granulate. Margin of orbit granulate; a distinct notch below outer angle; a short acute tooth at inner lower angle; upper margin slightly sinuous but without open notches. Front somewhat deflexed, very little projecting; margin unarmed, deeply notched at middle; lobes oblique, sinuous. The basal article of the outer antennae falls considerably short of reaching the front. A short ridge on endostome.

Chelipeds and legs setose, the major cheliped less so than the rest. Chelipeds stout; carpus and hand covered externally and above with small, subequal granules, regularly crowded and diminishing in size below; carpus with two sharp, minute teeth at inner angle. Legs with one row of short spines along upper edge of merus and a few rows of spinules or sharp granules on next two articles. Third, fourth and fifth articles of male abdomen fused.

Color.—Yellowish marbled with red (Stimpson).

Measurements.—Female (20052), length of carapace 6.3, width of same 9, fronto-orbital width 5.6, width of front 2.7 mm.

Range.—Bahamas and Cuba to Curaçao.

Material examined.—

BAHAMAS.—Green Turtle Cay; E. A. Andrews; 1 female (20052).

CURAÇAO.—Caracas Bay; 1920; C. J. van der Horst: In *Maeandrina;* April 7; 1 male (57001), 1 male, 1 young female (Amsterdam Mus.). In coral: May 5, 1 female (57000); May 13, 1 young male (60765). Under stones near shore; May 3; 1 ovigerous female (Amsterdam Mus.).

MICROPANOPE POLITA Rathbun

Plate 180, Figures 3 and 4

Micropanope polita RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 238 (type-locality, off Magdalena Bay, 36 fathoms; cotypes, Cat. No. 17397, U.S.N.M., Cat. No. 4252, M.C.Z.).

Panopeus tanneri FAXON, Bull. Mus. Comp. Zoöl., vol. 24, 1893, p. 154 (type-localities, off Galapagos Islands, 53 fathoms, cotypes including measured and figured specimens, in M.C.Z.; and off Cocos Island, 66 fathoms, cotype, Cat. No. 20606, U.S.N.M.); Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 19, pl. 3, figs. 4, 4*a*.

Xanthias politus RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 271.

Diagnosis.—Palms not more than half rough. A notch in upper margin of orbit. Basal article of antennae reaching front. Front double-edged.

Description.—Carapace moderately convex longitudinally, smooth and punctate posteriorly, rough-granulate anteriorly, especially on hepatic region; areolations distinct. A nearly transverse, slightly arched line of granules on the branchial region opposite the last lateral sinus. Front nearly straight, median notch narrow, a blunt tooth at each lateral angle. A double edge is formed by a groove which runs along the front, the lower edge projecting a little further

forward than the upper; both edges granulate, the lower more finely than the upper. Orbit with a pronounced inner tooth above and outside the front, a small emargination near middle of upper border, a larger triangular outer notch, and a blunt tooth at inner angle of lower margin. Antero-lateral teeth five including orbital angle; a concave sinus between first and second tooth; first and last tooth smallest. Ventral surface of carapace granulate; no subhepatic tubercle. Basal antennal article short, but touching the prolongation of the front.

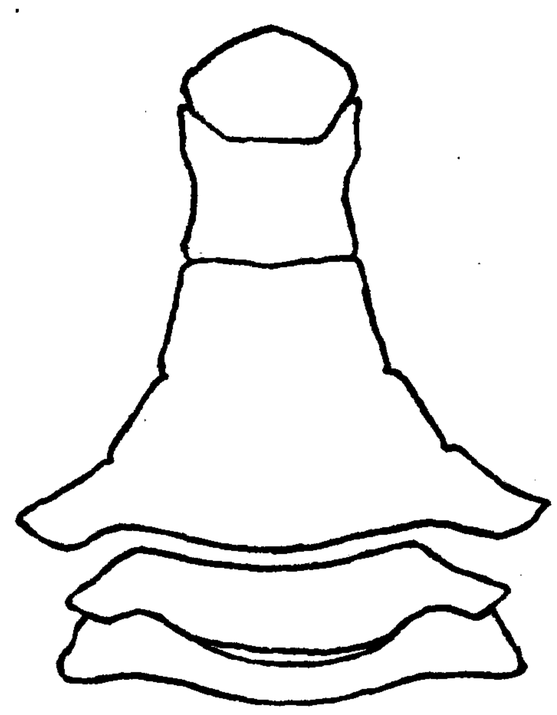


FIGURE 70.—MICROPANOPE POLITA, MALE (19972), ABDOMEN, × 10

Merus of chelipeds finely granulate, upper margin dentate; carpus squamoso-rugose, a distal groove and a stout tooth at inner angle; palms squamoso-tuberculate above and near wrist, elsewhere smooth and punctate; major palm robust, lower margin convex, fingers gaping, a large tooth at base of dactylus; minor palm much narrower, lower margin almost straight, fingers meeting, teeth not prominent. Fingers black, tips lighter, crossing when flexed. Legs slender, punctate, spinulous above, last three segments hairy.

In the male abdomen the slender distal angles of the sixth segment are prolonged on either side of the terminal segment which is broader than long.

Measurements.—Male (20606), length of carapace 6.1, width of same 9.4, fronto-orbital width 6.4, width of front 3.4 mm.

Range.—From Magdalena Bay, Lower California, Mexico, to Galapagos Islands; 20 to 66 fathoms.

Material examined.—See table, page 437.

MICROPANOPE LATA (Faxon), new combination

Plate 180, Figures 5 and 6

Panopeus latus FAXON, Bull. Mus. Comp. Zoöl., vol. 24, 1893, p. 153 (type-locality, Bay of Panama, 85 fathoms; type in M.C.Z.); Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 18, pl. 3, fig. 3, 3*a*.

Diagnosis.—Carapace very broad and very convex antero-posteriorly. No tooth at outer angles at front. Hands mostly smooth.

Description (after Faxon).—Carapace broad, convex antero-posteriorly, granulate, especially on the hepatic, branchial and cardiac regions; areolations well marked and protuberant. Front with a small median incision, lobes slightly convex, not produced into teeth at lateral angles. Five antero-lateral teeth; postocular tooth small, separated from the second tooth by a shallow, granulate sinus, third tooth broadest, rounded off at apex, fourth most salient, acute, fifth very small, acute; all have crenate or spinulous margins. Orbital

margin minutely crenulate, upper part with two closed fissures; outer hiatus a triangular notch; lower margin produced to form an obtuse tooth at inner angle. Subhepatic region granulate, without tubercle.

Chelae unequal but similar. Carpus rough with small tubercles and having a distal groove and a small blunt tooth at inner angle. Hands robust, inflated, smooth except near articulation with carpus where there are scattering granules; upper and lower margins rounded. Fingers long, down-curved, smooth, canaliculate, their cutting edges irregularly armed with small and rather sharp teeth, without any prominent basal tooth; when closed the fingers gape slightly and tips cross. Legs setose, merus with small teeth on upper edge. Penult segment of male abdomen with concave sides, terminal segment broad and rounded.

Measurements.—Male holotype, length of carapace 6.5, width of same 10.25 mm.

Range.—Known only from the single type specimen, male (4484, M.C.Z.) from the Bay of Panama; lat. 7° 33′ 00″ N.; 85 fathoms; sft. gn. M. brk. Sh.; temperature 57.3° F.; March 11, 1891; station 3397, *Albatross*.

Remarks.—Allied to *M. xanthiformis*, but carapace much broader and more convex from front to back, front less prominent and destitute of lobules at lateral angles, and carpal tooth of cheliped blunt.

MICROPANOPE XANTHIFORMIS (A. Milne Edwards)

Plate 180, Figures 7 and 8

Panopeus xanthiformis A. Milne Edwards, Crust. Rég. Mex., 1880, p. 353, pl. 53, figs. 4–4*b* (type-locality, off Grenada, 92 fathoms; type in Paris Mus.); Bull. Mus. Comp. Zoöl., vol. 8, Dec., 1880, p. 13.

Micropanope xanthiformis Rathbun, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 274; Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 32.—A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 324.

Diagnosis.—Shape xanthoid. Front shallow. Carapace and chelipeds very rough in adults. Subhepatic tubercle ill defined.

Description.—Carapace depressed, coarsely granulate on anterior arch, granules depressed; regions well marked; an oblique ridge on hepatic region. Front slightly deflexed, shallow; lobes separated by a narrow fissure; margins sinuous, on the whole convex but with a distinct rectangular outer corner. Orbits wide, margin finely crenulate. Five antero-lateral teeth; second small, blunt, in adults considerably larger than postorbital angle, in the young obsolescent; third and fourth teeth large, acute; last very small and pointed; teeth with granulate margins. A slight subhepatic elevation formed by a number of granules.

Chelipeds rugose with coarser granules (or tubercles) than on carapace. Arm with a row of spines above; wrist with a deep anterior

groove and two inner spines, one smaller and below the other; major hand roughened on its upper and proximal portions, the roughness of the outer surface more extensive in the minor than the major chela. Fingers deeply grooved; dactylus of larger claw with a large basal tooth. Legs very long and slender; merus with a row of spines above, other articles spinulous.

Color.—Anterior portion of carapace light yellowish orange. Fingers of major chela brownish black, of minor chela black. Spines and tubercles of both chelipeds light salmon.

Measurements.—Male (19810), length of carapace 7, width of same 10, fronto-orbital width 7.2, width of front 3.7 mm.

Range.—From Cape Hatteras, North Carolina, and Gulf of Mexico to Cape Frio, Brazil; depth 8½ to 182 fathoms.

Material examined.—See table, page 444.

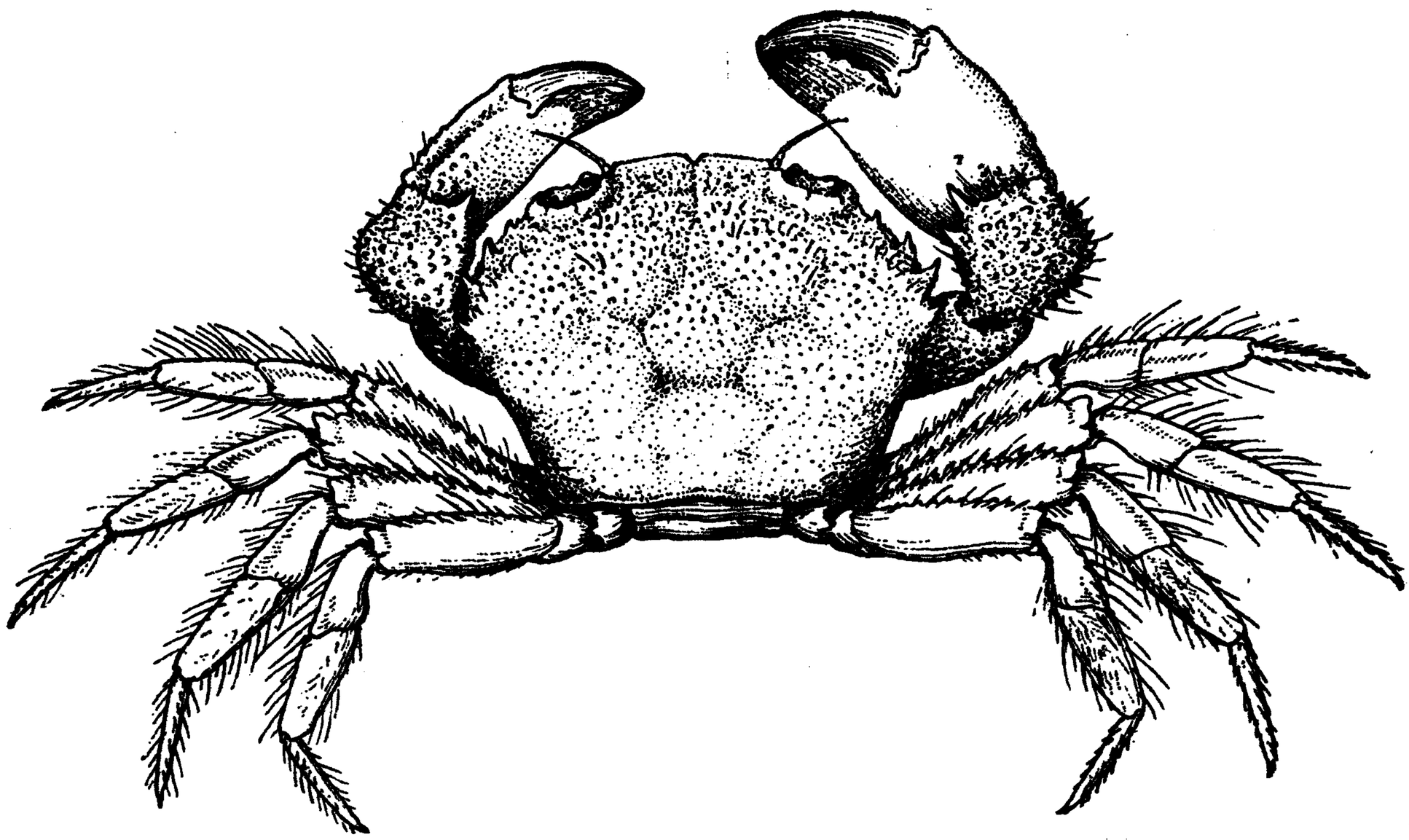


FIGURE 71.—MICROPANOPE SPINIPES, FEMALE, TYPE OF PILUMNUS ANDREWSII, DORSAL VIEW, ×3

MICROPANOPE SPINIPES A. Milne Edwards

Plate 181, Figures 1 and 2

Micropanope spinipes A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 326, pl. 54, figs. 3–3c (type-locality, Abrolhos Islands, Brazil, 30 fathoms; type in Museum of Comparative Zoölogy).—MIERS, *Challenger* Rept., Zool., vol. 17, 1886, pp. xx and 130; Bahia, 7 to 20 fathoms.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 323.

Pilumnus spinipes RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 264.—VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 10, 1900, p. 577 ("Cuba" is an error); vol. 13, 1908, p. 361, text-fig. 20, pl. 27 [not 26], fig. 1.

Pilumnus andrewsii RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 267, pl. 5, fig. 2 (type-locality, Green Turtle Cay, Bahamas; type, Cat. No. 20508, U.S.N.M.).

Diagnosis.—Palms smooth and bare over nearly the whole outer surface. Third and fourth antero-lateral teeth larger, first, second, and fifth smaller. Margin of front and orbits granulate.

Material examined of Micropanope xanthiformis

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
North Carolina:	° ′ ″	° ′ ″			°F.						
Off Cape Hatteras	35 12 30	75 05 00	48	crs. gy. bk. S.	77	Oct. 19, 1884	2269	*Albatross*	1♀ ovig.	8749	
Do	35 10 40	75 06 10	68	gy. M.	71.3	do	2268	do	2♀	8745	
Florida:			Feet		°C.						
Gulf Stream off Cape Florida.	2⅛ miles SSE. of Fowey Rocks Light.		45	rky.	21.1	Mar. 25, 1903	7511	*Fish Hawk*	2♀	60912	
			Fathoms								
Off Sand Key	Sand Key Light bearing W. about 8 miles.		15			June 24, 1893	41	Biological Expedition State Univ. Iowa.	1♂	S. U. I.	
					°F.						
Off Key West	24 25 30	81 47 45	50		74	Jan. 15, 1885	2316	*Albatross*	1♂ 1♀	9463	
White Shoals, Tortugas						July 19, 1924	25	W. L. Schmitt	1♀ 1y.	60781	Gift of Carnegie Institution.
Tortugas						July 22, 1924	41	do	1♂	60780	Do.
Do	About 10 miles S. of No. 2 buoy.		35–37	crs. S.		June 10, 1925	206	do	1♀ 1♂ 1y. smooth var.	60911 60784	Do.
Do	About 13 miles S. of No. 2 buoy.		87–45	rough		do	210	do	1 ovig. ♀	60910	Do.
Do	S. of red buoy No. 2		25	co. R.		June 11, 1925	217	do	1♀ y.	60782	Smoother variety. Gift of Carnegie Institution.
Western Dry Rocks			80			1916		*Eolis;* J. B. Henderson.	2♂	60783	
Cuba:											
Off Havana	23 10 25	82 20 24	33	Co.	79.1	Jan. 17, 1885	2324	*Albatross*	1♂	19810	Compared with type-specimen.
Do	23 11 45	82 17 54	182	fne. br. S.		do	2327	do	1♂	19811	
Mexico: Off Arrowsmith Bank, Yucatan.	20 59 30	86 23 45	130	Co.		Jan. 22, 1885	2354	do	1♂	19812	
					°C.						
Porto Rico: Off Porto Real	Punta de Guaniquilla, S. ¼ E., 2 miles.		8.5	Co. S.	26	Jan. 25, 1899	6074	*Fish Hawk*	1♂ y.	24349	
					°F						
Dominica			118	fne. S. brk. Sh.	65	1878–79	177	U.S.C.S. Str. *Blake*	1♂	2592, M.C.Z.	
Off Barbados			73	crs. co. S. brk. Sh.	70.75	1878–79	290	do	1♂	2658, M.C.Z.	
Off Grenada			92	Co. brk. Sh.	58.5		253	do	1♂	Paris Mus.	Type.
Off Curaçao	11 34 30	69 02 10	122	fne. Sh. gn. M.	59.5	Feb. 18, 1884	2124	*Albatross*	1 sterile ♀	7829	
	Lat. S.										
Brazil: Off Cape Frio	23 08 00	41 34 00	59	bu. M.	57.1	Dec. 30, 1887	2762	do	1♂	21996	

Description.—Upper surface of carapace rough with scalelike granules, which are sharper and higher on the anterior lateral arch. The granules of carapace and chelae bear hairs while many much finer hairs arise between them. Front bent obliquely down, a narrow transverse ridge at the bend, nearly parallel with the edge; margin of frontal lobes nearly straight, sloping backward a little from the median V-shaped notch; a small rectangular tooth at outer end. Upper orbital margin minutely granulate or denticulate, lower margin also denticulate, a large triangular tooth at inner angle, a large outer sinus. Outer orbital tooth and next antero-lateral tooth at some distance, very small but plainly marked and acute; below and between them a sharp subhepatic tubercle; the last three antero-lateral projections are triangular spine-pointed teeth, the last one more or less smaller than the others. Endostomial ridge not nearly reaching epistome.

The outer-upper surface of the wrist is entirely covered with spinules or sharp granules and has a transverse distal groove, and two sharp spines on the inner edge, the one at the inner angle longer than any other. Upper surface of hand spinulous in part, more so in minor than major chela and in the young than full grown; outer surface in both sexes entirely smooth and bare in the old, but with a narrow strip on upper and proximal portion which is spinulous. Minor manus with a dorsal groove, fingers each with two deep grooves both inside and outside. Grooves less evident on the major chela, which is much the stouter. Ambulatory legs very slender, spinulous. Male abdomen with third, fourth, and fifth segments fused.

Color.—Male (in formalin), pale buff on upper side of carapace and legs; chelae yellowish or salmon on the palm, with a white patch preceded by a yellow one at base of claws, which were umber-brown. (Verrill.)

Measurements.—Female (20508), length of carapace 8.9, width of same 12.8, fronto-orbital width 8, width of front 4.1 mm.

Range.—From Bahamas and Florida Keys to the Abrolhos Islands, Brazil; Bermuda.

Material examined.—Bermuda; 1898; A. E. Verrill and party; 1 male, 1 female (P.M.Y.U.).

Hawk Channel, Florida; 4¼ miles W. by N. of Elbow Reef beacon; 2¾ fathoms; barry S.; 20.5° C.; February 19, 1903; station 7467, *Fish Hawk;* 1 female (60779).

Green Turtle Cay, Bahamas; 1897; E. A. Andrews; 2 females (20508), types of *Pilumnus andrewsii.*

No Name Key, Florida; banks, low tide; 1885; H. Hemphill; 1 female (19891).

Caracas Bay, Curaçao; 1920; C. J. van der Horst; in coral, May 5, 1 male (56896); in sponge, May 10, 1 young female (Amsterdam Mus.).

Maceio, Alagoas, Brazil; coral reef; July 26, 1899; A. W. Greeley, Branner-Agassiz Expedition; 1 male (25726).

Off Abrolhos Islands, Brazil; 30 fathoms; U. S. Coast Survey Str. *Hassler;* 1 female, holotype (2981, M. C. Z.).

MICROPANOPE BARBADENSIS (Rathbun), new combination

Pilumnus barbadensis RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 9, 1921, p. 73, pl. 1 (type-locality, Barbados; type in Mus. S. U. I.).

Diagnosis.—Carapace broad-oval, frontal lobes oblique. Outer orbital fissures absent or minute. Color of immovable fingers covering distal two-thirds only. Minor palm rough outside, major palm rough only on its upper, proximal portion.

Description.—Carapace suboval, antero-lateral margin arched but shorter than postero-lateral. Surface covered with a short, soft, sparse pubescence which does not conceal the carapace. Furrows between regions and gastric subregions well marked. Surface minutely roughened, especially along front and antero-lateral regions where the granules are acutely pointed. Lobes of front oblique, edge slightly convex save at outer end which is right angled in smaller specimens but has a small, more or less pointed tooth in the old (female, 12.3 mm. wide); edge crenulate. Inner angle of orbit acute; upper margin sloping obliquely outward and backward to a slight outer tooth; edge finely denticulate; notches very small, or in the old disappearing altogether. Antero-lateral margin armed with three slender, acuminate spines, each set in a stout, triangular, denticulate base. Carapace widest at the posterior pair of these spines; the two interspaces are subequal; between the anterior spine and the orbital angle there is a spinule, little larger than the sharp denticles of the neighboring surface, and confused in dorsal view with several subhepatic spinules. Suborbital region covered with coarse, acute granules Lower orbital margin more advanced than upper, its spinules more elongate; spinule at inner angle a little larger and more pronounced.

Chelipeds very unequal, thinly clothed with longer hairs than the carapace; carpus covered with acute granules, and having two spinules, one above the other at inner angle. Only the proximal third or less of the major palm is rough with granules, the roughness forming an oblique band bordering the carpus but stopping short of the lower margin; the proximal two-thirds of the upper edge is separately roughened; remainder of palm smooth and naked; the Florida female is an exception, the granules covering all but the distal end of the palm; fingers of male dark brown with light tips, color not reaching base of immovable finger, color line vertical; a narrow interdigital gape. In the minor cheliped the entire outer surface of palm is very rough, the granules arranged for the most part longitudinally; fingers less gaping, deeply grooved, ridges very rough. In the female, the

fingers are a lighter brown; in the largest female the roughness on the major palm is less extensive.

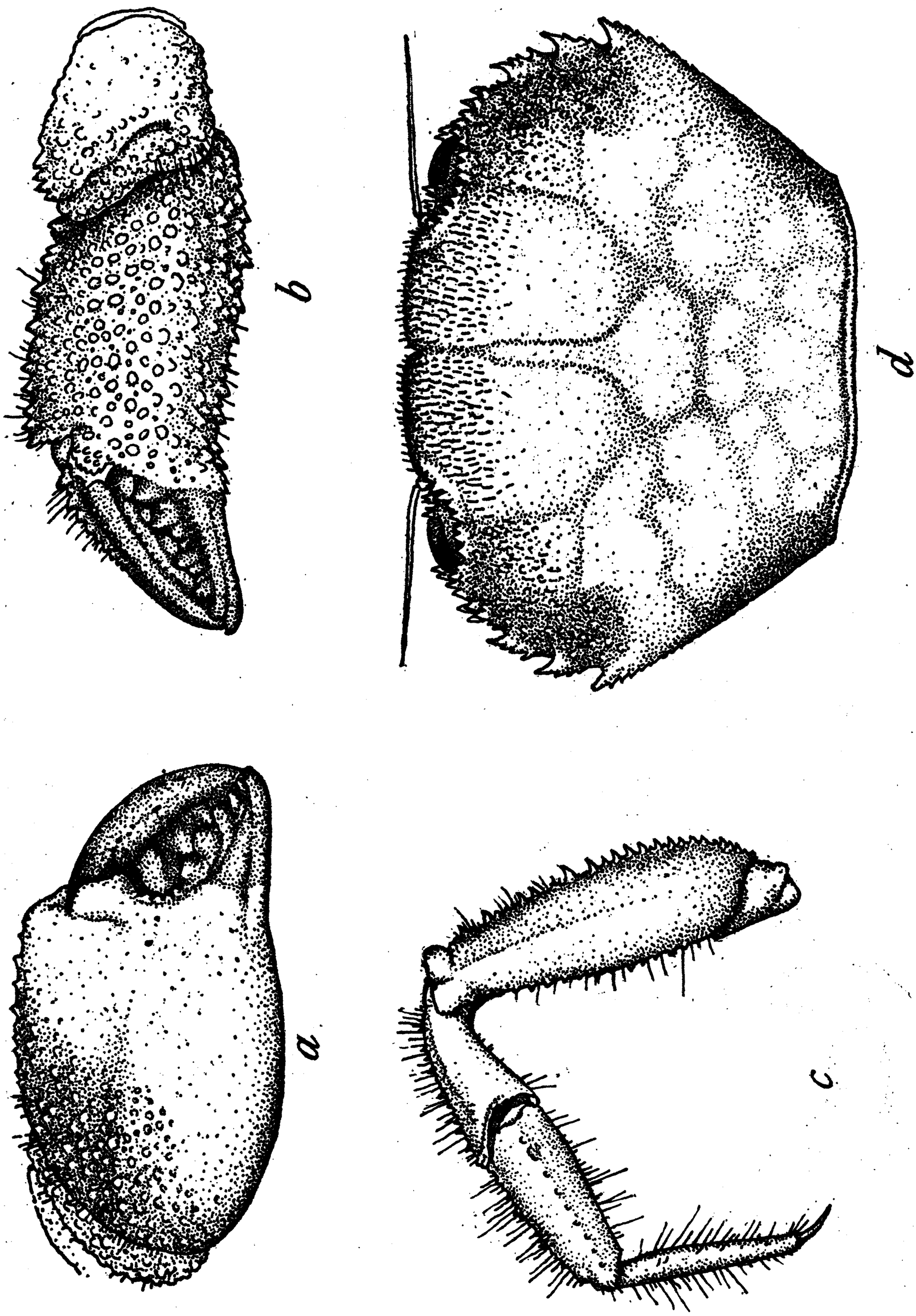


FIGURE 72.—MICROPANOPE BARBADENSIS, FEMALE, BARBADOS: *a*. MAJOR CHELA, ×8. *b*. MINOR CHELA, ×9.4. *c*. AN AMBULATORY LEG, ×8. *d*. CARAPACE, EYES, AND ANTENNAE, ×7

Ambulatory legs slender, bordered with long hair; merus slightly enlarged, upper margin edged with slender spines; dactyli noticeably slender.

Measurements.—Male holotype, length of carapace 6.7, width 9.4 mm.; figured female, length 7.6, width 10.7 mm.; largest female, width 12.3 mm.

Range.—Tortugas, Florida; Barbados.

Material examined.—Middle section of Bird Key reef, Tortugas, Florida; July 26, 1924; W. L. Schmitt; 1 female (60934); gift of Carnegie Institution.

Barbados; Barbados-Antigua Expedition, State University of Iowa: Okra Reef; May 13, 1918; 2 young (Mus. S.U.I.). Barbados; May 31, 1918; 1 male holotype, 1 female (Mus. S.U.I.), 2 males, 1 female (58042); from old coral heads. Barbados; June 4, 1918; 5 small (Mus. S.U.I.), from coral heads.

MICROPANOPE NITIDA Rathbun

Plate 181, Figures 3 and 4

Micropanope nitida RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 587, pl. 42, fig. 9 (type-locality, southern part of Gulf of California, 8 fathoms, station 2824, *Albatross;* type, Cat. No. 21583, U.S.N.M.); Bull. Amer. Mus. Nat. Hist., vol. 48, 1923, p. 623.

Diagnosis.—General appearance smooth. Frontal lobes rounded; second and fifth lateral teeth reduced; color of immovable finger not continued on palm.

Description.—Carapace broad, convex in both directions; regions faint; surface minutely granulate or almost smooth, covered with very minute punctae and occasionally a larger one. Front flat, inclined, granulate; edge thin; median sinus V-shaped; lobes sinuous, convex for their inner two-thirds. Orbits with two V-shaped sinuses on superior margin. Lateral teeth five; first or orbital tooth small, little advanced; second low, rounded and connected with the first by a shallow sinus; third and fourth large, arcuate outer and concave inner margins and acute curved tips; fifth very small. No subhepatic tubercle. Outer suborbital fissure deep, narrow at base, with convex sides; inner tooth low and blunt. Second segment of male abdomen wide, leaving exposed at its outer distal corners a very small piece of sternum; third segment with broad base and angular corners, reaching coxae of last pair of legs; penult segment short, sides convex; terminal segment triangular, end blunt.

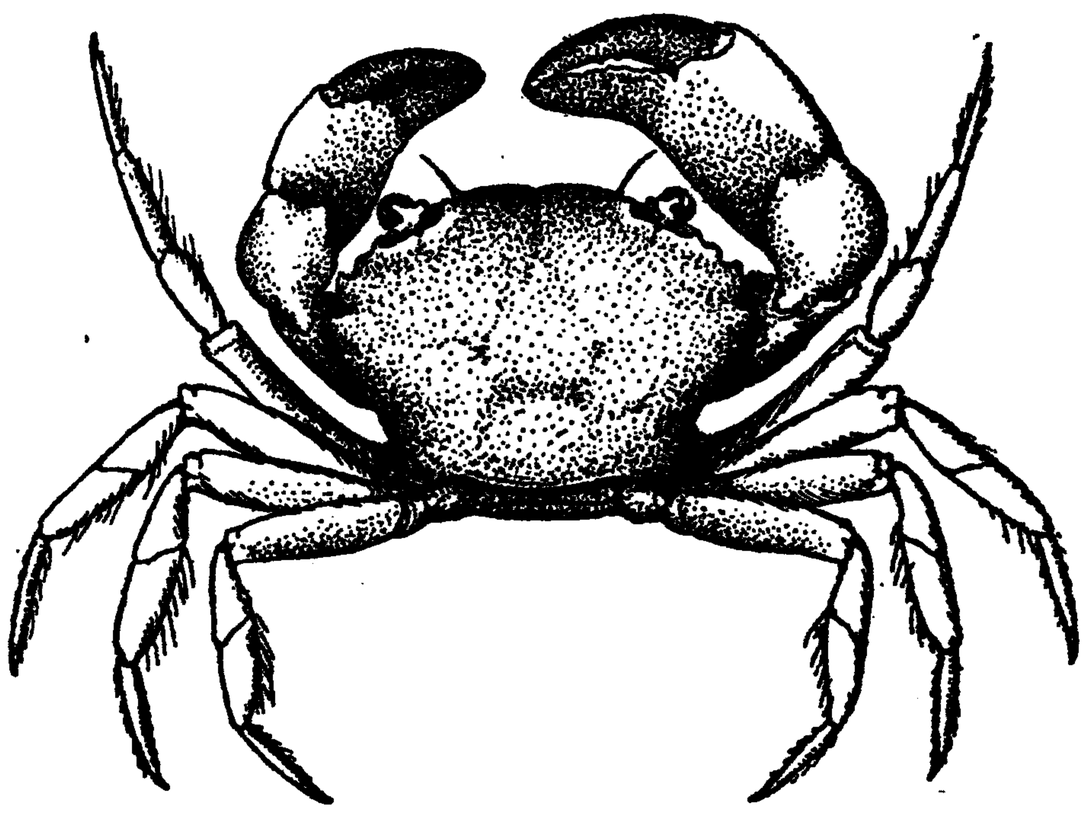


FIGURE 73.—MICROPANOPE NITIDA, MALE, HOLOTYPE, CARAPACE 11.5 MM. WIDE, DORSAL VIEW

Chelipeds strong, finely granulate. Upper margin of arm granulate or denticulate. Carpus slightly rugose, a short sharp inner tooth or

Material examined of Micropanope nitida

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″								
Mexico:										
Gulf of California	24 22 30	110 19 30	8	brk. Sh	Apr. 30, 1888	2824	*Albatross*	2♂ 9♀	21583	Type lot.
Do	24 22 15	110 19 15	7	brk. Co	do	2825	do	3♂ 6♀	21997	
Do	24 12 00	109 55 00	9.5	Sh	do	2826	do	2♂	21998	
Do	24 11 45	109 55 00	10	Sh	do	2827	do	1♀	21999	
Do	24 11 30	109 55 00	10	Sh	do	2828	do	2♀	22000	
Do	Agua Verde Bay				Apr. 1, 1911		do	1♂ 3♀	60030	
Locality not given					1911		do	11♂ 8♀ (1 ovig.) 12♂ 8♀ 1 y	60031 Amer. Mus	

Material examined of Micropanope areolata

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″			°F.						
California: 6 miles north of Santa Monica, Los Angeles County.								E. P. Chace	7 y	53986	
Mexico:											
Off Adair Bay	31 21 00	113 49 00	11	S. brk. Sh. G	67	Mar. 25, 1889	3024	*Albatross*	4♂ 1♀	21584	
Patos Island						Apr. 23, 1921		Fred Baker	1♂	58113	Gift of California Academy Sciences.
Southern part Gulf of California.	24 12 00	109 55 00	9.5	Sh		Apr. 30, 1888	2826	*Albatross*	1♂ 1♀	22001	
Do	24 11 45	109 55 00	10	Sh		do	2827	do	1♂	22002	
Do	24 11 30	109 55 00	10	Sh		do	2828	do	1♂ 4♀	22003	

spine, a blunt tooth beneath it, an anterior groove. Large hand strong, margins convex; upper surface broad and flattened, in smaller specimens with two blunt crests; fingers bent downward, slightly gaping, marked with punctate impressed lines, prehensile teeth low. Basal tooth of major dactyl little enlarged if at all. Smaller hand resembling larger, two-thirds as wide. Fingers dark brown, the color line on the fixed finger running obliquely down from proximal end of prehensile margin and parallel to proximal end of palm. Legs long and narrow, anterior margins of merus finely spinulous; last two articles with pubescent margins.

Measurements.—Male holotype, length of carapace 8.1, width of same 11.5, fronto-orbital width 8.8, width of front 4.5 mm.

Range.—Gulf of California, 7 to 10 fathoms.

Material examined.—See table, page 449.

MICROPANOPE AREOLATA Rathbun

Plate 182, Figures 1 and 2

Micropanope areolata RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 588 (type-locality, off Adair Bay, Gulf of California, 11 fathoms, station 3024, *Albatross;* type, Cat. No. 21584, U.S.N.M.).

Diagnosis.—Carpus of chelipeds and antero-lateral portions of carapace rough. Color of immovable finger continued on palm. Otherwise near *nitida.*

Description.—Closely allied to *M. nitida,* with which it may be compared. Carapace somewhat narrower, front relatively narrower, first and second lateral teeth more completely united. Surface slightly pubescent, regions more distinctly marked, granulation fine but plain on protogastric, hepatic and epibranchial lobes, epigastric ridge well developed. A subhepatic tubercle. Wrists much roughened, palms finely rugose, color of immovable fingers extending well back on palms, basal tooth of major dactyl not heavy, though larger than in *nitida.* Male abdomen similar to that of *M. nitida* but last two segments shorter.

Measurements.—Male holotype, length of carapace 6.4, width of same 8.9, fronto-orbital width 6.7, width of front 3.4 mm.

Range.—Southern California and Gulf of California, to a depth of 11 fathoms.

Material examined.—See table, page 449.

MICROPANOPE NUTTINGI (Rathbun), new combination

Xanthias nuttingi RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 271, pl. 4, fig. 1 (type-locality, Bahama Banks; cotypes in Mus. State Univ. Iowa and Cat. No. 19975, U.S.N.M.); Bull. U. S. Fish Comm. for 1900, vol. 20, part 2 (1901), p. 35.

Diagnosis.—Second lateral tooth absent. Palms rough with bead tubercles, covering both palms of female and minor palm and greater part of major palm of male.

Description.—Carapace suboval, convex in an antero-posterior direction, nearly flat in a transverse direction; anterior half rough with squamose granules; regions distinct. Front convex, having two lobes with granulate margins separated by a V-shaped sinus; outer angle of each lobe subrectangular. Second normal antero-lateral tooth of this genus suppressed, being completely united with the orbital tooth which is not prominent; three remaining teeth sharp-pointed, posterior one smallest. Outer fissure of orbit broad, V-shaped.

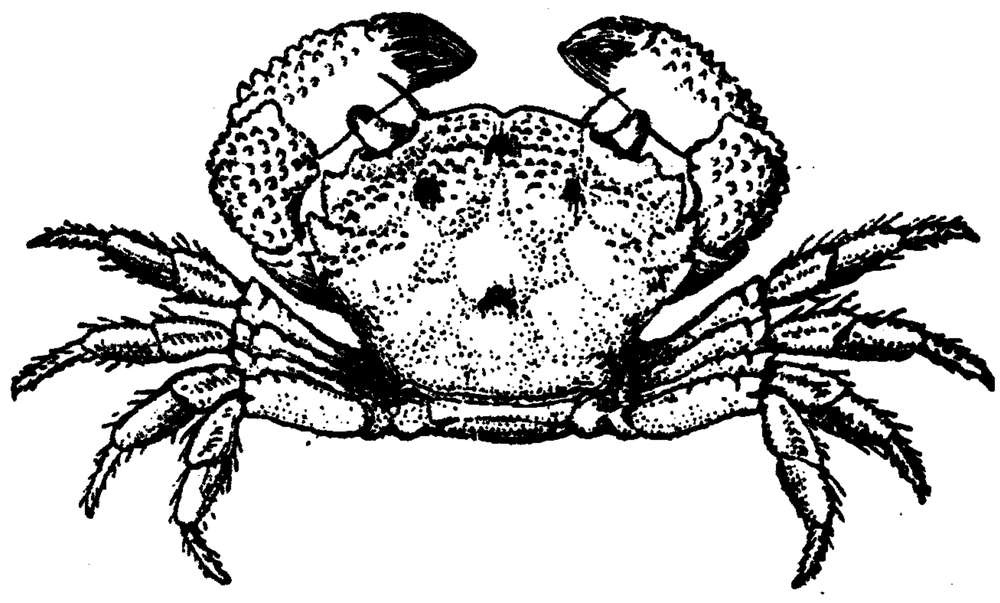


FIGURE 74.—MICROPANOPE NUTTINGI, MALE, DORSAL VIEW, ×4.8

Chelipeds heavy, very unequal, arm spinulous on upper edge; wrist covered with beadlike tubercles and with a deep anterior groove and an inner right angle tipped with a spinule; a second spinule below. Major hand in male with upper and about two-thirds of outer surface ornamented with bead tubercles; lower third and distal extremity smooth and shining; fingers broad, not gaping, brown with light tips; dactylus with large basal tooth; color of immovable finger not running back on manus, but forming a line with articulation of dactylus. Minor hand almost entirely covered with tubercles, which grow smaller toward distal and lower margins; upper margin with a longitudinal groove; fingers deeply grooved. Upper margin of ambulatory legs tuberculate or granulate. The females differ in having the whole outer surface of the major as well as the minor palm tuberculate.

Measurements.—Male (24289), length of carapace 3.8, width of same 5.7, fronto-orbital width 4, width of front 2 mm.

Color.—In alcohol, speckled with blue; larger patches of blue on anterior gastric and cardiac region.

Range.—From Cape Hatteras, North Carolina, and Gulf of Mexico to Cape St. Roque, Brazil. Shallow water to 37 fathoms.

Material examined.—See table, pages 452–453.

MICROPANOPE URINATOR (A. Milne Edwards), new combination

Plate 182, Figures 3 and 4; Plate 183, Figures 1–3

Pilumnus urinator A. MILNE EDWARDS, Crust. Rég. Mex., 1881, p. 289, pl. 53, fig. 2–2*b* (type-locality, near Santa Cruz [St. Croix], West Indies, 245 fathoms; type in Paris Mus.).—RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 265.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 326.

Diagnosis.—Rough; carapace short-haired, chelipeds and legs long-haired; spines white. Five antero-lateral spines. Outer surface of both palms rough all over; fingers deeply grooved.

Material examined of Micropanope nuttingi

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″			°C.						
North Carolina: Off Cape Hatteras.	35 21 00	75 21 30	16	gy. S. brk. Sh.		Oct. 19, 1884	2280	*Albatross*	1♀ 2 y	60908	
Bahamas: Bahama Banks						May 17, 1893		State Univ. Iowa Exped.	5♂3♀ Numerous	19975 Mus. S.U.I.	From millepores.
Florida:											
Off Biscayne Bay			*Feet* 16–34			May 29, 1912		P. Bartsch	1♀	60907	
Off Key West			*Fathoms* (1)			June 26, 1893	46	State Univ. Iowa Exped.	1♂	Mus. S.U.I.	
Northwest of Tortugas	25 04 30	82 59 15	26	fne. wh. S. brk. Sh.		Mar. 19, 1885	26	*Albatross*	1♂	19894	
Tortugas	Due S. of buoy E. side of channel.		37	Sh. S		June 10, 1925	207	*Dohrn*, W. L. Schmitt.	1♂	60767	Gift of Carnegie Institution.
Do	8 miles S. of red buoy No. 2.		25			June 11, 1925	217	do	1 y	61115	Do.
West of Marco	26 00 00	82 57 30	24	fne. S. bk. Sp. brk. Sh.		Mar. 19, 1885	2413	*Albatross*	1♀	19885	
Southwest of Cape San Blas.			25–27			Feb. 7, 1885	2369–2374	do	1♀	60766	
Mexico:											
Off Cape Catoche	22 18 00	87 04 00	24	wh. R. Co		Jan. 30, 1885	2365	do	2♂ 1♀	19884	
Do	22 08 30	86 53 30	25	Co. S		do	2362	do	1♂ 1♀	19882	
Do	22 07 30	87 06 00	21	wh. R. Co		do	2363	do	1♀	19883	
Cuba: Reef Lavesos Italienos, opposite Cayo Lavesos.			2–3	Co. S. R		June 2, 1914	14	*Tomas Barrera*, Henderson and Bartsch.	1♂	48527	
Jamaica: Montego Bay	Off point					June 28, 1910		E. A. Andrews	3♂	42946	
Porto Rico:											
Mayaguez Harbor						Jan. 20, 1899		*Fish Hawk*	1♂ 2♀	24285	
Do	Red buoy entrance, ESE., ½ mile.		25–30	S. M. Sh	25	do	6062	do	1♂	24289	
					°F.						
Do	Customhouse, NE. ¾ E., 4½ miles.		4–6	Co	68	do	6065	do	1♂ 2♀	24292	
					°C.						
Off Boca Prieta	Fanduco Cay, E., 1¾ mile.		8.5	Co. S	25	Jan. 25, 1899	6075	do	1♂	24291	
Playa de Ponce Reef						Feb. 1, 1899		do	1♂	24293	

Off Humacao	Hucares, NW ¾ W., 2¼ miles.		9.5	Co	26	Feb. 8, 1899	6099	do	1♀	24286	
Do	Humacao, N. ½ W., 3 miles.		12.5	Co	26.4	do	6098	do	1♂ 1♀	24287	
Off Vieques Island	Pt. Mula lighthouse, SSW. ⅜ W., 5¾ miles.		14	Co. S	25.6	do	6085	do	1♂	24288	
Virgin Islands:											
Off St. Thomas	Sail Rock, NW. ½ W., 4 miles		20	Co	25	Feb. 6, 1899	6080	do	1♂	24290	
Virgin Islands				From piles		1915		C. R. Shoemaker	1♂ 1♀	60768	Gift of Carnegie Institution.
Caribbean Sea: Old Providence Island.						Apr. 4-9, 1884		*Albatross*	1♀	19886	
Brazil: Off Cape St. Roque	*Lat. S.* 6 59 30	34 47 00	20	brk. Sh	°*F.* 79	Dec. 16, 1887	2758	do	2♀	22020	

[1] Shallow.

