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Crustacean Hosts of the Pedunculate Barnacle Genus *Octolasmis* in the Northern Gulf of Mexico

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Crustacean Hosts of the Pedunculate Barnacle Genus *Octolasmis* in the Northern Gulf of Mexico

WILLIAM B. JEFFRIES AND HAROLD K. VORIS

A survey of live and preserved crustaceans from the northern portion of the Gulf of Mexico was conducted to investigate the colonization habits of the barnacle genus *Octolasmis*. In all, three crustacean orders (Decapoda, Isopoda, and Stomatopoda) comprising 43 families, 78 genera, and 122 species were surveyed. *Octolasmis* barnacles were observed to infest 14 families, 20 genera, and 27 species of the orders Decapoda and Isopoda. In order of decreasing frequency, the *Octolasmis* species encountered were *O. lowei*, *O. forresti*, *O. hoehi*, and *O. aymonini geryonophila*. The first two were found primarily in the gill chambers, the third was found mainly on external mouthparts, and the last was found exclusively on the external mouthparts, ventral pereonal and pleonal surfaces of the isopod, *Bathyergusus giganteus*. The decapod families *Pisidae* and *Portunidae* had the highest rates of infestation, whereas the family *Galatheidae* (represented by six species) did not host *Octolasmis*. The order Stomatopoda, represented by two families (*Lysiosquillidae* and *Squillidae*), two genera, and seven species was also not infested with *Octolasmis*. Statistical tests confirm that octolasmids do not randomly occupy hosts, rather they appear to select a subset, generally the larger species of crustaceans.
ilegal to collect Crustacea while temporarily assigned as a visiting scientist to NOAA R/V Oregon II for 2 wk in July of 1998 during one of the annual flatfish cruises. Similarly, in Sep. 1997, 1998, and 1999 we obtained Crustacea while we were guest scientists aboard the R/V A. E. Verrill on day cruises with the Alabama Bureau of Fisheries.

In addition, preserved specimens of Crustacea were graciously loaned to us by two museums, The University of Alabama, Tuscaloosa, AL, and The Florida Marine Research Institute, St. Petersburg, FL. These loans comprised the bulk of the total 1,915 specimens scrutinized for life cycle stages of Octolasmis species. Most of the crustaceans examined were adults.

Hand lenses, Optikon surgical glasses, and dissecting microscopes were used in searching for octolasmids on the exoskeleton, ambulatory appendages, antennae, mouthparts, and in the branchial chambers of potential hosts. Typically the carapace was removed, whole or piecemeal, to allow inspection of the branchial chambers.

A complete list of potential host species arranged taxonomically, the numbers of specimens examined for octolasmids, and their lot numbers are given in Appendix 1. Freshly collected crustaceans were identified using the studies of Powers (1977), Williams (1984), and Williams et al. (1989). For the preserved museum specimens, the assigned identifications on the labels in the collections were used except where incorrect or outdated nomenclature was detected. The crustacean classification used in this study follows Martin and Davis (2001), the “Decapod masterlist 2002.doc” provided by David Camp, and McLaughlin et al. (2004). All subspecies were lumped under the appropriate species name.

Recent estimates of marine crustacean species of the Atlantic coast of the eastern United States, including the Gulf of Mexico, have been reported in different ways: Powers (1977) catalogued 352 crabs (Brachyura) of the Gulf of Mexico; Williams (1984) recorded 342 decapod species “...occurring on continental shelf of temperate eastern United States...”; and Williams et al. (1989) reported 912 marine species in contiguous waters of the Atlantic.

For this study, we sought a more comparable figure and consulted publications resulting from ongoing annual species surveys made in the Gulf of Mexico. A subset of 157 crustacean species was collected in the northern Gulf by the GULF STATES MARINE FISHERIES COMMISSION as documented in annual published Shrimp/Groundfish survey composition lists from the SEAMAP cruises 1984–1995 (e.g., for 1984, see Thompson and Bane, 1986).

