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ZOOLOGICAL RESULTS OF THE THIRD TANGANYIKA  
EXPEDITION, CONDUCTED BY Dr. W. A.  
CUNNINGTON, 1904—1905. Report on the  
Brachyurous Crustacea. By WILLIAM A.  
CUNNINGTON, B.A., Ph.D., F.Z.S.

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[From the PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON,  
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INVERTEBRATE  
ZOOLOGY  
Crustacea

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Zoological Results of the Third Tanganyika Expedition,  
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(Plates XVI. & XVII.\* and Text-figure 84.)

1. *Introduction.*

Since the year 1896, when Mr. J. E. S. Moore paid his first visit to Lake Tanganyika, our knowledge of the fauna of that lake, and of the interesting problems which are connected with it,†, has considerably advanced. The single representative of the Brachyura then collected was described somewhat later‡, but already, in 1887, a description had been given by Milne-Edwards§ of another form brought from the lake by Captain Joubert. The description of this last-mentioned type was unfortunately very incomplete, while at that time no male specimen had been obtained. During Mr. Moore's second expedition, in 1899-1900, he succeeded in collecting further examples of both the species already known, and furnished male specimens of the form which Milne-Edwards had described from the female alone. Finally, a Third Tanganyika Expedition was dispatched in 1904, with the conduct of which I had the honour of being entrusted, and which has added yet again to our knowledge of the Brachyurous Crustacea of the lake.

The very earliest facts which were learned respecting the fauna of Tanganyika seemed to show that the animals it contained were not merely of an unusual type, but were different from those living in the other big African lakes. It is an interesting fact that, with the lapse of time and a very great increase in our knowledge of the lakes of Central Africa, this dissimilarity of Tanganyika has been not only confirmed, but rendered more and more striking. Among other animal groups, that of the Brachyura affords an excellent example of this remarkable state of things; so that a double purpose will be served by the description in this paper of Crabs from Nyasa, which lake has the normal characteristics of the African fresh-waters.

The collection of Crabs made during this Expedition contains representatives of five species, of which two alone have been previously described. By the kindness of Dr. W. T. Calman, I have been permitted to examine and compare with the collection a large number of specimens of nearly allied forms, belonging to

\* For explanation of the Plates, see p. 276.

† Moore, 'The Tanganyika Problem' (London, 1903).

‡ Cunnington, Proc. Zool. Soc. 1899, p. 697.

§ Ann. Sci. Nat. ser. Zool. t. iv. (1887) p. 116.

the British Museum\*. Among others are some which are stated to have come from Nyasa and Tanganyika; and since no notice of these specimens appears to have been published, it seems desirable to consider them, also, in the present paper. The following is thus a complete list of the species at present known to occur in the lakes in question:—

NYASA.

- Potamon (Potamonautes) inflatus* (H. Milne-Edwards).  
 „ *(Potamonautes) orbitospinus*, sp. n.  
 „ *(Potamonautes)* sp. ?

TANGANYIKA.

- Potamon (Potamonautes) platynotus*, sp. n.  
 „ *(Potamonautes)* sp. ?  
*Platylhelfusa armata* A. Milne-Edwards.  
 „ *maculata* (Cunnington).  
 „ *conculcata*, sp. n.

2. *Systematic Notes and Description of New Species.*

Family POTAMONIDÆ (= THELPHUSIDÆ).

Subfamily POTAMONINÆ.

*Lake Nyasa.*

POTAMON (POTAMONAUTES) INFLATUS (H. Milne-Edwards).

*Potamon (Potamonautes) inflatus* Rathbun, *Nouv. Arch. Mus. Hist. Nat. Paris*, 4<sup>e</sup> sér., vii. (1905) p. 174 (ubi synonym.).

A single fair-sized male specimen in the collection of the British Museum (Reg. No. 96.7.19.1) appears to belong to this species. The only particulars given are:—“Kavisonda, Nyasa. Presented by Dr. Ansorge.”

POTAMON (POTAMONAUTES) ORBITOSPINUS, sp. n. (Plate XVI. fig. 1.)

*Description.*—Carapace considerably flattened, antero-lateral margins arcuated and denticulate, extending laterally less than an orbit's breadth beyond the external orbital angle. No definite epibranchial tooth, but the end of the post-frontal crest forming a distinct corner at that point. Regions and sutures on carapace moderately marked, lateral regions exhibiting a series of small slightly oblique granular ridges. Front rather deflexed, less than one-third the width of the carapace, and with its anterior margin

\* By the courtesy of the authorities of the Berlin Museum, co-types of some of the species described by Hilgendorf from German East Africa were lent to the British Museum for the purpose of comparison with those discussed here. I am especially indebted to Dr. P. Pappenheim for detailed information regarding these specimens.

situated. Post-frontal crest prominent, almost straight, and extending to margins, with branches of mesogastric groove angulated. Orbits large, and eyes large, with stout peduncles. External orbital angle produced into prominent spine. Ischium of external maxillipeds showing longitudinal furrow, somewhat nearer to the inner edge. Chelipeds in both sexes subequal; merus trigonous, with a series of small spines and distally a prominent spine on the anterior margin; carpus with two spines on inner margin, the posterior being the smaller. Fingers pointed and slightly hooked; teeth fairly uniform, of moderate size. Ambulatory legs long and slender, also somewhat compressed. Colour in life dull dark green, shading into dark purple; the most prominent parts of the front, the external orbital spines, antero-lateral margins, and portions of post-frontal crest outlined in white; legs dark purple.

Dimensions as follows:

Adult male (largest specimen):	
	mm.
Length of carapace .....	38.4
Breadth of carapace .....	56.0
Fronto-orbital width .....	36.7
Width of front .....	13.8

Adult female:	
Length of carapace .....	36.9
Breadth of carapace .....	53.9
Fronto-orbital width .....	34.5
Width of front .....	14.2

*Remarks.*—As there has recently been published a very comprehensive revision of the Potamonidae by Miss Rathbun\*, it becomes desirable to take this as a basis, and correlate with it any newly described forms. Accordingly that portion of the key given by Miss Rathbun† which is affected is restated below, but slightly modified to include this new species, while distinguishing it from *johnstoni*, the species close to which it finds a place.

- h.* Carapace broader; less than three-quarters as long as broad.  
*j.* Antero-lateral margins denticulated; external orbital angle produced into prominent spine ..... *orbitospinus*.  
*j'.* Antero-lateral margins granulated; external orbital angle forms low blunt process ..... *johnstoni*.

Even a casual study of the species comprised in the genus *Potamon* renders it abundantly evident that in many cases they cannot be distinguished by very striking differences of character. It is therefore the more important to make clear the actual points of disagreement which have been thought in this case to justify the formation of a new species. *P. orbitospinus* approaches most

\* Nouv. Arch. Mus. Hist. Nat. Paris, 4<sup>e</sup> sér., vi.-viii., 1904-1906.

