana, 11 Nov. 2002; 6 males, cl 3.4–4.0 mm, 11 females, cl 3.7–4.3 mm, 3 ovigerous females, cl 4.0–4.4 mm, ZRC 2007.0491, Marulas Cave, lowest part, Luzon, the Philippines, coll. D. E. Husana, 11 Nov. 2002; 12 males, cl 3.4–4.0 mm, 6 females, cl 4.1–4.5 mm, 1 ovigerous female, cl 4.1 mm, eggs 0.90 × 0.55 mm, ZRC 2007.0492, middle of Marulas Cave, Luzon, the Philippines, coll. D. E. Husana, 11 Nov. 2002; 8 males, cl 3.3–3.8 mm, 1 female, cl 4.1 mm, 1 ovigerous female, cl 4.5 mm, with hatchings, NMCR, Marulas Well, outside the Marulas Cave, Luzon, the Philippines, coll. D. E. Husana, 11 Nov. 2002.

Description. – Rostrum (Fig. 6A) short, straight, pointed, unarmed, reaching near to or slightly beyond end of basal segment of antennular peduncle. Inferior orbital angle acute, fused with antennal spine; pterygostomian margin sub-rectangular.

Sixth abdominal somite 0.54 times length of carapace, 1.3 times as long as fifth somite, as long as or slightly longer than telson. Telson (Figs. 6B, C) 2.8 times as long as wide, distal margin rounded, with a very tiny median projection, with 4 pairs of dorsal spinules, and one pair of dorsolateral spinules; distal end with 3–4 pairs of spines, lateral pair longer than intermediate pairs; sublateral pair shortest. Preanal carina (Fig. 6D) low, lacking spine.

Eyes strongly reduced, cornea absent, unpigmented or occasionally with very tiny dot; anterior end reaching to half length of basal segment of antennular peduncle. Antennular peduncle 0.5 times as long as carapace; basal segment of antennular peduncle as long as combined lengths of second and third segments, anterolateral angle 0.25 times length of second segment, second segment distinctly longer than third segment. Stylocerite reaching 0.7 times length of basal segment of antennular peduncle. Scaphocerite (Fig. 6E) 3.0 times as long as wide.

Incisor process of mandible (Fig. 6F) ending in a row of small teeth, molar process truncated. Lower lacinia of maxillula (Fig. 6G) broadly rounded, upper lacinia elongated, with numerous distinct teeth on inner margin, palp slender. Upper endites of maxilla (Fig. 6H) subdivided, palp elongated, scaphognathite tapering posteriorly with numerous long, curved setae at posterior end. Distal end of palp of first maxilliped (Fig. 6I) triangular, with a finger-like projection; flagellum of the exopod very short, endopod high, as long as flagellum of exopod in length. Second maxilliped (Fig. 6J) typical, except the slightly reduced podobranch. Third maxilliped (Fig. 6K) reaching to end of third segment of antennal peduncle, with ultimate segment as long as penultimate segment.

Epipods well developed on first four pereiopods. First pereiopod (Fig. 7A) reaching to end of basal segment of antennal peduncle; merus 2.1 times as long as broad, as long as carpus; carpus excavated anteriorly, shorter than chela, 1.6 times as long as high; chela 1.8 times as long as broad; fingers slightly shorter than palm. Second pereiopod (Fig. 7B) reaching to middle of third segment of antennular peduncle; merus shorter than carpus, 5.3 times as long as broad; carpus excavated, shorter than chela, 4.8 times as long as high; chela 2.4 times as long as broad; fingers 1.6 times as long as palm. Third pereiopod (Figs. 7C, D) reaching beyond scaphocerite by length of dactylus, propodus 10.4 times as long as broad, 4.1 times as long as dactylus; dactylus 3.3 times as long as wide (spines included), terminating in two claws, 3 or 4 accessory spines on its flexor margin. Fourth pereiopod reaching to end of scaphocerite, similar in form as third one. Fifth pereiopod (Figs. 7E, F) reaching to end of scaphocerite, propodus 14 times as long as broad, 3.2 times as long as dactylus; dactylus 4.8 times as long as wide (spines included), terminating in a single claw, with 42–49 spines on its flexor margin.

