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LOUIS S. KORNICKER

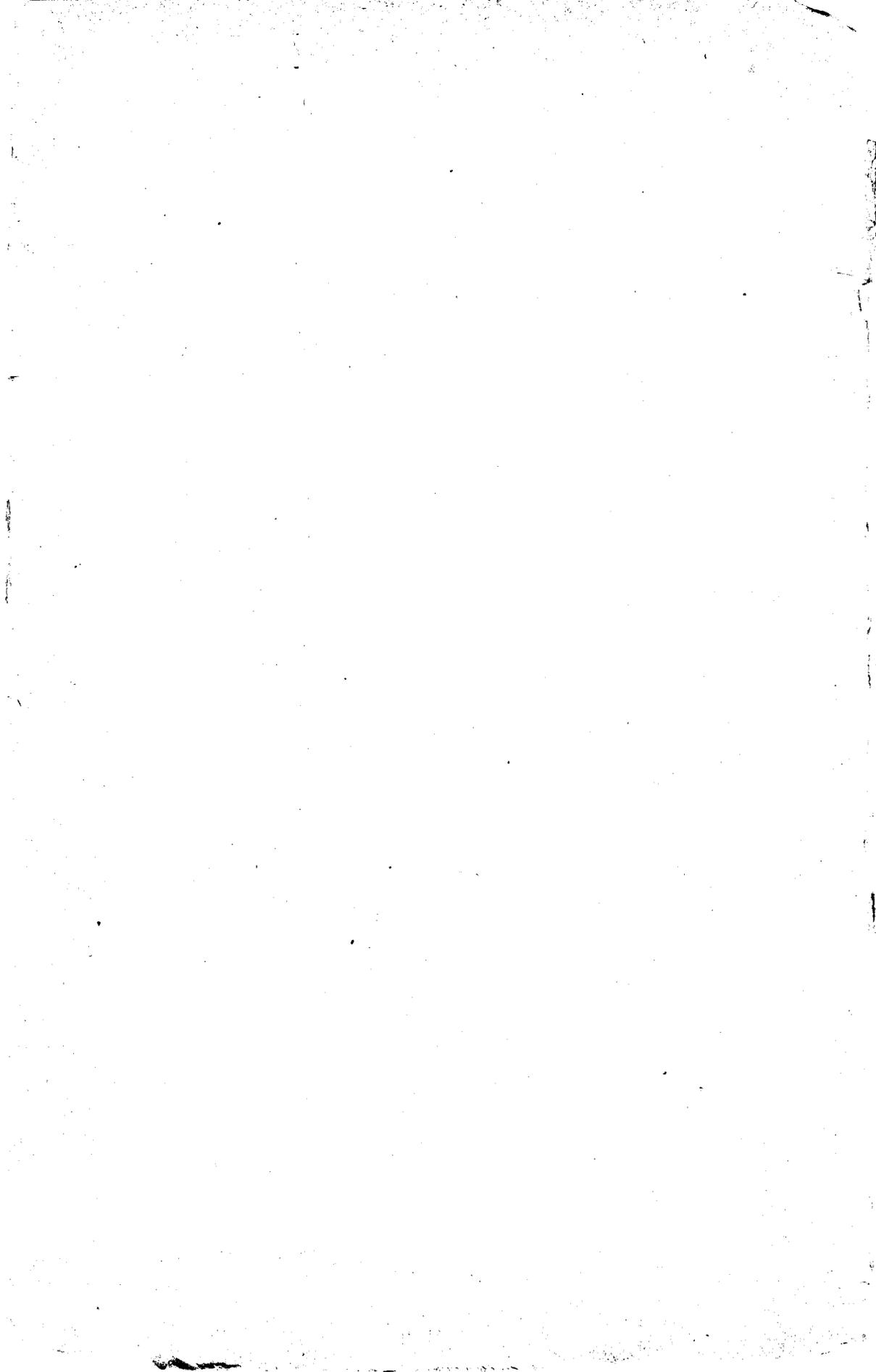
The Crustacea of the Bermuda Islands

With Notes on the Collections Made by the New York
University Expeditions in 1897 and 1898:

W. M. RANKIN.

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THE CRUSTACEA OF THE BERMUDA ISLANDS

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W. M. RANKIN.

(Read May 8, 1890.)

[Plate XVII.]

FOR a few weeks during each of the summers of 1897 and 1898, a party sent out by the New York University was in the Bermudas investigating the fauna and the general character of the islands, with a view to the desirability of establishing there a permanent biological station. Among the various collections gathered was a considerable number of Crustacea, which have been in my hands for identification and study.

Hitherto the most complete list of the Bermuda Crustacea has been that of Heilprin, who, in 1888, conducted to the islands a party from the Philadelphia Academy of Natural Sciences. Some of the results of this expedition were published in the "Proceedings of the Philadelphia Academy" of that year, and in book form—"The Bermuda Islands"—the following year. Professor Heilprin enumerated 27 species, all but four of which have been collected by the N. Y. University expedition, but which now puts on record in the following list 43 species, 16 more than Heilprin collected.

Besides Heilprin's list there are several other recorded collections from the Bermudas, and it has been my purpose in the present paper to gather together all these reports and to compile, along with the notes on the species of this expedition, a complete list of the hitherto recorded Crustacea of the Bermuda islands.

BIBLIOGRAPHY.

The publications, which include special collections of Crustacea from the Bermudas, are as follows :

J. M. Jones—"The Naturalist in Bermuda," London, 1859.

A. Heilprin—"The Bermuda Islands," Philadelphia, 1889.

A. E. Ortmann—"Decapoden und Schizopoden der Plankton-Expedition," 1893.

The following "Reports of the Challenger Expedition" :

"The Brachyura," **Miers**; "The Anomura," **Henderson**;
"The Macrura," **Spence Bate**; "The Stomatopoda," **Brooks**;
"The Phyllocarida," **Sars**.

In addition to these published lists I have, through the kindness of Miss Rathbun, of the U. S. National Museum, received a list of the Crustacea collected by Dr. G. Brown Goode at the Bermudas in '76 and '77, and now in the National Museum. I have also seen several species in the American Museum of Natural History in New York, which were collected by Professor Whitfield.

MATERIAL STUDIED FOR THIS PAPER.

In the present paper I have noted for each species, so far as I have been able to determine, its recorded observance by the authorities quoted above, and have likewise indicated those found in the Goode and Whitfield collections. The results of this compilation give a total of 61 species.

The Amphipoda and Isopoda, several species of which were collected, still await identification.

