

posteriorly; along the lateral margins and across the posterior border there is a series of small white blotches, about 2 to 3<sup>mm</sup> in diameter, the posterior ones smaller. The legs and chelipeds above are red, variegated with black and white spots, the black markings being most abundant on the posterior legs; the anterior ones and the chelipeds being more red; the first joint of the chelipeds is mostly red, with the black and white marks only at the edges; the second and third joints on all the legs are red with black edges, without spots. The chelæ are mostly yellowish, becoming white at the tips and reddish at the joints; the last joint of the other legs is yellow. All the legs are white beneath, except on the last three joints. Abdomen dark purplish brown below, whitish above anteriorly. Eye-stalks colored like carapace above, light red below.—C. S. V.

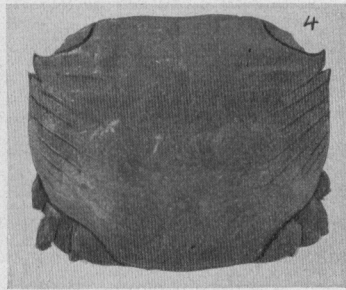


Figure 4.—Mangrove Crab, *Goniopsis cruentatus*. Carapace, about nat. size. Phot. A. H. V.

Most of the specimens are much brighter colored than the above, especially when the adherent dirt is removed. The larger males usually have a large amount of red on the back of the carapace and chelæ.

The variations in this species seem to be less than in many others of this family.

N. Mus. number	Sex	Measurements.*				Locality
		Length of carapace	Breadth of carapace	Breadth at anterior angles	Breadth of front	
7542	♀	31.0	38.2	35.5	20.0	Old Providence
"	♀	34.7	42.5	39.0	22.0	" "
"	♀	44.5	55.0	48.0	28.0	" "

\* The first ten series of measurements were made by Professor S. I. Smith from specimens collected by the "Albatross," in 1884. The others are by the writer.

N. Mus. number	Sex	Length of carapace	Breadth of carapace	Breadth at anterior angles	Breadth of front	Locality
7542	♂	34.0	39.5	37.0	20.4	Old Providence
"	♂	48.3	58.0	50.3	27.8	" "
"	♂	42.0	48.0	44.2	25.0	" "
"	♂	41.3	48.0	45.0	24.0	" "
7677	♂	41.6	48.2	45.8	24.6	Jamaica
7537	♀	35.8	43.3	40.3	23.3	Old Providence
"	♀	33.0	39.0	36.9	20.7	" "
3047 Y. M	♂	33	40	38	22	Bermuda
3047a	♂	27	31	30	17	"
1901a	♂	40	45	43	26	"
1901b	♀	26	29	29	16	"
1901c	♀	24	30	29	16	"
1901d	♂	18	23	23	13.5	"

The chelæ, which are nearly equal, measure in No. 3047 (see pl. xi, fig. 1) 27<sup>mm</sup> long, 14.5 wide; in 3047a, they are 19<sup>mm</sup> by 10<sup>mm</sup>; in 1901a, 33<sup>mm</sup> by 20<sup>mm</sup>.

It has been taken at Bermuda by most collectors. It was in the collections of G. Brown Goode, A. Heilprin, Prof. T. Kincaid, Dr. T. H. Bean, Prof. E. L. Mark, Bermuda Biol. Sta., and others.

It was taken by us in several localities, especially at Coney Island, Hungry Bay, and at Somerset I., near the shore of "The Scour." It is common among mangroves, living among the tangled roots in burrows, where it is not easily captured, owing to its shyness and agility. It sometimes actively climbs up the aerial roots and trunks of the mangroves, when disturbed.\* We also sometimes found it in heaps of stones, at high-water mark, where it was more easily captured. Its colors, though showy, seem to be protective in many places where it lives, for they match the colors of the dead leaves and other objects in the swamps. Perhaps they are more particularly nocturnally protective, for it is most active at night.

It has a very extensive distribution, being found on nearly all tropical American shores. It ranges from Florida to Rio Janeiro, Brazil (Dana), and throughout the West Indies. West Coast of Africa at Ashantee (J. E. Benedict); Liberia; Guinea; Gabun; Angola, etc. West Coast of Central America (Kingsley). Florida Keys and Abrolhos Reefs, Brazil (Smith).

\* In such cases it can easily be caught by shaking them off from the branches of the trees into hand-nets held below them:

**Grapsus grapsus** (Linn.). *Cliff Crab. Red Shore-Crab.*

*Cancer grapsus* Linné, *Systema Naturæ*, ed. xii, i, p. 1048, 1767; *Amenit. Acad.*, 2d ed., iv, p. 252, pl. 3, fig. 10, 1788.

*Grapsus pictus* Lamarek, *Système Animaux sans Vertèb.*, p. 150, 1801.

