59.53, 842 A (729)

Article III—NOTES ON THE WEST INDIAN CRABS OF THE GENUS *ACTÆA*

By Lee Boone

Dr. R. W. Miner found, in a branch of stag-horn coral at Little Golding Cay, Bahamas, a remarkably large, old male specimen of *Actæa acantha*, with the unusual entirely black claws, and a color plate[1] subsequently made under his direction by Dr. G. H. Childs establishes the first color record of this century-old species. These facts prompted the notes which follow.

Further investigation revealed that the closely related species, *Actæa setigera*, has been masquerading as two species, the young ones being known as *Actæa bifrons* Rathbun.

The rare and remarkably beautiful *Actæa palmeri* Rathbun is here figured for the first time, through the courtesy of Dr. Alexander Wetmore of the United States National Museum.

Several unusually large specimens of *Actæa rufopunctata nodosa* Stimpson are in the collection of the American Museum, enabling the writer to present more extensive data than has hitherto been available on the West Indian variety of this Indo-Pacific species. This evidence tends to show that when large adults are considered, even the validity of the subspecies is destroyed, unless the name arbitrarily be retained for convenience of geographic distribution—a highly questionable practice. The first color notes of the West Indian representative of the species, made by the author in Cuba, are given.

The Pilumnidæ, of which the present genus is a representative, offer an unusually rich field for investigation by collectors. These crabs are sluggish, for the greater part contenting themselves to dwell concealed in some coral crevice, or sponge. Consequently, they normally are much more sparsely represented in collections than even the spider crabs.

Actæa acantha H. Milne Edwards

Figures 1 to 4

Cancer acanthus H. Milne Edwards, 1834, 'Hist. Nat. Crust.,' I, p. 379. Desbonne and Schramm, 1867, 'Crustacés de Guadeloupe,' p. 22.

Actæa acantha A. Milne Edwards, 1865, Nouv. Arch. Mus. Hist. Nat. Paris, I, p. 278, Pl. xvii, fig. 1; 1881, 'Miss. Sci. au Méx.,' V, p. 245, Pl. xliii, fig. 1. Rath-

[1]This color plate (xxviii) is one of the series made in connection with Dr. Miner's studies for the Coral Reef group and is on file in the Department of Lower Invertebrates, American Museum of Natural History.

BUN, 1897, Ann. Inst. Jamaica, I, Art. 1, p. 13; 1901, Bull. U. S. Fish Comm., XX, part 2, p. 34. BOONE, 1927, Bull. Bingham Oceanog. Coll., I, Art. 2, p. 27.

Actæa spinifera KINGSLEY, 1879 (1880), Proc. Acad. Nat. Sci. Phila., XXXI, p. 392.

TYPE.—H. Milne Edwards states that the locality of his type was unknown. The specimen was deposited in the Paris Museum. The first definite locality for the species was Guadeloupe.

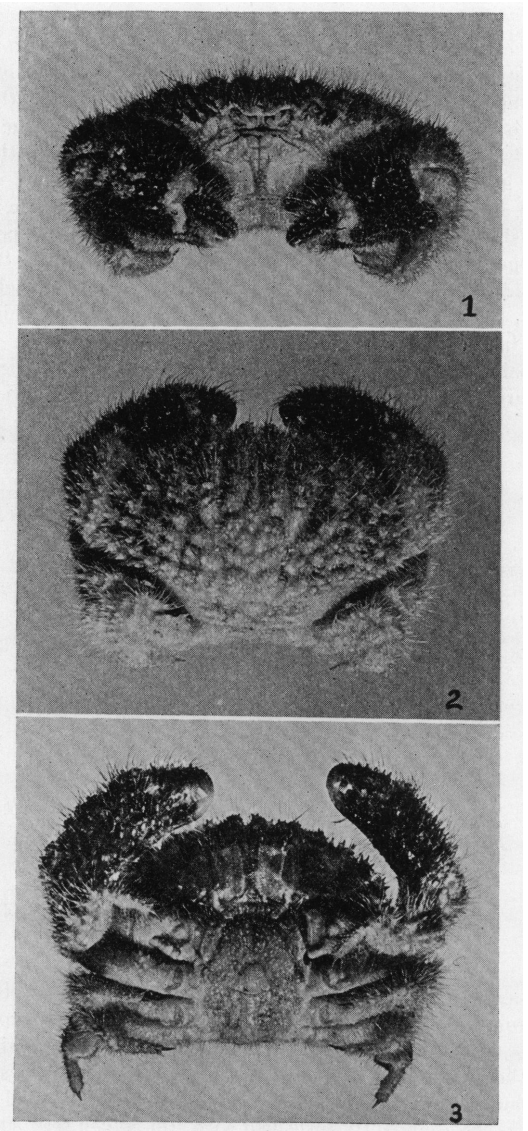
DISTRIBUTION.—Previously reported from the Florida Keys; Porto Rico; Jamaica; Siguanea Bay, Isle of Pines, and Fernando Noronha, Brazil. Littoral.

