

APPENDIX I. LIST OF MATERIAL EXAMINED

Material is listed as follows: source abbreviation, registration number(s), number of specimens, carapace width(s) in mm. Carapace widths do not include the length of lateral spines when present. Type species are indicated by an asterisk (*). Source abbreviations: BMNH - Natural History Museum (London); USNM - National Museum of Natural History (Washington D.C.); MNHN - Muséum National d'Histoire Naturelle (Paris); QM - Queensland Museum (Brisbane); PCNR - personal collection, not retained.

Calappinae

Acanthocarpus: **A. alexandri* - MNHN B13444 (2: ♀ 20.4; ♂ 22.86), BMNH 1938.3.19.117-118 (2: ♀ 27.08; ♂ 3.22); *A. africanus* - BMNH 1952.12.10.1 (1: ♂ 61.78); *A. brevispinis* - MNHN B12506 (1: ♂ 52.66), MNHN B13507 (1: ♀ 46.08); *A. delsolari* - MNHN B13443 (1: ♀ 38.3)

Calappa: **C. granulata* - MNHN B16282 (2: ♂ 61.6; ♀ 62.16), BMNH 1953.10.28.49 (3: ♀ 29.3; ♂ 31.3, 84.4), BMNH 1956.5.2.60 (1: ♂ 64.1), BMNH 1954.11.4.179-180 (2: ♂ 55.6; ♀ 84.02), BMNH unreg. (2: ♀ 103.46, 92.46); *C. hepatica* - PCNR (4: ♂ 41.6, 37.66; ♀ 36.48, 41.8); *C. lophos* - MNHN B16285 (2: ♂ 55.5, ♀ 53.0); *C. peli* - MNHN B16263 (1: ♀ 62.36), MNHN B13470 (1: ♂ 50.4); *C. philargius* - QM W8293 (1: ♂ 81.2)

Cryptosoma: **C. bairdii* - USNM 7204 (5: ♀ 28.6, 13.1; ♂ 20.3, 12.4, 8.5), USNM uncat (4: ♀ 31.78, 27.5; ♂ 20.3, 20.38)

Cycloes: **C. granulosa* - ZRC 1996.1810 (1: ♀ 20.5), ZRC 1996.1814-1815 (2: ♂ 36.2, 30.9); BMNH 1934.1.16.24 (1: 20.5), BMNH 1907.5.22.19 (1: ♂ 18.2)

Cyclozodion: **C. angustatum* - USNM 250715 (4: ♀ 24.3, 19.4; ♂ 19.8, 21.1) *C. tuberculatum* - USNM 250881 (1: ♀ 17.76), USNM 250882 (1: ♀ 9.0)

Mursia: *M. armata* - QM W16988 (2: ♂ 61.54; ♀ 49.06), BMNH 1930.12.2.34-36 (3: ♀ 30.34; ♂ 30.1, 36.0); **M. cristimanus* - BMNH 1884.31 (3: ♂ 22.0; ♀ 19.26, 15.32); *M. curtispina* - MNHN 24479 (1: ♂ 65.3), MNHN B24373 (1: ♀ 57.8); *M. musorstomia* - MNHN B24405 (2: ♂ 22.3; ♀ 18.4)

Paracyclois: *P. atlantis* - USNM 250724 (1: ♂ 21.28), USNM 250837 (3: ♀ 27.26, 50.1; ♂ 32.2); **P. milneedwardsii* - QM W17011 (2: ♀ 42.88; ♂ 57.94)

Platymera: **P. gaudichaudii* - MNHN B20859 (1: ♂ 42.7), BMNH 1913.12.10.108 (1: ♀ 46.7), BMNH 1869.37 (2: ♂ 66.0, 74.44)

Hepatinae:

Hepatus: **H. princeps* - BMNH 1976:317 (1: ♂ 44.32), BMNH 1938.3.29.66 (1: ♀ 47.16), MNHN B21540 (1: ♂ 69.2), MNHN B21536 (1: ♂ 29.16); *H. chilensis* - BMNH 1913.12.10.109-116 (2: ♂ 82.0; ♀ 67.92); *H. epheliticus* - USNM 8782-8783 (4: ♀ 56.1, 58.9; ♂ 58.4, 63.14); *H. fasciatus* - BMNH 1869.37 (4: ♀ 70.22, 70.9, 64.36; ♂ 52.8)

