

NEW SPECIES OF CRABS OF THE FAMILIES GRAPSIDÆ
AND OCYPODIDÆ.

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The new species and subspecies here described will be illustrated in the final report on the collections obtained in Philippine and adjacent waters during the years 1907-1910 by the steamer *Albatross* of the United States Bureau of Fisheries.

The new forms are as follows:

Varuna altimana.

Ptychognathus guijulugani.

Sesarma (Sesarma) palawanense.

Sesarma (Sesarma) vicentense.

Sesarma (Sesarma) mindanaoense.

Sesarma (Sesarma) edwardsi philippinense.

Sesarma (Sesarma) æquifrons.

Sesarma (Sesarma) tectum.

Sesarma (Holometopus) limbense.

Sesarma (Parasesarma) dumacense.

Sesarma (Parasesarma) moluccense jamelense.

Sesarma (Parasesarma) pangauranense.

Macrophthalmus sandakani.

Dotilla sigillorum.

Tympanomerus philippinensis.

The genus *Varuna*¹ is expanded to include those species of *Ptychognathus* in which the front is prominent, sublaminar, its margin horizontal and distant from the anterior border of the antennular cavities; the antero-lateral teeth well-marked and acute; the upper surface of the wrist subquadrilateral and armed at the inner angle with a tooth or spine; all of which characters are common to typical *Varuna*. The species added to *Varuna* resemble *Ptychognathus* in having the exognath wider in the male than in the female.

¹ Milne Edwards, Dict. Class. Hist. Nat., vol. 16, 1830, p. 511.

The genus *Varuna* as now modified comprises the following species:

Varuna litterata (Fabricius, 1798). Type-species.

Varuna tomentosa Pfeffer, 1889.

Varuna dentata (de Man, 1892).

Varuna spinicarpus (Ortmann, 1894).

Varuna polleni (de Man, 1895).

Varuna affinis (de Man, 1895).

Varuna onyx (Alcock, 1900).

Varuna altimana Rathbun, 1914.

Family GRAPSIDÆ.

Subfamily VARUNINÆ.

VARUNA ALTIMANA, new species.

Type-locality.—Point Jamelo, Luzon; river, in 20-foot seine; July 13, 1908; 1 male.

Type.—Cat. No. 44558, U.S.N.M.

Dimensions.—Male type, length 20.7 mm., width 21.8 mm.

Surface uneven; H-depression deep; a groove either side of the intestinal region; a transverse groove runs inward behind the second and behind the third tooth; frontal and hepatic regions depressed; surface finely punctate and covered with still finer reticulating lines formed by flattened, confluent granules. Front broad, prominent, feebly bilobed, its lateral margins making an obtuse angle with the anterior margin. Upper border of orbit strongly S-shaped, forming at its union with the front a closed fissure ending in a triangular sinus. Antero-lateral margins moderately convergent, 3 teeth acute, with straight sides and separated by deep, narrow sinuses. Postero-lateral margins subparallel, slightly sinuous; a granulated line, beginning a little ways from the margin and considerably behind the last lateral tooth, forms the upper boundary of the very short and broad obliquely-vertical section of the branchial region.

Antennules obliquely folded; nasal lobe triangular. Sides of ischiognath parallel; in the male the exognath is large and much swollen; reaching nearly to the end of the merognath and one and three-fifths times as wide as the ischiognath; in the female the exognath is much flatter and narrower, being not quite so wide as the ischiognath.

Chelipeds stout in male; a fringe of hair on upper and inner edges of merus; carpus with a long spine which is triangular at the base, the tip acuminate, a tubercle at base of spine, just below anterior margin of segment; palms high, postero-inferiorly much swollen, posteriorly rugose; upper margin compressed and elevated in a flat lobe occupying the proximal two-thirds; fingers very broad and flat, narrowly gaping; immovable finger horizontal, with a blunt longitudinal ridge continued almost imperceptibly on the palm, and a

sinus in the prehensile margin near the tip, teeth 9-11; dactylus strongly arched, armed with about 13 irregular teeth. Chelipeds of female weak, the palm and fingers each with a well-marked ridge.

Legs narrow; margins hairy; last 3 joints heavily fringed below; a sharp, subdistal spine on merus.

Abdomen of male subtriangular; terminal segment one and one-half times as long as its middle width.

This species is nearest to *V. affinis* (de Man)¹ but has a more sinuous orbital margin, a different-shaped maxilliped (exognath wider, and ischiognath not widening distally), a longer, slenderer carpal spine, a lobe on upper margin of hand, a gape between the fingers.

*V. spinicarpus*² has a more even carapace; less sinuous orbital margin; nasal lobe with sides angled, not straight; hand without a lobe above; merus-joints of legs with a small, inconspicuous spine; abdomen of male narrower.

The lateral margins of the carapace are less incurved anteriorly than in *V. tomentosa*³ or *litterata*⁴ so that the carapace is squarer. The union of the anterior with the lateral edges of the front makes more of an angle than in either of those species, where the corners are rounded off.

PTYCHOGNATHUS GUIJULUGANI, new species.

Type-locality.—Guijulugan, Negros; April 2, 1908; 2 males, 2 females, adult (1 female ovig.).

Type.—Cat. No. 44668, U.S.N.M.

Dimensions.—Length of largest male, 8 mm., width 9.3 mm. Length of ovigerous female 8 mm., width 9 mm.

