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## STUDIES IN AUSTRALIAN CRUSTACEA.

No. 4.\*

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(Plates xlii-xliii.)

### AUSTRALIAN FRESH-WATER CRABS.

(Plate xlii.)

The identification of the several species of Fresh-water Crabs occurring in Australia is a matter of considerable difficulty. This is partly due to the fact that references to them in literature are both scanty and incomplete, but a greater difficulty is presented by the remarkable degree of variation which they exhibit in characters which are recognised as constant in marine species.

The extraordinary uniformity of climatic and other conditions prevailing over a large portion of Australia, combined with a close intermingling of the river systems, has enabled many of our fresh-water animals to distribute themselves over an exceedingly wide area. Some fishes<sup>1</sup> for example, are known to range from the western waters of New South Wales to Central, North, and Western Australia; though they present remarkable variations in both form and colour-marking, they cannot be subdivided even into geographical subspecies, as is readily proved by a large series of specimens collected from various widely separated localities. Similarly, the Yabbie, *Parachærops bicarinatus*<sup>2</sup>, ranges from Victoria to Queensland, Central and North Australia, and perhaps reaches the Western State, but though it exhibits marked variation in all parts of its range, it nevertheless appears indivisible into subspecies. Though more restricted in their distribution, the Fresh-water Crabs of Australia appear to be equally variable, and in the absence of ample material from numerous localities, it seems to be impossible to determine the true relationship of the different forms to one another.

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\* For No. 3 see Vol. ix., p. 321.

<sup>1</sup> Ogilby and McCulloch—Mem. Qld. Mus., v., 1916, pp. 101, 106, 110.

<sup>2</sup> Smith—Proc. Zool. Soc., 1912, pp. 147, 163.

Five names have been bestowed upon Australian specimens, all of which were obtained in Queensland, four being from Cape York. *Thelphusa transversa*, Von Martens<sup>3</sup>, and *T. crassa*, A. M.-Edwards<sup>4</sup>, were described almost simultaneously, and are considered synonymous by De Man<sup>5</sup>. *T. leichardti*, Miers<sup>6</sup>, an insufficiently characterised species, is perhaps merely a variety of *T. transversa*. The other species *T. angustifrons*, A. M.-Edwards<sup>7</sup>, and *T. planifrons*, Bürger<sup>8</sup>, are better characterised, and may be distinguished by the following key:—

- a. Lateral margins of front parallel; fronto-orbital breadth equal to the length of the cephalothorax; penultimate leg twice as long as the cephalothorax.....*planifrons*.
- aa. Lateral margins of front divergent backwards; fronto-orbital breadth less than the length of the cephalothorax; penultimate leg much less than twice as long as the cephalothorax.
- b. Pronounced postfrontal elevations extending between the epi-branchial teeth; branchial regions markedly rugose both anteriorly and posteriorly.....*angustifrons*.
- bb. Postfrontal elevations obsolete or absent; branchial regions almost or quite smooth anteriorly.....*transversa and leichardti*.

GEOTHELPUSA LEICHARDTI, *Miers*.

(Plate xlii., figs. 1-4.)

*Thelphusa leichardti* Miers, Zool. Alert, 1884, p. 236.

*Adult male* (from twenty miles west of Hughenden, North Queensland.)

Cephalothorax smooth, punctate; the punctations close and coarse on the gastric regions, finer and less numerous elsewhere. The carapace is very convex longitudinally; the middle part of the back is flat transversely, but the swollen branchial regions make it very convex laterally. Cervical

<sup>3</sup> Von Martens—Monatsb. Ak. Wiss. Berlin, 1868, p. 609.

<sup>4</sup> A. Milne Edwards—Nouv. Arch. Mus. Paris, v., 1869, p. 177, pl. ix., fig. 2.

<sup>5</sup> De Man—Notes Leyd. Mus., xiv., 1892, p. 241.

<sup>6</sup> Miers—Zool. Alert, 1884, p. 236.