Hepatella: **H. amica* - USNM 69207 (2: ♀ 26.58, 11.3), USNM 69209 (1: ♀ 12.2)

Osachila: **O. tuberosa* - USNM 156520 (4: ♂ 14.22, 14.72; ♀ 13.2, 12.66); *O. antillensis* - BMNH 1984.137 (10: ♂ 29.08, 25.44, 29.56; ♀ 21.2, 23.74, 21.9, 22.4, 25.1, 23.14, 19.78)

Matutinae

Matuta (Mebeli): **M. michaelsoni* - MNHN B13442 (3: ♂ 15.14, 14.1; ♀ 13.2), MNHN B13527 (1: ♂ 12.26), MNHN B13439 (1: ♀ 13.84)

Matuta (Izanami): *M. curtispina* - USNM uncat D5140 (1: ♂ 37.46); **M. inermis* - USNM 65381 (2: ♀ 20.24; ♂ 17.36); QM unreg. (2: ♀ 32.7; ♂ 32.3)

Matuta (Ashtoret): **M. banksii* - MNHN B16321 (1: ♂ 45.02), MNHN B21360 (1: ♀ 28.7); *M. granulosa* - QM W12649 (in part) (2: ♀ 40.9; ♂ 45.2), PCNR (6: ♂ 38.44, 43.14, 28.54, 31.64; ♀ 28.14, 29.12)

Matuta: **M. victor* - MNHN B21361 (2: ♂ 40.5; ♀ 31.7)

Orithyiinae

Orithyia: **O. sinica* - USNM 57605 (2: ♀ 48.5; ♂ 34.0), QM W19182 (2: ♂ 48.0; ♀ 50.72); *O. mamillaris* - BMNH 1874.2 (2: ♀ 61.6; ♂ 66.6)

OUTGROUPS

Leucosiidae: *Leucosia ocellata* - QM W2696 (1: ♀ 26.9), QM W4681 (2: ♂ 24.74, 26.28), PCNR (3: ♂ 20.4, 25.83, ♀ 27.3)

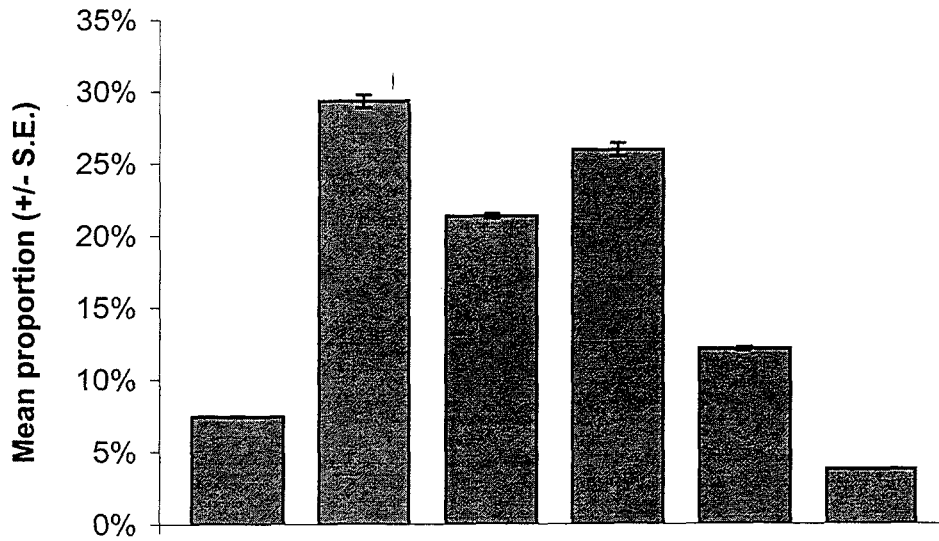
Dorippidae: *Dorippe sinica* - BMNH 1930.12.2.18 (4: ♀ 42.7; ♂ 29.6, 31.78, 35.2); *D. quadridens* - QM unreg. (2: ♀ 35.8; ♂ 35.5), PCNR (1: ♂ 37.58)