Associated with *P. barbata* at Guijulugan, were four specimens of a closely allied species.

Carapace a little broader than long, flat, regions indistinct; post-frontal tubercles well marked; the oblique portion of the branchial region is separated from the horizontal portion by a fine granular line in the posterior half.

Front sinuous, prominent, half as wide as greatest width of carapace; edge without a line of granules.

Antero-lateral teeth 3, blunt, the first or orbital tooth the longest, the last tooth very small; teeth not projecting sideways, sinuses triangular.

Upper border of orbit sinuous and oblique. The antennules fold nearly transversely. Epistome very narrow, almost linear; posterior border crenulate.

¹ *Ptychognathus affinis* de Man, Zool. Jahrb., Syst., vol. 9, 1895, p. 97; vol. 10, 1898, pl. 28, figs. 21, 21a, 21b.

² *Ptychognathus spinicarpus* Ortmann, Zool. Jahrb., Syst., vol. 7, 1894, p. 711, pl. 23, figs. 13, 13i, 13k, 13z.

³ Pfeffer, Jahrb. Hamburg. Wiss. Anst., vol. 6, 1888 (1889), p. 30.

⁴ (Fabricius) Alcock, Journ. Asiatic Soc. Bengal, vol. 69, 1900, p. 401, and synonymy.

The maxillipeds are situated a considerable distance back of the edge of the buccal cavity.

Exognath broader than ischiognath in both sexes, more so in male than in female; ischiognath with subparallel sides; antero-external lobe of merognath very broad.

In the male the inner angle of the wrist is rectangular, not toothed; hand massive, with a squarish patch of hair at the distal end, which is continued part way on the fingers. The dactylus is a little more than twice as long as the upper margin of the palm, is finely toothed, and when closed leaves a gap between it and the horizontal fixed finger; the latter has fewer teeth, 2 or 3 of which near the middle are large. In the female the wrist bears an equilateral, acute tooth at its inner angle, the chela is weak, with a well-marked granulate ridge above the lower margin, and grooved fingers; near the tips there is on the inner and outer surfaces a row of short hairs which are appressed against the horny tips.

Legs rather narrow; no spine on meropodites; last 2 joints moderately hairy; the second and third pairs are about one and three-fourths times, the last pair one and one-fourth times, the length of the carapace.

Differs from *P. barbata*¹ in having the carapace a little narrower; front more advanced and less deflexed, lacking the double row of granules in that species; upper line of orbit more oblique and more sinuous; epistome about half as wide; distance between epistome and maxillipeds greater; in the male the exognath is wider, ischiognath narrower, and lobe of merognath larger, than in *barbata*; these characters are present, though less marked, in the female; inner angle of wrist of male squarer, inner distal margin of wrist shorter, so that upper surface of wrist is more oblong than in *barbata* (this difference less evident in female); in the presence of a row of short hairs about the ends of the fingers in the female.

Subfamily SESARMINÆ.

SESARMA (SESARMA) PALAWANENSE, new species.

Type-locality.—River, Nakoda Bay, Palawan Island; December 31, 1908; 3 adult females, 1 of which is ovigerous.

Type.—Cat. No. 45792, U.S.N.M.

Dimensions.—Female, length of carapace 39.6 mm.; width between orbital angles 41.8 mm.; width between epibranchial teeth 40.5 mm.; width between posterior angles 36.7 mm.; width of front, 20.3 mm. Length of propodus 25.6 mm.; length of palm, between articulations, 9 mm.; length of dactylus, upper margin, 17.6 mm.

¹(A. Milne Edwards) de Man, Zool. Jahrb., Syst., vol. 9, 1895, p. 105, and synonymy; vol. 10, 1898, pl. 28, fig. 23.

Carapace a little broader than long, narrowing behind, the subrectangular epibranchial tooth at some little distance behind the acute orbital angle, the margin behind the second tooth slightly concave. Surface covered with tufts of coarse hair, intervening spaces smooth except for the customary granulate lines on the postero-lateral portions. Regions deeply separated from one another. Postfrontal lobes separated by deep and wide U-shaped sinuses, of which the median is much larger than the lateral; submedian lobes more than one and one-half times as wide as outer lobes. Surface of front very much as in *S. tæniolatum* White,¹ being concave and smooth except for a few tubercles; lower margin very sinuous. Upper margin of orbit long and sinuous and directed backward to the orbital tooth.

Upper margin of merus of cheliped armed with a large flat subdistal tooth; inner margin sparingly denticulate or spinose and expanded distally in a broad tooth. Outer surface of merus and carpus covered with granulated lines and tubercles; inner angle of carpus armed with a subrectangular tooth; outer and upper surface of propodus covered with tubercles, which for the most part are depressed and separated by reticulating grooves; fingers devoid of granules or tubercles except on the upper part of the dactylus; upper margin of palm thin, crossed by short, crowded and nearly longitudinal lines of granules, close to which runs a single line of smaller granules extending from the articulation with the carpus to the tooth at the distal end of the upper margin; no pronounced transverse elevation on inner surface of palm, but a feeble trace of a ridge; this surface is sparingly dotted with granules; fingers with a narrow gape (in the female), prehensile edges furnished with low uneven teeth; upper edge of dactylus margined, and milled inconspicuously on the proximal half with about 25 grooves which stop short of the basal end.

