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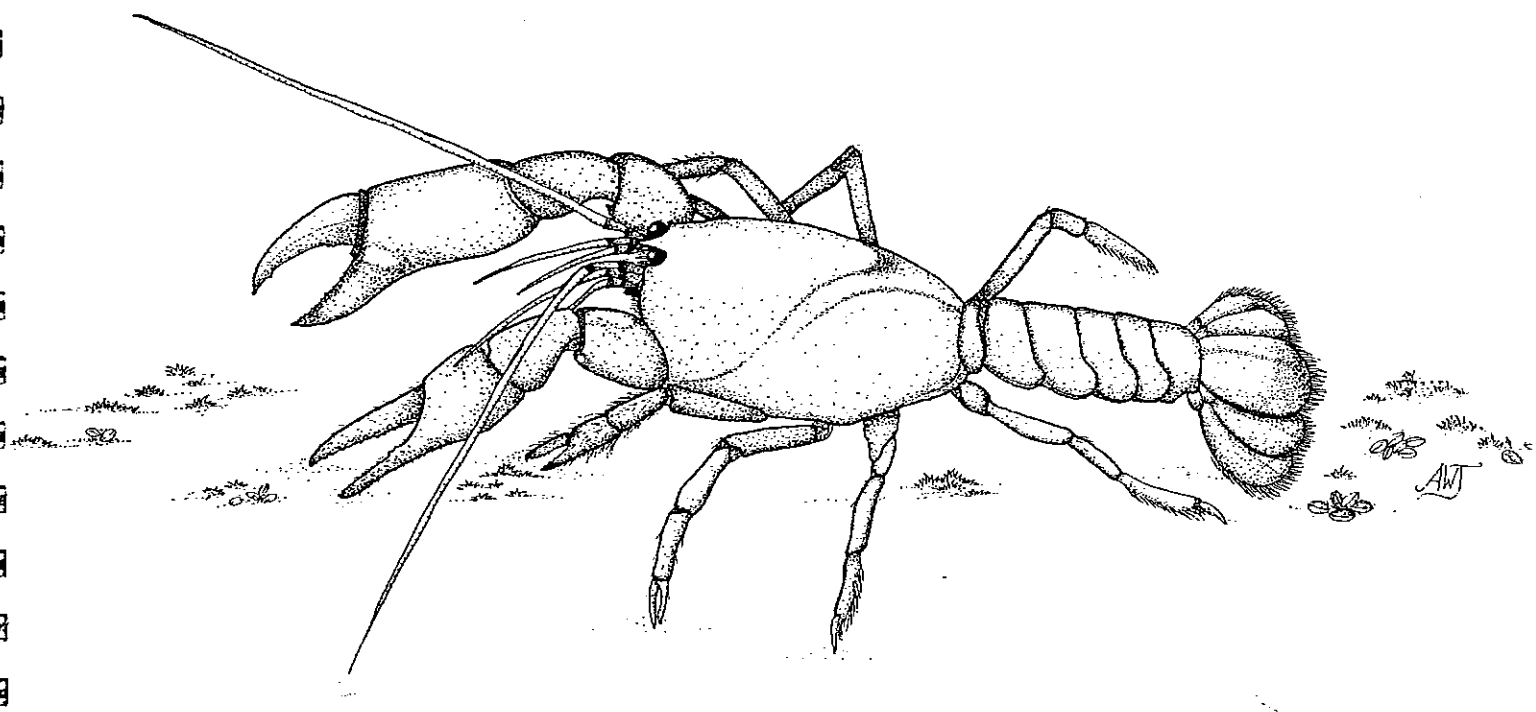

Pierre Horwitz

Identification Guide No. 5

COOPERATIVE RESEARCH CENTRE FOR FRESHWATER ECOLOGY

The Murray-Darling Freshwater Research Centre

A PRELIMINARY KEY TO THE SPECIES OF DECAPODA (CRUSTACEA: MALACOSTRACA) FOUND IN AUSTRALIAN INLAND WATERS

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Cover: *Engaewa subcoerulea* Riek, 1967 from a swamp near Shannon River, west of Walpole in south-western Australia. Drawing by Angela Wardell-Johnson.

1. Synopsis of the taxonomy of the genera of Australian inland aquatic Decapoda

Order Decapoda
- Suborder Pleocyemata
  - Infraorder Astacidea
    - Superfamily Parastacoidea
      - Family Parastacidae
        - Genera *Cherax* (22)[1], *Euastacus* (37), *Astacopsis* (3)[2], *Geocharax* (2)[3], *Gramastacus* (1)[4], *Engaewa* (3)[5], *Engaeus* (35), *Tenuibranchiurus* (3)[6], *Parastacoides* (10)[7]
  - Infraorder Caridea
    - Superfamily Atyoidea
      - Family Atyidae
        - Genera *Paratya* (1), *Australatya* (1), *Caridina* (8)[8], *Caridinides* (1), *Stygiocaris* (2), *Parisia* (2), *Pycneus* (1), *Pycnisia* (1)
    - Superfamily Palaemonoidea
      - Family Palaemonidae
        - Genera *Macrobrachium* (9)[9], "*Palaemonetes*"(1), *Leptopalaemon* (1), *Kakaducaris* (1)
  - Infraorder Brachyura
  - Section Oxyrhyncha
    - Superfamily Hymenosomatoidea
      - Family Hymenosomatidae
        - Genus *Amarinus* (1)
  - Section Brachyrhyncha
    - Superfamily Grapsidoidea
      - Family Grapsidae
        - Genera *Leptograpsodes* (1), *Sesarma*
    - Superfamily Potamoidea
      - Family Sundathelphusidae
        - Genus *Holthuisana* (7)[10]

Classifications to family adapted from Bowman and Abele (1982). Number of species given in parentheses, according to published sources (see References), or unpublished data (see Notes below).

Notes

[1] The genus *Cherax* has been the subject of an unpublished taxonomic revision by Austin (1986, and in press). The common yabbies *C. destructor* and *C. albidus* are considered to be valid as subspecies of *destructor* on the basis of work presented in Sokol (1988) and Campbell *et al.* (1994). An additional four species have been recognised in the genus *Cherax* (Short 1991, 1993a; Short and Davie 1993; Austin pers. comm.), and since none were considered in Austin's revision they are included in this document. Thus, 22 species are recognised in the genus in Australia.

[2] The genus *Astacopsis* exhibits some extreme morphological variability (Swain *et al.* 1982) and has recently been revised to contain three species (Hamr 1992) but incomplete analysis of the relationship between species in this genus and those in the genus *Euastacus* from Victoria highlight the need for caution when assigning species (Austin pers. comm., Horwitz unpublished data).

[3] Two species are currently recognised in the literature for *Geocharax* (*falcata* and *gracilis*), but they cannot be satisfactorily separated so they are treated as one taxon for the purposes of this key. Specimens from coastal New South Wales are considered to consitutue a second species in the genus following preliminary electrophoretic analysis (Horwitz, Adams and Baverstock, unpubl. data), and morphological examination (Horwitz unpubl. data).

[4] Number of species in the decapod genus *Gramastacus* recorded by Zeidler and Adams (1990) is 1, but recently collected specimens from Barmah State Forest are very closely related and may constitute a separate species.

[5] *Engaewa* has been found to contain at least four species (including the three species described by Riek 1967), on the basis of electrophoretic and morphological data (Horwitz, Adams and Baverstock, unpublished data, Horwitz unpublished data). However, the species *similis* and *reducta* are treated as one species complex as morphological variability has yet to be resolved. There are no consistent characters which will separate *Engaewa* from other genera, and the genus is considered here to be a subset of the morphological variability within *Engaeus*.

[6] *Tenuibranchiurus* currently contains one species but recently Horwitz, Adams and Baverstock (unpublished data) recorded three electrophoretically and geographically distinct species.

[7] *Parastacoides* is now known to be far more diverse than currently recognised, with up to ten species being present in Tasmania (Richardson pers. comm.).

[8] *Caridina* is currently being studied by Satish Choy; the genus is in need of systematic revision to take into account newly found morphological variation (perhaps even at the generic level) and taxonomic errors. The number of species currently recognised is therefore likely to be an underestimate of the actual number.

[9] The genus *Macrobrachium* is currently being revised by John Short of the Queensland Museum., and undescribed variation exists for this genus.

[10] Includes six species recognised by Bishop (1963) and one species recently described by Short (1994). Bott's revision (1970), in which he suggested only two species were represented in Australia, is overlooked here in favour of the discussion given in Short (1994).

2. Notes on the use of the key, with glossary of selected terms, and index to diagrams

To use this key, the biologist should have a binocular microscope and a probe (the finer the probe, the better). A pair of vernier callipers or a graticule fixed to the ocular lens of the microscope can be useful to establish lengths and widths for ratios.

Prior to using the key, the specimen should be prepared in such a way that all dirt and encrusting materials (such as silt) are removed and the underlying structure of specimens is exposed. This preparation is particularly important for the examination of the rostral region, the sternum and the dorsal surface of the elements of the tail fan, and is best accomplished by directing a fine jet of water at the area (for the former two regions) or by wiping gently with a moist tissue or a fine, cut-off paint-brush (for the latter region).

In general, the use of ratios has been avoided, but when they are included, they can often be judged by eye. Where lengths have been used, they are compared to the length of another appendage or morphological feature.

Characters requiring dissections have also been avoided and, if used, they are always supplied as a last alternative in a combination with other characters; in fact, only the presence or absence of the pleurobranchs and occasionally the gastric mill need investigation by dissection.

Single characters have been used to separate groups of taxa; ideally these characters have been closely scrutinised and their variability assessed for all known specimens. The use of single characters greatly enhances the ease of use of a taxonomic key, but problems can arise if taxa are variable for any of these characters. Keying species of shrimps or prawns in the genera *Macrobrachium* or *Caridina* will be difficult for this reason.

By far the largest number of couplets in the keys are based on combinations of characters rather than single character. The application of combinations of characters unfortunately increases the bulk of the key, but their inclusion allows for either uncommon character variations or damage to the specimen and increases the efficiency and accuracy of the key. When used in combination, each character is separated by a semi-colon. In combination, the characters are not necessarily hierarchical. Additional characters, which are only used to clarify a character state or refine the definition of a species, are given in brackets.

On several occasions (particularly for the key to the *Euastacus* species), the key employs alternatives since no single character can consistently separate the two species. Alternative character states are separated by colons.

In general all adult male and female specimens can be keyed out, and the larger the juvenile, the more likely it is to be keyed out correctly. Users of this key must note, however, that allometric changes of character states are a common feature of decapod crustaceans. For instance, for crayfish:

i) the abdomen and its appendages are relatively larger as juveniles;
ii) rostral spines generally decrease in number and become more blunt with age;
iii) the relative lengths of antennae decrease with age; and
iv) patterns of setation and tuberculation may be under-developed as juveniles.

Great care must be taken to ensure that key characters are whole and not broken, regenerating or disfigured. This particularly applies to the following three characters:

i) regenerating chelae cannot be used in the key; they are best identified by their small size, and a reduction or absence of armature (spines, tubercles) and setae. Regenerating chelae should not be confused (but often are) with the small chela of an heterochelous species. In general, always use the larger of the chelae, unless instructed otherwise.

ii) the rostral apex can be broken or disfigured, causing a misinterpretation of the form of the tip (rounded or spiniform), and the nature of the rostral carinae.

iii) the antennal or antennular flagella are susceptible to damage, especially after preservation, as well as the exopodite of the third maxilliped. Damaged appendages like these may have blackened tips; both the right and left flagellum should be examined to confirm lengths or character states.

Unless otherwise stated, the terms of 'dactylus', 'propodus', 'carpus' and 'merus' refer to the chelae (first pereiopod of parastacids, second pereiopod of palaemonids)

In the event of an undescribed variation occurring, consideration should be given to consulting different pathways in the key, and the geographical ranges of the likely outcomes. Finally, if no adequate conclusion can be reached, the specimen should be sent to a relevant authority or set aside as "errant" to await a detailed examination of its specific status.

GLOSSARY OF SOME MORPHOLOGICAL TERMS

1. Positional adjectives - and combinations of them (ie. dorsomesial, posteroventrolateral)
Dorsal - up, on top
Ventral - down, below, undeneath
Anterior - towards the front
Posterior - towards the rear
Caudal - towards the tail or rear
Proximal - appendage: towards the body
Distal - appendage: away from the body
Lateral - appendage or body; outer side
Mesial - appendage: inner side
Apical - projection: away from the base
Basal - projection: towards the base

2. Appendages
Chelae - unless otherwise stated, this term is used in this key to mean the greater pair of pereiopods (1st pereiopods in Parastacidae, Brachyrhyncha, or 2nd pereiopods in Palaemonidae)
Chelate - Dactyl articulating with propodal finger
Pereiopod - non-maxillary appendage on thorax (thoracic appendage = thoracopod) which is either ambulatory or modified for clasping (ie. chelae or walking legs)
NB. Historically the spelling of this term has varied (ie. pereiopod, pereopod, peraeopod); throughout I have used the spelling "pereiopod". Unfortunately the current standard spelling for the term is "pereopod". The reader and user of this key is therefore urged not to perpetuate the confusion my error could create; accordingly, wherever I have used "pereiopod" please visualise, and use, "PEREOPOD".

3. Exoskeleton features

Boss - raised mound as a dominant feature

Bumps - raised mounds, but relatively insignificant in size

Granulations - very small tubercles occurring over the surface (the granulations of the branchiostegites in *Euastacus* are termed' general tubercles')

Punctations - very small pits occurring over the surface

Setae - hairs; can be single, in tufts, or in mats, pads or patches, or stiff, fine, plumose etc

Spines - projection raised to a sharp point; spines and tubercles are often only distinguishable by their sharpness. However some authors (ie. Morgan for *Euastacus*) use spines in a generic sense to describe patterns of exoskeleton projections, when the projection occurs in the same position, but is sharp on one species and blunt on the other. In this case all projections are "spines".

Tubercles - projections which tend to be solid but not necessarily sharp.

DIAGRAMS

As a guide, the following list is an index of the diagrams which should assist in the identification of key characters.

FIGURE 17: GASTRIC MILL - ZYGOCARDIAC OSSICLE

ATYIDAE

FIGURE 18 LATERAL VIEW OF CARAPACE OF *Patratya australiensis*

FIGURE 19 FIRST PEREIOPOD OF *Patratya australiensis*

FIGURE 20 SECOND PEREIOPOD OF *Australatya striolata*

PALAEMONIDAE

FIGURE 21 FIRST MAXILLIPED *Kakaducaris glabra*

FIGURE 22 UROPODAL APPENDAGES (*Macrobrachium*)

FIGURE 23 LATERAL VIEW OF CARAPACE, BRANCHIOSTEGAL SUTURE, BRANCHIOSTEGAL SPINE, AND HEPATIC SPINE

3. Preliminary key to species of Australian freshwater crayfish (Decapoda: Parastacidae)

by Pierre Horwitz[1] and Chris Austin[2]

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1. Branchiocardiac groove either fusing with, running extremely close to and then fusing with, or being subparallel to, dorsolateral portion of cervical groove; reproductively active females never with subcalcified anteroventral flap on second adbominal pleuron 2

Branchiocardiac groove anterolaterally running distinctly separate and parallel to cervical groove, never fusing with cervical groove and only converging on cervical groove at extreme anterolateral portion where it curves very slightly anteriorly; reproductively active females with subcalcified anteroventral flap on second adbominal pleuron 5

2(1). Abdomen with lateral spines, tubercles or bumps, setal bumps or setose tubercles; male may have genital cuticle partition .....*Euastacus/Astacopsis* 49

Abdomen without lateral spines, bumps, tubercles, setal bumps or setose tubercles; male never with genital cuticle partition 3

3(2). Sternal pore present on any or all lateral processes of sternum. If not, penes tubular, enlarged and subcalcified except immediately proximally; telson conspicuously membranous over posterior half; never with tufts of stiff setae on abdomen ...*Cherax*.....94

Never with sternal pore on lateral processes of sternum; genital papillae of male simple and calcified; telson membranous over posterior third or less, or not at all .....*Parastacoides* or juvenile *Euastacus/Astacopsis*.....4

4(3). Pleurobranchs absent; Tasmania only

.....*Parastacoides*.....

[Genus being revised by Alastair Richardson, Zoology Dept. University of Tasmania: he has provided the following ordered character list which will assist in the separation of "species", particularly adult females; the character states commence with the couplet devised by Sumner (1980) to separate three "subspecies"]

1) Uropods with central carina projecting beyond posterior margin into a spine.....2
Uropods terminaly ropunded and setose.....*P. tasmanicus tasmanicus*

2) Inner ramus of uropod with small additional spines mesial to central spine.....*P. tasmanicus insignis*
Inner ramus of uropod without additional spines mesial to central spine.....*P. tasmanicus inermis*

3. Propodus of adult cheliped laterally concave or convex
4. Rostrum very short or 'normal'
5. With or without posteriorly-directed cavity formed at the bases of 4th pair of pereiopods
6. Propodus with or without distinct dorsal carina
7. Adult colour: dark brown to black (eggs brown) or reddish or greenish, leg bases tinged with orange (eggs orange)]

Pleurobranchs present; Tasmania, Victoria, New South Wales or Queensland

.....juvenile *Euastacus/Astacopsis*.....try 49

5(1) Small suborbital spine at dorsolateral edge of antennal basipodite; dactyl of chelae articulating in oblique plane; post-orbital ridges always very strongly expressed

.....6

Without small suborbital spine at dorsolateral edge of antennal basipodite; dactyl of chelae articulating in vertical plane; postorbital ridges never very strongly expressed (except for *E.laevis*)

.....8

6(5) Chelae (of females) not covered in dense fine setae; dactyl of chela curved over proximal third of cutting edge; penes of male small and papilla-like; rostral carinae and postorbital ridges terminate acutely anteriorly, but not in conspicuous spine

.....*Geocharax*.....7

Chelae (of females) covered in dense fine setae; dactyl of chela more or less straight, without proximal curve; penes of male raised, wide in diameter and longer than coxopodite; rostral carinae and postorbital ridges each with conspicuous anterior terminal spine

.....*Gramastacus insolitus*

7(6). Anterior edge of carapace produced to short spine at terminus of cervical groove

.....*Geocharax* sp. (Wyong)

Without a short spine at terminus of cervical groove on anterior edge of carapace

..... *Geocharax gracilis/falcata*

8(5) Chelae isomorphic (homochelous); inner ramus of uropod with either or both lobes of protopodite produced to acute point; ischium on antennal peduncle with centrolateral spine .....*Tenuibranchiurus*.....9

Chelae either ismorphic (homochelous) or dimorphic (heterochelous); inner ramus of uropod almost always with neither lobes of protopodite produced to acute point; ischium of antennal peduncle without centrolateral spine .....*Engaewa/Engaeus*.....10

9(8) Propodus with row of small granulations along dorsal surface and in carinate row along ventral surface; otherwise lateral and mesial surface of propodus largely glabrous .....*Tenuibranchiurus* sp. 1

Propodus studded with large granules on lateral, mesial, and particularly dorsal and ventral surfaces. .....*Tenuibranchiurus glypticus* and *Tenuibranchiurus* sp. 2

10. *Engaewa* and *Engaeus* species

10(8). Outer ramus of uropod with transverse suture (may be very faint) 14

Outer ramus of uropod without any trace of transverse suture. 11

11(10). Exopodite of third maxilliped long and multiarticulate (at least as long as ischium); antennal flagellum long, 1.5-2 x OCL .....(in part) *orramakunna*

Exopodite of third maxilliped reduced to shaft-like stump or more usually absent; antennal flagellum less than 1.33 x OCL and rarely extending beyond posterior rim of carapace 12

12(11). Sternum with large pores on LP 4th P (which open ventrally) .....*cisternarius*

Sternum without pores on lateral processes 13

13(12). Antennal scale reduced, never extending beyond junction of penultimate and distal segments of antennal peduncle; antennules biflagellate; individuals usually with only male or female gonopores .....*disjuncticus*

Antennal scale long, extending beyond distal segment of antennal peduncle and ending in long terminal spine; antennules uniflagellate; individuals intersexed .....*hemicirratulus*

