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Squat lobsters (Crustacea: Decapoda: Galatheoidea and Chirostyloidea) collected during the TALUD XIV cruise in the Gulf of California, Mexico, and rediscovery of *Gastroptychus perarmatus* (Haig, 1968) in the eastern Pacific

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Abstract

Seven species of squat lobsters were collected during the TALUD XIV cruise in the Gulf of California, Mexico. *Gastroptychus perarmatus* (Haig, 1968) was collected for the second time since it was described and represents a first record of the genus in the tropical eastern Pacific. Its association with gorgonians is also noted from color pictures taken during a deep-water dive in another cruise in the area. *Janetogalathea californiensis* (Benedict, 1902) was captured in four sampling stations, in the same area where it has been previously reported. Three species of *Munida* Leach, 1820 were collected (*M. bapensis* Hendrickx, 2000, *M. mexicana* Benedict, 1902, and *M. tenella* Benedict, 1902). Records of *M. bapensis* of this cruise combined with additional captures of this species in 2007 in the same area indicate that it is the most abundant deep-water species of squat lobster in the northern part of the central Gulf of California. Among the species of *Munida*, *M. tenella* was second in abundance and included specimens much larger than previously known. The single record for *M. mexicana* fits within the currently known depth and geographical ranges. Only one species of *Munidopsis* Whiteaves, 1874 (*M. depressa* Faxon, 1892) was collected, in one of the deeper sampling stations visited during the cruise and its northernmost distribution limit within the Gulf of California is increased by ca two degrees of latitude. The seventh species collected during this survey, *Pleuroncodes planipes* Stimpson, 1860, is a common inhabitant of the California Current and the Gulf of California.

Key words: deep-water squat lobsters, Galatheoidea, Chirostyloidea, Gulf of California, Mexico

Introduction

The squat lobsters of the eastern Pacific (including the remote island of Juan Fernandez, Chile) comprise 77 species belonging to eight genera: *Janetogalathea* Baba & Wicksten, 1997 (1 species) and *Galathea* Fabricius, 1793 (1) (Galatheidae); *Gastroptychus* Caullery, 1896 (4) and *Uroptychus* Henderson, 1888 (3) (Chirostylidae); *Munida* (18), and *Pleuroncodes* Stimpson, 1860 (2) (Munididae); *Galacantha* A. Milne Edwards, 1880 (2) and *Munidopsis* Whiteaves, 1874 (46) (Baba *et al.* 2008; Hendrickx & Ayon-Parente 2010). Since Faxon (1893, 1895) studied the squat lobsters collected by the steamer "Albatross" off the Pacific coast of America, there has been only a few contributions dealing specifically with the Galatheoidea and Chirostyloidea (sensu Ahyong *et al.* 2010) off the eastern Pacific. In his study of the specimens of squat lobsters held at the United States National Museum, Benedict (1902) included all species known for the eastern Pacific at that time and described 14 new taxa for the region. Posterior contributions in which new taxa were added to the local fauna include those by Haig (1968: 1 species), Pequegnat & Pequegnat (1971: 1 species), Khodkina (1973; 4 species), Baba (1977; 2005; 4 species), Ambler (1980; 2 species), Williams (1988; 1 species), Williams & Baba (1989: 2 species), Baba & Haig (1990; 1 species), Hendrickx (2000, 2003; 3 species), Jones & Macpherson (2007: 5 species), and Hendrickx & Ayón Parente (2010; 1 species). A review paper published by Fierro *et al.* (2008) included all species of squat lobsters known to the neotropics, 161 in total (both sides of America; 59 for the Pacific), but this figure also includes some species exclusively reported in temperate provinces of the eastern Pacific.

During the TALUD XIV cruise in the northern part of the central Gulf of California, Mexico, a large series of specimens of squat lobsters was collected while sampling macrobenthos fauna and this material is reported here.

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Material and methods

The material was obtained while sampling with the R/V "El Puma" of the Universidad Nacional Autónoma de México in the northern part of the Gulf of California, roughly between 28°10' and 29°10'N. A total of 30 stations were visited, with depth ranging from 148 to1346 m (Fig. 1). Specimens were collected with a 2.35 m wide by 0.95 m high standard benthic sledge or a 1.80 m wide by 0.80 m high modified Agassiz dredge, both equipped with an outer collecting net of ca 5.5 cm (2 1/4") stretch mesh and an inner net of ca 2.0 cm (3/4") stretch mesh. Sampling depth was estimated with a digital SIMRAD echo sounder. Epibenthic temperature and oxygen concentrations were measured ca 10 m above bottom level with a Seabird CTD-O_2 probe. Oxygen level were also double-checked with the Winkler method using water samples collected in closing bottles near bottom.

