THE CRABS (CRUSTACEA: DECAPODA: BRACHYURA) OF THE PACIFIC COAST OF COLOMBIA*

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ABSTRACT
An annotated checklist of the 213 species of brachyuran crabs known up to now from Pacific coast of Colombia, is presented. This list is the first attempt to compile all information about the brachyuran crabs reported from this coast. Brief comments on the zoogeographic affinities of the Pacific Colombian crab fauna, are included.

RESUMEN
Se presenta una lista anotada de las 213 especies de cangrejos braquios conocidos hasta ahora de la Costa Pacífica de Colombia. Esta lista es el primer intento para recopilar toda la información de los cangrejos de esta costa. Se incluye un breve análisis sobre las afinidades zogeográficas de la fauna de cangrejos braquios del Pacífico de Colombia.

INTRODUCCION
The Pacific coast of Colombia presents a wide variety of habitats for brachyuran crabs, such as mangrove swamps and estuaries that are strongly affected by freshwater outflows, and having surface water temperatures ranging from 27°C to 30°C and salinities from 0 to 28 ppt. The brachyurans found in

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these habitats are mostly estuarine species adapted to turbid waters and muddy substrates. However, the coastline also has rocky and sandy shores, mud flats, and coral reefs. The coral reefs are poorly developed and restricted to Gorgona and Malpelo Islands, as well as some areas between Cabo Corrientes and Punta Arditas, such as the Sound of Utría. The reefs are dominated by branching corals of the genus *Pachyseris*, particularly *P. damicornis*, a species that harbors numerous obligatory and facultative commensals decapod crustaceans.

Apparently the first known collection of crabs for the Pacific coast of Colombia was made by the "U.S. Fish Commission Steamer Albatross", which visited Malpelo Island in March 1891, a single male specimen of the common land crab was described by Faxon (1893) as *Geocarcinus major.* Faxon (1895) gave new crab records from this area. A collection of shallow water and semiterrestrial crabs was made by Dr Enrico Festa during 1895–1896 in Tumaco. Nobili (1901) described the collected material. In 1924 - 1925 the "St. George" stopped at Gorgona Island, and the crabs collected were described by Finneghan (1931). Subsequently, the "Velero III" traversed the area in 1934 and 1935, but only the *Oxystrongyloides* were reported (Rathbun, 1937). In 1938 the "Zaca" visited Gorgona Island, and the Brachyuran crabs were reported by Crane (1940, 1941, 1947) and Garth (1951), although the Gonorhaceae and Pinnotheridae were not included. In 1941 the "Ackroyd" expedition sampled several localities along the coast of Colombia, including stations at Gorgona Islands, Málaga, Guevita, Utría, Solano, Humboldt Bay, and the Gulf of Cupica. The material thus obtained was reported by Garth (1946, 1948, 1950). Finally, the expedition of the University of Lund to Chile visited Buenaventura, Colombia for a few days, and the small crab collection obtained was published by Garth and Haig (1956).

Since that time, a considerable number of species have been added, primarily as result of the collections by Prahl et al. (1978), Prahl and Gull (1979), Prahl (1981a, 1981b) and Prahl (1982a, 1982b). Prahl and Gull (1982) described a new spider crab, *Tyche sulae*, and Prahl (1983a) described a new fresh-water crab, *Hypolobocera gorgonensis*, collected from Gorgona Island. Prahl (1983b) gave the first report of *Gecarcinus planatus* and Prahl (1985c) reported new crabs of the genus *Uca* for the Pacific coast of Colombia. Prahl and Manjarres (1964) published a paper on the crabs of the family Gecarcinidae known from Colombia. Prahl and Toro (1985) described a new fiddler crab, *Uca (Uca) intermedia*, and Prahl and Froidevand (1985) reported 37 Xanthid crabs for the Pacific coast of Colombia. Also, two reviews have been published, that of the family Grapsidae (Prahl and Sánchez, 1985) and another of the Caupolicanidae (Prahl and Sánchez, 1986). Finally, a new *Patamocarcinus* was described from the Serranía de Baudo, Chocó (Prahl and Ramos, 1987), and 4 new *Hypolobocera* from the Pacific Colombian drainage (Prahl, 1988).

Taking into consideration all available information about the brachyuran crabs from the Pacific coast of Colombia, a list of them is presented. This effort is the first attempt to compile a list, which will contribute to knowledge of crab fauna of relatively unknown part of the Panama Bight as well as that of the Pacific drainage of western Colombia.
MATERIALS AND METHODS
During a 10-year period (1979-1988) we collected brachyuran crabs from intertidal and shallow waters (no more than 20m depth), from the mouth of the Río Mira in the south to Punta Ardiitas in the north. Most of the crab collection obtained has been deposited in the Colección de Referencia de la Sección de Biología Marina de la Universidad del Valle (CRBMUV), in Cali. The present list is mainly based on material from the reference collection, and includes material of terrestrial and fresh-water crabs of the Pacific drainage collected by us during the same period.

