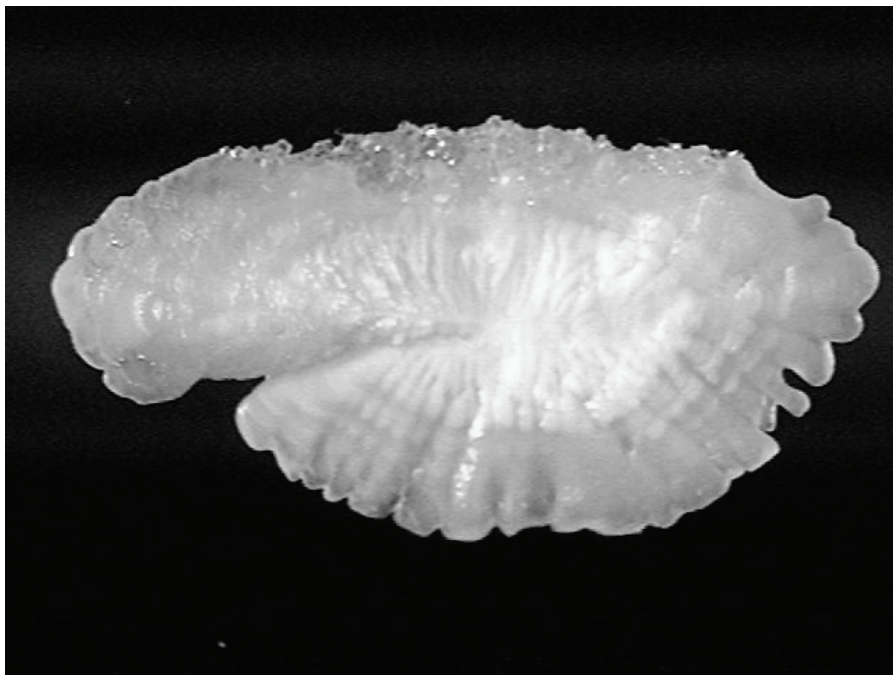




A GUIDE TO OTOLITHS FROM FISHES OF THE GULF OF MEXICO



By

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National Oceanic and Atmospheric Administration
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U.S. DEPARTMENT OF COMMERCE
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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Introduction

The otoliths of teleost fishes have many practical applications in fisheries science, many of which are only beginning to be fully exploited. In addition to age information, otolith microchemistry can also aid in stock identification (Edmonds *et al.*, 1989). Analysis of banding patterns can be crossdated with tree-ring records to validate ages of long-lived fishes (Black *et al.*, 2005), just as bomb radiocarbon signatures in otoliths can be referenced to known dates of atomic bomb tests in the 1950-70's (Campana, 1997). Otoliths can also be used for species identification, which has practical applications for diet studies, micropaleontology, and taxonomy. Species within a family will have similarly shaped otoliths, however, the exact shape of the otolith is unique to species. Otoliths grow continuously throughout a fish's life and otolith weight is generally demonstrably related to fish age and influenced by growth rates (Pawson, 1990). The two and three-dimensional shape of the otolith may also change dramatically as the fish gets larger. The goal of this report is to provide digital images of sagittal otoliths from common fishes in the northern Gulf of Mexico.

Methods

Otoliths were extracted by port samplers and field biologists from fish landed at ports and vessels throughout the northern Gulf of Mexico. The majority of otoliths used in this catalogue were borrowed from the Natalie Aimes Memorial Otolith Archive, housed at the NOAA Fisheries Panama City Laboratory. Additional otoliths were lent by the Department of Fisheries and Aquatic Sciences (FAS) at the University of Florida. Otoliths were collected by port agents throughout the northern Gulf of Mexico and by field biologists. If necessary, otoliths were briefly soaked in a dilute sodium hypochlorite-water solution, and extraneous material removed with tweezers. Otoliths were magnified by a Meiji Techno microscope, and digital images of dry otoliths were taken with a Hitachi KP-D50 Color digital camera using ImagePro software.

Results

Digital images of otoliths from a total of 172 species representing 36 families are presented in this catalogue. Additional images are provided for nine species, for which otoliths from different sizes of fish were available. Species are sorted alphabetically by family and common name. The geographic distribution of the species and length of the fish (when available) are also presented. Lengths that were estimated are denoted by an asterisk (*). Lengths are reported in centimeters (cm) fork (FL) or total length (TL). Unless otherwise stated, the otoliths pictured are sagittal. Two images of each otolith are presented: the proxal and distal surfaces. Distribution information is from Peterson's Field Guide to Atlantic Coast Fishes (Robbins and Carleton, 1986) and Fishes of the Gulf of Mexico Volumes I & II (McEachran and Fechhelm, 1998; 2005). Gulf of Mexico is abbreviated as GOM.

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Family Ariidae: Seacatfishes

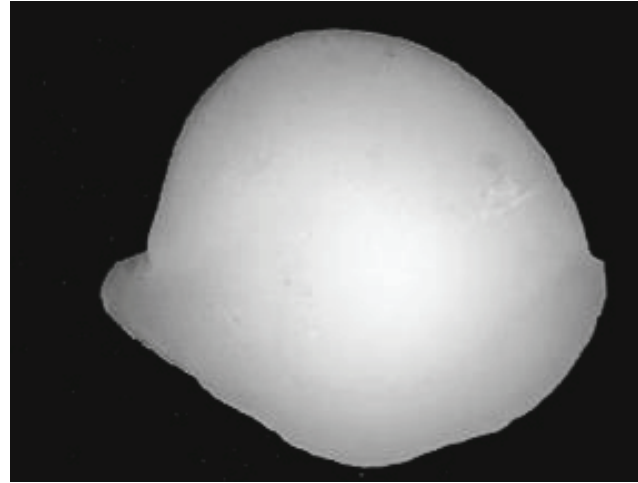
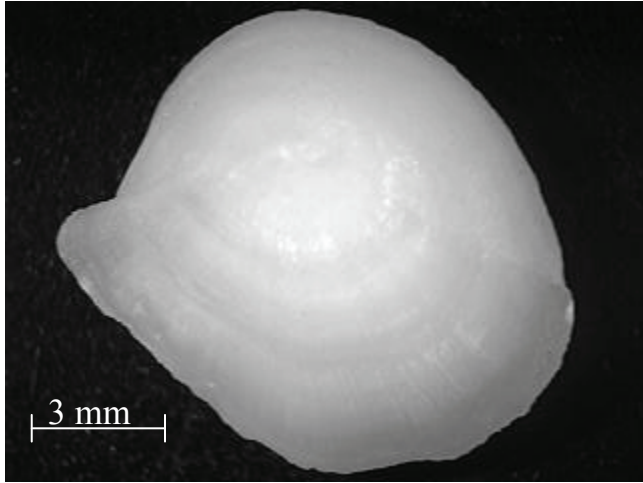


Figure 1. Gafftopsail catfish,
Bagre marinus
Distribution: Northern GOM
to Venezuela
Specimen length: 26.1 cm FL

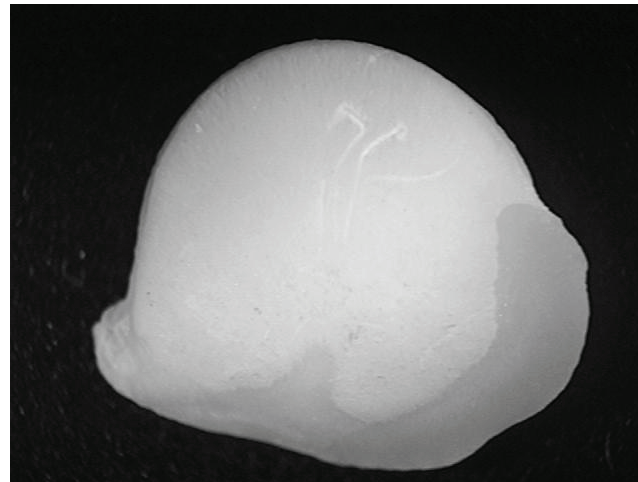
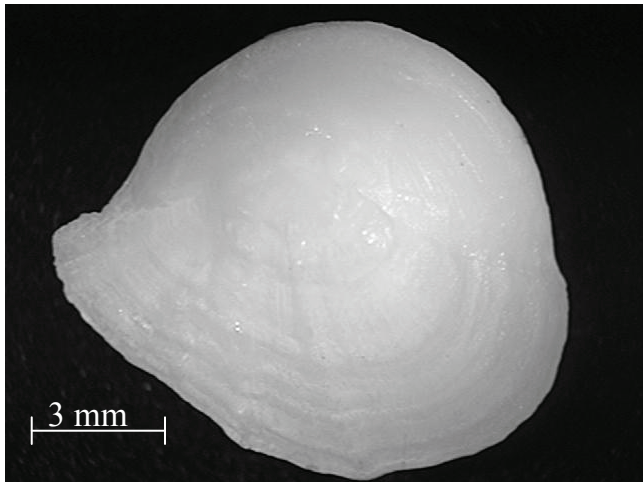


Figure 2. Hardhead catfish,
Arius felis
Distribution: Northern GOM,
southern Florida, and Mexico
Specimen length: 31.0 cm FL

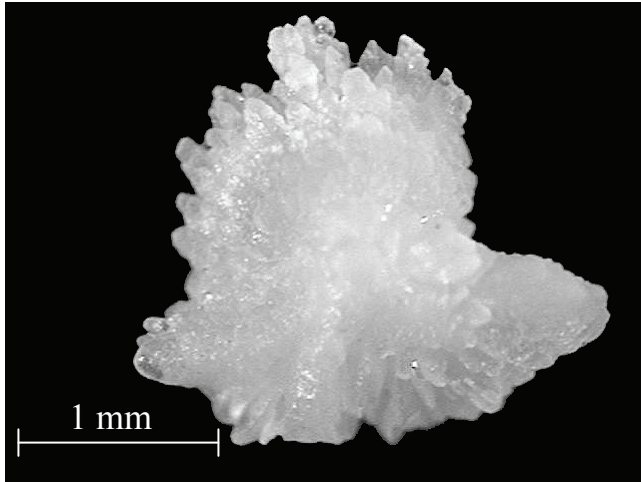
Family Balistidae: Triggerfishes

Figure 3. Gray triggerfish,
Balistes capriscus
Distribution: Nova Scotia to
Argentina, Bahamas, GOM
Specimen length: 25 cm TL*

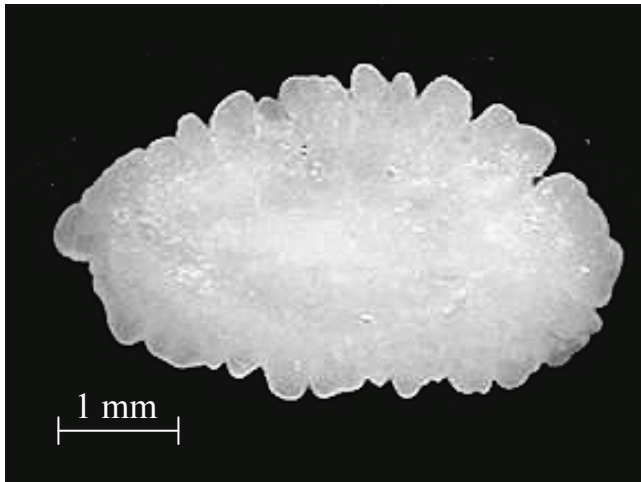
Family Batrachoididae: Toadfishes

Figure 4. Gulf toadfish,
Opsanus beta
Distribution: Florida south of
Cape Canaveral, Bahamas,
GOM
Specimen length: 14.1 cm TL

Family Bothidae: Lefteye flounders

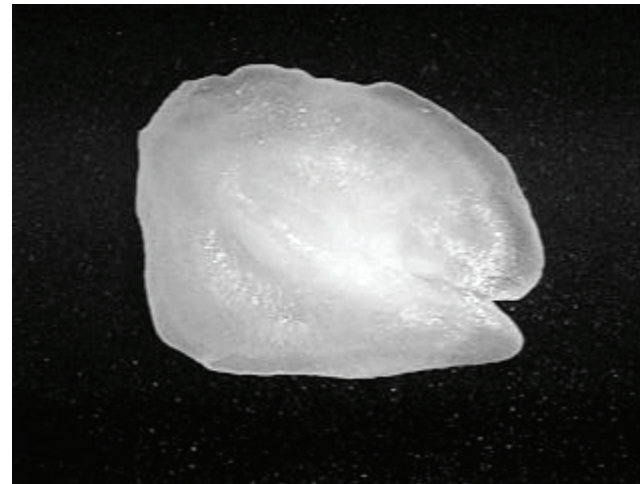
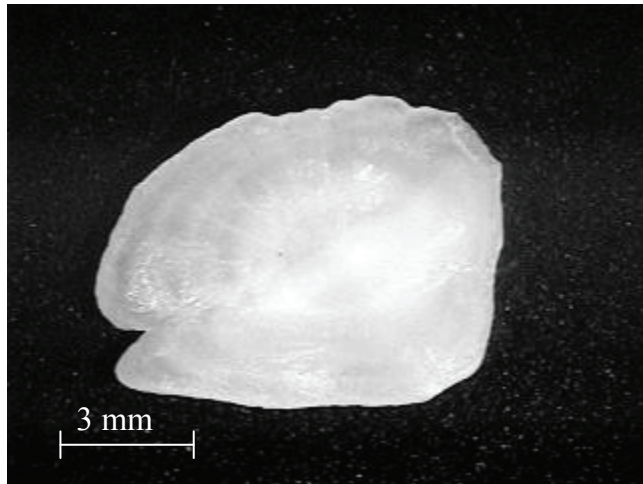


Figure 5. Dusky flounder,
Syacium papillosum
Distribution: North Carolina
and northern GOM to Brazil
Specimen length: 32.2 cm TL

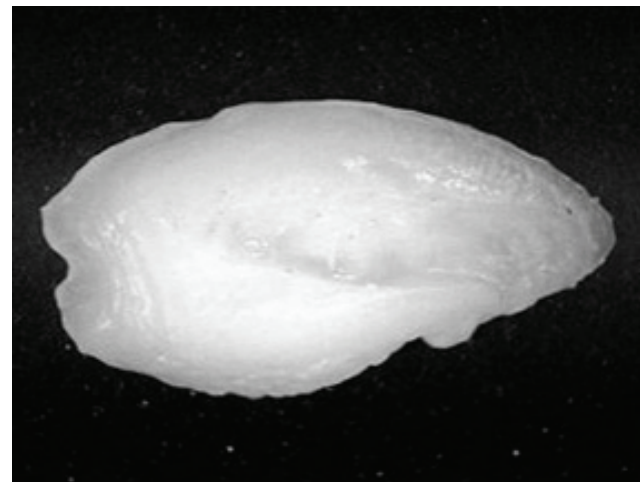
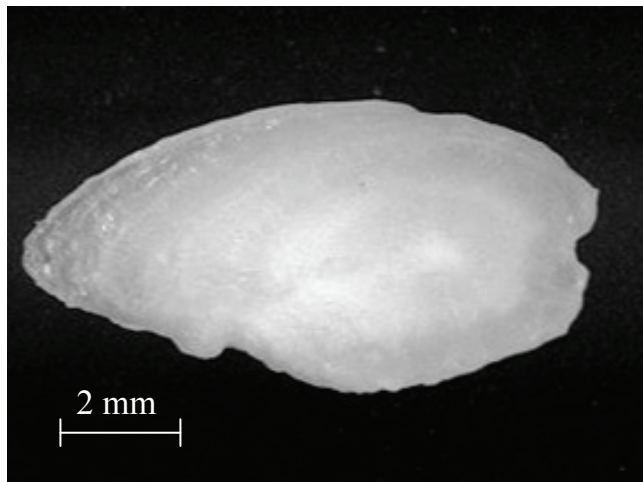


Figure 6. Gulf flounder,
Paralichthys albigutta
Distribution: North Carolina
to Texas, not in southern
Florida
Specimen length: 38.0 cm TL

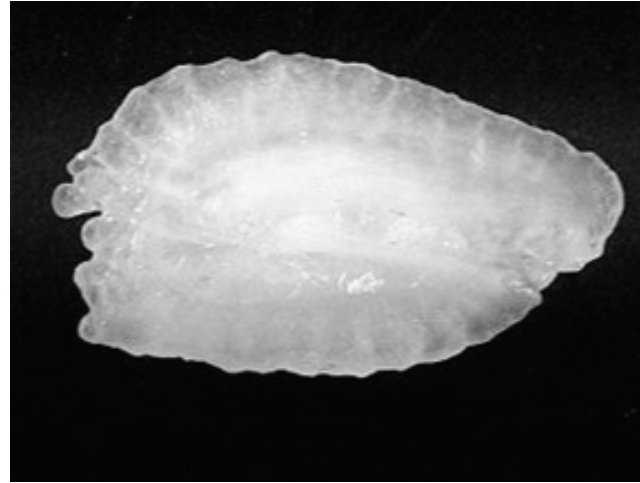
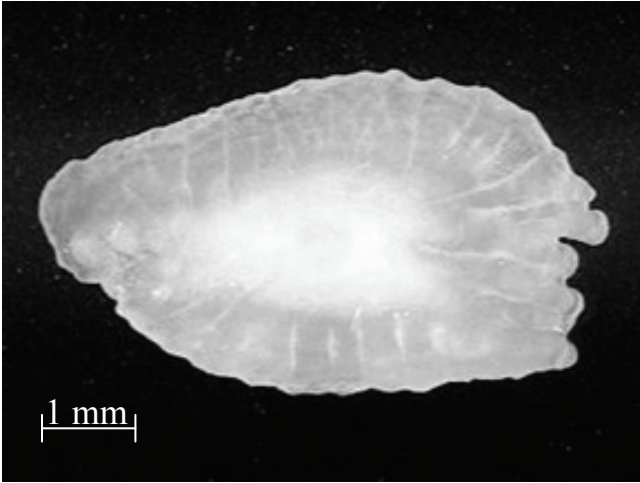


Figure 7. Ocellated flounder,
Ancylosetta quadrocellata
Distribution: North Carolina
to Florida, GOM
Specimen length: 21.5 cm TL