MATERIAL EXAMINED.—Color sketch No. 28, by Dr. G. H. Childs, made from specimen Cat. No. 6029, a large old male taken on stag-horn coral, Little Golding Cay, Bahamas, July 1, 1924, by Dr. R. W. Miner. Also one large female, Andros, Bahamas, 1908, collected by B. E. Dahlgren and H. Mueller.

TECHNICAL DESCRIPTION.—Old male, 27.5 mm. long, 42 mm. maximum width, interorbital region 11 mm. wide. Carapace broadly, evenly rounded on the frontal and anterolateral margins; the postlateral margins slightly excavate, convergent, the posterior margin straight. Entire dorsal surface of carapace and legs roughened with spinulose granulæ which on the carapace form regular elongate or rounded lobes that are separated from each other by deep channels. The grooves delimiting the regions of the carapace are more sharply defined than the other grooves. The cervical, urogastric, and cardiac grooves are the most deeply impressed.

The frontal margin is produced into a pair of rounded, denticulate, submedian, or rostral teeth, separated by a U-shaped sulcus, from which a longitudinal median groove runs back on the gastric region and bifurcates posteriorly. There is an acute tooth at the preorbital angle, separated from the submedian pair of teeth by an unequal-sided concavity with denticulate margin; a longitudinal carina runs back on each side from the base of the preorbital tooth across the gastric region to the transverse groove defining the anterior cardiac region, the cervical runs back from behind the orbit. The cardiac and intestinal regions are circumscribed and lobed. The anterolateral margin is cut into five lobes beside the postorbital lobe. The entire orbital margin, upper and lower, is spinose, two larger spines occur at the postorbital lobe. Each of the anterolateral lobes is cut into about four sharp radiating spines on the outer margin with a group of lesser coarse granulæ at their base. Each lobe is separated from its neighbor by a distinct groove and inside of each marginal lobe there is a somewhat similar rounded spinose lobe, each of which is circumscribed by a groove. The summit of the branchial region is covered by several granulose lobes; the postlateral margin is ornamented with a series of small granulæ. The subhepatic and sub-branchial regions are margined by flattish granulæ along their upper half, the lower portion being smooth. The sternal plastron is paved with rounded granules. The male belt is seven-segmented, moderately wide.

The chelipeds are equal in the male, with the meral joint short, triquetral, only the tip of its upper distal angle roughened where it projects beyond the carapace; the carpus is about as long as the merus, with the entire upper and outer surfaces roughened with coarse, spinose granulæ separated from each other by channels; the propodus, including the finger, is equal in length to one-half the maximum width of the carapace; the outer surface of the palm is evenly convex, its height is equal to its length along the upper lateral margin;



Figures 1 to 3 *Actæa acantha*.
(All natural size.)

Fig. 1. Front view of large old male, showing black claws. Fig. 2. Dorsal view of same specimen. Fig. 3. Ventral view of same specimen.

the entire upper and outer surface of the palm is ornamented with sharp spines set approximately in longitudinal rows; these spines are continued onto the fingers. The propodal finger is stocky, short, about one-half as long as the palm, with a large sub-basal tooth, and another strong tooth at the tip. The hinged finger is longer than the propodal with a more curved tip, three small teeth on the cutting edge. There is a slight gape distally.

The present specimen is very unusual in having the entire palm and both fingers except the whitish tips, and a narrow, light ashen band on the propodus at the base of the hinged finger, of a deep brownish black. There is also on the inner lateral face of the merus, midway its lower margin, a small circular spot of blackish brown.

