

## Distribution and Taxonomic Remarks for Five Crab Species of the Family Grapsidae (Crustacea: Sesarminae and Varuninae) of the Mexican Pacific

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**Abstract.**—The present report updates the distribution of *Armases magdalenense* (Rathbun, 1918), *Hemigrapsus oregonensis* (Dana 1851) and *Goetice americanus* Rathbun 1923 along the Baja California coast. Previous records of *Tetragrapsus jouyi* (Rathbun 1893) to the rocky intertidal of Punta Pelicano, near Puerto Peñasco, Sonora, are rejected. These were based on misidentifications of specimens of *G. americanus*. *Tetragrapsus jouyi* is known from salt marsh areas of Guaymas, Sonora, and Bahía de Los Angeles, Baja California (new locality). The presence of *Hemigrapsus nudus* in the Gulf of California is not confirmed. It undoubtedly occurs on the west coast of the Baja California Peninsula northward to Alaska, U.S.A. An identification key to the Varuninae of the East Pacific is provided.

**Resúmen.**—El presente trabajo actualiza la distribución de *Armases magdalenense* (Rathbun, 1918), *Hemigrapsus oregonensis* (Dana 1851) and *Goetice americanus* Rathbun 1923. Se rechazan los registros previos de *Tetragrapsus jouyi* (Rathbun 1893) para el intermareal rocoso de Punta Pelicano, cerca de Puerto Peñasco, Sonora. Estos fueron identificaciones incorrectas de especímenes pertenecientes a *G. americanus*. *Tetragrapsus jouyi* se conoce para saladares de Guaymas, Sonora y Bahía de Los Angeles, Baja California (nueva localidad). No se confirma la presencia de *Hemigrapsus nudus* en el Golfo de California. Esta especie ocurre, con certeza, en la costa occidental de la península de Baja California y hacia norte hasta Alaska, E.U.A. Se provee una clave para identificar las especies de la subfamilia Varuninae del Pacífico Oriental.

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The study of specimens collected in the Gulf of California and of others borrowed from several institutions allows us to correct and update the distribution of 5 species of grapsid crabs (1 Sesarminae and 4 Varuninae) of the East Pacific. Information presented herein update those reported by Hendrickx (1995). For each species listed, some taxonomic and ecological remarks based on the new material are presented. In addition, a comparative morphological analysis allows us to provide a key for the members of the subfamily Varuninae of the East Pacific.

### Material and Methods

This study is largely based on material collected by the authors along the Baja California Peninsula and Sonora coast, north to parallel 31°N. Additional material came from the Invertebrate Collection (Crustacea) of the Scripps Institution of Oceanography, University of California, La Jolla, California (SIO) and the Invertebrate Collection of the Peabody Museum of Natural History, Yale University,

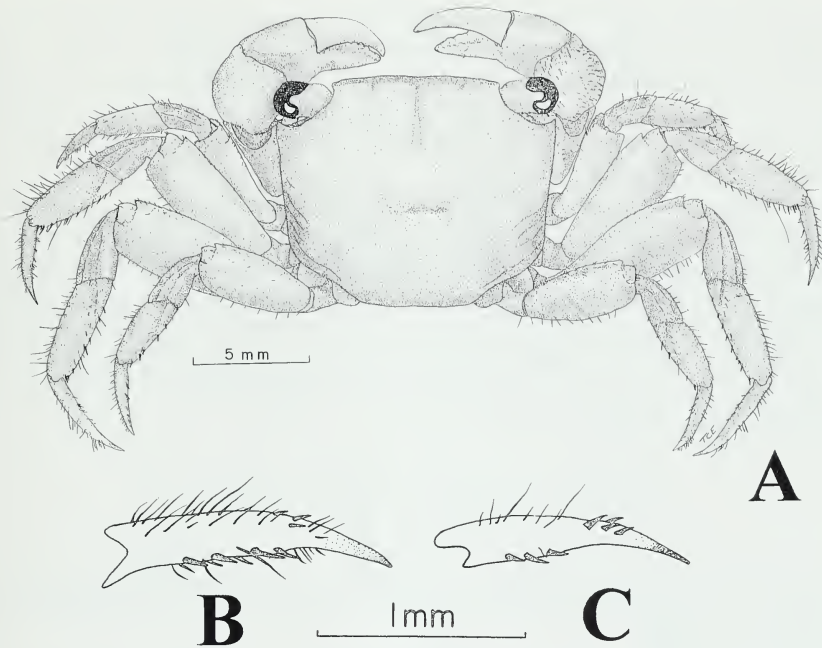


Fig. 1. *Armases magdalenense* (Rathbun 1918); A, male holotype dorsal view; B–C dactyli of the fourth walking leg (A–C from Abele 1992).

