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THE FRESHWATER CRAYFISH (FAMILY PARASTACIDAE) OF QUEENSLAND

WITH AN APPENDIX DESCRIBING OTHER AUSTRALIAN SPECIES.

By E. F. RIEK.

Commonwealth Scientific and Industrial Research Organization — Division of Entomology, Canberra, A.C.T.

(Figures 1–13.)

Freshwater crayfish occur in almost every body of fresh water from artificial dams and natural billabongs (standing water) to headwater creeks and large rivers (flowing water). Generally the species are of considerable size and therefore easily collected, but even so many of the larger forms are unknown scientifically. This paper deals with all the species that have been collected from Queensland. It also includes a few species from New South Wales and other States. No doubt additional species will be found and some of the more variable series, at present included under the one specific name, will be further subdivided.

From Queensland nine species are described as new, making a total of seventeen species (of three genera) recorded from that State. The type localities of all but two of these species are in Queensland but some are not restricted to the State. Clark's 1936 and subsequent papers have been used as the basis for further taxonomic studies of the Australian freshwater crayfish.

In Queensland the most widely distributed genus is undoubtedly *Cherax*. Ten of the species belong to this genus. These crayfish prefer the lower altitudes and a few species are able to live in somewhat brackish water. When the creeks dry out they burrow down until they reach the level of the ground water and thus survive till further rains. One species, *punctatus* Clark, is stated to be terrestrial. Four new species are recorded for this genus. Specimens of *dispar*, sp. nov., of south-eastern Queensland prefer the lower reaches of creeks where there is an abundant growth of freshwater plants. A very distinct subspecies, *dispar elongatus*, is described from the lakes and creeks of Fraser Island. *C. robustus*, sp. nov., also from Fraser Island, has evolved most probably from *depressus*, sp. nov., of the mainland. *C. depressus* occurs with *rotundus* at Mt. Coot-tha, Brisbane. *C. rhynchotus*, sp. nov., from Mapoon, Queensland, shows affinities with the Western Australian species.

Four new species of *Euastacus* are described, making a total of seven species of the genus to be recorded from Queensland. *E. hystricosus*, sp. nov., occurs at the headwaters of the Mary River, while a second *valentulus*, sp. nov., was collected from Currumbin Creek. *E. sulcatus*, sp. nov., is widely distributed through the Lamington National Park and *cunninghami*, sp. nov., is recorded only from the Cunningham's Gap area.

The genus *Tenuibranchiurus*, gen. nov., is erected for the reception of a new species, *glypticus*, somewhat resembling an *Engaeus* but differing in branchial structure. The species occurs at Caloundra, very close to the ocean beach, and at Mt. Gravatt, Brisbane. Specimens prefer the "wallum" swamps, where they dig deep burrows up to 3 feet or so in length in the dark, very humic soil. At both localities specimens were associated with *Cherax rotundus* Clark.

Crayfish grow considerably after reaching sexual maturity, so it is well to keep this fact in mind when describing new species, for there are often slight modifications, more particularly in the development of spines on the body and of the great chelae, both in juvenile and senile stages.

Family PARASTACIDAE Huxley.

Key to Queensland Genera of the Family.

1. Stems of podobranchs without lateral, wing-like expansions; first abdominal somite without distinct pleura; plane of propodus and dactylus of great chelae vertical so that the dactylus pinches vertically down on to the propodus; telson entirely calcareous; branchial formula $18 + \text{ep.}$ *Tenuibranchiurus*
- Stems of podobranchs each produced laterally into a broad, wing-like expansion; pleura of first abdominal somite reduced in size but distinct; plane of propodus and dactylus of great chelae not vertical so that the dactylus pinches laterally down on to the propodus; posterior portion of the telson membranous; branchial formula $21 + \text{ep.}$ 2
2. Telson partially divided by a transverse suture; male genital aperture on a separately calcified papilla on the coxopodite of the fifth peripods; abdominal pleura spinose; rostral carinae tuberculate or spinose *Euastacus*
- Telson without partial transverse suture; male genital aperture on a complex, uncalcified papilla; abdominal pleura without spines; spines on rostral carinae limited in number or absent *Cherax*

Genus *Cherax* Erichson, 1846.

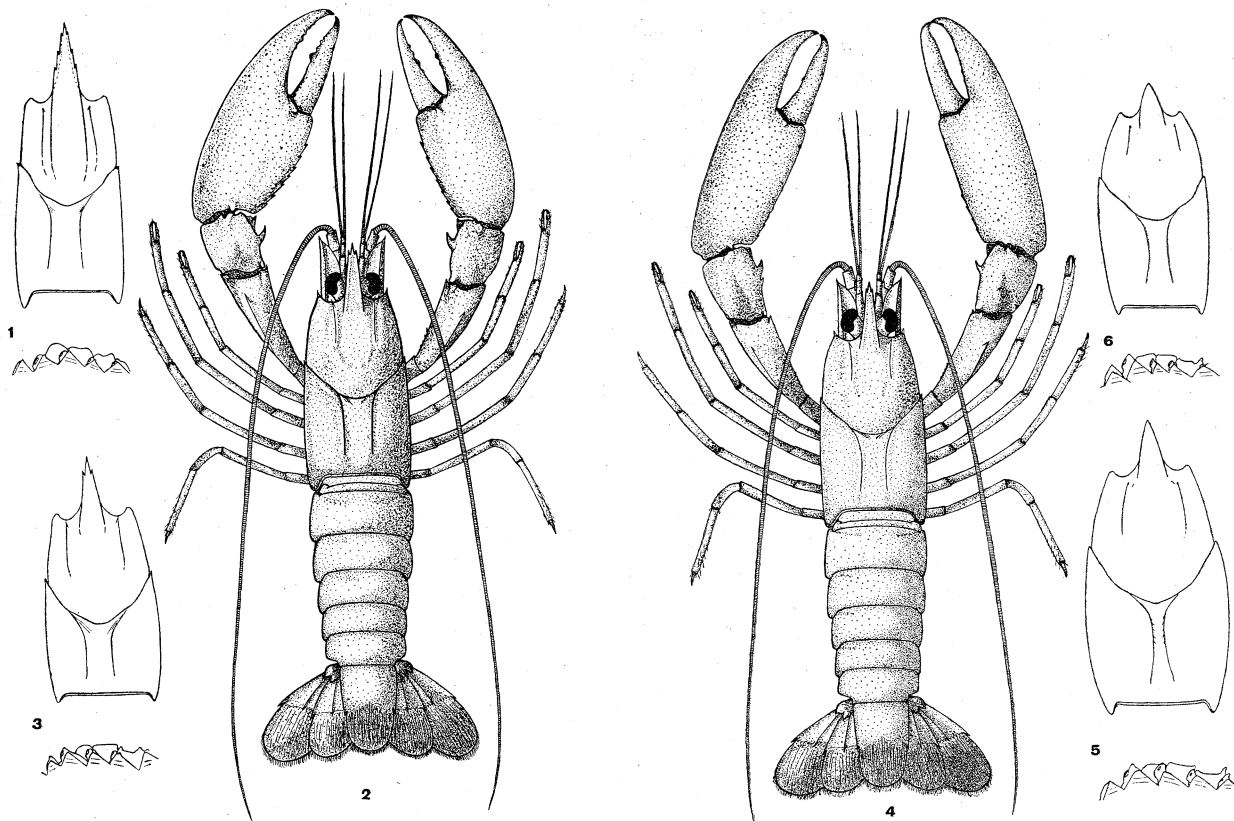
Genotype, *Astacus* (*Cherax*) *preissii* Erichson.

Telson without a transverse suture, posterior portion membranous; stems of podobranchs each produced laterally into a broad, wing-like expansion with the exceptions of that on the fourth peripods (that is, the most posterior podobranch); branchial formula $21 + \text{ep.}$; abdomen without spines or tubercles; male genitalia a complex uncalcified papilla; plane of propodus and dactylus of first peripods not vertical; pleura of first abdominal somite distinct.

The branchial formula is often $20 + r + \text{ep.}$, the posterior arthrobranch of the seventh thoracic somite being virtually absent. This is definitely the condition in *dispar*, *albidus*, *rotundus*, *robustus* and *depressus*. In *bicarinatus* the posterior arthrobranches of thoracic somites five, six and seven are all reduced.

Key to the Queensland Species of Cherax.

