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Contribution from the United States Fisheries Biological Station, Beaufort, N. C.

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THE DECAPOD CRUSTACEANS OF BEAUFORT, N. C., AND THE SURROUNDING REGION.

By W. P. HAY and C. A. SHORE.

Contribution from the United States Fisheries Biological Station, Beaufort, N. C.

INTRODUCTION.

The following report on the decapod crustaceans of the region surrounding Beaufort, N. C., was begun by the junior author in 1904, while a student in the University of North Carolina, and was worked on actively for three years. During that time the crustacean material which had accumulated at the United States fisheries laboratory was studied and identified, much collecting was done and descriptions of most of the species known to occur in the region were prepared for publication. An extensive series of photographs was also made for the purpose of illustrating the paper.

At this point other duties intervened and made it necessary to permanently abandon all hope of completing the report.

In 1912 the senior author took up the work. It was hoped at first to bring the paper to an early conclusion, but it soon became evident that several seasons' work would be required to produce a satisfactory result. The nomenclature and synonymy of the species already described had to be brought up to date, the rather extensive collections of five or six years had to be worked over, and numerous additional descriptions and photographs had to be prepared. As the work progressed it became clearly evident that the needs of the student of crustaceans would be best served by the preparation of entirely new and uniform descriptions of all the species. Although this involved the rewriting of all the descriptions of the junior author and the preparation of a new series of photographs, the task was undertaken and pushed forward as rapidly as other duties would permit. It is now brought to a conclusion with the belief that future collecting will add but few species to the list.

The growth of our knowledge of the crustacean fauna of the Beaufort region has been slow and extends over many years. The first collector, of whose work we have a record, was William Stimpson, who visited Beaufort, in company with T. N. Gill, in 1860. In his brief account of this trip[a] he gives a list of 38 species of decapod crustaceans which he had collected. In 1871 Elliott Coues, at that time an Army surgeon, stationed at Fort Macon, published the second of his "Notes on the fauna of Fort Macon, N. C., and vicinity (No. 2)"[b] which included a list of 27 species of decapods,

a Amer. Jour. Sciences and Arts, series 2, vol. XXIX, p. 442–445. 1860.
b Proc. Acad. Nat. Sci. Phil., vol. XXIII, p. 120–124. 1871.

8 of which were additions to Stimpson's list. Seven years later Coues and Yarrow, in the fifth installment of "Notes on the fauna of Fort Macon, N. C., and vicinity (No. 5)"[a] gave a short list of 6 species, 2 of which had not appeared in any previous list. An appendix to the same paper, by J. S. Kingsley, entitled "A list of the decapod crustaceans of the Atlantic coast whose range embraces Fort Macon,"[b] included 63 species, of which 51 were definitely credited to Beaufort or Fort Macon and 3 were additions to the fauna. A year later the same author published a paper under the title, "On a collection of crustaceans from Virginia, North Carolina, and Florida, with a revision of the genera of Crangonidæ and Palæmonidæ"[c] in which he mentions 36 species as having come from Beaufort or Fort Macon. Of these, 8 were new records.

The collection which was the subject of Kingsley's report had been made by Prof. H. E. Webster, of Union College. It was later transferred, in part at least, to the United States National Museum and supplied the types of *Lepidopa websteri* Benedict and *Pinnixa cristata* Rathbun, both of which were collected near Beaufort.

During the years that Johns Hopkins University maintained its seaside laboratory at Beaufort, the crustaceans were studied by Dr. Brooks and a number of his students. A great deal was added to the knowledge of the habits and development of some of the species, but only one or two new ones were added to the fauna.[d]

The manuscript of the junior author included 87 species, but he omitted 8 which had been listed by the writers already mentioned. His additions to the fauna were 33 species, making a total of 95 species for the Beaufort region.

The careful and systematic survey of the offshore fishing banks by the steamer *Fish Hawk* during the summers of 1914 and 1915, energetic shore and shallow water collecting by parties from the laboratory and the inclusion of the fresh-water species of the region have enabled the senior author to add 57 species to those already known, and the detection by Dr. Mary J. Rathbun of a hitherto unknown species of *Parapinnixa* brings the total to 153.

The status of some of these species may justly be questioned, but it has been thought advisable to include all that have been reported from the region and all which, from what is known of their habits and distribution, are reasonably certain, sooner or later, to fall into the hands of the collector. There are also included several species which are perhaps, strictly speaking, deep-water forms ranging well beyond the 50-fathom line. In nearly all cases, however, they are represented in our collections by specimens from shallower water or are known to enter shallower water in localities not far to the north or to the south. The report thus becomes virtually a descriptive list of the decapod crustaceans of the Middle Atlantic coast, and, to a large measure, fills the gap between the various lists of New England, New York, and New Jersey crustaceans, and the Porto Rican fauna described by Dr. Mary J. Rathbun. It includes a large proportion of the species whose northern limit of distribution has been supposed to be in the neighborhood of Charleston, S. C., together with many that, up to the present, have not been known north of Florida or the West Indies.

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[a] Proc. Acad. Nat Sci. Phil., vol. xxx, p. 297–315. 1878.

[b] Ibid., p. 316–330.

[c] Proc. Acad. Nat. Sci. Phil., vol. xxxi, p. 383–427, pl. 14. 1879.

[d] *Stenopus hispidus*, the larval form of which was reported by Brooks and Herrick (Mem. Nat. Acad. Sci., v, 339–352) is not included in the present paper. The adult has not been collected north of the Bahamas.

The general aspect of the decapod fauna of the Beaufort region is subtropical. Unquestionably the great influx of species have been from the south, and the comparatively few northern ones that occur are evidently at a disadvantage. The Gulf Stream sweeping up along the coast at no great distance from the shore has doubtless been the route by which numerous crustaceans, often in the larval stages, have come northward. Some of these have been able to establish themselves while others are more or less regularly replaced by new individuals as the old ones are killed during the colder months of the year. The offshore fishing banks [a] offer peculiarly favorable conditions for the life of these tropical species of crustaceans, and of fishes, echinoderms, cœlenterates, and sponges as well, and have yielded some 30 species of decapods which have rarely, if ever, been taken closer to the shore.

The Gulf Stream and the prevailing south and southeast winds bring to the region, and often into the harbor, great quantities of drifting *Sargassum* among which large numbers of the smaller pelagic crabs and shrimps have taken shelter. In nearly all cases, the females of these species are laden with eggs, but it is probable that few if any of these survive the journey into the shallower and quieter waters along the coast. Some of the pelagic species, however, are so constant in their occurrence and their larval forms are so frequently met with that it is evident that they breed at no great distance from, if not within, the region.

For the truly local fauna, comprising the species that are firmly established and which can readily be obtained by ordinary methods of collecting, the shallow waters of the sounds and Beaufort Harbor, with their broad expanses of sand and mud flats, and the salt marshes which extend for miles along their margins offer an ideal home. The shrimps and swimming crabs are found in abundance in the deeper waters or among the eel grass near the marshes. Mud crabs and various burrowing species occur on the muddy bottoms, and myriads of fiddler crabs are to be seen on the mud flats along the margin of the marshes at low tide. In certain parts of the harbor there are areas of shelly bottom of considerable extent, and it is in such places that shrimps of the genus *Sicyonia* and crabs of the genera *Lithadia*, *Spelæophorus* and *Heterocrypta* occur. On the sandy bottoms the purse crabs (*Persephona*) and the box crabs (*Hepatus*) are occasionally found along with numbers of lady crabs (*Ovalipes*) and blue crabs, both *Callinectes sapidus* and *C. ornatus*. The sand flats, especially if there is an admixture of mud, are good collecting grounds for the burrowing and commensal species such as *Upogebia affinis*, *Polyonyx macrocheles*, and the various species of *Pinnixa*. Among the beds of oyster shells *Upogebia* and the species of *Crangon* are to be found. The sandy shores support such species as *Emerita talpoida*, *Albunea gibbesii*, and *Arenæus cribrarius*. These same shores, but in their higher levels, are inhabited by great numbers of the sand crabs (*Ocypode albicans*) whose curious appearance is certain to command the attention of even the most unobservant visitor and whose fleetness of foot will astonish him. About the rock jetties and the wharves the agile wharf crabs (*Sesarma cinerea*) are always in evidence. The fresh waters of the region have been very inadequately explored but it may safely be said that not more than the three species of crawfishes and one species of shrimp described in this paper will be found there.

[a] The location and character of these banks have been described by Radcliffe, Bureau of Fisheries, Economic Circular No. 8.

In questions of nomenclature the authors have adhered rigidly to the "Code of Nomenclature" of the American Ornithologists' Union.

As is usual in papers of this nature, the synonymies of this paper have proved to be one of the most difficult and laborious parts of its preparation. It has been found impracticable to include citations to all the literature, but such citations as are given have been carefully verified and a conscientious effort has been made to include all that may be of value and to exclude all that have no special bearing on the question at hand.

The classification adopted is that of Borradaile [a] and the characters of the families, suborders, and tribes have been taken almost bodily from his paper. The sequence of families and genera follows the one adopted by the United States National Museum.

As far as possible the important diagnostic characters of the families and genera have been incorporated in the keys and are often repeated, in part, in the species descriptions. In addition to this, because of the somewhat new classification that has been adopted, brief diagnoses of the families and higher groups have been included in

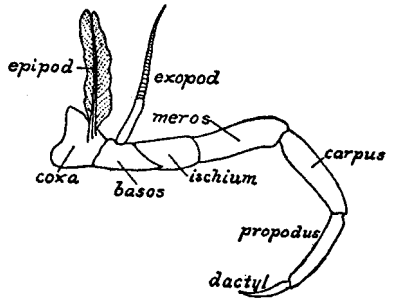

FIG. 1.—A crustacean leg showing epipod and exopod.

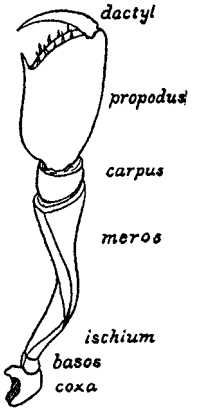

FIG. 2.—A subchelate limb of a crustacean.

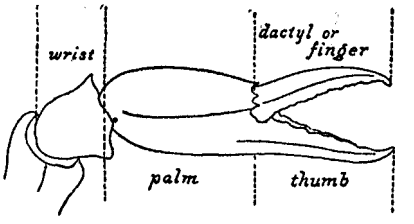

FIG. 3.—Chela of a crab.

the body of the paper. It has not been thought necessary to include diagnoses of the genera as most of these have been sufficiently defined in Dr. Rathbun's report on the Brachyura and Macrura of Porto Rico, a paper which should be in the hands of anyone who attempts to work with the decapod crustaceans of our southern coast.

Throughout the progress of their work, both authors have received the assistance of their associates in the Beaufort laboratory and the permanent force at the station on occasions too numerous and in ways too varied to be itemized. It is a pleasure, however, to acknowledge the many evidences of friendly interest that have been shown. In a more definite manner we are under many obligations to the Division of Marine Invertebrates of the United States National Museum, where Dr. Mary J. Rathbun, Dr. J. E. Benedict, and Mr. Waldo L. Schmitt have given us invaluable assistance. Through their kindness it has been possible to compare our materials with the accurately labeled specimens in the National Museum, to consult literature that otherwise would have been obtained only with great difficulty, and to obtain a final settlement of numerous perplexing questions of identification and nomenclature.

[a] Annals and Magazine of Natural History, ser. 7, vol. XIX, p. 457-486. 1907.

KEY TO THE FAMILIES OF DECAPOD CRUSTACEANS WHICH ARE REPRESENTED IN THE BEAUFORT REGION.

a. General form shrimplike—the abdomen well developed and, usually, with the cephalothorax also, compressed; pleopods always present in full number and used for swimming..(Suborder *Natantia*).

b. Pleura of second segment of abdomen not overlapping those of the first segment..(Tribe *Peneidea*).

c. First three pairs of legs chelate; all of the legs well developed.....Family PENEIDÆ (p. 377).

cc. None of the legs chelate; last two pairs of legs small or wanting....Family SERGESTIDÆ (p. 381).

bb. Pleura of second segment of abdomen overlapping those of the first segment....(Tribe *Caridea*).

c. Carpus of second pair of legs subdivided into two or more articles.

d. Eyestalks short and usually covered by the carapace; first pair of legs stronger than the second pair.....Family CRANGONIDÆ (p. 382).

dd. Eyestalks of medium length or long, not covered by the carapace; first pair of legs not stronger than the second pair.

e. Rostrum small or wanting; eyestalks very long and slender; first two pairs of legs subequal.....Family OGYRIDÆ (p. 388).

ee. Rostrum well developed; eyestalks not abnormally lengthened; second pair of legs usually longer or stronger than first pair.....Family HIPPOLYTIDÆ (p. 390).

cc. Carpus of second pair of legs not subdivided.

d. Rostrum well developed and compressed; first pair of legs not subchelate.

e. Third pair of maxillipeds pediform; body slender.....Family PALÆMONIDÆ (p. 392).

ee. Third pair of maxillipeds very broad; body short and thick. Family GNATHOPHYLLIDÆ (p. 395).

dd. Rostrum short; not compressed; first pair of legs subchelate.....Family CRAGONIDÆ (p. 396).

aa. General form lobsterlike or crablike—the abdomen may be well developed or greatly reduced in size, but in either case it, and, usually, the cephalothorax also is depressed; pleopods reduced or absent, not used for swimming.....(Suborder *Reptantia*).

b. Abdomen extended, symmetrical, well armored, with well-developed pleura and broad tail fin; third pair of legs like the first, either chelate or simple; branchiæ numerous.

c. Rostrum small or wanting; exopodites of uropods not sharply divided into two parts (Section *Palinura*).

d. Body subcylindrical; antennæ with strongly developed flagella..Family PALINURIDÆ (p. 398).

dd. Body strongly depressed; antennæ short, squamiform.....Family SCYLLARIDÆ (p. 398).

cc. Rostrum well developed; exopodites of uropods divided into two parts by a suture (Section *Astacura*).

d. Marine species; last segment of thorax coalesced with the one in front of it Family HOMARIDÆ (p. 399).

dd. Fresh-water species; last segment of thorax not coalesced with the one in front of it.....Family ASTACIDÆ (p. 400).

bb. Abdomen bent upon itself or flexed beneath the thorax, or, rarely, soft and extended; pleura usually small or wanting; third pair of legs unlike the first, never chelate; branchiæ usually few.

c. Uropods usually present, often reduced in size, sometimes united with the telson; last thoracic sternum free; carapace not fused with the epistome.....(Section *Anomura*).

d. Abdomen well developed.

e. Abdomen symmetrical; tail fan well developed. .

f. Abdomen more or less flexed beneath the thorax; body depressed..Tribe *Galatheidea*.

g. Form somewhat lobsterlike; rostrum well developed...Family GALATHEIDÆ (p. 401).

gg. Form crablike; rostrum short and broad or wanting. Family PORCELLANIDÆ (p. 403).

ff. Abdomen extended, more or less membranous; cephalothorax compressed (Tribe *Thalassinidea*).....Family CALLIANASSIDÆ (p. 406).

ee. Abdomen unsymmetrical; tail fan reduced and adapted for holding the body in hollow objects. (Tribe *Paguridea*).....Family PAGURIDÆ (p. 408).

dd. Abdomen much reduced in size and flexed under the thorax; tail fan not adapted for swimming; rostrum small or wanting.....(Tribe *Hippidea*).

e. First pair of legs simple; carapace subcylindrical.....Family HIPPIDÆ (p. 416).

ee. First pair of legs subchelate; carapace depressed.....Family ALBUNEIDÆ (p. 414).

cc. Uropods rarely present, never biramous; abdomen small and permanently flexed beneath the thorax; first pair of legs always chelate or subchelate.....(Section *Brachyura*).

d. Buccal frame roughly quadrate.
e. Last pair of legs modified in form and dorsal in position; openings of oviducts on coxopodites; first pleopods present in the female.....(Tribe *Dromiacea*).
f. Eyes completely sheltered by orbits.....Family DROMIIDÆ (p. 417).
ff. Eyes not sheltered by orbits.
g. Legs of moderate length; gills 13 or 14 on each side.....Family HOMOLIDÆ (p. 419).
gg. Legs excessively long and slender; gills 8 on each side.Family LATREILLIDÆ (p. 419).
ee. Last pair of legs normal in form and position; openings of oviducts on the sternum; first pleopods wanting in the female.....(Tribe *Brachygnatha*).
f. Body of medium width or broad in front; rostrum reduced or wanting; orbits well formed .....(Subtribe *Brachyrhyncha*).
g. Free-living crabs with well-developed eyes and firm, hard carapace.
h. Carapace broad, short, rounded anteriorly.
i. Distal articles of last pair of legs broad and thin, paddlelike.....Family PORTUNIDÆ (p. 426).
ii. Distal articles of last pair of legs not paddlelike.
j. Antennules folding longitudinally; outer maxillipeds long, overlapping the epistome.....Family CANCRIDÆ (p. 434).
jj. Antennules folding transversely or obliquely transversely; outer maxillipeds usually not overlapping the epistome.
k. Body usually transversely oval.....Family XANTHIDÆ (p. 435).
kk. Body usually square or squarish.....Family GONOPLACIDÆ (p. 442).
hh. Carapace more or less quadrilateral; frontal region curved downward.
i. Front broad, eyestalks of moderate length or short....Family GRAPSIDÆ (p. 447).
ii. Front of moderate width or narrow; eyestalks often very long.....Family OCYPODIDÆ (p. 450).
gg. Small commensal crabs with very small eyes and orbits; carapace usually more or less membranous.....Family PINNOTHERIDÆ (p. 442).
ff. Body narrowed in front; rostrum usually distinct; orbits usually incomplete.....(Subtribe *Oxyrhyncha*).
g. Chelipeds not a great deal larger than the other legs.....Family INACHIDÆ (p. 452).
gg. Chelipeds much larger than any of the other legs.....Family PARTHENOPIDÆ (p. 461).
dd. Buccal frame triangular, produced over the epistome.....(Tribe *Oxystomata*).
e. First pair of legs chelate; body and legs normal; antennæ small.
f. Front of body not specially produced and upturned; eyes of normal size; maxillipeds more nearly horizontal.....Family CALAPPIDÆ (p. 420).
ff. Front of body produced into a projecting, upturned mass bearing the small eyes close together and closed in front by the more nearly vertical maxillipeds.....Family LEUCOSIIDÆ (p. 423).
ee. First pair of legs subchelate; body more or less abnormal in shape; last one or two pairs of legs more dorsal than the others; antennæ large.....Family RANINIDÆ (p. 420).

Suborder NATANTIA.

Decapod crustaceans of a shrimplike form having the abdomen strongly developed and compressed, with its first segment little, if any, smaller than the others and with five pairs of well-developed pleopods which are used for swimming. The cephalothorax is usually also compressed and the legs are slender except that any one of the first three pairs may be robust and chelate. Podobranchia are rarely present on the first three pairs of legs and never on the last two pairs. The rostrum is usually strongly developed and compressed.

This important suborder, which comprises 185 genera, is divided into 3 tribes, of which 2 are represented in the Beaufort fauna.

Tribe PENEIDEA.

Natantia having the third pair of legs chelate but not stouter than the two preceding pairs, the pleura of the first abdominal segment not overlapped by those of the second, the abdomen without a sharp bend and the first abdominal appendages of the male with a sexual apparatus. The gills are never developed as phyllobranchiæ.

This tribe comprises 2 families, both of which have representatives in the Beaufort fauna.

Family PENEIDAE.

Peneidea having the last two pairs of legs well developed and the gills numerous. This family comprises 23 genera, of which 4 are represented in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Integument thin; abdomen smooth, not carinate anteriorly; trunk legs with exopodites; pleopods biramous.....(Subfamily *Peneinæ*).
b. Endopodite of first maxilla elongate and segmented.....*Peneus.*
bb. Endopodite of first maxilla short and unsegmented.
c. Exopodites present on all, or all but the last pair of legs; antennular flagella moderately long; no pleurobranchiæ on the last two thoracic somites.....*Trachypeneus.*
cc. Exopodites wanting on all the legs; antennular flagella short; no pleurobranch on the last thoracic somite.....*Parapenæus.*
aa. Integument rigid; abdomen more or less carinate throughout its length and marked with furrows; trunk legs without exopodites; pleopods all uniramous.....(Subfamily *Sicyoninæ*) *Sicyonia.*

Genus PENEUS Weber.

Peneus Weber, 1795, p. 94.
Penæus Fabricius and most subsequent writers.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Dorsal surface of carapace with a carina extending from the rostrum nearly to the posterior margin and bordered on each side by a deep sulcus.....*brasiliensis.*
aa. Dorsal carina about two-thirds as long as carapace and with shorter lateral sulci.....*setiferus.*

Peneus brasiliensis Latreille. Shrimp. Pl. xxv, fig. 6.

Penæus brasiliensis Latreille, 1817, p. 156; Stimpson, 1871, p. 132; Coues, 1871, p. 124; Kingsley, 1878–79, p. 330; Rathbun, 1901, p. 100; Sumner, 1911, p. 665.

Integument thin, polished, and translucent. Carapace with a high median carina, continuous in front with the rostrum; extending back almost to the posterior margin of the carapace, and bordered on each side by a deep and broad sulcus; posterior half of carina with a median longitudinal groove; anterior half arcuate, highest above orbit and with nine or ten sharp serrations, the posterior one of which is almost halfway back on the carapace and remote from the others while the anterior six or seven are on the rostrum proper. Lower margin of rostrum with two or three spines, the tip slender, horizontal, and unarmed. Anterior margin of carapace with a strong spine below the base of the eyestalk from which a carina extends backward nearly to the well-marked hepatic spine. Cervical groove extending only halfway from hepatic spine to dorsal carina. A subhorizontal suture below the hepatic spine.

Fourth, fifth, and sixth segments of the abdomen carinate, the sixth having the carina bordered on each side by a sulcus. Telson with a deep median groove and an acuminate tip. Eyes large and prominent, on rather slender stalks. Peduncle of first antenna slightly exceeding tip of rostrum. Second antenna with its scale longer than rostrum, flagellum about one and one-half times as long as body. Legs slender and rather short, the three anterior pairs chelate. Pleopods well developed, all except the first pair provided with two foliaceous branches.

Length of a female, tip of rostrum to tip of telson, 158 mm.; carapace, 52 mm.

In Beaufort Harbor and neighboring localities, especially in the brackish creeks to the north and east of the town this species is abundant. In suitable places great schools of shrimps are found in the summer and fall and are caught for shipment to northern markets. These schools often consist of both *P. brasiliensis* and *P. setiferus*, though the former appears to be the more numerous. Locally shrimps are eaten and are in some demand for use as fish bait. Large individuals are found throughout the summer, but those of immature size appear to be most abundant during the early months of the season. In the fall nearly all are full grown and are to be found in large schools outside the harbor where they are fished for with purse nets. At one haul in 1912 in the bight at Cape Lookout 240 boxes, weighing about 150 pounds each, were taken and shipped from Beaufort to northern markets.

Peneus setiferus (Linnæus). Shrimp. Pl. XXV, fig. 5.

Cancer setiferus Linnæus. 1767, p. 1054.
Penæus fluviatilis Say, 1818, p. 236.
Penæus setiferus Milne-Edwards, 1834–1840, p. 414 [1837], 1837, p. 414; Gibbes, 1850, p. 199; Stimpson, 1871, p. 133; Kingsley, 1878–79, p. 330; Fowler, 1912, p. 316.

In form and general appearance similar to *P. brasiliensis* but with the median carina of the carapace continued backward only about two-thirds the length of the carapace, not grooved posteriorly, with the lateral sulci terminating near the most posterior serration, and provided with nine or ten sharp teeth above, of which the anterior six are on the rostrum proper. Tip of rostrum long and slender, the first spine being about opposite the eye, gently upcurved distally, except the tip which is sometimes depressed; lower surface with two teeth. Spine behind eye, hepatic spine and suture below the latter essentially as in *P. brasiliensis*, cervical groove shorter than in that species.

Abdominal segments as in *P. brasiliensis*.

Peduncle of first antenna considerably and scale of second antenna slightly shorter than rostrum; flagellum of second antenna twice as long as body.

In life the animal is translucent, almost transparent, bluish white with dusky bands and patches composed of minute scattered black specks. The rostrum and sides are tinged with pink. The blades of the pleopods are marked with dark red. The antennæ are dark brown. The uropods have the tips of their blades a very dark brown purple with a narrow stripe of light greenish-yellow along the margin. After death the body whitens and the colors stand out with greater distinctness.

The longer and more slender rostrum, longer antennæ and the shorter sulci lateral to the dorsal carina of the carapace distinguish this species at once from *P. brasiliensis*.

This shrimp appears to attain abundance earlier in the summer than does *P. brasiliensis* and comes to market during the last weeks of July or in early August. Several boat loads were seen late in July, 1912, the first lots consisting of small specimens, the later ones nearly all full grown.

Genus TRACHYPENEUS Alcock.

Trachypeneus Alcock, 1901, p. 15.

Trachypeneus constrictus (Stimpson). Pl. XXV, fig. 9.

Penæus constrictus Stimpson, 1871, p. 135; Kingsley, 1878–79, p. 330.
Parapenæus constrictus Smith, 1885a, p. 174; Rathbun, 1901, p. 101.

Integument smooth and polished, dorsal region of carapace with very fine short, appressed setæ. Carapace carinated on its anterior three-fourths, with a spine behind base of rostrum. Antennal and hepatic spines well developed. Lateral groove extending about three-fifths the length of carapace. Rostrum reaching middle of penultimate segment of first antenna, directed slightly upward, its upper margin usually slightly arched and bearing usually seven (7–9) equidistant teeth diminishing in size toward extremity. Peduncle of first antenna extending beyond eye as far as length of eye; very pubescent above. Abdomen carinate from fourth to sixth segment. Telson with two rounded carinæ above, tapering to a short, acuminate tip, armed on either side with a short spine.

Length of a female, 54 mm.; carapace, including rostrum, 18 mm.; rostrum, 6 mm.

Color in life, translucent white, with purplish gray cloudings and blotches; appendages pinkish.

Specimens occasionally occur within the harbor. On the Blackfish Banks it is more common but is never taken in large numbers.

Genus PARAPENÆUS Smith.

Parapenæus Smith, 1885a, p. 170.

KEY TO THE SPECIES.

a. Dorsal margin of rostrum with less than 12 teeth; eyes of moderate size.....*politus*.
aa. Dorsal margin of rostrum with 12 to 15 teeth; eyes very large.....*megalops*.

Parapenæus politus Smith. Pl. xxv, fig. 7.

Parapenæus politus Smith, 1881, p. 444; ibid., 1885a, p. 172.

Integument smooth and polished, carapace not setose. Carapace with a low median carina, continuous in front with the rostrum, extending back almost to the posterior margin and bearing a small spine some distance behind base of rostrum. Rostrum arched, distal half deflexed, about as long as eye and falling short of the first article of the antennulary peduncle, dorsal margin with six teeth diminishing in size anteriorly, ventral margin heavily ciliate. Hepatic, antennal and branchiostegal spines well developed, the last placed a little behind the margin of the carapace. A shallow groove extends from behind the eye almost to the posterior margin of the carapace and another, extremely faint, runs upward from the inferior margin at the base of the second pair of legs.

Abdomen two and one-fourth times as long as carapace; fourth, fifth, and sixth segments carinate, the carina ending on each segment in a small tooth. Sixth abdominal segment a little more than twice the length of the fifth. Telson tapering to a sharp point, furrowed above and with a slender spine on each side near the tip.

Two specimens, 50 and 60 mm. long, respectively, were taken by the *Fish Hawk* off Beaufort Inlet in water not exceeding 180 fathoms deep. They differ somewhat, principally in the more strongly curved rostrum, from typical *P. politus* and were at first thought to be specifically distinct, but a careful comparison with the specimens of that species in the United States National Museum shows that these differences are too slight to be worthy of recognition.

Parapenæus megalops Smith. Pl. xxv, fig. 8.

Parapenæus megalops S. I. Smith, 1885a, p. 172; Rathbun, 1901, p. 102.

Covering of abdomen and carapace naked and smooth. Carapace carinate on its anterior half, the carina with a spine behind base of rostrum. Rostrum elevated, arched, terminal half very slender, upper surface armed with 12 to 15 spiniform teeth crowded posteriorly, but becoming more remote and smaller anteriorly; tip reaching to distal end of antennal scales in females; shorter in males. Antennal, hepatic, and branchiostegal spines well developed. No antennal suture. Eyes extremely large, extending laterally beyond carapace. Antennal peduncles extending beyond eyes less than length of eyes; terminal segment longer than penultimate.

Fourth to sixth segments of abdomen with a thin, sharp, median carina. Telson with a lateral as well as two dorsal carinæ.

Length of male, tip of rostrum to tip of telson, 91 mm.; carapace, including rostrum, 24 mm.; rostrum, 9 mm.

A few specimens were dredged by the *Fish Hawk* in deep water off Cape Lookout.

Genus SICYONIA H. Milne-Edwards.

Sicyonia H. Milne-Edwards, 1830, p. 339.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Dorsal carina of carapace with three teeth.
b. Rostrum with two teeth above and two or three spines at tip.....*lævigata*.
bb. Rostrum with three or four teeth above; short; acute at tip.....*brevirostris*.
aa. Dorsal carina of carapace with two teeth.
b. Rostrum with three teeth above and one below.....*dorsalis*.
bb. Rostrum with two small teeth above.....*edwardsii*.

Sicyonia lævigata Stimpson. Pl. xxv, fig. 1.

Sicyonia lævigata Stimpson, 1874, p. 131; Rathbun, 1901, p. 130.

Integument rather firm, very finely granulate and more or less sculptured. Carapace with a median dorsal carina broken into three nearly equidistant, forwardly directed, acute teeth with tufts of setæ between them. Rostrum upturned, its superior margin with two teeth, its tip truncate, with two or

three spiniform teeth and reaching nearly to end of antennular peduncle. External maxillipeds considerably longer than antennal peduncle. Third pair of legs exceeding external maxillipeds by length of fingers and half the palm.

Abdomen with a median dorsal carina which terminates on the first segment in an anteriorly directed tooth and on the last segment in a posteriorly directed one; side with shallow sulci, otherwise almost smooth.

Length of a female, 30 mm.

Color, yellowish brown, the cephalothorax darker than the abdomen and sometimes bluish or greenish.

Sicyonia lævigata is fairly common in Beaufort Harbor, especially on shelly bottoms.

Sicyonia brevirostris Stimpson. Pl. xxv, fig. 4.

Sicyonia brevirostris Stimpson, 1874, p. 132.

Integument firm, much sculptured, especially the abdomen; abdomen with scattered tubercles, whole body with a covering of very short and fine setæ. Rostrum short, not equaling eyes, its upper margin with three teeth behind the acute tip. Median carina of carapace with three strong teeth. Antennal and hepatic spines well developed. Peduncle of antennule short, its terminal article a little more than half as long as penultimate. Peduncle of antenna a little shorter than external maxillipeds. Third pair of legs exceeding external maxillipeds by about two-thirds the length of the hand.

Carina of abdomen prominent, fissured, and deeply notched behind on each segment; first segment with an anteriorly projecting tooth, fifth and sixth segments with backwardly directed ones. Anterolateral angles of first, second, third, and fourth segments dentiform, those of the third and fourth developed as stout, outwardly projecting, curved spines; posterior lateral angle of fifth segment spiniform.

Length of a male, tip of rostrum to tip of telson, 78 mm.; carapace, including rostrum, 27 mm.; rostrum, 3.5 mm.

Three specimens, two males and a female, were dredged by the *Fish Hawk* in 17 and 63 fathoms outside the harbor.

Sicyonia dorsalis Kingsley. Pl. xxv, fig. 3.

Sicyonia dorsalis Kingsley, 1878, p. 97; Rathbun, 1901, p. 103.

Integument fairly solid, both carapace and abdomen much sculptured. Carapace with a median dorsal carina with one tooth a little behind the middle and one much smaller near base of rostrum. Rostrum upturned, its superior margin with three teeth, its tip reaching slightly beyond eyes, notched at end and with small tooth on lower surface. External maxillipeds shorter than antennal peduncle. Peduncle of antennule short, the second article twice the length of third. Third pair of legs reaching slightly beyond external maxillipeds.

Abdomen with a high median dorsal carina, the anterior and posterior teeth strong; a minute posterior tooth on fifth segment. Sixth segment with a posterolateral spine above which is a triangular tooth. Full-grown individuals with a posterolateral spine on third, fourth, and fifth segments also.

A single small specimen, 34 mm. long, now in the laboratory collection, was dredged by the *Fish Hawk* a short distance off the inlet in 1902. Dr. Mary J. Rathbun records an example from Porto Rico 90 mm. long.

Sicyonia edwardsii Miers. Pl. xxv, fig. 2.

Palemon carinatus Olivier, 1811, p. 667 (teste Milne-Edwards).
Sicyonia carinata Milne-Edwards, 1837, p. 344; ibid., 1834–1840, t. II, p. 410; Dana, 1852, p. 602; Bate, 1888, p. 294.
Sicyonia edwardsii Miers, 1881, p. 367.

Integument, especially of the abdomen, firm. Carapace nearly smooth and with fine scattered hairs; abdomen deeply sculptured and with scattered tubercles. Dorsal carina of carapace with two teeth. Rostrum directed obliquely upward, its upper margin nearly straight and armed with two small teeth; its tip notched and falling short of eyes. Anterior margin of carapace with a small spine below eye. Lateral spines well developed. External maxillipeds reaching terminal article of antennulary peduncle and exceeding antennary peduncle. Third pair of legs exceeding external maxillipeds by length of fingers.

Abdomen with dorsal carina like that of *S. brevirostris*. Lateral angles of segments not produced into spines.

The right of this species to be included in the Beaufort fauna rests, so far as is known, on a single specimen of 25 mm. long, dredged by the *Fish Hawk* in 141 fathoms off Beaufort Inlet.

Family SERGESTIDAE.

Peneidea having the last two pairs of legs reduced in size or lost and the gills few or wanting.

Three genera are recognized, of which only the following is known from the Beaufort region.

Genus LEUCIFER Milne-Edwards (=LUCIFER of most authors.).

Leucifer Milne-Edwards, 1837, p. 468.

Leucifer faxoni Borradaile. Pl. XXVI, fig. 10.

Lucifer typus. Faxon, 1879, p. 113, pl. 7, figs. 1–3.
Lucifer sp. Brooks, 1883, pp. 57–137.
Lucifer faxoni Borradaile, 1915, p. 228.

Integument smooth, thin, and transparent. Anterior portion of cephalothorax greatly lengthened, bearing the eyes, antennules, and antennæ far in front of the mouthparts and legs; abdomen strongly developed, with large swimmerets and tail fin.

Anterior prolongation of cephalothorax about one and one-half times as long as posterior portion, nearly cylindrical, produced into a small rostrum, a spine on each side behind the eye, and a knoblike suborbital lobe. Posterior portion of cephalothorax with a small spine on each side in front. Eyes large and prominent, on stout conical stalks about one-third the length of the anterior part of the cephalothorax. Peduncle of antennules long and slender; basal article longer than the other two combined; third article shortest; flagella long and slender. Peduncle of antennæ about half as long as first article of the antennular peduncle; flagellum slender, longer than that of the antennule; scale almost linear and fringed along its inner margin with long hairs. Mandibles without a palpus. Two pairs of maxillæ and three pairs of maxillipeds, the last pair pediform, are present. Four pairs of slender legs, the first two pairs short, the last two of nearly equal length and extending forward almost to the end of the cephalothorax. Abdomen much compressed, its segments deepest at the point of insertion of the swimmerets and there produced into a spiniform angle; sixth segment as long as the two which precede it, its posterolateral angles spiniform, a small median spine above the base of the telson and, in the male, two strong lateral spines of which the posterior is curved and about twice as long as the anterior. Telson slender, about half as long as uropods, with a stout spine on each side and a prominent projection on the ventral side near the middle. Uropods about as long as the sixth segment, the outer branch strongly developed, the inner branch much shorter and narrower.

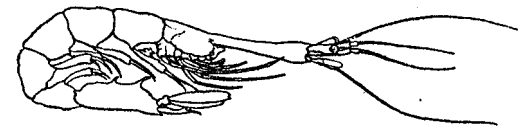

FIG. 4.—*Leucifer faxoni*. ♂. × 10.

Length, 10 to 12 mm.

Color, when alive, almost perfectly transparent; in alcohol, white.

This interesting little shrimp is not uncommon in the waters of the harbor and has been taken in the tow nets throughout the summer. Egg-bearing females were collected June 30, 1912. Outside the harbor it is much more abundant, at times occurring in such great swarms that it constitutes a large proportion of the plankton material.

The development of *Leucifer* was worked out by Dr. W. K. Brooks from material secured, largely, at least, at Beaufort, and his paper, already cited, is a zoological classic. His figures of the animal are the best that have been published and show conclusively that he was dealing with the species that is described above. Unfortunately in this, as in many other cases, Dr. Brooks made no effort to determine the proper specific name of his specimens. Faxon's description and figures show that he also was dealing with the present species to which, with some doubt, he applied the name *Lucifer typus* Milne-Edwards. In a recent paper, however, Borradaile shows that the *Leucifer* of the western Atlantic is not *L. typus* or any other hitherto described species, and proposes for it the name *L. faxoni*.

It was the opinion of Dr. Brooks that *Leucifer* breeds in the marshes which border the harbor along the town front. His reasons for coming to such a conclusion are not altogether satisfactory, and in view of the fact that the shrimp is far more abundant outside than inside the harbor and that the genus is known the world over as a strictly pelagic one, it is very probable that he was mistaken.

Tribe CARIDEA.

Natantia having the third pair of legs not chelate, the pleura of the first abdominal segment overlapped by those of the second segment, the abdomen usually with a sharp bend and the gills always developed as phyllobranchiæ.

This large and important tribe comprises 153 genera, divided among 20 families. Of the latter, 5 are represented in the Beaufort fauna.

Family CRANGONIDAE (= ALPHEIDAE of most authors). The snapping shrimps.

Caridea having the first two pairs of legs chelate, the first pair usually much stronger than the others and often unsymmetrical, the carpus of the second pair of legs subdivided, the eyes small and usually covered by the carapace, the mandibles deeply cleft and the second maxillipeds with a very short seventh article.

Of the 27 recognized genera the following are represented in the Beaufort region:

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Eyestalks covered by the carapace.
  b. Hand of large cheliped cylindrical; trunk legs with exopodites.....*Synalpheus.*
  bb. Hand of large cheliped compressed; trunk legs without exopodites.....*Crangon.*
aa. Eyestalks completely exposed.....*Automate.*

Genus SYNALPHEUS. Bate. Coutière.

Synalpheus Bate, 1888, p. 572; Coutière, 1899, p. 334.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

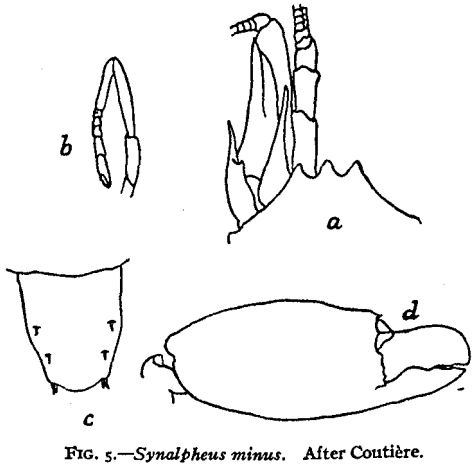

FIG. 5.—*Synalpheus minus.* After Coutière.

a, Front of carapace and appendages; *b*, second leg; *c*, telson; *d*, large chela.

a. Rostrum comparatively broad, not longer than the supra-orbital lobes.....*minus.*
aa. Rostrum comparatively slender, more or less exceeding the supra-orbital lobes.
  b. Movable finger of small cheliped with a conspicuous bunch of curled hairs. Rostrum little longer than supra-orbital lobes...*longicarpus.*
  bb. Movable finger of small cheliped without a bunch of curled hairs. Rostrum considerably longer than supra-orbital lobes.....*townsendi.*

Synalpheus minus (Say). Pl. XXVI, fig. 3.

Alpheus minus Say, 1818, p. 245.
Synalpheus minus Coutière, 1909.

Similar in appearance to the two following species but with a much shorter and broader rostrum which has at the base about the same width as the supra-orbital spines and hardly exceeds them in length. The sides of the telson are not strongly convergent and the spines at its tip are about equal in length. The spine on the basal article of the antennule reaches to near the middle of the second article. The spine on the basal article of the antenna reaches to the end of the first article of the antennule, while the spine of the second article slightly exceeds the third article of the antennule. The smaller cheliped does not bear a brush of hairs. The movable finger of the larger cheliped is heavy, but is not raised into a crest as in *S. townsendi*. The second pair of legs has the carpal articles in the proportion of 5, 1, 1, 1, 2.

Length, 12.5 mm.; carapace, 4 mm.

One specimen which agrees closely with Coutière's description and figures was taken by the *Fish Hawk* on the fishing banks (station 7956) in 16 fathoms.

This is unquestionably the *Alpheus minus* of Say and is almost equally certainly not the *Alpheus minus* of Kingsley, Brooks, Herrick, and others whose papers are commonly listed in the synonomy of the species. These authors, beyond any reasonable doubt, applied the name to the species now known as *Crangon packardi*, which is, as they stated, common in Beaufort Harbor. True *Synalpheus minus*, on the other hand, is not common anywhere in the region, and it is doubtful if it ever occurs in the harbor. It has been recorded by Coutière from farther south and is probably the species recorded by Smith[a] from off Cape Hatteras, in 16 fathoms.

Synalpheus longicarpus (Herrick). Pl. XXVI, fig. 2.

Alpheus saulcyi var. *longicarpus* Herrick, in Brooks and Herrick, 1892, p. 383 (part).
Synalpheus longicarpus Coutière, 1909, p. 53.

Carapace about two-thirds as long as abdomen, subcylindrical, and smooth; crossed by a very faint cervical groove; frontal border produced into a sharp-pointed lobe above each eye; rostrum carinate, slender and slightly longer than supra-orbital lobes.

Abdomen smooth, tapering; telson with strongly convergent, sinuous sides and truncate tip which bears four slender spines, upper surface with four strong movable spines; sixth segment and basal article of uropod with flat marginal spines.

Eyes small. Basal article of antennule with a spine on outer margin which does not reach to the end of the article. Basal and second articles of antenna each with a strong, acute, forwardly directed spine, of which the tip of the one on the second article exceeds the other and extends a little beyond the base of the third article of the antennule. Chelipeds very unequal, the smaller one with a conspicuous brush of curled hairs on the movable finger; the larger one cylindrical, with short fingers of which the movable one is much the larger and strongly curved. Second pair of legs with the carpus subdivided into five articles which have approximately the proportions of 4, 1, 1, 1, 2.

Length, 22 mm.; carapace, 9.5 mm.

Color, a translucent milky white; the tip of the large chela brown.

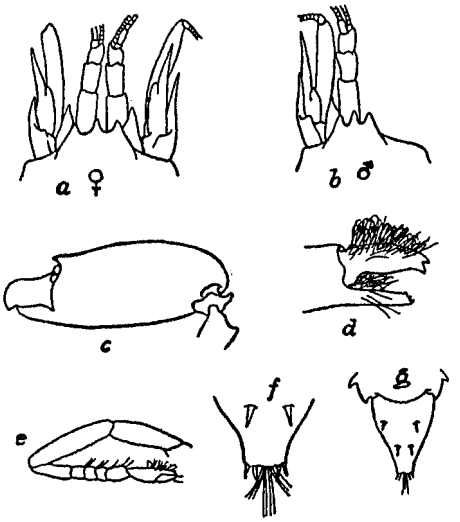

FIG. 6.—*Synalpheus longicarpus*. After Coutière.

a, Front of carapace and appendages of female; *b*, same of male; *c*, large chela; *d*, fingers of small cheliped; *e*, one of the second pair of legs; *f*, distal end of telson; *g*, telson.

Many specimens of this snapping shrimp have been collected from the interior of sponges thrown upon the shore by the waves. On the fishing banks it is probably the commonest member of the genus, often occurring in enormous numbers in the large sponges which are to be obtained in that locality. In August, 1915, such a sponge about 2 feet in height, belonging to the genus *Spirastrella*, was brought in by the *Fish Hawk*. When cut open its larger canals were found to be full of *S. longicarpus*, several hundred of which were saved before the patience of the collector was exhausted. A considerable number of these shrimps were found to be infested with isopod parasites, one a species of *Phryxus* being attached to the lower surface of the abdomen, while the other, a species of a new genus, *Synsynella*,[b] was an inhabitant of the branchial chamber.

a Smith, Sidney I.: Report Commissioner of Fisheries for 1885, p. 54.

b *Phryxus subcaudalis* Hay and *Synsynella deformans* Hay, Proc. U. S. Nat. Mus., 41, pp. 569–572, 1916.

Synalpheus townsendi Coutière. Pl. XXVI, fig. 1.

Synalpheus townsendi Coutière, 1909, p. 32.

Similar in form to *S. longicarpus* but with a much slenderer rostrum which considerably exceeds the supra-orbital lobes and reaches slightly beyond the distal end of the basal article of the antennule. The sides of the telson are not as strongly convergent and are slightly produced into little angles at the distal end and the inner pair of spines are slender and about three times as long as the outer one on each side. The spine on the basal article of the antennule reaches beyond the end of the article and slightly exceeds the rostrum. The spine of the basal article of the antenna extends to about the middle of the spine of the second article, while the latter slightly exceeds the distal end of the third article of the antennule. The smaller cheliped lacks the brush of curled hairs on the movable finger and the larger one has the upper margin of the movable finger elevated into a thick crest. Second pair of legs with the carpus divided into five articles which have the approximate proportions of 5, 1.5, 1, 1, 2.

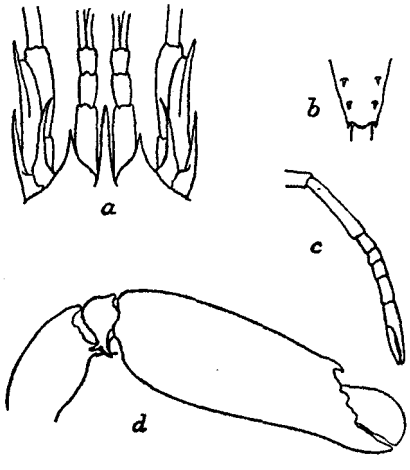

FIG. 7.—*Synalpheus townsendi*.
a, Front of carapace and appendages; *b*, telson; *c*, second leg; *d*, large cheliped.

Length of a female, 16 mm.; carapace, 7 mm.

Color in life, body and legs a light pellucid pinkish red, the large chela, pink changing to green on the fingers.

Five specimens of a little snapping shrimp which have been identified as this species were taken at the fishing banks (station 7943) in 13½ fathoms of water. Another series was taken at the same locality (station 8293) from the interior of a large sponge dredged in 16 fathoms. They do not agree in all respects with Coutière's description and figures, but appear to stand about halfway between his variety *brevispinis* and the typical form. The species has been previously reported from the coast of North Carolina and its presence on the fishing banks is not surprising.

Genus CRANGON (=ALPHEUS of most authors).

Crangon Weber, 1795, p. 94.
Alpheus Fabricius, 1798, p. 380; Coutière, 1899, p. 336.

KEY TO THE SPECIES OF THE BEAUFORT REGION.[a]

a. Orbital lobes of carapace with a small spine in front..... *formosus*.
aa. Orbital lobes of carapace without a distinct spine.
  b. Orbital lobes forming a toothlike projection; large hand with a groove above and below along outer margin and between these grooves a tooth..... *packardii*.
  bb. Orbital lobes rounded; hand broad and notched on both margins.
    c. Base of rostrum passing gradually into the lateral dorsal surface..... *heterochælis*.
    cc. Base of rostrum with its borders sharply defined..... *armillatus*.

Crangon formosus (Gibbes). Pl. XXVI, fig. 5.

Alpheus formosus Gibbes, 1850, p. 196; Rathbun, 1901, p. 106.
Alpheus poeyi Guèrin Meneville, 1857, p. 10.

Carapace one-half as long as the abdomen, compressed, not grooved; rostrum beginning at posterior line of the eyes and reaching, or nearly reaching, the second article of the antennule, flat above, its margins concave at base but nearly parallel anteriorly and with scattered stiff hairs; the tip rounded, with two or three minute spines; orbital lobes with an acute, anteriorly directed spine much shorter than the rostrum.

[a] In the account of his trip to Beaufort, Stimpson (Amer. Jour. Sci. & Arts, ser. 2, vol. XXIX, p. 442–445, 1860) mentions *Alpheus intermedius* as a member of the Beaufort fauna. It has been impossible to ascertain what species he had in mind and a thorough review of the literature has failed to bring to light any crustacean described under that name.

Antennules with the inner branch filiform; outer branch thick, but bearing near its tip a filiform extension; basal spine slightly exceeding the first article. Antennular scale slightly longer than the peduncle, basal spine shorter than basal spine of antennule. Chelæ very unequal; the larger one compressed (but not nearly so much as in *C. heterochælis*) smooth above and unnotched along the margins; movable finger about one-fourth as long as hand; smaller chela much slenderer, its inner surface with a stout spine overhanging the base of the movable finger; the latter about half as long as hand. Carpal articles of second pair of legs having the proportion 4, 1.7, 1, 1, 2.

Length of an ovigerous female, 31 mm.; carapace, 11 mm.

Color: Along the median line, extending from the distal end of the peduncles of the antennules to the base of the telson a narrow light stripe, light orange-yellow anteriorly merging into yellowish green and finally gray posteriorly; on each side of this a broad stripe of chocolate brown; below this, along each side, a stripe of white; and below this a stripe of light vinaceous brown followed on the abdomen by a border of ultramarine blue. The chelæ are greenish brown with orange-red fingers. The antennules, antennæ, and walking legs are ultramarine blue. The telson and tail fins are blotched and bordered with yellow.

Two specimens, one a female with eggs almost ready to hatch, of this strikingly colored snapping shrimp were taken by the *Fish Hawk* on the fishing grounds at a depth of about 15 fathoms. The species was described by Gibbes from Key West, Fla., and since that time it has not been reported on the coast of the United States. It has, however, been collected in Porto Rico, Cuba, Bermudas, and Brazil.

Crangon packardii (Kingsley). Pl. XXVI, fig. 4.

Alpheus packardii Kingsley, 1879 (1880), p. 417; Rathbun, 1901, p. 107.
Alpheus bermudensis Bate, 1888, p. 547.
Alpheus minus Herrick, in Brooks and Herrick, 1892, p. 372.

Carapace about two-thirds as long as abdomen, somewhat compressed, cervical groove hardly evident; front produced into an obtuse angle above each eye; rostrum carinate, the carina extending back as far as base of eyestalks, the spiniform tip reaching second article of antennule.

Abdomen compressed, smooth, tapering. Telson rather small, faintly grooved; upper surface with four strong, movable spines; tip fringed with small spines.

