

Tweedie, M.W.F. 1936

Roux, J.

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On the Crabs of the Family Grapsidae in the Collection of the Raffles Museum

By M. W. F. TWEEDIE, M.A.

Plates XIV, XV

Of the material described in the following pages by far the greater part has been collected during the last three years, mainly in mangrove swamps around Singapore Island and at a few other Malayan localities. An account is given of all the forms that are identifiable with certainty, or of which there is material adequate for description, but there remain a few species belonging to the genera *Pachygrapsus*, *Ptychognathus* and *Sesarma* which are represented by single specimens or by juvenile series, for the proper treatment of which further collecting and study is necessary.

In a number of cases published descriptions have been found inadequate for determination with certainty, and recourse has been had to comparison with types or well authenticated specimens. This would have been impossible without the generous assistance of zoologists in various parts of the world. Acknowledgements in this respect are due to Dr. Mary J. Rathbun, Dr. Isabella Gordon, Prof. Dr. H. Balss, Prof. Dr. H. Boschma, Dr. B. N. Chopra and Dr. K. Stephensen. Some of the material from Christmas Island was previously studied by Mr. Melbourne Ward, and two species of terrestrial *Sesarmæ* were identified by Dr. J. Roux.

When measurements are given the posterior breadth of the carapace is taken between the bases of the last pair of legs. The figure for the total length of the abdomen is obtained by measuring the joints separately, as if it is measured as a whole its curvature gives rise to an error resulting in an underestimate of its true length.

Systematic.—

Pachygrapsus quadratus sp. n.

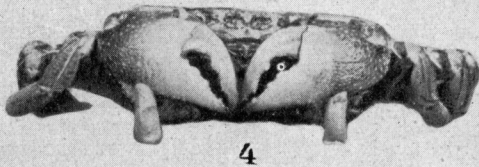
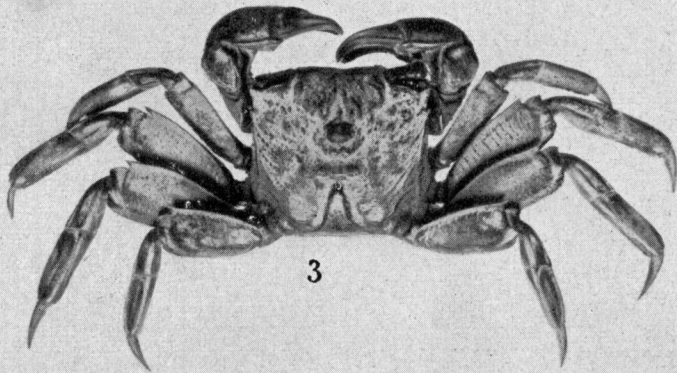
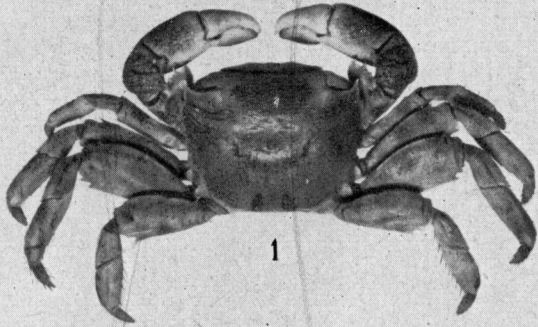
Sesarma (*Sesarma*) *gemmifera* sp. n.

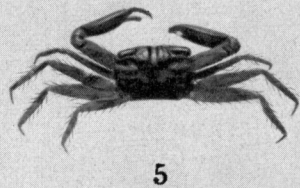
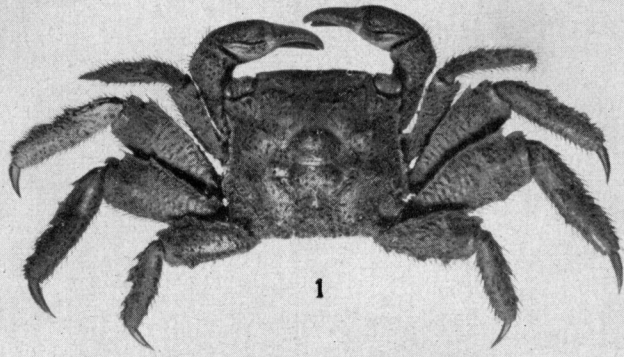
Sesarma (*Sesarma*) *singaporensis* sp. n.

Sesarma (*Parasesarma*) *calypso lanchesteri* subsp. nov.

Sesarma (*Parasesarma*) *rutilimana* sp. n.

Sesarma (*Chiromantes*) *siamensis* Rathbun = *Sesarma fasciata* Lanch.





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Sesarma (*Sesarma*) *smithii* H. Milne-Edwards referred to the subgenus *Sarmatium*.

The types of the new forms will be deposited in the British Museum.

Sub-family GRAPSINÆ

Genus *Grapsus* Lamarck

Grapsus strigosus (Herbst).

1799. *Cancer strigosus* Herbst, Krabben, iii, 1, p. 55.

1918. *Grapsus strigosus*, Tesch, "Siboga"-Exped., xxxix, p. 71.

Material.—Two males and three females from the Horsburgh Lighthouse, off the south-east point of Johore, April, 1934.

Grapsus intermedius de Man.

1888. *Grapsus intermedius* de Man, Arch. Naturgesch., Jahrg. liii, p. 365.

1918. *Grapsus intermedius*, Tesch, "Siboga"-Exped., xxxix, p. 71.

1934. *Grapsus intermedius*, Ward, Bull. Raffles Mus. ix, p. 24.

Material.—A male and two females from Christmas Island, Indian Ocean, 1932.

These specimens were identified and commented on by Melbourne Ward, (l.c.).

Genus *Geograpsus* Stimpson

Geograpsus grayi (H. Milne-Edwards).

1853. *Grapsus grayi* Milne-Edwards, Ann. Sci. Nat. Zool. (3) xx, p. 170.

1918. *Geograpsus grayi*, Tesch, "Siboga"-Exped., xxxix, p. 74.

Material.—One male from Christmas Island, Indian Ocean, 1932.

Geograpsus crinipes (Dana).

1851. *Grapsus crinipes* Dana, Proc. Ac. Nat. Sci. Philad., 1851, p. 249.

