

## Systematics of the genus *Scleroplax* Rathbun, 1893 (Crustacea: Brachyura: Pinnotheridae)

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### Abstract

The taxonomic status of the monotypic genus *Scleroplax* Rathbun, 1893, is evaluated and separated from other genera of the *Pinnixa* White, 1846, complex. Distinguishing characters of *Scleroplax* are a hard, subheptagonal and dorsally, highly convex carapace, and a third maxilliped with a propodus that extends to the end of the dactylus. The genera *Scleroplax*, *Pinnixa*, *Austinixa* Heard & Manning, 1997, *Glassella* Campos & Wicksten, 1997, *Indopinnixa* Manning & Morton, 1987, and *Tetrias* Rathbun, 1898, share a carapace that is wider than long and a distinct lateral exopod lobe on the third maxilliped, all of which may represent monophyletic characters. Updated information on the distribution and hosts of *S. granulata* Rathbun, 1893, indicate that the species now ranges from Vancouver Island, British Columbia, Canada to El Coyote estuary, Punta Abreojos, Baja California Sur, México. It inhabits burrows of the echinoid *Urechis caupo* Fisher & MacGinitie, 1928, and the mud shrimps *Neotrypaea californiensis* (Dana, 1854), *N. gigas* (Dana, 1852) (new host record), *Upogebia pugettensis* (Dana, 1852), and occasionally *U. macginitiorum* Williams, 1986 (new host record).

**Key words:** Crustacea, Brachyura, Pinnotheridae, *Scleroplax*, systematics, geographic distribution, new hosts

### Resumen

El estatus taxonómico del género monotípico *Scleroplax* Rathbun, 1893, es evaluado y separado de otros géneros del complejo *Pinnixa* White, 1846. Caracteres diagnósticos de *Scleroplax* son un caparazón subpentagonal, duro, convexo y dorsalmente alto, y el tercer maxilípido con un propodio que se extiende hasta el final del dactilo. Los géneros *Scleroplax*, *Pinnixa*, *Austinixa* Heard & Manning, 1997, *Glassella* Campos & Wicksten, 1997, *Indopinnixa* Manning & Morton, 1987, y *Tetrias* Rathbun, 1898, comparten un caparazón que es más ancho que largo y un distinguible lóbulo lateral sobre el exópodo del tercer maxilípido, los cuales podrían representar características monofiléticas. Información actualizada sobre la distribución y huéspedes de *S. granulata* Rathbun, 1893, indica que esta especie se distribuye desde la Isla Vancouver, Columbia Británica, Canadá

hasta el Estero El Coyote, Punta Abreojos, Baja California Sur, México. Esta habita en las madrigueras del equiúrdo *Urechis caupo* Fisher & MacGinitie, 1928, y de los camarones de fango *Neotrypaea californiensis* (Dana, 1854), *N. gigas* (Dana, 1852) (nuevo huésped), *Upogebia pugettensis* (Dana, 1852) y ocasionalmente *U. macginitiorum* Williams, 1986 (nuevo huésped).

**Palabras clave:** Crustacea, Brachyura, Pinnotheridae, *Scleroplax*, sistemática, distribución geográfica, nuevos huéspedes

## Introduction

Ongoing studies on the subfamily Pinnotherinae prompted a reassessment of the diagnosis of the genus *Scleroplax* Rathbun, 1893. This genus was erected to accommodate its type species, *S. granulata* Rathbun, 1893, which inhabits burrows of estuarine invertebrates along the west coast of Canada, United States, and northern México (Bonfil *et al.* 1992). Since its description, the systematic position of this monotypic genus has been somewhat controversial. Holmes (1900) synonymized it with *Pinnixa* White, 1846, while Rathbun (1893, 1918) and subsequent authors considered the genus as distinct. Rathbun supported this separation because, unlike *Pinnixa*, the anterolateral and posterolateral margins in *Scleroplax* curve gradually and do not form an angle, which should not be considered a reliable character.