14(10). Large median terminal spine on caudal edge of either or both the inner and outer rami of uropod 15

No large terminal spine at caudal edge of either inner or outer ramus of uropod 16

15(14). Caudal edge of outer uropodal ramus usually produced to large median terminal spine; sternum with pores on LP 3rd and 4th P (at least); individuals with either male or female gonopores, rarely with both
.....*spinicaudatus*

Caudal tip of outer uropodal ramus produced to rounded point (not spine); sternum without pores on lateral processes; individuals usually intersexed
.....*phyllocercus*

16(14). Sternum without pores on LP 3rd P
.....17

Sternum with pores on LP 3rd P
.....34

17(16). Sternum with pores on LP 4th P (pores open either ventrally or posteriorly)
.....18

Sternum without pores on LP 4th P
.....21

18(17). Exopodite of third maxilliped reduced to stump (approximately $^1/_4$ as long as ischium); usually no spines on inner ramus of uropod; rostral carinae short, low and blunt; carapace usually abundantly setose
.....*sternalis*

Exopodite of third maxilliped multiarticulate and longer than ischium; inner ramus of uropod with spines; rostral carinae conspicuously raised; carapace largely asetose
.....19

19(18). Areola narrow (usually 0.25 - 0.35 as wide as long); bullar lobes setose; sternal pores on LP 4th P opening posterolaterally; chelae always without tufts of bristle setae on propodal finger and dactyl
.....*lyelli*

Areola broad (usually 0.4 - 0.5 as wide as long); bullar lobes without setae; sternal pores on LP 4th P opening ventrally; chelae, particularly small dimorphic and isomorphic chelae, with tufts of bristle setae on dactyl and propodal finger
.....20

20(19). Lateral surface of propodal palm always non-granulate; dorsal surface of dactyl of small dimorphic chelae with tufts of extremely long, flexible setae; mesial side of cutting edges of dactyl and propodal finger on small dimorphic and isomorphic chelae with only sparse plumose setae

.....*mairener*

Lateral surface of propodal palm always granulate; dorsal surface of dactyl of small dimorphic chelae with moderately long bristle setae; mesial side of both cutting edges on small dimorphic and isomorphic chelae with thick patch of plumose setae

.....*granulatus*

21(17). Exopodite of third maxilliped multiarticulate (with shaft and flagellum) and at least $^1/_2$ as long as ischium

.....22

Exopodite of third maxilliped reduced to stump or shaft (which is either less than $^1/_2$ as long as ischium, tubercle-like or completely absent)

.....25

22(21). Exopodite of third maxilliped longer than length of ischium; antennal flagella longer than OCL and always extending beyond posterior rim of carapace; rostral carinae fusing with rostral rim anteriorly (never fusing with themselves)

.....23

Exopodite of third maxilliped usually shorter than ischium; antennal flagella never extending beyond posterior edge of carapace; rostral carinae fusing together anteriorly

.....*australis*

23(22). Individuals not intersexed (with either male or female gonopores, not both); areola usually greater than $^2/_5$ as wide as long; postorbital ridges ranging from low and blunt to raised and sharp; caudolateral corners of telson and inner and outer rami of uropods spined; dorsal edge of merus with band of tubercles; dorsal surface of dactyl without tufts of bristle setae

.....24

Individuals intersexed; areola usually $^1/_3$ as wide as long; postorbital ridges almost obsolete or absent; caudolateral corners of telson and inner and outer rami of uropods may show reduced spination; dorsal edge of merus with reduced tuberculation; dorsal surface of dactyl (on all chelae except some large dimorphic chelae) with tufts of bristle setae

.....*mallacoota*

24(23). Sternal keel continuing between LP 4th P; LP 4th P sloping more posteriorly than inwards; postorbital ridges conspicuously raised and usually sharp; propodal palm entirely granulate

.....*laevis*

Sternal keel terminating at articulation level of 4th pereiopods; LP 4th P sloping inwards; postorbital ridges usually slightly raised but always blunt; propodal palm non-granulate over mesial and lateral surfaces

.....*nulloporius*

25(21). Exopodite of third maxilliped not absent but reduced to shaft or stump which is $^1/_4$ - $^1/_2$ as long as ischium

.....26

Exopodite of third maxilliped either completely absent or reduced to very small movable tubercle

.....28

26(25). Individuals not usually intersexed; antennal scale always extending as far as apex of distal segment of antennal peduncle; antennal flagella long but only extending to middle somites of abdomen; pleura of abdominal somite 1 small but somewhat bilobed

.....27

Individuals usually intersexed; antennal scale never extending as far as apex of distal segment of antennal peduncle; antennal flagella very long and extending to telson or posterior somites of abdomen; pleura of abdominal somite 1 small but somewhat unilobed; propodal palm of chelae densely studded with large granulations

.....*martigener*

27(26). Dorsal edge of propodal palm with row of small tubercles proximally only (row not extending along entire length of edge); rostral carinae fusing neither with rostral rim nor with themselves anteriorly; mesioventral corner of coxopodite of third maxilliped non-tuberculate; sternal keel summit higher than LP 3rd P

.....*orientalis*

Dorsal edge of propodal palm with row of tubercles extending along entire length of edge; rostral carinae usually fusing either with rostral rim or with themselves anteriorly; mesioventral corner of coxopodite of third maxilliped spiniform or tuberculate; sternal keel summit lower than LP 3rd P

.....*leptorhynchus*

28(25). Rostrum produced to blunt, rounded tip or to rounded point and not upturned; antennal scale without terminal spine (or spine very small if present) and never extending as far as apex of distal segment of antennal peduncle

.....29

Rostrum with upturned, apically sharp tip; antennal scale always with conspicuous large terminal spine and always extending at least to apex of distal segment of antennal peduncle

.....30

29(28). Rostral carinae smooth and non-tuberculate; ventral surface of propodal palm of chelae smooth except for sparse setose tubercles

.....*urostrictus*

Rostral carinae composed of small tubercles along their length; ventral surface of propodal palm with distinct, carinate row of tubercles along length

.....*rostrogaleatus*

30(28). Antennal flagella extending past posterior edge of carapace; pleura of first abdominal segment very small but somewhat bilobed; ventral surface of propodal palm with row or band of large granulations or tubercles along edge; posterior pleurobranch long (as long as penultimate pleurobranch)

.....31

Antennal flagella not extending past posterior edge of carapace; pleura of first abdominal segment very small and unilobed; ventral surface of propodal palm with only sparse setose tubercles along edge (otherwise smooth); posterior pleurobranch either very small or absent completely

.....32

31(30).Propodal palm of chelae granulate on both lateral and mesial surfaces; outer ramus of uropod with longitudinal median carina terminating on suture as broad curve and without spine, and suture with only 0 -1 extra dorsomesial spines and 0-3 extra dorsolateral spines

.....*curvisuturus*

Propodal palm non-granulate and non-tuberculate on lateral and mesial surfaces; outer ramus of uropod with longitudinal median carina terminating in spine on suture and suture with 0-2 extra dorsomesial spines and 1- 5 extra dorsolateral spines

.....*affinis*

32(30).Rostral carinae usually conspicuously raised and $^1/_2$ - $1^1/_2$ x rostral length; sternal keel raised between 3rd and 4th pereiopods and terminating abruptly at 4th pereiopod articulation level; carpus with or without setose tubercles along mid-dorsal line; posterior pleurobranch very small

.....33

Rostral carinae usually low and blunt, 0 - $^3/_4$ x rostral length; sternal keel very low between 3rd and 4th pereiopods and always fading out prior to 4th pereiopod articulation level; carpus usually without setose tubercles along mid-dorsal line; posterior pleurobranch completely absent

.....*cymus*

33(32).Propodus and dactyl without tufts of small fine setae but with abundant tufts of long bristle setae; large dimorphic chelae without conspicuous cutting edge gape; suture on outer ramus of uropod without extra dorsomesial spines and with 0-3 extra dorsolateral spines

.....*tuberculatus*

Propodus and dactyl with tufts of small fine setae (which often give chelae a downy appearance) but without tufts of long bristle setae on dactyl; large dimorphic chelae with concave cutting edges giving conspicuous cutting edge gape; suture on outer ramus of uropod with 1-3 dorsomesial spines and with 3-7 dorsolateral spines

.....*victoriensis*

34(16). Exopodite of third maxilliped multiarticulate and as long as or longer than ischium

.....39

Exopodite of third maxilliped reduced to shaft which is less than $^1/_2$ length of ischium or absent

.....35

35(34).Rostral tip rounded or bluntly pointed; antennal scale small and extending no further than to junction of penultimate and distal segments of antennal peduncle; suborbital angle blunt and obtuse

.....36

Rostral tip produced to upturned apical spine; antennal scale extending to at least base of distal segment of antennal peduncle; suborbital angle usually pointed and approximately 90-100°

.....37

36(35).Dorsal edge of propodal palm with double row of tubercles along entire length; ventral edge of propodal palm with single carinate row of tubercles
.....*fossor*

Dorsal edge of propodal palm with only small tubercles proximally; ventral edge of propodal palm smooth
.....*strictifrons*

37(35). Sternum without pores on LP 1st and 2nd P; antennal flagella not usually extending past posterior edge of carapace
.....38

Sternum with pores on LP 1st and 2nd P; antennal flagella usually extending to second or third abdominal segments
.....*fultoni*

38(37). Propodal palm tuberculate wuith tufts of bristle setae
.....*tayatea*

Propodal palm smooth and asetose
.....*yabbimunna*

39(34). Ventral surface of propodus carinate
.....40

Ventral surface of propodus without a distinct carina
.....42

40(39) Sternal keel produced to a point anteriorly between LP 3rd P and 4th P
.....41

Sternal keel anteriorly ending abruptly and swollen between LP 3rd P and 4th P
.....*Engaewa reducta/similis* complex

41(40) Sternal pores present (elongate and slit-like) on LP 1st, 2nd and 3rd P
.....*Engaewa subcoerulea*

Sternal pores absent on LP 1st and 2nd P, and if present on LP 3rd P they are small and pit-like
.....*Engaewa* sp. nov.

42(39) Ischium of third maxilliped without setae or only sparsely setose on ventrolateral surface; areola moderately broad ($^1/_3$ - $^1/_2$ as wide as long); individuals not usually intersexed
.....43

Ischium of third maxilliped with at least thin patch of plumose setae over ventrolateral surface; areola around $^1/_3$ as wide as long; individuals almost always intersexed
.....45

43(42) Sternum without pores on LP 1st and 2nd P; propodal palm with band of granulations along ventral surface
.....(in part).*mairener*

Sternum with pores on LP 1st and 2nd P; propodal palm smooth or with either smooth or tuberculate carina along ventral surface
.....44

44(43). Rostral tip bluntly pointed; ventral surface of propodal palm with smooth carina or with tuberculate carina
.....*lengana*

Rostral tip sharply pointed; propodal palm smooth ventrally
.....(in part).*orramakunna*

45(42).Dense patch of plumose setae on propodus distinctly covering more surface mesially than laterally
.....46

Propodus without patch of plumose setae or with setae equally distributed over both mesial and lateral surfaces
.....47

46(45).Ventral surface of merus (and usually carpus) with abundant plumose setae in dense patch
.....*merosetosus*

Ventral surface of merus asetose or only sparsely and thinly setose
.....*sericatus*

47(45).Propodal palm with subcarinate row of tubercles along centrodistal portion of ventral surface

..... *karnanga*

Propodal palm either smooth or sparsely granulate over ventral surface

.....48

48(47). Sternum without pores on LP 1st or 2nd P, OR IF PRESENT: propodal palm with dense patches of plumose setae extending over ventral $^1/_2$ of mesial surface and ventral $^1/_2$ of lateral surface, OR IF NOT: dorsal surface of dactyl always non-granulate (except for rare occurence of granulations only at distal extremity); dorsal surface of propodal palm with small tubercles and extra granulations which decrease in number and density over distal $^1/_3$

.....*quadrimanus*

Sternum always with pores on LP 1st and 2nd P; dense patches of setae on propodal palm never extending over mesial and lateral surfaces; dorsal surface of dactyl with granulations (on all chelae except for small dimorphic chelae and some isomorphic chelae of reproductively active females); tuberculation and granulation continuing along entire length of dorsal surface of propodal palm

.....*cunicularius*

49.*Euastacus* and *Astacopsis* species

REGIONAL KEYS

Specimen from Queensland.....see Short and Davie 1993 or Morgan 1991

Specimen from Victoria.....see Morgan 1986

Specimen from New South Wales.....see Morgan in press

Specimen from Tasmania (*Astacopsis*).....see Hamr 1992

Euastacus and *Astacopsis*

(adapted from Morgan 1983; unless otherwise stated species refer to those in the genus *Euastacus*; if specimen is a female, key first assuming that a cuticle partition is present in the male (see couplet 52); if it keys and matches, check the alternative route briefly before assigning the identification. If it doesn't key, take the cuticle partition absent route and try it that way.)

49(2 or 4). Median longitudinal carina between rostral carinae present .....*Astacopsis gouldi*

Median longitudinal carina between rostral carinae absent 50

50(49). Well-defined, longitudinal groove on dorsal surface of carpus 52

Without well-defined, longitudinal groove on dorsal surface of carpus (at most with broad, shallow depression) 51

51(50). Lateral ventral spine row on propodus well developed; 6-9 spines on mesial margin of propodal palm .....*robertsi*

Lateral ventral spine row on propodus poorly developed; 4-5 spines on mesial margin of propodal palm .....*fleckeri*

52(50). Male cuticle partition present 53

Male cuticle partition absent 82

53(52). Thoracic and telsonic spines medium sized to large, or if thorax or telson spines small or absent: 2 to 1 lateral propodus spine rows, rostral carinae medium length to long, suborbital spine large to very large, usually 2 mesial carpal spines, or if 3: usually large thoracic spines or large D-L abdominal spines

.....54

Thoracic spines absent or inconspicuous and without the above combination of characters, or if thoracic spines medium-sized or small: rostral carinae bases usually short and spread, 3 or more carpal spines mesially (or if 2: either 0-1 apical dorsal spines on propodal finger and moderate to sparsely distributed general tubercles, or very bumpy lateral to dactylus base dorsally)

.....59

54(53). No basal mesial spines on dactylus

.....55

At least 1 basal dorsomesial dactylar spine, and sometimes basal mesial dactylar spine as well

.....56

55(54). 3-4 apical mesial dactylar spines; 5 (very rarely 6) apical mesial spines on propodal finger. [Poorly spinose lateral to dactylar base dorsally.]

.....*valentulus*

1-2 apical mesial dactylar spines; 6-7 apical mesial spines on propodal finger. [Usually very bumpy lateral to dactylar base dorsally; D-L and D abdominal spines accentuated by dark spots.]

.....NSW sp. 1

56(54). Dorsal thoracic spines absent or low and inconspicuous; telsonic spines small or absent; usually 2-10 apical dorsal spines on propodal finger; TAP ≤ 5

.....*sulcatus*

Dorsal thoracic spines medium sized or large; telsonic spines usually medium sized or large; usually 0-1 apical dorsal spines on propodal finger, or if >1 spines: large telsonic spines present; TAP ≥ 5

.....57

57(56). Telsonic spines small or medium sized; D abdominal spine present and usually sharp on somites 2-4; red spines on abdomen and thorax. [0, rarely 1, lateral spine on outer rami of uropod]

.....*suttoni*

Telsonic spines usually large; D abdominal spine absent on somites 2-4 (a boss present), or if very blunt D spines present: 2 distinct spines anterior to mouth; overall dark green, including spines

.....58

58(57). 3-6 lateral spines on outer rami of uropods; dorsal abdominal boss not distinctly U-shaped (sometimes very blunt D spines); several D-L and D spines on somite 6
....*hystricosus*

Usually 0 (rarely 1) lateral spines on outer uropodal ramus; dorsal abdominal boss distinctly U-shaped on specimens >50 OCL; D spines absent on somite 6
.....*kershawi*

59(53). Ventral lateral spine row on propodus absent or poorly developed (usually ≤ 4 central spines if present); largest ventromesial carpus spine ≥ ventral spine; usually ≥ 4 mesial carpus spines, 1st can be < 2nd, or if 3 mesial spines: above characters and 2° characters below apply and no spines above cutting edge of propodal finger
.....60

Ventral lateral spine row on propodus well developed, or if poor, the following characters apply; largest ventromesial carpus spine < ventral spine, or if slightly > ventral spine: dactylar base spines present; < 4 mesial carpus spines, 1st largest, or if 4 mesial spines: marginal spines present on antennal scale or ventral propodus lateral spine row well developed and other characters above apply
.....66

60(59). Li abdominal spines small (or medium sized) on somite 2, or if merely bumps: cephalon poorly punctose, LP 3rd P parallel and 1 apical mesial dactylar spine
.....61

Li abdominal spines reduced to low bumps and above combination of characters does not apply
.....65

61(60). 1-3 spines above cutting edge of propodal finger, or if none (rare): suborbital spine small or very small, antennal scale widest at $^1/_2$ (or slightly $<^1/_2$) its length and usually 5-6 spines along the mesial edge of propodal palm
.....*reductus*

No spines above cutting edge of propodal finger and above combination of characters does not apply
.....62

62(61). No apical dorsal spines on propodal finger; antennal scale widest at much $<^1/_2$ its length
.....63

1-2 apical dorsal spines on propodal finger, or if none: antennal scale widest at or slightly $<^1/_2$ its length
.....64

64(63). Rostral tubercles to $^1/_2$ or $<^1/_2$ carinae length; 1-2 rostral tubercles
.....*urospinosus*

Rostral tubercles to $^1/_2$ or $>^1/_2$ carinae length; 3-4 rostral tubercles
.....*yigara*

64(63). Rostral spines to full length of carinae; LP 1st P close together; suborbital spine small
.....*maidae*

Rostral spines $<^1/_2$ to $^1/_2$ carinae length (sometimes slightly $>^1/_2$); LP 1st P separated or widely separated; suborbital spine medium sized to medium/large
.....*balanensis*

65(60). Suborbital spine medium/large to very large; 2 apical mesial dactylar spines; antennal scale widest at much $<^1/_2$ its length
.....*setosus*

Suborbital spine small or very small; 1 apical mesial dactylar spine; antennal scale widest at slightly $<^1/_2$ its length
.....*jagara*

66(59). 2 mesial carpal spines (very rarely 3 and then on 1 chela only and spines 2 and 3 close). [0-1 apical dorsal spines on propodal finger; general tubercles on thorax moderately distributed to sparse; medium sized or small thorax spines usually present.]
.....67

3 (rarely 4) mesial carpal spines, or if 2 spines: 2 apical dorsal spines on propodal finger or very bumpy lateral to base of dactylus dorsally. [General tubercles on thorax usually moderately distributed to dense]
.....68

67(66). No apical dorsal spines on propodal finger; suborbital spine small; TAP $2^1/_2$-$4^1/_2$
.....*simplex*

1 apical dorsal spines on propodal finger; suborbital spine medium sized or large; TAP 7-8
.....NSW sp.2

68(66). Dorsal thoracic spines absent or low and inconspicuous (sometimes 1-2 tiny blunt spines behind cervical spines); rostral spines not markedly decreasing in size proximally, usually to ≥ 1/2 carinae length, or if <1/2: rostrum thin and 2-7 apical dorsal spines on propodal finger

.....69

Dorsal thoracic spines medium sized or small, or if absent: either rostral spines to <1/2 carinae length (rarely to 1/2) with spines obviously diminishing in size proximally, rostrum not unusually thin and no (rarely 1) apical dorsal spines on propodal finger, or dorsal mesial spines near base of dactylus extending >1/2 length of dactylus, or marginal spines present on antennal scale

.....76

69(68). Spines above cutting edges of propodal finger and dactylus extending to >1/2 of full gape; usually ≥ 2 apical dorsal spines on the propodal finger. [Marginal mesial spines absent from near base of dactylus]

.....70

Spines above cutting edges to ≤1/2 of gape of propodal finger and only rarely slightly >1/2 of gape of dactylus; O or 1 apical dorsal spine on propodal finger, or if 2 spines: either 2 mesial carpal spines or usually a marginal spine near base of dactylus

.....73

70(69). Dorsal carpal spines absent

.....7 1

Dorsal carpal spines present

.....*eungella*

71(70) Post-orbital ridge spine absent

.....*monteithorum*

Post-orbital ridge spine present

.....72

72(71) Rostral spines to ≤1/2 rostral length

.....NSW sp. 3

Rostral spines to >1/2 rostral length

.....*bindal*

73(70). Usually 2-3 apical dorsolateral spines on propodal finger; 1-2 basal dorsomesial dactylar spines and usually 1 marginal spine near base; usually ≥ 4 spines lateral to dactylar base ventrally, often extending up propodus in 2 short rows; TAP $4^1/_2$-5

.....NSW sp. 4

0-1 apical dorsal spines on propodal finger, or, if 2 apical spines: 2 mesial carpal spines; rarely dorsomesial spines near dactylar base and no marginal spine near base on normal chelae; usually ≤ 4 spines lateral to dactylar base ventrally; TAP $2^1/_2$-4

.....76

74(73). Setation moderate to light, few tufts of setae on chelae; fingers of chelae punctose; ventral lateral propodal spine row well developed or complete; LP 1st P usually narrow and close. [3 mesial carpal spines.]