1918. *Geograpsus crinipes*, Tesch, "Siboga"-Exped., xxxix, p. 74.

Material.—Two females from Christmas Island, Indian Ocean, 1932.

Both this and the last species were recorded by Calman¹ from Christmas Island.

1. Calman, Proc. Zool. Soc. 1909, p. 705.

Genus *Pachygrapsus* Randall.

Pachygrapsus planifrons de Man.

1888. *Pachygrapsus planifrons* de Man, Arch. Naturgesch., Jahrg. liii, p. 368 (Noordwachter Island, Bay of Batavia).

1918. *Pachygrapsus planifrons*, Tesch, "Siboga"-Exped., xxxix, p. 77.

1934. *Pachygrapsus planifrons*, Ward, Bull. Raffles Mus., ix, p. 25.

Material.—A series from Christmas Island, Indian Ocean.

These specimens were identified and commented on by Melbourne Ward (l.c.).

***Pachygrapsus natalensis* Ward.**

1934. *Pachygrapsus natalensis* Ward, Bull. Raffles Mus., ix, p. 25 (Christmas Island, Indian Ocean).

Material.—One female paratype from Christmas Island.

***Pachygrapsus minutus* A. Milne-Edwards.**

1873. *Pachygrapsus minutus* A. Milne-Edwards, Nouv. Arch. Mus. Paris, ix, p. 292 (New Caledonia).

1909. *Sesarma murrayi* Calman, Proc. Zool. Soc. London, p. 708.

1934. *Pachygrapsus minutus*, Balss, Zool. Anz., cvi, 10, p. 229.

1934. *Pachygrapsus murrayi*, Ward, Bull. Raffles Mus., ix, p. 25.

Material.—A series of specimens from Christmas Island, Indian Ocean, identified by Melbourne Ward (l.c.).

I follow Balss (l.c.) in reducing *P. murrayi* to the synonymy of *P. minutus*.

***Pachygrapsus quadratus* sp. n. Plate, XIV, fig. 1.**

1900. ? *Pachygrapsus transversus*, Lanchester, Proc. Zool. Soc. London, 1900, p. 755, under *Metopograpsus oceanicus* J. & L.

Type.—An adult male collected at Siglap, Singapore in Sept. 1933 by a native collector of the Raffles Museum.

Material.—Two adult males from Siglap, Singapore including the type, an adult female from Penang (1935) and seven small specimens of both sexes from Pulau Pisang, an island in the south part of the Malacca Strait (1934).

Characters.—A species closely allied to *P. transversus* (Gibbes), but distinguished by the flatter and more quadrate carapace, which is far less convergent backwards, the ratio of the posterior to the anterior breadth being 1:2.4 (in the type of *quadratus*) against 1:3.05 (in a male *transversus* from Brazil);¹ by the absence of well marked transverse ridges on the carapace, and of the conspicuous brown patches on the fingers of *transversus*.

Description.—The ornamentation of the carapace consists of the following elements: A transverse ridge extends a little way on to the carapace from just in front of the epibranchial tooth and a shorter transverse line lies just behind it. From the

1. Through the kindness of Dr. M. J. Rathbun and of the Direction of the U. S. National Museum I have been able to compare specimens of *P. transversus* from the coast of Brazil with the present species.

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epibranchial tooth a ridge runs obliquely backwards, and behind and parallel to it are 8 or 9 oblique lines on the branchial regions. On the gastric region are numerous short, faint, transverse, beaded lines.

Of the post-frontal lobes the outer pair are very slightly the broader. The anterior margins of all four lobes lie nearly in one straight line, those of the outer being only slightly in advance of and oblique to the inner. The front is rather prominent and its margin nearly straight in the middle part, having only a very slight median emargination. At each side it slopes back to the interior orbital angle, and is beaded in all its extent.

The chelæ are subequal or unequal, the right, in most cases, being larger than the left. In adults the lower border of the immovable finger is markedly convex.

The female exhibits no secondary sexual characteristics except that the chelæ are rather smaller and the carapace broader, particularly posteriorly, so that it has even more the appearance of being almost quadrate.

Remarks.—Lanchester (l.c.) recorded specimens of *Pachygrapsus* from Malacca which he identified as *P. transversus*, but pointed out that, apart from the condition of the internal subocular lobe, they resemble *Metopograpsus oceanicus* so closely that they might be regarded as a variety of it. *P. quadratus* does bear a strong resemblance to *M. oceanicus* in respect of the ornamentation of its carapace and the development of its legs and chelipeds. As Tesch¹ points out, *P. transversus* could not possibly be confused with *M. oceanicus*, and it seems probable that Lanchester's specimens were *P. quadratus*, which is, however, readily distinguishable from *M. oceanicus* by the more quadrate carapace and the narrower front, as well as by the reduced internal suborbital lobe.

Measurements of the type.

Carapace.

Anterior breadth	..	..	22.6 mm.
Breadth between epibranchial teeth	..	..	23.9 "
Median length	..	..	20.4 "
Posterior breadth	..	..	9.5 "
Breadth of front	..	..	13.3 "

Right Chela.

Length	..	..	19 "
Height of palm	..	..	10.5 "
Length of dactylus	..	..	11 "

Penultimate walking leg.

Length of merus	..	..	15	mm.
Breadth of merus	..	..	7	"
Combined length of carpus and propodus	..	..	17.3	"
Length of dactylus	..	..	5.8	"

Abdomen.

Length	..	..	14.3	"
Breadth at third segment	..	..	11.1	"
Length of penultimate segment	..	..	3	"
Breadth at base	..	..	6.9	"
Length of last segment	..	..	3.2	"
Breadth at base	..	..	4.2	"

1. Tesch, "Siboga"-Exped., xxxixc, (1918), p. 82.

Genus *Metopograpsus* H. Milne-Edwards.

Metopograpsus messor gracilipes de Man.

1891. *Metopograpsus messor* var *gracilipes* de Man, Notes Leiden Mus., xiii, p. 49 (Pacific).
 1895. *Metopograpsus messor* var *gracilipes*, de Man, Zool. Jahrb. Syst., ix, p. 75.
 1918. *Metopograpsus messor* subsp. *gracilipes*, Tesch, "Siboga"-Exped., xxxixc, p. 79.

Material.—Three males and two females from Singapore and neighbouring islands and two males from Pulau Pisang in the south part of the Malacca Strait.

