



A NEW SPECIES OF *MUNIDOPSIS* (ANOMURA, GALATHEOIDEA,
MUNIDOPSIDAE) FROM THE GULF OF CALIFORNIA,
WESTERN MEXICO

BY

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ABSTRACT

A new species of *Munidopsis* Whiteaves, 1784 is described from the SW Gulf of California, western Mexico. The new species differs from all other known species of *Munidopsis* of the East Pacific by the presence of numerous antero-posteriorly compressed processes on the carapace, many of which are truncate and with crenulated anterior margin, by its oval-shaped carapace, wider in its posterior half, and by the short, subrectangular, narrow rostrum with an upturned distal portion. It also differs from the East Pacific species and other species of *Munidopsis* by the densely pitted carapace and appendages.

Key words. — Gulf of California, western Mexico, *Munidopsis* new species

RÉSUMÉ

Une nouvelle espèce de *Munidopsis* Whiteaves, 1784 est décrite du golfe de Californie SW, à l'ouest du Mexique. La nouvelle espèce diffère de toutes les autres espèces connues de *Munidopsis* du Pacifique Est par la présence sur la carapace de nombreux processus comprimés antéro-postérieurement, dont un grand nombre est tronqué et avec un bord antérieur crénelé, par la forme ovale de la carapace qui est plus large dans sa moitié postérieure, et par le rostre court, subrectangulaire, étroit et dont l'extrémité est tournée vers le haut. Elle se distingue aussi des espèces du Pacifique Est et des autres *Munidopsis* par la présence de nombreuses petites perforations sur la carapace et sur les appendices.

Mots clés. — Golfe de la Californie, Mexique de l'ouest, *Munidopsis* espèce nouvelle

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INTRODUCTION

A recent compilation by Appeltans et al. (2012) set the number of valid extant species of squat lobsters at 921. Based on recent phylogenetic analysis, two new superfamilies, Aegloidea, containing the Aegliidae, and Kiwaoidea, containing the Kiwaidae, were established by McLaughlin et al. (2007). The affinities of aeglids and kiwaidae within the Anomura, however, have been widely debated and still need further investigations (Ahyong et al., 2009). Recent new classification of Chirostyloidea and Galatheoidea proposed by Schnabel & Ahyong (2010) and Ahyong et al. (2010), includes a total of six families within these two groups of squat lobsters: Chirostylidae, Eumunidae and Kiwaidae in the former, Galatheidae, Munididae and Munidopsidae in the latter.

Even after having been separated from the other “galatheoids”, the Munidopsidae remains a very speciose family with about 270 species in four genera: *Galacantha* A. Milne-Edwards, 1880; *Leiogalathea* Baba, 1969; *Munidopsis* Whiteaves, 1874; and *Shinkaia* Baba & Williams, 1998 (MacPherson, 2007; Baba et al., 2008; Ahyong et al., 2010; Taylor et al., 2010). The vast majority of these species belong to the genus *Munidopsis*. Within the Munidopsidae, new species are described on a regular basis (e.g., Komai, 2011; Macpherson, 2011) and the total number of known species is changing very quickly. Of these ca 270 species, 49 occur in the East Pacific, from the Bering Sea to the southern tip of Chile (Baba et al., 2008): 3 species of *Galacantha* (including *G. bellis* Henderson, 1885, described from off the Juan Fernandez Islands) and 46 of *Munidopsis*.

The Mexican Pacific fauna of *Munidopsis* is rather reduced (12 species) (Hendrickx & Harvey, 1999; Hendrickx, 2003), and only a few species have been described based on type material originally collected in these waters, most by the “Albatross” in 1892: *Munidopsis alvisca* Williams, 1988 (Guaymas Basin); *M. depressa* Faxon, 1893 (off Tres Marias Islands); *M. hystrix* Faxon, 1893 (off Acapulco); *M. lentigo* Williams & Van Dover, 1983 (off Baja California); *M. quadrata* Faxon, 1893 (off Tres Marias Islands); and *M. scabra* Faxon, 1893 (off Tres Marias Islands) (Baba, 2005; Baba et al., 2008). In the area extending off the Mexican west coast, the Gulf of California is where most species have been collected so far, totalling seven out of the 12 Mexican species of *Munidopsis* (Hendrickx & Serrano, 2013). The material reported herein corresponds to an undescribed species collected in the southern end of the Gulf of California, off the east coast of the Baja California Peninsula.