† *Op. cit.* vii. p. 160.

nearly to the forms *P. hilgendorfi* (Pfeffer) and *P. johnstoni* (Miers). In order to render a comparison more easy, the diverging characters of these three species are given in tabular form, while it may here be stated that *P. orbitospinus* is a species certainly more easily recognised than some of those which are allied to it.

<i>hilgendorfi</i> (Pfeff.) (not <i>hilgendorfi</i> Hilg.).	<i>orbitospinus</i> , sp. n.	<i>johnstoni</i> (Miers).
Carapace somewhat flattened.	Carapace considerably flattened.	Carapace somewhat flattened.
Antero-lateral margins granulated.	Antero-lateral margins denticulated.	Antero-lateral margins granulated.
External orbital angle rather acute.	External orbital angle produced into prominent spine.	External orbital angle forms low blunt process.
Fronto-orbital width '71 that of carapace.	Fronto-orbital width '64 that of carapace.	Fronto-orbital width '59 that of carapace.
Ischium of external maxillipeds without longitudinal furrow.	Ischium of external maxillipeds with longitudinal furrow.	Ischium of external maxillipeds with longitudinal furrow.
Posterior carpal spine (of cheliped) little developed.	Posterior carpal spine (of cheliped) sharp and well developed.	Posterior carpal spine (of cheliped) little developed.
	Ambulatory legs long and slender.	Ambulatory legs short and stout.

*Occurrence*.—Nkata Bay, 23/6/04. Several specimens of medium size. The Crabs were captured and brought me by the natives, so that I have no direct evidence of their mode of life. They are said to live in the water and not on land, though they sometimes come on to the beach.

Three small and immature specimens in the collection of the British Museum (Reg. No. 91.12.19.1 3). Only the following particulars are given:—"Lake Nyasa, Coll. Miss M. Woodward, pres. by Miss Sophia McLaughlin."

One rather small male, no precise locality given, British Museum (Reg. No. 93.1.14.1). "Lake Nyasa. Received from Mr. Joseph A. Williams, Universities Mission, Likoma, Lake Nyasa."

One large female specimen, British Museum (Reg. No. 97.4.29.1). "West coast of Lake Nyasa from Ukala (?Nkata) Bay to Ruarwe, June 1896." "A. Whyte collector—pres. by Sir H. H. Johnston."

A single large male specimen, collected by Mr. J. E. S. Moore during one of his expeditions to Tanganyika, but without further particulars.

POTAMON (*POTAMONANTES*) sp. ?

Reference has already been made to the fact that it is often difficult to distinguish between closely similar species of this genus. Many of the characters enumerated by the systematic writers on this group, while in certain cases affording a ready means of separating species, are in other cases of little or no value. A careful consideration of many of the described species and the examination of an extensive series of specimens lead to the undoubted conclusion that some species have been established without sufficient justification. While a species or even a genus may be established on the strength of a single specimen, if its characters are sufficiently unusual, it is necessary to be very cautious in doing anything of the kind within the limits of this subgenus (*Potamonantes*) in particular. Yet there are several species of *Potamonantes* based upon single specimens, and even upon specimens which were recognised as being immature. We do not know a great deal about the modifications in form produced by advancing age, but we do know, from the examination of any extensive series, that they are considerable. The proportion of length of carapace to its breadth, with the relative proportions of the front, the orbits, and the fronto-orbital width—all of them characters employed by the systematist—are undoubtedly dependent upon the age and growth of the individuals.

But more than this. A natural hesitation to lay stress on every little difference in form is only emphasized by the result of Schenkel's\* investigation of the species *Potamon* (*Potamonantes*) *celebensis* de Man. He is able to distinguish some six local varieties, in addition to the *forma typica* of de Man. These differ from one another in colour, in the shape of legs and carapace, in the extent of the sculpturing, and especially as regards the degree to which the carapace is vaulted and the branchial regions dilated. But, as Schenkel points out, these features are precisely those which would be affected by a difference of surroundings. He finds the Crabs with the flattest carapace come from mountain-streams, where of course the water is pure and well oxygenated. The converse holds equally good, the gill-chambers in other varieties being inflated in proportion to the sluggish or muddy nature of the river inhabited, and it is obvious that the sculpturing is in a great measure an expression of the degree of inflation of the carapace. Again, it is pointed out that the amount of the food-supply must have a powerful influence on growth: thus with two Crabs of similar size, that from water poor in nourishment will be far older than the other, and so not strictly comparable with it.

As Schenkel considered it desirable to retain a single species, but to constitute a number of varieties in this case, this discussion of the facts is very suggestive in a general sense. Under such circumstances, some observers would not even separate into

\* Verh. naturf. Ges. Basel, Bd. xiii. 1902, p. 528.

varieties, and, on the other hand, there can be no doubt that many so-called species of other writers are not more distinct than these varieties of Schenkel. If it is possible to trace a gradual transition from one variety to another, as appears to be the case with the form *celebensis*, it becomes evident that certain established species are of similarly little value, and that species of this genus ought never to be constituted on such slender grounds.

This matter is dealt with at such length, because the conviction has forced itself upon me that the number of African species, at all events, has been multiplied to an excessive degree. Where two or more well-marked species exist side by side, there can be no hesitation in the matter; but our knowledge of the Crabs of the African continent is still very scanty, and over a vast area restricted to a few isolated records. Thus it is impossible to determine yet whether this or that species may not prove to be only a slight local modification of some widely distributed form. This being the case, I have not ventured to name the two specimens from Nyasa, which are placed under the head-line above.

Although it was during my study of the two species described as new in this paper that I became impressed with the unsatisfactory character of some species of *Potamonautes*, it was not until I examined these two Nyasa specimens and a third from Tanganyika that I found a case where the most careful comparison only resulted in confusion with several closely allied species. The two specimens from Nyasa—a rather small male and a small female—are in the collection of the British Museum (Reg. No. 97.4.29.2 3), and the following note is given as to locality:—“Kondowe to Karonga, N. Nyasa, June 1896. A. Whyte collector—pres. by Sir H. H. Johnston.”

Using as a basis the key in Miss Rathbun's recent revision, we find they belong to group *a*, where the lateral margin extend less than an orbit's breadth beyond the external orbital angle. Further, they would seem to belong to division *e'*, where the post-frontal crest is little advanced in the middle, and to subdivision *f'*, with fingers of the cheliped but slightly gaping. Thus they would come nearest to the species *hilyendorfi* (Pfeff.) and *johnstoni* (Miers). The specimens differ from *hilyendorfi* (Pfeff.) principally in possessing a furrow on the ischium. From *johnstoni* they differ in being distinctly longer in proportion to the breadth, in the sculpturing being less marked, and in the absence of the fairly stout spinules on the anterior margin of the carpus of the cheliped—a single distal spine only being present.