Endopod of male first pleopod (Fig. 7G) subtriangular, 2.1 times as long as wide, 0.4 times length of exopod, no appendix interna. Appendix masculina of male second pleopod (Fig. 7H) sub-cylindrical, spinose, reaching to 2/3 length of endopod.

Uropodal diaeresis (Fig. 7I) with 17–20 movable spinules, outer most one distinctly longer than lateral angle.
Fig. 6. *Edoneus marulas*, new species: A, cephalothorax and cephalic appendages, lateral view; B, telson; C, distal portion of telson; D, preanal carina; E, scaphocerite; F, mandible; G, maxillula; H, maxilla; I, first maxilliped; J, second maxilliped; K, third maxilliped. Scale bars: A = 1 mm; B, E = 0.5 mm; C = 0.1 mm; D, F–K = 0.3 mm. (male, cl 3.9 mm, paratype, ZRC).
Fig. 7. *Edoneus marulas* new species: A, first pereiopod; B, second pereiopod; C, third pereiopod; D, dactylus of third pereiopod; E, fifth pereiopod; F, dactylus of fifth pereiopod; G, male first pleopod; H, male second pleopod; I, uropodal diaeresis. Scale bars: A–C, E = 0.5 mm; D, F, I = 0.1 mm; G, H = 0.2 mm; (male, cl 3.9 mm, paratype, ZRC).
Ovigerous female with eggs sized 0.90 x 0.55 mm.

**Habitat.**- Marulas Cave is located in Barangay Tinandog, same area as the previous two caves visited. Of the three caves studied, this is the shortest one. Its coordinates are 13°59'40.6"N 121°52'23.2"E, 78 m above sea level and about 4 km away from the sea at its northeast. There is a dry creek on the surface that sinks to the cave entrance. Water is not present at the cave entrance until about 36 m inside where it leaks (spring) from the rock crevices. The stairway-like morphology of the underground stream where pools could be found in each step provides refuge for the aquatic animals. There was also one ovigerous female of *Caridina typus* H. Milne Edwards, 1837, with carapace length 8.3 mm, collected from lowest part of this cave in the present collection. *Caridina typus* is one of most widely distributed species in islands of the Indo-West Pacific and requires seawater to complete its life cycle (Cai, pers. obs.).

**Etymology.**- The species is named after the type locality-Marulas Cave in Luzon, the Philippines. Name used as an apposition.

**Remarks.**- With respect to the rostrum and the eyes, *Edoneus marulas* is similar to *E. atheatus* and *E. sketi*. But the stout carpus of the first pereiopod (carpus 1.6 times as long as high vs. 2.0 times in *E. atheatus*, and 2.4 times in *E. sketi*) can easily differentiate it from the latter two species. With regard to the form of the second pereiopod, *E. marulas* is similar to *E. erwini*, but it can be distinguished by its short and unarmed rostrum, and the strongly reduced eyes (vs. eyes developed).

**Key to the species of Edoneus**

1. Eyes reduced distinctly ......................................................... 2
   - Eyes developed ......................................................... *Edoneus erwini*
2. Rostrum unarmed, carpus of first pereiopods stout, less than twice as long as high ......................................................... 3
   - Rostrum armed ventrally with 1-4 teeth, carpus of first pereiopods slender, 2.4 times as long as high ........... *E. sketi*
3. Carpus of first pereiopods 1.6 times as long as high ............
   - Carpus of first pereiopods 2.0 times as long as high ........ 
   - Carpus of first pereiopods 1.6 times as long as high .............. *E. marulas* .............................. *E. atheatus*

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**LITERATURE CITED**


