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THE DECAPOD CRUSTACEANS OF ALLIGATOR HARBOR AND ADJACENT INSHORE AREAS OF NORTHWESTERN FLORIDA ¹

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The general paucity of organized information on the decapod Crustacea of the northeastern Gulf coast and the evidence that inshore waters of the area support a rich fauna led the writer to undertake this study. The work was begun in the summer of 1952 and completed a year later. Data has been gathered on the distribution and habitats of the *Decapoda* of shallow waters in the general area of Alligator Harbor, Franklin County, Florida, and a key has been prepared to the species collected.

HISTORICAL

Among the earliest collections of marine Crustacea from Florida is that made by Professor H. E. Webster, reported by Kingsley (1879). Webster collected along the Gulf coast south of Sarasota. Ives (1891) lists some decapods collected between Cedar Keys and the mouth of the Caloosahatchie river in 1886. Hemphill did considerable collecting south of Cedar Keys, and Stearns, who obtained most of his material from fish stomachs, was the source of many records from Pensacola prior to 1900; both of these collections were reported on in part by Rathbun (1918, 1925, 1930, 1937).

Offshore collections were made by the *Albatross* in 1885 and by the *Fish Hawk* in 1901 and 1902. The *Pelican* made some collections in 1939, but apparently only the shrimps of the family *Palaemonidae* have been reported on (Holthuis, 1951, 1952).

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Burkenroad (1934, 1939) has made important contributions concerning the family *Penaeidae* in the Gulf, mostly off Louisiana. Schmitt (1935a) described two new species of mud shrimps from Grande Isle; both are abundant along Alligator Point. A list of the fauna of the Grande Isle region (Behre, 1950) included 69 species of decapods. Chace (1942) described two small shrimps from Sanibel Island; one of these is common in Alligator Harbor. McRae (1950) studied the xanthid crabs of the Cedar Key area.

One of the few thorough studies of a decapod fauna comparable to that found in the northeastern Gulf is the survey of the species found at Beaufort, North Carolina, by Hay and Shore (1918).

THE AREA STUDIED

All decapods reported here were collected in water less than about 35 feet deep off Franklin and Wakulla counties in northwestern Florida. In certain areas, including Alligator Harbor, the Gulf beach of Alligator Point, the bottom near whistle buoy 26 (about 10 miles southeast of Alligator Point), and the area near St. Marks Light, collecting was more intensive than it was in other parts of the region.

Alligator Harbor is a shallow bay, open only at one end, formed by Alligator Point. The salinity is essentially the same as that of adjacent inshore Gulf waters, as there are no important freshwater streams entering the bay. Salinity records usually range from 28 to 34 ^{parts} per thousand. The bottom is principally muddy sand and supports extensive beds of marine phanerogams of three species, *Thalassia testudinum* Koenig and Sims, *Cymodocea manatorum* Aschers, and *Halodule wrightii* Aschers. Much of the upper (eastern) part of the bay is covered by algae, often unattached, of the genus *Cladophora*. During spring and summer *Spyridia* and *Chondria* are abundant. Intertidal oyster bars occur along the mainland shore of the bay opposite the Alligator Harbor Laboratory. Drum Creek is a meandering tidal stream that originates in a salt marsh behind Drum Point just west of the laboratory.

The Gulf beaches of Alligator Point and Dog Island, about 10 miles southwest, were the source of several species not found elsewhere. Rocky spots in 8-10 feet of water 4-5 miles ESE of St. Marks Light were an important source.

Whistle buoy 26, about 10 miles southeast of Alligator Point in the open Gulf, marks an area of scattered sponges and coral heads in 30 to 35 feet of water where many species were collected.

Much collecting was done by means of dredges, trawls, and diving equipment operated from aboard the laboratory motor vessels *Sea Quest* and *Dolphin*. Fish stomachs from offshore were occasionally examined. Burrowing species were obtained by digging and by collecting in the surf.

KEY TO THE DECAPOD CRUSTACEA OF THE
ALLIGATOR HARBOR AREA ²

- 1. General form shrimp-like; cephalothorax and abdomen usually compressed laterally. (Suborder Natantia) 2
 General form lobster-like or crab-like; cephalothorax and abdomen usually depressed. (Suborder Reptantia) 29
- 2. Pleura of second segment of abdomen not overlapping those of the first segment. (Tribe Panaeidea) 3
 Pleura of second segment of abdomen overlapping those of the first segment. (Tribe Caridea) 10
- 3. First three pairs of legs chelate, all of the legs well developed
 PENAEBIDAE 4
 None of the legs chelate, last two pairs small or wanting ...SERGESTIDAE
Lucifer faxoni
- 4. Integument thin; abdomen smooth, not carinate anteriorly 5
 Integument rigid; abdomen more or less carinate throughout its length and marked with furrows 8
- 5. Endopodite of first maxilla elongate and segmented; rostrum with ventral teeth 8
 Endopodite of first maxilla short and unsegmented; rostrum without ventral teeth 7
- 6. Dorsal carina about 2/3 length of carapace, with bordering lateral grooves about 1/2 length of carapace; flagellum of second antenna twice the body length *Penaeus setiferus*
 Dorsal carina of carapace extending from rostrum nearly to posterior margin and bordered on each side by a deep groove; flagellum of second antenna less than twice the body length *Penaeus duorarum*
- 7. Rostrum with long styliform tip, five dorsal teeth near base; posterior pereopods with long feeler-like tips *Xiphopeneus kroyeri*

² Only a small part of the material in this key is strictly original. Most of it has been compiled from keys or descriptive material published by the following authors: Anderson and Lindner, 1943; Burkenroad, 1934, 1939; Chace, personal communications; Coutiere, 1909; Hay and Shore, 1918; Holthuis, 1951, 1952; Lunz, 1937, 1945; Rathbun, 1918, 1925, 1930, 1933, 1937; and Schmitt, 1930, 1935a, 1935b.

(A glossary of terms used will be found at the end of this key.)

- Rostrum short and bearing usually 7 (7-9) equidistant teeth above; posterior pereopods not feeler-like *Trachypeneus constrictus*
8. A sharp spine on anterior margin of carapace below eye; dorsal carina of second abdominal segment not notched 9
 Angle below eye unarmed; a notch in dorsal carina of second abdominal segment *Sicyonia laevigata*
9. Dorsal carina of carapace with 3 or 4 teeth behind orbital margin, of which 3 are large and placed far behind orbit *Sicyonia brevirostris*
 Dorsal carina of carapace with 2 or 3 teeth behind orbital margin, of which 2 are large and placed far behind orbit *Sicyonia typica*
10. Carpus of second pair of legs annulated 11
 Carpus of second pair of legs not annulated ... PALAEMONIDAE 23
11. Eyes covered by the carapace CRANGONIDAE 12
 Eyes not covered by the carapace HIPPOLYTIDAE 18
12. Hand of large cheliped compressed; species most common in shallow water 13
 Hand of large cheliped cylindrical; species usually found in deeper water 14
13. Orbital lobes forming tooth-like projections; propodus of major cheliped not notched below *Alpheus normanni*
 Orbital lobes rounded; propodus of major cheliped notched on both margins *Alpheus heterochaelis*
14. Dactyls of last three pairs of feet with two unequal hooks, ventral hook always stronger *Synalpheus fritzmuelleri*
 Dactyls with two hooks approximately equal in width at base 15
15. Dactyls long and slender, hooks directed with the axis of the dactyl, little curved, the dorsal hook longer 16
 Dactyls short, hooks strongly curved, nearly equal in length 17
16. Frontal teeth longer than wide and spinous *Synalpheus townsendi*
 Frontal teeth squarish *Synalpheus minus*
17. Fingers of the small chela each armed with three strong flat teeth, crossed in a vertical plane; movable finger of the large hand greatly over-reaching the immovable finger *Synalpheus pectiniger*
 Fingers of the small chela with only two teeth; movable finger of the large hand little longer than the immovable finger
 *Synalpheus longicarpus*
18. Carpus of second pair of legs with two to five annuli 19
 Carpus of second pair of legs with many annuli
 *Hippolysmata wurdemanni*
19. Rostrum exceeding the eyestalks 20
 Rostrum not exceeding the eyestalks *Thor floridanus*
20. Series (5-9) of small spines along anterior margin of carapace below the eye 21
 Single spine on carapace behind base of antenna but none below that 22

21. Carapace and rostrum unarmed above except for a small median spine on gastric region *Latreutes fucorum*
 Carapace strongly humped and armed with five or six spiniform teeth, first at about the middle of the carapace, last above the cornea
 *Latreutes parvulus*
22. Rostrum almost twice as long as carapace proper, smooth above, serrate below *Angasia carolinense*
 Rostrum much shorter, with two or three spines above and three below
 *Hippolyte pleuracantha*
23. Propodi of second pair of legs swollen markedly 24
 Propodi of second pair of legs not swollen 25
24. One hand enlarged much more than the other..... *Periclimenaeus wilsoni*
 Both hands swollen to a lesser extent *Typton tortugae*
25. Rostrum with teeth above and below 26
 Rostrum unarmed below except for one or two minute teeth near tip
 *Periclimenes longicaudatus*
26. Rostrum directed straight forward, not noticeably upcurved, armed with 2 - 5 teeth below 27
 Rostrum upcurved distally, armed with 5 - 9 teeth below
 *Palaemon floridanus*
27. Second pair of legs long, with both fingers notched on inner edges, causing a conspicuous gap *Periclimenes americanus*
 Second pair of legs normal; shrimps more common in brackish waters 28
28. Dorsal teeth of rostrum reaching up to apex which often is bifid
 *Palaemonetes intermedius*
 Dorsal margin of rostrum with an unarmed stretch before tip, thereby dagger-shaped *Palaemonetes pugio*
29. Carapace not fused with the epistome; antennae inserted laterad to the eyes; uropods present (except in Lithodidae), but often greatly modified. (Tribe Anomura) 30
 Carapace fused with the epistome, at least at the sides; antennae inserted mediad to the eyes; uropods usually absent, rarely vestigial (Dromiidae and Dynomenidae). (Tribe Brachyura) 49
30. Abdomen symmetrical and covered with an exoskeleton for the most part 31
 Abdomen unsymmetrical and generally unprotected; tail fan adapted for holding the body in hollow objects PAGURIDAE 40
31. Abdomen flexed beneath the cephalothorax; cephalothorax depressed or subcylindrical 32
 Abdomen extended, lobster-like; cephalothorax compressed laterally
 CALLIANASSIDAE 33
32. Second to fourth legs normal, crab-like; tail fan well developed and adapted for swimming PORCELLANIDAE 35
 Second to fourth legs with the last joint curved and flattened; tail fan not adapted for swimming. (Superfamily Hippidca) 48

33. Rostrum small; chelipeds dissimilar and unequal 34
 Rostrum large; chelipeds similar and subequal *Upogebia affinis*
34. Inner uropods narrow, about four times as long as broad *Callianassa islagrande*
 Inner uropods about twice as long as greatest width *Callianassa jamaicense louisianensis*
35. Carapace depressed; cheliped large 36
 Carapace subcylindrical, much longer than broad; chelipeds small *Euceramus praelongus*
36. Carapace subcircular, about as broad as long; chelipeds broad and flat 37
 Carapace oval, broader than long; hands slender and distorted *Polyonyx macrocheles*
37. Basal article of antenna little developed, flagellum not excluded from the orbit 38
 Inner angle of basal article of antenna expanded to meet the superior margin of the carapace, excluding the flagellum from the orbit 39
38. Body and appendages comparatively smooth *Porcellana sayana*
 Body and legs with numerous tuberculate elevations *Porcellana sorjata*
39. Carpus armed with three, low, distant, spine-tipped teeth *Petrolisthes armatus*
 Carpus armed with four teeth or lobes, not including antero-external angle *Petrolisthes galathinus*
40. Chelipeds subequal, or the right one is slightly larger than the left 41
 Left cheliped much larger than the right 45
41. Paired appendages absent on the first abdominal segment of both sexes 42
 Paired appendages present on the first two abdominal segments of the male and, in most species, on the first segment of the female 44
42. Fingers of chelipeds opening and closing horizontally 43
 Fingers opening and closing obliquely or nearly vertically *Petrochirus bahamensis*
43. Fingers spooned; antennal flagellum long and not setose *Clibanarius vittatus*
 Fingers acuminate; antennal flagellum short and much ciliated *Isocheles wurdemanni*
44. Rostrum prominent; paired appendages present on first abdominal segment of female; head appendages white, ringed with black *Paguristes tortugae*
 Rostrum rudimentary; no paired appendages on abdomen of female; conspicuous blue spot, bordered distally with black, white, and yellow, on merus of chela *Paguristes hummi*
45. Eyestalks with cornea dilated 46
 Eyestalks with cornea not dilated *Pagurus annulipes*