They agree to some extent also with *suprasulcatus pseudoperlatus*, which, if it exist at all as a true variety, is in a measure intermediate between *hilyendorfi* (Pfeff.) and *johnstoni*. The length in proportion to the breadth is, however, more extreme in the case of *suprasulcatus pseudoperlatus*. From another important type in group *c*—*perlatus* itself—these individuals do not differ greatly, the carapace being of much the same proportions as regards length and breadth. The width of the front is, however,

considerably less than in *perlatus*, and the post frontal crest does not extend forward so far in the middle. The posterior carpal spine of the cheliped is also sharper and more prominent. Both the male and female specimens show only a single transverse furrow on the sternum in front of the abdomen, while in the specimens of allied species examined the males almost invariably have two furrows even in young individuals.

From this description of the characters of these two Nyasa Crabs, it will be evident that my former contention is not without foundation. These individuals agree to a considerable extent with several species, and where they disagree with one they agree with another, while, to my mind, they have not a single character which satisfactorily distinguishes them from those forms to which they are undoubtedly allied. In the present state of our knowledge, it would be futile to attempt to determine which species should be eliminated, and Miss Rathbun has certainly taken the right course in retaining most of the species hitherto described, though it seems to have led her into some difficulties respecting her key. Bearing in mind the facts which have been detailed at some length above, I prefer, in a case like this, to leave the specimens unnamed, and so at least avoid adding to the already existing superfluity.

*Lake Tanganyika.*

POTAMON (POTAMONAUTES) PLATYNOTES, sp. n. (Plate XVII. figs. 1 & 3.)

*Description.*—Carapace much flattened, antero-lateral margins arcuated and denticulate, extending laterally slightly more than an orbit's breadth beyond the external orbital angle. No definite epibranchial tooth, but the end of the post-frontal crest forming a distinct corner at that point. Regions and sutures on carapace ill-defined, postero-laterally a few inconspicuous granular ridges. Front rather deflexed, less than one third the width of the carapace, and with its anterior margin sinuated. Post-frontal crest prominent, slightly arcuated, but sinuated laterally, extending to margins; branches of mesogastric groove straight. Orbits, eyes, and peduncles small. External orbital angle existing as a short blunt spine. Ischium of external maxillipeds not showing longitudinal furrow, though this may be faintly indicated in the oldest specimens. Anterior portion of the sternum hairy in the female, not hairy in the male. Chelipeds in both sexes subequal; merus trigonous, with a series of granules, and distally a stout spine, on the anterior margin; carpus with a prominent spine on the inner margin and a slight process just behind it. Fingers distally hollowed out, spoon-shape and meeting closely in a sharp cutting-edge (Plate XVII. fig. 3); dactylus usually slightly longer than the pollex. Teeth fairly uniform, of moderate size, but the fingers of the larger chela gape a little and have proximally a few larger flat crushing-teeth. Ambulatory legs of moderate length, little compressed. Colour in life a uniform dull greenish brown; the dactyli of the chelipeds in the males usually black.



Dimensions as follows:—

Male (probably young specimen):	mm.
Length of carapace.....	20·3
Breadth of carapace .....	30·7
Fronto-orbital width .....	19·7
Width of front .....	10·1
Adult female (largest specimen):	
Length of carapace .....	33·7
Breadth of carapace .....	48·2
Fronto-orbital width.....	30·0
Width of front .....	13·8

*Remarks.*— This species comes into Miss Rathbun's key under the heading *c'*, where the carapace extends laterally more than an orbit's breadth beyond the external orbital angle. It finds its place in the same subdivision (*g'*) as the species *ambiguus* and *urogoroensis*, and that portion of the key, modified to include it, is accordingly given below:—

- g'*. Anterior branch of cervical suture absent.
- h*. Ischium of external maxillipeds without longitudinal furrow.
- j*. Anterior portion of female sternum hairy..... *platynotus*.
- j'*. Anterior portion of female sternum not hairy .....
- k*. Ischium of external maxillipeds with longitudinal furrow... *ambiguus*.

The principal points in which *platynotus* differs from *ambiguus* on the one hand and *suprasulcatus* on the other are also given in tabular form. The most striking features of the new species are

<i>suprasulcatus</i> Hilg.	<i>platynotus</i> , sp. n.	<i>ambiguus</i> Rathbun.
Carapace moderately vaulted.	Carapace much flattened.	Carapace distinctly vaulted
Antero-lateral margins granulated.	Antero-lateral margins denticulated.	Antero-lateral margins granulated.
Anterior branch of cervical suture present.	Anterior branch of cervical suture absent.	Anterior branch of cervical suture absent.
Fronto-orbital width '60 that of carapace.	Fronto-orbital width '62 that of carapace.	Fronto-orbital width '57 that of carapace.
Ischium of external maxillipeds without longitudinal furrow.	Ischium of external maxillipeds without longitudinal furrow.	Ischium of external maxillipeds with longitudinal furrow.
Fingers pointed and slightly hooked.	Fingers distally hollowed out spoon-shape.	Fingers pointed and slightly hooked.

the flattened carapace, the denticulated antero-lateral margin, and the character of the fingers.

\* It is by no means obvious why Miss Rathbun has inserted the form *urogoroensis* here, under the heading *c'*, when it is quite clear from Hilgendorf's description, [9]

*Occurrence*.—Kasakalawe and Kituta Bay, both south end of Tanganyika. Several specimens; some females probably full-grown, but the largest male apparently not so. The Crabs were taken under boulders about high-water level.

POTAMON (*POTAMONAUTES*) sp.

Under this heading, I place a single rather small male belonging to the British Museum (Reg. No. 89.2.8.1), of which the only particulars are: "Lake Tanganyika, E. C. Hore (ex coll.)." This specimen agrees with and differs from its near allies in very much the same way as the unnamed forms from Nyasa, which are dealt with above. Thus it finds its place near to the latter, with which it agrees in showing only a single transverse furrow on the sternum in front of the abdomen, although a male. It disagrees with the Nyasa form, however, in being less inflated and in showing the sculpturing more distinctly. Further, the antero-lateral margins are more finely perlated, and the spine on the merus of the chelipeds is longer and sharper. In this case also the specimen differs little from several species, and appears to have no satisfactory distinguishing characters of its own, so that I again take the course least open to objection and leave it unnamed.

Genus *PLATYTHELPHUSA* A. Milne-Edwards.

*Platythelphusa* A. Milne Edwards, Ann. Sci. Nat., Zool. 7<sup>e</sup> ser., t. iv. (1887) p. 146.

*Platythelphusa* Hilgendorf, Deutsch-Ost-Afrika, Bd. iv. Lief. ix. (1898) p. 21.