Ambulatory legs broad; third pair one and two-thirds times as long as carapace; merus joints broad, that of third pair a little over twice as long as broad, and armed with a strong, acute subdistal tooth; propodi long and dactyli short, the latter seven-tenths as long as the former in the third pair.

Terminal segment of female abdomen a little longer than wide and so deeply invaginated in the sixth segment that the latter reaches nearly as far forward as does the terminal segment.

Closely allied to *S. tæniolatum* from which it differs in its longer and narrower carapace; narrower front; in the greater difference in the width of the outer and inner frontal lobes; in the granulate, not pectinate, ridge near the upper margin of the palm, which is closer to that margin and not straight but follows the slight curve of the margin; and in the absence of a transverse ridge inside the palm.

¹ Alcock, Journ. Asiatic Soc. Bengal, vol. 69, 1900, p. 419, and synonymy.

Our species resembles also *S. lafondii* Hombron and Jacquinot,¹ which has a similar ornamentation on the upper margin of the palm, no ridge inside the palm, but the upper margin of the movable finger entirely smooth; in this last character, *S. palawanense* is intermediate between *tæniolatum* and *lafondii*. The latter has an even broader carapace than *tæniolatum*, and its side margins are parallel instead of convergent.

SESARMA (SESARMA) VICENTENSE, new species.

Type-locality.—Port San Vicente (Luzon side), Palaui Island, off northern Luzon; beach; Nov. 15, 1908; 1 male.

Type.—Cat. No. 45758, U.S.N.M.

Dimensions.—Male, length 8.8 mm., width at orbital angles 9.2 mm., posterior or greatest width 9.7 mm., width of front 4.6 mm.

A small, square species with 3-toothed side margins and a vertical front. Carapace a little wider than long, sides nearly parallel but slightly diverging posteriorly, and a little concave behind the third tooth; dorsal surface almost flat, except near the front and postero-lateral corners; regions delimited, surface roughened with crowded flattened granules anteriorly and with confluent grooves and pits posteriorly; on the hepatic and anterior branchial regions there are also unequal bead-granules. Suprafrontal lobes nearly transverse, separated by very small emarginations, the lobes of the inner pair a little more than one and one-half times as wide as those of the outer pair; from these lobes the front descends abruptly, lower margin horizontal, sinuous with two broad, shallow lobes and an equally broad median sinus; sides of front parallel, lower corners rounded, surface finely granulous, a tubercle on each side near the lower margin almost in line with the notch between the outer and inner postfrontal lobes.

Upper margin of orbit inclined obliquely backward and outward to the acutangled antero-lateral tooth; this is separated by a well-marked notch from the second tooth which is small and obtusangled; the third tooth is simply a smooth swelling of the margin.

Epistome covered with vesicular pubescence. Merus of outer maxillipeds equal in length to the ischium, its antero-lateral angles rounded off.

Only the left cheliped is present and that is rather small, not one and one-half times as long as the carapace. Lower and inner margins of merus denticulate, outer surface covered with short rugæ, upper margin formed by parallel, oblique rugæ. Upper surface of carpus crossed by granulated rugæ, inner angle bluntly rounded. Outer surface of hand nearly smooth, punctate, upper surface covered with sharp granules, and near the margin, with obliquely longitudinal and

¹ Voy. l'*Astrolabe*, Atlas of Zoology, Crustacea, 1852 (?), pl. 6, figs. 4 and D.

broken lines of granules; upper half of inner surface sparingly granulous, no transverse ridge present. The fingers do not gape when closed, although the irregular teeth do not fit snugly together; the upper margin of the dactyl bears 6 spinules on the proximal half.

Merus joints of legs diminishing toward both ends, upper surface roughened with fine granules, anterior margin with a short subdistal tooth tipped with a back bristle, merus of third pair about two and three-fourth times as long as wide. Last three joints narrow, bordered with dark bristles; dactyli nearly straight till near the tip, a little longer than their respective propodi.

In the male abdomen the margins are concave from the beginning of the fourth to the beginning of the sixth segment; terminal segment large, as wide as long, and as wide as the adjoining end of the sixth segment.

This species is most nearly related to *S. sinense* Milne Edwards.¹ It differs from *sinense* in its narrower front, only half as wide as the distance between the orbital angles, in having a third tooth on the side margins, in the middle part of the outer surface of the palm being nongranulate, and in the absence of a transverse granular line on the inner surface.

SESARMA (SESARMA) MINDANAOENSE, new species.

Type-locality.—Small stream south of Cotabato, Mindanao; May 20, 1908; 1 female.

Type.—Cat. No. 45765, U.S.N.M.

Dimensions.—Type female, length of carapace 18.2 mm.; width at antero-lateral angles 19 mm., width at postero-lateral angles 20.2 mm., width of front 11.2 mm., height of same 2.3 mm., length of propodus of cheliped below 9.4 mm., same above 3.3 mm., height of same 4.2 mm., length of merus of third leg 15.6 mm., width of same 6 mm.

Carapace convex, regions well marked, especially the mesogastric and the cardiac; a groove parallel to the gastro-cardiac groove cuts off a narrow strip of the mesogastric region except across the middle; surface rough with coarse pits and fine grooves; from most of the pits a bunch of short hairs arises; one of these bunches is situated on each of the 4 tubercles behind the postfrontal lobes; the tubercles of the outer pair are further forward than those of the inner pair and are nearly the size of the postfrontal lobes. These lobes are deeply and widely separated, the outer ones three-fifths as wide as the inner ones; the intervening furrows are continued well back on the carapace; sides of front parallel, lower rim projecting, in dorsal view bilobed and with a broad median sinus, in front view arcuate and a little sinuous. Upper margin of orbit oblique, orbital angle acute; outer margin of orbital tooth sloping backward and inward; next lateral

¹ See de Man, Zool. Jahrb., Syst., vol. 2, 1887, pp. 648 and 669.

tooth rectangular; a trace of a third tooth, indicated by a thickening of the margin.