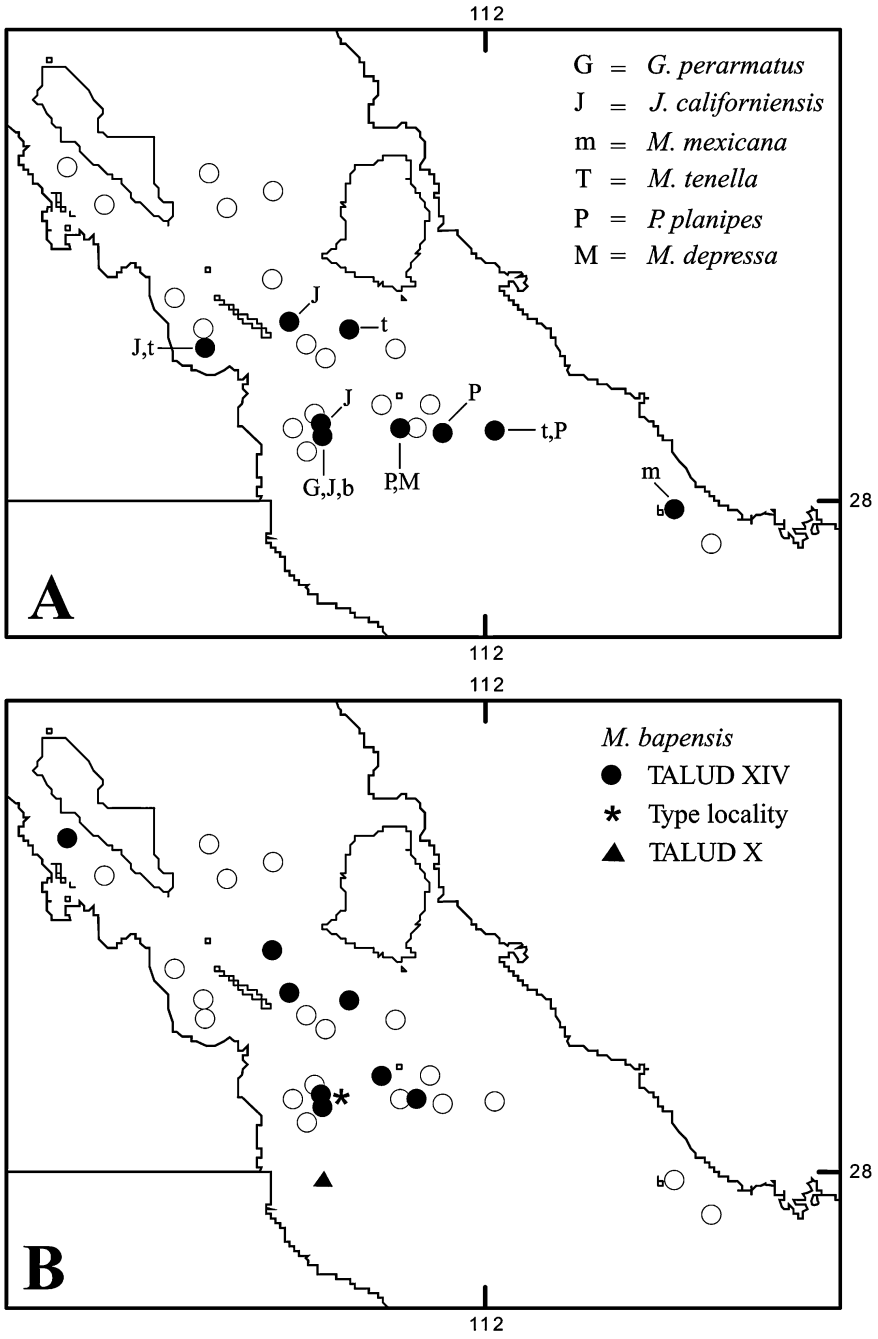

FIGURE 1. Location of sampling stations at which squat lobsters were collected during the TALUD XIV cruise. Open circles indicate stations where no specimens were collected. A, all species, except *Munida bapensis*. B, *Munida bapensis*.

The specimens examined are deposited in the invertebrate collection at the Mazatlán Marine Station, UNAM, in Mazatlán, Mexico (EMU), with their respective catalogue number. Abbreviations used are: CL, carapace length; CLr, carapace length with rostrum; CW, carapace width; TL, total length, from tip of rostrum to posterior margin of telson; ovig., ovigerous; juv., juveniles. CLr is ommited for specimens lacking rostrum. The classification used follows Baba (2005), Baba *et al.* (2008), and Ahyong *et al.* (2010). Synonymies include all references known to the author, except in *Pleuroncodes planipes* Stimpson, 1860, for which a restricted synonymy is provided.

Results

Chirostyloidea Ortmann, 1892

Chirostylidae Ortmann, 1892

Gastroptychus perarmatus (Haig, 1968)

(Figs.2, 3)

Chirostylus perarmatus Haig, 1968: 272, figs. 1–3. — Wicksten 1989: 315 (list).
Gastropthychus perarmatus. — Baba 1977: 205. — Baba and Haig 1990: 859 (key). — Baba 2005: 212 (key), 214 (list). — Fierro *et al.* 2008: 4 (list). — Baba *et al.* 2008: 23 (list).