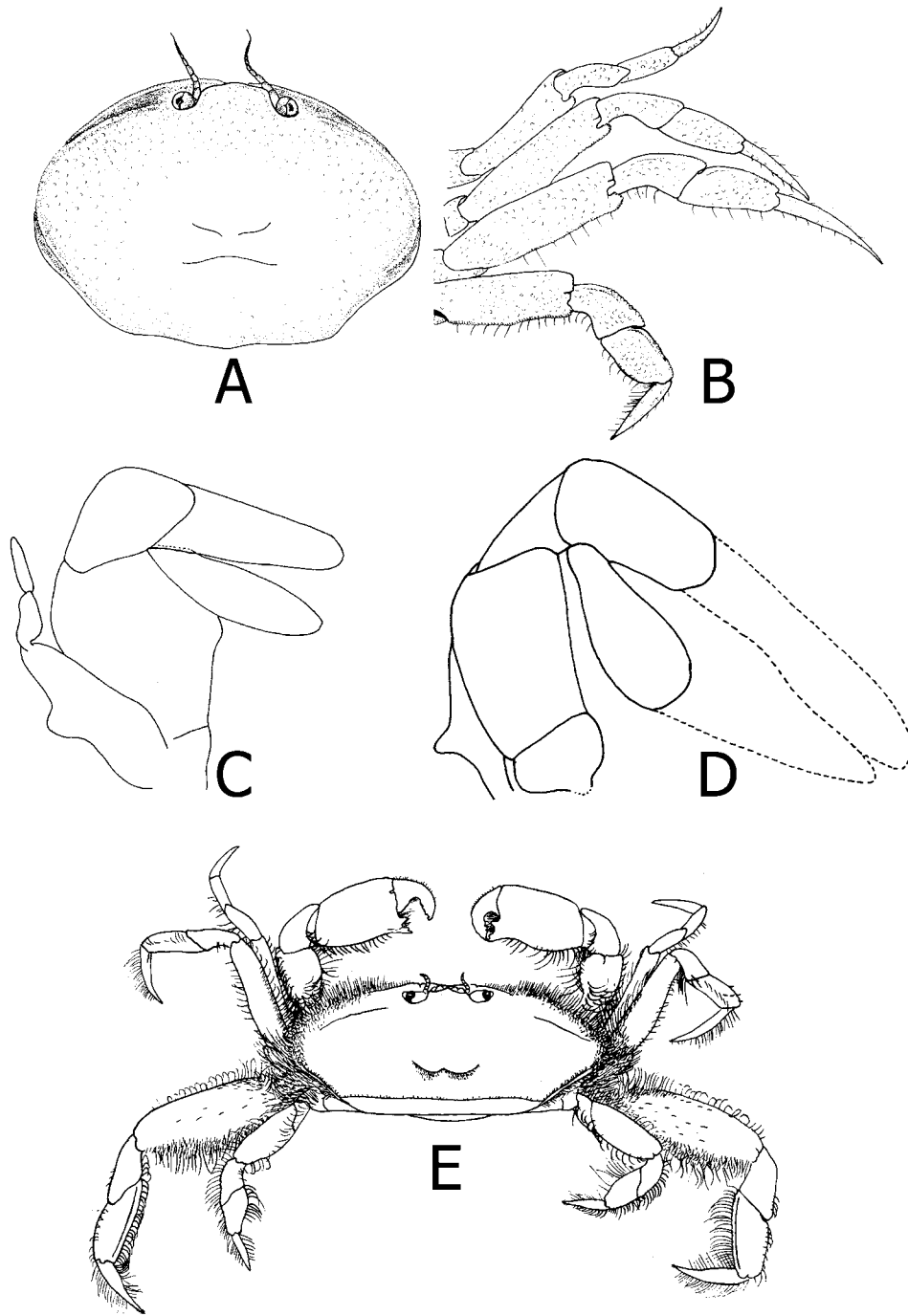
The present paper reviews the diagnosis of the genus *Scleroplax*, reveals its morphologic relationships with members of the closely related *Pinnixa* complex and updates its geographic distribution and hosts. Sources of specimens examined in this study include: Laboratorio de Sistemática de Invertebrados, Facultad de Ciencias, Universidad Autónoma de Baja California (UABC); Colección de Referencia de Invertebrados, Instituto de Ciencias del Mar y Limnología (Mazatlán Station), Universidad Nacional Autónoma de México (EMU); National Museum of Natural History, Smithsonian Institution, (USNM); and Natural History Museum of Los Angeles County (material formerly in the holdings of the Allan Hancock Foundation, University of Southern California, Los Angeles, California (AHF)). Other abbreviations used in the account include: cl = carapace length; cw = carapace width; WL = walking legs; MXP3 = third maxilliped; BC = Baja California, México; BCS = Baja California Sur, México.

