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Checklist of fossil decapod crustaceans from tropical America. Part I: Anomura and Brachyura

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ORIGINAL ARTICLE

Checklist of fossil decapod crustaceans from tropical America. Part I: Anomura and Brachyura

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ABSTRACT

Our knowledge of fossil crustaceans from the tropics has increased considerably during recent decades, thanks to novel findings and the re-examination of museum specimens. However, several previous records have

been misidentified, numerous museum specimens have never been reported, and many new discoveries are yet to be published. Here, we present a detailed, up-to-date, and revised checklist for every marine, terrestrial, or freshwater fossil decapod crustacean occurrence from tropical America known to us, including their age, geographic occurrences, and related literature. We recognize the occurrence of at least 32 superfamilies, 69 families, 190 genera, and 415 species of brachyurans ('true' crabs), and anomurans ('false' crabs, hermit crabs, squat lobsters, and allies), several of them previously unknown. The checklist comprises records from three main geographic regions: 1) northern South America (Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Venezuela); 2) Central America and southern North America (Belize, Costa Rica, Honduras, Panama, Mexico, southern and central Florida); and 3) the Caribbean Islands + Bermuda (Anguilla, Antigua, Aruba, Bahamas, Barbados, Bermuda, Bonaire, Cuba, Curaçao, Dominican Republic, The Grenadines, Haiti, Jamaica, Puerto Rico, Saint Bartélemy, Saint Martin, Trinidad). Previous findings, new occurrences, and the revised systematic placement for several problematic/misidentified records, indicate that the fossil record of anomurans and brachyurans in tropical America is more diverse than previously envisioned, with a considerable degree of endemism at the genus- and species-levels.

Key words

Cenozoic, Central America, Mesozoic, Neotropics, North America, South America.

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Introduction

New paleontological discoveries made mostly during the last two decades have dramatically expanded our understanding of the crustacean fossil record from the New World's tropics. Recent works on fossil and extant anomurans and brachyurans (Hendrickx, 1995; Magalhães, 2003; Ng *et al.*, 2008; De Grave *et al.*, 2009; Boyko and McLaughlin, 2010; McLaughlin *et al.*, 2010; Osawa and McLaughlin, 2010; Schweitzer *et al.*, 2010; Jagt *et al.*, 2015; among many others) have been pivotal to the synthesis of the current state-of-knowledge of marine, terrestrial, and freshwater fossil decapods in tropical America, one of the most diverse regions on Earth. These new discoveries, together with novel phylogenetic hypotheses, and re-examinations of

several previous findings, call for an urgent revision of the crustacean fossil record from tropical America, and are the motivation behind the present checklist. In this work, we focus on the brachyuran and anomuran fossil decapods from the tropical Western Hemisphere and the need to put them into updated temporal, geographic, and systematic contexts.

The tropics are defined as the regions surrounding the Equator, extending roughly from the Tropic of Cancer (~23.3˚N) to the Tropic of Capricorn (~23.3˚S). In addition to the tropical occurrences of fossil anomurans and brachyurans, we have included records from subtropical areas ranging in latitude from ~30˚N to ~30˚S (Fig. 1). Since the Neotropical region engulfs most of South America, here we restrict the South American fossil records to those north of 30˚S latitude. The Caribbean, for the purpose of our work, is considered to be the non-continental land surrounded by the Caribbean Sea, and mostly positioned on the Caribbean tectonic plate. The fossil occurrences have been grouped into three main geographic regions: 1) northern South America, with records from Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, and Venezuela; 2) Central America and southern North America, with records from Belize, Costa Rica, Honduras, central and southern Florida, Mexico, and Panama; and 3) the Caribbean Islands + Bermuda, with records from Anguilla, Antigua, Aruba, Bahamas, Barbados, Bermuda, Bonaire, Cuba, Curaçao, Dominican Republic, the Grenadines, Haiti, Jamaica, Puerto Rico, Saint Bartélemy, Saint Martin, and Trinidad (Fig. 1). To the best of our knowledge, these are the tropical American countries, states, territories, or islands from where fossil anomurans and brachyurans have been either reported in the literature, or found as unpublished material in museum collections (*e.g.*, USNM, MNHN) and reported here. Other tropical American countries, territories, or islands not listed or mentioned lack known brachyuran or anomuran fossils.

This work provides not only an updated and detailed list of fossil anomurans and brachyurans from tropical America, but also includes several new records and a re-examination of the systematic placement of problematic taxa. Although some genera such as *Lobonotus* A. Milne-Edwards, 1863, *Araripecarcinus* Martins-Neto, 1987, *Tepexicarcinus* Feldmann, Vega, Applegate and Bishop, 1998b, *Prehepatus* Rathbun, 1935b, and *Roemerus* Bishop, 1983b, still have unclear systematic affinities due to convergence, incompleteness of their carapaces, and/or poor preservation (*e.g.*, Bishop, 1985; Vega *et al.*, 1995b; 2005; 2006a; Schweitzer *et al.*, 2006b; Jagt *et al.*, 2010; 2014; Ossó *et al.*, 2014; Luque, 2015a; 2015b), the systematic position of most other families, genera, and species here included have been verified by us and are, to the best of our knowledge, as accurate and updated as possible. As a result, we recognize the occurrence in the tropical Americas of at least 32 superfamilies, 69 families, 190 genera, and 415 spp. of brachyurans ('true' crabs) and anomurans ('false' crabs, hermit crabs, squat lobsters, and allies) (Chart 1). New records include the first occurrence of Early Cretaceous pagurid anomurans from Colombia, the crabs *Costacopluma* Collins and Morris, 1975, *Quasilaeviranina* Tucker, 1998, and *Palaeoxanthopsis* Beurlen, 1958 from the Late Cretaceous of Colombia; *Euphylax* Stimpson, 1862 from the Eocene of Peru; *Paraeuphylax* Varela and Schweitzer, 2011 from the Miocene of Venezuela; *Portunus* Weber, 1795 from the Miocene of Colombia; *Johngarthia* Türkay, 1970 from the Pleistocene of Brazil; *Falconoplax* Van Straelen, 1933 and *Pinnixa* White, 1846 from the Miocene of Panama; *Ixa* Leach, 1817 from the Cenozoic of Chile; and some eubrachyurans from the Cenomanian of Bolivia and the Paleocene of Colombia.

Although the phylogenetic position of most brachyuran families is relatively well resolved, there are still discrepancies regarding the classification and subsequent naming of the principal brachyuran ranks above superfamily- and below infraorder-levels, *i.e.*, sections and subsections. The International Code of Zoological Nomenclature does not regulate the nomenclature for taxa in ranks between superfamily and infraorder, which has led to at least two different phylogenetic hypotheses: a) a monophyletic Podotremata (*e.g.,* Guinot *et al.*, 2013; Davie *et al.*, 2015; Jagt *et al.*, 2015), and b) a paraphyletic podotremous grade (*e.g.,* Ahyong *et al.*, 2007; De Grave *et al.*, 2009; Scholtz and McLay, 2009; Karasawa *et al.*, 2011; Tsang *et al.*, 2014). Since the aim of the present work is to provide a revised and updated list of fossil decapod crustaceans from tropical America and not to discuss the phylogenetic relationships among higher brachyuran taxa between the superfamily and infraorder ranks, we have grouped the taxa under superfamilies, first

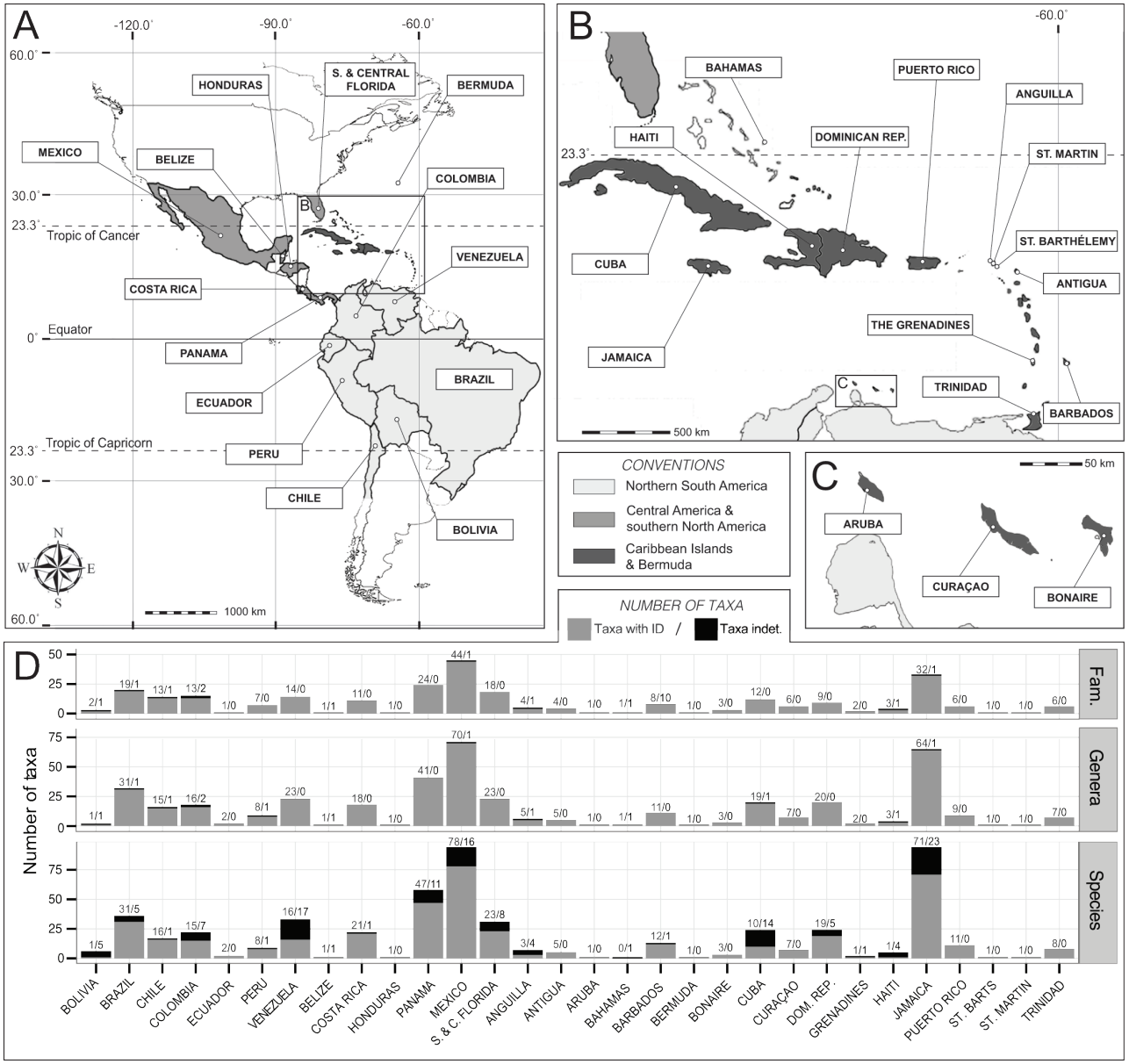

Figure 1. Location map of the tropical and subtropical American countries, states, territories, or islands where fossil anomurans and brachyurans have been discovered/reported to date. A, northern South America (light gray) with records from Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, and Venezuela; continental Central America and southern North America (intermediate gray), with records from Belize, Costa Rica, Honduras, Panama, Mexico, and southern and central Florida; B, Caribbean Islands and Bermuda (dark gray), with records from Anguilla, Antigua, Aruba, Bahamas, Barbados, Bermuda, Bonaire, Cuba, Curaçao, Dominican Republic, the Grenadines, Haiti, Jamaica, Puerto Rico, Saint Bartélemy, Saint Martin, and Trinidad; C, close-up of the ABC islands north of Venezuela: Aruba, Bonaire, and Curaçao; D, count of confirmed (grey bars) and indeterminate (black bars) number of families, genera, and species of fossil anomurans and brachyurans for each of the countries, states, territories, or islands included in this study.

based on their approximate phylogenetic position (*e.g.*, typical podotremous superfamilies are listed before eubrachyuran superfamilies) (Fig. 2), and second, alphabetically within superfamilies. The schematic phylogenetic relationships among the anomuran and brachyuran superfamilies and sections/subsections listed in this work are partially based on the works of Bracken-Grissom *et al.* (2013) for Anomura (white box), Karasawa *et al.* (2011) for podotremous Brachyura (colored boxes), and Tsang *et al.* (2014) for eubrachyuran Brachyura (grey box) (Fig. 2; Chart 1). In this checklist, one dagger (†) indicates taxa that are exclusively known from fossils, and no dagger denotes extant taxa with known fossil record. Extant-only species, genera, families and superfamilies are not listed here.

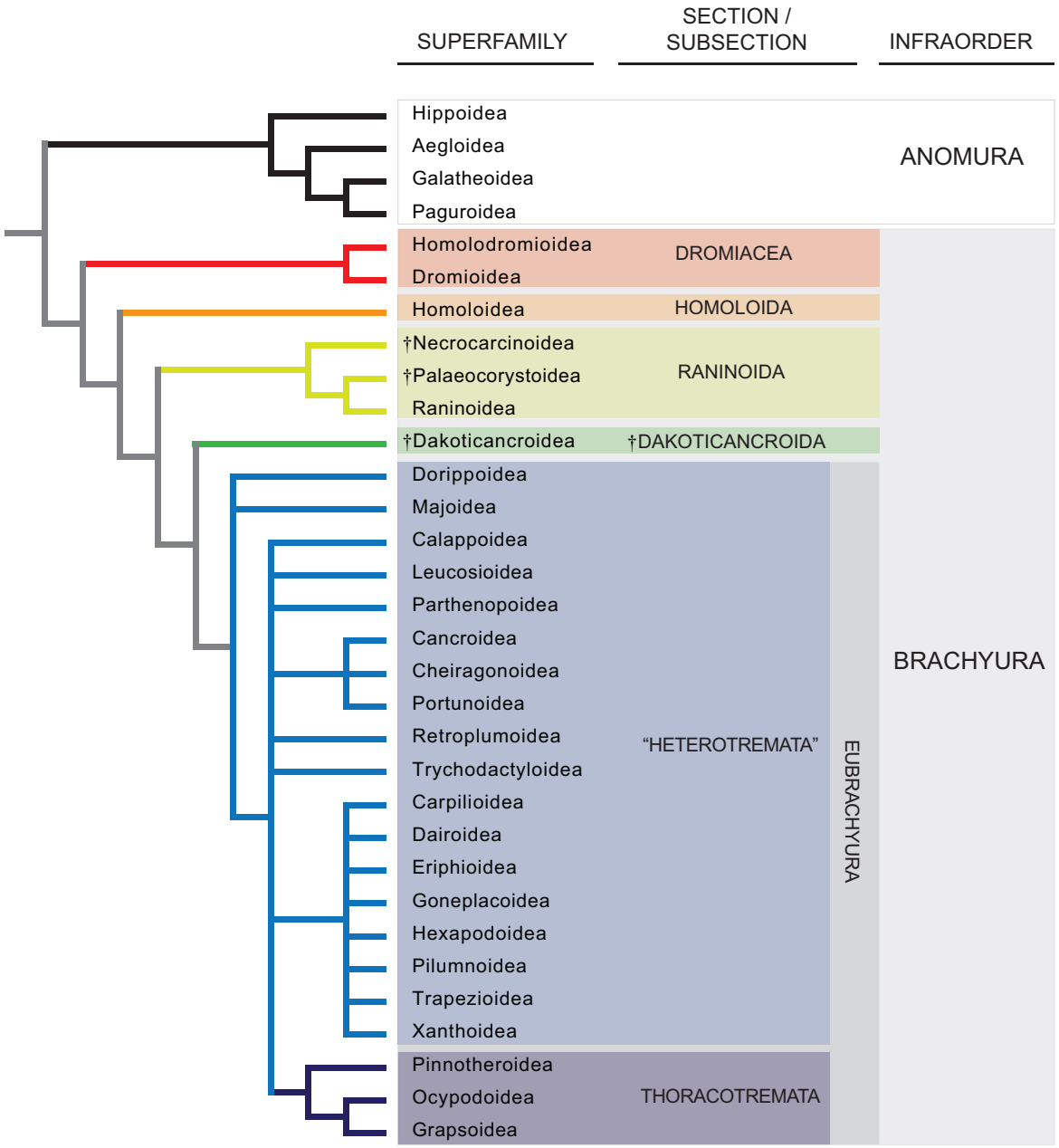

Figure 2. Schematic phylogenetic relationships among the superfamilies of Anomura and Brachyura listed in this work. The general topology and colored boxes reflect current phylogenetic scenarios based on molecular and morphological data, partially following the works of Bracken-Grissom *et al.* (2013) for Anomura (white box), Karasawa *et al.* (2011) for podotremous Brachyura (colored boxes), and Tsang *et al.* (2014) for some eubrachyuran Brachyura (grey box). The order in which superfamilies are listed in this figure, from top to bottom, is the same followed through the checklist and in Chart 1, whereas families, genera, and species within a given superfamily are listed alphabetically. Superfamilies with a dagger (†) are only known from fossils.

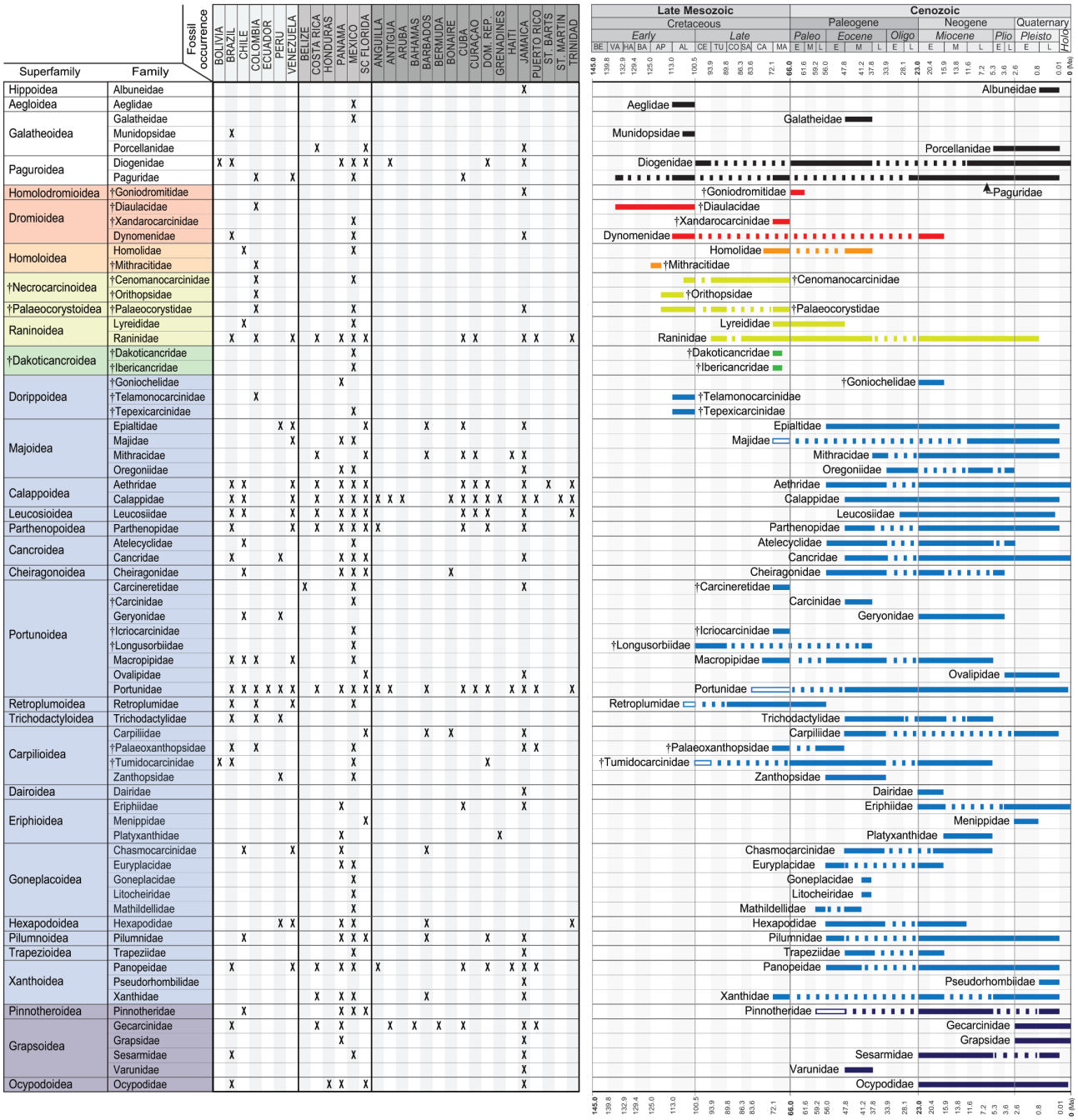

Chart 1. Geographic (left) and stratigraphic (right) distribution of 32 superfamilies and 69 families of anomurans and brachyurans with fossil records in tropical America summarized in this work. Colors for countries/regions as in Fig. 1. Colors for families and superfamilies as in Fig. 2. Fossil occurrences for a given family and country are marked with 'X'. Solid horizontal bars indicate the known chronologic and stratigraphic ages for a given family, dotted lines indicate unknown but expected occurrences, and outlined white bars indicate taxa with dubious or indeterminate familial placement. Taxa marked with a dagger (†) only known from fossils. SC Florida = South and Central Florida. Numerical ages given in millions of years (Ma). Geologic time abbreviations: AL = Albian, AP = Aptian, BA = Barremian, BE = Berriasian, CA = Campanian, CE = Cenomanian, CO = Coniacian, E = early, HA = Hauterivian, Holo = Holocene, L = late, MA = Maastrichtian, M = middle, Oligo = Oligocene, Paleo = Paleocene, Pleisto = Pleistocene, Plio = Pliocene, SA = Santonian, TU = Turonian, VA = Valanginian. Geologic time slices not to scale.

Institutional abbreviations

CPC = Colección Paleontológica de Coahuila, Museo del Desierto, Saltillo, Coahuila, Mexico.
IGM = Colección Nacional de Paleontología, Instituto de Geología, UNAM, Mexico D.F., Mexico.
IGM p = Colecciones Paleontológicas Museo José Royo y Gómez, Servicio Geológico Colombiano, Bogotá, Colombia (formerly INGEOMINAS).
IHNFG = Colección Paleontológica de Chiapas, Museo Eliseo Palacios, Tuxtla Gutiérrez, Chiapas, Mexico.
LPURCA = Laboratório de Paleontologia da Universidade Regional do Cariri.
MNHN = Muséum national d'Histoire naturelle, Paris, France.
MNRJ = Museu Nacional, Universidade Federal do Rio de Janeiro.
MUN STRI = Mapuka Museum of Universidad del Norte, Barranquilla, Colombia.
MUZ = Museo de Múzquiz, Múzquiz, Coahuila, Mexico.
UF = Invertebrate Paleontology Division, Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA.
USNM = United States National Museum, Smithsonian Institution, Washington, D.C., USA.

Annotated checklist

Order DECAPODA Latreille, 1802

Clade MEIURA Saint Laurent, 1980

Northern South America

BOLIVIA

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

Diogenidae *incertae sedis* [Cenomanian, Potosí] (Fig. 3A–H) [Notes 1, 2].

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily ?CARPILIOIDEA Ortmann, 1893

?Tumidocarcinidae Schweitzer, 2005a

***Dynomenopsis* † Secretan, 1972**

Dynomenopsis branisai † Secretan, 1972 (type) [Cenomanian, Potosí] (Schweitzer and Feldmann, 2012) [Note 2].

EUBRACHYURA *incertae sedis*

Eubrachyuran 1 (carapace) [Cenomanian, Potosí] (Fig. 3I, J) [Note 2].
Eubrachyuran 2 (carapace) [Cenomanian, Potosí] (Fig. 3K, L) [Note 2].
Eubrachyuran indet. (claw fragments) [Cenomanian, Potosí] (Fig. 4A–J) [Note 2].
?Eubrachyuran indet. (claw fragments) [Miocene, Santa Cruz] (Fig. 4K–N)

Note 1. To date, the only known fossil decapod records from Bolivia are those reported by Secretan (1972), which include some indeterminate decapod cheliped remains, and the brachyuran *Dynomenopsis branisai*, all from the Cenomanian Miraflores Formation of the Puca Group in Esquena. A parcel of decapod remains deposited at the Paleontological Collections of the Muséum National d'Histoire Naturelle in Paris (MNHN), includes several paguroid chelipeds and many brachyuran carapace and cheliped remains (Figs. 3, 4). The paguroid remains consist mainly of major left chelipeds, which are characteristic of the family Diogenidae (including Coenobitinae), and reminiscent of the 'indeterminate decapod remains' reported by Secretan (1972, text fig. 1, plates II and III). Herein, we tentatively assign Secretan's specimens and the new material to Diogenidae *incertae sedis* (Fig. 3A–H), until further studies permit a more accurate systematic placement.

Note 2. To our knowledge, *Dynomenopsis branisai*, from the Cenomanian of Esquena, is the only known fossil brachyuran from Bolivia to date. As suggested by Schweitzer and Feldmann (2012), the affiliation of *Dynomenopsis* with Tumidocarcinidae, or even Carpilioidea, can only be corroborated as more material becomes available. Here, we maintain it within Tumidocarcinidae albeit with uncertainty. The occurrence of two additional carapaces from apparently different taxa (Fig. 3I, L), increase the number of fossil brachyurans known from Bolivia to three. The labels and metadata associated with these specimens indicate that they were collected in Cenomanian rocks of Esquena. Several of the chelipeds and cheliped fragments here illustrated (Fig. 4A–J) are associated with one of the carapaces (Fig. 3K, L), and are strongly reminiscent of the chelipeds seen among several durophagous eubrachyurans (J. Luque, pers. obs.).

BRAZIL

Infraorder ANOMURA MacLeay, 1838

Superfamily GALATHEOIDEA Samouelle, 1819

Munidopsidae Ortmann, 1898

***Brazilomunida* † Martins-Neto, 2001**

Brazilomunida brasiliensis † (Beurlen, 1965, as *Galatheites brasiiensis*) (type) [Albian, Sergipe]

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

***Dardanus* Paul'son, 1875**

Dardanus spp. [Paleocene, Pernambuco] (*in* Távora *et al.*, 2005) [Note 1]

Infraorder BRACHYURA Latreille, 1802

Superfamily DROMIOIDEA De Haan, 1833
Dynomenidae Ortmann, 1892

***Maurimia* † Martins-Neto, 2001**

Maurimia sergipensis † (Beurlen, 1965, as ?*Cyclothyreus sergipensis*) (type) (as *Distefania sergipensis in* Schweitzer *et al.*, 2010) [Albian, Sergipe]

Superfamily NECROCARCINOIDEA † Förster, 1968

Necrocarcinoidea *incertae sedis*

***Araripecarcinus* † Martins-Neto, 1987**

Araripecarcinus ferreirai † Martins-Neto, 1987 (type) [early Albian, Ceará] (Luque, 2015b) [Note 2].

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides spp. [Paleocene, Pernambuco] (Távora *et al.*, 2016) [Note 3].

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatella* Smith, 1869a**

Hepatella amazonica † Beurlen, 1958a [early Miocene, Pará].

Calappidae De Haan, 1833

Calappidae *incertae sedis* [early Miocene, Pará] [Note 4].

***Acanthocarpus* Stimpson, 1871**

Acanthocarpus obscurus † (Rathbun, 1918, as *Mursia obscura*) [early Miocene, Pará] (*in* Beurlen, 1958a) (Fig. 5A).

