

Sitka: F. Bischoff; 3 specimens (2178). L. A. Beardslee; 1 male (3171). Depth, 10 fathoms; Harriman Alaska Exped.

Waterfall: in stomach of sculpin; January 9, 1923; Biological Survey, U. S. Department of Agriculture; 1 female; returned to sender.

Ward Cove, Revillagigedo Island; Dr. T. H. Streets, U. S. N.; 1 male, 1 female (14761).

Cedar Island, Loring; June 17, 1904; Chamberlain and Aller, Bur. Fisheries; 3 males, 3 females (1 ovigerous) (46633).

Tongass Village, Tongass Island, Alexander Archipelago; W. R. Coe, Harriman Alaska Exped. (Yale Univ. Mus.).

## BRITISH COLUMBIA

Tleedoo Village, near Susk, northwest coast of Graham Islands, Queen Charlotte group; August 18, 1883; James G. Swan: 2 males (6611).

Fort Rupert; between high and low tide lines, among rocks, seaweed and kelp; Harlan I. Smith; 3 males (22588).

Ucluelet; low tide to deep water; Geol. Survey of Canada; 1 male (40068).

Barclay Sound; September 27, 1888; *Albatross*; 5 males, 7 females (15570).

Otter Bay, Pender Islands; *Albatross*: 10 specimens (19314).

Denman Island; shore; June, 1903; *Albatross*; 2 males, 1 female (31607).

Victoria; Dr. C. F. Newcombe; 2 specimens (15795).

## WASHINGTON

Straits of Fuca: 1 male (3400). 1880; D. S. Jordan; 19 males, 12 females (3077).

Neah Bay: J. G. Swan; 11 specimens (2396), 1 male (5771). May 12, 1914; Bureau of Fisheries; 1 male (48837).

Port Angeles; September 3, 1891; *Albatross*: 8 males, 7 females (18140).

Puget Sound: U. S. Exploring Expedition; 1 male, 1 immature female, cotypes (1237, M. C. Z.). D. S. Jordan; 2 specimens (3097). J. S. Kingsley; 1 male, 3 females (53056), received from Boston Soc. Nat. Hist.

Port Townsend; August 15, 1889; *Albatross*, 1 male, 3 females (16033), 1 female (18297).

Port Townsend Bay; July 1, 1903; *Albatross*: Kala Point, N. 41° W., 1.1 miles; 14 to 17 fathoms; sft. gn. M. br. Co.; temp. 50.8° F.; station 4214; 1 female (31604). Kala Point, N. 83° W., 0.5 mile; 17 fathoms; gn. M. fne. S. stky.; temp. 50.1° F.; station 4215; 1 male (31605).

Kilisut Harbor, near Port Townsend; July 1, 1903; *Albatross*; 1 male, 2 females (31603).

Port Ludlow; Sylvanus Bailey; 1 male, 1 female (14762). W. H. Dall; 5 specimens (14755).

Port Orchard; July, 1889; O. B. Johnson; 16 males, 7 females (14967).

#### CALIFORNIA

Mendocino; May, 1860; A. Agassiz; 2 males (999, M. C. Z.).

#### PUGETTIA RICHII Dana

*Pugettia richii* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 268 (type-locality, California<sup>29</sup>; type not extant); U. S. Expl. Exped., vol. 13, Crust., part 1, 1852, p. 118, pl. 4, fig. 4a-e.—LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 76 [14].—NEWCOMBE, Bull. Nat. Hist. Soc. Brit. Columbia, 1893, p. 21.—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 71.—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 24.—WEYMOUTH, Stanford Univ. Publ., Univ. Ser. No. 4, 1910, p. 30, pl. 4, fig. 11.—SCHMITT, Univ. California Publ. Zool., vol. 23, 1921, p. 207, pl. 33, fig. 6, text-fig. 129.

*Diagnosis*.—Hepatic expansion narrow; transverse, the narrow postocular tooth and first antero-lateral tooth acute and deeply separated. Merus of chelipeds with a few tubercles on the upper side but no acute carina; the inner side may become strongly ridged in adult males, but is generally rounded in young males and in females; the carinae of the carpus are not prominent. Merus and propodus of legs not carinate. Ischium of maxillipeds plane or obscurely furrowed, exognath not grooved.

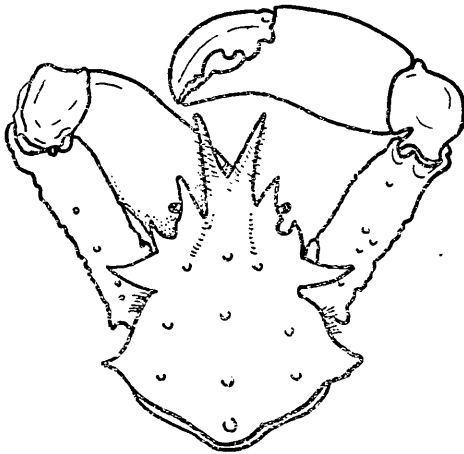


FIG. 66.—PUGETTIA RICHII, MALE, CARAPACE AND CHELIPEDS, X 0.8. (AFTER DANA AND SCHMITT)

as in *P. gracilis*, except that the 10 principal tubercles (4 gastric, 4 branchial, 1 cardiac and 1 intestinal) are nearer of a size; just outside the anterior of the branchial tubercles there is a small tubercle; also one above the posterior margin either side of the intestinal lobe, and one, more obscure, in the furrow between cardiac and branchial regions. Setae as in *P. gracilis*. Postocular tooth

*Description*.—Carapace ovate, tuberculate; number and position of tubercles

<sup>29</sup> According to Stimpson, Boston Journ. Nat. Hist., vol. 6, 1857, p. 457, this species was collected by William Rich, Botanist of the U. S. Exploring Expedition, at San Diego, which is probably the type locality.

directed obliquely outward. It and the antero-lateral tooth are narrow. Postero-lateral spine or tubercle longer than in *P. gracilis*.

On the basal article of the antenna there is a tubercle on the outer margin near the posterior end. The merus and carpus of the chelipeds are bluntly ridged, the merus tuberculate above, especially at proximal end. Ambulatory legs more slender and cylindrical than in *P. gracilis*.

*Color*.—Red, varying from bright to dark, and often closely matching certain of the encrusting corallines (Weymouth).

*Measurements*.—Male (23921), length of carapace to end of horn 40.6, width 33 mm.

*Range*.—From Clayoquot Sound, Vancouver Island, British Columbia, to San Diego Bay, California. From between tides to 50 fathoms.

*Material examined*.—

#### BRITISH COLUMBIA

Ucluelet; low tide to deep water; Geol. Survey of Canada; 1 male (40067).

Barclay Sound; September 27, 1888; *Albatross*: 1 male, 2 females (15572).

Victoria; Dr. C. F. Newcombe (specimens returned to sender).

#### WASHINGTON

Dockton, Puget Sound; May 11, 1906; *Albatross*: 1 male (46527).

#### CALIFORNIA

Humboldt Bay; July 18, 1916; Scripps Inst.: 1 female, returned to sender.

Mendocino; May, 1860; A. Agassiz; 1 female, with *P. gracilis* (999, M. C. Z.).

Monterey Bay; *Albatross*: 1 male (15573). Under rocks and among algae about mean and low tide marks; 1898; Harold Heath: 1 male, 3 females (22873).

Monterey; Henry Hemphill: 1 male (2276), 1 young (21371). 1880; D. S. Jordan: 1 male, 2 females (3058).

Pacific Grove; July, 1895; J. O. Snyder: 1 male (19814). John C. Brown; 15 specimens (23921). 1918; T. S. Oldroyd: 5 males, 2 females (1 ovig.) (54008).

Venice, Santa Monica Bay; from Venice Mar. Biol. Sta.: February 2, 1911; *Anton Dohrn*, P. S. Barnhart: 2 males, 2 females (50172). Under Venice Aquarium: 1 male, 1 female (45582). Venice Breakwater; October 16, 1913; *Anton Dohrn*, P. S. Barnhart: 1 male (50175). Off Venice; August 2, 1913; *Anton Dohrn*: 2 males, 1 female (50173).

3.5 miles S. by W. of Venice; 24 fathoms; July 29, 1913; *Anton Dohrn*; 2 males, 1 female (50174). Two miles S. by E. from Point Del Rey, Santa Monica Bay; August 8, 1913; 3 males, 10 ovigerous females (50171).

San Pedro; E. P. Chace; December 15, 1918; 1 male (53984). San Pedro and vicinity; 1 male, 1 female (50960).

Long Beach, wharf; H. N. Lowe; 1 male (23050), "rare."

Laguna Beach; W. A. Hilton; 1 young female (48985), 1 male (50593).

Off Catalina Island; 50 fathoms; H. N. Lowe; 1 young female (29952).

La Jolla, in tide pools; September 21, 1918; W. L. Schmitt; 1 young (53977).

San Diego: Rosa Smith; 1 male (14765). Henry Hemphill; 1 male (49153).

San Diego Bay; 6.5 fathoms; M. S.; Apr. 1, 1896; *Albatross*; 1 female (20173).

**PUGETTIA DALLI** Rathbun

Plate 59, figs. 1-4

*Pugettia dalli* RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 232 (type-locality, "Southern California," really Catalina Harbor<sup>30</sup>; holotype, Cat. No. 17506, U. S. N. M.); Harriman Alaska Exped., vol. 10, 1904, p. 173, pl. 2, figs. 1 and 1a.—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 26.—SCHMITT, Univ. California Publ. Zool., vol. 23, 1921, p. 208, pl. 23, fig. 5.

*Diagnosis*.—Postocular projection a flat oval lobe; hepatic projection a slender, transverse spine. Merus of chelipeds carinated on three margins; carpus tricarinate above. Ambulatory legs not carinate. Ischium of maxillipeds and also exognath grooved.

*Description*.—A small species. Carapace subtriangular; in its perfect state it is covered with short cutaneous vesicles which form prominences on the protogastric, mesogastric, cardiac, intestinal, hepatic, and branchial region (3 dorsal). The anterior part of the protogastric region, as well as the rostrum and the antero-lateral margin of the branchial region are covered with curled setae. When these coverings are removed, there is a large tubercle on the cardiac and intestinal regions and on each protogastric lobe; median gastric tubercles obsolescent; branchial regions not areolate. Lateral margin with two spines, the hepatic one slender, transverse or nearly so, and almost horizontal, the branchial spine stouter and upturned. Postocular tooth thin, obtuse, its upper surface flattened in a smooth oval plate inclined downward from the horizontal at an angle of

<sup>30</sup> The jar from which the type specimens were taken contained mixed lots from Catalina Harbor and Monterey, as *P. dalli* has not yet been found north of the Santa Barbara Islands, it is reasonable to assume that Catalina Harbor is the type-locality.



about 45 degrees. Rostral horns more slender than in *P. richii*, widely divergent. Preocular tooth acuminate.

Antennae exceeding rostrum; a large lobe on outer margin of basal article. Chelipeds strong; merus with a prominent thin and irregular carina on margins; carpus strongly carinate above and on inner margin, outer and upper surfaces irregularly ridged; hand large, compressed, margins thin; palm nearly as broad as long; fingers gaping, a tooth near base of dactyl, and one on pollex toward distal end of gape. Legs much more slender than in *P. richii* of equal size; first pair about as long as, or longer than, the chelipeds; three succeeding pairs short, decreasing regularly in length; margins fringed with club-shaped setae.

Females differ from adult males in having a broader and more ovate carapace, three distinct branchial areolations, when the pubescence is removed, and in the much more swollen gastric region.

*Color*.—Specimens in formalin, from Laguna Beach, are largely dull red, with some white; legs more or less banded.

*Measurements*.—Male (29951), total length of carapace 17, width 13.4 mm.

*Range*.—From Santa Cruz Island, California (lat. 34° N.), to San Geronimo Island, west coast of Lower California, Mexico (about lat. 29° 40' N.). Shore to 58 fathoms.

*Material examined*.—

#### CALIFORNIA

Off Santa Cruz Island; lat. 34° 00' 00'' N.; long. 119° 29' 30'' W.; 30 fathoms; P.; Feb. 6, 1889; station 2945, *Albatross*; 1 young female (17628).

Between Venice and Rocky Point, Santa Monica Bay; Aug. 11, 1914; *Anton Dohrn*; 1 male (50203), from Venice Mar. Biol. Sta.

Point Vincent; from rocks; Feb., 1918; H. N. Lowe; 1 male (53342).

Off Point Fermin, San Pedro; March 14, 1914; *Anton Dohrn*; 5 ovigerous females (50200), from Venice Mar. Biol. Sta.

San Pedro; H. N. Lowe; 1 male (32972).

Off Wilmington; lat. 33° 38' 45'' N.; long. 118° 13' 45'' W.; 20 fathoms; gy. S. brk. Sh.; Feb. 5, 1889; station 2942, *Albatross*; 1 large male (18190).

Laguna Beach; W. A. Hilton; 2 males, 5 females (4 ovigerous, 1 young) (48909, 50607–50609).

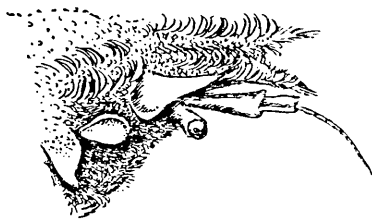


FIG. 67.—*PUGETTIA DALLI*, MALE (29951), ANTERIOR PORTION IN PROFILE TO SHOW FLAT SIDE OF POSTORBITAL LOBE,  $\times 4$

Santa Catalina Island: Dredged January, 1863; J. G. Cooper; 1 male (17372). Isthmus Harbor; Nov. 27, 1913; *Anton Dohrn*; 7 males, 4 females (3 ovigerous) (50201), from Venice Mar. Biol. Sta. Catalina Harbor; W. H. Dall; 4 males, 4 females (1 male is holotype) (17506). Avalon Bay; October 22, 1910; *Anton Dohrn*, P. S. Barnhart; 1 young (50202), from Venice Mar. Biol. Sta.

San Clemente Island; H. N. Lowe; 3 males, 2 females (29951).

La Jolla; 1915; Scripps Inst.; 1 ovigerous female (returned to sender).

San Diego: 10 fathoms; H. Hemphill; 1 male, 1 female (4283). C. R. Orcutt; 1 male (17371).

San Diego Bay; lat. 32° 41.5' N.; long. 117° 13.5' W.; shore; July 9, 1906; Scripps Inst.; 1 female (returned to sender).

San Diego Bay; *Albatross*: 12 fathoms; fne. S. R.; Mar. 22, 1894; station 3581; 1 male, 1 female (31484). 6.5 fathoms; M. S.; Apr. 1, 1896; station 3621; 1 female (20172).

Vicinity of San Diego; Point Loma Lighthouse, N. 43° E., 5.2 miles; 55-58 fathoms; fne. gy. S.; Mar. 12, 1904; station 4347, *Albatross*; 1 young female (46755).

#### MEXICO

San Geronimo Island, Lower California; 7 fathoms; July 19, 1896; A. W. Anthony; 1 young (19525).

#### PUGETTIA VENETIAE Rathbun

Plate 59, figs. 5-7

*Pugettia venetiae* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 2 (type-locality, five miles off Newport Beach, California; from Venice Marine Biological Station, University of Southern California; 1 ovigerous female, holotype, Cat. No. 50268, U. S. N. M.).

*Diagnosis*.—Two hepatic spines, the larger one exceeding in size the lateral branchial spine. A distinct postocular spine. Wrist and margins of arm spinous.

*Description*.—Surface, except of fingers and distal portion of hand, covered with a short, dense pubescence, with occasional tufts of longer, club-shaped setae, which are most noticeable on the tubercles and other high portions of the carapace and in submarginal rows on ambulatory legs; long, straight hairs border the inner margins of the rostral horns, and curled hairs form an oblique row on each proto-gastric lobe. Carapace lumpy, each lump or boss furnished with one or more tubercles. The tubercles are as follows: Four gastric, of which two are median, two lateral, these a little behind the anterior median tubercle; one cardiac; three intestinal, arranged transversely; four or five branchial. Lateral spines three, one branchial and two hepatic; the branchial and the posterior of the hepatic spines are larger, curved, and with slender tips directed forward;

the minor hepatic spine is a little below the level of the major one, and is straight. Postorbital spine a little behind the eye, slender, similar to the two large lateral spines, but not so long-pointed. Preorbital spine also large, directed forward; in front of it, is visible the antennal spine. Rostrum deeply divided by a wide sinus; outer margins of horns subparallel. The basal antennal article has, besides the antero-external spine, one further back on the outer margin, while in the same line but behind the orbit there is another small spine. A small subhepatic spine; also a row on the subbranchial and on the pterygostomian region.

Chelipeds of adult male about as long as carapace. Ischium spined on inner margin; merus on inner, upper and inner-lower margins, 4 of the upper spines being the longest of all; the carpus has 2 spines on inner margin, a row of four on outer margin, and a few spines above and below; a few spinules on upper surface of palm at proximal end. Upper and lower margins of palm slightly convex; dactylus nearly as long as upper margin of palm; fingers narrow, deflexed, toothed within, a very narrow gape at base where the teeth are smaller.

Ambulatory legs subcylindrical, slender; propodites thickest at distal end; dactyls with two rows of sharp, prehensile spinules, and a long, light-horn-colored tip.

*Measurements.*—Female, holotype, median length of carapace 16.7, length of horns 4.4, width of carapace, spines excluded, 13.2 mm.

Male (50268), median length of carapace 13.2, length of horns 2.7, width of carapace, spines excluded, 10.5 mm.

*Range.*—From Newport Beach, California, to Magdalena Bay, Lower California. 10 to 36 fathoms.

*Material examined.*—Five miles off Newport Beach, California; Anton Dohrn; from Venice Marine Biological Station; 1 ovigerous female, holotype, without chelipeds or legs; 1 male, paratype, with left cheliped and no legs (50268).



FIG. 68.—*PUGGETIA VENETIAE*, FEMALE (50268), MAXILLIPED,  $\times 10.5$

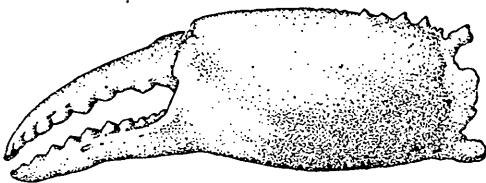


FIG. 69.—*PUGGETIA VENETIAE*, MALE (50268), LEFT CHELA,  $\times 6$

Off east end of Catalina Island, California; 30 fathoms; April 1, 1915; *Anton Dohrn*: from Venice Marine Biological Station; 1 male, 1 young female (50526).

Cortes Bank, Lower California, Mexico; lat. 32° 24.2' N.; long. 119° 6.2' W.: 19–29 meters (10–16 fathoms); rky.; July 18, 1908; station 1561, *Agassiz*; ovigerous female, holotype; received from Scripps Institution (53959).

Off Magdalena Bay, Lower California; lat. 24° 58' 15" N.; long. 115° 53' 00" W.; 36 fathoms; Coralline; temp. 64.3° F.; March 2, 1889; station 2989, *Albatross*; 1 young male, 1 young female (17380).

*Remarks*.—This is not a typical *Pugettia*. The supraocular cave is less expanded over the eye, and the narrow postocular spine is isolated both from the cave and from the hepatic prominences. The eye is larger than is usual in the Acanthonychinae. In the shape of the carapace behind the rostrum the species approaches *Antilibinia*.<sup>31</sup>

#### Genus MIMULUS Stimpson

*Mimulus* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 199 [71]; type, *M. foliatus* Stimpson.

Carapace flattened, smooth or nearly so, subpentagonal; lateral portions laminate, much produced, winglike, antero-lateral margin cut by a narrow fissure into two closely approximate lobes. Rostrum short, bifid, horizontal. Basal antennal article enlarged at base and narrowing distally. Orbits incomplete below, but furnished above with a preocular and postocular spine. First pair of ambulatory legs much exceeding the others.

There is perhaps only one species, and that from the west coast of North America.

#### MIMULUS FOLIATUS Stimpson

##### Plate 60.

*Mimulus foliatus* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 200 [72], pl. 3, fig. 1 (type-locality, off Monterey, California, taken from the stomachs of percid fishes, "Cabesones"; cotype, Cat. No. 1244, M. C. Z.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, pl. 18, figs. 4–4d; 1878, p. 145.—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 23.—RATHBUN, Harriman Alaska Exped., vol. 10, 1904, p. 173.—WEYMOUTH, Stanford Univ. Publ., Univ. Ser. No. 4, 1910, p. 30, pl. 4, figs. 12 and 13.—SCHMITT, Univ. California Publ. in Zool., vol. 23, 1921, p. 204, text-fig. 127.

?*Mimulus acutifrons* A. MILNE EDWARDS, Ann. Soc. Entom. France, vol. 7, 1867, p. 264 (type-locality, unknown; type in Paris Mus.); Crust. Rég. Mex., 1878, p. 145.

*Pugettia foliata* RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 72.

*Diagnosis*.—Carapace broader than long or very slightly longer than broad. Lateral projections continuous. Postorbital tooth small.

<sup>31</sup> M'Leay, in Smith, Illus. Zool. S. Africa, Annulosa, 1838, p. 56.

*Description*.—Carapace flattened and marked with several undulations; lateral expansions a little reflexed, margin behind incision nearly twice the length of that before; antero-lateral and postero-lateral angles wide, the latter somewhat produced; median region tumid, bearing two small, obsolescent, gastric tubercles, in front of which there may be two convergent rows of curved setae; another tubercle on each branchial region, a little above the middle of the postero-lateral margin. Intestinal region produced backward in a large smooth protuberance. Rostral horns short, flattened, with convex outer margins and spiniform, incurved tips; median notch narrowly triangular and setose; on upper side of rostrum there are two double rows of curved setae. Preocular tooth large, triangular, acute; postocular small and pointing obliquely downward, separated by a fissure from the preocular.

Chelipeds of male large; inner margin of merus and carpus lanellate; hand oblong, fingers bent downward and curved inward, somewhat gaping near base, distally dentate, a large tooth on the dactylus in the gape. The propodites of the ambulatory legs have each a tuft of setae below.

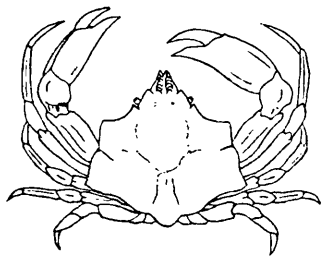


FIG. 70.—*MIMULUS FOLIATUS*, MALE COTYPE, CARAPACE 28 MM. LONG, DORSAL VIEW. (AFTER STIMPSON)



FIG. 71.—*MIMULUS FOLIATUS* (22874), MAXILLIPED,  $\times 5$

*Color*.—A dull purplish, tan or red; legs banded. Variable. A male (22874) had a deep red carapace, with a narrower lighter border on the limb, and in the center a broad white V; hands red above, shading to white below; legs crossed by broad bands of red and white.

*Measurements*.—Female (23925), length of carapace to tip of rostral horns 29, width 32.4 mm. Male (22874), length 24.4, width 27.8 mm.

*Range*.—Unalaska to Monterey Bay, California; Mazatlan, Mexico (A. Milne Edwards). Low tide to 20 fathoms.

*Material examined*.—

Off Imagnec Pinnacle, Captains Bay, Unalaska, Alaska; 8 to 20 fathoms; 1880; W. H. Dall: 1 female (14894).

Ucluelet, British Columbia; low tide to deep water; Geol. Surv. of Canada; 1 male (40076).

Barclay Sound, British Columbia; *Albatross*; 1 male (15548).

Mendocino, California; A. Agassiz; 3 males, 3 females (1 ovigerous); identified by Stimpson (993, M. C. Z.).

Monterey, California: From stomach of fish; A. S. Taylor; 1 male, without chelipeds or legs, cotype (1244, M. C. Z.). H. Hemphill; 1 male (3291).

Monterey Bay, California: Low tide among and under rocks; 1898; Harold Heath; 4 males, 3 females, 3 young (22874).

Pacific Grove, California: John C. Brown; 2 males, 3 females (1 ovigerous). 1918; T. S. Oldroyd; 1 male, 1 ovigerous female (54010).

#### Genus LEUCIPPA Milne Edwards

*Leucippa* MILNE EDWARDS, Ann. Soc. Entom. France, vol. 2, 1833, p. 512; type, *L. pentagona* Milne Edwards; Hist. Nat. Crust., vol. 1, 1834, p. 345.

Carapace subpentagonal or subtriangular, the length exceeding the width but little; lateral margins dēntate or lobed. Rostrum horizontal, wide, lamellate, two-horned. A preorbital and a postorbital tooth present. Eyes small; peduncle very short. Basal article of outer antennae short; next two articles concealed under the rostrum. Epistome of moderate size; merus of outer maxillipeds much dilated outwardly, slightly truncate at the anterior inner angle, a small sharp tooth in front of insertion of palp. Legs short, compressed. Abdomen with seven segments free in both sexes.

Contains only one species, from South America and west coast of Mexico.

#### LEUCIPPA PENTAGONA Milne Edwards

Plate 61; plate 222, figs. 7-9

*Leucippa pentagona* MILNE EDWARDS, Ann. Soc. Entom. France, vol. 2, 1833, p. 517, pl. 18B, figs. 1 and 2 (*pantagona*, on plate) (type-locality, Chile; type in Paris Mus.); Hist. Nat. Crust., vol. 1, 1834, p. 347, pl. 15, figs. 9 and 10.—RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 572; vol. 38, 1910, pp. 571 and 613.—DOFLEIN and BALSS, Jahrb. Hamburg. Wiss. Anst., vol. 29, 1912, p. 36, text-fig. 4.

*Leucippa ensenadae* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1843, p. 9 (type-locality, "l'Ensenade de Ros," Patagonia; type in Paris Mus.); atlas, vol. 9, 1847, pl. 5, figs. 3-3b.

*Leucippa laevis* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 273 (locality not given); U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 135 (type-locality, Rio de Janeiro; type not extant); atlas, 1855, pl. 6, fig. 5a-c.

*Leucippa levis* SMITH, Trans. Connecticut Acad. Sci., vol. 2, 1869, p. 33.

*Pugettia*, species, MIERS, Proc. Zool. Soc. London, 1881, pp. 63 and 66.

*Pugettia australis* MIERS, Proc. Zool. Soc. London, 1881, p. 66 (type-locality, mouth of Rio de la Plata, 28 fathoms, lat. 36° 47' S., long. 55° 17' W.; type in Brit. Mus.); *Challenger* Rept., Zool., vol. 17, 1886, p. 40 (sp.?).

*Diagnosis*.—A preorbital and a postorbital tooth. Rostrum flat, bifid. Chelipeds, legs and basal article of antennae cristate.

*Description*.—Covered with a vesicular pubescence, easily rubbed off, except on fingers and horny tips of ambulatories. Carapace subtriangular, smooth; median region sparingly tumid; rostrum elongate, furcate, horns triangular, usually acute, and with a narrow, triangular

interval. A very small preorbital tooth. Antero-lateral margins of carapace very thin, a little reflexed, four-toothed or angulately undulate, the teeth unequal, the first tooth equivalent to the postorbital angle, the fourth tooth forming the postlateral angle of the carapace. Pterygostomian region usually two-toothed or spined. Basal article of antennae armed outside with a prominent crest, ending forward in a small tooth and followed behind by a spiny tubercle.

Chelipeds stout, cristate above; manus compressed; fingers curved down, edges crenulate, when closed, leaving a narrow gape in basal half or more. Legs cristate above except on dactylus; the latter finely denticulate below.

*Color*.—Pale gray (Milne Edwards). Tawny yellow (Milne Edwards and Lucas).

*Measurements*.—Largest male (2115, M. C. Z.), length of carapace to tip of horn 23, width 20.4 mm.

*Variations*.—Varies in width of carapace, prominence of lateral teeth, acuteness and divergence of rostral horns. Average individuals have the *ensenadae* form (Edwards and Lucas, fig. 3).

*Range*.—From Cape St. Roque, Brazil, to Patagonia, to Chile; Magdalena Bay, Lower California, Mexico. Depth, 7 to 52 fathoms.

*Material examined*.—See table, page 186.

#### Genus SPHENOCARCINUS A. Milne Edwards

*Sphenocarcinus* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, explanation of pl. 17, fig. 5; 1878, p. 135; type, *S. corrosus* A. Milne Edwards.

*Oxypleurodon* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 38; type, *O. simpsoni* Miers.

Carapace elongate-subpentagonal, broad behind, tapering in front to a rostrum which may be long and simple to near the tip or formed of two spines either contiguous or divergent. Surface of carapace usually symmetrically and deeply honeycombed by broad, deep channels which leave symmetrical tubercles often with overhanging edges between them. No true preocular and postocular spines, but the eye is deeply sunk between two low, smooth excrescences which are preocular and postocular in position. Basal antennal segment truncate-triangular; antennary flagella completely hidden beneath the rostrum. Epistome long and narrow. External maxillipeds with the merus as broad as the ischium, somewhat dilated at the antero-external angle, and usually slightly excavated at the antero-internal angle for the insertion of the small palp.

Chelipeds not much stouter but shorter than the next pair of legs which are the shortest of the ambulatories; the dactyli of the legs,

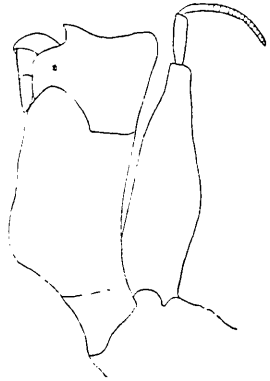


FIG. 72.—LEUGIFFA PENTAGONA (47119), MAXILLIPED, X 8.4

Material examined of *Leucippa pentagona*

Locality	Bearings		Fathoms	Bottom	Temp.	Date	Station	Collector	Specimens	Cat. No.	Remarks
	Latitude S.	Longitude W.									
Brazil: Off Cape St. Roque.	° ' "	° ' "	20	brk. Sh.	° F.	Dec. 16, 1887	2758	<i>Albatross</i> .	1 ♂	23346	Identified by A. Milne Edwards.
Uruguay: Rio de la Plata, below Montevideo.	6 59 30	34 47 00	7		79			U. S. C. S. S.	10 ♂ ♀	2017, M.C.Z.	
Argentina: Buenos Aires								<i>Hassler</i> .			
Off Rio de la Plata.	36 42 00	56 23 00	11.5	S. brk. Sh.		Jan. 12, 1888	2764	<i>Albatross</i>	1 ♀	674, Mus.	
Do.	36 43 00	56 23 00	10.5	S. brk. Sh.		do.	2765	do.	17	Parulista.	
Do.	36 47 00	56 23 00	68	S. brk. Sh.		do.	2766	do.	75	21898.	
Patagonia:									18	21899.	
San Antonio Bay						Mar. —, 1872		U. S. C. S. S.	4 ♂ 2 ♀	2115, M.C.Z.	
Off Vermoja Head.	41 17 00	63 00 00	17			Mar. 4, 1872	244P	<i>Hassler</i> .	1 ♀		
Gulf of San Matias						Mar. —, 1872		do.	2 ♂	2018, M.C.Z.	Identified by A. Milne Edwards.
Off Gulf of San Matias.	40 03 00	58 56 00	52	fine dk. S.		Jan. 13, 1888	2767	<i>Albatross</i> .	4	21901.	
Eastern Patagonia.								C. E. Porter	1 ♂	47119.	
Mexico: Magdalena Bay, Lower California.	Lat. N. 24 38 00	112 17 30	51	gn. M.		May 2, 1888	2833	<i>Albatross</i> .	1 ♂	21902.	



though stout, recurved and prehensile, are not toothed along the posterior edge. Abdomen in both sexes with seven distinct segments.

East and west coast of middle America. Indo-Pacific region from the western Indian Ocean to the Hawaiian Islands. Depth, 14 to 300 fathoms.

## KEY TO THE AMERICAN SPECIES OF THE GENUS SPHENOCARCINUS

- A<sup>1</sup>. Dorsal surface deeply channeled. Antero-lateral margin entire. corrosus, p. 187.  
 A<sup>2</sup>. Dorsal surface uneven but not deeply channeled. Antero-lateral margin coarsely dentate. agassizi, p. 188.

Analogous species on opposite sides of the continent: *corrosus* (Atlantic); *agassizi* (Pacific).

## SPHENOCARCINUS CORROSUS A. Milne Edwards

Plate 62; plate 223, figs. 3-5

*Sphenocarcinus corrosus* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, pl. 17, figs. 5-5c; 1878, p. 136 (type-locality, off Barbados, 100 fathoms; holotype in Mus. Comp. Zoöl.).—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 66.—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 8.—HAY, Bull. Bur. Fisheries, vol. 35, 1918, p. 460, pl. 39, fig. 1.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 378, text-fig. 18.

*Diagnosis*.—Carapace deeply channeled between large, eroded tubercles. Antero-lateral margin entire. Rostrum longer than postrostral portion of carapace.

*Description*.—Antero-lateral margin of carapace concave, postero-lateral margin convex. Dorsal surface deeply channeled; the elevations thus formed are coarsely punctate or eroded, and form a regular pattern; one gastric elevation is longitudinally placed and widens behind; with a small, circular lobe on each side it resembles a clover leaf; cardiac lobe transversely elongate with a deep notch on each side of its posterior margin; an intestinal lobe follows the posterior margin; a lateral lobe (paired) extends from behind the lateral angle forward nearly to the eye; a small postocular and a larger supraocular elevation. Rostrum normally longer than carapace, composed in greater part of two cylindrical horns which are contiguous to near the tips, or occasionally divergent for a considerable distance. Two short rostrums have,

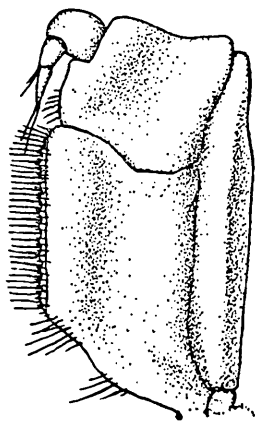


FIG. 73.—SPHENOCARCINUS CORROSUS, FEMALE (15183), MAXILLIPED,  $\times 16$

in one case, horns wholly divergent; in the other, no sign of bifurcation, but a simple, acute tip.

Chelipeds rather small and weak; the first pair of walking legs exceeds them by more than the length of its dactyli.

*Color*.—Orange red (Hay).

*Measurements*.—Ovigerous female (15183), extreme length of carapace, 22.7; length from posterior margin to line between anterior margins of supraocular elevations, 10.3; width of carapace, 10.8 mm.

*Range*.—Off Cape Lookout, North Carolina, to Barbados; 90 to 148 fathoms.

*Material examined*.—

Gulf Stream, 30 miles due S. of Cape Lookout Lightship, North Carolina; about 100 fathoms; *Fish Hawk*; 2 males, 2 females (51071), 1 male (50520).

Off Cape Fear, North Carolina; lat. 33° 20' 00" N.; long. 77° 05' 00" W.; 90 fathoms; gy. S.; temp. 65.8° F.; April 2, 1885; station 2418, *Albatross*; 1 female, ovigerous (15183).

SE. by E. ½ E. of Sand Key, Florida; 90 fathoms; J. B. Henderson; 1 young female (50519).

Off Barbados: Off Sandy Bay; 100 fathoms; December 29–30, 1871; *Hassler* Exped.; 1 female, holotype (2019, M. C. Z.). Lat. 13° 03' 50" N.; long. 59° 37' 05" W.; 94 fathoms; Co. brk. Sh.; temp. 61° F.; Mar. 5, 1879; station 276, U. S. C. S. S. *Blake*; 1 specimen (2886, M. C. Z.).

#### SPHENOCARCINUS AGASSIZI Rathbun

Plate 63; plate 223, figs. 1 and 2

*Sphenocarcinus agassizi* RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 231 (type-locality, Gulf of California, 14 fathoms; holotype, Cat. No. 17343, U.S.N.M.).—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 7, pl. 1, figs. 3, 3a.

*Diagnosis*.—Carapace with surface uneven, not deeply channeled. Antero-lateral margin dentate. Rostrum shorter than postrostral portion of carapace.

*Description*.—Whole surface of body and limbs clothed with a short, close pubescence. Rostral horns long, horizontal, contiguous. A more or less broken, longitudinal, rounded ridge runs along the median line of the carapace from the base of the rostrum to the intestinal region, rising into a prominent tubercle on the gastric area. A transverse flattened tubercle on the cardiac region and two roundish ones on each branchial region. Antero-lateral margin of carapace armed with four prominent tubercles or large teeth, counting the one at the external orbital angle; these teeth increase in size successively from the first to the last. Upper margin of orbit thickened and produced into a blunt preocular tooth. Outer margin of pterygostomial region furnished with two or three rounded tubercles. On the merus of chelipeds two short spines at proximal end on superior

border and one at distal extremity; otherwise the limbs are unarmed; fingers short, gaping slightly at base, cutting edges crenulate, tips blunt.

*Measurements.*—Male holotype, extreme length of carapace 35, length from posterior margin to line between anterior margins of preocular teeth 19.2, width of carapace 23 mm. Male (M. C. Z.), length of carapace including rostrum 39, of rostrum 16, width of carapace 28 mm. (Faxon).

*Range.*—Gulf of California to Panama, 14 to 71 fathoms.

*Material examined.*—

Gulf of California; off Cape Tepoca, Mexico; lat.  $30^{\circ} 28' 00''$  N.; long.  $113^{\circ} 06' 30''$  W.; 14 fathoms; bk. S. brk. Sh.; temp.  $66^{\circ}$  F.; Mar. 24, 1889; station 3019, *Albatross*; 1 male, holotype (17343).

Gulf of California; northwest of Guaymas, Mexico; lat.  $28^{\circ} 07' 00''$  N.; long.  $111^{\circ} 39' 45''$  W.; 71 fathoms; fine gy. S. brk. Sh.; temp.  $57.9^{\circ}$  F.; Mar. 23, 1889; station 3011, *Albatross*; 2 males, 1 female (17342).



FIGS. 74-75.—MENAETHIOPS PORTORICENSIS. 74 (LEFT), FEMALE, HOLOTYPE, ANTERIOR HALF OF CARAPACE,  $\times 14.5$ ; 75 (RIGHT), FEMALE (56912), BASAL ARTICLE OF LEFT ANTENNA, MUCH ENLARGED

### Genus MENAETHIOPS Alcock

*Menaethiops* ALCOCK, Journ. Asiat. Soc. Bengal, vol. 64, 1895, p. 289; type, *M. bicornis* Alcock.

Carapace subpyriform or oblong, pubescent; rostrum divided into two slender spines. The eyes, which are movable forwards but not retractile, are in great part concealed beneath a large, very conspicuous, laminar, supraocular eave, terminating anteriorly in a spine. No postorbital spine. Basal article of antenna broad; mobile portions of antennae visible from above, either side of rostrum. Merus of outer maxillipeds as broad as ischium, and palp inserted at antero-internal angle of merus. Chelipeds of male enlarged. The

ambulatory legs, of which the first is longer than the rest, have strongly recurved dactyli. Abdomen of seven separate segments in both sexes.

Off Porto Rico; Zanzibar; Karachi, India.

**MENAETHIOPS PORTORICENSIS** Rathbun

Plate 49, figs. 1 and 2

*Menaethiops portoricensis* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 2 (type-locality, Porto Rico;  $1\frac{1}{2}$  miles S. of Caña Gorda Islands, near Guanica Harbor; 26 fathoms; female, holotype, F 2628, Amer. Mus. Nat. Hist.).

*Diagnosis.*—Rostrum nearly half as long as remainder of carapace, its spines widely divergent. Two marginal, hepatic spines.

*Description.*—Surface of carapace and appendages in large part covered with broad, flattened vesicles the largest of which are spatuliform. These are so varied in size, shape, and disposition that at first sight they appear like foreign bodies. Carapace constricted behind orbit and behind hepatic regions. Gastric, cardiac, and intestinal regions tumid, and tuberculate or granulate; four tubercles form a transverse diamond on the gastric region. Rostrum slender, divided in its middle into two widely divergent, slightly curved and tapering horns; basal half of rostrum with a median furrow. Preocular spine suberect, prominent; nearer the median line may be

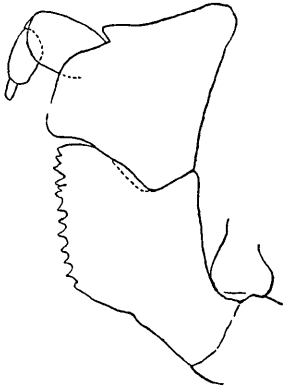


FIG. 76.—MENAETHIOPS PORTORICENSIS, MALE (56012), ENDOPODITE OF MAXILLIPED,  $\times 43.8$

seen a smaller spine of the basal antennal article. On the lateral margin of the hepatic region there are two slender spines; on the branchial region near its anterior end and a little above the margin there is a small, acute spine, while near the lateral angle of the carapace is the largest spine of all. The ornamentation of the carapace is considerably obscured by the vesicular pubescence. Besides a long, slender, cylindrical spine at the antero-external angle of the basal antennal article, there is a tubercle on its outer margin. Two pterygostomial tubercles.

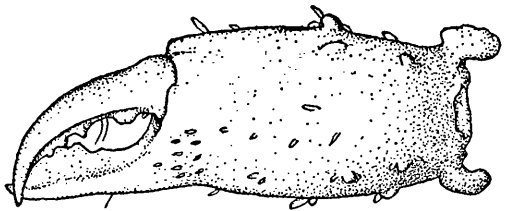


FIG. 77.—MENAETHIOPS PORTORICENSIS, MALE (56012), CHELA, MUCH ENLARGED

Chelipeds of male stout; fingers widely gaping in their basal half, the fingers being arched away from each other; prehensile edges broad and thin; a large tooth near base of dactyl. Legs highly

ornamented (fig. 78); dactyls armed with a few (4 to 6) sharp spinules, which become longer towards the horny tip of the dactyl.

*Measurements.*—Female, holotype, total length of carapace 5.4, length of rostrum 1.6, width of carapace with spines 3.6, without spines 2.7 mm. Both males lack the rostral horns.

*Range.*—Porto Rieo (southwest coast); 11 to 26 fathoms.

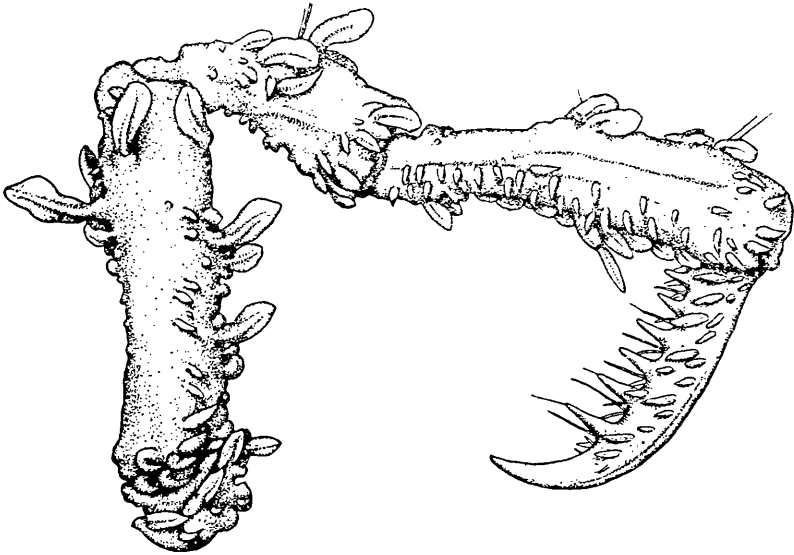


FIG. 78.—MENAETHIOPS PORTORICENSIS, FEMALE (56012), A LOOSE LEG, MUCH ENLARGED

*Material examined.*—

Southwest of Salinas Cove; 11 fathoms; July 10, 1915; 1 male (F 2384, Amer. Mus. Nat. Hist.); 1 male, 1 ovigerous female (56012).

One and a half miles south of Caña Gorda Islands, near Guanica Harbor; 26 fathoms; scattered coral rock and sand with algae; June 23, 1915; 1 ovigerous female, holotype (F 2628, Amer. Mus. Nat. Hist.).

Genus **ESOPUS** A. Milne Edwards

*Esopus* A. MILNE EDWARDS, Crust. Rég. Mex., 1875. p. 89; type, *E. crassus* A. Milne Edwards.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zool., vol. 47, 1923, p. 389.

Body and feet almost entirely smooth. Carapace thick, gibbous, and as if inflated. Front formed by a large, rounded, tuberculiform prominence. Basal segment of antenna very large, swollen, extending well beyond eyes. Antennular fossettes very narrow. Orbits incomplete below, postocular process present but separated by a rather wide fissure above. Ocular peduncles stout, and capable of folding into a cavity hollowed for the purpose. Buccal cavity wide in front. Merus of outer maxillipeds a little dilated outward and forward, and not notched on inner side for insertion of palpus.

Ambulatory legs very slender, rather long, dactyli very delicate. (A. Milne Edwards.)

Abdomen of adult female wide, swollen, and formed of four (not three) articles, the fourth to seventh segments, inclusive, being coalesced.

Contains only one species.

ESOPUS CRASSUS A. Milne Edwards

Plate 222, figs. 10-12

*Esopus crassus* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 90, pl. 17. figs. 1-1c (type-locality, off Barbados, 100 fathoms; holotype, Cat. No. 1944, M. C. Z.).

*Diagnosis*.—Carapace oval, lobulate, finely granulate. Ambulatory legs smooth and slender.

*Description*.—Carapace narrow, oval, and slightly narrowed in front; entirely covered, excepting in the interlobular depressions, with shining and almost confluent granules. Anterior part very swollen. Interorbital space divided into three nearly equal lobes by two longitudinal depressions which are connected behind with the cervical suture. Protogastric lobes clearly marked on their outer side; on the inner side they are confluent with the mesogastric lobe which is elevated in a point above them; metagastric lobes confluent on the median line and separated by a deep suture from the urogastric lobes which are themselves confluent. Anterior cardiac lobe conical, prominent, and surmounted by a large tubercle; posterior cardiac, or intestinal, lobe much more depressed, and divided into two portions by a transverse suture. Hepatic region small and rounded. The branchial region bears on its middle portion a tubercle smaller than that of the cardiac lobe; borders of metabranchial lobe cut above the base of the legs into three blunt points. Pterygostomian regions papillated and granulated. Basal article of antennae covered with granulations similar to those of the front. Some large granules on front of epistome. Abdomen also granulate. Chelipeds of female cylindrical and very slender. Ambulatory legs smooth; first three pairs nearly the same length; fifth a little shorter. (A. Milne Edwards.)

The median lobule of the front or interorbital space is divided transversely in two, forming a short, buttonlike, rostral projection. The anterior point of the mesogastric region is a smooth, white, oval elevation.

*Measurements*.—Female, holotype, length of carapace 13, width 8.4 mm.

*Range*.—Known only from the unique type.

*Material examined*.—Off Sandy Bay, Barbados; 100 fathoms; December 29-30, 1871; Hassler Expedition; 1 female, holotype (1944, M. C. Z.).

## Subfamily PISINAE

*Pisinac* ALCOCK, Journ. Asiat. Soc. Bengal, vol. 64, 1895, p. 165.

*Blastidae* STEBBING, Marine Invest. S. Africa, vol. 4, Cape Town, 1905, p. 25.

Eyes with commencing orbits, of which one of the most characteristic parts is a large, blunt, usually but not always isolated, cupped postocular process into which the eye is retractile, but never to such an extent as to completely conceal the cornea from dorsal—still less from ventral—view; there is almost always a distinct supraocular eave, which is often produced forwards as a spine; the eyestalks are short. The basal antennal article is usually rather broad, at any rate at the base; its antero-external angle is generally produced forwards as a spine or tooth. The merus of the external maxillipeds, owing to the expansion of its antero-external angle, is broader than the ischium and carries the palp at its antero-internal angle. Rostrum usually two-spined or two-toothed. Legs often very long. (After Alcock.)

## KEY TO THE AMERICAN GENERA OF THE SUBFAMILY PISINAE

- A<sup>1</sup>. Supraocular eave not in close contact with the postocular spine or process.
  - B<sup>1</sup>. No tooth on orbital margin between supraocular eave and postocular cup.
    - C<sup>1</sup>. Supraocular eave produced anteriorly in a spine. (In the genus *Rochinia*, this is true of American species.)
      - D<sup>1</sup>. Rostrum bifid for more than half its length.
        - E<sup>1</sup>. Rostrum thin, broad, flat and horizontal. Movable articles of antennal peduncle laterally carinate; palms carinate above. Carapace lumpy.....*Scyra*, p. 195.
        - E<sup>2</sup>. Rostrum armed with two long slender spines, or thick and deflexed.
          - F<sup>1</sup>. Rostrum thick and deflexed. Supraocular eave widespreading, separated from the postocular tooth by a broad V-shaped sinus. Large, hairy crabs.....*Loxorhynchus*, p. 198.
          - F<sup>2</sup>. Rostral spines slender.
            - G<sup>1</sup>. Ambulatory legs bordered with two rows of spines.
              - Oplopisa*, p. 228.
            - G<sup>2</sup>. Ambulatory legs not bordered with two rows of spines.
              - H<sup>1</sup>. An orbital spine between postocular spine and basal antennal article; orbit very open above; supraocular eave narrow, its spine small. Chelae of male swollen.
                - Trachymaia*, p. 229.
              - H<sup>2</sup>. No orbital spine between postocular spine and basal antennal article; supraocular eave advanced in a substantial spine.
                - J<sup>1</sup>. Chelipeds of male much enlarged; palm broad, upper edge thin. Superior orbital sinus V-shaped.....*Chorilia*, p. 202.
                - J<sup>2</sup>. Chelipeds slender, often greatly elongated in male. Orbital sinuses U-shaped and more open than in *Chorilia*.
                  - Rochinia*, p. 204.
      - D<sup>2</sup>. Rostrum bifid at tip only, or at least not behind the middle. Carapace broadly subtriangular. Preocular spine well developed.
        - E<sup>1</sup>. Not more than two long, antero-lateral marginal spines. Inferior orbital sinus rounded.....*Libidoclaea*, p. 223.

- E<sup>2</sup>. Three long, antero-lateral marginal spines besides the orbital spine. Inferior orbital sinus acute. (True of the typical or American species) ..... *Chorilibinia*, p. 309.
- C<sup>2</sup>. Supraocular cave not produced anteriorly in a spine.
- D<sup>1</sup>. Carapace either broader than long or very little longer than broad. Rostrum short. Chelipeds much shorter than ambulatory legs.
- E<sup>1</sup>. Rostrum very small, simple. Basal antennal article reaching to line of rostrum..... *Leurocyclus*, p. 230.
- E<sup>2</sup>. Rostrum longer than in *Leurocyclus*, bilobed. Basal antennal article not reaching to line of rostrum..... *Chionoecetes*, p. 232.
- D<sup>2</sup>. Carapace considerably longer than broad. Rostrum elongate.
- E<sup>1</sup>. Carapace smooth.
- F<sup>1</sup>. Basal article of antennae narrow; peduncle not reaching end of rostrum..... *Pelia*, p. 275.
- F<sup>2</sup>. Basal article of antennae broad, nearly as broad as long; peduncle reaching or overreaching end of rostrum..... *Pisoides*, p. 284.
- E<sup>2</sup>. Carapace rough with tubercles or tubercles and spines. Carapace lyrate; rostrum triangular, horns contiguous or nearly so. *Hyas*, p. 252.
- B<sup>2</sup>. A tooth on orbital margin between supraocular cave and postocular cup.
- C<sup>1</sup>. Rostrum small. Carapace suborbicular or broadly ovate.
- D<sup>1</sup>. Ambulatory legs with very long propodites and very short dactyls. Ischium of outer maxillipeds much longer than merus. *Herbstia*, p. 293.
- D<sup>2</sup>. Ambulatory legs with dactyls nearly as long as propodites. Ischium of outer maxillipeds scarcely longer than merus (both measured on outer margin)..... *Micropisa*, p. 303.
- C<sup>2</sup>. Rostrum of considerable length. Carapace narrower than in C<sup>1</sup>, distinctly longer than broad.
- D<sup>1</sup>. Chelipeds filiform, chelae more slender than merus. Legs much stouter, spinous..... *Lepteces*, p. 292.
- D<sup>2</sup>. Chelipeds as stout as, or stouter than, ambulatory legs.
- E<sup>1</sup>. First ambulatory leg long, much longer than the last three.
- F<sup>1</sup>. Orbit very open; postorbital tooth small. Carapace oval, mostly smooth. Antennae concealed by rostrum.... *Chorinus*, p. 304.
- F<sup>2</sup>. Orbit not very open; postorbital tooth of good size. Carapace pyriform, with four spines forming a square on widest portion. Antennae visible at sides of rostrum..... *Notolopas*, p. 287.
- E<sup>2</sup>. Ambulatory legs diminishing regularly from first to fourth pair. Carapace rough with numerous spines.
- F<sup>1</sup>. Orbit closed below; postorbital tooth broad. Spines of carapace short and stout..... *Nibilia*, p. 289.
- F<sup>2</sup>. Orbit very open above and below; postorbital projection a slender spine. Spines of carapace long and slender. *Holoplites*, p. 307.
- A<sup>2</sup>. Supraocular cave in close contact with the postocular process. (In young *Libinia* there may be a narrow open slit in superior orbital margin.)
- B<sup>1</sup>. Carapace usually subglobose behind the rostrum, spinous; rostrum involute..... *Libinia*, p. 310.
- B<sup>2</sup>. Carapace subtriangular, lumpy; rostrum more or less revolute. Orbit outward-looking. Basal antennal article tapering, not spined. *Lissa*, p. 331.



## Species of Pisinae wrongly ascribed to America:

*Cancer hircus* FABRICIUS, Species Insectorum, vol. 1, 1781, p. 503; Jamaica.  
= *Pisa tetraodon* (Pennant, 1777), a European species. Type examined (Kiel Mus.).

## Genus SCYRA Dana

*Scyra* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 269; type, *S. acutifrons* Dana; U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 94.—Holmes, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 41.

Carapace subpyriform, tuberculated, having a few or no spines. Rostrum composed chiefly of two flattened horns. Orbits small, with a fissure above and below, the lower and sometimes the upper one being open. Preorbital spine present. Basal antennal article rather narrow, with a small spine at antero-external angle, the two following articles compressed and not concealed by rostrum. Merus of maxillipeds distally truncate, notched at antero-internal angle. Chelipeds of male well developed, hand compressed and carinated above, fingers acute. Legs moderately long and narrow, diminishing rather regularly in length from first to fourth. Abdomen 7-segmented in both sexes. (After Holmes.)

Inhabits the west coast of North America and the coast of Japan.

## SCYRA ACUTIFRONS Dana

## SHARP-NOSED CRAB

Plate 79; plate 224, figs. 4 and 5

*Scyra acutifrons* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 269 (type-locality, *in mari Oregonensi*; type not extant); U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 95, pl. 2, figs. 2a-2d.—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 41.

*Diagnosis.*—Carapace of adult without a spine on hepatic or branchial margin. Margins of arm tuberculate, not cristate; dactylus of chela with a large, subbasal tooth. Ambulatory legs subcylindrical, dactyli rather stout.

*Description.*—Carapace covered with tubercles; gastric region tumid, separated from cardiac and branchial regions by a conspicuous depression; an acute or spiniform tubercle near the center of the gastric region, behind which there is a larger, obtuse tubercle. Branchial regions tumid, bearing at the widest part a large, projecting tubercle, in front of which lies an elevation which may bear several small tubercles though often smooth. A very large tubercle on the cardiac and a small one on the intestinal region. Rostrum short, horns ovate-lanceolate, occupying over half the length. Preorbital spine small, acute. A lobe on outer margin of basal antennal article and immediately behind it, a tooth in line with the very prominent

antero-lateral border of the buccal cavity. Pterygostomian region carinate, carina roughly crenate.

Chelipeds of male large; merus semicylindrical (flattened below) and strongly pustulate, especially at the angles; carpus pustulate, several ridges on upper-outer surface; manus long, high, compressed, the palm below the wide carina often inflated; fingers deflexed, and in old males, gaping at base, with a large tooth near base of dactyl.

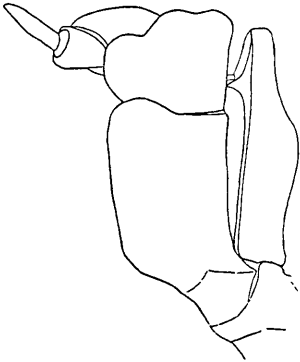


FIG. 79.—SCYRA ACUTIFRONS (31548),  
MAXILLIPED,  $\times 6.2$

Legs subcylindrical, more or less pubescent; propodi sulcate on either side; dactyli considerably shorter than propodi and furnished with sharp, corneous tips.

*Variations.*—In the female the regions of the carapace are much less elevated, the gastric region more evenly rounded. Occasional small ones (1 male, 3 females, in the collection) 13 or 14 mm. long, have a slender, sharp spine on the hepatic margin, a character not found in other young or adults. One of the females is ovigerous.

*Measurements.*—Male (14966), length of carapace to tip of horns 52.6, width 37.7 mm.

*Range.*—Kodiak, Alaska, to San Diego, California, low tide to 45 fathoms.

*Material examined.*—

#### ALASKA

Kodiak; W. G. W. Harford; 1 female (14801).

#### BRITISH COLUMBIA (VANCOUVER ISLAND)

Ucluelet; low tide to deep water; from Geol. Surv. of Canada; 1 male (40064).

Off Cape Beale; Sept. 26, 1888; *Albatross*: Lat.  $49^{\circ} 00' 00''$  N.; long.  $125^{\circ} 48' 00''$  W.; 24 fathoms; gy. S.; temp.  $52.3^{\circ}$  F.; station 2881; 1 female (16344). Lat.  $48^{\circ} 53' 00''$  N.; long  $125^{\circ} 53' 00'$  W.; 34 fathoms; R.; temp.  $50.3^{\circ}$  F.; station 2879; 1 male (16343).

Victoria; C. F. Newcombe; 1 male (15793).

#### WASHINGTON

Off Cape Flattery; lat.  $48^{\circ} 30' 00''$  N.; long.  $124^{\circ} 57' 00''$  W.; September 24, 1888; *Albatross*: 40 fathoms; R.; temp.  $47.8^{\circ}$  F.; station 2873; 1 female (18986). 27 fathoms; R. Sh.; temp.  $50.3^{\circ}$  F.; station 2874; 2 males (16020). 40 fathoms; R. Sh.; temp.  $47.8^{\circ}$  F.; station 2875; 1 female (18987).

Near Port Townsend, Admiralty Inlet; Admiralty Head Light, N.  $38^{\circ}$  W., 1.3 miles; 26 to 15 fathoms; R. Sh.; temp.  $50.8^{\circ}$  F.;

June 29, 1903; station 4205, *Albatross*; 4 males, 5 females (31548), 1 male (46631).

Admiralty Inlet; 1903; *Albatross*; 7 males, 5 females (31547).

Port Orchard, Puget Sound; July, 1889; O. B. Johnson; 8 males, 3 females (14966).

Dockton, Puget Sound; May 10-11, 1906; *Albatross*; 1 male, 2 ovigerous females (46630); 2 are encrusted with sponges and barnacles.

Puget Sound; 1880; D. S. Jordan; 1 female (3099).

## CALIFORNIA

Humboldt Bay; July 18, 1916; 1 male (Scripps Inst.).

Off Farallon Islands; 20<sup>f</sup> fathoms; October 3, 1901; Bur. Fisheries; 1 male (33469).

Off Santa Cruz; lat. 36° 55' 10'' N.; long. 122° 04' 00'' W.; 21 fathoms; rky.; temp. 52.3° F.; Mar. 13, 1890; station 3124, *Albatross*; 1 ovigerous female (15513).

Monterey; Doctor Canfield; 2 males, 1 female (3449). D. S. Jordan; 1 male (16291). H. N. Lowe; 1 male, 2 females (53341).

Monterey Bay; at extreme low tide mark usually, under rocks or in crevices; Harold Heath; 3 males, 1 female (22876).

Pacific Grove; July, 1895; J. O. Snyder; 1 male, 3 females (19815). John C. Brown; 5 specimens (23923).

Off Santa Barbara; February 11, 1889; *Albatross*: Lat. 34° 22' 45'' N.; long. 119° 40' 30'' W.; 21 fathoms; gn. M.; station 2961; 1 male (16341). Lat. 34° 20' 40'' N.; long. 119° 37' 45'' W.; 26 fathoms; gy. S. P. St.; temp. 58° F.; station 2969; 1 male (16342).

Off Santa Rosa Island; 38 to 45 fathoms; April 15, 1904; station 4431, *Albatross*; 1 young male (46756).

Off Venice, Santa Monica Bay; August 13-14; *Anton Dohrn*; from Venice Mar. Biol. Sta.; 1 immature female (50206).

Three miles south of Venice; 14 fathoms; July 29, 1913; *Anton Dohrn*; from Venice Mar. Biol. Sta.; 1 ovigerous female (50205).

Off Point Fermin, San Pedro; March 14, 1914; *Anton Dohrn*; from Venice Mar. Biol. Sta.; 1 ovigerous female (50204), variety with hepatic spine.

Laguna Beach; W. A. Hilton; 1 young male (48986).

San Diego Bay; Ballast Point Lighthouse, W. SW.  $\frac{1}{2}$  W., 300 yards; 12 fathoms; fine. S. R.; March 22, 1894; station 3581, *Albatross*; 1 male, 1 female (20149).

## SOUTHERN CALIFORNIA

W. H. Dall; 2 young females (16290). *Anton Dohrn*; from Venice Mar. Biol. Sta.; 1 ovigerous female (50207).

Genus **LOXORHYNCHUS** Stimpson

*Loxorynchus* STIMPSON, Proc. Boston Soc. Nat. Hist., vol. 6, Feb., 1857, p. 84; type, *L. grandis* Stimpson.

*Loxorhynchus* STIMPSON, Journ. Boston Soc. Nat. Hist., vol. 6, 1857, p. 451 [10]; correction of *Loxorynchus*.

Carapace pyriform, tuberculate or spinous, and pubescent. Gastric region large, convex. Hepatic region small, prominent, armed with one or two stout spines. Rostrum bifid, more or less deflexed; horns divergent. Orbits imperfect, interrupted above and below by a deep, longitudinal sinus; ocular cavity subtubular. Eyes rather short, retractile, not concealed. Preorbital tooth strong; postorbital tooth acute, almost longitudinal; below it there is a smaller spine just outside the basal article of the antenna. This article is broad, nearly quadrate, armed at the outer apex with an acute spine extended laterally; movable part of the antenna not concealed by the rostrum; flagellum long. Epistome large. Pterygostomial region tuberculate.

Ischium of external maxillipeds strongly produced and rounded at the antero-internal angle; the same angle of the merus is subrectangular, internal angle deeply notched for insertion of palpus. Chelipeds of adult male much enlarged, longer than next leg; fingers gaping, extremities dentate, a large basal tooth on the dactylus. Legs diminishing in length from the first to the fourth pair; subcylindrical; dactyli stout, unarmed. Abdomen with seven separate segments in both sexes.

Inhabits the west coast of California and Lower California, Mexico.

KEY TO THE SPECIES OF THE GENUS **LOXORHYNCHUS**

- A<sup>1</sup>. Carapace multispinous. Hepatic region armed with two large spines. Front strongly deflexed.....**grandis**, p. 198.  
 A<sup>2</sup>. Carapace covered chiefly with a few large bosses or tubercles, each tipped with a spine. Hepatic region armed with one large spine. Front moderately deflexed.....**crispatus**, p. 200.

**LOXORHYNCHUS GRANDIS** Stimpson

## SHEEP CRAB; KELP CRAB

Plates 64 and 65

*Loxorynchus grandis* STIMPSON, Proc. Boston Soc. Nat. Hist., vol. 6, Feb., 1857, p. 85 (type-locality, near San Francisco, California; holotype, Cat. No. 15376, U. S. N. M.); Ann. Lyc. Nat. Hist. New York, vol. 7, 1859, p. 49.

*Loxorhynchus grandis* STIMPSON, Journ. Boston Soc. Nat. Hist. vol. 6, 1857, p. 452 [12], pl. 20, fig. 1; pl. 22, fig. 1.—HOLMES, Occas. Papers Calif. Acad. Sci., vol. 7, 1900, p. 29.—RATHBUN, Proc. U. S. Nat. Mus., vol. 35, 1908, p. 342, pls. 45, 46 and 47, fig. 1; fossil.

*Diagnosis*.—Carapace multispinous. Two large hepatic spines. Front strongly deflexed. Two tubercles on basal antennal segment. Upper margin of manus of adult male less than twice its width.

*Description.*—Carapace covered with spines or with spines and tubercles. Surface clothed with a vesicular pubescence mixed with longer, curved, yellow bristles which are most numerous about the spines and form a longitudinal row extending from either side of the gastric region to the extremity of the rostrum. A stout spine on the margin of the hepatic region and another equally large just below the margin. A tubercle on the edge of the supraocular cave just above the eye. The basal antennal article besides the antero-external spine has a tubercle on the outer margin and another on the anterior margin at the insertion of the next article.

Chelipeds of adult male much enlarged and about one and one-fourth times the length of the carapace. Outer surface of merus and carpus and upper surface of proximal half of manus tuberculate; merus subtriangular, three or four spines on upper margin. Hand much swollen, about two-thirds as thick as high and about two-thirds as high as its superior length. Fingers gaping for less than half their length.

Legs subcylindrical; merus with a few spines or tubercles on distal half of upper margin, most evident in the first pair; carpus elongate, with a few tubercles or spines, and a longitudinal depression on the outer surface; propodus smooth. The vesicular pubescence on the legs is for the most part longer than on the carapace and extends to the horny tips of the dactyls; a few curved, yellow bristles are intermixed.

*Measurements.*—Male (18640), length of carapace to tip of horn 200 mm., width 159 mm., length of propodus of cheliped on lower margin 120, on upper margin 66, width of same 46, thickness 34.5, length of movable finger 64 mm.

*Range.*—From San Francisco, California, to Point San Bartholome, Lower California; to a depth of 68 fathoms; not common. Fossil in Fresno County, California, in Lower Pliocene series.

*Material examined.*—

#### CALIFORNIA

Near San Francisco; Lieut. W. P. Trowbridge, U. S. A., collector; 1 female, holotype (15376).

Santa Barbara; 1880; D. S. Jordan; 1 male (3050) covered with bryozoans.

Off Santa Barbara; lat.  $34^{\circ} 19' 30''$  N.; long.  $119^{\circ} 44' 15''$  W.; 68 fathoms; gn. M.;  $54^{\circ}$  F.; May 11, 1889; station 2973. *Albatross*; 1 male (17379).

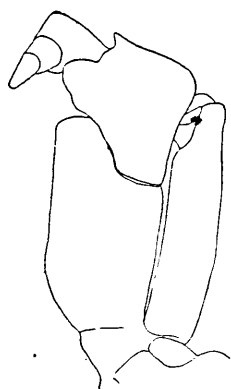


FIG. 50.—*LOXORHYNCHUS GRANDIS* (54738), MAXILLIPED,  $\times 1.57$

San Pedro Bay; deep water; July, 1896; H. N. Lowe; 1 female, very large (19866).

San Pedro; 10 fathoms; H. N. Lowe; 1 male (23047).

San Pedro Breakwater; June, 1911; *Anton Dohrn* (P. S. Barnhart), from Venice Mar. Biol. Sta.; 1 male, 1 female (50257).

Santa Catalina Island; April, 1897; *Albatross*; 1 male, 1 female (20151), entirely concealed by algae.

China Point, San Clemente Island; July 17, 1908; haul 1556; 1 young (Scripps Inst.).

San Diego; Dr. C. B. R. Kennerly; 1 carapace of large specimen (17572), labeled by Stimpson.

San Diego Bay;  $\frac{3}{4}$  k. E. NE. Point Loma Lighthouse;  $6\frac{1}{2}$  fathoms; M. S.; April 1, 1896; station 3621; *Albatross*; 1 small male (20150).

California; origin uncertain; 1 male (54738).

#### LOWER CALIFORNIA (WEST COAST)

Ensenada; Enrique Gonzalez; photograph of specimen identified and returned to A. E. Herrera.

San Martin Island (about lat.  $30^{\circ} 30' N.$ ); caught with hook; March 30, 1881; Lieut. H. E. Nichols, U. S. N., U. S. C. S. S. *Hassler*; 1 male, very large (18640).

Point San Bartholome; 1911; *Albatross*; 1 female (57562).

#### LOXORHYNCHUS CRISPATUS Stimpson

##### Plates 66 and 67

*Loxorhynchus crispatus* STIMPSON, Journ. Boston Soc. Nat. Hist., vol. 6, 1857, p. 453 [13], pl. 22, figs. 2-4 (type-locality, San Miguel Island near San Pedro, California; types, Cat. No. 2083, U. S. N. M.).—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 74.—HOLMES, Occas. Papers Calif. Acad. Sci., vol. 7, 1900, p. 30.

*Diagnosis*.—Carapace covered chiefly with a few large, spine-tipped bosses or tubercles. One large hepatic spine. No tubercles on basal antennal segment. Upper margin of manus of adult male more than twice its width.

*Description*.—The carapace bears 9 or 10 large, conical bosses or tubercles covered except at the tip with very thick, short hair, which makes them appear hemispherical with a small shining point emerging; besides there are a number of smaller, similar tubercles symmetrically arranged. As in *L. grandis*, a row of curled hairs extends from either side of the gastric region forward on to the rostral horns. Rostrum moderately inclined. Only one hepatic spine, its anterior margin sloping backward to the tip. No tubercle on the margin of the supraocular cave or on the basal antennal article.

Chelipeds of old male elongate, over twice as long as carapace; merus with four spines above, two at the distal end and two near the

proximal end; carpus with some blunt tubercles and spines, inner angle prominent, bluntly rounded; hands little compressed, less than two-thirds as thick as high and about two-fifths as high as its superior length; proximal half of upper margin spined; fingers gaping for more than half their length. Ambulatory legs unarmed. Sternal segments deeply furrowed.

*Measurements.*—Male (2193), length of carapace to tip of horns 114, width 84, length of cheliped about 272; length of propodus of cheliped on lower margin 125, on upper margin 77.7, width of same excluding spines 30.7, thickness 21, length of movable finger 50 mm. Male (2000, M. C. Z.), length of carapace to tip of horns 133.5, width 96, length of cheliped about 251; length of propodus of cheliped on lower margin 113, on upper margin 68.6, width of same excluding spines 30.2, thickness 19, length of movable finger 46.6 mm.

*Range.*—California from San Francisco to San Diego; 4 to 74 fathoms.

*Material examined.*—

#### CALIFORNIA

San Francisco; received December, 1859; T. G. Cary; 1 male of unusual size (2000, M. C. Z.); 1 large male, 1 large ovigerous female (334, M. C. Z.); identified by Stimpson.

Off Farallon Islands; 20 fathoms; October 3, 1899; *Albatross*; 2 males, 1 ovigerous female (33455).

Monterey; 1880; D. S. Jordan; 6 males, 5 females (5876).

Monterey Bay: 100 feet; brought in by Chinese fishermen; Harold Heath; 2 males, 1 female (22875). *Albatross*; 1 male (26117).

Monterey Bay; 1904; *Albatross*: Point Pinos Lighthouse, S. 9° E., 4.5 miles; 46–56 fathoms; crs. S. Sh. R.; June 7; station 4551; 1 female with Rhizocephalid parasite; 1 young (46591). Point Pinos Lighthouse, S. 73° E., 4 miles; 66–73 fathoms; gn. M. R.; June 9; station 4552; 1 female, 1 young. Point Pinos Lighthouse, S. 67° E., 3.7 miles; 65–74 fathoms; R.; June 9; station 4553; 1 male (46533).

Off Point Conception; January 8, 1889; *Albatross*: Lat. 34° 25' 25'' N.; long. 120° 20' 00'' W.; 31 fathoms; gy. S. brk. Sh.; station 2908; 1 male, 1 female (15547). Lat. 34° 24' 30'' N.; long. 120° 20' 00'' W.; 44 fathoms; fne. gy. S.; station 2907; 1 young (17363).

San Miguel Island; Lieut. W. P. Trowbridge, U. S. Army; 2 males, 1 female (2083), types (1 male holotype, 2 paratypes).

Off San Miguel Island; 1889; *Albatross*: Lat. 34° 07' 00'' N.; long. 120° 33' 30'' W.; 53 fathoms; brk. Sh. S.; January 5; station 2895; 1 female (15546). Lat. 34° 04' 00'' N.; long. 120° 19' 30'' W.; 26 fathoms; gy. S.; temp. 54.9° F.; February 9; station 2958; 1 male (15600).

Off Santa Rosa Island; off Brockway Point; 38 to 45 fathoms; April 15, 1904; station 4431, *Albatross*; 1 male, 2 females, 3 young (46590).

Off Santa Cruz Island; lat.  $34^{\circ} 01' 30''$  N.; long.  $119^{\circ} 29' 00''$  W.; 36 fathoms; G. brk. Sh.; temp.  $57^{\circ}$  F.; February 12, 1889; station 2975, *Albatross*; 1 young (17361).

Santa Monica Bay; 3 miles SW. by S., of Venice; 22 fathoms; August 2, 1913; *Anton Dohrn*, Venice Mar. Biol. Sta.; 1 male, 1 young (50248).

Between Venice and Rocky Point, near San Pedro; August 12, 1914; *Anton Dohrn*, Venice Mar. Biol. Sta.; 1 female, ovigerous (50006).

San Pedro; about 4 fathoms; H. N. Lowe; 1 female (23046).

Off Wilmington; February 5, 1889; *Albatross*: Lat.  $33^{\circ} 36' 00''$  N.; long.  $118^{\circ} 09' 30''$  W.; 27 fathoms; fne. gy. S. St.; station 2939; 1 male (15545). Lat.  $33^{\circ} 35' 15''$  N.; long.  $118^{\circ} 08' 30''$  W.; 47 fathoms; fne. gy. S. St.; temp.  $58^{\circ}$  F.; station 2938; 3 males (15601).

Santa Catalina Island: Entrance to Catalina Harbor; December 30, 1912; *Anton Dohrn*, Venice Mar. Biol. Sta.; 1 young male (50247). Off Santa Catalina Island; 50 fathoms; H. N. Lowe; 1 young (29953).  $1\frac{1}{2}''$  off Avalon, Dakins Cove; 47 fathoms; fne. gy. S.; temp.  $51.7^{\circ}$  F.; April 8, 1897; station 3662, *Albatross*; 2 young (20258).

Off San Nicolas Island; lat.  $33^{\circ} 18' 00''$  N.; long.  $119^{\circ} 24' 00''$  W.; 45 fathoms; ers. gy. S. brk. Sh.; February 13, 1889; station 2981, *Albatross*; 1 young (17360).

Off San Diego; lat.  $32^{\circ} 33' 30''$  N.; long.  $117^{\circ} 16' 00''$  W.; 36 fathoms; gy. S.; temp.  $58.2^{\circ}$  F.; January 26, 1889; station 2934, *Albatross*; 1 young (17362).

Southern California; *Anton Dohrn*, Venice Mar. Biol. Sta.; 1 immature male (50246).

California: C. M. Scammon; 1 male (2193). John Mullan; 1 male (11159). Bur. Fisheries; 1 ovigerous female (49956).

#### Genus CHORILIA Dana

*Chorilia* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 269; type, *C. longipes* Dana; U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 91.

Carapace subpyriform, convex, spinous or tuberculate or both. Spines of rostrum long, slender, diverging from near the base, Pre-ocular spine present; supraocular hood separated by a U-shaped sinus from the postocular cup; orbit open below; eyestalks restricted at middle. Basal segment of antenna long and narrow; movable portion more or less exposed beside the rostrum. Chelipeds enlarged, manus compressed. Ambulatory legs slender, almost unarmed, first pair much the longest.

Pacific coast of North America from Alaska Peninsula to San Diego, California; Japan. 18 to 650 fathoms.



## CHORILIA LONGIPES Dana

## CHORILIA LONGIPES TURGIDA Rathbun

Plate 224, figs. 1-3; plate 225

*Chorilia longipes* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 269 (type-locality, *ad oras Oregonenses*,\* type not extant); U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 91; atlas, 1855, pl. 1, fig. 5a-d.

*Hyastenus (Chorilia) longipes* MIERS, Journ. Linn. Soc. London, vol. 14, 1879, p. 65S.—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 33.

*Hyastenus (Chorilia) japonicus* MIERS, Proc. Zool. Soc. London, 1879, p. 27, pl. 1, fig. 2 (type-locality, lat. 41° 40' N., long. 141° 10' E., 100 fathoms; type in Brit. Mus.).

*Hyastenus longipes* MIERS, *Challenger* Rept., Zool., vol. 17, 1886, p. 56.—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 85, pl. 7; vol. 17, 1894, p. 62, pl. 1, fig. 5.

*Hyastenus japonicus* MIERS, *Challenger* Rept., Zool., vol. 17, 1886, p. 56.

*Chorilia longipes turgida* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 3 (type-locality, off San Diego, 359 fathoms; holotype, male, Cat. No. 15500, U. S. N. M.).

*Diagnosis*.—Hepatic spine when present smaller than lateral branchial spine. Preocular spine directed obliquely outward. Spines and tubercles of carapace numerous.

*Description of typical form*.—Carapace covered with numerous tubercles and some short unequal spines; the largest spine is that at the widest part of the carapace on the margin of the branchial region. Other important spines are two median gastric, which with two smaller lateral spines or tubercles form a rhomb. A blunt ridge or tubercle on hepatic region. Cardiac region at its narrowest, more than half its greatest width. Two median cardiac tubercles, one larger intestinal tubercle. Rostrum about half (it may be more or less than half) as long as remainder of carapace; horns gradually tapering, acuminate. A slender preocular spine.

Two spines on outer margin of basal antennal segment, followed posteriorly by a triangular tooth situated just outside the segment. Merus of outer maxillipeds with concave surface and prominent outer angle; ischium with a broad and deep, longitudinal sulcus.

Chelipeds massive; merus prismatic, rough with granules, and with tubercles and spines arranged in rows. Carpus similarly rough, inner margin lamellate, the lamella bearing a backward-pointing lobe at the proximal end. Manus compressed, upper edge thin. Fingers narrow, gaping in their basal half or two-thirds; dactylus as

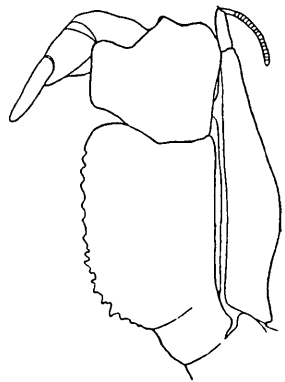


FIG. 81.—CHORILIA LONGIPES (31637), MAXILLIPED,  $\times 4.3$

long or nearly as long as upper margin of palm, with a subbasal tooth; immovable finger with a basal tooth; distal ends of fingers meeting, their edges crenulate.

The legs of the first pair exceed the cheliped little or not at all; the other pairs are considerably shorter and themselves diminish successively in length. The merus of each terminates in a short, sharp point above; the dactylus is slender and curved.

*Description of Chorilia longipes turgida.*—In the southern part of its range, the carapace of *C. longipes* becomes much rougher, more spinous, the tubercles replaced by short sharp spines; the hepatic region bears a spine on its margin instead of a tubercle or blunt ridge; the width of the carapace increases notably in proportion to the length, the branchial regions are inflated and approach nearer the median line, so that the distance between them is not more than half the greatest width of the cardiac region and is often much less; the movable segments of the antennal peduncle are longer and more slender.

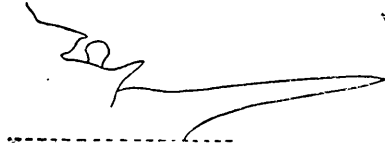


FIG. 82.—CHORILIA LONGIPES TURGIDA, FRONT AND ORBIT,  $\times 1.6$ . (AFTER RATHBUN)

Occasional specimens intermediate between the typical and the *turgida* forms have been found from Oregon southward.

*Measurements.*—Male of typical form (31634), length of carapace on median line 53.2, width 44.4 mm. Male holotype of subspecies *turgida* (15500), length of carapace on median line 56, width 50 mm.

*Range of the species.*—Shumagin Bank and Kodiak, Alaska, to San Diego, California; Japan. 18 to 650 fathoms. The typical form ranges from the northern limit to Monterey Bay; the subspecies *urjida*, from Monterey Bay to San Diego. Another subspecies, *C. l. japonica* (Miers) inhabits Japanese waters.

*Material examined.*—See table, pages 205-209.

#### Genus ROCHINIA A. Milne Edwards

*Amathia* ROUX, Crust. Médit., 1828, p. [5]; type, *A. rissoana* Roux.—MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 285. Not *Amathia* Lamouroux, 1816, a genus of polyyps.

*Pisa* (*Amathia*) DE HAAN, Fauna Japon., 1839, pp. 78 and 84.

*Rochinia* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 86; type, *R. gracilipes* A. Milne Edwards.

*Scyramathia* A. MILNE EDWARDS, Comptes Rendus Acad. Sci., Paris, vol. 91, 1880, p. 356; type, *S. carpenteri* Norman.—ALCOCK, Journ. Asiat. Soc. Bengal, vol. 64, 1895, p. 201.—A. MILNE EDWARDS and BOUVIER, Expéd. Sci. Travailleur et Talisman, Crust. Déc., pt. 1, 1900, p. 131.

*Anamathia* SMITH, Proc. U. S. Nat. Mus., vol. 7, 1885, p. 493; type, *A. rissoana* (Roux).—MIERS, Challenger Rept., Zool., vol. 17, 1886, p. 25.

*Rachinia* ALCOCK, Journ. Asiat. Soc. Bengal, vol. 64, 1895, p. 165.

