

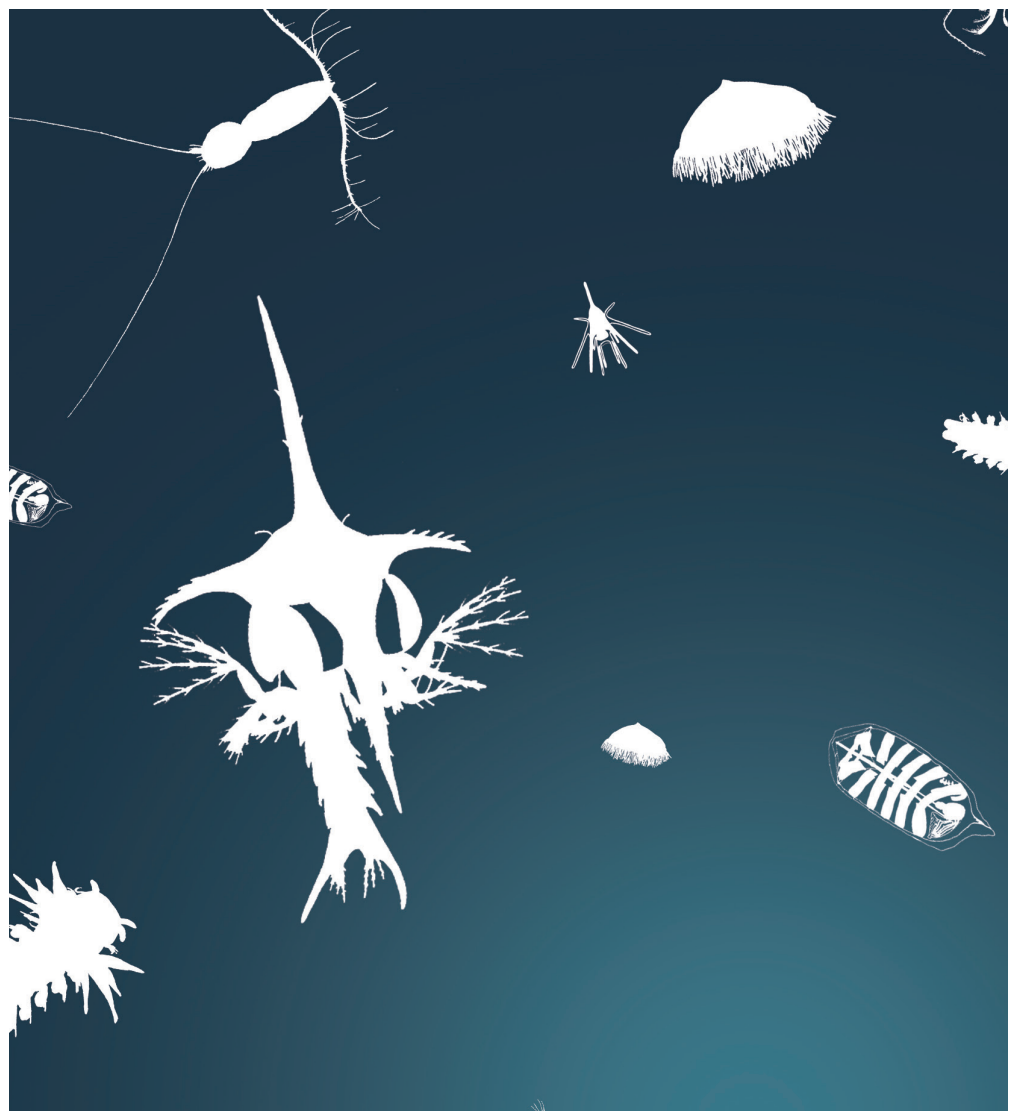
Xanthidae MacLeay, 1838

Rony R. R. Vieira and Cléverson R. M. dos Santos

Leaflet No. 200 | June 2023

ICES IDENTIFICATION
LEAFLETS FOR
PLANKTON

FICHES D'IDENTIFICATION
DU ZOOPLANCTON



International Council for the Exploration of the Sea Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
Info@ices.dk

Series editor: Antonina dos Santos and Lidia Yebra
Prepared under the auspices of the ICES Working Group on Zooplankton Ecology (WGZE)
This leaflet has undergone a formal external peer-review process

Recommended format for purpose of citation:

Vieira, R. R. R. and dos Santos, C. R. M. 2023. Xanthidae MacLeay, 1838. ICES Identification Leaflets for Plankton No. 200. 19 pp. <https://doi.org/10.17895/ices.pub.23276423>

ISBN number: 978-87-7482-981-2

ISSN number: 2707-675X

Cover Image: Inês M. Dias and Lígia F. de Sousa for ICES ID Plankton Leaflets

This document has been produced under the auspices of an ICES Expert Group or Committee.
The contents therein do not necessarily represent the view of the Council.

© 2023 International Council for the Exploration of the Sea.

This work is licensed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).
For citation of datasets or conditions for use of data to be included in other databases, please refer to ICES data policy.



Contents

1	Summary.....	1
2	Introduction.....	1
3	Distribution.....	2
4	Taxonomic Key.....	6
5	Tables.....	8
6	Figures.....	9
7	Links to further information.....	11
8	Terminology.....	13
9	References.....	14
10	Author contact details.....	19

Xanthidae MacLeay, 1838

Order: Decapoda

Family: Xanthidae MacLeay, 1838

Genus: *Cataleptodius* Guinot, 1968; *Garthiope* Guinot, 1990; *Mecataleptodius* Tavares and Mendonça Jr., 2022; *Medaeops* Guinot, 1967; *Monodaeus* Guinot, 1967; *Microcassiope* Guinot, 1967; *Micropanope* Stimpson, 1871; *Nanocassiope* Guinot, 1967; *Platypodiella* Guinot, 1967; *Pseudomeda* Guinot, 1968; *Williamstimpsonia* Števcíć, 2005; *Xantho* Leach, 1814.

1 Summary

This is a compilation of the available descriptions of the zoeal and megalopa stages of the Brachyura Xanthidae crabs of the Atlantic Ocean belonging to three subfamilies (Euxanthinae, Xanthinae, and Zosiminae). Descriptions of the zoea of 12 species and the megalopa of 6 species are included, with a key for both stages provided.

2 Introduction

Family Xanthidae MacLeay, 1838 belongs to the subsection Heterotremata *sensu* Guinot (1977); it is the most speciose family within Brachyura, with 124 genera, and 639 species (Lai *et al.*, 2011; Thoma *et al.*, 2013; Thoma and Felder, 2020). Based on adult characters, this family is currently composed of 15 subfamilies (see Ng *et al.*, 2008; Mendoza and Guinot, 2011; Mendoza and Manuel-Santos, 2012). Eriphioidea and Pilumnoidea were recently removed from the Xanthidae and now form their own superfamilies (Števcíć, 2005; Ng *et al.*, 2008).

The zoeal stages of the majority of Brachyura are pelagic, and free from the convergent and divergent adaptations undergone by adults in response to the different habitats they occupy. For most species, the larval stage is also the main source of geographic dispersion. Although larval morphological studies have been extremely valuable to understand relationships amongst the more primitive groups, they have contributed little to the wider problem of brachyuran classification (Rice, 1980). Even so, Hyman (1925), Aikawa (1929, 1933, 1937), Gurney (1938, 1942), Lebour (1944), Wear (1970), and Rice (1980) proposed systematic arrangements of Xanthidae groups based on larval characters.

Several keys to larval crab identification are available; these are the most comprehensive references for larval crabs occurring in the Atlantic Ocean (Sandifer, 1972; Rice, 1980; Martin, 1984; Ingle, 1992; Paula, 1996; Pohle *et al.*, 1999; dos Santos and González-Gordillo, 2004; Vieira and Calazans, 2010; Cuesta and González-Gordillo, 2020).