.....*polysetosus*

Setation moderate to heavy, setal tufts obvious on chelae; either punctation absent (or very few) on fingers of chelae and ventral lateral propodal spine row absent or poorly developed, or if finger punctation moderate and ventral lateral propodal spine row to apex: setation heavy; LP 1st P usually robust. [Usually 3 mesial carpal spines, or if 2 spines: 2 dorsal apical spines on propodal finger]

.....75

75(74). Ventral lateral propodal spine row absent or subapical

.....*neohirsutus*

Ventral lateral propodal spine row from approximately centre of propodus extending to apex

.....*hirsutus* subsp. A

76(68). 1 apical mesial spine on dactylus, or if 2 spines: no telsonic spines and either, dorsal propodus lateral to dactylus base with many small spines and bumps [TAP 3-$3^1/_2$], or TAP $4^1/_2$-5

.....77

2 apical mesial spines on dactylus; either telsonic spines present (can be small and then setation very heavy) or TAP 6-9

.....78

77(76). Broad zone of small dorsal thoracic spines; TAP 3-$3^1/_2$. [Very bumpy on dorsal dactylus lateral to articulation; spines above cutting edge of propodal finger extending to $>^1/_2$ of full gape; basal mesial spines on dactylus absent; rostral spines usually covering $>^1/_2$ carinae length]

.....NSW sp. 5

Dorsal thoracic spines either absent, or if present rarely in a zone and rostral spines usually covering $\leq^1/_2$ carinae length with proximal spines small and blunt; TAP $4^1/_2$-10

.....*australasiensis*

78(76). Telsonic surface spines medium sized or small (if small, setation very heavy); TAP 3-$4^1/_2$ [Thoracic spines medium sized or small.]
.....*hirsutus* subsp. B

Telsonic surface spines absent (surface may be bumpy at setal bases); TAP 6-9
.....79

79(78). 2-5 basal dorsomesial dactylar spines usually extending $>^1/_2$ gape; basal mesial dactylar spine usually absent; 3-5 (rarely 2) apical mesial dactylar spines, usually joining dorsomesial spines
.....80

1 (rarely 2) basal dorsomesial dactylar spine(s); 1-2 basal mesial dactylar spines; 2 apical mesial dactylar spines (basal mesial dactylar spines don't join apical dactylar spines)
.....81

80(79). Spines above cutting edges of propodal finger and dactylus extending over $^1/_2$, $>^1/_2$ or full gape; thoracic spines usually small or absent.....*woiwuru*

(..... *Astacopsis franklinii*)

Spines above cutting edges of propodal finger and dactylus apical only; thoracic spines medium sized with some small
.....*neodiversus*

81(79). Marginal spine(s) present on antennal scale; dorsal thoracic spines absent
.....*diversus*

Marginal spines absent on antennal scale; dorsal thoracic spines medium sized
.....*bidawalus*

82(52). Telsonic spines absent or small; uropodal spines absent; 3 (rarely 4) mesial carpal spines, or if 2 spines: either above tailfan characters apply and TAP ≥ 8, or thoracic spines small, slightly > gradient or absent. [Rostral spines small or medium sized; D abdominal spines tiny and blunt or absent.]
.....83

Telsonic and uropodal spines usually large or medium sized, or if absent the following characters apply; 2 (rarely 3) mesial carpal spines; D abdominal spines usually large or medium sized on anterior somites (often sharp); rostral carinae medium length to long
.....89

83(82). 3 (or 4) mesial carpal spines
.....84

2 mesial carpal spines
.....87

84(83). Mesial carpal spines 2 and 3 close or share bases; rostral carinae not distinctly spread
.....85

Mesial carpal spines 2 and 3 not distinctly closer than 1 and 2; rostral carinae short and spread
.....86

85(84). 1 dorsomesial, and 1-2 mesial basal dactylar spines; TAP ≤ 7
.....*claytoni*

Usually ≥ 1 (rarely 0) dorsomesial and 0 mesial dactylus spines; TAP ≥ 8
.....NSW sp. 6 (especially subsp. A)

86(84). Usually 2 (very rarely 1 or 3) apical mesial dactylar spines; propodal finger punctation usually very sparse; TAP $5^1/_2$-11
.....*crassus*

Usually 1 apical mesial dactylar spine; propodal finger punctation usually moderate; TAP 2-3 (usually $2^1/_2$)
.....NSW sp. 7

87(83). More than 1 basal dorsomesial dactylar spines; setation usually moderate to heavy
.....NSW sp. 6 (especially subsp. B)

1 basal dorsomesial dactylar spine; setation light
.....88

88(87). Ventromesial spine smaller than ventral spine on carpus; dorsal surface of propodus lateral to dactylar base with few bumps (often punctose); antennal basipodite spine absent to small, TAP 8-10
.....*brachythorax*

Ventromesial spine larger than or equal to ventral spine on carpus; dorsal surface of propodus lateral to dactylus base very bumpy; antenna basipodite spine medium sized to large; TAP $6^1/_2$-8
.....NSW sp. 8

89(82). General tubercles on lateral thorax dense (sometimes moderately distributed); dorsal abdominal boss very poorly developed or absent; thoracic spines small, or if large: setation moderately heavy or heavy
.....NSW sp. 6 (especially subsp. C)

General tubercles on lateral thorax moderately distributed to sparse, or if dense: setation moderate or light (and TAP ≤ 7); dorsal boss present, or if absent: setation light and/or TAP ≥ 8
.....90

90(89). Thoracic spines usually large but flat or rounded (rarely blunt posteriorly); D abdominal spines absent, or small if present and only on anterior somites, often on 1 side only; abdominal boss pronounced on specimens >60 OCL. [usually 2 Li spines per side on somite 2.]

.....*bispinosus*

Thoracic spines sharp or blunt, rarely rounded; D abdominal spines present, often sharp; abdominal boss not very pronounced (obscured by broad D spines) or absent

.....91

91(90). Dorsal abdominal boss absent; D abdominal spines small and sharp; rostral carinae thin; dorsal carpal spines and precarpal spines often present

.....NSW sp. 9

Dorsal abdominal boss present under D spines (boss may be slight on specimens < 60 OCL but then D spines usually blunt); rostral carinae not distinctly thin; dorsal carpus and precarpus spines usually absent

.....92

92(91). TAP ≥ $7^1/_2$; dorsal chelae dark green or green/brown; often several D-L and D spines on abdominal somite 6. [General tubercles moderately distributed or sparse.]

.....*spinifer*

TAP <$7^1/_2$; chelae pale or white dorsally; if general tubercles sparse D abdominal spines usually curved towards anterior on specimens >50 OCL

.....93

93(92). D abdominal spines usually curved towards anterior on specimens >50 OCL; bases of rostral carinae usually parallel; general tubercles on lateral thorax moderately distributed or sparse; telsonic spines medium sized or small (sometimes absent); basal dorsomesial dactylar spines usually absent; usually 2 Li spines per side on somite 2

.....*armatus*

D abdominal spines not strongly curved to anterior; bases of rostral carinae diverging; general tubercles often dense; telsonic spines usually large; usually 1-3 basal dorsomesial dactylar spines; usually >2 Li spines per side on somite 2

.....*yarraensis*

94. *Cherax* species

Specimen found in south-western Australia
.....95

Specimen found in northern or eastern Australia
.....102

Key to the Cherax **species and subspecies, south-western Australia**

95 (94). One to four median spines present on dorsal surface of telson on a level with caudolateral spines
.....96

Telson without spines on dorsal surface
.....97

96(95). Cephalothorax with numerous tufts of long setae; median longitudinal carina entire, extending posteriorly to cervical groove
.....*tenuimanus* subsp. A

Cephalothorax devoid of setae; median longitudinal carina discontinuous
.....*tenuimanus* subsp. B

97 (1). Five raised longitudinal carinae present on dorsal cephalon
.....*quinquecarinatus*

Cephalon without distinct median longitudinal carina; usually with reduced postorbital ridges and shortened rostral carinae so that a maximum of 4 (usually only 2 ridges) are consipicuous on dorsal cephalon
.....98

98(97). Setae present (on ventral surface) on carpus and merus; mesial margin of antennal scale inflated distally
.....99

Setae absent on carpus and merus; mesial margin of antennal scale tapering gradually towards spine
.....100

99(98). Branchiostegites at cervical groove without spines, but often with series of tubercles; setae on propodus somewhat reduced; mesial margin of propodal palm with conspicuous tubercles extending over more than $^3/_4$ of edge; LP 4th P opening (pore) present but indistinct

.....*destructor destructor*

Branchiostegites at cervical groove with at least one well developed spine; mat of dense setae on propodus; mesial margin of propodal palm with conspicuous tubercles extending over no more than $^3/_4$ of edge; LP 4th P with conspicuous ventral opening

.....*destructor albidus*

100(98). Punctations on cephalon and areola reduced (cephalon "shiny" in appearance); lower branchiostegites with long recumbent setae; rostral carina ending in blunt tubercle close to apex

.....*glaber*

Punctations on cephalon and areola dense (giving cephalon a mat appearance); branchiostegites without long recumbent setae but occasionally with carapace and abdomen covered with short erect setae (*C. crassimanus*); rostral carina frequently with two or more tubercles or spines towards apex

.....101

101(100). Large well developed moderately curved blunt spine on mesial margin of carpus; tubercles on inner margin of propodal palm well developed but few in number, usually ranging from 9-12; individuals frequently attaining a size greater than 30 mm OCL

.....*preissii*

Small, sharply curving, anteriorly directed spine on mesial margin of carpus; tubercles on inner margin of propodal palm small and numerous usually ranging from 12-16; individuals rarely attaining a size greater than 30mm OCL

.....*crassimanus*

Key to the *Cherax* species and subspecies of northern and eastern Australia

102(94). Rostral spines well developed ranging from 4 to 6; distance from base of rostrum to proximal rostral spine less than 70% of total rostral length; mature males with outer distal margin of propodus partially or complelely uncalcified; tubercles on inner margin of propodal palm ranging from 15 to 23; mesial margin of antennal scale tapering gradually to antennal spine

.....103

Apex of rostrum generally developed into 2 (rarely 0, 1 or 3) tubercles or blunt spines, which can be occasionally be developed into sharp spines; distance from base of rostrum to proximal rostral spine greater than 70% of total rostral length; outer distal margin of propodus completely calcified; tubercles on inner margin of propodal palm ranging from 5 to 16; mesial margin of antennal scale either semicircular in shape or inflated distally

.....106

103(102). Distal outer margin of propodus uncalcified in mature males; carpus with single small spine on mesial surface; ventral surface of merus covered with setae; rostral carina developed into ridges extending posteriorly well beyond anterior of postorbital ridges so that 4 distinct keels are apparent on dorsal surface of cephalon; sternal keel between 5th pereiopods developed into triangular spine

.....*quadricarinatus*

Distal outer margin of propodus partially uncalcified; carpus with multiple spines on mesial surface (generally 2 or 3); ventral surface of merus without setae; rostral carina not extending posteriorly onto dorsal surface of cephalon far beyond anterior of postorbital ridges; sternal keel between 5th pereiopods developed into flat triangular plate

.....104

104(103). Rostrum with blunt spines or tubercles; branchiostegites with 4 or 5 spines along cervical groove

.....105

Rostrum with well developed spines; branchiostegites with 3 or less spines along cervical groove

.....*rhynchotus*

105(104). Rostral carina not reaching beyond postorbital ridge; dorsal surface of merus with row of tubercles; dactylus without large tubercle on cutting edge

.....*barretti*

Rostral carina reaching beyond postorbital ridge; dorsal surface of merus without dorsal tubercles; dactylus with large tubercle on cutting edge

.....*nucifraga*

106(102). Rostrum without spines or tubercles (except for bluntly pointed apex); rostral carinae fusing with rostral rim apically
.....*parvus*

Rostrum with usually 2 (rarely 1 or 3) spines or tubercles on, or at terminus of, rostral carinae
.....107

107(106). Setae present on ventral surface of propodus (includes setae extending from cutting edge of propodus onto ventral surface)
.....108

Ventral surface of propodus devoid of setae
.....112

108(107). Outer half of ventral surface of propodus covered with conspicuous setae; setae absent from merus; areola narrow, AL/AW ratio greater than 10
.....110

A mat of setae either on cutting edges only or extending posteriorly from cutting edge of propodus onto ventral surface so that setae restricted to inner half of ventral surface of propodus; setae present on merus; areola wide, AL/AW ratio less than 5 (except *cartalacoolah*)
.....109

109(108). Setae usually restricted to cutting edges of ventral propodus and dactylus, without extension onto basal area of propodal finger and dactylus; tubercles along mesial edge of propodal palm restricted to proximal $^1/_2$; areola narrow, AL/AW ratio greater than 10
.....*cartalacoolah*

Setae extending from cutting edges onto basal area of propodal finger and dactylus (ventral surface); tubercles along mesial edge of propodal palm extending over proximal $^2/_3$; areola narrow, AL/AW ratio less than 5
.....*robustus*

110(108). Setae on ventral surface of propodus short and dense and completely covering lateral ventral surface; distal margin of propodus gently curved without coarse punctations
.....*setosus*

Setae on ventral surface of propodus long and sparse and tending to be concentrated in small clumps of 2 or 3 seta; distal margin of propodus angular and with coarse punctations
.....111

111(110). Lower branchiostegites covered with short setae; 1-5 small tubercles or spines on basal mesial region of dactylus

.....*Cherax* sp. C

Branchiostegites without setae; no small tubercles or spines on basal mesial region of dactylus

.....*rotundus*

112(107). Sternal keel with LP 5th P diverging from base, with distinct triangular spine or plate at posterior terminus of keel; mats of setae on propodus, carpus and merus

.....113

Sternal keel with LP 5th P fused, without triangular spine or plate; usually with setae absent from propodus, carpus and merus

.....115

113(112). Mesial margin of antennal scale broadly inflated distally; with round or slit-like opening on LP 4th P; generally without distinct rostral or postorbital spines; occasionally, a single short lateral spine is present on cervical groove

.....114

Mesial margin of antennal scale semicircular; LP 4th P entire; conspicuous rostral and postorbital spines; 2 or more lateral spines on cervical groove

.....*dispar*

114(113). Branchiostegites at cervical groove without spines, but often with series of tubercles; setae on propodus somewhat reduced; mesial margin of propodal palm with conspicuous tubercles extending over more than $^3/_4$ of edge; LP 4th P opening (pore) present but indistinct

.....*destructor destructor*

Branchiostegites at cervical groove with at least one well developed spine; mat of dense setae on propodus; mesial margin of propodal palm with conspicuous tubercles extending over no more than $^3/_4$ of edge; LP 4th P with conspicuous ventral opening

.....*destructor albidus*

115(112). Areola very narrow, almost obliterated, AL/AW greater than 40; LP 4th P developed into prominent projections terminating with large round opening or pore

.....*punctatus*

Areola distinct; AL/AW not exceeding 15; LP 4th P rounded without conspicuous pore

.....116

116(115). Punctations on cephalon reduced and scattered; 5-6 tubercles on inner margin of propodal palm; areola relatively wide, AL/AW less than 3
.....*wasselli*

Punctations on cephalon numerous and close together; 7-14 tubercles on inner margin of propodal palm; AL/AW ratio greater than 3
.....117

117(116). Sternal keel deeply excavated between second and third lateral processes; uropodal protopodite with multiple spines; mesial surface of carpus with large angular spine, with surface of merus immediately posterior to spine smooth and undeveloped
.....118

Sternal keel entire between second and third lateral processes; uropodal protopodite rounded; mesial surface of carpus with large blunt curved spine with one or more small tubercles or spines developed on proximal mesial surface posterior to spine
.....*cuspidatus*

118(117). Rostral carina straight, tapering gradually to apex; rostrum relatively broad, POW/RW less than 1.9; maximum size exceeds 25 mm OCL
.....*cairnsensis*

Rostral carina curving abruptly inwards at apex so that rostrum terminates broadly; rostrum narrow, POW/RW greater than 1.9; maximum size very small, rarely exceeding 20 mm OCL
.....*depressus*

FIGURE 1: LATERAL VIEW OF CARAPACE SHOWING MORPHOLOGICAL FEATURES AND MEASUREMENTS

1 Depth of carapace
2 Branchiocardiac groove P (posterior)
3 Branchiocardiac groove A (anterior)
4,5,6 Postcervical grooves
7 Cervical groove

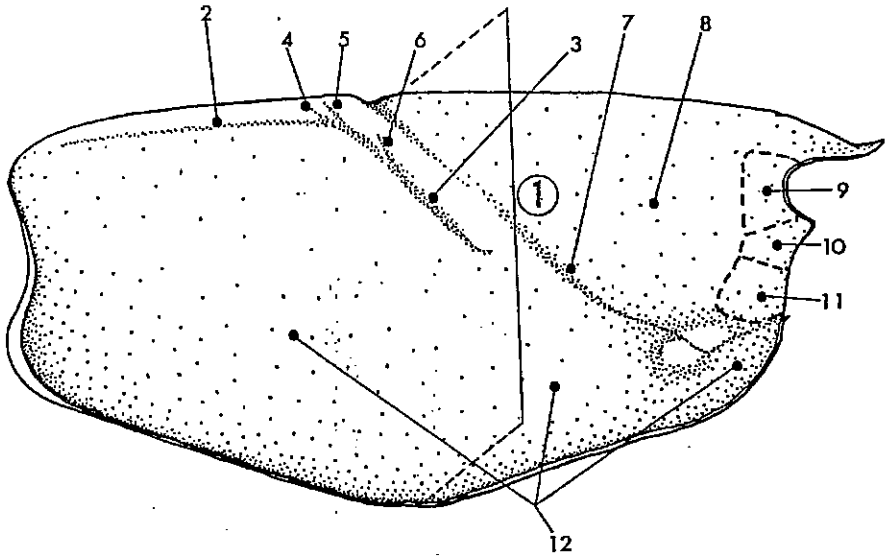
Regions of Carapace
8 Lateral cephalic
9 Orbital
10 Antennal
11 Mandibular
12 Branchiostegal

FIGURE 2: DORSAL VIEW OF CARAPACE SHOWING MORPHOLOGICAL FEATURES AND MEASUREMENTS

1 Orbital carapace length (OCL — measured from posterior level of orbit to posterior edge of carapace)
2 Width of carapace
3 Cephalic length
4 Thoracic or areolal length
5 Areolal width
6 Branchiocardiac groove P (posterior)
7 Areola
8 Areolal lines
9 Postcervical groove C
10 Postcervical groove B
11 Postcervical groove A
12 Cervical groove A at apex or meson
13 Branchiocardiac groove A (anterior)
14 Dorsal cephalon
15 Postorbital line
16 Carinate line

FIGURE 3: LATERAL VIEW OF CARAPACE (*Euastacus*)