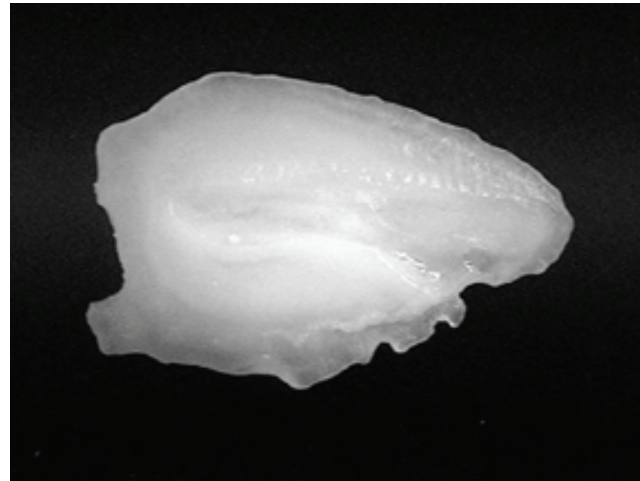
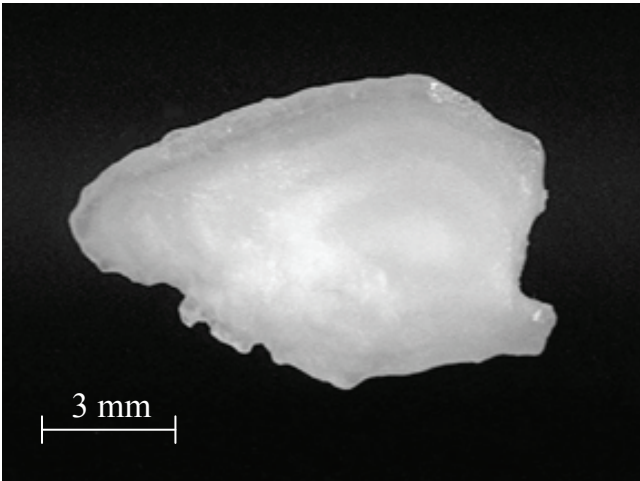


Figure 8. SE flounder,
Paralichthys lethostigma
Distribution: North Carolina
to Texas, absent in southern
Florida
Specimen length: 54.5 cm TL

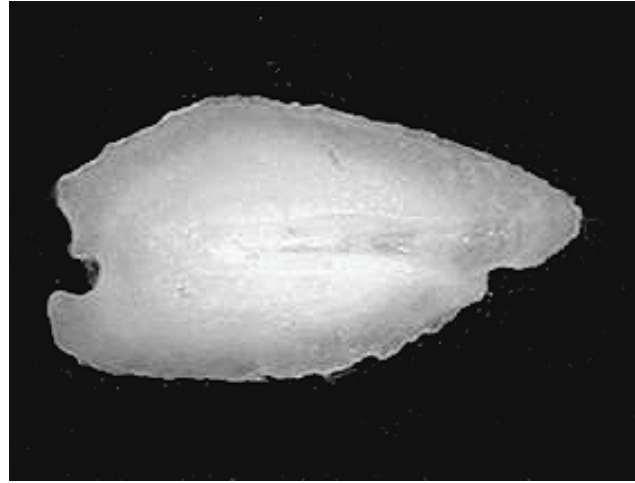
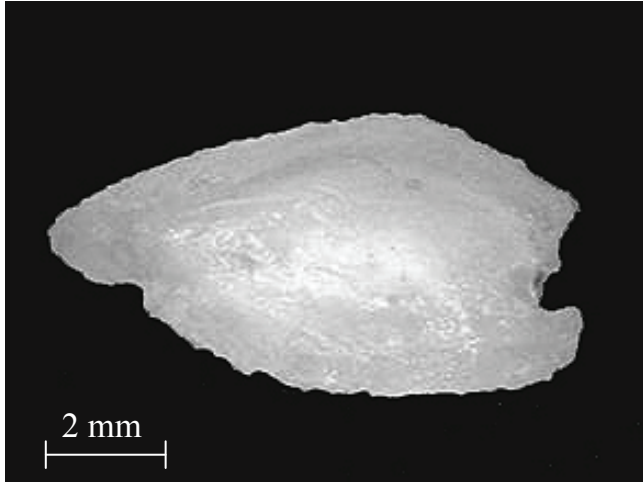


Figure 9. Summer flounder,
Paralichthys dentatus
Distribution: Maine to
southern Florida .
Specimen length: 38.0 cm TL

Family Carangidae: Jacks

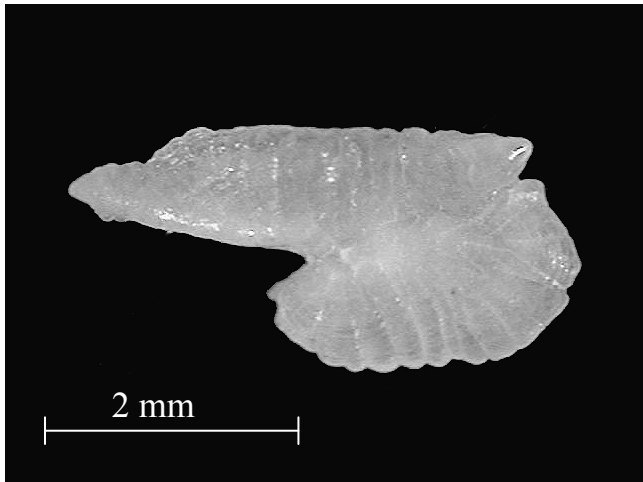


Figure 10. African pompano,
Alectis ciliaris
Distribution: Worldwide in
warm waters
Specimen length: 25.4 cm FL

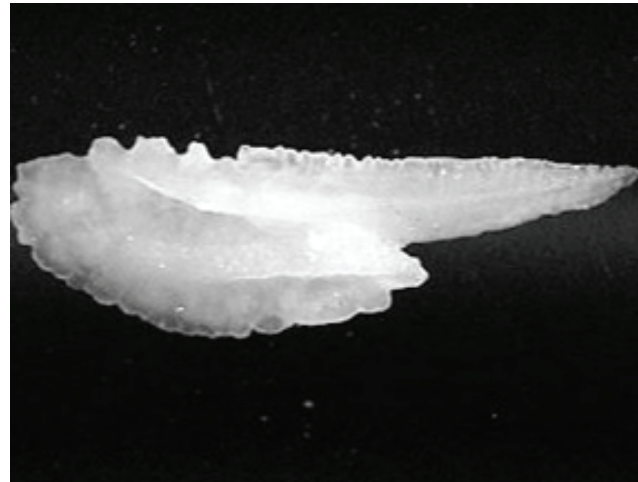
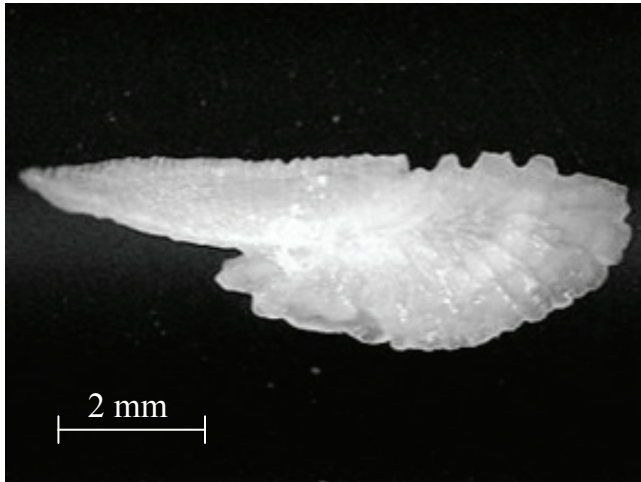


Figure 11. Almaco jack,
Seriola rivoliana
Distribution: Massachusetts
to Argentina, eastern Atlantic
Specimen length: 54.4 cm FL

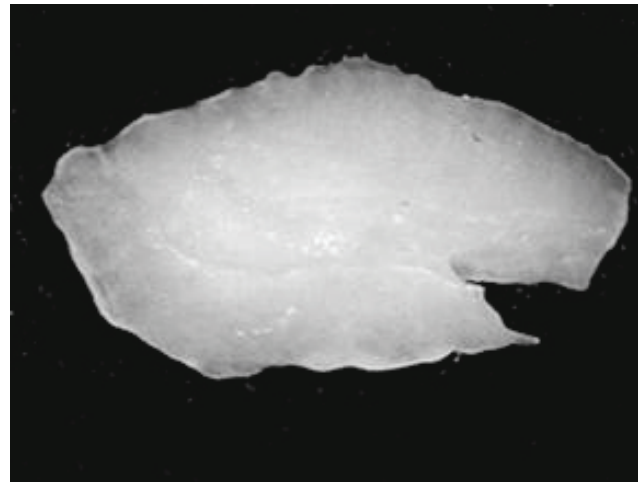
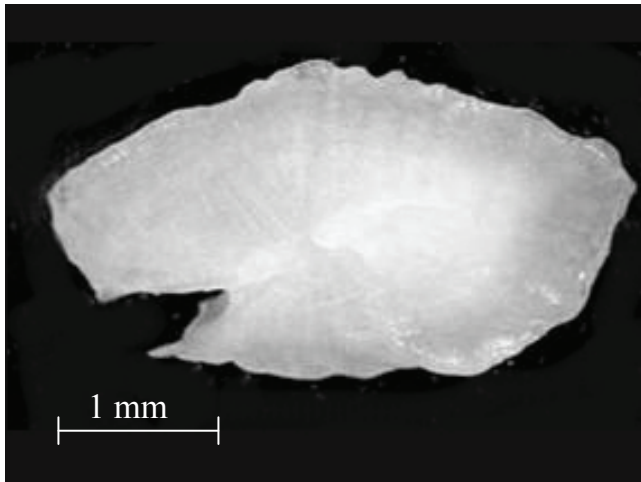


Figure 12. Atlantic bumper,
Chloroscombrus chrysurus
Distribution: Massachusetts,
Bermuda and northern GOM
to southeastern Brazil; absent
in the Bahamas
Specimen length: 16.1 cm FL

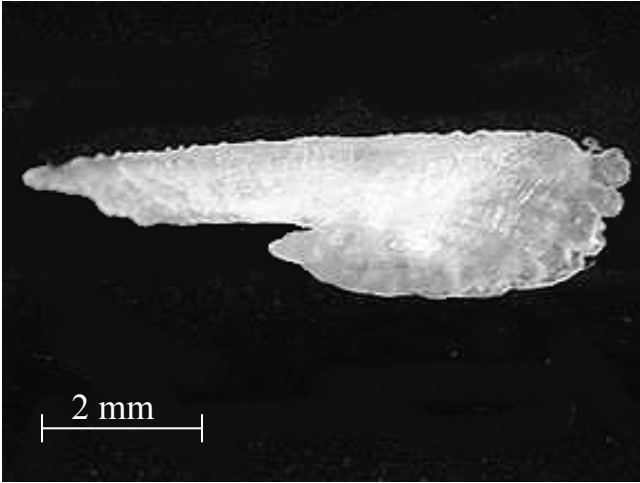


Figure 13. Banded rudderfish, *Seriola zonata*
Distribution: Nova Scotia to southeastern Brazil
Specimen length: 52.0 cm FL

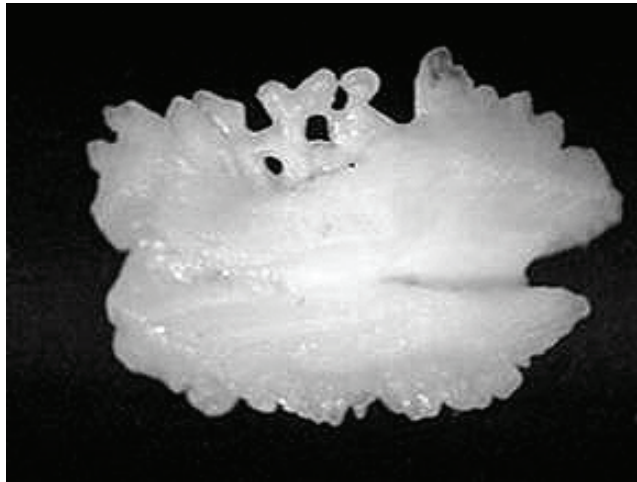
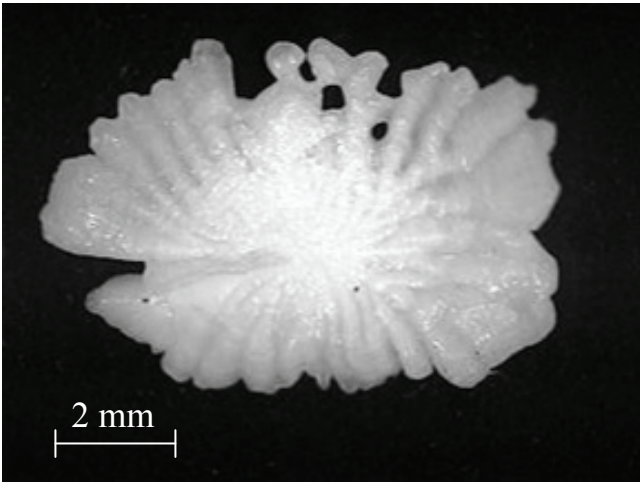


Figure 14. Bigeye scad, *Selar crumenophthalmus*
Distribution: Nova Scotia, Bermuda, and northern GOM to southeastern Brazil;
worldwide in warm waters.
Specimen length: 54.3 cm FL

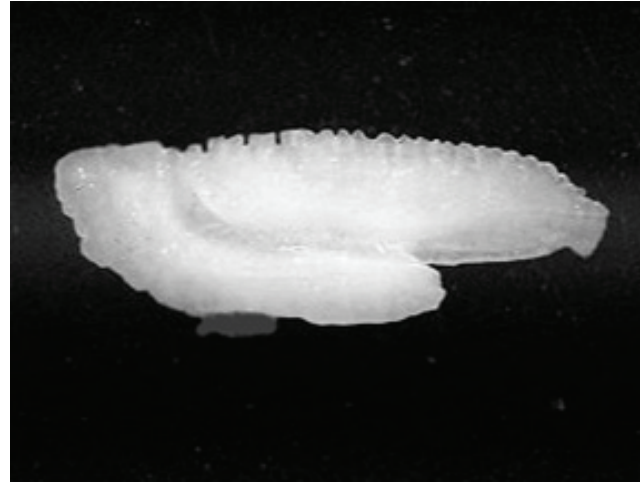
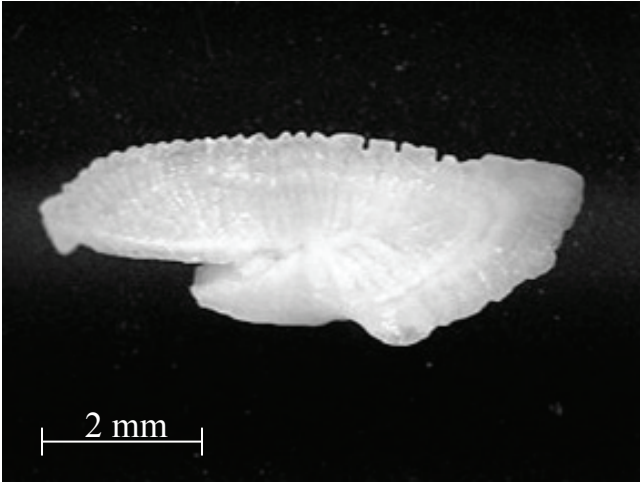


Figure 15. Blue runner,
Caranx crysos
Distribution: Nova Scotia
and northern GOM to Brazil,
eastern Atlantic.
Specimen length: 28 cm FL

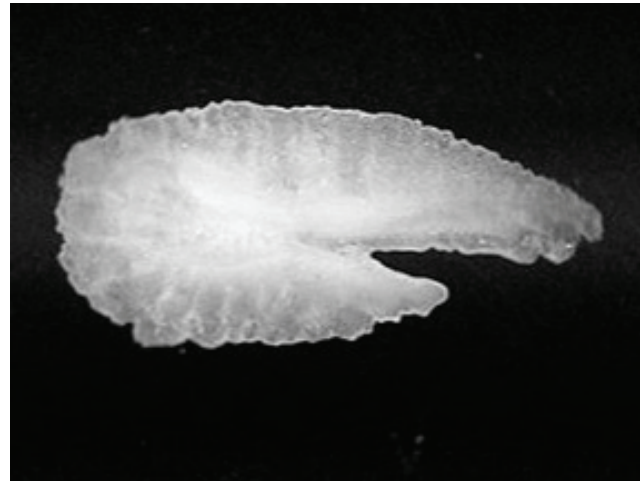
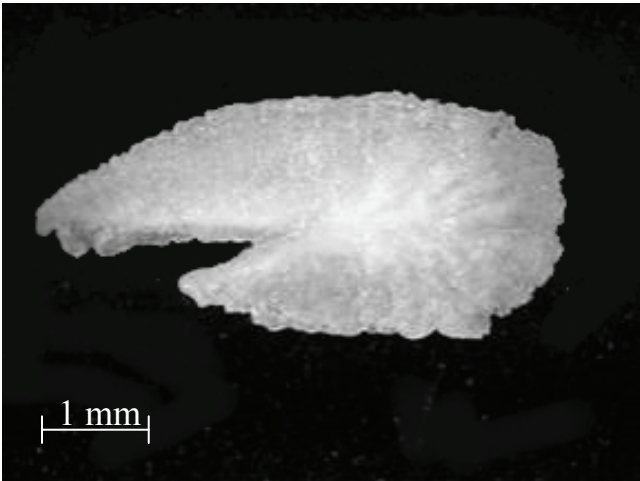


Figure 16. Cottonmouth jack,
Uraspis secunda
Distribution: Massachusetts
and northern GOM to Brazil;
worldwide in warm waters
Specimen length: 32.2 cm FL

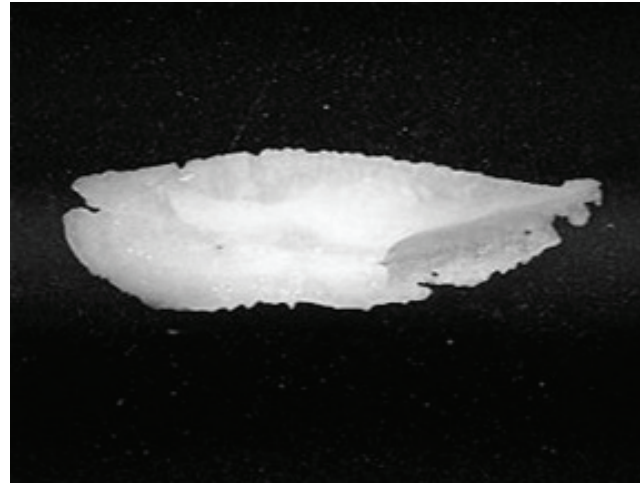
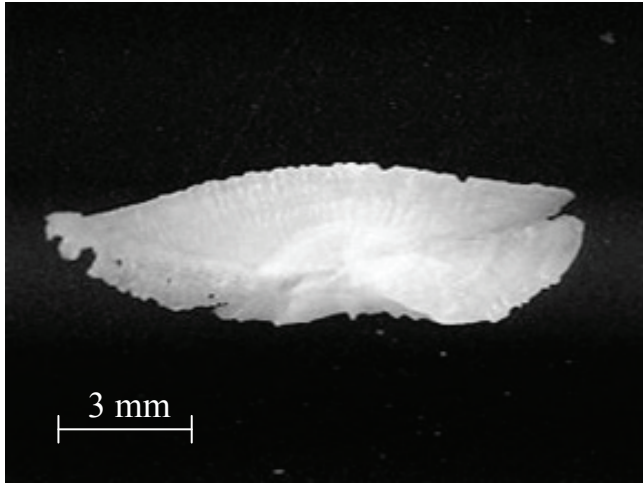