Metopograpsus oceanicus (Jacq. & Lucas).

1842. *Grapsus oceanicus* Jacquinot et Lucas Voy. "Astrolabe" et Zélée, Crust., p. 73.
 1918. *Metopograpsus oceanicus*, Tesch, "Siboga"-Exped., xxxixc, p. 81.

Material.—Numerous specimens from Singapore and neighbouring islands.

Metopograpsus latifrons (White). Plate XIV, fig. 2.

1847. *Grapsus latifrons* White, Voy. "Fly", ii, p. 337.
 1853. *Metopograpsus maculatus* H. Milne-Edwards, Ann. Sci. Nat. Zool. (3) xx, p. 165.

Material.—Seven males and seven females from Singapore. de Man and Tesch¹ have separated this species from *M. maculatus* H.M.-E. on the different ratios of the anterior breadth to the length of the carapace. The figure quoted by Tesch for *latifrons* is 100: 84–91 and for *maculatus* 100: 77–80.

1. Tesch, "Siboga"-Exped., xxxixc (1918), p. 81.

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The present series of specimens have been measured with a view to obtaining this ratio, and the results are as follows:—

<i>Breadth</i>	<i>Length</i>	<i>Ratio</i>	<i>Sex</i>
29.5 mm.	25.4 mm.	86	♂
28 "	25.9 "	90	♂
24.7 "	20.5 "	83	♂
26.6 "	22 "	83	♂
27 "	22.8 "	84.5	♂
27.5 "	23 "	84	♂
19.5 "	17 "	87	♂
30.5 "	25.2 "	83	♀
26.3 "	21.6 "	82	♀
25.5 "	21.5 "	84	♀
24 "	19.6 "	82	♀
20.5 "	18.5 "	90	♀
18 "	15.5 "	86	♀
14 "	12 "	86	♀

The range exhibited by this series is 82–90, and this comes so close at its minimum to the maximum quoted for *maculatus* that, failing other discriminating characteristics, I cannot regard the two species as distinct.

Sub-family VARUNINÆ.

Genus *Varuna* H. Milne-Edwards.

Varuna litterata (Fabr.).

1798. *Cancer litteratus* Fabricius, Ent. Syst. Suppl., p. 342.

1900. *Varuna litterata*, Alcock, Journ. As. Soc. Bengal, lxi, 2, p. 401.

1918. *Varuna litterata*, Tesch, "Siboga"-Exped., xxxix, p. 84.

Material.—A series of specimens from Singapore.

Genus *Ptychognathus* Stimpson.

Ptychognathus pusillus Heller.

1865. *Ptychognathus pusillus* Heller, Reise "Novara", Crust., p. 60 (Nicobar Islands).

1889. *Ptychognathus pusillus*, de Man, Zool. Jahrb. Syst., iv. p. 440.

1905. *Ptychognathus pusillus*, de Man, Proc. Zool. Soc. London, 1905, p. 537.

1918. *Ptychognathus pusillus*, Tesch, "Siboga"-Exped., xxxix, p. 93.

Material.—Nine males and one female from "The Waterfall", Christmas Island, Indian Ocean, collected by Dr. R. Hanitsch on 8th October, 1904.

The two largest males measure 18 mm. in greatest carapace breadth, the single female is juvenile, measuring only 8 mm. Evidently this series was collected concomitantly with those described by de Man in 1905 (l.c.).

Ptychognathus barbatus (A. Milne-Edwards).

1873. *Gnathograpsus barbatus*, A. Milne-Edwards, *Nouv. Arch. Mus. Paris*, ix, p. 316. (New Caledonia).

1900. *Ptychognathus barbata*, Alcock, *Journ. As. Soc. Bengal*, lxi, 2, p. 406.

1902. *Ptychognathus barbatus*, de Man, *Abhandl. Senckenb. Gesellsch.*, xxv, p. 505.

Material.—One female from Telok Bunga, Pulau Tioman, collected by N. Smedley, May, 1927.

Pseudograpsus albus Stimpson.

1858. *Pseudograpsus albus* Stimpson, *Proc. Ac. Nat. Sci. Philadelphia*, 1858, p. 104.

1907. *Pseudograpsus albus*, Stimpson, *Smiths. Misc. Coll.*, xlix, p. 127.

1918. *Pseudograpsus albus*, Tesch, "Siboga"-*Exped.*, xxxix, p. 99.

Material.—One female from Christmas Island, Indian Ocean, 1932.

This specimen was examined by Melbourne Ward and identified as *P. crassus* A. M.-E.¹. Re-examination of it convinces me that it is really referable to *albus*. It differs from Stimpson's description (l.c. 1907) in having no tuft of hairs on the outside of the chela, and in the presence of a longitudinal ridge of the lower border of the outer surface of the hand. These however are, generically, female sexual characteristics, and Stimpson's description is obviously based on a male.

From *P. crassus* the specimen differs in colour (it is almost white), the postero-lateral border is not keeled and granular and there are no velvety black hairs on the last three joints of the walking legs.

Sub-family SESARMINÆ

Genus *Sesarma* Say

Subgenus *Sesarma* s.s.

***Sesarma* (*Sesarma*) *amphinome* de Man.**

1900. *Sesarma* (*Sesarma*) *amphinome* de Man, *Notes Leyden Museum*, xxi, p. 133 (Borneo).

Material.—One male from Idragiri, Sumatra, presented by Dr. J. Roux of the Musée d'Histoire Naturelle, Bâle.

***Sesarma* (*Sesarma*) *brockii* de Man.**

1887. *Sesarma brockii* de Man, *Zool. Jahrb. Syst.*, ii, p. 651 (Amboina).

1902. *Sesarma* (*Sesarma*) *brockii*, de Man, *Abhandl. Senckenb. Gesellsch.* xxv, p. 516.

1917. *Sesarma* (*Sesarma* s. s.) *brockii*, Tesch, *Zool. Meded.*, Leiden, iii, p. 39.

1. Melbourne Ward, *Bull. Raffles Mus.*, ix, 1934, p. 26.

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Material.—A series of specimens from the Singapore coast of the Johore Strait and from Siglap, Singapore, 1934.

All the specimens were found associated with *Metopograpsus* spp., on the wooden piles of fishing stakes and bathing enclosures, not, like most of the other marine members of the genus, in mangrove swamp.