Material examined of Tetraxanthus bidentatus

Locality	Bearings		Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	Latitude N.	Longitude W.									
	° ′ ″	° ′ ″			°*F.*						
Off Cape Lookout, N. C	34 38 30	75 33 30	124	S. R		Oct. 18, 1885	2602	*Albatross*	1♀	18248	
Off Fowey, Fla			75-100					J. B. Henderson	1 y ♀	60827	
Off Key West, Fla			75					do	1♂	53770	
Off Sand Key, Fla	Sand Key Light bearing W. about 18 miles.		15			June 24, 1893	42	Biol. Exped. State Univ. Iowa.	1♀	Mus. S.U.I	
S. of Cape San Blas, Fla	28 36 00	85 33 30	111	gy. M		Mar. 14, 1885	2402	*Albatross*	10♂ 8♀	9759	
Off Grenada			92	Co. brk. Sh	58.5	1878-79	253	U. S. C. S. Str. *Blake*	1♂	2904, M.C.Z	Type.
	Lat. S.										
Off Cape Frio, Brazil	23 08 00	41 34 00	59	bu. M	57.1	Dec. 30, 1887	2762	*Albatross*	2♂	22015	

Description.—A rough species. Carapace broad; regions plainly marked, granulate except in the depressions, and covered with a short, thin pile. All the spines, spiny tips and spinules, however small, are conspicuously white in preserved specimens, in contrast with the darker color of the body. Hepatic region spinulous. Antero-lateral spines five, including a very small one at the orbit; second to fifth spines set in stouter, denticulate bases; third and fourth largest, subequal, curved, the second and fifth subequal, second curved, first and fifth straight. Orbital margin spinulous; on the upper margin the spinules diminish on the inner half to granules; they are somewhat larger on the lower margin, interrupted on the outer half by a broad, pointed sinus, and extending inward to a large, triangular, granulated tooth. An oblique row of a few white spinules on the eyestalk at inner base of eye. Frontal lobes slightly arcuate; edge finely denticulate, separated by a very small median notch but not sharply divided from the outer angle which is subrectangular, not advanced and edged with two minute white granules. Endostomial ridge obscure.

Chelipeds rough and bristling; two long spines above merus; carpus heavily spined, the longest spine at inner angle; one equally long below it in minor cheliped; minor palm spinous on the entire outer surface; on the major palm the spines change to coarse granules below and distad. Fingers deeply grooved, especially the minor pair, where the ridges are armed with sharp granules. Legs rough except on those flat surfaces of the dilated merus which are subject to friction; long-hairy on the lower surface, and also on the upper surface of the last three articles; propodus dilated; dactylus long, slender, curved, with a light brown, horny tip of needle-like sharpness.

Third, fourth, and fifth segments of male abdomen fused.

Measurements.—Male (7806), length of carapace 7, width of same 10, fronto-orbital width 7, width of front 3.6 mm.

Range.—From Florida Keys to St. Croix, West Indies; 80 to 250 fathoms.

Material examined.—Off Key West, Florida; about 80 fathoms, Biol. Exped. State Univ. of Iowa, 1893; 1 male (Mus. S.U.I.).

Off Santiago, Cuba; February 27, 1884; *Albatross:* Lat. 19° 56′ 44″ N.; long. 75° 50′ 49″ W.; 202 fathoms; hrd. crs. S.; station 2131; 2 males (7806). Lat. 19° 55′ 58″ N.; long. 75° 47′ 07″ W.; 250 fathoms; hrd. Co.; station 2135; 2 males (7812).

MICROPANOPE CRISTIMANUS Stimpson

Plate 183, Figures 4–6

Micropanope cristimana STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 107 [17] (type-locality, Cape St. Lucas; type not extant).

Diagnosis.—Carapace with transverse ridges. First and second lateral teeth completely fused, posterior tooth well marked. Frontal lobes triangular.

Description.—Carapace convex, smooth posteriorly, and with a transverse ridge, interrupted at the middle, on the protogastric, epigastric, and frontal regions, and one on each hepatic and epibranchial region. Front convex, strongly projecting, the two lobes triangular, separated by a large V-shaped sinus from which arises a deep furrow extending backward to the gastric region; each lobe with tip rounded, outer margin very oblique, concave, outer tooth small, separated from orbital tooth by a very obtuse angle. Superior orbital sinuses not far apart. The normal second tooth of the lateral margin is completely absorbed in the first or orbital tooth. This and the other three teeth are strong, the last two with a median ridge, the last (or true fifth) tooth larger than common in *Micropanope*. Outer hiatus of orbit almost obsolete; inferior inner tooth of orbit prominent, subconical, tip narrow, subacute.

Chelipeds large, smooth, polished; carpus with a broad depressed tooth at inner angle, and a short crest, bordering a depressed area, at outer angle; hands short, broad and compressed above, where a smooth crest is formed; posterior outer extremity of hand protuberant and more or less bituberculate. Fingers black with white tips; those of the smaller chela much deflexed and longer than the palm; color of immovable fingers extended on palm. Ambulatory legs rather compressed and faintly crested above; dactyli pubescent.

Measurements.—Male type, length of carapace 5.6 mm. (.22 inch), width of same 6.9 mm. (.27 inch). Male (46080), total length of carapace 5.3 mm., width of same 7, fronto-orbital width 4.6, width of front 2.4 mm.

Range.—West coast of Mexico.

Material examined.—Manzanillo, State of Colima; on drifted pile; July 17, 1913; C. R. Orcutt; 1 male, 2 females (1 ovigerous) (46080).

Genus RHITHROPANOPEUS Rathbun

Rhithropanopeus RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 273; type, *R. harrisii* (Gould).

Allied to *Panopeus*. Carapace subquadrilateral, approaching the Goneplacidae in form, dorsal ridges prominent, postero-lateral margins not markedly convergent. Front less than a third as wide as carapace, horizontal, margin thick, double-edged. Upper emarginations of orbit obsolescent. Eyes filling orbits. Chelipeds very unequal, heavy; major dactylus without large basal tooth. Third or coalesced segment of male abdomen not reaching coxae of last pair of legs.

Contains only one species.

RHITHROPANOPEUS HARRISII (Gould)

Plate 183, Figures 7 and 8

Pilumnus harrisii GOULD, Rept. Invert. Massachusetts, 1841, p. 326 (type-localities, Cambridge marshes and clinging to floating seaweed in Charles River; types not extant).

Panopeus wurdemannii GIBBES, Proc. Amer. Assoc. Adv. Sci., vol. 3, 1850, p. 176 [12] (type-locality, Enterprize, Fla. (cotypes, Cat. No. 16157, U.S.N.M., and in Charleston Mus.).—LEIDY, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 3, 1855, p. 17. Not *P. wurdemannii* Benedict and Rathbun, 1891.

Panopeus harrisii STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1859, p. 55 [9].—BENEDICT and RATHBUN, Proc. U. S. Nat. Mus., vol. 14, 1891, p. 378, pl. 21, fig. 2; pl. 24, fig. 16.

Rhithropanopeus harrisii RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 273.

Diagnosis.—Front truncate; dorsal ridges prominent. First two antero-lateral teeth fused, last three dentiform. Legs slender.

Description.—Two transverse lines of granules on each protogastric region, one on mesogastric region interrupted at middle, two branchial, one of which is opposite the tip of the posterior lateral tooth. Front little produced, edge nearly straight, channeled, upper and lower margins granulate; median notch triangular. Lateral teeth not prominent; a sinus in coalesced tooth; third and fourth teeth pointing obliquely forward; last tooth smaller. Outer orbital hiatus a nearly closed fissure opening on a broad shallow notch. No subhepatic tubercle.

In the old the chelipeds are nearly smooth. In small specimens the wrist is rough with lines and bunches of granules, distal groove deep; two granulate ridges on upper margin of palm; upper edge of fingers granulate. Fingers slender, prehensile edges evenly dentate. Legs long, slender, compressed.

The third segment of the male abdomen does not touch the coxae of the last pair of legs; terminal segment subquadrate.

Color.—Brownish, paler below; fingers white. Yellow with red spots (18501).

Measurements.—Male (3149), length of carapace 14.3, width of same 19.4 mm.

Habitat.—In brackish or fresh water. Local.

Range.—From Miramichi estuary, New Brunswick (Connolly), to Mexico.

Material examined.—

MAINE.—Sheepscot; from among oysters growing in Sheepscot River; November 5, 1902; W. C. Kendall; 8 specimens (28783).

CONNECTICUT.—East side New Haven Harbor; September, 1892; James E. Benedict; 20 specimens (18194).

NEW YORK.—Creek near West Point, Hudson River; Dr. E. A. Mearns, U. S. Army; 6 females, 1 young (19632).

MARYLAND.—Chester River, Kent County; September 3, 1910; W. W. Wallis; 13 males, 14 females (4 ovigerous), 20 young (56365).

Bloody Point Light, NNE. ¾ E.; North and Poplar Island, SE. by E. ¾ E.; lat. 38° 47′ 30″ N.; long. 76° 25′ 06″ W.; 20 fathoms; sft. bk. M.; April 25, 1916; station 8528, *Fish Hawk;* 1 male (56270).

Island Creek, Talbot County; July 26, 1911; C. R. Shoemaker and W. D. Appel; 3 males, 3 females, 14 young (56366).

Chesapeake Beach; August 26, 1927; W. L. Schmitt; 2 males, 4 females (2 ovigerous), 14 young (60825).

South of Chesapeake Beach; William Palmer; 6 specimens (54802). September 13, 1919; 1 male (53593).

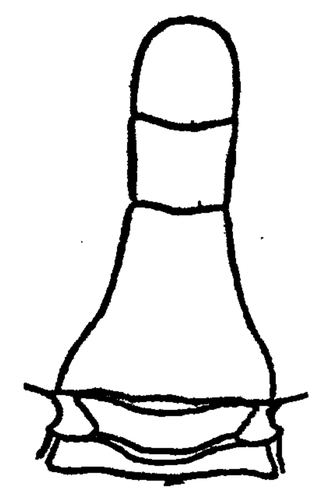


FIGURE 75.—RHITHROPANOPEUS HARRISII, MALE ABDOMEN, ENLARGED. AFTER BENEDICT AND RATHBUN

Plum Point; Around piles; August 15–24, 1912; William Palmer; 1 female (56372). July 14, 1914; C. R. Shoemaker; 5 young (56377). Plum Point Creek; July 4, 1912; Palmer and Weed; 1 male (44496).

St. George Island; July 6, 1896; H. M. Smith, U. S. Fish Commission; 1 specimen (20252).

Herring Creek near Piney Point; September 11, 1926; James E. Benedict, jr.; 10 males, 8 females (60279).

Potomac River; 5 males, 3 females (3176).

VIRGINIA.—Lower Machodoc Creek; James E. Benedict, jr.; June 25, 1917; 3 males, 7 females (1 ovigerous) (56368). August 3, 1917; 11 males, 11 females, 29 young (56384).

West coast of Chesapeake Bay, Northumberland County; December 23, 1914; P. L. Boone; 3 males, 2 females (48851).

Rappahannock River; in stomach of *Lophodytes;* December 31, 1916; Biological Survey, U. S. Department of Agriculture; fragments of 2 specimens; returned to sender.

SOUTH CAROLINA.—Winyah Bay; *Fish Hawk:* Above brackish water; 1 male, 1 female (15682). December, 1890; 3 males, 3 females (15684), 1 young (15761). Half a mile N. of wharf on South Island; 4 fathoms; hrd. S.; temperature 48.5° F.; January 3, 1891; station 1639; 6 males, 1 female, 2 young (15691). From ½ mile N. to 400 yards E. of wharf on South Island; 4–5 fathoms; hrd. S. Sh.; temperature 49.5°–50° F.; Jan. 3, 1891; stations 1641–1642; 186 specimens (15695, 20250, 56264). Four hundred yards SSW. of wreck buoy; 5 fathoms; hrd. S.; temperature 50.5° F.; January 3, 1891; station 1643; 1 male (15693).

Clambank Creek; *Fish Hawk;* 1 male (26363).

Santee Club; in stomach of *Lophodytes;* December 31, 1909; Biological Survey, U. S. Department of Agriculture; 1 small; returned to sender.

FLORIDA.—Tributary of St. Johns River; fresh water; Benjamin Harrison; 2 males, 2 females (18501).

St. Johns River, opposite Palatka; January 25, 1897; W. C. Kendall; 1 male (21842).

St. Johns River, at Palatka; January 20, 1897; W. C. Kendall; 1 male, 4 females (22277).

St. Johns River, near Beecher Point; March 17, 1897; W. C. Kendall; 8 males, 9 females (22159).

Border of Lake Monroe; in holes in the rocks; Lewis R. Gibbes; 1 male, 1 female (16158), cotypes of *Panopeus wurdemannii* Gibbes.

Lake Monroe; in stomach of *Bufo;* Biological Survey, U. S. Department of Agriculture; fragments, returned to sender.

Enterprise; Lewis R. Gibbes; 2 males (16157), cotypes of *Panopeus wurdemannii* Gibbes.

Sanford; April 12, 1897; W. C. Kendall; 1 male (21843).

Indian River; February 18, 1880; R. E. Earll, U. S. Fish Commission; 11 males, 8 females (3149).

Shark Harbor Bay, Charlotte County; J. L. Madden; 1 female (60826).

MISSISSIPPI.—Grand Plains Bayou; April 19, 1897; B. W. Evermann, U. S. Fish Commission; 1 male (22262).

LOUISIANA.—Grand Isle; June 30, 1929; E. H. Behre; 2 males (1 covered with bryozoan) (63039).

MEXICO.—Vicinity of Pueblo Viejo, Vera Cruz, 2 kilometers S. of Tampico; May 23–31, 1910; Edward Palmer; 1 female (59915)

Genus TETRAXANTHUS Rathbun

Tetraxanthus RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 4, 1898 p. 275; type, *T. bidentatus* (A. Milne Edwards).

Carapace subquadrate, convex, not areolate; orbit as wide as half the front; lateral teeth four including orbital angle; first and second small, third and fourth more or less dentiform, blunt. Palate with a ridge. Fingers long, compressed. Legs long and slender.

Known only from the Atlantic coast of middle America.

KEY TO THE SPECIES OF THE GENUS TETRAXANTHUS

A¹. Lateral projections of carapace shallow, not prominent., A broad lobe on inner margin of wrist ..... **bidentatus, p. 458.**

A². Third and fourth lateral teeth prominent. A blunt tooth at inner angle of wrist ..... **rugosus, p. 459.**

TETRAXANTHUS BIDENTATUS (A. Milne Edwards)

Plate 184

Xanthodes bidentatus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 353, pl. 53, figs. 5–5*b* (type-locality, Grenada, 92 fathoms; type in M. C. Z.).

Tetraxanthus bidentatus RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 275.

Diagnosis.—Very convex. Lateral projections shallow. One lobe on inner margin of carpus of cheliped. Legs smooth.

Description.—Body covered with a short, thin down. Carapace smooth to the naked eye, microscopically granulate; very convex from front to back, much less so transversely. Gastric and hepatic regions feebly indicated. Margin of front slightly arcuate, nearly straight, divided by a small median emargination. Inner angles of orbit small, and though more elevated than the front, project scarcely at all laterally, superior fissures obsolescent, outer sinus broad and shallow; outer angle a small triangular tooth not prominent. Behind it on the antero-lateral margin are three other lobes or teeth, the second a small shallow lobe, the third an obtuse-angled tooth or lobe with short anterior and long, somewhat convex posterior margin which is nearly longitudinal; last tooth dentiform, short, elevated. Basal antennal article short and broad.

Chelipeds of male long, strong, unequal; a broad lobe on upper margin of merus and at inner angle of carpus. Manus elongate, increasing in width distally, margins a little convex. Fingers long, deflexed, with little or no gape, prehensile teeth uneven, a larger one at base of major dactyl, dark color not covering tips of fingers or base of immovable finger. Ambulatory legs slender, unarmed, pubescent toward extremities.

Color.—Fingers except extreme tips fresh-blood red, tips white. (Henderson.)

Measurements.—Male (9759), length of carapace 17.6, width of same 23.8, fronto-orbital width 14.6, width of front 7 mm.

Range.—North Carolina and Gulf of Mexico to Cape Frio, Brazil; 15 to 124 fathoms.

Material examined.—See table, page 453.

TETRAXANTHUS RUGOSUS, new species

Plate 185

Type-locality.—Off Sand Key, Florida, 120 fathoms; holotype, male, Cat. No. 60828, U.S.N.M.

Diagnosis.—Moderately convex. Third and fourth lateral teeth prominent. Two blunt teeth on inner margin of carpus of cheliped. Legs spinulous.

Description.—Narrower, more hexagonal and less convex than the preceding. Front bilobed, lobes little oblique. The rectangular tooth at inner upper angle of orbit projects sideways beyond the front. Of the four antero-lateral teeth (including the orbital) the second is placed close to the first, both together occupying much less of the margin than the third tooth. Third and fourth teeth large, triangular, prominent, tips tuberculiform, the posterior margin of the third tooth sinuous instead of convex. Posterior margin of carapace more concave than in *bidentatus*.

Chelipeds rough; merus short, upper edge tuberculate, outer surface broad, granulate, especially near the margins. Carpus coarsely and irregularly ridged, interspaces rough, inner angle with a thick blunt tooth and below it a smaller tooth. Propodus granulate and rugose, a double ridge and intervening sulcus on the upper surface, two faint longitudinal carinae on the outer surface of the minor manus. Fingers of major chela slightly gaping, teeth few and large, a strong tooth at base of dactyl; fingers of minor chela not gaping, teeth more numerous, small and low. Merus of ambulatory legs rough above; last two articles pubescent.

Color.—Fingers black, tips lighter, yellowish-brownish black.

Measurements.—Female holotype, length of carapace 8.7, width of same 11.4, fronto-orbital width 7.3, width of front 3.8 mm.

Range.—Florida Keys; West Indies.

Material examined.—Off Sand Key, Florida; 120 fathoms; *Eolis*, John B. Henderson; 1 male holotype (60828).

Off Sambo Key, Florida; 120 fathoms; *Eolis*, John B. Henderson; 1 male, 1 ovigerous female (60829).

South of Cuba; lat. 19° 56′ 06″ N., long. 75° 47′ 32″ W.; 254 fathoms; February 27, 1884; station 2134, *Albatross;* 1 immature female (7815).

Genus ECTAESTHESIUS Rathbun

Ectaesthesius RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 591; type, *E. bifrons* Rathbun.

Carapace smooth, wider than in *Trapezia* and sides more arcuate, bidentate, one tooth at lateral angle, the other further forward; postero-lateral margins converging. Regions not indicated. Front broad, slightly bilobed. Orbits shallow, entire; inner hiatus closed by union of lower orbital margin with front. Peduncular articles of antennae short; the penult article just reaches lower corner of front; the last article attains frontal margin. Palatal ridge partially developed, anteriorly obsolete. Antero-external angle of merus of outer maxillipeds laterally produced, antero-internal angle emarginate. Chelipeds of female unequal, smooth, not enlarged; arm short, margins entire; wrist unispinous; fingers elongate, acute. Legs short, last three articles setose; dactyli rather stout.

Contains only one species.

ECTAESTHESIUS BIFRONS Rathbun

Ectaesthesius bifrons RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 591, pl. 42, figs. 12–14 (type-locality, off Chatham Island, Galapagos Islands, 45 fathoms; type, Cat. No. 21586, U.S.N.M.).

Diagnosis.—Orbital hiatus closed. Sides of carapace bidentate. Fingers very long.

Description.—Carapace slightly convex in both directions, about three-fourths as long as wide, antero-lateral margins arcuate, postero-lateral sinuous, rapidly converging. Surface smooth, microscopic granulation near front and lateral teeth. Front nearly half width of carapace, slightly arcuate, almost imperceptibly bilobed, edge thin, retreating at outer angles; just behind and parallel to the margin is a sharp ridge slightly interrupted at middle. Orbit less than half as wide as front; upper margin oblique, outer angle not advanced. Margin between orbit and first lateral tooth crenulate. Tooth at lateral angle subacute, a little in front of middle of carapace; anterior tooth obtuse, about one-third distance from orbital angle to lateral tooth. Abdomen of mature female narrow; third, fourth, and fifth segments subequal in length as well as in width; sixth of same width but longer; seventh narrower, length and breadth subequal, extremity rounded.

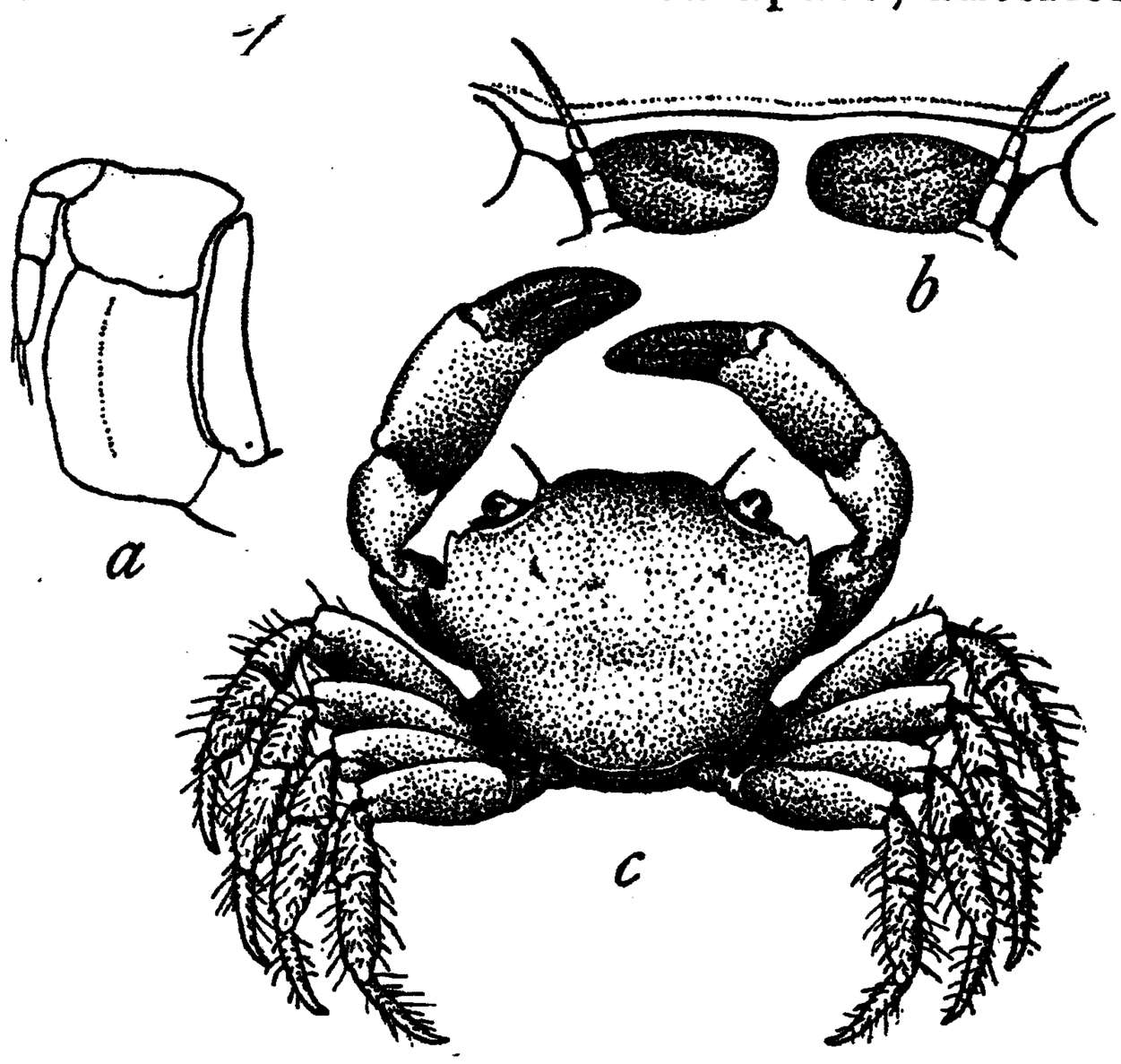


FIGURE 76.—ECTAESTHESIUS BIFRONS, FEMALE, HOLOTYPE, CARAPACE 9.7 MM. WIDE. *a.* OUTER MAXILLIPED. *b.* FRONT VIEW. *c.* DORSAL VIEW

Arm extending but little outside carapace, trigonal, widest near middle; carpal tooth large, spiniform. Hand with inner surface swollen toward proximal end; margins smooth, rounded; superior margin slightly convex, inferior sinuous, that of fixed finger concave. Dactylus longer than superior margin of palm. Fingers not gaping, a few lines of punctae; dactylus without teeth; larger fixed finger with one low tooth on basal half and two teeth and a few denticles on terminal half; in smaller chela, the teeth are all on terminal half. Legs as in *Trapezia;* dactyli nearly as long as propodi.

Measurements.—Ovigerous female, length of carapace 7, width of same 9.7, fronto-orbital width 7.2, width of front 4.4 mm.

Range.—Off Chatham Island, Galapagos Islands; lat. 0° 50′ 00″ S., long. 89° 36′ 00″ W.; 45 fathoms; gy. S.; temperature 74.1° F.; April 4, 1888; station 2809, *Albatross;* 1 ovigerous female, holotype (21586).

Genus CHLORODIELLA Rathbun

Chlorodius MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 399; type, *C. niger* (Forskål). Not *Clorodius* Leach in Desmarest, 1823.

Fucicola GISTEL, Naturg. Thierreichs, 1848, p. VIII (part); not *Fucicola* Menke, 1844, nudibranch.

Chlorodiella RATHBUN, Proc. Biol. Soc. Washington, vol. 11, 1897, p. 157; substituted for *Chlorodius* Milne Edwards.

Carapace depressed, hexagonal; regions partially or not at all demarcated; surface smooth and almost unbroken except sometimes anteriorly and on branchio-hepatic region near antero-lateral border, where there may be some broad transverse wrinkles. Fronto-orbital border varying from about two-thirds to more than three-fourths the width of carapace. Front broad, almost straight, emarginate in middle, its outer angles separated from the supra-orbital margin by a groove. Antero-lateral borders cut into four lobes or teeth, exclusive of orbital angle. Orbit with two suture lines above and one below outer angle; eyes on short thick stalks. Basal antennal article large, extending upwards and outwards into the orbital gap. Merus of external maxillipeds with anterior margin almost transverse. Chelipeds unequal, more than twice as long as carapace; fingers stout, deeply hollowed at tip. Legs spinulous. The third to fifth somites of the male abdomen are fused.

Inhabits the Indo-Pacific region, the Atlantic coast of middle America; also west Africa.

Contains only one American species.[52]

CHLORODIELLA LONGIMANA (Milne Edwards)

Plate 186

Chlorodius longimanus MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 401 (type-locality, Porto Rico; type in Paris Mus.).

Chlorodiella longimanus RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 14.

Chlorodiella longimana RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, part 2 (1901), p. 36.

Diagnosis.—Transverse folds on carapace. Front double-edged. Chelipeds extremely long and heavy. A sinus on front edge of merus of outer maxilliped.

Description.—Surface punctate and microscopically granulate. Gastric region faintly indicated. A smooth transverse ridge and a deep furrow on epigastric, protogastric, hepatic and anterior branchial regions. The first three lateral teeth blunt, the last two longer and acute or subacute; a tubercle above the fourth tooth. Front with a double edge, the upper one truncate, feebly notched at middle, the

[52] The identity of "*Chlorodius caribaeus*" Desbonne (Desbonne and Schramm, Crust. Guadeloupe, 1867, p. 31) has not been determined.

Chlorodius imbricatus Spence Bate (Proc. Zool. Soc. London, 1864, p. 664; in Lord's Naturalist in Vancouver Island and British Columbia, vol. 2, 1866, p. 270), "Esquimalt Harbor, 8 fathoms," does not belong to the fauna of British Columbia and was introduced along with others into Bate's report through an error in locality. See S. I. Smith, Rept. Geol. Sur. Canada, 1878–1879 (1880), p. 209 B, footnote.

lower edge with a deeper notch and somewhat sinuous lobes; outer corners tuberculiform, turned down to meet the basal antennal segment. The anterior margin of the outer maxillipeds has a well marked sinus at its middle.

Chelipeds very long. Two-thirds of the arm projects beyond the carapace, its anterior margin armed with four or five teeth or spines. Wrist smooth, bearing a spine or tubercle at inner angle. Palm long and smooth, fingers stout and black, the color of the fixed finger continued on palm; prehensile edges with two or three low, rounded, inconspicuous teeth. Legs spinulous above and hairy.

Color.—Rather uniform pinkish red. Some very inconspicuous tiny white dots on carapace and small irregular brownish spots on top of chelae.

Measurements.—Male (57992), length of carapace 12.8, width of same 20, fronto-orbital width 12.9, frontal width 6 mm.

Range.—Florida Reefs; Bahamas; West Indies; Curaçao; St. Thomas Island, west Africa (Osorio).

Material examined.—

FLORIDA.—Miami; G. M. Gray; 1 male (42138).

Cape Florida; 1884; Dr. Edward Palmer; 1 male (9304), 10 specimens (9306).

Biscayne Bay; 1901; James E. Benedict; 1 male (25650).

Rodriguez Creek; 1884; Dr. Edward Palmer; 1 male, 1 female (9305).

Hawk Channel, 4¼ miles W. by N. of Elbow Reef beacon; 2¾ fathoms; barry, S.; temperature 20.5° C.; February 19, 1903; station 7467, *Fish Hawk;* 1 ovigerous female (53771).

Key West; 1885; Henry Hemphill; 4 males, 2 females (9303).

Bird Key reef, Tortugas; 1924; W. L. Schmitt; gift of Carnegie Institution: July 16; 2 males (60860). Middle section; July 26; 1 male (60724). July 28; Bender collector; 1 female (60861). North end of Bird Key reef, "Channel reef;" August 12; 3 males (60862).

BAHAMAS.—Andros Bank; in sponge; Frederick Stearns; specimen returned to sender.

WEST INDIES.—Jamaica; P. W. Jarvis; specimens returned to sender.

Porto Rico: Type specimens (Paris Mus.). 1899; *Fish Hawk:* Mayaguez, January 20, 1 young female (24300); Ponce, February 1, 1 specimen (24301); Arroyo, on lighthouse reef, February 3, 1 male (24302). San Juan; G. M. Gray; specimen returned to sender.

Culebra: Ensenada Honda; February 9–11, 1899; *Fish Hawk;* 9 males, 5 females (24303).

St. Thomas; January 17–24, 1884; *Albatross;* 1 male, 1 female (8935).

St. Croix; specimens in Copenhagen Museum.

Martinique; specimens in Paris Museum.

Barbados: Barbados-Antigua Expedition, State University of Iowa, 1918: Okra Reef; May 13; 2 males, 2 females (Mus. S. U. I.). One male S. of station 19, off Needham Point; 84 fathoms; rky.; station 20; 1 male (Mus. S. U. I.). Barbados: May 15, 3 males, 7 females (1 ovigerous), 2 young (Mus. S. U. I.); in coral heads, 1 male (Mus. S. U. I.), 2 males, 3 females (57992).

CURACAO.—1884; *Albatross;* 1 female (17815).

Genus XANTHIAS Rathbun

Xanthodes DANA, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, May, 1852, p. 73; type, *X. granosomanus* Dana, 1852=*Xantho lamarckii* Milne Edwards, 1834. Name preoccupied by Guénee, Jan., 1852, for a genus of Lepidoptera.

Xanthias RATHBUN (part), Proc. Biol. Soc. Washington, vol. 11, 1897, p. 165; substituted for *Xanthodes*.—ODHNER, Göteborg's K. Vet. Handl., Fjärde Följden, vol. 29, No. 1, 1925, p. 84.

Carapace thick, somewhat depressed posteriorly, inclined downward anteriorly, moderately broad, suboval, regions delimited and to a certain extent areolated in anterior two-thirds. Fronto-orbital border half or more than half greatest width of carapace; front strongly produced, convex, bilobed, outer angles not set off from orbital border by an emargination. Antero-lateral margin cut into four lobes or teeth besides the orbital angle. The three grooves of the orbital margin either fairly distinct or quite indistinct. Basal antennal article broad and very short; the flagellum, about as long as the greatest width of the orbit, is lodged in the orbital hiatus.

Chelipeds equal or nearly so in both sexes; hands stout; fingers slender, little curved, tips acute. Legs stoutish, usually more or less hairy and granulate or rough along upper border. Abdomen of male with third to fifth segments entirely or partially fused.

As restricted by Odhner this genus inhabits chiefly the Indo-Pacific region. Only one American species belongs here.

XANTHIAS INORNATUS (Rathbun), new combination

Plate 187

Actaea inornata RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 583, pl. 42, fig. 3 (type-locality, off Cape St. Roque, Brazil, 20 fathoms, station 2758 [*Albatross*]; type, Cat. No. 21579, U. S. N. M.).

Xanthias vestitus RATHBUN, Proc. Biol. Soc. Washington, vol. 35, 1922, p. 103 (type-locality, Spanish Harbor, Curaçao; type in Amsterdam Museum); Bijdragen tot de Dierkunde, Amsterdam, vol. 23, 1924, p. 15, pl. 3, figs. 4–6.

Diagnosis.—Size small. Covered with short felt. Carapace granulate near margins. Wrist and hand granulate. Fingers light colored.

Description.—Entire animal except extremities of fingers covered with a very short feltlike pubescence which conceals granules and other inequalities and obscures the antero-lateral teeth. Carapace

very flat posteriorly, anterior third deflexed. When the felt is removed the regions are fairly well indicated, the urogastric region is depressed, the grooves forming an H in middle of carapace are especially deep. Fine granules are scattered sparsely on the antero-lateral, postero-lateral and posterior portions. Antero-lateral teeth shallow, blunt; first, or E of Dana, long and low, second and third subequal, fourth smallest. Carapace very nearly as wide at last tooth as at penultimate. Fronto-orbital distance a little over half as great as width of carapace; front, between antennae, less than one third the carapace width, separated from orbital border by a deep groove but without emergination; anterior margin of front bilobed, median notch V shaped.

Carpus and manus of subequal chelipeds covered with granules; fingers light colored; propodal finger horizontal except at tip where it crosses the dactylus, gape narrow. Ambulatory legs smooth.

Measurements.—Female holotype, length of carapace 4.3, width 5.6, fronto-orbital width 3.1, width of front 1.6 mm. Male holotype of *vestitus*, length of carapace 4.6, width 6.4 mm.; female paratype, length 5.2, width 7.6 mm.

Range.—Curaçao; Cape St. Roque, Brazil.

Material examined.—Spanish Port, Curaçao; 1920; C. J. van der Horst collector: April 16; 2 males, 2 females (57002), 4 females (Amsterdam Mus.). May 6; 3 males (1 is holotype of *X. vestitus*), 4 females (Amsterdam Mus.).

Off Cape St. Roque, Brazil, lat. 6° 59′ 30″ S., long. 34° 47′ 00″ W., 20 fathoms, brk. Sh., temperature 79° F., December 16, 1887, *Albatross;* 1 female, holotype (21579).

Genus PARAXANTHIAS Odhner (part)

Liomera (part) DANA, Amer. Journ. Sci., ser. 2, vol. 12, 1851, p. 124.
Xanthodes (part) DANA, Proc. Acad. Nat. Sci. Philadelphia, vol. 6, 1852, p. 73.
Xanthias (part) RATHBUN, Proc. Biol. Soc. Washington, vol. 11, 1897, p. 165.
Paraxanthias ODHNER (part), Göteborg's K. Vet. Handl., Fjärde Följden, vol. 29, No. 1, 1925, p. 85; type, *P. notatus* (Dana).

Carapace broad, suboval or subhexagonal, convex in both directions, regions well delimited. Antero-lateral margins thick, dentate, with four divisions not counting the orbital angle which may be confluent with the first lobe. Frontal lobes obliquely cut, with outer angles produced and separated by an emargination from the upper orbital margin. Basal antennal article short and broad, merely touching front; flagellum lodged in orbital hiatus. Anterior border of merus of outer maxilliped a little oblique. Chelae distinctly unequal, both stout; fingers rather short, the movable one strongly curved. Male abdomen with third to fifth segments fused.

Odhner divides the genus *Xanthias* according to the characters of front and chelae. He groups under *Paraxanthias* the species *notatus* (Dana), *pachydactylus* (A. Milne Edwards), *elegans* (Stimpson), *taylori* (Stimpson), all of which have areolated, subhexagonal carapaces, strong lateral teeth and stout minor chelae, together with *dispar* (Stimpson), *longimana* (A. Milne Edwards) and *alcocki* (Calman), which have almost smooth, barrel-like carapaces, only slight traces of lateral marginal divisions and very narrow, slender minor chelae; and also *parvus* (Borradaile), which is intermediate between these two subgroups.

I do not believe that any useful purpose is subserved by placing the species of the two groups together, and because the type species of the genus *Liomera* has been transferred to the genus *Carpilodes*, I am obliged to make a new genus for the species *dispar* and *longimana*. (See below.) Perhaps *parvus* should be placed there also. The species *alcocki* should remain in the genus *Lioxanthodes*, the lateral lobes of its front not being separated from the inner supra-orbital angles.

KEY TO THE AMERICAN SPECIES OF THE GENUS PARAXANTHIAS

A¹. Manus nodulous.
  B¹. Each half of frontal margin bituberculate. Legs densely hairy. **taylori**, p. 466.
  B². Each half of frontal margin slightly arcuate except for a small tooth at outer angle. Legs sparsely hairy ..... **insculptus**, p. 468.
A². Manus not nodulous. Roughness inconspicuous ..... **sulcatus**, p. 469.

PARAXANTHIAS TAYLORI (Stimpson)

Plate 188; Plate 189, Figure 1

Xanthodes taylori STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1861, p. 208 [80], pl. 3, fig. 3 (type-locality, Monterey, California; type not extant).
Xanthias taylori HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 65.—SCHMITT, Univ. California Publ. Zool., vol. 23, 1921, p. 246, text-fig. 147, pl. 37, fig. 8, and synonymy.
Paraxanthias taylori ODHNER, Göteborg's K. Vet. Handl., Fjärde Följden, vol. 29, No. 1, 1925, p. 85.

Diagnosis.—Carapace subhexagonal, deeply areolated; anterolateral teeth strong. Carpus and manus with prominent smooth tubercles.

Description.—Carapace flat behind, in front strongly convex longitudinally but nearly plane transversely. Areolets anteriorly embossed. Lobes of front separated by a wide rounded median notch and furnished with a rounded tooth at inner and outer angles, between which are several tubercles; above the front a transverse crenulated ridge; inner orbital angle prominent, separated by a deep notch from outer angle of front; upper orbital margin with a rounded tooth which is bounded on either side by a deep sulcus; postorbital tooth small and continuous posteriorly with a rounded protuberance;

the latter separated by a smooth sulcus from a subconical tubercle; three posterior teeth on antero-lateral margin prominent, the last two curved forward, the first obtuse and generally more or less bifid; from it a row of two or three tubercles extends forward below the margin; usually there is a small tooth behind the one at antero-lateral angle.

Chelipeds stout, more or less unequal; carpus covered with prominent, rounded, smooth, glossy, rose-colored tubercles. Hand oblong, longer than wide, upper and outer surface covered with tubercles like those on carpus, arranged in seven or eight longitudinal rows; fingers stout, gaping in major chela, almost meeting in smaller.

Color.—Uniform dark red, lighter below; fingers black, the black not extending back upon hand.

Measurements.—Ovigerous female (23920), total length of carapace 25.2, width 42 mm.

Range.—Monterey Bay, California, to Magdalena Bay, Lower California. Beach to 55 fathoms. Abundant under stones between tides and also in kelp holdfasts from deeper water.

Material examined.—

CALIFORNIA.—Monterey Bay; under rocks, low tide mark to mean tide; Harold Heath; 1 male (22871).

Monterey; Henry Hemphill; 1 female (3290).

Pacific Grove: John C. Brown; 5 specimens (23920). Ida S. Oldroyd; 1918; 1 male, 5 females (54011).

Venice breakwater; Venice Marine Biological Station: 1 female (45580). October 29, 1913; P. S. Barnhart, *Anton Dohrn;* 2 males (50191); 1 male (50292).

Point Vincent; from rocks; 1918; H. N. Lowe; 10 specimens (51125).

San Pedro; E. P. Chace: December 15, 1918; 1 male, 1 female (54000). May 4, 1919; 1 female, 1 young (53904).

San Pedro; *Anton Dohrn,* Venice Marine Biological Station: Foot of breakwater, February 21, 1913; 1 male (50192). Portuguese Bend; littoral; June 26, 1914; 1 male, 1 female (50196).

San Pedro; H. N. Lowe; 1 female (19733).

Long Beach; H. N. Lowe; 3 males, 2 females (50546).

Seal Beach, south of Long Beach; March 2, 1919; E. P. and E. M. Chace; 2 young (53999).

Laguna Beach; W. A. Hilton; 1 young (50594); 1 male (48992).

Catalina Harbor, Santa Catalina Island; W. H. Dall: 40 to 60 fathoms; 1 young (4279). 1874; 30 to 40 fathoms; sandy mud; 2 females (14749). 1874; beach; 6 males, 2 females (14750).

Santa Catalina Island; *Anton Dohrn,* Venice Marine Biological Station: Catalina Harbor; April 1, 1915; 1 male (50293). West shore, Catalina Harbor; December 28, 1912; 1 male, 3 females (50193).

Avalon Bay; October 22, 1910; P. S. Barnhart; 2 young (50198). Isthmus; December 27, 1912; 1 young (50195). Isthmus Harbor; November 27, 1913; 27 males, 16 females (50199).

San Nicholas Island; H. N. Lowe; 5 males, 1 female (32973).

San Clemente Island; January, 1899; H. N. Lowe; 1 female (23060).

La Jolla: March 6, 1898; *Albatross;* 1 female (21780). From kelp holdfast on beach; August 18, 1918; W. L. Schmitt; 3 young (53981). Tide pools; September 22, 1918; W. L. Schmitt; 1 young (53980).

San Diego: Henry Hemphill; 8 males, 12 females (17535). C. R. Orcutt; 1 male, 1 female (17303).

Southern California; 1874; W. H. Dall; 20 males, 12 females, 11 young (14751).

Southern California; *Anton Dohrn,* Venice Marine Biological Station: 1 male (50194), 1 female (50197). February 19, 1913; 4 males, 5 females (50189). March 13, 1913; 10 males, 8 females (50190).

Off southern California; *Albatross;* 1 male (18178).

LOWER CALIFORNIA.—Cortez Bank; lat. 32° 23′ 30″ N.; long. 119° 02′ 15″ W.; 55 fathoms; gray sand; temperature 53.1° F.; January 16, 1889; 1 young male (17396).

PARAXANTHIAS INSCULPTUS (Stimpson), new combination

Plate 189, Figure 4

Xanthodes insculpta STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 105 [15] (type-locality, Cape St. Lucas; type not extant).

Xanthias insculptus RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 271.

Pilumnoides pusillus RATHBUN, Proc. Washington Acad. Sci., vol. 4, 1902. p. 281, pl. 12, figs. 9 and 10 (type-locality, Tagus Cove, Albemarle Island; cotype, Cat. No. 24832, U.S.N.M.).—BOONE, Zoologica, vol. 8, 1927, p. 215, text-fig. 78.

Xanthias insculpta RATHBUN, Zoologica, vol. 5, 1924, p. 157, text-fig. 38.—BOONE, Zoologica, vol. 8, 1927, p. 207, figs. 74 A and 74 B (megalops).

Diagnosis.—Carapace areolate, chelipeds nodulous. Palm with two longitudinal ridges.

Description.—Carapace naked, slightly convex, somewhat lobulate, the protogastric region divided in two by a longitudinal furrow, median furrow also deep, the area adjacent to the anterolateral margin broken up into four or five lobules; entire surface very finely granulate. Margin of frontal lobes slightly convex except for a squarish tooth at outer angle. Orbital margin with two shallow V-shaped fissures above and one below outer angle.

FIGURE 77.—PARAXANTHIAS INSCULPTUS, MALE (24832), CARAPACE 3 MM. WIDE. *a.* CHELA. *b.* DORSAL VIEW OF CRAB

Antero-lateral border distinctly marked, almost limbed, and furnished with five teeth, including the orbital tooth which is small and little prominent; second, third, and fourth teeth subequal, fifth much smaller. From it a crest extends obliquely inward and backward on carapace.

Chelipeds not very unequal, covered with large tubercles or nodules, five or six on the carpus, nine or ten on the manus. A granulated longitudinal ridge on outer surface of manus; immovable finger with two carinae, the lower of which extends back on the palm. Dactylus with a deep superior furrow. The fingers of the larger cheliped when closed leave a small hiatus at base, those of the smaller cheliped either have a smaller hiatus or fit tight together. Legs sparsely hairy.

Measurements.—Male, type of *insculpta*, length 0.12 inches (3 mm.), width 0.17 inches (4.3 mm.). Male (57145), length 3, width 4 mm. Male, type of *pusillus*, a postlarval stage, length 2.4, width 3 mm. Miss Boone gives for *insculpta*, length 12, width 14 mm.; this proportion is impossible and is not borne out by her Figure 74 A.

Range.—From Cape St. Lucas, Lower California, Mexico, to the Galapagos Islands.