Apparently, this coloration of the chelipeds in the males of this species is very unusual, it only having been reported by Dr. A. Milne Edwards.

The four pairs of ambulatories are moderately stout with the exposed dorsal surfaces and margins ornamented with many spines and granulations set approximately in rows. The merus, nearly half as wide as long, with the upper and lower

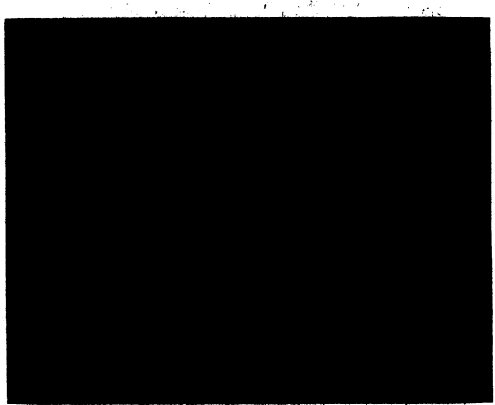


Fig. 4. *Actæa acantha*, dorsal view of female.
(Natural size.)

lateral margins spinose and the upper surface smooth on the first to third pairs, but spinose on the upper surface of the fourth pair; the carpus and propodus are about the same length, each about half as long as the merus, covered with spines on the outer surface; the dactyl is about as long as the propodus but very slender, tapering, with the outer surface spinose and a sharp curved corneous toe-nail at the tip. The chelipeds and legs are abundantly furnished with stiff golden setæ similar to those on the carapace.

The females and young males differ from the above described specimen only in not having the brownish black coloration in the chelipeds.

Color.—Plate xxviii of crab found in close association with stag-horn coral, taken July 1, sketched July 3, Little Golding Cay, Bahamas, by Dr. Childs.

Dorsal View.—Carapace and appendages decidedly setiferous, setæ light golden. Dorsal of carapace light lilac-purple, with a tinge of wild rose near the frontal and outer

branchial margin, and a tinge of pale blue in the purple on the mesogastric region.

The ambulatories are all alternately banded with lilac-purple and rose, the numerous golden setæ influencing this coloration. The meral and carpal joints of the chelipeds are similarly banded on the upper surface, the propodus including the fingers (upper and inner surface) is uniformly a rich moss green, except for a spot of rose at the median base of the fingers; finger tips pearly white.

Dr. Childs notes, "Under side and legs verging from light purple to yellow."

Actæa setigera Milne Edwards

Figures 5*a* and *b*

Xantho setiger H. Milne Edwards, 1834, 'Hist. Nat. Crust.,' I, p. 390.

Actæa setiger Stimpson, 1859, Ann. Lyc. Nat. Hist. N. Y., VII, p. 5. Boone, 1927, Bull. Bingham Oceanog. Coll., I, Art. 2, p. 27.

Actæa setigera A. Milne Edwards, Nouv. Arch. du Mus., I, Mem., p. 271, Pl. xviii, fig. 2. Stimpson, 1871, Bull. Mus. Comp. Zoöl., II, p. 138. A. Milne

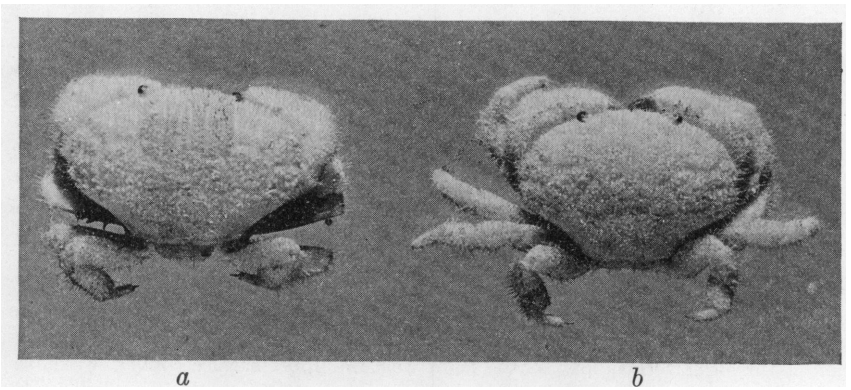


Fig. 5. *Actæa setigera*, dorsal view of male (*a*) and female (*b*).
(Natural size.)