<sup>7</sup> A. Milne Edwards—Nouv. Arch. Mus. Paris, v., 1869, p. 171, pl. viii., fig. 1.

<sup>8</sup> Bürger—Zool. Jahrb., Syst., viii., 1894, p. 6, pl. i., fig. 6.

groove incomplete and forming a very shallow depression on each side, but the H-shaped grooves defining the gastro-cardiac regions are more distinct. No postfrontal prominences, though a minute median furrow is present. The length of the cephalothorax is 1.4 in its breadth.

Front, orbital borders, and anterolateral margins raised into a low ridge. Front deflexed, its anterior margin slightly concave, its width 4.4 in the breadth of the carapace; its anterior face is deflexed downward and backward to meet the epistome. Outer frontal angles rounded and continuous with the orbital borders. Orbits slightly oblique, wider than deep, the margins entire without sutures; the lower margin is microscopically milled and forms a cristate tubercle internally, and the exterior angle is not tooth-like.

Lateral margins of carapace arcuate, defined anteriorly by a low, smooth crest; a minute notch a short distance behind the eye on each side forms an epibranchial tooth. Posterolateral margins ill-defined, slightly oblique, and longer than the anterolateral; they are marked with fine wrinkles which pass forward and downward to the sides of the carapace. Pterygostomial and subhepatic regions somewhat rugose with scattered ridges and wrinkles.

Abdomen consisting of seven movable segments. The first is rounded anteriorly, with concave sides; its width is one-sixth greater than its length. The second is wider than long, its sides almost parallel, slightly convergent anteriorly. The fifth, fourth, and third joints become uniformly wider, while the second and first are as wide as the fifth. Sternum and abdomen with scattered punctations. Two broad and deep furrows are present on the anterior part of the sternum between the last abdominal segment and the base of the maxillipeds.

Basal antennal joint in contact with the under surface of the fronto-orbital angle, the flagellum about two-thirds as long as the eye. Epistome broad, with a broad rounded depression on its median portion, which forms an angular lobe between the maxillipeds. Outer maxillipeds smooth, punctate; the ischium is subquadrangular, much longer than broad, with a slightly oblique groove much nearer the inner than the outer

border; the merus is much broader than long, with its outer margins rounded, the inner truncate; it is pointed anteriorly, with its antero-internal angle somewhat excavate.

Chelipeds very unequal but of similar construction. The upper margin of the merus is rugose, and terminates in an obtuse tubercle; the other margins are smooth. Carpus punctate; with two inner spines, the antero-superior of which is the larger. Hand smooth, without sharp angles; fingers of the larger hand are widely gaping, meeting only at their tips, and are denticulate along their whole inner margins; the upper has two groups of enlarged teeth, one near the base and the other near the middle, while the lower has a very large tooth between the two upper ones, and one in advance of it. In the smaller hand the fingers meet along almost their whole length; the denticulations are subequal, but some are somewhat enlarged as in the larger hand.

Meral joints of the ambulatory legs compressed, with three ridges, one above and two below; in the first three pairs the upper portion of the basal half is rugose, but in the fourth pair it is smooth. Carpal joints of the first three pairs with one superior and two lateral ridges, the two latter terminating in minute spines; in the fourth pair the two lateral ridges are obsolete. Propodus of each pair with several larger and smaller spines on its upper and lower ridges, and one at the termination of each. Tarsi with strong spines on each of the four upper and lower angles.

Breadth of carapace 44mm.; length of carapace 31mm.; fronto-orbital width 25mm.; breadth of front 10mm.

*Female*.—A female 38mm. wide, which was collected with the male, differs in having the hands subequal in size and of the same shape as the smaller hand of the male. The branchial regions are less inflated so that the carapace is flatter from side to side, and the cervical grooves are much less evident. The abdomen completely covers the sternum, and is widest between the fourth and fifth segments; its sides are arcuate, narrowing evenly forwards to the obtusely angular tips. In all other details the female appears similar to the male.