Material examined.—Galapagos Islands:

Reef north of Tagus Hill, Tagus Cove, Albemarle Island; March 16, 1899; Hopkins Stanford Galapagos Expedition; 2 males, cotypes (Stanford Univ. and 24832, U.S.N.M.).

Off Eden Island, northwest of Indefatigable Island; April 1, 1923; Williams Galapagos Expedition; 1 male (N. Y. Zool. Soc.), 1 young (57745).

PARAXANTHIAS SULCATUS (Faxon), new combination

Plate 189, Figures 2 and 3

Xanthodes sulcatus FAXON, Bull. Mus. Comp. Zoöl., vol. 24, 1893, p. 152 (type-locality, off Panama, 153 fathoms, station 3391; type, the measured male, M. C. Z.); Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 17, pl. 3, fig. 2, 2*a*.

Xanthias sulcatus RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 271.

Diagnosis.—Carapace suboval. Lateral teeth very small. Granulation and tuberculation inconspicuous. Legs slender.

Description.—Carapace very convex from before backward, granulated, granulation coarsest on lower surface and near borders of upper surface. Deeply impressed grooves separate the gastric from the branchial regions, and the mesogastric from the lateral gastric lobes. The median groove which extends from the mesogastric region to the front is crossed a short distance behind the frontal margin by a transverse groove, which meets on each side another groove running parallel to the upper margin of the orbit; in this way there are marked off a pair of frontal and a pair of orbital areolets. Frontal

margin in general horizontal, its two lobes slightly convex, finely denticulate, a small triangular tooth at outer angle, separated from the upper orbital angle by a notch. Antero-lateral border of carapace armed with four small spines or teeth; no tooth at external orbital angle. Of the teeth the first is smallest, third largest, second and fourth of about equal size; margins of teeth denticulate.

Chelipeds short, unsymmetrical; merus granulated on outer face, spinulous on upper edge and grooved near articulation with carpus. Carpus granulated on outer side, and having a tooth at inner angle. Major propodus inflated, granular along upper margin and at proximal end of outer face where some of the granules are enlarged and tubercular. Minor propodus with subparallel margin, rough all over the outer face. Meri of ambulatory legs finely roughened.

Measurements.—Male type, length of carapace 8, width 11, length of large chela 10, width of same 5 mm. (Faxon). Female (20053), length of carapace 7.6, width 11.2, fronto-orbital width 6.6, frontal width 3.6 mm.

Range.—Off Panama, 153 to 182 fathoms.

Material examined.—Off Panama; 1891; *Albatross:*

Lat. 7° 33′ 40″ N., long. 79° 43′ 20″ W.; 153 fathoms; gn. M.; temperature 55.8° F.; March 9; station 3391; 1 male (type), 3 females (4483, M. C. Z.).

Lat. 7° 12′ 20″ N., long. 80° 55′ 00″ W.; 182 fathoms; bk. G. Sh.; temperature 54.1° F.; February 23; station 3355; 1 male, 2 females (20053).

Genus EUCRATODES A. Milne Edwards

Eucratodes A. Milne Edwards, Crust. Rég. Mex., 1880, p. 346; type, *E. agassizii* A. Milne Edwards; Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 14.—Rathbun, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 35.

Carapace oval, of moderate width, antero-lateral margins arcuate, feebly dentate, postero-lateral converging. Fronto-orbital width about two-thirds the greatest width of carapace. Frontal lobes entire. No upper fissures on orbital margin, a shallow emargination below. Basal article of antennae short, just touching a prolongation of front; the flagellum lies in the orbital hiatus. Antennules folded transversely. Buccal cavity broad; margin of epistome with two notches on each side; endostome without ridge. Merus of outer maxillipeds subquadrilateral, notched at inner angle for articulation of palpus. Chelipeds of moderate size and nearly equal; fingers pointed. Ambulatory legs slender, smooth; dactyli elongate. Third, fourth, and fifth segments of abdomen fused; third segment angular at sides, reaching coxae of fifth pair of feet.

Akin to *Metopocarcinus*. Contains only one species.

EUCRATODES AGASSIZII A. Milne Edwards

Plate 190

Eucratodes agassizii A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 347, pl. 61, fig. 1–1*e* (type-locality, 100 fathoms, west of Florida; type not located); Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 14, (type-locality corrected to 100 fathoms at lat. 21° 14′ N. [Yucatan Channel], collected by Stimpson).—RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 35.

Diagnosis.—Antero-lateral margins dentate. Front one-third as wide as carapace. Basal antennal segment touching prolongation of front. Dactyli of legs long and straight.

Description.—Carapace thick, very convex in an antero-posterior direction, slightly convex transversely; regions scarcely indicated except for the H-shaped depression at middle of carapace; surface smooth to naked eye, but under the lens it is punctate and obscurely granulate, except along antero-lateral margin, where the granules are plainly seen. Antero-lateral margin obscurely five-toothed, first or orbital tooth small; second rounded and separated from the first by a shallow sinus, as in species of *Eurypanopeus;* third larger, but little prominent; fourth not so wide but most prominent; fifth small. Front slightly bilobed, lobes separately convex; a short closed median fissure; margin thin. Lower surface of carapace coarsely granulate. The arm has a superior subterminal tooth, the wrist a blunt inner tooth. Surface of chelipeds similar to that of carapace; lower surface of palms coarsely granulate. Dactylus of larger hand with a large basal tooth. The brown color of the fixed finger covers only its distal half. The chela figured by Milne Edwards is the smaller of the two; the larger is more swollen. Ambulatory legs pubescent, margins hairy.

Color.—Pale yellow; fingers brown (A. Milne Edwards).

Measurements.—Male (24318), length of carapace 6.2, width of same 8.5, fronto-orbital width 5.5, width of front 2.8 mm. Young male (24319), length of carapace 3.3, width of same 4.2 mm.

Variations.—The type male is intermediate in size between the two above measured; it shows only three lateral teeth on the carapace, on account of the suppression of the second and fifth teeth shown in the largest specimen. The teeth of the young male (see above) are also undeveloped.

Range.—Porto Rico; Yucatan, Mexico.

Material examined.—Porto Rico; 1899; *Fish Hawk:* Off Aguadilla; Point de Borinquen lighthouse, NE. by N. ¾ N., 3¼ miles; 137 fathoms; S. M. Sh.; temperature 24° C.; January 18; station 6055; 1 male (24318). Mayaguez Harbor; Point del Algarrobo, E., 4⅝ miles; 161–172 fathoms; M. S.; temperature 23° C.; January 20; station 6066; 1 young male (24319).

Genus MENIPPE de Haan

Menippe DE HAAN, Fauna Japon., Crust., 1833, pp. 4 and 21; type, *M. rumphii* (Fabricius).

Carapace broad, transversely oval, moderately convex fore and aft, very slightly so from side to side; regions, except gastric, little defined. Several pits form a semicircle on either side opposite the last two lateral teeth. Antero-lateral borders long, strongly arched, cut into four teeth besides orbital; postero-lateral borders slightly shorter than antero-lateral, convergent; posterior border short. Front narrow, about a fifth or less than a fifth the greatest breadth of carapace, rather prominent, almost horizontal, cut into two lobes, the outer angle of each of which forms a distinct tooth or lobule. Orbit with three grooves near the outer angle well marked; inner orbital angles, both upper and lower, pronounced. Eyes on short, thick stalks. Side edges of front not turned down; the short basal antennal article does not nearly reach the front, so that the cavities of orbits and antennules are not properly separated; next antennal article just reaches front, and the long antennary flagellum stands in the orbital hiatus. Antennules fold nearly transversely. Anterior edge of merus of external maxillipeds oblique and a little sinuous but not excised. Ridges of endostome complete, but low and faint. Chelipeds massive, a little unequal in both sexes; fingers stout, pointed, not hollowed. Abdomen of male singularly broad, all seven segments distinct.

Indo-Pacific region; both coasts of middle America.

KEY TO THE AMERICAN SPECIES OF THE GENUS MENIPPE

A[1]. Surface of carapace not nodose, almost smooth. Antero-lateral teeth or lobes shallow or little projecting. A stridulating apparatus present.
- B[1]. Margin of front with two lobules on outer side of each submedian lobe.
  - C[1]. Second antero-lateral lobe not bilobate. Two lobes or teeth on lower orbital margin ---------- **mercenaria**, p. 472.
  - C[2]. Second antero-lateral lobe bilobate. Three lobes on lower orbital margin ---------- **frontalis**, p. 477.
- B[2]. Margin of front with one lobule on outer side of each submedian lobe. Second antero-lateral lobe bilobate ---------- **obtusa**, p. 478.

A[2]. Surface of carapace anteriorly nodose. Antero-lateral teeth strong, projecting well out from carapace. No stridulating apparatus -- **nodifrons**, p. 479.

ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

Atlantic	Pacific
mercenaria	*frontalis*

MENIPPE MERCENARIA (Say)

STONE CRAB

Plates 191–193

Cancer mercenaria SAY, Journ. Acad. Nat. Sci. Philadelphia, vol. 1, 1818, p. 448 (type-locality, "the southern states"; type, 114.3 mm. wide, not extant).

Xantho mercenaria MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 399.

Pseudocarcinus ocellatus MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 409 (type-locality unknown; type in Paris Mus.).

Pseudocarcinus mercenarius GIBBES, Proc. Amer. Assoc. Adv. Sci., vol. 3, 1850, p. 176 [12].

Menippe ocellata VON MARTENS, Arch. f. Naturg., vol. 22, pt. 1, 1856, p. 87.

Menippe mercenaria STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1859, p. 53 [7].—A. MILNE EDWARDS, Crust. Rég. Mex., 1879, p. 262, pl. 47 (colored) and 48, fig. 3.—R. RATHBUN, Fisheries and Fishery Industries of the U. S., sec. 1, 1893, p. 772, pl. 264.—HAY and SHORE, Bull. Bur. Fisheries, vol. 35, 1915–16 (1918), p. 439, pl. 35, fig. 8.

Menipe ocellata GUNDLACH and TORRALBAS, Anales Acad. Cien. Habana, vol. 36, 1900, p. 369, not text-fig. 5G.

Diagnosis.—Carapace smooth, not lumpy. Antero-lateral teeth

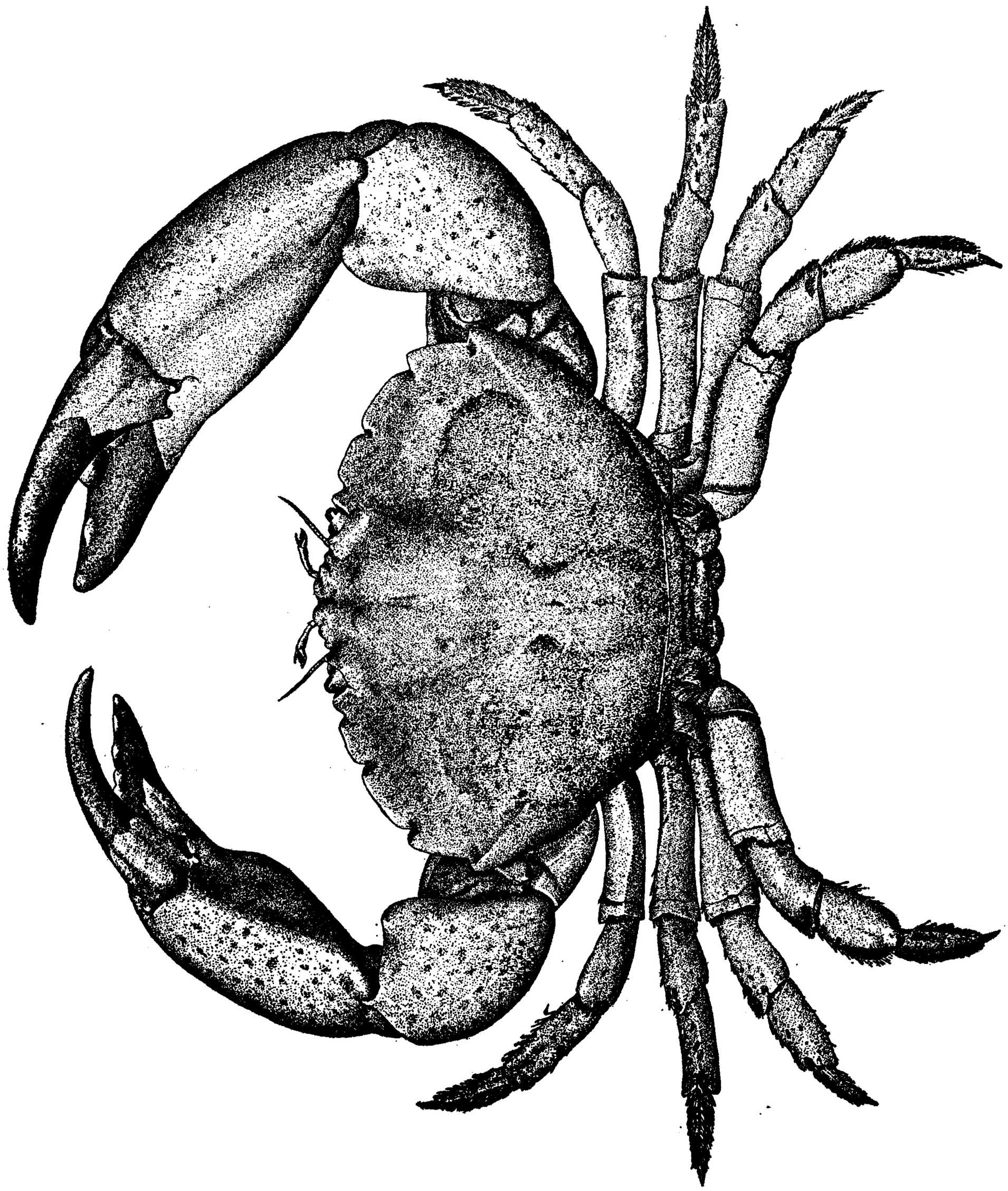


FIGURE 78.—MENIPPE MERCENARIA, MALE, CHARLESTON, DORSAL VIEW. AFTER R. RATHBUN

low, not prominent. A stridulating organ on inner side of palm. Black not wholly covering fingers but ending obliquely.

Description.—Carapace minutely granulate, punctate, not nodulose; epigastric areas slightly elevated. Two large pits mark the

widest part of the mesogastric region. Anterior part of this region outlined; crescentic grooves at middle of carapace well marked. Each lobe of front is oblique and subdivided into three, one large submedian and two small. Inner supraorbital tooth with transverse anterior margin; outer angle obtuse, not advanced; lower margin bidentate, inner tooth prominent, outer one lower than the inner, but similar to and almost merged with the tooth above it, but more advanced. Second to fourth lateral teeth shallow, more or less truncate or lobiform, having short anterior and long posterior margins, which meet at an obtuse angle. Fourth tooth subdentiform, last tooth dentiform, blunt, projecting outward; from it a low, blunt ridge runs obliquely backward.

Dactylus of major chela with a large basal tooth, fixed finger with a large subbasal tooth; other teeth few and large. The fingers of the minor chela have numerous small teeth. The dark color of the fingers ends in an uneven or broken, oblique line, the color extending the length of the prehensile edge but little more than half the length of the outer edge. On the distal upper half of the inner surface of both palms in both male and female there is a broad oblong patch of striae obliquely placed, which serves as a stridulating organ. It is adapted for playing against the thick edge of the second and third antero-lateral teeth and the outer suborbital tooth. There is a series of granules on the suborbital and subhepatic regions which may provide the element of friction, although the articulation of the arm seems not to permit this. There is a row of these round or oblong granules or small tubercles behind and parallel to the lower orbital border, and on the second and third antero-lateral lobes, besides a few granules toward the buccal cavity.

Color.—Young specimens, a dark purplish blue, the very young always with a white spot on the wrist; with age the color becomes a dark brownish red more or less mottled and spotted with dusky gray. (Hay.) Fingers black; legs ornamented with red and yellow bands.

Measurements.—Male (32250), total length of carapace 85.6, width of same 127, fronto-orbital width 47, width of front 24.6 mm.

Habitat.—The young are hatched at intervals throughout the spring and summer and, after having assumed the crab form, appear to resort to the deeper channels of the harbor where they live under the shell fragments with which such bottoms are covered. On attaining a width of half an inch or thereabouts they move into shallower water and may be found among the oyster shells and the rocks about the harbor jetties. Here they live until they have attained full size, when, if circumstances seem to demand it, they move to some shoal and just below low-tide mark make burrows. These

Material examined of Menippe mercenaria

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
North Carolina:	° ′ ″	° ′ ″			° F.						
Shackleford Bank				From rocks		Sept. 12, 1928		Schmitt & Shoemaker.	2♂ 3♀ 1 y	62527	
Beaufort								William Stimpson	1♀	17527	
South Carolina								Brevoort	1	2089	
Bull's Bay Lighted Beacon.						Mar. 23, 1891		*Fish Hawk*	1 y	17170	Among oyster shells.
Cooper River			5	hrd. C	50	Jan. 16, 1891		do	1♂	32250	
Charleston Harbor			7.8	stk	58	Mar. 13, 1891	1659	do	1♀	17171	
Charleston market						Mar. —, 1880		R. E. Earll	1♀	4906	
Cat Island Creek, Port Royal.						Feb. 2, 1891		*Fish Hawk*	1 y	26144	On gorgonian.
Calibogue Sound			6.6–8.3		50–52	Jan. 16, 1891	1648–1651	do	2 y	18195	
Georgia: St. Mary's						Mar. 24, 1896		O. Bangs	1 large female	19474	
Bahamas: West side Andros Island.								Frederick Stearns	Specimens returned to sender.		
Florida								H. E. Webster	3 y	56829	From Boston Society of Natural History.
Indian River, at Titusville.						Jan. 14, 1896		U. S. Fish Commission.	3 small ♀	20097	
Indian River								G. Wurdemann	7	2094	
Fort Pierce						Jan. 23, 1896		U. S. Fish Commission.	1♀	20095	Obtained from fisherman.
Miami								G. M. Gray	2 y	42129	
			Feet		° C.						
Biscayne Bay	4 miles ENE. of Turkey Point.		8.5	hrd. S	25	Mar. 6, 1903	7476	*Fish Hawk*	1 y	53754	
Key West						Dec. —, 1883		D. S. Jordan	4 y	6370	
Do								H. Hemphill	18♂ 9♀ 12 y	8964	
Do						Apr. 15, 1884 to Apr. 27, 1884		*Albatross*	1 y 29	18520 7509	
Do						Apr. 11, 1889		do	1♂	20096	
Do						Feb. 11, 1903		*Fish Hawk*	1♂	33463	
Do									1♂	57007	From Boston Society of Natural History.
Key West Harbor						1884		Edward Palmer	4 y	15101	From piles of wharf and among rocks.

Material examined of Menippe mercenaria—Continued

Locality	Bearings		Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	Latitude N.	Longitude W.									
Florida—Continued.	° ′ ″	° ′ ″	*Feet*		° *C.*						
North of Knights Key Channel.	6 miles NNE. ½E. of East Bahia Honda Key.		11	barry	20.5	Jan. 22, 1903	7414	*Fish Hawk*	1 y	53756	
Marco						May —, 1884		H. Hemphill	6♂ 3♀ 15 y	6948	
Oyster Bay								do	1 y	14988	
Puntarasa						Feb. —, 1884		do	4♂ 8♀ 13 y	6439	
Sanibel Island						Feb. 22, 1928		O. C. Van Hyning	1 ♂ 2♀	Fla. State Mus.	
Off Sanibel Island	Bell buoy off Sanibel Island Light, NE., 10-2½ miles.		4.75	Sh. wh. M		Jan. 1, 1913	7795(9)	*Fish Hawk*	1 y	50465	
Boca Grande						Apr. 27, 1915		do	1 y. ♀	56359	
Off Charlotte Harbor.	26 35 00	83 11 00	27.5	sdy	20	Apr. 2, 1901	7122	do	7 y	25607	
Do	26 33 00	83 10 00	28	sdy	19	do	7123	do	3 y	25608	
Charlotte Harbor						Mar. —, 1887		W. H. Dall	1♂	14995	
Do								E. B. Baker	2	2017	
Little Sarasota Bay								H. Hemphill	2♀	14991	
Sarasota Bay						Feb. —, 1884		do	3 y	6432	
Do								H. E. Webster	1♂ 1 y	56830	
Goodland Point								H. Hemphill	24 y	14989	
Palma Sola, mouth of Manatee River.								do	3♀	14997	
Mullet Key									1 y	53757	
Off Port Tampa			4	sdy		Jan. 25, 1898		*Fish Hawk*	3 y	26145	
Do			4	muddy		Jan. 29, 1898		do	1 y	26146	
Tampa Bay								H Hemphill	2 y	14992	
Dunedin						Feb. —, 1916		J. B Clark	1♀	57843	From Florida State Mus.
Off northwest end St. Martins Reef, near Florida Banks.	28 50 00	83 00 00				1887		Lieut. J. F. Moser, U. S. N.	1 y	14994	
Cedar Keys						Dec. —, 1883		H. Hemphill	14♂ 6♀ 10 y	6409	
Do				Flats, low tide		Mar. 27, 1926		Miller and Aschemeier.	1 y	60973	
Pepperfish Key	29 32 10	83 29 50	3	sdy	21.8	Nov. 5, 1901	7144	*Fish Hawk*	1 y	53755	
St. Vincent Sound, Apalachicola.						Mar. 26, 1915		do	1♂ 1♀	56383	

Alabama: Mobile Bay									1 y.	19355	
Mississippi: Biloxi									1 sm.	Copenhagen Mus. 26147	
Louisiana: Near St. Joseph Island Light.	U. S. Fish Commission.		Feb. 21, 1898			On oysters			1 y.		
Texas: Galveston									1	M. C. Z. 20637	
Matagorda Bay	J. D. Mitchell		Dec. 20, 1904						10 y.	33032	
Palacios Reef, Matagorda Bay.	T. E. B. Pope, Bureau of Fisheries.								1♂ 2♀		
Southern States									1♂ 1♀	Phila. Acad.	Male 95 mm. wide; female 111.3 mm. wide.
Cuba						Under stones	(1)		1	M. C. Z. 61114	
Varadero, bay side	Melbourne Ward		Apr. —, 1927						2♂	62528	
Jamaica: Port Royal	C. R. Orcutt								1 chela		
Mexico: Yucatan	A. H. Blackiston		1922						Claws	57067	

[1] Below low tide.

burrows extend obliquely for a distance of 12 to 20 inches and are about 6 inches in diameter. (Hay.)

Economic value.—Used extensively for food.

Range.—North Carolina to Mexico.

Material examined.—See table, pages 475–476.

MENIPPE FRONTALIS A. Milne Edwards

Plates 194–196

Menippe frontalis A. MILNE EDWARDS, Crust. Rég. Mex., 1879, p. 264, pl. 48, fig. 2 (type-localities, Panama (figured specimen) and Ecuador; types in British Museum).—NOBILI, Boll. Mus. Torino, vol. 16, no. 415, 1902, p. 33 (Bay of Santa Elena, Ecuador).

Diagnosis.—Carapace uneven but not lumpy. Second lateral lobe bilobate. Three lobes on inferior orbital margin. A stridulating organ on inner surface of palm.

Description.—Punctae of surface very numerous and both large and small. Gastric, cardiac, and intestinal regions and anterior part of mesogastric subregion deeply outlined; epigastric subregion elevated. Anterior portion of carapace unevenly pitted. Frontal lobes deeply and widely separated, the emargination succeeded by a deep furrow; each submedian lobe is followed by two small lobules, forming an oblique line with the small, retreating, thickened, obtusangled, inner tooth of the orbit. A tubercle on either side of the dorsal surface of the front, opposite the last or posterior of the two marginal lobules. Outer and lower teeth or lobes of orbit sloping well away from the cavity containing the eye, the outer tooth low, with tuberculiform tip, the tooth beneath it broader and a little more advanced; median suborbital tooth low, inner tooth somewhat

higher and rounded. The second to fifth antero-lateral teeth or lobes are similar to those of *mercenaria* except that the second is more advanced, more transverse, and is subdivided by a shallow sinus into two lobules.

On the upper distal quarter of the inner face of the palm there is an oblong patch, vertically placed, of parallel oblique striae. There are certain fixed points on the carapace against which the striae may be scraped; they are small tubercles, mostly oblong and whitish, situated as follows: One oblong on the lower surface of the median and outer suborbital lobes, two further back near the angle of the buccal cavity; and just below the antero-lateral margin one small tubercle on each lobule of the second lobe and two or three on the third lobe or tooth. This stridulating apparatus is present on a specimen only 18 mm. wide. Black of fingers not covering their base but ending in an irregular, mostly scalloped line.

Color.—General color of preserved specimens red. Outer face of manus reticulated with yellow.

Measurements.—Male (60758) total length of carapace 86, width of same 128, fronto-orbital width 45.6, width of front 20.8 mm.

Range.—West coast of Nicaragua to Peru.

Material examined.—Nicaragua; Dr. Carl Flint; 1 female (3812).

Panama: J. H. Sternbergh collector; 2 males, 1 female (17300). Chame Point; June–July, 1912; Robert Tweedlie, Smithsonian Biological Survey; 1 young (59310). Canal Zone; August, 1915; J. Zetek; 1 male, paper shell (48807).

Paita, Peru; under rocks, low tide; October 8, 1926; W. L. Schmitt; 3 males, 19 females (60758); a fine series of large specimens, the first recorded from Peru.

Locality unknown; 1 male (13885).

MENIPPE OBTUSA Stimpson

Plates 197; 198, Figures 1 and 2

Menippe obtusa STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1859, p. 53 [7] (type-locality, Panama; type, Cat. No. 2050, U.S.N.M.).

Diagnosis.—A single lobule on frontal margin next to each submedian lobe. Front channeled just above the lobes. Second antero-lateral lobe bilobate. Stridulating organ of palm unlike in the sexes.

Description.—Carapace nearly smooth and even, flattened posteriorly; a tubercle on each side of front and of epigastric region. Gastric region defined. Frontal region channeled along the margin above the lobes. A single lobule behind each frontal lobe, forming an oblique row with the obtuse, tuberculiform inner angle of orbit. Outer angle of orbit low and blunt; the tooth below it blunt and a little more advanced; tooth at inner lower angle large and rounded. Between these last two, on ventral surface and not projecting to orbital margin there is a tubercle. Antero-lateral teeth similar to those of *frontalis*, but the second lobe is bilobate.

The palms are furnished with a large lobe within, at the proximal end of the upper surface. On the distal upper quarter of the inner surface of each palm there is a suboval stridulating area formed of parallel oblique striae; these are entire in the male and in the major chela of the female, but are broken into short lengths and utriculiform granules in the minor chela of the female. This area as in *frontalis* is played upon by a series of small, elongate, whitish tubercles; two are on the outer and middle tubercles below the orbit, two are on the lobules of the second antero-lateral lobe, two others on the adjacent end of the third lobe, and one is near the angle of the buccal cavity; besides there are several granules on the suborbital and subhepatic region. A young female only 10.2 wide shows the stridulating apparatus.

The dark color of the fingers very nearly covers them to the base in the male and major chela of the female; in the minor chela of the female it is more extensive on the immovable finger, reaching from the interdigital sinus obliquely backward some distance on the palm.

Color.—Of preserved specimen reddish, mottled or banded. (Stimpson.)

Measurements.—Female holotype, total length of carapace 30.4, width of same 43, fronto-orbital width 20, width of front 9.5 mm. Male (17301), length 35.5, width 52 mm. Female (17301), length 38.8, width 56.3 mm.

Range.—Pacific side of Costa Rica and Panama.

Material examined.—Punta Arenas, Costa Rica; specimen in Copenhagen Museum.

Panama: J. H. Sternbergh; 1 female holotype, 1 young female (2050). Henry A. Ward; 1 male, 1 female (17301).

Remarks.—In the female, 17301, the major chela is abnormal; although of large size, the fingers partake of the nature of the minor fingers, being more elongate than in the type female, the fixed finger having five teeth in place of three and the black color running along the base of the palm as in the minor chela.

MENIPPE NODIFRONS Stimpson

Plate 198, Figure 3; Plate 199

Pseudocarcinus rumphii MILNE EDWARDS, vol. 1, 1834, p. 408. Not *Cancer rumphii* Fabricius, Ent. Sys., Suppl., 1798, p. 336.

Menippe rumphii DANA, U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 179.—SMITH, Trans. Connecticut Acad. Sci., vol. 2, 1869, p. 34.—STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 106 [16].—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 263, pl 48, figs. 4–4*b*.

Menippe nodifrons STIMPSON, Ann. Lyc Nat. Hist. New York, vol. 7, 1859, p. 53 [7] (type-locality, Indian River, Florida; type not extant).

Carpilius corallinus GUNDLACH and TORRALBAS, Anales Acad. Cien. Habana, vol. 36, 1900, p. 367, text-fig. 4 G.

Menippe rumphi? A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 316.

Diagnosis.—Antero-lateral regions lumpy; lateral teeth prominent. No stridulating organ on inner side of palm. Black of fingers not continued quite to palm and ending irregularly though not obliquely.

Description.—Surface covered with crowded depressed granules and coarse punctae. Gastric region distinct and divided into five subregions; on the epigastric regions there is a pair of lobules which with a similar pair on the front form a quadrilateral, those of the anterior pair further apart than those of the posterior. A low elevation nearly parallel with the curve of the antero-lateral border crosses either branchial region; other shorter elevations cross the hepatic and protogastric regions. The frontal margin consists of two prominent, submedian, well-separated, arcuate lobes outside of each of which are two smaller lobes forming an oblique line; the inner of these small lobes is sometimes obliterated in the old. Inner angle of orbit thick, obtusangled; outer angle thick, blunt; lower margin forming two subequal lobes separated by a rounded sinus, the outer lobe directly below the smaller outer supraorbital angle. Antero-lateral border rather sharp and divided into four prominent lobes of which the first two are broadly rounded, the last two dentiform, obtuse, strongly projecting sideways; from the last one a ridge extends obliquely inward on the carapace.

Inner angle of wrist bluntly prominent. Legs with upper border of carpus and both borders of propodus hairy; dactylus more thickly hairy.

Color.—Reddish; feet banded with red and yellowish; fingers black.

Measurements.—Male (59309), total length of carapace 49, width of same 72, fronto-orbital width 25.8, width of front 14.7 mm.

Range.—From Indian River, Florida and Gulf of Mexico to State of Santa Catharina, Brazil. West Africa.

Material examined.—

UNITED STATES.—Indian River, Florida; U. S. Fish Commission; specimen returned to sender.

Cameron, Louisiana; R. P. Cowles; 1 male (30566).

WEST INDIES.—Cuba; *Tomas Barrera* Expedition, Henderson and Bartsch: June 8–9, 1914; station 16; 1 young female (48524). Guantanamo Bay; station 24; 1 male (50537).

Cuba: Cojimar Playa, near Havana; Melbourne Ward; 1 male; returned.

Jamaica: March 1–11, 1884; *Albatross;* 4 males, 6 females, 2 young (17781). T. H. Morgan; 1 ovigerous female (17213). J. E. Duerden; specimens returned to sender. Kingston Harbor: 1893; R. P. Bigelow, 2 males (17968); P. W. Jarvis, specimens returned to sender. C. R. Orcutt: 3 males, 1 pair chelipeds (62530); Kingston, 1 cheliped (62529); Harbor Head, Kingston, 1 female (61130).

St. Thomas Harbor, St. Thomas, Virgin Islands; July 13, 1915; C. R. Shoemaker; 1 female (53758), gift of Carnegie Institution.

TRINIDAD.—February, 1878; Crosby; 11 young (56831), received from Boston Society of Natural History.

PANAMA.—Meek and Hildebrand, Smithsonian Biological Survey: Toro Point, Canal Zone; January 25, 1912; 2 females (59309, 59311). Fox Bay, Colon; January 20, 1912; 1 ovigerous female (59308). Porto Bello; April 24–28, 1911; 1 male (44178). Colon (Aspinwall); 4 fathoms; 1884; *Albatross;* 1 female (7646). Colon Harbor; on dock piles; 1923; Williams Galapagos Expedition; 1 young (57734), from New York Zoological Society.

COLOMBIA.—Sabanilla; March 16–22, 1884; *Albatross;* 1 female (7568).

BRAZIL.—Branner-Agassiz Expedition; A. W. Greeley, collector; 1899: Mamanguape stone reef; June 20 and 23; 2 young (25721). Rio Goyanna stone reef; June 18; 1 female (25722). Pernambuco stone reef at Ilha de Nogueira; July 10; 1 young (25723). Coral reef, Maceio, Alagôas; July 22; 1 male, 2 females (25724).

Ilha Governador; outside mouth of river; from under rocks, sponges, and bunches of bryozoa; September 1, 1925; W. L. Schmitt; 1 male (60759).

Paqueta; August 19, 1925; W. L. Schmitt; 1 female (60762).

Conto do Rio, Nictheroy; tide pool, on sides and in water; August 22, 1925; W. L. Schmitt; 1 male, 2 young (60764).

Ilha dos Buzios, São Paulo; 1906; Fr. Gunther, collector; received from H. von Ihering; 1 female (47832).

Villa Bella, Ilha de São Sebastião, São Paulo; Beach; September 24, 1925; W. L. Schmitt; 1 male (60761). October, 1925; H. Luederwaldt, collector; 4 young (60763); received from W. L. Schmitt.

Bahia de Guanavara; 1923; C. Fernetz; 1 female; returned to Buenos Aires Museum.

Saco São Francisco, Bahia de Guanavara; 1923; C. Fernetz; 1 ovigerous female; returned to Buenos Aires Museum.

São Francisco do Sul; October 5, 1925; W. L. Schmitt; 1 male (60760).

Brazil; 1 specimen (16422); received from W. H. Dall.

WEST AFRICA.—Gabon, French Congo; specimen in Paris Mus.

Genus PILUMNUS Leach

Pilumnus LEACH, Trans. Linn. Soc. London, vol. 11, 1815, pp. 309 and 321; type *P. hirtellus* (Linnaeus).

Acanthus LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 32; type, *A. spino-hirsutus* Lockington.

Eupilumnus KOSSMANN (not Kingsley), Zool. Ergeb. Reise Küstengeb. Rothen Meeres, Crust., 1877, p. 38; type, *E. actumnoides* (A. Milne Edwards).

Parapilumnus KOSSMANN, Zool. Ergeb. Reise Küstengeb. Rothen Meeres, Crust., 1877, p. 38; type, *P. cristimanus* (A. Milne Edwards).

Carapace and legs generally covered with hair. Carapace transversely oval or subquadrilateral, declivous anteriorly, flat posteriorly, not greatly broader than long; the regions, as a rule, but moderately plainly demarcated and areolated. Antero-lateral borders not longer, but commonly shorter than postero-lateral, and cut into teeth which are often spiniform. Front usually about a third the greatest breadth of carapace, but sometimes broader; cut into two lobes, the outer angle of each of which commonly forms an independent dentiform or spiniform lobule separated from the supra-orbital angle by a groove or notch. The orbits generally have a gap or fissure just below the outer angle, and one or two gaps or notches in the upper border; inner lower orbital angle commonly sharp and prominent. Eyes moderately long and slender. The antennules fold transversely. Basal antennal article short, either not quite touching the front or just touching it by its inner angle; the flagellum, which is planted in the orbital hiatus, is long, usually very much longer than the major diameter of orbit. Ridges of endostome, defining expiratory channels, plain, but not very high; anterior border of merus of external maxillipeds almost transverse and not notched. Chelipeds stout, the fingers coarse, short, and pointed. Legs usually stout and of moderate length. The abdomen of male consists of seven separate segments.

Found on the American coasts from North Carolina to Argentina and from San Pedro, California, to Peru. Also inhabits other tropical and warm temperate seas.

KEY TO THE AMERICAN SPECIES OF THE GENUS PILUMNUS

A¹. Margin of frontal lobes more or less convex.
- B¹. Antero-lateral spines or teeth four, or occasionally three, including the outer orbital one.
  - C¹. Ambulatory legs of moderate length, less than twice as long as carapace.
    - D¹. Palms hairy or partly hairy.
      - E¹. Major palm partly smooth and bare on outer surface.
        - F¹. Hair on carapace not covering the whole carapace or not forming so thick a coat as to conceal the surface beneath.
          - G¹. Two or more superhepatic spines. All long spines black or dark colored----------**sayi, p. 484.**
          - G². No superhepatic spines.
            - H¹. Major palm smooth on larger part of outer surface----------**dasypodus, p. 493.**
            - H². Major palm rough on larger part of outer surface.
              - J¹. Frontal lobes deep, margins arcuate. Orbit unarmed above----**quoyi, p. 510.**
              - J². Frontal lobes shallow.

K¹. Margins of carapace long spined.
L¹. Frontal lobes edged with 5 or more denticles or spinules. Lateral spines more or less compound---**caribaeus**, p. 491.
L². Frontal lobes edged with 3 spines. Lateral spines simple. **townsendi**, p. 504.
K². Lateral and orbital margins armed with spiniform teeth. Frontal margin spinulous----**depressus**, p. 506.
F². Hair covering the whole carapace and forming a thick coat concealing the surface beneath.
G¹. Chelipeds spinous above. A transverse row of long hairs across front-------**floridanus**, p. 507.
G². Chelipeds not spinous above. Carapace tuberculate.
H¹. Felt-like covering of carapace forming well defined areoles, deeply separated from one another. Half or less than half of outer surface of major palm bare and smooth. **holosericus**, p. 519.
H². Felt-like covering of carapace not forming well defined, deeply separated areolets.
J¹. Anterior half of carapace and upper surface of chelipeds dotted with bead-like tubercles. Upper margin of orbit furnished with truncate spines--**pannosus**, p. 514.
J². Tubercles of carapace not numerous nor prominent. Upper margin of orbit not spinous----------**lacteus**, p. 511.
E². Major palm with outer surface rough all over or nearly so.
F¹. Carapace covered with a dense pubescence in which are set small tubercles regularly placed.
G¹. Hairy covering short and trim. A small bare, smooth spot on major palm at base of immovable finger----------**limosus**, p. 518.
G². Hairy covering short; long tubular hairs interspersed, numerous on legs and chelipeds giving them a ragged appearance. Red bead tubercles showing on carapace, chelipeds and legs. **gemmatus**, p. 513.
F². Carapace pubescent and hairy but not so densely as to conceal the surface beneath.
G¹. Carapace and chelipeds spinous. Carapace narrow, about one-fourth wider than long; anterolateral margin short. Spines of carpus of ambulatory legs normal to the article. **diomedeae**, p. 501.
G². Carapace and chelipeds granulate, without spines. **pygmaeus**, p. 515.
D². Palms naked----------**nudimanus**, p. 523.
C². Ambulatory legs very long and slender, the longest ones twice as long as carapace.

D¹. Frontal lobes arcuate, finely denticulate.....**marshi**, p. 499.
D². Frontal lobes spinulous or spinous.....**gracilipes**, p. 499.
B². Antero-lateral spines or teeth five including the outer orbital one.
C¹. Outer surface of major palm partly smooth.
D¹. First two antero-lateral spines nearer together than the others, sometimes united at base. Margins of front and orbit long-spined.....**spinohirsutus**, p. 503.
D². First two antero-lateral spines small. Margin of front granulate, of orbit spinulous at most.....**miersii**, p. 510.
C². Outer surface of major palm everywhere rough with spines or granules.
D¹. Upper margin of orbit and margins of ambulatory legs unarmed.....**xantusii**, p. 486.
D². Upper margin of orbit spined, ambulatory legs spinulous. **gonzalensis**, p. 505.
E¹. Carapace largely flat. Front spined.
E². Carapace convex. Front granulate.....**longleyi**, p. 502.
A². Margin of frontal lobes distinctly oblique and concave, sometimes nearly straight.
B¹. Carapace one-half wider than long. A subhepatic tubercle present. Greater part of outer surface of major palm bare...**reticulatus**, p. 521.
C¹. Lateral teeth lobiform, flattened in a plane perpendicular to the dorsum.....**reticulatus**, typical, p. 522.
C². Lateral teeth with acute edge corresponding to marginal line of carapace.....**reticulatus forma tessellata**, p. 522.
C³. Some of the tubercles of carapace and chelipeds stalked and flattened above, mushroom-like.....**reticulatus forma fragosa**. p. 522.
B². Carapace narrower. Both palms rough outside.
C¹. Antero-lateral marginal spines small. No subhepatic tubercle or tooth.....**stimpsonii**, p. 524.
C². Marginal spines long; three at inner end of orbit curving over eyestalk. Subhepatic region covered with sharp granules. **spinosissimus**, p. 494.

ANALOGOUS SPECIES OF PILUMNUS ON OPPOSITE SIDES OF THE CONTINENT

Atlantic	Pacific
sayi	*xantusii*
longleyi	*spinohirsutus*
holosericus	*limosus*

PILUMNUS SAYI Rathbun

Plate 200, Figures 1 and 2; Plate 201, Figures 4–7

Cancer aculeatus SAY, Journ. Acad. Nat. Sci. Philadelphia, vol. 1, 1818, p. 449 (type-localities, Georgia and E. Florida; type not extant); not *C. aculeatus* O. Fabricius, 1780, nor Herbst, 1790.

Pilumnus aculeatus GUÉRIN-MÉNÉVILLE, Icon. Règne Anim. Cuvier, 1829 (?), pl. 3, figs. 2–2*c*.—MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 420.—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 282, pl. 50, fig. 1–1*c*.

Pilumnus sayi RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 15 (name *sayi* substituted for *aculeatus* preoccupied in *Cancer*).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 320.

Diagnosis.—Four lateral marginal spines, two superhepatic spines. Long spines of body and appendages black or dark brown, color

persisting. Outer surface of major palm of adult partly smooth and bare. Three spines or spinules on edge of each frontal lobe.

Description.—Carapace about three-fourths as long as wide, anterior half semicircular, strongly deflexed, posterior half with sides constricted. Dorsal surface with a thin coat of short downy hair interspersed with many long stout hairs with pointed tips; hair scanty on posterior third. When the hair is removed the fine granular hair sockets are revealed, forming a rough surface. On the hepatic region are two long curved dorsal spines with sometimes 1, 2, or 3 supplementary spines, and one long spine just below the lateral margin between the first and second marginal spines. The marginal spines are four in number, including the outer orbital spine. Orbit armed with 3 long spines above and 4 long and 2 or 3 short spines below, the short ones between the 2 outermost long ones. Front advanced; median sinus large, its sides converging, apex rounded; lobes bordered with three principal spines shorter than those described above; at outer angles of front a single long spine.

Chelipeds and legs clothed with long hairs similar to those on the carapace and also some short hairs. Chelipeds very unequal, the major palm of the adult male half again as high as the minor palm. Upper margin of merus armed with a few small blunt spines and at the end with two large curved spines, distal and subdistal. Carpus and dorsal aspect of manus of major palm armed with dark spines, those of the manus arranged more or less in longitudinal rows and becoming pointed tubercles lower down on the surface; the smooth area of the outer palm may exceed the spined area, from which it is separated by an oblique line, or it may be very much reduced as in smaller specimens and in females. In the minor palm the spines very nearly cover the outer face (entirely cover it in small specimens) and the conical tubercles outnumber the spines. Lower edge of palms obscurely tuberculate, convex in major palm, only slightly so in minor palm, lower edge of the whole propodus sinuous, fingers deflexed, tips curved upward; major finger a little longer than basal height. Movable fingers with a few conical spines and tubercles in 3 rows above near base. On the ambulatory legs the spines on the upper margin of the merus are small, slender, and approximate; those of the carpus and propodus are long and dark and disposed in two rows; horny tip of dactyl slender and dark.

Color.—Grayish brown irregularly suffused with red; spines mostly black, hairs yellow. (Hay and Shore.)

Measurements.—Male (12472), length of carapace including spine 21.8, width including spines 29, width excluding spines 25.5, fronto-orbital width 19, width of front including outer or antennal spines 8.8 mm.

Habitat.—Fairly common on shelly bottoms and not infrequently crawling over wharf piles. (Hay and Shore.)

Range.—North and South Carolina, west and southwest coast of Florida, Bahamas, Jamaica, Guadeloupe (A. Milne Edwards), Curaçao.

Material examined.—See table, pages 487–490.

PILUMNUS XANTUSII Stimpson

Plate 201, Figures 1–3

Pilumnus xantusii STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 213 [85] (type-locality, Cape St. Lucas; cotypes in Paris Mus. and M.C.Z., Cat. No. 1259).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 284, pl. 51, figs. 1–1*b*.

