Table S58. Planktonic foraminifera reported from the deep Gulf of Mexico. Species reported only from sediment samples are marked with an asterisk (*). (Data from Jones 1968; Snyder 1978.)

Globigerinidae
- *Globigerina bulloides*
- *Globigerina calida**
- *Globigerina digitata**
- *Globigerina falconensis**
- *Globigerina pachyderma**
- *Globigerina quinqueloba**
- *Globigerina rubescens**
- *Globigerinella siphonifera*
- *Globigerinoides conglobatus*
- *Globigerinoides elongatus**
- *Globigerinoides fistulosus**
- *Globigerinoides quadrilobatus**
- *Globigerinoides ruber*
- *Globigerinoides tenellus**
- *Globigerinoides trilobus*
- *Hastigerina pelagica*
- *Orbulina bilobata**
- *Orbulina suturalis**
- *Orbulina universa*
- *Pseudohastigerina praepumilis**
- *Sphaeroidinella dehiscens**

Candeinidae
- *Candeina nitida**
- *Globigerinita glutinata*
- *Globigerinita iota**
- *Globigerinita uvula**

Catapsydracidae
- *Globoquadrina dutertrei*
- *Pulleniatina obliquiloculata*

Globorotaliidae
- *Globorotalia akersi**
- *Globorotalia crassaformis*
- *Globorotalia cultrata*
- *Globorotalia flexuosa**
- *Globorotalia hirsuta**
- *Globorotalia inflata**
- *Globorotalia menardi**
- *Globorotalia scitula**
- *Globorotalia truncatulinoides*
- *Globorotalia tumida**
- *Globorotalia ungulata**

Table S59. Pelagic cnidarians recorded from open waters of the Gulf of Mexico. Depth distributions are given as epipelagic (e) and bathypelagic (b), but these are loosely defined. Here, epipelagic probably refers to the upper 200 m or so, and bathypelagic refers to waters below that depth. (Data from P. Phillips 1972.)

Species	Depth e	Depth b	Species	Depth e	Depth b
Scyphozoa					
Atolla vanhoeffeni		×	*Nausithoe punctata*	×	
Atolla wyvillei	×	×	*Pelagia noctiluca*	×	
Aurelia aurita	×		*Periphylla periphylla*		×
Deepstauria enigmata	×		*Periphyllopsis braueri*		×
Linuche unguiculata	×		*Stomolophus meleagris*	×	
Hydrozoa					
Siphonophores					
Abyla haeckeli	×		*Eudoxoides spiralis*	×	
Abylopsis eschscholtzi	×		*Halistemma rubrum*	×	×
Abylopsis tetragona	×		*Hippopodius hippopus*	×	×
Agalma okeni	×		*Lensia fowleri*	×	
Amphicaryon acaule	×	×	*Maresearsia praeclara*	×	
Amphicaryon ernesti	×	×	*Marrus orthocannoides*	×	
Amphicaryon peltifera	×		*Nanomia bijuga*	×	
Bassia bassensis	×		*Nectopyramis diomedeae*		×
Bargmannia elongata	×	×	*Nectopyramis natans*		×
Ceratocymba dentata	×		*Physalia physalis*	×	
Ceratocymba leukarti	×		*Physophora hydrostatica*	×	
Ceratocymba sagittata	×		*Praya dubia*	×	×
Chelophyes appendiculata	×		*Rhizophysa filiformis*	×	
Chuniphyes multidentata	×	×	*Rosacea cymbiformis*	×	
Clausophyes ovata	×	×	*Sulculeolaria biloba*	×	
Cordagalma cordiforme	×		*Sulculeolaria chuni*	×	
Diphyes bojani	×		*Sulculeolaria quadrivalis*	×	×
Diphyes dispar	×		*Vogtia glabra*	×	
Enneagonum hyalinum	×		*Vogtia pentacantha*	×	
Erenna richardi	×		*Vogtia serrata*	×	
Eudoxoides mitra	×		*Vogtia spinosa*	×	
Anthomedusae, hydromedusae, and relatives					

Aegina citrea	×	×	*Liriope tetraphylla*	×	
Aeginura grimaldi		×	*Oceania armata*	×	
Aequorea aequorea	×		*Orchistoma pileus*	×	
Aequorea floridana	×		*Pantachogon haeckeli*		×
Aequorea pensilis	×		*Pegantha martagon*	×	
Aglaura hemistoma	×		*Persa incolorata*	×	
Bougainvillia platygaster	×		*Porpita porpita*	×	
Colobonema sericeum		×	*Proboscidactyla ornata*	×	
Crossota rufobrunnea		×	*Rhopalonema funerarium*		×
Cunina duplicata	×		*Rhopalonema velatum*	×	
Cunina fowleri	×		*Solmissus incisa*	×	×
Cunina octonaria	×		*Solmundella bitentaculata*	×	
Cunina peregrina	×		*Stomotoca pterophylla*	×	
Cytaeis tetrastyla	×		*Velella velella*	×	
Halicreas minimum		×	*Zygocanna vagans*	×	
Haliscera bigelowi		×			

Table S60. Pelagic pteropods and heteropods recorded from open waters of the Gulf of Mexico. (Data from Hughes 1968; Snider 1975; D. Taylor 1969; D. Taylor and Berner 1970.)

Pteropods

Cavolina gibbosa
Cavolina inflexa
Cavolina longirostris
Cavolina tridentata
Cavolina uncinata
Clio baltantium
Clio chaptali
Clio cuspidata
Clio polita
Clio pyramidata
Clio recurva
Creseis acicula
Creseis calciformis
Creseis virgula
Cuvierina columnella
Diacria quadridentata
Diacria trispinosa
Hyalocylis striata
Limacina bulimoides
Limacina helicoides
Limacina inflata
Limacina lesueuri
Limacina trochiformis
Peraclis apicifulva
Peraclis bispinosa
Peraclis moluccensis
Peraclis reticulata
Peraclis triacantha
Styliola subula

Heteropods

Atlanta fusca
Atlanta gaudichaudi
Atlanta heliconoides
Atlanta inclinata
Atlanta inflata
Atlanta lesueuri
Atlanta peroni
Cardiapoda placenta
Carinaria lamarcki
Firoloida desmarestia
Oxygyrus keraudreni
Protatlanta souleyeti
Pterotrachea coronata
Pterotrachea hippocampus
Pterotrachea minuta
Pterotrachea scutata

Table S61. Pelagic cephalopods recorded from open waters of the Gulf of Mexico. Depth ranges, where available, are indicated as epipelagic (e) or mesopelagic (m). (Data from Lipka 1975; Passarella and Hopkins 1991; Salcedo-Vargas 1991.)