The nomenclature adopted here is that used by Bowman and Abele (1982); for the family Xanthidae we also considered the nomenclature introduced by Guinot (1988, 1989, 1971).

In the list, the symbol *** indicates those species reported by other authors from the Pacific coast of Colombia, but not examined by us. Species marked with a "*" have been included based on verbal communication with the senior author to the junior authors and have not been located at the CRBMUV (the senior author died before this manuscript was completed).

SYSTEMATIC LIST

**Order DECAPODA** Latreille, 1803
**Suborder PLEOCYEMATA** Burkenroad, 1963
**Infraorder BRACHYURA** Latreille, 1803
**Section DROMIACEA** De Haan, 1833
**Superfamily DROMIOIDEA** De Haan, 1833

- **Family DROMIIDAE** De Haan, 1833
  - *Dromidia larraburel* Rathbun, 1910
  - **Hypoconcha panamensis** Smith, 1869

- **Family DYNOMEDIDAE** Ortmann, 1892
  - *Dynomene ursula* Simpson, 1880
  - **Section ARCHAEOBACHYURA** Guinot, 1977
  - **Superfamily RANINOIDEA** De Haan, 1839

- **Family RANINIDAE** De Haan, 1839
  - *Ranilla fornicata* (Faxon, 1893)
  - *Raninoides Loevis* (Latreille, 1825)
  - **Section OXYSTOMATA** H. Milne Edwards, 1834
  - **Superfamily DORIPPOIDEA** MacLeay, 1838

- **Family DOHIPPIDAE** MacLeay, 1838
  - *Ethusa ciliatirostris* Faxon, 1893
  - *Ethusa lati Rathbun, 1893
  - *Ethusa mascarone panamensis* Finnean, 1931
*Ethusina gracilipes* (Miers, 1886)
*Ethusina smithiana* Faxon, 1893

Superfamily LEUCOSIOIDEA Samouelle, 1819

Family CALAPPIDAE De Haan, 1833
*Acanthocarpus delsotelii* Garth, 1973
*Calappa convexa* Saussure, 1853
*Calappa saussurei* Rathbun, 1898
*Cycloes bairdii* Stimpson, 1860
*Hopalus kossmanni* Neumann, 1878

Family LEUCOSIOIDEA Samouelle, 1819
*Iliacantha hancockii* Rathbun, 1935
*Iliacantha schmitti* Rathbun, 1935
*Iliacantha* sp.
*Leucosilia jurinei* (Saussure, 1853)
*Lithadia cumingii* Bell, 1855
*Persephona townsendi* (Rathbun, 1893)
*Randailla agaricia* Rathbun, 1898

Section OXYRHYNCHIA Latreille, 1803
Superfamily MAJOIDEA Samouelle, 1819

Family MAJIDAE Samouelle, 1819
*Ala cornuta* (Stimpson, 1860)
*Colloides gibbosus* (Bell, 1835)
*Colloides granosus* Stimpson, 1860
*Colloides tenirostris* Rathbun, 1893
*Eplattoides murphyi* (Garth, 1948)
*Eucinetops panamensis* Rathbun, 1923
*Euprognatha bifida* Rathbun, 1893
*Hemus fenneganae* Garth, 1958
*Herbstia pubescens* Stimpson, 1871
*Herbstia tumida* (Stimpson, 1871)
*Inachoidea laevis* Stimpson, 1860
*Lissa aurivillii* Rathbun, 1898
*Lissa tuberosa* Rathbun, 1898
*Macrococeloma villosum* (Bell, 1835)
*Malopsis panamensis* Faxon, 1893
*Microphys brachialis* Rathbun, 1892
*Microphys platysoma* (Stimpson, 1860)
*Mithrax denticulatus* Bell, 1835
*Mithrax pygmaeus* Bell, 1835
*Mithrax sinensis* Rathbun, 1892
*Mithrax tuberculatus* Stimpson, 1860
*Neodoclea boneti* Buitendijk, 1950
Notolapas lamellatus Stimpson, 1871
Paradasgillus depressus (Bell, 1835)
Pella pacifica A. Milne Edwards, 1875
Pella sp.
Pella tumida (Lockington, 1877)
Pitho quinqueidentata Bell, 1835
Pitho picteti (Sauvage, 1853)
Podocelia angulata Finnegren, 1931
*Podocelia hemphilli (Lockington, 1877)
Podocelia veleonis Garth, 1948
*Podocelia vestita (Stimpson, 1871)
*Podocelia ziesenhenneli Garth, 1940
Pyromaiia tuberculata mexicana (Rathbun, 1893)
Sphenocarcinus agassizi Rathbun, 1893
Stenoclonops ovata (Bell, 1835)
Stenorrhynchus debilis (Smith, 1871)
Teleophys gregilipes Stimpson, 1860
Teleophys tumidus (Cano, 1899)
Thoe sulcata panamensis Nobili, 1901
Tyche lamellifrons Ball, 1835
Tyche sulae von Prahl & Guhl, 1932