Material examined. TALUD XIV, Station 4 (28°10'05"N, 112°31'59"W), 7 Apr 2011, 1 male (CL 38.4 mm), 2 females (CL 20.7 and 34.2 mm), 1 ovigerous female (CL 32.6 mm), and 2 juveniles (CL 14.3 and 15.7 mm), benthic sledge, 435–451 m, rocky bottom (EMU-8919). Same station, 2 males (CL 38.3 and 43.0 mm), and 2 ovigerous females (CL 36.5 and 37.6 mm) (EMU-8920). Same station, 1 male (CL 38.2 mm), and 3 ovigerous females (CL 35.6–41.8 mm) (EMU-8921).

Color. Fresh specimens were examined onboard and color photographs (Fig. 2) of freshly collected individuals allow for a precise color description. Carapace white, tips of large spines orange; rostrum white with blush of orange at about mid-length; antenna and antennula dark orange. Chelipeds and walking legs dark orange, tips of large spines white.

Size and fecundity. Compared to the 10 specimens reported by Haig (1968) in the original description, the sample from the TALUD XIV cruise is larger and includes much larger specimens: largest male, 43.0 mm CL vs. 26 mm for the male holotype; largest female, 41.8 mm vs. 21.2 mm for the paratypes. No ovigerous females were reported by Haig (1968), but our sample includes six females, with CL ranging from 32.6 to 41.8 mm. Number of eggs per individual is as follow: 139 (CL 32.6 mm); 251 (CL 37.6 mm); 87 (CL 36.5 mm; female partly spent); 174 (CL 35.6 mm); 301 (CL 36.9 mm); 259 (CL 41.8 mm). Egg size of largest female: 1.96 mm (average based on 20 measurements).

Ecology. The material of *G. perarmatus* reported herein was collected in 435–451 m depth, in a relatively cold (6.84 °C) and severely hypoxic (0.21 ml O_2/l) environment (Table 1). These 14 specimens were collected incidentally. Indeed, the sampling area was selected based on the assumption that the bottom was muddy. Although the sampling device was recovered safely after the trawl, there were clear signs of damages when examined on deck, and the front section of the collecting net was severely torn. Large and small pieces of rock were found in the net, thus indicating that the equipment had been trawled at least for a period of time on hard bottom. Haig (1968) noted that *G. perarmatus* was collected from green mud, in 229 m depth. Video footage taken by a Remote Operated Vehicle (ROV) in the Gulf of California (JASON dive) are currently being studied and show *G. perarmatus* associated with a gorgonian, probably of the genus *Callogorgia* (Fig. 3), fixed on a rocky bottom.

Remarks. According to Baba *et al.* (2008), the genus *Gastroptychus* contains 21 species: two in the Indian Ocean, five in the Atlantic and 16 in the Pacific. Of the 16 species with records in the Pacific Ocean, only five have been found in the eastern Pacific (west coast of America): *G. milneedwardsi* (Henderson, 1885), from the Straits of Magellan, Chile; *G. cavimurus* Baba, 1977, from off Ecuador and Peru; *G. defensus* (Benedict, 1902) from the Galapagos Islands; *G. iaspis* Baba & Haig, 1990, from off British Columbia to western Mexico; and *G. perarmatus* (Haig, 1968), from off California (Hendrickx & Harvey 1999; Baba *et al.* 2008). *Gastroptychus perarmatus* was described from a small series of 10 specimens collected north of Anacapa Island, California, at a depth of 125 fm

(ca 230 m) and was never found again until now, although it is a large animal (TL is over 21 cm in the largest male examined).