Figure 17. Crevalle jack,
Caranx hippos
Distribution: Nova Scotia
and northern GOM to
Uruguay
Specimen length: 60 cm TL*

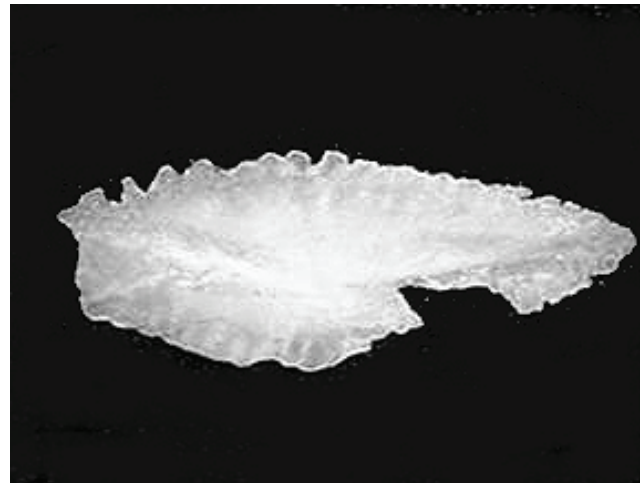
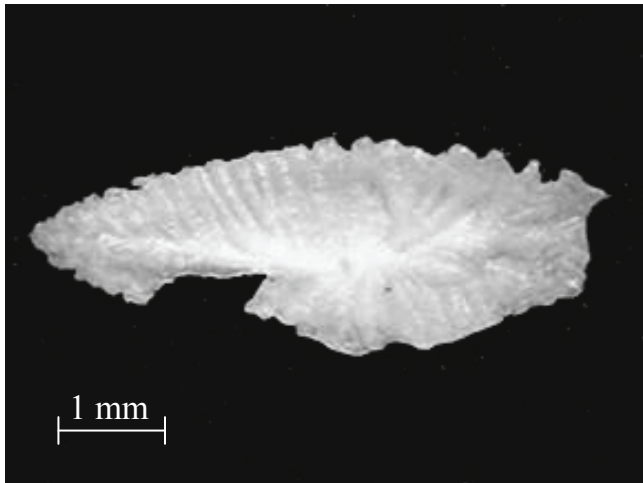


Figure 18. Florida pompano,
Trachinotus carolinus
Distribution: Massachusetts
to southeastern Brazil
Specimen length: 25 cm TL*

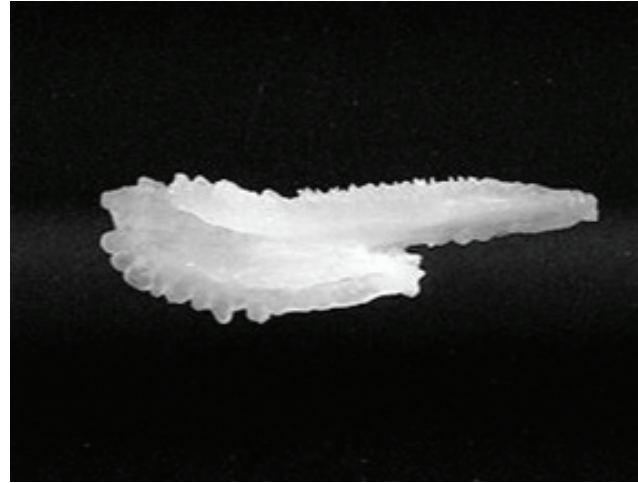
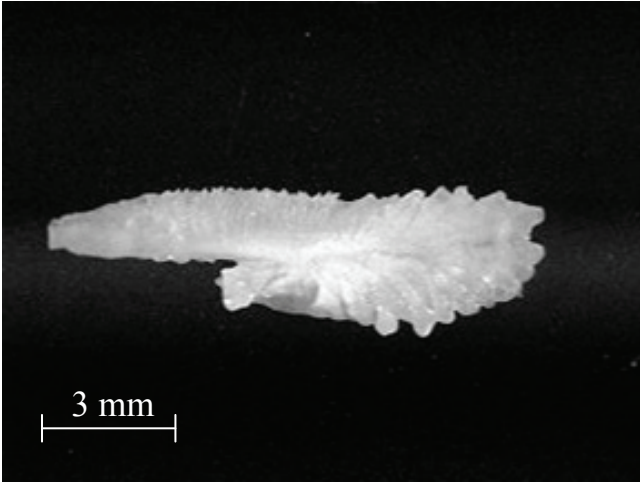


Figure 19. Greater
amberjack, *Seriola dumerili*
Distribution: Worldwide in
warm waters
Specimen length: 87 cm FL

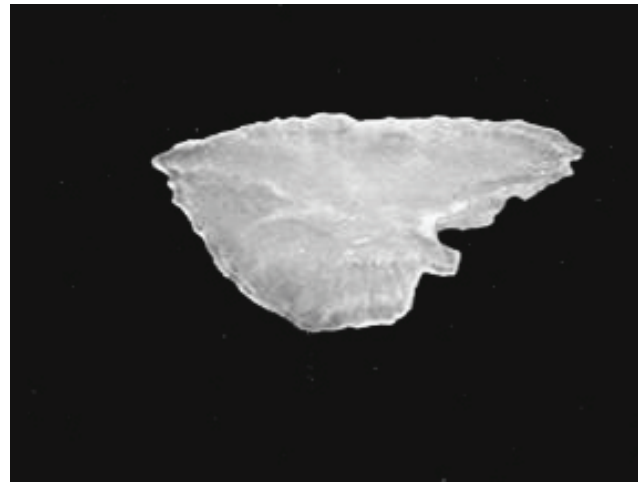
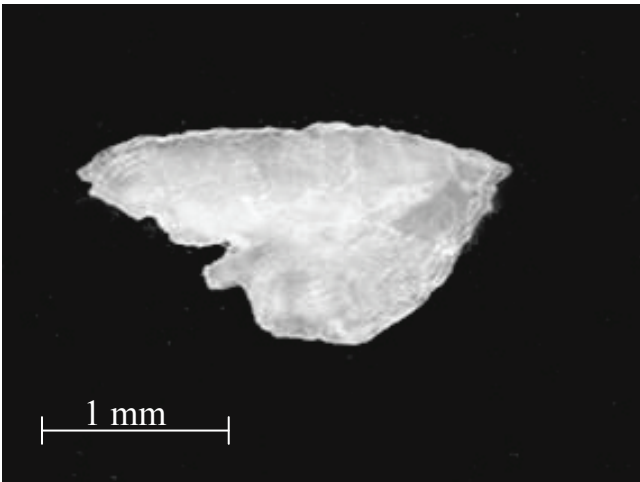


Figure 20. Leatherjacket,
Oligoplites saurus
Distribution: Maine and
northern GOM to Uruguay,
Eastern Pacific
Specimen length: 19 cm FL

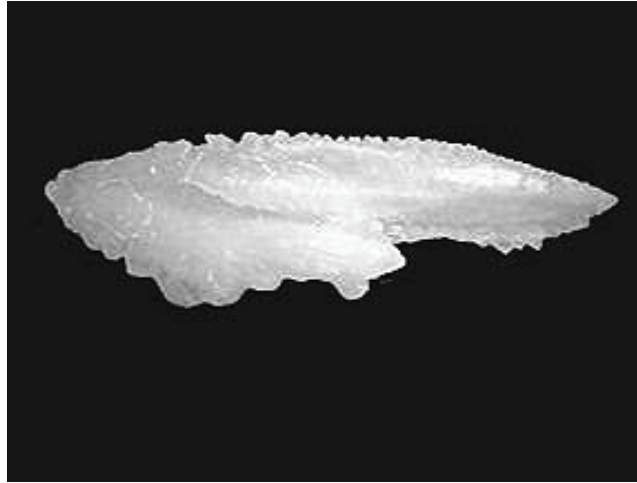
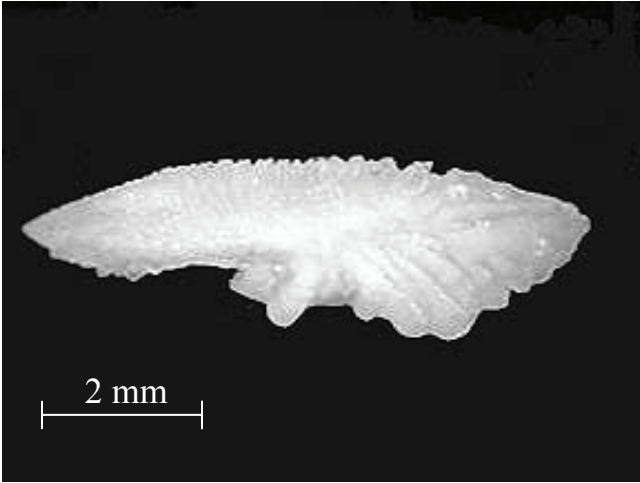


Figure 21. Lesser amberjack, *Seriola fasciata*
Distribution: Massachusetts to Argentina, eastern Atlantic
Specimen length: 54.4 cm FL

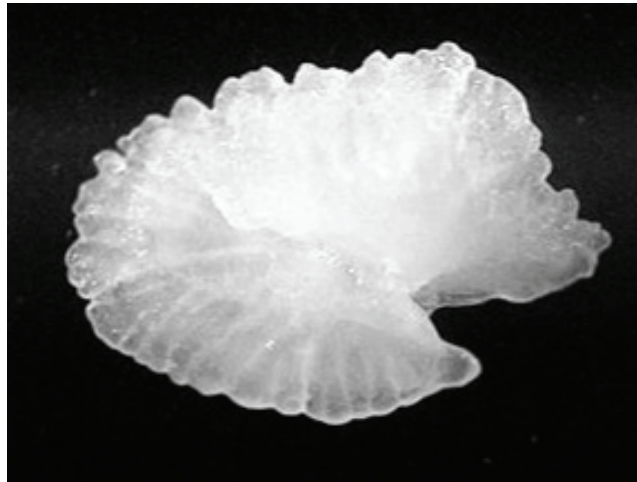
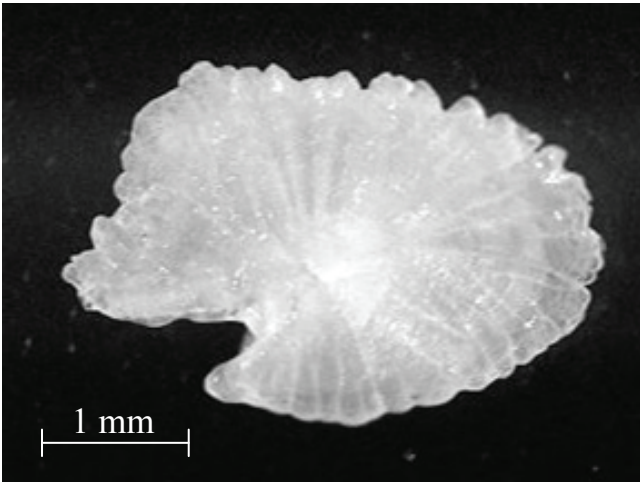


Figure 22. Lookdown, *Selene vomer*
Distribution: Nova Scotia to Uruguay, eastern Atlantic
Specimen length: 17.0 cm FL

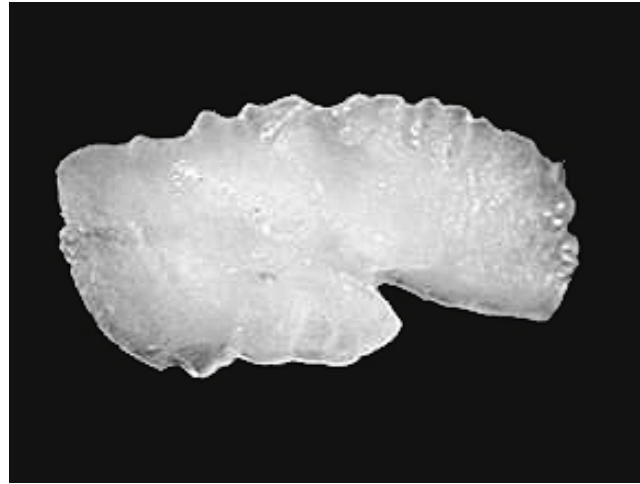
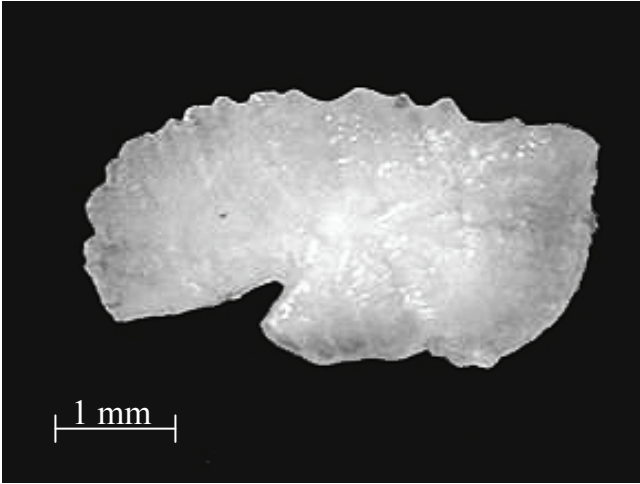


Figure 23. Moonfish, *Selene setapinnis*
Distribution: Nova Scotia to Uruguay; eastern Atlantic
Specimen length: 16.4 cm FL

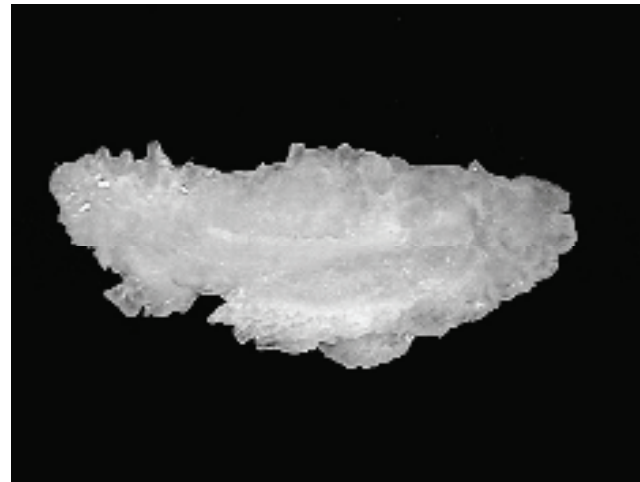
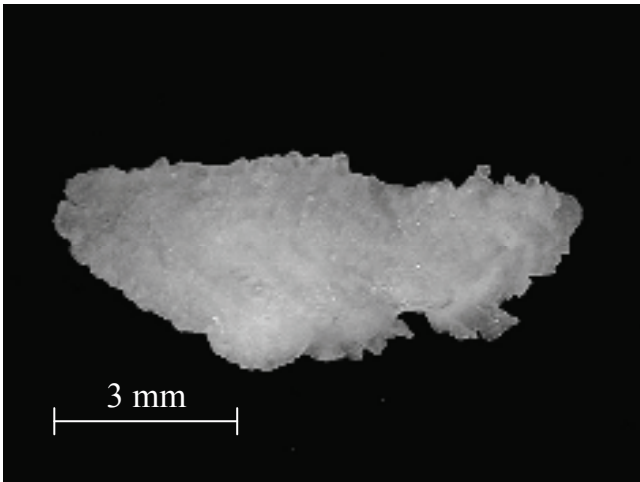


Figure 24. Permit, *Trachinotus falcatus*
Distribution: Coastal waters from Massachusetts to Bermuda and Brazil, GOM, Bahamas, Antilles
Specimen length: 51.2 cm FL

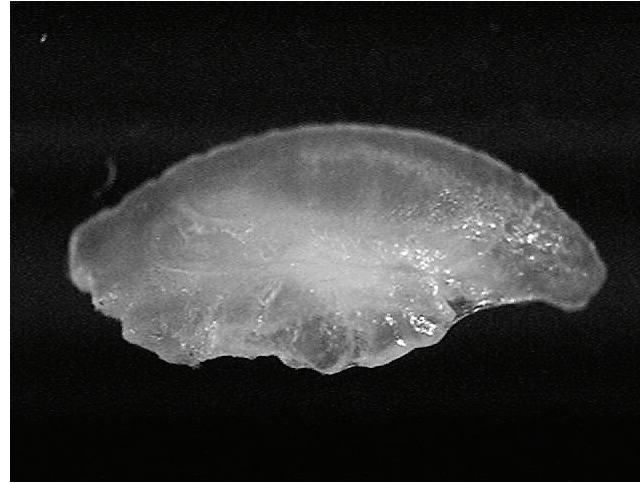
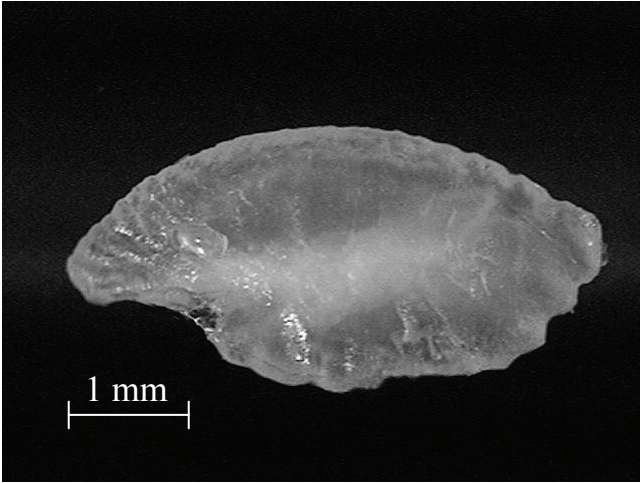


Figure 25. Round scad,
Decapterus punctatus
Distribution: Gulf of Maine
to Argentina
Specimen length: 16.5 cm FL