MATERIAL AND METHODS

The material was obtained while sampling with the R/V “El Puma” of the Universidad Nacional Autónoma de México in the southern part of the Gulf of

California. It was collected with a 2.35 m wide by 0.95 m high benthic sledge equipped with an outer collecting net of ca 5.5 cm (2.25 inch) stretch mesh and an inner net of ca 2.0 cm (0.75 inch) stretch mesh. The sampling depth of the benthic sledge was estimated with a digital SIMRAD echo sounder.

The specimen is deposited in the invertebrate collection at the Mazatlán Marine Station, UNAM, Mazatlán, Mexico (EMU). Abbreviations used are: CL, carapace length, without rostrum; St., sampling stations.

TAXONOMIC ACCOUNT

Munidopsis alfredolaquardai sp. nov.

(figs. 1-3)

Material examined.— Holotype female, CL 7.1 mm, TALUD IX, St. 10 (24°56'24"N 110°16'42"W), 12/Nov/2005, benthic sledge, 969-1225 m depth (EMU-9559).

Description.— Carapace (figs. 1A, 2A-D), excluding rostrum, nearly as wide as long; oval, wider in posterior half, dorsal surface not markedly convex, with

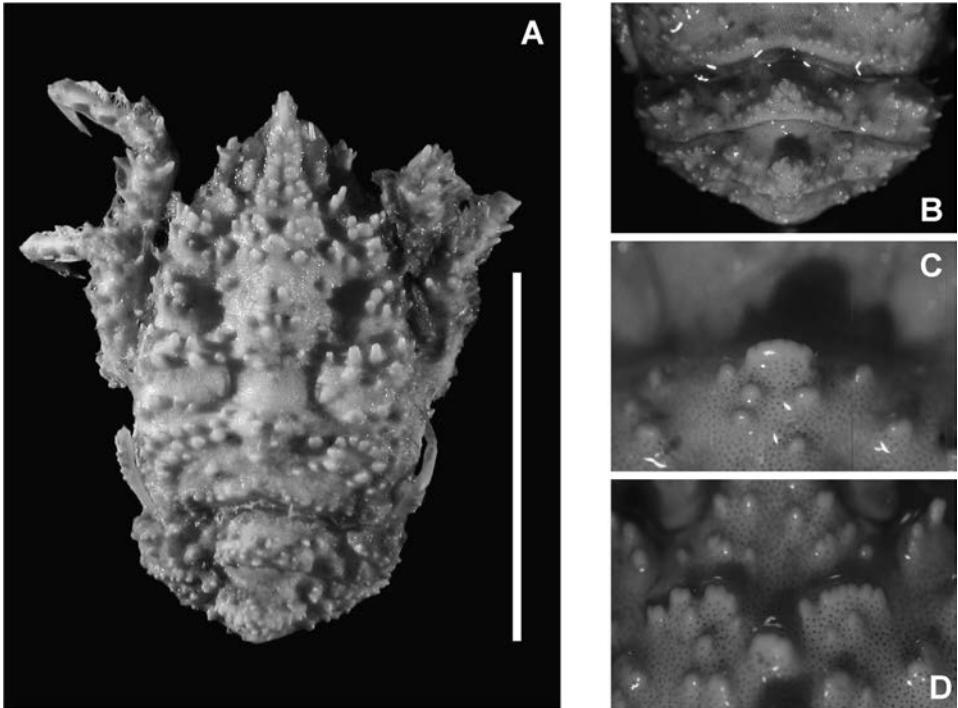


Fig. 1. *Munidopsis alfredolaquardai* sp. nov., female holotype (EMU-9559). A, dorsal view; B, detail of abdominal somites 2-3, dorsal; C, detail of antero-posteriorly compressed laminate tubercle in cardiac region; note numerous pits; D, same, epigastric region. Scale bar = 1 cm.