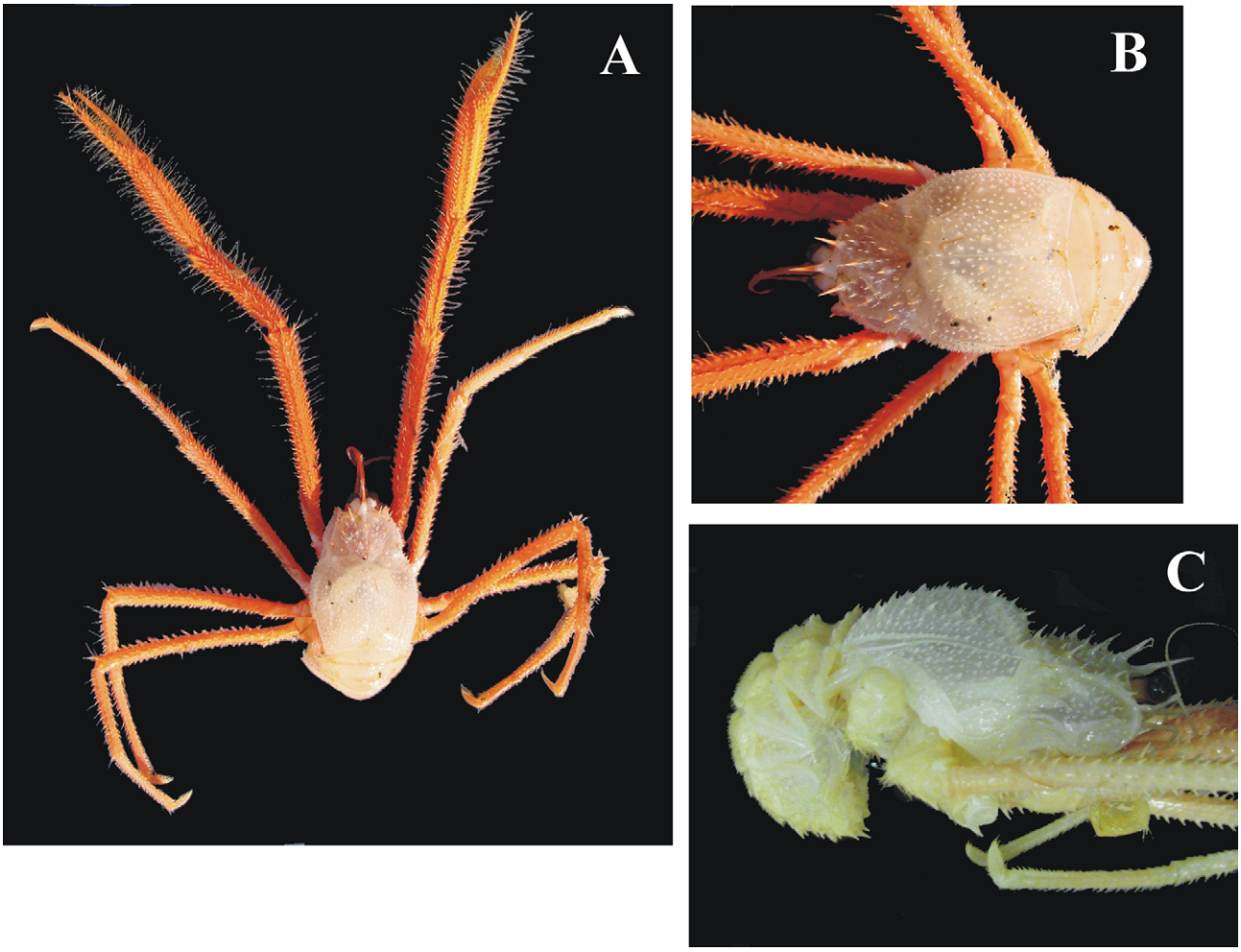

FIGURE 2. *Gastropthychus perarmatus* (Haig, 1968), male, TALUD XIV, Station 4 (CLr ca 38 mm) (EMU-8920). A, dorsal view. B, same, detail of carapace. C, same, lateral view of carapace.

TABLE 1. Species of squat lobsters captured during the TALUD XIV cruise in the northern Gulf of California. Values of environmental data measured in situ.

Species	Stations													Depth range	Temp. range	Dissolved O2 range
	1	2	3	4	8	9	12	14	19	20	27	30	32	(m)	(°C)	(ml/l)
G. perarmatus				×										435–451	6.8	0.21
J. californiensis				×	×					×		×		270–557	6.8–12.7	0.21–1.86
M. bapensis				×	×	×	×	×	×	×	×			286–915	6.8–12.7	0.18–1.45
M. mexicana													×	122–123	13.7	2.77
M. tenella	×							×				×		208–414	11.4–13.7	0.41–2.77
P. planipes	×	×	×											208–925	6.8–12.2	0.10–0.51

The material examined herein fits very well with the original description of Haig (1968), including: the presence of many small spines and the position, size and number of large spines on the carapace; the relative size and orientation of the rostrum; the shape of the sternal plates as well as the position and size of the sternal spines; the length of the chelipeds and the proportion of the joints; and the spination of the walkings legs. The carapace of largest specimens is particularly fragile and somewhat flexible. In largest specimens also the postcervical portion of the carapace is more elevated (Fig. 2C) than in the holotype illustrated by Haig (1968: fig. 2).

FIGURE 3. *Gastropthychus perarmatus* (Haig, 1968) on a specimen of the gorgonian *Callogorgia* sp. JASON dive J2-337, northern Gulf of California, ca 700 m depth.

Baba (2005) discussed the affinities among species of *Gastroptychus*, noting that the genus can be divided into two groups. The first features a pair of third maxillipeds widely separated at their base and the anterior end of the sternal plastron somewhat concave and with a row of spines; the second group has the third maxillipeds closely set and the anterior end of the sternal plastron is medially ridged, sloping, and with a pair of spines behind it. Considering that *G. spinifer* should be included in the group with gaping third maxilliped (K. Baba, pers. comm. May 2011), there are nine species in the former group and 11 in the latter (including *G. perarmatus*) (see Baba 2005). *Gastroptychus meridionalis* de Melo-Filho & de Melo, 2004, available after K. Baba's monograph was in print, features a row of spines on the anterior portion of the sternal plate and the bases of the third maxillipeds are widely gapping, thus indicating it belongs to the first group of species as defined by Baba (2005).

Gastroptychus perarmatus was omitted by Schmitt (1921) in his catalogue of Californian marine decapod crustaceans, and by Austin (1985) in his checklist of marine invertebrates of the cold temperate north-eastern Pacific. It was not reported by Martin & Zimmerman (1997) in their survey of the Santa Maria Basin and the Western Santa Barbara Channel, California.