*Limnothelphusa* Cunnington, Proc. Zool. Soc. 1899, p. 698.

*Limnothelphusa* and *Platythelphusa* Moore, 'The Tanganyika Problem' (London, 1903), pp. 280, 286.

*Platythelphusa* and *Limnothelphusa* Rathbun, Nouv. Arch. Mus. Hist. Nat. Paris, 4<sup>e</sup> sér. vii. (1905) pp. 268, 269.

There are a number of reasons which have led me to offer here a new description of this genus established by A. Milne-Edwards in 1887. As I have stated elsewhere\*, the account given of the type species, *P. armata*, and particularly the figures of it, leave a good deal to be desired. Miss Rathbun reproduces a photograph of this same individual, and adds something to the description; but, as a result of the Second and Third Tanganyika Expeditions, we

very incomplete though it is, that his specimen should come into the group *c*, in which the carapace extends laterally less than an orbit's breadth beyond the external orbital angle. While it may perhaps be doubted whether the distinction given above under *j* and *j'* is of much weight, it will be evident that if the species *urogoreensis* were withdrawn from its false position, the new form *platynotus* would then be distinguishable from *ambiguus* by the difference of the external maxillipeds. It is not necessary to discuss here the position which *urogoreensis* should really occupy, the simpler course is taken of merely incorporating the new species in the existing key.

\* Proc. Zool. Soc. 1899, p. 704.

now possess in this country a fairly complete series of this species of both sexes. We have the possibility for the first time of comparing males with the female on which the genus was founded, and this might in itself justify a redescription. But a comparison between a large series of the form described as *Limnothelphusa maculata* and the specimens of *Platythelphusa armata* (which I was unable to make in 1899), has convinced me that the former cannot be regarded as constituting a separate genus, but falls into place as a species of *Platythelphusa*. A third species of *Platythelphusa* is among the acquisitions of the last expedition, so that the description which follows has been materially modified in view of our much more extensive knowledge.

*Description.*—Carapace almost quadrilateral; antero-lateral margins arcuated and armed with spines; postero-lateral margins but slightly arcuated. Front little deflexed, nearly straight. Post-frontal crest distinct and peralated, but not extending to lateral margins. Sub-orbital spine more or less distinct, in addition to prominent inner sub-ocular tooth. A stout triangular process descends from the external angle of the front, and may be produced into a small spine antero-distally. Antennae situated partly behind and partly between this descending process of the front and the inner sub-ocular tooth; the distal segments thus escape an appearance of displacement by the front. Merus of external maxillipeds broader than long, the palp being attached to its antero-internal angle; ischium without longitudinal furrow. Ambulatory legs somewhat compressed, the fourth leg considerably shorter than the others, and with its two terminal segments broad and flattened.

*Remarks.*—With the inclusion of *Limnothelphusa*, this genus has lost nothing of its original distinctiveness. In the generic description of *Limnothelphusa*, stress was laid on the simple nature of the second antennal segment, which was undistorted by the deflexed front. Although it was perhaps not very happily expressed, this character is just as typical of the other two species we know from Tanganyika, and deserves emphasis accordingly. In those genera and subgenera where the front is considerably depressed, the antennae have the appearance, at least, of a lateral displacement or distortion in consequence. All the species of *Platythelphusa* show the front little deflexed, but have a triangular process descending from the external angle, which process, however, passes to the front and side of the antenna, without modifying its shape or direction. In order to make this distinctive feature quite clear, the frontal region of all three species of *Platythelphusa* is figured, while corresponding figures are given of certain well-known species of the subgenera of *Potamon* (Plate XVI. figs. 2-7).

Owing to the modification of the generic characters of *Platythelphusa* and the suppression of the genus *Limnothelphusa*, Miss Rathbun's key to the subfamily Potamoninae\* requires

\* *Op. cit.* t. vi. p. 245.

alteration. In the restatement which follows, the subgenera are omitted, as they are not affected, and care has been taken to retain the original form as far as possible.

#### Subfamily POTAMONINÆ.

- c. Ocular peduncles large, not tapering towards distal extremity.  
*f.* A stout triangular process descends from the external angle of the front ..... PLATYTHELPHUSA.  
*f'*. No process descending from the external angle of the front.  
*g.* Front not armed with spines or spinules ..... POTAMON.  
*g'*. Front armed with spinules ..... HYDROTHELPHUSA.  
*e'*. Ocular peduncles small, tapering towards distal extremity. ERMETOPUS.

Since there are now three species included in the genus *Platythelphusa*, it may be well to furnish a key to them, although they are much more distinct and well defined than is the case with many species of *Potamonautes*.

#### Key to the Species of PLATYTHELPHUSA.

- a.* Carapace extending laterally more than an orbit's breadth beyond the external orbital angle; front less than one-third width of carapace ..... *armata*.  
*a'*. Carapace extending laterally less than an orbit's breadth beyond the external orbital angle; front more than one-third width of carapace.  
*b.* Carapace moderately convex; carpus of cheliped without spines on outer margin; ambulatory legs of moderate length, anterior margin of the merus without spines ..... *maculata*.  
*b'*. Carapace extremely flattened; carpus of cheliped bearing spines on outer margin; ambulatory legs long, anterior margin of the merus produced distally into two spines..... *conculcata*.

PLATYTHELPHUSA ARMATA A. Milne-Edwards. (Text-figure 84.)

*Platythelphusa armata* A. Milne-Edwards, Ann. Sci. Nat., Zool. 7<sup>e</sup> sér., iv. (1887) p. 147.

*Platythelphusa armata* Hilgendorf, Deutsch-Ost-Afrika, Bd. iv. Lief. ix. (1898) p. 22.

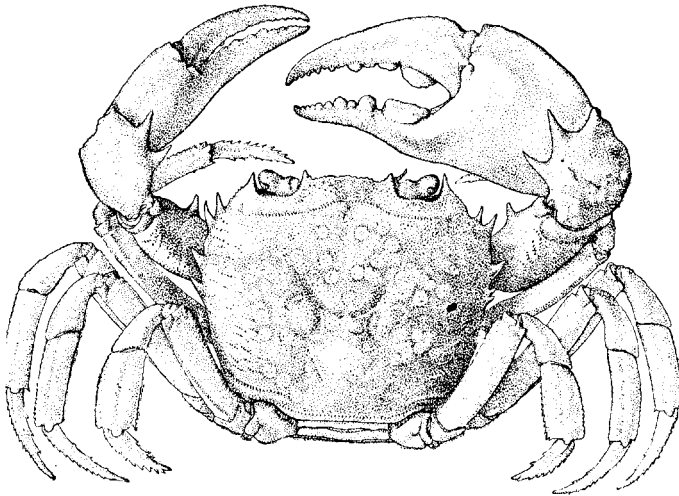
*Platythelphusa armata* Moore, 'The Tanganyika Problem' (London, 1903), p. 286.

