

Article VIII.—THE BRACHYURAN CRABS COLLECTED
BY THE AMERICAN MUSEUM CONGO EXPEDITION,
1909–1915¹

BY MARY J. RATHBUN

ECOLOGICAL AND OTHER NOTES² BY HERBERT LANG

PLATES XV TO LXIV, 22 TEXT FIGURES, 1 MAP

INTRODUCTION

The collection of brachyuran crustaceans (nearly 3,000 specimens) obtained by Messrs. Lang and Chapin is a large one, especially in relation to the brief period devoted to its acquisition. Although the number of marine, brackish-water, and terrestrial species obtained is only about a third of the total number known to inhabit the western coast of Africa,³ or that faunal area extending from Senegal to Angola, yet the large series of many of the species enables us to define them with greater accuracy. Furthermore, the occurrence at the mouth of the Congo means in many cases an extension of the previously known range, and also adds five species to the marine fauna of the continent of Africa; two of these, *Geograpsus lividus* and *Pachygrapsus gracilis*, are American species; two others, *Menippe nanus* and *Cyclograpsus occidentalis*, were described from the Cape Verde Islands, while the third represents a new species of the extensive and unusually plastic genus *Sesarma*, viz., *S. (Chiromantes) alberti*.⁴ Five new species were found among the river crabs, or Potamonidæ.

Plates XV, XVI, XVII, and LV to LXIV are from photographs made in the field by Mr. Herbert Lang. Plates XL and LIV were borrowed from the U. S. National Museum. Plates XVIII to XX, XXIII to XXXVI, and XLII are from photographs taken by Mr. Clarence R. Shoemaker and retouched by Mr. Seward H. Rathbun. The remaining plates were photographed at the American Museum. The drawings of the text figures were made by Miss Violet Dandridge, except Fig. 1c by Mr. Seward H. Rathbun.

¹Scientific Results of The American Museum Congo Expedition. General Invertebrate Zoology, No. 6.

²These notes are indicated in the text by quotation marks and Mr. Lang's initials. Short field notes by Mr. Lang are also given in connection with the locality records.

³A list of the decapod crustaceans of western Africa between 16° north latitude and 17° south latitude, including the fauna not only of the coast but of the fresh waters tributary to the coast and of the neighboring islands, was published in 1900 in the Proceedings of the United States National Museum, XXII, No. 1199, pp. 271–316.

⁴Named for the King of the Belgians.

NEW SPECIES, WITH THEIR TYPE LOCALITIES

	PAGE
<i>Potamon (Potamonautes) stanleyensis</i> . Stanleyville.....	415
“ (<i>Geothelphusa</i>) <i>congoënsis</i> . Gamangui.....	422
“ “ <i>perparvus</i> . Stanleyville.....	425
“ (<i>Acanthothelphusa</i>) <i>faradjensis</i> . Faradje.....	428
“ “ <i>langi</i> . Stanleyville.....	430
<i>Sesarma (Chiromantes) alberti</i> . Malela.....	448

LIST OF SPECIES TAKEN BY THE AMERICAN MUSEUM CONGO
EXPEDITION

<i>Dromia atlantica</i> Doflein.....	393
<i>Callinectes marginatus</i> (A. Milne Edwards).....	395
“ <i>gladiator</i> Benedict.....	397
“ <i>latimanus</i> Rathbun.....	398
<i>Thalamita africana</i> Miers.....	402
<i>Potamon (Potamonautes) floweri</i> de Man.....	406
“ “ <i>dybowskii</i> Rathbun.....	410
“ “ <i>lirrangensis</i> Rathbun.....	413
“ “ <i>stanleyensis</i> , new species.....	415
“ (<i>Potamon</i>) <i>ballayi</i> (A. Milne Edwards).....	419
“ (<i>Geothelphusa</i>) <i>congoënsis</i> , new species.....	422
“ “ <i>perparvus</i> , new species.....	425
“ (<i>Acanthothelphusa</i>) <i>faradjensis</i> , new species.....	428
“ “ <i>langi</i> , new species.....	430
<i>Erimetopus brazzæ</i> (A. Milne Edwards).....	433
<i>Deckenia mitis</i> Hilgendorf.....	434
<i>Menippe nanus</i> A. Milne Edwards and Bouvier.....	436
<i>Pilumnus verrucosipes</i> Stimpson.....	437
<i>Panopeus africanus</i> A. Milne Edwards.....	438
<i>Eurypanopeus blanchardi</i> (A. Milne Edwards)?.....	440
<i>Grapsus grapsus</i> (Linnaeus).....	441
<i>Geograpsus lividus</i> (H. Milne Edwards).....	442
<i>Goniopsis cruentata</i> (Latreille).....	443
<i>Pachygrapsus transversus</i> (Gibbes).....	444
“ <i>gracilis</i> (Saussure).....	445
<i>Sesarma (Chiromantes) africanum</i> H. Milne Edwards.....	446
“ “ <i>alberti</i> , new species.....	448
“ (<i>Holometopus</i>) <i>büttikoferi</i> de Man.....	449
“ “ <i>angolense</i> Brito Capello.....	451
“ “ <i>elegans</i> Herklots.....	453
<i>Sarmatium curvatum</i> (H. Milne Edwards).....	454
<i>Cyclograpsus occidentalis</i> A. Milne Edwards.....	455
<i>Cardisoma armatum</i> Herklots.....	456
<i>Ocypode ippeus</i> Olivier.....	461
“ <i>africana</i> de Man.....	462
<i>Uca tangeri</i> (Eydoux).....	465
<i>Pisa carinimana</i> Miers.....	466

LIST OF LOCALITIES, WITH NAMES OF THE SPECIES TAKEN AT EACH

Avakubi	Libreville, Gaboon
<i>Potamon (Potamonautes) dybowskii</i>	<i>Potamon (Potamonautes) floweri</i>
Bafwabaka	“ “ <i>dybowskii</i>
<i>Potamon (Potamonautes) dybowskii</i>	“ (<i>Geothelphusa</i>) <i>congoënsis</i>
“ (<i>Geothelphusa</i>) <i>congoënsis</i>	<i>Sesarma (Chiromantes) africanum</i>
Bafwamoko	Lopez (Cape), French Congo
<i>Potamon (Potamonautes) dybowskii</i>	<i>Ocypode ippeus</i>
“ “ <i>stanleyensis</i>	Malela
Bafwasende	<i>Sesarma (Chiromantes) alberti</i>
<i>Potamon (Potamonautes) dybowskii</i>	“ (<i>Holometopus</i>) <i>büttikoferi</i>
“ (<i>Geothelphusa</i>) <i>congoënsis</i>	“ “ <i>angolense</i>
Banana	<i>Sarmatium curvatum</i>
<i>Callinectes marginatus</i>	<i>Cardisoma armatum</i>
“ <i>gladiator</i>	Moanda
“ <i>latimanus</i>	<i>Callinectes marginatus</i>
<i>Potamon (Potamonautes) floweri</i>	<i>Grapsus grapsus</i>
<i>Panopeus africanus</i>	<i>Goniopsis cruentata</i>
<i>Grapsus grapsus</i>	<i>Sesarma (Holometopus) elegans</i>
<i>Geograpsus lividus</i>	<i>Sarmatium curvatum</i>
<i>Goniopsis cruentata</i>	<i>Cardisoma armatum</i>
<i>Pachygrapsus transversus</i>	<i>Ocypode ippeus</i>
“ <i>gracilis</i>	“ <i>africana</i>
<i>Sesarma (Chiromantes) africanum</i>	<i>Uca tangeri</i>
“ “ <i>alberti</i>	Nepoko River (Affluents of), near
“ (<i>Holometopus</i>) <i>büttikoferi</i>	Gamangui (Ituri Forest)
“ “ <i>elegans</i>	<i>Potamon (Potamonautes) floweri</i>
<i>Sarmatium curvatum</i>	“ “ <i>dybowskii</i>
<i>Cyclograpsus occidentalis</i>	“ (<i>Geothelphusa</i>) <i>congoënsis</i>
<i>Cardisoma armatum</i>	Ngayu
<i>Ocypode ippeus</i>	<i>Potamon (Potamonautes) floweri</i>
“ <i>africana</i>	“ “ <i>dybowskii</i>
<i>Uca tangeri</i>	Padron Point
Batama	<i>Menippe nanus</i>
<i>Potamon (Potamonautes) dybowskii</i>	Poko
Comarock (River near), Athi Plains,	<i>Potamon (Potamonautes) floweri</i>
British East Africa	“ “ <i>dybowskii</i>
<i>Deckenia mitis</i>	“ (<i>Geothelphusa</i>) <i>congoënsis</i>
Faradje	San Antonio, Angola
<i>Potamon (Potamonautes) floweri</i>	<i>Callinectes gladiator</i>
“ (<i>Acanthothelphusa</i>) <i>faradjensis</i>	<i>Eurypanopeus blanchardi</i> ?
Garamba	<i>Goniopsis cruentata</i>
<i>Potamon (Potamonautes) floweri</i>	<i>Pachygrapsus gracilis</i>
Leopoldville	<i>Sesarma (Chiromantes) africanum</i>
<i>Potamon (Acanthothelphusa) langi</i>	“ “ <i>alberti</i>
<i>Erimetopus brazze</i>	“ (<i>Holometopus</i>) <i>büttikoferi</i>
	“ “ <i>elegans</i>

<i>Sarmatium curvatum</i>	<i>Pachygrapsus transversus</i>
<i>Ocypode ippeus</i>	<i>Pisa carinimana</i>
" <i>africana</i>	Tshopo River (Affluents of), near Stanleyville
<i>Uca tangeri</i>	
<i>Pisa carinimana</i>	<i>Potamon (Potamonautes) floweri</i>
Stanleyville	" " <i>dybowskii</i>
<i>Potamon (Potamonautes) dybowskii</i>	" " <i>stanleyensis</i>
" " <i>lirrangensis</i>	" (Potamon) <i>ballayi</i>
" " <i>stanleyensis</i>	" (Geothelphusa) <i>congoensis</i>
" (Potamon) <i>ballayi</i>	" " <i>perparvus</i>
" (Geothelphusa) <i>perparvus</i>	Vankereckhovenville
" (Acanthothelphusa) <i>langi</i>	<i>Potamon (Potamonautes) floweri</i>
St. Paul de Loanda, Angola	" (Acanthothelphusa) <i>faradjensis</i>
<i>Dromia atlantica</i>	Yakuluku
<i>Callinectes marginatus</i>	<i>Potamon (Potamonautes) floweri</i>
<i>Thalamita africana</i>	Zambi
<i>Pilumnus verrucosipes</i>	<i>Sesarma (Holometopus) büttikoferi</i>
<i>Panopeus africanus</i>	" " <i>angolense</i>

APPROXIMATE LOCATION OF PLACES MENTIONED IN THIS PAPER

Albert Edward L.—0° to 0° 30' S., 29° 30' E.	Chinchoxo.—5° 15' S., 12° 15' E.
Aruwimi R.—1° 20' N., 27° 40' E.	Comarock, Athi Plains.—1° 20' S., 37° 5' E.
Assinie.—5° N., 3° 20' W.	Dakar.—14° 40' N., 17° 35' W.
Avakubi.—1° 20' N., 27° 40' E.	Daressalaam.—6° 50' S., 39° 15' E.
Bafwabaka.—2° 10' N., 27° 50' E.	Dungu R.—4° 40' N., 28° 35' to 30° 40' E.
Bafwamoko.—0° 40' N., 26° 55' E.	Elmina.—5° 5' N., 1° 30' W.
Bafwasende.—1° 10' N., 27° 15' E.	Faradje.—3° 40' N., 29° 40' E.
Bahr-el-Djebel.—7° 30' to 9° 30' N., 30° 15' to 30° 40' E.	Gamangui.—2° 10' N., 27° 20' E.
Bahr-el-Gebel, see Bahr-el-Djebel.	Ganschü, see Nganchü.
Banana.—6° S., 12° 20' E.	Garamba.—4° 10' N., 29° 40' E.
Banana Creek.—6° S., 12° 25' to 12° 35' E.	Gorée Bay.—14° 35' N., 17° 30' W.
Bangui.—4° 25' N., 18° 35' E.	Hippopotamus Island.—5° 55' S., 12° 50' E.
Batama.—1° N., 26° 40' E.	Ituri R.—1° 30' N., 26° to 30° E.
Benguela.—12° 30' S., 13° 20' E.	Katala.—6° S., 12° 45' E.
Beyah R., Elmina, see Elmina.	Kituri, Upper Lualaba.—5° 40' S., 26° 55' E.
Bird Island.—5° 55' S., 12° 55' E.	Koloka.—3° 5' N., 24° 35' E.
Boma.—5° 50' S., 13° 10' E.	Kunga.—5° 55' S., 12° 35' E.
Bomokandi R.—3° 45' to 2° 50' N., 26° 10' to 29° 45' E.	Kwamouth.—3° 20' S., 16° 10' E.
Boutry.—4° 55' N., 1° 50' W.	
Bulabemba.—6° 3' S., 12° 28' E.	
Bulikoko Island.—6° S., 12° 45' E.	
Cape Lopez.—0° 40' S., 8° 45' E.	

- Lagos.—6° 30' N., 3° 25' E.
 Landana.—5° 15' S., 12° 15' E.
 Leopoldville.—4° 25' S., 15° 20' E.
 Libreville.—0° 25' N., 9° 25' E.
 Lindi R.—1° 25' N. to 0° 25' S., 25° 5' to 29° E.
 Liranga.—0° 45' S., 17° 45' E.
 Lobito Bay.—12° 25' S., 13° 25' E.
 Lualaba R.—1° to 12° S., 25° to 27° E.
- Malela.—6° S., 12° 40' E.
 Matadi.—5° 50' S., 13° 35' E.
 Moanda.—5° 55' S., 12° 25' E.
 Moanda R., see Moanda.
 Mombasa.—4° S., 39° 50' E.
 Monrovia.—6° 30' N., 10° 50' W.
 Muserra.—7° 25' S., 12° 55' E.
- Nairobi.—1° 5' S., 36° 50' E.
 Nemlao.—5° 55' S., 12° 30' E.
 Nepoko R.—2° 20' to 1° 35' N., 27° 35' to 29° 20' E.
 Netona.—5° 55' S., 12° 30' E.
 Nganchouno, see Nganchu.
 Nganchu.—3° 18' S., 16° 6' E.
 Ngancin, see Nganchu.
 Ngayu.—1° 40' N., 27° 40' E.
- Padron Point.—6° 5' S., 12° 50' E.
 Plettenbergs Bay.—34° S., 23° 15' E.
 Poko.—3° 10' N., 26° 50' E.
- Ponta da Lenha.—6° S., 12° 45' E.
- Rock Spring, Monrovia, see Monrovia.
 Ruwenzori Mt.—0° 30' N., 29° 50' E.
- San Antonio.—6° 10' S., 12° 20' E.
 Shiloango R.—5° S., 12° to 13° E.
 Simons Bay.—34° 10' S., 18° 25' E.
 Spring Rock, Monrovia, see Monrovia.
 Stanley Pool.—4° 15' S., 15° 30' E.
 Stanleyville.—0° 30' N., 25° 15' E.
 St. Paul de Loanda.—8° 55' S., 13° 10' E.
- Tanga.—5° 5' S., 39° 5' E.
 Tanganyika L.—3° to 9° S., 29° to 31° E.
 Tshopo R., see Stanleyville.
- Ubangi R.—0° to 5° N., 18° to 23° E.
 Uele R.—3° 30' N., 23° to 30° E.
- Vankerckhovensville.—3° 20' N., 29° 20' E.
- Wembere Steppe.—4° 10' S., 34° 15' E.
- Yakuluku.—4° 20' N., 28° 50' E.
 Yei R.—6° 35' to 3° 50' N., 30° 20' to 30° 45' E.
- Zambi.—6° S., 12° 50' E.