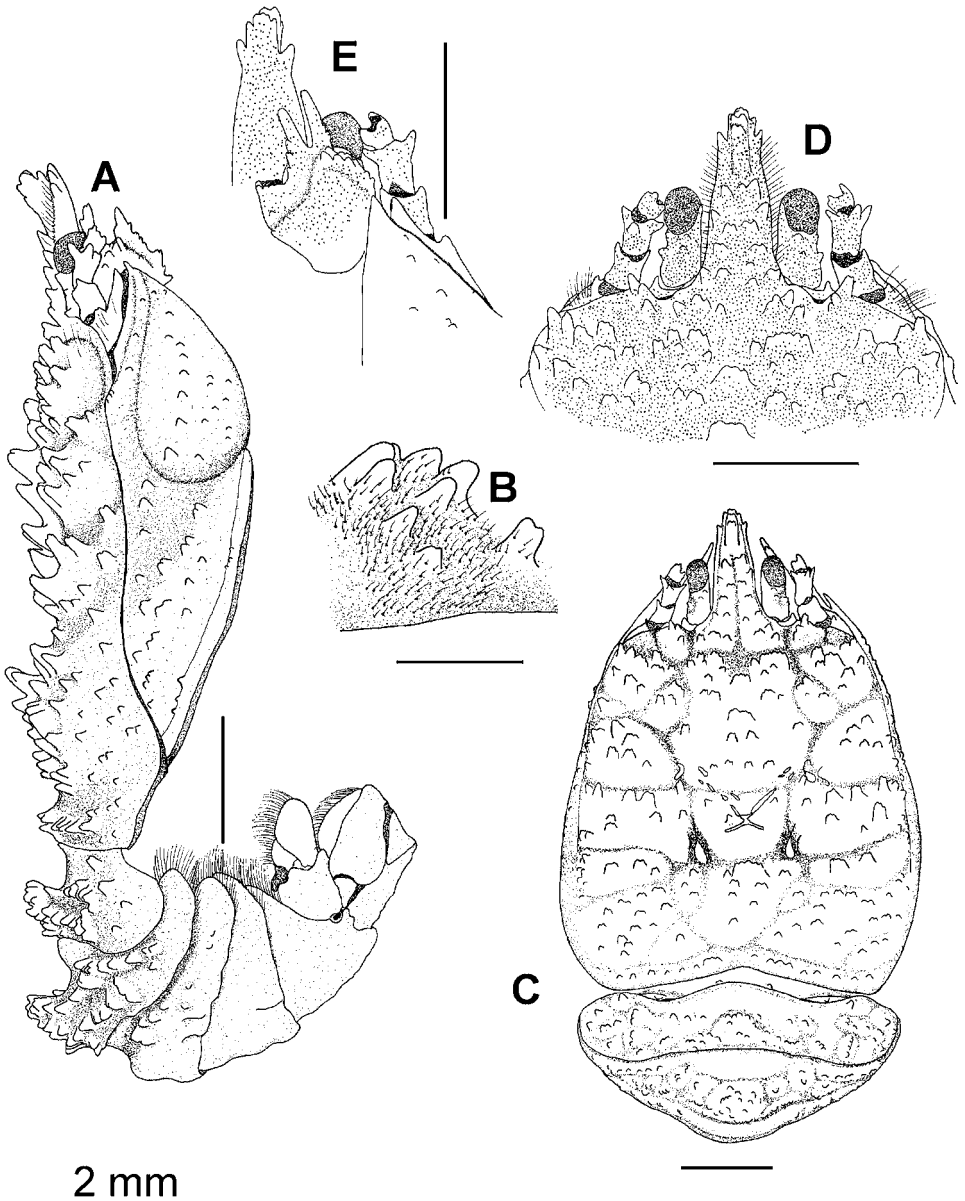


Fig. 2. *Munidopsis alfredolaguardai* sp. nov., female holotype (EMU-9559). A, carapace and abdomen, lateral (pits not represented); B, detail of right anterobranchial region showing pitted carapace; C, carapace and abdomen, dorsal (pits not represented); D, anterior portion of carapace, dorsal, including pits; E, rostrum, left antennule and antenna, including pits, ventral. Scale bars = 2 mm.

moderate depressions, regions well delineated, elevated, with stout tubercle-like, antero-posteriorly compressed processes, many truncate and with crenulated anterior margin, surface of carapace densely pitted, each pit with a protruding short setae (fig. 2B). Cervical and postcervical grooves forming deep furrows, epigastric region narrow, elevated, hepatic and anterior branchial regions elevated, posterobranchial regions slightly elevated, mostly in posterior part, cardiac region elevated, preceded by 2 deep lateral depressions. Gastric region divided into anterior and posterior portions by transverse depression, anterior portion with pair of broad, antero-posteriorly compressed, distally crenulated, laminate tubercles (left divided into 3 pieces; right almost entire) (fig. 1D), followed by 2 median laminate, crenulated tubercles, and 2 transverse rows of 2 and 4 tubercles, a few isolated lateral tubercles behind large pair of distal laminate tubercles, posterior portion with 3 isolated tubercles; hepatic and anterior branchial regions each with 7 truncate, single or bifid flattened tubercles; posterior branchial region with truncate, single or bifid flattened tubercles arranged in irregular transversal series; cardiac region triangular, narrow, one large, anterior laminate tubercle with crenulated margin (fig. 1C), and 7 