Eyes well developed but completely covered by the carapace. Antennules with the inner branch slender, the outer one shorter and with its proximal four-fifths enlarged. Antennæ a little longer than body, slender; scale as long as peduncle of antennule and with a strong apical spine; basal segment with a strong spine on lower part of outer surface. Third maxillipeds slender, not reaching tip of antennal scale, terminal segment with long hairs. Chelæ unequal, the larger one broad and flattened, slightly sinuate along inner margin; outer margin with a longitudinal groove above and below, the ridge between them ending in a strong tooth behind base of dactylus; dactylus heavy, curved, toothed at base; both fingers with setæ at tips. Smaller hand about one-half as wide and three-fourths as long as the larger one, similarly formed but with a sharp spine above at base of dactylus; no basal tooth on dactylus and both fingers slenderer and more hairy. Carpus much reduced. Meros with a spiniform tooth near distal end and one or two small spines below. All the legs with scattering long hairs especially at the joints. Carpal articles of second pair of legs diminishing as follows: Second, first, fifth, third, and fourth.

Length of a male, 27 mm.

Color, gray.

This, the commonest snapping shrimp of the region, is usually found on shelly bottoms and is frequently brought up in the dredge. It may also be found on wharf piles and among old oyster shells. Its snap, although readily enough noticed, is weak in comparison with that of its larger relative *C. heterochælis*.

This is, in all probability, the species indicated by the name *Alpheus minor*, in the older lists of the crustaceans of the Beaufort region. As determined by Coutière, *Alpheus minor* Say is a *Synalpheus;* it is apparently one of the rarest crustaceans of the region and was probably never recognized nor collected here until within a year or two. That the *Alpheus minus* (or *minor*) of Herrick, Brooks, and other students of the Johns Hopkins summer laboratory was *Crangon packardii* is conclusively proved by the colored figure in Herrick's paper.

Crangon heterochælis (Say). Pl. xxvi, fig. 6.

Alpheus heterochælis Say, 1818, p. 243; Milne-Edwards, 1837, t. II, p. 356; Kingsley, 1878–79, p. 329; Herrick, in Brooks and Herrick, 1892, p. 372; Rathbun, 1901, p. 107; Coutière, 1910, p. 485.

Carapace slightly more than half as long as abdomen, slightly compressed and without grooves; front produced into a rounded lobe above each eye; rostrum carinate, the carina not extending back as far as base of eyes talks and the tip falling short of second article of antennule; rostro-orbital depressions passing gradually into dorsal surface. Abdomen compressed, smooth, tapering; telson with subparallel sides and rounded tip; the four movable spines of the upper surface and those of the distal border relatively much weaker than in *C. packardii*.

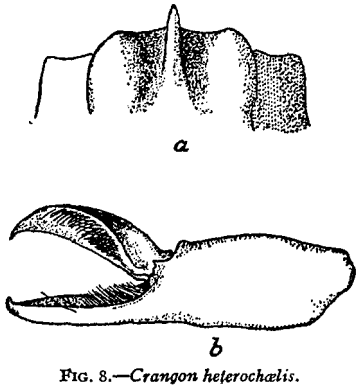

FIG. 8.—*Crangon heterochælis*.

a, Front of carapace; *b*, small chela.

Eyes relatively small, covered by the carapace. Antennules with inner branch filiform, about half as long as antenna; outer branch with proximal half expanded. Antennæ a little longer than body, very slender; scale with a strong apical spine which slightly exceeds the antennular peduncle; basal segment with a rather weak spine below. Chelæ very unequal; the larger one much distorted, the upper and lower surfaces with irregular shallow grooves and the outer and inner margins deeply notched near base of fingers; dactylus very broad and heavy, strongly curved and with a very large basal tooth. Smaller chela, in the male, with the dactylus peculiarly flattened and expanded on its outer surface; fingers of small chela, in both sexes, much weaker, less curved, and more hairy than in the large chela. Carpal articles of second pair of legs diminish as follows: First, second, fifth, third, fourth.

Length of a male, 40 mm.; carapace, 13 mm.; a female, 50 mm.

Color, dark, translucent sea green, slightly flushed with purple on sides of carapace; with white markings on chelipeds; walking legs pale vermilion; tips of uropods blue, with a narrow border of orange on distal margin, the outer blade having in addition a patch of vermilion just above the blue, and a narrow white border; articular surfaces and points of abdominal segments and a small streak along cervical groove white.

This species of snapping shrimp, while not as common in the Beaufort region as *C. packardii*, is far from rare and is locally often quite abundant. Its favorite habitat is around the edges of oyster reefs where it digs large burrows in the mud or conceals itself among the shells. When captured the loud snapping sound it makes, which is comparable to the cracking of a small whip, is sure to command attention. Females bearing their large masses of clear apple-green eggs have been taken early in July. An isopod parasite (*Probopyrus alphei* Richardson) is occasionally found in the gill chamber of this snapping shrimp.

Crangon armillatus (H. Milne-Edwards). Pl. xxvii, fig. 1.

Alpheus armillatus H. Milne-Edwards, 1834–1840, t. II, p. 354; Coutière, 1910, p. 485.

Very closely resembling *C. heterochælis* except in the rostrum and the small chela of the male.

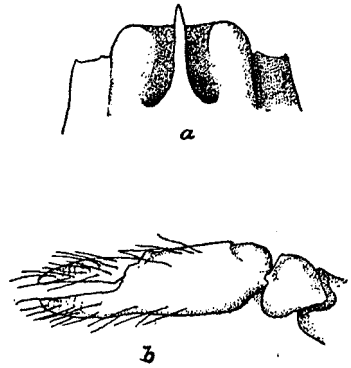

FIG. 9.—*Crangon armillatus*.

a, Front of carapace; *b*, small chela.

The rostrum has the form of a narrow crest which, just behind the eyes, widens abruptly into a triangular area the borders of which are slightly concave and very distinctly limit the rostro-orbital depressions, even slightly overhanging them in adult specimens.

The dactylus of the small chela of the male lacks the setose crests and expanded external surface so characteristic of *C. heterochælis*.

By Coutière this species is said to be abundant and widely distributed along the Atlantic coast and often to accompany *C. heterochælis*. At Beaufort, however, it does not appear to be common, a single specimen, dredged by the *Fish Hawk*, being for a long time the only one in the laboratory collection,

but after the severe storm of September 4, 1913, another individual was found in a small boat that had been sunk off Pivers Islands. On August 20, 1914, 6 specimens, 3 males and 3 females, were collected under the rocks of the jetty east of Fort Macon. A male and female were found together in every case in a hollow under a flat rock. The males were colored much like *C. heterochælis*, except that the conspicuous orange and vermilion areas on the tail fin were lacking. The females were a deep greenish blue with white marking on the large chela. During the night of August 20 a large male shed his shell but increased very little, if any, in length. To provide for the withdrawal of the large hand through the relatively very slender wrist a large oval area on the upper and inner surface of the proximal part of the shell of the hand is detached and the carpus, meros, and ischium, at least, are split lengthwise so that the hand is not drawn through them at all.

Genus AUTOMATE De Man.

Automate De Man, 1897, p. 529.

Automate kingsleyi Hay. Pl. XXVI, fig. 7.

Automate kingsleyi Hay, 1917, p. 72.

Cephalothorax about half as long as abdomen, subcylindrical, with a large sinus in front behind the eyestalks in which the rostrum appears as a small median projection. Eyestalks contiguous, broad at the base, corneal surface well developed and, in lateral view, with a minute point on the anterior surface. Antennular and antennal peduncles very long, the former with a short scale which barely exceeds the basal article, and the latter with a long narrow scale which extends to the middle of the terminal article. Third maxillipeds exceeding antennal peduncles by less than the length of their terminal article. Chelipeds unequal and somewhat dissimilar, the larger one appearing to be stouter and rougher than its mate; fingers slightly gaping, the thumb in line with the hand and broad at base; movable finger much narrower and rather strongly curved; carpus short; meros about as long as movable finger. Second pair of legs about as long as chelipeds but very slender, weakly chelate and with the carpus divided into five articles having the proportions of 1, $1\frac{1}{4}$, $\frac{4}{5}$, $\frac{2}{3}$, $\frac{4}{5}$.

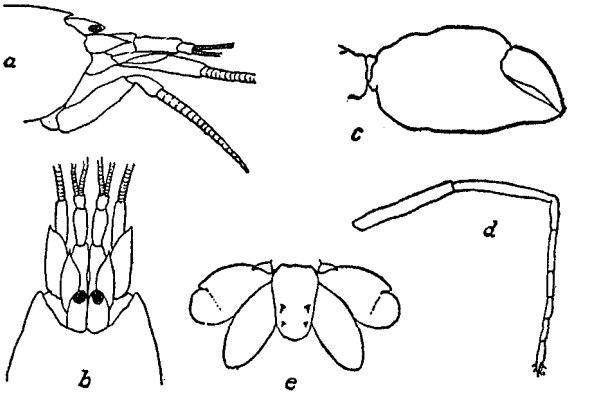

FIG. 10.—*Automate kingsleyi*, type, ♀×4.

a, Front of carapace and appendages, lateral view; *b*, the same, dorsal view; *c*, large hand; *d*, second leg; *e*, telson and uropods.

Abdomen well developed, compressed, with strong swimmerets. Telson tapering, armed above at each side with two spines, one of which is at about the middle of the length and the other at about halfway between the middle and the distal end; terminal spines well developed. Uropods with oval blades.

Length of a female (type) 16 mm.; cephalothorax 4 mm.

Color, in life almost transparent except for a small amount of red pigment on the appendages and telson.

A single specimen, a female carrying orange-yellow eggs, was collected on Shark Shoal breakwater July 9, 1916, by Mr. O. W. Hyman. It was kept alive in the laboratory for over a month, during which time the eggs dropped off without hatching and the animal moulted twice without appreciably increasing in size.

The species appears to be very close to *A. evermanni* Rathbun but differs in the length of the third maxillipeds, the proportions of the articles of the carpus of the second pair of legs, the arrangement of the spines of the dorsolateral surface of the telson, the width of the caudal laminæ and the slightly more developed rostrum. It also bears a good deal of resemblance to *A. acanthopus* De Man, but it differs from it in having the scale of the second antenna longer than the basal article, the more extensive corneal surface of the eyes and the outline of the front margin of the carapace. From both these species

and from all the other species of the genus, it differs in the shape of the hands. The specimen is a female, but the large hand is as broad and heavy and the palm is as short as the hand of the male of any other member of the genus.

The species has been named in honor of Dr. J. S. Kingsley, to whose interest and industry much of our knowledge of the Beaufort crustaceans is due.

Family OGYRIDAE nov.

Caridea having the first two pairs of legs chelate but of nearly equal size and not much, if any, larger than the other legs, the carpus of the second legs subdivided, the rostrum small or wanting, the eyestalks long, slender, and fully exposed but with the retinal surface reduced, the telson thick and obtusely pointed, the blades of the uropods curved outward, a thelycum present in the female.

The family thus characterized is coterminous with the genus *Ogyris* and, probably, should stand between the Crangonidæ and Hippolytidæ. Coutière, holding that *Ogyris*, *Automate*, and *Pterocaris* are closely related and that *Automate* is unquestionably akin to *Crangon*, places *Ogyris* in the family Alpheidæ (=Crangonidæ). It is evident, however, that Coutière had based his conclusions on the descriptions and figures of other writers without having had an opportunity to examine specimens of either *Ogyris* or *Pterocaris* and perhaps *Automate* also. Ortman, who had seen specimens of *Ogyris*, placed the genus in the family Hippolytidæ. None of these observers appears to have noticed the presence of a thelycum in the female. Having before us representatives of *Ogyris* and *Automate*, as well as several typical genera of both the families mentioned, we have come to the conclusion that *Ogyris* differs too greatly and in too many characters to admit of our placing it in either family. Its resemblance to *Automate* is very slight, and it appears also to be very different from *Pterocaris*.

Genus OGYRIS Stimpson.

Ogyris Stimpson, 1860, p. 36.

Ogyris alphærostris Kingsley. Pl. XXVI, fig. 9.

Ogyris alphærostris Kingsley, 1880, p. 420.

Cephalothorax about half as long as abdomen, the carapace thin, polished, sparingly pubescent, lightly grooved and with a rather strong, movable spine on the median line a little behind the very small rostrum. Eyestalks about half as long as carapace, rather broad at base, becoming almost thread-like distally but with the tip enlarged. Basal article of antennule with a strong external and a smaller superior spine, the entire peduncle about four-fifths as long as eyestalk; flagella of equal length. Antennal peduncle shorter than that of the antennule; flagellum slender and about twice as long as carapace; scale lanceolate, extending to the distal end of second article of antennular peduncle. Third maxillipeds pediform, stronger and longer than any of the legs, their tips considerably exceeding the eyes. Legs all slender, alike on the two sides, the first and second pairs chelate, the second pair the longer and with its carpus subdivided into four articles which have the proportions of 7½, 2½, 1, 2. Third and fourth legs normal, fifth legs much

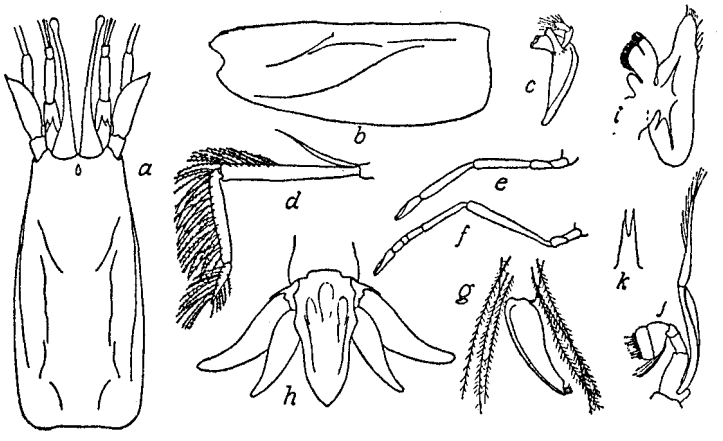

FIG. 11.—*Ogyris alphærostris*, ♀ ×4½.

a, Cephalothorax, dorsal view; *b*, carapace, lateral view; *c*, mandible; *d*, third maxilliped; *e*, first leg; *f*, second leg; *g*, tip of fourth leg, ×40; *h*, telson and uropods; *i*, first maxilliped; *j*, second maxilliped; *k*, thelycum.

more slender. Thelycum consisting of an anterior thin plate bifurcate anteriorly and a posterior shorter emarginate plate which are situated on the sternum between the last three pairs of legs. Telson about as long as sixth abdominal segment, thickened and convex above, its margins sinuate and converging to a narrow, rounded tip. Both blades of uropods with their distal third curved outward. Plumose hairs, mostly long and slender, are present in abundance along the front of the carapace, the margins of the telson and uropods and the superior surface of most of the legs.

Length, 27 mm.; carapace, 8.5 mm.; antenna, 16 mm.

Color, a translucent white, flushed with pink and yellow on the tail fin and legs.

A single specimen of this shrimp, an egg-laden female, was taken in the otter trawl in about 2 fathoms of water off the ocean beach of Bogue Bank about a mile west of Fort Macon on July 30, 1914. It was taken to the laboratory and kept alive for several days in a small aquarium where its behavior, as well as its appearance, strongly suggested some *thalassinid*.

The specimen is of unusual interest as it is the second one of the species and genus to be recorded from the Atlantic coast of the United States, and it throws a good deal of light on a very inadequately known group of crustaceans. There can be no reasonable doubt that it is correctly identified as *O. alphærostris* since it agrees in all essential respects with Kingsley's description of that species, and the locality at which it was collected is reasonably near the type locality. Kingsley's specimen was collected by Prof. Webster on the ocean side of Northampton County, Va., and is now in the collection of the United States National Museum. Unfortunately, however, it and several other specimens which would be of value in the present connection have been sent to Dr. H. Coutière, of the Paris Museum, for study and no direct comparison can be made. Kingsley stated that it was in bad condition, and this fact may account for some of the discrepancies between his description and figure and the specimen in hand.

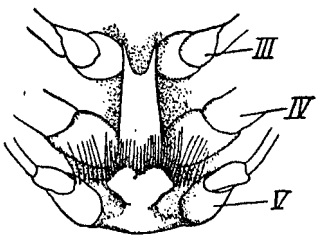

FIG. 12.—*Ogyris alphærostris*. Sterna of last three thoracic segments showing the thelycum. ×7.

At the present time four species of *Ogyris* are known: *O. orientalis* Stimpson[a] from the China Sea and southern Japan, *O. alphærostris* Kingsley from the coasts of Virginia and North Carolina, *O. occidentalis* Ortmann[b] from the mouth of the Tocantins River and from southwestern Louisiana, and *O. sibogæ* De Man[c] from the Sulu Sea and Saleh Bay in the Dutch East Indies.

It has been assumed that the triarticulate carpus of the second pair of legs of *O. orientalis* and *O. alphærostris* distinguishes them at once from *O. occidentalis* and *O. sibogæ* in which this part is described as being quadriarticulate. There is little doubt, however, that in the use of the term *triarticulate* both Stimpson and Kingsley referred to the articulations while Ortmann and De Man referred to the articles of the carpus, and that an examination of the specimens will show that throughout the genus the carpus is composed of four articles. It will also probably be found that in all four species there is a small rostrum and that the telson is thick, uneven above, and with sinuous sides. Assuming these characters to be present, *O. alphærostris* is distinguished from the others by its smooth, noncarinate carapace, *O. occidentalis* may be known by the presence of seven to nine teeth, and *O. orientalis* and *O. sibogæ* by the presence of four or five teeth on the dorsal carina of the carapace. The last two species may, perhaps, be distinguished from each other by the larger size of the rostrum and the more strongly developed protuberance on the lateral margin of the telson in *O. sibogæ*, but one is inclined to believe that they may prove to be identical.

Whether a thelycum is present in the female of any other species of *Ogyris* than the one here described can not be ascertained. Such a structure is not mentioned in any other description, but that fact does not prove its absence. The specimens previously described have been, in nearly every instance, very small or more or less mutilated and under such conditions the thelycum might easily have been overlooked or mistaken for something else. A thelycum is found in the shrimps of the family Peneidæ and a somewhat similar sperm receptacle is characteristic of the crawfishes of the family Astacidæ, but its occurrence and unusual development in *Ogyris alphærostris* is most unexpected.

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[a] Proc. Acad. Nat. Sci. Phil. XII, 36, 1860.

[b] Ergibnisse der Plankton-Exped. der Humboldt-Stiftung. Dekapoden and Schizopoden, 1893.

[c] Siboga Expedition, Decapoda, monograph XXXIXa.

Family HIPPOLYTIDAE.

Caridea having the first two pairs of legs chelate but the first pair not much stronger than the rest, the carpus of the second pair of legs subdivided, the eyes well developed and not covered by the carapace, the mandibles usually deeply cleft, and the second maxillipeds with a very short seventh article.

Of the 27 genera now recognized, the following are represented in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Carpus of second pair of legs vary from two to five articles.
  b. Rostrum exceeding the eyestalks.
    c. Front margin of carapace with not more than one spine below the eye.
      d. Rostrum with teeth above and below.....*Hippolyte*.
      dd. Rostrum finely serrate above, coarsely serrate below.....*Tozeuma*.
    cc. Front margin of carapace with several small spines below the eye; rostrum toothed at the tiponly.....*Latreutes*.
  bb. Rostrum not exceeding the eyestalks.....*Concordia*.
aa. Carpus of second pair of legs composed of many articles.....*Hippolysmata*.

Genus HIPPOLYTE Leach.

Hippolyte Leach, 1814, p. 431.

Hippolyte pleuracantha (Stimpson). Pl. XXVI, fig. 8.

Virbius pleuracanthus Stimpson, 1874, p. 127; Kingsley, 1878–79, p. 329; Fowler, 1912, p. 330, pl. 95.

Carapace thin and smooth, anterior border with a spine below eye, side with a sharp hepatic spine behind base of antenna and a small spine on each side at base of rostrum. Rostrum rather stout at base, thin distally, slightly decurved, armed above with two or three teeth, below with one tooth near the tip and two farther back; tip reaching to extremity of antennular peduncle. Outer flagellum of antennule thickened, about as long as antennal scale, and about four-fifths as long as inner flagellum. Antennal scale large, extending about one-third its length beyond tip of rostrum. First pair of legs small, chelate. Second pair of legs chelate, the carpus triarticulate. Dactyli of other legs broad, compressed, and armed along their inner edge with small spines. Abdomen strongly geniculated between the third and fourth segments. Posterior part of third segment raised and produced into a sort of hood which overhangs the fourth segment. Telson smooth above, margins with two small, movable spines on each side; tip truncate and armed with slender spines. Dorsal surface of abdomen and thorax, tips of abdominal pleuræ, and distal portion of eyestalks with tufts of plumose hairs.

Length of adult females, 12 to 18 mm.

Color, often a bright green but usually mottled brown or red.

This little shrimp, like *Tozeuma carolinense*, is to be found in abundance on the submerged *Zostera* in various parts of the harbor. It may also be found in considerable numbers about the rock jetties off Fort Macon. Egg-bearing females occur throughout the summer.

Genus LATREUTES Stimpson.

Latreutes Stimpson, 1860, p. 27 (96).

Latreutes ensiferus (H. Milne-Edwards). Pl. XXVI, fig. 13.

Hippolyte ensiferus H. Milne-Edwards, 1834–1840, t. II, p. 374.
Latreutes ensiferus Stimpson, 1860, p. 27 (96); Bate, 1888, p. 583; Rathbun, 1901, pt. 2, p. 114; Sumner, 1911, pt. 2, p. 664.

Integument smooth and polished, body slender and but slightly humped at end of third abdominal somite. Carapace subcylindrical, with a small dorsal spine; a strong postocular spine and a series of five to eight small spines along anterior margin below eye. Rostrum nearly as long as carapace, rather stout at base but rapidly tapering to a thin, deep, slightly upcurved blade smooth above and below and serrate at the apex. Antennæ very slender, longer than the body; scale almost as long as rostrum, tapering

to a narrow point. First pair of legs short and stout; hand inflated, with short fingers and articulated at lower angle with carpus; carpus with its anterior margin excavate to receive the hand, its superior angle with a bundle of hairs. Second pair of legs slender, the carpus divided into three articles of which the central is the longest. Third, fourth, and fifth legs slender, with long spines on inferior margin of propodi; dactyls bifurcate at tip.

Telson narrow, tapering, upper surface with two pairs of small spines near margin, tip obtuse and armed with a strong median spine on either side of which are two slender spines.

Length of a male, 12 mm.; carapace, including rostrum, 5 mm.; rostrum, 2.5 mm.

In life it is almost transparent and colorless. It lives among floating *Sargassum* and at times is easily taken in the harbor and along the sea beaches. An occasional individual is found to carry an isopod parasite (*Probopyrus latreuticola* Gissler)) in one of its branchial chambers.

Genus TOZEUMA Stimpson.

Tozeuma Stimpson, 1860, p. 26 (95).

Tozeuma carolinense Kingsley. Pl. XXVII, fig. 2.

Tozeuma carolinensis Kingsley, 1878a, p. 90; ibid., 1880a, p. 413; Rathbun (*T. carolinense*), 1901, p. 114.

Elongate, compressed. Carapace smooth and polished, its anterolateral angle with a spine, a triangular tooth below eye, and a strong spine on either side at base of rostrum. Rostrum slender, almost twice as long as remainder of carapace, rounded and almost unarmed above, base somewhat flattended and horizontal, distally inclined slightly upward, serrated below and lamellate toward base. Outer flagellum of antennule thick and much shorter than inner, neither quite reaching tip of antennal scale. Antennæ longer than rostrum; scale lanceolate, less than half as long as rostrum. Legs all short; first pair very short, stout, hand inflated, fingers curved, closing completely; second pair also chelate, very slender. Carpus triarticulate; other legs with simple, curved dactyli.

Abdomen strongly geniculated between third and fourth segments, the third segment of the male bearing a low hump; fifth segment with a spine on each side on posterior margin; sixth segment with a posterolateral spine and a stronger one on each side at base of telson; telson with two pairs of dorsal spinules, posterior margin armed on each side with one long and one short spinule.

Length of a male, 40 mm.; carapace, including rostrum, 19 mm.; rostrum, 12 mm.

Color usually green but sometimes gray or grayish red.

Very common in nearly all parts of the harbor where there is a growth of *Zostera*.

Genus CONCORDIA Kingsley.

Concordia Kingsley, 1880, p. 415.

Concordia gibberosus Kingsley. Pl. XXVI, fig. 11.

Concordia gibberosus Kingsley, 1880a, p. 415.

Carapace, rather short, elevated and armed dorsally with five or six slender spines the first of which is near the extremity of the rostrum while the last is a little forward of the middle of the carapace, these teeth well separated and the carapace between them not carinate; rostrum short, little if any advanced beyond the eyes. Abdomen strongly bent in the middle; telson narrow, sides straight, tapering to an acute tip. Eyestalks short and stout. Antennules with the basal articles ciliate above, flagella short, the outer one stout and ciliate, the inner one slender. Antennal scale extending to about the middle of the flagella of the antennule; flagellum of antenna slender and about twice as long as the carapace. First pereiopods short, stout, fingers shorter than the palm; second pereiopods longer and slenderer, carpus composed of three articles of which the distal and proximal ones are of nearly equal length and considerably shorter than the intermediate one. The other pereiopods are slender, the propodal articles with a few minute spines on the posterior border, the dactyls short, curved and with spines on the concave margin.

Length, 8 to 12 mm.

This species has not been detected within recent years. The original specimen, collected at Fort Macon, by Prof. H. E. Webster and described by Kingsley, is preserved in the United States National Museum. Other specimens are from "off South Carolina," and Punta Rassa, Fla. The type specimen lacks some of the pereiopods, but the others show that the carpus consists of three articles instead of two, as has been understood from Kingsley's description.

Genus HIPPOLYSMATA Stimpson.

Hippolysmata Stimpson, 1860, p. 26 [95].

Hippolysmata wurdemanni (Gibbes). Pl. XXVI, fig. 12.

Hippolyte wurdemanni Gibbes, 1850, p. 197.
Hippolysmata wurdemanni Kingsley, 1878a, p. 90; ibid, 1880a, p. 411.

Carapace dorsally carinate on anterior half and with a spine about midway between tip of rostrum and posterior margin. Rostrum reaching distal end of second article of peduncle of antennule, slightly decurved, armed above with four teeth and below with three or four teeth. Anterior margin with a strong spine behind base of antenna. Antennules with the inner flagellum slender, about as long as body; outer flagellum with about 20 basal segments thickened and bearing at about the seventeenth segment a long slender flagellum similar to the inner one. Antennal scale long, narrow, truncate at tip and with a strong apical spine; flagellum considerably longer than body. First pair of legs with carpus and hand of nearly equal length, fingers half as long as palm. Carpus of second pair about forty-seven articulate, sharply bent at about the nineteenth articulation.

Abdomen smooth, not strongly geniculate. Telson narrow, straight sided, upper surface with four small, movable spines forming a square near middle; tip truncate, with two slender spines.

Length of a female, 30 mm.; carapace and rostrum, 11 mm.; rostrum, 3 mm.

Color, a translucent white with beautiful longitudinal and transverse markings of red.

Commonly found at Beaufort swimming near the stone jetties or among hydroids growing on piles.

Family PALAEMONIDAE.

Caridea having the first two pairs of legs chelate, the second pair usually larger than the first, the carpus of the second pair of legs not subdived, the rostrum long, compressed, armed with teeth and not movable, the mandibles deeply cleft and the second maxillipeds with a very short seventh article.

Twenty-six genera are now recognized of which four are represented in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Legs of the second pair approximately alike in size and shape
  b. Rostrum with teeth both above and below.
    c. Mandibles with a palp.....*Palæmon.*
    cc. Mandibles without a palp.....*Palæmonetes.*
  bb. Lower surface of rostrum toothless except at tip.....*Urocaris.*
aa. Legs of second pair dissimilar, one of them greatly enlarged.....*Coralliocaris.*

Genus PALÆMON Fabricus.

Palæmon Fabricus, 1798, p. 387; *Leander* Desmarest, 1849, p. 87; Stimpson, 1860, p. 40 [109].

Palæmon tenuicornis Say. Pl. XXVII, fig. 6.

Palæmon tenuicornis Say, 1818, p. 249; Sumner, 1911, p. 663.
Palæmon tenuirostris H. Milne-Edwards, 1834-1840, t. II, p. 395.

Form stout, integument firm, translucent. Cephalothorax short. Carapace almost as deep as long, its front margin with a spine just below the eye and another a little back at the base of the antenna. Rostrum with its axis decurved but upper margin of crest almost straight, armed above with 11 or 12 teeth and below with 6 or 7, the teeth more and more crowded distally and the spaces between them densely ciliated.

Peduncle of antennules shorter than rostrum; outer flagellum very slender and much shorter than the inner one which has its basal portions thickened and bears a long, slender side branch near its base. Antennal scale reaching to tip of rostrum, tapering very slightly to a truncate tip, apical spine small; flagellum very slender, about as long as body. First pair of legs weak, carpus shorter than hand, palm shorter than fingers.

Abdomen bent and slightly humped at end of third segment. Upper surface of telson slightly grooved and with four small spines.

Length of a female, 45 mm.; carapace, including rostrum, 16 mm.; rostrum, 9 mm.

This shrimp has been collected from floating *Sargassum* in the harbor, from the piles of the town wharves, and outside the harbor, by the *Fish Hawk*.

Genus PALÆMONETES Heller.

Palæmonetes Heller, 1869, p. 157.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Second pair of legs long, considerably exceeding the rostrum.
b. Fifth pair of legs not reaching the tip of the rostrum; marine.....*carolinus*.
bb. Fifth pair of legs exceeding the tip of the rostrum; fresh water.....*exilipes*.
aa. Second pair of legs shorter, hardly reaching the tip of the rostrum; marine.....*vulgaris*.

Palæmonetes carolinus Stimpson. Pl. XXVII, fig. 4.

Palæmonetes carolinus Stimpson, 1874, p. 129; Kingsley, 1878–79, p. 330; Fowler, 1912, p. 328.

Integument moderately firm. Carapace rounded above, anterior margin with suborbital and branchiostegal spines; rostrum slightly exceeding the antennal scales, thin, deep, upcurved in distal half at least, armed above with 8 or 9 teeth and below with 4 or 5, the intervals between the teeth ciliated and the posterior one of the upper surface somewhat removed from the others and belonging, perhaps, to the carapace.

Antennular peduncle shorter than antennal scale; inner flagellum slender; outer flagellum with the basal articles thickened and bearing at about the eighth article an accessory branch of about twelve articles. Antennal flagellum considerably longer than body; scale foliaceous, its sides tapering slightly to an obliquely rounded tip which usually fails to reach the end of the rostrum. First pair of legs short, reaching scarcely beyond the carpus of the second pair. Second pair of legs very long, exceeding the rostrum by almost the length of the hand; fingers a little shorter than the palm. Distal end of fifth legs not extending to the tip of the rostrum.

Abdomen rather stout, bent but not conspicuously humped at the fourth segment. Telson tapering, its sides straight, tip with two long slender spines, upper surface with four small spines.

Length of a female, 24 mm.; carapace, including rostrum, 10 mm.; rostrum, 6 mm.

Color in life, almost transparent; in alcohol, milky white.

It occurs in abundance in the eel grass and about the margins of the marsh in all parts of the harbor, usually in company with *P. vulgaris*.

Palæmonetes vulgaris (Say). Pl. XXVII, fig. 5.

Palæmon vulgaris Say, 1818, p. 248; Coues, 1871, p. 124.
Palæmonetes vulgaris Stimpson, 1871, p. 129; Smith, 1873, p. 550; Kingsley, 1878–79, p. 330; Paulmier, 1905, p. 132; Sumner, 1911, p. 663; Fowler, 1912, p. 324, pl. 94.

Similar to *P. carolinus* except as follows: The dorsal spine of the carapace is lacking or is moved forward until it forms a part of the series of rostral teeth. The tip of the rostrum is more acute, the teeth of the upper margin are smaller and more acute, and those of the lower margin number two or three. The antennular peduncle is as long as the antennal scale. The second pair of legs is much shorter, hardly reaching the tip of the rostrum, and the fingers are considerably shorter than the palm.

Length of a female, 31 mm.; carapace, including rostrum, 12.5 mm.; rostrum, 6 mm.

This species, often found in company with *P. carolinus*, has also been taken frequently in floating *Sargassum*. In August, 1915, it was found in great numbers in a small pool of slightly brackish water close to Newport River about 3 miles north of the laboratory.

Palæmonetes exilipes Stimpson. Pl. XXVII, fig. 3.

?*Hippolyte paludosa* Gibbes, 1850, p. 197.
Palæmonetes paludosa Kingsley, 1878a, p. 97.
Palæmonetes exilipes Stimpson, 1871, p. 130; Smith, 1874, p. 641, pl. 1, fig. 1.

Integument thin and transparent. Carapace subcylindrical, smooth, with slender and acute suborbital and branchiostegal spines; rostrum long, slender, compressed, gently curved upward dis-

tally, armed above with 7 or 8 equidistant teeth and below with 2 to 4; second tooth of dorsal margin usually directly above the bases of the ocular peduncles; the tip unarmed, slender, and acute. Outer flagellum of antennule much longer than the inner, the basal portion thick and bearing, at about the sixteenth article, an accessory branch of about seven articles. Antennal flagellum longer than body; scale broad, its rounded tip slightly exceeding the rostrum, its sides nearly parallel. First pair of legs hardly reaching the hand of the second pair of legs and about equaling the antennal scale. Second pair of legs more slender, exceeding the rostrum by more than the length of the hand; fingers a little shorter than the palm. Fifth pair of legs exceeding the tip of the rostrum.

Abdomen rather slender, humped at end of fourth segment. Telson tapering gradually to the extremity where the sides turn in suddenly to end in an acuminate median tooth, on each side of which is a long stout spine and at each lateral angle a much shorter one, while between the inner spines there is a pair of long plumose hairs. The dorsal surface of the telson bears two pairs of spines, one near the distal end and the other one-fourth the distance from the distal end to the base.

Length, 42 mm.; carapace, 18 mm.

Color in life, nearly transparent; in alcohol, milky white.

While *P. exilipes*, being an inhabitant of fresh water, has not been taken in the immediate vicinity of Beaufort, it may be safely predicted that it will be found there sooner or later. It has been collected at Edenton, Wilmington, Hales Point, and Lake Mattamuskeet. It may be readily distinguished from the others of its genus by its much more slender form and slender hands as well as by its habitat.

Genus UROCARIS Stimpson.

Urocaris Stimpson, 1860, p. 39 [108].

Urocaris longicaudata Stimpson. Pl. XXVII, fig. 7.

Urocaris longicaudata Stimpson, 1860, p. 108; Kingsley, 1880a, p. 444; Rathbun, 1901, p. 126.

Integument very thin, transparent, and smooth. Carapace rounded above, its anterior margin with a strong, rounded tooth at the side of the orbit. Rostrum hardly reaching end of second article of antennular peduncle, its upper edge raised into a high, arcuate, 7 to 8 toothed crest, its lower margin with a small spine near tip. Antennal scale exceeding peduncle by about half its length, its margins nearly parallel; apical spine small; flagellum very slender, longer than body. Inner flagellum of antennule with the basal segments thickened and bearing at about the eighth segment a long slender branch almost as long as antenna; inner flagellum simple, more slender and shorter. First pair of legs slender, carpus and hand of nearly equal length. Second pair of legs longer; the carpus, palm, and fingers subequal.

Abdomen strongly bent between third and fourth segments, the posterior part of the third segment extended back like a hood above the fourth. Sixth segment slender and about as long as fourth and fifth combined. Telson narrow, tapering, upper surface with 4 small spines, tip obtuse and bearing several slender spines.

Length of a male, 17 mm.; carapace, including rostrum, 4.2 mm.; rostrum, 1.5 mm.

Found in abundance on submerged eel grass along with *Hippolyte* and *Tozeuma*, where it escapes observation by reason of its almost perfect transparency.

Genus CORALLIOCARIS Stimpson.

Coralliocaris Stimpson, 1860, p. 38 [107].

Coralliocaris wilsoni Hay. Pl. XXVII, fig. 8.

Coralliocaris wilsoni Hay, 1917, p. 71.

Body somewhat compressed, cephalothorax about as long as abdomen excluding telson. Carapace firm, smooth, polished, and with a well-defined postantennal spine; rostrum about one-third as long as remainder of carapace, compressed, slightly decurved and armed above with 11 to 13 acute, equidistant teeth. Eyestalks stout. Antennular flagella of about equal length, the outer much thicker than the inner. Antennal scale broad, equal to the rostrum in length. First pair of legs alike, slender, chelate, the tips of the fingers hairy. Second pair of legs very unequal, the larger one having the chela so large that its bulk is almost equal to the rest of the animal; hand cylindrical, movable finger strongly curved, bent inward, its cutting edge with a prominent lobe near the base; thumb bent downward out of line

with the hand, its cutting edge with two slender teeth. Smaller chela about one-third the size of its mate, somewhat compressed but otherwise similarly constructed. Third, fourth, and fifth legs with short, conical dactylus.

Telson narrow, its sides uniformly convergent to the small rounded tip, which bears four slender spines; there is also a spine on each margin near the middle.

Length of body, 16 mm., carapace, 7 mm., large claw, 10 mm.

Color, pellucid, milky white. Egg masses light bluish-green. The integument is so transparent that the color of the internal organs is plainly visible.

Three specimens of this little shrimp, 2 females and 1 male, were obtained August 1, 1914, on the fishing banks about 20 miles off Beaufort Inlet. Another series of 8 or 10 specimens was collected July 20, 1915. In both cases the animals were found in the canals of a large sponge in company with *Synalpheus longicarpus* and *S. townsendi*, to which they bear a striking superficial resemblance. When disturbed or, especially, when dropped into alcohol, they are able to make a snapping sound with the large chela quite as loud as that made by one of the true snapping shrimps.

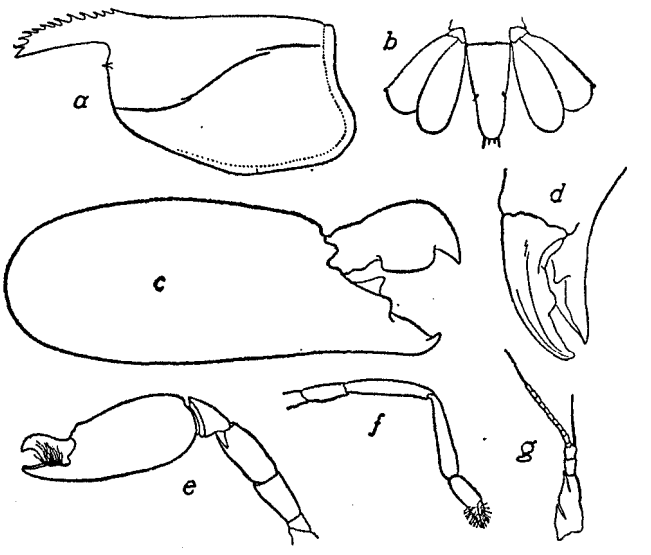

FIG. 13.—*Coralliocaris, wilsoni*, ♂ ×4½.

a, Carapace, lateral view; *b*, telson and uropods; *c*, large chela; outer surface; *d*, fingers of large chela from above; *e*, small chiliped; *f*, right leg of first pair; *g*, antennule.

The species has been dedicated to Dr. H. V. Wilson, of the University of North Carolina, for many years an investigator at the Beaufort station, at one time its director, a well-known authority on sponges, and the one to whom the undertaking of this paper on the decapod crustaceans is largely due.

Family GNATHOPHYLLIDAE.

Caridea having the first two pairs of legs chelate, the first pair smaller than the second, the carpus of the second pair not subdivided, the rostrum short and toothed, the third article of the third maxillipeds very broad, the mandibles simple and the second maxillipeds with a very short seventh article.

The family contains but a single genus.

Genus GNATHOPHYLLUM Latreille.

Gnathophyllum Latreille, 1819, p. 72; (*Gnatophyllum*) ibid, 1829, p.96.
Drimo Risso, 1829, p. 70.

Gnathophyllum modestum Hay. Pl. XXVIII, fig. 1.

Gnathophyllum modestum Hay, 1917, p. 72.

Body short and thick. Carapace with a low carina continuous in front with the rostrum and extending about halfway to the posterior margin. Rostrum reaching to distal end of basal article of antennule, obliquely truncate above and with 7 teeth. Suborbital spine acute. Abdomen with the last three segments abruptly smaller and strongly flexed; telson with two marginal spines at about the distal third, the tip almost truncate and with 6 spines, of which the median and longest pair is about one-

fifth as long as the telson. Eyes rather large and with a prominent, conical, black protuberance on the cornea. Antennæ about twice as long as carapace. Third maxillipeds with the meral and carpal articles very broad, closing the whole front of the buccal region, the two terminal articles slender and extended straight forward. Second pair of legs much stronger than the first, exceeding the rostrum by the length of the hand; fingers more than half as long as the palm.

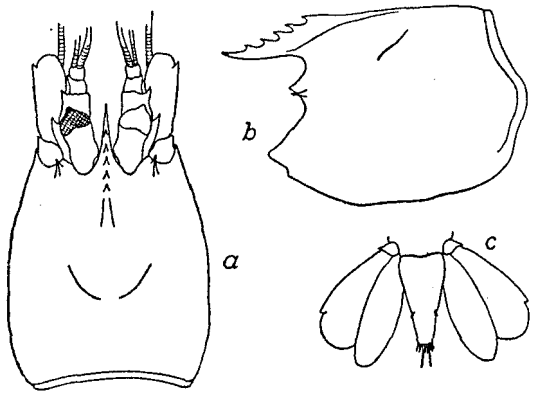

FIG. 14.—*Gnathophyllum modestum*, type, ♀ X4¾.

a, Dorsal view of cephalothorax; *b*, carapace, lateral view; *c*, telson and uropods.

Length, about 21 mm.; carapace, 8 mm.; rostrum, 2 mm.; hand, 5 mm.

Color: Cephalothorax and abdomen dark brownish-red, telson and tail fins white, eyestalks and peduncles of antennæ and antennules white, flagella of antennæ and antennules and bands on legs purple.

Only one specimen, an ovigerous female, has been collected. It was obtained by the *Fish Hawk* and brought to the laboratory preserved in formalin, but was not noticed until some days later. The color notes were made at once and the specimen transferred to alcohol. Within a few days a spotting or mottling of the surface began to appear, which by the end of the summer had become quite pronounced, but the spots do not have the arrangement described by Faxon in the species *G. panamense*. At no time has there been a suggestion of the bands of color described by Dr. Mary J. Rathbun in *G. americanum*.

A careful comparison of the Beaufort specimen with the two species mentioned and with *G. elegans* shows it to be distinct. It is probably most closely related to *G. panamense*. which it resembles in color pattern, and with which it agrees in length of rostrum and number of rostral teeth. It differs from all hitherto known species, however, in the arrangement of the spines at the tip of the telson. It, furthermore, differs from *G. panamense* in the length of the longer spines at the tip of the telson, in the longer fingers and longer wrist. From *G. americanum* it differs in color and in the much weaker second pair of legs.

Family CRAGONIDAE.

Caridea having the first pair of legs subchelate, the carpus of the second pair not subdivided, the rostrum short and not compressed and the second maxillipeds with a very short seventh article.

This family comprises 13 genera of which only 1, *Crago*, occurs in the Beaufort region.

Genus CRAGO Lamarck.

Crago Lamarck, 1801, p. 159.
Crangon Fabricius, 1798, p. 387. (Not *Crangon* Weber, 1795.)

Crago septemspinosus (Say). Northern shrimp. Pl. XXVII, fig. 9.

Crangon septemspinosum Say, 1818, p. 246.
Crangon vulgaris, Verrill and Smith, 1875, p. 550; R. Rathbun, 1884, p. 816; Paulmier, 1905, p. 131.
Crangon crangon and *Crangon vulgaris* of authors (in part).
Crago septemspinosus Fowler, 1912, p. 320, pl. 93; Sumner, 1911, p. 664.

Integument moderately firm, polished, translucent. Carapace subcylindrical, its dorsal surface with a small appressed spine back of the rostrum; anterior margin with the suborbital angle slightly and the subantennal angle strongly produced, the latter almost spiniform and with a minute spine below it; lateral spine of carapace well developed; anterior part of side of carapace with two impressed lines

which originate, one from a fissure in the superior margin of the orbit, and the other at the external canthus, unite above the lateral spine and disappear a little farther back. A third line begins in the fissure at the external canthus and passes below the lateral spine. Rostrum shorter than eyestalks, unarmed, its tip obtuse. First segment of peduncle of antennule with a mucronate scale below the eye; flagella little longer than antennal scale. Antennæ as long as body, slender; scale long, broadest below middle, thence tapering rapidly to the narrow rounded tip; apical spine strong, about as long as distal width of scale. External maxillipeds about as long as antennules, hairy. First pair of legs subchelate, palm with a strong spine at distal end of finger; meros with a small spine on lower margin. Second pair of legs almost filiform, third pair stronger, fourth and fifth pairs normal but comparatively weak. Telson slender, with four small spines above, tip unarmed.

Length of a female, 55 mm.; carapace, including rostrum, 11 mm.; rostrum, 1 mm.

Color, according to Say, pale cinereous, with very numerous irregular, stellate, blackish-brown spots.

In the Beaufort region this shrimp has been supposed to be very rare. The laboratory collection long contained but a single specimen taken in shallow water close to the laboratory. During the early spring of 1914 two additional specimens were taken in the same locality. In the late fall of the same year it was quite frequently taken in the otter trawl in the Morehead Channel, a dozen or more sometimes coming up at one haul. Most of the specimens were ovigerous females whose eggs, in some cases, were nearly ready to hatch.

Suborder REPTANTIA.

Decapod crustaceans, usually of a lobsterlike or crablike form, having the abdomen, whether well developed or greatly reduced, more or less depressed, the first segment distinctly smaller than the rest, and the pleopods, which are not used for swimming, often reduced or wanting. The cephalothorax also is usually depressed and the legs are strong, the first pair usually, the others never, larger than their fellows. Some of the first four pairs of legs rather often bear podobranchs. The rostrum is usually small or wanting; if present it is depressed.

This large and important division of decapod crustaceans, comprising some 700 genera, is divided into the "sections" *Palinura*, *Astacura*, *Anomura*, and *Brachyura*, all of which are represented in the fauna of the Beaufort region.

Section PALINURA.

Reptantia having the abdomen well developed, extended, symmetrical, and well armored, the carapace fused at the sides to the epistome, the legs strong, the third pair being like the first either chelate or simple, the rostrum small or wanting and the gills numerous.

This section comprises two tribes, of which one, *Eryonidea*, does not occur within our limits. The other, *Scyllaridea*, is represented by two species.

Tribe SCYLLARIDEA.

Palinura having the first article of the second antenna fused with the epistome, no antennal scale, all the legs of about the same length and, with the occasional exception of the first pair, none of them chelate, the first abdominal segment without limbs and the tail fin divided by indistinct sutures into a soft hinder half and a harder front half.

This tribe comprises two families, both of which are represented in our fauna.

Family PALINURIDAE.

Scyllaridea having the cephalothorax subcylindrical, the eyes not inclosed in separate orbits formed by the edge of the carapace and the second antennæ provided with flagella.

This family includes 6 genera of which only 1 occurs in our fauna.

Genus PANULIRUS White.

Palinurus White, 1847, p. 69.

Panulirus argus (Latreille). Sea crawfish. Pl. XXVIII, fig. 3.

Palinurus argus Latreille, 1804, t. III, p. 393.
Panulirus argus White, 1847, p. 69; Rathbun, 1901, p. 98.

Carapace as long as the first five abdominal segments, sparsely setose and covered with strong spines arranged in more or less regular longitudinal rows. Spines above the orbits very large, compressed and curved upward and forward. Antennal segment with a pair of spines in front, a weaker pair about halfway to the eye, a strong median spine and weaker lateral ones below the insertion of the antennules.

Abdomen smooth, each segment crossed by a furrow which is more or less distinctly interrupted at the middle. Pleural angles each produced into a strong, sharp, backwardly directed tooth which is deeply notched and toothed on its posterior margin. Proximal division of telson with rather strong spines; distal division with weak spines and cilia in longitudinal lines. Eyes large and prominent. First antenna nearly two-thirds as long as the body, its peduncle slightly exceeding that of the second antenna, outer flagellum shorter and thicker than the inner and strongly ciliate distally. Second antenna very large and heavy, exceeding the body by more than the length of the carapace, its peduncular article with numerous strong spines, its flagellum stout, stiff, with a line of cilia along its inner margin and ringed with spines at intervals.

Legs rather weak, none of them chelate, their tips acute and bristly. Pleopods wanting on the first segment of the abdomen, those of the other somites with a single, broad, membranous lamina. Uropods indurated proximally, membranous distally, the basal article bispinose, a row of denticles along margin of indurated part and lines of minute spines and setæ on upper surface of membranous part.

Color, yellowish and bluish. Abdomen with many small yellow spots; a large yellow spot on each side of the second and sixth segments.

This species, which attains a large size farther south, is rarely represented about Beaufort except by small individuals. These are sometimes taken by fishermen when seining for shrimps in the creeks above the harbor or are caught in dip nets about the wharves in the town, but are of most frequent occurrence outside the inlet. The largest specimen in the laboratory collection measures, exclusive of the antennæ, 90 mm. in length. A much larger specimen, having a body length of 430 mm., was caught near Cape Lookout in the spring of 1916. It was kept alive in an aquarium for about two months.

Family SCYLLARIDAE.

Scyllaridea having the cephalothorax depressed, the eyes inclosed in separate orbits formed by the edge of the carapace and the second antennæ with flat scales in place of flagella.

Of the eight genera now recognized in this family, only one is believed to be represented in the Beaufort fauna.

Genus SCYLLARUS Fabricius.

Scyllarus Fabricius, 1875, p. 413.
Arctus Dana, 1852, p. 516.

Scyllarus americanus (Smith). Pl. XXVIII, fig. 2.

Arctus americanus Smith, 1869, ser. 2, p. 119.
Scyllarus (Arctus) gundlachi von Martens, 1872, p. 123.
Scyllarus americanus Rathbun, 1901, p. 97.

Integument rugose and hard except for the membranous tips of the uropods and telson. Carapace as long as the first five abdominal segments, its greatest breadth slightly exceeding its length. Dorsal surface with three longitudinal ridges, the median of which has three blunt prominences while the lateral ones are conspicuously broken toward their anterior ends. Margins of carapace more or less dentate and produced anteriorly into a prominent angle which is continued across the front below the orbits so that the latter appear to be excavated in the dorsal surface. Abdomen convex dorsally, rugose; each segment slightly notched on the posterior margin and with a conspicuous impressed line running from near the middle line to the pleural angle. Proximal portion of telson and uropods indurated, the distal half membranous and smoothly rounded. Eyes subspherical, prominent. Antennules biflagellate. Antennæ of four articles, of which the second and fourth are broad thin scales, the anterior margin of the fourth being deeply scalloped. Legs rather small, all simple in the male, fifth pair minutely chelate in the female. Swimmerets of first segment wanting, those of second segment slender and biramous, the others consisting of a single foliaceous branch.