Diagnosis.—Five lateral marginal spines. Superior margin of orbit unarmed. Ambulatory legs without spines. Carapace less than a fifth wider than long.

Description.—Carapace narrow, moderately convex, anteriorly hairy but posteriorly short-pubescent like the abdomen. Gastric region and its principal lobules well circumscribed. Several very short spines on the hepatic and branchial regions toward the antero-lateral margin. Surface elsewhere either smooth or sparsely roughened with sharp grains. Front rather broad, arcuate, deeply incised at middle but without lateral incisions; margin armed with six or more small spines. Superior margin of orbit straight, ciliated, but not armed with spines; inferior margin spinulous and with two or three spines toward inner angle. Antero-lateral margin armed with five spines, regularly placed and nearly equidistant, but diminishing in size forward; the anterior one at external angle of orbit.

Merus of outer maxillipeds longer than usual in the genus, being nearly square, and less incised at the internal angle. Chelipeds short and thick; greater hand hairy above and externally and armed with spines; surface between the spines smooth and glabrous except toward the fingers where it becomes granulated, the spines disappearing or becoming tubercles; lower surface and inner side near fingers granulated. Fingers tuberculate at base. Ambulatory legs not spinous but clothed above with very stiff hairs.

Color.—Reddish; spines black; fingers black.

Measurements.—Male type, length of carapace 15.2 mm. (0.6 inch), width of same, spines excluded, 17.3 mm. (.68 inch). (Stimpson.) Length of largest male examined 11.7, width without spines 14, width of front 4.6 mm.

Range.—Cape St. Lucas, Lower California, Mexico. Known only from the type-locality.

Material examined.—Cape St. Lucas; John Xantus; 1 male, 1 female, cotypes (62737); cotypes (1259, M.C.Z.).

Material examined of Pilumnus sayi

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
North Carolina:	° ′ ″	° ′ ″			°F.						
Off Cape Hatteras	35 22 30	75 26 00	7	crs. gy. S		Oct. 20, 1884	2287	*Albatross*	1♂	7245	
Do	35 21 00	75 21 30	16	gy. S. brk. Sh		Oct. 19, 1884	2280	do	1 y ♀	60954	
Do	35 08 30	75 10 00	49	gy. S		Oct. 17, 1885	2596	do	1♀	18036	
Off Cape Lookout	Off Harker's Island, near Beaufort.							*Fish Hawk*	1 y ♀	51090	
Do	Bogue Sound					July —, 1912		W. P. Hay	2♂ 1 y	51383	Dredged.
Do	25 miles ESE. of Lookout Lightship.					July 28, 1915		*Fish Hawk*	1♂ 1♀	60183	
Do	Fishing grounds off Beaufort Harbor.	34 20 00 / 76 49 00	13.5	Co. S. Sh	80	Sept. 6, 1913	7943	do	4	51047	
Do	Fishing grounds off Beaufort Harbor.	34 17 00 / 76 56 00	16	Sh	79	Sept. 7, 1913	7951	do	1♂	51387	
Off Cape Fear	33 38 00	77 36 00	15	gy. S. brk. Co		Oct. 20, 1885	2622	*Albatross*	1♀	14393	
Do	33 38 00	77 36 00	15	gy. S. brk. Co		do	2623	do	1♂	18039	
Do	33 37 30	77 36 30	14	crs. yl. S. brk. Sh.		do	2617	do	1♂	18037	
Do	33 37 15	77 35 30	17	crs. yl. S. brk. Sh.		do	2618	do	1♂ 2♀	18038	
South Carolina: Near Port Royal.								*Fish Hawk*	1♀	18219	
Florida:											
West Florida								Henderson and Simpson.	1♂ 2♀	18035	
Do								J. W. Velie	1♀	23013	
Pensacola						1882		Silas Stearns	1	9269	
Do								do	2	9270	From fish stomach.
Off Carrabelle	Carrabelle Light, N. by W., 14⅔ miles.		10		60.2	Jan. 16, 1913	7810(24)	*Fish Hawk*	1♀	60182	In beam trawl.
Do	Carrabelle Light, NW. ½ N., 16 miles.		10.25		60.2	do	7809(23)	do	1♂ 1 y	60181	
					°C.						
Aucilla section	29 54 00	84 06 00	4.5	R. Co. Sh	14	Dec. 5, 1901	7191	do	1♀	60155	Soft shell.
Do	29 49 00	84 06 15	6	R. Co	15	do	7192	do	1♂	60156	
Do	29 48 10	83 55 15	5	S. Co	21	Nov. 6, 1901	7148	do	2♀	53737	
Do	29 44 09	84 06 30	7	R. Co	16.5	Dec. 5, 1901	7193	do	1♂ 1 y	53738	
Do	29 34 00	84 07 20	10.5	R. Co	17.6	do	7195	do	1♀	53739	
Pepperfish Key section.	29 33 05	83 28 03	2.25	S. Co	21.5	Nov. 5, 1901	7143	do	1♂	53726	
Do	29 32 10	83 29 50	3	sdy	21.8	do	7144	do	1♀	60147	
Do	29 19 30	83 46 00	10		18.3	Nov. 20, 1901	7158	do	1♂ 1 y	53727	

Material examined of Pilumnus sayi—Continued

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
Florida—Continued.	° ′ ″	° ′ ″			°F.						
Cedar Keys						Dec. —, 1883		H. Hemphill	1♀	18034	
Do						Mar. 27, 1926		Miller and Aschemeier.	1♂ 1 y ♀	60953	On flats at low tide.
Do						Feb. —, 1887		Lieut. J. F. Moser, U. S. N.	4♂ 1♀	12472	
Off Cedar Keys	Cedar Keys Light, N. ¾ E. 21¾ miles.		5.75	Co	63.45 °C.	Jan. 11, 1913	7807(21)	*Fish Hawk*	2♂ 2♀	60180	1 with Rhizocephalid.
Deadman's Bay section.	29 48 05	83 46 40	4	Co	19.5	Nov. 7, 1901	7150	do	1 y	60149	
Do	29 43 40	83 49 45	5.25	Co	20.5	do	7151	do	1♂	53712	
Do	29 39 30	83 53 10	7.5	S. Co	21.5	do	7152	do	1♂	53717	
Do	29 32 30	83 50 00	9	R. Co	16.6	Dec. 6, 1901	7201	do	1 y	60157	
Do	29 32 00	83 58 30	10.5	Co	22.5	Nov. 7, 1901	7154	do	1♂	53718	
Do	29 24 30	83 49 30	10	R. Co	17	Dec. 6, 1901	7202	do	1♂	60158	
Do	28 58 50	83 54 20	10	S. Co	22	Nov. 7, 1901	7155	do	1♂	60150	
			Feet								
Florida Banks	28 56 00	82 55 00	19			Apr. 3, 1887		Lieut. J. F. Moser, U. S. N.	1♀	13065	
Do	Off NW. end St. Martin's Reef. Near 28 50 00	83 00 00				1887		do	2♂ 3♀	13041	
			Fathoms								
North Key section	Sea Horse Key Light, E. ¼ N., 5. miles.		3.25	sdy. rky	14.5	Nov. 27, 1901	7180	*Fish Hawk*	1♂	60152	
Do	29 08 45	83 14 45	3	sdy	14.2	do	7179	do	1♀ immat	60151	
Do	29 05 00	83 22 30	5.5	sdy. rky. Co	15.5	do	7177	do	1♂ 1♀ 2 y	53719	
Do	29 00 00	83 18 45	5.75	rky. Co	15.3	Nov. 28, 1901	7182	do	1♂	53720	
Do	28 57 30	82 58 00	3	rky	15.5	Dec. 9, 1901	7207	do	2♂ 2♀	53721	
Do	28 55 00	83 28 10	10.5	R. Co	17	Nov. 28, 1901	7184	do	2♂	60153	
Do	28 52 45	83 07 00	5.75	rky	16.1	Dec. 9, 1901	7209	do	1♂	53722	
Do	28 47 45	83 28 00	11.5	R. Sh	17	Nov. 28, 1901	7186	do	1 y	60154	Soft shell.
St. Martin's section	28 41 00	83 15 15	8.5	rky	13.5	Jan. 17, 1902	7226	do	1♂	53725	
Do	28 35 30	83 02 30	3	sdy. grsy	12	Jan. 15, 1902	7222	do	1 y ♂ 2♀ immat.	60161	
Do	28 34 45	83 08 00	5.75	Co. R. G	12.5	do	7221	do	1♂	53724	
Do	28 33 30	83 19 00	9	sdy. grsy	13.6	do	7219	do	1 y	60160	
Do	28 27 15	83 19 00	10.5	rky. sdy	14	do	7218	do	2♂	53723	
Do	28 25 15	82 57 00	2.75	S. G	12	do	7213	do	1♀ immat	60159	

Anclote section	28 19 45	83 06 30	8.5	rky. G	13	Jan. 24, 1902	7240	do	1♂	53736	
Do	28 19 30	83 01 00	6.25	rky. G	12.5	do	7239	do	1♂ 1♀	53735	
Do	28 19 00	82 55 15	3	S. G	12	do	7238	do	1♂	53734	
Do	28 08 30	83 12 00	11	hrd. & G	14	Jan. 23, 1902	7232	do	1♂	60162	
Do	28 01 30	83 08 00	11	rky	13.5	do	7234	do	2♀ 1 y	53733	
Anclote Keys						Apr. 23, 1917		W. Topliff	1♂	57851	From Florida State Museum.
					°F.						
Off Anclote Keys	Anclote Light, E. ⅛ S., 14 miles.		8.5	Cc	63.95	Jan. 11, 1913	7806(20)	*Fish Hawk*	1 y ♀	60179	
Off Port Tampa			4	M		Jan. 29, 1898		do	1♀	26180	
Do						Jan. 25, 1898		do	2♂	26112	
Tampa Bay			5–6.5			Mar. 29, 1901 Apr. 1, 1901	7109 7117 7121	do	3♂ 6♀ 3 y	25629	
Pass a Grille						Feb. 12, 1922		Joseph Lee	1♀	55570	
Keys of Sarasota								Mrs. E. A. Reed	1♂	60184	
Off Sarasota Bay	Longboat Inlet, ENE., 4½ miles.			S. brk. Sh		Jan. 5, 1913	7802(16)	*Fish Hawk*	2♂ 1♀	60178	
Do	Sarasota Pt., NE. by E., 9¼ miles.			rf. Co	65	do	7801(15)	do	2 y	60177	One in sponge.
Off Charlotte Harbor.	Gasparilla Light, E. by S., 6¼ miles.		7	hrd. S. brk. Sh.		Jan. 4, 1913	7799(13)	do	2 y ♀	60175	
Do	Gasparilla Light, SE. by E., 6½ miles.			hrd. S. brk. Sh.		do	7800(14)	do	1♂	60176	
Do	26 35 00	83 11 00	27.5	sdy	66	Apr. 2, 1901	7122	do	2♂ 2♀	25628	
Do	26 33 00	83 10 00	28	sdy	66	do	7123	do	1♂ 6♀	25627	
					°C.						
Off Sanibel Islands	Bell buoy off Sanibel Island Light, NE., 10-2½ miles.		4.75	Sh. wh. M		Jan. 1, 1913	7795(9)	do	2♂	60172 60173	
Do	do					do	7795(9) Haul 2.	do	1♀	60171	
Marco			(1)			May —, 1884		H. Hemphill	3♂ 4♀	6952	
Caxambas						1919		George Mott	1♀	53403	
			Feet								
Cape Romano, 2 miles W. of.			15–18					Lieut. J. F. Moser, U. S. Navy.	1♂	13053	
			Fathoms								
Off Cape Sable	25 10 10	81 28 30	4.75	gy. S. Sh	23.5	Dec. 17, 1902	7354	*Fish Hawk*	1♀	60164	
Do	25 09 45	81 18 35	3.25	rky. Co	23.5	do	7351	do	3♂ 1♀	53729	
Do	25 09 37	81 15 15	2.5	rky. Co	23.5	do	7350	do	1♂ 2♀	53731	
Do	25 07 10	81 29 00	5	rky. Co	23	Dec. 18, 1902	7361	do	2♂	53728	
Do	25 06 52	81 22 25	4.25	S. brk. Sh	23	do	7359	do	1♀	60166	
			Feet								
Do	25 06 30	81 12 25	11.5	rky	22	do	7356	do	1♀	60165	

[1] Outside beach to 3 fathoms.

Material examined of Pilumnus sayi—Continued

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
Florida—Continued.	° ′ ″	° ′ ″			°C.						
Off Cape Sable	25 01 00	81 25 30	4.5	Sp. S. Sh.	23	Dec. 19, 1902	7373	*Fish Hawk*	2♀	60168	
Do	25 00 40	81 15 37	2.5	rky.	22.5	do	7370	do	1♀	53732	
Do	24 58 05	81 28 30	5	rky.	22	do	7375	do	3♂ 1♀	53730	
Do	E. end Sawyer Key, S. ¼ W., 2¼ miles.		4.75	rky.	22.5	Dec. 22, 1902	7390	do	3♂ 1 juv.	60169	
Off Northwest Channel.	24 42 30	81 55 52	7.25	Co.	20	Feb. 24, 1902	7293	do	2 y.	60163	
Do	24 38 40	81 56 28	5.25	Co.	19.5	do	7295	do	1 y ♀	53753	
Do	5 miles off breakwater		6					J. B. Henderson	1♂ 1♀	53751	
			Feet								
Hawk Channel	3½ miles N. ¾ E. of Sombrero Light.		11.5	rky.	24.5	Jan. 27, 1903	7427	*Fish Hawk*	1♀	60170	Shedding. Identification uncertain.
Tortugas			(1)			1893		Biol. Exped. to Florida Keys and Bahamas.	1♂	Mus. S.U.I.	
Tortugas, outer lighthouse reef.	Stomach of fish No. 167, yellow grunt, *Haemulon sciurus* (Shaw).					June 7, 1925		W. L. Schmitt	1 cheliped	60957	Gift of Carnegie Institution. Fish taken by dynamiting.
Tortugas, off north end of Loggerhead Key.	Stomach of fish No. 31, schoolmaster, *Neomaenis apodus* (Walbaum).					do		do	1♀	60956	Gift of Carnegie Institution. Fish taken by dynamiting. With Rhizocephalid parasite.
Tortugas, outer lighthouse reef.	Stomach of fish No. 137, yellow grunt, *Haemulon sciurus* (Shaw).					do		do	1 cheliped	61129	Gift of Carnegie Institution.
Bahamas: Egg Island						May 13, 1893		Biol. Exped. to Florida Keys and Bahamas.	1♂	Mus. S.U.I.	

[1] Dredged.

PILUMNUS CARIBAEUS Desbonne and Schramm

Plate 200, Figures 3 and 4

Pilumnus caribaeus DESBONNE and SCHRAMM, Crust. Guadeloupe, 1867, p. 32 (type-locality, Guadeloupe; type not extant).—STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 141.—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 284.

Pilumnus ? aculeatus VON MARTENS [not Say], Arch. f. Naturg., vol. 22, pt. 1, 1856, p. 91.

Pilumnus brasiliensis MIERS, *Challenger* Rept., vol. 17, 1886, p. 151, pl. 13, figs. 2–2*d* (type-locality, near Bahia, 7 to 20 fathoms; type in Brit. Mus.).—RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, part 2 (1901), p. 40.

Diagnosis.—Secondary spines or spinules on lateral margin. Spines light horn color. Superhepatic spines wanting. Five or more denticles or spinules on edge of each frontal lobe.

Description.—Closely related to *P. sayi;* differs as follows: Fronto-orbital distance greater. The hairy coating is softer and evenly distributed on the dorsum, the long hairs slenderer than in *sayi.* The larger spines of body and appendages are light horn color. No superhepatic spines, subhepatic spine not large, marginal spines, one or more, have a small secondary spine on the posterior slope. Orbital spines numerous (7 or 8 above, 9 or 10 below), unequal but none large. Median sinus of front U-shaped or somewhat buttonholed, lobes edged with five or more small spines or acute denticles.

The outer surface of the manus in both chelipeds is rough but the hair on the major manus is confined to the dorsal aspect or upper proximal half while the lower distal half is naked. The spines on the carpus and in the upper 3 or 4 rows of the manus are long, narrow and curved, the spines of the manus become, from the upper rows downward, gradually shorter, stouter and more conical until the lower ones are pointed tubercles. The lower part of the outer surface of the major manus may be smooth. The tuberculation of the lower margin is more pronounced than in *sayi.* On the whole the spination of the chelipeds is coarser than in *sayi.* The lower margin of the major propodus is convex below instead of sinuous. Ambulatory legs and horny tips of their dactyls shorter than in *sayi.*

Measurements.—Female (31082), length of carapace including spine 17.3, width including spines 23, width excluding spines 21.6 fronto-orbital width 16.6, width of front including outer or antennal spine 7.5 mm.

Color.—Reddish with some spots of a dirty white, fingers black (Desbonne and Schramm).

Range.—From Bahamas and Florida Keys to Brazil.

Material examined.—

BAHAMAS.—1903; B. A. Bean; received from Geographic Society of Baltimore: Off Governor's Harbor; in oyster dredge; July 7; 1 male, 7 females (31046). Off Green Cay; in oyster dredge; June 30; 1 male, 3 females, 3 young (31082).

1893; Biological Expedition, State University of Iowa: Egg Island; 1 female (Mus. S.U.I.). Bahama Banks, from millepores; May 12; 1 male (Mus. S.U.I.). Bahama Banks; May 15; 1 female (20022), 1 female (Mus. S.U.I.).

CUBA.—1914; Henderson and Bartsch, *Tomas Barrera* Expedition: Punta Colorado; 2–3 fathoms; Sh. Grs.; station 10; 1 female (48554). Bahia Honda; 2–12 fathoms; M. Co.; June 4; station 15; 1 male (48542).

JAMAICA.—T. H. Morgan; 1 small female (17214); identification uncertain. March 1–11, 1884; *Albatross;* 2 males (19887). P. W. Jarvis; 1 male (19403). C. R. Orcutt; 1 female (62553). Kingston Harbor: 1893, R. P. Bigelow, 1 female (19890); May–July, 1896, F. S. Conant, 2 males, 1 female (19596). Kingston; C. R. Orcutt; 1 male (62552).

VIEQUES.—Off Vieques Island; February 8, 1899; *Fish Hawk:* Point Mula Lighthouse, S. SW. ⅜ W., 5¾ miles; 14 fathoms; Co. S.; temperature 25.6° C.; station 6085; 2 small males (24355). Culebritas Lighthouse, NE. ½ N., 10 miles; 15 fathoms; Co.; temperature 26° C.; station 6091; 1 small male, 2 young (24357). Culebritas Lighthouse, NE. ⅜ E., 7¼ miles; 16 fathoms; Co.; temperature 25.2° C.; station 6092; 1 young (24358). Point Mula Lighthouse, E. ½ N., 11¼ miles; 6 fathoms; Co.; temperature 27.3° C.; station 6096; 1 small male (24359).

CULEBRA.—Off Culebra Island; Point Mula Lighthouse, SW. ½ S., 8½ miles; 14¾ fathoms; Co. S.; temperature 25.5° C.; February 8, 1899; station 6086, *Fish Hawk;* 2 small females, 1 young (24356).

VIRGIN ISLANDS.—St. Thomas; January 17–24, 1884; *Albatross;* 1 male, 2 females (19888).

1915; C. R. Shoemaker collector; gift of Carnegie Institution: Between Water Island and St. Thomas; 2–5 fathoms; June 28; 1 young female (60206). South side of Buck Island, 3 miles from St. Thomas; from fish pot; July 6; 1 male, soft shell (60207). South of Buck Island, about 3 miles from St. Thomas; from fish pot; July 8; 1 female (53752).

CURAÇAO.—February 10–18; 1884; *Albatross;* 1 ovigerous female (18040), carapace 6.7 mm. wide; identification uncertain.

BRAZIL.—Bay of Bahia; specimens in Copenhagen Mus.

Copacabana, Rio de Janeiro; in *Sargassum bacciferum*, carried to shore by waves; January, 1922; Carlos Moreira; 1 young (60935).

Ilha São Sebastião, State of São Paulo: 1900; E. Garbe collector; 1 female (returned to Mus. Paulista).

Villa Bella; October, 1925; H. Luederwaldt collector; 1 male, 1 ovigerous female (60933); received from W. L. Schmitt.

PILUMNUS DASYPODUS Kingsley

Plate 200, Figures 5 and 6

Pilumnus dasypodus KINGSLEY, Proc. Boston Soc. Nat. Hist., vol. 20, 1879, p. 155 (type-locality, Key West, Florida; type not located.—RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2, 1901, p. 40.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 320.

Pilumn us vinaceus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 283, pl. 50 figs. 2–2*b* (type-locality, Florida Reefs; type, Cat. No. 3049, M.C.Z.).

Diagnosis.—Margins spinous. No superhepatic spines. Outer surface of major palm of both sexes largely smooth and bare; spines and tubercles of upper part not arranged in rows.

Description.—Carapace thinly covered on its anterior two-thirds with long fine hair and occasional stouter setae interspersed; upper part of chelipeds and surface of legs similarly clothed. Under the hair the carapace is roughened by granular hair sockets and on the antero-lateral region by sharp granules. Frontal lobes with slightly arched and oblique margins furnished with very short spines or sharp granules and separated from each other by a median V notch and from the small, inconspicuous, single-spined, outer tooth by a wider U-shaped sinus. Orbital border strongly spined, about seven spines below and three or four above with sharp granules toward inner supraorbital tooth; the strongest spine is at the outer angle where it forms the smallest of the four spines arming the antero-lateral margin. They have conical bases and long, slender, incurved, horny extremities. A short subhepatic spine.

Chelipeds very unequal, spinous and granulate except lower-distal two-thirds (about) of outer surface of major palm which is smooth and naked in both sexes. The movable fingers have at base rows of sharp granules and slender hairs. Fingers of minor chela grooved on the outside, of major chela evenly rounded without grooves. Legs spinous above.

Color.—Body and claws brownish wine color, legs much lighter; fingers and extremities of spines brown. (A. Milne Edwards.)

Measurements.—Male (50535), entire length of carapace 10.7, entire width 15, fronto-orbital width 10.4, width of front 4.4 mm.

Affinity.—Small specimens of *dasypodus* are sometimes not easily distinguished from *sayi*. *P. dasypodus* is less heavily clothed with hair than *sayi* and less ragged looking. The front is more deflexed and less advanced, therefore appears wider. The spines and tubercles of the major palm in *sayi* are arranged more or less in rows and these rows have a tendency to encroach on the lower distal half; in *dasypodus* there are seldom any definite rows and the lower distal two-thirds or one-half in both sexes is smooth and bare. The immovable finger of the major chela in *dasypodus* is a little longer than in *sayi*.

Range.—North and South Carolina. From Gulf of Mexico to Florianopolis [Desterro], Brazil. Shallow water to 11 fathoms. A. Milne Edwards records *vinaceus* from 37 fathoms in the Gulf of Mexico.

Material examined.—See table, pages 495–498.

PILUMNUS SPINOSISSIMUS Rathbun

Plate 200, Figures 7 and 8

Pilumnus spinosissimus RATHBUN, Bull. Labor. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 265, pl. 5, fig. 3 (type-locality, off Key West, 5¼ fathoms; type in Mus. State Univ. Iowa).

Diagnosis.—Long-hairy. Frontal lobes oblique. Three innermost orbital spines curving over eyestalk. Four long antero-lateral spines. Palms short and high.

Description.—Carapace anteriorly strongly deflexed, front half covered with spiniform granules and rather sparse long hairs; posterior

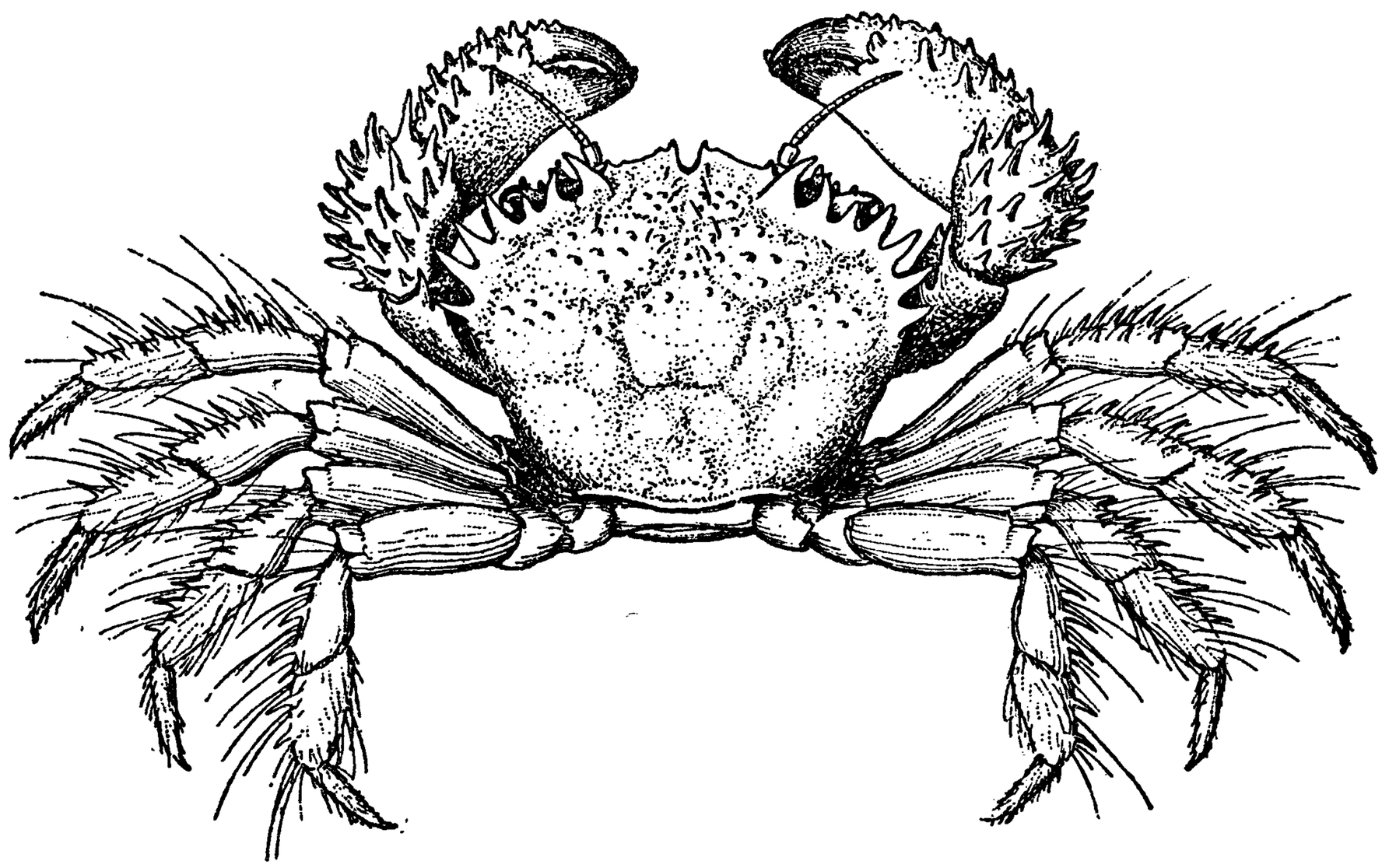


FIGURE 79.—PILUMNUS SPINOSISSIMUS, MALE, TYPE, DORSAL VIEW, × 3

half almost smooth; regions deeply limited. Front bilobed; lobes separated by a broad U-shaped sinus; each lobe has an oblique margin armed at inner end with a short spine and a few minute spinules; at outer end of front a small isolated or antennal spine. Superior orbital margin armed with four long spines, two innermost curving over the orbit but in planes at right angles to each other; inferior margin armed with a large inner process with bispinose tip and two shorter spines between which there is a row of stout spinules. Lateral margin of carapace with three long spines beside orbital spine; posterior spine a little shorter.

Chelipeds: Two long curved spines at distal end of upper margin of arm; wrist armed with about 20 sharp spines directed distad. Approximately two-thirds of outer surface of larger hand of male covered with about seven irregular rows of spines, larger above,

Material examined of Pilumnus dasypodus

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
North Carolina:	° ′ ″	° ′ ″			°C.						
Off Cape Hatteras	35 21 00	75 21 30	16	gy. S. brk. Sh		Oct. 19, 1884	2280	*Albatross*	1 y. ♀ 2 y.	20054	
Beaufort Harbor, off laboratory.					24	May 6, 1915	8261	*Fish Hawk*	2 y. ♀	60937	
Off Beaufort Harbor.	Fishing grounds NE. from can buoy, 1 mile.		15.5	Smooth		Aug. 12, 1914	8217	do	1♂	51076	
South Carolina: 15 miles southeast of Charleston.				Taken from piece of coral.		Mar. 23, 1880		R. E. Earll	1♀	5063	
Florida:					°F.						
Off Carrabelle	Carrabelle Light, NW. ½ N., 16 miles.		10.25		60.2	Jan. 16, 1913	7809 (23)	*Fish Hawk*	1♂	60195	
					°C.						
Aucilla Section	29 54 00	84 06 00	4.5	R. Co. Sh	14	Dec. 5, 1901	7191	do	1♂	60188	
Do	29 48 10	83 55 15	5	S. Co	21	Nov. 6, 1901	7148	do	1♂	60148	In sponge.
Do	29 52 10	83 51 47	3	S. Co	20	do	7147	do	1♀	60185	
Pepperfish Key Section.	29 18 00	83 37 00	8	rky	18	Nov. 21, 1901	7161	do	1♂	60187	
Do	29 21 00	83 32 00	6.75	rky	16.7	do	7160	do	1♂	60186	
Anclote section	28 01 30	83 08 00	11	rky	13.5	Jan. 23, 1902	7234	do	1♂	60189	
					°F						
Do	Anclote Light, E. ⅛ S., 14 miles.		8.5	Co	63.95	Jan. 11, 1913	7806 (20)	do	1♂	60194	
Tampa Bay								J. S. Raymond	2♂	60198	From palmetto borings by *Teredo*.
Mullett Key									1♂ 1♀	60197	
Goodland Point								H. Hemphill	1♀	18030	
Off Boca Grande	Boca Grande Light, NNE ⅜ E., 24½ miles, to NE. ¼ N., 20 miles.		12.5		68.5	Jan. 2, 1913	7796 (10)		1♂ 2♀	60174	
Sarasota Bay								H. E. Webster	1♀	56846	From Boston Society of Natural History.
Off Sanibel Island	Bell buoy off Sanibel Id. Light, NE. 10-2½ miles.		4.75	Sh. wh. M		Jan. 1, 1913	7795 (9)	*Fish Hawk*	1♂ 1♀	60193	
Marco			1-3			May —, 1884		H. Hemphill	50+	6976	

Material examined of Pilumnus dasypodus—Continued

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
Florida—Continued.	° ′ ″	° ′ ″	*Feet*		°*C*						
Off Cape Romano	2 miles W. of Cape Romano.		15–18					Lieut. J. F. Moser, U. S. Navy.	1♀	18029	
Do	4 miles E. of Cape Romano.		18			Apr. 18, 1887		do	1 y	13060	
			Fathoms								
Off Cape Sable	25 00 55	81 22 15	4	rky	22	Dec. 19, 1902	7372	*Fish Hawk*	1♂ 1♀	60191	
Do	24 58 05	81 28 30	5	rky	22	do	7375	do	1♂	60192	
Do	25 00 40	81 15 37	2.5	rky	22.5	do	7370	do	1♂ 1♀	60190	
			Feet								
Do	25 00 30	81 12 20	11.5	rky	22	do	7369		1♂ 1♀	60167	
Key West						1885		H. Hemphill	2♂ 1♀	14443	
West of Tortugas	24 44 00	83 26 00	37			1877–78	10	U.S.C.S.S. *Blake*	2♂	3049, M.C.Z.	Cotypes of *P. vinaceus*.
Eastern Dry Rocks								Edward Palmer	2♀ 2 y	18027	
Cape Florida								do	2♂ 1♀	18028	
Cuba:			*Fathoms*								
Cabañas			2–12	S. Sh. grass to M.		June 8, 1914; June 9, 1914	16	Henderson and Bartsch.	1♂ 2♀ ovig	48543	
Havana									2	Copenhagen Mus.	
Guantanamo Bay								Henderson and Bartsch.	27	50535	1 with Rhizocephalid.
Jamaica:											
Kingston Harbor								P. W. Jarvis	1♂	19676	
Jamaica						1884		*Albatross*	2♂ 2♀ 1 y	18026	
Do						1910		E. A. Andrews	2 y	43058	
Bogue Islands						June 15, 1910		C. B. Wilson	1♀	43057	
Montego Bay						July 15, 1910		do	1♀	43059	
Porto Rico:											
Mayaguez						Jan. 20, 1899		*Fish Hawk*	1♀	24360	
Do						Jan. 21, 1899		do	1♂ 2♀ 1 y	24361	On corals.
Boqueron Bay						Jan. 25, 1899		do	1 y	24362	
Boqueron						do		do	2♀	24363	
Porto Real						Jan. 27, 1899		do	1♂ 2♀ 1 y	24364	

Reefs at Ponce						Jan. 30, 1899		do	3 y	24365	
Playa de Ponce Reef.						Feb. 1, 1899		do	4♂ 5♀	24366	
Porto Rico						1899		do	2♂ 5♀ 1 y	24369	
Culebra:											
Ensenada Honda						Feb. 9, 1899; Feb. 11, 1899		do	1♂ 1♀	24367	
Culebra						Feb. 8, 1899		do	1♀	24368	
St. Thomas:											
St. Thomas						Jan. 17, 1884 to Jan. 24, 1884		*Albatross*	4♂ 3♀	18516	1 with Rhizocephalid.
Do						do		do	2 y	18041	
Do				From piles near town.		July 7, 1915		C. R. Shoemaker	1♂ 4♀ (2 ovig.) 1 y.	60199	From Carnegie Institution.
St. Thomas Harbor				From bottom of small boat.		July 10, 1915		do	6♂ 7♀ (3 ovig.) 4 y.	60201	Do.
Gregerie Bay			0.5–2.75	Co. R. S. seaweed		July 7, 1915	7	do	12♂ 16♀ (1 ovig.)	60200	Do. 1 with Rhizocephalid.
Mosquito Bay			2	wh. S. Co		July 21, 1915	12	do	1♀	60202	With 2 Rhizocephalids. From Carnegie Institution.
Virgin Islands				From piles		1915		do	9♂ 11♀ (2 ovig.) 6 y.	60203	Do.
St. John									3	Copenhagen Mus.	
Martinique									1	Paris Mus	
Curaçao						Feb. 10, 1884 to Feb. 18, 1884		*Albatross*	1♂ 2♀	18523	
Caracas Bay						Apr. 19, 1920		C. J. van der Horst.	1♀	56899	With Rhizocephalid parasite.
Spanish Water				Mangrove roots		Apr. 8, 1920		do	1♀ ovig	56897	
Do						May 18, 1920		do	1♂	56898	
Brazil:											
Pernambuco (probably).						1876–77		R. Rathbun	1♀	19892	Hartt Explorations.
Pernambuco stone reef at Ilha de Nogueira.						July 10, 1899		A. W. Greeley	3♀	25727	Branner-Agassiz Expedition.
Stone reef at Boa Viagem, Pernambuco.						July 6, 1899		do	3♂ 1♀	25728	Do.
Coral reef, Maceio, Alagoas.						1899		do	1♂ 1♀	Stanford Univ.	Do.
Brazil						1899		do	1♂	25729	Do.

Material examined of Pilumnus dasypodus—Continued

Locality	Bearings		Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	Latitude N.	Longitude W.									
	° ′ ″	° ′ ″									
Brazil—Continued. Bom Fim, Bahia, stone reef.						1876–77		R. Rathbun	1♂ 1♀ ovig.	40824	Hartt Explorations. Atypical. Spines unusually developed, especially those bordering the orbit.
Rio de Janeiro						Aug. 24, 1925		U.S.C.S.S. *Hassler*.	1 sm	M. C. Z.	
Pedras da Itapuca, Bay of Rio de Janeiro.								W. L. Schmitt	2 y	60936	
Desterro [Florianopolis.]									1	Paris Mus.	

diminishing lower down on the article; outer surface of smaller hand covered with spines. In the female the major as well as the minor palm also is covered outside with spines and tubercles. Dactyli spinulous on proximal half or two-thirds. Fingers deeply grooved outside. Legs long-hairy; merus spinulous above; carpus and propodus armed with long spines; dactyli thick and with a long horny tip.

Measurements.—Male holotype, length of carapace 8.3, width of same including spines 11.6, excluding spines 10.5 mm. Female (22268), length of carapace including spine 10.8, width of same including spines 15, excluding spines 14, fronto-orbital width 11.8, width of front including antennal spine 5.2 mm.

Range.—Florida Keys.

Material examined.—

Off Biscayne Key; 16–34 feet; May 29, 1912; Paul Bartsch; 1 male (60222).

Duck Key, N., 1.25 miles; 2.75 fathoms; Co. Sh.; December 20, 1912; station 7790 (4), *Fish Hawk;* 1 male (60221).

Key West; 1896; B. W. Evermann, U. S. Fish Commission; 1 female (22268).

Off Key West; about one mile from Light; 5¼ fathoms; June 26, 1893; station 44, Biological Expedition, State University of Iowa; 1 male holotype (Mus. S. U. I.).

Tortugas; from stomachs of fish obtained by dynamiting; 1925; W. L. Schmitt; gift of Carnegie Institution: Fish No. 137, yellow grunt, *Haemulon sciurus* (Shaw), on outer Lighthouse reef; June 7;

1 immovable finger (60959). Fish No. 179, schoolmaster, *Neomaenis apodus* (Walbaum), off N. end of Loggerhead Key; June 9; 2 chelipeds (60961). Fish No. 246, common grunt, *Haemulon plumieri* (Lacépède), off N. end of Loggerhead Key; June 9; 1 cheliped (60960). Fish No. 622, sailors choice, *Haemulon parra* (Desmarest); June 23; 1 chela (60958).

Tortugas: S. end of Loggerhead Key; from large rock 2 feet by 18 inches by 18 inches; August 10, 1924; W. H. Longley; 1 young male (62557); gift of Carnegie Institution.

PILUMNUS GRACILIPES A. Milne Edwards

Plate 201, Figures 8 and 9

Pilumnus gracilipes A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 288, pl. 50, figs. 3, 3*a* (type-locality, off Barbados, 100 fathoms; type in Museum of Comparative Zoölogy).

Diagnosis.—Carapace narrow, subquadrilateral, short-hairy. A spine at middle of upper margin of orbit. Legs very long and slender.

Description.—Carapace thicker and more quadrilateral than usual in *Pilumnus*, covered with pubescence and short, stiff bristles which are yellow with dark reddish-brown tips (in spirit) and are so scattered as not to conceal details of carapace. Regions not deeply outlined, surface without granulations and spines, but a little rugose from the punctæ in which the hairs are inserted. Front wide, lobes spinulous, little arched forward. Inner superior angle of orbit with two spines. Upper border of orbit with a curved spine at middle and 3 or 4 spiniform granules between it and the postorbital spine; lower border armed with about four spines and terminated by a bispinose inner angle. Some spiniform tubercles and numerous granules on subhepatic and pterygostomian regions. Antero-lateral margin short, armed with four spines including that at the orbital angle.

Chelipeds unknown. Ambulatory legs extraordinarily long and slender, margins sparsely hairy; merus, carpus and propodus armed above with a row of rather long, slender spines; dactyl remarkably long.

Measurements.—Female holotype, ovigerous, length of carapace 16, width of same 20 mm.

Range.—Barbados, 100 fathoms. Known only from the unique type-specimen.

Material examined.—Off Sandy Bay, Barbados; 100 fathoms; 1871; U. S. Coast Survey Steamer *Hassler;* 1 female holotype (2974, M. C. Z.).

PILUMNUS MARSHI Rathbun

Pilumnus marshi RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2, 1901, p. 41, text-fig. 8 (type-locality, off St. Thomas, 20–23 fathoms; type, Cat. No. 23771, U.S.N.M.).

Diagnosis.—Subquadrate; antero-lateral margin short, three-spined. Outer surface of both palms rough and hairy all over. Legs long and narrow.

Description.—Carapace narrow, relatively broad behind, postero-lateral margins slightly convergent and twice as long as the antero-lateral. Surface pubescent, with longer, very fine hairs interspersed; a few short spinules scattered on antero-lateral region. Front with a median V-notch, two subtruncate or slightly arcuate lobes with finely denticulate edge, separated by a U-shaped sinus from the isolated outer spine. Orbital margin finely denticulate and with a few separated spinules above and several at the inner end below. Eyes large, reniform. Antero-lateral margin with three spines, none at orbital angle, first two spines long, slender, attached to broad bases, third spine slender but much smaller and rather closely appressed to side of carapace.

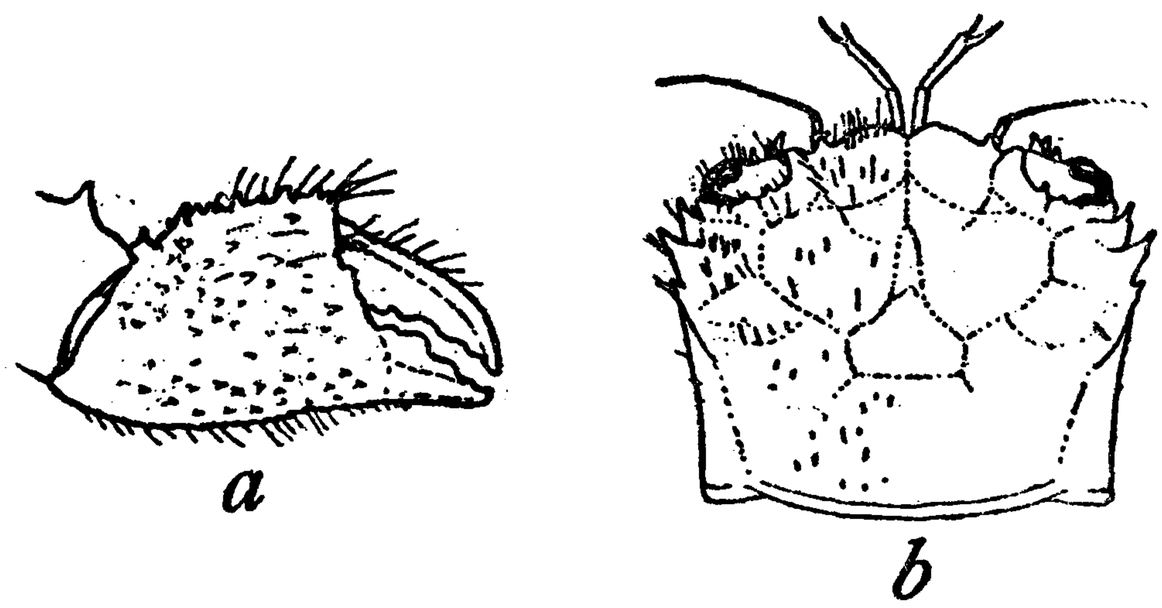


FIGURE 80.—PILUMNUS MARSHI, MALE, ×4. *a*. MAJOR CHELA. *b*. CARAPACE

Chelipeds and legs thinly clothed with long hair. Margins of merus and dorsal aspect of carpus and propodus of cheliped spinous. Chelae similar and not very unequal; their spines become progressively smaller on outer surface of palms until below they are sharp granules. Merus of ambulatory legs dilated, armed above, also carpus and propodus with a row of slender curved spines, below minutely spinulous; three terminal articles long and narrow, the dactylus nearly straight down to the curved horny tip.

Color.—In alcohol the spines are white, fingers light horn color, tips white.

Measurements.—Male holotype, length of carapace 5.5, width of same 7, fronto-orbital width 6.2, width of front 2.8 mm. Female (24242), length of carapace 5.7, width of same 7.1 mm.

Range.—Tortugas, Florida, and off St. Thomas, Virgin Islands.

Material examined.—White Shoals, Tortugas, Florida; July 19, 1924; station 25; W. L. Schmitt; 1 male (60822); gift of Carnegie Institution.

Off St. Thomas; February 6, 1899; *Fish Hawk:* Sail Rock, NW. ½ W., 4 miles; 20 fathoms; Co.; temperature 25° C., station 6080; 1 female (24242). Sail Rock, W. by N. ½ N., 6 miles; 20–23 fathoms; Co.; temperature 25.8° C.; station 6079; 1 immature male (23771).