The present key incorporates, for the most part, morphological diagnostic characters of all known larval descriptions of Xanthidae from the Atlantic Ocean. Only the distinct external morphological characters of the first zoea and megalopa stages were used and illustrated (Figures 1–4); they can often be easily observed under microscope magnification.

Listed below are the 12 species belonging to the family Xanthidae, which are currently recorded in the Atlantic Ocean with known larval stages descriptions. The taxonomic status is according to Ng *et al.* (2008), Lai *et al.* (2011), and the World Register of Marine Species (WoRMS, 2023):

Order Decapoda

Infraorder Brachyura

Family Xanthidae MacLeay, 1838

Subfamily Euxanthinae Alcock, 1898

Medaeops granulosus (Haswell, 1882)

Monodaeus couchii (RQ Couch, 1851)

Subfamily Xanthinae MacLeay, 1838

Cataleptodius floridanus (Gibbes, 1850)

Mecataleptodius parvulus (Fabricius, 1793)

Microcassiope minor (Dana, 1852)

Nanocassiope melanodactylus (A. Milne-Edwards, 1867)

Pseudomadaeus agassizi (A. Milne-Edwards, 1880)

Williamstimpsonia denticulatus (White, 1848)

Xantho hydrophilus (Herbst, 1790)

Xantho pilipes A. Milne-Edwards, 1867

Xantho poressa (Olivieri, 1792)

Subfamily Zosiminae Alcock, 1898

Platypodiella spectabilis (Herbst, 1794)

3 Distribution

Medaeops granulosus (Haswell, 1882)

Adult habitat: low intertidal, reef, rocky shore, shallow subtidal (Davie, 2002); depth range 4–187 m (AquaMaps, 2019).

ICES area distribution: USA (North Caroline) (Paulay and Brown, 2023).

Worldwide distribution: Western Pacific Ocean - Australia, Japan, China, Singapore, Indonesia, Republic of Korea, Pakistan (Serène, 1984; Paulay and Brown, 2023).

Monodaeus couchii (Couch, 1851)

Adult habitat: deep-sea species living on muddy substrates of the outer shelf and continental slope (Mori *et al.*, 1995). Sublittoral species, occurring on the outer shelf and slope to depth of 1300 m (Türkay, 1976). Depth range from 7 to beyond 180 meters, on coral bank and sponges on rock, muddy sand, mud, sand, and gravel, and on *Modiolus* beds (Manning and Holthuis, 1981; Moyse and Smaldon, 1990; Mori *et al.*, 1995). Opportunistic predator but appears to be able to deposit feed and scavenge.

ICES area distribution: Norway, United Kingdom, the Portuguese mainland, Azores, Canary Islands, Canada (Quebec) (Abelló *et al.*, 1988; Mori *et al.*, 1995; dos Santos, 1999).

Worldwide distribution: Mediterranean Sea – Croatia, Malta, France, Spain, Tunisia. Eastern Atlantic Ocean – Morocco, Mauritania, Guinea-Bissau, Angola (Manning and Holthuis, 1981).

Cataleptodius floridanus (Gibbes, 1850)

Adult habitat: on coral reefs or rocky bottoms, on *Sargassum* and inside living sponges; from intertidal up to 35 m (Rathbun, 1930; Melo, 1996).

ICES area distribution: Bermuda, USA (Florida) (Mantelatto *et al.*, 2020).

Worldwide distribution – Eastern Atlantic Ocean – Guinea, Serra Leona, Liberia, Ivory Coast, Ghana, Benin, Togo, Nigeria, Cameroon, Gabon. Western Atlantic Ocean – Bahamas, Gulf of Mexico, Honduras, Panama, Costa Rica, the Antilles, Colombia, Brazil (Melo, 1996; Mantelatto *et al.*, 2020).

Mecataleptodius parvulus (Fabricius, 1793)

Adult habitat: on beaches, gravel, sand-slimy and sand muddy bottoms, coral under rocks on sand bottom, rocky tide pool and crevices, between the tide mark to a depth of 14.5 m (Melo, 1996; Alves, *et al.*, 2006; Mantelatto *et al.*, 2020; Tavares and Mendonça Jr, 2022).

ICES area distribution: Bermuda, USA (Florida) (Rathbun, 1930; Abele and Kim, 1986; Mantelatto *et al.*, 2020).

Worldwide distribution: Western Atlantic Ocean – Bahamas, Gulf of Mexico, Jamaica, Haiti, the Antilles, Puerto Rico, Barbados, Curaçao, Venezuela, Brazil (Rathbun, 1930; Abele and Kim, 1986; Melo, 1996, Alves *et al.* 2006; Mantelatto *et al.*, 2020).

Microcassiope minor (Dana, 1852)

Adult habitat: from intertidal zone to a depth of 220 m, in loose rubble or coral fragments, molluscan and other shells (Manning and Holthuis, 1981; Felder *et al.*, 2009).

ICES area distribution: Portugal (Azores and Madeira archipelagos), Spain (Canary Islands) (Felder *et al.*, 2009).

Worldwide distribution: Eastern Atlantic Ocean – Cape Verde, Ivory Coast, Ghana, São Tomé and Príncipe, Annobón, Saint Helena. Western Atlantic Ocean – Bahamas, Gulf of Mexico, Cuba, Curaçao, the Los Roques Archipelago, Venezuela (Manning and Holthuis, 1981; Felder *et al.*, 2009).

Nanocassiope melanodactylus (A. Milne-Edwards, 1867)

Adult habitat: depth range 3–225 m; usually in bottom with coralline algae or foraminifera on mud or muddy sand (Monod, 1956; Manning and Holthuis, 1981).

ICES area distribution: Portugal (European coast 36.8°N, 8.6°W; 36.9°N, 7.7°W; 36.9°N, 7.8°W; 38.6°N, 28.7°W; 39.2°N, 9.7°W; Azores and Madeira archipelagos) (dos Santos and Niza, 2022).

Worldwide distribution: Eastern Pacific Ocean – Mexico, Cocos Island, the Galapagos Islands, Venezuela. Eastern Atlantic Ocean: Ivory Coast, Nigeria, Equatorial Guinea, Saint Helena, the Canary islands, Cape Verde, São Tomé and Príncipe, Annobón (Manning and Holthuis, 1981; dos Santos and Niza, 2022).

Pseudomedeus agassizi (A Milne-Edwards, 1880)

Adult habitat: found on rocky, sand, molluscan and other shells; depth range 0–211 m (Wenner and Read, 1982; Felder *et al.*, 2009).

ICES area distribution: USA (Virginia to Texas) (Williams, 1984, Felder *et al.*, 2009; Mantelatto *et al.*, 2020).

Worldwide distribution: Western Atlantic Ocean – Gulf of Mexico, the Antilles, Brazil (Powers, 1977; Williams, 1984, Felder *et al.*, 2009; Mantelatto *et al.*, 2020).

Williamstimpsonia denticulatus (White, 1848)

Adult habitat: from the intertidal zone to a depth of 21 m or more; on rocky or sand rocks algae and calcareous algae (Manning and Holthuis, 1981; Melo, 1996; Felder *et al.*, 2009).

ICES area distribution: Bermuda, USA (Florida) (Rathbun, 1930; Abele and Kim, 1986; Mantelatto *et al.*, 2020).

Worldwide distribution: Eastern Atlantic Ocean – Ghana, islands in the Gulf of Guinea. Central Atlantic – Ascension Island. Western Atlantic Ocean - Bahamas, Gulf of Mexico, Honduras, Panama, Cuba, the Antilles, Venezuela, Brazil (Rathbun 1930; Powers 1977; Keith 1985; Abele and Kim 1986; Manning and Chace 1990; Melo, 1996, Mantelatto *et al.*, 2020).