Outer surface of merus and carpus of cheliped of female crossed by short granulated rugæ; merus with a short acute tooth above, no large tooth but a row of denticles on the inner margin; no tooth at inner angle of wrist; palm relatively smooth and punctate, finely rugose in the proximal and upper portions; a few obliquely longitudinal granulated lines at the upper margin and just inside; inner margin almost smooth. The lower margin of the propodus is nearly straight; fingers nearly meeting, irregularly toothed; dactylus granulate at the proximal end, upper margin punctate.

Third leg about two and one-half times as long as carapace, its merus over two and one-half times as long as wide; a sharp spine above each merus; margins of last two segments and distal end of carpal segments furry; dactyli with long horny tips, definitely shorter than their respective propodi in the second and third legs, a very little longer than the propodi in the first and fourth pairs.

Near *S. modestum* de Man¹ and *S. longipes* Krauss.² From both it may be recognized by the wider front, different slope of the orbital tooth, smoother hands, longer merus joints of the legs; from the second by the shorter dactyli of the legs.

SESARMA (SESARMA) EDWARDSI PHILIPPINENSE, new subspecies.

Type-locality.—Pangauran River, Port Caltom, Busuanga Island; Dec. 15, 1908; 3 males, 3 females (1 male is type); also Dec. 16, 1908, 1 female with Rhizocephalid parasite under the abdomen.

Type.—Cat. No. 45750, U.S.N.M.

Dimensions.—Type male, length of carapace 14.5 mm., width between the orbital angles 16.7 mm., width of front 9.6 mm.

This subspecies has a little wider carapace than typical *edwardsi*; the chelæ are narrower, the fingers more elongate and more horizontal; the abdomen of the male with the terminal segment deeply inserted in the sixth segment.³

Variety *brevipes* de Man⁴ has a male abdomen similar to that of *philippinense*, but has much shorter legs. The legs of the Philippine form are as in typical *edwardsi*.⁵

SESARMA (SESARMA) ÆQUIFRONS, new species.

Type-locality.—Pangauran River, Port Caltom, Busuanga Island; Dec. 15, 1908; 1 male (type), 1 female.

Type.—Cat. No. 45754, U.S.N.M.

¹ Abh. Senckenb. naturf. Ges., vol. 25, 1902, p. 511, pl. 19, figs. 8-8d.

² Die Südafrikanischen Crustaceen, 1843, p. 44, pl. 3, figs. 2, a, b, c, d.

³ See Journ. Linn. Soc. London, Zool., vol. 22, 1888, pl. 13, figs. 1-4.

⁴ Zool. Jahrb., Syst., vol. 4, 1889, p. 425, pl. 9, figs. 6a, 6b.

⁵ Idem, pl. 9, fig. 6c.

Dimensions.—Male, length of carapace 9.6 mm., width at epibranchial tooth 11.4 mm., width at anterior angles 11.2 mm., width at posterior angles 10.7 mm., width of front 7.2 mm., height of front 1 mm., length of third ambulatory leg 6.5 mm., width of same 2.9 mm.

Distinguished by the slightly marked frontal lobes and the well-defined upper surface of the palm.

Carapace sensibly wider than long, wider anteriorly than posteriorly, widest at the single epibranchial tooth, lateral margins a little concave; surface everywhere punctate, mesogastric region defined, as is also the posterior cardiac lobe; oblique lateral lines few, about seven, the anterior of these crossing the epibranchial tooth. Front very wide, widening below, superior lobes separated by shallow furrows, the lateral ones very short; outer lobes a little narrower than inner; surface of front nearly vertical, lower margin arcuate, although nearly straight at the middle. Upper margin of orbit directed very obliquely backward to the short and slightly advanced orbital tooth; next tooth subrectangular.

Maxillipeds widely gaping, the merus joints obliquely transverse. Chelipeds of male unequal; outer surface of arm, wrist, and proximal half of palm crossed by fine granulated rugæ which on the middle of the palm are longitudinal; no spine on upper margin of arm, only a blunt angle; inner margin sparingly denticulate and with a shallow rounded prominence; no tooth at inner angle of wrist; chelæ punctate; upper surface of palm flattened, limited outwardly by a smooth blunt ridge and inwardly by an uneven granulated margin; a transverse line of granules inside palm, otherwise surface nearly smooth. Fingers moderately gaping; the horny extremity embraces the subterminal tooth on each finger; upper margin of dactylus with a line of four distant spinules; lower margin of immovable finger straight except at tip; prehensile edges irregularly toothed, three teeth on each finger enlarged.

Ambulatory legs of moderate length; carpal and propodal segments densely hairy.

Abdomen of male narrow, with a large terminal segment which is nearly as wide as long.

Resembles the very briefly described *S. læve* A. Milne Edwards¹ in its smooth shining carapace, but the carapace is narrower than in *læve* (where it is 7 mm. × 10 mm.), and the front has not a straight margin.