PILUMNUS DIOMEDEAE Rathbun

Plate 202, Figures 2 and 3

Pilumnus diomedeae RATHBUN, Proc. U. S. Nat. Mus., vol. 17, p. 3, advance sheet, March 20, 1894; p. 85, July, 1894 (type-locality, off Havana, 184 fathoms; type, Cat. No. 9526, U.S.N.M.).

Diagnosis.—Four long spines on each lobe of front. Carapace very rough. Hairs extremely long. Spines of carpus and propodus of ambulatory legs normal to the article.

Description.—Carapace of moderate width. Surface very rough with acute granules or hair sockets; some and perhaps all of the hairs long, yellow. Front with two produced oblique lobes each bearing four slender spines; a longer incurved spine near antenna. Orbital spines 9: 2 on the upper margin, one at the outer angle and 6 below; of the 2 upper, one is next the antennal spine, the other at middle of orbit; of the suborbital spines the two outermost are separated by a deep narrow sinus, the two innermost are more advanced. There are four strong antero-lateral spines including the orbital; between the first and second there is a small supernumerary spine; the second spine has an accessory spinule. Subhepatic and pterygostomian regions spinulous; two small spines form a longitudinal line on the process which bears the two spines at inner angle of orbit.

Chelipeds unequal, spinous, long-hairy like the carapace. Merus with surface minutely spinulous, margins spinous, upper margin with two huge spines at distal end. Carpus with outer surface spinous and spinulous, an unusually long and strong spine at inner angle. Manus with two rows of four slender spines on upper surface, lower margin spinulous, spines of outer surface arranged in four or five longitudinal rows, inner surface minutely granulous. Fingers spinulous and hairy proximally, horn-colored, teeth and tips almost white. Ambulatory legs very long, slender, long-hairy like carapace and chelipeds; margins of merus and upper margin of carpus and propodus armed with slender spines, those on carpus and propodus nearly normal to the article.

Measurements.—Female holotype, width of carapace including spines 16, excluding spines 15, width of front including antennal spine 6, length of longest hairs about 6, length of inner spine of carpus of cheliped 2.5 mm.

Range.—Entrance to Gulf of Mexico, 130 to 184 fathoms.

Material examined.—

Off Havana, Cuba; lat. 23° 10′ 40″ N.; long. 82° 20′ 15″ W.; 184 fathoms; fne. gy. wh. Co.; January 20, 1885; station 2345, *Albatross;* 1 female, holotype (9526); hinder portion missing.

Yucatan Channel, Mexico; lat. 20° 59′ 30″ N.; long. 86° 23′ 45″ W.; 130 fathoms; Co.; January 22, 1885; station 2354, *Albatross;* 1 female, soft shell (18158).

PILUMNUS LONGLEYI, new species

Plate 202, Figures 4 and 5

Type-locality.—South end of Loggerhead Key, Tortugas, Florida; Aug. 10, 1924; W. H. Longley; one female (Cat. No. 62569); gift of Carnegie Institution.

Diagnosis.—Five antero-lateral spines of which the third is double. Hepatic region spinous. Manus of both chelipeds rough and hairy outside.

Description.—Carapace covered with uneven hairs which are shorter on the posterior half; underneath the hairs the surface is rough with pointed granules, which also border the front. Hepatic region armed above with several spines two of which are longer and with dark tips. Regions deeply marked. Anterior and antero-lateral margins together arcuate. Frontal lobes convex, bordered with 8 or more granules some of which may be acute, but no spines; lobes separated from each other and from the outer spine by a broad V. Orbital margin spinous, spines unequal. Antero-lateral margin 5-spined; first two spines shorter, slenderer and nearer together than the others; third spine bispinose; fourth and fifth longest; terminal half of spines light brown. Subhepatic region granulate and with one spine.

Chelipeds and legs long-hairy. Chelipeds massive, very unequal; two spines on upper margin of merus; carpus and upper part of manus armed with stout spines; outer surface of manus covered with acute or subacute tubercles. Major fixed finger short and broad, prehensile edge with two large teeth above the point, followed by two smaller ones; teeth of dactylus low, 5 or 6 in all, the 2 proximal ones united and enlarged, the fourth may be equally large. Three longitudinal rows of granules on upper surface of dactylus in basal third. Fingers of minor cheliped slenderer, the fixed finger longer. Merus of ambulatory legs 1 to 3 armed with a row of spines above, carpus with three rows, propodus with two rows. Last leg with a spine at distal end of merus; carpus and propodus with a row of spines above and an incomplete row on outer surface.

Measurements.—Female (62569), total length of carapace 11.4, width including spines 16, width excluding spines 15, fronto-orbital width 10.4, width of front between antennae 4.8 mm. The male (60955) measures 17.4 mm. in extreme width.

Young.—Small specimens are rougher and more spinous, spines white; there may be 3 superhepatic spines, one protogastric spine near by, and 4 or 5 smaller epibranchial spines.

Relation.—This species is easily confounded with *sayi* and *caribaeus*, which it resembles in general appearance, but can be told (1) by the antero-lateral spines 5 in number, or 6, counting as 2 the spines of the constantly bispinose third spine, whereas in *sayi* the spines are

only 4, and in *caribaeus* 5 with the second insignificant and the third, fourth, and fifth equal and with stout spinulous bases; (2) by the edge of the front finely and numerously granulate; and (3) by the greater number of spines on the dorsal surface of the antero-lateral region.

Range.—Bahamas and Florida Keys.

Material examined.—

BAHAMAS.—Golding Key, Andros Island; May 13, 1912; Paul Bartsch; 1 young female (60205).

FLORIDA.—Hawk Channel; half a mile SE. by S. of SE. end of Duck Key; 2.25 fathoms; rky.; temperature 24.5° C.; January 27, 1903; station 7429, *Fish Hawk;* 1 female (60204).

Key West; Union College collection; 2 males (42815), 1 male (42816).

Tortugas; through W. L. Schmitt; gift of Carnegie Institution: S. end of Loggerhead Key; from large rock 2 feet by 18 inches by 18 inches; August 10, 1924; W. H. Longley, collector; 1 female, holotype (62569). Off N. end of Loggerhead Key; by dynamite; from stomach of fish No. 19, schoolmaster, *Neomaenis apodus* (Walbaum); June 5, 1925; W. L. Schmitt collector; 1 male (60955).

PILUMNUS SPINOHIRSUTUS (Lockington)

Plate 203

Acanthus spino-hirsutus LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 33 [6] (type-locality, San Diego; type not extant), and p. 102 [8] (part).

Pilumnus spino-hirsutus STREETS and KINGSLEY, Bull. Essex Inst., vol. 9, 1877, p. 107 (part).

Pilumnus spinohirsutus RATHBUN, Harriman Alaska Exped., vol. 10, 1904, p. 185 (part), not pl. 7, fig. 2; Proc. U. S. Nat. Mus., vol. 38, 1910, p. 585 (part); Bull. Amer. Mus. Nat. Hist., vol. 48, 1923, p. 623, pl. 27.

Diagnosis.—Width of carapace (exclusive of spines) nearly 1½ times length. Antero-lateral spines 5, the first interspace shorter than the others. No subhepatic spine, sometimes small spinules. In male, half of outer surface of major palm is smooth and naked, this area bounded by an oblique line.

Description.—Dorsal surface of carapace and appendages covered with long hairs except the hinder part of the carapace; carapace and ambulatory legs have also a short coat of pubescence. Carapace very convex antero-posteriorly, slightly convex from side to side. Frontal lobes truncate, slightly oblique, 3-spined. Antero-lateral margins armed with long spines, orbit and front with shorter spines; lateral spines 5, the first or orbital spine a little shorter than the others, the space between first and second less than the other spaces, the bases of these two spines being often contiguous, so that they appear like one deeply bifid spine. The third spine has a tendency to produce a posterior branch. Subhepatic spine wanting, in its place there may be some small spinules.

The lower half of the major palm of the male is usually smooth and naked, the smooth area separated from the rough area by a line running from the lower proximal corner to the distal end opposite the middle of the base of the dactylus or sometimes further down. In the female the smooth space is similar to, but smaller than, that of the male.

Measurements.—Female (32964), length of carapace including spine 23.4, median length 22.4, width including spines 34.6, excluding spines 32, fronto-orbital width 20.3, width of front including antennal spine 8.5 m.

Range.—From San Pedro, California, to Magdalena Bay, Lower California.

Material examined.—

CALIFORNIA.—Vicinity of San Pedro; 1917; E. P. Chace; 1 male (53988).

Long Beach; H. N. Lowe; 1 female, soft shell (50550).

Santa Catalina Island; dredged; H. N. Lowe; 3 females (32964).

La Jolla, on rocks north of Institute; January 28, 1915; Scripps Institution; 3 males, 4 females (54763), 2 males, 6 females (2 ovigerous) (Scripps Inst.). Third lateral spine bifid in 1 male (54763).

San Diego: C. R. Orcutt; 1 male, 1 female (54734). False Bay; San Diego Society of Natural History; 1 female (returned to sender).

Southern California; *Anton Dohrn;* Venice Marine Biological Station; 1 female (50258).

LOWER CALIFORNIA.—Point Abreojos; March 6, 1911; *Albatross;* 1 male (60035).

Magdalena Bay: 1917; C. R. Orcutt; 1 male, soft shell, 1 female (50631). Shore; Hanna and Jordan, California Acad. Sci.; 1 male; returned.

Magdalena Bay; Sail Rock, Entrada Point, S. 53° W.; Redondo Point, S. 15° W.; lat. 24° 35′ 20″ N.; long. 111° 59′ 35″ W.; 13.5 fathoms; S. brk. Sh.; March 21, 1911; station 5678, *Albatross;* 1 male, 1 female, 2 young (60034).

PILUMNUS TOWNSENDI Rathbun

Plate 202, Figure 1; Plate 204, Figures 1 and 2

Acanthus spino-hirsutus LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 102 [8] (part), not p. 33 [6].

Pilumnus spino-hirsutus STREETS and KINGSLEY, Bull. Essex Inst., vol. 9, 1877, p. 107 (part).—KINGSLEY, Proc. Boston Soc. Nat. Hist., vol. 20, 1879, p. 154.—RATHBUN, Harriman Alaska Exped., vol. 10, 1904, p. 185 (part), pl. 7, fig. 2; Proc. U. S. Nat. Mus., vol. 38, 1910, p. 585 (part).

Pilumnus townsendi RATHBUN, Bull. Amer. Mus. Nat. Hist., vol. 48, 1923, p. 624, pl. 28 (type-locality, off Adair Bay, Gulf of California; type, Cat. No. 17413, U.S.N.M.).

? *Eriphides hispida* BOONE, Zoologica, vol. 8, 1927, p. 236 (part: text-fig. 87 B).

Diagnosis.—Width of carapace (exclusive of spines) 1⅓ or less than 1⅓ times length. Antero-lateral spines 4, equally separated. A slender, well-marked, subhepatic spine, below the interval between first and second lateral spines. In both sexes less than half of outer surface of major palm is smooth. A continuous low of short, conical spines runs lengthwise in line with the base of cutting edge of propodal finger.

Description.—General appearance same as that of *P. spinohirsutus.* The frontal spines are longer than in *spinohirsutus;* the other differences are indicated in the diagnosis.

Measurements.—Female holotype, length of carapace including spine 14.2, median length 13.8, width including spines 21.4, excluding spines 18.3, fronto-orbital width 14.7, width of front including antennal spine 6.6 mm.

Range.—West coast of Mexico, from Magdalena Bay to Manzanillo, via Gulf of California. ? Galapagos Islands.

Material examined.—

WEST COAST OF LOWER CALIFORNIA.—Off Magdalena Bay; lat. 24° 38′ 00″ N.; long. 112° 17′ 30″ W.; 51 fathoms; gn. M.; temperature 56.4° F.; May 2, 1888; station 2832, *Albatross;* 1 young, soft shell (21988); width 4.3 mm., identification uncertain.

Magdalena Bay; Sail Rock, Entrada Point, S. 53° W.; Redondo Point, S. 15° W.; lat. 24° 35′ 20″ N.; long. 111° 59′ 35″ W.; 13.5 fathoms; S. brk. Sh.; March 21, 1911; station 5678, *Albatross;* 1 male, 1 female (60038).

GULF OF CALIFORNIA.—Head of Concepcion Bay; April 6, 1911; *Albatross;* 1 male, 3 young (60036).

San Luis Gonzales Bay; March 27, 1889; *Albatross;* 1 male (17414).

Off Shoal Point; lat. 31° 31′ 45″ N.; long. 114° 19′ 00″ W.; 10 fathoms; gy. s.; March 26, 1889; station 3027, *Albatross;* 1 young (18621).

Off Adair Bay; March 25, 1889; *Albatross:* Lat. 31° 22′ 00″ N.; long. 114° 07′ 45″ W.; 17 fathoms; G. brk. Sh.; temperature 65.2° F.; station 3026; 2 females (1 is holotype) (17413). Lat. 31° 21′ 00″ N.; long. 113° 49′ 00″ W.; 11 fathoms; S. brk. Sh. G.; temperature 67° F.; station 3024; 4 males, 2 females (17412).

NW. of Guaymas; lat. 28° 16′ 00″ N.; long. 111° 54′ 00″ W.; 22 fathoms; fne. gy. S.; temperature 63° F.; March 23, 1889; station 3012; *Albatross;* 1 male (18199).

STATE OF COLIMA.—Manzanillo; on drifted pile; July 17, 1913; C. R. Orcutt; 5 females (46081).

PILUMNUS GONZALENSIS Rathbun

Plate 204, Figures 3 and 4

Pilumnus gonzalensis RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 240 (type-locality, San Luis Gonzales Bay; type, Cat. No. 17415, U.S.N.M.).

Diagnosis.—Short-hairy over all its dorsal surface. Carapace largely flat; five lateral spines, first two small. Infero-distal half of outer surface of major palm naked, but mostly rough with tubercles and granules.

Description.—A much flattened species, carapace deflexed in anterior third, covered with a short, dense, tough pubescence, each hair straight, regularly tapering. When the hairs are removed, the outlines of the mesogastric region are distinct, and three or four spinules near antero-lateral margin. Front with margin hairy and spinulous with 10 or 12 spinules, median sinus V-shaped, lateral lobes scarcely separated from median and less advanced. Margin of orbit armed with about 11 conical spines. Five antero-lateral spines, the first two very small, equal, close together at base, and shorter than the remaining spines; third spine with a small one on its posterior slope; all have one or more accessory spinules. Pubescence of ventral surface shorter than that of dorsal; subhepatic region spinulous and subbranchial region granulous. Ridge on endostome distinct.

Chelipeds very unequal, upper surface covered with hair and short conical spines which become acute tubercles and then granules lower down on the outer surface of the palms, there forming irregular longitudinal lines; major palm naked toward fingers and lower edge, punctate and finely granulous; fingers short, stout, gaping; dactyls tuberculate above near base. Legs broad, hairy, spinulous above.

Color.—In alcohol, hairs yellow, carapace red mottled with pale yellowish, spines and fingers brown.

Measurements.—Male (17415), length including spine 13, width including spines 18, excluding spines 16.4, fronto-orbital width 11.4, width of front 5.5 mm.

Range.—Gulf of California, Mexico.

Material examined.—La Paz; L. Belding; 5 males, 2 females (4628).

San Francisquito Bay; April 9, 1911; *Albatross;* 1 female (60033), 1 female (Amer. Mus.).

San Luis Gonzales Bay; March 27, 1889; *Albatross;* 8 males, 13 females (17415); 1 male is holotype.

Tepoca Bay; April 25, 1921; Fred Baker, Exped. California Academy of Sciences; 2 young females (Cal. Acad. Sci.).

Gulf of California; 1921; Exped. California Academy of Sciences; 1 male (Cal. Acad. Sci.).

PILUMNUS DEPRESSUS Stimpson

Pilumnus depressus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 109 [19] (type-locality, Cape St. Lucas; type not extant).

Diagnosis.—Carapace and outer surface of major cheliped mostly naked. Lateral and orbital margins dentate.

Description.—"Body depressed; carapax for the most part flattened and naked, but slightly curved, pilose and roughened toward the

anterior and antero-lateral margins. Frontal margin spinulose. Margins of the orbits above and below armed with spiniform teeth. Antero-lateral margin with three spiniform teeth besides the angle of the orbit, which, like the next lateral tooth, is bifid. Subhepatic tooth minute. Subhepatic and suborbital regions covered with sharp granules concealed beneath pubescence. Feet pilose and spinulose; spinules shorter than in *P. xantusii*. Greater cheliped naked and obsoletely granulated on the larger part of its distal surface." (Stimpson.)

Measurement.—Male type, length of carapace 8.9 mm. (0.35 inch), width of same 11.9 mm. (0.47 inch). (Stimpson.)

Range.—Cape St. Lucas, Lower California, Mexico. Known from the original description only.

PILUMNUS FLORIDANUS Stimpson

Plate 205, Figures 3 and 4

Pilumnus floridanus STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 141 (type-locality, Tortugas; type in M. C. Z.).—RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 40.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 322.

Pilumnus lacteus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 292, pl. 51, fig. 5–5*b*. Not *P. lacteus* Stimpson, 1871.

Diagnosis.—A transverse row of long hairs across front. Front bare, unarmed. Orbit entire above, spinulous below. Four lateral spines. Chelipeds spinous.

Description.—A small species: Carapace covered with a dense, short pubescence, thinning behind, and a few longer clavate hairs, a transverse series of which across the frontal region is a conspicuous feature. Lobes of front almost bare, edge slightly oblique, entire, median notch triangular, lateral notches rounded, outer teeth minute, deflexed. Hepatic region finely roughened above but without spines. Antero-lateral marginal spines four, slender, set in conical bases; below the interval between the orbital and the next spine may be seen a small subhepatic spine. Orbital margin unarmed above, having a small V-shaped notch opposite the end of the gastro-hepatic furrow; armed below with from eight to ten spinules, those on the inner half a little larger.

Chelipeds spinous above, two spines near distal end of merus, carpus armed all over its exposed surface; on the manus the spines become pointed tubercles on the outer surface; the major manus has a limited, smooth bare space on its distal lower portion, sometimes amounting to half its outer surface in the male, usually much more restricted and often lacking in the female. Ambulatory legs spined above.

Measurements.—Male (11306), length of carapace 6.5, width of same 9.6, fronto-orbital width 6.9, width of front 3.4 mm.

Range.—North Carolina and Gulf of Mexico to the Virgin Islands.

Material examined.—See table, pages 508–509.

Material examined of Pilumnus floridanus

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″			°C.						
North Carolina: South of Cape Lookout, off fishing buoy.	34 20 15	76 49 00	16	hrd		July 14, 1915	8283	*Fish Hawk*	1♀	61124	
West coast of Florida:											
Off Cape San Blas	29 18 15	85 32 00	25	crs. gy. S. brk. Sh.		Feb. 7, 1885	2370	*Albatross*	1 y	18018	
Do			25–27			do	2369–2374	do	2 y	19859	
South of Cape St. George.	28 45 00	85 02 00	30	gy. S. brk. Co		Mar. 15, 1885	2405	do	1♀	18019	
South of St. George Island.	28 46 00	84 49 00	26	crs. S. Co		do	2406	do	1♂ 5 y	18020	
Do	28 47 30	84 37 00	24	Co. brk. Sh		do	2407	do	1♂	18021	
Cedar Keys			Low tide.	Flats		Mar. 27, 1926		Miller and Aschemeier.	1♀	60944	
Anclote Section	28 01 30	83 08 00	11	rky	13.5	Jan. 23, 1902	7234	*Fish Hawk*	1♂	60208	
West of Charlotte Harbor.	26 47 30	83 25 15	28	fne. wh. S. bk. Sp. brk. Sh.		Mar. 18, 1885	2410	*Albatross*	3♂ 1♀ 1 y	9821	
Do	27 04 00	83 21 15	26	crs. gy. S. brk. Sh.		do	2409	do	3 y	18022	
Do	26 33 30	83 15 30	27	fne. wh. S. bk. Sp.		do	2411	do	2♂ 2♀ 3 y	18023	
Do	26 35 00	83 11 00	27.5	sdy	20	Apr. 2, 1901	7122	*Fish Hawk*	4♂	25630	
Do	26 33 00	83 10 00	28	sdy	19.1	do	7123	do	10+	25631	
					°F.						
West of Sanibel Islands.	26 19 00	83 11 00	27	S. algae	68	Mar. 21, 1889	5108	*Grampus*	1 y	23393	
West of Marco	26 00 00	82 57 30	24	fne. S. bk. Sp. brk. Sh.		Mar. 19, 1885	2413	*Albatross*	17♂ 10♀ 5 y	11306	
					°C.						
West of Cape Romano.	25 50 15	82 41 45	21	sdy	20	Apr. 2, 1901	7124	*Fish Hawk*	6♂ 4♀	25632	
Gulf of Mexico						Mar. 7, 1885		*Albatross*	1♀	10034	On fish line.
Bay of Florida								Union College collection.	4 y	60212	
North of Tortugas	25 04 30	82 59 15	26	fne. wh. S. brk. Sh.		Mar. 19, 1885	2414	*Albatross*	7♂ 9♀	18025	
White Shoals, Tortugas.						July 19, 1924	22	W. L. Schmitt	1♀	60820	Gift of Carnegie Institution.
Do	5 miles S. of Loggerhead Key.		7–10			July 20, 1924	29–32	do	1♂	60942	Do.
Do						July 20, 1924	35, 36	do	1♀	61125	Do.

Tortugas	6 miles S. of No. 2 buoy.		18	crs. S		July 22, 1924	44	do	5♂ 7♀ 3 y	60941	Do.
Do	Between 10 and 11 miles S. of No. 2 buoy.		35–37	S		June 10, 1925	206–207	do	10♂ 7♀ (1 ovig.).	60938	Gift of Carnegie Institution; 2 with parasites.
Do	About 13 miles S. of No. 2 buoy.		87–45	Rough		do	210	do	1 y	60943	Gift of Carnegie Institution.
Do	About 8 miles S. of No. 2 buoy (sponge haul).		25	Picked from coral rock.		June 11, 1925	217	do	4♂ 7♀ (1 ovig.) 6 y.	60939	Do.
Do	E. side Loggerhead Key.			From 2 buckets of turtle grass, roots, etc.		June 17, 1925		do	2 y	60940	Do.
Do	Greater heads up reef. Stomach of fish No. 391, yellow grunt, *Haemulon sciurus* (Shaw).					June 13, 1925		do	1 pair chelipeds.	61126	Do.
Do	S. of SW. channel buoy					Aug. 16, 1924	7	*Dohrn* (W. L. Schmitt).	1♀	62554	Do.
Off Key West, inside the reef.	Key West Light to East Channel Bar buoy, 71° 53′; to Beacon "A," 74° 46′.		5.25	Co. S. G	20	Feb. 13, 1902	7278	*Fish Hawk*	1 y	60209	
Key West								H. Hemphill	6 y	18272	
			Feet								
North of Knight's Key Channel.	2 m. NE. by E. of Basin Bank.		8.5	rky	21.5	Jan. 22, 1903	7417	*Fish Hawk*	1 y	60210	
Yucatan Channel:											
North of Cape Catoche.	22 18 00	87 04 00	24	wh. R. Co		Jan. 30, 1885	2365	*Albatross*	3♂ 1 y	18017	
Do	22 07 30	87 06 00	21	do		do	2363	do	1♂	18016	
Bahamas:											
Green Cay			4			June 30, 1903		B. A. Bean	1♂	31065	From Geographic Society of Baltimore.
Bahama Banks						May 18, 1893		Biological Expedition, State University of Iowa.	1♂ 1♀	Mus. S.U.I.	
West Indies:											
Jamaica									1 y	Returned to sender.	Identification uncertain.
Mayaguez Harbor, Porto Rico.	Red buoy entrance, ESE. ½ mile.		25–30	S. M. Sh	25	Jan. 20, 1899	6062	*Fish Hawk*	1♀ 1 y	24297	
Off Culebra Island	Culebrita Lighthouse, NE., 5¼ miles.		15	Co	25.2	Feb. 10, 1899	6093	do	2 y	24295	
Off Vieques Island	Culebrita Lighthouse, NE. ⅜ E., 7¼ miles.		16	Co	25.2	do	6092	do	2 y. ♀	24296	
Off St. Thomas	Sail Rock, W. by N. ½ N., 6 miles.		20–23	Co	25.8	Feb. 6, 1899	6079	do	1♂ 2♀ 3 y	24294	
St. Thomas						Jan. 17, 1884 to Jan. 24, 1884		*Albatross*	1♀	18517	Dredged.
Virgin Islands			Piles.					C. R. Shoemaker	1♀	60211	

PILUMNUS QUOYI Milne Edwards

Plate 206, Figures 1–4

Pilumnus quoii MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 418 (type-locality, Rio de Janeiro; type in Paris Mus.).

Pilumnus quoyi A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 289, pl. 50, fig. 5–5c.

Diagnosis.—Wrists and hands covered with large shining spines. Orbit entire above, spined below. Frontal lobes very arcuate.

Description.—Dorsum covered with very stiff and spaced, short, russet hairs, regularly placed and not concealing the surface. Carapace very convex longitudinally, uneven, smooth, one and a fifth wider than long (narrower than in A. Milne Edwards's figure); antero-lateral border upturned, armed with three spines besides the orbital; spines sharper than represented in figure; also a subhepatic spine. Front consisting of two deep deflexed lobes with very arcuate and granulate margin, and a small triangular outer tooth. Orbit practically entire above though traces of two or three spinules remain; below five or six irregular short spines. Pterygostomian region granulate.

Merus of outer maxillipeds with the anterò-internal angle truncate, not emarginate. Chelipeds and legs very hairy, hairs longer than on the carapace. Chelipeds very strong, unequal. Terminal and subterminal spine on merus large. Spines or subacute tubercles of carpus and manus very striking, stout and shining; they extend all over the outer face of the minor palm and over the greater part of the major palm. Ambulatory legs short, strong, wider than figured, and unarmed.

Measurements.—Male holotype, entire length of carapace 20.6, width of same including spines 26, excluding spines 23.4 mm.

Range.—Guiana (A. Milne Edwards) and Rio de Janeiro, Brazil.

Material examined.—Rio de Janeiro, Brazil; Quoy and Gaimard collectors; one male, unique type (Paris Mus.).

PILUMNUS MIERSII A. Milne Edwards

Plate 206, Figure 5

Pilumnus miersii A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 292, pl. 51, fig. 3 (type-locality, Antilles; type in Paris Mus.).

Diagnosis.—Five antero-lateral spines. Outer face of larger palm smooth.

Description.—Resembles in general form *P. floridanus*. It is clothed with a very short down in which some longer hairs are inserted on the feet. Carapace wide, smooth, regions scarcely indicated. Front little advanced, edge granulate. Orbits with a few small spinules above, below roughened with pointed granules or spinules. Antero-lateral border armed with five spines, counting the orbital spine; the first two are very small and pointed, the others well developed. Some subhepatic tubercles between the second and third marginal spines.

Chelipeds very unequal; wrists tuberculate or granulate; major palm very swollen and with numerous pearl-shaped tubercles above, which disappear on the outer face; minor palm rather deep, spinous above and outside. Ambulatory legs without spines.

Measurements.—Female cotype, length of carapace 9.3, width of same including spines 13.2, excluding spines 12.2 mm.

Range.—Antilles.

Material examined.—Antilles; Freminville collector; 2 dried specimens, the larger a female (Paris Museum).

PILUMNUS LACTEUS Stimpson

Plate 205, Figures 1 and 2

Pilumnus lacteus STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 142 (type-localities, reef at Cruz del Padre, Cuba, and at Key West in from 2 to 5 fathoms; types not extant).—Not MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 292, pl. 51, fig. 5–5*b*.

Diagnosis.—Covered with an uneven velvet, concealing tubercles. Tubercles few and small. Four lateral teeth. More than half of outer surface of major and minor manus bare and smooth.

Description.—Covered with a very short velvet like pubescence easily rubbed off. Tubercles of carapace and chelipeds not numerous, invisible through the hairy coating. Carapace widest at last tooth; nearly smooth, a row of five low tubercles parallels the antero-lateral and orbital margins; a few tubercles on epigastric region, a few very obscure on hinder part of protogastric lobe, not more than one on mesogastric region. Lobes of front triangular, edge granulate. Inferior margin of orbit granulate, two granules on superior margin. Antero-lateral teeth four, subconical, with sharp horny tips, the first or orbital tooth very short, tips of second and third curved forward.

Two similar curved spines at distal end of upper margin of merus of cheliped. Scattered tubercles on carpus, a short blunt tooth at inner angle. Outer surface of hands largely smooth and glabrous; the tubercles and hairy coating of the major palm cover only the extreme proximal end of the outer surface together with the upper surface, or it may be only the proximal end of the same, and form an oblique line with the smooth area. The rough hairy part of the minor palm is more extensive than on the major palm. In both palms the tubercles have a tendency to spread further than the hair, encroaching on the glabrous space. On the ambulatories the pubescence is supplemented by long slender hairs on the margin.

Color.—Pubescence whitish or cream-color. Outer surface of hands light red. (Stimpson.)

Measurements.—Male (17902) entire length of carapace 8, entire width of same 11.5, fronto-orbital width 7.7, width of front 3.7 mm.

Range.—North Carolina; west coast of Florida; Cuba.

Material examined.—See table, page 512.

Material examined of Pilumnus lacteus

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temp.	Date	Station	Collector	Specimens	Cat. No.	Remarks
North Carolina:	° ′ ″	° ′ ″									
Shackleford Bank (inside), Beaufort.				Washed from seaweed.	°F.	Sept. 12, 1928		Schmitt and Shoemaker.	1 y	62556	
South of Cape Fear River	33 49 45	78 04 00	8	hrd	80.5	July 12, 1915	8275	*Fish Hawk*	1♂	60949	
Florida:					°C.						
Aucilla section	29 44 09	84 06 30	7	R. Co	16.5	Dec. 5, 1901	7193	*Fish Hawk*	1♂	60216	
Pepperfish Key section	29 29 30	83 33 25	4.75	sdy	21.5	Nov. 5, 1901	7146	do	1 y	60215	
Off Northwest end St. Martin's Reef.	Near 28° 50′ 00″ north latitude, 83° 00′ 00″ west longitude.					1887		Lieut. J. F. Moser, U. S. N.	1♂ 1♀	17901	
Marco			1–3					H. Hemphill	12♂ 9♀ 3y	17902	
Off Cape Sable	25 09 45	81 18 35	3.25	rky. Co	23.5	Dec. 17, 1902	7351	*Fish Hawk*	4♂ 6♀ (1 ovig.)	60217	
Tortugas						June —, 1893		Biol. Exped., State Univ. Iowa.	1♂	Mus. S. U. I.	
Do	Stomach of fish No. 550, gray snapper, *Neomaenis griseus* (L.).					June 21, 1925		W. L. Schmitt	1♂	61127	Gift of Carnegie Institution.
Key West			(1)					U. S. C. S. Str. *Bache*, Wm. Stimpson.	Many small.	2461, M.C.Z.	
Cuba:											
Ensenada de Cajon, off Cape San Antonio.						May 22, 1914		Henderson and Bartsch, *Tomas Barrera* Exped.	1♀ ovig	48534	
Los Arroyos						May 20, 1914	8	do	2♂ 4y	48535	
Cabañas						1914	16	do	1 y	48531	
Ensenada de Santa Rosa			1–3	S. Sh. M. sponge		1914		do	1♀	48532	
Keys at Esperanza			(2)			May 11, 1914	1–2	do	1♀	48533	
Varadero playa, Bay of Cardenas.			(3)	Under stones		Apr —, 1927		Melbourne Ward	1♂	Returned	

Dredged. [2] Shallow. [3] Near shore.

PILUMNUS GEMMATUS Stimpson

Plate 207, Figures 1–3

Pilumnus gemmatus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 214 [86] (type-localities, St. Thomas and Tortugas; types not extant).—RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 38.—Not A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 290, pl. 51, fig. 4–4*b*.

Diagnosis.—Dorsal aspect showing small red tubercles set in close-cut velvet. Outer surface of both hands entirely covered with tubercles and hair. Fingers deeply grooved.

Description.—Carapace rather narrow, covered as are also the chelipeds and legs with a short, close pubescence (with occasional stout and long cylindrical setae), which does not conceal boundaries of regions and the small red beads or tubercles scattered on anterior two-thirds of carapace (3 to 6 on each areolet), upper and outer surfaces of chelipeds and upper surface of legs. On the latter the tubercles or granules are much smaller than elsewhere. Frontal lobes subtriangular, granulate on margin, more advanced near median line; interspace large, V-shaped; a transverse row of stout setae behind each lobe. Upper orbital margin with two or three red tubercles, lower margin finely denticulate, a shallow outer notch. Antero-lateral projections four, short, stout; tips varying from blunt in first and second tooth to acute in the last.

Entire outer surface of both hands tuberculate, the tubercles growing smaller and more numerous toward lower margin. Propodal finger horizontal, lower edge slightly arcuate, tip slightly upcurved. Both fingers deeply grooved; tubercles on upper portion of basal half of dactylus, a few on outer surface of immovable finger, where in small specimens they form in two rows on the ridges. Outer lower margin of arm with a broad band of tubercles and granules.

Color.—Pubescence cream-colored or whitish; granules, tubercles and spines all bright ruby red. (Stimpson.) Fingers light brown.

Measurements.—Female (56900), entire length 10.6, entire width 13.5, fronto-orbital width 9, width of front 4 mm.

Range.—Tortugas, Florida; Culebra Island to Curaçao.

Material examined.—Tortugas, Florida; June 5–8, 1893; Biological Expedition, State University of Iowa; 1 male (Mus. S.U.I.).

Tortugas, Florida; W. L. Schmitt; gift of Carnegie Institution: Six dredge hauls W. of Loggerhead Key, off dock and N. of lighthouse pier; 8–5 feet; August 3, 1924; 1 young female (60946). Stomach of fish No. 121, gray snapper, *Neomaenis griseus* (Linnaeus), outer Lighthouse Reef; June 7, 1925; 1 female (60945). Mid-section of Bush Key reef inside, 3 feet before eelgrass; washed from weed and rocks; August 1, 1924; 4 specimens (62555).

Ensenada Honda, Culebra Island; February 10, 1899; *Fish Hawk;* 1 female (24370).

St. Thomas; 1915; C. R. Shoemaker collector; Carnegie Institution donor: Shore near town; June 30; 1 male (60213). Lagoons; July 7; 1 male (60214).

Off St. Thomas; Sail Rock, W. by N. ½ N., 6 miles; 20–23 fathoms; Co.; temperature, 25.8° C.; February 6, 1899; station 6079, *Fish Hawk;* 1 male (24371).

Curaçao: 1884; *Albatross;* 1 female (17913). 1920; C. J. van der Horst: Caracas Bay; in coral; May 5, 1 female (Amsterdam Mus.); April 23, 1 female (56900). Spanish Water; in *Siderastrea,* April 29, 1 female (Amsterdam Mus.); in *Porites furcata,* May 5, 1 male, 1 female, 1 young (Amsterdam Mus.).

PILUMNUS PANNOSUS Rathbun

Plate 207, Figures 4 and 5

Pilumnus gemmatus A. Milne Edwards, Crust. Rég. Mex., 1880, p. 290, pl. 51, figs. 4–4*b;* not *P. gemmatus* Stimpson 1860.

Pilumnus pannosus Rathbun, Proc. U. S. Nat. Mus., vol. 19, 1896, p. 142 (type-locality, Key West, Florida; type, Cat. No. 13814, U.S.N.M.); Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 39.—A. Milne Edwards and Bouvier, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 321.

Diagnosis.—Tubercles of carapace concealed by dense hairy coat. Three lateral teeth have spinuliform tips, orbital teeth end in truncate spines. A large part of outer surface of palm smooth and bare except in minor palm of female.

Description.—Resembles *P. gemmatus.* Carapace wider and less quadrate, entirely covered with a soft, thick, plushlike pubescence which is not evenly distributed; here and there are longer, irregular, club-shaped setae which give a very ragged appearance. This hairy coat conceals the details of ornamentation but shows the lobulation of the anterior part and the tubercles of the chelipeds. Anterior half of carapace and upper surface of chelipeds and legs dotted with beadlike tubercles. Frontal lobes subtriangular, granulate on the margin, more advanced near median line; interspace V-shaped; outer tooth triangular, acute. Upper margin of orbit with three truncate spines, one at inner angle and two near the middle; a similar one at outer angle; lower margin with a row of short, stout, truncate spines or tubercles of unequal size and a V-shaped notch near outer angle. The antero-lateral projections look like shallow lobes tipped with a spinule until the pubescence is removed when they are seen to be (with the exception of the exorbital spine) triangular, well-separated spines with slender pointed tips directed forward and easily broken off. A well developed subhepatic spine.

Upper portion of hands tuberculate but usually a large part of outer surface smooth and naked; extent of smooth bare space varying, in adult males from half to nearly all of the outer surface in the major palm and from one-third to one-half in the minor palm; in females

and young males it is more restricted, from a little less than half to a little more than half in the major palm, and a small spot at base of propodal finger in the minor palm. A few tubercles on dactylus near articulation. Fingers of male with shallow grooves indicated by lines of punctae, of female with deep grooves in minor chela and in propodal finger of major chela. Ambulatory legs pubescent and bordered with fringes of club-shaped setae mixed with long fine hair.

Color.—Carapace under pubescence bright red as is also the bare part of the palms. (A. Milne Edwards.)

Measurements.—Male (11192), entire length of carapace 8.8, entire width of same 12, fronto-orbital width 7.8, width of front 3.8 mm.

Range.—North Carolina; Bahama Banks and coasts of Florida to Virgin Islands.

Material examined.—See table, pages 516–518.

PILUMNUS PYGMAEUS Boone

Plate 207, Figures 4 and 5

Pilumnus pygmaeus BOONE, Zoologica, vol. 8, 1927, p. 221, text-fig. 81 (type-locality, off Hood Island, Galapagos, 15 feet; holotype female in Mus. New York Zool. Soc.).

Diagnosis.—Carapace and chelipeds granulate, not spinous. Lateral teeth obscure, edge denticulate. Size small.

Description.—Carapace transversely suboval, posteriorly narrowing rapidly; convex, especially antero-posteriorly; regions feebly indicated except the anterior part of the gastric region which is plainly marked; surface irregularly hairy, anterior two-thirds granulate. Anterior margins also granulate. Front cut by a large median V-shaped emargination into two oblique, subentire, and slightly convex lobes; median notch not visible in dorsal view. Lateral margin having three (not counting orbital angle) long, shallow, scarcely projecting and equally spaced teeth, the edges of which are unequally and bluntly denticulate.

Chelipeds very unequal, stout, hairy, granulate; palms swollen; fingers rather short, tips light colored. In the major chela the prehensile teeth are unequal, the largest one near base of fixed finger. Ambulatory legs with margins granulate and hairy.

Measurements.—Ovigerous female, paratype, total length of carapace 2.6, width of same 3.5, fronto-orbital width 2.5, width of front 1.4 mm.

Range.—Galapagos Islands.

Material examined.—Off Hood Island, 15 feet; station 54, *Arcturus* Oceanographic Expedition; 1 ovigerous female, paratype (Mus. New York Zool. Soc.).

Material examined of Pilumnus pannosus

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″			°C.						
North Carolina: Bogue Sound, off Beaufort.						July —, 1912		W. P. Hay, Bureau of Fisheries.	1♀ 1 y	51390	
Florida:											
Aucilla section	29 54 00	84 06 00	4.5	R. Co. Sh	14	Dec. 5, 1901	7191	*Fish Hawk*	1 y	60118	
Do	29 52 10	83 51 47	3	S. Co	20	Nov. 6, 1901	7147	do	1 y. ♂	60117	
Pepperfish Key section.	29 32 10	83 29 50	3	sdy	21.8	Nov. 5, 1901	7144	do	1♀ 1 y	60116	
					°F.						
Off Cedar Keys	Cedar Keys Light, N. ¾ E., 21¾ miles.		5.75	Co	63.45	Jan. 11, 1913	7807(21)	do	2♂	60146	
En route to James City.	Bell buoy off Sanibel Id. Light, NE., 10 2½ miles.					Jan. 1, 1913	7795(9)	do	1♀ 1 y. ♀	60145 60144	
					°C.						
North Key section	28 57 30	82 58 00	3	rky	15.5	Dec. 9, 1901	7207	do	2♀	60119	
Off northwest end St. Martins Reef.	Near 28° 50′ 00″ N., 83° 00′ 00″ W.					1887		Lieut J. F. Moser, U S. Navy.	1♀	18031	
Goodland Point								H. Hemphill	2♂ 2♀	18033	
Eastern Dry Rocks								Edward Palmer	1♀	14436	
Off Cape Sable	E. end of Sawyer Key, S. ¼ W., 2¼ miles.		4.75	rky	22.5	Dec. 22, 1902	7390	*Fish Hawk*	2♂ 2♀ 1 y	60133	
Do	25 10 10	81 28 30	4.75	gy. S. Sh	23.5	Dec. 17, 1902	7354	do	3♂ 6♀	60125	
Do	25 09 52	81 21 53	3.75	gy. S. Sh	23.5	do	7352	do	1♂ 1♀	60124	
Do	25 09 37	81 15 15	2.5	rky. Co	23.5	do	7350	do	6♂ 4♀	60123	
Do	25 07 05	81 25 50	4.5	gy. S	23	Dec. 18, 1902	7360	do	2♂ 1♀	60127	
			Feet								
Do	25 06 30	81 12 25	11.5	rky	22	do	7356	do	7♂ 8♀ (1 ovig.).	60126	
			Fathoms								
Do	25 03 30	81 12 10	2.75		22	do	7366	do	1♂	60128	
Do	25 00 55	81 22 15	4	rky	22	Dec. 19, 1902	7372	do	2♂ 2♀	60132	1 female soft-shell.
Do	25 00 40	81 15 37	2.5	rky	22.5	do	7370	do	2♂	60131	Soft-shell.
			Feet								
Do	25 00 30	81 12 20	11.5	rky	22	do	7369	do	1♂	60130	
Do	WSW. ½ W., 7¼ miles from signal.		11	gy. S. G	22	do	7368	do	3♂	60129	
Do						Dec. 17, 1902		do	1♂ 1♀	60122	Male soft-shell.

Key West				S. R. Co. algae		1885		H. Hemphill	20♂ 20♀	13814	Sand flats, between tides; among rocks, low tide; among corals, on reefs; among algae, 2 feet below low tide. Types.
Do						Apr. 15, 1844 to Apr. 27, 1884		*Albatross*	19♂ 23♀ 1 y.	11192	
Do								C. N. E. Eliot	1♀	22992	
Key West harbor								Edward Palmer	2♂ 6♀ 1 y.	13894	
Off Key West inside the reef.	Key West Light to East Channel Bar Buoy, 71° 53′, to Beacon "A", 74° 46′.		5.25	co. S. G	20	Feb. 13, 1902	7278	*Fish Hawk*	3♂ 3♀ 2 y.	60121	
Do	E. Martello Tower to Key West Light, 36° 00′, to Sand Key Light, 52° 36′.		5.25	co. S. G	20	do	7277	do	1♂ 1♀	60120	
Hawk Channel	3½ miles N. ¾ E. of Sombrero Light.	*Feet*	11.5	rky	24.5	Jan. 27, 1903	7427	do	1♀	60139	
Do	1 mile NNW. ½ W. of East Washerwoman.	*Fathoms*	2.75	rky	24.5	do	7428	do	1 y. ♀	60140	
Do	½ mile SE. by S. of SE. end of Duck Key.		2.25	rky	24.5	do	7429	do	1♂ 3♀ (1 ovig.).	60141	
Do	1 ¼ miles S. by W. of SE. point of Long Key.		2.5	Barry	21	Feb. 18, 1903	7463	do	1♂	60143	
No Name Key								H. Hemphill	1♂ 2♀	18032	
Pigeon Key Lake	Nearly 1¼ mile NNE ½ E. of Money Key.		9	S. G	17.5	Jan. 7, 1903	7402	*Fish Hawk*	1♂	60134	
Knights Key						Jan. 21, 1903		do	1♂	60135	
North of Knights Key Channel.	3 miles NE. by N. of E. Bahia Honda Key.	*Feet*	11	rky	20	Jan. 22, 1903	7412	do	1♂ 1♀	60136	
Do	2¾ miles N. of Basin Bank		10.5	rky	21	do	7416	do	1♀	60137	
Florida Bay	9½ miles NW. ½ N. of Bamboo Key.		8	S. G	20	Jan. 23, 1903	7425	do	2 y	60138	
Do			8–11.5		23–23.5	Jan. 29, 1903		do	1♂	60142	
Biscayne Bay	Near Cape Florida.							U. S. Fish Commission.	1♂ 1♀	31472	
Cape Florida								Edward Palmer	2♂	14435	
Miami								G. M. Gray	1♂	42151	

Material examined of Pilumnus pannosus—Continued

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″									
Bahamas								Frederick Stearns	Specimens	Returned to sender. Mus. S. U. I.	In living sponges.
Bahama Banks						May 15, 1893		Biological Expedition, State University Iowa.	2♂	do	
Do						May 17, 1893		do	1♂	8933	From millepores.
Jamaica						Mar. 1, 1884 to Mar. 11, 1884		*Albatross*	1♂ 2♀	19677	
Kingston Harbor								P. W. Jarvis	1 y	24372	
Porto Rico: Reefs at Ponce						Jan. 30, 1899		*Fish Hawk*	1♂ 1♀ 1 y	24373	
Playa de Ponce Reef						Feb. 1, 1899		do	1♂ 1♀	19889	
St. Thomas						Jan. 17–24, 1884.		*Albatross*	2♂ 3♀		
St. John: Coral Bay									1♂	Copenhagen Mus.	