Species	e	m	Species	e	m
Sepioidea			*Lampadioteuthis megaleia*	×	×
Heteroteuthis atlantus	×		*Leachia cyclura*	×	×
Heteroteuthis dispar	×		*Liocranchia reinhardti*	×	×
Heteroteuthis hawaiiensis	×	×	*Lycoteuthis diadema*	×	×
Spirula spirula	×	×	*Lycoteuthis springeri*		
			Mastigoteuthis glaucopsis		
Teuthoidea			*Mastigoteuthis grimaldi*		
Abralia redfieldi	×	×	*Octopoteuthis megaptera*	×	×
Abralia veranyi	×	×	*Ommastrephes bartrami*		
Abraliopsis atlantica	×	×	*Ommastrephes pteropus*	×	
Abraliopsis pfefferi			*Onychoteuthis banksii*	×	×
Ancistroteuthis lesueuri	×	×	*Onykia carribaea*	×	
Bathothauma lyromma	×		*Ornithoteuthis antillarum*	×	
Bathyteuthis abyssicola	×	×	*Phasmatopsis oceanica*	×	
Brachioteuthis riisei	×	×	*Pholidoteuthis adami*	×	
Chiroteuthis capensis	×		*Pterygioteuthis gemmata*	×	×
Chiroteuthis joubini	×		*Pterygioteuthis giardi*	×	×
Corynomma speculator	×		*Pyroteuthis margaritifera*	×	×
Cranchia scabra	×	×	*Selenoteuthis scintillans*	×	×
Ctenopteryx sicula	×		*Taningia danae*	×	
Cycloteuthis sirventi	×	×	*Tetronychoteuthis dussumieri*	×	×
Discoteuthis discus	×		*Thysanoteuthis rhombus*	×	
Egea inermis	×	×			
Enoploteuthis anaspis	×		**Vampyromorpha**		
Enoploteuthis leptura	×		*Vampyroteuthis infernalis*		
Galiteuthis armata					
Helicocranchia papillata	×		**Octopoda**		
Helicocranchia pfefferi	×	×	*Alloposus mollis*	×	×
Histioteuthis corona	×	×	*Argonauta argo*	×	
Histioteuthis dofleini	×	×	*Japetella diaphana*	×	×
Illex coindetii			*Scaeurgus unicirrhus*	×	×
Joubiniteuthis portieri			*Tremoctopus violaceus*	×	

Table S62. Pelagic polychaetes recorded from open waters of the Gulf of Mexico. (Data from Berkowitz 1976.)

Alciopa reynaudii	*Sagitella kowalewskii*
Alciopina parasitica	*Tomopteris* sp.
Naiades cantrainii	*Torrea candida*
Plotohelmis sp.	*Travisiopsis* sp.
Rhynchonerella gracilis	*Typhloscolex mülleri*
Rhynchonerella moebii	*Vanadis minuta*
Rhynchonerella petersii	*Vanadis* sp.

Table S63. Depth distribution patterns of 97 species of pelagic calanoid copepods collected at discrete depth intervals in the Gulf of Mexico. Depth intervals are as follows: epipelagic (e) = 0–200 m, upper mesopelagic (um) = 200–500 m, lower mesopelagic (lm) = 500–1,000 m, bathypelagic (b) = 1,000–1,900 m. (From Park 1970.)

Species	Depth e	um	lm	b
Eucalanidae				
Eucalanus attenuatus				×
Eucalanus elongatus			×	×
Rhincalanus cornutus				×
Paracalanidae				
Calocalanus contractus				×
Calocalanus pavoninus				×
Calocalanus styliremis				×
Paracalanus denudatus				×
Paracalanus parvus				×
Pseudocalanidae				
Clausocalanus furcatus				×
Clausocalanus paululus				×
Clausocalanus pergens				×
Ctenocalanus vanus				×
Farrania frigidus			×	×
Microcalanus pygmaeus				×
Spinocalanidae				
Mimocalanus crassus				×
Mimocalanus cultrifer			×	×
Mimocalanus nudus				×
Monacilla tenera		×		×
Monacilla typica			×	×
Spinocalanus abyssalis		×	×	×
Spinocalanus brevicaudatus		×		
Spinocalanus horridus			×	×
Spinocalanus magnus			×	×
Spinocalanus oligospinosus		×	×	
Spinocalanus parabyssalis		×		

Species	Depth e	um	lm	b
Scolecithrichidae continued				
Scaphocalanus longifurca			×	×
Scaphocalanus magnus			×	
Scaphocalanus major			×	
Scaphocalanus subcurtus		×		
Scolecithricella abyssalis				×
Scolecithricella dentata		×	×	×
Scolecithricella emarginata			×	
Scolecithricella lobophora			×	
Scolecithricella maritima				×
Scolecithricella ovata			×	
Scolecithricella pseudoarcuata			×	
Scolecithricella valens			×	
Scolecithricella vittata	×			
Scolecithrix brady				×
Scottocalanus helenae			×	
Scottocalanus persecans			×	
Tharybidae				
Undinellia brevipes				×
Temoridae				
Temoropia mayumbaensis				×
Metridia brevicauda				×
Metridia curticauda				×
Metridia princeps				×
Lucicutiidae				
Lucicutia clausi	×	×		
Lucicutia curta			×	
Lucicutia flavicornis	×	×		
Lucicutia longiserrata			×	
Lucicutia ovalis			×	×