Xantho hydrophilus (Herbst, 1790)

Adult habitat: usually in shallow water, to 30–40 m, but also recorded from a depth of around 250 m. (Manning and Holthuis, 1981; Serène, 1984).

ICES area distribution: United Kingdom, Ireland, Jersey, Portugal, the Azores and Madeira archipelagos (Cartaxana *et al.*, 2021; Orrel, 2023; Paulay and Brown, 2023; dos Santos and Niza, 2022).

Worldwide distribution: Western Pacific Ocean – Australia, Papua New Guinea, Bali, Guam, Philippines, Taiwan, Japan, French Polynesia. Eastern Atlantic Ocean: Morocco, Canary Islands, Cape Verde (de Man, 1887; Manning and Holthuis, 1981; Serène, 1984; Ng and Chia, 1997; Sato, 2023; Samyn and Vandenberghe, 2021).

Xantho pilipes A. Milne-Edwards, 1867

Adult habitat: shallow water, intertidal to about 40 m (Manning and Holthuis, 1981).

ICES area distribution: Norway, Sweden, United Kingdom, Ireland, France, Spain, Portugal (Alvarez, 1968; Manning and Holthuis, 1981; Paula and dos Santos, 2000).

Worldwide distribution: Mediterranean Sea - Croatia, Italy, Greece, France, Spain, Tunisia. Eastern Atlantic Ocean – Angola, Mauritania, Senegal (Alvarez, 1968; Manning and Holthuis, 1981).

Xantho poressa (Olivi, 1792)

Adult habitat: on beaches of coarse gravel and stones (Alvarez, 1968).

ICES area distribution: Sweden, United Kingdom, France, Portugal (Alvarez, 1968; Manning and Holthuis, 1981).

Worldwide distribution: Mediterranean Sea – Slovenia, Croatia, Montenegro, Albania, Greece, Turkey, Italy, France, Spain, Morocco. Eastern Atlantic Ocean - Canary Islands (Alvarez, 1968, Manning and Holthuis, 1981)

Platypodiella spectabilis (Herbst, 1794)

Adult habitat: depth range 5–15 m, in coral reefs, under rocks, and commonly associated with *Palythoa* cnidarian colonies (Melo, 1996; Mantelatto *et al.*, 2020).

ICES area distribution: Bermuda, USA (Florida) (Melo, 1996; Chagnoux, 2021; Orrell, 2023; Sandoval and Guerra, 2021).

Worldwide distribution: Western Atlantic Ocean – Bahamas, Gul of Mexico, Honduras, the Antilles, Guadeloupe, Colombia, Venezuela, Trinidad and Tobago, Brazil (Melo, 1996; Chagnoux, 2021; Sandoval and Guerra, 2021; Orrell, 2023).

3.1 Description and general morphology of larval stages of the Xanthidae crabs

The larval development of Xanthidae comprises two consecutive phases in their life cycle: zoea, with four stages, and one megalopa stage before the metamorphosis to juvenile.

Zoeal stages are characterized by a globose carapace with dorsal, rostral and lateral spines, maxillipeds with long distal setae on the exopod used for swimming, and a pleon with 5 somites (zoea I and II) or 6 somites (zoea III and IV) that ends in a fork-shaped telson.

The first two stages lack pleopods and carry 4 and 6 natatory setae on the exopod of the first and second maxillipeds, respectively. The third stage shows uniramous pleopod buds and 8 natatory setae on the exopod of the first and second maxillipeds, respectively. Fourth stage shows developed biramous pleopod buds and 10 natatory setae on the first and second maxillipeds, respectively (Rice, 1980; Ingle, 1992; Cuesta and González-Gordillo, 2020).

Megalopa with a depressed carapace is a transitional stage between the planktonic zoeal phase and the benthic juvenile stages. It has 5 well developed pairs of walking legs (pereiopods) (first pair chelate) and the pleon with pleopods that allow for swimming (Cuesta and González-Gordillo, 2020). Table 1 presents the number of larval stages described, the location from which the ovigerous female was collected, and the selected references of the known morphological larval descriptions to date.

4 Taxonomic Key

4.1 Zoéal stages

1A	Rostral spine with spinules.....	2
1B	Rostral spine without spinules.....	7
2A	Protopod of antenna with spines along $\frac{3}{4}$ length (Figure 1a)..... <i>Williamstimpsonia denticulatus</i> (Figure 1A)	
2B	Protopod of antenna with spines along less $\frac{3}{4}$ length.....	3
3A	Lateral spines of carapace without spinules on dorsal region.....	4
3B	Lateral spines of carapace with spinules on dorsal region (Figure 1E).....	6
4A	Dorsal spine of carapace without spinules.....	5
4B	Dorsal spine of carapace with spinules..... <i>Xantho pilipes</i> (Figure 1B)	
5A	Pleon, posterior margins of pleonites 4 and 5 without minute denticles..... <i>Platypodiella spectabilis</i> (Figure 1C)	
5B	Pleon, posterior margins of pleonites 4 and 5 with minute denticles (Figure 1d)..... <i>Cataleptodius floridanus</i> (Figure 1D)	
6A	Exopod antennal <i>ca.</i> 17% length of protopod (Figure 1e)..... <i>Microcassiope minor</i> (Figure 1E)	
6B	Exopod antennal <i>ca.</i> 19% length of protopod (Figure 1f)..... <i>Nanocassiope melanodactylus</i> (Figure 1F)	
7A	Tip of protopod of antenna rounded (Figure 1g)..... <i>Mecatleptodius parvulus</i> (Figure 1G)	
7B	Tip of protopod of antenna no rounded.....	8
8A	Antenna smaller than rostral spine.....	9
8B	Antenna as long as rostral spine.....	10

- 9A Antenna 2/3 the length of the rostral spine.....*Monodaeus couchii* (Figure 1H)
- 9B Antenna smaller than 2/3 the length of the rostral spine.....
.....*Medaeops granulosus* (Figure 1I)
- 10A Protopod of antenna present 2 or 3 distal spines (Figure 1j).....
.....*Xantho hydrophilus* (Figure 1J)
- 10B Protopod of antenna present more 3 distal spines.....11
- 11A Coxal endite of maxillule in first zoea stage present 7 setae (Figure 1k) and absence of
secondary rostral spine in all zoeal stages.....*Xantho poressa* (Figure 1K)
- 11B Coxal endite of maxillule in first zoea stage present 6 setae and from second stage of
zoeal stages presence of a secondary rostral spine (Figure 1l).....
.....*Pseudomedeus agassizii* (Figure 1L)

4.2 Megalopa Stage

- 1A Antenna with 9 articles (Figure 2a).....*Pseudomedeus agassizii* (Figure 2A)
- 1B Antenna with more than 9 articles.....2
- 2A Antenna with 10 articles.....3
- 2B Antenna with 11 articles.....5
- 3A First article of antenna with 4 setae (Figure 2b).....
.....*Nanocassiope melanodactylus* (Figure 2B)
- 3B First article of antenna with less than 4 setae.....4
- 4A First article of antenna with 3 setae (Figure 2c).....*Xantho pilipes* (Figure 2C)
- 4B First article of antenna with 2 setae (Figure 2d).....*Monodaeus couchii* (Figure 2D)
- 5A First article of antenna without setae (Figure 2e).....*Xantho hydrophilus* (Figure 2E)
- 5B First article of antenna present 4 setae (Figure 2f).....*Xantho poressa* (Figure 2F)

5 Tables

Table 1 - Species larval description information with number of larval stages, ovigerous female collected location and the reference of the known larval descriptions to date.