The carapace has considerable resemblance to that of *S. semperi* Bürger,² but the legs are shorter, the palm has no transversely oblique ridges above, and the movable finger is very feebly ornamented on the upper margin, instead of having stout tubercles.

¹ Nouv. Arch. Mus. Hist. Nat., Paris, vol. 5, 1869, p. 27.

² Zool. Jahrb., Syst., vol. 7, 1893, p. 630, pl. 21, fig. 1.

SESARMA (SESARMA) TECTUM, new species.

Type-locality.—Port San Vicente, Palaui Island, off northern Luzon; seine; Nov. 14, 1908; 1 female adult.

Type.—Cat. No. 45766, U.S.N.M.

Dimensions.—Type female, length 18.3 mm., width at antero-lateral angles 18.4 mm., greatest width (at middle of carapace) 20.2 mm., width of front 12 mm., height of front 3.7 mm., length of propodus of cheliped 9.2 mm., height of same 4.8 mm., superior length of palm 3.6 mm., length of merus of third leg 14.3 mm., width of same 5.3 mm.

This crab is densely covered with pubescence everywhere except on the corneæ, the terminal half of the fingers and the horny tips of the legs; tufts of longer hairs are disposed on carapace, chelipeds, and legs, including a tuft on each tubercle.

Carapace almost square, except for the two lobiform teeth which project laterally beyond the orbital tooth and make the carapace wider at those points. Regions limited by wide grooves. The principal tubercles are as follows: One large, behind each frontal lobe, the middle pair further back than the outer pair; one in the middle of the mesogastric region, and one on each side and nearly in the same line on the protogastric region; two side by side on the cardiac region; about three on each branchial region. Before the hairy coat is removed the tubercles seem to be more numerous. The surface is in the main smooth and shining, and there are no oblique ridges on the posterolateral regions. Frontal lobes prominent and deeply separated, the outer a little narrower than the inner. The front widens from above downward, is lowest at the outer ends and most prominent along the lower margin; this last is convex in front view, but sinuous from above, showing six shallow prominences; surface of front uneven. Upper margin of orbit very oblique; orbital tooth very slightly advanced, outer margin convex.

Chelipeds of female equal, of moderate size. Merus with a subterminal tooth on upper margin, and a slight prominence but no tooth on the inner margin. Outer surface of carpus covered with low tubercles; inner angle blunt. Chelæ, when hair is removed, smooth and shining, without ornamentation in the way of granules or lines but with two or three depressed and inconspicuous tubercles on upper surface, and fine punctæ in a reticulating pattern where the hairs are inserted; upper margin of palm blunt; lower margin of propodus nearly straight; fingers slender, prehensile edges finely toothed as far as to the horny extremities which occupy the distal third and are slightly notched where the tips cross each other. Merus joints of the legs bordered by irregular tufts of hair which have the appearance of lobes; a subterminal tooth on anterior margin; the tufts of hair on the upper surface of merus, carpus, and propodus

look like granules or tubercles, but when they are removed the surface is seen to be glossy and in the main smooth though a little uneven; dactyli shorter than propodi, tapering to a very slender horny tip.

Terminal segment of abdomen of female inserted up to its middle in the sixth segment.

S. tectum, in the absence of rugose lines on the postero-lateral portions of the carapace, in the shining surface, lack of roughness or granulation, coat of setæ and hairs, resembles *S. lanatum* Alcock,¹ but the latter has a considerably wider carapace, with the tufts of hair smaller, more numerous and more uniform.

SESARMA (HOLOMETOPUS) LIMBENSE, new species.

Type-locality.—Limbe Island, Gulf of Tomini, Celebes; November 12, 1909; 1 male (type), 2 females (1 ovigerous).

Type.—Cat. No. 45920, U.S.N.M.

Dimensions.—Male type, length of carapace 6.8 mm., width at antero-lateral angles 7.7 mm., width at postero-lateral angles 7.2 mm., width of front 4.4 mm.; ovigerous female, length of carapace 11.7 mm., width at antero-lateral angles 12.9 mm., width at postero-lateral angles 12.7 mm., width of front 7 mm.

Carapace deeply sculptured; not only are the interregional grooves deep, but the grooves separating the postfrontal lobes are continued halfway to the mesogastric region, and the branchial region shows several areolets along its inner border. Surface punctate and shining, with numerous very short and inconspicuous hairs. The antero-lateral tooth projects forward but not outward. Where the foremost of the oblique ridges joins the side margin, the latter is a little swollen. The front is about 4 times as wide as high, surface concave, sides converging below, lower margin slightly sinuous, and in front view, arcuate as well; a bunch of coarse granules near the middle of either half. Postfrontal lobes somewhat oblique, outer pair slightly narrower than inner pair.

Arm without spine above; inner margin with a triangular tooth denticulated on the edge. Palm rather smooth, sparingly punctate, with fine rugæ near the wrist and sparse granules near the top; upper margin a single slightly angled, granulated line running obliquely backward and outward from the distal angle of the palm to the point where it curves down to the articulation of the wrist. Within this margin and forming part of the inner surface, although visible from above, there are 2 or 3 granulated lines, the upper of which is, in the male, parallel to the upper margin; the others are also oblique but not parallel. The upper margin of the finger bears 8 or 9 sculariform tubercles in the male; in the female the tubercles are low and only 5 or 6 proximal ones are discernible.