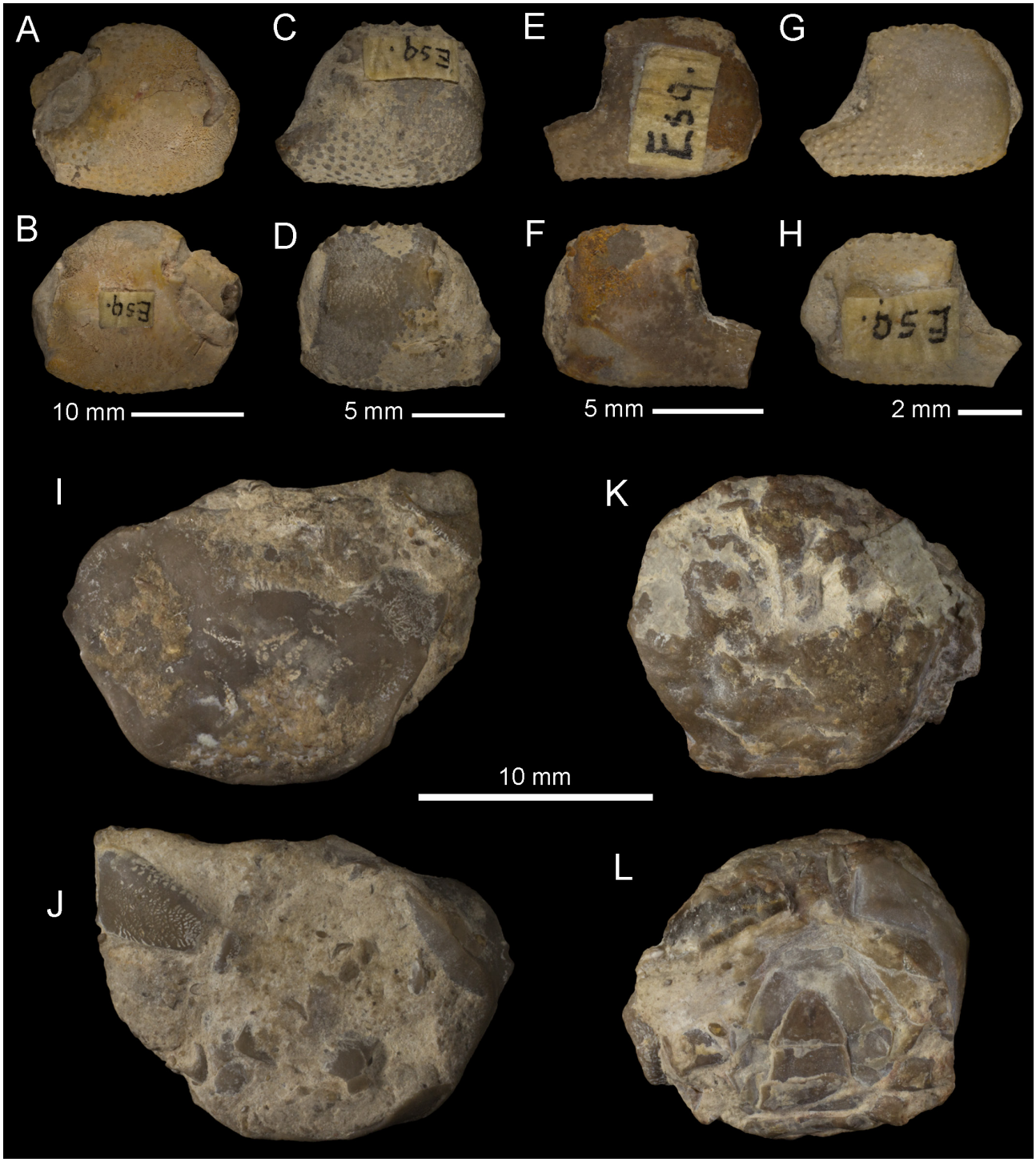

Figure 3. Fossil Anomura and Brachyura from the Cretaceous of Bolivia, South America. A–H, Anomura: Paguroidea: ?Diogenidae, Cenomanian of Potosí; A, B, MNHN-F.A57970, left cheliped in outer (A) and inner (B) views; C, D, MNHN-F.A57972, left cheliped in outer (C) and inner (D) views; E–H, MNHN-F.A57971, left chelipeds in outer (E, G) and inner (F, H) views. I–L, Brachyura: Eubrachyura, of Potosí; I, J, eubrachyuran indet., MNHN-F.A57973, in dorsal (I) and ventral (J) view. K–L, eubrachyuran indet., MNHN-F.A57966, in dorsal (K) and ventral (L) view. Photos courtesy of Jocelyn Falconnet, Peter Massicard, and Sylvain Charbonnier (MNHN). All specimens dry, uncoated.

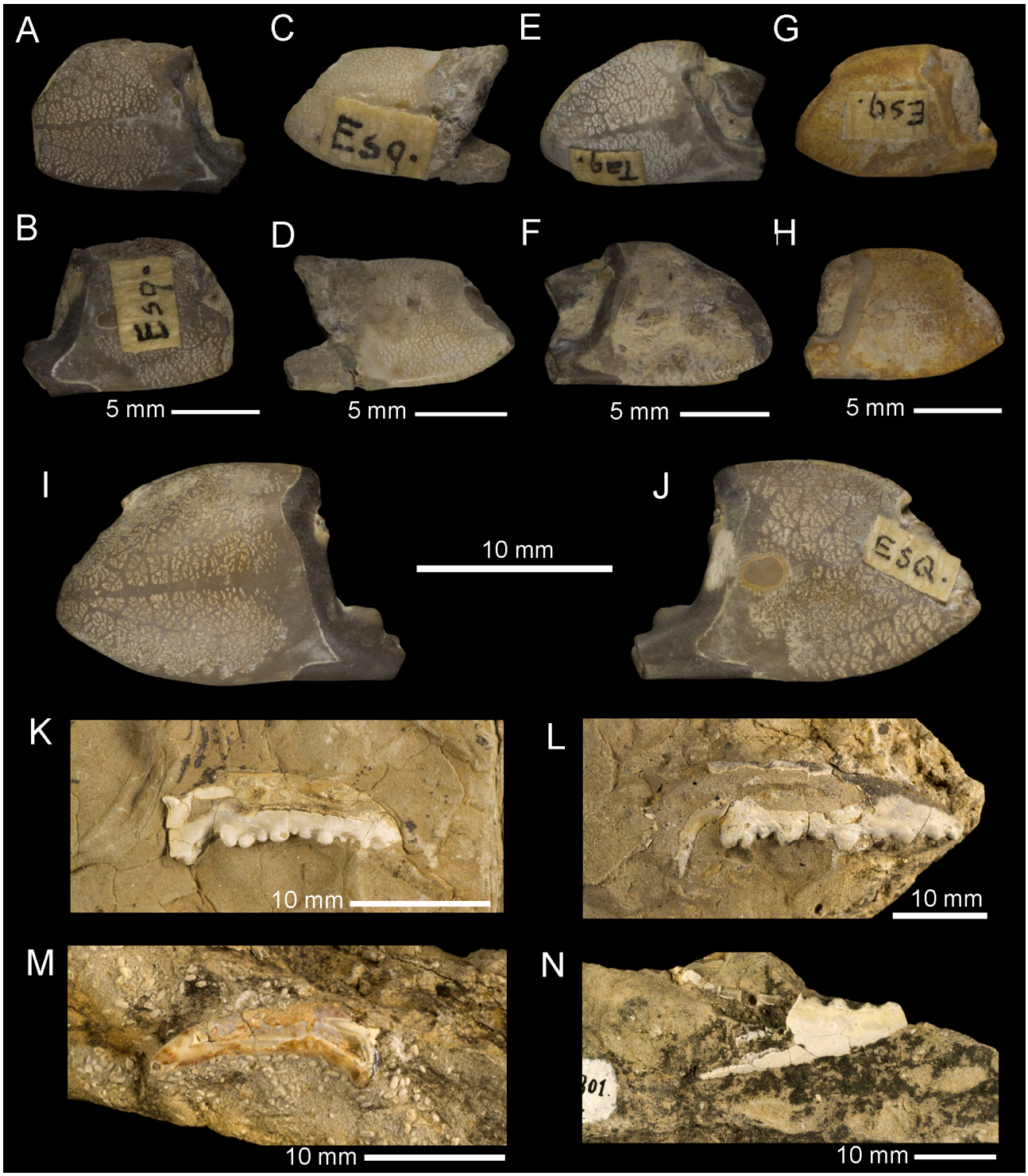

Figure 4. Fossil Brachyura from the Cretaceous and Neogene of Bolivia, South America. A–J, eubrachyuran chelipeds associated with crab carapace MNHN-F.A57966 (see Fig. 3K, L) from the Cenomanian of Potosí; A–H, MNHN-F.A57968, several right chelipeds in outer (A, C, E, G) and inner (B, D, F, H) views; I, J, MNHN-F.A57967, a large right cheliped in outer (I) and inner (J) view. K–N, eubrachyuran chelipeds from the Miocene of Santa Cruz; K, MNHN-F.A57963, dactylus; L, MNHN-F.A57961, dactylus; M, MNHN-F.A57962, dactylus; N, MNHN-F.A57964, fragment of pollex. Photos courtesy of Jocelyn Falconnet, Peter Massicard, and Sylvain Charbonnier (MNHN). All specimens dry, uncoated.

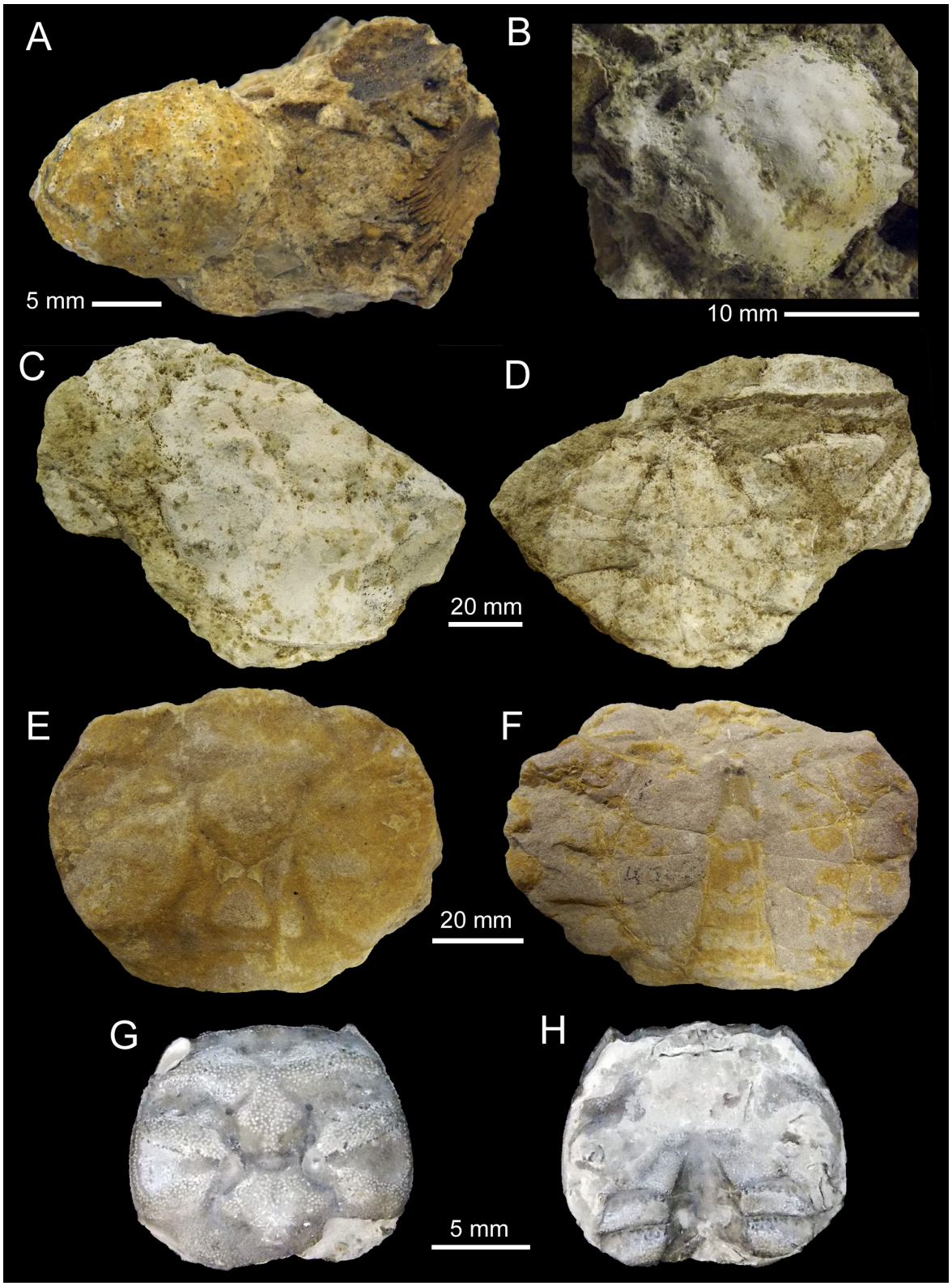

Figure 5. Fossil Eubrachyura from the Cretaceous of Brazil, South America. A, B, Calappoidea: Calappidae: A, *Acanthocarpus obscurus* (Rathbun, 1918) MNRJ 4583-I, carapace, dorsal view, early Miocene of Pará; B, *Calappa circularis* (Beurlen, 1958a), syntype, MNRJ 4619-I, carapace, dorsal view, Miocene of Pará. C, D, Portunoidea: Portunidae: *Callinectes paraensis* Beurlen, 1958a, male, holotype, MNRJ 4585-I, early Miocene of Pará, dorsal (C) and ventral (D) views. E, F, Macropipidae: *Ophtalmoplax brasiliana* (Maury, 1930), male, MNRJ 4581-I, Maastrichtian of Paraíba, dorsal (E) and ventral (F) views. G, H, Retroplumoidea: Retroplumidae: *Costacopluma nordestina* Feldmann and Martins Neto, 1995, male, LPURCA specimen uncatalogued, Paleocene of Pernambuco, dorsal (G) and ventral (H) views. Photos by William Santana. All specimens dry, uncoated.

?*Calappa* Weber, 1795

?*Calappa* sp. aff. *C. zurcheri* † Bouvier, 1899 [as *Calappilia brooksi in* Távora *et al.*, 2005, and *Calappilia in* Rumsey *et al.*, 2016) [early Miocene, Pará] (Vega *et al.*, 2009).

***Calappilia* † A. Milne-Edwards, 1873**

Calappilia circularis † (Beurlen, 1958a, as *Calappa circularis*) [early Miocene, Pará] (Fig. 5B).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae *incertae sedis*

***Typilobus* † Stoliczka, 1871**

Typilobus unispinatus † Martins-Neto, 2001 (as *Randallia* sp. in Beurlen, 1958a) [Miocene, Pará].

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Parthenope* Weber, 1795**

Parthenope trituberculata † Beurlen, 1958a [early Miocene, Pará].

Superfamily CANCROIDEA Latreille, 1802

Cancridae Latreille, 1802

Cancrinae Latreille, 1802

***Cyclocancer* † Beurlen, 1958a**

Cyclocancer tuberculatus † Beurlen, 1958a (type) [early Miocene, Pará].

Superfamily PORTUNOIDEA Rafinesque, 1815

Macropipidae Stephenson and Campbell, 1960

***Ophthalmoplax* † Rathbun, 1935b**

Ophthalmoplax brasiliana † (Maury, 1930, as *Zanthopsis brasiliana*) [Campanian – Maastrichtian, Paraíba] (Pralon *et al.* 2017) (Fig. 5E, F).

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes tajinensis † Vega, Feldmann, Villalobos-Hiriart and Gío-Argíez, 1999 (*sensu* Távora *et al.*, 2002) [early Miocene, Pará] [Note 5].

***Scylla* De Haan, 1833**

Scylla costata † Rathbun, 1919 [Miocene, Pará] (reported in Beurlen, 1958a, and Távora *et al.*, 2002).

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphyplax septendentatus † Beurlen, 1958a [early Miocene, Pará].

Portuninae Rafinesque, 1815

***Achelous* De Haan, 1833**

Achelous spinimanus (Latreille, 1819) (*sensu* Távora *et al.*, 2002) [early Miocene, Pará] [Note 5].

***Arenaeus* Dana, 1851d**

Arenaeus cribrarius (Lamarck, 1818) [early Miocene, Pará].

***Callinectes* Stimpson, 1862**

Callinectes paraensis † Beurlen, 1958a [early Miocene, Pará] (Fig. 5C, D).
Callinectes reticulatus † Rathbun, 1918 (claws only) [early Miocene, Pará].

Portunus Weber, 1795

Portunus atecuicitlis † Vega, Feldmann, Villalobos-Hiriart and Gío-Argíez, 1999 (*sensu* Távora *et al.*, 2002) [early Miocene, Pará].
Portunus haitensis † Rathbun, 1923a [Miocene, Pará] (*sensu* Távora *et al.*, 2002).
Portunus pirabaensis † Martins-Neto, 2001 [Miocene, Pará].
Portunus spp. [early Miocene, Pará] (cited in Beurlen, 1958a, as *Neptunus* sp., in Távora and Dias, 2016, as *Portunus oblongus*, and erroneously as *Palaeopinnixa perornata*, and in Brito, 1971 as *Callinectes ferreirai* and *C. pirabensis*) [Note 6].

Superfamily RETROPLUMOIDEA Gill, 1894

Retroplumidae Gill, 1894

?_Archaeopus_ † Rathbun, 1908

?*Archaeopus rathbunae* † Beurlen, 1965 [Albian, Sergipe] [Note 7].

Costacopluma † Collins and Morris, 1975

Costacopluma nordestina † Feldmann and Martins Neto, 1995 [Paleocene, Pernambuco] (Fig. 5G, H).

Superfamily TRICHODACTYLOIDEA H. Milne Edwards, 1853

Trichodactylidae H. Milne Edwards, 1853

Trichodactylidae spp. indet. [late Miocene, Amazonas] (Klaus *et al.*, 2017).

Superfamily CARPILIOIDEA Ortmann, 1893

Palaeoxanthopsidae † Schweitzer, 2003

Palaeoxanthopsis † Beurlen, 1958b

Palaeoxanthopsis cretacea † (Rathbun, 1902) (type) [Maastrichtian, Paraiba].

Tumidocarcinidae † Schweitzer, 2005a

Paratumidocarcinus † Martins-Neto, 2001

Paratumidocarcinus marajoarus † Martins-Neto, 2001 (type) [Miocene, Pará]

Lobonotus † A. Milne-Edwards, 1863

Lobonotus sturgeoni † (Feldmann, Bice, Schweitzer, Salva and Pickford, 1998a) [Paleocene, Pernambuco] (*in* Távora *et al.*, 2005).

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

Panopeus H. Milne Edwards, 1834

Panopeus capanemaensis † Martins-Neto, 2001 [Miocene, Pará]
Panopeus sp. [early Miocene, Pará] (*in* Brito, 1971)

Tetraxanthus Rathbun, 1898

Tetraxanthus rathbunae Chace, 1939 (*sensu* Távora *et al.*, 2002) [Miocene, Pará].

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

Johngarthia Türkay, 1970

Johngarthia lagostoma H. Milne Edwards, 1837 (as *Gecarcinus lagostoma*) [Pleistocene, Pernambuco] (Fig. 6) [Note 8].

Sesarmidae Dana, 1851c

Sesarma Say, 1817

Sesarma paraensis † Beurlen, 1958a [Miocene, Pará].

Superfamily OCYPODOIDEA Rafinesque, 1815

Ocypodidae Rafinesque, 1815

***Uca* Leach, 1814**

Uca antiqua † Brito, 1972 (junior synonym *U. inaciobritoi* † Martins-Neto, 2001) [Miocene, Pará] [Note 9].

BRACHYURA *incertae sedis*

Brachyuran zoea larvae indet. [early Albian, Ceará] (Maisey and Carvalho, 1995; Luque, 2015b) [Note 2].

Eubrachyura indet. (as *Piloslambrus guerini* in Távora and Dias 2016) [Miocene, Pará] [Note 6]

Note 1. Távora *et al.* (2005) reported the occurrence of the extant hermit crabs *Dardanus fucosus* Biffar and Provenzano Jr, 1972, and *Dardanus insignis* (Saussure, 1858), from the Paleocene Maria Farinha Formation, State of Pernambuco, based on a handful of fragmentary cheliped remains. However, these ~60 million year old fossil specimens do not seem conspecific with *D. fucosus* or *D. insignis*, and their systematic affinities need to be re-examined.

Note 2. The holotype and sole specimen of *Araripecarcinus ferreirai* is a ventral molt, which complicates its systematic placement. Considered by Martins-Neto (1987) as a dorsal carapace of a portunid crab, Guinot and Breton (2006) recognized its superficial resemblance to raninoidan crabs. Karasawa *et al.* (2008) corroborated the raninoidan affinities. Luque (2015b) re-described and re-illustrated the type specimen of *Araripecarcinus*, and based on taxonomic and cladistics approaches, indicated that it may be closer to the necrocarcinoid-like clade of raninoidans. Furthermore, its geographic range and age also matches that of other early Cretaceous necrocarcinoids from tropical South America (*e.g.*, Vega *et al.*, 2010; Luque *et al.*, 2012; Karasawa *et al.*, 2014; Luque, 2014). Although *Araripecarcinus* might be closer to Necrocarcinidae or Orithopsidae, its systematic affinities remain unclear (Luque, 2015b). The only other brachyuran remains known from the Romualdo Formation are a few zoea larvae preserved as fish stomach contents (Maisey, 1994; Maisey and Carvalho, 1995; Luque, 2015b).

Note 3. Távora *et al.* (2016) reported on a couple of specimens of *Raninoides* from the Paleocene Maria Farinha Formation that were assigned to two known fossil species from the Eocene and Oligocene of USA: *Raninoides fulgidus* Rathbun, 1926, and *Raninoides lewisana* Rathbun, 1926. However, the authors did not provide any discussion or remarks justifying their systematic placement. Several species of fossil *Raninoides* are known from Paleogene rocks worldwide, and most of them are difficult to tell apart from one another. Thus, based solely on the illustrations of Távora *et al.* (2016) we cannot confirm the specific affinities of the material, and for this reason, we consider them as *Raninoides* spp. indet. until detailed comparison is made or better material becomes available.

Note 4. Távora *et al.* (2002, fig. 8) reported a presumably indeterminate species of *Callinectes* (Portunidae) from the Miocene of Pará. Based solely on their original illustration, we conclude that the specimen does not belong to *Callinectes* or even Portunidae, but rather represents a dorsal carapace akin to Calappidae.

Note 5. Távora *et al.* (2002) reported the occurrence of the extinct *Necronectes tajinensis* and *Scylla costata*, and the extant portunids *Achelous spinimanus*, from the lower Miocene Pirabas Formation, State of Pará, each based on one poorly preserved specimen. The sternum and only part of the chelipeds of the purported '*A. spinimanus*' are preserved, making the diagnostic characteristics of the species difficult to observe. The material of *N. tajinensis* is even less well preserved and also in ventral view, which makes the identification unreliable. Thus, we consider both records as doubtful. Likewise, the affiliation of the sole propodus of the cheliped referred to *S. costata* is dubious.

Note 6. In a recent work, Távora and Dias (2016) reported the occurrence of the swimming crab *Portunus oblongus* based on relatively poorly preserved cheliped and dorsal carapace material. Although it is possible that their specimens belong to *Portunus*, their specific assignment to *P. oblongus* is not justified or discussed, especially given that at least three other species of *Portunus* – *i.e.*, *P. atecuicitlis*, *P. haitensis*, and *P. pirabaensis* –, and two of its close relative *Callinectes* – *i.e.*, *C. paraensis* and *C. reticulatus* –, are known from

the same strata and age in the state of Pará. Therefore, herein we consider this record as *Portunus* sp. A second record assigned herein to *Portunus* spp. corresponds to what Távora and Dias (2016) incorrectly called *Palaeopinnixa porornata* [sic] (correct spelling is *perornata*) following the typographic error in the original publication of the species by Collins and Morris (1976, p. 127). *Palaeopinnixa perornata* is a crab of the family Hexapodidae – not Pinnotheridae, as suggested by Távora and Dias (2016) –, characterized by the unusual reduction of their fifth pair of pereiopods and their corresponding sternite 8, giving the impression of having only three pairs of walking legs (hence Hexapodidae). Hexapodid crabs share a small and wide pea-like carapace with some Pinnotheridae due to convergence (usually no more than a couple centimeters total), which has previously influenced some authors to place fossil hexapodids among pinnotherids (Vía Boada, 1966; Collins and Rasmussen, 1992; Schweitzer and Feldmann, 2001). The large specimen illustrated by Távora and Dias (2016) as *Palaeopinnixa perornata* corresponds to the ventral carapace of a medium size Portuninae, most likely one of the *Portunus* or *Callinectes* species mentioned above. Another taxon reported by Távora and Dias (2016) was incorrectly assigned to *Piloslambrus guerini* (Parthenopidae). Despite the poor preservation and illustration of that specimen, the dorsal regions, carapace outline, and tuberculation pattern indicate that this fossil is neither conspecific nor congeneric with the extant *P. guerini*. Herein, we consider it provisionally as Eubrachyura *incertae sedis*. Some portunid remains illustrated in Brito (1971), as *Callinectes ferreirai* and *C. pirabensis* are here considered as *Portunus* spp.

Note 7. The original description of *'Archaeopus' rathbunae* does not include images of the holotype, but only a single line drawing (Beurlen, 1965, fig. 4). Based exclusively on the line drawing provided by Beurlen, the specimen does not seem assignable to *Archaeopus*, casting doubt on its generic placement.

Note 8. A small lot of cheliped fragments in the USNM Paleobiology collections, collected in 1973 from "Pleistocene dune deposits at Ponto Santo Antonio, Fernando de Noronha Island, S. Atlantic Ocean (Brazil)", is referred to the extant gecarcinid crab *Johngarthia lagostoma* (Fig. 6). The recent discovery of claw remains of *J. lagostoma* in Holocene deposits from the Rocas Atoll, nearby the Fernando de Noronha Island (Soares *et al.*, 2016), confirm the presence of the species in the South Atlantic Islands during the Quaternary. These occurrences represent the first fossil records of the genus (Fig. 6).

Note 9. Brito (1972) named *Uca antiqua* as a subspecies of *U. maracoani* (*i.e.*, *U. maracoani antiqua*). Later, Martins-Neto (2001) recognized that both subspecies were different enough to merit independent species status. However, instead of elevating *antiqua* to the species level, he erected a new species, *U. inaciobritoi*, to replace it. Following Article 23.3.1. Principle of Priority of the ICZN, *Uca antiqua* Brito, 1972, is the valid name for the taxon, and *U. inaciobritoi* Martins-Neto, 2001, is thus a junior synonym, and therefore invalid. Távora (2001) synonymized *U. antiqua* with *U. maracoani* based on the study of 96 *Uca* specimens from Pirabas Formation. However, Távora (2001) did not provide characters to support his point of view. Herein, we maintain both *U. antiqua* and *U. maracoani* as valid separate species.

CHILE

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

?Paguroidea *incertae sedis* [Maastrichtian, Algarrobo] (Schweitzer *et al.*, 2006a).

Infraorder BRACHYURA Latreille, 1802

Superfamily HOMOLOIDEA De Haan, 1833

Homolidae De Haan, 1839

***Homolopsis* † Bell, 1863**

Homolopsis chilensis † Förster and Stinnesbeck, 1987 [Maastrichtian, near Concepción].