46. Hands broad and flat	47
Hands subcylindrical; chelipeds slender	<i>Pagurus longicarpus</i>
47. Chelae light-colored, with flat surface	<i>Pagurus floridanus</i>
Chelae brick red, a pit or dimple on surface of each at base of immovable finger	<i>Pagurus impressus</i>
48. First pair of legs simple, carapace subcylindrical	HIPPIDAE
.....	<i>Emerita talpoida</i>
First pair of legs subchelate; carapace depressed.	ALBUNEIDAE
.....	<i>Lepidopa benedicti</i>
49. Anterior thoracic sterna not unusually broad, posterior thoracic sterna not keel-like	50
Anterior thoracic sterna very broad, posterior thoracic sterna narrow and keel-like.	RANINIDAE
.....	<i>Ranilia muricata</i>
50. Mouth field prolonged forward to form a groove	51
Mouth field roughly quadrate	54
51. Front of body not specially produced and upturned; eyes of normal size.	CALAPPIDAE
.....	52
Front of body produced into a projecting, upturned mass, bearing the small eyes closer together.	LEUCOSIIDAE
.....	53
52. Posterolateral region of the carapace expanded and dentate	<i>Calappa flammea</i>
Posterolateral region of the carapace not expanded	<i>Hepatus epheliticus</i>
53. Only three spines on posterior and lateral margins of the carapace	<i>Persephona punctata aquilonaris</i>
Nine short lateral and posterior tubercles	<i>Persephona crinita</i>
54. Last pair of legs abnormal, dorsal.	DROMIIDAE
.....	55
Last pair of legs normal	56
55. Carapace convex, pilose	<i>Dromidia antillensis</i>
Carapace flat, membranous above	<i>Hypoconcha arcuata</i>
56. Carapace circular or quadrate, usually broader than long; rostrum wanting	57
Carapace, triangular, with the apex projecting forward and forming a rostrum	95
57. Free-living crabs with well-developed eyes and firm, hard carapace	58
Small commensal crabs with very small eyes and orbits	86
58. Carapace elliptical, rounded anteriorly	59
Carapace approximately quadrilateral, front region curved downward	78
59. Distal articles of last pair of legs flattened for swimming.	PORTUNIDAE
.....	60
Distal articles of last pair of legs not flattened.	XANTHIDAE
.....	66
60. Carapace very broad, antero-lateral teeth nine	61
Carapace not very broad, antero-lateral teeth five	<i>Ovalipes ocellatus guadulpensis</i>

- 61. Palate with a longitudinal ridge; color in life, various hues of green, blue, and brown 62
 Palate without a longitudinal ridge; color in life, cream with brick red spotting *Arenaeus cribrarius*
- 62. Abdomen of male triangular 63
 Abdomen of male \perp -shaped, last two segments much narrower than the basal segments 65
- 63. Carapace wide; antero-lateral margin the arc of a circle whose center is near the posterior margin of the carapace; a round bare spot on postero-lateral slope of carapace *Portunus gibbesi*
 Carapace narrow; antero-lateral margin the arc of a circle whose center is near the center of the cardiac region; no round bare spot on postero-lateral slope of carapace 64
- 64. Interocular teeth eight, the inner orbital bilobed.....*Portunus spinimanus*
 Interocular teeth six, the inner orbital tooth entire
 *Portunus depressifrons*
- 65. Frontal teeth, including the inner orbitals, four *Callinectes sapidus*
 Frontal teeth, including the inner orbitals, six *Callinectes danae*
- 66. Frontal margin not transversely grooved 67
 Frontal margin transversely grooved *Leptodius floridanus*
- 67. Ambulatory legs and carapace not markedly spinulose, granular, or hairy 68
 Ambulatory legs usually spinulose, granular, or hairy 75
- 68. Carapace more or less hexagonal; anterolateral teeth well developed 69
 Carapace transversely oval; anterolateral teeth not strong; fingers of minor cheliped spooned *Eurypanopeus depressus*
- 69. Movable finger of major chela with large basal tooth 70
 Movable finger of major chela without large basal tooth
 *Neopanope texana texana*
- 70. Anterolateral teeth sharp-pointed 71
 Anterolateral teeth not sharp-pointed 74
- 71. Carapace crossed by broken, transverse, raised, granulated lines on anterior half 72
 Carapace not crossed by transverse raised lines 73
- 72. Sixth segment of male abdomen much broader than long; chelipeds very unequal, color of immovable finger running slightly back on palm; fingers of minor cheliped partially spooned *Panopeus turgidus*
 Sixth segment of male abdomen very little broader than long; color of immovable fingers running well back on palm in male; fingers of minor cheliped not spooned *Panopeus herbsti*
- 73. Front arcuate, forming a regular curve with anterolateral margins. Second anterolateral tooth lobiform, separated from the first by a shallow sinus *Neopanope packardi*
 Front narrow and extending beyond curve of anterolateral margins. Anterolateral teeth evenly produced *Hexapanopeus angustifrons*

74. Third to fifth segments of male abdomen fused; fingers white *Eurytium limosum*
 All seven segments of male abdomen distinct; fingers black *Menippe mercenaria*
75. Anterolateral borders with spines or spine-tipped teeth 76
 Anterolateral teeth not spine-tipped *Micropanope pusilla*
76. Carapace and chelipeds spinulose 77
 Carapace granulose anteriorly, pubescent posteriorly; chelipeds granu-
 lose *Lobopilumnis agassizi*
77. Two or more superhepatic spines; long spines dark-colored; ground
 color varying from orange in young to dark red in adults *Pilumnus sayi*
 No superhepatic spines; major palm smooth or bare on outer surface;
 ground color more drab *Pilumnus dasypodus*
78. Carapace with three, sharp anterolateral spines. Species found in water.
 GONEPLACIDAE *Euryplax nitida*
 Anterolateral spines minute. Species normally found on land 79
79. Front broad, eyestalks of moderate length or short; outer maxillipeds
 do not conceal central part of mouth opening. GRAPSIDAE 80
 Front of moderate width, eyestalks long; outer maxillipeds almost com-
 pletely conceal mouth opening. OCYPODIDAE 81
80. Lateral margin of carapace with a tooth behind the outer orbital tooth;
 body strongly convex above; inhabits salt marshes .. *Sesarma reticulatum*
 Lateral margin of carapace without a tooth behind the outer orbital
 tooth; body nearly flat above; inhabits beaches above the drift line
 *Sesarma cinereum*
81. Eyestalks slender; chelipeds of male very unequal 82
 Eyestalks stout; chelipeds of male nearly equal *Ocypode quadratus*
82. Anterior part of side margins convex and curving gradually back-
 wards 83
 Anterior part of side margins almost straight, continuing backward with
 an angular turn *Uca speciosa*
83. An oblique tuberculate ridge on inner surface of larger palm of male
 extending upward from lower margin 84
 No oblique tuberculate ridge on inner surface of palm *Uca pugilator*
84. Front wide, at least 1/3 of fronto-orbital width; leg joints red; found
 along brackish streams *Uca minax*
 Front narrower; less than 1/3 of fronto-orbital width; carapace in life,
 greenish black; lives in muddy areas *Uca pugnax rapax*
85. Dactyli of the walking legs simple, acute 86
 Dactyli of first three walking legs bifurcate 93
86. Third walking leg little, if any, longer than the other legs 87
 Third walking leg longer and stronger than the others, often consider-
 ably so 88

87. Palpus of outer maxilliped small, not nearly half as large as merus
 *Pinnotheres strombi*
 Palpus of outer maxilliped large, nearly or quite half as large as merus
 *Pinnotheres maculatus*
88. Carapace with a ridge entirely across hinder part, behind which the
 surface slopes steeply down *Pinnixa chacei*
 Carapace without a ridge on back part or with a ridge on cardiac region
 only 89
89. Fourth leg when extended reaching end or beyond end of merus of
 third leg 90
 Fourth leg when extended not reaching end of merus of third leg
 *Pinnixa floridana*
90. Carapace less than twice as wide as long 91
 Carapace more than twice as wide as long 92
91. Propodus of third leg as wide as long or nearly so *Pinnixa cylindrica*
 Propodus of third leg distinctly longer than wide *Pinnixa retinens*
92. Single bilobed cardiac ridge present *Pinnixa pearsei*
 Two short ridges on cardiac region *Pinnixa chaetoptera*
93. Dorsal ridge oblique 94
 Dorsal ridge transverse *Dissodactylus stebbingi*
94. Dactyls of first three legs bifurcate half way to their base
 *Dissodactylus mellitae*
 Dactyls of first three legs bifurcate less than halfway to their base
 *Dissodactylus crinitichelis*
95. Chelipeds mobile, seldom much larger than the other legs.
 INACHIDAE 96
 Chelipeds not specially mobile, much larger than the other legs; carapace
 sharply triangular. PARTHENOPIDAE
96. Basal article of antenna extremely slender throughout its length; eyes
 without orbits and not concealed 97
 Basal article of antenna not slender, often very broad; eyes with orbits
 or capable of concealment 101
97. Carapace elongate, narrowed in front; external maxillipeds somewhat
 pediform, with the palp large and coarse, merus often narrower than
 ischium; basal article of antenna subcylindrical 98
 Carapace usually subtriangular; external maxillipeds with the merus as
 broad as the ischium and the palp small; basal article of antenna flattened
 or concave ventrally *Inachoides laevis*
98. Rostrum very long; dactyli of walking legs shorter than the propodites 99
 Rostrum short; dactyli of walking legs shorter than the propodites ... 100
99. Carapace smooth and even above; antennae concealed beneath the ros-
 trum; color, red, with black stripes *Stenorynchus seticornis*
 Carapace rough and uneven above; antenna long, flagella exposed
 *Metoporphaphis calcarata*

100. Dactyli of last three ambulatory legs curved, short, contained twice, or more than twice, in their respective propodites; cardiac prominence low; pterygostomian region protuberant, more or less compressed and prolonged in a tubercle at the middle; sternal segments of males separated by deep grooves *Podochela riisei*
 Dactyli of last three legs more than half as long as their respective propodites; cardiac prominence greater, spiniform; pterygostomian region with long, thin lamina produced downward; sternal segments of males flat, with sharp-edged margins *Podochela sidneyi*
101. Basal article of antenna of moderate width; orbits incomplete, never entirely concealing the cornea 102
 Basal article of antenna very broad; orbits always complete enough to conceal the retracted cornea from dorsal view; eyestalks usually long 106
102. Eyes with orbits, having a large, cupped postocular process into which the eye is retractile 103
 Eyes without true orbits; carapace oblong with two lateral lobes; rostrum slightly bilobed at tip *Epialtus dilatatus forma elongata*
103. Supraocular eave in close contact with the postocular process; spines and tubercles on the carapace 104
 Supraocular eave not in close contact with the postocular spine; small crab with smooth, evenly rounded carapace *Pelia mutica*
104. Median spines six, tubercles few 105
 Median spines of carapace nine; tubercles numerous, unevenly placed *Libinia emarginata*
105. Fork of rostrum in adult shallow, horns blunt; lateral marginal spines in young large *Libinia dubia*
 Fork of rostrum in young deeper, horns acute, curved toward each other. Lateral marginal spines small except for the posterior one, which is long and slender *Libinia erinacea*
106. Orbits projecting sideways beyond the general outline of the carapace and often tubular; legs not cristate 107
 Orbits not projecting sideways beyond the general outline of the carapace; cardiac prominence high, crenulate plates on legs *Hemus cristulipes*
107. Carapace not truncate anteriorly 108
 Carapace broadly truncate anteriorly; orbits facing forward; rostrum minute *Pitho anisodon*
108. Carapace ovate, as broad as long; orbits not tubular 109
 Rostrum large, usually with two strong horns 110
109. Carapace without smooth, oblique branchial sulci *Mithrax pleuracanthus*
 Carapace with smooth, oblique, branchial sulci *Mithrax forceps*
110. Orbits tubular, strongly projecting; basal antennal article very broad 111
 Orbits little projecting; basal antennal article moderately broad, armed with a prominent spine at anteroexternal angle *Microphrys bicornutus*
111. Rostral horns adjacent and subparallel at base. Four dorsal bosses, each with a sharp tubercle at tip 112

- Rostral horns divergent from base. Dorsal protuberances spiniform
 ----- *Macrocoeloma camptocerum*
112. Posterolateral projections narrow, spinelike.....*Macrocoeloma trispinosum*
 Posterolateral projections very broad, their margins continuous with marginal lines of carapace ----- *Macrocoeloma trispinosum nodipes*
113. Carapace not laterally expanded over the ambulatory legs
 ----- *Parthenope serrata*
 Carapace more or less expanded to form a vault in which the ambulatory legs are concealed ----- *Heterocrypta granulata*

GLOSSARY OF TERMS USED IN THE KEY

- Ambulatory legs—legs used for walking rather than feeding (cheli-peds), swimming, or cleaning.
- Annuli—rings or joints.
- Antennae—styliform tactile organs placed laterad to the smaller antennules.
- Article—joint; often used synonymously with annulus.
- Branchial region—lateral area of the carapace extending from the hepatic region to the posterior border.
- Carapace—part of shell covering the cephalothorax.
- Cardiac region—median area of the carapace located behind the cervical suture and ahead of the intestinal (last) region.
- Carina—a keel-like prominence.
- Carpus—(wrist) fifth segment of leg or maxilliped.
- Chelae—forceps-like pinching claws, the last two segments of the cheliped.
- Crenulate—minutely scalloped.
- Dactyl—movable finger of chela or terminal segment of pereopod.
- Endopodite—inner or main branch of an appendage.
- Epistome—narrow structure between the mouth parts and the antennular bases.
- Flagellum—styliform terminal process of an antenna or antennule.
- Front—usuall, the anterior border of the carapace between the orbits; sometimes, the anterior margin between the anterolateral extremities.
- Gastric region—median area of the carapace between the cardiac and frontal regions.
- Hepatic region—small anterolateral region between the epibranchial and orbital regions.
- Interocular teeth—projections of the carapace between the eyes.
- Ischium—Third segment (from the body) of a leg or maxilliped.