irregularly-set smaller tubercles; posterior margin slightly concave, preceded by raised tuberculate ridge interrupted medially, tubercles extending to lateral margins of carapace; lateral margins with about 4 irregularly-set tubercles merging with carapace tubercles; posterolateral carapace with cluster of 7-8 small tubercles barely visible in dorsal view. Rostrum densely pitted, short, stout, less than 0.25 times carapace length, subrectangular in dorsal view, narrow (about 0.3 times distance between anterolateral spines), dorsally covered with truncate, single or bifid flattened tubercles, a few laterodistal and distal tubercles, distal third with a median, pronounced, upturned dorsal crest, dorsally armed with tubercles, 2 postrostral series of 2-3 single or bifid tubercles in line with orbital margin. Frontal margin irregular, orbital posterior margin deeply concave, laterally flanked with an obtuse, triangular antennal spine bearing a group of 2-3 obtuse tubercles, margin between antennal spine and anterolateral spine unarmed, slightly convex, little oblique, about twice as wide as orbital margin. Anterolateral angle of carapace marked with 1-2 closely set tubercles.

Pterygostomian flap (fig. 2A) pitted, with scattered, irregularly-set single or bifid tubercles, anteriorly armed with short, sharp spine.

Sternum (fig. 3A) as long as wide, sternites 3-4 densely pitted, sternite 5 partly pitted anterolaterally, sternites 6-7 without pits, sternum maximum width at sternite 6; sternite 3 moderately broad, 2.5 times wider than long, anterior margin with deep median notch flanked by 2 lobes, each with shallow, median notch; sternite 4 wide, anterior margin tuberculate, moderately oblique; sternites 4, 5, 6 and 7 separated by almost undistinct, shallow furrow.

