

Hermit crabs (Crustacea: Decapoda: Anomura: Paguroidea) of the Northern Marianas, including new records and an updated checklist*

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Abstract— The Mariana Islands consist of two volcanic island arc chains, one volcanically inactive frontal arc in the Southern Marianas and a younger, volcanically active arc in the Northern Marianas. Given their extreme remoteness, the hermit crab fauna of the uninhabited northern islands are little-known. In this study we collected and examined hermit crabs from two scientific cruises to the Northern and Southern Marianas conducted in 2003 and 2015. We report 39 species from these field efforts, including 5 new records and 6 undescribed species. The updated checklist of the hermit crabs of the Marianas now includes 79 species.

Sumària— Guaha dos na pátte iya Islan Mariãnas: i sanháya nu i tãya' botkan siha yan i sanlãgu ni mas hoben yan guaguaha ha' meggai manlã'la' na botkan siha. Didide' tiningo'-ta put umang siha gi iya Mariãnas, kululo'ña i patten sanlãgu sa' chãgo' yan disetto. Gi ini estudiu-mãmi, manmanhokka ham yan manmananalisa ham umang tãsi siha durãnten dos na biãhi gi patten sanlãgu yan sanháya gi 2003 yan 2015 na sakkan. Hami en sodda' 39 na klãsi, kontodu sinko na klãsen konosidu ni finane'na mali'e' gi iya Mariãnas yan sies na klãsi ni mannuebu gi siensia. Humuyongña, pã'go in tungo' 79 na klãsen umang siha gi iya Mariãnas.

Introduction

The Mariana Islands are a chain of volcanic and uplifted limestone islands that form part of the Izu-Bonin-Mariana island arc system, located approximately a thousand kilometers to the east of the Philippine Archipelago. The Marianas are comprised of two geologically distinct island arcs: the older (ca. 43 Ma), volcanically-inactive frontal arc of the southern islands (Farallon de Medinilla southwards to Guam; here termed Southern Marianas), and the considerably younger (ca. 1.3 Ma), volcanically-active inner arc of the northern islands (Uracas to Anatahan, here termed Northern

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Marianas; Paulay 2003), together with the smaller seamounts of the Western Mariana Ridge (e.g., Arakane Reef, Pathfinder Reef, Stingray Shoals), which are intermediate in age to the two main island arcs. Due to their considerably young age, the Northern Marianas lack well-developed coral reefs, having only incipient coral communities on bare volcanic rock. The northern islands also lack lagoonal habitats, except for the protected caldera of Maug Island. Consequently, the biota of the Northern Marianas is depauperate compared to the older, more geologically stable, and relatively reef-rich islands to the south (Paulay 2003; Starmer et al. 2005). The remoteness and inaccessibility of the Northern Marianas chain is another reason why fewer species have been reported compared to the Southern Marianas.

Despite being poorly studied and relatively depauperate, the fauna of the Northern Marianas is biogeographically interesting because of the presence of species that are limited to the northern arc of islands, and never found in the southern arc (Paulay et al. 2003). The reasons for the biogeographic break separating the Northern and Southern Marianas remain unclear.

For clarity, it is worth noting that the geologically distinct northern arc islands and southern arc islands do not correspond to the political unit termed the Commonwealth of the Northern Mariana Islands (CNMI). The CNMI is comprised of all the islands of the northern arc together with most of the islands of the southern arc, with the exception of Guam which comprises a distinct political unit. This paper reports species records for the entire CNMI political unit, spanning both the Northern Mariana islands (Uracas to Anatahan) and the Southern Mariana islands (Farallon de Medinilla to Rota). The terms “Northern Marianas” and “Southern Marianas” will be used in this paper refer to the geologically distinct island arcs (Fig. 1).

The first comprehensive checklist of the regional hermit crab fauna was produced by Wooster (1979; see also Wooster 1982), focusing primarily on Guam but including a few stations in the Northern Marianas. In 1992, the Natural History Museum and Institute, Chiba, Japan, undertook an expedition to the Northern Marianas and published comprehensive checklists of the carcinological fauna, including a paper on the hermit crabs and other anomurans (Asakura et al. 1994). Checklists to the entire marine biota of Guam and the rest of the Marianas were made available in a published volume (Paulay 2003), including a comprehensive checklist of the crustaceans (Paulay et al. 2003) that compiled previous work as well as new records. However, the surveys conducted by Paulay and colleagues were primarily restricted to the southern island of Guam. Descriptions of new species or new records on the basis of material from the Southern Marianas have also been published (McLaughlin 2002; Komai & Osawa 2006; 2007; Kropp 2015). More recently, MCD Malay (in 2003) and AK Miller (in 2015) participated in scientific cruises to the Northern Marianas conducted by the U.S. National Oceanographic and Atmospheric Administration (NOAA). While the expeditions’ primary goals were coral reef rapid ecological assessments, fisheries assessments, and marine megafaunal surveys, the authors had opportunities to sample the crustacean fauna of the remote Northern Marianas. The new collections presented here provide an update the checklist of hermit crabs of the CNMI, and clarify the biogeographic distribution of paguroids in the Northern Marianas. Five new records and six undescribed species are herein reported.

Materials and Methods

Specimens were collected during two separate expeditions to the CNMI on board the NOAA vessel TR/V *Oscar Elton Sette*. The first expedition took place in August to September 2003 and covered fourteen islands and offshore reefs (55 sampling stations in total), while the second expedition occurred in June 2015 and covered six islands and 25 sampling stations (Fig. 1 and Table 1). In 2003, specimens were hand-collected using SCUBA, snorkeling, and reef-walking; while in 2015 the specimens were collected using snorkeling, baited crab pots, and ring nets. Additional specimens were collected in Rota and Saipan in July and August 2003, respectively, via snorkeling

and diving. For most stations, the recorded minimum and maximum depths refer to the entire dive, snorkel, or trap depth range. Photos of fresh specimens, when available, are provided.

Names were checked for validity against McLaughlin et al. (2010) and WoRMS Editorial Board (2021). Species are listed by family and then alphabetically. Records are listed from the southernmost to the northernmost collecting station. The specimens are deposited in the Florida Museum of Natural History, University of Florida (UF; 2003 specimens) and the Scripps Institution of Oceanography Benthic Invertebrate Collection (SIO-BIC; 2015 specimens).



Fig. 1. Map of the Mariana Islands, with northern arc and southern arc islands indicated. Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Results

We report data for 39 species. The updated checklist, compiling all published species from the Marianas, is provided in Table 2. The new data raise the number of hermit crabs known from the Marianas from 65 species (as of the last compilation; Paulay et al. 2003) to 81 species (nearly a 25% increase).

LIST OF SPECIES

FAMILY COENOBITIDAE Dana 1851

Coenobita perlatus H. Milne Edwards 1837

Material. 1 specimen (UF 8388), Pagan Island, station PAG-04.

Coenobita rugosus H. Milne Edwards 1837

Material. 1 specimen (UF 7436), Pagan Island, station PAG-04.

FAMILY CALCINIDAE Fraaije, Van Bakel & Jagt 2017

Aniculus aniculus (Olivier 1812)

Fig. 2a

Material. 1 specimen (SIO-BIC C14220), Pagan Island, station P3.

Aniculus retipes Lewinsohn 1982

Material. 1 specimen (UF 5812), Agrihan Island, station AGR-06.

Calcinus argus Wooster 1982

Material. 1 specimen (UF 5714), Saipan Island, station NM-05.

Calcinus elegans (H. Milne Edwards 1836)

Fig. 2b

Material. 1 specimen (UF 5698), Saipan Island, station NM-03; 2 specimens (UF 5697), Guguan Island, station GUG-002; 1 specimen (SIO-BIC C14246), Guguan Island, station AKM-GUG-02; 2 specimens (UF 5700), Alamagan Island, station ALA-002; 1 specimen (SIO-BIC C14219), Pagan Island, station P3; 2 specimens (UF 5699), Maug Islands, station MAUG-03; 1 specimen (SIO-BIC C14194), Maug Islands, no station info.

Calcinus guamensis Wooster 1982

Material. 1 specimen (UF 5742), Guguan Island, station GUG-002.

Calcinus hazletti Haig & McLaughlin 1984

Fig. 2c

Material. 1 juvenile, shield length (SL) 1.58 mm (UF 7075), Saipan Island, station NM-05 [identification tentative]; 2 specimens (UF 7076), Sarigan Island, station SAR-002; 2 specimens (UF 5739), Alamagan Island, station ALA-003; 2 specimens (UF 5736), Pagan Island, station PAG-01; 1 specimen (UF 5732), Pagan Island, station PAG-07; 1 specimen (UF 5729), Agrihan Island, station AGR-02; 2 specimens (UF 5738), Agrihan Island, station AGR-04; 4 specimens (UF 5741), Asuncion Island, station ASU-02; 3 specimens (UF 5731), Asuncion Island, station ASU-03; 1 specimen (UF 5733), Maug Islands, station MAUG-01; 5 specimens (UF 5740), Maug Islands, station MAUG-02; 4 specimens (UF 5730), Maug Islands, station MAUG-02; 1 specimen (UF 7074), Maug Islands, station MAUG-03; 1 specimen (UF 5735), Maug Islands, station MAUG-04; 1 specimen (UF 5734), Maug Islands, station MAUG-06; 3 specimens (UF 5737), Maug Islands,

station MAUG-06; 2 specimens (UF 5725), Maug Islands, station MAUG-10; 3 specimens (UF 5726), Maug Islands, station MAUG-11; 1 specimen (UF 5727), Stingray Shoal station STI-001; 1 specimen (UF 5723), Stingray Shoal, station STI-002; 1 specimen (UF 5728), Uracas Island, station URA-002.