Two specimens of this animal were dredged by the *Fish Hawk* in deep water off Beaufort Inlet. The larger of the two measures 39 mm. from the tip of the antenna to the end of the telson.

Section ASTACURA.

Reptantia having the abdomen extended, well developed, symmetrical, and well armored, the cephalothorax subcylindrical, the carapace free from the epistome, the first three pairs of legs chelate, the first pair much stronger than the rest, the rostrum well developed, and the gills numerous.

Two of the three families which constitute this section are described here.

Family HOMARIDAE (=NEPHROPSIDAE of most authors).

Marine Astacura having the last thoracic segment consolidated with the one in front of it, the pleurobranchs four in number, and with sexual appendages present in the male.

Nine genera are now recognized in this family. Of these only one is, or was formerly, represented in the Beaufort region.

Genus HOMARUS Weber. The lobsters.

Homarus Weber, 1795, p. 94; Milne-Edwards, H., 1837, t. II, p. 333.

Homarus americanus H. Milne-Edwards. American lobster. Pl. XXVIII, fig. 7.

Homarus americanus H. Milne-Edwards, 1837, t. II, p. 334; De Kay, 1844, p. 23; Coues, 1871, p. 124; Kingsley, 1878–79, p. 320; R. Rathbun, 1885, p. 781; Herrick, 1895, p. 1–252; Fowler, 1912, pp. 96–99; Sumner, 1911, p. 665.

Cephalothorax subcylindrical, the carapace smooth and punctate above and on the sides, but with short and acute post orbital, post antennal, and infraorbital spines. Rostrum narrow, decurved until near the tip, which is usually more or less upcurved; margins above with 2 or 3 teeth on each side, lower surface with from 1 to 3 teeth a short distance behind the tip. Abdomen strong, its pleura more or less acuminate and directed backward; telson with a spiniform tooth on each side near the tip; basal article of appendages of sixth segment with two strong denticles. Antennal scale small; antennal

flagellum a little longer than body. Chelipeds large and heavy, unequal in size, and with dissimilar chelæ, the broader and heavier one having lobate teeth on the opposable margins of the fingers, while the more slender one has small, sharp teeth and numerous stiff setæ; both chelæ with strong spiniform tubercles on the inner margin in two rows and the base of the movable finger with a tubercle. Walking legs, with pencils of setæ, on the terminal articles.

Color, above dark bluish-green, mottled and speckled with darker spots, merging into dusky yellow or orange on the sides of the carapace and the blades of the tail fin; spines of chelipeds and rostrum, margins of chelæ, and the antennulary and antennal flagella red; walking legs clear bluish-green.

The only record of the occurrence of the lobster in the Beaufort region is by Coues, who stated that a small individual was captured near the town, by fishermen, in the summer of 1870. His surmise, that it might have been thrown overboard from some vessel from the north, may have been correct, but there is good reason to believe that in former years the range of this crustacean extended considerably farther to the south than it does at present. According to Herrick (op. cit., p. 15), "It has been said that lobsters have been seen along the beach in the surf near Indian River Inlet, Delaware. Two or three have been recorded at Johnstown, in the northeastern corner of Virginia, and in October, 1884, the United States Fish Commission steamer *Albatross* obtained a single specimen of good size off Cape Hatteras, North Carolina, from a depth of about 30 fathoms, by means of the beam trawl." De Kay (op. cit., p. 25) stated that in 1814 Gen. Pinckney liberated a car full of lobsters in the harbor of Charleston, S. C., and that survivors of these or their offspring were captured as late as 1830.

At the present time the lobster is not known to occur south of the Delaware breakwater.

Family ASTACIDAE (=POTOMOBIIDAE, of most authors). The fresh-water crawfishes.

Fresh water Astacura, having the last thoracic segment free from the one in front of it, the pleurobranchs wanting or reduced to one on each side, and with sexual appendages present in the male.

Two or three genera are included in this family. Of these, only one is represented in the Beaufort region.

Genus CAMBARUS Erichson.

Cambarus Erichson, 1846, p. 88.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Rostrum long and slender, with lateral teeth near the tip..... *blandingii*.
aa. Rostrum short and broad, without lateral teeth.
b. Rostrum rather deeply concave above..... *diogenes*.
bb. Rostrum nearly flat above, with a low carina..... *uhleri*.

Cambarus blandingii (Harlan). Blanding's crawfish. Pl. XXVIII, fig. 5.

Astacus blandingii, Harlan, 1830, p. 464; De Kay, 1844, p. 23.
Cambarus blandingii, Hagen, 1870, p. 43; Faxon, 1885, p. 19; Fowler, 1912, p. 357.

Carapace subcylindrical, smooth above, but with numerous small tubercles on the sides; rostrum elongate, with sharp, raised margins and short lateral spines. Chelipeds slender and thickly tuberculate; chelæ cylindrical and with slender fingers. Walking legs weak, pubescent at the tips, the third and fourth pairs of the male with a hook on the third article. First abdominal appendages of the male club-shaped, with two small, incurved, horny teeth on the distal end of the outer branch and a single backwardly directed spine on the inner branch.

Length, 75 to 80 mm.

Color, dull greenish-brown, whitish beneath and on lower part of carapace, often with a dark greenish longitudinal stripe on the sides; tubercles of chelæ black; sometimes entirely black.

This species is said by Faxon to have been collected at Beaufort, but when and by whom is not stated. Recent collecting has failed to bring it to light in what might fairly be termed the Beaufort region. It has been taken at Lake Matamuskeet and at Wilmington, however, and undoubtedly occurs in the intermediate country. It is an inhabitant of ponds and ditches near the seacoast from New York to Georgia.

Cambarus diogenes Girard. Solitary crawfish. Pl. XXVIII. fig 4.

Cambarus diogenes, Girard, 1852, p. 88; Faxon, 1885, p. 71; ibid., 1914, p. 400; Fowler, 1912, pp. 102–103.

Carapace subcylindrical, compressed anteriorly, without spines and only lightly granulate on the sides; rostrum rather narrow, short, its upper surface rather deeply concave and lightly foveolate at the base. Chelipeds large and heavy; chelæ broad, heavily punctate, fingers ribbed above and below. Third pair of walking legs of the male with a hook on the third article. First abdominal appendages of the male short, strong and twisted, the posterior edge bearded at the base and with two backwardly directed teeth at the distal end. Abdomen shorter than the cephalothorax.

Length, 75 to 80 mm.

Color, very dark brown or olive brown, sometimes almost black; edges of rostrum, postorbital ridges and tips of chelæ and legs orange red.

Although this species had been collected in various other parts of North Carolina it was not until the summer of 1913 that it was met with in the Beaufort region. At that time several specimens were taken from holes which they had dug along the edge of a swamp on the north side of Cullys Creek, 10 or 12 miles north of the laboratory. In most cases these holes were surmounted by low and poorly constructed chimneys.

Cambarus uhleri Faxon. Uhler's crawfish. Pl. XXVIII, fig. 6.

Cambarus uhleri, Faxon, 1884, p. 116; ibid., 1885, p. 77; ibid., 1914, p. 400.

Distinguishable from *C. diogenes* by the rostrum, which in this species is nearly plane above, with a very low and indistinct carina, behind which there is a shallow foveola. The abdomen is commonly longer than the cephalothorax.

Length, 60 to 75 mm.

Color, yellowish or greenish brown, lighter on the sides; rostrum, chelæ, and legs with yellow, or orange.

One or two specimens of this crawfish were secured in 1913 on the south side of Cullys Creek. They were taken from holes which they had dug at the edge of ponds in the woods.

Section ANOMURA.

Reptantia having the abdomen more or less reduced, asymmetrical, flexed beneath the thorax or imperfectly armored but almost always with biramous appendages on the sixth segment; the cephalothorax usually depressed; the carapace free from the epistome; a movable antennal scale often present; the third pair of legs unlike the first and the last pair markedly different from the third.

This section is divided into 4 tribes, all of which are represented in the Beaufort fauna.

Tribe GALATHEIDEA.

Anomura having the abdomen relatively well developed, not closely folded under the thorax, symmetrical and with well-developed pleura, but to some extent not capable of complete extension, the cephalothorax more or less depressed, and the second to fourth pairs of legs with the dactyl not curved and flattened.

Of the 5 families into which this tribe is divided 2 are represented in our fauna.

Family GALATHEIDAE.

Galatheidea having the abdomen not folded under the thorax, the second antennæ with a four-jointed stalk, the arthrobranchs normally placed, and the third maxillipeds with mastigobranchs.

This family comprises 8 genera, of which 2 occur in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Rostrum rather broad, its margins toothed.....*Galathea*.
aa. Rostrum slender, toothless except at extreme base.....*Munida*.

Genus GALATHEA Weber.

Galathea Weber, 1795, p. 94.

Galathea rostrata H. Milne-Edwards. Pl. XXIX, fig. 4.

Galathea rostrata H. Milne-Edwards, 1880, p. 47. H. Milne-Edwards and Bouvier, 1894, p. 252; ibid., 1897, p. 14; Benedict, 1902, p. 303.

Carapace somewhat flattened, crossed by numerous strong, ciliated ridges, its lateral margins with a number of acute spines and its front prolonged into a broad rostrum which is acute at the tip and has four strong, anteriorly projecting spines on each side. Abdomen with cross ridges like those on the carapace but without spines. Chelipeds nearly twice as long as the body, comparatively heavy, with rows of spines or spiniform granules along the margins and appressed, squamiform, ciliated granules on the surfaces; a few larger spines on the carpus and the distal end of the meros; hand a little shorter than the body, fingers gaping widely at the base.

Length, carapace 9 mm.; cheliped, 20 mm.; hand, 10 mm.

A single, much mutilated specimen of this species was obtained, in 1915, by the *Fish Hawk* on the fishing grounds in 14 fathoms. Other specimens, probably from about the same locality, were obtained during the dredging carried on in 1902.

Genus MUNIDA Leach.

Munida Leach, 1820, p. 52.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Abdomen unarmed with spines.....*irrasa*.
aa. Second, third, and fourth abdominal segments with four spines each.....*longipes*.

Munida irrasa H. Milne-Edwards. Pl. XXVIII, fig. 8.

Munida irrasa H. Milne-Edwards, 1880, p. 49; Benedict, 1903, p. 310.
Munida caribæa H. Milne-Edwards and Bouvier, 1897, p. 25.

Carapace spiny in anterior half and adorned with iridescent pubescence. Median rostral spine about twice and lateral rostral spines about half as long as eye. Lateral border with seven spines. No spines on abdomen. Meros of third maxilliped with three spines on the lower margin. Chelipeds three or four times as long as carapace, the meros with rows of spines which are continued onto the carpus and hand. Second pair of legs reaching the proximal end of the hand.

Length of body of a male, 35 mm.; of carapace, 19 mm.; of cheliped, 66 mm.; width of carapace, 11 mm.

Several specimens were obtained by the *Fish Hawk* in 1902 at a depth of 66 fathoms and again in 1914 at a depth of 47 fathoms (station D8249), about 23 miles off Cape Lookout.

Munida longipes H. Milne-Edwards. Pl. XXVIII, fig. 9.

Munida longipes H. Milne-Edwards, 1880, p. 50; H. Milne-Edwards and Bouvier, 1897, p. 44.

Carapace somewhat flattened; front armed with three spines, the two lateral extending a little farther than and the median not quite as far as the eye. There are two gastric spines, placed behind the lateral spines of the front; a small spine about midway between the gastric spine and the lateral border; about six spines on the lateral border, the first the largest; a longitudinal row of three placed to each side of the cardiac region; and two spines on the posterior border. Second, third, and fourth segments of abdomen with four spines each. Eyes large and kidney shaped, their peduncles short. The three anterior pairs of legs more than three times as long as the carapace and armed with many spines.

Length of body, 47 mm.; of carapace, 21 mm.; of chelipeds, 72 mm.; of third pair of legs, 78 mm.; width of carapace, 16 mm.

Several specimens were obtained by the *Fish Hawk* in 1902 at a depth of 172 fathoms (station 7315).

Family PORCELLANIDAE. The porcelain crabs.

Galatheidea, usually of a crablike form, having the abdomen closely folded beneath the thorax, the stalk of the second antenna composed of four articles, the arthrobranchs normally placed, and the third maxillipeds without mastigobranchs.

Of the 8 genera now recognized in this family, 5 have representatives in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Carapace depressed, chelipeds large.
  b. Carapace subcircular, about as broad as long, chelipeds broad and flat.
    c. Epimeral pieces of carapace separated by membranous interspaces; body smooth, hands very rough ..... *Pachycheles.*
    cc. Epimeral pieces of carapace not separated by membranous interspaces.
      d. Basal article of antenna little developed, the flagellum not excluded from the orbit. *Petrolisthes.*
      dd. Inner angle of basal article of antenna expanded to meet the superior margin of the carapace and excluding the flagellum from the orbit ..... *Porcellana.*
  bb. Carapace oval, broader than long, hands slender and distorted ..... *Polyonyx.*
aa. Carapace subcylindrical, much longer than broad, chelipeds small ..... *Euceramus.*

Genus PORCELLANA Lamarck.

Porcellana Lamarck, 1801, p. 153; restricted by Stimpson, 1858, p. 242.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Body and appendages comparatively smooth ..... *sayana.*
aa. Body and legs with numerous tuberculate elevations ..... *soriata.*

Porcellana sayana (Leach). Pl. XXIX, fig. 7.

Pisidia sayana Leach, 1820, p. 54.
Porcellana ocellata Gibbes, 1850, p. 190; Kingsley, 1878, p. 325.
Porcellana sayana Kingsley, 1880, p. 407; Benedict, 1901, p. 137.

Integument minutely granulate, body depressed, carapace a little longer than wide, dorsal surface slightly convex, meeting the lateral parts in a sharp ridge which ends in a slight shoulder a little behind base of antenna. Rostrum triangular, its tip abruptly decurved; orbit with a strong tooth at inner angle separated from the rostrum by a wide and rather deep notch, outer angle much less conspicuous. Cervical groove lightly impressed.

Antennæ slender, longer than carapace. Chelipeds strong and heavy; hand as long as or longer than carapace, its outer margin fringed with long hairs; fingers short, curved and bent. Proximal inner angle of carpus and distal inner angle of meros produced, forming lobes. Second, third, and fourth legs normal; fifth legs reduced and carried above the others. Abdomen weak, much flattened; uropods small and weak; telson divided into about seven small plates by oblique and longitudinal impressions.

Length of a male: Carapace, 9 mm.; hand, 9.5 mm.; width of carapace, 8.5 mm.

Color in life, reddish or rusty brown with irregular longitudinal white lines, of which the median one is broadest and expanded anteriorly; hands and carpi with white spots on a red ground; smaller legs with transverse reddish bars. In alcohol the red color disappears and the animal becomes perfectly white.

Porcellana sayana is not infrequently taken in the dredge in various parts of the harbor and along the neighboring coast. It is most often found in some crevice in a cluster of oyster shells, but is sometimes found as a commensal of the hermit crab (*Pagurus pollicaris*) in the shell of some gastropod. It has also been collected among the rocks of the jetties near Fort Macon.

An account of the zoëa of this crab, secured from eggs hatched at Beaufort, has been given by Brooks and Wilson.[a]

[a] Johns Hopkins University, Biological studies, vol. II, no. 1, p. 58–64, pl. VI, VII, 1881.

Porcellana soriata Say. Pl. XXIX, fig. 6.

Porcellana soriata Say, 1818, p. 456; Benedict, 1901, p. 137.
Pisidia socia Leach, 1820, p. 54.
Porcellana sociata Gibbes, 1850, p. 190; Kingsley, 1879, p. 407.

Integument firm, areolations of carapace well marked, some of them tuberculate. Carapace hexagonal, slightly wider than long; margins more or less hairy; front, viewed from above, rounded, tridentate from before, the rostrum little, if any, longer than the lateral teeth. Antennæ slender, about as long as carapace.

Chelipeds long and heavy, very tuberculose; hand fringed with hair along lower margin and with the tubercles in rather well-defined rows; fingers with white, strongly hooked tips; carpus with a strong spine and with the tubercles irregularly arranged; under slight magnification the tubercles appear granulate. Second, third, and fourth legs stout, hairy, and with sharp, curved dactyli. Fifth legs vestigial and placed above the others. Abdomen flattened, but of moderate width; telson subtriangular and divided into five regions by well-defined fissures.

Length of carapace, of a male 5 mm.; width, 5.25 mm.

Color in life, a dirty gray; in alcohol, a rusty or grayish red.

Several specimens of this little crab were collected early in the spring of 1912 and two more were secured in July, 1913. In both instances the crabs were found in the canals of sponges washed up on the outer beach of Bogue Bank near Fort Macon. In 1916 two pairs were collected by Mr. O. W. Hyman from the Fort Macon jetty. At the fishing banks the species is common in the larger sponges that are brought up in the dredge. On several occasions 25 or 30 specimens have been collected from one sponge.

Genus PETROLISTHES Stimpson.

Petrolisthes Stimpson, 1858, p. 240.

Petrolisthes galathinus (Bosc). Pl. XXIX, fig. 1.

Porcellana galathina Bosc, 1803, p. 233, pl. 6, fig. 2.
Porcellana sexspinosa Gibbes, 1850, p. 190.
Petrolisthes sexspinosus Stimpson, 1862, p. 73; Kingsley, 1879, p. 405; Benedict, 1901, p. 133.
Petrolisthes galathinus Ortmann, 1897, p. 283.

Carapace a little longer than wide and crossed by numerous ciliated, rugose lines which are best defined anteriorly; front produced into a broad, triangular, sinuous-sided rostrum marked off from the orbit by a notch; supra-orbital and outer orbital spines strong and acute; a strong postorbital spine from which a ridge runs backward a little distance, forming the margin of the carapace, and then turns inward to be lost among the rugæ of the back.

Antennæ about two and a half times as long as the carapace. Meros of third maxilliped with a strong internal spine. Chelipeds large, flattened, crossed obliquely by ciliated rugæ and dentate and ciliate along the outer margin of the hand and carpus; carpus about half as long as hand, its inner margin with five or six strong, serrate spines; movable finger sinuate, its upper margin costate; meros with a spine at the inner distal angle. First, second, and third walking legs with the meros flattened and denticulate on the superior margin; dactyli spinulose. Fourth legs slender and carried on the back.

Length of carapace, 8 mm.; width, 7.5 mm.; length of chela, 10.5 mm.; carpus, 6 mm.

Color in life, grayish brown without markings; in alcohol, light brown with purple or dark-red lines and dots on the rugæ.

Quite a number of specimens of this little crab were taken by the *Fish Hawk* at depths of 6 or 7 fathoms off New River Inlet and off the mouth of the Cape Fear River. One or two of these individuals bore rhizocephalan parasites.

Genus PACHYCHELES Stimpson.

Pachycheles Stimpson, 1858, p. 228.

Pachycheles rugimanus H. Milne-Edwards. Pl. XXIX, fig. 2.

Pachycheles rugimanus H. Milne-Edwards, 1880, p. 36; Benedict, 1901, p. 136.

Carapace slightly longer than wide, flat from side to side, convex from front to back, lightly rugose along the sides; frontal margin projecting downward in an obtuse angle in the middle, hardly visible from above; orbits deeply excavated, their margins slightly raised and their external angle spiniform.

Chelipeds subequal; carpus with four spines, graded in size, the proximal one being the largest; upper surface with four prominent tuberculate ridges with deep channels between; the channels crossed by irregular septæ forming a row of oblong pits between the ridges; the ridges and pitted channels continued onto the hand but with less regularity in their arrangement; fingers tuberculate almost to their tips. First three pairs of walking legs stout and with the three distal articles hairy. Fourth pair weak and borne on the back.

Length of a male, 7.5 mm.; width, 7 mm.

Color, brownish red, the fingers vermilion.

Two specimens of this crab were taken on the fishing banks in 14 fathoms and another off Cape Lookout in 47 fathoms by the *Fish Hawk* in 1914.

Genus POLYONYX Stimpson.

Polyonyx Stimpson, 1858, p. 233.

Polyonyx macrocheles (Gibbes). Pl. xxix, fig. 8.

Porcellana macrocheles Gibbes, 1850, p. 191.
Polyonyx macrocheles Stimpson, 1857–1860, p. 229; Benedict, 1901, p. 138; Sumner, 1911, p. 669.

Integument firm and smooth. Carapace transversely oval, about one-fourth wider than long; front hardly produced, its margin slightly sinuous; infolded lateral portions separated from the rest of the carapace by a deep fissure. Antenna slender, about one and one-half times as long as body; its basal segment massive, completely filling the fossa in which it is lodged and bearing the flagellum at its outer angle. Chelipeds unequal, long and distorted; hand of the larger one nearly twice as long as carapace; superior margin convex, inferior margin nearly straight and with a fringe of long hairs; fingers short, hooked at tip and toothed on cutting edges, movable one falcate; carpus as long as hand minus the fingers, thick, deeply excavated along front surface to receive the retracted hand; carpus subcubical, likewise excavated in front. Second, third, and fourth legs normal but with short dactyli which bear brushes of stiff hairs. Abdomen small, much flattened; uropods small; telson divided into small plates.

Measurements of a male: Length of carapace, 7 mm.; width of carapace, 9.25 mm.; length of hand, 13 mm.

Color, grayish white, sometimes stained with brown.

This curious little crab is a common commensal of *Chætopterus pergamentaceus* whose U-shaped tubes may be found imbedded in the shoals in various parts of the harbor. It is very rarely found outside these tubes; in fact when grown, it is probably impossible for it to escape from the tube in which it has taken up its abode.[a] A male and a female are usually found together in the end of the tube opposite the one occupied by the worm. The breeding season extends through the whole summer, females carrying eggs having been collected from June 21 to October 25.

Genus EUCERAMUS Stimpson.

Euceramus Stimpson, 1860, p. 445.

Euceramus prælongus Stimpson. Pl. xxix, fig. 3.

Euceramus prælongus Stimpson, 1860, p. 445; Kingsley, 1878–79, p. 408; Benedict, 1901, p. 138.

Carapace subcylindrical, elongate, the sides slightly arcuate, with minute irregular, transverse rugæ anteriorly; anterolateral margins with two spines on each side behind the antennæ; front tridentate, the median spine being about twice as long as the lateral ones. Eyes well developed but almost concealed beneath the front. Antennules very short. Antennæ about three-fourths as long as body, their flagella sparsely covered with very fine hairs. Third maxillipeds large and forming a subquadrate shield which extends laterally almost to the edge of the carapace. Chelipeds stout; hand slightly roughened and hairy; fingers about as long as palm, not gaping. Second pair of legs shorter than the third and fourth pairs. Fifth pair reduced and turned dorsally. Abdomen small, its distal segments very narrow and the uropods vestigial.

Measurements: Length of carapace, 8 mm.; width of carapace, 3.75 mm.

[a] Enders: Notes on the commensals found in the tubes of *Chætopterus pergamentaceus*, American Naturalist, vol. xxxix, p. 37–40, 1905.

This little crustacean appears to be one of great rarity in the Beaufort region and for a number of years has not been taken at all. In the collection of the laboratory of the Bureau of Fisheries there is a single mutilated specimen without any data. Another was taken, but unfortunately lost, during the summer of 1914 while the *Fish Hawk* was dredging in Lookout Bight. The species was originally described by Stimpson from a specimen obtained at Beaufort and was later collected by Prof. Webster and recorded by Kingsley.

Tribe THALASSINIDEA.

Anomura of a somewhat shrimplike form having the cephalothorax compressed, the abdomen large, symmetrical, extended and sometimes with well-developed pleura, and the appendages of the sixth segment usually adapted for swimming. The carapace and the covering of the abdomen are often more or less membranous and the last articles of the second to fourth pairs of legs are not curved and flattened.

This tribe comprises 4 families of which 1 is represented in the Beaufort fauna.

Family CALLIANASSIDAE.

Thalassinidea having a "*linea thalassinica*," small abdominal pleura, no sutures on the sixth abdominal appendages, no podobranchs on any of the legs, and broad appendage on the third to sixth abdominal segments.

Of 13 genera, 3 are represented in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Rostrum small; first two pairs of pleopods different from the following three pairs; chelipeds dissimilar and unequal.
  b. Inner blade of uropods oval; telson nearly flat above ..... *Callianassa*.
  bb. Inner blade of uropods narrow, its margins nearly parallel; upper surface of telson with a deep median groove ..... *Callichirus*.
aa. Rostrum large; second pair of pleopods like the following three pairs; chelipeds alike and subequal ..... *Upogebia*.

Genus CALLIANASSA Leach.

Callianassa Leach, 1814, p. 400.

Callianassa stimpsoni Smith. Pl. XXIX, fig. 5.

Callianassa stimpsoni Smith, 1873, p. 549; Kingsley, 1880a, p. 410; Sumner, 1911, p. 666.

Integument throughout smooth and shining, thin, but more than membranaceous. Cephalothorax about one-third the length of the abdomen, very thin shelled on the sides but with an oval, thickened plate on the dorsal region; rostrum and postorbital spines subequal, small and acute. Abdomen with the third, fourth, and fifth segments of about the same width and each with a small patch of fine hairs on the posterolateral angle; sixth segment narrowing; telson small, flat, rounded. Eyestalks small, flat, pointed, and with the tips curved outward. Antennular peduncle about two-thirds as long as the carapace, densely ciliate beneath, the flagella about as long as the distal article of the peduncle. Antenna slender, longer than the cephalothorax, its peduncle geniculate between the second and third articles. First pair of legs in the male very dissimilar; the larger one with a prominent tooth at the proximal end of the meros beneath; carpus articulating with meros by the extreme upper angle, its width equal to that of hand; fingers of about equal length, hairy and with incurved tips. Uropods with both blades broad.

Length of a male, 59 mm.; carapace, 14.5 mm.

Although recorded by Kingsley in 1879, this crustacean was not met with again in the Beaufort region until 1914, when a small specimen was brought in from the Blackfish Banks by the steamer *Fish Hawk*.

Genus CALLICHIRUS Stimpson.

Callichirus Stimpson, 1866, p. 47.

Callichirus major (Say). Pl. XXIX, fig. 10.

Callianassa major Say, 1818, p. 238; Gibbes, 1850, p. 194; Coues and Yarrow, 1878, p. 378.
Callichirus major Stimpson, 1866, p. 47; ibid 1871, p. 122.

Integument throughout more or less thin and membranaceous, the most indurated portions being the chelipeds and an oval plate covering the anterior three-fourths of the carapace. Rostrum very small, obtuse, and with a slightly smaller projecting lobe on each side of it on the margin of the front. Eyes minute, situated at about the middle of the outer margin of the flattened and pointed peduncles. Antennular peduncles about two-thirds as long as carapace, stout, densely ciliate beneath, each with two flagella about as long as the distal article of the peduncle. Antenna slender, longer than cephalothorax, the peduncle geniculate between the second and third articles. First three pairs of legs much compressed, the margins of the distal articles especially sharp. First pair of legs probably dissimilar, the larger one in the specimen missing; the remaining one, on the right side, with the chela rather small; fingers weak and meeting only at their tips; carpus as long as hand and somewhat wider. Second legs with long cilia on lower margin; chela short and triangular. Third legs with the penultimate article transverse, it and the small triangular dactyl densely ciliate. Fourth and fifth legs subcylindrical; propodi and dactyl ciliate.

Abdomen long, gradually widening from the body to the third segment and thence narrowing slightly to the sixth. Sixth segment deeply grooved above. Uropod with the outer branch broad, rounded at the tip and ciliate on its distal half while the inner one is very narrow, almost parallel sided, obliquely truncate and ciliate at the tip only. Telson with an inflated area on each side distally, giving it the appearance of being deeply notched or fissured.

Length: Tip of rostrum to tip of telson, 96 mm.; carapace, 21 mm.; antenna, 30 mm.; telson, 8 mm.

Color, (in alcohol) white, the cilia everywhere dark brown.

The somewhat mutilated specimen from which this description was written has been in the museum in the United States Fisheries biological station, Beaufort, N. C., for many years. It is without data as to time and place of collection, but there is no doubt that it came from somewhere in the neighborhood of Beaufort.

A careful comparison with Say's description reveals a number of apparent differences which have tempted those who have examined it to regard it as a distinct species. Say attributes to *C. major* small eyes placed on the upper side of cylindrical, obtuse peduncles, a rostrum having the form of a very small, projecting, acute angle, and a telson rounded at the tip. In the main his description fits this specimen very well, and it is believed that the discrepancies are to be attributed to Say's choice of words rather than to real structural differences in the animals. Unfortunately Say's specimens, which came from the banks of St. Johns River, Fla., have been lost and no others have been collected in that region.

Gibbes (*loc. cit.*) stated that he had specimens of *C. major* from the coast of South Carolina and Charleston Harbor and that he regarded them as identical with the species described by De Kay [a] as *Gonodactylus setimanus*. He mentioned specimens in the Charleston museum and in the museum of the Lyceum of Natural History of New York. Unfortunately all of these specimens appear to have been lost, and it is therefore impossible to pass upon the accuracy of Gibbes's identifications.

The specimens upon which Coues and Yarrow based their statement that *C. major* belongs to the Beaufort fauna have likewise disappeared. In fact the specimen from which the present description was taken is believed to be the only one in existence that at all approaches Say's *Callianassa* (*Callichirus*) *major* and until there is proof to the contrary it will be best to regard it as belonging to that species.

According to Say's account the animal is common along the coast of the Southern States. "It lives in burrows which penetrate the sand to a depth of 18 inches or more. The mouths of these burrows are near low-water mark and often project, like a small chimney, half an inch or more above the surface of the sand. While the exuviæ, especially of the large cheliped, occur frequently on the sea beach in the early spring, the animals themselves are seldom seen and are usually to be obtained only by digging."

In the Beaufort region the species is certainly one of the greatest rarity, for, in spite of the energetic work of many collectors through many years, only one specimen has been found.

[a] Nat. Hist. N. Y. Crust., vol. 34.

Genus UPOGEBIA Leach.

Upogebia Leach, 1814, p. 400.

Upogebia affinis (Say). Pl. XXIX, fig. 9.

Gebia affinis Say, 1818, p. 241; Kingsley, 1880, p. 410.
Upogebia affinis Stebbing, 1893, p. 185; Sumner, 1911, p. 666; Fowler, 1912, p. 108.

Integument, save that of the dorsal part of the carapace and of the legs, more or less membranous. Carapace about half as long as abdomen, its cephalic portion about twice as long as the thoracic; nearly flat above; anteriorly rugose, covered with short, rigid hairs and terminating in three acute points of which the median considerably exceeds the lateral ones; a small, upcurved spine behind the eye; a minute lateral spine just behind the cervical groove.

Abdomen gradually increasing in width to the fourth segment. Fifth segment much narrower posteriorly; sixth subquadrate. Lateral parts of third and fourth segments densely pubescent and all with their pleuræ marked off by an impressed line. Telson broad, subquadrate, with an impressed median line. Caudal lamellæ small, the inner one truncate and with a median rib and costate outer border; the outer one rounded at tip and with two ridges.

Eyestalks concealed, pubescent above; corneal surface small. Antennæ a little less than twice as long as carapace. Chelipeds stout; chelæ fringed with long hairs beneath, with an external dentate ridge above, a median row of acute spines and an internal line of stiff hairs; immovable finger smooth, curved and with a small tooth near the middle; movable finger much longer, denticulate above at base; carpus grooved on outer face, with a row of small spines below, a row of small teeth above on inner margin, six acute spines along the distal margin above and a strong marginal spine below; meros with a small spine above and a fringe of long hairs beneath. First pair of walking legs ciliate at tips and along lower margin; fourth article with a strong spine at base. Second, third, and fourth legs ciliate at tips.

Length, 40 to 60 mm.

Color, a light gray or yellowish gray, the cilia darker.

At Beaufort this crustacean occurs in various parts of the harbor in burrows which it digs to a depth of about a foot in muddy sand between tide levels. The margins of Town Marsh, of Pivers Island, and the projecting shoal above the fish factory are favorable collecting grounds. In the latter locality an hour's work at low tide has brought to light as many as 50 specimens ranging from very young to full-grown individuals. Females carrying eggs may be collected at almost any time during the summer. A small percentage of the adults have been found to carry a large isopod parasite (*Pesudione upogebiæ* Hay)[a] in the right or left branchial chamber.

Tribe PAGURIDEA.

Anomura having the abdomen usually well developed but nearly always asymmetrical, soft and twisted or bent under the thorax, and with the appendages of its sixth segment, when present, adapted for holding the body in hollow objects.

This tribe includes 4 families, 1 of which is represented within the Beaufort limits.

Family PAGURIDAE. The hermit crabs.

Marine Paguridea having an asymmetrical, soft, spirally twisted abdomen whose appendages, except those of the sixth segment, are greatly reduced in size or wanting; the antennal scale is thornlike, the stalks of the first antennæ are of moderate length and their flagella end in a filament.

Of 31 genera, 7 occur in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.[b]

a. External maxillipeds approximated at base; chelipeds subequal or the left is much larger than the right; very rarely is the right slightly, never is it much, larger than the left. . (Subfamily *Dardaninæ*).

[a] Hay: Proc. U. S. Nat. Mus., vol. 41, p. 572, 1916.

[b] This key is taken, with modifications, from Alcock, Cat. Ind. Decapod. Crust. in Indian Mus., part II, 1905.

b. Paired appendages present on the first two abdominal segments of the male and the first segment of the female..... *Paguristes*.

bb. No paired appendages on the first abdominal segment of either sex.

c. Fingers of chelipeds opening and closing horizontally..... *Clibanarius*.

cc. Fingers opening and closing obliquely or nearly vertically..... *Petrochirus*.

aa. External maxillipeds widely separated at base by a sternum; right cheliped usually much larger than the left, the left never larger than the right; occasionally they are subequal (Subfamily *Paguringæ*).

b. Fingers opening and closing obliquely; vas deferens not protruding; first abdominal segment of female only with a pair of appendages..... *Pylopagurus*.

bb. Fingers opening and closing horizontally; first abdominal segment without paired appendages in either sex.

c. Vas deferens not protruding in the form of a tube..... *Pagurus*.

cc. Vas deferens produced on the right side only into a tube which recurves over onto the dorsum of the abdomen..... *Catapagurus*.

Genus PAGURISTES Dana.

Paguristes Dana, 1852, p. 436; ibid., 1852, p. 269.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Anterior portion of carapace wider than long, carpus and hands rather thickly covered with long, soft hair..... *moorei*.

aa. Anterior portion of carapace longer than wide, carpus and hands with scattered short hairs. . *armatus*.

Paguristes moorei Benedict. Pl. xxx, fig. 3.

Paguristes moorei Benedict, 1901, p. 144, pl. 4, fig. 3.

Anterior division of carapace broader than long, its anterior margin with three projections—a rounded median one (rostrum) and a pair of slightly more advanced and more acute lateral ones; upper surface with a few scattered hairs and more or less iridescent. Eyestalks almost parallel sided, slightly dilated at the corneal end, straight or slightly curved outward; scale small, blunt-tipped. Antennal peduncle extending slightly beyond middle of eyestalk; flagellum short, not exceeding the tips of the legs. Antennulary peduncle not quite reaching the end of the eyestalk. Chelipeds subequal in size and of similar form, the chelæ short and thick; upper surface of carpus and hand with a covering of long, soft hair, which almost hides the spinules and sharp tubercles beneath; inner superior margin of hand with a row of five small, stout spines; carpus with two rows and meros with one row of spines above. First pair of walking legs with a row of spines along the upper margin of the carpus and propodus.

Length, 13 mm.; carapace, 5 mm.

Color, yellowish, the eyestalks deep orange or crimson below and white above.

A single small specimen of this species was brought in by the *Fish Hawk* in 1915 from the margin of the Gulf Stream about 30 miles due south of the Cape Lookout Lightship.

Paguristes armatus Hay. Pl. xxx, fig. 7.

Paguristes armatus Hay, 1917, p. 73.

Anterior division of carapace considerably longer than wide, its front margin thickened and drawn out into an almost straight-sided, acute rostrum whose tip considerably exceeds the rather obtuse lateral projections. Eyestalks considerably longer than greatest width, but not quite equal to the length of the anterior division of the carapace, nearly straight and not much enlarged distally; scale acute. Peduncle of antennule slightly longer than eyestalk. Peduncle of antenna about two-thirds as long as eyestalk; acicle straight, spinulose from base to tip. Chelipeds not very unlike in size, and similar in form, short, thick; meros, with a few spines distally; carpus and hand covered with strong, sharp-pointed, conical tubercles, of which those on the upper margin of the movable finger, palm, and carpus are larger than the others. Carpus and propodus and to some extent the dactyli of the first pair of walking legs spinulose along the upper and lower margins.

Length, about 20 mm.; carapace, 8.5 mm.

Color, in alcohol, nearly white; each cheliped with a conspicuous orange-yellow band across the meros; a faint trace of a similar band on each of the walking legs.

A single specimen of this species was obtained by the *Fish Hawk* from the margin of the Gulf Stream, 30 miles south of the Cape Lookout Lightship. It is rather closely related to *P. spinipes* H. Milne-Edwards, but differs in having much shorter eyestalks and differently formed hands.

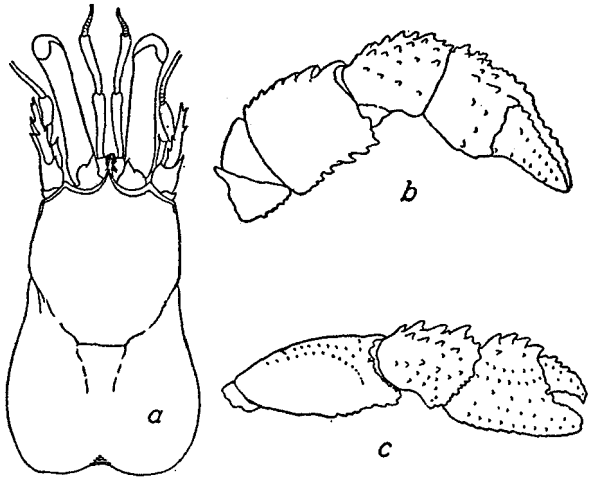

FIG. 15.—*Paguristes armatus*, type. X4½.

a, Dorsal view of carapace and frontal appendages; *b*, left cheliped, from above; *c*, right cheliped.

Genus CLIBANARIUS Dana.

Clibanarius Dana, 1852, p. 6.

Clibanarius vittatus (Bosc). Striped hermit crab. Pl. XXX, fig. 9.

Pagurus vittatus Bosc., 1802, p. 78; H. Milne-Edwards, 1837, t. II, p. 237.
Clibanarius vittatus Stimpson, 1858, p. 235; Kingsley, 1878–79, p. 326.

Anterior division of carapace subquadrate; front with the rostrum slightly more prominent than the lateral projections. Eyestalks long, slender, slightly exceeding the peduncles of the antennules, nearly cylindrical and curved very little; cornea not dilated, scale small, pointed, its margin serrate. Antennal peduncles about equal to those of antennules, acicle acute and serrate along the margin. Chelipeds similar on the two sides; hand thick, inflated, covered thickly above and sparingly below with coarse tubercles from the base of each of which springs a bundle of stiff hairs; fingers heavy, gaping at the base, cutting edge corneous and extending along the upper side; carpus as long as hand to base of thumb, its upper surface with spiniform tubercles and hairs. Second and third pairs of legs exceeding the chelipeds by over half the length of the dactyli; their tips corneous and the two distal articles with numerous bundles of hairs. Fourth and fifth pairs of legs reduced, the fifth ones very small and turned onto the back.

Measurements of a female: Length of carapace, 28.5 mm.; eyestalks, 12.5 mm.; hand, 18 mm.; width of front, 5.5 mm.

Color in life, light olive-gray, with longitudinal stripes of darker color on the three anterior pairs of legs. In alcohol the dark stripes on the legs become brownish red.

This hermit crab is common throughout the harbor. It may be recognized at once by its symmetrical claws.

Genus PETROCHIRUS Stimpson.

Petrochirus Stimpson, 1858, p. 233(71).

Petrochirus bahamensis (Herbst). Pl. XXX, fig. 6.

Cancer bahamensis Herbst, 1796, p. 30.
Pagurus granulatus Olivier, 1811, p. 640; H. Milne-Edwards, 1834–1840, t. II, p. 225; Dana, 1852, p. 453; Henderson, 1888, p. 56.
Petrochirus granulatus Stimpson, 1858, p. 71.
Petrochirus bahamensis Benedict, 1901, p. 140.

Anterior division of carapace flattened, rough and uneven and with scattered tufts of hairs; front tridentate, the rostrum about as long as the lateral teeth. Eyestalks one and three-fourths as long as distance between lateral teeth of front, straight, dilated distally and with a tuft of hairs above the corneal surface; scale small, its anterior margin serrate. Antennular peduncles exceeding eyestalks. Antennal peduncles shorter than eyestalks, acicle rather slender and with bundles of hairs. Chelipeds

nearly equal in size, the right slightly larger than the left; hands and carpi coarsely tuberculate, the tubercles dentate and setiferous on the upper surface, but becoming spinous along the inner margin. Second and third pairs of legs slender, slightly exceeding the chelipeds and with the two distal articles hairy. Fourth and fifth pairs of legs reduced, the fifth pair turned up against the side.

Measurements of a male: Length of carapace, 12.5 mm.; eyestalks, 5.8 mm.; hand, 12 mm.; width of front, 2.8 mm.

This species has been secured by dredging in 8 to 12 fathoms 4 or 5 miles off Beaufort Inlet.

Genus PAGURUS Fabricius.

Pagurus Fabricius, 1793, p. 468.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Eyestalks with the cornea dilated.
  b. Hands broad and flat; species reaching a rather large size ..... *pollicaris.*
  bb. Hands subcylindrical; chelipeds rather slender; small species.
    c. Carpus as long as the palm and half the finger ..... *longicarpus.*
    cc. Carpus barely longer than the palm ..... *corallinus.*
aa. Eyestalks with the cornea not dilated.
  b. Eyestalks reaching almost to the end of the antennular peduncle ..... *annulipes.*
  bb. Eyestalks much shorter than the antennular peduncle ..... *cokeri.*

Pagurus pollicaris Say. Pl. xxx, fig. 1.

Pagurus pollicaris Say, 1817, p. 162; H. Milne-Edwards, 1834–1840, t. II, p. 37; De Kay, 1844, pp. 19, 21; Sumner, 1911, p. 666; Fowler, 1912, p. 371, pl. 11, fig. 1.
Eupagurus pollicaris Stimpson, 1858, p. 237; Coues, 1871, p. 124; Kingsley, 1878–79, p. 327; Paulmier, 1905, p. 136.

Anterior division of thorax subcordate, truncate behind; front with three projections, of which the rostrum is slightly less advanced and more obtuse than the lateral ones. Eyestalk moderately stout, one and one-half times as long as width of front, nearly straight, the cornea dilated; scale broad, with blunt tips. Antennular peduncle exceeding eye by about three-fourths the length of the distal article. Antennal peduncle about as long as that of antennule; acicle slender, curved outward. Right cheliped stout; its hand flattened, rather finely granulate and tuberculate, crested and dentate along lower margin to tip of immovable finger; movable finger with a prominent, projecting angle on outer border; carpus with numerous tubercles larger than those of the hand, subspinous and ciliated on upper surface; meros with a few squamiform tubercles. Left cheliped similar but with both margins of hand dentate, the movable finger not produced and the dentation of the inner margin of the hand carried onto the carpus. Second and third pairs of legs strong; fourth pair reduced; fifth pair reduced and carried on the back.

Measurements of a male: Length of carapace, 14 mm.; eyestalks, 6 mm.; hand, 12.5 mm.; width of front, 4 mm.

This hermit crab has been collected in nearly all parts of the harbor but prefers the deeper channels.

It may readily be distinguished from the other hermits of the region by its large, broad, dissimilar hands.

Pagurus longicarpus Say. Pl. xxix, fig. 13.

Pagurus longicarpus Say, 1817, p. 163; Gould, 1841, p. 330; De Kay, 1843, p. 22; Sumner, 1911, p. 667; Fowler, 1912, p. 373.
Eupagurus longicarpus Stimpson, 1858, p. 237; Kingsley, 1878–79, p. 326; Paulmier, 1905 p. 136.
Eupagurus longipes, Coues, 1871, p. 124.

Anterior division of thorax subcordate, truncate behind; rostrum considerably less prominent and less acute than the lateral teeth of the front. Eyestalks stout, one and one-third times as long as width of front, cornea dilated; scale broad with blunt tip. Antennular peduncle exceeding eye by about one-half the length of the terminal article. Antennal peduncle shorter than that of the antennule, acicle slender, curved outward. Right cheliped much longer and larger than the left, subcylindrical; hand short, very lightly crested and minutely dentate along outer margin, upper surface minutely granulate and with two incomplete rows of larger granules near proximal end; fingers short, hooked at

tips; carpus as long as hand to middle of finger, with small scattered tubercles and two rows of subspinous larger ones. Left cheliped similarly formed but with relatively broader, unhooked fingers. Second and third legs slender, extending about as far as the chelipeds. Fourth and fifth pairs much reduced, the latter turned upward onto the back.

Measurements of a male: Length of carapace, 7 mm.; eyestalks, 3 mm.; hand, 8 mm.; width of front, 2 mm.

Pagurus longicarpus is by far the commonest hermit crab of the region and occurs in nearly every locality examined. It is most abundant, however, in the channels whence, by dredging, hundreds may be taken in a few hours.

Pagurus corallinus (Benedict). Pl. xxx, fig. 4.

Eupagurus corallinus Benedict, 1892, p. 23.

Anterior division of carapace subcordate, truncate behind; rostrum obtuse, much produced beyond the rounded, unarmed lateral projections. Eyestalk falling far short of the tip of the antennulary peduncle, stout, largest distally; cornea dilated; scale sharp-pointed and with a prominent subterminal spine. Antennal peduncle about as long as that of the antennule, acicle about equaling eye. Large cheliped with the meros compressed, quadrilateral when seen from the side; carpus a little longer than palm, its upper surface thickly set with sharp spiny granules, its margin with rows of small spines; hand fringed with spines alternately large and small, the spines becoming longer near the tips of the fingers, entire upper surface set with small, slender spines. Smaller cheliped with the meros much compressed; carpus compressed and surmounted by an inner row of small and an outer row of larger spines; hand, wide and compressed; fingers broad and gaping at the base; carpal and propodal articles of the first and the carpal article of the second walking leg crested with acute spines.

Color white, the large cheliped blotched with red, the other legs banded with the same color.

One small specimen about 15 mm. long was dredged by the *Fish Hawk* in 47 fathoms off Cape Lookout. The large cheliped is missing, but the specimen agrees so perfectly in all that remains with Dr. Benedict's descriptions that his words regarding the missing part have been included in this description. The species has been known previous to this from Key West.

Pagurus annulipes (Stimpson). Pl. xxix, fig. 12.

Eupagurus annulipes Stimpson, 1860, p. 243; Kingsley, 1878–79, p. 326; Sumner, 1911, p. 666.

Anterior division of carapace subcordate, truncate behind; rostrum arcuate, lateral angles of front obtuse. Eyestalk extending nearly to tip of antennular peduncle, slightly constricted in the middle, cornea not dilated; scale broad and rounded, but with one or two minute spines on anterior border. Antennal peduncle shorter than that of antennule; acicle slender, hairy, curved outward. Right cheliped very long, subcylindrical, moderately and evenly granulate above and finely ciliate; hand somewhat inflated; fingers short and with hooked tips; carpus as long as palm of hand, spinulose along inner margin. Left cheliped much shorter than the right, thickly ciliate and spinulose above; hand shorter than carpus; fingers shorter than palm, weak and slightly gaping. Second and third legs of right side as long as cheliped, ciliate to their tips; those of left side similar, but slightly shorter. Fourth legs much reduced. Fifth pair smaller and carried on dorsal surface.

Measurements of a male: Length of carapace, 3 mm.; eyestalk, 1.2 mm.; hand, 3.5 mm.; width of front, 1 mm.

This little hermit crab, while not as abundant as *P. longicarpus*, is not uncommon on shelly bottoms in the channels of the harbor and along the coast. When living, its appendages are marked with alternate rings of white and brown.

Pagurus cokeri Hay. Pl. xxx, fig. 2.

Pagurus cokeri Hay, 1917, p. 73.

Anterior portion of carapace as long as broad, its anterior margin with three projections of which the middle one is decidedly more advanced and is terminated by a spine about twice as large as the spines of the lateral ones; a little behind the frontal margin and parallel with it there is an irregular line of stiff hairs. Eyestalks short and stout, their length equal to about twice the diameter of the cornea; scale small, its tip spinulose. Peduncle of antennule about one and three-fourths times as

long as eyestalks. Antennal peduncle a little shorter than that of antennule, its basal article with a small lateral spine curved downward and forward, its second article with a spine on the inner distal angle and several spinules on the inner side of the outer distal prolongation; acicle curved; flagellum slender, longer than the body. Chelipeds hairy; meros and carpus nearly smooth except for a few spines along the margins, chelæ with the entire upper surface spinulose, the spinules being placed quite close to one another and each with a cluster of stiff hairs at the base on the distal side; the right cheliped is much larger than the left and its hand has the finger and palm of about equal lengths; in the left hand the finger is about four times as long as the palm and when closed meets the thumb for only a short distance near the tip.

Length: About 29 mm.; carapace, 11 mm.

Two specimens of this hermit crab were dredged by the *Fish Hawk* from the margin of the Gulf Stream at a point 30 miles south of Cape Lookout Lightship. The species is most closely related to *P. bouvieri* (Fax) [=*smithii* Milne-Edwards and Bouvier] from which it differs, however, in the spines on the antennal peduncle, the length of the movable finger as compared with the palm of the small hand and the gaping fingers. The species has been named in honor of Dr. R. E. Coker, of the Bureau of Fisheries, one time biologist of the North Carolina Geological Survey at Beaufort, and a contributor to the literature on the fauna of the region.

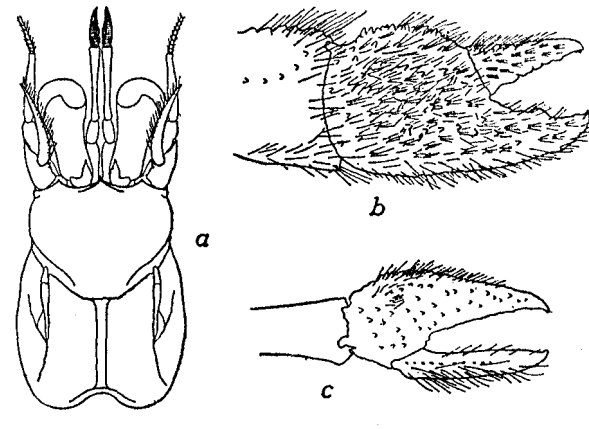

FIG. 16.—*Pagurus cokeri*, type, ♀×4⅓.

a, Dorsal view of carapace and frontal appendages, the basal articles of the antennules considerably foreshortened; *b*, right chela; *c*, left chela.