- Maxillipeds—the three outermost pairs of masticatory organs.
- Merus—fourth segment (from the body) of a leg or maxilliped.
Usually the first long segment of a cheliped.
- Orbital lobes or teeth—the first of the anterolateral teeth behind the orbits.
- Palp—last two or three joints following the merus joint of a maxilliped.
- Palate—roof of the mouth.
- Pediform—foot-shaped.
- Pereiopods—the chelipeds and walking legs.
- Pilose—covered with soft hair.
- Pleopods—appendages on the underside of the abdomen.
- Pleura—lateral plates of the abdominal segments of a shrimp.
- Postocular process—equivalent to the orbital tooth or postorbital spine.
- Propodus—sixth segment of a leg or maxilliped. In a cheliped, the palmar portion or manus and the immovable finger.
- Pterygostomian region—triangular space on the ventral surface of the carapace, on either side of the buccal cavity.
- Rostrum—forward projection of the carapace between the bases of the eyestalks.
- Sterna—plates on the ventral surface of the thorax.
- Styliform—developed into a slender process.
- Subchelate—imperfectly chelate, the terminal segment folding back against the next one.
- Subcylindrical—approaches a cylindrical form.
- Sulci—furrows or grooves.
- Tail fan—posterior appendages of the abdomen usually used in swimming backward; found in most *Macrura* and *Anomura*.
- Telson—central appendage of the tail fan.
- Truncate—the end cut off even; not tapering.
- Uropods—appendages of the tail fan flanking the telson.

ANNOTATED LIST OF SPECIES

Suborder NATANTIA

Tribe PENAEIDEA

Family PENAEIDAE

Penaeus setiferus (Linnaeus). (3, 8).³ The white shrimp is the most important commercial species of the Apalachicola fishery (Idyll, 1950). It is often taken in abundance in Mud Cove, on the outer beach of Alligator Point. None were taken in Alligator Harbor during this study.

Penaeus duorarum Burkenroad. Grooved shrimp are less abundant along the Gulf Beach of Alligator Point, although juveniles are often abundant in the bay. Approximately 100 of medium size were taken by a single pull of a 30-foot minnow seine near the laboratory pier on July 6, 1952. Larger individuals were found during winter months. The closely related *P. aztecus*, abundant off Louisiana, is said to occur in commercial catches at Apalachicola in the summer (Idyll, 1950).

Trachypeneus constrictus (Stimpson). This is a smaller species than the commercial shrimps. Two females, 59 and 66 mm in length, were taken 2 miles off Cape St. George Light on February 28, 1951. A 23 mm specimen was taken in Alligator Harbor, November 1, 1952.

Xiphopeneus kroyeri (Heller). (3, 32). Miles (1951) reported a catch of over 700 pounds of "sea bobs" in one trawl haul near Apalachicola, May 25, 1951. Because this species is small, shrimp fishermen usually avoid them if possible as there is no market in Florida at present. Burkenroad (1934) observed that *X. kroyeri* seldom enters inside waters of Louisiana, probably because of low salinity. None were found in Alligator Harbor during this study, although H. J. Humm observed a school under the laboratory pier in September, 1951. Four specimens collected by Miles ranged from 115 to 132 mm.

Sicyonia laevigata Stimpson. (8, 17). Hardbacks or coral shrimp (common names for the genus) prefer firm or irregular bottom and do not occur in schools. One specimen was taken in a dredge haul in the boat canal near St. Marks Light on a soft mud bottom.

³ Numbers refer to titles in the literature cited which contain figures or photographs of the species discussed.

Sicyonia brevirostris Stimpson, (8, 17). A single specimen was taken by trawl about 2 miles off Cape St. George Light on February 28, 1951, by Robley Miles. The length was 70 mm.

Sicyonia typica Boeck. (17, 32). A common species formerly known as *edwardsi*. A specimen taken near Carrabelle, February 18, 1950, was determined by Martin Burkenroad of the Texas Institute of Marine Science. Others have been taken along the breakwater at St. Marks Light, in Alligator Harbor, and in the Gulf off Alligator Point. Length of the largest specimen was 49 mm. Distinctive longitudinal patches of bright blue color occur on the outer uropods.

Family SERGESTIDAE

Lucifer faxoni Borradaile. (8). This holoplanktonic decapod occurs sparingly in Alligator Harbor and more abundantly in the Gulf proper. A 10-minute tow with a No. 10 plankton net near buoy 26 off Alligator Point produced 137 specimens ranging from 2 to 11.2 mm in length.

Tribe CARIDEA

Family CRANGONIDAE

Alpheus heterochaelis Say. (8, 32). This large snapping shrimp or pistol shrimp inhabits quiet, shallow water, especially oyster bars. Its loud snapping is often heard at low tide along Drum Creek. A pistol claw from one of these shrimps was found in the stomach of a grouper caught in 6 fathoms of water by H. J. Humm.

Alpheus normanni Kingsley. (8). Often found among colonies of the ascidian, *Styela plicata*, this is probably the most common of the snapping shrimps in Alligator Harbor. A few were also found near buoy 26.

Synalpheus minus (Say). (7, 8). Common in sponges in deeper water, especially near buoy 26. Two specimens, however, were found in an ascidian cluster in Alligator Harbor. Adults usually occur in pairs. The species is easily recognized by the red color of the distal third of the snapping claw. The body is yellow to yellow-green.

Synalpheus fritzmulleri Coutiere. (7). Twelve of these colorful shrimps were taken from a tube sponge, *Callyspongia vaginalis*, at

the edge of South Shoals, about 8 miles SE of Alligator Point, on March 12, 1953. The color in life has been well described by Schmitt (1930).

Synalpheus townsendi Coutiere. (7, 8). The most frequently taken snapping shrimp in the buoy 26 area. This species seems less dependent on sponges than the other members of the genus taken locally.

Synalpheus pectiniger Coutiere. (7). Smallest species of the genus recorded here, it was collected only once, when 13 specimens were taken from a large yellow sponge secured by trawl about 2 miles off the mouth of the Ochlockonee river on March 14, 1953. This shrimp was found only in channels near the periphery of the sponge and usually in pairs. *S. longicarpus* occurred throughout the sponge but never close to *S. pectiniger*.

Synalpheus longicarpus (Herrick). (7, 8). Although the most abundant snapping shrimp at Beaufort, N. C. (Hay and Shore, 1918), this species seems to be restricted to loggerhead sponges and a similar, yellow sponge in this area. Coutiere (1909) emphasized the variations of many species of this genus. A specimen taken four miles ESE of St. Marks Light lacked both a rostrum and projections of the orbital lobes. A total of 893 specimens, most of them small, were taken from the same sponge mentioned in the discussion of *S. pectiniger*. The sponge was about 700 cubic inches in volume. Only 10 of these specimens were ovigerous, possibly resulting from overcrowding of the habitat as suggested by Coutiere (1909) to explain a similar observation.

Family HIPPOLYTIDAE

Angasia carolinensis (Kingsley). (8, 32). The grass shrimp is found in beds of turtle grass, *Thalassia testudinum*, where it is often abundant. Ovigerous specimens were 28 to 42 mm long. This shrimp is usually green in color, occasionally brown, with the young translucent.

Hippolysmata wurdemanni (Gibbes). (8). The scarlet stripes of this shrimp provide an easy means of identification. It is usually encountered in clumps of algae, sponges, or ascidians and is widely distributed locally. The largest found was an ovigerous female 38 mm in length, which was taken January 7, 1950.

Hippolyte pleuracantha (Stimpson). (8). Ovigerous specimens of this tiny, translucent species ranged from 9.2 to 11.6 mm. It is abundant in shallow water among algae and eel grass.

Thor floridanus Kingsley. (14). Nine ovigerous specimens were found on a large plant of *Sargassum linifolium* growing on a rocky spot in ten feet of water, four miles ESE of St. Marks Light, August 17, 1952. Spawning had apparently just begun when 80 specimens, only three ovigerous, were taken from the same area, March 8, 1953. This shrimp has a very short rostrum and is almost as stocky as *Latreutes parvulus*; ovigerous specimens were 11 to 13.2 mm in length.

Latreutes parvulus (Stimpson). (8, 32). Twelve specimens of this shrimp were taken in the vicinity of Dog Island and near buoy 26; all were ovigerous and varied in length from 8.4 to 12.8 mm. They are usually associated with *Sargassum*, with which their mottled brown color blends. Fenner A. Chace, Jr., of the U. S. National Museum made the identification and provided the correct name for this species, which was formerly known as *Concordia gibberosus*.

Latreutes fucorum (Fabricius). (8, 32). *Sargassum* weed is also favored by this shrimp. Ovigerous specimens taken off the mouth of Ochlockonee Bay, March 14, 1953, were from 12.2 to 18.5 mm long. A single specimen was found in Alligator Harbor. The rostrums of those examined varied greatly as to length, depth, and number of spines.

Family PALAEMONIDAE

Periclimenes americanus (Kingsley). (9). This species is widely distributed in the area studied although it was never taken at the same time as the more numerous *P. longicaudatus*. Those from ESE of St. Marks Light were associated with *Sargassum*. Ovigerous females were taken from early March through August. The chelipeds have two dark bars at the bases of the dactyls and are unusually long, 12 mm on a specimen 14 mm long.

Periclimenes longicaudatus (Stimpson). (9). The translucence and small size of this shrimp cause it to be easily overlooked. It was not taken near St. Marks Light or buoy 26. Ovigerous females were taken in March and September.

Periclimenaeus wilsoni (Hay). (9). Pairs of this snapping shrimp occupy the canals of sponges. The major propodus is larger than

in any shrimps of the genus *Synalpheus* examined by the writer. For two pairs taken July 7, 1952, the ratio of the length of the propodus to that of the body was about one to four in the females and about two to three in the males. It has been reported previously only from Beaufort, N. C., and Tortugas, Florida (Holthuis, 1951).

Typton tortugae McClendon. (9). Two of these active little shrimps were found near the periphery of the same yellow sponge from which 893 *Synalpheus longicarpus* were taken. The hands are more nearly equal in size than in any other snapping shrimps so far found in this area. The chelae and dorsal part of the body are faintly orange in color and sprinkled with red spots. The movable finger of the chela and the tip of the fixed finger have dark borders. This species has not been reported previously north of Tortugas in the Gulf of Mexico.

Palaemon floridanus Chace. (10). This comparatively large member of the family was described (Chace, 1942) from specimens taken at Captiva Island, Florida. A number of these shrimps were observed hovering around a piling in the boat harbor near St. Marks Light, August 22, 1952; of 18 captured, 9 were ovigerous. Three specimens, two ovigerous, were taken in Alligator Harbor, April 28, 1950. One ovigerous specimen was 45 mm long.

Palaemonetes intermedius Holthuis. (10). Three specimens, 19 to 22 mm long, were taken in Alligator Harbor, January 14, 1950. They are much smaller than local specimens of the closely related *P. pugio*.

Palaemonetes pugio Holthuis. (10). This glass shrimp is abundant locally in brackish water. Forty specimens were seined from "tidal channels south of East River on the St. Marks Light road, 6.2 miles SSE of Newport" by R. W. Yerger and students, May 18, 1952. Two specimens, one ovigerous, were taken from drifting seaweed (*Gracilaria*) at the east end of the Apalachicola bridge, north side, February 18, 1953, by H. J. Humm. It is abundant in a landlocked, brackish pond near the Alligator Harbor Laboratory. A single specimen was taken in Alligator Harbor, April 4, 1953.

Family PORCELLANIDAE

Porcellana sayana (Leach). (32). A total of 28 were taken in dredge hauls near buoy 26 between October 18 and December 21,

1952; none was ovigerous. The largest was a male 12 mm long. George Grice collected 7 specimens near the mouth of the Ochlockonee River on October 31, 1954. Six of these, including a male 14 mm long, show the typical spotted coloration, but a single ovigerous female is cream-colored.

Porcellana soriata Say. (8). These warty little crabs are usually found in the interstices of sponges. Of 7 females taken from sponges of the genus *Ircinia* near buoy 26, July 7, 1952, 6 were ovigerous.

Petrolisthes armatus (Gibbes). This widely ranging anomuran crab is common in the Alligator Harbor area wherever it can find a hiding place in shallow water, especially on oyster bars. Although the species is common at Bermuda, it is not known from the east coast of the United States, except for a questionable record from Connecticut (Rathbun, 1905).

Petrolisthes galathinus (Bosc.). (8). The two species of *Petrolisthes* apparently do not overlap in habitat in local waters. *P. galathinus* is found in deeper water where it is one of the most abundant decapods. Thirty specimens taken 8 miles south of Alligator Point on November 18, 1952, ranged from 2 to 10.6 mm in length; the largest was an ovigerous female. None of the 54 specimens taken March 12, 1953, was carrying eggs.

Polyonyx macrocheles (Gibbes). (8). A pair of crabs of this species or of *Pinnixa chaetoptera* are usually to be found in the tube of the annelid, *Chaetopterus variopedatus*, although the two species of crabs are not known to occur together. Ovigerous specimens were found in November, 1953.

Eucramus praelongus Stimpson. (8). Specimens were taken near Dog Island and off Alligator Point. The largest specimen, 16 mm in length, was found under a shell on a beach west of Apalachicola, January 11, 1953, by Sue Barnett.

Family CALLIANASSIDAE

Callianassa islagrande Schmitt. (31). Although very abundant in a narrow band of the lower intertidal zone of Gulf sand beaches, this burrowing shrimp was not described until 1935 (a) by Waldo Schmitt from specimens collected at Grande Isle, Louisiana. A square meter dug to a depth of about 20 inches in the Gulf beach of Alligator Point produced 30 females (two ovigerous) and 3 males.