Superfamily RANINOIDEA De Haan, 1839

Lyreididae Guinot, 1993

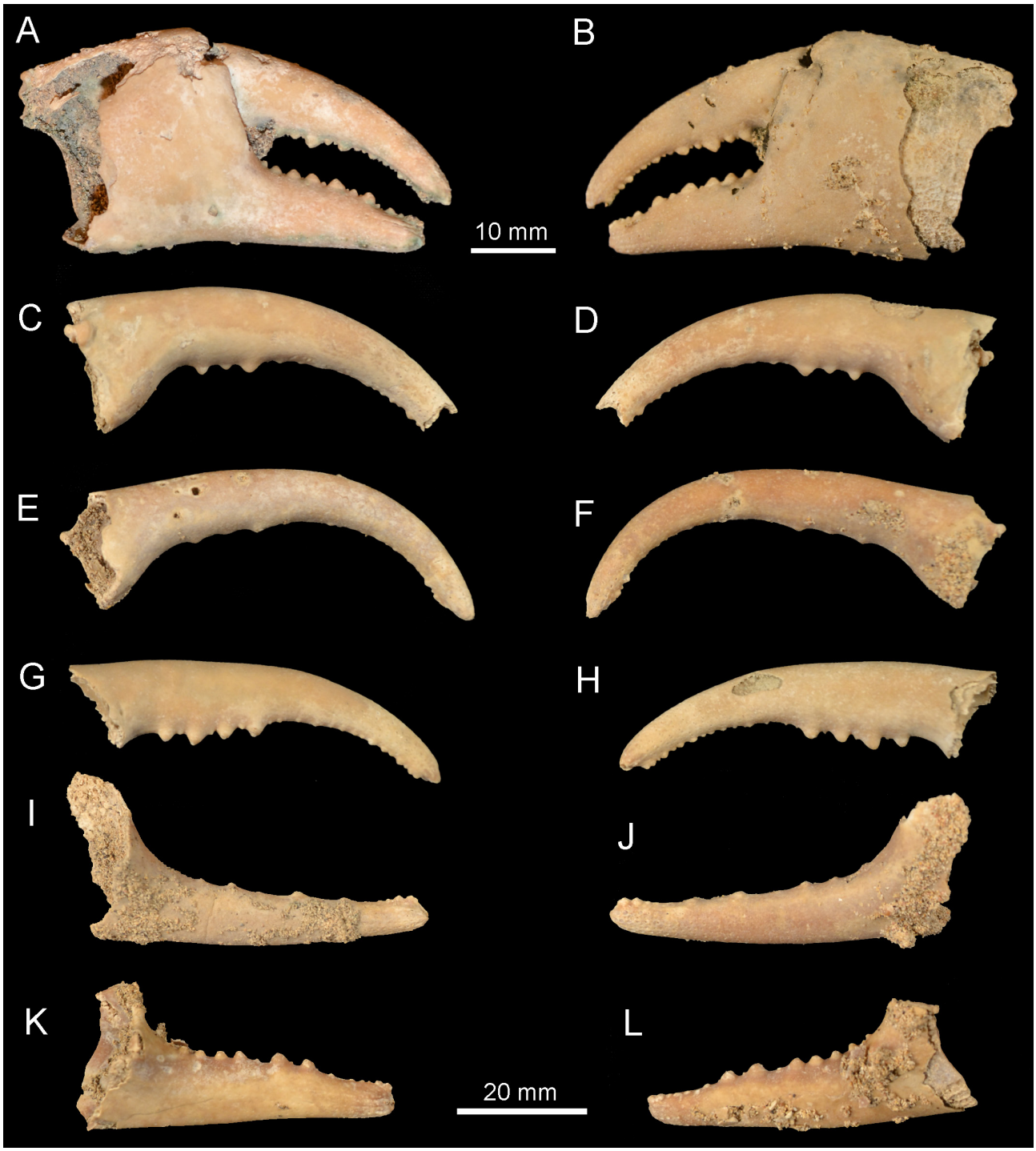

Figure 6. Fossil Eubrachyura from the Pleistocene of Brazil, South America. A–L, Grapsoidea: Gecarcinidae: *Johngarthia lagostoma* H. Milne Edwards, 1837, USNM 618300, Pernambuco; A, B, articulated minor cheliped; C–H, isolated dactyli of major cheliped; I, L, isolated/fragmented cheliped pollices; K, L, isolated/fragmented cheliped pollices. Photos by Javier Luque. All specimens dry, uncoated.

Lyreidinae Guinot, 1993

***Lyreidus* De Haan, 1841**

Lyreidus lebuensis † Feldmann, 1992 [Eocene, near Lebu] (as *Lyreidus* sp. *in* Feldmann and Chirino-Galvez, 1991).

Raninidae De Haan, 1839

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides araucana † (Philippi, 1887, as *Symnista araucana*) [Eocene, near Lebu].

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus spinimarginatus † Feldmann, Schweitzer and Encinas, 2005 [Miocene, Cardenal Caro].

Calappidae De Haan, 1833

***Calappilia* † A. Milne-Edwards, 1873**

?*Calappilia chilensis* † Feldmann, Schweitzer and Encinas, 2005 [Miocene, Cardenal Caro].

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871
***Ixa* Leach, 1817**

Ixa sp. cf. *I. cylindrus* (Fabricius, 1777) [Cenozoic indet., locality unknown] (Fig. 7) [Note 1].

Superfamily CANCROIDEA Latreille, 1802

Atelecyclidae Ortmann, 1893

***Trichopeltarion* A. Milne-Edwards, 1880b**

Trichopeltarion frassinetti † Feldmann, Schweitzer and Encinas, 2010 [late Pliocene, Guafo Island].
Trichopeltarion levis † Casadío *et al.*, 2004 [Miocene, Cardenal Caro] (Feldmann *et al.*, 2005; 2010).

Superfamily CHEIRAGONOIDEA Ortmann, 1893

Cheriagonidae Ortmann, 1893

***Pirulella* † Feldmann, Schweitzer and Encinas, 2010**

Pirulella antipodea † Feldmann, Schweitzer and Encinas, 2010 [early Pliocene, Chiloé Island].

Superfamily PORTUNOIDEA Rafinesque, 1815

Geryonidae Colosi, 1923

***Archaeogeryon* † Colosi, 1923 (= *Proterocarcinus* Feldmann, Schweitzer and Encinas, 2005)**

Archaeogeryon navidad † (Feldmann, Schweitzer and Encinas, 2005) [Miocene, Cardenal Caro] (Feldmann *et al.*, 2010).

***Chaceon* Manning and Holthuis, 1989**

Chaceon quadrata † Feldmann, Schweitzer and Encinas, 2010 [Miocene, Corrál].

***Geryon* Krøyer, 1837**

Geryon manningi Feldmann, Schweitzer and Encinas, 2010 [early Pliocene, Chiloé Island].

Macropipidae Stephenson and Campbell, 1960
***Minohellenus* † Karasawa, 1990**

Minohellenus araucanus † (Philippi, 1887) [Miocene, locality indet.].

Portunidae Rafinesque, 1815

***Pheophthalmus* † Feldmann, Schweitzer and Encinas, 2010**

Pheophthalmus mochaensis † Feldmann, Schweitzer and Encinas, 2010 [Miocene, Mocha Island].

Superfamily GONEPLACOIDEA MacLeay, 1838

Chasmocarcinidae Serène, 1964

Chasmocarcininae Serène, 1964

***Chasmocarcinus* Rathbun, 1898**

Chasmocarcinus chiloeensis † Feldmann, Schweitzer and Encinas, 2010 [Miocene, Chiloé Island].

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Pilumninae Samouelle, 1819

***Pilumnus* Leach, 1816**

Pilumnus cucaoensis † Feldmann, Schweitzer and Encinas, 2005 [Miocene, Chiloé Island and Cardenal Caro] (Feldmann *et al.*, 2010).

Subsection THORACOTREMATA Guinot, 1977

Superfamily PINNOTHEROIDEA De Haan, 1833

Pinnotheridae De Haan, 1833

Pinnothereliinae Alcock, 1900a

***Pinnixa* White, 1846**

Pinnixa navidadensis † Feldmann, Schweitzer and Encinas, 2005 [Miocene, Cardenal Caro] (Feldmann *et al.*, 2010).

Note 1. This is the first occurrence of fossil *Ixa* in South America, and apparently the second record worldwide (Schweitzer *et al.*, 2010). Unfortunately, no detailed geographic or stratigraphic data are associated with the specimen here reported (Fig. 7), or the record listed in Schweitzer *et al.* (2010).

COLOMBIA

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

?*Paguristes* Dana, 1851c

?*Paguristes* sp. [late Valanginian, Santander] (Fig. 8A) [Note 1].

Infraorder BRACHYURA Latreille, 1802

Superfamily DROMIOIDEA De Haan, 1833

Diaulacidae † Wright and Collins, 1972

***Diaulax* Bell, 1863**

Diaulax rosablanca † Gómez, Bermúdez and Vega, 2015 [late Valanginian, Santander].
Diaulax sp. † [late Valanginian to Albian, Santander].

Superfamily HOMOLOIDEA De Haan, 1833

Mithracitidae † Števčić, 2005

***Mithracites* † Gould, 1859**

Mithracites takedai † Van Bakel, Guinot, Jagt and Fraaije, 2012b [late Aptian, Santander]

Superfamily NECROCARCINOIDEA † Förster, 1968
Cenomanocarcinidae † Guinot, Vega and Van Bakel, 2008

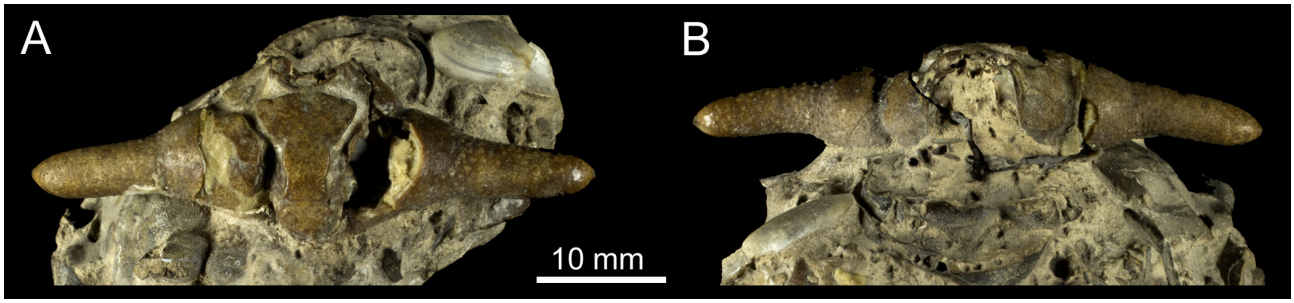

Figure 7. Fossil Eubrachyura from the Cenozoic of Chile, South America. A, B, Leucosoidea: Leucosidae: *Ixa* sp. cf. *I. cylindrus* (Fabricius, 1777), MNHN-F.R03449, Cenozoic indet., locality unknown, in dorsal (A) and frontal (B) views. Photos courtesy of Peter Massicard and Sylvain Charbonnier (MNHN). All specimens dry, uncoated.

Cenomanocarcinus † Van Straelen, 1936

Cenomanocarcinus vanstraeleni † Stenzel, 1945 (as *Ophthalmoplax spinosus in* Feldmann, Villamil and Kauffman, 1999; and as ?*Pinnotheres* sp. *in* Feldmann *et al.*, 1999) [late Albian to Campanian of Cundinamarca, Boyacá and Tolima] (Vega *et al.*, 2007b; 2010) [Note 2].

Orithopsidae † Schweitzer, Feldmann, Fam, Hessin, Hetrick, Nyborg and Ross, 2003

Bellcarcinus † Luque, 2014

Bellcarcinus aptiensis † Luque, 2014 (type) [late Aptian, Santander and Boyacá] [Note 3].

Colombicarcinus † Karasawa, Schweitzer, Feldmann and Luque, 2014.

Colombicarcinus laevis † Karasawa, Schweitzer, Feldmann and Luque, 2014 (type) [late Aptian, Santander and Boyacá] [Note 3].

Planocarcinus † Luque, Feldmann, Schweitzer, Jaramillo and Cameron, 2012

Planocarcinus olssoni † (Rathbun, 1937, as *Dakoticancer olssoni*) (type) (and as *Necrocarcinus in* Feldmann *et al.*, 1999; and *Orithopsis in* Vega *et al.*, 2010) [late Aptian, Santander and Boyacá] (Luque *et al.*, 2012) [Note 3].

Planocarcinus johnjagti † Bermúdez, Crúz and Vega *in* Bermúdez *et al.*, 2013 [late Aptian, Boyacá].

Superfamily PALAEOCORYSTOIDEA † Lőrenthey *in* Lőrenthey and Beurlen, 1929

Palaeocorystidae † Lőrenthey *in* Lőrenthey and Beurlen, 1929

Joeranina † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a

Joeranina kerri † (Luque, Feldmann, Schweitzer, Jaramillo and Cameron, 2012, as *Notopocorystes kerri*) [late Aptian–middle Albian, Santander and Boyacá] (Fig. 8B).

Joeranina colombiana † Bermúdez, Crúz and Vega *in* Bermúdez *et al.*, 2013 [early-middle Albian, Boyacá].

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

Quasilaeviranina † Tucker, 1998

Quasilaeviranina sp. † [early-middle Santonian to Maastrichtian of Boyacá, Tolima, and Cundinamarca] (Fig. 8C) [Note 4].

Section EUBRACHYURA Saint Laurent, 1980

Eubrachyura indet. (as ?Goneplacoidea *incertae sedis*, *in* Kiel and Hansen, 2015) [Oligocene, Córdoba] [Note 5].

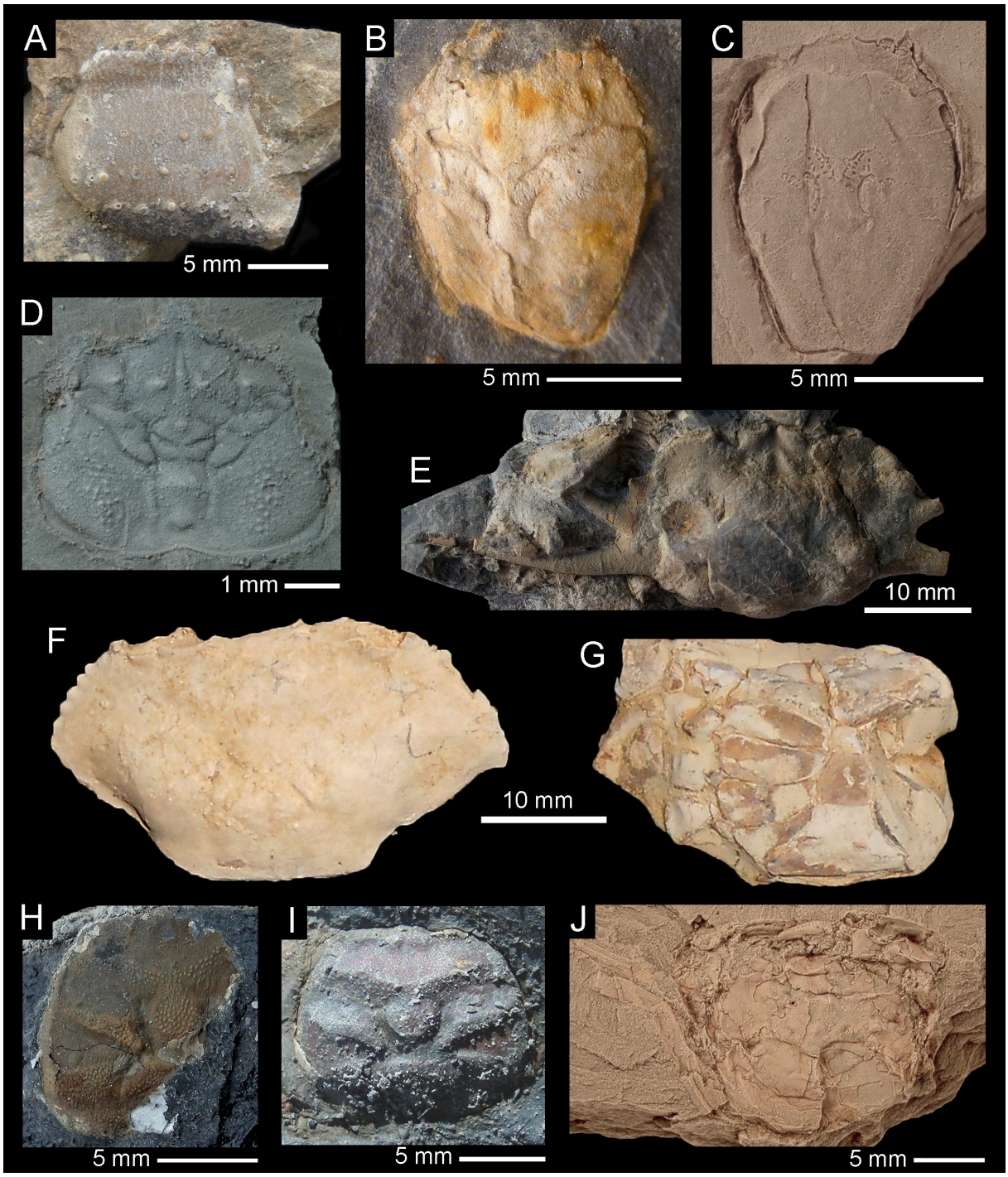

Figure 8. Fossil Anomura and Brachyura from the Cretaceous and Cenozoic of Colombia, South America. A, Anomura: Paguroidea: Diogenidae: ?*Paguristes* sp. left cheliped, specimen IGM p880851, late Valanginian, Santander. B–J, Brachyura; B, C, Raninoida; B, Palaeocorystoidea: Palaeocorystidae: *Joeranina kerri* (Luque *et al.*, 2012), dorsal view of holotype IGM p881128, late Aptian of Santander; C, Raninoidea: Raninidae: Raninoidinae: *Quasilaeviranina* sp., dorsal view of uncatalogued specimen, early-middle Santonian of Boyacá; D–J, Eubrachyura; D, Dorippoidea: Telamonocarcinidae: *Telamonocarcinus antiquus* Luque, 2015a, dorsal view of holotype IGM p881012, early Albian of Santander. E, Carpilioidea: Palaeoxanthopsidae: *Palaeoxanthopsis* sp., dorsal view of specimen IGM IGM p881293, Maastrichtian of Santander. F, G, Portunoidea: Portunidae: Portuninae: *Portunus oblongus* Rathbun, 1920b, from the Miocene of La Guajira; F, dorsal view, specimen MUN-STRI 37322; G, male ventral view, specimen MUN-STRI 37324. H, I, Retroplumoidea: Retroplumidae: *Costacopluma* sp. from the Maastrichtian of Santander; H, dorsal carapace, specimen IGM p881282; I, dorsal carapace, specimen IGM p881282. J, Eubrachyura *incertae sedis*, dorsal view of specimen IGM p881262, Paleocene of La Guajira. Photos by Javier Luque. Specimens C, D, J dry, coated with ammonium chloride; all other specimens dry, uncoated.

Eubrachyura indet. 2 [Paleocene, Guajira] (Fig. 8J) [Note 6].

Subsection HETEROTREMATA Guinot, 1977

Superfamily DORIPPOIDEA MacLeay, 1838

Telamonocarcinidae † Larghi, 2004

***Telamonocarcinus* † Larghi, 2004**

Telamonocarcinus antiquus † Luque, 2015a [early Albian, Santander] (Fig. 8D) [Note 7].

Superfamily PORTUNOIDEA Rafinesque, 1815

Macropipidae Stephenson and Campbell, 1960

***Ophthalmoplax* † Rathbun, 1935b**

Ophthalmoplax andina † Guzmán, Bermúdez, Gómez-Cruz and Vega, 2016 [Campanian, Boyacá] [Note 6].

Ophthalmoplax brasiliana † (Maury, 1930) [junior synonym *O. triambonatus* Feldmann and Villamil, 2002] [Maastrichtian, Boyacá] [Note 8].

Portunidae Rafinesque, 1815

Portuninae Rafinesque, 1815

***Callinectes* Stimpson, 1862**

Callinectes reticulatus † Rathbun, 1918 (claw) [Oligocene, Antioquia].

***Portunus* Weber, 1795**

Portunus oblongus † Rathbun, 1920b [Miocene, La Guajira] (Fig. 8F, G) [Note 9].

Superfamily RETROPLUMOIDEA Gill, 1894

Retroplumidae Gill, 1894

***Costacopluma* † Collins and Morris, 1975**

Costacopluma spp. † [Coniacian to Maastrichtian of Tolima, Cundinamarca, Boyacá and Santander] (Fig. 8H, I) [Note 10].

Superfamily TRICHODACTYLOIDEA H. Milne Edwards, 1853

Trichodactylidae H. Milne Edwards, 1853

Dilocarcininae Pretzmann, 1978

***Sylviocarcinus* H. Milne Edwards, 1853**

Sylviocarcinus piriformis (Pretzmann, 1968) [early Miocene, Tolima] (Fig. 4B) [Note 11].

Superfamily CARPILIOIDEA Ortmann, 1893

Palaeoxanthopsidae † Schweitzer, 2003

***Palaeoxanthopsis* † Beurlen, 1958b**

Palaeoxanthopsis sp. † [Maastrichtian, Santander] (Fig. 8E) [Note 12].

Note 1. This represents the first record of anomuran crabs from Colombia, and one of the oldest decapod crustaceans for northern South America (Fig. 8A). Furthermore, if its generic affinities are confirmed, this would be the earliest record for the genus, extending its temporal and geographic record from the Late Cretaceous of North America to the Early Cretaceous of northern South America (~135 Ma).

Note 2. The species reported by Feldmann *et al.* (1999) as *Ophthalmoplax spinosus* from the Turonian of Colombia does not belong to *Ophthalmoplax* or any eubrachyuran crab. The material represents a taxon congeneric with *Cenomanocarcinus*, as suggested by Vega *et al.* (2007b). The specimen of ?*Pinnotheres* sp. *in* Feldmann *et al.* (1999) seems to correspond also to a poorly preserved carapace of *Cenomanocarcinus* sp.

Note 3. *Colombicarcinus* and *Planocarcinus* share several traits with Necrocarcinidae and Orithopsidae, but the absence of ventral and appendicular characters

obscures their familial affinities. A recent revision of these taxa suggests that they may represent either basal orithopsids, or even representatives of distinctive orithopsid sister clades likely related to *Bellcarcinus* and similar forms (Schweitzer *et al.*, 2016). Currently, the age of *Planocarcinus olssoni* is considered as late Aptian based on the youngest rocks outcropping near the area of collection (Luque *et al.*, 2012), in contrast to the Barremian age originally suggested by Rathbun (1937). Although it is plausible that *P. olssoni* was already present in the Barremian, the recent discovery of *P. olssoni* in the late Aptian–early Albian rocks of Boyacá in association with new records of *Bellcarcinus aptiensis* and *Joeranina kerri* (J. Luque, pers. obs.) confirms its presence during the latest Early Cretaceous (late Aptian–early Albian).

Note 4. This is the first record of the genus *Quasilaeviranina* for tropical America, and the oldest record worldwide, *i.e.*, early-middle Santonian (~85 Mya), given that all other quasilaeviraninids known so far are Paleocene-Eocene in age (Van Bakel *et al.*, 2012a; Karasawa *et al.*, 2014; Martínez-Díaz *et al.*, 2017; Luque, in progress).

Note 5. A fragmented dorsal carapace of an Oligocene brachyuran crab was assigned to ?Goneplacoidea *in* Kiel and Hansen (2015, fig. 5G). Investigation of the original material suggests that 1) it was illustrated upside down, and 2) that it is not a goneplacoid but may represent a xanthoid-like species (J. Luque, pers. obs.).

Note 6. This eubrachyuran from the Cerrejón Formation in La Guajija represents the first record of Paleocene decapods in Colombia. A detailed description of this taxon is forthcoming (Luque, in prep.).

Note 7. *Telamonocarcinus antiquus* is the oldest representative of the family Telamonocarcinidae and the superfamily Dorippoidea yet known, and together with Componocancridae Feldmann *et al.*, 2008, and Tepexicarcinidae Luque, 2015a, represent the earliest confirmed crown- and stem-group Eubrachyura – or higher true crabs – known to date (late Albian). Their geographic occurrences suggest that early eubrachyurans could have radiated in the Americas during the Early Cretaceous or earlier (Luque, 2015a).

Note 8. The fossil record of *Ophthalmoplax* was recently reviewed by Vega *et al.* (2013), who recognized the morphological similarities between *O. brasiliana* and several records from Colombia and Venezuela previously reported as *O. triambonatus* Feldmann and Villamil, 2002, and currently synonymized with *O. brasiliana* (Jagt *et al.*, 2015; Guzmán *et al.*, 2016). Yet, the systematic relationships among species of *Ophthalmoplax* and related genera need to be revised.

Note 9. This is the first record of *Portunus oblongus* for Colombia. It is a widespread species found in Miocene rocks of Venezuela, Cuba, Dominican Republic, and Trinidad (*e.g.*, Rathbun, 1920b; Collins and Morris, 1976; Feldmann and Schweitzer, 2004; Varela and Rojas-Consuegra, 2009; Aguilera *et al.*, 2010).

Note 10. *Costacopluma* is one of the most widespread brachyurans in the Cretaceous of Colombia, occurring in Coniacian to Maastrichtian rocks of Tolima, Cundinamarca, Boyacá, and Santander, and typically associated with raninids, palaeoxanthopsids, and axiidean shrimp (J. Luque, pers. obs.). These are the first reports of *Costacopluma* and the family Retroplumidae for Colombia, and a detailed description of the species is forthcoming.

Note 11. The specimens of *Sylviocarcinus* from the Miocene Villavieja Formation of Colombia are represented solely by cheliped fragments, principally pollices, dactyli, and fragments of the palm. Rodriguez (1997) considered these remains conspecific with the extant *S. piriformis*, which today lives in the same watershed. However, it is unclear if the fossil material indeed belongs to the same species, as no carapaces have been discovered, which makes the verification of its systematic placement difficult.

Note 12. This is the first record of the genus *Palaeoxanthopsis* and the family Palaexanthopsidae for Colombia. Its Maastrichtian age confirms the wide distribution of the genus and family in the Americas during the Late Cretaceous (Rathbun, 1902; Vega *et al.*, 2001b; Schweitzer *et al.*, 2008) (see also under 'Jamaica' herein).

ECUADOR

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes proavitus † (Rathbun, 1918) [early Miocene, Cuenca Basin] (Morris, 1973) [Note 1].

Portuninae Rafinesque, 1815

***Portunus* Weber, 1795**

Portunus oblongus † Rathbun, 1920b [late Miocene, locality indet.] (*in* Collins and Morris, 1976)

Note 1. *Necronectes proavitus* is known from Miocene deposits of Ecuador, Venezuela, Panama, Puerto Rico, and apparently also Trinidad (Roberts, 1975; Feldmann *et al.*, 1993; Schweitzer *et al.*, 2002; 2006c; Collins *et al.*, 2009c; Cáceres *et al.*, 2016), which indicates a trans-isthmian distribution for the taxon. To our knowledge, this is the only record of fossil crabs from Ecuador.

PERU

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Epialtidae MacLeay, 1838

Epialtinae MacLeay, 1838

***Eoinachoides* † Van Straelen, 1933b**

Eoinachoides latispinosa † Carriol, Muizon and Secretán, 1987 [late Miocene, Pisco] (Fig. 9C).

Pisinae Dana, 1851b

***Libinia* Leach, 1815**

Libinia peruviensis † Carriol, Muizon and Secretán, 1987 [early Pliocene, Pisco].

Superfamily CANCROIDEA Latreille, 1802

Cancridae Latreille, 1802

Cancrinae Latreille, 1802

***Cancer* Linnaeus, 1758**

Cancer borealis Stimpson, 1862 [Miocene–early Pliocene, Pisco and Arequipa] (Fig. 9A, B).

Superfamily PORTUNOIDEA Rafinesque, 1815

Geryonidae Colosi, 1923

***Chaceon* Manning and Holthuis, 1989**

Chaceon peruvianus † (Orbigny, 1842, as *Portunus*) [Miocene, locality unknown] (Fig. 9D, E) [Note 1].

Portunidae Rafinesque, 1815

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphylax sp. cf. *E. callinectias* † Rathbun, 1918 [Eocene, Pisco] (Fig. 9F–H) [Notes 2, 3].

Portuninae Rafinesque, 1815

***Callinectes* Stimpson, 1862**

Callinectes ?*reticulatus* † Rathbun, 1918 [middle Oligocene, Piura] (Fig 9I–K) [Note 3].

Superfamily TRICHODACTYLOIDEA H. Milne Edwards, 1853

Trichodactylidae H. Milne Edwards, 1853

Trichodactylidae spp. indet. [middle Eocene to late Oligocene, Loreto and San Martín] (Klaus *et al.*, 2017).

Superfamily CARPILIOIDEA Ortmann, 1893

Zanthopsidae † Vía Boada, 1959

***Zanthopsis* † M'Coy, 1849**

Zanthopsis errans † Woods, 1922 [Eocene, Piura].

Superfamily HEXAPODOIDEA Miers, 1886

Hexapodidae Miers, 1886

***Palaeopinnixa* † Vía Boada, 1966**

Palaeopinnixa eocenica † (Woods, 1922, as *Thaumastoplax*) [Eocene, Piura].

Note 1. The label associated with the holotype of *Chaceon peruvianus* (Orbigny, 1842), MNHN.F.B33420 (Fig. 9D, E), indicates that the specimen comes from Miocene rocks outcropping south of the Sasaco basin, likely near Nazca and Arequipa, but any details of its provenance are unknown (Orbigny, 1842, part 4, t. 3, p. 107).

Note 2. Re-examination of three specimens catalogued as ?*Callinectes* sp., *i.e.*, USNM 618318 (one sample, Fig. 9F), and USNM 618319 (two samples, Fig. 9G, H) from the lowermost upper Eocene Basal Talara shales (*Discocyclina peruviana* zone) about a mile northwest of Lagunitas, Pisco, Peru, indicates that they belong to *Euphylax*. To our knowledge, this would represent the first record of the subfamily Podophthalminae and the genus *Euphylax* for Peru.

Note 3. This is the first record of the subfamily Portuninae and the genus *Callinectes* for Peru (Fig. 9I–K). The occurrence in Peru of *Euphylax* and *Callinectes* in Eocene and Oligocene rocks, and *Cancer* and *Eoinachoides* in Miocene and Pliocene deposits (see Carriol *et al.*, 1987), indicate that these genera had a wide trans-isthmian distribution during the Paleogene and Neogene.