*Platythelphusa armata* Rathbun, Nouv. Arch. Mus. Hist. Nat. Paris, 4<sup>e</sup> sér., vii. (1905) p. 269.

*Description*.—Carapace moderately convex, extending laterally more than an orbit's breadth beyond the external orbital angle. The antero-lateral margins differ little in length from the postero-lateral, with which they are almost directly continuous. Number of spines on antero-lateral margin extremely variable, usually four or five, in addition to the spine at the external orbital angle. Regions and sutures fairly well marked. The postero-lateral regions exhibit a series of small slightly oblique granular ridges.

Front less than one-third the width of the carapace, its margin perlated, and with a stout spine at each extremity. Sub-orbital spines short and stout; a small spine on the descending process of the front. Orbits small,  $\cdot 16$  width of carapace; orbital margins perlated. Eyes and peduncles small. Chelipeds in both sexes unequal; merus trigonous, with distally a prominent spine on the anterior margin, and a small spine or tubercle on the ventral margin; carpus with two spines on inner margin and one above the point of articulation with the hand. Hands and fingers somewhat compressed, the dorsal border being keeled and granulated; the ventral border in the larger chela characteristically arcuated at the junction of the pollex. Fingers pointed and slightly hooked; those of the larger chela gape, and have a pair of large flat crushing-teeth proximally, with a series of rather smaller ones distally. In the smaller chela the teeth are fairly uniform and of moderate size. Ambulatory legs of moderate length. Colour, in life, yellowish brown, with irregular blotches of darker brown on the carapace.

Text-fig. 84.

*Platythelphusa armata*, large male.  $\times \frac{2}{3}$ .

Milne-Edwards and Miss Rathbun give the detailed dimensions of an adult female (type specimen), but as we now possess for the first time particulars of males, the measurements of an adult male the largest known specimen are included here. In this individual (text-fig. 84) the size of the larger chela is very striking, the length of the hand and pollex being greater than the whole breadth of the carapace.

Adult male (largest specimen), Moore's collection :	mm.
Length of carapace.....	53.2
Breadth of carapace .....	66.3
Fronto-orbital width .....	40.1
Width of front .....	18.7
Larger chela : greatest length of hand and pollex.	74.3
"    "    greatest height of hand .....	35.8

*Remarks.*—While the chelipeds in both sexes are unequal, it appears that either the right or left may be the larger, quite indiscriminately. The large crushing-teeth are often considerably worn in old specimens, and the spines of carapace and chelipeds become blunt and rounded. This is, in fact, the case with the male specimen which is figured, where it is clear that certain of the spines have lost their original sharpness, but it should be understood that the spines in question are normally very sharp and strong.

A curious feature of the specimens of this Crab is the number of circular blotches which appear on the surface of the carapace and appendages. The marks are approximately round, and seem due to an eating-away of the calcareous matter of these spots, which occur in greater numbers on larger and older specimens. In some cases the fingers of the chelæ have suffered severely, being partially eaten through by this process of erosion. It seems most probable that these blotches are due to the action of boring Alge. A portion of test including such a spot was decalcified, cleared, and mounted in balsam, but showed little structure even then. From a central point, a number of fine processes, or perhaps tubules, could be seen to radiate, but nothing further could be made out.

*Occurrence.*—The locality is given by Milne-Edwards simply as Lake Tanganyika. Moore states\* that he obtained this species only off the west coast of the lake, and in nets and dredges worked in water of about 20 fathoms. The experience of the third Expedition shows that it occurs more widely distributed in the lake, and may be taken in much shallower water than 20 fathoms.

Kasakalawe (south end): a single, rather young specimen, taken under a stone about water-level, at the same time as specimens of *Potamon (Potamonautes) platynotus*.

Mbete (south end): two or three young specimens came on board my dhow clinging to the anchor-chain. The vessel was probably anchored in two or three fathoms of water.

Among a number of specimens of *Platythelphusa maculata*, dredged in 10-15 fathoms, principally at the south end of the lake, are two or three small Crabs belonging to this species.

Vua, on the west coast: a single adult, seen from the dhow crawling about in a foot or two of water, and caught in a hand-net.

North end of the lake: a single specimen not full-grown.

\* *Op. cit.* p. 280.

PLATYTHELPHUSA MACULATA (Cunnington). (Plate XVII. figs. 5 & 6.)

*Limnothelphusa maculata* Cunnington, Proc. Zool. Soc. 1899, p. 698.

*Limnothelphusa maculata* Moore, 'The Tanganyika Problem' (London, 1903), p. 280.

*Limnothelphusa maculata* Rathbun, Nouv. Arch. Mus. Hist. Nat. Paris, 4<sup>e</sup> sér., vii. (1905) p. 269.

As this species is now regarded as falling under the genus *Platythelphusa*, in consequence of the examination of much more extensive material, it becomes evident that it merits a more complete specific description, which accordingly follows.

*Description.* Carapace moderately convex, extending laterally less than an orbit's breadth beyond the external orbital angle. Antero-lateral margins shorter than postero-lateral, with which they are almost directly continuous. Number of spines on antero-lateral margin variable, usually three, in addition to the spine at the external orbital angle. Regions and sutures moderately marked. Postero-lateral regions exhibit a series of small slightly oblique granular ridges. Front more than one-third the width of the carapace, margin perlated, and in extreme cases produced into a small spine at each extremity. Sub-orbital spines little developed: no spine on the descending process of the front. Orbits large,  $\cdot 24$  width of carapace; orbital margins perlated. Eyes and peduncles large. Chelipeds in the male unequal, subequal in the female; merus rather short, trigonous, with distally a sharp spine on the anterior margin; carpus with two spines on inner margin and one above the point of articulation with the hand. Fingers of the larger chela gape considerably, are pointed and slightly hooked, and carry a few larger crushing-teeth proximally, with smaller teeth distally. Fingers of the small chela, and both chela of the female (Plate XVII. fig. 5), distally meet closely in a sharp cutting-edge, while proximally there are uniform teeth of moderate size. Ambulatory legs of moderate length. Colour in life dark brownish grey, with dark brown or reddish spots.

As now there has been obtained quite an extensive series of specimens, some of which are larger than those examined before, it seems worth while to furnish a further list of dimensions, to compare with those given under the original description of this species. As in the case of *P. armata*, the larger chela of old male specimens is of a great size, the length of hand and pollex exceeding the total breadth of the carapace.