Desmarest, *Consider. Général. Crust.*, p. 130, pl. 16, fig. 1, 1823.

M.-Edwards, *Hist. Nat. Crust.*, ii, p. 86, 1837 (Antilles); *Régne animal de Cuvier*, 3<sup>me</sup> édit., pl. 22, fig. 1.

Gibbes, *Proc. Amer. Assoc. Adv. Sci.*, 3d meeting, p. 181 (17), 1850 (Florida).

Dana, *U. S. Expl. Expd.*, *Crust.*, p. 336, 1852 (Maderia, Cape Verdes, Peru, Paumotu Archipelago, Sandwich Is.). S. I. Smith, *Trans. Conn. Acad. Sci.*, iv, p. 257, 1880 (synonymy and table of measurements).

Miers, *Proc. Zool. Soc. London*, 1877, p. 73 (Galapagos Is. ; >(*G. altifrons* Stimp.).

Hilgendorf, *Monatsb. Akad. Wissensch. Berlin*, 1878, p. 807 (Mozambique).

*Grapsus maculatus* M.-Edwards, *Ann. Sci. nat.*, III, xx, p. 167 (133), pl. 6 (= pl. 22, *Régne animal de Cuvier, Crust.*), 1853 (Antilles).\*

Stimpson, *Ann. Lyceum Nat. Hist. New York*, vii, p. 229 (101), 1860 (Florida).

Kingsley, *Proc. Acad. Nat. Sci. Philadelphia*, 1879, p. 401 (Santa Cruz, Tahiti). Miers, *Voy. Challenger*, vol. xvii, p. 255, 1886. Young, *op. cit.*, p. 280, 1900. J. E. Benedict, *Crust. West Africa*, *Proc. U. S. Nat. Mus.*, xvi, p. 538, 1893.

*Grapsus ornatus* M.-Edwards, *Ann. Sci. nat.*, III, xx, p. 168 (134), 1853 (Chili).

*Grapsus Webbi* M.-Edwards, *Ann. Sci. nat.*, III, xx, p. 167 (133), 1853.

Stimpson, *Proc. Acad. Nat. Sci. Philadelphia*, 1858, p. 102 (48).

*Grapsus altifrons* Stimpson, *Ann. Lyceum Nat. Hist. New York*, vii, p. 230 (102), 1860 (Cape St. Lucas).

*Grapsus grapsus* M. J. Rathbun, *Brachyura and Macr. Porto Rico*, p. 16, 1901 (deser. and distr.). Rankin, *Crust. Berm.*, p. 527, 1900. Verrill, *The Bermuda Is.*, i, p. 94.

## PLATE X, FIGURE 6. PLATE XI, FIGURE 2.

This is a large and conspicuous species, remarkable for its agility and swiftness. It runs and climbs over the rough and eroded rocks and cliffs between tides, and even to some distance above high-water mark, often ascending the nearly perpendicular cliffs with great agility. When pursued by man it usually escapes by rapid running, often hiding in some deep crevice or cavernous place. If hard pressed it will take to the water, where it can usually be caught with a landing net, for it cannot swim very rapidly. Sometimes several

\* The name *C. maculatus* in the binomial system dates from Edwards' edition of Catesby, *Nat. Hist. Carolinas*, 1771, vol. ii, pl. xxxvi, where it is well figured in colors.

can be seen, at a distance, clustered together on the exposed cliffs, for their bright red chelæ and large size render them very conspicuous, but they usually run away rapidly or plunge into the water when approached.

It is not easy to explain how it could have acquired such bright colors by natural selection, for in Bermuda and most other regions where it abounds the colors appear not at all protective, unless at night, but quite the reverse. Possibly the colors were originally developed in some region where its surroundings were different, and red colors prevailed among the rocks; but its colors may be nocturnally protective. At present the species has spread all around the world in tropical seas, and it does not much need color protection, owing to its watchfulness and agility, yet it is often killed by sea-fowl, and also by the *Octopus*.

The colors are somewhat variable. Some are much redder than others. A large one, in life, had the carapace very dark brown, thickly and irregularly mottled and spotted with bluish and grayish white; the lighter color predominating in the radial grooves. Chelipeds with the chelæ and carpal joints bright dark red, white at tips of claws; basal joint pale blue, red at the ends. Legs dark reddish brown above, thickly blotched with bluish white, and bright red at each joint. The posterior pair of legs are tinged with orange on the lighter parts. Beneath, orange red and light blue; branchial areas, oral organs, and area in front of mouth mostly light blue; sternum and under side of legs, orange and blue.

The sexes differ very little in size or color. The larger males are often brighter red than the females, but not constantly so. The ground-color is often blood-red with most of the small yellow spots round and about 1 to 2<sup>mm</sup> in diameter. The chelæ of the males are usually a little larger than those of the females. The right and left differ but little in the male. Some females taken by us in April, 1901, carried eggs.