In our study, a total of 1,915 specimens representing 122 species of crustaceans were examined for octolasmids (Table 1). Appendix 1 provides the disposition of the 122 species within the 43 families represented and the museum lot numbers for the specimens examined.

The following species of Octolasmis have been previously recorded from hosts collected from the Gulf of Mexico: O. aymonini grynoaphila Pilsbry, 1907, O. forresti (Stebbing, 1894), O. hoeki (Stebbing, 1895), and O. lowei (Darwin, 1851) (Pilsbry, 1907; Pearse, 1932, 1952; Humes, 1941; Henry, 1954; Causey, 1961; Hulings, 1961; Wells, 1966; Spivey, 1981; Gittings, 1985; Gittings et al., 1986).

RESULTS

The 122 decapod, isopod, and stomatopod species from the northern Gulf of Mexico examined for Octolasmis spp. are listed in alphabetical order in Table 1. The number of specimens of each sex examined from each source is also provided. In all, 1,915 crustaceans were examined for the presence of Octolasmis species. The number of specimens examined per species ranged from 1 to 344, with 1 being the modal value and 6 the median. Of the 122 species examined as potential hosts, 27 species representing 14 families of crustaceans were infested with Octolasmis. The median sample size among the 27 species was 14. These 27 species are grouped by family in Table 2. The numbers of individuals infested, the percentage infested, the Octolasmis species, and descriptions of their distributions on their hosts are also provided. In Figure 1, the percentage of individuals infested with Octolasmis is shown for the 15 species of crustaceans that were represented in our samples by 10 or more individuals. The crustacean hosts are ordered on the graph according to the level of infestation.

This study documents, for the first time, new Octolasmis hosts: three families (Dromiidae, Glyphocragonidae, and Raninidae) of the 14 families of crustaceans and 14 of the 27 species (51%) listed in Table 2 have not been reported previously to host Octolasmis. Among the 14, 10 hosted a single Octolasmis species, two hosted two Octolasmis species, and two hosted three Octolasmis species, thus making a total of 20 new hosts.

Of the 27 host species listed in Table 2, 12 were represented by a total of more than 20 specimens. For each of these species, we used
Table 1. Summary of Decapoda, Isopoda, and Stomatopoda species from the northern Gulf of Mexico examined for the presence of Octolasmis. Samples came from collections made by the authors at the Dauphin Island Sea Lab (DISL), 1997–99, and museum collections at the University of Alabama (UAL) and the Florida Marine Research Institute (FMRI). Genera and species are listed in alphabetical order and the specimens were adults unless otherwise indicated.

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</table>

a Juvenile indicates the specimens were sexually immature; NS indicates the specimens were not sexed.

b To conserve space, counts from two other years are given here. Totals given in this note are included in the grand total column. Six species (males, females, total) with samples from DISL 1997: Callinectes sapidus, 11, 5, 16; Callinectes similis, 79, 85, 165; Clibanarius vittatus, not sexed, 85; Lithium dubia, 0, 4, 6; Lithium emarginatus, 1, 0, 1; Menippe mercenaria, 23, 20, 43. Two species (males, females, total) with samples from DISL 1999: Lithium dubia, 6, 8, 14; Raninoides loevis, 4, 1, 5.
TABLE 2. Twenty-seven crustacean species found to harbor Octolasmis species. The number of decapod and isopod specimens examined and the number infested with Octolasmis are provided along with the identity of the barnacle and the location of the barnacles on the host. The crustacean hosts are listed in alphabetical order within families, genera, and species. R = right, L = left. O. a. g. = Octolasmis aymonini geryonophila. An asterisk indicates the 14 species that are newly recorded as hosts for Octolasmis spp. A grand total of 259 crustaceans (column 3) were found to be infested.