Species	Number of larval stages described	Ovigerous female location	References
<i>Medaeops granulosus</i>	4 zoea	Intertidal reef located in front of Shimokai Marine Research Station Japan	Terada, 1990
<i>Monodaeus couchii</i>	4 zoea and 1 megalopa	South off Spanish Head, Isle of Man (UK)	Ingle, 1983
<i>Cataleptodius floridanus</i>	1 zoea	Bermuda (UK)	Ingle, 1987
<i>Mecataleptodius parvulus</i>	1 zoea	Collected by SCUBA divers at Vitória Island 23°44'04"S, 45°01'35"W (Brazil)	Barros-Alves <i>et al.</i> , 2013
<i>Microcassiope minor</i>	1 zoea	Lower shore from Ponta Delgada, São Miguel island, Azores (Portugal)	Clark <i>et al.</i> , 2004
<i>Nanocassiope melanodactylus</i>	4 zoea and 1 megalopa	Collected by SCUBA divers at 10 m depth, Caldeirinha, Guia, Faial island, Azores (Portugal)	Dornelas, <i>et al.</i> , 2004
<i>Pseudomedaeus agassizi</i>	4 zoea and 1 megalopa	Vicinity of Cape Lookout, North Caroline (USA)	Costlow and Bookhout, 1968
<i>Williamstimpsonia denticulatus</i>	1 zoea	Collected by SCUBA divers at Vitória Island 23°44'04"S, 45°01'35"W (Brazil)	Barros-Alves <i>et al.</i> , 2013
<i>Xantho hydrophilus</i>	4 zoea and 1 megalopa	South off Spanish Head, Isle of Man (UK)	Ingle, 1983
<i>Xantho pilipes</i>	4 zoea and 1 megalopa	Collected by SCUBA divers at 10 m in the crater of Guia mount, Faial island, Azores (Portugal)	Paula and dos Santos, 2000
<i>Xantho poressa</i>	4 zoea and 1 megalopa	El Chato beach, Cádiz, Gulf of Cádiz (Spain)	Rodríguez and Martin, 1997
<i>Platypodiella spectabilis</i>	1 zoea	Félix Beach, São Paulo (Brazil) and Guana Island, British Virgin Islands (UK)	Fransozo <i>et al.</i> , 2001

6 Figures

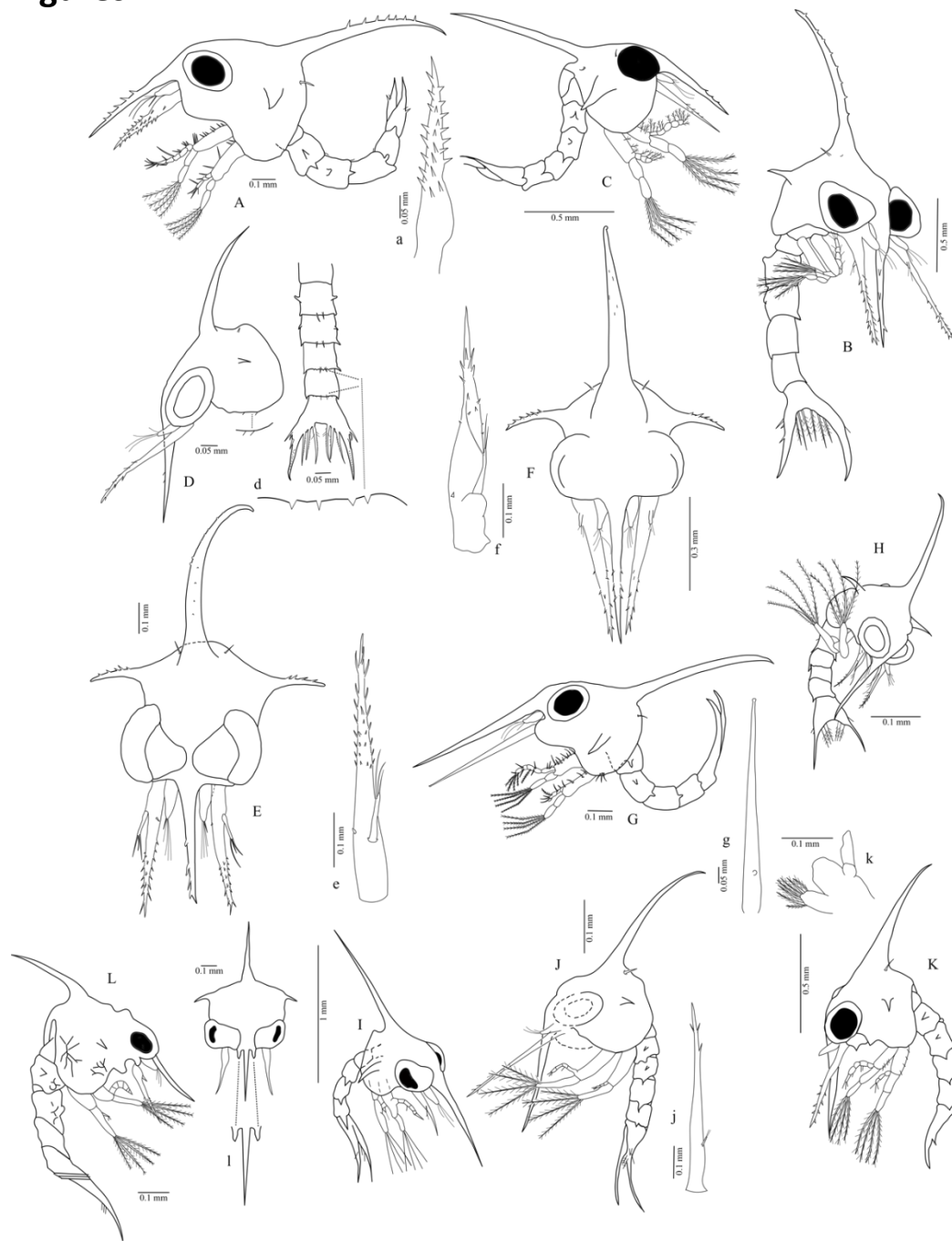


Figure 1. General morphology of Xanthidae zoeal stages 1. A, *Williamstimpsonia denticulatus* (lateral view), a, antenna; B, *Xantho pilipes* (lateral view); C, *Platypodiella spectabilis* (lateral view); D, *Cataleptodius floridanus* (lateral view), d, posterior margins of pleonites 4 and 5; E, *Microcassiope minor* (frontal view), e, antenna; F, *Nanocassiope melanodactylus* (frontal view), f, antenna; G, *Mecataleptodius parvulus* (lateral view), g, antenna; H, *Monodaeus couchii* (lateral view); I, *Medaeops granulosis* (lateral view); J, *Xantho hydrophilus* (lateral view), j, antenna; K, *Xantho poressa* (lateral view), k, maxillule; L, *Pseudomedaeus agassizii* (lateral view); l, secondary rostral spine from the second stage. All figures redrawn from: A, Barros-Alves *et al.* (2013); B, Paula and dos Santos (2000); C, Fransozo *et al.* (2001); D, Ingle (1987); E, Clark *et al.* (2004); F, Dornelas *et al.* (2004); G, Barros-Alves *et al.* (2013); H, Ingle (1983); I, Terada (1990); J, Ingle (1983); K, Rodríguez and Martín (1997); L, Costlow and Bookhout (1968).