1. Postorbital spine (1st) at terminus ridge
2. Cervical spines
3. Dorsal thoracic spines (showing medium/large blunt ones and sharp ones)
4. General tubercles, or large granulations on lateral region of carapace (branchiostegites)
5. Suborbital spine
6. Rostral spines (carried on rostral carina)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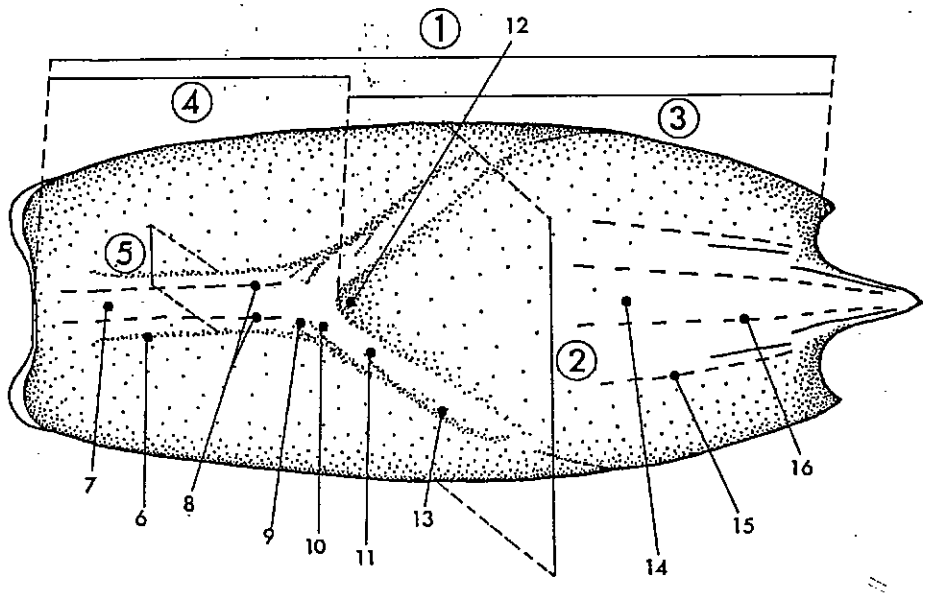
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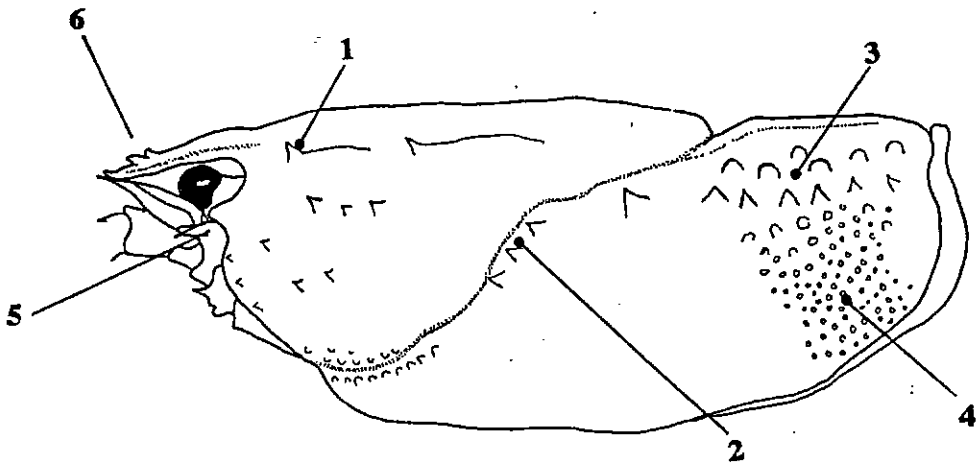
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FIGURE 4: LATERAL VIEW OF ANTERIOR CEPHALON

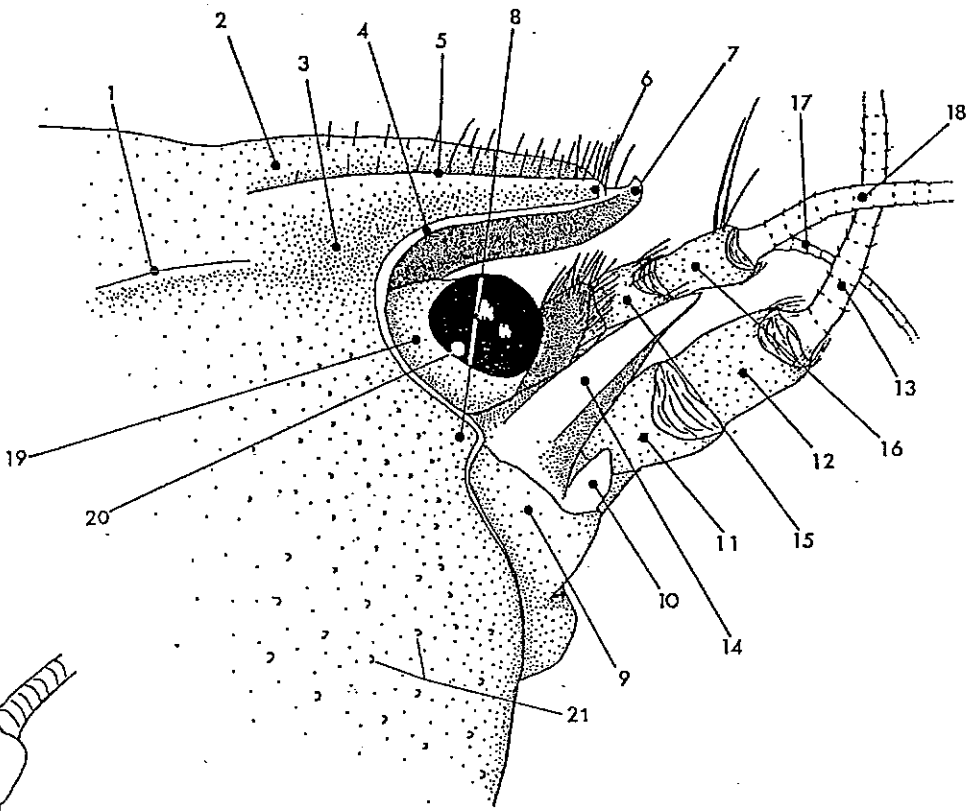
1 Postorbital ridge
2 Intracarinate region (depressed)
3 Postorbital depression (present dorsally)
4 Rostral rim
5 Rostral carinae (smooth)
6 Rostral carinae terminating abruptly and fusing with rostral rim
7 Rostral tip or apex (upturned and spiniform)
8 Suborbital angle
9, 10 Basipodite of antenna
11 Penultimate segment of antennal peduncle
12 Distal segment of antennal peduncle
13 Antennal flagellum
14 Antennal scale
15 Penultimate segment of antennular peduncle
16 Distal segment of antennular peduncle
17 Inner flagellum of antennules
18 Outer flagellum of antennules
19 Orbital peduncle
20 Pigmented area of eye
21 Granulations in antennal and orbital regions of carapace

FIGURE 5: VENTRAL VIEW OF ANTERIOR CEPHALON

1. Interantennal spine
2. Coxopodite antennal spine
3. Basipodite antennal spine
4. 'Suborbital spine'

FIGURE 6: DORSAL VIEW OF ANTERIOR CEPHALON SHOWING MORPHOLOGICAL FEATURES AND MORPHOMETRIC MEASUREMENTS

1 Rostral length (taken from posterior level of orbit to tip of rostrum)
2 Rostral width (measured at anterior level of eyes)
3 Eye width (maximal)
4 Orbital width (between suborbital angles)
5 Antennal scale length
6 Antennal scale width (maximal)
7 Length of inner flagellum of antennule
8 Length of outer flagellum of antennule
9 Length of antennal flagellum
10 Approximate length of rostral carinae
11 Lateral constriction of apex of rostrum
12 Terminal spine on antennal scale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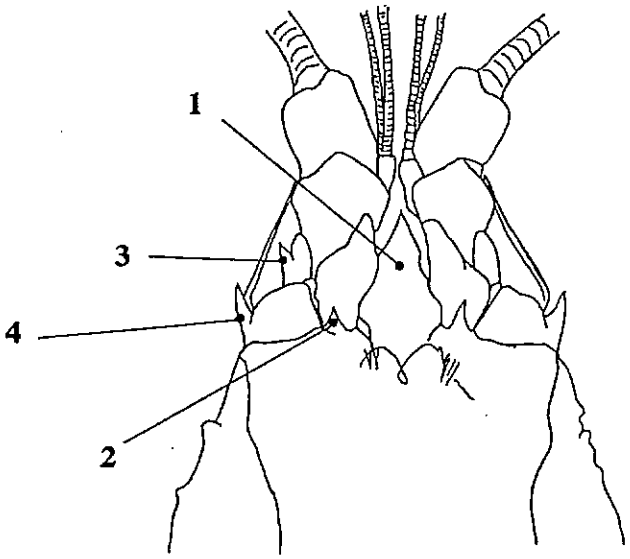
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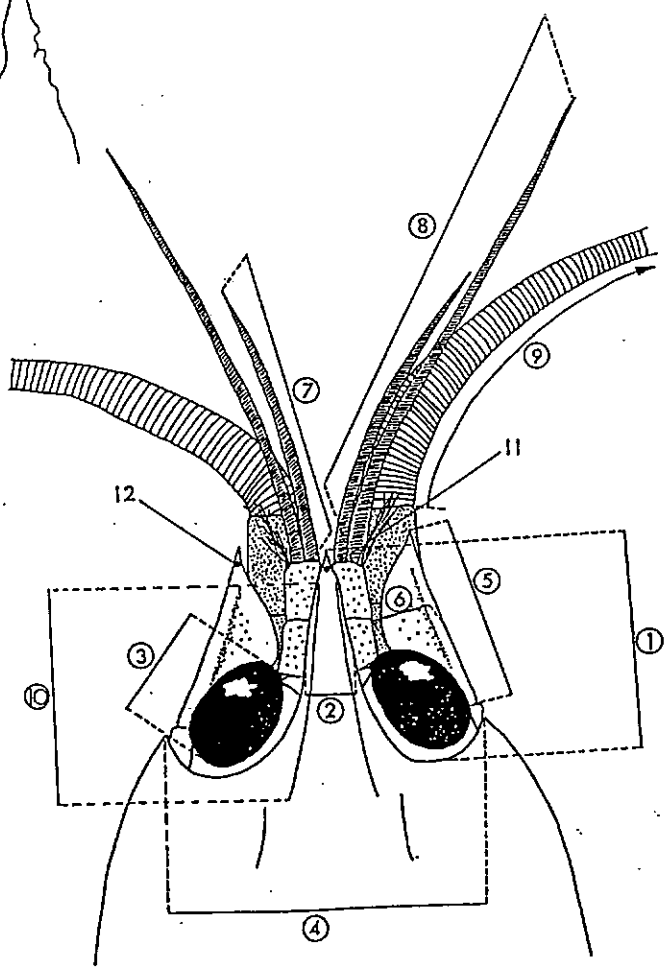
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FIGURE 7: DORSAL VIEW OF ABDOMINAL SOMITES AND TAIL FAN APPENDAGES SHOWING MORPHOLOGICAL FEATURES AND MEASUREMENTS

1 Length of outer ramus of uropod
2 Width of outer ramus of uropod
3 Width of somite 3 of abdomen
4 Somite 1 of abdomen
5 Width of telson
6 Length of telson
7 Length of inner ramus of uropod
8 Width of inner ramus of uropod
9 Somite 2 of abdomen
10 Tergum of somite
11 Pleurum of somite
12 Uropodal protopodite (showing both lobes well rounded and not produced to spine)

Outer Ramus of Uropod
13 Longitudinal median carina (which terminates in spine — see 16)
14 Caudolateral corner of ramus (with 2 spines on its edge)
15 Extra dorsolateral spines along transverse suture
16 Median spine on transverse suture
17 Extra dorsomesal spines along transverse suture

Inner Ramus of Uropod
18 Caudolateral corner of ramus (with 1 spine)
19 Longitudinal median carina (which terminates in spine premarginally)

Telson
20 Caudolateral corner with 1 spine

FIGURE 8: DORSAL VIEW OF ABDOMINAL SOMITES AND TAIL FAN APPENDAGES (*Euastacus*)

1. Telsonic spines (medium/large spines on dorsal surface of telson)
2. Li spines - far lateral (edge) spines on pleura
3. Lii spines - non-edge lateral spines on pleura
4. Dorsolateral (D-L) spines on abdominal somites
5. Dorsal (D) spines on abdominal somites

FIGURE 9: VENTRAL VIEW OF SOMITES 2 AND 3 OF ABDOMEN ON REPRODUCTIVELY ACTIVE FEMALE SHOWING MORPHOLOGICAL FEATURES AND MEASUREMENTS

1 Subcalcified flap or anteroventral extension of pleurum of somite 2

FIGURE 9A: TELSON AND UROPODAL RAMI (*Cherax*) SHOWING SUBCALCIFIED OR MEMBRANOUS PORTIONS

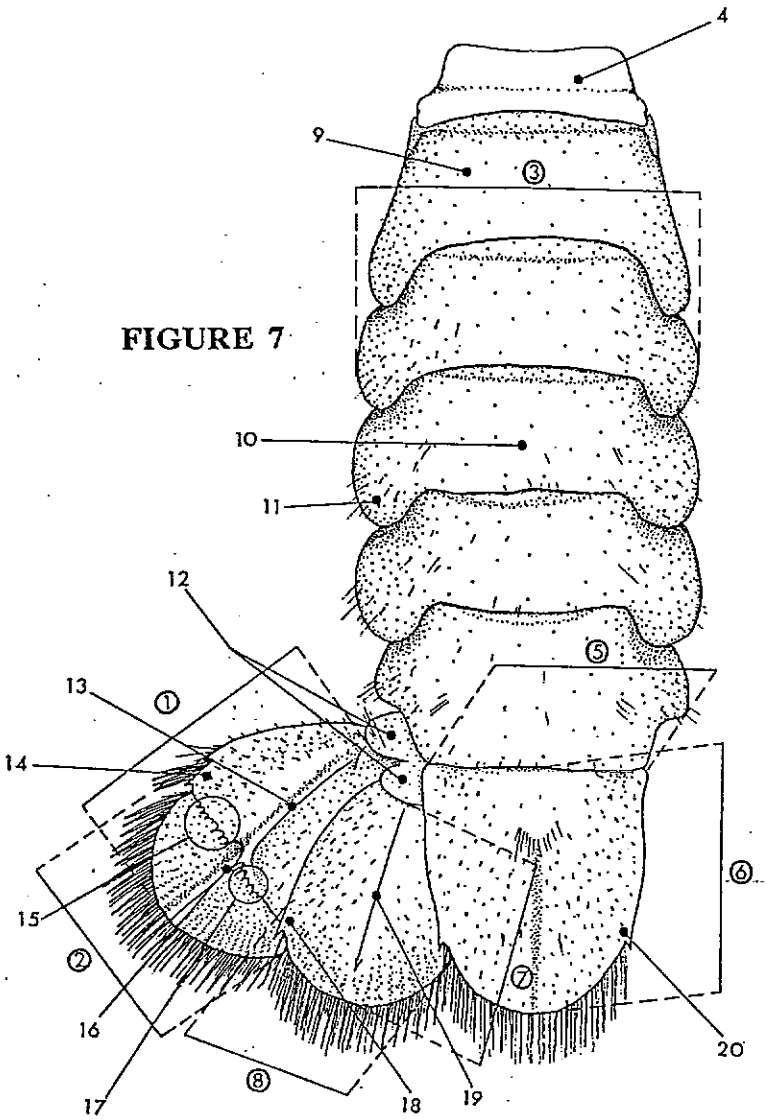


FIGURE 7

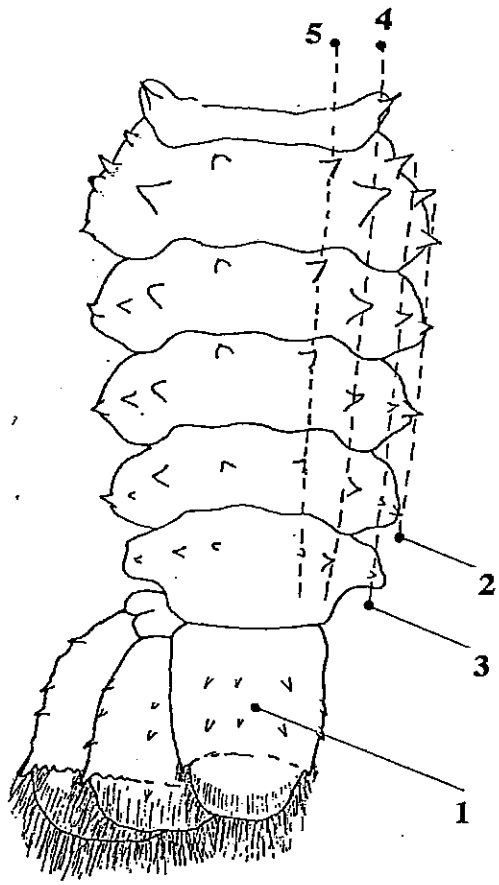


FIGURE 8

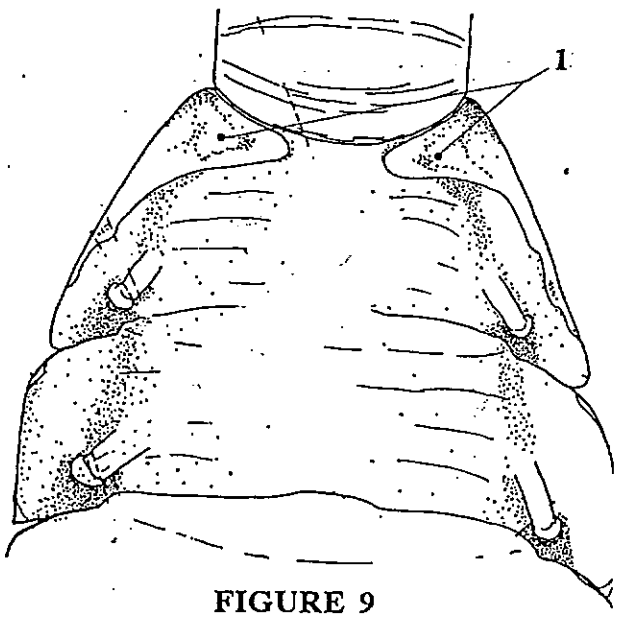


FIGURE 9

FIGURE 9A

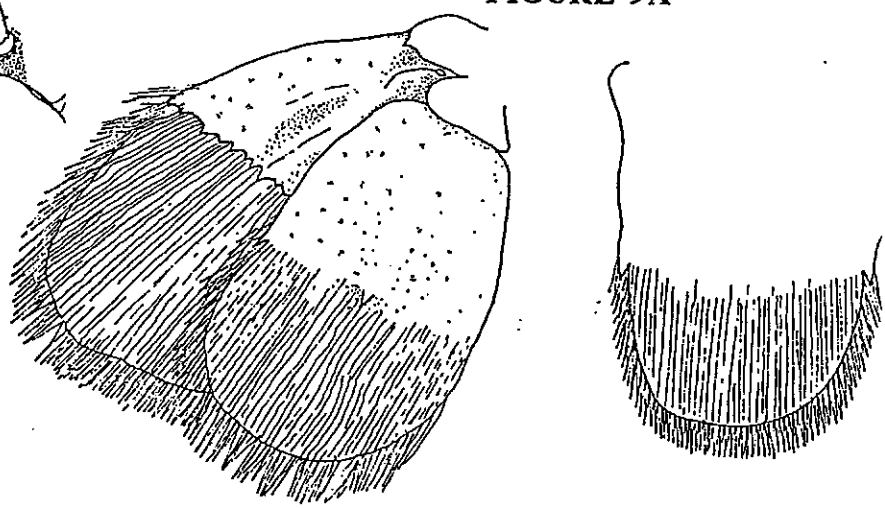


FIGURE 10: CHARACTERISTICS OF STERNUM OF INTERSEXED SPECIMEN SHOWING LATERAL PROFILE (A) AND VENTRAL VIEW (B)

1 1st Pereiopod (or chela; 1st P)
- **1a** Articulation of pereiopod and lateral process
- **1c** Lateral process of 1st pereiopod (LP 1st P)

