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

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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. hoeki*, 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, *Bathynomus 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.

Pedunculate barnacles have a paleontological history dating back to the Upper (Late) Silurian Epoch, but even at that early date, 416–421 millon years ago, a symbiotic association with another living animal species had already evolved. Upper Silurian fossils confirm intimate cohabitation of early postlarval stage lepadomorph pedunculate barnacles, *Cyprilepas holmi* Eichw. Wills, 1962, with another animal species, a chelicerate of the subclass Eurypterida, Burmeister, 1843, *Eurypterus fischeri* Eichw. (Wills, 1963). *Lepas* is the pedunculate barnacle genus most commonly observed today attached to flotsam and jetsam. However, it is the genus *Octolasmis* that has exploited the symbiotic life style so successfully, including as hosts: corals, echinoderms, mollusks, horseshoe crabs, lobsters, isopods, stomatopods, fish, and sea snakes (Jeffries and Voris, 1996). In addition to selecting a variety of hosts, *Octolasmis* species choose various sites for attachment to the hosts. For example, *Octolasmis warwickii* Gray, 1825, *Octolasmis tridens* (Aurivillius, 1894), *Octolasmis hoeki* (Stebbing, 1895) and *Octolasmis aymonini geryonophila* Pilsbry, 1907, live exposed on their crustacean hosts, attached to exoskeletal surfaces such as the carapace, antennae, mouthparts, and ambulatory appendages. These *Octolasmis* species have robust plates supporting the capitulum and are thus distinguished from *Octolasmis angulata* (Aurivillius, 1894), *Octolasmis bullata* (Aurivillius, 1892), *Octolasmis cor* (Aurivillius, 1892), *Octolasmis lowei* (Darwin, 1851), and *Octolasmis neptuni* (MacDonald, 1869), whose capitular plates are reduced or absent, and that mainly live sheltered within the branchial chambers of their crustacean hosts (Voris and Jeffries, 1997).

Useful biological overviews replete with drawings and keys describing all barnacle species indigenous to the Gulf of Mexico are provided in Pilsbry (1907), Henry (1954), Wells (1966), Spivey (1981), Gittings (1985), and Gittings et al. (1986). A few other publications such as Causey (1960, 1961) and Colón-Urban et al. (1979) report research on *Octolasmis* species collected in the Gulf of Mexico.

We have chosen to focus on the symbiotic genus *Octolasmis* with the objective of conducting the first broad search for *Octolasmis* among potential host species of crustaceans from a limited geographic area in the Western Hemisphere. Our research was undertaken with an aim to: (1) survey a large sample of potential host crustaceans for species of *Octolasmis* in the northern Gulf of Mexico; (2) assess *Octolasmis* species diversity in that geographic area; and (3) assess the attachment sites of *Octolasmis* on their respective host Crustacea.

Materials and Methods

In the years 1997, 1998, and 1999, primarily in the months of Sep. to Nov., Crustacea were collected for us by fishermen in the northern Gulf of Mexico. Also, one of us (WBJ) was privileged 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 geryonophila* 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, Glyphocrangonidae, 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

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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.[a]

	Numbers of specimens										
	DISL 1998			UAL			FMRI				
Species	M	F	Total	M	F	Total	M	F	Total	Grand total	*Octolasmis* present
Acanthocarpus alexandri				5	10	15	6	4	10	25	No
Albunea gibbesii							4	6	10	10	No
Albunea paretii				1		1			0	1	No
Alpheus floridanus				1	2	3			0	3	No
Anasimus latus				1	1	2	2	2	4	6	No
Aratus pisonii							2	3	5	5	No
Arenaeus cribarius	27	7	34							34	Yes
Aristeus antillensis								1		1	No
Bathynomus giganteus				2	8	10	1	2 juv.	3	13	Yes
Bathyplax typhlus							1	2	3	3	No
Calappa flammea	2		2	3	2	5	1	3	4	11	No
Calappa galloides							2	3	5	5	No
Calappa sulcata	8	7	15	2		2				17	Yes
Callidactylus asper				1						1	No
Callinectes exasperatus							1		1	1	No
Callinectes larvatus							1	3	4	4	No
Callinectes ornatus							4	2	6	6	No
Callinectes sapidus	15	84	99							115[b]	Yes
Callinectes similis	120	59	179							344[b]	Yes
Carpilius corallinus							1		1	1	No
Cataleptodius floridanus							3	5	8	8	No
Chorinus heros								2	2	2	No
Clibanarius vittatus										85[b]	No
Coelocerus spinosus							1	1	2	2	Yes
Cryptodromiopsis antillensis				3	7	10	4	7	11	21	Yes
Cyclozodion angustum								2	2	2	No
Dardanus insignis				NS		9				9	No
Dromia erythropus				1		1				1	No
Dyspanopeus texana							10		10	10	No
Emerita benedicti				NS		8				8	No
Eriphia gonagra								1	1	1	No
Ethusa microphthalma				3	3	6				6	No