VENEZUELA

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

***Paguristes* Dana, 1851c**

Paguristes sp. [early Miocene, Falcón] (Aguilera *et al.*, 2010).

***Petrochirus* Stimpson, 1858**

Petrochirus sp. [Oligo-Miocene to Pleistocene of Falcón, Lara and Sucre] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides rathbunae † Van Straelen, 1933b [late Eocene (Priabonian) to Miocene, Falcón and Lara] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010) [Note 1].

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

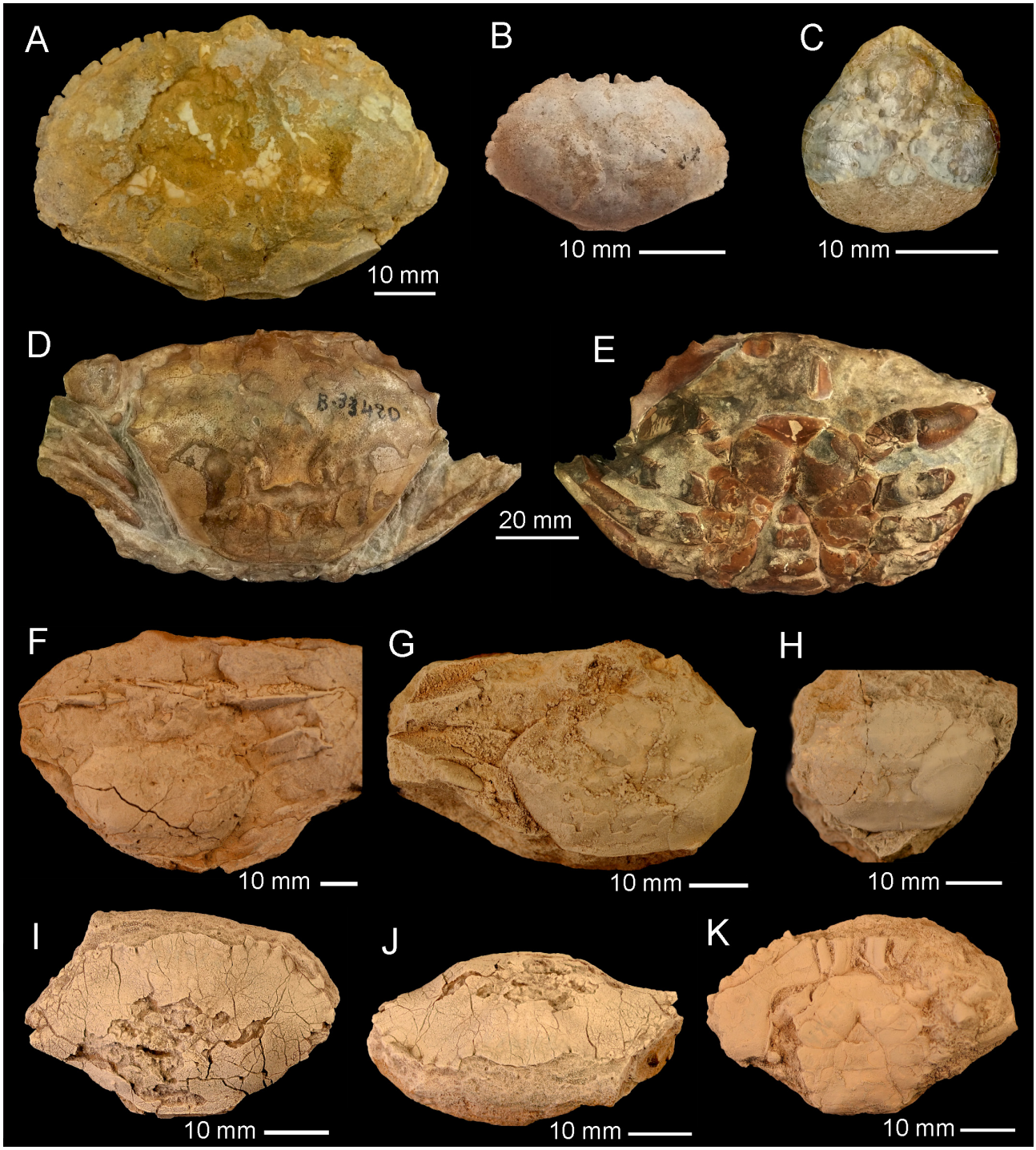

Figure 9. Fossil Eubrachyura from the Cenozoic of Peru, South America. A, B, Cancroidea: Cancridae: *Cancer borealis* Stimpson, 1859, early Pliocene of Pisco, dorsal view of specimens MNHN.F.R07746 (A) and MNHN.F.R07748 (B). C, Majoidea: Majidae: Epialtinae: *Eoinachoides latispinosa* Carriol, Carriol, Muizon and Secretán, 1987, late Miocene of Pisco, holotype, MNHN.F.R70743, dorsal view. D, E, Portunoidea: Geryonidae: *Chaceon peruvianus* (d'Orbigny, 1842), Miocene of Sasaco (locality unknown), holotype, MNHN.F.B33420, dorsal (D) and ventral (E) views. F–H, Portunidae: Podophthalminae: ?*Euphylax* sp., Eocene of Pisco, specimen USNM 618318, dorsal view (F); specimen USNM 618319a, dorsal view (G); specimen USNM 618319b, ventral view (H). I–K, Portuninae: *Callinectes* sp. aff. *C. reticulatus* Rathbun, 1918, middle ?Oligocene of Piura, specimen USNM 496112a, dorsal (I) and frontal (J) views; specimen USNM 496112b, dorsal view (K). Photos A–D courtesy of Jocelyn Falconnet, Peter Massicard, and Sylvain Charbonnier (MNHN); photos F–K by Javier Luque. Specimens A–D dry, uncoated; F–K dry, coated with ammonium chloride.

Epialtidae MacLeay, 1838

Epialtinae MacLeay, 1838

***Eoinachoides* † Van Straelen, 1933b**

Eoinachoides senni † Van Straelen, 1933b (type) [middle Eocene to Miocene, Falcón] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).

Eoinachoides sp. † [late Miocene, Falcón] (Aguilera *et al.*, 2010).

Mithracidae MacLeay, 1838

***Mithrax* Desmarest, 1823**

Mithrax sp. [Plio–Pleistocene, Falcón and Sucre] (Aguilera *et al.*, 2010).

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Eriosachila* † Blow and Manning, 1996**

Eriosachila rathbunae † (Maury, 1930) [Eocene to Miocene of Falcón, Lara and Zulia] (Van Straelen, 1933b; Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).

Eriosachila sp. [early Miocene, Falcón] (Aguilera *et al.*, 2010).

***Hepatella* Smith, 1869a**

Hepatella amazonica † Beurlen, 1958a [Miocene, Falcón and Lara] (Aguilera *et al.*, 2010).

***Hepatus* Latreille, 1802**

Hepatus gronovii Holthuis, 1959 [Pleistocene, Sucre] (Aguilera *et al.*, 2010)

Hepatus sp. [early Miocene, Falcón] (Aguilera *et al.*, 2010) [Note 2].

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa laraensis † Van Straelen, 1933b [middle Eocene to early Miocene, Lara] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).

Calappa nitida Holthuis, 1958 [Pleistocene, Sucre] (Aguilera *et al.*, 2010).

Calappa sp. [Oligocene to early Pliocene of Falcón, Lara and Sucre] (Aguilera *et al.*, 2010) [Note 2].

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Persephona* Leach, 1817**

Persephona sp. cf. *P. punctata* (Linnaeus, 1758) [Oligo-Miocene to Pleistocene of Falcón, Lara and Sucre] (Aguilera *et al.*, 2010).

***Iliacantha* Stimpson, 1871**

Iliacantha sp. [early to late Miocene, Falcón] (Aguilera *et al.*, 2010).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Parthenope* Weber, 1795**

Parthenope venezuelensis † Van Straelen, 1933b [early to late Miocene (not Oligocene), Falcón] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).

Parthenope sp. [early Miocene to Pliocene, Falcón and Sucre] (Aguilera *et al.*, 2010)

***Platylambrus* Stimpson, 1871**

Platylambrus sp. [early Miocene to Pliocene, Falcón] (Aguilera *et al.*, 2010).

Superfamily PORTUNOIDEA Rafinesque, 1815

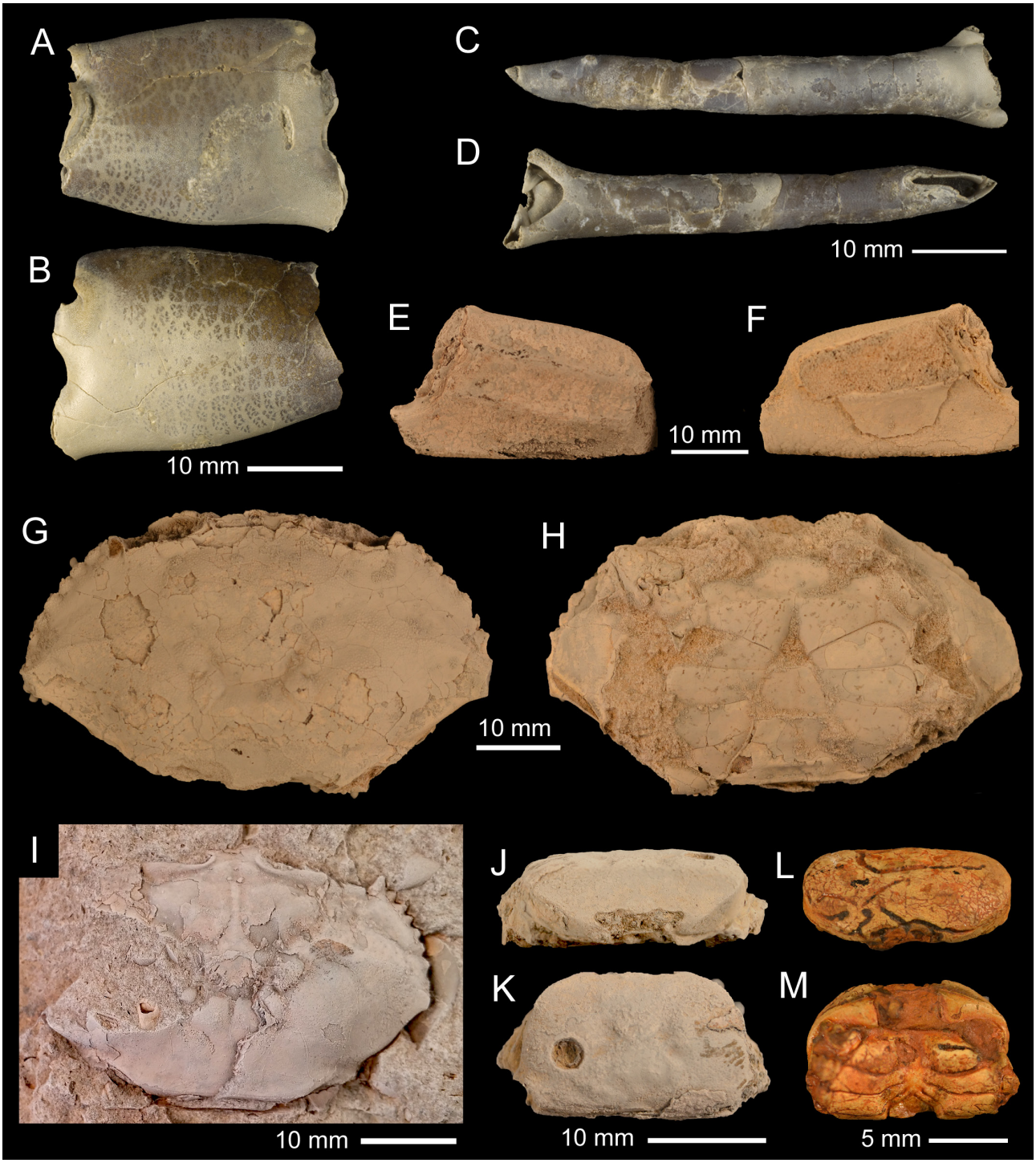

Figure 10. Fossil Eubrachyura from the Cenozoic of Peru and Venezuela. A–D, eubrachyuran cheliped remains indet., MNHN-F. A57960, from the late Miocene of El Jahuay, Peru. A, B, left propodus, outer (A) and inner (B) views; C, D, malformed dactylus, upper (C) and lower occlusal (D) views. E–H, Portunoidea: Portunidae: Portuninae: *Callinectes* Stimpson, 1862, from the Miocene of Zulia, Venezuela; E, F, *Callinectes* sp. cf. *C. reticulatus* Rathbun, 1918, left cheliped, USNM 618310, in outer (E) and inner (F) views; G, H, *Callinectes* sp. cf. *C. declivis* Rathbun, 1918, USNM 618306, dorsal carapace in dorsal (G) and ventral (H) views. I, Podophthalminae: *Paraeuphylax cubaensis* Varela and Schweitzer, 2011, USNM 618317, early Miocene of Zulia, Venezuela, dorsal carapace. J–M, Hexapodoidea: Hexapodidae: *Palaeopinnixa* Vía Boada, 1966, from the Miocene of Falcón, Venezuela; J, K, *Palaeopinnixa* sp., USNM 618314, in frontal (J) and dorsal (K) views with a circular hole in left branchial region (see text, Panama, Note 3). L, M, *Palaeopinnixa* sp., USNM 618316, in frontal (L) and ventral (M) views. Photos A–D courtesy of Jocelyn Falconnet, Peter Massicard, and Sylvain Charbonnier (MNHN); photos E–M by Javier Luque. Specimens A–D, L, M dry, uncoated; E–K dry, coated with ammonium chloride.

Macropipidae Stephenson and Campbell, 1960

***Ophthalmoplax* † Rathbun, 1935b**

Ophthalmoplax brasiliana † (Maury, 1930 [junior synonym *O. triambonatus* Feldmann and Villamil, 2002]) [Maastrichtian, Táchira] (Aguilera *et al.*, 2010).

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes proavitus † (Rathbun, 1918) [late Miocene, Falcón) (Cáceres *et al.*, 2016)
?*Necronectes* sp. † [Miocene, Lara] (Aguilera *et al.*, 2010) [Note 2].

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphylax sp. [Miocene to Pliocene, Falcón and Zulia].

***Paraeuphylax* † Varela and Schweitzer, 2011**

Paraeuphyplax cubaensis † Varela and Schweitzer, 2011 [early Miocene, Zulia] (Fig. 10I) [Note 3].

?*Saratunus* † Collins, Lee and Noad, 2003

?*Saratunus* sp. † [early Miocene, Falcón] (Aguilera *et al.*, 2010) [Note 2].

Portuninae Rafinesque, 1815

***Achelous* De Haan, 1833**

Achelous gibbesii (Stimpson, 1862) [Miocene to Pleistocene, Falcón and Sucre] (Aguilera *et al.*, 2010)

***Callinectes* Stimpson, 1862**

Callinectes reticulatus † Rathbun, 1918 (claws only) [early Miocene, Zulia] (Fig. 10E, F).
Callinectes sp. cf. *C. declivis* † Rathbun, 1918 [Miocene, Zulia] (Fig. 10G, H).

***Portunus* Weber, 1795**

Portunus oblongus † Rathbun, 1920b [Miocene, Falcón and Lara] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).
Portunus sp. [early Miocene to Pliocene, Falcón] (Aguilera *et al.*, 2010).

***Scylla* De Haan, 1833**

Scylla sp. [Miocene to Pliocene, Falcón and Lara] (Aguilera *et al.*, 2010) [Note 2].

Superfamily RETROPLUMOIDEA Gill, 1894

Retroplumidae Gill, 1894

***Costacopluma* † Collins and Morris, 1975**

Costacopluma bifida † Collins, Higgs and Cortitula, 1994 [Paleocene, Zulia]
Costacopluma sp. † [Paleocene, Trujillo] (Aguilera *et al.*, 2010) [Note 2].

Superfamily GONEPLACOIDEA MacLeay, 1838

Chasmocarcinidae Serène, 1964

Chasmocarcininae Serène, 1964

***Falconoplax* † Van Straelen, 1933b**

Falconoplax kugleri † Van Straelen, 1933b (type) [middle-late Eocene to early Miocene, Lara and Falcón] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010).

Superfamily HEXAPODOIDEA Miers, 1886a

Hexapodidae Miers, 1886a

***Palaeopinnixa* † Vía Boada, 1966**

Palaeopinnixa perornata † Collins and Morris, 1976 [early Miocene (not Oligocene), Falcón and Lara] (Feldmann and Schweitzer, 2004; Aguilera *et al.*, 2010) (Fig. 10J–M) [Note 4].

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Eurytium* Stimpson, 1859**

Eurytium sp. [Pliocene, Falcón] (Aguilera *et al.*, 2010)

Note 1. Feldmann and Schweitzer (2004) commented that the association of *Raninoides rathbunae* with taxa like *Eriosachila* and *Falconoplax* suggests a Miocene age for the assemblage, thus casting doubts on its Eocene age. We concur. However, we tentatively maintain the stratigraphic record of *R. rathbunae* as ?Eocene – Miocene until new material with clearer stratigraphic information becomes available.

Note 2. Unidentified cheliped remains by Aguilera *et al.* (2010) have been tentatively assigned to *Scylla* sp. [Miocene], ?*Necronectes* [Miocene] and doubtfully *Saratunus* [Miocene]. The presence of *Necronectes* in Venezuela has been recently confirmed (Cáceres *et al.*, 2016). *Scylla* is known from Puerto Rico and Brazil, so its occurrence in Venezuela and other countries in tropical America would not be unexpected. Aguilera *et al.* (2010) also reported on the occurrence of indeterminate species of *Calappa* [Miocene to Pleistocene], *Hepatus* [Miocene], and *Costacopluma* [Paleocene]; all three are known from other Venezuelan localities of similar age.

Note 3. A specimen in the USNM Paleobiology collections from the early Miocene of the Zulia State, is herein assigned to *Paraeuphylax cubaensis* (Fig. 10I). *Paraeuphylax* superficially resembles *Saratunus* and *Euphylax*; two genera previously reported from the Miocene of Falcón and the Pliocene San Gregorio Formation, Venezuela (Aguilera *et al.*, 2010). However, *Paraeuphylax* differs from these genera by its wider carapace, wider orbits (nearly one-third the carapace width), narrower rostrum (one-tenth the carapace width), and the presence of eight anterolateral spines excluding the outer orbital one (Collins *et al.*, 2003; Varela and Schweitzer, 2011).

Note 4. A specimen of *Palaeopinnixa perornata* herein illustrated (Fig. 10J, K) has a circular hole over the left branchial region of the carapace. It superficially resembles a predatory drill hole (see Klompmaker *et al.*, 2013b), but it is more circular than bacterial lesions (Klompmaker *et al.*, 2016a). Additional study is needed to check whether the hole penetrates (part of) the cuticle or only the internal mold.

Central America and southern North America

BELIZE

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily PORTUNOIDEA Rafinesque, 1815

Carcineretidae † Beurlen, 1930

***Carcineretes* † Withers, 1922**

Carcineretes planetarius † Vega, Feldmann, Ocampo and Pope, 1997 [Maastrichtian, Albion Island].

COSTA RICA

Infraorder ANOMURA MacLeay, 1838

Superfamily GALATHEOIDEA Samouelle, 1819

Porcellanidae Haworth, 1825

***Pachycheles* Stimpson, 1858**

Pachycheles latus † Rathbun, 1918 [Pliocene, Port Limón] (Fig.11A).

***Petrolisthes* Stimpson, 1858**

Petrolisthes avitus † Rathbun, 1918 [Pliocene, Port Limón] (Fig.11B).

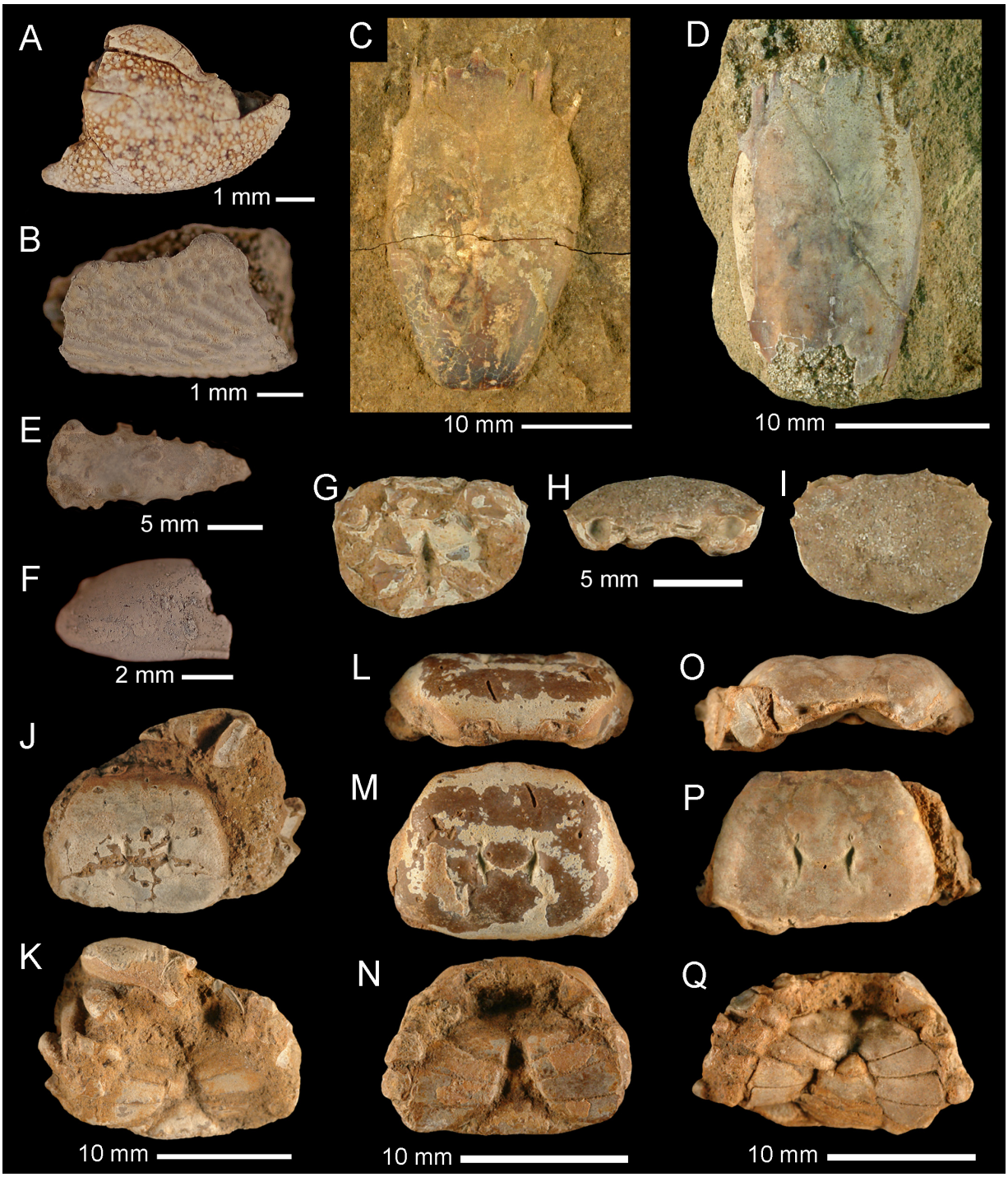

Figure 11. Fossil Anomura and Brachyura from Costa Rica and Panama, Central America. A, B, Anomura: Galatheoidea: Porcellanidae: A, *Pachycheles latus* Rathbun, 1918, holotype, USNM 324264, Pliocene of Port Limón, Costa Rica; B, *Petrolisthes avitus* Rathbun, 1918, holotype USNM 324266, Pliocene of Port Limón, Costa Rica. C, D, Brachyura: Raninoidea: Raninidae: Raninoidinae: *Raninoides* sp. cf. *R. benedicti* Rathbun, 1935a, late Miocene of Panama; C, UF 210170, dorsal carapace, Chiriquí; D, UF 274886, dorsal carapace, Colón. E, Dorippoidea: Goniochelidae: *Goniochele armata* Rathbun, 1918, holotype, USNM 324259, dactylus, early Miocene of the Panama Canal. F–I, Goneplacoidea: Euryplacidae; F, *Euryplax culebrensis* Rathbun, 1918, holotype, USNM 324226, right cheliped propodus, early Miocene of the Panama Canal; G–I, *Euryplax* sp., UF 262570, early Miocene of the Panama Canal, in frontal (G), dorsal (H), and ventral (I) views. J–Q, Chasmocarcinidae: *Falconoplax kugleri* Van Straelen, 1933b, early Miocene of the Panama Canal; J, K, UF 260866, in dorsal (J) and ventral (K) views; L–N, UF 262570, in frontal (L), dorsal (M), and ventral (N) views; O–Q, UF 260866, in frontal (L), dorsal (M), and ventral (N) views. Photos A, B, E, F courtesy of Rodney Feldmann (KSU); photos C, D, G–Q courtesy of Sean Roberts (FLMNH). Specimens A, B, E, F dry, coated with ammonium chloride; C, D, G–Q dry, uncoated.

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839
Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides sp. cf. *R. benedicti* Rathbun, 1935a [?early Pleistocene, Burica Peninsula].

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Mithracidae MacLeay, 1838

***Thoe* Bell, 1836**

Thoe asperoides † Collins and Todd *in* Todd and Collins, 2005 [late Pliocene to early Pleistocene, Limón].

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus lineatinus † Collins and Todd *in* Todd and Collins, 2005 [late Pliocene to early Pleistocene, Puntarenas).
Hepatus biformis † Collins *in* Todd and Collins, 2005 [early Pliocene, Puntarenas].

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa costaricana † Rathbun, 1918 [Pliocene; Puerto Limón] (Todd and Collins, 2005).

***Cryptosoma* Brullé, 1839**

Cryptosoma bairdii (Stimpson, 1862) [early Pleistocene, Puntarenas] (Todd and Collins, 2005).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819
Ebaliinae Stimpson, 1871

***Leucosilia* Bell, 1855**

Leucosilia bananensis † Rathbun, 1918 [Pliocene, Limón)] (Todd and Collins, 2005).

***Speleophorus* A. Milne-Edwards, 1865**

Speleophorus ?*subcircularis* † Collins and Todd *in* Todd and Collins, 2005 [early Pleistocene, Puntarenas] (Todd and Collins, 2005).

***Persephona* Leach, 1817**

Persephona sp. cf. *P. enigmatica* Collins and Todd *in* Todd and Collins, 2005 [late Pliocene, Limón].
Persephona sp. [Limón, Puntarenas] (Todd and Collins, 2005).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

***Platylambrus* Stimpson, 1871**

Platylambrus spinulatus † Collins and Todd *in* Todd and Collins, 2005 [early Pleistocene, Limón]

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphyplax callinectias † Rathbun, 1918 [early Pliocene (not Miocene), Limón] (Todd and Collins, 2005).
Euphyplax fortis † Rathbun, 1918 [early Pliocene (not Miocene), Limón] (Todd and Collins, 2005).

Euphyplax maculatus † Collins and Todd *in* Todd and Collins, 2005 (claw fragments) [early Pleistocene, Puntarenas].

Sandomingia † Rathbun, 1919

Sandomingia yaquiensis † Rathbun, 1919 [late Pliocene, Limón].

Portuninae Rafinesque, 1815

***Callinectes* Stimpson, 1862**

Callinectes declivis † Rathbun, 1918 (fingers only) [early Pliocene to early Pleistocene, Limón] (Todd and Collins, 2005).

***Portunus* Weber, 1795**

Portunus gabbi † Rathbun, 1919 [Pliocene, Limón].

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Lophopanopeus* Rathbun, 1898**

Lophopanopeus maculoides † Collins and Todd *in* Todd and Collins, 2005 [late Pliocene, Limón].

Xanthidae MacLeay, 1838

Actaeinae Alcock, 1898

***Heteractaea* Lockington, 1877**

Heteractaea lunata (H. Milne Edwards and Lucas, 1843) [late Pliocene to early Pleistocene, Limón].

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Cardisoma* Latreille, 1828**

Cardisoma guanhumi Latreille, 1828 [late Pliocene to early Pleistocene, Limón].

HONDURAS

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection THORACOTREMATA Guinot, 1977

Superfamily OCYPODOIDEA Rafinesque, 1815

Ocypodidae Rafinesque, 1815

***Uca* Leach, 1814**

Uca sp. aff. *U. ornata* or *U. insignis* (as *U. 'marinae'* Domínguez Alonso, 2008) [Plio–Pleistocene, Choluteca] [Note 1].