2 2nd Pereiopod (2nd P)
- **2a** Articulation of pereiopod and lateral process
- **2b** Pore on lateral process
- **2d** Keel rising to crest (which is slightly higher than lateral process)

3 3rd Pereiopod (3rd P)
- **3a** Articulation of pereiopod and lateral process
- **3c** Lateral process of 3rd pereiopod
- **3d** Keel rising to summit (which is much higher than lateral processes and immediately posterior of articulation level
- **3e** Keel remaining sharp between 3rd and 4th pereiopods and fading out at articulation level of 4th pereiopods
- **3f** Penultimate peak on keel at articulation level of 3rd pereiopods
- **3g** Female gonopore

4 4th Pereiopod (4th P)
- **4a** Articulation of pereiopod and lateral process
- **4b** Small pore opening posteriorly or posteriolaterally (NOT VISIBLE IN VENTRAL VIEW)
- **4h** Transverse carina on lateral process

5 5th Pereiopod (5th P)
- **5g** Male gonopore

- **6a** Lobe of annulus ventralis
- **6b** Continuous central groove separating lobes of annulus ventralis

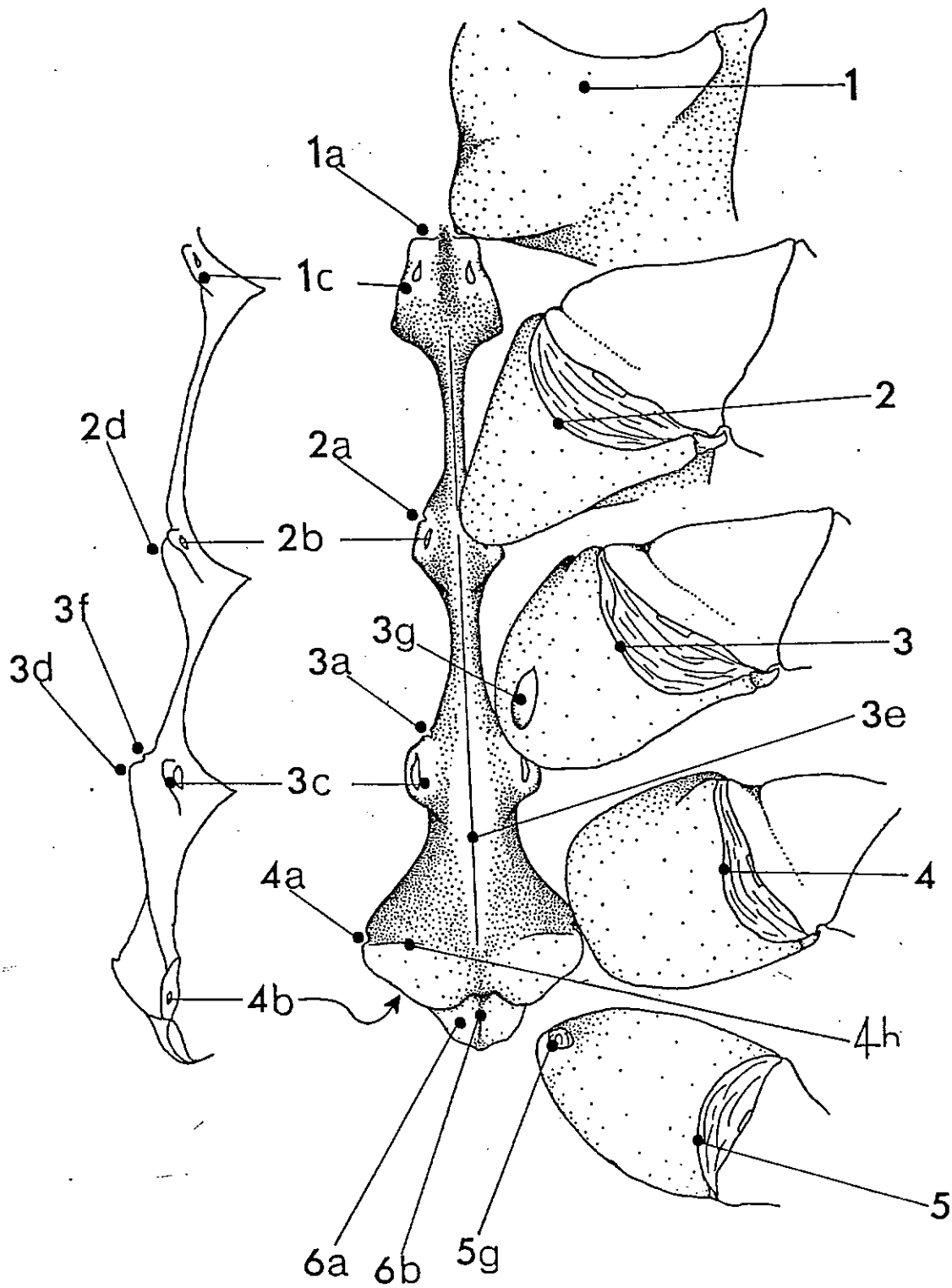


FIGURE 10: CHARACTERISTICS OF STERNUM OF INTERSEXED SPECIMEN SHOWING LATERAL-PROFILE (A) AND VENTRAL VIEW (B)

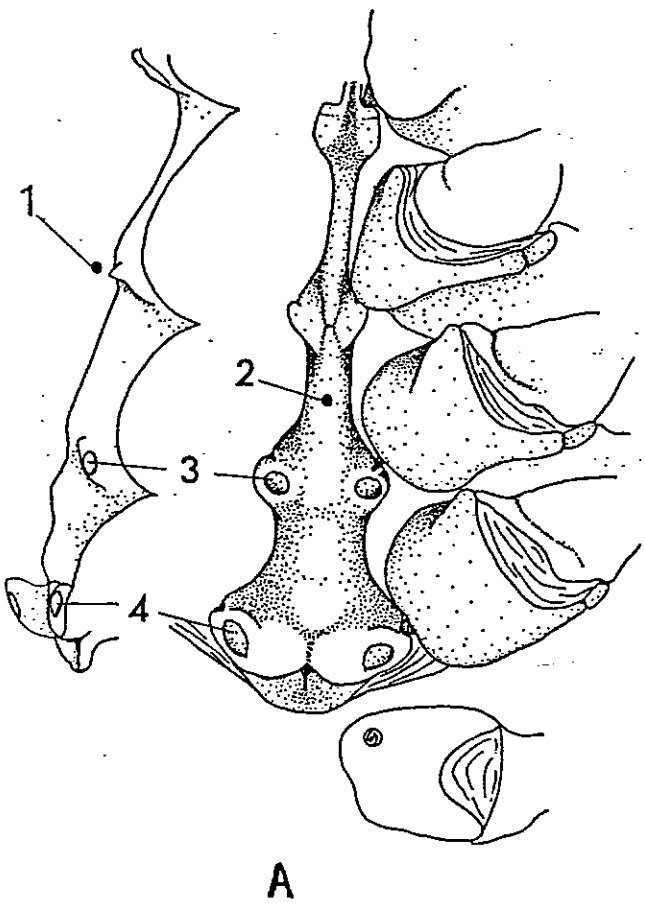
FIGURE 11: CHARACTERISTICS OF STERNUM SHOWING LATERAL PROFILE AND VENTRAL VIEW OF SPECIMEN WITH STERNAL PORES (A) AND OF SPECIMEN WITHOUT STERNAL PORES (B)

A

1 Keel not rising to crest and not higher than lateral process at 2nd pereiopods
2 Keel low and blunt
3 Very large pore on LP 3rd P
4 Very large pore (opening ventrally) on LP 4th P

B

1 Keel rising to crest and higher than lateral process
2 Keel low and blunt, but continuing between lateral processes of 4th pereiopod
3 LP 3rd P without pore
4 LP 4th P without pore



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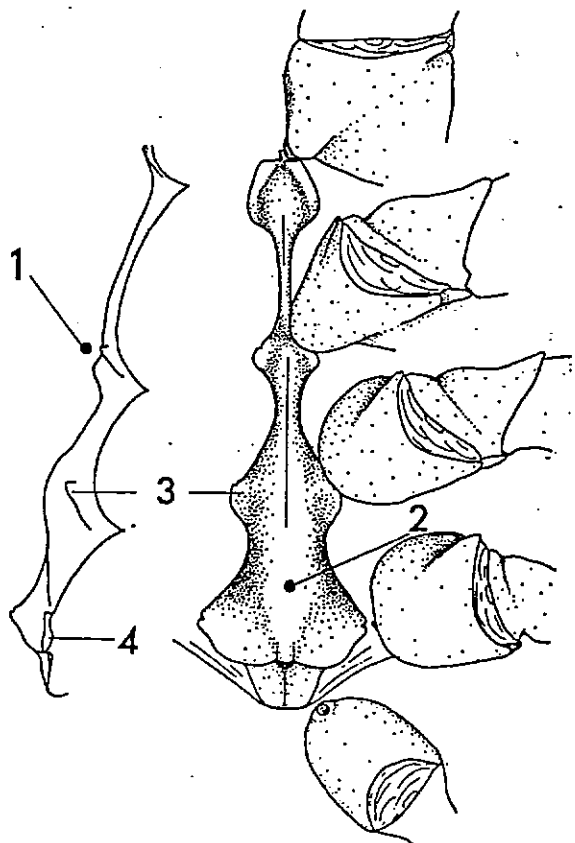

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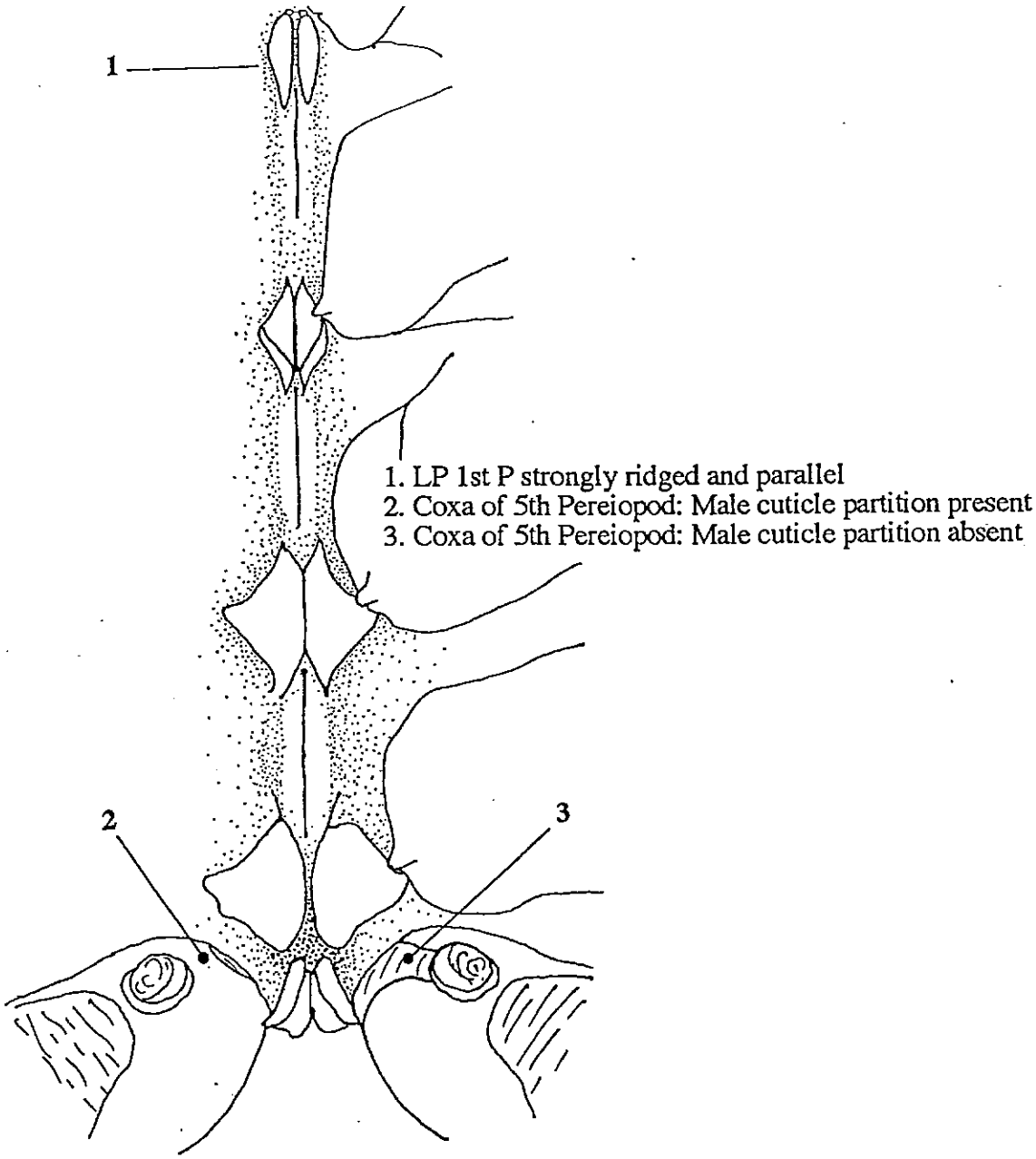


FIGURE 12: CHARACTERISTICS OF STERNUM SHOWING MALE CUTICLE PARTITION CHARACTER (*Euastacus*)

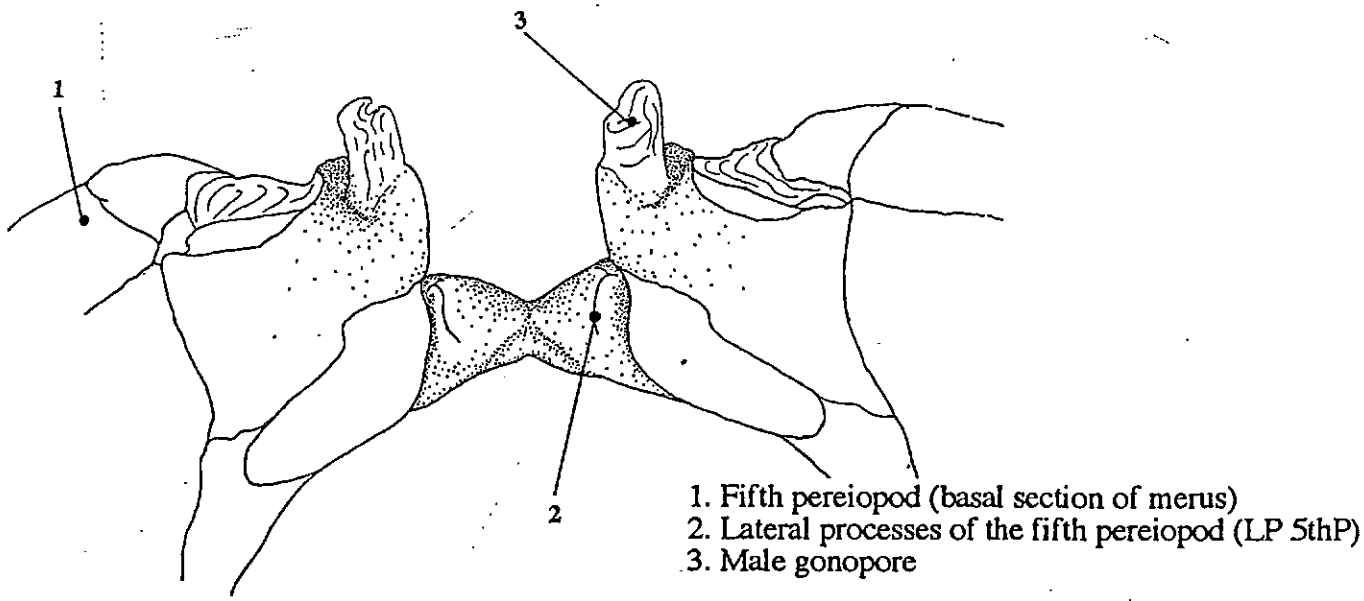


FIGURE 12A: FIFTH PEREIOPOD, MALE GONOPORE AND STERNUM (*Cherax*)

FIGURE 13: SOME CHARACTERISTICS OF CHELAE SHOWING DORSAL VIEW (A) AND LATERAL VIEW (B)

1	Depth of propodus
2	Width of propodus
3	Length of propodus
4	Length of dactyl
5a	Prominent dorsal spine on merus
5b	Prominent centroventral spine on merus
6a	Middorsal line on carpus
6b	Centrodorsal groove on carpus
6c	Ventral tubercles on carpus
7	Tubercles along dorsal surface of propodal palm
8	Setose tubercle with tuft of long bristle setae
9	Tubercles along ventral surface of propodal palm

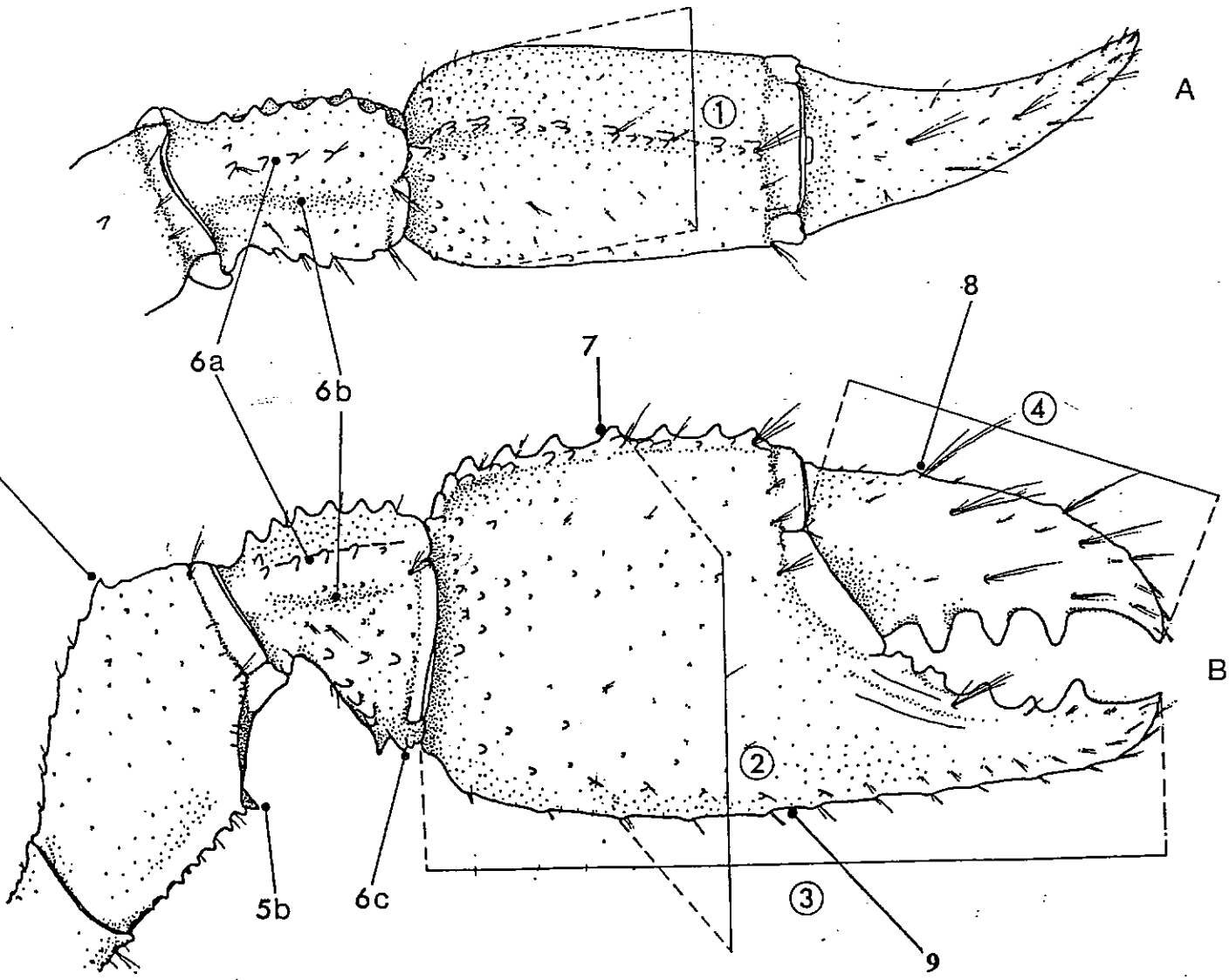


FIGURE 14A: LARGE DIMORPHIC CHELA (A) AND SMALL DIMORPHIC CHELA (B) FROM SAME INDIVIDUAL (AND SAME SCALE) SHOWING MAJOR DIFFERENCES BETWEEN THE TWO (*Engaeus*)