TABLE 1. Continued.

Species	Numbers of specimens									Grand total	*Octolasmis* present
	DISL 1998			UAL			FMRI				
	M	F	Total	M	F	Total	M	F	Total		
Euchirograpsus americanus							3		3	3	No
Euphrosynoplax clausa	2		2							2	No
Eurypanopeus depressus							3	1	4	4	No
Eurytium limosum							5	2	7	7	No
Farfantepenaeus aztecus	17	17	34							34	No
Freyvillea hirsuta				3	3	6				6	No
Glyphocrangon longleyi					7	7				7	No
Glyphocrangon spinicauda							28	43	71	71	Yes
Glypturus acanthochirus									1 juv.	1	No
Glyptoxanthus erosus					2	2	1	4	5	7	Yes
Goniopsis cruentata							2	1	3	3	No
Hepatus epheliticus	2	4	6	1		1				7	Yes
Heterocarpus ensifer								6	6	6	No
Heterocarpus oryx									1 juv.	1	No
Homola minima				2	2	4				4	No
Hypoconcha parasitica				2	2	4				4	No
Hypoconcha spinosissima				1		1				1	No
Iliacantha subglobosa				2	1	3				3	No
Libinia dubia	4	2	6	1	1	2				26[b]	Yes
Libinia emarginata		2	2							3[b]	Yes
Lobopilumnus agassizii				2	2	4	5	6	11	15	No
Lysiosquilla scabricauda							10	1	11	11	No
Macrocoeloma septemspinosum				3	3	6	1	1	2	8	No
Macrocoeloma trispinosum				1		1	5	2	7	8	Yes
Menippe mercenaria	10	1	11							54[b]	Yes
Menippe nodifrons							2	8	10	10	No
Mithraculus coryphe							3		3	3	No
Mithraculus forceps							5	1	6	6	No
Mithraculus sculptus							2	3	5	5	No
Mithrax caribbaeus							1		1	1	No
Mithrax hispidus				1		1				1	No
Mithrax pleuracanthus				3	3	6	4	8	12	18	No
Mithrax spinosissimus							2		2	2	No
Mithrax verrucosus							2	2	4	4	No

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TABLE 1. Continued.