Carapace pyriform or elongate-triangular, with posterior margin rounded; armed with spines or spines and tubercles. Hepatic and

Material examined of *Chorilia longipes*

| Locality                                    | Bearings    |              | Fathoms | Bottom                   | Temp. | Date          | Albatross Station | Specimens   | Cat. No. | Form     |
|---|-------------|--------------|---------|--------------------------|-------|---------------|-------------------|-------------|----------|----------|
|   | Latitude N. | Longitude W. |         |                          |       |               |                   |             |          |          |
| Alaska:                                     |             |              |         |                          |       |               |                   |             |          |          |
| Off Shumagin Bank                           | 54 46 00    | 157 43 30    | 138     | M. G.                    | 37.4  | Aug. 28, 1890 | 3359              | 2 young     | 18185    | Typical. |
| Off Sitkalidak Island, Kodiak               | 57 00 00    | 153 18 00    | 69      | gn. M.                   | 44    | Aug. 10, 1888 | 2855              | 1♂          | 15496    | Do.      |
| Chilkoot Inlet                              |             |              | 45-51   | gn. M.                   | 40    | July 16, 1903 | 4254              | 1♂          | 31641    | Do.      |
| Stephens Passage                            |             |              | 131-188 | R. brk. Sh.              | 40.9  | July 14, 1903 | 4253              | 1♂ 8♀       | 31642    | Do.      |
| Kasaan Bay, Prince of Wales Island.         |             |              | 101-123 | gy. gn. M. ers. S.       | 44.1  | July 11, 1903 | 4246              | 1♂ 3♀       | 31632    | Do.      |
| Junction of Clarence Strait and Behm Canal. |             |              | 89-114  | gn. M. fine. S. brk. Sh. | 44.3  | do            | 4247              | 1♀ 9        | 31648    | Do.      |
| Vicinity of Naha Bay, Behm Canal.           |             |              | 206-248 | ers. S. rky.             | 48.8  | July 9, 1903  | 4239              | 2♂ 1♀       | 31640    | Do.      |
| Vicinity of Yes Bay, Behm Canal.            |             |              | 108-240 | rky.                     | 42.4  | July 7, 1903  | 4230              | 2♂ 5♀       | 31636    | Do.      |
| Do.   |             |              | 41-134  | G. Sponge.               | 47.8  | do            | 4228              | 5♂ 6♀       | 31635    | Do.      |
| Do.   |             |              | 192-198 | gn. M.                   | 42.6  | July 8, 1903  | 4237              | 1♂          | 31639    | Do.      |
| Do.   |             |              | 147-205 | R. ers. S.               | 42.8  | do            | 4236              | 1♂ 1♀       | 31638    | Do.      |
| Do.   |             |              | 130-193 | gy. M. bk. Sp.           | 42.8  | do            | 4235              | 2♂ 2♀       | 31637    | Do.      |
| Do.   |             |              | 45      | gy. M. rky.              | 43.7  | do            | 4234              | 1♀ 9        | 31647    | Do.      |
| Boca de Quadra.                             |             |              | 149-181 | dk. gn. M.               | 43.6  | July 6, 1903  | 4225              | 4♂          | 31633    | Do.      |
| Do.   |             |              | 156-166 | dk. gn. M.               | 43.7  | do            | 4224              | 1♂          | 31634    | Do.      |
| British Columbia:                           |             |              | 204     | gy. S. P.                | 42.6  | Aug. 31, 1888 | 2861              | 3♂ 3♀       | 21246    | Do.      |
| Off Queen Charlotte Sound                   | 50 49 00    | 127 36 30    | 238     | Vol. S. G. brk. Sh.      | 41.7  | Sept. 1, 1888 | 2862              | 9♂ 11♀ 2 y. | 15497    | Do.      |
| Off Forth Rupert, center of Round Island.   |             |              | 25-30   | Sponge.                  | 49.1  | June 25, 1903 | 4203              | 4♀ 9        | 31646    | Do.      |

Material examined of *Chorilia longipes*—Continued

| Locality  | Bearings  |              | Fathoms | Bottom          | Temp.      | Date           | Albatross Station | Specimens     | Cat. No.     | Form                              |
|---|---|--------------|---------|-----------------|------------|----------------|-------------------|---------------|--------------|-----------------------------------|
|   | Latitude N.   | Longitude W. |         |                 |            |                |                   |               |              |                                   |
| British Columbia—Continued                        |   |              |         |                 |            |                |                   |               |              |                                   |
| Gulf of Georgia; Halibut Bank.                    | Cape Roger Curtis, Bowen Island, N. 89° E., 11 miles.   |              | 28-44   | fine, gy. S.    | °F<br>53.8 | June 20, 1903  | 4196              | 1 y. ♀        | 31645        | Typical.                          |
| Do.   | Cape Roger Curtis, Bowen Island, S. 89° E., 10.8 miles. |              | 23-18   | gn. M. fine. S. | 50.3       | do             | 4193              | 3♂ 8♀ (small) | 31643, 50976 | Hepatic spine on 10 specimens.    |
| Gulf of Georgia; off Nanaimo, Vancouver Island.   | Sharp Point, Nanaimo Har., S. 1° W., 1.6 miles.         |              | 89-97   | gn. M. fine. S. | 47.1       | June 19, 1903  | 4192              | 1 y. ♀        | 31644        | Typical.                          |
| Straits of Fuca; south shore of Vancouver Island. | 48 29 40 124 40 10                                      | ° ' "        | 135     | gy. S. G.       | 55         | Aug. 28, 1891  | 3449              | 4             | 17081        | Do.                               |
| Do.   | 48 27 50 124 42 40                                      |              | 152     | gy. S. rky.     | 44.2       | Sept. 1, 1891  | 3154              | 1♂            | 17085        | Do.                               |
| Do.   | 48 26 50 124 39 35                                      |              | 151     | G. S.           | 44         | Aug. 28, 1891  | 3450              | 2             | 17082        | Do.                               |
| Do.   | 48 25 10 124 37 50                                      |              | 106     | G. S.           | 45         | do             | 3451              | 2             | 17083        | Do.                               |
| Do.   | 48 24 40 124 29 10                                      |              | 125     | rky. bk. G.     | 44.5       | Aug. 20, 1891  | 3152              | 1♂            | 17084        | Do.                               |
| Do.   | 48 24 20 124 24 40                                      |              | 123     | gy. S. P.       | 44.3       | Sept. 2, 1891  | 3456              | 2             | 17086        | Do.                               |
| Do.   | 48 18 30 123 22 00                                      |              | 56      | gy. S. Sh. rky. | 46.3       | Sept. 4, 1891  | 3069              | 1♀            | 17088        | Do.                               |
| Do.   | 48 16 00 123 45 05                                      |              | 100     | rky.            | 44         | Aug. 27, 1891  | 3445              | 1             | 17080        | Do.                               |
| Washington:                                       |   |              |         |                 |            |                |                   |               |              |                                   |
| Off Cape Flattery.                                | 48 33 00 124 53 00                                      |              | 59      | bk. S. M.       | 45.5       | Sept. 25, 1888 | 2877              | 1♀            | 15495        | Do.                               |
| Do.   | 48 30 00 124 57 00                                      |              | 27      | R. Sh.          | 50.3       | Sept. 24, 1888 | 2874              | 1♂            | 15499        | Do.                               |
| Do.   | 48 21 45 124 50 30                                      |              | 77      | gn. M. S.       | 45         | May 14, 1897   | 3673              | 1 y.          | 21765        | Do.                               |
| Straits of Fuca.                                  | 48 17 20 124 07 25                                      |              | 114     | gy. S. G. R.    | 44.4       | Sept. 2, 1891  | 3461              | 2             | 17087        | Do.                               |
| Do.   | 48 13 30 123 11 20                                      |              | 97      | gn. M. P.       | 46         | Aug. 27, 1891  | 3443              | 2             | 17079        | Do.                               |
| Admiralty Inlet.                                  | 48 12 00 122 49 00                                      |              | 40      | P.              | 51.7       | Sept. 6, 1888  | 2865              | 1♂            | 15494        | Do.                               |
| Oregon:   |   |              |         |                 |            |                |                   |               |              |                                   |
| Off Columbia River.                               | 46 09 00 124 22 30                                      |              | 68      | gy. S.          | 45.8       | Oct. 13, 1888  | 2882              | 1♂            | 15498        | Typical.                          |
| Off Cape Kiwanda.                                 | Cape Kiwanda, N. 31° E., 12.2 miles.                    |              | 50      | fine, gy. S.    |            | Sept. 3, 1914  | 115732            | 1 y.          | 52760        | Do.                               |
| Off Alsea River.                                  | 44 29 30 124 17 00                                      |              | 42      | fine, gy. S.    | 56         | Sept. 2, 1880  | 3085              | 1 y.          | 17626        | Do.                               |
| Heceta Bank.                                      | 43 59 00 124 56 00                                      |              | 46      | C. Sh.          | 47.7       | Oct. 19, 1888  | 2889              | 1♂            | 16776        | Hepatic spine, otherwise typical. |
| California:                                       |   |              |         |                 |            |                |                   |               |              |                                   |
| Off Point Arena.                                  | 38 58 10 123 57 05                                      |              | 75      | fine, S. M.     | 48.4       | Sept. 25, 1890 | 3350              | 2♂ 2♀         | 16030        | Typical.                          |
| S. of the Farallones.                             | 37 37 00 123 42 00                                      |              | 68      | C. R.           | 49         | Apr. 24, 1897  | 3672              | 2♂            | 26115        | Do.                               |
| Off Pigeon Point.                                 | 37 08 00 122 07 00                                      |              | 206     | fine, gy. S.    | 41.8       | Mar. 12, 1890  | 3112              | 4♂ 4♀         | 15515        | Do.                               |
| Off Point Ano Nuevo.                              | 37 06 00 122 30 00                                      |              | 62      | M.              |            | do             | 3114              | 1♂ 1♀         | 15512        | Do.                               |
| Monterey Bay.                                     | 36 55 10 122 23 50                                      |              | 210     | bk. S. R.       | 43.7       | Apr. 12, 1860  | 3205              | 1 y. ♂        | 15514        | Do.                               |

| Do.                   | 36  | 49  | 20 | 122 | 12 | 30 | 156     | gn. M.             | 52.8 | Mar. 13, 1890 | 3126  | 3♂                        | Intermediate in width, otherwise typical. |
|-----------------------|-----|-----|----|-----|----|----|---------|--------------------|------|---------------|-------|---------------------------|---|
| Do.                   | 36  | 45  | 00 | 121 | 53 | 00 | 68      | M. S. Blair        |      | Apr. 13, 1897 | 3666  | 1♂                        | Typical.                                  |
| Do.                   | 36  | 47  | 00 | 122 | 11 | 00 | 278     | gn. M. frs. S.     | 42.7 | Apr. 16, 1897 | 3669  | 1♂                        | Typical.                                  |
| Do.                   | 285 | 357 |    |     |    |    | 285-357 | gn. M.             |      | May 12, 1904  | 4461  | 2♂ 5♀ (2 ovig., 1 in one) | Intermediate.                             |
| Do.                   | 161 | 265 |    |     |    |    | 161-265 | gn. M.             | 44.4 | May 13, 1904  | 4462  | 1♂                        | targida? carapace lacking.                |
| Do.                   | 65  | 144 |    |     |    |    | 65-144  | gn. S. R.          |      | May 14, 1901  | 46587 | 1♂ 1 ovig. ♀              | targida.                                  |
| Do.                   | 347 | 383 |    |     |    |    | 347-383 | gn. M.             | 44.9 | May 20, 1901  | 4507  | 1 Y.♂                     | Do.                                       |
| Do.                   | 391 | 406 |    |     |    |    | 391-406 | gn. M. R.          |      | May 23, 1904  | 4514  | 1♂                        | Do.                                       |
| Do.                   | 198 | 495 |    |     |    |    | 198-495 | gn. M. crs. S. Sh. |      | do            | 4515  | 1 Y.♀                     | Typical.                                  |
| Do.                   | 46  | 56  |    |     |    |    | 46-56   | cr. S. Sh. R.      |      | June 7, 1904  | 4551  | 1 Y.♂                     | Do.                                       |
| Do.                   | 65  | 74  |    |     |    |    | 65-74   | R.                 |      | June 9, 1904  | 4553  | 1 Y.♂                     | Do.                                       |
| Off Point Carmel      | 36  | 31  | 00 | 121 | 59 | 00 | 162     | gn. S. R.          | 41.5 | Apr. 3, 1890  | 3183  | 1 Y.♂                     | targida.                                  |
| Off Point Sur         | 36  | 14  | 00 | 121 | 58 | 40 | 298     | yl. S. M.          | 41.1 | do            | 3187  | 1 Y.♂                     | Carapace wide; no hepatic spine.          |
| Off San Simeon Bay    | 35  | 25  | 50 | 121 | 09 | 10 | 160     | gn. M.             | 44.4 | Apr. 5, 1890  | 3103  | 1♂                        | Do.                                       |
| W. of Point Buchon    | 35  | 18  | 30 | 121 | 28 | 00 | 440     | frs. gy. S. M.     | 39.9 | Apr. 27, 1911 | 5696  | 1♂ 1♀                     | Do.                                       |
| Off Point Concepcion  | 34  | 12  | 30 | 120 | 32 | 30 | 145     | gn. M.             | 48.6 | Jan. 5, 1889  | 2893  | 1♀                        | Do.                                       |
| Off San Miguel Island | 34  | 10  | 45 | 120 | 16 | 45 | 267     | gn. M.             | 48   | Feb. 9, 1889  | 2960  | 1♂                        | Intermediate in width, otherwise typical. |
| Do.                   | 33  | 55  | 30 | 120 | 28 | 00 | 376     | yl. M.             | 42.8 | Jan 6, 1889   | 2896  | 2♂ 4♀                     | targida.                                  |
| Do.                   |     |     |    |     |    |    | 264-271 | gn. M.             |      | Apr. 15, 1904 | 4436  | 3♂ 6♀ (5 ovig.)           | Do.                                       |
| Off Santa Rosa Island | 33  | 57  | 30 | 120 | 18 | 30 | 52      | frs. gy. S. R.     | 53.1 | Feb. 8, 1889  | 2956  | 2♂                        | Typical.                                  |
| Do.                   |     |     |    |     |    |    | 243-265 | gn. M.             |      | Apr. 15, 1904 | 4433  | 1♂                        | targida.                                  |
| Off Santa Cruz Island |     |     |    |     |    |    | 447-510 | bk. M. R.          |      | Apr. 14, 1904 | 4427  | 6♂ 4 ovig. ♀              | Do.                                       |
| Do.                   |     |     |    |     |    |    | 197-281 | bk. S. P. R.       |      | do            | 4430  | 2♀ 2 Y.                   | Do.                                       |

Material examined of *Chorilia longipes*—Continued

| Locality                                     | Bearings                                      |              | Fathoms | Bottom             | Temp. | Date          | Albatross Station | Specimens             | Cat. No.                       | Form   |
|--|---|--------------|---------|--------------------|-------|---------------|-------------------|-----------------------|--------------------------------|--|
|  | Latitude N.                                   | Longitude W. |         |                    |       |               |                   |                       |                                |  |
| California—Continued                         |   |              |         |                    |       |               |                   |                       |                                |  |
| Off Anacapa Island.                          | 33 56 30                                      | 119 22 30    | 388     | gn. M.             | °F    | Feb. 12, 1889 | 2979              | 3♂ 4 ♀ (2 ovig.)      | 16031                          | <i>turgida</i> ; 1 specimen with sharp, hepatic tubercles. |
| Do.  | 33 49 45                                      | 119 24 30    | 603     | gn. M.             | 38.9  | do.           | 2980              | 4♂ 6 ♀                | 15502                          | <i>turgida</i> .   |
| Off Wilmington.                              | 33 38 45                                      | 118 13 45    | 20      | gy. S. brk. Sh.    |       | Feb. 5, 1889  | 2942              | 1 ♀                   | 18184                          | Do.  |
| Off Santa Barbara Island.                    | 33 24 45                                      | 119 07 00    | 178     | S. M. G.           | 46.7  | Feb. 13, 1889 | 2982              | 2 ♀                   | 15510                          | Do.  |
| Do.  | North-east point, N. 80° W., 8.6 miles.       |              | 302-638 | gn. M.             |       | Apr. 11, 1904 | 4415              | 4♂ 2 ♀                | 46578                          | Do.  |
| Do.  | Southwest rock, N. 49° W., 4.7 miles.         |              | 323-448 | dk. gn. M. R.      |       | Apr. 12, 1904 | 4416              | 4♂ 3 ♀ (1 ovig.) 6 y. | 46534                          | Do.  |
| Do.  | Southwest Rock, N. 8° E., 6.9 miles           |              | 238-310 | dk. M. S. R.       |       | do.           | 4418              | 3♂ 1 ♀ 16 y.          | 46579, 46749                   | Do.  |
| Off San Nicolas Island.                      | East point, S. 73° W., 8.4 miles.             |              | 238     | bk. M. R.          |       | do.           | 4419              | 1 ♀                   | 46750                          | Do.  |
| Do.  | East point, S. 77° W., 5.7 miles.             |              | 32-33   | fine. gy. S.       |       | do.           | 4420              | 2 ♀                   | 46751                          | Do.  |
| Do.  | East point, S., 7.6 miles                     |              | 216-339 | gy. S. bk. P. Sh.  |       | Apr. 13, 1904 | 4423              | 12♂ 6 ♀ 11 y.         | 46580, 46752                   | Do.  |
| West of San Nicolas Island.                  | 33 13 30                                      | 120 04 30    | 451     |                    |       | Apr. 26, 1911 | 5693              | 1♂ 1 ♀                | 55758                          | Do.  |
| Off Santa Catalina Island.                   | South-east point, N. 19° 30' E., 3.2 miles.   |              | 478-600 | gy. S. R.          |       | Apr. 9, 1904  | 4407              | 3♂ 2 ♀                | Amert. Mus.                    | Do.  |
| Northwest of San Clemente Island.            | 33 08 00                                      | 118 40 00    | 414     | gy. S.             | 41.4  | May 8, 1888   | 2839              | 34                    | 21897                          | Do.  |
| San Clemente Island.                         | 33 04 30                                      | 117 42 00    | 464     | gn. M.             | 46.5  | July 19, 1905 |                   | 23♂ 16 ♀ 12 y.        | Scripps Inst.                  | Do.  |
| Between Santa Catalina Island and San Diego. | 32 49 00                                      | 117 27 30    | 359     | M.                 |       | Feb. 4, 1889  | 2937              | 1♂ 1 ♀                | 15505                          | Do.  |
| Vicinity of San Diego.                       | 32 47 30                                      | 118 10 00    | 417     | bk. S. G.          | 41    | Jan. 23, 1889 | 2928              | 16                    | 15500, type lot; 15501, 20499. | Do.  |
| Do.  | 32 43 00                                      | 117 51 00    | 313     | gn. M.             | 43.3  | do.           | 2927              | 9♂ 12 ♀               | 15504, 46664                   | Do.  |
| Do.  |   |              |         |                    |       |               |                   |                       | 15503                          | Do.  |
| Do.  | 32 33 30                                      | 117 16 00    | 36      | gy. S.             | 58.2  | Jan. 26, 1889 | 2934              | 1♂                    | 15506                          | Do.  |
| Do.  | Point Loma Light-house, N. 52° E., 7.2 miles. |              | 129-143 | gn. M. fine. S. R. | 48    | Mar. 4, 1904  | 4311              | 1 ♀ 9                 | 46567                          | Do.  |
| Do.  | Point Loma Light-house, N. 56° E., 7.9 miles. |              | 95-185  | fine. gy. S. R.    |       | do.           | 4312              | 1♂ 1 ovig. ♀          | 46568                          | Intermediate.  |

|         |   |         |                    |       |               |      |                     |       |                  |
|---------|---|---------|--------------------|-------|---------------|------|---------------------|-------|------------------|
| Do..... | Point Loma Light-house, N. 36° E., 11 miles.              | 471-510 | gn. M. fnc. S.     | 40    | Mar. 5, 1904  | 4317 | 3 y. ♂ 2 y. ♀       | 46569 | <i>turgida</i> . |
| Do..... | Seledad Hill, Point Loma, S. 50° E., 5.6 miles.           | 264-243 | sf. gn. M.         | 41    | Mar. 8, 1904  | 4326 | 1 ♂ 1 ovig. ♀       | 46570 | Do.              |
| Do..... | Point Loma Light-house, N. 27° E., 12.2 miles.            | 301-487 | gn. M.             | 41.7  | Mar. 9, 1904  | 4333 | 1 ovig. ♀           | 46571 | Do.              |
| Do..... | Point Loma Light-house, N. 36° E., 11.2 miles.            | 287-369 | gn. M.             | 41.5  | Mar. 10, 1904 | 4339 | 13 ♂ 16 ♀ (3 ovig.) | 46572 | Do.              |
| Do..... | South Point, South Coronado Island, N. 79° E., 3.3 miles. | 266-323 | gy. S. bk. Sp.     | 42    | Mar. 11, 1904 | 4341 | 2 ovig. ♀           | 46573 | Do.              |
| Do..... | Point Loma Light-house, N. 35° E., 4.2 miles.             | 46-50   | dk. gn. M. fnc. S. | 50.4  | Mar. 12, 1904 | 4346 | 1 y. ♂              | 46695 | Do.              |
| Do..... | Point Loma Light-house, N. 36° E., 12.3 miles.            | 423-488 | sf. gn. M.         | 40    | Mar. 14, 1904 | 4351 | 3 y.                | 46746 | Do.              |
| Do..... | Point Loma Light-house, N. 49° E., 15.6 miles.            | 646-650 | gn. M.             | 38.5  | do.           | 4354 | 1 y. ♀              | 46571 | Do.              |
| Do..... | Point Loma Light-house, N. 85° E., 9 miles.               | 98-220  | gn. M. br. Sp. R.  | 49    | Mar. 15, 1904 | 4359 | 2 y.                | 46747 | Do.              |
| Do..... | Point Loma Light-house, S. 82° E., 10 miles.              | 260-284 | gn. M. S. R.       | 43    | Mar. 16, 1904 | 4369 | 1 ovig. ♀           | 46575 | Do.              |
| Do..... | Point Loma Light-house, N. 81° E., 9.5 miles.             | 89-145  | gy. S. R.          | ..... | Mar. 6, 1904  | 4371 | 1 immature ♀        | 49696 | Do.              |
| Do..... | Point Loma Light-house, N. 57° E., 11 miles.              | 458-591 | gn. M. S.          | ..... | Mar. 17, 1904 | 4378 | 2 ♂                 | 46535 | Do.              |
| Do..... | 32 41 50 117 48 45  | 264-285 | fnc. gy. S. R.     | ..... | Apr. 7, 1904  | 4399 | 2 y.                | 46748 | Do.              |
| Do..... | 32 50 20 118 03 30  | 500-507 | gn. M.             | 40.2  | Apr. 8, 1904  | 4400 | 1 ♂ 1 ovig. ♀       | 46576 | Do.              |

lateral epibranchial spines prominent. Rostrum consisting of two spines usually long and slender. Eyes small, retractile against a postocular process; the supraocular cave usually terminates in a tooth or spine. Basal antennal article narrow and either unarmed, or with one or more spines. Merus of outer maxillipeds as broad as ischium, truncated distally, slightly produced at the antero-external angle, and bearing the palp at the antero-internal angle.

Chelipeds usually slender, often greatly elongated in the male, with the palms broadened and compressed. Ambulatory legs slender and elongate; first pair markedly the longest. Abdomen in both sexes composed of seven distinct segments.

East coast of America from 40° N. latitude to Barbados and from Cape Frio, Brazil, to Cape Horn; northeast Atlantic to South Africa; Mediterranean; Indian Ocean and Australia to Japan; Galapagos Islands. Depth, 30 to 738 fathoms.

KEY TO THE AMERICAN SPECIES OF THE GENUS ROCHINIA

- A<sup>1</sup>. Median spines 6; gastric spines 6; 2 spines on basal antennal article.  
crassa, p. 210.
- A<sup>2</sup>. Median spines or tubercles fewer than 6; gastric spines or tubercles fewer than 6.
- B<sup>1</sup>. Median tubercles 3; gastric tubercles 3.
- C<sup>1</sup>. Rostrum longer than remainder of carapace.....cornuta, p. 217.
- C<sup>2</sup>. Rostrum shorter, less than half as long as remainder of carapace.  
gracilipes, p. 218.
- B<sup>2</sup>. Median spines or tubercles 4; gastric spines or tubercles 4.
- C<sup>1</sup>. Spines of carapace and rostrum long and slender; a spine at angle of buccal cavity.....hystrix, p. 214.
- C<sup>2</sup>. Spines or tubercles of carapace short or of moderate length; no spine at angle of buccal cavity.
- D<sup>1</sup>. Dorsal tubercles mostly large and flat-topped....umbonata, p. 222.
- D<sup>2</sup>. Dorsal tubercles or spines acute, not large and flat-topped.
- E<sup>1</sup>. Two spines on basal antennal article; an oblique row of 3 spines from the anterior, median, gastric spine to the marginal, branchial spine at the widest part of the carapace.....vesicularis, p. 221.
- E<sup>2</sup>. Only one spine or tooth on basal antennal article; an oblique row of more than 3 spines from the anterior, median, gastric spine to the marginal, branchial spine.
- F<sup>1</sup>. An oblique row of 4 spines from the anterior, median, gastric spine to the marginal, branchial spine; 3 branchial spines (paired).....tanneri, p. 216.
- F<sup>2</sup>. An oblique row of 5 spines from the anterior, median, gastric spine to the marginal, branchial spine; 5 branchial spines (paired).....occidentalis, p. 220.

ROCHINIA CRASSA (A. Milne Edwards)

Plates 68, 69 and 226

*Amathia crassa* A. MILNE EDWARDS, Crust. Rég. Mex., 1879, p. 203, pl. 28, figs. 2-2*b* (type-locality, between Cuba and Florida, lat. 24° 15' N.; long. 82° 13' W., 229 fathoms; holotype, Cat. No. 2862, Mus. Comp. Zoöl.); Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 3.



*Amathia agassizii* SMITH, Bull. Mus. Comp. Zoöl., vol. 10, 1882, p. 1, pl. 2, figs. 2 and 3 (type-locality, off Charleston, South Carolina. lat. 32° 25' N.; long. 77° 42' 30' W., 262 fathoms; type in Mus. Comp. Zoöl.); Proc. U. S. Nat. Mus., vol. 6, 1883, p. 3; Rept. U. S. Commr. of Fish and Fisheries for 1882 (1884), p. 346 [2].

*Anamathia crassa* SMITH, Proc. U. S. Nat. Mus., vol. 7, 1884 (1885), p. 493.—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 60, pl. 1, fig. 4; Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 254, pl. 1.—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 10.

*Anamathia agassizii* SMITH, Proc. U. S. Nat. Mus., vol. 7, 1884 (1885), p. 493; Rept. U. S. Commr. of Fish and Fisheries for 1885 (1886), p. 624 [20], pl. 1, figs. 2, 3, 3a.

*Scyramathia agassizi* Sars, Norske Nordhavs Exped., Crust., vol. 1, 1885, p. 274.

*Diagnosis*.—Median spines 6; gastric spines 6; a prominent tooth at angle of buccal cavity; 2 spines on basal antennal article; a stout spine at extremity of merus of ambulatory legs.

*Description*.—Carapace very convex in both directions with a tendency to median carination; surface pubescent. Median spines,

6 (2 gastric, 1 genital, 2 cardiac, 1 intestinal); a spine (paired) beside each of the median gastric spines; the anterior of the median spines forms the first of an oblique row extending backward to the spine at the lateral angle of the branchial region; a prominent, marginal hepatic spine; three small spines form a triangle on the inner portion of the branchial region. Above the posterior margin there is a small spine on each side of the middle, and over the bases of the last two legs, a row of six or more spinules; above the anterior of these an

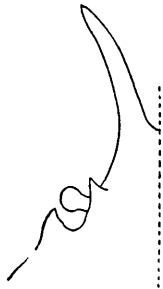


FIG. 83.—ROCHINIA CRASSA, FRONT AND ORBIT,  $\times 1.5$ . (AFTER RATHBUN)

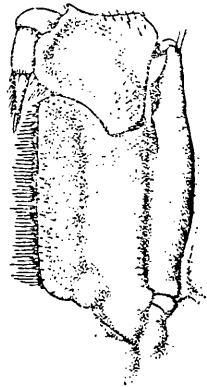


FIG. 84.—ROCHINIA CRASSA, MALE (11213), MAXILLIPED,  $\times 2.9$

irregular row of spines extends forward to the anterior angle of the buccal cavity. Spines of rostrum stout, gradually tapering, acuminate, diminishing in length with age. There is a preocular spine, a well-developed postocular lobe, and on the upper orbital margin a small tubercle. Basal antennal article with two spines on the outer margin, pointing downward, forward, and outward.

Chelipeds long, slender, tuberculate, becoming much stouter and more elongate in the old. Merus with a distal spine and one or more spinules near the proximal end. Manus slightly compressed and distally enlarged. Fingers gaping at base, a tooth on the dactyl in the gape; prehensile edges furnished with stout teeth. Ambulatory legs slender, much shorter than the chelipeds in very large males,

Material examined of *Rochinia crassa*

| Locality  | Bearings  |              | Fathoms | Bottom          | Temp.       | Date           | Station | Collector          | Specimens     | Cat. No.       | Remarks  |
|---|---|--------------|---------|-----------------|-------------|----------------|---------|--------------------|---------------|----------------|--|
|   | Latitude N.   | Longitude W. |         |                 |             |                |         |                    |               |                |  |
| Southeast of Massachusetts:<br>Off Nantucket Shoals | 39 56 00  | 69 22 00     | 208     | vl. M.          | ° F<br>46   | Sept. 14, 1881 | 1032    | Fish Hawk.         | 2 y.          | 7300           |  |
| Do.   | 39 53 30  | 69 43 20     | 148     | crs. S. bk. Sp. | 45          | Aug. 6, 1884   | 2200    | Albatross.         | 1 ♂           | 8043           |  |
| Do.   | 39 53 00  | 69 50 30     | 264     | gn. M. S.       | 47          | Aug. 4, 1881   | 939     | Fish Hawk.         | 1 y.          | 7310           |  |
| South of Marthas Vineyard.                          | 39 55 31  | 70 39 00     | 193     | S. M.           |             | Oct. 4, 1882   | 1154    | do.                | 1 ♂           | 18758          |  |
| Do.   | 39 57 45  | 70 56 30     | 195     | gn. M. S.       | 44.5        | Aug. 2, 1884   | 2183    | Albatross.         | 1 ♂           | 8042           | Half grown.  |
| Do.   | 39 58 35  | 71 00 30     | 197     | gn. M.          | 45          | Sept. 21, 1883 | 2092    | do.                | 1 s. ♂        | 5379           |  |
| North Carolina: Off Cape Hatteras                   | 35 14 20  | 74 59 10     | 142     | bu. M.          | 50.5        | Nov. 9, 1883   | 2109    | do.                | 1 ♀           | 5693           |  |
| South Carolina:<br>Off Cape Romain                  | 32 36 00  | 77 29 15     | 258     | gy. S. bk. Sp.  | 45.5        | Oct. 21, 1885  | 2624    | do.                | 1 ♂           | 11213          |  |
| Off Charleston.                                     | 32 25 00  | 77 42 30     | 262     | cr. S.          |             | July 13, 1880  | 319     | Blake.             | 1 ♂           | 3174, M. C. Z. |  |
| Southeast of Charleston.                            | 32 10 10  | 79 07 10     | 214     | gn. M. S.       | ° C<br>22.7 | Dec. 9, 1919   | 20035   | Albatross.         | 3 ♂ 2 ovig. ♀ | 55412          | Figured type of <i>Amaditia agassizii</i> .  |
| Georgia: East of Savannah.                          | 31 57 00  | 78 18 35     | 334     | hrd.            | ° F<br>45   | July 12, 1880  | 317     | Blake.             | 1 y.          | 4922           | In otter trawl. Large. Figured by Smith, Bull. M. C. Z., vol. 10, 1882, pl. 2, fig. 3. |
| Florida:<br>Off Fernandina.                         | 30 53 00  | 79 42 30     | 273     | gy. S. bk. Sp.  | 48.7        | May 5, 1886    | 2667    | Albatross.         | 2 ♂ 1 ♀       | 11397          |  |
| Do.   | 30 47 30  | 79 49 00     | 270     | gy. S.          | 48.3        | do.            | 2666    | do.                | 3 y.          | 11383          |  |
| Off St. Augustine.                                  | 29 47 00  | 80 05 45     | 263     | fine. gy. S.    | 45.2        | May 4, 1886    | 2665    | do.                | 10 ♂ 7 ♀      | 11358          |  |
| Off Carysfort.                                      | 25 20 30  | 79 58 00     | 217     | gy. S.          | 42.6        | Apr. 9, 1886   | 2642    | do.                | 3 ♂ 1 ♀       | 11392          | Mostly soft shell.   |
| Gulf Stream, off Cape Florida.                      | 7 1/2 miles E. of Fowey Rocks Light.                          |              | 185     | gy. M.          | 49          | Mar. 30, 1903  | 7520    | Fish Hawk.         | 1 y. ♂        | 46381          |  |
| Do.   | 6 miles E. of Fowey Rocks Light.                              |              | 200     | gy. M.          | 48          | Mar. 25, 1903  | 7514    | do.                | 2 ♂ 1 ♀ 8 y.  | 46789          |  |
| Do.   | 6 1/2 miles E. SE. 1/6 E. of Fowey Rocks Light.               |              | 200     | gy. M.          | 46          | do.            | 7513    | do.                | 1 y. ♂        | 46980          |  |
| Florida.  | Sand Key Light bearing N. 1/2 W., about 6 miles               |              | 1 105   |                 |             | June 20, 1893  | 33      | Biol. Exped. Iowa. | 2 y. ♀        | Mus. S. U. I.  |  |
| Do.   | American Shoal Light bearing N. by W. 1/4 W., about 10 miles. |              | 105-110 |                 |             | June 27, 1893  | 52      | do.                | 1 ♂           | do.            |  |

1 About 105 fathoms.

Material examined of *Rochinia crassa*—Continued

| Locality                 | Bearings  |              | Fathoms | Bottom       | Temp. | Date          | Station | Collector                      | Specimens | Cat. No.       | Remarks                                |
|--------------------------|---|--------------|---------|--------------|-------|---------------|---------|--------------------------------|-----------|----------------|--|
|                          | Latitude N.   | Longitude W. |         |              |       |               |         |                                |           |                |  |
| Florida—Continued        |   |              |         |              |       |               |         |                                |           |                |  |
| Florida                  | ° ' "   | ° ' "        | 70-80   |              | ° F   | June 29, 1883 | 62      | Biol. Exped. State Univ. Iowa. | 1 lg. ♂   | 18671          |  |
| Do                       | American Shoal Light bearing NE. by N., 8 miles.                | " " "        | 85-95   |              |       | do            | 63      | do                             | 1 y. ♀    | Mus. S. U. I.  |  |
|                          | American Shoal Light, N. by E. $\frac{1}{2}$ E., about 8 miles. | " " "        | 1-200   |              |       | June 27, 1883 | 56      | do                             | 1 y. ♀    | do             | Holotype of <i>Ama-<br/>tha crassa</i> |
| Puntales Plateau.        | 24 16 00  | 81 22 00     | 229     | sfl. Co. Oz. | 49.5  | 1877-78       | 5       | Riabe                          | 1 ♂       | 2862, M. C. Z. |  |
| South of Marquesas Keys. | 24 15 00  | 82 13 00     |         |              |       |               |         |                                |           |                |  |

1 About 200 fathoms.

Material examined of *Rochinia tanneri*

| Locality   | Bearings   |          | Fathoms | Bottom | Temp. | Date           | Station | Collector                      | Specimens      | Cat. No.      | Remarks   |
|--|--|----------|---------|--------|-------|----------------|---------|--------------------------------|----------------|---------------|-----------|
|  | Lat. N.  | Long. W. |         |        |       |                |         |                                |                |               |           |
| Southeast of Massachusetts: Off Martha's Vineyard. | ° ' "  | ° ' "    | 146     | S. Sh. | ° F   | Sept. 21, 1881 | 1038    | Fish Hawk                      | 1 y.           | Y. U. M.      | Paratype. |
| Delaware: Off the Capes of Delaware.               | 38 39 00   | 73 11 00 | 130     | S.     | 49    | Oct. 10, 1881  | 1043    | do                             | 1 ♂            | 18915         | Holotype. |
| Florida: Gulf Stream, off Key West.                | 24 21 55   | 81 58 25 | 98      | S.     | 55    | Feb. 14, 1902  | 7279    | do                             | 1 y. ♂         | 46982         |           |
| Do.  | 21 17 05   | 81 58 25 | 132     | S.     | 52    | do             | 7280    | do                             | 1 ♂ 1 immat. ♀ | 46773         |           |
| Off Key West.                                      | Sand Key Light bearing N. NW., about 5 miles.    | " " "    | 190     |        |       | June 21, 1893  | 35      | Biol. Exped. State Univ. Iowa. | 1 ♀            | 20017         |           |
| Off American Shoal.                                | American Shoal Light bearing NE. by N., 8 miles. | " " "    | 70-80   |        |       | June 29, 1893  | 62      | do                             | 1 ♂            | Mus. S. U. I. |           |

1 About 90 fathoms.

and diminishing rapidly in size from first to fourth; in specimens of medium size they surpass the chelipeds; merus with a short spine at distal extremity.

*Measurements.*—Male (18671), length of carapace to base of horns 95 mm., width of carapace 79.5 mm., length of cheliped extended about 39.4 cm. or 15½ inches; entire width of crab with chelipeds extended, about 83.6 cm. or 33 inches; length of merus of cheliped 17.5 cm.; length of propodus of cheliped on upper margin 16.2 cm.; length of same on lower margin 20.6 mm.

*Range.*—East coast of North America between 40° N. latitude and Florida Straits. Depth, 70 to 334 fathoms.

*Material examined.*—See table, pages 212-213.

ROCHINIA HYSTRIX (Stimpson)

Plates 70 and 71

*Amathia hystrix* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 124 (type-locality, off Sand Key, Florida, lat. 24° 16' 00'' N.; long. 81° 42' 00'' W., 137 (corrected from 138) fathoms; type not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 134; 1879, p. 200, pl. 28, figs. 1-1 b; Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 2.

*Anamathia hystrix* SMITH, Proc. U. S. Nat. Mus., vol. 7, 1884 (1885), p. 493; Rept. U. S. Commr. of Fish and Fisheries for 1885 (1886), p. 626.—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 61.—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 10.

*Scyramathia hystrix* RATHBUN, Bull. U. S. Fish Comm., vol. 20 for 1900, pt. 2 (1901), p. 62.

*Diagnosis.*—Median spines 4; gastric spines 4; spines of rostrum and carapace long and slender; one spine on basal antennal article; a slender spine at angle of buccal cavity, and at extremity of merus of ambulatory legs.

*Description.*—Carapace covered with a short, dense, vesicular pubescence, and armed with 16 long, slender spines—2 rostral; 4 median, of which 2 are gastric, 1 cardiac and 1 intestinal; 1 gastric spine on either side of the median line; 1 marginal hepatic (paired); 3 branchial (paired) of which 1 is on the margin. The preocular spine is slender and much shorter than the other dorsal spines; postocular lobe slightly developed. Basal antennal article with a spine at the antero-external angle, while a longer spine is situated at the antero-external angle of the buccal cavity.

Chelipeds slender and weak, very little stouter than the ambulatory legs and shorter than the first two pairs; merus cylindrical and with a terminal spine; carpus with an external spine; manus slightly compressed, widening distally; fingers toothed throughout their length, very narrowly gaping. First ambulatory leg much the longest. All are very slender, and the merus terminates in a spine.

Material examined of *Rochinia hystrix*

| Locality                            | Bearings                       |              | Fathoms | Bottom  | Temp.       | Date          | Station | Collector       | Specimens | Cat. No.                 | Remarks                 |
|-------------------------------------|--------------------------------|--------------|---------|---------|-------------|---------------|---------|-----------------|-----------|--------------------------|-------------------------|
|                                     | Latitude N.                    | Longitude W. |         |         |             |               |         |                 |           |                          |                         |
| Gulf Stream, off Key West, Florida. | 24 17 05                       | 81 58 25     | 132     | S.      | ° F<br>52   | Feb. 14, 1902 | 7280    | Fish Hawk       | 1 ovig ♀  | 46702                    |                         |
| Do.                                 | 21 19 00                       | 81 39 15     | 120     | Co.     | 53.5        | Feb. 26, 1902 | 7298    | do              | 1♂        | 46703                    |                         |
| Off Sand Key, Florida.              |                                |              | 128     |         |             |               |         | W. Simpson      | 1♂, small | 2961, M.C.Z.             | Identified by W. Faxon. |
| Western Dry Rocks, Florida.         |                                |              | 144     |         |             |               |         | J. B. Henderson | 1 ♀       | 50510                    |                         |
| Off Havana, Cuba.                   | 2½ miles NW. of Havana Light.  |              | 387     | Co.     | 49          | Apr. 30, 1884 | 2152    | Albatross       | 1 y. ♀    | 4910                     |                         |
| Do.                                 | 23 09 30                       | 82 11 30     | 242     | Co.     | ° C<br>21.6 | 1877-78       | 58      | Blake           | 1 ♀       | 2692, M.C.Z.             |                         |
| Mayaguez Harbor, Porto Rico.        | Customhouse, E. ½ S., 9 miles. | 220-225      | 242     | rky.    | 21.6        | Jan. 21, 1899 | 6070    | Fish Hawk       | 1 ♀       | 24115                    |                         |
| Off Martinique.                     | 14 25 15                       | 60 54 50     | 213     | hd.     | ° F<br>50.5 | Feb. 11, 1879 | 208     | Blake           | 1         | 2850, M.C.Z.             |                         |
| Off St. Lucia.                      | 13 49 12                       | 61 01 40     | 164     | ex. S.  | 56          | Feb. 15, 1879 | 218     | do              | 3         | 2928, 2860, M.C.Z.       |                         |
| Off St. Vincent.                    | 13 07 55                       | 61 05 36     | 121     | Co.     | 57.5        | Mar. 3, 1879  | 269     | do              | 2         | 2858, 1473, M.C.Z.       |                         |
| Do.                                 | 13 06 45                       | 61 06 55     | 87      | Co.     | 62          | Feb. 21, 1879 | 232     | do              | 1         | 2735, M.C.Z.             |                         |
| Off Barbados.                       | 13 11 18                       | 59 41 12     | 180     | hd.     | 50.75       | Mar. 9, 1879  | 295     | do              | 1         | 2908, M.C.Z.             |                         |
| Do.                                 | 13 12 00                       | 59 41 00     | 210     | ers. S. | 49.75       | do            | 291     | do              | 3         | 2620, 3010, 1475, M.C.Z. |                         |
| Do.                                 | 13 06 30                       | 59 39 20     | 82      | S.      | 60          | Mar. 10, 1879 | 300     | do              | 1♂        | 1473, M.C.Z.             |                         |
| Do.                                 | 12 57 10                       | 59 36 50     | 221     | S.      | 50.5        | Mar. 6, 1879  | 280     | do              | 2         | 2801, 1471, M.C.Z.       |                         |

*Measurements.*—Male (46703), length of carapace to base of horns 21.9, length including horns 41.5, width of carapace excluding spines 15.4, including spines 33.2, length of cheliped 44 mm.

*Range.*—Florida Straits and Caribbean Sea as far as St. Vincent and Barbados. Depth, 88 to 387 fathoms.

*Material examined.*—See table, page 215.

ROCHINIA TANNERI (Smith)

Plate 227, fig. 1

?*Amathia modesta* STIMPSON, Bull. Mus. Comp. Zool., vol. 2, 1871, p. 124

(type-locality, off Sand Key, Florida, 120 fathoms; type not extant).

*Amathia tanneri* SMITH, Proc. U. S. Nat. Mus., vol. 6, 1883, p. 4 (type-locality, off Delaware Bay, 130 fathoms; holotype, Cat. No. 18915, U. S. N. M.).

?*Anamathia modesta* SMITH, Proc. U. S. Nat. Mus., vol. 7, 1884 (1885), p. 493.

*Anamathia tanneri* SMITH, Proc. U. S. Nat. Mus., vol. 7, 1884 (1885), p. 493; Rept. U. S. Commr. of Fish and Fisheries for 1885 (1886), p. 626 [22], pl. 1, fig. 4.—RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 254.

*Diagnosis.*—Median spines 4; gastric spines 4; spines of carapace short and stout, of rostrum long; one spine on basal antennal article; a blunt tooth at angle of buccal cavity; a short spine at extremity of merus of first ambulatory leg, a tooth on the other legs.

*Description.*—Spines of carapace of the same number as in *hystrix* but much shorter, especially the lateral gastric spines which in small specimens are reduced to tubercles. Orbit less open than in *hystrix*, the supraocular cave projecting further over the eye; pre-ocular spine present. Basal antennal article with an antero-external spine. Anterior angles of buccal cavity prominent with a broad triangular tooth, followed by 3 or 4 blunt, conical projections on the pterygostomian region.

Chelipeds very little stouter than ambulatory legs and similar to those of small specimens of *R. crassa*. The merus of the ambulatory legs terminates in a tuberculiform protuberance except in the first leg where it is produced in a short spine.

*Measurements.*—Male, station 62, S. U. I. Exped., length of carapace from posterior margin to base of horns 21.6, total length of carapace including spines 35.2, width of carapace excluding spines 15, including spines 23.1 mm.

*Range.*—Off Marthas Vineyard, Massachusetts, to Straits of Florida. Depth, 70 to 146 fathoms.

*Material examined.*—See table, page 213.

*Remarks.*—It seems very probable that the type of *Amathia modesta* was a specimen of *R. tanneri* with the lateral gastric spines suppressed. If this could be proved, the name *modesta* would take precedence of *tanneri*.

## ROCHINIA CORNUTA (Rathbun)

Plate 227, fig. 2

*Anamathia cornuta* RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 571, pl. 41, fig. 2 (type-locality, northeast of Indefatigable Island, Galapagos Islands, 392 fathoms; holotype, Cat. No. 21572, U.S.N.M.).

*Scyramathia cornuta* RATHBUN, Mem. Mus. Comp. Zool., vol. 35, 1907, p. 73.

*Diagnosis*.—Median tubercles 3; gastric tubercles 3; dorsal protuberances 9, short, conical; rostrum longer than remainder of carapace; 2 long marginal spines (paired).

*Description*.—Surface closely covered with tuberculiform, cutaneous vesicles, among which are a few curved hairs. Tubercles and spines of carapace as follows: Gastric region with 3 tubercles or short spines, the lateral ones in advance of the median; cardiac and intestinal regions each with one, short and conical; branchial region with 2, short, the posterior one the smaller and nearer the median line; hepatic and branchial regions each with a long, slender, marginal spine directed outward, upward and forward. Rostral horns very long, slender, nearly equaling or exceeding half the entire length of the carapace, and extending nearly to base of rostrum, widely divergent, slightly arched. Supraocular eave well developed, preocular spine slender, not reaching line of base of rostral horns. Basal article of antenna with a short tooth or spine at antero-lateral angle. Pterygostomial ridge with three or four tubercles. A broadly rounded lamina at angle of buccal cavity.

Chelipeds slender. Merus triangulate: outer face with a low blunt ridge; upper margin with a sharp terminal spine, and a broad subacute tooth near proximal end. Carpus with a superior uneven crest, a tubercle on outer surface near distal end. Propodus compressed, upper edge thin; dactylus more than half superior length of propodus. Fingers with narrow gape along their basal third, prehensile edges crenate. Merus of ambulatory legs with a short spine which decreases in size and acuteness from first to fourth pair, where it is a blunt lobiform prominence.

*Measurements*.—Ovigerous female, type, length from posterior margin to tip of horns 50.2, length from base of horns 25, length of horns 26.5, width exclusive of spines 20.2, length of branchial spine 9 mm.

*Range*.—Off the Galapagos Islands, 392 to 633 fathoms.

*Material examined*.—Northeast of Indefatigable Island; lat. 00° 29' 00" S.; long. 89° 54' 30" W.; 392 fathoms; wh. bk. S.; 43.9° F.; April 15, 1888; station 2818, *Albatross*; 5 males, 2 females (1 ovigerous, holotype) (21572).

Off Hood Island; lat. 1° 35' 00" S.; long. 89° 30' 00" W.; 633 fathoms; lt. gy. glob. Oz.; temp. 39.5° F.; November 7, 1904; station 4641, *Albatross*; 1 male (33395).

## ROCHINIA GRACILIPES A. Milne Edwards

Plate 229, figs. 1-4

*Rochinia gracilipes* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 86, footnote (type-locality, Cape Corrientes, Argentina; holotype in Paris Mus.).

*Rochinia gracilipes* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, pl. 18, figs. 1-1d.—LAGERBERG, Schwed. Sudpolar Exped. 1901-1903, vol. 5, Lief. 7, Anom. u. Brach., 1905, p. 22.

*Diagnosis*.—Median tubercles 3; gastric tubercles 3; dorsal protuberances 9; rostrum less than half as long as remainder of carapace; 2 short marginal spines (paired).

*Description*.—The median protuberances are bluntly rounded, the gastric and cardiac larger than the intestinal. The lateral gastric tubercles are acute. The branchial tubercle either side of the cardiac tubercle is very small. The hepatic and branchial marginal spines are short and conical; between them and only a little higher up on the carapace is a similar but shorter, branchial spine. A short preocular spine or tooth and a similar postocular one. Rostrum of moderate length, slightly deflexed, the outer margins of the horns little divergent. A small tooth at antero-lateral angle of basal article of antenna; a tubercle just outside the base of the article and 2 or 3 tubercles in a row on the pterygostomian region. Angles of buccal cavity rounded, margin thickened. A slight notch visible at inner angle of merus of maxillipeds.

Chelipeds stout; palm broad, less than twice as long as greatest width; fingers not quite meeting at base when closed.

*Measurements*.—Male, holotype, total length of carapace 23.5, width 16.2 mm. (A. Milne Edwards). The specimens collected by the *Hassler* are smaller.

*Range*.—From Cape Frio, Brazil, to Cape Horn. Depth, 30 to 55 fathoms.

*Material examined*.—See table, page 219.

*Additional localities recorded*.—

Cape Corrientes, Argentina (male, figured type, A. Milne Edwards); 100 meters (Lagerberg).

East Patagonian Bank; lat. 44° S.: 90 meters (Doflein and Balss).

South of Cape Horn; lat. 56° 20' S., long. 67° 42' W.: 44 fathoms; *Hassler* (A. Milne Edwards).

*Remarks*.—In the number and arrangement of prominences on the carapace, this species agrees with *R. cornuta*, but the rostral and lateral marginal spines in the latter are much longer, the anterior branchial spine much higher up and the chelipeds slenderer.



*Material examined of Rochinia gracilipes*

| Locality                            | Lat. N.  | Long. W. | Fath-oms | Date          | Station | Collector    | Specimens         | Cat. No.                 |
|-------------------------------------|----------|----------|----------|---------------|---------|--------------|-------------------|--------------------------|
| Brazil: Off Cape Frio.....          | ° ' "    | ° ' "    | 35       | Jan. 22, 1872 | 20      | Hassler..... | 1♂ 1♀ 3 Y.....    | 2056, M. C. Z.           |
| Argentina: Off Rio de la Plata..... | 37 42 00 | 56 20 00 | 44       | Mar. 1, 1872  | 26      | do.....      | 3♀ (1 ovig.)..... | 1949, M. C. Z.           |
| Patagonia:                          |          |          |          |               |         |              |                   |                          |
| Off mouth of Rio Colorado.....      | 40 22 00 | 60 35 00 | 30       | Mar. 3, 1872  | 27      | do.....      | {1♂ 4♀<br>1♂ 1♀   | 1951, M. C. Z.<br>55118. |
| Off Gulf of San Matias.....         | 41 40 00 | 63 12 00 | 30       | Mar. 7, 1872  | 30      | do.....      | 1♂ 1♀ 2 Y.....    | 1950, M. C. Z.           |

*Material examined of Rochinia umbonata.*

| Locality                       | Lat. N.  | Long. W. | Fath-oms | Bottom                   | Temp.       | Date          | Station | Collector      | Specimens      | Cat. No.       |
|--------------------------------|----------|----------|----------|--------------------------|-------------|---------------|---------|----------------|----------------|----------------|
| Georgia.....                   | 30 44 00 | 79 26 00 | 440      | C.o. crs. S.<br>Sh. For. | ° F<br>45.6 | Apr. 1, 1885  | 2415    | Albatross..... | 1♂ 2♀.....     | 9851.....      |
| Florida:                       |          |          |          |                          |             |               |         |                |                |                |
| Off Fernandina.....            | 30 58 30 | 79 38 30 | 294      | gy. S. dead<br>C.o.      | 46.3        | May 5, 1886   | 2668    | do.....        | 2♂ 1♀.....     | 11377.....     |
| Gulf Stream, off Key West..... | 24 18 00 | 81 47 45 | 133      | S. Co.                   | 53.5        | Feb. 19, 1902 | 7286    | Fish Hawk..... | 1 ovig. ♀..... | 46774.....     |
| Do.....                        | 24 17 30 | 81 53 30 | 127      | S. Gr.                   | 53          | do.....       | 7283    | do.....        | 1 Y. ♀.....    | 46983.....     |
| Off St. Vincent.....           | 13 06 45 | 61 06 55 | 88       | C.o.                     | 62          | Feb. 21, 1879 | 232     | Blaker.....    | 1♂.....        | 6316, M. C. Z. |

## ROCHINIA OCCIDENTALIS (Faxon)

Plate 228; plate 229, fig. 5.

*Anamathia occidentalis* FAXON, Bull. Mus. Comp. Zoöl., vol. 24, 1893, p. 150 (type-locality, near the Galapagos Islands, 385 fathoms, holotype, Cat. No. 4479, M. C. Z.); Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 8, pl. 1, figs. 2 and 2a.

*Diagnosis*.—Median spines and tubercles 4; gastric spines and tubercles 4; 14 dorsal spines and tubercles; marginal spines and rostral horns of moderate length; a small spine or tooth on basal antennal article; none at buccal angle; a tubercle at end of merus of all legs.

*Description*.—Carapace strongly arched, clothed with tuberculi-form, cutaneous vesicles and with delicate setae hooked at their tips; and furnished with spines and tubercles arranged as follows: Four on the gastric region (two in the median line, two lateral), the posterior of the median ones having the form of a tubercle, from which a low blunt keel runs back to the cardiac region; one on the cardiac region, one (tubercle) on the intestinal region, one (a marginal spine) on each hepatic region, five on each branchial region. Of the branchial spines the one at the widest part projects upward and forward, and is the longest spine of the carapace, one-half as long as the rostral horns. There are four or five small tubercles on the outer border of the pterygostomian region. Rostrum more than one-fourth the length of the carapace and with 2 slightly divergent awl-shaped horns. Preocular spine well-developed and acute. Basal antennal article with a short, blunt spine or tubercle at its antero-external angle. Buccal area with its antero-external angle projecting but not dentiform.

Chelipeds of male twice as long as carapace, not much more robust than the ambulatory legs; propodus little longer than the merus, subcylindrical, widening toward the fingers. Fingers less than half the basal portion; prehensile edges regularly dentate, closing throughout their length. Merus of ambulatory legs with a small tubercular projection at the distal end above, most prominent in the anterior pair.

*Measurements*.—Male holotype, length of carapace without rostral horns 45, length of rostral horns 12, width of carapace 38, length of longest branchial spine 7 mm.

*Range*.—Galapagos Islands. Known only from type-specimen.

*Material examined*.—Off the Galapagos Islands; lat.  $1^{\circ} 03' 00''$  S.; long.  $89^{\circ} 28' 00''$  W.; 385 fathoms; R.; temp.  $43.2^{\circ}$  F.; March 28, 1891; station 3404; 1 male, holotype (4404, M. C. Z.).

## ROCHINIA VESICULARIS (Rathbun)

Plate 230

*Scyramathia vesicularis* RATHBUN, Mem. Mus. Comp. Zoöl., vol. 35, 1907, p. 73, pl. 5, fig. 7; pl. 8, figs. 1 and 1a (type-locality, SE. of Hood Island, Galapagos Islands, 300 fathoms; (holotype, Cat. No. 32860, U.S.N.M.).

*Diagnosis*.—Median spines 4; gastric spines 4; dorsal and marginal spines short and numerous; 2 spines on basal antennal article; a spine on lower margin of orbit outside the antennal article; none at buccal angle; a spine or sharp tooth at end of merus of all legs.

*Description*.—Body and legs everywhere covered with a pubescence formed of spherical vesicles; a few long, slender hairs on the gastric region, the lateral margins and the rostrum. Carapace behind the orbits armed with 20 short, stout, sharp-pointed spines, of which 4 are gastric (2 median, the lateral spines on either side of the anterior median), 1 cardiac, 1 intestinal, 1 hepatic, marginal (paired), 6 branchial (paired), of which one is suberect above the lateral angle, one is almost in line with the latter and the cardiac spine, 2 others, more anterior, form a straight line with the cardiac spine, while 2, smallest are above the bases of the second and third legs. Preocular spine similar to the others; postocular cup narrow, curved inward, spine-tipped. Rostrum composed of 2 slender, moderately divergent horns, two-fifths the length of the remainder of the carapace. Basal antennal article armed with two spines on its outer margin; immediately behind the posterior of these is another spine on the orbital margin.

Chelipeds of small male just as long as carapace and rostrum and a little stouter than the legs; arm with a row of four short spines above, which increase toward the wrist; wrist with 3 or 4 similar spines; palm with sides parallel, one and one-half times as long as fingers, which meet when closed, edges crenulate. Merus of ambulatory legs with a spine or sharp tooth at distal end; first pair one and one-half times as long as carapace and rostrum.

In the female the rostrum is shorter, one-third the length of remainder of carapace; the cheliped equals length of carapace and half the rostrum; fingers relatively longer than in the male; first ambulatory one and one-fifth times as long as carapace and rostrum.

*Measurements*.—Male holotype, total length of carapace 20.7, width 11.5, length of rostral horns 6 mm.

*Range*.—Off the Galapagos Islands; 300 fathoms.

*Material examined*.—Southeast of Hood Island, Galapagos Islands; lat. 1° 30' 30'' S.; long. 89° 35' 00'' W.; 300 fathoms; brk. Sh. Glob.; temp. 48.6° F.; November 7, 1904; station 4642, *Albatross*; 1 male, holotype, 2 females (32860).

## ROCHINIA UMBONATA (Stimpson)

Plate 72; plate 73, fig. 1

*Scyra umbonata* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 115 (type-locality, off Sand Key, Florida, 143 fathoms; type not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 87; 1880, pl. 31 A, figs. 5–5b; Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 2.

*Scyramathia umbonata* A. MILNE EDWARDS, Comptes Rendus Acad. Sci., Paris, vol. 91, 1880, p. 356. (See Sars, Norske Nordhavs Exped., vol. 14, Crustacea, pt. 1, 1885, pp. 6, 7 and 274; also Smith, Rept. U. S. Commr. of Fish and Fisheries for 1885 (1886), p. 625 [21]).

*Anamathia umbonata* RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 61, pl. 1, figs. 1–3.—FAXON, Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 10.

*Diagnosis*.—Median tubercles four; gastric tubercles four; dorsal tubercles mostly large and flat-topped. No spine on basal antennal article or at buccal angle. A tubercle at end of merus of ambulatory legs.

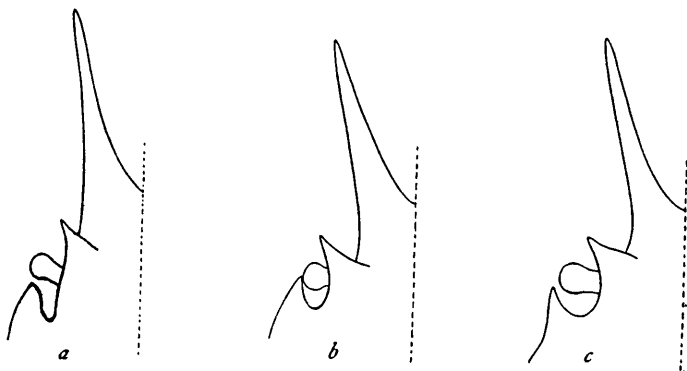


FIG. 85.—ROCHINIA UMBONATA (11377), FRONT AND ORBIT, AFTER RATHBUN. *a*. MALE, TOTAL LENGTH OF CARAPACE 26.5 MM. *b*. MALE, TOTAL LENGTH OF CARAPACE 28 MM. *c*. OVIGEROUS FEMALE, TOTAL LENGTH OF CARAPACE, 31 MM.

*Description*.—Surface covered with a close tuberculiform pubescence with longer club-shaped setae on the margins of the legs and slender curved setae on the rostrum and gastric region and outer margin of branchial region. Carapace with nine tubercles on the dorsal surface, of which six are usually large, flattened and irregular in shape, and are situated on the posterior gastric, the cardiac, and two on each branchial region, the anterior of which is the larger; the three smaller tubercles are gastric, one anterior median, the others lateral. An hepatic and a branchial marginal spine, which may be either triangular, flattened and somewhat appressed, or conical and projecting outward. There is a small tubercle on the middle of the posterior margin, or of a raised ridge parallel to the posterior margin. Orbits variable, either narrow with the supraocular cave somewhat convex in outline and the preocular spines directed forward and subparallel to each other, or

wider, with the eave wholly concave and the spines directed obliquely outward. Rostral horns varying from 0.21 to 0.4 of the length of remainder of carapace. Basal antennal article unarmed or with a very low and inconspicuous tooth at anterior angle. Angles of buccal cavity projecting, lobiform. Subbranchial and pterygostomian regions tuberculate.

Chelipeds in male slightly enlarged, nearly as long as first ambulatory leg; merus somewhat angled, upper margin tuberculate proximally and with a distal spine. Carpus uneven; inner margin with a thin lobe near the merus. Manus compressed, narrow, margins thin. Dactylus about  $\frac{2}{3}$  the length of upper margin of manus, a large tooth at base in the hiatus. Prehensile edges of both fingers denticulate. Ambulatory legs of moderate length, with a tubercle at distal extremity of merus, or in the first pair a short spine.

Extremely variable, variations independent of sex.

*Measurements.*—Ovigerous female (11377), length of carapace on median line 24.4, length of horn 7, width of carapace exclusive of spines 18 mm.

*Range.*—Off Georgia to St. Vincent, West Indies. Depth, 88 to 440 fathoms.

*Material examined.*—See table, page 219.

#### Genus LIBIDOCLAEA Milne Edwards and Lucas

*Libidoclaea* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1843, p. 6; type, *L. granaria* Milne Edwards and Lucas.

Carapace broadly pyriform, swollen above; branchial regions much enlarged; gastric region prominent; genital region small, triangular, its posterior part encroached upon by the branchial regions which at this point are separated from each other only by a deep depression; cardiac and intestinal regions very oblique. Surface rough with fine granulations, sharp tubercles and spines. Rostrum long, extremity bifid. Orbits deeply cut above and below; a strong preocular spine above; eyes short, stout and retractile; basal article of antennae of moderate width, with two spines or teeth on outer margin. Buccal cavity closed by outer maxillipeds. Anterior portion of sternal plastron very oblique; abdominal segments distinct in both sexes. Chelipeds elongate; not surpassing the next pair of legs; fingers long, slender, and denticulate on inner border. Ambulatory legs slender, diminishing successively in length; dactyli long, slender, and slightly curved.

Southern part of South America.

#### KEY TO THE SPECIES OF THE GENUS LIBIDOCLAEA

- A<sup>1</sup>. Rostrum less than one-third as long as remainder of carapace and bifurcate for less than half its length.....*granaria*, p. 224.  
 A<sup>2</sup>. Rostrum more than one-third as long as remainder of carapace (intestinal spine excluded) and bifurcate for half its length.....*smithii*, p. 226.

## LIBIDOCLAEA GRANARIA Milne Edwards and Lucas

Plates 76-78; plate 231, figs. 1, 2, 4, 5 and 6

*Libidoclaea granaria* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1843, p. 8; atlas, vol. 9, 1847, pl. 3, pl. 4, figs. 1-1b (type-locality, environs of Valparaiso; type in Paris Mus.).—MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 72.

*Libidoclaea coccinea* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 268 (type-locality, in deep water off eastern Patagonia; type not extant); U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 88; atlas, 1855, pl. 1, figs. 3a-3d.

*Libinia coccinea* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 73.—RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 574.

*Libinia gracilipes* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, pp. 73 and 74, pl. 9, figs. 2-2c (type-locality, off coast of Chiloe, 45 fathoms; type in Brit. Mus.).

*Diagnosis.*—Rostrum bifurcate for less than half its length. Spines of carapace moderate, spine at lateral angle less than half as long as width of branchial region except in young (16 mm. long and under), where it is just half as long as width of branchial region.

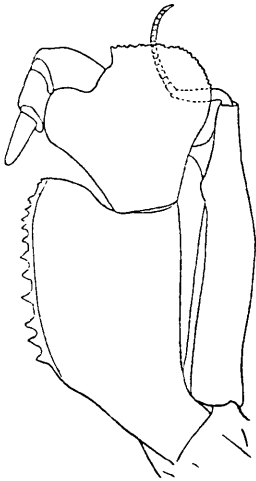


FIG. 86.—LIBIDOCLAEA GRANARIA (21919), MAXILLIPED,  $\times 7.5$

*Description.*—Spines and tubercles of carapace very unequal; the principal spines are proportionally much longer in the young than in the old. Gastric tubercles 7, 3 median, the middle one of which may almost disappear, and 2 on each side in a longitudinal line; a long cardiac spine, a longer intestinal spine, a still longer spine on the lateral margin at the widest part of the carapace and opposite the narrow anterior border of the cardiac region. Hepatic margin produced in a spine. A curved line of tubercles follows the innermost margin of the branchial region; among the larger tubercles of this region a triangle of 3 near the gastric region is prominent; while a still larger spine lies above the postero-lateral margin and in a line with the cardiac spine; from it a row of spines curves downward and then forward and is continued on the subbranchial and the pterygostomian regions, ending in a flat triangular spine at the angle of the buccal cavity.

Rostrum inclined downward; horns short, moderately spreading. Supraocular cave narrow, armed with a sharp, ascending spine, and divided from the postocular cup by a narrow fissure; this cup in lateral view shows a rounded lobe. This in turn is separated by a broad, curved sinus from the basal segment of the antennae. The segment is anteriorly narrowed and its outer margin is occupied by

two stout curved spines. Behind the orbital sinus there is a well-developed tubercle.

The merus of the outer maxillipeds is a little longer than wide, its antero-external angle is broadly rounded.<sup>32</sup>

The chelipeds and legs are very long, the chelipeds not so long as the first pair of ambulatory legs even in the fully developed male, where they are stouter than the legs. Their surface is rough with fine sharp granules which, if invisible to the naked eye, are evident to the touch when the appendage is rubbed from the distal end toward the carapace. Palms of old male compressed, a little narrower at proximal end than elsewhere; fingers about two-thirds as long as upper margin of palm, gaping at base and armed with low teeth on their prehensile edges. A smooth longitudinal depression on the upper surface of the carpus of the ambulatory legs.

*Measurements.*—Male (Milne Edwards and Lucas), length of carapace 67, width 56 mm. Male (Dana), length  $2\frac{3}{8}$  inches (60.4 mm.), width without spines  $2\frac{1}{8}$  inches (54 mm.). Male (Miers), length and width about 36 mm. Immature male (21919), length of carapace from posterior margin to tip of horns 36.2, width with spines 38, without spines 30 mm. Male (1870, M. C. Z.), length of carapace from posterior margin to tip of horns 90.5, extreme width 86.2, length of cheliped, approximately 235, length of propodus of cheliped on lower margin about 116, length of same on upper margin 74.2, length of dactylus of cheliped about 47 mm.

*Color.*—Carapace yellowish white, ambulatory legs of same color but much darker (Milne Edwards and Lucas). Scarlet (Dana). Yellowish-brown, in spirit (Miers).

*Range.*—From Valparaiso, Chile, to off Gulf of San Matias, Patagonia; 30 to 52 fathoms.

*Material examined.*—

Porto San Pedro, Island of Chiloe, Chile: U. S. C. S. S. *Hassler*: 1 old male encrusted with *Balanus* (1870, M. C. Z.).

Off Gulf of San Matias, Patagonia: lat.  $40^{\circ} 03' 00''$  S.; long.  $58^{\circ} 56' 00''$  W.; 52 fathoms; fne. dk. S.; January 13, 1888; station 2767, *Albatross*; 200 specimens of medium and small size (21919); the male measured above is the largest specimen of this lot.

*Other records.*—

Near Valparaiso (Milne Edwards and Lucas).

Off Cape Tres Montes, Chile; lat.  $46^{\circ} 53' 15''$  S.; long.  $75^{\circ} 12' 00''$  W.; 45 fathoms; station 304, *Challenger* (Miers).

<sup>32</sup> This is contrary to the form of the merus given in the atlas of d'Orbigny's "Voyage," pl. 4, fig. 1 b, where the merus has a prominent tooth at the antero-external angle. I am disposed to believe that the artist may have included the angle of the buccal cavity with the merus. This view is substantiated by the correspondence in all essentials of the figures of the other parts as represented by the three authors above cited. Compare pl. 4, fig. 1 a of M. Edwards and Lucas with pl. 1, fig. 3 c of Dana and pl. 9, fig. 2 b of Miers; also pl. 3 of M. Edwards and Lucas with pl. 1, fig. 3 a of Dana and pl. 9, fig. 2 of Miers.

Off eastern coast of Patagonia; 30 fathoms (Dana).

*Age variation.*—A male collected by the *Hassler* is larger than any previously recorded. The dorsal spines of the carapace are reduced to tubercles, even those of the margin are very short and conical. The rostrum is much wider at base than its length and does not widen at the tip as in the young; horns very short; length of rostrum 9.6, width at base 11.4, width at tips 2.7 mm. The inner margins of the orbits converge anteriorly, the interspace narrowing from 17.6 to 14.8 mm. The width of the body, exclusive of spines, in relation to its total length, is greater than in smaller specimens.

**LIBIDOCLAEA SMITHII (Miers)**

Plates 74 and 75; plate 231, fig. 3

*Libinia smithii* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 73, pl. 9, figs. 1-1c (♂) (type-locality, off coast of Chile, lat. 52° 45' 30'' S., long. 73° 46' 00'' W., 245 fathoms; type in Brit. Mus.).

*Libinia hahni* A. MILNE EDWARDS, *Miss. Sci. Cape Horn*, vol. 6, 1891, *Crust.*, p. 5, pl. 1 (♀) (type-localities, Beagle Channel, in sight of Loupataya, 198 meters or 108 fathoms and near Murray Narrows, 280 meters or 153 fathoms; type in Paris Mus.).

*Diagnosis.*—Rostrum bifurcate for half its length. Some spines of carapace long, spine at lateral angle about as long as width of branchial region.

*Description.*—Differs from *L. granaria* in the greater length of the rostrum and of certain spines of the carapace. The rostrum in the largest male is nearly half as long as the postrostral portion of the carapace not counting the posterior spine, the horns occupy half the length of the rostrum and diverge widely. The spine at the lateral angle of the carapace is the longest and equals in length the width of the branchial region. Other elongate spines are four median spines, namely, the intestinal, cardiac, anterior, and posterior gastric; the hepatic spine; two branchial spines (paired); preocular spine (paired). The tubercles of the carapace are fewer and lower than in *granaria* of similar size. In the females examined the rostral horns are less divergent than in the male, but the long spines of the carapace are very little if any shorter than in the male. In the young only six spines are noticeably longer than in *granaria* of the same size, viz, the two rostral, cardiac, intestinal and lateral branchial (paired).

*Measurements.*—Male (21922), length of carapace from posterior margin to tip of horn 43, width including spines 52.1, width excluding spines 29.6 mm. Ovigerous female (21920), length from posterior margin to tip of horn 51.8, width excluding spines 38.6 mm.

*Color.*—In spirit, light yellowish brown (Miers).

*Range.*—From Calbuco, Chile (Lenz) to Straits of Magellan; depth, 10 to 15 (Lenz) and 61 to 1,050 fathoms.

*Material examined.*—See table, page 227.



Material examined of *Libinia clauseni*

| Locality                                    | Lat. S.  | Long. W. | Fathoms | Bottom | Temp. | Date          | Station | Collector      | Specimens   | Cat. No. |
|---|----------|----------|---------|--------|-------|---------------|---------|----------------|-------------|----------|
| Patagonia:                                  |          |          |         |        | ° F   |               |         |                |             |          |
| Off Chonos Archipelago.....                 | 45 35 00 | 75 55 00 | 1,050   | gn. M. | 36.9  | Feb. 11, 1888 | 2788    | Albatross..... | 1 y. ♂      | 21924    |
| Off Port Otway.....                         | 46 47 30 | 75 15 00 | 61      | gn. M. | 53.9  | Feb. 9, 1888  | 2787    | do.....        | 4♂ 6♀ 10 y. | 21923    |
| Between Wellington Island and mainland..... | 48 41 00 | 74 24 00 | 194     | bu. M. | 51.9  | Feb. 8, 1888  | 2784    | do.....        | 1♂ 2♀       | 21922    |
| Off Esperanza Island.....                   | 51 02 30 | 74 08 30 | 122     | bu. M. | 47.9  | Feb. 6, 1888  | 2783    | do.....        | 1 y. ♀      | 21921    |
| Straits of Magellan.....                    | 53 01 00 | 73 42 30 | 369     | gn. M. | 46.9  | Feb. 2, 1888  | 2780    | do.....        | 1 y. ♂ 1♀   | 21920    |

Material examined of *Trachymaia cornuta*

| Locality                | Lat. N.  | Long. W. | Fathoms | Bottom          | Temp. | Date          | Station | Collector      | Specimens | Cat. No.                      | Remarks  |
|-------------------------|----------|----------|---------|-----------------|-------|---------------|---------|----------------|-----------|-------------------------------|----------|
| Little Bahama Bank..... | 27 22 00 | 78 07 30 | 338     | gy. S.          | ° F   | May 2, 1886   | 2655    | Albatross..... | 1♂        | 11400.....                    |          |
| St. Croix.....          | 17 37 15 | 64 48 20 | 248     | Co. S. brk. Sh. | 47.5  | Jan. 5, 1879  | 134     | Blaie.....     | 1         | 2706, M. C. Z.                |          |
| Off Barbados.....       | 13 12 00 | 59 41 00 | 210     | ers. S.         | 54.5  | Mar. 9, 1879  | 291     | do.....        | 4         | 2723, 2863,<br>4170, M. C. Z. |          |
| Do.....                 | 13 05 00 | 59 39 40 | 140     | Co. brk. Sh.    | 43.75 | Mar. 10, 1879 | 299     | do.....        | 2         | 2763, M. C. Z.                | Cotypes. |

Genus **OPLOPISA** A. Milne Edwards

*Oplopisa* A. MILNE EDWARDS, Crust. Rég. Mex., 1879, p. 201; type, *O. spinipes* A. Milne Edwards.

Near *Pisa* Leach,<sup>33</sup> but differs in the form of the maxillipeds and of the buccal cavity; the merus of the outer maxillipeds is much dilated at its antero-external angle while truncate on the inner side; the buccal cavity, instead of a straight anterior margin, is much more advanced on the sides than in the middle portion. Carapace pyriform, with two rostral horns and inner orbital angles spiniform. Orbit incompletely closed below, the low border being separated from the basal article of the antenna by a deep, wide cut; this article is narrow, the movable part of the antenna is exposed in dorsal view. Antennular fossettes large. (After A. Milne Edwards.)

Known only from the type species.

**OPLOPISA SPINIPES** A. Milne Edwards

Plate 232, figs. 1 and 2

*Oplopisa spinipes* A. MILNE EDWARDS, Crust. Rég. Mex., 1879, p. 201, p. 15 A, figs. 5-5b (type-locality, in explanation of plate, Strait of Florida, 101 fathoms; type in Paris Mus.).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 11, fig. 8.

*Diagnosis*.—Orbital margin unarmed except for the preorbital and the postorbital spine. Carapace rough with spines and granules. Antennae, buccal area, chelipeds and legs similar to *Mithrax*.

*Description*.—Carapace thick, swollen, slightly hairy, regions little marked. Four tubercles surmount the gastric region; three of them are situated in advance in a transverse row, the fourth is behind. Some tubercles on the cardiac, branchial and hepatic regions; between the tubercles the surface is covered with fine granulations. Rostrum narrow, formed of two straight, divergent horns; it is about one-third as long as the rest of the carapace. Postorbital angle wide, triangular and pointed. Basal article of outer antennae armed on its lateral margin with two spines, the anterior of which is the most developed. Chelipeds of female very feeble, furnished on the merus and carpus with short, obtuse spines. Ambulatory legs not very long, covered with regularly disposed spines. (After A. Milne Edwards.)

*Measurements*.—Length of carapace including rostrum 12.5, excluding rostrum 9, width of carapace 7 mm. (A. M. E.).

*Locality*.—Known only from the type-locality, Strait of Florida, 101 fathoms.

*Remarks*.—The figures of this species suggest strongly the young of a *Mithrax*, but the want of spines on the upper and lower margins of the orbit forbids its inclusion in that genus.

<sup>33</sup> Edin. Encyc., vol. 7, 1814, p. 431.

## Genus TRACHYMAIA A. Milne Edwards

*Trachymaia* A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 351; Bull. Mus. Comp. Zoöl., vol. 8, Dec. 29, 1880, p. 3; type, *T. cornuta* A. Milne Edwards.

Carapace broad, much swollen posteriorly, spinous. Rostrum short, deeply bifurcate. A small preocular spine, a large postocular spine, an infero-orbital spine. Eyes large, flattened almost horizontally. Basal antennal article long and narrow; next article inserted on either side of rostrum. Merus of outer maxillipeds with antero-external angle much dilated, antero-internal angle oblique, not notched. Chelipeds elongate, chelae much enlarged. Legs very slender, first one longer than cheliped, remainder diminishing rapidly in length; dactyli long, styliform, unarmed.

Contains but one species.

## TRACHYMAIA CORNUTA A. Milne Edwards

Plate 80; plate 232, figs. 3-5

*Trachymaia cornuta* A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 352 (type-locality, off Barbados, 82 and 140 fathoms; cotypes, Cat. No. 2763, M. C. Z.); Bull. Mus. Comp. Zoöl., vol. 8, Dec. 29, 1880, p. 3.—RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 63.

*Trachymaia cornuta* A. MILNE EDWARDS, Crust. Rég. Mex., 1880, pl. 31 A, figs. 2-2c.

*Diagnosis*.—Carapace broad, spines delicate; eyes large and flat; chelipeds long and massive; ambulatory legs filiform. Merus of outer maxillipeds not notched at antero-internal angle.

*Description*.—Carapace rough with spinules and covered with soft bristles; spines arranged as follows: Four on gastric region forming a transverse diamond; 2 median cardiac, close together; 5 branchial, three near inner margin, 2 near outer; 1 hepatic and 1 subhepatic spine; on posterior margin a line of 25 small spines terminating above first leg; of this row the median spine and 2 near the middle are larger than the others; on the margin of the branchial region there is a line of 4 spines extending forward from above first leg; a cluster of 4 spines on pterygostomian region; rostral spines long, slender, divergent; pre-orbital spine acuminate; postorbital projecting laterally much beyond eye. Eyes large, flattened almost horizontally. A large sub-orbital spine and a spine at angle of buccal cavity. Basal antennal article bears a terminal and one lateral spine; second movable article reaches half way to end of rostral spines, remaining portion exceeds rostrum by half its length. In male abdomen, first segment

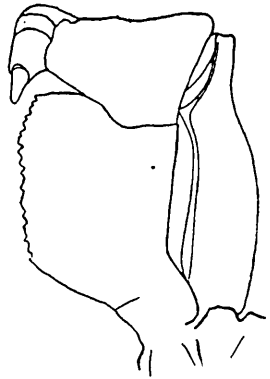


FIG. 87.—TRACHYMAIA CORNUTA (11400), MAXILLIPED,  $\times 11.6$

has three spinules transversely arranged; second has two median and one lateral; third and fourth have a median tubercle; sternum with four spinules in front of abdomen.

Chelipeds nearly twice length of carapace; ischium, merus and carpus spiny; hand broad, upper margin spinulose; lower margin with a tooth near articulation; fingers flattened laterally, broad, prehensile edges dentate, acute, narrowly gaping for half their length. Legs slender, first nearly three times length of carapace, fourth about one-half length of first.

*Measurements*.—Male (11400), median length of carapace 14.5, length including horns (tips broken off) 15.7, width without spines 13 mm.

*Range*.—Little Bahama Bank; St. Thomas; St. Croix; Nevis; Barbados. Depth, 82 to 338 fathoms.

*Material examined*.—See table, page 227.

#### Genus LEUROCYCLUS Rathbun

*Salacia* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1843, p. 12; type, *S. tuberculosa* Milne Edwards and Lucas. *Salacia* preoccupied by Lamouroux, Hist. Pol. Coral. Flex., 1816, p. 212.

*Leurocyclus* RATHBUN, Proc. Biol. Soc. Washington, vol. 11, 1897, p. 164 (substituted for *Salacia*).

Carapace broader than long, suborbicular, depressed, regions well marked. Rostrum very small, subtriangular. Orbits directed forward; postocular cup large, separated from the scarcely projecting inner margin of the orbit by a triangular sinus. Basal segment of antenna very wide, wider than the space between it and the postocular tooth, and having a blunt tooth at the antero-external angle; the movable portion is entirely visible in dorsal view beside the rostrum. Epistome rudimentary. Ischium of outer maxillipeds broad, inner margin denticulate; merus cordiform. Chelipeds short; palm much swollen; fingers long, slightly curved, inner margins denticulate. Ambulatory legs very long, spinulose; merus subcylindrical, propodus compressed, dactylus long, slender, compressed, and slightly curved. Sternal plastron much wider than long. Sixth and seventh segments in male abdomen fused; in female, fifth, sixth, and seventh fused.

Contains only two species.

#### LEUROCYCLUS TUBERCULOSUS (Milne Edwards and Lucas)

Plate 232, figs. 6–11; plate 233

*Salacia tuberculosa* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, Crust., 1843, p. 13; atlas, vol. 9, 1847, pl. 2 (type-locality unknown; Chile?; holotype in Paris Mus.).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 387, pl. 12, fig. 5.