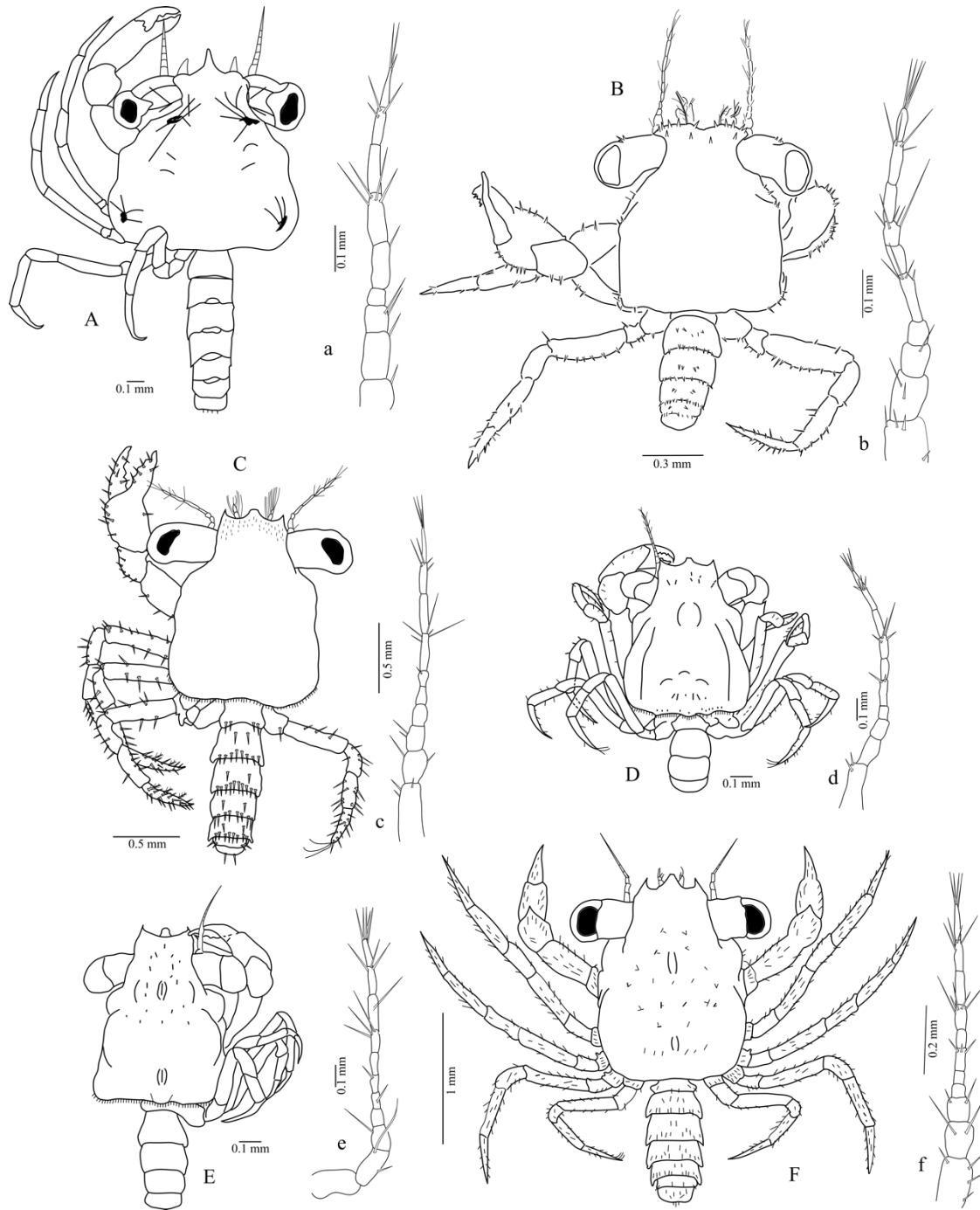


Figure 2. General morphology of Xanthidae megalopa larval stage. A, *Pseudomedaeus agassizii* (dorsal view), b, antenna; B, *Nanocassiope melanodactylus* (dorsal view), b, antenna; C, *Xantho pilipes* (dorsal view), c, antenna; D, *Monodaeus couchii* (dorsal view), d, antenna; E, *Xantho hydrophilus* (dorsal view), e, antenna; F, *Xantho poressa* (dorsal view), f, Antenna. All figures redrawn from: A, Costlow and Bookhout (1968); B, Dornelas *et al.* (2004); C, Paula and dos Santos (2000); D, Ingle (1983); E, Ingle (1983); F, Rodríguez and Martín (1997).

7 Links to further information

WoRMS

Medaeops granulosus <https://www.marinespecies.org/aphia.php?p=taxdetails&id=211030>

Monodaeus couchii <https://www.marinespecies.org/aphia.php?p=taxdetails&id=241154>

Cataleptodius floridanus <https://www.marinespecies.org/aphia.php?p=taxdetails&id=241142>

Mecataleptodius parvulus

<https://www.marinespecies.org/aphia.php?p=taxdetails&id=1588130>

Microcassiope minor <https://www.marinespecies.org/aphia.php?p=taxdetails&id=107429>

Nanocassiope melanodactylus

<https://www.marinespecies.org/aphia.php?p=taxdetails&id=241157>

Pseudomedaes agassizi <https://www.marinespecies.org/aphia.php?p=taxdetails&id=444171>

Williamstimpsonia denticulatus

<https://www.marinespecies.org/aphia.php?p=taxdetails&id=742108>

Xantho hydrophilus <https://www.marinespecies.org/aphia.php?p=taxdetails&id=107440>

Xantho pilipes <https://www.marinespecies.org/aphia.php?p=taxdetails&id=107441>

Xantho poressa <https://www.marinespecies.org/aphia.php?p=taxdetails&id=107442>

Platypodiella spectabilis <https://www.marinespecies.org/aphia.php?p=taxdetails&id=422143>

Molecular information

Medaeops granulosus <https://www.ncbi.nlm.nih.gov/nuccore/?term=Medaeops+granulosus>

Monodaeus couchii <https://www.ncbi.nlm.nih.gov/nuccore/?term=Monodaeus+couchii>

Cataleptodius floridanus <https://www.ncbi.nlm.nih.gov/nuccore/MN184111.1>

Mecataleptodius parvulus No information

Microcassiope minor <https://www.ncbi.nlm.nih.gov/nuccore/MZ400985>

Nanocassiope melanodactylus No information

Pseudomedaes agassizi <https://www.ncbi.nlm.nih.gov/nuccore/MW081986.1>

Williamstimpsonia denticulatus <https://www.ncbi.nlm.nih.gov/nuccore/KF683004.1>

Xantho hydrophilus <https://www.ncbi.nlm.nih.gov/nuccore/HM751075.1>

Xantho pilipes <https://www.ncbi.nlm.nih.gov/nuccore/HM638061.1>

Xantho poressa <https://www.ncbi.nlm.nih.gov/nuccore/AM418532.1>

Platypodiella spectabilis <https://www.ncbi.nlm.nih.gov/nuccore/MF490210.1>

Other useful links

Crab Database

Medaeops granulosus

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/medaeops/medaeops-granulosus-2402>

Monodaeus couchii

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/monodaeus/monodaeus-couchii-2384>

Cataleptodius floridanus

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/cataleptodius/cataleptodius-floridanus-2253>

Mecataleptodius parvulus

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/xanthodius/xanthodius-parvulus-2047>

Microcassiope minor

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/microcassiope/microcassiope-minor-2134>

Nanocassiope melanodactylus

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/nanocassiope/nanocassiope-melanodactylus-2113>

Pseudomedaes agassizi

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/pseudomedaes/pseudomedaes-agassizi-2363>

Williamstimpsonia denticulatus

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/williamstimpsonia/williamstimpsonia-denticulatus-2074>

Xantho hydrophilus

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/xantho/xantho-hydrophilus-2055>

Xantho pilipes

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/xantho/xantho-pilipes-2054>

Xantho poressa

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/xantho/xantho-poressa-2053>

Platypodiella spectabilis

<https://www.crabdatabase.info/krabi/brachyura/eubrachyura/heterotremata/xanthoidea/xanthidae/platypodiella/platypodiella-spectabilis-1956>

8 Terminology

The terminology explained below has been taken, with modifications, from Rice (1980), Ingle (1992), Marques and Pohle (1995), Clark *et al.* (1998), Clark and Paula (2003), Clark and Cuesta (2015), and Cuesta and González-Gordillo (2020).