Superfamily PARTHENOPOIDEA MacLeay, 1838

Family PARTHENOPIDAE MacLeay, 1838
*Cryptopodia nassieri Rathbun, 1925
Daldorphia garthi Glassell, 1940
Heterocrypta colombiana Garth, 1939
Leiolambris punctatissimus (Owen, 1839)
*Mesoroebia bellii (A. Milne Edwards, 1879)
Parthenope hypopica (Stimpson, 1871)
Parthenope depressusculus (Stimpson, 1871)
*Parthenope exilipes (Rathbun, 1893)
Parthenope stimpsoni Garth, 1958
Solenolambris arcuatus Stimpson, 1871
Thyrolambris glasselli Garth, 1958

Section BRACHIYRYNCHA Borradaile, 1907
Superfamily PORTUNOIDEA Rafinesque, 1815

Family PORTUNIDAE Rafinesque, 1815
Areneaus mexicanus (Gerstäcker, 1856)
Callinectes arcuatus Ordway, 1863
Callinectes foxotes Ordway, 1863
Cronus ruber (Lamarck, 1818)
Euphylax dovili Stimpson, 1860
Euphylax robustus A. Milne Edwards, 1874
Portunus acuminatus (Stimpson, 1871)
Portunus asper  A. Milne Edwards, 1861
Portunus brevimanus (Faxon, 1893)
Portunus Irisescens (Rathbun, 1893)
Portunus panamensis (Stimpson, 1871)
Portunus tuberculatus (Stimpson, 1860)
Portunus xantusii affinis (Faxon, 1893)
+Portunus xantusii xantusii (Faxon, 1893)

Superfamily XANTHOIDEA MacLeay, 1838

Family GONEPLACIDAE MacLeay, 1838
Chasmocarcinus latipes Rathbun, 1898
*Chasmocarcinus longipes Garth, 1940
+Chasmocarcinus ostrearicola Rathbun
Cytotix panamensis Garth, 1940
Pseudohomilia xanthiformis Garth, 1940

Family XANTHIDAE MacLeay, 1838
Cataloptodius taboganus (Rathbun, 1912)
+Corallasio armstrongi Garth
Cycloixinus vittalus (Stimpson, 1860)
Daire americana Stimpson, 1860
Domecih hispida Eyedoux & Souleyet, 1842
Edwardsium lobipes (Rathbun, 1896)
Epoxanthus tenuidactylus (Lockington, 1877)
Erphia squamata Stimpson, 1859
Erphides hispida (Stimpson, 1860)
Eurypanopeus planus (Smith, 1899)
Eurypanopeus transversus (Stimpson, 1860)
Eurytium affine (Streets & Kingsley, 1877)
Eurytium tristani Rathbun, 1906
Globoplumus xanthusii (Stimpson, 1860)
Glyptoxanthus labyrinthicus (Stimpson, 1860)
Heteractea lunata (H. Milne Edwards & Lucas, 1843)
*Heteractea petersoni Garth, 1940
Hexapanopeus nicaraguensis (Rathbun, 1904)
Hexapanopeus sinaloensis Rathbun, 1930
Liomera cinctimana (White, 1847)
Lipaestesius leeanus Rathbun, 1898
Lophoanopus maculatus Rathbun, 1898
Lophoxanthus tamelipes (Stimpson, 1860)
Medaeus pelagicus (Grisell, 1938)
Medaeus spinulifer (Rathbun, 1898)
Menippe frontalis A. Milne Edwards, 1879
Menippe obtusa Stimpson, 1860
+Metapocarcinus truncatus Stimpson, 1860
+Micropanope taylori Garth
Micropanope xanthusii (Stimpson, 1871)
*Ozius perlatus Stimpson, 1860
*Ozius tenuidactylus (Lockington, 1877)
Ozius verreauxii Saussure, 1853
Panopeus bermudensis Benedict & Rathbun, 1891
Panopeus chilensis H. Milne Edwards & Lucas, 1844
Panopeus purpureus Lockington, 1877
Paractaea sulcata (Stimpson, 1860)
Pilumnus nobilis Garth, 1948
Pilumnus pygmaeus Boone, 1827
Pilumnus townsendi Rathbun, 1923
Platypodea dovili (Stimpson, 1871)
Platypodiella rotundata (Stimpson, 1860)
*Quadrella nitida Smith, 1869
Trapezia corallina Germain, 1856
Trapezia digitalis Latreille, 1825
Trapezia ferruginea Latreille, 1825
Trapezia formosa Smith, 1869
*Xanthias serrulata Finnegan, 1931
Xanthioides sternbergi Stimpson, 1859
Xanthioides stimpsoni (A. Milne Edwards, 1879)

