Contributions to Indian Carcinology.—On Indian and Malayan Telphusidæ, Part I,—*by* James Wood-Mason *of Queen's College, Oxford.*

(With Plates XI and XII.)

[Read 5th April, received 25th April, 1871.]

In the year 1869,* M. Alphonse Milne-Edwards published a Revision of the genus *Telphusa* with descriptions of some new forms which brought up the number of known species to thirty-six.

In 1868,† E. von Martens (in a paper entitled "*Ueber einige Ost-asiatische Süsswasserthiere*" described *T. Borneensis* from the rivers of Borneo.

In this, the first part of my paper on the Telphusidæ, which will be continued in succeeding numbers of the Journal, I shall give descriptions of fifteen new species; of which two belong to Milne-Edwards' sub-genus *Paratelphusa.*

For the opportunity of drawing up these descriptions, I am especially indebted to my friend, Dr. F. Stoliczka, who has also added to the Museum collections under my care many interesting species of marine Crustacea; to Dr. Francis Day; to my colleague Dr. J. Anderson who collected several species during the Yunan expedition; to Major Godwin-Austen and to Captain Stewart-Pratt of Morar; to Messrs. W. T. Blanford, V. Ball, H. L. Houghton and above all to that indefatigable observer Mr. S. E. Peal of Sibsaugur who has so greatly enriched the collections of the Indian Museum in every group of the Arthropoda.

The Telphusidæ are essentially fresh-water Crustaceans, but in India are commonly called land-crabs from the circumstance that many of the species are able to live for a very considerable time out of water, far removed from rivers, tanks, marshes, jhíls, &c., provided that the air that enters the branchial chamber is sufficiently saturated with moisture to prevent the branchiæ from becoming desiccated, and so unfitted for the performance of their respiratory functions. My freind, Captain Stewart Pratt, forwarded to me, at the commencement of the present hot season, specimens of *Telphusa*

* Nouvelles arch. du Mus., 1869, tom. V, p. 161—191, pl. 8—11.
† Wiegmann's Archiv für Naturg., xxxiv, Jahrg., 1 Bd., p. 18.

Indica which he had obtained from holes dug by the crabs in the neighbourhood of water; the bottoms of these holes were found to be below the level of the neighbouring water, and there appears to be good reason for believing that these creatures deepen their holes *pari passu* with the change in the level of the water, so that moisture sufficient for the maintenance of their branchiæ in a state fit for respiration may reach their retreats. Col. Sykes' account* of the so-called land-crabs of the Dekhan, prefixed to Prof. Westwood's description of *Telphusa cunicularis* = *Indica*, Latr., gives a good idea of the terrestrial habits, the prodigious numbers, and the extent of the burrowings of these creatures.

Stimpson,† influenced by the feeble development of the post-frontal crest and by the absence of the epibranchial teeth in certain species, but especially by their terrestrial habits, gave them the generic appellation of *Geotelphusa*. But, as M. Alphonse Milne-Edwards justly remarks, there appear to be no sufficient reasons for the foundation of this new genus, the definition of the limits of such an artificial group being difficult, because there are species possessing all the essential characters of *Telphusa*, in which the frontal crests become more and more obliterated and the epibranchial teeth scarcely perceptible.

The land-crabs, properly so-called, belong to the Gecarcinidæ, a family of the Crustacea grapsoidea of Dana (= Catometopa, M. Edw., *minus* Telphusiens), and are well known from the accounts of the extraordinary periodical migrations of the species of the West Indian genus *Gecarcinus* to the sea for the purpose of depositing their eggs or brood. This family is represented in India by *Cardisoma* which is widely distributed, and by *Gecarcinuca Jacquemontii*, M.—Edw., occurring in great numbers in company with *Telphusa Guerini*, M.—Edw., at Khandalla in the Western Ghâts.

Dana in his great work on the Crustacea, acknowledging the greater affinities of Telphusidæ to the Cancroidea, to which they are united by such forms as *Eriphia*, removed them from their

* Trans. Entom. Soc. Lond. vol. i, p. 181.
† Proc. Acad. Nat. Sc. Phil. 1858, p. 179.

association with the GRAPSIDÆ in the CATOMETOPA, and placed them in their more natural position next to the CANCROIDEA TYPICA under the legionary name of the TELPHUSINEA or CANCROIDEA GRAPSIDICA, on the ground that they possess the same number of branchiæ, a similar abdomen, and have the male copulatory organs similarly inserted in the basilar joint of the last pair of ambulatory legs, and covered from their origin by the abdomen. The TELPHUSIDÆ, however, evidently constitute a transition between the CANCROIDEA TYPICA and the GRAPSOIDEA, as may be seen from their general Grapsoid form.

The family TELPHUSIDÆ is divisible into the following genera and subgenera:—

TELPHUSA, (Syn. *Geotelphusa*): *Hab.* Southern Europe, Africa, India and its islands, Burma, China, Australia, Chili.

PARATELPHHSA: *Hab.* South-Eastern Bengal, Assam, Burma, Pegu, China, Siam and the Indo-Malayan Archipelago.

BOSCIA, DILOCARCINUS, SYLVIOCARCINUS, POTAMOCARCINUS, TRICHODACTYLUS, &c.: *Hab.* Tropical America.

DECKENIA: *Hab.* Eastern Africa (Zanzibar). This genus resembles the TELPHUSIDÆ in the development of the branchial regions and in the position of the male copulatory organs, but the structure of the external maxillipedes and position of the efferent orifices of the branchial cavities recalls the disposition of these parts in the Oxystomatous Crustacea.

Of the developmental history of the TELPHUSIDÆ nothing is, I believe, known, and I extremely regret that I have not yet had an opportunity of making observations on this head; but this I can say, that the ova are of large size and few in number. Whether, however, direct development without metamorphosis is correlated with the large size of the eggs and their fewness in number, as in the single instance amongst the Brachyura (in *Gecarcinus*), investigated by Prof. Westwood, or whether the young commence their existence as Zoëas, as in another species of the same genus, noted by Thomson, must be left for future observations. Arguing from what happens in the case of fresh-water branchiferous Gasteropods,* the

* Troschel, Hand. der Zoologie.

young of which possess no ciliated buccal lobes, while these are possessed by the allied LITTORINIDÆ, and from other instances in which fresh-water allies of marine animals, which do undergo a metamorphosis, are ametabolous, it is probable that the young of the TELPHUSIDÆ leave the egg in a condition differing but little from that of their parents.

CRUSTACEA CANCROIDEA.

TELPHUSINEA VEL CANCROIDEA GRAPSIDICA.

Fam.—*TELPHUSIDÆ.*

Genus.—TELPHUSA, Latreille.

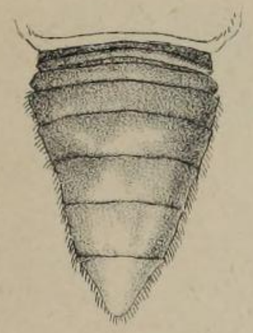
Diagnosis.—Carapace broader than long, with the interregional furrows little marked, with the exception of the cervical suture which is occasionally very deeply impressed. Front deflexed, generally with a straight free margin; orbits large with their infero-internal angle sending upwards a stout vertical tooth to about against the antennæ, which are exceedingly small and lodged in the inner canthus of the eye. Antennulary pits pretty long, but very narrow. External maxillipedes large with their third joint subquadrate, with the antero-internal angle truncated and giving insertion to the fourth joint. Sternal region almost as long as broad. Abdomen of both males and females constituted by 7 free somites.

Sub-genus.—PARATELPHUSA, M.-Edw.

The species referable to the subgenus *Paratelphusa* are further characterized by the presence of an acute spine on the superior angle of the meropodites of the chelipedes, situated just behind the constriction near the distal articular end of the joint; the inferior angles of the joint being rounded off, and devoid of the tubercles which are invariably present in *Telphusa*.

Paratelphusa Dayana, n. sp. Pl. XI.

The carapace is much broader than long, the greatest breadth being measured between the points of the last epibranchial tooth, extremely convex, smooth, punctate, and appears finely granular under an ordinary lens. The branchial lobes are greatly swollen and are not sub-divided into anterior and posterior divisions; the mesial crescentic portion of the cervical suture is distinctly marked



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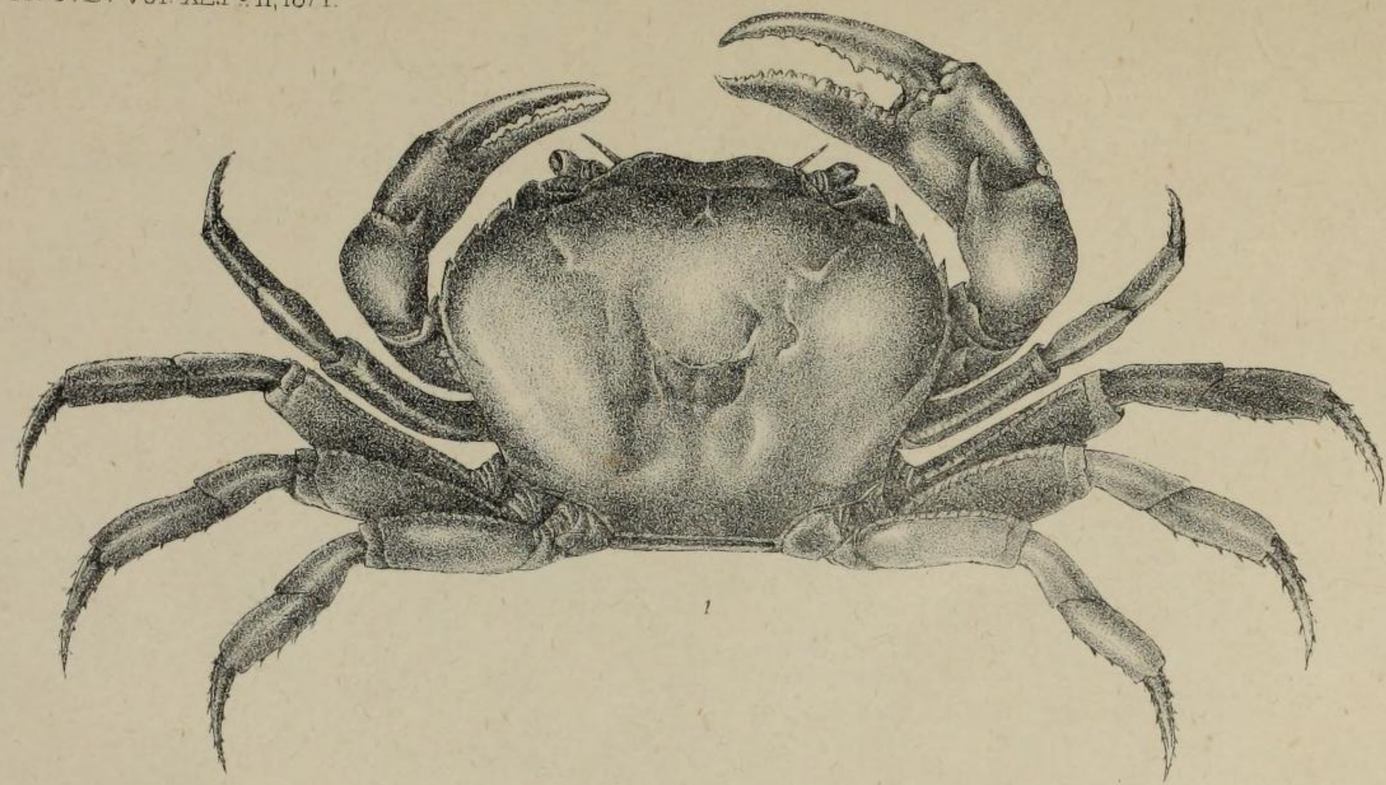