Zoea - First larval phase, with a variable number of stages. It is characterized by motility (swimming activity), using mouthpart appendages (maxillipeds). In the last stages, pereopods and pleopods appear as non-functional buds with different degrees of development.

Megalopa - Last larval phase, characterized by the use of the pleopods for swimming with one stage. It is a transitional phase between the planktonic zoeal phase and the benthonic juvenile stages. The pereopods are developed and functional and are primarily used to catch or capture prey items.

Carapace - Layer covering cephalon and pereion of zoea and megalopa larvae. Rostral, dorsal, and lateral spines can be present in zoea.

Antennule - First pair of cephalic appendages. In the first stage is usually uniramous with endopod absent. The antennule becomes biramous later in zoeal development. In the megalopa larval stages, it includes a peduncle, the basal article.

Antenna - Second pair of cephalic appendages. Well developed in the zoeal stages, is formed by a protopod, endopod, and exopod with different degree of development. In the megalopa is a single multi-article process with a number of articles and setae per segment forming important diagnostic characters useful in identification and phylogenetic studies.

Mandible - Third pair of cephalic appendages. Mandibles are present from the first zoea stage. They are composed of an incisor and a molar process and a basal portion. An endopod palp bud appears in the last zoeal stages. In the megalopa stage the endopod palp is articulated with setae, and the incisor and molar portions of the mandible can no longer be distinguished.

Maxillule - The fourth pair of cephalic appendages. It consists of a protopod (with coxal and basal endites), an endopod (articulated), and an exopod (absent in first zoea, present as a plumose seta in subsequent stages, and well developed and articulated in the megalopa).

Maxilla - Fifth pair of cephalic appendages. It consists of a protopod (with coxal and basal endites), an endopod (entire, but it can be bilobed), and an exopod (scaphognathite).

Maxilliped - First three pairs of thoracic appendages (thoracopods). In the zoeal phase, the first two pairs are used for swimming, while the third pair is only present as a bud in the last stages. In the megalopa, all three pairs are modified to act as mouth parts.

Pereopods - Five pairs of thoracic appendages (thoracopods 4-8). The chelipeds and four pairs of walking legs posterior to the chelipeds. In the first zoea stage pereopods are absent. In the last stages they are present as non-functional buds with the first pair bilobed (=chelipeds). Pereopods are well developed and functional in the megalopa stage.

Pleon - Third body tagma composed 5 - 6 pleonites, and a terminal portion called telson. First zoea stage with 5 pleonites. The sixth pleonite can be present in the zoeal stages III and IV, and is generally well developed in the megalopa phase, although in some species it is absent.

Pleopods - Abdominal natatory appendages. Present as non-functional buds on pleonites second to fifth or sixth during the zoea phase, and functional on pleonites second to sixth in the megalopa phase. Pleopods of pleonites second to fifth in megalopa are biramous, formed by a

protopod (without setation), an exopod with a variable number of long natatory setae, and a small endopod with a variable number of *cincinnuli* (hocked setae). *Cincinnuli* are used to link the pair of pleopods of the same pleonites, allowing synchronical swimming. The fifth pair of pleopods on the sixth pleonite, called uropods, are uniramous (endopod absent), and setation can be present in the protopod and exopod (natatory setae).

Telson – Terminal unit of the pleon bearing the anus. Different morphologies can be observed in the zoea phase depending on the taxonomical position. In the megalopa phase, the morphology is similar in all species, a plate-like quadrate with the posterior margin rounded (with a concave or convex shape).

9 References

Abele, L. G. and Kim, W. 1986. An illustrated guide to the marine decapod crustaceans of Florida. Technical Series, 8 (1). State of Florida Department of Environmental Regulation, USA.

Abelló, P., Valladares, F. J., and Castellón, A. 1988. Analysis of the structure of decapod crustaceans assemblages off the Catalan coast (North-West Mediterranean). *Marine Biology*, 98: 39-49. <https://doi.org/10.1007/BF00392657>

Aikawa, H. 1929. On larval forms of some Brachyura. *Records of Oceanographic Works in Japan*, 2: 17–55.

Aikawa, H. 1933. On larval forms of some Brachyura. Paper II: a note on indeterminable zoeas. *Records of Oceanographic Works in Japan*, 5: 124–154.

Aikawa, H. 1937. Further notes on brachyuran larva. *Records of Oceanographic Works in Japan*, 9: 87–162.

Alvarez, R. Z. 1968. Crustáceos decápodos ibéricos. *Investigación Pesquera*, 32: 1–510.

Alves, D. F. R., Cobo, V. J., and Melo, G. A. S. 2006. Extension of the geographical distribution of some brachyuran and porcellanid decapods (Crustacea) to the coast of the State of São Paulo, Brazil. *Revista Brasileira de Zoologia*, 23(4): 280–283. <https://doi.org/10.1590/S0101-81752006000400045>

AquaMaps. 2019 (October). Computer generated distribution maps for *Medaeops granulosus*, with modelled year 2050 native range map based on IPCC RCP8.5 emissions scenario. Retrieved from <https://www.aquamaps.org>

Barros-Alves, S. de P., Alves, D. F. R., Bolla Jr, E. A., Cobo, W. J., and Negreiros-Fransozo, M. L. 2013. First zoeal stage of *Cataleptodius parvulus* (Fabricius, 1793) and *Xanthodius denticulatus* (White, 1848) (Decapoda: Brachyura): larval evidences and systematic position. *Zootaxa*, 3731(2): 234-242. <http://dx.doi.org/10.11646/zootaxa.3731.2.4>

Cartaxana, A., Brites Soares, L., Parrinha D., Simão, I. 2021. Portuguese Decapoda Crustacea - Museu Nacional de História Natural e da Ciência collections. Version 1.2. Museu Nacional de História Natural e da Ciência. <https://doi.org/10.15468/jfz2ut>

Chagnoux, S. 2021. The crustaceans collection (IU) of the Muséum national d'Histoire naturelle (MNHN - Paris). Version 68.224. MNHN - Museum national d'Histoire naturelle. Occurrence dataset: <http://collections.mnhn.fr/ipt/resource?r=mnhn-iu&v=68.224>

Clark, P. F. and Paula, J. 2003. Descriptions of ten Xanthoidean (Crustacea: Decapoda: Brachyura) first stage zoeas from Inhaca Island, Mozambique. *The Raffles Bulletin of Zoology*, 51(2): 323–378.