Remarks. Common in the intertidal area of the Northern Marianas. There is one questionable record from Saipan (UF 7075), however it is a juvenile and cannot be identified with confidence. Even if UF 7075 is indeed *C. hazletti*, the species is exceedingly rare in the Southern Marianas. This species is otherwise only known from Hawaii and Japan (Haig & McLaughlin 1984; Asakura & Tachikawa 2003; Arima 2004). However, the Northern Mariana population is genetically distinct from the Hawaiian population (Malay & Paulay 2010). Given the genetic evidence and disjunct distribution, it is possible that the Northern Marianas and Japanese form represents a cryptic species.

Calcinus isabellae Poupin 1997

Material. 1 specimen (UF 5690), Guguan Island, station GUG-001; 1 specimen (UF 5691), Maug Islands, station MAUG-03; 1 specimen (UF 5691), Maug Islands, station MAUG-04.

Calcinus laevimanus (Randall 1840)

Fig. 2d

Material. 1 specimen (UF 5705), Saipan Island, station NM-07; 1 specimen (SIO-BIC C14214), Pagan Island, station P1.

Calcinus latens (Randall 1840)

Fig. 2e

Material. 1 specimen (UF 5766), Aguijan Island, station AGU-02; 2 specimens (UF 5768), Saipan Island, station NM-04; 8 specimens (UF 5769), Saipan Island, station NM-08; 2 specimens (UF 5771), 2 specimens (SIO-BIC C14260), Sarigan Island, station AKM-SAR-02; Alamagan Island, station ALA-002; 6 specimens (SIO-BIC C14216), Pagan Island, station P1; 1 specimen (UF 5765), Asuncion Island, station ASU-03; 1 specimen (UF 5770), Maug Islands; station MAUG-06; 1 specimen (UF 5764), Maug Islands, station MAUG-10; 2 specimens (UF 5763), Maug Islands, station MAUG-11.

Calcinus lineapropodus Morgan & Forest 1991

Material. 1 specimen (UF 5758), Rota Island, station ROT-03; 3 specimens (UF 5747), Tinian Island, station MM-TIN-02; 2 specimens (UF 5759), Tinian Island, station MM-TIN-03; 5 specimens (UF 5750), Saipan Island, station NM-08; 1 specimen (UF 5761), Sarigan Island, station SAR-002; 1 specimen (UF 5760), Guguan Island, station GUG-003; 1 specimen (UF 5749), Alamagan Island, station ALA-001; 1 specimen (UF 5817), Pagan Island, station PAG-01; 3 specimens (UF 5757), Pagan Island, station PAG-07; 1 specimen (UF 5754), Pagan Island, station PAG-09; 1 specimen (UF 5751), Agrihan Island, station AGR-02; 2 specimens (UF 5756), Agrihan Island, station AGR-03; 1 specimen (UF 5748), Maug Islands, station MAUG-04; 4 specimens (UF 5753), Maug Islands, station MAUG-10.

Calcinus minutus Buitendijk 1937

Material. 4 specimens (UF 5694), Saipan Island, station NM-02; 1 specimen (UF 5693), Pagan Island, station PAG-09; 1 specimen (UF 5696), Maug Islands, station MAUG-10.

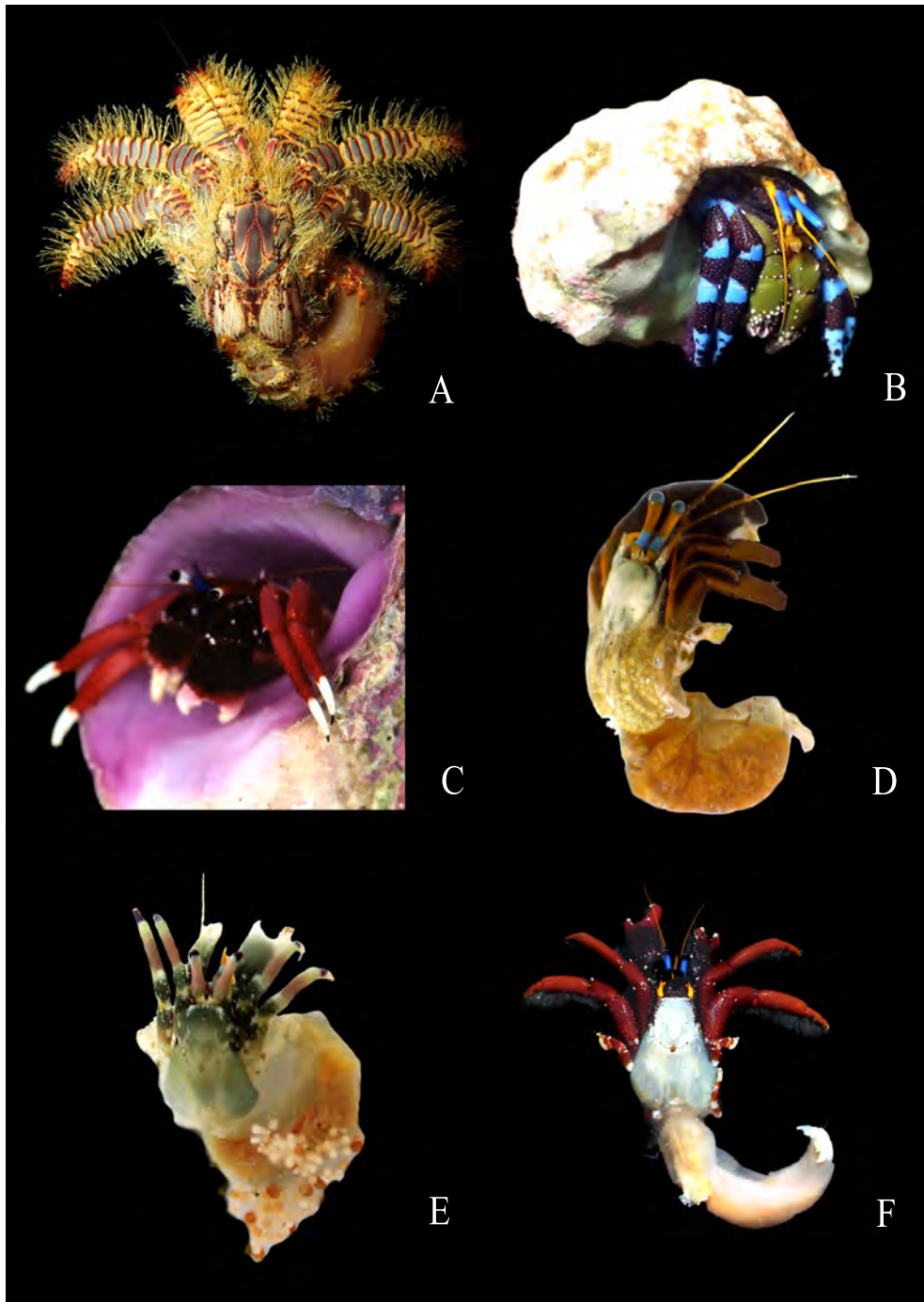


Fig 2. A: *Aniculus aniculus* (Olivier, 1812), Pagan Island (SIO-BIC C14220). B: *Calcinus elegans* (H. Milne Edwards, 1836), Alamagan Island (SIO-BIC C14219). C: *Calcinus hazletti* Haig and McLaughlin, 1984, photo not associated with specimen. D: *Calcinus laevimanus* (Randall, 1840), Saipan Island (SIO-BIC C14214). E: *Calcinus latens* (Randall, 1840), Pagan Island (SIO-BIC C14216). F: *Calcinus morgani* Rahayu and Forest, 1999, Pagan Island (SIO-BIC C14234).