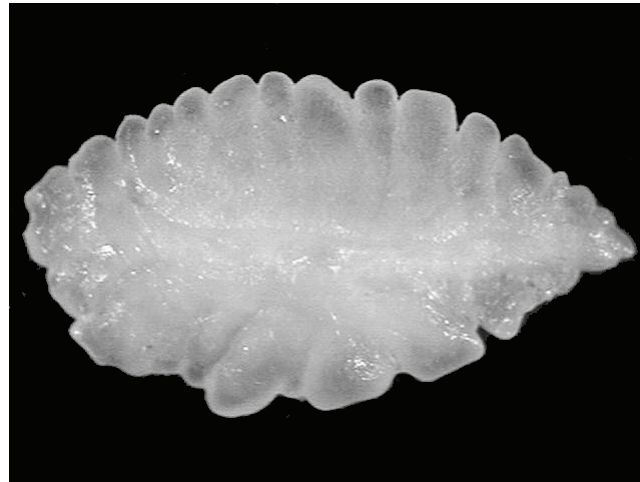
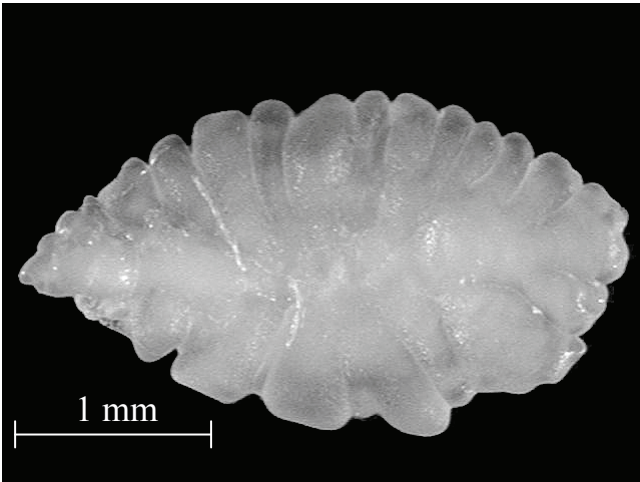


Figure 26a. Rough scad,
Trachurus lathami
Distribution: Gulf of Maine
to Argentina
Specimen length: 5.7 cm FL

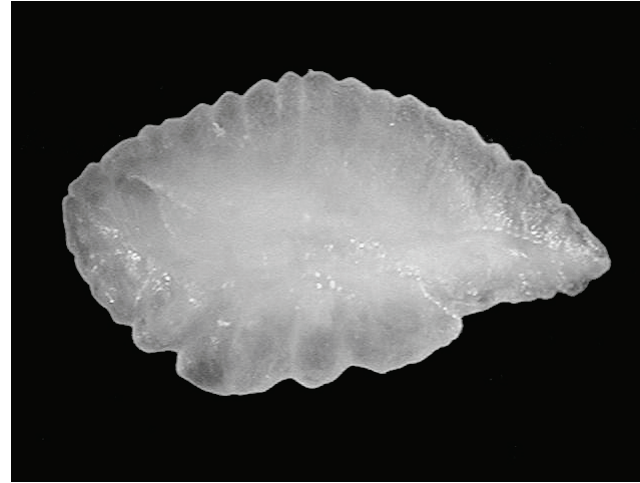
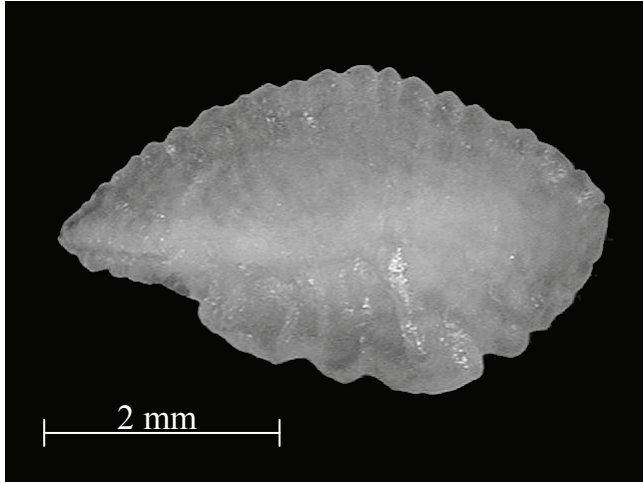


Figure 26b. Rough scad,
Trachurus lathami
Distribution: Gulf of Maine
to Argentina
Specimen length: 12.0 cm FL

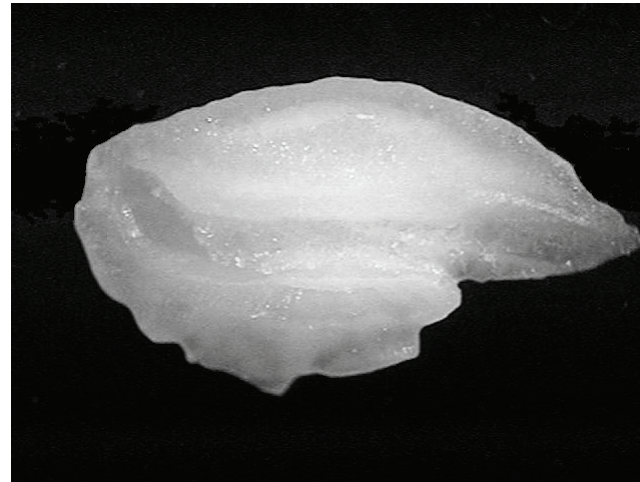
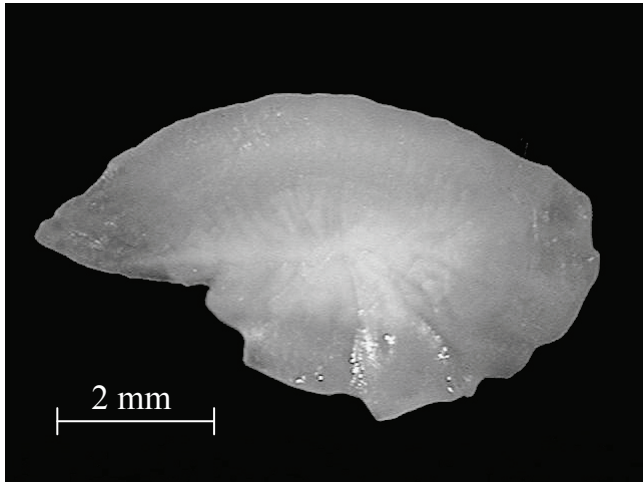


Figure 26c. Rough scad,
Trachurus lathami
Distribution: Gulf of Maine
to Argentina
Specimen length: 20.6 cm FL

Family Clupeidae: Herrings

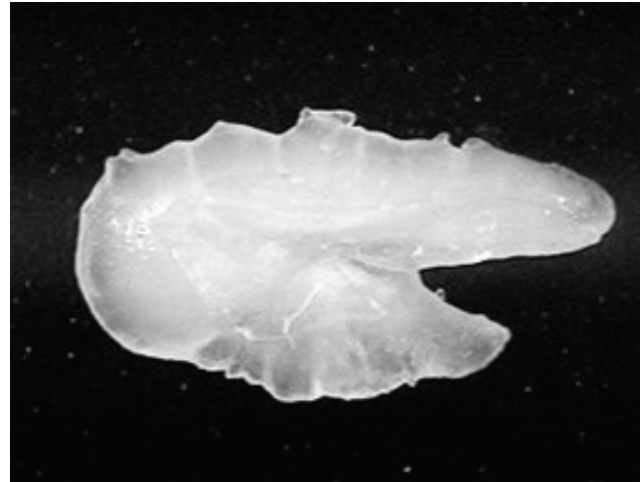
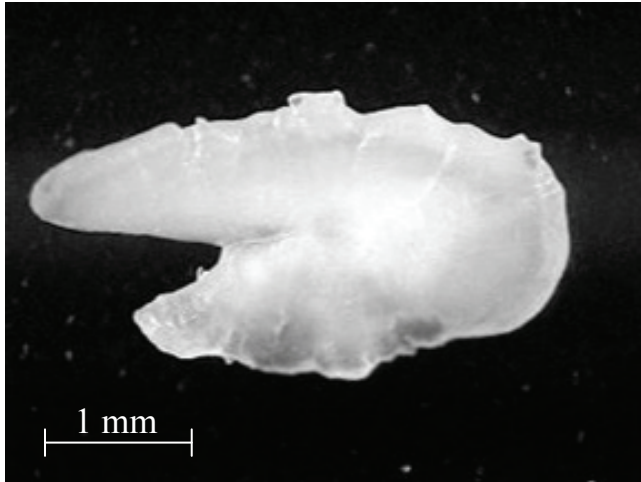


Figure 27. Atlantic thread herring, *Opisthonema oglinum*
Distribution: Cape Cod, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 15.9 cm FL

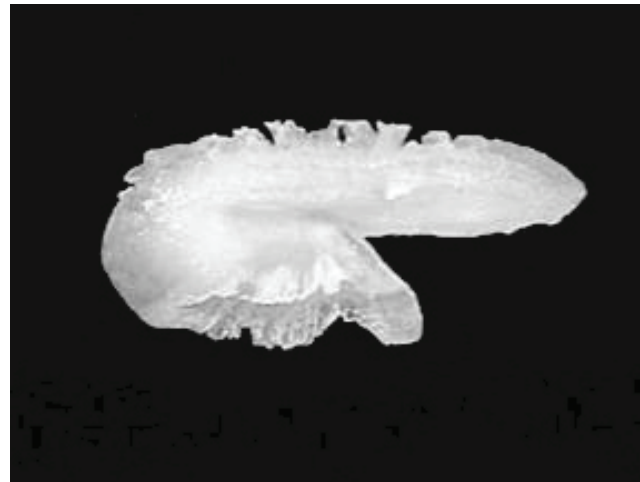
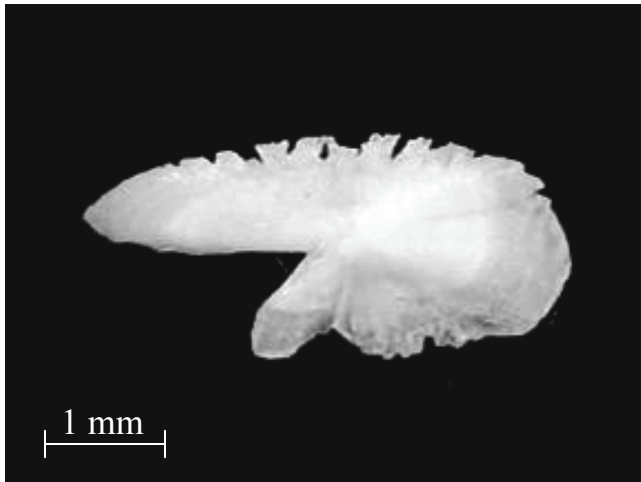


Figure 28. Gulf menhaden, *Brevoortia patronus*
Distribution: Northern GOM to southeastern Florida and southeastern Texas
Specimen length: 25.0 cm FL

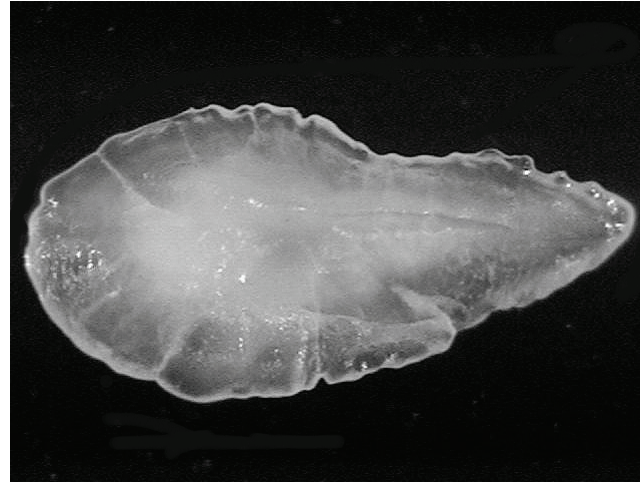
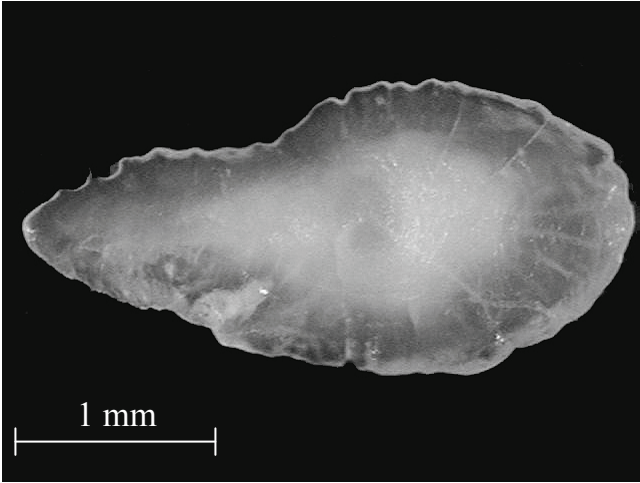


Figure 29. Round herring,
Etrumeus teres
Distribution: Bay of Fundy to
Venezuela
Specimen length: 12.5 cm FL

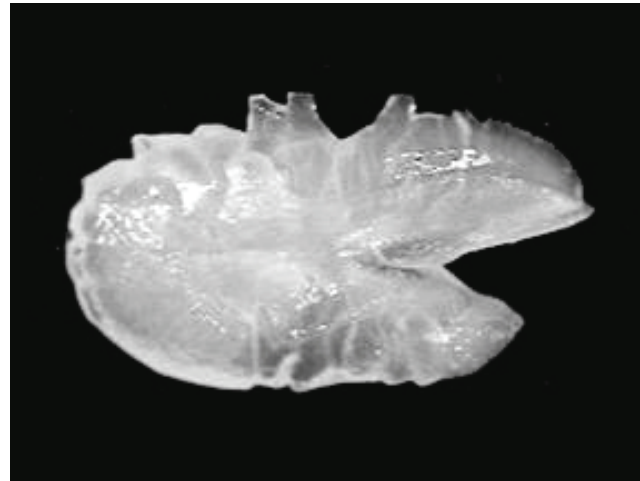
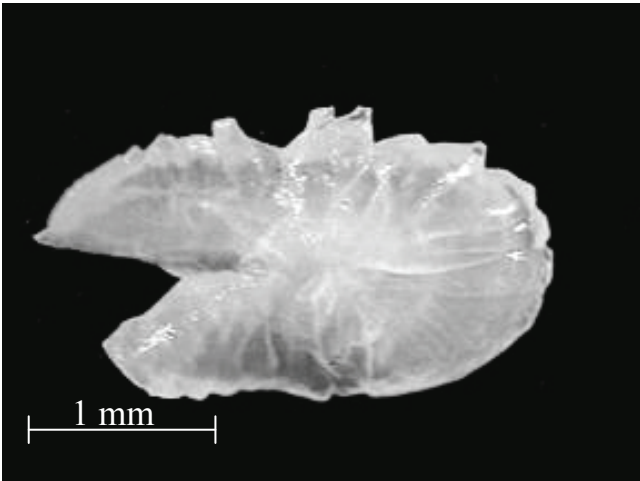


Figure 30. Scaled sardine,
Harengula jaguana
Distribution: Northeast
Florida, Bahamas, and
Northern GOM to Brazil
Specimen length: 10.0 cm FL

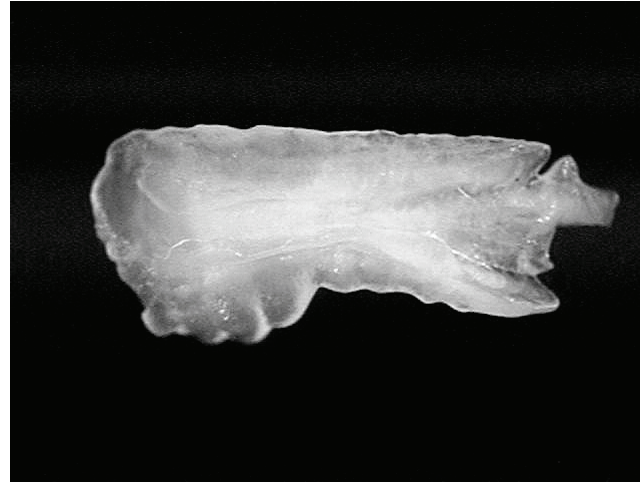
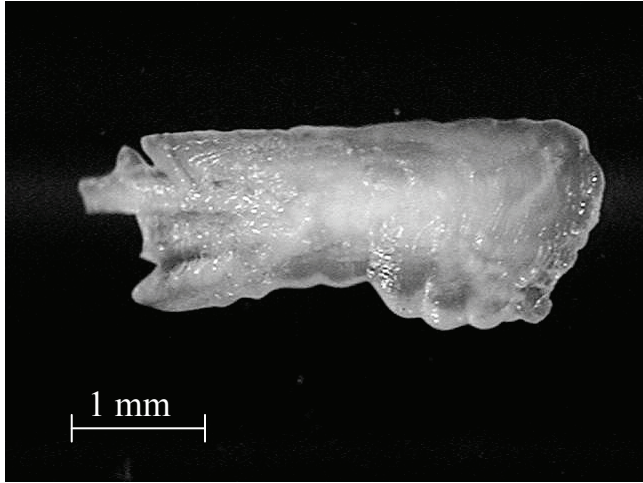


Figure 31. Spanish sardine, *Sardinella aurita*
Distribution: Massachusetts to Argentina, GOM, Bahamas, and Antilles
Specimen length: 18.2 cm FL

Family Cynoglossidae: Tonguefishes

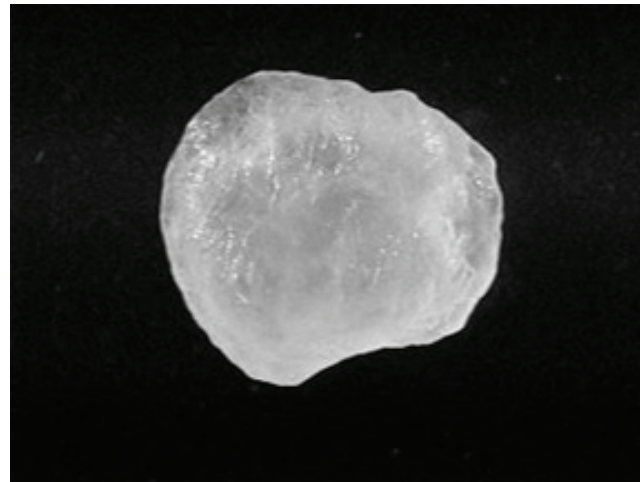
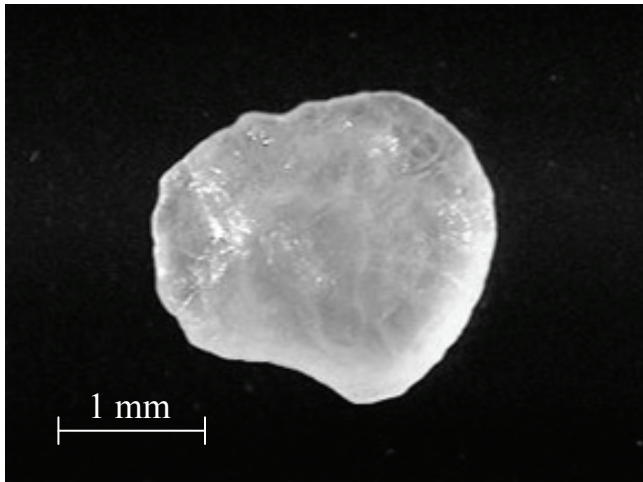


Figure 32. Blackcheek tonguefish, *Symphurus plagusia*
Distribution: New York, Bahamas, and northern GOM to Panama
Specimen length: 13.0 cm TL