¹ Journ. Asiatic Soc. Bengal, vol. 69, 1900, p. 418; Illus. Zool. Investigator, Crust., pt. 10, 1902, pl. 65, figs. 4, 4a.

Legs long and narrow, the third pair more than twice as long as the carapace, and its merus two and one-third times as long as wide. The spine on the upper margin of the merus-joints is acuminate. The propodites are unusually long, the anterior margin of the third one being 4 times as long as its greatest width; the dactyls, on the other hand, are rather short, that of the third leg about two-fifths as long as the propodus. The dactyli are of uncommon form, convex on the anterior margin and also, but very slightly so, on the posterior margin, down to the long-pointed tip.

This species has no resemblance to any other of the subgenus *Holometopus*, but its general aspect is much like that of a Samoan species of the subgenus *Parasesarma*, which I shall describe later.

SESARMA (PARASESARMA) DUMACENSE, new species.

Type-locality.—Dumaca River, Luzon; February 25, 1909; 1 female, thin-shelled.

Type.—Cat. No. 45922, U.S.N.M.

Dimensions.—Type female, length of carapace 13.2 mm., width between antero-lateral angles 17.6 mm., width between postero-lateral angles 15.7 mm., width of front 9.8 mm., length of propodus of cheliped below 7.9 mm., same above 3 mm., height of same 3.4 mm., length of merus of second leg 10.7 mm., width of same 4.8 mm.

Allied to *S. plicatum*.¹ The sides of the carapace are slightly concave; the antero-lateral tooth is acute; its outer margin does not curve inward toward the tip as in *S. plicatum*, but the tooth projects strongly outward. The interregional grooves are very deep, as are also the grooves separating the postfrontal lobes; these grooves are continued back nearly to the angles of the mesogastric region. On each branchial region there is a smooth longitudinally oblique ridge running near the side of the cardiac and intestinal regions. The lateral margins of the deflexed front converge below, while in *plicatum* they diverge; that part of the front lying before the antennules is very swollen. The propodus of the cheliped is more slender than in the female of *plicatum*; on the upper surface of the palm there is a pectinated ridge beginning at the distal inner angle of that surface and running in a longitudinally oblique direction, not in a transversely oblique direction, as in *plicatum*; parallel to this ridge there is a fine granulated ridge near the posterior margin. The protuberances on the upper margin of the movable finger are low and sculariform; there are about 7 on the proximal half, after that they become very faint; each one is divided by a transverse line into a large proximal portion and a small tuberculiform distal portion. The anterior or upper margin of the meropodites of the ambulatory legs

¹ (Latreille) Rathbun, Kgl. Danske Vidensk. Selsk. Skrifter, 7 Række, naturv. og math. Afd., vol. 4, 1910, p. 329, and synonymy.

is less convex in the distal half than in *plicatum*, so that the segment is wider distally than in that species.

Color.—In alcohol the carapace is blotched, and the legs finely mottled, with dark on a light ground.

SESARMA (PARASESARMA) MOLUCCENSE JAMELENSE, new subspecies.

Type-locality.—Point Jamelo, Luzon, in river; taken in 20-foot seine; July 13, 1908; 2 males, 2 females (1 male is type).

Type.—Cat. No. 45917, U.S.N.M.

Dimensions.—Type male, length of carapace 10 mm., width between antero-lateral angles 11.3 mm., width between postero-lateral angles 10.8 mm., width of front 6.6 mm., length of propodus of cheliped below 7 mm., same above 3 mm., height of same 4 mm., length of merus of third leg 7.7 mm., width of same 3.4 mm.

This form differs from typical *moluccense* de Man,¹ in having the carapace a little narrower in proportion to its length; in the front also narrower in proportion to the width between the antero-lateral angles; in the 9 or 10 tubercles on the upper margin of the movable finger being obliquely transverse instead of longitudinal, each tubercle trending forward or distally toward the inside of the finger, as in *S. lenzii* de Man.²

As in the typical species, the carapace is widest at the anterior angles; the surface of the front bears an elongated transverse tubercle near the lower margin on either side of the middle, and a round tubercle underneath the outer corner of the postfrontal lobes of the inner pair; the upper margin of the arm has no subdistal spine, only an obtuse tooth, the lower margin has a triangular expansion with denticulate border, and a spine or sharp tooth at the angle; the upper surface of the palm has two oblique pectinated ridges subparallel to the posterior margin, the ridges being prolonged backward by simple granulated lines toward the articulation with the carpus; in the female the ridges are more longitudinal; the merus joints of the legs bear a sharp spine on the upper margin; the abdomen of the male is shaped as in *S. lenzii*.³

SESARMA (PARASESARMA) PANGAURANENSE, new species.

Type-locality.—Pangauran River, Port Caltom, Busuanga Island; December 15, 1908; 1 female ovig.

Type.—Cat. No. 45909, U.S.N.M.

Dimensions.—Type female, length of carapace 4.8 mm., width at antero-lateral angles 6.5 mm., width at postero-lateral angles 5.6

¹ *Sesarma melissa* var. *moluccensis* de Man, in Max Weber, Zool. Ergebnisse einer Reise nach Niederländisch Ostindien, vol. 2, 1892, p. 328.

Sesarma (*Parasesarma*) *moluccensis* de Man, Zool. Jahrb., Syst., vol. 9, 1895, p. 202; vol. 10, 1898, pl. 31, fig. 36.

² Zool. Jahrb., Syst., vol. 10, 1898, pl. 30, fig. 35g.