This species also varies considerably in its form and the proportions of length to breadth of the carapace, as shown by the following table of measurements. The front is often nearly or quite perpendicular, but in other cases more or less oblique.

Measurements.\*

N. Mus. number	Sex	Length of carapace	Breadth		Br. of front	Height of front	Localities
			Breadth of carapace	across ant. angles			
7647a†	♀	44.0	48.3	35.3	18.5	8.0	St. Thomas
7647b†	♀	37.5	40.5	30.4	15.0	7.2	“ “ Yale
7647c†	♀	38.0	42.3	31.7	15.8	7.5	“ “
7647d‡	♀	27.5	30.4	23.8	11.7	4.6	“ “
7647e§	♀	20.0	22.9	18.4	8.5	3.5	“ “
7647f	♂	33.5	37.7	28.6	14.0	6.0	“ “
7647g†	♂	37.7	41.6	30.3	15.2	6.5	“ “ Yale
7647h*	♂	50.0	53.0	38.2	20.0	9.0	“ “
7647i*	♂	54.3	60.0	41.5	21.5	10.0	“ “
7543a‡	♂	37.0	42.0	30.2	15.0	6.4	Old Providence
7543b‡	♀	37.6	42.0	30.4	15.2	6.5	“ “
7564a†	♂	38.6	43.2	31.5	15.5	6.9	Sabonilla
7564b	♂	35.1	38.0	29.0	14.4	6.1	“
7564c¶	♀	24.0	27.0	21.2	9.8	3.8	“
7564a¶	♀	24.2	27.1	21.6	10.0	4.0	“ Yale
7564e¶	♂	27.0	30.0	23.1	11.0	4.3	“
7564f¶	♂	21.0	23.5	19.0	8.9	3.5	“
7840¶	♀	25.0	21.8	21.8	10.1	4.2	Curaçao
Yale Mus.	♂	37.2	40.5	29.5	14.7	—	Bermuda
4064 Y. M.	♂	67.0	73.8	47.7	26.8	—	Bermuda
4066 YM**	♂	60.0	72.5	46.0	26.0	—	La Paz., L. Cal.
4062 Y. M.	♂	65.0	73.0	58	30.0	12	Bermuda
1901 Y. M. α	♂	50	58	42	21	—	“
1901b	♀	54	61	42	22	—	“
1901c	♀	58	62	34	27	—	“
1901d	♀	51	57	40	23	—	“
1898a	♂	66	72	49	30	—	“
1898b	♀	55	60	41	24	—	“

Chelæ.

		Right		Left	
		length	height	length	height
1901a	♂	30	18	26	15
1901b	♀	24	14	24	14
1901c	♀	25	17	23	13
1898a	♂	45	27	44	20

\* The first 19 series are by S. I. Smith from specimens collected by "the Albatross" in 1884, mostly now in the U. S. Nat. Museum.

† The front is perpendicular.

‡ The front is slightly oblique.

§ The front is considerably oblique.

|| The front is very slightly oblique.

¶ The front is nearly perpendicular.

\*\* The front is decidedly oblique.

In nearly all the Bermuda specimens measured the front is nearly perpendicular and very concave.

Nos. 7564d, coll. Jan. 17-24, and 7840, coll. Feb. 10-18, carried eggs.

\*\* The right chela in this was 43<sup>mm</sup> long, 27<sup>mm</sup> broad; the left was 44<sup>mm</sup> long, 27<sup>mm</sup> broad.

It has been taken at Bermuda by nearly all collectors.

We found it very common on most of the precipitous and rocky shores of Bermuda in 1898, but it was far less common in March and April, 1901. Probably the cold period earlier in the winter and spring of 1901, which was so fatal to the fishes,\* also killed off many of the crabs of this and allied species.

This species is found on all tropical coasts. On the Atlantic coast it extends from Florida to Brazil. On the Pacific side it ranges from Peru to Lower California. West Africa, at many localities. Cape Verde Islands (Dana, Stimpson). Ascension I. and Fayal (Benedict). Young individuals were taken by us on the reefs and serpentine atolls at Bermuda. Miss Rathbun has recorded an instance of a young one taken on the Pacific far from land. Small specimens often occur among barnacles, etc., on the bottoms of vessels.

Pernambuco, Brazil, New Zealand, Tahiti, Natal, Mauritius (Kingsley). Hawaiian Is. (Dana).

Four specimens were taken from the bottom of a vessel recently arrived from Swan Island, W. Indies, at Woods Hole, Mass., July 14, 1887, (t. S. I. Smith in MSS.).