Species	Numbers of specimens									Grand total	*Octolasmis* present
	DISL 1998			UAL			FMRI				
	M	F	Total	M	F	Total	M	F	Total		
Munida flinti				4	4	8				8	No
Munida irrasa				11	1	12				12	No
Munida pusilla				7	2	9				9	No
Munidopsis robusta							10	3	13	13	No
Munidopsis spinosa							3		3	3	No
Myropsis quinquespinosa	1		1	5	5	10				11	No
Nemausa acuticornis				3	4	7				7	No
Nephropis aculeata							4	1	5	5	No
Nibilia antilocarpa					1	1				1	No
Ovalipes floridanus	1		1							1	Yes
Ovalipes ocellatus		1	1							1	No
Ovalipes stephensoni	2	1	3				1	1	2	5	Yes
Pachycheles rugimanus					6	6				6	No
Paguristes erythrops				4		4				4	No
Panopeus herbstii							13	6	19	19	No
Panopeus occidentalis							6	8	14	14	No
Panulirus argus								7	7	7	No
Parthenope agona				5	6	11				11	No
Persephona mediterannea	2		2							2	Yes
Petrolisthes galathinus					3	3	1	1	2	5	No
Pilumnus sayi							3	3	6	6	No
Platylambrus fraterculus				2	3	5				5	No
Platylambrus granulata				10	1	11	1	2	3	14	Yes
Platylambrus pourtalesii							1	1	2	2	No
Platylambrus serratus								4	4	4	No
Plesionika longicauda				2	1	3				3	No
Plesionika longipes							3	7	10	10	No
Polycheles typhlops				2	2	4				4	No
Portunus depressifrons							2	4	6	6	No
Portunus floridanus	3	3	6							6	No
Portunus gibbesii	61	43	104							104	Yes
Portunus ordwayi				3	4	7	9	8	17	24	No
Portunus spinicarpus	3		3				6	12	18	21	Yes
Portunus spinimanus	10	1	11	10	13	23				34	Yes

TABLE 1. Continued.

Species	Numbers of specimens									Grand total	*Octolasmis* present
	DISL 1998			UAL			FMRI				
	M	F	Total	M	F	Total	M	F	Total		
Pyromaia arachna				1	6	7				7	No
Ranilia muricata				2	4	6	2	9	11	17	No
Raninoides loevis	12	16	28	2	1	3	6	4	10	46[b]	Yes
Rochinia crassa				1	3	4				4	Yes
Scyllarides aequinoctialis							2	3	5	5	Yes
Scyllarides nodifer				5	1	6	13	10	23	29	Yes
Scyllarus americanus							5	5	10	10	No
Scyllarus chacei				3	8	11		15	15	26	No
Sergio trilobata								2		2	No
Sicyonia brevirostris							8	9	17	17	No
Sicyonia typica							6	6	12	12	No
Squilla chybdaea	8	9	17							17	No
Squilla deceptrix							5	6	11	11	No
Squilla edentata				1	3	4	1	6	7	11	No
Squilla empusa	78	93	171							171	No
Squilla neglecta							2	3	5	5	No
Squilla rugosa							2	4	6	6	No
Stenocionops furcatus				1	3	4	2	1	3	7	Yes
Stenocionops spinimanus	1		1	2		2	2		2	5	Yes
Stenorhynchus seticornis				3	3	6				6	No
Symethis variolosa								1	1	1	No
Tetraxanthus rathbunae				3	3	6				6	No
										1,915[b]	

[a] juv. indicates that the specimens were sexually immature; NS indicates that 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, 86, 165; *Clibanarius vittatus*, not sexed, 85; *Libinia dubia*, 0, 4, 4; *Libinia emarginata*, 1, 0, 1; *Menippe mercenaria*, 23, 20, 43. Two species (males, females, total) with samples from DISL 1999: *Libinia dubia*, 6, 8, 14; *Raninoides loevis*, 4, 1, 5.

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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.

Crustacean host	Number Examined	Number Infested	Percent infested	*Octolasmis* species	Location on host
Calappidae					
Calappa sulcata	17	13	76.5	*O. lowei*	R/L inner gill surfaces, gill rakers
				O. hoeki	R/L inner gill surfaces, gill rakers
Cirolanidae					
Bathynomus giganteus	13	5	38.5	*O. a. g.*	R/L external mouthparts; hypopharynx; R/L pereonal and pleonal sternites, dorsal and ventral surfaces of pleopodal endopods and exopods
Dromiidae					
*Cryptodromiopsis antillensis**	21	1	4.8	*O. forresti*	R chamber floor
Glyphocrangonidae					
*Glyphocrangon spinicauda**	71	1	1.4	*O. hoeki*	R 1 and 4 ventral surfaces of pleopods
				O. lowei	R 1 and 4 ventral surfaces of pleopods
Hepatidae					
Hepatus epheliticus	7	4	57.1	*O. lowei*	R/L inner gill surfaces, gill rakers, and excurrent channels; R chamber floor
Leucosiidae					
Persephona mediterranea	2	1	50.0	*O. lowei*	R/L inner gill surfaces, chamber walls
Menippidae					
Menippe mercenaria	54	6	11.1	*O. lowei*	R/L inner gill surfaces, chamber floors
Mithracidae					
*Macrocoeloma trispinosum**	8	1	12.5	*O. lowei*	L chamber floor
*Stenocionops furcatus**	7	3	42.9	*O. lowei*	R/L inner gill surfaces, chamber floors
*Stenocionops spinimanus**	5	3	60.0	*O. hoeki*	L dorsal chela; R/L incurrent channels, external mouthparts, gill bailers, inner gill surfaces, chamber walls and floors
				O. forresti	R/L inner and outer gill surfaces
				O. lowei	R/L external mouthparts