Supertfamily GRAPSIDOIDEA MacLeay, 1838

Family GECARCINIDAE MacLeay, 1838
Cardisoma crassum Smith, 1870
Gecarcinus quadratus Saussure, 1853
Gecarcinus planatus Stimpson, 1860
Gecarcinus malaenius Faxon, 1893

Family GRAPSIDAE MacLeay, 1838
Aratus pisonii H. Milne Edwards, 1837
*Cyclograpsus integer H. Milne Edwards, 1837
Geograpsus lividus (H. Milne Edwards, 1837)
Glyptograpsus impressus Smith, 1870
Goniopsis pulchra (Lockington, 1876)
Grapsus grapsus (Linnaeus, 1758)
Pachygrapsus transversus (Gibbes, 1850)
Pericon gibbesi (H. Milne Edwards, 1853)
Plagiusia immaculata (Lamarck, 1818)
Planes minutus (Linnaeus, 1758)
Sesarma aequatoriale Ortmann, 1894
Sesarma angustum Smith, 1870
Sesarma occidentale Smith, 1870
Sesarma rhizophorae Rathbun, 1896
Sesarma sulcatum Smith, 1870
Superfamily PINNOTHERIOIDEA De Haan, 1833

Family PINNOTHERIDAE De Haan, 1833
- Pinnixa richardsoni Glasell, 1936
- Pinnixa valerii Rathbun,
- Pinnothereus angelicus Lockington, 1877
- Pinnothereus malaguenia Garth, 1948

Superfamily POTAMOIDEA Ortmann, 1896

Family PSEUDOHELPHIDAE Ortmann, 1893
- Hypolobocera andagoyensis Pretzmann, 1965
- Hypolobocera beeleri Pretzmann, 1966
- Hypolobocera buenaventurensis Rathbun, 1905
- Hypolobocera cajambrensis von Prahl, 1968
- Hypolobocera chochoensis Rodriguez, 1960
- Hypolobocera dentata von Prahl, 1987
- Hypolobocera gorgonensis von Prahl, 1983
- Hypolobocera malaguenia von Prahl, 1988
- Hypolobocera meinerti von Prahl, 1969
- Hypolobocera mutisp von Prahl, 1988
- Hypolobocera orientalis Pretzmann, 1968
- Potamocarcinus colombiensis von Prahl & Ramos, 1987

Superfamily OCYPODOIDEA Rafinesque, 1815

Family OCYPOIDEAE Rafinesque, 1815
- Ocypode gaudichaudi H. Milne Edwards & Lucas, 1843
- Ocypode occidentalis Stimpson, 1860
  - Uca argillicola Crane, 1941
  - Uca batuenata Crane, 1941
- Uca bebebe Crane, 1941
- Uca brevitrons (Stimpson, 1860)
- Uca delchmanni Rathbun, 1935
  - Uca dorotheae (von Hagen, 1968)
- Uca festae Nobili, 1901
- Uca galapagensis galapagensis Rathbun, 1902
- Uca galapagensis hemadurensis (Bott, 1954)
- Uca heteropleura (Smith, 1870)
  - Uca inequida Rathbun, 1935
- Uca intermedia von Prahl & Toro, 1985
- Uca latimanus (Rathbun, 1893)
- Uca maraonii insignis H. Milne Edwards, 1852
- Uca musca musica (Rathbun, 1914)
- Uca musca terricola (Crane, 1941)
  - Uca oerstedii Rathbun, 1904
- Uca ornata (Smith, 1870)
- Uca panamensis Stimpson, 1859
- Uca pygmaea Crane, 1941
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Uca salititata Crane, 1941
*Uca stenodactylus* (H. Milne Edwards & Lucas, 1843)
Uca stylirosa (H. Milne Edwards, 1852)
Uca tenulipes Crane, 1941
Uca thayeri umbratilis Crane, 1941
Uca vocator ecuadoriensis Maccagno, 1928
*Uca zaceae* (Crane, 1941)
Ucides cordatus occidentalis (Ortmann, 1898)