**Geograpsus lividus** (Edw.) Stimp.

*Grapsus lividus* A. Milne-Edw., Hist. Nat. des Crust., ii. p. 85, 1837; Melang. Carcinol., p. 135.

*Geograpsus lividus* Stimpson, Proc. Acad. Nat. Sci., Philad., 1858, p. 101; Notes on North Amer. Crust., Annals Lyc. Nat. Hist., N. York, vii, p. 230; 1860. Kingsley, Proc. Acad. Nat. Sci., Philad., p. 195, 1880 (description).

M. J. Rathbun, Proc. U. S. Nat. Mus., xxi, p. 604, 1898; Brach. and Maer. Porto Rico, p. 16, 1901; Verrill, these Trans., xi, p. 574, 1900.

*Geograpsus occidentalis* Stimpson, Annals Lyc. Nat. Hist. N. Y., vii, p. 230, 1860 (West Coast).

FIGURE 5. PLATE XXVI, FIGURE 1.

In life, the carapace in our specimens was light yellowish brown, marbled or irregularly reticulated with very dark brown streaks, or umber-colored markings, most numerous anteriorly; legs olive-brown above, paler beneath; abdomen pale bluish gray. (C. S. V.)

\* See The Bermuda Islands, i, p. 91; these Trans., vol. xi, p. 503.

Nat. Mus. number	Sex	Length carapace	Breadth carapace	Br. at ant. angles	Br. of front	Locality
7344a	♂	20.0	24.0	20.6	10.4	Sabonilla
7344b	♂	17.0	20.9	17.6	8.8	"
7344c	♀	11.9	15.0	13.0	6.4	"
7344d	♀	15.0	19.0	16.1	8.0	"
7344e	♀	17.5	21.6	18.4	9.0	"
7344f	♀	19.0	23.5	20.0	10.0	"
7344g	♀	19.9	24.5	20.3	10.1	"
7344h	♀	22	27.0	22.0	11.0	"
7344i	♂	22.5	28.0	22.4	11.3	"
36	♀	18.3	23.8	19.2	10.0	Bermuda (Goode)

Nos. 7344a—i were measured by Prof. S. I. Smith.

Nos. 7344e and f were carrying eggs. Taken by the "Albatross," March, 1884.

A single Bermuda specimen (No. 36) was in the collection of G. Brown Goode. The Yale party took two adult specimens in 1898. A larger broken ♂ specimen is in the collection of the Bermuda Biol. Station, 1903, taken at Hungry Bay. Breadth between outside of orbits, 23<sup>mm</sup>; length of chela, 21; height, 10.5<sup>mm</sup>. It occurs under stones on rocky shores and sometimes on coral reefs.

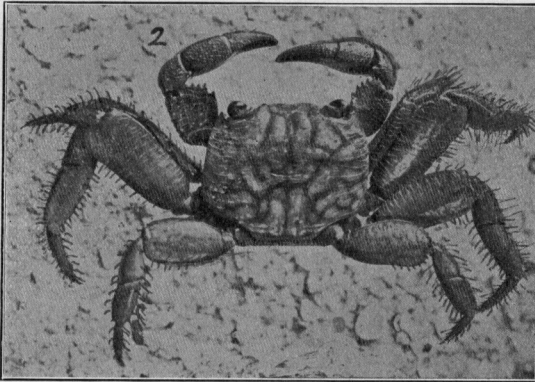


Figure 5.—*Geograpsus lividus*, from Bermuda,  $\times$  about 1 $\frac{1}{2}$ . Phot. A. H. V.

Its known range is extensive; from Florida to the Antilles and Columbia. On the West Coast, from Cape St. Lucas to Chili (*G. occidentalis* Stimp.). James I., Galapagos (M. J. Rathbun).

***Pachygrapsus transversus* Stimpson. Mottled Shore-Crab.**

*Grapsus transversus* Gibbes, Proc. Amer. Assoc. Adv. Sci., 3d meeting, p. 181 (17), 1850 (Florida).

*Pachygrapsus transversus* Stimpson, Ann. Lyc. Nat. Hist. New York, vii, p. 64 (18), 1859; Amer. Jour. Sci. (2), xxvii, p. 446, 1859.