## Systematics

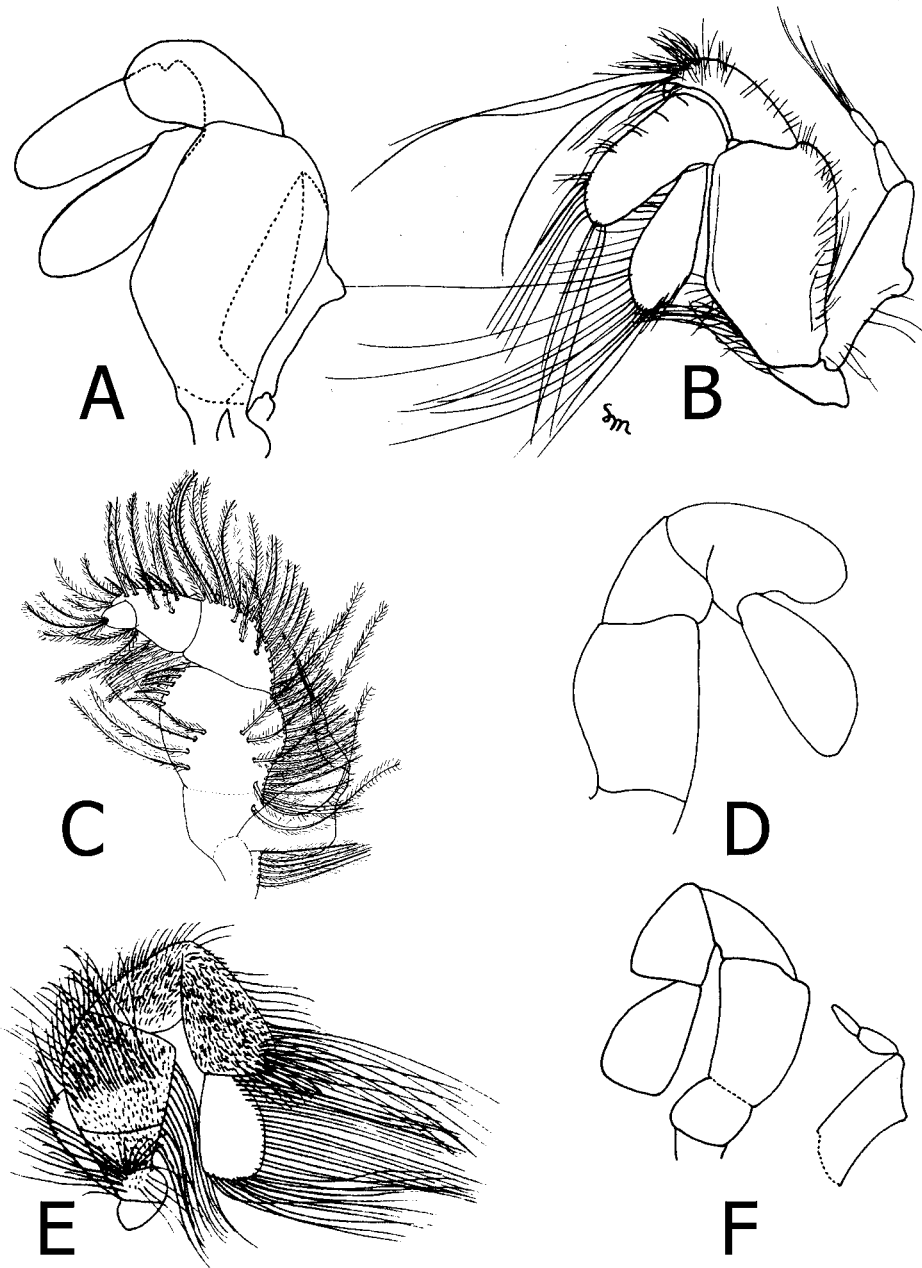
### Pinnotheridae de Haan, 1833

#### *Scleroplax* Rathbun, 1893

**Type species.** *Scleroplax granulata* Rathbun, 1893, by original designation and monotypy. Gender feminine.



**FIGURE 1.** A–C *Scleroplax granulata* Rathbun, 1893 (female, cl 4.2 mm, cb 6.0 mm., El Coyote estuary, Abreojos Point, Baja California Sur, México, UABC); D) *Pinnixa* sp. (female, cb = 6.0mm, El Verde estuary, Mazatlán, Sinaloa, México, EMU-842; E) *Auxtinixa cristata* Rathbun, 1900, (male cb 6.3 mm., St. Lucie, Florida, USA, USNM). A, E) dorsal view; B) WL 1–4; C–D) MXP3. Illustrations not to scale. Dotted lines indicate the setae of the propodus and dactylus. (E from Manning and Felder, 1989).