Galatheoidea Samouelle, 1819

Galatheidae Samouelle, 1819

Janetogalathea californiensis (Benedict, 1902)

Galathea californiensis Benedict, 1902: 247, fig. 1. — Rathbun 1904: 166. — Schmitt 1921: 164, fig. 104. — Luke 1977: 30 (catalogue). — Wicksten 1982: 245; 1987: 50; 1989: 315 (list). — Hendrickx 1993b: 309 (table).
Janetogalathea californiensis. — Baba & Wicksten 1997: 40, figs. 1, 2. — Hendrickx & Harvey 1999: 375 (list). — Fierro *et al.* 2008: 5 (list). — Baba 2005: 246 (list). — Baba *et al.* 2008: 82 (list). — Hendrickx *et al.* 2011: 91, figs. 1, 2.

Material examined. TALUD XIV. St. 4 (28°11'27"N, 112°32'06"W), 16 males (CL 9.7–21.0 mm; CLr 13.1–28.7 mm) (EMU-8945), 4 females (CL 10.6–14.0 mm; CLr 14.4–18.5 mm), and 11 ovig. females (CL 13.8–18.3 mm; CLr 17.8–24.1 mm) (EMU-8946), 435–451 m, benthic sledge. St. 8 (28°17'06"N, 112°33'39"W), 8 Apr 2011, 1 male (CL 16.6 mm; CLr 21.2 mm), 520–557 m, Agassiz dredge (EMU-8947). St. 20 (28°46'29"N, 112°45'40"W), 9 Apr 2011, 2 males (CL 12.2–13.5 mm; CLr 16.6–18.2 mm), and 1 juv. (not measured), 410–414 m, benthic sledge (EMU-8948). St. 30 (28°32'57"N, 112°59'26"W), 11 Apr 2011, 1 female (CL 9.5 mm; CLr 13.5 mm), and 1 ovig. female (damaged; CL approx. 16.0 mm), 270–309 m, benthic sledge (EMU-8949).

Size and fecundity. Baba & Wicksten (1997) reported a maximum CLr of 22.5 mm for males and 21.2 mm for females. Maximum size (CLr) of material examined herein is 28.7 mm for males, 18.5 for females, and 24.1 for ovigerous females. A total of 37 specimens of *J. californiensis* were collected, including 12 ovigerous females. Number of eggs per individual is as follow: 139 (CL 32.6 mm); 251 (CL 37.6 mm); 87 (CL 36.5 mm; female partly spent); 174 (CL 35.6 mm); 301 (CL 36.9 mm); 259 (CL 41.8 mm). Egg size of largest female (average based on 20 measurements): 0.65 mm. The smallest male examined (CL 9.7 mm) has the two gonopods fully developed.

Ecology. The material collected during the TALUD XIV cruise was found in the following epibenthic environmental conditions: depth, 270–557 m; temperature, 6.8–12.7 °C: dissolved oxygen concentration, 0.21–1.86 ml O_2/l (Table 1).

Remarks. Hendrickx *et al.* (2011) recently discussed the geographic and bathymetric distribution of *J. californiensis*, noting that the oxygen minimum zone that characterizes most of the Gulf of California, seems to play an important role in local distribution of this species. Prior to this study, *J. californiensis* had been reported in three localities in the Gulf of California, including two "Velero" and one GUAYTEC (R/V "El Puma") cruises (see Hendrickx *et al.* 2011). All three stations were revisited during the TALUD XIV but no specimens of this species were found. The material reported herein is from four sampling stations, thus increasing to seven the total number of known localities within the Gulf of California. Altogether four males, two females, three ovigerous females, and one juvenile have been previously reported from the Gulf of California (Wicksten 1987; Baba & Haig 1997; Hendrickx *et al.* 2011). Material examined herein includes an additional 37 specimens.

Munididae Ahyong, Baba, Macpherson & Poore, 2010

Munida bapensis Hendrickx, 2000
(Fig. 4)

Munida bapensis Hendrickx, 2000: 165, fig. 3; 2003: 133 (key); 2008: 48, fig. 1. — Baba 2005: 259 (list). — Fierro *et al.* 2008: 5 (list). — Baba *et al.* 2008: 88 (list).

Material examined. TALUD XIV. St. 4. (28°11'27"N, 112°32'06"W), 7 Apr 2011, 175 males (CL 9.9–30.5 mm; CLr 13.6–44.05 mm) (EMU-8933), 28 females (CL 7.7–19.8 mm; CLr 11.2–28.7 mm) (EMU-8950), and 107 ovig. females (CL 15.8–24.7 mm; CLr 22.0–35.3 mm) (EMU-8934), 435–451 m, benthic sledge. Same station, 12 males (CL 12.2–32.0 mm), 2 females (CL 7.0 and 16.3 mm), and 14 ovig. females (CL 16.2–22.4 mm) (EMU-9289). St. 8 (28°17'06"N, 112°33'39"W), 8 Apr 2011, 18 males (CL 11.3–31.9 mm; CLr 14.9–44.5 mm), 9 females (CL 13.5–17.4 mm; CLr 19.0–23.4 mm), and 9 ovig. females (CL 17.9–25.2 mm; CLr 25.0–33.8 mm), 520–557 m, Agassiz dredge (EMU-8935). St. 9 (28°20'04"N, 112°21'33"W), 8 Apr 2011, 2 males (CL 10.9 and 15.5 mm; CLr 15.1 and 20.5 mm) 822–915 m, benthic sledge (EMU-9443). St. 12 (28°15'19"N, 112°13'57"W), 8 Apr 2011, 4 males (CL 8.5–14.8 mm; CLr largest male, 22.3 mm), one female (damaged), and 4 ovig. females (CL 19.2–24.1 mm; CLr 27.2–34.1 mm), 286–289 m, Agassiz dredge (EMU-8936). St. 14 (28°35'32"N, 112° 27'53"W), 8 Apr 2011, 11 males (CL 12.6–29.9 mm; CLr 16.4–41.9 mm), 4 females (CL 11.1–14.2 mm; CLr 15.9–20.9 mm), and 4 ovig. females (CL 18.2 mm; CLr 25.7–27.3 mm), 305–316 m, benthic dredge (EMU-8937). St. 19 (28°37'37"N,