PILUMNUS LIMOSUS Smith

Plate 208; Plate 209, Figures 1–3

Pilumnus limosus SMITH, Proc. Boston Soc. Nat. Hist., vol. 12, 1869, p. 285 (type-localities, Zorritos, Peru, and Panama; types in P. M. Y. U.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 291, pl. 50, figs. 4–4*b*.

Diagnosis.—Covered with a velvety pubescence forming a pattern leaving scattered tubercles exposed on carapace. Four lateral teeth. Upper and outer surfaces of both palms rough and hairy; only a small spot bare near immovable finger of major manus.

Description.—Body and appendages covered with a light brown, velvet like pubescence composed of short clavate hairs, among which the tubercles and granules appear as depressed pits in the general surface; and around them the pubescence forms a regular, ornamental and somewhat reticulate pattern. Carapace strongly deflexed in front, much flattened posteriorly, and when the hairs are removed, distinctly areolated, and showing above about forty scattered small tubercles or granules. About fourteen of these are on the gastric region, two on each epigastric lobe, three or four on each protogastric lobe, one at the extremity of the mesogastric and three

in a triangle behind it; two of the largest are on the hepatic region and smaller ones are scattered on the branchial and posterior regions. Median lobes of front almost perpendicular, separated by a deep, acutely triangular sinus, anterior margins oblique, arcuate, and slightly denticulate; the small lateral lobes are minute teeth or tubercles. Upper margin of orbit armed with three small pointed teeth, the outer one forming the external angle. Antero-lateral margin armed with three long, triangular teeth which are separated from the angle of the orbit by a broad shallow sinus below which there is a slender subhepatic tubercle. Lower margin of orbit broken by a deep sinus, the inner lobe prominent and usually somewhat bituberculate at tip, outer lobe armed along the margin with three or four small tubercles; external hiatus well marked. Inferior orbital region with a few scattered granules. An oblique line of 8 or 10 small tubercles on the subbranchial region terminating just behind the posterior tooth of the antero-lateral margin.

Chelipeds slightly unequal, carpus armed with a strong spine on the inner edge and a few scattered tubercles on the upper surface, hand tuberculate above and externally, the major palm with a naked and smooth space on the lower edge at base of finger; fingers smooth, striate and dark brown, the color not spreading on palm. Legs armed with a few scattered sharp granules on upper side.

Measurements.—Male, cotype (Panama), length of carapace 11.4, width of same 15 mm. Female (60225), length of carapace 6.6, width of same 9.5, fronto-orbital width 6, width of front 2.7 mm.

Range.—Panama; Ecuador; Peru.

Material examined.—Panama; Capt. J. M. Dow; 1 female (4080).

Panama; shore, on rocks, low tide; May–July, 1924; Elizabeth Deichmann; 1 male, 1 female (60225).

Ecuador: South side Point Santa Elena; September 17, 1926; W. L. Schmitt; 1 female (60821).

Paita, Peru; October 8, 1926; W. L. Schmitt; 1 female (60950).

PILUMNUS HOLOSERICUS Rathbun

Plate 207, Figures 8 and 9

Pilumnus holosericus RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 268, pl. 5, fig. 1 (type-locality, St. Thomas, Virgin Islands; Cat. No. 19705, U.S.N.M.); Bull. U. S. Fish Comm. for 1900, vol. 20, part 2 (1901), p. 39.

Diagnosis.—Covered with a smooth thick felt, concealing the tubercles of the carapace in large part. Four lateral teeth. Half or less than half of outer surface of major manus bare and smooth.

Description.—Carapace suboval; dorsal surface entirely covered with a dense pubescence forming a smooth felt-like surface but dis-

posed in nodules or areoles corresponding largely to the regions and subregions; a median gastric furrow extends nearly to posterior end of region; a tuft of coarse tubular hairs on each protogastric and epibranchial lobe and eight single or double similar hairs regularly disposed on the carapace and one on each eyestalk. When the pubescence is removed numerous small tubercles are exposed. Front with two oblique entire lobes, no outer lobules or angulations, a large median V-sinus. Antennal flagellum as long as width of front. Upper margin of orbit interrupted by two well marked sinuses; outer tooth small; lower margin granulate, a large acute inner tooth. Antero-lateral margin with three broad, thick teeth with tuberculiform tips. In the long interval between them and the orbital tooth a subhepatic tubercle is visible. Carpus and manus of chelipeds with a covering similar to that of the carapace. Carpus and manus

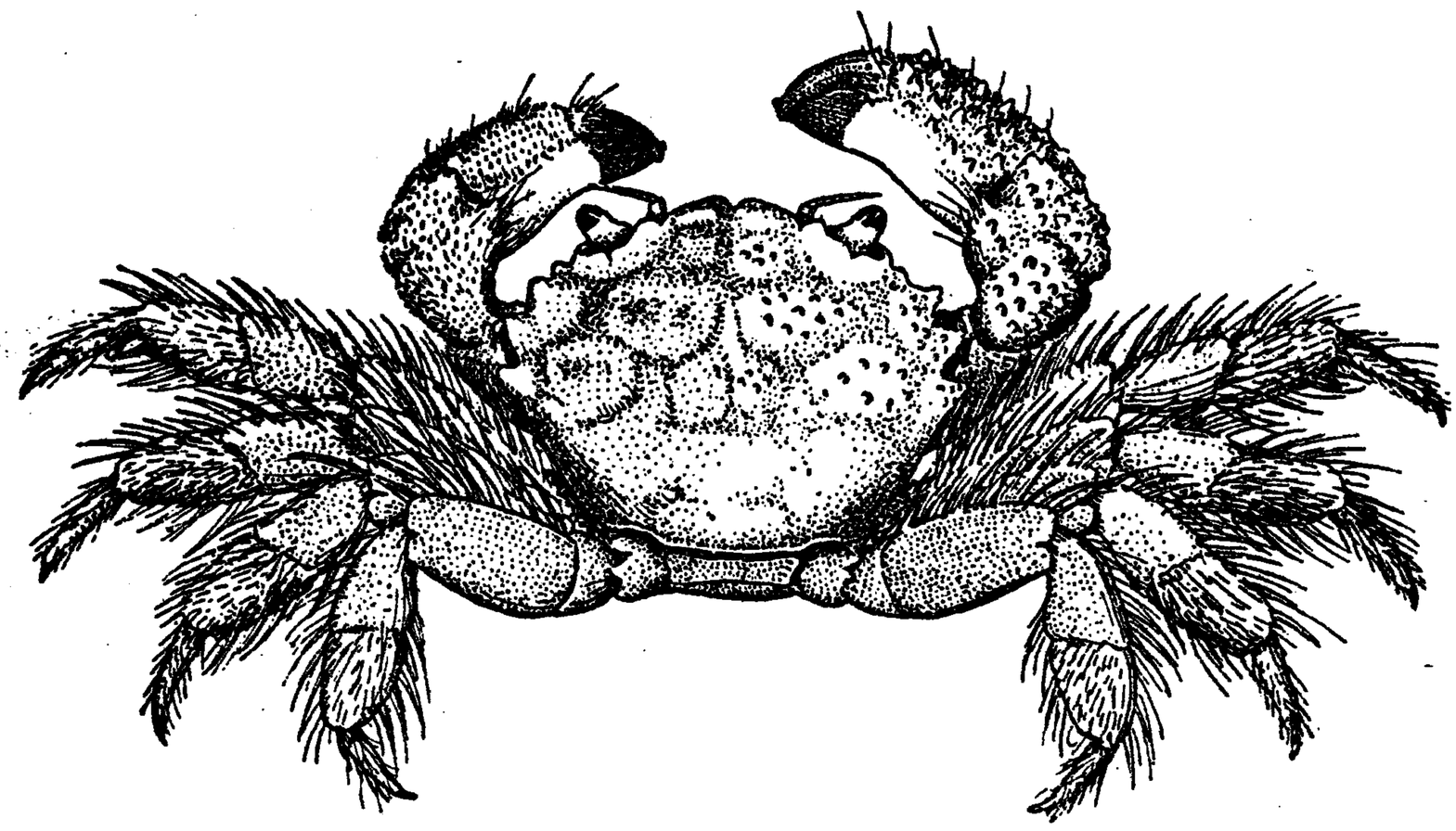


FIGURE 81.—PILUMNUS HOLOSERICUS, MALE, DORSAL VIEW SHOWING TUBERCLES ON RIGHT HALF OF CARAPACE, ×3

of chelipeds with a covering similar to that of the carapace, excepting that the lower distal end (half or less than half) of the major manus is bare and smooth; tubercles small and numerous and plainly visible embedded in the felt. Fingers relatively short and stout. Ambulatory legs covered with a very short velvet and margined with numerous coarse tubular hairs.

Color.—Hands pink, the pink of the tubercles persisting for many years in preserved specimens.

Measurements.—Male (24377), entire length of carapace 7.3, entire width of same 9.2, fronto-orbital width 6.6, width of front 3.1 mm.

Range.—Tortugas, Bahamas, and Porto Rico to Trinidad and Curaçao.

Material examined.—Tortugas, Florida; 1924; W. L. Schmitt; gift of Carnegie Institution: Rocks on east side of Loggerhead Key; July 28; 1 male, 1 ovigerous female (60947). Middle section of Bird Key reef; July 26; 1 ovigerous female (60948).

Egg Island, Bahamas; 1893; Biological Expedition, State University of Iowa; 1 male (Mus. S. U. I.).

Porto Rico; 1899; *Fish Hauk:* Mayaguez; on coral reef; January 23; 1 male, 3 females (24378). Porto Real; January 27; 1 male, 2 females (24374). Boqueron Bay; on coral reef; January 28, 1 male, 2 females (24379). Ponce; February 1; 1 male (24380). Reefs at Ponce; January 30; 2 males, 3 females (24375). Lighthouse reef, Playa de Ponce, January 31, 1 female (24376) and February 1, 4 males, 15 females (24377). Lighthouse reef, Arroyo; February 3; 5 males, 2 females, 2 young (24381). Porto Rico; 1 male, 1 young (24382).

St. Thomas: Krebs collector; from Copenhagen Mus.; 1 male, holotype (19705). *Albatross;* 1 male (19893).

St. John: 1 female (Copenhagen Mus.).

Trinidad; Feb. 1878; Crosby collector; from Boston Society of Natural History; 1 ovigerous female (57014).

Caracas Bay, Curaçao; 1920; C. J. van der Horst: Under stones near shore; May 3; 2 males (Amsterdam Mus.). In coral; May 13; 1 male, 1 female (56901), 4 females (1 ovigerous) (Amsterdam Mus.).

PILUMNUS RETICULATUS Stimpson

Plate 209, Figures 4 and 5; Plate 210

Pilumnus reticulatus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 214 [86] (type-locality, St. Thomas; type not extant).—RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 38.

Pilumnus tessellatus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 295, pl. 51, figs. 2–2*d* (type-locality, Desterro, Brazil; type in Paris Mus.).

Pilumnus fragosus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 296, pl. 52, figs. 1–1*f* (type-locality, St. Thomas; type in Paris Mus.).

Pilumnus meridionalis NOBILI, Boll. Mus. Zool. Anat. Comp. R. Univ. Torino, vol. 16, No. 402, 1901, p. 8 (type-locality, Mar del Plata, Argentina; type in Turin Mus.).

Diagnosis.—Hairs reticulated, a single large tubercle in the interstices. Frontal lobes oblique, concave. A few strong suborbital teeth. Greater part of outer surface of major palm bare; at least half of minor palm hairy.

Description.—Carapace, upper surface of chelipeds, and also the legs clothed with short, stout setae, closely arranged to form reticulating lines inclosing small naked polygonal areoles which on the anterior half of carapace and chelipeds are mostly each occupied by a large tubercle projecting forward and flattened on its superior and posterior surface. About eleven such tubercles on carapace excluding marginal ones, and fifteen or more on each cheliped. On the legs there are two tubercles at proximal end of carpus and one at distal end of propodus; otherwise the naked cavities are unoccupied by tubercles; about two areoles occupy width of leg. Some much longer

and stouter clavate setae are dispersed among the short ones which clothe the general surface. Margin of frontal lobes oblique and slightly concave; at the outer ends there is a small blunt subrectangular tooth. Antero-lateral margin with four teeth (including the orbital), similar to the dorsal tubercles. There is also a subhepatic and a subbranchial tubercle. Two or three, occasionally four, projecting teeth on lower margin of orbit between the large inner tooth and the outer orbital tooth.

Lower and distal two-thirds of outer surface of larger palm and half or less of smaller palm smooth and naked; in the young the smaller palm is hairy all over its outer face. Fingers also smooth; only a few setae at base of dactyl.

Variations.—There is considerable variation in the shape of teeth and tubercles. In typical *reticulatus* (pl. 209, figs. 4 and 5) the tubercles are depressed and their surface slightly convex, the lateral teeth are similar lobes or tubercles flattened in a vertical plane, that is, perpendicular to the dorsum. In some specimens the lateral teeth are dentiform, depressed, forming an acute edge corresponding to and continuous with the edge of carapace; this is *forma tessellata* = *forma meridionalis* (plate 210, figs. 7–11). In occasional specimens some of the tubercles are fungiform or mushroomlike; this is *forma fragosa* (plate 210, figs. 1–6).

Measurements.—Male (60220), entire length of carapace 10.8, entire width of same 15.3, fronto-orbital width 9.5, width of front 4.2 mm. Male (48319), entire length of carapace 14, entire width of same 19, fronto-orbital width 11, width of front 5.2 mm.

Range.—From Jamaica and Porto Rico to Patagonia. Panama (Pacific).

Material examined.—

WEST INDIES AND CARIBBEAN SEA.—Jamaica: P. W. Jarvis; specimens returned to sender. March 1–11, 1884; *Albatross;* 1 male, 2 females (18538); *forma fragosa.* Drunken Man's Key, off Kingston Harbor; May 6, 1893; R. P. Bigelow; 1 female (17993); *forma tessellata.*

Porto Rico; 1899; *Fish Hawk:* 1 male, 1 female (24251). Mayaguez; January 19 and 20; 2 males (24249). Mayaguez Harbor; January 20; 1 male (24253). Playa de Ponce Reef; February 1; 1 male (24252). Arroyo; February 4; 1 male, 1 female (24250). Puerto Real; 1 young female (24248).

St. Thomas: January 17–24, 1884; *Albatross*; 4 males (18515). 1915; C. R. Shoemaker, for Carnegie Institution: St. Thomas Harbor, on the bottom of small boat, July 10, 1 female (60219); Gregerie Bay, ½ to 2¾ fathoms, Co. R. S. seaweed, station 7, July 7, 1 male, 4 females (60218). St. Thomas; *Hassler* Exped.; 1 ovigerous female (2457, M.C.Z.).

Virgin Islands; from piles; 1915; C. R. Shoemaker; 5 males, 1 female, 1 young (60220), gift of Carnegie Institution.

Curaçao; 1884; *Albatross;* 1 female (17904).

PANAMA.—Shore of Panama (Pacific side); low tide, rocks; May-July, 1924; Elizabeth Deichmann; 1 male (60224).

Near Panama City; under stones on reefs; May, 1927; Melbourne Ward; 1 female, *forma tessellata;* returned.

BRAZIL.—Pernambuco stone reef at Ilha de Nogueira; July 10, 1899; A. W. Greeley, Branner-Agassiz Expedition; 1 male (25725), 1 female (Stanford Univ.).

Recife Mapelle; 1876–1877; R. Rathbun, Hartt Explorations; 1 male (19966); *forma tessellata.*

Bay of Bahia; specimens in Copenhagen Museum.

Rio de Janeiro; one specimen lent by Copenhagen Museum.

Villa Bella, Ilha São Sebastião, São Paulo; October, 1925; H. Luederwaldt; 1 young (61128); *forma tessellata.*

Ponta da Cruz, São Francisco, Santa Catharina; October 7, 1925; W. L. Schmitt; 1 male (60952); *forma tessellata.*

Florianopolis (formerly Desterro); Fritz Müller; 3 males, cotypes (Paris Mus.), 1 female, cotype (20261), received from Paris Museum; *forma tessellata.*

ARGENTINA.—Buenos Aires (?); 1 male (48319), received from H. von Ihering; *forma tessellata.*

San Antonio W.; A. Carcelles and A. Radice, collectors; 2 males, 9 ovigerous females; lent by Buenos Aires Mus. (14833).

Puerto Militar; Luis Alimonda collector; 2 males; lent by Buenos Aires Mus. (11775, 11776); *forma tessellata.*

PATAGONIA.—Eastern Patagonia; C. E. Porter; 1 male (60951), *forma tessellata,* variety with dorsum nearly smooth.

PILUMNUS NUDIMANUS Rathbun

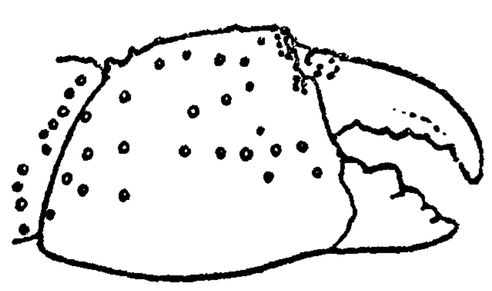
Pilumnus nudimanus RATHBUN, Bull. U. S. Fish Comm. for 1900, vol. 20, pt. 2 (1901), p. 39, text-fig. 7 (type-locality, Arroyo, Porto Rico; holotype female, Cat. No. 23770, U. S. N. M.).

Diagnosis.—Carpus of chelipeds covered with large tubercles set in, but not concealed by, a short dense fur. Palms naked. A tuberculate ridge on hepatic region.

Description.—Carapace covered with a short dense pubescence (easily rubbed off) among which are a few tufts of longer stout setae on the frontal, gastric, and anterior branchial regions. Hepatic region prominent, having an oblique row, parallel to the antero-lateral margin, of five or six small, reddish-brown beadlike tubercles, visible amid pubescence. Antero-lateral margin armed with three spines, stout at the base but sharp at the ends which are hooked forward, the anterior one with a denticle on its posterior slope. A denticle at outer angle of orbit and another behind it. Upper orbital

margin with two or three beadlike tubercles similar to those in the hepatic row; lower margin granulate or crenulate. A subhepatic spinule or denticle. Median sinus of front V-shaped, margin of lobes arcuate, finely granulate; outer tooth small, a reddish tubercle at tip.

Upper margin of arm with a strong subterminal tooth. Wrist densely furred, except in a narrow groove parallel to distal margin, and bearing a number of large tubercles plainly visible of which there is in the major cheliped about 26 behind the groove and 11 in front of it. Hands of female very unequal, naked, sparingly dotted on the outer surface with tubercles, except on lower third of major hand, and a smaller area at proximal end of minor hand, which are smooth. Major dactylus with tubercles above at the basal end. Fingers of minor chela deeply furrowed, three ridges on dactylus granulated for half or two-fifths their length, one ridge on fixed finger granulated for half its length. Legs long-hairy, upper surface of carpal and propodal segments flattened and paved with depressed acorn-shaped tubercles.



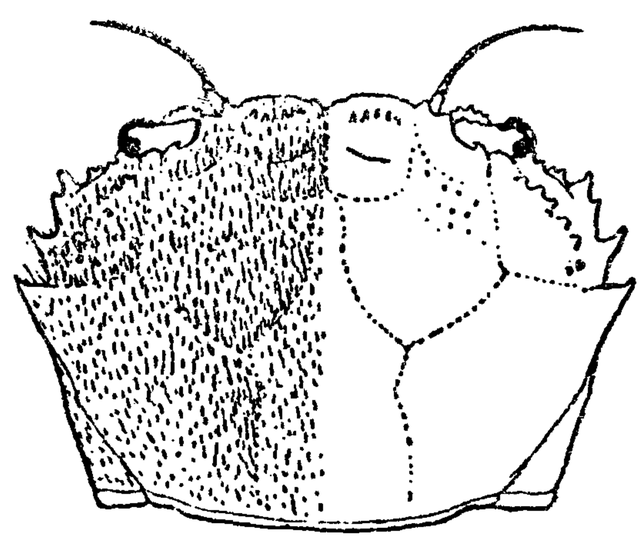


FIGURE 82.—PILUMNUS NUDIMANUS, FEMALE HOLOTYPE. *a*. CHELA. *b*. CARAPACE.

Measurements.—Female holotype, entire length of carapace 6, entire width of same 8.8 mm.

Range.—Porto Rico.

Material examined.—Arroyo, Porto Rico; 1899; *Fish Hawk*: February 4; 1 ovigerous female, holotype (23770). On Lighthouse reef; February 3; 1 young (24241).

PILUMNUS STIMPSONII Miers

Plate 205, Figures 5 and 6

Pilumnus marginatus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 109 [19] (type-locality, Cape St. Lucas; type not extant).

Pilumnus stimpsonii MIERS, *Challenger* Rept., Zool., vol. 17, 1886, p. 147; name substituted for *P. marginatus* Stimpson 1871, preoccupied by Stimpson himself in 1858 for another species from Loo Choo.

Diagnosis.—Small, one-fourth wider than long. Carapace tuberculate, sparsely hairy; antero-lateral margin short, four-toothed or spined. No subhepatic tooth. Both palms rough outside.

Description.—A very small species. Carapace somewhat hairy, moderately convex; middle gastric region distinctly outlined, others less so; surface regularly covered with small, mostly distant, acute tubercles, between which the surface is very minutely punctate.

The punctae probably served as hair sockets. Posterior extremity very narrow. Areolets not protuberant. Median frontal channel rather deep and conspicuous. Front broad, most advanced at middle, lobes with slightly concave, nearly straight oblique margin, separated from the supra-orbital margin by a small notch; its margin is granulated and has a slight channel running parallel with it and separating it from the frontal region. Orbital margin unarmed except by small tubercles or granules, according to Stimpson, and has a single slight fissure at the middle above. In the dried specimen (60223) there is a sharp spinule on the upper margin of each orbit a little within or anterior to the fissure; also two spines on lobe at inner lower angle. Antero-lateral margin sharply defined, almost limbed; armed with three very slightly prominent spines besides angle of orbit and a broad lobe posterior to it, neither of which project beyond the general outline. The three teeth are each composed of two or three denticles of about the size of the dorsal tubercles. Last tooth minute and almost directly behind and above the one in front of it and is easily overlooked. There is no subhepatic tooth but the region is finely granulate.

Ridges of endostome sufficiently marked. Chelipeds large, bristling with spines and acute tubercles. The spines occupy the upper surface of carpus and manus, the longest spines on the margin, five or six on margin of manus; lower down on the outer surface the spines become sharp tubercles which toward the smooth lower margin are scarcely more than granules. The ridges of both fingers are granulate for half their length.

Color.—Chelipeds rosy red in a dried specimen.

Measurements.—Ovigerous female, dried (60223), length of carapace 3.9, width of same 5, posterior width of same 3.7, fronto-orbital width 4, width of front 1.8 mm. Male type, length 4 mm. (0.16 inch), width 5 mm. (0.2 inch).

Range.—West coast of Mexico: Cape St. Lucas to Manzanillo.

Material examined.—Manzanillo, State of Colima; on drifted pile; July 17, 1913; C. R. Orcutt; 1 ovigerous female, 2 young (60223).

Genus LOBOPILUMNUS A. Milne Edwards

Lobopilumnus A. Milne Edwards, Crust. Rég. Mex., 1880, p. 297; type, *L. agassizii* (Stimpson).

Closely allied to *Pilumnus*. Carapace unusually thick, much swollen and deeply lobulate anteriorly. Front consisting of two rounded lobes plainly separated from the inner orbital angles by a rectangular emargination. Orbits with two fissures above and a third below the outer angle. Antero-lateral margin cut into three large teeth behind the orbital tooth or lobe; they are roughened by numerous spinules or tubercles. A tubercle or small tooth on sub-

hepatic region. Basal article of outer antennae very short, not reaching or barely reaching the prolongation of the front. Merus of outer maxillipeds wider than long, anterior border concave, inner emargination obtusangled. Buccal cavity wide anteriorly; endostome with a sharp crest on each side. Abdomen of seven distinct segments.

LOBOPILUMNUS AGASSIZII (Stimpson)

FORMA TYPICA

Plate 211, Figures 1 and 2

Pilumnus agassizii STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 142 (type-localities, between East and Middle Keys, Tortugas, 5 to 7 fathoms, and east of the Tortugas, 13 fathoms; types not extant).

FORMA PULCHELLA

Plate 211, Figure 3

Lobopilumnus pulchellus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 299, pl. 52, figs. 4*a* and 5 (type-locality, Florida reefs; cotypes in M.C.Z., cotype from Sombrero in Paris Mus.).

FORMA BERMUDENSIS

Plate 211, Figure 5

Lobopilumnus agassizii A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 298, pl. 52, fig. 4–4*c* (Florida reefs, Bermudas).

Lobopilumnus agassizii bermudensis RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 269 (type-locality, Bermuda; type, Cat. No. 42798, U.S.N.M.).

Lobopilumnus agassizii bermudensis A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 319.

Lobopilumnus agassizii var. *bermudensis* VERRILL, Trans. Connecticut Acad. Arts and Sci., vol. 13, 1908, p. 360, pl. 14, figs. 1 and 2.

FORMA TRINIDADENSIS, new

Plate 211, Figure 4

See below.

Diagnosis of species.—Carapace rough and hairy. Marginal teeth sharp, divergent. Frontal lobes denticulate. Chélae thickly tuberculate.

Description of typical form.—Areolets of carapace protuberant. Surface pubescent everywhere except on the anterior and antero-lateral areolets which are naked and thickly granulated. The depressions between the protuberant areolets are broad, occupying fully as much space as the areolets themselves. Two of the areolets form the broad lobes of the front, which are as large and prominent as the epigastric lobes, or even larger. Frontal surface vertical, not much projecting, but the lobes are deeply separated from each other and from the small lobules at the outer ends of the front. Orbital region protuberant and granulate; margin not toothed, but crenulated with granules, not advanced at outer angle, and marked by two fissures above and one less conspicuous one below. The antero-lateral margin

behind the orbit is armed with three triangular, spine-tipped, equal teeth of moderate size. Subhepatic tooth distinct.

Chelipeds short, stout; carpus covered above with granulated tubercles which are confluent exteriorly, forming transverse ridges; hand covered above and outwardly with small but prominent mammillary tubercles, having their apices pointing forward and arranged largely in longitudinal lines on the outer surface. Legs pubescent and hairy, carpal and propodal articles armed with minute spines or spiniform granules above.

Color.—Above sand filled gray pile, granules and knobs are ochraceous rufous + madder brown; inner sides of meral joints of legs and chelipeds smooth and much white. Whitish spots. (Schmitt, Cat. No. 61110.) *Forma bermudensis:* Yellowish or salmon; fingers black (Verrill). Fingers dark burnt umber with whitish apices; hands pink flesh color on inside and between articulation of fingers on outside (Schmitt).

Variation.—The species is variable especially as to the number and prominence of the areolets on the carapace. The typical form is not uncommon on the west coast of Florida. Some of the extremes are worthy of distinct names. In *forma bermudensis* the areolets are fewer and lower than in typical *agassizii*, those of the protogastric and epibranchial regions are inconspicuous. Pubescence more widespread, concealing much of the granulation. Sharp granules few or altogether absent from upper surface of carpus and propodus of legs. This form has been found not only at Bermuda but on the Florida reefs (A. M. E.) and near Key West. (See table, pp. 528 and 529.)

Contrasting with *bermudensis* is a form (*forma pulchella*) reaching further south to Cuba and the Yucatan Channel which was described by A. Milne Edwards from the Florida reefs. It is the roughest form, the areolets embracing the mesogastric region, which has three, the whole protogastric region which has four or five, and that part of the branchial region between the mesogastric region and the posterior of the lateral teeth. The bare areolets form a striking pattern against the pubescent background.

Quite at the other extreme is a single specimen supposed to have come from Trinidad, in which the regions and subregions show little signs of areolation and the hairy coat is unusually thick. The granules or tubercles are few, even on the antero-lateral teeth. I call this *forma trinidadensis*.

Habits.—Verrill says [53] of *forma bermudensis:* "When living the carapace and legs are often rather thickly covered, and sometimes almost concealed, by a coating of whitish calcareous mud and sand that adheres to the hairs that cover the back. * * * It is most

[53] Trans. Connecticut Acad. Arts and Sci., vol. 13, 1908, p. 360.

Material examined of Lobopilumnus agassizii and its formae

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
Florida:	° ′ ″	° ′ ″			°C.						
Pensacola						1882		Silas Stearns	1♂	4498	
Southwest of Cape San Blas.	29 18 15	85 32 00	25	crs. gy. S. brk. Sh		Feb. 7, 1885	2370	*Albatross*	1♂	17811	
Do	29 15 30	85 29 30	27	G		do	2372	do	2♀	17816	
Do	29 11 30	85 29 00	26	S. G. brk. Sh		do	2374	do	1♂	17822	
Pepperfish Key section	29 03 45	83 38 00	9¾	Sh. S	17.5	Nov. 27, 1901	7172	*Fish Hawk*	1 y. ♀	60756	
South of St. George Island.	28 46 00	84 49 00	26	crs. S. Co		Mar. 15, 1885	2406	*Albatross*	2♂ 4♀	17817	
Do	28 47 30	84 37 00	24	Co. brk. Sh		do	2407	do	1♂	17818	
North Key section	28 54 00	83 30 30	11	R. Co. S	17	Nov. 28, 1901	7185	*Fish Hawk*	1♀	53741	
Do	28 47 45	83 28 00	11½	R. Sh	17	do	7186	do	2♂	53740	
Southwest of Sarasota	27 04 00	83 21 15	26	crs. gy. S. brk. Sh.		Mar. 18, 1885	2409	*Albatross*	2♀	9815	
Off Charlotte Harbor	26 33 00	83 10 00	28	sdy	19.1	Apr. 2, 1901	7123	*Fish Hawk*	1♂ 1♀	25626	
West of Sanibel Islands	26 18 30	83 08 45	27	fne. gy. S. bk. Sp. brk Sh.		Mar. 19, 1885	2412	*Albatross*	2♀	9833	
West of Marco	26 00 00	82 57 30	24	fne. S. bk. Sp. brk. Sh.		do	2413	do	2♂ 4♀	9837	
Off Cape Romano	25 50 15	82 41 45	21	sdy	20	Apr. 2, 1901	7124	*Fish Hawk*	3♀	25625	
Inside Sombrero								U. S. C. S. str. *Bache*; Wm. Stimpson.	1♂ 3♀	2989, M.C.Z.	*Forma bermudensis.*
North of Tortugas	25 04 30	82 59 15	26	fne.wh. S. brk. Sh.		Mar. 19, 1885	2414	*Albatross*	1♂ 2♀ 1y	17819	
Off Northwest Channel	24 46 12	81 53 30	10¼	Co	19	Feb. 24, 1902	7290	*Fish Hawk*	1♂	53742	*Forma bermudensis.*
Do	24 42 30	81 55 52	7¼	Co	20	do	7293	do	1♂ 1♀ ovig.	53743	
Off Key West, inside the reef.	Key West Light to E. channel Bar Buoy, 71° 53′, to Beacon A, 74° 46′.		5¼	Co. S. G	20	Feb. 13, 1902	7278	do	1 y.♂	60755	
Off Key West			(1)			June 26, 1893	45, 46	Biological Expedition, State University of Iowa.	2♂ 1♀ 1y	S. U. I	
Tortugas						1893		do	2♂ 1♀ 1y 1♀	S. U. I. 20024	
Do						1873		W. H. Jaques	1♀ ovig.	4816 M.C.Z.	Typical.
Do	In channel 5/8 mile N. of Bird Key.		10.5			July 17, 1924	7	W. L. Schmitt	1♀	60899	Gift of Carnegie Institution.
Do	Across S. end of White Shoal.		9.5			July 19, 1924	23	do	1♂	60900	Do.

Do	S. of No. 2 buoy		(2)			July 22, 1924	40	do	1♀	60902	Do.
Do	6 miles S. of No. 2 buoy		18			do	44	do	1♂	61110	Do.
Do	Between No. 2 buoy and No. 1 spar, cross channel haul.		8–5			June 11, 1925	213	do	2 chelae	60903	Do.
			Feet								
Do	3 miles N. of Loggerhead Key on shoals.		10–45			June 17, 1925		Taylor and Dexter	1♂	60904	Do.
Do	S. of Loggerhead Key toward old wreck.					June 19, 1925		Taylor	1♂	60901	Do.
West Florida			19					U. S. C. S. str. *Bache;* Wm. Stimpson.	1♀ ovig.	2975, M.C.Z.	Typical.
Do								do	1♂ 1♀	2976, M.C.Z.	Cotypes of *pulchella.*
Off Majeres			12					do	1 y	2988, M.C.Z.	Cotype of *pulchella.*
Gulf of Mexico						1885		*Albatross*	1♂	40275	
Yucatan:			*Fathoms*								
North of Cape Catoche	22 07 30	87 06 00	21	wh. R. Co		Jan. 30, 1885	2363	do	1♀	17820	*Forma pulchella.*
Do	22 18 00	87 04 00	24	wh. R. Co		do	2365	do	1♀	17821	Do.
Contoy Island			12–18					Wm. Stimpson	1♀	2977, M.C.Z.	Cotype of *pulchella.*
Cuba: Reef Lavesos Italienos, opposite Cayo Lavesos.			2–3	Co. S. R		June 2, 1914		Henderson and Bartsch.	1 ovig. ♀	48563	*Forma pulchella.*
Trinidad:								Crosby	1♀	56764	Type of *forma trinidadensis.* Received from Boston Society of Natural History.
Bermuda:						1876–1877		G. Brown Goode	7♂ 9♀	42798	Types of *forma bermudensis.*

[1] Shallow.

[2] About 20.

frequently found under stones and dead corals. * * * Common, both on the reefs and rocky shores, at low tide."

Measurements.—Male, *forma typica* (53742), entire length of carapace 22.7, entire width of same 30.2, fronto-orbital width 19, width of front 8.8 mm. Female, *forma pulchella* (48563), entire length of carapace 18.5, entire width of same 25.3, fronto-orbital width 16, width of front 7.4 mm. Male, *forma bermudensis* (42798), entire length of carapace 24.6, entire width of same 33.2, fronto-orbital width 21.9, width of front 10 mm. Female, *forma trinidadensis* (56764), entire length of carapace 21.3, entire width 30.3, fronto-orbital width 19.1, width of front 8.8 mm.

Range.—Gulf of Mexico (west coast of Florida and Florida Keys), Yucatan Channel, Cuba, Trinidad.

Material examined.—See table, pages 528 and 529.

Genus HETERACTAEA Lockington

Heteractaea LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 97 [3]; type, *H. pilosus* Lockington=*H. lunata* Milne Edwards and Lucas.

Dorsal aspect hairy as in *Pilumnus*. Carapace approaching a typical Xanthid form, little swollen. Fronto-orbital distance great, front with a straight thick border. Orbital border thick, lobed below. Antero-lateral border spinous. No palatal ridge. Carpus of ambulatory legs armed above with a raised crest in the shape of a horn. Abdomen of male with third, fourth and fifth segments fused.

Known only in tropical and subtropical waters of America.

KEY TO THE SPECIES OF THE GENUS HETERACTAEA

A[1]. Crest of carpus of ambulatory legs bearing only one horn. Orbit bilobed below ..... **ceratopus**, p. 530.

A[2]. Crest of carpus of first three ambulatory legs bearing two horns. Orbit trilobed below ..... **lunata**, p. 532.

ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

Atlantic	Pacific
ceratopus	*lunata*

HETERACTAEA CERATOPUS (Stimpson)

Plate 212, Figures 5–8; Plate 213

Pilumnus ceratopus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 215 [87] (type-locality, Key Biscayne, Florida; type not extant).

Pilumnus? SCHRAMM, in Desbonne and Schramm, Crust. Guadeloupe, 1867, p. 33, pl. 3, figs. 9 and 10.

Heteractaea ceratopus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 300, pl. 52, fig. 3–3*d*.

Diagnosis.—Crest of carpus of all the ambulatory legs with a single horn at distal end. Inferior orbital margin bilobed.

Description.—Body clothed above with very short tufts of pubescence somewhat irregularly arranged, leaving many open spaces;

feet much more thickly covered with a longer hairy coat. Carapace flattened posteriorly but anteriorly sloping moderately toward the margins. Regions sufficiently distinct. A transverse ridge on frontal region, interrupted at middle. Surface naked along anterior margins which are obtuse and thickened. Three long and strong acute spines on antero-lateral margin, directed more forward than outward, and in the same line a slender spinule in front of the first and of the second principal spine. One principal and one or two minor subhepatic spines. Front nearly horizontal, very little advanced; a large median V emargination separating two slightly oblique lobes, each with a projecting lobule at inner end. Superior margin of orbit unarmed, fissured at middle; outer angle tuberculiform, projecting laterally; inferior margin deeply bilobate; lobes large, triangular, projecting; external hiatus well marked.

Chelipeds very unequal, covered above and externally with short spines more or less pyramidal in form; infero-distal half of outer surface of palm naked; upper half of inner surface tuberculate and granulate. Fingers channeled. Legs compressed, densely hairy; merus spined above and with a larger spine at extremity; carpus with a large, smooth, procumbent, hornlike process lying on its upper side, in front of which are three or four spines along the anterior margin. All the leg spines have a tuft of long hairs inserted on one side near the tip.

Color.—Carapace milk white. Naked part of palm bright red or purplish; fingers black. Feet a little red; nails brown. Hairs russet.

Measurements.—Male (24845), entire length of carapace 20.5, width excluding spines 27.2, including spines 30, fronto-orbital width 15, width of front 7.7 mm.

Range.—From Bahamas and Miami, Florida, to Trinidad.

Material examined.—

BAHAMAS.—Green Turtle Cay; E. A. Andrews; 1 female (20711).

Andros Island; in sponge; Frederick Stearns; 1 male (42794).

Bahamas; Dr. Henry Bryant; 1 male (56820), received from Boston Society of Natural History.

FLORIDA.—Miami; G. M. Gray; 1 female (42142).

Hawk Channel, 4¼ miles W. by N. of Elbow Reef beacon; 2¾ fathoms; barry, S.; temperature 20.5° C.; February 19, 1903; station 7467, *Fish Hawk;* 1 male (60741).

Duck Key; in coral; December 19, 1912; *Fish Hawk;* 1 male (60740).

Key West; January 28, 1901; B. A. Bean and W. H. King; 2 males, 3 females (24845).

Tortugas; June 5–8, 1893; Biological Expedition, State University of Iowa; 1 male (S. U. I.), 1 female (20025).

Tortugas; 1924; gift of Carnegie Institution: Washed from weeds and rocks off mid-section of Bush Key reef inside, 3 feet before eelgrass; August 1; W. L. Schmitt; 1 male (62520). S. end of Loggerhead Key, from large rock 2 feet by 18 inches by 18 inches; August 10; W. H. Longley; 2 females, 1 young (62521).

CUBA.—Los Arroyas; May 20, 1914; Henderson and Bartsch; station 8, *Tomas Barrera* Expedition; 1 young (48521).

Punta Colorado; 2 to 3 fathoms; Sh. Grs.; May, 1914; same collectors; station 10; 1 male (47920).

CARIBBEAN SEA.—Caracas Bay, Curaçao; 1920; C. J. van der Horst: May 5; 1 male in sponge (56882), 1 female, in coral (56881). 6 males, 3 females, 2 young (Amsterdam Mus.).

Trinidad; February, 1878; Crosby, collector; 1 male (56821), from Boston Society of Natural History.

Barbados; from coral heads; June 4, 1918; Barbados-Antigua Expedition; 2 females (58004), from State University of Iowa.

HETERACTAEA LUNATA (Milne Edwards and Lucas)

Plate 212, Figures 1–4; Plate 214

Pilumnus lunatus MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, 1843, p. 20; atlas, vol. 9, 1847, pl. 9, figs. 2–2*d* (type-locality, Valparaiso; type in Paris Mus.).—STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 216 [88].—STREETS and KINGSLEY, Bull. Essex Inst., vol. 9, 1877 (1878), p. 106.

Heteractaea pilosus LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 97 [3] (type localities, San José Island, Amortiguado Bay; and Port Escondido, both in the Gulf of California; types not extant).

Heteractaea lunata KINGSLEY, Proc. Acad. Nat. Sci. Philadelphia, 1879 (1880), p. 396.—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 301, pl. 52, fig. 2–2*b*.

Diagnosis.—Crest of carpus of ambulatory legs two-horned or crescentic; no crest on last pair. Inferior orbital margin trilobed, a small lobe between two large ones.

Description.—Similar to the preceding. Carapace wider in proportion to its length; surface rugose or granulous. Front thick as in *ceratopus*, but doubled by a padlike crest which runs parallel and close to the marginal crest. Superior margin of orbit without fissure; inferior margin with a small tooth or tubercle between the two large lobes. Antero-lateral margin with three pointed teeth, directed more outward than forward. Two large tubercles on subhepatic region; one is visible from above between the first antero-lateral tooth and the exorbital lobe, the other is below the outer end of that lobe and is partially concealed by it; the subhepatic tubercles form a continuous line with the antero-lateral teeth (but not the exorbital lobe) and lead up to the outer lobe of the inferior orbital margin.

Chelipeds covered with coarse conical tubercles each of which forms a center for a rosette of short coarse hairs. Ambulatory legs

more hairy than chelipeds. The crest of the carpus in the first three pairs only has two spines above, one near each end, forming a crescent.

Color.—Carapace and legs russet brown. Palms rose color, fingers deep brown.

Measurements.—Male (33274), entire length of carapace 10.2, width excluding spines 14.6, including spines 15.5, fronto-orbital width 9, width of front 4.3 mm. Male (Gulf of California), length of carapace 19, width 27 mm. (Lockington).

Range.—From San Diego, California (Faxon) to Valparaiso, Chile.

Material examined.—

MEXICO.—Los Coronados Island; imbedded in coral [54]; 1 female; returned to Mrs. Kate Stephens, San Diego Society of Natural History.

Maria Madre Island; California Acad. Sci.: E. part of bay; 5–8 meters; May 17, 1925; F. Contreras; 2 males (62700). 4–10 fathoms; 2 males, returned.

PANAMA.—Capt. J. M. Dow; 2 males, 3 females (2146). March 12, 1891; *Albatross;* 1 male (20603). Low tide, rocks; May–July, 1924; E. Deichmann; 1 male, soft shell (60742).

Taboguilla Island; *Albatross:* 1 fathom; low tide, from coral; October 31, 1904; 4 males, 2 females, 1 young (33274). Between tide-marks; October 31, 1899; 1 male, 1 female (M.C.Z.).

Genus ACIDOPS Stimpson

Acidops STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 110 [20]; type, *A. fimbriatus* Stimpson.—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 301.

Carapace broad, smooth, with convex antero-posterior and nearly plane transverse dorsal outline; surface nearly even. Antero-lateral margin short, acute, with three inconspicuous teeth, besides the angle of the orbit. Eyes and orbits elongate, resembling somewhat those of certain Macrophthalmoids. Orbits destitute of teeth or fissures. Eye-peduncles flattened, with an acute anterior edge continuous with the margin of the carapace. The basal article of the external antennae fills the orbital hiatus and just reaches the front. Chelipeds short. Legs broad and compressed except the dactyli which are narrow. Abdomen of male with the third segment much produced on either side; appendages of first pair broadly laminate at base, geniculated at the posterior third of their length and tapering to a fine point somewhat incurved toward the extremity and reaching to the penult segment of the abdomen; those of the second pair two-thirds as long as the first, slender, cylindrical, and tapering to a filiform extremity.