*Salacia* sp.? BRITO CAPELLO, Journ. Sci. Lisboa, vol. 3, no. 12, 1871, p. 263, pl. 3, figs. 3, 3a, 3b.

*Diagnosis*.—Palms dilated. Merus of ambulatories proximally enlarged. A thick brush of hair on propodus of last three legs.

*Description*.—Carapace covered with tubercles and fine granulations; short, scattered, fawn-colored hairs in the interregional depressions. Rostrum and superior inner border of orbit finely granulate. Merus of chelipeds ornamented with many longitudinal rows of prominent granules, some of which take the form of more or less spiny tubercles. Manus dilated and covered with fine granules and occasional spiny tubercles. Ambulatory legs granulate; ischium armed above with an erect spine; some spines also on the merus especially of the first two pairs where they form a row continuous with the ischial spine; merus proximally enlarged; granules of propodus arranged in rows; propodus of last three legs covered on the upper surface with a brush of numerous, crowded hairs; in the first leg the hairs are confined to the outer border of the same article; dactylus flattened and deeply grooved, a slight swelling in the old at the base of the horny tip. Sternum finely granulate.

*Color*.—Carapace yellowish white; tips of walking legs brown.

*Measurements*.—Type male, length 52, width 55 mm. (M. E. and L.). Male (Chile), length 60, width 71 mm. (Brito Capello).

*Range*.—From Rio de Janeiro, Brazil (Bouvier), to Chile (Milne Edwards and Lucas; Brito Capello).

*Material examined*.—Chile(?); 1 male, holotype (Paris Mus.).

LEUCOCYCLUS GRACILIPES (A. Milne Edwards and Bouvier)

Plates 82 and 83

*Leurocyclus tuberculosus* RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 573.

*Microrhynchus gracilipes* A. MILNE EDWARDS, MS., in A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 387.

*Salacia gracilipes* A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, pl. 11, figs. 9 and 10, text-fig. 21 (type-locality, off the Rio de la Plata, lat. 40° 22' S., long. 60° 35' W., 30 fathoms; holotype in Paris Mus.).

*Diagnosis*.—Palms not dilated. Merus of ambulatories not at all enlarged. No brush of hair on propodites.

*Description*.—Closely related to the preceding, but much smaller. Besides the differences noted above, the chelae are longer; the ambulatories much longer and slender, with the superior basal spines larger.

*Measurements*.—Immature male (21907), length of carapace 12.7, width 12.5 mm. Adult male (holotype) length 11.6, width 11.7 mm.

*Range*.—Off the Rio de la Plata; 10½ to 30 fathoms.

*Material examined*.—Argentina; off Rio de la Plata; January 12, 1888; *Albatross*: Lat. 36° 42' 00'' S.; long. 56° 23' 00'' W.; 11½

fathoms; S. brk. Sh.; station 2764; 10 young (21907). Lat.  $36^{\circ} 43' 00''$  S.; long.  $56^{\circ} 23' 00''$  W.;  $10\frac{1}{2}$  fathoms; S. brk. Sh.; station 2765; 25 young (21908). Lat.  $36^{\circ} 47' 00''$  S.; long.  $56^{\circ} 23' 00''$  W.;  $10\frac{1}{2}$  fathoms; S. brk. Sh.; station 2766; 4 young (21909).

Genus **CHIONOECETES** Kröyer

*Chionoecetes* KRÖYER, Naturh. Tidssk., ser. 1, vol. 2, 1838, p. 249; type, *C. opilio* (O. Fabricius).

*Peloplastus* GERSTÄCKER, Arch. f. Naturg., vol. 22, pt. 1, 1856, p. 102, published April, 1857, according to Stimpson; type, *P. pallasii* Gerstäcker = *C. opilio* (O. Fabricius).

Carapace about as broad as long, breadth at orbits about half as great as across branchial regions; either depressed or partially inflated, more or less tuberculate or spinose. Rostrum short, divided into two flat, triangular horns. Orbits large, shallow, open above so that the short, thick eye-peduncles are visible from above when retracted; cornea large. No preocular tooth or spine; a large postocular tooth, directed forward. Basal antennal article narrow, diminishing distally and ending in a spine; next two articles not dilated; flagellum short.

Chelipeds much shorter than the first three ambulatory legs; fingers long and narrow; palm only slightly enlarged until the crab reaches considerable size (100 mm. or more). Legs more or less compressed. Abdomen composed of seven segments.

Occurs from Cortes Bank (lat.  $32^{\circ} 17' 00''$  N.), off San Diego, California, northward through Bering Sea and Strait to the Arctic, westward on the Siberian coast to long.  $173^{\circ} 24' 00''$  W. and eastward on the Alaskan coast as far as a point 10 miles west of Point Franklin. West coast of Greenland (lat.  $70^{\circ} 42' 00''$  N.) southward to Casco Bay, Maine. Kamchatka; Okhotsk Sea to south coast of Hokkaido (Jesso); sea of Japan to lat.  $36^{\circ} 01' 30''$  N. (coast of Korea). Chile. Littoral to 1,625 fathoms.

KEY TO THE SPECIES OF THE GENUS CHIONOECETES

- A<sup>1</sup>. Branchial regions depressed or slightly swollen. Lateral margin of carapace exposed in dorsal view as far forward as first pair of ambulatory legs. Rostrum horizontal. Meropodites of legs broadly dilated.
- B<sup>1</sup>. Length and breadth of carapace subequal; dorsal surface ornamented with tubercles. Spines of pterygostomian-branchial row small, numerous, and of nearly equal size..... *opilio*, p. 233.
- B<sup>2</sup>. Carapace broader than long; dorsal surface with a few spines anteriorly. Last three or four spines of pterygostomian-branchial row large... *bairdi*, p. 235.
- A<sup>2</sup>. Branchial regions much swollen dorsally and laterally concealing a large part of the side margins of the carapace. Dorsal surface spinous. Rostrum ascending. Meropodites of legs narrow.
- B<sup>1</sup>. The two dorsal branchial ridges meet outwardly in a curved line marked by two subequal spines. Posterior marginal arch of carapace medially interrupted. Interbranchial space very deeply depressed.
- tanneri*, p. 243.

- B<sup>2</sup>. The two dorsal branchial ridges meet outwardly in an acute angle marked by a large spine. Posterior margin of carapace regularly arcuate. Interbranchial space shallower than in *tanneri*-----*angulatus*, p. 247

CHIONOECETES OPILIO (O. Fabricius)

(CHIONOECETES OPILIO ELONGATUS Rathbun)

Plates 84 and 85

- Cancer phalangium* O. FABRICIUS, Favna Groenlandica, 1780, p. 234, Greenland; not *Cancer phalangium* J. C. Fabricius, 1775.
- Cancer opilio* O. FABRICIUS, K. Danske Vid. Selsk. Skr., nye Saml., vol. 3, 1788, p. 182, plate (type-locality, Greenland; type not extant).<sup>34</sup>
- Chionoectes opilio* KRÖYER, Naturh. Tidssk., ser. 1, vol. 2, 1838, p. 249.—SMITH, Trans. Conn. Acad. Sci., vol. 5, 1879, p. 41, and synonymy.—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 74, pl. 4, figs. 5-7, and synonymy; in Grenfell's Labrador, 1909, p. 481.—HANSEN, Danish Ingolf-Exped., vol. 3, pt. 2, 1908, p. 13.—PARISI, Monitore Zool. Ital., vol. 27, 1916, p. 189.
- Chionoectes behringianus* STIMPSON, Proc. Boston Soc. Nat. Hist., vol. 6, Feb., 1857, p. 84 (type-locality, off Cape Romanzoff, Alaska; cotypes, Cat. Nos. 2031 and 53041, U. S. N. M., Cat. No. 1875, M. C. Z.); Journ. Boston Soc. Nat. Hist., vol. 6, 1857, p. 449 [8]; Smithsonian. Misc. Coll., vol. 49, 1907, p. 8.
- Peloplastus pallasii* GERSTÄCKER, Arch. f. Naturg., vol. 22, pt. 1, 1856, published April, 1857, according to Stimpson (type-locality, Asiatic Sea; type in Berlin Mus.).
- Chionoectes chilensis* STREETS, Proc. Acad. Nat. Sci. Philadelphia, vol. 22, 1870, p. 106 (type-locality, Chile; type not extant).
- Chionoectes opilio elongatus* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 3 (type-locality, Sea of Japan, 245 fathoms; holotype, male, Cat. No. 46636, U. S. N. M.).

*Diagnosis*.—Carapace chiefly tuberculate. Rostrum horizontal. Branchial regions far apart. Lateral margin of carapace exposed in dorsal view as far forward as first pair of ambulatory legs. Mero-podites of legs broadly dilated.

*Description*.—Surface covered with a very short pubescence and with scattered, unequal, rugose prominences which are blunt, wartlike, and granulate about the middle but become more acute anteriorly. The larger tubercles end posteriorly rather abruptly in a transverse line across the carapace through the middle of the cardiac region. Gastric region depressed and well separated from the branchial regions. The posterior and postero-lateral margins have a double row of granules, the upper row being widely interrupted at the intestinal region. The antero-lateral marginal row of spines or tubercles is continued to the angle of the buccal cavity. A similar but shorter marginal row crosses the subhepatic and suborbital

<sup>34</sup> Dr. K. Stephensen, of the Zoological Museum of Copenhagen, writes under date of Jan. 29, 1923, that the type is not in that museum. He says: "It is very improbable that any of O. Fabricius's types are preserved. King Christian VIII (who died in 1848) bought his collection or, rather, the remaining parts of it, and our museum includes the royal collection; but there are, unfortunately, no notes on the origin of the material."

regions. Rostrum horizontal. Supraocular cave a little arched, margin oblique. Two supraorbital notches, a broad suborbital sinus and a narrower one next to the basal antennal article. This article as well as the lower orbit has denticulate margins.

Chelipeds not more than one and one-half times as long as the carapace except in the old, twice as long; margins of merus rough with sharp granules or denticles; carpus and manus with lines of the same; manus swollen, prismatic; fingers half again as long as palm, deflexed, grooved, smooth except for the denticulate prehensile edges. First three ambulatory legs very long (about twice as long as carapace, in the old three times as long), flat; merus joints very rough except near the middle of the surfaces. Last leg much shorter (about as long as cheliped) and narrower, merus smoother.

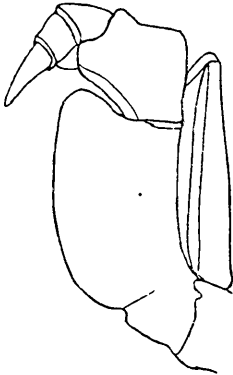


FIG. 58.—*CHIONOECETES OPILIO* (43803), MAXILLIPED,  $\times 3.7$

First two or three segments of abdomen coarsely granulate; terminal segment in male invaginated in sixth segment.

*Color*.—Light brick-red above, often iridescent, below yellowish-white; sides of feet shining white (Stimpson).

*Measurements*.—Male (9231), length of carapace and rostrum (approximately) 125.5, width 127.5, length of cheliped 234, of first

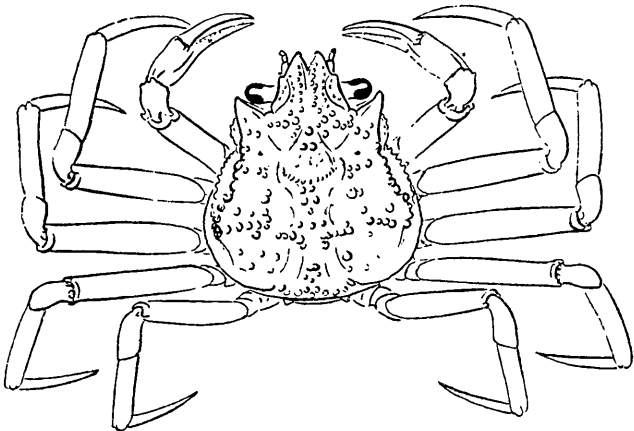


FIG. 59.—*CHIONOECETES OPILIO*, YOUNG MALE, DORSAL VIEW, ENLARGED. (AFTER SMITH, MS.)

ambulatory leg 299 mm. Male (46636, *opilio elongatus*), total length of carapace 118, width 122.5 mm.

*Range*.—From west Greenland, in lat.  $70^{\circ} 42'$  N. (Hansen), southward to Casco Bay, Maine, in fish stomachs (Smith). From Arctic Alaska, 10 miles west of Point Franklin, westward to northeast Siberia (long.  $173^{\circ} 24'$  W.) (Stuxberg), and southward through



Bering Strait to the Aleutian Islands and to Korea (lat.  $36^{\circ} 01' 30''$  N.). Littoral to 350 fathoms (West Greenland) and 1,215 fathoms (Sea of Japan). Chile (Streets).

*Variation.*—Varies as to roughness of carapace, amount of hairiness and length and width of legs, especially of the merus. In the Sea of Japan the legs are longer than elsewhere, the merus of the second leg usually exceeding that of the first in old males; the length of the second merus is from 5.5 to 6.3 times its width. The same article in similar specimens from Greenland and the Atlantic has a length of from 4.9 to 5.2 times its width, and is shorter or just as long as the first merus. The typical form of the species reappears in Alaskan waters and Bering Sea, but in the Okhotsk Sea there is a tendency toward the long-legged form of the Sea of Japan. This form may be known as *Chionoecetes opilio elongatus*. (See table.)

*Material examined.*—See table, pages 236-242.

CHIONOECETES BAIRDI<sup>24</sup> Rathbun

Plates 86 and 87

*Chionoecetes opilio* RATHBUN (part), Proc. U. S. Nat. Mus., vol. 16, 1893, p. 74.

*Chionoecetes bairdi* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 3 (type-locality, head of Kingcombe Inlet, British Columbia; H. E. Nichols; 1 male, holotype, Cat. No. 5862, U.S.N.M.).

*Diagnosis.*—Near *opilio*. Carapace a little wider than long (length measured to tip of rostral teeth). The spines in the row leading from the pterygostomian region backward to the branchial region become suddenly larger, the last three or four spines being of considerable size; in *opilio* these spines do not increase notably in size. Several other prominences of the antero-lateral regions are spinous instead of tuberculous. Outer orbital tooth curved more strongly inward than in *opilio*, rostral teeth narrower, interspace wider. Spines of legs longer.

*Description.*—The branchial regions are more depressed than in *opilio*, and in consequence the width is greater; the width exceeds the length, while in *opilio* the width is subequal to the length. The inclined subtriangular facet of the anterior branchial region is steeper, higher and shorter than in *opilio*; the highest point is marked by a spine, instead of a tubercle; in *opilio*, there are no dorsal spines, that is, none above those in the submarginal row. In *bairdi* the last (posterior) three or four spines of the pterygostomian-branchial row are notably enlarged; also the outermost of the prominences in the transverse branchial row is spinous or spinulous. The whole animal is rougher than in *opilio*. The carapace is narrower across the orbits, the outer orbital teeth are bent inward more; the median emargination of the front is wider and the teeth narrower and with less arched margins,

<sup>24</sup> For Prof. Spencer F. Baird, first U. S. Commissioner of Fish and Fisheries.

Material examined of *Chionoecetes opilio*

| Locality  | Bearings             |                      | Fathoms  | Bottom                          | Temp.       | Date                           | Station         | Collector  | Specimens                | Cat. No.                      | Remarks   |
|---|----------------------|----------------------|----------|---------------------------------|-------------|--------------------------------|-----------------|--|--------------------------|-------------------------------|---|
|   | Latitude N.          | Longitude W.         |          |                                 |             |                                |                 |  |                          |                               |   |
| EAST COAST OF NORTH AMERICA   | ° ' "                | ° ' "                |          |                                 | ° F         |                                |                 |  |                          |                               |   |
| West Greenland:<br>Waaigat Channel.....   |                      |                      |          |                                 |             | Aug., 1883                     |                 | U. S. S. <i>Yamtic</i> ,<br>Ensign H. G. Dressel, U. S. N., Greely Relief Party. | 3♂.                      | 9231.                         |   |
| Arswek.....<br>Godhaven.....  | 69 30 00             |                      |          |                                 |             | Apr. 14, 1896<br>June 8, 1884  |                 | P. H. Sorensen-Ensign C. S. McClain, U. S. N., U. S. S. <i>Alerik</i> ,<br>do    | 1♂ 1 ♀<br>9.             | 21637.<br>13770.              |   |
| Exact locality not given.<br>Davis Strait.....  |                      |                      |          |                                 |             | 1884<br>July, 1879             |                 | N. P. Scudder, U. S. Fish Commission.<br>Owen Bryant.....                        | 3 y.<br>1 left cheliped. | 13784<br>40191.               | From halibut stomach.                                 |
| Labrador: 1 m. N. of Battle Harbor.<br>Newfoundland:<br>South by east from Burin, Placentia Bay.<br>Northwest of Flemish Cap.<br>Off southeast coast.....<br>Northwest part of Grand Bank.<br>Grand Bank..... |                      |                      | 50       | fine S.                         |             | Sept. 14, 1908                 |                 | do   | 1♂ 2 ♀ 2 y               | 38425.                        |   |
|   |                      |                      | 110      | rky. pibly.                     |             | Sept. 23, 1908                 |                 | do   | 1 ♀<br>1♂ 1 ♀            | 38424<br>B. S. N. 11.         |   |
|   | 47 40 00             | 47 35 30             | 206      | gn. M. bk. Sp.                  |             | Aug. 12, 1886                  | 297             | <i>Albatross</i>   | 1 sm. ♀                  | 11874.                        |   |
|   | 47 13 00             | 52 24 00             | 86       | gy. S.                          | 29.5        | July 2, 1885                   | 2457            | do   | 1♂.                      | 10206.                        |   |
|   | 47 10 00             | 51 02 00             | 82       | gn. M. fine. S.                 | 29.7        | June 26, 1885                  | 2463            | do   | 2♂.                      | 10207.                        |   |
|   |                      |                      |          |                                 |             |                                |                 | N. P. Scudder, U. S. Fish Commission.  | 1 lge. ♀                 | 19031.                        |   |
| Off southeast coast.....<br>Green Bank.....<br>Nova Scotia:<br>Off Cape North, Cape Breton Island.  | 46 23 00<br>45 47 00 | 52 45 00<br>54 13 30 | 88<br>59 | crs. gy. S.<br>fine. S. bk. Sp. | 29.5<br>30  | July 2, 1885<br>July 3, 1885   | 2459<br>2461    | <i>Albatross</i><br>do   | 1♂ 1 ♀<br>1 y. ♂         | 10204.<br>10205.              |   |
|   |                      |                      |          |                                 |             | Aug. 21, 1880                  |                 | Sch. <i>Bellerophon</i> ,<br>Capt. Andrew McKenzie.                              | 1 lge.                   | 41493.                        | Gloucester donation No. 812 to U. S. Fish Commission. |
| Chebueto Head, N. by E. ¼ E., 26 miles.<br>S. E. ¼ S. from Cape Sable, 27 to 31 miles.  | 43 05 30<br>43 00 00 | 65 02 00<br>65 09 00 | 90-91    | fine. sdy. M.                   | 33.5-<br>39 | Sept. 6, 1877<br>Aug. 21, 1877 | 85, 86<br>43-46 | <i>Spedwell</i><br>do  | { 2 y.<br>2.             | 18762<br>Y. U. M.<br>Y. U. M. |   |

| Off Banquereau   | 44 36 00 | 57 07 00                 | 200             | 131 1/2 S.     | Aug. 31, 1883 | J. Mnrdoch,<br>Point Barrow<br>Exped., U. S.<br>Signal Service,<br>Canadian Arctic<br>Exped.                            | 1 y.                 | Y. U. M.               | Gloucester dona-<br>tion No. 318 to<br>U. S. Fish Com-<br>mission.<br>(Gloucester dona-<br>tion No. 353 to<br>U. S. Fish Com-<br>mission.<br>Gloucester dona-<br>tion No. 740 to<br>U. S. Fish Com-<br>mission. |
|--|----------|--------------------------|-----------------|----------------|---------------|---|----------------------|------------------------|---|
| Banquereau and vicin-<br>ity.  | 44 28 00 | { 56 24 00<br>59 06 00 } | { 170-<br>200 } |                |               | (Capt. Matthew<br>Parks, Sch.<br><i>Dary Crockett</i> .<br>Capt. Wells &<br>Crew, Sch. <i>H.</i><br><i>A. Duncan</i> .) | 1                    | Y. U. M.               |   |
| Western Bank (or Sable<br>Island Bank).                              |          |                          |                 |                |               |   | 11                   | Y. U. M.               |   |
| NORTHWEST AND WEST<br>COASTS OF NORTH AMER-<br>ICA.                  |          |                          |                 |                |               |   |                      |                        |   |
| Arctic Alaska:<br>10 miles west of Point<br>Franklin.                |          |                          |                 |                |               |   | 2♂                   | 7879                   |   |
| Off Icy Cape   | 70 24 00 | 161 25 00                | 9-10            | M. P.          | Aug. 19, 1913 | 2 y. ♂ 1 y. ♀   | 2 y. ♂ 3 y. ♀        | Ottawa Mus.            |   |
| Off Point Hope   |          |                          | 25              |                | July 13, 1884 | U. S. R. S. <i>Cor-<br/>win</i> , Capt. M.<br>A. Healy.<br>U. S. R. S. <i>Cor-<br/>win</i> , Capt. C.<br>L. Hooker.     | 6♂ 8 ♀               | 14699                  |   |
| Exact locality not given.  |          |                          |                 |                |               | Lieut. Geo. M.<br>Stoney, U. S.<br>N.   | 1 ♀                  | 14694                  |   |
| North of Bering Strait.  | 66 12 00 | 168 54 00                | 30              | Sh. P.         | July 3, 1884  |   |                      |                        |   |
| Bering Strait and Bering<br>Sea (American side):                     |          |                          |                 |                |               |   |                      |                        |   |
| Bering Strait.   |          |                          |                 |                |               | Wm. Stimpson,<br>N. Pac. Expl.<br>Exped.  | { 5♂ 1 ♀<br>1♂ 1 ♀ } | 2031<br>1875, M. C. Z. | { Labeled by Stimp-<br>son, " <i>Chionoecetes</i><br><i>beringianus</i> ."<br>Do<br>{ Gift of Boston Soc.<br>{ Nat. Hist.   |
| "Russian America"  |          |                          |                 |                |               | Wm. Stimpson,<br>N. Pac. Expl.<br>Exped.  | 1 ♀                  | 53041                  |   |
| Mouth of Port Clar-<br>ence, Alaska, just<br>south of Bering Strait. |          |                          | 7-12            |                | 1874          | W. H. Dall  | 2♂ 1 ♀               | 14680                  |   |
| Northwest of Nunivak<br>Island.                                      | 60 27 00 | 169 04 00                | 24              | fre. gy. S.    | Aug. 2, 1893  | <i>Albatross</i> .  | 11                   |                        | Medium size, in 3<br>fish stomachs.   |
| Do   | 60 22 00 | 168 45 00                | 25.5            | gy. S. bk. SP. | June 5, 1884  | Lieut. Geo. M.<br>Stoney, U. S.<br>N.   | 1♂                   | 14695                  |   |

Material examined of *Chionoecetes opilio*—Continued

| Locality   | Bearings    |              | Fathoms | Bottom                       | Temp. | Date          | Station | Collector            | Specimens     | Cat. No.       | Remarks            |
|--|-------------|--------------|---------|------------------------------|-------|---------------|---------|----------------------|---------------|----------------|--------------------|
|  | Latitude N. | Longitude W. |         |                              |       |               |         |                      |               |                |                    |
| NORTHWEST AND WEST COASTS OF NORTH AMERICA—continued |             |              |         |                              |       |               |         |                      |               |                |                    |
| Bering Strait and Bering Sea—Continued               |             |              |         |                              |       |               |         |                      |               |                |                    |
| Northwest of Pribilof Islands.                       | 57 48 00    | 171 21 00    | 52      | gn. M.                       | 38    | Aug. 5, 1893  | 3527    | Albatross            | 2             |                | In 1 fish stomach. |
| Do.  | 57 10 00    | 170 47 15    | 47      | bl. M. Sh.                   | 40    | Aug. 3, 1891  | 3442    | do.                  | 1 lge. ♂      | 1222, M. C. Z. |                    |
| Do.  | 57 06 30    | 170 22 30    | 20      | fne. gy. S. Sh.              |       | do.           | 3438    | do.                  | 1 y.          | 17073          |                    |
| Do.  | 57 06 00    | 170 25 00    | 41      | fne. bk. S.                  | 44    | do.           | 3439    | do.                  | 54            | 17074          |                    |
| Do.  | 57 05 00    | 170 41 00    | 48      | bk. N. Sh.                   |       | do.           | 3440    | do.                  | 3 lge., 3 sm. | 17075          |                    |
| Southeast of Pribilof Islands.                       | 56 28 00    | 169 46 00    | 51      | fne. gy. S. M.               | 39.5  | Sept. 2, 1893 |         | do.                  | 2 lge.        | 19301          |                    |
| Do.  | 55 58 00    | 167 16 00    | 75      | gn. M.                       | 36.8  | Aug. 22, 1895 | 3610    | do.                  | 1 y.          | 55744          |                    |
| Unalak Harbor, Unalaska.                             | 53 59 36    | 166 29 43    | 85      | gn. M.                       | 41    | Aug. 15, 1890 | 3311    | do.                  | 1 y.          | 55745          |                    |
| Between Bristol Bay and Pribilof Islands.            | 57 22 20    | 164 24 40    | 29.5    | bk. M.                       | 44.8  | June 14, 1890 | 3252    | do.                  | 111           | 15831, 15855   |                    |
| Do.  | 57 05 50    | 164 27 15    | 36      | M. S.                        | 35    | do.           | 3253    | do.                  | 5 lge.        | 15856          |                    |
| North of Unimak Island.                              | 56 18 00    | 164 34 10    | 49      | gn. M. bk. Sh.               | 35    | do.           | 3256    | do.                  | 1 ♂           | 15859          |                    |
| Do.  | 55 04 00    | 165 04 00    | 61      | bk. M.                       | 39.5  | June 24, 1890 | 3263    | do.                  | 1 lge. ♂      | M. C. Z.       |                    |
| Off Khoudbouline Islands.                            | 56 30 45    | 161 50 15    | 53      | fne. S. gn. M.               | 38.2  | June 29, 1890 | 3252    | do.                  | 1 ♂ 12 y.     | 15857          |                    |
| Do.  | 56 25 40    | 162 39 15    | 41      | fne. gy. S.                  | 37    | June 28, 1890 | 3279    | do.                  | 2 y.          | 15840          |                    |
| Do.  | 56 12 30    | 162 13 00    | 47      | fne. gy. S.                  | 38.8  | do.           | 3278    | do.                  | 2 y.          | 15839          |                    |
| Off Cape Senlavin.                                   | 56 39 30    | 160 29 00    | 37      | fne. gy. S. Sh. <sup>G</sup> | 41.5  | July 17, 1890 | 3286    | do.                  | 3 y.          | 15844          |                    |
| Do.  | 56 26 30    | 160 00 00    | 15      | bk. G.                       | 45.5  | do.           | 3288    | do.                  | 3 y.          | 15845          |                    |
| ASIA.  |             |              |         |                              |       |               |         |                      |               |                |                    |
| East coast of Siberia:                               |             |              |         |                              |       |               |         |                      |               |                |                    |
| Off St. Lawrence Bay, Bering Strait.                 | 65 25 00    | 171 11 00    | 6.25-   |                              |       | July 20, 1885 |         | { U. S. S. Corwin,   |               | 14696          |                    |
|  | to          | to           | 11      |                              |       |               |         | { Capt. M. A. Healy, | 1 ♂           |                |                    |
| Port Providence, Bering Strait.                      | 65 28 00    | 171 26 00    | 8-20    | M.                           |       | 1880          |         | { W. H. Dall.        | 1 ♂ 1 ♀       | 14683          |                    |

|   |   |                    |        |                    |      |            |           |       |
|---|---|--------------------|--------|--------------------|------|------------|-----------|-------|
| Commander Islands.....                    | { N. point of Copper Island, N. 76° E., 8.8 miles.<br>54 50 20 1167 13 00<br>Cape Monati, Bering Island, N. 52° W., 8.75 miles.<br>54 36 15 166 58 15   | 56-57              | gn. S. | June 14, 1906      | 4788 | Albatross  | 1 y.      | 46499 |
| Do.....                                   | 72-76   | rk y.              | do.    | do.                | 4791 | do.        | 1 y.      | 46543 |
| Avacha Bay, Kamchatka.                    | 13  |                    |        | June 21, 1900      |      | do.        | 1 lge. ♂. | 32230 |
| Do.....                                   | 52 58 00 158 36 00<br>51 16 00 158 03 00  | 16                 | bk. M. | 47.7 Aug. 19, 1896 | 3642 | do.        | 1 ♂ 1 y.  | 20120 |
| Southeast coast of Kamchatka.             | 100   | bk. S. P.          |        | 31.7 Aug. 20, 1896 | 3643 | do.        | 25        | 20130 |
| Do.....                                   | 51 00 00 157 48 00<br>{ Startschkof Island, S. 70° W., 5 miles.<br>52 47 20 158 44 30<br>Startschkof Island, S. 71° W., 4 miles.<br>52 47 00 158 43 00<br>Startschkof Island, S. 76° W., 4.8 miles.<br>52 46 50 158 44 30<br>Mouth of Aangan River, N. 75° E., 8 miles.<br>51 38 00 156 21 00<br>Mouth of Aangan River, N. 71° E., 8.5 miles.<br>51 37 00 156 21 00 | 96                 | bk. S. | 33.1 do.           | 3644 | do.        | 25        | 20131 |
| Off Avacha Bay, Kamchatka.                | 58-69   | S. P.              |        | June 20, 1906      | 4704 | do.        | 13 y.     | 46492 |
| Do.....                                   | 48  | S. P. Sh.          |        | do.                | 4796 | do.        | 2 y.      | 46544 |
| Do.....                                   | 69-48   | gn. S. P.          |        | do.                | 4795 | do.        | 2 ovig. ♀ | 46401 |
| On Codfish Banks, Okhotsk Sea, Kamchatka. | 25  | gn. S.             |        | June 21, 1906      | 4799 | do.        | 27 y.     | 43810 |
| Do.....                                   | 25  | gn. S.             | 36.9   | do.                | 4798 | do.        | 12 y.     | 46545 |
| Japan:<br>Off Sakhalin Island.....        | 20  | inc. ey. S.        |        | Aug. 31, 1896      | 3651 | do.        | 1 y.      | 20132 |
| Okhotsk Sea.....                          | 67  | S. P.              | 30.9   | Sept. 27, 1906     | 5024 | do.        | 1 y.      | 46557 |
| Do.....                                   | 119   | gn. M. bk. S. G.   | 30.4   | Sept. 28, 1906     | 5026 | do.        | 4 y.      | 43818 |
| Do.....                                   | 109   | gn. M. crs. bk. S. | 30.1   | Sept. 27, 1906     | 5022 | do.        | 2 y.      | 43815 |
| Do.....                                   | 188   | inc. ey. S. P. (1) | 32     | Sept. 28, 1906     | 5027 | do.        | 2 y. ♂.   | 46588 |
| Do.....                                   | 100   | br. M. bk. S. P.   | 30.4   | Sept. 26, 1906     | 5018 | do.        | 1 y.      | 46556 |
| Sakhalin Island.....                      |   |                    |        |                    |      | M. Sasaki. | 1 ♂.      | 56387 |

1 Approximate.



|                          |   |         |                     |      |               |      |     |                          |                  |   |
|--------------------------|---|---------|---------------------|------|---------------|------|-----|--------------------------|------------------|---|
| Do.                      | N. point Sado Island, S. 31° W., 13 miles.      | 176-200 | fne. br. M. (?)     | 31.9 | July 18, 1906 | 4812 | do. | 6♂, 2♀ (1 ovig.)<br>3 y. | 43759            | Do.   |
| Do.                      | N. point Sado Island, S. 30° W., 17 miles.      | 200     | br. M. bk. S.       | 33.9 | do            | 4813 | do. | 2♂, 2 ovig. ♀            | 46546            | Do.   |
| Do.                      | Hime Saki Light, S. 16° E., 3.8 miles.          | 245     | fne. br. M.         | 33.1 | July 19, 1906 | 4819 | do. | 2♂                       | {46547<br>46636} | <i>C. opilio elongatus</i> ,<br>Holotype,<br><i>C. opilio elongatus</i> . |
| Do.                      | Shidzu Misaki Light, N. 57° W., 16 miles.       | 163     | gn. M.              | 31.9 | July 22, 1906 | 4828 | do. | 1 ovig. ♀<br>4 y.        | 43813<br>46540   | Do.   |
| Do.                      | Shidzu Misaki Light, N. 58° W., 21 miles.       | 527-548 | gn. M.              | 32.9 | July 22, 1906 | 4829 | do. | 4 y.                     | 46671            | Do.   |
| Do.                      | Shidzu Misaki Light, N. 60° W., 12 miles.       | 114     | fne. gy. S. bk. Sp. | 42.5 | July 21, 1906 | 4826 | do. | 2 y.                     | 46548            | Do.   |
| Do.                      | Bonsole Rock, Matsu Shima, N. 76° W., 17 miles. | 1, 215  | gn. to br. M.       | 32.8 | July 28, 1906 | 4851 | do. | 1 ♀                      | 43808            | Do.   |
| Do.                      | Dogo Island, Oku Group, S.E. 14 miles.          | 100     | gn. M. bk. S. Glob. | 39.9 | July 26, 1906 | 4843 | do. | 1♂ 3 y.                  | 46549            | Do.   |
| Off east coast of Korea. | 36 29 20 133 01 20                              | 150     | gn. M. fne. gy. S.  |      | Aug. 1, 1906  | 4868 | do. | 8 y.                     | 46552            | Do.   |
| Do.                      | 36 31 00 129 46 00                              | 150     | gn. M. fne. gy. S.  | 33.4 | do            | 4867 | do. | 1 ovig. ♀ 1 y.           | 43801            | Do.   |
| Do.                      | 36 30 30 129 43 00                              | 94-60   | gn. M. fne. gy. S.  |      | do            | 4870 | do. | 4 y.                     | 43819            | Do.   |
| Do.                      | 36 30 00 129 42 00                              | 94      | gn. M. fne. gy. S.  |      | do            | 4869 | do. | 1 y.                     | 43814            | Do.   |
| Do.                      | Cape Clonard, S. 34° W., 18 miles.              | 181     | gn. M.              | 32.9 | July 31, 1906 | 4862 | do. | 2♂                       | 43800            | Do.   |
| Do.                      | Cape Clonard, S. 23° W., 13 miles.              | 122     | gn. M.              | 34.1 | do            | 4860 | do. | 4 y.                     | 43812            | Do.   |
| Do.                      | Cape Clonard, S. 7° W., 12 miles.               | 67      | gn. M. S. P.        | 39   | do            | 4858 | do. | 1 ♀                      | 43804            | Do.   |
| Do.                      | Cape Clonard, S. 12° W., 12 miles.              | 93      | gn. M.              |      | do            | 4859 | do. | 1 cheliped, 1 leg of ♀.  | 46551            | Do.   |
| Do.                      | Cape Clonard, N. 50° W., 3.3 miles.             | 89      | gn. M.              | 36.1 | July 30, 1906 | 4856 | do. | 2 immature ♀             | 46550            | Do.   |
| Do.                      | Cape Clonard, N. 36° W., 5.5 miles.             | 70-89   | gn. M.              | 61   | do            | 4855 | do. | 1 y. ♂ 1 y. ♀            | 43809            | Do.   |





than in *opilio*. The lateral margin of the carapace is deeply scalloped, this character alone serves to distinguish very young specimens (10 mm. and under) from the allied species. Chelipeds and legs more coarsely and abundantly spinous than in the allied species. Male abdomen with sides a little more concave, terminal segment with its free edge more arched, the segment less invaginated in the preceding segment.

*Measurements*.—Male holotype, length of carapace and rostrum 73.3, width 81.2, length of cheliped about 100, of first ambulatory leg about 182 mm. Male (31661), length of carapace and rostrum 121, width 139.4, length of cheliped about 197, of first ambulatory leg, 292 mm.

*Range*.—From the southeastern part of Bering Sea (lat.  $56^{\circ} 18' 00''$  N.) and the Aleutian Islands (about long.  $178^{\circ}$  E.) eastward and southward to British Columbia (Kingcombe Inlet). From shallow water to 259 fathoms; usually in less than 100 fathoms.

*Material examined*.—See table, pages 244–246.

#### CHIONOECETES TANNERI (Rathbun)

Plates 88, 89, and 234

*Chionoecetes tanneri* RATHBUN (part), Proc. U. S. Nat. Mus., vol. 16, 1893, p. 76, pl. 4, figs. 1–4 (type-locality, Gulf of the Farallones, California, 29 fathoms; holotype, Cat. No. 15860, U. S. N. M.); Harriman Alaska Exped., vol. 10, 1904, p. 174.—HOLMES, Occas. Papers Calif. Acad. Sci., vol. 7, 1900, p. 40.—WEYMOUTH, Leland Stanford Jun. Univ. Publ., Univ. Ser. No. 4, 1910, p. 35, pl. 7, fig. 19.

*Diagnosis*.—Carapace chiefly spinose. Rostrum ascending. Branchial regions nearly meeting on median line, interspace deeply depressed. Lateral margin of carapace exposed in dorsal view only as far forward as third pair of ambulatory legs. Meropodites of legs narrow, little dilated.

*Description*.—Carapace much swollen at the branchial regions, which are distended both vertically and laterally, concealing the lateral margin of the carapace. Between the branchial regions, which nearly meet, there is a deep, narrow depression which widens anteriorly and joins the cervical suture. Carapace covered with spines and spinules instead of tubercles and granules; the transverse row across the branchial regions is more prominent than in *opilio*, and is well in advance of the cardiac row; from its outer end a row of spines runs obliquely forward toward the orbit. The outer spine of the oblique branchial row is as large as the outer spine of the transverse row, is directly in front of it, and is usually more produced laterally; the two rows therefore join in a curve not at an angle. Another row of spines forms the lateral supra-marginal border of the branchial region, and is continued on the pterygostomian region; from this row

Material examined of *Chionoecetes bairdi*

| Locality  | Bearings |           | Fathoms | Bottom           | Temp. | Date           | Station | Collector   | Specimens                   | Cat. No.     | Remarks   |
|---|----------|-----------|---------|------------------|-------|----------------|---------|-------------|-----------------------------|--------------|---|
|   | Lat. N.  | Long. W.  |         |                  |       |                |         |             |                             |              |   |
| Bering Sea (American side):                             |          |           |         |                  |       |                |         |             |                             |              |   |
| Southeast of Pribilof Islands.                          | 55 58 00 | 167 16 00 | 75      | gn. M.           | 36.8  | Aug. 22, 1895  | 3610    | Albatross.  | 200                         | 13310        | 1 young <i>C. opilio</i> at this station.                   |
| Do.   | 55 17 00 | 167 34 00 | 91      | gn. M. S.        | 37.1  | Aug. 13, 1895  | 3605    | do.         | 1 lge. ♂, 200 sm. 1 ovig. ♀ | 18307        | 1 large <i>C. opilio</i> at this station.                   |
| North of Unimak Island.                                 | 56 18 00 | 164 31 10 | 49      | gn. M. bk. Sh.   | 35    | June 14, 1890  | 3256    | do.         |                             | 55742        |   |
| Aleutian Islands and Alaska Peninsula:                  |          |           |         |                  |       |                |         |             |                             |              |   |
| Kyska Harbor, Kyska Island.                             |          |           | 9-12    | sdv. M.          |       | 1873           |         | W. H. Dall. | 1 ♀                         | 11681        |   |
| Bay of Islands, Adakh Island.                           |          |           | 9-16    | M. S.            |       | 1873           |         | do.         | 1 ♀ 3 y.                    | 13114        |   |
| Nanan Bay, Atka Island.                                 |          |           | 10-16   | S.               |       | 1873           |         | do.         | 14 y.                       | 14776        |   |
| Captains Bay, Unalaska.                                 |          |           | Beach.  | Sh., etc.        |       | Sept. 10, 1874 |         | do.         | 1 y. ♂                      | 13140        |   |
| Captains Harbor Port.                                   |          |           | 9-16    |                  |       | 1871, 1874     |         | do.         | 1 ♂ 1 ♀                     | 14675        |   |
| Levashof, Unalaska.                                     |          |           | 20-30   | M. Sh.           |       | 1874           |         | do.         | 2 y.                        | 14773        |   |
| Do.   |          |           | 80      | S.               |       | Sept. 18, 1874 |         | do.         | 9 y.                        | 13133        |   |
| Do.   |          |           | 60-80   | S. St.           |       | 1871           |         | do.         | 1 ♂                         | 14685        |   |
| Do.   |          |           | 30      | sdv.             |       | 1872           |         | do.         | 2 y.                        | 13123        |   |
| Do.   |          |           | 16      |                  |       | 1874           |         | do.         | 1 y.                        | 13138        |   |
| Between Pinnacle and Ulakhta or Dutch Harbor, Unalaska. |          |           |         |                  |       |                |         |             |                             |              |   |
| Ituluk, Unalaska.                                       |          |           | 10      | Shingle.         |       | 1871           |         | do.         | 1 y.                        | 14774        |   |
| Do.   |          |           | 10-12   | M. St.           |       | 1871           |         | do.         | 1 ♀                         | 13113        |   |
| Do.   |          |           | 15      | gy. S.           |       | 1871           |         | do.         | 5 ♂ 2 ♀                     | 13119        |   |
| Ituluk Harbor, Unalaska.                                | 53 59 36 | 166 29 43 | 85      | gn. M.           | 41    | Aug. 15, 1890  | 3311    | Albatross.  | 77                          | 15849        | 1 young <i>C. opilio</i> at this station.                   |
| Unalaska Bay.   |          |           |         |                  |       | May 24, 1906   |         | do.         | 1 ♂                         | 46561        | From stomach of cod.  |
| Off Aektok Island.                                      | 53 56 00 | 165 40 00 | 54      | gy. S.           | 42    | July 28, 1888  | 2844    | do.         | 1 y. ♂ 1 y. ♀               | 15471        | 1 large male and 12 young <i>C. opilio</i> at this station. |
| North of Unimak Island.                                 | 55 01 00 | 165 01 00 | 61      | bk. M.           | 39.5  | June 21, 1890  | 3263    | do.         | 1 ♂ 1 ovig. ♀ 8 y.          | 15837        |   |
| Northwest of Unimak Island.                             | 54 48 00 | 165 13 30 | 70      | bk. S. G.        | 39    | do.            | 3258    | do.         | 1 y.                        | 15835        |   |
| East of Unimak Island.                                  | 55 06 00 | 163 28 00 | 9       | fine dk. vol. S. | 40    | June 25, 1894  | 3600    | do.         | 1 y.                        | 18980        |   |
| South of Unimak Island                                  | 54 20 30 | 163 37 00 | 61      | bk. S. M.        |       | May 21, 1890   | 3216    | do.         | 45                          | 15826        |   |
| Shumagin Islands.                                       | 55 16 00 | 160 28 00 | 62      | gn. M.           | 43    | Aug. 2, 1888   | 2849    | do.         | 4 ♂ 3 ♀                     | 15462        | "1 quart discarded."  |
| Do.   | 55 10 00 | 160 18 00 | 110     | gn. M.           | 41    | July 31, 1888  | 2848    | do.         |                             | 15467, 20125 |   |

|   |   |         |                 |      |               |      |                           |             |         |
|---|---|---------|-----------------|------|---------------|------|---------------------------|-------------|---------|
| Do  | 54 55 00   159 52 00  | 35      | gy. S. brk. Sh. | 44.8 | Aug. 4, 1888  | 2851 | .do.                      | 1 Y.        | 15476   |
| Do  | 55 15 00   159 37 00  | 58      | bk. S.          | 41.8 | .do.          | 2852 | .do.                      | 2♂ 1 Y.     | 15470   |
| Do  | Off Round Id., Coal Harbor, Unga Id.  | 6-8     | M               |      | 1872          |      | W. G. Hall.               | 2♂ 1 ♀.     | 14681   |
| Do  | Coal Harbor, Unga Id.   | 3       | Shingle         |      | 1872          |      | .do.                      | 1♂          | 14686   |
| Do  | Popoff Strait   | (1)     | Under stones    |      | July 5, 1872  |      | W. H. Dall                | 1♂          | 14679   |
| Do  | Samborn Harbor, Nagai   | 20      | M               |      | 1872          |      | W. G. Hall                | 1♂          | 14687   |
| Do  | Chichi Islands  | 7-18    | S.              |      | 1874          |      | W. H. Dall                | 3 Y.        | 14674   |
| Do  | Chignik Bay   | 12-14   | M. S.           |      | 1874          |      | .do.                      | 2 Y.        | 13121   |
| Do  | Chajakfa Cove, Kodiak   | 15-20   | G               |      | 1874          |      | .do.                      | 1♂ 1 ♀.     | 13128   |
| Do  | Cape Ugat, N.E. by N., Cape Karluk, S. SW. 1/2 W., Church, S. SE. 1/2 E.        | 31      | gy. S. Sh.      | 46.4 | July 10, 1880 |      | .do.                      | 3♂ 3 ♀ Y.   | 14677   |
| Do  | Cape Ugat, N.E. by E., Church, SE. 1/2 S. W., Cape Alitak, S. 71° W., 5.5 miles | 110     | gn. M.          | 39   | .do.          | 3675 | .do.                      | 5♂ 3 ♀ 8 Y. | 12526   |
| Do  | Cape Alitak, S. 44° W., 6.2 miles   | 41-35   | gn. M. fine S.  |      | Aug. 6, 1903  | 4279 | .do.                      | 1 Y.        | 31556   |
| Do  | Cape Alitak, S. 41° W., 7.1 miles   | 36-11   | gn. M. fine S.  |      | .do.          | 4274 | .do.                      | 1♂          | 31661   |
| Do  | Off Sitkalitak Island   | 69      | gn. M.          | 44   | Aug. 10, 1888 | 2855 | .do.                      | 2♂ 2 ♀.     | 31555   |
| Do  | Alognak Bay, Alognak Island.  | 16-17.5 | gy. S. brk. Sh. | 50.9 | Aug. 3, 1903  | 4268 | .do.                      | 3♂ 9 ♀.     | 15468   |
| Do  | Point Lipselit, SW., 1 mile.  | 14-19   | brd. gy. S. R.  |      | .do.          | 4270 | .do.                      | 1 Y.        | 31660   |
| Do  | Point Lipselit, SW., 1 mile.  | 14-19   | brd. gy. S. R.  |      | .do.          | 4270 | .do.                      | 1♂ 2 ♀.     | 31554   |
| Southeastern Alaska:                              |   |         |                 |      |               |      |                           |             |         |
| Chugachik Bay, Cooks Inlet.                       |   | 20-60   | sdly. M.        |      | June 30, 1880 |      | W. H. Dall                | 1♂          | 14688   |
| Port Etches.                                      |   | 12-18   |                 |      | 1874          |      | .do.                      | 9♂ 6 ♀ 9 Y. | 14691   |
| Port Mulgrave, Yakutat Bay.                       |   | 6-10    |                 |      | 1874          |      | .do.                      | 1 Y.        | 14775   |
| Taiya Inlet, Lynn Canal                           |   | 217-259 | rky.            | 36.8 | July 16, 1903 | 4255 | Albatross.                | 3♂ 1 ♀.     | 31553   |
| Chilkoot Inlet.                                   | 8.1 miles.  | 45-51   | gn. M.          | 40   | .do.          | 4254 | .do.                      | 1♂          | 31659   |
| Indian Rock, S. 63° E., 3.3 miles.                |   | 198-201 | gy. M.          | 40.8 | July 14, 1903 | 4252 | .do.                      | 1 ♀.        | 31552   |
| Hugh Point, N. 59° W., 3.9 miles.                 |   | 15      | G. M.           |      | Aug., 1882    |      | W. H. Dall                | 1 Y.        | 14772   |
| Stephens Passage.                                 |   | 25      |                 |      | Dec. 6, 1922  |      | Dr. W. H. Jones, U. S. N. | 1♂          | 5795    |
| Sitka Harbor                                      |   | 25      |                 |      |               |      | J. S. Ligon.              | 2 Y.        | Returne |
| Wrangell  | 22 miles N.W. of  |         |                 |      |               |      | Albatross.                | 1 ♀.        | 31551   |
| Eastern Passage, vicinity of Sitkine River delta. | Center of Simonof Island, N. 61° W., 5.3 miles.                                 | 79-70   | gy. M.          | 43.6 | July 13, 1903 | 4249 | Albatross.                | 1 ♀.        | 31551   |

From Biol. Surv.,  
U. S. Dept. of  
Agriculture.

1 Shoal water.

Material examined of *Chionoecetes bairdi*—Continued

| Locality   | Bearings  |              | Fathoms | Bottom         | Temp.       | Date          | Station | Collector                          | Specimens | Cat. No.      | Remarks     |
|--|---|--------------|---------|----------------|-------------|---------------|---------|------------------------------------|-----------|---------------|-------------|
|  | Latitude N.   | Longitude W. |         |                |             |               |         |                                    |           |               |             |
| Southeastern Alaska—Con.<br>Boca de Quadra                           | ° ' "   | ° ' "        | 48-57   | sft. gn. M.    | ° F<br>44.6 | July 6, 1903  | 4223    | do.                                | 2♂ 3♀     | 31549         |             |
|  | Center of Grouse Islet,<br>Mink Bay, N. 20°<br>W., 1.5 miles. |              |         |                |             |               |         |                                    |           |               |             |
| Vicinity of Yes Bay,<br>Behm Canal.                                  | ° ' "   | ° ' "        | 39-45   | sft. gy. M. R. | 44.7        | July 8, 1903  | 4233    | do.                                | 1♀        | 31550         |             |
| Do   | ° ' "   | ° ' "        | 45      | gy. M. rky.    | 43.7        | do.           | 4234    | do.                                | 1 y.      | 31638         | Soft shell. |
| Kasaan Bay, Prince of<br>Wales Island.                               | ° ' "   | ° ' "        | 42-47   | gn. M.         | 40.1        | July 11, 1903 | 4243    | do.                                | 2 y.      | 31557         |             |
| Southeastern Alaska<br>British Columbia: Head of<br>Kingcombe Inlet. | ° ' "   | ° ' "        |         |                |             | Aug. 2, 1881  |         | Lieut. Henry E.<br>Nichols, U.S.N. | 1♂<br>1♂  | 10292<br>5862 | Holotype.   |

a short branch runs up on the branchial region. An irregular row of small spines crosses the gastric region. The orbits, outer margin of the post-orbital teeth and the infero-lateral and posterior margins of the carapace are armed with spinules. Rostral horns more upturned than in *opilio* and a little longer and narrower, leaving a wider interspace.

Posterior margin of epistome strongly deflexed in the center and arched at the sides. The external maxillipeds when in place do not fit closely into the buccal cavity, as in *opilio*; merus with spinous margins. Ambulatory legs armed with longer and stouter spines than in *opilio*. In adults more than in young the legs are longer in *tanneri*, especially the meropodites, which are much narrower, and in the male do not widen at the proximal end as in *opilio*. Legs of female shorter than of male, as is the case in *opilio*.

Second segment of male abdomen bent downward at lateral extremities in almost a right angle. On the sternum in front of the abdomen there is a transverse ridge of sharp tubercles.

*Measurements.*—Male, holotype, length of carapace on median line 119, width exclusive of spines 130, length of first ambulatory leg 316, length of its merus 134, greatest width of same merus 18.5 mm.

*Range.*—From Washington (lat. 47° 29' 30" N.) to the extreme northern part of Lower

California (lat.  $32^{\circ} 17' 00''$  N.). Depth, from 29 to 1,062 fathoms; seldom less than 250 fathoms.

*Material examined*.—See table, pages 248–250.

CHIONOECETES ANGULATUS Rathbun

Plates 90 and 91

*Chionoecetes angulatus* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 4 (type-locality, south of Pribilof Islands; 1,401 fathoms; station 3604, *Albatross*; male, holotype, Cat. No. 19303, U.S.N.M.).

*Diagnosis*.—Near *tanneri*. The two dorsal rows of spines and tubercles on the branchial region meet at the outer margin in an acute angle. Interbranchial space not deeply depressed. Rostral teeth as wide as, or wider than, the length of their inner margin.

*Description*.—Specimens of this species were formerly placed with *C. tanneri*, but the subsequent collection of considerable material demonstrates that the form from northern waters may well be classed as a distinct species.

Carapace more pubescent than in *tanneri*; the pubescence of *tanneri* is less dense and more easily rubbed off.

Posterior margin of carapace gently arcuate; in *tanneri* there is a median interruption or small shallow bight.

Interbranchial space not so deeply depressed; the urogastric region is defined by a groove on either side; in *tanneri* the whole region is depressed and narrowly compressed.

The two dorsal ridges on the branchial region converge in straight lines and meet in an acute angle marked by a single, though not simple, large spine; in *tanneri* the ridges meet in a curved line marked by two subequal spines. The posterior of these ridges is formed of bunches of acute tubercles, except the outer one or two on each side, which may be spines or spinous; in *tanneri* this ridge is composed largely of single spines.

The rostral teeth are wider, the width at base being in half-grown specimens as great as the length of the inner margin; in old specimens, greater than the length.

Legs more dilated toward the proximal end.

*Measurements*.—Male, holotype, length of carapace on median line 73, width exclusive of spines 78.6, length of first ambulatory leg 182, length of its merus 73.3, greatest width of same merus without spines, 13 mm. Largest male (46638), length of carapace on median line 134.4, width exclusive of spines 151.5, length of first ambulatory leg 356.5, length of its merus 149.7, greatest width of same without spines 25 mm.

*Range*.—From east coast of Kamchatka (Avacha Bay) eastward through Bering Sea to the Pribilof Islands, thence southward along the Aleutian Islands as far east as long.  $167^{\circ} 25' 00''$  W. From

Material examined of *Chionoecetes tanneri*

| Locality                              | Bearings   |              | Fathoms  | Bottom          | Temp. | Date           | Station | Collector | Specimens | Cat. No. | Remarks   |
|---------------------------------------|--|--------------|----------|-----------------|-------|----------------|---------|-----------|-----------|----------|-----------|
|                                       | Lat. N.  | Long. W.     |          |                 |       |                |         |           |           |          |           |
| Washington:<br>Off Sea Lion Rock      | 47° 29' 30"                                      | 125° 43' 00" | 636      | gn. M.          | 37.9  | June 28, 1889  | 3070    | Albatross | 1 Y.      | 20673    |           |
| Off Grays Harbor                      | 46° 55' 00"                                      | 125° 11' 00" | 559      | br. Oz.         | 38.4  | Sept. 23, 1888 | 2871    | do        | 6 ♂       | 15485    |           |
| California:<br>Gulf of the Farallones | 37° 43' 20"                                      | 122° 43' 00" | 29       | crs. G.         | 50.4  | Mar. 10, 1890  | 3100    | do        | 1 ♂       | 15860    |           |
| Off Halfmoon Bay                      | 37° 23' 00"                                      | 123° 08' 00" | 391      | C.              | 40.8  | Mar. 11, 1890  | 3104    | do        | 8 im. ♀   | 15489    |           |
|                                       | Pigeon Point Light-house, S. 34° E., 10.5 miles. |              | 5-65     |                 |       |                |         | do        | 8 y.      | 15190    | Holotype. |
| Off Pigeon Point                      | 37° 19' 00"                                      | 122° 30' 00" |          |                 |       | Oct. 6, 1904   | 4567    | do        | 1 Y. ♂    | 46397    |           |
| Do                                    | 37° 08' 00"                                      | 122° 47' 00" | 296      | fine. gy. S.    | 41.8  | Mar. 12, 1890  | 3112    | do        | 1 Y.      | 15493    |           |
| Monterey Bay                          | 36° 43' 00"                                      | 122° 12' 00" | 581      | gn. M. S.       | 37.8  | Apr. 17, 1897  | 3670    | do        | 1 ovig. ♀ | 26131    |           |
| Do                                    | 36° 47' 00"                                      | 122° 11' 00" | 278      | gn. M. fine. S. | 42.7  | Apr. 16, 1897  | 3669    | do        | 40 y.     | 26118    |           |
| Do                                    | Point Pinos Light-house, S. 31° E., 9.3 miles.   |              | 389-456  | gn. M.          |       | May 23, 1904   | 4513    | do        | 2 ♀       | 26130    |           |
| Do                                    | Point Pinos Light-house, S. 29° E., 10.7 miles.  |              | 394-524  | gn. M. R.       |       | do             | 4514    | do        | 1 Y.      | 26370    |           |
| Do                                    | Point Pinos Light-house, S. 18° E., 8.1 miles.   |              | 198-495  | gn. M. crs. S.  |       | do             | 4515    | do        | 1 ♂       | 46463    |           |
| Do                                    | Point Pinos Light-house, S. 49° E., 12.3 miles.  |              | 718-756  | Sh.             |       | May 24, 1904   | 4516    | do        | 4 ♂ 1 ♀   | 46482    |           |
| Do                                    | Point Pinos Light-house, S. 52° E., 9.1 miles.   |              | 750-766  | gn. M. S.       |       | do             | 4517    | do        | 2 ♀       | 46486    |           |
| Do                                    | Point Pinos Light-house, S. 58° E., 12.7 miles.  |              | 766-800  | ft. gy. M.      |       | May 27, 1904   | 4528    | do        | 2 ♂ 4 ♀   | 46384    |           |
| Do                                    | Point Pinos Light-house, S. 78° E., 6.8 miles.   |              | 755-958  | ft. gy. M.      |       | do             | 4530    | do        | 2 ♂       | 46467    |           |
| Do                                    | Point Pinos Light-house, S. 74° E., 7.4 miles.   |              | 861-1062 | hrd. S. M.      |       | May 31, 1904   | 4537    | do        | 1 ♂       | 46519    |           |
| Do                                    | Point Pinos Light-house, S. 85° E., 6.5 miles.   |              | 795-871  | hrd. gy. S.     |       | do             | 4538    | do        | 3 ♂ 5 ♀   | 46594    |           |
| Do                                    | Point Pinos Light-house, S. 85° E., 6.5 miles.   |              |          |                 |       | do             |         | do        | 4 ♂ 1 ♀   | 46480    |           |
| Do                                    | Point Pinos Light-house, S. 85° E., 6.5 miles.   |              |          |                 |       | do             |         | do        | 4 ♂ 1 ♀   | 46595    |           |

| Do                      | Point Pinos Light-house, S. E., 11.2 miles.                      | 389-551 | gn. M.         | June 1, 1901  | 4540 | do | 1 ♀                           | 46477               |
|-------------------------|--|---------|----------------|---------------|------|----|-------------------------------|---------------------|
| Do                      | Point Pinos Light-house, S. 41° E., 9.3 miles.                   | 381-633 | gn. M. S.      | do            | 4541 | do | 1 ♀                           | 46475               |
| Do                      | Point Pinos Light-house, S. 35° E., 7.2 miles.                   | 331-456 | brd. S. M.     | do            | 4542 | do | 1 ♂                           | 46468               |
| Do                      | Point Pinos Light-house, S. 46° E., 8.4 miles.                   | S19     | inc. bk. S. R. | June 3, 1904  | 4546 | do | 1 y. ♀                        | 46596               |
| Off Carmelo Bay         | 36 30 00   22 00 00  | 659     | gn. M.         | Apr. 27, 1911 | 5699 | do | {3♂, 5♀<br>1♂, 1♀             | 55751<br>Amer. Mus. |
| Off Point Sur           | 36 18 50   22 06 00  | 328     | bk. S. M.      | Apr. 3, 1890  | 3186 | do | 2 ♀                           | 15191               |
| Do                      | Point Sur, N. 6° W.; Junipero Mountain, N. 47° E.                | 475     |                | Apr. 27, 1911 | 5698 | do | {4 y.<br>1 y.                 | 47096<br>Amer. Mus. |
| Do                      | 35 50 00   21 49 30  |         |                |               |      |    |                               |                     |
| Do                      | Silver Peak, N. 49° E., 7.5 miles.                               | 185     | gn. M. bk. S.  | do            | 5697 | do | {7 y.<br>17 y.                | 55757<br>Amer. Mus. |
| West of Piedras Blancas | 35 35 00   21 39 00  |         |                |               |      |    |                               |                     |
| Do                      | Pine Mountain, N. 42° E.   | 140     |                | do            | 5696 | do | {1♂, 2♀, 8 y.<br>1♂, 3♀, 8 y. | 55756<br>Amer. Mus. |
| Do                      | 35 18 30   21 28 00  |         |                |               |      |    |                               |                     |
| Do                      | 34 15 00   20 36 00  | 284     | yl. M.         | Jan. 5, 1880  | 2802 | do | 1 ♂                           | 15483               |
| Off Point Conception    | Northeast point Santa Barbara Island, N. 89° E., 8.6 miles.      | 302-638 | gn. M.         | Apr. 11, 1904 | 4415 | do | 3                             | 46471               |
| Do                      | Southwest Rock San-cti Barbara Island, N. 46° W., 4.7 miles.     | 323-418 | dk. gn. M. R.  | Apr. 12, 1904 | 4416 | do | 2 ovig. ♀                     | 46470               |
| Do                      | San Miguel Island, 7° E., 9.8 miles.                             | 294-271 | gn. M.         | Apr. 15, 1901 | 4436 | do | 1 y. ♂                        | 16516               |
| Off San Miguel Island   | Chief Islet, N. 21° W., 2.9 miles.                               | 506-680 | gn. M. bk. P.  | Apr. 14, 1904 | 4429 | do | 2 ovig. ♀                     | 46469               |
| Do                      | Point San Pedro, N. 35° E., 7 miles.                             | 447-510 | bk. M. K.      | do            | 4127 | do | {1♂, 8 ovig. ♀<br>18♂         | 46471               |
| Do                      | Point San Pedro, N. 34° E., 10.3 miles.                          | 761-891 | gn. M.         | do            | 4128 | do | 2 ♂                           | 46472               |
| Do                      | 33 49 45   19 21 30  | 603     | gn. M.         | Feb. 12, 1880 | 2980 | do | 3♂, 1♀                        | 15477               |
| Off Anacapa Island      | Northwest of San Nic-o-las Island.                               | 531     | gn. S. Glob.   | Apr. 26, 1911 | 5695 | do | {♂, 2 y.<br>1 y.              | 55755<br>Amer. Mus. |
| Do                      | 33 33 00   20 17 30  |         |                |               |      |    |                               |                     |
| Do                      | 33 24 36   20 12 30  | 640     | gn. M.         | do            | 5694 | do | {1 immad. ♀<br>1♂, 1 y.       | 55752<br>Amer. Mus. |
| Do                      | 33 21 36   20 12 30  | 334-600 | ky. S. R.      | Apr. 9, 1904  | 4407 | do | 8 ovig. ♀                     | 46566               |
| Do                      | Southeast point Santa Catalina Island, N. 19° 30' E., 3.2 miles. |         |                |               |      |    |                               |                     |

Material examined of *Chionoecetes tanneri*—Continued

| Locality                               | Bearings   |              | Fathoms | Bottom          | Temp.   | Date          | Station | Collector        | Specimens                                | Cat. No.                | Remarks |
|--|--|--------------|---------|-----------------|---------|---------------|---------|------------------|--|-------------------------|---------|
|  | Latitude N.  | Longitude W. |         |                 |         |               |         |                  |  |                         |         |
| California—Continued                   | 33° 08' 00"  | 118° 40' 00" | 414     | gy. S.          | 41.4    | May 8, 1888   | 2839    | <i>Albatross</i> | 1 lge. ♀, 13 small.                      | 21910                   |         |
| Off San Clemente Island                | (East point Northwest Harbor, N. 74° W., 5.8 miles)      |              | 542-599 | gn. M.          | 40      | Apr. 8, 1901  | 4402    | do.              | 1 ♂, 2 ovig. ♀<br>1 ovig. ♀<br>3 ovig. ♀ | 46487<br>46465<br>46478 |         |
| Do.                                    | 33° 04' 30"  | 117° 42' 00" | 464     | gn. M.          | 46.5    | Feb. 4, 1888  | 2837    | do.              | 1 ♂, 1 ♀                                 | 15482                   |         |
| Do.                                    | 32° 50' 20"  | 118° 03' 30" | 500-507 | gn. M.          | 40.2    | Apr. 8, 1904  | 4400    | do.              | 2 ♂, 46464, 46518                        | 20127                   |         |
| Do.                                    | 32° 44' 00"  | 119° 32' 00" | 822     | gn. M. S.       | 39.2    | Apr. 13, 1896 | 3627    | do.              | 1 ♀                                      | 15484                   |         |
| Off San Diego                          | 32° 40' 30"  | 117° 31' 30" | 822     | gn. M.          | 39      | Jan. 19, 1888 | 2923    | do.              | 12 ♂, 5 ♀                                | 15487                   |         |
| Do.                                    | 32° 32' 30"  | 117° 24' 00" | 339     | M.              | 42.9    | do.           | 2925    | do.              | 1 ♂                                      | 15480                   |         |
| Do.                                    | 32° 27' 30"  | 117° 24' 30" | 623     | gn. M.          |         | Jan. 26, 1888 | 2929    | do.              | 1 ♂, 2 ♀                                 | 15480                   |         |
| Do.                                    | Point Loma Light-house, N. 33° E., 9.6 miles.            |              | 67-116  | gy. S. Sh.      | 48-49.9 | Mar. 2, 1904  | 4305    | do.              | 1 ♂, 1 ♀                                 | 46476                   |         |
| Do.                                    | Point Loma Light-house, N. 40° E., 13.4 miles.           |              | 549-585 | gn. M.          | 39      | Mar. 14, 1904 | 4352    | do.              | 1 y. ♀                                   | 46515                   |         |
| Do.                                    | Point Loma Light-house, N. 33° 30' E., 13.6 miles.       |              | 514-541 | gn. M. fine. S. | 40      | Mar. 9, 1904  | 4334    | do.              | 1 y. ♂                                   | 46517                   |         |
| Lower California: Off Coronado Islands | South point North Coronado Island, N. 64° E., 5.4 miles. |              | 641-666 | gn. M.          | 42.5    | Mar. 18, 1904 | 4382    | do.              | 1 y. ♀                                   | 46593                   |         |
| Off Cortes Bank                        | 32° 17' 00"  | 119° 17' 00" | 984     | gy. M.          | 38      | Jan. 17, 1889 | 2919    | do.              | 1 ♀                                      | 15479                   |         |



Material examined of *Chionoecetes angulatus*

| Locality  | Bearings   |              | Fathoms | Bottom                           | Temp. | Date           | Station | Collector | Specimens                             | Cat. No                 | Remarks         |
|---|--|--------------|---------|----------------------------------|-------|----------------|---------|-----------|---------------------------------------|-------------------------|-----------------|
|   | Latitude N.  | Longitude E. |         |                                  |       |                |         |           |                                       |                         |                 |
| Kamchatka: Off Avacha Bay.                            | 52° 37' 30"  | 158° 50' 00" | 682     | gn. M. crs. bk. }<br>S. brk. Sh. | 36.6  | June 20, 1906  | 4797    | Albatross | 8♂ 13♀ (1 ovig. 1 shedding).<br>21 y. | 43824, 43825,<br>46498. |                 |
| Alaska (Bering Sea): Pribilof Islands.                | 56° 57' 30"  | 170° 33' 00" | 49      | gn. M. fine. S.                  | 41    | Sept. 2, 1863  | 3556    | do.       | 1♂                                    | 46638                   |                 |
| Southwest of Pribilof Islands.                        | 56° 12' 00"  | 172° 07' 00" | 1,625   | gn. Oz.                          | 35    | Aug. 4, 1890   | 3308    | do.       | 20                                    | 15862                   |                 |
| Southeast of Pribilof Islands.                        | 55° 51' 00"  | 169° 18' 00" | 688     | gn. M.                           | 36.9  | July 17, 1893  | 3501    | do.       | 60                                    | 18358                   |                 |
| South of Pribilof Islands                             | 55° 06' 00"  | 169° 08' 00" | 1,044   | gn. M. fine. S.                  | 35.8  | Aug. 5, 1895   | 3601    | do.       | 5                                     | 19302                   |                 |
| Do.   | 54° 54' 00"  | 168° 59' 00" | 1,401   | gn. Oz.                          | 33.2  | Aug. 12, 1895  | 3601    | do.       | 17                                    | 19303                   | 1♂ is holotype. |
| Bowers Bank.  | 54° 33' 30"  | 178° 44' 00" | 584     | gn. M. bk. sp.                   |       | June 4, 1906   | 4775    | do.       | 2 y.                                  | 43820                   |                 |
| Do.   | 54° 33' 00"  | 178° 45' 00" | 557-584 | For.<br>gn. M. bk. sp.           | 37.2  | do.            | 4774    | do.       | 3 y. (1 soft shell).                  | 43821, 46786            |                 |
| Do.   | 54° 20' 30"  | 179° 09' 30" | 764     | gn. to br. M.<br>fine. bk. S.    | 37    | June 3, 1906   | 4768    | do.       | 3 y.                                  | 43822                   |                 |
| North of Islands of Four Mountains, Aleutian Islands. | West point Yunaska Island, S. 37° E.<br>53° 12' 00"    | 171° 37' 00" | 1,217   | fine. bk. S.                     | 35.2  | May 29, 1906   | 4765    | do.       | 1♂                                    | 46541                   |                 |
| Do.   | 53° 55' 00"  | 170° 50' 00" | 1,033   | gn. Oz.                          | 35.4  | Aug. 3, 1890   | 3307    | do.       | 1 lge.<br>1 ovig. ♀                   | 15861<br>17168          |                 |
| North of Unalaska.                                    | 54° 11' 30"  | 167° 25' 00" | 987     | gn. M. bk.<br>lav. S.            | 35.9  | Aug. 18, 1895  | 3607    | do.       | 25                                    | 19304                   |                 |
| British Columbia: Off Queen Charlotte Islands.        | 52° 39' 30"  | 132° 38' 00" | 1,588   | gv. Oz. crs. S.                  | 35.3  | Sept. 3, 1890  | 3342    | do.       | 14                                    | 15864                   |                 |
| Do.   | 51° 23' 00"  | 130° 34' 00" | 876     | gn. M.                           | 36.5  | Aug. 31, 1888  | 2960    | do.       | 5♂ 2♀ 7 y.                            | 15478                   |                 |
| Washington: Off Gray's Harbor.                        | 46° 44' 00"  | 124° 32' 00" | 58      | rkv.                             | 46.5  | Sept. 23, 1888 | 2870    | do.       | 3 ♀                                   | 15474                   |                 |
| Oregon: Northwest of Cape Blanco.                     | Cape Blanco Light, S. 69° E., 30 miles.<br>43° 01' 00" | 125° 12' 30" | 1,064   | gn. M.                           | 35.9  | Apr. 27, 1901  | 3788    | do.       | 1 ovig. ♀                             | 33457                   |                 |

1 Approximate position.

British Columbia (lat.  $52^{\circ} 39' 30''$  N.) southward to Oregon (lat.  $43^{\circ} 01' 00''$  N.). Depth, 49 to 1,625 fathoms.

*Material examined.*—See table, page 251.

### Genus HYAS Leach

*Hyas* LEACH, Edin. Encyc., vol. 7, 1814, p. 431; type, *H. araneus* (Linnaeus).

Carapace broad, but still narrower than the postfrontal length, more or less lyrate or shield-shaped, tuberculate and pubescent. Rostrum triangular, flat, bifid, horns separated by a narrow slit or interspace. Eyes when retracted not entirely covered by the narrow supraocular cave; a fissure above and below the orbit; postocular cup formed by a large, triangular, flattened and acute tooth. A

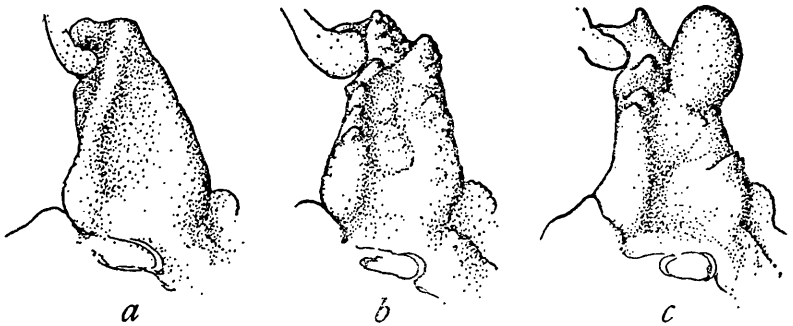


FIG. 90.—HYAS, LEFT BASAL ANTENNAL ARTICLE OF THREE SPECIES. a. ARANEUS, MALE (10031). b. COARCTATUS ALUTACEUS, MALE (40182). c. LYRATUS, MALE (15927)

tubercle on the middle of the anterior surface of the eyestalk. Basal antennal article of good size, longer than wide; the next, or first movable, article laterally dilated; last article of peduncle, narrow, cylindrical. Chelipeds stout, chelae compressed. Ambulatory legs subcylindrical.

*Distribution.*—Arctic Ocean with the exception of the Siberian coast between long.  $147^{\circ}$  E. and Kara Sea, and of the American coast between Baffin's Bay and Langton Bay, Northwest Territories; Bering Sea and North Pacific Ocean southward on the Asiatic side to Korea and perhaps Amoy, and on the American side to the State of Washington; North Atlantic Ocean southward on the American side to Cape Hatteras, and on the European side to the English Channel.

#### KEY TO THE AMERICAN SPECIES AND SUBSPECIES OF THE GENUS HYAS

- A<sup>1</sup>. Carapace subtriangular; hepatic region not dilated laterally. Basal antennal article subtriangular.....*araneus*, p. 253.  
 A<sup>2</sup>. Carapace lyrate; hepatic region dilated laterally forming, with the post-orbital region, an alate expansion. Basal antennal article with sides nearly parallel.

- B<sup>1</sup>. Posterior angle of hepatic projection broadly rounded. Basal antennal article without a large tubercle at antero-external angle.
- C<sup>1</sup>. Rostrum long; total carapace length is to rostrum length as 4.5:1 in medium specimens up to 6.4:1 in largest specimen.  
*coarctatus*, typical, p. 258.
- C<sup>2</sup>. Rostrum shorter and broader; total carapace length is to rostrum length as 7:1 in medium specimens up to 9.3:1 in large specimens.  
*coarctatus alutaceus*, p. 258.
- B<sup>2</sup>. Posterior angle of hepatic projection subacute. Basal antennal article with bead tubercle at antero-external angle.....*lyratus*, p. 270.

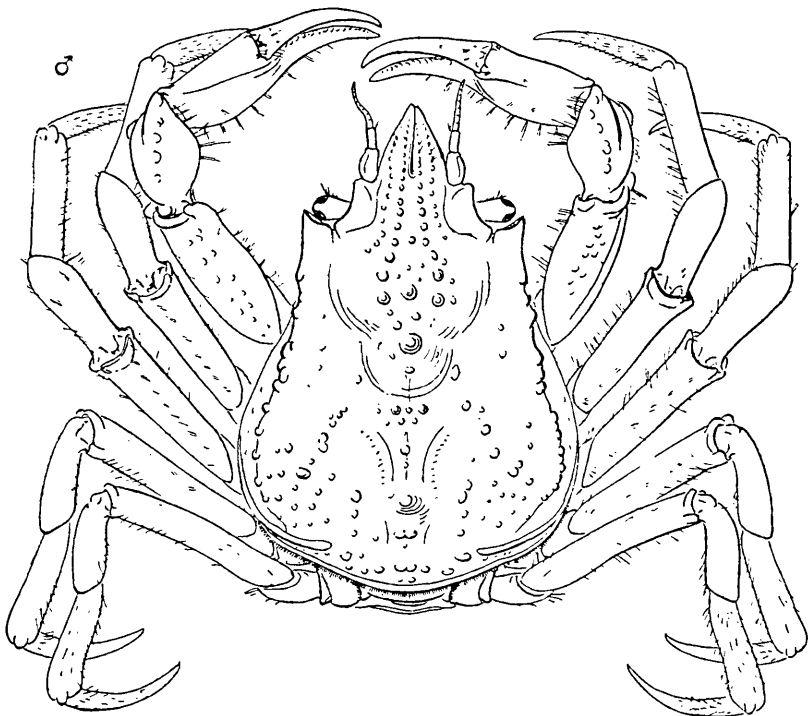


FIG. 91.—HYAS ARANEUS, MALE, DORSAL VIEW,  $\times 1.55$ . (AFTER SMITH, MS.)

HYAS ARANEUS (Linnaeus)

TOAD CRAB. HARPER (Leach)

Plates 92 and 93

*Cancer araneus* LINNAEUS, Syst. Nat., ed. 10, vol. 1, 1758, p. 628 (type-locality, in *Occano Europaeo*; type not extant). Not *Cancer araneus* Herbst, Naturg. Krabben u. Krebse, vol. 1, 1785, p. 206.

*Cancer bufo* HERBST, Naturg. Krabben u. Krebse, vol. 1, 1790, p. 240 (wrongly 242), pl. 17, fig. 95 (type-locality, in *der Nordsee*; type in Berlin Mus.).

*Inachus araneus* FABRICIUS, Entom. Syst., Suppl., 1798, p. 356.

*Maja bufo* BOSCH, Hist. Nat. Crust., vol. 1, 1802, p. 255.

*Maja araneus* LEACH, Edin. Encyc., vol. 7, 1814, p. 394.

*Hyas araneus* LEACH, Edin. Encyc., vol. 7, 1814, p. 431; Malac. Podoph. Brit., 1816, pl. 21A, colored, and explanatory text.—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 67, and synonymy; in Grenfell, Labrador, 1909, p. 481.—BIRULA, Annuaire Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, vol. 11, 1906 (1907), p. 4.—HANSEN, Danish Ingolf-Exped., vol. 3, part 2, 1908, p. 13, except Brandt's and Stuxberg's records.—



FIG. 92.—HYAS ARANEUS (10031), MAXILLIPED,  $\times 2.85$

*Description*.—Carapace very convex antero-posteriorly, strongly deflexed in front of the middle of the gastric region. Rostral horns contiguous. Lateral margins of carapace tuberculate behind the postorbital tooth, converging anteriorly throughout their length, or in small specimens the margins of the postorbital teeth may be parallel; marginal line interrupted between hepatic and branchial regions by a small, shallow sinus. Surface uneven, ornamented with pustulate tubercles, especially on the median gastric area and in an oblique row on each branchial region; on the intestinal region two tubercles side by side which may in small specimens be united in one. Basal article of antenna subtriangular, narrowing anteriorly, margins thick.

Chelipeds in old male stout, fingers thick, slightly compressed, fingers very narrowly gaping when closed; first ambulatory leg longer than cheliped.

*Color*.—The dorsal surface except of the fingers a dull purplish red, ventral surface chiefly buff, according to Leach's figures.

BIRULA, Mém. Acad. Imp. Sci. St. Pétersbourg, ser. 8, vol. 29, 1910, p. 4, pl. 1, fig. 1.—DONS, Tromsø Mus. Aarshefter 34, 1912-13, p. 146, pl. 1, figs. 1-13; pl. 2, figs. 1 to 8, 11; pl. 3, figs. 1 & 2, text-figs. A 1, 3, 5 & 7, B 1 & 1a, C; 37, 1914 (1915), p. 86.—VON HOFSTEN, K. Sv. Vet. Akad. Handl., vol. 54, 1916, p. 63.

*Hyas coarctatus*, var., HOEK, Nederl. Archiv f. Zoologie, Suppl. vol. 1, Lief. 3, 1882, p. 3, pl. 1, fig. 1.

*Hyas coarctata* STUXBERG, Vega-Exp. Vetensk. Iakt., vol. 5, 1886, p. 51.

*Hyas araneus*, var. *hoekii* BIRULA, Annuaire Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, vol. 2, 1897, p. 442 [38] (type-locality, White Sea, 3-100 fathoms; type in Petrograd Mus.); vol. 4, 1899, p. 37 [18], text-fig. 3.

*Hyas araneus hoekii* BIRULA, Mém. Acad. Imp. Sci. St. Pétersbourg, ser. 8, vol. 29, 1910, p. 3, and synonymy.

*Diagnosis*.—Carapace subtriangular; hepatic region not dilated laterally. Basal antennal article subtriangular, narrowing anteriorly (fig. 90, a).