Mature individuals of both sexes from Alligator Point beach averaged 57 mm in length and somewhat longer from Dog Island where 3 males ranged from 75 to 78 mm. The species does not occur where the wave action is too slight, as in Alligator Harbor, or too strong, as at Cape San Blas.

Callianassa jamaicensis louisianensis Schmitt. (31). This subspecies, abundant in sheltered bays and estuaries locally, was described at the same time as *C. islagrande* (Schmitt, 1935a). The mud-lined burrows are often over 3 feet in depth, hence specimens are not easily obtained. The method used by Lunz (1937b) in capturing *C. major* has not succeeded with either of the local species. Ovigerous females were taken near the Alligator Harbor Laboratory pier on September 10 and October 4, 1954. Body length of a female was 60 mm; of a male, 63 mm. Several red-patterned commensal copepods were usually found on this mud shrimp.

Upogebia affinis (Say). (8). This mud shrimp burrows in softer bottom than *Callianassa* does, especially where the narrow-leaved eel grass, *Halodule wrightii*, stabilizes the muddy substratum. It was taken along the rock breakwater near St. Marks Light, at Bald Point, and on the flats off the end of Alligator Point. A. S. Pearse (1952) described a parasitic isopod, *Phyllodurus robustus*, from a specimen collected by H. J. Humm at the mouth of Alligator Harbor, June 19, 1952.

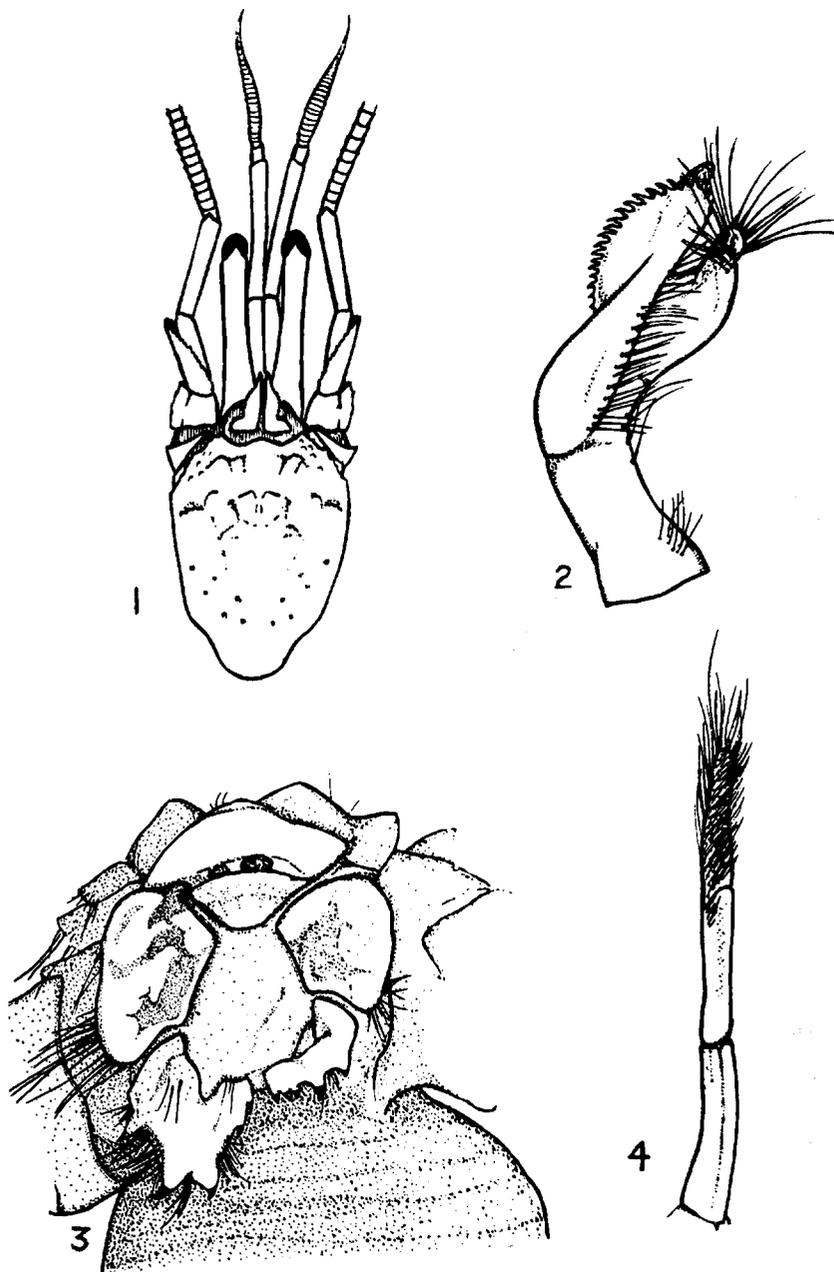
Family PAGURIDAE

Clibanarius vittatus (Bosc.). (8). The striped hermit crab is common along sheltered shores and is the largest species of Paguridae found in Alligator Harbor. It is frequently taken in shells of *Melongena corona*, less often in *Busycon* and *Fasciolaria*. Many were found out of water at low tide.

~~*Paguristes tortugas* omitted by mistake.~~

Paguristes hummi, sp. nov.

Type: Male, holotype; Cat. No. 95,596, United States National Museum; from Alligator Harbor, Franklin County, Florida; June 1, 1952; collected by A. S. Pearse. Paratypes: 1 male in a sponge, April 17, 1952, and 2 males occupying a single sponge, May 10, 1952, from Alligator Harbor, collected by H. J. Humm; 1 male from a *Murex* shell, Alligator Harbor, April 4, 1953; 4 males, 1 female, from Mullet Key breakwater tidepool, Tampa Bay, Florida, October 10, 1953; 20 females (10 ovigerous), 25 males from the last locality, October 16, 1954. All type material is deposited in the U. S. National Museum.



EXPLANATION OF FIGURES

1. Anterior portion of carapace and head appendages of *Paguristes hummi*. X 10.
2. First pleopod of *P. hummi*. X 55.
3. Ventral view of telson of *P. hummi*. X 20.
4. Second pleopod of *P. hummi*. X 55. (All figures are of holotype.)

Description: Anterior portion of carapace slightly longer than wide; rostral tooth obtuse, shorter than laterals, not reaching to base of eye scales; laterals short, armed with minute, marginal spinules; surface with a few setose tubercles, transverse depression in postfrontal region.

Eye-stalks, including the cornea, long, slightly exceeding the peduncles of the antennae; constricted in mid-section. Eye-scales medially adjacent from base to apex, except for shallow indentations near the bases; base subquadrate, lateral projections produced anterolaterally; apical regions armed with 4-7 spines anteriorly, the largest at the tip.

Antennal acicle extends $3/4$ length of eye-stalk; 5 spines on the inner margin, none on the outer. Third segment of peduncle of antennule reaches past cornea by half its length. Flagellum of antennule bears single rows of dense cilia on ventral surface, while that of the antenna has two rows forming a 120 angle ventrally, the rows consisting of a pair of long cilia at each articulation.

Chelipeds equal, similar, moderately spined, sparsely setose; merus crested dorsally with spinules and setae, single short spine on inner distal margin, inner surface smooth, outer surface and lower margin granular; carpus armed with 6-8 spines on inner margin of upper surface and 9 or more on the outer margin, with the spines increasing in length and number distally; the surface between the margins bears fewer spines and setae; lateral and ventral areas between the upper third of the inner surface and the outer margin are smooth. Manus twice as long as wide; armed with 4 longitudinal rows of spines on the upper surface, 6 spines in the inner row, only 4 that are distinct in the 2nd row, 5 in the 3rd row (all topped by a single bristle), 15 or more in the outer, marginal row, with the pollex bearing the largest spines; the bases of the outer row are setiferous. The prehensile edge of the pollex has 4 small teeth and many calcareous denticules; the 1st and largest tooth is $1/3$ the distance from the angle to the apex. The outer edge of the dactyl has 9 or more protuberances, only the first 3 of which are spinulose. The fingers gape slightly for $3/4$ of the distance to the corneous apices.

Ambulatory legs slender, propodi $3/4$ as long as dactyli, 1st pair crested with spinules on merus and propodus, 2nd pair with tubercles only; both pairs setose except for lateral surfaces of meri and inner surfaces of propodi.

Telson asymmetrical, bifid, and armed with a variable number of spines; on each lobe the two apical spines are the largest.

Color: In life, the outstanding color mark is an iridescent blue patch on the inner surface of the merus of the cheliped; this area is bordered anteriorly by a narrow black line, followed by a similar yellow line. In alcohol, the blue and yellow fade and the black line becomes brick red; the ambulatory legs have pinkish bands and the chelae are marked with blotches of similar coloring.

Measurements: Male holotype; length from rostrum to telson 22 mm, of anterior portion of carapace 4 mm, width 3.5 mm, length of cheliped 12 mm, of merus 4.5 mm, of carpus 2.7 mm, of manus 5.5 mm, of dactyl 3 mm; width of manus 2.7 mm, length of eyestalk 3.2 mm, of antennal acicle 2.5 mm.

Range: In Alligator Harbor this hermit is uncommon. At Mullet Key, in Tampa Bay, it was plentiful at times during the summer of 1953. It was not

observed at Mullet Key in 1954 until October 16, when several hundred were found in small tidal pools behind the breakwater after the season's first cold front had passed.

Habitat: Small sponges were the usual habitation in Alligator Harbor, although two specimens were taken in *Murex* shells. At Mullet Key it has been found only on the south side of the island, in the intertidal zone. The crabs averaged smaller here and were found in a variety of small gastropod shells, most commonly in those of the genus *Terebra*. Several were found in *Olivella* shells and one was taken in a scaphopod shell.

*Remarks:*⁴ This proposed species bears a closer resemblance to several species of the genus *Paguristes* found along the coasts of western and southern Africa, than it does to most of the American species. Of the 15 African species figured by Forest (1954), it resembles *P. hispidus* Edwards and Bouvier and *P. microphthalmus* Forest in the rudimentary development of the rostrum and in having the eye scales closely adjacent and similar in outline although differing in the number and position of the spines. *P. hummi* differs from all African species in the absence of spinules on the outer margins of the antennal acicles. The second pair of male pleopods most closely resemble those of *P. fagei* Forest (1954), although the two species are otherwise dissimilar. Of the American species, it is most like *P. praedator* Glassell (1937), from the Gulf of California, but differs in having larger spinules on the eye scales, 5 spinules instead of 2 or 3 on the inner side of the antennal acicle, and more spines on the chelipeds.

This proposed species is named for Dr. Harold J. Humm, of Duke University, who collected the first specimen and contributed it to the U. S. National Museum.

Isocheles wurdemanni Stimpson. One specimen, a male, was found occupying an *Oliva* shell on the outer beach of Alligator Point. It was the only hermit crab found in a shell of that genus in the area. The species does not seem to be abundant anywhere, although Dr. Fenner A. Chace, Jr., reports (*in litt.*) that there are specimens from Louisiana, Texas, and Venezuela in the U. S. National Museum. It resembles young of *Petrochirus bahamensis* but is white in color.

Petrochirus bahamensis (Herbst). (8). This large red hermit is rare in the Alligator Harbor area. A specimen with carapace

⁴ Reference has been made to the following papers since the original manuscript was prepared.

FOREST, JACQUES

1954. Les *Paguristes* des cotes occidentales et meridionales d'Afrique. Ann. S. Afr. Mus. 41(part 4): 159-213.

GLASSELL, S. A.

1937. The Templeton Crocker Expedition. XI. Hermit crabs from the Gulf of California and the west coast of Lower California. Zoologica, N. Y. Zool. Soc. 22(part 3): 241-263.

length 26 mm was dredged near buoy 26, March 12, 1953. It occupied a Scotch bonnet shell, *Phalium granulatum*, which bore on the outside six anemones, *Calliactus tricolor*. A larger specimen, carapace length 47 mm, was taken near the mouth of the Ochlockonee River by George Grice, October 31, 1954. It was occupying a *Busycon* shell.

Pagurus floridanus (Benedict). The flat-clawed hermit is characteristic of bays and inshore waters, although usually in somewhat deeper water than *P. longicarpus*. *Polynices duplicata*, the shark-eye shell, seems to be its favorite abode; its claws fit the snail shell like an operculum when it retracts. A sea anemone, *Calliactus tricolor*, is often present on the outside of the shell. There is some doubt that *P. floridanus* is specifically distinct from *P. pollicaris*, the closely-related Atlantic coast species (Chace, 1953, *in litt.*).

Pagurus longicarpus Say. (8). This plain little hermit is probably the most abundant pagurid in Alligator Harbor. It generally occupies gastropod shells smaller than those which shelter *P. floridanus*. An ovigerous female was taken from a *Nassarius* shell on September 8, 1952, in Alligator Harbor.

Pagurus annulipes (Stimpson). (8). Adults of this small hermit are often overlooked or taken to be juveniles of larger species. Though widely distributed locally, it seemed to be most abundant in the extensive grass beds off St. Marks Light. It occupies a variety of small snail shells and one was found in a tooth shell, another in a sponge. Five of 67 specimens taken March 7, 1953, off St. Marks Light were ovigerous. Carapace length of the largest was 6.8 mm.

Pagurus impressus (Benedict). The dimpled hermit is frequently taken by trawl or dredge on South Shoals between Mud Cove and buoy 26. Three specimens from near buoy 26 occupied these interesting abodes: (1) a tough, green sponge; (2) a shell of *Melongenena corona*, a gastropod found only in estuaries and bays; (3) a shell of *Murex brevifrons*, a gastropod not yet known alive locally.