[54] Of this coral Dr. T. Wayland Vaughan says, "probably near *Pocillopora capitata* Verrill, which is found along the west coast of America from Lower California to Panama."

Somewhat allied to *Pilumnus* but differs greatly in the character of orbits and eye-peduncles. (Stimpson.)

West Coast of Mexico; South Australia.

ACIDOPS FIMBRIATUS Stimpson

Plate 215

Acidops fimbriatus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 111 [21] (type-locality, Cape St. Lucas; type not extant).

? *Ceratoplax ciliata* CANO, Bull. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, p. 229 (Ecuador). Not *C. ciliata* Stimpson.

Diagnosis.—Eyestalks long (for a Xanthid) and flattened. An anterior fringe of hair. Lateral teeth inconspicuous. Chelipeds short.

Description.—Anterior and antero-lateral margins of carapace ciliated with a fringe of long fine hairs. Carapace covered with a short pubescence and areolated, the areolets being sufficiently distinct, but not at all protuberant. Angle of orbit and next tooth of antero-lateral margin about equal in size; the other two teeth very small. Subhepatic region smooth. Front not prominent; median sinus slight; lobes very slightly convex. A strong, prominent endostomial ridge, continued to the epistome. External maxillipeds hairy; merus somewhat swollen. Chelipeds somewhat hairy; hand granulated on outer side; fingers short, acuminate and with granulated longitudinal ridges. Legs ciliated. Resembles *Ceratoplax ciliatus* in appearance. (After Stimpson.)

Measurements.—Male type, length of carapace 5.3 mm. (0.21 inch); width of same 7.1 mm. (0.28 inch). Female (Baumoris), length of carapace 10.3, width of same 14.3 mm.

Range.—Cape St. Lucas, Lower California, Mexico (type-locality); ? Ecuador; South Australia.

Material examined.—Baumoris, Port Phillip, Victoria, Australia; J. Gabriel; 1 female (Australian Mus.). This specimen sent for examination some years ago fits Stimpson's description except in one minor point, that is, the first 3 lateral teeth are subequal and larger than the fourth, instead of the last two very small. The Australian specimen is twice as large as the type and of the opposite sex. The areolation of the carapace is fairly distinct in spite of the pubescence which is very short and dense and mixed on the elevations with a few long, coarse hairs. Maxillipeds wide, merus transversely oblong-oval, without a notch at the inner angle. First segment of abdomen (female) much wider than any of the others.

Genus PILUMNOIDES Milne Edwards and Lucas

Pilumnoides MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1843, p. 21; type, *P. perlatus* (Poeppig).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 303.

Carapace thick, swollen, suborbicular, narrow behind. Regions well marked, little prominent. Front bilobed and deflexed. Orbits deep, almost circular, superior emarginations typically replaced by closed fissures. Antero-lateral margins little oblique, prolonged inward and backward from the last lateral tooth by a small crest on the branchial regions. Basal article of outer antennae remarkably short, second article scarcely reaching the subfrontal prolongation; flagellum short. Basal article of inner antennae wide and raised, the fossette in which the remaining articles are folded is oblique. The buccal cavity bears on either side a small emargination, corresponding to an endostomial crest which limits the canal of the branchial chamber. Outer maxillipeds wide; merus rounded at external angle and slightly cut inside for insertion of palp. Chelipeds subequal, short and strong; arm entirely concealed under carapace; three large lobes or tubercles on upper margin of palm. Last three articles of ambulatory legs rounded above, dactyli terminated by slender, pointed nails. Abdomen of male with seven free segments.

Panama to Chile; southern Florida and West Indies; Argentina to Straits of Magellan.

KEY TO THE SPECIES OF THE GENUS PILUMNOIDES

A[1]. Carapace and chelipeds not thickly covered with hair. A large tubercle on outer surface of immovable finger.
  B[1]. Branchial ridge almost transverse.....**perlatus, p. 535.**
  B[2]. Branchial ridge almost longitudinal.....**hassleri, p. 537.**
A[2]. Carapace and chelipeds thickly covered with hair. No large tubercle on outer surface of immovable finger.....**nudifrons, p. 538.**

ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

Atlantic	Pacific
hassleri	*perlatus*

PILUMNOIDES PERLATUS (Poeppig)

Plate 216; Plate 217, Figure 3; Plate 218, Figure 3

Hepatus perlatus POEPPIG, Arch. f. Naturg., vol. 2, pt. 1, 1836, p. 135, pl. 4, fig. 2 (type-locality, St. Vincent Bay, near Talcahuano, Chile; type in Mus. Univ. Leipzig).

Pilumnoides perlatus MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1844, p. 21; atlas, vol. 9, 1847, pl. 9, figs. 1–1*c*.—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 304, pl. 54, figs. 6, 6*a*.—RATHBUN, Revista Chilena Hist. Nat., vol. 11, 1907, p. 49, pl. 2, figs. 1 and 2; Proc. U. S. Nat. Mus., vol. 38, 1910, p. 544, pl. 50, fig. 2.

Pilumnoides danai KINAHAN, Journ. Roy. Dublin Soc., vol. 1, 1857, pp. 333 and 337, pl. 14, fig. 2 (type-locality, Chinchas Islands, Peru, 7 fathoms; type in Mus. Roy. Dublin Soc.).

Diagnosis.—Branchial ridge almost transverse. Short transverse granulated ridges on anterior part of carapace.

Description.—Carapace broader than long, anterior two-thirds tuberculate, the tubercles forming, in part, short transverse striae,

posterior third nearly smooth; antero-lateral margin with five or six irregular teeth. Front most produced at middle. Outer orbital sinus narrow, between two flat sharp-edged teeth. Chelipeds tuberculate, tubercles arranged in rows on lower half of palm, the next to the lowest row terminating in a large tooth or tubercle on the outside of the immovable finger; upper edge of palm trilobate or tridentate; fingers brown with white tips, gaping slightly in basal half. Legs slender, terminal half or third furry.

Color.—Larger specimens, dark bistre with a whitish area either side of posterior portion. Smaller ones almost black; clove brown carapace and legs; chelipeds except fingers a sort of lavender gray; fingers olive or bistre. (Schmitt.)

Measurements.—Male, Valparaiso, length of carapace 18, width of same 23.3 mm. Female, ovigerous, Valparaiso, length of carapace 10.2, width of same 13 mm.

Range.—Panama (Cano) to Chile. Accidental at Queenstown, Ireland, and Plymouth, England (Calman).

Material examined.—

PERU.—Paita; October 7 and 8, 1926; 1 male, 3 young (60929, 60932).

Bay of Sechura, west of Matacaballa; about 5 fathoms, in trawl; April 8, 1907; R. E. Coker, collector, for the Peruvian Government; specimens returned.

Salavery; 1926; W. L. Schmitt: October 19; 1 male, 1 female, 10 young (60927). October 21; 11 males, 9 females (1 ovigerous), 12 young (60816). October 23 and 24; 18 males, 37 females (7 ovigerous) 9 young (60815).

Near northeast side of San Lorenzo Island; 2.5 fathoms, dredged; same collector; 1 male, 2 females (40423).

San Lorenzo Island; 1926; W. L. Schmitt: November 1; 1 female (60928); November 3; 6 males, 1 female, 5 young (60819). November 7; 1 young female (60818). Dredged; 4 young (60930).

Callao; specimens in Copenhagen Museum.

CHILE.—Antofagasta: November 6, 1914; J. N. Rose; 2 females (49058), received from the Carnegie Institution. November 15, 1926; W. L. Schmitt; 3 females (1 ovigerous), 6 young (60817).

Valparaiso Bay; C. E. Porter; 1 male, 1 female, returned to Mus. Hist. Nat. Valparaiso; 1 female (32263).

Valparaiso; April, 1920; Edwyn Reed; 8 males, 11 females (5 ovigerous); lent by Buenos Aires Museum (10806).

Valparaiso; January 7, 1927; W. L. Schmitt; 16 young (62551).

Talcahuano; January 15, 1927; W. L. Schmitt; 1 male, 2 females (60931).

PILUMNOIDES HASSLERI A. Milne Edwards

Plate 217, Figures 1 and 2

Pilumnoides hassleri A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 304, pl. 54, fig. 5–5*d*, (immature female) (type-locality, lat. 40° 22′ S., long. 60° 35′ W., 30 fathoms; cotypes in M.C.Z., cotypes in Paris Mus.); Bull. Mus. Comp. Zoöl., vol. 8 ,Dec. 1880, p. 13.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 317.

Pilumnoides perlatus RATHBUN (not Poeppig), Proc. U. S. Nat. Mus., vol. 21, 1898, p. 586.

Diagnosis.—Branchial ridge longitudinally oblique, almost parallel to postero-lateral margin. Carapace granulate.

Description.—Less strongly marked than *P. perlatus*. Carapace longer and narrower, postero-lateral margins more convergent. Surface of anterior two-thirds finely granulate; two hepatic nodules, the outer one small. Antero-lateral margin definitely quinquedentate, counting the angle of the orbit and a lobe immediately behind it; the margin is prolonged on the branchial region in a line almost parallel to the postero-lateral margin. The upper margin of the orbit sometimes but not always shows traces of emargination at the fissures; outer fissure narrow, its borders not raised. Ornamentation of chelipeds similar to that in *perlatus* but on the upper half of outer surface of palm the tubercles are in large part clustered together, forming larger unequal tubercles. The lobes on the upper margin are more dentiform than in the allied form. The lobe on the outside of the propodal finger is more projecting than in *perlatus;* the lower margin of that finger is arcuate, not straight. Fingers light colored in preserved specimens.

Measurements.—Male (53446), length of carapace 11.7, width of same 13.1 mm.

Range.—From Uruguay to the Straits of Magellan.

Material examined.—

URUGUAY.—Lat. 35° 24′ S., long. 53° 10′ W.; 70–75 fathoms; June 13–July 1, 1925; *Undine*, Capt. C. Alexandersson; 7 males, 1 female, 5 young; lent by Buenos Aires Museum (15885).

ARGENTINA.—Off the Rio de la Plata; January 13, 1888; *Albatross:* Lat. 36° 42′ S., long. 56° 23′ W.; 11.5 fathoms; S. brk. Sh.; 3 young (21989). Lat. 36° 43′ S., long. 56° 23′ W.; 10.5 fathoms; S. brk. Sh.; 4 males, 3 females, 5 young (21990). Lat. 36° 47′ S., long. 56° 23′ W.; 10.5 fathoms; S. brk. Sh.; 1 male, 4 females (21991).

Mar del Plata: April 29, 1919; F. Felippone; 1 male (53446). Martin Doello-Jurado collector; lent by Buenos Aires Museum: 25 fathoms, March 1918, 4 females (1 ovigerous), Cat. No. 9359; from the market, August 7, 1918, 1 male, 3 females; 2 males, 7 females, Cat. No. 10763; 2 males, 3 females, Cat. No. 9445. August 28, 1920,

3 females, Cat. No. 11381. April 14, 1921, M. Lesieux collector, 2 males, 2 females (1 ovigerous), lent by Buenos Aires Museum. February 1924, Leloir and Francheshi collectors, 1 male, lent by Buenos Aires Museum (14292).

Off Mar del Plata, 1914, *Patria*, lent by Buenos Aires Museum: Station 76, 1 male, 9 females, Cat. No. 8620; station 81, 2 males, 4 females (3 ovigerous).

Off Punta Mogotes; about 25 meters; *Patria;* lent by Buenos Aires Museum; Second voyage, station 75, 1 male, 2 females; second voyage, stations 75 and 76, 4 males, 4 females; station 77, 11 males, 8 females, 1 young.

Off Argentina; 1872; *Hassler:* E. of Creek Id.; lat. 40° 22′ S., long. 60° 35′ W.; 30 fathoms; March 3; station 27; 12 specimens, cotypes (2979, M.C.Z.). Off Bermeja Head; lat. 41° 17′ S., long. 63° 00′ W.; 17 fathoms; March 4; station 28; 1 specimen (2978, M.C.Z.).

Coast of Argentina; F. Felippone; 1 female (61123).

PATAGONIA.—Point Madryn (probably); 2 young females; lent by Buenos Aires Museum.

CHILE.—Straits of Magellan; lat. 52° 22′ 30″ S., long. 69° 22′ 00″ W.; 29.5 fathoms; S. St.; January 18, 1888; station 2775, *Albatross;* 1 male (21992).

PILUMNOIDES NUDIFRONS (Stimpson)

Plate 218, Figures 1 and 2

Pilumnus nudifrons STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 143 (type-locality, off Sombrero Key, 111 and 125 fathoms; types destroyed in the Chicago fire).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 293, pl. 53, figs. 1–1*g*.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 320.

Pilumnoides nudifrons RATHBUN, Bull. Lab. Nat. Hist., State Univ. Iowa, vol. 4, 1898, p. 263.

Diagnosis.—Carapace and chelipeds thickly hairy; a bare strip across front and orbits. No large tubercle on outside of propodal finger.

Description.—Carapace more swollen than in the other species and front more deflexed; surface densely clothed with a short vesicular pubescence except for a naked band across the front and postorbital region; some longer hairs on anterior portion. When the hairs are removed the surface shows granulation on the highest parts of the subregions, separated by broad smooth spaces. Frontal lobes less oblique than in *perlatus* and *hassleri*. Slight emarginations in the upper border of the orbit, separated by a shallow lobe; outer sinus broad and shallow. Lateral teeth much as in *hassleri* but the last three are erect.

Material examined of Pilumnoides nudifrons

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.
	° ′ ″	° ′ ″			°F.					
Florida: Gulf Stream, off Key West	24 21 55	81 58 25	98	S	55	Feb. 14, 1902	7279	*Fish Hawk*	3♀ ovig	60811
Do	24 13 45	81 58 15	304	S	52	do	7281	do	1♂	60813
Do	24 18 37	81 36 50	127	rky	58	Mar. 4, 1902	7301	do	1♀ ovig	60814
Off Key West	Sand Key Light, NNW.		(1)			June 20, 1893	30	Biol. Exped. State Univ. Iowa	1♂	Mus. S.U.I.
Off Sand Key	Sand Key Light, N., about 6 miles.		116			June 19, 1893	29	do	1♀	20023
Off American Shoal	American Shoal Light, NE. by N., 8 miles		70–80			June 29, 1893	62	do	1♂	Mus. S.U.I.
Sambo Key			118			1916		*Eolis* (J. B. Henderson)	1♀	60812

[1] About 100.

Merus of outer maxillipeds produced obliquely forward and outward. Outer aspect of chelipeds densely hairy, hairs longer than the pubescence of the carapace and extending over the base of the dactylus and all but the tip of the propodal finger. When the hairs are removed, four or five rows of tubercles are visible but less regular than in the above species and interspersed on the distal portion including bases of fingers with closely placed tubercles. No large tubercle on outside of propodal finger. Three large tubercles on upper margin of palm, the first two subequal and subacute, the third or most distal very much larger, broadly rounded, domelike. Last three articles of ambulatory legs as well as sternum and abdomen densely hairy.

Measurements.—Male, station 30, length of carapace 14.8, width of same 17.4 mm.

Range.—Florida Straits; Barbados (A. Milne Edwards). 70 to 304 fathoms.

Material examined.—See table on this page.

Genus OZIUS Milne Edwards

Ozius MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 404; type, *O. tuberculosus* Milne Edwards.

Carapace broad, transversely oblate-oval, moderately convex fore and aft, slightly convex or nearly flat from side to side; the regions, except gastric, little defined; the surface smooth or granular, often rugose anteriorly. Antero-lateral borders of good length, strongly arched, usually

broadly crenate or lobulate; postero-lateral borders convergent, about as long as or shorter than antero-lateral. Front rather broad (considerably more than a fourth, the greatest breadth of carapace), obliquely deflexed, cut into four lobules or teeth of about equal size, separated from orbit by a notch. Orbits deep, rather small, the grooves near outer angle inconspicuous; eyes on short, thick stalks. The antennules fold nearly transversely. Basal antennal article prolonged between side of front and orbital plate; the flagellum, which is very small (about half the major diameter of the orbit in length,) stands in the orbital hiatus. The ridges of the endostome, defining the expiratory channels, are very strong, and the opposed margin of the merus of the external maxillipeds is notched, usually very deeply, so that a permanent expiratory orifice results. Chelipeds massive, unequal in both sexes; the fingers of good length, pointed, not hollowed. The abdomen of the male consists of seven segments.

Indo-Pacific region; both sides of middle America.

KEY TO THE AMERICAN SPECIES OF THE GENUS OZIUS

A[1]. Carapace less than one and a half times as wide as long. Size large. Chelipeds smooth ---------- **verreauxii**, p. **540**.

A[2]. Carapace more than one and a half times as wide as long. Size small. Chelipeds rough.

B[1]. Minor manus more than half as high as major. Lateral border marginate.

C[1]. Inner surface of manus not swollen near proximal end. Anterior and antero-lateral borders together not broadly arched. **reticulatus**, p. **542**.

C[2]. Inner surface of manus swollen near proximal end. Anterior and antero-lateral borders together broadly arched --- **perlatus**, p. **543**.

B[2]. Minor manus not more than half as high as major. Lateral border thick, not marginate ---------- **agassizii**, p. **544**.

ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

Atlantic	Pacific
reticulatus	*perlatus*

Ozius rugosus Milne Edwards and Lucas, "Chili,"[55] is a synonym of *Lydia tenax* (Rüppell), which inhabits the western part of the Indian Ocean, from the Red Sea to Baluchistan. "Chili" is very likely an error in locality.

OZIUS VERREAUXII Saussure

Plate 219; Plate 220, Figure 3

Ozius verreauxii SAUSSURE, Rev. Mag. Zool., ser. 2, vol. 5, 1853, p. 359 [6], pl. 12, fig. 1 (type-locality, Mazatlan, Mexico; type not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 277, pl. 5, fig. 4.

Xantho grandimanus LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 98 [4] (type-locality, La Paz, L. C.; type not extant).

[55] In d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, 1844, p. 17; atlas, vol. 9, 1847, pl. 8 bis.

Diagnosis.—Of large size. Carapace less than one and a half times as wide as long; last two lateral teeth, though small, distinct and projecting. Chelipeds smooth.

Description.—Carapace narrow, less than one and a half times as wide as long. Surface covered with depressed granules, antero-lateral regions rugose. Grooves deep about the anterior portion of the gastric and mesogastric regions; a broad median groove between mesogastric region and edge of front. An oblique furrow runs across the front and behind the orbit; from it a short branch partially subdivides the protogastric regions. There is an oblique branchial ridge ending at the base of the penult lateral tooth. Front divided into four well separated lobes, those of the outer pair smaller than those of the inner. Orbits heavily rimmed, the rim enveloping the outer suborbital tooth; a tooth below at inner angle. Behind the orbital rim, 5 antero-lateral projections, the first three lobate, the last two shallow teeth.

Inner angle of carpus of cheliped blunt. Manus swollen, punctate, the punctae arranged chiefly in longitudinal lines. Fingers narrow, those of major chela widely gaping, teeth of movable finger larger and fewer than those of the dactylus, the large basal tooth excepted. Fingers of minor chela scarcely gaping, teeth numerous, those of the immovable finger running larger. The color of the major fixed finger runs backward and upward a little on the palm. Dactylus, propodus and distal end of carpus of ambulatory legs densely pubescent.

Color.—Slate gray with bandings of coral at meral and carpal joints of ambulatory legs. (Boone.)

Measurements.—Female (48779), length of carapace 52.4, width of same 81.7, fronto-orbital width 32.7, width of front 18.1 mm.

Range.—From Magdalena Bay, Lower California, to Ecuador (Nobili).

Material examined.—

MEXICO.—Magdalena Bay; June, 1917; C. R. Orcutt; 1 large female (Mus. San Diego Soc. Nat. Hist.).

La Paz, Gulf of California; L. Belding; 1 female (4627).

Teacapan, Sinaloa; from oyster beds; Secretaria de Agricultura y Fomento; 1 male (61029).

PANAMA.—Pacific shore of Panama; low tide, rocks; May–July, 1924; E. Deichmann; 1 male (60791).

Taboga Island: May 12–15, 1911; Meek and Hildebrand, Smithsonian Biological Survey; 1 female (43994). June, 1914; J. Zetek; 2 females (48775, 48779).

Taboguilla Island; between tide marks; October 31, 1904; *Albatross;* 1 female (33303).

Naios Island; G. M. Gray; 1 female (42145).

GALAPAGOS ISLANDS.—James Island; April 11, 1888; *Albatross;* 2 males (21981).

Indefatigable Island: April 12, 1888; *Albatross;* 1 male (21983). April 25, 1923; Williams Galapagos Expedition; 1 male (57737); gift of New York Zoological Society.

Charles Island; April 1, 1891; *Albatross;* 1 female (20605).

Chatham Island; April 4, 1888; *Albatross;* 1 female (21982).

OZIUS RETICULATUS (Desbonne and Schramm)

Plate 220, Figures 1 and 2

Lagostoma reticulata DESBONNE and SCHRAMM, Crust. Guadeloupe, 1867, p. 34, pl. 4, fig. 6 (type-locality, Guadeloupe, "au Moule et à la Pointe-à-Pitre"; type not extant).

Lagostoma reticulata DESBONNE and SCHRAMM, Crust. Guadeloupe, 1867, explanation of pl. 4, fig. 6.

Ozius integer SMITH, Rept. Peabody Acad. Sci., for 1869 (1871), p. 89 (type-locality, Aspinwall; type in M.C.Z.).

Ozius reticulatus A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 278, pl. 55, fig. 3–3*d*.

Diagnosis.—Size small. Carapace more than one and a half times as wide as long. Lateral borders subentire, the teeth scarcely projecting outward beyond the marginal curve. Antero-lateral regions and wrist and palm eroded.

Description.—Carapace more than one and a half times as wide as long; deeply eroded along the antero-lateral regions, covered with depressed granules and punctae elsewhere. Gastric and mesogastric regions well delimited. Mesogastric region constricted before it widens out; protogastric lobes partly subdivided. The oblique branchial ridge does not extend to the antero-lateral margin. Submedian frontal lobes subtriangular, outer lobes smaller, triangular; median sinus narrower than lateral ones. Above the margin of the front a transverse ridge, giving the appearance of a double-edged front. From this ridge the median groove leads backward. Inner suborbital tooth small, inconspicuous. Antero-lateral border marginate, entire or subentire; the positions of three of the obsolete teeth are indicated by short, oblique, dorsal ridges, but the teeth can best be discerned from the ventral side.

Carpus and manus of chelipeds eroded. Minor manus two-thirds as high as major. The dark color of the minor fingers covers only the distal half, of the major fingers reaches nearly to the proximal end.

Color.—Wine-color or dirty rose forming a reticulated pattern with lakes or spots of fawn-color. (Desbonne and Schramm.)

Measurements.—Male (24354), length of carapace 15, width of same 23.8, fronto-orbital width 9.2, width of front 6.2 mm.

Range.—Bahamas; West Indies; north coast of South America.

Material examined.—Bahamas; Charles L. Edwards; specimens returned to sender.

Jamaica: Southeast Cay; P. W. Jarvis; specimens returned to sender.

Culebra Island: Ensenada Honda; February 9 and 10, 1899; *Fish Hawk;* 4 males, 1 female (24354).

St. John Island, Virgin Islands; specimens in Copenhagen Museum.

St. Croix Island; specimens in Copenhagen Museum.

Curaçao, D. W. I.; Spanish Bay; among stones in the surf; May 11, 1920; C. J. van der Horst; 1 male (Amsterdam Museum), 1 ovigerous female (56886).

Curaçao, D. W. I.; 1905; J. Boeke: Rifwater; shallow water; muddy bottom; September 23; 1 male (Leiden Mus.). Bay of Wacao; sandy beach; October 4–5; 1 ovigerous female (Leiden Mus.).

Colombia: Sabanilla; March 16–22, 1884; *Albatross;* 10 males, 18 females (17824).

Panama: Colon [Aspinwall]; J. A. McNeil; 1 male, type of *O. integer* (4827, M.C.Z.).

OZIUS PERLATUS Stimpson

Plate 221, Figures 1 and 2

Ozius perlatus STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 211 [83] (type-locality, Cape St. Lucas; cotypes in Museum of Comparative Zoölogy).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 278, pl. 55, figs. 2–2*c*.—BOONE, Zoologica, 1927, p. 228, text-fig. 84.

Diagnosis.—Anterior and antero-lateral borders together strongly arched. Inner surface of palm swollen near its proximal end. Otherwise much as in *reticulatus*.

Description.—Carapace very broad and depressed. Anterior part of carapace and upper side of chelipeds rugose, the raised portions reticulating, the pits and channels deep, as if eroded. The antero-lateral borders form with the front a curve of a large circle, their outline is entire anteriorly, but posteriorly there is an indication of three teeth. Carapace flat and obscurely granulate posteriorly, anteriorly deflexed, well areolated, the anterior branchial lobule being circumscribed. Latero-inferior regions granulated. Front depressed and transversely channeled, nearly straight in a view from above, but strongly bidentate at the middle in a front view; teeth obtuse. Basal article of external antennae projecting, being jammed in the inner angle of the orbit. External maxillipeds more or less pubescent; merus rather deeply bisulcate and anteriorly conspicuously notched at the efferent aperture. (Stimpson, A. Milne Edwards.)

Color.—Dark reddish. (Stimpson.)

Measurements.—Length of carapace 16.5 mm. [0.65 inch], width 28 mm. [1.1 inch] (Stimpson). Female, length of carapace 10, width 16 mm. (A. Milne Edwards).

Range.—Cape St. Lucas, Lower California, Mexico; Panama; Galapagos Islands; Ecuador.

Material examined.—Cape St. Lucas; John Xantus; 1 male, 1 female, cotypes (1256, M. C. Z.).

Ecuador: South side of Point Santa Elena; September 17, 1926; W. L. Schmitt; 1 female (60790).

OZIUS AGASSIZII A. Milne Edwards

Plate 221, Figures 3 and 4

Ozius agassizii A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 279, pl. 55, figs. 1–1*d* (type-locality, Panama; type in M. C. Z.).—NOBILI, Boll. Mus. Zool. Anat. Comp. Univ. Torino, vol. 16, 1901, no. 415, p. 36.—BOONE, Zoologica, vol. 8, 1927, p. 225, text-fig. 83.

Diagnosis.—Minor cheliped very slender, especially the fingers. Carapace and chelipeds tuberculate. Lateral margin of carapace thick.

Description.—Approaches the two preceding in form of carapace but is less regularly ovoid. The anterior surface bears instead of depressions small unequal tubercles, which give it a very rough appearance. Regions indistinct. An oblique granulate line runs from the lateral angle to the gastric region. Front quadrilobate, the lobes of the median pair very broad, subtriangular and blunt. Antero-lateral borders thick, not margined as in *reticulatus*, entire in front, two shallow teeth at the widest part; sometimes an indication of another tooth in front of, or behind these two.

Chelipeds very unequal, the minor manus only half as high as the major; both are swollen and approach the cylindrical. Merus, carpus, manus and half of dactylus very rough with tubercles, which form irregular lines above the manus. Fingers long and slender, those of major chela gaping; those of minor chela extremely long, exceeding palm in length, and extremely slender, fitting tight together; teeth minute.

Color.—Uniform red brown, or a rather bright carmine band on the anterior and antero-lateral regions. (Nobili.)

Measurements.—Female (33329), length of carapace 13.1, width of same 21.5, fronto-orbital width 11, width of front 5.4 mm.

Range.—From Costa Rica to Ecuador (Nobili).

Material examined.—Costa Rica: Punta Arenas; 3 large specimens (Copenhagen Mus.).

Panama: Pacific shore of Panama; low tide, rocks; May–July, 1924; E. Deichmann; 1 male, 1 ovigerous female (60788). Taboga Island: July, 1924; E. Deichmann; 1 male (60789). May, 1927; Melbourne Ward; 1 male, 1 female; returned. Taboguilla Island; between tide marks; October 31, 1899; *Albatross;* 2 males, 4 females, 7 young (33329), 2 males, 2 females, 3 young (M. C. Z.). Perico Island; Oct. 26, 1904; *Albatross;* 1 male, 1 young (33288).

Galapagos Islands: James and Charles Islands; *Hassler* Expedition; specimens in M. C. Z. Chatham Island; Dr. W. H. Jones, U. S.

Navy; 2 females, 1 young (17804). Duncan Island; *Albatross;* 2 males, 5 females (21984).

Genus ERIPHIA Latreille

Eriphia LATREILLE, Nouv. Dict. Hist. Nat., vol. 10, 1817, p. 404; type, *E. spinifrons* (Herbst).

Carapace thick and deep, approaching a quadrilateral shape, very little convex or nearly flat, not remarkably broader than long. Antero-lateral borders slightly curved, much shorter than postero-lateral, and meeting the latter, not at a strong angle, as in most xanthids, but at a very open and imperceptible angle; though spinate, they are not cut into lobes. Fronto-orbital border extremely broad, much more than three-quarters the greatest breadth of carapace; the front is strongly deflexed, almost straight, cut in the middle into two lobes, beyond which the wide inner orbital lobe is in contact with a singularly broad prolongation of the infra-orbital plate. The orbits, which are deep and oval, are therefore completely closed and widely separated from the antennae. Basal antennal article very small, short, and broad; flagellum long, more than the major diameter of the large orbit. The antennules fold transversely. The crests of endostome, defining the expiratory canals, are strong, and the canal is completed below by the foliaceous process of the first maxillipeds, the anterior edge of that process being concave. Oblique anterior border of merus of external maxillipeds not notched. Chelipeds massive, unequal in both sexes; fingers stout, pointed, not hollowed. The abdomen of the male has all seven segments separate.

Inhabits both coasts of middle America; eastern Atlantic and southern Europe to the Indo-Pacific region.

KEY TO THE AMERICAN SPECIES OF THE GENUS ERIPHIA

A[1]. Carapace roughened antero-laterally with tubercles each formed of a row of two or more granules.
  B[1]. Male abdominal appendages of first pair with extremity gradually tapering and sharp pointed ..... **gonagra**, p. **545**.
  B[2]. Male abdominal appendages of first pair with thickened, blunt tips ..... **squamata**, p. **550**.
A[2]. Carapace covered with single granules, coarser in front half ..... **granulosa**, p. **551**.

ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

Atlantic	Pacific
gonagra	*squamata*

ERIPHIA GONAGRA (Fabricius)

CALICO CRAB

Plate 222

Cancer gonagra FABRICIUS, Species Insectorum, 1781, p. 505 (type-locality, Jamaica; type in Kiel Mus.).

Eriphia gonagra MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 426, pl. 16, figs. 16 and 17.—HAY and SHORE, Bull. Bur. Fisheries, vol. 35, 1915–16 (1918), p. 439, pl. 35, fig. 6.

Eriphia armata DANA, U. S. Expl. Exped., vol. 13, Crust., part 1, 1852, p. 248, atlas, 1855, pl. 14, fig. 6 *a–d* (type-locality, Rio Negro, Patagonia; type not extant).

Eriphia laevimana var. *smithii* CANO, Boll. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, p. 210 (part), not MacLeay, 1838.

Diagnosis.—Male abdominal appendages of first pair with extremity gradually tapering and sharp pointed. Carapace roughened antero-laterally with tubercles each formed of a row of two or more granules. Frontal lobes (between antennae) divided each into a broad, transverse, inner lobe and a very small outer lobule. Tubercles of proximal row on wrist not dissimilar to remaining tubercles.

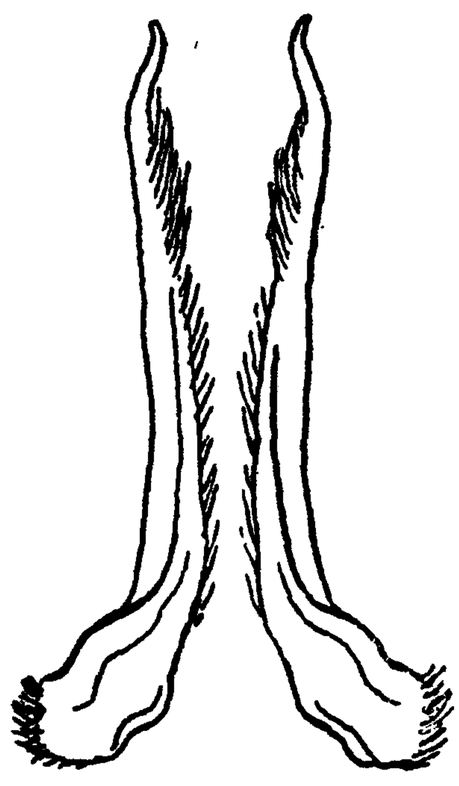


FIGURE 83.—ERIPHIA GONAGRA, MALE (59423), FIRST PAIR OF ABDOMINAL APPENDAGES, × 3

Description.—Carapace of moderate width, regions clearly marked on anterior two-thirds; postorbital grooves very deep; a transverse broken granulated line in front of epigastric lobes, another similar line across protogastric and hepatic lobes; a line of tubercles parallel to antero-lateral margins; these last armed with five or six spiniform teeth behind the orbital tooth. Front wide, deflexed, and divided into four lobes; the two median wider and more advanced than the lateral, truncate, with a finely granulated border; lateral lobes very small, close to the median pair. The so-called outer frontal lobe which lies alongside the inner suborbital tooth, pertains to the upper orbital border. Inner orbital suture very sinuous; below it a line of large tubercles.

Chelipeds strong, swollen, unequal. Hand covered with large, round, flattened, squamiform tubercles, more elevated on the small hand than on the large; the major dactylus has a large rounded tooth at its base. Wrist covered with less prominent tubercles. Legs clothed with fine, stiff hairs on the last three articles.

Color of Tortugas specimens (Schmitt).—Carapace brownish green, marked along areolations and on anterior rugae with a warmer bluish brown; anterior spines, edge of orbits and of front touched with yellow. Under parts whitish suffused with pink, becoming yellowish posteriorly and on abdomen, and bluish anteriorly and laterally; maxillipeds purplish. Antennules claret color as is ridge of epistome between efferent branchial openings. Fingers and tubercles (upper four or five rows) of manus and carpus deep purplish brown, becoming grape juice color on anterior inner portion and lower edge of palm. Ground color of manus, carpus and merus light bluish purple, more or less suffused with yellow on inner portion.

Extreme tips of fingers light yellowish followed by a narrow, not prominent, reddish brown band; a similar band about bases of fingers. Ambulatory legs yellowish along upper edge, becoming light pinkish purple to bluish white on anterior and posterior sides and beneath, each article marked on middle of upper edge with a patch of reticulating lines of grape juice color, the patches extending part way down anterior and posterior sides. Two smaller patches, more or less inconspicuous occur on the meri.[56]

Measurements.—Male (22016), total length of carapace 30.5, width of same 43.8, fronto-orbital width 33.4, width of front 11.6 mm.

Range.—North Carolina to Patagonia (Dana); Bermudas.

Material examined.—

NORTH CAROLINA.—Shackleford Bank: On the jetties; August, 1915; *Fish Hawk*; 5 specimens (51066). Inside; washed from seaweed; September 12, 1928; Schmitt and Shoemaker; 1 young female (62513).

FLORIDA.—Indian Key; H. Hemphill; 2 males, 4 females (14987).

Key Vaccas; H. Hemphill; 1 male (14985).

Big Pine Key; H. Hemphill; 2 males, 1 female (14986).

Key West: H. Hemphill; 3 males, 3 females (9271). Maynard, collector; 8 males, 6 females (2 ovigerous) (56810, 56811, 57009); from Boston Society of Natural History. Off east Martello Tower; July 14, 1924; W. L. Schmitt; 1 male (59422); gift of Carnegie Institution.

Tortugas; P. Bartsch: Loggerhead Key; June 1, 1916; 1 female (56364). Bush Key; June, 1921; 1 male, 1 female (57127).

Tortugas; W. L. Schmitt; gift of Carnegie Institution: Loggerhead Key; rocks on east side; July 28, 1924; 3 males, 1 ovigerous female (59421). Bird Key Reef: North end, "Channel reef," August 12, 1924, 1 male, 1 ovigerous female (59426); south end, August 13, 1924, 3 males, 1 female (59423); July 26, 1924, Bender collector, 2 females (60869). June 2, 1925, 1 male (60867); stations 25 and 26, June 7, 1925, 1 male, 3 females (1 ovigerous) (60866). Long Key beach; east side; August 5, 1924; 1 female (59420). Bush Key Reef: Midsection, August 1, 1924, 6 males, 8 females (1 ovigerous) (59425); northern section, August 2, 1924, 1 male (59424).

Tortugas; Bush Key Reef; July 16, 1926; C. R. Shoemaker; 1 male, 1 female (60864); gift of Carnegie Institution.

BAHAMAS.—Doctor Bryant; 1 male, 1 female (56813), from Boston Society of Natural History. Green Turtle Cay; E. A. Andrews; 1 male, 3 females (20712). Biological Expedition of State University of Iowa: Harbor Island, July 8, 1 male (Mus. S.U.I.); Spanish Wells, July 12, 1 male, 1 female (Mus. S.U.I.). Andros

[56] For color, see also Rathbun, Proc. Washington Acad. Sci., vol. 2, 1900, p. 141; and Hay and Shore, Bull. Bur Fisheries, vol. 35, 1915-16 (1918), p. 439.

Banks, in sponges, Frederick Stearns; specimens returned to sender. Andros Island; 1912; Paul Bartsch: East side, near lighthouse south of South Bight, May 14, 1 male, 2 females (45548). Smith's place, south side of east end of South Bight, Long Bay Key District, May 5, 2 males, 1 female (45547).

CUBA.—Ensenada de Cajon, off Cape San Antonio; May 22, 1914; Henderson and Bartsch; station 11, *Tomas Barrera* Expedition; 1 male (48560), 1 ovigerous female (48555).

Bahia Honda; June 7, 1914; Henderson and Bartsch, *Tomas Barrera* Expedition; 1 male, 1 female (48565).

Marianao Playa; C. F. Baker; 1 male (31890).

Cardenas; 1923; Dr. Francisco R. Sosa; 1 male, 1 female (58388), 1 specimen (59374).

JAMAICA.—Jamaica; 1 male, type (Kiel Mus.).

Montego Bay; P. W. Jarvis; 2 males (19068). Small brackish pond near shore; June 23, 1910; C. B. Wilson; 1 male (42930). 1910; E. A. Andrews: Coral reef near Bogue Islands, June 21, 1 male, 2 females (42925); rocks in front of Sea View, August 30, 9 males, 2 females (1 ovigerous) (43052).

Umbrella Point; July 14, 1910; E. A. Andrews; 1 female (42924).

Rocks on Hale shore; September 2, 1910; E. A. Andrews; 1 ovigerous female (42923).

Port Royal Cays; P. W. Jarvis; specimens returned to sender.

Robins Bay; January 31, 1928; C. R. Orcutt; 1 young (61344).

Jack's Bay; February 15, 1928; C. R. Orcutt; 1 female, 2 young (62515).

SAN DOMINGO.—1878; W. M. Gabb, 23 males, 19 females, 1 young (3197).

PORTO RICO.—1899; *Fish Hawk:* Mayaguez; on coral reef; January 23; 1 young female (24306). Boqueron Bay; January 28; 1 male (24307). Ponce; January 31; 2 males (24270). Reefs at Ponce; January 30; 1 male, 2 females (24308). Playa de Ponce Reef; February 1; 1 male (24273). Hucares; February 13; 1 male (24310). Ensenada Honda, Culebra Island; February 9; 1 female (24309). Caballo Blanco Reef, Vieques Island; February 7; 2 males, 3 females (24267).

VIRGIN ISLANDS.—St. Thomas; Riise collector; specimens in Copenhagen Mus.

St. John; Örsted collector; specimens in Copenhagen Mus.

St. Croix Island; Örsted collector; specimens in Copenhagen Mus.

ANTIGUA.—Pillars of Hercules, English Harbor; 1918; Barbados-Antigua Expedition, State University of Iowa; 1 young (Mus. S.U.I.).

BARBADOS.—May 8, 1890; U. S. Eclipse Expedition to Africa, W. H. Brown; 1 female (14884). 1918; Barbados-Antigua Expedition, State University of Iowa: 1 male, 3 females (Mus. S.U.I.).

Bathsheba; 2 males (57998), 1 male (Mus. S.U.I.). Needham Point; 3 females (1 ovigerous) (Mus. S.U.I.). Pelican Island; tide pool; May 11; 1 female, 1 young (57999).

Rock pool at Bathsheba; February 22, 1924; Gerrit S. Miller; 1 female (62514).

TRINIDAD.—February, 1878; Crosby collector; 2 males, 3 females (56812); from Boston Society of Natural History.

ARUBA, D.W.I.—Playa; July, 1905; 1 female (Leiden Mus.).

COLOMBIA.—Sabanilla; *Albatross;* 3 males, 6 females, 2 young (17773).

Cartagena; Colegio de San Pedro Apostal; 1 young (53409).

PANAMA.—Colon (Aspinwall): C. F. Winslow; 1 male (56814), from Boston Society of Natural History. Meek and Hildebrand, Smithsonian Biological Survey: Coral reef, May 2, 1911, 1 male (44179), 1 female (Field Mus.). Tide pools, March 13, 1912, 1 male (59296).

BRAZIL.—State of Parahyba: Mamanguape stone reef; June 23, 1899; A. W. Greeley, Branner-Agassiz Expedition; 1 male (25741).

State of Pernambuco: 1899; A. W. Greeley, Branner-Agassiz Expedition: Rio Goyanna stone reef, 7 males, 2 females (Stanford Univ.); Pernambuco stone reef, July 7, 3 males, 2 females (25742); Boa Viagem stone reef, July 6, 1 female, soft shell (25743). 1876–1877; R. Rathbun, Hartt Explorations: Pernambuco, 1 male, 1 female (40572); Santo Aleixo, 2 young (40596); Rio Formoso, 2 males, 1 female (40595).

State of Alagoas: Maceio coral reef; July 25, 1899; A. W. Greeley, Branner-Agassiz Expedition; 8 males, 3 females (25744).

State of Bahia: Bahia; December 23, 1877; *Albatross;* 1 female (22017). Abrolhos Islands; December 27–28, 1887; 25 specimens (22016). 1876–1877, R. Rathbun, Hartt Explorations: Plataforma, 1 young (40592), 2 males, 2 females (1 ovigerous) (40594), 1 male, 1 female (40593). Rio Vermelho, February 6, fragments (19967). Abrolhos Islands, 1 male (40573).

State of Rio de Janeiro: Nictheroy, Bay of Rio de Janeiro; July 20, 1915; J. N. Rose; 1 female (48302); gift of Carnegie Institution.

State of São Paulo: Villa Bella, Ilha São Sebastião; October, 1925; H. Luederwaldt collector; W. L. Schmitt; 1 male (60870). Iguape; 1902; R. Kroner; 1 male (47840); gift of H. von Ihering.

State of Santa Catharina: São Francisco; 1925; W. L. Schmitt: October 28 and 29, 3 males, 1 ovigerous female (60868). October 30, 1 male, 2 females (1 ovigerous) (60865).

BERMUDA.—Hungry Bay; July–September; F. G. Gosling; 1 female (25443).

ERIPHIA SQUAMATA Stimpson

Plate 223; Plate 224, Figure 1

Eriphia squamata STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1859, p. 56 [10] (type-locality, Mazatlan; type not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 339, pl. 56, figs. 3–3*e*.—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 544, pl. 41, fig. 1.

Eriphia laevimana var. *smithii* CANO, Boll. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, p. 210 (part), not MacLeay, 1838.

Diagnosis.—Like *gonagra*, but with the tubercles of the palms larger, rounder and closer together and ciliated on the margin. Male abdominal appendages of first pair with thickened blunt tips.

Measurements.—Male (6698), total length of carapace 36.6, width of same 51.3, fronto-orbital width 37.3, width of front 12.2 mm.

Range.—Mexico to Chile (A. Milne Edwards).