Doubtless this total represents very imperfectly the crustacean life of the Bermudas. During the two short seasons spent on the islands by the expedition no particular attention was given to the Crustacea above other forms of marine life; and the fact that 18 species recorded by other investigators were not discovered by this expedition, argues for the existence of many more, as yet unrecorded.

The field of research was limited, being mostly confined to Castle Harbor, at Walsingham, in '97, and to Bailey's Bay on the north shore, in '98, at which two localities the temporary

laboratory was situated. The most of the littoral forms were found in the vicinity of these two places. Tonging for coral in Castle Harbor, at a depth of a few feet, gave some of the rock-living forms, as *Alpheus*. Expeditions to Castle, Cooper, and St. David islands, increased the number, especially in land and rock crabs (*Gecarcinus* and *Grapsus*). In 1897 an excellent opportunity was afforded the expedition of learning something of the bottom at six fathoms depth, through the courtesy of Lieut. Gubbins, in charge of the government dredger "St. Albans," at work in the channel at St. George; from the material thus gathered several species of *Alpheus* were procured. In 1898 some attempt at hand dredging at the Flatts and in Harrington Sound was made. The securing of a new species of *Nika*, a genus hitherto unknown from this region, and the *Nebalia* of the Challenger Expedition, proves that many interesting forms may be found by an extension of the work on these lines.

CHARACTERISTICS OF THE BERMUDA CRUSTACEAN FAUNA.

The physical conditions of the Bermudas: warm, shallow waters, a coral shore, largely rocky, but with stretches of sandy beach, would naturally lead us to expect a similarity in their crustacean fauna to that of the West Indies and the adjacent shores of Florida; and such, in fact, we find to be the case. The land-crabs, *Gecarcinus*, find dry exposed hillsides suitable for their burrows; the mangrove swamps hide the bright colored *Goniopsis*; on the spray-washed cliffs the rock-crab, *Grapsus*, climbs; the great variety of littoral crabs find shelter under the stones of the beaches; and masses of Sargassum conceal the *Nautilograpsus*, which, with *Leander natator*, and perhaps others, have found their way to the islands in the floating weed. In the tide-pools may be found the swimming crabs, *Callinectes* and *Achelous*, and the hosts of the agile shrimp, *Leander affinis*; while the coral is tunneled by, and gives shelter to, the *Alpheus* and *Gonodactylus*.

All these characters of the Bermudan shores must be familiar to one who has visited the West Indies; so it is not surprising

to find that out of a total of 61 species in this list all but five have already been reported from the neighboring regions. These five are the two new species, *Nika bermudensis* and *Alpheus laucirostris*, and the eastern species, *Palaemonella tenuipes* (from the Sooloo Sea), *Leander affinis* (from Amboina), and *Penaeus velutinus* (from the Pacific). As to these three last-mentioned species, there is some reason for separating the Bermuda forms from their eastern allies; but even if on further study this should prove advisable, it is clear that they are closely related to the species mentioned above. The same interesting relationship is shown in other forms as well,—as in the genus *Alpheus* we have the *A. hippothoë* var. *bahamensis*, which, as I noted in a previous paper, is very near the East Indian variety *A. edamensis*; and the new species of *Nika* comes quite near the Amboinian *N. processa*.

With such exceptions, however, the crustacean fauna of Bermuda is most closely allied to its nearest neighbors, and it is probable that further investigations both in the Bermudas and the West Indies will show a still more complete similarity of the forms.

Many of the species, as is also the case with those found in the West Indies, have a distribution more or less widely extended in both hemispheres. I have reckoned that 18 out of the 61 are so distributed; while 33 are, so far as known, confined to the West Indies and the coast of America, between, approximately, the Carolinas and Brazil. Two, *Panopeus herbstii* and *Alpheus caudci*, belong to the east and west coasts of America; and four, *Neptunus anceps*, *Calcinus tibicen*, *Alpheus hippothoë* var. *bahamensis*, and *Alpheus bermudensis*, belong to the West Indies alone, though it is highly probable that further research will discover them on the shores of the mainland. Of all the list, only three are known from Bermuda alone—the two new species described in this paper and *Paranebalia longipes*.

The expedition is entitled to the credit of adding eight species to the crustacean fauna of Bermuda, *i. e.*, *Panopeus herbstii*, *Neptunus spinimanus*, *Nika bermudensis*, *Leander natator*, *Alpheus laucirostris*, *A. hippothoë* var. *bahamensis*, *Lepas anatifera* and *L. pectinata*.

DECAPODA.

OCYPODIDÆ.

1. **Ocypode arenaria** (Catesby).

Cancer arenarius Catesby, History of the Carolinas, II., p. 35, 1771.

One ♂ from South Shore, '97; one ♀, sandy beach, Cooper Island, '98. Reported by Miers.

Distribution: South shore of Long Island, to Brazil; West Indies.

GECARCINIDÆ.

2. **Gecarcinus lateralis** (Fremenville).

Ocypoda lateralis Fremenville, Ann. Sci. Nat. (2), III., p. 224, 1835.

7 ♂, 3 ♀, Castle and Cooper Island, '97. Burrows in the sandy soil among the grass. 'Seen also on the small islands off "Seaward," Bailey's Bay.

Reported by Heilprin, Miers, and J. M. Jones.

I am inclined to consider *G. lateralis* and *G. ruricola* (Linnaeus) as synonyms; but as my specimens correspond to Milne-Edwards' description "Tarses armés de quatre rangées d'épines" (Hist. Nat. Crust., II., p. 27, 1834), while the two specimens from the Bahamas which I have examined have six rows, and therefore would be Milne-Edwards' *G. ruricola*, I adopt Heilprin's determination until a more complete series from both the Bermudas and West Indies may be examined.

Miers' reported *G. lagostoma* is probably, as Heilprin suggests, also *G. lateralis*.

Distribution: West Indies; Florida Keys.

*3. **Cardisoma guanhumi** Latreille.

Reported by Miers.

Distribution: East and west Central America; West Indies; West Africa.

NOTE.—Species prefixed by (*) are not in the collections of the N. Y. University Expeditions. They are placed in their appropriate place in order to make the list consecutive.

GRAPSIDÆ.

4. **Sesarma cinerea** (Say).

Grapsus cinerea Say, Jour. Acad. Nat. Sci. Philadelphia, I., p. 442, 1818.

Several specimens from the Flatts and Bailey's Bay, '98.

Very numerous at the Flatts on rocks above high water mark. They run very rapidly and conceal themselves under stones when pursued. They may not uncommonly be found on the trunks of the juniper trees, the bark of which they resemble in color. One specimen was taken as high as two feet from the ground.