TABLE 2. Continued.

Crustacean host	Number Examined	Number Infested	Percent infested	*Octolasmis* species	Location on host
Parthenopidae					
*Platylambrus granulata**	14	7	50.0	*O. lowei*	L inner gill surfaces, chamber floor
Pisidae					
*Coelocerus spinosus**	2	1	50.0	*O. lowei*	R chamber wall
				O. forresti	R gill 4 outer surface
Libinia dubia	26	19	73.1	*O. lowei*	R/L inner gill surfaces, chamber walls and floors
Libinia emarginata	3	3	100.0	*O. lowei*	R/L chambers
*Rochinia crassa**	4	3	75.0	*O. lowei*	R/L inner gill surfaces, chamber walls
Portunidae					
Aranaeus cribarius	34	12	35.3	*O. lowei*	R/L inner gill surfaces, chamber walls
Callinectes sapidus	115	107	93.0	*O. lowei*	R/L inner gill surfaces, chamber walls
*Callinectes similis**	344	2	0.6	*O. lowei*	R/L inner gill surfaces, chamber walls
*Ovalipes floridanus**	1	1	100.0	*O. lowei*	R/L inner gill surfaces, chamber walls
*Ovalipes stehensoni**	5	1	20.0	*O. lowei*	R/L inner gill surfaces, chamber walls
*Portunus gibbesii**	104	5	4.8	*O. lowei*	R/L inner gill surfaces, chamber walls
Portunus spinicarpus	21	3	14.3	*O. lowei*	R/L inner gill surfaces, gill rakers, chamber walls
Portunus spinimanus	34	15	44.1	*O. lowei*	R/L inner gill surfaces; L chamber floor
Raninidae					
*Raninoides loevis**	46	14	30.4	*O. lowei*	R/L inner carapace margin, external mouthparts, chamber walls
Scyllaridae					
Scyllarides aequinoctialis	5	2	40.0	*O. hoeki*	R/L external mouthparts, chamber walls adjacent to incurrent channels
				O. lowei	R inner gill surfaces
				O. forresti	R/L chamber walls adjacent to incurrent channels
Scyllarides nodifer	29	24	82.8	*O. hoeki*	R/L external mouthparts, chamber walls adjacent to incurrent channels
				O. forresti	R/L inner carapace margin, chamber walls, adjacent adjacent to incurrent channels

TABLE 2. Continued.

Crustacean host	Number Examined	Number Infested	Percent infested	*Octolasmis* species	Location on host
				O. lowei	R/L inner gill surfaces, chamber walls adjacent to incurrent channels
Xanthidae					
*Glyptoxanthus erosus**	7	2	28.6	*O. forresti*	R/L inner and outer gill surfaces, chamber floors
				O. hoeki	R/L external mouthparts
				O. lowei	R/L inner and outer gill surfaces, chamber floors

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. lowei* on two host species and with *O. lowei* and *O. forresti* on four host species. They were found on the gill