Material examined.—

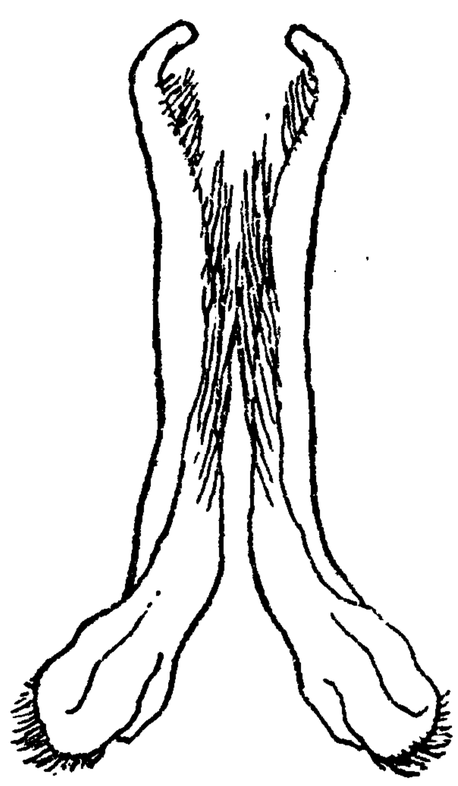


FIGURE 84.—ERIPHIA SQUAMATA, MALE (50629), FIRST PAIR OF ABDOMINAL APPENDAGES, × 3

MEXICO.—Magdalena Bay, Lower California: 1917; C. R. Orcutt; 4 males, 3 females (50629). Shore; Hanna and Jordan, California Acad. Sci.; 1 male, soft shell; returned.

La Paz, Lower California; L. Belding; 1 male, 3 females (4625). January 14, 1921; A. L. Herrera; 1 female (61140). La Paz Harbor; March 12, 1889; *Albatross;* 2 males, 2 females (17411).

Pichilinque Bay; *Albatross:* April 29, 1888; 1 female (22018). March 27, 1911; 2 males, 3 females (2 ovigerous) (50480).

Agua Verde Bay; April 1, 1911; *Albatross;* 1 male, 1 female (50481).

Bocochibampo Bay; 1922; C. R. Orcutt; 2 chelipeds (57062), 2 chelipeds (57058).

Mazatlan; 1911; *Albatross;* 1 propodus of cheliped (53348).

Maria Magdalena Id.; Hanna and Jordan, California Acad. Sci.; 1 male (62699).

Santa Isabel Id., Tepic Territory; among rocks; Secretaria de Agricultura y Fomento; 1 male (61033).

NICARAGUA.—Corinto; J. A. McNiel; specimens in M.C.Z.

COSTA RICA.—Punta Arenas (Pacific side); in the rocks; January, 1907; P. Biolley collector; 1 female (39090); from J. Fid. Tristan.

PANAMA.—Capt. J. M. Dow; 1 male (3268). H. A. Ward; 1 male, 1 female (17787). Panama City; December 16, 1913: J. Zetek; 1 male (48797).

1912; Meek and Hildebrand, Smithsonian Biological Survey: Balboa, Canal Zone: tide pool, February 8, 1 male (Field Mus.); February 7, 3 males, 1 female (59299); February 9, 1 ovigerous female (59297). Rio de Panama, tide pools, March 21, 1 female (59300). Panama Bay: February 19, 1 male (59298); island at end

of breakwater, February 5, 1 male (Field Mus.). Panama, March 23, 1 male, 3 females (Field Mus.).

Taboguilla Island, Bay of Panama; between tide marks; October 31, 1899; *Albatross;* 1 female (33281), 1 female (M.C.Z.).

ECUADOR.—South side Point Santa Elena; 1926; W. L. Schmitt: On neck; September 16; 1 male (60872). September 17; 2 males, 1 young female (60729).

Salinas; 1926; W. L. Schmitt: September 12–14; 14 males, 25 females (4 ovigerous, 1 soft shell, 1 shedding), 1 young (60730). Under rocks; September 15; 1 female (60872).

GALAPAGOS ISLANDS.—Chatham Island; April 16–17, 1884; Dr. W. H. Jones, U. S. Navy; 1 male (17783).

PERU.—Las Vacas, near Capon; beach; January 23, 1908; R. E. Coker; 1 female (40424); gift of Peruvian Government.

ERIPHIA GRANULOSA A. Milne Edwards

Plate 224, Figures 2–4

Eriphia granulosa A. Milne Edwards, Crust. Rég. Mex., 1880, p. 339, pl. 56, fig. 2–2*b* (type-locality, Chile (?); type in Paris Mus.).

Diagnosis.—Carapace covered with single granules, coarser in front half. Frontal lobes (between antennae) undivided, smooth and convex, edge arcuate. Tubercles of proximal row on wrist longitudinally elongate. Male abdominal appendages of first pair stout.

Description.—Carapace narrower and flatter than in the two preceding species; front less deflexed. Regions well defined, the hepatic plainly circumscribed. Dorsal surface all over granulate, the granules coarser on the gastric, hepatic, and anterior half of branchial region; scattered tufts of hair. Antero-lateral border armed with five small, spiniform teeth (not counting orbital angle). Median emargination of front acutely pointed; lobe on either side smooth, surface convex, edge entire. The so-called outer lobe of the front really represents the inner supra-orbital angle; it is lobiform, smooth, and bent down to the smaller inferior orbital lobe; upper border finely granulate, a spine at outer angle; lower margin smooth. Jugal region smooth below inner orbital suture.

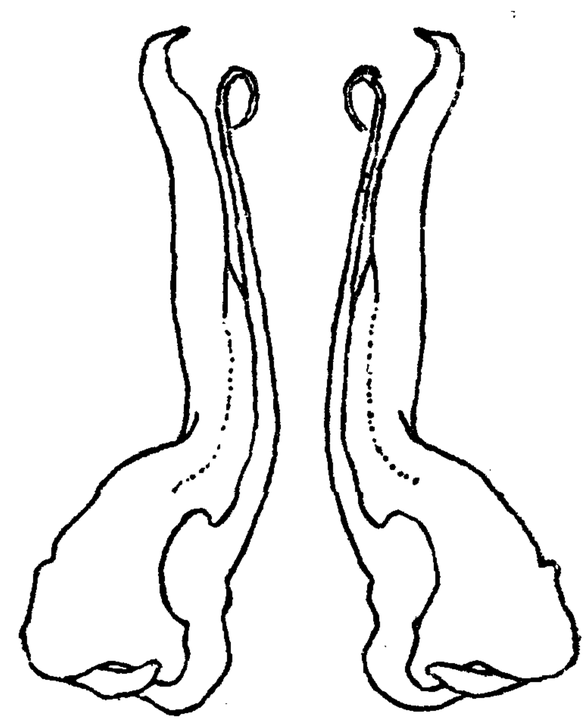


FIGURE 85.—ERIPHIA GRANULOSA, MALE (25667), ABDOMINAL APPENDAGES, × 10

Carpus and manus of chelipeds covered with large rounded tubercles, each with a marginal fringe of short hair; on the carpus the tubercles are arranged in transverse rows, those of each row confluent proximally; on the row nearest the manus the tubercles are almost obliterated and form a scalloped edge. The tubercles of the manus are round or approximately so, except the row bordering the carpus

which are longitudinally oblong. Legs slender, edged with long, fine hairs.

Color.—Red purple. (A. Milne Edwards.)

Measurements.—Female (25667), total length of carapace 9.2, width of same 12.6, fronto-orbital width 11.4, width of front (between antennae) 3.8 mm.

Range.—Cocos Island, off Panama (Boone); Galapagos Islands; Chile (?).

Material examined.—

GALAPAGOS ISLANDS.—Albemarle Island: Reef north of Tagus Hill, Tagus Cove; March 16, 1899; Stanford University; 1 male, 1 female, 1 young (25667).

Eden Island, off Indefatigable Island; rock pools; April 6, 1923; Williams Galapagos Expedition; 1 young (57730); gift of New York Zoological Society.

Chatham Island; Dr. W. H. Jones, U. S. Navy; 1 ovigerous female (15378).

CHILE.—Chile (?);[57] 1 female, holotype (Paris Mus.).

Remarks.—Very distinct from, and not to be confused with, the *gonagra-squamata* type. In *granulosa* the lobes of the front and inner orbit, both above and below, have smooth convex surfaces which is not the case in *gonagra* and *squamata*. The granules of the gastric region in *granulosa* are single, not combined in rows, and the arrangement of tubercles on wrist and hand is distinctive.

Genus ERIPHIDES Rathbun

Pseuderiphia A. Milne Edwards, Crust. Rég. Mex., 1880, p. 340; type, *P. hispida* (Stimpson). Not *Pseuderiphia* Reuss, 1859, a genus of fossil crabs.

Eriphides Rathbun, Proc. Biol. Soc. Washington, vol. 11, 1897, p. 164; substituted for *Pseuderiphia* preoccupied.

Carapace strongly narrowed behind; regions faintly marked. Front between orbits very wide; outer antennae very remote from orbits. A deep suborbital hiatus. Buccal cavity a little narrowed anteriorly; margin of outer maxillipeds with a sinus on anterior border. Sternal plastron narrow and flat. Chelipeds unequal; fingers of minor chela ending in a spoon. Ambulatory legs with short, stout dactyls, ending in strongly hooked nails. Carapace, chelipeds and legs covered with short bristly hairs.

Contains only one species.

ERIPHIDES HISPIDA (Stimpson)

Plates 225 and 226

Eriphia hispida Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 218 [90] (type-locality, west coast of Central America; type not extant).

Pseuderiphia hispida A. Milne Edwards, Crust. Rég. Mex., 1880, p. 340, pl. 56, figs. 1–1c.

[57] On the label in the Paris Museum, "Chili" is followed by an interrogation point.

Eriphides hispida RATHBUN, Proc. Washington Acad. Sci., vol. 4, 1902, p. 282.—BOONE, Zoologica, vol. 8, 1927, p. 237, text-fig. 87 A (not 87 B, which is a *Pilumnus*).

Diagnosis.—Covered with black setae. Carapace and chelipeds very rough with subacute tubercles. Front between orbits extremely wide.

Description.—Carapace depressed except anteriorly where it rounds downward; a deep median sulcus in front of mesogastric region. Surface rough with squamiform tubercles, larger anteriorly than posteriorly; stiff black setae proceed chiefly from the tubercles. Frontal margin between orbits armed with numerous short, obtuse spines. Antero-lateral margins with 7 to 9 spiniform teeth, often themselves denticulate. Orbits further from antennae than in the genus *Eriphia*. Below outer angle of orbit a deep emargination, deeper than wide.

Chelipeds tuberculate or granulate above and outside, and hands inside. Fingers of major chela rounded, blunt; those of minor chela broader, hollowed out in a long spoon, edge mostly thin. Legs very broad, compressed, non-granulate; upper border of meri thin and crenulated.

Color.—Purplish brown. (A. Milne Edwards.)

Measurements.—Female (22019), total length of carapace 47.3, width of same 62.6, fronto-orbital width 44.6, width between orbits 32.8, width of front between antennae 15.2 mm.

Range.—West coast of Costa Rica; Panama (A. Milne Edwards); Galapagos Islands.

Material examined.—

COSTA RICA.—Peñón de Tivives near Boca Jesús Maria; J. F. Tristan; specimen returned to sender.

GALAPAGOS ISLANDS.—Albemarle Island; April 10, 1888; *Albatross;* 2 females (22019).

Duncan Island; April, 1888; *Albatross;* 1 female (40631).

Eden Island, off Indefatigable Island; 1923; Williams Galapagos Expedition; 1 female; gift of New York Zoological Society.

Genus DOMECIA Eydoux and Souleyet

Domecia EYDOUX and SOULEYET, Voy. *Bonite*, I, Crust., 1842, p. 234; type, *D. hispida* Eydoux and Souleyet.—A MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 345.

Domaecius DANA, Amer. Journ. Sci., ser. 2, vol. 12, 1851, p. 128; U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 230.

Domaecia DANA, U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 251.

Domoecia A. MILNE EDWARDS, Nouv. Arch. Mus. Hist. Nat. Paris, vol. 9, 1873, p. 263.

Neleus DESBONNE and SCHRAMM, Crust. Guadeloupe, 1867, p. 35; type, *N. acanthophorus* Desbonne and Scramm = *D. hispida* Eydoux and Souleyet.

Eupilumnus KINGSLEY (not Kossmann), Proc. Acad. Nat. Sci. Philadelphia, vol. 31, 1879 (1880), p. 397; type, *E. websteri* Kingsley = *D. hispida* Eydoux and Souleyet.

Carapace somewhat transversely oval, but much contracted posteriorly, flat, somewhat hairy, with no trace of regions. Fronto-orbital border not much less than greatest breadth of carapace. Front profusely spinate, the spines being sharp and a little curved. The antero-lateral borders pass backward with but little outward slope, a little shorter than the concave and convergent postero-lateral borders, and armed with a number of sharp curved spines. The orbits are at antero-lateral angles of carapace and do not conceal the eyes; their edge shows no fissures nor sutures; their upper and lower inner angles are broadly in contact, or almost in contact, so as to exclude the antennae. The antennules fold nearly transversely. The basal antennal article hardly reaches the front, though its outer angle is produced toward front; the flagellum is short, hardly as long as orbit. Buccal cavern broad; crests of endostome not very strong, nor is the foliaceous process of first maxillipeds produced far forward; external maxillipeds very long, merus remarkably broad and short. Chelipeds somewhat unequal, short, and not very massive; arm almost entirely hidden by carapace; fingers compressed, pointed. Legs stout, especially meropodites. The abdomen of the male has all seven segments distinct and separate.

Both sides of tropical America; Indo-Pacific region.

DOMECIA HISPIDA Eydoux and Souleyet

Plate 227

Domécie hérissée EYDOUX and SOULEYET, Voy. *Bonite*, 1841 (?), pl. 2, figs. 5 to 10.

Domecia hispida EYDOUX and SOULEYET, Voy. *Bonite*, vol. 1, Crust., 1842, p. 235 (type-locality, Sandwich Islands; type in Paris Mus.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 345, pl. 58, figs. 2–2*d*.—VERRILL, Trans. Connecticut Acad. Arts and Sci., vol. 13, 1908, p. 364, text-fig. 21.

Neleus acanthophorus DESBONNE and SCHRAMM, Crust. Guadeloupe, 1867, p. 35 (type-locality, Guadeloupe; type not extant).

Pilumnus melanacanthus KINGSLEY, Proc. Boston Soc. Nat. Hist., vol. 20, 1879, p. 156 (type-locality, Key West; cotypes in Mus. Comp. Zoöl.).

Eupilumnus websteri KINGSLEY, Proc. Acad. Nat. Sci. Phila., vol. 31, 1879 (1880), p. 397, pl. 14, fig. 3 (type-locality, Key West; type not located).

Diagnosis.—Carapace much narrowed behind. Carapace and chelipeds armed with black spines. Merus of outer maxillipeds very short. Fingers compressed and pointed.

Description.—Carapace covered with light-colored hairs; antero-lateral border with four to six (including orbital angle) acute dark-tipped spines, and several similar spines on carapace just inside antero-lateral border, and also just inside spiny fronto-orbital border. Upper orbital margin and prominent edge of the epistome finely denticulate; lower orbital margin spinous. Merus of external maxillipeds extremely broad and short, with an elevated patch of denticles on outer surface. Chelipeds unequal; arm, wrist, hand, and dactylus

studded with acute spines above. Legs stout, of moderate length; upper surface of last four articles fringed with hairs, upper edge of merus spinate, as also, but much less distinctly, is the upper edge of carpus and propodus.

Color.—Light yellowish red, front darker; spines blackish. (Verrill.)

Measurements.—Male (24315), total length of carapace 7, total width of same 9.5, fronto-orbital width 7.6, width of front between antennae 3.8 mm.

Habitat.—Among sponges and branches of corals and in holes of dead corals and stones.

Range.—From off South Carolina to Brazil; eastern Atlantic, Indian, and Pacific Oceans to American coast: Gulf of California to Panama (Verrill).

American material examined.—

SOUTH CAROLINA.—Open ocean off Gulf Stream; lat. 32° + N., long. 74° + W.; June 12, 1903; B. A. Bean; 1 female (31057); gift of Geographic Society of Baltimore.

BAHAMAS.—From sponges; Frederick Stearns; specimens returned to sender. J. I. Northrop; specimens returned to sender.

FLORIDA.—Rodriguez Creek; 1884; Edward Palmer; 6 males, 7 females (13569).

Key West; A. S. Packard, Jr.; 2 males, 1 female, cotypes of *Pilumnus melanacanthus* (4811, M. C. Z.).

Key West; among corals and algae, low tide; H. Hemphill; 1 male (14453).

Dry Tortugas; 1884; Edward Palmer; 2 males, 2 females (18044).

Sand Key Light; among sponges and rocks; 1893; Biological Expedition, State University of Iowa; 5 females (Mus. S.U.I.).

WEST INDIES.—Cuba: On reef flat between Cayo Hutia and Little Cayo, NE. of Light; May 12, 1916; *Tomas Barrera* Expedition; 1 male, soft shell (48516); from Henderson and Bartsch.

Jamaica: P. W. Jarvis; specimens returned to sender. Kingston Harbor; 1884; *Albatross;* 1 male, 4 females (18043).

St. Thomas; shore; January 17–24, 1884; *Albatross;* 5 males, 4 females (18042).

Porto Rico; 1899; *Fish Hawk:* Mayaguez; on corals; January 21; 11 females, 2 young (24311). Mayaguez; on coral reef; January 23; 5 males, 11 females, 2 young (24312). Porto Real; January 27; 1 female (24313). Playa de Ponce reef; February 1; 1 male (24314). Off Humacao; Humacao N. ¾ W. 5¼ miles; 10 fathoms; Co.; temperature 26° C.; February 14; station 6097; 1 male (24317).

Culebra Island: Ensenada Honda; February 9 and 11, 1899; *Fish Hawk;* 4 males, 1 female (24315).

Off Vieques Island: Culebrita Lighthouse, NE. ⅜ E., 7¼ miles; 16 fathoms; Co.; temperature 25.2° C.; February 10, 1899; station 6092, *Fish Hawk;* 1 male, 1 female (24316).

Barbados; 1918; Barbados-Antigua Expedition, State University of Iowa: In corals; May and June; 1 male, 2 females (1 ovigerous), 1 young (Mus. S.U.I.), 1 male, 3 ovigerous females, 1 young (57996). Okra Reef; May 13; 1 male, 6 females (4 ovigerous) (Mus. S.U.I.). Needham Point; May 18; 1 male (Mus. S.U.I.). Off Needham Point; 84 fathoms; rky.; 1 male, 4 females (2 ovigerous) (Mus. S.U.I.). W. by N. of Pelican Island, 1½ miles; 80 fathoms; rky; May 16; 1 young (Mus. S.U.I.).

CURAÇAO.—Caracas Bay; 1920; C. J. van der Horst: In corals; April; 5 males, 6 females, 9 young (Amsterdam Mus.). In *Meandrina;* April 7; 2 males, 1 female (56875).

Spanish Water; in *Porites furcata;* May 5, 1920; C. J. van der Horst; 1 male (Amsterdam Mus.).

BRAZIL.—Maceio coral reef, Alagôas; July 25, 1899; A. W. Greeley, Branner-Agassiz Expedition; 1 female (25745).

Pernambuco; 1876–77; R. Rathbun, Hartt Explorations: 1 male (19968). Rio Formoso; December, 1875; J. C. Branner collector; 1 female (19965).

WEST COAST OF MEXICO.—Maria Madre Island; March–May, 1927; from Secretaria de Agricultura y Fomento, Mexico, through A. L. Herrera; 1 male (60728).

Maria Madre Island; E. part of bay; 5–8 meters; May 17, 1925; F. Contreras; California Acad. Sci.; 1 ovigerous female; returned.

Genus TRAPEZIA Latreille

Trapezia LATREILLE, Encyc. Méth., vol. 10, 1825, p. 695; type, *T. dentifrons* Latreille, 1825, = *T. cymodoce* (Herbst, 1801).

Grapsillus MACLEAY, in Andrew Smith, Ill. Zool. S. Africa, Annulosa, 1838, p. 67; type, *G. maculatus* MacLeay = *Trapezia cymodoce maculata* (MacLeay).

Carapace approaching the quadrilateral, little convex, not much broader than long, smooth and without trace of regions. Antero-lateral borders much shorter than postero-lateral, running backwards almost straight and parallel with each other or curved outward and away from each other, not therefore meeting the convex curved and convergent postero-lateral borders at any angle. Fronto-orbital border extremely broad, about as extensive as greatest breadth of carapace. Front broad, horizontal, lamellar, separated from supra-orbital angle by a notch; cut into two lobes of which both inner and outer angles are pronounced, so that with the supraorbital angle the front usually appears 6-toothed. Orbits large, cut out of antero-lateral angles of carapace; their dentiform upper and lower inner angles broadly in contact, so that the antennae are widely excluded; margins without fissures or sutures. The antennules fold nearly trans-

versely. Basal article of antennae slender and very short, not nearly reaching front; flagellum very long, much longer than major diameter of orbit. Crests of endostome well developed, the expiratory canals closed in below by the foliaceous process of the first maxillipeds; anterior edge of merus of slender external maxillipeds not notched.

Chelipeds long, very massive, not very unequal in either sex; the arm usually projects a long way beyond carapace, its anterior edge sharp, crest-like, serrate; the fingers have usually a thin and sharp cutting edge, best marked on the immobile finger. Legs stout, of moderate length. Third to fifth segments of male abdomen fused. (After Alcock.)

Red Sea, Indo-Pacific region and west American continent and islands from Cape St. Lucas to Galapagos Islands.

KEY TO THE AMERICAN SPECIES AND SUBSPECIES OF THE GENUS TRAPEZIA

A[1]. Carapace widest at middle in full grown.
  B[1]. Front not prominent, lobes shallow. Lateral projection of carapace a tooth.....**cymodoce ferruginea**, p. 557.
  B[2]. Front prominent, lobes strongly marked. Lateral projection a spine. Carapace covered with small red spots...**cymodoce maculata**, p. 558.
A[2]. Carapace not widening from orbits backward. Front finely denticulate. Lateral projection absent or insignificant.....**digitalis**, p. 559.

TRAPEZIA CYMODOCE FERRUGINEA Latreille

Plate 228, Figures 1 and 2

Trapezia ferruginea LATREILLE, Encyc. Méth., Hist. Nat., Entom., vol. 10, 1825, p. 695 (type-locality, Red Sea; type not in Paris Mus.).—ALCOCK, Journ. Asiat. Soc. Bengal, vol. 67, 1898, p. 220.

? *Trapezia cymodoce* S. I. SMITH, Proc. Boston Soc. Nat. Hist., vol. 12, 1869, p. 287; Pearl Islands, Bay of Panama.—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 22; Acapulco.

Grapsillus ferrugineus RATHBUN, Bull. U. S. Fish Comm. for 1903, part 3, 1906, p. 865.

Trapezia cymodoce ferruginea RATHBUN, Mem. Mus. Comp. Zoöl., vol. 35, 1907, p. 58.

Diagnosis.—Antero-lateral margins diverging backward in the full grown; lateral projection a tooth or not very spiniform. Front not prominent, lobes shallow.

Description.—Front not very prominent, but advanced beyond the inner supra-orbital angle, and cut into two shallow lobes, each of which has the inner angle dentiform and the outer angle rounded. Tooth at lower inner angle of orbit not very sharp; outer angle acute but scarcely spiniform; lateral epibranchial tooth short and not very spiniform. Upper border of palm subacute; outer surface smooth, bare and polished.

Typical *cymodoce* has the front and all the marginal teeth and spines more prominent than in the subspecies *ferruginea*, the upper and lower

edges of palms sharp, the upper part of the outer surface covered with silky wool. There are gradations between these two forms.[58]

Color.—Orange; fingers grayish or brownish yellow; short spines at extremity of ambulatory dactyls brownish yellow. (Dana.)

Measurements.—Ovigerous female (33337), length of carapace 12.2, width of same 15.1, fronto-orbital width 12.6, width of front between antennae 5.5 mm.

Range.—From Clarion Islands and Acapulco, Mexico, to Panama and Galapagos Islands (Boone); Red Sea to Indo-Pacific region.

American material examined—

MEXICO.—Clarion Island; March 4, 1889; *Albatross;* 7 males, 5 females (17416).

Acapulco; April 18, 1891; *Albatross;* 1 female (20617).

California Academy of Sciences; 1925:

Maria Madre Island: E. part of bay; 5–8 meters; May 17, 1925; F. Contreras; 11 males, 21 females (62708); 29 males, 21 females, returned. Hanna and Jordan; 4–10 fathoms; 1 male, 1 female, returned; 1 female (62694).

Socorro Island; 2 ovigerous females: 1 returned; 1 (62695).

Clarion Island; shore; 1 male, returned.

PANAMA.—Panama; Henry A. Ward; 1 female (17302).

Taboga Island; among corals; June, 1924; E. Deichmann; 1 ovigerous female (60830).

Taboguilla Island; from coral, low tide, 1 fathom; October 31, 1904; *Albatross;* 3 males, 7 females (33337).

Pearl Islands; F. H. Bradley; specimens in M.C.Z.

TRAPEZIA CYMODOCE MACULATA (MacLeay)

Plate 228, Figures 3 and 4

Grapsillus maculatus MacLeay, in Andrew Smith, Ill. Zool. S. Africa, Annulosa, 1838, p. 67 (type-locality, South Africa, type probably not extant).

Trapezia maculata Dana, U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 265; atlas, 1855, p. 15, figs. 4*a–d*.—Stimpson, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 219 [91].

Trapezia rufopunctata A. Milne Edwards (not Herbst), Crust. Rég. Mex., 1880, p. 342.

Trapezia ferruginea maculata Ortmann, Zool. Jahrb., Syst., vol. 10, 1897, p. 206.

Diagnosis.—Covered with small red spots. Antero-lateral margins diverging backward in the full grown; lateral projection a spine. Front prominent, lobes strongly marked.

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[58] Latreille described *T. ferruginea* as having the upper edge of the palm sharp. Concerning the specimens in the Paris Museum, Professor Bouvier wrote as follows:

"De *Trapezia ferruginea* caracterisée par 'la tranche supérieure des mains aigués' il n'en trouve pas dans notre collection. Mais en comparant les assez nombreux exemplaires qui s'y trouvent j'ai pu remarquer qu'il y a des différences très sensible dans cette tranche, chez les divers spécimens. Dans les uns le bout supérieur est franchement arrondi et ne mérite pas le nom de 'tranche'; dans d'autres il est étroit, bien distinct, et forme à vrai dire une tranche, mais une tranche à peine saillante et jamais aigué. Entre les deux extrêmes que je vous ai signalé, il me parait y avoir tous les intermediaires."

Description.—Front prominent, well advanced beyond the rounded, inner supra-orbital angle, cut into two well marked lobes, each of which has the inner angle dentiform and outer angle rounded. Tooth at lower inner angle of orbit with spiniform tip turned inward; outer angle of orbit acute. Lateral epibranchial angle marked with a sharp spine. Upper border of palm blunt, lower border acute; outer surface covered with a short down easily rubbed off.

Color.—A grayish or reddish yellow spotted above and below rather coarsely with small, rounded, deep-red spots. (Dana.)

Measurements.—Male (29486), total length of carapace 12, width of same 13.5, fronto-orbital width 12.4, interorbital width 7.3, width of front between antennae 5.5 mm.

Range.—From the Red Sea eastward through the Indo-Pacific region to the Hawaiian Islands and the west coast of Mexico (Stimpson).

Material examined.—No American material has been seen by the writer. The subspecies was reported by Stimpson from Socorro Island, Revilla Gigedo Islands, Mexico.

TRAPEZIA DIGITALIS Latreille

Plate 228, Figures 5 and 6

Trapezia digitalis LATREILLE, Encyc. Méth., Hist. Nat., Entom., vol. 10, 1825, p. 696 (type-locality, Red Sea; type not extant).

Trapezia corallina GERSTAECKER, Arch. f. Naturg., vol. 22, pt. 1, 1856 (1857), p. 126 (type-locality, Veragua; type in Berlin Mus.).

Trapezia nigro-fusca STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 219 [91] (type-locality, Cape St. Lucas; type not extant).

Trapezia formosa SMITH, Proc. Boston Soc. Nat. Hist., vol. 12, 1869, p. 286 (type-locality, Pearl Islands, Bay of Panama; cotypes in M.C.Z.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 343, pl. 58, fig. 1–1*b*.

Diagnosis.—Antero-lateral margins parallel; lateral projection lacking or a slight tooth in the full grown. Front finely denticulate, lobes obscure.

Description.—Surface smooth and burnished. Carapace with a much broader look than the preceding owing to the somewhat lesser prominence of the front and the greater convergence of the postero-lateral borders. Antero-lateral margins subparallel. Front slightly notched in the middle line and separated from the scarcely dentiform supra-orbital angles by a shallow notch; it is thus obscurely divided into two lobes each of which has the free edge finely and irregularly denticulate. Outer angle of orbit acute and also the inner angle of the lower margin. Lateral margins either entire or with a slight notch, but no spine except in the very young.

Chelipeds subequal in both sexes. Arm short, broader than long, its foliaceous anterior border dentate or crenate; inner angle of wrist acute; upper border of hand rounded, lower border acute. Legs smooth, except the dactyls.

Color.—Dark brown, either uniform or with darker patches on the carapace. Inner side of claws and also the fingers lead-color. Legs light brown tending toward yellowish. (Latreille.) It is probable that this color description was made from preserved specimens, as other authors give brighter colors for the species: Gerstaecker says, body light coral red, fingers black-brown (*corallina*), while Smith for *formosa* gives uniform orange, a little darker above than below, fingers, brownish.

Measurements.—Male (25365), length of carapace 10, fronto-orbital and greatest width of carapace 12, interorbital width 7.9, width of front between antennae 6.2 mm.

Range.—Cape St. Lucas, Lower California, Mexico, to Panama; Red Sea to Indo-Pacific region.

American material examined.—

MEXICO.—California Academy of Sciences; 1925:

Maria Madre Island: E. part of bay; 5–8 meters; May 17, 1925; F. Contreras; 3 males, 4 females (62710); 4 males, 4 females, returned. Hanna and Jordan; 4–10 fathoms; 1 male, 1 ovigerous female, returned.

Socorro Island; 1 ovigerous female, returned.

Clarion Island; shore; 1 male, 1 ovigerous female, returned; 1 ovigerous female (62709).

PANAMA.—Veragua; 1 male, 1 female (Berlin Mus.; Cat. No. 2259); types of *T. corallina.*

Pearl Islands; F. H. Bradley; 1 female (4834, M.C.Z.); cotype of *T. formosa.*

Genus QUADRELLA Dana

Quadrella DANA, Amer. Journ. Sci., ser. 2, vol. 12, 1851, p. 128 (no species mentioned); Proc. Acad. Nat. Sci. Philadelphia, 1852, p. 84; type, *Q. coronata* Dana; U. S. Expl. Exped., vol. 13, Crust., part 1, 1852, p. 265.

Carapace squarely hexagonal, nearly as long as broad, moderately convex, perfectly smooth without trace of regions. Antero-lateral borders straight, sloping slightly outwards and joining the subequal postero-lateral borders at a very wide but distinct angle marked usually by a spine. Fronto-orbital border a little less than greatest width of carapace, interorbital border six spined, front proper cut into four spines, external to which, on either side is seen the spiniform internal angle of the lower edge of the orbit projecting beyond the acute supra-orbital angles. Orbits small, cut out of the antero-lateral angles of the carapace and not concealing eyes. Antennules folding almost transversely. Basal antennal article slender, not nearly reaching front; flagellum slender and long, nearly half the length of carapace. Crests of endostome distinct, expiratory canals closed as in *Trapezia.*

Chelipeds somewhat unequal, massive and long, the whole of the long arm projecting beyond the carapace. Legs long and slender,

the dactyli spined along inner edge. Abdomen of male with third to fifth segments fused. (After Alcock.)

Indo-Pacific region to the west coast of tropical America.

QUADRELLA NITIDA Smith

Plate 229

Quadrella nitida SMITH, Proc. Boston Soc. Nat. Hist., vol. 12, 1869, p. 288 (type-locality, Pacheca, Pearl Islands, Bay of Panama; types in P. M. Y. U.).—RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 590.

Quadrella coronata ORTMANN, Zool. Jahrb., Syst., vol. 10, 1897, p. 210 (part).—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, pp. 586 and 617.

Diagnosis.—One spine on wrist. No spine in old specimens at lateral angle of carapace. Anterior border of carapace not deeply cut, so that the spines are shorter than in *coronata*.

Description.—Median sinus deeper than lateral sinuses of front. A spine at lateral angle of carapace in small specimens but only a slight angular projection in larger ones. Posterior edge of merus of cheliped rounded, anterior edge armed with six to eight slender spines. Carpus smooth, evenly rounded on outer side and with a single short spine on the anterior part of the inner side. Hands stout and considerably swollen, especially the larger one, smooth and unarmed, equalling or exceeding breadth of carapace. Fingers not gaping, those of larger chela rather stout and strongly incurved, those of smaller chela longer and more slender. Dactyli of legs pubescent.

Color.—Alcoholic specimens light yellowish, fingers tinged with orange and encircled with a median band of black (Smith). Small specimens (22021) show the color of fingers extending only three-fifths of length from tip and ending in an oblique line.

Measurements.—Male (22021), total length of carapace 8.9 mm., width of same 9.6 mm.; fronto-orbital width 7.6, width of front between antennae 3.7 mm.; female (22021), total length 6.6 mm., width 6.7 mm.

Range.—Lower California, Mexico, to Panama. 6 to 31 fathoms.

Material examined.—

Off Cape St. Lucas, Lower California; lat. 22° 52′ 00″ N., long. 109° 55′ 00″ W.; 31 fathoms; rky.; temperature 74.1° F.; May 1, 1888; station 2829, *Albatross;* 2 males, 2 females (22021).

Genus MELYBIA Stimpson

Melybia STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 144; type, *M. thalamita* Stimpson.

Carapace rather narrow, subquadrate, slightly convex, regions faintly marked. Antero-lateral margins very short, with four teeth or spines, including the orbital. Fronto-orbital width great, about five-sixths the greatest width of carapace. Front about two-fifths the width of carapace. Front depressed, bilobed, separated by a notch from inner orbital angle. Orbits large, Portunid-like, com-

pletely filled by the stout eyes; two superior notches in margin, and a broader notch below on outside. Basal article of antenna narrow, reaching a process of front and closing the orbital hiatus. Outer maxillipeds much smaller than buccal cavity; the exognath half the width of the endognath. Chelipeds unequal, long and strong, the arm reaching far beyond the carapace; spinulous. Legs long and narrow, spinulous; dactyli long. Abdomen of male with third to fifth segments fused.

Contains only one species.

MELYBIA THALAMITA Stimpson

Plate 230

Melybia thalamita Stimpson, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 144 (type-localities, off French Reef, 15 fathoms, and west of Tortugas, 35–42 fathoms; cotypes not extant).—A. Milne Edwards, Crust. Rég. Mex., 1880, p. 275.

Melybia forceps A. Milne Edwards, Crust. Rég. Mex., 1880, p. 274, pl. 49, fig. 1–1*e* (type-locality, Abrolhos Islands, Brazil; type in M. C. Z.).

Diagnosis.—Orbits and eyes large. Outer maxillipeds much smaller than buccal cavity. Chelipeds large. Legs slender.

Description.—Surface covered with a short, thin pubescence; carapace nearly even, minutely granulate. Median notch of front large, V-shaped; lobes oblique, margin nearly straight, subentire. Inner-upper tooth of orbit subtriangular; margin of orbit minutely crenulated; space between superior notches arcuate; outer point, in line with lateral margin of carapace, not at all produced. Immediately behind is the first antero-lateral tooth; teeth spiniform, acuminate; first and fourth small, second and third large; the first is sometimes bifid at tip, and in small specimens is altogether absent.

Merus of chelipeds armed with spines on upper and inner margin. Carpus spinulous on outer surface; three spines along inner margin, the middle one the longest, the one nearest the palm a little above the margin. Manus with a double row of spines above. Fingers two-thirds as long as palm, heavy, broad, compressed, grooved; prehensile edges furnished with shallow teeth; dactyl slightly roughened on its superior carina toward the proximal end. Ambulatory legs sparsely long-hairy; merus with a row of spines on upper margin and in the first three pairs one spine near distal end of lower margin. Dactylus nearly as long as propodus.

Color.—In some preserved specimens, the ambulatory legs show broad transverse bands of dark mottled with light.

Measurements.—Male (7774), total length of carapace 6.9, total width of same 9.8, fronto-orbital width 8.2, width of front 3.7 mm.

Variation.—Stimpson notes a smooth variety; this is equivalent to *M. forceps* A. Milne Edwards.

Range.—Florida Straits to Brazil.

Material examined.—See table page 563.

Material examined of Melybia thalamita

Locality	Bearings: Latitude N.	Bearings: Longitude W.	Fathoms	Bottom	Temperature	Date	Station	Collector	Specimens	Catalogue No.	Remarks
	° ′ ″	° ′ ″			°F.						
Loggerhead Key, Tortugas, Florida.			Beach	Under Sargassum.		July 15, 1924		W. L. Schmitt	1 ovig. ♀	61112	Gift of Carnegie Institution.
Tortugas, Florida	About 10 miles S. of No. 2 buoy.		[1] 45			July 23, 1924	50	do	1♂	61113	Do.
Off Havana, Cuba	23 10 40	82 20 30	201	Co		May 1, 1884	2167	*Albatross*	1♂ 1♀	7774	
Do	23 10 39	82 20 29	192	Co		do	2164	do	1♂	8943	
Do	23 10 25	82 20 24	33	Co	79.1	Jan. 17, 1885	2324	do	1 ovig. ♀	18271	
Off Port Antonio, Jamaica								J. E. Duerden			Specimens returned to sender.
Port Royal Cays, Jamaica								do			Do.
Between Jamaica and Haiti	17 44 05	75 39 00	23	Co. brk. Sh		Feb. 29, 1884	2138	*Albatross*	1♂ 1♀	7763	
					°C.						
Off Culebra Island	Pt. Mula Lighthouse, SW. ¼ S., 10½ miles.		15.25	Co. S	25	Feb. 8, 1899	6087	*Fish Hawk*	1♂	24351	
Do	Culebrita Lighthouse NE. 5¼ miles.		15	Co	25.2	Feb. 10, 1899	6093	do	1♂ 1♀	24352	
Off Vieques Island	Pt. Mula Lighthouse, E. by N. 10¾ miles.		12.5	Co	27	Feb. 14, 1899	6095	do	1♀	24353	
Barbados				brk. Co		May 27, 1918		Barbados-Antigua Exped., State Univ. Iowa.	1 ovig. ♀	58013	
Do						1918		do	2♂ 1 ovig. ♀	Mus. S.U.I.	
Do	SW. of Pelican Island, 1 mile.		38	fne. co. Frags.		May 13, 1918	1	do	1 ovig. ♀ 1 y.	do	
St. Joris Bay, Curaçao			1	rky		Apr. 3, 1905		J. Boeke	2♂	Leiden Mus.	
Near Colon [Aspinwall], Panama.	9 32 00	79 54 30	34	brk. Sh		Apr. 2, 1884	2146	*Albatross*	1♂ 1♀	18439	
Off Abrolhos Islands, Brazil			30					*Hassler* Exped	1♂	2971, M.C.Z.	Type of *M. forceps*.

[1] About.

EXPLANATION OF PLATES

Plate 1

Figure 1. *Pseudocorystes sicarius* (after Milne Edwards and Lucas), Valparaiso, carapace 55 mm. long, dorsal view.
2. Same, outer face of chela and carpus.
3. Same, outer maxilliped.
4. *Gomeza serrata* (after Dana), Patagonia, 50 fathoms, carapace about 2.7 mm. long, dorsal view.
5. Same, rostrum.
6. Same, antennal and buccal regions.

Plate 2

Ovalipes ocellatus ocellatus, male (32448), carapace 68 mm. wide, ventral view

Plate 3

Figure 1. *Ovalipes ocellatus ocellatus*, male (32448), carapace 68 mm. wide. ventral view showing stridulating ridge on carapace.
2. Same, ventral view showing stridulating ridge at base of arm.

Plate 4

Figure 1. *Ovalipes ocellatus guadulpensis*, holotype, female, carapace 36 mm. wide, dorsal view.
2. *Ovalipes ocellatus guadulpensis*, immature female (17959), ventral view.

Plate 5

Ovalipes punctatus, male. Type of *Platyonichus purpureus* in M.C.Z.

Plate 6

Ovalipes punctatus, ovigerous female (61020), carapace 91.5 mm. wide, dorsal view

Plate 7

Figure 1. *Ovalipes punctatus*, male (61019), width of carapace 108.6 mm., ventral view.
2. *Ovalipes punctatus*, ovigerous female (61020), width of carapace 91.5 mm., ventral view.

Plate 8

Figure 1. *Ovalipes punctatus*, male (61019), ventral view showing stridulating ridge on lower margin of chelae, chela 81.4 mm. long.
2. Same, first right ambulatory leg showing horny ridge on distal margin of merus.

Plate 9

Bathynectes superba

Figure 1. Male, enlarged, Florida reefs, carapace from behind. After A. Milne Edwards.
2. Male (11366), width of carapace 55.2 mm., ventral view showing chela.
3. Chela, outer face. After A. Milne Edwards.
4. Female (18759), width of carapace 65 mm., dorsal view.

PLATE 10

Bathynectes superba, male (11366), width of carapace 55.2, ventral view showing abdomen

PLATE 11

Coenophthalmus tridentatus, male, 39° 02′ S., 59° 27′ W., carapace 17.6 mm. wide, dorsal view

PLATE 12

Coenophthalmus tridentatus, male, 39° 02′ S., 59° 27′ W.

FIGURE 1. Ventral view showing abdomen.
2. Ventral view showing chelae.

PLATE 13

FIGURE 1. *Portunus* (*Portunus*) *ventralis*, ovigerous female (53763), carapace 28 mm. wide, ventral view showing right chela.
2. Same, dorsal view.
3. *Coenophthalmus tridentatus*, male, near Montevideo, chela, outer face, enlarged.
4. Same specimen, dorsal view.
5. Same, antennal and buccal regions.

PLATE 14

Portunus (*Portunus*) *sayi*, male (8217), carapace 37 mm. wide

FIGURE 1. Ventral view showing chelae.
2. Dorsal view.
3. Ventral view showing abdomen.

PLATE 15

Portunus (*Portunus*) *anceps*, male (24503), carapace 29.4 mm. wide

FIGURE 1. Ventral view showing chelae.
2. Dorsal view.
3. Ventral view showing abdomen.

PLATE 16

Portunus (*Portunus*) *gibbesii*, male (11217), carapace 70 mm. wide, dorsal view

PLATE 17

Portunus (*Portunus*) *gibbesii*, male (11217), carapace 70 mm. wide

FIGURE 1. Ventral view showing chelae.
2. Ventral view showing abdomen.

PLATE 18

Portunus (*Portunus*) *xantusii*, male (21782), carapace 56.7 mm. wide

FIGURE 1. Ventral view showing outer surface of chela.
2. Dorsal view.
3. Ventral view.

PLATE 19

Portunus (*Portunus*) *acuminatus*, male (40270), carapace 65 mm. wide

FIGURE 1. Ventral view showing chelae.
2. Dorsal view.
3. Ventral view showing abdomen.

PLATE 20

FIGURE 1. *Portunus* (*Portunus*) *panamensis*, female, Panama Bay, carapace about 25 mm. wide, dorsal view.
2. *Portunus* (*Portunus*) *asper*, female (22025), carapace 75 mm. wide, ventral view showing left chela.
3. Same, dorsal view.

PLATE 21

Portunus (*Portunus*) *asper*, female cotype in Paris Museum

PLATE 22

FIGURE 1. *Portunus* (*Portunus*) *asper*, male (61332), carapace 51.2 mm. wide, ventral view showing chelae.
2. Same, ventral view showing abdomen.
3. *Portunus* (*Portunus*) *panamensis*, male (22023), 44 mm. wide, ventral view showing chelae.

PLATE 23

Portunus (*Portunus*) *panamensis*, male (22023), carapace 44 mm. wide, dorsal view

PLATE 24

Portunus (*Portunus*) *panamensis*, male (22023), carapace 44 mm. wide, ventral view showing abdomen

PLATE 25

Portunus (*Portunus*) *vocans*

FIGURE 1. Male (6930), carapace 23.5 mm. wide, ventral view showing chelae.
2. Same, ventral view.
3. Holotype, carapace 43 mm. wide (after A. Milne Edwards), dorsal surface.
4. Same, ventral surface, showing stridulating ridge.
5. Same, left half of front and orbit, dorsal surface.
6. Same, right half of anterior part, ventral surface.

PLATE 26

Portunus (*Achelous*) *spinimanus*, male (61277), carapace 85.6 mm. wide, dorsal view

PLATE 27

Portunus (*Achelous*) *spinimanus*, male (61277), carapace 85.6 mm. wide, ventral view showing outer surface of chelae