- Smith, Report Peabody Acad. Sci. Salem, 1869, p. 91, 1871 (Pacific coast Central America); Trans. Conn. Acad., iv, 259, 1880 (synon. and measurements).
- M. J. Rathbun, Branner-Agassiz Exp. Brazil, p. 137; Brach. and Macr. of Porto Rico, p. 17, 1901 (descr.).
- Kingsley, Proc. Boston Soc. Nat. Hist., xx, p. 158, 1879 (descr.); Proc. Acad. Nat. Sci. Philadelphia, 1879, p. 400; op. cit., p. 199, 1880 (syn. and descr.).
- Goniograpsus innotatus* Dana, Proc. Acad. Nat. Sci. Philadelphia, 1851, p. 249 (3), 1851 (South America); Crust. U. S. Expl. Exped., p. 345, pl. 21, fig. 9, 1852.
- Metopograpsus miniatus* Saussure, Crust. Mexique et Antilles (Mém. Soc. Phys. Hist. nat. Genève, xiv), p. 28, pl. 2, fig. 17, 1858. (Parasited, t. Rathbun.)
- Metopograpsus dubius* Saussure, op. cit., p. 29, pl. 2, fig. 16, 1858.
- Pachygrapsus intermedius* Heller, Zool. Bot. Verein Verhandl., Wien, xii, 1862, p. 521 (Brazil); Reise der Novara, Crust., p. 44, 1865. Smith, Trans. Conn. Acad., ii, p. 37.
- Pachygrapsus socius* Stimpson, Ann. Lye. Nat. Hist. New York, x, p. 114 1871 (Cape St. Lucas, Panama, Peru).

## PLATE XII, FIGURES 3—36.

This species is very variable in colors, but the tints are evidently decidedly protective. The mottlings of yellow, olive, and brown closely resemble the colors of the stained and weather-beaten rocks and dead algæ among which it usually lives.

In life, the ground-color of the carapace is most frequently dull olive-green, yellowish, or yellowish-brown, sometimes dull gray, more or less covered by irregular mottlings of darker brown, reddish, or dark olive, usually darkest anteriorly, where the transverse ridges are often edged with reddish or dark brown, making them more conspicuous; large chelæ are often plain light brown or reddish brown, usually with pale tips, but in some cases they are blotched with darker brown, or tinged with bright red on some parts, especially at the joints. The pereopods are usually banded with darker and lighter brown.

*Measurements.\**

Sex	Length	Breadth	Front	Locality
♀	10.1 <sup>mm</sup>	13.2	7.2	Provincetown
"	11.0	15.0	8.3	Florida
"	11.4	15.9	8.8	"
"	11.5	15.6	8.6	Brazil
"	13.7	18.2	9.8	Acajutla
"	14.2	19.0	10.8	Bermuda
♂	10.0	12.8	7.0	Paita, Peru

\* Many of the measurements are by Prof. S. I. Smith.



Sex	Length	Breadth	Front	Locality
♂	10.5	13.7	7.6	Bermuda
"	10.5	13.9	7.6	Panama
"	10.7	14.1	7.8	Bermuda
"	10.7	14.2	7.7	Panama
"	11.0	14.3	7.6	Brazil
"	12.4	16.4	9.0	Bermuda
"	12.5	16.3	8.9	Florida
"	13.1	17.2	9.6	Bermuda
"	13.8	17.4	9.8	Panama
"	14.5	18.2	10.0	Brazil
"	15.2	19.4	10.6	Panama
"	15.3	19.7	10.6	Brazil
"	9.2	13.0	7.0	Bermuda
"	13.0	17.0	10.0	Bermuda†
♀	15.5	21.0	15.0	Bermuda†

† Length of largest chela, 13<sup>mm</sup>; height, 6<sup>mm</sup>.

‡ Length of largest chela, 11.5<sup>mm</sup>; height, 5.5<sup>mm</sup>.

The proportion of length to breadth of the carapace varies from 1:1.25 to 1:1.41, but is usually about 1:1.30 to 1:1.35.

A parasitic isopod crustacean sometimes infests its branchial cavities and in some cases causes an enlargement or distortion, due to the swelling of the carapace on one side. The parasite, which is allied to *Bopyrus* and *Cepon*, is relatively large.\* It occurred in about 25 per cent. of the adult specimens examined from some localities. Some of the specimens collected in April carried eggs. Some were then soft-shelled. Specimens collected in June and July (Berm. Biol. Sta.) also carried eggs.

This appears to be the most abundant shore crab at Bermuda. It is to be found everywhere between tides where there are loose stones or masses of dead algae under which it can conceal itself. It is also to be seen running actively about in such localities, where it is often associated with *Sesarma Ricordi* and *Planes minutus*.

It is sometimes found, also, on the coral reefs. Also among the roots of mangroves.

It has been taken in Bermuda by nearly every collector of Crustacea.

It has a very wide distribution in all tropical and subtropical seas. It has been found among the barnacles, etc., scraped from the bot-

\* These parasites have recently been sent to Miss Harriet Richardson, who identifies them as *Leidya distorta* (*Cepon distorta* Leidy). It was originally found in the gill-cavity of a "fiddler-crab" (*Gelasimus pugilator*) by Leidy on the coast of New Jersey. It has seldom been found by later collectors.

toms of vessels far from its usual habitats. In this way its range may have been greatly extended by commerce in modern times. Adult living specimens were taken at Provincetown, Mass., in 1879. They occurred among barnacles, etc., on the bottom of a whaling vessel returned from a cruise in the Gulf Stream region and were associated with other southern species. (See S. I. Smith, 1884.)