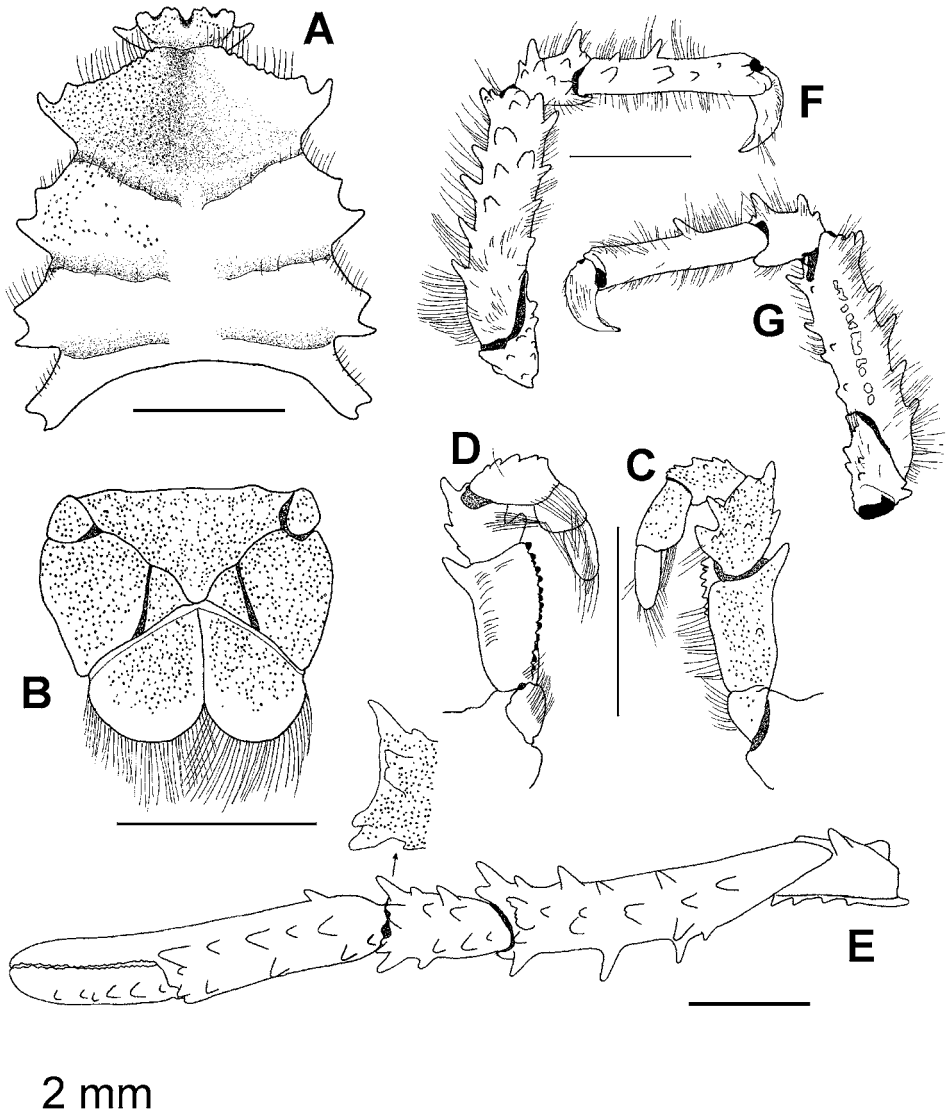


Fig. 3. *Munidopsis alfredolaguardai* sp. nov., female holotype (EMU-9559). A, sternum, sternites 3-7, showing pitted areas, ventral; B, telson, dorsal, showing pits; C, left third maxilliped, lateral; D, same, ventral; E, right cheliped, lateral (arrow, anterior part of carpus with pits represented); F, right second pereopod, lateral; G, same, mesial. Scale bar = 2 mm.

Abdomen (fig. 2A, C) with numerous protuberances and tubercles, somites dorsally pitted; posterior half of somites 2 and 3 (fig. 1B) with elevated median protuberance covered with tubercles, a few isolated tubercles lateral to median protuberance, clusters and transversal series of single or bifid tubercles extending onto lateral portion of somites; somite 4 with low, smooth, median protuberance

and a few isolated tubercles laterally. Telson (fig. 3B) slightly wider than long, composed of 9 plates, combined width of posterior plates about 1.6 their length.