1 Propodal palm entirely granulate
2 Tufts of long bristle setae on dactyl (and also on propodal finger)
3 Dense pad of short plumose setae along cutting edges of dactyl and propodal finger and extending from cutting edges onto propodal palm

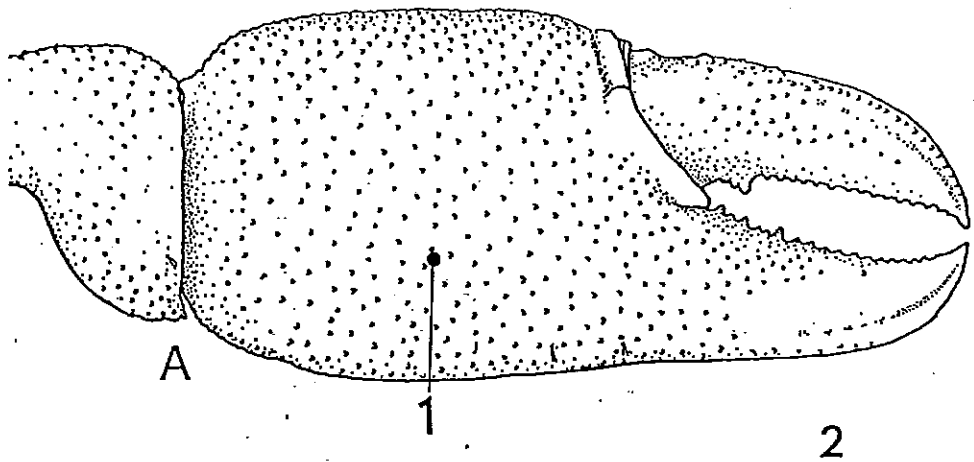
FIGURE 14B: RIGHT CHELA (*Geocharax*) SHOWING CURVE OVER PROXIMAL THIRD OF DACTYL

1. Curve over proximal third of dactyl (observable both on the outer edge of the dactyl, and on the cutting edge)

FIGURE

14C: MERUS, CARPUS AND PROPODAL PALM OF RIGHT CHELA (*Cherax*) SHOWING MESIAL SURFACE AND PATCHES OF SETAE

1. Patch or pad of dense fine setae on dorsal (dorsomesial) surface of propodal palm
2. Patch or pad of dense fine setae on mesial surface of carpus
3. Small patch of dense fine setae on ventral surface of carpus
4. Patch or pad of dense fine setae on ventral surface of merus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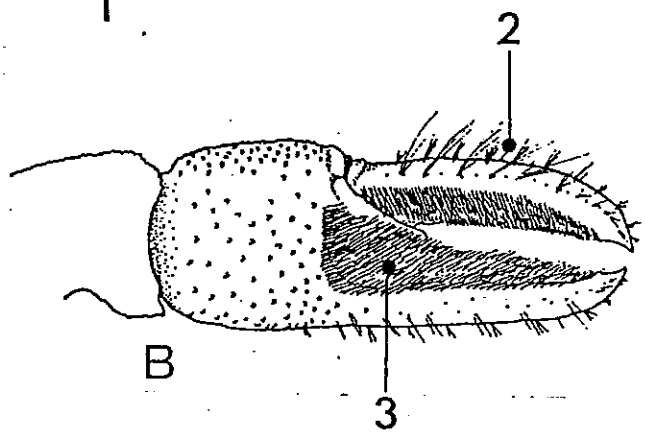
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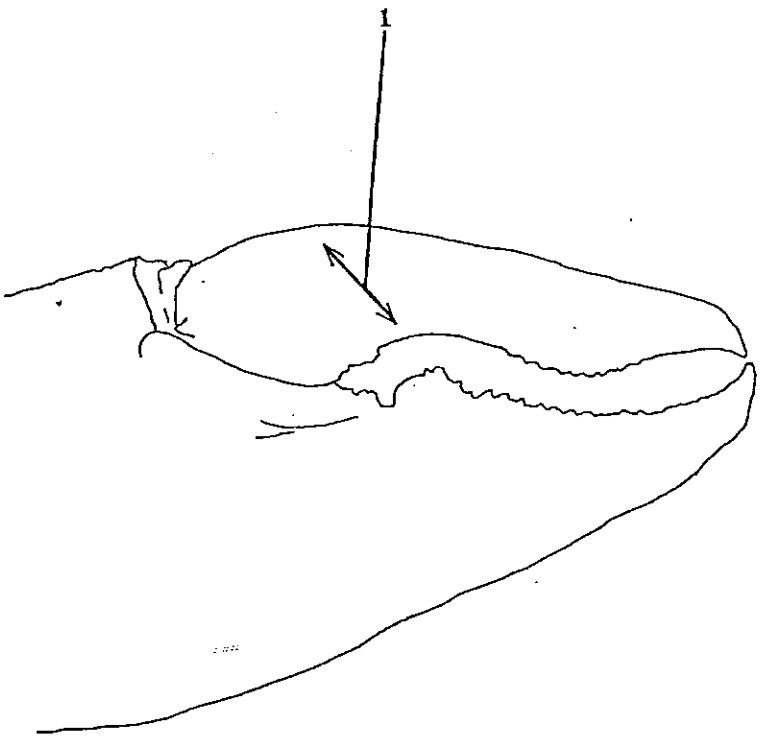
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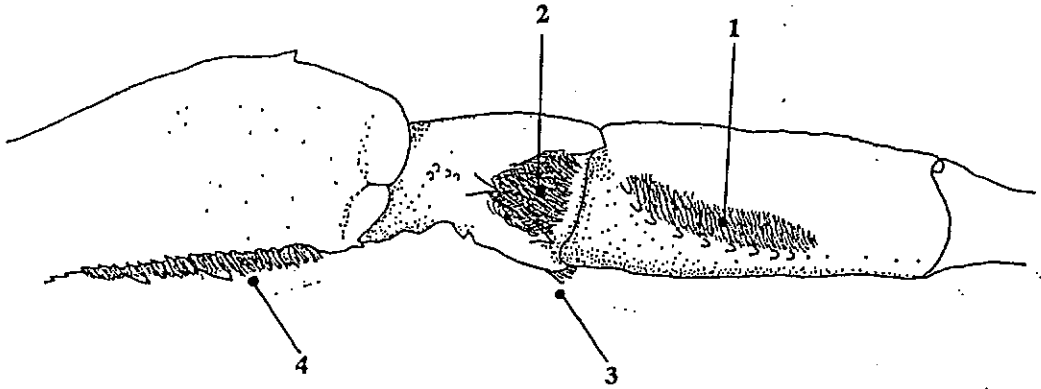
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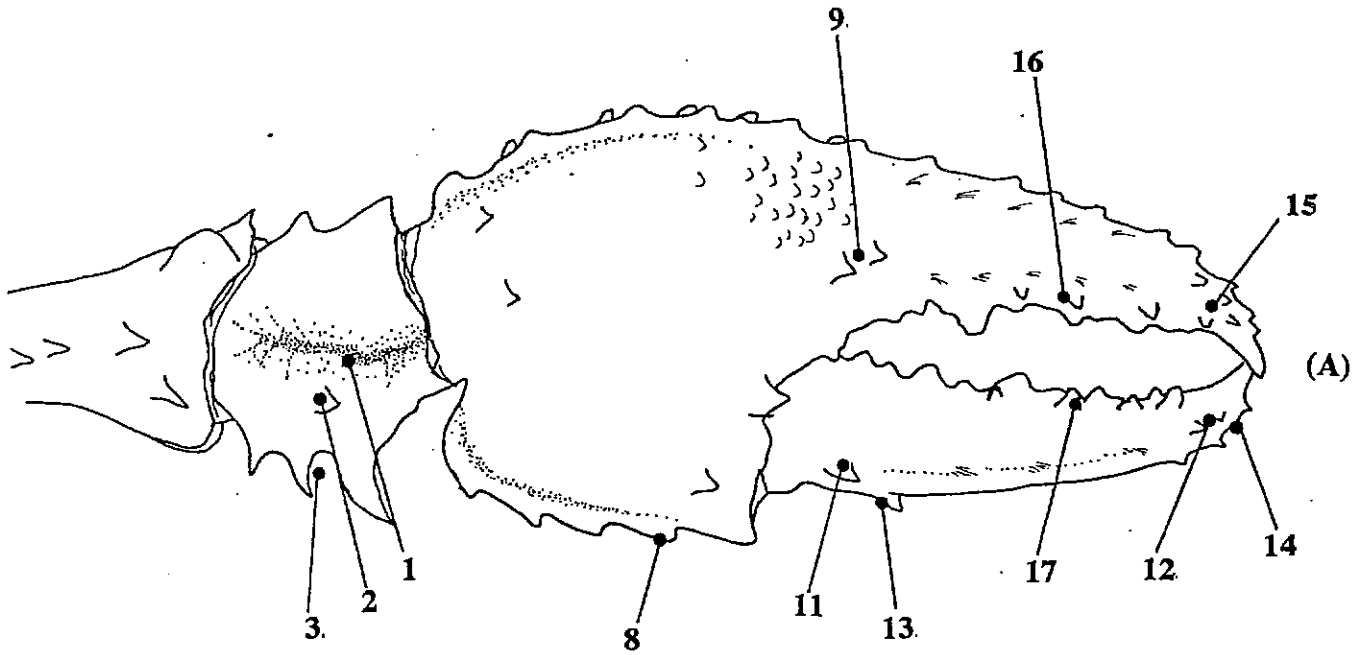
FIGURE 15: LARGE LEFT CHELA (*Euastacus*) (A) DORSAL (B) LATERAL (C) VENTRAL

1. Longitudinal groove, dorsal surface of carpus
2. Carpal spine, dorsal surface
3. Mesial carpal spines (3)
4. Ventromesial carpal spines
5. Ventral carpal spine

6. Dorsal spine row (complete condition)
7. Ventral spine row (complete condition)
8. Spines along mesial edge of propodal palm

9. Dorsal spines lateral to dactylar articulation
10. Ventral spines lateral to dactylar articulation
11. basal dorsomesial dactylar spines
12. apical dorsomesial dactylar spines
13. basal (or marginal) mesial dactylar spine
14. apical mesial dactylar spine
15. apical dorsolateral spines on propodal finger
16. spines along propodal finger, above cutting edge
17. spines along dactylus, above cutting edge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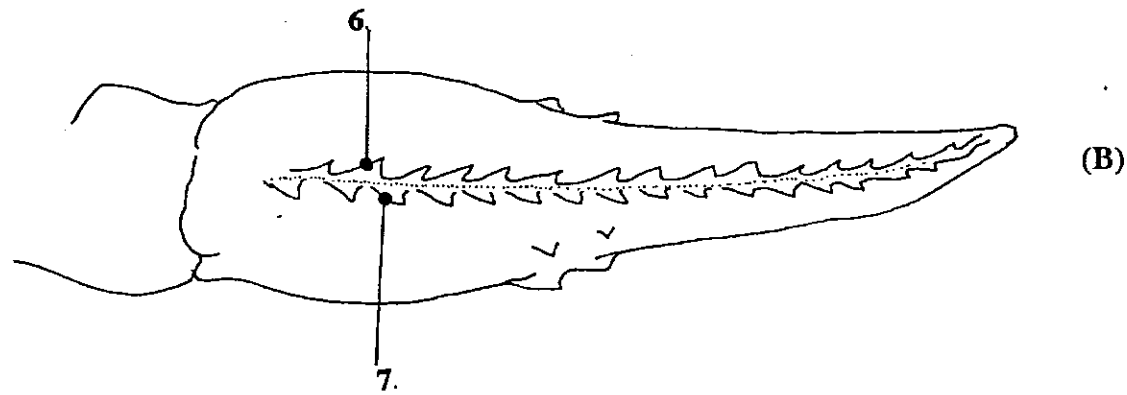
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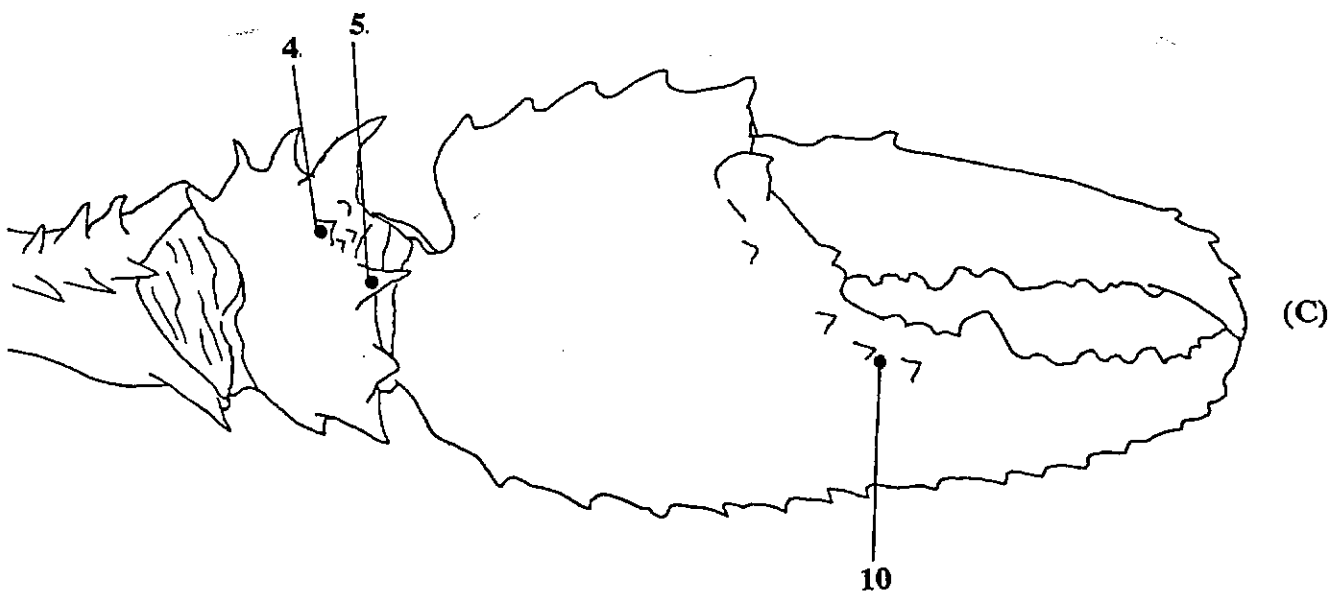
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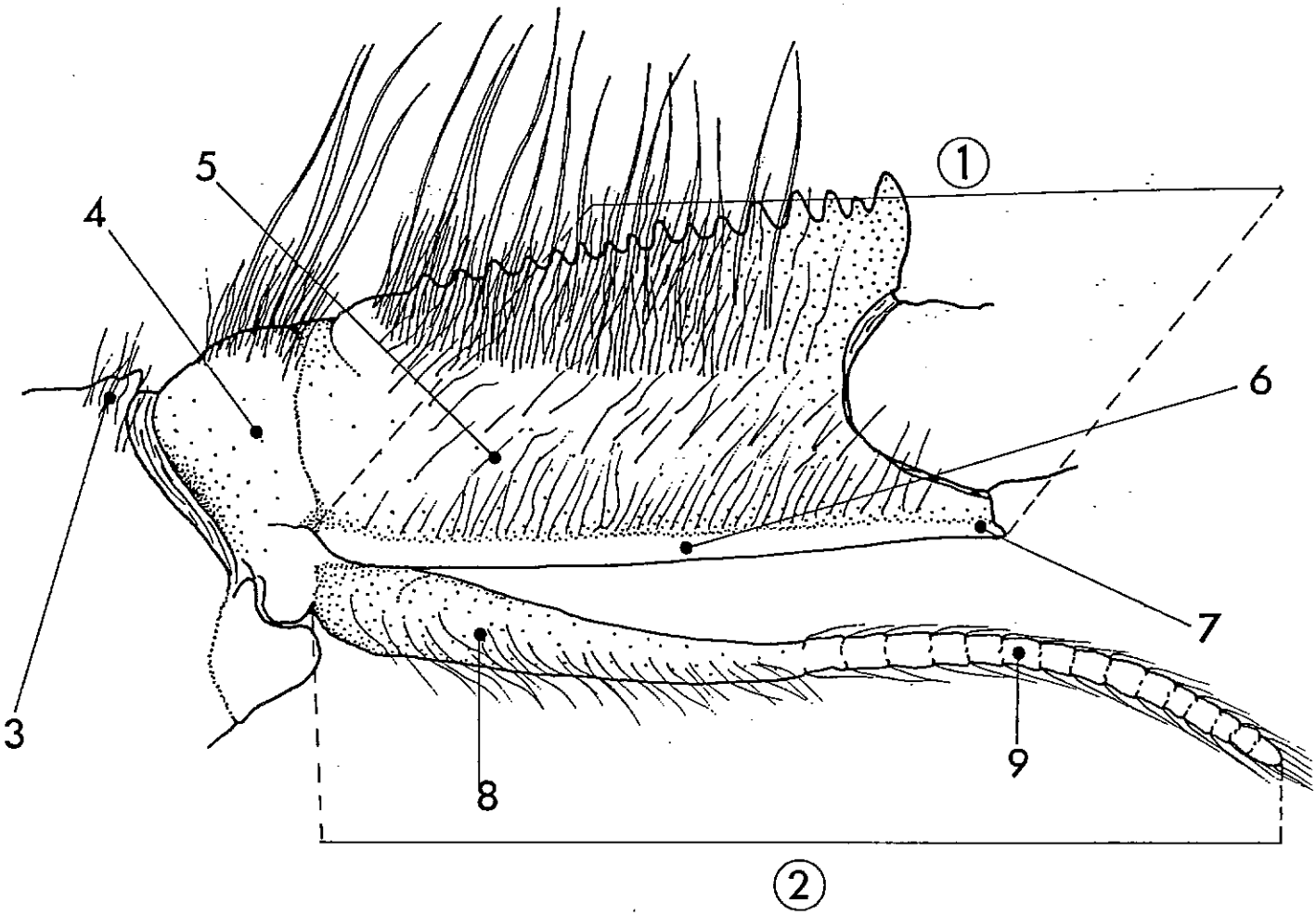
FIGURE 16: VENTRAL VIEW OF THIRD MAXILLIPED ON RIGHT SIDE SHOWING MORPHOLOGICAL FEATURES AND MEASUREMENTS

1 Length of ischium (measured from junction of basipodite and ischium to laterodistal corner of ischium)
2 Length of exopodite
3 Mesoventral corner of coxopodite (triangular and sharp here)
4 Ventrolateral surface of basipodite (asetose here)
5 Ventrolateral surface of ischium (sparsely setose here)
6 Carinate lateral edge of ischium
7 Laterodistal corner of ischium
8 Shaft of exopodite
9 Flagellum of exopodite

FIGURE 17: GASTRIC MILL - ZYGOCARDIAC OSSICLE

1. Zygocardiac ossicle (lateral view)
2. Zygocardiac teeth
3. Ventral ear
4. TAP (in this instance TAP = 6)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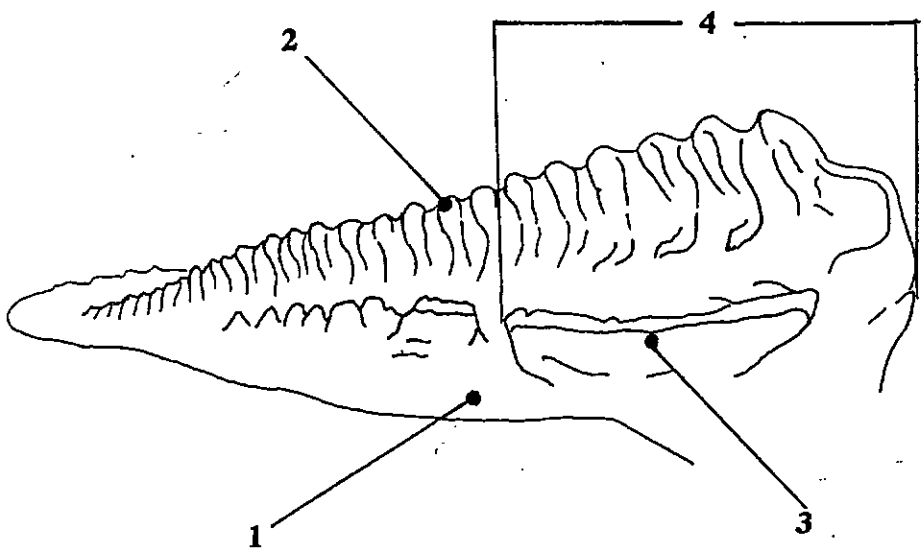
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4. Preliminary key to the species of Australian shrimps (Atyidae) found in inland waters.

by Satish Choy[1] and Pierre Horwitz[2]

[1]Water Resources Technical Centre, Department of Primary Industries, Rocklea, Queensland

[2]Department of Environmental Management, Edith Cowan University, Joondalup, WA.