CALLINECTES FROM THE MOUTH OF THE CONGO

Among the species from the mouth of the Congo, those of the genus *Callinectes* are the most important in the collection, as they have been hitherto little known. Four species inhabit the West African coast. One was discovered more than a century ago during the earliest expedition to the Congo, for in Appendix No. IV to the 'Narrative of an Expedition to explore the River Zaire, usually called the Congo, in South Africa, in 1816, under the direction of Captain J. K. Tuckey, R. N.,' London, 1818, Leach says, under *Lupa* [= *Neptunus* of authors, with which *Callinectes* was early combined]: "Of this genus three new species were discovered, all of which belong to that section in which the hinder lateral spine of the shell is very much elongated." Leach never published descriptions of these species but some specimens labeled by him are in the British Mu-

seum; his *Lupa smythiana* is identical with *Callinectes gladiator*, while his *L. cranchiana* is not a *Callinectes*, but is equivalent to *Portunus* (= *Neptunus*) *sayi*, and the identity of his third species is unknown.¹

Three species of *Callinectes* are present and are well represented in the American Museum collection; a fourth is figured in color by A. Milne Edwards and Bouvier, 1900,² and by Gruvel in 1912,³ under the name of "*Callinectes diacanthus* var. *africanus*." This seems to be more closely related to *C. sapidus* (= *hastatus*), the common edible crab of the Atlantic coast of America, than to any other species; it has only two teeth instead of four on the frontal margin between the antennæ, and the shape of all the teeth and spines and the disposition of the granules are similar to those of *C. sapidus*. On the other hand, the intramedial region is shorter, as are the chelipeds also.⁴ The writer doubts that the name "*africanus*" is correctly applied to this form. *C. africanus* was first described by A. Milne Edwards⁵ in 1879 from the Cape Verde Islands. In 1896 the writer examined in Paris what she supposed were the type specimens of *africanus*, although they were not labeled "types," and came to the conclusion that they were synonymous with *marginatus* and *larratus*.

THE LAND CRABS, OR CARDISOMAS

The bulkiest part of the collection is formed by the land crabs, of which 120 specimens were collected, enough to demonstrate that certain differences between the African species, *Cardisoma armatum*, and the American species, *C. guanhumi*, are constant. It has not yet, however, been proved that *armatum* is the sole representative of the genus in western Africa, as it is claimed by some authors that the true *guanhumi* does exist there.

THE RIVER CRABS, OR POTAMONIDÆ

By far the most important part of the results of the Museum's expedition, in the line of decapods, is the group of river crabs (Potamoni-dæ) which inhabit the Congo and its tributaries and their banks.

¹This information has been obtained through Dr. W. T. Calman who has kindly examined such of Leach's specimens as remain in the British Museum.

²Expéd. Sci. du Travailleur et du Talisman, 1880-1883, Crust. Déc., 1ère partie, Paris, p. 71, Pl. iv, fig. 5.

³Ann. Inst. Océanog., V, fasc. 1, pp. 5, 6 and 11, Pl. II, fig. 1.

⁴May not the specimen found in a basin at Rochefort, France (See Bouvier, 1901, in Bull. Mus. Paris, VII, p. 16) be this species and have emigrated from the West African instead of the American coast?

⁵1879, Crust. Rég. Mex., p. 229.

Distribution of African River Crabs

Half of the African species of the family Potamonidæ are referable to the subgenus *Potamonantes* of the genus *Potamon*. This subgenus is said to be restricted to Africa, but *Potamon fruhstorferi* Balss,¹ from Annam, French Indo-China, has every indication of belonging to *Potamonantes* and was placed in that subgenus by its author.

Potamon (Geothelphusa) ranges from western Africa to eastern Africa, including Madagascar (*P. (G.) ankaraharæ* Nobili),² to northern Africa, and through southern Asia (Indian peninsula excluded) to Japan; Australia (?).

Potamon, the typical subgenus of *Potamon*, is scantily represented on the continent of Africa, although Madagascar yields a number of species. Two typical species inhabit northern and northeastern Africa respectively and extend, one into southern Europe, the other into western Asia. The three Potamons of middle Africa (*didieri*, *nigrensis*, and *ballayi*) are all atypical and have much in common, the first and second, with *Potamonantes*, the third with *Geothelphusa*.

Acanthothelphusa, one of the subgenera of spined Potamons, is known from northeastern and middle Africa and southern Asia (peninsular India excepted). Seven species inhabit the Congo district; another (*niloticus*) extends from Egypt to British East Africa; still another (*chaperi*) inhabits Assinie on the Ivory Coast; while *antongilensis* is restricted to the island of Madagascar.

Platythelphusa (three species) is peculiar to Lake Tanganyika.

Hydrothelphusa (one species) is restricted to Madagascar.

Erimetopus (one species) inhabits the Congo.

Of the genus *Deckenia*, two species are found in East Africa, one in the Seychelles.

Cylindrotelphusa, of the subfamily Gecarcinucinae, is said by Alcock³ to live in peninsular India and New Guinea; two West African species should be referred to the genus, *C. macropus* from Liberia and *C. perrieri* from the Congo.⁴

¹1914, Zool. Jahrb., Syst., XXXVII, p. 403, text-figs. A, B, C, Pl. xv, fig. 2.

²1906, Boll. Mus. Zool. Anat. Torino, XXI, No. 532 [pp. 1-4], text-figs. A-C.

³1910, Rec. Indian Mus., V, p. 259.

⁴Bouvier, 1917, Comptes Rendus Acad. Sci. Paris, November 12, CLXV, p. 658, doubts the locality of *perrieri* because of the absence of a collector's name from the label and would consider *Cylindrotelphusa* wholly Indo-Australian. The occurrence of *C. macropus* in Liberia is, however, indisputable.

List of Congo Potamonidæ

SUBFAMILY POTAMONINÆ

Potamon (Potamonautes)

- africanus* (A. Milne Edwards). Cameroon; French Congo.
aloyssi-sabaudiaë Nobili. Mt. Ruwenzori.
aubryi (H. Milne Edwards). Guinea; Cameroon; French and Belgian Congo.
decazei (A. Milne Edwards). Togo; Cameroon; Island of Fernando Po; French Congo.
**dybowskii* Rathbun. French and Belgian Congo.
**floweri* de Man. Soudan; French and Belgian Congo.
**lirrangensis* Rathbun. Belgian Congo.
tueboensis Rathbun. Belgian Congo.
pobeguini Rathbun. Spanish Guinea; Cameroon (?); French Congo.
regnieri Rathbun. French Congo.
**stanleyensis*, new species. Belgian Congo.

Potamon (Potamon)

- *ballayi* (A. Milne Edwards). French and Belgian Congo.
didieri Rathbun. Abyssinia; British East Africa; Belgian Congo.

Potamon (Geothelphusa)

- *congoënsis*, new species. Belgian Congo.
emini (Hilgendorf). Abyssinia; British East Africa; German East Africa; Belgian Congo.
**perparvus*, new species. Belgian Congo.

Potamon (Acanthothelphusa)

- campi* Rathbun. Belgian Congo.
chavanesii (A. Milne Edwards). Cameroon; French and Belgian Congo.
**faradjensis*, new species. Belgian Congo.
**langi*, new species. Belgian Congo.
marchei (Rathbun). French Congo.
pæcilei (A. Milne Edwards). French Congo.
schubotzi Balss. Belgian Congo.
*Erimetopus *brazzæ* (A. Milne Edwards). French and Belgian Congo.

SUBFAMILY GECARCINUCINÆ

- Cylindrotelphusa perrieri* (Rathbun). Congo.

Relations of Congo Potamonidæ

Two species from the above list do not belong to the fauna of the Congo Valley, but are in the Belgian Congo; one of these (*aloyssi-sabaudiaë*) occurs only at Mt. Ruwenzori, and one (*emini*) in Lake Albert-Edward-Nyanza, as well as farther east. Of the twenty-five species enumerated, seventeen are restricted to the valley of the Congo and its tributaries. Of those with wider range, four species occupy other watercourses farther up the western coast of Africa, one (*P. decazei*) reach-

*Represented in the American Museum collection.

ing as far north as Togo, Guinea. Two species, only, show a connection between the Congo and northeastern or eastern Africa; the distribution of *P. floweri* in the upper Nile Valley and throughout west-central Africa is comparable to the distribution of many (nearly 100) species of fresh-water fishes. (See Nichols and Griscom, 1917, Bull. Amer. Mus. Nat. Hist., XXXVII, p. 740.) *P. didieri* of the upper Congo has been found elsewhere only in British East Africa (Nairobi) and Abyssinia.

GENERAL ECOLOGY OF THE CONGO ESTUARY¹

"The crabs from the Lower Congo dealt with in this paper were collected chiefly at Zambé, Banana, Bulabemba, and in mangrove swamps north and east as far as Moanda, Kunga, and Malela. Fortunately I was in this region at the most opportune time, the dry season, from the middle of June to the beginning of September 1915. Then the crabs were more concentrated in places still retaining sufficient moisture, for the water was at its lowest and rain scarce. A week was spent on the southern, or Portuguese, side of the river, near Padron Point and San Antonio, where the conditions seemed less favorable for crabs.

"From the hillside just north of Banana, at the edge of the Savannah, one can embrace with a glance the great estuary of the Congo (Map, p. 388). Along both sides of the main channel extend great areas of low-lying mangrove swamps, separated into many islands and inundated by the tides (Pls. LVIII, LIX, and LX). The biota of the immediate neighborhood of the river proper, practically to the mouth, is that of fresh water. At Zambé, where conditions are not brackish enough for the growth of mangroves, we found on the trip down-river that the crabs commenced to be common and gregarious in some of the papyrus and reed swamps on nearby islands.

"The mouth of the river is only six miles wide and, naturally, the force of the current is so great that most minor forms of marine life have no chance to flourish along its ruthless course. Sixty miles from the coast the billowing brown waters of the Congo still pollute the transparent emerald of the ocean. Hardly weakened by estuarine shallows, the mighty river, in a single broad channel, drives its silt-bearing floods like a huge wedge into the crystal-clear, white-crested deep. Near Bulabemba Island even ocean steamers are rocked as by a heavy gale, due to the powerful struggle of over half a billion gallons of water dashed every minute against the Atlantic surf.

¹In the preparation of the ecological notes relating to the estuary of the Congo and of the captions to Plates LV to LXIV, I have had the benefit of the criticism and advice of Dr. J. Bequaert, who has made an extensive botanical survey of the Lower Congo.—H. L.

"Banana peninsula is a mere sandy tongue less than a mile long and only a few hundred yards wide. Sand bars stretching southward into the mouth of the Congo practically shut off the waves of the Atlantic at this point, and the result is a rather quiet bay (Pl. LVI, fig. 1). Here the salinity of the water is slightly reduced and the environmental conditions are sufficiently different from those on the surf-beaten Atlantic shores to allow a distinctive fauna both on the beach and in the water. To the southeast, Bulabemba Island and adjoining mangrove swamps form a divide between the rush of fresh water in the main channel and the creeks of various salinity. In certain parts of the more extensive mangrove swamps the ground is densely pitted with thousands of holes, the entrances to the burrows of the crabs. One or two species generally predominate, though naturally a few other forms may be met with in suitable places.

"The chief ecological conditions associated with different kinds of crabs at the mouth of the Congo or a few miles up-river are more varied than a superficial estimate might promise. They include fresh or salt water or a mixture of both; quiet, shallow coves or wave-battered Atlantic shores; mangrove jungles, *Raphia* swamps and tangles of *Pandanus* roots; firm bases of papyrus and grass tussocks (Pl. LXI) tunneled as runways and resting places; gaps in stone heaps or the recesses in laterite boulders; a thin line of drift an inch high; decayed hollow shoots and branches still covered with bark; firm sand flats submerged at high tide (Pl. LV, fig. 2); the water-soaked level several feet below the burning hot sand or beneath mud baked as hard as rock; the oozy mire or morasses so deep that man becomes helpless in them; the tough, peat-like mass the mangroves have built up; impenetrable stockades of well-anchored prop-roots (Pl. LVI, fig. 2); the lofty outlook above the water on branch or root; and, not the least of them, the water, a safe resort making escape doubly easy.

"Whenever ecological conditions of a particular type are prevalent, crabs of one kind are apt to be more common and are often gregarious. The naturalist must then be satisfied with quantitative results rather than qualitative, for no extraordinary variety of species could be expected in sites which are fairly uniform. Typical of this are the mangrove swamps, though mud is by no means the only habitable medium they offer. A considerable amount of slowly decaying vegetable matter is held fast among the roots, and other plants also secure a firm hold. The ever recurring tides with the various changes in the level of the water, in both dry and wet seasons, must keep some of the crabs busy to remain

Stanleyville, April 1915, about 515 (49 ovig. ♀). Avakubi, October 7, 1909, about 200 (7 ovig.). Niangara, November 1909, 11 ♂, 19 ♀. Faradje, January 1913, about 141 (19 ovig.).

Beni lies to the east of the Congo-Nile divide. Lenz's statement (in the tabular summary of the distribution of his material) places his *C. t.* var. *breviatus* 20 kilometers northwest of Beni. An orographical map published in 1918 by the Royal Geographical Society of London shows that a river lying in that direction might well belong to the Congo watershed, although the map accompanying Schubotz's preliminary account of the German Central African Expedition¹ seems to place these specimens within the Nile watershed, an occurrence of considerable interest with respect to the geographical distribution of the Crustacea of the Congo region.

MEASUREMENTS.—Of the largest specimen observed, a female from Stanleyville: length of rostrum, of which the extreme tip is missing, 5.5; preorbital length of antennular peduncle, 4.25; post-orbital length of carapace, 5.5; depth of carapace, 4; length of abdomen about 18; length of telson exclusive of terminal spines, 3.5 mm.

DESCRIPTION.—A much more variable species than hitherto realized by authors. The rostrum varies in length, reaching from about as far as the middle of the last segment of the antennular peduncle to, in exceptional cases, twice the length of the last segment beyond the end of the antennular peduncle. Most specimens seem to have the rostrum a little longer than the antennular peduncle. The rostrum varies in both shape and direction; sometimes it is directed a little downwards proximally, while distally it is ascendant with a very slightly curved tip; in some specimens the upper outline is slightly convex, but in many it is quite straight. The length of the free portion of the rostrum, as compared to its depth, varies from about 5 to 8.3 times as long as deep, not including the dorsal spines.

Of the 153 specimens tabulated below the dorsal rostral teeth range from 10 to 29 in number; of these from 2 to 6 may be on the carapace, though in the specimens with 28 teeth but 2, and in one with 29 teeth, but 3 teeth were situated on the carapace. The more usual number of dorsal rostral teeth lies between 14 and 22, the greater number of specimens having 17, 18, or 19 teeth; of these the greater number of specimens have 3 teeth on the carapace. Below, the teeth vary from 3 to 17 in number; the more usual range, however, being 6 to 12; the greater number of specimens had 7, 8 or 9. The tooth-free portion of the rostrum varies considerably above and below. In any large series about 50 per cent of the specimens will have the unarmed distal portion well marked, occupying dorsally in one case more than one-third the length of the free portion of the rostrum; in the remaining 50 per cent the teeth, above and below, run quite close to the tip, practically eliminating what might be called a tooth-free portion.

¹1909, Sitzb. Gesell. Naturf. Freunde Berlin, pp. 383-400, 1 map.

"The halophilous shore vegetation, which generally creeps up to or across the line of drift, appears more varied on the Angolan side. There, too, beyond the reach of salt water, dense groves of *Borassus* palms and *Sansevieria* are common (Pl. LV, fig. 1). On and near Banana peninsula *Phoenix* palms are abundant (Pl. LVII, fig. 1) and these sites are generally frequented by land crabs only, whereas several species of shore crabs live on the nearby sandy beach.

"Coral reefs are unknown along the Belgian shore but on the Angolan side several miles south of Padron Point such a formation commences, introducing a richer crustacean and molluscan fauna, just as is the case with the small field of laterite blocks below the lighthouse at Moanda near the base of the precipitous wall of red laterite soil (Pl. LVII, fig. 2).

"Though mangroves are common in similar tropical regions, in the Congo estuary they are especially vigorous and seem to rival those of Malaysia in size. The gigantic trunks attain seventy-five feet in height and more than two feet in diameter, and are cut at Malela into splendid boards and beams. In the mangrove swamps a considerable number of creeks of various widths make access by rowboat easy. At high tide, from a distance, the mass of dark green leaves glistening in the sun, the gray and brown streaks of aerial roots, and portions of trunks give the impression of a uniformly luxuriant growth of bushes and forests (Pl. LVIII). At low tide, the tangle of stilt-roots, anchoring the whole firmly into the mud, are forced on the attention (Pl. LIX). They help consolidate, or at least hold fast, the slush, débris, and sand, and thereby offer a home of perfect safety to millions of crabs that need not burrow far. The prop-roots of these extensive and often dense mangrove forests, and those of *Pandanus* (Pl. LXII), tangled and entwined, form an impenetrable stockade often fringed by *Raphia* palms (Pl. LX, fig. 1). Here at low tide the soft miry edges and slanting roots are the preferred hunting grounds of small troops of walking fish (*Periophthalmus*).