Eyes (fig. 2D) movable, narrow, peduncle cylindrical, 1.5 as long as cornea, dorsal margin with 2 small tubercles, outer margin with 1 tubercle.

Antennular basal segment (fig. 2E) wide, flattened, somewhat operculiform; distomesial margin unarmed; prominent, stout, blunt distodorsal and distolateral spines, inner margin of distodorsal spine with 2 small tubercles, outer margin of distolateral spine with minute tubercles; lateral margin swollen, with strong, blunt tubercles.

Antennal basal segment (fig. 2E) reduced in size, with stout, reduced distomesial and distolateral spines; article 1 with blunt distomesial and 1 distolateral spine; segment 2 with prominent distomesial and distolateral spines, and one mesiodorsal spine; segment 3 with blunt distomesial spine.

Third maxilliped (fig. 3C, D) segments pitted, except dactylus; ischium longer than merus, flexor margin without terminal spine, extensor margin with one prominent, stout distal spine; crista dentata with 15 corneous teeth; flexor margin of merus with 2 strong, triangular teeth, proximal twice as wide as distal, bearing 2 small, ventral tubercles; extensor margin with 2 small tubercles and 2 strong, stout teeth, distal tooth the largest, ventral face with few small tubercles; carpus with a row of tubercles on extensor margin, flexor margin unarmed; propodus and dactylus unarmed.

Left and right (fig. 3E) chelipeds (pereiopod 1) subequal, slightly more than twice as long as carapace length (without rostrum), entirely pitted, but without striae or small granules, long ventral and dorsal marginal setae; ischium with strong distolateral spine, 8 smaller spines on mesial margin, ventral face with a few minute tubercles, distal margin partly crenulated; merus a little shorter than chela, 3 long spines, including distal one, and a proximal small spine on lateral dorsal margin, mesiodorsal margin with 7 small tubercles, shallow groove on margins, outer face with a longitudinal median row of 5 strong spines, a row of 3 spines parallel to ventral margin, 1 isolated spine proximally, close to dorsal margin, ventral margin with 1 distal and 1 subdistal strong spines, and 1 intercalated small spine, inner face with 3 rows of short tubercles, outer distal margin with 3 tubercle-like spines, 2 largest compressed, with bifid tip; carpus twice as long as high, dorsal margins with 2 small tubercles (inner margin), 1 large distal and 1 small subdistal spines (outer), outer face with 2 rows of tubercles, ventral margin with 2 spines; palm slender, ca 1.8 times length of carpus, 3 times as long as high, and 1.3 times as long as fingers; fingers not gaping, prehensile margins each with row of triangular teeth, distal portion of fingers widening, spoon-like; dactylus with row of triangular tubercles on outer face, decreasing in size proximally, outer face of propodus smooth; dorsal face of chela with 1 row of 5 submarginal triangular teeth

near dorsal margin, and one row of 5 teeth of triangular teeth parallel to the former, 1 strong ventral tooth at a distance from the articulation with carpus.

Pereiopods 2-4 similar, successively diminishing in size, strong, entirely pitted, with blunt spines and antero-posteriorly compressed, truncated tubercles, dorsal and ventral fringes of long setae. Pereiopod 2 reaching to carpus of pereiopod 1. Ischium of pereiopod 2 (fig. 3F, G) with one strong distodorsal spine, lateral face with 2-3 small tubercles, distal margin with 3 compressed tubercles, ventral margin with 3 small tubercles, mesial face unarmed; merus triangular in cross-section, dorsal margin with 5 strong spines, including distal one, the latter compressed, bifid, lateral face with row of 4 single and bifid tubercles in distal half, distal margin with 3-4 rounded tubercles, ventral margin with 4 spines, distal the strongest; mesial face unarmed; carpus triangular, dorsal margin with 3 spines, proximal small, remaining 2 widely spaced, lateral face with 5 spines, ventral margin and mesial face unarmed; propodus about 3/4 merus length, rounded in cross-section, 1 strong dorsal spine at about mid-length, lateral face with a pair of proximal spines, followed with 1 compressed tubercle, 1 medium-size spine and 1 minute tubercle, 1 flattened, bifid distal tubercle, mesial and ventral margins unarmed; dactylus short, strongly curved, flexor margin unarmed, 2 tufts of subterminal setae.