This key was initially based on the generic key provided in Williams 1980, with source material for species level identifications from Riek 1953, Holthuis 1960, Williams 1964, Williams 1977, Williams and Smith 1979, Smith and Williams 1980, 1982a, 1982b, Holthuis 1986, Bruce 1992, and Short 1993. Species of *Caridina* have been keyed by compiling data on relative lengths and dentition of the rostrum (mainly from Riek 1953), making identifications vulnerable to damaged rostra and ontogenic changes; needless to say, this key requires more work and great caution should be exercised when using it.

1. Supraorbital spine present on either side at base of rostrum; exopods present on all pereiopods
.....*Paratya australiensis* Kemp

No supraorbital spine; exopods absent, or if present usually on pereiopod 1 only (except for *Stygiocaris* where exopods are present on all pereiopods)
.....2

2. Eyes normal, not reduced; specimens usually from epigean habitats
.....3

Eyes small with a reduction in pigment; from hypogean habitats
.....12

3. Exopod present at the base of first pereiopod
.....*Caridinides wilkinsi* Calman

Exopod absent at base of first pereiopod (or any pereiopod)*
.....4

4. Second pereiopod with propodal palm; carpus elongate, more than 2x longer than broad, and somewhat cylindrical in shape
.....5

Second pereiopod without propodal palm; carpus squat, less than 2x longer than broad; anterior margin deeply excavated
.....*Australatya striolata* (McCulloch and McNeill)

*vestigial ones may be present in some specimens of *Caridina thermophila*

5. Rostrum short, not extending beyond middle of penultimate segment of antennule, devoid of teeth on upper border

.....6

Rostrum extending to, or well beyond, the penultimate segment of antennular peduncle; teeth present on upper border of rostrum

.....7

6. Rostrum dorsoventrally compressed with strongly expanded lateral carina, lower margin without teeth, lower margin without teeth; eggs large (>0.9 mm) and few in number (<60)

.....*Caridina zebra* Short

Rostrum more laterally compressed, without expanded lateral carina, lower margin may have some teeth; eggs small (<0.6 mm) and numerous (>100)

.....*Caridina typa* Milne Edwards

7. Rostrum extremely long, at least 1.5x longer than carapace, strongly curved, upper margin with less than 15 relatively widely space teeth

.....*Caridina gracilirostris* De Man

Rostrum less than 1.5x carapace length, not strongly curved upwards, upper margin with more than 15 relatively closely spaced teeth

.....8

8. Rostrum relatively short, not reaching tip of antennular peduncle; either straight or turned downwards in lateral profile

.....9

Rostrum relatively long, reaching tip or beyond antennular peduncle; either straight or with upward inflexion in lateral profile

.....10

9. Dorsal surface of rostrum with less than 5 teeth placed behind orbital margin; eggs large (>0.8 mm) and few (<50); currently known only from central Queensland

.....*Caridina thermophila* Riek

Dorsal surface of rostrum with more than 5 teeth placed behind orbital margin; eggs small (>0.5 mm) and numerous (>100); known only from coastal areas of tropical Australia (and outside Australia)

.....*Caridina serratirostris* De Man

10. Dorsal surface of rostrum without teeth on distal 1/3 except for a subapical one (ie. upper tip of rostrum bare)

.....*Caridina "nilotica"*(P.Roux)

Dorsal surface of rostrum with teeth on distal 1/3 (ie. all the way to the tip)

.....11

11. Distal teeth on rostrum larger than proximal ones; telsonic spines equal

.....*Caridina mccullochi* J.Roux

Distal teeth on rostrum not conspicuously larger than proximal ones; outer pair of telsonic spines longer and stronger than others

.....*Caridina indistincta* Calman

12. Exopods absent from all pereiopods

.....13

Exopods present on all pereiopods

.....16

13. Rostrum extremely small and acute, much wider than long; 3rd and 4th pereiopods developed into massive raptorial appendages, merus robust and ovate

.....*Pycnisia raptor* Bruce

Without the above combination of characters, merus slender and elongate

.....14

14. Rostrum depressed; no pleurobranch or setobranch at the base of fifth pereiopod; fourth pereiopod without epipodite (tips of dactyl and propodal finger on 1st, 2nd and 3rd pereiopods sharply hooked)

.....*Pycneus morsitans* Holthuis

Without the above combinations of characters

.....15

15. First antennae with small tooth like spines on distal borders of first and second segments of peduncle; fingers of chelae of 1st and 2nd pereiopods clawed

.....*Parisia unguis* Williams

First antennae without small tooth like spines on distal borders of first and second segments of peduncle; fingers of chelae of 1st and 2nd pereiopods broadly rounded

.....*Parisia gracilis* Williams

16. Lance-shaped rostrum constricted in the basal part; pterygostomial angle acute; scaphocerite (antennal scale) about three times as long as broad
.....*Stygiocaris lancifera* Holthuis

Spear-shaped rostrum not constricted in the basal part, tapers gradually; pterygostomial angle broadly rounded; scaphocerite (antennal scale) less than 2.5 times as long as broad
.....*Stygiocaris styliferа*Holthuis

FIGURE 18 LATERAL VIEW OF CARAPACE OF *Pa ratya australiensis*

1 Teeth on dorsal edge of rostrum
2 Supraorbital spine

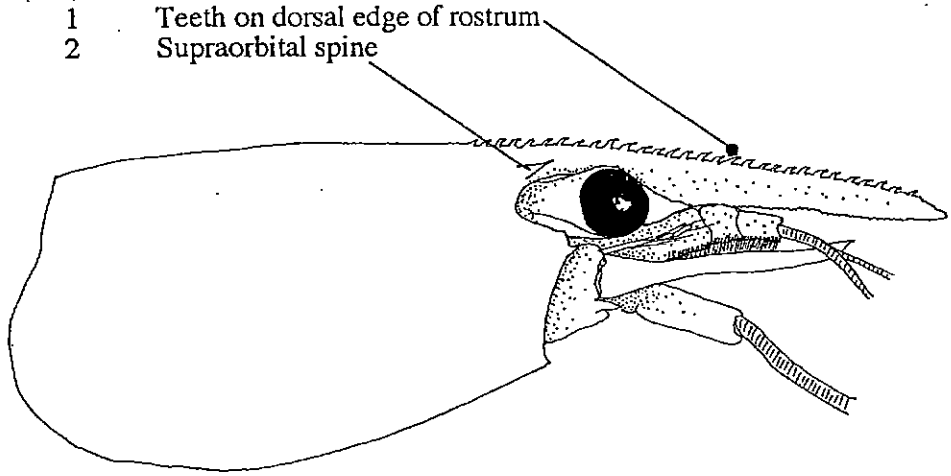


FIGURE 19 FIRST PEREIOPOD OF *Pa ratya australiensis*

1 Exopod

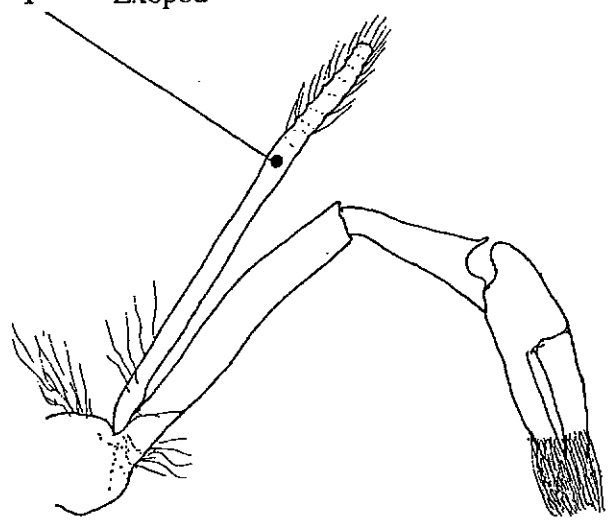
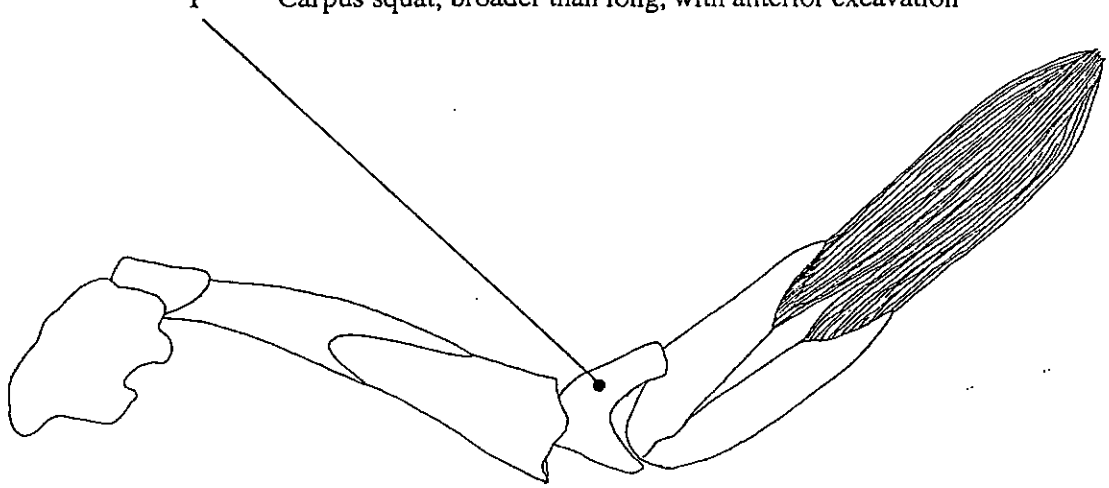


FIGURE 20 SECOND PEREIOPOD OF *Australatya striolata*
(Redrawn after Smith and Williams 1982a)

1 Carpus squat, broader than long, with anterior excavation



5. Preliminary key to the species of Australian prawns (Palaemonidae) found in inland waters.

Sources: Riek (1951), Boulton and Knott (1984), Fincham (1987), Bruce (1993), Bruce and Short (1993), Chace and Bruce (1993).
The Australian species belonging to the genus *Macrobrachium* is currently being revised by John Short, Queensland Museum; the key presented here for this genus is taken from that given by Fincham (1987) to give identifications to species which are known to occur in Australian inland waters.

1. Mouthparts modified to form a filtratory basket (particularly the endites of first maxillipeds which are densely fringed medially with fine long setae); exopod (outer ramus) of uropod with caudolateral tooth but without small mobile spinule medial to it

.....Kakaducaridinae.....2

Mouthparts not modified to form a filtratory basket (endites of first maxillipeds not densely fringed medially with fine long setae); exopod (outer ramus) of uropod with caudolateral tooth and with small mobile spinule medial to it

.....Palaemoninae.....including *Macrobrachium*.....3

2. Rostrum strongly dentate; carapace without a distinct branchiostegal suture; telson with two pairs of dorsal spines

.....*Leptopalaemon gagadjui* Bruce and Short

Rostrum generally without teeth; carapace with branchiostegal suture; telson without dorsal spines

.....*Kakaducaris glabra* Bruce

3. Carapace with spine below branchiostegal groove (spine arising posterior to anterior margin of carapace)

.....*"Palaemonetes australis"*

[This species found extensively in inland and estuarine waters in south-western Australia. It does not conform with recent diagnoses of the genus *Palaemonetes*, mainly due to the presence of a mandibular palp in many specimens, and should be considered congeneric with *Macrobrachium intermedium*, an estuarine/marine species (Boulton and Knott 1984)]

Carapace with spine as above, except placed above branchiostegal groove

.....4

4 (2). Carpus longer than merus

.....5

Carpus about as long as or shorter than merus

.....7

E
E
E

5 (4). Tip of telson reaching beyond tip of longer posterior spines
.....*rosenbergii* (De Man)

Tip of telson not reaching beyond tip of longer posterior spines
.....6

6 (5). Fingers with a row of enlarged tubercles at inner side of cutting edge
.....*bullatum* Fincham

Fingers without a row of enlarged tubercles at inner side of cutting edge. (Fingers usually with 10 or more denticles on cutting edge)
.....*australe* Guerin-Meneville

7 (4). Fingers covered with velvety hairs
.....8

Fingers naked or with a few stiff setae
.....~~12~~ 14

8 (7). Carpus shorter than propodal palm
.....9

Carpus equal to or longer than propodal palm
.....~~14~~ 13

9 (8). Propodal palm slightly swollen
.....10

Propodal palm not swollen
.....~~13~~ 12

10 (9). Fingers equal to propodal palm
.....*adscitum adscitum* Riek

Fingers shorter than propodal palm
.....11

11 (10). Upper margin of rostrum straight, 2 or 3 teeth behind line of orbit
.....*atactum sobrinum* Riek

Upper margin of rostrum convex, 1 or 2 teeth behind line of orbit
.....*australiense cristatum* Riek

12 (7). Fingers almost as long as propodal palm; pereiopods coarsely tuberculate
.....*australiense crassum* Riek

Fingers much shorter than propodal palm; pereiopods finely tuberculate
.....*australiense eupharum*Riek

13(9). Fingers just shorter than propodal palm
.....*atactum atactum* Riek

Fingers distinctly shorter than propodal palm
.....*australiense australiense* Holthuis

14 (8). Upper margin of rostrum with 11 or more teeth
.....*glypticum* Riek

Upper margin of rostrum with 10 or less teeth
.....15

15 (14). Fingers shorter than palm
.....*lar* (Fabricius)

Fingers a little longer than propodal palm
.....*atactum ischnomorphum* Riek

FIGURE 21 FIRST MAXILLIPED *Kakaducaris glabra* SHOWING SETAE WHICH FORM FILTRATORY BASKET
(Mesial view of right appendage, redrawn from Bruce 1993)