The presence of a small subdistal spine on the upper border of the merus of the cheliped of the female and its absence in the adult male, a character noted by de Man (l.c. 1902) and Tesch (l.c.), is confirmed by this series, but there are also indications of it in some young males.

Sesarma (*Sesarma*) *kraussi* de Man.

1847. *Sesarma longipes* White nec Krauss, List spec. Crust. Coll. Brit. Mus., p. 39 (Singapore).

1887. *Sesarma kraussii* de Man, Zool. Jahrb. Syst., ii, p. 652 (Bay of Bengal).

1917. *Sesarma* (*Sesarma s. s.*) *kraussi*, Tesch, Zool. Meded., Leiden, p. 164.

Material.—A good series of specimens from Port Swettenham, Selangor, December, 1934.

Sesarma (*Sesarma*) *tiomanensis* Rathbun.

1913. *Sesarma tiomanense* Rathbun, Proc. U. S. Nat. Mus., xlvii, p. 335.

Material.—A single female from Pulau Panjang, South Natuna Islands, collected by P. M. de Fontaine, 1931.

Sesarma (*Sesarma*) *edwardsii* de Man.

1887. *Sesarma edwardsii* de Man, Zool. Jahrb. Syst., ii, p. 649 (Bay of Bengal).

1917. *Sesarma* (*Sesarma s. s.*) *edwardsii*, Tesch, Zool. Meded., Leiden, iii, p. 147.

Material.—An adult male from Pulau Ayer Merbau and two juveniles from Pulau Pawai, both islands near Singapore, the former collected by F. N. Chasen in 1931 and the latter by the writer in 1933.

Sesarma (*Sesarma*) *ocypoda* Nobili.

1899. *Sesarma ocypoda* Nobili, Ann. civ. stor. nat. Genova, (2), xx, p. 513 (Bencoolen, Sumatra).

1917. *Sesarma* (*Sesarma s. s.*) *ocypoda*, Tesch, Zool. Meded., Leiden, iii, p. 179.

1929. *Sesarma* (*Sesarma*) *ocypoda*, de Man, Bijdr. Dierk., Amsterdam, xxvi, p. 19.

Material.—Specimens from Bukit Timah, Singapore, 1933 (identified by Dr. J. Roux); Gunong Pulai, Johore, 1934; Pulau Tioman, South China Sea, coll. N. Smedley, 1929 (identified by Dr. J. Roux).

In this series there are two adult males, one from Bukit Timah and one from Pulau Tioman. Both appear to be referable to the typical form, but there are in one eleven and in the other

twelve tubercles on the upper border of the dactylus of the cheliped, whereas in the type specimen from Bencoolen there were fourteen.

Sesarma (Sesarma) ocypoda var. gracillima de Man?

1902. *Sesarma (Sesarma) ocypoda* var. *gracillima* de Man, Abhandl. Senckenb. Gesellsch., xxv, p. 522 (Baram River, Borneo).

1917. *Sesarma (Sesarma s. s.) ocypoda gracillima*, Tesch, Zool. Meded., Leiden, iii, p. 179.

Material.—A series, including two apparently adult males, from a stream near the River Yum, Plus Valley, E. Perak, F.M.S., March, 1933.

The two adult males present characteristics that appear to conform with those described from the var. *gracillima* by de Man and Tesch (l.c.).

When compared with the specimens of *ocypoda* from Singapore and Pulau Tioman (all four specimens are about the same size, 11–12 mm. in anterior carapace breadth), the carapace of the Perak form is seen to be flatter and almost exactly as long as broad, the typical specimens being a little broader than long, and the grooves separating the post-frontal lobes to be narrower.

The chelipeds in the specimens from Perak are very much smaller and slenderer, and the horny margins at the tips of the cutting edges of the fingers occupy nearly a third of the length of the fingers, just as described for *gracillima*. In both specimens the dactyli of the chelipeds carry nine small tubercles, of which the proximal three or four are scarcely directed forwards.

If these specimens are correctly referred to *gracillima*, it would appear that this form is merely a variety and not a geographical race. Nothing is said either by de Man or Tesch about the exact localisation of their specimens, but it is of interest to note that those from Perak came from a locality more than fifty miles from the sea and at an altitude of 2500–3000 feet.

Sesarma (Sesarma) foxi Kemp.

1918. *Sesarma foxi* Kemp, Mem. Asiatic Soc. Bengal, vi, p. 238 (Langkawi Islands).

Material.—A male and an ovigerous female from the Larut Hills, Perak, F. M. S. at 3,700 feet, collected by H. M. Pendlebury, February, 1932. A duplicate specimen from this locality was identified by Dr. J. Roux.

Sesarma (Sesarma) minuta de Man.

1887. *Sesarma minuta* de Man, Zool. Jahrb. Syst., ii, p. 650 (Edam Island, near Batavia).

1888. *Sesarma minuta*, de Man, Arch. Naturgesch., Jahrg. liii, p. 377.

1917. *Sesarma (Sesarma s. s.) minuta*, Tesch, Zool. Meded., Leiden, iii, p. 174.

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A series of specimens from Singapore and a neighbouring island, Pulau Senang, and from Horsburgh Lighthouse off the south-east point of Johore.

Sesarma (*Sesarma*) *taeniolata* White. Text fig. 1a.

1847. *Sesarma taeniolata* (White) Gray. List. spec. Crust. Coll. Brit. Mus., p. 38. (Philippines).

1917. *Sesarma* (*Sesarma* s. s.) *taeniolata*, Tesch, Zool. Meded., Leiden, iii, p. 201 and p. 183 (under *S. palawanensis* Rathbun).

Material.—Three males and one female from Singapore (River Jurong) and the Johore Strait.

Tesch (ll.c.) defines this species by the large number (more than 40) of tubercles on the upper margin of the mobile finger and by the presence, in both sexes, of a pectinated crest on the upper border of the palm of the chela. He finds that it is also separable from *S. palawanensis* by the proportions of the carapace.

Through the kindness of Prof. Dr. H. Boschma, Director of the Leiden Museum, I have been able to examine a male and a small female of this species from Batavia from the material studied by Tesch; both display the characteristics enumerated by him, the male having 44 and 45 tubercles, respectively, on the mobile fingers and the female about 50. The "tympana" noted by Tesch on the 4th sternite are quite distinct in the male specimen.