"According to Dr. Bequaert, the common mangrove of the Congo swamps is the *Rhizophora Mangle* Linnæus. Wherever at high tide the ground is regularly covered by salt or brackish water, they flourish together with their halophilous associates, generally not within the reach of heavy waves. On the Belgian shore the mangrove belt extends about 18 miles up-stream from Banana. On the Angolan side the considerably narrower strip reaches farther west and extends up-river about 28 miles, but the mangroves do not seem to attain as great a size as on the Belgian shore; this is true also of the patches at the mouth of the Moanda and Shiloango Rivers." (H. L.)

COLLECTING AND PRESERVING

"The greatest drawback in collecting crabs is the habit they have of shedding their limbs the very instant they are caught. In the field one usually kills them by injecting beneath their recurved abdomen some preserving fluid, which is most effective when forced into the slightly raised portion along the center. But too often in the creature's last spasms, chelipeds and legs are snapped off at certain points beyond the joints. Some species are more apt to do this than others and there is a great difference in the manner in which the young and fully adult react. Of the crabs represented in the collection, the adults of *Cardisoma armatum* are least liable to autotomize, but in the genus *Ocypode* the young were less subject to self-mutilation than the adult. *Grapsus grapsus*, *Goniopsis cruentata*, *Sesarma (H.) africanum*, and *S. (H.) elegans* were in this respect the most difficult to deal with.

"To overcome partly these difficulties one should avoid touching the crabs directly. After allowing them to retreat into their refuges, they may be enveloped within a quantity of the substance in which they are hiding, be it vegetable débris, mud, sand or soil, or held down below the gravel or in the crevices. They can then be injected just as easily and, with this method, limbs are seldom dropped off. Perfect specimens can also be obtained by exposing the crabs to the sun, which kills them quickly, or by drowning.

"In some crabs a rapid injection of a solution of 40 per cent formaldehyde mixed with half the quantity of 90 per cent alcohol gave the most satisfactory results. In tropical climates the large claws should be specially injected before the specimen is permanently preserved in 70 per cent alcohol. If glass jars are used, care should be taken to open them every day for the first week, as gases form and develop sufficient pressure to break the containers." (H. L.)

SYSTEMATIC DISCUSSION OF SPECIES COLLECTED

Tribe **BRACHYURA**Subtribe **DROMIACEA****Dromiidae****DROMIA** Weber

Dromia WEBER, 1795, *Nomenclator entomologicus*, p. 92.

Dromia atlantica Doflein

Plate XVIII, Figure 3; Text Figure 1

Dromia atlantica DOFLEIN, 1904, *Brachyura 'Valdivia' 1898-1899*, VI, p. 10; Atlas, Pl. VII, figs. 3 and 4.

Locality.—St. Paul de Loanda; September 23, 1915; 1 ♀.

Range.—Mouth of the Congo, 44 meters (Doflein). St. Paul de Loanda.

Measurements.—Length of carapace to end of median tooth, 27.4; length of carapace to median sinus of front, 26; greatest width measured between tips of the posterior of the lateral teeth, 30 mm.

Description.—Sutures of carapace feeble except the longitudinal portions of the H-form depression in the center of the carapace. Rostral horns stout, conical, the two lateral spines as long as their basal width, and longer than the depressed median spine. A short, thick, triangular spine at upper, inner angle of orbit; a much smaller

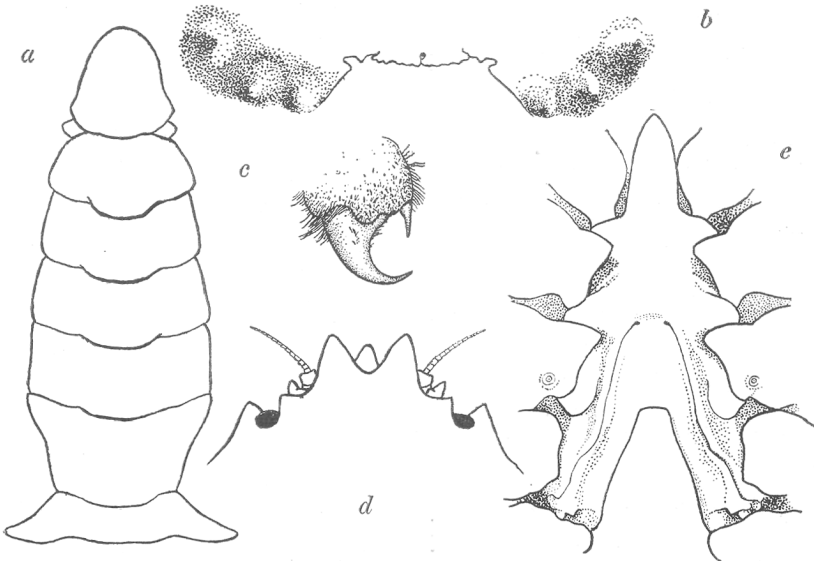


Fig. 1. *Dromia atlantica*, female 30 mm. wide, St. Paul de Loanda.

A, abdomen; b, edge of epistome and neighboring tubercles; c, extremity of left third leg; d, anterior part of carapace with antennae and eyes; e, sternum, showing sulci.

spine at lower, inner angle; just below the outer fissure lies the largest of the orbital spines, conical, pointing forward. Four anterolateral spines; the interspaces of the anterolateral border are of different lengths, represented by 3.1.2.4, the fourth interspace being the longest, the second nearly as long, the first, or that lying next the orbital tooth, still shorter, while the third interspace is a little more than half as long as the fourth. The first anterolateral tooth is one of a row of three protuberances leading to the buccal cavity and diminishing in size, the interspaces subequal. Edge of epistome crenulate, with about ten crenules.

Carpus of cheliped uneven with a few low nodules, and two large, conical ones on the border next to the manus. The pubescence, which coats the entire animal, reaches to the middle of the immovable finger, but farther down the outside of the dactylus, and only a third the length of the upper surface of the same. Carpus of last leg subtriangular, strongly widened toward the distal end. The propodus of the last two legs bears a very slender, short spine at its extremity which forms a sort of chela with the dactylus.

Sternal sulci slender, inconspicuous, reaching only to a line which, if continued, would run between the first and second ambulatory legs. Terminal segment of abdomen (of female) a little longer than wide.

Doflein described this species from a male specimen, from the mouth of the Congo, only 8 mm. long, in which the length of the carapace including the rostrum was as great as the width; in the adult female here described the carapace is a little wider than its total length. In Doflein's figure 3, Plate VII, the rostral horns are narrower and the interspace wider than in the female. In the female there is a difference in color between the outer and inner portions of the pterygostomian regions. Otherwise the two specimens seem to agree.

"This small crab was found at a depth of only a few feet between sponges that surrounded *Pinna*, a description of which is given under *Pisa carinimana*. Its carapace, with its peculiar 'mossy' color and hairiness, completely matched the surroundings." (H. L.)

Subtribe **BRACHYGNATHA**
Superfamily **Brachyrhyncha**
Portunidae

CALINECTES Stimpson

Callinectes STIMPSON, 1860, Ann. Lyc. Nat. Hist. New York, VII, p. 220.

KEY TO THE WEST AFRICAN SPECIES IN THE CONGO COLLECTION

- A. Lateral spine of carapace elongate, about three times as long as the tooth just in front of it. Size small, carapace about three inches or less than 80 mm. wide. Appendages of male abdomen reaching to middle of penultimate segment.
gladiator.

- A'. Lateral spine two and one-half, or less than two and one-half, times as long as the tooth just in front of it. Size larger, carapace four or more inches (100 mm. or more) wide.
- B. Lateral teeth trending forward, the second to fifth teeth, inclusive, having convex outer margins. Maximum size about four and three-quarters inches, or 120 mm. Appendages of male abdomen very short, overreaching antepenult segment but little if at all. *marginatus*.
- B'. Lateral teeth trending forward little if at all, the margins nearly straight. Maximum size about six inches, or 152 mm. Appendages of male abdomen very long, reaching end, or beyond end, of abdomen. Immovable finger of major chela extraordinarily swollen in its basal half. *latimanus*.

Callinectes marginatus (A. Milne Edwards)

Plates XIX, Figure 1, XX, Figure 1; Text Figure 2

- Neptunus marginatus* A. MILNE EDWARDS, 1861, Arch. Mus. Hist. Nat., Paris, X, p. 318, Pl. xxx, fig. 2, Gaboon. Types examined (3 young ♀ ♀).
- Callinectes larvatus* ORDWAY, 1863, Boston Journ. Nat. Hist., VII, p. 573, Key West, Tortugas, Bahamas, Haiti. RATHBUN, 1895, Proc. U. S. Nat. Mus., XVIII, p. 358, Pls. xvii; xxiv, fig. 5; xxv, fig. 4; xxvi, fig. 4; xxvii, fig. 4.
- Callinectes larvatus* A. MILNE EDWARDS, 1879, Crust. Rég. Mex., p. 225 (variety of *C. diacanthus*).
- Callinectes africanus* A. MILNE EDWARDS, 1879, Crust. Rég. Mex., p. 229 (variety of *C. diacanthus*), Cape Verde Islands. Types examined (2 large ♂ ♂).
- Callinectes larvatus* var. *africanus*? BENEDICT, 1893, Proc. U. S. Nat. Mus., XVI, p. 537.
- Callinectes marginatus* RATHBUN, 1897, Proc. Biol. Soc. Washington, XI, p. 149. DE MAN, 1900, Mém. Soc. Zool. France, p. 41, Pl. I, figs. 5, 5a (♀ not ♂). BOUVIER, 1901, Bull. Mus. Hist. Nat., Paris, p. 16.

Localities.—Banana; July 1915; 7 ♂ ♂, 7 ♀ ♀, 1 young. One specimen, a ♂, is of large size, the remainder are medium or small. Banana; August 1915; 10 ♂ ♂, 9 ♀ ♀, varying from 21.5 to 40.5 mm. in length. Moanda; July 1915; 2 ♂ ♂, immature. St. Paul de Loanda; September 23, 1915; 1 ♀, young. Locality not given; 1 ♂, half grown.

Range.—West coast of Africa, from Cape Verde Islands to Lobito, Angola. Florida Keys and Bahamas to Bahia, Brazil.

Measurements.—Length of male (Banana, July 1915) to the median sinus of the front, 43.8; width, 101; length of lateral spine, 10.6; length of preceding tooth, 4 mm.

Description.—Areolations of carapace well marked; granules coarse; gastric ridges slightly curved and parallel; length of intramedial area (that part of the gastric region behind the posterior of the gastric ridges) a little less than half of its anterior width and from two-thirds to three-quarters of its posterior width. Front, between the antennæ, four-toothed; median teeth small but well marked; lateral teeth broadly obtuse. Suborbital tooth prominent, arcuate, curved upward. The anterolateral teeth trend forward and are, in the adult, separated by deep rounded sinuses; the second to fifth teeth, inclusive, have convex posterior or outer margins;

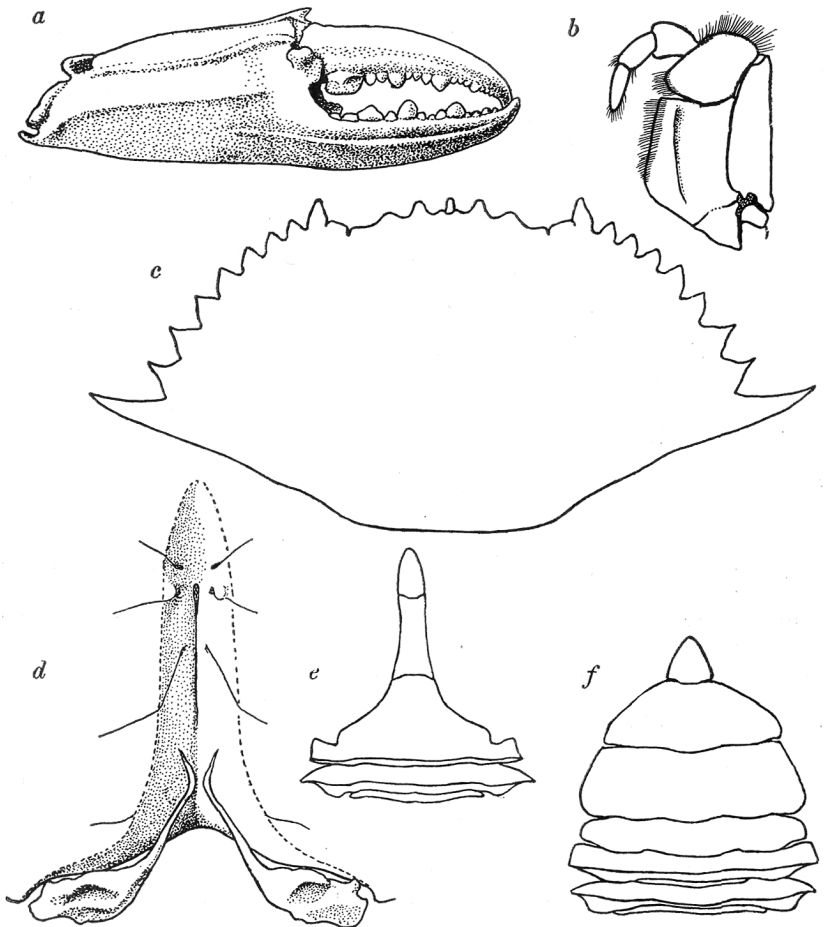


Fig. 2. *Callinectes marginatus*, Banana.

A, right, major chela of male 101 mm. wide; b, outer maxilliped of same; c, outline of carapace of same; d, appendages of first abdominal segment, in sternal cavity, same specimen; e, abdomen of same; f, abdomen of female 85 mm. wide.

first three or four teeth obtuse or subacute, the remainder acute or sharp; lateral spine between two and two and one-half times the length of the preceding tooth.

Distal end of merus of maxilliped strongly arched. Costæ of manus of cheliped prominent, roughened with granules of medium size. The lowest costa of the outer surface vanishes on the proximal half of the segment. Large tooth at base of dactylus of major chela broader than long.

Male abdomen small; penultimate segment wider at proximal than at distal end, margins slightly concave; appendages very short, overreaching third segment but little or not at all. Terminal segment of female abdomen a little longer than wide.

The crosswise sternal groove just in front of the abdomen is not straight but is directed obliquely backward a little from the outer ends to the median line.

The female is smaller than the male; the carapace is more swollen; the granules coarser, more bead-like. In the medium-sized and young specimens the sinuses between the lateral teeth are relatively smaller and less rounded than in the adult or old, but the teeth always curve forward in the manner characteristic of this species.

***Callinectes gladiator* Benedict**

Plate XIX, Figure 2; Text Figure 3

Lupa smythiana LEACH (*nomen nudum*) in White, 1847, List Crust. Brit. Mus., p. 27. Not *Neptunus sanguinolentus* (Herbst).

Callinectes tumidus var. *gladiator* BENEDICT, 1893, Proc. U. S. Nat. Mus., XVI, p. 537, Beyah River, Elmina, Ashantee.

Callinectes tumidus gladiator RATHBUN, 1895 (1896), Proc. U. S. Nat. Mus., XVIII, p. 360.

Callinectes gladiator RATHBUN, 1897, Proc. Biol. Soc. Washington, XI, p. 150.

Localities.—Banana; August 1915; 6 young (4 ♂♂, 2 ♀♀). Banana (no date); 2 ♂♂, 1 ♀, all adult. San Antonio; August 1915; 1 ♂ adult, 2 young (♂, ♀).

Range.—Liberia to San Antonio, Angola.

Measurements.—Length of male (San Antonio) to the median sinus of the front, 30.3; width, 78.7; length of lateral spine, 10.8; length of preceding tooth, 3.4 mm.

Description.—A smaller and more delicate looking species than *C. marginatus*.

The carapace is more strongly areolated, the six bosses (four branchial, two cardiac) which surround the posterior part of the gastric region are very prominent; a still higher elevation lies just outside the inner branchial nodules and is finely and closely granulate. The granulation of the carapace as a whole is finer and sparser than in *marginatus*; both raised gastric lines are curved forward at outer ends and are subparallel; one or both, however, may be slightly bent forward at the middle. The intramedial area is more constricted behind than in the preceding species; its length is considerably less than half its anterior width and is from two-thirds to three-quarters its posterior width. The four median teeth are narrower, those of the median pair more prominent, tuberculiform. The anterolateral teeth are separated by narrower sinuses; the lateral spine is very long, about three times as long as preceding tooth.

Distal end of merus of outer maxilliped strongly arched; outer angle more strongly produced sideways.

Fingers of cheliped more slender than in *marginatus*; basal tooth of major dactylus broad, low and of moderate size.

Male abdomen small; the spine at each end of the second segment in both sexes is compressed, slender, and curved upward and sometimes backward. The male abdominal appendages reach quite to the middle of the penultimate segment.