Edwards, 'Miss. Sci. Méx.,' V, p. 244. Rathbun, 1897, Ann. Inst. Jamaica, I, Art. 1, p. 13; 1898, Bull. Labr. Nat. Hist., State Univ. Iowa, IV, p. 263; 1901, Bull. U. S. Fish Comm., XX, part 2, p. 34. Verrill, 1908, Trans. Conn. Acad. Arts and Sci., XIII, p. 338. Rathbun, 1921, State Univ. Iowa, Studies Nat. Hist., IX, No. 5, p. 71; 1924, Bijdragen tot de Dierkunde, Natura Artis Magistra, Amsterdam, Afl., 23, p. 15.

Actæa bifrons Rathbun, 1898, Bull. Labr. Nat. Hist., State Univ. Iowa, IV, p. 262, Pl. iv, figs. 3 and 4; 1901, Bull. U. S. Fish Comm., XX, part 2, p. 34; 1921, State Univ. Iowa, Studies Nat. Hist., IX, No. 5, p. 71.

Type.—Original description based on a specimen from the Antilles, deposited in the Paris Museum.

Distribution.—West Indian region: Antilles; Florida Reefs; Cuba; Porto Rico; Jamaica; Tortugas; Bermuda; Barbados; Curacao; Glover Reef. Littoral.

Material Examined.—One male, 1 female specimen collected on Little Golding Cay Reef, Bahamas, April, 1908, by B. E. Dahlgren and H. Mueller; 1 female, West

Indies, Cat. No. 6123; 1 small male, Ensenada, Porto Rico; 3 males from Bridgetown, Barbados; 2 males, Mangrove Island at Parguera, Ensenada, Porto Rico; 1 female, Turks Island, Bahamas; 1 large female, Dry Tortugas, Florida; 1 small female, Ensenada, Porto Rico.

COLOR.—Unknown.

TECHNICAL DESCRIPTION.—Carapace two-thirds as long in the median line as wide; the interorbital region equal to about one-third of the maximum width of carapace; preorbital margin produced into a submedian pair of shallow rounded teeth, slightly separated; anterolateral margin broadly, evenly rounded, divided into four truncated lobes by as many groove-like depressions which run backward across the anterior half of the carapace dividing the carapace into lobules as illustrated. There is also a median groove running back from between the rostral teeth and bifurcating posteriorly; a longitudinal groove runs backward on each side from behind the preorbital angle and another from about midway behind the orbit, across the gastric region, dividing it into lobes. The anterolateral margin is not toothed, merely incised by these grooves. There is a transverse groove running outward from behind the orbit approximately subparallel to and near the anterior lateral margin. Two more transverse grooves run outward across the anterior branchial and mesobranchial regions. The cardiac region is circumscribed. The carapace is only moderately convex longitudinally and scarcely at all so transversely. The postlateral margins are convergent, the posterior margins nearly straight, only about as long as the interorbital margin. The entire dorsal surface of the carapace is covered with coarse rough granulæ and abundant short, up-standing, reddish-gold setæ, as are also the upper surfaces of the chelipeds and eyes. The male abdominal belt is five-segmented, the third, fourth and fifth segments being fused. The female belt is seven-segmented, tongue-shaped, the lateral margins moderately convex, ciliated.

The eyes are small, black, set on stocky stalks.

The chelipeds are equal in both sexes, the merus short, closely appressed to the body, only the tip of its upper surface projecting beyond the carapace, the carpus is about three-quarters as long as the palm with the upper surface convex, widening distally; the palm is three-quarters as high as long, the outer surface moderately convex; the propodal finger, which is half as long as the palm, is narrowly triangular and is deflected downward, the tip slightly upcurved; the hinged finger is more curved and thicker than the propodal finger, regularly dentate, longitudinally grooved, no gape. On the male specimen, both fingers are chocolate-brown, this coloration extending backward on the palm for about three-fifths its length along the lower half outer surface. In the female this brown coloration is confined to the fingers, not reaching up on the palm. The entire exposed surface of the distal end of the merus, the outer face of the carpus and propodus and the proximal parts of the fingers are covered with coarse granulæ and fine setæ.

The four pairs of ambulatories are similar, moderately stout, slightly decreasing in length from the first to fourth pairs with the exposed outer surfaces granular and setose. The meral, carpal and propodal joints are wide in ratio to their length; the dactyli about as long as the propodi but much slenderer, although strong and with the tips each with an acuminate toe-nail.