Material examined of *Hyas araneus*

| Locality                                | Bearings    |              | Fathoms | Bottom          | Temp. | Date           | Station | Collector                                  | Specimens       | Cat. No.       | Remarks   |
|---|-------------|--------------|---------|-----------------|-------|----------------|---------|--|-----------------|----------------|-----------|
|   | Latitude N. | Longitude W. |         |                 |       |                |         |  |                 |                |           |
| Greenland:<br>Exact locality not given. | ° ' "       | ° ' "        |         |                 | ° F   |                |         | Dr. Pavy, Hologate Exped.<br>H. G. Dresel. | 2 lge. ♀<br>2 ♀ | 3671.<br>14990 |           |
| Godhavn Harbor, Disco Island.           |             |              | 30      |                 |       | July, 1883     |         | L. Kumlien.                                | 1♂              | 19332          |           |
| Godthaab, Davis Straits.                |             |              |         |                 |       | Aug., 1879     |         | N. P. Seudder,<br>U. S. Fish Comm.         | 1 ♀             | 40180          | On trawl. |
| Labrador:                               |             |              |         |                 |       |                |         | Owen Bryant.                               | 2               | 38449          |           |
| Outside of Hebron.                      |             |              | 60      | G               |       | Aug. 25, 1908  |         | do.  | 1               | 38451          |           |
| Off Fish Island.                        |             |              | 75      | M               |       | do.            |         | do.  | 1               | 38450          |           |
| Nain.                                   |             |              | 7       | M               |       | Aug. 18, 1908  |         | do.  | 1 ♀             | 38452          |           |
| Gready Harbor.                          |             |              | 12      |                 |       |                |         | do.  | 3♂ 2 ♀ 10 y.    | 5242, 10031    |           |
| L'Anse au Loup and Forteau Bay.         |             |              | 15-25   | S. Kelp, Dirt.  |       | 1882           |         | Winifred A. Stearns.                       |                 |                |           |
| Labrador:                               |             |              |         |                 |       |                |         | W. Henry.                                  | 1 lge. ♂        | 16280          |           |
| Do                                      |             |              |         |                 |       | Nov., 1882     |         | L. M. Turner.                              | 1♂ 1 ♀          | 5844.          |           |
| Quebec:                                 |             |              |         |                 |       |                |         | J. Schmitt.                                | 2 ♀             | 26194          |           |
| Anticosti Island.                       |             |              |         |                 |       |                |         | N. A. Comeau.                              | 1 ♀             | 43666          |           |
| Godbout.                                |             |              |         |                 |       |                |         |  |                 |                |           |
| Newfoundland:                           |             |              |         |                 |       |                |         |  |                 |                |           |
| St. Johns.                              |             |              |         |                 |       |                |         |  |                 |                |           |
| Off St. Lawrence Harbor, Placentia Bay. |             |              |         |                 |       | 1885           |         | Albatross.                                 | 4♂              | 10138          |           |
| Grand Bank of Newfoundland.             |             |              | 50      | rky.            |       | Sept. 29, 1908 |         | Owen Bryant.                               | 1               | 38448.         |           |
| Do                                      |             |              |         |                 |       |                |         | Sch. Victor.                               | 2 ♀             | 3781.          |           |
| Do                                      |             |              |         |                 |       |                |         | N. P. Seudder.                             | 1♂              | 40181          |           |
| Do                                      | 46 20 00    | 49 52 00     | 40      | brk. Sh.        | 35.3  | June 25, 1885  | 2446    | Albatross.                                 | 59              | 10226          |           |
| Do                                      | 46 09 30    | 49 48 30     | 39      | brk. Sh.        | 33.5  | do.            | 2445    | do.  | 32              | 10225          |           |
| Do                                      | 45 59 00    | 49 45 30     | 39      | wh. S. brk. Sh. | 34.4  | do.            | 2444    | do.  | 3♂ 5 ♀          | 10224          |           |
| Do                                      | 47 04 00    | 50 48 00     | 89      | fine. gn. S.    | 29.7  | June 26, 1885  | 2452    | do.  | 3 lge. ♂        | 10229          |           |
| Do                                      | 43 36 00    | 50 05 00     | 37      | ers. brk. Sh.   | 35.8  | June 24, 1885  | 2437    | do.  | 1               | 10220          |           |
| Do                                      |             |              |         | brk. St.        |       |                |         |  |                 |                |           |
| Do                                      | 43 36 00    | 50 03 50     | 37      | gn. S. bk. Sp.  | 36.8  | do.            | 2438    | do.  | 3               | 10221          |           |
| Do                                      |             |              |         | brk. Sh.        |       |                |         |  |                 |                |           |
| Do                                      | 43 37 00    | 49 56 30     | 36      | wh. S. bk. Sp.  | 37.8  | do.            | 2439    | do.  | 2♂ 8 ♀          | 10222          |           |
| Do                                      | 43 00 00    | 50 47 30     | 129     | yl. S. bk. Sp.  | 33.5  | June 23, 1885  | 2431    | do.  | 2 ♀             | 10218          |           |
| Green Bank                              | 45 35 00    | 55 01 00     | 67      | lk. gy. S.      | 30    | July 3, 1885   | 2465    | do.  | 4♂ 4 ♀          | 10233          |           |

Gloucester donation to U. S. Fish Comm.

Material examined of *Hiyas araneus*—Continued

| Locality  | Bearings    |              | Fathoms | Bottom            | Temp.  | Date          | Station           | Collector               | Specimens | Cat. No. | Remarks                                   |
|---|-------------|--------------|---------|-------------------|--------|---------------|-------------------|-------------------------|-----------|----------|---|
|   | Latitude N. | Longitude W. |         |                   |        |               |                   |                         |           |          |   |
| Newfoundland—Contd.<br>St. Peters Bank                        | ° ' "       | ° ' "        |         |                   | ° F    |               |                   | Sch. <i>Noiice</i>      | 1 Y       | 14456    | Gloucester donation to U. S. Fish Comm.   |
| Do.   | 45 29 00    | 55 24 00     | 67      | Co.               | 30     | July 3, 1885  | 2466              | <i>Albatross</i>        | 15        | 10234    | } From cod stomach.                       |
| Do.   | 45 23 00    | 55 41 00     | 38      | (fine wh. S. bk.) | } 35.8 | do.           | 2467              | do.                     | 16 ♀      | 10235    |   |
| Do.   | 45 11 30    | 55 51 30     | 42      | (inc. bk. S.)     |        | 33            | do.               | 2468                    | do.       | 13       |   |
| Do.   | 45 07 00    | 55 09 00     | 90      | gy. S. bk. Sp. J. |        | Aug. 22, 1885 | 2698              | do.                     | 7         | 11897    |   |
| Do.   | 45 04 00    | 55 23 00     | 72      | Co.               |        | do.           | 2699              | do.                     | 25 ♂ 20 ♀ | 11898    | } Gloucester donation to U. S. Fish Comm. |
| Do.   | 44 56 00    | 55 49 30     | 75      | gy. S. bk. Sp.    |        | do.           | 2701              | Sch. <i>Mystic</i>      | 1 ♂ 1 ♀   | 11870    |   |
| Banquereau:   |             |              | 50      |                   |        |               |                   |                         |           | 3781     |   |
| East of Banquereau  | 44 27 30    | 57 10 45     | 137     | ers. S. G.        | 40     | July 4, 1885  | 2472              | <i>Albatross</i>        | 1         | 10238    | } Do.                                     |
| Do.   | 44 28 30    | 57 10 45     | 133     | hrd.              | 40     | do.           | 2474              | do.                     | 1 ♂       | 10239    |   |
| South of Banquereau   | 44 09 00    | 58 03 00     | 250-350 |                   |        |               |                   | Sch. <i>Mary F.</i>     | 1 ♀       | 3790     |   |
| Misaine Bank  | 45 27 30    | 58 27 45     | 50      | G. P.             |        | July 6, 1885  | 2490              | <i>Chisholm</i>         | 1         | 10240    | } From cod stomach.<br>Do.                |
| Do.   | 45 22 00    | 58 43 45     | 75      | wh. S.            | 33.3   | do.           | 2492              | <i>Albatross</i>        | 16        | 10241    |   |
| Do.   | 45 07 30    | 59 27 45     | 44      | ers. y. S. P.     | 32.2   | do.           | 2496              | do.                     | 3 ♂ 1 ♀   | 10245    |   |
| Between Middle Ground and Halifax, Nova Scotia, Gulf of Maine | 44 22 30    | 61 00 15     | 47      | P.                | 35     | July 7, 1885  | 2503              | do.                     | 11 ♂ 14 ♀ | 10247    |   |
| Do.   |             |              |         |                   |        |               |                   | U. S. Fish Comm.        | 6 y.      | 3826     |   |
| Casco Bay, Maine:   |             |              |         |                   |        | 1871          |                   | do.                     | 1         | 35306    |   |
| West of Haskells Island.                                      |             |              | 5       |                   |        | Aug. 14, 1911 |                   | (Rathbun and Danbridge) | 1 ♂       | 43162    | } Do.                                     |
| Northeast of Eagle Island.                                    |             |              | 6.5     |                   |        | do.           |                   | do.                     | 3 y.      | 43163    |   |
| Massachusetts: Gloucester Outer Harbor.                       |             |              | 8-10    |                   |        | 1878          | 141-146, 201, 202 | <i>Speedwell</i>        | 2 ♂ 3 ♀   | 2867     |   |
| Off Cape Cod.   |             |              |         |                   |        | 1879          |                   | U. S. Fish Comm.        | 1 ♂ 3 ♀   | 3919     |   |

|                               |  |            |             |                |               |  |   |             |   |
|-------------------------------|--|------------|-------------|----------------|---------------|--|---|-------------|---|
| North of Cape Cod.....        | { Race Point Light, S. 9°              | 30         | ers. S.     | July 25, 1879  | 246-          | Speedwell.....                           | 4♂  | 3973.       |   |
|                               | { W. 5½ miles.                         |            |             |                |               |  |   |             |   |
| Mouth of Cape Cod Bay.....    | { 42° 00' 00" 70 13 00                 | 30-31      | Inc. gy. S. | Aug. 11, 1879  | 290,          | do.                                      | 3 y.  | 3968.       |   |
|                               | { 42° 04' 45" 70 16 00                 |            |             |                |               |  |   |             |   |
| Cape Cod Bay.....             | { 42° 04' 30" 70 16 15                 | 26.5       | bu. M.      | Aug. 30, 1879  | 319           | do.                                      | 3♂ 2♀   | 3932.       |   |
|                               | { 10° E., 1½ miles.                    |            |             |                |               |  |   |             |   |
| Do.                           | { Billingsgate Light, S.               | 15         | bu. M.      | Sept. 15, 1879 | 358           | do.                                      | 1♂ 4♀   | 3929.       |   |
|                               | { 63° E., 3¼ miles.                    |            |             |                |               |  |   |             |   |
| Do.                           | { 19° E., Rocky Point, N.              | 18         | .           | July 21, 1879  | 240           | do.                                      | 1 ovig. ♀   | 3933.       |   |
|                               | { Wood End Light, N.                   |            |             |                |               |  |   |             |   |
| Do.                           | { 41° 52' 30" 70 15 00                 | 15.5       | gn. M. S.   | Sept. 9, 1879  | 341           | do.                                      | 2♂ 2♀   | 3931        | { 2 encrusted with <i>Palanus</i> .   |
|                               | { Manomet Point, N.                    |            |             |                |               |  |   |             |   |
| Crab Ledge, off Chat-ham.     | { 41° 51' 30" 70 21 30                 | 15         | S. G.       | Aug. 30, 1881  | 965           | <i>Fish Hawk</i> .....                   | 1♀  | 18777.      | Decorated with foreign substances.  |
|                               | { 68° W., 9 miles.                     |            |             |                |               |  |   |             |   |
| Do.                           | { Chatham Lights, N.W. by W., 6 miles. | 16-18      |             | do.            | 967-969       | do.                                      | 1♀  | 46462.      |   |
|                               |  |            |             |                |               |  |   |             |   |
| Rhode Island: Off Watch Hill. |  | 17-21      |             | Aug. 21, 1874  |               | U. S. Fish Comm. S. M. Johnson & Co.     | 1♂  | 40757.      |   |
|                               | New England coast.                     |            |             |                |               |  |   |             |   |
| Spitzbergen: Bionens Bay..... |  | { Long. E. | 7-10        |                | Aug. 10, 1881 |  | Doctor Eckstein, U. S. N., U. S. S. <i>Alliance</i> . | 2♂          | 4514.   |
|                               | { 79 45 00                             |            |             |                |               |  |   |             |   |
| Hebrides Helgoland.           |  |            |             |                |               | A. M. Norman Roy, Biol. Sta., Helgoland. | 1♀  | 6317.       |   |
|                               |  |            |             |                |               |  |   |             |   |
| Germany: Kiel Harbor.         |  |            |             |                |               | Karl Möbins.                             | 1♀  | 3304.       | From German Educational Exhibition, Louisiana Purchase Exposition, 1904, through U. S. Bureau of Fisheries. |
|                               | { Germany                              |            |             |                |               |  |   |             |   |
| North Sea.....                |  |            |             |                |               |  | 1♂ 1♀   | 32362.      | Type of <i>Cancer</i> <i>bata</i> Herbst.   |
|                               |  |            |             |                |               |  |   |             |   |
|                               |  |            |             |                |               |  | 1.  | Berlin Mus. |   |

*Measurements.*—Male (10229), extreme length of carapace 72.4, width 54 mm. Largest male examined (3319), length 94, width 72 mm. Male, Iceland, length 110, width 86 mm. (Hansen).

*Range.*—West coast of Greenland from lat. 69° 15' to 64° 11' N. (Hansen); from Labrador at Hebron, about lat. 58° 20' N., southward to Rhode Island. East coast of Greenland (Dons); Iceland; Northern Europe; Arctic Ocean from Spitzbergen eastward to about 60° E., in Kara Sea. ? Atka, Aleutian Islands (Birula, 1910).

Shallow water to 500 meters (273 fathoms), according to Dons.

*Material examined.*—See table, pages 255–257.

HYAS COARCTATUS Leach

HYAS COARCTATUS ALUTACEUS Brandt

HYAS COARCTATUS URSINUS Rathbun

TOAD CRAB

Plates 94–97

*Hyas coarctatus* LEACH, Trans. Linn. Soc. London, vol. 11, 1815, p. 329 (type-localities, in *mari Britannico; apud Frith of Forth, Plymouth Sound et Salcombe*; supposed types in Brit. Mus., but label incomplete<sup>30</sup>); Malac. Podoph. Brit., 1816, pl. 21B.—SMITH, Rept. U. S. Fish Commr., vol. 1, 1871–72 (1873), p. 548 [254].—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 69, and synonymy; in Grenfell, Labrador, 1909, p. 481; Rept. Canad. Arc. Exped., 1913–18, vol. 7, pt. A, 1919, p. 9A.—BIRULA, Annuaire Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, vol. 11, 1906 (1907), p. 8.—HANSEN, Danish Ingolf-Exped., vol. 3, pt. 2, 1908, p. 15.—DONS, Tromsø Mus. Aarshefter 34, 1912–13, p. 158, pl. 1, figs. 14–19; pl. 2, figs. 9–10; pl. 3, figs. 3–8, text-figs. A2, 4, 6 and 8, B2 and 2a, and synonymy except *H. lyratus*; 37, 1914 (1915), p. 88.

*Lissa fissirostra* (by error, *fssirostra*) SAY, Journ. Acad. Nat. Sci. Philadelphia, vol. 1, 1817, p. 79 (type-locality, coast of Long Island; type not extant).

*Hyas coarctata* MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 312; R. Anim. de Cuvier, disciples ed., p. 90, pl. 32, fig. 3.—BIRULA, Annuaire Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, 1897, p. 445 [41].

*Hyas serratus* HAILSTONE, Mag. Nat. Hist., vol. 8, 1835, p. 262 (type-locality, near Hastings, England, in trawl net; type not extant).

*Hyas bufonius* WHITE, List Crust. Brit. Mus., 1847, p. 6 (locality not given; type in Brit. Mus.).

*Hyas coarctatus*, var. *alutacea* BRANDT, in Middendorff's Reise in den Äussersten Norden und Osten Sibiriens, vol. 2, Zool., pt. 1, 1851, p. 79 (type-locality, Bear Island, near the Schantar Islands, Okhotsk Sea, Siberia; type in Petrograd Mus.).

<sup>30</sup> Dr. Calman, of the British Museum, under date of January 23, 1923, writes: "There are in our collection a number of old dry specimens of *Hyas coarctatus* which according to the 'List of British Animals,' part 4, Crustacea, 1850, came 'from the collection of Dr. Leach,' but curiously enough their origin is not stated in the museum register and I suspect some confusion has taken place in the labels of the specimens themselves. The result is that although it is probable that some of them might be ranked as the syntypes of the species, I am not confident that I can tell which they are. I do not think it likely that types exist in any other museum."



*Hyas latifrons* STIMPSON, Proc. Acad. Nat. Sci. Philadelphia, vol. 9, 1857, p. 217 [24] (type-locality, in *Mari Beringiano*; types, Cat. No. 2100, U. S. N. M.); Smithson. Misc. Coll., vol. 49, 1907, p. 9, pl. 2.

*Hyas coarctatus*, var. *latifrons* BRAŽNIKOV, Mém. Acad. Imp. Sci. St. Pétersbourg, ser. 8, vol. 20, 1907, No. 6, p. 43.

*Hyas coarctatus alutaceus* BIRULA, Mém. Acad. Sci. St. Pétersbourg, ser. 8, vol. 29, 1910, p. 4, pl. 1, figs. 2-5.

*Hyas coarctatus forma alutacea* DONS, Tromsø Mus. Aarshefter 37 (1914), 1915, p. 86, footnote.

*Hyas coarctatus ursinus* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1924, p. 4 (type-locality, Sea of Japan, 325 fathoms; holotype, female, Cat. No. 46493, U. S. N. M.).

*Diagnosis*.—Carapace lyrate; postorbital and hepatic regions dilated laterally, forming a winglike expansion with a rounded, posterolateral angle. Basal antennal article narrowing anteriorly but not triangular, and without large tubercle (fig. 90, *b*).

*Description*.—The hepatic and postorbital regions are dilated laterally and form an expansion with a broadly rounded posterolateral margin, which is separated by a broad and deep sinus from the branchial region. The tubercles of the lateral margin extend forward only to the posterior part of the hepatic region. The basal article of the antenna narrows a little forward, its thickened side margins are granulate, the outer margin terminating forward in a distinct although blunt tooth.

The ornamentation of the carapace is similar to that of *H. araneus*. On the mesogastric region two large median tubercles, on the urogastric region two others side by side. In the old the carapace is rougher than in *araneus*, and the chelipeds more roughly granulate. The rostral horns may be contiguous or diverge narrowly or have a buttonhole gape, meeting only at the tips. The chelipeds may attain or exceed the length of the legs of the first pair.

*Color*.—According to Leach's figures, the color is similar to that of *H. araneus*, but the red of carapace and chelipeds is more restricted. Dusky brick-red above, whitish below (Stimpson, as *latifrons*).

*Variations*.—In the course of its range, the species shows great variation. The typical form is of relatively small size, has a long rostrum in proportion to length of carapace; rostrum contained in total carapace length 4.5 times in specimens of medium size, to 6.4 times in the largest (Birula). The form called *alutacea* by Brandt and later *latifrons* by Stimpson has a shorter, broader rostrum, its length contained in total carapace length 7 times in specimens of medium size, to 9.3 times in large specimens. The anterior third of the carapace, embracing the hepatic regions, is wider in *alutaceus* than in typical *coarctatus*; the tubercles of the carapace are less strongly marked.

Material examined of *Ilyas coarctatus*

| Locality   | Bearings    |              | Fathoms | Bottom                | Temp. | Date                            | Station | Collector   | Specimens       | Cat. No.            | Remarks                                  |
|--|-------------|--------------|---------|-----------------------|-------|---------------------------------|---------|---|-----------------|---------------------|--|
|  | Latitude N. | Longitude W. |         |                       |       |                                 |         |   |                 |                     |  |
| Greenland:<br>Off Here Island.....   | 70° 20' 00" | 56° 00' 00"  | 90      |                       | ° F   | June 12, 1884                   |         | C. S. McClain,<br>Ensign, U. S. N.<br>U. S. S.                | 1 ♀             | 13759               | <i>atutaceus</i> , var;<br>horns narrow. |
| Disco Harbor.....  |             |              |         |                       |       | July, 1883                      |         | H. G. Dressel,<br>Ensign, U. S. N.<br>Greely<br>Relief Exped. | 1               | 13988               | <i>atutaceus</i> .                       |
| Greenland:<br>Davis Strait.....  |             |              |         |                       |       |                                 |         | Dr. Favy.<br>N. P. Scudder,<br>U. S. Fish<br>Comm.            | 1 lge. ♂<br>1 ♀ | 5239<br>46676       | Do.<br>Do.                               |
| Hudson Bay: Near Egg Is-<br>land.<br>Labrador:<br>South shore Hudson<br>Strait.<br>Ungava Bay.....   |             |              | (1)     |                       |       | Aug. 17, 1900                   |         | E. A. Preble,<br>Biol. Survey.                                | 1 ♀             | 26351               | Do.                                      |
| 20 miles south of Nain-<br>1 mile north of Battle<br>Harbor.<br>Hensley Harbor<br>Newfoundland:<br>Off St. Lawrence Har-<br>bor, Piacenta Bay.<br>Flemish Cap..... |             |              |         |                       |       | 1897                            |         | Wm. Wakeham   | 2               | 21459               | Do.                                      |
|  |             |              |         |                       |       | 1897                            |         | Diana, Hudson<br>Bay Exped.                                   | 1 ♂             | O t t a w a<br>Mus. | Do.                                      |
|  |             |              | 50      | fine S.               |       | Aug. 15, 1903<br>Sept. 14, 1903 |         | Owen Bryant<br>do   | 8<br>1 ♂        | 38457<br>38456      | Do.<br>Do.                               |
|  |             |              | (2)     |                       |       | 1882                            |         | W. A. Stearns   | 3 ♀             | 5240                | Do.                                      |
|  |             |              | 50      | rky.                  |       | Sept. 29, 1908                  |         | Owen Bryant   | 1               | 38454               | Do.                                      |
|  |             |              | 86      | gy. S. bk. Sp.        |       | Aug. 11, 1886                   | 2694    | <i>Albatross</i>  | 4               | 11873               | Typical.                                 |
|  |             |              | 73      | gy. S. sm. bk.<br>St. |       | do                              | 2692    | do  | 1 ♀             | 11872               | Do.                                      |
| Grand Bank.....  | 47° 29' 00" | 52° 18' 00"  | 86      | G.                    |       | July 2, 1885                    | 2456    | do  | 3 ♂             | 10200               | <i>atutaceus</i> .                       |
| Do.....  | 47° 21' 00" | 51° 38' 30"  | 81      | br. S.                | 30    | June 26, 1885                   | 2455    | do  | 1 ♂, 2 ♀        | 10208               | Do.                                      |
| Do.....  |             |              |         |                       |       |                                 |         | N. P. Scudder,<br>U. S. Fish<br>Comm.                         | 1 ♂             | 40182               | Do.                                      |
| Green Bank.....  | 45° 50' 00" | 54° 06' 00"  | 67      | gy. S. Sh.            | 30    | July 3, 1885                    | 2460    | <i>Albatross</i>  | 1 ♂, 1 ♀        | 10212               | Do.                                      |
| Do.....  | 45° 44' 00" | 54° 27' 00"  | 45      | brk. Sb.              | 30    | do                              | 2463    | do  | 1 ♀             | 10213               | Do.                                      |
| St. Peters Bank.....   | 45° 29' 00" | 55° 24' 00"  | 67      | C.                    | 30    | do                              | 2466    | do  | 1 ♀             | 16287               | Do.                                      |

|  |  |                                  |                            |                                    |                              |  |                         |  |
|--|--|----------------------------------|----------------------------|------------------------------------|------------------------------|--|-------------------------|--|
| Nova Scotia:<br>Aricat Harbor, Cape Breton, in cod stomach | 30   |                                  |                            | Sept., 1890                        | W. A. Stearns                | 1  | 15289                   | Do.  |
| Misaine Bank   | 45 27 30<br>44 54 00<br>44 22 30                     | 58 27 45<br>59 46 45<br>61 00 15 | G. P.<br>fnc. br. S.<br>P. | July 6, 1885<br>do<br>July 7, 1885 | <i>Albatross</i><br>do<br>do | 4<br>1<br>5 <sup>1</sup> 10 <sup>1</sup> ♀ | 10214<br>10215<br>10216 | Do.<br>Do.<br>Near typical; rostrums varying in length.  |
| Off Halifax  | 44 30 00   | 63 18 00                         | ers. S.                    | July 8, 1885                       | do                           | 1 ♀  | 10217                   | Typical.   |
| Do.  | Sandwich Point, Halifax Harbor, W. 1/2 N., 1/8 mile. |                                  |                            | Sept. 4, 1877                      | <i>Speedwell</i>             | 1  | 2700                    | Near typical; horns narrow, not very long.               |
| Barrington Pass  | 3 1/2-9  |                                  |                            | June - July, 1910.                 | Geol. Surv. Can. adn.        | 1 ♂ 1 ♀                                    | 41887                   | Typical.   |
| Browns Bank, off Cape Sable.                               | 40   |                                  | rky. sdy.                  | Oct. 8, 1908                       | Owen Bryant                  | 2 y.                                       | 38453                   | Do.  |
| Do.  | 45   |                                  |                            | do                                 | do                           | 3 y.                                       | 38455                   | Do.  |
| La Have Bank   | 42 56 00   | 64 51 00                         | G. St.                     | Sept. 12, 1872                     | <i>Rache</i>                 | 4  | 3942                    | Do.  |
| Do.  | 42 46 00   | 66 27 00                         | fnc. sdy. M.               | Aug. 20, 1877                      | <i>Speedwell</i>             | 1 ♀  | 2702                    | Typical; tips of rostrum broken off.                     |
| Do.  | 42 27 00   | 66 00 45                         | S. G. brk. Sh.             | May 16, 1883                       | <i>Albatross</i>             | 1 ♀  | 5801                    | Typical.   |
| Do.  | 41 13 00   | 66 00 50                         | bu. M.                     | Sept. 4, 1883                      | do                           | 1  | 5809                    | Do.  |
| New Brunswick:<br>Grand Manan                              |  |                                  |                            | 1872                               | U. S. Fish Comm              | 1 y. ♀                                     | 38018                   | Do.  |
| Do.  |  |                                  |                            | 1872                               | H. E. Webster                | 4  | 3921                    | Typical; rostrum of largest specimen not very long.      |
| Do.  |  |                                  |                            | Aug. - Sept. 1898                  | M. J. Rathbun                | 10 sm.                                     | 21689                   | Typical.   |
| West of Grand Manan  | 3-25   |                                  |                            | 1872                               | U. S. Fish Comm              | 1 ovig. ♀                                  | 40753                   | Do.  |
| Maine:<br>Off Monhegan                                     | 40-55  |                                  |                            | Aug. 2, 1912                       | <i>Grampus</i>               | 1  | 46002                   | Do.  |
| Off Seguin   | 60   |                                  |                            | July 26, 1912                      | do                           | 1 ♂ 1 ♀                                    | 45998                   | Do.  |
| West of Haskells Island, Casco Bay                         | 5  |                                  |                            | Aug. 14, 1911                      | Rathbun & Dandridge          | 2 y.                                       | 43164                   | Do.  |
| Mouth of Casco Bay   | 30   |                                  |                            | July 24, 1912                      | <i>Grampus</i>               | 2 ♀  | 45999                   | Do.  |
| Cashes Lodge   |  |                                  |                            |                                    | U. S. Fish Comm              | 1 y.                                       | 40192                   | Near typical; carapace very wide across hepatic regions. |
| Do.  | 42 49 00   | 68 50 00                         | rky.                       | 1873                               | <i>Bache</i>                 | 10   | 3878                    | Typical.   |
| Massachusetts:<br>Off Thatchers Island                     | 73-75  |                                  | fnc. S.                    | Aug. 16, 1878                      | <i>Speedwell</i>             | 2  | 2594                    | Do.  |
| Do.  | 29   |                                  | stony, Sp. G               | Sept. 2, 1878                      | do                           | 10   | 2593                    | Do.  |
| Do.  | 98   |                                  | muddy                      | do                                 | do                           | 1  | 2581                    | Do.  |
| Off Eastern Point  | 45   |                                  | M.                         | Aug. 29, 1878                      | do                           | 1 ♂ 3 ♀                                    | 2865                    | Do.  |

1 Beach, high-water mark.

1 Shallow.

Material examined of *Hyas coarctatus*—Continued

| Locality                                  | Bearings   |              | Fathoms | Bottom           | Temp.<br>°F   | Date                        | Station | Collector                       | Specimens                                      | Cat. No.       | Remarks  |
|---|--|--------------|---------|------------------|---------------|-----------------------------|---------|---------------------------------|--|----------------|--|
|   | Latitude N.  | Longitude W. |         |                  |               |                             |         |                                 |  |                |  |
| Massachusetts—Contd.<br>Off Cape Ann..... | ° ' "  | ° ' "        | 57-63   |                  |               | Sept. 17, 1878              | 210-214 | Speedwell.....                  | 6.....   | 2599           | Typical.   |
| Gloucester, off shore                     |  |              |         |                  |               |                             |         | Mar. Biol. Lab.,<br>Woods Hole. | 1♂ <sup>7</sup> .....                          | 46186          | Do.  |
| Massachusetts Bay.....                    | 42 30 00   70 20 00<br>Thatchers Island<br>Light, N.W. ¼ N.,<br>13½ miles; Halfway<br>Rock, W. by N., 20<br>miles. |              | 90      | M.....           | 38.5-<br>39   | Aug. 14, 1877               | 32      | Speedwell.....                  | 3.....   | 2703           | Do.  |
| Nahant.....                               |  |              | 30      |                  |               | June, 1912<br>July 13, 1912 | 6       | A. S. Pearce<br>Grampus.....    | 1♂ <sup>7</sup> .....<br>1♂ <sup>7</sup> ..... | 45887<br>46004 | Do.<br>Do.   |
| Near Boston Lightship.                    | 42 09 30   69 57 00<br>Cape Cod Light,<br>S. 30° W., 8 miles.  |              | 73      | G.....           |               | July 29, 1879               | 265     | Speedwell.....                  | 3♂ 1♀.....                                     | 3997           | Do.  |
| Off Cape Cod.....                         | 42 08 30   70 13 00  |              | 30      | crs. S.          |               | July 25, 1879               | 249-250 | .....do.....                    | 12♂ 6♀.....                                    | 3947           | Do.  |
| Do.....                                   | Off South end Stell-<br>wagens Bank.   |              | 26-28   |                  | 41.8-<br>42.8 | Sept. 6, 1879               | 329-334 | .....do.....                    | 26.....  | 3970           | Near typical; ros-<br>trums varying in<br>length.    |
| Do.....                                   | 42 03 30   70 23 00<br>Race Point Light,<br>N. 86° E., 6¼ miles.   |              | 26      | gn. M.           | 39            | Aug. 11, 1879               | 294     | .....do.....                    | 1♀.....  | 3998           | Typical.   |
| Do.....                                   | 42 03 00   69 22 00<br>Cape Cod Light, S.<br>88° W., 30 miles.   |              | 106     | gy. M.           |               | Sept. 18, 1879              | 360     | .....do.....                    | 1♂ 1 y.....                                    | 40752          | Do.  |
| Do.....                                   | 41 35 30   69 42 00<br>Chatham Light, N.<br>75° W., 12 miles.  |              | 18      | speckled S.      |               | Sept. 19, 1879              | 370     | .....do.....                    | 20 sin. ♂ ♀.....                               | 3958           | Do.  |
| Do.....                                   | 41 35 30   69 35 00<br>Chatham Light, N.<br>72° W., 16 miles.  |              | 34.5    | crs. speckled S. |               | .....do.....                | 371     | .....do.....                    | { 2 y.....<br>1 y.....                         | 40754<br>37964 | { abutaneous shape of<br>A very early crab<br>stage. |
| Do.....                                   | Off Chatham.   |              | 16-18   |                  | 50.5-<br>52   | Aug. 30, 1881               | 967-969 | Fish Hawk.....                  | 9♂ 9♀ 7 y.....                                 | 4554           | Do.  |
| Do.....                                   | Chatham Lights, W.<br>N.W. ¼ W., 6½ miles.   |              | 16      | S. G. St.....    | 51            | .....do.....                | 974     | .....do.....                    | 2♂ 5♀.....                                     | 4555           | Do.  |
| Do.....                                   | Chatham Lights, W.<br>N.W. ¼ W., 6 miles.  |              | 16      | S. G. St.....    | 52            | .....do.....                | 976     | .....do.....                    | 6♂ 6♀.....                                     | 39944          | Do.  |

| Do. | Chatham Lights, NW,<br>by W. $\frac{3}{4}$ W., $\frac{5}{8}$<br>miles. | 14       | S. St. P.                  | 53    | do.                   | 980              | do.            | 1♂.            | 46028 | Do.  |
|-----|--|----------|----------------------------|-------|-----------------------|------------------|----------------|----------------|-------|--|
| Do. | {Off Chatham.....}   | 33       | M. S.                      | 41.5  | do.                   | 984              | do.            | 7.             | 40711 | {Near typical; ros-<br>trums varying in<br>length.<br>Typical. |
| Do. | {41 31 00   69 28 00 }   | 33-43    |                            |       | do.                   | 981              | do.            | 50♂ ♀          | 3349  |  |
| Do. | Off Chatham.   | 28-90    |                            | 37-40 | do.                   | 984              | do.            | 6.             | 14508 | Do.  |
| Do. | Vicinity of Woods Hole   |          |                            |       | Aug. 2 and 3,<br>1882 | 1080             |                |                |       |  |
| Do  | South of Marthas Vine-<br>yard.  | 25       | S.                         | 50    | Sept. 7, 1881         | 985              | V. N. Edwards  | 2 y. ♀         | 32484 | Do.  |
| Do. | 41 00 00   70 49 00  |          |                            |       | 1911                  |                  | N. J. Rathbun. | 3              | 32485 | Do.  |
| Do. | 40 20 00   70 35 00  | 55       | sft. M.                    | 44    | Aug. 23, 1883         | 1159             |                | 1 y. ♂         | 6506  | Do.  |
| Do. | 40 14 00   70 29 15  | 62       | sft. M.                    | 45    | do.                   | 1157             |                | 2 ♂            | 5804  | Do.  |
| Do. | 40 03 00   70 38 00  | 89       | ky. S.                     | 49    | Aug. 22, 1882         | 1109             |                | 1 ♀            | 4744  | Do.  |
| Do. | 40 02 00   70 45 00  | 89       | ky. S.                     | 48    | do.                   | 1117             |                | 1 ♀            | 4743  | Do.  |
| Do. | 40 02 18   70 23 06  | 192      | fine. S.                   | 50    | Sept. 4, 1880         | 869              |                | 1 y.           | 34016 | A very early crab  |
| Do. | 40 46 30   69 50 15  | 18       | fine. S. bk. Sp.           | 55.9  | Sept. 27, 1884        | 2255             | Albatross      | 1 ♂            | 8660  | Typical.   |
| Do. | 40 38 30   69 29 00  | 30       | yl. S.                     | 52.9  | Sept. 28, 1884        | 2256             | do.            | 2 ♂ 3 ♀        | 7169  | Do.  |
| Do. | 40 34 30   69 50 45  | 32       | gy. S. bk. Sp.             | 52.9  | Sept. 27, 1884        | 2253             | do.            | 1 y.           | 8733  | Do.  |
| Do. | 40 26 00   69 29 00  | 36       | gy. S. bk. Sp.             | 51.2  | Sept. 28, 1884        | 2258             | Albatross      | 3 y. ♂ 1 y. ♀  | 7168  | Do.  |
| Do. | 39 54 00   69 44 00  | 158      | fine. S.                   | 45    | Aug. 11, 1872         | 1097             | Fish Hawk      | 1 ♀            | 4745  | Do.  |
| Do. |  |          |                            |       |                       |                  | Smith & Harger | 2              | 35305 | Do.  |
| Do. |  |          |                            |       |                       | ( <sup>1</sup> ) | Sch. Clifton   | 1 ♀            | 3726  | Do.  |
| Do. |  |          |                            |       | Aug. 30, 1883         | 2057             | Albatross      | 9              | 5796  | Do.  |
| Do. |  | 86       | ers. S. bk. Sp.<br>bk. Sh. | 57    | Aug. 30, 1883         | 2057             |                |                |       |  |
| Do. |  | 45       | ers. S.                    |       | 1872                  | 93.94            | Bacle          | 7              | 3838  | Do.  |
| Do. |  | 70       | yl. S.                     | 42.2  | Sept. 4, 1885         | 2570             | Albatross      | 15             | 10791 | Do.  |
| Do. |  | 50       | S. S.                      | 43    | Aug. 31, 1872         | 82               | Bacle          | 1 y.           | 40756 | Do.  |
| Do. |  | 50       | wh. S. bk. Sp.             | 46    | Sept. 4, 1883         | 2081             | Albatross      | 6♂ ♀           | 5806  | Do.  |
| Do. |  | 49       | ers. yl. S.                | 46.5  | do.                   | 2082             | do.            | {10♂ ♀<br>1♂ ♂ | 5808  | Do.  |
| Do. |  | 150      | S. G.                      | 42    | Aug. 31, 1883         | 2062             | do.            | 1              | 20933 | Do.  |
| Do. |  | 41       | bu. M. S.                  | 41    | do.                   | 2059             | do.            | 2              | 5798  | Do.  |
| Do. |  | 72       | S. G. bk. Sh.              | 43.6  | July 13, 1885         | 2525             | Sch. Sultana   | 2 y.           | 10248 | Do.  |
| Do. |  |          |                            |       |                       | ( <sup>1</sup> ) |                | 24♂ ♀          | 3698  | Do.  |
| Do. |  | 16½      | sft. M. ers. S.            | 55    | Aug. 14, 1880         | 797              | Fish Hawk      | 1 y.           | 40755 | Do.  |
| Do. |  | 17-21    |                            |       | Aug. 21, 1874         |                  |                | 3 y.           | 40751 | Do.  |
| Do. |  | 18       | fine. S. Sh.               | 45.5  | May 5, 1883           | 2017             | Albatross      | 1 y.           | 6376  | Do.  |
| Do. |  | 66½      |                            |       | July 10, 1892         | 5155             | Grampus        | 2 y. ♀         | 5571  | Do.  |
| Do. |  | 373      | gn. M. fine. S.            |       | Apr. 30, 1883         | 2012             | Albatross      | 1 y. ♀         | 5589  | Do.  |
| Do. |  | 45       | gy. bk. S.                 |       | May 1, 1883           | 2014             | do.            |                |       | Do.  |
| Do. |  | 35 43 00 |                            |       | Oct. 21, 1884         | 2308             | do.            |                |       | Do.  |

\* (Gl. Don. 787.

† (Gl. Don. 931.

Material examined of *Hyas coarctatus*—Continued

| Locality   | Bearings    |              | Fathoms          | Bottom | Temp. | Date          | Station | Collector  | Specimens  | Cat. No.     | Remarks   |
|--|-------------|--------------|------------------|--------|-------|---------------|---------|--|------------|--------------|---|
|  | Latitude N. | Longitude W. |                  |        |       |               |         |  |            |              |   |
| Arctic Alaska: <sup>s</sup><br>Cape Smyth.....             | ° ' "       | ° ' "        | ( <sup>g</sup> ) |        | ° F   | 1882-83       |         | Point Barrow Exped., U. S. Sig. Service, U. S. R. S. <i>Corwin</i> . | 3♂         | 7852         | <i>atitaceus</i> .  |
| Southwest of Cape Smyth,<br>10 miles W. of Point Franklin. | 71 02 00    | 157 46 00    | 19               |        |       | Aug. 21, 1884 |         | Pt. Barrow Exped.  | 1♂ 6♀ 1 Y. | 14730        | Do.   |
| Off Icy Cape.....  | 70 21 00    | 161 25 00    | 13½              | S.     |       | Aug. 31, 1883 | 23      | Canad. Arc. Ex.  | 1♀         | 7878         | Do.   |
| Off Cape Sabine.....                                       |             |              | 9-10             | M. P.  |       | Aug. 19, 1913 |         | W. H. Dall   | 4♂ 4♀      | 54196        | Do.   |
| Off Point Hope.....  |             |              | 13               | G      |       | Aug. 24, 1880 |         | Capt. M. A. Healy, U. S. R. S. <i>Corwin</i> .                       | 1♂ 1♀      | 14738        | Do.   |
|  |             |              | 25               |        |       | July 13, 1884 |         | U. S. R. S. <i>Corwin</i> .  | 3♂         | 14729        | Do.   |
| Arctic Ocean.....  |             |              |                  |        |       | 1880          |         | N. Pac. Expl. Exped.   | 1♂ 2♀ 2 Y. | 14732        | Do.   |
| Do.....  |             |              |                  |        |       |               |         |  | 1♂         | 1236, M.C.Z. | <i>atitaceus</i> ; labeled " <i>H. latifrons</i> " by Stimpson. |
| Off Kotzebue Sound.....                                    | 66 45 0     | 166 35 00    | 10               | S.     |       | Aug. 19, 1880 |         | W. H. Dall   | 1♂ 1♀      | 14743        | Do.   |
| North of Cape Prince of Wales.                             | 66 07 00    | 168 26 37    | 31               |        |       | June 14, 1884 |         | U. S. R. S. <i>Corwin</i> .  | 7♂ 3♀ 5 Y. | 14728        | Do.   |
| Off Cape Prince of Wales                                   |             |              | 23               | M.     |       | 1874          |         | W. H. Dall   | 1♂ 3♀      | 14739        | Do.   |
| Do.....  | 65 49 15    | 169 04 30    | 26               |        |       | June 14, 1884 |         | Capt. M. A. Healy, U. S. R. S. <i>Corwin</i> .                       | 1 Y. ♂     | 13390        | Do.   |
| Bering Strait.....   |             |              | 13               | G      |       | 1880          |         | W. H. Dall   | 1♂ 1 Y.    | 14737        | Do.   |
| Bering Sea (Alaskan side):<br>Bering Sea.....              |             |              |                  |        |       |               |         | Wm. Stimpson, N. Pac. Expl. Exped.                                   | 4♂ 4♀      | 2100         | <i>atitaceus</i> ; types of <i>H. latifrons</i> Stimpson.       |
| 12 miles east of King Island                               |             |              | 17               | M.     |       | 1874          |         | W. H. Dall   | 1♂ 3♀ 1 Y. | 14741        | Do.   |
| St. Lawrence Island  |             |              | 22               |        |       | 1912          |         | Riley D. Moore   | 2♂ 2♀      | 46099        | Do.   |
| Southeast of St. Lawrence Island.                          | 62 54 00    | 166 38 00    |                  |        |       | June 14, 1884 |         | Lieut. Geo. M. Stoney, U. S. N.                                      | 2♂         | 14731        | Do.   |
| Norton Sound.....  | 63 37 00    | 165 19 00    |                  |        |       | June 15, 1884 |         | do.  | 1♀         | 14735        | Do.   |
| Between Nunivak Island and St. Matthew Island.             | 60 22 00    | 168 45 00    | 12               |        |       |               |         | do.  | 1♀         | 14733        | Do.   |

|                          |                   |       | Do. |    | Do. |  | Do. |            | Do.      |      | Do.   |  | Do. |  |
|--------------------------|-------------------|-------|-----|----|-----|--|-----|------------|----------|------|-------|--|-----|--|
|                          |                   |       | 1 ♀ |    | 1 ♀ |  | 1 ♀ |            | 1 ♀      |      | 1 ♀   |  | 1 ♀ |  |
| Do.                      | 60                | 06 00 | 171 | 25 | 00  |  |     | 31. I Aug. | 3, 1893  | 3519 | 18338 |  |     |  |
| Between St. Matthew      | 58                | 19 30 | 172 | 02 | 00  |  |     | Aug.       | 5, 1893  | 3528 | 18344 |  |     |  |
| island and Pribilof      |                   |       |     |    |     |  |     |            |          |      |       |  |     |  |
| islands.                 | 58                | 36 00 | 172 | 21 | 00  |  |     | 36. I Aug. | do       | 3529 | 18345 |  |     |  |
| Do.                      | 59                | 39 00 | 173 | 53 | 00  |  |     | 34.9 Aug.  | 6, 1893  | 3530 | 18346 |  |     |  |
| Do.                      |                   |       |     |    |     |  |     |            |          |      |       |  |     |  |
| Between Nunivak Is-      | 59                | 22 00 | 168 | 21 | 00  |  |     | 40.8 Aug.  | 2, 1893  | 3514 | 18337 |  |     |  |
| land and Pribilof Is-    |                   |       |     |    |     |  |     |            |          |      |       |  |     |  |
| lands.                   |                   |       |     |    |     |  |     |            |          |      |       |  |     |  |
| Do.                      | 58                | 27 00 | 169 | 01 | 00  |  |     | Aug.       | 1, 1893  | 3513 | 18336 |  |     |  |
| Northwest point, St.     |                   |       |     |    |     |  |     | July       | 20, 1922 |      | 56308 |  |     |  |
| Paul Island,             |                   |       |     |    |     |  |     |            |          |      |       |  |     |  |
| Pribilof Islands.        | St. George Island |       |     |    |     |  |     |            |          |      |       |  |     |  |
| Do.                      | 57                | 58 00 | 169 | 07 | 00  |  |     | 35.7 May   | 2, 1914  |      | 48289 |  |     |  |
| Do.                      | 57                | 49 30 | 169 | 27 | 00  |  |     | Aug.       | 4, 1893  | 3522 | 18339 |  |     |  |
| Do.                      | 57                | 48 00 | 171 | 21 | 00  |  |     | Aug.       | 1, 1893  | 3512 | 18335 |  |     |  |
| Do.                      | 57                | 30 00 | 170 | 02 | 00  |  |     | 38 Aug.    | 5, 1893  | 3527 | 18343 |  |     |  |
| Do.                      | 57                | 31 00 | 170 | 57 | 00  |  |     | 38 Aug.    | 4, 1893  | 3523 | 18340 |  |     |  |
| Do.                      | 57                | 31 00 | 170 | 57 | 00  |  |     | 38.9 Aug.  | 5, 1893  | 3526 | 18342 |  |     |  |
| Do.                      | 57                | 22 00 | 169 | 36 | 00  |  |     | 37.2 Aug.  | 1, 1893  | 3511 | 18334 |  |     |  |
| Do.                      | 57                | 24 00 | 169 | 36 | 00  |  |     | 40.3 Aug.  | 4, 1893  | 3524 | 18341 |  |     |  |
| Do.                      | 57                | 18 00 | 170 | 42 | 00  |  |     | 38.9 July  | 12, 1893 | 3484 | 18324 |  |     |  |
| Do.                      | 57                | 18 00 | 171 | 54 | 00  |  |     | 37.4 Aug.  | do       |      | 18325 |  |     |  |
| Do.                      | 57                | 12 30 | 169 | 51 | 00  |  |     | 40.1 Aug.  | 1, 1893  | 3510 | 18333 |  |     |  |
| Do.                      | 57                | 09 00 | 168 | 17 | 00  |  |     | 38.1 July  | 28, 1893 | 3505 | 18329 |  |     |  |
| Do.                      | 57                | 07 30 | 170 | 28 | 15  |  |     | 38.7 July  | 18, 1896 | 3638 | 20153 |  |     |  |
| Do.                      | 57                | 06 30 | 170 | 28 | 00  |  |     | 30 Aug.    | do       | 3637 | 20152 |  |     |  |
| Do.                      | 57                | 06 30 | 170 | 22 | 30  |  |     | Aug.       | 3, 1891  | 3438 | 17077 |  |     |  |
| Do.                      | 57                | 06 00 | 170 | 35 | 00  |  |     | do         | do       | 3439 | 17078 |  |     |  |
| Do.                      | 57                | 04 00 | 170 | 21 | 00  |  |     | do         | do       | 3537 | 18354 |  |     |  |
| Do.                      | 57                | 03 00 | 169 | 43 | 00  |  |     | do         | do       | 3500 | 18352 |  |     |  |
| Do.                      | 57                | 00 00 | 169 | 09 | 00  |  |     | do         | do       | 3568 | 32261 |  |     |  |
| Do.                      | 56                | 58 00 | 170 | 09 | 00  |  |     | do         | do       | 3566 | 18353 |  |     |  |
| Do.                      | 56                | 57 30 | 170 | 33 | 00  |  |     | do         | do       | 3594 | 18350 |  |     |  |
| Do.                      | 56                | 56 30 | 169 | 27 | 00  |  |     | do         | do       | 3604 | 18328 |  |     |  |
| Do.                      | 56                | 55 00 | 169 | 52 | 00  |  |     | do         | do       | 3609 | 18355 |  |     |  |
| Do.                      | 56                | 50 00 | 169 | 59 | 00  |  |     | do         | do       | 3584 | 18350 |  |     |  |
| Do.                      | 56                | 40 00 | 169 | 20 | 00  |  |     | do         | do       | 3569 | 18356 |  |     |  |
| Do.                      | 56                | 37 00 | 170 | 19 | 00  |  |     | do         | do       | 3495 | 18326 |  |     |  |
| Do.                      | 56                | 34 00 | 170 | 19 | 00  |  |     | do         | do       | 3554 | 18342 |  |     |  |
| Do.                      | 56                | 31 00 | 169 | 17 | 00  |  |     | do         | do       | 3561 | 18337 |  |     |  |
| Do.                      | 56                | 28 00 | 169 | 28 | 00  |  |     | do         | do       | 3552 | 18351 |  |     |  |
| Do.                      | 56                | 02 00 | 169 | 30 | 00  |  |     | do         | do       | 3500 | 18347 |  |     |  |
| Do.                      | 58                | 11 30 | 163 | 02 | 45  |  |     | do         | do       | 3250 | 18372 |  |     |  |
| Off Cape Newenham        | 58                | 34 15 | 162 | 22 | 00  |  |     | do         | do       | 3248 | 18871 |  |     |  |
| Between Pribilof Islands | 56                | 45 00 | 167 | 25 | 00  |  |     | do         | do       | 3611 | 19318 |  |     |  |
| and Bristol Bay.         |                   |       |     |    |     |  |     | Aug.       | 22, 1895 |      |       |  |     |  |
| Do.                      | 56                | 34 00 | 167 | 19 | 00  |  |     | Aug.       | 9, 1893  | 3539 | 18347 |  |     |  |
| Do.                      | 56                | 27 00 | 166 | 08 | 60  |  |     | do         | do       | 3540 | 18348 |  |     |  |
| Do.                      | 57                | 33 00 | 165 | 55 | 00  |  |     | July       | 29, 1893 | 3506 | 18330 |  |     |  |

5 For larvae examined, see Rept. Canad. Arc. Exped., 1913-18, vol. 7, part A, 1919, p. 9A.  
6 Beach.

Material examined of *Hyas coarctatus*—Continued

| Locality  | Bearings   |              | Fathoms | Bottom           | Temp. | Date          | Station | Collector                          | Specimens   | Cat. No. | Remarks   |
|---|--|--------------|---------|------------------|-------|---------------|---------|------------------------------------|-------------|----------|---|
|   | Latitude N.                                      | Longitude W. |         |                  |       |               |         |                                    |             |          |   |
| Bering Sea—Continued.<br>Between Pribilof Islands<br>and Bristol Bay. | 57 35 50   | 165 05 00    | 25.5    | fine. gy. S.     | 37.5  | June 14, 1890 | 3251    | <i>Albatross</i> .                 | 86.         | 15873.   | <i>alutaceus</i> .                              |
| Do.   | 57 43 00   | 164 42 00    | 31      | fine. gy. S.     | 37.5  | July 29, 1893 | 3507    | do.                                | 81 ge.      | 18331.   | Do.   |
| Do.   | 57 05 50   | 164 27 15    | 36      | N. S.            | 35    | June 14, 1890 | 3253    | do.                                | 1 y. ♀      | 15875.   | Do.   |
| Do.   | 57 22 20   | 164 24 40    | 29.5    | bk. N.           | 44.8  | do.           | 3252    | do.                                | 16.         | 15874.   | Do.   |
| Do.   | 56 14 00   | 164 08 00    | 49      | bk. N. fine. S.  | 36.1  | Aug. 10, 1893 | 3541    | do.                                | 5.          | 19346.   | Do.   |
| Bristol Bay   | 57 51 30   | 164 40 00    | 23      | fine. gy. S.     | 41.8  | July 22, 1890 | 3505    | do.                                | 2.          | 15862.   | Do.   |
| Do.   | 58 26 30   | 161 36 00    | 17.5    | G.               | 38    | June 9, 1890  | 3246    | do.                                | 2.          | 15870.   | Do.   |
| Do.   | 57 24 30   | 161 17 00    | 33      | fine. gy. S.     | 38.9  | July 22, 1890 | 3506    | do.                                | 19.         | 15894.   | Do.   |
| Do.   | 58 02 30   | 161 13 45    | 28      | fine. gy. S.     | 39.5  | do.           | 3504    | do.                                | 1 y.        | 15893.   | Do.   |
| Do.   | 57 27 00   | 160 23 30    | 33      | bk. S.           | 40.2  | do.           | 3503    | do.                                | 15.         | 15891.   | Do.   |
| Do.   | 57 45 45   | 160 12 15    | 30      | fine. gy. S.     | 40.2  | do.           | 3502    | do.                                | 4.          | 15890.   | Do.   |
| Do.   | 56 26 30   | 160 00 00    | 15      | bk. G.           | 45.5  | July 17, 1890 | 3288    | do.                                | 39.         | 15884.   | Do.   |
| Do.   | 57 14 00   | 159 35 00    | 32      | bk. S. G.        | 40    | July 18, 1890 | 3292    | do.                                | 3.          | 15886.   | Do.   |
| Do.   | 57 30 00   | 159 33 00    | 30      | fine. gy. S.     | 40    | do.           | 3293    | do.                                | 5.          | 15887.   | Do.   |
| Do.   | 56 58 30   | 159 11 00    | 26      | bk. S. G.        | 41.2  | do.           | 3291    | do.                                | 4.          | 15885.   | Do.   |
| Do.   | 57 38 00   | 159 07 30    | 26      | gy. S.           | 41.5  | July 19, 1890 | 3297    | do.                                | 1.          | 15889.   | Do.   |
| Do.   | 57 16 45   | 159 03 30    | 30      | bk. G.           | 41    | July 18, 1890 | 3294    | do.                                | 12.         | 15888.   | Do.   |
| Southwest of Bristol Bay.   | 56 39 30   | 160 29 00    | 37      | fine. gy. S. Sh. | 41.5  | July 17, 1890 | 3286    | do.                                | 36.         | 15883.   | Do.   |
| Do.   | 56 16 30   | 160 53 00    | 25.4    | fine. G.         | 43    | June 29, 1890 | 3284    | do.                                | 1.          | 15882.   | Do.   |
| Do.   | 56 28 00   | 161 16 30    | 30      | fine. gy. S.     | 40.3  | do.           | 3283    | do.                                | 4.          | 15881.   | Do.   |
| Do.   | 56 14 00   | 161 41 15    | 36      | gy. S. bk. Sp.   | 40.3  | do.           | 3283    | do.                                | 3.          | 15879.   | Do.   |
| Do.   | 56 30 45   | 161 50 15    | 53      | fine. S. gn. M.  | 38.2  | June 28, 1890 | 3282    | do.                                | 23.         | 15880.   | Do.   |
| Do.   | 56 27 00   | 162 08 00    | 36      | fine. gy. S.     | 41    | June 28, 1890 | 3280    | do.                                | 2.          | 15878.   | Do.   |
| Do.   | 56 12 30   | 162 13 00    | 47      | fine. gy. S.     | 38.8  | do.           | 3278    | do.                                | 68.         | 15876.   | Do.   |
| Do.   | 56 25 40   | 162 30 15    | 41      | fine. gy. S.     | 37    | do.           | 3279    | do.                                | 8.          | 15877.   | Do.   |
| Do.   | 56 10 00   | 163 26 00    | 49      | dk. N. fine. S.  | 39.2  | Aug. 10, 1893 | 3542    | do.                                | 2.          | 18349.   | Do.   |
| Siberia:  |  |              |         |                  |       |               |         |                                    |             |          |   |
| East Cape.  |  |              | 10-25   |                  |       | July 15, 1879 |         | Dr. R. White                       | 1♂ 2♀       | 14744.   | Do.   |
| Plover Bay.   |  |              | 15-20   |                  |       | 1880          |         | W. H. Dall                         | 2♂ 1 ♀ 2 y. | 14740.   | Do.   |
| Do.   |  |              |         |                  |       | 1905          |         | do.                                | 10♂ 9 ♀     | 5241.    | Do.   |
| Do.   |  |              |         |                  |       |               |         | C. W. Washburne, U. S. Geol. Surv. | 1 carapace. | 32441.   | Do.   |
| Off Copper (or Miedni) Island.  | North point Copper Island, N. 76° E., 8.8 miles. |              | 57-56   | gn. S.           |       | June 14, 1906 | 4788    | <i>Albatross</i> .                 | 1 y. ♂      | 46452.   | <i>alutaceus</i> varying toward <i>urinus</i> . |
|   | 54   | 50           | 24      | 167              | 13    | 00            |         |                                    |             |          |   |



|                 |   |       |  |                |      |            |  |                          |   |
|-----------------|---|-------|--|----------------|------|------------|--|--------------------------|---|
| Do.             | North point Copper Island, N. 73° E., 9.1 miles.  | 56    | gn. S.   | do.            | 4789 | do.        | 1 y. ♀   | 46673.                   | <i>ursinus?</i>   |
| Kamchatka       | { Cape Nalacheff, N. 5° W., 10.5 miles.<br>S. shore Tarainoki, S. 43° W., 0.7 miles.<br>Staritschko Island, S. 70° W., 5 miles.<br>Staritschko Island, S. 76° W., 4.8 miles.<br>Staritschko Island, S. 71° W., 4 miles.<br>Staritschko Island, S. 71° W., 4 miles.<br>Avatcha Bay.<br>52 47 45 158 36 30<br>51 16 00 158 03 00<br>51 09 00 157 48 00<br>(Codfish banks, Okhotsk Sea; mouth of Avagan River, N. 71° E., 8.5 miles.<br>51 37 00 156 21 00<br>Mouth of Avagan River, N. 73° E., 8 miles.<br>51 38 00 156 21 00 | 42    | gy. S. G.                                      | June 23, 1900  | 3782 | do.        | 2 y.   | 46672.                   | <i>alutaceus.</i>   |
| Do.             | S. shore Tarainoki, S. 43° W., 0.7 miles.   | 12    | gn.-M. S. Sh. G.                               | June 21, 1900  | 3780 | do.        | 1 ♀  | 25211.                   | Do.   |
| Do.             | Staritschko Island, S. 70° W., 5 miles.   | 58-69 | S. P.  | June 20, 1906  | 4794 | do.        | { 42 ♂ 50 ♀ (21<br>ovig.).<br>{ 28 ♂ 42 ♀ (13<br>ovig.). | { 46418, 46449<br>46447. | { Do.<br>Do.  |
| Do.             | Staritschko Island, S. 71° W., 4 miles.   | 69-48 | gn. S. P.                                      | do.            | 4795 | do.        | { 28 ♂ 42 ♀ (13<br>ovig.).                               | { 46418, 46449<br>46447. | { Do.<br>Do.  |
| Do.             | Staritschko Island, S. 71° W., 4 miles.   | 48    | S. P. Sh.                                      | do.            | 4796 | do.        | 4 ♂ 3 ♀ 4 y.   | 46450.                   | Do.   |
| Do.             | Avatcha Bay.  | 16    | bk. M.   | Aug. 19, 1896  | 3642 | do.        | 1 ♂  | 20154.                   | Do.   |
| Do.             | 52 47 45 158 36 30  | 100   | bk. S. P.                                      | 31.7           | 3643 | do.        | 1 ♀  | 20155.                   | Do.   |
| Do.             | 51 09 00 157 48 00  | 96    | bk. S.   | 33.1           | 3644 | do.        | 1 ♂  | 20156.                   | Do.   |
| Do.             | (Codfish banks, Okhotsk Sea; mouth of Avagan River, N. 71° E., 8.5 miles.<br>51 37 00 156 21 00<br>Mouth of Avagan River, N. 73° E., 8 miles.<br>51 38 00 156 21 00   | 25    | gn. S.   | June 21, 1906  | 4798 | do.        | 7 y.   | 46451.                   | Do.   |
| Do.             | Okhotsk Sea.  | 25    | gn. S.   | do.            | 4799 | do.        | 6 y.   | 43797.                   | Do.   |
| Do.             | Japan:  |       |  |                |      | M. Sasaki  | 2 ♂  | 54506.                   | Do  |
| Sakhalin Island | { Flat Hill, N. 48° W.,<br>Cape Patience, S. 74° W.<br>48 43 10 144 59 30<br>46 44 30 143 45 00   | 67    | S. P.  | Sept. 27, 1906 | 5024 | Albatross. | 1 ♀  | 46461.                   | Do.   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 64    | br. M. fine. bk. S. R. Co.                     | Sept. 26, 1906 | 5016 | do.        | 2 ♂  | 46458.                   | <i>alutaceus</i> varying toward <i>ursinus</i> .          |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 64    | br. M. fine. bk. S. R. Co.                     | do.            | 5017 | do.        | 1 y. ♂   | 46459.                   | Do.   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 192   | br. M. bk. S. P.                               | do.            | 5018 | do.        | 1 ♂ 1 y.   | 46460.                   | Do.   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 18    | fine. gy. S.                                   | Aug. 31, 1896  | 3646 | do.        | 10   | 20157.                   | <i>alutaceus.</i>   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 25    | fine. dk. S.                                   | do.            | 3649 | do.        | 2 ♂ 2 ♀  | 20158.                   | Do.   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 20    | fine. gy. S.                                   | do.            | 3651 | do.        | 9  | 20159.                   | Do.   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 42-43 | { gn. M. fine. gy. S.<br>{ gn. M. fine. gy. S. | Sept. 24, 1906 | 5005 | do.        | 1 ♂ 1 y. ♀   | 46456, 43796.            | Do.   |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 43-42 | { gn. M. fine. gy. S.<br>{ gn. M. fine. gy. S. | do.            | 5006 | do.        | 4 ♂ 2 ♀  | 43794.                   | { <i>alutaceus</i> varying toward <i>ursinus</i> .<br>Do. |
| Do.             | { Cape Tonin, N. 59° W.,<br>12.5 miles.<br>46 43 30 143 45 00<br>Cape Tonin, N. 66° W.,<br>21.3 miles.<br>46 41 30 143 57 40<br>West of Robben Island.<br>do.<br>do.<br>Aniwa Bay.<br>46 04 40 142 27 30<br>Aniwa Bay.<br>46 04 00 142 29 00<br>Aniwa Bay.<br>46 07 50 142 37 20  | 40    | { gn. M. fine. gy. S.<br>{ gn. M. fine. gy. S. | do.            | 5008 | do.        | 1 ♂  | 43798.                   | <i>alutaceus.</i>   |

Material examined of *Hyas coarctatus*—Continued

| Locality             | Bearings   |                    | Fathoms | Bottom                 | Temp.<br>°F | Date           | Station | Collector    | Specimens     | Cat. No.     | Remarks   |
|----------------------|--|--------------------|---------|------------------------|-------------|----------------|---------|--------------|---------------|--------------|---|
|                      | Latitude<br>N.   | Longitude<br>E.    |         |                        |             |                |         |              |               |              |   |
| Japan—Continued.     |  |                    |         |                        |             |                |         |              |               |              |   |
| Sakhalin Island      | ° ' " "  | ° ' " "            | 21-32   | gn. M. S.              |             | Sept. 21, 1906 | 5010    | Albatross    | 3♂ 8♀ 18 y    | 43793, 46674 | { <i>alutaceus</i> varying<br>toward <i>ursinus</i> . |
| Do                   | Korsokov Light, N. 5°<br>E., 9.5 miles.                                  | 46 30 30 142 43 30 | 42      | gn. M.                 | 33.9        | Sept. 25, 1906 | 5011    | do           | 1♀            | 46457        | <i>alutaceus</i> .                                    |
| Do                   | Antwa Bay  | 46 18 30 143 05 40 | 42-43   | gn. M.                 |             | do             | 5012    | do           | 1♂ 2 ovig. ♀  | 43792        | { <i>alutaceus</i> varying<br>toward <i>ursinus</i> . |
| Do                   | Antwa Bay  | 46 17 50 143 08 30 | 43      | gn. M.                 | 36.7        | do             | 5013    | do           | 1♀            | 43795        | Do.   |
| Do                   | Antwa Bay  | 46 17 00 143 09 00 | 31      | gy. M. gn. S.          |             | do             | 5000    | do           | 2♂ 1♀ 2 y     | 46453        | Do.   |
| Do                   | Gulf of Tartary  | 47 37 30 141 42 30 | 35-38   | fine. gy. S. gn.<br>M. | 42.4        | do             | 5003    | do           | 1 y. ♀        | 46454        | Do.   |
| Do                   | Gulf of Tartary  | 47 32 30 141 45 00 | 38      | gn. M.                 | 41.2        | do             | 5004    | do           | 2 imm. ♀      | 46455        | Do.   |
| Do                   | Gulf of Tartary  | 47 31 00 141 44 30 | 86      | dk. S. G.              | 43.7        | Sept. 30, 1906 | 5031    | do           | 2 y.          | 46675        | <i>ursinus</i> , probably.                            |
| Do                   | Gulf of Tartary  | 44 04 00 145 32 00 | 142     | gy. M. S. G.           | 35.1        | Sept. 22, 1906 | 4993    | do           | 1 y. ♂ 1 y. ♀ | 46400        | <i>ursinus</i> .                                      |
| Do                   | Bonassiri Shima (off<br>north end of Rebun<br>I., N. 47° E., 3<br>miles. | 45 25 30 140 53 00 | 1325    | gn. M.                 |             | do             | 4992    | do           | 1 ovig. ♀     | 46493        | <i>ursinus</i> . Type.                                |
| Do                   | Bonassiri Shima, N.<br>52° E., 8 miles.                                  | 45 24 00 140 49 10 | 170-200 |                        |             |                | 4812    | do           | 1 y. ♀        | 46494        | <i>ursinus</i>  |
| Do                   | North point Sado Is-<br>land, S. 31° W., 15<br>miles.                    | 38 33 00 138 40 00 | 130     | gn. M.                 | 39.4        | July 21, 1906  | 4822    | do           | 1 y. ♀        | 46495        | Do.   |
| Do                   | No Saki, S. 80° W., 4.5<br>miles.  | 37 08 10 137 08 00 |         |                        |             |                |         | do           | 1♂ 2♀         | 47109        | Do.   |
| China: Shanghai      |  |                    |         |                        |             |                |         | E. Desclamps |               |              | Typical.  |
| Europe:              |  |                    |         |                        |             |                |         | A. M. Norman |               |              | Do.   |
| Shetland Islands     |  |                    |         |                        |             |                |         | K. Möbius    |               |              | Do.   |
| Kiel Harbor, Germany |  |                    |         |                        |             |                |         |              |               |              | Do.   |

7 Approximate.

8 The author ventures to include this record in the list, as Hansen has found a specimen in the Copenhagen Museum labeled "Amoy."

*H. coarctatus alutaceus* has an extensive range. According to Birula (1910) it reaches as far north and west as Bennett Island on the Siberian coast, thence eastward to Bering Strait and southward through the width of Bering Sea to Okhotsk Sea and the southern shore of Sakhalin Island. Further south, Sea of Japan to Shanghai, there is another well marked subspecies, *Hyas coarctatus ursinus*, to be dealt with elsewhere.

In the Arctic, *alutaceus* occurs also east of Bering Strait as far as Point Barrow, Alaska, and again in Beaufort Sea, Northwest Territories. Although from this point to the Greenland coast the species is absent, it is the same form, *alutaceus*, which appears in lat. 70° 25' N., West Greenland, and is continued thence southward, by way of Hudson Strait and Bay to Labrador, Newfoundland, and Cape Breton.

At Newfoundland and farther west and south, that is, from Nova Scotia, by way of Gulf of Maine, to North Carolina, the form changes, but not abruptly, into the typical *coarctatus* of the British Isles. This form, following the general direction of the Gulf Stream, is continued northeasterly from the Carolina coast to northwestern Europe; thence it extends eastward in the Arctic only to the Murman Sea and therefore fails to connect with the Siberian range of *alutaceus* by nearly 100° of longitude.

Besides the geographical variation there is much individual variation even in specimens from the same gathering, regardless of age or sex. This makes the definite division into separate forms very difficult and unsatisfactory. Some of the variations are noted in the last column of the distribution table.

*Measurements.*—Largest specimen, male, examined (Grand Banks, *alutaceus*, 40182), length of carapace 80, greatest width 64.5 mm. Male (west Greenland), length 99, width 74 mm. (Hansen). Largest American specimen, male, of typical form examined (off Cape Cod, 4555), length 30.2, width 19.7 mm. Largest specimen known of typical form, male, Murman Sea, length 51.5, width 35 mm. (Birula, 1910).

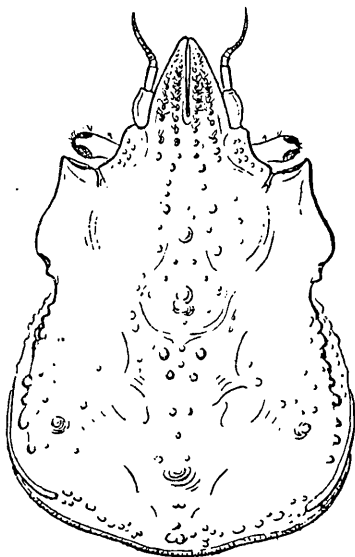


FIG. 93.—HYAS COARCTATUS, MALE, CARAPACE.  
(AFTER SMITH, MS.)

*Range*.—From west Greenland (lat. 70° 25' N., Hansen) and east Greenland (lat. 66° N., Dons) to Hudson Strait and Bay, thence south to Cape Hatteras, North Carolina (lat. 35° 43' N.).

Langton Bay, Northwest territories, Canada; from Point Barrow, Alaska, to Bering Strait and southward in American waters of Bering Sea to lat. 56° 10' N.; thence southward via Kamtchatka and Sakhalin Island (Japan) to Yezo Strait and through the Sea of Japan to Korea (lat. 37° 02' N., Hansen), *ursinus* form. Shanghai (see table); Amoy (lat. 24° 30' N., Hansen).

Iceland; Arctic coast of Europe to long. 49° E. (Birula) and lat. 79° 30' N. at Spitzbergen (Dons); northern Europe southward to about latitude 49.5° N. (Dons).

Coast of Siberia and northward, as far west as Bennett Island (about 147° E.) and north as 76° 50' N. (Birula) to East Cape.

Depth, low-water mark to 373 fathoms, exceptionally 906 fathoms (W. Atlantic).

*Material examined*.—See table, pages 260–268.

HYAS LYRATUS Dana

BLUNT-NOSED CRAB

Plate 235

- Hyas lyratus* DANA, Amer. Journ. Sci., ser. 2, vol. 11, 1851, p. 268 (type-locality, *ad oras Oregonenses*; type not extant); U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 86; atlas, 1855, pl. 1, fig. 1a-d.—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 72, pl. 3, and synonymy. — HOLMES, Occas. Papers Calif. Acad. Sci., vol. 7, 1900, p. 32, and synonymy.
- Hyas coarctatus* DONS, Tromsø Mus. Aarshefter 34, 1912–13, p. 158 (part: *lyratus* form).

*Diagnosis*.—Carapace lyrate; angle of hepatic margin acute or subacute. Basal antennal article with a large, smooth, round tubercle at antero-external angle (fig. 90, c).

*Description*.—Carapace more lyrate than in *H. coarctatus*; the lateral expansion of the hepatic region is more pronounced and is produced to a subacute angle. Surface less convex antero-posteriorly. The lines of tubercles, median, marginal and branchial, are stronger; two large median gastric tubercles, and on either side and a little in advance of the anterior of these, another large tubercle; cardiac region surmounted by a tubercle, a larger one on the intestinal region; a pointed tubercle on the posterior margin of the hepatic expansion. A narrow cleft between the rostral horns, tips more widely separated. Margins of basal article of antenna armed with a few small conical tubercles including one at the extremity of the inner margin; at the extremity of the outer margin a very large, smooth, spherical tubercle, which is partly visible from above and alone serves to distinguish the species not only from others of this

Material examined of *Hyas tigratus*

| Locality                                    | Bearings    |              | Fathoms | Bottom               | Temp. | Date          | Station | Collector | Specimens | Cat. No. |
|---|-------------|--------------|---------|----------------------|-------|---------------|---------|-----------|-----------|----------|
|   | Latitude N. | Longitude E. |         |                      |       |               |         |           |           |          |
| Bering Sea:<br>Off Bering Island, Siberia.  | 54 36 15    | 166 57 15    | 72      | P.                   | ° F   | June 14, 1906 | 4792    | Altross.  | 1 y. ♂    | 46679.   |
| Off Pribilof Islands, Alaska.               | 56 34 00    | 170 19 60    | 62      | gn. M.               | 39.5  | Sept. 2, 1893 | 3554    | do.       | 2         | 18320.   |
| Do.   | 56 58 00    | 170 09 09    | 25      | S. dk. Sp. rky.      | 42.9  | Sept. 3, 1893 | 3558    | do.       | 1 ♂       | 18321.   |
| Do.   | 56 02 00    | 169 30 00    | 121     | fine. gy. S. G.      | 38.6  | July 17, 1893 | 3500    | do.       | 25        | 18317.   |
| Do.   | 56 02 00    | 169 20 00    | 43      | fine. gy. S. bk. Sp. | 40.7  | Sept. 1, 1893 | 3500    | do.       | 1 ♂ 1 ♀   | 18322.   |
| Southeast of Pribilof Islands               | 55 17 00    | 167 34 00    | 91      | gn. M. S.            | 37.1  | Aug. 13, 1895 | 3905    | do.       | 2 ♀       | 55746.   |
| Off Kyska Island, Rat Is-<br>lands.         | 52 01 00    | 177 34 00    | 34      | bk. G.               |       | June 8, 1894  | 3598    | do.       | 1         | 18978.   |
| Do.   | 52 05 00    | 177 40 00    | 55      | rky. fine. S. Sh.    |       | June 9, 1894  | 3599    | do.       | 1         | 18979.   |
| Petrel Bank, off Semiso-<br>pochnoi Island. | 52 11 00    | 179 49 00    | 52-43   | fine. G.             |       | June 5, 1906  | 4777    | do.       | 1 y. ♂    | 46677.   |
| Do.   | 52 11 00    | 179 57 00    | 54-56   | brk. Sh. P. S.       | 40.8  | do.           | 4779    | do.       | 1 y. ♀    | 46678.   |
| Off Unalaska.                               | 53 40 30    | 157 30 00    | 59      | bk. S. Co.           | 40.8  | Aug. 18, 1890 | 3319    | do.       | 1         | 15935.   |
| Do.   | 53 40 00    | 167 29 45    | 59      | bk. S. Co.           | 40.8  | do.           | 3320    | do.       | 1         | 15936.   |
| Do.   | 53 58 03    | 166 33 25    | 63      | M.                   | 40.8  | Aug. 22, 1890 | 3335    | do.       | 1         | 15937.   |
| Do.   | 53 58 36    | 166 29 43    | 85      | gn. M.               | 41    | Aug. 15, 1890 | 3311    | do.       | 5         | 15953.   |
| Do.   | 54 01 51    | 166 27 38    | 68      | fine. bk. S.         | 42.7  | do.           | 3313    | do.       | 1         | 15954.   |
| North of Akutan Island                      | 55 00 00    | 166 10 00    | 78      | fine. bk. S.         | 41    | Sept. 1, 1893 | 3549    | do.       | 2         | 18319.   |
| Do.   | 54 15 00    | 165 03 00    | 72      | P.                   | 41    | July 23, 1888 | 2842    | do.       | 11        | 15533.   |
| Do.   | 54 18 00    | 165 55 00    | 56      | bk. S.               | 41    | do.           | 2841    | do.       | 1 ♀       | 15531.   |
| Off Unimak Pass.                            | 54 49 00    | 165 42 00    | 91      | bk. S. G.            | 39.5  | Sept. 1, 1893 | 3548    | do.       | 9         | 18318.   |
| Do.   | 54 26 15    | 165 32 00    | 56      | bk. P.               | 39    | June 24, 1890 | 3257    | do.       | 5         | 15910.   |
| Unimak Pass.                                | 54 20 00    | 165 30 00    | 50      | bk. S. P. Sh.        | 39.7  | do.           | 3223    | do.       | 2         | 15903.   |
| Do.   | 54 15 00    | 165 06 00    | 34      | G. brk. Sh.          | 39.7  | do.           | 3222    | do.       | 12        | 15902.   |
| Off Unimak Island.                          | 54 48 00    | 165 13 30    | 70      | bk. S. G.            | 39    | June 24, 1890 | 3270    | do.       | 1 y.      | 15901.   |
| Do.   | 54 40 50    | 165 05 30    | 41      | bk. S. G.            | 40.6  | do.           | 3269    | do.       | 1         | 15912.   |
| North of Alaska Peninsula                   | 55 23 30    | 163 29 00    | 32      | bk. S. G.            | 41    | June 25, 1890 | 3267    | do.       | 3         | 15913.   |
| Do.   | 55 31 40    | 163 07 00    | 31      | bk. S. G.            | 41    | June 27, 1890 | 3272    | do.       | 1         | 15914.   |
| Do.   | 56 25 40    | 162 39 15    | 41      | fine. gy. S.         | 37    | June 28, 1890 | 3279    | do.       | 1         | 15917.   |
| Do.   | 56 22 30    | 162 13 00    | 47      | fine. gy. S.         | 38.8  | do.           | 3278    | do.       | 9         | 15916.   |
| Do.   | 56 17 00    | 162 08 00    | 36      | fine. gy. S.         | 41    | do.           | 3280    | do.       | 1         | 15918.   |
| Do.   | 56 30 45    | 161 50 15    | 53      | fine. S. gn. M.      | 38.2  | June 29, 1890 | 3282    | do.       | 2         | 15920.   |

Material examined of *Hijas lyratus*—Continued

| Locality   | Bearings    |              | Fathoms | Bottom         | Temp. | Date          | Station | Collector        | Specimens  | Cat. No. |
|--|-------------|--------------|---------|----------------|-------|---------------|---------|------------------|------------|----------|
|  | Latitude N. | Longitude W. |         |                |       |               |         |                  |            |          |
| N. of Alaska Peninsula—Con.                                  |             |              |         |                |       |               |         |                  |            |          |
| Do.  | 55 58 45    | 161 46 30    | 18      | G. S. R.       | 43.2  | June 28, 1890 | 3277    | <i>Albatross</i> | 3          | 15915.   |
| Do.  | 56 14 00    | 161 41 15    | 36      | fv. S. bk. Sp. | 40.3  | do.           | 3281    | do.              | 2          | 15919.   |
| Do.  | 56 28 00    | 161 16 30    | 39      | fv. S.         | 42    | June 29, 1890 | 3283    | do.              | 1          | 15921.   |
| Do.  | 56 16 30    | 160 53 00    | 25      | fv. G.         | 42    | do.           | 3284    | do.              | 14         | 15922.   |
| Do.  | 56 39 30    | 160 29 00    | 37      | fv. S. Sh. G.  | 41.5  | July 17, 1890 | 3286    | do.              | 4          | 15923.   |
| Do.  | 56 26 30    | 160 00 00    | 15      | bk. G.         | 45.5  | do.           | 3288    | do.              | 1          | 15924.   |
| Off Bristol Bay  | 57 24 30    | 161 17 00    | 33      | fv. S.         | 38.9  | July 22, 1890 | 3306    | do.              | 10         | 15932.   |
| Do.  | 58 12 45    | 160 37 30    | 17      | fv. S.         | 40.2  | July 20, 1890 | 3301    | do.              | 6          | 15933.   |
| Bristol Bay  | 57 45 45    | 160 12 15    | 30      | fv. S.         | 40.2  | July 21, 1890 | 3302    | do.              | 6          | 15938.   |
| Do.  | 57 45 45    | 160 12 15    | 15      | fv. S.         | 42.2  | July 20, 1890 | 3300    | do.              | 6          | 15930.   |
| Do.  | 58 12 30    | 159 55 00    | 32      | bk. S. G.      | 38    | July 18, 1890 | 3292    | do.              | 4          | 15926.   |
| Do.  | 57 14 00    | 159 35 00    | 32      | bk. S. G.      | 38    | June 8, 1890  | 3291    | do.              | 1          | 15009.   |
| Do.  | 58 38 30    | 159 33 30    | 14      | bk. M.         | 38    | July 18, 1890 | 3293    | do.              | 1          | 15009.   |
| Do.  | 57 30 00    | 159 33 00    | 30      | fv. S.         | 40    | do.           | 3294    | do.              | 3          | 15927.   |
| Do.  | 56 58 30    | 159 11 00    | 25      | bk. S. G.      | 41.2  | do.           | 3291    | do.              | 1          | 15923.   |
| Do.  | 57 16 45    | 159 03 30    | 30      | bk. G.         | 41    | do.           | 3294    | do.              | 8          | 15928.   |
| Do.  | 57 26 30    | 158 46 00    | 24      | fv. S. bk. Sp. | 43    | July 19, 1890 | 3296    | do.              | 2          | 15928.   |
| Do.  | 58 16 30    | 158 13 00    | 11      | bk. S.         | 39    | June 7, 1890  | 3235    | do.              | 2          | 15907.   |
| Do.  | 58 11 00    | 158 05 30    | 14.75   | G. S. Sh.      | 39    | do.           | 3236    | do.              | 2          | 15908.   |
| Do.  | 58 23 45    | 157 42 45    | 7.25    | S. P.          | 44.5  | June 2, 1890  | 3233    | do.              | 6          | 15906.   |
| Head of Bristol Bay  | 58 31 30    | 157 34 15    | 10.5    | P. St.         | 44.5  | do.           | 3232    | do.              | 3          | 15905.   |
| Do.  | 58 35 00    | 157 28 50    | 12      | S.             | 44.5  | do.           | 3231    | do.              | 5          | 15904.   |
| Alutlean Islands and south of Chichagof Harbor, Attu Island. |             |              | 5-7     | G. S.          |       | 1873          |         | W. H. Dall.      | 1♂         | 14720.   |
| Kyska Harbor, Kyska Island.                                  |             |              | 7-14    | S.             |       | 1873          |         | do.              | 1♂ 1♀ 1 y. | 14721.   |
| Constantine Harbor, Amchika Island.                          |             |              | 6-10    | S. St.         |       | 1873          |         | do.              | 1♂         | 14726.   |
| Bay of Islands, Adakh Island.                                |             |              | 9-16    | M. S.          |       | 1873          |         | do.              | 2 y.       | 14767.   |
| West of Ameknak Island, Capeains Bay, Unalaska.              |             |              | 60      | R. St. M.      |       | 1874          |         | do.              | 1♂         | 14723.   |
| Do.  |             |              | 25-75   | OR. S.         |       | 1880          |         | do.              | 1♂ 1♀      | 12504.   |
| South of Akutan Island                                       | 53 56 00    | 165 56 00    | 45      | bk. S.         | 43.5  | 1874          |         | do.              | 3♂ 1♀ 1 y. | 14732.   |
| Southeast of Akutan Island                                   | 53 56 00    | 165 40 00    | 54      | bk. Sh. P.     | 42    | July 28, 1888 | 2843    | <i>Albatross</i> | 5♂ 2♀      | 15532.   |
| South of Unimak Island                                       | 54 14 00    | 164 35 00    | 59      | bk. S. G.      | 38    | do.           | 2844    | do.              | 1♂         | 15537.   |
| Do.  | 54 20 30    | 163 37 00    | 61      | bk. S. M.      | 38    | May 22, 1890  | 3219    | do.              | 2          | 15900.   |
| Do.  | 54 10 00    | 162 57 30    | 41      | bk. S.         | 38    | May 21, 1890  | 3216    | do.              | 3          | 15889.   |
| Do.  |             |              |         |                |       | do.           | 3213    | do.              | 13.        | 15886.   |

| Locality                                  | 15-25   | S. G.                    | Depth      | Date          | Sex        | Length | Collector              | Weight | Age |
|---|---------|--------------------------|------------|---------------|------------|--------|------------------------|--------|-----|
| South of Alaska Peninsula:                |         |                          |            |               |            |        |                        |        |     |
| Rekofski Bay                              | 6-9     | S. St. M.                | 55 16 00   | 1872          | 2♂ 3♀      | 14724. | W. H. Dall             |        |     |
| Coal Harbor, Unga Island                  | 69      | gn. M.                   | 55 00 00   | 1872          | 10♂ 7♀     | 14718. | do.                    |        |     |
| Shumagin Islands                          | 110     | gd. M.                   | 55 01 00   | Aug. 2, 1888  | 2♀         | 15535. | Albatross              |        |     |
| Do.                                       | 48      | fine. gy. S.             | 54 55 00   | July 31, 1888 | 1♂         | 15534. | do.                    |        |     |
| Do.                                       | 35      | fv. S. brk. Sh.          | 54 55 00   | do.           | 2 y.       | 15542. | do.                    |        |     |
| Do.                                       | 58      | bk. S.                   | 57 00 00   | Aug. 4, 1888  | 1♀         | 15543. | do.                    |        |     |
| Do.                                       | 69      | gd. M.                   | 57 00 00   | do.           | 2♂ 1♀ 3 y. | 15538. | do.                    |        |     |
| South of Kodiak Island                    | 60      | bk. S.                   | 56 55 00   | Aug. 10, 1888 | 2          | 15896. | do.                    |        |     |
| Do.                                       | 68      | fv. Sh. bk. Sp.          | 58 07 00   | Aug. 22, 1888 | 1♀         | 15540. | do.                    |        |     |
| East of Adognak Island                    | 53      | brk. Sh. gy. S.          | 58 05 00   | do.           | 3♂ 8♀      | 15536. | do.                    |        |     |
| Do.                                       | 65-48   | br. M. S. O.             | 8.5 miles. | Aug. 15, 1903 | 1          | 15897. | do.                    |        |     |
| Shelkof Strait, Kodiak                    |         |                          |            |               | 5♂ 2 y.    | 31584. | do.                    |        |     |
| Kodiak                                    |         |                          |            |               |            |        | W. J. Fisher           |        |     |
| Do.                                       |         |                          |            | Aug. 14, 1888 | 1♂ 1♀      | 12318. | Albatross              |        |     |
| Allitak Bay, Kodiak                       | 29      | dk. gy. M. R.            |            | Aug. 6, 1903  | 1 y.       | 15539. | do.                    |        |     |
| Off Karluk, Kodiak                        | 31      | gy. S. Sh.               | 46.4       | July 19, 1897 | 3 y.       | 21768. | do.                    |        |     |
| Do.                                       | 110     | gn. M.                   | 39         | do.           | 1♂ 1♀      | 21769. | do.                    |        |     |
| Uyak Bay, Kodiak                          | 80-74   | gy. M.                   | 42.2       | Aug. 14, 1903 | 1♂ 1♀      | 31582. | do.                    |        |     |
| Do.                                       | 99      | sft. gy. M. fine. bk. S. |            | do.           | 2 y.       | 31583. | do.                    |        |     |
| Shahafka Cove, St. Paul Harbor, Kodiak    | 12-14   | M. S.                    |            | 1874          | 28 y.      | 14727. | W. H. Dall             |        |     |
| Adognak Bay, Adognak Island, Kodiak Group | 16-17.5 | gy. S. brk. Sh.          | 50.9       | Aug. 3, 1903  | 1 y.       | 31656. | Albatross              |        |     |
| Do.                                       | 14-19   | brd. gy. S. R.           |            | do.           | 3♂         | 31581. | do.                    |        |     |
| Off Marmot Island, east of Adognak Island |         |                          |            | July 8, 1880  | 1♂         | 14719. | T. H. Bean             |        |     |
| Southeastern Alaska:                      |         |                          |            |               |            |        |                        |        |     |
| Chugach Bay, Cooks Inlet                  | 20-60   | sdly. M.                 |            | June 30, 1880 | 3♂         | 12510. | W. H. Dall             |        |     |
| Cordova, Prince William Sound.            |         |                          |            | June 29, 1914 | 5♂ 1♀      | 48836. | Bureau of Fisheries    |        |     |
| Port Etches, Prince William Sound.        | 5-18    | G. St.                   |            | 1874          | 19 y.      | 14725. | W. H. Dall             |        |     |
| Berg Bay, Glacier Bay                     |         |                          |            | 1899          |            |        | Harriman Alaska Exped. |        |     |
| Vicinity of Funter Bay, Lynn Canal        | 350     | rky.                     |            | July 23, 1903 | 1♂         | 31577. | Albatross              |        |     |
| Chilkoot Inlet                            | 73-72   | gy. M.                   | 38.5       | July 16, 1903 | 1♂ 1♀      | 31576. | do.                    |        |     |
| Dundas Bay, Icy Strait                    | 78-21   | gy. S. brk. Sh. R.       | 44.7       | July 24, 1903 | 1♀         | 31578. | do.                    |        |     |

Material examined of *Hyas Iyratus*—Continued

| Locality  | Bearings   |              | Fathoms | Bottom                     | Temp. | Date          | Station | Collector  | Specimens    | Cat. No. |
|---|--|--------------|---------|----------------------------|-------|---------------|---------|--|--------------|----------|
|   | Latitude N.  | Longitude W. |         |                            |       |               |         |  |              |          |
| Southwestern Alaska—Con.<br>Dundas Bay, Icy Strait  | ° ' "  | ° ' "        | 10-8.5  | gn. M. rky.                | ° F   | July 24, 1903 | 4261    | Albatross  | 1♂           | 31579.   |
| Do  | Point Wimbeldon, S.<br>24° W., 0.3 mile.<br>Point Wimbeldon, S.<br>20° W., 0.4 mile. |              | 9-6.5   | crs. S. rky.               |       | do            | 4263    | do   | 1♂           | 31580.   |
| Juneau  |  |              | 50      |                            |       | 1899          |         | Harriman Alaska<br>Exped.                            |              |          |
| Stephens Passage  | Hugh Point, S. 71° W.,<br>8.4 miles.   |              | 198     | rky                        | 40.9  | July 14, 1903 | 4251    | Albatross  | 1 ♀          | 31574.   |
| Do  | Thistle Ledge, N. 53°<br>E., 1.7 miles.  |              | 188-131 | R. brk. Sh.                | 40.9  | do            | 4253    | do   | 1♂ 3 ♀       | 31575.   |
| Bay of Pillars, Kuiu Island.<br>In stomach of halibut.  |  |              | 8       |                            |       | Aug. 29, 1900 |         | do   | 1♂ 5 ♀       | 25210.   |
| Sitka Harbor  | Point Amelius, S. 80°<br>W., 5.8 miles.  |              | 15      | G. M.                      |       | 1874          |         | W. H. Dall   | 2 ♀          | 14766.   |
| Off Shakan, Sumner Strait.  | Point Amelius, N. 75°<br>W., 5 miles.  |              | 212-169 | bu. M.                     | 44.2  | Aug. 24, 1903 | 4302    | Albatross  | 1♂           | 31586.   |
| Do  |  |              | 153-218 | S. R.                      |       | do            | 4299    | do   | 1 ♀          | 31585.   |
| Wrangell  |  |              |         |                            |       | July —, 1882  |         | Dr. W. H. Jones,<br>U. S. N., U. S. S.<br>Wachusett. | 3♂ 3 ♀       | 5243.    |
| Port Wrangell (probably)  |  |              |         |                            |       |               |         | Lieut. Command-<br>er H. E. Nichols,<br>U. S. N.     | 1♂           | 5872.    |
| Steamer Bay, Etolin Island,<br>Kasaan Bay, Prince of<br>Wales Island.                             | East end Long Island,<br>N. 55° W., 3 miles.   |              | 123-101 | gy. gn. M. crs. S.         | 44.1  | July 11, 1903 | 4216    | Albatross  | 1♂           | 16279.   |
| Do  | Sandy Point, N. 62°<br>W., 1.2 miles.  |              | 42-47   | gn. M.                     | 49.1  | do            | 4243    | do   | 1♂ 4 ♀       | 31572.   |
| Do  | East end Long Island,<br>N. 78° W., 1.1 miles.                                       |              | 95-114  | gn. M. fine S. brk.<br>Sh. | 44.3  | do            | 4247    | do   | 2 ♀          | 31655.   |
| Vicinity of Yes Bay, Behm<br>Canal.   | East end Square Is-<br>land, Specious Bay,<br>S. 34° W., 1.2 miles.                  |              | 147-205 | R. crs. S.                 | 42.8  | July 8, 1903  | 4236    | do   | 1 ♀          | 31571.   |
| Yes Bay   |  |              |         |                            |       | Aug. 25, 1905 |         | do   | 1♂ 1 ovig. ♀ | 46497.   |
| Nakat Harbor, about 3<br>miles northeast of Port<br>Fongass, Dixon entrance,<br>British Columbia. |  |              |         |                            |       | June 10, 1883 |         | Lieut. Command-<br>er H. E. Nichols,<br>U. S. N.     | 1            | 14841.   |
| Outer Bay, Fender Island,<br>Seymour Narrows.   |  |              |         |                            |       |               |         | Albatross  | 2            | 19317.   |



| Menzius Bay, Discovery Passage. | 6     | sft.                   | July 31, 1881 | July 6, 1915  | 1 y.   | 5777.                |
|---------------------------------|-------|------------------------|---------------|---------------|--------|----------------------|
| Concox                          | (1)   |                        |               |               | 1♂     | Victoria Mus. 15798. |
| Victoria, Washington:           |       |                        |               |               | 1      |                      |
| Off Squin Bay                   | 81    | bu. M.                 | 44            | Apr. 30, 1884 | 1 y.   | 18977.               |
| Port Townsend                   |       |                        |               |               | 5♂ 2♀  | 13541.               |
| Port Townsend (Bay)             | 14-17 | sft. gn. M. br. Co.    | 50.8          | July 1, 1903  | 1♂ 2♀  | 31569.               |
| Do                              | 17    | gn. M. fine. S. stuky. | 50.1          | .do.          | 3♂ 6♀  | 31570.               |
| Admiralty Inlet                 | 16-20 | gn. M. S. brk. Sh.     | 51.8          | .do.          | 1 y.   | 31653.               |
| Do                              | 16-31 | gn. M. S. brk. Sh.     | 50.8          | .do.          | 1 y    | 31654.               |
| Puget Sound at Simeathnoo       |       |                        |               |               | 1 y. ♂ | 1230, M. C. Z.       |

1 Dredged

genus but from all other spider crabs. The outer angle of the merus of the third maxilliped is more arcuate than in *coarctatus*. The tubercles of the chelipeds are stronger than in *coarctatus* and the manus has the upper margin tuberculate for two-thirds of its length. The manus of well developed males is longer in proportion to its width than in the preceding species.