Family ALBUNEIDAE

Lepidopa benedicti Schmitt. This beach burrower that roughly resembles the well-known mole crab, *Emerita*, was taken in the same habitat as *Callianassa islagrande*. As many as four were taken

in a square meter area though they seemed to be less abundant than this ordinarily. Another quadrat 4 by 20 feet yielded only 8 specimens, two of which were ovigerous, with lengths of 14.3 and 20 mm. It seemed to be more plentiful at Cape San Blas, west of Apalachicola, where the wave action is stronger than at Alligator Point.

Family HIPPIDAE

Emerita talpoida (Say). (32). Along the Gulf beach of Alligator Point the mole crab is gregarious but seldom abundant. On September 26, 1952, 158 were taken from an area of approximately two square meters. Of a total of 261 taken from September 26 to October 17, 1952, 221 were ovigerous with lengths from 18-32 mm. Modes occurred at 23-24 mm and 27-28 mm. They were scarce after October.

Tribe BRACHYURA

Family RANINIDAE

Ranilia muricata H. Milne Edwards. (8, 28). A portion of a carapace of this species was found on the outer beach of Dog Island in January, 1953. Since the identity was clear and the species known from the Anclote area (taken by the *Fish Hawk* in five fathoms in 1901), the species is included. Hay and Shore (1918) state that ". . . it appears to be confined to sand bottoms well offshore."

Family DROMIIDAE

Dromidia antillensis Stimpson. (8, 28). This hirsute crab typically carries a sponge or ascidian large enough to cover its carapace. One specimen from off Alligator Point carried the ascidian, *Eudistoma capsulatum* (kindly determined by Dr. W. G. Van Name). Carapace color is usually dark red, but in a "soft shell" from near buoy 26 it was bright orange.

Hypoconcha arcuata Stimpson. (8, 28). Three specimens have been secured: one near Carabelle on February 18, 1950; another near buoy 26 at a depth of forty feet, July 28, 1953; and a third on the flats off the end of Alligator Point on October 24, 1953, by Miss Phyllis Carter. This "pelecypod hermit" lives in the concave side of a clam shell valve which it grasps "so tightly that it is almost impossible to remove the live animal from its abode without crushing it" (Hay and Shore, 1918).

Family CALAPPIDAE

Calappa flammea (Herbst). The flame-streaked box crab is found locally in deeper water offshore where it is often taken by shrimp trawlers. It was taken near buoy 26 and along South Shoals. The largest was an adult female 72 mm long and 107 mm wide. *Calappa* may spend much of its time partially buried in the sand (Pearse, Humm, and Wharton, 1942).

Hepatus epheliticus (Linnaeus). (8, 28). Though not taken in Alligator Harbor, liver crabs were often found along the outer beach where four males 37 to 43 mm wide were taken January 10, 1953. Carlgren and Hedgpeth (1952) present a figure of *Hepatus* carrying the anemone *Calliactis tricolor*. This commensal relationship was not observed locally, although a small *Hepatus* placed in an aquarium soon carried three anemones.

Family LEUCOSIIDAE

Persephona punctata aquilonaris Rathbun. (8, 28). The largest of the two purse crabs taken, this species was found only in Alligator Harbor. It is characterized by red blotches on the cream-colored carapace.

Persephona crinita Rathbun. (8, 28). Found in Alligator Harbor, where it is less common than the above species, off Alligator Point and in Apalachicola Bay, the latter record by Miles (1951). In this species the carapace is uniform blue-gray.

Family PORTUNIDAE

Ovalipes ocellatus guadulpsensis (Saussure). (8, 26). Lady crabs frequent sandy shoals and none were found in Alligator Harbor. The numbers of shed carapaces on the beach indicated a greater abundance off Dog Island than off Alligator Point. An adult female from near buoy 26 was 68 mm wide. Eleven males were taken in one trawl haul eight miles south of Alligator Point, March 12, 1953.

Portunus gibbesi Stimpson. (8, 26). During winter months the catch of this species in trawl hauls exceeded that of all other portunids combined. Three trawl hauls in Mud Cove, January 10, 1953, yielded 92; 52 females, 38 males, and 2 juveniles. A large male, width 60 mm, was regenerating both chelipeds and one leg;

seven crab barnacles, *Chelonibia patula*, were attached to the carapace. *P. gibbesi* was more common near shore than at buoy 26.

Portunus spinimanus Latreille. (8, 26). Larger and narrower than *P. gibbesi*, *P. spinimanus* seems to be more generally distributed both with reference to depth and season. The largest female taken was 73 mm wide and 42 mm long. An ovigerous female was taken off Alligator Point, July 7, 1952.

Portunus depressifrons Stimpson. (8, 26). A single specimen was taken near buoy 26, November 29, 1952; length 25 mm, width 40 mm. The color pattern is somewhat similar to that of *P. spinimanus*, but the carapace is darker and more evenly mottled. Paddles and feet are light blue.

Callinectes sapidus Rathbun. (8, 26). The edible blue crab is abundant along the northern Gulf coast of Florida. Two spawning periods are evident in this region, one beginning in late February or early March and a second in late August or September. At these times, males and females tend to occupy separate areas (Miles, 1951). In Tampa Bay, females often swim at the surface, probably when migrating.

Barnacles of several species often occur on *C. sapidus*; *Balanus amphitrite* and *Chelonibia patula* attach to the carapace, *Octolasmis mulleri* parasitizes the gill chamber, and the sacculinid parasite, *Loxothylacus texanus*, lives beneath the abdomen. Humes (1941) found 640 specimens of *Octolasmis* in one gill chamber of *C. sapidus*.

Callinectes danae Smith. (26). Two small specimens were taken in Alligator Harbor and three along the outer beach. Miles (1951) reported this species quite common on the shrimp fishery grounds off Apalachicola. An ovigerous female taken by Miles is 67 mm wide.

Arenaeus cribrarius (Lamarck). (8, 26). Speckled sand crabs were common along the outer beach of Alligator Point. Between September 3 and October 17, 1952, 79 were taken in the wave line; eleven of these were adult females with widths from 79 to 96 mm, average 88 mm. None were ovigerous. The largest male seen was 110 mm wide. These crabs were taken at night with the aid of a light.

Family XANTHIDAE

Leptodius floridanus (Gibbes). (26). Two females, widths 18 and 22 mm, in the collection of the Florida State University Marine

Laboratory, were taken at Shell Point, Wakulla County, February 12, 1950. Rathbun gives no records for the United States north of the Florida keys and Tortugas.

Panopeus herbsti H. Milne Edwards. (8, 26). Found in two habitats in Alligator Harbor; on oyster bars and in the mud banks of Drum Creek. A male, 55 mm in width, was collected at the St. Marks Light breakwater on February 2, 1950, by Rollin Stevens. The dark body color, continued on legs and chelae, distinguishes *P. herbsti* from *Eurytium limosum*, which has propodi dark green above and tan below, with the fixed finger white, the movable finger lavender shading to tan.

Panopeus turgidus Rathbun. (26). A single specimen was taken at Wakulla Beach and determined by Dr. Fenner A. Chace, Jr. It apparently is more common further west along the Gulf coast.

Neopanope texana texana Stimpson. (26). Two other species, *N. packardi* and *Eurypanopeus depressus* are not easily distinguished from *N. texana*, all three of which are abundant in Alligator Harbor. *N. packardi* has a large basal tooth on the movable finger of the major chela. *E. depressus* adults are easily identified but the juveniles resemble species of *Neopanope* except for the more oval shape and flattened carapace. *Neopanope* spp. are most abundant in shallow water with soft bottom and ample vegetation (McRae, 1950).

Neopanope packardi (Kingsley). (26). Although this species seems to be more abundant locally than *N. texana*, it apparently is not known north of Miami on the Atlantic coast (Rathbun, 1930). The largest specimens were found during the cooler months.

Hexapanopeus angustifrons (Benedict and Rathbun). (8, 26). Occurs in Alligator Harbor but is more common in outside waters. On August 17, 1952, 27 specimens were taken from a piece of driftwood on the outer beach. Nine of these were males, 18 were females among which eight were ovigerous. Adults ranged from 8 to 12 mm in width. The variable russet, gray, and yellow color patterns are an aid in identification. There is often a yellow band along the anterior border of the carapace.

Eurypanopeus depressus (Smith). (8, 26). Although found in greatest abundance on oyster bars, *E. depressus* also occurs on barnacle-encrusted pilings and in clusters of the ascidian, *Styela plicata*. Nine ovigerous females collected in Alligator Harbor in

September averaged 9 mm in width while ten others (not ovigerous) taken in January ranged from 11 to 18 mm wide.

Eurytium limosum (Say). (8, 26). Probably no other locally occurring xanthid is more deserving of the name "mud crab." It is plentiful in the soft, muddy banks of Drum Creek. When this creek was treated with rotenone in July, 1952, many left their burrows to feed on dead minnows. The largest male taken was 34 mm wide; four ovigerous females taken in August ranged from 15 to 22 mm in width. This species resembles *Menippe mercenaria* but the habitats do not appear to overlap. A similar crab found in the same habitat was *Panopeus herbsti*, forma *obesa*.

Micropanope pusilla H. Milne Edwards. (26). Three specimens, including an ovigerous female, were taken near buoy 26 in July. This species was the smallest xanthid found.

Menippe mercenaria (Say). (8, 26). Juvenile stone crabs are abundant in local waters but large adults are uncommon. Young specimens are black or dark purple with white bands at the leg articulations. The dark color changes to dull red and finally to a grayish ground color with many deep purple spots. The young are widely distributed, taking refuge in natural holes and crevices, although McRae (1950) stated that *Menippe* shuns oyster bars and soft bottoms, and prefers turtle grass flats. Several large specimens were taken in the vicinity of rocky areas in 6 to 10 feet of water about five miles ESE of St. Marks Light in July, 1953.

Pilumnus sayi Rathbun. (8, 26). Locally the hairy mud crab is the most widely distributed of the xanthids and perhaps of all the decapods. It is uncommon in Alligator Harbor but at buoy 26 it is the most abundant species. Of 201 decapods (25 species) taken there December 8, 1952, 72 were *P. sayi*. Thirty of the 60 specimens taken along South Shoals in March, 1953 were adult females, 25 of which were ovigerous. They ranged from 12 to 31 mm in width, with an average of 17 mm. The largest male observed was 32 mm wide.

Pilumnus dasypodus Kingsley. (8, 26). Smaller, darker and less bristly than *P. sayi*, this species is also much less common in local waters. It was taken at St. Marks Light, Mud Cove, and near buoy 26. An ovigerous female taken in July, 1952 was 9.7 mm wide.

Lobopilumnus agassizi (Stimpson). (8, 26). A single specimen, a male 14 mm wide, was taken near buoy 26 in July, 1952 by H. J. Humm.

Family GONEPLACIDAE

Euryplax nitida Stimpson. (24). A male, width 26 mm, was found under a conch shell on the flats at the mouth of Alligator Harbor in November, 1952 by H. J. Humm. A 9 mm specimen was taken from the stomach of a blackfish (*Centropristes melanus*) caught near buoy 26, December 21, 1952.

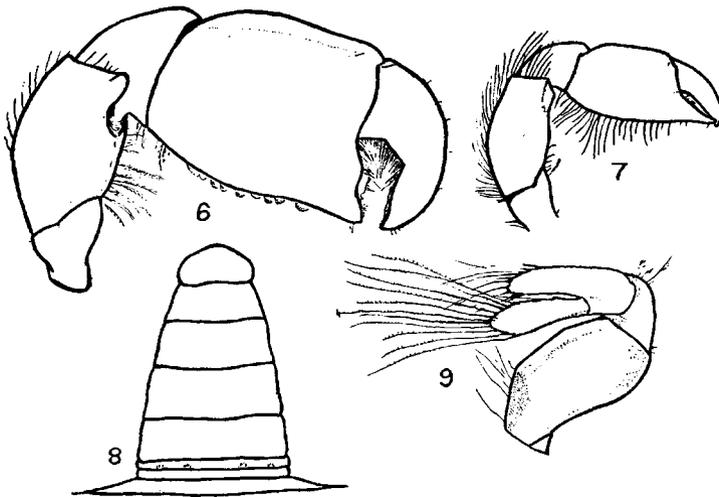
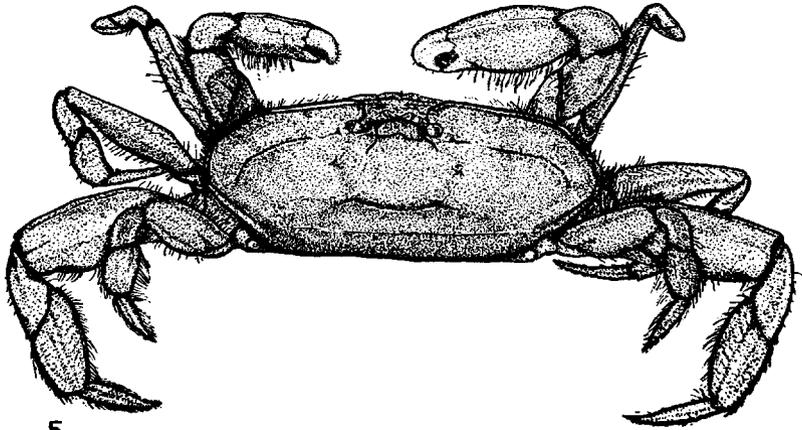
Family PINNOTHERIDAE

Pinnotheres strombi Rathbun. (24). Miss Sylvia A. Earle found a single female while examining 137 specimens of *Strombus alatus* taken by trawl about three miles SSW of Alligator Point, June 17, 1953.