<table>
<thead>
<tr>
<th>Crustacean host</th>
<th>Number Examined</th>
<th>Infested</th>
<th>Percent infested</th>
<th>Octolasmis species</th>
<th>Location on host</th>
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<td>O. lowei</td>
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<td></td>
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<td></td>
<td></td>
<td>O. hoeki</td>
<td>R/L inner gill surfaces, gill rakers</td>
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<tr>
<td>Cirolanidae</td>
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<td>Bathynomus giganteus</td>
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<td>5</td>
<td>38.5</td>
<td>O. a. g.</td>
<td>R/L external mouthparts; hypopharynx; R/L pereonal and pleonal sternites, dorsal and ventral surfaces of pleopodal endopods and exopods</td>
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<td>Dromiidae</td>
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<td>O. forresti</td>
<td>R chamber floor</td>
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<td>Glyphocrangonidae</td>
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<td>1.4</td>
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<td>R 1 and 4 ventral surfaces of pleopods</td>
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<td>O. lowei</td>
<td>R 1 and 4 ventral surfaces of pleopods</td>
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<td>Hepatidae</td>
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<td>57.1</td>
<td>O. lowei</td>
<td>R/L inner gill surfaces, gill rakers, and excurrent channels; R chamber floor</td>
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<td>O. lowei</td>
<td>L chamber floor</td>
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<td>L dorsal chela; R/L incurrent channels, external mouthparts, gill bailers, inner gill surfaces, chamber walls and floors</td>
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<td>R/L inner and outer gill surfaces</td>
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<td>R/L external mouthparts</td>
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<tr>
<td>Crustacean host</td>
<td>Number</td>
<td>Percent</td>
<td>O. loewi</td>
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<td>50.0</td>
<td>O. loewi</td>
<td>L inner gill surfaces, chamber floor</td>
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<td>1</td>
<td>50.0</td>
<td>O. loewi, O. forresti</td>
<td>R chamber wall</td>
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<td>R/L inner gill surfaces, chamber walls</td>
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<td>14.3</td>
<td>O. loewi</td>
<td>R/L inner gill surfaces, gill rakers, chamber walls</td>
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<td>44.1</td>
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<td>R/L external mouthparts, chamber walls adjacent to incumbent channels</td>
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<td>29</td>
<td>24</td>
<td>82.8</td>
<td>O. hoeki, O. forresti</td>
<td>R/L inner gill surfaces, R/L chamber walls adjacent to incumbent channels</td>
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https://aquila.usm.edu/goms/vol22/iss2/5
DOI: 10.18785/goms.2202.05
the chi-square test to compare the observed distribution of males and females infested with the expected numbers infested on the basis of the numbers of males and females examined. In none of these species did we find a significant difference between the observed numbers and expected numbers ($P > 0.05$). This represents nearly an even split between males and females. Thus, the data collected in this study suggest that for most host species both male and female crustaceans are equally likely to be hosts of Octolasmis.

Octolasmis lowei was by far the most ubiquitous species in the survey, being present on 25 of the 27 infested host species. They were observed most frequently in the gill chambers on the floor, the wall, the gills, especially the inner (hypobranchial) gill surfaces, and the gill rak­ers. In addition, they were frequently observed attached to the inner carapace margin, commonly adjacent to the incurrent channel openings. Less frequently, they were found within the excurrent channels and on external mouthparts. On Glyphocrangon spinicauda they were present on the ventral pleopod surfaces. Octolasmis hoeki was observed on six host species all of which hosted other Octolasmis species as well. They occurred only with $O. \text{lowei}$ on two host species and with $O. \text{lowei}$ and $O. \text{forresti}$ on four host species. They were found on the gill

**Fig. 1.** The percentage of individuals infested with Octolasmis is shown for 15 species of crustaceans that were represented in our samples by 10 or more specimens. The crustacean hosts are ordered on the graph according to the level of infestation, and the sample size for each species is given at the end of each bar.
chamber floors, the walls, the inner gill surfaces, gill rakers, and gill baiiers. They were also observed on external mouthparts, on the inner carapace margin adjacent to the incurrent channels, and infrequently, on a dorsal chela. On G. spinicauda they were on the ventral pleopod surfaces.