Note 1. Following the work of Dominguez (2008), Luque *et al.* (*in press*) found that the Honduras material seems to be close to *U. ornata*, except for the similarity between the ornamentation on the merus of the major claw of some male *U. 'marinae'* and male *U. insignis*. However, the Honduras material differs from *U. insignis* in several aspects, which it shares with extant and fossil *U. ornata*. Alternatively, since *U. ornata* and *U. insignis* can be found in sympatry today, it is possible that the fossil assemblage might comprise individuals from both species (Luque *et al.*, in press).

PANAMA

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

***Dardanus* Paul'son, 1875**

Dardanus biordines † Collins and Todd *in* Todd and Collins, 2005 [early Pliocene, Bocas del Toro].

***Petrochirus* Stimpson, 1858**

Petrochirus bouvieri † Rathbun, 1918 [late Miocene to late Pliocene, Bocas del Toro, Colón and Darién].

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Ranininae De Haan, 1839

?*Ranina* Lamarck, 1801

?*Ranina* sp. [Miocene, Chiriquí].

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides sp. cf. *R. benedicti* Rathbun, 1935a [late Miocene of Bocas del Toro, Chiriquí and Colón] (Fig. 11C, D).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily DORIPPOIDEA MacLeay, 1838

?Goniochelidae † Schweitzer and Feldmann, 2011

?*Goniochele* † Bell, 1858

?*Goniochele armata* † Rathbun, 1918 [early Miocene (not Oligocene), Panama Canal] (Fig. 11E) [Note 1].

Superfamily MAJOIDEA Samouelle, 1819

Mithracidae MacLeay, 1838

***Thoe* Bell, 1836**

Thoe asperoides † Collins and Todd *in* Todd and Collins, 2005 [late Miocene, Bocas del Toro].

Oregoniidae Garth, 1958

***Hyas* Leach, 1814 [*in* Leach, 1813–1815]**

Hyas sp. [late Miocene, Darién] (Todd and Collins, 2005).

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Eriosachila* † Blow and Manning, 1996**

Eriosachila terryi † (Rathbun, 1937, as *Zanthopsis terryi*) [late Eocene, Panama].

***Hepatus* Latreille, 1802**

Hepatus biformis † Collins and Todd *in* Todd and Collins, 2005 [late Miocene, Bocas del Toro].
Hepatus chiliensis H. Milne Edwards, 1837 [Pleistocene, Panama Canal Zone].
Hepatus lineatinus † Collins and Todd *in* Todd and Collins, 2005 [middle Miocene to late Pliocene, Bocas del Toro and Colón].
Hepatus sp. [middle Holocene, Bahía de Panamá] (Portell *et al.*, 2012; Klompmaker *et al.*, 2016b; Luque *et al.*, in press).

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa flammea (Herbst, 1794) [late Miocene to Pleistocene, Colón].
Calappa zurcheri † Bouvier, 1899 [Miocene, unknown provenance] (Fig. 12M) [Note 2].
Calappa sp. [early late Pliocene, Bocas del Toro] (Todd and Collins, 2005).

***Calappella* † Rathbun, 1918**

Calappella quadrispina † Rathbun, 1918 (type) [early Miocene (not Oligocene), Panama Canal].

***Cryptosoma* Brullé, 1839**

Cryptosoma bairdii (Stimpson, 1862) [early late Pliocene, Bocas del Toro] (Todd and Collins, 2005).

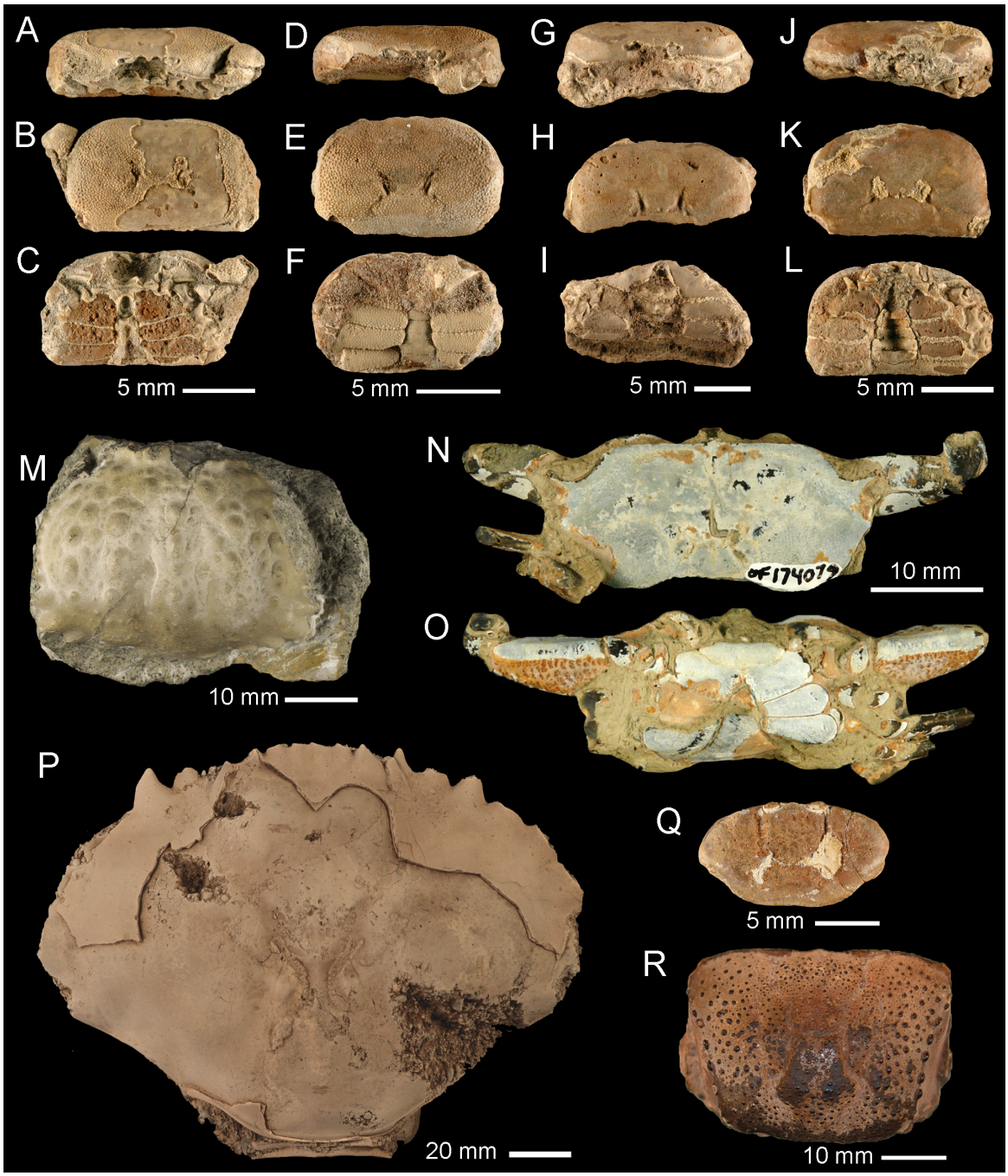

Figure 12. Fossil Eubrachyura from Panama, Central America. A–L, Hexapodoidea: Hexapodidae: *Palaeopinnixa prima* (Rathbun, 1918), early Miocene of the Panama Canal; A–C, UF 217685; D–F, UF 219754; G–I, UF 219750; J–L, UF 219751; specimens in frontal (A, D, G, J), dorsal (B, E, H, K), and ventral (C, F, I, L) views. M, Calappoidea: Calappidae: *Calappa zurcheri* Bouvier, 1899, holotype, MNHN-F.R03770, dorsal carapace, Miocene of Panama, locality unknown. N, O, Portunoidea: Portunidae: Podophthalminae: ?*Euphylax* sp., UF 174079, Quaternary, Pacific of Panama, dredged from a depth of ~50.0 meters, in dorsal (N) and ventral (O) views. P, Necronectinae: *Necronectes proavitus* (Rathbun, 1918), hypotype, USNM 371312, Miocene of Colón, dorsal carapace. Q, Pinnotheroidea: Pinnotheridae: Pinnotherinae: *Pinnotheres* sp., UF 115397, early Miocene Panama Canal, dorsal carapace. R, Ocypodoidea: Ocypodidae: Ocypodinae: *Uca ornata* Smith, 1870, USNM 618320, Holocene, Pacific of Panama, dorsal carapace. Photos A–L, N, O courtesy of Sean Roberts (FLMNH); photo M courtesy of Jocelyn Falconnet, Peter Massicard, and Sylvain Charbonnier (MNHN); photos P–R by Javier Luque. Specimens A–O, Q, R dry, uncoated; P dry, coated with ammonium chloride.

***Mursia* Desmarest, 1823**

Mursia macdonaldi † Rathbun, 1918 [early Miocene (not Oligocene), Panama Canal].
Mursia obscura † Rathbun, 1918 [early Miocene (not Oligocene), Panama Canal].

***Mursilia* † Rathbun, 1918**

Mursilia ecristata † Rathbun, 1918 [early to middle Miocene, Colón].

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Iliacantha* Stimpson, 1871**

Iliacantha panamica † Collins and Todd *in* Todd and Collins, 2005 [late Miocene, Bocas del Toro].
Iliacantha sp. [late Pliocene, Bocas del Toro] (Todd and Collins, 2005).

***Leucosilia* Bell, 1855**

Leucosilia bananensis † Rathbun, 1918 [middle-late Miocene, Bocas del Toro and Colón].
Leucosilia jurinii (Saussure, 1853) [Pleistocene, Colón] (Rathbun, 1918).
Leucosilia sp. cf. *L. jurini* [Quaternary, Bahía de Panamá] (Luque *et al.*, in press).

***Persephona* Leach, 1817**

Persephona enigmatica † Collins and Todd *in* Todd and Collins, 2005 [early late Pliocene, Bocas del Toro].
Persephona manningi † Collins and Todd *in* Todd and Collins, 2005 [early late Pliocene, Bocas del Toro].

***Speloeophorus* A. Milne-Edwards, 1865**

Speloeophorus subcircularis † Collins and Todd *in* Todd and Collins, 2005 [early late Pliocene, Bocas del Toro].

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Parthenope* Weber, 1795**

Parthenope panamensis † Rathbun, 1918 [early Miocene (not Oligocene), Panama Canal].
Parthenope pleistocenica † Rathbun, 1918 [Pleistocene, Colón].

***Platylambrus* Stimpson, 1871**

Platylambrus spinulatus † Collins and Todd *in* Todd and Collins, 2005 [early late Pliocene, Bocas del Toro].

Superfamily CANCROIDEA Latreille, 1802

Cancridae Latreille, 1802

Cancrinae Latreille, 1802

***Cancer* Latreille, 1802**

Cancer santosi † (Rathbun, 1937, as *Lobocarcinus santosi*) [late Eocene, Los Santos].

Superfamily CHEIRAGONOIDEA Ortmann, 1893

Cheriagonidae Ortmann, 1893

***Montezumella* † Rathbun, 1930**

Montezumella casayetensis † Rathbun, 1937 [late Oligocene or early Miocene, Bahía de Panamá].

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

Necronectes † A. Milne-Edwards, 1881

Necronectes proavitus † (Rathbun, 1918, as *Gatunia proavita*) [early Miocene, Colón] (Fig. 12N).

Podophthalminae Dana, 1851d

Euphylax Stimpson, 1862

Euphylax callinectias † Rathbun, 1918 [early Miocene (not Oligocene), Panama Canal].
Euphylax maculatus † Collins and Todd *in* Todd and Collins, 2005 [middle-late Miocene to late Pliocene, Bocas del Toro, Colón, and Darién].
Euphylax sp. [Quaternary, Panama Province (dredged)] (Fig. 12 N, O).

Sandomingia † Rathbun, 1919

Sandomingia yaquiensis † Rathbun, 1919 [early to late Pliocene, Bocas del Toro].

Portuninae Rafinesque, 1815

Callinectes Stimpson, 1862

Callinectes declivis † Rathbun, 1918 [late Eocene to early Miocene, Panama Canal].
Callinectes reticulatus † Rathbun, 1918 [early Miocene, Panama Canal].
Callinectes sp. cf. *C. arcuatus* Ordway, 1863 [Quaternary, Bahía de Panamá] (Portell *et al.*, 2012; Luque *et al.*, in press).

Portunus Weber, 1795

Portunus gabbi † Rathbun, 1919 [middle-late Miocene, Darién].
Portunus sp. cf. *P. tenuis* † Rathbun, 1919 [Pleistocene, Chiriquí] [Note 3].

Superfamily ERIPHIOIDEA MacLeay, 1838

Eriphiidae MacLeay, 1838

Eriphia Latreille, 1817

Eriphia sp. aff. *E. squamata* Stimpson, 1859 [Quaternary, Bahía de Panamá] (Luque *et al.*, in press).

Platyxanthidae Guinot, 1977

Platyxanthus A. Milne-Edwards, 1863

Platyxanthus sp. [late Miocene, Bocas del Toro] (Todd and Collins, 2005).

Superfamily GONEPLACOIDEA MacLeay, 1838

Chasmocarcinidae Serène, 1964

Chasmocarcininae Serène, 1964

Falconoplax † Van Straelen, 1933b

Falconoplax kugleri † Van Straelen, 1933b [early Miocene, Panama Canal] (Fig. 11J–Q) [Note 3].

Euryplacidae Stimpson, 1871

Euryplax Stimpson, 1859

? *Euryplax culebrensis* † Rathbun, 1918 [early Miocene (not Oligocene), Panama Canal] (Fig. 11F) [Note 5].
Euryplax sp. [early Miocene, Panama Canal] (Fig. 11G–I) [Note 5].

Superfamily HEXAPODOIDEA Miers, 1886

Hexapodidae Miers, 1886

Palaeopinnixa † Vía Boada, 1966

Palaeopinnixa prima † (Rathbun, 1918, as *Thaumastoplax prima*) [early Miocene (not Oligocene), Panama Canal] (Fig. 12A–L) [Note 6].

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Pilumninae Samouelle, 1819

Pilumnus Leach, 1816

Pilumnus sp. [Pliocene - early Pleistocene, Bocas del Toro and Chiriquí] (Todd and Collins, 2005).

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Eurytium* Stimpson, 1859**

Eurytium crenulatum † Rathbun, 1918 [Pleistocene, Colón] [Note 7].

***Panopeus* H. Milne Edwards, 1834**

Panopeus antepurpureus † Rathbun, 1918 [Pleistocene, Colón and Darién]
Panopeus chilensis Milne Edwards and Lucas, 1843 (claw fragment) [?early Pleistocene, Bocas del Toro] (Todd and Collins, 2005).

Xanthidae MacLeay, 1838

Actaeinae Alcock, 1898

***Heteractaea* Lockington, 1877**

Heteractaea lunata (H. Milne Edwards and Lucas, 1843) [late Pliocene, Bocas del Toro].

Xanthinae MacLeay, 1838

***Micropanope* Stimpson, 1871**

Micropanope sp. [early late Pliocene, Bocas del Toro] (Todd and Collins, 2005).

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Cardisoma* Latreille, 1828**

Cardisoma crassum Smith, 1870 [Quaternary, Bahía de Panamá] (Portell *et al.*, 2012; Luque *et al.*, in press) [Note 8].

Grapsidae MacLeay, 1838

***Grapsus* Lamarck, 1801**

Grapsus sp. aff. *G. grapsus* (Linnaeus, 1758) [Quaternary, Bahía de Panamá] (Portell *et al.*, 2012; Luque *et al.*, in press) [Note 8].

Superfamily OCYPODOIDEA Rafinesque, 1815

Ocypodidae Rafinesque, 1815

Ocypodinae Rafinesque, 1815

***Uca* Leach, 1814**

Uca ornata Smith, 1870 [Quaternary, Bahía de Panamá] (Portell *et al.*, 2012; Luque *et al.*, in press) [Note 9].
Uca sp. [as *U. macrodactyla in* Rathbun, 1918) [Note 9].

Superfamily PINNOTHEROIDEA De Haan, 1833

Pinnotheridae De Haan, 1833

Pinnothereliinae Alcock, 1900a

***Pinnixa* White, 1846**

Pinnixa sp. [early Miocene, Panama Canal (Fig. 12Q) [Note 10].

Note 1. *Goniochele* is the type genus of Goniochelidae, a monotypic eubrachyuran family apparently akin with Dorippoidea (Schweitzer and Feldmann, 2011; Guinot *et al.*, 2013; Luque, 2015a). Its confirmed fossil record is restricted to two species from the Eocene of Europe: *Goniochele angulata* Bell, 1858, and *Goniochele madseni* Collins and Jakobsen, 2003. A putative third species, *Goniochele armata* Rathbun, 1918 (Fig. 11E), was originally described from the Miocene (not Oligocene) Culebra Formation from the Panama Canal based on

the isolated dactylus of a left cheliped. The general elongate triangular shape with armed edges suggested to Rathbun (1918) affinities with *Goniochele*. Due to the lack of additional material from the Panama Canal, it is hard to confirm Rathbun's dactylus with *Goniochele*. Thus, we maintain it in the genus but with uncertainty.

Note 2. *Calappa zurcheri* is the first described fossil decapod crustacean from Panama. Although Bouvier (1899) reported it as Miocene in age, its exact geographic provenance and stratigraphic context is unknown. Based on our own field observations and the stratigraphic context of recent findings, Bouvier's specimen could come from the early excavations of the Panama Canal, as we have recovered similar material from the Miocene Culebra and Gatún formations in the area of the recent expansion of the Canal.

Note 3. The material of *Portunus tenuis* reported by Rathbun (1918) and Todd and Collins (2005) consist of cheliped fragments, making its systematic placement questionable.

Note 4. *Falconoplax*, despite being one of the most abundant crabs from the Miocene Culebra Formation (hundreds of specimens) (Fig. 11J–Q), is only until recently that has been recognized for Panama (Robins *et al.* 2016; herein).

Note 5. As noted by Collins *et al.* (2009c), Rathbun (1918) erected several new genera and species based on fragmentary material, including isolated pollices and dactyli. *Euryplax culebrensis* does not seem to be an exception. The only goneplacoid-like crabs clearly known from the fossil record of Panama are the abundant *Palaeopinnixa prima* and *Falconoplax kugleri*. Both taxa are represented by hundreds of specimens (Robins *et al.*, 2016), often so complete that the appendages are still attached to the body as in life position. It is possible that the holotype of *Euryplax culebrensis* may represent cheliped material from either *P. prima* or *F. kugleri.*

Note 6. *Palaeopinnixa prima* is similar in shape to the coeval *P. perornata* from Venezuela, but differs in the carapace outline, the latter having more roundish lateral margins. *Palaeopinnixa* is, together with *Falconoplax*, the most abundant crab in the Culebra Formation (Robins *et al.*, 2016).

Note 7. *Eurytium crenulatum* was described by Rathbun (1918), based on a right dactylus found in Pleistocene sediments near Mount Hope in the Colón Province, Panama. Additional carapace and cheliped material from lower to upper Pliocene rocks of the Limón Province, Costa Rica, has been assigned to *E. crenulatum* since then (Todd and Collins, 2005; Collins *et al.*, 2009c).

Note 8. The occurrences of the land crab *Cardisoma crassum* and the Sally Lightfoot crab *Grapsus grapsus* in the Quaternary of the Pacific Coast of Panama represent the first and second known fossil records of these species to date, respectively (Luque *et al.*, 2015; Luque *et al.*, in press).

Note 9. This middle-Holocene occurrence of *Uca ornata* accounts for the most complete and abundant fiddler crab fossil record known, constituted by several hundred specimens of juveniles and adults from both sexes (Luque *et al.*, in press). Another fossil fiddler crab from Panama is *Uca macrodactyla* Rathbun, 1918, described based on a single dactylus of an ambulatory leg from Pleistocene deposits near Colón. Crane (1975) commented about the uncertain specific affinities of Rathbun's fossil, and also the synonymy of *U. macrodactyla* with *U. galapagensis s.l.* We concur with Crane (1975) and consider the specimen as an indeterminate species of *Uca s.l.*

Note 10. This is the first report of fossil pinnotherids from Panama, and the second record of the genus *Pinnixa* for the Americas, with *P. navidadensis* from the Miocene of Chile representing the only other record known thus far.

MEXICO

Infraorder ANOMURA MacLeay, 1838

Superfamily AEGLOIDEA Dana, 1852

Aeglidae Dana, 1852

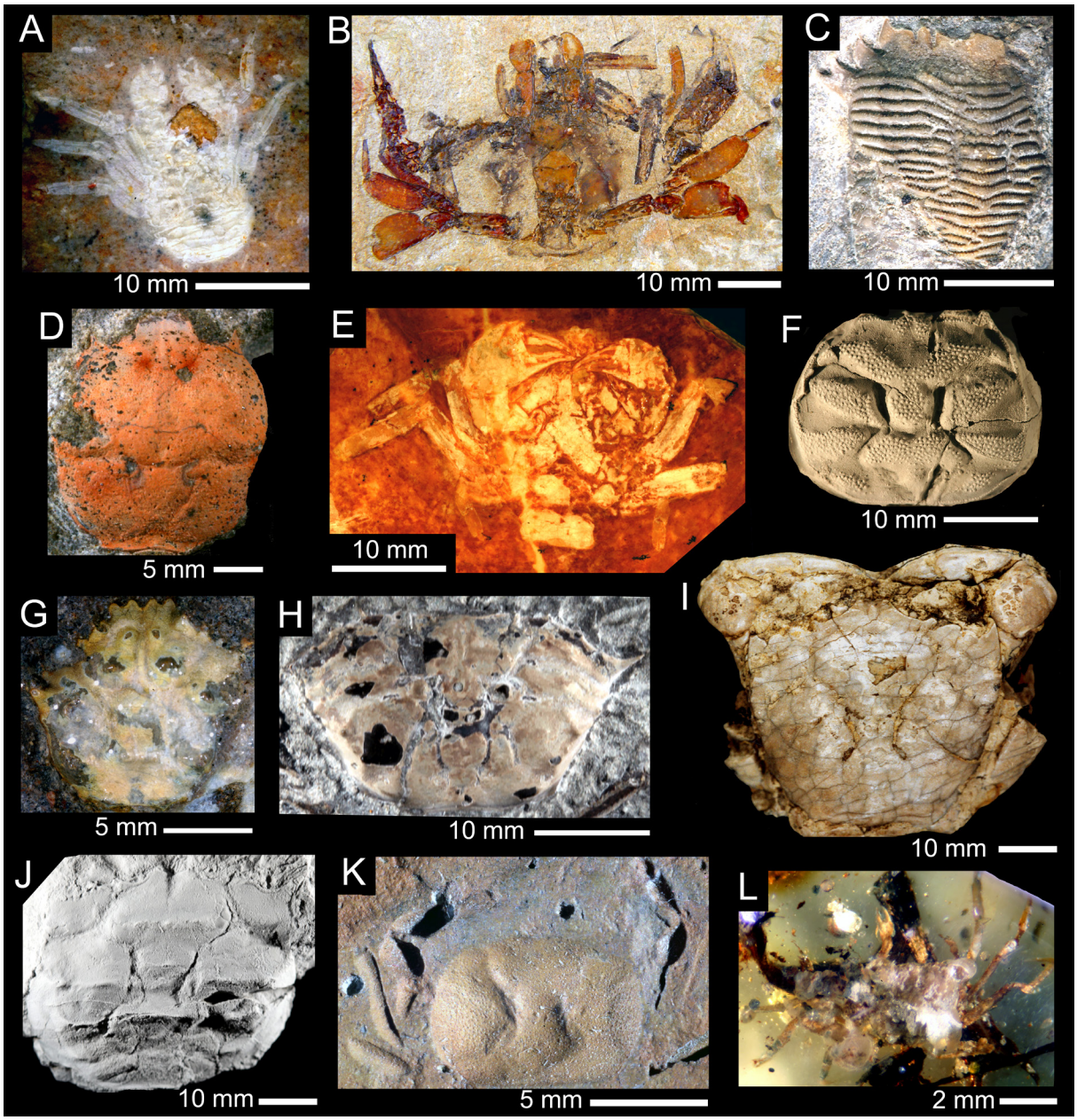

Figure 13. Fossil Anomura and Brachyura from Mexico. A, Anomura: Aegloidea: Aeglidae: *Protaegla minuscula* Feldmann, Vega, Applegate and Bishop, 1998b, holotype, IGM-6502, late Albian of Puebla. B–L, Brachyura. B, Necrocarcinoidea: Cenomanocarcinidae: *Cenomanocarcinus vanstraeleni* Stenzel, 1945, hypotype, MUZ-801, Turonian of Múzquiz, Coahuila; C, Raninoidea: Raninidae: *Lophoranina cristaspina* Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a, hypotype, IHNFG-3460, middle Eocene of Copoya, Chiapas; D, Dakoticancroidea: Ibericancridae: *Sodakus mexicanus* Vega, Feldmann and Villalobos-Hiriart, 1995b, hypotype to be deposited at CPC, early Maastrichtian of Paredón, Coahuila; E, Superfamily uncertain: Tepexicarcinidae: *Tepexicarcinus tlayuaensis* Feldmann, Vega, Applegate and Bishop, 1998b, hypotype, IGM-6609, late Albian of Puebla; F, Retroplumoidea: Retroplumidae: *Costacopluma mexicana* Vega and Perrillat, 1989, holotype, IGM-4128, early Maastrichtian of Sierra El Antrisco, Nuevo León, Mexico; G, Cheiragonoidea: Cheiragonidae: *Karasawaia markgrafi* (Lőrenthey, 1907 [1909]), hypotype, IHNFG-3030, early Eocene of El Veinte, Chiapas; H–J, Portunoidea; H, Icriocarcinidae: *Icriocarcinus xestos* Bishop, 1988, hypotype, IGM.6625-2, late Campanian of Punta Santo Tomás, Baja California; I, Carcineretidae: *Carcineretes planetarius* Vega, Feldmann, Ocampo and Pope, 1997, hypotype, IHNFG-3412, early Maastrichtian of Ocozocoautla, Chiapas; J, Macropipidae: *Ophthalmoplax brasiliana* (Maury, 1930), hypotype, CPC-881, late Maastrichtian of Arroyo Amargos, Coahuila; K, ?Pinnotheroidea: ?Pinnotheridae: *Viapinnixa perrilliatae* Vega, Nyborg, Fraaye and Espinosa, 2007a, paratype, IGM-9109, middle Paleocene of La Mesita, Coahuila; L, Grapsoidea: Sesarmidae indet., specimen IHNFG-4991, early Miocene of Simojovel, Chiapas. Photos by Francisco Vega. F and K previously illustrated *in* Armstrong *et al.* (2009), and J *in* Vega *et al.* (2013). Specimens A–E, G–I, K, L dry, uncoated; F and J dry, coated with ammonium chloride.

Protaegla † Feldmann, Vega, Applegate and Bishop, 1998b

Protaegla miniscula † Feldmann, Vega, Applegate and Bishop, 1998b (type) [Albian, Puebla] (Vega *et al.*, 2005) (Fig. 13A).

Superfamily GALATHEOIDEA Samouelle, 1819

Galatheidae Samouelle, 1819

Galatheidae indet. [middle Eocene, Baja California Sur] (Schweitzer *et al.*, 2006b).

Superfamily PAGUROIDEA Latreille, 1802

Paguroidea spp. indet. [middle Eocene, Baja California Sur] (Schweitzer *et al.*, 2005).

Diogenidae Ortmann, 1892

?_Paguristes_ Paul'son, 1875

? *Paguristes mexicanus* Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a [middle Eocene, Chiapas, Baja California Sur] (Schweitzer *et al.*, 2002; 2005; Vega *et al.*, 2008).

Petrochirus Stimpson, 1858

Petrochirus sp. [middle Eocene and early Miocene, Chiapas] (Vega *et al.*, 2008; 2009).

Paguridae Latreille, 1802

Pagurus Fabricius, 1775

Pagurus sp. [Albian, Puebla] (Vega *et al.*, 2005).

Palaeopagurus † Van Straelen, 1925

Palaeopagurus sp. cf. *P. pilsbyi* † Roberts, 1962 [early Maastrichtian, Nuevo León] (Vega *et al.*, 1995b).

Infraorder BRACHYURA Latreille, 1802

Superfamily DROMIOIDEA De Haan, 1833

Dynomenidae Ortmann, 1892

Graptocarcinus † Roemer, 1887

Graptocarcinus muiri † Stenzel, 1944b [Albian, San Luis Potosí].

Xandarocarcinidae † Karasawa Schweitzer and Feldmann, 2011

Xandarocarcinus † Karasawa, Schweitzer and Feldmann, 2011 (as *Xandaros in* Bishop, 1988)

Xandarocarcinus sternbergi † (Rathbun, 1926) [Maastrichtian, Baja Calafornia Sur] (Bishop, 1986; Schweitzer *et al.*, 2002).