Actæa bifrons Rathbun

Figure 6

SYNONYMY.—See under *Actæa acantha* Milne Edwards.

TYPE.—Taken at Aspinwall, lat. 9° 32′ 20″ N., long. 79° 54′ 45″ W., 34 fathoms, 'Albatross' station 2147, deposited in the United States National Museum, Cat. No. 7803. A very young specimen, male 5.5 mm. long, 8 mm. wide.

DISTRIBUTION.—Porto Rico: Aspinwall (type-locality), 34 fathoms; off Vieques, 12 fathoms; Ensenada Honda, Culebra. Colon, Panama; Barbados; also Shoal Bank, 20–40 and 30 fathoms.

MATERIAL EXAMINED.—One young female, taken off Vieques, 12 fathoms, and originally identified by Dr. Mary J. Rathbun as *Actæa bifrons*.

ORIGINAL DESCRIPTION.—"Allied to *A. setigera;* front double; fingers smooth.

"Carapace narrower and flatter than in *setigera;* areolations similar, granulation finer, marginal lobes more angular. Front (Fig. 3), with a double edge, the inferior slightly in advance of the superior, but scarcely noticeable in a dorsal view; the two

Fig. 6. Young *Actæa setigera*, ×5, originally identified as *Actæa bifrons* Rathbun.

lobes of the superior margin are slightly arcuate, margin denticulate or granulate; the lower margin viewed from in front is sinuous; surface between the two margins, concave. The epigastric region is coarsely granulate. Eyes larger than in *setigera;* inferior orbital margin with a prominent tooth at the inner angle. The chelipeds differ from those of *setigera* in having the fingers longer in proportion to the palm, more strongly bent downward, the pollex wider at base than the dactylus. The fingers are horn-color and are almost smooth, being marked with lines of shallow pits; in *setigera*, on the contrary, the grooves on the fingers are very deep and the intervening ridges are narrow and armed with conical tubercles. The hairs which cover the surface are dark brown, in *setigera*, yellow.

"DIMENSIONS.—Male, length 5.5, width 8 mm."

TECHNICAL DESCRIPTION.—Young female, 5 mm. wide, 3.3 mm. long. This species appears to me to be only the young of *Actæa setigera* Milne Edwards, of which species a series of young adults in the American Museum collections shows in degree varying according to their increased size the frailty of the specific characters ascribed to *A. bifrons* as diagnostic.

The length-width ratio of this specimen does not vary from that of several young specimens of *A. setigera*. Those familiar with young post-larval reef crabs are well aware that at such early age the carapace is normally much flatter, or less convex, than later in life, also that the eyes of young crabs are usually larger in proportion to the rest of the body than they are as the crab grows. The major divisions or areolations are similar to these of *setigera* and the granulations are NOT any finer but, as is usual in young crabs, the granulæ are sometimes less abundantly developed. The "front with a double edge, the inferior slightly in advance of the superior, but scarcely noticeable in a dorsal view," ascribed to *bifrons*, is simply the very thin shell-like frontal margin of a young crab, projecting slightly in advance of the heavier row of coarse granules which occur slightly behind the margin and by reason of their height stand out conspicuously if viewed from the front. "The two lobes of the superior margin are slightly arcuate, margin denticulate or granulate; surface between the two margins concave." The two lobes of the superior margin are slightly arcuate in *setigera* and retain this when the crab has attained a width of one inch or more, but the margin thickens as the granulations develop on older specimens; the concave surface between the two margins referred to is no wider, if as wide as a single granule, and disappears entirely as the granules develop. The "more angular" marginal lobes ascribed to *bifrons* are, in the specimen before me, not at all broken into angulations, as represented in the illustration of the type description. Four distinct lobes are indicated and accentuated by the clustered granulations, but the lateral margin is not toothed.