Epipods absent from pereiopods 1-4.

Egg size, 1.10-1.25 mm wide.

Etymology.— The species is named after Dr. Alfredo Laguarda Figueras, dean of the Instituto de Ciencias del Mar y Limnología (ICML), UNAM, in recognition of his outstanding career and his remarkable influence on the academic development of the ICML. It is formed directly by the union of the forename “Alfredo” and the surname “Laguarda” as a noun in the genitive case.

Remarks.— *Munidopsis alfredolaguardai* new species differs from all other known species of *Munidopsis* of the East Pacific by the presence of numerous antero-posteriorly compressed processes on carapace, many of which are truncate and with crenulated anterior margin. These tubercles are particularly noticeable on gastric and cardiac regions. The oval-shaped carapace, slightly wider in posterior half, and the short, subrectangular, narrow rostrum (width at base less than 0.25 times the distance between anterolateral spines) with an upturned distal portion, are other characteristics that set this species apart from all the other *Munidopsis* in the region.

Similar antero-posteriorly compressed processes on carapace have been described for *Munidopsis sonne* Baba, 1995, known from active thermal vent area in the North Fiji Basin, SW Pacific (Baba, 1995), *M. proales* Ahyong & Poore, 2004, and *M. tasmaniae* Ahyong & Poore, 2004, off Western Australia and Tasmania (Ahyong & Poore, 2004), *M. papanui* Schnabel & Bruce, 2006, from off New

Zealand, *M. tuberipes* Komai, 2011, from off Japan (Komai, 2011), and *M. naginata* Cubelio et al., 2007, from hydrothermal vent off Okinawa, Japan. *Munidopsis sonne* was later reported from Brothers Seamount, Kermadec Volcanic Arc, by Cubelio et al. (2007), but the illustrations are rather poor and do not show the typical antero-posteriorly compressed, truncate processes described by Baba (1995, fig. 1a, c) in the holotype. These six species and *Munidopsis alfredolaguardai* new species have a similar shape, but can be separated by several characteristics. In *M. alfredolaguardai* new species the carapace is armed with 4 irregularly-set lateral tubercles merging with carapace tubercles, while in *M. proales*, *M. tasmaniae* and *M. papanui* there are 3 or 4 strong lateral teeth or processes. *Munidopsis tuberipes* lacks lateral teeth while *M. sonne* and *M. naginata* feature weak and obscure protuberances. The rostrum of *M. alfredolaguardai* new species is subrectangular, rather narrow and short, with a median, pronounced, upturned dorsal crest, vs. a typically triangular rostrum in *M. tasmaniae*, *M. papanui*, *M. tuberipes*, and a long, spine-like, upturned rostrum in *M. naginata* (rostrum of *M. proales* unknown). Rostrum of *M. sonne* is also subrectangular in dorsal view, but it lacks the dorsal crest. *Munidopsis naginata* features large, prominent eyes with short peduncle vs. narrow eye and very long peduncle in *M. alfredolaguardai*, while the other five species feature short (*M. sonne* and *M. papanui*) or medium-sized (*M. proales*, *M. tasmaniae* and *M. tuberipes*) peduncles. *Munidopsis alfredolaguardai* new species features a short, triangular merus in the third maxilliped, with two strong teeth on the flexor margin, the proximal tooth being large, subtriangular. Although similar in shape, this segment bears a series of 5 sharp teeth in *M. sonne*, 4 sharp teeth in *M. proales*, 3 in *M. tasmaniae* (the proximal wide, subtriangular) and in *M. papanui*, and one large, proximal tooth followed by a series of small distal spines in *M. naginata*. *Munidopsis tuberipes* third maxilliped merus is very similar to the one of *M. alfredolaguardai* new species, with one large, proximal, triangular tooth and a smaller distal tooth, but it bears much more small tubercles. The wide, almost operculate basal antennal segment in *M. alfredolaguardai* new species is also similar to *M. sonne*, but in the latter there is no distomesial spine and the segment is cristate dorsolaterally, while in *M. alfredolaguardai* new species both the distomesial and distolateral spines are present, and the article is tuberculated dorsolaterally. Both distomesial and distolateral spines are also present in the other five species, and the segment is either cristate dorsolaterally (*M. papanui*) or not (*M. proales*, *M. tasmaniae*, *M. tuberipes* and *M. naginata*). In *M. tuberipes* and *M. papanui*, chelipeds are more massive than in *M. alfredolaguardai* new species, while these are slender in *M. proales* and *M. naginata*. Chelipeds of *M. alfredolaguardai* new species are very similar to those of *M. sonne* and *M. tasmaniae*, with which they share the “spoon-shaped” or “hollowed internal margin” fingers.