³ Idem, pl. 30, fig. 35b.

mm., width of front 3 mm., length of merus of third leg 4.3 mm., width of same 1.5 mm.

The lateral margins of the carapace are slightly concave behind the acute antero-lateral spine; the upper margin of the orbit is long and sinuous; the surface is coarsely punctate, and on the anterior part, single coarse bristles proceed from some of the punctæ. Front high, about one-fourth its width, sides parallel, lower margin most produced downward at the middle. Outer postfrontal lobes scarcely more than half as wide as inner ones, their anterior margin being continued downward toward the lower outer angle of the front.

Arm without subdistal spine on upper margin, but with a triangular spine on inner margin. The outer surface of the palm has a microscopic granulation and is coarsely and sparsely punctate; on the upper part there are a few larger granules; the upper surface is crossed by three irregular longitudinally oblique ridges subparallel to the posterior margin. Inner surface of palm without transverse ridge. The upper margin of the finger has a row of very small and low tubercles, of which there are about 11 on the proximal half; on the distal half no tubercles are perceptible.

Legs slender, especially in the last three segments; the merus joints have no subdistal spine above, but only a right-angled tooth; the dactyli are long and straight to near the end.

Color.—The carapace in alcohol is dark, and the legs are cross-banded with dark; on the propodal segments there are two dark bands.

This little species, for the mature female is only a quarter of an inch wide, has much in common with *S. calypso*,¹ in which, however, the front is wider and lower, the meropodites of chelipeds and legs have a superior spine, the meropodites of the legs are wider and the dactyli more curved.

Family OCYPODIDÆ.

Subfamily MACROPHTHALMINÆ.

MACROPHTHALMUS SANDAKANI, new species.

Type-locality.—Sandakan, Borneo; shore; March 3, 1908; 1 female.

Type.—Cat. No. 44546, U.S.N.M.

Dimensions.—Female, length 8.2 mm., width at antero-lateral angles, 18 mm.

Female.—Carapace a little more than twice as wide as long; sides posteriorly convergent; first of the 3 antero-lateral teeth situate on the upper margin of the orbit, the second tooth forming the angle of the carapace; 3 granulated tubercles in a longitudinal row on the branchial region; 2 deep, curved, transverse grooves on the anterior

¹ De Man, Zool. Jahrb., Syst., vol. 9, 1895, p. 185; vol. 10, 1898, pl. 30, fig. 34.

half of the lateral regions. Eyes reaching nearly to end of orbit, but halfway between tips of first and second teeth. Front moderately constricted, anterior edge truncate. Lower edge of orbit prominent, crenulate.

Upper half of outer surface of palm granulate. Ambulatory legs sparsely furnished with long fine hairs, most numerous on the margins of the fourth leg and the anterior margin of the merus of the third leg; a sharp subdistal spine on anterior margin of second and third legs.

Allied to *M. brevis* (Herbst)¹=*M. grandidierii* Milne Edwards² and to *M. sulcatus* Milne Edwards.³ *M. brevis* lacks the row of tubercles on the branchial region; the tooth at the antero-lateral angle of the carapace is broader; the anterior margin of the merus of the first three legs is densely hairy. In *M. sulcatus* the eyes reach beyond the carapace, the surface of the hand of the female is smooth, the legs are unarmed.

Subfamily SCOPIMERINÆ.

DOTILLA SIGILLORUM, new species.

Type-locality.—Sandakan Bay, Borneo; in seine; March 2, 1908; 1 female, mature.

Dimensions.—Length of carapace, 6 mm.; width of carapace, 9.4 mm.; thickness of body, 6.3 mm.

Type.—Cat. No. 44549, U.S.N.M.

Body very thick. Carapace very convex, short and broad, nearly smooth, and naked; a broad furrow on the front is continued across the gastric region; from each side of the mesogastric region a deep narrow groove runs back on the branchial region to a point opposite the cardiac region, where it turns outward and forward, forming a loop. Orbit shallow, oblique, its upper limit indicated only by a fine smooth rim as far as the tooth at the outer end; this last is very obtuse-angled and bounded posteriorly by a shallow notch. The orbit is on a much lower level than the apparent margin of the carapace; this margin is partially indicated by a very fine granulated line, which is present above the middle of the ocular peduncle, and also about the antero-lateral angle. There is a similar granulated line above the postero-lateral margin and the base of the last leg. Sides of the carapace vertical and horizontally grooved. Front narrow, deflexed vertically, lateral margins convergent, slightly hollowed at base of eye-stalks, extremity broadly triangular; surface smoothly elevated along the sides, a circular elevation in the center of the broad median furrow. Lower border of orbit finely crenulate.

¹ *Cancer brevis* Herbst, *Naturg. Krabben u. Krebse*, vol. 3, Heft 4, 1804, p. 9, pl. 60, fig. 4.

² *Nouv. Arch. Mus. d'Hist. Nat.*, Paris, vol. 4, 1868, p. 84, pl. 20, figs. 8-11.

³ *Ann. Sci. Nat., Zool.* (3), vol. 18, 1852, p. 156 (120).

Subbranchial, subhepatic and pterygostomian regions pubescent, sculptured. Epistome broad and very shallow, distant from, and above, the anterior margin of the merognath; the intervening space is filled by the palpus. Maxillipeds very large, bulging, the merus broader than long and about three times as large as the ischium, intermediate sulcus slightly oblique; merus with an antero-internal angle, and a sulcus along the anterior and the external margins.