Octolasmis forresti was observed on six host species, one alone, one only with O. lowei, four with O. hoeki and O. lowei. They were observed in the gill chambers on the inner and outer gill surfaces and on the chamber floor. They were also found on the inner carapace margin adjacent to the incurrent channel apertures.

Octolasmis aymonini geryonaphila was observed on one species only, Bathynomus giganteus, the deep-sea isopod. They were observed attached to the exoskeleton on the external mouthparts, maxillipeds, maxillae, and mandibles; the paired pereon sternites 1-8; the paired pleon sternites 1-5; the dorsal and ventral surfaces of the five pairs of paddle-shaped pleopods (each with overlapping endopod and exopod); at the junction of the endo- and exopod of the uropod; and on the ventral perimeter of the telson.

It is notable that none of the seven mantis shrimp (Stomatopoda) species were infested with Octolasmis, although we have observed such associations between O. waervickii and the mantis shrimp Harpiosquilla raphidea (Fabricius, 1798) obtained from the Indian Ocean (Jeffries and Voris, unpubl. data). Within the Isopoda, family Cirolanidae, one species was infested with Octolasmis. Within the Decapoda, the Brachyuran crab families contained the bulk of the host species (Table 2).

**DISCUSSION AND CONCLUSIONS**

*The value of the survey.*—This survey of potential hosts of barnacles of the genus *Octolasmis* is of unprecedented taxonomic breadth. For the first time, it documents the extent of diversity of *Octolasmis* hosts in the Gulf of Mexico region of the Atlantic Ocean. The fact that 14 new host species were discovered illustrates an immediate benefit of this type of survey, which samples broadly and documents both the absence and presence of barnacles, illuminating the nonrandom use of crustacean species and the degree of host specificity among *Octolasmis* species. By documenting the species that were found not to host *Octolasmis* (the negative data), we begin to accumulate information that may eventually identify and document whole genera or even families that are free of *Octolasmis*. The value of such information was recognized by Humes (1941), who, in addition to recording detailed data about six brachyuran species that hosted *Octolasmis mülleri* (= *O. lowei* by most other authors) their numbers, sex, infestation rates and sites, also similarly identified 11 other crab species in the same locality which "...were without *Octolasmis.*" Now, as then, such observations become useful in directing research on symbiont requirements and factors that may govern host selection by cyprids.

*Survey limitations.*—The specimens reported in this study came from a limited geographic area and largely from shallow seas. For example, some specimens were collected in 1998 on the R/V Oregon II during the July survey, in random trawls made at computer-generated sites and at varying depths to 60 fathoms. Others were similarly collected in the 1998 Oct. survey on the R/V A. E. Verrill by trawl at depths not exceeding 16 m. The local Dauphin Island fishermen always fished in shallow water, and thus, those samples were strongly biased toward species frequenting shallow water habitats.

Sample sizes for each species were unequal because multiple factors limited the number of specimens available for each species. For example, we borrowed "reasonable numbers" depending upon the numbers of any given species in the museum collections. In addition, for some very "hard-shelled" species as well as for some very "fragile-shelled" species, no attempt was made to remove the carapace because it would have meant destruction of the specimen.

Although accepting museum identifications without expert verification by group specialists may lead to the inclusion of some misidentifications, the list of specimens examined and their museum lot numbers (Appendix) allows for cross checking in the future.

Furthermore, in a survey of this type, the variable sample sizes of the host species has a major influence on the likelihood of discovering an infestation. For example, 103 of the species were represented by between 1 and 20 specimens, and only 14% of these species had *Octolasmis*. Of the 19 species that were represented by more than 20 specimens, 68% were infested.