Reported by Heilprin, from the Flatts; Whitfield collection.
Distribution: Virginia to Florida; West Indies.

*5. **Cyclograpsus integer** Milne Edwards.

Reported by Heilprin; Goode collection.

Distribution: Florida; West Indies; Brazil.

6. **Pachygrapsus transversus** (Gibbes).

Grapsus transversus Gibbes, Proc. Am. As. Adv. Sci., III., p. 181, 1850.

Numerous specimens from the tide pools under stones in Castle Harbor and Bailey's Bay, '97 and '98. They conceal themselves among the stones which they somewhat resemble in color. It seems to be the most common littoral crab.

Reported by Heilprin, Miers and Ortmann; Goode collection.
Distribution: warm and temperate waters of both hemispheres.

*7. **Pachygrapsus gracilis** (Saussure).

Goode collection.

Distribution: Florida; West Indies; Yucatan.

8. **Nautilograpsus minutus** (Linnæus).

Cancer minutus Linnæus, Sys. Nat., Ed. X, I., p. 625, 1758.

Numerous specimens found, in '97, in the tide-pools with *Pachygrapsus* among the Sargassum in which it lives, and is so found distributed over the shores of the Atlantic, Pacific and Indian oceans.

Reported by Heilprin—"one small specimen." Goode collection.

9. **Grapsus grapsus** (Linnæus).

Cancer grapsus Linnæus, Sys. Nat., Ed. X, I., p. 630, 1758.

3 ♂, 2 ♀. On rocks of Castle and Cooper Islands and on South Shore '97 and '98. These brilliantly colored crabs, though quite common on the surf-beaten rocks of the islands, are difficult to collect, as they make their way with surprising activity over the jagged coral cliffs, disappearing suddenly into narrow clefts or dropping into the boiling surf below.

Reported by Heilprin and Miers (*G. maculatus*).

Distribution: Warm seas of both hemispheres.

10. **Goniopsis cruentatus** (Latreille).

Grapsus cruentatus Latreille, Hist. Nat. des Crust., VI., p. 70, 1803.

2 ♂, 1 ♀, 1 ♀ juv. Longbird Island, at end of the St. George causeway, '98. Very numerous among the mangroves at this place. The crabs are exceedingly wary and at the slightest disturbance hide themselves among the roots of the mangroves or in the crevices of the causeway wall.

Reported by Heilprin and Miers from Hungry Bay.

Distribution: Florida to Brazil; West Indies; West Africa.

CANCRIDÆ.

11. **Eriphia gonagra** (Fabricius).

Cancer gonagra Fabricius, Sp. Ins., p. 505, 1781.

2 ♀ with ova. Cooper Island, near shore, '97.

Reported by Miers "a small adult male."

Distribution: Atlantic coast, South Carolina to Brazil; West Indies.

12. **Panopeus herbstii** M.-Edwards.

M.-Edwards, Hist. Nat. Crust., I., p. 403, 1834.

(a) 1 ♂. No locality noted, '97.

A large specimen, 40 mm. long, and 61 mm. wide. In the form of its abdomen and the antero-lateral teeth this specimen

resembles very closely the figure and description of *P. validus* Smith from the west coast of Central America, given by Benedict and Rathbun (Proc. U. S. Nat. Mus., XIV., p. 362, 1891). Probably *P. herbstii* and *P. validus* represent the east and west coast forms of the same species.

(b) 1 ♂, 1 ♀, under stones Long Bird Island, '98. The ♂ is 22 mm. × 34 mm. As the stones are lifted it is quite possible to overlook the crab, so close is its resemblance to the mud in which it lies concealed.

Heilprin, Miers and Ortman report *P. herbstii* var. *serrata* Saussure; and J. M. Jones previously reported the same. These were small specimens—probably *P. bermudensis*. *P. herbstii* I consider new to the Islands.

Distribution: Rhode Island to Brazil; West Indies; probably west coast of Central America.

13. **Panopeus bermudensis** Benedict and Rathbun.

Benedict and Rathbun, The Genus *Panopeus*, Proc. U. S. Nat. Mus., XIV, p. 376, pl. XX, 1891.

Numerous specimens from Bailey's Bay and Coney Island and dredged at the Flatts, '98.

The average size of the male is 9.5 mm. long and 13 mm. broad.

They may be found at low tide under stones in small depressions in the sand. They are variously colored, dark, light or mottled, corresponding to their surroundings. The fingers vary considerably; sometimes quite dark, frequently as light as the palms. I find a large tooth on the dactyl of the larger hand in all but two specimens.

Collected at Bermuda by G. Brown Goode (B. & R., l. c. supra, p. 377); and probably the *P. herbstii* var. *serratus* of the other reports belongs here.

Distribution: Florida Keys to Brazil; West Indies.

*14. **Eurytium limosum** (Say).

Reported by Miers.

Distribution: New York to Brazil; West Indies.

15. **Actaea setigera** (Milne-Edwards).

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

Actaea setigera A. Milne-Edwards, Nouv. Crust. du Museum, I., p. 271, pl. XVIII., fig. 2, 1865.

1 ♂, Castle Harbor, under stones at low tide, '98.

Purplish-red in color, lighter on appendages; fingers and lower portion of hand black. Size, 40 mm. broad, 27 mm. long.

An unusually broad specimen, probably quite old.

Reported by Heilprin, "one male dredged off Shelly Bay," and by Ortmann. Whitfield collection.

Distribution: Florida Keys; West Indies.

16. **Xantho denticulata** White.

White, Ann. and Mag. Nat. Hist. Ser. 2, II., p. 285, 1849.

1 ♂, Cooper's Island, '97.

Reported from Bermuda by J. M. Jones; Goode collection.

Distribution: West Indies; Mexico; Brazil.

* 17. **Lophactaea lobata** (Milne-Edwards).

Goode collection.

Distribution: Florida Keys; West Indies.

* 18. **Lobopilumnus agassizii** Stimpson.

Reported by Heilprin; Goode collection.

Distribution: Florida.

PORTUNIDAE.

19. **Callinectes ornatus** Ordway.

Ordway, Boston Jour. Nat. Hist., VII., p. 571, 1863.

1 ♂ spurious, 4 ♀. Bailey's Bay at low tide, '97 and '98.

Olive-green carapace, appendages marked with blue.

Reported from Bermuda by J. M. Jones; Goode collection.

Distribution: South Carolina to Brazil; West Indies.

* 20. **Callinectes sapidus** Rathbun.