- Clark, P. F. and Cuesta, J. A. 2015. Larval systematics of Brachyura, *In* Castro, P. Davie, P. J. F., Guinot, D., Schram, F. R., von Vaupel-Klein, J. C. (eds), *Treatise on Zoology – Anatomy, Taxonomy, Biology. The Crustacea*, 9 part C (2 vols). Leiden: Brill, pp. 981–1048. https://doi.org/10.1163/9789004190832_020
- Clark, P. F., Calazans, D., and Pohle, G. W. 1998. Accuracy and standardization of brachyuran larval descriptions. *Invertebrate Reproduction & Development*, 33(2–3): 127–144. <https://doi.org/10.1080/07924259.1998.9652627>
- Clark, P. F., Dionisio, M. A., and Costa, A. C. 2004. *Microcassiope minor* (Dana, 1852): a description of the first stage zoea (Crustacea: Decapoda: Brachyura: Xanthidae). *Mediterranean Marine Science*, 5(2): 23–34. <https://doi.org/10.12681/mms.200>
- Costlow, J. D. and Bookhout, C. G. 1968. Larval development of the crab, *Leptodius agassizii* A. Milne Edwards in the laboratory (Brachyura, Xanthidae). *Crustaceana Supplement*, 2: 203–213. <http://www.jstor.org/stable/25027396>
- Cuesta, J. A. and González-Gordillo, J. I. 2020. Varunidae H. Milne-Edwards, 1853, and Ocypodidae Rafinesque, 1815. ICES Identification Leaflets for Plankton, No. 190. 19 pp. <http://doi.org/10.17895/ices.pub.5995>
- Davie, P. J. F. 2002. Crustacea: Malacostraca: Eucarida (part 2): Decapoda – Anomura, Brachyura. *In* Wells, A., Houston, W. W. K. (eds), *Zoological Catalogue of Australia*. Vol. 19.3B. Melbourne; CSIRO Publishing, Australia xiv + 641 pp.
- De Man, J. G. 1887. Bericht über die von Herrn. Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv für Naturgeschichte*, Berlin, 53(1): 215–288, plates 7–10.
- Dornelas, M., Clark, P. F., and Paula, J. 2004. The larval development of *Nanocassiope melanodactyla* (A. Milne Edwards, 1867) (Crustacea: Decapoda: Brachyura: Xanthidae). *Journal of Natural History*, 38(4): 509–535. <http://dx.doi.org/10.1080/0022293021000033247>
- Dos Santos, A. M. de M. 1999. Larvas de crustáceos decápodes ao largo da costa portuguesa. PhD Thesis, Faculdade de Ciências, Universidade de Lisboa. 287.
- Dos Santos, A., González-Gordillo, J. I. 2004. Illustrated Keys for the identification of the Pleocyemata (Crustacea: Decapoda) zoeal stages, from the coastal region of south-western Europe. *Journal of the Marine Biological Association of the United Kingdom*, 84: 205–227.
- Dos Santos, A., Niza, H. 2022. Larvae of decapods off Portuguese coast from 1986 to 1994. Version 1.42. IPMA – Instituto Português do Mar e da Atmosfera. Sampling event dataset. <https://doi.org/10.15468/w67xkq>
- Felder, D. L., Álvarez, F., Goy, J. W., and Lemaitre, R. 2009. Decapoda (Crustacea) of the Gulf of Mexico, with comments on the Amphionidacea. *In* Felder, D. L., Camp, D. K. (eds), *Gulf of Mexico - Origins, Waters, and Biota. Biodiversity*. Texas A & M University Press, College Station, Texas. Gulf of Mexico Waters and Biota, pp. 1019–1104.
- Fransozo, A., Negreiros-Fransozo, M. L., Martin, J. W., and Trautwein, S. E. 2001. Morphology of the first zoeal stage of *Platypodiella spectabilis* (Herbst, 1794) (Decapoda, Brachyura, Xanthidae) obtained in the Laboratory. *Gulf and Caribbean Research*, 13: 71–77. <https://doi.org/10.18785/gcr.1301.08>
- Gurney, R. 1938. Notes on some decapod Crustacea from the Red Sea. VI-VIII. *Proceedings of the Zoological Society of London: Series B, Systematic and morphological*, 108B: 73–84.
- Gurney, R. 1942. Larvae of decapod Crustacea. Ray Society Volume: 129. London: Bernard Quaritch, Ltd. 306 pp.

- Hyman, O. 1925. Studies on larvae of crabs of the family Xanthidae. Proceedings of the United States National Museum, 67(3): 1–22. <https://doi.org/10.5479/si.00963801.67-2575.1>
- Ingle, R. W. 1983. A comparative study of the larval development of *Monodaeus couchi* (Couch), *Xantho incisus* and *Pilumnus hirtellus* (Linnaeus) (Crustacea: Brachyura: Xanthidae). Journal of Natural History, 17(6): 951–978. <https://doi.org/10.1080/00222938300770741>
- Ingle, R. W. 1987. The first zoea of three *Pachygrapsus* species and of *Cataleptodius floridanus* (Gibbes) from Bermuda and Mediterranean (Crustacea: Decapoda: Brachyura). Bulletin of the British Museum of Natural History (Zoology), 52: 31–41.
- Ingle, R. 1992. Larval stages of Northeastern Atlantic crabs. An illustrated key. London, Chapman & Hall. 363 pp.
- Keith, D. 1985. Shallow-water and terrestrial brachyuran crabs of Roatan and Swan Islands, Honduras. Sarsia, 70: 229–358. <https://doi.org/10.1080/00364827.1985.10419681>
- Lai, J. C. Y., Mendoza, J. C. E., Guinot, and D. Clark, P. F. 2011. Xanthidae Macleay, 1838 (Decapoda: Brachyura: Xanthoidea) systematics: A multi-gene approach with support from adult and zoeal morphology. Zoologischer Anzeiger, 250: 407–448. <https://doi.org/10.1016/j.jcz.2011.07.002>
- Lebour, M. V. 1944. The larval stages of *Portumnus* (Crustacea, Brachyura) with notes on some other genera. Journal of the Marine Biological Association of the United Kingdom, 26: 7–15. <https://doi.org/10.1017/S0025315400014429>
- Manning, R. B., Chace, F. A. 1990. Decapod and stomatopod crustacea from Ascension Island, South Atlantic Ocean. Smithsonian Contributions to Zoology, 503: 1–91. <https://doi.org/10.5479/si.00810282.503>
- Manning, R. B., Holthuis, L. B. 1981. West African brachyuran crabs (Crustacea: Decapoda). Smithsonian Contributions to Zoology, 306: 1–379. <https://doi.org/10.5479/si.00810282.306>
- Mantelatto, F. L., Tamburus, A. F., Magalhães, T., Buranelli, R. C., Terossi, M., Negri, M., Castilho, A. L., Costa, R., and Zara, F. J. 2020. Checklist of decapod crustacean from the coast of the São Paulo state (Brazil) supported by integrative molecular and morphological data: III. Infraorder Brachyura Latreille, 1802. Zootaxa, 4872: 1–108. <https://doi.org/10.11646/zootaxa.4872.1.1>
- Marques, F. and Pohle, G. 1995. Phylogenetic analysis of the Pinnotheridae (Crustacea, Brachyura) based on larval morphology, with emphasis on the *Dissodactylus* species complex. Zoologica Scripta, 24: 347–364. <https://doi.org/10.1111/j.1463-6409.1995.tb00479.x>
- Martin, J. W. 1984. Notes and bibliography on the larvae of xanthid crabs, with a key to the known xanthid zoeas of the western Atlantic and Gulf of Mexico. Bulletin of Marine Science, 34(2): 220–239.
- Melo, G. A. S. 1996. Manual de identificação dos Brachyura (caranguejos e siris) do litoral brasileiro. Plêiade/FAPESP, São Paulo, 604 pp.
- Mendoza, J. C. E. and Guinot, D. 2011. Revision of the genus *Glyptoxanthus* A. Milne-Edwards, 1879, and establishment of Glyptoxanthinae nov. subfam. (Crustacea: Decapoda: Brachyura: Xanthidae). Zootaxa, 3015: 29–51. <https://doi.org/10.11646/zootaxa.3015.1.4>
- Mendoza, J. C. E. and Manuel-Santos, M. R. 2012. Revision of *Garthiella* Titgen, 1968 (Crustacea: Decapoda: Brachyura: Xanthidae), with description of a new subfamily and a new species from the central Philippines. Zootaxa, 3446: 32–48. <https://doi.org/10.11646/zootaxa.3446.1.2>