*Color*.—Dull pinkish red.

*Measurements*.—Male (5872), length of carapace 105, width 80 mm.

*Range*.—Bering Sea, from a line connecting Bering Island, Commander Islands, Siberia, with Pribilof Islands and Bristol Bay, Alaska (greatest lat. 58° 38' 30'' N.), southward along the shores of the Aleutian Islands, thence eastward and southward to Admiralty Inlet, Washington (about lat. 48° N.). Depth, 5 to 350 fathoms.

*Material examined*.—See table, pages 271-275.

### Genus PELIA Bell

*Pelia* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 170; type, *P. pulchella* Bell; Trans. Zool. Soc. London, vol. 2, 1836, p. 44.

Carapace pyriform, swollen, especially the gastric and cardiac regions, smooth or nearly so, and covered with a thin coating of short, soft hair; lateral margins entire. Rostrum well developed, divided for half or more of its length into two acute divergent horns. The outer margins of the supraocular eaves converge anteriorly and

Material examined of *Pelagia mutica*

| Locality                  | Bearings  |              | Fathoms         | Bottom          | Temp. | Date           | Station   | Collector                  | Specimens | Cat. No.        | Remarks                     |
|---------------------------|---|--------------|-----------------|-----------------|-------|----------------|-----------|----------------------------|-----------|-----------------|-----------------------------|
|                           | Latitude N.   | Longitude W. |                 |                 |       |                |           |                            |           |                 |                             |
| Massachusetts:            |   |              |                 |                 |       |                |           |                            |           |                 |                             |
| Buzzards Bay              | Cataumet Harbor   |              | 3-4             | S. G.           |       | Aug. 7, 1905   | 141       | Phalarope                  | 2♂        | 32473           |                             |
| Do                        | Nyes Neck, S. SE. $\frac{3}{4}$ E., $\frac{1}{2}$ mile.     |              | 5-25            | S.              | 68    | Aug. 26, 1881  | 936       | Fish Hawk                  | 1♂1♀      | 34069           |                             |
| Do                        | Near entrance of Hog Island Harbor.                         |              | 3-25-4, 75      | St. many algae. |       | Aug. 5, 1905   | 134       | Phalarope                  | 1♀        | 32488           |                             |
| Do                        | Northern shore of Uncatena Island.                          |              | 3-4.5           | P. St.          |       | July 27, 1905  | 117       | do                         | 1♂        | 32489           |                             |
| Woods Hole                | Nobiska Beach.  |              |                 |                 |       | 1882           |           | U.S. Fish Comm.            | 1♂        | 34170           |                             |
| Do                        | U. S. Fisheries pier  |              |                 |                 |       | Aug. 5, 1905   | 19        | J. A. Cushman              | 1♀        | 32475           |                             |
| Do                        | Vicinity of Woods Hole.                                     |              |                 |                 |       | 1905           | 3         | M. J. Rathbun              | 3         | 32474           |                             |
| Do                        | Ram Island.   |              |                 | S.              |       | Aug. 6, 1893   |           | S. D. Judd                 | 1♀        | 22160           |                             |
| Off Martha's Vineyard.    | Off East Chop.  |              | 10-11.5         | S. Sh. G. R. M. | 72    | Aug. 11, 1887  | 1205-1208 | Fish Hawk                  | 4♂7♀      | 12784           |                             |
| Do                        | West Chop Light, E. $\frac{1}{2}$ N., $1\frac{1}{4}$ miles. |              | 9               | S. G.           | 65    | Sept. 22, 1881 | 1041      | do                         | 2♂        | 14458           |                             |
| Do                        | West Chop Light, E. $\frac{1}{2}$ N., $1\frac{1}{4}$ miles. |              | 6               | S. G.           | 65    | do             | 1042      | do                         | 7♂5♀      | 40748           |                             |
| Do                        | West Chop Light, S. $\frac{3}{4}$ E., $\frac{3}{4}$ mile.   |              | 14              | St.             | 67    | July 20, 1881  | 933       | do                         | 2 ovig. ♀ | 38139           |                             |
| Vineyard Sound.           |   |              |                 |                 |       |                |           | U.S. Fish Comm.            | 11        | 16209           |                             |
| Do                        |   |              |                 |                 |       | 1871           |           | do                         | 10        | 10026           |                             |
| Do                        |   |              |                 |                 |       | 1875           |           | do                         | 1♂1♀      | 40128           |                             |
| Do                        |   |              | 6-13            | hrd. Sh. G.     | 69-70 | Aug. 31, 1875  | 710-715   | Biactlight                 | 1♂5♀      | 40749           |                             |
| Do                        |   |              |                 |                 |       | Aug. 10, 1881  |           | U.S. Fish Comm.            | 1♂        | 40738           |                             |
| Do                        |   |              | (1)             |                 |       | 1883           |           | do                         | 637       |                 |                             |
| Do                        |   |              | 3-5             |                 |       | 1883           |           | do                         | 2♂2♀      | 8486            |                             |
| Do                        |   |              | (1)             |                 |       | 1911           |           | do                         | 2         | 43153           |                             |
| Connecticut:              |   |              |                 |                 |       |                |           |                            |           |                 |                             |
| Norank                    |   |              |                 |                 |       | 1874           |           | do                         | 1♂        | 40750           |                             |
| Exact locality not given. |   |              |                 |                 |       | 1874           |           | do                         | 1 y.      | 36265           |                             |
| Maryland: Tangier Sound   | Fox Poplar to Jones Lighthouse, 51° 03'.                    |              | 2 $\frac{1}{2}$ | sticky.         | 70    | June 4, 1891   | 1651      | Fish Hawk                  | 12        | 16773, 31468    |                             |
| Virginia:                 |   |              |                 |                 |       |                |           |                            |           |                 |                             |
| Eastern shore.            |   |              |                 |                 |       |                |           | J. S. Kingsley collection. | 2♀        | 53067           | From Boston Soc. Nat. Hist. |
| Exact locality not given. |   |              |                 |                 |       |                |           |                            | Specimens | Union Col-lege. |                             |

| North Carolina:<br>Off Cape Hatteras<br>Beaufort.                                    | 35 21 00 | ° ' "    | 75 21 30  | ° ' "                | 16           | gy. S. brk. Sh. | Oct. 19, 1884                          | Albatross                         | 4 y. Specimens.    | 41028<br>Union Col-<br>lege.          |
|--|----------|----------|---|----------------------|--------------|-----------------|--|-----------------------------------|--------------------|---------------------------------------|
| South Carolina:<br>Jericho Creek<br>Cahibogue Sound<br>Merritts Creek                |          |          |   |                      |              | Among oysters   | Jan. 23, 1891<br>1891<br>Mar. 21, 1891 | <i>Fish Hawk</i><br>do.<br>do.    | 1<br>1♂<br>2♂      | 17172<br>17173<br>26179               |
| Florida:<br>Barnes Lake and Lig-<br>num Vitae Lake.<br>Big Spanish Key Chan-<br>nel. |          |          | Between Little Pine<br>Key and No Name<br>Key.                |                      | 2½           | Débris<br>rky.  | Feb. 4, 1903<br>Jan. 5, 1903           | do.<br>do.                        | 1♂ 1 ovig. ♀<br>1♀ | 47080<br>47082                        |
| Off Northwest Channel,<br>Off Key West.  | 24 38 40 | 81 56 28 | About 1 mile from<br>light.                                   | 5.25<br>19.5<br>5.25 | 5.25<br>5.25 | Co.             | Feb. 24, 1902<br>June 26, 1893         | do.<br>State Univ.<br>Iowa Exped. | 1♀<br>2 y.         | 47083<br>Mus.S.U.I.                   |
| Florida Bay<br>Do.   |          |          |   | 7-11.5               |              |                 | Jan. 29, 1903                          | <i>Fish Hawk</i>                  | 1♂<br>Specimens.   | 47081<br>Union Col-<br>lege.<br>59883 |
| Marco.<br>Off Sanibel Islands.   |          |          | Sanibel Islands Light,<br>N.E. 1½ miles.                      |                      | 2            |                 | Dec. 31, 1912                          | H. Hemphill<br><i>Fish Hawk</i>   | 11<br>1♀           | 16969<br>59883                        |
| Do.  |          |          | Bell Buoy off Sanibel<br>Islands Light, N.E.,<br>10-2½ miles. |                      | 4.75         | Sh. wh. M       | Jan. 1, 1913                           | do.                               | 1♂ 2♀              | 50985                                 |
| Punta Russa<br>Off Charlotte Harbor.   |          |          |   |                      | 1            |                 | Feb., 1884                             | H. Hemphill                       | 1♂                 | 23284                                 |
| Charlotte Harbor.  | 25 35 00 | 83 11 00 |   | (20° C)<br>(66° F)   | 27.5         | sdly.           | Apr. 2, 1901                           | <i>Fish Hawk</i>                  | 1♂                 | 25598                                 |
| Sarasota Bay.  |          |          |   |                      |              |                 | 1885                                   | W. H. Dall                        | 1♂                 | 17002                                 |
| Goodland Point.  |          |          |   |                      |              |                 | 1885                                   | H. Hemphill                       | 3                  | 16208<br>17000                        |
| Cedar Keys.  |          |          |   |                      |              |                 | 1887                                   | Lieut. J. F.<br>Moser, U.S.N.     | 1                  | 16207                                 |
| Do.  |          |          |   |                      |              |                 | Dec. 1883                              | H. Hemphill                       | 5.                 | 6419.                                 |
| Do.  |          |          |   |                      |              |                 | do.                                    | do.                               | 9.                 | 17001                                 |
| West Florida.  |          |          |   |                      | 1            | Co.             | do.                                    | Henderson and<br>Simpson.         | 1                  | 17800                                 |
| Cuba: Off Havana.  |          |          |   |                      |              |                 | 1893                                   | State Univ.<br>Iowa Exped.        | 1♂ 1♀              | Mus.S.U.I.                            |
| Porto Rico:<br>Mayaguez.<br>Boqueron Bay   |          |          |   |                      |              |                 | Jan. 20, 1899<br>Jan. 25, 1899         | <i>Fish Hawk</i><br>do.           | 2♂<br>1♀           | 24166<br>24165                        |
| Off Boca Prieta.   |          |          | Fanduco Cay, E., 1¼<br>miles.                                 | 25                   | 8.5          | Co. S.          | do.                                    | do.                               | 1♀                 | 24164.                                |
| St. Thomas.  |          |          | Sail Rock, W. by N. ½<br>N., 6 miles.                         | 25.8                 | 20-23        | Co.             | Feb. 6, 1899                           | do.                               | 1♀                 | 24167                                 |

1 Low water.

2 Dredged.

3 Between stations 7432 and 7442.

4 Haul 1.

are unarmed; a narrow slit separates the eaves from the postocular teeth which are small, subtriangular, and hollowed within for the reception of the eyes. Basal article of antennae long and narrow, furnished usually with a tooth or spine at the antero-external angle; and more or less exposed in dorsal view beside the rostrum. Merus of outer maxilliped notched at inner angle; inner angle of ischium strongly advanced.

Chelipeds stout in old males, slender in females and undeveloped males; merus three-sided; fingers sharp-pointed, finely denticulate or crenulate and in contact in their terminal half. First pair of ambulatory legs much longer than the others; second, third, and fourth pairs diminishing successively in length, the last pair very short. Legs margined with rows of stiff setae; merus much compressed and having an acute upper edge; dactyli strongly curved, corneous tips long and sharp.

Not found outside of America, where it is distributed from southern Massachusetts to St. Thomas, West Indies, from Cape St. Roque, Brazil, to northern Patagonia, from Venice, California, to Panama, and at the Galapagos Islands.

KEY TO THE SPECIES OF THE GENUS PELIA

- A<sup>1</sup>. Rostrum not long, from one-fourth to two-fifths as long as remainder of carapace. Basal article of antenna not more than half exposed in dorsal view.
- B<sup>1</sup>. Carapace elongate, its greatest width about two-thirds its greatest length.  
Outer margins of rostral horns divergent or parallel.
- C<sup>1</sup>. Basal article of antenna half or nearly half exposed in dorsal view.
- D<sup>1</sup>. Carapace moderately high on the median line.....*mutica*, p. 278.
- D<sup>2</sup>. Carapace very high on the median line. Rostrum more deflexed, carapace wider at hepatic regions than in *mutica*.....*rotunda*, p. 279.
- C<sup>2</sup>. Only the extremity bearing the spine or tooth of the basal article of antenna exposed in dorsal view.....*tumida*, p. 281.
- B<sup>2</sup>. Carapace broad, its greatest width about three-fourths its greatest length.  
*pacifica*, p. 283.
- A<sup>2</sup>. Rostrum long, nearly half as long as remainder of carapace. Basal article of antenna almost wholly exposed in dorsal view. (Bell.)  
*pulchella*, p. 284.

Analogous species on opposite sides of the continent: *mutica* (Atlantic); *tumida* (Pacific). -

PELIA MUTICA (Gibbes)

Plate 98, figs. 2 and 3

*Pisa mutica* GIBBES, Proc. Amer. Assoc. Adv. Sci., vol. 3, 1850, p. 171 [7] (type-locality, Charleston Harbor, off White Point Battery, S. C.; type not extant).

*Pelia mutica* STIMPSON, Ann. Lye. Nat. Hist. New York, vol. 7, 1860, p. 177.—SMITH, Rept. U. S. Commr. of Fisheries for 1871 and 1872 (1873), p. 548 [254].—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 73, pl. 16,

figs. 2-2b.—KINGSLEY, Proc. Acad. Nat. Sci. Philadelphia, vol. 31, 1879, p. 385.—SUMNER, Bull. Bur. Fisheries, vol. 31 for 1911 (1913), pt. 1, p. 331 (chart 113); pt. 2, p. 670.

*Diagnosis*.—Greatest width of carapace about two-thirds its greatest length. Outer margins of rostral horns either diverging anteriorly or parallel.

*Description*.—Gastric and cardiac regions elevated, the latter smoothly rounded. Rostrum nearly two-fifths as long as remainder of carapace, a furrow on its basal portion; horns more or less divergent, their outer margins often parallel. Basal antennal article half visible in dorsal view, and usually furnished with a small tooth or spine at antero-external angle.

Chelipeds of well-developed male as long as first ambulatory leg but stouter and almost bare. Upper and inner margins of merus dentate; a longitudinal denticulate ridge on the carpus; upper and lower margins of manus slightly arcuate; basal half of fingers widely gaping, the sinus of the dactylus being longer than that of the fixed finger; the occludent margins, as well as the broad basal tooth of the dactylus, are denticulate.

*Color*.—Bright red in patches on carapace, and in bands on legs, spots of lighter red on chelipeds.

*Measurements*.—Male (40750), length of carapace on median line 11.2, to end of horns 13.4, width of carapace 8.8 mm.

*Habitat*.—On gravelly and shelly bottoms of bays and sounds.

*Range*.—Buzzards Bay and Vineyard Sound, Massachusetts, to west coast of Florida; Cuba, Porto Rico, and St. Thomas, West Indies. Low water to 27½ fathoms.

*Material examined*.—See table, pages 276-277.

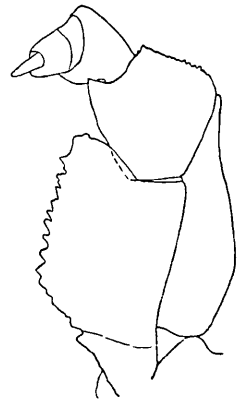


FIG. 94.—*PELIA MUTICA* (40750), MAXILLIPED, X 17

**PELIA ROTUNDA** A. Milne Edwards

Plate 100

*Pelia rotunda* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 74 (type-localities, Desterro, Brazil, figured type in Paris Mus., and northern Patagonia, cotypes, Cat. No. 1899, M. C. Z.).—RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 89.

*Pelia rotundata* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, pl. 16, figs. 4-4g.

*Diagnosis*.—Differs little from the preceding. Gastric and cardiac regions more swollen, rostrum more deflexed, width of carapace at hepatic regions relatively greater; spine at external angle of basal antennal article a little longer. Perhaps not specifically distinct from *P. mutica*.

Material examined of *Pelvia rotunda*

| Locality  | Bearings    |              | Fathoms | Bottom      | Temp. | Date          | Station | Collector  | Specimens         | Cat. No.                             | Remarks                            |
|---|-------------|--------------|---------|-------------|-------|---------------|---------|--|-------------------|--------------------------------------|------------------------------------|
|   | Latitude S. | Longitude W. |         |             |       |               |         |  |                   |                                      |                                    |
| Brazil:<br>Off Cape St. Roque<br>Ilha do Santa Anna | 6 59 30     | 34 47 00     | 20      | brk. Sb     | 79    | Dec. 16, 1887 | 2758    | Albatross<br>Hartland, Cope-<br>land, Thayer<br>Exped. | 1 ♀<br>1 ♂        | 2191<br>1901, M. C. Z.               |                                    |
| Rio de Janeiro                                      |             |              |         |             |       |               |         | Hasler   | 1 ♂ 2 ♀           | Copenhagen<br>Mus.<br>2047, M. C. Z. |                                    |
| Rat Island, Rio de Ja-<br>neiro.                    |             |              | 7       |             |       |               |         | do   | 1 sim. ♂          | 1900, M. C. Z.                       |                                    |
| Uruguay: Rio de la Plata,<br>below Montevideo.      |             |              |         |             |       |               |         | Albatross  | 2 ♂               | 16347                                |                                    |
| Argentina:<br>Off Rio de la Plata                   | 36 42 00    | 56 23 00     | 11.5    | S. brk. Sh. |       | Jan. 12, 1888 | 2764    | do   | 2 ♂ 2 ♀           | 21912                                |                                    |
| Do  | 36 43 00    | 56 23 00     | 10.5    | S. brk. Sh. |       | do            | 2765    | do   | 16 ♂ 17 ♀         | 17321                                |                                    |
| Do  | 36 47 00    | 56 23 00     | 10.5    | S. brk. Sh. |       | do            | 2766    | do   |                   |                                      |                                    |
| Patagonia:<br>Off Vermeja Head                      | 41 17 00    | 63 00 00     |         |             |       |               |         | Hasler   | 7 ♂ 2 ovig. ♀     | 1898, M. C. Z.                       | Identified by A.<br>Milne Edwards. |
| East of Gulf of San<br>Matias.                      | 41 40 00    | 45 13 00     | 30      |             |       |               |         | do   | 7 ♂ 5 ♀ (2 ovig.) | 1899, M. C. Z.                       | Cotypes.                           |

*Measurements.*—Male (17321), length of carapace on median line 15.5, to end of horns 17.7, width of carapace 11.7 mm.

*Range.*—From Cape St. Roque, Brazil, to northern Patagonia. Depth, 7 to 30 fathoms.

*Material examined.*—See table, page 280.

PELIA TUMIDA (Lockington)

Plate 99, figs. 2 and 3

*Pisoides? tumidus* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 30 [3] (type-locality, between tides, near San Diego; type not extant); p. 67 [5], San Bartolomé Bay and Magdalena Bay.

*Microphrys tenuidus* [error for *tumidus*] (= *Pisoides tenuidus*) MIERS, *Challenger Rept.*, Zoöl., vol. 17, 1886, p. 83.

*Pelia pacifica* RATHBUN, not A. Milne Edwards, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 90; vol. 21, 1898, p. 573; vol. 38, 1910, p. 572 (part); Harriman Alaska Exped., vol. 10, 1904, p. 174 (part).

*Pelia*, sp., RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 90.

*Pelia tumida* RATHBUN, Harriman Alaska Exped., vol. 10, 1904, p. 174.

*Pelia clausa* RATHBUN, Mem. Mus. Comp. Zoöl., vol. 35, 1907, p. 72 (type-locality, "Southern California," really Catalina Harbor, see footnote, p. 178; holotype, Cat. No. 16203, U. S. N. M.).

*Diagnosis.*—Greatest width of carapace about two-thirds its greatest length. Outer margins of rostral horns either parallel or diverging anteriorly. Frontal region strongly deflexed. Of the basal antennal article only the spine or tooth is visible from above.

*Description.*—Gastric region much elevated, rounded and often furnished with a small tubercle at the anterior summit. Branchial regions inflated; cardiac region with a small rounded elevation. Rostrum depressed, elongated, varying from one-third in the old male to one-fourth the length of the remainder of the carapace, and bifurcated for about half its length; horns narrow, divergent, and slightly upturned at the tip. The basal antennal article is scarcely visible from above except for the spine or tooth at the antero-external angle.

Chelipeds not so long as first ambulatory leg, stout in well developed males; merus with margins sparingly granulate; hand oblong, compressed, inflated, the edges obtuse and subparallel although slightly arcuate; fingers gaping at base, neatly fitting together along the denticulate distal half of their inner margins; a broad, truncate molariform tooth or tubercle on the inner margin of the movable finger near the base is an important feature of the gape. In the undeveloped males (the *clausa* form) the chelipeds are weak as in the adult females, the chelae small, palms tapering distally, the fingers meeting except for a very slight gape in the basal third or fourth.

*Color.*—Chelipeds speckled with dark brownish as far as the middle of the fingers, especially the dorsal aspect; speckles few on wrist.

*Measurements.*—Male (50962), length of carapace on median line 17.4, to end of horns 19.2, width of carapace 13 mm.

*Range.*—From Santa Monica Bay, California, to Magdalena Bay, Lower California, and Gulf of California, Mexico. Shallow water to 50 fathoms.

*Material examined.*—

#### CALIFORNIA

Venice Breakwater; *Anton Dohrn*; from Venice Marine Biol. Sta.: West end under rocks; January 3, 1912; P. S. Barnhart; 1 female (50217). February 19, 1913; J. Ross Beck; 1 male, soft shell (50219). October 16, 1913; P. S. Barnhart; 1 ovigerous female (50221). October 29, 1913; P. S. Barnhart; 5 males, 1 female (50218). 1 male (45585).

Between Venice and San Pedro; June 18, 1913; *Anton Dohrn* (P. S. Barnhart); from Venice Marine Biol. Sta.; 1 male (50311).

Point Vicente; from rocks; February, 1918; H. N. Lowe; 2 males (51123), nearly of a size, one having well developed chelipeds, the other feeble ones.

Reef Point; July 6, 1917; E. P. Chace; 1 ovigerous female (53985).

San Pedro: H. N. Lowe; 1 male (32971). Vicinity of: E. P. Chace; 1 male (50962).

Long Beach; H. N. Lowe; 6 males, 1 female (46777).

Laguna Beach; W. A. Hilton: 1 male (48908). 1 male (48984), returned to sender. 1 male, 1 ovigerous female (50596).

Santa Catalina Island: Isthmus Harbor; *Anton Dohrn*; from Venice Marine Biol. Sta.; 2 males, 2 females (50005). Catalina Harbor; W. H. Dall: Beach; 18 specimens (16203); 1 male is holotype of *P. clausa*. Depth, 30 to 40 fathoms; 1 male (16204). Avalon Bay; October 22, 1910; *Anton Dohrn* (P. S. Barnhart); from Venice Marine Biol. Sta.; 1 young female (50220). Off Catalina Island; 50 fathoms; H. N. Lowe; 1 male (29957).

San Clemente Island; H. N. Lowe: 1 male (29956).

La Jolla: March 6, 1898; *Albatross*; 1 female (21770). Rocks above Scripps Institution, January 29, 1915; 2 ♀ (Scripps Inst.).

San Diego: 10 fathoms; Henry Hemphill; 1 female (6385). C. R. Orcutt; 6 specimens (16206). Rosa Smith, 1 female (16998). U. S. C. S. S. *Hassler*; 1 male (2046, M. C. Z.).

San Diego County; C. R. Orcutt; 1 male (16205).

Exact locality not given; *Anton Dohrn*; from Venice Marine Biol. Sta.; 1 female (50312).

#### MEXICO

Gulf of California, near upper end; lat. 31° 22' 00'' N.; long. 114° 07' 45'' W.; 17 fathoms; G. brk. Sh.; temp. 65.2° F.; March 25, 1889; station 3026, *Albatross*; 1 ovigerous female (16349).



West of Magdalena Bay; lat. 24° 58' 15'' N.; long. 115° 53' 00'' W.; 36 fathoms; Coralline; temp. 64.3° F.; March 2, 1889; station 2989, *Albatross*; 1 male (16348), with abnormal rostrum.

Magdalena Bay, Lower California: 1917; C. R. Orcutt; 1 female, with Rhizocephalid parasite (50639). Lat. 24° 32' 00'' N.; long. 111° 59' 00'' W.; 12 fathoms; fne. gy. S.; May 2, 1888; station 2831, *Albatross*; 1 male (21913).

**PELIA PACIFICA** A. Milne Edwards

Plate 98, fig. 1; plate 99, fig. 1

*Pelia pacifica* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 73, pl. 16, figs. 3-3c (type-locality, Bay of Panama; type in Paris Mus.).—RATHBUN, Harriman Alaska Exped., vol. 10, 1904, p. 174 (part); Mem. Mus. Comp. Zoöl., vol. 35, 1907, p. 72 (part); Proc. U. S. Nat. Mus., vol. 38, 1910, p. 572 (part); not vol. 16, 1893, p. 90, nor vol. 21, 1898, p. 573.

*Diagnosis*.—Greatest width of carapace about three-fourths its greatest length. Outer margins of rostral horns converging anteriorly. Fingers of mature male unusually narrow, gape correspondingly wide. Frontal region moderately deflexed.

*Description*.—Carapace shorter and more triangular than in any of the preceding species, the rostrum being much shorter, not more than one-fourth, in the old male, as long as remainder of carapace, its outer margins converging anteriorly, thus carrying out the triangular form of the carapace. Very little of the basal antennal article is visible from above; its outer angle is tipped with a spine.

The chelipeds in the well-developed male are stouter than in the preceding species, and about as long as the first pair of ambulatory legs; palm wider, varying from 0.72 (in the smaller specimen) to 0.81 (in the old) of its superior length; a little narrowed distally and slightly constricted near the fixed finger; fingers widely gaping for half or (in the old) two-thirds of their length, slender, the basal tooth of the dactylus comparatively insignificant, the fixed finger arched very markedly downward in the basal half, thus increasing the gape.

*Measurements*.—Male (46077), length of carapace on median line 10.5, to end of horns 12.2, width of carapace 9.2 mm.

*Range*.—From Manzanillo, Mexico. to Panama.

*Material examined*.—

Manzanillo, Colima, Mexico; on drifted pile; July 17, 1913; C. R. Orcutt; 1 male, 1 female (46077).

Perico Island, Panama; October 26, 1904; *Albatross*; 1 male, 1 female (33393), 1 female (M. C. Z.).

Panama; May, 1869; Dr. Sternberg; 1 male (2043, M. C. Z.).

## PELIA PULCHELLA Bell

Plate 241, figs. 1-4

*Pelia pulchella* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 170 (type-locality, Galapagos Islands; type not extant); Trans. Zool. Soc. London, vol. 2, 1836, p. 45, pl. 9, figs. 2, 2d-2f.

*Diagnosis*.—Rostrum long, nearly half as long as remainder of carapace. Basal article of antennae almost wholly exposed in dorsal view.

*Description* (after Bell).—Carapace pyriform, gibbous, rounded, polished, somewhat hairy; regions elevated, the cardiac region forming a rounded tubercle. Rostrum straight, nearly half as long as remainder of carapace, bifid at extremity, with a slight groove continued backward from the bifurcation. Basal article of antennae almost wholly exposed above, slightly tapering toward its extremity where there is a small external tooth; flagellum extending a little beyond apex of rostrum.

Chelipeds longer than body; arm with a toothed carina above and two carinae beneath, the outer of which is minutely serrated; hands slightly compressed, smooth; fingers, when closed, in contact throughout their whole length, the half toward the apex being serrated, and a tubercle of the immovable finger fitting into a corresponding excavation in the movable one. Ambulatory legs compressed, carinated and hairy above.

*Measurements*.—Male holotype, length 4 lines (10.16 mm.), width  $2\frac{1}{2}$  lines (6.35 mm.).

*Locality*.—Known only from the unique type taken at the Galapagos Islands, 6 fathoms, sandy mud.

## Genus PISOIDES Milne Edwards and Lucas

*Pisoides* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, 1843, p. 10; type, *P. tuberculosus* Milne Edwards and Lucas.—DANA, U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 79.

Carapace much longer than wide, trianguliform, slightly swollen. Gastric and cardiac regions very apparent and separated from each other and from the branchial regions by rather deep furrows. Rostrum directed a little obliquely downward and armed with two very long and moderately divergent spines. Eyes imperfectly retractile, peduncle short, constricted at middle, its base filling the orbital cavity. This last has a cut on its upper margin, but is devoid of a tooth above its inner angle; below, the cavity is incomplete but there is a small spine near the base of the antenna and a large and very sharp tooth at the outer orbital angle. Basal article of antenna a little longer than wide, and having at its antero-external angle a small tubercle which is advanced between the next or movable

article and the orbit; this article is much longer than the preceding, wide, and very depressed; next article shorter, reaching about to end of rostrum, or even surpassing it. Antennules and mouth parts as in *Pisa*. Epistome almost linear. Sternal plastron as long as wide.

Chelipeds short, rather stout; fingers slender, elongate, slightly curved and finely denticulate on the inner border. Legs diminishing progressively in length, the first being longer than the cheliped; merus and carpus very wide and compressed, propodus cylindrical, dactylus short, very crescentic, unarmed below. Abdomen 7-segmented in both sexes. (After Milne Edwards and Lucas.)

Known only on the Pacific coast of South America from Panama to the Straits of Magellan, including the Galapagos Islands.

**PISOIDES EDWARDSII (Bell)**

Plate 236

*Hyas edwardsii* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 171 (type-localities, Valparaiso and Galapagos Islands; types not extant); Trans. Zool. Soc. London, vol. 2, 1836, p. 49, pl. 9, fig. 5.

*Pisoides tuberculatus* MILNE EDWARDS and LUCAS, d'Orbigny's Voy. l'Amér. Mérid., vol. 6, pt. 1, 1843, p. 11; vol. 9, atlas, 1847, pl. 5, figs. 1-1d (type-locality, *les côtes du Chili*; type in Paris Mus., cotype in Mus. Phila. Acad. Nat. Sci.).—NICOLET, in Gay, Hist. Chile, Zool., vol. 3, 1849, p. 134.—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 75, pl. 16, figs. 5-5b.—LENZ, Zool. Jahrb., Suppl. 5, vol. 2, 1902, p. 757.—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, pp. 572 and 616.

*Pisoides edwardsii* DANA, U. S. Expl. Exped., vol. 13, Crust., pt. 1, 1852, p. 87; atlas, 1855, pl. 1, figs. 2a and 2b.—MIERS, Proc. Zool. Soc. London, 1881, p. 63.—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, pp. 572 and 613.

*Pisoides edwardsi* MIERS, Proc. Zool. Soc. London, 1881, p. 66.

*Diagnosis*.—No preocular spine; postocular spine large, sharp. Basal antennal article nearly as broad as long, and with a prominent tubercle at its antero-external angle. Rostral horns flat.

*Description*.—Carapace and ambulatory legs covered with a short, dense velvet in the midst of which are some elongate hairs recurved at the end. Carapace dotted beneath with small round pits which serve for the insertion of the hairs. Branchial, gastric and genital regions ornamented with prominent tubercles. Anterior margin of merus of chelipeds armed at the extremity with a strong spine. Merus of first ambulatory leg strongly compressed, its upper margin cristate; merus of remaining legs wide, flat and rounded above; on the outer margin of the merus a very pronounced spine especially in the first pair. Carpus short, wide; propodus elongate, cylindrical. Abdomen of both sexes entirely smooth. (Milne Edwards and Lucas.)

Branchial regions tumid, bearing two or three small, faint tubercles. The cardiac region is a broad prominence with rounded surface, and

either side posteriorly there is a small tubercle. Gastric region prominent with a low posterior tubercle and another oblong anterior one equally distinct. Intestinal region with a small tubercle. All the tubercles are mostly concealed by the villosity of the surface, so as not to be seen unless it is removed. (Dana.)

Rostrum flat, horns evenly and slightly divergent and setigerous within. Basal article of antenna subquadrate, outer angle projecting; next article twice as long as the second movable one, both flat and ciliate on the outer side, the last one ciliate on both margins; antero-external angle of basal article set with minute spinules or hairs; also a prominence at posterior angle is raggedly but minutely denticulate. Outer maxillipeds pubescent. A fringe of rather short hairs on opposite (upper and lower) margins of legs. (Dana.)

*Color.*—Carapace and chelipeds yellow tinged with red (M. Edwards and Lucas). Reddish brown; hair brown; hands red (Bell). Chelae bright rose (Miers).

*Measurements.*—The largest specimen recorded was measured by Dana: Male, Valparaiso, length 16 lines (34 mm.), width 12 lines (25.4 mm.), length of rostrum 4 lines (8.5 mm.). Sex not given, Chili, length 23 mm., width 16.5 mm. (M. Edwards and Lucas). Adult male, Galapagos, length 6 lines (12.7 mm.), width 4 lines (8.5 mm.) (Bell). Immature male, Valparaiso, length 9 lines (19.1 mm.), width 7 lines (14.9 mm.) (Bell).

*Range.*—Panama to Straits of Magellan; Galapagos Islands.

*Localities recorded.*—

Panama (A. Milne Edwards). Galapagos Islands (Bell, A. Milne Edwards). Chile (H. Milne Edwards and Lucas, A. Milne Edwards). Iquique (Lenz). Valparaiso (Bell, Nicolet, Dana). Bay of Guajacan (Lenz). Tumbes (Lenz). Talcahuano, in seaweed (Lenz). Calbuco (Lenz). Trinidad Channel, 30 fathoms, sandy (Miers). Port Rosario, 2 to 30 fathoms, sand and rock (Miers).

*Material examined.*—

Chile; Guérin collection, No. 16; T. B. Wilson, donor; 1 male, "type" of *Pisoides tuberculosus* (Mus. Phila. Acad. Nat. Sci.); "rarissima." This may be one of the original type specimens; it is larger than the specimen measured by Milne Edwards and Lucas, being 30 mm. in total length and 14.6 mm. in width. About three obscure gastric tubercles form a median ridge, and the same number are in a longitudinal row on the middle of the branchial region. Rostral horns acuminate, being narrow spines; outer edges almost parallel to each other. No preorbital spine; postorbital spine directed obliquely upward and forward, but not outward. Basal antennal article not visible in the dried specimen; first movable article laminate, appearing half as wide as rostrum. Fingers narrowly gaping in basal third.

Genus **NOTOLOPAS** Stimpson

*Notolopas* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 96; type, *N. lamellatus* Stimpson.—MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 64.

Carapace subpyriform, moderately convex, and rounded posteriorly; posterior margin more or less distinctly carinated, dorsal surface bearing a few spines. Rostrum well developed, entire at base, then bifurcating, horns divergent. Supraocular eave well developed, furnished anteriorly with a small spine or tooth; a small tooth between the eave and the postocular cup, which is hollowed for the eye; inferior sinus broad. Basal article of antenna broad, a spine or tooth at antero-external angle and a lobe or tooth on outer margin; following articles slender, not concealed by rostrum. Anterior margin of merus of outer maxilliped truncate, inner angle variably emarginate.

Chelipeds of adult male stouter than legs, palm slightly compressed, fingers gaping at base. Ambulatory legs very slender, subcylindrical, first pair considerably longer than the second, last three pairs diminishing regularly in length; dactyli curved and nearly as long as the propodi.

Inhabits both coasts of middle America, from North Carolina to Bahia, Brazil, and from Manzanillo, Mexico, to Panama.

KEY TO THE SPECIES OF THE GENUS *NOTOLOPAS*

- A<sup>1</sup>. A sharp, lamellate carina across posterior end of carapace. Basal antennal article wide, having a broad shallow lobe on outer margin.  
*lamellatus*, p. 287.
- A<sup>2</sup>. No sharp carina across posterior end of carapace. Basal antennal article of moderate width, having a tooth or small lobe on outer margin.  
*brasiliensis*, p. 288.

Species on both sides of the continent: *lamellatus*.

**NOTOLOPAS LAMELLATUS** Stimpson

Plates 81 and 238, fig. 1

*Notolopas lamellatus* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 10, 1871, p. 97 (type-localities, Panama and Manzanillo; types not extant).—MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, pp. 64 and 65, pl. 8, fig. 1c.

*Diagnosis*.—A sharp, lamellate carina around carapace above posterior margin. A broad, shallow (little projecting) lobe on outer margin of basal antennal article. Antero-internal outline of merus of maxilliped oblique, slightly notched.

*Description*.—Posterior half of dorsum flattened, enclosed by a ridge which posteriorly becomes a broad concave lamella projecting over the posterior margin; four equidistant spines on this margin, two median, the gastric spine at the highest point of the carapace, the other two branchial, above the widest part of the carapace. Cardiac region a rounded nodule. Two small protogastric spines. Rostrum

bifurcate for half its length, horns tapering, acute, widely divergent. A short but well marked supraocular spine. Basal antennal article much widened, especially posteriorly where it forms a strong lobe on the margin; tooth at antero-external angle a little more advanced than that at antero-internal angle. A small lobe behind outer margin of basal article and in transverse line with antennal glands. Antero-internal outline of merus of maxilliped oblique, slightly notched. Chelipeds of largest male examined, which may not have reached its full development, just as long as next leg, palm slightly narrowed distally, gape of fingers slight. Abdomen of male widened a little at end of sixth segment.

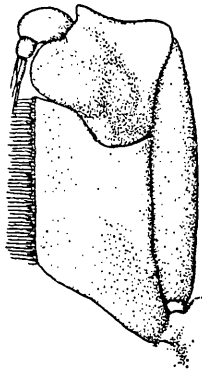


FIG. 95.—NOTOLOPAS  
LAMELLATUS, FEMALE  
(48799), MAXILLIPED,  
× 11.5

*Measurements.*—Male (48805), length of carapace on median line to posterior spine 17.3, length to tip of horn 20.2, width of carapace exclusive of spines 10.6 mm. Largest specimen, a female (48799), length of carapace on median line to posterior spine 20.7, length to tip of horn 25, width of carapace exclusive of spines 14 mm.

*Range.*—From Manzanillo, Mexico, to Panama. Off Beaufort, North Carolina.

*Material examined.*—

Corinto, Nicaragua; J. A. McNeil; 1 female (4791, M. C. Z.).

Carbon Island, Corinto, Nicaragua; J. A. McNeil; 1 immature female (4792, M. C. Z.).

Puntarenas, Costa Rica; P. Biolley, collector; gift of J. F. Tristan; 4 males, 1 female, all small (49087).

Taboga Island, Panama; June, 1914; J. Zetek; 1 male (48805).

Panama City; Oct. 5, 1914; J. Zetek; 1 ovigerous female (48799).

Panama; Hassler Exped.; 2 males, 2 females (1 with *Sacculina*) (2042, M. C. Z.).

Off Beaufort, North Carolina; Fish Hawk; 1 ovigerous female (52758).

**NOTOLOPAS BRASILIENSIS Miers**

Plate 237; plate 238, figs. 2-4

*Notolopas brasiliensis* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 64, pl. 8, figs. 1-1b (type-locality, Bahia, 7 to 20 fathoms; type in Brit. Mus.).

*Hyastenus caribbaeus* RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 85, pl. 6, fig. 2 (type-locality, Sabanilla, Colombia; holotype, Cat. No. 16315, U.S.N.M.).

*Diagnosis.*—The carina around the posterior end of the carapace above the margin is low, blunt and ill-defined. A tooth or small, pointed lobe on outer margin of basal antennal article. Antero-internal emargination of merus of maxilliped almost a right angle.

*Description*.—Differs from *N. lamellatus* in having the large, posterior, dorsal area of the carapace but feebly defined by a low, blunt ridge; the spines are similarly placed. The protogastric tubercles are low. Rostrum bifurcate for more than half its length, varying from three-fourths in the holotype of *caribbaeus* to three-fifths in the paratype; horns variably divergent, slightly so in the figured specimen (pl. 237), more so (about  $40^\circ$ ) in the smaller male from Sabanilla,  $45^\circ$  in Miers's type. Tooth on supraocular eave insignificant, more so in large specimens than in Miers's type as figured. Basal antennal article narrower than in *lamellatus*, bearing on its outer margin a tooth which is less prominent with age; tooth at antero-external angle less advanced than that at antero-internal angle. A tubercle instead of a compressed lobe behind outer margin of basal article and in transverse line with antennal glands. Antero-internal notch of merus of maxilliped well made, subrectangular. Chelipeds of well-developed male not quite so long as next leg, palm gradually widened distally; fingers about one-third as long as palm, gaping in proximal half, a tooth on the dactylus in the gape. Sixth segment of abdomen of male with arcuate lateral margins.

*Measurements*.—Male (16315), holotype of *caribbaeus*, length of carapace on median line to tip of posterior spine 16, length of carapace to tip of horn 23.4, width of carapace 10.5 mm.

*Range*.—Colombia to Bahia, Brazil. To a depth of 20 fathoms.

*Material examined*.—

Sabanilla, Colombia; 1884; *Albatross*; 2 males, holotype and paratype of *Hyastenus caribbaeus* (16315).

State of Parahyba, Brazil; Mus. Paulista (H. von Ihering); 1 male, No. 936 (returned to sender).

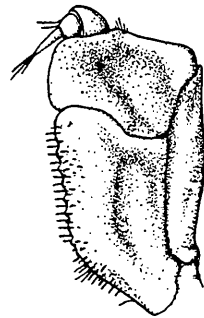


FIG. 96.—NOTOLOPUS BRASILIENSIS, MALE (16315), MAXILLIPED,  $\times 10.66$

#### Genus NIBILIA A. Milne Edwards

*Nibilia* A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 132; type, *N. erinacea* A. Milne Edwards = *antilocapra* (Stimpson).

Carapace pyriform, much swollen, longer than wide. Rostrum bifurcate, horns moderately divergent. Preorbital angle prolonged in a spine. Orbit complete below; orbital border armed with a spine or tooth between the supraocular eave and the postocular cup; a closed fissure between the suborbital border and the basal segment of the antenna. This segment is elongate and bears a strong spine on its outer margin and at its anterior angle; the next article which is cylindrical is inserted beside the rostrum. The merus of the

outer maxillipeds has a transverse distal margin, its outer angle is strongly produced sideways, its inner angle is deeply notched.

In the full grown male the chelipeds are longer and stouter than the legs; chela almost cylindrical; fingers in contact in the distal half, not hollowed at tips.

Contains only one species.

**NIBILIA ANTILOCAPRA (Stimpson)**

Plates 102, 103 and 239

*Herbstia* . . . SCHRAMM, in Desbonne and Schramm, Crust. Guadeloupe, 1867, p. 17, pl. 7, fig. 23.

*Pisa antilocapra* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 110 (type-localities, off Carysfort Reef, 52 and 60 fathoms; off Alligator Reef, 118 fathoms; types not extant).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, pl. 11, figs. 4 and 5; pl. 12, fig. 3, text-fig. 19.

*Pisa praelonga* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 111 (type-localities, off Alligator Reef, 118 fathoms; off Tennessee Reef, 124 fathoms; types not extant).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 384, pl. 11, figs. 6 and 7; pl. 12, fig. 4.

*Nibilia erinacea* A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 133, pl. 25 (type-locality, "Guadeloupe, dans le Canal de Saintes et à Marie-Galante, sur la côte de Capesterre;" from fish-traps set in rather deep water; type in Paris Mus.).

*Diagnosis*.—Rostrum deeply bifurcate; carapace multispinous; orbit with a spine or tooth between preocular eave and postocular cup.

*Description*.—Carapace very spinous. Rostrum horizontal, undivided at base, but bifurcate for the greater part of its length, the horns varying from three-fifths to four-fifths of the total length of rostrum. Preorbital spine ascending, slightly curved, not as advanced as the base of the horns; behind it a small spine on the supraocular eave; a triangular spine or tooth on the supraorbital border; postocular cup terminating in a spine. A short spine just outside the posterior end of the basal antennal article, and behind this a tubercle, both in line with a prominent spine at the angle of the buccal cavity. Carapace bristling with unequal spines; on the gastric region about 18 of fair size with some smaller ones interspersed; one of the strongest occupies the summit of the gastric region and is the center of a circle of smaller spines. The same arrangement is seen on the cardiac region. Certain of the hepatic and branchial spines are very long; one marginal hepatic spine is the longest spine behind the orbits; 4 long spines form a transverse diamond on the intestinal region; a regular series of spines runs above the posterolateral mar-

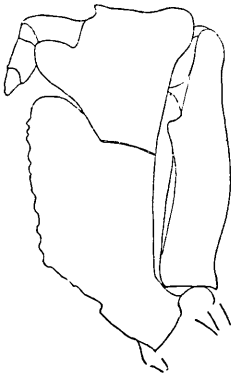


FIG. 97.—*NIBILIA ANTILOCAPRA* (14091), MAXILLIPED,  $\times 3.6$



gin of the carapace. Pterygostomian region armed with 2 rows of spines. Maxillipeds and sternum smooth. Three spines on each of first three abdominal segments of male.

Manus nearly as long as merus, nearly smooth, a few spines near articulation with carpus; merus and carpus rough with spines above and below. In the old male (see Schramm's pl. 7), the fingers gape for half their length, and there is a small but well defined molariform tooth on the dactylus within the gape.

Ambulatory legs long and slender; a few spines longitudinally arranged on merus and carpus; dactylus long, stout, unarmed and short-haired.

The young and half-grown are covered with very short hair, while the old are nearly bare except for the ambulatory dactyli.

*Measurements.*—The largest male noted is that described by Schramm: length of carapace including rostrum 120 mm., greatest width 82, length of rostrum 22, of horns 18, of chelipeds 220, of chelae 110, of movable finger 38, of first ambulatory 190 mm. Length of youngest specimen, female (9688), 20.5, width 9.4, length of horns 6.4 mm.

*Range.*—From off Cape Hatteras, North Carolina, to Gulf of Mexico and Windward Islands. Depth, 52 to 140 fathoms.

*Material examined.*—Off Cape Hatteras, North Carolina; *Albatross*: Lat. 35° 11' 30'' N.; long. 75° 05' 00'' W.; 59 fathoms; crs. S. bk. Sp.; temp. 75° F.; October 21, 1884; station 2301; 1 male, 1 female (7256). Lat. 35° 08' 00'' N.; long. 75° 05' 30'' W.; 63 fathoms; gy. S. brk. Sh.; October 17, 1885; station 2595; 1 male, 1 female (14091).

Gulf of Mexico: East of Delta of Mississippi River; lat. 29° 15' 00'' N.; long. 88° 06' 00'' W.; 60 fathoms; bu. M.; temp. 61.8° F.; Mar. 4, 1885; station 2386, *Albatross*; 1 young female (9688).

Windward Islands; 1879; U. S. C. S. S. *Blake*:

Off St. Vincent: Lat. 13° 07' 55'' N.; long. 61° 05' 36'' W.; 124 fathoms; Co.; temp. 57.5° F.; March 3; station 269; 1 female (2865, M. C. Z.). Lat. 13° 06' 45'' N.; long. 61° 06' 55'' W.; 87 fathoms; Co.; temp. 62° F.; February 21; station 232; 1 ovigerous female (2869, M. C. Z.).

Off Barbados: Lat. 13° 05' 00'' N.; long. 59° 39' 40'' W.; 140 fathoms; Co. brk. Sh.; temp. 56.5° F.; March 10; station 299; 1 ovigerous female (2864, M. C. Z.); 2 males, 2 ovigerous females (2866, M. C. Z.). Lat. 13° 02' 36'' N.; long. 59° 37' 45'' W.; 123 fathoms; R.; temp. 56.5° F.; March 10; station 297; 1 male (2867, M. C. Z.).

*Remarks.*—*Pisa antilocapra* appears to have been founded on a young specimen of this species, while the type of *P. praelonga* was a much smaller (scarcely 10 mm. long) and consequently narrower specimen.

Genus **LEPTECES** Rathbun

*Lepteces* RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 83; type, *L. ornatus* Rathbun.

Carapace subpyriform or triangulate, slightly convex, tuberculate; preocular spine present. Rostral spines divergent. Orbit with two hiatuses above and one below. Antennae with a spine at antero-external angle of basal segment, movable portion visible in dorsal view at sides of rostrum. Outer maxilliped with antero-external angle strongly produced and rounded, inner angle notched. Chelipeds more slender than ambulatory legs; manus more slender than merus; fingers very short, meeting when closed. Ambulatory legs spinous, diminishing rapidly in length from first to fourth leg.

Contains only one species.

**LEPTECES ORNATUS** Rathbun

Plate 244, fig. 2

*Lepteces ornatus* RATHBUN, Proc. U. S. Nat. Mus., vol. 16, 1893, p. 84, pl. 6, fig. 1 (type-locality, off Arrowsmith Bank, Yucatan; holotype, Cat. No. 9546, U.S.N.M.).

*Diagnosis.*—Chelipeds filiform. Flat-topped mushroom tubercles form a regular pattern on carapace. A lobe between supraocular cave and exorbital tooth.

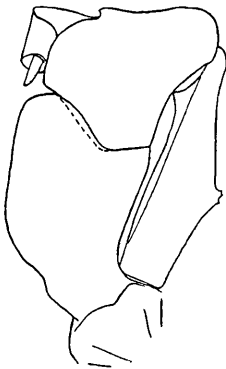


FIG. 98.—*LEPTECES ORNATUS* (9546), MAXILLIPED,  $\times 18$

*Description.*—Entire surface except chelae granulate. Carapace ornamented with tubercles of two kinds; first and most conspicuous, raised mushroom-like tubercles, each surmounted by a flat, circular, granulate disk. Tubercles of this sort with disks overlapping surround cardiac region and outline inner margin of branchial region; one on posterior edge of gastric region, four follow posterolateral margin, two arranged transversely on the intestinal region, while a line of four runs almost transversely across each hepatic region

and onto the gastric; many additional smaller tubercles of this sort. The second variety of tubercle is smaller but higher, more like a cylindrical spine, granulate and surmounted by a few long hairs; four such tubercles on gastric region, two being median, six on branchial region, two or three on cardiac region, three on posterior margin. Entire surface between and beneath the tubercles is crowded with stellar granules, varying in size.

Rostral spines regularly tapering, divergent, with long hairs especially on inner margins. Preocular spine strongly curved upward (concave above), at an angle of about 45 degrees with rostrum, acute, a few long hairs at tip.

Basal segment of antenna with outer margin convex, a stout spine at antero-lateral angle, directed forward; flagellum surpassing rostrum. Epistome sharply recessed at middle.

Chelipeds weak in both sexes, much shorter than next leg; merus cylindrical, very rough; carpus granulate; palms smooth, tapering to the fingers, which are one-fifth as long as upper margin of palm. Ambulatory legs stout, somewhat angled, armed with two longitudinal rows of spines and rough with two sorts of tubercles; dactyls finely roughened, tips horny.

*Measurements*.—Male holotype, length of carapace 17, width 9 mm.

*Range*.—Known only from the type-specimens, off Arrowsmith Bank, Yucatan; lat.  $20^{\circ} 59' 30''$  N.; long.  $86^{\circ} 23' 45''$  W.; 130 fathoms; Co.; January 22, 1885; station 2354, *Albatross*; 2 males, 6 females (9546).

#### Genus HERBSTIA Milne Edwards

*Herbstia* MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 301; type, *H. condyliata* (Fabricius). Name not invalidated by *Herbstium* Leach, 1823.

*Rhodia* BELL, Proc. Zool. Soc. London, vol. 3, 1835, p. 169; type, *R. pyriformis* Bell.

*Herbstiella* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 93; type, *H. depressa* Stimpson.

*Fisheria* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 72 [10]; type, *F. depressa* Lockington = *Herbstia camptacantha* (Stimpson), not *H. depressa* (Stimpson).

Carapace broadly triangular or subpyriform, tuberculated or spinose. Rostrum short, horns acute, vertically compressed and dilated at base. Orbits complete, shallow, with or without a pre-orbital spine. Eyes short, not entirely concealed when retracted. Basal antennal article moderately dilated and armed with an antero-external spine, the distal portion not entirely covered by the rostrum. Merus of maxillipeds distally truncated and not produced at outer angle. Ambulatory legs rather slender, subcylindrical and of moderate length; dactyls nearly straight, acute.

East and west coasts of tropical America; Mediterranean and southward along the west coast of Africa.

#### KEY TO THE AMERICAN SPECIES OF THE GENUS HERBSTIA

A<sup>1</sup>. Merus of ambulatory legs armed with spines.

B<sup>1</sup>. Two teeth on outer margin of basal antennal article behind antero-external tooth or spine.

C<sup>1</sup>. First movable article of antenna falling considerably short of tip of rostrum; postocular tooth small, directed forward.

*camptacantha*, p. 294.

C<sup>2</sup>. First movable article of antenna nearly as advanced as tip of rostrum; postocular tooth large, directed obliquely outward. . . . *depressa*, p. 298.

B<sup>2</sup>. One tooth on outer margin of basal antennal article behind antero-external tooth or spine.

C<sup>1</sup>. First movable article of antenna not reaching so far forward as tip of rostrum.

D<sup>1</sup>. Palms armed with spines or tubercles above at proximal end. One tooth on movable finger of male in the gape. Supraorbital margin with two teeth between preocular and postocular teeth.

parvifrons, p. 296.

D<sup>2</sup>. Palms smooth, unarmed. Two teeth on movable finger in the gape. Supraorbital margin with only one tooth between preocular and postocular teeth.....edwardsii, p. 300.

C<sup>2</sup>. First movable article of antenna overreaching rostrum...tumida, p. 299.

A<sup>2</sup>. Merus of ambulatory legs unarmed.

B<sup>1</sup>. Lateral margin of carapace armed with four teeth or spines. Palm with a single spine.....pyriformis, p. 301.

B<sup>2</sup>. Lateral margin armed with smaller, more numerous teeth or spines. Rostrum shorter. Palm unarmed.....pubescens, p. 302.

Analogous species on opposite sides of the continent: *depressa* (Atlantic); *tumida* (Pacific).

#### HERBSTIA CAMPTACANTHA (Stimpson)

Plate 105, figs. 1 and 2; plate 240, figs. 9-13

*Herbstia parvifrons* STIMPSON (not Randall), Ann. Lyc. Nat. Hist. N. Y., vol. 7, 1860, p. 185.

*Herbstiella camptacantha* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 94 (type-localities, Cape St. Lucas and Acapulco; cotype, male, from Acapulco, Cat. No. 991, M. C. Z.).

*Fisheria depressa* LOCKINGTON (*vide* Holmes), Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 72 [10] (type-localities, Port Escondido and San José Island, both in Gulf of California; types destroyed in the San Francisco fire, 1906).

*Milhrax armatus?* LOCKINGTON (not Saussure), Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 70 [8].

*Herbstia camptacantha* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 78, pl. 18, figs. 3-3e.

*Herbstia* (*Herbstiella*) *camptacantha* MIERS, Journ. Linn. Soc. London, vol. 14, 1879, p. 655; *Challenger* Rept., Zool., vol. 17, 1886, p. 49.—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 37 (part).

*Diagnosis*.—Palm unarmed. Three spines on outer margin of basal antennal article, including that at anterior angle; first movable article falling considerable short of tip of rostrum.

*Description*.—Carapace slightly convex, surface regularly and conspicuously punctate; cervical suture deep and well marked, sulci separating branchial from cardiac region very shallow, no sulcus between branchial and intestinal region, which is rather flattened. Twenty small tubercles on carapace not including marginal spines: Five tubercles on gastric region, of which four are in a transverse line, the two on either side of middle approximated; three on cardiac region, two on intestinal region, five on each branchial region. On the margin, 14 spines on each side behind orbit, 5 antero-lateral, 9 postero-lateral; posterior spines very small, blunt or tuberculiform, anterior ones larger. A similar spine and two smaller ones on sub-

hepatic region; oblique ridge separating pterygostomian from subhepatic region armed with five spines, the anterior three small and toothlike. Horns rather large and divergent, forming more than half length of rostrum, their tips as well as those of the antennal spines bent inward. All of the spines are much more acute in young specimens than in adults.

Chelipeds long, merus armed with numerous (about 13) blunt spines on outer side; carpus tuberculated above; hand large, compressed, perfectly smooth and unarmed above and below; fingers less than half as long as palm, and gaping; the dactylus bears a strong truncated tooth at middle. Merus of ambulatory legs armed with 7 to 10 spines along the upper edge, and two or three below near the extremity; carpus slightly tuberculated, propodus unarmed.

Adult males entirely naked, young and females frequently pubescent. (After Stimpson.)

The supraorbital border bears two small teeth, of which the outer is the larger. Basal antennal article armed with three spines on the orbital border, counting the antero-external spine. Carpus of cheliped smooth. (A. Milne Edwards.)

*Notes on cotype from Acapulco.*—The specimen is now in poor condition. Of the five antero-lateral marginal spines, the single hepatic spine is the largest. The nine postero-lateral spines or spinules are very small. Of the dorsal branchial spines three form an arc parallel to the outer margin and are stouter and more conical than any other branchial spines. The penult segment of the male abdomen is widest near its distal end.

*Color.*—A light flesh tint (Lockington, as *armatus*). In spirits bright red, manus, under sides of legs and buccal apparatus especially bright (Lockington, as *depressa*).

*Measurements.*—Length of carapace of adult male, type, 17.1 mm. (.675 inch), width 14.4 mm. (.57 inch) (Stimpson). Female, Mazatlan, length of carapace 32 mm., width 30 mm. (Lockington, as *Mithrax armatus?*).

*Range.*—Cape St. Lucas to Acapulco, Mexico (Stimpson). Mazatlan (Lockington, as *armatus*). Pert Escondido and San José Island, Gulf of California (Lockington, as *depressa*). Patos Island, in upper half of Gulf.

Holmes<sup>37</sup> extends the range of this smooth-handed species into California; but all the Californian specimens examined by the writer 7.5 mm. long and over show spines or spinules on the proximal upper margin of the palm and should be referred to the following species.

*Material examined.*—Acapulco, Mexico; A. Agassiz. collector; one male (991, M. C. Z.); labeled by Stimpson "*Herbstia parvifrons*."

<sup>37</sup> Occas. Papers California Acad. Sci., vol. 7, 1900, p. 37.

and is apparently that type-specimen of *H. camptacantha* which was measured by Stimpson, as given above.

Patos Island, anchorage; 4.5 fathoms; May 23, 1921; Fred Baker, California Academy Expedition; one young female (California Acad.), damaged, and having a soft, hairy shell. It belongs, however, to the group having the antennal spine long and the rostral spines long, regularly tapering and divergent. The legs are transversely banded with an orange color when preserved; the propodal articles are longer and slenderer than in the young of *parvifrons* Randall.

HERBSTIA PARVIFRONS (Randall)

Plate 106

*Herbstia parvifrons* RANDALL, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1839, p. 107 (type-locality, western America; holotype in Mus. Phila. Acad. Nat. Sci.).—HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 38, and synonymy.

*Rhodia parvifrons* RATHBUN, Amer. Nat., vol. 34, 1900, p. 511; not synonymy.—WEYMOUTH, Leland Stanford Jr. Univ. Publ., Univ. Ser. No. 4, 1910, p. 34, pl. 7, fig. 18; not all synonymy.

*Herbstia (Herbstiella) camptacantha* HOLMES, Occas. Papers California Acad. Sci., vol. 7, 1900, p. 37 (part).—RATHBUN (not Stimpson), Proc. U. S. Nat. Mus., vol. 16, 1893, p. 79 (part).

*Diagnosis*.—Palm armed with spines or spinules at the proximal end of its upper margin. Two spines on outer margin of basal antennal article, including that at anterior angle; first movable article falling short of tip of rostrum.

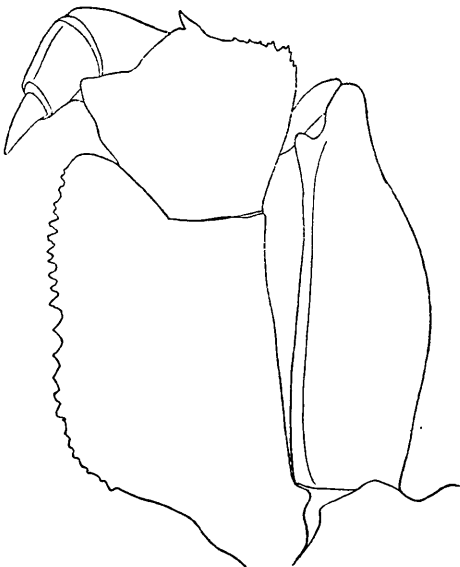


FIG. 99.—HERBSTIA PARVIFRONS (32962), MAXILLIPED,  $\times 6.4$

*Description*.—The description given by Stimpson for *Herbstiella camptacantha* applies very well to the Californian species here called *parvifrons* except that in place of two of the dorsal branchial tubercles there are spines; spines of arm more numerous than in *camptacantha* and in two adjacent and irregular rows, 12 or 13 in the outermost row, 5 or 6 in the other row, 2 spines on inner margin just distad of the middle; palm not unarmed but furnished on the proximal two-

fifths of the upper margin with 5 or 6 spines, present not only in the adult but as spinules, fewer in number, in the young, down to a

carapace length of 7.5 mm.; spines on upper edge of merus of ambulatory legs 9 to 12, instead of 7 to 10, with 1 to 3 below near the extremity (2 to 3 in *camptacantha*), obsolescent on last leg; carpus not tuberculated, but armed in first two pairs with a single spine at inner distal angle of upper surface, unarmed in last two pairs; adults as well as young hairy.

The basal antennal segment is armed with two spines on the orbital border, counting the antero-external spine, while A. Milne Edwards figures 3 for *camptacantha*.

*Color*.—Carapace a light tan mottled with dark brown; ambulatory legs barred with reddish brown; chelipeds, excepting the light tips of fingers, a still more pronounced red (Weymouth). Large male in formalin (32962), a brilliant crimson all over.

*Measurements*.—Male (32962), total length of carapace 43.3, width 41.6 mm. Male (23064) total length of carapace 21.4, width 18.8 mm.

*Range*.—Monterey Bay, California (Weymouth) to Magdalena Bay, Lower California.

*Material examined*.—

“Western America”; T. Nuttall; 1 female, holotype (Mus. Phila. Acad. Nat. Sci.).

San Pedro, California; H. N. Lowe; 1 young male (32980).

Long Beach, California; H. N. Lowe; 1 young male (46757).

Laguna Beach, California; W. A. Hilton; 2 ovigerous females (48913, 50598).

San Pedro to Santa Catalina Island, California; Nov. 27, 1913; *Anton Dohrn*; from Venice Marine Biological Station; 2 young (50263).

Isthmus Harbor, Santa Catalina Island, California; Venice Marine Biological Station; 1 young male (46416).

Catalina Harbor, Santa Catalina Island, California: P. S. Barnhart, *Anton Dohrn*; from Venice Marine Biological Station; 3 young males, 2 young females (50256). Beach; W. H. Dall; 1 young female (16320). Depth, 30 to 40 fathoms, sandy mud; W. H. Dall; 3 young (16321).

San Clemente Island, California; H. N. Lowe; 2 males (23064, 32962).

San Diego County, California; C. R. Orcutt; 1 young male (16323).

Southern California: *Anton Dohrn*; Venice Marine Biological Station; 1 young male, 1 young female (50255). W. H. Dall; 3 young (16322).

Lower California, Mexico; off Magdalena Bay; 1889; *Albatross*: Lat. 24° 58' 30'' N.; long. 115° 52' 30'' W.; 34 fathoms; coralline; temp. 63.9° F.; March 2; station 2988; 1 young female (16346). Lat. 24° 58' 15'' N.; long. 115° 53' 00'' W.; 36 fathoms; coralline; temp. 64.3° F.; March 2; station 2989; 1 young male (16345).

## HERBSTIA DEPRESSA Stimpson

Plate 104, fig. 1

*Herbstia depressa* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, 1860, p. 185 [57] (type-locality, St. Thomas; type not extant).—RATHBUN, Univ. Iowa Studies Nat. Hist., vol. 9, No. 5, 1921, p. 81, pl. 2, fig. 4.

*Herbstiella depressa* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 93.

?*Herbstia* (*Herbstiella*) *depressa*? MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 51, pl. 7, fig. 2.

*Diagnosis*.—Palm unarmed. Two spines on outer margin of basal antennal article, including that at anterior angle; first movable article advanced nearly to tip of rostrum.

*Description*.—Carapace much depressed, generally covered with sordes adhering to a slight pubescence easily detached, beneath which the surface is glabrous and less tuberculous than in *H. camptacantha*. A median protuberance on the gastric, and one on the cardiac region; two tubercles on the intestinal region in a transverse row. Lateral and posterior margins armed with small subspineform tubercles. A stout spine on the hepatic region. Rostrum rather short and broad, cleft for one-half its length; horns triangular, acute. Frontal region and surface of rostrum with a median longitudinal sulcus between two short prominent ridges. Preorbital teeth, orbits and antennae nearly as in *camptacantha*. Basal spine of antennae long, projecting almost as far as horns of rostrum. Exognath of external maxillipeds broad, fusiform, almost angular at middle of external margin.

Chelipeds shorter than next leg; merus armed with one row of spines above, elsewhere smooth; carpus with numerous very short spines on upper surface; hand glabrous. Ambulatory legs slender, hairy above; second pair two-thirds longer than carapace; merus of all armed with spines above, sometimes below. (After Stimpson.)

In a larger specimen than those above described there are four additional tubercles or granules forming a transverse oblong on the branchial region, two of the granules near the inner angle of this region and the other two in a line posterior to the middle of the cardiac region; also on dorsal surface a granule which forms a triangle with the two marginal spines at the widest part of the carapace; two teeth on outer margin of basal antennal segment; seven spines and one spinule on merus of cheliped, about 12 spinules and tubercles on wrist.

*Measurements*.—Male type (Stimpson), length of carapace 9.6 mm. (0.38 inch), width 7.6 mm. (0.3 inch). Ovipigerous female, Barbados, length including horns 14.8, median length 14, width 12 mm.

*Range*.—St. Thomas; Barbados; Curaçao. I think it very doubtful if the specimen figured by Miers as a possible *depressa* is really one; it lacks a preorbital spine and the rostral horns are cut too deep. It is from Barra Grande, Brazil, lat. 9° 05' 00" to 9° 10' 00" S.;



long. 34° 50' 00'' W. to 34° 53' 00'' W., 30 to 350 fathoms, station 122, *Challenger*.

*Material examined*.—

St. Thomas; 1 ovigerous female (Copenhagen Mus.).

Barbados; May 15, 1918; Biol. Exped. State Univ. Iowa; 1 ovigerous female (Mus. S. U. I.).

Caracas Bay Curaçao; from sponge; May 10, 1920; C. J. van der Horst; 1 male, 1 female (Amsterdam Mus.), 1 female (55768).

**HERBSTIA TUMIDA (Stimpson)**

Plate 105, figs. 5 and 6

*Herbstiella tumida* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 95 (type-locality, Manzanillo, Mexico; type not extant).

*Herbstia (Herbstiella) tumida* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 49.

*Diagnosis*.—Basal article of antenna very little, if any, wider posteriorly than anteriorly; a small tooth at insertion of next article; antero-external spine directed strongly outward as well as forward; first movable article overreaches rostrum.

*Description*.—Female: Body and feet pubescent. Carapace convex with the regions more protuberant than in *camptacantha* or *depressa*. There are indications of tubercles on the upper surface, distributed as in *camptacantha*, but they are faint protuberances rather than tubercles, except the two on the intestinal region, which are small but distinctly prominent. There is a minute sharp spine at the anterior end of the branchial region and one on the hepatic region. On the antero-lateral margin there are no distinct spines, but the rounded surface is covered with minute, sharp tubercles. On the postero-lateral margin about 10 minute spines, the anterior one largest. Horns of rostrum small, acute, and placed close together; they form less than half length of rostrum. Basal article of antennae short and broad, with a sharp projection at insertion of movable part of antennae; antero-external spine straight, acute and pointing obliquely outward; the other spines shorter than in the allied species.

Merus of chelipeds armed above with 8 acute spines; carpus with one minute spine above and a slight crest on outer side; hand unarmed. Ambulatory legs with ten long, slender spines above and 2 or 3 below. (After Stimpson.)

In a female from Gulf of California the mesogastric and cardiac protuberances are high and surmounted by a strong tubercle; the rostral horns are not contiguous but have a narrow interspace with subparallel sides; preocular spine short, stout, suberect, not overlapping the antennal spine. Behind it are two small teeth and a V-shaped sinus next the postocular tooth; on the lower margin of the

orbit there is a strong tooth; on the outer margin of the basal antennal article two small denticles.

Compared to *H. depressa*, the carapace is narrower, also the ischium of the maxillipeds; antennae longer and fringed with longer hair.

*Measurements*.—Female, Gulf of California, length of carapace to tip of horn 13.5, width 10.7 mm.

*Range*.—Gulf of California and Manzanillo, Mexico.

*Material examined*.—Gulf of California; 1 female (Amer. Mus. Nat. Hist.).

HERBSTIA EDWARDSII Bell

Plate 105, figs. 3 and 4; plate 240, figs. 1–4

*Herbstia edwardsii* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 170;

Trans. Zool. Soc. London, vol. 2, 1836, p. 46, pl. 9, figs. 3, 3*g*–3*i* (type-locality, Galapagos Islands, 6 fathoms; coral sand; type not extant).

*Herbsticella edwardsii* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 93.

*Diagnosis*.—Two teeth in the gape of movable finger of male. Supraorbital margin with only one tooth between preocular and postocular teeth. Palms smooth, unarmed.

*Description*.—Carapace depressed, much rounded, postfrontal portion nearly circular but rather narrowed forwards; minutely punctate. Four small tubercles transversely placed on gastric region, several similar ones elsewhere especially on branchial regions and lateral margin. Front moderately prominent, rostrum very small, horns pointed and a little flattened. Orbits large, furnished with a tooth at upper, inner angle, another at outer angle, and a third, small and rounded, beneath; between which and the basal article of the antenna there is a considerable hiatus. Basal article rather broad, with a large tooth at the antero-external angle and a smaller one behind it on the margin; next two articles cylindrical, the last extending a little beyond the rostrum.

Chelipeds of male more than twice as long as the postfrontal portion of carapace, rather robust, and nearly cylindrical; hand rather larger than the other segments, smooth; dactylus with two teeth (in Bell's figure) in the gape, immovable finger with a strong tooth between the two above. Legs sparsely hairy, merus with a row of small spines above. (Bell.)

*Notes on a female from James Island*.—The tubercles of the dorsal surface of the carapace are much more obscure than represented by Bell; there are 7 tubercles on the intestinal region arranged in 2 transverse rows, 4 in the anterior row and 3 in the posterior. Of the marginal spinules that on the hepatic region is largest and sharpest. On the upper margin of the orbit a small blunt tooth between the preocular and postocular teeth. The tooth on outer margin of basal

antennal article is acute. The fingers of the feeble chelipeds of the female are without enlarged teeth.