Spinocalanus pteronus				×	*Lucicutia paraclausi*	×			
Spinocalanus spinosus			×		*Lucicutia parva*				×
Spinocalanus usitatus			×						
Teneriforma naso				×	**Heterorhabdidae**				
					Disseta palumboi			×	×
Aetideidae					*Heterorhabdus abyssalis*			×	×
Chiridiella bispinosa			×		*Heterorhabdus medianus*		×		
Chiridius gracilis		×			*Heterorhabdus papilliger*	×		×	
Chiridius poppei			×		*Heterorhabdus robustus*				×
Chirundina streetsii			×		*Heterorhabdus spinifer*		×		
Euaetideus acutus	×				*Heterorhabdus vipera*		×		
Euaetideus giesbrechti	×	×			*Heterostylites major*			×	
Euaetideus pulchra			×		*Mesorhabdus brevicaudatus*			×	
Euaetideus rostrata			×						
Gaetanus minor		×			**Augaptilidae**				
Gaetanus pileatus		×			*Disco inflatus*			×	
Undeuchaeta major			×		*Euaugaptilus hecticus*			×	
Undeuchaeta plumosa			×	×	*Euaugaptilus nodifrons*			×	
					Euaugaptilus palumboi		×	×	
Phaennidae					*Haloptilus longicirrus*				×
Xanthocalanus paululus			×	×	*Haloptilus longicornis*	×	×		
					Haloptilus paralongicirrus	×	×		
Scolecithrichidae					*Pseudaugaptilus longiremis*		×	×	
Racovitzanus levis		×							
Racovitzanus porrecta		×		×	**Arietellidae**				
Scaphocalanus acuminatus				×	*Phyllopus helgae*			×	
Scaphocalanus amplius		×	×						
Scaphocalanus brevirostris		×	×		**Bathypontiidae**				
Scaphocalanus curtus		×		×	*Bathypontia minor*				×
Scaphocalanus echinatus			×		*Bathypontia similis*			×	

Table S64. Pelagic mysid shrimps collected from open waters of the Gulf of Mexico. (Data from T. L. Hopkins and Lancraft 1984; L. Pequegnat 2000.)

Eucopiidae
Eucopia australis
Eucopia grimaldii
Eucopia sculpticauda
Eucopia unguiculata

Lophogastridae
Gnathophausia gigas
Gnathophausia gracilis
Gnathophausia ingens
Gnathophausia zoea
Lophogaster longirostris

Mysidae
Anchialina typica
Bowmaniella parageta
Bowmaniella sewelli
Brasiliomysis castroi
Mysidopsis bigelowi
Promysis atlantica
Siriella thompsoni

Petalophthalmidae
Petalophthalmus armiger

Table S65. Pelagic amphipods recorded from open waters of the Gulf of Mexico. (Data from Berkowitz 1976; Morée 1979.)

Acanthoscina sp.	*Phronima pacifica*
Amphithyrus sp.	*Phronima sedentaria*
Eupronoe sp.	*Phronima stebbingii*
Leptocotis sp.	*Phronimella elongata*
Oxycephalus sp.	*Rhabdosoma* sp.
Phronima atlantica	*Scina* sp.
Phronima colletti	*Vibilia* sp.
Phronima curvipes	

Table S66. Pelagic euphausiid shrimps recorded from open waters of the Gulf of Mexico with the known depth distributions by zone. e = epipelagic, m = mesopelagic, and b = bathypelagic. (Data from T. L. Hopkins and Lancraft 1984; James 1966, 1970; W. Pequegnat, L. Pequegnat, et al. 1971; Schroeder 1971.)

Species	Depth e	m	b	Species	Depth e	m	b
Bentheuphausiidae				*Stylocheiron affine*	×	×	
Bentheuphausia amblyops			×	*Stylocheiron carinatum*	×	×	
				Stylocheiron elongatum		×	
Euphausiidae				*Stylocheiron longicorne*	×	×	
Euphausia americana	×	×		*Stylocheiron maximum*		×	
Euphausia brevis	×	×		*Stylocheiron robustum*		×	
Euphausia gibboides	×	×		*Stylocheiron suhmii*	×	×	
Euphausia hemigibba	×	×		*Thysanopoda acutifrons*			
Euphausia mutica	×	×		*Thysanopoda aequalis*			
Euphausia pseudogibba	×	×		*Thysanopoda cornuta*			
Euphausia tenera	×	×		*Thysanopoda cristata*		×	
Nematobrachion boopis		×		*Thysanopoda egregia*			×
Nematobrachion flexipes		×		*Thysanopoda microphthalma*			
Nematobrachion sexspinosum		×		*Thysanopoda monacantha*	×		
Nematoscelis atlantica	×			*Thysanopoda obtusifrons*		×	
Nematoscelis megalops				*Thysanopoda orientalis*		×	
Nematoscelis microps	×			*Thysanopoda pectinata*		×	
Nematoscelis tenella		×		*Thysanopoda subaequalis*	×	×	
Stylocheiron abbreviatum	×	×		*Thysanopoda tricuspidata*	×		

Table S67. Pelagic penaeid shrimps collected from open waters of the Gulf of Mexico. (Data from Berkowitz 1976; T. L. Hopkins and Lancraft 1984; L. Pequegnat 2000; W. Pequegnat, L. Pequegnat, et al. 1971; T. Roberts 1970; Roberts and Pequegnat 1970.)

Penaeidae
Bentheogennema intermedia
Gennadas bouvieri
Gennadas capensis
Gennadas scutatus
Gennadas talismani
Gennadas valens

Sergestidae
Lucifer faxoni
Lucifer typus
Sergestes armatus
Sergestes atlanticus
Sergestes corniculum
Sergestes filictum
Sergestes grandis
Sergestes japonicus
Sergestes pectinatus
Sergestes robustus
Sergestes sargassi
Sergestes splendens
Sergestes talismani
Sergestes vigilax

Table S68. Pelagic caridean shrimps collected in open waters of the Gulf of Mexico with the known depth distributions by zone. e = epipelagic, m = mesopelagic, and b = bathypelagic. (Data from T. L. Hopkins and Lancraft 1984; T. L. Hopkins, Gartner, and Flock 1989; L. Pequegnat 2000; L. Pequegnat and Wicksten 2006; W. Pequegnat, L. Pequegnat, et al. 1971.)