112°41’05”W), 9 Apr 2011, 1 female (CL 13.3 mm; CLr 19.9 mm), 560–580 m, benthic sledge (EMU-8938). St. 20 (28°46'29"N, 112°45'40"W), 9 Apr 2011, 1 male (CL 12.7 mm; CLr 19.8 mm), and 1 ovig. female (CL 20.4 mm; CLr 29.0 mm), 410–414 m, benthic sledge (EMU-8939). St. 27 (29°08’53”N, 113°25’28”W), 10 Apr 2011, 1 male (CL 15.9 mm; CLr 22.9 mm), 860–907 m, benthic sledge (EMU-9444).

Color. As described by Hendrickx (2008). Carapace and legs orange. Rostrum orange dorsally, whitish ventrally; supraocular spines whitish. Tip of spines on chelipeds and walking legs whitish; ventral part of dactylus of walking legs whitish.

Size and fecundity. Of the 408 specimens collected during the TALUD XIV cruise, 54% are males and 46% females (34% ovigerous). Ovigerous females range from 15.8/22.0 mm to 25.2/33.8 mm (CL/CLr). Number of eggs vary from 268 to 1884 per female (10 females with CL from 15.9 to 24.7 mm) and is size-related (Table 2). Egg size, 0.59–0.68 mm (based on 20 eggs of largest female).

FIGURE 4. *Munida bapensis* Hendrickx, 2000, male, dorsal view. TALUD XIV, Station 4 (CLr ca 40 mm) (EMU-8933).

TABLE 2. Number of eggs carried by ovigerous females of *M. bapensis* Hendrickx, 2000, related to carapace length (CL).

Size (CL)	Number of eggs
15.9	268
16.6	297
19.0	1068
21.2	1033
22.3	951
22.6	1311
23.3	1884
23.9	1487
24.0	1596
24.7	1643

Remarks. The largest male examined is CLr 44.5 mm and is larger than previously reported (Hendrickx 2008). The rediscovery of *M. bapensis* in samples of the TALUD X cruise in 2007 (488 specimens in one sample; Hendrickx 2008) and present material (405 specimens in six samples) undoubtedly indicate that this species is one of the most abundant galatheids in the northern part of the central Gulf of California.

Ecology. The material collected during the TALUD XIV cruise was found in the following epibenthic environmental conditions: depth, 286–915 m; temperature, 6.8–12.7°C; dissolved oxygen concentration, 0.18–1.45 ml O_2/l (Table 1), with five records out of eight in oxygen values <0.54 ml O_2/l. The most abundant sample (St. 4) corresponds to 0.21 ml O_2/l, in severe hypoxic conditions.

Munida mexicana Benedict, 1902

Munida mexicana Benedict, 1902: 264, fig. 13. — Hendrickx 1993a: 7 (list); 1993b: 309 (table); 1996: 616 (list); 2000: 175, figs. 7, 8. — Hendrickx & Harvey 1999: 375 (list). — Baba 2005: 268 (list). — Fierro *et al.* 2008: 6 (list). — Baba *et al.* 2008: 106 (list).

Material examined. TALUD XIV. St. 32 (27°56'13"N, 111°19'44"W), 11 Apr 2011, 3 ovig. females (CL 3.9–4.3 mm; CLr 4.7–6,3 mm), 122–123 m, benthic sledge (EMU-8944).

Fecundity. One ovigerous female from St. 32 is 4.7 mm CLr, the smallest size reported so far for this species. Females carry ca 150–200 eggs per female. Egg size, 0.44–0.53 mm (based on 20 eggs).

Remarks. *Munida mexicana* has been reported by Hendrickx (2000) as a common and abundant species on the continental shelf of the Gulf of California, in depth from 30 to 102–110 m (maximum known depth: 145 m; Benedict 1902).

Ecology. Epibenthic values of temperature (13.7 °C) and dissolved oxygen (2.77 ml O_2/l) (Table 1) fit well within the known range reported for this species (Hendrickx 2003).

Munida tenella Benedict, 1902

Munida tenella Benedict, 1902: 274, fig. 20. — Hendrickx 1993b: 310 (table); 1995: 559 (text fig.); 2000: 186, fig. 14. — Hendrickx & Harvey 1999: 375 (list). — Baba 2005: 276 (list). — Fierro *et al.* 2008: 6 (list). — Baba *et al.* 2008: 125 (list).