Genus PYLOPAGURUS A. Milne-Edwards and Bouvier.

Pylopagurus A. Milne-Edwards and Bouvier, 1893, p. 74.

Pylopagurus rosaceus A. Milne-Edwards and Bouvier. Pl. xxx, fig. 5.

Pylopagurus rosaceus A. Milne-Edwards and Bouvier, 1893, p. 74.

Anterior division of carapace about as long as broad, its anterior margin with three projections, the median one (rostrum) obtuse and slightly advanced beyond the lateral ones, which terminate in a minute spine; sides of dorsal surface and anterior margin with a few tufts of setæ. Eyestalks stout, considerably shorter than the anterior division of the carapace, distinctly dilated at the distal end and with three or four pencils of setæ in line along the upper surface, eye scale small, its tip acute. Antennal peduncle extending beyond the eye, flagellum slender and longer than the body, acicle strongly curved. Right cheliped very much larger than the left; chelæ in both hands capable of being bent down at a right angle to the carpus so as to form, either singly or together, an operculum to close the orifice of the cavity inhabited by the crab; both margins of large chela and outer margin of small one armed with a row of close-set conical teeth and the upper surface of both covered with closely crowded rosettelike tubercles each of which consist of a central larger tubercle surrounded by a number of smaller ones. Walking legs of medium length, the first and second on the left side and the second on the right side exceeding the large chela.

Length of a male, about 24 mm., carapace, 9 mm.

Two specimens of this hermit crab were obtained by the *Fish Hawk* in 1915 from the margin of the Gulf Stream about 30 miles south of Cape Lookout Lightship.

Genus CATAPAGURUS A. Milne-Edwards.

Catapagurus A. Milne-Edwards, 1880, p. 46.

Catapagurus sharreri A. Milne-Edwards. Pl. XXIX, fig. 11.

Catapagurus sharreri A. Milne-Edwards, 1880, p. 46; Smith, 1883, p. 31, pl. 4, fig. 5; ibid, 1884, p. 353, pl. IV, fig. 1–2; ibid, 1886, p. 642.
Hemipagurus socialis, Smith, 1881, p. 423.

Carapace convex, rugose on the gastric region. Ocular peduncles rather short and thick; ophthalmic scales less than half as long as the peduncles, narrow and acute. Chelipeds slender, the right a little longer and considerably stouter than the left; hand with the internal surface covered with long hairs; movable finger with a large tooth near the middle. Second and third pairs of legs nearly equal in length and slightly exceeding the chelipeds, their meral articles spinulose on the margins, their dactyli compressed and ciliated.

Measurements of a male (type): Length, 13 mm.; eyestalks, 2 mm.; right chela, 8 mm.; left chela, 7.5 mm. (Smith).

This species has been collected at various points along the Atlantic coast from Massachusetts to the mouth of the Chesapeake. The type specimens came from the Barbados. It is usually found at greater depths than 100 fathoms, but has been taken in less than 60 fathoms. It was dredged by the *Fish Hawk* in 1902, in 151 fathoms, off Cape Lookout.

This hermit crab is sometimes found in a naked shell of some gastropod, but usually the shell is completely overgrown and finally removed by a colony of *Epizoanthus americanus*.

Tribe HIPPIDEA.

Anomura having the abdomen reduced in size and bent under the thorax, the appendages of the sixth segment not adapted for swimming, the first pair of legs simple or subchelate, the second to fourth pairs of legs with the last article curved and flattened, the rostrum small or wanting and the third maxillipeds without mastigobranchs.

Both of the families recognized in this tribe are represented in the Beaufort fauna.

Family ALBUNEIDAE.

Hippidea having the first pair of legs subchelate, the third maxillipeds narrow, and the carapace flattened and without wings which cover the legs.

Of the 4 genera assigned to this family, 2 occur in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Eyestalks narrow, triangular.....*Albunea.*
aa. Eyestalks broad, oval.....*Lepidopa.*

Genus ALBUNEA Weber.

Albunea Weber, 1795, p. 94; Fabricius, 1798, p. 372.

Albunea gibbesii Stimpson. Pl. XXX, fig. 11.

Albunea symnista Gibbes, 1850, p. 187 (not *A. symnista* Fabricius.).
Albunea gibbesii Stimpson, 1859, p. 78; Benedict, 1901, p. 139.

Carapace lyrate, convex from side to side, almost straight along median line; front with a minute rostrum with a strong spine on either side followed by about nine slender spines; anterolateral angle with a stout conical spine which projects little if any beyond the anterior border; posterior margin deeply and broadly notched; dorsal surface with numerous, irregular, impressed lines which take a more or less transverse course, a short one near the front and one crossing near the middle like an inverted *W* being the most conspicuous. Eyes minute, at the tip of the narrow, triangular eyestalks. Antennules about twice as long as carapace, slender and densely ciliated above and below along inner surface. Basal segment of antenna with an acute small spine, flagellum about half as long as peduncle. First pair of legs stout, hairy, all but the distal segments inflated; hand subchelate, the inferior distal

angle of propodus produced into a spine, dactyli curved and rather slender. Second, third, and fourth legs stout, hairy, and with falcate dactyli. Fifth legs weak, borne above the others. Second, third, and fourth abdominal segments with expanded pleura. Fifth and sixth segments small. Uropods consisting of a rather large basal article and two small falcate blades. Telson of male triangular, of the female rounded.

Length of a male, rostrum to tip of telson, 36 mm.; carapace, 20 mm.

Color, a light purple with whitish markings, more or less iridescent.

This species, whose distribution extends from North Carolina to the West Indies, is not uncommon on the sandy shoals about Beaufort. It is seldom taken, however, except at times of extreme low tide, when the sand flats are exposed to the heat of the sun and the animal comes to the surface. In the dredging about the fishing banks it has been collected on several occasions, and once it was found in the stomach of a blackfish.

Genus LEPIDOPA Stimpson.

Lepidopa Stimpson, 1858–1860, p. 230 (1858).

Lepidopa websteri Benedict. Pl. XXX, fig. 12.

? Lepidopa venusta and *L. scutellata* Kingsley, 1880a, p. 410.
Lepidopa websteri Benedict, 1903, p. 892.

Carapace lyrate, widest anteriorly, sides sinuous and slightly convergent posteriorly. Posterior margin slightly concave; sides of carapace folded inward ventrally, over the bases of the legs, this flap, especially posteriorly, more or less membranous; anterolateral angle produced into a flat spine; front fringed with setæ and produced into a short, triangular rostrum and a slightly more prominent, triangular tooth on either side of it; dorsal surface crossed near the front by an impressed, ciliate band with backwardly directed ends, a narrower band ending in obliquely directed impressed lines crosses at about the middle of the carapace.

Eyestalks oval, lamellate. Antennulary peduncle exceeding eyestalk; flagellum straight, slender, nearly three times as long as the carapace. Antennæ situated at the extreme outer angles of the front; basal article stout; scale reduced to a minute point; flagellum stout, curved, composed of seven short articles. First pair of legs with broad, flat articles, dactyli turned back on propodus to form a subchela. Second, third, and fourth legs without dactyli but with the propodus developed into a halberd-shaped two-pointed foot. Fifth legs much reduced, slender and doubled up between the abdomen and body.

Abdomen short and partly flexed beneath the body; second, third, and fourth segments with expanded pleura. Uropods small, with slender basal article and long oval blades; their margins and those of the abdominal segments fringed with long, silky hairs. Telson lozenge-shaped with rounded corners.

Length of carapace, 12 mm.; width, 15.5 mm.

Color, in alcohol, probably also in life, pure white, but everywhere beautifully iridescent, giving pearly reflections at every turn of the body.

The museum of the Beaufort laboratory contains a single damaged specimen of this animal, the locality of which has been lost, but which undoubtedly came from one of the sea beaches of the region. The only other known specimen, in the collection of Union College, was picked up on the shore near Fort Macon. During the summers of 1911 and 1912 exuviæ of rather small individuals were not at all uncommon along the beach to the west of the fort, where they have been cast up by the waves.

From its similarity to *Albunea gibbesii* and *Emerita talpoida*, this crustacean must be regarded as a burrower in the sand. It has been suggested by Dr. Benedict that its habitat is probably in deeper water than the species mentioned. It must be said, however, that a vast amount of digging close to the shore has failed to produce any living specimen, nor has dredging at distances from the shore varying from 200 yards to 20 miles. The creature may be very local in distribution or may live within the region of tumbling surf where collecting is impossible.

Kingsley lists *L. venusta* and *L. scutellata* as members of the Beaufort fauna, but neither of these is believed to occur in the region. Kingsley's record was unquestionably based on the specimen collected by Prof. Webster, and this is the one which later became the type of Benedict's *L. websteri*. The differences between *L. websteri* and *L. venusta* are very slight, however, and future investigation may show the two species to be identical.

Family HIPPIDAE.

Hippidea having the first legs simple, the third maxillipeds broad, and the carapace subcylindrical and with wings which cover the legs.

This family comprises 2 genera, of which 1 is represented in the Beaufort fauna.

Genus EMERITA Gronovius.

Emerita Gronovius, 1764, p. 234.

Emerita talpoida (Say). Sand bug. Pl. xxx, fig. 8.

Hippa talpoida Say, 1817, p. 160; Coues, 1871, p. 124; Kingsley, 1878–79, p. 326; Paulmier, 1905, p. 135.
Emerita talpoida Benedict, 1901, p. 138; Sumner, 1911, p. 666; Fowler, 1912, p. 366.

Body convex, oval, covered with a firm shell. Carapace imbricately rugose anteriorly, smooth and polished posteriorly; anterior margin with a small blunt rostrum separated by a rounded sinus on each side from a more prominent and acute tooth; an impressed transverse line a little behind the rostrum and a deeper, more strongly curved one farther back; posterolateral margins extending downward to cover bases of legs; anterolateral margins concave and subserrate.

Eyes minute on long, slender stalks. Antennules about twice as long as eyestalks, their basal article with a strong external spine. Antennæ, when extended, nearly as long as cephalothorax; their first peduncular article very short, the second one the largest and with its outer margin produced into a strong, forwardly directed spine, bifid at the tip and with a deep fissure below it; flagellum densely ciliated along the ventral side and normally held concealed within the buccal cavity. First pair of legs directed forward, their articles more or less ciliated and with impressed, interrupted transverse ciliated lines; fifth article spinose at distal end. Second, third, and fourth legs strong, ciliated, their tips curved and foliaceous. Fifth pair of legs almost filamentous, entirely concealed beneath the abdomen.

Abdomen flexed so that the telson and sixth segment lie beneath the body, the uropods being turned forward so as to rest along the sides of the proximal segments. Telson elongate, lanceolate, margined, with reflected cilia above and inflected ones on the edge, base with two short, impressed lines.

Length, 31 mm.; carapace, 15 mm.; telson, 10 mm. Width, carapace, 11 mm.; telson, 5 mm.

This active little crustacean has been collected at various points about the harbor and is to be looked for wherever the beach is composed of clean, fine sand. The outer beach of Bogue Bank is the best collecting ground, however, for there in certain spots it may often be obtained in great numbers. The animals lie in the sand at the edge of the water. As the tide rises or when a large wave washes over them they leave their burrows and scurry to a lower or higher level where they instantly bury themselves only to emerge in a few seconds to seek a new place. In quiet water they lie motionless with only the eyes and antennules above the surface of the sand.[a] A full account of the early stages of this species is given by S. I. Smith,[b] who obtained his material at Woods Hole, Mass.

Section BRACHYURA.

Reptantia having the abdomen much reduced in size, closely bent under the thorax, never used for swimming, and with the appendages of the sixth segment missing; the cephalothorax depressed, the carapace fused with the epistome at the sides and nearly always also in the middle, the antennal scale never movable, the third maxillipeds broad, the first pair of legs chelate and nearly always much stronger than any of the others.

The 3 tribes into which this section is divided are all represented in the Beaufort fauna.

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[a] For an account of the habits of the closely related species *E. analoga*, see Weymouth and Richardson, Smithsonian Miscellaneous Collections, vol. LIX, p. 1–14, 1912.

[b] Transactions of the Connecticut Academy of Sciences, vol. III, p. 311–342, pl. XLV–XLVIII, 1877.

Tribe DROMIACEA.

Brachyura having the buccal frame roughly quadrate, the last pair of legs abnormal in form or size and dorsal in position, the female openings coxal, the first pair of abdominal appendages present in the female, and the gills usually many.

This tribe comprises 5 families, of which 3 are represented in the Beaufort fauna.

Family DROMIIDAE.

Dromiacea having the carapace usually not longer than broad and with a well-marked side edge, the eyes usually completely sheltered by orbits when retracted, the gills 14 to 20 on each side, the sternum of the female with longitudinal grooves, and the fourth and fifth legs small, subdorsal, and usually prehensile.

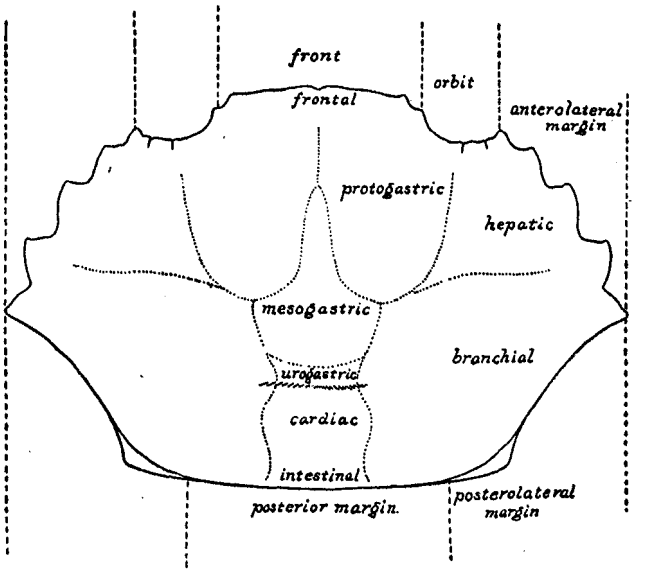

FIG. 17.—Dorsal surface of a crab's carapace showing the important regions and margins.

Of the 11 genera assigned to this family 2 have representatives in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Carapace firm and hard; body covered with short hairs.....*Dromidia.*
aa. Carapace soft and membranous; body mostly naked.....*Hypoconcha.*

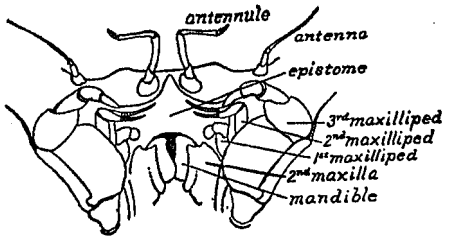

FIG. 18.—Mouth region of a crab showing the appendages.

Genus DROMIDIA Stimpson.

Stimpson, 1858–1860, p. 225.

Dromidia antillensis Stimpson. Pl. XXXI, fig. 5.

Dromidia antillensis Stimpson, 1859, p. 24; Benedict, 1901, p. 132; Verrill, 1908, p. 431.

Body and legs covered with a thick coat of short bristles, leaving only the tips of the fingers exposed. Carapace convex in all directions, longer than wide; rostral tooth smaller and on a lower level than the inner orbita teeth; a tooth at about the middle of the superior margin of the orbit and another on the inferior margin; anterolateral margins with four or five dentiform tubercles on each side.

Chelipeds thick and heavy; hand with three blunt spines on upper margin; fingers curved and with strong, interlocking teeth. Second and third legs strong and with long, curved dactyli; fourth and fifth legs subchelate, the fourth pair the smaller and the fifth turned forward onto the back.

Length of carapace of a male, 32 mm.; width, 31 mm.

Color, brownish red, fingers crimson, claws of legs horn color.

Two or three specimens of this curious crab were dredged at depths of about 7 fathoms on the fishing grounds. Like many other crustaceans of the offshore banks it is a West Indian species which has

extended its range far northward in this favorable locality. The creature is said to conceal itself by holding a flat or concave piece of living sponge upon its back, but in none of the Beaufort specimens was the habit observed. One perfect specimen brought up in the dredge was clinging to the branches of a *Gorgonia*. It was carried alive to the laboratory, where it was kept for several days in a small aquarium. It spent the entire time huddled up in a corner and showed no interest in anything except some fragments of oyster which were thrown in for it to eat.

Genus HYPOCONCHA Guérin Méneville.

Hypoconcha Guérin Méneville, 1854, p. 333.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Anterior margin of carapace without spines.....*arcuata*.
aa. Anterior margin of carapace with several strong spines.....*sabulosa*.

Hypoconcha arcuata Stimpson. Pl. XXXI, fig. 2.

Hypoconcha arcuata Stimpson, 1859, p. 72; Benedict, 1901, p. 133.

Body short, broad, flattened; dorsally with a thin, parchmentlike covering, ventrally solid and roughly granulate, the appendages capable of being folded compactly against the body. Front margin of carapace nearly semicircular in outline; the margin densely ciliated, deeply fissured in the middle, and with a shallow notch on each side near the middle; ventral surface without ridges, sloping evenly to the anterior margin, and with eyes, antennules, antennæ, and mouth parts deeply seated in depressions in its surface; a narrow fissure in front of the eye, for the lodgment of the flagellum of the antennary flagellum; outer posterior margin of orbit fissured. Third maxillipeds completely closing the buccal cavity. Legs all stout, hairy, and coarsely granulate; the first pair chelate, the fingers somewhat spatulate and toothed at the tip, the thumb set on at an angle with the hand; second and third legs with sharp, corneous tips; fourth and fifth legs borne on the dorsal surface, their penultimate segment very short, and the terminal segment reduced to a little curved claw. Abdomen short, flexed so that its last two segments lie on the thoracic sterna.

Length of a male, in natural position, 33 mm.; carapace, 24 mm.; width of carapace, 24 mm.

Color, gray.

This curious little crab has so far been obtained only in the dredge in Bogue Sound, off Morehead City. It is always found occupying a valve of some lamellibranch shell, preferably, it seems, a clam shell, which it carries about upon its back, after the manner of a hermit crab. By means of the claws on its fourth and fifth pairs of legs, aided, perhaps, by the pressure of its body against the shell, it clings so tightly that it is almost impossible to remove the live animal from its abode without crushing it.

Hypoconcha sabulosa (Herbst). Pl. XXXI, fig. 3.

Cancer sabulosus Herbst, 1799, vol. II, p. 57.
Hypoconcha sabulosa Guérin Méneville, 1854, p. 333; Stimpson, 1858, p. 226; ibid., 1859, p. 72; Benedict, 1901, p. 133.

In form and general appearance very similar to *H. arcuata*, but with the ventral surface nodulose as well as granulate, and marked by several strong ridges. The anterior margin of the carapace is not so deeply fissured, the notches above the antennæ are scarcely evident, and toward the middle, beneath the fringe of setæ, there are several strong spines. The antennary fossæ are limited in front by a pair of strong, oblique ridges, which arise between two of the spines of the anterior border, meeting each other in the middle line at the front of the epistome. The posterior border of the epistome is raised into a prominent ridge, which is continued on either side across the front and some distance along the sides of the buccal area. The basal articles of the antennæ are tuberculate; the basal one has a strong, inwardly directed tooth and the terminal one a tooth on each side of the base of the flagellum. The fissure in the outer margin of the orbit is very noticeable, owing to the development of a strong tubercle on either side of it, the one lying just behind the eye being especially strong and spiniform. The carpal segment of the first pair of legs bears several dentate tubercles.

Length of a female, in natural position, 33 mm.; carapace, 22 mm.; width of carapace, 22 mm.

Color, gray.

This species occurs in Beaufort harbor, but is apparently less common than *H. arcuata*. In habits the two species, so far as is known, are similar.

Family HOMOLIDAE.

Dromiacea having the eyes incompletely sheltered by orbits when retracted, the sternum of the female without longitudinal grooves, the first article of the eyestalk not much longer than the second, and the gills 13 or 14 on each side.

There are 4 genera, of which 1 occurs in the Beaufort region.

Genus HOMOLA Leach.

Homola Leach, 1815, p. 81.

Homola barbata (Fabricius). Pl. xxx, fig. 10.

Cancer barbatus Fabricius, 1793, t. II, p. 460; Herbst, 1796, vol. II, pl. xxxvii, fig. 6.
Homola barbata White, 1847, p. 55; Smith, 1886, p. 637 (33), pl. II, fig. 1.

Carapace about one-fourth longer than wide, its surface everywhere granulate and spinulose and sparsely setose; the sides straight, only slightly convergent posteriorly and extending almost vertically downward from a spiny ridge that extends backward from behind the strong anterolateral spine. Rostrum small, bifurcate at tip. A spine on each side at the base of the rostrum, one at the outer orbital angle, a transverse row of two behind the rostrum, behind these a transverse row of eight, and, a little farther back, a small median spine. Anterolateral parts, below and behind orbits, with small spines.

Eyestalks long, slender at base, and suddenly enlarged below the cornea. Chelipeds of moderate size, their surface granulate and hairy, and the meros and carpus with rows of spines. Walking legs with flattened articles, long, hairy, and spinulose along margins. First segment of abdomen with a prominent median tubercle.

Length of a female: 16 mm.; width, 12.5 mm.

One specimen, a female, was collected by the *Fish Hawk* at station 7334, depth 63 fathoms.

Family LATREILLIDAE.

Dromiacea having the eyes completely exposed on long stalks in which the first article is much longer than the second, the sternum of the female without longitudinal grooves and the gills 8 on each side.

Of the 2 genera, 1 occurs in the Beaufort region.

Genus LATREILLIA Roux.

Latreillia Roux, 1828, p. (1).

Latreillia elegans Roux. Pl. xxxi, fig. 4.

Latreillia elegans Roux, 1828, pt. 5, pl. xxii; Milne-Edwards, 1834–1840, t. I, p. 277; Smith, 1884, p. 351, [7], pl. II, fig. 2–2a pl. III, fig. 1.

Body pyriform, finely granulate, truncate in front and armed with two long, divergent horns between which a minute spinelike rostrum projects obliquely downward; each horn is minutely spinulose near the tip and at about the proximal third bears a spine on the lower side. Front margin of carapace with an acute spine projecting downward at the base of the eyestalks. Abdomen of the female broad; the first segment with a median tubercle; second segment with a strong median spine; third segment, with which the segments which follow are coalesced, with a stout spine on each lateral margin. In the male the abdomen appears to be composed of six distinct segments and lacks all the spines, except the one of the second segment.

Eyes large, pyriform, at the end of slender stalks whose length slightly exceeds that of the supraorbital horns. Third maxillipeds slender and somewhat pediform. Legs very long, almost filiform, their ischial and propodal articles spinulose. Chelipeds about twice as long as the body and about half as long as third walking legs, very slender; hand a little longer than the carpus; movable finger a little less than half as long as the palm.

Measurements of a female: Length, along median line, 9 mm.; width, 5.5 mm.; horn, 5 mm.; third leg, 67 mm.

Three specimens of this bizarre crab, one male and two females, were dredged by the *Fish Hawk* in over 100 fathoms, 30 miles south of Cape Lookout. The species has been reported from the American coast by S. I. Smith whose specimens came from a depth of 70 fathoms off the coast of Massachusetts. It was described by Roux from the Mediterranean.

Tribe OXYSTOMATA.

Brachyura having the buccal frame (endostome) prolonged forward, like a gutter, over the epistome, the female openings usually sternal, the first abdominal appendages of the female wanting, and the gills few.

This tribe includes 4 families of which 3 are represented in the Beaufort fauna.

Family RANINIDAE.

Oxystomata having the body long and more or less abnormal in shape, the abdomen not completely hidden beneath the thorax, the antennæ large and the last two pairs of legs more dorsal than the others and with their last two articles broad.

This family comprises 9 genera of which 1 is represented in the Beaufort fauna.

Genus RANILIA H. Milne-Edwards.

Ranilia H. Milne-Edwards, 1834–1840, t. II, p. 195.

Ranilia muricata H. Milne-Edwards. Pl. XXXI, fig. 1.

Ranilia muricata H. Milne-Edwards, 1834–1840, t. II, p. 195; Kingsley, 1878–79, p. 316.

Carapace oval, strongly convex from side to side, slightly so from front to back, smooth posteriorly but with numerous transverse cilated wrinkles anteriorly; rostrum slender; anterior border of carapace with four strong spines on each side, of which the innermost constitutes the internal angle of the orbit, the third surmounts the external angle of these cavities and the fourth is at the external angle of the front.

Eyestalks strong, about four times as long as the rostrum and capable of being turned back into the deep, oblique orbits. First antennæ very small. Second antennæ directed forward and slightly longer than the eyestalks. First pair of legs subchelate, stout, flattened distally, squamose-denticulate above and with a strong spine on the supero-distal margin of the meros, carpus and manus; distal margin of manus perpendicular, toothed; dactyl strong, curved. Second, third, and fourth pairs of legs with flattened, triangular dactyli. Fifth pair of legs elevated, turned forward and densely fringed with hairs. Abdomen short and narrow.

Color, porcelain white with red vermiculate transverse lines on the cephalothorax and red dots and blotches on the legs.

This species, first credited to the North Carolina fauna by Kingsley, appears to be confined to the sand bottoms well offshore. In the operations on the Blackfish Banks in 1913 and 1914 several specimens were obtained in the dredge and fragments of others were secured from fish stomachs. It has not been met within the harbor nor along the beaches.

Family CALAPPIDAE.

Oxystomata of normal crablike form having the abdomen hidden beneath the thorax, the antennæ small, the legs normal in position, the afferent openings of the gill chambers in front of the chelipeds, the gills nine on each side and the male openings coxal.

This family comprises 11 genera of which 3 are represented in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Posterolateral region of the carapace expanded and dentate..... *Calappa.*
aa. Posterolateral region of the carapace not expanded.
b. Carapace considerably broader than long, regularly convex above..... *Hepatus.*
bb. Carapace nearly as long as broad, dorsal surface very uneven..... *Osachila.*

Genus CALAPPA Weber.

Calappa Weber, 1795, p. 92; Fabricius, 1798, p. 309.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Posterior margin of carapace with only broad and shallow teeth.
b. Carapace about two-thirds as long as wide; crest of hand eight or nine toothed ..... *flammea*.
bb. Carapace nearly as long as wide; crest of hand six or seven toothed ..... *angusta*.
aa. Posterior margin of carapace with a pair of spines near the middle ..... *sulcata*.

Calappa flammea (Herbst). Box crabs. Pl. XXXI, fig. 8.

Cancer flammea Herbst, 1796, vol. II, p. 161.
Calappa flammea Bosc, 1802, t. I, p. 185; Miers, 1886, p. 284; Rathbun, 1901, p. 84; Verrill, 1908, p. 420; Summer, 1916, p. 669; Fowler, 1912, p. 116.
Calappa marmorata Latreille, 1803, p. 392; Kingsley, 1878–79, p. 324; ibid, 1880[a], p. 402, (not *C. marmorata* Fabricius).

Carapace about two-thirds as long as wide, convex and granulate above, the granules larger toward the front and grouped to form several longitudinal lines of nodules; front with a broad median notch, projecting slightly beyond the orbits; anterolateral border crenulate, granulate and bluntly dentate; posterolateral margins expanded into winglike extensions and with seven strong teeth with beaded edges; posterior margin arcuate, its edge beaded.

Chelipeds large, capable of being fitted closely against the front of the body; superior margin of carpus and hand raised into a prominent crest which is coarsely granulate on the carpus and eight or nine toothed on the hand; meros with a strong, four-toothed crest parallel with the outer distal border. Walking legs capable of being completely hidden beneath the carapace.

Color buff or light purple with dark purplish-brown lines forming a coarse reticulate pattern over the anterior part of the carapace and thence radiating to the lateral and posterior borders. Carpus with color markings continuous with those of the carapace. Hand light purple with a few dark blotches near the upper part of the outer surface. Inner surface of cheliped largely dark red. Walking legs very light pink.

Measurements of a large male: Length, 86 mm.; width, 132 mm.; length of hand, 73 mm.; width of hand, 58 mm.

This crab, perhaps the most striking one of the region, does not often occur within the harbor, but is not infrequently brought up in the dredge from a depth of a few fathoms outside the inlet. The specimens secured in the harbor are usually less than 25 mm., in width; those obtained outside are usually twice or three times as wide and on rare occasions an individual as large as the one whose measurements are given is captured.

The natural range of the species extends as far northward as Cape Hatteras but in the larval stages it often drifts as far to the north as southern New England. Some of these are supposed to now and then survive a mild winter and to develop by the next summer into the small specimens which have at rare intervals been taken on the coasts of Massachusetts and Rhode Island. The larval stages have been described and figured by S. I. Smith.[a]

Calappa angusta A. Milne-Edwards. Pl. XXXI, fig. 7.

Calappa angusta A. Milne-Edwards, 1880, p. 18.

Carapace about eight-ninths as long as wide, tuberculate and granulate above, the tubercles placed irregularly except in the middle line where there are several in a row; front depressed, deeply grooved in the middle and marked off from the orbits by a groove on each side; anterolateral margin granulate; posterolateral margin with one large tooth at the posterolateral angle in front of which are five or six teeth of diminishing size; on the posterior margin there is one rather strong tooth immediately behind the large tooth at the posterolateral angle and several smaller tubercles and granules.

Chelipeds strong; hand indistinctly tuberculate in rows and with a high crest on the superior margin the edge of which is divided into six or seven teeth; meros with a serrate, transverse crest on the outer surface near the distal end.

Length of a male, 17 mm.; width, 19 mm.

[a] Trans. Conn. Acad. Arts and Sci. vol. IV, p. 263, 1880.

Color, clear orange red above and on the sides, yellowish behind; tips of the walking legs bright-yellow; chelipeds slightly purplish.

This species had been reported from a depth of 63 fathoms off Cape Lookout and has been taken by the *Fish Hawk* (station 8249) in 47 fathoms at a point about 23 miles off Cape Lookout. In the deeper water of the Gulf Stream it appears to be more abundant, several specimens, one of them a male 32 mm. wide and 28 mm., long, were brought up from depth of from 100 to 200 fathoms.

Calappa sulcata Rathbun. Pl. XXXI, fig. 6.

Calappa sulcata Rathbun, 1898, p. 289; ibid, 1901, p. 85.

Carapace about seven-eights as long as wide, finely granulate and with about 7 rows of tubercles; anterolateral border with about 14 crenulations, granulate on edge; posterior margin between wings with 2 prominent, acute spines; wings not strongly developed, having 6 marginal teeth,2 behind and 3 in front of the posterolateral tooth, which is long and spiniform.

Expansion of meros of cheliped four lobed; superior crest of hand six to seven dentate; outer surface of hand with an irregular, oblique, almost smooth sulcus bordered by tubercles, and an acuminate inferior proximal spine.

Dimensions of a female: Length, 21 mm.; width at sinus just in front of wings, 23 mm.; width at posterior lateral spines, 23.8 mm.

Color, in alcohol, light pinkish brown with a number of small, narrow rings of dark red—3 on the carapace and the others on the chelipeds.

This box crab has been dredged at a depth of 27 fathoms off Cape Lookout, as reported in Dr. Mary J. Rathbun's description of which this is a condensation.

Genus HEPATUS Latreille.

Hepatus Latreille, 1802, t. III, p. 22.

Hepatus epheliticus (Linnæus). Calico crab, Dolly Varden crab. Pl. XXXII, fig. 1.

Cancer epheliticus Linnæus, 1749–69, vol. VI, p. 414; Rathbun, 1897, p. 37.
Cancer decorus Herbst, 1796, vol. II, p. 154.
Hepatus decorus Gibbes, 1850, vol. III, p. 183; Coues, 1871, p. 124; Kingsley, 1880a, p. 324.

Carapace about two-thirds as long as wide, convex above, regularly arcuate in front, and strongly narrowed behind; front narrow, straight, prominent and placed much higher than the continuation of the anterolateral borders of the carapace; anterolateral borders dentate; superior surface of carapace with several transverse lines or groups of tubercles. Chelipeds moderately strong, carpus and manus with lines of coarse tubercles on their outer face and a crest which, on the manus, is four toothed on the superior margin.

Color, dark gray or brownish with numerous, rather large, round or irregular spots of light red with darker borders scattered over the carapace.

This crab is not uncommon in depths of a few fathoms in the channels of the harbor though the individuals so secured are not as numerous nor as large as those taken outside. In a series representing various ages a great deal of variation is to be seen, the granulations being relatively much coarser in the young and the spots more numerous and brightly colored.

Genus OSACHILA Stimpson.

Osachila Stimpson, 1871*b*, p. 154.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Abdomen eroded along the margins and on last two segments..... *semilevis.*
aa. Abdomen deeply eroded all over..... *tuberosa.*

Osachila semilevis Rathbun. Pl. XXXI, fig. 9.

Osachila semilevis Rathbun, 1916, p. 652.

Carapace octagonal, with six large protuberances, one mesogastric, one metagastric (paired), one cardiac, one mesobranchial (paired) all of which are rough as if finely eroded, while the depressions are nearly smooth; anterolateral margins continued toward buccal cavity and finely dentate; posterolateral margins thick and with four lobes, the first of which does not project as far as the adjacent antero-

lateral lobe; the last posterolateral lobe quite prominent; front usually with a narrow buttonholelike sinus.

Cheliped short, thick, tuberculate on the outer face and with rough margins; hand stout; thumb thick; movable finger comparatively slender and straight; upper margin of hand with three simple teeth. Walking legs of moderate size, more or less prismatic and lightly grooved. Abdomen narrow, eroded along the margins and on the last two segments.

Length of a female, 11.6 mm.; width, 13 mm.

Two specimens of this curious little crab were obtained by the *Fish Hawk* (station 7959 and 7978) in about 14 fathoms. The species belongs to the West Indian fauna and hitherto has not been collected north of Florida.

Osachila tuberosa Stimpson. Pl. XXXI, fig. 10.

Osachila tuberosa Stimpson, 1871*b*, p. 154; A. Milne-Edwards, 1880, p. 20 (pt.); Smith, 1886, p. 636 [32]; Rathbun, 1898, p. 118; ibid., 1916, p. 649.

Carapace octagonal with six large protuberances; one mesogastric, one metagastric (paired), one cardiac, one mesobranchial (paired) all of which as well as the lateral margins and, to some extent, the depressions of the shell are eroded; anterolateral margins continued toward the buccal cavity and finely dentate; posterolateral margins with four lobes, the first of which projects sideways slightly beyond the adjacent anterolateral tooth; front usually with a narrow sinus.

Cheliped short, thick, tuberculate on outer face and with rough margins; hand stout; thumb thick, movable finger with a short, dense pubescence; upper margin of hand with three teeth, the proximal one of which is bifid. Walking legs more or less prismatic, with sharp margins and light longitudinal grooves. Abdomen narrow, deeply eroded all over.

Length of female: 18.2 mm.; width, 20.2 mm.,

This species has been recorded by Smith (loc. cit.) from off Cape Hatteras in 48 fathoms. Like *O. semilevis*, it belongs to the West Indian fauna and strays northward along the edge of the Gulf Stream.

Family LEUCOSIIDAE.

Oxystomata of normal crablike form having the abdomen hidden beneath the thorax; the antennæ small, the legs normal in position, the afferent openings of the gill chambers on either side of the mouth at the base of the third maxillipeds, the gills less than 9 on each side and the male openings sternal.

Of the 36 genera now placed in this family 4 have representatives in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Carapace ovoid or globular and smooth or granular.
  b. Fingers opening in a horizontal plane.....*Persephona*.
  bb. Fingers opening in vertical plane.....*Iliacantha*.
aa. Carapace polygonal, uneven, nodular or eroded.
  b. Posterior portion of carapace without deep cavities.....*Lithadia*.
  bb. Posterior portion of carapace with a deep rounded cavity on each side.....*Spelœophorus*.

Genus PERSEPHONA Leach.

Persephona Leach, 1817, p. 18, 22.

Persephona punctata (Linnæus). Purse crabs. Pl. XXXII, fig. 9.

Cancer punctatus Linnæus, 1758, p. 630 (part.).
Guaia punctata H. Milne-Edwards, 1834–1840, t. II, p. 127; Gibbes, 1850, p. 185.
Persephona punctata Stimpson, 1859, p. 70; Coues, 1871, p. 123; Kingsley, 1878–79, p. 324; Rathbun, 1901, p. 87.

Carapace globular, thickly strewn dorsally and laterally with granules of various sizes and with three sharp, recurved spines, one at each end of the posterior margin and one median just above the posterior margin; front narrow, broadly bidentate, produced and elevated and with the dentiform angles of the branchial channels projecting slightly beyond it; anterior and lateral regions bounded externally

by a row of beadlike granules which is broken toward the front by a single tubercle of larger size and toward the back extends to a point nearly opposite the end of the posterior margin. Chelipeds subcylindrical in the adult male, about one and a half times as long as the carapace; meros with many large tubercles; carpus and hand nearly smooth except on margins; hand somewhat flattened and dilated; fingers weak.

Color, grayish brown, with darker irregular spots or marmorations, the granules white or tinged with red.

This curious crab is occasionally found stranded at low tide on Bird Shoal, but is more often obtained by dredging in the shallow waters of the region. It is nowhere abundant and so far as is known it is about as likely to be met with in one place as in another. The purselike receptacle formed by the enormously enlarged penultimate segment of the abdomen of the female may be found filled with eggs at almost any time during the summer.

Genus ILIACANTHA Stimpson.

Iliacantha Stimpson, 1871*b*, p. 155.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Fingers about half as long as palm of hand..... *intermedia.*
aa. Fingers longer than palm of hand..... *subglobosa.*

Iliacantha intermedia Miers. Pl. XXXII, fig. 3.

Iliacantha intermedia Miers, 1886, p. 302, pl. XXVI, fig. 3, 3a.

Carapace orbicular, with upturned and truncate frontal portion; three posterior spines, of which the median is conical, slightly recurved at the tip, and placed at a higher level than the shorter, flattened, triangular spines of the posterior margin; surface of carapace with very small, evenly scattered granules; margins granulate; front deeply grooved above, broadly notched in front and with the spiniform angles of the branchial channels extending beyond it.

Chelipeds slender; the meros cylindrical and granulate, the granules much coarser proximally; manus smooth, nearly as long as carapace, more or less club-shaped, somewhat inflated proximally, but tapering rapidly to the very slender fingers, which are about one-half the length of the palm, incurved at the tip and denticulate on the distal half of their opposable margins.

Color, gray, without markings of any kind; in alcohol, fading to a pinkish white.

Dimensions of a male: Length, 16 mm.; width, 12 mm.; chela, length, 13 mm.; fingers, 4 mm.

Two specimens of this little crab were taken by the *Fish Hawk* at station D 7942. In general appearance it so closely resembles the young of *Persephona punctata* that its identity would be pretty certain to escape unnoticed on a cursory examination.

Iliacantha subglobosa Stimpson. Pl. XXXII, fig. 2.

Iliacantha subglobosa Stimpson, 1871, p. 155.

Very similar to *I. intermedia*, but with less coarsely granulate carapace, more rounded spines at the sides of the posterior end of the carapace and much longer fingers; the latter exceed the palm in length and are armed at regular intervals with relatively large teeth between which are numbers of much smaller teeth.

Length of a male, 21 mm.; width, 16 mm.; chela, length, 22 mm; fingers, 13 mm.

There is no record of the occurrence of this crab in the immediate vicinity of Beaufort, but it has been taken at various points along the coast to the north and south of this locality and doubtless will be found to occur here.

Genus LITHADIA Bell.

Lithadia Bell, 1855, p. 305.

Lithadia cariosa Stimpson. Pl. XXXII, fig. 6.

Lithadia cariosa Stimpson, 1860, p. 238; Kingsley, 1878–79, p. 325.

Carapace convex, subpentagonal, its surface very uneven and covered everywhere, as are the other parts of the body and legs, with beadlike granules, larger posteriorly; front narrow, upturned, and broadly notched; posterior margin bilobate and partly overhung by the large, knoblike cardiac lobe; subhepatic

region with a large blunt tooth. Abdomen of male narrow triangular with a backward projecting spine at proximal end of the penultimate segment; abdomen of female with the penultimate segment very large, nearly circular.

Chelipeds stout, a little longer than the width of the carapace, their joints angular, outer margin of manus crested.

Length of carapace, 14 mm., width, 15 mm.

Color, a light gray or buff; the female occasionally with two or three small red spots on the abdomen.

This curious little crab is not uncommon at depths from 1 to 5 fathoms in the channels about Beaufort. When brought to the surface in the dredge it feigns death and is only with difficulty distinguished from the pebbles and bits of shell among which it appears to make its home. Eggs occur at intervals throughout the summer.

Stimpson's material, from which the species was described, came from Beaufort Harbor.

Genus SPELŒOPHORUS A. Milne-Edwards.

Spelæophorus A. Milne-Edwards, 1865, p. 148.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Lateral margins of carapace expanded into broad, flattened wings.....*pontifera.*
aa. Lateral portions of carapace tumid, not expanded into wings.....*nodosus.*

Spelœophorus pontifera (Stimpson). Pl. xxxii, fig. 5.

Lithadia pontifera Stimpson, 1871, p. 115; Rathbun, 1901, p. 88.
Spelæophorus triangulus A. Milne-Edwards, 1880, p. 23.

Carapace subrhomboidal, from one-third to one-sixth wider than long, its surface granulate and very uneven; front narrow, produced, upturned, and with a deep median sinus; orbits small; lateral margin of branchial region on each side extended into a broad wing which conceals the legs and whose outer end is truncate or concave; anterolateral margin concave and with a notch near its middle; posterior margin broad and with a deep rounded cavity on each side of the intestinal region which extends toward, and almost to, a much smaller pit on the dorsal surface at the side of the cardiac region; a narrow suture connects the cavity and pit of each side. From the front a ridge, interrupted at the center of the carapace, extends back along the mid-dorsal line almost to the posterior margin; on each side of this ridge, in the branchial region, is a prominent elevation more or less divided into two parts, one of which is connected by a ridge with the anterior angle of the lateral wing, while the other is similarly connected with the posterior angle.

Chelipeds of moderate size; meros with two large, triangular teeth on the outer margin; fingers slender and curved. Walking legs granulate and tuberculate throughout.

One specimen, 12 mm. wide, was secured by the *Fish Hawk* on the fishing banks.

The species is a small one, apparently attaining a width of about 15 mm., and is extremely variable. The ridges and elevations of the dorsal surface may be sharp and very conspicuous or low and rounded; the angles of the lateral wings of the carapace may be produced or rounded off. The female is not as wide in proportion to her length as is the male, her abdomen is densely tuberculate and the outer posterior part of the lateral wings is somewhat tumid.

Among the specimens in the United States National Museum the extreme of angularity of sculpture in this species is shown by a specimen from off Culebra, P. R. A less angular specimen comes, probably from Florida. The Beaufort specimen is less angular than either of these.

Spelœophorus nodosus (Bell). Pl. xxxii, fig. 4.

Oreophorus nodosus Bell, 1855, p. 307.
Spelæophorus nodosus Milne-Edwards, 1865, p. 149; Rathbun, 1901, p. 89.
Spelæophorus nodosus Stimpson, 1871, p. 119.

Carapace convex, subtriangular or pentagonal, posterolateral angles rounded, its surface evenly and thickly covered everywhere with crowded, rounded granules; a prominent, broad ridge extends backward from the front to the cardiac region; on each side there is a low hump on the hepatic region, and behind this, at the side of the gastric region, there is a much larger hump, and still farther back, near the posterior border, is one of nearly equal size; the posterior humps overhang and largely contain a pair

of deep cavities whose rounded mouths open one on each side of the posterior margin. The front is narrow, bilobed, and upturned; a short distance back, on the subhepatic region, is a prominent nodose elevation, and a little farther back two others of slightly smaller size.

Chelipeds short and stout, rough, coarsely granulate and crested along the outer margin; crest of meros with a large distal and a small proximal lobe.

Length of carapace, 15 mm.; width, 17 mm.

Color in life, salmon pink with a few purplish spots on the carapace and rusty brown marks on the legs.

A single adult female of this species was dredged in the channel of Bogue Sound opposite Morehead City on July 14, 1913, and an adult male was taken from a fish's stomach at the Blackfish Bank on August 1, 1914. The species has heretofore been taken much farther south.

Tribe BRACHYGNATHA.

Brachyura having the buccal frame roughly quadrate, the last pair of legs normal in form, rarely reduced in size, and almost never dorsal, the gills few, the first abdominal appendages of the female wanting, and the female openings sternal.

Both of the subtribes and 8 out of the 18 families of this tribe are represented in the Beaufort fauna.

Subtribe BRACHYRHYNCHA.

Brachygnatha having the body oval, circular, or quadrate and broad in front, the rostrum reduced or wanting, and the orbits nearly always well inclosed.

This subtribe comprises 14 families, of which 7 are represented here.

Family PORTUNIDAE. The swimming crabs.

Brachyrhyncha having the body transversely oval, the last pair of legs more or less distinctly adapted for swimming, and the antennæ folding obliquely or transversely.

Of the 33 genera assigned to this family 4 are represented here.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Carapace with five teeth of about equal size on anterolateral margin; interocular teeth three..... *Ovalipes.*

aa. Carapace with nine anterolateral teeth, of which the last is usually much larger than the others; interocular teeth four, six, or eight.

b. Palate without a longitudinal ridge..... *Arenæus.*

bb. Palate with a longitudinal ridge.

c. Abdomen of male triangular..... *Portunus.*

cc. Last two segments of male abdomen very much narrower than the basal segments.... *Callinectes.*

Genus OVALIPES Rathbun.

Ovalipes Rathbun, 1898, p. 597.

Platyonichus Latreille, 1825, p. 151, pt. (not *Platyonichus* Latreille, 1818, vol. XXVII, p. 4).

Ovalipes ocellatus ocellatus (Herbst). Lady crab. Pl. XXXII, fig. 7.

Cancer ocellatus Herbst, 1782–1804, vol. III, heft 1, p. 61.

Portunus pictus Say, 1817, p. 62.

Platyonichus ocellatus Latreille, 1825, p. 152; H. Milne-Edwards, 1834–1840, t. 1, p. 437; Coues, 1871, p. 120; Kingsley, 1878–79, p. 321; Smith, 1886, p. 631; Paulmier, 1905, p. 143; Fowler, 1912, p. 421.

Ovalipes ocellatus Rathbun, 1898, p. 597; Sumner, 1911, p. 672.

Carapace about one-fourth wider than long, convex, finely granulate everywhere except in the median line, where there is a longitudinal band of slightly enlarged granules; front with three acute teeth, of which the median is about twice as long as the lateral ones. Orbit with one shallow fissure above.

Anterolateral teeth strong, acute, directed forward. Inner suborbital angle projecting as far as the median tooth. Lower surface of carapace in the anterolateral region with a curved stridulating ridge. Abdomen of male narrow, its sides nearly parallel; sixth segment more than twice as long as seventh, which is circular; abdomen of female not greatly broader than that of male, widest at fifth segment.

Chelipeds rather large; anterior margin of meros with several small spines and a dense fringe of hairs; carpus with two spines, the inner one very strong; hand triangular, external border costate, internal border with an overhanging densely ciliated ridge, which ends distally in a sharp spine; external costa and internal line of cilia continued onto the dactyl.

Measurements of a male: Carapace, length, 31 mm., width, 38 mm., thickness of body, 12.5 mm.; length of cheliped, 42 mm.

Color, yellowish gray, closely set with small annular spots of reddish purple; carapace and chelipeds with a silvery or brassy iridescence.

The lady crabs are not often observed in the Beaufort region and probably are not as abundant as they are farther north. On Bird Shoal and Shark Shoal and on the ocean beaches their cast-off shells are often to be found, but these are of small size, and would seem to indicate that mostly immature individuals come within reach of the ordinary collector. By the use of the dredge or otter trawl outside the inlet many adult specimens have been obtained, and they appear to be fairly common about the fishing banks. In the spring of 1915 a number of specimens were obtained in the pound net set in Newport River, about 1 mile north of the laboratory.

Ovalipes ocellatus floridanus sub. sp. nov. Pl. XXXII, fig. 8.

Ovalipes ocellatus, var., Smith, 1887, p. 632.
Holotype, No. 47957, U. S. Nat. Mus., ♂ from Pensacola, Fla. Paratypes, No. 17915, U. S. Nat. Mus.

Differs from *Ovalipes ocellatus ocellatus* in the lack of the purple ocellated spots, the color being a uniform grayish yellow; the carapace is less arched and is evenly granulate all over, the median band of enlarged granules not being evident; the anterolateral spines, especially the outer orbitals, are more acute; the orbits are wider, the distance between the outer and inner orbital spines exceeding the distance between the suborbital spines, whereas in *O. ocellatus ocellatus* the reverse is usually true. The broadening of the orbits appears to have been brought about at the expense of the interorbital part of the carapace, the distance between the two inner orbital spines being slightly less than in typical *ocellatus* from the north.

In the region about Beaufort, especially at a distance of a few miles off Cape Lookout, this form of the lady crab is probably much more common than the spotted form. In the harbor it is very rare. Specimens from the neighborhood of Cape Hatteras are not typical in all cases as regards measurements; often the color is the only distinctive character. Along the Florida coast, judging from the collection in the National Museum, the unspotted form is the only one that occurs.

Genus PORTUNUS Weber. The pelagic crabs.

Portunus Weber, 1795, p. 93; Fabricius, 1798, p. 325.

KEY TO THE SPECIES OF THE BEAUFORT REGION.[a]

a. Carapace wide; if the middle of the posterior margin be taken as a center and a circle drawn with the length of the carapace as its radius, the periphery will fall well within the tips of the anterolateral spines.....(Subgenus *Portunus*).
b. Interocular teeth six, the inner orbital being entire.....*sayi.*
bb. Interocular teeth eight, the inner orbital being bilobed.....*gibbesii.*

a Portunus and *Achelous*.—It is needless, in the present case, to attempt to settle the status of any of the groups into which the genus *Portunus* has been divided. Whether the form of the carapace, the shape and function of the anterior walking legs, the articles of the third maxillipeds, or some other structural detail will furnish entirely satisfactory characters for a division can be determined only by the critical study of a much more extensive collection of species than we have at our command. For the purposes of this paper it appears to be best to follow Dr. Mary J. Rathbun in regarding *Portunus, sensu stricto*, as consisting of those species with a broad carapace and *Achelous* as consisting of those with a narrow carapace, placing both as subgenera under *Portunus*. It is doubtless true that this difference will not show in the case of very young individuals of some of the species, but with reasonably mature and with all adult specimens there should be no trouble in making the distinction.

aa. Carapace narrower; a circle drawn as before will fall well outside the tips of the fifth, sixth, and seventh anterolateral spines.....(Subgenus *Acheloüs*).
b. Interocular teeth eight, the inner orbital being bilobed.....*spinimanus.*
bb. Interocular teeth six, the inner orbital being entire.
c. Basal article of last pair of legs with an acute, upright spine.....*sebæ.*
cc. Basal article of last pair of legs without an erect spine.
d. Internal spine of carpus extending to middle of hand or beyond.....*spinicarpus.*
dd. Internal spine of carpus of moderate length.
e. Superoexternal surface of chela with a conspicuous, smooth silvery or iridescent area..*ordwayi.*
ee. Superoexternal surface of chela ridged and not iridescent.
f. Superior margin of hand with two distal spines, one behind the other; posterior lateral spine distinctly longer than the others.....*anceps.*
ff. Superior margin of hand with only one distal spine; posterior lateral spine little if any longer than one in front of it.....*depressifrons.*

Portunus gibbesii (Stimpson). Pl. XXXIII, fig. 1.