1. Rostrum with lateral spines (very small in *bicarinatus* and *destructor*) 2
- Rostrum without lateral spines 6
2. Areola narrow 3
- Areola wide, not greater than three times as long as broad 4
3. Rostral carina with a single small spine towards apex *destructor* Clark
- Rostral carina with two conspicuous spines towards apex *rhynchotus*, sp. nov.
4. Rostrum two times as long as broad at base; antenna not reaching beyond the telson; eyes small; rostral spines very small *bicarinatus* (Gray)
- Rostrum more than two times as long as broad at base; antenna reaching beyond the telson; eyes large 5
5. Rostral carinae extending to the level of the posterior end of the post-orbital ridge; rostrum three times as long as broad at base, with three lateral spines on each side *quadricarinatus* (von Martens)
- Rostral carinae extending only to the level of the anterior end of the post-orbital ridge; rostrum two and one-half to three times as long as broad at base, with only one lateral spine on each side towards the apex *dispar*, sp. nov.
6. Sternal keel blunt; lateral processes of sternal keel increasing in length considerably in the posterior somites so that the coxopodites of the fourth peripods are wide apart; rostrum slightly greater than two times as long as broad at base *albidus* Clark
- Sternal keel sharp; lateral processes of the sternal keel increasing only slightly in length in the posterior somites; rostrum two times or less as long as broad at base 7
7. Rostrum two times as long as broad at base; areola four to six times as long as broad; sternal keel sharp, continuous *rotundus* Clark
- Rostrum two times as long as broad at base; areola three to four times as long as broad; sternal keel with a slight depression between the bases of the second and third peripods *robustus*, sp. nov.
- Rostrum two times as long as broad at base; areola six to eight times as long as broad; sternal keel with a deep depression between the bases of the second and third peripods *depressus*, sp. nov.
- Rostrum only slightly longer than broad at base *punctatus* Clark



Figures 1-6.

1. *Cherax quadricarinatus* (von Martens). Juvenile; from Batavia River. Cephalothorax (dorsal) and sternal keel (lateral view, with posterior end to left). 2. *Cherax dispar*, sp. nov. Holotype male. 3. *Cherax dispar*, sp. nov. Cephalothorax (dorsal) and sternal keel (lateral view). 4. *Cherax dispar elongatus*, nov. Holotype male. 5. *Cherax albidus*, Clark. Cephalothorax (dorsal) and sternal keel (lateral view). 6. *Cherax rotundus*, Clark. Specimen from Brisbane. Cephalothorax (dorsal) and sternal keel (lateral view).

All figures slightly less than natural size.

***Cherax quadricarinatus* (von Martens), 1868.**

(Figure 1.)

Astacus quadricarinatus von Martens, 1868, Monats. Akad. Wiss., Berlin, 617.*Cherax quadricarinatus* Clark, 1936, Mem. Nat. Mus., Victoria, x, 22.

This form is readily distinguished from the other Queensland species of the genus by the development of the carinae on the cephalothorax. The arcinae of the rostrum are continued posteriorly towards the cervical groove so that in that region four carinae are present, the two rostral carinae and the two post-orbital ridges.

Type Locality.—Cape York.

Distribution.—Batavia River, north Queensland (M. Ward); Richmond; Norman River; Telemon; Yirrkala, Darwin; Yam Creek, Darwin; Brooklyn Station, Mary River, tributary of Mitchell River (May, 1947, P. O. Flecker).

Specimens up to 210 mm. in length have been collected from the Norman River. Roux (1921) regards the species *Cheraps lorentzi* Roux 1911 as a synonym of *Cherax quadricarinatus* (von Martens). Clark (1936) considers both *lorentzi* and *aruanus* Roux as well as *albertsii* (Nobili) synonyms of *quadricarinatus*. A comparison of north Australian specimens with specimens from New Guinea shows that, in this case at least, we have well-defined subspecies. Material from Aru Islands has not been examined. The New Guinea subspecies can be distinguished by the stronger development of the rostral carinae which are continued almost to the cervical groove. This difference is quite pronounced even in juvenile specimens of the two subspecies. Also, the rostrum is relatively longer and thinner in the New Guinea subspecies.

***Cherax dispar*, sp. nov.**

(Figures 2–3.)

Diagnosis.—Areola wide, two and one-half to three times as long as broad; great chelae seventy-five to eighty per cent. of the body length; eyes large, almost equal in diameter to the width of the rostrum at its base. The species can be separated readily from *rotundus*, with which it occurs at various localities, including the type locality, by the difference in the shape of the rostrum and the high cephalothorax, but more particularly by the wide areola and the relatively large eyes.

Description of Adult.—Carapace slightly higher than broad; cervical groove with one, but usually more, fine, sharply pointed spines on each lateral portion; areola wide, two and one-half to three times as long as broad; cephalic region of cephalothorax more than two times as long as areola; rostrum narrow, two and one-half to three times as long as broad at base, apex sharp, with a conspicuous sharp spine on each side towards the apex; post-orbital ridge sharp and somewhat raised, ending anteriorly in a well-developed sharp spine; eyes large, diameter almost equal to the width of the rostrum at its base; scaphocerite of antenna moderately broad, tending to be triangular, just reaching to the base of the flagellum of the antenna; antenna long, reaching beyond the telson; sternal keel moderately sharp, lateral processes increasing considerably in length in the posterior somites so that the coxopodites of the fifth pereopods are wide apart; great chelae of the male long, typically seventy-five to eighty per cent. of the body length; propodus two and one-half times as long as broad; upper surface and cutting edge of propodus, cutting edge of dactylus and upper and lower surfaces of merus, covered with long setae; great chelae of female 65 to 70 per cent. of the body length.

Colour.—Light greenish-grey tending to blue on the abdomen, under surface almost colourless; great chelae blue on the upper surface, lighter in colour on the under surface. The chelae become blue only with maturity. Very young specimens (10 mm.) may be reddish and not bluish as is general.

Length of holotype male, 75 mm., length of allotype female, 65 mm.

Types.—Holotype male (No. P.11956), allotype female (No. P.11957) and paratypes in the Australian Museum Collection.

Type Locality.—Sandy Creek, Moorooka, Brisbane.

Distribution.—Sandy Creek, Moorooka, Brisbane; Enoggera Creek, Brisbane; Greenbank; Doughboy Creek, Brisbane; Caloundra; Cowan Cowan, Moreton Island.

Described from a series of two thousand specimens ranging in size up to 82 mm. body length, collected from the type locality, together with specimens from Moreton Island, Caloundra and Enoggera Creek, and a single specimen from both Greenbank and Doughboy Creek. The largest specimen is a female; females of only 50 mm. have been collected with eggs. The chelae of the immature male resemble those of the female in relative length. In the Moreton Island series the sternal keel is relatively blunt and the whole animal relatively longer and thinner. In the large series from the type locality there are many abnormal specimens. In these the rostrum is only slightly longer than broad at the base but the other features and appendages are of normal proportions. When the rostrum is broken off several ecdyses occur before the normal condition is reached again so that in time the rostrum of each of these specimens would have assumed normal proportions.

***Cherax dispar elongatus*, nov.**

(Figure 4.)

Diagnosis.—Areola wide; eyes large; great chelae 80 to 85 per cent. of the body length. This subspecies differs from *dispar* in the relative size and shape of the great chelae and in their texture. It also differs in the slightly reduced rostrum. The species was not associated with *robustus*, sp. nov., which occurs in other lakes on Fraser Island.

Description of Adult.—Similar to *dispar*; rostrum slightly shorter; scaphocerite of antenna not reaching to the base of the flagellum of the antenna; great chelae long, 80 to 85 per cent. of the body length; propodus three times as long as broad, smooth and glossy but very finely punctate; dactylus only one-third as long as propodus. The lower margin of the propodus is straight, not curved as in typical *dispar*. The female differs in that the great chelae are only 60 to 65 per cent. of the body length.

Colour.—Greenish on thorax and abdomen; great chelae deep green tending to almost black on the upper surface, lighter in colour below. In the Lake Boemangan series the body is grey tinged with green and has numerous fine white spots on the branchiostegites. The chelae vary from green to deep blue.

Length of holotype male, 70 mm., length of allotype female, 55 mm.

Types.—Holotype male (No. P.11959), allotype female (No. P.11960) and paratypes in the Australian Museum Collection.

Type Locality.—Lake McKenzie, Fraser Island, Queensland.

Distribution.—Lake McKenzie, Lake Boemangan and Rocky Creek, Fraser Island.

Described from a series of forty-five specimens ranging in size up to 80 mm. collected from the type locality, together with twelve specimens from Lake Boemangan and twenty specimens from Rocky Creek. The Lake Boemangan specimens approach the typical mainland form and probably represent a more recent migration from the mainland than do the Lake McKenzie specimens.

***Cherax dispar crassus*, nov.**

Diagnosis.—Chelae similar to those of *dispar elongatus* but with the tip of the propodus not as strongly curved. Dactylus relatively shorter than in the typical form.

Description of Adult.—Similar to *dispar*; rostrum slightly shorter and with the rostral spines generally smaller; great chelae long, 80 to 85 per cent. of the body length; propodus three times as long as broad, surface very finely punctate; dactylus only one-third as long as propodus. The margins of the propodus are almost parallel but the width increases slightly till the junction with the dactylus.

Colour.—Similar to the typical form but with the chelae tending to be green.

Length of holotype male, 70 mm.