The specimens in the present collection are characterised by having rather over 60 tubercles on the mobile finger, 63 and 65 in the largest male, and in both sexes, as in the Leiden Museum specimens, the tubercles extend almost to the tips of the fingers. In the single small female the pectinated crest on the palm is slightly, but quite distinctly developed. The "tympana" on the 4th sternite are distinctly visible only in the largest male.

Sesarma (*Sesarma*) *singaporensis* sp. n.

Cotypes.—An adult male and female from the Kranji river, Singapore Island, collected by M. W. F. Tweedie in June, 1935.

Material.—Specimens from Singapore (Kranji and Jurong rivers) and the Johore Strait.

Characters.—A species closely allied to *S. taeniolata* but distinguished by the following characters:

1. The front is rather broader and its free edge less sinuous.
2. The teeth of the pectinated ridge on the palm of the male are rather coarser and less numerous. In the female the pectinated ridge is absent and represented by a raised line of granules.

3. The tubercles on the upper margin of the dactylus are less numerous, numbering 35 to 37 in the male. In this sex the tubercles are small, transverse and parallel-sided in the proximal part, but distally they are larger and gradually assume a triangular shape, the apices of the triangles being directed inwards and their bases being contiguous. In the largest females the tubercles number about 30 and only occupy the proximal two thirds of the finger. In smaller females they are even fewer in number, feebly developed and may extend less than half way along the finger.

The palm in both sexes is reddish orange in colour and the fingers deep red.

Measurements of male cotype.

Carapace.

Anterior breadth	..	..	32	mm.
Breadth between epibranchial teeth	..	..	32.3	"
Median length	..	..	29.6	"
Posterior breadth	..	..	14	"
Breadth of front	..	..	17.6	"

Right chela.

Length	..	..	27	"
Height of palm	..	..	15.5	"
Length of dactylus	..	..	18.5	"

Penultimate walking leg.

Length of merus	..	..	25.8	"
Breadth of merus	..	..	12.2	"
Combined length of carpus and propodus			28	"
Length of dactylus	..	..	12.2	"

Abdomen.

Length	..	..	25	"
Breadth at third segment	..	..	16.7	"
Length of penultimate segment	..	..	5.5	"
Breadth at base	..	..	10.5	"
Length of last segment	..	..	4.7	"
Breadth at base	..	..	5	"

Sesarma (Sesarma) palawanensis Rathbun. Plate XIV, fig. 3, 4; text fig. 1b.

1914. *Sesarma (Sesarma) palawanense* Rathbun, Proc. U. S. Nat. Mus., xvii, p. 72 (Palawan Island, Philippines).

1917. *Sesarma (Sesarma) palawanensis*, Tesch, Zool. Meded., Leiden, iii, p. 183. (New Guinea).

Material.—A good series of both sexes from Singapore (Jurong and Kranji rivers) and from Kuantan, Pahang, on the east coast of the Malay Peninsula.

Up to the present this species has been known from the female only, and its discrimination accordingly a matter of

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some difficulty. In the present series the females agree with the descriptions of Rathbun and Tesch sufficiently closely to justify considering them conspecific. In view of the remoteness of the type locality, however, it is quite possible that a good series of topotypical examples would prove to be subspecifically distinct from the Malayan form.

In the male the palm of the chela differs from that of the female in carrying a pectinated ridge like that found in both sexes of *S. taeniolata*. The dactylus carries, in the adult, 46 to 48 tubercles, which are small and transverse proximally but become larger and more elongated distally, the distal two or three being longer than broad. These tubercles stop short before the tip of the finger. The chelæ themselves are more massive than in any of the allied species, and in the largest males the basal part of the cutting edge of the immovable finger is expanded into a broad molariform process. On the inner surface of the palm there is, in the male, a conspicuous granular crest, and in the larger females this crest appears to be more strongly developed than in the specimens described by Rathbun. The coloration of the chelæ in the male is very distinctive. Externally the palm is purple on its basal two thirds, and on its upper part this colour extends forwards to the articulation of the dactylus and, in a tapering strip, along the upper surface of that joint. The rest of the palm and dactylus and the whole of the immobile finger are white. The parts of the palm and dactylus that are coloured purple are granular. The white parts are smooth and sparsely pitted with the exception of a strip of coarse granules occupying the basal half of the lower surface of the immobile finger.

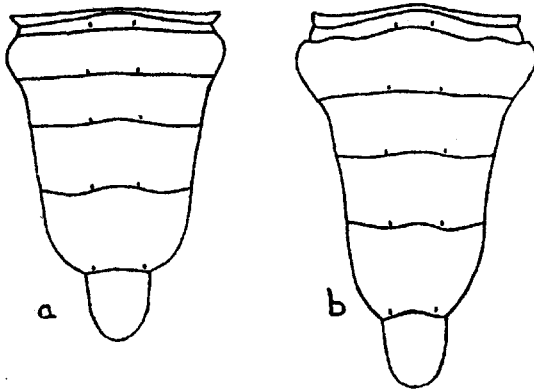


Fig. 1. a, *Sesarma taeniolata*; b, *S. palawanensis*.
Male abdomina.

The abdomen of the male is much narrower than that of *S. taeniolata*, the length of the penultimate segment being about 60% of its basal breadth, as against a trifle over 50% in the allied species.

Measurements of an adult male from Kuantan. *Carapace.*

Anterior breadth	..	..	37.5	mm.
Breadth between epibranchial teeth	..	..	37	"
Median length	..	..	34.5	"
Posterior breadth	..	..	15.5	"
Breadth of front	..	..	18.5	"

Chela.

Length	..	..	30.8	"
Height of palm	..	..	18	"
Length of dactylus	..	..	21.2	"

Penultimate walking leg.

Length of merus	..	..	29	"
Breadth of merus	..	..	12.2	"
Combined length of propodus	..	..	32.6	"
Length of dactylus	..	..	12.8	"

Abdomen.

Length	..	..	28.5	"
Breadth at third segment	..	..	17.6	"
Length of penultimate segment	..	..	6.4	"
Breadth at base	..	..	10.3	"
Length of last segment	..	..	5.9	"
Breadth at base	..	..	5	"

The species of the group of *S. taeniolata*.