	Depth				Depth		
Species	e	m	b	Species	e	m	b
Bresiliidae				*Notostomus elegans*			x
Lucaya bigelowi	x	x		*Notostomus gibbosus*		x	x
				Notostomus longirostris			x
Oplophoridae				*Oplophorus gracilirostris*			x
Acanthephyra acanthitelsonis		x	x	*Oplophorus spinosus*			x
Acanthephyra brevirostris		x	x	*Systellaspis cristata*			x
Acanthephyra curvirostris		x	x	*Systellaspis debilis*		x	x
Acanthephyra pelagica		x	x				
Acanthephyra purpurea		x	x	**Pandalidae**			
Acanthephyra stylorostrata		x	x	*Parapandalus longicauda*		x	x
Ephyrina ombango		x	x	*Parapandalus richardi*		x	x
Hymenodora glacialis			x	*Parapandalus willisi*		x	x
Hymenodora gracilis			x				
Janicella spinicauda		x	x	**Pasiphaeidae**			
Meningodora mollis			x	*Parapasiphae cristata*		x	x
				Parapasiphae sulcatifrons			x

Table S69. Pelagic chaetognaths recorded from open waters of the Gulf of Mexico. Depth distributions are given as epipelagic (e), mesopelagic (m), and bathypelagic (b). (Data from Every 1968; McLelland 1984, 1989; McLelland and Perry 1989; Michel 1984.)

Species	Depth			Species	Depth		
	e	m	b		e	m	b
Bathybelos typhlops			×	*Krohnitta subtilis*	×	×	
Caecosagitta macrocephala			×	*Mesosagitta decipiens*		×	
Eukrohnia bathyantarctica			×	*Mesosagitta minima*	×	×	
Eukrohnia bathypelagica			×	*Mesosagitta sibogae*		×	
Eukrohnia calliops			×	*Pterosagitta draco*	×		
Eukrohnia fowleri			×	*Sagitta bipunctata*	×		
Eukrohnia probiscidea			×	*Sagitta fiderici*	×		
Ferosagitta hispida	×			*Sagitta helenae*	×		
Flaccisagitta enflata	×			*Sagitta megalophthalma*		×	
Flaccisagitta hexaptera	×	×		*Sagitta tenuis*	×		
Flaccisagitta lyra		×		*Serratosagitta serratodentata*	×		
Krohnitta pacifica	×			*Solidosagitta planktonis*		×	

Table S70. Orders and families of nektonic fishes important in epipelagic, mesopelagic, or bathypelagic waters of the open Gulf of Mexico. Some less important families mentioned in the text are also included.

Lamniformes
- Rhincodontidae – whale sharks
- Alopiidae – thresher sharks
- Cetorhinidae – basking sharks
- Lamnidae – mackerel sharks
- Scyliorhinidae – cat sharks
- Carcharhinidae – requiem sharks
- Sphyrnidae – hammerhead sharks

Squaliformes
- Squalidae – dogfish sharks

Rajiformes
- Myliobatidae – eagle rays
- Mobulidae – mantas

Osmeriformes
- Argentinidae – argentines
- Bathylagidae – deep-sea smelts
- Microstomatidae – microstomatids
- Opisthoproctidae – spookfishes
- Alepocephalidae – smoothheads
- Platytroctidae – tubeshoulders

Stomiiformes
- Gonostomatidae – bristlemouths
- Sternoptychidae – hatchetfishes
- Phosichthyidae – lightfishes
- Astronesthidae – snaggletooths
- Chauliodontidae – viperfishes
- Idiacanthidae – black dragonfishes
- Malacosteidae – loosejaws
- Melanostomiidae – scaleless dragonfishes
- Stomiidae – scaly dragonfishes

Aulopiformes
- Giganturidae – giganturids
- Chlorophthalmidae – greeneyes
- Ipnopidae – ipnopids
- Notosudidae – notosudids
- Scopelarchidae – pearleye fishes
- Alepisauridae – lancetfishes
- Evermannellidae – sabertooth fishes
- Paralepididae – barracudinas

Myctophiformes
- Myctophidae – lanternfishes

Gadiformes
- Bregmacerotidae – codlets

Lophiiformes
- Ceratiidae – seadevils
- Himantolophidae – himantolophids
- Linophrynidae – linophrynids
- Melanocetidae – melanocetids
- Oneirodidae – oneirodids
- Thaumatichthyidae – thaumatichthyids

Atheriniformes
- Belonidae – needlefishes
- Exocoetidae – flying fishes
- Hemiramphidae – halfbeaks

Stephanoberyciformes
- Melamphaidae – melamphaids
- Cetomimidae – whalefishes

Perciformes
- Echeneidae – remoras
- Carangidae – jacks
- Coryphaenidae – dolphinfishes
- Chiasmodontidae – chiasmodontids
- Luvaridae – louvars
- Gempylidae – snake mackerels
- Scombridae – mackerels
- Xiphiidae – swordfishes
- Istiophoridae – billfishes

Tetraodontiformes
- Molidae – molas

Table S71. Brief sketches of important families of fishes found in epipelagic, mesopelagic, or bathypelagic waters of the open Gulf, giving information on recognition characters, habitats, and habits and listing important genera. Some less important families mentioned in the text are also included.

Rhincodontidae – whale shark. The whale shark has a long spindle-shaped (terete) body with a compressed head, a wide mouth containing many tiny teeth, and a very large caudal fin. The brownish body is marked by a characteristic network of longitudinal and transverse white lines and white spots. This is the world's largest fish, and it is known to reach a length of more than 15.5 m (50 ft). It feeds on zooplankton and micronekton that it strains from epipelagic waters. The single genus is *Rhincodon*.

Alopiidae – thresher sharks. These sharks have terete bodies and long narrow pectoral fins. The dorsal lobe of the caudal fin is greatly elongated and makes up about half the length of the body. Thresher sharks inhabit epipelagic and upper mesopelagic waters, where they feed on schooling squids and fishes. The only genus in the Gulf is *Alopias*.

Cetorhinidae – basking sharks. This shark is long and slender, with a pointed snout and small eyes. The mouth is large and filled with tiny hooklike teeth. Large gill slits in front of the pectoral fins extend from the top to the bottom of the head. The caudal fin is large, and the lower lobe is well developed. This shark is epipelagic and feeds by straining plankton and micronekton from the water. It is the world's second largest fish and reaches a length of nearly 15 m (49 ft). *Cetorhinus* is the only genus in the Gulf.

Lamnidae – mackerel sharks, great white sharks. These sharks have spindle-shaped bodies and moderately long fins. The teeth are broad, sharp, and bladelike. Gill slits are long. The dorsal and

ventral lobes of the caudal fin are about equal. Although primarily epipelagic, some have been taken at depths of over 305 m (1,000 ft). They feed on a variety of large animals including squids, fishes, sea turtles, birds, and marine mammals. Some reach a length of 6.4 m (20 ft). Representative genera are *Carcharodon* and *Isurus*.