Material examined. TALUD XIV St. 1 (28°15'38"N, 111°58'33"W), 7 Apr 2011, 23 males (CL 9.4–22.4 mm; CLr 14.3–29.7 mm), 29 females (CL 8.1–21.6 mm; CLr 12.2–29.1 mm), 1 ovig. female (CL 18.0 mm; CLr 23.4 mm), and 9 juv. (not measured), 208–212 m, benthic dredge (EMU-8940). Same station, 1 male (CL 11.7 mm; CLr18.9 mm), and 3 females (CL 14.2–19.4 mm; CLr largest female, 29.1 mm) (EMU-8943). St. 14 (28°35’32”N, 112° 27’53”W), 8 Apr 2011, 6 males (CL 12.7–19.8 mm; CLr 19.6–26.2 mm), 7 females (CL 12.6–15.1 mm; CLr

19.9–24.5 mm), and 1 ovig. female (CL 17.7 mm; CLr 27.1 mm), 305–316 m, benthic dredge (EMU-8941). St. 20 (28°46'27"N, 112°45'24"W), 9 Apr 2011, 1 juv. (damaged, not catalogued), 410–414 m, benthic sledge. St. 30 (28°32'57"N, 112°59'26"W), 11 Apr 2011, 2 males (CL 9.9–25.0 mm; CLr 16.2–34.2 mm), and 2 females (CL 10.5–12.0 mm; largest female CLr 18.7 mm) 270–309 m, benthic sledge (EMU-8942).

Color. Carapace and pereiopods bright red.

Size and fecundity. The type material obviously corresponds to small specimens (18 mm total length, "from the front to the end of the telson" [sic]; Benedict, 1902: 275; about 12 mm of maximum CLr, based on illustration by Benedict 1902). The large series of specimens reported by Hendrickx (2000) from 12 stations throughout the northern and central Gulf of California included specimens of up to 16.0 mm CLr. Among the TALUD XIV material examined, the largest male is 34.2 mm CLr and the largest female 29.1 mm CLr.

In total 85 specimens were collected, and only two ovigerous individuals of about the same size (CL 17.7 and 18.0 mm) were found among the 41 females, carrying over 1000 eggs each. Egg size: 0.37–0.44 mm (based on 20 eggs of largest female).

Ecology. *Munida tenella* was captured in depths of 208–414 m (Table 1), much deeper than previously known (70–130 m) (Hendrickx 2000). The series of large specimens (CLr > 20.0 mm) captured during the TALUD cruises in depth of 208–414 m contrasts with the series of much smaller specimens (CLr <16 mm) reported by Hendrickx (2000) between 27 and 112 m depth. This might indicate that larger specimens occur in deeper water.

Epibenthic values of temperature and dissolved oxygen associated with the capture of *M. tenella* were 11.4–13.7 °C and 0.41–2.77 ml O_2/l, respectively (Table 1). The largest catch corresponds to the 0.41 ml O_2/l value.

Pleuroncodes planipes Stimpson, 1860

Pleuroncodes planipes Stimpson, 1860: 245. — Rathbun 1904: 166. — Schmitt 1921: 163. — Hendrickx 1993a: 7 (list); 1993b: 310 (table); 1995: 556 (text fig.). — Hendrickx and Harvey 1999: 377 (list). — Baba *et al.* 2008: 178 (list). — Fierro *et al.* 2008: 9 (list).

Material examined. TALUD XIV. St. 1 (28°15'38"N, 111°58'33"W), 7 Apr 2011, 5 males (CL 21.8–22.9 mm; CLr 26.7–30.1 mm), 1 female (CL 22.7 mm; CLr 26.9 mm), and 2 ovig. females(CL 17.5 and 18.9 mm; CLr 22.6 and 24.1 mm), benthic sledge, 208–212 m (EMU-9290a). St. 2 (28°14'31"N, 112°08'27"W), 7 Apr 2011, 1 female (CL 13.4 mm; CLr 20.1 mm), benthic sledge, 512–525 m (EMU-9290b). St. 3 (28°16'03"N, 112°17'40"W), 7 Apr 2011, 1 male (CL 14.2 mm; CLr 18.3 mm), benthic sledge, 914–925 m (EMU-9290c).

Remarks. *Pleuroncodes planipes* features both a pelagic and a benthic phase, making it difficult to determine its bathymetric range as specimens are often caught up in trawls hauled back to surface. Within the Gulf of California, the species is known from the east coast, north to about Tiburon Island and it is occasionally very abundant (Hendrickx 1995). In the California Current area, it ranges from San Francisco, California, to the tip of the Baja California Peninsula, then further south to Central America. In the Gulf of California, environmental data indicate that it usually occurs close to the upper limit of the oxygen minimum zone (OMZ) (Hendrickx 1985; Aurioles-Gamboa & Balart 1995).

Because the material examined could have been captured at the bottom or during return of the trawl net to surface, it is not possible to relate the epibenthic values of parameters measured at the sampling stations with the presence of *P. planipes*.