New Haven, Connecticut (YPM). The Baja California records of *Hemigrapsus oregonensis* provided by the late John S. Garth, are based on material of the Allan Hancock Foundation, from collections made primarily by the “Velero IV”, “Searcher” and “The Kenyon-Williams” expeditions. This material is in the Natural History Museum of Los Angeles County (LACM). Voucher specimens are deposited in the Laboratorio de Invertebrados, Facultad de Ciencias, Universidad Autónoma de Baja California (UABC). Other abbreviations used are: Gulf of California (GC); Baja California (BC); Baja California Sur (BCS); Sonora (SON); Departamento de Investigación Científica y Tecnológica, Universidad de Sonora (DICTUS).

#### Taxonomic Account

Family Grapsidae MacLeay 1838

Subfamily Sesarminae Dana 1851

*Armases magdalenense* (Rathbun 1918)

Fig. 1A–C

*Previously known distribution.*—Bahía Magdalena, west coast of BCS and from Bahía Altata, Altata, Sinaloa (GC), to Agua Brava, Nayarit (Abele 1992; Hendrickx 1993, 1995; Villalobos-Hiriart et al. 1989).

*Material examined.*—20+ males and ovigerous females, Estuary of Mulegé River, Mulegé, BCS (GC), 30 Jul 1996.

*Remarks.*—Four species of the genus *Armases* Abele 1992 have been recorded along the East Pacific: *A. angustum* (Smith 1870) (Mexico to Ecuador); *A. occi-*

*dentale* (Smith 1870) (El Salvador to Ecuador); *A. gorei* (Abele 1981) (Peru) and *A. magdalenense* (Rathbun 1918) (Mexico), (see Abele 1992). *Armases magdalenense* can be separated from other species for its carapace (Fig. 1A), distinctly wider than long ( $cl/cb = 0.83$ ), the extensor margin of the dactyl of the last walking leg is also armed with black spines (Fig. 1B–C) and the palm of the chela is smooth (Abele 1992).

The present record extends the northern distribution limit of *A. magdalenense* in the GC approximately 300 km. It is a common but inconspicuous crab along banks of estuary of the Mulegé River and its habitat agrees with that reported by Hendrickx and Salgado-Barragán (1992): under dead plants on sandy substrate, in the shade of mangrove trees above the water line. Two species of fiddler crabs, *Uca latimanus* (Rathbun 1893) and *U. crenulata crenulata* (Lockington 1877), and the grapsoid crab *Geograpsus lividus* (H. Milne-Edwards 1837) were collected in the same habitat.

Subfamily Varuninae H. Milne-Edwards, 1853

*Goetice americanus* Rathbun 1923

Fig. 2A–B

*Previously known distribution.*—GC, Bahía San Luis Gonzága, BC, and Guaymas, SON; west coast of the BC Peninsula at Bahía Tortugas (=San Bartolomé), BCS (Rathbun 1923).

*Material examined.*—100+ males and females, San Felipe and vicinity, BC, Puerto Peñasco, SON, Bahía de Los Angeles, BC, and Bahía Concepción, BCS, 1985–1995.

*Remarks.*—*Goetice americanus* is the most abundant brachyuran crab of the highest rocky intertidal of the GC. It is a common species from Bahía de Los Angeles, BC north to San Felipe, BC and Puerto Peñasco, SON, but is rare at Bahía Concepción and southward along the BC peninsula coast. Hendrickx (1994) reported *G. americanus* to Guaymas. However, his collecting efforts along the tropical Pacific (see Hendrickx 1995) and that of ours on the west coast of the BC peninsula (1985–1997) had failed to produce specimens of this species. Our findings suggest that Rathbun's (1923) record of *G. americanus* to Bahía San Bartolomé (=Bahía Tortugas) on the west coast of the BC Peninsula is extralimital.

*Goetice americanus* can be easily recognized by its coloration. The carapace has a marble color with a great deal of variation of white, red and gray. Ovigerous females have been collected in January, April and November.

Additional remarks on this species are under *Hemigrapsus nudus* (Dana 1851) and *Tetragrapsus jouyi* (Rathbun 1893).