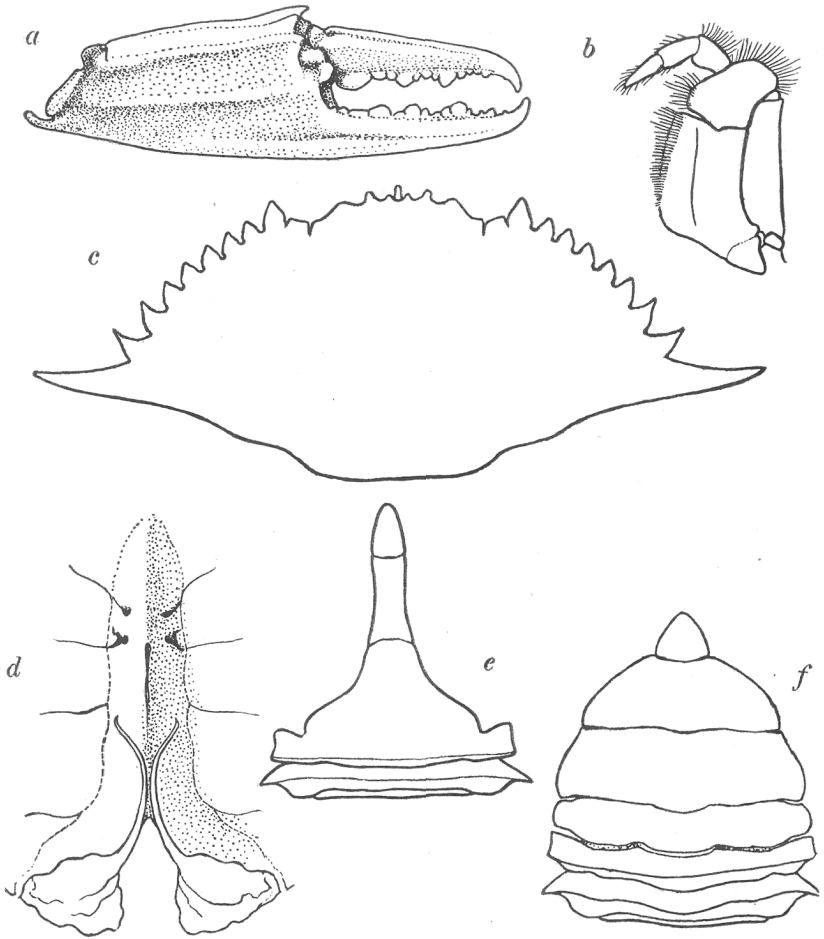


Fig. 3. *Callinectes gladiator*.

A, right, major chela of male 79.8 mm. wide, Banana; b, outer maxilliped of male 78.7 mm. wide, San Antonio; c, outline of carapace of same; d, appendages of first abdominal segment, in sternal cavity, same specimen; e, abdomen of same; f, abdomen of female 74 mm. wide, Banana.

Callinectes latimanus Rathbun

Plates XV, Figure 2, XXI, XXII, Figure 1; Text Figure 4

Callinectes bocourti RATHBUN (not A. Milne Edwards), 1897, Proc. Biol. Soc. Washington, XI, p. 151, African specimens only.

Callinectes latimanus RATHBUN, 1897, Proc. Biol. Soc. Washington, XI, p. 151, text-figs. 6-8, Lagos, Bight of Benin, Guinea.

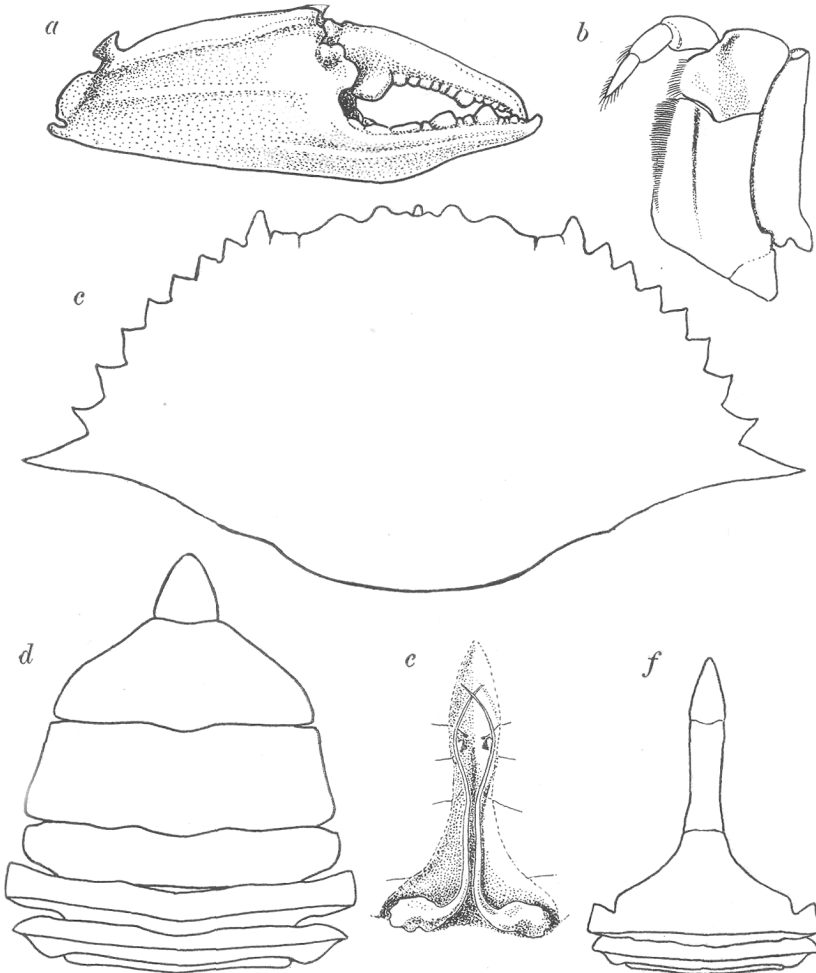


Fig. 4. *Callinectes latimanus*, Banana.

A, right, major chela of male 129.3 mm. wide; b, outer maxilliped of same; c, outline of carapace of same; d, abdomen of female 109.8 mm. wide; e, appendages of first abdominal segment, in sternal cavity, of same male as a; f, abdomen of same.

Neptunus marginatus var. *truncata* AURIVILLIUS, 1898, K. Svenska Vet.-Akad. Handlingar, XXIV, Afd. IV, No. 1, p. 5, Pl. I, figs. 1-4, Cameroon, immature ♀, not ♂.

Callinectes diacanthus var. *africanus* LENZ, 1910, Wiss. Ergeb. d. Deutschen Zentral-Afrika Exped. 1907-1908, Leipzig, III, Zool. I, Lief. 3, p. 5, Landana, two young specimens.

Locality.—Banana; July 1915; 10 ♂♂, 6 ♀♀ of large size, 1 ♂ of medium size, 1 young ♂, 1 young ♀. Banana; August 1915; 2 ♂♂ medium. Banana; September 1915; 1 ♂ medium, 1 very large dried ♂.

Range.—From Senegal to the mouth of the Congo.

Measurements.—Largest male, dried: length of carapace to median sinus of front, 72 mm.; width to tip of lateral spines, 152 mm.; width immediately in front of lateral spines, 127.5 mm.

Description.—Of larger size than *marginatus*; surface near the margins very sparsely granulated. Raised gastric lines curved forward at outer ends, especially the anterior line, so that the distance between these lines is less at the middle than toward the outer ends. Intramedial region longer in proportion to its width than in *marginatus*; its length just equal to its posterior width and half, or nearly half, its anterior width. Raised branchial line straighter than in that species, not directed toward the tooth in front of the lateral spine but, throughout its slightly sinuous course, toward the spine itself. Frontal teeth more triangular than in either of the other species, and the median pair larger and more advanced in proportion to the outer pair. Lateral spine moderate, from 2.25 to 2.5 times the length of next tooth. Lateral teeth more triangular than in the other species, sides nearly straight (in teeth 2 to 6), and edges coarsely granulate; in teeth 2 to 7, inclusive, the anterior or inner margin of each tooth is shorter than the posterior or outer margin.

Distal margin of merus of outer maxilliped subtruncate. Costæ of manus not prominent, granulated lines narrow, almost disappearing on the two lower costæ of the outer surface. In the major chela the basal part of the immovable finger is excessively swollen along the lower margin; the basal tooth of the dactylus is very large, obliquely placed and normally longer than wide.

The male abdomen is much larger in proportion to the sternum than in *marginatus*; the terminal segment is nearly twice as long as broad. The appendages reach beyond the tip of the abdomen itself. The last segment of the female abdomen is very little longer than wide; the lateral margins of the penultimate segment are for the most part nearly straight, then curve gently backward to meet the antepenultimate segment; this last is a little shorter than the penultimate segment.

The crosswise sternal groove just in front of the abdomen is transverse or very nearly so.

The female is smaller than the male. Its carapace is more regularly convex than that of the male and the surface less uneven. The surface is more densely and coarsely granulous, although granules are always sparse near the lateral margins, still sparser near the front, and quite absent from the posterior and posterolateral margins in the male, while in the female there are a few fine granules near the posterior angles.

In the female the intramedial region is less constricted than in the male, and its length may be a little less than its posterior width. On the other hand, in some males the length of the intramedial region is a little greater than its posterior width.

The swollen immovable finger of the large cheliped is common to males and females, from the largest down to one 36 mm. long by 71.3 mm. wide. An exception is a male, 45.2 by 92 mm., in which the fingers of the major cheliped are narrow and elongate, almost meeting when closed, and the basal tooth of the dactylus only slightly enlarged. This may be due to injury and consequent regeneration of the chela; the chela resembles that of a young male, 22.5 mm. long by 42 mm. wide. On the other hand, a still smaller specimen, female, 17.4 mm. by 35 mm., has a stout major chela, with gaping fingers; large, characteristic, basal tooth on the dactyl; and the faint beginning of a swelling of the immovable finger. In proportion to its size the lateral spine is longer than in older specimens, and the four teeth preceding the spine are unusually sharp.

I think that I was mistaken in 1897 (*loc. cit.*) in referring African specimens to *C. bocourti*. The young specimen (18735) in the National Museum from Senegal is, I believe, *C. latimanus*; it had been labeled "*C. africanus*" at the Paris Museum, but it is not one of the type lot. The types of *africanus* consist of two large males from the Cape Verde Islands and, although I am unable to re-examine them at present, I still consider them *marginatus*, because A. Milne Edwards's brief description of *africanus* applies better to *marginatus* than to the other African species. From notes made long ago at the Berlin Museum on a large male (5566) from Chinchoxo and a small female (3647) from Liberia, I conclude that these too should be referred to *latimanus*.

"Crabs of the genus *Callinectes* were common on submerged flats in sites where the fine, loose sand was constantly but gently moved by the action of the waves. They were numerous near Banana (Pl. LVI, fig. 1), Moanda, San Antonio, and Padron Point, but the different species were not distinguished in the field. Most of the series of *C. latimanus*, including the largest male, which measured six inches across the carapace from spine to spine, were taken in the bay to the east of and about half-way up Banana peninsula in a sheltered place where the salinity of the water was considerably reduced. Here at low tide these crabs can be observed when hurrying over the sand in shallow water. With one claw fully outstretched and with adjoining limbs pressed alongside, both rudder and limbs unite in sudden efforts by which they shoot like an arrow in short zigzags. With surprising dexterity they shift their rudder-blades and limbs. So rapidly do they move beneath the protecting clouds of fine sand they stir up that it becomes difficult to discover their whereabouts; and so suddenly do they assume immobility that the sand drifting

back covers all trace of their new hiding place, usually just below the sandy surface which the waves have helped to smooth. None were seen on land.

"The species included in this genus represent the well-known 'soft-shelled' crabs, yet in the estuary of the Congo neither white men nor natives use them as food. The flatness of the carapace, the slender claws, and the modification of the posterior limbs into flat rudders, easily shifted, make this group first-class swimmers, and the strong spines at the edge of the hard carapace undoubtedly protect them against being swallowed by fishes. Their rapidity in defense, and the quick use of their sharp hands make catching them a lively sport." (H. L.)

THALAMITA Latreille

Thalamita LATREILLE, 1829, in Cuvier, Le Règne Animal, IV, p. 33, footnote.

Thalamita africana Miers

Plate XXIII; Text Figure 5

Thalamita integra var. *africana* MIERS, 1881, Ann. Mag. Nat. Hist., (5) VIII, p. 218, Canaries.

Locality.—St. Paul de Loanda; September 21 and 23, 1915; 9 ♂♂, 10 ♀♀ ovig., 1 ♀ young.

Range.—Canary Islands; Gorée Bay, Senegambia, 9 to 15 fathoms (Miers); St. Thomas Island (Osorio); St. Paul de Loanda.

Measurements.—Length of carapace of male, 26.7; width of same, 42.1; fronto-orbital width, 31 mm.

Description.—This species belongs to the group of *Thalamita* in which the front between the antennæ is bilobed, or between the orbits quadrilobed; in which the two median lobes form a convex arch, and are separated from each other by a slight fissure, the margin of each lobe slightly concave at middle. The overlapping lobes of the outer pair are oblique and considerably narrower than those of the inner pair. Anterolateral margins considerably curved for a *Thalamita*; first tooth widest and subtruncate; second and third teeth similar to each other and blunt-pointed; fourth and fifth teeth acute; fourth much the smallest but not rudimentary; fifth projecting laterally much beyond the others. Three finely crenulated transverse ridges; one between the teeth of the last pair, interrupted at the cervical suture and on the median line; one protogastric, narrowly interrupted by the mesogastric region; and one in front of this, widely separated in the middle. Besides, there is a very short ridge on the branchial region not far from its inner boundary; this is most evident in females and may disappear in old males. Epigastric lobes rather prominent. Remainder of carapace smooth.

Ridge on basal segment of antennæ smooth, nondentate but finely granulate.

Chelipeds of male not very unequal, nearly smooth. Inner margin of merus provided with a distally-directed rounded lobe or tooth, followed by three or four small

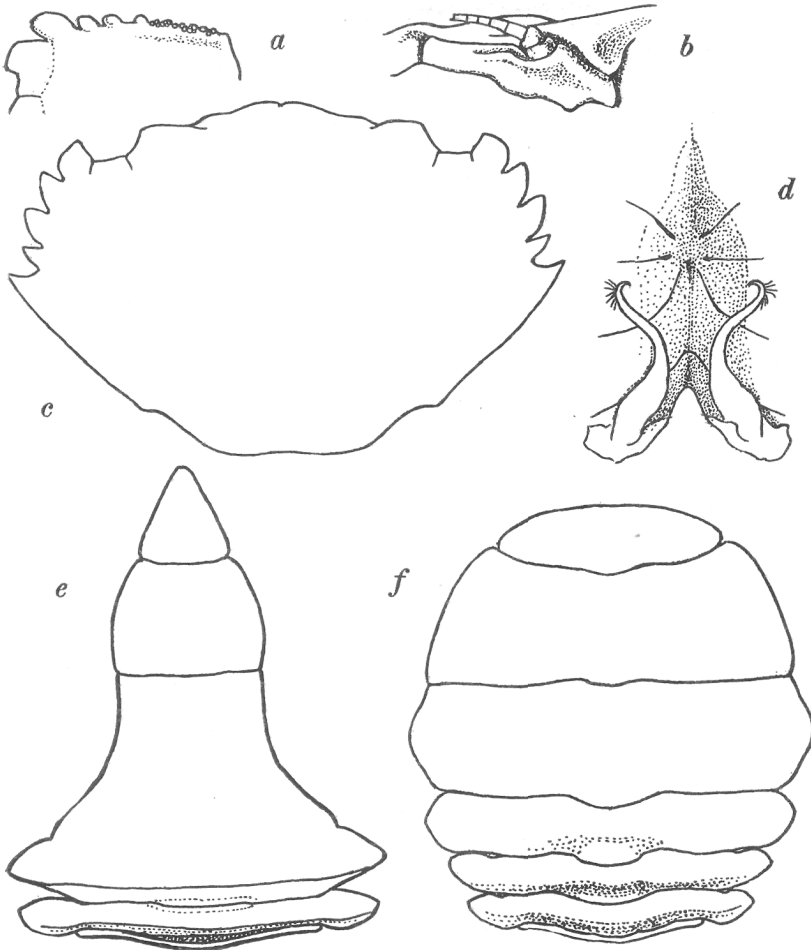


Fig. 5. *Thalamita africana*, St. Paul de Loanda.