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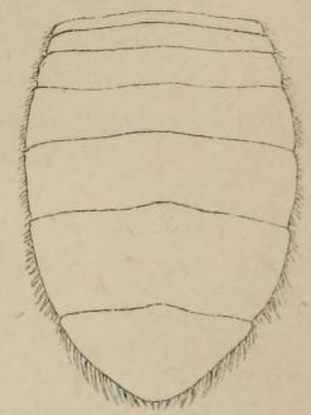

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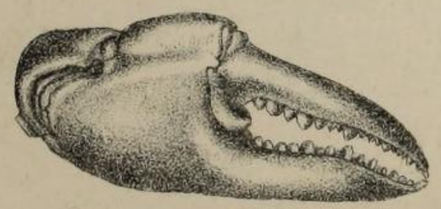

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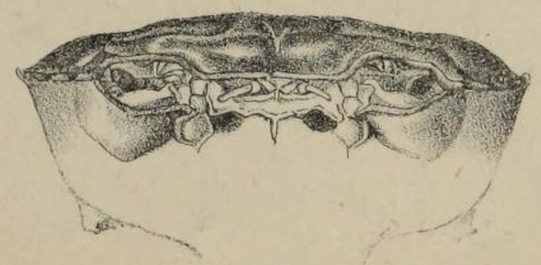

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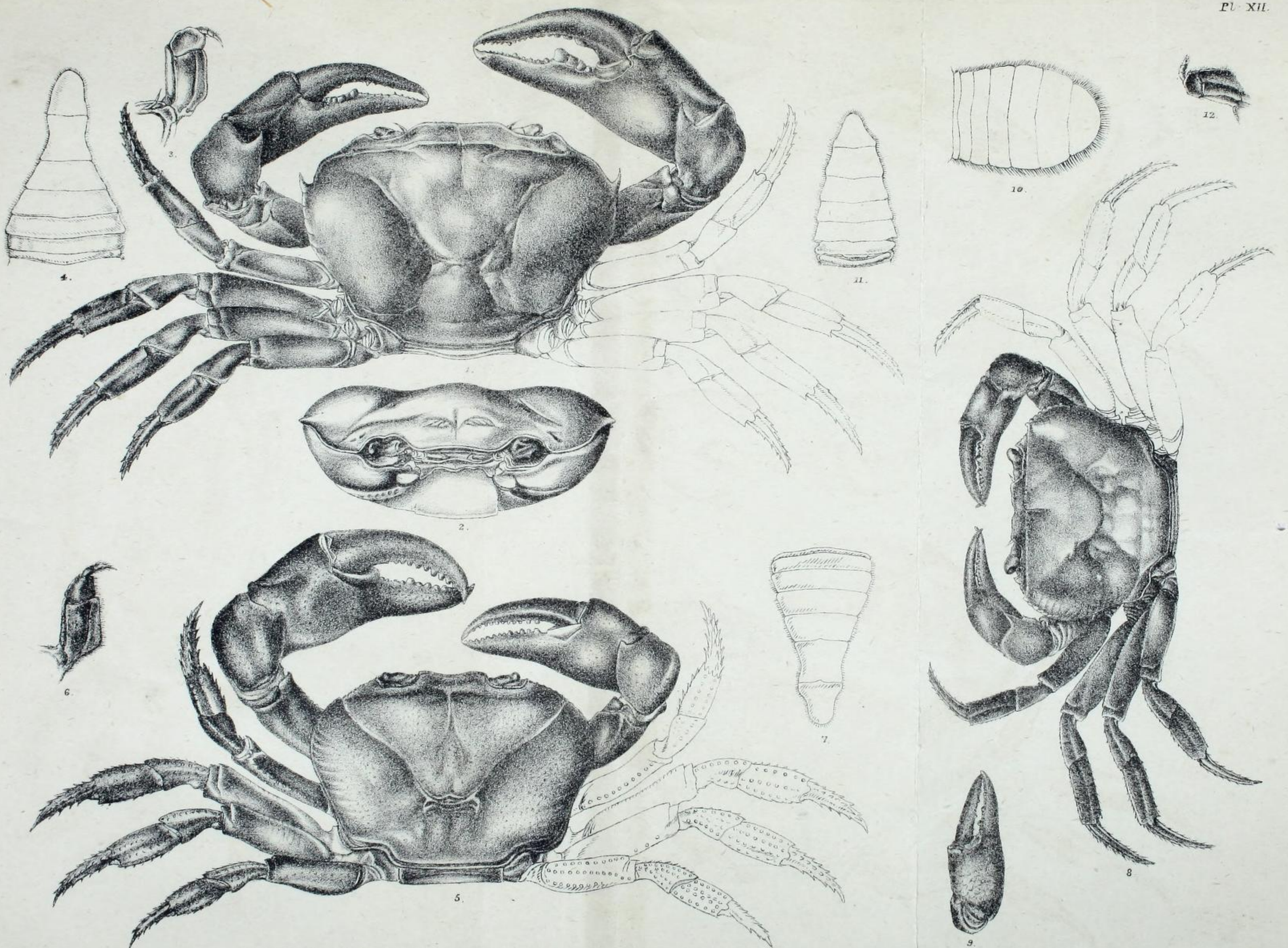
S. Sedgfield. Lith.

Paratelphusa Dayana. n. sp.

Calcutta



1-4. *Paratelphusa spinigera*, p. 194. 5-7. *Telphusa lugubris*, p. 197. 8-12. *Telphusa Stoliczkana*, p. 199.

and continued nearly to the level of the last epibranchial tooth, where it ends to appear again opposite the second tooth, whence it passes to the edge of the post-frontal crest which it but faintly indents. The post-frontal ridge is well marked and, between the point at which its edge is notched by the passage across it of the cervical suture and the anterior epibranchial tooth, is crenulated; the cardiac lobe is marked off from the branchial by two shallow almost linear depressions on each side of the middle line, and in front from the urogastric by a line curving almost concentrically with the convexity of the cervical suture. The epigastric lobes are slightly wrinkled or foveate anteriorly, and advanced beyond the line of the post-frontal crest as in *Paratelphusa spinigera*, and separated from one another by the mesogastric suture, which rapidly bifurcates as it passes backwards, appearing as a short V-shaped impression on the carapace, the space intercepted between the arms of the V being the point of the narrow anterior prolongation of the mesogastric lobe.

The antero-lateral margins are inclined and armed, not counting the blunt extra-orbital tooth with its curved external margin, each with four acute, spiniform epibranchial teeth of which the most anterior is the largest; the rest are equal in size to, and equidistant from each other; from the last a short well defined keel, obscurely crenated on its inner edge, passes backwards and inwards on to the carapace which is marked with a few small straggling tubercles along the line of the epibranchial spines. Front very broad especially at base, punctate, finely granular and transversely wrinkled, its free margin is bayed in the middle line, but not greatly lamellar and projecting forwards over the epistomial region, as in *Paratelphusa sinensis*, M.-Edw., and in *P. spinigera*.

The inflected portion of the carapace is finely tuberculated anteriorly; anterior pleural lobe distinct and almost devoid of tubercles; posterior pleural smooth, thickly granulated where it bounds the anterior pleural.

The anterior boundary of the epistoma is crenulated; its posterior margin is notched on each side of the middle line from which a long sharp process extends downwards between the palpiform appendages of the external maxillipedes; this process does not

correspond exactly with the triangular process of the epistoma in other species of *Telphusa*, but is the greatly developed median palatal ridge; externally to each notch the posterior margin of the epistoma forms two distinct lobes with granulated edges. The second joint of the external maxillipedes is punctate and its external margin crenulated. The third joint is much broader than long and has its external and anterior angles well rounded off and distinctly granular; the exopodite is crenulated on its internal margin. The abdomen of the male differs greatly from that of *Paratelphusa spinigera*, having the form of an isosceles triangle.

The chelipedes are greatly unequal in size, both in males and females, especially in the former; the meropodites have their ventral angles rounded off as in *Paratelphusa spinigera*, their outer or posterior face rugose, their posterior angle also rugose and armed with a sharp spine arising just proximally to the constriction near the distal articular end; carpopodites faintly rugose above, armed with a single excessively long, stout spine; penultimate joint obsoletely tubercular above, externally and internally all but smooth; in the larger claw a considerable hiatus exists between the dentated margin of the prolongation of this joint and that of the dactylopodite, which in the smaller claw is throughout its length in complete contact with the immoveable arm of the pincers.

The terminal joints of the ambulatory legs are extremely slender, acute, and armed with fine sharp spines.

Breadth, ...	42 mm.
Length, ...	31 mm.

Hab. Mandélé and Prome, Upper Burma.

Plate XI. Fig. 1. *Paratelphusa Dayana*, of the natural size; 2. Front view. 3. External view of right chela. 4. External maxillipede. 5. Abdomen of the male. 6. The same of a female.

PARATELPHUSA SPINIGERA, Pl. XII, Figs. 1-4.

'*Thelphusa spinigera*,' White, MSS. List of the specimens of Crustacea in the collection of the British Museum, p. 30, (no description).