*Importance of crab size.*—In the mangrove crab, *Scylla serrata*, the size (a proxy for both age and instar) of the crab has been shown to be correlated with infestation by *O. cor* (Jeffries et al., 1992). *Scylla serrata* the smallest crab to host an octolasmid was 34.3 mm in carapace width (in-
star 10). In this study, the smallest crab to host an octolasmid was a *Raninoides loewi* with a carapace width of 19.2 mm. To test the effect of size in this study we chose the largest crab (carapace width of brachyurans only, n = 81 species) for each species. Next we compared the mean maximum carapace widths of every species that hosted octolasmids (mean = 78.7 mm) to those that did not host octolasmids (40.7 mm). The means of these two groups proved to be significantly different (Tukey Honestly significant difference test, *P* < 0.001). These results suggest that larger crab species are more susceptible to infestation by octolasmids than smaller species.

**Role of host sex on infestation.**—Among the 27 host species listed in Table 2, we found no difference between the observed distribution of males and females infested and the expected numbers infested on the basis of the numbers of males and females examined. These observations are in contrast to assertions made by Coker (1902) and Humes (1941) that female *Callinectes sapidus* had higher rates of infestation by *O. loewi*. We applied chi-square tests to the data provided by these authors and found that in both cases the females had significantly higher rates of infestation (*P* < 0.01) supporting their conclusions. Conversely, DeTurk (1940) asserted a similar difference regarding the same species but when we applied a chi-square test to his data we found no difference between the rates of infestation between males and females (*P* > 0.05).

These observations suggest that infestation rates of *Octolasmis* differ between male and female crustaceans in some locations and during some seasons. The recent report of Gannon et al. (2001) tends to support this assertion.

**Nonrandom nature of the distributions.**—The observation of 259 specimens with one or more *Octolasmis*, among the 1,915 crustaceans representing 122 species surveyed differs from what would be expected on the basis of the sample sizes of each crustacean species examined (G-test, *P* < 0.0001). Of the 122 species, 95 bore no octolasmids, whereas 27 species hosted octolasmids. In *C. sapidus*, 107 of 115 specimens were infested, accounting for 41% of the 259 crustaceans observed to host octolasmids (Table 2). A bias in favor of *Octolasmis* infestation was doubtless introduced when we purchased larger blue crabs, many of which bore balanoid barnacles on the carapace (both indicative of time lapsed since the previous molt).

We also generated 20 data sets by distributing 259 barnacles randomly over the total of 1,915 crustaceans representing 122 species 20 times. We then compared the randomly generated distributions to the observed distribution. In the observed data set, 27 of the 122 species of crustaceans had one or more octolasmids. The 20 random data sets had significantly more species infested (range 60–77 species, mean = 69.4 species, *t* = 7.16, *P* < 0.001). A comparison of the observed and randomly generated data for *C. sapidus* is instructive. We observed 107 of 115 *C. sapidus* infested with one or more *Octolasmis*. In the 20 random data sets, 11–20 of the 115 *C. sapidus* were infested with a mean of 14.85. The difference between the observed distribution and the 20 random runs for *C. sapidus* is highly significant with the observed distribution having at least five times the infestation rate of any of the random runs (*t* = 32.95, *P* < 0.001).

**Importance of host families.**—In this study, the 122 species examined fall within the 43 families named in Appendix 1. Most of the families are represented by just one or two species so it is not possible to infer that *Octolasmis* is either a common or uncommon symbiont among the species of the family. However, the samples among a few of the families justify some preliminary comment. Six species of Galatheidae represented by between 3 and 13 specimens and six species of Squillidae represented by between 5 and 171 specimens were found to be free of *Octolasmis*. Thus, it is likely that these families may rarely host *Octolasmis*. On the other hand, the families Pisidae and Portunidae were found to have a high proportion of infestation among the species examined. Four of six species of the Pisidae and 8 of 15 species of Portunidae hosted *Octolasmis*, and thus these families may prove to be particularly important in the biology of *Octolasmis*. This view is also supported by observations made on crustaceans from the sea adjacent to Singapore, where 12 of 12 species of Portunidae and 7 of 13 species of Xanthidae were found to host *Octolasmis* (Jeffries et al., 1982).