Pinnotheres maculatus Say. (8, 24). Mussel crabs were common in the scallop, *Pecten gibbus*, in Alligator Harbor during the summer of 1952 but were not found in scallops taken several miles SE of St. Marks Light at that time. Males were occasionally seen swimming at the surface. A female was found in the large clam, *Atrina rigida*. All females taken in July were ovigerous.

Dissodactylus mellitae Rathbun. (8, 24). Although commonly associated with the sand dollar, *Mellita quinquesperforata*, this species appears to be least specific with reference to host of any of the three species of the genus recorded from the area. All are characteristically found clinging to the underside of a sand dollar or sea biscuit. An examination of 50 *Mellita* from the outer beach on August 25, 1952, yielded 68 *D. mellitae*. Sand dollars in Alligator Harbor, however, had very few commensal crabs. Thirty-five from near the laboratory pier produced only one crab; 110 sand dollars from Drum Point had only seven crabs. At the harbor mouth sand bar, a collection of 50 *Mellita* yielded 182 *Dissodactylus* on 41 of the sand dollars. These crabs were 0.9 to 4.8 mm in width. Ovigerous females were noted in July.

Near buoy 26, a male was taken along with five *D. stebbingi* from the sea biscuit, *Clypeaster subdepressus*, on July 7, 1952. Eight were taken from the purple sand dollar, *Encope michelini*, on November 15, 1952, about eight miles south of Alligator Point. Ten *D. crinitichelis* were also present on these sand dollars.



EXPLANATION OF FIGURES

5. Dorsal view of *Pinnixa chacei* holotype male. X 15.
6. Right cheliped of *P. chacei* holotype male. X 30.
7. Right cheliped of *P. chacei* allotype female. X 30.
8. Abdomen of *P. chacei* holotype male. X 30.
9. Left outer maxilliped of *P. chacei* holotype male. X 60.

Dissodactylus crinitichelis Moreira. (24). The ten specimens mentioned above were 2.4 to 10 mm wide; one female was ovigerous. This species attains a larger size than *D. mellitae* and varies from white to dark-patterned. Rathbun described this crab under the appropriate name, *D. encopei* in 1901, and was unaware of its previous description when she published her monograph on the grapsoid crabs in 1918. She listed it correctly in her 1933 report on the *Brachyura* of Porto Rico and the Virgin Islands.

Dissodactylus stebbingi Rathbun. (24). Five specimens were found on the underside of sea biscuits taken near buoy 26, July 7, 1952. The largest was an ovigerous female 4.2 mm wide. Sea biscuits taken at other times did not yield the commensal crab, although it is probable that the crabs are often washed off before the dredge or trawl is taken aboard.

Pinnixa chacei, sp. nov.

Types: Male holotype, Cat. No. 95,694, and ovigerous female allotype, from Gulf Beach of Alligator Point, Franklin County, Florida; collected on October 4, 1952. Paratypes: 5 other males taken at the same time; 6 females (1 ovigerous) from the same place, August 30, 1952; 14 specimens from Cat Island, Mississippi, including 2 adult and 6 juvenile males, 3 adult ovigerous females and 3 juveniles, collected by H. M. Hefley. All type material is deposited in the U. S. National Museum.

Description: Carapace broad, 2.5 times as wide as long. A high sharp carina extending across carapace in cardiac region, meeting posterior ends of lateral crests near posterolateral borders. Postfrontal crest reaching orbital margins laterally and interrupted medially by a shallow groove. Granulate anterolateral line extending transversely from orbits and curving to meet lateral crests between bases of 4th and 5th legs. Subhepatic margins continuous with lateral crests and prominent from lateral angles to epistome. Frontal region conspicuously recessed behind subhepatic margins; epistome plainly visible from above. Front trilobate, median point obtuse, extending as far as laterals; orbits ovoid, half as wide as front. Surface of carapace smooth, subhepatic regions pubescent. Antenna equal to front in length.

Chela large in male. Palm short, high, and thin, $\frac{3}{5}$ as thick as high, $\frac{5}{6}$ as high as long; dorsal margin ridged and straight; lower margin convex for first $\frac{3}{5}$ of distance, straight distally to tip; dense tuft of pubescence in gape. Chela otherwise smooth except for single row of fine hair extending upward from near lower edge on inner surface. Thumb short, prehensile edge truncate, bidentate; proximal tooth beginning at lower edge of gape, 4 times as high as wide and separated from distal tooth by a groove equal to the vertical height of the latter; both teeth set with minute denticles, a single denticle in the groove. Movable finger evenly curved on outer surface; prehensile

edge concave proximally, straight on distal half, with at least 9 denticles on the proximal 3/4.

Dactyls of walking legs slender, of 4th leg straight, of the others slightly curved, especially so on 2nd pair; dactyl of 4th leg slightly overreaching merus of 3rd. Merus and propodus of 3rd leg broad, merus more than twice as long as wide, propodus more than one and a half times; legs bare and smooth except for fine fringes of hair on the margins.

Abdomen widest at base, tapering uniformly, except for 6th segment which is somewhat constricted; segments subequal in length.

Variations: Chelae much smaller in female; fixed finger 2/3 length of movable finger; upper tooth absent; small indentation on lower edge of movable finger near base; no tuft of hairs in angle of gape but a continuous fringe on upper surface of movable finger. Abdomen of female fringed with hair. Chelae of juvenile males resemble those of females. Adults from Cat Island, Mississippi, have a short, dark pubescence in the fissures of the carapace and on the subhepatic regions, apparently due to adhering particles; the margins of the legs have the hair worn away.

Color: In life, males white, with brown specking; females slate grey, with translucent legs; juveniles paler. In alcohol, males white, females amber.

Measurements: Male holotype, length of carapace from rostral tip to posterior border 3.3 mm, width 8.2 mm; length of 3rd leg about 9.8 mm, of merus of 3rd leg along the outer margin 3.7 mm, width 1.7 mm, length of propodus 2.4 mm, width 1.5 mm. Female paratype, length 2.7 mm, width 6 mm.

Range: Known to occur from Alligator Harbor, Florida, to Grande Isle, Louisiana (specimens examined by Fenner A. Chace, Jr., and returned to collector).

Habitat: Intertidal zone; commensal with *Callianassa islagrande*, living in the upper part of the fragile sand-walled burrows.

Remarks: This proposed species is near *P. patagoniensis* Rathbun (1918), known only from San Matias Bay, eastern Patagonia. The most apparent difference is the recessed frontal region of *P. chacei*; in this species the margin of the front lies about half way between the frontal crest and the epistome, whereas in *P. patagoniensis* the frontal margin is almost directly above the epistome and in line with the subhepatic margins of the carapace. *P. chacei* also has the cardiac crest slightly irregular and concave in outline rather than even and convex, and the crest terminating laterally farther from the posterolateral borders; the anterolateral line less prominent and less evenly curved laterally; the gastro-cardiac furrow deeper and straighter; the merus of the 3rd walking legs less dilated ventrally and entire, instead of armed with minute teeth and the propodal length-width ratio 2.2 rather than 1.8 as in *P. patagoniensis*; and the penultimate segment of the abdomen less narrowed distally.

The proposed species differs from *P. cristata* Rathbun (1918), from the coasts of the Carolinas, in the following respects: The carapace is less broad, the width-length ratio 2.5, compared with 2.85 in *P. cristata*; the lateral angles are less acutely produced, the frontal region more recessed; the anterolateral line begins at the orbits and curves to meet the border further back instead

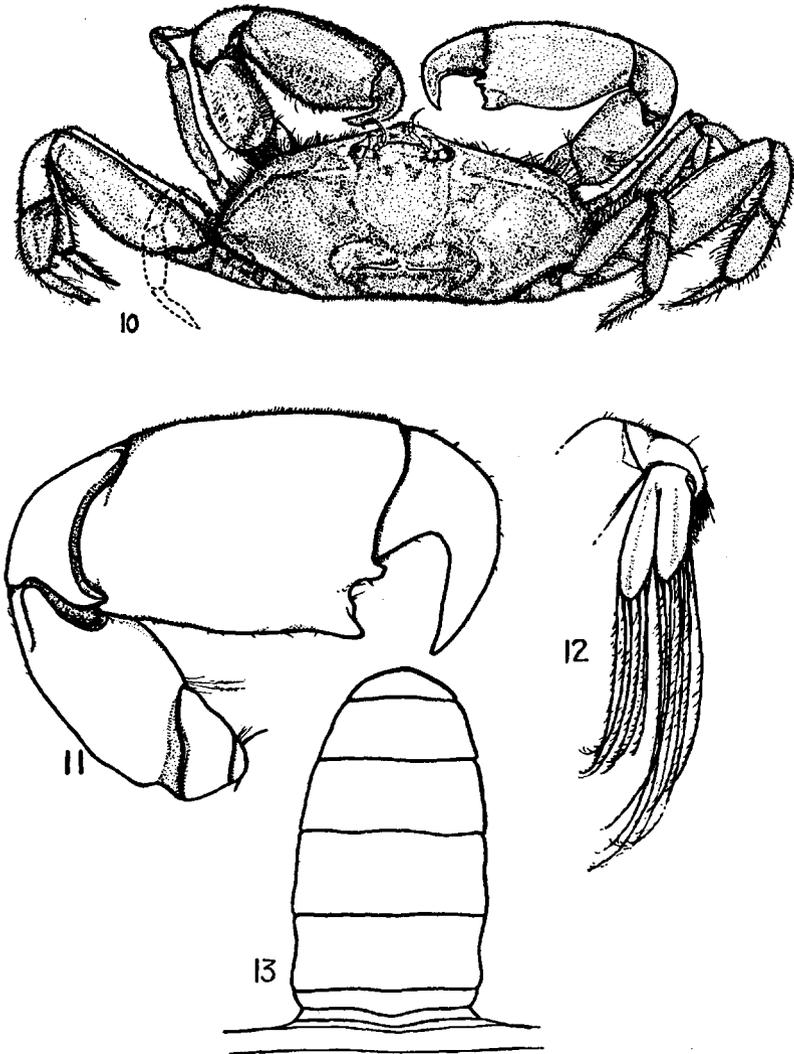
of starting in the hepatic region and extending almost straight to the border; the post-frontal crest is more distinct; the antennae are shorter by half the length of an orbit; a narrower groove separates the proximal tooth from the distal tooth and the proximal tooth is broader; the movable finger is less evenly curved; and there is a pubescent tuft in the gape and a fringe of hair on the palm, whereas in *P. cristata* the chela is nearly bare. The 3rd walking leg is proportionately heavier, the length-width ratio of the merus and propodus being 2.2 and 1.6 respectively, rather than 2.9 and 1.8 as in *P. cristata*; the posterior margin of the 3rd leg is bare rather than densely pubescent. The penultimate segment of the abdomen is shorter and slightly less constricted than in *P. cristata*. Females of *P. cristata* have a rudimentary proximal tooth above the fixed finger, whereas this tooth is absent in *P. chacei*.

This species is named for Dr. Fenner A. Chace, Jr., Curator, Division of Marine Invertebrates, U. S. National Museum, who first recognized significant differences between this species and those previously known.

Pinnixa floridana Rathbun. (24). This is the only species of *Pinnixa* found here which was not obtained by digging, hence its commensal relationship is not known locally. A male was found under a rock in about ten feet of water four miles ESE of St. Marks Light, July 13, 1952. Three others, one male and two ovigerous females, were taken from a compound ascidian growing at the base of a soft coral, *Eugorgia virgulata*, which washed ashore on the outer beach of Alligator Point in August, 1952.

Pinnixa retinens Rathbun. (24). An ovigerous female was taken from the burrow of the mud shrimp, *Upogebia affinis*, on the bar at the mouth of Alligator Harbor in June, 1952. Dr. Fenner A. Chace, Jr., stated (*in litt.*) that this was only the second report of this crab since its discovery in Chesapeake Bay in 1918. He had received another specimen from Joel Hedgpeth, Texas Institute of Marine Science, a few weeks earlier.

Pinnixa chaetoptera Stimpson. (8, 24). This species is represented by two forms along the northern Gulf Coast. The larger form lives in the tubes of the annelid, *Chaetopterus variopedatus*, the smaller one in the burrow of *Callianassa jamaicensis louisianensis*. The latter form is probably the more common one, but it apparently has been overlooked previously (Chace, *in litt.*). The crab seems to prefer the upper narrow portion of the *Callianassa* burrow. Of 44 specimens taken September 19 and October 1, 1952, 20 were males ranging in width from 3.1 to 7.0 mm with a width/length ratio of 2.3/1; fourteen were adult females rang-



EXPLANATION OF FIGURES

10. Dorsal view of *Pinnixa pearsei* holotype male. X 10.
 11. Right cheliped of *P. pearsei* holotype male. X 30.
 12. Right outer maxilliped of *P. pearsei* holotype male. X 60.
 13. Abdomen of *P. pearsei* holotype male. X 30.

ing in width from 4.8 to 8.8 mm with a width/length ratio of 2.4/1. Ten of these females were ovigerous.

An ovigerous female of the larger form was taken from a *Chaetopterus* tube May 3, 1952; it was 13.6 mm wide.

Rathbun (1918) reported an ovigerous female from Rio de Janiero with a width of only 7 mm and with other slight differences from typical specimens. This suggests that the small form may be widely distributed.

Pinnixa pearsei, sp. nov.

Types: Male, holotype; Cat. No. 74959, from a sand-mud beach among *Diopatria* tubes, at Indian Pass, Apalachicola, Florida; November 30, 1935; collected by A. S. Pearse. Male, paratype; found in a worm tube at the mouth of Alligator Harbor, Franklin County, Florida; November 22, 1952; collected by H. J. Humm.