Carapace very greatly broader than long, smooth except on the postero-lateral margin which bears numerous wrinkles; these are con-

tinued neither on to the inflected portion of the carapace, nor on the posterior pleural region; front broad, punctate, projecting pent-house fashion over the antennulary pits between which it wholly forms the broad septum; its free margin is sinuous, presenting mesially a broad shallow bay; orbital borders indistinctly crenulated; the anterior pleural or subhepatic regions are faintly marked off from the inflected portion of the carapace which bounds them externally, while they are most distinctly separated from those portions of the posterior pleural lobes which pass forwards, so as to form the parallel boundaries of the buccal frame by a deep groove, running outwards and backwards from the epistoma; this is deeply excavated and its posterior margin sends backwards in the middle line a short broad-based triangular projection. The extra-orbital angle is somewhat obtuse and is widely separated from the single acute forwardly directed epibranchial spine, in the rear of which is a very short smooth crest. Branchial lobes enormously swollen and not subdivided, separated from the gastric region by the deeply impressed cervical suture which does not pass through the postfrontal crest; this subsides without reaching the acute, arched antero-lateral margin, and is interrupted by the advanced position of the epigastric lobes; these are in front rugose and faintly distinguishable from the rest of the gastric region, but separated from one another by a short mesogastric furrow. A very deep muscular impression is visible at each postero-lateral angle of the gastric area. Cardiac region convex, distinct. Two large puncta, which frequently become confluent, mark the post-frontal furrow behind the external canthus of the eye. Chelipedes smooth and extremely unequal both in males and females, in some the right, in others the left being the larger; meropodites are smooth and their angles rounded, the upper one only being slightly rugose and bearing proximally to the constriction at its distal extremity a sharp spine, as in the rest of the species of the subgenus. The upper surfaces of the carpopodites are transversely convex; their inner margins armed with an exceedingly stout sharp spine; the penultimate joint is internally smooth, convex and punctate, the puncta being disposed in longitudinal series; the dactylopodites are slender, much curved, longitudinally punctate, minutely granular and only in contact with the extremity of the produced

portion of the preceding joint in adult individuals. The ambulatory legs and the dorsal edges of their meropodites are perfectly smooth.

Breadth, ... 58 mm.
Length, ... 40 mm.

Hab. I found this interesting species exceedingly abundant in the tanks of Calcutta. It has recently been collected by my servant, who accompanied Dr. Day on a trip to the upper waters of the Ganges, at Hurdwar and at Roorkee, where it lives in the river itself and in the contiguous ponds and marshes.

Plate XII. Fig. 1. *Paratelphusa spinigera* of the natural size. 2. Front view. 3. External maxillipede. 4. Abdomen of the male.

Telphusa Indica.

Telphusa Indica, Latreille, Encyclo. Méth., Insectes, t. X, p. 563;—Guérin-Méneville, Iconographie du Règne animal, Crust., pl. iii, fig. 3;—Milne-Edwards, Hist. Nat. des Crust., t. II, p. 13; and Voy. de M. Jacquemont dans l'Inde, p. 7, pl. ii, fig. 1—4;—Alph. Milne-Edwards, Révision du genre *Thelphusa* et description de quelques espèces nouvelles.

Thelphusa cunicularis, Westwood, Trans. Entom. Soc., London, vol. i, p. 183, pl. xix, fig. 1—6.

The largest specimen in my possession measures in a straight line in breadth 83 mm., in length 59 mm., and was collected with two others at Singhur near Poona in running water. It was in this neighbourhood also that M. Jacquemont collected his specimens. Col. Sykes, in his account of the land-crabs of the Dekhan, prefixed to Prof. Westwood's description of the species under the name of *Thelphusa cunicularis*, mentions its occurrence in the same place, and in all the valleys and on the most elevated tablelands of the Ghâts at from 2,000 to 5,000 feet above the sea-level, and is of opinion that it does not extend more than fifteen or twenty miles to the eastward of the Ghâts. Mr. W. T. Blanford has, however, brought specimens from S. E. Berar, west of Chanda, and I am indebted to Mr. V. Ball for examples from near Chota Nagpúr. One of the Museum collectors lately obtained individuals from Ranígunj, a place within 120 miles of Calcutta. On the Parisnáth hill it occurs up to about 3,000 feet. It is as yet

unknown from any place of the south part of India, or from Eastern Bengal. The 'Tille Naudon' of the Coromandel coast with which it has been said to be identical, is certainly not *T. Indica*, but, as M. Milne-Edwards has stated, *T. Leschenaultii*, which also occurs at Ranígunj. A fine series of specimens of the present species has lately been received from my friend Captain Stewart Pratt of Morar, who has furnished me with some interesting notes respecting the habits of the species.

Telphusa lugubris, n. sp. Pl. XII, Figs. 5—7.

The carapace is very greatly broader than long, distinctly punctate and somewhat flattened posteriorly; the cervical suture curves forwards and outwards to the rudimentary epibranchial teeth; the hepato-gastric area thus limited off is convex in every direction, and only marked mesially by a long tolerably deeply imprinted mesogastric furrow which exhibits a tendency to bifurcation at its posterior extremity; gastric area marked with two larger puncta, one being situated at each horn of the mesial crescentic portion of the cervical suture, from which two shallow hardly indicated longitudinal depressions pass backwards, one on each side of the middle line dividing the cardiac from the convex branchial regions; the sub-division of these into posterior and anterior lobes is scarcely perceptible. Oblique granulated rugosities mark the whole surface of the branchial area, becoming more numerous on the postero-lateral margin, whence they sweep downwards and forwards on to the floor of the branchial chamber. Latero-anterior margin with a short obscurely granulated carina. Postfrontal crest continuous from the mesogastric furrow to the epibranchial teeth, its epigastric portion is wrinkled and bent forward, and it becomes almost effaced behind the inner canthus of the eyes. Front rough, deflexed, with a sinuous obsoletely granulated free border. Orbits very high, with crenulated margins; extra-orbital angles little developed, separated from the epibranchial teeth by a long, granulated, oblique and nearly straight external border; anterior pleural lobes broad, nearly smooth, distinguishable from the inflected portion of the carapace by the termination of the rugosities with which the latter is ornamented. The epistoma is smooth and lighter in colour

than the rest of the animal, concave both transversely and longitudinally; its posterior margin sends backwards and downwards a short triangular process, but it is not notched.

The external maxillipedes and their exopodites are coarsely punctate, and appear minutely granular under a lens.

The chelipedes are greatly unequal in both males and females, the convex posterior surfaces of the meropodites are excavated into extremely shallow communicating foveæ; the posterior angles are rugose and rounded off; their ventral surfaces have smoothly tuberculated margins. The carpopodites are minutely foveate above, and punctate and armed on the inner margin, with a short obtuse spine; the succeeding joint is punctate, foveate and granular, and its distal prolongation shows more distinctly these characters, and in young specimens only is in contact with the whole length of the dentated inner edge of the dactylopodite; the teeth and tips of the pincers have both the colour and transparency of amber.

The ambulatory legs are punctate; the dorsal edges of their meropodites are scabrous, and nearly straight, the last joints are extremely stout, and well armed with amber-like spines.

The abdomen in general form resembles that of *Telphusa Indica*, or of *Paratelphusa spinigera*.

Breadth, ...	52 mm.
Length, ...	36 mm.

In colour this species is of a rich dark brown above, below lighter but brighter; the inter-articular membranes are straw coloured, and the teeth of the pincers and the spines on the terminal joints of the ambulatory legs are, as has been described, amber-like. The epidermis is very delicate, rapidly cracking and peeling off after death, and on exposure to the air, when removed from the spirits of wine.

Hab. Pankabaree (about 2000 feet at the base of the Sikkim hills); Teesta valley and Eastern Sikkim at 3—4000 ft.; Thancote hills, Nepál; Cherra Punjí in the Khasi hills.

Plate XII. Fig. 5. *Telphusa lugubris* of the natural size. 6. External maxillipede. 7. Abdomen of the male.

Telphusa Stoliczkana, n. sp. Pl. XII, Figs. 8—12.

Carapace much broader than long, smooth, punctate, minutely granular under a lens; cervical suture distinctly marked mesially, continued outwards and forwards on each side as a shallow depression which disappears posteriorly to the postfrontal crest, limiting off the gastric area from the branchial lobes, the anterior halves of which are distinguished from the posterior by their greater convexity; cardiac region perceptible; antero-lateral margin carries a not very salient epibranchial tooth, which is separated from the extra-orbital angle by the oblique tuberculated external margin of the latter, and passes backwards for a short distance as a tuberculated crest; postero-lateral margin covered with rugosities from which spring a few hairs; the inflected part of the carapace is more obscurely rugose; the posterior and anterior pleural lobes are smooth, the latter being separated from the former, and from the inflected portion of the carapace by a granulated line; infra-orbital margins crenulate; front narrow, granulated; its free margin is deeply bayed, having in consequence a bilobed appearance; postfrontal furrow smooth, bounded poteriorly by a well defined crenulated crest which passes from the mesogastric furrow to the epibranchial teeth in an uninterruptedly straight line, that part of it which forms the frontage of the epigastric lobes being rugose.

The posterior margin of the epistoma is smoothly tubercular, but those parts of it which go to form the boundaries of the efferent apertures of the branchial chambers are entire.

The chelipedes are greatly unequal in males and sub-equal in females; the meropodites are rugose and have a few hairs near the base of the posterior angle; the carpopodites are rugose above and bear a strong sharp spine in the usual position and beneath it a smaller one; the pincers are multidentate and their arms cross at the extremities.

The ambulatory legs are very long; their meropodites resemble those of *Telphusa longipes*, Alph. M.-Edwards, but their penultimate joints are longer in proportion to their breadth and the last joints are stouter and more elongated.

Length of the female specimen described, ...	30 mm.
Breadth, ...	40 mm.

Length of a male, ... 36 mm.
Breadth, ... 48 mm.

The greater difference between the length and breadth in the male specimen is only apparent, being entirely due to the greater mesial excavation of the front.

A male and a female of this species were collected during a trip to the Malayan peninsula and presented to the Indian Museum, together with an interesting series of marine Crustacea by Dr. Stoliczka.

Hab. Penang.

Plate XII. Fig. 8. *Telphusa Stoliczkana* of the natural size. 9. External view of right chela. 10. Abdomen of the female. 11, Do. of the male. 12. External maxillipede.

(To be continued in the next number of the Journal.)

JOURNAL

OF THE

ASIATIC SOCIETY.

PART II.—PHYSICAL SCIENCE.

No. III.—1871.

ON INDIAN AND MALAYAN TELPHUSIDÆ, Part I,—

by J. WOOD-MASON, Esq.