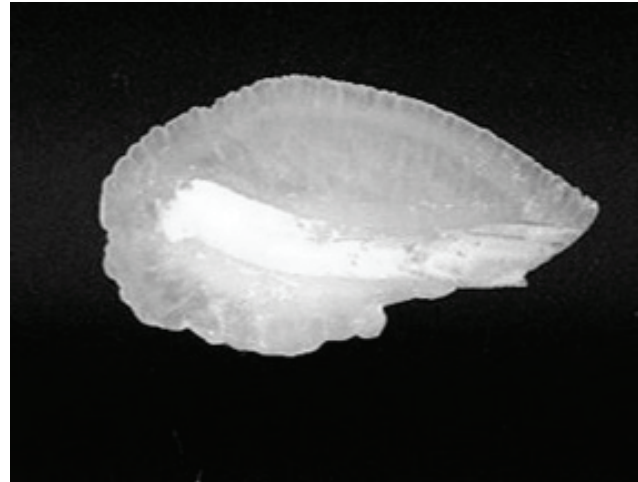
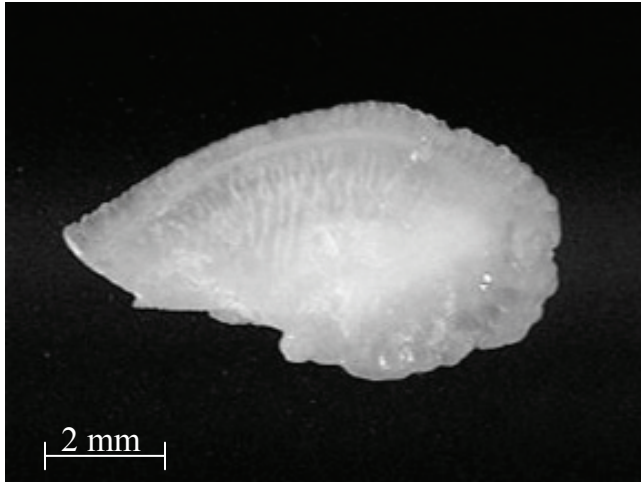
Family Elopidae: Tarpons

Figure 33. Ladyfish, *Elops saurus*
Distribution: Cape Cod, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 34.0 cm FL

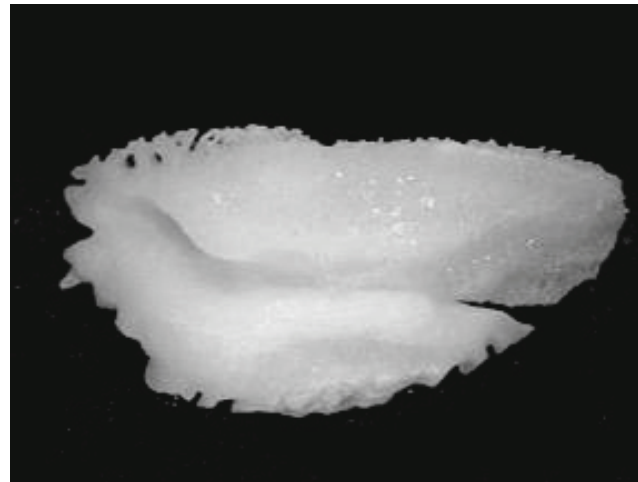
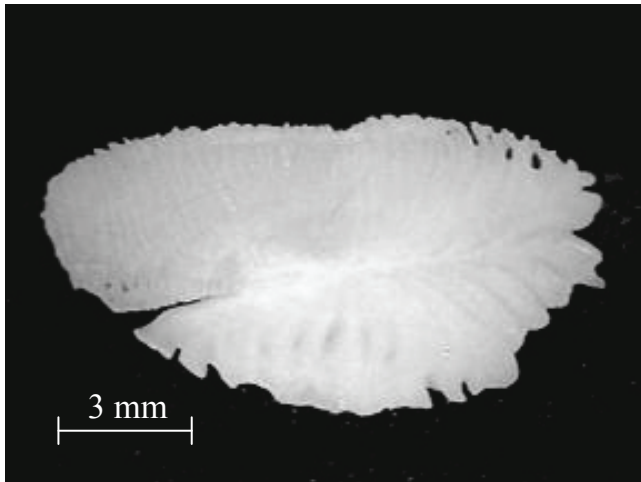
Family Emmelichthyidae: Rovers

Figure 34. Crimson rover, *Erythrocles monodi*
Distribution: New York, Bahamas, and northern GOM to Panama
Specimen length: 13.0 cm TL

Family Engraulidae: Anchovies

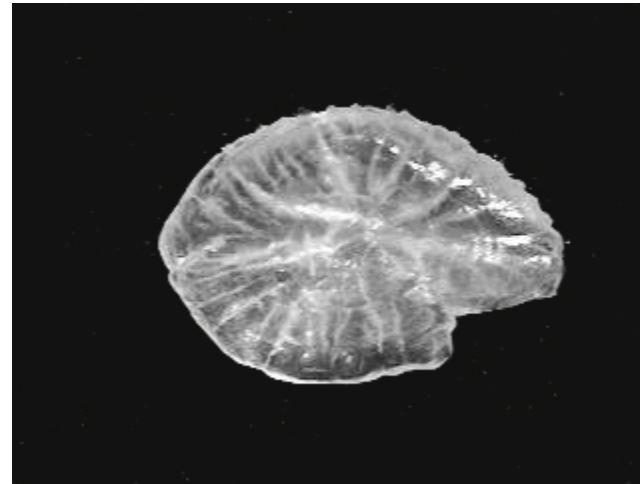


Figure 35. Bay anchovy, *Anchoa mitchelli*
Distribution: Gulf of Maine to Florida and GOM to Yucatan
Specimen length: 13.0 cm FL

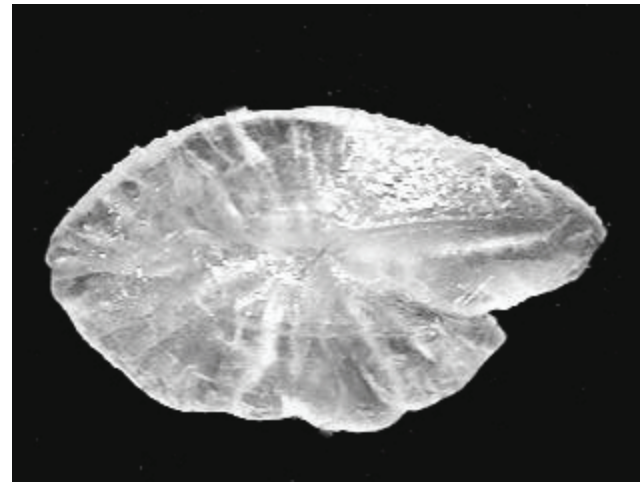
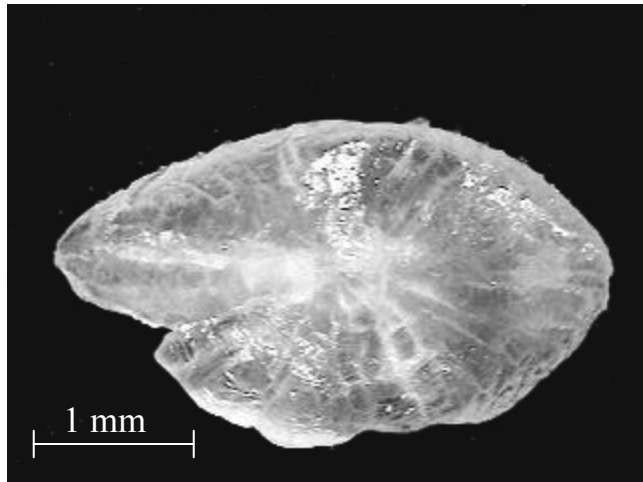


Figure 36. Striped anchovy, *Anchoa hepsetus*
Distribution: Chesapeake Bay and northern GOM to Uruguay
Specimen length: 14.0 cm FL

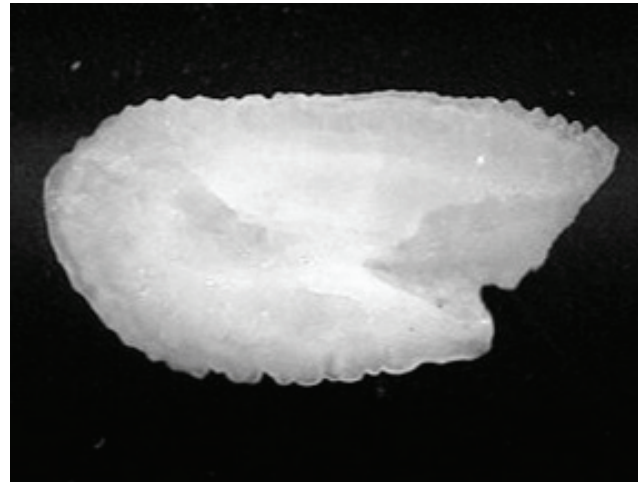
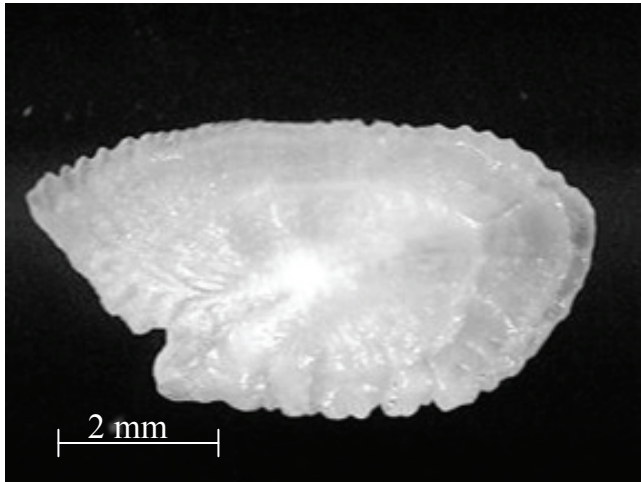
Family Ehippidae: Spadefish

Figure 37. Spadefish,
Chaetodipterus faber
Distribution: Massachusetts,
Bermuda, and northern GOM
to southeastern Brazil
Specimen length: 29.7 cm FL

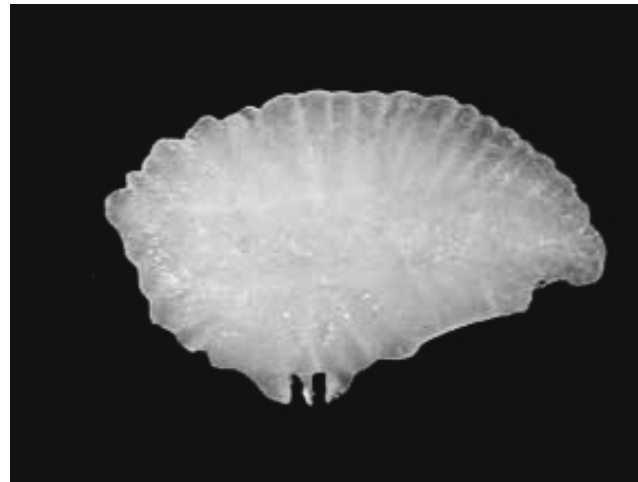
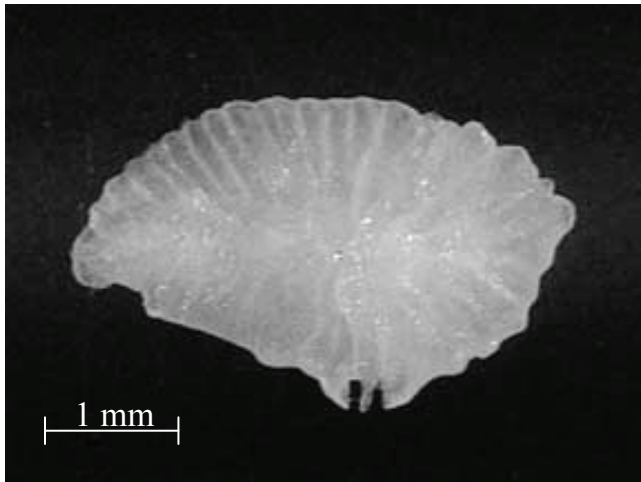
Family Exocoetidae: Flyingfishes

Figure 38. Common
halfbeak, *Hyporhamphus*
unifasciatus
Distribution: Maine,
Bermuda, and northern GOM
to Argentina
Specimen length: 18.6 cm FL

Family Gadidae: Cods

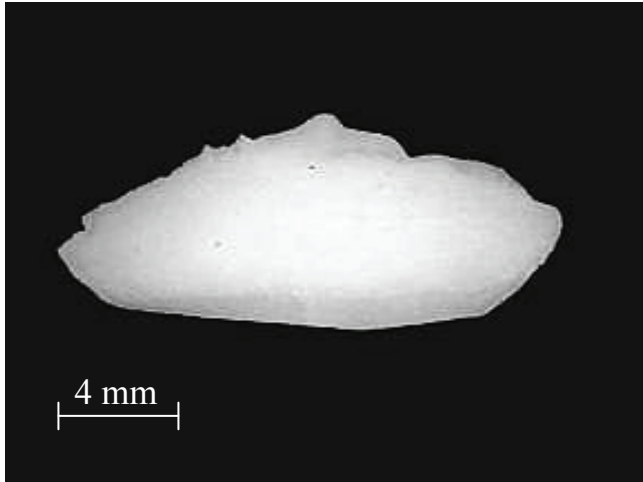


Figure 39. Gulf hake,
Urophycis cirrata
Distribution: Northern GOM
Specimen length: 46.0 cm FL

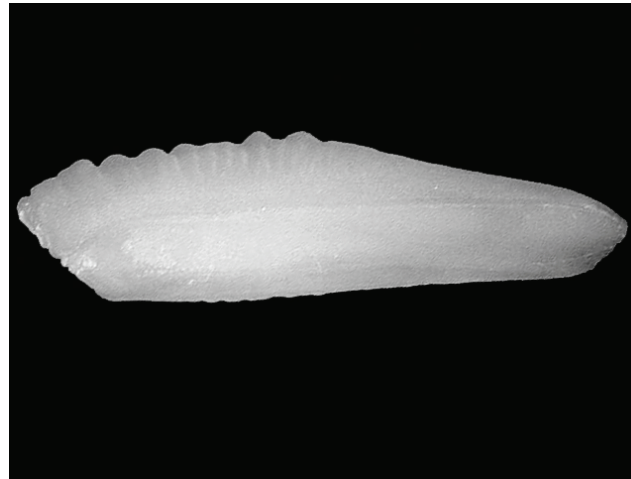
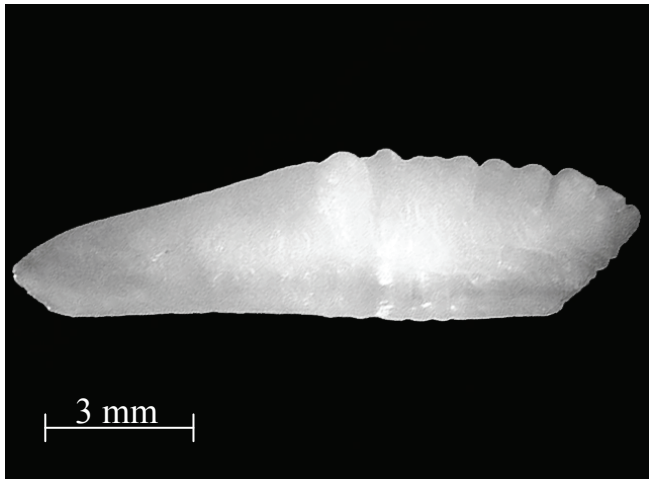


Figure 40. Spotted hake,
Urophycis regia
Distribution: Southern New
England to northeastern
GOM
Specimen length: 34.0 cm TL

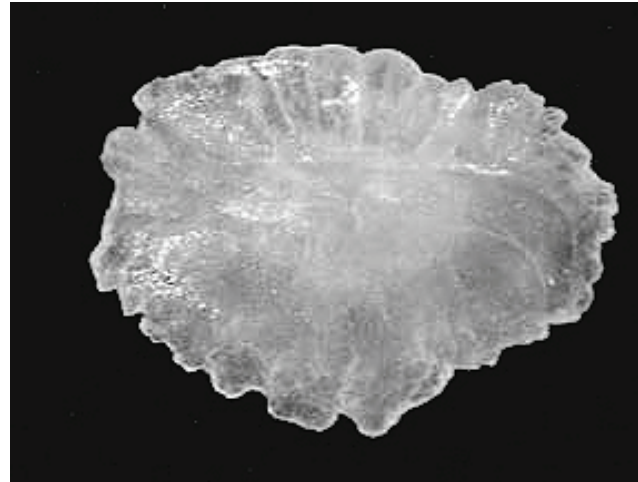
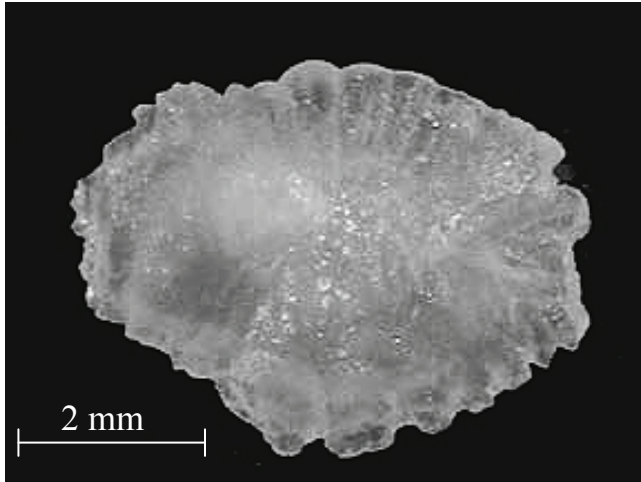
Family Gerreidae: Mojarras

Figure 41. Silver jenny,
Eucinostomus gula
Distribution: Massachusetts,
Bermuda, and northern GOM
to Brazil
Specimen length: 8.5 cm FL

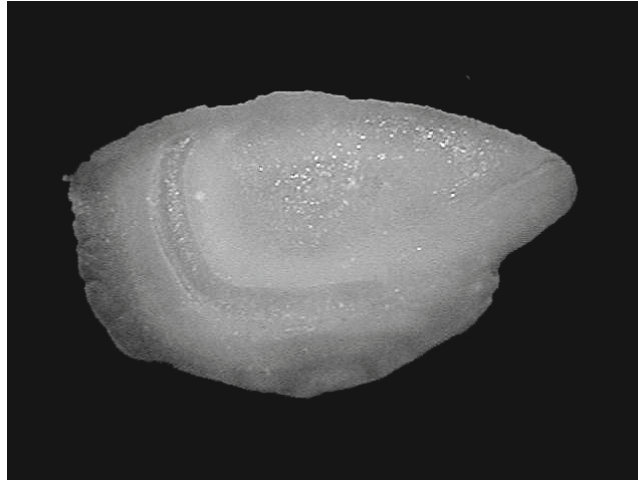
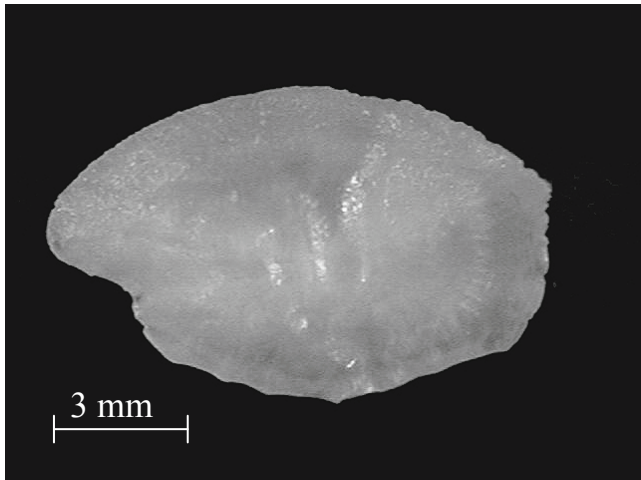
Family Haemulidae: Grunts