Reported by Rathbun in Proc. U. S. Nat. Mus., XVIII., p. 352, 1896.

J. M. Jones reports *Lupa diacantha*.

Distribution : Cape Cod to Texas ; Jamaica ; Brazil.

21. **Neptunus anceps** De Saussure.

H. de Saussure, Crust. Nouv. des Antilles et du Mexique, in Mém. de la Soc. Phys. Hist. Nat., Genève, XIV., p. 434, pl. II., fig. 11, 1858.

1 ♀, Cooper Island, '97. Length 18 mm., width 30 mm. Heilprin in his list, gives *N. hastatus* which is a Mediterranean species. A. Milne-Edwards in his key to the species of *Neptunus* (Arch. Mus. H. N. Paris, t. X., p. 326, 1861), makes the difference between *N. hastatus* and *N. anceps* consist in the breadth of the last two segments of the male abdomen. As my single specimen is a female I cannot verify this statement, but have no doubt that the Bermuda form is *N. anceps*.

Distribution : "The Antilles, taken at Cuba," Saussure.

*22. **Neptunus sayi** (Gibbes).

Reported by Ortmann ; Goode collection.

Distribution : Atlantic coast of North America ; West Indies.

23. **Neptunus (Achelous) spinimanus** (Latreille).

Portunus spinimanus Latreille, Nouv. Dict. Hist. Nat., XXVIII., p. 47, 1819.

Achelous spinimanus A. M.-Edwards, Arch. Mus. H. N. Paris, X., p. 34, pl. 32, 1861.

The single specimen was presented to me by Rev. H. J. Wood of St. George, who had obtained it from some fishermen of St. David's, '97. The carapace is covered with a close drab-colored pubescence except on ridges which are smooth and brownish-red. Pereiopods marked with longitudinal white stripes. Length 60 mm. breadth 100 mm.

This species has not before been recorded from Bermuda and, according to Mr. Wood, had never before been observed.

Distribution : South Carolina to Brazil ; West Indies ; Chili. (A. M.-Edwards).

24. **Neptunus (Achelouïs) depressifrons** Stimpson.

Amphitrite depressifrons Stimpson, Ann. Lyc. Nat. Hist. N. Y., VII., p. 58, 1862.

Achelouïs depressifrons Stimpson, *ibid.*, p. 223.

1 ♀. Coney Island, in the sand at low tide, '98.

Color of carapace—above mottled like the sand, below, white, giving it a close resemblance to its environment. Small red markings on fingers of chelipeds and on propodos of second pereopods. Length, 14 mm.; breadth, 19 mm.

Reported by Miers, "an adult male"; Goode collection.

Distribution: South Carolina to Florida; West Indies.

* 25. **Portunus (Achelouïs) sebae** M.-Edwards.

Goode collection.

Distribution: Coast of North America.

INACHIDÆ.

* 26. **Podochela riisei** Stimpson.

Reported by Miers.

Distribution: West Indies and Brazil.

PERICERIDÆ.

27. **Macrocoeloma trispinosa** (Latreille).

Pisa trispinosa Latreille, Encyc. Méth. Hist. Nat., X., p. 142, 1825.

1 ♀. The cove at Coney Island, '98.

Reported by Miers—two specimens, and by Ortmann; Whitefield collection.

Distribution: North Carolina to Brazil; West Indies.

28. **Microphys bicornutus** (Latreille).

Pisa bicornuta Latreille, Encyc. Méth., X., p. 141, 1825.

Numerous specimens from Bailey's Bay, Castle Harbor, and White Island in Hamilton Harbor. Common.

Reported by Heilprin, Miers, J. M. Jones¹ and Ortmann.

Distribution: Florida to Brazil; West Indies.

¹ Jones reports, "*Pericera cornuta*, from fish pots." It is probable that *Microphys bicornutus* is meant.

29. **Mithrax hirsutipes** (Kingsley).

Mithraculus hirsutipes Kingsley, Proc. Ac. Nat. Sci. Phil., p. 389, pl. 14, fig. 1, 1879.

Mithraculus forceps A. Milne-Edwards, Miss. Sci. au Mexique, pt. 5, I., p. 109, (?) 1880.

Numerous specimens from Castle Harbor in tide pools, and dredged, '97 and '98.

This and *Pachygrapsus transversus* were the most common species noted.

I consider that the name *M. hirsutipes* should take precedence over *M. forceps* as the latter does not seem to have been published until 1880, although the "Mission scientifique," in which the name appears, bears the date on the title page of 1875.

Reported by Heilprin (3 specimens), Miers (1 specimen) and Ortmann; Goode and Whitfield collections.

Distribution: North Carolina to Brazil; West Indies.

* 30. **Mithrax hispidus** (Herbst).

Goode collection.

Distribution: Florida to Brazil; West Indies.

* 31. **Mithrax (Nemausa) rostrata** A. M.-Edwards.

Reported by Miers.

Distribution: Gulf of Mexico.

CALAPPIDÆ.

32. **Calappa flammea** (Herbst).

Cancer flammea Herbst, Natur. Krabben u. Krebsc, II., p. 161, 1793.

Miers, Challenger Brachyura, p. 284 (for synonymy).

4 ♂, St. David Island, Coney Island and Bailey's Bay, in shallow water, '97 and '98. One was taken while exuviating; the crab was nearly buried in the sand, with the posterior margin of the carapace alone protruding.

Reported by Heilprin, Miers and Ortmann.

Distribution: North Carolina to Venezuela; West Indies; East Indies and Cape of Good Hope.

* 33. **Calappa gallus** (Herbst).

Reported by Miers.

Distribution: East and West Indies; Red Sea.

HIPPIDÆ.

34. **Remipes cubensis** Saussure.

Saussure, Rev. Mag. Zoöl., ser. 2, IX., p. 503, 1857.

Hippa scutellata (Fabricius), Sp. Ins., II., p. 474, 1793.

Eighteen specimens from the sandy beach of Cooper Island, '97.

Reported by Henderson. Jones reports "Hippa or sand-bug."

Distribution: American and African shores of Atlantic.

PORCELLANIDÆ.

35. **Petrolisthes armatus** (Gibbes).

Porcellana armata Gibbes, Proc. Am. As. Adv. Sci., III., p. 190, 1850.

Numerous specimens from under stones in tide pools. Castle Harbor, Bailey's Bay and Harrington Sound, '97 and '98.

The specimens present considerable variation in the color—dark-blue, speckled, reddish-white and slate.

Reported by Heilprin, Henderson, Ortmann.