*Color*.—Grayish brown above, yellowish beneath, chelipeds plumbeous, ambulatory legs somewhat flesh-colored. (Bell.)

*Measurements*.—Type (Bell), length 17.8 mm. (7 lines), width 16.5 mm. (6½ lines). Female (1879, M. C. Z.), length to tip of horns 10.5, width 8.5 mm.

*Range*.—Galapagos Islands, to 6 fathoms.

*Material examined*.—James Island, Galapagos Archipelago; Hassler Exped.; 1 ovigerous female (1879, M. C. Z.).

#### HERBSTIA PYRIFORMIS (Bell)

Plate 104, figs. 2 and 3; plate 240, figs. 5-8

*Rhodia pyriformis* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 170; Trans. Zool. Soc. London, vol. 2, 1836, p. 44, pl. 9, figs. 1-1c (type-locality, Galapagos Islands, 6 fathoms, coral sand; type not extant).

*Herbstia pyriformis* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 93.

*Diagnosis*.—Merus of ambulatory legs unarmed. Four lateral teeth or spines. Posterior margin of carapace strongly produced. One spine on palm.

*Description*.—Male: Carapace pyriform, somewhat depressed, regions slightly and evenly elevated; rostrum about as broad as long, small, consisting of two pointed teeth; lateral margin with four distant, minute teeth or spines; posterior margin strongly produced. Orbits large, with a triangular hiatus above, and a preocular and postocular tooth. Antennae twice as long as rostrum, basal article bidentate, tooth at middle of outer margin shorter than the antero-external tooth which is under and projects beyond the supero-internal angle of orbit.

Arm and wrist hairy and beset with small spines; hand hairy above, smooth. Fingers slender, not gaping, minutely serrated. Ambulatory legs longer than chelipeds, the second pair by nearly one-third; remainder diminishing gradually. They are nearly cylindrical, smooth and hairy. (Bell.)

*Notes on a male from James Island*.—The median posterior protuberance of the carapace is more abrupt than as figured by Bell and is surmounted by a suberect, conical tubercle with a sharp point. The rostrum is not so deeply bifurcate as in Bell's figure, but each horn is longer than its basal width. The inner margins of the orbits converge anteriorly where they are tipped with a small spine; postocular tooth tipped with a spinule; two supraorbital emarginations between which the margin is transverse, not dentiform. The anterior spine of the basal antennal article is long, straight and acumi-

nate; the other marginal spine is at the posterior end of the segment and is much smaller but also sharp. The lower margin of the orbit is more advanced than the upper and is transverse and slightly sinuous.

The three long margins of the merus of the cheliped are armed with spines; the carpus bears six spines (visible to the naked eye), arranged in two longitudinal series; a similar spine surmounts the condyle of the palm which articulates with the wrist.

*Color*.—Pink, hairs brown; legs whitish with pink rings or bands.

*Measurements*.—Type male (Bell), length 20.3 mm. (8 lines), width 15.2 mm. (6 lines). Male (1895, M. C. Z.), length to tip of horns 14.7, width 10.3 mm.

*Range*.—Galapagos Islands, to 6 fathoms.

*Material examined*.—James Island, Galapagos Archipelago; Hassler Exped.; 1 male (1895, M. C. Z.).

#### HERBSTIA PUBESCENS Stimpson

*Herbstia pubescens* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 10, 1871, p. 92 (type-locality, Manzanillo, Mexico; holotype not extant).

*Diagnosis*.—Merus of ambulatory legs unarmed. Lateral spines more than four. A transverse gastro-cardiac ridge.

*Description*.—Body covered with a dense, short pubescence, beneath which the carapace is smooth and unarmed, except at the sides, where there are a few minute spines. There are two inconspicuous tubercles in the median line on the gastric region, and a short, transverse, tuberculiform ridge between the gastric and the cardiac region, which latter is somewhat prominent. There is a single small triangular tubercle at the posterior extremity on the intestinal region. Rostrum very short. Chelipeds with merus and carpus armed with spiniform tubercles; hand smooth, unarmed. Ambulatory legs unarmed, pubescent; dactyli very short.

Differs from *H. pyriformis* in its shorter rostrum, and in the spines of the lateral margins of the carapace which are smaller and more numerous. (Stimpson.)

*Measurements*.—Female holotype, length of carapace 21.6 mm. (0.85 inch), width 17 mm. (0.67 inch).

*Range*.—Manzanillo, Mexico. Known only from the type-specimen.

Genus **MICROPISA** Stimpson

*Micropisa* STIMPSON, Proc. Acad. Nat. Sci. Philadelphia, vol. 9, 1857, p. 217; type, *M. ovata* Stimpson; Smithson. Misc. Coll., vol. 49, 1907, p. 10.

*Phycodes* A. MILNE EDWARDS, Rev. et Mag. de Zool., ser. 2, vol. 21, 1869, p. 374; type, *P. antennarius* A. Milne Edwards. Not *Phycodes* Guenée, 1852 (Lepidoptera).

*Apionithrax* RATBUN, Proc. Biol. Soc. Washington, vol. 11, 1897, p. 164; type, *A. antennarius* (A. Milne Edwards).

Carapace broad across the branchial regions, suboval, little convex, more or less spinous, front between the eyes narrow, rostrum short, bifid. Preorbital spine present or absent; a supraorbital fissure and an exorbital tooth present; orbits open below. Eyes retractile but not concealed. Basal article of external antennae armed with a tooth or spine at its external angle; movable portion visible from above. Fingers of adult male touching only at the extremities.

Brazil; West Africa; Cape Verde Islands. Shallow water; 30–180 meters (16–98 fathoms).

\* **MICROPISA VIOLACEA** A. Milne Edwards

Plate 101; plate 241, figs. 5–8

*Micropisa violacea* A. MILNE EDWARDS, Nouv. Arch. Mus. Hist. Nat., Paris, vol. 4, 1868, p. 50, pl. 16, figs. 3–6 (type-locality, Cape St. Vincent, Cape Verde Islands; holotype in Paris Mus.).—A. MILNE EDWARDS and BOUVIER, Brach. *Travailleur* et *Talisman*, 1900, p. 130.

*Phycodes antennarius* A. MILNE EDWARDS, Rev. et Mag. de Zool., ser. 2, vol. 21, 1869, p. 374.

*Herbstia violacea* MIERS, Ann. Mag. Nat. Hist., ser. 5, vol. 8, 1881, p. 206; *Challenger* Rept., Zool., vol. 17, 1886, p. 50.

*Diagnosis*.—No preocular spine. Marginal spines numerous. Antero-external spine of basal antennal article directed outward and visible from above. Merus and carpus of cheliped nearly smooth.

*Description*.—Carapace almost as wide as long, covered, as are also the legs and the lower surface of the body with a brown, rather dense velvet. Rostrum divided half way by two short, straight, divergent horns. Orbit large, its supraocular eave little projecting and bearing at its posterior end a sharp spine directed outward and separated by a narrow fissure from the large postorbital spine. This last points forward and has at its inner base a small spine directed obliquely inward and forward. Infra-orbital border with a deep sinus, along the inner side of which there lies a small, blunt, non-projecting tooth. Basal article of antenna armed with two anterior spines, the outer one visible from above, the inner one partially concealed by the following article. Antero-lateral margin armed with one hepatic spine, three small and three large branchial spines alternating, the last of which forms the lateral angle of the carapace, and is followed by a small postero-lateral spine. Above the posterior

border are five distant spines, two branchial (paired), the outer one the strongest of all, and one intestinal. A transverse row of four gastric spines, a median mesogastric spine; a small cardiac tubercle or spine; three hepatic spines.

Chelipeds of adult male very little longer than carapace, stout; hand swollen, slightly narrowed distally, fingers slender, widely gaping except at tips, a low tooth on dactylus at basal third. Ambulatory legs stout, graduated, the first pair a little longer than chelipeds.

*Variations.*—A half-grown male from west Africa has the spines relatively shorter or reduced to tubercles, legs slenderer than in full-grown male, but cheliped well developed.

*Measurements.*—Male (334, Mus. Paulista), total length of carapace 51, total width 49.3, width without spines 43.2, least width between eyes 8.3, length of horn 5.1 mm.

*Range.*—Brazil: Provinces of Rio de Janeiro, São Paulo, and Santa Catharina. Previously known only from West Africa (Sahara to Angola) and the Cape Verde Islands; shallow water to 180 meters (98 fathoms).

*Material examined.*—

Serra de Masahé, Province of Rio de Janeiro, Brazil; 1912; E. Garbe, collector; from Museu Paulista; 1 male (Cat. No. 55769, U.S.N.M.).

Santos, Province of São Paulo, Brazil; 1896; Bisego, collector; lent by Mus. Paulista (Cat. No. 334).

Desterro, Province of Santa Catharina, Brazil; January, 1866; Fritz Müller; 1 small male (2052, M. C. Z.).

Off Sahara, Africa; lat.  $21^{\circ} 47' N.$ ; long.  $19^{\circ} 47' W.$ ; 140 meters; green muddy sand; July 13, 1883; station 92, *Talisman*; 1 male (22969) received from Paris Museum.

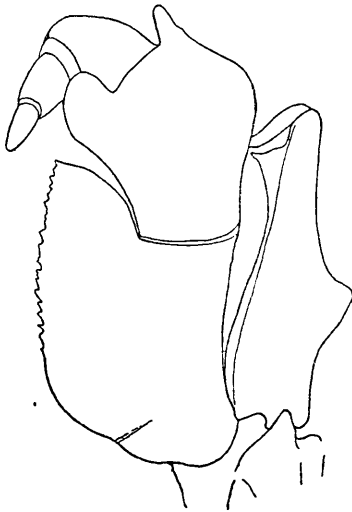


FIG. 100.—MICROPISA VIOLACEA (55769), MAXILLIPED,  $\times 6$

#### Genus CHORINUS Latreille

*Charineus* (Leach MS.) DESMAREST, Dict. Sci. Nat., vol. 28, 1823, p. 266; Consid. Gén. Crust., 1825, p. 153; *nomen nudum* (neither described nor adopted).

*Chorinus* (Leach MS.) LATREILLE, Encyc. Méth., Hist. Nat., Entom., vol. 10, 1825, pp. 139 and 699; in Cuvier, Règne Anim., ed. 2, vol. 4, 1829, p. 58 (described, but name not adopted, by Latreille as a division of the subgenus *Pisa*; only species, and therefore type, *Pisa heros* (Herbst).—MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 314.—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 86.

Carapace oblong-oval. Rostrum with two slightly divergent horns. Preorbital spine stout, postorbital spine small, dentiform, remote

from orbit. Two superior orbital spines. Basal antennal segment short and narrow; flagellum short, concealed beneath rostrum. Outer maxillipeds with the ischium advanced at the antero-internal angle; merus rhomboidal, advanced at middle, outer angle laterally produced, antero-internal margin oblique, ending posteriorly in a slight tooth. Chelipeds elongate, stouter than ambulatory legs. Legs of first pair long, of remaining pairs very short. Abdomen of both sexes composed of seven separate segments.

Contains only one species, the other species referred to *Chorinus* having been transferred to different genera.

Restricted to the eastern coast of America and to the Bermudas.

CHORINUS HEROS (Herbst)

Plate 107; plate 246, figs. 3-5

*Cancer heros* HERBST, Natur. Krabben u. Krebse, 1790, vol. 1, pl. 18, fig. 102; 1796, vol. 2, p. 165, pl. 42, fig. 1 (type-locality, "der Ocean"; type in Berlin Mus.).

*Maja heros* BOSCH, Hist. Nat. Crust., vol. 1, 1801-2 (an X), p. 251.

*Maja héros* LATREILLE, Hist. Nat. Crust., vol. 6, 1803, p. 101.

*Cancer (Inachus) heros* LATREILLE in Cuvier, Règne Anim., vol. 3, 1817, p. 21.

*Pisa heros* LATREILLE, Encyc. Méth., Hist. Nat., Entom., vol. 10, 1825, p. 139; in Cuvier, Règne Anim., ed. 2, vol. 4, 1829, p. 58.

*Chorinus heros* MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 315; in Cuvier, Règne Anim., Disciples' ed., p. 85, pl. 29, figs. 2-2b.—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 86.

*Chorinus barbirostris* (Leach MS.) WHITE, List Crust. Brit. Mus., 1847, p. 6.

*Diagnosis*.—Carapace oval, with two long horns, connected by a sievelike channel of long hairs. Chelipeds of male very long and stout. Legs of first pair long, of second, third, and fourth pairs short.

*Description*.—Carapace pubescent, convex, posterior two-thirds smooth, anterior third deflexed, covered with short, blunt tubercles or spines, from which proceed a tuft of coarse hairs: these tubercles are continued part way on the rostrum. Rostral horns stout, usually more or less incurved, about one-third the length of remainder of carapace, and furnished on inner edges with two rows of long, closely placed hairs, which rows separating form with those on the opposite horn a long channel. Preorbital spines about one-third length of rostral horns, curved and directed forward. Marginal spines two, one gastric and one hepatic, the former the longer, flattened, both curved. Above the orbit are two tubercles or stout spines, the anterior the larger and more or less compound. The branchial region has a few tubercles at anterior angle and on antero-lateral margin.

Subhepatic and pterygostomian regions tuberculate. Basal antennal segment with a stout spine at its extremity and a tubercle on lateral margin; almost in the same line there is a tubercle just behind

the segment and another at angle of buccal cavity; two movable segments of antennal peduncle flattened, the first one widening at its distal extremity.

Chelipeds naked and smooth, attaining a length of twice that of the carapace in the male; merus cylindrical; manus compressed and slightly dilated, the palmar portion about twice length of fingers; fingers gaping slightly for their distal half or third. Legs stout, pubescent, and hairy, the first pair attaining a length greater than that of carapace; remaining pairs much shorter and decreasing regularly in length.

*Measurements.*—Male, Bermuda (Amer. Mus. 5527), total length of carapace to tip of horns 63.7 mm., length on median line 46.6, length of horn 16.8, width of carapace 32.3, length of cheliped about 90.4, of first ambulatory 76.8 mm.

*Range.*—Florida Keys to Bahia, Brazil; to a depth of 16 fathoms. Cuba (von Martens). Also Bermuda.

*Material examined.*—

Tortugas, Florida; W. H. Longley; 1 male (50441), "abundant."

Key West, Florida; C. J. Maynard; received from Boston Soc. Nat. Hist.; 1 male, 2 females (53044).

Sand Key Light, Florida; rocks, sponges, etc.; 1893; Biol. Exped. State Univ. Iowa; 1 young female (Mus. S. U. I.).

Hawk Channel, Florida,  $1\frac{1}{4}$  miles S. by W. of southeast end of Long Key; 15 feet; Barry; February 18, 1903; station 7463, *Fish Hawk*; 1 young (47067).

Florida; J. S. Kingsley collection; received from Boston Soc. Nat. Hist.; 1 male (53043).

Yucatan, off Mujeres Island; 12 fathoms; crs. co. S.; W. Stimpson; 1 young (1941, M. C. Z.).

Lime Cay, Jamaica; P. W. Jarvis, collector; specimen returned to sender.

Jamaica; from Mar. Biol. Lab., Woods Hole; 1 male (47353).

San Domingo; 1878; W. M. Gabb; 1 male (4176).

San Antonio Bridge, San Juan, Porto Rico; January 12, 1899; *Fish Hawk*; 1 young (24163).

Caballo Blanco Reef, Vieques, Porto Rico; February 7, 1899; *Fish Hawk*; 1 male, 1 female (24201).

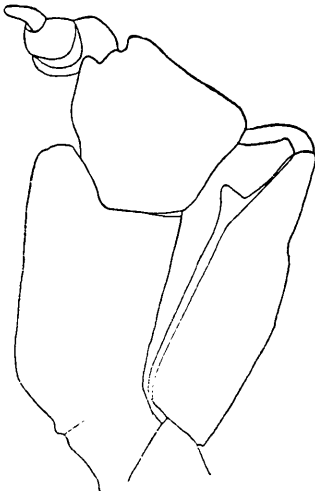


FIG. 101.—*CHORINUS HEROS* (53044),  
MAXILLIPED, X 6



Off Vieques, Porto Rico; Point Mula Lighthouse, S. SW.  $\frac{3}{8}$  W.,  $5\frac{3}{4}$  miles; 14 fathoms; Co. S. Sh.; temp.  $25.6^{\circ}$  C.; February 8, 1899; station 6085, *Fish Hawk*: 1 young (24160).

Off Vieques, Porto Rico; Culebrita Lighthouse, NE.  $\frac{3}{8}$  E.,  $7\frac{1}{4}$  miles; 16 fathoms; Co.; temp.  $25.2^{\circ}$  C.; February 10, 1899; station 6092, *Fish Hawk*: 1 young (24161).

Off Humaçao, Porto Rico; Ilucres, NW.  $\frac{3}{4}$  W.,  $2\frac{1}{4}$  miles;  $9\frac{1}{2}$  fathoms; Co.; temp.  $26^{\circ}$  C.; February 14, 1899; station 6099, *Fish Hawk*: 1 young (24162).

St. Croix (Copenhagen Mus.).

Barbados; Theodore N. Gill; 1 male (1268, M. C. Z.).

Bahia, Brazil (Copenhagen Mus.).

Rio Vermelho, Bahia, Brazil; February 6; R. Rathbun, Hartt Explorations, 1875-1877; 1 specimen (19945).

Bermuda; L. L. Mowbray; 1 male (Amer. Mus.).

Locality not given: 1 carapace of type, original of Herbst's plate 18, figure 102 (Berlin Mus.).

#### Genus HOLOPLITES Rathbun

*Holoplites* RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 64; type, *H. armata* (A. Milne Edwards).

Carapace pyriform, covered with sharp spines of unequal length. Rostrum composed of two long, slender, divergent horns. Orbits open, armed with an anterior, a superior, a posterior, and an inferior spine; anterior spine long. Basal antennal segment very narrow, spinous. Antero-internal margin of the merus of the maxillipeds oblique, not notched for the articulation of the palpus; antero-external angle expanded. Abdomen of female with the fourth, fifth, and sixth segments coalesced. Chelipeds and merus of ambulatory legs spinous. Contains only one species.

#### HOLOPLITES ARMATA (A. Milne Edwards)

Plate 108; plate 245, figs. 6-8

*Nibilia armata* A. MILNE EDWARDS, Crust. Rég. Mex., 1880, p. 348, pl. 31 A, figs. 3-3 c (type-locality, Antilles; cotypes in M. C. Z.); Bull. Mus. Comp. Zoöl., vol. 8, December, 1880, p. 4 (St. Vincent, Grenadines, Barbados; 88 to 180 fathoms.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 386, text-fig. 20.

*Holoplites armatus* RATHBUN, Proc. U. S. Nat. Mus., vol. 17, 1894, p. 64.

*Diagnosis*.—Covered with sharp spines. Rostral horns divergent. Antero-internal angle of merus of maxillipeds not notched.

*Description*.—Preorbital spines much elevated, about half as long as the rostral spines and longer than the other spines of the carapace. Postorbital spine remote from the orbit; below and behind it there is a subhepatic spine. The basal antennal segment bears a long spine at the antero-external angle, and a shorter lateral spine; almost

Material examined of *Holoplites armata*

| Locality         | Bearings                       |                   | Fathoms | Bottom       | Temp.     | Date          | Station | Collector      | Specimens | Cat. No.                               | Remarks |
|------------------|--------------------------------|-------------------|---------|--------------|-----------|---------------|---------|----------------|-----------|--|---------|
|                  | Latitude N.                    | Longitude W.      |         |              |           |               |         |                |           |  |         |
| Cuba.....        | ° ' "                          | ° ' "             | 387     | Co.          | ° F<br>40 | Apr. 30, 1884 | 2152    | Albatross..... | 1 ♀       | 6941.....                              |         |
| St. Vincent..... | 2½ miles N.W. of Havana Light. | 13 07 55 61 05 36 | 124     | Co.          | 57.5      | Mar. 3, 1879  | 269     | Riake.....     | 4         | 2729, 2865,<br>2868, 3029,<br>M. C. Z. |         |
| Do.....          | 13 06 45                       | 61 06 55          | 88      | Co.          | 62        | Feb. 21, 1879 | 232     | do.....        | 2         | 2869, 3028,<br>M. C. Z.                |         |
| Do.....          | 13 06 36                       | 61 12 45          | 114     | Co.          | 57        | Feb. 18, 1879 | 224     | do.....        | 1 ♂       | 3030, M. C. Z.                         | "Type." |
| Barbados.....    | 13 14 18                       | 59 41 12          | 180     | hrd.....     | 50.75     | Mar. 9, 1879  | 265     | do.....        | 1         | 2652, M. C. Z.                         |         |
| Do.....          | 13 05 00                       | 59 39 40          | 140     | Co. brk. Sh. | 56.5      | Mar. 10, 1879 | 299     | do.....        | 5         | 2864, 2866,<br>M. C. Z.                |         |
| Do.....          | 13 02 36                       | 59 37 45          | 123     | R.           | 56.5      | do.....       | 297     | do.....        | 1         | 2867, M. C. Z.                         |         |

in the same line there is a sub-orbital spine. The angle of the buccal cavity is armed with a spine, and the pterygostomian area bears several small spines.

Chelipeds short, stout in the male and feeble in the female; merus somewhat trigonal, its margins and the outer surface of the carpus armed with long spines; upper margin of manus spinous; fingers about the same length as the palm in



FIG. 102.—*HOLOPLITES ARMATA*  
(2866), MAXILLIPED,  $\times 9.37$

female, shorter in male. Ambulatory legs hairy; the merus armed with a terminal spine and two other spines on the upper surface; carpus slightly roughened and propodus unarmed; dactylus spinulose on the inner margin.

The first, second, and third segments of the abdomen of the male have three spines. The first three segments of the abdomen of the female are shorter and have each a median spine, diminishing in length from the first to the

third; they have also small lateral spinules; coalesced segment very large and smooth; terminal segment broadly rounded at the extremity. The abdomen has scattered hairs like the rest of the surface.

*Variations.*—The rostrum is of variable length and may, or may not, be divided to its base. Supraorbital spine variable in size and position.

*Measurements.*—Ovigerous female (6941), length of carapace, including rostrum, 23.5; length of rostral spines 8; width of carapace exclusive of spines, 11; inclusive of spines, 16 mm.

*Range.*—West Indies: Cuba; St. Vincent; Barbados; Grenadines. Depth, 88 to 387 fathoms.

*Material examined.*—See table, page 308.

#### Genus CHORILIBINIA Lockington

*Chorilibinia* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 69 [7]; type, *C. angustus* Lockington.—MIERS, Journ. Linn. Soc. London, vol. 14, 1879, p. 654; *Challenger* Rept., Zool., vol. 17, 1886, p. 45.—ALCOCK, Journ. Asiat. Soc. Bengal, vol. 64, 1895, p. 221.

*Chlorolibinia* HASWELL, Cat. Austral. Crust., 1882, p. 17; type, *C. gracilipes* Miers.

Carapace triangular. Rostrum long, broad, and emarginate at tip as in *Libinia*, but the eyes concealed beneath it as in *Chorinnus* and its allies. Preorbital and postorbital spines acute, separated above and below by an acute fissure and together constituting the orbit. (Lockington.)

Besides the type species from the Gulf of California, a species from Papua and North Australia and another from the Andamans, have been referred to this genus.

#### CHORILIBINIA ANGUSTA Lockington,

*Chorilibinia angustus* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 69 [7] (type-locality, Gulf of California; type not extant).

*Chorilibinia angusta* MIERS, Ann. Mag. Nat. Hist., ser. 5, vol. 4, 1879, p. 7.

*Diagnosis.*—Rostral horns comprising only one-third length of of rostrum. A long spine on basal antennal segment. Chelipeds slender, same length as next pair of legs.

*Description.*—Whole of upper and under surface except inner side of hand and upper surface of rostrum tomentose, with longer hairs at intervals and a row of the latter on each side of rostrum. Carapace triangular, narrowing gradually to region of eyes; orbits salient. Rostrum long, shorter in female than in male, emarginate at tip, the bifurcation divergent, extending only one-third length of rostrum. Basal segment of antennae terminating outwardly in a long spine which precedes the preorbital spine when viewed from above; next two segments setose, slender, cylindrical. Preorbital spine large, acute, separated from the acute postorbital spine by a pointed fissure both above and below. Antero-lateral margin with three spines

besides the postorbital, the largest spine at the lateral angle. Tubercles of carapace prominent, each culminating in a single spine; a tubercle with spine on posterior angle.

Chelipeds slender, about same length as next pair of legs; merus with 4 tubercles above; manus smooth, slender; fingers small, slender, in contact most of their length, serrate on inner border. Ambulatory legs slender, rounded, first pair much the largest; dactyli sharp (Lockington).

*Measurements*.—Male cotype, length of carapace 20, width 12 mm.; female cotype, length of carapace 23, width 15 mm.

*Material examined*.—None.

*Range*.—Gulf of California; known only from the description of the three type-specimens.

*Remarks*.—Perhaps the same as *Libinia mexicana*.

#### Genus LIBINIA Leach

*Libinia* LEACH, Zool. Misc., vol. 2, 1815, p. 129; type, *L. emarginata* Leach.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 235 (part: not *L. macdonaldi* and *spinimana*), and synonymy.

Carapace convex; tuberculous or spinous; triangular-orbiculate and evenly rounded behind the frontal region. Preocular spine usually distinct. Rostrum emarginate or bifid at the apex. Orbits small, nearly circular, with a superior fissure closed or nearly so, and a closed fissure or an open sinus below. Basal antennal segment moderately enlarged. Merus of external maxillipeds truncate at distal end. Chelipeds well developed; palm elongate; fingers with one exception evenly denticulate on inner margins. Ambulatory legs well developed, sometimes elongate, diminishing in length from first to fourth pair; segments subcylindrical, usually unarmed.

America, from Nova Scotia to Terra del Fuego, and from Lower California, Mexico, to Chile; San Francisco, California. Bermuda?; West Africa.

#### KEY TO THE SPECIES OF THE GENUS LIBINIA

A<sup>1</sup>. Merus of chelipeds unarmed or bearing only one spine or tubercle.

B<sup>1</sup>. Rostrum either horizontal or deflexed.

C<sup>1</sup>. Median spines more than 6.

D<sup>1</sup>. Tubercles of carapace numerous, nongranulate, more or less unevenly placed. Median tubercles or spines 9, 5 behind cervical groove. Tooth or tubercle at angle of basal segment of antenna inconspicuous from above.....**emarginata**, p. 311.

D<sup>2</sup>. Tubercles and spines of carapace not numerous, granulate, evenly placed. Median tubercles or spines 7, 4 behind cervical groove. Tooth or spine at angle of basal segment of antenna curved, conspicuous from above.....**spinosa**, p. 325.

C<sup>2</sup>. Median spines 6.

D<sup>1</sup>. No spine at middle of hepatic region.

E<sup>1</sup>. Fork of rostrum in adult shallow, tips of horns blunt. Lateral marginal spines in young of good size, subequal .....**dubia**, p. 313.

E<sup>2</sup>. Fork of rostrum in young deeper than in *dubia*, horns acute, curved toward each other. Lateral marginal spines in young small except the posterior one which is very long and slender.

erinacea, p. 321.

D<sup>2</sup>. A spine at middle of hepatic region.

E<sup>1</sup>. Carapace with a lateral marginal arc of 5 spines. Lower fissure of orbit closed.

F<sup>1</sup>. A rhomb of 4 spines on branchial region besides the marginal arc. Orbit deep, projecting well beyond outline of carapace.

rhomboidea, p. 323.

F<sup>2</sup>. Five spines on branchial region besides the marginal arc. Orbit shallow, not projecting beyond outline of carapace.

ferreirae, p. 324.

E<sup>2</sup>. Branchial region (in the young) with only 3 spines, all long, 1 marginal, 2 dorsal. An open sinus below orbit. . . . .mexicana, p. 328.

B<sup>2</sup>. Rostrum ascending, hollowed beneath, forming with the antennae an efferent channel. Median tubercles or spines 8; a rhomb of 4 on branchial region; no lateral marginal arc of spines. . . . .setosa, p. 327.

A<sup>2</sup>. Merus of chelipeds armed with longitudinal rows of tubercles and spines. Horns widespread and half as long as rostrum. . . . .rostrata, p. 329.

*Libinia? verrucosa* Lockington from Mazatlan<sup>38</sup> is a *nomen nudum*.

Species reported on both sides of the continent: *emarginata*, *spinosa*, *rostrata*.

LIBINIA EMARGINATA Leach  
COMMON SPIDER CRAB

Plates 110-113

*Libinia emarginata* LEACH, Zool. Misc., vol. 2, 1815, p. 130, pl. 108 (type-locality unknown; type in Brit. Mus.).—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 235, pl. 31, fig. 2, and synonymy.—HAY and SHORE, Bull. Bur. Fisheries, vol. 35, 1915-16 (1918), p. 456, pl. 38, fig. 6, and synonymy.

*Libinia canaliculata* SAY, Journ. Acad. Nat. Sci. Philadelphia, vol. 1, 1817, p. 77, pl. 4, fig. 1 (type-locality, bays and inlets of the [east] coast; cotypes from Great Egg Harbor, in Mus. Phila. Acad. Nat. Sci.; specimens, probably cotypes, in Brit. Mus., "presented by T. Say").<sup>39</sup>

*Libinia affinis* RANDALL, Journ. Acad. Nat. Sci. Philadelphia, vol. 8, 1839, p. 106 (type-locality, Upper California; two small male types, labeled "NW coast America," are in Mus. Phila. Acad. Nat. Sci.).

*Diagnosis*.—Carapace with nine median spines or tubercles. Dorsal tubercles many. No spine at angle of buccal cavity.

*Description*.—Surface of body and limbs densely pubescent. Carapace, without rostrum, nearly hemispherical in the old, narrower anteriorly in the young; regions well marked; covered with short spines and tubercles. Median spines 9, of which 4 are gastric, 1 genital, 2 cardiac, and 2 intestinal. Lateral marginal spines 5 on each

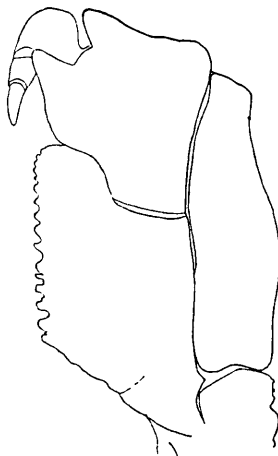


FIG. 103.—LIBINIA EMARGINATA (3898), MAXILLIPED,  $\times 2.55$

<sup>38</sup> Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 64. <sup>39</sup> White, List Crust. Brit. Mus., 1847, p. 4.

side; 2 prominent pterygostomian spines; other large spines are 2 or 4 above the posterior margin besides the median spine and about 4 dorsal branchial spines. Smaller dorsal spines and tubercles numerous, including a transverse line of four gastric tubercles in a row between the first and second median spines. Rostrum deflexed, narrowing distally to the terminal spines, which are short and divergent. Interorbital space medially canaliculate. A short preocular spine; orbital sinuses closed; 2 small spines beneath the orbit on the basal antennal segment.

Chelipeds of adult male stronger than the ambulatory legs and longer than the first pair; a spine in the old, a tubercle in the half

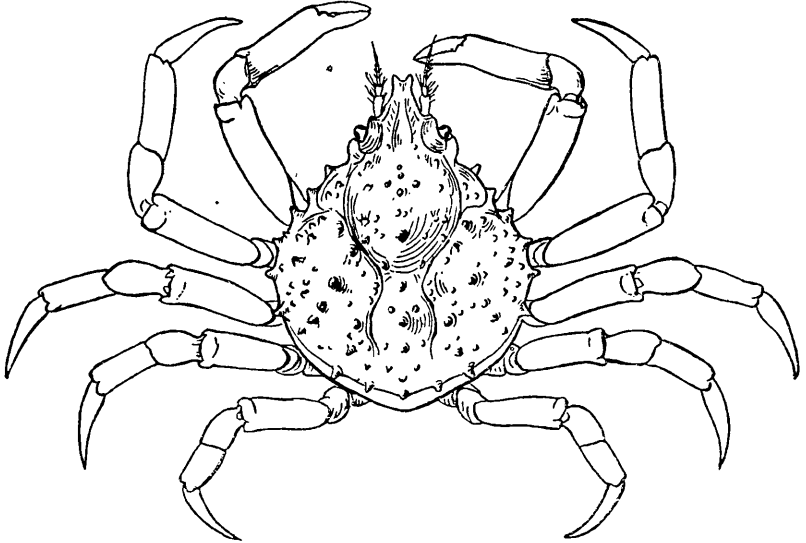


FIG. 104.—*LIBINIA EMARGINATA*, YOUNG MALE (40178), TOTAL LENGTH OF CARAPACE 43 MM., DORSAL VIEW.  
(AFTER R. RATHBUN)

grown, near proximal end of upper surface of merus of cheliped: carpus and chelae rough with pearly granules; palms increasing in width distally; fingers about half as long as palm, moderately gaping at base. Ambulatory legs decreasing rapidly in length.

*Color*.—A brownish or dirty yellow.

*Variations*.—An ovigerous female (15203) from Charlotte Harbor, Florida, approaches somewhat the *dubia* type. It is an *emarginata* in the number of median spines and in possessing a sharp tubercle on the arm; but it resembles *dubia* in the large size of the following spines, viz, the marginal, dorsal branchial, anterior pterygostomian, as well as 3 of the median spines, and in the scarcity of tubercles on the carapace. This specimen I at one time referred to *L. distincta*.<sup>40</sup>

A male and an ovigerous female (20106), between 65 and 75 mm. long from Boca Grande Pass, Florida, are also atypical but in a lesser

<sup>40</sup> Proc. U. S. Nat. Mus., vol. 22, 1900, p. 294.

degree, that is, the spines that are elongate in No. 15203 are less so in No. 20103 and the tubercles are more abundant.

*Measurements.*—Largest male, Atlantic City (in Mus. Phila.), median length 107.2, width 95.3 mm. Large male (32236), total length of carapace 103.4, width including spines 93.7 mm.

*Habitat.*—Very abundant on muddy shores and flats; also occurs on every other sort of bottom.

*Range.*—From Windsor, Nova Scotia, to West Florida; California. Also reported from the Isthmus of Panama and Bermuda,<sup>41</sup> which localities need verification. Depth, shore to 27, exceptionally 68, fathoms.

*Material examined.*—See table, pages 314-317.

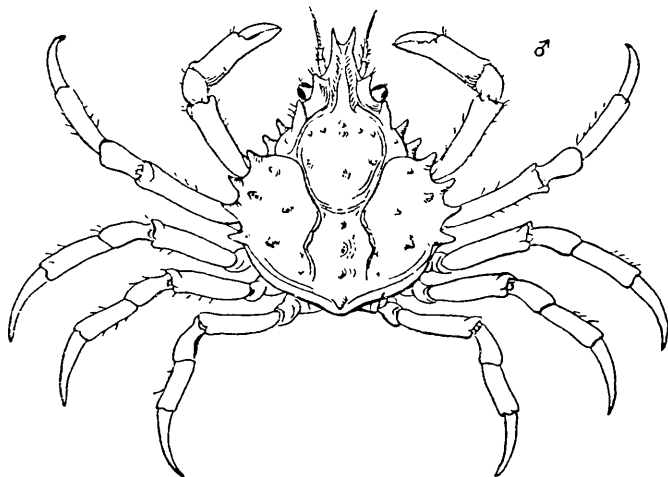


FIG. 105.—LIBINIA DUBIA, YOUNG MALE (40177), TOTAL LENGTH OF CARAPACE 58 MM., DORSAL VIEW. (AFTER R. RATHBUN)

LIBINIA DUBIA Milne Edwards

Plates 114 and 115; plate 122, fig. 1

*Libinia dubia* MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 300, pl. 14bis, fig. 2 (type-locality, *côtes des Etats-Unis*; type in Paris Mus.).—STREETS, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 104.—A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 129 (part; not *L. distincta* von Martens nor *rhomboidea*), pl. 18, figs. 5-5 d, not pl. 26.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 237, pl. 31, fig. 1 (part, not all synonymy).—HAY and SHORE, Bull. Bur. Fisheries, vol. 35, 1915-16 (1918), p. 456, pl. 38, fig. 5, and synonymy.

*Libinia canaliculata* DE KAY, Crust. of N. Y., 1844, p. 2 (part). Not *L. canaliculata* Say, 1817.

*Libinia distincta* GUÉRIN, La Sagra's Hist. Cuba, pt. 2, vol. 7, 1856, Crust., p. xii (type-locality, Cuba; type in Lisbon Mus.).—BRITO CAPELLO, Jorn. Sci. Lisboa, vol. 3, no. 12, 1871, p. 263, pl. 3, fig. 2 (type).

*Libinia subspinosa* STREETS, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 105 (type-locality, "Chile," really Cuba; holotype in Mus. Phila. Acad. Nat. Sci.).

<sup>41</sup> Recorded, but identification doubted by Verrill, Trans. Conn. Acad. Sci., vol. 13, 1908, p. 396.

Material examined of *Libinia emarginata*

| Locality                                    | Bearings                                   |              | Fathoms | Bottom           | Temp.<br>°F  | Date           | Station | Collector            | Specimens     | Cat. No.            | Remarks                       |
|---|--|--------------|---------|------------------|--------------|----------------|---------|----------------------|---------------|---------------------|-------------------------------|
|   | Latitude N.                                | Longitude W. |         |                  |              |                |         |                      |               |                     |                               |
| Nova Scotia: Windsor.                       | ° ' "                                      | ° ' "        | 1-5     |                  |              |                |         | Geol. Survey Canada. | 1             | Trans. No. 146/177. | Returned to sender.           |
| Massachusetts: Wellfleet or Provincetown.   |  |              |         |                  | 1878         |                |         | U.S. Fish Comm.      | 1♂            | 2978                |                               |
| Do  |  |              |         |                  | 1878         |                |         | do                   | 2♀            | 3808                |                               |
| Do  |  |              |         |                  | 1879         |                |         | do                   | 6             | 5875                |                               |
| Cape Cod.                                   |  |              |         |                  |              |                |         | Wm. Stimpson.        | 1♂ 2♀         | 2023                |                               |
| Vineyard Sound.                             |  |              |         |                  | 1875         |                |         | U.S. Fish Comm.      | 140♂♀         | 3607                |                               |
| Do  |  |              |         |                  | 1881         |                |         | do                   | 14 y          | 4019                |                               |
| Do  |  |              |         |                  |              |                |         | do                   | 10♂♀          | 4019                | With <i>Balanus</i> attached. |
| Do  |  |              |         |                  | Aug. 8, 1883 |                |         | do                   | 1♀ and exuvia | 36973               |                               |
| Do  |  |              | 6-13    | hrd. Sh. G       | 70           | Aug. 31, 1875  | 710-715 | Blue light.          | 9 y           | 36874               |                               |
| Do  | West Chop Light, E.                        |              | 9       | S. G             | 65           | Sept. 22, 1881 | 1041    | Fish Hawk.           | 4 y           | 4010                |                               |
| Do  | 1/2 N., 1 1/2 miles.                       |              |         |                  |              |                |         | do                   | 10            | 5858                |                               |
| Woods Hole                                  |  |              |         |                  |              |                |         | do                   |               |                     |                               |
| Do  |  |              |         |                  | 1883         |                |         | U.S. Fish Comm.      | 2 y           | 40740               |                               |
| Do  |  |              |         |                  | 1911         |                |         | do                   | 5 y           | 35046               |                               |
| Vicinity of Woods Hole.                     |  |              |         |                  |              |                |         | do                   | 6             | 43182               |                               |
| Southwest of Gay Head, Marthas Vineyard Rd. |  |              |         |                  | 1911         |                |         | do                   | 1♂            | 43108               |                               |
| Buzzards Bay                                |  |              |         |                  |              |                |         | do                   | 25 y          | 32483               |                               |
|   | 41 00 45                                   | 71 00 05     | 27      | S.               | 53.5         | Sept. 6, 1887  | 1247    | Fish Hawk            | 1♂            | 12852               |                               |
|   | Nye's Neck, S. SE. 3/4 E., 1/2 mile.       |              | 5.25    | S.               | 68           | Aug. 26, 1881  | 956     | do                   | 8 very young  | 4054                |                               |
| Mattapoisett Harbor.                        |  |              |         |                  |              | Nov., 1882     |         | Willard Nyc. jr.     | 10 y          | 5825                |                               |
| Rhode Island: Sakonnet River                |  |              |         |                  | 71           | Aug. 27, 1880  | 834     | Fish Hawk            | 1 y           | 38148               |                               |
| Do  | McCurry's Point, W. SW., 3/4 mile.         |              | 11      | dk. sfl. field M | 71           | do             | 835     | do                   | 1 y           | 36751               | Soft shell.                   |
| Do  | McCurry's Point, N. 1/2 E., 1 1/2 miles.   |              | 3.5     | sft. M. brk. Sh. | 71           | do             | 837     | do                   | 2 y           | 40743               |                               |
| Do  | Black Point, NW. by W., 1/2 W., 1/2 mile.  |              | 5       | S.               | 71           | do             |         | do                   | 1 y ♂         | 49114               | Do.                           |
| Narragansett Bay                            | North end Dutch Island, S., 1/2 mile.      |              | 10.5    | S. M. Sh.        | 69           | Aug. 6, 1880   | 774     | do                   | 1 y ♂         | 49114               |                               |
| Do  | Beaver Tail Light, W. 3/4 N., 1 1/4 miles. |              | 16      | S. G. brk. Sh.   | 60           | Aug. 12, 1880  | 782     | do                   | 2 y           | 40764               |                               |



Figured.  
With young oyster  
on upper surface  
of carapace.

|   |   |       |                        |      |                |             |   |         |        |
|---|---|-------|------------------------|------|----------------|-------------|---|---------|--------|
| Do.   | South end Hope is-<br>land, N. E., $\frac{1}{4}$ mile.                              | 5.5   | M. brk. Sh.            | 70   | Aug. 23, 1880  | 820         | do.   | 1 y.    | 34102. |
| Do.   | South end Hope is-<br>land, N. E., $\frac{1}{4}$ mile.                              | 5-5.5 | M. brk. Sh.            | 70   | do.            | 820,<br>821 | do.   | 8 y.    | 40765. |
| Do.   | Beaver Tail Light, S.<br>to N. by E., $\frac{1}{2}$ mile.                           | 2.5   | S.                     | 66   | Sept. 1, 1880  | 852         | do.   | 1♂ 5 y. | 4536.  |
| Do.   | Beaver Tail Light,<br>S. W., $\frac{3}{4}$ W., $2\frac{1}{2}$ miles.                | 4.5   | S.                     | 67   | do.            | 853         | do.   | 7 y.    | 40744. |
| Do.   | Beaver Tail Light,<br>S. W. by S., 2 miles.   | 6     | S.                     | 67   | do.            | 854         | do.   | (2 y.)  | 36309. |
| Do.   | Beaver Tail Light,<br>S. W., $\frac{1}{4}$ S., $1\frac{1}{4}$ miles.                | 14    | crs. S. brk. Sh.       | 66   | do.            | 858         | do.   | (13 y.) | 40741. |
| Do.   | Beaver Tail Light, W.<br>N. W., $\frac{1}{2}$ W., $\frac{1}{2}$ mile.               | 12.5  | M.                     | 67   | Sept. 17, 1880 | 882         | do.   | 3♂ 2♀   | 4535.  |
| Do.   | Halfway Rock, N.<br>N. E., $\frac{1}{2}$ E., $2\frac{1}{2}$ miles.                  | 17-21 |                        |      |                |             | do.   | 1 s. ♂  | 5761.  |
| Off Newport.  |   |       |                        |      | 1880           |             | U. S. Fish Comm.  | 1♂      | 3583.  |
| Newport.  |   |       |                        |      | 1880           |             | do.   | 3 lge.  | 3136.  |
| Off Newport.  | Point Judith, N. W. by<br>W., $\frac{3}{4}$ W., $1\frac{1}{4}$ miles.               | 12.5  | S. G. few large<br>St. | 59   | Nov. 15, 1875  | 798         | Samuel Powel.   | 1 y.    | 4167.  |
| Off Watch Hill<br>Connecticut.<br>Noank.                    |   |       |                        |      | Aug. 14, 1880  |             | <i>Fish Hawk</i>  | 1 y.    | 40766. |
| New Haven.  |   |       |                        |      | Aug. 21, 1874  |             | U. S. Fish Comm.  | 1 y.    | 40742. |
| Savin Rock, New Haven                                       |   |       |                        |      | 1874           |             | do.   | (2♂)    | 5874.  |
| Oyster beds of H. C.<br>Howe, mouth of New<br>Haven Harbor. |   |       |                        |      | May 28, 1880   |             | do.   | 1♂      | 40178. |
| Off Stratford.  |   |       |                        |      |                |             | do.   | 1 y.    | 40739. |
| Do.   | Stratford Point Light,<br>E. N. E., $2\frac{1}{2}$ miles.                           | 3.83  | hrd.                   | 69.8 | Sept. 19, 1890 | 1550        | <i>Fish Hawk</i>  | 1 y.    | 17142. |
| Do.   | Stratford Point Light,<br>N. E. by E., $\frac{3}{4}$ E., $2\frac{1}{2}$<br>miles.   | 3.5   | hrd.                   | 69   | Sept. 22, 1890 | 1552        | do.   | 3 y.    | 17143. |
| Do.   | Stratford Point Light,<br>N. by E., $\frac{1}{2}$ E., $4\frac{1}{4}$<br>miles.      | 27.66 | sft.                   | 67   | Oct. 1, 1890   | 1578        | do.   | 1 y.    | 17145. |
| Do.   | Stratford Point Light,<br>N. N. W., $3\frac{1}{2}$ miles.                           | 10    | sft.                   | 66   | Oct. 9, 1890   | 1615        | do.   | 1 y.    | 17144. |
| Do.   | Stratford natural oys-<br>ter bed.  |       |                        |      | Oct. 4, 1892   |             | Oyster Str. Hen-<br>ry J., owner<br>Theodore<br>Lounides. | 1♀      | 26095. |
| Connecticut.  | Middle Ground Light-<br>house, E. by S., $\frac{1}{4}$ S.,<br>$1\frac{1}{2}$ miles. | 12    | sft.                   | 68.5 | Sept. 25, 1890 | 1558        | <i>Fish Hawk</i>  | 1 y.    | 17141. |
| Do.   | Penfield Reef Light, W.<br>by N., $\frac{1}{4}$ W., $3\frac{1}{2}$<br>miles.        | 6     | sft.                   | 70   | Sept. 19, 1890 | 1547        | do.   | 6 y.    | 17140. |
| Norwalk Islands.  |   |       |                        |      | July, 1899     |             | J. E. Benedict.   | 2♀      | 42639. |

Covered with  
young  
oysters.  
Received through  
U. S. Fish Comm.

Material examined of *Libinia emarginata*. Continued

| Locality                                      | Bearings    |              | Fathoms | Bottom                   | Temp. | Date            | Station | Collector                           | Specimens | Cat. No.     | Remarks                            |
|---|-------------|--------------|---------|--------------------------|-------|-----------------|---------|-------------------------------------|-----------|--------------|------------------------------------|
|   | Latitude N. | Longitude W. |         |                          |       |                 |         |                                     |           |              |                                    |
| New York:                                     |             |              |         |                          | ° F   |                 |         |                                     |           |              |                                    |
| Off Montauk.....                              | ° ' "       | ° ' "        |         |                          |       | 1874            |         | U. S. Fish Comm                     | 1 ♀       | 40763        |                                    |
| Fort Pond Bay.....                            |             |              |         |                          |       | May 25, 1887    |         | Grampus                             | 1 ♂       | 14842        |                                    |
| Great South Bay.....                          |             |              |         |                          |       |                 |         | T. H. Bean                          | 1 ♀       | 49569        |                                    |
| Fire Island Beach.....                        |             |              |         |                          |       | Sept. 30, 1884  |         | do                                  | 1 ♀       | 8916         |                                    |
| Fire Island, near Inlet, Anchorage Creek..... |             |              |         |                          |       | Oct. 11, 1898   |         | U. S. Fish Comm                     | 1 ♀       | 49119        |                                    |
| The Gut.....                                  |             |              |         |                          |       | July 23, 1898   |         | Biological Laboratory, Cold Spring. | 9         | 21657        |                                    |
| New Jersey:                                   |             |              |         |                          |       |                 |         |                                     |           |              |                                    |
| Atlantic City.....                            |             |              |         |                          |       |                 |         | Joseph Leidy                        | 1 lge. ♂  | Phila. Acad. |                                    |
| Do.....                                       |             |              |         |                          |       |                 |         | Mrs. E. P. Miller                   | 1 lge. ♀  | 23475        |                                    |
| Great Egg Harbor.....                         |             |              |         |                          |       |                 |         | Thomas Say                          | 2 ♀       | Phila. Acad. | COPIES of <i>L. cancellulata</i> . |
| Delaware: Bethany Beach, Chesapeake Bay.....  |             |              |         |                          |       | July 4-10, 1912 |         | W. D. Appel                         | 1 ♂       | 41573        |                                    |
|   |             |              |         |                          |       | 1880            |         | Earl & McDonald                     | 1 ♂       | 5870         |                                    |
| Tangier Sound, Maryland.....                  |             |              | 2½      | sticky.....              | 70    | June 4, 1891    | 1651    | Fish Hawk                           | 2 ♀       | 16073        |                                    |
| Off Bell on Rappahannock Spit, Virginia.....  |             |              | 7.5     | gn. Marl. S.             | 65.3  | Oct. 23, 1915   | 8313    | do                                  | 2 ♀       | 54449        | From seaweed.                      |
| Off Plantation Light, Virginia.....           |             |              | 25      | hrd., brk. sh.           |       | Apr. 22, 1916   | 5503    | do                                  | 1 ♀       | 54448        |                                    |
| Do.....                                       |             |              | Meters  |                          | ° C   | July 8, 1920    | 8826    | do                                  | 1 Y ♂     | 55720        |                                    |
|   |             |              | 45.75   |                          |       |                 |         |                                     |           |              |                                    |
| Off Butler's Bluff, Virginia.....             |             |              | Fathoms | hrd., Seaweed, fr. E. S. | ° F   | Dec. 3, 1915    | 8372    | do                                  | 1 ♀       | 54455        |                                    |
|   |             |              | 18      | gn. M. fr. E. S.         | 49.3  |                 |         |                                     |           |              |                                    |
| Off Thimble Shoal Light, Virginia.....        |             |              | 3.75    | gn. M. fr. E. S.         | 68.7  | Oct. 22, 1915   | 8338    | do                                  | 1 ♀       | 54446        |                                    |
|   |             |              | 15.25   | hrd.                     | 47.8  | Apr. 21, 1916   | 8157    | do                                  | 1 Y ♂     | 54450        |                                    |
| Hampton Roads, Virginia.....                  |             |              | 11-12   |                          |       | Apr. 8, 1887    | 2736    | Albatross                           | 1 ♂ 3 ♀   | 12452        |                                    |
|   |             |              |         |                          |       |                 | 2737    |                                     |           |              |                                    |



*Diagnosis.*—Carapace with six median spines. Dorsal tubercles few. A spine at angle of buccal cavity.

*Description.*—Very much like *L. emarginata*, but with a more pyriform carapace and fewer spines. There are but 6 median spines, of which 2 are gastric, 1 genital, 2 cardiac, and 1 intestinal; the preorbital, pterygostomian and lateral spines are stronger than in *emarginata*, but the spiniform tubercles are few or wanting altogether, and the rostrum is slightly longer and more definitely bifid. Antero-lateral angle of buccal cavity armed with a spine.

Very small specimens, less than 10 mm. long, of *dubia* and *emarginata*, are difficult or impossible to differentiate.

*Measurements.*—Total length of carapace of large male (15824) 101.6 mm., width including spines 89.1 mm.

*Habitat.*—On muddy shores; has nearly the same habits as *L. emarginata*.

*Variation.*—Extremely variable as to length of dorsal spines and tubercles.

*Range.*—From Cape Cod, Massachusetts, to Texas; Cuba. West Africa (Streets). Shallow water to 25 fathoms.

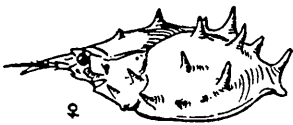


FIG. 106.—LIBINIA DURIA, YOUNG FEMALE (40176), TOTAL LENGTH OF CARAPACE 35.5 MM., PROFILE. (AFTER SMITH, MS.)

Brito Capello,<sup>42</sup> gives for *L. distincta* the locality "Chile," which is an error, as A. Milne Edwards said in 1878,<sup>43</sup> for Cuba. The holotype of *L. subspinosa* Streets, "Chile," is probably one of the same lot of specimens as the type of *L. distincta* Guérin.

*Material examined.*—

Vineyard Sound, Massachusetts; U. S. Fish Comm.: 1875; 1 female, figured (40176). Sept. 3, 1875; 1 young (40746).

Woods Hole, Massachusetts; U. S. Fish Comm.: 1882; 29 specimens (4905). Caught in fyke-net; October, 1882; V. N. Edwards; 1 large male (5839). Vicinity of; 1911; 1 male (43813).

Mattapoisett Harbor, Massachusetts; November, 1882; W. Nye, jr.; 2 young males (15121).

Newport, Rhode Island; shore; 1880; U. S. Fish Comm.; 2 young (40112).

Narragansett Bay, Rhode Island; Beaver Tail Light, SW.  $\frac{1}{4}$  W.,  $1\frac{3}{4}$  mile;  $12\frac{1}{2}$  fathoms; S. G.; temp.  $68^{\circ}$  F.; September 1, 1880; station 851, *Fish Hawk*; 2 young (54444).

Noank, Connecticut: 1874; U. S. Fish Comm.; 1 male, figured (40177); 1 young (40738).

Great South Bay, Patchogue, Long Island, New York; October, 1884; T. H. Bean; 1 female with mollusk attached (8915).

<sup>42</sup> Journ. Sci. Lisboa, vol. 3, no. 12, 1871, p. 263.

<sup>43</sup> Crust. Rég. Mex., 1878, p. 129.

The Gut, New York; July 23, 1898; Biological Laboratory, Cold Spring, Long Island; 1 female (21658).

Barnegat, New Jersey; October 13, 1883; Samuel Ridgway; 1 female (5491), almost completely enveloped in a large mass of serpulid worm tubes.

Chincoteague, Virginia; July, 1913; Henderson and Bartsch; 2 males (46284).

Tangier, Virginia; on Oyster Rock; November 19, 1921; C. W. Shores; 1 male (55477).

Hampton Roads, Virginia; 12 fathoms; April 8, 1887; station 2737, *Albatross*; 1 young (15158).

Norfolk, Virginia; Sibley Coll.; 1 male (15824).

For specimens collected in Chesapeake Bay Survey, by U. S. Bureau of Fisheries, see table, page 320.

Beaufort, North Carolina; June 9 and 16, 1904; B. A. Bean and C. A. McKnew; 2 males (30525).

Off Beaufort, North Carolina, on fishing grounds; 12½ fathoms; station 7963, *Fish Hawk*; 7 specimens (51031).

East end of Sullivan's Island, Charleston, South Carolina; on oyster bed; Joe Whiteside and C. C. Leslie, U. S. Fish Comm.; 1 female (3186).

One mile inside May River, South Carolina; *Fish Hawk*; 1 young (26362).

Fernandina, Florida; in shrimp trawl; December 6, 1919; *Albatross*; 1 male (54442).

Indian River Inlet, Florida; January 23, 1896; U. S. Fish Comm.; 1 female (20104).

Indian River at Titusville, Florida; January 14, 1896; U. S. Fish Comm.; 1 female (20105).

Miami, Florida; G. M. Gray; 1 female (42146).

Cape Florida, Florida; Wurdemann; 1 male, with dorsal surface nearly smooth (1865, M. C. Z.).

Bonefish Banks, S. W. end of Biscayne Bay, Florida; November 26, 1906; Pine and Bean; 1 female (33155).

Key West, Florida; 1884; *Albatross*; 10 young (16155).

Boca Grande, Florida; April 27, 1915; E. Danglede; 3 males (54445); variety with low tubercles.

Off Cape Sable, Florida; Lieut. J. F. Moser, U. S. N., U. S. C. S. S. *Bache*; 1 female (13756).

Punta Rassa, Florida; February, 1884; Henry Hemphill; 18 males, 10 females (6436).

Charlotte Harbor, Florida; March, 1887; W. H. Dall; 1 female (12446).

Sarasota Bay, Florida; February, 1884; H. Hemphill; 2 males, 6 females, 1 young (6422).

Material examined of *Labinia dubia* from Chesapeake Bay survey

| Locality   | Bearings    |              | Fathoms | Bottom                           | Temp. | Date          | Station | Collector | Specimens         | Cat. No. | Remarks           |
|--|-------------|--------------|---------|----------------------------------|-------|---------------|---------|-----------|-------------------|----------|-------------------|
|  | Latitude N. | Longitude W. |         |                                  |       |               |         |           |                   |          |                   |
| Chesapeake Bay:  |             |              |         |                                  |       |               |         |           |                   |          |                   |
| Off Sandy Point Light-house, Maryland.                         | 39 01 40    | 76 20 36     | 13      | sft. bk. M.                      | 65.6  | Oct. 27, 1915 | 8363    | Fish Hawk | 1 Y.              | 54135    |                   |
| Off Thomas Point Shoal Lighthouse, Maryland.                   | 38 55 09    | 76 23 12     | 23      | hrd. bk. M.                      | 65.5  | do            | 8361    | do        | 4 Y.              | 54136    |                   |
| Off Chesapeake Beach Wharf, Maryland.                          | 36 41 48    | 76 29 36     | 6       | sft. bk. M.                      | 64.2  | Oct. 26, 1915 | 8357    | do        | 1 Y.              | 54128    |                   |
| Off Sharp's Island Light, Maryland.                            | 38 40 15    | 76 25 06     | 20      | hrd. thin coat M.                |       | May 22, 1916  | 8357    | do        | 1 Y.              | 54143    |                   |
| Off Windmill Point Lighthouse, Virginia.                       | 37 38 50    | 76 05 20     | 7       | { hrd. gn. Marl. S. }            | 65.3  | Oct. 23, 1915 | 8343    | do        | { 2 Y. ♀<br>1 ♀ } | 54432    | From seaward.     |
| Off Bell Buoy, Rappahannock Spit, Virginia.                    | 37 35 25    | 76 11 20     | 7.5     | sft. gn. M. S.                   | 66    | do            | 8342    | do        | 4 Y.              | 54420    | With long spines. |
| Off Cherrystone Light, Virginia.                               | 37 23 30    | 76 04 50     | 13      | hrd.                             | 75.9  | July 26, 1916 | 8603    | do        | 1 Y. ♂            | 54451    |                   |
| Off Wolf Trap Light, Virginia.                                 | 37 22 12    | 76 10 25     | 9.5     | sft. gn. M. S.                   | 66    | Oct. 22, 1915 | 8341    | do        | 2 Y. ♀            | 54127    |                   |
| Between New Point Comfort Light and York Spit Light, Virginia. | 37 16 50    | 76 14 27     | 5.5     | hrd., fnc. S. M., marine growth. | 50.3  | Apr. 22, 1916 | 8506    | do        | 1 Y. ♀            | 54441    |                   |
| Southeast of Plantation Light, Virginia.                       | 37 15 21    | 76 04 40     | 25      | hrd., brk. Sh.                   | 51.6  | do            | 8563    | do        | 1 Y. ♂            | 54410    |                   |
| 2 miles W. 1/2 S. from Cherrystone Light, Virginia.            | 37 13 12    | 76 04 30     | 18      | hrd., seaweed, fnc. gy. S.       | 49.3  | Dec. 3, 1915  | 8372    | do        | 1 Y. ♀            | 54134    |                   |
| Back River Light, NW, Thimble Light, W.                        | 37 12 00    | 76 10 05     | 4       | fnc. gy. S.                      | 68    | Oct. 22, 1915 | 8356    | do        | 1 Y.              | 54433    |                   |
| Off 38-foot Channel Lighthouse, Virginia.                      | 37 06 35    | 76 07 30     | 8.25    | gy. M. fnc. gy. S.               | 68    | do            | 8357    | do        | 3 Y.              | 54430    |                   |
| No. 4 Buoy, N. by W. 1/2 W.; No. 5 Buoy, W. 3/4 N., Virginia.  | 36 58 38    | 76 07 14     | 5.25    | hrd., brk. Sh.                   | 46.2  | Apr. 21, 1916 | 8498    | do        | 1 Y.              | 54438    |                   |
| Off Cape Charles Light, Virginia.                              | 37 03 24    | 75 58 20     | 10      | hrd. Sh. fnc. gn. S.             | 50.3  | Apr. 22, 1916 | 8502    | do        | 1 Y. ♀            | 54439    |                   |

Goodland Point, Florida; H. Hemphill; 1 male (15120).

Cedar Keys, Florida; December, 1883; H. Hemphill; 1 female (6411).

Near Cedar Keys, Florida; February, 1887; Lieut. J. F. Moser, U. S. N., U. S. C. S. S. *Bache*; 3 males, 2 females (12471).

West Florida; Henderson and Simpson; 1 young (16311).

Florida; Dr. Bryant; received from Boston Society of Natural History; 1 male (53054).

Cameron, Louisiana; R. P. Cowles; 1 female (30574).

Corpus Christi, Texas; November 27–30, 1891; B. W. Evermann, U. S. Fish Comm.; 1 female (17100). 2 males, 1 female, from Shamrock Point (17099).

Cuba; wrongly labeled "Chile"; Guérin collection; T. B. Wilson, donor; 1 small male, holotype of *L. subspinosus* Streets (Phila. Acad.). Median length of carapace 37, total length 38.5, width with spines 34, without spines 29 mm.

West Africa; Gaboon country; Du Chaillu, collector; 1 young female (Phila. Acad.); length of carapace on median line to posterior margin 18.4 mm., length from tip of rostral horn to posterior margin 19.8 mm., width without spines 13.2 mm., with spines 15.7 mm.

LIBINIA ERINACEA (A. Milne Edwards)

Plate 109

*Pisa erinacea* A. MILNE EDWARDS, Crust. Rég. Mex., 1879, p. 202, pl. 15 A, figs. 4–4b (type-locality, lat. 24° 44' N., long. 83° 26' W., between Florida and Cuba, 37 fathoms; type in Paris Mus.).

*Diagnosis*.—Carapace with 6 median spines. Three dorsal spines and tubercles on branchial region; no dorsal spine on hepatic region. Spines uneven; 8 are long, forming a cross.

*Description of young specimen*.—Carapace pyriform, much longer than wide, excluding spines. Six median spines, 2 gastric, 1 genital, 2 cardiac, 1 intestinal; the anterior gastric and the genital spine are very small, the others long. Marginal spines 5 (paired), the posterior one very long, the others small. Dorsal branchial protuberances 3, forming a triangle, the posterior one very long and forming a conspicuous line of 5 with the anterior cardiac spine and the posterolateral spine; the innermost of the branchial triangle is a low spine, the outermost a small tubercle. Rostrum very long, bifid for half its length, horns slender, moderately divergent, tips sharp-pointed and subparallel. Two pterygostomian spines, in a longitudinal line, the anterior one the larger. A tooth at the antero-lateral angle of the basal segment of the antenna and one on its outer margin.

Chelipeds of the immature specimens examined weak and shorter than the ambulatory legs.

*Measurements.*—Immature female (46292), total length of carapace 31.1 mm., median length 26.8 mm., width including spines 25.2, excluding spines 18 mm. Mr. N. S. Burnham saw one three times as large. Young female, length 37, width 27 mm. (Brito Capello).

*Habitat.*—Found crawling on logs just under the surface of the water, and always seen in little patches of moss. (Burnham).

*Remarks.*—This species is undoubtedly a *Libinia*, but the form of the adult is not known. It is nearest *L. dubia*, having the same number of protuberances. It is narrower than *dubia* of the same length, and its narrow carapace and long horns led A. Milne Edwards to place it in the genus *Pisa*. It also differs from *dubia* in having only 8 spines of good size behind the front and those very long, while the remaining spines are very small or obsolescent; the 8 long spines form a cross, 4 being median and 4 in a line between the posterolateral angles. The 4 spines in a transverse row in front of this line are inconspicuous. In *dubia*, while the 6 median spines are unequal they are not strikingly so, the 3 dorsal branchial spines are subequal, the last or posterior of the marginal spines may be the longest of the arc but the others are also of good size. Orbit more open than in *dubia*, the outer margin of the supraocular eave more concave, its posterior angle prominent and conspicuous. The adult of *erinacea* may prove to be only a variety of *L. dubia*.

*Range.*—Florida Keys to western Cuba; 2 to 37 fathoms.

*Material examined.*—

Biscayne Bay, Florida; 1 mile N. of Feather Bed Bank; 2 fathoms; S. G.; March 7, 1903; station 7481, *Fish Hawk*; 1 young female (47100).

Jewfish Creek, Florida; (a salt-water connection between Barnes Sound and Blackwater Sound); N. S. Burnham; 1 young female (46292).

North of Knights Key Channel, Florida; 3 miles NE. by N. of East Bahia Honda Key; 11 feet; rky.; Jan. 22, 1903; station 7412, *Fish Hawk*; 1 young female (47099).

Pigeon Key Lake, Florida; 1 mile E. of East Bahia Honda Key; 10½ feet; rky.; Jan. 7, 1903; station 7404, *Fish Hawk*; 1 young female (47101).

Cuba; on reef flat between Cayo Hutia and Little Cayo, NE. of light; Henderson and Bartsch, *Tomas Barrera Exped.*; 1 young male (48745).



## LIBINIA RHOMBOIDEA Streets

Plates 116 and 117; plate 245, figs. 1-3

*Cangrejo Peludo* PARRA, Descripcion de diferentes piezas de Historia Natural, Havana, 1787, p. 134, pl. 50, fig. 1.

*Libinia rhomboidea* STREETS, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 106 (type-locality, East Indies; holotype in Mus. Phila. Acad. Nat. Sci.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 131.

*Libinia inflata* STREETS, Proc. Acad. Nat. Sci. Philadelphia, 1870, p. 106 (type-locality, West Indies; type thought to be in Mus. Phila. Acad. Nat. Sci., where it is labeled "Cuba").

*Libinia distincta* VON MARTENS, Arch. f. Naturg., vol. 38, part 1, 1872, p. 79, pl. 4, figs. 1 *a* and 1 *b*.—GUNDLACH and TORRALBAS, Anales Acad. Cien. Habana, vol. 36, 1899 (1900), p. 303, text-figs. on p. 304; reprint, 1917, p. 13, pl. [3], fig. 6. Not *L. distincta* Guérin, 1856.

*Libinia dubia* A. MILNE EDWARDS (part), Crust. Rég. Mex., 1878, p. 129 (Cuban specimen only), pl. 26.

*Diagnosis*.—Carapace with 6 median spines. Four dorsal spines on branchial region; one dorsal spine on hepatic region.

*Description*.—Carapace the shape of *L. dubia*, pyriform-orbicular. Rostrum more deeply emarginate, horns more acutely pointed. Six median spines, 2 gastric, 1 genital, 2 cardiac, and 1 intestinal. The anterior gastric spine is one of a transverse row of 5 of which the 2 spines of the intermediate pair are smaller and a little more advanced than the others. Five strong lateral marginal spines which with a similar spine at the middle of the hepatic region make almost a semicircle. Four dorsal branchial spines form an elongate rhomb. Two strong pterygostomian spines and, almost in the same line but directed forward, a spine on the edge of the epimeron and in front of the cheliped. The spines of the branchial and hepatic regions are longer than those of the median region. A short spine at antero-external angle of buccal cavity, and adjacent to it, a longer one on the suborbital region. Basal antennal segment armed with 3 short spines, 1 at the antero-external angle, 1 on the inner margin, bordering the antennular fossa, and the third on the outer margin, forming part of the orbital border.

Chelipeds of old male shorter than in *emarginata* or *dubia*; merus armed with a spine above near the proximal end; palm and wrist roughly granulate; dactylus two-thirds as long as upper margin of palm.

Ambulatory legs longer and more slender than in *emarginata* or *dubia*, the first leg longer than the cheliped. Dactyli very long and slender, and almost bare, the hairy coating extending only a short distance from the propodus.

*Variations*.—In two specimens the genital spine is almost suppressed, and the posterior of the cardiac spines is represented by a low elevation with a deep depression at the center, as described by

Streets. In the Port of Silan female, the median spines and the two innermost branchial spines are reduced to tubercles.

*Relationships*.—Nearly allied to *dubia* but has 2 more dorsal spines (paired), one hepatic, the other forming the anterior end of the branchial rhomb. The posterior end of the supraocular cave forms a spine pointing sideways where it overlaps the postocular cup.

*Measurements*.—Large male (48671), total length of carapace 90.3 mm., width including spines 83 mm., width excluding spines 73.1 mm. Type female (Mus. Phila.), total length of carapace 80.7, median length 78, width without spines 65 mm.

*Range*.—Western Cuba; Yucatan.

*Material examined*.—

Havana, Cuba; 1871; Ramon M. Fornes; 1 male, 1 female (2076, 2077, M. C. Z.).

Santa Lucia, Cuba; May, 1914; Henderson and Bartsch, *Tomas Barrera* Exped.; 1 female (47919).

Cape Cajon, Cuba; from traps; 1914; Henderson and Bartsch, *Tomas Barrera* Exped.; 1 female (48671).

Cuba; N. H. Bishop; received from Boston Soc. Nat. Hist.; 1 male (53050).

Cuba; Guérin's collection; T. B. Wilson; 1 male and cast shell (Phila. Acad.); labeled "*inflata* Sts" and is perhaps type of *inflata*.

Cuba; Gundlach; 3 specimens labeled "*L. distincta* Guérin" (Berlin Mus.).

Off Merida, Yucatan, Mexico; A. Schott; 1 male (2169). Port of Silan, Yucatan; 1 adult female (Cat. No. 772, Mus. Phila. Acad. Nat. Sci.)

"East Indies"; locality probably an error; T. B. Wilson; 1 female, holotype (Phila. Acad.).

#### LIBINIA FERREIRAE Brito Capello

Plates 118 and 119; plate 245, figs. 4 and 5

*Libinia ferreirae* BRITO CAPELLO, Journ. Sci. Lisboa, vol. 3, No. 12, 1871, p. 262, pl. 3, figs. 1, 1a (type-locality, Brazil "provavelmente;" type in Lisbon Mus.).

*Libinia gibbosa* A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 131 (type-locality, Desterro, Brazil; type in Paris Mus.).

*Diagnosis*.—Median spines 6; branchial spines 7 or 8, in 3 rows; 1 supero-hepatic spine.

*Description*.—Carapace orbicular, except for the frontal region, and very convex. Length of preorbital portion between one-fifth and one-sixth of the remaining length. Rostral horns short and very divergent. Five large lateral spines, conical, acute. Dorsal surface well spined and tuberculate. On the gastric region, 5 sharp tubercles in a row and one median, farther back; the intermediate pair of the

row are smaller and may be further forward than the other 3. Four median spines on the posterior half, of which one is genital, 2 cardiac, and 1 intestinal; 8 spines in 3 subparallel rows on the branchial region, of which 2 small are in an almost longitudinal row near the cardiac region, 4 form an irregular oblique line at the summit (the hinder 1 may be absent or obsolescent), while 2 are further forward. One small spine at middle of hepatic region. Pterygostomian region armed with 2 large spines, the anterior much the longer; one stout spine or tubercle at angle of buccal cavity and one further forward close to the basal antennal segment; this segment has 2 tubercles or lobes on its outer margin.

*Measurements.*—Male (?), type, length 68 mm., width 58 mm. (Brito Capello). Female, mature (47833), total length of carapace 50.4, width including spines 50, excluding spines 44.2 mm.

*Range.*—Brazil: States of Rio de Janeiro and São Paulo.

*Material examined.*—Terra de Masahe, State of Rio de Janeiro; January, 1912; E. Garbe: received from Mus. Paulista through H. von Ihering; 1 female (47833).

Santos, State of São Paulo; 1902; Mus. Paulista; 1 young male, returned to sender.

Iguapé, State of São Paulo; 1902; R. Krone; received from Mus. Paulista, through H. von Ihering; 1 young male (47855).

#### LIBINIA SPINOSA Milne Edwards

Plates 120 and 121

*Libinia spinosa* MILNE EDWARDS, in Guérin, Icon. Règne Anim., Crust., pl. 9, figs. 3-3b; Hist. Nat. Crust., vol. 1, 1834, p. 301 (type-locality, "les côtes du Brésil;" type in Paris Mus.).—LAGERBERG, Schwed. Südpolar Exped., 1901-1903, vol. 5, Lief. 7, Anom. u. Braech., 1905, p. 21.

*Libinia espinosa* [error for *spinosa*] GUÉRIN, La Sagra's Hist. Cuba, part 2, vol. 7, 1856, Crust., p. xii.

*Libidoclaea brasiliensis* HELLER, Crust. Reise Novara, 1865, p. 1, pl. 1, figs. 1 and 1a (type-locality, Rio de Janeiro; type in Vienna Mus.).

*Diagnosis.*—Median tubercles 7, gastric tubercles 7, lateral marginal spines 4. A straight row of 4 spines between the posterior cardiac spine or tubercle and the postero-lateral marginal spine.

*Description.*—Carapace in the large male orbicular, save for the rostrum and broader than long without rostrum. Marginal spines short, dorsal protuberances rather high tubercles; all are densely granulated and bare at the summit. Median tubercles 7, 3 gastric, 1 genital, 2 cardiac, and 1 intestinal, the last the most conical and spiniform. Marginal spines 4, the first of which is situated well on the hepatic region. Protogastric spines 2 (paired), situated one obliquely behind the other and nearer the median line, the interval between them being opposite the anterior median tubercle. Dorsal branchial spines 4; two of these form a straight, oblique line with

the postero-lateral marginal spine and the posterior of the cardiac spines; the other two form a transversely oblique line near the inner angle of the region. A small tubercle near inner angle of hepatic region.

Rostrum broad behind, diminishing to base of the short, blunt horns and then widening slightly. Preocular tooth strong. A sinus in lower margin of orbit. Two large pterygostomian spines, followed by a tubercle on the upturned edge of the carapace, in front of the cheliped; a strong, conical tooth or spine at the angle of the buccal cavity and a small tooth in front of it; 2 large teeth on the basal antennal segment, 1 at the antero-external angle and 1 on outer margin.

Chelipeds of large male not quite so long as first ambulatory leg; a stout, subacute spine near base of merus; palm increasing considerably in width toward the fingers, which gape widely at base; dactylus more than half as long as upper width of palm. Ambulatory legs decreasing rapidly in length.

*Measurements*.—Male (Ilha Victoria), total length of carapace 69.7 mm., width including spines 65 mm.

*Color*.—Deep yellowish (Heller).

*Range*.—From Rio de Janeiro to Terra del Fuego (Lagerberg). Chile (Milne Edwards and Lucas; Nicolet, in Gay).

*Material examined*.—

Rio de Janeiro, Brazil: Collected by Mus. Nac. Rio; received from Mus. Paulista (H. von Ihering, 337); 1 ovigerous female (47826). 1872; *Hassler* Exped.; 1 young (1866, M. C. Z.).

Ilha Victoria, São Paulo, Brazil; 1906; Fr. Günther, collector; lent by Mus. Paulista (335); 1 male.

Cabo Santa Maria, Rocha, Uruguay; F. Felippone; 2 males, 3 females (54625, 54633, 55770).

Maldonado, Uruguay; T. G. Cary; 5 males, 5 females (1868, M. C. Z.).

Isla de Flores, Uruguay; F. Felippone; 1 male (55771).

Arroyo Pantanoso, Bay of Montevideo, Uruguay; F. Felippone; 1 male (44689), 1 ovigerous female (44690).

Rio de la Plata, below Monte Video, Uruguay; 7 fathoms; *Hassler* Exped.; 4 young (1867, M. C. Z.); identified by A. Milne Edwards.

Argentina; off Rio de la Plata; lat. 36° 47' 00'' S.; long. 56° 23' 00'' W.; 10½ fathoms; S. brk. Sh.; Jan. 12, 1888; station 2766, *Albatross*; 1 young male, 1 young female (21918).

Port San Antonio, Patagonia; Feb., 1872; *Hassler* Exped.; 4 males (1869, M. C. Z.).

San Matias Bay, Patagonia; *Hassler* Exped.; 1 immature female (2050, M. C. Z.).

## LIBINIA SETOSA Lockington

## Plate 243

*Libinia canaliculata?* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 67 [5].

*Libinia affinis?* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 67 [5].

*Libinia setosa* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 68 [6] (type-locality, San Bartolomé Bay, Lower California; type not extant).—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 238, pl. 28; vol. 21, 1898, p. 574.

*Libinia semizonale* STREETS, Bull. U. S. Nat. Mus., No. 7, 1877, p. 103 (type-locality, Lower California; holotype, Cat. No. 2300, U.S.N.M.).

*Diagnosis.*—Rostrum ascending, channeled below. Median spines of carapace 8; 2 superhepatic spines; a rhomb of 4 on branchial region.

*Description.*—Carapace broadly pyriform, its width less than the postfrontal length. Rostrum ascending, not widened at the extremity, emarginate, forming two shallow teeth which are shorter in old than in young; rostrum arched from side to side, bordered with a fringe of hair, and forming with the rather rigid antennae which are similarly fringed, an expiratory channel.

Median spines 8, of which 4 are gastric, 1 genital, 2 cardiac and 1 intestinal; a single spine on each side of the anterior gastric spine; 2 marginal spines, 1 branchial, the other subhepatic; 4 dorsal branchial spines, of which 2 form a slightly curved line with the marginal spine and the posterior cardiac spine, and the other 2 are in line with the genital spine. A prominent preocular spine. Two hepatic spines, one above the other; a subbranchial spine, below the epimeral suture. A small spine or two on either side above the postlateral margin. Two stout pterygostomial spines, the posterior one very blunt; a spine at antero-external angle of basal antennal segment; a spine just behind the outer margin of that segment.

Chelipeds of old male much longer than ambulatory legs, stout, finely granulate; palm not widening much toward fingers; dactylus  $\frac{2}{3}$  as long as upper margin of palm; fingers gaping in basal half. Legs stout and rather short.

*Variations.*—In the old the spines are small, or reduced to sharp tubercles or, as in the case of the postlateral tubercles, obsolete. In the young, 18 mm. or less in length, 11 spines are very long and the rest small; the long spines are 3 median (penultimate gastric, anterior cardiac and intestinal), and 4 branchial (paired) forming 2 transverse lines on the carapace; posterior gastric spine wanting.

*Measurements.*—Largest male (19523), total length of carapace 95 mm., total width 75.6 mm.

*Range.*—Lower California, Mexico, where so far as known it has been taken only on the west coast.

*Material examined.*—

## MEXICO: LOWER CALIFORNIA

Dr. Thomas H. Streets, U. S. N.; 1 male (2300), holotype of *Libinia semizonale* Streets.

Playa Maria Bay; August 24, 1896; A. W. Anthony; 5 large males (19523).

Santa Maria Bay; March 18, 1911; in boat dredge; *Albatross*; 8 young (47113).

Abreojos Point; July 31, 1922; G. D. Hanna, California Academy Expedition; 7 males, 3 females (Cal. Acad.); 1 male, 1 female (56853).

Off Abreojos Point; lat. 26°-42' 30'' N.; long. 113° 34' 15'' W.; 5½ fathoms; gn. M.; May 4, 1888; station 2835, *Albatross*; 1 young female (21917).

Magdalena Bay; May 2, 1888; *Albatross*: Lat. 24° 38' 00'' N.; long. 112° 17' 30'' W.; 51 fathoms; gn. M.; temp. 56.4° F.; station 2832; 2 young (21915). Lat. 24° 38' 00'' N.; long. 112° 17' 30'' W.; 51 fathoms; gn. M.; station 2833; 2 young (21916). Lat. 24° 32' 00'' N.; long. 111° 59' 00'' W.; 12 fathoms; fne. gy. S.; station 2831; 19 young (21914).

Magdalena Bay: 1917; C. R. Orcutt; 1 male (50628). *Hassler* Exped.: 1 young female (1871, M. C. Z.).

## LIBINIA MEXICANA Rathbun

## Plate 244, fig. 1

*Libinia mexicana* RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 242, pl. 31, fig. 3 (type-locality, Gulf of California, station 3029, *Albatross*; holotype, Cat. No. 16072, U.S.N.M.).

*Diagnosis.*—Carapace of young with 12 long spines behind the orbits. Median spines 6. A long hepatic spine.

*Description of young male.*—Pubescence short, stout, vesicular. Carapace pyriform, much narrower (exclusive of spines) than the postfrontal length. Median spines 6: 2 gastric, long, 1 genital, short, 2 cardiac, the anterior short, posterior long, and 1 intestinal, long. Two long marginal spines, 1 hepatic, 1 branchial and a small spinule or tubercle on the postlateral margin. A short gastric spine either side of the anterior median spine; 2 long dorsal branchial spines arranged in an obliquely longitudinal line. Preocular cave armed with a rather long, suberect spine. Rostrum horizontal, slightly constricted at middle, horns occupying nearly half its length, tapering, acute. Two pterygostomian protuberances, the anterior a conical, acute spine, the posterior a tubercle. A sharp conical spine occupies the anterior margin of the basal antennal segment. An open sinus in lower margin of orbit.

*Measurements.*—Young male, holotype, total length of carapace from posterior margin 13.3, width without spines 7.5, with spines 11.2 mm.

*Range.*—Known only from the type-locality and unique specimen from the Gulf of California, off Shoal Point, Mexico, near the mouth of the Colorado River. lat.  $31^{\circ} 33' 00''$  N.; long.  $114^{\circ} 20' 30''$  W.,  $10\frac{1}{2}$  fathoms, fine gy. S. brk. Sh., Mar. 26, 1889, station 3029, *Albatross*, 1 young male (16072).

*Remarks.*—Differs from all other species in the long, horizontal, hepatic spine.

LIBINIA ROSTRATA Bell

Plate 122, fig. 2; plate 242

*Libinia rostrata* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 169 (type-locality, "ad oras Peruviae"; type not extant); Trans. Zool. Soc. London, vol. 2, 1836, p. 42, pl. 8, fig. 3.