Lupa gibbesii Stimpson, 1862, p. 57.
Acheloüs gibbesii Stimpson, 1862, p. 222; Verrill, 1908, p. 389.
Portunus gibbesii Rathbun, 1900, p. 140.

Carapace more than twice as wide as long, not tumid, thickly covered with small spherical granules, pubescent, and with three or four naked, transverse ridges, two of which arise from the lateral spines and run toward the gastric region; frontal teeth 8, including the two points of the inner orbitals, each of which is notched at the summit; the 2 median teeth are narrower and slightly more advanced than the next pair; external orbital tooth not much larger than the teeth of the anterolateral border, which are stout, acute, and directed forward; the last tooth, or lateral spine, slender, very sharp, curved forward and about as long as the space occupied by the four preceding teeth; near the anterolateral margin at the base of the teeth are one or more small, naked, iridescent areas.

Chelipeds long, slender; meros with five or six spines in front and one at the distal end; carpus with a large internal and a smaller external spine; chela slender, ribbed on all its surfaces; the ribs continued onto the fingers and made rough by sharp-pointed, appressed tubercles; there are two spines on the hand, one at the articulation with the carpus, the other near the distal end of the superior rib; fingers nearly straight with incurved tips.

Length of a male, 29 mm.; width, 61 mm.

Color, brownish red, the transverse ridges on the carapace and the spines and margins of the chelipeds carmine red.

On the American coast the range of this crab extends as far north as Woods Hole, Mass. It is fairly common about Beaufort and is often taken in the deeper channels of the harbor.

Portunus sayi (Gibbes). Pl. XXXIII, fig. 2.

Portunus pelagicus Bosc, 1805, p. 219.
Lupa pelagica Say, 1817, p. 97; De Kay, 1844, p. 11 (not *L. pelagica* Leach).
Lupa sayi Gibbes, 1850, p. 178.
Neptunus sayi Stimpson, 1860, p. 220.
Portunus sayi Rathbun, 1897, p. 22; ibid, 1898, p. 276; Verrill, 1908, p. 376; Sumner, 1911, p. 672.

Carapace very nearly twice as wide as long, somewhat tumid, smooth and polished to the naked eye, but with a lens it is seen to be finely granulate; frontal teeth 6, including the inner orbitals; the 2 median teeth smaller but on a line with the next pair; external orbital tooth larger than those of the anterolateral border except the ninth, which is stout, acute, and about as long as the space occupied by the three preceding teeth; the teeth of the anterolateral border blunt and increasing slightly in size posteriorly.

Chelipeds of moderate length, somewhat larger in the male than in the female; meros with four, rarely three, stout, curved spines in front, none behind; carpus with two spines. Manus with an acute spine at the articulation and a smaller one near the base of the movable finger; the external surface with two longitudinal ribs of which the lowermost extends onto the finger; the superior surface with three ribs which are continued onto the finger, the innermost one being ciliate beneath.

Length of a male, 20.5 mm.; width, 40 mm.

Color, chocolate brown, with cloudings of olive green and irregular white spots.

A pelagic form, living among *Sargassum*, and not infrequently carried by the currents into the harbor. Quite a number of the specimens taken at Beaufort were egg-bearing.

Portunus (Acheloüs) spinimanus Latreille. Pl. XXXIII, fig. 4.

Portunus spinimanus Latreille, 1819, p. 47.
Acheloüs spinimanus De Haan, 1833, p. 8; Coues, 1871, p. 120; Kingsley, 1878–79, p. 320 (*spinimana*); Verrill, 1908, p. 385.
Lupa spinimana Stimpson, 1859, p. 57.
Portunus (Acheloüs) spinimanus Rathbun, 1901, p. 45.
Acheloüs smithii Verrill, 1908, p. 386, figs. 32 and 33.

Carapace considerably less than twice as wide as long, finely granulate and pubescent and with a number of prominent, curved, coarsely granulate, transverse ridges; frontal teeth 8, including the inner orbitals, each of which is notched at the summit and presents two points; the 2 middle teeth are slightly narrower and more advanced than the next pair and all are considerably more advanced than the inner orbitals; outer orbital teeth obtuse, not much larger than the teeth of the anterolateral borders which are strong, acute, or acuminate and of about one size except the last, which is about twice as large a, the others and usually curved forward.

Chelipeds long, pubescent, and serratogranulate all over; meros with four, sometimes five, strong, curved spines in front and one at the distal end; carpus with two spines, the inner one much the stronger, and on the upper surface four conspicuous ridges; hand slender, all its surfaces with ridges which extend onto the fingers; a strong spine at the carpal articulation and another near the base of the movable finger; fingers nearly straight, the tips incurved.

Length of a male, 31 mm.; width, 52 mm.

Color, yellowish or reddish brown, ridges of carapace, spines of chelipeds and fingers and tips of legs red, fingers with white blotches.

This species, which bears a general resemblance to *Portunus gibbesii*, is not uncommon in the waters off Beaufort Inlet and is sometimes found in the deeper channels of the harbor. The two species are quite often found in company, as they doubtless require the same conditions, but may be readily distinguished by the narrower, rounder form of *P. spinimanus* and the entire lack of the iridescent patches on the carapace mentioned in the description of *P. gibbesii*.

In his paper on the decapod crustaceans of Bermuda, Verrill has described a subspecies, *smithii*, which he states has been collected at Fort Macon, off Hatteras, and at other points farther south. It has been pointed out by Dr. Mary J. Rathbun[a] that *Acheloüs smithii* Verrill was based upon a misinterpretation of a figure by A. Milne-Edwards[b] of an immature swimming crab said to have come from Chile and identified by Edwards as *Portunus spinimamus*.

It may easily be that the figure in question does not represent *P. spinimanus* of Latreille at all It may even be that Latreille, Leach, and various other early writers confounded two or more species under this name, though this seems unlikely, but the *Lupa*, or *Acheloüs, spinimanus* of Stimpson, Smith, Kingsley, and various others was unquestionably the same as the one to which the name is here applied.

Portunus (Acheloüs) spinicarpus Stimpson. Pl. XXXIII, fig. 3.

Acheloüs spinicarpus Stimpson, 1871, p. 148.
Neptunus spinicarpus A. Milne-Edwards, 1879, p. 221.
Portunus (Acheloüs) spinicarpus Rathbun, 1901, p. 47.

Carapace slightly more than twice as wide as long, sculptured, with a number of naked, rather coarsely granulate, arching, transverse ridges between which the shell is finely granulate and pubescent; frontal teeth 6, including the inner orbitals, the outer margins of which are sinuate but not notched; the true frontal teeth are narrow, acute, separated by broad notches, and the median pair is considerably advanced beyond the others; external orbital tooth acute and larger than the neighboring teeth of the anterolateral margin; the latter vary somewhat in size, are concave sided and very acute, the eighth tooth has the form of a slender, forwardly curving spine more than half as long as the anterolateral border; posterolateral angle sharp, the margin being slightly recurved.

[a] Proc. U. S. Nat. Mus., vol. XXXVIII, 577 (footnote), 1910. [b] Arch. Mus. Hist. Nat., Paris, vol. X, pl. 32, 1861.

Chelipeds long and slender; meros with four stout, curved spines in front and a single similar one at the distal end behind; carpus with two spines of which the outer is small and weak while the inner one is very long and extends along the side of the hand almost to the base of the movable finger; hand with serratotuberculate ridges, which are prolonged onto the fingers, and two spines, one at the carpal articulation, the other near the base of the movable finger; fingers nearly straight, incurved at tips.

Length of a male, 18 mm.; width, 38 mm.

Color, brownish yellow with red markings on ridges of carapace, spines of legs and fingers.

This appears to be a species of the deeper waters of the region. It has been dredged from 13 to 134 fathoms off Hatteras, off Cape Fear, and between Hatteras and Cape Lookout, but so far as is definitely known has not been taken anywhere along the shore or in the harbor.

Portunus (Achelous) sebæ (Milne-Edwards). Pl. XXXIII, fig. 5.

Lupea sebæ H. Milne-Edwards, 1834–1840, t. 1, p. 455.
Neptunus sebæ A. Milne-Edwards, 1861, p. 329.
Achelous sebæ Smith, 1869, p. 34; Verrill; *ibid.*, 1908, p. 380.
Portunus (Achelous) sebæ Rathbun, 1901, p. 46.

Carapace less than twice as wide as long, pubescent and with very indistinct granulate ridges; frontal teeth 6, including the inner orbitals; the outer margins of which are only slightly sinuate; teeth of the median pair blunter and more advanced than those of the next pair; external orbital tooth acuminate and slightly larger than the nearest anterolateral tooth; anterolateral teeth acute or acuminate, their tips turned forward, the eighth one longer than the space occupied by the three preceding teeth.

Chelipeds of moderate length, pubescent and with fringes of silky hairs; meros with five spines in front and one behind; carpus with two spines, the internal one being strong and very sharp; hand with three spines; one at the carpal articulation, a small one immediately above the base of the movable finger, and a larger one farther back; fingers slender, straight. Basal article of last pair of legs with an erect spine.

Length of a male, 29.5 mm.; width, 55.2 mm.

Color, in alcohol, pale brownish yellow, fingers red, a large round red spot on each flank of the carapace. By Verrill the hairs fringing the legs and chelipeds are said to be red.

There is no record of this species having been taken in the Beaufort region, and there are no specimens in the United States National Museum from farther north than Key West, Fla. It occurs in the Bermudas, and both Dr. Mary J. Rathbun and Prof. Verrill state that its range extends from North Carolina to Brazil. The species, in all probability, will be found here sooner or later, and is therefore included in this paper.

Portunus (Achelous) depressifrons Stimpson. Pl. XXXIII, fig. 7.

Amphitrite depressifrons Stimpson, 1859, p. 58.
Achelous depressifrons Stimpson, 1860, p. 223; Coues, 1873, p. 121; Kingsley, 1878–79, p. 320; Verrill, 1908, p. 391.
Portunus (Achelous) depressiforns Rathbun, 1901, p. 45.

Carapace about one and three-fifths times as wide as long, uneven, pubescent and with indistinct transverse ridges; frontal teeth six, including the inner orbitals, which are neither notched nor sinuate and much larger than the others, the tips of all the teeth about on a line; external orbital tooth strong, its tip rounded; anterolateral teeth acute, turned forward, the eighth scarcely longer than the one in front of it, the teeth and the intervals between them ciliated.

Chelipeds trigonal, serratogranulate and pubescent; meros with five spines in front and a distal one behind; carpus with two spines, the outer much smaller than the inner one; hand short and compressed, its upper margin raised into a crest which terminates distally in a stout spine, a smaller spine at the carpal articulation; fingers flattened, the movable one with a border of cilia on the superior margin. The three pairs of walking legs are unusually long and slender and the first pair has its articles fringed with hairs. The swimming legs are shorter than in most of the species of this genus.

Length of a male, 23.5 mm.; width, 37 mm. (Specimen from Key West, Fla.)

Color: Verrill stated that "in life the carapace is irregularly mottled with light and dark gray, closely imitating the colors of the sand; the chelipeds and posterior legs are similar, though paler; but the first pair of ambulatory legs, which are longer than the others, are bright purple or deep blue, in the larger specimens, while some portion of the same color is usually seen on the next two pairs, but the color

of the first pair is in striking contrast with that of the rest of the crab. The very young specimens did not show this distinction in the color of the legs, so far as observed."

This crab, reported from Fort Macon by Coues and by Kingsley has not been collected here for many years, so far as our records go. The United States National Museum has no specimens from farther north than Key West, Fla., and the Bahamas. Prof. Verrill reports it as very common at Bermuda. The original description by Stimpson was based on specimens from the coast of South Carolina and the Florida Keys. It is liable to be found here at any time.

Portunus (Achelous) anceps (Saussure). Pl. XXXIII, fig. 8.

Lupea anceps Saussure, 1858, p. 434.
Achelous anceps Stimpson, 1871, p. 113; Smith, 1886, p. 634; Verrill, 1908, p. 378.
Neptunus ventralis A. Milne-Edwards, 1879, p. 215, pl. XL, fig. 3.
Portunus (Achelous) anceps Rathbun, 1900, p. 141.
Portunus ventralis Rathbun, 1901, p. 45.

Carapace twice as wide as long, pubescent and with several distinct arching, granulate, transverse ridges; frontal teeth 6, including the inner orbitals which are blunt and considerably shorter than the outer pair of true frontal teeth; median pair of teeth very short and smaller than the inner orbitals; anterolateral teeth small, acute and curved forward, the last one sharp, slender, and about as long as the space occupied by the four preceding teeth.

Chelipeds long; meros with four spines in front and a distal one behind; carpus ridged and with a strong internal and a smaller external spine; hand with ridges on the outer and superior surfaces, most of which are continued onto the fingers, the superointernal ridge more elevated than the others and ending distally in two spines, one behind the other.

Length of a male, 13 mm.; width, 26 mm. (Verrill).

Color: "Mottled gray and yellowish white so as to imitate the sand pretty closely; the first pair of legs in some were red, in others yellow; the chelipeds and other legs had, in part, the same color." (Verrill.)

The natural habitat of this species is in more tropical waters than those of the Beaufort region, but it, like the other swimming crabs, is carried northward in the Gulf Stream and its occurrence here would occasion no surprise. A good series of specimens was reported by Smith from off Cape Hatteras in 7 to 16 fathoms. Verrill stated that it is not uncommon at Bermuda.

The identity of *P. anceps* and *P. ventralis* was first suspected by Verrill [a] from the comparison of the measurements of Bermudean specimens of *P. anceps* with those given by Dr. Mary J. Rathbun for Porto Rican specimens identified by her as *P. ventralis*. A careful comparison of specimens in the National Museum shows that Prof. Verrill's suspicion was well founded.

Portunus (Achelous) ordwayi (Stimpson). Pl. XXXIII, fig. 6.

Achelous ordwayi Stimpson, 1860, p. 224; Smith, 1869, p. 9; ibid., 1870, p. 148; Verrill, 1908, p. 381.
Neptunus ordwayi A. Milne-Edwards, 1879, p. 217.
Portunus (Achelous) ordwayi Rathbun, 1901, p. 46.

Carapace one and one-half times as wide as long, uneven, the elevations granulate and the depressions pubescent, with a number of conspicuous, curving, transverse ridges; frontal teeth 6, including the inner orbitals which are acuminate; true frontal teeth of about one size, triangular, acute, the middle pair advanced beyond the others; outer orbital tooth large; anterolateral teeth diminishing slightly in size from the first to the seventh, inclusive, the eighth about as long as the space occupied by the two preceding teeth, the tips of all acute and turned forward.

Chelipeds of moderate length; meros with four or five strong spines in front and a single distal one behind; carpus ribbed and with a strong internal and a much smaller external spine; hand ribbed on all its surfaces except the superior one, which is flat and highly iridescent over more or less of its area; the superointernal ridge is raised into a crest which terminates distally in a sharp spine. The margins of the carapace and chelipeds are more or less fringed with silky hairs.

Length of a male, 24.5 mm.; width, 37.5 mm.

Color, carapace and legs reddish brown, due to a fine mottling with red, yellowish brown, and gray; beneath pale orange, deeper on the chelipeds and legs; chelæ, above, deep red-brown, the fingers with two cross bands of light orange-red.

Taken by the *Albatross* in 32 fathoms between Cape Hatteras and Cape Lookout.

[a] Op. cit., p. 379.

Genus CALLINECTES Stimpson.

Callinectes Stimpson, 1860, p. 220.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Frontal teeth, including the inner orbitals, four.....*sapidus.*
aa. Frontal teeth, including the inner orbitals, six.....*ornatus.*

Callinectes sapidus Rathbun. Blue crabs. Pl. XXXV, fig. 1.

Lupa hastata Say, 1817, p. 65, and 1818, p. 443.
Lupa dicantha De Kay, 1844, p. 10.
Callinectes hastatus Ordway, 1836, p. 568; Coues, 1871, p. 120; Paulmier, 1905, p. 142.
Callinectes sapidus Rathbun, 1896, p. 352; Verrill, 1908, p. 370; Sumner, 1911, p. 672; Fowler, 1912, p. 128–130.

Carapace, including lateral spines, two and a half times as wide as long, moderately convex, nearly smooth except on inner branchial and cardiac regions where it is lightly tuberculate; a tuberculate transverse line from one lateral spine to the other and a shorter transverse line about halfway between this and the frontal margin; frontal teeth, four, including the inner orbitals, triangular, acute, both pairs more or less distinctly bilobed; anterior eight anterolateral spines of subequal length, concave on both margins and acuminate; lateral spines nearly straight, longer than the space occupied by the three preceding teeth; inner suborbital tooth prominent and acute.

Chelipeds of male large and powerful, those of the female considerably smaller; meros with three spines in front and one small one at the distal end behind; carpus with one spine and one spiniform tubercle on the external surface; manus strong, prominently ribbed and with a strong proximal spine; fingers strong, nearly straight and strongly toothed.

Length of a male, 67 mm.; width, 166 mm.

Color, grayish or bluish green of varying shades and tints relieved by more or less brilliant red on the spines of the carapace and the fingers.

This crab, so abundant along the Atlantic coast from Cape Cod southward, is common enough in the Beaufort region to be of some commercial importance. Throughout the summer soft crabs are caught for local consumption and occasionally a few are shipped away. At Morehead City the business of shipping soft crabs is carried on with regularity, though most, if not the whole, of the supply is obtained from Harkers Island and points still farther to the eastward. Hard crabs are not utilized to any marked degree. Some years ago at one of the oyster canneries in Beaufort an effort was made to establish a crab-canning industry, but it was found that crabs could not be obtained in sufficient numbers at the time they were wanted and the venture failed. With proper apparatus and perhaps some patience in training the fishermen to use it there should be no difficulty in securing quite as many blue crabs in the neighborhood of Beaufort as at any other point along the coast. At present fishing is done only with hand nets in the marshes and creeks.

The development and behavior of the blue crab are extremely interesting, but the study of its life history, while of no little practical improtance, is a matter of much difficulty. Young crabs and some of the older ones may be observed with ease in shallow water near the shore; the older individuals, however, prefer deeper water and can not well be watched. When a number are confined together in a limited space they will fight to the death and the victors will devour the vanquished without compunction. To confine a sufficient number of crabs of various sizes and both sexes in separate compartments is troublesome and so far has been an impossibility, except during the summer months. The following brief account is based on the observations of several years, and while incomplete gives the most important facts as far as they have been ascertained.[a] It also indicates how much is still to be learned.

Egg-bearing females begin to appear in the spring, become abundant during the summer, and diminish rapidly in numbers in the early fall. The eggs, when first laid, are of a light orange-yellow color, but as they grow older they darken and finally become dark brown or a dirty gray. They are very small and may number anywhere from 1 to 5,000,000. Collectively they form a mass which projects far beyond the margins of the abdomen of the female and interferes considerably with her movements. She carries them about until they hatch, when the little crabs, in the zoëa stage, leave the mother and float away in the water.

[a] In this connection see Hay, Report, Bureau of Fisheries, for 1904, p. 397, and Binford, Johns Hopkins Circ. February, 1911; also Chidester, Biol. Bull. xxi, no. 4, p. 235–248, 1911.

The time required by the young crab to pass through the zoëa and megalops stages to the first crab stage is not known, but it is probable that young hatched during the summer complete their transformation before winter. By this time they are about 3 millimeters wide. They probably grow little if at all during the colder months, but early the next spring are ready to begin their active predatory life. If an adequate supply of food is obtained they grow quite rapidly, molting at first at intervals of about a week and later at intervals of about a month, increasing about one-third in width at each molt. By the end of the second summer they have reached a width of from 75 to 100 millimeters.

In both sexes maturity is probably reached in the third or fourth summer after hatching. The full-grown male measures over 160 millimeters from tip to tip of his lateral spines and is about as active and pugnacious an animal as is to be found in the water. The females are somewhat smaller and have weaker chelipeds, but they can inflict a very painful bite and will fight savagely if surprised and retreat is impossible. During the molt at which the female reaches maturity her abdomen loses the triangular shape which it has had through the earlier molts; it becomes broad and rounded and lies loosely on the ventral side of the thoracic sterna. A day or two previous to this molt, under normal conditions, she has been taken up by some male who carries her about until her shell is ready to be cast, guards her during the process, and immediately afterwards mates with her. It is believed that she never mates again, although she may produce more than one lot of eggs, and it is probable that she never molts again. The male also probably does not molt after reaching maturity, but he will mate repeatedly with different females if he has an opportunity to do so.

The courting habit of the male, referred to by Prof. Verrill [a] and others, is very interesting. The "dancing and strutting" is done immediately before the female is taken up to be carried about and does not appear ever to be enacted except before a female that is about to cast her shell. The attitude of the female at such times appears to be one of interest and submission. How soon eggs are produced after mating is not known, but there are reasons for believing that it is not for several weeks and possibly not until the next season. It is not at all likely that two lots of eggs are produced in one summer, although well-developed eggs may be found in the ovary of a female that has just hatched one lot.

Having reached maturity the crab probably lives three or four years. Its enemies, aside from man, do not appear to be numerous and against them it is ordinarily able to defend itself if escape is not practicable. Its shell, however, affords a convenient lodging place for barnacles and bryozoans and its gills and gill chambers become clogged with clusters of a little stalked barnacle (*Octolasma darwini*) all of which doubtless help to weaken it and to make it an easy victim of some hungry fish or a summer storm. Observations made during the summer indicate that the mortality is greatest among the old females at that season of the year, but it may be that the males die and are destroyed in deeper water so that their shells are not cast on the shore. When laden with eggs the females seek comparatively shallow water and at times have been observed in numbers close to the edge of the deep channels which run along the inside of Bogue and Shackleford Banks.

Two specimens of dwarf females, both mature, have been collected at Beaufort. The smaller of these measures only 35 mm. long and 80 mm. wide.

Callinectes ornatus Ordway. Pl. XXXIV, fig. 2.

Callinectes ornatus Ordway, 1863, p. 571; Rathbun, 1895, p. 356; ibid, 1901, p. 48; Verrill, 1908, p. 366.

Carapace of approximately the same proportions as in *C. sapidus;* somewhat tumid and finely granulate throughout; transverse lines distinct; frontal teeth, including the inner orbitals, 6; anterolateral spines shallow and broad, the tips of the first five or six acute, the others acuminate; lateral spines curved forward and hardly as long as the space occupied by the three preceding teeth; inner suborbital angle prominent but hardly acute. First segment of abdomen of male produced laterally into an acute, upturned spine. Chelipeds formed as in *C. sapidus* but with the spines probably more acute, the ridges of the manus more developed and the teeth on the fingers larger and sharper.

Length of a male, 33 mm.; width, 74 mm.

Color, clear grayish or bluish green with red on the fingers and more or less brilliant blue on the front of the chelipeds and terminal joints of the legs, merging into dark blue or purple at the articulations; lateral spines and lower surface of chelipeds and teeth of chelæ ivory white.

[a] Loc. cit., p. 371, 372.

Callinectes ornatus is by no means rare in Beaufort Harbor though full grown individuals are not to be found. Specimens 3 inches and less in width can usually be collected about Bird Shoal and may easily be distinguished from the commoner *C. sapidus* by their more brilliant coloration and by their greater pugnacity. It also seems that their claws are stronger than those of *C. sapidus* of the same size and their nip is correspondingly more painful.

Genus ARENÆUS Dana.

Arenæus Dana, 1851, p. 130.

Arenæus cribrarius (Lamarck). Pl. XXXIV, fig. 3.

Portunus cribrarius Lamarck, 1818, p. 259.
Lupa maculata Say, 1818, p. 445.
Arenæus cribrarius Dana, 1852, p. 290; Coues, 1871, p. 121; Kingsley, 1878, p. 320; Rathbun, 1901, p. 50; Sumner, 1911, p. 672; Fowler, 1912, p. 413.

Carapace more than twice as wide as long, very finely granulate; produced on each side into a strong spine between which and the orbit are eight strong, somewhat acuminate teeth heavily ciliate beneath; front narrow, not so far advanced as the outer orbital angles, and with three teeth on each side of the median notch; of these teeth the outer one forms the inner angle of the orbit and the central one is partly coalesced with the innermost one; superior wall of orbit with two deep fissures dividing it into three lobes; inferior wall of orbit with a wide external fissue and with the inner angle much advanced; lower surface of carapace hairy.

Chelipeds of moderate size; meros with three spines on the anterior border and a short tuberculiform one near the distal end of the posterior border; carpus with two spines; hand short, with five longitudinal granulose carinæ and two spines, one at the articulation with the carpus and the other above the base of the dactyl. Walking legs rather short and weak, densely ciliate. Swimming feet stout. Basal segment of abdomen produced on each side into a strong, sharp, slightly upcurved spine.

Length of carapace, 27 mm.; width, 59 mm.

Color, light vinaceous brown or olive brown thickly covered over the dorsal surface with small, rounded, white spots; tips of walking legs, yellow.

So far as is known this crab seldom if ever enters the harbor and is rarely washed ashore along the outer beaches. It lives in rather shallow water close to the shore but is sufficiently adroit as a swimmer to escape the dangers of the tumbling surf. The collector in search of specimens should be able to haul a seine or an otter trawl about half a mile offshore and parallel with the beach.

Family CANCRIDAE.

Brachyrnyncna having the body broadly oval or hexagonal, the last pair of legs not adapted for swimming, the first pair of antennæ folding lengthwise, and the second antennæ with short, naked flagella.

This, the typical family of crabs, has been restricted until it now contains but two genera. Of these, one is represented within our limits.

Genus CANCER Linnæus.

Cancer Linnæus, 1758, p. 625; restricted by Leach, 1815, p. 308, 320.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Anterolateral teeth of carapace with denticulate margins.....*borealis.*
aa. Anterolateral teeth with the margins granulate.....*irroratus.*

Cancer borealis Stimpson. Northern crab, Jonah crab. Pl. XXXV, fig. 2.

Cancer irroratus Say, 1817 (pt.), p. 60; Gould, 1841, p. 322.
Platycarcinus irroratus Gibbes, 1850, p. 176.
Cancer borealis Stimpson, 1859, p. 50; Kingsley, 1884, p. 317; R. Rathbun, 1884, p. 769; Sumner, 1911, p. 672; Fowler, 1912, p. 133.

Carapace transversely oblong oval, about two-thirds as long as wide, angular at the sides, the surface finely granulate; anterolateral margins divided into nine quadrangular, crenate lobes or teeth, the

margins of which are minutely denticulate; front produced beyond internal orbital teeth and with three teeth of which the middle one is longer than the others and depressed; orbits circular, with two narrow fissures above and two below, the suborbital lobe being strongly produced.

Chelipeds about as long as second pair of legs, stout; carpus and hand with strong, granulose rugæ; carpus with a sharp spine at its inner angle; hand smooth on inner face, heavily rugose on outer face; two rugæ continued from hand onto the finger which is slaty black at the tip and somewhat deflexed. Ambulatory legs short, fringed beneath, the dactyli tipped with black.

Length, 62 mm.; width, 91 mm.

Color, yellowish beneath, brick-red above; back with two curved lines of yellowish spots, and behind the middle, a figure somewhat resembling the letter H. The legs are mottled and reticulated with yellow and brick-red and more or less purplish.

Small and immature specimens of this species are sometimes dredged in depths from 3 to 5 fathoms within the harbor. Larger specimens have been obtained in deep water off the coast.

Cancer irroratus Say. Northern rock crab. Pl. XXXV, fig. 1.

Cancer irroratus Say, 1817 [pt.], p. 59; Stimpson, 1859, p. 50; Coues, 1871, p. 120; Kingsley, 1878–79, p. 317; Paulmier, 1905, p. 139; Sumner, 1911, p. 671; Fowler, 1912, p. 429, pl. 134, 135.
Platycarcinus irroratus H. Milne-Edwards, 1834–1840, t. 1, p. 414.
Cancer sayi Gould, 1841, p. 323.
Platycarcinus sayi De Kay, 1844, p. 7.

Carapace about two-thirds as long as wide, convex, granulated; anterolateral border divided into nine teeth whose margins are granulate, not denticulate as in *C. borealis*, and the notches between the teeth are continued onto the carapace as short-closed fissures, giving a pentagonal character to the teeth; posterolateral border a granulated ridge having at its outer end one tooth similar to those of the anterolateral border but smaller; front with three teeth, of which the middle one exceeds the others and is depressed. Abdomen of male broad; first, second, and third segments with a transverse granulated ridge.

Chelipeds of moderate size, not as long as the second pair of legs; carpus with granulated ridges and with a sharp spine at the inner distal angle; hand nearly smooth on inner face, outer face with four or five granulated lines, two of which are continued onto the finger, while the superior one is cristate. Ambulatory legs rather long and slender, meros of first and second pairs extending far beyond carapace.

Length, 65 mm.; width, 95 mm.

Color, yellowish, closely dotted with dark purplish brown, which becomes reddish brown after death.

This crab is rare at Beaufort and the few specimens which have been obtained are immature. At some distance from the coast larger individuals have been dredged up. Both this species and the preceding one are members of a northern fauna, and except in deep water do not extend much farther south than the Carolina coast.

Family XANTHIDAE.

Brachyrhyncha having the body usually transversely oval, the last pair of legs normal, the first pair of antennæ folding obliquely or transversely and the male openings rarely sternal.

This very large family of crabs comprises at the present time 106 genera. Of this number 11 are represented in the Beaufort region.

KEY TO THE GENERA OF THE BEAUFORT REGION.[a]

a. Frontal margin presenting but a single edge, not transversely grooved.
  b. Carapace naked or lightly pubescent, front granulate or smooth, teeth of anterolateral border usually flattened and subtriangular.

[a] While in most of the keys in this paper it has been possible to utilize generic characters and to show to some extent the accepted ideas of the relationship of the genera, it has been impossible to do so in the case of the family Xanthidæ. The differences between the genera into which the old genus *Panopeus* has been divided are either too subtle to be appreciated, except after long study of the species, or are to be found in a combination of characters no one of which can always be depended upon. It has therefore been necessary to make use of the most trivial characters and, since each genus, with the exception of *Pilumnus*, is represented in the Beaufort fauna by a single species, the key is really a key to the species.

c. Antennæ not excluded from orbits.
d. Teeth of anterolateral margins sharp-pointed.
e. Dactyl of large hand with a large basal tooth.
f. Outer surface of carpus smooth or nearly so ..... *Panopeus.*
ff. Outer surface of carpus with a groove parallel with the distal margin ..... *Hexapanopeus.*
ee. Dactyl of large hand without a large basal tooth.
f. Fingers of small hand spoon-shaped at their tips ..... *Eurypanopeus.*
ff. Fingers of small hand not spoon-shaped at their tips ..... *Neopanope.*
dd. Teeth of anterolateral margins blunt-pointed or rounded.
e. Front with two rounded lobes ..... *Eurytium.*
ee. Front with two lobulate lobes ..... *Menippe.*
cc. Antennæ excluded from the orbits ..... *Eriphia.*
bb. Carapace hairy or with extensive pubescent areas, front and anterolateral border with spines or spiniform teeth.
c. Carapace spiny or granulate and with plumose hairs ..... *Pilumnus.*
cc. Carapace nodose anteriorly, pubescent posteriorly ..... *Lobopilumnus.*
aa. Frontal margin transversely grooved so as to appear double.
b. Carapace more or less nodose in front, fingers black ..... *Leptodius.*
bb. Carapace with conspicuous transverse ridges, fingers white or brown ..... *Rhithropanopeus.*

Genus HEXAPANOPEUS Rathbun.

Hexapanopeus Rathbun, 1898, p. 273.

Hexapanopeus angustifrons (Benedict and Rathbun). Narrow mud crab. Pl. XXXIV, fig. 7.

Panopeus angustifrons Benedict and Rathbun, 1891, p. 373.
Hexapanopeus angustifrons Rathbun, 1898, p. 273; Sumner, 1911, p. 673.

Carapace about two-thirds as long as wide, convex from front to back, regions fairly well marked, surface finely granulate; anterolateral edge thin and upturned and divided into five teeth, of which the first two are separated by a well-defined sinus, the third and fourth are successively broader and the fifth is shorter, narrower, and more distinctly directed outward; from the fourth and fifth teeth well-defined ridges extend obliquely inward and backward for a distance of about twice the length of the teeth; front narrow and produced, divided by a prominent V-shaped notch into halves, each of which is bilobate, the markedly sinuate anterior border forming a broad inner and a small and inconspicuous outer lobe.

Chelipeds strong, granulate, and finely rugose; meros with a well-developed tooth on the upper margin; carpus with a deep groove parallel to the distal margin, an obtuse tooth at the inner angle, and the superior surface rough and more or less tuberculate; hands unequal and dissimilar; propodus usually with a fairly strong costa above and indications of one on the outer surface; both these costæ are continued onto the fingers, which are strong and inclined to be hooked at their tips; the movable finger of the larger hand has a strong tooth at the base.

Length, 19.5 mm.; width, 28 mm.

Color, variable, sometimes a uniform brownish yellow or even light buff, but usually a dark reddish brown or dark gray, the females usually darker than the males and often more or less spotted. In both sexes the fingers are black or dark brown at the base, lighter at the tips; the dark coloration is not extended onto the hand, but stops abruptly well within the base of the fingers.

This little crab occurs in various parts of the harbor, especially where the bottom is covered with old shells. It is frequently brought up in the dredge in the channel off Morehead City and may be collected in the shallow water about Bird Shoal. It appears to like to hide among the masses of ascidian-covered shells that are so abundant in these localities. In size it ranks far below the common *Panopeus herbstii,* but is rather larger than the other mud crabs of the region. It comes to sexual maturity at a very early age, specimens less than 12 mm. across having been found with eggs.

Genus PANOPEUS Milne-Edwards.

Panopeus H. Milne-Edwards, 1834–1840, t. 1, p. 403.
Eupanopeus Rathbun, 1898, p. 273.

Panopeus herbstii H. Milne-Edwards. Common mud crab. Pl. xxxiv, fig. 9.

Cancer panope Herbst, 1801 (?), p. 40; Say, 1817, p. 58.
Panopeus herbstii H. Milne-Edwards, 1834, t. 1, p. 403; Coues, 1871, p. 120; Kingsley, 1878–79, p. 318; Benedict and Rathbun, 1891, p. 358; Sumner, 1911, p. 673.
Panopeus herbstii var. *obesus* S. I. Smith, 1869, p. 278.
Eupanopeus herbstii Rathbun, 1898, p. 273; ibid., 1901, p. 28; Verrill, 1908, p. 344; Fowler, 1912, p. 122, 123.

Carapace about two-thirds as long as wide, regions well marked, surface sparingly granulate; anterolateral margin with five teeth, of which the first two are coalescent, the third and fourth are larger, prominent, and with arcuate outer margins and acute tips, while the fifth is smaller, acute at the tip and has the outer margin straight; a transverse ridge extends inward from the fifth tooth and a shallow groove from the fourth tooth; front with a narrow median fissure, the anterior margin of each half sinuate.

Chelipeds heavy, finely granulate; carpus without a groove on the superior surface and with a blunt internal spine; hands unequal and dissimilar, the larger one having the movable finger curved and strongly toothed at base, while the finger of the smaller one is more nearly straight.

Measurements of a male: Length of carapace, 26 mm; width, 38 mm.

Color, a dirty gray or slate color; fingers black, the color extending a little onto the palm of the hand.

One of the most abundant crabs of the region, being found wherever the bottom in shallow water is muddy or covered with shells or stones. In suitable localities, along the edges of the higher marshes, it is often found in burrows and frequently associated with *Sesarma reticulata* and *Uca minax*. Specimens from such localities are usually more convex, smoother, have blunter anterolateral teeth, a less conspicuous tooth at the base of the movable finger of the large hand and are more inclined to be of a purplish color than are specimens taken from the channels of the harbor. They probably represent the variety *obesus* Smith, which has been recorded from the Beaufort region by Coues and Kingsley. In their paper on the genus *Panopeus* Dr. Benedict and Dr. Mary J. Rathbun do not recognize the variety *obesus* as a subspecies, but after a careful study of a large number of specimens it was their conclusion that the *obesus* characters, rather than being inherent and transmissable ones, are the result of habitat and habits.

Genus EURYPANOPEUS A. Milne-Edwards.

Eurypanopeus A. Milne-Edwards, 1880, p. 318.

Eurypanopeus depressus (Smith). Flat mud crab. Pl. xxxiv, fig. 4.

Panopeus depressus Smith, 1869, p. 283; Kingsley, 1878–79, p. 319; Benedict and Rathbun, 1891, p. 336; Paulmier, 1905, p. 140; Fowler, 1912, p. 117–118.
Eurypanopeus depressus A. Milne-Edwards, 1880, p. 320; Sumner, 1911, p. 673.

Carapace about three-fourths as long as wide, flattened posteriorly, convex in the anterior half, minutely pubescent and with several fine transverse rugæ; anterolateral teeth three, the first two having coalesced to form a broad lobe whose margin is only slightly sinuate, the remaining teeth acute and thin edged; front nearly straight, median notch small or wanting altogether.

Chelipeds dissimilar and very unequal; the smaller one more rugose than the larger and with the margins of the fingers nearly straight and opposable for a considerable distance while the tips are thin edged and hollowed out—"spoon-shaped"; larger cheliped with nearly smooth articles, the hand very heavy and inflated, movable finger strongly curved, obscurely toothed at the base and meeting the immovable one only at the tip; in the unworn condition both fingers show indication of the spoonlike flattening.

Length of carapace, 14 mm.; width, 19.5 mm.

Color, mottled grayish olive; fingers black, the color of the immovable finger extending well onto the palm.

This species appears to frequent localities where the water is comparatively clean and is not often found where the other mud crabs abound.

Genus NEOPANOPE A. Milne-Edwards.

Neopanope A. Milne-Edwards, 1880, p. 329.

Neopanope texana sayi (Smith). Southern mud crab. Pl. XXXIV, fig. 8.

Panopeus sayi S. I. Smith, 1869, p. 284; ibid, 1874, p. 312, 547; Kingsley, 1878–79, p. 319; Birge, 1883, p. 411–426, pl. XXX–XXXIII; Gissler, 1884, p. 225; Benedict and Rathbun, 1891, p. 363, pl. XXII, fig. 4, and pl. XXIII, fig. 7, 8; Paulmire, 1905, p. 140.
Panopeus texanus Kingsley, 1880a, p. 394; A. Milne-Edwards, 1880 (pt.), p. 312, pl. LVIII, fig. 4.
Panopeus texanus sayi Rathbun, 1898, p. 273.
Neopanope texana sayi Sumner, 1911, p. 673; Fowler, 1912, p. 400, pl. 121.

Carapace about three-fifths as long as wide, quite convex, minutely granulate and lightly pubescent, especially near anterior and lateral regions; anterolateral teeth five, of which the first two are coalesced and separated by only a shallow sinus, the third and fourth are larger and directed forward while the fifth is smaller and directed somewhat outward; from the fourth and fifth teeth short, oblique ridges extend inward and backward; front with a very small median notch, each half only slightly sinuate, the entire effect being that a much flattened curve extending from eye to eye.

Chelipeds smooth, unequal and dissimilar, carpus with a prominent groove parallel with its distal margin; movable finger of large hand without a large basal tooth.

Length, 17 mm., width, 22.5 mm.

Color, usually a dark slaty bluish green, sometimes brown or even buff; fingers black, the color extending well onto the palm.

In the parts of the harbor which support oyster reefs this crab is abundant. It may also be found among the clusters of ascidians on the wharf piling about the town. The zoëa and megalops stages of *P. texanus sayi* have been fully described and figured by E. A. Birge (loc. cit.).

Genus EURYTIUM Stimpson.

Eurytium Stimpson, 1859, p. 56.

Eurytium limosum (Say). Pl. XXXV, fig. 7.

Cancer limosa Say, 1818, p. 446.
Panopeus limosus H. Milne-Edwards, 1834–1840, t. 1, p. 404.
Eurytium limosum Stimpson, 1859, p. 56; Kingsley, 1878–79, p. 316; A. Milne-Edwards, 1880, p. 332; Rathbun, 1901, p. 41; Verrill, 1908, p. 358; Fowler, 1912, p. 124.

Carapace about one and one-half times as wide as long, very convex from front to back, nearly plane from side to side, surface smooth to the eye but under a lens finely granulate; front about one-fourth the width of carapace, divided into two lobes by a median notch from which a shallow groove runs back over the gastric region; orbital margins somewhat elevated; external orbital tooth coalesced with the first tooth of the anterolateral border, the division between the two indicated by a shallow sinus; anterolateral teeth with raised margins, the second and third rounded at the tip, the fourth more prominent and subacute.

Chelipeds unequal and dissimilar, more so in the male than in the female; meros with a denticulate superior border and a distal spiniform tooth; carpus not grooved; fingers pointed.

Length of a male, 24 mm., width, 36 mm.

Color in life: "Carapace a brilliant purplish blue; wrist and hand bluish; proximal upper half of movable finger pink; remainder of finger porcelain white; lower portion of chelipeds and also the carpal teeth yellow."[a] The color of the fingers is not continued onto the palm.

This crab is common along the coast farther to the south and is said to have been collected as far north as New Jersey. It is given in Kingsley's list of crustaceans whose range embraces Fort Macon, but is not definitely credited to the Beaufort locality.

So far as is known it has never been taken here, but it is one of the species for which the collector should be on the lookout. It is said to live in holes which it digs along the margins of salt marshes near high-tide level. Its brilliant coloration should enable one to recognize it at once.

Having no Beaufort specimens for study the above description was based on a fine male from Port Royal Island, South Carolina, borrowed from the United States National Museum.

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a Rathbun, Bull. U. S. Fish Commission, vol. XX, p. 40.

Genus MENIPPE De Haan.

Menippe De Haan, 1833, p. 4, 21.

Menippe mercenaria (Say). Stone crab. Pl. xxxv, fig. 8.

Cancer mercenaria Say, 1818, p. 448.
Xantho mercenaria H. Milne-Edwards, 1834–1840, t. 1, p. 399.
Pseudocarcinus mercenarius Gibbes, 1850, p. 176.
Menippe mercenaria Stimpson, 1859, p. 53; Coues, 1871, p. 120; Kingsley, 1878–1879, p. 318; A. Milne-Edwards, 1880, p. 262; R. Rathbun, 1893, p. 772.

Carapace transversely oval, about two-thirds as long as wide, convex, minutely punctate and granulate; anterolateral border divided into four lobes of which the first two are wide, the third is wide but dentiform, and the fourth is much narrower and dentiform; front with a median sulcus, on each side of which is a broad trilobulate lobe; orbital border thick, fissures indistinct; antenna not separated from orbit.

Chelipeds very large and heavy, unequal, nearly smooth; inside surface of hands with a patch of very fine, oblique, parallel striæ, fingers each with a large tooth. Ambulatory legs stout, hairy distally.

Measurements of a female: Length of carapace, 79 mm.; width, 116 mm.; length of cheliped, 155 mm.

Color of young specimens, a dark purplish blue, the very young always with a white spot on the wrist. As the animal grows older the color becomes a dark brownish red more or less mottled and spotted with dusky gray.

This crab, which is easily the largest and most massive one of the region, is still relatively abundant, although individuals of the largest size are becoming less and less common. The young are hatched at intervals throughout the spring and summer and, after having assumed the crab form, appear to resort to the deeper channels of the harbor where they live under the shell fragments with which such bottoms are covered. On attaining a width of half an inch or thereabouts they move into shallower water and may be found among the oyster shells and the rocks about the harbor jetties. Here they live until they have attained full size, when, if circumstances seem to demand it, they move to some shoal and just below low-tide mark make burrows. These burrows extend obliquely for a distance of 12 to 20 inches and are about 6 inches in diameter. The largest of these crabs may have an extent between the tips of the chelipeds of over 1 foot, but as they are not inclined to be pugnacious they are easily caught. When discovered in a burrow, it is said that they may be removed with impunity if the collector adopts the simple precaution of keeping his hand to the upper wall of the hole.

As an article of food the stone crab is in great demand and the supply is so meager that even local needs can not be satisfied.

Genus ERIPHIA Latreille.

Eriphia Latreille, 1817, p. 404.

Eriphia gonagra (Fabricius). Calico crab. Pl. xxxv, fig. 6.

Cancer gonagra Fabricius, 1781, p. 505.
Eriphia gonagra H. Milne-Edwards, 1834–40, t. 1, 426; pl. xvi, fig. 16, 17; Rathbun, 1901, p. 42; Verrill, 1908, p. 362.

Carapace about one-fourth wider than long, rather flat, with the regions clearly marked off; nearly smooth posteriorly but granulate anteriorly and with two transverse lines of subspinous granules, one in front of the epigastric lobes and the other across the protogastric and hepatic lobes. Front very wide, strongly deflexed and divided into four lobes, of which the two median are broader and more advanced than the lateral ones and have a finely granulate border; the lateral lobes form the front of the raised margin of the orbits and are in contact beneath with a prolongation of the infraorbital plate, thus completely excluding the antenna from the orbit. Anterolateral margins with a row of five spines including the outer orbital, behind and inside of which are a few squamiform tubercles.

Chelipeds unequal, strong, swollen; hand and carpus with numerous large rounded elevations which are larger on the hands than on the carpi and on the smaller than on the larger hand; movable finger with a squamiform tubercle above at the base and, in the larger hand, a large rounded tooth at the base of the cutting edge. Ambulatory legs rather slender, their distal three segments with fine stiff hairs.

Length of a male, 9 mm.; width, 12 mm.

Color: Most of the anterior half of the carapace and a broad median stripe extending to the posterior margin dark purplish brown, the legs a lighter tint of the same color; front margined with brownish orange; sides of carapace, upper surface of chelipeds, dactyli and bases of legs and a narrow band on the

distal margin of the other leg articles light yellow; tubercles of the upper half of the chelipeds dark blue; of the lower half, yellow; lower surface of chelipeds and body white; fingers brown.

Four specimens of this gayly colored crab, all immature males, were collected in August, 1915, from the jetties on Shackleford Bank. They were found under flat rocks while search was being made for *Pachygrapsus transversus* and *Eurypanopeus depressus* but appeared to prefer situations a little higher above the water than the other two species. One individual contained an isopod parasite (probably *Leidya distorta*) in its branchial chamber.

Eriphia gonagra has not been reported heretofore on our coast north of South Carolina. Verrill and others have collected it at Bermuda. It is common from the Florida Keys to Brazil and probably throughout the Bahamas and West Indies.

Genus PILUMNUS Leach.

Pilumnus Leach, 1815, p. 309, 321.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Hand with numerous acute black spines.....*sayi*.
aa. Hand without spines.....*lacteus*.

Pilumnus sayi Rathbun. Hairy crab. Pl. XXXV, fig. 4.

Cancer aculeatus Say, 1818, p. 449.
Pilumnus aculeatus Guérin-Meneville, 1828; pl. III, fig. 2; H. Milne-Edwards, 1834–1840, t. I, p. 420; Coues, 1871, p. 120.
Pilumnus sayi Rathbun, 1897, p. 15.

Carapace about three-fourths as long as wide, sparsely covered with long filiform and plumose hairs and with about six blackish, acute, nearly erect spines on each side; front depressed, emarginate in the center, obscurely so on each side and with four or five spines on each side; superior and inferior orbital walls with marginal spines.

Superior surfaces of chelipeds and ambulatory legs with many filiform and plumose hairs, the carpal and propodal articles being most thickly covered and having several strong spines as well. Chelipeds large, unequal; carpus with 15 or 20 erect black spines; spines of hand strong and acute above but becoming smaller on the external face; fingers ribbed, black and with obtuse teeth, the movable finger spiny above at base.

Length, 22 mm.; width, 29 mm.

Color, grayish brown irregularly suffused with red; spines mostly black, and the hairs yellow.

This crab which is easily distinguished from all the others in the region, is fairly common on the shelly bottoms of all the channels of the harbor and is not infrequently found crawling about over the wharf piles about the town front. It also occurs rather abundantly on the Blackfish Banks.

Pilumnus lacteus Stimpson. Small hairy crab. Pl. XXXV, fig. 3.

Pilumnus lacteus Stimpson, 1871, p. 142.

Carapace about three-fourths as long as wide and with tufts of plumose hairs on the anterior and scattered single hairs on the posterior parts; anterolateral margins with four anteriorly directed teeth which increase in size from before backwards; front depressed, deeply notched in the middle and with a smaller notch near the eye; orbital margins with small tubercles but without well developed spines.

Chelipeds dissimilar in size but otherwise practically alike, stout, setose and plumose-hairy, and somewhat tuberculate above, but naked and polished below and on the ventral half or two-thirds of both the inner and outer surfaces of the chela; there is a row of small spines on the inner part of the distal margin of the carpus. Ambulatory legs hairy and plumose but without spines.

Length of a male: 11.5 mm.; width, 15.25 mm.

Color, gray or pinkish, the plumose hairs whitish or cream-colored, hands and tips of legs light red.

This species is much rarer at Beaufort than *P. sayi* but may usually be found, if careful search is made, on the wharf piles about the town. It is rarely taken by dredging in the harbor and has only once been found in the material brought in by the *Fish Hawk* from outside.

Genus LOBOPILUMNUS A. Milne-Edwards.

Lobopilumnus A. Milne-Edwards, 1880, p. 297.

Lobopilumnus agassizii (Stimpson). Pl. XXXIV, fig. 5.

Pilumnus agassizii Stimpson, 1871, p. 142.
Lobopilumnus pulchellus A. Milne-Edwards,1 50, p. 299.
Lobopilumnus agassizii Rathbun, 1898, p. 269.

Carapace convex, strongly nodose and granulate and pubescent everywhere except anteriorly; front consisting of two large lobate masses deeply separated from each other and from the orbits; orbital region with two fissures above and two very narrow ones below, the margin granulate; anterolateral margin with three acute, triangular teeth.

Chelipeds stout and heavy; carpus with forwardly directed granulate tubercles. Ambulatory legs pubescent and hairy, their carpal and propodial articles with minute spines above.

Length, 16 mm.; width, 21 mm.

One female taken by the *Fish Hawk* in 13 fathoms at station 7326 represents this species in the laboratory collection.

Genus LEPTODIUS A. Milne-Edwards.