Types.—Holotype male (No. P.11962) and paratypes in the Australian Museum Collection.

Type Locality.—Caboolture, Queensland.

This form approaches *dispar elongatus* in the shape and size of the great chelae. It has been collected only from the Caboolture region, but as it is only possible to distinguish the subspecies on fully-grown specimens, the range will, in all probability, be extended.

***Cherax destructor* Clark, 1936.**

Cherax destructor Clark, 1936, Mem. Nat. Mus. Victoria, x, 26.

Diagnosis.—Sternal keel moderately sharp; areola narrow; rostrum two times as long as broad at base, apex sharp, with a spine on each side; carapace broader than high.

Type Locality.—Melbourne, Victoria.

Distribution.—Cape York; Rockhampton; Burnett River; Barron Falls; Dunk Island.

Clark records this species from the several localities in Queensland listed above. I have not seen specimens collected in Queensland. Collections from many of the north Queensland localities contain only specimens of *Cherax depressus*, sp. nov., a species most closely allied to *rotundus* but superficially resembling a juvenile *destructor*.

***Cherax albidus* Clark, 1936.**

(Figure 5.)

Cherax albidus Clark, 1936, Mem. Nat. Mus. Victoria, x, 28.

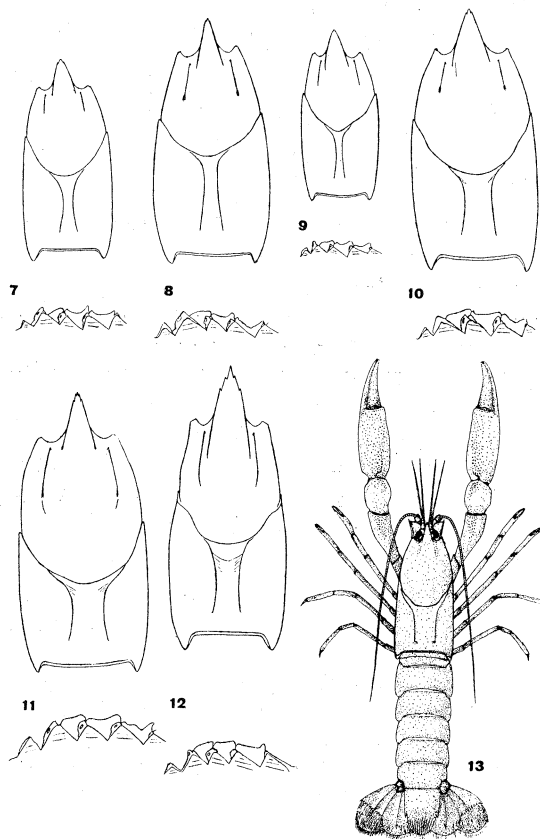
Diagnosis.—Sternal keel blunt; areola narrow, seven to eight times as long as broad; rostrum narrow, two to two and one-half times as long as broad. This species differs from *destructor* in the absence of lateral spines on the rostrum and in the relatively flat sternal keel with conspicuous openings on the lateral processes.

Description of Adult.—Carapace not quite as high as broad; areola narrow, seven to eight times as long as broad; cephalic region of cephalothorax less than twice as long as areola; rostrum narrow, two to two and one-half times as long as broad at base, apex sharp, without lateral spines; post-orbital ridge rounded; eyes small, diameter less than the width of the rostrum at its base; scaphocerite of antenna broad and rounded, not quite reaching to the base of the flagellum of the antenna; antenna not reaching beyond the telson; sternal keel blunt, lateral processes increasing only slightly in the posterior somites so that the pereopods are not wide apart; great chelae stout, 75 per cent. of the body length.

Type Locality.—Nurrabiel, Victoria.

Queensland Distribution.—Eromanga; Longreach; Condamine; Chinchilla; Warrego River; Charleville; Diamantina River (billabongs); Essay, via Hughenden; Cunnamulla; Muttaborra.

This is the common species of crayfish of western Queensland. It is responsible for considerable damage to bore drains. The species has not previously been recorded from Queensland.



Figures 7-13.

7. *Cherax depressus* sp. nov. Type series. Cephalothorax (dorsal) and sternal keel (lateral view). 8. *Cherax depressus*, var. Specimen from Gladstone. Cephalothorax (dorsal) and sternal keel (lateral view). 9. *Cherax depressus*, var. Specimen from Cairns. Cephalothorax (dorsal) and sternal keel (lateral view). 10. *Cherax robustus*, sp. nov. Type series. Cephalothorax (dorsal) and sternal keel (lateral view). 11. *Cherax bicarinatus* (Gray). Specimen from Condamine. Cephalothorax (dorsal) and sternal keel (lateral view). 12. *Cherax rhynchotus*, sp. nov. Type series. Cephalothorax (dorsal) and sternal keel (lateral view). 13. *Tenuibranchiurus glypticus*, gen. et. sp. nov. Holotype.

All figures slightly less than $\times 2$ diameters.

Cherax rotundus Clark, 1941.

(Figure 6.)

Cherax rotundus Clark, 1941, Mem. Nat. Mus. Victoria, xiii, 34.

Diagnosis.—Sternal keel sharp, continuous between the coxopodites of the second and third periopods; rostrum two times as long as broad at base, without lateral spines; areola narrow, four to six times as long as wide.

Description of Adult.—Carapace slightly higher than broad; areola narrow, four to six times as long as broad; cephalic region of cephalothorax less than twice as long as areola; rostrum broad, two times as long as broad at base, apex sharp, without lateral spines; post-orbital ridge sometimes ending anteriorly in a sharp spine; eyes small, diameter less than the width of the rostrum at its base; scaphocerite of antenna broad and rounded, not reaching the base of the flagellum of the antenna; antenna not reaching beyond the telson; sternal keel sharp, continuous, not depressed between the coxopodites of the second and third periopods; lateral processes of the sternum increasing only

slightly in the posterior somites so that the fifth periopods are not wide apart; great chelae stout, typically 70 per cent. of the body length; propodus two times as long as broad.

Type Locality.—Muddy Creek, Severn.

Distribution.—Muddy Creek, Severn; Greenbank (J. Peberdy); Milmerran (C. F. Fysh); Cedar Creek Falls, Tambourine Mountain; Petrie; Dayboro; Caloundra; Lyra; numerous localities within a 10-mile radius of Brisbane.

This is the most common species of crayfish in south-eastern Queensland where it occurs in almost every creek, often in large numbers. In dry weather specimens of this species build a cone of excavated earth round the entrance to the burrow and in some cases actually seal the opening in this manner. A true gynandromorph of the species was collected from Milmerran. This is the only one throughout the whole collection of some four to five thousand specimens, though partial gynandromorphs are quite common.

***Cherax punctatus* Clark, 1936.**

Cherax punctatus Clark, 1936, Mem. Nat. Mus. Victoria, x, 29.

This is described as a terrestrial species of *Cherax*, some of the specimens having been collected under a rotten log, others burrowing down several feet to ground-water level. The burrows are marked by large cones of excavated earth.

Type Locality.—Coorari.

Distribution.—Coorari; Eumundi.

I have not examined specimens of this species but it is said to resemble *rotundus*. In dry weather *rotundus* also builds a cone of earth at the entrance to its burrow which may be quite removed from permanent water.

***Cherax depressus*, sp. nov.**

(Figures 7-9.)

Diagnosis.—Areola narrow, six to eight times as long as broad; rostrum two times as long as broad at base, without spines, apex somewhat rounded; sternal keel sharp, with a deep depression between the coxopodites of the second and third periopods.

Description of Adult.—Carapace slightly higher than broad; areola narrow, six to eight times as long as broad; cephalic region of cephalothorax less than two times as long as areola; rostrum long, two times as long as broad, apex somewhat rounded, without lateral spines; post-orbital ridge blunt, ending anteriorly in a rounded boss; eyes small, diameter less than the width of the rostrum at its base; scaphocerite of the antenna broad and rounded, not reaching to the base of the flagellum of the antenna; antenna reaching to the telson; sternal keel sharp, but with a deep depression between the coxopodites of the second and third periopods, lateral processes not very long so that the coxopodites of the periopods diverge only moderately; great chelae stout, typically 65 to 70 per cent. of the body length; propodus two to two and one-half times as long as broad.

Colour.—Mottled grey with the joints red and the chelae tipped in red, or else blue-grey with the chelae tipped in red. The mottled grey is the more typical.

Length of holotype male, 80 mm., length of allotype female, 70 mm.

Types.—Holotype male (No. P.11964), allotype female (No. P.11965) and paratypes in the Australian Museum Collection.

Type Locality.—Mt. Coot-tha, Brisbane.

Distribution.—Mt. Coot-tha, Brisbane; Northbrook Creek, Brisbane Valley; Pullenvale; Eidsvold (Burnett River); Bundaberg; Gin Gin; Watalgan (M. Ward); Gladstone; Dunk Island; Cardwell; Herbert River; Cairns; Kuranda.