**Barnacle species co-occurrences.**—*Octolasmis loewi* occurred on all but two of the 27 host species reported on in this study. In four host species, *O. loewi* occurred with both *O. hoeki* and *O. forresti*. All three of these *Octolasmis* species occurred in similar locations within the host’s gill chambers or adjacent to incumbent channel openings. Our modest sample sizes do not allow us to address possible subtle site selection.
differences among *Octolasmis* species using statistical approaches. It is noteworthy that our observations differ sharply from the conclusions of Gittings (1985, 1986) in which he reports a clear spatial segregation between *O. longi* within the branchial chambers of *Calappa sulcata* (on the gills and in the gill chambers) and *O. hoeki* outside the chambers (on the mouthparts, the carapace near the gills, and on the exoskeleton of the first walking legs near the branchial chamber). These conclusions are based on an undisclosed sample size of *C. sulcata*. In another study where large numbers of hosts have been systematically studied, site selection differences by cyprids of other *Octolasmis* species have been clearly demonstrated in the mangrove crab, *S. serrata* (Voris et al., 2000).

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**Appendix**

List of potential host species examined arranged taxonomically. The species fall within 45 families. The number of specimens examined and the museum specimen numbers are also given following each species name. DISL = Dauphin Island Sea Lab, UAL = University of Alabama Museum, FMRI = Florida Marine Research Institute. The nomenclature used here follows “An updated classification of recent Crustacea” by Martin and Davis (2001), “Decapod masterlist 2002.doc” provided by David Camp, and McLaughlin et al. (2004). All subspecies were lumped under the appropriate species name.

Subphylum Crustacea Brünnich, 1772; Class Malacostraca Latreille, 1802; Subclass Heterocarpus Calman, 1904; Order Stomatopoda Latreille, 1817; Suborder Unipeltata Latreille, 1825; Superfamily Lysisquisoidea Giesbrecht, 1910.


Superfamily Eumalacostraca Gröben, 1892; Superorder Peracarida Calman, 1904; Order Isopoda Latreille, 1817; Suborder Flabellifera Sars, 1882.

Family Cirolanidae Dana, 1852: *Bathy­nomus giganteus* A. Milne Edwards, 1871, UAL 10 (236FmTrSofDISL, AT14059Tr13, ST14050Tr4), FMRI three (I 29351, I 54975–6).

Superorder Eucarida Calman, 1904; Order Decapoda Latreille, 1802; Suborder Dendrobranchiata Bate, 1888; Superfamily Penaeoidea Rafinesque, 1815.


Suborder Pleocymata Buckenroad, 1963; Infraorder Caridea Dana, 1882; Superfamily Alpheoidea Rafinesque, 1815.

Family Alpheidae Dana, 1882: *Alpheus floridanus* Kingsley, 1878, UAL three (6179 3670).

Superfamily Pandaloidae Haworth, 1825.

Family Pandalidae Haworth, 1825: *Heterocarpus ensifer*, A. Milne Edwards, 1881, FMRI six (I 28809, I 4660); *Heterocarpus oxyx*, A. Milne Edwards, 1881, FMRI one (I 6706); *Plesionika lon-
gicaua, Rathbun, 1901, UAL three (6179 4203); Plesionika longipes (A. Milne Edwards, 1881), FMRI 10 (I 29933).

Superfamily Cranoidea Hathow, 1825.

Family Glyphocrangonidae Smith, 1884: Glyphocrangon longlei, Schmitt, 1931, UAL seven (6179 2902, 6179 2903); Glyphocrangon spincicaua, A. Milne Edwards, 1881, FMRI 71 (I 6692, I 60228, I 6673).

Infraorder Astacidea Latreille, 1853; Superfamily Procambaroidea Stimpson, 1858.