- Monod, T. 1956. Hippidea et Brachyura ouest-africans. Mémoires de l'Institut Français d'Afrique Noire (I.F.A.N, Dakar), 45: 1–674.
- Mori, M., Abelló, P., Mura, M., and De Ranieri, S. 1995. Population characteristics of the crab *Monodaeus couchii* (Crustacea, Brachyura, Xanthidae) in the Western Mediterranean. *Miscel-lània Zoologica*, 18: 77–88.
- Moyse, J. and Smaldon, G. 1990. Crustacea III: Malacostraca Eucarida, *In* Hayward, P. J., Ryland, J. S. (eds), *The Marine Fauna of the British Isles and North-West Europe*. Clarendon Press, Oxford, pp 510–552.
- Ng, P. K. L. and Chia, D. G. B. 1997. *Lophozozymus erinnyes*, a new species of poisonous crab from Australia, with notes on *L. pictor* (Fabricius, 1798), *L. incisus* (H. Milne Edwards, 1834) and *L. edwardsi* (Odhner, 1925) (Crustacea: Decapoda: Brachyura: Xanthidae). *The Raffles Bulletin of Zoology*, 45(2): 419–443, figs 1–11.
- Ng, P. K. L., Guinot, D., and Davie, P. J. F. 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, 17: 1–286.
- Orrell, T. and Informatics Office. 2023. NMNH Extant Specimen Records. Version 1.45. National Museum of Natural History, Smithsonian Institution. Occurrence dataset. <https://doi.org/10.15468/hnhrg3>
- Paula, J. 1996. A key and bibliography for the identification of zoeal stages of brachyuran crab (Crustacea, Decapoda, Brachyura) from the Atlantic coast of Europe. *Journal of Plankton Research*, 18(1): 17–27. <https://doi.org/10.1093/plankt/18.1.17>
- Paula, J. and dos Santos, A. 2000. Larval and early post-larval stages of the crab, *Xantho pilipes* A. Milne Edwards, 1867. (Crustacea, Decapoda, Xanthidae) reared under laboratory conditions. *Invertebrate Reproduction & Development*, 38(3): 253–264. <https://doi.org/10.1080/07924259.2000.9652458>
- Paulay, G. and Brown, W. 2023. UF Invertebrate Zoology. Florida Museum of Natural History. Occurrence dataset. <https://doi.org/10.15468/sm6qo6>
- Pohle, G., Mantelatto, F. L., Negreiros-Fransozo M. L., and Fransozo, A. 1999. Larval Decapoda (Brachyura) *In* Boltovskoy, D. (ed), *South Atlantic Zooplankton*. The Netherlands: Backhuys Publishers. pp. 1281–1351.
- Powers, L. W. 1977. A catalogue and bibliography to the crabs (Brachyura) of the Gulf of Mexico. *Contributions in Marine Science*, 20: 1–190.
- Rathbun, M. J. 1930. The cancriid crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae and Xanthidae. *Bulletin of the United States National Museum*, 152: 1–609. <https://doi.org/10.5479/si.03629236.152.i>
- Rice, A. L. 1980. Crab zoeal morphology and its bearing on the classification of the Brachyura. *Transactions of the Zoological Society of London*, 35: 271–424. <https://doi.org/10.1111/j.1096-3642.1980.tb00060.x>
- Rodríguez, A. and Martin, W. 1997. Larval development of the crab *Xantho poressa* (Decapoda: Xanthidae) reared in the laboratory. *Journal of Crustacean Biology*, 17(1): 98–110. <https://doi.org/10.1163/193724097X00142>
- Samyn, Y. and Vandenberghe, T. 2021. Royal Belgian Institute of Natural Sciences Crustacea collection. Royal Belgian Institute of Natural Sciences. Occurrence dataset. <https://doi.org/10.15468/xtpoux>

Sandifer, P. A. 1972. Morphology and ecology of Chesapeake Bay decapod crustacea larvae. PhD Thesis, University of Virginia Charlottesville, 532 pp.

Sandoval, L. D. L., Guerra, A. F. C. 2021. Crustáceos de la Colección de Referencia de Biología Marina de la Universidad del Valle (CERBMcr-UV). Version 8.1. Universidad del Valle. <https://doi.org/10.15472/uofnlo>

Sato, T. 2023. Crustacean specimen database of Kanagawa Prefectural Museum of Natural History. National Museum of Nature and Science, Japan. <https://doi.org/10.15468/2ssjai>

Serène, R. 1984. Crustacés décapodes brachyours de L'Océan Indien Occidental et de la mer rouge, Xanthoidea: Xanthidae et Trapeziidae. Avec um addendum par Crosnier, A.: Carpilidae et Menippidae. Faune tropicale, XXIV: 1–400, fig. A–C+1–243, pl. I–XLVIII.

Štević, Z. 2005. The reclassification of Brachyura crabs (Crustacea: Decapoda: Brachyura). *Natura Croatia*, 14(suppl. 1): 1–159.

Tavares, M. and de Mendonça Jr, J. B. 2022. Brachyuran crabs (Crustacea, Decapoda) from the remote oceanic Archipelago Trindade and Martin Vaz, South Atlantic Ocean. *Zootaxa*, 5146(1): 1–129. <https://doi.org/10.11646/zootaxa.5146.1.1>

Terada, M. 1990. Zoal development of five species of Xanthid crabs, reared in the laboratory. *Research on Crustacea*, 18: 23–47. https://doi.org/10.18353/rcrustacea.18.0_23

Thoma, B. P., Guinot, D., and Felder, D. L. 2013. Evolutionary relationships among American mud crabs (Crustacea: Decapoda: Brachyura: Xanthoidea) inferred from nuclear and mitochondrial markers, with comments on adult morphology. *Zoological Journal of the Linnean Society*, 170: 86–109. <https://doi.org/10.1111/zoj.12093>

Thoma, B. P. and Felder, D. L. 2020. A new genus species of xanthoid crab (Decapoda: Brachyura) from offshore hard bank habitats in the Gulf of Mexico. *Zootaxa*, 4731(3): 403–413. <https://doi.org/10.11646/zootaxa.4731.3.8>

Türkay, M. 1976. Decapoda Reptantia von der portugiesischen und marokkanischen Küste. Auswertung der Fahrten 8, 9c (1967), 19 (1970), 23 (1971) und 36 (1975) von F. S. "Meteor". "Meteor" Forschungsergebnisse, Reihe D: Biologie, 23: 23–44, figures 1–35.

Vieira, R. R. R. and Calazans, D. K. 2010. Chave ilustrada para identificação das zoés de Brachyura do estuário da Lagoa dos Patos (RS) e região costeira adjacente. *Biota Neotropica*, 10(3): 431–437. <https://doi.org/10.1590/S1676-06032010000300036>

Wear, R. G. 1970. Notes and bibliography on the larvae of xanthid crabs. *Pacific Science*, 24: 84–89.

Wenner, E. L., Read, T. H. 1982. Seasonal composition and abundance of decapod crustacean assemblages from the South Atlantic bight, USA. *Bulletin of Marine Science*, 32(1): 181–206.

Williams, A. B. 1984. Shrimps, lobsters, and crabs of the Atlantic Coast of the Eastern United States, Maine to Florida. Washington, D. C.: Smithsonian Institution Press. 550 pp.

WoRMS Editoroial Board. 2023. World Register of Marine Species. Available from <https://www.marinespecies.org> at VLIZ. Accessed 2023-02-16. <https://doi.org/10.14284/170>

10 Author contact details

Rony R. R. Vieira
Laboratório de Crustáceos Decápodes,
Instituto de Oceanografia, Universidade Federal do Rio Grande.
Av. Itália Km 08, CP 474, 96201-900, Rio Grande, RS, Brasil
ronycrab@gmail.com

Cléverson R. M dos Santos
Museu Paraense Emílio Goeldi, Coordenação de Zoologi.
Av. Perimetral 1901, 66077-830, Belém, PA, Brasil
crsantos@museu-goeldi.br