It ranges from Florida and Bermuda to southern Brazil; from Peru to the Gulf of California; West Africa at Loanda, etc. Cape Verde Islands and Madeira; East Indies; Australia; New Zealand; Tahiti; Galapagos Is.; Pernambuco, etc.; Brazil, on stone reefs, and Maceio on coral reefs (M. J. Rathbun); Rio (Heller); Australia (Miers).

**Pachygrapsus gracilis** (Saussure) Stimp.

*Metopograpsus gracilis* Saussure, Mem. Soc. Phys. Hist. Nat. Geneva, xiv, p. 443, pl. II, f. 15, 15a, 1858.

*Pachygrapsus gracilis* Stimpson, Ann. Lyc. Nat. Hist. N. York, x, p. 113, 1871.

Kingsley, Proc. Boston Soc. Nat. Hist., xx, p. 159, 1870 (deser.). Synop.

Grapsidæ, Proc. Acad. Nat. Sci., Philad. for 1880, p. 200 (syn. and deser.)

M. J. Rathbun, Branner-Agassiz Exp., p. 137, 1900; Brach. and Macr. of Porto Rico, p. 17, 1901.

FIGURES 6, 6a. PLATE XII, FIGURE 2.

This is usually smaller than the preceding, and is much less common. Its colors are similar, but the reticulations and mottlings are darker brown. It can best be distinguished by the more prominent, thin, and nearly straight, front; the straighter sides of the carapace,

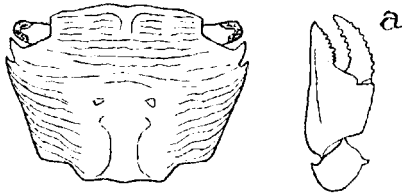


Figure 6.—*Pachygrapsus gracilis*, carapace enlarged; 6a, one of the chelæ. After Saussure.

which is not plicated over the cardiac region; and by the chelæ, which have small denticles on the upper side of the carinate manus, and on the dactylus. The manus has fine oblique ridges above, and the carpus is covered with fine oblique and irregular ridges.

It appears to be rare at Bermuda, or at least is seldom taken there. A few good specimens were found at Bermuda by us in 1898 and April, 1901; one of the latter carried eggs. A specimen was also obtained by Mr. Goode, 1876. It has been found at the Florida

Keys, Yucatan, and in the West Indies. Brazil, on mangroves (Rathbun.) It is most frequently found among the roots of mangroves.

Measurements.

No.	Sex	Carapace		Between orbits	Chelæ		Locality
		length	breadth		length	height	
4018a	♀	11	14	10	9	4	Bermuda
4018b	♀ eggs	10.5	13	9	7.5	3.5	"
4018c	♀	15.5	20.5	14	11	5.2	"
4018d	♀	13	16.5	10	8.5	4	"

*Planes minutus* (Linn.) Dana. Gulf-weed Crab.

*Cancer minutus* Linné, Syst. Naturæ, ed. 12, i, p. 1040, 1767. Fabricius, Syst. Ent., p. 402, 1775.

*Grapsus minutus* Latreille, Hist. nat. Crust. et Insectes, vi, p. 68, 1803.

*Grapsus cinereus* Say, Jour. Acad. Nat. Sci. Philad., i, p. 99, 1817 (*non Grapsus cinereus* Bosc, nec *Grapsus (Sesarma) cinereus* Say, 1818).

*Grapsus pelagicus* Say, op. cit., p. 442, 1818.

*Nautilograpsus minutus* H. Milne-Edwards, Hist. nat. Crust., ii, p. 99, 1837.

Smith and Harger, these Trans., iii, p. 26, 1874. Smith, op. cit., iv, p. 263; v, p. 120. Stimpson, Crust. N. Pacific Expl. Exped., p. 121, 1907.

*Planes Linnæana* Bell, British Stalk-eyed Crust., p. 135 (cut), 1844. White, List of Crust. British Mus., p. 41, 1847.

*Planes minutus* Dana, United States Expl. Exped., Crust., p. 346, 1852.

Kingsley, Synopsis Grapsidæ, Proc. Acad. Nat. Sci. Philad., for 1880, p. 202 (descr. and syn.).

FIGURE 7. PLATE XIII, FIGURES a—j'. PLATE XXVII, FIGURE 6.

In life, this small crab varies greatly in form and color. Usually it is irregularly mottled or blotched with light greenish yellow or pale yellow on a darker olive-green ground-color, usually with a large blotch or spot of pale yellow or whitish on the back of the carapace, thus imitating the olive-green colors of the gulf-weed (*Sargassum*) and the whitish patches of Bryozoa (*Biflustra*) with which the *Sargassum* is commonly covered. Thus its colors are eminently protective, for it naturally lives in the open sea among *Sargassum*.