Family Cyprinidae Gill, 1866, FMRI seven (I 2544, I 2587, I 5927). Family Cyprinidae Dana, 1852: Procambarus clarkia (Girard, 1852), FMRI 25 (I 5889, I 552, I 19257, I 19285, I 5927).

Superfamily Heptacocidae Stimpson, 1858, FMRI one (I 8280); Spergo trilobata (Biffar, 1970), FMRI two (I 8350).

Superfamily Spergoidea Stimpson, 1858: Spergo callipterus (Bosch, 1802), DISL b (97433–97517); Dardanus insignis (de Saussure, 1858), UAL nine (6183 4608); Paguristes erythrosp Holthuis, 1959, UAL four (6183 4733).

Infraorder Brachyura Latreille, 1802; Division Dromiacea de Haan, 1833; Superfamily Dromioidea de Haan, 1833.

Family Dromiidae de Haan, 1833: Cryptodromopsis antillensis (Stimpson, 1858), UAL 10 (6185 10568, 6185 6857, 6185 6896, 6185 6916), FMRI 11 (I 239, I 321, I 397, I 843, I 1781, I 2239, I 3359, I 9950, I 14220, I 19452–3); Dromia erythropus (George Edwards, 1771), UAL one (6185 6922); Hypoconcha parasitica (Linnaeus, 1763), UAL four (6185 6940, 6185 6944); Hypoconcha spinosissima Rathbun, 1933, UAL one (6185 6969).

Superfamily Homoloidea de Haan, 1839.


Division Eubrachyura of Saint Laurent, 1980; Subdivision Raninoidea de Haan, 1839; Superfamily Raninoidea de Haan, 1839.

Family Raninidae de Haan, 1839: Ranilia murecata H. Milne Edwards, 1837, UAL six (6186 0032, 6186 0028), FMRI 11 (I 18678, I 373, I 3065, I 19913); Raninoides levis (Latreille, 1825), DISL 28 (98020–3, 98134–5, 98137–47, 98478–88), UAL three (6186 0058), FMRI 10 (I 19956, I 19948), DISL five (99015–9).

Family Symethidae Goek, 1981: Synethis variolosa (Fabricius, 1793), FMRI one (I 4096).

Subdivision Heterotremata Guinot, 1977; Superfamily Dorippoidae MacLeay, 1838.


Family Calappidae Milne Edwards, 1837: Acanthocarpus alexandri Stimpson, 1871, UAL 15 (6168 6648,49,52,53), FMRI 10 (I 29939); Calappa flavnea (Herbst, 1794), DISL two (98126, 98132), UAL five (6186 6689), FMRI four (I 832, I 32008); Calappa galloides Stimpson, 1859, FMRI five (I 1840, I 5033, I 32634); Calappa sulcata Rathbun, 1898, DISL 22 (98011–19, 98130, 98852–93), UAL two (22 VII ’75); Cyclocoeloid angustum (A. Milne Edwards, 1880), FMRI two (I 24148).