Leptodius A. Milne-Edwards, 1863, p. 284.

Leptodius agassizii A. Milne-Edwards. Pl. XXXIV, fig. 6.

Leptodius agassizii A. Milne-Edwards, 1880, p. 270, pl. XLIX, fig. 3.

Carapace broad, suboval, flattened and finely granulate posteriorly, conspicuously sculptured anteriorly, the regions lobulate and with coarse granules and fine scattered hairs along the front margin of the lobules; frontal margin double, there being a transverse groove extending across from orbit to orbit, both edges of the groove and the orbital margin granulate; of the five anterolateral teeth, the last two or three only are well developed, sharp and turned forward, the second and sometimes the third are triangular and obtuse and the first (the outer orbital angle) is represented by an elevated mass of granules.

Meros of cheliped slightly surpassing the carapace; carpus strong, with a sharp internal spine and with many irregular, granulate rugæ above; hands unequal, the larger one with strong, blunt-tipped fingers, the smaller one with more slender, more acute and more conspicuously grooved fingers which show a tendency to be spoon-shaped at the tips; in both hands the upper and outer surfaces are granulate and tuberculate, the tubercles being arranged in rows. Walking legs granulate and hairy.

Color, after a short preservation in alcohol, light red, fingers black.

Length of a male, 8 mm.; width, 12 mm.

Three small specimens of this crab were dredged by the *Fish Hawk* in 1915 in 16 fathoms on the fishing banks off Beaufort Inlet. The species has already been collected off Cape Hatteras and at various points farther south. All the Beaufort specimens have the last three anterolateral spines well developed but a series in the United States National Museum from Pensacola, Florida, shows that in larger individuals the number may be reduced to two.

Genus RHITHROPANOPEUS Rathbun.

Rhithropanopeus Rathbun, 1898, p. 273.

Rhithropanopeus harrisii (Gould). Pl. XXXV, fig. 5.

Pilumnus harrisii Gould, 1841, p. 326; De Kay, 1844, p. 7.
Panopeus harrisii S. I. Smith, 1873, p. 547; Kingsley, 1878–79, p. 319; Benedict and Rathbun, 1901, p. 378, pl. XXI, fig. 2, pl. XXIV, fig. 16.
Rhithopanopeus harrisii Rathbun, 1900(b), p. 138; Sumner, 1911, p. 674; Fowler, 1912, p. 397, pl. 119–120.

Carapace about three-fourths as long as wide, much less convex from side to side than from front to back, sparsely pubescent toward the anterolateral angles, protogastric regions with two transverse lines of granules, a similar line from one posterior lateral tooth to the other across the mesogastric region; front almost straight, very slightly notched and with its margin grooved, so that, viewed from in front, it appears to be double; postorbital angle and first anterolateral tooth completely coalesced; the first and second developed teeth of about the same size and perhaps slightly larger than the last one.

Chelipeds quite unequal and dissimilar, carpus not grooved above and with a moderately developed internal tooth; chelæ indistinctly costate above, the larger one with short thumb and strongly

curved movable finger, the smaller one with a proportionately longer thumb and long, straight movable finger; in neither hand is there a large basal tooth on the movable finger. Ambulatory legs long, slender, compressed, and more or less hairy.

Length of a male, 14.5 mm.; width, 18.5 mm.

Color, in alcohol, yellowish or brownish, fingers white. In life the color is stated by Fowler to be more or less dull brownish, paler below; chelipeds brownish above, paler below; fingers brownish, not contrasted with rest of propodus. Ambulatory legs all brownish, paler below.

This small crab, which has been collected at various places along the Atlantic coast from Long Island Sound to Florida, has, as yet, not been detected in the Beaufort region. It may be that conditions here are unfavorable for its existence, but it is far more probable that a careful search will bring it to light. It does not appear to be abundant anywhere, but it has been found under a great variety of conditions and has been recorded from fresh-water streams as well as from the brackish and salt water. The description given above has been based on a series of specimens from Indian River, Fla., in the United States National Museum.

Family GONOPLACIDAE.

Brachyrhyncha closely resembling the Xanthidæ but having the body usually square or squarish and the male openings sternal or, if coxal, passing along a groove in the sternum.

Forty-nine genera are now assigned to this family, only one of which is represented within the Beaufort limits.

Genus EURYPLAX Stimpson.

Euryplax Stimpson, 1860, p. 60.

Euryplax nitida Stimpson. Pl. XXXVI, fig. 8.

Euryplax nitidus Stimpson, 1859, p. 60; Smith, 1870, p. 162.
Euryplax nitida Stimpson, 1871, p. 150; Kingsley, 1880a, p. 399; Rathbun, 1901, p. 8.

Carapace about two-thirds as long as wide, convex from front to back, less so from side to side, surface smooth and shining; anterolateral margin short and armed with three stout teeth including the outer orbital angle; front about half as broad as carapace, entire or very faintly notched in the middle, deeply notched on each side above the antennæ, orbits wide.

Chelipeds stout; distal end of inner face of meros of male with a round or oval pit concealed by a tuft of plumose hairs; carpus broad, inner margin with a sharp spine and below this a pilose patch. Walking legs slender. Females with narrower carapace, no pit at the end of the meros and the chelipeds more nearly equal.

Length of a male, 6.5 mm.; width, 10.5 mm.

Two specimens were taken by the *Fish Hawk* at depths of 14½ and 16 fathoms on the fishing banks. Both are males and of small size. Another specimen in the laboratory, probably from the same locality in 1902 or 1907, is a female of a larger size but badly broken.

Family PINNOTHERIDAE. The commensal crabs.

Small commensal Brachyrhyncha having the body more or less globose or quadrate, the carapace often more or less membranous, and the eyes and orbits very small.

This family comprises 23 genera, of which 3 have representatives within the Beaufort limits.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Dactyli of the walking legs simple, acute.
  b. Third walking leg little, if any, longer than the other legs.
    c. Carapace globose and more or less membranous; buccal mass subquadrangular..... *Pinnotheres*.
    cc. Carapace more flattened, oval, and rather firm; buccal mass subtriangular..... *Parapinnixa*.
  bb. Third walking leg longer and stronger than the others, often considerably so..... *Pinnixa*.
aa. Dactyli of the first, second, and third walking legs bifurcate..... *Dissodactylus*.

Genus PINNOTHERES Latreille.

Pinnotheres Latreille, 1802, p. 25.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Carapace nearly naked; second pair of legs stouter than third pair.....*ostreum.*
aa. Carapace covered with a short pubescence; second pair of legs not stouter than third pair. .*maculatus.*

Pinnotheres ostreum Say. Oyster crab. Pl. xxxv, fig 9.

Pinnotheres ostreum Say, 1817, p. 67; De Kay, 1843, p. 12; Stimpson, 1859, p. 67; Smith, 1873, p. 367; R. Rathbun, 1884, p. 765; Paulmier, 1905, p. 149; Sumner, 1911, p. 674; Fowler, 1912, p. 138.

Carapace of female subcircular in outline, tumid, membranous, smooth, and with a broad, shallow, longitudinal depression at each side of the cardiac and gastric areas; front rounded, slightly produced, covering and concealing the eyes. Abdomen very large and broad, extending forward to the mouth parts and laterally to or beyond the bases of the legs.

Eyes, antennules, and antennæ greatly reduced. Chelipeds small, the articles subcylindrical and polished; hand weak, its superior margin elevated above base of movable finger; fingers short, the immovable one conical and pubescent on its inner surface, movable one slenderer and curved. Second pair of legs slender but stouter than the others and with the penultimate article swollen; third pair longest, fifth pair turned backward and upward.

Measurements of a female: Length of carapace, 9 mm.; width, 11 mm.; length of hand, 4.5 mm.

Color: Female, in life, whitish or salmon pink.

This well-known commensal of the oyster has been collected in various parts of the Beaufort region, and doubtless is distributed generally throughout the area. It is females alone, however, which are abundant; no specimen of the male has yet been obtained at Beaufort. In the National Museum, among more than a hundred females, collected at many localities and at various seasons, Dr. Mary J. Rathbun has found but a single very small and immature male. By S. I. Smith the male of *P. ostreum* is said to be free swimming. The scarcity of the sex in collections indicates that this may be true, but it is also possible that Smith mistook the unspotted form of the next species for the male of *P. ostreum.*

Pinnotheres maculatus Say. Pinna crab, mussel crab. Pl. xxxv, fig. 10.

Pinnotheres maculatum Say, 1818, p. 450.
Pinnotheres maculatus Stimpson, 1859, p. 67; Coues, 1871, p. 123; Kingsley, 1878–79, p. 323; R. Rathbun, 1884, p. 766; Sumner, 1911, p. 674; Fowler, 1912, p. 136–137.
Pinnotheres ostreum Smith, 1873, pl. 1, fig. 2.

Carapace of female semimembranous, suborbicular, somewhat narrowing anteriorly, the sides being obliquely truncated; median regions defined by deep, irregular sulci; surface covered with a dense but very short pubescence; front bilobate. Abdomen very large, as in *P. ostreum.*

Cheliped moderately stout, its articles subcylindrical and more or less pubescent; hand well developed, its palmar portion about twice as long as the fingers, both of which are nearly straight, hooked at their tips and toothed. Walking legs slender, with short curved dactyli, none of them conspicuously larger than the others, the penultimate article of the second pair not swollen; last pair smallest and turned forward and upward and with longer dactyli than those of the other legs.

The males differ from the females in being much smaller, firmer in texture, and flatter; the chelipeds are shorter and stouter and the second and third pairs of walking legs have the carpal and propodial articles densely fringed with silky hairs.

Measurements of a female: Length of carapace, 16 mm.; width, 17.25 mm.; length of hand, 9 mm.

Measurements of a male: Length of carapace, 8.4 mm.; width, 7 mm.; length of hand, 3.5 mm.

In this crab there are two distinct color phases—one is a plain, almost uniform yellowish-brown, the other has the carapace black or dark brown with a central dorsal stripe and two symmetrical spots of white, while the sternum and abdomen are white with narrow bars of black. Heretofore the uniformly colored individuals have been regarded as females and the spotted ones as males, but a recent examination by Dr. Mary J. Rathbun, of the specimens in the National Museum, shows that this is not always the case. The males, both young and adult, are usually spotted, but are sometimes plain. The females are usually spotted when young, but are always plain colored when adult.

Dr. Rathbun suggests in explanation of this unusual condition of affairs that the habitat of the individual may determine its coloration. The male of this species, as is well known, can move about and doubtless spends more or less of his life swimming from place to place. The young females may, to some extent, have the same habit, and so long as they are free swimming they may be spotted. But as soon as an individual of either sex settles down to a commensal life with some mollusk, it may lose its spots and become uniformly colored.

The female of *P. maculatus* alone is common. She is frequently found as a commensal in the shells of *Pinna* or of *Pecten* and will probably be found to occur in other lamellibranchs. Occasionally a male will be found in company with a female, more rarely he is found swimming freely in the water.

Genus DISSODACTYLUS Smith.

Dissodactylus, S. I. Smith, 1870, p. 172.
Echinophilus Rathbun, 1900b, p. 590.

Dissodactylus mellitæ (Rathbun). Pl. xxxvi, fig. 1.

Echinophilus mellitæ Rathbun, 1900b, p. 590.
Dissodactylus mellitæ Rathbun, 1901, p. 22; Sumner, 1911, p. 675.

Carapace about 1.25 as wide as long, oval, smooth, and polished except in the anterolateral portions, where there is a slight pubescence. Front slightly emarginate and fringed with short stiff hairs. From the anterolateral angle a low ridge runs obliquely inward and backward about halfway to the median line.

Chelipeds short and stout; chela longer than the other articles combined, cylindrical, its upper and outer faces with a few impressed, short, oblique lines from which short appressed hairs extend distally; fingers considerably shorter than palm, bent inward and curved, their opposable margins with tufts of short bristles; carpus with a distal fringe of short hairs and an impressed line similar to those on the chela; meros very short and stout, its lower surface with oblique lines. Second, third, and fourth legs stout, their margins fringed with short hairs and their dactyls deeply bifid. Fifth legs with styliform dactyls and fringed with long hairs along both front and hind margins.

Length of a male, 3 mm.; width, 3.6 mm.

This minute crab, which, with the exception of *Leucifer*, is probably the smallest of our malocostracan fauna, is fairly abundant throughout the region. It is to be found clinging to the spines of the sand dollar (*Mellita pentapora*), which occurs in great numbers on the shoals and sandy bottoms both within and outside the harbor. In some localities a crab or two will be found on nearly every sand dollar examined, but usually they are not present in such numbers. When the sand dollar is lifted from the water, the crabs scurry about over their host and quickly drop off to hide in the sand.

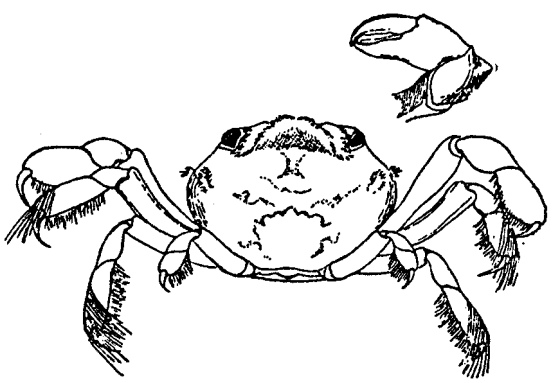

FIG. 19.—*Parapinnixa beaufortensis*, dorsal view. Type, ♂ X20.

Genus PARAPINNIXA Holmes.

Parapinnixa Holmes, 1895, p. 563.

Parapinnixa beaufortensis Rathbun.

Parapinnixa beaufortensis Rathbun, 1918, p. 112.

Carapace rather regularly oval, about one and one-third times as wide as long, with the surface behind the anterior border depressed and plumose; regions indicated by a series of pits which are light brown in the specimen preserved in alcohol. Fronto-orbital width two-thirds as great as width of carapace; front about two-fifths width of carapace, a large emargination at its middle in dorsal view; edge of lobes sinuous. A tuft of hair on either side of dorsal surface near lateral margin, but not projecting sideways beyond that margin. A similar tuft, attached to the ventral surface, projects beyond the margin. Eyes large, of a bronze-brown color.

The outer maxillipeds are characteristic of the genus. Chelipeds stout; carpus squarish in dorsal view, its outer distal angle prominent; palm inflated, margins convex, lower margin hairy, width greater at distal than proximal end, the upper distal angle higher than base of dactylus; dactylus about as long as upper edge of palm; both fingers much curved; when closed the tips cross and there is no gape, the thin and irregularly denticulate edges fitting together.

Legs fringed with long hair, especially on the propodites, where there is a border of hair on the lower margin, and in the second and third legs a row of still longer hair attached near the upper margin on the posterior surface, the length of the hairs being twice as great as the width of the propodite. The legs diminish in stoutness from the first to the fourth. The first leg is a little longer than the second, the third about as long as the first. Propodites stout, upper margins convex. Dactylus of first three legs long, curved, the slender horny tips about half the entire length; dactylus of fourth leg similar in shape, but very much smaller.

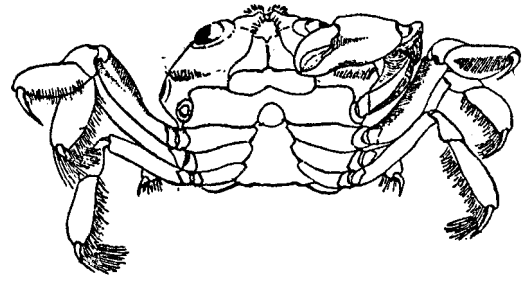

FIG. 20.—*Parapinnixa beaufortensis*, ventral view. Type, ♂×20.

Abdomen of male suboblong, distally tapering, at base not more than half the width of the sternum; sutures faint except the one marking the subtriangular terminal segment.

Length of carapace of male, holotype, 1 mm.; width of same, 1.3 mm.

The almost minute specimen upon which this species was established and which, up to the present time, is unique, was detected by Dr. Mary J. Rathbun among some material sent to the United States National Museum from the fishing grounds, 20 miles off Beaufort Inlet. From its small size, relatively large eyes, the long hairs on the legs, and the thin prehensile edges of the fingers, Dr. Rathbun surmises that the specimen may possibly represent a postlarval stage of some crab, the adult of which is as yet unknown.

We are indebted to Dr. Rathbun for permission to copy her description and figure of this specimen. Owing to its small size and the lateness of its discovery it has not been possible to secure a satisfactory photograph for the plates which illustrate this paper.

Genus PINNIXA White.

Pinnixa White, 1846, p. 177.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Chela with the thumb much shorter than the movable finger and bent downward.
  b. Posterior part of carapace with a short transverse ridge more or less interrupted in the middle.
    c. Penultimate article of third pair of walking legs about as broad as long.....*chætopterana*.
    cc. Penultimate article of third pair of walking legs distinctly longer than broad.....*sayana*.
  bb. Posterior part of carapace with a conspicuous transverse ridge extending uninterruptedly from side to side.....*cristata*.
aa. Chela with the thumb about as long as the movable finger and not bent downward....*cylindrica*.

Pinnixa chætopterana Stimpson. Pl. XXXVI, fig. 4.

Pinnixa chætopterana Stimpson, 1860, p. 235; Sumner, 1911, p. 674.
Pinnixa cylindrica Stimpson, 1859, p. 68.

Carapace transversely oval, a little more than twice as wide as long; surface uneven, sides densely pubescent, and the regions well defined by pubescent sulci; cardiac region with an acute transverse crest broadly interrupted in the middle so as to form two dentiform prominences, more conspicuous in the male than in the female; front narrow and with a deep median groove.

Chelipeds stout, pubescent; hand, in the male, with the palmar edge perpendicular, the immovable finger very short, deflected, and with a tooth on its cutting edge, the movable finger strongly curved,

smooth on both edges and meeting its fellow only at the tip; hand of female smaller, its palmar edge oblique and the immovable finger considerably longer than in the male. Second and third pairs of legs slender; fourth pair longer and much stouter, conspicuously pubescent and with the inferoposterior margins of the third, fourth, and sixth segments dentate; fifth pair like the fourth, but smaller.

Measurements of a male: Length of carapace, 5.25 mm.; width, 12 mm.; length of hand, 5 mm.

Color, nearly white, but usually much obscured by the brown or blackish hairs and the dirt collected in them.

This crab lives commensally with the worms *Chætopterus pergamentaceus* and *Amphitrite ornata* and is seldom found outside their tubes.[a]

Pinnixa sayana Stimpson. Pl. XXXVI, fig. 3.

Pinnixa sayana Stimpson, 1859, p. 236; Kingsley, 1878–79, p. 323; Sumner, 1911, p. 674.
Pinnixa cylindrica Smith, 1873, p. 546.

Carapace smooth and polished, lightly pubescent on the sides, depressed at the middle, and with a low, ill defined, transverse ridge parallel with and close to the posterior margin extending about one-third the width of the carapace; two similar ridges on the anterolateral slope, distant from but nearly parallel with each other, the superior one curving inward and defining the branchial region; front deeply grooved above.

Hands stout, compressed, hardly twice as long as broad; immovable finger very short; movable finger strongly curved; both fingers toothless. Walking legs smooth, penultimate pair larger than the others, but not so much so as in *P. chætopterana.*

Measurements of a male: Length of carapace, 3 mm.; width, 6 mm.

Color, almost white, but more or less stained with brown.

This crab, the carapace which resembles that of *P. cylindrica,* while its hands are more like those of *P. chætopterana,* is said to be occasionally found in the sand-walled tubes of *Arenicola cristata.* The specimens from which the species was originally described by Stimpson were dredged in 6 fathoms, sandy mud, off the mouth of Beaufort Harbor.

Pinnixa cristata Rathbun. Pl. XXXVI, fig. 5.

Pinnixa cristata Rathbun, 1900, p. 589.

Carapace smooth, polished, and very slightly pubescent at the extreme outer corners, not depressed in the middle and with a conspicuous sharp, almost straight ridge which extends without a break entirely across the shell a little in front of the posterior border; anterolateral ridge less conspicuous.

Chelipeds stout and constructed like those of *C. chætoptèrana,* but perfectly smooth except for a band of fine hair along the lower margin on the inner surface. Walking legs somewhat longer than those of related species and sparsely hairy along the margins only.

Measurements of a female: Length of carapace, 4.3 mm.; width, 10 mm.

The only known specimen of this species was collected at Beaufort many years ago by Prof. H. E. Webster, of Union College, N. Y., and is now in the United States National Museum. No data accompanied it, so we are uninformed as to its mode of life. It doubtless lives as a commensal in the tube of one of the many species of worms and should be looked for with care. In general appearance it resembles *P. cylindrica,* but has a hand like *P. sayana.* The shell is broader in proportion to the length than in *P. cylindrica,* however, and the legs are markedly more slender. The long, unbroken ridge across the back is a mark that can hardly be overlooked.

Pinnixa cylindrica (Say). Pl. XXXVI, fig. 2.

Pinnotheres cylindricum Say, 1818, p. 452; De Kay, 1844, p. 13.
Pinnixa cylindrica White, 1846, p. 177; Stimpson, 1860, p. 235; Kingsley, 1878–79, p. 324.
Pinnixa lævigata Stimpson, 1859, p. 68.

Carapace smooth, polished, punctate, pubescent at the extreme outer corners, depressed in the middle, a very inconspicuous transverse ridge parallel with and close to the posterior margin, and a more conspicuous anterolateral ridge; front bilobed, but not as deeply grooved as in *P. chætopterana* or *P. sayana.*

[a] Enders, H. F.: "Notes on the commensals found in the tubes of *Chætopterus pergamentaceus,*" Amer. Nat., vol. XXXIX, 1905, p. 37.

Chelipeds moderately stout; hand about one and one-half times as long as wide, fingers gaping at base and of nearly equal length, the immovable one curved upward and with a tooth near its tip; the movable one curved and with a tooth near the middle. Walking legs smooth above and below, pubescent only on the basal articles, the meral and carpal articles more or less crested and fringed with hairs; penultimate pair large and thick.

Measurements of a male: Length of carapace, 5.2 mm.; width, 10.5 mm.; hand, 4 mm.

This species, like the others of the genus, is found most frequently as a commensal in some worm tube. An occasional specimen has been found swimming about in the water.

Family GRAPSIDAE.

Brachyrhyncha having the body more or less distinctly quadrate, the front broad, the eyestalks of moderate length, and a gap of at least appreciable size between the third maxillipeds.

Thirty-nine genera are included in this family. Of these, five are represented in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Antennæ covered by the front.
  b. Third maxillipeds without a pubescent oblique ridge.
    c. Carapace decidedly broader than long.....*Pachygrapsus.*
    cc. Carapace about as long as broad; legs strongly fringed with hairs.....*Planes.*
  bb. Third maxillipeds with an oblique pubescent ridge crossing the ischium and meros.....*Sesarma.*
aa. Antennæ visible from above.
  b. Antennules covered by the front; carapace broadest anteriorly.....*Euchirograpsus.*
  bb. Antennules folded back into a pair of deep frontal notches; carapace broadest at about the middle.....*Plagusia.*

Genus PACHYGRAPSUS Randall.

Pachygrapsus Randall, 1839, p. 127.

Pachygrapsus transversus Gibbes. Mottled shore crab. Pl. XXXVI, fig. 9.

Pachygrapsus transversus Gibbes, 1850, p. 181; Rathbun, 1901, p. 17.

Carapace rectangular, about one-fourth wider than long, depressed, polished, and finely plicate, the plicæ being transverse except on the branchial regions, where they are oblique. Sides strongly converging posteriorly and with a well-marked tooth behind the orbital angle. Front slightly more than half as wide as carapace, its edge sinuous, and its upper surface with four low elevations.

Chela finely granulate, ridged longitudinally on lower outer surface, margins rounded; dactyl with smooth upper margin. Posterodistal angle of the meros of ambulatory legs and anterodistal angle of meros of chelipeds dentate.

Measurements of a male: Length, 11 mm.; width, 14 mm.

The ground color is almost black, crossed by numerous fine greenish-gray lines which follow the transverse and oblique plicæ and at intervals unite to form spots of various sizes and shapes. The ambulatory legs are dark brown or blackish with gray spots.

This crab appears to occur in this region very irregularly. The first specimen was collected in 1902 from the piles of the railroad wharf at Morehead City. No more were observed until 1912, when it became common on the beaches of Bogue and Shackleford Banks. In 1913 and 1914 it was not collected, but in 1915 and 1916 it was again found in small numbers on the Shackleford jetties. Owing to its close resemblance both in appearance and habits to *Sesarma cinerea* it is apt to be overlooked except by one familiar with it.

Genus PLANES Bowdich.

Planes Bowdich, 1825, p. 15.

Planes minutus (Linnæus). Gulf-weed crab. Pl. XXXVI, fig. 6.

Cancer minutus Linnæus, 1758, p. 625.
Grapsus minutus Latreille, 1803, p. 68.
Planes clypeatus Bowdich, 1825, p. 15.
Nantilograpsus minutus H. Milne-Edwards, 1834–1840, t. II, p. 90; De Kay, 1844, p. 15.
Planes minutus, White, 1847, p. 42; Verrill, 1908, p. 325; Sumner, 1911, p. 675; Fowler, 1912, p. 140–141.

Carapace quadrilateral, as wide as long, depressed, smooth, and with a shallow foveola or longitudinal groove between the orbits; front decurved, usually slightly emarginate in the middle, its edges minutely denticulate or smooth; orbits large; outer orbital angle spiniform and behind it a small sinus.

Eyes large, on stout stalks. Chelipeds large and heavy; chelæ inflated and smooth, the immovable finger bent downward, movable finger curved, both with blunt teeth throughout their length; carpus with a strong spine on inner face; meros and ischium with a thin serrate crest along the inner margin, which terminates at the distal end of the meros in two or three spines. Walking legs with brown, horny dactyls and a few minute denticles.

This little crab is truly pelagic and of world-wide distribution. It is occasionally found along the outer beach and more rarely in the harbor on floating planks and logs covered with goose barnacles. It is of a reddish-fawn color, more or less blotched with dark brown, and usually has a small white spot on each side or a large white spot on the front of the carapace.

Genus EUCHIROGRAPSUS A. Milne-Edwards.

Euchirograpsus A. Milne-Edwards, 1853, p. 175 (141).

Euchirograpsus americanus A. Milne-Edwards. Pl. XXXVI, fig. 7.

Euchirograpsus americanus A. Milne-Edwards, 1880, p. 18.

Carapace flattened, subquadrate, the length and width about equal, the lateral borders nearly straight and parallel; surface finely granulate and with a few very short, fine hairs visible only with a lens; front somewhat produced, lamellate and rather broadly notched. There is a small shoulder at the inner canthus of the orbit. The external orbital angle is spiniform, and behind this, on the margin of the carapace, are three smaller spines, of which the first and third are less developed than the second.

Chelipeds stout; the meros with a dentate crest below; the hand with longitudinal granulate ridges, those of the upper surface with hairs. Ambulatory legs strong, long, and with flattened, spiny meral articles, the dactyli with five or six strong spines, of which the distal three are especially prominent at the tip of the leg.

Length of carapace, 8 mm.; width, 8.25 mm.

Color, light brown, the legs with five or six bands of red.

One specimen, a young female, was taken by the *Fish Hawk* in 47 fathoms about 25 miles off Cape Lookout.

Genus SESARMA Say.

Sesarma Say, 1817, p. 76.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Lateral margin of carapace with a tooth behind the outer orbital tooth; body strongly convex above ..... *reticulata*.
aa. Lateral margin of carapace without a tooth behind the outer orbital tooth; body nearly flat above ..... *cinerea*.

Sesarma reticulata Say. Marsh crab. Pl. XXXVI, fig. 12.

Sesarma reticulata Say, 1817, p. 73; Gibbes, 1850, p. 180; Smith, 1869, p. 156; Coues, 1871, p. 121; Kingsley, 1878–79, p. 323; Sumner, 1911, p. 675; Fowler, 1912, p. 440, pl. 139.

Carapace rectangular, about one-fourth wider than long, convex, regions distinct, surface punctate and with scattered clumps of setæ above and in front; obliquely striate and setose on the posterolateral

regions and with regular rows of low tubercles bearing short curved hairs on the inferolateral and frontal regions. The dorsal portion of the carapace overhangs the sides, and beneath the projecting shelf there is a line of cilia; front broad, slightly sinuate above basal segments of antennæ; anterolateral angle with a small tooth behind it.

Eyestalks short and stout. Chelipeds of male stout; the hand with a slight crest above and the meros with a low, smooth-edged crest along its anterior border; chelipeds of female similar, but much smaller. Walking legs hairy distally.

Measurements of a male: Length of carapace, 14 mm.; width, 16 mm.; width of front, 10 mm.; depth of body, 10 mm.

Color, dark olive, nearly black or purple.

This crab, which occurs from Cape Cod to the Gulf of Mexico, has been found in the Beaufort region in the salt marshes near Fort Macon, where it lives in burrows, similar to those of *Uca minax*, at about high-tide level. It has also been collected in a marsh on the mainland near Lenoxville and in the marshes along Newport River above Beaufort. The specimens from these localities and all the others we have seen alive were of a deep purple color, with the tips of the fingers white or yellowish.

Sesarma cinerea Say. Wharf crab, wood crab. Pl. XXXVI, fig. 11.

Sesarma cinerea Say, 1818, p. 442; Gibbes, 1850, p. 180; Coues, 1871, p. 121; Kingsley, 1878–79, p. 323; Smith, 1869, p. 157.

Similar to *S. reticulata*, but with the carapace somewhat narrower in proportion to its length and less convex; front not sinuate above bases of antennæ and lateral margin without a tooth behind the anterolateral angle.

Chelipeds with the hand shorter and less evidently crested than in *S. reticulata;* anterior margin of meros produced into a triangular denticulate plate. Walking legs with only a few scattered stiff hairs distally. Abdomen of the male broadest at third segment; fourth, fifth, and sixth, with sides gradually converging; seventh abruptly narrow and longer than broad.

Measurements of a male: Length of carapace, 13.5 mm; width, 15 mm.; width of front, 9 mm.; depth of body, 8 mm.

Color, brown, varying toward olive.

This little crab occurs throughout the region and is everywhere abundant. Throughout the warmer months of the year it is found crawling actively about on the wharves and stone jetties or resting in shallow burrows above tide mark along the shores. When pursued it scampers away with astonishing swiftness and if caught is always ready to escape by dropping off the legs by which it is held. Its eggs are produced in early summer although an occasional female with eggs may be found late in July or even in August.

Genus PLAGUSIA Latreille.

Plagusia Latreille, 1806, p. 33.

Plagusia depressa (Fabricius). Rock crab. Pl. XXXVI, fig. 10.

Cancer depressus Fabricius, 1775, p. 406.
Plagusia depressus Say, 1817, p. 100.
Plagusia depressa Rathbun, 1901, p. 19; Verrill, 1908, p. 332.

Carapace subhexagonal, wider than long, depressed, covered with flattened tubercles margined with short setæ; front broad, with a deep median furrow and deep notches for the antennules; a spiniform tubercle on each side between the median furrow and the antennulary notch; postorbital angle produced into a strong curved spine and followed, along the anterolateral margin, by three similar spines of diminishing size.

Chelipeds small and weak; hands and carpus broadly ribbed above, the ribs fringed with setæ; meros with three small spines above at the distal end. Walking legs strong, increasing in size from the first to the third, the fourth shorter than the second; dactyli strong and spinulose below; upper surface of all with anterior and posterior fringes of hairs, the posterior fringe the stronger and on the distal articles of the legs situated on the upper surface; meral articles flattened and with a strong spine near the distal end; second and third legs with a broad, dentate crest above on the basal article.

Length of carapace of a male, 21 mm.; width, 23 mm.

This crab is an accidental visitor from the south. Two specimens, both males, were collected in August, 1912, on the rock jetty on Shackleford Bank. Their presence there at that time was probably due to the heavy southwest winds which had blown continuously for almost two weeks.

Family OCYPODIDAE.

Brachyrhyncha having the body more or less distinctly quadrate, the front of moderate width or narrow, the eyestalks usually long and little or no gap between the third maxillipeds.

This family comprises 14 genera, of which 2 are represented within the Beaufort limits.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Eyestalks stout; chelipeds of male somewhat unequal.....*Ocypoda.*
aa. Eyestalks slender; chelipeds of male very unequal.....*Uca.*

Genus OCYPODE Weber.

Ocypode Weber, 1795, p. 92; Fabricius, 1798, p. 312.

Ocypode albicans Bosc. Sand crab. Pl. XXXVII, fig. 1.

Ocypode albicans Bosc, 1802, p. 196; Rathbun, 1901, p. 6; Sumner, 1911, p. 675; Fowler, 1912, p. 457, pl. 148, 149.
Ocypode arenarius Say, 1817, p. 69; Verrill, 1908, p. 306.
Ocypode arenaria H. Milne-Edwards, 1834–1840, t. II, p. 44; Coues, 1871, p. 122; Kingsley, 1878, p. 322.

Carapace quadrilateral, convex above from front to back, the sides nearly vertical and the front strongly deflexed; dorsal region finely granulate on middle and posterior portions, coarsely granulate toward the sides; a raised, dentate ridge marks off the dorsal region from the sides and is continued into a prominent acute angle at the outer corner of the orbit; a similar, but lower ridge extends upward and forward from the base of the fourth leg; orbits very large and open, extending all along the anterior margin on either side of the narrow front, both upper and lower margins crested and dentate.

Eyestalks large, club-shaped; the cornea covering over half the distal article. Antennules and antennæ much reduced, the flagellum of the former being hidden beneath the front. Chelipeds, in both sexes and even in the young, unequal, well developed, the larger chela with a vertical stridulating ridge of tubercles on the inner surface near the base of the movable finger; lower margin of hand thin and serrate; outer surface coarsely tuberculate. Ambulatory legs long, compressed, their margins with numerous tufts of stiff yellow hairs. Between the basal articles of the third and fourth legs, on the ventral surface, is a hair-fringed breathing slit.

Measurements of a female: Length of carapace, 42 mm.; width, 51 mm.

Color, gray or grayish white with yellow markings below and on the legs. Young very unlike the adults, being a mottled gray and brown.

The sand crabs are of the most characteristic animals of the region and occur in abundance along the ocean beaches and to some extent within the harbor. Their holes, which they dig to a depth from 2 to 4 feet, are to be found in large numbers near the extreme high-tide mark on the outer beaches, in smaller numbers still higher up and occasionally in the dunes, from an eighth to a quarter of a mile from the water. During the heat of the day they keep pretty well to their holes, though it is not at all unusual to find them out in the full glare of the noonday sun, but as evening approaches they sally forth in search of food and probably prowl about during the greater part of the night. At night they gather by the hundreds along the beach just at the edge of the water whence they rush down after each receding wave to pick up fragments of food left on the sand. At such times they enter the water without hesitation but do not go out from the shore more than a few feet. They are, also, to be found high up on the beaches and will gather in numbers about a fire built where they can see it. They will approach slowly until the heat becomes evident, then scurry away only to come back and repeat the performance.

When abroad in the daytime they are alert and are able to distinguish a large moving object a long distance off. If one of them is approached it moves away slowly and perhaps will attempt to hide. If it is pursued it runs with great rapidity until it finds a hole, either its own or that of another crab, into which it can dart. If a hole is not available it will take to the water, run out a few feet from the shore and settle into the sand.

The egg-laying season appears to be confined to the spring or very early summer. The only egg-bearing female we have seen collected was caught in a haul seine near Fort Macon in July, 1913. Only a few unhatched eggs remained of the large number that she had had a few days earlier, for her swimmerets were well covered with empty egg skins.

Genus UCA Leach. The fiddler crabs.

Uca Leach, 1814, p. 430; Rathbun, 1897b, p. 154.
Gelasimus Latreille, 1817, p. 517.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Carapace fully one and one-half times as wide as long; color dark, often with blue on the front; size small; large cheliped of male with an oblique tuberculate ridge on the inner surface..... *pugnax.*
aa. Carapace less than one and one-half times as wide as long.
b. Thickness of body less than two-thirds the width of the carapace; color dark, usually with more or less grayish toward the front margin; size large; large cheliped of male with an oblique tuberculate ridge on the inner surface..... *minax.*
bb. Thickness of body two-thirds the width of the carapace; color light purplish gray mixed with brown; size small; large cheliped of male without a tuberculate ridge on the inner surface..... *pugilator.*

Uca minax (Le Conte). Large fiddler crab. Pl. XXXVII, fig. 3.

Gelasimus minax Le Conte, 1855, p. 403; Coues, 1871, p. 121; Kinglsey, 1880, p. 148; Paulmier, 1905, p. 147.
Gelasimus vocator Kingsley, 1880a, p. 399.
Uca minax Rathbun, 1900, p. 585; Sumner, 1911, p. 675; Fowler, 1912, p. 450, pl. 144, 145.

Carapace quadrilateral, about one and one-third times as wide as long, convex and nearly smooth above; front deflexed; lateral regions nearly vertical; anterolateral angle slightly produced, continued backward and inward as a low, but well-defined ridge and, above the orbits, entirely across to the opposite side as a low revolute ridge; a semicircular groove on each side inside the anterolateral angle. Orbits large and open, their lower margin dentate. Front rather narrow.

Eyestalks long, slender. Antennules and antennæ small, the flagellum of the former being hardly visible. Chelipeds in the male very unequal, in the female equal and of small size. Large hand of male tuberculate above and in front, ridged above, inner surface with a central, oblique tuberculated ridge; fingers strong, meeting only at their tips, their cutting edges tuberculate and with a few larger teeth at irregular intervals, immovable finger truncate at tip. Walking legs strong and sparsely hairy.

Measurements of a male: Length of carapace, 20 mm.; width, 30 mm.; length of large hand, 56 mm.

Color, chestnut brown becoming gray in front, chelipeds with red spots at the articulations, chelæ ivory white, legs olive or grayish brown.

This is the largest of the three fiddler crabs found in the region and is to be looked for in the marshes some distance back from the salt water. In such situations they dig holes, often considerably above high tide level, which penetrate to a depth of 1 or 2 feet. In the moat at Fort Macon and along the banks of the canal leading to the Neuse River *U. minax* may be found living where the water about them is almost perfectly fresh. In some cases they build at the mouth of their burrow a low chimney or roof over a short tunnel along the surface of the ground with the mud pellets which they bring up, but usually the excavated material is scattered at some distance from the burrow. Females with eggs have been found as late as August.

Uca pugnax (Smith). Mud fiddler. Pl. XXXVII, fig. 4.

Gelasimus vocans Gould, 1841, p. 325; De Kay, 1844, p. 14 (pt).
Gelasimus palustris Stimpson, 1859, p. 62 (pt.).
Gelasimus pugnax Smith, 1869, p. 131; Coues, 1871, p. 121; Kingsley, 1878–79, p. 322; Paulmier, 1905, p. 147.
Gelasimus vocator Kingsley, 1880, p. 147.
Uca pugnax Rathbun, 1900, p. 585; Sumner, 1911, p. 675; Fowler, 1912, p. 454, pl. 146, 147.

Carapace one and one-half to one and three-fifths times as wide as long. Large hand of male slender, its inner surface with a tuberculate ridge like that of *U. minax;* fingers long and slender, widely gaping at base and meeting only at their tips; movable finger strongly curved, evenly denticulate; immovable finger with one larger tooth near the middle, its inferior border nearly straight, its tip sometimes depressed.

Measurements of a male: Length of carapace, 10.5 mm.; width, 17 mm.; length of large hand, 30 mm.

Color of carapace, dark olive, almost black, becoming bluish on the front; chelipeds brownish yellow; legs brown.

This species, which appears to combine the characters of *U. minax* and *U. pugilator*, is in most cases readily distinguishable by the characters given above. In habits it is most like *U. minax*, frequenting salt marshes and seldom or never occurring on the beaches as does *U. pugilator*, but is seldom found at any great distance from the water.

Uca pugilator (Bosc). Sand fiddler. Pl. XXXVII, fig. 2.

Ocypoda pugilator Bosc, 1802, t. 1, p. 197.
Gelasimus pugilator Latreille, 1817, p. 520; Coues, 1871, p. 121; Kingsley, 1880, p. 150; Paulmier, 1905, p. 147.
Gelasimus vocans De Kay, 1844 (pt), p. 14.
Uca pugilator Rathbun, 1900, p. 585; Sumner, 1911, p. 675; Fowler, 1912, p. 446, pl. 142, 143.

Carapace less than one and one-half times as wide as long, gastric and cardiac regions separated by a distinct transverse line, lateral border often with a line of granules just within the margin. Large hand of male without the tuberculate ridge possessed by *U. minax* and *U. pugnax* and with the fingers stronger than those of the latter species and with larger teeth placed at irregular intervals; inferior surface of immovable finger convex.

Measurements of a male: Length of carapace, 12 mm.; width, 17.5 mm.; length of large hand, 25 mm.

Color, purplish gray of varying shades with irregular markings of brown or dark gray; hand of male white, more or less suffused at the base with purple.

This is the smallest and most abundant fiddler crab of the region and is found in countless numbers on the sandy and muddy beaches of the harbor and the creeks tributary to it. This species lays its eggs in the spring and early summer, and by August the young, from 2 to 5 mm. across, may be found among the droves of adults.[a]

Subtribe OXYRHYNCHA.

Brachygnatha having the body more or less triangular in form, the fore part narrow, usually forming a distinct rostrum, and the orbits usually incomplete.

This subtribe comprises three families, of which two are represented in the Beaufort fauna.

Family INACHIDAE. The spider crabs.

Oxyrhyncha having the chelipeds not a great deal larger than the other legs and the fingers not bent at an angle with the hand, the second article of the second antenna well developed but usually fused with the epistome and often with the front, the orbits generally more or less incomplete and the body usually more or less covered with hooked hairs.

No less than 145 genera are assigned to this family, 14 of which are represented in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Basal article of antenna extremely slender throughout its length and usually long; eyes without orbits and not concealed.
  b. Carapace elongate, narrowed in front; external maxillipeds somewhat pediform, with the palp large and coarse and the meros usually narrower than the ischium; basal article of antenna usually subcylindrical.
    c. Rostrum extremely long; dactyli of walking legs as long as or longer than the propodi.
      d. Carapace smooth, even above; antennæ concealed beneath the rostrum..... *Stenorynchus.*
      dd. Carapace rough and uneven above; antennæ long, flagella exposed..... *Metoporhaphis.*
    cc. Rostrum short; dactyli of walking legs shorter than the propodi..... *Podochela.*
  bb. Carapace usually subtriangular; external maxillipeds with the meros at least as broad as the ischium and the palp small; basal article of antenna flattened or concave ventrally.
    c. Inner crest of basal article of antenna very prominent and projecting downward at right angles to the outer crest; rostrum simple..... *Collodes.*

[a] For an account of the habits of this and other fiddler crabs, see Pearse: Smiths. Rept. for 1913, p. 415-428, 1914.

cc. Inner crest of basal article of antenna advanced to the line of the front, or nearly so; rostrum bifid ..... *Euprognathus.*

aa. Basal article of antenna not slender, often very broad; eyes with orbits or capable of concealment.

b. Eyes without true orbits.

c. Eyestalks short, sunk in the sides of a huge rostrum formed of two contiguous horns ..... *Sphenocarcinus.*

cc. Eyestalks not short, concealed beneath long, curved supraocular horns; rostrum consisting of two curved, divergent horns ..... *Tyche.*

bb. Eyes with true orbits.

c. Orbits with a large, blunt, cupped postocular process into which the eye is retractile, but is not entirely concealed.

d. Carapace covered with short hairs, rostrum double ..... *Pelia.*

dd. Carapace nearly or quite naked, rostrum single ..... *Pyromaia.*

cc. Orbits complete, wholly concealing the retracted eyes.

d. Fingers spoon-shaped at tips.

e. Carapace suboblong or suboval; legs not spiny ..... *Pitho.*

ee. Carapace subtriangular; legs spinous ..... *Mithrax.*

dd. Fingers acute at tips.

e. Orbits tubular, directed outward; carapace subtriangular or oblong.

f. Carapace with lateral spines ..... *Stenocionops.*

ff. Carapace without lateral spines ..... *Macrocœloma.*

ee. Orbits not tubular, directed obliquely forward.

f. Carapace orbicular ..... *Libinia.*

ff. Carapace subpyriform, somewhat depressed ..... *Microphrys.*

Genus PODOCHELA Stimpson.

Podochela Stimpson, 1860, p. 194.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Rostrum broad, rounded in front ..... *riisei.*

aa. Rostrum drawn out into a slender point ..... *gracilipes.*

Podochela riisei Stimpson. Pl. XXXVII, fig. 9.

Podochela riisei Stimpson, 1860; p. 196; Rathbun, 1901, p. 54; Verrill, 1908, p. 398.
Podochela reisei A. Milne-Edwards, 1880, p. 193.
Coryrhynchus riisei Kingsley, 1880, p. 384.

Cephalothorax pyriform, depressed, the greatest width near the posterior margin about two-thirds the length; rostrum broad, rounded in front, deeply excavated below for the antennules, carinate above and with a tuft of curled hairs; orbits rounded, their margins thickened and with a row of hairs; dorsal region uneven and with tufts of hairs. Sternum of male thrown into ridges which radiate to the bases of the legs.

Eyestalks short and stout, the cornea oblique; basal segment of antenna with a high crest on each margin; chelipeds slender in both sexes, the fingers in contact throughout their length; first pair of ambulatory legs considerably stouter than the others, about three times as long as the carapace; upper surface of all the legs with regularly spaced tufts of stiff, curled hairs.

Length of a male, 15 mm.; width, 10 mm.

Several specimens of this homely crab are reported to have been taken among hydroids at Beaufort. It may have occurred in former years but there is no recent record of it having been collected anywhere within the harbor. During the seasons of 1913 and 1914 a few specimens came in from the *Fish Hawk* dredgings. Two of these, from stations D7943 and D8204, have the chela like that described for *P. macrodera*, stout, the propodus dilated, and the fingers gaping at the base; otherwise they agree with the present species.

Podochela gracilipes Stimpson. Pl. XXXVII, fig. 6.

Podochela gracilipes Stimpson, 1871, p. 126; A. Milne-Edwards, 1879, p. 192; Rathbun, 1894, p. 50.

Cephalothorax pyriform, depressed, about two-thirds as wide as long; rostrum drawn out into a slender point, nearly flat above and with curled hairs along the margin; dorsal region uneven, as in *P. riisei*, but with very few crispate hairs; crests on basal article of antenna less pronounced than in *P. riisei* and with the dactylus of the first pair more than one-third as long as the propodus.

Dimensions of a female: Length of carapace, 9.75 mm.; width, 6.5 mm.

One specimen was taken by the *Fish Hawk* in 47 fathoms about 23 miles east of Cape Lookout. The species is readily distinguished from both *P. riisei* and *P. macrodera* by the shape of the rostrum.

Genus METOPORHAPHIS Stimpson.

Metoporhaphis Stimpson, 1860, p. 198.

Metoporhaphis calcaratus (Say). Pl. XXXVII, fig. 5.

Leptopodia calcarata Say, 1818, p. 455.
Metoporhaphis calcarata Stimpson, 1860, p. 198.
Metoporhaphis calcaratus A. Milne-Edwards, 1880, p. 174; Rathbun, 1894, p. 45.

Carapace triangular, very uneven, nodulose, each nodule surmounted by a tubercle and this in turn usually with a pencil of soft, hooked hairs; rostrum as long as or longer than the carapace, subcylindrical, upcurved, trispinous at the extreme tip.

Legs slender, the articles cylindrical but somewhat crooked; each leg with a strong terminal spine on the superior surface of the meral article; dactyli of all the legs with a double fringe of hairs.

Chelipeds comparatively small, less than half as long as first ambulatory legs; meral article with a marginal row of spines; carpus with a spine; hand with an incurving row of stiff bristles along each margin; fingers weak, widely gaping at base.

Measurements of a female: Length of carapace and rostrum, 21 mm.; length of rostrum, 10.5 mm.; width of carapace, 10 mm.

Color, a dirty gray.

Not uncommon among hydroids and ascidians at Beaufort, but most frequently obtained by dredging in Bogue Sound off Morehead City.

Genus EUPROGNATHA Stimpson.

Euprognatha Stimpson, 1871, p. 122.

Euprognatha rastellifera Stimpson. Pl. XXXVII, fig. 7.

Euprognatha rastellifera Stimpson, 1871, p. 123; A. Milne-Edwards, 1878, p. 183; Rathbun, 1898, p. 253; ibid., 1901, p. 58.
Euprognatha rastellifera spinosa, Rathbun, 1894, p. 55.

Carapace a little longer than wide, granulate, and with spines on the gastric, cardiac, and branchial regions and on the supraorbital margin; postorbital angle tapering to a slender point; rostrum considerably advanced, notched at the tip, the teeth short, triangular; basal joint of antenna with a slender spine directed obliquely forward and equally advanced with the front; interantennular spine inclined downward, equaling or surpassing the front. Sternum regularly granulated except on concave portion between the chelipeds.

Chelipeds nearly twice as long as carapace, granulate or spinous; hand swollen; fingers more than half the length of the palm, gaping slightly for about half their length. Ambulatory legs granulate, with tufts of curled setæ and often small spines.

Length of a male, 14.4 mm.; width, 12 mm.

Probably extralimital. Although the northern and southern limits of the range of this species easily include the entire Carolina coast, it has not as yet been found in the Beaufort region. It is probably to be looked for on the edge of the continental slope.

Genus PYROMAIA Stimpson.

Pyromaia Stimpson, 1871, p. 109.

Pyromaia cuspidata Stimpson. Pl. XXXVIII, fig. 4.

Pyromaia cuspidata Stimpson, 1871, p. 110; A. Milne-Edwards, 1879, p. 197, pl. XXXVI, fig. 2; Rathbun, 1894, p. 73.
Apiomaia cuspidata Von Martens, 1871, p. 182; Miers, 1879, p. 651.

Carapace triangular, about two-thirds as wide as long, somewhat tumid, granulate, and spiny. Rostrum tapering to a point, spinulose along the margins. Orbits large, open, with a supraorbital, postorbital, and two preorbital spines, the latter belonging to the basal article of the antenna and the posterior one of them directed downward. Mid-dorsal line with five erect spines—two on the gastric area, two on the cardiac area, and one on the first segment of the abdomen—the first three of these spines stand vertically but the last two are directed backward. Mesogastric and branchial areas each with one or two large and several small spines.

Antennulary septum prolonged downward into a sharp, triangular tooth. Chelipeds exceeding the rostrum by about the length of the fingers, weak, sparsely hairy, and with an irregular border of small spines. Walking legs long and slender, the meral articles spiny at the distal end, the dactyli long, slender, and curved.

Length of a male, 16 mm.; width, 9 mm.

Color, brown, the legs with lighter cross bands.

This species has been collected on the fishing banks in about 15 fathoms on two occasions. A small male was secured in 1914 and 5 specimens, 3 males and 2 females, in 1915. They are all immature but do not differ materially from larger specimens from the Florida coast.