In his account of *S. palawanensis* Rathbun Tesch¹ refers to a natural group within the genus comprised of *S. tetragona* Fabr., *S. taeniolata* White, *S. lafondi* H. & J. and *S. palawanensis*. To this list must now be added *S. singaporensis* Tweedie. Consideration of de Man's description and figure of the type of *S. tetragona*² persuades me that this species would be better excluded from the natural group, owing to the very distinctive ornamentation of the moveable finger and the absence (apparently) of a longitudinal pectinated ridge from the palm of either sex.

Of the four other species only the first three were known to Tesch and of these *S. lafondi* and *S. palawanensis* were known only from the females. The male of the latter is described in this paper, and Tesch suggests in his description of *S. taeniolata*

1. Tesch, Zool. Meded., Leiden, iii (1917), p. 183.

2. de Man, Zool. Jahrb. Syst., ii (1887), p. 665, pl. 17, fig. 1.

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crebristriata (Tesch op. cit. p. 203) that this form is really the male of *S. lafondi*. I am inclined to accept this view, particularly as it has been shown that the pectinated ridge on the palm is present only in the male in two other species of the group. This group, consisting of the four species *S. taeniolata*, *S. lafondi* (= *S. t. crebristriata*), *S. palawanensis* and *S. singaporensis* may now be defined as follows:

Large, mangrove-dwelling *Sesarmæ* in which the carapace is more or less quadrate and beset with tufts of hair. In the chelæ the palm, at least in the male, carries a single longitudinal pectinated ridge and the dactylus, at least in the male, is beset with a row of closely and evenly placed tubercles. The number of these tubercles is large, in the male at least 35 and at most about 90.

The following key may be used for the determination of both sexes.

1. A pectinated ridge present on the palm of the chela of both sexes, tubercles on the dactylus more than 40, usually about 60. [Length of penultimate segment of male abdomen 50-53% of basal breadth] .. *S. taeniolata*.
- A pectinated ridge present only on the palm of the male and represented in the female by a row of granules .. 2
2. The dactylus of the male with 85 to 90 small tubercles, that of the female with a longitudinal keel with more or less transverse striæ. [Length of penultimate segment of male abdomen about 46% of basal breadth.¹] *S. lafondi* (= *S. t. crebristriata*).
- The dactylus of the male with 35 to about 50 tubercles and of the female with rather less. In the latter sex the tubercles do not extend to the tip of the finger .. 3

1. From the measurements taken by Tesch, op. cit., p. 206.

3. The tubercles on the dactylus of the male 35 to 37 in number, the extreme length of the orbit in both sexes not more than half the breadth of the front. [Male abdomen as in *S. taeniolata*]

S. singaporensis.

- The tubercles on the dactylus of the male 46 to 48. The extreme length of the orbit in both sexes distinctly more than half the breadth of the front. [Length of penultimate segment of male abdomen about 60% of basal breadth]

S. palawanensis.

Sesarma (Sesarma) gemmifera sp. n. Plate XV, fig. 1; text fig. 2.

Cotypes.—An adult male and female from mangrove swamp in the Johore Strait, collected by M. W. F. Tweedie, October, 1934.

Material.—A series of specimens from the Johore Strait and from the River Serangoon, Singapore; a series from Port Swettenham, Selangor, F. M. S.

Characters.—A species of *Sesarma* s.s. in which the anterior breadth of the carapace is greater than the length, and the chelæ of the male bear a single longitudinal pectinated ridge on the upper surface of the palm. By this combination of characters it is affiliated in with the species of *Sesarma* of the group of *S. taeniolata* and with *S. (S) brockii* de Man. From all these species it is immediately distinguished by the very hairy condition of the carapace and legs, by the very shallow median emargination of the free edge of the front, which is more steeply deflexed than in any of them, and by the highly characteristic ornamentation of the upper border of the moveable finger.

Description.—The carapace is a little broader than long and slightly convex in both directions; beneath its covering of hair it is smooth, except for scattered punctæ, the usual oblique lines on the branchial regions, the post-frontal lobes and a low, slightly rugose ridge separating the urogastric and cardiac regions. The gastric region is fairly well defined, and the protogastric lobe is continued forward as a groove which becomes deep and narrow between the median post-frontal lobes. The two pairs of post frontal lobes are about equal in width. The lateral are bounded anteriorly by a row of low, polished granules, the median are rugose in their anterior part, and extend slightly farther forward than the lateral.

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The external orbital angles are sharp and directed obliquely forwards, and are separated from the smaller and less salient epibranchial teeth by a deep gap. The lateral borders are slightly convergent posteriorly.

Tesch, Zool. Meded., Leiden, iii, 1917, pp. 238-250

The front is so steeply deflexed that it is scarcely visible in dorsal view. Its edge is finely and regularly beaded and is almost straight, presenting only the faintest trace of a median emargination.

The surface of the carapace is covered rather thickly with interspersed curved bristles and longer hairs. These have a tendency, particularly when the animal is wet, to be arranged in tufts, recalling the appearance of the genus *Clistocoeloma*. The tufts are, however, never regularly and symmetrically disposed, as in that genus, and, moreover, the relation of the antennæ to the orbits is quite typical for the genus *Sesarma*.

The hairiness extends over the whole animal except for the under surface of the meri of the walking legs, and the lower and inner surfaces of the palms and the distal parts of the fingers of the chelæ.

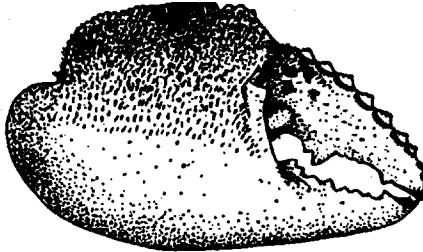


Fig. 2. *Sesarma* (*Sesarma*) *gemmifera* sp. n. Right chela.

In the chelipeds, which are equal or sub-equal, the upper border of the arm bears a small subdistal tooth. The laminar expansion at the distal end of the inner border is rounded or obtusely angled, and has its edge bluntly denticulate, not sharply toothed or laciniate, as is usual in the allied species. The outer border of the arm is finely and irregularly denticulate, and its outer surface is covered with transverse squamiform markings and rather sparsely scattered hairs. The upper surface of the wrist is finely granular and rather densely coated with short bristles. Its inner angle is somewhat produced, but not dentate.