Described from a series of more than three hundred specimens from the type locality, together with numerous other specimens. The species occurs with *rotundus* at the type locality, but can be distinguished by the shape of the sternal keel, the general lack of spines on the body and the size of the chelae. The specimens from Bundaberg and Gladstone and further north may be sub-specifically distinct, as the sternal keel is not so deeply incised between the second and third pereopods and the areola is somewhat narrower than in specimens from the Brisbane area. Clark (1936) records *destructor* from several localities in Queensland but an examination of material from some of the localities listed by that author has revealed the presence only of *depressus* or its variants. Superficially these two species are alike, but differ strikingly in the development of the sternal keel, that of *depressus* being much more strongly developed particularly between the third and fourth pereopods.

***Cherax robustus*, sp. nov.**

(Figure 10.)

Diagnosis.—Areola narrow, three to four times as long as broad; rostrum two times as long as broad at base, without spines, apex sharp; sternal keel sharp, with only a slight depression between the second and third pereopods.

Description of Adult.—Carapace higher than broad. Areola narrow, three to four times as long as broad; cephalic region of cephalothorax two times as long as areola; rostrum broad, two times as long as broad at base, without spines but carinae pronounced and ending before the apex; post-orbital ridge ending anteriorly in a blunt spine; eyes small, diameter less than the width of the rostrum at its base; scaphocerite of antenna broad and rounded, not reaching to the base of the flagellum of the antenna; antenna reaching to the telson; sternal keel sharp and with only a very slight depression between the coxopodites of the second and third pereopods; lateral processes not very long so that the coxopodites of the pereopods diverge only moderately; great chelae of male long and stout, typically 80 to 85 per cent. of the body length; propodus two and one-half times as long as broad.

Colour.—Blue on the upper surface with the chelae deep blue to almost black.

Length of holotype male, 85 mm., length of allotype female, 80 mm.

Types.—Holotype male (No. P.11967), allotype female (No. P.11968) and paratypes in the Australian Museum Collection.

Type Locality.—Lake Birrabeen, Fraser Island.

Distribution.—Lake Birrabeen and Lake Tahwan, Fraser Island.

Described from a series of twenty-five specimens from Lake Birrabeen and twenty specimens from Lake Tahwan. Female specimens of this species lay their eggs in August.

The four species, *rotundus*, *depressus*, *punctatus* and *robustus* form a natural group. *Cherax rotundus* and *depressus* occur in association in the Brisbane area. The two species, though closely related, do not interbreed under natural conditions. To the south only *rotundus* appears to persist, while as one proceeds north, *depressus* becomes the dominant form, but the specimens are now no longer identical with those of the Brisbane area but show variation in the direction of *rotundus*, so that the Cairns and other north Queensland specimens can either be regarded as variants of *depressus* or of *rotundus*. For the present they have all been grouped as *depressus* until further collecting elucidates the complex. *Cherax robustus* of Fraser Island has most probably evolved from the mainland form through isolation. *Cherax rotundus* may or may not be specifically distinct from *punctatus* as the type descriptions are very similar; *rotundus* has similar burrowing habits to *punctatus* and with the drying up of temporary water masses specimens merely burrow down to ground-water level and so could quite easily be regarded as terrestrial if collected during a dry spell.

***Cherax preissii* (Erichson), and *Cherax bicarinatus* (Gray).**

Some confusion has arisen regarding the specific identification of the two species *preissii* Erichson and *bicarinatus* Gray. The species *preissii* was described from south-west Australia, while the type locality of *bicarinatus* is Port Essington, Northern Territory. McCulloch (1914) in dealing with the Western Australian species describes two forms *preissii* and *preissii* var. *angustus* (McCulloch). His variety *angustus*, which is specifically distinct from his *preissii*, is recorded only from the south-west portion of Western Australia whereas the *preissii* of McCulloch is more widely distributed. In my opinion *preissii* of McCulloch is really *bicarinatus* Gray and *preissii* var. *angustus* McCulloch is specifically distinct. I have examined the type material of *preissii* var. *angustus* McCulloch in the Australian Museum and as McCulloch did not designate a holotype, I designate the single male specimen, Australian Museum Catalogue No. P.2749, as holotype, and No. P.2751 as allotype female. No. P.2750 is a paratype female (juvenile). The type of *preissii* is lost so one could regard the type specimens of McCulloch's variety as the neotypes of *preissii* and thus retain *preissii*, the genotype of *Cherax*.

***Cherax bicarinatus* (Gray), 1845.**

(Figure 11.)

Astacus bicarinatus Gray, 1845, Eyre's Jour. Exped. Disc. Cent. Austral. (Appendix), 410.

Cheraps preissii McCulloch, 1914, Rec. West. Aust. Mus., i, 229.

Cherax bicarinatus Clark, 1936, Mem. Nat. Mus. Victoria, x, 23.

There is a doubtful record of this species from Queensland so I have given a description of the species based on this material.

Diagnosis.—Sternal keel sharp; areola wide, two and one-half times as long as broad; rostrum two times as long as broad at base, with two pairs of small, lateral spines towards the apex.

Description of Adult.—Carapace higher than broad; areola wide, two and one-half times as long as broad; cephalic region of cephalothorax greater than twice as long as areola; rostrum two times as long as broad at base, apex sharp, with two pairs of small lateral spines towards the apex; post-orbital ridge rounded; eyes small, diameter less than the width of the rostrum at its base; scaphocerite of antenna broad but tending to be triangular, widest in the middle, just reaching to the base of the flagellum of the antenna; antenna not reaching to the telson; sternal keel sharp, lateral processes increasing only slightly in the posterior somites so that the fifth pereopods are not wide apart.

Type Locality.—Port Essington, Northern Territory.

Queensland Locality.—? Condamine.

Described from two male specimens collected at ? Condamine where they were associated with *albidus*. The two species are very readily distinguished by the rostrum and the width of the areola. This species differs from *destructor* in the width of the areola and the number of rostral spines. Whereas in *destructor* the areola is narrow in *bicarinatus* it is very wide, being only two and one-half times as long as broad.

***Cherax rhynchotus*, sp. nov.**

(Figure 12.)

Diagnosis.—Areola narrow, four to five times as long as broad; eyes small, diameter less than the width of the rostrum at its base; rostrum large, two times as long as broad at base, rostral carinae each with two conspicuous spines on the apical third.

Description of Adult.—Carapace slightly higher than broad; areola narrow, four to five times as long as broad; cephalic region of cephalothorax less than two times as long as areola; rostrum long and broad, two times as long as broad at base, apex sharp, with two pairs of prominent lateral spines, the posterior pair lying at the junction of the apical and middle thirds of the rostrum; post-orbital ridge prominent, ending anteriorly in a sharp spine; eyes small, diameter less than the width of the rostrum at its base; scaphocerite of antenna moderately broad, widest in the middle or slightly towards base, just reaching to the base of the flagellum of the antenna; antenna reaching to the telson; sternal keel very sharp, slightly excavated between the second and third pereopods, lateral processes of the keel not prominent. Chelae are absent from all except the allotype female and even in that case both are regenerating.

Length of holotype male, 85 mm., length of allotype female, 82 mm.

Types.—Holotype male, allotype female and seven paratypes in the Australian Museum Collection (No. P.4237).

Type Locality.—Mapoon, Queensland.

Described from a series of nine specimens from the type locality. There are both male and female specimens but a high percentage are intersexes. The species is allied to *bicarinatus*, but can be distinguished on the shape of the rostrum and the width of the areola. The areola is considerably wider in *bicarinatus*. The rostrum in *rhynchotus* is relatively longer, though broader and the two spines on each rostral carina are distinct, with the posterior one lying approximately at the junction of the apical and middle thirds. In *bicarinatus* the small spines are both more or less apical. There are three juvenile specimens from the Fly River, New Guinea, in the Australian Museum collection which are provisionally referred to this species.

Genus *Euastacus* Clark, 1936.

Genotype, *Euastacus elongatus* Clark, 1941.

Telson with the lateral margins divided by a transverse suture, membranous posteriorly; stems of podobranchs each produced laterally into a broad, wing-like expansion with the exception of that of the fourth pereopods; branchial formula 21 + ep.; abdomen with spines and tubercles, sometimes restricted to the pleura; male genitalia a simple, separately calcified papilla; plane of propodus and dactylus of first pereopods not vertical; pleura of first abdominal somite distinct.

The chelae vary in relative size and shape in the same individual as well as in growth stages so that their relative proportions are unsatisfactory specific characters. The genus is separated from *Astacopsis* chiefly on the structure of the gills. *Euastacus fleckeri* approaches *Astacopsis* in the reduction of the spines on the abdomen. The chief specific characters for *Euastacus* are the relative proportions of the rostrum, the tubercles of the branchiostegites and the spines of the abdomen, particularly those of the sixth somite, telson and uropods.