(With pl. xiii, and xiv.)

(Continued from p. 200).

Telphusa lævis, n. sp., pl. xiv, figs. 1—6.

The carapace is narrow especially posteriorly, cordiform, smooth, extremely convex in every direction, finely granulated and punctate, unbroken by interregional furrows, the posterior boundary of the gastric area alone being faintly indicated; epigastric lobes hardly perceptible in some specimens; post-frontal ridge feebly developed, interrupted, most apparent behind the eyes; postero-lateral margins rounded off, marked with extremely delicate oblique wrinkles which pass downwards and forwards on to the branchial floor which is much swollen; antero-lateral margins rounded, inclined, bearing rudimentary epibranchial teeth which pass backwards and inwards for a short distance as an obscure, crenulated crest. Front broad, deflexed, terminated by a nearly straight free margin; its anterior third flattened and perfectly vertical. Orbits oval with obscurely crenated margins, not at all salient; their external angles scarcely projecting beyond the general level of the orbital margins; anterior pleural regions convex, finely granulated, separated near their internal boundaries from the rest of the inferior surface of the carapace by a well defined, finely tuberculated line, passing directly

downwards from the epibranchial teeth. The posterior margin of the peristoma has a median rounded projection, notched on each side. The chelipedes are very unequal, in some specimens the right, in others the left being the larger; meropodites with their dorsal edges sharply rugose; carpopodites also rugose with their inner margins armed in the usual manner with a sharp tooth, beneath which is a smaller one; the propodite of the larger claw is extremely convex, smooth, granulated and near its extremity canaliculate, punctate, and with the granulations passing into minute sharp spinules; the dactylopodite is similarly marked and is in contact with the extremity only of the produced portion of the penultimate joint in the larger claw.

The ambulatory legs are thin, slender, and rugose.

Length, ... 16 mm.

Breadth, ... 21 mm.

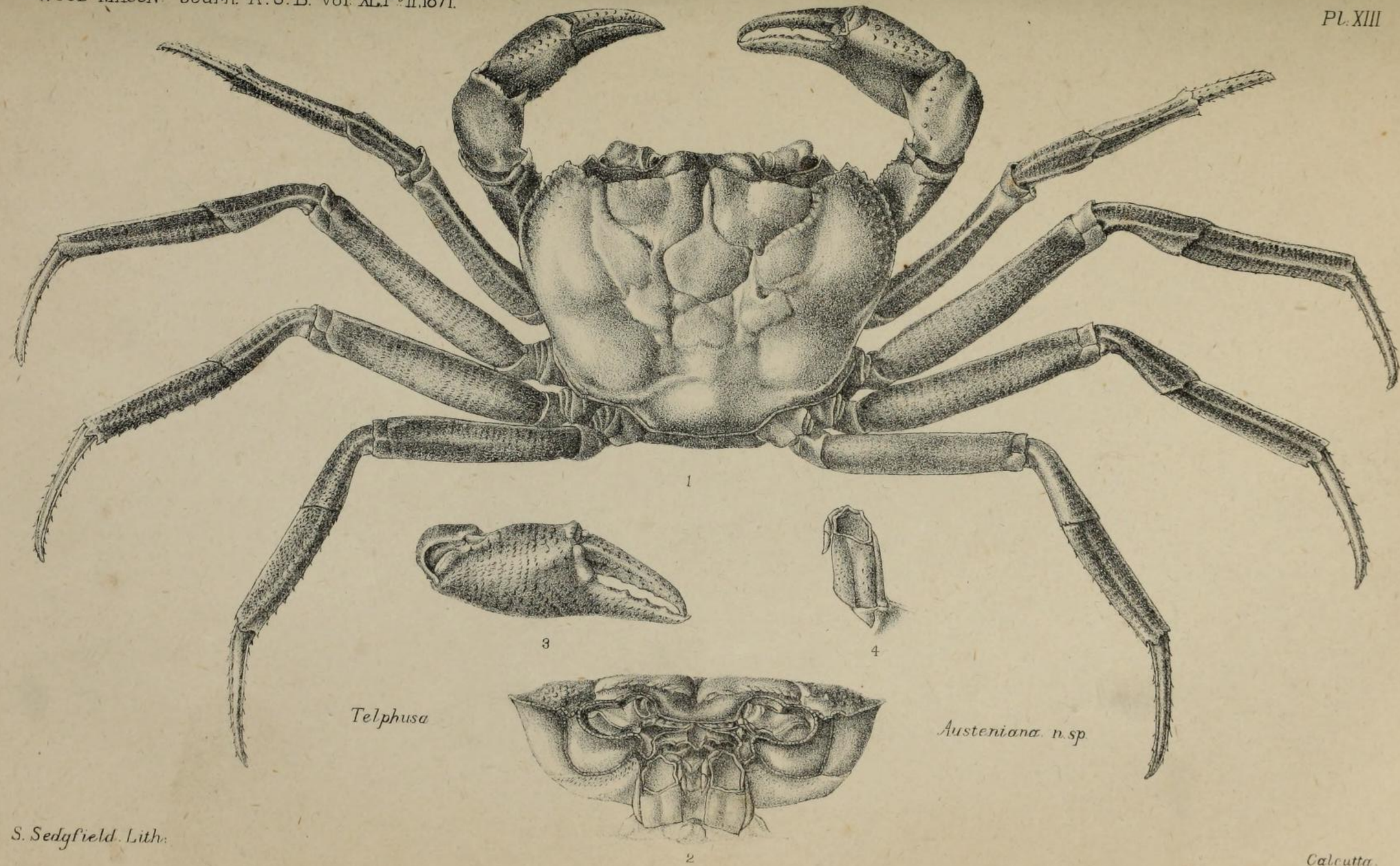
Hab. Cherra Púnjí; Goalparah.

Plate XIV. Fig. 1. *Telphusa lævis*, nat. size. 2. Front view. 3. External maxilliped. 4. Chela. 5. Do. of another specimen. 6. Abdomen of male.

Telphusa Leschenaultii.

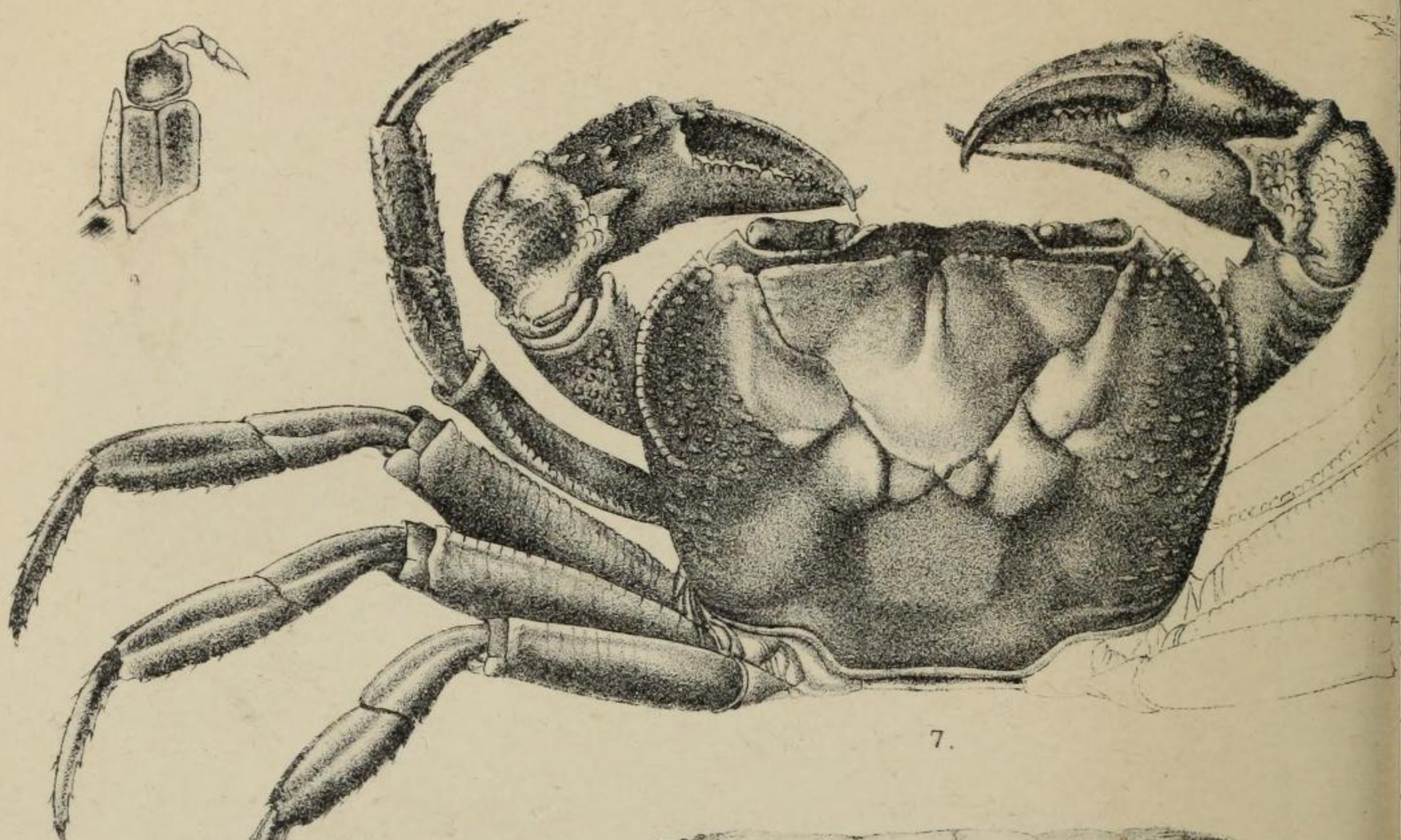
Milne-Edwards, Hist. Nat. des Crust., Tom. II, p. 13, Ann. des Sc. nat., III. Sér., Tom. XX, p. 211. Heller, Reise der Fregatte Novara, Crustaceen, p. 32. Alph. Milne-Edwards, Révision du genre *Thelphusa*, Nouvelles Archives du Muséum, 1869, Tom. V, p. 165, pl. viii, fig. 3, 3a.