Figure 42. Bluestriped grunt,
Haemulon sciurus
Distribution: Shallow waters
from South Carolina to
Bermuda to Brazil, GOM,
Bahamas, and Antilles
Specimen length: 24.3 cm FL

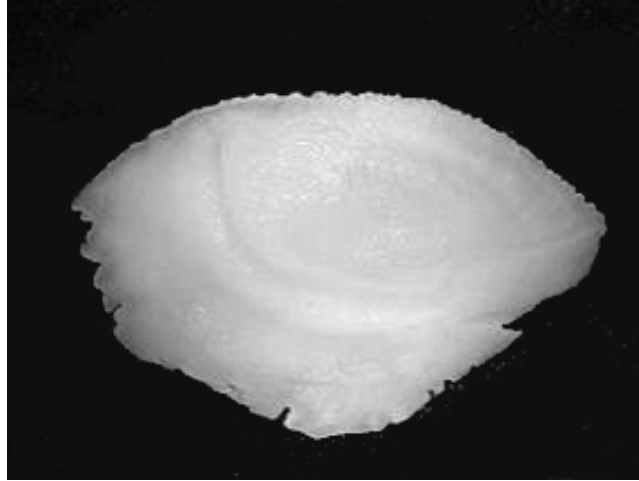
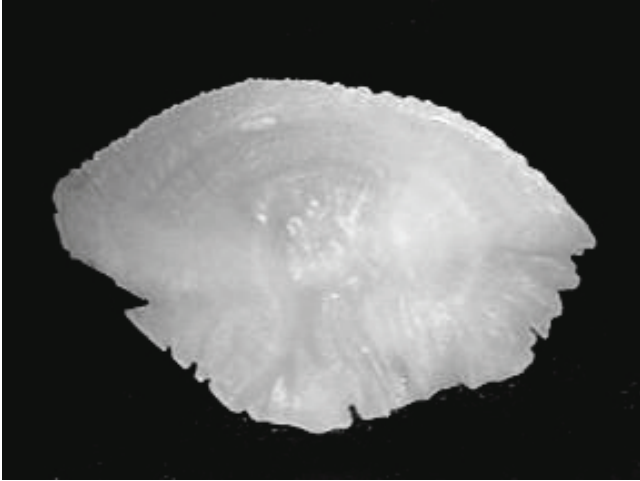


Figure 43. Margate,
Haemulon album
Distribution: Bermuda,
Florida, and Bahamas to
Brazil
Specimen length: 69.5 cm FL

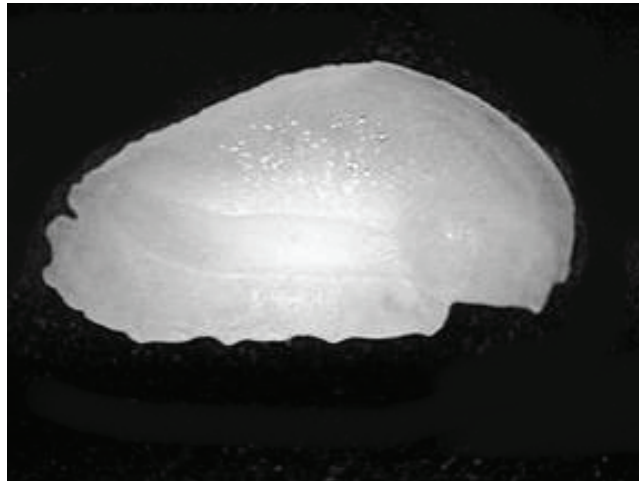
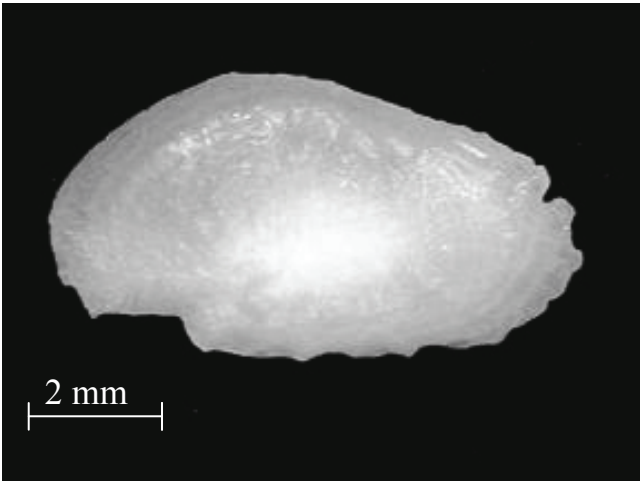


Figure 44. Pigfish,
Orthopristis chrysoptera
Distribution: New York and
Bermuda to Florida and
Mexico
Specimen length: 20 cm FL

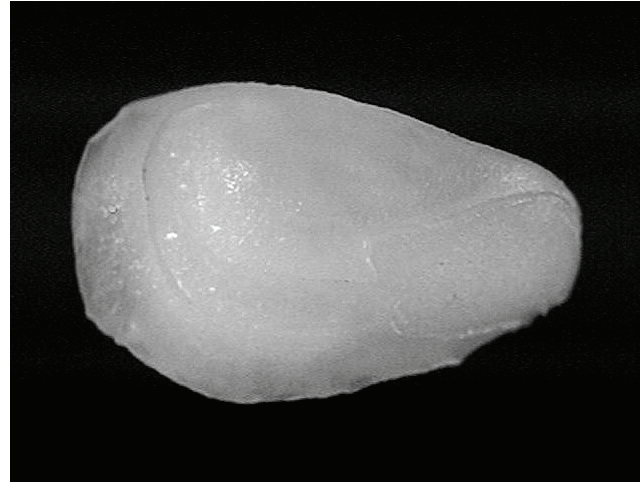
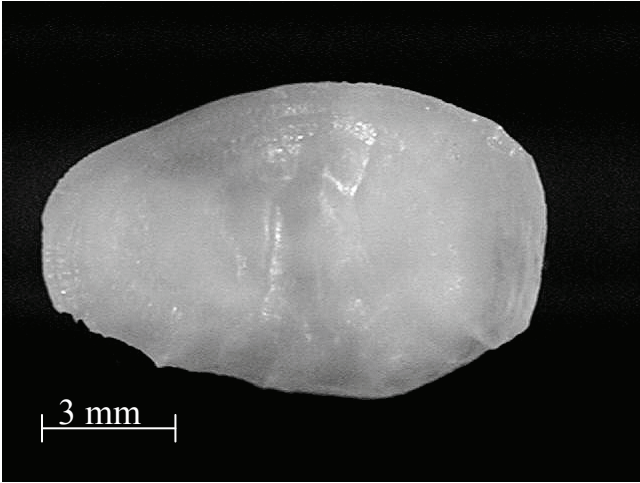


Figure 45. Porkfish,
Anisotremus virginicus
Distribution: Florida to
Bermuda and Brazil,
southeastern GOM and
Antilles
Specimen length: 25.5 cm TL

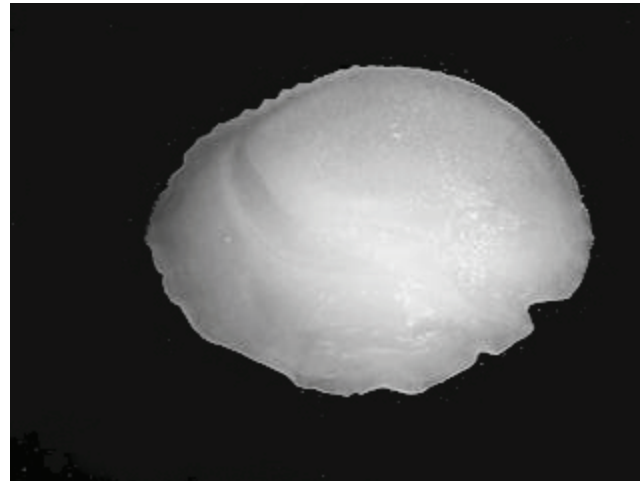
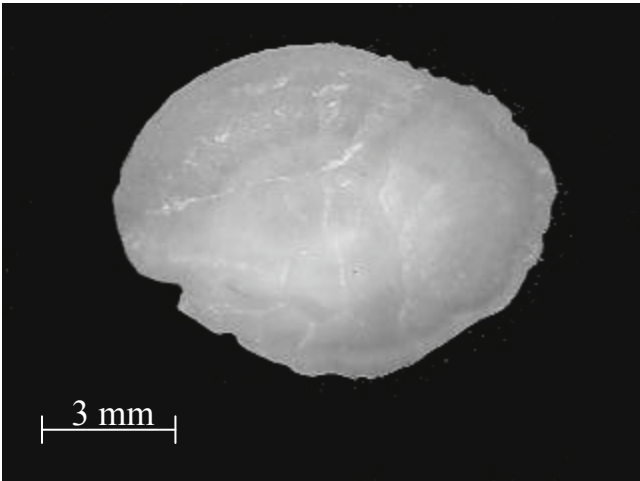


Figure 46. Tomtate,
Haemulon aurolineatum
Distribution: Massachusetts,
Bermuda, and northern GOM
to Brazil
Specimen length: 20.4 cm FL

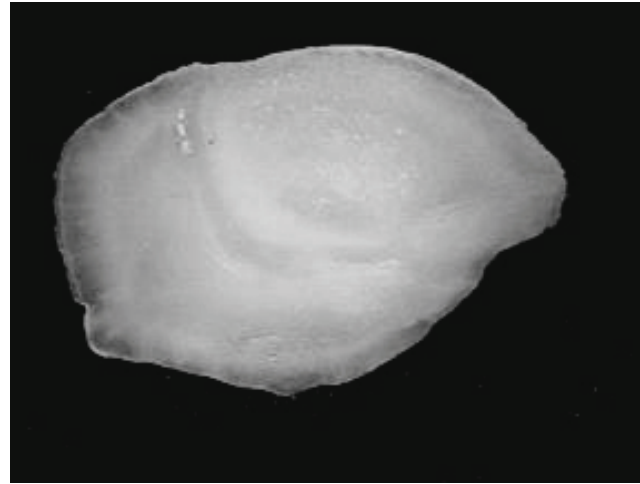
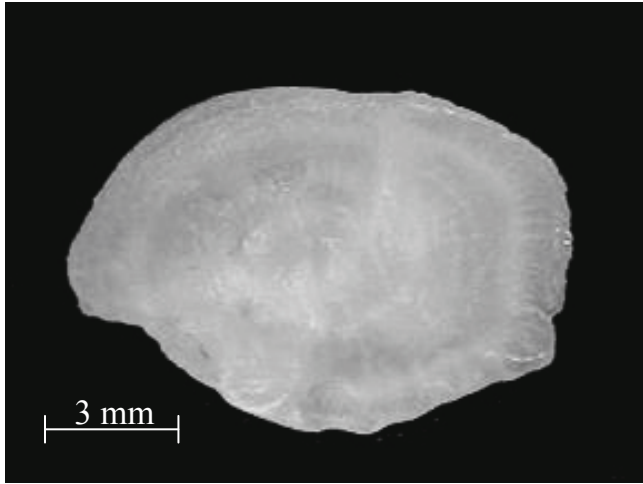


Figure 47. White grunt,
Haemulon plumieri
Distribution: Maryland,
Bermuda, and northern GOM
to Brazil
Specimen length: 29.0 cm
FL

Family Holocentridae: Squirrelfishes

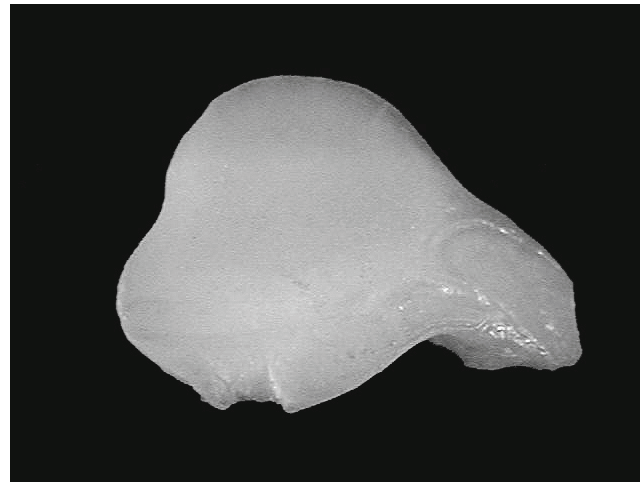
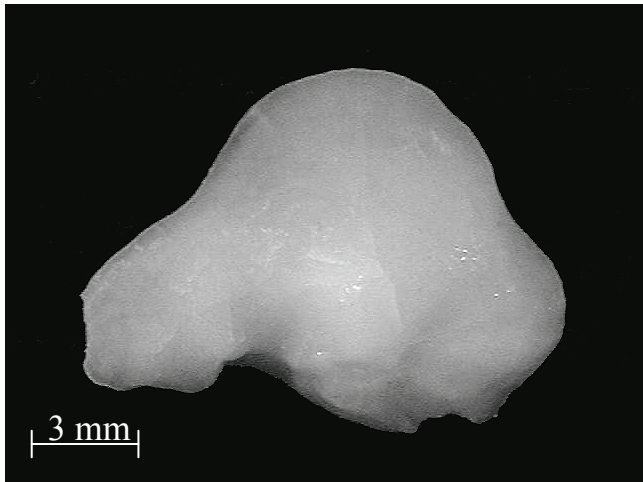


Figure 48. Bigeye soldierfish,
Ostichthys trachypoma
Distribution: Long Island to
Brazil
Specimen length: 20.9 cm FL

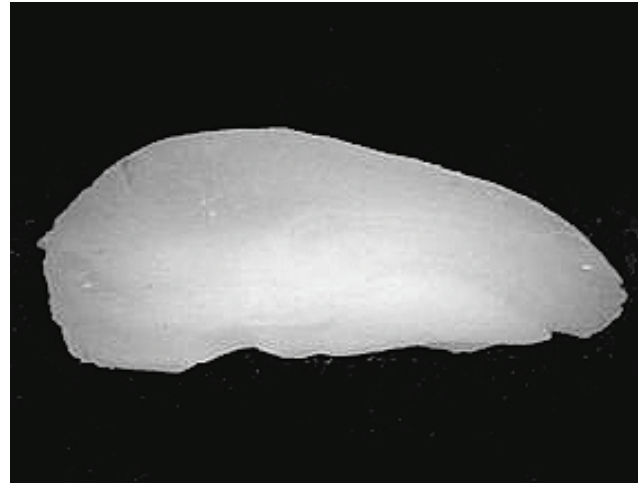
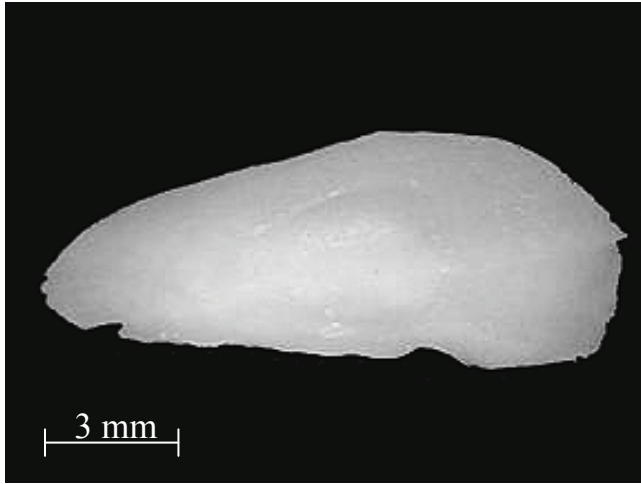


Figure 49. Squirrelfish,
Holocentrus adscensionis
Distribution: North Carolina
and Bermuda to Brazil,
eastern Atlantic
Specimen length: 35 cm TL*

Family Labridae: Wrasses

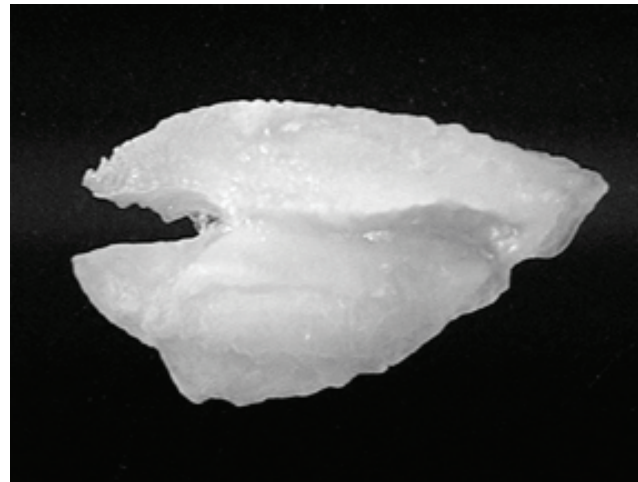
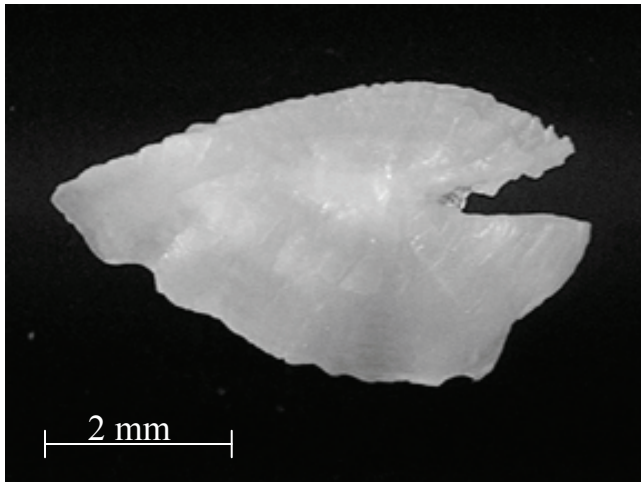


Figure 50. Hogfish,
Lachnolaimus maximus
Distribution: Nova Scotia,
Bermuda, and northern GOM
to northern South America
Specimen length: 29.6 FL