Family Hepatidae Bellwood, 1996: Hepatus epheliticus (Linnaeus, 1763), DISL six (98005–
Family Parthenopidae MacLeay, 1838: Parthenope agona (Stimpson, 1871), UAL 11 (6187 7393, 6187 7400); Platylambros fraterculus (Stimpson, 1871), UAL five (6187 7451); Platylambros granulata (Kingsley, 1879), UAL 11 (6187 7526, 6187 7501), FMRI three (I 607); Platylambros portalestii (Stimpson, 1871), FMRI two (I 29401, I 29271); Platylambros serratus (H. Milne Edwards, 1834), FMRI four (I 509, I 865). Superfamily Majoidea Samouelle, 1819. Family Portunidae Rafinesque, 1815: Arenaeus cebrianus (Lamarck, 1818), DISL 34 (98124–5, 98251–61, 98329–10, 98328, 98420–1, 98489–0, 98731, 98744–56); Callinectes exasperatus (Gorteacker, 1856), FMRI one (I 2239); Callinectes larvatus Ordyw, 1863, FMRI four (I 4983); Callinectes ornatus Ordyw, 1863, FMRI six (I 864, I 4325); Callinectes sappidus Rathbun, 1896, DISL nine (98008–10, 98706–5, 98313, 98148, 98150, 98329, 98350–3, 98433), DISL 16 (97202, 97206–10, 97212–5, 97412–70); Callinectes similis Williams, 1966, DISL 179 (98149, 98151, 98191–20, 98262–86, 98295–25, 98381–19, 98422–32, 98434–77, 98605), DISL 165 (97222–97386); Ovalipes floridanus Hay and Shore, 1918, DISL one (98727); Ovalipes occlus (Herbst, 1779), DISL one (98707); Ovalipes ocellatus (Herbst, 1779), DISL one (98707); Ovalipes stephensi Williams, 1976, DISL three (98007, 98031, 98266), FMRI two (I 10748); Portunus depressifrons (Stimpson, 1859), FMRI six (I 29422–6); Portunus floridanus Rathbun, 1930, DISL six (98610–1, 98701–4); Portunus gibbesii (Stimpson, 1859), DISL 104 (98001–2, 98169–89, 98491–01, 98601–4, 98607–9, 98612–40, 98683–00, 98706–9, 98792–43); Portunus orbawai (Stimpson, 1860), UAL seven (6189 8038–9), FMRI 17 (I 984, I 838, I 29439); Portunus spinicarpus (Stimpson, 1871), DISL three (98728–0), FMRI 18 (I 445, I 29443); Portunus spinimanus Latreille, 1819, DISL 11 (98190, 98263–5, 98361–3), UAL 23 (6189 8221, 22 VII ’75). Superfamily Xanthoidea Samouelle, 1819. Family Carripilidae Guinot, 1976: Carpiilis corallinus (Herbst, 1783), FMRI one (I 10052). Family Goneplacidae MacLeay, 1838: Batbyplax typhlus, A. Milne Edwards, 1880, FMRI three (I 6696); Freyvella hieruta (Borradaille, 1916), UAL six (6189 7003). Family Menippidae Guinot, 1978: Eraiphon gongrana (Fabricius, 1871), FMRI one (I 2297); Menippe mercenaria (Say, 1818), DISL 11 (98152, 98222, 98287–0, 98293, 98335, 98516, 98594), DISL 43 (97205, 97216–9, 97389–5, 97396–9, 97401–11, 97418–32); Menippe nodifrons Stimpson, 1859, FMRI 10 (I 14472, I 7862). Family Panopeidae Guinot, 1978: Dysanopus texana (Stimpson, 1859), FMRI 10 (I 6719); Eu-
rypanopeus depressus (Smith, 1869), FMRI four (I 5062); Eurytinum limosum (Say, 1818), FMRI seven (I 1014, I 4780); Panopeus herbsti H. Milne Edwards, 1834, FMRI 19 (I 1792, I 2509, I 5098, I 1014, I 4778); Panopeus occidentalis de Saussure, 1857, FMRI 14 (I 25770, I 4919, I 11450).

Family Pilumnidae Guinot, 1978: Lobodilemus agassizii (Stimpson, 1871), UAL four (6189 8533), FMRI 11 (I 1558, I 371, I 1946); Pilumnus sayi Rathbun, 1897, FMRI six (EJ-84–56).


Family MacLeay, 1838: Cataleptodius floridanus (Gibbes, 1850), FMRI eight (I 2299); Glyptoxanthus erosus (Stimpson, 1859), UAL two (6189 8475), FMRI five (I 483, I 3133, I 6585). Xanthoidea incertae sedis: Tetraxanthus rathbuniae Chace, 1939, FMRI six (EJ-84–56). Superfamily Grapsoidae MacLeay, 1838. Family Grapsidae MacLeay, 1838: Gonioptes cruentata, (Lettreille, 1802), FMRI three (I 15637, I 2296).


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