*Nomenclature.*—In identifying these specimens as *T. leichardti*, I am guided rather by a consideration of the locality whence that species was obtained than by the meagre characters referred to by Miers. He had two examples from different sources, the localities of which he gave merely as East Australia, but according to the notes of the late Mr. F. E. Grant, he examined a specimen in the British Museum which was labelled "*Telphusa leichardti*, *sp. nov.*, E. Australia, Lat. 27° 9', Long. 144°." This position is in South-western Queensland, and is well within the area over which the species described above ranges. As already stated, however, I think it probable that *T. leichardti* is not distinct from *T. transversa*, the types of which were obtained at Cape York.

*Variation.*—The Australian Museum collection includes nineteen examples from different localities which appear to be specifically identical, though they exhibit considerable variation in several structural details. The *fronto-orbital width* ranges from 1.9-1.7 in the width of the cephalothorax; that this is merely individual variation is proved by the fact that it differs in individuals which have been collected together, while a series of specimens shows an unbroken range of intermediate stages. The *convexity of the back* is evidently a very variable character. Notwithstanding the very different appearance of markedly convex examples from New South Wales, and others much flatter from King Sound, North West Australia, an intermediate series seems to preclude the possibility of the two being distinct species or even subspecies. On the other hand, four from North-eastern Queensland, in which the carapace is particularly flat, may be conveniently separated as a distinct variety under the name *plana*. The width of the *abdomen* in both sexes is variable; the form of the male abdomen is shown in my figure, but the proportions of the component segments, and particularly of the last three, are somewhat variable; the female abdomen may entirely cover the sternum, or leave a portion exposed on either side. The *rugosity* of the legs varies somewhat in different specimens, as do the fine lines on the sides of the carapace, but to a less degree than the other features noted.

*Locs.*—The two specimens described in detail were collected by Mr. F. L. Berney twenty miles west of Hughenden, North Queensland, where the species is quite common, occurring in

every stream and waterhole around the district. It digs burrows in the wet mud of the banks, piling up a small crater of soil at their mouths a couple of inches high. The other specimens which I identify as this species were obtained at the following localities :—

- (3)—Dandaloo, Bogan River, Central New South Wales.
- (3)—Moree, Gwydir River, Northern New South Wales.
- (2)—Forty miles North-west of Collarenebri, Northern New South Wales.
- (2)—Angeldool, Narran River, Northern New South Wales.
- (1)—Port Darwin, North Australia.
- (6)—King Sound, North West Australia.
- (2)—Locality ?

GEOTHELPHUSA LEICHARDTI, VAR. PLANA, var. nov.

(Plate xlii., fig 5.)

Four examples from North-east Queensland are very different in general appearance to those I have identified as *G. leichardti*, but I am unable to discover any important structural differences to distinguish them. The carapace is much flatter both transversely and longitudinally than in *G. leichardti*, and the chord of the antero-lateral borders is relatively shorter; the cervical and gastro-cardiac grooves are somewhat more deeply impressed, and the former diverge more widely than in *G. leichardti*; the postfrontal prominences are very weakly indicated; the male abdomen is narrower than is usual in *G. leichardti*, the greatest breadth of the third segment being only equal to the combined lengths of the last two. Apart from these features however, I can find no definite character by which this form may be recognised.

Measurements of the male specimen figured. Length of carapace 23mm. ; breadth of carapace  $30\frac{1}{2}$ mm. ; fronto-orbital width 19mm. ; breadth of front  $7\frac{1}{2}$ mm.

*Locs.*—(2) Eureka Creek, Walsh River, North-east Queensland (flowing into the Gulf of Carpentaria.)

(2)—Cooktown, North-east Queensland.

Notes on Variation in *ASTACOPSIS SERRATUS*, Shaw.

(Plate xliii.)

The common Crayfish or Fresh-water Lobster of Eastern and Southern New South Wales and Victoria undergoes considerable alteration in its armature and ornamentation during transition from the young to the adult stages. It is also subject to considerable variation at all ages, but particularly when about 100mm. long, at which size it begins to develop the large tubercles and spines which are characteristic of full-grown specimens.