Carapace convex from behind forwards and transversely; front broad, especially at base, sinuous, produced, with a sharp chisel-like free edge; anterior boundary of the epistoma almost straight, sending forwards a small median process which indents the sub-frontal lobe, scarcely taking any share in the formation of the inter-antennulary septum; posterior edge divided by two distinct notches into three rounded lobes, the median one of which is largest, lateral lobes internally rounded but passing almost straight outwards to form the anterior boundaries of the orifices for the egress of the water that has served for respiration. Post-frontal crest interrupted, divided into two external larger and two internal slightly advanced smaller portions which together equal in width one of the former; antero-lateral margin armed with an epibranchial tooth



S. Sedgfield. Lith.

Calcutta.



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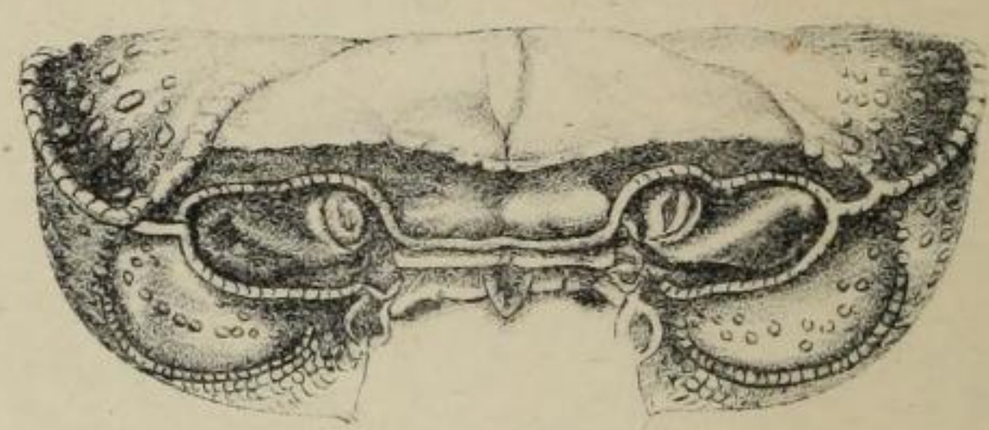

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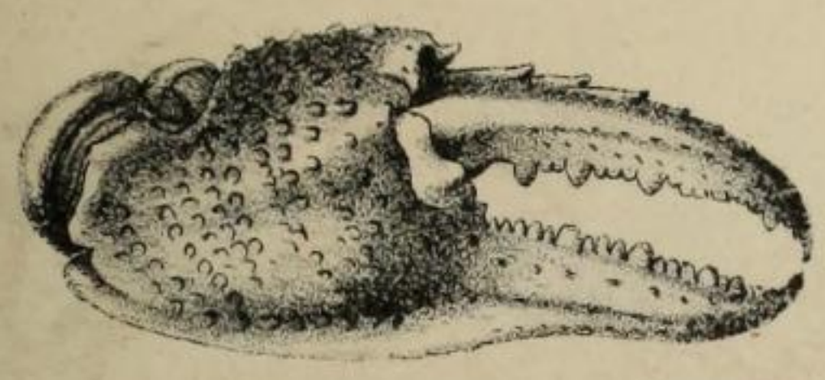
1-6. Telphusa lævis. 7-11. T



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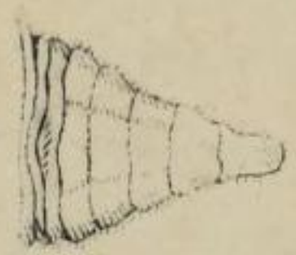

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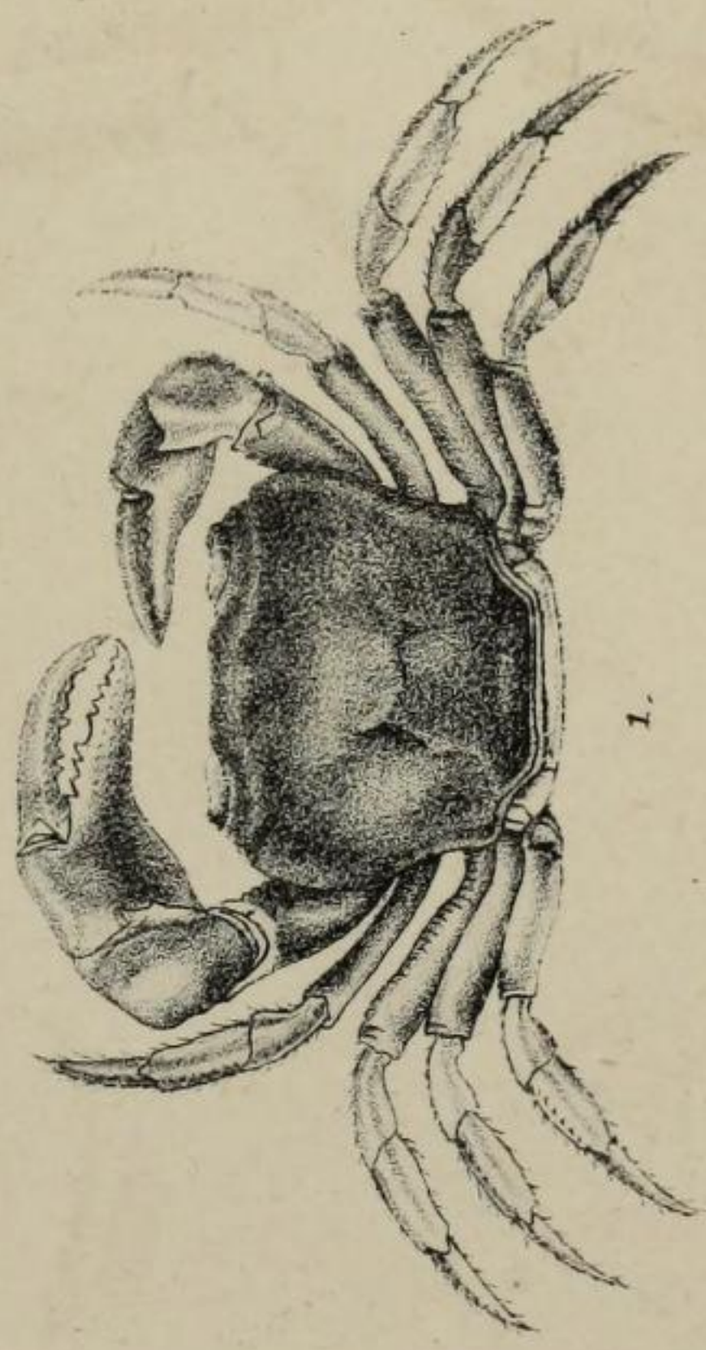

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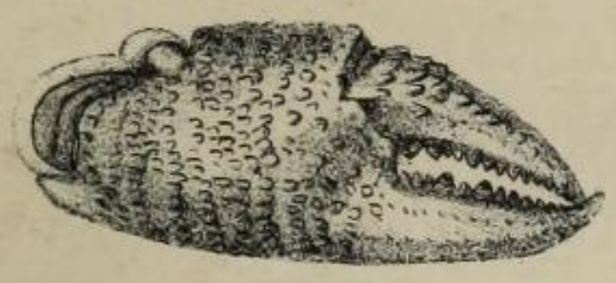

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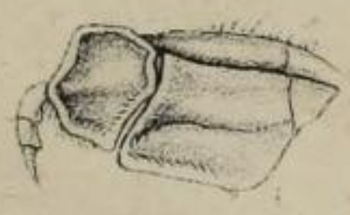

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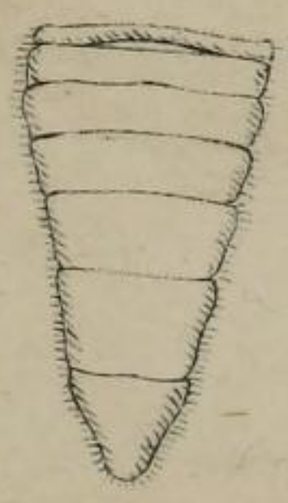


16.

12–16. *Telphusa Atkinsoniana.*

Calcutta.

continued backwards and inwards as a sharp, finely crenulated crest. The surface of the carapace, especially anteriorly, appears minutely granular under an ordinary lens, its sides behind the points at which the cristiform continuations of the epibranchial teeth subside are marked with oblique sub-parallel corrugations. The four posterior pairs of ambulatory legs are extremely thin; the posterior flat faces of their meropodites are raised into coarse granulations, while the anterior surfaces remain smooth; the dactylopodites are extremely slender, acute. Chelipedes subequal, dactylopodites in contact throughout their entire length with the propodites the outer faces of which are smooth and convex; carpopodites furnished internally with a long sharp spine, beneath which is a smaller one; meropodites corrugated on their posterior surfaces.

I am unable to verify Heller's statement that the crest on the latero-anterior margin is smooth in the females.

Hab. Ranígunj; Pondicherry; Madras; Ceylon; Malabar coast; Mauritius; Nicobar Islands and probably many other islands of the Indo-Malayan archipelago; and Tahiti.

Telphusa Guerini.

Telphusa Guerini, Milne-Edwards, Mélanges Carcinologiques, p. 176; Alph. Milne-Edwards, Nouv. Archives du Muséum, 1869, Tom. V, p. 182, pl. xi, fig. 4, 4a et 4b.

Telphusa planata, Alph. Milne-Edwards, Nouv. Archives du Muséum, 1869, Tom. V, p. 181, pl. xi, fig. 3, 3a et 3b.

Telphusa planata is given as a synonym of *T. Guerini*, M.-Edw., with doubt, although M. Alph. Milne-Edwards' description of the former applies exactly to individuals amongst my series of examples of the latter.

Hab. Concan and Khándalla, Western Gháts, near Bombay; Belaspúr.

Telphusa Austeniana, n. sp., pl. xiii.

Carapace much broader than long, flattened in the middle posteriorly to a line passing through its widest part; protogastric lobes convex, separated from one another by the narrow forward prolongation of the meso-gastric lobe; meso-gastric furrow passing into the post-frontal, deeply dividing the two epigas-

tric lobes which are all but confluent with the protogastric : branchial lobes convex, each divided by a transverse valley into an anterior and posterior portion ; postero-laterally to the gastric region the surface of the carapace is raised on each side into an irregular areolet bounded antero-laterally by the epibranchial, behind by the meta-branchial lobe from which the cardiac area is separated by an indistinct longitudinal depression ; post-frontal furrow deeply excavated behind the eyes ; post-frontal crest scarcely interrupted by the advanced position of the epigastric lobes, continued outwards on each side from the meso-gastric furrow in an irregular, rugose line to the epibranchial teeth ; these pass backwards, as prominent dentate crests and, with the extra-orbital teeth, are extremely salient ; orbital margins finely crenated ; front deflexed, wider at base than at its free margin, raised into two eminences one on each side of the middle line ; antero-lateral portions of the branchial regions marked with numerous coarse granulations ; postero-lateral margins and the parts of the carapace which form the floors of the branchial cavities rugose. Chelipedes slender ; chelæ externally rugose, covered, especially on their infero-internal surface, with small rough tubercles. Carpopodites above rugose with a longitudinal row of tubercles near their inner margins, from which there projects a very sharp spine with a smaller one below it. Ambulatory legs enormously long and slender by which character alone it is possible at once to distinguish *T. Austeniana* from all its known congeners.