Genus STENORYNCHUS Lamarck.

Leptopodia Leach, 1815, p. 15 (not *Leptopodia* Leach, 1814, p. 431).
Stenorynchus Lamarck, 1818 (pt.), p. 236 (not *Stenorhynchus* Latreille, 1825, nor *Stenorynchus* H. Milne-Edwards, 1834).

Stenorynchus sagittarius (Fabricius). Arrow crab. Pl. XXXVII, fig. 8.

Cancer sagittarius Fabricius, 1793, t. II, p. 442.
Leptopodia sagittaria Leach, 1815, p. 16.
Stenorynchus seticornis Lamarck, 1818, p. 237.
Stenorynchus sagittarius Rathbun, 1901, p. 53; Verrill, 1908, p. 397.

Carapace triangular, broadest behind, diminishing in width to the eyes and thence produced into the slender, flattened, laterally spinuliferous rostrum, which varies from slightly longer than the carapace to twice as long; there is a small postorbital spine.

Legs very slender and composed of cylindrical articles which bear spines at their distal ends and scattered spines near the middle of their length; the first pair of ambulatory legs is from eight to eight and a half times as long as the carapace; the second, third, and fourth legs successively shorter.

Chelipeds slender, cylindrical; hand weak, dactylus contained from two and a half to four times in the length of the propodus.

Measurements of a male: Length of carapace and rostrum, 45.3 mm.; length of rostrum, 23.2 mm.; width of carapace, 19 mm.

Color, creamy white or buff, with bands of brown or black diverging from the median line to the posterior margin; fingers blue; spines of rostrum, legs, and teeth of chelæ orange or red.

An occasional specimen of this curious crab has been taken by the *Fish Hawk* during the dredging operations off Beaufort Inlet and Cape Lookout. A number of fine examples were secured in 1914 on the Blackfish Banks and to the southward.

Genus PELIA Bell.

Pelia Bell, 1835, p. 170.

Pelia mutica (Gibbes). Pl. XXXVIII, fig. 7.

Pisa mutica Gibbes, 1850, p. 171.
Pelia mutica Stimpson, 1860, p. 177; Kingsley, 1878–79, p. 316; A. Milne-Edwards, 1880, p. 73; Rathbun, 1901, p. 62; Sumner, 1911, p. 670.

Carapace pyriform, regions elevated, covered everywhere with a thin coating of soft hair; rostrum about two-fifths as long as rest of carapace and composed of two horns united at the base but divergent distally.

Chelipeds rather long; in the male about as long as body, feeble; fingers sharp-pointed, finely denticulate, and in contact distally. First pair of legs larger than the others; last pair much reduced in size.

Dimensions of a male: Length, 9.5 mm.; width, 5.8 mm.

Occasionally found among the hydroids and sponges growing on wharf piles. The carapace and legs are usually covered with such a thick growth of sponge that it is only after tediously removing the foreign objects that the crab can be definitely seen.

Genus LIBINIA Leach.

Libinia Leach, 1815, p. 129.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Median line of carapace with about six spines..... *dubia.*
aa. Median line of carapace with about nine spines..... *emarginata.*

Libinia emarginata Leach. Spider crab. Pl. XXXVIII, fig. 6.

Libinia emarginata Leach, 1815, p. 130; Smith, 1879, p. 45; Rathbun, 1892, p. 235; Paulmier, 1905, p. 145; Sumner, 1911, p. 670; Fowler, 1912, p. 386.
Libinia canaliculata Say, 1817, p. 77; H. Milne-Edwards, 1834–1840, t. 1, p. 300; Gibbes, 1850, p. 169; Coues, 1871, p. 120; Kingsley, 1878–79, p. 316.

Carapace orbicular, about one-sixth longer than wide, spinous and tuberculate, and with a dense covering of short hairs. The larger spines are arranged as follows: A median row of about nine, extending from near the base of the rostrum to the posterior border; two subhepatic, of which the anterior is the longer; a lateral row of five; two spines, in addition to the median one, just above the posterior border; and about three on the branchial region; spiniform tubercles are scattered about among the larger ones. Rostrum slightly depressed, emarginate, or bifid at tip; a median groove between the eyes. A deep groove marking off the gastric region. Orbits with a prominent preorbital spine, two smaller spines beneath, on the basal article of the antenna, and one fissure above and one beneath.

Chelipeds equal, larger in the male; hands granulate, fingers smooth, evenly denticulate and about half as long as hand. Ambulatory legs long, hairy, unarmed, often unequal and asymmetrical—the result, perhaps, of injury and subsequent regeneration.

Color, a brownish or dirty yellow.

Length of a female, 62 mm.; greatest width, 58 mm.

Not uncommon in Beaufort Harbor.

Libinia dubia H. Milne-Edwards. Spider crab. Pl. XXXVIII, fig. 5.

Libinia dubia H. Milne-Edwards, 1834–1840, t. 1, p. 300; Gibbes, 1850, p. 169; A. Milne-Edwards, 1880, p. 129; Paulmier, 1905, p. 145; Sumner, 1911, p. 670; Fowler, 1912, p. 114.

Very similar in general characters to *L. emarginata* but with a more pyriform carapace and fewer spines. There are but six spines in the median row; the preorbital, subhepatic, and lateral spines are stronger than in *L. emarginata*, but the spiniform tubercles are few or wanting altogether, and the rostrum is slightly longer and more definitely bifid. The antero-lateral angle of the buccal frame is spinous in the present species.

Length of carapace of a male, 85 mm.; width, 75 mm.

This is the more common species in Beaufort Harbor and can usually be collected when wanted in the shallower water under the wharves along the town front. Occasionally large individuals are found on Bird Shoal in pools left by the falling tide; less frequently a specimen is brought up in the dredge. Immature individuals are often completely overgrown with sponges, hydroids, or ascidians, but the larger ones are usually nearly clean. Neither this nor the preceding species appear to be as abundant at Beaufort as they are farther north.

Genus MACROCŒLOMA Miers.

Macrocœloma Miers, 1879, p. 665.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Carapace with dorsal spines in addition to the epibranchial and posterior spines..... *camptocerum.*
aa. Carapace without dorsal spines in addition to the epibranchial and posterior spines... *trispinosum.*

Macrocœloma trispinosum (Latreille). Pl. XXXVIII, fig. 11.

Pisa trispinosa Latreille, 1825, p. 142.
Pericera trispinosa H. Milne-Edwards, 1834-1840, t. 1, p. 336; A. Milne-Edwards, 1880, p. 51.
Macrocœloma trispinosum Miers, 1879b, p. 665; Rathbun, 1901, p. 74; Verrill, 1908, p. 414.

Carapace irregularly triangular, with a velvety covering of short brown hairs; the mid-dorsal region much elevated and bearing four low rounded tubercles, one on the gastric, one on the cardiac, and one on each epibranchial region; posterolateral angle prolonged into a strong flattened spine which is directed outward and somewhat backward; posterior margin with a broad, triangular projection the tip of which may be slightly recurved; front formed of two somewhat flattened horns which are nearly parallel at the base but gradually curve away from each other at the tip.

Basal article of antenna with its inner angle produced, greatly exceeding the frontal margin and forming on each side of the bifurcate rostrum a broad spine directed obliquely outward.

Chelipeds weak; the meros nodose; the hand small with short fingers, the movable one of which is lightly furrowed above.

Length of a male, 27 mm.; width, 25 mm.

One young individual of this species has been found among seaweeds in the harbor. Others have been found outside the harbor in floating masses of *Sargassum* and it has been brought up in the dredge at the Blackfish Banks.

Macrocœloma camptocerum (Stimpson). Pl. XXXVIII, fig. 12.

Pericera camptocera Stimpson, 1870, p. 112; A. Milne-Edwards, 1873, p. 57.
Macrocœloma camptocera Miers, 1886, p. 79, 80; Rathbun, 1892, p. 249; ibid, 1898, p. 257.

Carapace irregularly triangular, sparsely covered with light-colored, stiff, curled hairs and with four strong spines on the dorsal region—one on the gastric, one on the cardiac, and one on each epibranchial lobe; posterolateral angle prolonged into a strong, acute, conical spine directed obliquely outward and backward; posterior margin with a conical, acute, somewhat recurved spine; front composed of two rather strongly divergent horns.

Basal article of antenna with its inner angle produced into a rather slender, curved spine which is directed obliquely outward and forward about midway between the orbit and the rostral horn. Chelipeds weak, smooth throughout; hand small, fingers short and not grooved above.

Length of a female, 24 mm.; width, 20 mm.

Color, a dirty brown.

Two specimens were obtained by the *Fish Hawk* on the fishing banks in water 14 fathoms deep.

Genus MITHRAX Latreille.

Mithrax Latreille, 1817, p. 23.
Trachonites Latreille in Desmarest, 1823, p. 263.
Mithraculus White, 1847, p. 7.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Carapace with oblique, parallel branchial grooves..... *forceps*.
aa. Carapace without oblique, parallel branchial grooves.
b. Rostral horns about as long as broad..... *depressus*.
bb. Rostral horns shorter, broader than long..... *pleuracanthus*.

Mithrax forceps (A. Milne-Edwards). Pl. XXXVIII, fig. 1.

Mithraculus forceps A. Milne-Edwards, 1873-1880 [1875], p. 109.
Mithraculus hirsutipes Kingsley, 1880, p. 389.
Mithrax forceps Miers, 1886, p. 88; Rathbun, 1901, p. 70.

Carapace about one-fifth wider than long, deeply sculptured in the young but becoming smoother with age; anterolateral border with four tubercles (apart from the outer orbital spine) the last two or three of which are usually acute and turned forward at the tip; from near the bases of the first, second, and third teeth three broad grooves run diagonally backward over the branchial area thus leaving two well-defined unbroken ridges on this part of the carapace; the cardiac and gastric regions are crossed by less sharply defined ridges which are more or less broken up into low, rounded tubercles; front with a broadly V-shaped, median notch on each side of which is a rounded lobe; superior and inferior anteorbital teeth of about equal size and not greatly exceeding the postorbital teeth.

Chelipeds strong; meros with two strong spines or tubercles in front, five much smaller ones along posterior margin and usually two on the upper surface near the posterior margin; carpus entirely smooth or with a small spine near inner distal angle; hand smooth, polished, and somewhat tumid; fingers stout, widely gaping at the base but with expanded, hollowed-out tips; movable finger with a single large tooth at basal third or with two or three small teeth; immovable finger with from one to three teeth at the middle. Ambulatory legs spiny or denticulate and with many fine hairs.

Dimensions of a male: Length of carapace, 13 mm.; width, 16 mm.

Color, red, approaching vermilion and with little or no trace of purple.

This species, which was formerly thought to be the common *Mithrax* of the Beaufort region, is unquestionably much less abundant than the next, *M. depressus*. The two species, so far as can be determined, live together under the same conditions on the Blackfish Banks. Neither has ever been taken within the harbor or close to the shore.

Mithrax depressus A. Milne-Edwards. Pl. XXXVIII, fig. 2.

Mithrax depressus A. Milne-Edwards, 1873–1880 [1875], p. 96; Rathbun, 1901, p. 68; Verrill, 1908, p. 407.

Carapace little if any wider than long, conspicuously tuberculate; spines of anterolateral border well developed, the anterior one or two inclined to be double, while the posterior one or two are acute and curved forward; on the gastric region there are five small tubercles in a transverse row and in front of these two pairs of tubercles, the anterior pair being at the base of the rostral horns; on the mesogastric region there are two tubercles on each side in a transverse line; on the cardiac region a group of three or four poorly defined ones and on the branchial area four rather strong tubercles and several smaller ones arranged more or less in three oblique rows which start at the anterolateral margin; front broadly notched; lower anteorbital tooth considerably exceeding the upper one, its tip acute and strongly incurved; postorbital teeth much smaller than the anteorbitals.

Chelipeds rather slender; meros with one blunt spine in front, five smaller ones on posterior margin and a few on upper surface; carpus with several small tubercles; hand rather slender, upper and lower borders nearly straight; fingers slightly gaping, dentate for nearly their entire length. Ambulatory legs dentate and hairy.

Dimensions of a male: Length of carapace, 15 mm.; width, 15.6 mm.

Color, brownish red.

It appears to be the commonest and most characteristic crab of the offshore banks, where it is found in company with *M. forceps*.

Mithrax pleuracanthus Stimpson. Pl. XXXVIII, fig. 3.

Mithrax pleuracanthus Stimpson, 1871, p. 116; Rathbun, 1901, p. 68.
Mithrax hispidus Rathbun, 1892 (pt.), p. 265.

Similar in all general characters to *M. depressus* but with the carapace broader in proportion to its length and with the anterolateral margins less arcuate. The rostral horns are shorter and wider and placed closer together, the interspace tending toward a narrow V-shape. The tubercles of the carapace differ in that the two of each pair on the mesogastric region are confluent. There are also small tubercles about the base of each lateral spine.

The two species are so much alike that, after they have been for a time in alcohol, only the closest study and the comparison with well authenticated specimens of both species will make their separation possible. It is probable, however, that living specimens of *M. pleuracanthus* may be readily recognized by their color, which, judging from comparatively fresh specimens in formalin, is a much deeper red with distinct crimson cast.

Three or four specimens were taken on the Blackfish Banks in 1913 and 1914.

Genus MICROPHRYS H. Milne-Edwards.

Microphrys H. Milne-Edwards, 1851, p. 251.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Carapace without lateral laminiform processes; one branchial spine..... *bicornutus*.
aa. Carapace with two lateral laminiform processes; two branchial spines..... *platysoma*.

Microphrys bicornutus (Latreille). Pl. XXXVIII, fig. 10.

Pisa bicornuta Latreille, 1825, p. 141; Gibbes, 1850, p. 170.
Milnia bicornuta Stimpson, 1860, p. 51, 180.
Microphrys bicornutus A. Milne-Edwards, 1872, p. 247; ibid, 1873–1880 [1873], p. 61, pl. XIV, fig. 2–4; Rathbun, 1901, p. 72.

Carapace subpyriform, uneven and covered with rounded tubercles, among which are scattered hooked hairs. Rostrum composed of two stout, rather long horns which may diverge slightly from the base but are often nearly parallel; a strong spine below the front of the orbit; supraorbital spine well-developed and postorbital angle prominent. Branchial area with two or three short spines, the larger one of which usually curves upward.

Chelipeds moderately strong, the meral and carpal articles somewhat nodose; hand smooth, fingers about two-thirds as long as the palm.

Length, 14 mm.; width, 10.5 mm.

Color, in alcohol, light gray; in life, yellowish brown.

Three immature specimens of this species were obtained in 14 fathoms on the fishing banks off Beaufort in 1915.

Microphrys platysoma (Stimpson). Pl. XXXVIII, fig. 9.

Milnia platysoma Stimpson, 1860, p. 180.
Microphrys platysoma A. Milne-Edwards, 1873–1880, p. 62; Rathbun, 1901, p. 72.

Carapace slightly longer than wide, broadly subpyriform and depressed; surface thickly covered with tubercles and short, stout spines among which are bands and patches of crispate hairs; there are two or three strong spines on each branchial region, a prominent tuberculate boss on the cardiac region and a strong spine on the superior margin of the orbit; anterolateral margin with two laminiform processes, one on the branchial, the other on the hepatic region; rostral horns slender, acute, and directed straight forward. The spine of the basal article of the antenna extends obliquely outward and is about one-half the length of the rostrum.

Chelipeds rather weak, exceeding the rostral horns by less than the length of the hand; meros with a dentate, laminate, superior crest; carpus tuberculate; hand smooth, the palm about twice as long as broad; fingers widely gaping at the base. Ambulatory legs hairy, the meral and carpal articles with a strong spine.

Length of a male, 18 mm.; width, 16.5 mm.; length of rostrum, 5 mm.

Three specimens, one male and two females, were taken, at as many stations, on the Blackfish Banks by the *Fish Hawk* in 1914 at depths ranging from 13 to 16 fathoms.

Genus PITHO Bell.

Pitho Bell, 1836, p. 172.
Othonia Bell, 1836a, p. 55.
Piloronus Gistel, 1848, p. x (substitute for *Pitho* Bell).
Engyzomaria Gistel, loc. cit. (substitute for *Othonia* Bell).
Microrynchus Desbonne and Schramm, 1867, p. 20.

Pitho lherminieri (Desbonne and Schramm). Pl. XXXVIII, fig. 8.

Othonia lherminieri Desbonne and Schramm, 1867, p. 20; A. Milne-Edwards, 1875, p. 116 (not *O. lherminieri* Rathbun, 1892).
Othonia carolinensis Rathbun, 1892, p. 256.
Pitho lherminieri Rathbun, 1897, p. 8; Rathbun, 1901, p. 78.

Carapace as long as or longer than broad, oval; back with tubercles of various sizes and scattered hooked hairs; sides arcuate and armed with five strong teeth (exclusive of postorbital tooth) of which the first is the largest, the second and third are subequal, and the fourth and fifth are much smaller; eye sockets tubular, the distal extremity being bidentate and nearly or quite as advanced as the frontal teeth; the latter are short, conical, and separated by a V-shaped notch.

Antennæ short and fringed with stiff hairs, the first article coalesced with the carapace to form the floor of the orbit, the second article flattened and considerably produced into a lobe on the outer margin.

Chelipeds of full grown male from one and one-half to nearly two times as long as body, the meros subcylindrical while the carpus and hand are more or less compressed and distinctly angled along the margins.

Length of a male, 15 mm.; width, 14 mm.

Several specimens of this crab, mostly of small size, were brought in by the *Fish Hawk* in 1913 and 1914 from the Blackfish Banks. It has never been taken close to the shore.

Genus STENOCIONOPS Latreille.

Stenocionops Latreille, 1829, p. 59.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Carapace with about eight strong median spines.....*spinosissima.*
aa. Carapace with about four spiniform tubercles in the median line.....*furcata coelata.*

Stenocionops spinosissima (Saussure). Pl. XXXIX, fig. 2.

Pericera spinosissima Saussure, 1858, p. 10, pl. 1, fig. 2; A. Milne-Edwards, 1880, p. 52.
Pericera atlantica Rathbun, 1892, p. 247.
Pericera spinosissima Rathbun, 1898, p. 256.

Carapace oval, about one and one-half times as long as broad, granulate and covered with a sparse growth of short and fine curled hairs among which are a number of stout spines; about eight spines, larger and smaller, form a longitudinal median row extending from the front of the cardiac area to the posterior margin, there are two spines on each side on the mesogastric area and two, stronger than the others mentioned, well down on the branchial region; both the anterior and posterior orbital angles are spiniform, and behind the eye on the margin of the carapace is a spine; the rostral horns are stout, straight, and widely divergent. Basal article of antennæ armed in front with a flat spine much shorter than the orbital spines.

A single immature specimen was obtained by the *Fish Hawk* at station 7313, depth 69 fathoms, and another at a depth of about 50 fathoms 30 miles due south of Cape Lookout Lightship.

Stenocionops furcata cœlata (A. Milne-Edwards). Pl. XXXIX, fig. 3.

Pericera cœlata A. Milne-Edwards, 1879, p. 200, pl. XV*a*, fig. 3.
Pericera cornuta cœlata Rathbun, 1892, p. 244.
Stenocionops furcata cœlata Rathbun, 1901, p. 73.

Carapace pyriform, about one-half longer than wide, uneven, with strong spines and a dense covering of short setæ among which are many longer hooked hairs. Rostrum consisting of two nearly straight diverging horns with rows of hooked setæ; orbital region broad; preorbital spine strong; suborbital and postorbital spines much smaller. Mid-dorsal line with four strong spiniform tubercles, of which one is on the gastric region, while the other three are on the cardiac and intestinal regions; the most posterior spine has its tip curved forward. Lateral border with four stout spines, of which one is on the hepatic and the others on the branchial region. In addition to the spines mentioned there are two rather strong ones on the branchial region on each side and various smaller ones toward the front. Ventral surface of body and legs, except the distal articles of the chelipeds so closely covered with bulbose setæ that the shell is hidden.

Chelipeds slender; chelæ weak, the fingers less than half as long as the palm; meral article with a strong spine above near the distal end followed by several smaller spines. Walking legs more or less rough and with clusters of hooked hairs.

Length, including rostral horns, 60 mm.; width, including spines, 40 mm.; rostral horns, 18 mm.

Color, in life, dark red.

The large male described above and one immature specimen were obtained in 1915, in about 15 fathoms, on the fishing banks off Beaufort.

Genus SPHENOCARCINUS A. Milne-Edwards.

Sphenocarcinus A. Milne-Edwards, 1873–1880, p. 135.

Sphenocarcinus corrosus A. Milne-Edwards. Pl. XXXIX, fig. 1.

Sphenocarcinus corrosus A. Milne-Edwards, 1873–1880, p. 135; Rathbun, 1894, p. 66.

Carapace subtriangular, the lateral margin concave and the posterior one convex, depressed, deeply grooved, and prolonged anteriorly into a rostrum composed of two long cylindrical horns which in old

individuals are slightly divergent at the tip. The grooves of the dorsal surface are deep and their surface is finely punctate. The elevations of the carapace are as follows: One gastric, placed longitudinally, a small circular lobe on each side; a cardiac, placed transversely with a deep notch on each side posteriorly; an intestinal, the outer ends of which extend outward along the posterior margin; a lateral, paired, extending from the lateral angle forward nearly to the eye; a small post ocular and a larger supraocular elevation on each side; the margins of these elevations are sharply defined and the surface is finely eroded.

Chelipeds rather small and weak. First pair of walking legs longer than any of the others and exceeding the chelipeds by more than the length of the dactyli.

Measurements of a male: Total length, 21 mm.; rostrum, 13 mm.; extreme width, 10 mm.

Color, orange red.

Four specimens of this remarkable little crab were brought in by the *Fish Hawk* from a depth of about 100 fathoms, 30 miles south of Cape Lookout. It has been recorded by Dr. Mary J. Rathbun from 90 fathoms off Cape Fear. In the specimens at hand an interesting variation is shown in the rostrum. In the largest individual, a female, the two horns extend straight forward and are in contact except close to the tip; their length is exactly equal to the extreme width of the carapace. In the next specimen, a male, the horns are proportionally longer, curved outward and are divergent for about the terminal half. In the next individual the horns are considerably shorter than the width of the carapace and in close contact throughout their length. In the last individual, 8 mm. wide, the location of the horns is occupied by a single conical process showing no indication of bifurcation.

Genus TYCHE Bell.

Tyche Bell, 1836a, p. 57.

Tyche emarginata White. Pl. XXXIX, fig. 4.

Tyche emarginata White, 1847, p. 206; Stimpson, 1871, p. 119; A. Milne-Edwards, 1873, p. 126.
Platyrhinchus trituberculatus Desbonne and Schramm, 1867, pl. III, figs. 7, 8.

Carapace about one and two-thirds times as long as wide, irregular and angular, prolonged in front into four long, cylindrical, curved horns, the median pair belonging to the rostrum and the lateral one springing from above the eyes; from the front the carapace slopes abruptly upward, the gastric regions being concave, to an irregularly octagonal dorsal area which has nodulose lateral borders and which is prolonged behind into a laminiform expansion that overhangs the base of the abdomen and the basal articles of the walking legs. The anterior margin, behind the base of the supra-orbital horns, is laminiform and divided by a deep, narrow fissure.

Eyestalks long, but projecting very little beyond the margin of the carapace. Antennæ concealed beneath the front. Third maxillipeds with the exopodite provided with a hook which overlaps the base of the ischium of the endopodite; ischium and meros with similar interlocking processes. Chelipeds short and weak. Walking legs of moderate size, their dactyli very long and slender.

Length, posterior margin to base of rostrum, 28 mm.; width, 20 mm.

A single specimen of this curious crab was brought in by the *Fish Hawk* from the fishing grounds (station 7944) where it was dredged in about 14 fathoms. It was completely overgrown with sponge, hydroids, bryozoans, and worm tubes, the entire mass being twice or three times the size of the crab. After the removal of as much of the foreign growth as could be taken off without injury to the specimen it proved to be a female with her abdominal pouch filled with eggs.

Family PARTHENOPIDAE. The long-armed crabs.

Oxyrhyncha having the chelipeds much larger than any of the other legs and with the fingers bent on the hand at an angle toward the side on which the immovable finger is set, the second article of the second antenna small, short and not fused with the epistome or the front, the orbits well formed, and hooked hairs very seldom present.

This family comprises 17 genera, of which 4 are represented in the Beaufort fauna.

KEY TO THE GENERA OF THE BEAUFORT REGION.

a. Carapace not laterally expanded.
b. Carapace rough, tuberculate or subspinous.
c. Carapace triangular, convex; pterygostomian and subhepatic regions not deeply excavated to form passages to the efferent branchial apertures.....*Parthenope.*
cc. Carapace subrhomboidal, depressed; pterygostomian and subhepatic regions excavated so as to form, in conjunction with the retracted chelipeds, passages to the efferent branchial apertures.....*Platylambus.*
bb. Carapace smooth.....*Solenolambus.*
aa. Carapace expanded laterally to form a vault beneath which the walking legs are concealed,.....*Heterocrypta.*

Genus PARTHENOPE Weber.

Parthenope Weber, 1795, p. 92.
Lambrus Leach, 1815, p. 308, 310.

KEY TO THE SPECIES OF THE BEAUFORT REGION.

a. Margins of chelipeds denticulate or subspinous.....*agona.*
aa. Margins of chelipeds with serrate tubercles and laciniate spines.....*pourtalesii.*

Parthenope agona (Stimpson). Pl. XXXIX, fig. 5.

Lambus agonus Stimpson, 1871, p. 131; A. Milne-Edwards, 1873–1880 [1878], p. 151; 1879, pl. XXVIII, fig. 3; Rathbun, 1901, p. 79.

Carapace slightly (about one-eighth) broader than long, elevated along the middle line and with the branchial regions inflated; surface coarsely punctate and with many more or less spiniform tubercles, the larger of which are arranged as follows: Near the middle of the gastric region a transverse row of four; behind these a longitudinal row of four larger ones; one on each side, marking the ends of the posterior margin; four or five on each branchial region, the posterior one spiniform and turned obliquely outward; one on each hepatic region. The margin of the branchial region bears five or six small teeth; below and partly behind this is a short crest and below this a stout spine. Front produced, narrow at the tip but broad and with raised margins proximally. Orbit with an open fissure above and a broad gap below. A conical tubercle on the sternum at the base of the cheliped and a similar one on the coxal article of that appendage. Proximal segment of the abdomen with a sharp transverse crest forming a lobe in the center and a tooth on each side.

Chelipeds very long and slender, prismatic, finely rugose above, denticulate on both margins and with an additional row of denticles, median on the meros and carpus but approaching the outer margin on the hand; the denticles on the margins of the hand are much stronger distally. Ambulatory legs long, slender and nearly smooth.

Length of carapace, 16 mm.; width, 17.5 mm.

Color, light buff, more or less marbled with purple; chelipeds and legs with broad bands of purple.

One specimen, a female, was taken by the *Fish Hawk* 23 miles east of Cape Lookout in 47 fathoms.

Parthenope pourtalesii (Stimpson). Pl. XXXIX, fig. 6.

Lambrus pourtalesii Stimpson, 1871, p. 129.
Lambrus verrillii Smith, 1881, p. 415; ibid, 1883, p.14; ibid, 1887, p. 628 (24), pl. II, fig. 2.
Parthenope pourtalesii Verrill, 1908, p. 418.

Carapace triangular, nearly as long as broad, somewhat tumid in the mid-dorsal and branchial regions which are separated from each other by a pair of deep longitudinal depressions; surface everywhere minutely punctate or eroded; median line with four strong spiniform tubercles, one of which is on the gastric and three on the cardiac region; two small spines placed transversely in front of the gastric spine; branchial region with a conspicuous, laciniated spine at the posterolateral angle from which a row of two or three similar but smaller spines extends toward the gastric region; another row of from two to five extends along the posterior margin, and another row extends forward along the anterolateral margin. Rostrum directed obliquely downward, broad at the base and with conspicuous raised margins, but suddenly contracted near the tip.

Chelipeds long, slender, tuberculate and with a border of serrate tubercles and laciniate spines on both margins; meros with an additional median row of spiniform tubercles on the upper surface and the hand with an obsolete median row beneath. Meral articles of walking legs subspinous on both margins.

Measurements of male: Length, 9.5 mm.; width, 10 mm.; hand, 11.5 mm.

Color, purplish red with cross bands of buff on chelipeds and walking legs.

A series of four small specimens, one male and three females, was secured by the *Fisk Hawk* in about 100 fathoms, 30 miles south of Cape Lookout. They agree in essential characters with specimens of *P. pourtalesii* in the United States National Museum. No two specimens are exactly alike with respect to spines, but in all the breadth is slightly in excess of the length.

Genus PLATYLAMBRUS Stimpson.

Platylambrus Stimpson, 1871, p. 129.

Platylambrus serratus (H. Milne-Edwards). Pl. xxxix, fig. 7.

Lambrus serratus H. Milne-Edwards, 1834–1840, t. 1, p. 357.
Platylambrus serratus A. Milne-Edwards, 1873–1880 [1878], p. 156; Rathbun, 1901, p. 80.

Carapace subtriangular, about three fourths as long as wide, depressed, strewn with spines and tubercles; anterolateral margins curved, cut into seven or eight teeth and terminating posteriorly in a strong flat spine; posterolateral border with three short erect spines; on the back the spines are irregularly arranged, there being about eight prominent and numerous smaller ones on each branchial region and a median row of five, the anterior one of which is on the middle of the gastric region, while the posterior one is on the posterior margin. A pair of ridges converge from the orbits to the anterior median spine. Rostrum short, narrow and with raised margins which are continuous with the superior walls of the orbits.

Chelipeds, when extended, about twice as long as carapace, trigonal, smooth beneath, more or less tuberculate on upper surface and with the margins cut into lanceolate or triangular teeth which are fringed with fine hairs and much stronger on the outer than on the inner side of the articles; on the manus there are about nine teeth alternately large and small; fingers stout, very oblique. Ambulatory legs of moderate size, the longest not exceeding the meros of the cheliped.

Color, a rosy red more or less mottled with gray; fingers carmine, shading to black.

Dimensions of a male: Length, 17 mm.; width, 22 mm.; meros, 18 mm.; manus, 23 mm.

Several specimens were dredged by the *Fish Hawk* south and east of the fishing banks, about 15 or 20 miles off Beaufort Inlet. It has not been collected near the shore.

Genus SOLENOLAMBRUS Stimpson.

Solenolambrus Stimpson, 1871, p. 132.

Solenolambrus tenellus Stimpson. Pl. xxxix, fig. 8.

Solenolambrus tenellus Stimpson, 1871, p. 134.
Pisolambrus nitidus A. Milne-Edwards, 1873–1880 [1878], p. 158, pl. xxx, fig. 4.

Carapace a little broader than long and about equally produced in front of and behind the line of the lateral angles, strongly convex, and with four protuberances—one gastric, one cardiac, and two branchial; surface naked, glossy, and rather coarsely punctate; margins crenulate and dentate, the five or six teeth of the expanded and broadly rounded lateral angle being the most prominent; posterolateral margin slightly concave; posterior margin convex, its angles obtuse. Hepatic region with two or three denticulate teeth, those of the gastric and cardiac regions obtusely rounded; ridge of the branchial region well marked near the posterolateral margin, but almost obsolete anteriorly. Rostrum rather prominent and faintly tridentate at the extremity, median tooth smallest and most prominent. Eyes large, with a very minute tubercle at the summit.

Chelipeds very long and slender, their general surface smooth and polished; their edges denticulate; meros with about 13 teeth on either edge, the third tooth from the distal end being larger than the others; hand with 12 sharp, forward-curving teeth on the superior edge, the terminal tooth above the finger being spiniform and considerably longer than the others; outer margin with about 11 small teeth; inner margin with 19 or 20 very minute teeth.

Length of a male, 6.25 mm.; width, 6.75 mm.; hand, 8 mm.; meros of cheliped, 7.25 mm.

One specimen, a female, was brought in by the *Fish Hawk* in 1902 from off Cape Lookout in 69 fathoms. It was taken to the United States National Museum for identification, but since its return to the laboratory has been lost.

Genus HETEROCRYPTA Stimpson.

Heterocrypta Stimpson, 1871, p. 102.

Heterocrypta granulata (Gibbes). Hexagon crab. Pl. XXXIX, fig. 9.

Cryptopodia granulata Gibbes, 1850, p. 173.
Heterocrypta granulata Stimpson, 1871, p. 102; Kingsley, 1878–79, p. 317; Rathbun, 1901, p. 83; Sumner, 1911, p. 669.

Carapace subtriangular, its length two-thirds its width; anterolateral margins nearly straight, forming a sharp, slightly sinuous edge from which the shell slopes upward to a prominent granulate ridge which runs nearly parallel with the margin on each side, is connected with its fellow in front by a short transverse ridge, and behind joins the ridge which forms the posterior margin of the shell; from the ends of the short anterior transverse ridge a pair of granulate crests run forward to the margins of the rostrum. On the cardiac region there is a large granulate boss. Except on the ridges and margins the carapace above is smooth. Sternum and lower surface of abdomen coarsely granulate. Third, fourth, and fifth segments of male abdomen fused.

Chelipeds unequal, rather heavy, and longer than the width of the carapace; outer and inner margins of upper surface of meros, carpus, and manus expanded into irregular granulate or dentate crests; fingers short, the movable one very oblique and, in the larger chela, meeting the thumb for only a short distance near the tip. Ambulatory legs short, almost completely hidden beneath the carapace.

Length of a female, 11 mm.; width, 17 mm.

Color, varying from light gray to nearly black, usually with these two colors more or less commingled so as to produce an irregular mottling or marbling.

This curious little crab is not infrequently brought to the surface by the dredge from the shelly bottoms off Morehead City and in other places about the harbor. Its angular form and its coloration bear so close a resemblance to the fragments of shells among which it lives that it is extremely difficult to detect it.

The females frequently bear eggs, as these appear to be produced throughout the summer.

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EXPLANATION OF PLATES.

The figures are from photographs taken by the senior author and unless otherwise indicated are of specimens collected in the region about Beaufort.

PLATE XXV.

Fig. 1.—Sicyonia lævigata, ♂ and ♀, natural size.
Fig. 2.—Sicyonia edwardsii, ♂, natural size.
Fig. 3.—Sicyonia dorsalis, ♂, natural size.
Fig. 4.—Sicyonia brevirostris, ♀, ♀, natural size.
Fig. 5.—Peneus setiferus, ♂, natural size.
Fig. 6.—Peneus brasiliensis, ♂, ¾ natural size.
Fig. 7.—Parapenæus politus, ♂, natural size.
Fig. 8.—Parapenæus megalops, ♂, natural size.
Fig. 9.—Trachypeneus constrictus, ♂, natural size.

PLATE XXVI.

Fig. 1.—Synalpheus townsendi, ♂ × 2.
Fig. 2.—Synalpheus longicarpus, ♂, × 2.
Fig. 3.—Synalpheus minus, ♀, × 2.
Fig. 4.—Crangon packardii, ♂, × 1½.
Fig. 5.—Crangon formosus, ♀, natural size.
Fig. 6.—Crangon heterochælis, ♂, natural size.
Fig. 7.—Automate kingsleyi, ♀, type, natural size.
Fig. 8.—Hippolyte pleuracantha, ♀, × 4.
Fig. 9.—Ogyris alphærostris, ♀, natural size.
Fig. 10.—Leucifer faxoni, ♂, × 6.
Fig. 11.—Concordia gibberosus, ♀, × 2, coast of South Carolina.
Fig. 12.—Hippolysmata wurdemanni, ♂, natural size.
Fig. 13.—Latreutes ensiferus, ♀, × 5.

PLATE XXVII.

Fig. 1.—Crangon armillatus, ♂, natural size.
Fig. 2.—Tozeuma carolinense, ♂ and ♀, × 1½.
Fig. 3.—Palæmonetes exilipes, ♂, natural size.
Fig. 4.—Palæmonetes carolinus, ♂, × 2.
Fig. 5.—Palæmonetes vulgaris, ♂ and ♀, natural size.
Fig. 6.—Palæmon tenuicornis, ♀, natural size.
Fig. 7.—Urocaris longicaudata, ♂, × 4.
Fig. 8.—Coralliocaris wilsoni, ♂ and ♀, × 1½.
Fig. 9.—Crago septemspinosus, ♂, natural size.

PLATE XXVIII.

Fig. 1.—Gnathophyllum modestum, ♀, type, natural size.
Fig. 2.—Scyllarus americanus, ♀, natural size.
Fig. 3.—Panulirus argus, young ♂, ½ natural size.
Fig. 4.—Cambarus diogenes, ♀, ½ natural size.
Fig. 5.—Cambarus blandingii, ♀, ½ natural size, Lake Mattamuskeet, N. C.
Fig. 6.—Cambarus uhleri, ♀, natural size, Dorchester County, Md.
Fig. 7.—Homarus americanus, young ♂, ⅓ natural size, coast of Massachusetts.
Fig. 8.—Munida irrasa, ♂, natural size.
Fig. 9.—Munida longipes, ♂, ½ natural size.

PLATE XXIX.

Fig. 1.—Petrolisthes galathinus, ♂ and ♀, natural size.
Fig. 2.—Pachycheles rugimanus, ♀, natural size.
Fig. 3.—Euceramus prælongus, ♂, natural size.
Fig. 4.—Galathea rostrata, ♂, natural size, coast of Yucatan.
Fig. 5.—Callianassa stimpsoni, ♂, natural size.
Fig. 6.—Porcellana soriata, ♂, ×2½.
Fig. 7.—Porcellana sayana, ♀, natural size.
Fig. 8.—Polyonyx macrocheles, ♂ and ♀, natural size.
Fig. 9.—Upogebia affinis, ♂, natural size.
Fig. 10.—Callichirus major, ♂, natural size.
Fig. 11.—Catapagurus sharreri, ♂ and ♀, natural size.
Fig. 12.—Pagurus annulipes, ♂, ×3.
Fig. 13.—Pagurus longicarpus, ♂ and ♀, natural size.

PLATE XXX.

Fig. 1.—Pagurus pollicaris, ♂, ½ natural size.
Fig. 2.—Pagurus cokeri, ♂, natural size.
Fig. 3.—Paguristes moorei, ♀, natural size.
Fig. 4.—Pagurus corallinus, ♂, natural size.
Fig. 5.—Pylopagurus rosaceus, ♂, natural size.
Fig. 6.—Petrochirus bahamensis, ♂, natural size.
Fig. 7.—Paguristes armatus, ♀, natural size.
Fig. 8.—Emerita talpoida, ♀, natural size.
Fig. 9.—Clibanarius vittatus, ♂, natural size.
Fig. 10.—Homola barbata, ♀, natural size.
Fig. 11.—Albunea gibbesii, ♂, natural size.
Fig. 12.—Lepidopa websteri, ♀, natural size.

PLATE XXXI.

Fig. 1.—Ranilia muricata, ♂, natural size.
Fig. 2.—Hypoconcha arcuata, ♀, natural size.
Fig. 3.—Hypoconcha sabulosa, ♀, natural size.
Fig. 4.—Latreillia elegans, ♀, natural size.
Fig. 5.—Dromidia antillensis, ♂, natural size.
Fig. 6.—Calappa sulcata, ♂, natural size.
Fig. 7.—Calappa angusta, ♂, natural size.
Fig. 8.—Calappa flammea, ♂, natural size.
Fig. 9.—Osachila semilevis, ♂, natural size.
Fig. 10.—Osachila tuberosa, ♂, natural size.

PLATE XXXII.

Fig. 1.—Hepatus epheliticus, ♂, ¾ natural size.
Fig. 2.—Iliacantha subglobosa, ♂, natural size, Straits of Florida.
Fig. 3.—Iliacantha intermedia, ♂, natural size.
Fig. 4.—Spelœophorus nodosus, ♀ and ventral surface, natural size.
Fig. 5.—Spelœophorus pontifera, ♂, × 2.
Fig. 6.—Lithadia cariosa, ♂ and ♀, natural size.
Fig. 7.—Ovalipes ocellatus ocellatus, ♂, ⅔ natural size.
Fig. 8.—Ovalipes ocellatus floridanus, ♀, ¾ natural size.
Fig. 9.—Persephona punctata, ♂, ¾ natural size.

PLATE XXXIII.

Fig. 1.—Portunus gibbesii, ♂, ½ natural size.
Fig. 2.—Portunus sayi, ♂, natural size.
Fig. 3.—Portunus (Acheloüs) spinicarpus, ♂, natural size.
Fig. 4.—Portunus (Acheloüs) spinimanus, ♀, ¾ natural size.
Fig. 5.—Portunus (Acheloüs) sebæ, ♀, ¾ natural size, St. Thomas, W. I.
Fig. 6.—Portunus (Acheloüs) ordwayi, ♀, ¾ natural size, off Cape Lookout.
Fig. 7.—Portunus (Acheloüs) depressifrons, ♀, ¾ natural size, Key West, Fla.
Fig. 8.—Portunus (Acheloüs) anceps, ♂, natural size, Eleuthera Island, Bahamas.

PLATE XXXIV.

Fig. 1.—Callinectes sapidus, ♂, ½ natural size.
Fig. 2.—Callinectes ornatus, ♂, ¾ natural size.
Fig. 3.—Arenæus cribrarius, ♂, ⅔ natural size.
Fig. 4.—Eurypanopeus depressus, ♂ and ♀, natural size.
Fig. 5.—Lobopilumneus agassizii, ♀, natural size.
Fig. 6.—Leptodius agassizii, ♁, natural size.
Fig. 7.—Hexapanopeus angustifrons, ♂, natural size.
Fig. 8.—Neopanope texana sayi, ♂, natural size.
Fig. 9.—Panopeus herbstii, ♂, natural size.

PLATE XXXV.

Fig. 1.—Cancer irroratus, ♀, natural size.
Fig. 2.—Cancer borealis, young ♂, natural size.
Fig. 3.—Pilumnus lacteus, ♂, natural size.
Fig. 4.—Pilumnus sayi, ♂, natural size.
Fig. 5.—Rhithropanopeus harrisii, ♂ and ♀, Indian River, Fla.
Fig. 6.—Eriphia gonagra, ♂, natural size.
Fig. 7.—Eurytium limosum, ♂, ¾ natural size, Port Royal Island, S. C.
Fig. 8.—Menippe mercenaria, ♂, ½ natural size.
Fig. 9.—Pinnotheres ostreum, ♀, natural size.
Fig. 10.—Pinnotheres maculatus, ♂ and ♀, natural size.

PLATE XXXVI.

Fig. 1.—Dissodactylus mellitæ, ♀, × 8.
Fig. 2.—Pinnixa cylindrica, ♂ and ♀, natural size.
Fig. 3.—Pinnixa sayana, ♀, × 2.
Fig. 4.—Pinnixa chætopterana, ♂ and ♀, × 2.
Fig. 5.—Pinnixa cristata, ♀, type, × 2.
Fig. 6.—Planes minutus, ♂, natural size.
Fig. 7.—Euchirograpsus americanus, young ♀, natural size.
Fig. 8.—Euryplax nitida, ♂, × 1½.
Fig. 9.—Pachygrapsus transversus, ♂, natural size.
Fig. 10.—Plagusia depressa, ♂, natural size.
Fig. 11.—Sesarma cinerea, ♂ and ♀, natural size.
Fig. 12.—Sesarma reticulata, ♂ and ♀, natural size.

PLATE XXXVII.

Fig. 1.—Ocypode albicans, ♂, ½ natural size.
Fig. 2.—Uca pugilator, ♂ and ♀, natural size.
Fig. 3.—Uca minax, ♂ and ♀, natural size.
Fig. 4.—Uca pugnax, ♂ and ♀, natural size.
Fig. 5.—Metoporhaphis calcaratus, ♂ and ♀, natural size.
Fig. 6.—Podochela gracilipes, ♀, × 2.
Fig. 7.—Euprognatha rastellifera, ♂, × 1½.
Fig. 8.—Stenorynchus sagittarius, ♂, natural size.
Fig. 9.—Podochela riisei, ♂, natural size.

PLATE XXXVIII.

Fig. 1.—Mithrax forceps, ♂, natural size.
Fig. 2.—Mithrax depressus, ♂, natural size.
Fig. 3.—Mithrax pleuracanthus, ♂, natural size.
Fig. 4.—Pyromaia cuspidata, ♀, natural size.
Fig. 5.—Libinia dubia, ♀, ¾ natural size.
Fig. 6.—Libinia emarginata, ♂, ¾ natural size.
Fig. 7.—Pelia mutica, ♂, × 2.
Fig. 8.—Pitho lherminieri, young ♀, natural size.
Fig. 9.—Microphrys platysoma, ♂, × 1½
Fig. 10.—Microphrys bicornutus, young ♂, natural size.
Fig. 11.—Macrocœloma trispinosum, ♀, natural size.
Fig. 12.—Macrocœloma camptocerum, ♀, natural size.

PLATE XXXIX.

Fig. 1.—Sphenocarcinus corrosus, adult ♀ and two immature, natural size.
Fig. 2.—Stenocionops spinosissima, young ♂, ½ natural size.
Fig. 3.—Stenocionops furcata cœlata, ♂, ½ natural size.
Fig. 4.—Tyche emarginata, ♀, natural size.
Fig. 5.—Parthenope agona, ♀, natural size.
Fig. 6.—Parthenope pourtalesii, ♂, × 2.
Fig. 7.—Platylambrus serratus, ♂, natural size.
Fig. 8.—Solenolambrus tenellus, ♀, × 2.
Fig. 9.—Heterocrypta granulata, ♂ and ♀, natural size.