Key to the Queensland Species of Euastacus.

1. Rostrum almost two times as long as broad, apex sharp; post-orbital ridge ending anteriorly in a sharp spine ... 2
- Rostrum less than two times as long as broad, apex blunt and U-shaped; post-orbital ridge ending anteriorly in a slight boss 3
2. Sixth abdominal somite, telson and uropods with numerous sharp spines; branchiostegites strongly tuberculate and with a dorso-lateral row of sharp spines; rostral carinae with three pronounced spines; three rows of spines on each side of the abdomen *hystriacus*, sp. nov.
- Telson without dorsal spines; branchiostegites finely tuberculate and hirsute; spines of rostral carinae usually numerous (4-5); three rows of spines on each side of abdomen *sulcatus*, sp. nov.
- Telson without dorsal spines; branchiostegites strongly tuberculate; spines of rostral carinae numerous; two rows of spines on each side of the abdomen *calentulus*, sp. nov.
- Telson without dorsal spines; branchiostegites strongly hirsute; spines of rostral carinae usually numerous (4); two rows of spines on each side of the abdomen *cunninghami*, sp. nov.
3. Rostrum only slightly longer than broad, very much U-shaped; spines of the abdomen reduced to a single row on the pleural margins; branchiostegites with very few tubercles *fleckeri* (Watson)
- Rostrum moderately rounded; abdomen with three lateral rows of spines; branchiostegites strongly tuberculate ... *suttoni* Clark.

There appears to be a definite correlation between distribution and evolution within the Queensland species of the genus. As one proceeds north from New South Wales one finds that the species are to be collected only from higher and higher altitudes. *Euastacus* occurs almost at sea level at Sydney; *E. sulcatus*, which ranges from northern New South Wales into Queensland, generally is not collected below 1,500 feet; *E. suttoni* occurs only above 2,500 feet, while *E. fleckeri* of north Queensland lives only above the 3,000-foot level. Correlated with this distribution based on altitude one finds that the rostrum is progressively shortened and the abdominal spines reduced from *sulcatus* through *suttoni* to *fleckeri*.

***Euastacus sulcatus*, sp. nov.**

Diagnosis.—Rostrum V-shaped, two times as long as broad; branchiostegites finely tuberculate and hirsute; telson without spines on the dorsal surface or else with one or two poorly developed.

Description of Adult.—Carapace slightly shorter than abdomen (about equal in length to the abdomen in the male); areola wide, two and a half times as long as broad; cephalic region of cephalothorax two times as long as areola; carapace punctate; branchiostegites closely tuberculate and hirsute; rostrum V-shaped, just two times as long as broad; carinae spinose, four or five spines on each side; post-orbital ridge ending anteriorly in a sharp spine; antenna reaching at least to the middle of the abdomen; abdomen spinose; in addition to the marginal pleural spines a row of spines at the junction of the pleura with the somites. Further, on somites three, four and five there may be spines or tubercles between the two rows mentioned above. The marginal spines decrease in size posteriorly so as to be reduced to mere bosses on the last somites. Telson typically without spines on the dorsal surface, but with numerous setae; great chelae stout, typically 70 per cent. of the body length, strongly inflated in the male. Additional spines occur on the median surface of the propodus.

Colour.—In the adult, bright blue with a whitish shield on the dorsal surface of the carapace and with the apical regions of the chelae and periopods white; chelae with the basal regions deep blue on the upper surface, very much lighter in colour on the under surface. Specimens from Running Creek show red in place of the blue of the type specimens except in that the chelae tend to be bluish.

Length of holotype male, 175 mm., length of allotype female, 200 mm.

Types.—Holotype male (No. P.11921), allotype female (No. P.11922) and paratypes in the Australian Museum Collection.

Type Locality.—Binna Burra, Lamington National Park, Queensland (January, 1943, E. F. Riek).

Distribution.—Lamington National Park and Tambourine Mountain.

Described from a series of more than one hundred specimens ranging in size up to 235 mm. (female), mainly from Binna Burra. The Tambourine specimens show a slight reduction in the development of the spines of the abdomen. The uppermost series does not pass beyond the stage of bosses. This species has not been collected below an altitude of 1,500 feet. It shows a tendency to wander overland in the damp rain-forest and may thus pass readily from one river system to another. Females of only 120 mm. length have been collected with eggs, while males of only 90 mm. are sexually mature. Eggs are laid towards the end of November or in December.

***Euastacus cunninghami*, sp. nov.**

Diagnosis.—Rostrum V-shaped, twice as long as broad; branchiostegites densely hirsute, not spinose or tuberculate; telson without spines on the dorsal surface.

Description of Adult.—Carapace slightly shorter than abdomen in female, about equal to it in male; areola wide, about twice as long as broad; cephalic region of

cephalothorax twice as long as areola; carapace dorsally punctate; branchiostegites densely clothed with tufts of long setae, not obviously tuberculate; rostrum V-shaped, almost twice as long as broad; carinae spinose, four, rarely three or five, spines on each side; post-orbital ridge ending anteriorly in a sharp spine; antenna not reaching to the telson, only to the fourth abdominal somite; abdomen with only the pleura spinose, but the sixth somite is without spines or tubercles; in addition to the marginal pleural spines a row of bosses at the junction of the pleura with the somites. On somites three and four there may be a small spine mesad to the marginal pleural spine. Dorsal surface of the first three or four abdominal somites each shows a pair of small bosses; telson without spines on the dorsal surface but with numerous setae; great chelae relatively small.

Colour.—Dark reddish-black, lighter ventrally and at the joints; bosses on abdomen greyish-white; antennae reddish.

Length of holotype female, 135 mm., length of allotype male, 115 mm.

Types.—Holotype female (No. P.11929), allotype male (No. P.11930) and paratypes in the Australian Museum Collection.

Type Locality.—Western slopes of Cunningham's Gap, Queensland (23 October, 1948, E. F. Riek).

Described from a series of nine specimens. The two largest are females carrying eggs. The species is closely allied to *sulcatus*, but can be distinguished by the very hirsute branchiostegites and less spinose abdomen.

***Euastacus valentulus*, sp. nov.**

Diagnosis.—Great chelae stout and somewhat inflated; rostrum two times as long as broad, tending to be U-shaped; branchiostegites strongly tuberculate; telson without spines on the dorsal surface; two rows of spines on each side of the abdomen.

Description of Adult.—Carapace slightly shorter than abdomen; areola moderately wide, two and one-half to three times as long as broad; carapace punctate; branchiostegites strongly tuberculate; rostrum two times as long as broad at base, sides almost parallel for the greater part, tending to be U-shaped, apex sharp; carinae of rostrum with a number of spines; post-orbital ridge ending anteriorly in a sharp spine; antenna reaching to the sixth somite of the abdomen; abdomen spinose; in addition to the marginal pleural spines a row of sharp spines at the junction of the pleura with the somites, but decreasing in size posteriorly; telson without spines on the dorsal surface; great chelae very stout, slightly inflated, typically 70 per cent. of the body length.

Colour.—Preserved specimens only. Chelae bluish.

Length of holotype male, 180 mm.

Types.—Holotype male and paratype male (juvenile) in the Queensland Museum Collection.

Type Locality.—Upper reaches of Currumbin Creek.

Described from only two specimens, the holotype and a smaller male.

***Euastacus hystricosus*, sp. nov.**

Diagnosis.—Rostrum two times as long as broad, with three pronounced spines on each rostral carina; branchiostegites strongly tuberculate, with an irregular dorso-lateral row of sharp spines; sixth abdominal somite, telson and uropods with a number of sharp spines on the dorsal surface.

Description of Adult.—Carapace slightly shorter than abdomen; areola wide, two and one-half times as long as broad; cephalic region of cephalothorax two times as long as areola; carapace coarsely punctate; branchiostegites prominently tuberculate and with an irregular row of prominent sharp spines on the dorso-lateral portion; rostrum

two times as long as broad, pointed, tending to be U-shaped; carinae of rostrum with three sharp spines; post-orbital ridge ending anteriorly in a sharp spine; antenna reaching to the sixth somite of the abdomen; abdomen spinose; in addition to the marginal pleural spines a row of sharp spines at the junction of the pleura with the somites. Further, except on abdominal somites one and two, there is a third row of spines lying between the two mentioned above. Sixth abdominal somite with numerous, scattered, prominent spines on the dorsal surface; telson with numerous, scattered, prominent spines similar to those of the sixth abdominal somite; inner rami of the uropods with two longitudinal rows of prominent spines, one median along the carina, the other towards the outer, lateral margin; outer rami with a single row towards the outer, lateral margin; great chelae stout, not inflated.

Colour.—Preserved specimens rather dark. Chelae reddish; branchiostegites whitish; dorsal surface of the abdomen almost black. The smaller specimen appears to have been greenish, particularly on the abdomen.

Length of holotype male, 230 mm., length of allotype female, 155 mm.