*Hemigrapsus oregonensis* (Dana 1851)

Fig. 3A

*Known distribution.*—From Resurrection Bay, Alaska to Bahía San Juanico, BCS (Campos and Campos 1989); San Felipe and Bahía de Los Angeles, BC (Luke 1977).

*Material examined.*—14 juveniles, Estero Uno, north of Campo Don Abel, San Felipe, BC, 17 Mar 1995 (UABC); 20 males, 20 females, Laguna Percebú, San Felipe, BC, several dates (UABC); one ovigerous female, Guerrero Negro, BCS,

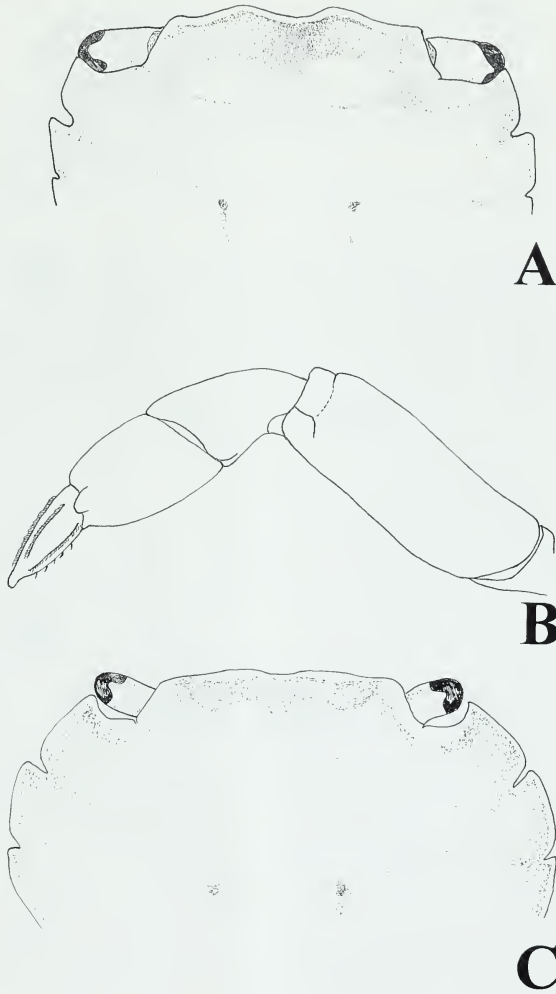


Fig. 2. A–B, *Goetice americanus* Rathbun 1923; C, *Hemigrapsus nudus* (Dana 1951). A, C, frontal view; B, dorsal face of the fourth walking leg.

21 Mar 1956 (LACM); 12 males, 12 females, Bahía Todos Santos, BC, 16 Apr 1980; 22 Nov 1996 (UABC); one male, two females, Bahía Tortugas, BCS, Jan–Apr 1987 (UABC); number and sex not available, Bahía San Juanico, BCS, 8 February 1955 (LACM).

*Remarks.*—See remarks under *H. nudus*.

*Hemigrapsus nudus* (Dana 1851)

Fig. 2C

*Known distribution.*—From Yakobi Island, Alaska to Bahía Tortugas, BCS, Mexico (Garth and Abbott 1980); presumably Bahía de Los Angeles (Luke 1977).

*Material examined.*—1 male, 1 female, Bahía Todos Santos, Ensenada, BC, no date available.