Scyliorhinidae – cat sharks. In this group the body is long and slender and the snout is pointed. The eyes are elongate. The first dorsal fin is located above or behind the origin of the pelvic fins. The ventral lobe of the caudal fin is poorly developed or absent. These sharks occur from the surface to depths of over 2,000 m. Representative genera include *Apristurus*, *Galeus*, and *Scyliorhinus*.

Carcharhinidae – requiem sharks (ocean whitetip, tiger, and blue sharks). These sharks have terete bodies with well-developed dorsal and pectoral fins. The dorsal lobe of the caudal fin is large and has undulations around the margin, and the ventral lobe is well developed. Requiem sharks inhabit epipelagic and mesopelagic waters, where they feed on larger invertebrates and fishes. The maximum known size is about 7.4 m (24 ft) for the tiger shark. Representative genera are *Carcharhinus*, *Galeocerdo*, and *Prionace*.

Sphyrnidae – hammerhead sharks. These have long spindle-shaped bodies. The flattened head has well-developed lateral lobes with the eyes and nostrils on or near the outer margins. The first dorsal fin and dorsal lobe of the caudal fin are very well developed. Hammerhead sharks live over the continental shelf and in upper epipelagic waters of the open Gulf, where they feed on cephalopods, crustaceans, and fishes. The great hammerheads reach a length of 5.5 m (18 ft). The single genus in the Gulf is *Sphyrna*.

Squalidae – dogfish sharks. These small slender sharks all lack anal fins. The mouth is small and located beneath or behind the eyes. The spiracle (a small passage from the pharynx to the outside

of the body) is well developed and situated high on the head, behind and often above the level of the eyes. Species may be epipelagic, mesopelagic, or bathypelagic, and possibly benthopelagic. They reach a maximum size of about 1.8 m (6 ft). Representative Gulf genera include *Centrophorus*, *Etmopterus*, and *Isistius*.

Myliobatidae – eagle rays. In this group the pectoral fins are broadly attached to the body, flattened, and laterally expanded to form flat, winglike projections. The head extends above and in front of the flattened body disk. Pelvic fins extend backward behind the disk. The long, whiplike tail may have one or more serrated spines near its base. Eagle rays are strictly epipelagic and are found over the continental shelf or in nearby open water. The maximum "wingspread" is about 2.3 m (7.5 ft). Genera inhabiting the Gulf are *Aetobatis* and *Myliobatis*.

Mobulidae – mantas. As in the case of the previous group, the manta rays have flattened, laterally expanded bodies and whiplike tails. However, the disk is much broader than long, and two lobes project forward from the sides of the head. Spines are absent and a small dorsal fin is present on the base of the slender tail. Mantas live over the continental shelf and in nearby epipelagic waters of the open Gulf, where they feed by straining plankton and micronekton from the water. The maximum body width is about 6.4 m (21 ft). Genera inhabiting the Gulf include *Manta* and *Mobula*.

Argentinidae – argentines. The argentines are small slender fishes with small terminal mouths, large eyes, and deeply forked caudal fins. The pectoral fins are situated low on the sides of the body, and an adipose fin is present. These fishes occur on the outer continental shelf and upper slope, where they feed on crustaceans. Gulf genera include *Argentina* and *Glossanodon*.

Bathylagidae – deep-sea smelts. These are also small slender fishes with terminal mouths and large eyes. The pectoral fins are set low on the sides of the body, and an adipose fin is present.

They differ from the argentines in internal skeletal structures. They appear to be mesopelagic and bathypelagic, where they feed on zooplankton. The single genus in the Gulf is *Bathylagus*.

Microstomatidae – microstomatids. These fishes are very similar to the bathylagids. They have slender bodies, short snouts, small mouths, and large eyes. However, the pectoral fins are located on the sides of the body, rather than ventrally. The adipose fin may be present or absent. In some species, the eyes are tubular and directed forward. The microstomatids are mesopelagic and feed on zooplankton. Gulf genera include *Microstoma*, *Nansenia*, and *Xenophthalmichthys*.

Opisthoproctidae – spookfishes. The Gulf species are small slender fishes with long pointed snouts and small terminal mouths. The eyes of most species are tubular and may be directed forward or upward. They feed on zooplankton. The two genera of the Gulf are *Dolichopteryx* and *Opisthoproctus*.

Alepocephalidae – smoothheads. In this group the body is slender to spindle shaped. The snout is pointed and the mouth is moderate to large. The eyes are large. The pectoral fins are located on the sides of the body and are often poorly developed. The pelvic fins are rudimentary or absent. The head is generally scaleless. Most species are mesopelagic or bathypelagic. Representative Gulf genera include *Alepocephalus*, *Bathytroctes*, and *Talismania*.

Platytroctidae – tubeshoulders. The tubeshoulders are slender to moderately deep-bodied fishes with pointed snouts and fairly large terminal mouths. The eyes are large. Pectoral fins are small or rudimentary. Pelvic fins are reduced or absent. Photophores are generally present on the head or body. The group is characterized by the presence of a sac on each side of the body that opens to the outside through a tube located behind the gill cover. Through this a luminous fluid can be discharged. These are mesopelagic or bathypelagic fishes. Representative genera of the Gulf are *Barbantus*, *Holtbyrnia*, and *Platytroctes*.

Gonostomatidae – bristlemouths. These small slender-bodied fishes have large terminal mouths extending to behind the eyes. The upper and lower jaws are lined with fine teeth. The eyes are large. One or two rows of tiny photophores line the lower sides of the body between the gill cover and the caudal fin. These are mesopelagic and bathypelagic, but many species move up into the epipelagic at night to feed on crustaceans and small fishes. This is an extremely abundant group of fishes. Representative Gulf genera are *Bonapartia*, *Cyclothone*, and *Gonostoma*.

Sternoptychidae – hatchetfishes. In some species of hatchetfishes the body is slender, but in many the forward half of the body is much deeper than the latter half. In this group the large mouth may be oblique or vertical. The eyes are large and the pectoral fins are set low on the sides of the body. Two rows of photophores line the lower sides, and others are present on the gill covers and near the eyes. Most direct the light downward. These fishes may be mesopelagic, bathypelagic, or benthopelagic, and some species are vertical migrators. They feed on zooplankton. Representative Gulf genera include *Argyropelecus*, *Polyipnus*, and *Sternoptyx*.