Breadth, ... 48 mm.
Length, ... 35 mm.

Length of carpopodite of 3rd pair of ambulatory legs = 34 mms. or nearly equal to the length of the carapace.

Hab. Cherra Púnjí ; the only specimen obtained is a female.

Plate XIII. Fig. 1. *Telphusa Austeniana,* nat. size. 2. Front view. 3. Chela. 4. External maxilliped.

Telphusa Pealiana, n. sp., pl. xiv, figs. 7—11.

Carapace thick, not much broader than long, convex from behind forwards; its areolation is similar to that of *Telphusa Atkinsoniana;* the cervical suture cuts through the post-frontal crest about 5 millimetres internally to the epibranchial teeth ; these are moderately salient ; the branchial region is somewhat convex and covered anteriorly with coarse irregular granulations ; antero-lateral margin inclined,

surmounted by an evenly denticulated crest; postero-lateral margin covered with oblique wrinkles which pass forwards and downwards on to the inflected portion of the carapace; posterior pleural lobe, where it is bounded by the anterior pleural, rugose; the latter is limited off by a line of regular bead-like tubercles; post-frontal crest, continuous to the epibranchial teeth from the meso-gastric furrow, curving forwards mesially and at each end; post-frontal furrow smooth behind the eyes; front narrow, deflexed, raised into a bilaterally symmetrical pair of eminences. Chelipedes subequal in the only specimen* (a female) in my possession; the meropodites are tuberculately rugose on their posterior surfaces and their ventral angles are beset with long tubercles; the carpopodites are rugose above and their inner margin is armed with a very sharp long spine from the sides of which spring 2 or 3 minute cusps; beneath the larger spine a smaller one is to be seen. The penultimate joint is externally rough, internally near the inferior margin tuberculated and above presents a few spiniform tubercles; the dactylopodite which is in contact with the other arm of the pincers throughout its length line has a few spinules above near its proximal end.

Length, ... 32 mm.
Breadth, ... 41 mm.

The posterior pair of ambulatory legs has not been preserved, but from those that remain, it will be seen that the penultimate joints resemble slightly those of *Telphusa Austeniana*, and of *T. Stoliczkana*. I have named this species after Mr. S. E. Peal, to whom the Indian Museum is indebted for many novelties in the various groups of Arthropoda.

Hab. Síbsaugor, Assam.

Plate XIV. Fig. 7. *Telphusa Pealiana*, nat. size. 8. Front view. 9. External maxilliped. 10. Chela. 11. Abdomen of male.

Telphusa Atkinsoniana, n. sp., pl. xiv, figs. 12—16.

The carapace is much broader than long, smooth, punctate mesially and posteriorly; the anterior branchial lobe is not greatly swollen above, is covered anteriorly with coarse granulations; epigastric lobes granulated, separated behind and laterally from the granulated proto-gastric and from one another by the meso-gastric

* Several specimens of each sex have been received from Mr. Peal since the above went to press.

furrow; postfrontal crest well developed, most distinctly tuberculated, curving slightly forwards at each end and passing completely into the epibranchial teeth, notched on each side externally to each epigastric lobe and internally to each epibranchial tooth; epibranchial teeth salient, separated from the denticulated margins of the prominent extra-orbital angles by a notch, curving backwards as regularly dentate crests; orbital and frontal margins conspicuously tuberculated; front moderately broad, deflexed, covered with rounded tubercles, smooth in the middle line, terminating in a nearly straight free margin. Postero-lateral margins marked with oblique rugations which gradually assume a tuberculated character as they pass forwards on to the inflected portion of the carapace; anterior pleural lobe beset in the centre with irregularly disposed rounded tubercles, limited off from the surrounding areæ by a regular line of larger bead-like tubercles.

Chelipedes subequal, densely tuberculated; meropodites with all their angles sharply tuberculated; carpopodites above granulately rugose and becoming towards the inner margin tuberculated, the tubercles extending on to the sides of the spine; beneath this spine is a smaller one from which passes upwards and towards the proximal articular extremity of the joint a row of two or three spiniform tubercles; externally the penultimate joint is excessively tuberculately granulated, the tubercles becoming very coarse and irregular in aged specimens, and on the upper border passing into spiniform tubercles in specimens of all ages; the superior margin of the dactylopodites is also beset with spiniform tubercles and their inner toothed margin is in contact throughout its length with the other arm of the pincers; the extremities of these are tipped with a blackish colour which is capable of defying the blanching action of spirit for years.

I will not venture to describe the precise distribution of the colours of this beautiful species, because I omitted to note them particularly when I received the specimen which has been chosen for description fresh from the hands of Dr. Stoliczka, but I can say that the inferior surface generally and the inner aspects of the chelipedes are suffused with a beautiful violet colour, the tubercles and spines offering their bright red tips in remarkable contrast.

Breadth, ... 38 mm.
Length, ... 28 mm.

Hab. Darjeeling; Thancote Hills, Nepal; Khasi Hills (?).

I have much pleasure in connecting with this beautiful species the name of Mr. W. S. Atkinson.

Plate XIV. Fig 12. *Telphusa Atkinsoniana*, nat. size. 13. Front view. 14. External maxilliped. 15. Chela. 16. Abdomen of male.

(*To be continued in the next number of the Journal.*)

Notes on birds observed in the neighbourhood of Nagpore and Kamptee, (Central Provinces), Chikalda and Akola in Berar, —*by Lieut.-Colonel* A. C. McMaster, *Madras Staff Corps.*

[Received 24th February, 1871.]

These rough notes were taken during hunting and shooting trips from Kamptee. The natural history of Chikalda is interesting, as, in addition to many birds and beasts commonly found in the plains, some hitherto supposed to have been restricted to particular localities meet each other on the neutral ground of these hills.

The names and numbers here given are taken from Jerdon's "Birds of India."

No. 6. Neophron percnopterus.—I found this bird breeding near Kamptee in January.

No. 29. Aquila fulvescens.—Kamptee.

No. 38. Circaetus Gallicus.—I saw one of these fine birds attempt to carry off a Cobra in the public gardens at Chikalda; my approach drove the eagle away from the reptile which, however, it had crippled completely.

No. 56. Milvus Govinda.—Jerdon says, that the kite "breeds from January to April, beginning to couple about Christmas." I have seen them building at Kamptee in November, December and January.

No. 65. Syrnium sinense.—I got a pair of these beautiful owls and a fully fledged young one at Gogee in Wurda district, on the 10th of March; they must, therefore, like most other birds of prey, pair early in the cold season.

No. 82. Hirundo rustica.—Kamptee and Nagpore.

Error of Newman's No. 94 *to the Kew and Greenwich Standards.*

Casella's barometer.		With Kew.	With Greenwich.
	No.	Inch.	Inch.
By	628	—.0155	—.0115
,,	632	—.0123	—.0083
,,	637	—.0146	—.0106
,,	627	—.0130	—.0090
,,	634	—.0139	—.0099
,,	635	—.0182	—.0142
,,	630	—.0140	—.0100
,,	631	—.0142	—.0102

If we reject the results afforded by barometers No. 632 and No. 635 which depart somewhat widely from the remainder, the mean of the remaining six comparisons gives the error of Newman's No. 94 — .0142 to the Kew, and — .0102 to the Greenwich Standard. Deducting these from the error, above given, of the same barometer to the Calcutta Standard, and changing the sign, we have the error of the Calcutta Standard as follows :—

Error of Calcutta Standard, Newman, No. 84.

To Kew.	To Greenwich.
+ .0109.	+ .0149.

These amounts, or say .011 and .015 inch, must therefore be deducted from the readings of the Calcutta Standard and all registers corrected thereto, to render them comparable with registers corrected to the Kew and Greenwich Standards respectively.

On Indian and Malayan Telphusidæ, Part I,—
by James Wood-Mason, Esq.

(Continued from page 207).

(With Plate XXVII).

Telphusa Edwardsii, n. sp., pl. xxviii, figs. 11—15.

Carapace sparingly hirsute above, more thickly so on the pleural region, broadest along a line dividing the anterior from the

tubercles decreasing gradually in size and sharpness from the base towards the tip.

The ambulatory legs are hairy as in *Telphusa hispida.*

Breadth, ... $38\frac{1}{2}$ mm.
Length, ... 28 mm.

Hab. Hotha, Yunan; Kakhyen-hills, Ponsee, Upper Burma. Collected by Dr. Anderson.

Plate xxvii, Fig. 11, *Telphusa Edwardsii*, nat. size. 12. Front view of the same. 13. External maxilliped. 14. Chela. 15. Abdomen of male.

TELPHUSA ANDERSONIANA, n. sp., pl. xxvii, figs. 16—20.

Carapace considerably broader than long, very sparingly hirsute, areolation similar to that of the preceding species; anterior branchial region covered with irregular tubercles which gradually pass backwards into the rugations that thickly mark the postero-lateral margin, the inflected portion of the carapace and a portion of the posterior pleural lobe; epigastric lobes separated from one another and from the protogastrics, post-frontal crest curved forwards in the middle; epibranchial teeth well marked and pass backwards on each side as regularly denticulated crests, the denticulations gradually decreasing in size backwards; anterior pleural lobes covered with inosculating *foveæ*, separated from the peristomial portions of the posterior by a tuberculated line which loses its beaded character as it passes upwards to the epibranchial tooth; front broad, especially at the base, tuberculated; its free margin is sinuous, well rounded laterally and coarsely crenated; orbital borders also crenated and rising externally into a salient, forwardly-directed tooth. The median triangular process of posterior border of the epistoma is extremely salient, coarsely crenate, and notched on each side; externally to the notches this posterior border is similarly crenate up to the point at which it begins to form the anterior boundaries of the exhalant orifices of the branchial chambers. Chelipedes subequal; meropodites with their three angles sharply tubercular, their posterior faces rugose and their ventral surface bearing a sharp spinule; carpopodites extremely rugose above, with their inner margins raised into a line of sharp, irregular tubercles above the level of the spine, beneath which an acute smaller one is to be seen, and with their distal articular ends greatly

thickened and rounded as in *Telphusa Edwardsii* to which this species is closely allied; propodites with their upper edge armed with a row of five forwardly-directed spiniform tubercles, externally to which are some small rounded tubercles; the rest of the surface, both externally and internally, is excavated into shallow, inosculating *foveæ*. Above, the dactylopodites are rounded and armed at the proximal end with a small spiniform tubercle, are externally longitudinally canaliculate and can be brought into complete contact with the immoveable arm of the pincers, which is also grooved.