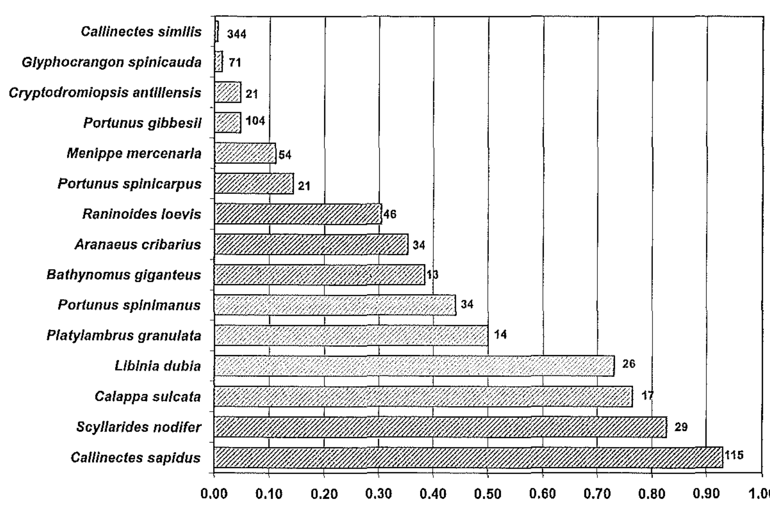

Fig. 1. The percentage of individuals infested with *Octolasmis* is shown for 15 species of crustaceans that were represented in our samples by 10 or more specimens. The crustacean hosts are ordered on the graph according to the level of infestation, and the sample size for each species is given at the end of each bar.

chamber floors, the walls, the inner gill surfaces, gill rakers, and gill bailers. 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 geryonophila 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. warwickii* 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-

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star 10). In this study, the smallest crab to host an octolasmid was a *Raninoides loevis* 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. lowei.* 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 octolasmid. 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 lowei* occurred on all but two of the 27 host species reported on in this study. In four host species, *O. lowei* 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 incurrent 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. lowei* 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 43 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 Hoplodarida Calman, 1904; Order Stomatopoda Latreille, 1817; Suborder Unipeltata Latreille, 1825; Superfamily Lysiosquilloidea Giesbrecht, 1910.

Family Lysiosquillidae Giesbrecht, 1910: *Lysiosquilla scabracauda* (Lamarck, 1818), FMRI 11 (I 5875, I 19293–4, I 14204, I 22345).

Superfamily Squilloidea Latreille, 1802.

Family Squillidae Latreille, 1802: *Squilla chybdaea* Manning, 1962, DISL 17 (98710–26); *Squilla deceptrix,* Manning, 1969, FMRI 11 (I 7220–2); *Squilla edentata* (Lunz, 1937), UAL four (6191 2087), FMRI seven (I 31982–3, I 29198, I 42122); *Squilla empusa* Say, 1818, DISL 171 (98156–68, 98223–50, 98332–4, 98517–54, 98555–81, 98595–7, 98598–0, 98606, 98641–6, 98647–82); *Squilla neglecta* Gibbes, 1850, FMRI five (I 19313); *Squilla rugosa* Bigelow, 1893, FMRI six (I 7150, I 19318, I 19320).

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

Family Cirolanidae Dana, 1852: *Bathynomus giganteus* A. Milne Edwards, 1879, UAL 10 (236FmTrSofDISL, AT14049Tr13, ST14050Tr4), FMRI three (I 29351, I 54975–6).

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

Family Aristeidae Wood-Mason, 1891: *Aristeus antillensis* A. Milne Edwards & Bouvier, 1909, FMRI one (I 6710).

Family Penaeidae Rafinesque, 1815: *Farfantepenaeus aztecus* (Ives, 1891), DISL 34 (98336–98349, 98355–98358, 98366–98380).

Family Sicyoniidae Ortmann, 1898: *Sicyonia brevirostris* Stimpson, 1871, FMRI 17 (I 7611, I 7608); *Sicyonia typica* (Boeck, 1864), FMRI 12 (I 19216–7, I 19219–0).

Suborder Pleocyemata Buckenroad, 1963; Infraorder Caridea Dana, 1852; Superfamily Alpheoidea Rafinesque, 1815.

Family Alpheidae Rafinesque, 1815: *Alpheus floridanus* Kingsley, 1878, UAL three (6179 3670).

Superfamily Pandaloidea Haworth, 1825.