**FIGURE 2.** A–F, Third maxillipeds. A) *Pinnixa cylindrica* (Say, 1818), (male, cl 5.8 mm, cb 11.8 mm., Sarasota Bay, Florida); B) *Auxtinixa cristata* (Rathbun, 1900), (male, cb 6.5 mm., Pierce Inlet, Florida, USA); C) *Glassella costaricana* (Wicksten, 1982), (female, holotype cl 1.8 mm, cb 4.2 mm., Playa de Coco, Guanacaste, Costa Rica, AHF 806); D) *Indopinnixa sipunculana* Manning and Morton, 1987, (male, holotype cl 2.3 mm, cb 4.2 mm, Tai Tan, Hong Kong, USNM 222500); E) *Tetrias fischeri* (A. Milne-Edwards, 1867), (female, cl 5.4 mm, cb 7.4 mm., Andamas Island); F) *T. scabripes* Rathbun, 1898 (male, cl 6.5 mm, cb 8.1 mm. Southern Gulf of California, México, EMU 4026) (A, from Rathbun, 1918; B, from Manning and Felder, 1989; E from Tesch, 1918).

**Hosts.** Crustacea, Decapoda (Callianassidae and Upogebidae); Echiurida (Urechidae).  
In burrows.

**Distribution.** Pacific Ocean coast, Canada to northern México.

**Diagnosis.** Carapace hard, subheptagonal, highly convex dorsally, anterolateral margins not forming angle with posterolateral margins; MXP3 slightly oblique, covers buccal cavity, ischio-merus subtrapezoidal, propodus extending to end of dactylus, both spoon-shaped and larger than carpus. WL1-4 of similar shape, third pair slightly longer, fourth not noticeably reduced.

**Taxonomic remarks.** The revised diagnosis allows the separation of *Scleroplax* from all the known genera in the *Pinnixa* complex. Diagnostic features of *Scleroplax* include the carapace and MXP3. In contrast to *Scleroplax*, in *Pinnixa sensu stricto*, the dactylus always protrudes beyond the distal tip of the shorter propodus. This feature is also observed in the genera *Indopinnixa* Manning & Morton, 1987, and *Austinixa* Heard & Manning, 1997. The shape and insertion point of the articles of MXP3 in *Glassella* Campos & Wicksten, 1997, and *Tetrias* Rathbun, 1898, are so different from *Scleroplax* that misidentification is unlikely (Fig. 2C, E–F). Members of the *Pinnixa* complex can also be separated from *Scleroplax* by their relatively flat carapace that is noticeably wider than long, with WL3 clearly longest and the thin WL4 the shortest.

An analysis of Rathbun (1918), Tesch (1918), Shen (1932), Glassell (1938), Garth, (1960), Righi (1967), Fenucci (1975), Manning & Morton (1987), Manning & Felder (1989), Zmarzly (1992), Campos & Wicksten (1997), Heard & Manning (1997), Campos *et al.* (1998) and Martins & D’Incao (1998) accounts and the study of voucher material listed in Table 1 revealed that the genera *Austinixa*, *Glassella*, *Indopinnixa*, *Pinnixa*, *Scleroplax*, and *Tetrias* should be considered a presumed homogeneous group. All these taxa share at least two inclusive characters, including a distinct carapace that is wider than long and a conspicuous lobe on the outer margin of the basal segment on the exopod of the third maxilliped (Fig 1 C–D, 2 A–F). These novelties distinguish these genera within the Pinnotheridae and may represent a separate monophyletic assemblage. *Alarconia* Glassell, 1938 (see Campos & Wicksten 1997) and the South Pacific genus *Pinnotherelia* Milne Edwards & Lucas, 1843, should not be considered members of this group despite sharing a carapace that is also wider than long. Both genera lack the exopod lobe of MXP3. The systematics of these genera will be discussed elsewhere.

### ***Scleroplax granulata* Rathbun, 1893**

**Type locality.** Ensenada, Baja California, México.

**Previous known distribution and hosts.** Vancouver Island, British Columbia, Canada to Punta Banda estuary, Ensenada, Baja California (Bonfil *et al.* 1992; Campos & Wicksten 1997). In burrows of the echiuroid *Urechis caupo* Fisher & MacGinitie, 1928, and the mud shrimps *Neotrypaea californiensis* (Dana, 1854), *N. gigas* (Dana, 1852) (new

host record), and *Upogebia pugettensis* (Dana, 1852).