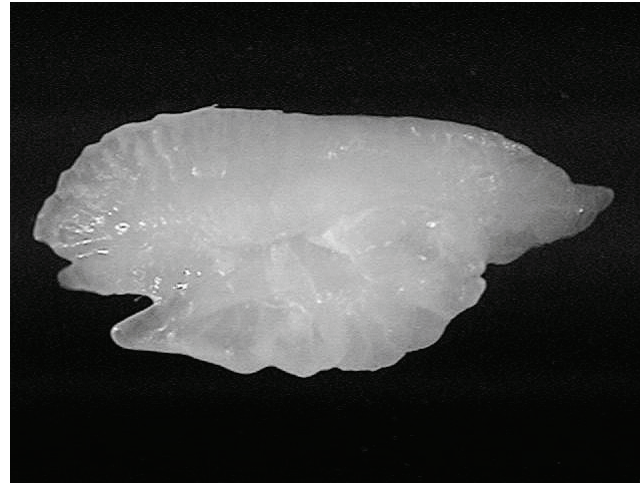
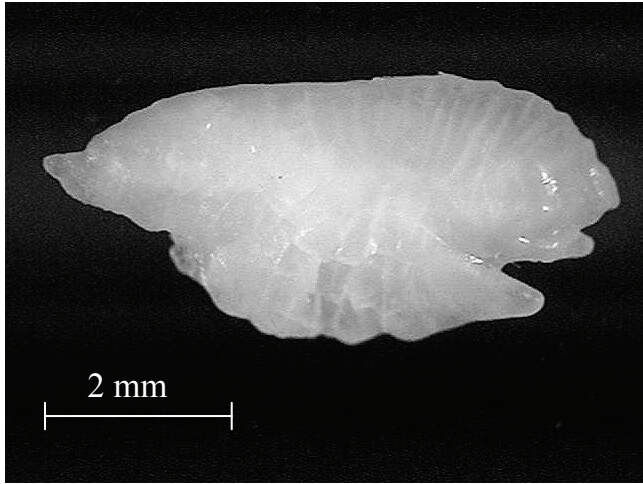


Figure 51. Red hogfish,
Decodon puellaris
Distribution: Northern GOM
to Brazil, Antilles, and
Bahamas
Specimen length: 22.5 cm TL

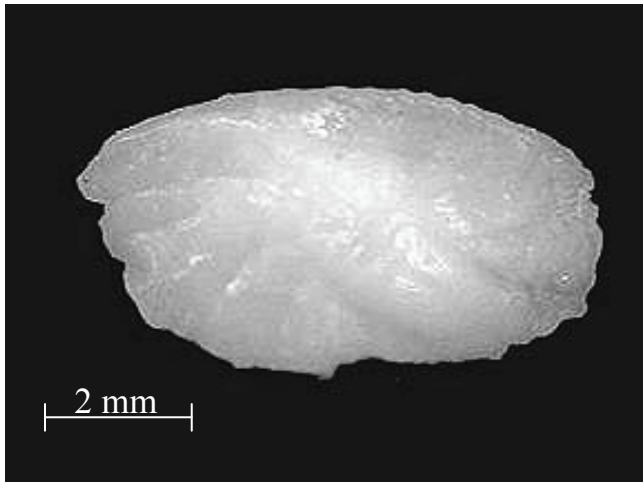


Figure 52. Spanish hogfish,
Bodianus rufus
Distribution: Bermuda, S
Florida, and northern GOM
to southern Brazil
Specimen length: 33.7 cm TL

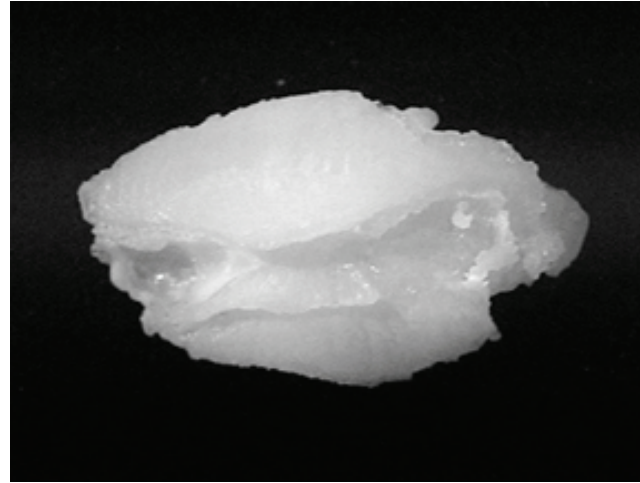
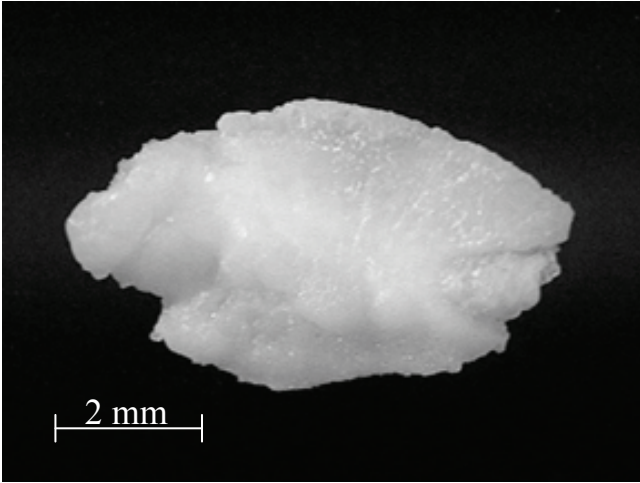


Figure 53. Spotfin hogfish, *Bodianus pulchellus*
 Distribution: Southeastern Florida and Bahamas to Honduras and northern South America
 Specimen length: 33.2 cm TL

Family Lobotidae: Tripletails

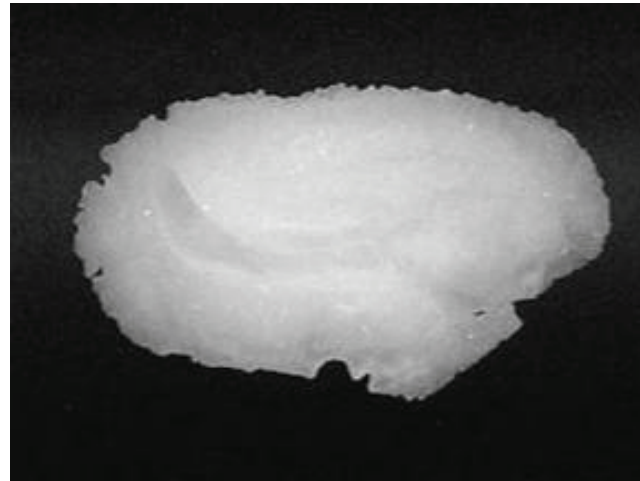
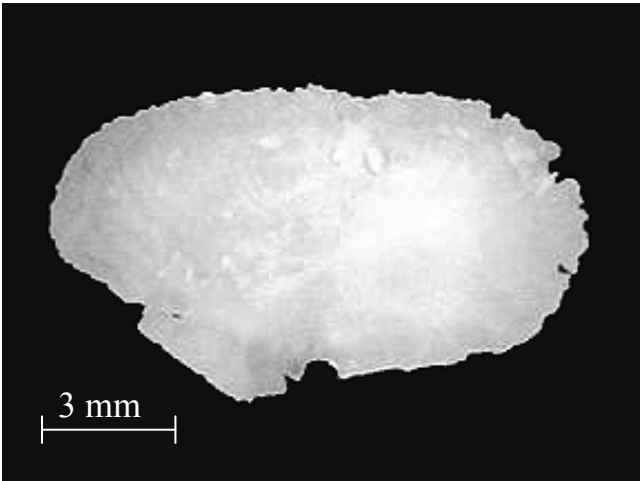


Figure 54. Tripletail, *Lobotes surinamensis*
 Distribution: Massachusetts and Bermuda to Argentina, worldwide in tropical and warm waters
 Specimen length: 40 cm TL*

Family Lutjanidae: Snappers

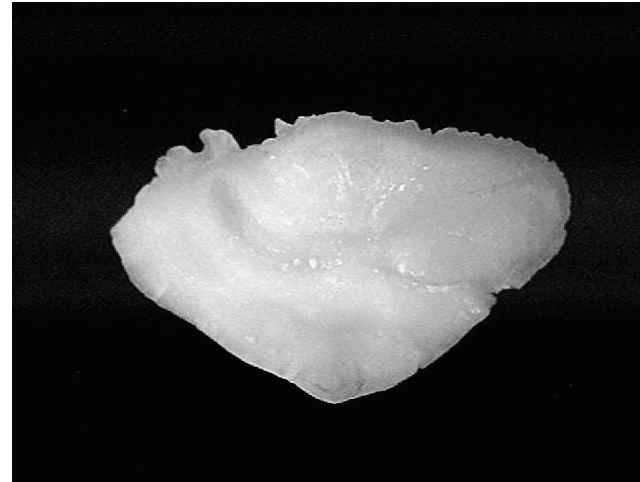
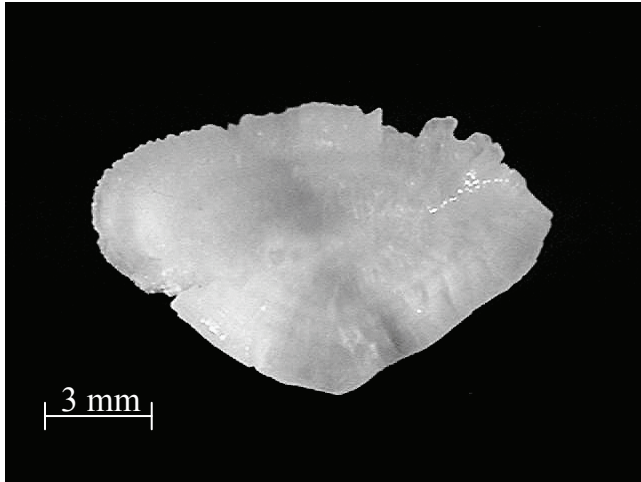


Figure 55. Black snapper,
Apsilus dentatus
Distribution: Northern GOM
to Venezuela
Specimen length: 62.0 cm TL

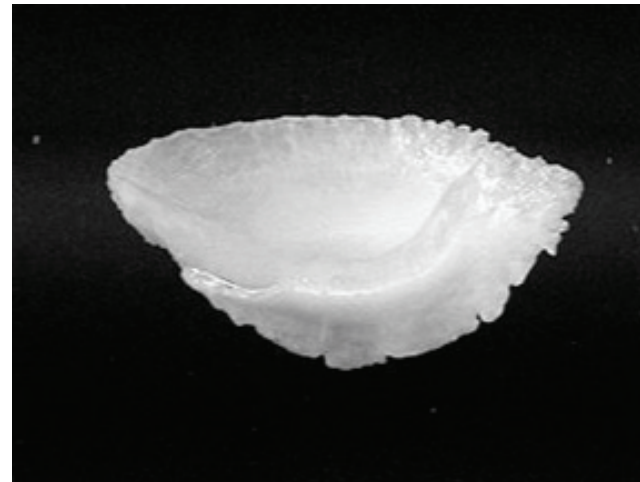
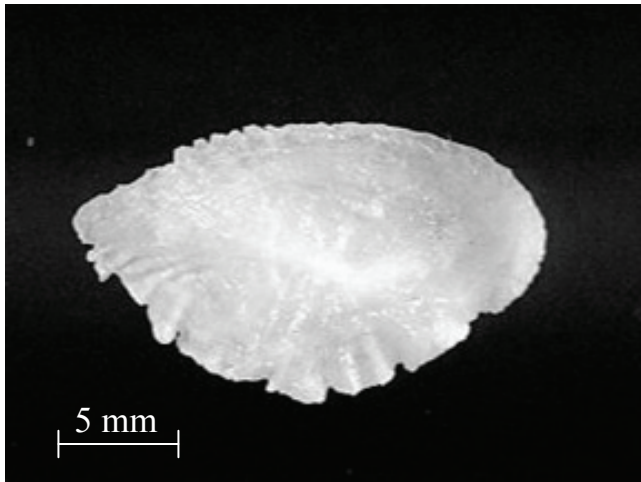


Figure 56. Blackfin snapper,
Lutjanus buccanella
Distribution: Massachusetts,
Bahamas, and northern GOM
to southeastern Brazil
Specimen length: 42.0 cm FL

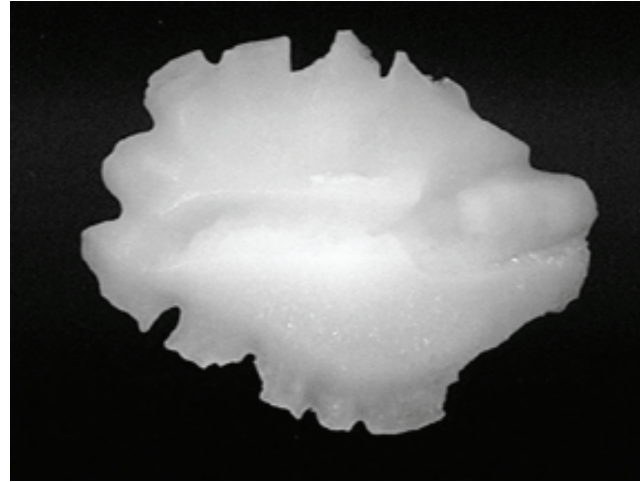
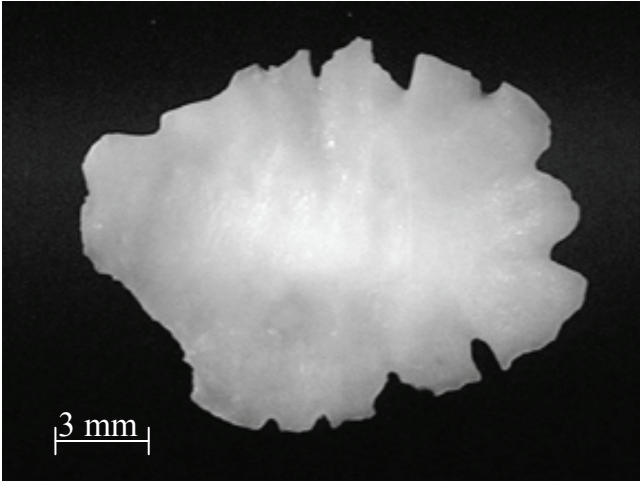


Figure 57. Cardinal snapper,
Pristipomoides
macrophthalmus
Distribution: Straits of
Florida, Bahamas, Greater
Antilles and Caribbean coasts
of Nicaragua and Panama
Specimen length: 44.0 cm FL

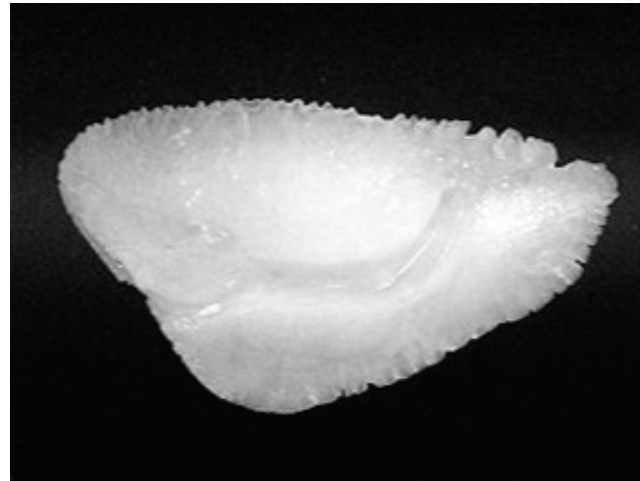
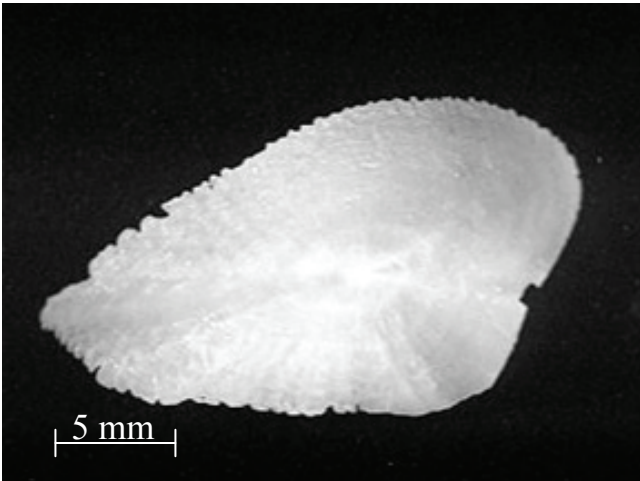


Figure 58. Cubera snapper,
Lutjanus cyanopterus
Distribution: Southeastern
Florida, Bahamas, and
Central America to Brazil
Specimen length: 83.0 cm FL

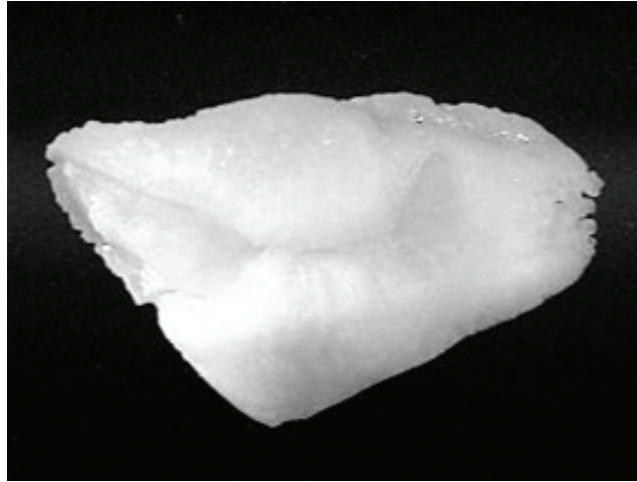
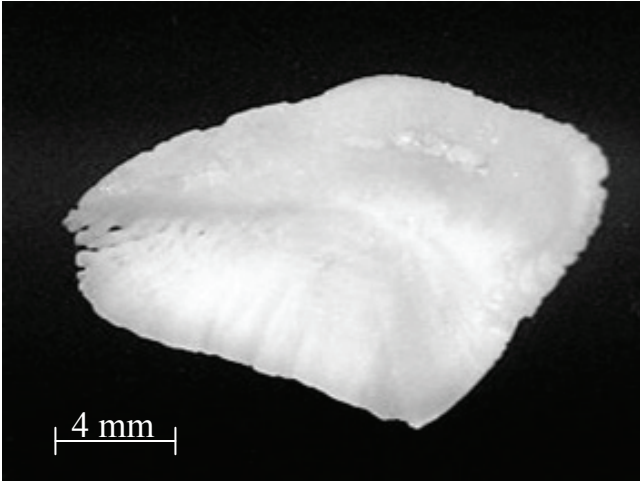