Distribution: Circumtropical.

CÆNOBITIDÆ.

* 36. **Cænobita diogenes** (Latreille).

Reported by J. M. Jones, Heilprin; Goode collection.

Since leaving the Islands I have seen several living specimens from near the Flatts, but none were collected by the party.

Distribution: West Indies to Brazil.

37. PAGURIDÆ.

37. **Calcinus tibicen** (Herbst).

(Plate XVII., Fig. 1.)

Cancer tibicen Herbst, Naturg. Krab. u. Krebse, II., p. 25, pl. XXIII., fig. 6, 1796.

Pagurus sulcatus M.-Edwards, Hist. Nat. Crust., II., p. 230, 1834.

Not *Calcinus tibicen* (M.-Edwards), l. c. p. 229; Dana (Crust., p. 458); and authors.

The original description of *Cancer tibicen* by Herbst, as pointed out by Hilgendorf (see Henderson, Chal. Anomurá, p. 61.), agrees with the West Indian *C. sulcatus* (M.-Ed.); and the *C. tibicen*, as described by Milne-Edwards from the South Seas, is another species. I consider, therefore, that this Bermudan and West Indian form should take the name *C. tibicen* (Herbst), and that *C. sulcatus* (M.-Ed.) should be a synonym. Milne-Edwards' short description of *C. sulcatus* agrees well with my specimens, except that the furrow on the propodos of the third pereopod is placed by him, probably by mistake, on the *right side* instead of the *left*.

Heilprin, in his list, identifies his specimens as *C. obscurus* Stimp. (Annals Lyceum Nat. Hist. N. Y., VII., p. 83, 1862). As Stimpson's specimens are from Panama, and as he describes the ambulatory feet as "dark-olive, almost black," it is probable that these Bermuda forms should not be referred to *C. obscurus*. I add from my material a more complete description of the species:

Calcinus tibicen (Herbst).

Carapace and appendages minutely and closely punctate. Carapace and chelipeds reddish-brown, a darker area in center of tergum; back of cephalo-thoracic groove lighter, more or less mottled with dark spots; rostrum minute; optic peduncles above orange, slightly darker at ends, terminating distally with a white band; below of a lighter shade, longer than the peduncles of the inner antennæ. Ocular scales appressed, triangular, with red base and white tips; cornea black.

Inner antennæ: dark-brown peduncle and orange flagellum. Outer antennæ; basal joint and spine dark-red, distal joint and flagellum orange. First pair of pereopods: chelæ reddish-brown, tips of fingers white, somewhat excavated; the upper margin of smaller hand with blunt keel and without any serrations.

Second and third pairs of pereiopods slightly lighter in color than the first; propodos with only a few hairs at its distal end, yellowish-white; dactyl of same color but with a median circular band of reddish-brown and a black tip. On the outer surface of the propodos of the third pereiopod of the *left side* is a broad and shallow, but well marked, longitudinal furrow.

Eight specimens, several with ova. In various gastropod shells, found under stones on shore of Castle Harbor and dredged in the channel, '97.

Distribution: West Indies.

38. *Clibanarius tricolor* (Gibbes).

Pagurus tricolor Gibbes, Proc. Am. As. Adv. Sci., III., p. 189, 1850.

Numerous specimens in various small spiral shells from Bailey's Bay and Castle Harbor '97 and '98. Several specimens were collected which had adopted the shell of the Pulmonate, *Bulinus decollatus*, as their habitation.

This brightly colored and very active little hermit crab is very abundant among the stones in tide-pools.

Reported by Heilprin; Goode collection.

Distribution: Florida and West Indies.

SCYLLARIDÆ.

39. *Scyllarus æquinoctialis* Lund.

Lund, Skrivter Naturh. Selsk., II., pt. 2, p. 21. Copenhagen 1793.

Three specimens, 2 ♂, 1 ♀, bought from fishermen were sent alive to the New York Aquarium in '97, but did not survive.

Heilprin reports a *Scyllarus sculptus* M.-Edwards, purchased at the Crawl. My specimens differ from M.-Edwards' description of *S. sculptus* in the lack of the median spines and it is probable that *S. æquinoctialis*—the common West Indian form, is the one reported by Heilprin rather than *S. sculptus*.

Reported also by J. M. Jones.

Distribution: West Indies to Brazil.

PALINURIDÆ.

40. **Palinurus argus** (Latreille).

Palinurus argus Latreille ; Milne-Edwards, Hist. Nat. Crust., II., p. 300, 1837.

2 ♂ juv. Locality not noted, '97. Two adult specimens were sent to the N. Y. Aquarium for exhibition, but did not survive the journey. This is the "lobster" of the Bermudas ; its large size and brilliant coloring make it by far the most striking of the Bermuda Crustacea.

Heilprin reports "*Palinurus americanus* Lamk., the large Bermuda Crayfish." As he says however that "I am unable to state positively if the species is correctly referred," it is probable that his species should also be *P. argus*.

Reported also by Jones ; Whitfield collection.

Distribution : Florida Keys ; West Indies to Brazil.

STENOPIDÆ.

*41. **Stenopus hispidus** (Latreille).

Reported by Spence Bate.

Distribution : warm waters of both hemispheres.

NIKIDÆ.

42. **Nika bermudensis** n. sp.

(Plate XVII., Fig. 2.)

Three specimens, 2 ♀ with ova, 1 ♂. Harrington Sound, dredged at a depth of one fathom in clean white sand, '98. I am indebted to Mr. F. W. Carpenter of New York University for these specimens.

Rostrum one-third the length of the cephalo-thorax, somewhat shorter than the ophthalmopoda, spiniform, not extending backward as a keel, bifid at apex, the lower tooth being the longer, projecting beyond the teeth on both sides are two hairs.

Anterior margin of carapace produced into a small rounded antennal angle, not spiniform, no ocular tooth. Fronto-lateral angle rounded.

First pair of antennæ: basal joint of pedicel reaches beyond the tip of rostrum, second and third joints together not so long as the first, third a little shorter than the second; outer flagellum robust, equal in length to the pedicel, basal two-thirds fringed with long cilia; inner flagellum slender, rather more than twice the length of outer.

Second pair of antennæ: scaphocerite almost as long as the pedicel of the inner antennæ, a spine on its distal, outer angle; flagellum a little longer than the body.

Third pair of maxillipedes: the two terminal joints together a little shorter than the antepenultimate; distal end of penultimate reaches the tip of pedicel of inner antennæ.