The upper surface of the hand of the male bears a single pectinated ridge, consisting of about 18 fine teeth, which is

continued at each end into a granular crest. In the female this combination is replaced by a continuous, sharply granular crest.

The outer surface of the palm is hairy and sparsely granular on its upper two thirds. The lower third and the under surface are hairless and punctate, with some obliquely disposed squami-form markings towards the base. The inner surface is coarsely granular, but the granules do not extend onto the immovable finger; there is no well defined granular ridge, as in *S. taeniolata*.

The upper margin of the moveable finger of the male bears 9 to 10 tubercles; these, except for the distal two or three which are small and indistinct, present a very characteristic appearance. They are oval in dorsal view, their longer axes being at one with that of the finger, and each one bears on the proximal slope of its upper surface two transverse grooves. In lateral view they are seen to be low, but distinctly angled at the summit, and asymmetrical, the grooved proximal slope being a little longer than the distal. Each tubercle is completely isolated from the rest and is surrounded at its base by a slightly raised reddish rim, the tubercles themselves being pale yellow. This contrast in colour, together with their complete isolation from each other, gives the tubercles the appearance of being set in the upper margin of the finger as gems are set in a ring. In the female the tubercles are very small, not more than five or six in number, and confined to the basal half of the finger.

The teeth and denticles on the cutting edges of the fingers are sharp and conical, and one enlarged tooth is present near the base of the dactylus.

The walking legs are everywhere hairy except for the under surface of the meri; when compared with those of allied species they present no unusual features.

The male abdomen is narrow and its last segment is distinctly longer than broad. The abdomen, together with the sternal segments, is sparsely covered with short hairs.

The colour of the animal is mainly dark brown with some of the margins and rugosities purplish. The chelæ are pale yellowish, and the movable finger is usually marked with some irregular purple blotches.

Measurements of male cotype.

Carapace.

Anterior breadth	..	..	22.5 mm.
Breadth between epibranchial teeth	22 "
Median length	20.8 "
Posterior breadth	9 "
Breadth of front	14.5 "

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Left chela.

Length	16.3	..
Height of palm	9.5	..
Length of dactylus	9.5	..

Penultimate walking leg.

Length of merus	..	..	..	15.8	..
Breadth of merus	..	..	..	8.4	..
Combined length of carpus and propodus	..	..	..	17.4	..
Length of dactylus	..	..	..	6.3	..

Abdomen.

Length	..	..	..	15.9	..
Breadth at third segment	..	..	..	9.2	..
Length of penultimate segment	..	..	..	3	..
Breadth at base	..	..	..	5.8	..
Length of last segment	..	..	..	3.5	..
Breadth at base	..	..	..	3.2	..

Subgenus *Holometopus* H. Milne-Edwards.

Sesarma (Holometopus) obtusifrons Dana.

1851. *Sesarma obtusifrons* Dana, Proc. Ac. Nat. Sci. Philad., p. 250 (Sandwich Islands).

1917. *Sesarma (Holometopus) obtusifrons*, Tesch, Zool. Meded., Leiden, iii, p. 179.

Material.—A single male from Christmas Island, Indian Ocean, September–October, 1932.

Also recorded from Christmas Island by Balss.¹

Subgenus *Parasesarma* de Man.

Sesarma (Parasesarma) bataviana de Man.

1890. *Sesarma bataviana* de Man, Notes Leyden Mus., xii, p. 101 (Batavia).

1917. *Sesarma (Parasesarma) bataviana*, Tesch, Zool. Meded., Leiden, iii, p. 132.

Material.—A series of specimens from Singapore (River Jurong and Serangoon) and the Johore Strait, 1934.

Through the kindness of Prof. Dr. H. Boschma, Director of the Rijksmuseum van Natuurlijke Historie, Leiden, an adult male specimen of this species from the north coast of Java (Coll. P.

1. Balss, Zool. Anz., cvi, 1934, p. 229.

Buitendijk, 1904) was sent on loan to this museum. Comparison of this specimen with a slightly smaller male from the river Jurong confirmed the identity of the Singapore material beyond all doubt.

Sesarma (Parasesarma) batavica Moreira.

1890. *Sesarma barbimana* de Man (*nec* Cano). Notes Leyden Museum, xii, p. 104, (Batavia).

1903. *Sesarma batavica* Moreira, Arch. Mus. Rio de Janeiro, xii, p. 117.

1917. *Sesarma* (*Parasesarma*) *batavica*, Tesch, Zool. Meded., Leiden, iii, p. 132.

Material.—Numerous specimens from Singapore, the Johore Strait and Port Swettenham.

Sesarma (Parasesarma) melissa de Man.

1887. *Sesarma melissa* de Man, Zool. Jahrb. Syst., ii, p. 656 (Mergui Archipelago).

1917. *Sesarma* (*Parasesarma*) *melissa*, Tesch, Zool. Meded., Leiden, iii, p. 174.

Material.—Numerous specimens from Singapore (River Jurong), the Johore Strait and Port Swettenham, 1934.

Sesarma (Parasesarma) calypso de Man.

1895. *Sesarma* (*Parasesarma*) *calypso* de Man, Zool. Jahrb. Syst., ix, p. 185; x (1898), pl. xxx, fig. 34 (Atjeh).

1917. *Sesarma* (*Parasesarma*) *calypso*, Tesch, Zool. Meded., Leiden, iii, p. 140.

Material.—Two males from Simalur Island off the west coast of Sumatra, collected by W. L. Abbott and C. Boden Kloss in 1902.

Sesarma (Parasesarma) calypso lanchesteri subsp. nov.

1900. *Sesarma calypso*, Lanchester, Proc. Zool. Soc. London, 1900, p. 757.

Type.—An adult male from mangrove swamp near the River Jurong, Singapore, collected by M. W. F. Tweedie in April, 1934.

Characters.—A subspecies of *S. (P.) calypso* de Man distinguished from the typical form by having only 8–9 tubercles on the upper border of the dactylus and 3–4 pectinated ridges on the hand. The latter of these two characteristics, together with the presence of a transverse row of granules on the inner surface of the palm, as in the typical form, distinguishes it from the subsp. *kükenthali* de Man¹.