The species is represented in the Australian Museum collection by a fine series of over seventy specimens from various parts of New South Wales, which are well graduated in size. The smallest specimens, 45mm. long (measured from the end of the rostrum to that of the telson), have the carapace nearly smooth, but it gradually becomes granular as they increase in size until a length of about 95mm. is attained, when larger tubercles and spines begin to make their appearance. Twenty full-grown examples, 160-260mm. long, are the typical *A. serratus* as figured by Shaw<sup>1</sup>, with large spines or tubercles on the posterior half of the carapace, and numerous stout spines on the abdomen.

Some examples of intermediate size, measuring up to 132mm. in length, have not developed the armature characteristic of the adult stages, but have the hinder portion of the carapace granular and the abdomen without spines as is typical of younger specimens; the lateral edges of the rostrum also are nearly smooth instead of strongly dentate as usual. These belong to the variety described and figured by Dana as *A. nobilis*<sup>2</sup>, but they do not appear to attain a large size, and perhaps develop into the typical form with increased age. Still others from near Stanthorpe, Southern Queensland, have the general characters of the variety *nobilis* but have the rostrum very large and broader than is usual in the species.

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<sup>1</sup> Shaw—Zool. N. Holland, 1794, p. 21, pl. viii.

<sup>2</sup> Dana—Wilkes U.S. Explor. Exped., Crust., i., 1852, p. 526, pl. xxxiii., fig. 3.



Twelve specimens, 62-82mm. long, differ from all others in the collection in having the whole carapace, abdomen, and appendages markedly hirsute, while the rostrum is narrower than is usual, though a careful comparison with others of the typical form and of similar size fails to reveal any further characters to distinguish them. They were obtained in the Belmore Falls Creek, which runs into the Kangaroo River, New South Wales, and were presented to the Australian Museum by Professor W. A. Haswell, F.R.S. He discovered a new commensal worm, *Temnocephala*, *sp.*, associated with them, which is distinct from any found elsewhere, and he suggests that this fact is of some importance as indicating at least long isolation from their nearest allies. In the absence of larger specimens, however, and considering that they exhibit no differentiating structural characters it seems best to regard these example as representing only a variety of *A. serratus*, which may be distinguished by the name *hirsutus*.

The colour variations of *A. serratus* are very striking, but cannot be investigated without the examination of a large series of fresh specimens from many localities. Some examples from the Blue Mountains are bright pink in life as in Shaw's original figure. McCoy<sup>3</sup> describes and figures Murray River specimens as light blue, while adults from around Sydney are largely dark green ornamented with deep blue and red.

*Astacopsis serratus* is known from the Murray River and its tributaries (Haswell<sup>4</sup>, McCoy<sup>5</sup>, Smith<sup>6</sup>, Austr. Mus.); Yarra, Plenty and Bunyip Rivers, Victoria (Smith); Blue Mountains, New South Wales (Haswell, Smith, Austr. Mus.); Parramatta and near Sydney (Smith, Austr. Mus.); Mt. Kosciusko (Austr. Mus.); various coastal localities from Bundanoon and Wollongong to Barrington Tops and Dorrego, New South Wales (Austr. Mus.); ? Richmond River (Haswell); Lyra, near Stanthorpe, Queensland (Austr. Mus.).

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<sup>3</sup> McCoy—Prodr. Zool. Vict., Dec. ii., 1878, pl. xv.

<sup>4</sup> Haswell—Cat. Austr. Crust., 1882, p. 174.

<sup>5</sup> McCoy—Prodr. Zool. Vict., Dec. ii., 1878, pl. xv.