Calcinus morgani Rahayu & Forest 1999

Fig. 2f

Material. 1 specimen (UF 5720), Rota Island, station ROT-05; 3 specimens (UF 5785), Rota Island, station ROT-05; 1 specimen (UF 5784), Aguijan Island, station AGU-02; 1 specimen (UF 6360), Saipan Island, station NM-04; 1 specimen (UF 5719), Saipan Island, station NM-04; 1 specimen (UF 5794), Saipan Island, station NM-05; 6 specimens (UF 5703), Saipan Island, station NM-04; 1 specimen (UF 5787), Anatahan Island, station ANA-003; 1 specimen (SIO-BIC C14259), Sarigan Island, station AKM-SAR-02; 3 specimens (UF 5791), Guguan Island, station GUG-001; 1 specimen (UF 5715), Guguan Island, station GUG-002; 1 specimen (UF 5717), Alamagan Island, station ALA-002; 3 specimens (UF 5790), Alamagan Island, station ALA-002; 1 specimen (UF 5721), Alamagan Island, station ALA-003; 2 specimens (SIO-BIC C14240), Alamagan Island, station AKM-ALA-01; 1 specimen (UF 5792), Pagan Island, station PAG-03; 1 specimen (SIO-BIC C14215), Pagan Island, station AKM-PAG-01; 1 specimen (SIO-BIC C14218), Pagan Island, station AKM-PAG-02; 3 specimens (SIO-BIC C14222), Pagan Island, station AKM-PAG-03; 1 specimen (SIO-BIC C14234), Pagan Island, station AKM-PAG-PA1; 1 specimen (SIO-BIC C14236), Pagan Island, station AKM-PAG-PA4; 1 specimen (UF 5788), Agrihan Island, station AGR-01; 1 specimen (SIO-BIC C14208), Agrihan Island, station AKM-AGR-00A3; 5 specimens (UF 5793), Maug Islands, station MAUG-03; 1 specimen (UF 7439), Maug Islands, station MAUG-04; 1 specimen (UF 5795), Maug Islands, station MAUG-04; 2 specimens (UF 5789), Maug Islands, station MAUG-10; 2 specimens (UF 5786), Supply Reef, station SUP-01; 1 specimen (SIO-BIC C14195), Maug Islands, no station info; 1 specimen (SIO-BIC C14196), Maug Islands, no station info.

Remarks. Komai (2004) demonstrated that *Calcinus areolatus* Rahayu & Forest 1999 was confounded with juvenile or young specimens of *C. morgani*. Additionally, *C. morgani* was formerly confused with the very similar *C. gaimardii*. The latter has not been found in the Marianas. *Calcinus morgani* is found in wave-exposed intertidal rocky shore and coral reefs, while *C. gaimardii* prefers calm, subtidal lagoonal waters (Asakura 2002). See Rahayu & Forest (1999) and Asakura (2002) for how to distinguish between the two species.

Calcinus pulcher Forest 1958

Material. 1 specimen (UF 7443), Agrihan Island, station AGR-04.

Remarks. *Calcinus pulcher* typically prefers protected lagoonal waters, thus a record from Agrihan is unexpected. This is the first record of *C. pulcher* from the Northern Marianas.

Calcinus seurati Forest 1951

Fig. 3a

Material. 1 specimen (UF 5707), Saipan Island, station NM-07; 1 specimen (UF 5708), Saipan Island, station NM-07; 1 specimen (SIO-BIC C14239), Alamagan Island, station AKM-ALA-01.

Calcinus vachoni Forest 1958

Fig. 3b

Material. 1 specimen (SIO-BIC C14237), Pagan Island, station AKM-PAG-PA4; 1 specimen (UF 5743), Maug Islands, station MAUG-03; 1 specimen (UF 5745), Maug Islands, station MAUG-06; 2 specimens (UF 5744), Maug Islands, station MAUG-11.

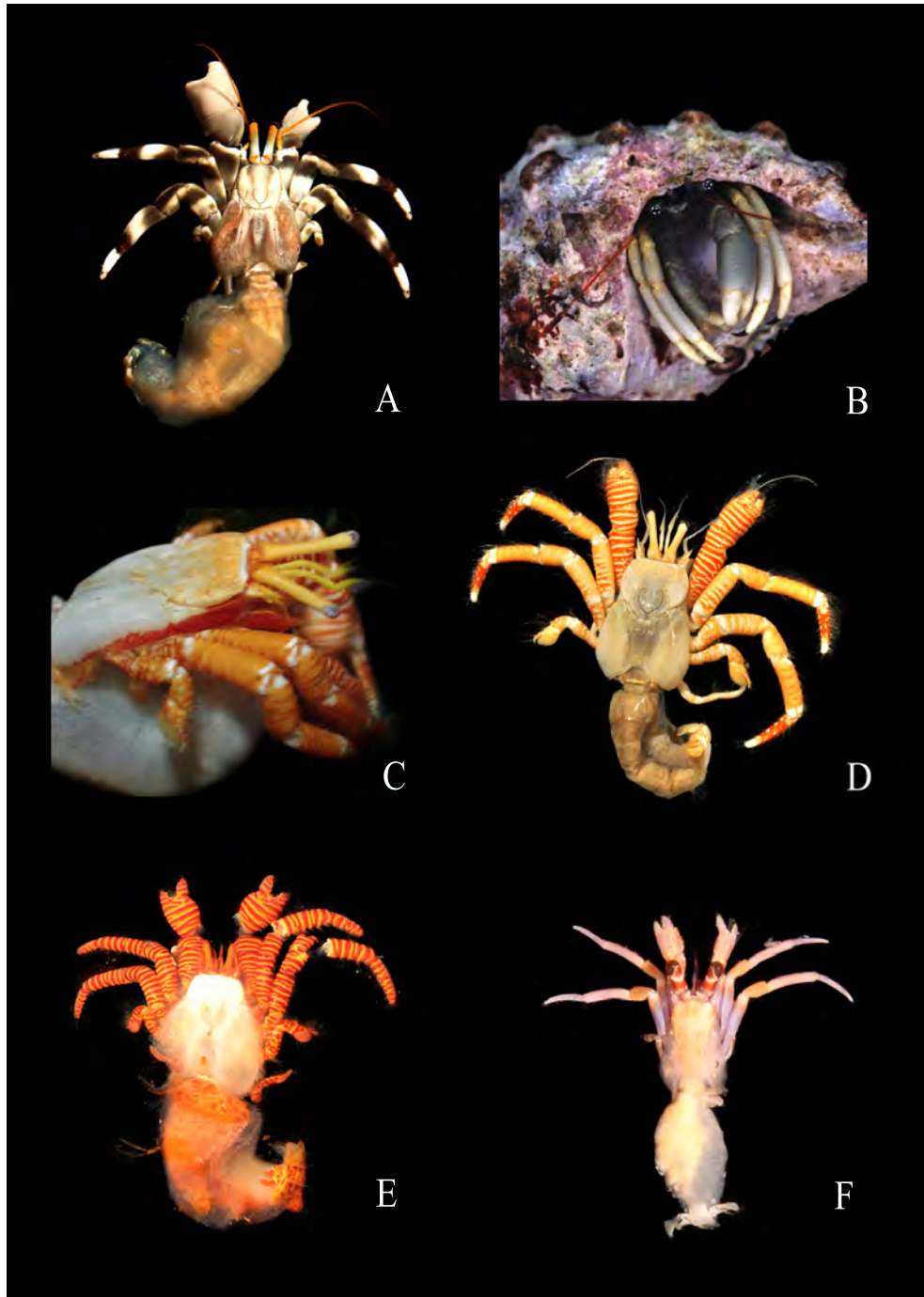


Fig. 3. A: *Calcinus seurati* Forest, 1951, Alamagan Island (SIO-BIC C14239) .
B: *Calcinus vachoni* Forest, 1958, photo not associated with specimen. C & D: *Ciliopagurus alcocki* Forest, 1995, Maug Islands (SIO-BIC C14197; 3D recently preserved). E: *Ciliopagurus strigatus* (Herbst, 1804), Alamagan Island (SIO-BIC C14241). F: *Dardanus gemmatus* (H. Milne Edwards, 1848), Guguan Island (SIO-BIC C14253).