Although very close to *M. sonne*, in which small, numerous spines and tubercles can be observed on the lateral faces and margins of chelipeds and second pereiopods, *M. alfredolaguardai* new species features fewer, larger obtuse spines and antero-posteriorly compressed processes. *Munidopsis sonne* also features an almost straight dactylus on pereiopods 2-3, with flexor margin bearing a row of setae along distal 2/3, while in *M. alfredolaguardai* new species the dactylus flexor margin is entirely naked and the article is stout, strongly curved, almost hook-shaped.

We are not aware of species of *Munidopsis* with densely pitted carapace and appendages as observed in *M. alfredolaguardai* new species. The presence of a short setae emerging from each pit probably indicates a sensorial function. The hook-shaped dactylus of pereiopods 2-3 might indicate a clinging behaviour similar to what can be observed in epialtid crabs (clinging on algae) and in prehensile appendages of the cymothoid isopods (clinging on fishes). However, there is no information related to the habitat of the species other than the depth (969-1225 m) at which it was collected.

Distribution.— *Munidopsis alfredolaguardai* new species is known only from the type locality, off the Baja California Peninsula in the SW Gulf of California, about 15 nm west of San José Island (fig. 4). According to measurements near bottom at the type locality and in its vicinity, dissolved oxygen concentrations in the depth range of 969-1225 m varied from 0.11 to 0.34 ml l⁻¹ (Serrano, 2012; D. Serrano, pers. comm.), thus indicating that *M. alfredolaguardai* new species is a member of the deep-water invertebrate community living beneath the Oxygen

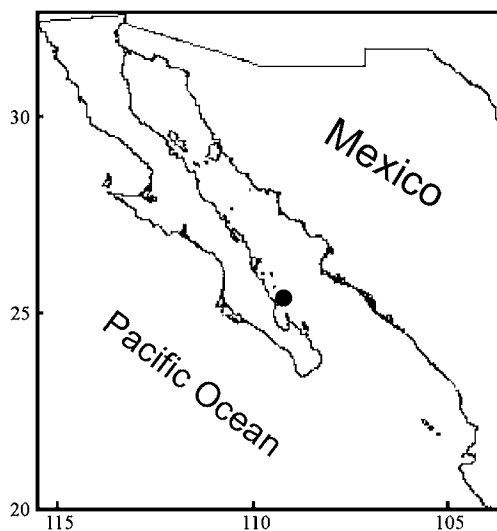


Fig. 4. Position of the type locality of *Munidopsis alfredolaguardai* sp. nov. in the SW Gulf of California, Mexico.

Minimum Zone, in a severely anoxic environment, as do many other species of decapod crustaceans off the west coast of Mexico (Hendrickx & Serrano, 2010).

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