The penultimate joints of the ambulatory legs are longer in proportion to their breadth than those of *T. Edwardsii*.

Breadth, ... 43 mm.
Length, ... 34 mm.

Hab. Momien, W. Yunan, at elevations of from 3500—5000 ft.; Kakhyen-hills, Ponsee, Upper Burma. Collected by Dr. Anderson.

Plate xxvii, Fig. 16. *Telphusa Andersoniana*, nat. size. 17. Front view of the same. 18. External maxilliped. 19. Chela. 20. Abdomen of male.

TELPHUSA HISPIDA, n. sp., pl. xxviii, figs. 1—5.

Carapace much broader than long, flattened above, hirsute, especially on the postero-lateral margins and the posterior pleural lobes; the surface is subpunctate and has an areolation very similar to that of *Telphusa Edwardsii*, but the postero-lateral boundary of the oval areolet is not so deep impressed; the epigastric lobes, as in *Telphusa Andersoniana*, are not distinct from the protogastrics behind; the cervical suture forms a very indistinct divisional line between the hepatic portion of the protogastric and the anterior moiety of the branchial lobe, which is obsoletely tubercular; the epibranchial teeth are by no means salient; the more obscurely denticulated crest of the antero-lateral margin is very little elevated, and the smooth furrow along the inner side of it, which is so noticeable in the former species, is absent; a bundle of short hairs springs from between each denticulation. The anterior is separated from the posterior cardiac lobe by a broad, shallow, transverse channel which extends right across the carapace, and these again are similarly marked off from the posterior halves of the branchial lobes. The post-frontal ridge is well marked, bent forwards in the middle, but is neither continuous to the

epibranchial teeth, nor interrupted by the projection beyond it of the epigastric lobes. The orbital rims and extraorbital teeth, crenulated. Front sinuous, short, not greatly deflexed, truncate on each side, irregularly punctate, minute hairs springing in bundles of 2 or 3 from the puncta. The structure of the epistoma is very much the same as in *T. Edwardsii*, but its surface is advanced so as to be more nearly in the same plane with the free margin of the front and the triangular process of its posterior border is more acute; mesially it is devoid of hairs, but laterally it is extremely hirsute. The anterior pleural lobe is distinct but the interpleural portion of the line that marks it off from the rest of the carapace is not tuberculated as in *T. Edwardsii;* neither is the inflected portion of the carapace so distinctly rugose nor so thickly covered with hairs. Of the chelipedes the right exceeds the left in size in the only adult specimen in my possession; the outer, or more strictly speaking the posterior, face of the meropodites is smooth, devoid of hairs, except towards the dorsal edge which is densely covered with bundles of hairs and but slightly rugose. The carpopodite is armed in the usual way with a spine, beneath which is a short bilobed spinule; its upper surface roughly punctate; an impression is to be observed at its distal articular end which is not more than ordinarily thickened. The propodite is coarsely punctate, its lower border is longitudinally concave, its prolongation is externally grooved, and so is the dactylopodite with which it is in contact throughout its whole length. The ambulatory legs are robust; the ridges of all their joints are thickly covered with bundles of hairs; the penultimate joints are similar to those of *Telphusa Andersoniana.*

Length, ... 31 mm.

Breadth, ... 43 mm.

Hab. Kakhyen-hills, Ponsee, Upper Burma. Collected by Dr. J. Anderson.

Plate xxvii, Fig. 1. *Telphusa hispida*, nat. size. 2. Front view of the same. 3. External maxilliped. 4. Chela. 5. Abdomen of male.

TELPHUSA TUMIDA, n. sp., pl. xxvii, figs. 6—10.

Carapace slightly broader than long, tumid, punctate, extremely convex in every direction, with an areolation similar to that of the three last described species, but the mesogastric lobe is almost confluent anteriorly with the protogastric and this latter is marked

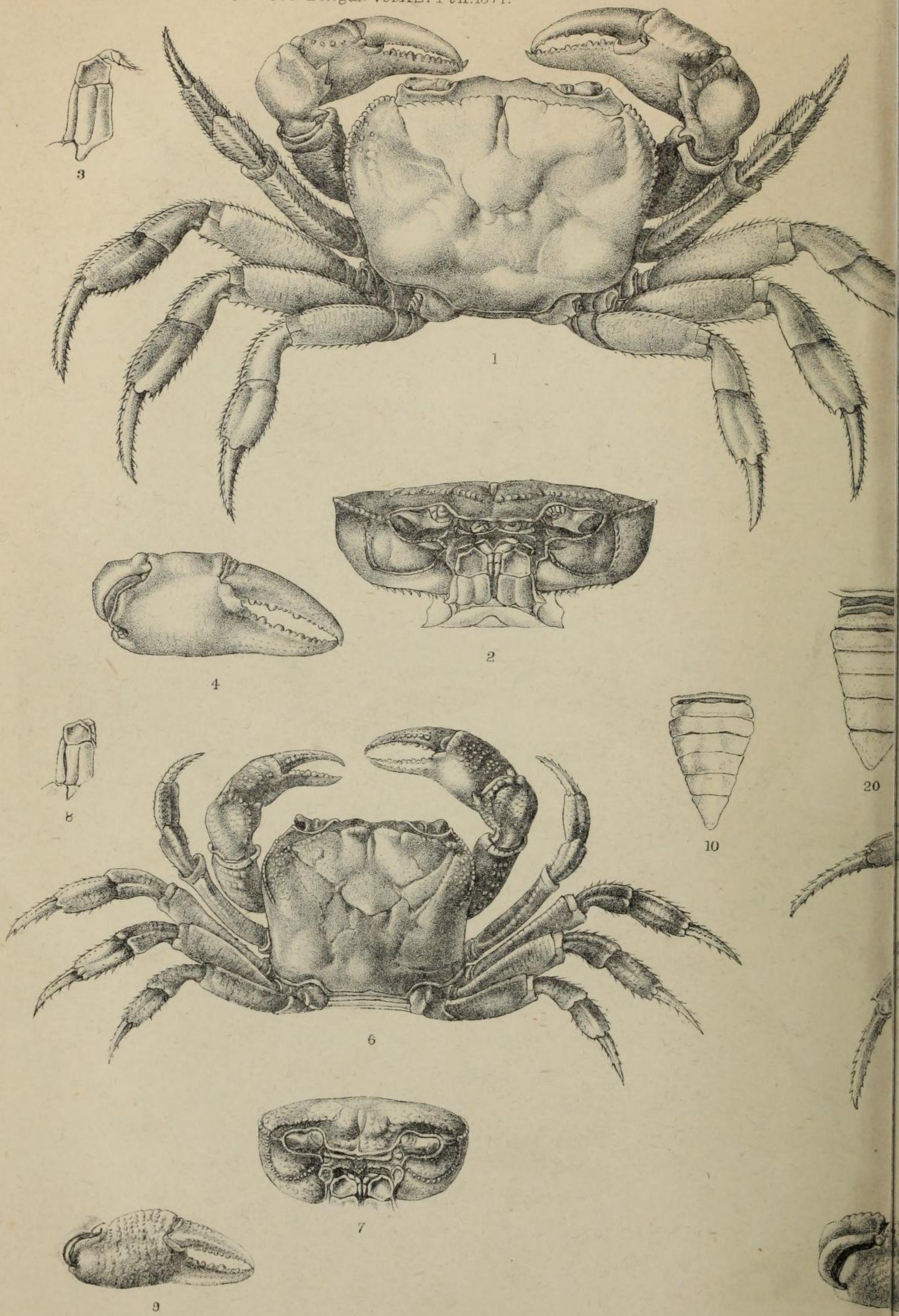
by a short branch running off from the cervical suture at right angles to it; the cardiac is separated from the posterior half of the branchial area; the epigastric lobes are prominent, anteriorly wrinkled and extend beyond the line of the rest of post-frontal ridge; anterior branchial lobe and post-frontal crest rugose; the latter is slightly indented by the cervical suture, and continuous from the epigastric lobes to the minute epibranchial teeth; antero-lateral margins greatly inclined with minutely denticulated crests; postero-lateral margin marked with oblique wrinkles which assume a tubercular character as they pass forwards on to the inflected portion of the carapace and the posterior pleural lobes which, where they form the peristoma, are completely covered with round, polished tubercles, disposed in pairs; the anterior pleural lobe presents a few scattered tubercles, and is cut off from the posterior pleural and from the inflected region of the carapace by a beaded line. Front broad, deflexed, coarsely granulated, marked by the prolongation forwards of the mesogastric furrow. The epistoma presents the same characters as that of *Telphusa Andersoniana*, except that its anterior margin is distinctly crenulated. The orbits and their external angles are crenated.

Chelipedes subequal; meropodites with their posterior faces and angles very rugose; carpopodites, above rugose, armed internally with a short blunt tooth, above and below which are some smooth tubercles; propodite externally convex and rugose; internally, especially near the lower margin, above, and below tuberculated; the upper margin of the dactylopodite is rounded and presents a short row of tubercles at its proximal end; the pincers are marked on every face with longitudinal rows of puncta and their arms can be almost completely apposed.

Breadth,	29 mm.	of a male.
Length,	24 mm.	,,
Breadth,	27 mm.	of a female.
Length,	22 mm.	,,

Hab. Hotha, Yunan; Kakhyen-hills, Ponsee, Upper Burma. Collected by Dr. Anderson.—Darjiling (?).

Plate xxvii, Fig. 6. *Telphusa tumida*, nat. size. 7. Front view of the same. 8. External maxilliped. 9. Chela. 10. Abdomen of male.