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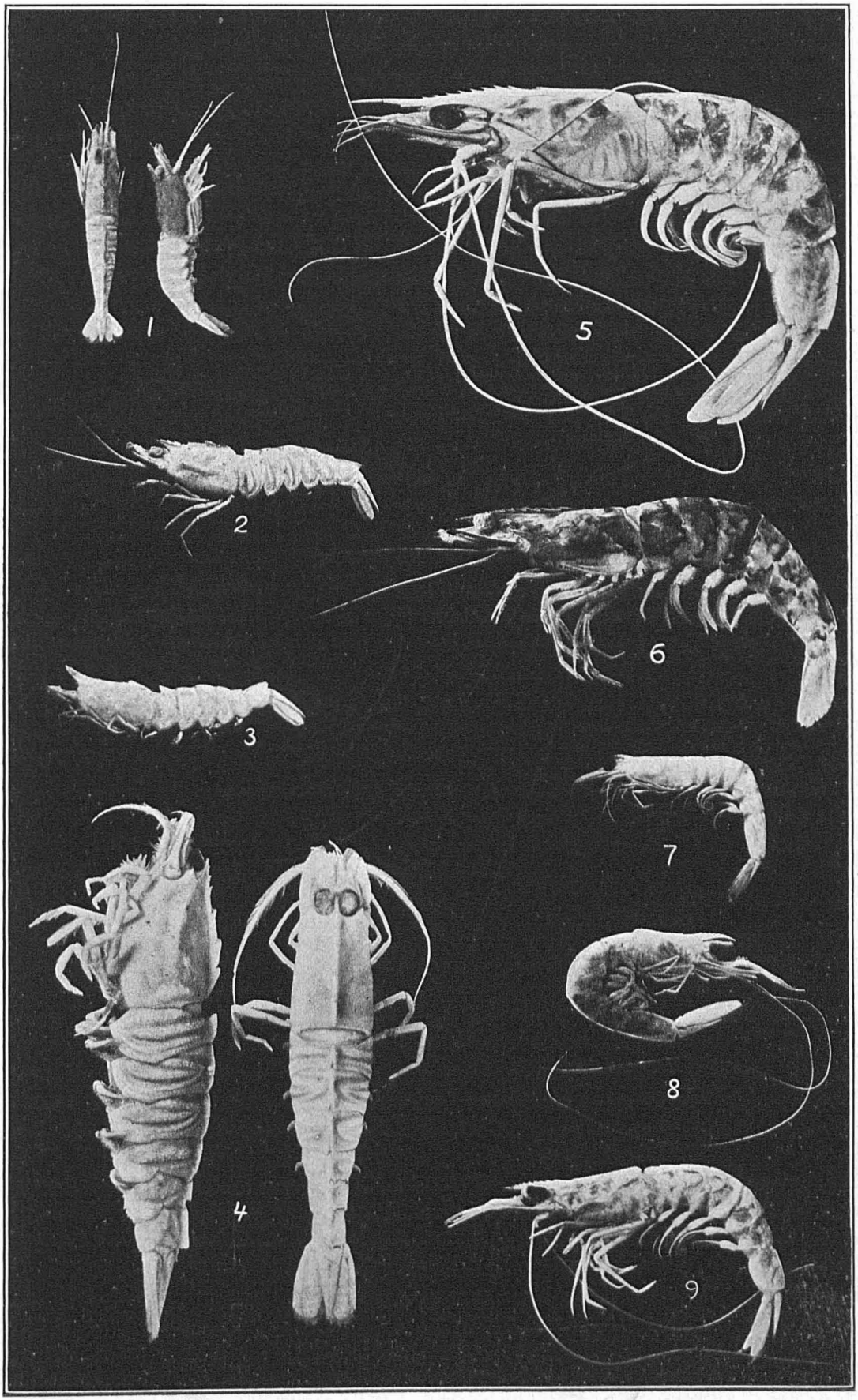
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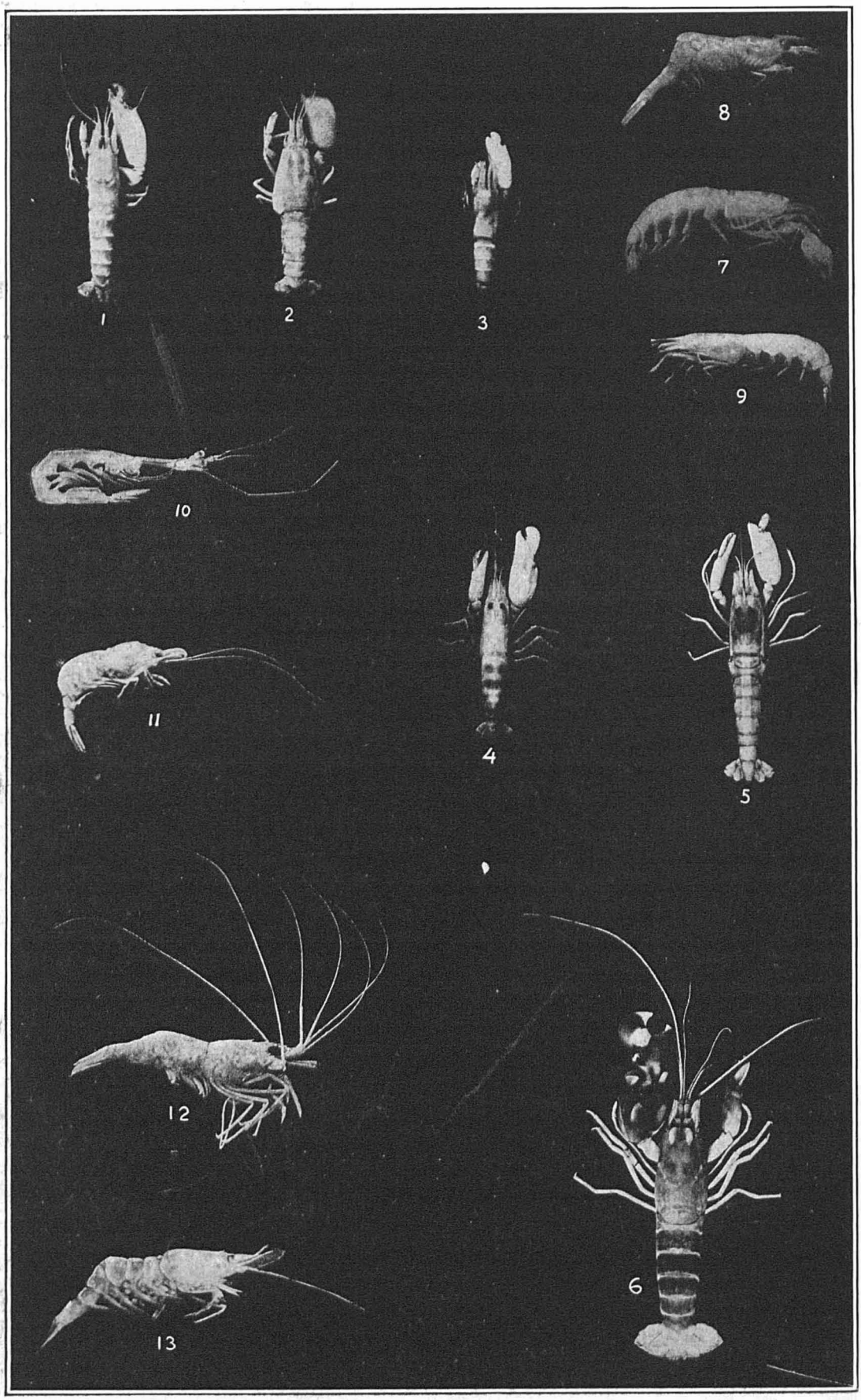
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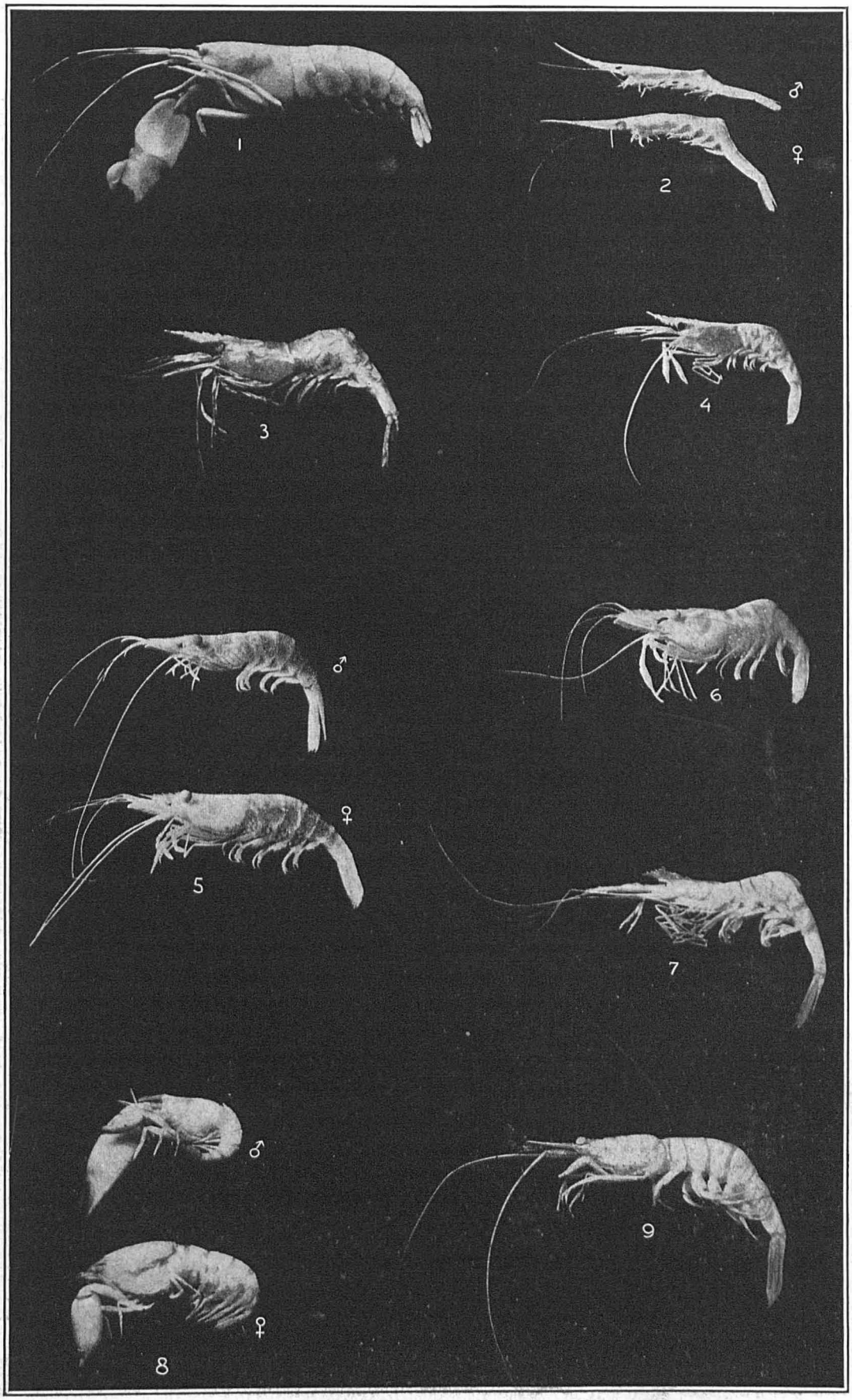
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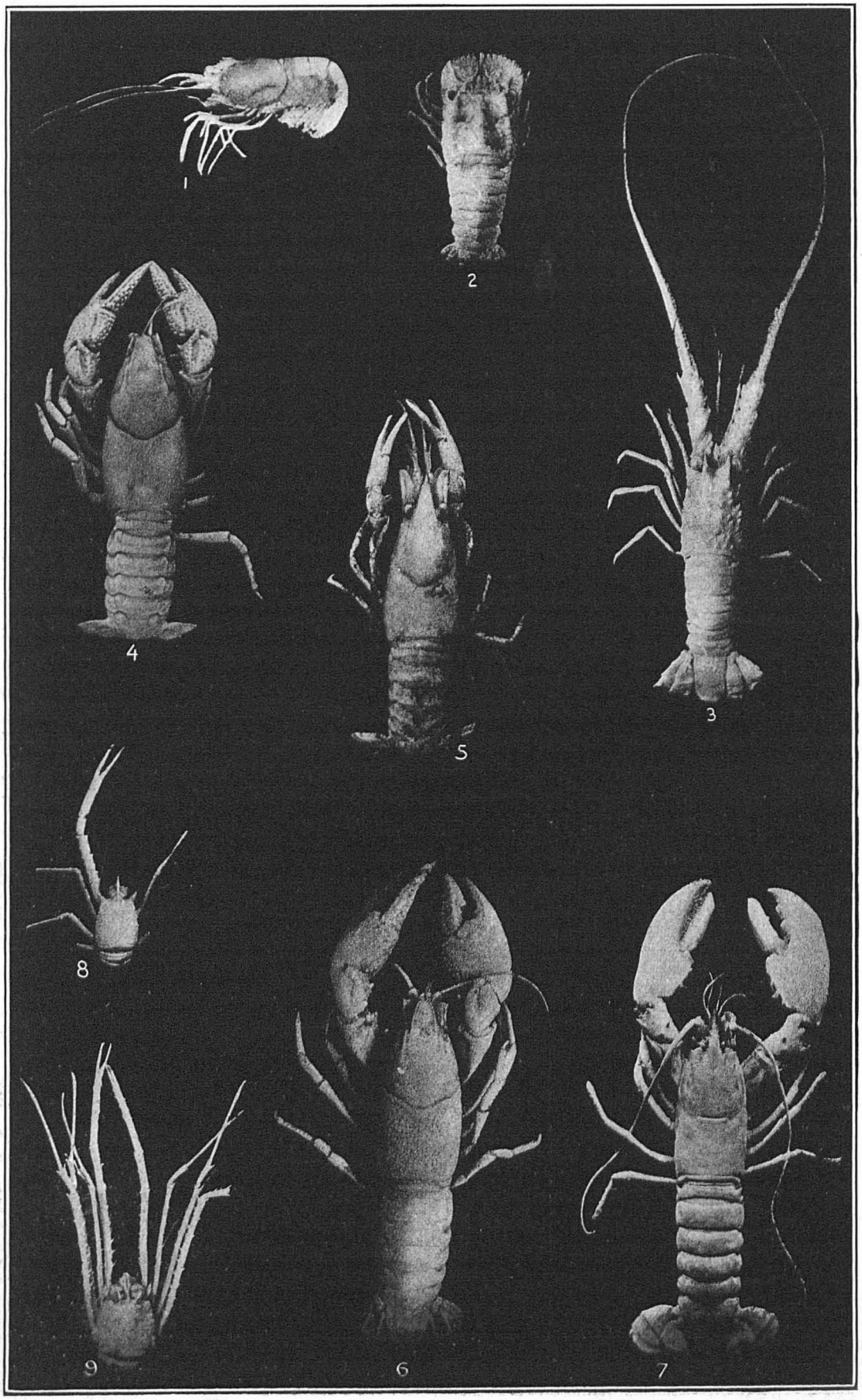
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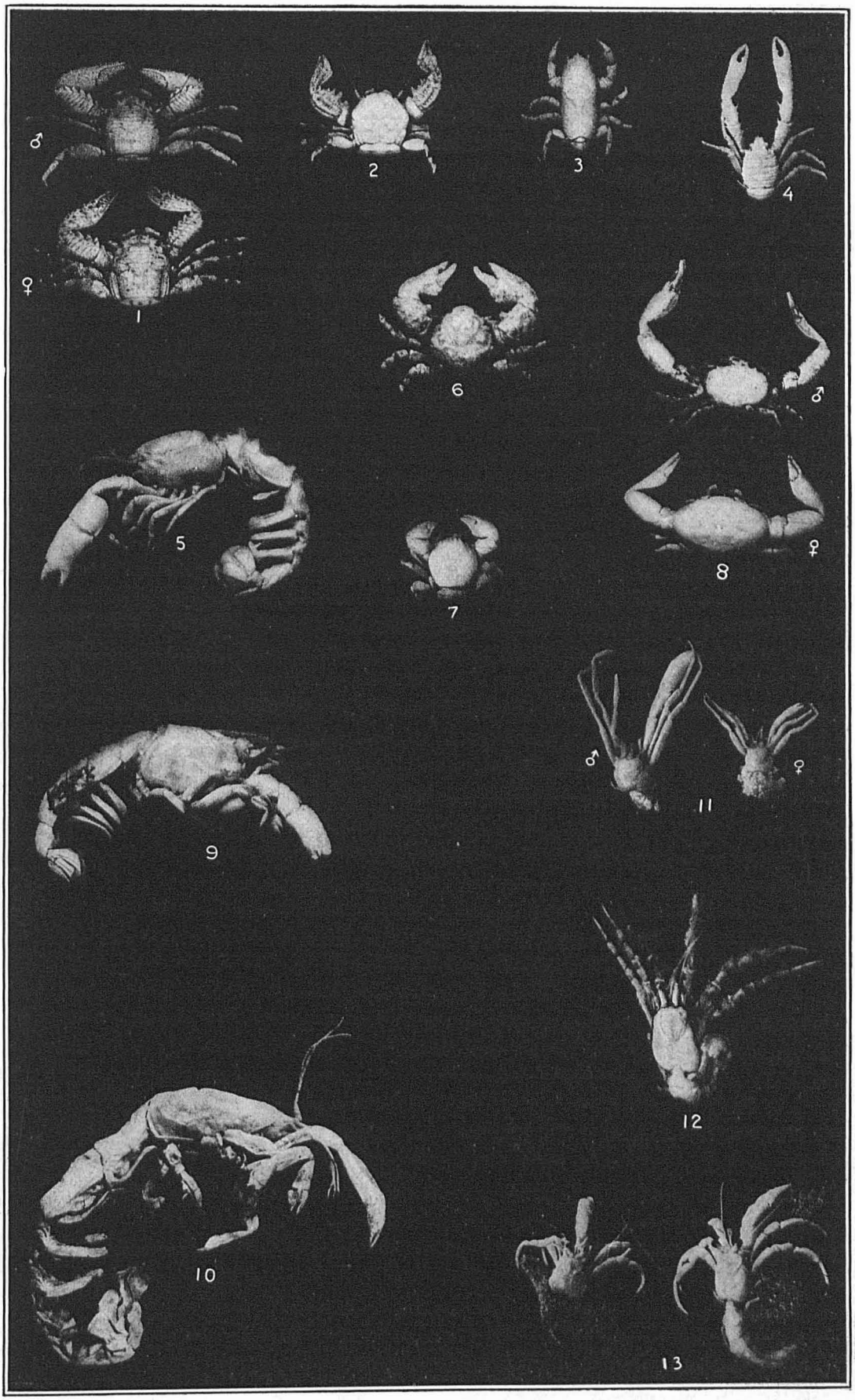
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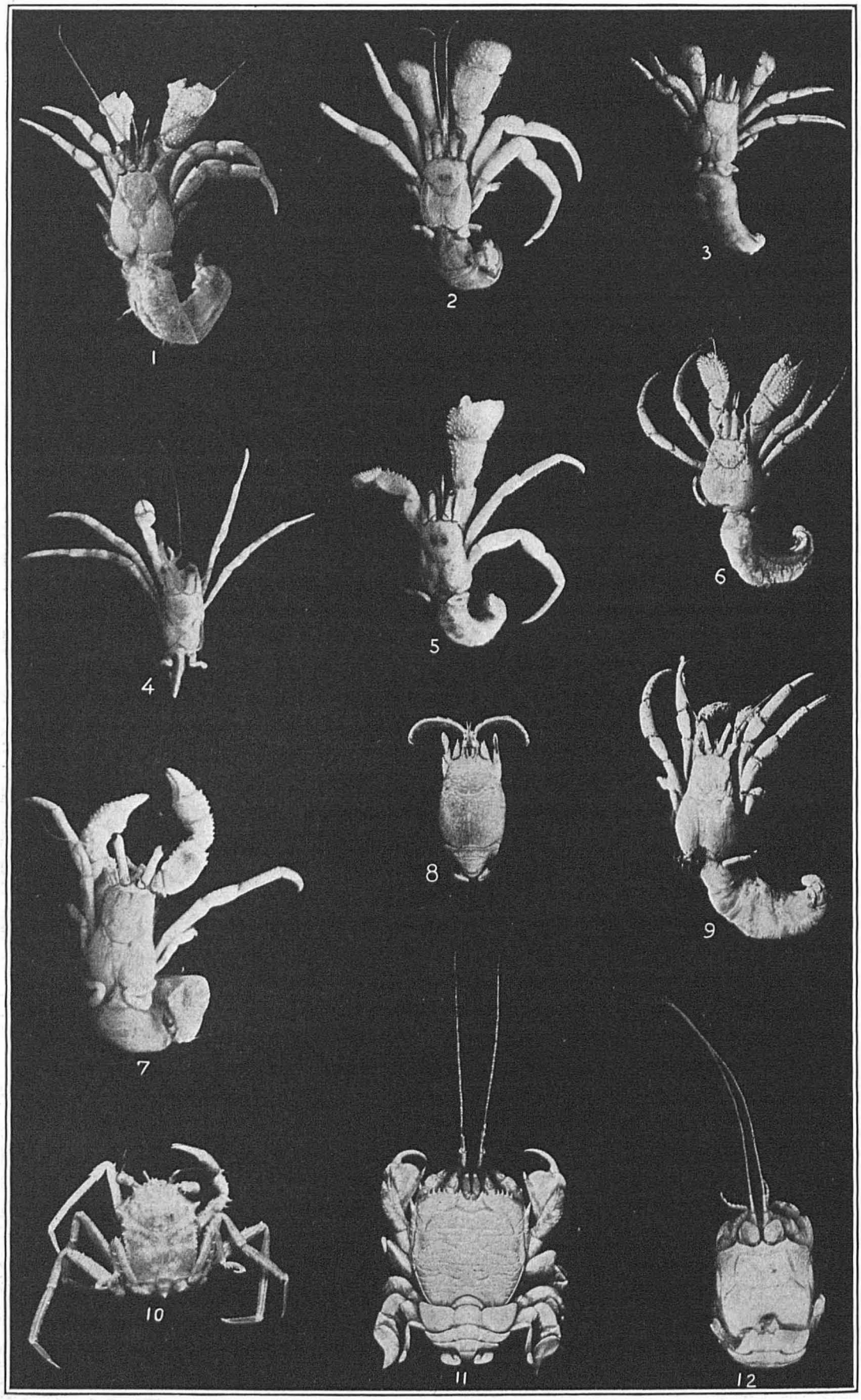
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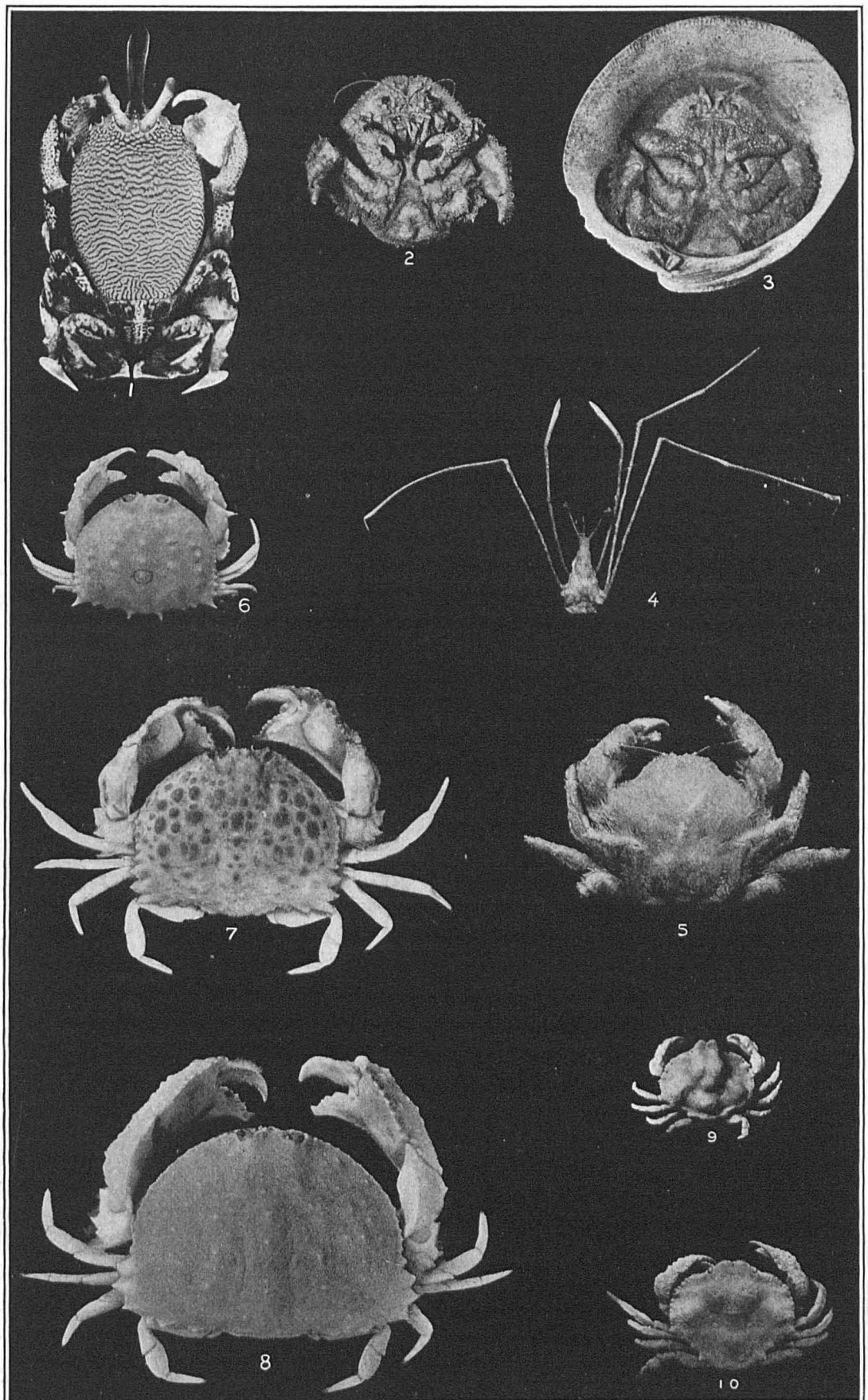
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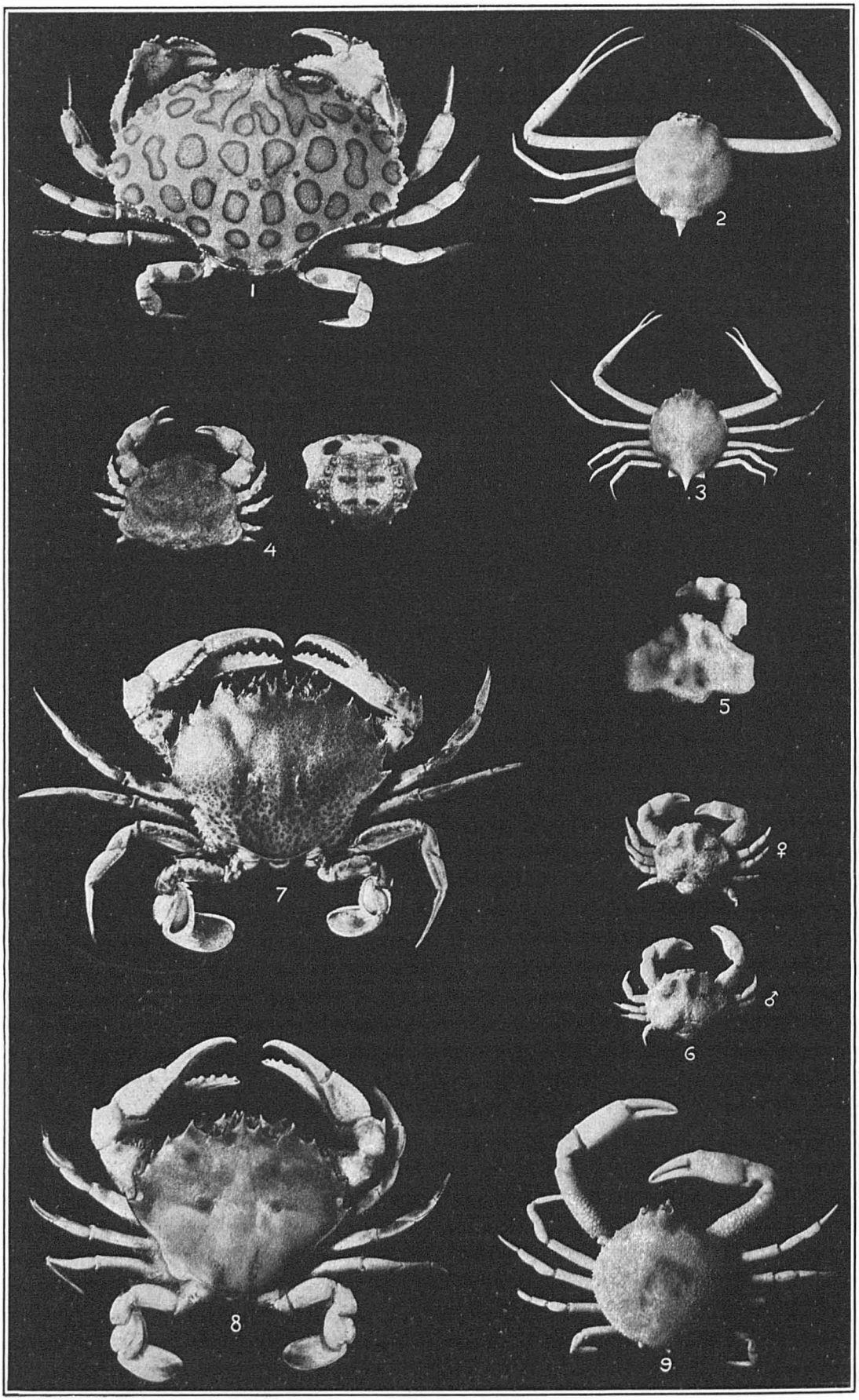
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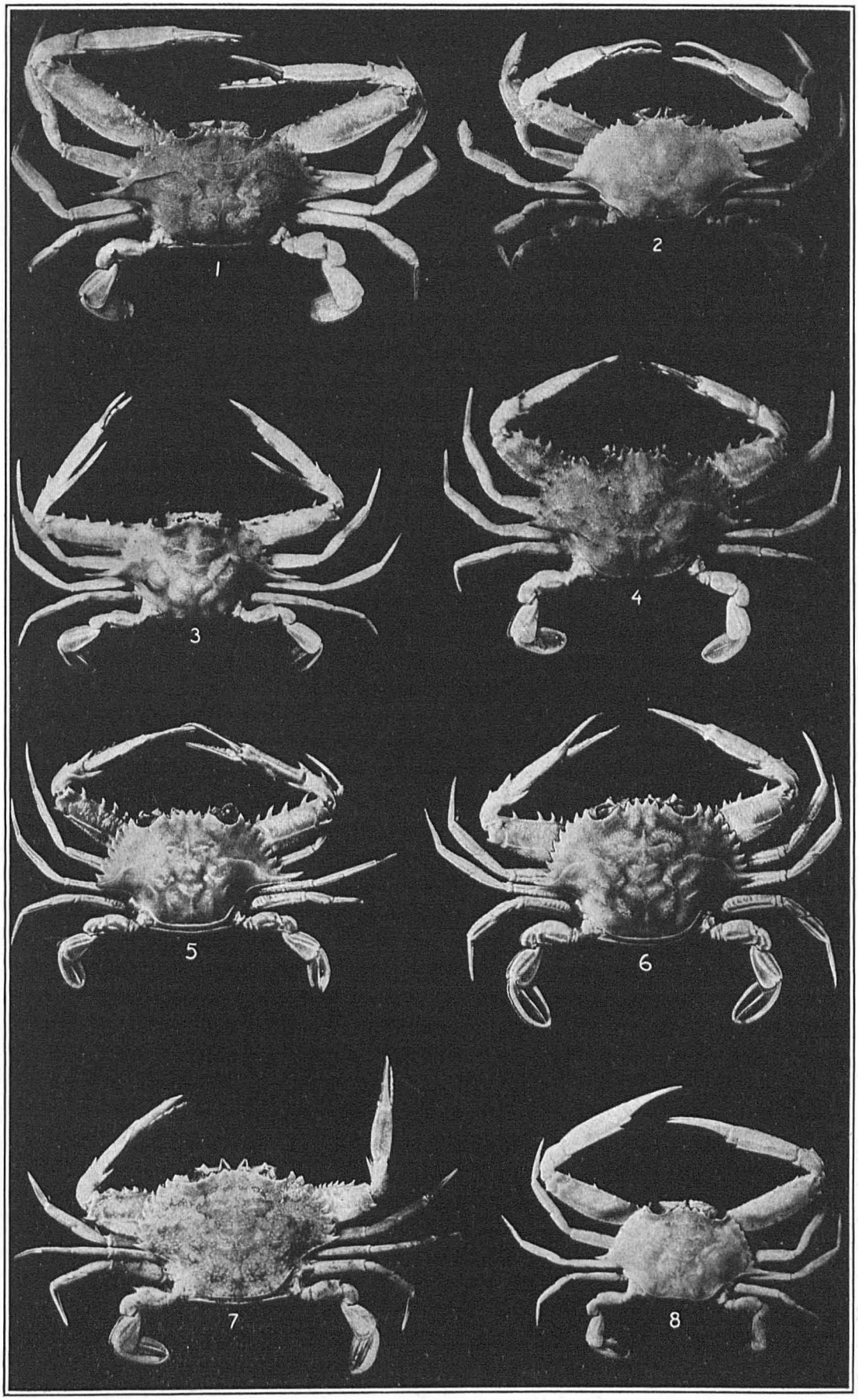
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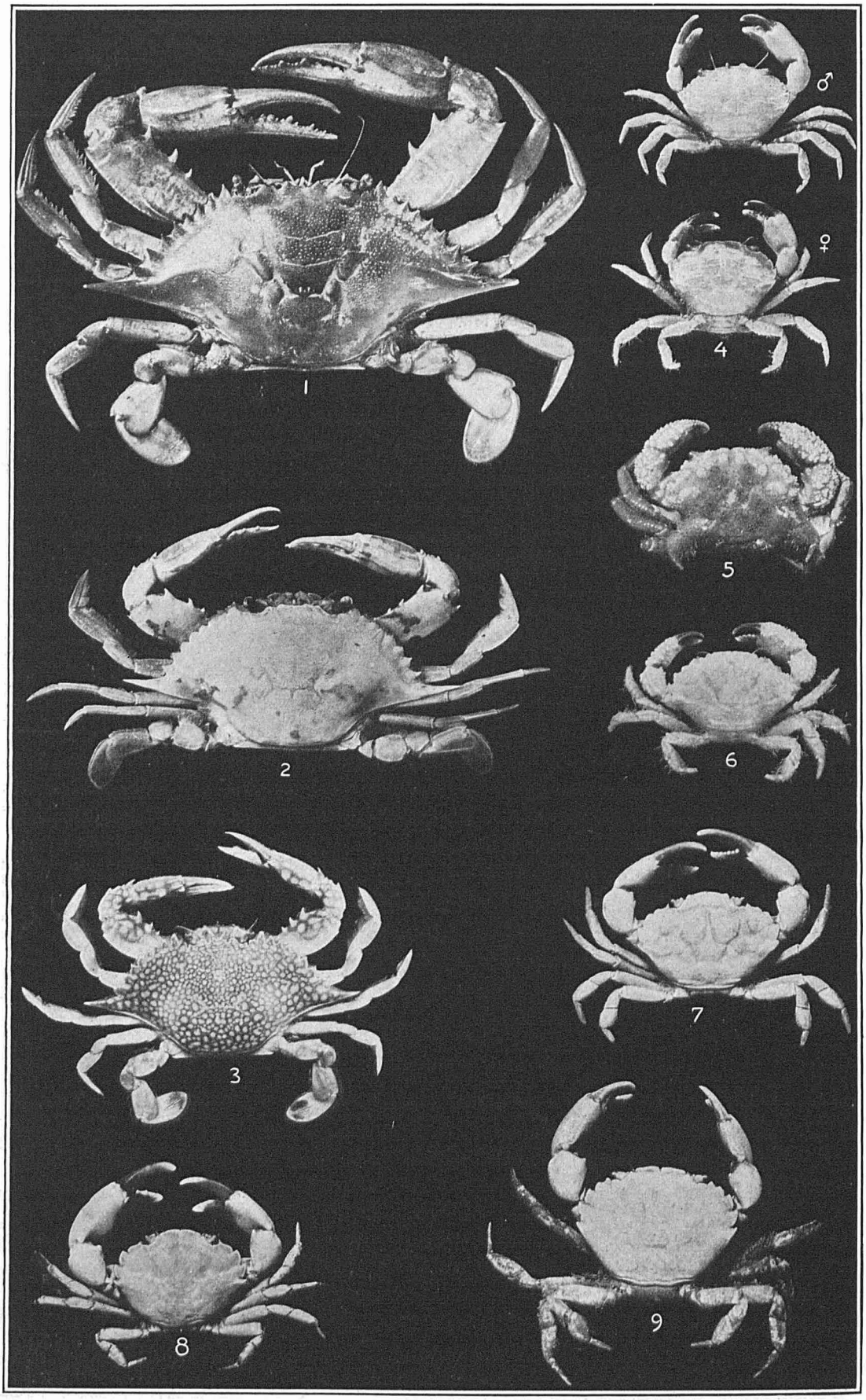
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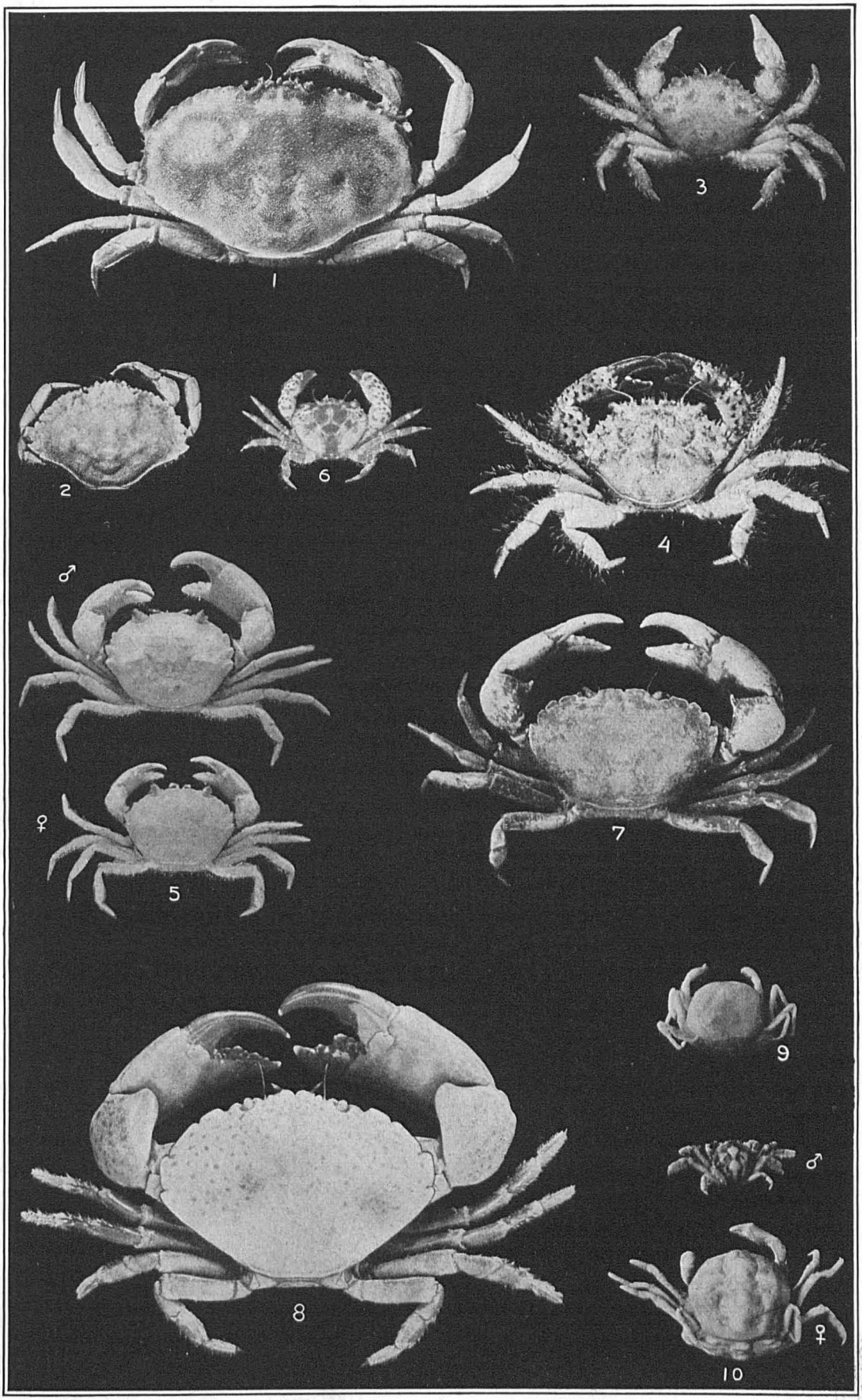
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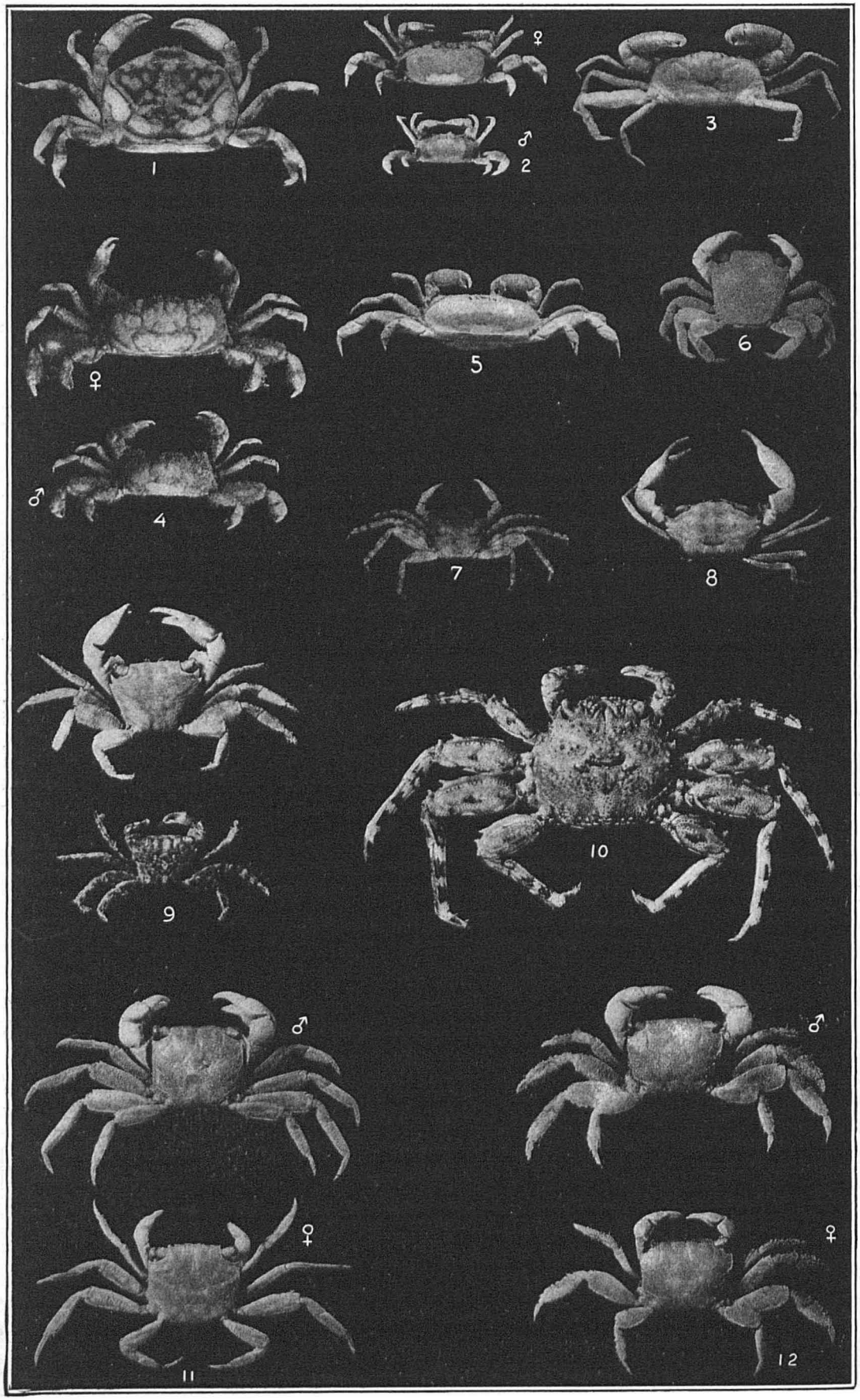
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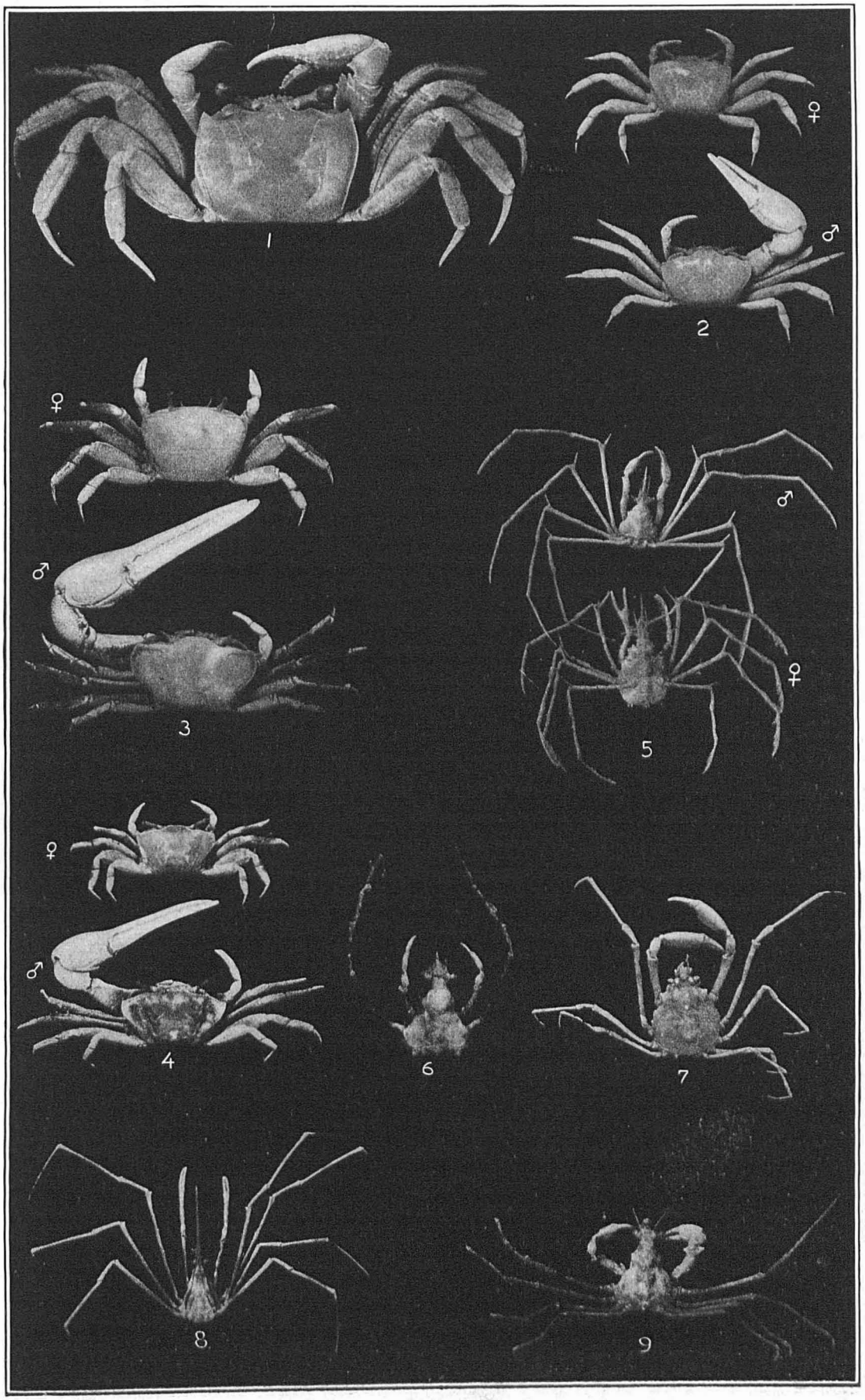
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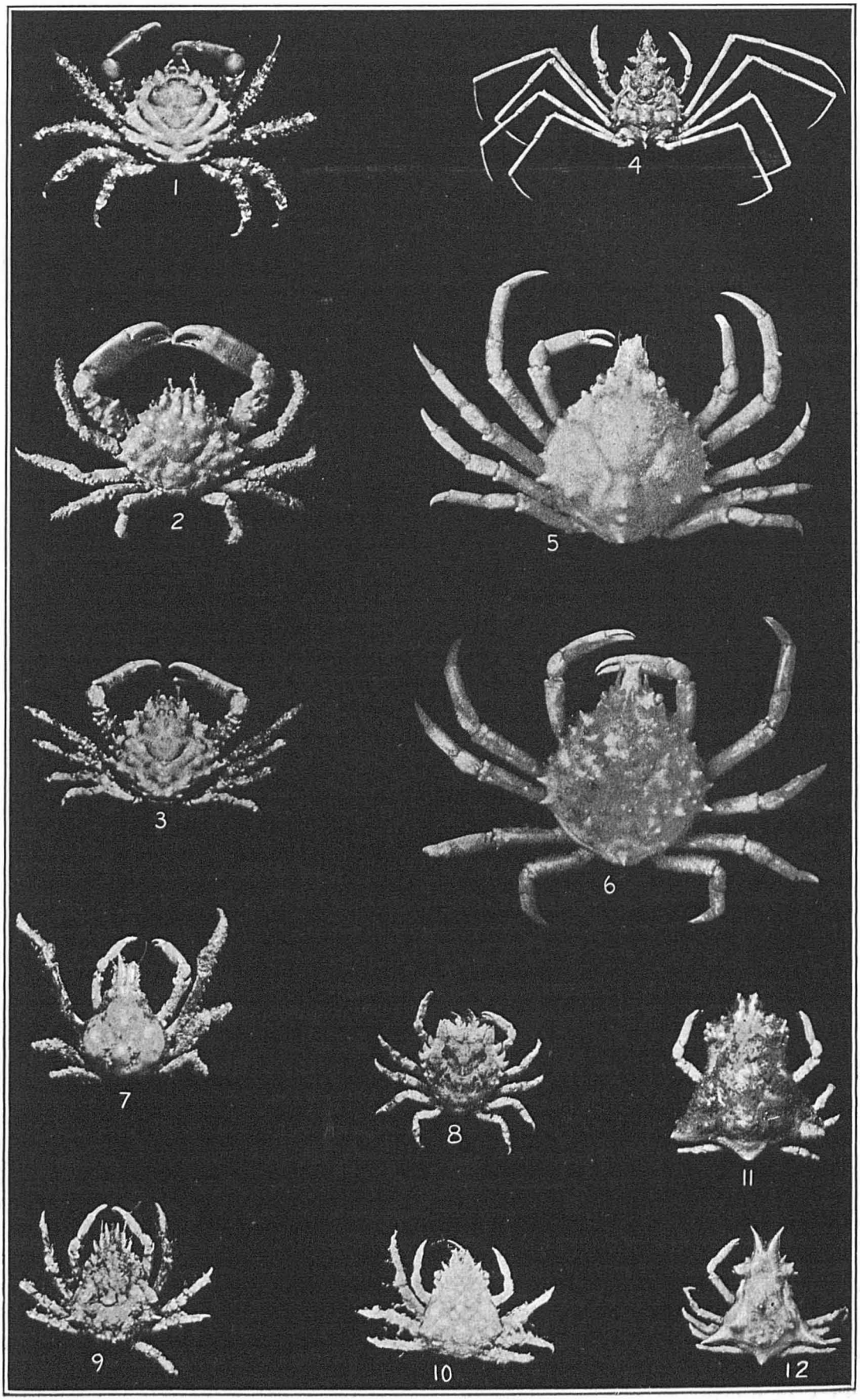
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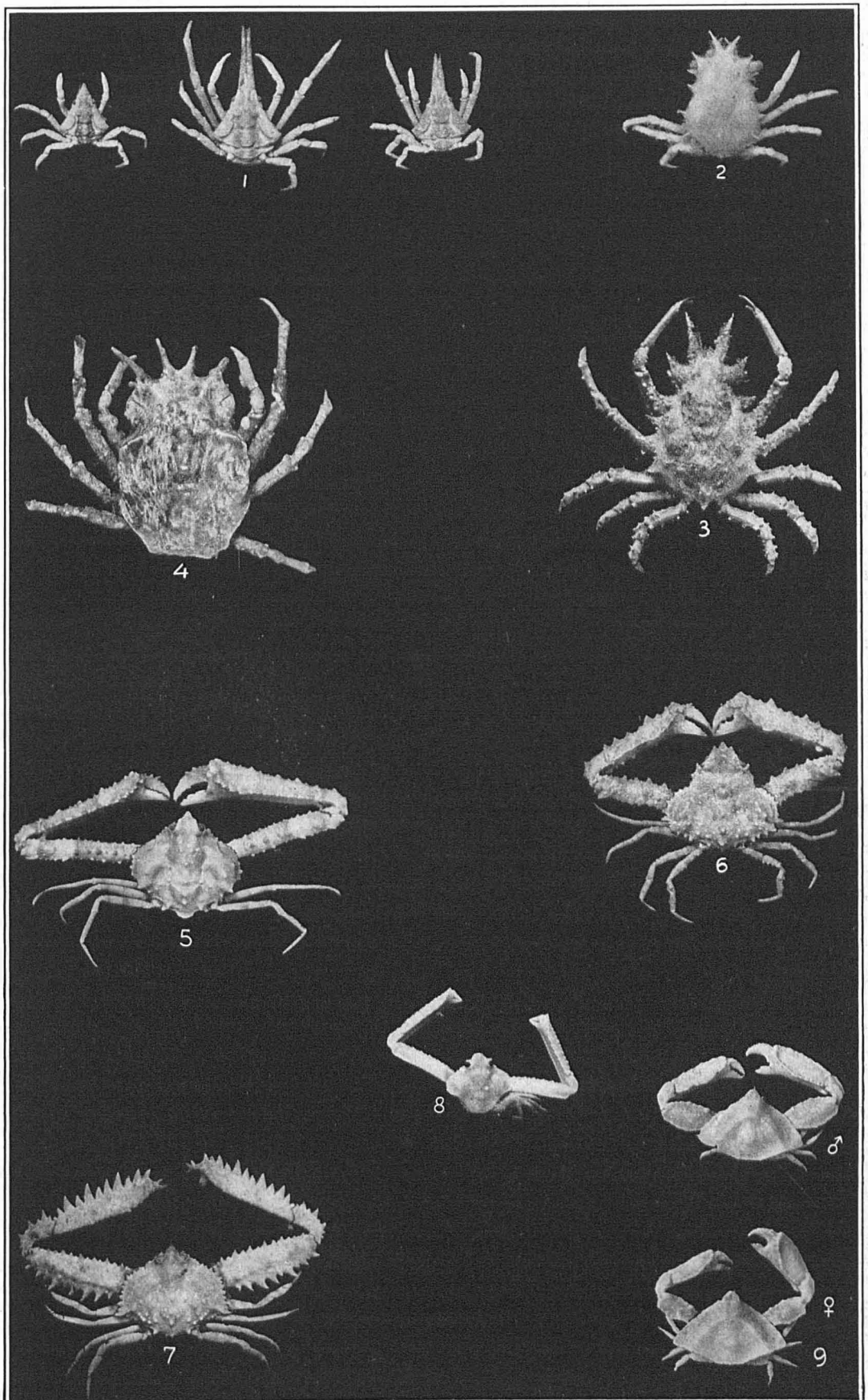
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