Xanthidae: *Atergatis floridus* - PCNR (5: ♂ 46.18, 56.28, 54.5; ♀ 55.0, 40.04)

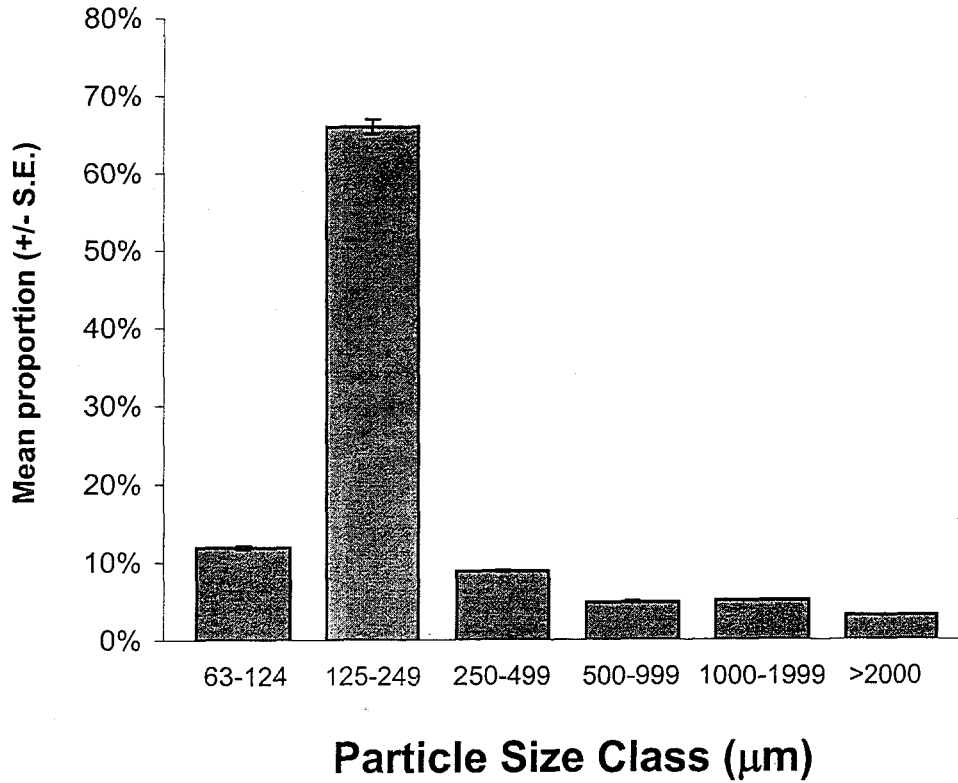
Portunidae: *Portunus pelagicus* - PCNR (4: ♂ 63.1, 46.4, 38.5, 65.7)

APPENDIX II Particle size profile of the sediments used in experiments

A. Pallarenda Beach sediments (n=4)



B. Orpheus Island inner reef flat sediments (n=4)



APPENDIX III. Traditional Classification of the Calappidae

Infraorder	Brachyura
Section	Oxystomata H. Milne Edwards, 1837
Subsection	Heterotremata Guinot, 1977
Superfamily	Calappoidea de Haan, 1837
Family	Calappidae H. Milne Edwards, 1837
Subfamilies	Genera
Calappinae Dana 1853	<i>Calappa</i> Weber, 1795 <i>Acanthocarpus</i> Stimpson, 1871 <i>Mursia</i> Desmarest, 1823 <i>Platymera</i> H. Milne Edwards, 1837 <i>Cycloes</i> de Haan, 1837 <i>Cryptosoma</i> H. Milne Edwards, 1837 <i>Paracyclois</i> Miers, 1886 <i>Cyclozodion</i> Williams & Child, 1988
Matutinae Stimpson 1871	<i>Matuta</i> Weber, 1795 <i>Ashtoret</i> Galil & Clark, 1994 <i>Izanami</i> Galil & Clark, 1994 <i>Mebeli</i> Galil & Clark, 1994
Hepatinae Stimpson 1871	<i>Hepatus</i> Latreille, 1802 <i>Hepatella</i> Smith, 1869 <i>Osachila</i> Stimpson, 1871
Orithyiinae Dana, 1853	<i>Orithyia</i> Fabricius, 1798