S. Sedgfield. Lith.

1-5. *Telphusa hispida.*
11-15. *Telphusa Edwardsii.*

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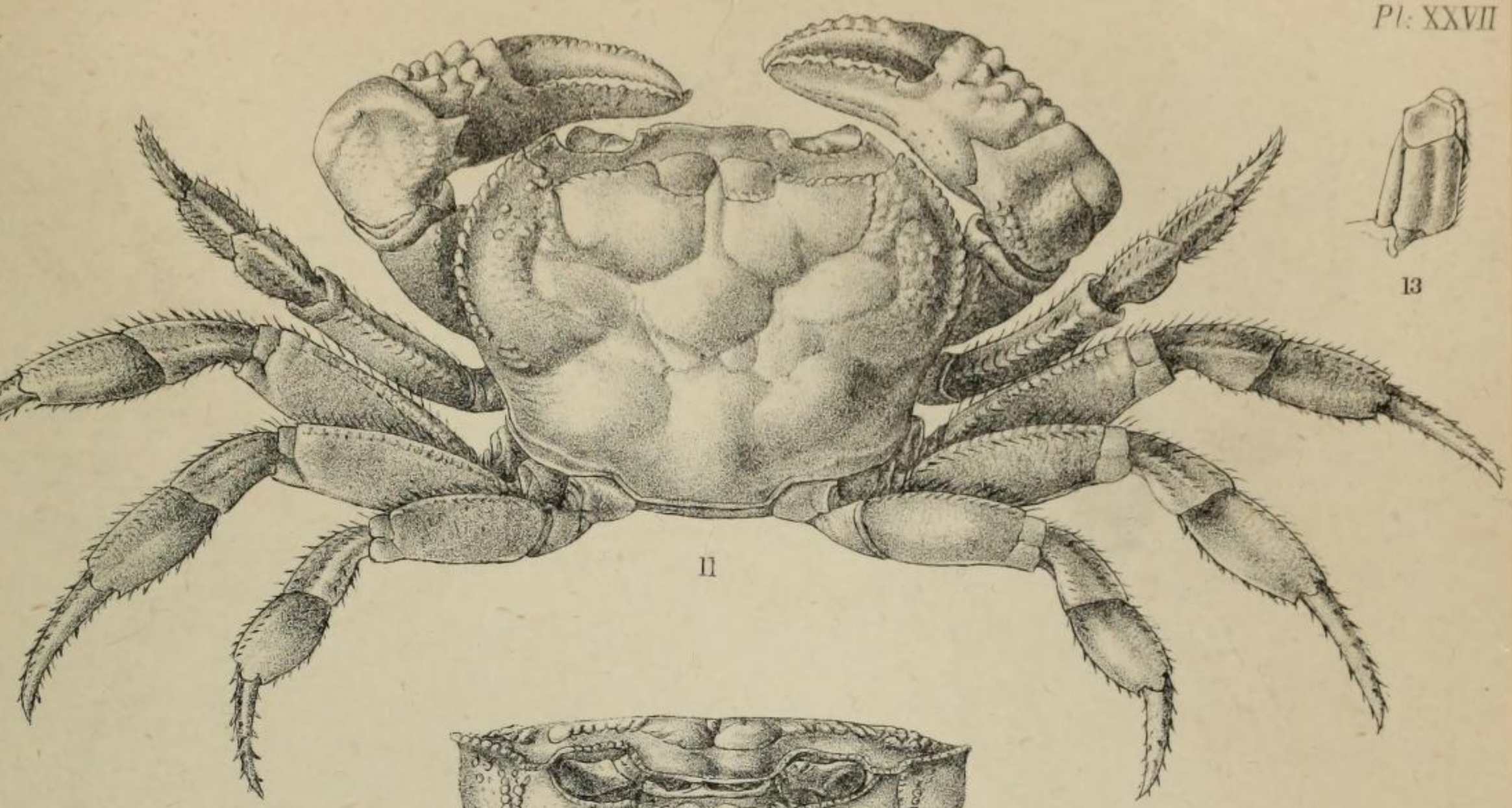

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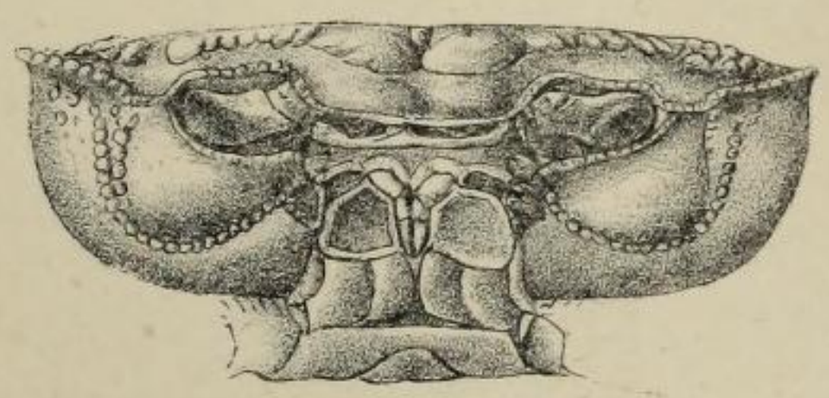

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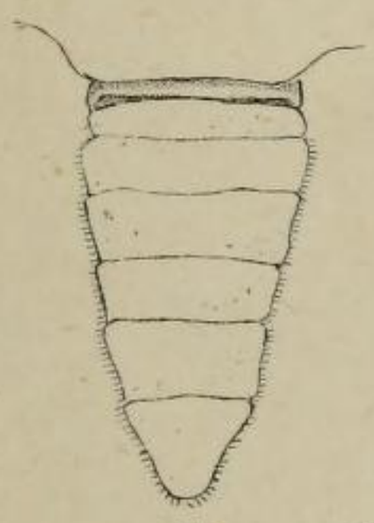

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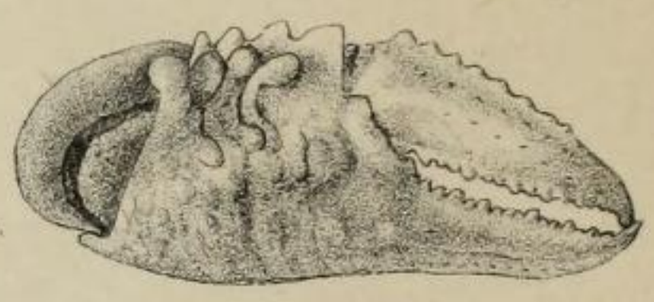

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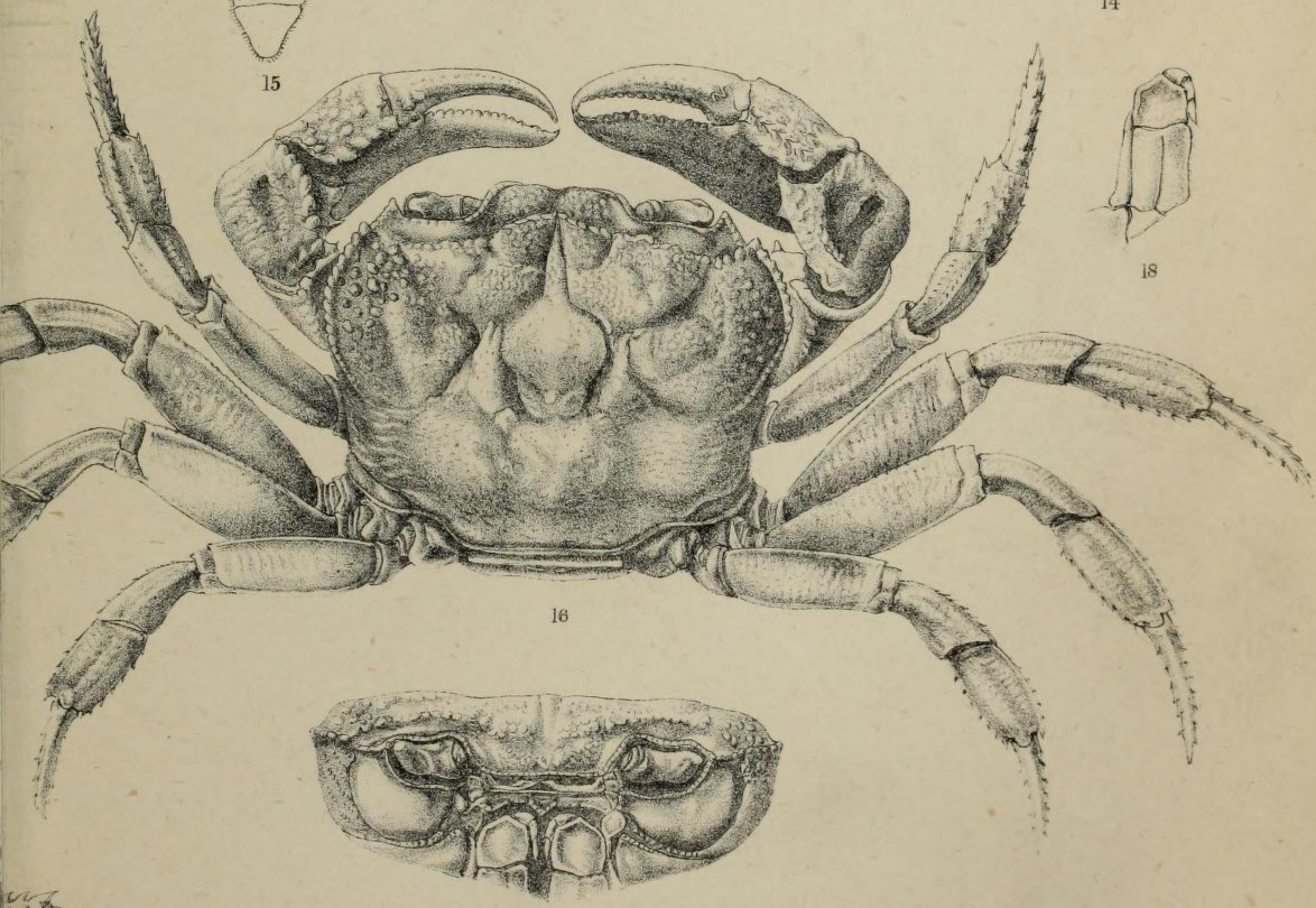

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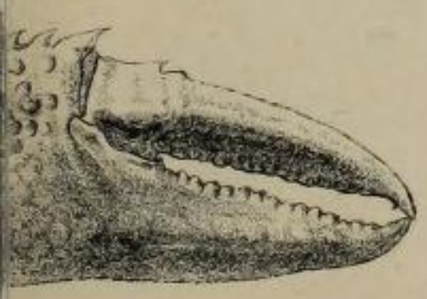

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-10. *Telphusa tumida.*
20. *Telphusa Andersoniana.*

Calcutta.