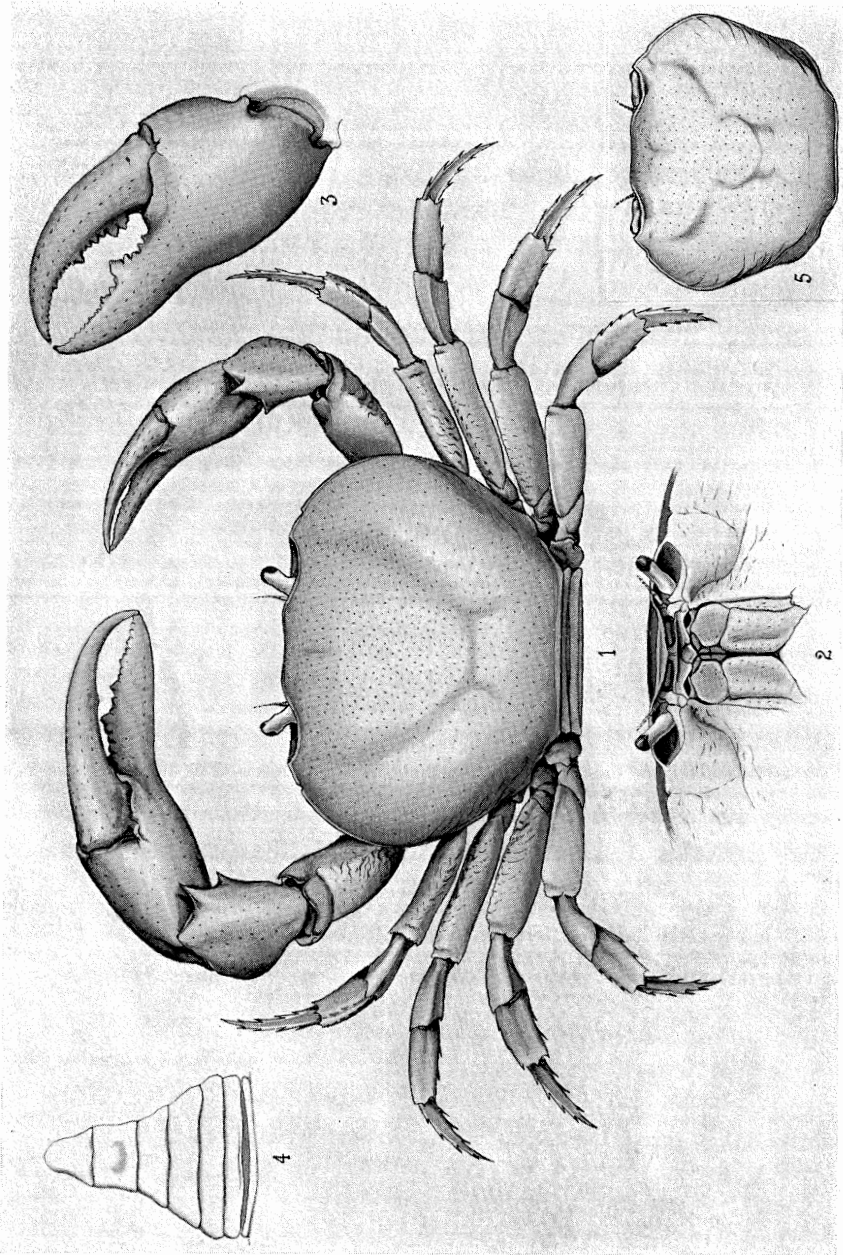
<sup>6</sup> Smith—Proc. Zool. Soc., 1912, p. 157, pls. xvi.-xviii.



EXPLANATION OF PLATE XLII.

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- Fig. 1. *Geothelphusa leichardti*, Miers. An adult male, 44mm. wide. Twenty miles west of Hughenden, North Queensland.
- Fig. 2. Mouth-parts and front of the same specimen.
- Fig. 3. Larger cheliped of the same specimen.
- Fig. 4. Abdomen of the same specimen.
- Fig. 5. *Geothelphusa leichardti*, var *plana*, var. nov. Type of variety, 30½mm. wide. Eureka Creek, Walsh River, North Queensland.