Types.—Holotype male and allotype female in the Queensland Museum Collection.

Type Locality.—Yabba Creek, Yabba, Queensland.

Distribution.—Yabba Creek, Yabba; Bon Accord Creek, Montville; Conondale (25 April, 1943, E. F. Riek).

In a juvenile specimen from Conondale the rostrum is quite pointed and there are four spines on the rostral carinae.

***Euastacus suttoni* Clark, 1941.**

Astacopsis serratus McCulloch, 1917 (in part), Rec. Aust. Mus., xi, 237.

Euastacus suttoni Clark, 1941, Mem. Nat. Mus. Victoria, xiii, 18.

Separated from *E. sulcatus*, which occurs nearer the coast, chiefly by the form of the rostrum and the tubercles of the branchiostegites. The two species are closely related.

Types.—In the National Museum Collection, Melbourne.

Type Locality.—Wyberba, Queensland.

Distribution.—Wyberba; Stanthorpe; Glen Aplin.

Specimens occur only above 2,500 feet at Glen Aplin and are bright red in the adult state.

***Euastacus fleckeri* (Watson), 1935.**

Astacopsis fleckeri Watson, 1935, Mem. Qld. Mus., x, 232.

Euastacus fleckeri Clark, 1941, Mem. Nat. Mus. Victoria, xiii, 19.

This form is distinguished from the other Queensland species by the short, broad, rounded rostrum and the poor development of spines on the abdomen.

Types.—Holotype in the Queensland Museum Collection.

Type Locality.—Root's Creek, north Queensland.

Distribution.—Root's Creek; Mosman River and its tributaries; Daintree River; Mt. Lewis near Cairns (H. Flecker).

This species does not occur below 3,000 feet.

Genus *Tenuibranchiurus*, gen. nov.

Genotype, *Tenuibranchiurus glypticus*, sp. nov.

Cephalothorax shorter than abdomen; carapace higher than broad; cervical groove deeply impressed, rounded; branchiocardiac grooves prominent; areola wide; rostral

carinae reduced or almost absent; sternal keel narrow, posterior pair of lateral processes large and flattened; male genital aperture on an arcuate medial projection of the coxopodite of the fifth pereopods. The aperture is on the ventral extremity of the projection. Abdomen slightly wider than cephalothorax, smooth, pleural margins of somites rounded; first abdominal somite with pleural portions very much reduced; telson without transverse suture, entirely calcareous; branchial formula typically $18 + ep.$; stem of podobranch not produced into a wing-like expansion; pleurobranchs reduced, typically to one situated on the last thoracic somite.

This genus is separated chiefly on the branchial arrangement. The gill-structure approaches most closely to that of *Parastacoides* Clark in the reduction in size of the posterior arthrobranchs and in the number of pleurobranchs, but the trend has proceeded further in *Parastacoides* which has no pleurobranchs. In most specimens of *Tenuibranchiurus glypticus* there is only the somewhat reduced posterior pleurobranch but in some females there are three, quite pronounced pleurobranchs on the last three thoracic somites.

***Tenuibranchiurus glypticus*, sp. nov.**

(Figure 13.)

Diagnosis.—Small; eyes reduced; cephalothorax higher than broad; abdomen longer than cephalothorax; great chelae 80 to 85 per cent. of the body length; propodus and dactylus lying in a vertical plane.

Description of Adult.—Carapace finely punctate, branchiostegites finely tuberculate; carapace much shorter than abdomen, much higher than broad, two and one-half times as long as broad; cervical groove deeply impressed, very oblique laterally; branchiocardiac grooves strongly marked, not meeting the cervical groove dorsal but being carried anterolaterally just below it for some distance, posteriorly ending in small, irregular, transverse grooves just before the posterior border of the cephalothorax; areola wide, only a little more than twice as long as broad, sides almost parallel posteriorly; rostrum broad, reaching only to the base of the third segment of the antennular peduncle, one and one-half times as long as broad, carinae poorly developed and in some cases partly obsolete; post-orbital ridges very much reduced; eyes relatively small, slightly greater in diameter than one-half the width of the rostrum at its base; antennule with the inner and outer flagella of equal size; antenna extending to the third segment of the abdomen, scaphocerite very broad anteriorly, ending in a short, sharp spine reaching to the middle of the second segment of the antenna and extending just beyond the rostrum; interantennal spine triangular, sharply pointed; exopodite of the third maxilliped long and flagellate; sternal keel narrow, moderately sharp, first two pairs of lateral processes rudimentary, third pair small, posterior pair large and broad, slightly flattened, processes between the fifth pereopods small, lateral processes of the sternal keel without conspicuous openings; abdomen slightly wider than cephalothorax; telson rounded, one and one-half times as long as broad, a blunt spine on each lateral margin towards the posterior border; uropods rounded, slightly longer than telson, each ramus with a longitudinal, median carina ending in a small spine towards the posterior margin, outer rami each with a transverse suture along which there are a number of very fine spines; telson and uropods bordered with numerous long setae; lobes at base of uropods rounded; pleural portions of abdominal somites each with a few, long, thin setae; great chelae long and stout, 80 to 85 per cent. of the body length, held so that the dactylus lies vertically above the propodus and not medially to it; propodus two and one-half times as long as broad (lateral view), viewed dorsally at least four times as long as broad, upper margin feebly tuberculate with several irregular rows of tubercles, lower margin smooth. The tubercles extend over the whole of the dorsal and lateral surfaces of the propodus decreasing in size towards the ventral margin. Dactylus one-third as long as propodus, upper margin very feebly tuberculate; cutting edges of propodus and dactylus each with one or two

well-developed tubercles; upper margins of carpus and merus feebly tuberculate; podobranchs without lateral, wing-like expansions, anterior arthrobranchs much larger than the posterior ones. Typically there is only a single pleurobranch, situated on the last thoracic somite, but occasionally in the female there are three, more strongly developed pleurobranchs on the last three thoracic somites. In the female the great chelae are slightly smaller and the abdomen very slightly wider than in the male.

Colour.—Greyish-brown tending to bluish-grey on the great chelae.

Length of holotype male, 24 mm., length of allotype female, 24 mm.

Types.—Holotype male (No. P.11970), allotype female (No. P.11971) and paratypes in the Australian Museum collection. One male paratype in the collection of Melbourne Ward.

Type Locality.—Caloundra, Queensland.

Distribution.—Caloundra (E. F. Riek); Bulimba Creek, Mt. Gravatt, Brisbane (E. F. Riek).

Described from a series of twenty-one specimens ranging in size up to 26 mm. collected from the type locality together with two specimens from Bulimba Creek.

APPENDIX.—OTHER AUSTRALIAN SPECIES.

This part of the paper deals with a number of new species and with the distribution of the better known forms.

Genus *Euastacus* Clark, 1936.

Euastacus nobilis crassus, nov.

Diagnosis.—Rostrum U-shaped, with a slight median spine, not twice as long as broad; branchiostegites closely tuberculate; abdomen almost devoid of spines except on the lateral margins of most pleura; telson without spines on the dorsal surface.

Description of Adult.—Male carapace equal in length to the abdomen (slightly less in female); areola wide, only twice as long as wide; cephalic region of cephalothorax more than twice as long as areola; carapace punctate, branchiostegites closely tuberculate and sparsely, finely hirsute; rostrum U-shaped, less than twice as long as broad at base, carinae with only a single or else two or three very slight tubercles, median apical spine short and blunt; post-orbital ridge ending anteriorly in a slight tubercle; antennae reaching only to the second segment of the abdomen; abdomen almost smooth, first segment with single pleural spines, second segment with a series (three to five, generally four) of sharp spines along the antero-lateral, pleural margin and a large rounded boss in the middle at the junction of the pleurum with the tergum, third and fourth segments with small, marginal pleural spines, fifth segment with the spine very reduced, sixth segment without a spine; telson and uropods without scattered spines on the dorsal surface but with tufts of setae; great chelae rather short, stout, propodus rather broad and inflated, carpus with a deep sulcus and three sharp spines on the meso-dorsal surface.

Colour.—Dorsal surface reddish-brown, cephalon darker; branchiostegites red; abdomen with anterior half of segments red, posterior darker, tending to black; chelae tipped with blue; joints red; spines not white but reddish; ventral surface red with ends of legs greenish, protopodites and sternal keel paler red, great chelae, below, tipped by deep blue. Young specimens are a much paler red below.

Specimens from Blundells, A.C.T., are of a different colour: Body blue-green; abdominal segments reddish over the anterior half, blue-green behind, blue laterally; claw of great chelae bright blue, underside of chelae white.

Length of holotype male, 115 mm., length of allotype female, 130 mm.

Types.—Holotype male (No. P.11937), allotype female (No. P.11938) and paratypes in the Australian Museum Collection.

Type Locality.—Small stream at Bendora, A.C.T. (12 March, 1949, E. F. Riek).