First pair of pereopods: robust, shorter than the third maxillipede, that on the left side terminates in a claw, on the right side in a small chela; the three terminal segments together equal in length to the meros. Second pair of pereopods: very slender and chelate, that on the left side, when extended, reaches slightly beyond third maxillipede, that on the right side about one-third longer; a bunch of fine hairs at the base of the hand; carpus multiarticulate; the ischium of both limbs has a sheath-like posterior outgrowth. Third, fourth and fifth pairs of pereopods long and slender, terminating in sharp claws, each of which has a bunch of fine hairs at its base and a few minute hairs near the tip; third and fifth pairs sub-equal, fourth noticeably longer, principally on account of the greater relative length of the meros and carpus so that the dactyl and part of the propodus reach beyond the end of the third and fourth; meros of the third pair has five backwardly projecting spines.

Telson: tapering to the apex, which terminates in a spine on either side; dorsal surface grooved, with two pairs of dorsal spines.

Total length of a female, 14 mm., cephalo-thorax, 9 mm.

This is the first recorded appearance of a *Nika* in the western Atlantic. The five described species of the genus are as follows:

1. *Nika edulis* Risso (Hist. Nat. Crust., Nice, p. 85, pl. 3, fig. 3, 1816). = *Processa canaliculata* Leach (Malacost, Pod. Brit., pl. I. 1818), Seas of Europe, Madeira, Cape Verde, Japan.

2. *N. japonica* De Haan (Fauna Japonica, pl. 46, fig. 6, 1850). East Coast of Asia.
3. *N. hawaiiensis* Dana (U. S. Expl. Ex., Crustacea, p. 538, 1852). Hawaii.
4. *N. macrognatha* Stimpson (Proc. Phil. Ac., p. 27, 1860). Hong-Kong.
5. *N. processa* Spence Bate (Challenger, Macrura, p. 527, pl. 95, 1888). Amboina.

The more marked differences between the Bermuda species and the others are the following: *N. edulis* has a keel on the rostrum; in *N. hawaiiensis* the rostrum is broad and triangular; *N. japonica* has no spines on the upper surface of the telson; *N. macrognatha* has smaller eyes and longer maxillipedes; *N. processa*, to which the new species is most closely allied, has a longer rostrum, longer maxillipedes and pereopods, the carpus of the 3d, 4th and 5th pereopods is equal to the meros and ischium together (in *N. bermudensis* the carpus is equal only to the meros), the second joint of the pedicel of inner antennæ is relatively longer than in *N. bermudensis*, where it very slightly exceeds in length the terminal joint.

From all these species *N. bermudensis* differs in having a bifid rostrum.

PALEMONTIDE.

43. *Palæmonella tenuipes* Dana.

Dana, Crust. U. S. Expl. Ex., p. 582, pl. 38, fig. 3, 1852.

1 ♂, 1 ♀ with ova. Broken out of coral rock in Castle Harbor, 6-8 feet, '97.

These two specimens belong, no doubt, to the same species as those dredged by Heilprin in Shelly Bay and referred by him to Dana's *P. tenuipes* from the Sooloo Sea. I note eight dorsal spines on rostrum instead of seven, and no spines on carpus of the second pereopod. Probably a new species should be made for this Bermuda form.

44. *Leander natator* (Milne-Edwards).

Palæmon natator M.-Edwards, Hist. Nat. Crust., II., p. 393, 1837.

This single specimen was found in '97, in a tide pool at Castle Island under masses of Sargassum with which it had undoubtedly reached the island, as it is a sargassum-living form and is so distributed throughout the warmer seas. I find on the rostrum eleven dorsal, and four ventral teeth.

Not before reported from the Bermudas.

45. **Leander affinis** (Milne-Edwards).

Palæmon affinis Milne-Edwards, Hist. Nat. Crust., II., p. 391, 1837.

Numerous specimens, usually with ova. Very common in pools among the rocks on the shores of Castle Harbor, '97 and '98.

As noted by Heilprin the number of rostral teeth varies considerably. The only difference from Spence Bate's description (Chal., Macrura, p. 782) of his Australian form seems to be that in the Bermuda form the ocellus is not clearly distinct from the cornea of the eye, as Spence Bate gives it, but lies just within its margin.

Reported by Heilprin and Ortmann; and by J. M. Jones as *Palæmon vulgaris*.

Distribution: New Zealand (Dana); Port Jackson (Bate).

ALPHEIDÆ.

46. **Alpheus edwardsii** (Audouin).

(Plate XVII., Fig. 3.)

Athanas edwardsii Audouin, Planches de la description de l'Égypte par M. Savigny, Crust. pl. X., fig. 1, 1810.

Three specimens from Castle Harbor, '97.

Reported by Heilprin and Ortmann.

Distribution: Circumtropical.

47. **Alpheus hipbothoë** de Man. var. **bahamensis** Rankin.

Rankin, Annals N. Y. Acad. Sci., XI., p. 247, pl. XXX., fig. 5, 1898.

Four specimens, St. David Island, in tide pools, '97.

These specimens have the characteristic blue tips of the fingers.
New to Bermuda.

Distribution : Bahamas.

48. **Alpheus bermudensis** Spence Bate.

(Plate XVII., Fig. 4.)

Spence Bate, Challenger, Macrura, p. 547, pl. 98, fig. 3, 1888.

(a) 3 specimens from dredger, '97. (b) 9 specimens from Bailey's Bay, under rocks at low tide, '98. (c) 2 specimens dredged in 1-2 fathoms at the Flatts, '98.

Heilprin considers that *A. bermudensis* is the same as *A. avarus* Fabr. and *A. edwardsii* Audouin. The synonymy of the two latter is probable; but there are well marked differences in specimens of the same size of *A. bermudensis* and *A. edwardsii*. In *A. edwardsii* there is a deep transverse constriction in the larger chela above and below; in *A. bermudensis* only above as shown in the figure (plate XVII., fig. 4). A deep longitudinal furrow is on the inner side near the upper surface of *A. bermudensis*, none in *A. edwardsii* (cf. fig. 3). The dactyl is longer and less sickle-shaped in *A. edwardsii*, and on the meros is a spine at the distal inner end. The carpal joints of the second pereiopods also differ, the first in *A. bermudensis* being shorter than the second, instead of longer, while the third and fourth are proportionately shorter than is the case in *A. edwardsii*. The small chela of *A. bermudensis* is very much smaller than the large; the fingers are about the length of the palm, slightly gaping, as the dactyl has a long slight curve.

Reported by Heilprin and Spence Bate, who also had a specimen from St. Thomas, W. I.

49. **Alpheus minor** Say.