Dromioidea _incertae sedis_

Prehepatus † Rathbun, 1935b

Prehepatus harrisi † Bishop, 1985 [early Maastrichtian, Nuevo León] (Vega *et al.*, 1995b).

Prehepatus mexicanus † Schweitzer, Feldmann, González-Barba and Ćosović, 2006b [middle Eocene, Baja California Sur].

Superfamily HOMOLOIDEA De Haan, 1833

Homolidae De Haan, 1839

Homola Leach, 1816 [imprint 1815]

Homola bajaensis † Schweitzer, Feldmann, González-Barba and Ćosović, 2006b [middle Eocene, Baja California Sur].

Zygastrocarcinus † Bishop, 1983a

Zygastrocarcinus carolinasensis † Klompmaker, Flores-Ventura and Vega, 2013a [late Campanian, Coahuila] (Vega *et al.*, 2016).

Superfamily NECROCARCINOIDEA † Förster, 1968

Cenomanocarcinidae † Guinot, Vega and Van Bakel, 2008

Cenomanocarcinus † Van Straelen, 1936

Cenomanocarcinus vanstraeleni † Stenzel, 1945 [Turonian-Coniacian, Coahuila] (Vega *et al.*, 2007b; 2010; Garassino *et al.*, 2013) (Fig. 13B).
Cenomanocarcinus sp. † [Campanian, Guerrero] (Vega *et al.*, 2010).

Superfamily PALAEOCORYSTOIDEA † Lőrenthey *in* Lőrenthey and Beurlen, 1929

Palaeocorystidae † Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Ferroranina* † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a**

Ferroranina sp. cf. *F. dichrous* † (Stenzel, 1945) [Turonian, Coahuila] (Vega *et al.*, 2007b).

Superfamily RANINOIDEA De Haan, 1839

Lyreididae Guinot, 1993

Macroacaeninae † Karasawa, Schweitzer, Feldmann and Luque, 2014

***Macroacaena* † Tucker, 1998**

Macroacaena venturai † Vega, Nyborg, Fraaye and Espinosa, 2007a [middle Paleocene (Selandian), Chiapas and Coahuila].

Marylyreidinae † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a

***Bournelyreidus* † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a**

Bournelyreidus oaheensis † (Bishop, 1978 , as Raninella oaheensis) [early Maastrichtian, Coahuila] (Vega *et al.*, 2016).

Raninidae De Haan, 1839

Raninidae spp. indet. [Turonian, Coahuila] (Vega *et al.*, 2007b).

Cyrtorhininae Guinot, 1993

***Claudioranina* † Karasawa, Schweitzer, Feldmann and Luque, 2014**

Claudioranina latacantha † Martínez, Aguillón, Luque and Vega, 2017 [middle Paleocene (Selandian), Coahuila].

Notopodinae Serène and Umali, 1972

***Notopus* De Haan, 1841**

Notopus minutus † Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a [Ypresian, Chiapas].

Ranininae De Haan, 1839

***Lophoranina* † Fabiani, 1910**

Lophoranina bishopi † Squires and Demetrion, 1992 [Ypresian and Eocene indet., Baja California, Sur] (Schweitzer *et al.*, 2002; 2007b).
Lophoranina cristaspina † Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a [middle Eocene and Ypresian, Baja California Sur; Ypresian, Chiapas] (Hernández-Monzón *et al.*, 2007; Vega *et al.*, 2008) (Fig. 13C).

?*Ranina* Lamarck, 1801

? *Ranina berglundi* † Squires and Demetrion, 1992 [middle Eocene and Ypresian, Baja California Sur] (Schweitzer *et al.*, 2006b; Vega *et al.*, 2008; Pasini and Garassino, 2017).
?*Ranina* sp. † [Eocene, Baja California Sur] (Rathbun, 1930)

***Vegaranina* † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a**

Vegaranina precocia † (Feldmann, Vega, Tucker, García-Barrera and Avendaño, 1996, as *Lophoranina precocious*) (type) [Maastrichtian, Chiapas].

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Notopoides* Henderson, 1888**

Notopoides exiguus † Beschin, Busulini, De Angeli and Tessier, 1998 [Ypresian, Chiapas] (Vega *et al.*, 2008).
Notopoides sp. † [Paleocene (Selandian), Coahuila] (Martínez-Díaz *et al.*, 2017).

***Quasilaeviranina* † Tucker, 1998**

Quasilaeviranina sp. cf. *Q. arzignanensis* † (Beschin, Busulini, De Angeli and Tessier, 1998) [Paleocene (Selandian), Coahuila] (Martínez-Díaz *et al.*, 2017)
Quasilaeviranina sp. cf. *Q. ovalis* † (Rathbun, 1935b) [Paleocene (Selandian), Coahuila] (Martínez-Díaz *et al.*, 2017).

***Raninoides* H. Milne Edwards, 1837**

Raninoides acanthocolus † Schweitzer, Feldmann, Gonzalez-Barba and Ćosović, 2006b [middle Eocene, Baja California Sur].
Raninoides mexicanus † Rathbun, 1930 [Miocene, Veracruz].
Raninoides proracanthus † Schweitzer, Feldmann, González-Barba and Ćosović, 2006b [middle Eocene, Baja California Sur].
Raninoides treldenaesensis † Collins and Jakobsen, 2003 [Ypresian, Chiapas] (Vega *et al.*, 2008).

Section DAKOTICANCROIDA † Rathbun, 1917

Superfamily DAKOTICANCROIDEA Rathbun, 1917

Dakoticancridae † Rathbun, 1917

***Dakoticancer* † Rathbun, 1917**

Dakoticancer australis † Rathbun, 1935b [early Maastrichtian, San Luis Potosí and Nuevo León] (Vega and Feldmann, 1991; Vega *et al.*, 1995a; 2016).

Ibericancridae † Artal, Guinot, Van Bakel and Castillo, 2008

?*Sodakus* † Bishop, 1978

Sodakus mexicanus † Vega, Feldmann and Villalobos-Hiriart, 1995b [early Maastrichtian, Nuevo León and Coahuila] (Vega *et al.*, 2016) (Fig. 13D).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily ?DORIPPOIDEA MacLeay, 1838

Tepexicarcinidae † Luque, 2015a

***Tepexicarcinus* † Feldmann, Vega, Applegate and Bishop, 1998b**

Tepexicarcinus tlayuaensis † Feldmann, Vega, Applegate and Bishop, 1998b [Albian, Puebla] (Vega *et al.*, 2005) (Fig. 13E).

Superfamily MAJOIDEA Samouelle, 1819

Majidae Samouelle, 1819

?Majidae indet. [Maastrichtian, San Luis Potosí] (Vega *et al.*, 1995a).

Oregoniidae Garth, 1958

***Oregonia* Dana, 1851a**

Oregonia spinifera Schweitzer, Feldmann, González-Barba, and Vega, 2002 [Oligocene, Baja California Sur].

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Eriosachila* † Blow and Manning, 1996**

Eriosachila bajaensis † Schweitzer, Feldmann, González-Barba and Vega, 2002 [Eocene (Bartonian), Baja California Sur] (Schweitzer *et al.*, 2007a).
Eriosachila sp. † [middle Eocene, Chiapas] (Vega *et al.*, 2001a).

***Hepatella* Smith, 1869a**

Hepatella amazonica † Beurlen, 1958a [early Miocene, Chiapas] (Vega *et al.*, 2009).

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa flammea (Herbst, 1794) [Oligocene, Baja California Sur] (Rathbun, 1930).
Calappa zurcheri † Bouvier, 1899 [Oligocene, Veracruz; early Miocene, Chiapas] (Rathbun, 1930; Vega *et al.*, 2009).

***Calappilia* † A. Milne-Edwards, 1873**

Calappilia hondoensis † Rathbun, 1930 [middle Eocene: Lutetian, Chiapas; Priabonian, Baja California Sur] (Vega *et al.*, 2001a; 2008; Schweitzer *et al.*, 2006b; 2007a).

***Mursia* Leach *in* Desmarest, 1823**

?*Mursia* sp. [middle Miocene, Veracruz] (Vega *et al.*, 1999).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Iliacantha* Stimpson, 1871**

Iliacantha panamanica † Collins and Todd *in* Todd and Collins, 2005 [early Miocene, Chiapas] (Vega *et al.*, 2009).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Daldorfiinae Ng and Rodríguez, 1986

***Daldorfia* Rathbun, 1904**

Daldorfia salina † Schweitzer, Feldmann, González-Barba and Ćosović, 2006b [middle Eocene, Baja California Sur].

Superfamily CANCROIDEA Latreille, 1802

Atelecyclidae Ortmann, 1893

***Levicyclus* † Schweitzer, Feldmann, Gonzáles-Barba and Vega, 2002**

Levicyclus tepetate † Schweitzer, Feldmann, González-Barba, and Vega, 2002 [Eocene, Baja California Sur].

Cancridae Latreille, 1802

Cancrinae Latreille, 1802

***Anatolikos* Schweitzer and Feldmann, 2000**

Anatolikos undecimspinosus † Schweitzer, Feldmann, González-Barba and Ćosović, 2006b [middle Eocene, Baja California Sur].

***Romaleon* Gistel, 1848**

Romaleon antennarium (Stimpson, 1856) [Pliocene, Baja California Sur].

Superfamily CHEIRAGONOIDEA Ortmann, 1893

Cheriagonidae Ortmann, 1893

***Karasawaia* † Vega, Nyborg, Coutiño and Hernández-Monzón, 2008**

Karasawaia markgrafi † (Lőrenthey, 1907 [German version 1907[1909], as *Plagiolophus markgrafi*) (type) [Ypresian, Chiapas] (Vega *et al.*, 2008) (Fig. 13G).

***Montezumella* † Rathbun, 1930**

Montezumella tubulata † Rathbun, 1930 [Eocene: Priabonian, Baja California Sur].

Superfamily PORTUNOIDEA Rafinesque, 1815

Carcineretidae † Beurlen, 1930

***Carcineretes* † Withers, 1922**

Carcineretes planetarius † Vega, Feldmann, Ocampo and Pope, 1997 [early Maastrichtian, Chiapas] (Vega *et al.*, 2001b) (Fig. 13I).

Carcinidae MacLeay, 1838

***?Xaiva* MacLeay, 1838**

?*Xaiva* sp. † [middle Eocene, Chiapas] (Vega *et al.*, 2008).

Icriocarcinidae † Števčić, 2005

***Icriocarcinus* † Bishop, 1988**

Icriocarcinus xestos † Bishop, 1988 [Maastrichtian, Baja California Sur] (Schweitzer *et al.*, 2002; Phillips *et al.*, 2014) (Fig. 13H).

***Branchiocarcinus* † Vega, Feldmann and Sour-Tovar, 1995a**

Branchiocarcinus cornatus † Feldmann and Vega, 1995 *in* Vega *et al.*, 1995a [Maastrichtian, San Luis Potosí] (Phillips *et al.*, 2014).

Branchiocarcinus flectus † (Rathbun, 1923b, as *Eryma flecta*) [Maastrichtian, San Luis Potosí] (Phillips *et al.*, 2014; Vega *et al.*, 2016).

Longusorbiidae † Karasawa, Schweitzer and Feldmann, 2008

***Longusorbis* † Richards, 1975**

Longusorbis eutychius † Schweitzer, Feldmann and Karasawa, 2007c [middle Eocene (Bartonian), Baja California Sur].

Longusorbis quadratus † Fraaije, Vega, Van Bakel and Garibay-Romero, 2006 [Cenomanian-Coniacian, Guerrero].

Macropipidae Stephenson and Campbell, 1960

***Maeandricampus* † Schweitzer and Feldmann, 2002**

Maeandricampus americanus † (Rathbun, 1930, as *Xanthosia americana*) [Eocene, Baja California Sur].

***Ophthalmoplax* † Rathbun, 1935b**

Ophthalmoplax brasiliana † (Maury, 1930) (as *Mascaranada difuntaensis in* Vega and Feldmann, 1991) [early to late Maastrichtian, Coahuila and Nuevo León] (Vega *et al.*, 2013; 2016) (Fig. 13J).

Portunidae Rafinesque, 1815

Portunidae indet. [middle Eocene, Chiapas] (Vega *et al.*, 2008).

Portunidae indet. [middle Eocene, Baja California Sur] (Schweitzer *et al.*, 2006b).

Portunidae indet. [early Miocene, Chiapas] (Vega *et al.*, 2009).

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes nodosus † Schweitzer, Feldmann, González-Barba and Vega, 2002 [Oligocene, Baja California Sur].

Necronectes tajinensis † Vega *et al.*, 1999 [middle Miocene, Veracruz].

Necronectes sp. † [early Miocene, Chiapas] (Vega *et al.*, 2009).

Portuninae Rafinesque, 1815

***Portunus* Weber, 1795**

Portunus atecuicitlis † Vega *et al.*, 1999 [early to middle Miocene, Chiapas and Veracruz] (Vega *et al.*, 2009).

***Scylla* De Haan, 1833**

Scylla costata † Rathbun, 1919 [age and locality unknown] (Rathbun, 1930).

Podophthalminae Dana, 1851d

Podophthalmus Lamarck, 1801

?*Podophthalmus* sp. † [Late Cretaceous, Tamaulipas] (Rathbun, 1930).

Superfamily RETROPLUMOIDEA Gill, 1894

Retroplumidae Gill, 1894

***Archaeopus* † Rathbun, 1908**

Archaeopus mexicanus † Schweitzer, Feldmann, González-Barba and Vega, 2002 [Campanian-Maastrichtian, Baja California Sur].

***Costacopluma* † Collins and Morris, 1975**

Costacopluma bishopi † Vega and Feldmann, 1992 [Coniacian, Guerrero] (Fraaije *et al.*, 2006; Martínez-Díaz *et al.*, 2016; Vega *et al.*, 2016).

Costacopluma grayi † Feldmann and Portell, 2007 [late Maastrichtian, Coahuila] (Martínez-Díaz *et al.*, 2016; Vega *et al.*, 2016).

Costacopluma mexicana † Vega and Perrillat, 1989 [late Campanian to early Maastrichtian of San Luis Potosí, Coahuila and Nuevo León] (Vega *et al.*, 1995a; Martínez-Díaz *et al.*, 2016; Vega *et al.*, 2016) (Fig. 13F).

Superfamily CARPILIOIDEA Ortmann, 1893

Palaeoxanthopsidae † Schweitzer, 2003

***Palaeoxanthopsis* † Beurlen, 1958b**

Palaeoxanthopsis meyapaquensis † (Vega, Feldmann, García-Barrera, Filkorn, Pimentel and Avendaño, 2001b, as *Paraxanthopsis meyapaquensis*) [early Maastrichtian, Chiapas].

***Paraverrucoides* † Schweitzer, 2003**

Paraverrucoides alabamensis † (Rathbun, 1935b, as *Xanthilites alabamensis*) [Paleocene (Selandian), Coahuila] (Vega *et al.*, 2007a; Martínez-Díaz *et al.*, 2017).

***Verrucoides* † Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a**

Verrucoides stenohedra † Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a [early Eocene (Ypresian), Chiapas] (Vega *et al.*, 2008).

Tumidocarcinidae † Schweitzer, 2005a

***Lobonotus* † A. Milne-Edwards, 1863**

Lobonotus mexicanus † Rathbun, 1930 [Eocene, Baja California Sur] (Schweitzer *et al.*, 2002; 2006b; 2007a).

Zanthopsidae † Vía Boada, 1959

***Neozanthopsis* † Schweitzer, 2003**

Neozanthopsis americanus † (Rathbun, 1928, as *Harpactocarcinus americanus*) [?middle Eocene, Baja California Sur] (Vega *et al.*, 2006b).

Superfamily GONEPLACOIDEA MacLeay, 1838

Euryplacidae Stimpson, 1871

***Orbitoplax* † Tucker and Feldmann, 1990**

Orbitoplax nandachare † (Vega *et al.*, 2001a, as *Stoaplax nandachare*) [Ypresian, Chiapas] (Vega *et al.*, 2008).

Goneplacidae MacLeay, 1838

***Amydrocarcinus* † Schweitzer, Feldmann, González-Barba and Vega, 2002**

Amydrocarcinus dantei † Schweitzer, Feldmann, González-Barba and Vega, 2002 [middle Eocene (Bartonian), Baja California Sur] (Schweitzer *et al.*, 2007a).

Litocheiridae Števčić, 2005

Paracorallicarcinus † Tessier, Beschin, Bussulini and De Angeli, 1999

Paracorallicarcinus tricarinatus † Schweitzer, Feldmann, González-Barba, and Ćosović, 2006b [middle Eocene, Baja California Sur].

Mathildellidae Karasawa and Kato, 2003

Mathildellidae indet. [late Campanian, Coahuila] (Vega *et al.*, 2016).

Tehuacana † Stenzel, 1944a

Tehuacana americana † (Rathbun, 1935, as *Dromilites americana*; = *Tehuacana tehuacana*) [Paleocene (Selandian), Coahuila] (Vega *et al.*, 2007a; 2008; Armstrong *et al.*, 2009; Martínez-Díaz *et al.*, 2017).
Tehuacana schweitzerae † Vega, Nyborg, Coutiño, and Hernández-Monzón, 2008 [Eocene (Lutetian), Chiapas].

Superfamily HEXAPODOIDEA Miers, 1886a

Hexapodidae Miers, 1886a

Palaeopinnixa † Vía Boada, 1966

Palaeopinnixa perornata † Collins and Morris, 1976 [early Miocene, Chiapas] (Vega *et al.*, 2009).

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Eumedoninae Dana, 1853

Santeella † Blow and Manning, 1996

Santeella lillyae † Blow and Manning, 1996 [early Eocene (Ypresian), Chiapas] (Vega *et al.*, 2008).

Superfamily TRAPEZIOIDEA Miers, 1886a

Trapeziidae Miers, 1886a

Archaeotetra † Schweitzer, 2005b

Archaeotetra inornata † Schweitzer, 2005b [middle Eocene, Baja California Sur].

Superfamily XANTHOIDEA MacLeay, 1838

Xanthoidea indet. [middle Eocene, Baja California Sur] (Schweitzer *et al.*, 2006b).

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

Eurytium Stimpson, 1862

Eurytium sp. [early Miocene, Chiapas; Pliocene, Veracruz] (Vega *et al.*, 2009).

Panopeus H. Milne Edwards, 1834

Panopeus veintensis † Vega, Nyborg, Coutiño and Hernández-Monzón, 2008 [early Eocene (Ypresian), Chiapas].

Xanthidae MacLeay, 1838

Xanthidae _incertae sedis_

?_Haydnella_ † Müller, 1984

?*Haydnella* sp. cf. *H. steiningeri* † Müller, 1984 [early Miocene, Chiapas] (Vega *et al.*, 2009).

Megaxantho † Vega, Feldmann, Garcia-Barrera, Filkorn, Pimentel and Avendaño, 2001b

Megaxantho zoque † Vega, Feldmann, Garcia-Barrera, Filkorn, Pimentel and Avendaño, 2001b [Maastrichtian, Chiapas] (Dietl and Vega, 2008).

Subsection THORACOTREMATA Guinot, 1977

Superfamily ?PINNOTHEROIDEA De Haan, 1833

?Pinnotheridae De Haan, 1833

?Pinnotherinae De Haan, 1833

Viapinnixa † Schweitzer and Feldmann, 2001

Viapinnixa alvarezi † Vega, Cosma, Coutiño, Feldmann, Nyborg, Schweitzer and Waugh, 2001a [early Eocene (Ypresian), Chiapas] (Vega *et al.*, 2008; Armstrong *et al.*, 2009).

Viapinnixa perrilliatae † Vega, Nyborg, Fraaye and Espinosa, 2007a [Paleocene (Selandian), Coahuila] (Armstrong *et al.*, 2009) (Fig. 13K).

Superfamily GRAPSOIDEA MacLeay, 1838

Sesarmidae Dana, 1851c

Sesarmidae indet. [Miocene (Aquitanian), Chiapas] (Serrano-Sánchez *et al.*, 2016).

Brachyura *incertae sedis*

?*Xanthosia* Bell, 1863

?Xanthosia zoquiapensis † Fraaije, Vega, Van Bakel and Garibay-Romero, 2006 [Campanian, Guerrero].

***Roemerus* † Bishop, 1983b**

Roemerus robustus † Bishop, 1983b [Albian, Chiapas] (Vega *et al.*, 2006a).

SOUTHERN AND CENTRAL FLORIDA, USA

Infraorder ANOMURA MacLeay, 1838

Superfamily GALATHEOIDEA Samouelle, 1819

Porcellanidae Haworth, 1825

***Petrolisthes* Stimpson, 1858**

Petrolisthes myakkensis † Bishop and Portell, 1989 [late Pliocene, Charlotte County] (Fig. 14A).

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

***Coenobita* Latreille, 1829**

Coenobitid indet. (crab habitational traces in neritid snail) [early Pleistocene, Hendry County] (Vermeij and Portell, 2013).

***Petrochirus* Stimpson, 1858**

Petrochirus bouvieri † Rathbun, 1918 [early Pleistocene, Glades County] (Rathbun, 1935b).

Petrochirus diogenes (Linnaeus, 1758) [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninae De Haan, 1839

***Lophoranina* † Fabiani, 1910**

Lophoranina sp. cf. *L. georgiana* † (Rathbun, 1935b) [late Eocene of Alachua, Marion, and Lafayette Counties] (Portell, 2004) (Fig. 14B, C).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Epialtidae MacLeay, 1838

Pisinae Dana, 1851b

***Libinia* Leach, 1815**

Libinia sp. [early-middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Mithracidae MacLeay, 1838

***Damithrax* Windsor and Felder, 2014**

Damithrax sp. cf. *D. pleuracanthus* (Stimpson, 1871) [late Pliocene to early Pleistocene, Sarasota County] (Klompmaker *et al.*, 2015) (Fig. 14I).

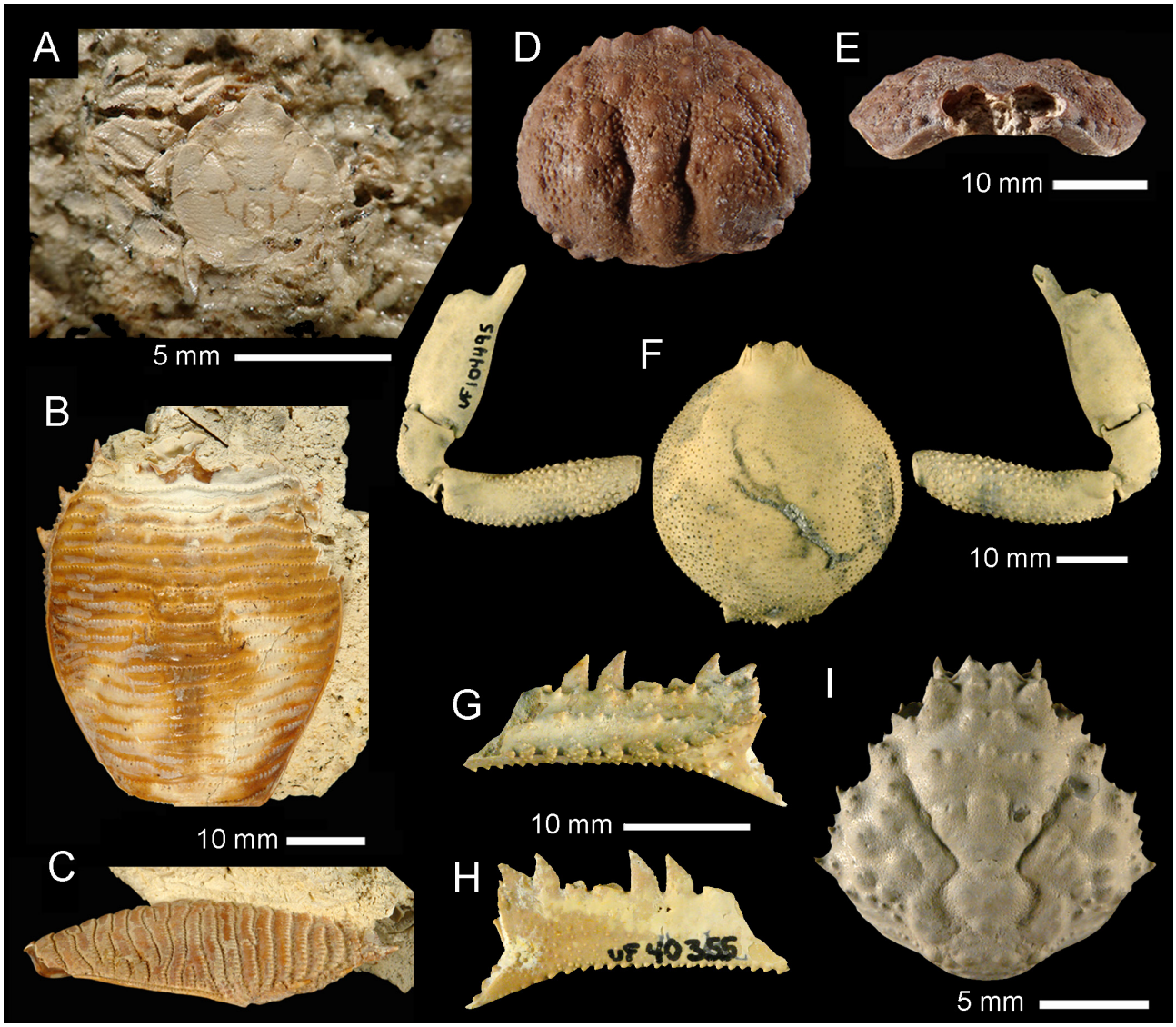

Figure 14. Fossil Anomura and Brachyura from southern and central Florida. A, Anomura: Galatheoidea: Porcellanidae: *Petrolisthes myakkensis* Bishop and Portell, 1989, dorsal view of carapace of holotype UF 8678 adhered to *Heliaster microbrachius* (sun star), late Pliocene of El Jobean, Charlotte County. B, C, Brachyura: Raninoidea: Raninidae: *Lophoranina* sp. cf. *L. georgiana* (Rathbun, 1935), interior and lateral views of dorsal carapace of UF 67098, late Eocene of Ocala, Marion County. D, E, Eubrachyura: Calappoidea: Calappidae: *Calappilia brooksi* Ross and Scolaro, 1964, dorsal (D) and frontal (E) views of UF 13349, late Eocene of Newberry, Alachua County. F, Leucosioidea: Leucosiidae: *Persephona mediterranea* (Herbst, 1794), dorsal view of carapace and interior and exterior views of associated left cheliped UF 104495, early–middle Pleistocene of Fort Drum, Okeechobee County. G, H, Parthenopoidea: Parthenopidae: *Platylambrus charlottensis* (Rathbun, 1935), external and internal views of right propodus UF 40355, Arcadia, De Soto County. I, Majoidea: Mithracidae: *Damithrax* sp. cf. *D. pleuracanthus* (Stimpson, 1871), dorsal view of carapace of holotype UF 29057, Pliocene–Pleistocene of Sarasota, Sarasota County. Photos courtesy of Sean Roberts (FLMNH). All specimens dry, uncoated.

Stenocionops Desmarest, 1823

Stenocionops suwanneeana † Rathbun, 1935b [late Eocene, Suwannee County].

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

Hepatus Latreille, 1802

Hepatus sp. [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Calappidae De Haan, 1833

Calappa Weber, 1795

Calappa ocalanus † (Ross, Lewis and Scolaro, 1964) (as *Aparnocondylus*) [late Eocene (Priabonian) of Alachua, Marion, and Lafayette Counties] (Portell, 2004; Rumsey *et al.*, 2016).
Calappa robertsi † Ross, Lewis and Scolaro, 1964 [late Eocene of Alachua, Marion, and Lafayette Counties] (Portell, 2004).
Calappa spp. [Plio-Pleistocene, central and southern peninsular Florida] (Portell and Agnew, 2004).

Calappilia † A. Milne-Edwards, 1873

Calappilia brooksi † Ross and Scolaro, 1964 [late Eocene of Alachua, Marion, and Lafayette Counties] (Portell, 2004) (Fig. 14D, E).
Calappilia calculosa † Rumsey, Klompmaker and Portell, 2016 [late Eocene-early Oligocene, Suwannee County].

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

Persephona Leach, 1817

Persephona mediterranea (Herbst, 1794) [early-middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004) (Fig. 14F).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

Platylambrus Stimpson, 1871

Platylambrus charlottensis † (Rathbun, 1935b) [early Pleistocene, Charlotte County] (Fig. 14G, H).