The chelipeds of the female are of moderate size, equal, finely granulate; a broadly oval tympanum extends half the length of the merus; the carpus is not much longer than wide, inner angle rounded; the manus increases in width distally, its height is nearly as great as its horizontal length across the middle, lower edge with a sharp granulated line which is continued half way along the finger, upper surface rounded; fingers long, slender, deflexed, curved inward, a granulated ridge on the outer surface of each and on the upper edge of the dactylus, but the distal third of the fingers is smooth; tips very slender, horny, overlapping; there is a narrow gape and a shallow prominence near the base of the dactylus.

Legs granulate; merus joints dilated, the tympana strongly marked, smooth, occupying the entire width and about three-fourths the length of the segments; dactyli much longer than carpal joints, grooved, carinæ sparingly fringed with hair.

Sternum and abdomen smooth and shining; abdomen subcircular.

This species is very distinct from any before described. It is thick like *D. myctiroides* (Milne Edwards)¹ and *D. wichmanni* de Man,² but the carapace is much shorter and broader and almost devoid of ornamentation. The merognath is wider than in any other species of *Dotilla*, the ischium-merus having much the form of that in *Scopimera investigatoris* Alcock,³ but the division sulcus is situated much further back. *D. profuga* Nobili⁴ is the only species which approaches ours in the reduction of the epistome. The tympana are larger and more conspicuous than in any other species.

TYMPANOMERUS PHILIPPINENSIS, new species.

Type-locality.—Guijulugan, Negros; shore; April 2, 1908; 1 male.

Type.—Cat. No. 45597, U.S.N.M.

Dimensions.—Type male, length 3.2 mm., width 5.2 mm.

Carapace subpentagonal, the upper margins of the orbit being oblique and the lateral margins of the carapace converging posteriorly; carapace convex from front to back, uneven, granulate; front almost wholly visible in dorsal view, more than one-fourth as wide, in its posterior or widest part, as the distance between the outer

¹ Ann. Sci. Nat., Zool. (3), vol. 18, 1852, p. 152, pl. 4, fig. 24.

² Weber, Zool. Ergeb. einer Reise in Niederl. Ost-Indien, vol. 2, 1892, p. 308, pl. 18, fig. 8.

³ Illus. Zool. Investigator, Crust., pt. 10, 1902, pl. 63, fig. 4b.

⁴ Boll. Mus. Zool. Anat. comp. R. Univ. Torino, vol. 18, 1903, No. 447, p. 22.

angles of the orbit; sides of front converging downward, lower margin rounded; surface concave; orbits with a dorsal inclination, upper margin sinuous; tooth at outer angle obliquely truncate externally, separated by a long, rounded sinus from the second tooth, which is small, obtuse and laminar, continuous with the postero-lateral margin; a raised line above and subparallel to the posterior margin.

On outer half of merus of maxilliped there is a groove subparallel to the outer margin. Chelipeds twice as long as carapace, granulate; wrist without tooth at inner angle; hands as high as their length at the middle, a little longer than the fingers measured horizontally; lower margin of propodus strongly sinuous, the manus convex below, the finger bent downward; upper margin of dactylus finely serrulate, a low tooth on the basal half of the prehensile edge; no tooth nor sinus on the prehensile edge of the immovable finger; that edge in both fingers denticulate. Legs long and narrow, sparingly hairy; merus joints dilated, without tympana, dactyli nearly as long as propodi.

First two segments of abdomen very short; third longer than first and second together, sides rounded; fourth not quite so long nor wide as third, its distal edge trilobate; fifth segment about as long as its distal width, constricted at base, sides sinuous; sixth segment broader than long, sides sinuous, forming a small tooth at proximal end.

The species in general appearance resembles *T. stapletoni* de Man,¹ which has transverse orbits, horizontal immovable fingers, almost smooth palms, and stout legs.

T. pusillus (de Haan)² has a more pentagonal carapace than the new species, the orbits and also the lateral margins being more oblique; the granules on the palm are reticulated, the immovable finger is horizontal, and both fingers have a strong ridge through the middle of the outer surface; the merus joints of the legs are provided with tympana.

In *T. orientalis* (de Man)³ the surface of carapace and hand is smooth, the carapace widens posteriorly, the cheliped and especially the carpus is elongate.

In *T. ceratophora* (Kœlbel),⁴ the eyestalk bears a long stylet which projects beyond the cornea, the chelipeds are elongate, the immovable finger has a strong tooth on its prehensile edge.

¹ Rec. Indian Mus., vol. 2, 1908, p. 212, pl. 18, fig. 1.

² *Ocypode (Cleistostoma) pusilla* de Haan, Fauna Japon., Crust., 1835, p. 56, pl. 16, fig. 1.

³ *Dioxippe orientalis* de Man, Journ. Linn. Soc. London, Zool., vol. 22, 1888, p. 138, pl. 9, figs. 8-10.

⁴ *Dioxippe ceratophora* Kœlbel, in Count Széchenyi's Keletarzsiai utjanak tudományos Eredménye, Budapesth, 1896, p. 714, pl. 1, figs. 8-12. (Title copied from Zool. Rec. 1899). For German translation, see Wissenschaftliche Ergebnisse der Reise des Grafen Béla Széchenyi in Ostasien 1877-1880, vol. 2, Wien, 1898, p. 573, pl. 1, figs. 8-12.



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