Measurements of Bermuda specimens.

Sex	Carapace length	Carapace breadth	Front breadth	Chela, larger. length	Chela, larger. height
♂	16	17	9	16	8
♀	13	13	8	9	5
♂	15	15	8	12	6.5
♂	15	15	8	13	7.5
♀	19.5	20	10.5	14	7.5
♂	18	19	10	16	10

The last two are from the region of the Gulf Stream.

Some of the specimens taken in April, 1901, were carrying eggs. Several of those collected by the Bermuda Biological Station in June and July, 1903, also carried eggs.

Wherever fresh masses of *Sargassum* are cast up by the waves this crab can almost always be found beneath them, often in considerable numbers. It is usually associated with small specimens of *Portunus Sayi* and two species of shrimp (*Latreutes ensiferus* and *Leander tenuicornis*). It is contained in all the Bermuda collections that I have examined.

The 36 specimens illustrated on my plate V, to show their variations in form and color, were all taken, with many more, under a single mass of *Sargassum* in March, 1901, by A. H. Verrill.

It is a good swimmer, however, having long legs bordered by a dense fringe of hairs, so that it is not entirely dependent on the *Sargassum*.

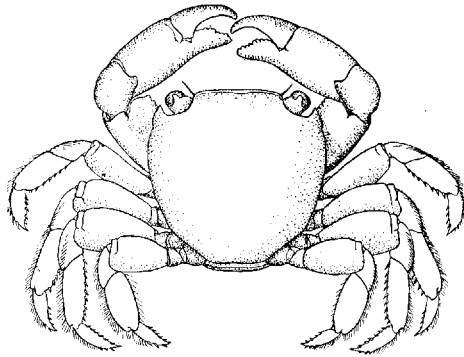


Figure 7.—Gulf-weed crab, *Planes minutus*, enlarged  $1\frac{1}{2}$ . The hairs of the legs are mostly omitted. J. H. Emerton del.

It is widely distributed, occurring in all tropical and subtropical seas in floating *Sargassum*.

In the Atlantic it occurs along the course of the Gulf Stream as far north, at least, as George's Bank and off Nova Scotia. It is sometimes cast ashore on the coasts of New England and Great Britain. Prof. Smith has recorded a large specimen found at Woods Hole, Mass., by V. N. Edwards, Sept. 11, 1877. Southward it extends to Brazil and Falkland Is. (Kingsley); on the Pacific coast from Peru to the Gulf of California. Also found in the central Pacific and Indian Oceans; Mediterranean (Heller). West Coast of Africa, Cape St. Lucas (Stimpson); Indian Ocean (M.-Edw.); New Zealand and Natal (Kingsley).

**Sesarma Ricordi** M.-Edw.

- Sesarma Ricordi* H. M.-Edw., Ann. Sci. Nat., ser. 3, vol. xx, p. 183, 1853. Kingsley, Proc. Acad. Nat. Sci., Philad., for 1880, p. 217. M. J. Rathbun, Synopsis Sesarmæ, Proc. Biolog. Soc. Washington, xi, p. 91, 1897 (deser. and synon.).  
 Brachy. and Macr. Porto Rico, p. 18, 1901 (deser.). Verrill, these Trans., x, p. 574, 1899.  
*Sesarma angustipes* Stimpson (*pars*) Smith, these Trans., ii, p. 159, 1869 (*non* Dana, t. M. J. Rathbun).  
*Sesarma cinerea* Stone, in Heilprin, op. cit., 1898. Rankin, op. cit., p. 526, 1900 (*non* Say, sp.).  
*Sesarma Stimpsonii* Miers, 1881, not of 1886 (t. Rathbun).

PLATE X, FIGURE 2. PLATE XI, FIGURE 3, VAR.

This common species is very variable in colors in life. The carapace is usually irregularly and variously mottled with olive-brown, olive-green, or reddish brown on a yellowish green or light olive ground color, in most cases pretty closely imitating the varied colors of the dead algæ and stained stones among which it most commonly lives.

Miss Rathbun, who has examined many of the original types, unites several nominal species with this. It seems to be distinct from the true *cinerea* and *angustipes*, with both of which it has often been confused. Probably the real *cinerea* does not occur at Bermuda.\*

The carapace of the typical variety appears nearly smooth to the eye over most of the surface, but under a lens shows minute sparse granules and hairs, which become more evident anteriorly and on the front, while on the sides, posteriorly, there are faint oblique plicæ. The lateral margins are nearly straight or only slightly sinuous; the front is a little sinuous on the edge with a slight median notch. The carapace is only slightly broader than long.