Family Pandalidae Haworth, 1825: *Heterocarpus ensifer,* A. Milne Edwards, 1881, FMRI six (I 28809, I 4660); *Heterocarpus oryx,* A. Milne Edwards, 1881, FMRI one (I 6706); *Plesionika lon-*

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gicauda, Rathbun, 1901, UAL three (6179 4203); *Plesionika longipes* (A. Milne Edwards, 1881), FMRI 10 (I 29933).

Superfamily Crangoidea Haworth, 1825.

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

Infraorder Astacidea Latreille, 1815; Superfamily Nephropoidea Dana, 1852.

Family Nephropidae Dana, 1852: *Nephropis aculeata* Smith, 1881, FMRI five (I 29368).

Infraorder Thalassinidea Latreille, 1831; Superfamily Callianassoidea Dana, 1852.

Family Callianassidae Dana, 1852: *Glypturus acanthochirus* Stimpson, 1866, FMRI one (I 8280); *Sergio trilobata* (Biffar, 1970), FMRI two (I 8350).

Infraorder Palinura Latreille, 1802; Superfamily Eryonoidea de Haan, 1841.

Family Polychelidae Wood-Mason, 1874: *Polycheles typhlops* Heller, 1862, UAL four (6182 4311).

Superfamily Palinuroidea Latreille, 1802.

Family Palinuridae Latreille, 1802: *Panulirus argus* (Latreille, 1804), FMRI seven (I 2544, I 5879, I 4762).

Family Scyllaridae Latreille, 1825: *Scyllarides aequinoctialis* (Lund, 1793), FMRI five (I 788, I 6921, I 6923, I 19441); *Scyllarides nodifer* Stimpson, 1866), UAL six (6182 4320, 6182 4313), FMRI 25 (I 5889, I 3770, I 3089, I 458, I 554, I 591, I 1450, I 3622, I 613, I 3864); *Scyllarus americanus* (Smith, 1869), FMRI 10 (I 5942); *Scyllarus chacei* Holthuis, 1960, UAL 11 (6182 4388–0), FMRI 15 (I 3057, I 5910, I 482, I 2272, I 552, I 19257, I 19285, I 5927).

Infraorder Anomura MacLeay, 1838; Superfamily Galatheoidea Samouelle, 1819.

Family Galatheidae Samouelle, 1819: *Munida flinti* Benedict, 1902, UAL eight (6183 6316, 6183 6321); *Munida irrasa* A. Milne Edwards, 1880, UAL 12 (6183 6376–7); *Munida pusilla* Benedict, 1902, UAL nine (6193 6392); *Munidopsis robusta* (A. Milne Edwards, 1880), FMRI 13 (I 6682, I 6690, I 6697); *Munidopsis spinosa* (A. Milne Edwards, 1880), FMRI three (I 6671). Family Porcellanidae Haworth, 1825: *Pachycheles rugimanus* A. Milne Edwards, 1880, UAL six (6183 6362); *Petrolisthes galathinus* (Bosc, 1802), UAL three (6183 6627), FMRI two (I 5002).

Superfamily Hippoidea Letreille, 1825.

Family Albuneidae Stimpson, 1858: *Albunea gibbesii* Stimpson, 1859, FMRI 10 (I 4484, I 14216, I 14220, I 19450); *Albunea paretii* Guerin-Meneville, 1853, UAL one (6183 6629).

Family Hippidae Latreille, 1825: *Emerita benedicti* Schmitt, 1935, UAL eight (6183 6630).

Superfamily Paguroidea Latreille, 1802.

Family Diogenidae Ortmann, 1892: *Clibanarius vittatus* (Bosc, 1802), DISL 86 (97433–97517); *Dardanus insignis* (de Saussure, 1858), UAL nine (6183 4608); *Paguristes erythrops* 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: *Cryptodromiopsis 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.

Family Homolidae, de Haan, 1839: *Homola minima* Guinot and Richer de Forges, 1995, UAL four (6185 7047–8, 6185 7050).