Say, Jour. Acad. Nat. Sci. Phil., I., p. 245, 1818.

Numerous specimens from the dredger, '97, and broken out of coral rock in Castle Harbor, '97 and '98.

Reported by Heilprin and Ortmann.

Distribution : Virginia to Panama; West Indies; west coast Central America.

50. **Alpheus candei** Guerin.

Guerin, in Sagra's Histoire de l'isle de Cuba, Paris, p. L, pl. II., fig. 9, 1857.

Alpheus transverso-dactylus Kingsley, Bull. U. S. Geol. Survey, IV. (no. I.), p. 196, 1878.

Seven specimens of a yellowish-green color with darker green carapace broken out of coral rock in Castle Harbor '97 and '98.

The description given by Kingsley (l. c. supra) of specimens from California corresponds very closely to Guerin's figure of his specimens from the coast of Cuba and to my material from Bermuda. I think there can be no doubt that *A. transverso-dactylus* Kingsley should be considered as a synonym of *A. candei* Guerin. Kingsley himself says "I cannot separate from this, i. e., the Californian *A. transverso-dactylus*, two specimens from Bermuda, one collected by J. M. Jones and the other by G. Brown Goode." This species comes near *A. streptochirus* Stimp. from the Cape Verde Islands.

Reported by Kingsley from Goode and Jones collections.

Distribution: California; West Indies.

51. **Alpheus lancirostris** n. sp.

(Plate XVII., Fig. 5.)

Nineteen specimens, 11 ♂, 8 ♀; two from dredger '97, the remainder from under stones in Bailey's Bay, at low tide, '98.

Carapace smooth. Rostrum prominent, laterally compressed and slightly bent down at tip, extending backward as a sharp lance-like keel to the posterior region of cornea where it broadens out to a triangular base; the keel is separated from the ocular lobes by a broad and well marked sulcus. Ocular lobes prominent dorsally; no spine, but slightly angular anteriorly.

Inner antennæ: basal joint of peduncle reaching to the tip of rostrum, with a sharp spine equal in length to the basal joint; two following joints cylindrical, the third half the length of second; upper flagellum short and stout, tipped with a long pencil of hair; inner flagellum rather more than twice the length of outer. Outer antennæ: basal joint of peduncle with short spine;

scaphocerite slightly longer than peduncle, ends in a stout spine, lamellar portion narrowed at base; flagellum nearly twice the length of the longer flagellum of inner antennæ, about equal to the body length.

First pair of pereopods: meros triangular in cross section, a spine at the distal end of the inner lower margin; carpus short; large hand much swollen, a deep narrow sulcus on upper margin, a depression on inner lateral surface running backwards and downwards from this, a shallower depression on the outer surface; a sulcus on the lower margin constricts the palma sharply from the thumb; dactyl strongly arched, very little longer than the thumb; articulation vertical; tip of dactyl and of thumb calcareous; scattered hairs on hand and dactyl; the whole aspect of the large hand, which appears to be always on the right side, is very similar to that of *A. edwardsii* (cf. pl. XVII, fig. 3); small hand cylindrical, long and slender, fingers nearly straight, as long as palma, slightly hairy.

Second pair of pereopods: carpus five-articulate; first and second joints subequal, third and fourth equal, together about the length of fifth, which is shorter than the second; hand slightly longer than fifth carpal joint.

Third and fourth pairs of pereopods similar, no meral spine. Fifth pair of pereopods more slender than fourth. Propodos of third, fourth and fifth pairs fringed with small spines; their dactyls slender and sharp.

Pleopods slender; in the females loaded with well developed ova. Telson rounded at distal extremity, lateral margins slightly concave; two small spines on each side of median line of dorsal surface. Uropods rounded at distal end; outer one with well-marked dieresis; the outer angle of proximal portion is marked by a minute spine and a longer articulated one is median to this.

Color of fresh specimens: three broad, transverse bands of brown on the carapace and one on each segment of the abdomen; antennæ and margins of the telson and uropods orange; pereopods yellow; large chela spotted with brown and with an orange area on the inner side; ends of fingers white. In alcohol the species is characterized by alternate bands of pink and white, while the chelæ are mottled with blue.

The affinities of the new species are with *A. intrinsicus* Spence Bate from Bahia (Chal., Macr., p. 557. pl. III., fig. 1). In both the rostrum is broad and flat at the proximal end and the sharp keel is separated from the eyes by a deep and wide sulcus, but in the new species the broadening of the keel of the rostrum towards its distal end is not so prominent, and the sharp spines on the inner dorsal surface of the ocular lobes are wanting. The teeth on the large chela of *A. intrinsicus* are wanting in the new species, and also the meral spines of the third and fourth pereopods. The carpus of the second pair of pereopods is five-jointed in the new species, six-jointed (according to Spence Bate's figure and description) in *A. intrinsicus*.

Measurements of large ♀: total length, 45 mm.; length of carapace, 15 mm.; of large chela, 21 mm.; of small chela, 13 mm.

52. ***Alpheus websteri*** Kingsley.

Kingsley, Proc. Ac. Nat. Sci. Phil., p. 416, 1879.

Five specimens, dredged in channel, 6 fathoms, '97.

This is probably the same as *A. formosus* Gibbes (Proc. A. A. A. S. III. p. 196, 1850), though as I am in doubt about the exact synonymy I retain provisionally the name above.

The small black spines of the uropods noted by Kingsley serve readily to identify this species. The triangular rostrum with the lateral sulci clearly distinguish it from *A. minor*, and place it in the same group with the new species.

The specimens were at first marked by a white band along the median dorsal surface and a wavy line on each side.

Heilprin reports one specimen of *A. formosus* Gibbes, obtained by dredging.

Distribution: Florida and West Indies.

PENEIDÆ.

53. ***Sicyonia carinata*** (Olivier) (?).

(Plate XVII., Fig. 6.)

Palaemon carinatus Olivier, Encyclop., t. VIII., p. 667, 1811.

Sicyonia carinata Milne-Edwards, Ann. Sci. Nat., ser. I., XIX., p. 344, pl. IX., fig. 9, 1830.

Sicyonia carinata Spence Bate, Challenger, Macrura, p. 294, pl. XLIII., figs. 2, 3, 1888.

Two damaged specimens. Harrington Sound, dredged in clean white sand with *Nika bermudensis*, 1 fathom. I am indebted to Mr. F. W. Carpenter, of the New York University, for the specimens dredged at this place in July, '98.