*Diagnosis.*—Rostrum with long, wide-spread horns. Arms with longitudinal rows of tubercles and spines. Three enlarged tubercles in gape at base of fingers.

*Description* (after Bell).—Carapace almost globose, regions much elevated, with numerous strong spines and tubercles, one longer than the rest standing out horizontally on each branchial region. Antero-lateral margin with 3 spines, while a fourth behind them forms the commencement of a flattened ridge extending backwards to the posterior margin. [These are undoubtedly submarginal, chiefly pterygostomian spines.] Orbits with a strong preocular spine. Rostrum very prominent, flattened, terminating in 2 strong divergent spines.

Chelipeds of male twice as long as body; arms furnished with numerous obtuse spines [disposed in 3 rows, according to figure]; wrists tuberculate; hands granulate; fingers touching each other only at the rather acute points.

According to Bell's figure, the arrangement of the dorsal protuberances is as follows: A transverse row of 5 tubercles on the anterior gastric region, with another median tubercle closely in advance; on the mesogastric region a small diamond of 4 tubercles placed lengthwise. Three other median tubercles, namely, genital, anterior cardiac, and intestinal. On the posterior half of the branchial region two longitudinal rows, the inner row of 2 tubercles, the outer row of 3 spines; on the anterior branchial region a triangle of 3 tubercles. The rostral horns are so widespread that the width between their tips is more than one and one-half times the width at base of rostrum. On the basal half of the fingers in the gape there are 2 tubercles on the dactylus and between them one on the fixed finger; distal half of prehensile edges crenulate. The first ambulatory leg is not much longer than the carapace.

*Notes on a specimen from Brazil in the museum at Philadelphia.*—It appears to be the same species. Although a little larger than the type, the chelipeds are not fully developed, the arm spines less strong, the enlarged tubercles on the fingers almost lacking. Only 5 median spines: 2 gastric, 1 genital, 1 cardiac, and 1 intestinal. Behind the cardiac spine there is a crater-like tubercle. On the gastric region are various spinules, mostly irregularly placed; between the anterior gastric spine and the right spine of the row of 3 (not 5) there is a small spine or spinule situated nearer the median spine; immediately behind the median spine and a little to the left there is a spinule; behind the posterior gastric spine there is a cluster of 6 spinules, of which all are irregularly placed save 2; those 2 make an equilateral triangle with the median spine. A dorsal hepatic spine. Only 1 really marginal branchial spine, that at postero-lateral angle; between it and the lateral gastric spine there is a wavy line of 3 spines; on the inner portion of branchial region there is a right-angled triangle formed of 3 spines. Rostrum inclined downward; horns more spreading than in Bell's figure; distance between tips 10.4 mm., or twice the width at base of rostrum. Preorbital spines slenderer and more outstanding than in Bell's figure. Three strong pterygostomian spines, as in the type, and at the beginning of the true marginal rim that runs around the postero-lateral and posterior margin. Three short spines on the basal antennal article, one at antero-internal angle, very blunt and lobiform, one acute at antero-external angle, and one a little stouter, on lateral margin. Five spines on upper side of arm, the one at the distal articulation smallest; a row of six small tubercles on outer surface; a few tubercles on proximal end of wrist.

An adult female from the Canal Zone measures 66.3 mm. long, 58.7 mm. wide, including spines, 47.8 mm. wide, excluding spines. It agrees with the Brazilian specimen in most characters; it has, however, a tubercle behind the second gastric spine. Horns spreading nearly as in Bell's figure. Chelipeds weak, upper half of surface of merus and carpus rough with many tubercles.

*Measurements.*—Male type (Bell), total length of carapace 2 inches 8 lines (71.1 mm.), width 2 inches 3 lines (58.42 mm.). Male (Brazil), median length 70.4, total length 77.5, width without spines 59.4, with spines 66 mm.

*Color.*—Of hair light brown; body itself paler (Bell).

*Range.*—Peru, 5 fathoms, soft mud; Panama (Atlantic side); Brazil.

*Material examined.*—

Toro Point, Canal Zone, Panama; January 25, 1912; Meek and Hildebrand, *Smithson. Biol. Surv.*; 1 adult female (56536).

Brazil; T. B. Wilson; 1 adult male (*Phila. Acad.*).



## Genus LISSA Leach

*Lissa* LEACH, Zool. Misc., vol. 2, 1815, p. 69; type, *L. chiragra* (Fabricius).  
*Lissula* RAFINESQUE, Amer. Monthly Mag., vol. 3, Aug. 1818, p. 272;  
 substituted for *Lissa* Leach.

Carapace triangular, very convex; surface very uneven; mesogastric region especially elevated; from it a more or less interrupted ridge extends to the postero-lateral angle; sides of gastric and branchial regions steep. Preocular tooth or spine present. Rostrum suboblong, flattened, inclined downward, sometimes deeply divided by a closed median fissure, extremity truncate, its outer ends forming a small lateral lobe or tooth. Orbit with a superior and an inferior closed fissure; eyes when retracted fitting into an inconspicuous cup-shaped postorbital lobe. Basal article of antennae much enlarged, its distal margin united with supraocular eave. Inner half or three-fifths of ischium of outer maxillipeds strongly advanced; merus subtriangular, dilated outwardly; a very shallow sinus at articulation of palpus. Chelipeds stout, palm compressed, enlarged, sometimes carinate; fingers gaping at base in the male. Ambulatory legs of moderate length, decreasing rapidly in size from the first to the last, either cristate or nodose; dactyli unarmed.

Inhabits both coasts of middle America, from Lower California to the Galapagos Islands, and from the Bahamas to the West Indies; also the Mediterranean.

## KEY TO THE AMERICAN SPECIES OF THE GENUS LISSA

- A<sup>1</sup>. Branchial ridges not deeply divided, but rather sharp and tuberculate or granulate.
- B<sup>1</sup>. Postero-lateral margin simply concave. Outer margins of hepatic regions diverging posteriorly.....aurivilliusi, p. 333.
- B<sup>2</sup>. Postero-lateral margin sinuous. Outer margins of hepatic regions parallel.....bicarinata, p. 332.
- A<sup>2</sup>. Branchial ridges divided into two rounded lobes.
- B<sup>1</sup>. Carapace granulate on the protuberances, nearly smooth elsewhere. At anterior angles of front a tooth less advanced than the submedian lobes.....tuberosa, p. 333.
- B<sup>2</sup>. Carapace everywhere granulate. At anterior angles of front, a small curved spine, more advanced than the submedian lobes.  
 brasiliensis, p. 335.

## ANALOGOUS SPECIES OF LISSA ON OPPOSITE SIDES OF THE CONTINENT

| Atlantic              |  | Pacific               |
|-----------------------|--|-----------------------|
| <i>bicarinata</i> .   |  | <i>aurivilliusi</i> . |
| <i>brasiliensis</i> . |  | <i>tuberosa</i> .     |

## LISSA BICARINATA Aurivillius

Plate 73, figs. 3 and 4

*Lissa bicarinata* AURIVILLIUS, Kongl. Sv. Vet. Akad. Hand., vol. 23, No. 4, 1889, p. 54 (type-locality, St. Barthelemy; type in Stockholm Mus.).—RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 255; Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2 (1901), p. 64.

*Diagnosis*.—Branchial ridge narrow; postero-lateral margin sinuous; outer margins of hepatic regions parallel.

*Description*.—Carapace with two rounded median prominences, one gastric and one cardiac, the former much larger and higher. From the gastric prominence two ridges run divergently backward to the postero-lateral angles of carapace. Both the median prominences and ridges are indistinctly tuberculate. Posterior outline arcuate and separated from the blunt postero-lateral angles by a broad rounded sinus. Sides of branchial and gastric regions steep. Outer margin of branchial region with a broad and shallow tooth at its middle. Outer margins of hepatic regions almost parallel. Rostrum wide, deflexed, subtruncate, widening at extremity, which is four-lobed; median lobes rounded and separated by a narrow U-shaped fissure; outer lobes smaller, blunt, slightly less advanced than median. Upper surface of rostrum slightly concave in a longitudinal direction. There is a short, acuminate preorbital spine directed obliquely upward. Legs furnished with triangular laminate crests.

*Measurements*.—Ovigerous female (24120), length of carapace 9.5, width 9.2 mm. Type female (Aurivillius, in letter), length of carapace 7, width 8, length of rostrum 2 mm.

*Range*.—Bahama Banks to St. Bartholomew, Leeward Islands; to a depth of 12½ fathoms.

*Material examined*.—

Bahama Banks; Biol. Exped. State Univ. Iowa, 1893; 1 female (Mus. S. U. I.).

Porto Rico: Mayaguez Harbor; customhouse, NE.  $\frac{3}{4}$  E., 4½ miles; 4 to 6 fathoms; Co.; temp. 68° F.; January 20, 1899; station 6065, *Fish Hawk*; 1 ovigerous female (24120).

Off Vieques Island; Point Mula Lighthouse, E. by N., 10¾ miles; 12½ fathoms; Co.; temp. 27° C.; February 14, 1899; station 6095, *Fish Hawk*; 1 female (24121).

## LISSA AURIVILLIUSI Rathbun

Plate 246, fig. 2

*Lissa aurivilliusi* RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1893, p. 575, pl. 41, fig. 4 (type-locality, off Cape St. Lucas, 31 fathoms; holotype, Cat. No. 21575, U.S.N.M.); Proc. Washington Acad. Sci., vol. 4, 1902, p. 284.

*Diagnosis*.—Branchial ridge narrow; postero-lateral margin concave; one crest on carpus of first three pairs of ambulatory legs.

*Description*.—Gastric prominence small, angular; oblique ridges leading from it sharp, finely tuberculate, with only a shallow tooth at middle in place of the round knob in *L. tuberosa* and terminating in a raised tooth at postero-lateral angle. Cardiac hump small, median ridge extending back from it narrow. Lateral margins tuberculate, a shallow tooth at middle and one farther back. Postero-lateral margin with a shallow sinus extending its whole length. Median notch of front shallow, outer teeth prominent.

Chelipeds much as in *L. tuberosa*. Ambulatory legs with only one crest on the carpus of the first three pairs, the anterior crest of *L. tuberosa* being represented by a tooth.

*Measurements*.—Male, holotype, length of carapace 12.5, width 13 mm. Immature female, length of carapace 9.8, width 10 mm.

*Range*.—West coast of Lower California, Mexico; Galapagos Islands. To a depth of 31 fathoms.

*Material examined*.—

Magdalena Bay, Lower California: lat. 24° 32' 00'' N.; long. 111° 59' 00'' W.; 12 fathoms; fine gy. S.; May 2, 1888; station 2831. *Albatross*; 1 female (21928).

Lower California; off Cape St. Lucas; lat. 22° 52' 00'' N.; long. 109° 55' 00'' W.; 31 fathoms; rky.; temp. 74.1° F.; May 1, 1888; station 2829, *Albatross*; 1 male holotype (21575).

Galapagos Islands; reef N. of Tagus Hill, Tagus Cove, Albemarle Island; Mar. 16, 1899; Stanford Univ.; 1 male (25674).

## LISSA TUBEROSA Rathbun

Plate 246, fig. 1

*Lissa tuberosa* RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1893, p. 574, pl. 41, fig. 3 (type-locality, southern part of Gulf of California, 8 fathoms; holotype, Cat. No. 21574, U.S.N.M.).

*Diagnosis*.—Carapace nodose; two large branchial protuberances; postero-lateral margin sinuous; two crests on carpus of ambulatory legs.

*Description*.—Surface covered with a dense, short, vascular pubescence. Carapace with two median tuberculated prominences, gastric higher than cardiac, which is continued along median line to posterior margin. Ridge running obliquely backward from gastric prom-

inence almost entirely occupied by two protuberances, one at its middle and one at postero-lateral angle of carapace, which presents a rounded or obliquely truncate outline. Sinus of postero-lateral margin more shallow than in *L. bicarinata*. Margin of hepatic region with a tubercle; of branchial region with several tubercles and a blunt tooth at middle. Hepatic region nearly vertical. Front with a shallow median emargination, from which the margin slopes obliquely backward or is almost transverse; outer corners with a slight tooth, most produced in the young. Preorbital tooth subacute or obtuse.

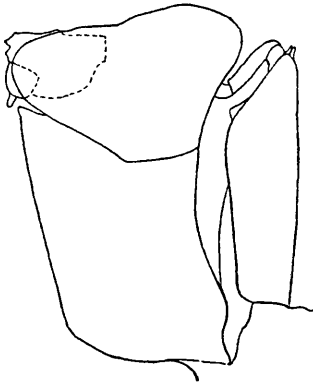


FIG. 107.—*LISSA TUBEROSA* (21927), MAXILLIPED,  $\times 19.5$

Chelipeds heavy in male; ischium with tooth on inner margin; merus with tridentate crest on superior margin; carpus with surface uneven, tubercle at inner angle. Hands broad, compressed, widening distally, inner surface tuberculate; lower margin of propodus with a sinus near its middle; dactylus with acute upper margin; fingers gaping for basal half. Chelipeds of female much smaller. Legs cristate; crest of merus with a thin triangular tooth at distal end; carpus with two triangular crests side by side, divergent, forming a cup; propodus with a triangular superior crest, a tubercle on anterior and posterior surfaces, and with swellings at articulation with dactylus.

*Measurements*.—Male, holotype, length 16.9, width 15.8 mm. Female (21925), length 14.1, width 14.5 mm; female, (21927), length 12.3, width 11.5 mm.

*Range*.—Southern part of Gulf of California. 7 to 10 fathoms.

*Material examined*.—

Gulf of California; April 30, 1888; *Albatross*: Lat.  $24^{\circ} 22' 30''$  N.; long.  $110^{\circ} 19' 30''$  W.; 8 fathoms; brk. Sh.; station 2824; 2 males, 1 is holotype (21574). Lat.  $24^{\circ} 22' 15''$  N.; long.  $110^{\circ} 19' 15''$  W.; 7 fathoms; brk. Co.; station 2825; 1 male, 1 female (21925). Lat.  $24^{\circ} 12' 00''$  N.; long.  $109^{\circ} 55' 00''$  W.;  $9\frac{1}{2}$  fathoms; Sh.; station 2826; 1 female (21926). Lat.  $24^{\circ} 11' 30''$  N.; long.  $109^{\circ} 55' 00''$  W.; 10 fathoms; Sh.; station 2828; 1 male, 3 females (21927).

## LISSA BRASILIENSIS Rathbun

## Plate 73, fig. 2

*Lissa brasiliensis* RATHBUN, Proc. U. S. Nat. Mus., vol. 64, art. 14, 1923, p. 4 (type-locality, off Cape Frio, Brazil; 35 fathoms; Hassler Exped.; holotype, female, Cat. No. 2055, M. C. Z.).

*Diagnosis*.—Carapace nodose; two large branchial protuberances; surface rough with granules; front strongly widened anteriorly.

*Description*.—Carapace hairy and granulate, the granules separated except on the summit of the protuberances where they are larger and more or less confluent. The protuberances are arranged as in *L. tuberosa*, but the terminal protuberance of the branchial ridge is more transverse and the posterior, deflected portion of the carapace is broader, its margin more arcuate. Two small anterolateral teeth, one hepatic, one branchial. Rostrum with surface concave from side to side, widening distally, anterior margin in the form of a cupid's bow, with a small median emargination and the outer angles directed upward in a stout, curved, blunt spine.

Only one crest on the carpus of the chelipeds, and a small tubercle outside the crest; two crests on the carpus of the ambulatory legs.

*Measurements*.—Female, holotype, length of carapace 16.6, width 15 mm.

*Range*.—Known only from the type-specimen.

## Subfamily MAJINAE

*Maiinae* ALCOCK, Journ. Asiat. Soc. Bengal, vol. 64, 1895, pp. 161, 166 and 236.

*Mamaiidae* STEBBING, Marine Invest. S. Africa, vol. 4, Cape Town, 1905, p. 22.

Eyes either (1) with orbits, which may be incomplete or complete, but are always complete enough to entirely conceal the fully retracted cornea from dorsal view; or (2) but partially protected by a huge hornlike or antlerlike supraocular spine, or by a large jagged postocular tooth or by both. The eyestalks are usually long.

The orbit, when present, is formed in one of two ways; there is always an arched, often very strongly arched, supraocular eave, and a prominent postocular spine; and either (1) the interval between the eave and the spine is filled by another spine, in which case the roof of the orbit, though fissured is fairly complete; or (2) the supraocular eave and the postocular spine are in contact with one another above, and below with a process of the basal antennal article, in which case the orbit has not only a complete or nearly complete roof, but a complete or nearly complete floor also.

The basal antennal article is always very broad, and is either very extensively produced outwards to aid in forming the floor of the orbit, or is armed distally with one or two large spines.

The external maxillipeds have the merus at least as wide as the ischium. (Alcock.)

KEY TO THE AMERICAN GENERA OF THE SUBFAMILY MAJINAE.

- A<sup>1</sup>. Eyes furnished with orbits, complete or fairly so.
- B<sup>1</sup>. Orbit formed (1) by a supraocular hood, the postero-external angle of which is often produced as a spine, (2) by a sharp postocular tooth and (3) by a spine intercalated between the two. Basal antennal article broad but not specially produced to form a floor to the orbit; usually armed at both its anterior angles with a strong spine.
- C<sup>1</sup>. Cardiac lobe not surrounded by a deep trench.
- D<sup>1</sup>. Carapace broadly ovate-triangular. Basal antennal article very broad, three-spined. Rostral horns each with an accessory spine.....**Maiopsis**, p. 337.
- D<sup>2</sup>. Carapace oblong-triangular. Basal antennal article of moderate width, two-spined. Rostral horns simple.....**Paramithrax**, p. 338.
- C<sup>2</sup>. Cardiac lobe surrounded by a deep trench except anteriorly. Carapace narrow, suboval.....**Temnonotus**, p. 340.
- B<sup>2</sup>. Orbits completely enclosed, often outstanding and tubular, and formed (1) by an arched supraocular hood or semi-tubular horn, (2) by a hollowed postocular process and (3) by a remarkable broadening, or by a prolongation, of the anterior part of the basal antennal article; and at the same time affording a complete concealment to the retracted eye.
- C<sup>1</sup>. Orbits not projecting sideways beyond the general outline of the carapace.
- D<sup>1</sup>. Carapace oblong-oval, hairy. Legs and movable articles of peduncle of antennae narrow and bordered with thick fringes of long hair. Dactyls of legs very small, subprehensile. Rostral horns long and narrow.....**Thersandrus**, p. 343.
- D<sup>2</sup>. Carapace subtriangular. Legs cristate.
- E<sup>1</sup>. Merus of ambulatory legs with a thin, lamellate, posterior expansion. No preorbital tooth.
- F<sup>1</sup>. Carapace very high on median line. Basal article of antennae broader than long.....**Hemus**, p. 345.
- F<sup>2</sup>. Carapace not noticeably high on median line, lobulate. Basal article of antennae no broader than long.....**Thoe**, p. 347.
- E<sup>2</sup>. Merus without posterior (or inferior) expansion, but cristate above. A preorbital tooth present.....**Teleophrys**, p. 440.
- C<sup>2</sup>. Orbits projecting sideways more or less beyond the general outline of the carapace, and often tubular.
- D<sup>1</sup>. A very long, elevated, preocular spine, twice as long as remainder of orbit. Legs filiform; movable article of antennal peduncle more slender and cylindrical.....**Picroceroides**, p. 353.
- D<sup>2</sup>. Preocular spine, when present, not remarkably long.
- E<sup>1</sup>. Carapace suboval, anteriorly broadly truncate. Rostrum minute, advanced slightly, if at all, beyond the orbits, which have a forward aspect. First movable article of antennal peduncle with a leaflike outer expansion.....**Pitho**, p. 355.
- E<sup>2</sup>. Carapace when suboval, without a minute rostrum.
- F<sup>1</sup>. Fronto-orbital width great, about three-fourths of branchial width. Orbits with a sideways aspect. Rostral horns slender, contiguous. Movable articles of antennal peduncle filiform.  
**Leptopisa**, p. 375.
- F<sup>2</sup>. Fronto-orbital width less than in F<sup>1</sup>, usually about half, or less than half, of branchial width.

- G<sup>1</sup>. Rostrum small. Carapace ovate, usually broader than long. Orbits not tubular.
- H<sup>1</sup>. Lateral margins of carapace laminiform, coarsely dentate. Carapace broadly triangular-ovate. Chelipeds and legs cristate above. Orbital margin not incised, bearing a preocular spine and a postocular tooth. *Anaptychus*, p. 377.
- H<sup>2</sup>. Lateral margins armed with four, or three, spines or lobes behind orbit. Legs spinous. Orbital margin spinous or tuberculous. . . . . *Mithrax*, p. 379.
- G<sup>2</sup>. Rostrum of good size, usually with two strong horns.
- H<sup>1</sup>. Lateral margin of carapace armed with a series of strong spines. Basal antennal article very broad.
- J<sup>1</sup>. Basal antennal article quadridentate. Postocular tooth large, quadrangular, armed with two teeth or spines. *Coelocerus*, p. 446.
- J<sup>2</sup>. Basal antennal article armed with fewer than four spines or teeth. Postocular tooth of moderate size, triangular, armed with only one spine. . . . . *Stenocionops*, p. 448.
- H<sup>2</sup>. Lateral margin of carapace not armed with a series of strong spines, but with a spine, usually strong, or a tubercle, at the lateral angle of the carapace.
- J<sup>1</sup>. Orbits tubular, strongly projecting; basal antennal article very broad. . . . . *Macrocoeloma*, p. 463.
- J<sup>2</sup>. Orbits little projecting, basal antennal article moderately broad, armed with a prominent spine at antero-external angle. . . . . *Microphrys*, p. 488.
- A<sup>2</sup>. Eyes partially protected by a huge hornlike supraocular spine; orbit unprotected below. Exognath of outer maxilliped with a falciform basal prolongation which is bent around forward and lodged in a groove of the ischium of the endognath, while the merus is extended in a similar way backward into the ischium. . . . . *Tyche*, p. 507.

#### Genus MAIOPSIS Faxon

*Maiopsis* FAXON, Bull. Mus. Comp. Zoöl., vol. 24, 1893, p. 150; type, *M. panamensis* Faxon; Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 11.

Carapace subtriangular, as broad as long, spinose; rostrum produced into 2 divergent horns with an accessory spine on outer margins; interorbital space broad. Eyes small, eyestalks slender, retractile within orbits. Orbits large, with a forward aspect, incomplete below, upper margin prominent, with 2 deep fissures, and supraocular spines. Epistome short. Basal segment of antennae very broad, 3 prominent spines on anterior margin; flagellum widely separated from cavity of orbit by a broad process of basal segment. Merus of outer maxillipeds notched at antero-internal angle. Chelipeds and legs of moderate length. Carpus of chelipeds elongate, not carinate; chela elongate, slender, fingers canaliculate within, but not spoon-shaped at tips, prehensile edges meeting throughout most of their length, not distinctly toothed. Ambulatory legs spinose. Abdomen of male 7-jointed, terminal joint short and broad. (Faxon.)

Contains but one species.

## MAIOPSIS PANAMENSIS Faxon

Plate 247

*Maiopsis panamensis* FAXON, Bull. Mus. Comp. Zoöl., vol. 24, 1893, p. 151 (type-locality, station 3355, *Albatross*, 182 fathoms; holotype, Cat. No. 4480, M. C. Z.); Mem. Mus. Comp. Zoöl., vol. 18, 1895, p. 13, pl. 2.

*Diagnosis.*—Carapace thickly covered with spines. Eystalks slender; orbits with 2 deep fissures above. Basal segment of antennae very broad, and with 3 anterior spines.

*Description.*—Dorsal surface of carapace thickly set with spines of various sizes and scattered hooked setae. Spines distributed as follows: 5 on the gastric region, 1 on the genital, 1 on the cardiac, 4 on the intestinal, and about 7 on each branchial region. Margin of carapace armed with 12 prominent spines, 3 of which are on the hepatic region. Chelipeds and legs covered with numerous spiny tubercles; meri armed with 3 or more prominent spines at distal end. Chela long and slender, tubercles of hand smaller than on other parts of legs; fingers nearly smooth; a deep pit at base of movable finger. Sternum ornamented with small tubercles along each side of abdomen. First abdominal segment furnished with a bidentate tubercle. (Faxon.)

*Measurements.*—Male, holotype, length from base of rostrum to posterior margin of carapace, 112; width 113.5; length of rostrum 22, length of horns 11, width between eyebrows 38, length of cheliped 156 mm.

*Range.*—Known only from the unique specimen dredged in the Bay of Panama; lat.  $7^{\circ} 12' 20''$  N.; long.  $80^{\circ} 55' 00''$  W.; 182 fathoms; bk. G. Sh.; temp.  $54.1^{\circ}$  F.; Feb. 23, 1891; 1 male (Cat. No. 4480, M. C. Z.).

## Genus PARAMITHRAX Milne Edwards

*Paramithrax* MILNE EDWARDS, Hist. Nat. Crust., vol. 1, 1834, p. 324 (part: §A); type, *P. peronii* Milne Edwards.—MIERS, Journ. Linn. Soc. London, vol. 14, 1879, p. 655 (part: subgenus *Paramithrax*, restricted).—RATHBUN, Biol. Results "Endeavour," 1909-14, vol. 5, part 1, 1918, p. 17.

Carapace oblong-triangular, usually spinous above. Rostrum composed of two spines divergent from their base. Orbits large, deep, oval, with a forward aspect, incomplete below, upper margin prominent, with two deep fissures and long spines. The eyes when retracted are concealed; stalks rather long, slender, curved, corneae small. Postorbital spine conical, usually remote from orbit so that the eye does not touch it. Basal article of antennae much enlarged, armed with spines; movable portion arising within orbital margin and separated from the cavity of the orbit by a narrow process of the basal article. Anterior margin of buccal cavity straight or nearly so.



Merus of outer maxillipeds notched at antero-internal angle. Chelipeds strong; fingers pointed. Ambulatory legs cylindrical; dactyls unarmed.

Inhabits for the most part Australia, New Zealand and outlying islands. One species only is found in American waters, at Juan Fernandez, Chile.

PARAMITHRAX BÄCKSTRÖMI Balss

Plate 123

*Paramithrax peronii* LENZ, Zool. Jahrb., Suppl. 5, 1902, p. 756; not *P. peronii* of Milne Edwards and other authors.

*Paramithrax bäckströmi* BALSS, Nat. Hist. Juan Fernandez, vol. 3, 1923, p. 336, text-fig. 3 (type-locality, Masatierra, Juan Fernandez).

*Diagnosis*.—Near *P. peronii* Milne Edwards,<sup>44</sup> but with a strong, preorbital spine, only 3 median spines and 3 branchial spines and a rougher cheliped.

*Description*.—A small crab. Carapace covered with curled hairs, finely granulate and armed with a few spines; of the median spines 2 are mesogastric, 1 intestinal; 2 pairs of submedian spines, 1 pair cardiac, the other on the posterior margin. Supraocular cave provided with a strong anterior and a small posterior spine; this is followed by a longer spine which is half as long as the postorbital spine; the latter has a lobe or tooth on its outer margin and is denticulate on inner margin. Two marginal hepatic spines, subequal, directed outward; followed by a small branchial spine, and at the widest part of the carapace by a strong spine; another similar spine above postero-lateral margin. Rostral horns very divergent, acuminate. Basal article of antenna with a large, flat, falciform tooth or lobe at outer angle and a small, sharp tooth at inner angle; inner margin denticulate. Flagellum extending for half its length beyond rostrum. Two sharp spines on the eye, one anterior, on the edge of cornea, the other superior, overlapping cornea.

Merus of outer maxillipeds subquadrate, with the inner, distal angle deeply notched, a tooth at outer angle of notch; palpus long and stout.

Merus and carpus of chelipeds ornamented with flat lobes or teeth; about 6 of these form a superior border on the merus; and 5 smaller lobes mark the lower-outer border; inner and outer surfaces unevenly granulate. On the carpus 3 or 4 lobes form a continuous crest above; only 1 lobe below; inner and outer surfaces uneven, the outer having 2 large tubercles. Upper carina of palm sharp, distally wanting. Fingers crenulate within, moderately gaping, no large basal tooth. Ambulatory legs slender, covered with curled hair; distal articulations of merus acute, in first pair spiniform.

<sup>44</sup> Hist. Nat. Crust., vol. 1, 1834, p. 324.

*Measurements.*—Largest male, holotype, median length of carapace 16.3, length from middle of posterior margin to tip of horns 20.8, width (approx.) without spines 12.8, with spines 14 mm. Female, ovigerous (55121), length of carapace from middle of posterior margin to tip of horns 12.3 mm.

*Range.*—Chile: Juan Fernandez (Lenz).

*Material examined.*—Juan Fernandez Island; U. S. C. S. S. *Hassler*; 12 males, 6 females (2048, M. C. Z.); 1 male, 1 female (55121, U. S. N. M.).

*Remarks.*—This species is closely allied to *P. peronii* and some of its differences might be attributed to growth change. On the other hand, the preorbital spine would be unlikely to disappear altogether, or one of the large branchial spines to develop where there was no trace of one in the young. Considering the great distance between their habitats, the difference in the size of mature specimens (mature specimens of *peronii* are from 55 to 80 mm. in length, of *bäckströmi* from 12 to 20 mm.), and the fact that some spines in *bäck-*

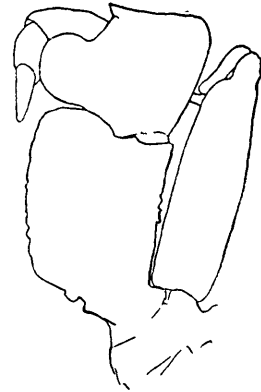


FIG. 108.—PARAMITHRAX BÄCKSTRÖMI, MALE (55121), MEDIAN LENGTH OF CARAPACE 16.3 MM., MAXILLIPED

*strömi* are absent in *peronii*, while the reverse is true of other spines, it seems reasonable to consider the two forms distinct. *P. bäckströmi* has a more oblong, less ovate carapace than *peronii*, increased by the more outstanding rostral and preorbital spines. All the spines except the postorbital, hepatic, anterior branchial and outer antennal, are slenderer and sharper than in the older species. Add to this, the more elaborate ornamentation of arm and wrist in *bäckströmi* and the absence of a large tooth from the dactyl, while one is present in *peronii*.

#### Genus TEMNONOTUS A. Milne Edwards

*Temnonotus* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 82; type, *T. granulatus* A. Milne Edwards.

Carapace swollen, slightly pyriform; margins rounded. Cardiac region almost surrounded by a deep trench. Rostrum formed of 2 short horns in the middle and a preorbital spine on either side. The orbital border has a superior fissure; eyes large and retractile into a deep lateral fossette. Inner antennae large, the interantennular partition prolonged in a spine. Basal article of outer antennae wide at base and narrowed at extremity, and separated from lower orbital margin of the carapace by an emargination; it is concealed by the front, but the mobile part of the antennae is visible beside the rostral horns. Merus of outer maxillipeds dilated at outer

angle, and notched at its inner angle for insertion of the palp. Legs short, first considerably longer than the others.

Known only from the West Indies.

## KEY TO THE SPECIES OF THE GENUS TEMNONOTUS

- A<sup>1</sup>. Cardiac lobe flat, granulous; walls of cardiac trench bordered by a raised rim..... granulosus, female, p. 341.  
 A<sup>2</sup>. Cardiac lobe convex, smooth save for one granule, and with hairy margin; walls of cardiac trench not rimmed..... simplex, male, p. 342.

## TEMNONOTUS GRANULOSUS A. Milne Edwards

Plate 249, figs. 7-9

*Temnonotus granulosus* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 83, pl. 17, figs. 2-2c (type-locality, near Barbados, 100 fathoms, Hassler Exped.; holotype, Cat. No. 1937, M. C. Z.).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 392.

*Diagnosis*.—Cardiac lobe flat, granulous, walls of trench with raised rim. Branchial region granulous, a few of the granules enlarged.

*Description of female*.—Carapace covered with large granules or tubercles between which are fine punctae, in which minute hairs are inserted; some granules are enlarged, namely, 1 on anterior part of cardiac lobe, 4 on each branchial region and 1 intestinal. Rostral horns small, a little flattened, without granulation but with some hooked hairs. Preorbital spines more divergent than rostral spines, short, scarcely reaching the line of bifurcation of the rostrum. Upper orbital border with 2 teeth, one superior, the other lateral. Basal article of antennae armed with 3 spines; the largest forms its anterior outer angle, another its posterior outer angle, and the third, which is smaller, is placed between the two; second and third articles cylindrical, flagellum small, surpassing by half its length the end of rostrum. Regions of carapace very distinct. Epigastric lobes separated from rest of carapace by a transverse sulcus which unites the two fissures of the orbits; a slightly prominent, lateral, hepatic spine; some other similar but smaller spines border the branchial regions. Cardiac lobe flat, granulous and bounded posteriorly and laterally by a deep trench-like depression with steep, smooth walls, the margins of which are marked by a nongranulate crest; trench absent anteriorly where the gastric region borders the cardiac. Chelipeds scarcely longer than the legs of first pair; hand smooth, fingers sharp; wrist and arm with some pointed tubercles. Legs smooth. Sternal plastron oval and very narrow. (A. Milne Edwards, amended.)

*Measurements*.—Female, holotype, length of carapace 23, width of same 15 mm.

*Range*.—Known only from the type-specimen.

*Material examined*.—Near Barbados; 100 fathoms; December, 1871; Hassler Exped.; 1 female, holotype (Cat. No. 1937, M. C. Z.).

## TEMNONOTUS SIMPLEX A. Milne Edwards

Plate 249, figs. 10-12

*Temnonotus simplex* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 84, pl. 17, figs. 3-3c (type-locality, near Barbados, 100 fathoms, Hassler Exped.; holotype, Cat. No. 1938, M. C. Z.); Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 2.—RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 255.—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 393.

*Temnonotus granulatus* A. MILNE EDWARDS, Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 2; (?) not *T. granulatus* A. Milne Edwards, 1875.

*Diagnosis*.—Cardiac lobe convex, smooth save for one granule, and with hairy margin; walls of trench not rimmed. Branchial regions partly spinous.

*Description of immature male, holotype*.—Carapace longer and less convex than *granulosus*, and with fewer granules; most of these are obscured by a dense coat of pubescence, except the spiniform granules, which correspond in position to the enlarged granules of *granulosus*. Rostral horns longer and slenderer; interorbital furrow not well marked. Basal article of antenna narrower and bearing only one small spine which is antero-external. Two lines of granules on the front are continued on the gastric region; this region bears some low tubercles. A rather strong spine on hepatic region. Branchio-hepatic furrow wide and deep. Branchial regions armed with many spines. Cardiac lobe bounded by a depression whose walls are less abrupt than in *granulosus*, and are not margined; the enclosed lobe is much swollen, its surface smooth except for one median granule forward, its margin furnished with a line of small, straight and stiff hairs. Above posterior margin a median spine directed backward. (A. Milne Edwards, amended.)

*Measurements*.—Immature male, holotype, length of carapace 12, width of same 8 mm.

*Range*.—Off Havana and Barbados. Depth, 100 to 200 fathoms.

*Material examined*.—

Off Havana, Cuba; Morro Castle bearing SW. by W., about 2½ miles; 200 fathoms; May 26, 1893; State Univ. Iowa Bahama Exped.; 1 male (Mus. S. U. I.).

Near Barbados; 100 fathoms; Hassler Exped.; 1 immature male, holotype (Cat. No. 1938, M. C. Z.).

Off Barbados; lat. 13° 03' 05'' N.; long. 59° 36' 18'' W.; 103 fathoms; Co. brk. Sh.; temp. 59.5° F.; Mar. 5, 1879; station 273, U. S. C. S. S. *Blake*; 1 male (Cat. No. 2853, M. C. Z.); identified by A. Milne Edwards as *granulosus*.

*Remarks*.—In the type male the posterior spine of the basal article of the antenna is either broken or stunted on the right side; on the left side all the spines are missing. In the Havana male the basal article bears two long spines. The male from Barbados which A.

Milne Edwards placed under *granulosus* has the general appearance of his *simplex*, but with two spines on the antennal article.

The figure of *granulosus* given by A. Milne Edwards, which is copied here, does not show the few, extra large tubercles on the carapace which are present in the type. In his figure of *simplex*, also here reproduced, the posterior spine of the carapace is exaggerated and the dorsal spines are represented more spinous than they really are.

It is extremely likely that the *simplex* form (of which 3 males are known) is the male of *granulosus*, of which only a female is known and was taken in the same haul as the type male of *simplex*.

### Genus THERSANDRUS Rathbun

*Sisyphus* DESBONNE, in Desbonne and Schramm, Crust. de la Guadeloupe, 1867, p. 20, pl. 3, figs. 11 and 12; type, *S. compressus* Desbonne.—A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 123. Not *Sisyphus* Latreille, 1825, a genus of Coleoptera.

*Thersandrus* RATHBUN, Proc. Biol. Soc. Washington, vol. 11, 1897, p. 164; type, *T. compressus* (Desbonne).

Carapace ovoid-oblong, depressed, covered as well as the feet, with short, brownish setae. Front formed of two rostral horns. Preorbital spines wanting. Orbits deep and tubular; upper border cut by a deep fissure; ocular peduncles very slender. Basal article of outer antennae remarkably wide and so united to the carapace that it closes the orbit below; the first movable article is large, a little flat and almost as long as the rostrum; next article more slender but well developed; flagellum small. Antennular fossae wide behind, very narrow in front. Outer maxillipeds wide; merus auriculate at its antero-external angle and deeply cut at the inner angle for the insertion of the palp; exognath narrow.

Chelipeds of male symmetrical, little swollen; fingers touching only at the extremities, which are not spoon-shaped. Ambulatory legs folded forward, the dactylus very slender, very hooked, very sharp and strongly folded under the propodus. Abdomen of male composed of seven distinct articles.

Contains only one species.

#### THERSANDRUS COMPRESSUS (Desbonne)

Plate 248, figs. 1-8

*Sisyphus compressus* DESBONNE, in Desbonne and Schramm, Crust. de la Guadeloupe, 1867, p. 20, pl. 3, figs. 11 and 12 (type-locality, Moule, Guadeloupe, among algae; cotype in Paris Mus.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1878, p. 124, pl. 24, figs. 1-1h.

*Diagnosis*.—Carapace depressed. Rostral horns small. Antennae and ambulatory legs fringed with long hair.

*Description*.—Regions of carapace little marked, surface almost smooth. The gastric region shows indications of four tubercles, the

three anterior disposed transversely and the single posterior tubercle on the median line; two longitudinal prominences on the interorbital space. An inconspicuous tubercle on the hepatic region makes a slender prominence outside; a marginal tubercle behind the branchio-hepatic suture. Otherwise the branchial regions are smooth, except

toward the gastric and cardiac sutures: where they are a little rugose. The rostral horns are a little deflexed, slender, flattened, with convex outer margins and lying almost parallel to each other; interspace deep and narrow, rounded at base. Fronto-interorbital space wide; superior orbital margins rounded. Antennae fringed with long hair.

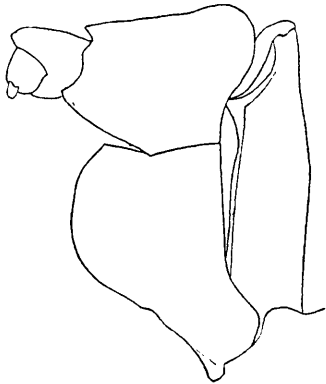


FIG. 109.—*THERSANDRUS COMPRESSUS* (48744), MAXILLIPED,  $\times 17.1$

Merus of chelipeds of adult male slender and unarmed; carpus a little rugose; hand smooth, laterally compressed, without crests; fingers slender, gaping, the dactylus having near its base a stronger tooth than the others. In the female the fingers meet and have no large basal

tooth. Ambulatory legs, short, stout, subcylindrical, fringed with long hair on each side, which gives them a broad, flat appearance; those of the first pair notably longer than the others, those of the second pair scarcely reaching the extremity of the merus of the first; those of fifth pair shortest.

*Color*.—Greenish or brownish (Desbonne).

*Measurements*.—Male (A. Milne Edwards), length of carapace 23, width of same 16, length of cheliped 23, of first pair of ambulatory legs with the dactylus folded 20, of the next leg in the same position 12 mm.

*Range*.—West Indies.

*Material examined*.—

Cuba, on reef Lavesos Italianos, opposite Cayo Lavesos; 2 to 3 fathoms; Co. R. S.; June 2, 1914; station 14, *Tomas Barrera Expedition*; Henderson and Bartsch; 1 male, soft shell (48744).

Guadeloupe; 1 male, cotype (Paris Mus.).

West Indies; 1 female, soft shell (Copenhagen Mus.).

Genus **HEMUS** A. Milne Edwards

*Hemus* A. MILNE EDWARDS, Crust. Rég. Mex., 1895, p. 88; type, *H. cristulipes* A. Milne Edwards.—RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2, 1901, p. 62.

Carapace thick and swollen; longer than wide. Rostrum small; no preorbital spines; orbit incomplete below. First and second movable articles of the external antennae remarkably wide and flat; the multiarticulate flagellum inserted at the external angle of the second. Merus of outer maxillipeds long and little dilated outwards; exognath very wide in its basal and middle portion, narrowing toward its extremity. Chelipeds small; fingers slightly gaping, strongly bent inward toward their extremity, but scarcely spoon-shaped. Ambulatory legs short, but very strong; merus ornamented with cristi-form prolongations; dactyli strong, much curved, without denticulations below.

The dilated legs fit together in such a way that with the antennal peduncle and the deflexed rostrum, they form a large cavity underneath the body.

Contains only the two following allied species occurring on opposite shores of the continent: *cristulipes* (Atlantic), *analogus* (Pacific).

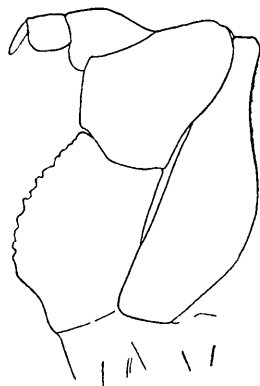


FIG. 110.—*HEMUS CRISTULIPES* (19724), MAXILLIPED,  $\times 30.7$

KEY TO THE SPECIES OF THE GENUS **HEMUS**

- A<sup>1</sup>. Tips of rostrum separated by a sinus wider than either tip. Cardiac prominence high----- *cristulipes*, p. 345.  
 A<sup>2</sup>. Tips of rostrum almost contiguous. Cardiac prominence larger, embracing part of the branchial regions and of the intestinal region-- *analogus*, p. 347.

**HEMUS CRISTULIPES** A. Milne Edwards

Plate 124, fig. 1; plate 248, figs. 9-15

*Hemus cristulipes* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 88, pl. 16, figs. 1-1f (type-locality, near Contoy, at the entrance of the Gulf of Mexico, 12 to 18 fathoms; holotype, Cat. No. 1943, M. C. Z.).—AURIVILLIUS, K. Sv. Vet.-Akad. Hand., vol. 23, pt. 1, 1889, p. 45, pl. 3, fig. 6.—RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2, 1901, p. 63.

*Diagnosis*.—Tips of rostrum separated by a sinus wider than either tip. Cardiac region prominent. Margins of merus joints of legs faintly crenulate.

*Description*.—Body and legs covered with depressed granules. The rostrum is wide, short, bicarinated above, bent downward, and bifurcated at its extremity. Upper orbital border unarmed, but having a narrow fissure; the postorbital cavity into which the eye can be

Material examined of *Hemus cristulipes*

| Locality                                    | Bearings                                       |                               | Fathoms | Bottom                                | Temp. | Date          | Station | Collector              | Specimens  | Cat. No.                  | Remarks                                      |
|---|--|-------------------------------|---------|---------------------------------------|-------|---------------|---------|------------------------|------------|---------------------------|--|
|   | Lat. N.  | Long. W.                      |         |                                       |       |               |         |                        |            |                           |  |
| Gulf of Mexico: Off Cape San Blas, Florida. | Between 29 11 30 and 29 18 15                  | Between 85 29 00 and 85 32 00 | 25-27   |                                       | ° C   | Feb. 7, 1885  | (1)     | Albatross              | 1 ♀        | 19724                     |  |
| Yucatan Channel: Near Contoy Island, Mexico |  |                               | 12-18   | sdy. R.                               |       |               |         | Wm. Stimpson           | 1 ♂        | 1943, M.C.Z.              | Holotype.                                    |
| North of Yucatan.                           | 22 07 30                                       | 87 06 00                      | 21      | wh. R. Co.                            |       | Jan. 30, 1885 | 2363    | Albatross              | 1 ♀        | 15167                     |  |
| Porto Rico: Off Boca Prieta                 | Fanduco Cay, E., 1¼ miles.                     |                               | 8.5     | Co. S                                 | 25    | Jan. 25, 1899 | 6075    | Fish Hawk              | 1 ♂        | 24226                     |  |
| Off Vieques Island                          | { Culebrita Lighthouse, N. E. by N., 10 miles. |                               | 15      | Co.                                   | 26    | Feb. 10, 1899 | 6091    | do.                    | 1 ♀        | 24224                     |  |
| Off Culebra Island                          | { Culebrita Lighthouse, N. E., 1¼ miles.       |                               | 15      | Co.                                   | 25.2  | do.           | 6093    | do.                    | 1 ♂        | 24225                     |  |
| Curacao: Schottegat (lagoon), Asiento Bay.  |  |                               | (?)     | In horn sponges. (In <i>Porites</i> ) |       | Apr. 3, 1905  |         | J. Boeke               | 1 ♀        | Leiden Mus.               |  |
| Spanish Water                               |  |                               |         |                                       |       | May 5, 1920   |         | { C. J. van der Horst. | 2 ♀<br>1 ♀ | Amsterdam Mus.<br>[59654] | 1 with Rhizocephalid parasite under abdomen. |

<sup>2</sup> Shallow water.<sup>1</sup> Between stations 2369 and 2374.

retracted is incomplete. Basal article of outer antennae wide, short, and not spinulose; a notch separates it from lower border of carapace. The carapace is very swollen, especially in the cardiac region, which is markedly prominent. Postorbital portion wide; gastric region high; branchial regions elliptical, bearing on each side two subacute prominences directed outward; the first stronger than the second. Subhepatic region deeply grooved. Chelipeds of male very small and smooth. First pair of ambulatory legs longer and stronger than the others; fifth very small. Merus of all the legs very wide, having above a thin, straight crest and below a lamellar prolongation with a crenulate and arcuate border; other joints of legs small. Abdomen of both sexes with seven free segments, the last elongate in the male.

*Measurements.*—Female (19724), length of carapace 7.6, width of same 6 mm.



*Range*.—Gulf of Mexico; Central America; Porto Rico; Curacao. Shallow waters to 27 fathoms.

*Material examined*.—See table, page 346.

**HEMUS ANALOGUS** Rathbun

Plate 124, figs. 2 and 3

*Hemus analogus* RATHBUN, Proc. U. S. Nat. Mus., vol. 21, 1898, p. 573 (type-locality, southern part of Gulf of California, 10 fathoms; holotype, Cat. No. 21573, U.S.N.M.).

*Diagnosis*.—Tips of rostrum almost contiguous. Cardiac prominence large, embracing part of the branchial regions and of the intestinal region. Margins of merus joints of legs distinctly denticulate.

*Description*.—Differs from *H. cristulipes* as follows: Carapace higher at the cardiac region, sloping more abruptly down toward front. The cardiac prominence is larger, embracing a considerable part of the branchial regions and of the intestinal region. Granulation sharper. Side margins of rostrum convex; terminal teeth nearer together. Preorbital angle rounded, sides rectangular. Outer margin of the first movable joint of the antenna more oblique and crenulate. Merus of legs narrower, their marginal denticles stronger.

*Measurements*.—Female holotype, length of carapace 8.2, width 6.5 mm.

*Range*.—Gulf of California.

*Material examined*.—Southern part of Gulf of California; lat. 24° 11' 30'' N.; long. 109° 55' 00'' W.; 10 fathoms; Sh.; April 30, 1888; station 2828, *Albatross*; 1 adult female, holotype, 1 immature female (21573).

**Genus THOE** Bell

*Thoe* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 170; type, *T. erosa* Bell.

*Platypes* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 41 [1]; type, *P. edentata* Lockington.

Carapace of moderate width, thick, lobulate; fronto-orbital region wide; rostrum small; no preorbital spine; orbital border unarmed. Basal article of antenna large; next article rather flat and attached to first joint near rostrum, but at a great distance from orbit. Exognath of outer maxillipeds very wide in middle. Sternal plastron almost circular. Chelipeds long and usually strong; hand compressed; fingers spoon-shaped, gaping in the adult. Ambulatory legs wide, decreasing rapidly in length from the first to the fourth; merus joints with longitudinal crests; last two joints short and nodose.

An American genus, ranging from the Florida Keys to the West Indies and from the Gulf of California, Mexico, to Ecuador and the Galapagos Islands.

KEY TO THE SPECIES OF THE GENUS *THOE*

- A<sup>1</sup>. Upper surface of merus and outer surface of carpus of cheliped not excavate.  
 B<sup>1</sup>. Carapace and basal segment of antennae without spines. . . . . *puella*, p. 348.  
 B<sup>2</sup>. Carapace with a spine at postero-lateral angle; basal segment of antennae with two distal spines . . . . . *aspera*, p. 352.
- A<sup>2</sup>. Upper surface of merus and outer surface of carpus of cheliped deeply excavate into several contiguous depressions.  
 B<sup>1</sup>. Upper or anterior margin of legs entire or nearly so.  
 C<sup>1</sup>. One anterior tooth or lobe on basal antennal article. Two rows of deep excavations on arm. . . . . *erosa*, p. 351.  
 C<sup>2</sup>. Two anterior teeth or lobes on basal antennal article. Outer row of excavations on arm obsolete. . . . . *panamensis*, p. 351.
- B<sup>2</sup>. Upper or anterior margin of legs spinous, the proximal spine of the series not marginal but situated on the posterior surface and conspicuous in legs of first three pairs. Two anterior teeth or lobes on basal antennal article. . . . . *sulcata*, p. 349.

Analogous species on opposite sides of the continent: *puella* (Atlantic), *sulcata* (Pacific).

**THOE PUELLA** Stimpson

Plate 125, figs. 1 and 2

*Thoe puella* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 178 (type-locality, Tortugas Is., Florida; type not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1873, p. 122, pl. 19, figs. 3-3e.

*Pisa latipes* DESBONNE, in Desbonne and Schramm, Crust. de la Guadeloupe, 1867, p. 19 (type-locality, Guadeloupe; cotype in Paris Mus.).

*Diagnosis*.—Sides of carapace perpendicular and nearly straight. Basal antennal joint not grooved. Margins of merus-joints of ambulatory legs thin.

*Description*.—Antero-lateral margins straight or nearly so; lobulations of dorsal surface well marked, covered with berry-like bunches of granules crowded together. Rostral horns separated by a deep, narrow fissure. Antennae fringed with long hair; basal joint as wide as long, with antero-external angle a blunt tooth. Arm and wrist of chelipeds covered with fine granulations, the arm with a line of tubercles on upper margin; hand smooth and shining except near articulation, where it is granulate, superior margin sharp for its proximal half; fingers finely serrulate within, a very shallow tooth near base of dactyl in male; fingers rather widely gaping in adult male; narrowly gaping in adult female. The

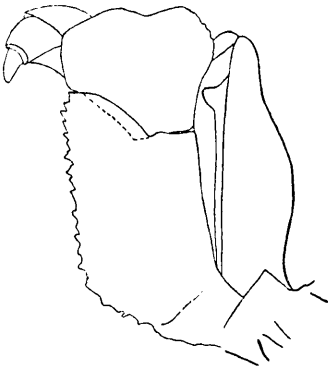


FIG. 111.—*THOE PUELLA* (14442),  
 MAXILLIPED, X 18.2

inferior laminate crests on merus joints of ambulatory legs longer than superior and about twice as wide; their upper surfaces concave,

margins undulate and finely crenulate; the carpus joints have a bilobed superior crest and a tooth on inferior margin; propodal joints with a narrow crest on each side and a blunt spine above.

Color, reddish (Desbonne), or bright red, with yellow patches (Stimpson.)

*Measurements.*—Male (46740), length of carapace 11.8, width of same 10.2 mm.

*Habitat.*—The broken pieces of coral lying in the fringing shallows of the cays frequently have bits of bright red sponge scattered over them, and it is on such broken pieces that this crab occurs. It is almost impossible to distinguish it from the sponge alongside, owing to the close imitation in size, outline, and color, and to its remaining motionless till all danger is apparently over. As the resemblance is so perfect as to deceive the keenest eyes, it is certain that the mimicry must secure absolute safety from the many marine creatures which roam about seeking what they may devour. (P. W. Jarvis, in *The Jamaica Post*, December 16, 1897.)

*Range.*—Florida Keys; West Indies to Curaçao.

*Material examined.*—

Key West, Florida; 1885; H. Hemphill; 3 males, 1 female (14442).

Sand Key, Florida; reef; J. B. Henderson: 1 male (46740). May, 1913; 1 male (46045).

Bush Key, Tortugas; June, 1921; Paul Bartsch; 2 males (56218).

Tortugas Reefs, Florida; J. B. Henderson: 2 males, 1 ovigerous female (46739). 1912; 1 male (45679).

Tortugas, Florida; June 5-8, 1893; State Univ. Iowa Biol. Exped.; 1 female (Mus. S. U. I.).

Jamaica; 1891; T. H. Morgan; 1 female (17211).

Ponce, Porto Rico; reefs; January 30, 1899; *Fish Hawk*; 1 male (24220).

St. Thomas; 1884; *Albatross*; 1 female (16201).

Caracas Bay, Curaçao; in coral; 1920; C. J. van der Horst; 1 male, 2 females (1 ovig.) (Amsterdam Mus.); 1 female (56858).

*THOE SULCATA* Stimpson

Plate 125, figs. 3 and 4

*Thoe sulcata* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 177 (type-locality, Cape St. Lucas, Lower California; cotypes, Cat. No. 1222, M. C. Z.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, pl. 19, figs. 5-5e; 1878, p. 121.—STREETS and KINGSLEY, Bull. Essex Inst., vol. 9, 1877 (1878), p. 104.

*Platypes edentata* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 41 [1], p. 65 [3] (type-locality, Mazatlan; type not extant).

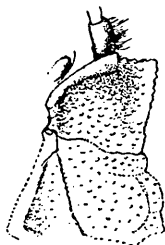


FIG. 112.—*THOE PUEL-LA*, FEMALE (14442), BASAL ANTENNAL ARTICLE AND SUB-HEPATIC REGION,  $\times 9$

*Diagnosis.*—Sides of carapace arcuate. Basal antennal article with a longitudinal groove parallel to its outer margin. Two rows of deep excavations on arm. Ridges and margins of ambulatory legs thickened; upper margin of merus spinous.

*Description.*—Of larger size than *T. puella*; antero-lateral margins more convex; arecolations and berry-like tubercles less strongly marked. Rostral horns contiguous, tips beadlike. The basal article of the external antennae is exposed from above, and bears two anterior teeth or lobes; it is separated from the fronto-orbital region by a deep suture or pit, and there is also a deep pit on the upper surface of the spine or tooth at its exterior angle; below, a shallow groove runs parallel with the outer margin. The first two movable articles of the antennae are broad and pitted, the remainder are very slender.

The merus of the chelipeds has two longitudinal but not contiguous rows of deep excavations; hands carinate beneath; in the adult male the fingers are very slender, the excavate tips are shorter than in *puella*, and the large tooth of the dactylus is near its middle and is slender, as long as it is wide. Both fingers more or less denticulate within. Merus of legs deeply bisulcate longitudinally by blunt ridges and armed along the superior margin with a series of strong, short spines which are not concealed by the thick hair; the proximal spine of the row is out of line and situated on the posterior surface instead of on the margin and is a conspicuous feature in the legs of the first three pairs; lower limb of merus narrower than in *puella* and with thickened margin; both margins fringed with hair. Superior margin of carpus thick, arcuate, inferior margin unilobate.

*Color.*—Chelipeds, in alcohol, a bright, shining carmine tint (Lockington).

*Measurements.*—Male (47121), length of carapace 15.1, width of same 14 mm. Length of type-specimen 22.8 mm. ( $\frac{9}{16}$  inch).

*Range.*—West coast of Mexico from Gulf of California (Tepoca Bay) to State of Oaxaca.

*Material examined.*—

Tepoca Bay, Sonora, Mexico; April 25, 1921; Fred Baker, California Academy Exped.; 1 male (Cal. Acad. Sci.), with chelipeds not fully developed.

San Francisquito Bay, east coast Lower California; beach; April 9, 1911; *Albatross*; 1 male (55767).

Mazatlan, Mexico; A. Agassiz; 3 males, 2 females (2097, M. C. Z.).

Cape St. Lucas, Lower California; John Xantus; 9 males, 3 females (1222, M. C. Z.).

Puerto Angel, Oaxaca, Mexico; 1910; C. R. Orcutt; 2 males (47121).

## THOE PANAMENSIS Nobili

Plate 125, figs. 5 and 6

*Thoe erosa* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, pl. 19, figs. 4-4*d*; 1878, p. 121 (not synonymy).—RATHBUN, Mem. Mus. Comp. Zoöl., vol. 35, 1907, p. 74 (not all synonymy). Not *T. erosa* Bell, 1836.

*Thoe panamensis* NOBILI, Boll. Mus. Zool. Anat. Comp. R. Univ. Torino, vol. 16, No. 415, 1901, p. 30 (type-locality, Isola Flamenco, Bay of Panama; type in Mus. Turin).—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, pp. 575 and 618; the locality "Ecuador" is an error.

*Diagnosis*.—Very near *T. sulcata*. Outer row of excavations on arm obsolete or obsolescent. Merus of ambulatory legs entire or obscurely spinulose above.

*Description*.—Panama specimens differ from more northern ones in the above characters chiefly. However, the obsolescence of the outer row of excavations on the arm is not altogether constant. The old male in *panamensis* has widely gaping fingers, as in *sulcata*, but the tooth on the dactyl at the middle of the gape is broader than long, its edge tridentate or tricrenulate. On the merus of the legs no spines or spinules show among the marginal hairs, nor is there a spine on the posterior surface near its proximal end.

Perhaps not specifically distinct from *sulcata*.

*Measurements*.—Male (48786), length of carapace 13.7, width of same 12.3 mm.

*Range*.—Bay of Panama.

*Material examined*.—

Taboguilla Island; between tide-marks; October 31, 1899; *Albatross*; 1 male (7072, M. C. Z.).

Taboga Island; June, 1914; J. Zetek; 1 male, 1 female (48786).

Perico Island; October 26, 1904; *Albatross*; 1 male (33390).

Panama; May, 1863; Dr. Sternberg; 2 males, 2 females (1945, M. C. Z.).

Panama; A. Agassiz; 3 ovigerous females (988, M. C. Z.); identified by Stimpson as *T. sulcata*.

## THOE EROSA Bell

Plate 249, figs. 1-6

*Thoe erosa* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 171 (type-locality, Galapagos Islands; type not extant); Trans. Zool. Soc. London, vol. 2, 1836, p. 48, pl. 9, figs. 4, 4 *k-4 o*.—NOBILI, Boll. Mus. Zool. Anat. Comp. R. Univ. Torino, vol. 16, No. 415, 1901, p. 30; not A. Milne Edwards, Crust. Rég. Mex., 1875, pl. 19, figs. 4-4 *d*; 1878, p. 121, nor Rathbun, Mem. Mus. Comp. Zoöl., vol. 35, 1907, p. 74.

*Diagnosis*.—One anterior tooth or lobe on basal antennal segment. Two rows of deep excavations on arm. Both fingers strongly arcuate; gaping edges entire except for one tooth on dactyl.

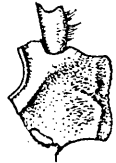


FIG. 113.—THOE PANAMENSIS, FEMALE (48786), BASAL ANTENNAL ARTICLE, X 9

*Description after Bell and Nobili.*—Carapace rounded behind, depressed, covered with low tuberosities; lateral margin without teeth, perpendicular. Rostrum minute, tapering to the point, which is slightly divided. Basal antennal joint with but one anterior tooth or lobe (according to Bell's figure 4 *k*) and that at the outer angle.

Chelipeds in the male longer and much more robust than the ambulatory legs. The arm has two series of quadrilateral excavations on the upper and outer surfaces, diminishing backwards. Hands tumid, convex inwardly and outwardly, smooth, carinated beneath, fingers meeting only at point, notably arcuate and leaving a large interspace except at tips, edge not excavated nor serrated, but with a single bifid tubercle near the middle of the movable finger. Legs flattened above, longitudinally rugose, the sides furnished with rather long hairs.

*Color.*—Light yellowish brown above, paler beneath (Bell).

*Measurements.*—Length of carapace of type-specimen 13.5 mm. (6 lines), width of same 11.3 mm. (5 lines).

*Range.*—Galapagos Islands, 7 fathoms, sandy mud (Bell); Bay of Santa Elena, Ecuador (Nobili).

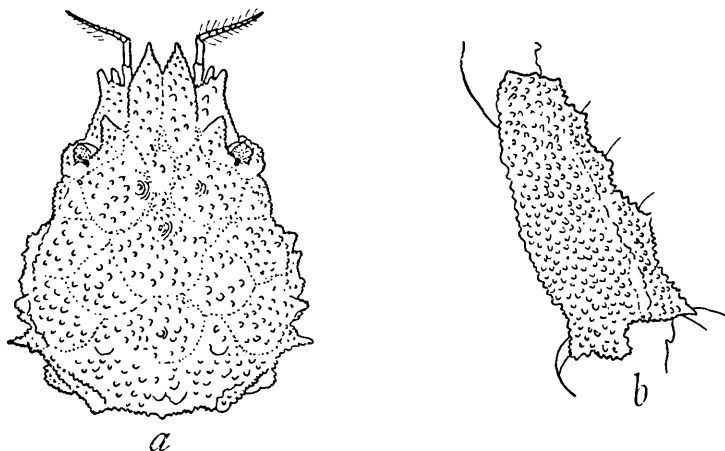


FIG. 114.—*THOE ASPERA*, MALE (23773), TOTAL LENGTH OF CARAPACE 10 MM. (AFTER RATHBUN.) a. CARAPACE, DORSAL VIEW. b. MERUS OF A RIGHT AMBULATORY LEG

***THOE ASPERA* Rathbun**

Plate 124, figs. 4 and 5

*Thoe aspera* RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2, 1901, p. 63, text-fig. 10 (type-locality, Ensenada Honda, Culebra; holotype, Cat. No. 23773, U.S.N.M.).

*Diagnosis.*—Carapace armed with some sharp spines and tubercles. Rostral horns separated by a large V. Basal antennal joint much longer than broad. Merus of legs moderately dilated.

*Description*.—Carapace more elongate than *T. puella*, the gastro-cardiac suture farther back, or halfway between posterior margin of carapace and posterior margin of orbit. Lobules separated by shallower depressions than in *T. puella*; protogastric and mesogastric lobules each surmounted by a high, acute tubercle; cardiac lobule with a similar but lower tubercle. Postero-lateral angle with a short spine; above and anterior to the spine, a sharp tubercle; another tubercle on each side of the middle near the posterior margin; and in front of these last still another tubercle on the branchial region. Rostral horns curving slightly inward and separated by a large V-shaped sinus. Basal antennal joint narrower than in other species of the genus, considerably longer than broad and armed distally with two spines, outer one above inner, both visible in a dorsal view; outer margin concave, a longitudinal crest at outer third; both crest and margin finely crenulate. Cheliped of male (perhaps not fully developed) rather feeble. The arm, wrist, and proximal fourth of palm are finely granulate; the arm has sharp granulated margins. The greater part of the palm is smooth and shining; three times as long as wide; the fingers gape slightly for two-thirds their length and are finely denticulate. Crests of merus joints of ambulatory legs thin and of about equal width; the anterior crest has one or two teeth, the posterior one has a rectangular distal prolongation. The carpus joints have a triangular inner tooth and a narrow outer crest. Surface sparingly pubescent; some longer hairs form lines on the rostrum and in the depressions of carapace.

*Measurements*.—Male, holotype, length of carapace 10, width 8.2 mm.

*Range*.—Porto Rico.

*Material examined*.—Ensenada Honda, Culebra Island, Porto Rico; February 9, 1899; *Fish Hawk*; 1 male, holotype, 1 female (23773).

#### Genus PICROCEROIDES Miers

*Picroceroides* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 77; type, *P. tubularis* Miers.—RATHBUN, *Bull. U. S. Fish Comm.*, vol. 20, for 1900, part 2 (1901), p. 76.

Carapace narrow and rounded behind, constricted behind the orbits, which are tubular and project laterally. The width at the orbits equals or exceeds the greatest width at the branchial regions. The orbits have a long preocular and a short postocular spine and are emarginate above and below. Rostral horns long, slender, and widely separated at base. Abdomen seven-jointed and transversely ridged in both sexes; in the male the ridges correspond to similar elevations on the sternum, which are rounded and separated by deep depressions. Epistome transverse. Antennular fossettes small, deep, and well defined. Basal joint of antenna considerably enlarged and

armed with an oblique keel immediately behind the next joint; following joints slender. Outer maxillipeds small; merus joints distally truncate, antero-external angle obtuse, antero-internal angle emarginate.

Chelipeds moderately elongate, rather slender; palms slightly compressed and more than twice as long as broad; fingers with an intermarginal hiatus at base. Ambulatory legs very slender and of moderate length, joints subcylindrical, unarmed; dactyli slightly arcuate.

Contains only one species.

**PICROCEROIDES TUBULARIS** Miers

Plate 126; plate 254, figs. 2-5

*Picroceroides tubularis* MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, p. 77, pl. 10, figs. 1-1c (type-localities, Fernando Noronha and Bahia, in shallow water; types in British Mus.).—RATHBUN, *Bull. U. S. Fish Comm.*, vol. 20, for 1900, pt. 2, 1901, p. 76.

*Diagnosis.*—Orbits tubular. Rostral and preocular horns very long and slender. Ambulatory legs slender. Abdomen and sternum deeply furrowed.

*Description.*—Carapace moderately convex, much longer than broad, but little dilated at branchial regions. Frontal space concave; gastric region somewhat elevated and obscurely tuberculated; the cardiac region bears a rounded prominence and the intestinal region a slender spine; the cervical and branchio-cardiac sutures are continuous and form a longitudinal sinus, separating the branchial from gastric and cardiac regions. The tubular orbits project laterally to a remarkable degree, and each bears a very long preocular and a small postocular spine, and has two notches in the inferior and one in superior margin. Rostral spines in adult male four-fifths the length of remainder of carapace; very slender, slightly curved, and remote from each other at base. The basal



FIG. 115.—PICROCEROIDES TUBULARIS (24082), MAXILLIPED,  $\times 8.58$

antennal joint has, besides the antero-internal crest, two small teeth on margin of orbit and a third on distal margin.

Chelipeds unevenly granulated; the outer surface of palm has a slight longitudinal depression near upper surface; the dactylus has a strong tubercle near its base. Carapace and ambulatory legs rather thinly pubescent; the margins of rostrum and of the free peduncular joints of antennae have some longer hairs, some of which are clavate.

*Measurements.*—Male (24082), median length of carapace, from posterior to anterior margin, 22.5; length of horn 19; width of



Material examined of *Picroceroides tubularis*

| Locality                         | Bearings    |                | Fathoms | Bottom       | Temp. | Date          | Station | Collector                         | Specimens      | Cat. No.                |
|----------------------------------|-------------|----------------|---------|--------------|-------|---------------|---------|-----------------------------------|----------------|-------------------------|
|                                  | Latitude N. | Longitude W.   |         |              |       |               |         |                                   |                |                         |
| Bahama Banks.....                | ° ' "       | ° ' "          | 10-40   |              | ° F   | May 18, 1893  |         | State Univ. Iowa<br>Bahama Exped. | 1 y.....       | Mus. S. U. I.<br>49084. |
| Do.....                          |             |                | 60      |              |       |               |         | J. B. Henderson                   | 1♂.....        | 47106.                  |
| Off Havana, Cuba.....            | 23 10 25    | 82 20 24       | 33      | Co.          | 79.1  | Jan 17, 1885  | 2324    | do.                               | 1 ovig. ♀      | 9495.                   |
| East of Cape Cruz, Cuba.....     | 19 48 00    | 77 17 00       | 33      | Co.          |       | Feb. 29, 1880 | XXXI    | Albatross                         | 1♂.....        | 4468, M. C. Z.          |
| Between Jamaica and Haiti.....   | 17 44 05    | 75 39 00       | 23      | Co. brk. Sh. |       | Feb. 29, 1884 | 2138    | Blake                             | 1♂ 1♀          | 6928.                   |
| Off St. Thomas, West Indies..... |             | ½ N., 6 miles. | 20-23   | Co.          |       | Feb. 6, 1899  | 6079    | Albatross<br>Fish Hawk            | 2♂ 1♀ 2 y..... | 24082.                  |

carapace at branchial regions 15.4, width between tips of postocular spines 17 mm.

*Range*.—From Bahama Banks and Florida Keys to Bahia, Brazil. Shallow water to 60 fathoms.

*Material examined*.—See table, page 355.

Genus PITHO Bell

*Pitho* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (Feb. 24, 1836), p. 172; type, *P. sexdentata* Bell.

*Othonia* BELL, Trans. Zool. Soc. London, vol. 2, 1836, p. 55; type, *O. sexdentata* (Bell). Name preoccupied by Johnston, in Loudon's Mag. Nat. Hist., vol. 8, March, 1835, p. 181, for a genus of worms.

*Piloronus* GISTEL, Natur. Tierreichs, 1848, p. X. (Substituted for *Pitho* Bell, said to be preoccupied by *Pytho* Fabricius).

*Engyzomaria* GISTEL, Natur. Tierreichs, 1848, p. X. (Substituted for *Othonia*, preoccupied).

*Microrynchus* DESBONNE, in Desbonne and Schramm, Crust. Guadeloupe, 1867, p. 20; type, *M. lherminieri* Desbonne.

Carapace truncate in front; frontal region wide; rostrum very short, formed of two small teeth. Orbits small, tubular, deep, and directed forward; eyes slender. Outer antennae short; basal article lamellose, forming floor of orbit; next article flat, short, and broad, outwardly expanded; third article flat, but smaller; flagellum very small. Carapace oblong-oval, antero-lateral and postero-lateral borders forming together an arcuate line. Merus of outer maxillipeds dilated outwardly and very slightly notched on inner side for insertion of palpus. Chelipeds with fingers spoon-shaped; hands more or less compressed. Ambulatory legs stout and rather short; dactyli sharp, spinulous below. Abdomen of male

narrow and formed of seven articles. Straight, stiff hairs border the antennae and are arranged in a series of tufts on the pterygostomian regions.

An American genus, ranging from Beaufort, North Carolina, to Cape St. Roque, Brazil, and from Magdalena Bay, Lower California, Mexico, to Panama and the Galapagos Islands.

## KEY TO THE SPECIES OF THE GENUS PITHO

- A<sup>1</sup>. Second and third lateral teeth, exclusive of tooth at orbital angle, partially united at base.
- B<sup>1</sup>. First movable segment of antenna much wider than long, its outer lobe strongly produced laterally. Lateral teeth of carapace blunt-tipped in the adult..... *aculeata*, p. 357.
- B<sup>2</sup>. First movable segment of antenna little, if any, wider than long, its outer lobe produced as much anteriorly as laterally. Lateral teeth of carapace acute.
- C<sup>1</sup>. Lateral teeth subequal in size. Carapace subcircular, front narrow. .... *laevigata*, p. 372.
- C<sup>2</sup>. Lateral teeth not subequal.
- D<sup>1</sup>. Last two lateral teeth not much, if any, smaller than the others.
- E<sup>1</sup>. Carapace strongly tuberculate. Second lateral tooth smaller, but not much smaller, than first and third..... *picteti*, p. 359.
- E<sup>2</sup>. Carapace nearly smooth.
- F<sup>1</sup>. Second lateral tooth very small, much smaller than first and third teeth..... *anisodon*, p. 368.
- F<sup>2</sup>. Second lateral tooth of considerable size, slender. .... *laevigata*, variety, p. 373.
- D<sup>2</sup>. Last two lateral teeth much reduced, at least in male. Manus of adult male broad, compressed.
- E<sup>1</sup>. First movable segment of antenna slightly wider than long. Lateral teeth sharper in female than in male, the last two teeth more prominent than in male..... *lherminieri*, p. 362.
- E<sup>2</sup>. First movable segment of antenna longer than wide. Fourth lateral tooth subequal to first three in female, fifth tooth smaller. Fourth and fifth teeth much reduced in male. .... *quinquedentata*, p. 361.
- A<sup>2</sup>. Second and third lateral teeth not united at base.
- B<sup>1</sup>. More than four lateral teeth. Carapace conspicuously granulated.
- C<sup>1</sup>. Lateral teeth five (exceptionally four), dentiform, their edges denticulate..... *mirabilis*, p. 366.
- C<sup>2</sup>. Lateral teeth six, spiniform..... *sexdentata*, p. 367.
- B<sup>2</sup>. Four lateral teeth or spines.
- C<sup>1</sup>. Lateral teeth long and narrow, spiniform. Rostral teeth acutely pointed..... *quadridentata*, p. 369.
- C<sup>2</sup>. Lateral teeth short and broad. Rostral teeth arcuate or very obtuse-angled..... *dispar*, p. 374.

## ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

## Pacific

*aculeata*.  
*lherminieri*.  
*mirabilis*.

## Atlantic

*picteti*.  
*quinquedentata*.  
*sexdentata*.

## PITHO ACULEATA (Gibbes)

Plate 127; plate 251, fig. 1

*Hyas aculeata* GIBBES, Proc. Amer. Assoc. Adv. Sci., vol. 3, 1850, p. 171 [7] (type-localities, Key West and "Florida"; types not extant).

*Othonia aculeata* STIMPSON, Ann. Lye. Nat. Hist. N. Y., vol. 7, 1859, p. 49; Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 116 (part).—MIERS, Journ. Linn. Soc. London, Zool., vol. 14, 1879, p. 673, pl. 13, fig. 6.—KINGSLEY, Proc. Acad. Nat. Sci. Philadelphia, 1879 (1880), p. 388 (part); not *O. aculeata* A. Milne Edwards, Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 2.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 255, pl. 34, figs. 1 and 2.

*Pitho aculeata* RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 7; Bull. U. S. Fish Comm., vol. 20, for 1900, part 2, 1901, p. 77.

*Diagnosis*.—First movable segment of antenna much wider than long. Lateral teeth of carapace obtuse, the second and third united at base. Fronto-orbital width great. Hands of adult male broad.

*Description*.—Carapace a little longer than broad, almost smooth above in adult, more or less tuberculous and granulous in young. Width between outer orbital angles two-thirds of entire width. Pre-orbital and external orbital angles subacute. The outer margins of the two external orbital teeth diverge anteriorly. Antero-lateral margins armed with five teeth (exclusive of orbital angle) more or less triangular, obtuse in the old, acute or subacute in the young, the second and third coalesced at their base, the fourth and fifth small. Frontal teeth small, flat, triangular, obtuse. Basal article of antennae wide; that portion of its anterior margin situated outside of the insertion of the next article is denticulate; a deep groove between this crest and frontal border, a second groove on the carapace parallel to first. First movable article of antennae with an outer lobe much produced laterally.

Chelipeds strong in the full-grown male, about 1.5 times as long as carapace; arm angular, with three depressed tubercles on upper margin; wrist with a smooth longitudinal crest; palms compressed, about 1.5 times as long as wide; fingers widely gaping for their distal two-thirds, with a tooth near the base of the dactyl. Chelipeds in the young male and in the female short and weak; fingers evenly dentate and in contact. The carpus joints of the ambulatory legs have a broad, deep groove on the outer surface.

Appendages of first segment of abdomen in the male are brown in color for their distal half, the brown parts in contact for half their length, diverging at extremities in slight curves convex to each other, each appendage terminating in a right-angled hook, the point of which is directed toward median line of carapace (fig. 116, c).

*Color*.—The following notes on the several lots of specimens obtained at Ragged Key were made by Mr. Henderson from the living specimens:

46032 and 46034. Ground of back dirty white with large square olive green maculations; claws and legs the same; last segment of claws the same green with irregular white dots; tips of claws white; under surface of body pure white and green.

46033. No two individuals alike; the general color of the back varies from almost black to olive green or chocolate, usually with lighter spaces of cream white in center of back, or dotted with cream white on hinder portion and on legs and claws; under side the same color but light; claws the color of back.

46035. Back ashen gray with light olive green flecks. Same color pattern on legs and pincers. Individuals vary in color; sometimes the green becomes yellowish. One or two are olive brownish, in which case there are whitish flecks scattered generally over the whole.

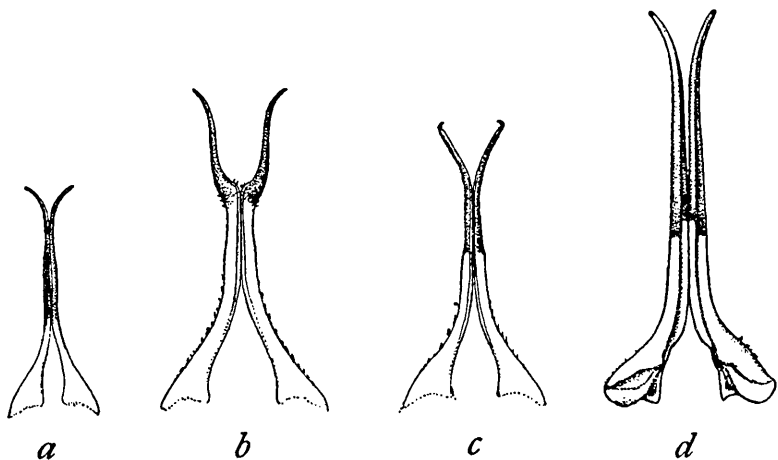


FIG. 116.—PITHO, APPENDAGES OF FIRST ABDOMINAL SEGMENT OF MALE OF DIFFERENT SPECIES. *a.* LHERMINIERI. *b.* ANISODON. *c.* ACULEATA. *d.* MIRABILIS. (*a, b,* AND *c,* AFTER RATHBUN)

*Measurements.*—Male (9283), length of carapace, measured to tips of rostral teeth 27.5; greatest width of carapace, teeth included, 26 mm.

*Range.*—Bahamas; Florida Keys; West Indies; northern coast of South America.

*Material examined.*—

Bahamas; 1886; *Albatross*: Nassau; 1 ovigerous female (11401). New Providence; 1 male, 1 female (16309).

Spanish Wells, Bahamas; July 12–13, 1893; State Univ. Iowa Exped.; 1 male, 2 females (Mus. S. U. I).

Ragged Key, Florida; on reef; May, 1913; J. B. Henderson; 7 males, 21 females (16 ovig.) (46035); 3 males (46034); 3 males, 3 females (1 ovig.) (46033); 5 males (46032).

Key Largo, Florida; H. Hemphill; 6 males, 6 females (14049).

Indian Key, Florida; H. Hemphill; 36 males, 30 females (14054).

Lower Metacumbe Key, Florida; H. Hemphill; 2 young (15809). Key Vaccas, Florida; on banks, low tide; H. Hemphill; 1 male, 10 females (14072).

Key West, Florida: H. Hemphill; 110 specimens. December, 1883; D. S. Jordan; 2 females (5751). April 15-27, 1884; *Albatross*; 5 males, 8 females (7518). C. N. E. Eliot; 1 young (22988). C. J. Maynard; exchange with Boston Soc. Nat. Hist.; 4 males, 1 ovigerous female (53034).

Dry Tortugas, Florida: 1884; Edward Palmer; 2 females (13896). 6 dried specimens (Brit. Mus.).

Dry Tortugas, Florida; 1893; State Univ. Iowa Exped.: June 5-8; 2 females, 1 young (Mus. S. U. I.). Shallow water; June 13; 1 male, 3 females (Mus. S. U. I.). Gulf weed; June 13; 1 male (Mus. S. U. I.).

Sarasota Bay, Florida; 1 young (Union College coll.).

Florida: C. J. Maynard; exchange with Boston Soc. Nat. Hist.; 1 male (53035). William Stimpson; 1 male, 1 female (Paris Mus.).

Cuba; 1914; Henderson and Bartsch, *Tomas Barrera* Exped.: Cabañas; on sand, shell, grass to mud bottom; June 8 and 9; station 16; 1 ovigerous female (48659). Bahia Honda; June 7; 2 males, 2 females (48674). Cayo Arenas; 2 fathoms; May 12; station 3; 1 young female (48714); 1 male (48715).

Jamaica: Off Montego Bay Point; June 28, 1910; E. A. Andrews; 1 male (43018). Lime Cay; P. W. Jarvis; specimens returned to sender.

Porto Rico; 1899; *Fish Hawk*: Boqueron Bay; January 25; 1 male, 1 female (24087). Ensenada Honda, Culebra; February 9; 1 young, 1 broken (24103). Culebra; February 11; 1 male, 1 female (24414).

St. Thomas; A. Milne Edwards; 1 male (Paris Mus.).

Guadeloupe (Geneva Mus.).

Old Providence; April 4-9, 1884; *Albatross*: 1 male (18568).

Aruba, Dutch West Indies; among algae in shallow water of lagoon; August 2, 1905; J. Boeke; 1 male (42982), 1 male (Leiden Mus.).

Curaçao, rifwater; shallow water; algae; in beam trawl; May 26, 1905; J. Boeke; 1 female (Leiden Mus.).

Caracas Bay, Curaçao; in sand; May 13, 1920; C. J. van der Horst; 1 male (Amsterdam Mus.).

**PITHO PICTETI (Saussure)**

Plate 130, figs. 2 and 3; plate 252, fig. 1

*Othonia picteti* SAUSSURE, Rev. et Mag. de Zool., ser. 2, vol. 5, 1853, p. 357, pl. 13, fig. 2 (type-locality, Mazatlan; type in Geneva Mus.).—STIMPSON, Journ. Boston Soc. Nat. Hist., vol. 6, 1857, p. 455.—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 118.