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

Family Raninidae de Haan, 1839: *Ranilia muricata* H. Milne Edwards, 1837, UAL six (6186 0032, 6186 0028), FMRI 11 (I 18678, I 373, I 3065, I 19913); *Raninoides loevis* (Latreille, 1825), DISL 28 (98020–3, 98134–5, 98137–46, 98478–88), UAL three (6186 0058), FMRI 10 (I 19956, I 19948), DISL five (99015–9).

Family Symethidae Goeke, 1981: *Symethis variolosa* (Fabricius, 1793), FMRI one (I 4096).

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

Family Dorippidae MacLeay, 1838: *Ethusa microphthalma* Smith, 1881, UAL six (6186 6813, 6186 6816, 6186 0814).

Superfamily Calappoidea Milne Eddwards, 1837.

Family Calappidae Milne Edwards, 1837: *Acanthocarpus alexandri* Stimpson, 1871, UAL 15 (6168 6648,49,52,53), FMRI 10 (I 29369); *Calappa flammea* (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, 98582–93), UAL two (22 VII '75); *Cyclozodion angustum* (A. Milne Edwards, 1880), FMRI two (I 24148).

Family Hepatidae Bellwood, 1996: *Hepatus epheliticus* (Linnaeus, 1763), DISL six (98005–

6, 98262, 98359–0, 98757), UAL one (SLURP 1078 1).

Superfamily Leucosioidea Samouelle, 1819.

Family Leucosiidae Samouelle, 1819: *Callidactylus asper* Stimpson, 1871, UAL one (6186 7055); *Iliacantha subglobosa* Stimpson, 1871, UAL three (6186 7102); *Myropsis quinquespinosa* Stimpson, 1871, DISL one (98024), UAL 10 (6186 7144–5, 6186 7147); *Persephona mediterranea* (Herbst 1794), DISL two (98127, 98155).

Superfamily Majoidea Samouelle, 1819.

Family Inachidae Hendrickx, 1995: *Stenorhynchus seticornis* (Herbst, 1788), UAL six (6287 1110, 6187 0134, 6187 0123).

Family Inachoididae Hendrickx, 1995: *Anasimus latus* Rathbun, 1894, UAL two (6187 7196), FMRI four (I 32008); *Pyromaia arachna* Rathbun, 1924, UAL seven (6187 0473, 6187 0460).

Family Mithracidae Hendrickx, 1995: *Macrocoeloma septemspinosum* (Stimpson, 1871), UAL six (6187 0642), FMRI two (I 3177); *Macrocoeloma trispinosum* (Latreille, 1825), UAL one (6187 0183), FMRI seven (I 5175, I 2026, I 409); *Mithraculus coryphe* (Herbst, 1801), FMRI three (I 5080); *Mithraculus forceps* (A. Milne Edwards, 1875), FMRI six (I 1643, I 4642, I 1436); *Mithraculus sculptus* (Lamarck, 1818), FMRI five (I 5079); *Mithrax carribaeus* Rathbun, 1900, FMRI one (I 5245); *Mithrax hispidus* (Herbst, 1790), UAL one (6187 0394); *Mithrax pleuracanthus* Stimpson, 1871, UAL six (6187 0266, 6187 0246), FMRI 12 (I 2090, I 476, I 6484, I 9948); *Mithrax spinosissimus* (Lamarck, 1818), FMRI two (I 1132, I 304); *Mithrax verrucosus* H. Milne Edwards, 1832, FMRI four (I 29393, I 5078); *Nemausa acuticornis* (Stimpson, 1870), UAL seven (6187 0213, 6187 0278); *Stenocionops furcatus* (Olivier, 1791), UAL four (6187 0600, 6187 1219), FMRI three (I 594, I 848); *Stenocionops spinimanus* (Rathbun, 1892), DISL one (98019), UAL two (6187 1219, 6187 0570), FMRI two (I 470, I 3144).