**TABLE 1.** Pinnotherid material examined.

Species	Institution
<i>Austinixa</i> sp.	UABC
<i>Austinixa cristata</i> (Rathbun, 1900)	USNM
<i>Austinixa felipensis</i> (Glassell, 1935)	UABC
<i>Glassella costaricana</i> (Wicksten, 1982)	UABC AHF806
<i>Indopinnixa sipunculana</i> Manning and Morton, 1987	USNM221697, 222500
<i>Pinnixa barnharti</i> Rathbun, 1918	UABC, USNM31510, LACM35-189.1
<i>Pinnixa longipes</i> (Lockington, 1876)	USNM110636
<i>Pinnixa franciscana</i> Rathbun, 1918	USNM110633, 110671
<i>Pinnixa tomentosa</i> Lockington, 1877	
<i>Pinnixa littoralis</i> Holmes, 1894	UABC
<i>Pinnixa schmitti</i> Rathbun, 1918	USNM
<i>P. tubicola</i> Holmes, 1894	USNM20860, UABC
<i>Pinnixa scamit</i> Martin and Zmarzly, 1994	USNM 267500, UABC
<i>Pinnixa richardsoni</i> Glassell, 1936	UABC
<i>Pinnixa valerii</i> Rathbun, 1931	UABC, EMU3769
<i>Pinnixa darwini</i> Garth, 1960	AHF 3812
<i>Pinnixa trasversalis</i> (H. Milne Edwards and Lucas, 1844)	UABC
<i>Pinnixa tumida</i> Stimpson, 1858	UABC
<i>Pinnixa cf. occidentalis</i> Rathbun, 1893	EMU 1416
<i>Pinnixa pambertoni</i> Glassell, 1935	UABC
<i>Pinnixa valdiviensis</i> Rathbun, 1907	UABC (Photographs)
<i>Tetrias scabripes</i> Rathbun, 1898	EMU-
<i>Pinnixa</i> sp.	EMU-842
<i>Scleroplax granulata</i> Rathbun, 1898	UABC, USNM17497
<i>Scleroplax</i> sp.	UABC

**Material examined (UABC), new range and host:** 10 males, 10 females, Punta Banda estuary, Ensenada, Baja California, 16 May 2006; in burrows of *Neotrypea californiansis* and *N. gigas* (new host record) and 1 male, 1 female, same locality and date; in burrows of *U. macginiteorum* Williams, 1986 (new host record); 55 males, 54 females (24 ovigerous), 15–17 July 1999 and 6 males, 18 females (8 ovigerous), 16 September 1999, El Coyote estuary, Punta Abreojos, Baja California Sur, México; in burrows of *N. californiansis* and *N. gigas*.

**Remarks.** The present records extend the distribution of *S. granulata* about 1000 km southward, from Ensenada, Baja California to El Coyote estuary, Punta Abreojos, Baja California Sur, México and *N. gigas* as a new host. Hendrickx (1984, 1995), with some hesitation, recorded *S. granulata* as occurring in Estero El Verde, Sinaloa, México. The identification of the female specimen (EMU-842) on which Hendrickx based his report shows that it is instead an undescribed species of *Pinnixa*. The tip of the maxilliped dactylus of the new species clearly overreaches the tip of the propodus (Fig. 1D), the flat carapace is transversally subrectangular and the WL3 is much longer than the other legs.

*Scleroplax granulata* is a common commensal in the middle and low intertidal mud burrows of the echiurid *Urechis caupo* and the mud shimps *N. californiensis*, *N. gigas* and *U. pugettensis* (Garth & Abbott, 1980; present paper). Ricketts *et al.* (1985) recorded *S. granulata* in burrows of *Upogebia* sp., at Punta Banda estuary, Ensenada, Baja California, México. In this locality *S. granulata* has been collected in burrows of the only species of *Upogebia*, *U. macginiteorum* (see, Campos & Campos, 1989). Other crab species that live in burrows of the same hosts include *Pinnixa franciscana* Rathbun, 1918, and *P. schmitti* Rathbun, 1918 (Zmarzly 1992).

### Acknowledgements

I am indebted to Drs. Gerhard Pohle, Huntsman Marine Science Centre, Mary K. Wicksten, Texas A & M University, Peter Castro, California State Polytechnic University, and an anonymous reviewer for their careful review of this paper, and to my wife Alma Rosa for the figures. Many thanks to the late Raymond B. Manning (Smithsonian Institution) and John S. Garth (Allan Hancock Foundation) for loaned museum specimens. The kind hospitality and support of Michel Hendrickx during my review of specimens at the Colección de Referencia de Invertebrados of his institution is gratefully acknowledged. The author is a scholarship holder of the Consejo Nacional de Ciencia y Tecnología (CONACyT), México and a postgraduate student at the Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo León, México. This study was supported by the project "Diversidad e integridad biótica de las comunidades de macroinvertebrados infaunales (Crustacea, Mollusca y Echinodermata) de tres estuarios de la costa occidental de Baja California." of the Facultad de Ciencias and Coordinación de Postgrado e Investigación, UABC.

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