Adult male:	mm.
Length of carapace .....	12.9
Breadth of carapace .....	16.4
Fronto-orbital width .....	13.2
Width of front .....	6.1
Larger chela: greatest length of hand and pollex .....	16.9
"    "    greatest height of hand .....	8.7
	19*

Adult female (largest specimen) :	mm.
Length of carapace .....	13.1
Breadth of carapace .....	16.9
Fronto orbital width .....	13.2
Width of front .....	6.1

*Remarks.*—While none of the specimens examined in 1899 carried ova, it is satisfactory, on comparison with this more extensive collection, to find that those regarded as adult were so in reality. Female specimens of approximately the same size as that described, but one of which is ovigerous, while the other carries the already liberated young, occur in the recent collection. Indeed we have further a female with total breadth of only 12.4 mm., but which is nevertheless ovigerous. The average size of the eggs themselves, which are not quite round, is 1.9 × 1.5 mm.

The much smaller size of this species enables it to be distinguished at once from adult specimens of *P. armata*, but, apart from that, the great relative breadth of the front and size of the orbits are differences easily recognised. Among the number of specimens which we now possess there exists considerable individual variation in respect to the development of certain spines, and this accounts for a slight discrepancy which may be noticed between the foregoing description and that given in the first instance. In the original type specimens, the spine on the carpus of the cheliped, above the articulation with the hand, is indicated but slightly, if at all. As it is, however, very well developed in a number of individuals, it is now included among the specific characters. Again, certain of the new specimens exhibit a small spine at each extremity of the front, and have a slight indication of sub-orbital spines, while others show no trace of these features. A more complete description of the fingers of the chelipeds is now given, and from my own observations I can add the coloration during life.

*Occurrence.*—The type specimens described in 1899 were obtained, according to the information supplied me by Mr. Moore, from Kituta Bay (south end), while he had also taken specimens at Niamkolo (south end) and Sumbu on the west coast. The Crabs were said to have been captured in fairly deep water—never less than 60, and from that to 500 feet deep. In his book on Tanganyika, however, Moore states\* that the specimens were obtained in water varying in depth from 500 to 600 feet. He also adds that the Crab occurs throughout the lake. With the latter statement, the experience of the recent Expedition is quite in accord; but whether the original individuals came from such very deep water or not, it is certainly a fact that the species may be found in much shallower regions.

Niamkolo Bay (south end): a large number of specimens

\* *Op. cit.* p. 280.



dredged among shells in about 10-15 fathoms. Also obtained in rather shallower water, but seldom in less than about 8 fathoms.

Pembe (east coast): among shells dredged in about 10 fathoms.

Kirando (east coast), 1/12/04: dredged in about 10 fathoms. Among these, a curiously blotched and not spotted individual.

PLATYTHELPHUSA CONCULCATA, sp. n. (Plate XVII. figs. 2 & 4.)

*Description*.—Carapace extremely flattened, extending laterally less than an orbit's breadth beyond the external orbital angle. The whole body remarkably thin in appearance. Antero-lateral margins shorter than postero-lateral, with which they are almost directly continuous. Three spines on antero-lateral margin, in addition to that at the external orbital angle. Regions and sutures very ill-defined. Lateral regions exhibit a few small granular ridges. Front more than one-third the width of the carapace, margin spinuliferous and with a sharp spine at each extremity. Sub-orbital spines prominent; a small spine on the descending process of the front. Orbits of moderate size,  $\frac{1}{18}$  width of carapace; orbital margins perlated. Eyes and peduncles rather large. Chelipeds in the male subequal; merus trigonous, with distally a sharp spine on the anterior margin, and a small blunt spine on the ventral margin; carpus with two spines on inner margin, two on outer margin, and one above the point of articulation with the hand. Fingers distally meet closely in a sharp cutting-edge, while proximally there are uniform teeth of moderate size. Fingers of the larger chela (Plate XVII. fig. 4) have a few larger teeth proximally. Ambulatory legs long and slender; the anterior margin of the merus, in each case, produced distally into two sharp spines, of which the terminal one is inconspicuous on the first and fourth legs. Colour (in spirit) yellowish brown, with darker reddish-brown spots.

Dimensions as follows:—

Male (probably adult):	mm.
Length of carapace .....	10.0
Breadth of carapace .....	11.9
Fronto-orbital width .....	9.1
Width of front .....	5.0

*Remarks*.—It is unfortunate that we possess only a single specimen of this species, which appears nevertheless to be quite well marked. In size it is still smaller than *P. maculata*, while the much flattened carapace and remarkable thinness of the body (whence the name) at once arrest the attention. The great development of spines is also striking, there being two additional ones on the outer margin of the carpus of the cheliped and the same number on the anterior margin of the merus of the ambulatory legs.

*Occurrence*.—The only specimen obtained was associated with

*P. maculata*, and dredged among shells in 10-15 fathoms of water at the south end of the lake.

### 3. General Remarks.

The principal result of our extended knowledge of the Brachyura of the African lakes is to make still more clear the very special nature of the Crab-fauna of Tanganyika. As is found to be the case in so many different groups of animals, the forms occurring in Tanganyika are for the most part endemic, while those found in the other big lakes are often of wide distribution. There occur in Nyasa, as we have seen, three species of *Potamonantes*, one of which, it is true, is described from that lake only. In the Victoria Nyanza, we find *Potamon* (*Parathelphusa*) *niloticus*, a very widely distributed form, and *P. (Geothelphusa) emini*, also known from Abyssinia. From the Albert Edward Nyanza there comes also a species of *Geothelphusa*. Thus, with the single exception of *P. (Potamonantes) orbitospinus*, from Nyasa, the forms at present known from these big lakes are by no means confined to them.

With Tanganyika it is quite otherwise. There are two species of *Potamonantes*, one of which is not known elsewhere, but beyond this, three species of a unique and remarkable genus wholly restricted to this lake. From the other lakes we have then only representatives of the subgenera of *Potamon*—forms such as are widely distributed in the tropical fresh waters of the Old World. From Tanganyika, while we have some representatives of these normal African types, we have a preponderance of forms perfectly distinct and occurring nowhere else. There is an indication, too, of that richness of the Tanganyika fauna which is so noticeable in some other animal groups. We know of five species of Crabs from Tanganyika, three from Nyasa, and only two from the Victoria Nyanza.

It is necessary to add a few remarks on the affinities of the genus *Platythelphusa*. The species *P. armata* has been considered to exhibit a distinctly marine appearance. Milne Edwards stated in the course of his original description that the Crab bore such a resemblance to certain marine or brackish-water Grapsidae that we might relate it to that group, were it not for the development of the abdomen and the absence of metamorphosis. In his book on 'The Tanganyika Problem,' Moore\* very rightly challenges the value of such a character as the latter to the systematist. If the absence of metamorphosis is the result of a particular habitat, as we have reason to suppose, we ought not to take it into account when we attempt to determine the affinities of a newly-discovered specimen. At the same time it would seem as if the resemblance to the Grapsidae could be only a very superficial one, produced, perhaps, by the more or less quadrilateral shape of the carapace.