The specimens come near to, and perhaps are, the *S. carinata* Olivier, the only species of *Sicyonia* reported from the West Atlantic region. My specimens differ from the figures of Spence Bate and Milne-Edwards (cf. fig. 6) in the position of the rostral teeth, mine having four teeth close together on the dorsal surface of rostrum and none below. One other tooth is posterior to the gastric region. As the thoracic appendages are entirely wanting I am not able to make a careful comparison of the forms and leave the Bermuda species for the present as *S. carinata*.

Reported by Ortmann. 1 ♀.

Distribution: St. Thomas, W. I., and Brazil.

* 54. **Penæus constrictus** Stimpson.

Reported by Ortmann; Goode collection.

Distribution: Coast of North and South Carolina.

* 55. **Penæus velutinus** Dana.

Reported by Heilprin.

Distribution: Pacific.

* 56. **Pandalus tenuicornus**.

Goode collection.

PHYLLOCARIDA.

57. **Paranebalia longipes** (Willemoes Suhm).

Nebalia longipes Willemoes Suhm, Trans. Linn. Soc. Lond., ser. 2, I., p. 26, pl. VI., 1879.

Paranebalia longipes Sars, Report on the Phyllocarida, in Challenger Report, p. 10, 1887.

Two specimens, ♀, dredged at the Flatts, 1 to 2 fathoms in clean sand, '98.

The type specimens of the Challenger expedition came from Bermuda in Harrington sound. Also collected there by Dr. Goode.

Not reported from other localities.

STOMATOPODA.

58. **Pseudosquilla ciliata** Miers.

Miers, Ann. and Mag. Nat. Hist. ser. 5, V., p. 108, pl. III., figs. 7 and 8, 1880.

One specimen from dredger, '97.

Reported from Bermuda by Bigelow in Proc. U. S. Nat. Mus., vol. XVII., p. 499, 1894.

Distribution: Atlantic and Pacific.

59. **Gonodactylus ørstedii** Hansen.

Hansen, Isopoden, Cumaceen und Stomatopoden der Plankton-expedition, 1895, p. 65.

G. chiragra Fabricius (in part), Ent. Sys., II., p. 513, 1793.

Five specimens, broken from coral rock, Castle Harbor and Bailey's Bay, '97 and '98.

Reported by Heilprin, one specimen from Flatts; Brooks and J. M. Jones; Goode collection.

Distribution: West Indies; Florida to Brazil.

CIRRIPIEDIA.

60. **Lepas anatifera** Linnæus.

Linnæus, Systema Naturæ, 1767.

Darwin, Monograph on Cirripedia, Lepadidæ, p. 73, 1851.

Several dried specimens from a log cast on the shore, '98.

Distribution: Common in all waters.

61. **Lepas pectinata** Spengler.

Spengler, Skrift. Nat. Sels., II, p. 106, 1793.

Darwin, Monograph on Cirripedia, Lepadidæ, p. 85, 1851.

One specimen attached to sargassum in water near North Rock, '98.

Distribution: Atlantic and Mediterranean waters.

PRINCETON UNIVERSITY, May, 1899.



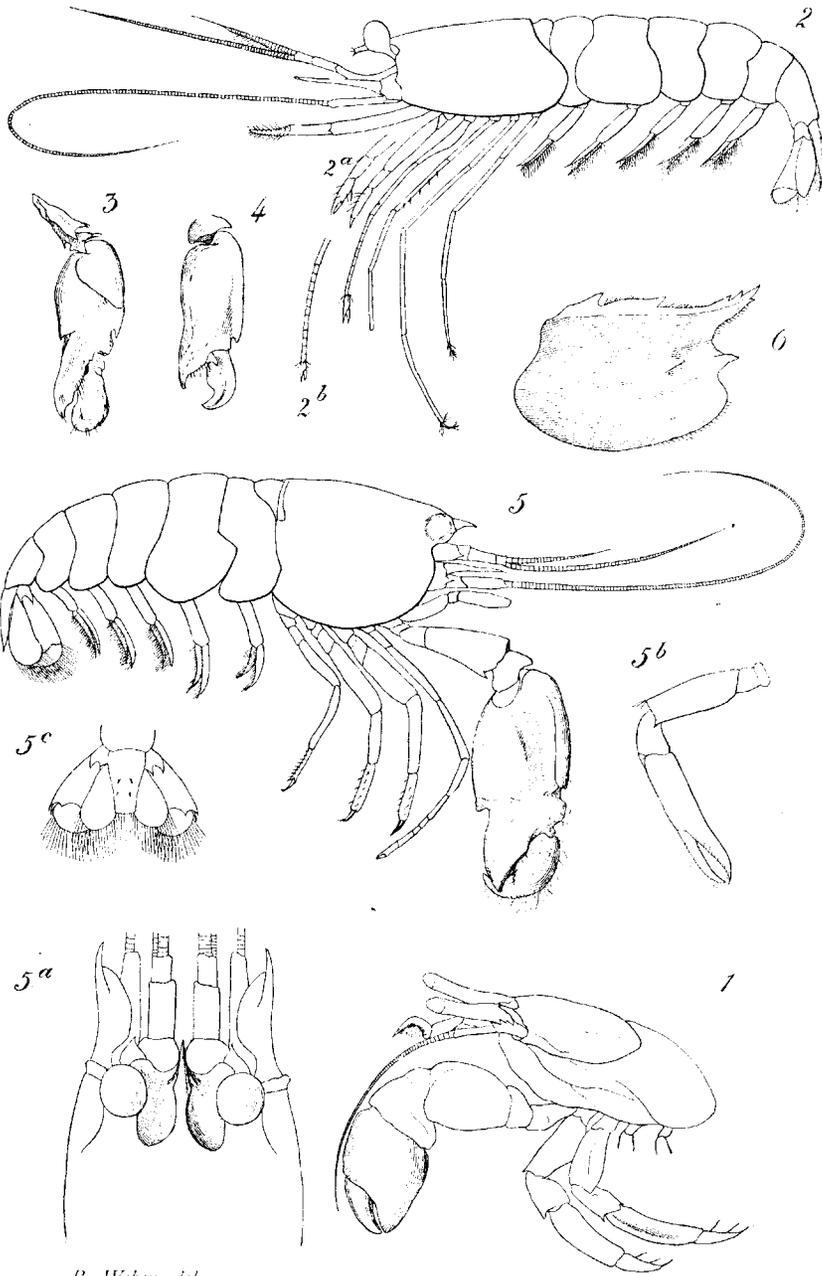
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PLATE XVII.

BERMUDA CRUSTACEA.

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R. Weber, del.