Ciliopagurus alcocki Forest 1995

Fig. 3c – 3d

Material. 1 female (SIO-BIC C14197), Maug Islands, station AKM-MAU-02.**Coloration.** Shield generally light orange, fading to white posteriorly. Ocular peduncles yellow-orange, cornea grey; ocular acicles orange. Antennular peduncles yellow. Antennal peduncles yellow-orange. Chelipeds bright red with light yellow rings. Second and third pereopods uniformly orange with irregular white markings at basal and distal ends of meri, carpi, and propodi; dactyls bright red with white spots and white basal and distal ends; terminal claws black. Pleon white.**Remarks.** The single specimen was caught at depth of 266–288 m and was in a cone snail. A color photograph of a freshly caught specimen from Kii Peninsula, Japan, was previously published by Miyake (1982: pl. 35, fig. 1 right, as *Trizopagurus teberarum*; cf. Forest 1995), with which the present specimen agrees well in the coloration. The color and color pattern are species specific in *Ciliopagurus* (Forest 1995; Poupin 2001; Poupin & Malay 2009). It was previously known from New Caledonia (type locality), Japan, and the South China Sea (Forest 1995), thus this represents a new record from the Marianas.*Ciliopagurus strigatus* (Herbst 1804)

Fig. 3e

Material. 3 specimens (UF 5777), Rota Island, station ROT-02; 1 specimen (UF 5783), Aguijan Island, station AGU-01; 1 specimen (UF 5776), Tinian Island, station MM-TIN-02; 1 specimen (UF 5773), Arakane Reef, station ARA-001; 1 specimen (SIO-BIC C14266), Sarigan Island, station AKM-SAR-04; 1 specimen (UF 5772), Alamagan Island, station ALA-003; 1 specimen (SIO-BIC C14241), Alamagan Island, station AKM-ALA-01; 3 specimens (UF 5774), Agrihan Island, station AGR-01; 3 specimens (UF 5778), Maug Islands, station MAUG-03; 1 specimen (UF 5781), Supply Reef, station SUP-01.*Dardanus crassimanus* (H. Milne Edwards 1836)**Material.** 1 male, SL 3.3 mm (UF 8614), Anatahan Island, station ANA-001; 1 female, SL 3.1 mm (UF 8617), Anatahan Island, station ANA-003; 1 female, SL 3.5 mm (UF 8615), Anatahan Island, station ANA-006; 1 ovigerous female, SL 4.6 mm and 1 male, SL 3.5 mm (UF 8612), Pagan Island, station PAG-07; 1 female, SL 3 mm (UF 58289), Agrihan Island, station AGR-003; 1 female, SL 3.5 mm (UF 7447), Agrihan Island, station AGR-03; 1 female, SL 3.7 mm (UF 8613), Agrihan Island, station AGR-06; 1 female, SL 5.1 mm (UF 8611), Asuncion Island, station ASU-002; 2 females, SL 3.1–3.9 mm and 1 specimen still in shell (UF 8618), Maug Islands, station MAUG-03; 1 male, SL 3 mm (UF 8616), Maug Islands, station MAUG-02; 1 male, SL 6.2 mm (UF 8619), Uracas Island, station URA-004.**Additional material.** 1 ovigerous female, SL 6.0 mm, 2 females, SL 3.6–4.4 mm, 1 male, SL 4.1 mm (UF 33241), Asuncion Island, collected by D. Wooster 07/08/1975; 1 female, SL 6.0 mm (UF 33234), Anatahan Island station 3, collected by D. Wooster 01/17/1975.**Remarks.** *Dardanus crassimanus* is usually identified on the basis of the distinctively tessellated margins on the lateral face of the left third pereopod propodus and dactyl, with a broad ridge on the propodus, a wide and deep sulcus traversing the propodus and dactyl, and a dense fringe of setae on the margins of the propodus and dactyl (McLaughlin et al. 2007). The species is similar to *Dardanus setifer*, but *D. setifer* bears corneous-tipped spines on the ridge of the left third pereopod propodus and along each of the dorsal and ventral margin tessellations, characters lacking in *D. crassimanus* (McLaughlin et al. 2007). Moreover, *D. crassimanus* has long and dense setae on the left cheliped, while setae on the left cheliped are short and arranged in a rosette-like manner in *D. setifer* (Rahayu & Wahyudi 2007). Another similar species is *D. scutellatus*, which differs in having an elongate palm of the left cheliped covered in short, stiff setae (Malay et al. 2018).

The specimens from the Northern Marianas agree generally with *D. crassimanus*, however some differences were noted in the sculpturing and armature of the left third pereopod propodus and dactyl, particularly along the dorsal and ventral margin tessellations. In the Marianas specimens, the margins of the tessellations are sometimes less deeply incised and less regular in appearance than in McLaughlin et al. (2007), or sometimes the tessellations resemble short projections that are separated from each other and bear strong spines. The mid-propodus ridge was also variable in development. Moreover, the cheliped is not as setose as in specimens from Japan and Taiwan (cf. Miyake 1978, 1982; McLaughlin et al. 2007). A prominent fleshy protuberance between the third and fourth pleopods in adults of both male and female in *D. crassimanus* was noted by Miyake (1978: Japanese text, p. 59; 1982: 110). This structure was found in the Marianas specimens, however the degree of development varied from a short flap of chitinous membrane to a stout or elongate fleshy protuberance.

The present specimens from Marianas are much smaller in the body size than specimens from Japan and Taiwan. The latter specimens are quite large, exceeding 15 mm in the shield length (Miyake 1978; McLaughlin et al. 2007). Wooster (1979) reported two color variants in the Marianas, a light form and a dark form. He also noted, and we corroborate, that *D. crassimanus* is common in the Northern Marianas yet uncommon in the Southern Marianas. *Dardanus crassimanus* is likely a species-complex, and careful comparison with the type material, including those of the synonymized taxa (*Pagurus sculptipes* Stimpson 1858; *Pagurus pavimentatus* Hilgendorf 1879), combined with molecular work on topotypic material, will be needed to delineate the species boundaries.

Dardanus deformis (H. Milne Edwards 1836)

Material. 1 specimen (UF 5804), Pagan Island, station PAG-08; 1 specimen (UF 5701), Maug Islands, station MAUG-10.

Dardanus gemmatus (H. Milne Edwards 1848)

Fig. 3f

Material. 1 specimen (SIO-BIC C14253), Guguan Island, station AKM-GUG-05.

Dardanus guttatus (Olivier 1812)

Material. 1 specimen (UF 6095), Tinian Island, station MM-TIN-01; 1 specimen (UF 5762), Arakane Reef, station ARA-001; 1 specimen (UF 5688), Zealandia Bank, station ZEA-001.

Dardanus jacquesi Asakura & Hirayama 2002

Fig. 4a

Material. 1 male, SL 6 mm (SIO-BIC C14503), Guguan Island, station AKM-GUG-03; 1 female, SL 8.5 mm (SIO-BIC C14509), Pagan Island, station AKM-PAG-02; 1 female, SL 3.4 mm (SIO-BIC C14502), no station info; 2 males and 1 female SL 4–9 mm (SIO-BIC C14504), no station info.

Remarks. When alive, the mesial faces of the palms and carpi of the chelipeds were conspicuously reflective, a character that faded upon preservation. Reflective surfaces may function for communication, as has also been reported in deep-water portunoid crabs in the genus *Ovalipes* (Parker et al. 1998). Color patterns otherwise fit closely with South African specimens of *D. jacquesi*, described by Landschoff (2018). *Dardanus jacquesi* is very similar to *D. dearmatus*, but can be differentiated from the latter on the basis of several characters, particularly in the slenderness of the propodus of the left third pereopod (Asakura & Hirayama 2002). On the basis of this character, and in the stoutness of the chelipeds, the Marianas specimens better agree with *D. jacquesi*. However, the pleonal plates were not visible in the present female specimens, and the spination on the inner face of the left cheliped is less pronounced than in the type material as described by Asakura & Hirayama (2002).

Dardanus jacquesi is known from the Seychelles and Ryukyu Islands (Asakura & Hirayama 2002), South Africa (Landschoff 2018) and now the Northern Marianas. This represents a new record for the Marianas and a range extension for the species.

Dardanus lagopodes (Forskål 1775)

Fig. 4b

Material. 1 specimen (UF 5797), Anatahan Island, station ANA-005; 1 specimen (UF 7396), Guguan Island, station GUG-001; 1 specimen (UF 5800), Guguan Island, station GUG-002; 1 specimen (UF 7820), Guguan Island, GUG-002; 1 specimen (UF 5806), Pagan Island, station PAG-01; 1 juvenile (SIO-BIC C14505), Pagan Island, station AKM-PAG-00P3; 2 specimens (UF 7445), Agrihan Island, station AGR-03; 1 specimen (SIO-BIC C14506), Agrihan Island, station AKM-AGR-00A3; 1 specimen (UF 7441) Asuncion Island, station ASU-02; 1 specimen (UF 5796), Asuncion Island, station ASU-02; 2 specimens (UF 5803), Maug Islands, station MAUG-02.

Remarks. For a long time, *D. lagopodes* was confused with *D. sanguinolentus*. See remarks under *D. sanguinolentus*.

Dardanus megistos (Herbst 1804)

Fig. 4c

Material. 1 specimen (SIO-BIC C14244), between Guguan and Alamagan Islands, station AKM-PAG-05.

Remarks. Very large individual occupying a triton (*Charonia tritonis*) shell.

Dardanus pedunculatus (Herbst 1804)

Fig. 4d

Material. 1 specimen (SIO-BIC C14212), Agrihan Island, station AKM-AGR-00A3.

Remarks. This is the first record of *D. pedunculatus* from the Marianas. While the Marianas is within the reported range of the species (South Africa to Hawaii, Malay et al. 2018), *D. pedunculatus* has not been found in Guam (Paulay, personal communication).

Dardanus sanguinolentus (Quoy & Gaimard 1824)

Fig. 4e

Material.

1 female, SL 2.5 mm and 1 male, SL 2.1 mm (UF 7444), Aguijan Island, station AGU-02; 1 female, SL 4.7 mm (SIO-BIC C14507), Saipan Island, station AKM-SAI-01; 1 male, SL 4.1 mm (SIO-BIC C14510), Guguan Island, station AKM-GUG-05.