A, anterior edge of merus of left cheliped of male 42.1 mm. wide; b, right antenna of same, showing basal segment; c, outline of carapace of same; d, appendages of first abdominal segment, in sternal cavity, of same specimen; e, abdomen of same; f, abdomen of female 33 mm. wide.

lobes and a number of granules, gradually diminishing to the proximal end. The carpus has a strong, horny-tipped inner spine and a few blunt ridges on the outer and upper surface. The palm bears at most three blunt ridges, one continued from the propodal finger and two superior, each of which is provided with a blunt 'tooth or spine distal to the middle; one or both of these teeth may be suppressed. In the female only is there a spine at the articulation with the carpus. In the female, also, the lowest ridge of the palm is longer and sharper than in the male. The merus of the swimming-foot is twice as long as wide; the propodus is armed below with a few fine spinules.

The front is more arcuate than in *T. integra*,¹ its lateral lobes arcuate instead of straight; the fourth lateral tooth is small but not minute, as in *integra*; the protogastric regions bear each a short granulated ridge, which is lacking in *integra*; and the two spines on the upper edge of the hand are blunt, not sharp.

"The most common species in the quiet stretches of the bay near the town of St. Paul de Loanda, and easily caught at low tide on the many submerged sand flats. Their behavior is much the same as that of *Callinectes* (p. 401), but their habitat there is typically marine." (H. L.)

Potamonidæ

Carapace broader than long, subquadrilateral, oblate-oval, or almost circular. Anterolateral borders arched, no longer, and often much shorter, than the posterolateral borders, which are convergent. Regions seldom areolated; the cervical suture may be deep and conspicuous or interrupted, often well defined only behind the mesogastric area. Branchial regions much dilated.

Front typically broad, not separated from the inner supraorbital angles, usually obliquely deflexed, sometimes horizontal or vertically deflexed, commonly bilobed or entire, seldom armed with spines or tubercles.

Antennules usually folded transversely in narrow fossæ, antennal peduncles occupying the orbital gap, the distal joints overlapped by the front. Antennal flagella short, sometimes quite vestigial.

Epistome transverse, of fair length fore and aft, well demarcated and never encroached upon by the external maxillipeds. The palpus of the latter articulates at, or near, the inner angle of the merus. Buccal cavity usually square.

Chelipeds in male unequal, often very much so; in female, equal or nearly so. Legs gressorial.

Sternum broad. Abdomen of male occupying all the space between the last pair of legs. The genital ducts of the male open on the coxopodites of the last pair of legs.

Potamoninæ

Mandibular palp composed of two or three distinct segments; terminal segment simple, often thickened at base for the attachment of a bunch of hairs, or occasionally with a small lobe on the ventral side of its base.

Merus of external maxillipeds transverse.

Efferent branchial channels not abnormally produced.

Antennules transverse.

Dactyli of walking-legs strongly spinose.

Abdomen of adult male almost never abruptly contracted distally; its sixth segment is almost always much broader than long, and its seventh segment is almost always broadly triangular.

¹Dana, 1852, Proc. Acad. Nat. Sci. Philadelphia, VI, p. 85; 1852, U. S. Expl. Exped., XIII, Crust., part 1, p. 281; 1855, Atlas, Pl. xvii, figs. 6a-d.

POTAMON Savigny

Potamon SAVIGNY, 1816, Mém. Anim. sans Vert., I, p. 107. RATHBUN, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, p. 247 (part).

Carapace traversed by a crest which consists of two portions, namely, (1) a shorter, coarser, epigastric portion, and (2) a longer, sharper, postorbital portion; these two portions may be distinct and discontinuous, or may be continuous, or one or both of them may be indistinct to the verge of disappearance.

Front broader than orbit, about one-fifth to about two-sevenths the greatest breadth of the carapace, deflexed, usually broadly bilobed or sinuous.

Outer orbital angle usually dentiform.

Anterolateral borders of carapace usually well defined, often cristiform and serrulate or crenulate, sometimes cut into large teeth or spines; their curve is usually broken, near the level of the postorbital crest, by a notch and spine, but these may be indistinct or obsolete. Posterolateral borders usually rounded and indefinite, crossed by oblique wrinkles continued from the side walls of the carapace.

Dactyli of legs armed with four rows of spines.

Abdomen of adult male regularly triangular. Abdomen of adult female broad, its terminal joint not elongate. In both sexes all seven abdominal segments are distinct and separate. (Condensed from Alcock.)

Subgenera.—The division of the genus *Potamon* into the three large subgenera *Potamonautes*, *Potamon*, and *Geothelphusa* is an arbitrary one, as it is based on the completeness, continuity, and distinctness of the postfrontal crest; and between any three groups into which the genus may be so divided there are various intergrading forms which it is difficult to place without violating the letter of the definitions. Alcock, in his key,¹ put *Potamonautes* under the headings, "3. Postorbital crests and lateral epibranchial spine very distinct" and "5. The epigastric and postorbital crests of each side form an unbroken line." In "3" I would insert after "lateral epibranchial spine" the words "if present." In my monograph of the Potamonidæ, 1904–1906, there were included in *Potamonautes* a number of species in which the crest was not distinct throughout its length. Today I would restrict that subgenus to those forms having a very distinct, meaning a sharp-edged, crest (it very often overhangs the surface in front of it), which shows no break except on the median line. There may or may not be a spine or tooth on the lateral margin at the end of the crest. I would omit from *Potamonautes* those species which I previously placed there in which the crest is strong but is interrupted by a notch at the outer end of the epigastric lobes.

It is difficult to define the limits of the subgenus *Geothelphusa*. Alcock gives in his key, "3. Postorbital crests and lateral epibranchial spine indistinct or obsolete." In reality, the outer portion or outer half

¹1910, Records Indian Mus., V, p. 257.

or two-thirds of the postorbital crests may be very distinct (e. g., *congoënsis*, two-thirds grown), although separated from the epigastric crests by an appreciable space where the surface rounds smoothly downward anteriorly. This pattern of geothelphusid crest is but slightly removed from that of *ballayi* and that again from *obesus*, both in the subgenus *Potamon*, while in some similar species also in the subgenus *Potamon* the postorbital crests are much more indistinct although more extensive than in the geothelphusids *congoënsis* or *perparvus*.

Acanthothelphusa is here reckoned as a subgenus of *Potamon*, because it is separated from the three subgenera discussed above by only one character, that of having several epibranchial spines or teeth. In other respects the species agree with one or another of the older subgenera.

Subgenus **POTAMONAUTES** MacLeay

Potamonautes MACLEAY, 1838, Illus. Zool. S. Africa, Annulosa, p. 64.

Postorbital crest very distinct or sharp-edged, forming an unbroken line with the epigastric crest. The spine or tooth or angle at the outer end of the crest is very distinct. There may be a tooth between the epibranchial tooth and the orbital tooth.

Potamon (Potamonautes) floweri de Man

Plate XX, Figure 2; Text Figure 6

Potamon (Potamonautes) floweri DE MAN, 1901, Proc. Zool. Soc. London, p. 94, Pl. x. RATHBUN, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, Pl. xvii, figs. 2 and 6; 1905, (4) VII, p. 193.

Localities.—Libreville, in the Gaboon; February 1916; J. P. Chapin, collector; A4518; 10 ♂♂, 7 ♀♀. The following localities are all in the Belgian Congo. Yakuluku; November 1911; 1 ♂. Garamba; June 1912; 1 ♀. Faradje: March-June 1911, 17 ♂♂, 5 ♀♀; 1911, No. 250, 1 ♀; October 1912, 3 ♂♂, 1 ♀ young; without date, 5 ♂♂, 7 ♀♀. Vankerekhovenville; April 1912; No. 414; 2 ♂♂, 1 ♀; the larger male has an emargination in the right side of the crest; the smaller male has regenerated the right maxilliped, which is reduced and abnormal. Ngayu; December 16, 1909; 1 ♀ ovig. Affluents of the Nepoko River near Gamangui (Ituri Forest): No. 68; 1 ♂. No. 69; 4 ♂♂, 7 ♀♀ (1 ovig., 1 with newly hatched crabs). No. 72; 4 ♂♂, 2 ♀♀ (1 ovig., 1 with newly hatched crabs). No. 73; 2 ♂♂, 5 ♀♀ (1 ovig.). No. 75; 3 ♂♂, 1 ♀. Poko: August 1913; No. 638, 1 ♀; October to December 1913, 1 ♂, 1 ♀, both small and with thin shell. South of Poko; October to December 1913; 2 ♂♂, 7 ♀♀ (1 ovig., 1 with newly hatched crabs). Affluents of the Tshopo River near Stanleyville; No. 884; 2 ♂♂. Banana; August 1915; 4 ♂♂.

Range.—The type locality is Bahr-el-Gebel, Soudan. The species has been taken also in the Yei River, affluent of the Nile, 1130 meters altitude; Upper Ubangi, French Congo; and at Faradje, "Dougou" River (probably Dungu), 1060 meters altitude.

Measurements.—Length of largest specimen, male (No. 68), 37.4; width, 59.8 mm. Length of smallest, free-living specimen in the collection, a male (Faradje March–June 1911), 13 mm.; width, 19.3 mm.

Diagnosis.—Carapace very convex. Postfrontal crest partly overhanging orbit. Lateral margin with two small teeth behind orbital tooth.

Description.—The carapace is very wide, its length about three-fifths of its width; very convex from front to back, much less so from side to side; surface smooth, finely punctate. Grooves in center of carapace of moderate depth; lateral portions of cervical groove indistinct; mesogastric suture tectiform; furrow behind orbits very deep.

Postfrontal crest transversely sinuous, more advanced behind orbits, edge crenulate in outer half. The crest occupies a much more advanced position than in allied species, and this is accented by the convexity of the carapace, with the result that, when viewed from above, the crest covers more or less of the orbital margin and also the tooth lying between the orbital and epibranchial teeth.

Anterolateral margins strongly arcuate, granulate or denticulate, often obscurely so, when it appears smooth and entire; posterolateral margins concave.

Front, measured below, one-fourth the width of the carapace; from above the edge appears widely emarginate; sides very oblique.

Outer orbital tooth acutangular, sharp. Between this tooth and the epibranchial angle there is a small, granulated tooth or prominence, immediately behind the deep groove which separates the suborbital and subbranchial areas. On the lateral margin, in front of this groove there may be one or two denticles or tubercles.

Lower margin of orbit almost transverse, little arcuate; a deep, outer notch commonly V-shaped.

Mandibular palp composed of two distinct joints, the terminal joint cut into two lobes (the outer one very short), which embrace the incisor process of the mandible.¹ Furrow on ischium of outer maxillipeds slightly nearer inner than outer margin; exopod with a flagellum half as long as its stalk.

Sternum thickened along insertion of chelipeds, and having a transverse groove between posterior outer corners of maxillipeds.

The subterminal projection of the inner face of the arm is a large, rather sharp, tubercle. Outer face of arm and wrist almost smooth. Primary and secondary spines of wrist acute. Fingers long, narrowly gaping, marked with a few rows of punctæ; upper margin of dactylus serrated with tubercles pointing distad. Similar but fewer tubercles on upper surface of palm. The prehensile teeth on the proximal half of the fingers are larger than on the distal half.

Merus of last two pairs of legs three times as long as broad.

Posterior width of terminal segment of male abdomen one-third greater than its length; penult segment the same length as the last, its anterior margin four-fifths

¹The mandible has the terminal segment of the palp more deeply divided than in *Potamon madagascariensis* (See Calman, 1913, Proc. Zool. Soc. London, text-fig. 161B, on p. 923) and forms a closer link with the subfamily Gecarcinucinae.

of its posterior. Appendage of first segment with a long slender tip, directed obliquely outward.

The species is well figured with details on Plate x, de Man, *op. cit.*

The crest varies much in direction: the middle half may be either quite transverse or slope back a little each side of the middle; it then runs obliquely forward to the extremity, in an arcuate or a straight line.

In many specimens of medium size, the anterolateral margin forms a sharper rim than in the old. Likewise the upper surface of the palms and movable fingers is usually rougher than in the old, and there may be an additional row of serrations on the inner surface just below the upper margin of the dactylus. These characters are by no means constant. Individuals of both sorts and of similar size may be found in the same lot. The palm and fingers are shorter and wider in medium than in the largest specimens.

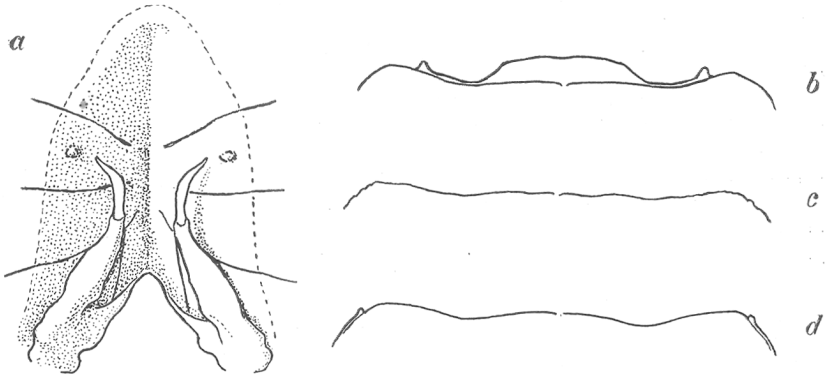


Fig. 6. *Potamon (Potamonantes) floweri*, male, Faradje.

A, appendages of first abdominal segment, in sternal cavity, of specimen 55.6 mm. wide; b, crest and anterior outline of a carapace 51.5 mm. wide; c, crest of a carapace 53.4 mm. wide; d, crest of same specimen as a.

The newly hatched young measure from 4.4 mm. long, 5 mm. wide (No. 69), to 4.8 mm. long, 5.3 mm. wide (S. of Poko). The front of the carapace is much less deflexed than it becomes later; sides of front subparallel, outer orbital tooth minute, epibranchial tooth still more so.

The eggs vary in diameter from 3 mm. (No. 69) to 3.5 mm. (No. 73).

P. (Potamonantes) aubryi Milne Edwards has the terminal segment of the mandibular palp bilobed as in *P. floweri*; the two species resemble each other in their very convex, subcylindrical form.

"The habits of this common and widely distributed species are so different from those of all other river crabs that in the field we soon called

specimens of *Potamon* (*Potamonautes*) *floweri* 'land crabs.' To be sure they occurred in nearly all the shallow brooks (Pls. LXIII and LXIV), but in the parts of the Rain Forest we visited they were equally at home on land, at least in all humid places, whether high on a hill, or beneath overhanging banks of brooks. Heaps of dead vegetation in the water-courses are among their favorite haunts and may also help their wide distribution when forced down-stream by the floods.

"The puffed, smooth appearance of the short, deep, unarmed carapace is associated with the air-breathing habit, and contrasts with the more flattened, well-modeled, rough, and even spiny carapace of crabs typical of the rivers of the interior. The color of this species is peculiarly protective in the various habitats, and to such an extent that on land the crabs often could be discovered only when rustling among dead leaves. Most of the upper surface is dark purplish brown, tones of yellow predominate on the big shears and legs, and the lower side is purplish gray; a yellowish line on the orbital border is more or less accentuated in different individuals.

"Our failure at first to see any of these crabs when we marched northward across the plains of the Uele District led us to believe that they were entirely absent, even from the rivers of the Savannah region. To our surprise we later found that during the dry season these 'land crabs' were all estivating in burrows. As the rainy season sets in they scatter again and may be found in brooks, swamps, and on land.

"At Faradje one of them had dug its burrow in the neighborhood of the Dungu River near the edge of a swamp we passed every day. Four times in two months it pushed new, damp soil outward, though it always kept the entrance clogged up. Finally, its successive efforts had raised a rough mound, in form resembling a reversed funnel. On opening the entrance, a thin rod could be lowered nearly five feet into the practically perpendicular channel. The crab always responded to this unwelcome disturbance by pinching the stick with its big claws. As the dry season advanced, the level of the ground-water fell lower and lower, and our crab found it necessary to keep within immediate neighborhood of moisture, or rather near the water-level where it then rested. The continued burrowing to a greater depth is evidently for the purpose of reaching the ground-water. This was especially true in one of the largest colonies met with. As a result of the first showers that introduce the rainy season, at the beginning of March the Yakuluku River had inundated its banks for about two days. In a sheltered cove about two feet above the usual water-level the black mud still showed a smooth, miry

condition. On its surface numerous small heaps of excavated mud were very conspicuous and all proved to be from burrows of these crabs. In a stretch of thirty yards two hundred were scattered. Each of the several dozen burrows examined contained but one crab. The floods had obliterated most of the former excavations, though those not reached by the current still showed the previous diggings of these crabs.