Superfamily CANCROIDEA Latreille, 1802

Cancridae Latreille, 1802

Cancrinae Latreille, 1802

Cancer Latreille, 1802

Cancer irroratus Say, 1817 [late Pleistocene-Holocene, Miami-Dade County] (Rathbun, 1935b).

Superfamily CHEIRAGONOIDEA Ortmann, 1893

Cheiragonidae Ortmann, 1893

Montezumella † Rathbun, 1930

Montezumella microporosa † Portell and Collins, 2002 [late Eocene, Alachua County] (Fig. 15F).

Superfamily PORTUNOIDEA Rafinesque, 1815

Ovalipidae Spiridonov *et al.*, 2014

Ovalipes Rathbun, 1898

Ovalipes stephensoni Williams, 1976 [early-middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Portunidae Rafinesque, 1815

Portuninae Rafinesque, 1815

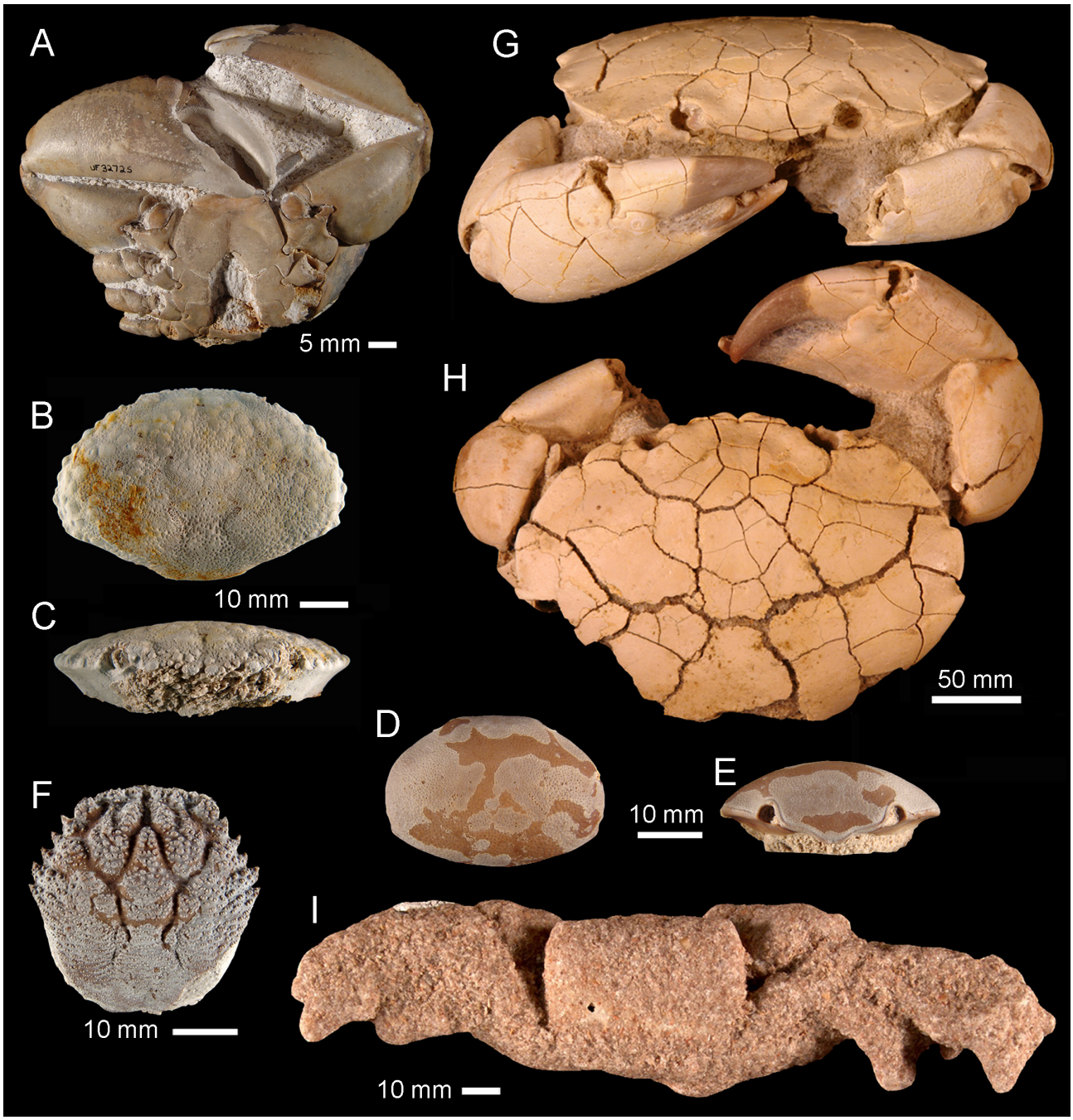

Figure 15. Fossil Eubrachyura from southern and central Florida. A, Carpilioidea: Carpiliidae: *Ocalina floridana* Rathbun, 1929, ventral view of UF 32725, late Eocene of Newberry, Alachua County; B, C, dorsal (B) and frontal (C) views of UF 105902, Newberry, Alachua County. D, E, *Palaeocarpilius brodkorbi* Lewis and Ross, 1965, dorsal (D) and frontal (E) views of UF 114368, late Eocene of Newberry, Alachua County. F, Cheiragonoidea: Cheiragonidae: *Montezuemella microporosa* Portell and Collins, 2002, dorsal view of holotype, UF 107150, late Eocene of Newberry, Alachua County. G, H, Eriphioidea: Menippidae: *Menippe mercenaria* (Say, 1818), dorsal (H) and frontal (G) views of carapace of UF 24668, late Pleistocene of Oldsmar, Pinellas County. I, Ocypodoidea: Ocypodidae: *Ocypode quadrata* (Fabricius, 1787), dorsal view of carapace, hypotype, UF 47573, late Pleistocene–Holocene of Satellite Beach, Brevard County. Photos courtesy of Sean Roberts (FLMNH). All specimens dry, uncoated.

***Achelous* De Haan, 1833**

Achelous depressifrons (Stimpson, 1859) [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).
Achelous gibbesii (Stimpson, 1859) [early-middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).
Achelous spinimanus (Latreille, 1819) [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004)

***Portunus* Weber, 1795**

?*Portunus* sp. [generic identification highly doubtful) [middle Eocene, Citrus County] (Ivany *et al.*, 1990; Portell, 2004).

Superfamily CARPILIOIDEA Ortmann, 1893

Carpiliidae Ortmann, 1893

***Ocalina* † Rathbun, 1929**

Ocalina floridana † Rathbun, 1929 (type) [late Eocene of Alachua, Levy, and Marion Counties] (Rathbun, 1935b) (Fig. 15A–C).

***Paraocalina* † Beschin, Busulini, De Angeli and Tessier, 2007**

Paraocalina brodkorbi † (Lewis and Ross, 1965) (as *Palaeocarpilius brodkorbi*) [late Eocene, Alachua County] (Fig. 15D, E).

Superfamily ERIPHIOIDEA MacLeay, 1838

Menippidae Ortmann, 1893

***Menippe* De Hann, 1833**

Menippe mercenaria (Say, 1818) [late Pleistocene, Pinellas County] (Portell and Schindler, 1991) (Fig. 15G, H).
Menippe nodifrons Stimpson, 1859 [early Pleistocene, Glades County] (Rathbun, 1935b; Portell, 2004).

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Pilumninae Samouelle, 1819

***Pilumnus* Leach, 1816**

Pilumnus sp. [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Subsection THORACOTREMATA Guinot, 1977

Superfamily OCYPODOIDEA Rafinesque, 1815
Ocypodidae Rafinesque, 1815

***Ocypode* Weber, 1795**

Ocypode quadrata (Fabricius, 1787) [late Pleistocene-Holocene, Brevard County] (Rathbun, 1935b; Portell *et al.*, 2003).

***Uca* Leach, 1814**

Uca sp. [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Superfamily PINNOTHEROIDEA De Haan, 1833

Pinnotheridae De Haan, 1833

Pinnothereliinae Alcock, 1900a

***Pinnixa* White, 1846**

Pinnixa sp. [middle Pleistocene, Okeechobee County] (Agnew, 2001; Portell and Agnew, 2004).

Caribbean Islands & Bermuda

ANGUILLA

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa earlei † Withers, 1924a [early Miocene, Cartouche Bay] (reported *in* Withers, 1924a, as late Oligocene; see also Collins *et al*. 2009c).
Calappa sp. (claw only) [early Miocene, Cathedral Cave] (Collins *et al.*, 2009c).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Parthenope* Weber, 1795**

Parthenope sp. (claw fragment) [early Miocene, Cartouche Bay] (as late Oligocene *in* Withers, 1924a; see also Collins *et al.*, 2009c).

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Scylla* De Haan, 1833**

Scylla costata † Rathbun, 1919 (claws only) [early Miocene, West side of Road Bay] (as late Oligocene *in* Withers, 1924a).

Podophthalminae Dana, 1851d

***Psygmophthalmus* † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c**

Psygmophthalmus bifurcatus † Collins *in* Collins *et al.*, 2009c [early Miocene, Betty Hill Quarry].

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Panopeus* H. Milne Edwards, 1834**

Panopeus sp. (claw fragment) [early Miocene, Cartouche Bay] (reported *in* Withers, 1924a as late Oligocene; see also Collins *et al*. 2009c).

Brachyura *incertae sedis*

Brachyuran indet. (‘*Lyreidus fastigatus*’, claw fragment) [Miocene, Crocus Bay] (Feldmann, 1992) [Note 1].

Note 1. A partial crab merus from Anguilla, initially described as representing the raninoid *Lyreidus fastigatus* Rathbun, 1919, was later removed from the genus by Feldmann (1992) based on the dissimilar nature of the merus to *Lyreidus*. Due to the poor and fragmentary nature of the material, it cannot be assigned to a particular group with certainty, thus we consider it here as ‘Brachyura *incertae sedis*’.

ANTIGUA

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

***Coenobita* Latreille, 1829**

Coenobita sp. cf. *C. clypeatus* (Fabricius, 1787) [late Holocene, Burma Quarry] (Luque, 2017)) [Note 1].

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

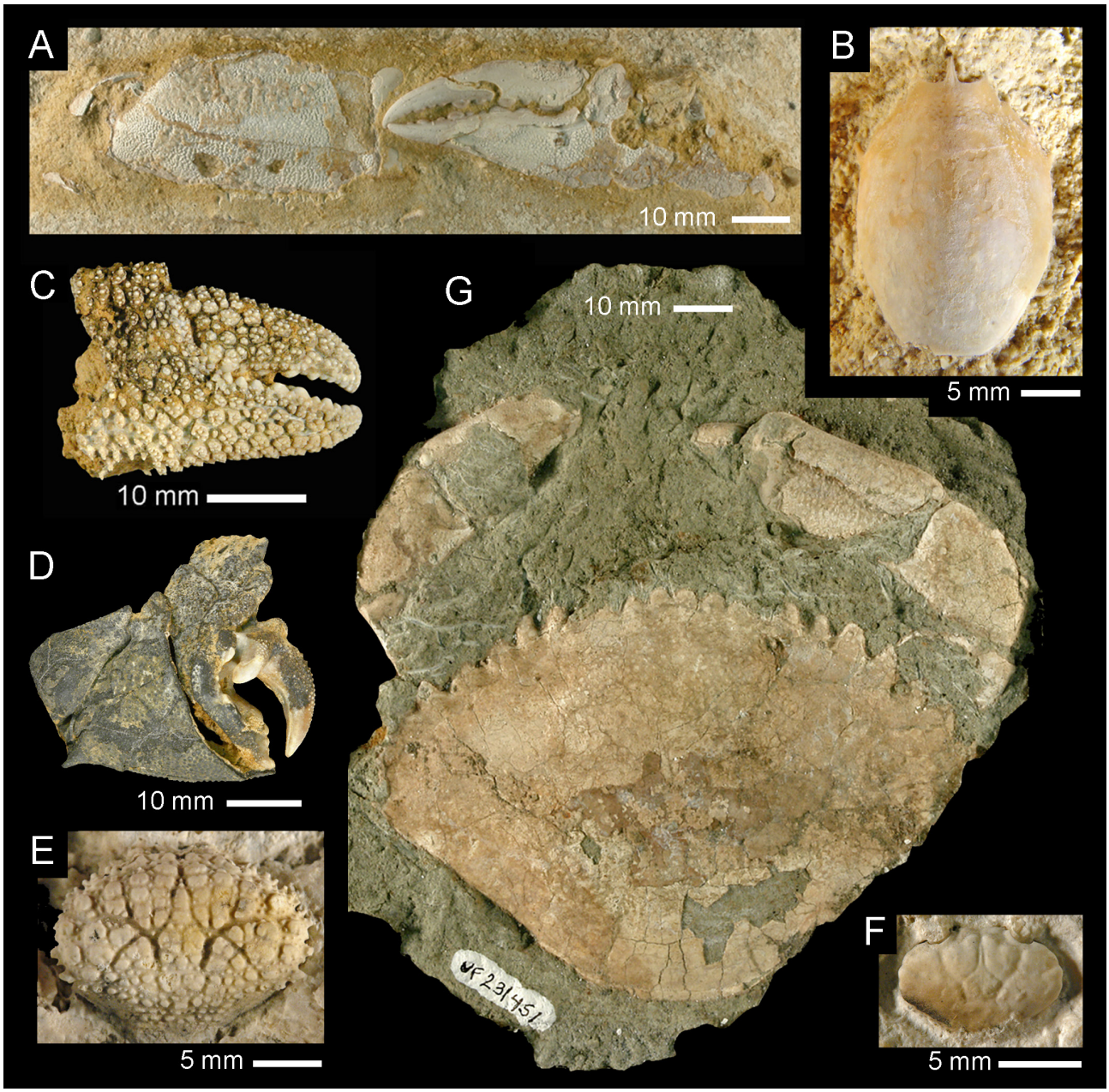

Figure 16. Fossil Anomura and Brachyura from the Neogene of the Caribbean. Antigua: A, Brachyura: Portunoidea: Portunidae: *Necronectes summus* Collins and Donovan, 1995, external view of chelipeds of UF 242593 embedded in limestone, Free Town, parish of Saint Philip. Curaçao: B, Brachyura: Raninoidea: Raninidae: *Ranilia constricta* (Milne-Edwards, 1880b), dorsal view of carapace of UF 227321, Saint Michiel. Jamaica: C, Anomura: Paguroidea: Diogenidae: *Petrochirus bahamensis* (Herbst, 1791), external view of right fixed finger and dactylus of UF 273849, Fort, parish of St. Thomas. D, Brachyura: Calappoidea: Calappidae: *Calappa springeri* Rathbun, 1931, external view of right carpus, propodus, and dactylus of UF 273851, Fort, parish of St. Thomas. E, Dairoidea; Dairidae: *Daira vulgaris* Portell and Collins, 2004, dorsal view of carapace, holotype, UF 68349, Duncans, parish of Trelawny. F, Xanthoidea: Panopeidae: *Lophopanopeus corallinus* Portell and Collins, 2004, dorsal view of carapace, holotype, UF 106702, Duncans, parish of Trelawny. Puerto Rico: G, Portunoidea: Portunidae: *Necronectes collinsi* Schweitzer *et al.*, 2006c, dorsal view of carapace of UF 231451, San Sebastian. Photos courtesy of Sean Roberts (FLMNH). All specimens dry, uncoated.

Calappidae De Haan, 1833

***Mursia* Leach *in* Desmarest, 1823**

Mursia granulosa † Collins and Donovan, 2002 [late Oligocene, locality unknown] (Collins and Donovan, 2002, p. 145).

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815
Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes summus † Collins and Donovan, 1995 [late Oligocene, Nonsuch Bay] (Fig. 16A).

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Cardisoma* Latreille, 1828**

Cardisoma sp. cf. *C. guanhumi* Latreille, 1828 [late Holocene, Burma Quarry] (Luque, 2017) [Note 1].

***Gecarcinus* Leach, 1814 [in Leach, 1813–1815]**

Gecarcinus sp. aff. *G. lateralis* (Freminville, 1835) [late Holocene, Burma Quarry] (Luque, 2017) [Note 1].

Note 1. To date, these represent the first records of fossil anomurans and thoracotreme brachyurans from the island, and they are among the only fossil remains of *Coenobita*, *Gecarcinus*, and *Cardisoma* worldwide (Luque, 2017).

ARUBA

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Calappidae De Haan, 1833

***Mursia* Leach *in* Desmarest, 1823**

Mursia creutzbergi † Collins and Donovan, 2004 [Miocene-Pliocene, Rooi Taki].

BAHAMAS

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Gecarcinus* Leach, 1814 [in Leach, 1813–1815]**

Gecarcinus sp. [late Holocene, San Salvador] (Locatelli, 2013).

BARBADOS

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Epialtidae MacLeay, 1838

Pisinae Dana, 1851b

***Herbstia* H. Milne Edwards, 1834**

Herbstia exserta † Collins and Morris, 1976 [middle to late Pleistocene, Coral Rock].

Mithracidae MacLeay, 1838

***Maguimithrax* Klompmaker *et al.*, 2015**

Maguimithrax spinosissimus (Lamarck, 1818) [middle to late Pleistocene, Highgate] (Collins and Morris, 1976).

Mithrax Desmarest, 1823

Mithrax hemphilli Rathbun, 1892 [middle to late Pleistocene, Highgate] (Collins and Morris, 1976).
Mithrax hispidus (Herbst, 1790) [as *Mithrax caribbaeus* Rathbun, 1920a] [middle to late Pleistocene, Gibbons] (Collins and Morris, 1976).
Mithrax aculeatus (Herbst, 1790) (as *Mithrax verrucosus in* H. Milne Edwards, 1832) [middle to late Pleistocene of Gibbons, Clapham and Garrison] (Collins and Morris, 1976).

Teleophrys Stimpson, 1860

Teleophrys ruber (Stimpson, 1871, as *Mithraculus ruber*) [middle to late Pleistocene, Gibbons] (Collins and Morris, 1976).

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Atoportuninae Števčić, 2005

Laleonectes Manning and Chace, 1990

Laleonectes vocans (A. Milne-Edwards, 1878) [middle to late Pleistocene, Coral Rock].

Portuninae Rafinesque, 1815

Achelous De Haan, 1833

Achelous gibbesii (Stimpson, 1862) [middle to late Pleistocene, Coral Rock].

Superfamily CARPILIOIDEA Ortmann, 1893

Carpiliidae Ortmann, 1893

Carpilius Desmarest, 1823

Carpilius corallinus (Herbst, 1783) [middle to late Pleistocene, Coral Rock] (*in* Collins *et al.*, 2009c).

Superfamily GONEPLACOIDEA MacLeay, 1838

Chasmocarcinidae Serène, 1964

Chasmocarcininae Serène, 1964

Falconoplax † Van Straelen, 1933b

Falconoplax bicarinella † Collins and Morris, 1976 [early-middle Eocene Scotland Beds, Spa].

Superfamily HEXAPODOIDEA Miers, 1886

Hexapodidae Miers, 1886

Palaeopinnixa † Vía Boada, 1966

Palaeopinnixa perornata † Collins and Morris, 1976 (type) [early-middle Eocene Scotland Beds, Spa].

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Pilumninae Samouelle, 1819

Pilumnus Leach, 1816

Pilumnus sp. (claw fragment) [Pleistocene, Clapham] (Collins and Morris, 1976).

Superfamily XANTHOIDEA MacLeay, 1838

Xanthidae MacLeay, 1838

Actaeinae Alcock, 1898

Paractaea Guinot, 1969

Paractaea nodosa (Stimpson, 1860) [Pleistocene, Coral Rock] (as *Actaea rufopunctata in* Collins and Morris, 1976).

BERMUDA

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Cardisoma* Latreille, 1828**

Cardisoma sp. cf. *C. guanhumi* Latreille, 1828 [late Pleistocene, Crystal Cave] (Luque, 2017) [Note 1].

***Gecarcinus* Leach, 1814 [*in* Leach, 1813–1815]**

Gecarcinus sp. [late Pleistocene, Admiral Cave] (Luque, 2017; FLMNH online database [Note 1].

Note 1. To our knowledge, these represent the first records of fossil decapods from Bermuda (Luque, 2017). The generic affinities of the several hundreds of Bermudan '*Gecarcinus*' sp. fossil remains in the FLMNH Invertebrate Paleontology Collections are still to be confirmed, especially due to the potential occurrence of other non-congeneric terrestrial and semi-terrestrial crabs (J. Luque and R.W. Portell, pers. obs.).

BONAIRE

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Superfamily CALAPPOIDEA De Haan, 1833

Calappidae De Haan, 1833

***Calappilia* † A. Milne-Edwards, 1873**

Calappilia bonairensis † Van Straelen, 1933a [middle to late Eocene (Lutetian-Priabonian), southwest of Seroe Montagne].

Superfamily CHEIRAGONOIDEA Ortmann, 1893

Cheiragonidae Ortmann, 1893

***Montezumella* † Rathbun, 1930**

Montezumella rutteni † Van Straelen, 1933a [middle to late Eocene (Lutetian-Priabonian), southwest of Seroe Montagne] (also reported *in* Collins and Donovan, 2005).

Superfamily CARPILIOIDEA Ortmann, 1893

Carpiliidae Ortmann, 1893

***Ocalina* † Rathbun, 1929**

Ocalina sublevis † Collins and Donovan, 2005 [middle to late Eocene (Lutetian-Priabonian), southwest of Seroe Montagne].

CUBA

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Paguridae Latreille, 1802

Paguridae indet. [late Pleistocene, US Guantanamo Bay Naval Station] (Collins *et al.*, 2009c).

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninae De Haan, 1839

***Vegaranina* † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a**

Vegaranina precocia † (Feldmann, Vega, Tucker, García-Barrera and Avendaño 1996, as *Lophoranina precocious*) (type) [Maastrichtian, Cienfuegos Province] (Varela and Rojas-Consuegra, 2009).

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides sp. [early Miocene, Matanzas Province] (*in* Varela and Rojas-Consuegra, 2011b).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Epialtidae MacLeay, 1838

Pisinae Dana, 1851b
***Libinia* Leach, 1815**

Libinia sp. [?Oligocene–Miocene, locality unknown] (Varela, 2013).

Mithracidae MacLeay, 1838

***Mithrax* Desmarest, 1823**

Mithrax hispidus (Herbst, 1790) [as *M. caribbaeus in* Rathbun, 1920a) [Pliocene–Pleistocene, La Habana] (see also Peñalver *et al.*, 1997).
?*Mithrax* sp. [late Pliocene, Matanzas Province and Sancti Spíritus Provinces] (Varela and Rojas Consuegra, 2009; Varela, 2013).

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus sp. [early Miocene, Matanzas Province] (*in* Varela and Rojas-Consuegra, 2011b).

***Eriosachila* † Blow and Manning, 1996**

Eriosachila cubaensis † Varela and Rojas-Consuegra, 2011a [early Miocene, Matanzas Province].

Calappidae De Haan, 1833

Calappidae indet. [late Pleistocene, US Guantanamo Bay Naval Station] (Collins *et al.*, 2009c).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Persephona* Leach, 1817**

Persephona sp. (merus fragment) [early Miocene, Sancti Spíritus Province] (*in* Varela and Rojas-Consuegra, 2009).

***Iliacantha* Stimpson, 1871**

Iliacantha sp. cf. *I. liodactylus* Rathbun, 1898 [early Miocene, Matanzas Province] (*in* Varela and Rojas-Consuegra, 2011b).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Spinolambrus* Tan and Ng, 2007**

Spinolambrus lazaroi † Varela, 2013 [early Miocene, Matanzas Province].

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes collinsi † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c [early Miocene, Matanzas Province] (Varela and Rojas-Consuegra, 2011b).

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphylax domingensis † (Rathbun, 1919) [early Miocene, Matanzas Province] (Schweitzer *et al.*, 2006c; Varela and Rojas-Consuegra, 2011c).

Paraeuphylax † Varela and Schweitzer, 2011

Paraeuphylax cubaensis † (type) Varela and Schweitzer, 2011 [early Miocene, Matanzas Province].

Portuninae Rafinesque, 1815

Arenaeus Dana, 1851d

Arenaeus sp. [early Miocene, Sancti Spíritus Province] (Varela, 2013).

Callinectes Stimpson, 1862

Callinectes sp. [early Miocene, Sancti Spíritus Province] (Varela, 2013).

Portunus Weber, 1795

Portunus oblongus † Rathbun, 1920b [early Miocene, Matanzas Province] (Varela and Rojas-Consuegra, 2009).

Portunus sp. (claw fragments) [early Miocene, Sancti Spíritus Province] (Schweitzer *et al.*, 2006c; Varela and Rojas-Consuegra, 2011c).

Superfamily ERIPHIOIDEA MacLeay, 1838

Eriphiidae MacLeay, 1838

Eriphia Latreille, 1817

Eriphia sp. [early Miocene, Sancti Spíritus Province] (Varela, 2013).

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeidae indet. [late Pleistocene, US Guantanamo Bay Naval Station] (Collins *et al.*, 2009c).

Panopeinae Ortmann, 1893

Eurytium Stimpson, 1859

Eurytium sp. [early Miocene, Sancti Spíritus Province] (Varela, 2013).

Panopeus H. Milne Edwards, 1834

Panopeus sp. [early Miocene, Sancti Spíritus Province] (Varela and Rojas-Consuegra, 2009; Varela and Rojas-Consuegra, 2011c).

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

Gecarcinus Leach, 1814 [in Leach, 1813–1815]

Gecarcinus ruricola (Linnaeus, 1758) [late Pleistocene, Matanzas Province] (identified by Mary J. Rathbun *in* Richards, 1935).

CURAÇAO

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Notopodinae Serène and Umali, 1972

Ranilia H. Milne Edwards, 1837

Ranilia constricta (A. Milne-Edwards, 1880b) [Pliocene, Salina Sint Michiel] (Stepp, 2014) (Fig. 16B).

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

Raninoides H. Milne Edwards, 1837

Raninoides lamarcki A. Milne-Edwards and Bouvier, 1923 [Pliocene, Salina Sint Michiel] (Stepp, 2014).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Mithracidae MacLeay, 1838

***Maguimithrax* Klompmaker *et al.*, 2015**

Maguimithrax spinosissimus (Lamarck, 1818) [Pliocene, Salina Sint Michael] (Stepp, 2014; Klompmaker *et al.*, 2015).

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus lineatinus † Collins and Todd *in* Todd and Collins, 2005 [Pliocene, Salina Saint Michiel] (Stepp, 2014).

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa galloides Stimpson, 1859 [Pliocene, Salina Sint Michiel] (Stepp, 2014).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Myropsis* Stimpson, 1871**

Myropsis quinquespinosa Stimpson, 1871 [Pliocene, Salina Sint Michiel] (Stepp, 2014)

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Portuninae Rafinesque, 1815

***Achelous* De Haan, 1833**

Achelous sebae (H. Milne Edwards, 1834) [Pliocene, Salina Sint Michiel] (Stepp, 2014).

DOMINICAN REPUBLIC

Infraorder ANOMURA MacLeay, 1838

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

***Dardanus* Paul'son, 1875**

Dardanus squamatus † Collins *in* Collins *et al.*, 2009c [late Miocene–early Pliocene, Río Gurabo and Río Mao].

***Petrochirus* Stimpson, 1858**

Petrochirus inequalis † Rathbun, 1919 [Pleistocene, Rio Gurabo and Santo Domingo] (Collins *et al.*, 2009c).

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus guraboensis † Collins *in* Collins *et al.*, 2009c [late Miocene, Rio Gurabo, Rio Cana and Rio Mao].

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa flammea (Herbst, 1794) [late Miocene, Rio Gurabo and Santo Domingo] (Collins *et al.*, 2009c).
Calappa sp. [late Miocene–early Pliocene, Rio Gurabo] (Collins *et al.*, 2009c).

***Cryptosoma* Brullé, 1839**

Cryptosoma bairdii (Stimpson, 1862) [late Miocene, Rio Gurabo] (Collins *et al.*, 2009c).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Persephona* Leach, 1817**

Persephona prepunctata † Rathbun, 1919 [late Miocene, Rio Gurabo and Rio Mao].

***Iliacantha* Stimpson, 1871**

Iliacantha sp. [early Miocene, Rio Gurabo] (Collins *et al.*, 2009c).

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Mesorhoea* Stimpson, 1871**

Mesorhoea mauryae † Rathbun, 1919 [late Miocene–early Pliocene, Río Cana and Santo Domingo] (Collins *et al.*, 2009c).

***Platylambrus* Stimpson, 1871**

Platylambrus obscura † Rathbun, 1919 [Miocene, Santo Domingo].

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Scylla* De Haan, 1833**

Scylla costata † Rathbun, 1919 [Miocene, valley of Yaque del Norte River] [Note 1].