Phosichthyidae – lightfishes. Lightfishes are slender and have large terminal mouths extending to below or behind the level of the eyes. Fine teeth line the outer edge of the upper jaw. Two rows of photophores line the lower sides of the body, and photophores are also present on the gill covers and around the eyes. These fishes may be mesopelagic, bathypelagic, or benthopelagic, and some are vertical migrators. Representative Gulf genera are *Polymetme*, *Vinciguerria*, and *Yarella*.

Astronesthidae – snaggletooths. These small slender fishes have large horizontal mouths containing short fang-like teeth. Chin barbels are present. Two rows of small photophores line the lower sides of the body, and others are present in the head region. Large light organs are

located behind the eyes. Most species are mesopelagic, but some are bathypelagic. Many are vertical migrators. They feed on crustaceans and small fishes. Genera inhabiting the Gulf include *Astronesthes*, *Borostomias*, and *Heterophotus*.

Chauliodontidae – viperfishes. These are slender scaleless fishes with very large jaws filled with many fang-like teeth. The chin barbel is absent in adults. The dorsal fin is located just behind the head, and the first fin ray is elongated. A ventral adipose fin is present just forward of the anal fin. Photophores occur around the eyes and in two rows along the sides of the abdomen. These fishes are mesopelagic and bathypelagic, and all are vertical migrators. They feed on small crustaceans and fishes. In the Gulf there is a single genus, *Chauliodus*.

Idiacanthidae – black dragonfishes. These are long, slender, scaleless fishes with large mouths and many fang-like teeth. A chin barbel is present in females only. Very long dorsal and anal fins line the posterior portion of the body. Photophores are present on the head and in two rows along the lower abdomen. Most of these mesopelagic and bathypelagic fishes are vertical migrators. They feed on midwater fishes. The single genus in the Gulf is *Idiacanthus*.

Malacosteidae – loosejaws. The loosejaws have long, slender, scaleless bodies and extremely large mouths with fang-like teeth in the lower jaw. A chin barbel is present in some species. The dorsal and anal fins are positioned far back near the tail. Pectoral fins are absent in some species. Large photophores are present near the eyes, and two rows of smaller photophores line the lower sides of the abdomen. These are mesopelagic and bathypelagic fishes, and some are vertical migrators. They feed on crustaceans and fishes. The Gulf genera include *Aristostomias*, *Malacosteus*, and *Photostomias*.

Melanostomiidae – scaleless dragonfishes. In these fishes the body lacks scales, and it is moderately to very slender. The large horizontal mouth contains many small fang-like teeth. The

chin barbel is short or long and often complexly branched near the tip. The dorsal and anal fins are set far back near the base of the tail. Light organs are present on the head and in two rows along the lower sides of the abdomen. These are mesopelagic and bathypelagic fishes and some are vertical migrators. They feed on crustaceans and fishes. Representative Gulf genera include *Bathophilus*, *Eustomias*, and *Melanostomias*.

Stomiidae – scaly dragonfishes. These are very elongated, slender fishes with small heads. The lower jaw has fang-like teeth and the chin barbel has a terminal bulb with filaments. The pectoral and pelvic fins are small, and the dorsal and anal fins are located near the tail base. Photophores are present on the head and in two rows along the sides of the abdomen. These fishes live in mesopelagic and bathypelagic waters, where they feed on shrimps and fishes. The common Gulf genus is *Stomias*.

Giganturidae – giganturids. These slender little fishes have short snouts and forward-directed tubular eyes. The horizontal mouth extends back behind the eyes and has fang-like teeth. The pectoral fins are placed high on the sides of the body, and pelvic fins are absent in adults. The dorsal and anal fins are located near the tail base. The caudal fin is deeply forked, and several rays of the lower lobe are greatly extended. The body lacks scales or photophores. These mesopelagic and bathypelagic fishes feed on other fishes. The maximum body length is about 25 cm (10 in). The only genus in the Gulf is *Gigantura*.

Chlorophthalmidae – greeneyes. The greeneyes are fairly slender fishes with pointed snouts and long mouths. The large eyes have pupils that are keyhole shaped, that is, with small dark spaces anterior to the lenses proper. The dorsal and anal fins are located fairly far forward and an adipose fin is present. The head, cheeks, and body are covered with scales. These fishes live in

epipelagic and mesopelagic waters, often near the bottom, where they feed on polychaetes, squids, crustaceans, and fishes. The Gulf genera are *Chlorophthalmus* and *Parasudis*.

Ipnopidae – ipnopids. These slender fishes are characterized by a depressed snout and long mouth that extends back well beyond the level of the eyes. The eyes may be small or vestigial and covered by skin and scales. The pectoral fins often have elongate fin rays. The pelvic fins are placed far forward. In some species (tripod fishes), the anterior rays of the pectoral fins and the lower lobe of the caudal fin are elongated and stiffened for support above the bottom or for probing the sediments for food. These are mesopelagic or bathypelagic fishes and are generally closely associated with the bottom. They feed on cephalopods, crustaceans, and fishes. The three genera inhabiting the Gulf are *Bathypterois*, *Bathytyphlops*, and *Ipnops*.

Notosudidae – notosudids. The notosudids are slender fishes with pointed snouts, large mouths, and large eyes. The dorsal, pelvic, and anal fins are small, but the pectorals are well developed. The dorsal fin is located about midbody, but the anal fin is posterior. An adipose fin is present. These fishes are found from epipelagic to bathypelagic depths, and some are bottom dwellers. They feed largely on zooplankton. Gulf genera are *Ahliesaurus* and *Scopelosaurus*.

Scopelarchidae – pearleye fishes. These somewhat elongate fishes have large mouths with an upper jaw lined by a row of fine teeth. The eyes are tubular and directed forward. An adipose fin is present. Pearleyes live in mesopelagic or bathypelagic waters, where they feed on other fishes. Genera inhabiting the Gulf are *Rosenblattichthys*, *Scopelarchoides*, and *Scopelarchus*.