*Micippa ovata* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 68 [6] (type-localities, Port Escondido, Mulege Bay, Los Angeles Bay, San José Island, and La Paz; types not extant).

- Micippa ovata*, var. *laevis* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 69 [7] (type-locality, Gulf of California; type not extant).  
*Othonia nicholsi* RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 257, pl. 35, fig. 3 (type-locality, Gulf of California, 45 fathoms; holotype, Cat. No. 15822, U.S.N.M.).  
*Pitho quinquedentata* RATHBUN (not Bell), Proc. U. S. Nat. Mus., vol. 21, 1898, p. 578; vol. 38, 1910, p. 573 (part).

*Diagnosis*.—Lateral teeth of carapace five, acute, the second and third united at base. Male appendages distally lyre-shaped. Outer margins of outer orbital teeth anteriorly convergent.

*Description*.—Carapace pubescent, tubercles furnished with long hairs. Legs long-hairy. Carapace shaped much as in *P. aculeata*, but fronto-orbital region narrower, only a little wider than half the carapace width. The outer margins of the outer orbital teeth anteriorly converge instead of diverge, as in *aculeata*. Carapace ornamented with strongly marked tubercles, the larger of which are spinous and are arranged as follows: Two on the median line of the gastric region, the anterior the smaller and sometimes bifid; two placed transversely on the anterior part of the cardiac region; four or five on each branchial region. Of smaller tubercles, there are two on each protogastric lobe, one almost in the same line on the mesogastric region, behind the latter two close together, and two side by side behind the median spine. On the cardiac region there is a curve of three granules in front of the middle and a curve of four behind the middle, the curves subparallel and concave behind. The branchial region has two lines of granules on the posterior half, one line following the general direction of the postero-lateral margin, the other line shorter, running along the inner boundary of the region, the two lines meeting at an acute angle. There are other granules scattered on the carapace but no conspicuous protuberances on the hepatic region.

Lobes of rostrum acute, a denticle on their inner margins which is partially superimposed on the lobe. Orbital angles acute or subacute. Antero-lateral teeth five, after the orbital angle, curved, acute, the second smaller than the third and basally joined to it. Carapace widest at the fourth tooth. Fifth tooth nearly as large as second.

First movable segment of antenna as broad as long, outer lobe not so long as in *aculeata*.

In the mature male the chelipeds are a fourth longer than the carapace; palms twice as long as wide, margins subparallel; fingers gaping for half their length, a large tooth on dactyl in the gape.

The appendages of the first segment of the male abdomen are so disposed as to form together in their distal half a lyre-shaped figure.

*Color*.—Whitish (Saussure).

*Measurements*.—Male (50654), length of carapace 19.4, width of same 17.2 mm. Male (2098), length of carapace 23, width 21.4 mm.

*Range*.—West coast of Mexico and Central America.

*Material examined*.—

Magdalena Bay, Lower California: C. R. Orcutt; 1 male, 1 female (50642); 1 male, 2 females (50654). August 14, 1872; U. S. C. S. S. *Hassler*; 1 male (Cat. No. 2098, M. C. Z.).

Off San Francisco (Gulf of California?); 3 males, 1 female (Brit. Mus.).

Northern part, Gulf of California; lat. 29° 30' N.; long. 112° 40' W.; 45 fathoms; 1880–1882; Lieut. Comdr. H. E. Nichols, U. S. Navy; 1 young female (15822), holotype of *Othonia nicholsi*.

San Jose Island, Gulf of California; 1921; California Academy of Sciences Expedition; 1 male (Cal. Acad.).

Southern part, Gulf of California; lat. 24° 11' 30'' N.; long. 109° 55' 00'' W.; 10 fathoms; Sh.; April 30, 1888; station 2828, *Albatross*; 1 male (21962).

Lower California; M. Diguët; 1 immature female (Paris Mus.). 1911; *Albatross*; 1 male (55751).

Realejo, Nicaragua; Oersted, collector; 1 male (19695); received from Copenhagen Mus.; 1 male, 1 female (Copenhagen Mus.).

#### PITHO QUINQUEIDENTATA Bell

Plate 250, figs. 1–4

*Pitho quinqueidentata* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 172 (type-locality, Galapagos Islands, sandy mud, 6 fathoms; type not extant).—RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 573 (part).

*Othonia quinque-dentata* BELL, Trans. Zool. Soc. London, vol. 2, 1836, p. 57, pl. 12, fig. 2.

*Othonia mirabilis* GERSTAECKER, Arch. f. Naturg., vol. 22, pt. 1, 1856, p. 113 (part).

*Othonia quinqueidentata* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 118, pl. 24, figs. 3–3c.

?*Othonia aculeata*? CANO, Boll. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, p. 181, pl. 7, fig. 6.

*Diagnosis*.—First movable segment of antenna narrow. Manus of cheliped broad, compressed. Fourth and fifth lateral teeth much reduced in male, second and third united at base.

*Description*.—Carapace of male narrow behind. Front rather wide, inner orbital tooth decidedly more advanced than outer tooth, rostral teeth still more advanced and separated by a V interspace. Lateral teeth five, blunt, the last two very small, the last one hardly more than a tubercle; second tooth nearly as large as third, and not entirely separated from it. First movable segment of antennae rather narrow. Chelipeds with manus compressed, upper edge sharp.

The above notes were made in the Paris Museum on a male from the Galapagos Islands. It is probably the specimen figured by A. Milne Edwards (see my figs. 1–3, pl. 250), in which, however, the

large, movable segment of the antenna is represented considerably wider than in my drawing (fig. 117, *a*).

In Bell's figure of the type female (see my fig. 4, pl. 250) the carapace is broad behind, the teeth of rostrum and orbit are equally advanced, the outer sides of the orbits diverge anteriorly, the first four lateral teeth are subequal in size and similar, the fifth tooth smaller but not rudimentary. The anterior third of the carapace is smooth, the remaining two-thirds granulated.

While the illustrations of the two authors at first glance seem irreconcilable, it is possible that some of the differences are attributable to exaggeration of sexual characters.

*Color*.—General color brown; feet with alternate rings of reddish and brown (Bell).

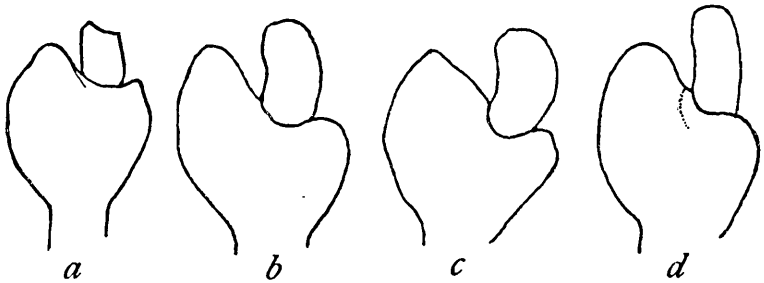


FIG. 117.—PITHO, FIRST AND SECOND MOVABLE ARTICLES OF ANTENNA OF DIFFERENT SPECIES. *a*. QUINQUE-DENTATA. *b*. LHERMINIERI. *c*. MIRABILIS. *d*. ANISODON.

*Measurements*.—Male (Galapagos Islands), length of carapace 16.7, width including spines 16.3, width excluding spines 14, fronto-orbital width 9.7 mm.

*Range*.—Bay of Panama; Galapagos Islands.

*Material examined*.—Panama; A. Milne Edwards; 1 young male (Paris Mus.). Galapagos Islands; received from British Museum; 1 male (Paris Mus.).

*Other records*.—It is possible that the carapace figured by Cano<sup>45</sup> belongs to this species, in which event the long filiform stalks from the antennal region may be considered as foreign growths.

#### PITHO LHERMINIERI (Schramm)

Plate 128, figs. 1 and 2; plate 129, figs. 1 and 2; plate 252, fig. 2

*Othonia quinque-dentata* WHITE (not Bell), List Crust. Brit. Mus., 1847, p. 9.

*Microrynchus lherminieri* DESBONNE (MS.) in Desbonne and Schramm, Crust. Guadeloupe, 1867, p. 20, *nomen nudum*.

*Othonia lherminieri* SCHRAMM, in Desbonne and Schramm, Crust. Guadeloupe, 1867, p. 20 (type-locality, Guadeloupe in the cavities of the keys; type in Paris Mus.).—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 116, pl. 24, figs. 5–5c. Not *O. lherminieri* Rathbun, 1892.

<sup>45</sup> Boll. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, pl. 7, fig. 6.



*Othonia aculeata* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 116 (part).—KINGSLEY, Proc. Acad. Nat. Sci. Philadelphia, 1879 (1880), p. 388 (part).—A. MILNE EDWARDS, Bull. Mus. Comp. Zoöl., vol. 8, 1880, p. 2.

*Othonia carolinensis* RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 256, pl. 35, figs. 1 and 2 (type-locality, off Charleston, South Carolina; holotype, Cat. No. 3158, U.S.N.M.).

*Pitho lherminieri* RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 8; Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2, 1901, p. 78.

*Pitho aculeata* A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 395.

*Diagnosis*.—First movable segment of antenna narrow. Manus broad, compressed. Fourth and fifth lateral teeth much reduced in females and young males, rudimentary in old males: second and third teeth united at base.

*Description*.—Carapace rough with tubercles of different sizes, as broad as long in the adult male, longer than broad in other forms, very narrow behind in males, much wider in females. Fronto-orbital width about half the entire width in adults, greater in the young. Frontal teeth slightly more advanced than orbital angles. Second and third lateral teeth subequal; fourth and fifth much reduced. First movable article of antenna similar to that of *P. anisodon*, but wider (fig. 117, b).

Chelipeds similar to those of *P. aculeata*. Appendages of abdomen of male in contact at about three-fifths the distance from distal end, then separating slightly in faint curves concave to each other, and again converging before they finally spread out at tips; distal three-fifths yellow, very slender, tapering gradually to a fine point (fig. 116, a).

*Variation*.—In the females and young males, the carapace is more tuberculate than in the old males, the lateral teeth are sharper, the fourth and fifth teeth being more prominent than in the males.

The Cuban male (48733) approaches *P. mirabilis* in having a shorter and broader carapace than in typical *lherminieri*; the usual pattern of tubercles and coarse granules is set in a background of very fine granules, finer than those of *mirabilis*; the transverse row of transverse tubercles above the posterior margin is almost indistinguishable.

*Color*.—Dirty brownish yellow (Desbonne).

*Measurements*.—Male (51003), length of carapace to tips of rostral teeth 15.4, width of carapace 14.6 mm. Female (19357), length of carapace 18.2, width of same 16.5 mm. Male (Paris Mus.), length and width each 25 mm.

*Range*.—From Beaufort, North Carolina, to São Paulo, Brazil.

*Material examined*.—See table, pages 364–365.



|  |                                    |        |                                  |       |                 |      |                                   |                            |                          |   |
|--|------------------------------------|--------|----------------------------------|-------|-----------------|------|-----------------------------------|----------------------------|--------------------------|---|
| Between Cape San Antonio and Cape Cujou.   |                                    |        |                                  |       | May 24, 1914    | 12   | .....do.....                      | 1y.....                    | 48732.....               |   |
| Bahia Honda.....   |                                    | 2-12   | Varying from pure sand to weedy. |       | June 4, 5, 1914 | 15   | .....do.....                      | 1 ♀.....                   | 48747.....               | With Rhizocephalid parasite.  |
| Cabañas.....   |                                    | 2-3    | Al. Co.....                      |       | June 8, 9, 1914 | 16   | .....do.....                      | 1 ♂.....                   | 48733.....               |   |
| Jamaica.....   |                                    | 2-25   | S. Sh. Grasso M.....             |       | .....           |      | T. H. Morgan.....                 | 1 ♀.....                   | 17205.....               |   |
| Port Royal.....  |                                    |        |                                  |       | .....           |      | P. W. Jarvis.....                 | 23 carapaces.....          | 19358.....               | Returned to sender.   |
| Jamaica.....   |                                    |        |                                  |       | .....           |      | .....do.....                      | 1 carapace.....            | 19357.....               |   |
| Porto Rico.....  |                                    |        |                                  |       | .....           |      | .....do.....                      | 1 ♂.....                   | 24107.....               |   |
| Mayaguez Harbor.....   |                                    | 97-120 | Co.....                          | 24    | Jan. 20, 1899   | 6067 | <i>Fish Hawk</i> .....            | 1 ♂.....                   | 24106.....               |   |
| Off Vieques Island.....  |                                    | 14     | Co. S. Sh.....                   | 25. 6 | Feb. 8, 1899    | 6085 | .....do.....                      | 1 ♂.....                   |                          |   |
| Lesser Antilles:<br>St. Thomas.....  |                                    |        |                                  |       | .....           |      | .....do.....                      | 3 ♂ 2 ♀.....               | Paris Mus.....           | Type.   |
| Off St. Croix Guadeloupe.....  | 17 46 10 61 53 15                  | 38     | S. blk. Sp. Sh.                  | 76.75 | Jan. 4, 1879    | 127  | A. Milne Edwards.....             | 1 sm. ♂.....               | 2581, M. C. Z.....       |   |
| Martinique.....  |                                    |        |                                  |       | .....           |      | A. Milne Edwards.....             | 1 ♂.....                   | Paris Mus.....           |   |
| West Indies.<br>Caribbean Sea:<br>Old Providence Island.<br>Great Bay, Wacao, Curaçao. |                                    |        |                                  |       | .....           |      | Latreille collection.....         | 1 ♀.....                   | .....do.....             | <i>O. quinqueidentata</i> of White.   |
| Brazil:<br>Off Cape St. Roque.....   | <i>Lat. S.</i><br>6 59 30 34 47 00 | 20     | brk. Sh.....                     | 79    | .....           |      | .....do.....                      | 3 sm. ♂.....               | Brit. Mus.....           |   |
| Islet of São Sebastião, São Paulo.   |                                    |        |                                  |       | .....           |      | .....do.....                      | 1 ovig. ♀.....             | 9133.....                |   |
|  |                                    |        |                                  |       | Oct. 3, 1905    |      | <i>Albatross</i><br>J. Boeke..... | 1 ♂.....                   | Leiden Mus.....          |   |
|  |                                    |        |                                  |       | Dec. 16, 1887   | 2758 | <i>Albatross</i> .....            | {1 ♂ 1 ovig. ♀<br>1 ♀..... | 21963.....<br>18615..... | Of small size; females have much slenderer lateral spines than customary.<br>Fragmentary. |
|  |                                    |        |                                  |       | 1915            |      | .....do.....                      | 1.....                     | 937, Mus. Paulista.....  |   |

\* Dredged.

\* Between 3 and 10 fathoms.

\* Shallow water.

## PITHO MIRABILIS (Herbst)

Plate 128, fig. 3; plate 129, fig. 3; plate 253, fig. 1

*Cancer mirabilis* HERBST, Naturg. d. Krabben u. Krebse, vol. 2, 1794, p. 152 (part), pl. 37, fig. 3 (type-locality not known; types in Berlin Mus.).

*Othonia mirabilis* GERSTAECKER, Arch. f. Naturg., vol. 22, pt. 1, 1856, p. 113 (part).

*Othonia sexdentata* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 117 (part).

*Othonia rotunda* RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 258, pl. 36, fig. 1 (type-locality, Key West, Florida; holotype, Cat. No. 15807, U.S.N.M.).

*Pitho mirabilis* RATHBUN, Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 258.

*Diagnosis*.—Carapace swollen, as broad as long, covered with fine bead granules. Lateral teeth diminishing in size from the anterior to the posterior, their edges denticulate.

*Description*.—Carapace as broad as long, widest at fourth antero-lateral tooth, much swollen in both directions, transversely rising abruptly from bases of lateral teeth, longitudinally rising in almost an equal curve from behind the front and from posterior margin. Regions faintly indicated. Carapace covered with granules more thickly set on posterior half; long, fine hairs proceed from the top of the granules. Along the outer margins of the gastric lobes, bunches of granules beset with coarse hairs form a broad line which is continued to rostrum. Rostral teeth sharp, produced beyond orbital angles. Preorbital tooth obtuse, less produced than post-orbital, which is subacute. Antero-lateral teeth usually five, acute, separated to their bases, the first the largest, the others as a rule decreasing in size to the last, the tips making a single curve. Anterior margins of teeth thickened. Antero-lateral margin marked by inconspicuous granules irregularly placed, giving the teeth the appearance of being themselves minutely dentate. Basal article of the antenna with a sharp, longitudinal groove through the middle; tooth at distal extremity slightly more produced than upper inner angle of orbit and visible in a dorsal view; outer lobe of first movable article directed forward (fig. 117, *c*). Abdomen and sternum minutely pubescent; abdominal appendages in male diverging slightly at distal ends hooked at tips (fig. 116, *d*).

Chelipeds in both sexes slender, longer than ambulatory legs, finely punctate, upper margin with thinly scattered hairs; arm angular, a few small tubercles on the upper margin; hand slightly tapering distally; fingers in male gaping for the proximal third, a tooth on dactyl; in the female, fingers evenly dentate and in contact for nearly their whole length, a slight gape at proximal end.

Ambulatory legs very hairy above, first pair reaching to about middle of manus.

*Measurements.*—Female (15807), length and width of carapace each 17.8; width between outer orbital angles 9.4 mm. Carapace of larger type (Berlin Mus.), sex unknown, length 18.7, width 19, width exclusive of teeth 17 mm.

*Range.*—Bahama Banks and Florida Keys to Guadeloupe.

*Material examined.*—

Bahama Banks; May 15–18, 1893; Biol. Exped. State Univ. Iowa; 1 male, 5 females (Mus. S. U. I.), 2 females (18674).

Hawk Channel, Florida; 1903; *Fish Hawk*:  $3\frac{1}{8}$  miles N.  $\frac{3}{4}$  E. of Sombrero Light;  $11\frac{1}{2}$  feet; rky.; Jan. 27; station 7427; 1 male (47072).  $1\frac{1}{4}$  miles S. by W. of southeast end of Long Key; 15 feet; barry; February 18; station 7463; 1 male (47073).

Key West, Florida: 1884; *Albatross*; 1 female (16298). 1885; H. Hemphill; 5 males, 5 females (1 male is holotype of *Othonia rotunda*) (15807).

Porto Rico; 1899; *Fish Hawk*: Porto Real; February 27; 1 male (24105). Exact locality not given; 1 female (24104).

Guadeloupe; 1 male (Geneva Mus.).

Locality unknown; 2 carapaces, cotypes of *Cancer mirabilis* (Berlin Mus.).

#### PITHO SEXDENTATA Bell

Plate 130, fig. 1; plate 250, figs. 5–9

*Pitho sexdentata* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 172 (type-locality, Galapagos Islands, 6 fathoms, sandy mud; type not extant).

*Othonia sexdentata* BELL, Trans. Zool. Soc. London, vol. 2, 1836, p. 56, pl. 12, figs. 1–1d.

*Othonia mirabilis* GERSTAECKER, Arch. f. Naturg., vol. 22, pt. 1, 1856, p. 113 (part).—CANO, Boll. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, pp. 102, 182.

*Othonia sexdentata* STIMPSON, Ann. Lyc. Nat. Hist. N. Y., vol. 7, 1860, p. 192.—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 117 (part).

*Diagnosis.*—Carapace oval, narrow across front. Six lateral teeth behind orbital tooth, teeth separated to their bases. Granulation dense.

*Description.*—Carapace broadly oval, moderately elevated, the surface rough, granulated and slightly hairy; the lateral margin with six, flattened, triangular, falciform teeth, the points acute and directed forward; a ridge of prominent granulations over the posterior margin. (Bell.)

*Notes made at Paris Museum on male from Cape St. Lucas.*—Fronto-orbital distance narrow, much as in *P. anisodon*. Rostral teeth very narrow and sharp or spiniform. Lateral teeth of carapace divided to their bases, acute, margins granulate; the sixth or posterior tooth

is postero-lateral, separated from the fifth tooth by a tubercle, and situated above the margin, forming an arcuate line with the other teeth but above their level. Granules and tubercles of carapace more numerous than in *P. quinquedentata*; there are about 50 small granules on the cardiac region and 40<sup>m</sup> on the mesogastric region; the granules of the postbranchial region are large and spinous. One or more hairs curved at tip arise from each tubercle or granule. An uninterrupted row of large transverse tubercles above margin. Orbital teeth acute, the outer one advanced nearly as far as the inner. First movable article of the antenna shaped much as in *P. quinquedentata*. Chelipeds weak; manus compressed, margins tapering toward extremity.

*Measurements*.—Male, Cape St. Lucas (Paris Mus.), length of carapace 14.2, width 13.8, width exclusive of spines 12, width between outer orbital angles 7 mm. Female, Cape St. Lucas (M. C. Z.), length of carapace 16.3, width 15.8, width exclusive of spines 13.7, width between outer orbital angles 7.4 mm. Female (Bell), length 9 lines (22.8 mm.), width 8 lines (20.3 mm.).

*Range*.—Cape St. Lucas, Lower California, Mexico; Galapagos Islands.

*Material examined*.—

Cape St. Lucas; John Xantus; 1 male, 1 female (55116), 12 males, 9 females (1225, M. C. Z.), 1 immature female (British Mus.).

Cape St. Lucas; A. Milne Edwards; 1 male (Paris Mus.).

Galapagos Islands; one specimen (Paris Mus.).

*Remarks*.—In this species there is in some individuals a tendency to a slight union of the second and third teeth at their base.

PITHO ANISODON (von Martens)

Plate 131; plate 251, fig. 2

*Oithonia anisodon* VON MARTENS, Arch. f. Naturg., vol. 38, pt. 1, 1872, p. 83, pl. 4, fig. 3 (type-locality, Cuba; cotypes in Berlin Mus.).

*Oithonia aculeata* KINGSLEY, Proc. Acad. Nat. Sci. Philadelphia, 1879 (1880), p. 388 (part).

*Oithonia lherminieri* RATHBUN (not Schramm), Proc. U. S. Nat. Mus., vol. 15, 1892, p. 255, pl. 34, figs. 3 and 4 (not all synonymy).

*Pitho anisodon* RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 8; Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, 1898, p. 258; Bull. U. S. Fish. Comm., vol. 20, for 1900, pt. 2 (1901), p. 77.

*Diagnosis*.—Lateral teeth of carapace five, acute; second tooth much reduced and united at base with third tooth. Fronto-orbital distance short. Palms of old male long and narrow. Distal third of male appendages lyre-shaped. Lobe of first movable segment of antenna small, forward-pointing.

*Description*.—Carapace oval, with the anterior margin narrow. Width between outer angles of orbits but little more than half the

greatest width of the carapace. Rostral teeth more advanced than orbits, horizontal, separated by a V-shaped interspace. Orbital angles acute, outer margin of outer tooth oblique and sinuous. Lateral teeth five, acute, curved, the second and fifth reduced, the second united at base with the third. Carapace nearly smooth; almost the only granules are near the last lateral tooth and in the row above the posterior margin. First movable segment of antenna with a short outer lobe which is directed forward (fig. 117, *d*).

The chelipeds of old males are from  $1\frac{1}{2}$  times to nearly twice as long as carapace; palms from twice to three times as long as wide; arm subcylindrical and nearly smooth; wrist with a longitudinal ridge, otherwise smooth.

Appendages of first segment of male abdomen with the distal third of a light brown color, gradually tapering and arranged in the form of a lyre, widely spreading at tips (fig. 116, *b*).



FIG. 118.—PITHO ANISODON (6424), MAXILLIPED,  $\times 8.58$

*Measurements*.—Male (15093), length of carapace to tips of rostral teeth 30.5, width of carapace including spines 28.8, excluding spines 25, fronto-orbital width 16.2 mm. Female (14077), length of carapace 29.2, width of carapace including spines 27, excluding spines 24.2, fronto-orbital width 14.5 mm.

*Variations*.—The spines of the carapace, rostral, orbital and lateral, may be more slender and elongate than usual, as in a small female (46721). The second lateral spine, commonly of small size, may be suppressed on one side while normal on the other (22269, 33152, 39471), or it may occur in the sinus between the second and fourth spines (male, 33151), instead of between the first and third.

*Range*.—Bahamas and Florida Keys to Guadeloupe and Curaçao.

*Material examined*.—See table, page 370.

#### PITHO QUADRIDENTATA (Miers)

Plate 132, fig. 2; plate 133, fig. 2; plate 250, fig. 10

*Othonia quadridentata* MIERS, Ann. Mag. Nat. Hist., ser. 5, vol. 4, 1879, p. 15, pl. 5, fig. 1 (type-locality, West Indies; types in Brit. Mus.).

*Othonia lherminieri* BENEDICT (not Schramm), Johns Hopkins Univ. Cir., vol. 11, No. 97, April, 1892, p. 77.—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 255 (part).

*Pitho quadridentata* RATHBUN, Ann. Inst. Jamaica, vol. 1, 1897, p. 9.

*Diagnosis*.—Four lateral spines, large, acute, pointing well outward. Teeth of front and orbits blunt. Distal third of male appendages lyre-shaped.

Material examined of *Pitho anisodon*

| Locality   | Bearings   |              | Fathoms   | Bottom       | Temp. | Date          | Station | Collector                                | Specimens    | Cat. No.       | Remarks  |
|--|--|--------------|-----------|--------------|-------|---------------|---------|--|--------------|----------------|--|
|  | Latitude N.  | Longitude W. |           |              |       |               |         |  |              |                |  |
| Bahamas: Off Governors Harbor, Eleuthera Island. | ° ' "  | ° ' "        | 5         |              | ° C   | July 7, 1903  |         | B. A. Bean, Geogr. Soc. Baltimore.       | 2♂ 2♀        | 31087          | In oyster dredge. A female with carapace 8.7 mm. long is carrying eggs .5 in diameter. |
| Florida: Cape Florida.                           |  |              |           |              |       | Oct. 29, 1896 |         | B. W. Evermann.                          | 1♂ 1♀        | 22252          |  |
| Broad Creek.                                     |  |              |           |              |       | Nov. 24, 1906 |         | B. A. Bean.                              | 1 sm. ♂      | 33144          |  |
| Do.  |  |              |           |              |       | Dec. 1, 1908  |         | do.                                      | 1♂           | 39471          | Soft shell.  |
| Broad Creek; ocean front.                        |  |              |           |              |       | Dec. 17, 1906 |         | Pine and Bean.                           | 2♂           | 33151          |  |
| Cards Sound.                                     | 1½ miles N. of Pumpkin Key.                        |              | Fed<br>10 | barry        |       | Mar. 10, 1903 | 7493    | <i>Fish Hawk</i> .                       | 1♀           | 46769          | With Rhizocephalid parasite.   |
| Key Largo.                                       | 4¼ miles W. by N. of Grecian Shoals, Hawk Channel. |              | 16.5      | barry, S     |       | Feb. 19, 1903 | 7467    | H. Hemphill.<br><i>Fish Hawk</i> .       | 5♀<br>3 y. ♀ | 15090<br>46788 |  |
| Do.  | ¼ mile SW. by S. of Basin Hill Beacon.             |              | 12        | S. Grass     |       | do.           | 7469    | do.                                      | 1 y. ♀       | 46721          |  |
| Lower Metacumbe Key                              |  |              | (1)       | G.           |       | Dec. 4, 1906  |         | H. Hemphill.<br>Pine Vande-grift & Bean. | 7♂ 12♀       | 14085          |  |
| Do.  |  |              |           |              |       | Jan. 28, 1903 |         | A. Jacky, on <i>Fish Hawk</i> .          | 1♂           | 33126          |  |
| Conch Key?                                       |  |              |           |              |       | Jan. 22, 1903 | 7416    | H. Hemphill.<br><i>Fish Hawk</i> .       | 11♂ 7♀ 4y    | 14077          | With unusually slender spines.   |
| No Name Key.                                     | 2¾ miles N. of Basin Bank.                         |              | 10.5      | rky.         |       | Dec. 6, 1906  |         | B. A. Bean.                              | 2♀           | 33152          |  |
| North of Knights Key Channel.                    |  |              |           |              |       | Feb. 13, 1902 | 7278    | <i>Fish Hawk</i> .                       | 1 y. ♀       | 46719          |  |
| Summerland Keys.                                 | Inside the reef, Key West Light to E.              |              | 5.25      | C. S. Grass. | 20    |               |         |  |              |                |  |
| Off Key West.                                    | Channel Bar Buoy, 71° 53', to Beacon "A", 74° 46'. |              |           |              |       |               |         |  |              |                |  |
| Key West.  |  |              |           |              |       |               |         | D. S. Jordan, U. S. Fish Comm.           | 3♂ 2♀        | 15093          |  |
| Do.  |  |              |           |              |       | 1885          |         | H. Hemphill.                             | 6♂ 3♀        | 9286           |  |



| Off Key West.....                                  | About 1 mile from Light.                        | 5.25              | June 26, 1893   | 44   | Biol. Exped. State Univ. Iowa.                           | 1 ♀            | Mus. S. U. I.      |
|--|---|-------------------|-----------------|------|--|----------------|--------------------|
| 2 miles west of Key West.                          |   |                   | Oct. 19, 1896   |      | R. W. Evermann, U. S. Fish Comm.                         | 1 ♂            | 22209.             |
| Boea Grande  |   |                   | Apr. 27, 1915   |      | E. Dangleade, Bur. Fisheries.                            | 1 ♀            | 56220.             |
| Off Cape Sable                                     | N. by W. 1/2 W., 7 1/4 miles from signal.       | 2                 | Dec. 19, 1902   | 7368 | <i>Fish Hawk</i> .                                       | 1 Y. ♂ 1 Y. ♀  | 46720.             |
| Florida Bay  | 25 03 30 S. 81 12 10 West                       | 2 75              | Dec. 18, 1902   | 7366 | do   | 1 ♀            | 46766.             |
| Do.  | 7 miles N. W. 1/2 W. of Bamboo Key.             | 10.5              | Jan. 23, 1903   | 7424 | do   | 1 ♂            | 54458.             |
| Sarasota Bay                                       |   |                   |                 |      | H. Hemphill  | 60, 6424, 6431 |                    |
| Off northwest end St. Martins Reef, Florida Banks. | Near 28 30 00 S. 83 00 00 W.                    |                   |                 |      | Lieut. J. F. Messer U. S. N., U. S. C. S. S. }<br>Bache. | 1 ♀            | 15097.             |
| North Key section                                  | 29 00 00 S. 83 18 45 W.                         | <i>Fath.</i> 3.75 | Nov. 28, 1901   | 7182 | <i>Fish Hawk</i> .                                       | 1 Y. ♀         | 46718.             |
| Pepperfish Key section                             | 29 15 30 S. 83 27 30 W.                         | 3.5               | Nov. 21, 1901   | 7166 | do   | 1 ♂ 3 Y.       | 46764.             |
| Do.  | 29 23 00 S. 83 27 05 W.                         | 3.5               | do              | 7139 | do   | 1 ♂            | 46763.             |
| Do.  | 29 26 15 S. 83 37 30 W.                         | 6.75              | Nov. 20, 1901   | 7156 | do   | 1 Y. ♂         | 46717.             |
| Ancilla section.                                   | 29 45 48 S. 83 57 30 W.                         | 7                 | Nov. 6, 1901    | 7149 | do   | 1 Y.           | 46716.             |
| West coast of Florida.                             |   |                   |                 |      | J. W. Velie.   | 1 ♀            | 25184.             |
| Cuba.  |   |                   | June 4, 5, 1914 | 15   | Henderson & Bartsch, Tomas Barera Exped.                 | 3, 2 ♀         | Berlin Mus. 48737. |
| Bahia Honda.                                       |   | 2-12              |                 |      | do   | 1 ♂            | 48736.             |
| Santa Lucia Bay.                                   | Along main shore and bayous opposite anchorage. |                   | May 15, 1914    |      | do   |                |                    |
| Jamaica  |   |                   | 1884            |      | <i>Albatross</i> .                                       | 2 ♀            | 16188.             |
| Porto Rico: Culebra Island.                        |   |                   | Feb. 11, 1899   |      | <i>Fish Hawk</i> .                                       | 1 ♂ 1 ♀        | 24086.             |
| Guadeloupe   |   |                   | May 26, 1905    |      | J. Boeke   | 1 ♀ immature.  | Geneva Mus.        |
| Curaçao: Offwater.                                 | (1) Algae.                                      |                   |                 |      |  |                | Leiden Mus.        |

Cotypes.

1 Shallow water.

1 Below low tide.

In beam trawl.

*Description*.—Allied to *P. anisodon*, but the second or smallest of the lateral spines is suppressed, leaving four spines, which are narrower, less flattened and more outstanding than in *anisodon*. All four spines are of large size, second and third largest, fourth as long as first and more slender; between first and second spines a tubercle may be present on one or both sides, corresponding to the small spine or tooth similarly placed in *P. anisodon*. Carapace wider than in *anisodon*, owing to the widespread spines, the width being greater than the length in the largest specimens, while in *P. anisodon* the width is much less than the length.

Teeth of rostrum short, blunt or subacute, separated by a wide V. Orbital teeth also blunt.

The fourth abdominal segment of the male is longer and narrower than in *anisodon*.

*Measurements of carapace of cotypes*.—Female, length 20.7, width 20.3, width without spines 17.4, fronto-orbital width 11 mm. Sex unknown, length 27, width 28.7, width without spines 24, fronto-orbital width 14.8 mm.

*Measurements of carapaces of Pitho quadridentata and anisodon of approximate size*

| Females                          | Length | Width | Width without spines | Fronto-orbital width |
|----------------------------------|--------|-------|----------------------|----------------------|
| <i>Pitho quadridentata</i> ..... | 22.8   | 23.2  | 19.5                 | 11.9                 |
| <i>Pitho anisodon</i> .....      | 22.6   | 20.7  | 19                   | 11                   |

*Range*.—Jamaica.

*Material examined*.—

Port Royal, Jamaica; P. W. Jarvis; 3 males, 2 females (19404).

Kingston Harbor, Jamaica; T. H. Morgan; 1 male (17204). 1896; F. S. Conant; 1 male (19585).

West Indies; 2 large females and 2 very large carapaces (cotypes, Brit. Mus.).

PITHO LAEVIGATA (A. Milne Edwards)

Plate 132, figs. 3 and 4; plate 133, fig. 3; plate 250, figs. 11–13

*Cancer mirabilis* HERBST, Naturg. d. Krabben u. Krebse, vol. 2, 1794, p. 152 (part), not pl. 37, fig. 3.

*Othonia laevigata* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 116; 1878, pl. 24, figs. 2–2b (type-locality, Antilles; holotype in Paris Mus.).

*Diagnosis*.—Five lateral teeth subequal; second and third united at base. Front narrow. Outer margin of lobe of first movable joint of antenna very arcuate.

*Description*.—Carapace subcircular, broader than long, the outer margins of the outer orbital teeth converging anteriorly, the fronto-

orbital distance narrow, less than half the width of the carapace. Five large, lateral teeth, flat and broad, except for the sharp tips which are curved forward and a little inward; the third and fourth teeth are the largest, the first and second nearly as large, the second and third slightly united at the base; last sinus widest. Orbital teeth blunt or nearly so. Rostral teeth subacute, interspace triangular, a little narrower than either tooth. The branchial and intestinal regions are covered with flattened granules, but sometimes appear almost smooth; the remainder of the carapace is covered with punctae or scalelike granules, from which proceed hairs. Gastro-branchial groove deep.

The lobe of the first movable segment of the antenna points forward, its outer margin is strongly curved.

*Measurements.*—Female (53051), entire length of carapace 33, entire width 34, width exclusive of spines 30, fronto-orbital width 15 mm. Male (type), entire length of carapace 34.8, entire width 40.8, width exclusive of spines 33, fronto-orbital width 16.2, length of merus of cheliped 21.5, width of same at middle 4.6 mm.

*Range.*—West coast of Florida southward to north coast of South America.

*Material examined.*—

St. Martins section, Florida; lat. 28° 34' 45'' N.; long. 83° 08' 00'' W.; 5¾ fathoms; Co. R. Grass; temp. 12.5° C.; January 15, 1902; station 7221, *Fish Hawk*; 1 female, variety (46765).

Antilles; 1 male, holotype (Paris Mus.).

Sabanilla, Colombia; 1884; *Albatross*; 1 immature female (15820).

Chaguamds Bay, Trinidad; W. O. Crosby; received from Boston Soc. Nat. Hist.; 2 ovigerous females (53051).

Locality not known; 1 carapace, cotype of *Cancer mirabilis* (Herbst), (Berlin Mus.).

*Variations.*—In the old females the posterior of the lateral teeth is in advance of the line of the gastro-cardiac suture. In the young female (15820), the line of that suture if prolonged would cross the posterior teeth; in this little specimen also the first and third teeth are subequal and larger than the others.

Most interesting is the female from the west coast of Florida (46765) which appears to represent a variety of *P. laevigata*. It differs from the typical form as follows: The second lateral tooth is much smaller than any of the others; it is slender, nearly straight, and as in typical *laevigata*, slightly united to the third tooth. The distance between the tips of the first and third teeth is less than between the third and fourth. The tips of the orbital teeth are more acute and are a little curved.

## PITHO DISPAR, new species

Plate 132, fig. 1; plate 133, fig. 1

?*Othonia quinquedentata* AURIVILLIUS (not Bell), K. Svenska Vetensk.-Akad. Handl., vol. 23, 1889, p. 56, pl. 3, fig. 9 (Wreck Bay, St. Thomas).

*Pitho anisodon* RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2 (1901), p. 77 (part: specimen from Culebra).

*Type-locality*.—Ensenada Honda, Culebra Island, Porto Rico; 1 ovigerous female, holotype. (Cat. No. 24205, U.S.N.M.)

*Diagnosis*.—Four lateral teeth. Rostral lobes rounded, not pointed. Orbital lobes not produced. Lobe of first movable segment of antenna small.

*Description*.—Carapace longer than wide, oblong-oval and hairy; branchial regions sparingly granulate; lateral teeth four, of rather small size, the first or anterior tooth low, its sides at right angles to each other, end rounded; three remaining teeth broad, curved, with a short, sharp point, the second tooth widest, the third most outstanding; in the interval between the first and second teeth of the left side there is a small tubercle. Rostrum divided into two short, rounded lobes or teeth. Orbital angles not produced, inconspicuous,



FIG. 119.—PITHO DISPAR, FEMALE (24205), OUTLINE OF FRONT AND ORBITS, FROM BELOW,  $\times 6$ .

anterior margin of preorbital lobe and of basal antennal segment transverse, not oblique as in other species; postorbital lobes with outer margins converging anteriorly, terminal angle a right angle. First movable segment of antenna narrow, a little longer than wide, outer lobe short, directed forward.

*Variation*.—Only two specimens of the species have been observed. The second one is also female, but immature and smaller than the holotype, and differs from it as follows: The branchial granulation is scarcely visible; the second lateral teeth lack a sharp tip, and may perhaps be broken off; there is no trace of a tubercle between first two teeth; the rostral lobes, though very short, are very obtuse-angled; the anterior margin of the pre-orbital lobe is slightly oblique; the outer margins of the postorbital lobes are subparallel.

*Measurements*.—Female, holotype, entire length of carapace 17.3, entire width 15.7, width without lateral teeth 14.6, fronto-orbital width 8.6 mm.

*Range*.—St. Thomas; Porto Rico.

*Material examined*.—

St. Thomas; 1884; *Albatross*; 1 young female (16189).

Ensenada Honda, Culebra Island, Porto Rico; February 10, 1899; *Fish Hawk*; 1 female, holotype (24205).

*Remarks.*—The specimen from Wreck Bay, St. Thomas, figured by Aurivillius has only four lateral teeth, but the first one is represented as similar to, and larger than, the two succeeding teeth. This throws doubt on the identity of his species and ours.

#### Genus LEPTOPISA Stimpson

*Leptopisa* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 114; type, *L. setirostris* (Stimpson).—RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2 (1901), p. 75.

*Leptopisa* (subgenus of *Tiarinia*) A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 63.

Carapace narrow, oblong, tuberculated, with an epibranchial spine, but no lateral series of spines. Orbits complete, short, tubular. Spines of rostrum long and slender. Basal joint of antenna enlarged, armed with spines distally; movable part of antennae very slender and partly hidden by rostrum. Buccal cavity very wide; merus of outer maxillipeds strongly dilated laterally, wider than ischium and notched at inner angle. Chelipeds slender, elongate. Ambulatory legs decreasing regularly in length, the first pair very long, last pair very short.

Closely allied to *Macrocoeloma*, from which it differs chiefly in its narrow carapace, long horns, and short orbital tubes.

Contains only the type species.

#### LEPTOPISA SETIROSTRIS (Stimpson)

Plate 134, figs. 1-3; plate 253, fig. 2

*Tiarinia setirostris* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 114 (type-localities, Key West, 2 to 5 fathoms; near the Tortugas, 9 fathoms; on the Fishing Banks, SW. of Loggerhead Key; types destroyed in the Chicago fire).

*Leptopisa setirostris* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1871, p. 114, in text.—RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, pt. 2, 1901, p. 75.

*Leptopisa* (subgenus of *Tiarinia*) *setirostris* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 64.

*Macrocoeloma tenuirostra* RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 252, pl. 33, fig. 1 (type-locality, between Jamaica and Haiti, 23 fathoms, station 2138, *Albatross*; type, Cat. No. 6929, U.S.N.M.).

*Diagnosis.*—Sides of carapace perpendicular; dorsum tuberculate. Rostral horns long, slender, contiguous.

*Description.*—Carapace covered with a short pubescence, and numerous depressed tubercles; cardiac region with a prominent tubercle; mesogastric region with one less high; intestinal region with two short median spines; a short, sharp spine at postero-lateral angle of branchial region; lateral margins nearly straight, tuberculate;

Material examined of *Leptopisa setirostris*

| Locality   | Bearings  |                      | Fathoms  | Bottom          | Temp.     | Date                           | Station    | Collector  | Specimens                              | Cat. No.                     | Remarks                             |
|--|---|----------------------|----------|-----------------|-----------|--------------------------------|------------|--|--|------------------------------|-------------------------------------|
|  | Latitude N.   | Longitude W.         |          |                 |           |                                |            |  |  |                              |                                     |
| Florida: Off Miami<br>Cuba:<br>Dinas Bay   | ° ' "   | ° ' "                | 30       | Mud and plants. | ° C       | May 17, 1911                   | 5          | J. B. Henderson.<br>Henderson & Bartsch,<br>Thomas Bar-<br>tera Exped. | 1♂ 2 ovig. ♀<br>1                      | 47065.<br>47922              |                                     |
| Ensenada de Santa Rosa.<br>On reef flat between Cayo Hatia and Little Cayo, northeast of light.<br>Jamaica: Between Jamaica and Haiti.<br>Porto Rico:<br>Off Humacao |   |                      | 1-3      | S. Sh. Sponge.  |           | May 19, 1914                   | 7          | do.<br>do.   | 1♂ 1 ♀<br>(2 ♀ (1 ovig.))<br>1 ovig. ♀ | 48658.<br>48667.<br>48700.   |                                     |
| Off Humacao  | 17 44 05  | 75 39 00             | 23       | Co. brk. Sh.    |           | Feb. 29, 1884                  | 2138       | Albatross.   | 1♂                                     | 6929                         | Holotype of <i>M. tenuirostra</i> . |
| Off Vieques Island   | Humacao, N. ½ W., 3 miles.<br>Culebrita lighthouse, NE. by N., 10 miles.<br>Culebrita lighthouse, NE. ¾ E., 7 ½ miles.<br>Point Mulia lighthouse, SW. ¼ S., 10 ½ miles. |                      | 12.5     | Co.             | 26.4      | Feb. 14, 1899                  | 6098       | Fish Hawk.   | 1 ♀                                    | 24191                        |                                     |
| Do.  |   |                      | 15       | Co.             | 26        | Feb. 10, 1899                  | 6091       | do.  | 1♂                                     | 24199                        |                                     |
| Do.  |   |                      | 16       | Co.             | 25.2      | do.                            | 6092       | do.  | 1 ♀                                    | 24187                        |                                     |
| Off Culebra Island   |   |                      | 15.25    | Co. S.          | 25        | Feb. 8, 1899                   | 6087       | do.  | 1♂ 1 ♀                                 | 24192                        |                                     |
| Do.  |   |                      | 15       | Co.             | 25.2      | Feb. 10, 1899                  | 6093       | do.  | 1♂                                     | 24188                        |                                     |
| St. Thomas:<br>Off St. Thomas  |   |                      | 20-23    | Co.             | 25.8      | Feb. 6, 1899                   | 6079       | do.  | 1 ♀ 1 Y.                               | 24193                        |                                     |
| Do.  |   |                      | 20       | Co.             | 25        | do.                            | 6080       | do.  | 1 Y.                                   | 24190                        |                                     |
| St. Thomas<br>West Indies  |   |                      |          |                 |           | Jan., 1884                     |            | Albatross.   | 1 Y.<br>1 ovig. ♀                      | 18562.<br>Copenhagen<br>Mus. |                                     |
| Brazil:<br>Off Cape St. Roque<br>Northeast of Bahia  | Lat. S.<br>6 59 30<br>11 49 00  | 34 47 00<br>37 20 00 | 20<br>40 | brk. Sh.        | ° F<br>79 | Dec. 16, 1887<br>Jan. 18, 1872 | 2758<br>11 | Albatross.<br>Hassler.   | 3♂<br>1♂ 1 ovig. ♀                     | 21929<br>1922, M. C. Z.      |                                     |

sides perpendicular. Orbit with a short preocular and postocular spine and an inferior tubercle on margin of antennal joint. Rostral horns about half as long as rest of carapace, slender, tapering, granulate, slightly convex to each other, leaving a narrow interspace at base and toward extremity, otherwise contiguous. Basal antennal joint with two short distal spines—one at insertion of second joint, the other terminating a longitudinal ridge and just visible beside rostrum in a dorsal view; flagellum filiform. Chelipeds tuberculate; palm slightly compressed, about two and one-half times as long as wide in adult male; fingers gaping in male, the dactylus with a broad basal tooth. Ambulatory legs pubescent.

*Measurements.*—Male (47065), entire length of carapace 22.5, length of rostral horns 7.2, branchial width inclusive of spines 9.7, exclusive of spines 9.3, width between tips of preocular spines 6.3 mm.

*Range.*—Florida Keys, from Miami southward; West Indies; northern Brazil. Depth, 1 to 40 fathoms.

*Material examined.*—See table, page 376.

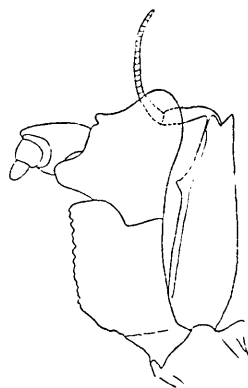


FIG. 120.—LEPTOPIISA SETIROSTRIS (48658), MAXILLIPED,  $\times 9.16$

#### Genus ANAPTYCHUS Stimpson

*Anaptychus* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 183 [55]; type, *A. cornutus* Stimpson.

*Ala* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 65 [3]; type, *A. spinosa* Lockington.

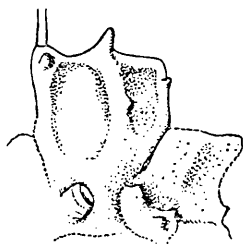


FIG. 121.—LEPTOPIISA SETIROSTRIS, FEMALE (48667), BASAL ARTICLE OF ANTENNA WITH POSTORBITAL LOBE,  $\times 9$

Carapace triangular, broader than long; lateral and antero-lateral margins laminiform, expanded above the bases of the legs and coarsely dentate; sides below the laminae perpendicular. Orbits complete, small and deep, but not tubular. Eyes retractile, capable of concealment. Rostrum and external antennae resembling those of *Microphrys*. Rostrum short, bifid. Spine of basal article of external antennae long, acute, much like the rostral horn; movable part exposed. Preorbital spine prominent, acute; outer orbital angle dentiform, minute; superior orbital fissures closed, inconspicuous. Merus of endognath of external maxillipeds broader than long, external angle abruptly prominent, inner angle sinuous at the insertion of the palp; exognath wide, armed on the inner side with a strong, exposed tooth.

## ANAPTYCHUS CORNUTUS Stimpson

Plate 134, figs. 4 and 5; plate 254, fig. 1

*Anaptychus cornutus* STIMPSON, Ann. Lyc. Nat. Hist. New York, vol. 7, 1860, p. 184 [56], pl. 2, figs. 1, 1a, 1b (type-locality, Pinacate Bay, near Guaymas, Gulf of California; type, male, not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 67, pl. 19, figs. 1-1b.—KINGSLEY, Proc. Boston Soc. Nat. Hist., vol. 20, 1879, p. 146.

*Ala spinosa* LOCKINGTON, Proc. California Acad. Sci., vol. 7, 1876 (1877), p. 66 [4] (type-localities, La Paz, San José Island and Port Escondido, all in Gulf of California; types not extant).

*Mithrax trigonopus* CANO, Boll. Soc. Nat. Napoli, ser. 1, vol. 3, 1889, p. 183, pl. 7, fig. 8 (type-locality, Panama; type in Naples Mus.?).

*Mithrax trigonopus* RATHBUN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 575.

*Diagnosis*.—Carapace broader than long. Antero-lateral margin a thin, tridentate crest. Rostral and antennal spines similar and subequal. Chelipeds and legs cristate.

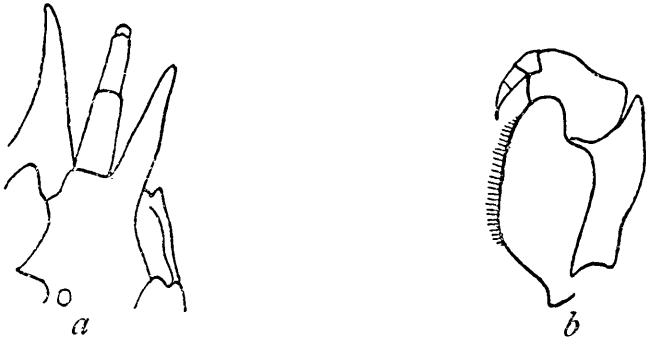


FIG. 122.—ANAPTYCHUS CORNUTUS, MALE, TYPE. a. ANTENNAL REGION, VENTRAL VIEW. b. MAXILLIPED. (AFTER STIMPSON.)

*Description*.—Carapace covered with minute tufts of very short setae. Upper surface nearly level, but the gastric, cardiac and inner part of branchial region slightly protuberant; nine or ten low tubercles on the gastric region. Antero-lateral margin with three large triangular sublaminiform teeth behind the orbit, separated from each other by regularly curved sinuses. Posterior margin with a crest interrupted on each side; the middle portion being arcuated, six-lobed and fringed with pencils of stout, longish setae. Rostrum from one-fourth to one-fifth as long as remainder of carapace, and cleft nearly to its base; horns acute.

Chelipeds a little longer than the first pair of ambulatory legs, but scarcely thicker; merus with five or six blunt, somewhat laminiform spines; outer surface of carpus with a laminiform, longitudinal crest through the middle and tubercles on each side; hand unarmed, minutely granulate; fingers narrowly gaping, crenulate within, tips not spoon-shaped within. Inferior surface covered with short, stout



setae, and some rows of long, stout setae on sternum and legs. Legs with merus and carpus bicristate above, propodus unicristate, crests divided into a few large lobes or teeth. These, as well as the lobes of the chelipeds are each tipped with a cluster of setae.

*Measurements.*—Male (46076), total length of carapace 16.8, width 18.3, length of horns 1.8 mm. Male, holotype, length 25.4, width 31.4 mm. (Stimpson). Female (Tepoca Bay), total length of carapace 27.3, width 32.8 mm.

*Range.*—Gulf of California to Panama.

*Material examined.*—

Lower California; M. Diguët; 2 immature females (Paris Mus.).

Tepoca Bay, Sonora, Mexico; April 15, 1921; Fred Baker, Cal. Acad. Exped.; 2 females (Cal. Acad.).

Pinacate Bay, Guaymas, Sonora, Mexico; Capt. C. M. P. Stone; 1 ovigerous female, paratype (331, M. C. Z.); described and figured by A. Milne Edwards.

Manzanillo, State of Colima, Mexico; on drifted pile; July 17, 1913; C. R. Orcutt; 1 male (46076).

Pearl Islands, Bay of Panama, Panama; S. W. Garman; 1 male (2039, M. C. Z.).

*Remarks.*—As Kingsley<sup>46</sup> has remarked, of one of Lockington's cotypes, the first lobe of the antero-lateral margin is narrower and more slender than figured by Stimpson, his type being a larger specimen.

#### Genus MITHRAX Latreille

*Mithrax* LATREILLE, Règne Anim. de Cuvier, vol. 3, 1817, p. 23; type, *M. hispidus* (Herbst).

*Trachonites* LATREILLE, in Desmarest, Dict. Sci. Nat., vol. 28, 1823, p. 263; type, *M. hispidus* (Herbst).

*Mithraculus* WHITE, List Crust. Brit. Mus., 1847, p. 7; type, *M. coronatus* White (part) = *M. sculptus* (Lamarck).

*Nemausa* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 80; type, *N. spinipes* (Bell).

Carapace ovate or oblong-ovate, either broader than long or slightly longer than broad. Antero-lateral margin bearing usually four, sometimes three, spines or lobes behind the orbit; postero-lateral margin sometimes having a spine or tubercle. The front has two small rostral horns, either pointed or truncate, sometimes very short, and beside them are other spines or prominences, either pre-orbital or antennal. Orbital borders more or less spinous or tuberculous. Antenna short; basal article wide, armed in front with two or three spines or lobes; second article inserted outside the orbit, at base of rostrum. Merus of outer maxillipeds wide and dilated outwardly; exognath wide. Sternal plastron almost circular.

<sup>46</sup> Proc. Boston Soc. Nat. Hist., vol. 20, 1879, p. 146.

Chelipeds long and strong, especially in male; fingers deeply hollowed out at tip, gaping considerably when shut. Legs robust, armed with spines and terminated by hooked dactyls which are often armed with spines on lower surface. Abdomen of male formed of seven free segments.

Restricted to America and the Bermudas.

KEY TO THE SPECIES OF THE GENUS *MITHRAX*

- A<sup>1</sup>. Carapace without smooth, oblique, branchial sulci. Subgenus *Mithrax*, p. 383.
- B<sup>1</sup>. Manus armed above with spines or spinules.
- C<sup>1</sup>. Two spines only on basal segment of antenna. . . . . *spinosissimus*, p. 383.
- C<sup>2</sup>. Three spines on basal segment of antenna.
- D<sup>1</sup>. Carapace not paved with flattened granules.
- E<sup>1</sup>. Carapace widest between tips of fourth antero-lateral spines (not counting orbital spine).
- F<sup>1</sup>. Three or four supraorbital spines, exclusive of preorbital and exorbital spines. Propodites of legs very long and slender. . . . . *cornutus*, p. 386.
- F<sup>2</sup>. Two supraorbital spines only, exclusive of preorbital and exorbital spines. Propodites of legs moderate. Size small. . . . . *acuticornis* (over 18 mm. long), p. 388.
- E<sup>2</sup>. Carapace as wide between tips of third antero-lateral spines as between tips of fourth spines. Carapace closely granulate and tuberculate and densely pilose. . . . . *pilosus*, p. 394.
- D<sup>2</sup>. Carapace paved with flattened granules, concealed by short hair. . . . . *verrucosus*, young, p. 400.
- B<sup>2</sup>. Manus not armed above with spines or spinules.
- C<sup>1</sup>. Rostral horns sharp or acute.
- D<sup>1</sup>. Rostral horns elongate.
- E<sup>1</sup>. A tubercle at middle of proximal end of outer surface of manus. . . . . *orcutti*, p. 397.
- E<sup>2</sup>. No tubercle on outer surface of manus.
- F<sup>1</sup>. Carapace with a lateral angle. Size small.
- G<sup>1</sup>. Hepatic and first branchial spine bifid, or with a secondary spine. . . . . *acuticornis*, small (under 18 mm. long), p. 388.
- G<sup>2</sup>. Hepatic and first branchial spine simple. . . . . *spinipes*, p. 391.
- F<sup>2</sup>. Carapace with sides rounded, without angle.
- G<sup>1</sup>. No sharp spines, only tubercles or stout, blunt spines on dorsal surface of carapace. . . . . *armatus*, p. 399.
- G<sup>2</sup>. Some spines on dorsal surface of carapace. . . . . *rostratus*, p. 386.
- D<sup>2</sup>. Rostral horns very short. Carapace ovate-oblong.
- E<sup>1</sup>. A well marked postero-lateral spine.
- F<sup>1</sup>. Four stout antero-lateral spines. . . . . *hemphilli*, immature, p. 395.
- F<sup>2</sup>. Only two antero-lateral spines. . . . . *holderi*, p. 392.
- E<sup>2</sup>. A small postero-lateral tubercle. Carapace densely pubescent. . . . . *bahamensis*, p. 393.
- C<sup>2</sup>. Rostral horns blunt, either subtruncate or tuberculiform.
- D<sup>1</sup>. Carapace paved with close-set granules or tubercles.
- E<sup>1</sup>. Carapace paved with convex tubercles each of which is granulate. . . . . *hemphilli*, mature, p. 395.
- E<sup>2</sup>. Carapace paved with flat, tessellated granules.
- F<sup>1</sup>. Lateral margins of carapace spinous. Wrist nearly smooth above, three tubercles on inner edge. . . . . *verrucosus*, p. 400.

- F<sup>2</sup>. Lateral margins of carapace with lumpy protuberances. Wrist tuberculate above, five tubercles on inner margin. *bellii*, p. 403.
- D<sup>2</sup>. Carapace not paved with close-set granules or tubercles.
- E<sup>1</sup>. Six or more antero-lateral spines or spinules. Chelipeds and ambulatory legs elongate.-----*pygmaeus*, p. 406.
- E<sup>2</sup>. Four or three antero-lateral spines or spines and tubercles.
- F<sup>1</sup>. Carapace nearly smooth; marginal spines simple.  
*braziliensis*, p. 404.
- F<sup>2</sup>. Carapace more or less lumpy; marginal spines more or less complex, either with a secondary spine or accessory tubercles.
- G<sup>1</sup>. Only two spines, lobes or teeth on basal segment of antenna.
- H<sup>1</sup>. A spine on, or just above, postero-lateral margin of carapace.
- J<sup>1</sup>. Carapace with areolations smooth (non-granulate). Three curved spines on antero-lateral margin of branchial region.
- K<sup>1</sup>. Two parallel and nearly transverse rows of well marked tubercles and spines on postero-lateral region.  
*caribbaeus*, of small or medium size, p. 409.
- K<sup>2</sup>. One row of not more than two or three well marked tubercles and spines on postero-lateral region. Prehensile edges of fingers of very old specimens entire, not crenulated, in the gape, except on the tubercle.-----*hispidus*, p. 406.
- J<sup>2</sup>. Carapace with areolations granulate. Two large lobes and a spine on antero-lateral margin; the first lobe hepatic.  
*tuberculatus*, p. 418.
- H<sup>2</sup>. A tubercle, instead of a spine, on, or just above, postero-lateral margin of carapace.
- J<sup>1</sup>. Carapace very wide, the anterior, marginal, branchial lobe strikingly protuberant. Postero-lateral slope of carapace smooth, behind the row of two conical tubercles which leads obliquely inward from the spine at the lateral angle. Rostral sinus V-shaped.-----*tortugae*, p. 417.
- J<sup>2</sup>. Carapace narrower, the anterior, branchial protuberance not strikingly prominent. Postero-lateral slope of carapace rough with a few tubercles or granules.
- K<sup>1</sup>. A well-marked, postero-lateral tubercle present, which is the outermost of a transverse row of three, this row having a similar row in front of it. Prehensile edges of fingers crenulated along the gape. Rostral sinus U-shaped.-----*caribbaeus*, large, p. 409.
- K<sup>2</sup>. An almost transverse row of two large tubercles leads inward from the spine at the lateral angle; the tubercles behind and immediately in front of it are all very small, or granules. Rostral sinus V-shaped in young, U-shaped in old.-----*pleuracanthus*, p. 411.
- G<sup>2</sup>. Three spines on basal segment of antenna.
- H<sup>1</sup>. Lateral spines of carapace simple. Wrist smooth except for a lobe on inner margin.-----*laevimanus*, p. 419.
- H<sup>2</sup>. Lateral protuberances of carapace not simple. Wrist granulate, three or four granules on inner margin.  
*sinensis*, p. 419.

- A<sup>2</sup>. Carapace with smooth, oblique, branchial sulci. Rostral horns very short. Minor teeth of orbit tuberculiform, inconspicuous.  
Subgenus *Mithraculus*, p. 421.
- B<sup>1</sup>. Carapace broader than long.
- C<sup>1</sup>. Antero-lateral margins cut into rounded lobes only.
- D<sup>1</sup>. Antero-lateral margin cut into three lobes.
- E<sup>1</sup>. Posterior part of carapace eroded. Inner or anterior margin of cheliped laminate, up to middle of palm..... *nodosus*, p. 429.
- E<sup>2</sup>. Posterior part of carapace nodose, not eroded. Inner margin of cheliped not laminate..... *coryphe*, p. 426.
- D<sup>2</sup>. Antero-lateral margin cut into four lobes. Wrist smooth, margin not laminate nor dentate..... *sculptus*, p. 422.
- C<sup>2</sup>. Antero-lateral margins cut into spines or angular lobes or spines and lobes.
- D<sup>1</sup>. Four antero-lateral protuberances behind the orbit. Wrist smooth above and with one inner tooth..... *forceps*, p. 431.
- D<sup>2</sup>. Three antero-lateral protuberances behind the orbit. Wrist more or less uneven above.
- E<sup>1</sup>. Carapace nearly half wider than long. Two lobes of basal segment of antenna equally advanced..... *denticulatus*, p. 428.
- E<sup>2</sup>. Carapace not much wider than long. Two lobes of basal segment of antenna not equally advanced.
- F<sup>1</sup>. Wrist obscurely tuberculate. Palm without tubercle on outer surface at articulation with wrist..... *ruber*, p. 432.
- F<sup>2</sup>. Wrist prominently tuberculate. Palm with small depressed tubercle on outer surface at articulation with wrist.  
*areolatus*, p. 433.
- B<sup>2</sup>. Carapace longer than broad..... *cinctimanus*, p. 438.

## DOUBTFUL SPECIES

- A<sup>1</sup>. Carapace one-fourth longer than wide, without spines or lateral angle.  
*leucomelas*, p. 421.
- A<sup>2</sup>. Not described..... *Mithrax*, sp. indet. (Valparaiso), p. 421.
- A<sup>3</sup>. Figured but not described. May be a young *Mithrax*..... "*Manilatus poeyi* Fornis." <sup>47</sup>

## ANALOGOUS SPECIES ON OPPOSITE SIDES OF THE CONTINENT

| Atlantic               | Pacific               |
|------------------------|-----------------------|
| <i>spinosissimus</i> . | <i>rostratus</i> .    |
| <i>acuticornis</i> .   | <i>spinipes</i> .     |
| <i>hemphilli</i> .     | <i>orcutti</i> .      |
| <i>verrucosus</i> .    | <i>bellii</i> .       |
| <i>coryphe</i> .       | <i>denticulatus</i> . |
| <i>ruber</i> .         | <i>areolatus</i> .    |

SPECIES ONCE REFERRED TO MITHRAX, NOW IN OTHER GENERA <sup>48</sup>

- Mithrax affinis* Brito Capello = *Schizophrys aspera* (Milne Edwards).  
*Mithrax asper* Milne Edwards = *Schizophrys aspera* (Milne Edwards).  
*Mithrax quadridentatus* MacLeay = *Schizophrys aspera* (Milne Edwards).

<sup>47</sup> Gundlach and Torralbas, An. Acad. Habana, vol. 36, 1899 (1900), text-fig. on p. 330; reprint, 1917, pl. [4], fig. 8.

<sup>48</sup> See also the index to this volume.

*Mithrax spinifrons* A. Milne Edwards = *Schizophrys aspera* (Milne Edwards).

*Mithrax triangularis* Kossmann = *Schizophrys aspera* (Milne Edwards).

*Mithrax suborbicularis* Stimpson = *Cyclax suborbicularis* (Stimpson).

Subgenus MITHRAX

Carapace without conspicuous, smooth, oblique, branchial sulci. Rostral horns usually as long as wide, sometimes elongate and spiniform. Minor teeth or tubercles of orbit plainly marked, though small.

MITHRAX (MITHRAX) SPINOSISSIMUS (Lamarck)

CANGREJO DE LA SANTA VIRGEN (Cuba); CABOUCA (Martinique)

Plate 135

*The Lazy Crab* HUGHES, Nat. Hist. Barbados, 1750, p. 262, pl. 25, fig. 1 (part: chelipeds and legs only).

*Cangrejo Santoya* PARRA, Descripcion de diferentes piezas de historia natural, 1787, p. 122, pl. 44.

?*Cangrejo Denton* PARRA, Descripcion de diferentes piezas de historia natural, 1787, p. 136, pl. 51, fig. 1.

*Maia spinosissima* LAMARCK, Hist. Nat. des Anim. sans Vert., vol. 5, 1818, p. 241 (type-locality, Ile-de-France; type in Paris Mus.). Locality erroneous.

*Mithrax spinosissimus* MILNE EDWARDS, Mag. Zool., vol. 2, 1832, classe 7, pl. 2 (colored) and 3 and description (Antilles; Martinique).—RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 261, and synonymy.—GUNDLACH and TORRALBAS, An. Acad. Habana, vol. 36, 1899 (1900), p. 305, text-fig. on p. 326; reprint, 1917, p. 14, pl. [3], fig. 7.

*Mithrax hispidus* DOFLEIN (not Herbst), Sitz. k. bayer. Akad. Wiss., math.-phys. Cl., vol. 29, 1899, p. 179; St. Pierre, Martinique, 4 to 5 fathoms.

*Diagnosis*.—Large, carapace without lateral angle. Three supra-orbital spines between preorbital and postorbital spine. Fifth lateral spine in line with gastro-cardiac suture. No spine on basal antennal segment at articulation of next segment.

*Description of adult*.—Carapace nearly naked, subcircular, about as broad as long; cervical suture deep; hepatic and cardiac regions distinctly delimited; surface rough with short spines, those in the center of the carapace blunt, those elsewhere sharp. Rostral horns narrow, extremity obliquely truncate and granulate, separated by a U-shaped sinus of equal length and breadth; at base of horns, two stout spines and behind these, two others similar but farther apart. Preorbital spine stouter than rostral horn, truncate and much less advanced than rostrum; between this and the truncate postocular lobe there are three smaller teeth; on the suborbital margin one acute spine outside the antennal segment; two spines on the antennal seg-

ment, the outer one small and acute, the inner one similar to the rostrum but a little more advanced, and bearing a secondary spine or spinule on the outer side near the end. Six spines on lateral margin, the first two double, the first one occupying the hepatic region, the last one smallest and on the postero-lateral margin. One suborbital, two large subhepatic, and numerous subbranchial spines, besides one at the angle of the buccal cavity and a row of three on the pterygostomian region.

Chelipeds of male massive, much longer than legs; merus armed with numerous stout spines, of which eight or nine are on the outer margin, the rest irregularly disposed; carpus dotted with unequal spines of which about 5 are on the inner margin; manus high, compressed, armed above with a more or less double row of spines; and on the inner surface with two to four spines on the proximal half. In the old males the spines of the cheliped tend to become blunt and tuberculiform, those of the arm retaining their spinous character the longest. Fingers curved, leaving a wide gape, in the middle of which is a strong tooth on the dactyl. Tips with crenated edges behind which are a few low tubercles.

Legs spinous and coarsely hairy, hair most dense on the last 2 segments; propodus very elongate and compressed.

Chelipeds of adult female no longer and not much stouter than legs of first pair; manus tapering a little distally; fingers narrowly gaping, with numerous denticles on the prehensile edges.

*Medium-sized specimens.*—The carapace is relatively longer, all the spines are sharper than in the old, the rostral horns curve inward at the tips which are sharp; the carapace is short-hairy; the chelipeds of both sexes are small, the gape occupies only about half length of fingers.

*Young.*—The last-mentioned characters are exaggerated, the rostral horns are relatively much longer and slender, being about one-fifth as long as remainder of carapace, two spines on the suborbital margin outside the antennal segment, the chelipeds are no longer or stouter than the last pair of legs, the gape of the fingers is reduced.

*Color.*—Vinous red with yellowish tints (A. Milne Edwards). Bright carmine (A. H. Verrill). Thorax dark red, ambulatories brick red, chelipeds rose red with yellow fingers (Doflein).

*Measurements.*—This is the largest species of *Mithrax*. Male (41777), entire length of carapace 170, length exclusive of horns 163, width just in front of fourth branchial spines 167, width between tips of fourth branchial spines 174, greatest width across subbranchial regions 184, length of manus below 187, above 97, greatest height of manus, including tubercle, 74.3 mm.

*Range*.—Carolina, Bahamas, and Florida Keys to the West Indies.

*Material examined*.—

Either North or South Carolina; Rev. M. A. Curtis; chelipeds of a very large specimen (22899).

Carysfort Reef, Florida, 120 miles NE. of Key West; 1884; Edward Palmer; 2 females (1 shedding) (9257).

Grassy Key Lake, Florida;  $3\frac{3}{4}$  miles NW.  $\frac{1}{2}$  N. of E. end of Grassy Key; 8 feet; rky.; January 28, 1903; station 7431, *Fish Hawk*; 1 young (46876).

Grassy Key Lake, Florida;  $2\frac{3}{4}$  miles N.  $\frac{1}{2}$  W. of Channel Key; 7.5 feet; rky.; January 29, 1903; station 7440, *Fish Hawk*; 1 young male (46972).

Key West, Florida: December, 1883; D. S. Jordan; 1 female (5758). 1884; *Albatross*; 1 male, 2 females (7339). 1885; Henry Hemphill; 5 males, 3 females, 2 young (9258). C. N. E. Eliot; 1 young (22987). January 28 and February 3, 1901; B. A. Bean and W. H. King; 2 young (24852).

Garden Key, Dry Tortugas, Florida; 1 male (15081).

Florida; G. Wurdemann; 3 males, 2 females (2093).

Florida Keys; *Fish Hawk*; 1 young (46877).

Esperanza, Cuba; shallow water about keys; May, 1914; stations 1 and 2, *Tomas Barrera Exped.*, Bartsch and Henderson; 3 females (2 ovigerous) (48395).

Los Arroyos, Cuba; May 20, 1914; station 8, *Tomas Barrera Exped.*, Bartsch and Henderson; 7 young (48668).

Havana, Cuba; June 4, 1884; D. S. Jordan; 1 ovigerous female (7854), with many young stalked barnacles attached.

Off Havana, Cuba; lat.  $23^{\circ} 10' 39''$  N.; long.  $82^{\circ} 20' 08''$  W.; 98 fathoms; Co.; April 30, 1884; station 2159, *Albatross*; fragments (6943).

Harbor of Santiago de Cuba; May, 1907; Lewis Brooks; 1 male, very large (41777).

Kingston Harbor, Jamaica; 1893; R. P. Bigelow; 1 male (17988).

Jamaica; 1910; C. B. Wilson; 1 ovigerous female (43090), covered with bryozoans, serpulids, and red foraminifera.

Jeremie, Hayti; Dr. D. F. Weinland; 1 male (1963, M. C. Z.).

St. Thomas; December, 1871; U. S. C. S. S. *Hassler*; 2 males, 1 female (1962, M. C. Z.).

Simson's Bay lagoon, St. Martin, Dutch West Indies; shallow water; September, 1905; J. Boeke; 1 male, 1 female (Mus. Leiden and Amsterdam).

Bay of Philipsburg, St. Martin, Dutch West Indies; September, 1905; Dr. Shaw; 1 young female (42976).

Guadeloupe; from Museum of L. Guesde; 1 female (4095).

## MITHRAX (MITHRAX) ROSTRATUS Bell

Plate 255

*Mithrax rostratus* BELL, Proc. Zool. Soc. London, vol. 3, 1835 (1836), p. 171 (type-locality not given; type not extant); Trans. Zool. Soc. London, vol. 2, 1836, p. 51, pl. 10, figs. 1-1b.—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 101.

*Diagnosis*.—Size medium. Carapace tuberculate and spinous; without lateral angle. Wrists covered with warty tubercles.

*Description* (after Bell).—Carapace rounded, anteriorly produced, moderately elevated, regions distinct; surface granulate and tuberculate, and with the margins and outer part of the branchial regions spinous. Rostral horns elongate, apices curved inward. Orbit nearly circular, surrounded with warty tubercles. Antennae rather longer than rostrum; basal joint with a tuberculated tooth at its outer angle; second and third joints rather broad, with long hairs on each side; fourth joint cylindrical and elongated.

Chelipeds of male moderately robust, of female rather slender; movable finger in male with a tubercle near base; hand smooth, other joints spinous and tuberculated. Legs spinous and tuberculate, excepting on the last two joints which, like the others, are hairy; dactyls of male furnished with a series of small denticulations beneath; female without them.

*Color*.—Lightish brown; hands mottled.

*Measurements*.—Length of carapace, 2 inches 2 lines (about 53 mm.), including rostrum which is 4 lines (about 10 mm.) long and 2 lines broad; width of carapace nearly 2 inches.

*Locality*.—Bell describes this species among a lot of "Crustacea of the Coasts of South America." A. Milne Edwards thinks that it is probably from the Galapagos Islands. It has not been collected since the original description.

## MITHRAX (MITHRAX) CORNUTUS Saussure

Plate 137, figs. 3 and 4; plate 256

## CORAL CRAB; RED SPIDER CRAB (Verrill)

*Cangrejo espinoso* PARRA, Descripción de diferentes piezas de historia natural, 1787, p. 127, pl. 47, fig. 1.

*Mithrax cornutus* SAUSSURE, Rev. et Mag. Zool., ser. 2, vol. 9, 1857, p. 501 (type-locality, Antilles; cotypes in Geneva Mus.); Mém. Soc. Phys. Genève, vol. 14, 1858, p. 423 [7].—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 97, pl. 22.—MIERS, *Challenger Rept.*, Zool., vol. 17, 1886, pp. 86 and 87.—VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 13, 1908, p. 400.

*Diagnosis*.—Antero-lateral spines not all in the same line, the last one situated at lateral angle of carapace. Three spines on basal antennal article. Three or four spines on supraorbital margin ex-



clusive of preorbital spine. Two rows of spines above palm. Propodites of legs long and slender.

*Description.*—A large species, resembling *M. spinosissimus*, the dorsum being armed with short, sharp spines. Carapace and appendages covered with a short woolly pubescence; legs furnished also with rather scanty, long, fine hairs. Rostral horns regularly tapering, much longer in the young than in the old. In small specimens the rostrum is contained from two and two-thirds to three and one-half times in remaining carapace-length. Besides the preorbital spine and the 2 spines of the antennal segment, there are 6 spines on the margin of the orbit, 3 inferior and lateral, 3 superior, according to A. Milne Edwards. In the specimen in hand there is still another superior spine—that is, 4 in all—of which 2 are on the outer slope of the preorbital spine, next one larger, independent, fourth one smallest, on the inner slope of the extraorbital spine. This last is not shown by A. Milne Edwards, although his figure has an unequal number of spines on the two orbits. In small specimens, under 33 mm. long, there are only 2 spines on the supraorbital margin, between the supraocular and postocular spines. Antero-lateral spines 4, the first or hepatic spine being triple, the other spines double, or with a secondary spine in front of the primary spine; fourth spine situated at the lateral angle of the carapace, opposite the gastrocardiac suture and a little below the level of the line of the preceding spines; a shorter postlateral spine, also one similar to the latter, a little higher up on the dorsal surface. The longest spine of the basal antennal segment has 2 or 3 spinules on its outer margin in a medium-sized specimen (32717); a small sharp spine is at the base of the following segment of the antenna.

Chelipeds stout, longer than any of the legs in the male; about 5 rows of spines on the merus, the spines of the 2 upper rows longest and sharpest; carpus armed with a number of sharp spines; hand elongate armed with 2 rows of spines above. Two rows of long spines and 2 rows of short spines on the merus joints of the legs; carpus joints armed with long spines; propodus joints long, narrow, subcylindrical and little roughened. Dactyli long and slender.

*Color.*—Yellowish or rosy; often rose-color (Saussure).

*Measurements.*—Male (Martinique), length of carapace 92, width 90; length of manus 82, length of legs of first pair 135 mm. (A. Milne Edwards). Female (Martinique), length of carapace 65, width 59, length of manus 33, length of legs of first pair 90 mm. (A. Milne Edwards). Female (32717), total length of carapace 40.4, length without horns 31.5, width without spines 26, with spines 32 mm.

*Range.*—From Florida Straits (46 miles south of Key West), 589 fathoms (Miers), to Bahia, Brazil, in shallow water. Dominica, 40

to 150 fathoms (A. E. Verrill). Martinique (A. Milne Edwards). Bermuda (A. E. Verrill).

*Material examined.*—

Antilles; 2 females, cotypes (Geneva Mus.).

Off Havana, Cuba; lat. 23° 10' 48'' N.; long. 82° 19' 15'' W.; 121 fathoms; fne. gy. Co.; Jan. 17, 1885; station 2330, *Albatross*; 1 carapace (9502).

Between Jamaica and Haiti; lat. 17° 43' 40'' N.; long. 75° 38' 25'' W.; 52 fathoms; Co. brk. Sh.; Feb. 29, 1884; station 2136, *Albatross*; 1 male (7760).

Soufrière Bay, Dominica; 100 fathoms; A. H. Verrill; 1 female (32717).

Bahia, Brazil; shallow water; H. M. S. *Challenger*; 1 small male (Copenhagen Mus.).

MITHRAX (MITHRAX) ACUTICORNIS Stimpson

Plate 136, figs. 1 and 2; plate 257, fig. 1

*Mithrax acuticornis* STIMPSON, Bull. Mus. Comp. Zoöl., vol. 2, 1870, p. 116 (type-localities, off the Quicksands [Florida], 34 fathoms, and west of the Tortugas, 37 and 42 fathoms; types not extant).—A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 98.—RATHBUN, Bull. U. S. Fish Comm., vol. 20, for 1900, part 2 (1901), p. 66 (part).—A. MILNE EDWARDS and BOUVIER, Mem. Mus. Comp. Zoöl., vol. 47, 1923, p. 390, pl. 11, fig. 11, text-figs. 22 and 23 (♀?).

*Nemausa rostrata* A. MILNE EDWARDS, Crust. Rég. Mex., 1875, p. 81, pl. 17, fig. 4 (type-localities, west of Florida, lat. 26° 16' N., 20 fathoms; near Mujeres, Yucatan, 12 fathoms; Martinique; cotypes, 1934, 1935, 1936, M. C. Z.).

*Mithrax (Nemausa) acuticornis* RATHBUN, Proc. U. S. Nat. Mus., vol. 15, 1892, p. 260 (part), pl. 37, fig. 1.

*Diagnosis.*—Small. Carapace with lateral angle. Two supra-orbital spines between preorbital and postorbital spine. Fourth lateral spine at lateral angle of carapace and behind the line of the gastro-cardiac suture. A small spine on basal antennal article at articulation of next article.

*Description.*—A small species. Carapace distinctly longer than broad, forming an angle at the meeting of the antero-lateral and postero-lateral margins. Cervical and cardiac sutures deep. Surface covered with sharp spines which are very short and scanty on the gastric region, longer and more numerous elsewhere. Rostral horns straight except for a slight curving inward at the tip, divergent, regularly tapering, and varying in length from one-seventh to one-sixth of the length of the remainder of the carapace. Principal spine of basal antennal article straight or slightly curved and half as long as rostrum; two other spines on the article, one of which forms part of the orbital border and the other, very small, lies at the base of the following, or first movable, article; in the larger specimens

there is also a small, rectangular tooth on the outer margin, close to the orbit. The orbit is armed with one spine below, outside the antenna, one at outer angle, and three above, of which the prominent preorbital spine is one.<sup>49</sup> Four large antero-lateral spines and one postero-lateral; the first, or hepatic, spine is double, having a small spine on its anterior side; the next three antero-lateral spines have each a small spine in front of it; the last of these antero-lateral spines is the longest and is situated at the lateral angle of the carapace, below the level of the others; the postero-lateral spine is shorter than the four antero-lateral.

Chelipeds of male about as long and as stout as the legs of the first pair; merus spinous, with two rows of long spines above; carpus covered with short, conical, subacute spines or tubercles, three of which are on the inner margin; manus with one or a few spinules above near proximal end; these are evident only in larger specimens, scarcely a trace in those with a carapace-length less than 18 mm.; fingers with a short and narrow gape, edges denticulate, a larger denticle on the dactylus in the middle of the gape. The spines on the legs are arranged in two rows above on the merus and carpus and are especially long in the first two pairs.

*Color*.—General color, deep red orange. Fingers somewhat purplish red with narrow white bands near bases (Henderson).

*Measurements*.—Male (25592), total length of carapace 21, length without horns 18.2, width without spines 15.8, width with spines 18 mm. Largest specimen, male (46964), total length 24, without horns 20.5, width without spines 17, with spines about 20 mm.

*Range*.—Gulf of Mexico (west coast of Florida); Florida Keys from Miami westward; Yucatan Channel. Porto Rico, Santa Cruz, Flannegan Passage, Montserrat and Grenadines (A. Milne Edwards for *Nemausa rostrata*). Off Bahia, Brazil. Depth, 12 to 45 fathoms; to 163 fathoms (A. M. E.).

*Material examined*.<sup>50</sup> See table, page 390.

*Remarks*.—*M. acuticornis*, of which no large specimens have yet been reported, may very easily be confused with the young of *M. cornutus* and *M. spinosissimus*. The body of *spinosissimus*, young, is rounder than in the other two species; the gastric region is less uneven in *cornutus*, young, and its granulation finer, sharper and less regular; rostrum of *acuticornis* shorter than in specimens of equal size of the other two species. The other notable differences are tabulated below (p. 391).

<sup>49</sup> Stimpson in his description gives six spiniform teeth to the orbit, not including those of the antennal joint, but this appears to be an error.

<sup>50</sup> As this small species has in the past been confused with the young of other species, only such specimens are included in the table as have been subject to careful revision.