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphylax domingensis † (Rathbun, 1919, as *Podophthalmus domingensis*) [Miocene, valley of Yaque del Norte River] [Note 1].

***Psygmophthalmus* † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c**

Psygmophthalmus bifurcatus † Collins *in* Collins *et al.*, 2009c [age uncertain, Rio Cana].

***Sandomingia* † Rathbun, 1919**

Sandomingia yaquiensis † Rathbun, 1919 [late Miocene–early Pliocene, Río Cana and Rio Yaque del Norte] (Collins *et al.*, 2009c) [Note 1].

Portuninae Rafinesque, 1815

***Callinectes* Stimpson, 1862**

Callinectes declivis † Rathbun, 1918 (fingers only) [late Miocene, Rio Gurabo and Rio Mao, Santo Domingo] (*in* Collins *et al.*, 2009c).

***Portunus* Weber, 1795**

Portunus gabbi † Rathbun, 1919 [Miocene, valley of Yaque del Norte River] [Note 1].
Portunus oblongus † Rathbun, 1920b [late Miocene–early Pliocene, Río Cana].
Portunus tenuis † Rathbun, 1919 (type) (claws only) [Miocene of Yaque Valley, Santo Domingo].

***Rathbunites* † Schweitzer, Dworschak and Martin, 2011 (as *Rathbunella in* Collins *et al.*, 2009c, name preoccupied)**

Rathbunites pentaspinosa (Collins *in* Collins *et al.*, 2009c) (type) [late Miocene–early Pliocene, Río Cana].

Superfamily CARPILIOIDEA Ortmann, 1893

Tumidocarcinidae † Schweitzer, 2005a

***Lobonotus* † A. Milne-Edwards, 1863**

Lobonotus sculptus † A. Milne-Edwards, 1863 (as *Archaeopilumnus caelatus in* Rathbun, 1919) [late Miocene, Rio Gurabo] (Rathbun, 1919; 1920b; Collins *et al.*, 2009c; Ossó *et al.*, 2014).

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Pilumninae Samouelle, 1819

***Pilumnus* Leach, 1816**

Pilumnus subequus † Rathbun, 1919 (claws only) [Miocene of Yaque Valley, Santo Domingo] [Note 1].

Pilumnus sp. [late Miocene, Rio Gurabo] (Collins *et al.*, 2009c).

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Eurypanopeus* A. Milne-Edwards, 1880a**

Eurypanopeus sp. aff. *E. crenatus* H. Milne Edwards, 1834 [age uncertain, Rio Cana] (Collins *et al.*, 2009c).

***Panopeus* H. Milne Edwards, 1834**

Panopeus sp. [late Miocene, Rio Gurabo] (Collins *et al.*, 2009c).

Note 1. As previously noted by Collins *et al.* (2009c, p. 62), Rathbun (1919) reported a handful of fossil crabs [*Scylla costata*, *Portunus gabbi*, *Euphylax dominguensis* (as *Podophthalmus*), and *Sandomingia yaquiensis*] from Haiti, but they originate from lower Miocene rocks exposed along the "Lower half of the valley of the Yaqui [*sic*] del Norte River, in the northern part of Santo Domingo" in the Dominican Republic.

THE GRENADINES

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa sp. cf. *C. springeri* (Rathbun, 1931) [middle Miocene, Carriacou] (Donovan *et al.*, 2003; Collins *et al.*, 2009c).

Superfamily ERIPHIOIDEA MacLeay, 1838

Platyxanthidae Guinot, 1977

***Platyxanthus* A. Milne-Edwards, 1863**

Platyxanthus sp. [middle Miocene, Carriacou] (Collins *et al.*, 2009c).

HAITI

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Eubrachyuran indet. (claw) (as ?*Zanthopsis* indet. *in* Rathbun, 1923a) [Eocene, Artibonite department] [Note 1].

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Mithracidae MacLeay, 1838

***Mithrax* Desmarest, 1823**

?*Mithrax* sp. [Pleistocene, Môle St. Nicolas in Nord-West department] (Rathbun, 1923a) [Note 2].

Superfamily PARTHENOPOIDEA MacLeay, 1838

?Parthenopoid indet. (claw fragment) [early Miocene, Centre department] [Note 1].

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Portuninae Rafinesque, 1815

Portunus Weber, 1795

Portunus haitensis † Rathbun, 1923a [early Miocene, Centre department] [Note 2].

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

Panopeus H. Milne Edwards, 1834

?*Panopeus* sp. indet. (fingers only) [early Miocene, Centre department] (Rathbun, 1923a) [Note 1].

Note 1. Rathbun (1923a) assigned some fossil cheliped fragments from Haiti to *Parthenope*, *Panopeus*, and '*Zanthopsis*' with uncertainty. Indeed, the generic and familial placements need to be re-examined.

Note 2. As previously noticed by Collins *et al.* (2009c, p. 62), a handful of fossil crabs reported by Rathbun (1919) as coming from Haiti are in fact from the Miocene of Dominican Republic.

JAMAICA

Infraorder ANOMURA MacLeay, 1838

Superfamily GALATHEOIDEA Samouelle, 1819

Porcellanidae Haworth, 1825

Petrolisthes Stimpson, 1858

Petrolisthes sp. [late Pleistocene, parish of St. Ann] (Morris, 1993).

Superfamily HIPPOIDEA Latreille, 1825

Albuneidae Stimpson, 1858

Albunea Weber, 1975

Albunea sp. [late Pleistocene, parish of St. Ann) (Morris, 1993).

Superfamily PAGUROIDEA Latreille, 1802

Diogenidae Ortmann, 1892

Dardanus Paul'son, 1875

Dardanus portmorantensis † Collins and Donovan, 2012 [Pleistocene, parish of St. Thomas].

Petrochirus Stimpson, 1858

Petrochirus bahamensis (Herbst, 1791) [late Pliocene to late Pleistocene, parish of St. Thomas] (Collins and Portell, 1998; Collins *et al.*, 2009a; Collins and Donovan, 2012) (Fig. 16C).
Petrochirus sp. [late Pleistocene, parish of St. Ann] (Morris, 1993).

Paguristes Dana, 1851c

Paguristes sp. cf. *P. lymanni* A. Milne-Edwards and Bouvier, 1893 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).
Paguristes sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Infraorder BRACHYURA Latreille, 1802

Superfamily HOMOLODROMIOIDEA Alcock, 1900b

Goniodromitidae † Beurlen, 1932

***Trechmannius* † Collins and Donovan, 2006**

Trechmannius circularis † Collins and Donovan, 2006 (type) [early Paleocene, parish of Portland].

Superfamily DROMIOIDEA De Haan, 1833

Dynomenidae Ortmann, 1892

***Dynomene* Desmarest, 1823**

Dynomene variabilis † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

***Kromtitis* † Müller, 1984**

Kromtitis spinulata † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

Superfamily PALAEOCORYSTOIDEA †

Lőrenthey *in* Lőrenthey and Beurlen, 1929

Palaeocorystidae † Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Cretacoranina* † Mertin, 1941**

Cretacoranina trechmanni † (Withers, 1927, as *Ranina trechmanni*) [Maastrichtian, parish of St. James] (Morris, 1993).

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninoidinae Lőrenthey *in* Lőrenthey and Beurlen, 1929

***Raninoides* H. Milne Edwards, 1837**

Raninoides louisianensis Rathbun, 1933 [Pleistocene, late Pleistocene, parish of St. Thomas] (Collins and Donovan, 1998).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily MAJOIDEA Samouelle, 1819

Epialtidae MacLeay, 1838

Pisinae Dana, 1851b

***Chlorilia* Dana, 1851b**

Chlorilia sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

***Libinia* Leach, 1815**

Libinia milnei (Collins and Donovan, 2012) [Pleistocene, parish of Portland].

***Pitho* Bell, 1836**

Pitho anisodon (von Martens, 1872) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997).
Pitho sp. (claw dactylus) [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

***Rochinia* A. Milne-Edwards, 1875**

Rochinia sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Mithracidae MacLeay, 1838

***Damithrax* Windsor and Felder, 2014**

Damithrax unguis † (Portell and Collins, 2004, as *Mithrax unguis*) [early Miocene, parish of Trelawny] (Klompmaker *et al.*, 2015).

***Maguimithrax* Klompmaker *et al.*, 2015**

Maguimithrax spinosissimus (Lamarck, 1818) [late Pleistocene, parish of St. Ann] (Morris, 1993).

***Mithraculus* White, 1847**

Mithraculus forceps A. Milne-Edwards, 1875 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a) [Note 1].
Mithraculus sp. aff. *M. coryphe* (Herbst, 1790) [late Miocene, parish of St. Thomas] (Collins *et al.*, 2010).
Mithraculus sp. cf. *M. forceps* A. Milne-Edwards, 1875 [late Pleistocene, parish of St. Ann] (Morris, 1993).

***Mithrax* Desmarest, 1823**

Mithrax arawakum † Klompmaker *et al.*, 2015 [early Miocene, parish of Trelawny].
Mithrax sp. cf. *M. hispidus* (Herbst, 1790) [= *M. caribbaeus* Rathbun, 1920a] [late Pleistocene, parish of St. Ann] (Morris, 1993).
Mithrax aculeatus (Herbst, 1782–1804) (= *M. verrucosus*

H. Milne Edwards, 1832) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).

***Nemausa* A. Milne-Edwards, 1875**

Nemausa acuticornis (Stimpson, 1871) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).
Nemausa donovani † (Portell and Collins, 2004, as *Mithrax donovani*) [early Miocene, parish of Trelawny].
Nemausa windsorae † Klompmaker *et al.*, 2015 [early Miocene, parish of Trelawny].

Teleophrys Stimpson, 1860

Teleophrys acornis † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

Oregoniidae Garth, 1958

***Hyas* Leach, 1814 [in Leach, 1813–1815]**

Hyas sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus praecox † Collins, Donovan and Dixon, 1997 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).
Hepatus sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa sp. cf. *C. gallus* (Herbst, 1803) [late Pleistocene, parish of St. Ann] (Morris, 1993).
Calappa springeri Rathbun, 1931 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997) (Fig. 16D).
Calappa sp. aff. *C. springeri* Rathbun, 1931 [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Persephona* Leach, 1817**

Persephona punctata (Linnaeus, 1758) [late Pleistocene, parish of St. Thomas) (Collins *et al.*, 1997).
Persephona sp. aff. *P. punctata* (Linnaeus, 1758) [late Pliocene, parish of St. Ann) (Morris, 1993).
?*Persephona* sp. [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).

***Uhlias* Stimpson, 1871**

Uhlias sp. cf. *U. limbatus* Stimpson, 1871 [late Pleistocene, parish of St. Ann) (Morris, 1993).

Leucosiidae *incertae sedis*

***Duncanitrix* † Schweitzer, Dworschak and Martin, 2011 [=*Duncania* Portell and Collins, 2004]**

Duncanitrix jamaicensis † (Portell and Collins, 2004) [early Miocene, parish of Trelawny].

Superfamily PARTHENOPOIDEA MacLeay, 1838

Parthenopidae MacLeay, 1838

Parthenopinae MacLeay, 1838

***Mesorhoea* Stimpson, 1871**

Mesorhoea sp. aff. *M. sexspinosa* Stimpson, 1871 [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

***Platylambrus* Stimpson, 1871**

Platylambrus sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Superfamily CANCROIDEA Latreille, 1802

Cancridae Latreille, 1802

Cancrinae Latreille, 1802

***Cancer* Linnaeus, 1758**

Cancer sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Superfamily PORTUNOIDEA Rafinesque, 1815

Carcineretidae † Beurlen, 1930

***Carcineretes* † Withers, 1922**

Carcineretes woolacotti † Withers, 1922 [Maastrichtian, parishes of Clarendon and St. James].

Ovalipidae Spiridonov *et al.*, 2014

***Ovalipes* Rathbun, 1898**

Ovalipes sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Portunidae Rafinesque, 1815

Atoportuninae Števčić, 2005

***Laleonectes* Manning and Chace, 1990**

Laleonectes vocans (A. Milne-Edwards, 1878) [late Pleistocene, parish of St. Thomas] (as P*ortunus vocans*, in Collins *et al.*, 2009).

Podophthalminae Dana, 1851d

***Euphylax* Stimpson, 1862**

Euphylax fortispinosus † Collins, Donovan, Lindsay and Simpson, 2001 [early Pleistocene, parish of St. Thomas] (Collins e*t al.*, 2009c).

Portuninae Rafinesque, 1815

***Achelous* De Haan, 1833**

Achelous sebae (H. Milne Edwards, 1834) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).

***Callinectes* Stimpson, 1862**

Callinectes jamaicensis † Withers, 1924b (claw fragment only) [middle Eocene (Lutetian), parish of Hanover] (Morris, 1993).

Callinectes sp. aff. *C. sapidus* Rathbun, 1896 [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Callinectes sp. cf. *C. toxodes* Ordway, 1863 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997).

***Portunus* Weber, 1795**

Portunus sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

***Pseudoachelous* † Portell and Collins, 2004**

Pseudoachelous schindleri † Portell and Collins, 2004 (type) [early Miocene, parish of Trelawny].

Superfamily CARPILIOIDEA Ortmann, 1893

Carpiliidae Ortmann, 1893

***Carpilius* Desmarest, 1823**

Carpilius corallinus (Herbst, 1783) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).

***Ocalina* † Rathbun, 1929**

Ocalina haldixoni † Collins and Donovan, 2006 [middle to late Eocene, parish of Portland].

Palaeoxanthopsidae † Schweitzer, 2003

?Palaeoxanthopsidae *incertae sedis* † (as *Necrocarcinus* sp. *in* Morris, 1993) [?Maastrichian, unknown] [Note 2].

***Palaeoxanthopsis* † Beurlen, 1958b**

Palaeoxanthopsis sp. † (as ?*Paranecrocarcinus* sp. *in*

Morris, 1993, fig. 1.6) [?Maastrichian, unknown] [Note 2].

Superfamily DAIROIDEA Serène, 1965

Dairidae Serène, 1965

***Daira* De Haan, 1833**

Daira vulgaris † Portell and Collins, 2004 [early Miocene, parish of Trelawny] (Fig. 16E)

Superfamily ERIPHIOIDEA MacLeay, 1838

Eriphiidae MacLeay, 1838
***Eriphia* Latreille, 1817**

Eriphia gonagra xaymacaensis † Collins and Donovan, 1998 (type) [late Pleistocene, parish of St. Thomas].
Eriphia sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Superfamily PILUMNOIDEA Samouelle, 1819

Pilumnidae Samouelle, 1819

Pilumninae Samouelle, 1819

***Pilumnus* Leach, 1816**

Pilumnus sp. aff. *P. pannosus* Rathbun, 1898 [late Pliocene, parish of St. Thomas].
Pilumnus sp. aff. *P. sayi* Rathbun, 1897a [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997).
Pilumnus sp. aff. *P. spinossimus* Rathbun, 1898 [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

Superfamily TRAPEZIOIDEA Miers, 1886

Trapeziidae Miers, 1886

***Trapezia* Latreille, 1828**

Trapezia prisca † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Eurypanopeus* A. Milne-Edwards, 1880a**

Eurypanopeus abbreviatus (Stimpson, 1860) [late Pleistocene, parish of St. Ann] (Morris, 1993).
Eurypanopeus sp. cf. *E. depressus* (Smith, 1869b) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997; Collins and Donovan, 2012).
Eurypanopeus sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

***Eurytium* Stimpson, 1859**

Eurytium sp. cf. *E. limosum* (Say, 1818) [late Pliocene to late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997; 2009c; Collins and Portell, 1998).

***Hexapanopeus* Rathbun, 1898**

Hexapanopeus caribbaeus (Stimpson, 1871) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 1997).

***Lophopanopeus* Rathbun, 1898**

Lophopanopeus corallinus † Portell and Collins, 2004 [early Miocene, parish of Trelawny] (Fig. 16F).
Lophopanopeus toomeyorum † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

***Neopanope* A. Milne-Edwards, 1880a**

Neopanope sp. [late Pliocene, parish of St. Thomas] (Collins and Portell, 1998).

***Panopeus* H. Milne Edwards, 1834**

Panopeus herbstii H. Milne Edwards, 1834 (claw only) [late Pliocene-late Pleistocene, parishes of St. Thomas and St. Ann] (Morris, 1993; Collins and Portell, 1998).

Panopeus nanus † Portell and Collins, 2004 [early Miocene, parish of Trelawny].
Panopeus rugosus A. Milne-Edwards, 1880b (claw only) [late Pleistocene, parish of St. Thomas] (Collins and Donovan, 2012).

***Tetraxanthus* Rathbun, 1898**

Tetraxanthus sp. [late Pliocene, parish of St. Thomas] (Collins *et al.*, 2009) (listed in Collins and Portell, 1998 as aff. *Eurypoda* sp.).

Pseudorhombilidae Alcock, 1900a

***Nanoplax* Guinot, 1967**

Nanoplax xanthiformis (A. Milne-Edwards, 1880b) [late Pleistocene, parish of St. Thomas] (Collins and Portell, 1998).

Xanthidae MacLeay, 1838

Actaeinae Alcock, 1898

***Actaea* De Haan, 1833**

Actaea acantha (H. Milne Edwards, 1834) [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).
Actaea bifrons Rathbun, 1898 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).

***Actaeops* † Portell and Collins, 2004**

Actaeops frontalis † Portell and Collins, 2004 (type) [early Miocene, parish of Trelawny].

Chlorodiellinae Ng and Holthuis, 2007

***Chlorodiella* Rathbun, 1897b (= *Chlorodius* H. Milne Edwards, 1834)**

Chlorodiella occidentalis † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

Xanthinae MacLeay, 1838

***Leptodius* A. Milne-Edwards, 1863**

Leptodius granulatus † Portell and Collins, 2004 [early Miocene, parish of Trelawny].

***Micropanope* Stimpson, 1871**

?*Micropanope nuttingi* (Rathbun, 1898) [late Pleistocene, parish of St. Thomas] (Collins and Portell, 1998).
Micropanope sp. cf. *M. polita* Rathbun, 1893 [late Pleistocene, parish of St. Ann] (Morris, 1993; Collins *et al.*, 2001).
Micropanope sp. cf. *M. spinipes* A. Milne-Edwards, 1988a [late Pliocene to late Pleistocene, parishes of St. Thomas and St. Ann] (Morris, 1993; Collins and Portell, 1998).
Micropanope pulcherrima † Portell and Collins, 2004 [early Miocene, parish of Trelawny].
Micropanope sp. aff. *M. truncatifrons* Rathbun, 1898 [late Pleistocene, parish of St. Thomas] (Collins *et al.*, 2009a).

***Cycludius* Dana, 1851 (= *Phymodius* A. Milne-Edwards, 1863)**

Cycludius sp. cf. *C. maculatus* (Stimpson, 1860) [late Pleistocene, parish of St. Ann] (Morris, 1993).

Xanthoidea *incertae sedis*

?*Xanthilites rathbunae* † Withers, 1924b [middle Eocene (Lutetian), parish of Hanover] (Morris, 1993).

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Cardisoma* Latreille, 1828**

Cardisoma guanhumi Latreille, 1828 [late Pleistocene, parish of St. Thomas] (Collins and Donovan, 1998; 2012).

Grapsidae MacLeay, 1838

***Pachygrapsus* Randall, 1840**

Pachygrapsus sp. [late Pleistocene, parish of St. Ann] (Morris, 1993).

Sesarmidae Dana, 1851c

***Sesarma* Say, 1817**

Sesarma sp. cf. *S. cookei* Hartnoll, 1971 (as *S. primigenium in* Collins, Mitchell and Donovan, 2009b) [late Pleistocene, parish of St. Elizabeth] (Donovan and Dixon, 1998; Baalbergen and Donovan, 2013; Donovan, 2016) [Note 3].

Varunidae H. Milne Edwards, 1853

?*Varuna* H. Milne Edwards, 1830

?*Varuna* sp. [middle Eocene, parish of St. James] (Morris, 1993).

Superfamily OCYPODOIDEA Rafinesque, 1815

Ocypodidae Rafinesque, 1815

***Uca* Leach, 1814**

Uca sp. [late Pleistocene, parish of St. Ann] (Morris, 1993).

Note 1. Collins *et al.* (2009a) listed this taxon from the late Pliocene Bowden Formation in error.

Note 2. Two fragmentary dorsal carapaces from the Late Cretaceous (stage unknown) were assigned by Morris (1993) to the necrocarcinoids *Necrocarcinus* and ?*Paranecrocarcinus* (Morris, 1993, figs. 1.5 and 1.6, respectively), but both Jamaican specimens lack diagnostic features of the families Necrocarcinidae and Paranecrocarcinidae. The overall configuration of the carapace regions and grooves, the absence of longitudinal rows of tubercles axially and along the branchial regions, the lack of coarse granulations, and the absence of postrostral slits, preclude placement among *Necrocarcinus*, ?*Paranecrocarcinus*, or any genus or family of Necrocarcinoidea (Schweitzer *et al.*, 2016). The specimens seem better placed among the heterotremous Eubrachyura, particularly the family Palaeoxanthopsidae. The specimen referred to '?*Paranecrocarcinus*' seems congeneric with *Palaeoxanthopsis* Beurlen, 1958b, and shares some overall similarities with *P. tylotus* from the late Maastrichtian of Puerto Rico (Schweitzer *et al.*, 2008). The specimen reported as '*Necrocarcinus*' also has an overall palaeoxanthopsid appearance, but its systematic affinities are yet to be determined.

Note 3. Cheliped remains of *Sesarma* sp. cf. *S. cookei* from the late Pleistocene of Jamaica were initially identified as *Gecarcinus* cf. *ruricola* (Collins *in* Donovan and Dixon, 1998), later as belonging to *S. primigenium* (Collins *et al.*, 2009b), and more recently as *Sesarma* sp. cf. *S. cookei* (Baalbergen and Donovan, 2013; Donovan, 2016; Luque, 2017).

PUERTO RICO

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninae De Haan, 1839

***Vegaranina* † Van Bakel, Guinot, Artal, Fraaije and Jagt, 2012a**

Vegaranina precocia † (Feldmann, Vega, Tucker, García-Barrera and Avendaño 1996, as *Lophoranina precocious*) [late Maastrichtian, Sabana Grande] (Schweitzer *et al.*, 2008).

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa pavimenta † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c [early Miocene, San Sebastián].

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes collinsi Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c [Oligocene-Miocene, San Sebastián and Yauco] (Schweitzer *et al.*, 2008) (Fig. 16G).

Necronectes proavitus † (Rathbun, 1918) [Miocene, uncertain] (Gordon, 1966; Schweitzer *et al.*, 2006c).

***Scylla* De Haan, 1833**

Scylla costata † Rathbun, 1919 (Miocene, San Sebastián and Yauco] (Schweitzer *et al.*, 2008).

Podophthalminae Dana, 1851d

***Psygmophthalmus* † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c**

Psygmophthalmus lares † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c (type) [early Miocene, San Sebastián].

Portuninae Rafinesque, 1815

***Portunus* Weber, 1795**

Portunus oblongus † Rathbun, 1920b [Miocene, uncertain] (Gordon, 1966; Schweitzer *et al.*, 2006c).

Portunus yaucoensis † Schweitzer, Iturralde-Vinent, Hetler and Velez-Juarbe, 2006c [early Oligocene (Rupelian), Yauco].

Superfamily CARPILIOIDEA Ortmann, 1893

Palaeoxanthopsidae † Schweitzer, 2003

***Palaeoxanthopsis* † Beurlen, 1958b**

Palaeoxanthopsis tylotus † Schweitzer, Velez-Juarbe, Martinez, Collmar Hull, Feldmann and Santos, 2008 [late Maastrichtian, Sabana Grande].

Superfamily XANTHOIDEA MacLeay, 1838

Panopeidae Ortmann, 1893

Panopeinae Ortmann, 1893

***Eurytium* Stimpson, 1859**

Eurytium granulosum † Schweitzer, Velez-Juarbe, Martinez, Hull, Feldmann and Santos, 2008 [Miocene, near Ponce] (Schweitzer *et al.*, 2008).

Subsection THORACOTREMATA Guinot, 1977

Superfamily GRAPSOIDEA MacLeay, 1838

Gecarcinidae MacLeay, 1838

***Cardisoma* Latreille, 1828**

Cardisoma guanhumi Latreille, 1828 [Pleistocene, Utuado] (Schweitzer *et al.*, 2008).

SAINT BARTHÉLEMY (ST. BARTS)

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Eriosachila* † Blow and Manning, 1996**

Eriosachila bartholomaensis † (Rathbun, 1919, as *Zanthopsis bartholomaensis*) [Eocene, St. Bartholomew].

SAINT MARTIN

Infraorder BRACHYURA Latreille, 1802

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Calappidae De Haan, 1833

***Tutus* † Collins *in* Collins *et al.*, 2009c**

Tutus granulosus † Collins *in* Collins *et al.*, 2009c [Miocene of Leeward Islands, Tintamare Island].

TRINIDAD

Infraorder BRACHYURA Latreille, 1802

Superfamily RANINOIDEA De Haan, 1839

Raninidae De Haan, 1839

Raninininae De Haan, 1839

***Lophoranina* † Fabiani, 1910**

Lophoranina porifera † (Woodward, 1866) ['Tertiary' indet, San Fernando].

Section EUBRACHYURA Saint Laurent, 1980

Subsection HETEROTREMATA Guinot, 1977

Superfamily CALAPPOIDEA De Haan, 1833

Aethridae Dana, 1851d

***Hepatus* Latreille, 1802**

Hepatus nodosus † Collins and Morris, 1976 [middle Miocene, Manzanilla Bay].

Calappidae De Haan, 1833

***Calappa* Weber, 1795**

Calappa cuspidata † (Guppy, 1909, as *Ranina cuspidata*) [Oligocene, Tamana District] (Pasini and Garassino, 2017).

Superfamily LEUCOSIOIDEA Samouelle, 1819

Leucosiidae Samouelle, 1819

Ebaliinae Stimpson, 1871

***Persephona* Leach, 1817**

Persephona punctata (Linnaeus, 1758) [Miocene-Pliocene, Manzanilla Bay] (Collins and Morris, 1976).

Superfamily PORTUNOIDEA Rafinesque, 1815

Portunidae Rafinesque, 1815

Necronectinae Glaessner, 1928

***Necronectes* † A. Milne-Edwards, 1881**

Necronectes proavitus † (Rathbun, 1918) [middle Miocene, near Caparo Saca Manteca] (Collins and Morris, 1976).

Portuninae Rafinesque, 1815

***Portunus* Weber, 1795**

Portunus oblongus † Rathbun, 1920b [middle Miocene, Manzanilla Bay and Montserrat] (Collins and Morris, 1976).

Superfamily HEXAPODOIDEA Miers, 1886a

Hexapodidae Miers, 1886a

***Palaeopinnixa* † Vía Boada, 1966**

Palaeopinnixa intermedia † (Collins and Morris, 1976, as *Thaumastoplax intermedia*) [middle Miocene, Montserrat].

Palaeopinnixa perornata † Collins and Morris, 1976 (type) [Miocene, Montserrat].

Final remarks

This revision of the anomuran and brachyuran fossil record in the tropical Americas demonstrates

a diversity and abundance previously unassessed, with 32 superfamilies, 69 families, 190 genera, and 415 species properly recognized (Figs. 1D, Chart 1). Most superfamilies and families in this checklist have pantropical distributions, although there is a considerable degree of endemism at the generic and specific levels, particularly during the Early Cretaceous of northern South America and Mexico, *e.g.*, *Brazilomunida*, *Protaegla*, *Maurimia*, *Dynomenopsis*, *Araripecarcinus*, *Bellcarcinus*, *Colombicarcinus*, *Planocarcinus*, *Tepexicarcinus*, and several new Cretaceous and Paleogene families, genera and species under study. However, the sampling bias in the tropics is still high, with most fossil records known from Cenozoic deposits through the continental and insular Caribbean. This is exemplified by countries like Jamaica (with 32 families, 65 genera, and 71 species) or Panama (with 24 families, 41 genera, and 47 species), that independently account for more fossil occurrences than much larger countries like Bolivia, Colombia, Ecuador and Peru all combined (Figs. 1D; Chart 1).

Despite this, several recent findings – particularly from northern South America – represent the oldest members of their genera, families, superfamilies, or even new lineages, and suggest a more complex phylogenetic scenarios than currently depicted (Luque *et al.*, 2016). Furthermore, several of these new findings challenge the paradigm of a high latitude origin for several groups, and extend their stratigraphic and paleogeographic ranges into the equatorial Neotropics, highlighting the role and importance of the tropical Americas in the origin and evolution of decapod crustaceans through time.

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