Remarks. The specimens fit well with the redescription of *D. sanguinolentus* provided in Malay et al. (2018). *Dardanus sanguinolentus* was recently resurrected and differentiated from *Dardanus lagopodes*. In the field, the two are readily distinguished: *D. sanguinolentus* has a bright red patch on the merus and carpus of the second and third pereopods and *D. lagopodes* has black patches on the same area, however the color changes to red in preservative. The two species also differ in the sculpturing of the left third pereopod: *D. sanguinolentus* always has a sulcus on the lateral face of the propodus and dactyl of the left third pereopod. The lateral face of the propodus and dactyl of the left third pereopod of *D. lagopodes* is more variable: it may be smooth, slender, and completely cylindrical or flattened and spiny, but it never bears a sulcus.

FAMILY DIOGENIDAE Ortmann 1892

Paguristes jalur Morgan 1992

Material. 8 specimens (UF 5710), Saipan Island, station NM-05; 1 specimen (UF 5709), Maug Islands, station MAUG-06.

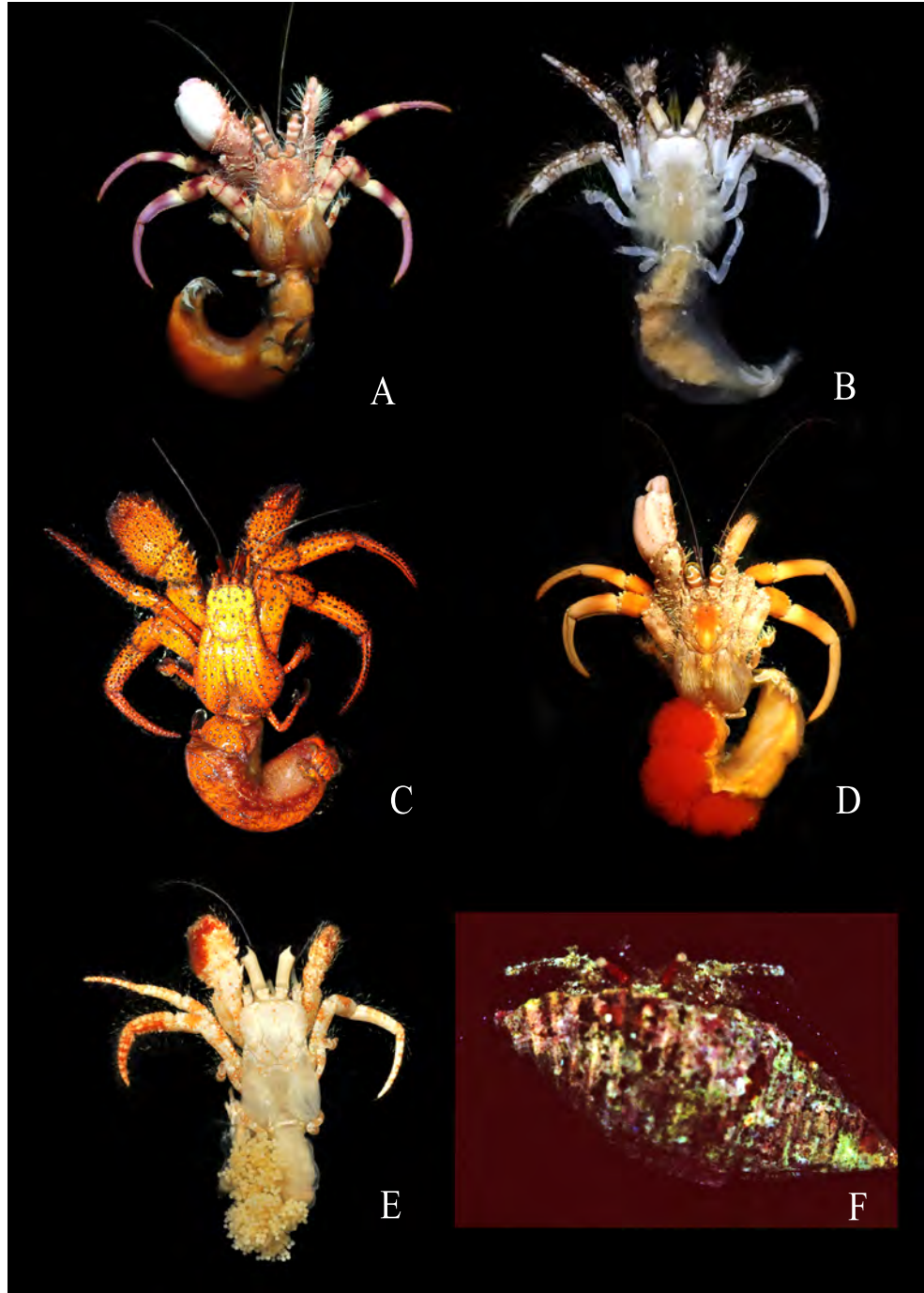


Fig. 4. A: *Dardanus jacquesi* Asakura and Hirayama, 2002, Pagan Island (SIO-BIC C14509). B: *Dardanus lagopodes* (Forskål, 1775), juvenile, Pagan Island (SIO-BIC C14505). C: *Dardanus megistos* (Herbst, 1804), between Guguan and Alamagan Islands (SIO-BIC C14244). D: *Dardanus pedunculatus* (Herbst, 1804), Agrihan Island (SIO-BIC C14212). E: *Dardanus sanguinolentus* (Quoy & Gaimard, 1824) Saipan Island (SIO-BIC C14507; recently preserved). F: *Micropagurus devaneyi* McLaughlin, 1986, Saipan Island (UF 7437).

Pseudopaguristes monoporus (Morgan 1987)

Material. 3 specimens (UF 5702), Saipan Island, station NM-08.

Pseudopaguristes sp.

Material. 1 male, SL 2.5 mm (SIO-BIC C14508), Sarigan Island, station AKM-SAR-03.

Remarks. The sole male specimen appears to represent an undescribed species of *Pseudopaguristes*, similar to *P. bollandi* Asakura & McLaughlin 2003 or *P. janetkae* McLaughlin 2002, but exhibiting different coloration. This undescribed species will be dealt with in a separate paper (Komai et al., in preparation).

FAMILY PAGURIDAE (Latreille 1802)

Catapaguroides sp.

Material. 1 male (SIO-BIC C14511), Guguan Island, station AKM-GUG-04.

Remarks. The sole male specimen is rather poor in condition; the right cheliped and pereopods 2 are missing. It seems to represent an undescribed species of *Catapaguroides*, but formal description is postponed until additional material becomes available for study.

From the Marianas, *Catapaguroides foresti* McLaughlin 2002 is known as the sole representative of the genus (McLaughlin 2002).

Catapagurus sp.

Material. 1 male (SIO-BIC C14512), Pagan Island, station AKM-PAG-04.

Remarks. The sole specimen represents an undescribed species of *Catapagurus*, which will be described as a new species in a separate paper (Komai et al., in preparation).

Micropagurus devaneyi McLaughlin 1986

Fig. 4f

Material. 1 male, SL 1.8 mm (UF 7437), Saipan Island, station NM-08.

Remarks. The sole male specimen is provisionally identified as *M. devaneyi* McLaughlin 1986. Asakura (2005) distinguished *M. devaneyi* from the very similar *M. propinquus* Asakura 2005 on the basis of the number of spines on the ventral margins of the dactyls of the pereopods. In the specimen from the Marianas, 2–4 spines are present, fitting *M. devaneyi* (vs. 4–7 spines in *M. propinquus*). The general armature of the chelipeds of *M. devaneyi* is described by Asakura (2005) as less pronounced than that of *M. propinquus*, which appears to be the case for the Marianas specimen based on a comparison of illustrations of *M. devaneyi* by McLaughlin (1986, fig. 4b, 4c) vs. the illustration of *M. propinquus* by Asakura (2005, figs. 4-5). Our specimen has solid red ocular peduncles (similar to *M. devaneyi*, while the coloration of *M. propinquus* is unknown). However, the specimen is similar to *M. propinquus* in having 1 strong spine and 1 small spine on the lateral margin of the merus of the left cheliped (see Asakura 2005, fig. 5C). Close comparison with the holotypes is needed to confirm the provisional identification. *Micropagurus devaneyi* is so far known from the Hawaiian Islands (McLaughlin 1986; Asakura 2005), so this represents a new record for the Northern Marianas and a considerable range extension for the species.

Micropagurus polynesiensis (Nobili 1906)

Material. 1 male, SL 2 mm (UF 7440), Saipan Island, station NM-08.

Remarks. The present specimen agrees well with the redescription of *Micropagurus polynesiensis* by Asakura (2005). This is the first record of *M. polynesiensis* for the Marianas.

Nematopagurus sp.