Alepisauridae – lancetfishes. The lancetfishes have slender scaleless bodies with long pointed snouts and large mouths. Dagger-like teeth hang from the roof of the mouth. The dorsal fin is long, high, and sail-like. An adipose fin is present. The small caudal fin is deeply forked. These

fishes live from epipelagic to bathypelagic depths, where they prey on squids, crustaceans, and other fishes. The maximum size is about 2 m (6.6 ft). *Alepisaurus* is the only genus in the Gulf.

Evermannellidae – sabertooth fishes. The sabertooths are moderately slender fishes with large heads and very large mouths containing many teeth. A large fang-like tooth hangs from the roof of the mouth. Some species have upwardly directed tubular eyes. The pectoral and pelvic fins are abdominal, the base of the anal fin is long, and an adipose fin is present. The caudal fin is deeply forked. These mesopelagic predators consume squids and fishes. Genera inhabiting the Gulf include *Coccorella*, *Evermannella*, and *Odontostomops*.

Paralepididae – barracudinas. These are very slender fishes with long pointed snouts and very large mouths full of small teeth. The lower jaw projects beyond the upper jaw. The dorsal, pectoral, and pelvic fins are short, and the anal fin base is long. A dorsal adipose fin is present. The caudal fin is deeply forked. These mesopelagic and bathypelagic fishes consume crustaceans and other invertebrates, as well as fishes. Representative Gulf genera include *Lestidiops*, *Stemonosudis*, and *Sudis*.

Myctophidae – lanternfishes. These small, slender to deep-bodied fishes have big heads and large eyes. The snout is short and the mouth is large, extending back behind the level of the eyes. The dorsal and anal fins are long and well developed, and an adipose fin is present. The caudal fin is forked. Photophores are generally present on the head and gill cover and along the lower abdomen and caudal peduncle and are also scattered elsewhere on the body. Lanternfishes inhabit epipelagic, mesopelagic, and bathypelagic waters, and many are vertical migrators. They feed on crustaceans, chaetognaths, and small fishes, as well as fish eggs and larvae. Seventeen genera inhabit the Gulf, including *Diaphus*, *Hygophum*, and *Myctophum*.

Bregmacerotidae – codlets. The codlets are small slender fishes with short, blunt snouts and small mouths. The first dorsal fin consists of a single long ray originating on top of the head. The second dorsal and anal fins have very long bases and many fin rays. The pectoral fins are inserted high on the sides of the body. The pelvic fins are attached far forward beneath the gill covers and have several elongate rays. These epipelagic and mesopelagic fishes feed on zooplankton. The single genus of the Gulf is *Bregmaceros*.

Ceratiidae – seadevils. In this and the following five families of anglerfishes there is strong sexual dimorphism, that is, the males are anatomically different from the females. Only the adult females will be described. The adult female seadevil is a deep-bodied fish in which the head makes up about 40% of the length of the body. The mouth is essentially vertical, and the eyes are tiny. The pectoral fins are situated in front of the small round operculum (gill opening). Pelvic fins are absent. The small dorsal and anal fins are located far back near the base of the tail. The illicium (fishing rod) is a thin rod attached to the top of the head, and the esca (bait) is a simple pear-shaped structure. Small bulbs (*caruncles*) located ahead of the second dorsal fin are luminescent. Males are tiny, and as adults they are parasitic on the adult females. These fishes are epipelagic to bathypelagic. *Cryptosaras* is the only Gulf genus.

Himantolophidae – himantolophid anglers. These fishes are sexually dimorphic. The adult females are robust and deep bodied, with blunt snouts and large mouths. The pelvic fins are absent. The second dorsal and anal fins are very small and situated just ahead of the tail. The illicium is short and thick, and the luminous esca is branched and antler-like. Males are small and parasitic in some species. These anglers are found in mesopelagic and bathypelagic waters, where they consume cephalopods and fishes. *Himantolophus* is the only genus in the Gulf.

Linophrynidae – linophrynid anglers. These anglers are sexually dimorphic. Adult females have short, deep bodies and large, nearly vertical mouths with fang-like teeth. The eyes are small, and there is a large branched chin barbel. The pectoral fins are inserted ahead of and above the opercular opening. Pelvic fins are absent. The second dorsal and anal fins are located near the tail. The illicium is short, and the bulbous esca may or may not have appendages. Males are tiny and are parasitic on the females. These are mesopelagic and bathypelagic fishes. The two Gulf genera are *Holophryne* and *Linophryne*.

Melanocetidae – melanocetid anglers. The melanocetids are sexually dimorphic. Adult females have short, deep bodies with large, nearly vertical mouths armed with many slender curved teeth. The eyes are small. The pectoral fins are inserted ahead of and above the small oval opercular opening, and the pelvic fins are absent. The anal fin base is very short. The dorsal and anal fins are located near the base of the tail. The illicium is short and bears a bulbous esca. In this group, the small males are apparently free living rather than parasitic. They live at mesopelagic and bathypelagic depths. *Melanocetus* is the single genus inhabiting the Gulf.

Oneirodidae – oneirodid anglers. In these sexually dimorphic fishes the adult females have large deep heads and short thin bodies. The large horizontal mouth has many teeth. The eyes are small. The pectoral fins are attached ahead of the oval opercular opening, and the pelvic fins are absent. The second dorsal and anal fins are situated near the base of the caudal fin. The illicium is attached far forward near the eyes and the esca is bulbous. In most species the male is not parasitic. These fishes inhabit mesopelagic and bathypelagic waters. The two Gulf genera are *Dolopichthys* and *Oneirodes*.

Thaumatichthyidae – thaumatichthyid anglers. These anglers are sexually dimorphic. Adult females have very slender bodies and long horizontal mouths in which the upper jaw is much

longer than the lower jaw. The eyes are small. The pectoral fins originate above the oval opercular openings. Pelvic fins are absent. The second dorsal and anal fins are tiny and located just ahead of the long, broad caudal fin. The luminous esca is branched and is situated below the snout, or it hangs from the roof of the mouth. It is not known whether adult males are free living or parasitic. These fishes live in mesopelagic and bathypelagic waters, and they may be associated with the bottoms. They feed on a variety of small invertebrates. *Thaumatichthys* is the single Gulf genus.