Family PALICIDAE Rathbun, 1898
*Palicus fragilis* (Rathbun, 1893)

Superfamily HAPALOCARCINOIDEA Calman, 1900

Family CRIPTOCHIRIDAE Kropp & Manning, 1985
Hapalocarcinus marsupialis Stimpson, 1859
Pseudocryptochirus crescentus (Edmonson, 1925)

**ZOOGEOGRAPHIC CONSIDERATIONS**

Oceanographic conditions are an important in that they can influence the distributions of animals and the development of biological communities. Therefore, in order to discuss the distribution of the brachyuran crabs the circulation patterns and thermal structure of the Tropical Eastern Pacific should be considered. The oceanographic conditions of the eastern tropical Pacific have been described by Wyrtki (1965, 1966).

The Pacific coast of Colombia forms part of the Panama Bight, an area of warm surface water of low salinity, which extends from the entrance of the Gulf of Panama (7°30’ N) south to Punta Galeras (1° N) in Ecuador. The Panama Bight area is limited in the south by an abrupt transitional region between the tropical waters of the Bight and the cool saline waters of the Peru Current, located between Punta Galeras and Cabo Blanco (4° S), Peru (Stevenson et al. 1970).

A large number (111, 52%) of the crabs from the Pacific coast of Colombia are distributed in the Eastern Pacific Zoogeographic Region, which extends from 3° S in the Gulf of Guayaquil, Ecuador, to Cape San Lucas (23° N), Baja California. The region includes three subdivisions, the Galapagos Province, the Panamic Province (3° N to 16° N) and the Mexican Province (from 16° N to 23° N) (Fig. 1).

The circulation pattern in the Eastern Pacific Zoogeographic Region is relatively complex and undergoes variations in response to the shifting of the trade wind system (the Intertropical Convergence Zone). The most important surface currents are the North Equatorial Countercurrent, the current off the coast of Central America, the California Current and the Panama Current system (Fig. 2).
Fig. 1 Zoogeographic provinces of the Eastern Pacific Zoogeographic Region (EPZR); GC, Gulf of California; GG, Gulf of Guayaquil; CP Cortez Province; GP, Galapagos Province; MP, Mexican Province; and PP, Panamic Province.

Fig. 2. Patterns of oceanic circulation in the Eastern Pacific Zoogeographic Region. CACC, Central America Coastal Current; CC, California Current; EC, Equatorial Current; NC, Niño Current or Panama Current; NEC, North Equatorial Current; PSC, Panama Current System; SEC, South Equatorial Current.
The 40% of the collected crabs are strongly related to the subtropical Cortez Province (the Gulf of California). A possible path of access is via larvae of species the California Current, because it flows south along Baja California to about 25° N, where it then swing westward to join the North Equatorial Current. In the southern summer, (February - April), when the Convergence zone is at its more southerly positions, and the Equatorial Counter current is weak or absent, the California Current joined at "Mexican Current"(composed of remnants of the California Current and waters leaving the Gulf of California) may split at about 20° N and part of it flows southward to Guatemala and Costa Rica. At about the coast of Costa Rica, the California Current turns westward, becoming part of a great clockwise flowing gyre existing in this area. The seasonal current from Panama is the southern limb of this clock-wise pool and therefore it is conceivable that the transport of crabs larvae might be possible from the Gulf of California along this route to the Colombian Pacific coast and off shore islands.

The Current of Panama (or Niño Current) which originates in the Panama Bay from January to April, may serve to transport crab larvae to the Galapagos Islands. It is reasonable to expect that the Panama Bight functions as a distribution area, for a large number of larvae that are transferred to the southern out lying regions with the shift to the south of tropical Panamic waters. In this fashion, it is possible to explain the relationship of Galapagos crabs with those from the Pacific coast of Colombia (51 species, 24%) and Gulf of California.

The cycloic gyre in the Panama Bight is also affected by the Equatorial Countercurrent, which flows eastward from the Central Pacific, between 4° and 11° N, and entering the circulation of the Bight (Wyrtki, 1965). Most brachyuran crabs from the eastern Pacific that also found in the Indo-Pacific, are commensals with pocillopora corals. Garth (1974) considered that the larvae of these crabs reach the east coast of America transported by the Equatorial Countercurrent, and that because they find a favorable coral habitat, their chances of survival virtually assured. As noted by Garth, this commensal relationship explains the success of these commensal crabs in colonizing the eastern Pacific.

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