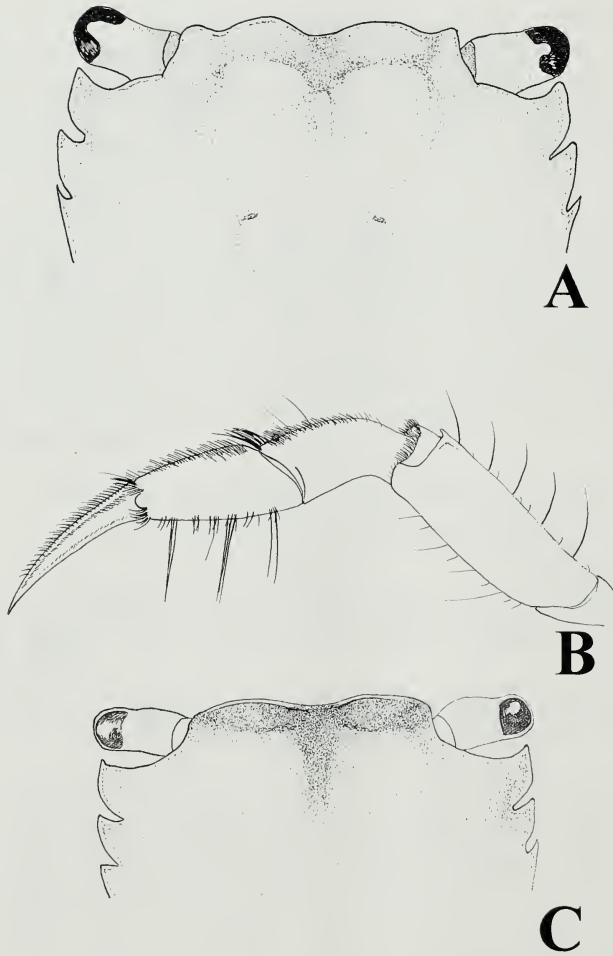


Fig. 3. A, *Hemigrapsus oregonensis* (Dana 1851); B–C *Tetragrapsus jouyi* (Rathbun 1893). A, C, frontal view; B, dorsal face of the fourth walking leg.

*Remarks.*—Rathbun (1923), Brusca (1980) and Garth and Abbott (1980) were hesitant about records of *H. oregonensis* and *H. nudus* in the Gulf of California. Hendrickx (1995), based on Luke's (1977) account, recorded these species to San Felipe, BC and Bahía de Los Angeles, BC respectively. The study of the material on which Luke (1977) based the records of *H. oregonensis* (SIO: C373, C375, C379, C1334) permits us to confirm the presence of this species in the upper Gulf of California. However, part of this material belongs in *Goetice americanus*. The presence of *H. nudus* is not confirmed by the present study. The only lot of specimens (SIO–C366) that supports Luke's report was not found in the SIO Crustacean Collection (C366). On the northeast Pacific coast *Hemigrapsus nudus* lives under rocks in the middle and higher intertidal. *Hemigrapsus oregonensis*, a burrower species, inhabits open mud flats, under rocks in muddy habitats, or in mats of *Enteromorpha* and beds of *Zostera*, high to low intertidal (see Garth and Abbott 1980; Bonfil et al. 1992).

*Tetragrapsus jowyi* (Rathbun, 1893)

Fig. 3B–C

*Known distribution.*—GC, Guaymas, SON (Rathbun, 1918); “quiet waters from Puerto Peñasco to Mazatlán, Espiritu Santo Island and San Francisco and La Paz,” Mexico (Vogel 1966; Brusca 1980).

*Material examined.*—40+ specimens, Bahía de Los Angeles, BC, Mar 1987 and Jul 1996.

*Remarks.*—*Tetragrapsus jowyi* was originally recorded in Guaymas, SON (Rathbun 1918). Later, Vogel (1966) reported this species in Punta Pelicano, a locality close to Puerto Peñasco, SON. Brusca (1980) pointed out that it is a common and abundant species throughout the Gulf of California, living under rocks. We have examined the 25 males and 13 females (YPM 5698) on which Vogel (1966) based her report and they belong in *Goetice americanus*. The specimens reported by Brusca (1980) were not found in the Puerto Peñasco Laboratory of the DICTUS or elsewhere. Their identity remains uncertain. Brusca (in litt.) informed us that many of his records, including that of *T. jowyi*, were based solely on field identifications, which further complicates this inquiry. We believe that the grapsoid crab Brusca (1980) recorded as common and abundant under rocks along the Gulf of California is either *G. americanus*, *H. oregonensis* or both. Our conclusion is supported by the fact that *T. jowyi* occurs intertidally in salt marsh habitat. In Bahía de Los Angeles, it burrows among the pickle weeds (*Salicornia pacifica*) and grasses (*Distichlis spicata*). *Tetragrapsus jowyi* never occurs under rocks as do *G. americanus* and *H. oregonensis*.