Material. 1 specimen (SIO-BIC C14517), Guguan Island, station AKM-GUG-05; 1 specimen (SIO-BIC C14518), Guguan Island, station AKM-GUG-03; 1 specimen (SIO-BIC C14519), Guguan Island, station AKM-GUG-03; 1 specimen (SIO-BIC C14520), Guguan Island, station AKM-GUG-03; 1 specimen (SIO-BIC C14512), Pagan Island, station AKM-PAG-04; 1 specimen (SIO-BIC C14522), Pagan Island, no station info; 1 specimen (SIO-BIC C14524), Pagan Island, no station info; 1 specimen (SIO-BIC C14238), Agrihan Island, from crab traps, no station info; 4 specimens (SIO-BIC C14513), Agrihan Island, from crab traps, no station info; 1 specimen (SIO-BIC C14523), Agrihan Island, from crab traps, no station info.

Remarks. The specimens represent an undescribed species, comparable with *N. gardineri* Alcock, 1905 and *N. lewinsohni* Türkay, 1986. This undescribed species will be dealt with in a separate paper (Komai et al., in preparation).

Pagurixus haigae Komai & Osawa 2007

Material. 1 male, SL 1 mm (UF 5807), Saipan Island, station NM-09.

Remarks. The type series of *Pagurixus haigae* contained specimens from Guam, Southern Marianas (Komai & Osawa 2007). This is the first record from the Northern Marianas.

Pagurixus sp. 1 (*P. anceps* species group)

Material. 1 female (SIO-BIC C14514), Guguan Island, station AKM-GUG-02.

Remarks. The sole female specimen is referred to a species of the *Pagurixus anceps* (Forest 1957) group, but still differs from known species of the group in the mesial margin of the right cheliped dactylus bordered with a distinct, denticulated ridge. The lack of dorsomesial spines on the right cheliped carpus (except for a tubercle at dorsomesial distal angle) and the possession of paired gonopores are also characteristic. It is likely that the present specimen represents an undescribed species, but we feel hesitation to formally describe a new species based only on a single, incomplete female specimen. Formal description of a new species is deferred in the hope that additional specimens become available for study.

Pagurixus sp. 2

Material. 1 specimen (SIO-BIC C14258), Sarigan Island, station AKM-SAR-01; 1 specimen (SIO-BIC C14515), Guguan Island, station AKM-GUG-02; 1 specimen (SIO-BIC C14516), Agrihan Island, from crab pot, no station info.

Remarks. The specimens represent an undescribed species of *Pagurixus*, comparable with *P. annulus* Komai & Poupin 2013, *P. brachydactylus* Komai & Osawa 2006 and *P. pseliophorus* Komai & Osawa 2006. This species will be dealt with in a separate paper (Komai et al., in preparation).

In addition to the three species mentioned in this work, seven species of *Pagurixus* are known from Guam, Southern Marianas (Komai & Osawa 2006): *P. carinimanus* Komai & Osawa 2006, *P. concolor* Komai & Osawa 2006, *P. maorus* (Nobili 1906), *P. nomurai* Komai & Asakura 1995, *P. paulayi* Komai & Osawa 2006, *P. ruber* Komai & Osawa 2006 and *P. tweediei* (Forest 1956).

Discussion and Conclusion

We report on 39 species from 4 paguroid families. Five are new records for the Marianas (*Ciliopagurus alcocki*, *Dardanus jacquesi*, *Dardanus pedunculatus*, *Micropagurus devaneyi*, and *M. polynesiensis*), and six represent undescribed species (*Pseudopaguristes* sp., *Catapaguroides* sp., *Catapagurus* sp., *Nematopagurus* sp., *Pagurixus* sp. 1, and *Pagurixus* sp. 2) that will be dealt with in a separate or future study. The fact that two short-duration cruises resulted in such an abundance of new records shows that the paguroids of the Marianas are still very much understudied. Future expeditions to the remote and uninhabited Northern Mariana Islands are likely to add even more new hermit crab species to the regional checklist.

The Southern Marianas (Guam to Farallon de Medinilla) has a higher species richness (n=66 species) than the Northern Marianas (n=49 species). This is expected, given the southern arc islands are considerably older, larger, better-studied (e.g., Paulay et al. 2003), and have more extensive reef development. Despite the younger age and lack of reef development in the northern arc, some species are largely limited to the Northern Marianas (Uracas to Anatahan) and are absent or very rare in the southern arc. These include the larger, terrestrial or shallow-water species *Coenobita purpureus*, *Calcinus hazletti*, *C. kurozumii*, *C. revi*, *Dardanus crassimanus*, and *D. pedunculatus*.

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Table 1. List of stations visited

Station number	Collection date	Island	Locality	Latitude	Longitude	Approx. depth range	Notes
AGR-01	08/27/2003	Agrihan Island	SE of island	18.75	145.7	10-14 m	
AGR-02	08/27/2003	Agrihan Island	S tip of island	18.733	145.667	9-15 m	
AGR-03	08/27/2003	Agrihan Island	SW of island	18.733	145.65	9-13 m	
AGR-04	09/06/2003	Agrihan Island	NW of island	18.8	145.65	12-15 m	
AGR-06	09/06/2003	Agrihan Island	Middle-West of island	18.75	145.633	12-15 m	
AGU-01	09/17/2003	Aguijan Island		14.85	145.567	13-16 m	
AGU-02	09/17/2003	Aguijan Island		14.85	145.533	12-15 m	
ALA-001	09/12/2003	Alamagan Island	NE of island	17.617	145.85	7-14 m	
ALA-002	09/12/2003	Alamagan Island	NW of island	17.617	145.817	9-14 m	
ALA-003	09/12/2003	Alamagan Island	SW of island	17.583	145.817	9-11 m	
ANA-001	09/10/2003	Anatahan Island	NE of Island	16.367	145.717	6-10 m	fringing reef; ash-covered
ANA-003	09/10/2003	Anatahan Island	Near SW tip of island	16.333	145.65	11-15 m	fringing reef; ash-covered
ANA-005	9/18/03	Anatahan Island		16.594	145.7	9-15 m	
ANA-006	09/10/2003	Anatahan Island		16	145	6-14 m	
ARA-001	09/15/2003	Arakane Reef		15.633	142.767	13-17 m	
ASU-02	09/05/2003	Asuncion Island	SW of island	19.683	145.4	4-12 m	
ASU-03	09/05/2003	Asuncion Island	NW of island	19.7	145.4	6-13 m	
GUG-001	09/11/2003	Guguan Island	E of island	17.3	145.85	9-13 m	
GUG-002	09/11/2003	Guguan Island	SW of island	17.3	145.833	9-13 m	
GUG-003	09/11/2003	Guguan Island	NW of island	17.317	145.833	9-16 m	

Table 1. List of stations visited (cont'd).

Station number	Collection date	Island	Locality	Latitude	Longitude	Approx. depth range	Notes
MAUG-01	09/02/2003	Maug Islands	Middle of W side of island	20.02	145.2	4-15 m	
MAUG-02	09/02/2003	Maug Islands	Middle of E side of island	20.02	145.23	4-16 m	
MAUG-03	09/03/2003	Maug Islands	S of E island, inner side	20.02	145.23	4-16 m	
MAUG-04	09/03/2003	Maug Islands	SE of E island, outer side	20.02	145.23	9-15 m	
MAUG-06	09/04/2003	Maug Islands	SE of N island, inner side	20.03	145.23	10-15 m	
MAUG-10	09/04/2003	Maug Islands	E side of W island, inner side	20.02	145.22	4-13 m	
MAUG-11	09/04/2003	Maug Islands	SW of W island, outer Side	20.03	145.22	12-17 m	
PAG-01	08/26/2003	Pagan Island	SE of island, middle of large bay	18.1	145.783	10-12 m	
PAG-03	09/07/2003	Pagan Island	N of island	18.167	145.783	11-14 m	
PAG-04	09/07/2003	Pagan Island	NW of island, in embayment	18.133	145.767	11-12 m	mostly bare pavement & black sand, few corals
PAG-07	09/08/2003	Pagan Island	SW of island	18.067	145.717	4-14 m	
PAG-08	09/08/2003	Pagan Island	SE of island	18.067	145.75	9-12 m	
PAG-09	09/13/2003	Pagan Island	S of island	18.067	145.717	4-29 m	
ROT-02	09/19/2003	Rota Island		14.154	145.259	9-12 m	
ROT-03	09/19/2003	Rota Island		14.114	145.167	6-14 m	
ROT-05	09/20/2003	Rota Island		14.183	145.207	7-13 m	
NM-02	08/15/2003	Saipan Island	Wing Beach	15.273	145.793	0-2 m	sheltered lagoon
NM-03	08/15/2003	Saipan Island	Wing Beach	15.273	145.793	3 m	reef crest
NM-04	08/16/2003	Saipan Island	San Antonio, W side of island	15.130	145.692	6-12 m	
NM-05	08/16/2003	Saipan Island	Akino Reef, W side of island	15.203	145.752	4-14 m	patch reef

Table 1. List of stations visited (cont'd).