APPENDIX IV. Proposed Taxonomic Classification of oxystomatoid crabs

Summary:

Section Heterotremata

Subsection *Incertae sedis*

Superfamily Calappoidea *emend.*

Calappidae

Hepatinae

Subsection Oxystomata *emend.*

Superfamily Leucosioidea

Matutidae

Leucosiidae

Superfamily Dorippioidea

Orithyidae

Dorippidae

Definition of component taxa:

SECTION HETEROTREMATA

Sub-Section *Incertae sedis*

This group may be defined by the following 6 characters: correspondence of the last abdominal suture to sternal suture 5/6, a narrow and elongate telson which is equal to or longer than the 6th abdominal segment, the presence of only two discontinuous sternal sutures, a robust exopod on the 2nd maxilliped, a cone-shaped 1st pleopod and a flange on the outer basal angle of the 1st pleopod.

Superfamily Calappoidea *emend.*

Defined by the presence of a broad and shallow suborbital channel and a reduction of the 7th episternite.

Calappidae – This family is defined by 13 characters. The cheliped has a lateral expansion on the merus, a small spine on the mero-carpal articulation, an expanded crest on the dorsal aspect of the propodus, a setal patch on the inner surface of the propodus and a hooked lobule on the dactylus. The 3rd maxilliped is characterized by a distinctive indentation on the anteromedial margin of the merus which creates a prominent medial lobe, a long basal segment on the palp, a longitudinal row of brush-like setae on the exopod, an enlarged and dorsally expanded coxa and a broad proximal section on the epipod. Other defining features include the presence of a concave pterygostomian region which forms a continuous channel leading to the respiratory

openings at the bases of the chelae, six abdominal segments being visible ventrally and a bent flagellum on the 2nd pleopod.

Hepatinae - Defined by the presence of a notch on the outer lateral margin of the merus of the 3rd maxilliped endopod.

Sub-Section Oxystomata *emend.*

This group may be defined by the oblique position of the cheliped merus at rest, the absence of a flagellum on the exopod of the 3rd maxilliped and a rounded- or blunt-tipped 1st pleopod.

Superfamily Leucosiioidea

This superfamily is characterized by the presence of a row of granules or spines on the ventral surface of the merus of the pereiopods, the oblique ridge on the shaft of the 1st pleopod and protruding vaginal lining.

Matutidae - This subfamily is defined by 6 characters: the antennal basal segment being < 5% of the orbital width and not reaching the inner orbital gap, a row of 3-4 spines on the ventral surface of the merus of the chelae, flattened pereiopods, a single discontinuous sternal suture and a characteristic fingerlike dorsal process on the distal tip of the 1st pleopod.

Leucosiidae – the status of this family is uncertain and awaits further study.

Superfamily Doripioidea

A highly characteristic group, defined by the presence of a clear, smooth sclerotized sheath around the penis, the ligamentous nature of the proximal articulation of the coxa to the basi-ischium, the protruding posterior border on the distal articulation of coxa to the basi-ischium, the lack of any fusion in the abdominal segments of adult individuals and the reduction of the episternites.

Orithyidae - This distinctive monotypic family is defined by 5 characters: the presence of a dorsal flange on the merus of the cheliped, an unusually short abdomen, the lack of correspondence between the last abdominal suture and any sternal suture, the presence of ornamentation on the 1st abdominal segment and a highly modified endostome.

Dorippidae – the status of this family is uncertain and awaits further study.

A phylogenetic study of the Calappidae H. Milne Edwards 1837 (Crustacea: Brachyura) with a reappraisal of the status of the family

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The phylogeny of box crab genera (Crustacea: Brachyura: Calappidae) with notes on their fossil record, biogeography and depth distribution

Orpha Bellwood*

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The occurrence, mechanics and significance of burying behaviour in crabs (Crustacea: Brachyura)

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