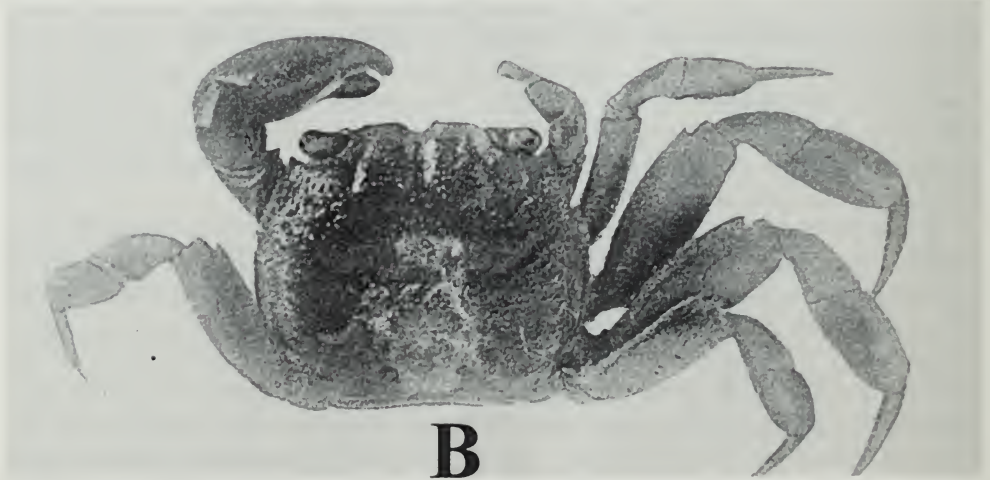
*Varuninae of the Mexican Pacific.*—Six species of Varuninae occur along the East Pacific coast. Except for *Glyptograpsus impressus* Smith 1870 (Acapulco, Mexico to Panama) and *Euchirograpsus pacificus* Türkay 1975 (Galapagos) (see Türkay 1975; Hendrickx 1995), the remaining species *G. americanus*, *H. nudus*, *H. oregonensis* and *T. jowyi* occur intertidally in temperate and sub-tropical waters of the Mexican Pacific. They inhabit the SON and BC coast, in the upper GC and the west coast of the BC Peninsula along the Californian Province. The Varuninae of the Mexican Pacific are morphologically similar, particularly in the general shape of the carapace, third maxilliped, and chelipeds. This similarity among these species has resulted in misidentifications. A detailed morphological comparison of these species allowed us to recognize several features of the carapace, abdomen and walking legs that permit easy recognition of each species. These features have been summarized in the key below. Regarding habitat, *H. oregonensis* and *T. jowyi* prefer salt marsh areas. However, the former may also live under rocks in muddy habitats. *Hemigrapsus nudus* and *G. americanus* inhabit rocky intertidal areas.

## Key to the Grapsidae-Varuninae of the East Pacific

- |   |   |
|---|---|
| 1. First segment of male abdomen covering entire sternum between legs of last pair .....            | 5 |
| 1'. First segment of male abdomen not entirely covering the sternum between legs of last pair ..... | 2 |
| 2. Walking legs 1–4 stout, bare or with scatter, short tufts of hair setae (Fig. 2B) .....          | 3 |
| 2'. Walking legs 1–4 slender and hairy (Fig. 3B) .....  | 4 |



**A**



**B**

Fig. 4. A, *Euchirograpsus pacificus* Türkay 1975, male holotype; B, *Glyptograpsus impressus* Smith 1870, male dorsal view (A from Türkay 1975; B, Rathbun 1918 respectively).

- 3. Antero-lateral margins of carapace straight and parallel, front deeply emarginate (Fig. 2A) ..... *Goetice americanus* Rathbun 1923
- 3'. Antero-lateral margins arcuate, front gently emarginate (Fig. 2C) .....  
..... *Hemigrapsus nudus* (Dana 1851)
- 4. Front deeply emarginate, with two prominent dorsal lobes (Fig. 3A) ..  
..... *Hemigrapsus oregonensis* (Dana 1851)
- 4'. Front gently emarginate, without prominent dorsal lobes (Fig. 3C) ....  
..... *Tetragrapsus jouyi* (Rathbun 1893)
- 5. Carapace squarish, lateral margins straight (Fig. 4A) .....  
..... *Euchirograpsus pacificus* Türkay 1975
- 5'. Carapace subrotund, lateral margins arcuate (Fig. 4B) .....  
..... *Glyptograpsus impressus* Smith, 1870

## Acknowledgments

Our great appreciation is due to Eric Lazo–Wasem, Manager Collection, Peabody Museum of Natural History, Yale University, for making available part of the reported material; to Richard C. Brusca, Michel Hendrickx, Raymond B. Manning and Michael Türkay for supplying pertinent literature and sharing important information; to José Delgadillo for the identification of the salt marsh plants; to Eduardo, Carmina, Lalito and Paulina Aguirre y González, and Tony Resendis for their invaluable support during an academic sojourn at Puerto Peñasco Laboratory, DICTUS and The Archleon campus, Bahía de Los Angeles respectively. This work was supported by the agreement CONACyT-UABC 3587-N9311.

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Accepted for publication 29 December 1997.