The chelipeds of "*bifrons*" have no differences from those of the series of *A. setigera* before me, except differences due to age and sex. In the older crab the palm becomes larger and more swollen, especially in the male, and the fingers correspondingly appear less angled. The fingers bear weakly delineated the identical grooves found in both small and large *setigera;* the conical tubercles, ascribed to the fingers of *setigera* by Dr. Rathbun as a differentiating character, are well-known to be a very variable factor in various members of the family. The horn-color of the fingers is also a doubtful item, since the finger coloration is known to be variable in the living animals and subject to much fading, especially in small preserved specimens. The hairs which cover the surface in Dr. Rathbun's type are described as dark brown; "in *setigera* yellow." A number of large specimens, unquestionably *setigera*, before me have brown or reddish brown setæ and brown fingers, others have faded yellow setæ and horn-colored fingers.

Actæa palmeri Rathbun

Figure 7

Actæa palmeri RATHBUN, 1894, Proc. U. S. Nat. Mus., XVII, p. 85; 1898, Bull. Labr. Nat. Hist., State Univ., Iowa, IV, p. 297; 1924, Bijdragen tot de Dierkunde, Natura Artis Magistra, Amsterdam, Afl., 23, p. 15.

TYPE.—Taken at Rodiguez Creek, Florida, by Dr. Edward Palmer; deposited in the United States National Museum.

MATERIAL EXAMINED.—One female, from sponge, Cotton Key Lake, Florida, Feb. 5, 1903.

DISTRIBUTION.—Bahama Banks; Cotton Key Lake, Fla.; Rodiguez Creek, Fla. (4 sp.); Caracas Bay, Curaçao, among branches of *Porites furcata* (1 sp.).

COLOR.—Unknown.

TECHNICAL DESCRIPTION.—Carapace oval, moderately convex in both directions; two-thirds as long in the median line as wide, interorbital space equal to quite one-third of maximum width of carapace. Frontal margin with paired submedian lobes or nodules, forming a tooth-like margin; preorbital angle with a much smaller tooth-like nodule. The entire orbit is surrounded by a series of nodules, four small ones along the lower outer margin and one larger nodule, broken simultating two. There are four large, separated nodules along the anterolateral margin which is not toothed. Behind and separated from the submedian pair of frontal nodules is a submedian pair of small nodules. There is a transverse row of seven separated elongated nodules across the anterior gastric-hepatic region, besides the marginal second pair of nodules which are approximately in line with this row. Behind these on the cardiac region there are four small nodules and two lobes on either side on the mesobranchial region. There are a pair of submedian nodules on the intestinal region and posterior to these, three or four coarse granules semiburied in dense setæ; similar setæ fill the

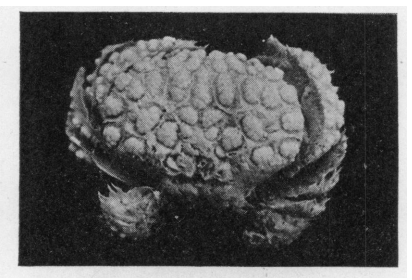


Fig. 7. *Actæa palmeri* Rathbun, very little enlarged.

furrows which separate the nodules. These nodules, the majority of which are of elongate oval form, consist of massed coarse rounded tubercles or granulæ.

The chelipeds are subequal in the female, small, closely appressed to the body; the merus small, entirely covered with furry setæ; the carpus nearly as long as the palm, with the upper surface convex and set with six small subcircular lobes, forming approximately two rows, one along the upper margin and one below; the palm is short and high and very swollen on the upper outer surface, with a longitudinal row of four small lobes along the upper margin and one similar tubercle proximally below this row, the remaining outer surface of the palm is covered with setæ; the propodal finger is short, bent downward; the hinged finger is slenderer, more curved and fits closely upon the lower finger. Both are devoid of grooves.

The ambulatories are relatively small, dorso-ventrally flattened, margined with close-set setæ, the exposed dorsal surface of the legs is ornamented with a row of rounded, separated elevated lobes on the carpal and propodal joints; the dactyli are very acuminate.

Actæa rufopunctata nodosa Stimpson

Figure 8

Actæa nodosa STIMPSON, 1862, Ann. Lyc. Nat. Hist., N. Y., VII, p. 203; Bull. Mus. Comp. Zoöl., II, p. 138; 1865, A. MILNE EDWARDS, Nouv. Arch. Mus., I, Mem., p. 266, Pl. XVII, fig. 6; 1881, Miss. Sci. Méx., V, p. 243.