Description.—The chief distinguishing characters are enumerated above. When compared with specimens of the typical form from Simalur Island, the tubercles on the dactylus of the cheliped of *lanchesteri*, besides being fewer in number, are seen to be less prominent, the distal three being very low

1. de Man, Abhandl. Senckenb. Gesellsch, xxv (1902) p. 534.

and faint. Numbers two and three (counting from the proximal end) are the largest, and, as in *kükenthali*, carry more curved transverse striations than in the typical form. The dactylus itself is relatively shorter in the new subspecies, being about equal to the height of the palm, whereas in the Simalur specimens the dactylus is nearly one and a half times this measurement. The lower border of the palm and immovable finger in *lanchesteri* is less sinuous than in the typical specimens, and the denticulation of this border at the base of the finger is coarser.

On the carapace of the type of *lanchesteri* the foremost of the oblique lines on the branchial regions meets the antero-lateral border in a slight notch, which is, however, not sufficiently deep to form an epibranchial tooth. In both the Simalur specimens the antero-lateral border is quite entire. On the surface of the carapace of *lanchesteri*, particularly on the anterior half, there is considerable development of small transverse, punctate and setiferous areas. In the typical specimens setæ occur only in very small, scattered tufts.

The proportions of the carapace and male abdomen and the development of the walking legs show no noticeable divergence from those of the typical form.

Sesarma (*Parasesarma*) *rutilimana* sp. n. Plate XV, fig. 2, text fig. 3.

Cotypes.—An adult male and an ovigerous female from Pulau Senang, an Island near Singapore, taken by a native collector of the Raffles Museum in November, 1934.

Material.—Twenty-three specimens, including the types from Pulau Senang, near Singapore, Nov. 1934. Three specimens from mangrove near the Jurong river, Singapore, 1934. Two juvenile specimens from Kuala Sedili, Johore, Nov. 1934.

Characters.—A small species of *Parasesarma* characterised by the smooth, shining and rather strongly areolated carapace, by the presence of only a single well marked pectinated ridge on the upper surface of the palm of the cheliped, by the large number (25–29) of tubercles on the upper edge of the moveable finger, and by the bright yellow and red coloration of the chelæ.

Description.—The carapace is somewhat broader than long, and its surface is smooth and shining; under a lens scattered groups of punctæ are visible, particularly in the anterior part, and some of these carry a few very short and inconspicuous hairs. The regions are well marked and separated by rather deep grooves. The usual oblique lines on the branchial regions are well marked and 5 to 6 in number.

Of the post-frontal lobes the median pair are transversely disposed and half as wide again as the lateral, which lie obliquely,

their anterior margins running down towards the outer angle of the front. Both pairs are smooth and shining, with little or no trace of rugosity.

The width of the front is just equal to half that of the carapace. It is obliquely deflexed, and its edge is smooth and has a rather shallow median emargination. Just inside the edge of the front, and below the groove separating the median and lateral frontal lobes, there is, on each side, a low, transverse tubercle.

The upper orbital margins are smooth, and the outer orbital angles are sharp and forwardly directed.

In the chelipeds, which are equal, the margins of the arm are crenulate. There is a small subdistal prominence on the upper margin, but no tooth. The inner margin is expanded distally into a sharp curved tooth; the crenulation of this margin extends to the tip of the tooth. The outer surface of the arm and the upper surface of the wrist carry squamiform markings.

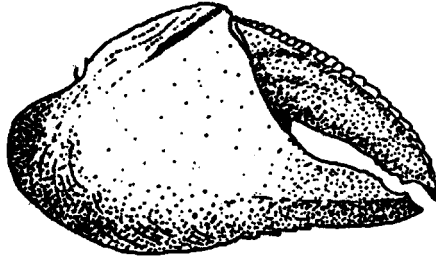


Fig. 3. *Sesarma (Parasesarma) rutilimana* sp. n. Right chela.

The palms of the chelæ are large and inflated and smooth externally except for some squamiform markings near the carpal articulation and extending onto the under surface. A low ridge runs from the palm onto the outer surface of the immovable finger, and the lower margin of the hand at the base of this finger is denticulate. The inner surface of the palm is sparsely granular, but carries no transverse ridge.

On the upper surface of the palm there is only one distinctly pectinated ridge consisting of rather over twenty small teeth. It is continued at its distal end into a short granular crest. The teeth in the proximal two thirds of the ridge are distinct and separate, but towards the distal end they become so minute and crowded together, that it is difficult to distinguish them. In the space between this ridge and the curved and beaded upper margin of the hand there are several short, irregular lines of granules. In the female the pectinated ridge is similarly developed, and behind, parallel to it, there is usually a single, continuous granular line.

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The upper margin of the male dactylus carries about 25–29 tubercles. At the base they are very small, but rapidly become larger and broader, so that most of the proximal half of the finger appears to be occupied by a raised, regularly and transversely milled band. About half way along the finger, in the region of the 17th–19th tubercles, a transition takes place in their shape: from being broadly transverse, smooth and symmetrical they become elongated, asymmetrical and more widely spaced, and the longer, proximal slopes are transversely (to the axis of the finger) striated.

Just inside the row of tubercles described above, on the proximal part of the finger, there are two rather irregular rows of granules, widely separated at the articulation, but coalescing distally.

The walking legs are slender. The upper surfaces of the meri of the first three pairs have granular and squamiform markings. Those of the last pair are smooth.

The male abdomen is triangular and rather broad.

In colour the carapace and legs are dark greenish brown, obscurely variegated with reddish or purple. The chelæ are characteristically coloured, the palms being bright yellow and the fingers orange red.

Measurements of male cotype.

Carapace.

Anterior breadth	..	..	10.7 mm.
Length	..	..	9 "
Posterior breadth	..	..	4.6 "
Breadth of front	..	..	5.5 "

Chela.

Length	..	..	8.3 "
Height of palm	..	..	5.1 "
Length of dactylus	..	..	5.5 "

Penultimate walking leg.

Length of merus	..	..	7.3 "
Breadth of merus	..	..	3 "
Combined length of carpus and propodus	..	..	8 "
Length of dactylus	..	..	3.8 "

Abdomen.

Length	..	..	7.4 "
Breadth at third segment	..	..	5.1 "
Length of penultimate segment	..	..	1.5 "
Breadth at base	..	..	3.4 "
Length of last segment	..	..	1.8 "
Breadth at base	..	..	1.9 "

Subgenus *Chiromantes* Gistel.