Distribution.—A.C.T.: Bendora; Blundells, Condor Creek (6 April, 1948, E. F. Riek). N.S.W.: Kosciusko (10 February, 1946, E. F. Riek).

The subspecies is described from a series of fifteen specimens from the type locality, the two largest females bearing young, together with three specimens from Blundells and a large series, with many juveniles, from Kosciusko. This subspecies, though close to the typical form, can be distinguished throughout all growth stages particularly by the more rounded rostrum. The branchiostegites are more tuberculate and the spination of the pleura and telson more reduced. There is a superficial resemblance to *fleckeri* (Watson) of north Queensland, but that species has an even more rounded rostrum and the cephalic portion of the cephalothorax is relatively short and the areola narrower.

***Euastacus polysetosus*, sp. nov.**

Diagnosis.—Rostrum tending to be U-shaped, not twice as long as wide at base; branchiostegites finely hirsute; abdomen with only very small, marginal, pleural spines lacking on the first and sixth somites; telson and uropods with very fine spines on the dorsal surface.

Description of Adult.—Male carapace equal in length to the abdomen (slightly less in the female); areola wide, a little more than twice as long as wide; cephalic region twice as long as areola; carapace finely, closely punctate; branchiostegites finely, closely hirsute and shagreened; rostrum tending to be U-shaped, less than twice as long as wide at base, carinae with from two to four rounded spines similar to the apical spine; post-orbital ridge ending anteriorly in a slight tubercle; antenna reaching only to about the second segment of the abdomen; abdomen almost without spines, finely hirsute, particularly on pleura, first segment without spines, second with three (occasionally only two as in holotype), small, lateral pleural spines, third to fifth with single, even smaller, lateral pleural spines (very reduced in allotype female), sixth without spines; telson and uropods with scattered, very fine spines from which arise tufts of setae; great chelae somewhat inflated in male, carpus with a deep sulcus and three sharp spines on the meso-dorsal surface.

Colour.—Dark greenish to black, lighter in colour below; joints red; under surface of chelae reddish.

Length of holotype male, 105 mm., length of allotype female, 110 mm.

Types.—Holotype male (No. P.11917), allotype female (No. P.11918) and paratypes in the Australian Museum Collection.

Type Locality.—Tubrabucca Creek, Hunter River, Barrington Tops, N.S.W. (7 April, 1949, E. F. Riek).

Described from a series of fourteen specimens from the type locality. The species resembles *hirsutus* (McCulloch) in its lack of spines, even to those of the abdomen where the pleural spines are only well-developed on the second somite. The setae of the body, which are dense but very fine, are thickest on the branchiostegites.

***Euastacus armatus* (von Martens), 1866.**

Specimens, tentatively placed in this species, from the Cotter River, near Canberra, A.C.T., approach *elongatus* Clark in the shape of the chelae, the spines of the rostrum and generally more strongly spinose body, but differ in the length of the antennae and spines of the telson. The normal adult size is only 150 mm. A series of nine specimens collected from the above locality (14 December, 1946, E. F. Riek).

With the new species of *Euastacus* described above there are six species known from New South Wales. In the Murrumbidgee and its smaller tributaries, *armatus* or possibly subspecies of it occur. In the far north coastal area one finds *sulcatus*, a widespread species in the Lamington National Park, south-east Queensland. Adequate collections have not been made in the central coastal area, but in the headwaters of the Manning juvenile specimens of the *sulcatus-spinifer* type occur. In the Hunter River at Barrington Tops is *polysetosus*, allied to *hirsutus* which occurs further south. The species *spinifer* is common in the Hawkesbury-Nepean system. In the Shoalhaven, in addition to *spinifer*, there is the distinct *hirsutus* known only from the headwaters. The species *nobilis* which prefers the smaller headwater streams and soakages is common around Sydney, while further inland at Bendora and Blundells in the Australian Capital Territory and at Kosciusko one has a distinct subspecies *nobilis crassus*.

The species *armatus* and *nobilis* occur also in Victoria with *elongatus* Clark, *yarraensis* (McCoy) and *bispinosus* Clark. There are no other recorded species of the genus in Australia.

Genus *Cherax* Erichson, 1846.

Cherax rotundus setosus, nov.

This subspecies differs from the typical form only slightly, but is characterized by the strong development of long setae on the under surface of the propodus of the chelae (first peripods). Such setae have not been observed on any species of this genus, so it is considered advisable to distinguish this form as a subspecies (of *rotundus*).

Length of holotype male, 80 mm.

Types.—Holotype male (No. P.4739) and one paratype male (No. P.4740) in the Australian Museum Collection.

Type Locality.—Booral, Karuah River, Port Stephens, N.S.W. (10 November, 1911).

There are also two juvenile specimens (P.4675) from a creek near Newcastle (May, 1907, D. G. Stead) in the Australian Museum Collection.

Cherax albidus Clark, 1936.

This species is common in Canberra, A.C.T. (21 December, 1948, 13 September, 1948, E. F. Riek). Females with eggs have been collected in September. Other localities are: Cotter River, A.C.T. (30 December, 1945, E. F. Riek); Laggan, near Crookwell, N.S.W. (12 April, 1946, E. F. Riek).

In a series of specimens of *albidus* from Koppio, near Todd River, 20 miles from Port Lincoln, South Australia, in the Australian Museum Collection, there is one very interesting abnormal specimen (P.4806). This particular specimen is an intersex of body-length 83 mm. which is apparently normal in all structures except in the placing of the genital apertures, which are four in number. It is not uncommon among specimens of the Australian Parastacidae to find intersexes with either three or four genital apertures. When three are present they are almost invariably two male and one female. In only one Australian specimen have I seen one male and two female apertures (in a specimen of *Cherax dispar*). When four are present (two male and two female), the male apertures are placed on the coxopodites of the fifth peripods, while the female apertures are placed similarly on the third peripods (the normal position of the apertures). In this specimen of *albidus*, while the two male apertures are placed normally, the two female apertures are quite abnormal in that they are situated on the fourth peripods, instead of on the third peripods and thus are on the segment next to the male apertures. These female apertures are quite well-developed and in no way distinguishable from normal apertures.

Genus **Engaeus** Erichson, 1846.

Engaeus parvulus, sp. nov.

Diagnosis.—Abdomen considerably shorter than cephalothorax; cervical groove obsolete, branchiocardiac grooves deeply impressed; areola narrow; carapace and abdomen with only scattered hairs; antennule with one flagellum reduced.

Description of Adult Male.—Carapace very finely punctate, branchiostegites smooth; faint transverse rugae between the reduced post-orbital ridges; carapace considerably longer than abdomen, much higher than broad; cervical groove only slightly impressed dorsally but more so laterally; branchiocardiac grooves strongly marked, not continued to the posterior border of the carapace; areola narrow, four times as long as wide, sides almost parallel posteriorly; rostrum short and broad, reaching to the middle of the third segment of the antennular peduncle, one and one-half times as long as broad, carinae poorly developed, generally not continued to the apex; post-orbital ridges very reduced; eye small, slightly greater in diameter than one-half the width of the rostrum at its base; antennule with the inner flagellum quite reduced, one-quarter to one-third (or a little more) the length of the outer flagellum; antenna not reaching to the abdomen; sternal keel broad and flat, posterior lateral processes quite large, processes between the fifth pereopods small; lateral processes of the sternal keel without conspicuous openings; abdomen very short and narrow; telson rather pointed behind, one and one-half times as long as broad, with a slight median longitudinal sulcus; outer ramus of uropods rather pointed, inner ramus more rounded, each ramus with a longitudinal median carina turning to a sulcus before the hind border, outer ramus with an irregular transverse suture at the junction of the middle and apical thirds; lobes at base of uropods rounded; great chelae long and stout, slightly longer than the body, held so that the dactylus lies vertically above the propodus; propodus in lateral view only twice as long as broad, upper margin with five or six small sharp spines, lower margin with four or five denticles; dactylus slightly less than half the propodus, with one or two enlarged teeth on the cutting edge; carpus with three to five sharp spines; merus with two or three spines on the upper surface and several on the lower.

Description of Adult Female.—Similar to the male but abdomen considerably broader and relatively a little longer, the chelae of more even size, one not noticeably enlarged and not quite as long as the body.

Colour.—Bright red with slight darkening, in some specimens, of the branchiostegites and abdominal pleura.

Length of holotype male, 43 mm., length of allotype female, 47 mm.

Types.—Holotype male (No. P.11973), allotype female (No. P.11974) and paratypes in the Australian Museum Collection.

Type Locality.—Blundells, Condor Creek, A.C.T. (31 March, 1948, E. F. Riek).

Described from a series of more than fifty specimens, though most of them are juvenile. This is the first species to be recorded from north of the Victorian border but the genus is widespread in Victoria and Tasmania.

Genus **Parastacoides** Clark, 1936.

Parastacoides setosimerus, sp. nov.