Station number	Collection date	Island	Locality	Latitude	Longitude	Approx. depth range	Notes
NM-07	08/18/2003	Saipan Island	N of Banzai cliff	15.291	145.813	0 m	supratidal splash pools
NM-08	08/18/2003	Saipan Island	Lau-lau Bay	15.157	145.754	3-12 m	silty reef
NM-09	08/19/2003	Saipan Island	Tanker dive site, W side of island			3-12 m	shipwreck and surroundings
SAR-002	08/24/2003	Sarigan Island	N-NW of island, in a small bay	16.717	145.767	9-14 m	rocky with ash layer
STI-001	08/29/2003	Stingray Shoals		20.5	142.433	21-25 m	
STI-002	08/29/2003	Stingray Shoals		20.5	142.433	18-22 m	
SUP-01	09/01/2003	Supply Reef		20.133	144.1	12-20 m	
MM-TIN-01	08/23/2003	Timian Island		15.033	145.65	10-17 m	reef slope with spur-and-groove formations
MM-TIN-02	08/23/2003	Timian Island		14.933	145.633	9-14 m	reef slope with wall
MM-TIN-03	08/23/2003	Timian Island		14.9833	145.6	9-12 m	
URA-002	08/31/2003	Uracas Island	SE of island	20.533	144.9	12-16 m	
URA-004	08/31/2003	Uracas Island	NW of island	20.55	144.883	9-11 m	
ZE-A-001	08/25/2003	Zealandia Bank		16.9	145.85	9-15 m	rock pinnacle
AKM-MAU-02	6/14 to 6/15/2015	Maug Islands		20.040	145.241	268-288 m	crab traps
AKM-AGR-00A3	6/17/2015	Agrihan Island		18.782	145.759	0-5 m	
AKM-PAG-00P3	6/18/2015	Pagan Island		18.363	145.869	0-5 m	
AKM-PAG-01	6/18/2015	Pagan Island	by Village area	18.134	145.759	18-25 m	ring net
AKM-PAG-02	6/19/2015	Pagan Island		18.033	145.721	55-96 m	crab trap
AKM-PAG-03	6/19/2015	Pagan Island		18.031	145.723	55-325 m	crab trap

Table 1. List of stations visited (cont'd).

Station number	Collection date	Island	Locality	Latitude	Longitude	Approx. depth range	Notes
AKM-PAG-04	6/19/2015	Pagan Island		18.087	145.765	58-89 m	crab trap
AKM-PAG-05	6/21/2015	Between Guguan and Alamagan		17.3560	145.484	55 m	from baited remote underwater video setup (BRUV)
AKM-PAG-00P1	6/18/2015	Pagan Island		18.803	145.859	0 m	
AKM-PAG-00P3	6/18/2015	Pagan Island		18.363	145.869	0 m	
AKM-ALA-01	6/21/2015	Alamagan Island		17.582	145.824	0-5 m	
AKM-PAG-PA1	6/20/2015	Pagan Island	windward side N	18.364	145.867	0-5 m	
AKM-PAG-PA4	6/20/2015	Pagan Island	camp bay S side	18.212	145.904	0-5 m	
AKM-GUG-02	6/22/2015	Guguan Island		17.322	145.842	0-5 m	
AKM-GUG-03	6/22/2015	Guguan Island		17.609	145.810	48-84 m	crab trap
AKM-GUG-04	6/23/2015	Guguan Island		17.291	145.842	38-40 m	crab trap
AKM-GUG-05	6/23/2015	Guguan Island		17.291	145.837	41-44 m	crab trap
AKM-SAI-01	6/11/2015	Saipan Island	Lau-lau Bay	15.157	145.754	29-35	ring net
AKM-SAR-01	6/24/2015	Sarigan Island		16.707	145.764		crab trap
AKM-SAR-02	6/24/2015	Sarigan Island		16.713	145.772	0-5 m	
AKM-SAR-03	6/24/2015	Sarigan Island		16.711	145.808	131-133 m	crab trap
AKM-SAR-04	6/25/2015	Sarigan Island		16.904	145.849	0-5 m	

Table 2. Updated checklist of the Paguroidea recorded from the Commonwealth of the Northern Mariana Islands (CNMI) with key references to records for the Northern and the Southern Mariana islands. Legend: Northern Marianas sites: ALA=Alamagan, ANA=Anatahan, AGR=Agrihan, ASU=Asuncion, GUA=Guam, GUG=Guguan, MAU=Maug, PAG=Pagan, PAT=Pathfinder Bank, SAR=Sarigan, STI=Stingray Shoal, SUP=Supply Reef, URA=Uracas, ZEA=Zealandia Bank. Southern Marianas sites: AGU=Aguijan, GUA=Guam, ROT=Rota, TIN=Tinian, SAI=Saipan, ARA=Arakane Reef.

Count		Key references	Northern Marianas	Southern Marianas	Comments
Superfamily PAGUROIDEA Latreille, 1802					
Family COENOBITIDAE Dana, 1851					
1	<i>Birgus latro</i>	Wooster, 1979; Amesbury, 1980; Asakura et al., 1994; Paulay et al., 2003	ANA, SAR, GUG, ALA, PAG, AGRI, ASU, MAU	GUA, ROT, TIN, SAI	
2	<i>Coenobita brevipennis</i>	Wooster, 1979; Asakura et al., 1994; Paulay et al., 2003	ANA, GUG, MAU	GUA, SAI	Asakura et al. (1994) note that this used to be called <i>C. clypeatus</i> or <i>C. hilgendorfi</i>
3	<i>Coenobita perlatus</i>	Asakura et al., 1994; Paulay et al., 2003; this paper	ANA, SAR, GUG, ALA, PAG, AGR, ASU, MAU	GUA, SAI	
4	<i>Coenobita purpureus</i>	Asakura et al., 1994; Paulay et al., 2003	MAU		
5	<i>Coenobita rugosus</i>	Asakura et al., 1994; Paulay et al., 2003; this paper	ANA, GUG, ALA, PAG, AGR, ASU, MAU	GUA, SAI	
6	<i>Coenobita spinosus</i>	Wooster, 1979 (as <i>C. cavipes</i>); Asakura et al., 1994 (as <i>C. cavipes</i>), Sasazuka et al., 2019	ANA, AGR	GUA	Based on genetic & morphological evidence, <i>C. spinosus</i> in the Marianas was previously misidentified as <i>C. cavipes</i> (Hsi-Te Shih, pers. comm.).
Family CALCINIDAE Fraaije, Van Bakel & Jagt, 2017					
7	<i>Aniculus aniculus</i>	Asakura et al., 1994; Paulay et al., 2003; this paper	ANA, GUG, ALA, PAG, AGR, ASU, MAU	GUA	
8	<i>Aniculus maximus</i>	Wooster, 1979; Paulay et al., 2003	PAG	GUA	
9	<i>Aniculus retipes</i>	Paulay et al., 2003; this paper	AGR	GUA	
10	<i>Aniculus ursus</i>	Wooster, 1979; Paulay et al., 2003	ANA, PAG, ASU, MAU	GUA	

Count		Key references	Northern Marianas	Southern Marianas	Comments
11	<i>Calcinus argus</i>	Wooster, 1982; Asakura & Tachikawa, 2000; Paulay et al., 2003; Malay & Paulay, 2010; this paper	GUG	GUA, SAI	
12	<i>Calcinus elegans</i>	Wooster, 1982; Asakura et al., 1994; Paulay et al., 2003; Malay & Paulay, 2010; this paper	ANA, SAR, GUG, ALA, PAG, AGR, ASU, MAU, URA	GUA, SAI	
13	<i>Calcinus guamensis</i>	Wooster, 1982; Asakura et al., 1994; Paulay et al., 2003; Malay & Paulay, 2010; this paper	GUG, PAG, AGR, ASU, MAU	GUA, SAI	
14	<i>Calcinus haigae</i>	Wooster, 1982; Paulay et al., 2003		GUA	
15	<i>Calcinus hazletti</i>	Malay & Paulay 2010, this paper	ANA, PAT, SAR, ALA, PAG, AGR, ASU, MAU, STI, URA	SAI?	Specimen from Saipan is a juvenile, identification is tentative (see text)
16	<i>Calcinus isabellae</i>	Wooster, 1982 (as <i>C. imperialis</i>), Asakura et al. 2002; Paulay et al., 2003; Malay & Paulay 2010; this paper	GUG, PAT, PAG, ASU, MAU	GUA	
17	<i>Calcinus kurozumii</i>	Asakura, 2002	PAG		The species is only known from Pagan Island.
18	<i>Calcinus laevimanus</i>	Asakura et al., 1994; Wooster, 1982; Paulay et al., 2003; Malay & Paulay, 2010; this paper	ANA, GUG, ALA, PAG, AGR, ASU, MAU	GUA, SAI	
19	<i>Calcinus latens</i>	Asakura et al., 1994; Wooster, 1982; Malay & Paulay, 2010; this paper	ANA, SAR, GUG, ALA, PAG, ASU, MAU	GUA, AGU, SAI	
20	<i>Calcinus lineapropodus</i>	Wooster, 1982 (as <i>Calcinus</i> sp. 1); Morgan & Forest, 1991; Paulay, 2003; Malay & Paulay, 2010; this paper	ANA, SAR, GUG, ALA, PAG, AGR, ASU, MAU	GUA, ROT, TIN, SAI	
21	<i>Calcinus minutus</i>	Wooster, 1979; Wooster, 1982; Malay & Paulay, 2010; this paper	ANA, SAR, GUG, ALA, PAG, AGR, MAU	GUA, ROT, TIN, SAI	