Description: Carapace broad, over twice as wide as long. Cardiac crest a straight line rising from branchio-cardiac fissures to an elevated, bilobed prominence medially. Anterolateral crest denticulate, extending from inner hepatic region to base of 3rd leg. Deep urogastric depression joined anteriorly by longitudinal fissures which bifurcate 3 times before passing the orbits laterally, the branch furrows are connected by a cervical groove; posteriorly, diagonal furrows delimit the cardiac carina. Wide depressions parallel the raised posterolateral border. Posteriorly, the carapace slopes abruptly from the cardiac crest. Surface punctate, lateral extremities pubescent, prominences worn bare; 2 rows of hair in pterygostomial region, the lower composed of dense, short hair, the upper of long, feather-like hair.

Chela massive, thickness and height respectively $3/5$ and $4/5$ the length; upper margin convex, lower straight; thumb bidentate; distal tooth truncate, tipped with sharp spine, the point of which is at right angles to the lower and distal margins of the palm; small peg-like tooth proximal to insertion of dactyl. Tip of dactyl meeting fixed tooth on inner angle. Entire surface of chela finely pubescent. Legs long and slender, except 3rd which is much more broad.

Abdomen broad, tapering uniformly to rounded distal segment.

Variations: The paratype male has a proportionately larger proximal tooth on the chela; the cardiac ridge is less raised and lacks the prominent lobes; there is less hair present; and the chelae are less swollen.

Color: In alcohol, the adult male is brown; the smaller male is nearly white.

Measurements: Male holotype, length of carapace 3.5 mm, width 8 mm; length of 3rd leg about 9.6 mm, of merus of 3rd leg along the outer margin 4 mm, width 2.3 mm, length of propodus 1.4 mm, width 0.8 mm. Male paratype, length of carapace 2.6 mm, width 5.7 mm.

Range: Known only from the types.

Habitat: Sand-mud areas in the intertidal zone; host unknown, probably an annelid worm.

Remarks: This proposed species is closely allied to *P. sayana* Stimpson, Rathbun (1918), which ranges from Massachusetts to Sarasota Bay, Florida. *P. pearsei* may be separated by these characters: The cardiac crest is higher, straight, and has peaks less than a fourth the distance from the midpoint to the end, whereas, in *P. sayana* the crest is advanced forward and is highest midway between the ends and the midpoint; the slope behind the cardiac crest is much steeper; the gastro-cardiac depression is greater; the carapace is broader, 2.3 and 2.2 times as long as wide in the type and paratype respectively, instead of 1.8 to 2.0 times as in *P. sayana*; and the propodus of the 3rd walking leg is broader, 1.7 and 1.5 times as long as wide respectively in the type and paratype, instead of 1.8 to 2.6 times as in *P. sayana*.

This species is named for Dr. A. S. Pearse, who collected the type specimen.

Pinnixa cylindrica Say. (8, 24). This species has been collected in the intertidal zone at a number of stations and seems to be associated with several of the larger annelids. It does not seem to have been studied since Stimpson stated in 1859 that "it lives with the lobworm (*Arenicola cristata*)" as quoted by Rathbun (1918).

Family GRAPSIDAE

Sesarma reticulatum (Say). (8, 24). The soft mud banks of Drum Creek have been the only source of specimens of this salt marsh crab, although it is probably widely distributed locally. It reaches a larger size than the more often seen *S. cinereum*.

Sesarma cinereum Say. (8, 24). The square-backed fiddler is abundant throughout the area on and above the drift line of sheltered beaches. Oviparous females were observed in August.

Family OCYPODIDAE

Ocypode quadratus (Fabricius). (8, 24). The ghost crab is abundant above the intertidal zone along the outer beach of Alligator Point, but is not seen on the bay side. In a collection of 50, only two were adult males (24 and 27 mm wide), 14 were adult females (23 to 38 mm wide), and 34 were juveniles (9 to 17 mm wide). The 17 to 23 mm range in which no specimens fell probably separated juveniles of that summer from adults hatched the previous year. It is the opinion of H. J. Humm that this species attains a larger size in North Carolina than at Alligator Point.

Uca minax (Le Conte). (8, 24). The red-jointed fiddler was found only along a drainage ditch at Spring Creek, but it is probably common in other similar areas of fresh water drainage. The largest male collected was 23 mm wide.

Uca pugnax rapax (Smith). (24, 27). The mud fiddler was found along mud banks and in salt marshes. It seems to avoid open sandy areas. A large male was 21 mm wide.

Uca speciosa (Ives). (24). This is the smallest and apparently the least abundant of the four local species. It has been found along Drum Creek, Alligator Harbor, and at Wakulla Beach; areas with muddy substrata. An adult male was 11 mm wide.

Uca pugilator (Bosc). (8, 24). This abundant fiddler is seen in droves along sandy bay beaches during the warmer months of the year; during cool weather it remains inactive in burrows 6 to 12 inches deep.

Family MAJIDAE

Stenorynchus seticornis (Herbst). (8, 25, 27). Only two specimens of this widely distributed arrow crab were taken, both dredged near buoy 26. The contrasting red and white lines on the clean carapace make it easily recognized.

Metoporphaphis calcarata (Say). (8, 25). This "submarine daddy-long-legs" is common in Mud Cove but is not found at buoy 26. It is able to remain in suspension in the water by rhythmic waving of its long, setae-lined legs. It was not seen to carry foreign material on its rough, spiny, carapace. Oviparous females were observed in March and August.

Podochela riisei Stimpson. (8, 25, 27). These long-legged spider crabs were most abundant around the rocky areas about four miles ESE of St. Marks Light. Ascidiarians are often found on the carapace and bryozoa are frequently attached to the legs. Those collected near or in growths of *Sargassum* were brown; specimens from near buoy 26 were brick red and bore species of red algae on the carapace, especially *Calathamnion byssoideum*, a filamentous species. The largest oviparous female examined, length 21 mm, was collected near Carabelle on February 18, 1950.

Podochela sidneyi Rathbun. (8, 24). Four specimens were collected, three from near buoy 26 and one from near Carabelle. One male was 21 mm long. This species is easily separated from *P. riisei* by the flat sternal plates on the ventral side.

Inachoides laevis Stimpson. (25, 27). Adults of this species are easily mistaken for young of *Podocheila*. Seven of nine taken near buoy 26, November 29, 1952, were ovigerous females 4.6 to 5.5 mm long. The largest male was 8.1 mm long. It was found only near buoy 26.

Epialtus dilatatus forma elongata Rathbun. (25). One of the many *Crustacea* which seek shelter in attached plants of *Sargassum* is this rather uncommon, guitar-shaped crab, the elongated form of which is known only from the west coast of Florida. An ovigerous female taken off Ochlockonee Bay, March 14, 1953, was 12 mm long. The largest male observed was 16 mm long.

Pelia mutica (Gibbes). (8, 25, 27). One of the most widely distributed of the spider crabs locally, *P. mutica* is also one of the smallest. In shallow water it is often found in clumps of the ascidian, *Styela*. Ovigerous females were taken in July and November and ranged from 4.8 to 9.5 mm long.

Libinia emarginata Leach. (8, 25). Immature specimens of this spider crab are common in local waters but adults have been taken infrequently. The largest was a male with a length of 102 mm and a width of 95 mm. Distance between the outstretched chelae was 38 mm.

Libinia dubia H. Milne Edwards. (8, 25). *L. dubia* seemed to be more common in Alligator Harbor than *L. emarginata*, but the reverse was true in outside waters. A large female, length 70 mm, taken in Alligator Harbor, June 11, 1952, weighed 153 grams, although this included 93 *Balanus eburneus* attached to the carapace. Adults of *dubia* and *emarginata* are readily distinguished when compared, but immature specimens are separated with difficulty. The rostrum of *L. dubia* is much longer, forming a V; the carapace is not so wide, and there is but one spine on the intestinal region (most posterior) whereas *L. emarginata* has two. Ovigerous specimens of *Libinia* were not observed.

Libinia erinacea (A. Milne Edwards). (25). Adults of this species have never been found, and Rathbun (1925) has predicted that they may prove to be only a variety of *L. dubia* when found. Small specimens have been collected locally in Alligator Harbor and near Carabelle. The two largest were determined by Dr. Fenner A. Chace, Jr., U. S. National Museum.

Hemus cristulipes A. Milne Edwards. (25, 27). Six of these odd little crabs were taken near buoy 26 in November and December, 1952. The crenulate plates on the legs and the pyramidal carapace distinguish it from *Pelia mutica*. A female was 5.3 mm long.

Pitho anisodon (von Martens). (25). Small specimens of *Pitho* were taken at rocky places SE of St. Marks Light and near St. Teresa. The only adult found was a male, width 30 mm, length 25 mm. The carapace is usually covered by a growth of sessile animals and plants.

Mithrax pleuracanthus Stimpson. (25). Juveniles were frequently taken near buoy 26 although adults seemed rare. The largest was a male 28 mm wide and 24 mm long.

Mithrax forceps (A. Milne Edwards). (8, 25). A female 13 mm long and 11 mm wide was taken from the stomach of a blackfish, *Centropristes melanus*, caught near buoy 26. Two small males were found by Richard Durant on some material brought up with the anchor near buoy 26. This crab is much flattened and probably lives in rock crevices. Its color is brick red.

Macrocoeloma trispinosum trispinosum (Latreille). (8, 25). Largest specimen taken was a male 20 mm long. Sponge crabs increase in number as buoy 26 is approached. Offshore specimens are red or maroon in color while those from shallow water are brown or olive. Larger specimens usually carry a considerable growth of sponge.

Macrocoeloma trispinosum nodipes (Desbonne). (8, 25). A male 27 mm long and 23 mm wide was taken near buoy 26. The clean carapace and bright orange color indicated that it had recently shed.

Macrocoeloma camptocerum (Stimpson). (8, 25). The single specimen of this species was taken in Alligator Harbor, May 19, 1951, and sent to Dr. Fenner A Chace, Jr., who made the determination.

Microphrys bicornutus (Latreille). (8, 25, 27). H. J. Humm collected the only specimen, a female, near buoy 26. The carapace was 9 mm long and covered by foreign material.

Family PARTHENOPIDAE

Heterocrypta granulata (Gibbes). (8, 25). The triangle crab is adapted to living on shell bottoms. The largest specimen, 14 mm wide, was taken in Alligator Harbor.

List of Species Known or Expected to Occur Off the Coast of Northwestern Florida within the Thirty Fathom Line But Not Found During This Study.

Species	Area	Latitude	Longitude	Depth
PENAEIDAE				
<i>Penaeus aztecus</i> Ives	Pensacola			
<i>Sicyonia dorsalis</i> Kingsley	Off Louisiana			
<i>Trachypeneus similis</i> (Smith)	Pensacola Bay			
SERGESTIDAE				
<i>Acetes carolinae</i> Hansen	Louisiana coast			
CRANGONIDAE				
<i>Crangon armillatus</i> (H. Milne Edwards)	Grande Isle, La.			21 fath.
<i>Synalpheus brooksi</i> Coutiere		29 15 30	85 29 30	21 fath.
<i>Synalpheus goodei</i> Coutiere	Tampa Bay			6.5 fath.
<i>Synalpheus grampusi</i> Coutiere		27 04 00	83 21 15	26 fath.
<i>Synalpheus hemphilli</i> Coutiere	St. Martins Reef			
<i>Synalpheus herricki</i> Coutiere	Anclote section (150 specimens)			
<i>Synalpheus tanneri</i> Coutiere		29 15 30	85 29 30	27 fath.
PALAEMONIDAE				
<i>Anchistoides antiguensis</i> (Schmitt)	West coast of Florida	28 46	84 49	
<i>Leander tenuicornis</i> (Say)	Punta Rassa, Fla.			
<i>Neopontonides beaufortensis</i> (Borradaile)	Beaufort, N. C. and Tortugas Is.			
<i>Palaemonetes vulgaris</i> (Say)	Apalachicola			
<i>Periclimenaeus maxillulidens</i> (Schmitt) ..	Off Cape San Blas	29 18 15	85 32 00	25 fath.
<i>Pontonia margarita</i> Smith	Off Panama City	30 06 00	85 45 00	
<i>Pontonia domestica</i> Gibbes	Port St. Joe			
HIPPIDAE				
<i>Emerita benedicti</i> Schmitt	Tampa Bay			
<i>Emerita portoricensis</i>	Pensacola			
ALBUNEIDAE				
<i>Albunea gibbesi</i> Stimpson	Santa Rosa Island			
<i>Albunea oxyopthalma</i> Leach	Santa Rosa Island			

List of Species Known or Expected to Occur Off the Coast of Northwestern Florida within the Thirty Fathom Line But Not Found During This Study—(Continued).