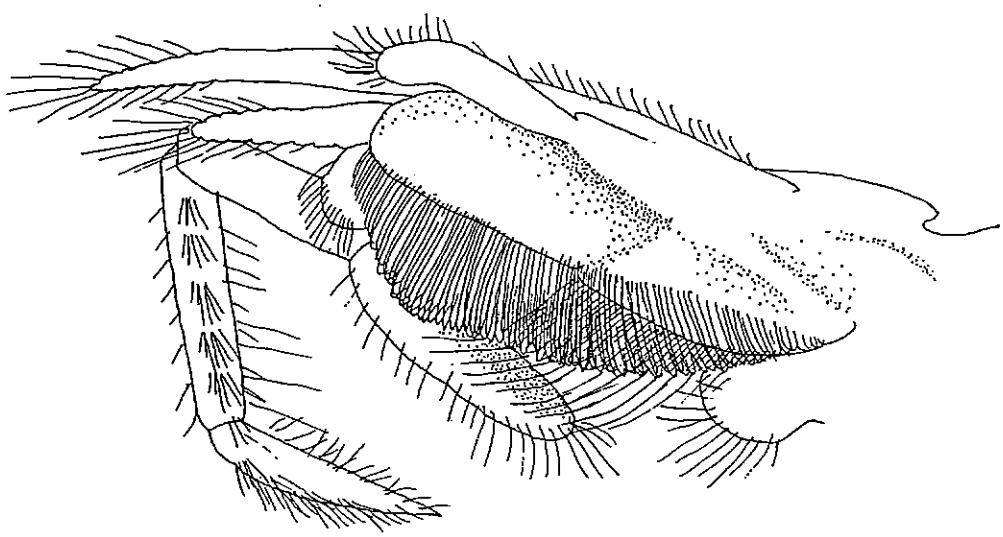


FIGURE 22 UROPODAL APPENDAGES SHOWING CAUDOLATERAL DETAIL OF OUTER RAMUS

1 Caudolateral spine
2 Small mobile spine mesial to caudolateral spine
3 Suture

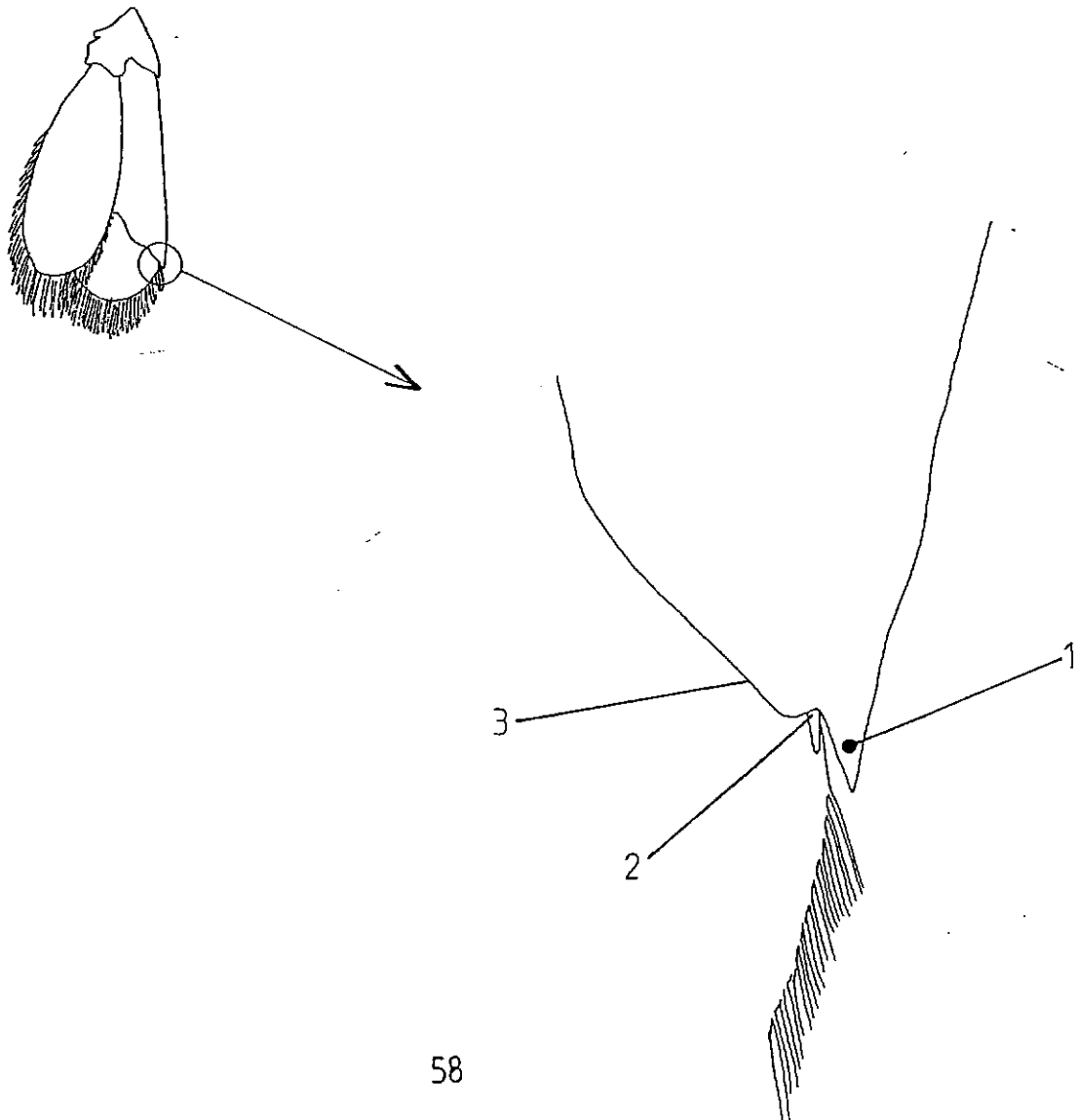
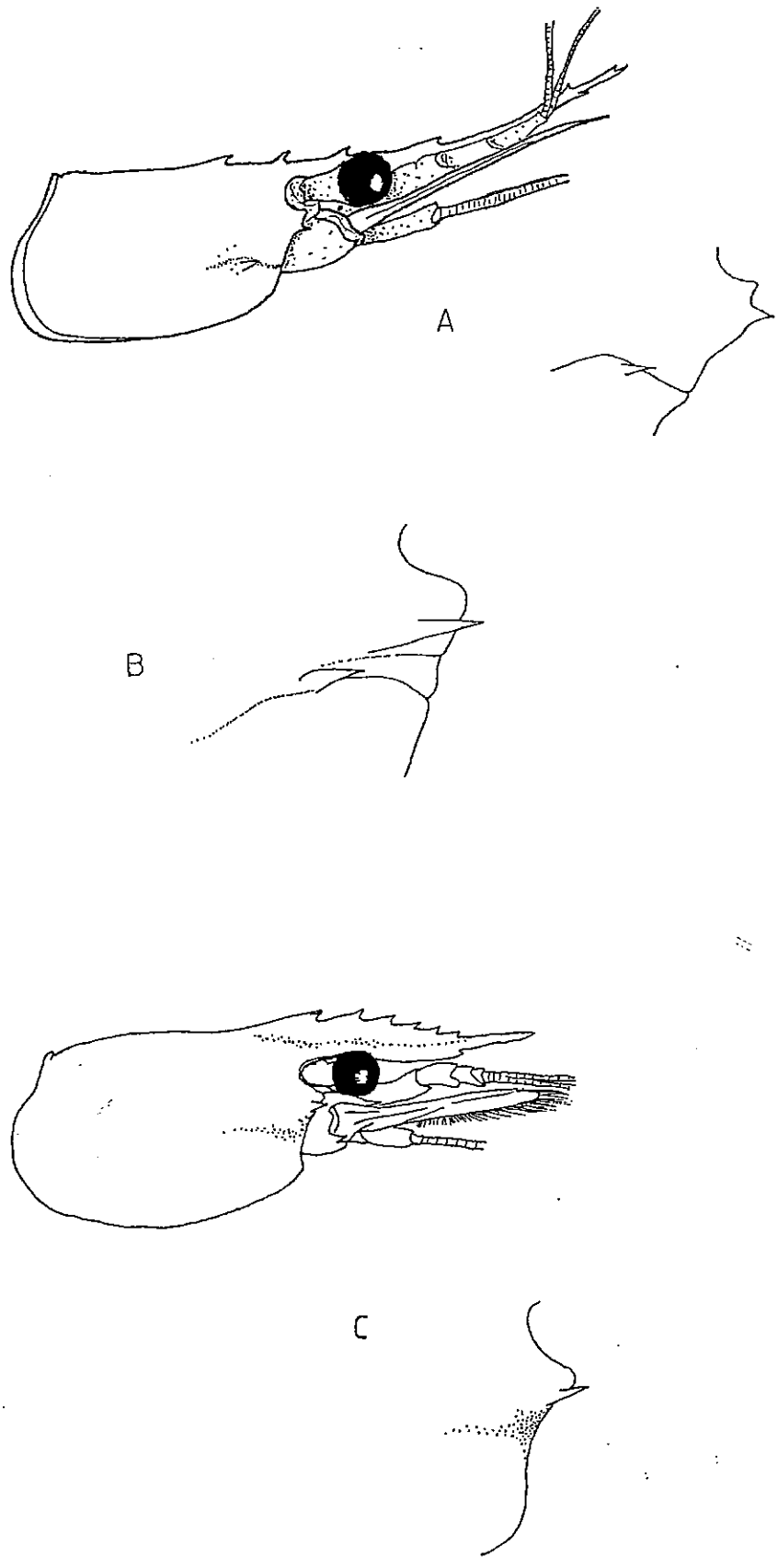


FIGURE 23 LATERAL VIEW OF CARAPACE, BRANCHIOSTEGAL SUTURE, BRANCHIOSTEGAL SPINE, AND HEPATIC SPINE

A *"Palaemonetes australis"* (suture above spine = branchiostegal spine)

B *Macrobrachium* sp. (suture below spine = hepatic spine)

C *Leptopalaemon* (no spine, indistinct suture; redrawn from Bruce and Short 1992).



6. Preliminary key to the species of Australian crabs (Sundathelphusidae) found in inland waters.

N.B. Crabs found in inland waters in Australia, belonging to Hymenosomatidae (see Walker 1969, Lucas 1980) and Grapsidae (see George 1962) are represented by only one species each and so can be keyed in the key to families of Decapoda given elsewhere. Only sundathelphusids are keyed here, by taking the key given in Bishop (1963) and modifying it to accomodate the new species described by Short (1994).

SUNDATHELPHUSIDAE: Genus*Holhuisiana*

1. Anterolateral regions of the carapace bearing a series of distinct striations 3

Anterolateral regions of the carapace not bearing distinct striations 2

2. Well-developed postorbital and epigastric crests. Length of telson distinctly greater than its basal width.....*angustifrons* (A.Milne Edwards)

Poorly-developed postorbital and epigastric crests. Length of male telson distinctly less than its basal width.....*agassizi*(Rathburn)

3. Small in size. Females showing abdomen of mature shape at carapace width 13 mm .....*wasselli* (Bishop)

Large in size. Females never showing abdomen of mature shape at carapace widths less than 25 mm.....4

4. Anterolateral regions of carapace swollen. Anterolateral tooth large, projecting beyond the lateral border of carapace.....*valentula* Riek

Anterolateral regions of carapace generally not swollen. Anterolateral tooth small, notch like, not projecting beyond the lateral border of carapace.....5

5. Front markedly concave, carapace deep, distinctly more than half greatest breadth. Length of telson distinctly greater than its basal width.....*raceki* (Bishop)

Front slightly concave or straight, carapace moderately deep, approximately half greatest breadth. Length of telson distinctly shorter than, or equal to, its basal width.....6

6. Telson as long as broad; median suture on ischium of thrid maxilliped very narrow and sharply defined; inferior orbital angle crenulate; eyestalks distally expanded.....*tigrina* Short

Telson broader than long; median suture on ischium of third maxilliped not narrow and sharply defined; inferior orbital angle entire; eyestalks not distally expanded .....*transversa* (von Martens)

7. Decapoda of Australian inland waters: species checklist with distributional ranges

In general, distributional ranges of species will provide an excellent mechanism for checking the validity of your keyed specimen (if you know where it came from). For this reason a checklist of species and their distributional ranges is given BUT it is not fool proof, because:

i) decapods are notorius or demonstrating disjunct distributions, and/or your decapod specimen may be a new distributional record;

ii) some decapod species are often translocated. In particular, some *Cherax* spp. and *Euastacus* spp., are prized for their recreational fishing or aquaculture attributes, or potential for bait, and are moved from one location to another. Similarly some freshwater crabs are popular in the aquarium trade and may be found in neighborhood wetlands when owners tire of them. Populations of decapods may thus establish outside their known range, in artificial (mainly) or natural waterways. They may even hybridize with local forms. Such translocations should neither be condoned nor forgotten when dealing with the classification of some decapods.

These distributional records are summaries of more detailed distributional records given by relevant decapod workers. This document SHOULD NOT, therefore, be cited as an authoritative text on distributions; the reader is referred to original sources. Caution must be used for some taxa where published distributional data are limited.

Parastacidae

Minor genera

Tenuibranchiurus glypticus Riek, 1951	Southeastern Queensland (Brisbane/Namour region ?and islands)
Tenuibranchiurus sp. 1	Southeastern Queensland (Maryborough region ?and islands)
Tenuibranchiurus sp. 2	Far northeastern NSW
Gramastacus insolitus Riek, 1972	Southwestern Victoria and far southeastern SA
Gramastacus	Central northern Victoria (Shepparton region)
Geocharax gracilis/falcata	Northwestern Tasmania, western Bass Strait islands, southwestern Victoria
Geocharax	Central eastern NSW (Wyong region)
Engaewa subcoerulea Riek, 1967	far southwestern WA (Walpole/Shannon region)
Engaewa reducta/similis	far southwestern WA (CapeLeeuwin/Naturaliste region)
Engaewa sp.	far southwestern WA (Walpole region)

Engaeus species

affinis Smith and Schuster, 1913	Central eastern Victoria
australis Riek, 1969	Wilsons Promontory, Victoria
cisternarius Suter, 1977	Western and northwestern Tasmania
cunicularius (Erichson, 1846)	Circum Bass Strait, including islands
curvisuturus Horwitz, 1990	Central eastern Victoria
cymus (Clark, 1936)	Central eastern Victoria, to ACT, and adjacent NSW districts
disjuncticus Horwitz, 1990	Northern and western Tasmania
fossor (Erichson, 1846)	Western and northwestern Tasmania
fultoni Smith and Schuster, 1913	Central southwestern Victoria (Otway Ranges)
granulatus Horwitz, 1990	Central northern Tasmania
hemicirratulus Smith and Schuster, 1913	Central southeastern Victoria
karnanga Horwitz, 1990	South Gippsland

Engaeus (cont.)

laevis Clark, 1941	Southern, eastern Victoria
lengana Horwitz, 1990	Northern and western Tasmania
leptorhynchus Clark, 1939	Northeastern Tasmania
lyelli Clark, 1936	Central Victoria
mairener Horwitz, 1990	Northeastern Tasmania
mallacootta Horwitz, 1990	Far eastern Victoria (and probably far southern NSW)
martigener Horwitz, 1990	Eastern Bass Strait Islands
merosetosus Horwitz, 1990	Central southwestern Victoria
nulloporius Horwitz, 1990	Northeastern Tasmania
orientalis Clark 1941	Eastern Victoria (East Gippsland and far southern NSW)
orramakunna Horwitz, 1990	Northeastern Tasmania
phyllocercus Smith and Schuster, 1913	South Gippsland
quadrimanus Clark 1936	Southern, eastern Victoria
rostrogaleatus Horwitz, 1990	South Gippsland
sericatus Clark, 1936	Central southwestern Victoria
spinicaudatus Horwitz, 1990	Northeastern Tasmania
sternalis (Clark, 1936)	South Gippsland
strictifrons (Clark, 1936)	Southwestern Victoria
tayatea Horwitz, 1990	Northeastern Tasmania
tuberculatus Clark, 1936	South Gippsland (east of Melbourne)
urostrictus Riek 1969	South Gippsland (east of Melbourne)
victoriensis Smith and Schuster, 1913	South Gippsland (east of Melbourne)
yabbimunna	Northwestern Tasmania

Euastacus species

armatus (von Martens, 1866)	Northern Victoria, Southeastern SA, ACT and central southern NSW
australasiensis (Milne-Edwards, 1937)	Central eastern NSW (Sydney/Blue Mountains region)
balanensis Morgan, 1988	Northeastern Queensland (Atherton Tableland region)
bidawalus Morgan, 1986	East Gippsland and far southeastern NSW
*bindal*Morgan, 1989	Northeastern Queensland (Townsville)
*bispinosus*Clark, 1936	Far southwestern Victoria and southeastern SA
brachythorax Riek, 1969	Far southeastern corner of NSW
claytoni Riek, 1969	Southeastern NSW (Captains Flat-Cooma-Bombal region)
crassus Riek, 1951	ACT, inland southeastern NSW and northern Victoria
diversus Riek, 1969	East Gippsland
eungella Morgan, 1988	Mideastern Queensland (Mackay region)
fleckeri (Watson, 1935)	Northeastern Queensland (Mossman region)
hirsutus (McCulloch, 1917)	Central eastern NSW (Wollongong-Nowra region)
hystricosus Riek, 1951	Southeastern Queensland (Conondale Range region)
*jagara*Morgan, 1988	Southeastern Queensland (Warwick region)
kershawi (Smith, 1912)	Southeastern Victoria (La Trobe River to East Gippsland)
maidae(Riek, 1956)	Southeastern Queensland (Qld/NSW border region)
monteithorum Morgan, 1989	Southeastern Queensland (Calliope Range region)
neodiversus Riek, 1969	Far South Gippsland
neohirsutus Riek, 1956	Northeastern NSW (Bellingen/Dorrigo region)
NSW sp. 1	Northeastern Queensland (Kempsey-Coff's Harbour)
NSW sp. 2	Northeastern Queensland (inland of Port Macquarie)
NSW sp. 3	Northeastern Queensland (Inland of Port Macquarie)
NSW sp. 4	Northeastern NSW (Nundle region)
NSW sp. 5	Far northeastern NSW (Richmond Range region)
NSW sp. 6	Southeastern NSW (from Nowra to Victoria/NSW border region)
NSW sp. 7	Southeastern NSW (between ACT, NSW/Victoria border)
NSW sp. 8	Southeastern NSW (southwest of Nowra))
NSW sp. 9	Central eastern NSW (Moss Vale region)

Euastacus (cont.)
polysetosus Riek, 1951 Northeastern Queensland (Barrington Tops)
reductus Riek, 1969 Northeastern NSW (Bulahdelah to inland of Taree)
robertsi Monroe, 1977 Northeastern Queensland (Cooktown region)
setosus (Riek, 1956) Southeastern Queensland (Brisbane region)
simplex Riek, 1956 Northeastern NSW (East of Armidale))
spinifer (Heller, 1865) Central eastern NSW (Ulladulla to Port Macquarie)
sulcatus Riek, 1951 Southeastern Queensland (Qld/NSW border region)
suttoni Clark, 1941 Far northeastern NSW and southeastern Queensland
urospinosus (Riek, 1956) Southeastern Queensland (Nambour region)
valentulus Riek, 1951 Southeastern Queensland and far northeastern NSW
woiwuru Morgan, 1986 Southeastern Victoria (east of Melbourne)
yarraensis (McCoy, 1888) Central southern Victoria
yigara Short and Davie, 1993 Northeastern Queensland (Cardwell Range)

Astacopsis species
franklinii (Gray, 1845) Eastern, western and southern Tasmania
gouldi Clark, 1936 North-eastern and north-western Tasmania
tricornis Clark, 1936 Central Plateau region, Tasmania

Cherax species
barretti Clark, 1941 ..... Wessell Island, Northern Territory
cairnsensis Riek, 1969 ... Northeastern Queensland
cartalacoolah Short, 1993 Northeastern Queensland (Cape Flattery)
Cherax sp. C ..... Central northern Victoria
crassimanus Riek, 1967 Far southwestern WA (Augusta-Walpole region)
cuspidatus Riek, 1969 .... Northeastern NSW
depressus Riek, 1951 Eastern Queensland from Cape York Peninsula to southeastern region
destructor albidus ..... Southwestern Victoria and far southeastern SA; and translocations
destructor destructor ..... Southeastern and central eastern Australia; Tasmania and southwestern Australia (translocations)
dispar Riek, 1951 Southeastern Queensland (Brisbane River to Elliot River and islands)
glaber Riek, 1967 Far southwestern WA (Augusta region)
nucifraga Short 1991 Northern Territory (barramundi stomach)
parvus Short and Davie, 1993 Northeastern Queensland (Cardwell Range)
preissii (Erichson, 1846) Southwestern WA (north of Perth to east of Albany, mainly inland)
punctatus Clark, 1936 Southeastern Queensland (Mary River region)
quadricarinatus (von Martens, 1868) Northern Territory (Daly River) to northeastern Queensland
quinquecarinatus (Gray, 1845) Southwestern WA (north of Perth to west of Albany, mainly near coastal)
rhynchotus Riek, 1951 North Cape York and islands
robustus Riek, 1951 Southeastern Queensland (Sunshine Coast, Fraser, Stradbroke islands)
rotundus Clark, 1941 ..... Northern NSW and southeastern Queensland
setosus Riek, 1951 ... Central eastern NSW
tenuimanus(Smith, 1912) Widely translocated in southern and western WA
wasselli Riek, 1969 Far north-eastern Queensland

Atyidae

Paratya australiensis Kemp, 1917 Eastern Australia to as far as 17°N, also in eastern Tableland areas
Caridinides wilkinsi Calman, 1926 Northern Australia (North from about 18°N)
Australatya striolata (McCulloch and McNeill, 1923) Eastern Australia (from far northeastern 16°N Queensland to southeastern NSW)
Caridina zebra Short, 1993 Northeastern Queensland (Herbert-Tully-Johnstone Catchments)
Caridina typus Milne-Edwards, 1837 Northeastern Queensland to Northern Territiory: Indo-Pacific
Caridina gracilirostris De Man, 1892 Northeastern Queensland to Northern Territiory: Indo-Pacific
Caridina thermophila Riek, 1953 Central Queensland (Muttaburra region)
Caridina serratirostris De Man, 1892 From Cairns, Queensland to Northern Territory
Caridina nilotica (P.Roux, 1833) Eastern Queensland: Indo-Pacific
Caridina mccullochi J.Roux, 1926 Eastern New South Wales
Caridina indistincta Calman, 1926 Eastern Queensland
Pycnisia raptor Bruce, 1992 Katherine, Northern Territory
Pycneus morsitans Holthuis, 1986 Gibson Desert, Western Australia
Parisia unguis Williams, 1964 Katherine, Northern Territory
Parisia gracilis Williams, 1964 Katherine, Northern Territory
Stygiocaris lancifera Holthuis, 1960 North-West Cape Peninsula, Western Australia
*Stygiocaris stylifera*Holthuis, 1960 North-West Cape Peninsula, Western Australia

Notes
1. *C. zebra* is possibly two species
2. Two new species, possibly 1 new genus to be described from the Northern Territory
3. One new *Caridina* species and possibly another one to be described from the Kimberleys
4. *C. nilotica* is a complex of species; one of Riek's (1953) subspecies is actually a good species *longirostris*

Palaemonidae

"Palaemonetes australis" South-western Australia
Kakaducaris glabra Bruce, 1993 Kakadu National Park, Arnhem Land, Northern Territory
Leptopalaemon gagadjui Bruce and Short, 1993 Arnhem Land Plateau, Northern Territory
Macrobrachium (distributional records in the literature scant, rendering these distributional summaries somewhat unreliable)
rosenbergii (De Man, 1879) Northern Australia (and Asia)
bullatum Fincham, 1987 Northern Territory
australe Guerin-Meneville, 1838
adscitum adscitum Riek, 1951 Queensland
atactum sobrinum Riek, 1951 Queensland (Muttaburra)
australiense cristatum Riek, 1951 NSW
australiense crassum Riek, 1951 Northeastern Queensland
*australiense eupharum*Riek, 1951 Eastern Queensland (Burdekin region)
atactum atactum Riek, 1951 Eastern Queensland
australiense australiense Holthuis, 1950 Eastern Queensland
glypticum Riek, 1951 Northern Queensland
lar (Fabricius, 1798) Northern Australia
atactum ischnomorphum Riek, 1951 Southeastern Queensland

Sundathelphusidae

angustifrons (A.Milne Edwards, 1869) Cape York Peninsula
agassizi(Rathbun, 1905) Far northeastern Queensland
wasselli (Bishop, 1963) Cape York Peninsula
valentula (Riek, 1951) Cape York Peninsula
raceki (Bishop, 1963) Cape York Peninsula
tigrina Short, 1994 Cape York Peninsula
transversa (von Martens, 1869) Northeastern HALF of Australia

Grapsidae

Leptograpsodes octodentatus (Milne-Edwards, 1837)
Southern Australia (Abrolhos Islands to Bass Strait Islands)

Hymensomatidae

Amarinus lacustris (Chilton, 1882) Southern Victoria and northern Tasmania (and New Zealand)

8. Acknowledgements

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