"The eggs are relatively large (about 3 mm.) and, as usual, are retained by modified pleopods beneath the recurved abdomen, which is forced far from its usual position by their great numbers. This is especially true after the hatching of the young, which are carried about for some time.

"The chief enemy of these and other river crabs is not man, for natives in the interior of the country do not use them as food.¹ They are extensively preyed upon by young crocodiles, monitors (*Varanus niloticus* Linnæus), insectivorous otters (*Potamogale velox* Du Chaillu), and several small carnivores, chiefly belonging to the mongooses. Large waterbirds are relatively scarce in the West African Rain Forest and none were found to feed on crabs. In a hornbill's (*Ceratogymna*) nest, however, were seen pieces of carapace, evidently brought there by the nursing male bird.

"Their known distribution and the general physiographic conditions of the country inhabited by these crabs indicate that probably they occur all across the equatorial zone from the Nile (Bahr-el-Djebel) to the Atlantic, though on the coast they have been collected only at Libreville (Gaboon) and Banana (mouth of the Congo) and none have been recorded in the regions between the eastern and western localities given by Miss Rathbun." (H. L.)

Potamon (*Potamonautes*) *dybowskii* Rathbun

Plate XXIV; Text Figure 7

Potamon (*Potamonautes*) *dybowskii* RATHBUN, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, Pl. xv [vii of *Potamonidæ*], fig. 3; 1905, (4) VII, p. 177, text-fig. 44.

Localities.—This species was described from a single specimen, a male, from Bangui in the French Congo, on the border of the Belgian Congo. Balss records it from Koloka (between Uele and Ituri).

In the Lang-Chapin collection there is a fine series of ninety-one specimens from eleven localities. They are as follows. Libreville, Gaboon, French Congo; February 1916; J. P. Chapin; 3 ♂♂, 5 ♀♀. South of Poko; October to December 1913; J. P. Chapin; 10 ♂♂, 5

¹The crabs brought back from Libreville, by Mr. J. P. Chapin, were all bought in the market.

♀ ♀. Bafwabaka; December 31, 1909; 1 ♂, 6 ♀ ♀ (1 young), variety; "above dark brownish mottled with pale greenish-yellow." Affluents of Nepoko River, near Gamangui (Ituri Forest); Nos. 68, 70, 71, 80; 6 ♂♂, 7 ♀ ♀. Ngayu; December 13, 1909; 1 ♂, 2 ♀ ♀; "brownish above." Avakubi: October 11, 1909, 3 ♀ ♀; from the Aruwimi River, October 14, 1909, 1 ♂, 1 ♀; October 21, 1909, 1 ♀; September 1913, 2 ♀ ♀. Bafwasende; common in the Lindi; September 23 and 25, 1909; 2 ♂♂, 3 ♀ ♀. Bafwamoko; September 14, 1909; 1 ♂, found in same brook as *P. stanleyensis*. Batama: July 18, 1909, 2 ♂♂, 1 ♀; September 16, 1909, 1 ♂ immature; September 17, 1909, 1 ♀ immature. Affluents of the Tshopo River, near Stanleyville; No. 884, 3 ♂♂, 3 ♀ ♀. Stanleyville: August 21, 1909, 1 ♀; April 1915, Nos. 833, 843, 859, and 932, 3 ♂♂, 1 ♀ ovig., 2 young; from affluent of Tshopo, April 1915, No. 841, 12 young. Locality not given; 1 ♀ with newly hatched young.

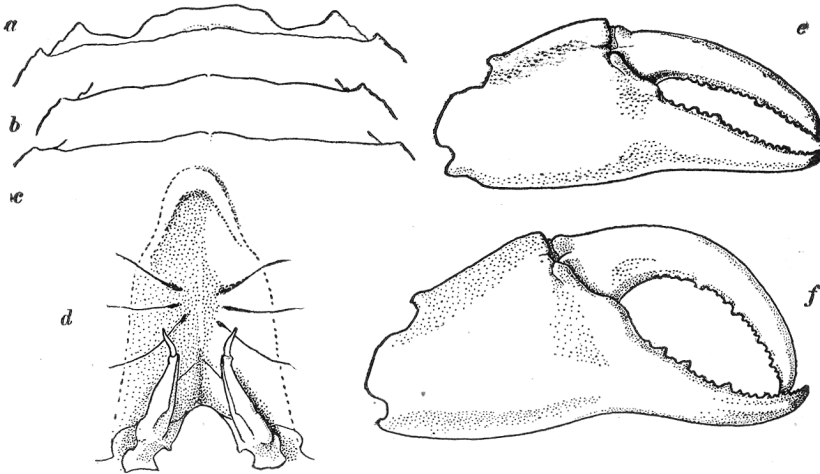


Fig. 7. *Potamon (Potamonautes) dybowskii*.

a, crest and anterior outline of female 64 mm. wide, Nepoko River; *b*, crest of female 52.8 mm. wide, Bafwabaka; *c*, crest of female 70 mm. wide, Bafwasende; *d*, appendages of first abdominal segment, in sternal cavity, of male 62.7 mm. wide, Nepoko River; *e*, right, major chela of same female as *c*; *f*, right major chela of same male as *d*.

Measurements.—Length of carapace of male (S. of Poko), 47.3 mm.; width of same, 63.4 mm.

Description.—The chief characters of the full-grown, adult male are as follows. The carapace is crossed by deep sutures, especially around the hinder border of the mesogastric region; the branchial region is distinctly divided into two subequal parts; the cervical suture disappears just before it reaches the postfrontal crest;

the anterior end of the mesogastric region is roof-shaped; the crest is deeply divided on the median line and slopes backward therefrom to a small, forward-pointing tooth at either end; behind the crest the lateral margin is subentire, obscurely denticulated; orbital angle subrectangular; margin behind it interrupted by the cervical suture and discontinuous with the margin behind the crest, which is on a much higher level than the orbital tooth; a deep notch under orbital angle; front bilobed, outer corners obtusangular.

Mandibular palp two-segmented; a faint suture shows indication of an additional segment at the proximal end; terminal segment simple. Ischial furrow of outer maxillipeds faint; antero-external margin of merus arcuate.

Chelipeds very unequal; one carpal spine, followed behind by several denticles; larger palm widening distally, convex below, palmar finger much deflexed, fingers widely gaping, teeth small, unequal, not crowded; fingers of smaller chela very long, horizontal, narrowly gaping.

The larger chela of the adult female is similar to that figured for the medium-sized male in text-figure 44, cited above, except that the fingers are longer. Eggs about 1.7 mm. in diameter.

Occasionally in adults the tooth at the end of the postfrontal crest, either on one side or both, is lacking or is only indicated; this is the case in a large female from Bafwasende, September 25, 1909.

In most specimens 55 mm. in width and under, the tooth of the crest is altogether lacking. On the other hand, a few carapaces even as small as 13 mm. wide possess one or both small teeth. (See figure 3 of the type cited.)

The exorbital tooth varies in width. In a female from Stanleyville, August 21, 1909, the tooth is narrower than common, the outer margin being definitely though not deeply concave.

In some instances the cervical suture is traceable, though faintly, quite to the inner base of the lateral tooth.

In a set of one male and six females from Bafwabaka, December 31, 1909, the crest has a tendency to be more sinuous and rougher than usual; the terminal tooth is broader and sharper; and the edge behind it is more distinctly serrate. The anterolateral striations of the upper surface are more pronounced. This form I have designated as a variety.

In a lot of three males and five females from Nepoko River, one female has a well-marked V-shaped indentation near the outer end of the crest. This might be thought accidental, if it were not duplicated on the opposite end of the crest.

"In all the small watercourses (Pls. LXIII and LXIV) that meander between the low hills of the Rain Forest *Potamon* (*Potamonantes*) *dybowskii* is fairly common and this should be no surprise since in a single day's march thirty or more of these heavily shaded brooks may be crossed. Wherever the crystal-clear water bubbles and gurgles over a rock-strewn

bed one may expect to find this large and lively crab between and beneath the algæ-covered stones, though its discovery is rendered difficult by its protective coloration. The dark brown upper surface of the carapace is mottled with pale greenish yellow, which is still more abundant on the legs. Often the crabs appear to be a dirty, yellowish gray. The tips of the shears are purplish; the abdomen and adjoining parts are usually a dirty, yellowish white, sometimes with a few purple markings on the former.

"It is probably to be found in suitable sites in all the watercourses of the West African Rain Forest. Some of these crabs were infested with hydroid-like parasites." (H. L.)

Potamon (*Potamonautes*) *lirrangensis* Rathbun

Plates XXV, XXVI, Figure 3; Text Figure 8

Potamon (Potamonautes) lirrangensis RATHBUN, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, Pl. xiv [vi of Potamonidæ], fig. 8; 1905, (4) VII, p. 169.

Localities.—The different lots of *P. lirrangensis* taken at Stanleyville are as follows. August 14, 1909; 1 ♀; "above dark greenish blue, joints of big shears vermilion." August 14, 1909; 1 ♂; caught at the edge of the Congo River. 1 ♀ young; "above greenish blue." August 18, 1909; 1 ♂; "dark brownish blue, abdomen yellowish white." August 28, 1909; 4 ♀ ♀; "dark bluish brown above." August 1909; 1 ♀. September 3, 1909; 1 ♂. February 1915; 2 ♂ ♂, 12 ♀ ♀ (2 ovig.). April 1915; Nos. 832, 833, 834, 836, 839; 4 ♂ ♂, 19 ♀ ♀ (6 ovig.). April 1915; Nos. 835, 838, 840; 3 ♂ ♂, 14 ♀ ♀ (3 ovig.); from the Congo River. April 1915; No. 837; 1 ♂, 2 ♀ ♀ (1 ovig.); the male was regenerating the smaller cheliped.

Range.—This species was described from a single adult female of moderate size, taken at Liranga, French Congo, at the confluence of the Ubangi with the Congo. We have at hand from the present collection sixty-seven individuals, all from Stanleyville and vicinity, which is situated twice as far as Liranga from the mouth of the Congo, and near its union with the Tshopo River.

Balss¹ reports the species from Kituri, upper Lualaba (headwater of the Congo), Katanga region, which is in the southernmost part of the Belgian Congo.

Measurements.—Male (February 1915): length of carapace, 44.7; width of same, 62.6 mm. Female (No. 836): length of carapace, 45.6; width of same, 61 mm. The

¹1914, Zool. Jahrb., Syst., XXXVII, Heft 4, p. 404.

smallest specimen taken (August 18, 1909) is a male, 22.9 mm. long, 30 mm. wide. The eggs vary in diameter from 1.8 to 2 mm.

Description.—*P. lirrangensis* is of the same general type as *P. dybowskii*: the sutures in the center of the carapace are deep; the anterior portion of the mesogastric region is distinctly outlined; and the median groove crossing the postfrontal crest is equally as deep as in *dybowskii*. However, the cervical groove is ill defined after leaving the mesogastric region; the groove dividing the branchial region in two is not accented; the narrow part of the mesogastric region tapers to a point; the postfrontal crest is more transverse than in the foregoing species, its edge is more sinuous and outwardly more crenulate and does not form a tooth at the outer end. Behind the crest the lateral margin is rough with numerous sharply marked acorn-shaped denticulations which point forward and are consequently oblique to the margin. Outer orbital angle narrow, acutangular, outer margin denticulate; orbital margin subparallel to crest; a deep U-shaped notch under orbital angle; margin of frontal lobes rather regularly arched.

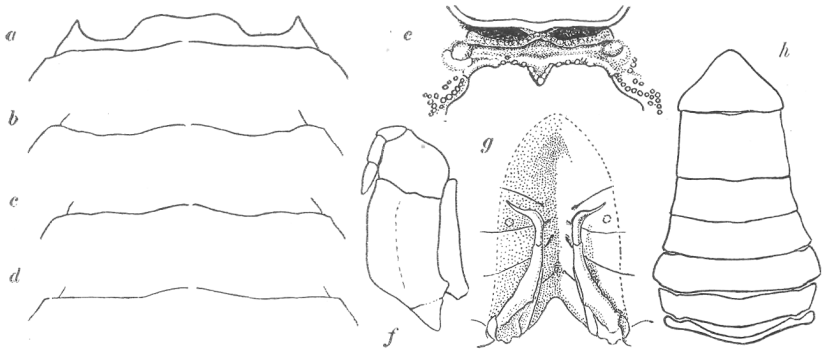


Fig. 8. *Potamon (Potamonauies) lirrangensis*, Stanleyville.

A, crest and anterior margin of carapace of female 56.6 mm. wide; b, crest of female 58.6 mm. wide; c, crest of female 54.3 mm. wide; d, crest of female 61 mm. wide (crests shown without crenulations); e, epistome of male 58.2 mm. wide; f, outer maxilliped of same; g, appendages of first abdominal segment, in sternal cavity, of same male; h, abdomen of same.

The median teeth of the anterior and the posterior margins of the epistome are triangular and longer in an axial direction than the corresponding teeth in *dybowskii*.

Mandibular palp two-jointed; terminal joint simple. Ischial furrow of outer maxillipeds easily visible though not deep; merus longer and narrower than in *dybowskii*, its antero-external margin less oblique.

Chelipeds of adult male very unequal; the sharp and more or less denticulated spine of the merus on the inner surface is just below the middle of the inner margin. Two sharp, good-sized spines on the inner margin of the carpus, the posterior spine smaller than the anterior. The palms increase but little in height distally; the fingers are longer than the middle of the palm in both chelae, slightly deflexed, little gaping, gradually tapering, armed with irregular teeth, in general alternating large and small, the largest teeth of the immovable finger more distally placed than those of the dactylus; the fingers are dark colored, the color persisting in alcohol, the darkest shade being next the horny tips and followed usually by a lighter band than the main brown shade of the fingers.

The ambulatory legs are more slender than in *P. dybowskii*; the male abdomen is wider, its terminal segment is less narrowed in the distal half, the outer margins therefore less concave.

The larger chela of the female is much stouter and shorter than that of the male; this is an anomaly, as, in this family as well as in most other crabs, the major as well as the minor cheliped of the female is slenderer and feebler than the corresponding member of the male. The excessive development of the major claw in the female *lirrangensis* may indicate the need for a defensive weapon in an inhabitant of the main body of the Congo.

In some specimens, No. 833, the postfrontal crest curves well forward at the outer end, so that in the largest female, it reaches as far forward in that place as at the middle. In other individuals, the crest bends backward near the outer end, as in a female, No. 832. In still others, the crest is very sinuous, as in a female taken August 28, 1909.

"The favorite haunts of *Potamon (Potamonautes) lirrangensis* are in large rivers near their banks or wherever drifting logs and similar material is caught; also in shallow water where canoes are habitually fastened and where the natives dump their refuse. At Stanleyville they were common in such sites both above and below the falls. In the Tshopo River, at low water, they were fairly numerous among the rocks and boulder fields above the falls, but apparently were absent from the shallow water on the sandy flats below.

"The deep blue shade on the upper surface is especially bright in newly hardened carapaces, but later turns to a distinctly brown or even greenish tint. The lower side is pinkish blue with gray and the joints on the inner side of the big shears are vermilion." (H. L.)

***Potamon (Potamonautes) stanleyensis*, new species**

Plate XXVI, Figures 1 and 2; Text Figure 9

Type locality.—Stanleyville, from the small affluents of the Tshopo River; April 1915; No. 841; 11 ♂♂, 15 ♀♀, 91 young.

Holotype.—Male (Amer. Mus. Nat. Hist.).

Locality.—Upwards of 250 specimens of all ages were taken at Stanleyville as follows. August 21, 1909; 5 young; "carapace above, dark water-green; towards abdomen more grayish; limbs greenish gray above; abdomen whitish gray." April 1915; No. 833; 4 ♂♂, 2 ♀♀; from brooks. April 1915; No. 841; 11 ♂♂, 15 ♀♀, 91 young; from the small affluents of the Tshopo River. April 1915; No. 843; 1 ♀ with newly hatched crabs, 10 young. April 1915; Nos. 844, 847, 859, 890, 925, 928, 944; 4 ♂♂, 1 ♀, 51 young. April 1915; Nos. 845, 846; 1

♂, 6 young; from forest brook. April 1915; No. 932; 9 ♂♂, 5 ♀♀, 45 young; one very small specimen has a break in the postfrontal crest. May 1915; No. 945; 1 ♂ young. Bafwamoko; September 14, 1909; 1 ♀; found in the same brook as *P. dybowskii*.

Measurements.—Male holotype: length of carapace, 25.2; width of same, 34.7 mm. Largest male, No. 845: length of carapace, 28; width, 39.4 mm. Female, No. 841: length of carapace, 30; width, 40 mm.