In addition to the references provided in the synonymy, *P. monodon* has been cited in many contributions dealing with its biology, ecology or fishery (Aurioles-Gamboa & Balart 1995; Poore *et al.* 2011).

Munidopsidae Ortmann, 1898

Munidopsis depressa Faxon, 1893

Munidopsis depressa Faxon, 1893: 189; 1895: 96, pl. XXII, figs 2, 2a, 2b. — Benedict 1902: 319. — Haig 1956: 79. — Luke 1977: 28 (catalogue). — Wicksten 1989: 315 (list). — Hendrickx & Harvey 1999: 376. — Hendrickx 1993b: 310 (table); 2011: 100, fig. 2; 2003b: 23. — Baba 2005: 282 (key), 288 (list). — Fierro *et al.* 2008: 7 (list). — Baba *et al.* 2008: 140 (list).

Material examined. TALUD XIV. St. 3 (28°16'03"N, 112°17'40"W), 7 Apr 2011, 3 males (CL 10.6–12.4 mm; CLr 14.7–16.3 mm), 914–925 m, benthic sledge (EMU-9279).

Remarks. Previously known from off California and from the Gulf of California (from ca 26°N south to off Tres Marias Islands). The present record extends the northernmost limit of *M. depressa* in the Gulf of California by over two degrees of latitude, to ca 28°16'N.

The recorded depth range of *M. depressa* in the Gulf of California is from 780 to 1300 m, just below the OMZ (Hendrickx 2003). As noted by Hendrickx & Serrano (2010), deep-water species occurring below the OMZ off western Mexico are unable to migrate to shallow water due to the physiological barrier formed by the OMZ and they form a distinct community, with no representative of the continental shelf community.

Discussion

According to Baba *et al.* (2008), squat lobsters comprise of 869 species and 42 genera, but new species are described virtually every week, mostly based on material from the Pacific Ocean (e.g., Cabezas *et al.* 2008: one new genus; Macpherson & Baba 2009: two new species; Macpherson & Cleva 2010: one new genus and two new species; Hendrickx & Ayon-Parente 2010: one new species; Baba 2011: one new species). A more recent compilation indicates that number of described species of squat lobsters has reached 916, an increase of 47 species (5.4%) in a little over three years. In addition to this, there is an estimated 26 undescribed species recognized as such by experts worldwide (Schnabel *et al.*, 2011). They are poorly represented, however, in the eastern Pacific (76 species or 8.3%) and, except for *Pleuroncodes*, endemic to the eastern Pacific with only two species [*P. planipes* and *P. monodon* (H. Milne Edwards, 1837)], all genera occurring in this region are also found elsewhere. Comparatively, in addition to seven of the eight genera of the eastern Pacific, there are three more genera in the western Atlantic (east coast of America): *Eumunida*, *Agononida*, and *Anomoemunida* (Fierro *et al.* 2008).

Material collected during the TALUD XIV cruise belongs to seven species, including the first record in the tropical eastern Pacific of *Gastroptychus perarmatus*, and the largest series of specimens of *Janetogalathea californiensis* ever collected in the Gulf of California (37 specimens). Three species of *Munida* were found. One of these (*M. mexicana*) is typically associated with the continental platform and was collected only once during the survey. The two others have been reported in depths of 587–633 m (*M. bapensis*) (Hendrickx 2008) and 27–130 m (*M. tenella*) (Hendrickx 2000). The material examined increases the shallower bathymetric limit to 286 m for the former, and the shallower and deeper bathymetric limits to 316 m and 915 m, respectively, for the latter. *Munidopsis depressa* has been recognized as the most frequently collected species of squat lobsters in sampling stations deeper than 500 m during the TALUD cruises in the Gulf of California (Hendrickx 2001; 2003). However, in this survey it appeared only once, in one of the deeper stations visited (914–925 m) and was absent from four other stations (depth between 823 and 1165 m) sampled during the same cruise.

The rediscovery of *Gastroptychus perarmatus* in the Gulf of California, 43 years after it was described from off California, is an important find and it represents the second locality known for this species.

Munida bapensis, a species described in 2000 based on only a few specimens collected in the northern part of the central Gulf of California, was later reported as abundant in a near-by locality (Hendrickx 2008), on a muddy bottom.

Squat lobsters were found in 13 hauls out of a total of 26 performed during the TALUD XIV cruise. The most frequently collected species, *M. bapensis* (6 out of 9 samples) co-occur four times in samples with *J. californiensis* (the later found in 8 out of 13 samples), and once with *M. tenella* (captured in 3 samples). *Munida mexicana* and *G. perarmatus* were both collected only once.

During the sampling operation at station 4, *M. bapensis* was found abundantly (310 specimens) in the same sample as *G. perarmatus*, but there is so far no direct evidence that both species share the same precise habitat. *Janetogalathea californiensis* was also collected at station 4 where *G. perarmatus* and *M. bapensis* where also collected, but again there is no evidence of a close sympatry among these species. Trawling distance covered by the sampling gear at station 4 (ca 1,400 m) was long enough to allow for segregated habitats for these species, and only direct observations made by ROV or diving saucers could help to confirm whether a close association exists among these species or not.

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