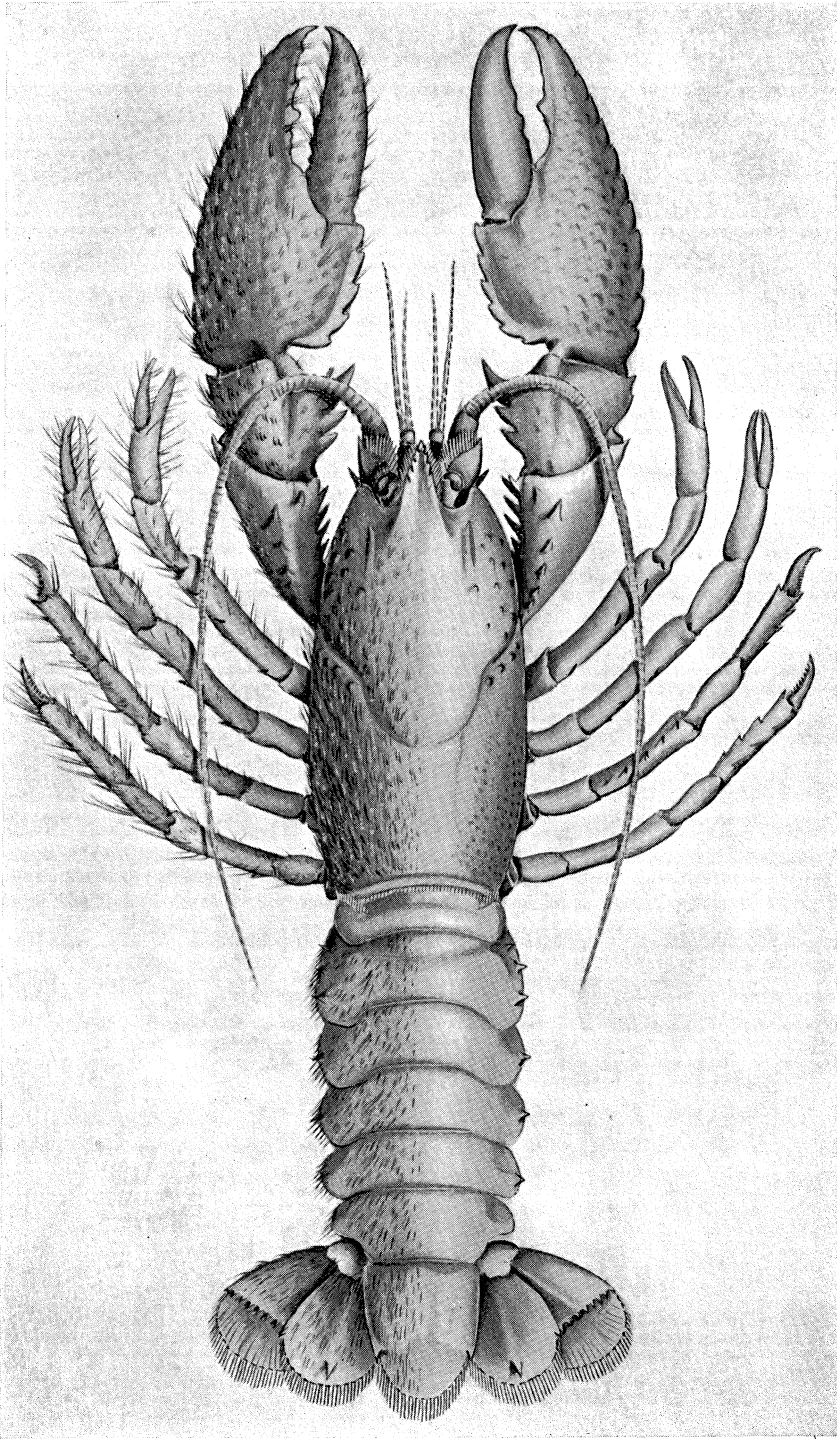




EXPLANATION OF PLATE XLIII.

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*Astacopsis serratus*, Shaw, var. *hirsutus*, var. nov. Type of variety, 76mm. long. Belmore Falls Creek, New South Wales.



A. R. McCULLOCH, Austr. Mus., del.