Actæa rufopunctata nodosa MIERS, 1886, 'Report "Challenger" Brachyura,' XVII, p. 122; RATHBUN, 1897, Ann. Inst. Jamaica, I, Art. 1, p. 13; 1898, Bull., Labr. Nat. Hist., State Univ. Iowa, IV, p. 263. MILNE EDWARDS AND BOUVIER, 1923, Mem. Mus. Comp. Zoöl., XLVII, p. 316.

TYPE.—Taken at Tortugas, Florida, by Dr. Whitehurst; deposited in the Museum of the Smithsonian Institution; believed to be no longer extant.

DISTRIBUTION.—Tortugas, Florida Reefs; Antilles; Cuba; Bahamas; Porto Rico; Jamaica; Barbados; Caracas Bay and Spanish Port, Curaçao; Brazil; usually in rather deep water, from 35 to 94 fathoms.

MATERIAL EXAMINED.—One male collected at Andros Island, Bahamas, April, 1908, Cat. No. 2415, A. M. N. H.; one small female and one male, off mouth of Guanica Harbor, Porto Rico; one male, Mangrove Island at Parguera, Ensenada, Porto Rico; one juvenile, one and one-half miles south of Cano Corda Is., near Guanica, Porto Rico.

COLOR.—Ruby red; fingers blackish brown, coral-pink tips.

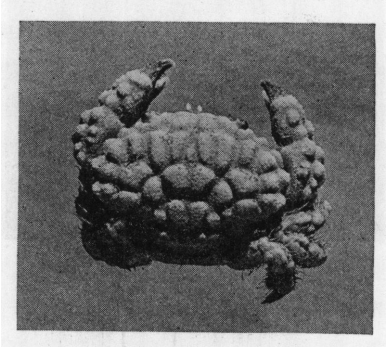


Fig. 8. *Actæa rufopunctata nodosa* Stimpson.
(Natural size.)

TECHNICAL DESCRIPTION.—Carapace oval, two-thirds as long in median line as the maximum width; frontal interorbital space scarcely one-third of body width; frontal margin deflected, divided into two rounded, very lightly separated lobes; preorbital angle obscure, superior orbital margin surrounded by elevated small lobules, one of which occurs at the postorbital angle. The anterolateral margin is bordered by four small lobes separated from each other by deep sulci and similarly separated from the four larger lobes which lie behind the marginal lobes. There is a deep median sulcus running back from the tiny median notch of the frontal margin on either side of which there is a small lobe reaching quite to the frontal margin, behind which there is another small lobe entirely circumscribed by sulci; there are four long lobules on the mesogastric region, the inner pair of which are submedian, situated behind the above-described small lobules and with one small lobule between their own bases posteriorly; the outer pair are behind the orbit. There are two separated triangular lobules on the circumscribed cardiac region, and three separated small lobules on the inner branchial region; the intestinal region has a pair of elongate, rounded lobules which are united

at the hinder end; on either side of these is a small subcircular elevation and behind this subparallel to the posterior margin is a flat transverse carina. In all there are about thirty-two lobules on the dorsal surface, all of which are circumscribed and emphasized by deeply cut sulci. The male abdominal belt is five-segmented.

The eyes are set on stout stalks, the cornea terminal, small and black.

The chelipeds are equal in the male, the merus not projecting beyond the body; the carpus large, convex on the upper surface and cut into five lobules separated by deep sulci as on the carapace, two of these lobules are small, situated along the upper margin; the remaining three are on the outer side and are much wider transversely. The palm is only about as long as the carpus and nearly as high as long with the lower half of the outer face roughly granulose; the upper half with five separated lobules, three of which are along the upper margin and in line with the upper row on the carpus, the other two just below the upper row but separated by a deep sulcus; the propodal finger is very short, scarcely one-third as long as the palm, moderately slender, with the outer face longitudinally grooved, one small subdistal tooth, the tip forming a blunt triangular tooth. The hinged finger is longer and more curved than the propodal, similarly grooved and with two small teeth besides the stout curved apex. The male has both fingers brownish black except the coral-pink tips, this black color extending back onto the palm for about two-fifths of its length.

The ambulatories are similar, successively decreasing in length posteriorly, each with the meral, carpal and propodal joints very wide in ratio to their length, and with their exposed upper surfaces each cut into several lobules separated by deep sulci, as on the carapace; the dactyli are strong but much slenderer than the associated propodi and have each a sharp, horny toe-nail.