Count		Key references	Northern Marianas	Southern Marianas	Comments
22	<i>Calcinus morgani</i>	Wooster, 1982; Asakura et al., 1994 [as <i>C. gaimardii</i>]; Paulay et al., 2003; Malay & Paulay, 2010; this paper	ANA, SAR, GUG, ALA, PAG, AGR, ASU, MAU, SUP	GUA, ROT, AGU, SAI	
23	<i>Calcinus pulcher</i>	Paulay et al., 2003; Malay & Paulay, 2010; this paper	AGR	GUA	
24	<i>Calcinus revii</i>	Asakura & Tachikawa 2000; Asakura, 2002	ASU, MAU		
25	<i>Calcinus seurati</i>	Wooster, 1982; Asakura et al., 1994; Malay & Paulay, 2010; Paulay et al., 2003	ANA, SAR, GUG, PAG, AGR, MAU, URA	GUA, SAI	
26	<i>Calcinus vachoni</i>	Malay & Paulay, 2010; this paper	PAG, MAU	GUA	
27	<i>Ciliopagurus alcocki</i>	this paper	MAU		
28	<i>Ciliopagurus major</i>	Forest, 1995		GUA	
29	<i>Ciliopagurus pacificus</i>	Forest, 1995		GUA	
30	<i>Ciliopagurus strigatus</i>	Wooster, 1979; Forest, 1995; this paper	SAR, ALA, GUG, AGR, MAU, SUP	GUA, ROT, AGU, TIN, ARA	
31	<i>Clibanarius corallinus</i>	Paulay et al., 2003		GUA	
32	<i>Clibanarius eurysternus</i>	Wooster, 1979		GUA	
33	<i>Clibanarius humilis</i>	Wooster, 1979; Asakura et al., 1994	GUG, ALA	GUA	
34	<i>Clibanarius striolatus</i>	Wooster, 1979		GUA	
35	<i>Clibanarius virescens</i>	Wooster, 1979		GUA	
36	<i>Dardanus crassimanus</i>	Wooster, 1979; this paper	ANA, GUG, PAG, AGR, ASU, MAU, URA	GUA	
37	<i>Dardanus deformis</i>	Wooster, 1979; this paper	PAG, MAU	GUA, SAI	
38	<i>Dardanus gemmatus</i>	Wooster, 1979; this paper	GUG	GUA	

Count		Key references	Northern Marianas	Southern Marianas	Comments
39	<i>Dardanus guttatus</i>	Wooster, 1979; this paper	ZEA GUG, PAG, MAU	GUA, TIN, ARA	
40	<i>Dardanus jacquesi</i>	this paper	GUG, PAG, AGR, ASU, MAU		
41	<i>Dardanus lagopodes</i>	Wooster, 1979; this paper	ANA, GUG, PAG, AGR, ASU, MAU	GUA	<i>D. lagopodes</i> and <i>D. sanguinolentus</i> were split recently (Malay et al. 2018). Range of <i>D. lagopodes</i> from literature sources are not certain and were omitted
42	<i>Dardanus megistos</i>	Wooster, 1979; this paper	between GUG & ALA	GUA	
43	<i>Dardanus pedunculatus</i>	this paper	AGR		
44	<i>Dardanus sanguinolentus</i>	this paper	GUG	GUA, AGU, SAI	
45	<i>Dardanus scutellatus</i>	Wooster, 1979		GUA	
Family DIOGENIDAE Ortmann, 1892					
46	<i>Diogenes pallescens</i>	Paulay et al., 2003		GUA	
47	<i>Diogenes</i> sp.	Asakura et al., 1994	MAU		
48	<i>Paguristes jalur</i>	Paulay et al., 2003; this paper	MAU	GUA, SAI	
49	<i>Pseudopaguristes monoporos</i>	Paulay et al., 2003; this paper		GUA, SAI	
50	<i>Pseudopaguristes janetkae</i>	McLaughlin, 2002a		GUA	
51	<i>Pseudopaguristes</i> sp.	this paper	SAR		
Family PAGURIDAE (Latreille, 1802)					
52	<i>Catapaguroides foresti</i>	McLaughlin, 2002b		GUA	
53	<i>Catapaguroides</i> sp.	this paper	GUG		
54	<i>Catapagurus</i> sp.	this paper	PAG		
55	<i>Micropagurus devaneyi</i>	this paper		SAI	
56	<i>Micropagurus polynesiensis</i>	this paper		SAI	

Count		Key references	Northern Marianas	Southern Marianas	Comments
57	<i>Nematopagurus sp.</i>	this paper	GUG, PAG, AGR		
58	<i>Paguritta harmsi</i>	Wooster, 1979 (as <i>Orthopagurus harmsi</i>)		GUA	This record is questionable, because <i>P. harmsi</i> is presently known with certainty only from Christmas Island, Indian Ocean Territory of Australia. It is likely that the record actually refers to <i>P. kroppi</i> . Paulay et al. (2003) listed only <i>P. kroppi</i> .
59	<i>Paguritta kroppi</i>	McLaughlin & Lemaitre, 1993		GUA	
60	<i>Pagurixus anceps</i>	Asakura et al., 1994	GUG, AGR, MAU, ALA		
61	<i>Pagurixus boninensis</i>	Asakura et al., 1994	PAG		Marked as a questionable record by Komai & Osawa 2006. Might be <i>P. ruber</i> .
62	<i>Pagurixus carinimanus</i>	Paulay et al., 2003 (as <i>Pagurixus</i> sp. 3), Komai & Osawa, 2006		GUA	
63	<i>Pagurixus concolor</i>	Komai & Osawa, 2006		GUA	
64	<i>Pagurixus haigae</i>	Paulay et al., 2003 (as <i>Pagurixus</i> sp. 8); Komai & Osawa, 2007; this paper	GUG	GUA, SAI	
65	<i>Pagurixus maorus</i>	Paulay et al., 2003; Komai & Osawa, 2006		GUA	
66	<i>Pagurixus nomurai</i> Komai & Asakura, 1995	Paulay et al. 2003 (as <i>Pagurixus</i> sp. 9); Komai & Osawa, 2006		GUA	
67	<i>Pagurixus paulayi</i>	Komai & Osawa, 2006		GUA	

Count		Key references	Northern Marianas	Southern Marianas	Comments
68	<i>Pagurixus ruber</i>	Paulay et al., 2003 (as <i>P. boninensis</i>); Komai & Osawa, 2006		GUA	
69	<i>Pagurixus tweediei</i>	Komai & Osawa, 2006		GUA	
70	<i>Pagurixus</i> cf. <i>tweediei</i>	Asakura et al., 1994	MAU		The identification was made based on McLaughlin & Haig (1984), in which <i>Pagurixus tweediei</i> was misidentified. Komai & Osawa (2006) supposed that McLaughlin & Haig's <i>P. tweediei</i> actually represents <i>P. carinimanus</i> . There is no doubt that the record of Asakura et al. (1994) is referred to a species other than <i>P. tweediei</i> .
71	<i>Pagurixus</i> sp. 1	this paper	GUG		
72	<i>Pagurixus</i> sp. 2	this paper	SAR, GUG, AGR		
73	<i>Pagurixus</i> sp. 9 (of Paulay et al., 2003)	Paulay et al., 2003		GUA	Upon examination of a color image, the individual seems to represent <i>Pagurixus carinimanus</i> .
74	<i>Pagurus hirtimanus</i>	Paulay et al., 2003		GUA	
75	<i>Pagurus?</i> sp. 1	Paulay et al., 2003		GUA	
76	<i>Porcellanopagurus eldredgei</i>	Paulay et al., 2003 (as <i>Porcellanopagurus</i> sp. 1); Kropp, 2015		GUA	
77	<i>Pylopaguropsis fimbriata</i>	McLaughlin & Haig, 1989		GUA	
78	<i>Pylopaguropsis keijii</i>	McLaughlin & Haig, 1989		GUA	
79	<i>Pylopaguropsis zebra</i>	Wooster, 1979		GUA	
80	<i>Trichopagurus trichophthalmus</i>	Paulay et al., 2003; Komai, 2013		GUA	
Family PARAPAGURIDAE Smith, 1882					
81	<i>Sympagurus dofleini</i>	Dunn et al., 1980; Paulay et al., 2003; Lemaitre, 2004		GUA	
82	<i>Tylaspis anomala</i>	Lemaitre, 1998		GUA	