Belonidae – needlefishes. The needlefishes are quite slender and have long, thin, pointed beaks with horizontal mouths bearing many tiny teeth. The pectoral fins are inserted behind the gill cover, and the small pelvic fins are located much farther back. The dorsal and anal fins have long fin bases and are situated near the caudal fin. The lower lobe of the caudal fin is longer than the upper lobe. These fishes live over the continental shelf and in epipelagic waters of the open Gulf, where they feed on small invertebrates and fishes. Representative Gulf genera include *Platybelone*, *Strongylura*, and *Tylosurus*.

Exocoetidae and Hemirhamphidae – flying fishes and halfbeaks. These fishes typically have spindle-shaped or elongate bodies with small mouths and large eyes. In flying fishes the snout is short, but in halfbeaks the lower jaw is generally extended into a long beak. The pectoral fins are inserted high on the side of the body, and in all flying fishes and some halfbeaks they are greatly elongated to serve as “wings” for gliding above the sea surface. The pelvic fins are abdominal and may also be elongated. The dorsal and anal fins are situated far back near the tail. The lower lobe of the caudal fin is much longer than the upper lobe and provides propulsion for the gliding flight. Flying fishes and halfbeaks occur over the continental shelf and in epipelagic waters of the open Gulf, where they feed on phytoplankton and zooplankton. Representative genera of the

Gulf include *Cheilopogon*, *Exocoetus*, *Hemiramphus*, *Hyporhamphus*, *Oxyporhamphus*, and *Parexocoetus*.

Melamphaidae – melamphaids. These are oblong fishes with short, blunt snouts, oblique mouths, small to moderate eyes, and very long heads. The bones around the eyes and making up the gill cover often bear spines. The pectoral fins insert below the midline of the body, and the pelvic fins are abdominal. The base of the dorsal fin is longer than the base of the anal fin. These are epipelagic and mesopelagic predators. Representative Gulf genera include *Melamphaes*, *Promitra*, and *Scopeloberyx*.

Cetomimidae – whalefishes. Whalefishes are elongate fishes with generally pointed snouts, very large horizontal mouths, and tiny eyes. The pectoral fins are small, and the pelvic fins are absent. The dorsal and anal fins are inserted far back near the base of the tail. Scales are absent except along the well-developed lateral line. These are mesopelagic and bathypelagic, and they feed on shrimps and other nektonic animals. Representative Gulf genera include *Cetomimus*, *Cetostoma*, and *Gyrinominus*.

Echeneidae – remoras. The remoras or sharksuckers were described in the preceding chapter. Since they hitch rides on larger marine animals, they are taken wherever their hosts go. Thus, they are found over the continental shelves as well as in epipelagic waters of the open Gulf. Common genera include *Echeneis* and *Remora*.

Carangidae – jacks. The jacks were taken up in the previous chapter. This is a diverse group of fishes with many different body forms and life history types. Those species that inhabit the open Gulf are all fast-swimming predators. Common open Gulf forms are found in the genera *Caranx*, *Hemicaranx*, and *Seriola*.

Coryphaenidae – dolphinfishes. The dolphinfishes were discussed in the previous chapter. These are colorful fast-swimming predators of coastal and oceanic waters that prey primarily on flying fishes and their relatives. In the open Gulf they are represented by a single genus, *Coryphaena*.

Chiasmodontidae – chiasmodontids. The chiasmodontids, sometimes referred to as the "swallowers," have fairly long, spindle-shaped bodies, two dorsal fins, and very large mouths. The jaws and stomachs are quite distensible so that these fishes can swallow prey even larger than themselves. They live in mesopelagic waters, where they feed on squids and fishes. Representative genera in the Gulf include *Chiasmodon* and *Kali*.

Luvaridae – louvars. In the louvars, the body is laterally compressed and spindle shaped with a bulging forehead. Above the eyes a groove extends from the snout to the back of the gill cover. The small mouth, eyes, and pectoral fins are located below the midline of the body. The dorsal and anal fins are long and low, and keels are present on both sides of the caudal fin base. The caudal fin itself is short and very high. This fish lives in epipelagic waters, where it feeds on jellyfishes, comb jellies, and other gelatinous animals. There is a single genus, *Luvarus*.

Gempylidae – snake mackerels. The snake mackerels have long, thin, often compressed bodies. The mouth is terminal, with a protruding lower jaw and many long teeth. There are two dorsal fins, the first being much longer than the second. Isolated finlets are usually present behind the dorsal and anal fins. The pectoral fins are inserted low on the sides of the body. The pelvic fins are located far forward, below the pectoral fins, and they are very small and reduced to a single spine. These barracuda-like fishes live in the epipelagic and mesopelagic zones, where they prey on squids and fishes. Representative genera include *Epinnula*, *Gempylus*, and *Ruvettus*.

Scombridae – mackerels. The mackerels, tunas, and their relatives were discussed in the previous chapter. They are all important predators of the outer continental shelves and open Gulf, where they feed primarily on squids and fishes. Important genera include *Euthynnus*, *Scomber*, *Scomberomorus*, and *Thunnus*.

Xiphiidae – swordfish. The swordfish was discussed in the previous chapter. Because of warm temperatures in the surface waters, in the Gulf the swordfish is limited to the cooler lower epipelagic and mesopelagic depths. There is a single species of the genus *Xiphias*.

Istiophoridae – billfishes. The billfishes, including the marlins and sailfishes, were discussed in the previous chapter. Unlike the swordfish, in which the bill is flattened and the pelvic fins are absent, in the billfishes the bill is round (in cross section), and pelvic fins are present. The marlins and sailfishes inhabit waters of the outer continental shelves and open Gulf, where they feed on squids and fishes. Representative genera include *Istiophorus*, *Makaira*, and *Tetrapturus*.

Molidae – molas. The molas, or ocean sunfishes, are related to the puffers and porcupine fishes of coastal waters. However, the bodies of molas are much modified. They are laterally compressed and squarish in shape, with very tall dorsal and anal fins. The small mouth is located at the front of the head near the midline of the body. The small gill openings are situated near the bases of the pectoral fins, and pelvic fins are absent. The posterior end of the body is truncated and fringed with a false caudal fin composed of rays of the dorsal and anal fins that have migrated to the hind end. Molas can be huge, achieving heights and lengths of over 2 m (7 ft) and weights of over 1,000 kg (1 ton). They float or swim at the surface of tropical and subtropical seas, where they feed on jellyfishes, comb jellies, and salps. Within the Gulf they are represented by the genus *Mola*.