*Measurements of Bermuda specimens.*

Number	Sex	Carapace length	Carapace breadth	Front breadth	Chelæ length	Chelæ height
a	♀	17	18	10	7	4
b	♂	16	17	9	12	7.5
c	♂	14	15	8	10	6
d	♂	13	13.5	7	9	5.5
e	♂	14.5	15	7.5	10	6

\* Dr. Rankin has kindly sent me for examination the specimens that he recorded (1900) as *S. cinerea*. They prove to be *S. Ricordi*.

This is one of the most common species, taken by nearly all collectors in Bermuda. It is often seen running actively about among the stones and dead seaweeds, from low tide nearly to high-water mark, usually associated with *Pachygrapsus transversus*. It may almost always be found under masses of *Sargassum* cast up on the shores as well as under stones.

Its range extends from Florida through the West Indies to Trinidad.

**Sesarma Ricordi**, var. **terrestris**, subspecies or var. nov.

PLATE XI, FIGURE 3.

This form first attracted my attention on account of its peculiar habits. Unlike most *Sesarmæ*, it lives away from the water, often in very dry, barren, sandy fields or pastures, under stones, though it was also found not far from the shore but where the soil was dry. It runs very rapidly when disturbed, and hides in holes or under other stones, but does not seek the water. Its color was darker than in the ordinary form, and the carapace was usually more or less covered by short hairs and adherent dirt, obscuring the colors, and giving it a gray appearance. Although so different in appearance and habits, it agrees so closely in form and structure that it seems to be only a variety that has acquired terrestrial habits, with trivial changes adapting it better for this mode of life.\* But no really intermediate specimens were found. Thus it seems to be a form or subspecies of some considerable antiquity and constancy.

The carapace appears more rough and uneven than in the ordinary form, for it is more strongly areolated and the branchial areas are more swollen, so that the vertical thickness is greater and the reticulated areas of the sides are broader, giving a larger surface for aëration of the water, and indicating larger gill cavities and gills. The dorsal surface of the carapace is covered with more numerous and larger granules, bearing numerous short dark hairs, very evident under a lens of low power, and capable of holding adherent dirt: the plicæ on the postero-lateral sides are stronger and more granulous; the lateral marginal edge is more sinuous anteriorly, owing to the more swollen branchial chamber. The anterior frontal margin is less sinuous, the median indentation often being obsolete or faint.

\* The specimens have also been studied by Miss M. J. Rathbun, who agrees with me in its relations.

The ambulatory legs are distinctly larger and longer than in the common form. When the legs are folded the tooth on the distal angle of the merus joint of the legs of the 3d and 4th pairs reaches considerably (2–3<sup>mm</sup>) beyond the outer orbital angle, while in *Ricordi* it just reaches it, or only slightly exceeds it (.5<sup>mm</sup> or less). The proportion of the merus joints of these legs to the breadth of the carapace is 1:1.36. In *Ricordi*, 1:1.5. Ratio of same to length of carapace, 1:1.2. In *Ricordi*, 1:1.4.

The colors, when living, appear dull or sordid yellowish brown, or mud-color, due to adherent dirt, often mottled with reddish brown. Fresh specimens cleaned in alcohol were variegated with pale bluish gray, dark brownish gray, and blackish, with some yellowish white; an irregular pale band, speckled with dark gray, extends from eye to eye. Legs above variegated with similar colors, but paler, the dark brown color mostly in irregular transverse bands. Chelæ whitish or pale yellow; legs bluish white beneath. Some specimens have the carapace finely speckled with red.

*Measurements of Bermuda specimens.*

Number	Sex	Carapace length	Carapace breadth	Front breadth	Chelæ length	Chelæ breadth
3148a	♂	18.0	20.0	11.0	15	8.5
3148b	♂	16.0	17.0	9.0	12	7.0
3148c	♀	17.5	18.5	9.7	10	5.5
d	♀	17.0	19.0	11.0	10	5.5
e	♂	13.5	15.5	8.0	10	7.0

This subspecies is, perhaps, in process of gradual differentiation, and destined to eventually become a valid species with true terrestrial habits should it not be prematurely exterminated. At present it has few enemies. It lives in waste uninhabited places. It is not uncommon in several localities. We found it not far from Hungry Bay; on the low barren hills of some of the smaller islands in places partly covered with sparse grass; and in other localities.

Several good specimens in the Yale Museum were collected by J. M. Jones, before 1867. They have no special labels as to seasons or stations.

This variety approaches *S. cinerea* Say in some characters more nearly than does the common form. In respect to the granulation of the front and frontal lobes, the specimens of *S. cinerea* in the Yale Museum, from Indian River and St. Augustine, Fla., labelled as *S. cinerea* by Miss Rathbun, and which I have compared with this