Diagnosis.—Front not more than one-third as wide as carapace. Carapace cordiform, rather flat, little granulate below. A shallow, outer, suborbital sinus. Merus of outer maxillipeds nearly as long as broad.

Description.—A rather small species. The carapace is moderately convex from front to back and from side to side; the areoles of the middle are well marked; mesogastric region distinctly delimited; cervical suture stopping a little behind postfrontal crest. Crest most advanced at middle, where it is divided by a deep groove; slightly oblique on either side and nearly straight up to a small, shallow sinus, just within the outer angle which is devoid of a tooth; the edge is smooth to the naked eye, but very finely crenulate. The lateral margin behind the crest is also smooth to the naked eye, but the lens shows minute, distant denticles. The lateral margin in front of the crest is sinuous and discontinuous with the margin behind the crest.

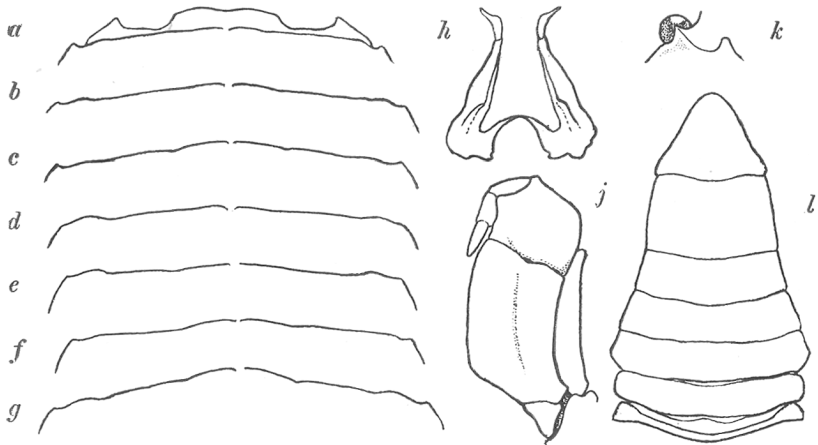


Fig. 9. *Potamon (Potamonautes) stanleyensis*.

a, crest and anterior margin of carapace of female 30.6 mm. wide, Bafwamoko; *b*, crest of carapace of male 31 mm. wide; *c*, crest of female about 36 mm. wide; *d*, crest of female 38 mm. wide; *e*, crest of female 39 mm. wide; *f*, crest of male holotype 34.7 mm. wide; *g*, crest of male 24.2 mm. wide; *h*, appendages of first abdominal segment of holotype; *i*, outer maxilliped of same; *k*, lateral and slightly ventral view of left orbit showing sinus below outer angle of same female as *c*; *l*, abdomen of holotype.

The edge of the front is bilobed, the lobes arcuate and forming an angle with the side margins of the front. The distance between the angles on the two sides is less than one-third the width of the carapace, while the posterior width of the front is just one-third the width of the carapace. The upper margin of the orbit slopes forward and outward and is sinuous. The outer orbital tooth is much less produced than the front; the notch below it is broad, and shallow; lower margin entire.

The mandible is two-jointed, the terminal joint simple. The groove on the ischium of the outer maxillipeds is deep and near the middle but not parallel to either margin; it stops short of either end of the segment; the merus is nearly as long as it is broad, the angle at which the anterior and the convex outer margins meet being itself rounded off.

The chelipeds of the adult male are unequal. The tooth on the inner surface of the merus, near the distal upper corner, is pyramidal, denticulated, and bluntly pointed. There are two conical, sharp spines on the inner margin of the carpus; the secondary one is much smaller and is followed by a few denticles. The larger palm is much swollen, its lower margin very convex; the smaller palm has similar features but less pronounced. Fingers long, deflexed, tips crossing, prehensile edges slightly gaping, their teeth irregular; in general, a few larger teeth alternate with two or three smaller ones, except at the proximal end where three or four teeth increase in size from the palmar end of the finger; the largest tooth is on the immovable finger.

Ambulatory legs of moderate length, rather slender; the merus of the second leg is three and two-fifths times as long as wide.

The sixth segment of the male abdomen is nearly as long as the seventh. The latter is subtriangular, broader than long, the margins only slightly sinuous and the tip rounded. The appendages of the first segment are strongly bent outward at the tip in the shape of a goose head.

This species is near *P. (Potamonautes) perlatus*,¹ but is flatter and more cordiform. It is also a much smaller species. The front is narrower; there is a sinus, though a shallow one, in the orbital margin below the outer angle; the lower surface of the carapace is smoother, having no bead granules on the suborbital and subbranchial regions; the merus of the outer maxillipeds is squarer, its length approaching its width; the ambulatory legs are narrower.

It is akin also to *P. (Potamonautes) anchietæ*² from Portuguese West Africa, but differs from it (according to Capello's figure) in its smaller size, narrower front, more oblique and more uneven crest, and in not having a distinctly denticulated anterolateral margin.

In some cases there is a slight prominence in the postfrontal crest just before it reaches the outer sinus. Sometimes there is an arching forward in place of the sinus, or sometimes the existence of the sinus produces a little tooth at the outer angle at the junction of the crest and the lateral margin. On the other hand the crest may be almost straight.

The females run larger than the males. The fingers are less deflexed and usually more nearly meet.

The young in the mother's apron (No. 843) are very narrow, the carapace of one measuring 3 mm. long by 3 mm. wide. The front is longer than in larger specimens and is very slightly bent down. The

¹1905, *Nouv. Arch. Mus. Hist. Nat., Paris*, (4) VII, p. 163, Pl. xiv [vi of Potamonidæ], fig. 4.

²Brito Capello, 1870, *Jorn. Sci. Lisboa*, III, p. 132, Pl. II, fig. 11.

carapace is strongly areolated and the crest relatively feeble and sinuous, divided into three scallops each side of the middle. Chelipeds equal and similar; ambulatory legs very slender.

In the smallest free-living specimen obtained (No. 928) the same characters exist but the carapace has already widened, being 4.3 mm. long by 4.7 wide. Three larger specimens (No. 928) are, respectively, 8 by 9.5 mm., 9 by 11.2 mm., and 12.4 by 15.2 mm.

The young, up to about 25 mm. wide, are covered with a very short, coarse, but not dense, pubescence. The epigastric portion of the post-frontal crest has often a tendency to separation from the protogastric portion, either by an emargination or by a broader depression of the crest itself. The crest is often more oblique than in the adult and shows more variation in individuals; it is also rougher or slightly more crenulate than in the adult. The lateral margins are minutely roughened or denticulate; those microscopic denticles which at older stages are imbedded in the smooth margin are, in the young, projecting, and visible with a low-power lens or even with the naked eye.

At about 25 mm. wide the crab changes color, from a very dark brownish green (in alcohol) to a much lighter, yellowish green (in alcohol).

“This medium-sized species is fairly common in the more shallow forest brooks (Pl. LXIV), a habitat which also attracts *P. (Potamonautes) dybowskii* and other forms. It, however, prefers places along the edge of the current, where dead branches and leaves, as well as overhanging green vegetation, create a semi-nocturnal environment even during hours of bright sunshine. At low water such sites are shared only with shrimps, smaller fishes, and a few water-snakes, while the larger forms of this fluviatile fauna retreat into the deeper holes and washouts.

“The general tone of the carapace above is dark green, that of the abdomen gray, and the big shears and limbs greenish gray on the upper side. This crab is not very active when adult, perhaps trusting to its protective coloration and immobility, but the much paler young scamper into hiding readily and prefer the more stagnant and even miry places.” (H. L.)

Subgenus **POTAMON**

Epigastric and postorbital crests not continuous; the former may be more or less in advance of the latter, or they may be in the same line and well developed, even having a sharp edge, but separated by a notch.

Lateral epibranchial spine distinct.

Potamon (Potamon) ballayi (A. Milne Edwards)

Plates XXVII, XXVIII, Figure 1; Text Figure 10

Thelphusa ballayi A. MILNE EDWARDS, 1886, Bull. Soc. Philom. Paris., (7) X, p. 149; 1887, Ann. Sci. Nat., (7) IV, Zool., p. 132, figs. 2 and 2a.*Potamon ballayi* DE MAN, 1898, Ann. Mus. Civ. Stor. Nat. Genova, (2) XIX, p. 436 [55].*Potamon (Potamonautes) ballayi* RATHBUN, 1900, Proc. U. S. Nat. Mus., XXII, p. 284.*Potamon (Potamon) ballayi* RATHBUN, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, p. 294, text-fig. 27, Pl. XII [IV of Potamonidæ], fig. 9.

Locality.—All the specimens from this expedition were taken in the neighborhood of Stanleyville as follows. August 28, 1909; 1 ♂, "dark brown above with a tinge of red, lighter near edge of carapace." April 1915: No. 833, 1 ♂, 1 ♀, "common in brooks"; No. 840, 10 ♂♂, 21 ♀♀; No. 841, 44 ♂♂ (1 with abnormal claw), 55 ♀♀ (2 with newly hatched young), from affluent of Tshopo River; No. 843, 10 ♂♂, 14 ♀♀ (1 with newly hatched young); No. 844, 1 ♂, 6 ♀♀, from forest brooks; No. 846, 5 ♂♂, 3 ♀♀, from forest brook; No. 932, 31 ♂♂, 29 ♀♀, 6 young; No. 934, 3 ♂♂, 7 ♀♀; No. 944, 4 ♂♂, 8 ♀♀, 2 young; No. 945, 4 ♂♂, 2 ♀♀; No. 946, 4 ♂♂, 6 ♀♀. Bottle 79, 4 ♂♂, 8 ♀♀ (1 ovig.), 1 young.

Range.—Previously taken in the French Congo at Ngancin¹ (type locality) and Gaboon.

Measurements.—Largest male (No. 846): length of carapace, 19.8; width 30 mm. Largest female (No. 932): length of carapace, 21.1; width 30 mm. Diameter of eggs (No. 841), 1.5 to 1.7 mm.

Diagnosis.—Carapace smooth, suboval. An epibranchial spine present. Postfrontal crest broadly, but not sharply, interrupted behind the outer angles of the front. No furrow on ischium of outer maxillipeds.

Description.—A small species. Carapace suboval, smooth, punctate; H-shaped depression in middle of carapace deep; cervical suture deep in the middle of its length; it stops anteriorly before reaching the postfrontal crest and posteriorly before reaching the inner branchial lobe. The anterolateral margin is an arcuate, granulate line interrupted by a small, sharp, forward-pointing spine at the postfrontal crest and by a very slight sinus in front of the spine; postlateral margin concave. The crest is in general oblique, its outer half margined and advanced at an angle directly behind the external tooth of the orbit; its inner half divided into an epigastric portion which is blunt and well marked, followed by a section in which the crest is almost obsolete; the median furrow is broad and deep and is continued backward for a little distance,

¹The original description of *P. ballayi* states that this species "habite le ruisseau du poste Ngancin (Mission de Brazza, avril 1884)". In April 1884, Dr. Ballay, one of de Brazza's companions, was at Nganchu, a poste on the right bank of the River Congo, opposite Kwamouth, according to the account of 'French Explorations in the Ogowe-Congo Region' published in 1886, Proc. Roy. Geogr. Soc. London, N. S., VIII, pp. 770-778. Ngancin is therefore to all appearances a misspelling for Nganchu. This locality is spelled Nganchouno on the map of the French Congo published in 1884, Petermanns Mittheilungen, XXX, Pl. XII. On more recent maps it is often given as Ganschu. (H. L.).

forming the acuminate point of the mesogastric region. The front, measured at its lower angles, is one-third the width of the carapace, bilobed, its sides oblique. Upper margin of orbit oblique and sinuous, outer angle short, broad, and obtuse-angled, the orbit having a strong dorsal inclination; a very shallow outer emargination.

Mandibular palp three-jointed, last joint simple; exognath of outer maxilliped long and plumose. No furrow on ischium of endognath; outer margin of merus arcuate, forming a slight angle with anterior margin.

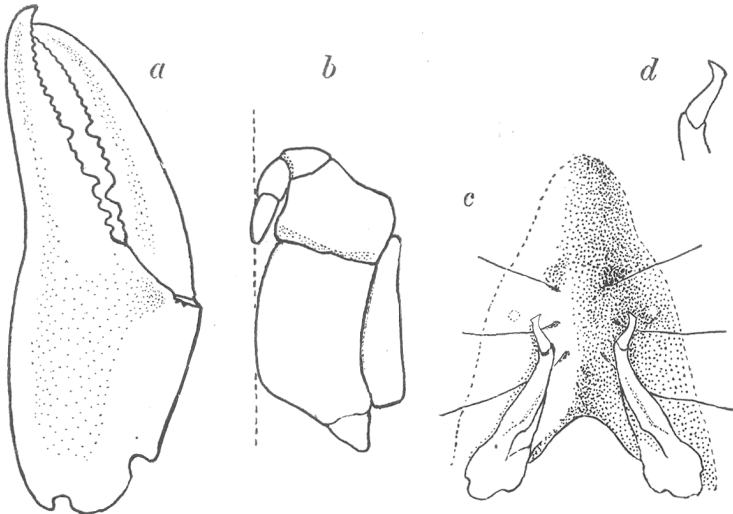


Fig. 10. *Potamon (Potamon) ballayi*, male, Stanleyville.

a, left, major chela of specimen 26.6 mm. wide; *b*, outer maxilliped of specimen 26 mm. wide; *c*, appendages of first abdominal segment, in sternal cavity, of same specimen; *d*, tip of one of these appendages, more enlarged.

Chelipeds very unequal; spine at distal, anterior corner of lower surface low, conical, granulated. Primary spine of carpus conical, acuminate; secondary spine very small, conical. Larger palm of male swollen; fingers elongate, deflexed; dactylus longer than middle length of palm; gape wide in old males; one, two, or three larger teeth on the basal half of each finger. Smaller chela of male much feebler than larger one; margins of palm subparallel; fingers almost horizontal, dactylus just as long as middle length of palm; fingers not gaping; teeth minute. The two chelipeds of the female are nearly of a size, but the major one shows a slightly swollen palm, and uneven prehensile teeth, with the gape scarcely more than in the minor chela.

Ambulatory legs of moderate size; a few spines towards the distal end of the dactyls are noticeably larger than the remainder.

The male abdomen is broad at base, subtriangular, the sixth and seventh segments having partially concave sides; the sixth segment is about half as long as its proximal width and about two-thirds as long as its distal width; seventh slightly longer than sixth segment.

The carapace of the newly hatched young (No. 843) is 3.2 mm. long by 3.5 mm. wide; the grooves of the carapace are deeper than in older

specimens; the front, between the eyes, is squarer and less deflexed and shows three deep longitudinal furrows, the median furrow and one on either side leading back from the lateral angle; the postorbital portion of the crest is not well marked, the outer angle of the orbit is not at all produced, and the epibranchial spine is very feeble.

The smallest specimen collected (No. 932), except those just from the egg, measures 4.5 mm. long and 5.5 wide. It has already taken on many adult characters; it is true that the front is long and little deflexed, but it lacks deep, longitudinal furrows; the postorbital portion of the crest is sharp-edged; the outer angle of the orbit is produced and the epibranchial spine well developed.

In some instances, an epibranchial spine is suppressed, as in female, No. 843 (left spine), or lacks a sharp tip, as in male, No. 843 (right spine).

In an old male, No. 841, carapace 19.7 by 28.9 mm., the epibranchial tooth has almost disappeared, remaining on both sides as a low, blunt tubercle; the postorbital part of the crest is almost blunt; the secondary spine of the carpus is reduced to a low tubercle on the larger cheliped and is obsolete on the smaller cheliped; the palm increases greatly in width toward the distal end, the fingers are widely gaping, the immovable finger much deflexed, all the prehensile teeth much worn and very short.

An old male, No. 843, a little smaller than the above, has similar epibranchial tubercles and blunt postorbital crests. The outer orbital angle is less advanced than usual, and there is no sinus below it.

In adult males, but not the oldest, the gape of the fingers is moderate and the enlarged basal teeth are larger than in more gaping fingers.

One male, No. 841, has the large chela abnormally developed; the fingers are strongly arched, the propodal finger curving abruptly down from the palm. When the fingers are widespread, the distance between their tips is 17 mm., between their middles 22 mm.

The figures given by A. Milne Edwards do not adequately represent the species. In reality, the epibranchial spine is very tiny and inconspicuous and the carapace bows out strongly behind it. The crest is not so sharply marked, so even, nor so regularly curved as in the figure. The outer angle of the orbit is not so pointed nor so produced as there represented. The figure does not show the secondary spine on the carpus of the chelipeds nor the prehensile teeth of the fingers.