Family Pisidae Hendrickx, 1995: *Chorinus heros* (Herbst, 1790), FMRI two (I 5242); *Coelocerus spinosus* A. Milne Edwards, 1875, FMRI two (I 28840, I 21450); *Libinia dubia* H. Milne Edwards, 1834, DISL six (98128–9, 98221, 98291–2, 98294), DISL 18 (97220–1, 97387–8, 99001–14), UAL two (SLURP 1078 1); *Libinia emarginata* Leach, 1815, DISL two (98003, 98004), DISL one (97211); *Nibilia antilocapra* (Stimpson, 1871), UAL one (6187 0357); *Rochinia crassa* (A. Milne Edwards, 1879), UAL four (6187 7625).

Superfamily Parthenopoidea MacLeay, 1838.

Family Parthenopidae MacLeay, 1838: *Parthenope agona* (Stimpson, 1871), UAL 11 (6187 7393, 6187 7400); *Platylambrus fraterculus* (Stimpson, 1871), UAL five (6187 7451); *Platylambrus granulata* (Kingsley, 1879), UAL 11 (6187 7526, 6187 7501), FMRI three (I 607); *Platylambrus pourtalesii* (Stimpson, 1871), FMRI two (I 29401, I 29271); *Platylambrus serratus* (H. Milne Edwards, 1834), FMRI four (I 509, I 865).

Superfamily Portunoidea Rafinesque, 1815.

Family Portunidae Rafinesque, 1815: *Arenaeus cribrarius* (Lamarck, 1818), DISL 34 (98124–5, 98251–61, 98320–1, 98328, 98420–1, 98489–0, 98731, 98744–56); *Callinectes exasperatus* (Gerstaecker, 1856), FMRI one (I 2293); *Callinectes larvatus* Ordway, 1863, FMRI four (I 4983); *Callinectes ornatus* Ordway, 1863, FMRI six (I 864, I 4325); *Callinectes sapidus* Rathbun, 1896, DISL 99 (98008–10, 98036–123, 98131, 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, 98267–86, 98295–25, 98381–19, 98422–32, 98434–77, 98605), DISL 165 (97222–97386); *Ovalipes floridanus* Hay and Shore, 1918, DISL one (98727); *Ovalipes ocellatus* (Herbst, 1799), DISL one (98705); *Ovalipes stephensoni* 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, 98732–43); *Portunus ordwayi* (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 MacLeay, 1838.

Family Carpiliidae Guinot, 1976: *Carpilius corallinus* (Herbst, 1783), FMRI one (I 10052).

Family Goneplacidae MacLeay, 1838: *Bathyplax typhlus,* A. Milne Edwards, 1880, FMRI three (I 6696); *Freyvillea hirsuta* (Borradaile, 1916), UAL six (6189 7003).

Family Menippidae Guinot, 1978: *Eriphia gonagra* (Fabricius, 1871), FMRI one (I 2297); *Menippe mercenaria* (Say, 1818), DISL 11 (98152, 98222, 98287–0, 98293, 98335, 98354, 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: *Dyspanopeus texana* (Stimpson, 1859), FMRI 10 (I 6719); *Eu-*

rypanopeus depressus (Smith, 1869), FMRI four (I 3062); *Eurytium limosum* (Say, 1818), FMRI seven (I 1014, I 4780); *Panopeus herbstii* 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: *Lobopilumnus agassizii* (Stimpson, 1871), UAL four (6189 8533), FMRI 11 (I 1558, I 371, I 19465); *Pilumnus sayi* Rathbun, 1897, FMRI six (EJ-84–56).

Family Pseudorhombilidae Hendrickx, 1998: *Euphrosynoplax clausa,* Guinot, 1969, DISL two (98153–4).

Family Xanthidae 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 rathbunae* Chace, 1939, UAL six (6189 9210).

Superfamily Grapsoidea MacLeay, 1838.

Family Grapsidae MacLeay, 1838: *Goniopsis cruentata,* (Latreille, 1802), FMRI three (I 15637, I 2296).

Family Plagusiidae Schubart, Cuesta, and Felder, 2002: *Euchirograpsus americanus* A. Milne Edwards, 1880, FMRI three (I 1471, I 25155).

Family Sesarmidae Dana, 1851: *Aratus pisonii,* (H. Milne Edwards, 1837), FMRI five (I 2347, I 2398).

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