Species	Area	Latitude	Longitude	Depth
DROMIIDAE				
<i>Hypoconcha sabulosa</i> (Herbst)	South of St. George Island	28 47 30	84 37 00	24 fath.
<i>Hypoconcha spinosissima</i> Rathbun	South of St. George Island	28 46 00	84 49 00	26 fath.
DORIPPIDAE				
<i>Clythrocerus nitidus</i> (A. Milne Edwards)	SW of Cape San Blas			25 fath.
EBALIIDAE				
<i>Ebalia cariosa</i> A. Milne Edwards	Cedar Keys			2 fath.
<i>Lithadia cadaverosa</i> Stimpson	SW of Cape San Blas	29 18 15	85 32 00	25 fath.
<i>Osachila semilevis</i> Rathbun	Off Cap San Blas	29 14 00	85 29 15	25 fath.
<i>Speloeophorus nodosus</i> (Bell)	Off Pepperfish Key	29 19 30	83 46 00	10 fath.
PORTUNIDAE				
<i>Portunus ordwayi</i> (Stimpson)	Pesacola			
<i>Portunus sayi</i> (Gibbes)	Surface	28 02 30	87 43 45	
<i>Portunus sebae</i> (H. Milne Edwards)	Anclote section			
<i>Portunus spinicarpus</i> (Stimpson)	SW of Cape San Blas	29 14 00	85 29 15	25 fath.
XANTHIDAE				
<i>Carpoporus papulosus</i> Stimpson	SW of Cape San Blas	29 18 15	85 32 00	25 fath.
<i>Glyptoxanthus erosus</i> (Stimpson)	SW of Cape San Blas	29 17 00	85 30 45	26 fath.
<i>Leptodius agassizi</i> H. Milne Edwards	Off Carrabelle Light, N. by W., 14 2/3 miles			10 fath.
<i>Micropanope nuttingi</i> (Rathbun)	SW of Cape San Blas			25 fath.
<i>Micropanope sculptipes</i> Stimpson	South of St. George Island	28 46 00	84 49 00	26 fath.
<i>Micropanope xanthiformis</i> A. Milnes Edwards	Cedar Keys			
<i>Panopeus rugosus</i> A. Milne Edwards	North Key section	28 55 30	83 02 00	25 fath.

List of Species Known or Expected to Occur Off the Coast of Northwestern Florida within the Thirty Fathom Line But Not Found During This Study—(Continued).

Species	Area	Latitude	Longitude	Depth
<i>Pilumnus floridanus</i> Stimpson	Cedar Keys			low tide
<i>Pilumnus lacteus</i> Stimpson	Aucilla section	29 44 09	84 06 30	7 fath.
<i>Pilumnus pannosus</i> Rathbun	Aucilla section	29 54 00	84 06 00	4.5 fath.
PINNOTHERIDAE				
<i>Dissodactylus borradailei</i> Rathbun		26 33 30	83 15 30	27 fath.
<i>Parapinnixa hendersoni</i> Rathbun		28 45 00	85 02 00	30 fath.
<i>Pirinotheres hemphilli</i> Rathbun	Cedar Keys			Between tides
<i>Pinnotheres moseri</i> Rathbun	Off St. Martins Reef	28 43	82 56	17 feet
MAJIDAE				
<i>Aepinus septemspinus</i> (A. Milne Edwards)	S. of Cape San Blas	29 14 00	85 29 15	25 fath.
<i>Anasimus latus</i> Rathbun	SE of Apalachicola	28 46 00	84 49 00	26 fath.
<i>Arachnopsis filipes</i> Stimpson	S. of Cape San Blas	29 18 15	85 32 00	25 fath.
<i>Batrachonotus fragosus</i> Stimpson	SE of Cape San Blas	28 45 00	85 02 00	30 fath.
<i>Collodes trispinosus</i> Stimpson	SE of Apalachicola	28 45 00	85 02 00	26 fath.
<i>Epialtus dilatatus</i> A. Milne Edwards	North Key section	29 05 00	83 22 30	5.5 fath.
<i>Macrocoeloma septemspinus</i> (Stimpson)	S. of Dog Island	28 47 30	84 37 00	24 fath.
<i>Mithrax acuticornis</i> Stimpson	Off St. Martins	28 46 00	84 49 00	20 fath.
<i>Pitho laevigata</i> (A. Milne Edwards)	St. Martins section	28 34 45	83 08 00	5.75 fath.
<i>Pitho lherminieri</i> (Schramm)	Deadmans Bay section	29 43 40	83 49 45	5.25 fath.
<i>Stenocionops furcata coelata</i> (A. Milne Edwards)	S. of Dog Island	28 47 30	84 37 00	24 fath.
<i>Tyche emarginata</i> White	Pepperfish Key section	29 21 00	83 32 00	6.75 fath.
PARTHENOPIDAE				
<i>Cryptopodia concava</i> Stimpson	S. of Cape San Blas	28 45 00	85 02 00	30 fath.
<i>Mesorhoca sexspinosa</i> Stimpson	North Key section	29 02 30	83 14 00	25 fath.
<i>Solenolambus tenellus</i> Stimpson	Off Cape St. George	28 45 00	85 02 00	30 fath.

Parthenope serrata (H. Milne Edwards). (8, 25). One specimen was obtained by dredge about six miles SE of Alligator Point in the open Gulf in August, 1953, by H. J. Humm.

DISCUSSION

A total of 113 species and subspecies of decapods (72 genera, 22 families) have thus far been collected in inshore waters of Franklin and Wakulla counties from depths of less than six fathoms. An additional 62 species not yet obtained in this area may be expected to occur within the 30 fathom line along the northwest Florida coast (Table 1). Of this group, 28 species were taken by the U. S. Fish Commission vessel *Albatross* in depths of 20 to 30 fathoms which, in these waters occur more than 50 miles offshore. If these 28 species are eliminated as of unlikely occurrence in inshore waters, there remain but 32 known species to be expected in the Alligator Harbor area in addition to the 113 species reported in this paper.

Schmitt (1924) compared the number of decapod species found within the 100 fathom line of the Tortugas Islands with those found within that line in other places. The 125 species found at Tortugas were compared with the 51 species known at that time from Woods Hole, 73 for the entire New England coast (Rathbun, 1905), 120 at Bermuda, 137 at Beaufort, N. C., and 70 from San Francisco Bay and adjacent waters. These are relatively low figures compared with the 242 species known from Puerto Rico by 1902. Rathbun (1933) and Schmitt (1935b) listed 315 species from Puerto Rico, but these included offshort collections to a depth of 278 fathoms.

The decapod fauna of the Alligator Harbor area is notably similar to that of Beaufort, N. C.; 81 of the species found here also occur at Beaufort. Only 23 of the species found locally are also known from the New England coast, while 53 local species are reported from Puerto Rican waters. The local decapod fauna appears to be more closely related to that of Beaufort, N. C., than to that of the Tortugas. Thirteen of the local species appear to be confined to the west coast of Florida or the northern Gulf coast. Another 15 species are found in this area and at Beaufort, but are not known from the Florida Keys.

Ten miles offshore southeast of Alligator Point near whistle buoy 26, forty species have been taken. Sixty-two species were collected within Alligator Harbor, but the number approaches 70 if the sand bar at the harbor mouth and the outer beach of Alligator Point are

included. Probably the four to six fathom water around the whistle buoy was much less thoroughly sampled than the shallow waters of the harbor.

The three new species are from shallow water. A small form of *Pinnixa chaetoptera*, the most abundant representative of the genus in local waters, apparently has not been reported previously.

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SUMMARY

A survey of the decapod fauna of Alligator Harbor and adjacent littoral areas from St. Marks Light to Apalachicola was undertaken from June, 1952, to April, 1953. Previous collections are also reported. The most intensive collecting was done in Alligator Harbor and along Alligator Point, near St. Marks Light and in the vicinity of buoy 26.

A total of 113 species and subspecies of decapods in 72 genera and 22 families have thus far been taken by the author and other personnel from the Florida State University Marine Laboratory in the area studied. Each species taken is discussed in the annotated list. A key for the determination of the species was compiled from available literature and personal findings. Three proposed new species, one in the genus *Paguristes* and two in the genus *Pinnixa*, are described.

Sixty-two other species which either have been found or may be expected to occur off the northwest coast of Florida within the 30 fathom line are listed.

The ranges of several species have been extended by this study. These include *Periclimenaeus wilsoni*, *Typton tortugae*, *Paguristes*

tortugae, and *Leptodius floridanus*, all of which were not previously known in the Gulf north of the Tortugas. A form of *Pinnixa chaetopterana* not previously known was found to be a commensal of *Callinassa jamaicensis louisianensis*.

LITERATURE CITED

ANDERSON, W. W., and M. J. LINDNER

1. 1943. A provisional key to the shrimps of the family *Penaeidae* with special reference to American forms. Trans. Amer. Fish Soc. 73: 286-319.

BEHRE, E. H.

2. 1950. Annotated list of the fauna of the Grande Isle region, 1928-1946. Occ. Papers Marine Lab. L. S. U., No. 6: 66 pp.

BURKENROAD, M. D.

3. 1934. The *Penaeidea* of Louisiana with a discussion of their world relationships. Bull. Amer. Mus. Nat. Hist. 68: 61-143.
4. 1939. Further observations on the *Penaeidea* of the northern Gulf of Mexico. Bull. Bing. Oceanogr. Lab. 6. (art. 6), 62 pp.

CARLGREN, O., and J. W. HEDGPETH

5. 1952. *Actinaria*, *Zoantharia*, and *Ceriantharia* from shallow water in the northwestern Gulf of Mexico. Publ. Inst. of Marine Sci. (Univ. of Texas) 2: 141-172.

CHACE, F. A., JR.

6. 1942. Six new species of decapod and stomatopod crustacea from the Gulf of Mexico. Proc. New Eng. Zool. Club 19: 79-92.

COUTIERE, H.

7. 1909. The American species of snapping shrimps of the genus *Synalpheus*. Proc. U. S. Nat. Mus. 51: 569-579.

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

8. 1918. The decapod crustaceans of Beaufort, N. C., and surrounding region. Bull. Bur. of Fish. 35: 371-475.

HOLTHUIS, L. B.

9. 1951. A general revision of the Palaemonidae (*Crustacea Decapoda Natantia*) of the Americas. I. The subfamilies *Euryrhynchinae* and *Pontoniinae*. Allan Hancock Foundation Publ., Occasional Paper No. 11, 331 p. (Univ. of S. Calif. Press.)
10. 1952. A general revision of the Palaemonidae (*Crustacea Decapoda Natantia*) of the Americas. II. The subfamily *Palaemoninae*. Allan Hancock Foundation Publ., Occasional Paper No. 12. 369 p. (Univ. of S. Calif. Press.)

HUMES, A. G.

11. 1941. Notes on *Octolasmis mulleri* (Coker), a barnacle commensal on crabs. Trans. Amer. Micro. Soc. 60: 101-104.

IDYLL, C. P.

12. 1950. Report on the present status of the Franklin County shrimp industry. Fla. State Board of Conser. Mimeo. Sep., 14 p.

IVES, J. E.

13. 1891. Crustacea from the northern coast of Yucatan, the harbor of Vera Cruz, the west coast of Florida, and the Bermuda islands. Proc. Acad. Nat. Sci. Phila. 42: 176-207.

KINGSLEY, J. S.

14. 1879. On a collection of Crustacea from Virginia, North Carolina, and Florida, with a revision of the *Crangonidae* and *Palaemonidae*. Proc. Acad. Nat. Sci. Phila. 30: 383-427.

LUNZ, G. R., JR.

15. 1937a. *Xanthidae* (mud crabs) of the Carolinas. Charleston Museum Leaflet No. 9, 9-28.
 16. 1937b. Notes on *Callinassa major* Say. Charleston Museum Leaflet No. 10, 15 p.
 17. 1945. Carolina shrimps of the genus *Eusicyonia*. Charleston Museum Leaflet No. 20, 12 p.

McRAE, E. D.

18. 1950. An ecological study of the xanthid crabs in the Cedar Key area. Unpubl. master's thesis, Univ. of Florida. 72 p.

MILES, R. M.

19. 1951. An analysis of the "trash fish" of shrimp trawlers operating in Apalachicola Bay and adjacent Gulf of Mexico. Unpubl. master's thesis, Florida State Univ. 45 p.

PEARSE, A. S.

20. 1952. Parasitic crustaceans from Alligator Harbor, Florida. Jour. Fla. Acad. Sci. 15: 187-243.

PEARSE, A. S., H. J. HUMM, and G. W. WHARTON

21. 1942. Ecology of sand beaches at Beaufort, N. C. Ecological Monographs 12: 135-190.

RATHBUN, MARY J.

22. 1901. The *Brachyura* and *Macrura* of Porto Rico. Bull. Bureau of Fisheries 20(part 2): 1-127. (1900)
 23. 1905. List of the *Crustacea*. Fauna of New England. Occasional Papers, Boston Soc. Nat. Hist. 7: 1-117.
 24. 1918. The grapsoid crabs of America. Bull. U. S. Nat. Museum 97, 461 p.

25. 1925. The spider crabs of America. Bull. U. S. Nat. Museum 129, 613 p.
26. 1930. The Cancroid crabs of America of the families *Euryalidae*, *Portunidae*, *Atelecyclidae*, *Cancriidae*, and *Xanthidae*. Bull. U. S. Nat. Museum 152, 609 p.
27. 1933. Brachyuran crabs of Porto Rico and the Virgin Islands. Sci. Survey of Porto Rico and the Virgin Islands 15: 1-121.
28. 1937. The oxystomatous and allied crabs of America. Bull. U. S. Nat. Museum 166, 272 p.

SCHMITT, W. L.

29. 1924. Observations on the Decapod Crustacea of Tortugas. Carnegie Inst. of Wash., Yearbook 23: 200-201.
30. 1930. Some observations on the Crustacea of Tortugas, Florida. Carnegie Inst. of Wash., Yearbook 29: 343-346.
31. 1935a. Mud shrimps of the Atlantic coast of North America. Smithsonian Misc. Coll. 93: 1-21.
32. 1935b. *Crustacea Macrura* and *Anomura* of Porto Rico and the Virgin Islands. Sci. Survey of Porto Rico and the Virgin Islands 15: 125-227.