"These crabs were common about Stanleyville in all the more shallow forest brooks (Pl. LXIV) and probably have a much wider distribution than our collecting would imply. It was only in that place that we

took crabs in greater numbers and specially dammed various brooks in native fashion, gathering below such barriers all specimens we could secure with small native nets. It is probable that they can live out of water and are only dependent on a certain amount of moisture. When disturbed they instantly cover themselves with mud or secure protection beneath any object." (H. L.)

Subgenus **GEOTHELPHUSA** Stimpson

Geothelphusa STIMPSON, 1858, Proc. Acad. Nat. Sci. Philadelphia, X, p. 100 [46].

Epigastric and postorbital crests either obsolete, or only partially developed; that is, the epigastric crests slightly developed, while the outer portion of the post-orbital crest may be very distinct, even sharp-edged, but separated by a considerable smooth space from the epigastric crest.

Lateral epibranchial spine either indistinct or obsolete.

Potamon (Geothelphusa) congoënsis, new species

Plates XXVIII, Figure 3, XXIX; Text Figure 11

Type locality.—Nepoko River, above Gamangui; February 1, 1910; 1 ♂.

Holotype.—Male (Amer. Mus. Nat. Hist.).

Localities.—French Congo: Libreville, Gaboon; February 1916; J. P. Chapin, collector; A4518; 4 ♂♂, 2 young. The remainder are from the Belgian Congo. Poko; 10 ♂♂, 17 ♀♀ (one with newly hatched young). Bafwabaka; December 31, 1909; 3 ♂♂, 1 ♀; "above a dark glossy purple, nearly black." Nepoko River, above Gamangui; February 1, 1910; 1 ♂ holotype. Near Bafwasende; September 28, 1909; 1 ♂; "above reddish brown, limbs grayish, abdomen bluish white." Affluent of the Tshopo River, near Stanleyville; No. 884; 1 ♀.

Measurements.—Male holotype: length of carapace, 29 mm.; width, 44 mm. Female (Poko): length of carapace, 23.3 mm.; width, 31.6 mm. Smallest specimen except those just from the egg, female (Libreville): length of carapace, 13.1 mm.; width, 17 mm.

Diagnosis.—Postfrontal crest almost transverse at outer end. Front bilobed. An outer orbital sinus present. Ischial furrow of outer maxillipeds shallow.

Description of old male.—Carapace suboval, smooth, covered with large punctæ visible to the naked eye; depressions in center of carapace deep, also the midbranchial groove and the short median groove which parts the crest; anterior mesogastric region tectiform. A pit on either side at the widest part of the mesogastric region; another pit on the protogastric region in a longitudinal line with the articulation of the eyestalk. Epigastric lobes blunt, oblique, separated by a smooth area from a short, feeble, crenulated crest which begins behind the cornea (when the eye is flat in the orbit) and is continued almost transversely to the lateral margin. In front of it and behind the outer orbital angle, there is a rounded seal-like pit. Edge of front dis-

tinctly bilobed, sides oblique, forming an angle with the anterior edge. Upper margin of orbit sloping backward and outward a little, sinuous; outer angle of orbit obtuse, little prominent, the outer sinus is broad, shallow and rounded at bottom; lower edge transverse, regularly tuberculate or crenulate. Anterolateral border of carapace lightly margined, coarsely punctate; the portion in front of the crest is curved downward; posterolateral border with a deep concavity.

Palp of mandible two-jointed; terminal joint simple. A shallow furrow on the ischium of the outer maxilliped, a little nearer the inner than the outer margin; outer margin of merus arcuate, forming a slight angle with the anterior margin; exognath bearing a long, plumose palp.

Chelipeds very unequal; superodistal prominence on inferior surface of merus low, surmounted by a bead tubercle, with two or three tubercles clustered around it; primary spine of carpus short, conical, acute; secondary spine very small, broad, and situated at the end of a denticulate ridge. Larger propodus one and one-half times as long, through the middle, as its distal or greatest height; lower margin convex; propodal finger curved, deflexed; fingers armed with small irregular teeth, and widely gaping. The fingers of the smaller chela almost meet when closed.

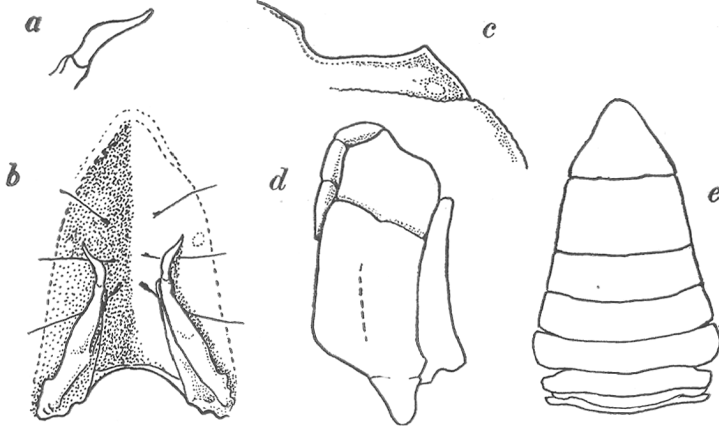


Fig. 11. *Potamon (Geothelphusa) congoënsis*, male.

a, tip of appendage of first abdominal segment of specimen 40.2 mm. wide from Bafwabaka; *b*, appendages of same segment, in sternal cavity; *c*, anterolateral portion of carapace showing extent of postorbital crest, of Bafwasende specimen 36 mm. wide; *d*, outer maxilliped of same specimen as *a* and *b*; *e*, abdomen of same.

The spines of the dactyli of the ambulatory legs increase in size toward the tip of the segment.

The transverse groove on the sternum which connects the two maxillipeds is very deep; behind it, on either side, a short, deep groove runs inward just in front of the cheliped.³

Abdomen narrow-triangular; sides of fifth and sixth segments feebly or partially concave; sides of terminal segment more deeply concave. The extremity of the appendages of the first segment curves outward and is produced in a slender tip.

Newly hatched specimens.—Carapace, 2.7 mm. long, 2.9 mm. wide. Lateral margin (from the anterolateral to the posterolateral angle) gently convex; antero-

lateral angle not advanced; crest wanting; front long, little deflexed, its sides subparallel, a deep median furrow throughout its length, back to the mesogastric region, which is completely delimited.

The short, sharp, outer crest may be lacking altogether (one male from Bafwabaka) or, as more often happens, may be continued inward as far as a point behind the articulation of the eyestalk (male from Bafwasende). In specimens of medium size, the crest is more oblique or directed more backward and outward than in the old. Occasionally the crest is a little scalloped. In some specimens the intermediate portion of the mesogastric region is more definitely limited (female from Bafwabaka). The protogastric pits may be very slightly impressed. In carapaces of 35 mm. in width and less the anterolateral margin is sharply margined and denticulate in inverse proportion to the size. The outer sinus of the orbit may be more distinctly V-shaped than in the old, but even then, it is a little rounded at the base. In smaller specimens the ischial furrow of the maxilliped is deeper. In many adult, but not full-grown, individuals the deep, oblique furrows of the sternum are continued quite to the abdominal cavity. In male specimens of medium size and age (carapace up to 36 mm. wide), the major cheliped is not strikingly larger than the minor one, and the gape of its fingers is moderate.

This species is related to the East African species *emini*,¹ of which I have no specimens at hand for comparison. *Emini* was never figured by Hilgendorf, its author, and I am doubtful whether the Selti specimen which I tentatively referred to this species in 1904 and 1905 is really conspecific with the types.

P. emini is a much smaller species than *congoënsis*; its postorbital crest is short and directed forward at the outer end; the lower edge of the front is nearly straight; the furrow on the ischium of the outer maxilliped is deeper.

P. congoënsis is also very close to *P. (P.) didieri*,² although placed in a different subgenus. When specimens of similar size are compared, the carapace is wider in *congoënsis* in relation to its length, but is more constricted posteriorly. The epigastric lobes are more oblique and are separated from the intermediate part of the crest by a wider interval; the intermediate part of the crest is less sharply marked; the outer part is straighter, less sinuous. The sides of the front are much more convergent and, in consequence, its lower edge is much narrower than in

¹*Telphusa emini* Hilgendorf, 1892, Sitzungsber. Ges. Naturf. Freunde Berlin, p. 11. *Potamon (Geothelphusa) emini* Rathbun, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, Pl. xviii [x of Potamonidæ], fig. 9; 1905, (4) VII, p. 209, text-fig. 49.

²*Potamon (Potamonautes) didieri* Rathbun, 1904, Nouv. Arch. Mus. Hist. Nat., Paris, (4) VI, Pl. xiv [vi of Potamonidæ], fig. 9; 1905, (4) VII, p. 170.

didieri. The anterolateral regions are considerably smoother than in *didieri*. The anterolateral margin of the merus of the outer maxilliped is more angular; in *didieri* that margin is a single curve to the insertion of the palpus. The exognath is shorter, not reaching beyond middle of merus.

"The nearly black upper surface of the carapace shows a distinct purplish hue which is much paler on the big shears. The limbs are mottled with dirty yellow; the eye-stalks have an orange tint. Most of the under side is pale grayish yellow, somewhat stronger than that on the abdomen and lower side of the legs. About the mouth-parts the color is a grayish blue. At Poko specimens of *Potamon (Geothelphusa) congoënsis* were caught in small native fish-traps baited with decomposed manioc to attract the small silurids in one of the heavily forested affluents (Pl. LXIV) of the Bomokandi River." (H. L.)

***Potamon (Geothelphusa) perparvus*, new species**

Plates XXVIII, Figure 2, XXX; Text Figure 12

Type locality.—Stanleyville; August 12, 1909; 2 ♂♂.

Holotype.—Male (Amer. Mus. Nat. Hist.).

Localities.—This species was taken only at Stanleyville and vicinity. The different lots were distributed as follows. August 21, 1909; 2 ♂♂ (1 is holotype); "dark brown, lighter toward abdomen, with tinge of red; shears a tinge of purple; abdomen whitish gray." From affluent of Tshopo River; April 1915; No. 841; 2 ♂♂, 1 ♀ young. From forest brooks; April 1915; No. 844, 1 ♂, 1 ♀; No. 847, 3 ♂♂, 1 ♀. April 1915; No. 932, 1 ♀ immature; No. 944, 3 ♀♀. May 1915; No. 945; 1 ♂.

Measurements.—Male holotype: length of carapace, 13.6; width of same, 19.6; fronto-orbital width, 13.7 mm. Largest female, No. 944: length of carapace, 12.4; width of same, 17.2; fronto-orbital width, 12.6 mm.

Diagnosis.—Postfrontal crest curved forward at outer end. Edge of front with a small median lobe. Maximum width of carapace about 2 cm. No outer orbital sinus. Ischial furrow of outer maxillipeds deep.

Description of type male.—Although the specimens are all small, the larger ones appear to be full grown. The carapace is very convex, the anterior portion inclined strongly downward, the lateral portions inclined moderately. Surface rather densely punctate; furrows deep on posterior half, the cardiac region wholly delimited; the furrow crossing the branchial region at its middle is noticeable, as is also one just in front of its posterior margin. Epigastric lobes low and smooth; a short carinated crest is situated behind the outer half of the orbit; it is nearly parallel to the orbital margin, is lightly sinuous and reaches the lateral margin of the carapace.

The margin of the front (between the eyes) is not visible in a strictly dorsal view, but, when the carapace is tipped back a little, it is seen to be sinuous, or trilobed,

there being a small median lobule; viewed from in front, the edge is nearly transverse; it meets the slightly oblique lateral edges with a rounded angle. Upper margin of orbit sinuous and directed forward and outward to the outer angle, which is obtuse and not at all prominent. The lateral border of the carapace is margined as far back as the widest part of the carapace, where it fades out gradually; that part of the margin lying in front of the crest curves strongly downward.

There is no sinus in the outer margin of the orbit. The lower surface of the carapace is almost smooth (devoid of granulation). The efferent branchial openings are large in proportion to the size of the crab and are transversely oblong. The mandible has a two-jointed palp, the last joint simple. The ischium of the outer maxillipeds is deeply furrowed, the furrow being approximately at the middle of the segment but a trifle nearer the inner edge: the merus is distinctly wider than long, outer margin very arcuate, anterior margin, outside the articulation of the palp, almost transverse. The palp of the exognath is of good length.

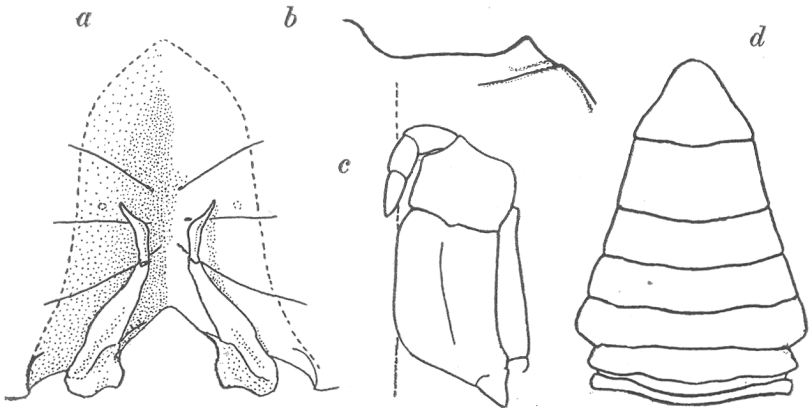


Fig. 12. *Potamon (Geothelphusa) perparvus*, male, 18.3 wide, Tshopo River.

A, appendages of first abdominal segment, in sternal cavity; b, anterolateral portion of carapace showing extent of postorbital crest; c, outer maxilliped; d, abdomen.

Chelipeds very unequal; protuberance at upper distal angle of lower surface stout, conical, tuberculate; two conical spines on the carpus, the secondary one much the smaller; larger palm much swollen, fingers moderately gaping, their fine, triangular, prehensile teeth interspersed with three or four larger ones. The smaller palm is inflated laterally but scarcely in a vertical direction, and the fingers have a very narrow interspace.

The anterior sternum has two deep, hairy grooves, one between the maxillipeds, the other a broken line which nearly touches the tip of the abdominal cavity.

The male abdomen tapers regularly from the third to the sixth segment inclusive, but the triangular seventh segment is a little wider at its base than the adjacent part of the sixth segment. The appendage of the first segment is similar to that of *P. (G.) congoënsis*.

This species is the counterpart in West Central Africa of *P. (G.) emini* (see page 424) of East Central Africa. It resembles *emini* in its

small size and in many other characters; the principal difference is that the fronto-orbital distance is greater than in *emini*, more than two-thirds of the width of the carapace instead of just two-thirds, and that the lateral margins are much less bowed outward. The regions of the carapace are more strongly defined than in *emini*.

P. (G.) perparvus is also related to *P. (G.) congoënsis*, but is more convex and of smaller size; the upper median point of the epistome is produced in the edge of the front so as to form a median lobe in the latter, a lobe which does not exist in *congoënsis*; the postfrontal crest curves forward at its outer end almost parallel with the orbital margin, while in *congoënsis* the crest is transverse or inclines a little backward at that point. *P. perparvus* has no outer orbital sinus, *congoënsis* has one; the former has a deep furrow on the ischiognath, the latter a shallow one; the groove bordering the distal end of the male abdominal cavity is pointed in *perparvus*, arcuate in *congoënsis*.

The chelipeds of the adult female are very small, subequal, and partake more of the character of the minor cheliped of the adult male. The same is true in general of immature individuals of both sexes. However, a male only 14.9 mm. wide, No. 847, shows a decided inequality in chelipeds.

The anterolateral margin of the carapace of all but the largest specimens is sharper and more denticulate than in the type and shows a definite posterior termination on the dorsal surface.

The efferent branchial openings vary from transversely oblong to oval (female, No. 844).

"Taken from a forest brooklet, the first left affluent below the falls of the Tshopo River near Stanleyville (Pl. LXIII). The shallow bed was only a few feet across at most and the running water hardly as many inches wide. The whole was practically covered by abundant vegetable débris with only a few blotches of white sand between and here and there little stagnant pools. These environmental conditions would rather encourage partially land-living habits. The smooth, roundish, unarmed carapace of this tiny crab should facilitate getting about among moist leaves. The dark brown color of the upper surface has a tinge of red and is lighter toward the abdomen. The big shears are purplish and the abdomen is whitish gray." (H. L.)

Subgenus **ACANTHOTHELPHUSA** Ortmann

Acanthothelphusa ORTMANN, 1897, Zool. Jahrb., Syst., X, pp. 299, 300.

Anterolateral borders of carapace strongly lacinate or spinose. Upper border of merus of chelipeds without a subterminal spine. The crest may be unbroken as in *Potamonautes* or interrupted as in subgenus *Potamon*.