Diagnosis.—Lateral spine of the telson at the apical fifth, apex evenly rounded; merus with a distinct spine on the upper surface towards the apex; carpus with distinct tubercles (three or more) on the meso-dorsal margin, anterior one largest; areola relatively narrow, twice as long as wide; spine on median longitudinal carina of inner rami of uropods almost at posterior margin, posterior border devoid of spines, outer rami with only one distinct longitudinal carina, continued across the suture only to the middle of the posterior portion and ending without spine, the outer carina distinct only over the basal quarter of the ramus.

Description of Adult.—Carapace very finely punctate, branchiostegites finely tuberculate; carapace not quite as long as abdomen (distinctly less in female), a little higher than broad; cervical and branchiocardiac grooves deeply impressed; areola relatively narrow, twice as long as wide; rostrum almost twice as long as wide at base, pointed, tapering more rapidly at apex; post-orbital ridges short and narrow, but sharp; eyes small, diameter slightly less than one-half the width of the rostrum at its base; antennule with the inner flagellum slightly shorter than outer; antenna not reaching to the telson; sternal keel blunt, wide and flat between the third and fourth periopods, lateral processes of the fourth periopods strongly angled so that there is a distinct groove between them; processes between the fifth periopods very small, close together; abdomen not quite as wide as cephalothorax (distinctly wider in the female); telson with apex evenly rounded, the lateral spine at the apical fifth, somewhat longer than wide; spine on median longitudinal carina of inner rami of uropods almost at the posterior margin, posterior border devoid of spines, outer rami with only one distinct longitudinal carina, continued across the suture only to the middle of the posterior portion and ending without spine, the outer carina distinct only over the basal quarter of the ramus; telson and uropods finely hirsute; great chelae evenly tuberculate, more so above on propodus and dactylus, carpus above with a slight sulcus, with distinct tubercles (three or more) on the meso-dorsal margin, the anterior one largest; merus with a distinct spine on the upper surface towards apex.

Colour.—Greenish with a reddish tinge; basal segments of all legs and third maxillipeds reddish, not so obvious on the posterior pair, basipodites bluish-grey, anterior cephalothorax and chelae somewhat lighter than the rest of the dorsal surface; joints whitish-grey.

Length of holotype male, 58 mm., length of allotype female, 70 mm.

Types.—Holotype male (No. P.11976), allotype female (No. P.11977) and paratypes in the Australian Museum Collection.

Type Locality.—Mt. Rufus, 4,000 feet, Tasmania (25 January, 1949, E. F. Riek).

Distribution.—Mt. Rufus and Lake St. Clair, Tasmania.

Described from a series of twenty-one specimens. The species approaches *tasmanicus* (Erichson) but differs at least in the structure of the telson and uropods.

***Parastacoides leptomerus*, sp. nov.**

Diagnosis.—Lateral spine of the telson at the apical quarter, apex acutely rounded; merus with a minute spine on the upper surface towards apex; carpus with irregular small tubercles on the meso-dorsal margin, but no pronounced anterior tubercle; areola relatively broad, less than twice as long as wide; spine on the median longitudinal carina of the inner rami of the uropods well before the posterior border, posterior border devoid of spines; outer rami with a single long carina continued across the suture only to the middle of the posterior portion and ending without spine.

Description of Adult.—Carapace very finely punctate, branchiostegites very finely tuberculate; carapace a little shorter than abdomen, distinctly so in female, a little higher than broad; cervical grooves deeply impressed, branchiocardiac grooves less so; areola relatively broad, less than twice as long as wide; rostrum not twice as long as broad at base, evenly tapered to sharp apex, carinae sharp; post-orbital ridges rather long, sharp, each ending posteriorly in a distinct boss; eyes small, diameter slightly less than one-half the width of the rostrum at its base; antennule with the inner flagellum slightly shorter than the outer; antenna not reaching to the telson; sternal keel relatively sharp but rounded between the third and fourth periopods, lateral processes of the fourth periopods large, flattened, only a shallow groove between them, processes between the fifth periopods small, sharp; abdomen not quite as wide as cephalothorax (a little wider in the female); telson with apex acutely rounded, distinctly

longer than wide, the lateral spine at the apical quarter; a faint, median longitudinal sulcus over the apical three-quarters; spine on median longitudinal carina of inner rami of uropods well before the posterior border, posterior border devoid of spines, outer rami with a single longitudinal carina continued across the suture only to the middle of the posterior portion and ending without a spine; telson and uropods finely hirsute; great chelae evenly tuberculate, more so above on propodus and dactylus, carpus above with a slight sulcus, with irregular small tubercles on the meso-dorsal margin but no pronounced anterior tubercle; merus with only a minute spine on the upper surface towards apex.

Colour.—Greenish with a reddish tinge; basal segments of all legs and of third maxillipeds reddish, not so obvious on posterior pair; lower surface of chelae greenish-grey, tips pale reddish; joints whitish-grey.

Length of holotype female, 53 mm., length of allotype male, 40 mm.

Types.—Holotype female (No. P.11979), allotype male (No. P.11980) and paratypes in the Australian Museum Collection.

Type Locality.—Lake Lilla and outlet stream, Cradle Mt., Tasmania (1 February, 1949, E. F. Riek).

Described from a series of seven specimens. The species differs from *setosimerus* in the structure of the telson and uropods, the areola and of the great chelae.

Selected References .

- Archey, G., 1915.—The Freshwater Crayfish of New Zealand. *Trans. Proc. N.Z. Inst.*, xlvii, 295–315.
- Boyden, A., 1943.—Serology and Animal Systematics. Crustacea Species Differentiation. *Amer. Nat.*, lxxvii (770), 234–255.
- Calman, W. T., 1911 Note on a Crayfish from New Guinea. *Ann. Mag. Nat. Hist.*, (8), viii, 366–368.
- Clark, E., 1936.—The Freshwater and Land Crayfishes of Australia. *Mem. Nat. Mus. Victoria*, x, 5–58.
- , 1936.—Notes on the Habits of Land Crayfishes. *Vict. Naturalist*, liii, 65–68.
- , 1937.—The Life History of the Gippsland Crayfish. *Aust. Mus. Mag.*, vi, 186–192.
- , 1939.—Tasmanian Parastacidae. *Pap. Roy. Soc. Tasmania*, 1938 (1939), 117–128.
- , 1941.—Revision of the genus *Euastacus* (Crayfishes, Family Parastacidae) with Notes on the Distribution of Certain Species. *Mem. Nat. Mus. Victoria*, xii, 7–30.
- , 1941.—New Species of Australian Freshwater and Land Crayfishes (Family Parastacidae). *Mem. Nat. Mus. Victoria*, xii, 31–40.
- Clark, E., and Burnet, F. M., 1942.—Application of Serological Methods to Study of Crustacea. *Aust. Jour. Exper. Biol. and Med. Sci.*, xx, 89–95.
- Flecker, H., and P. O., 1936.—The Haunt of the North Queensland Spiny Crayfish. *North Qld. Naturalist*, iv, 41, 18–20.
- Hale, H. M., 1925.—Observations on the Yabbie (*Parachaeraps bicarinatus*). *Aust. Mus. Mag.*, ii, 8, 271.
- , 1927.—The Crustaceans of South Australia, Part I. *Handbook Fauna Flora of South Australia*, Adelaide. 201 pp., 202 figs.
- , 1930.—A Remarkable Freshwater Crayfish. *Aust. Naturalist*, xi, 42–43.
- McCulloch, A. R., 1914.—Revision of the Freshwater Crayfishes of South Western Australia. *Rec. W. Aust. Mus.*, i, 228–235.
- , 1917.—Studies in Australian Crustacea, No. 4. *Rec. Aust. Mus.*, xi, 231–238.
- Martens, E. von, 1868.—Überblick der neuholländischer Flusskrebse. *Monats. Akad. Wiss., Berlin*, 615–619.
- Mulder, 1913.—Notes on a Freshwater Crayfish. *Geelong Naturalist*, v, 195–196.
- Roux, J., 1911.—Nouvelle espèces de décapodes d'eau douce provenant de papouasie. *Notes Leiden Mus.*, xxxiii, 81–106.
- , 1914.—Ueber das Vorkommen der Gattung *Cheraps* auf der Insel Misol. *Zool. Anz.*, xlii, 97–99.
- , 1921.—Crustacea. *Nova Guinea*, xlii, 585–606.
- Smith, G., 1912.—The Freshwater Crayfishes of Australia. *Proc. Zool. Soc. London*, 144–171.
- Smith, G. W., and Schuster, E. H. J., 1913.—The Genus *Engaeus* or the Land Crayfishes of Australia. *Proc. Zool. Soc., London*, 112–127.
- Watson, K., 1935.—A New *Astacopsis* from North Queensland. *Mem. Qld. Mus.*, x, 232.
- , 1936.—*Astacopsis fleckeri*. *Mem. Qld. Mus.*, xi, 52.