\* *Op. cit.* p. 286.

It must be admitted that the considerable development of spines, which we find in all these species, is a feature more commonly found among marine Crabs than among those inhabiting fresh-water, and so would in itself convey a false impression on a casual inspection. But we need not go outside the subfamily of the Potamoninae to find examples of Crabs which are just as "marine looking," as far as the development of spines is concerned. This is true of a number of species of *Parathelphusa*, and when we pass to the other subfamilies of the Potamonidae, we have *Potamocarcinus*, *Vadicia*, and *Bilocarcinus*, all extremely well armed with spines. As with all these genera and subgenera, there can be no doubt that *Platythelphusa*, despite its appearance, finds its nearest allies in this group of forms which are essentially and typically fresh-water in habitat.

It is a matter of more difficulty to decide which of the allied forms are most closely related to *Platythelphusa*. The species now known as *P. maculata* has been stated to be a primitive form\*, on account of the little deflection of the front, the nature of the antennae, and the spine-bearing margins of the carapace. These features are equally characteristic of the other two species of the genus, and do seem to show less specialisation than the deflexed front and inflated gill-chambers of some of the semi-terrestrial species of the subgenus *Potamon*. It is then not with the latter, but near the genus *Hydrothelphusa* and the subgenus *Parathelphusa* that we ought probably to place this distinctive Tanganyikan genus.

The problem of the origin of Lake Tanganyika, about which so much has been said and written, is of course intimately connected with the questions which have just been discussed. If the lake be the modified remains of part of an ancient ocean, we may expect its inhabitants to show both a primitive character and a marine aspect. These, Mr. Moore considers, are exhibited by all the members of his "halolimnic" group, among which are reckoned the species of *Platythelphusa*. It has been shown, however, that this genus has no better claims to a marine origin than other representatives of the family, and at the same time, that while it is not so specialised as certain allied forms which have adopted a partially terrestrial mode of life, neither need it be considered as the most primitive in the group. Still there is little evidence that this form was ever anything but wholly aquatic, and it may have become modified by the truly oceanic conditions prevailing in Tanganyika, until it attained a superficial resemblance to marine types.

In his report on the Macrurous Crustacea of the Expedition, Dr. Calman shows † that they are to be regarded rather as specialised than as primitive in character, and it may be asked

\* Proc. Zool. Soc. 1899, p. 702.

† Proc. Zool. Soc. 1906, p. 201.

why the same is not true of the Brachyura. An explanation is really not far to seek. All the Macrura concerned are wholly aquatic types, while among the Brachyura we have to institute comparisons with forms which have partially accustomed themselves to a terrestrial existence. Such a profound change in habits must produce an effect which, in comparison, would dwarf any modification brought about within the limits of a single medium.

There is gradually being accumulated a mass of information concerning the other animal groups inhabiting Tanganyika, and in nearly every case it is found that the forms are to a large extent endemic and, moreover, very distinct and highly modified. The explanation of this fact will be equally the explanation of the remarkable character and variety of the Tanganyika Crustacea, when compared with that of the other great African lakes. There seems little doubt that it is to be found in a growing divergence taking place in the lake during a prolonged period of isolation.

## EXPLANATION OF THE PLATES.

## PLATE XVI.

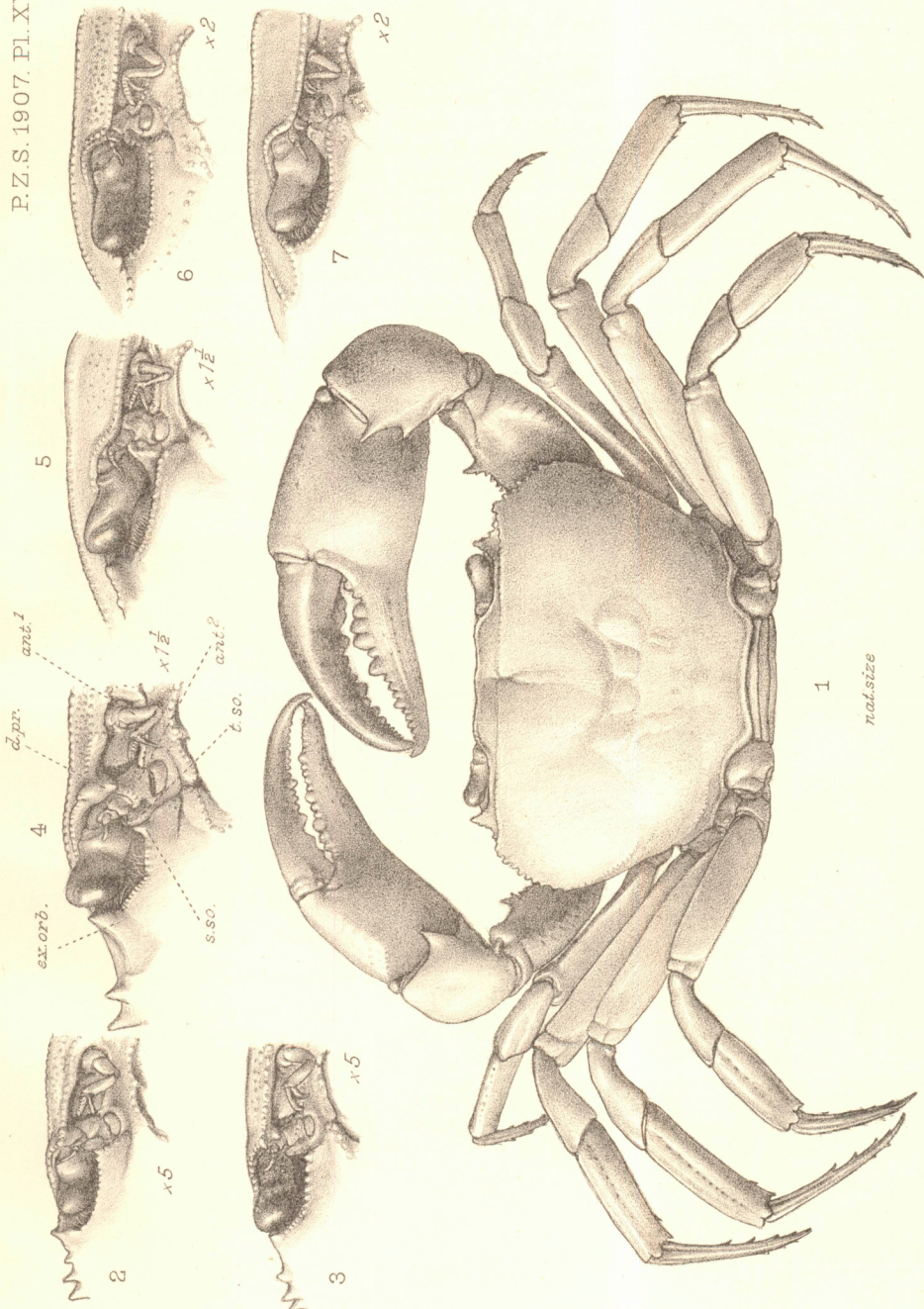
- Fig. 1. *Potamon (Potamonantes) orbitospinus* (p. 259). Adult male, general view from above. Nat. size.  
 Figs. 2-7. Series of figures of *Platylthelphusa* and *Potamon* to show the frontal region and illustrate the relations between the front, descending process, and antenna (p. 267).  
 Fig. 2. *Platylthelphusa maculata*.  $\times 5$ .  
 3. *Platylthelphusa conculeata*.  $\times 5$ .  
 4. *Platylthelphusa armata*.  $\times 1\frac{1}{2}$ .  
 5. *Potamon (Parathelphusa) niloticus*.  $\times 1\frac{1}{2}$ .  
 6. *Potamon (Potamonantes) platynotus*.  $\times 2$ .  
 7. *Potamon (Potamonantes) perlatus*.  $\times 2$ .

## PLATE XVII.

- Fig. 1. *Potamon (Potamonantes) platynotus* (p. 264). Adult female, general view from above. Nat. size.  
 2. *Platylthelphusa conculeata* (p. 273). Male, general view from above.  $\times 3$ .  
 3. *Potamon (Potamonantes) platynotus* (p. 264). Larger chela of adult female, to show nature of dentation.  $\times 1\frac{1}{2}$ .  
 4. *Platylthelphusa conculeata* (p. 273). Larger chela of male, to show nature of dentation.  $\times 5$ .  
 5. *Platylthelphusa maculata* (p. 271). Chela of female, to show nature of dentation.  $\times 5$ .  
 6. *Platylthelphusa maculata* (p. 271). Abdominal region of a female, from below, to show the large size of the abdomen, and the degree to which it covers the sternum.  $\times 3$ .

## Reference Letters.

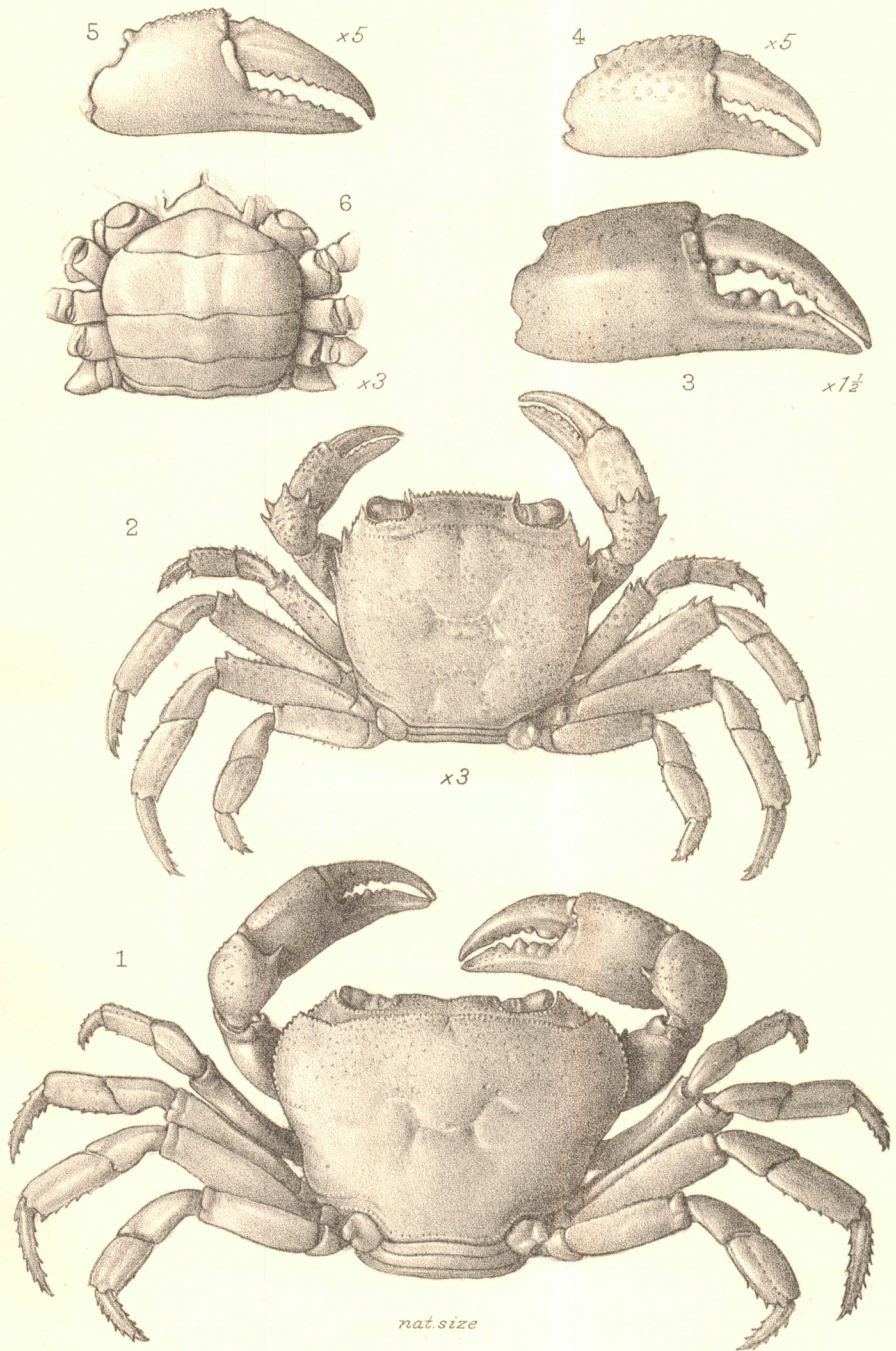
<i>ant.</i> 1. Antennule.		<i>ex.orb.</i> External orbital spine.
<i>ant.</i> 2. Antenna (second segment).		<i>s.so.</i> Sub-orbital spine.
<i>d.pr.</i> Descending process of front.		<i>t.so.</i> Sub-ocular tooth.



G.M. Woodward del. et lith.

West, Newman imp.

1. POTAMON (POTAMONAUTES) ORBITOSPINUS.  
 2-7. ANTENNAL REGION OF VARIOUS POTAMONIDAE.



G.M. Woodward del. et lith.

West, Newman imp.

1 & 3, POTAMON (POTAMONAUTES) PLATYNOTUS.  
2 & 4, PLATYTHELPHUSA CONCLICATA.  
5 & 6 PLATYTHELPHUSA MACULATA.