Figure 59. Dog snapper,
Lutjanus jocu
Distribution: Massachusetts,
Bermuda, and northern GOM
to Brazil
Specimen length: 75.5 cm FL

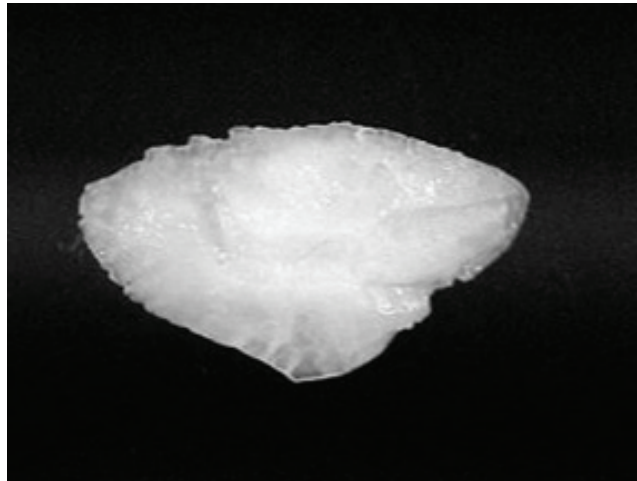
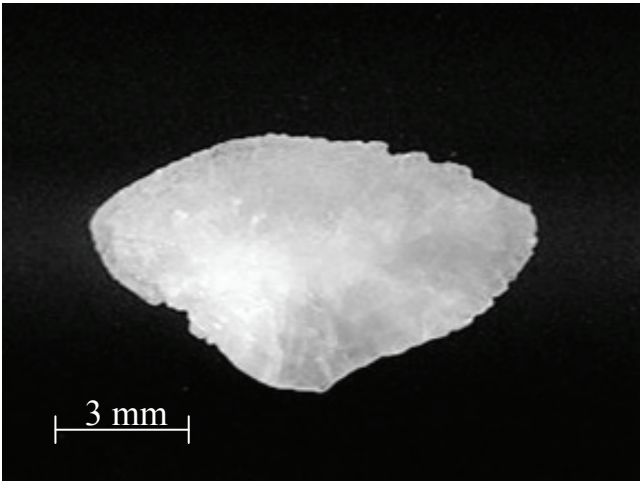


Figure 60. Gray snapper,
Lutjanus griseus
Distribution: Massachusetts,
Bermuda, and northern GOM
to southeastern Brazil;
Eastern Atlantic
Specimen length: 31.7 cm FL

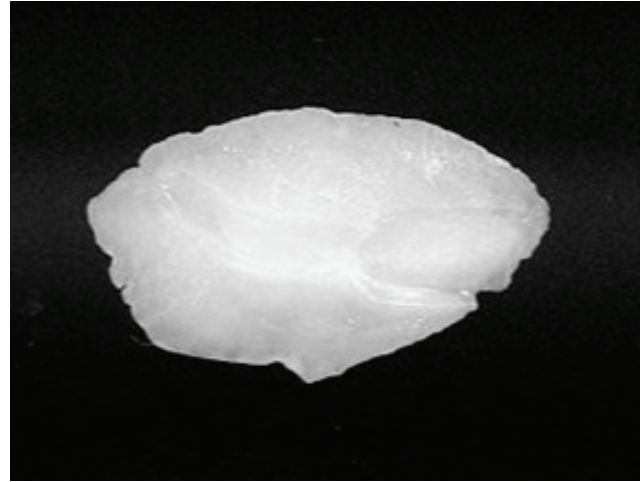
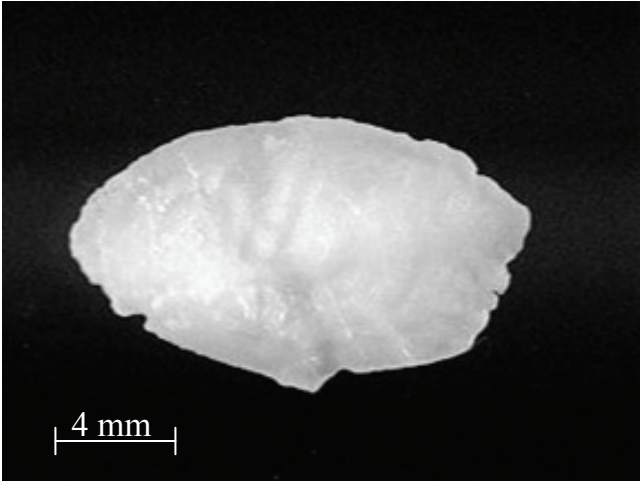


Figure 61. Lane snapper,
Lutjanus synagris
Distribution: North Carolina,
Bermuda, and northern GOM
to southeastern Brazil
Specimen length: 33 cm FL

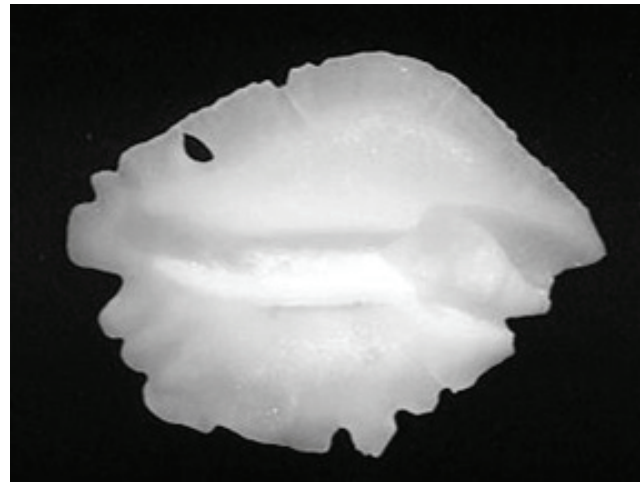
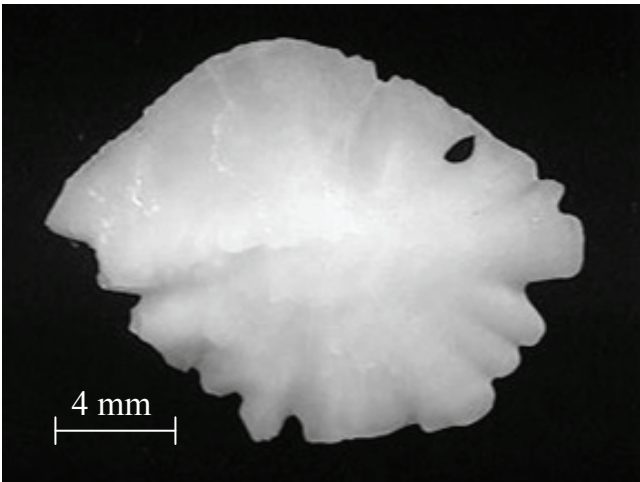


Figure 62. Mahogany
snapper, *Lutjanus mahogoni*
Distribution: North Carolina
and Bahamas to Guianas
Specimen length: 42.0 cm FL

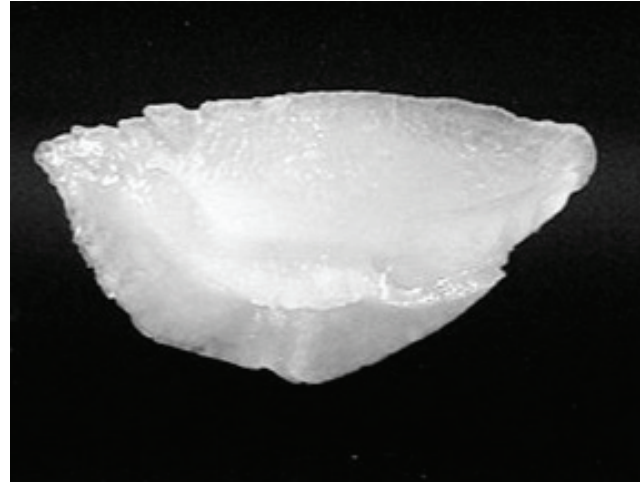
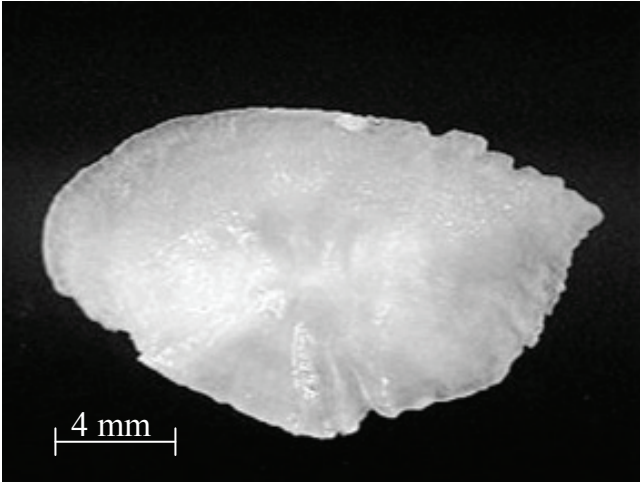


Figure 63. Mutton snapper,
Lutjanus analis
Distribution: Massachusetts,
Bermuda, and northern GOM
to Brazil
Specimen length: 46.8 cm FL

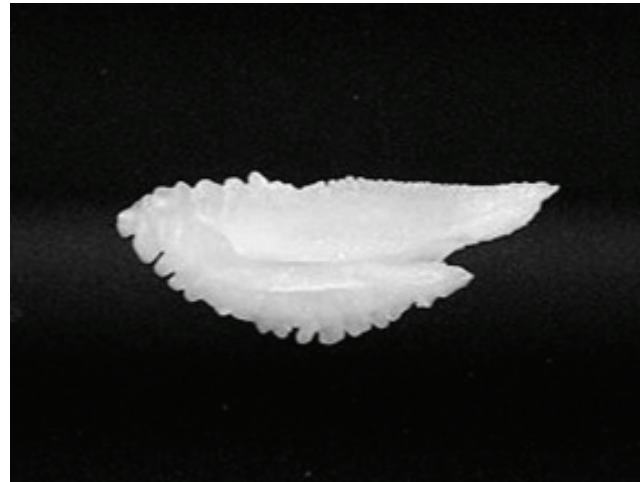
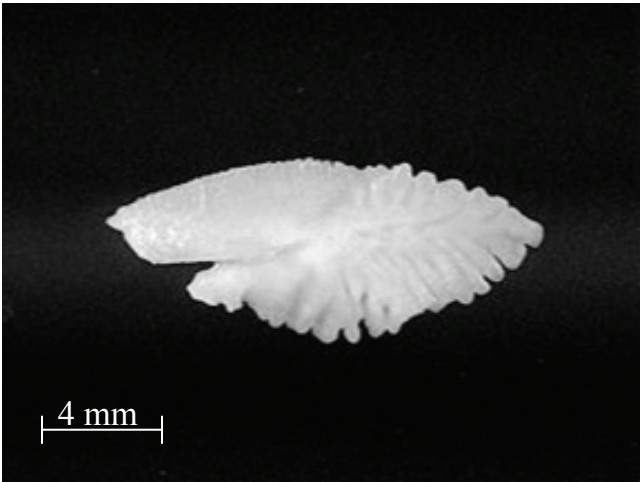


Figure 64. Queen snapper,
Etelis oculatus
Distribution: Bermuda,
Florida, and Bahamas to
Brazil, worldwide in tropical
waters
Specimen length: 69.5 cm FL

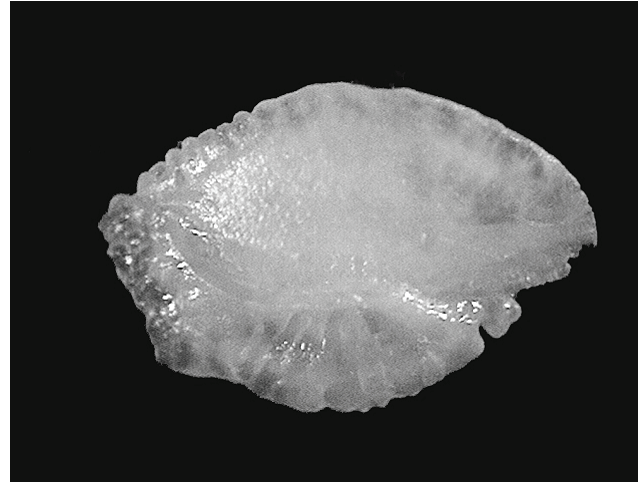
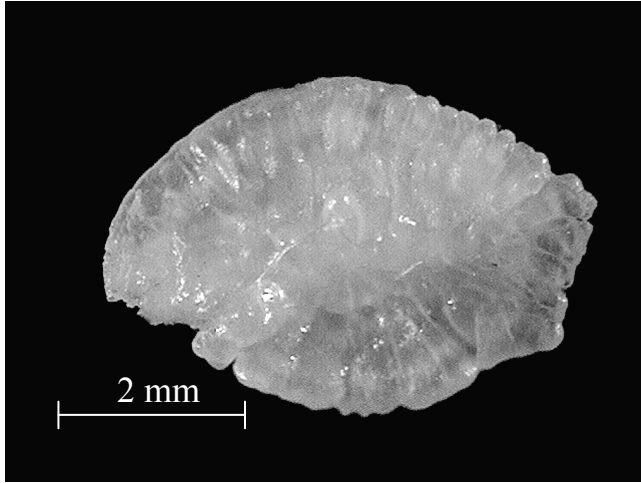


Figure 65a. Red snapper,
Lutjanus campechanus
Distribution: North Carolina
to Florida Keys and GOM to
the Yucatan
Specimen length: 9.0 cm FL

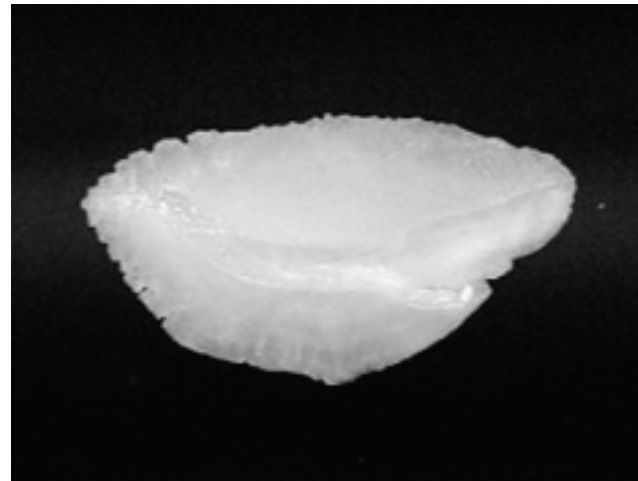
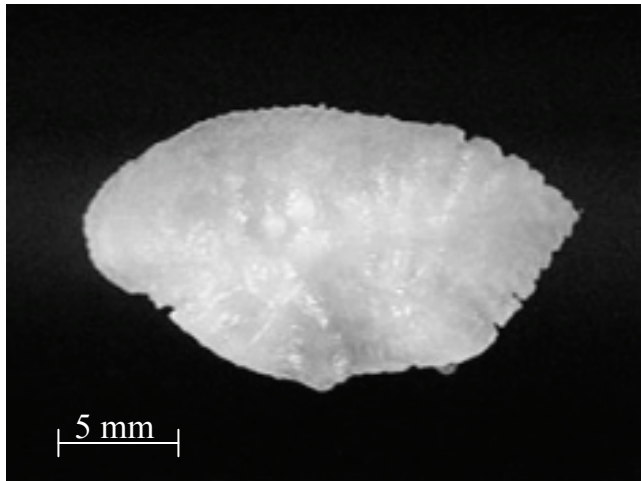


Figure 65b. Red snapper,
Lutjanus campechanus
Distribution: North Carolina
to Florida Keys and GOM to
the Yucatan
Specimen length: 52.0 cm FL

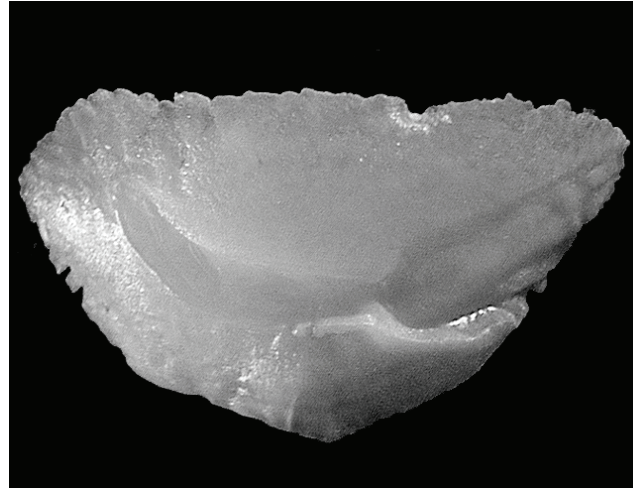
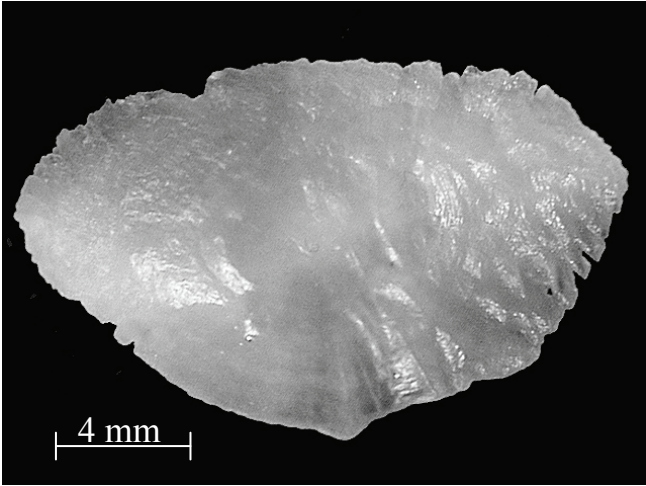


Figure 65c. Red snapper,
Lutjanus campechanus
Distribution: North Carolina
to Florida Keys and GOM to
the Yucatan
Specimen length: 58.4 cm FL

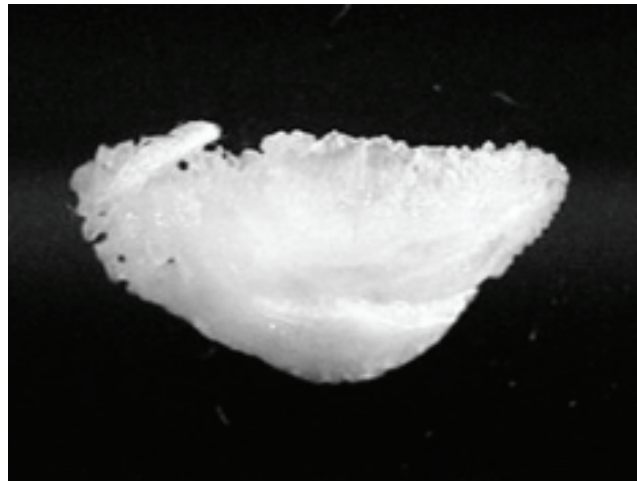
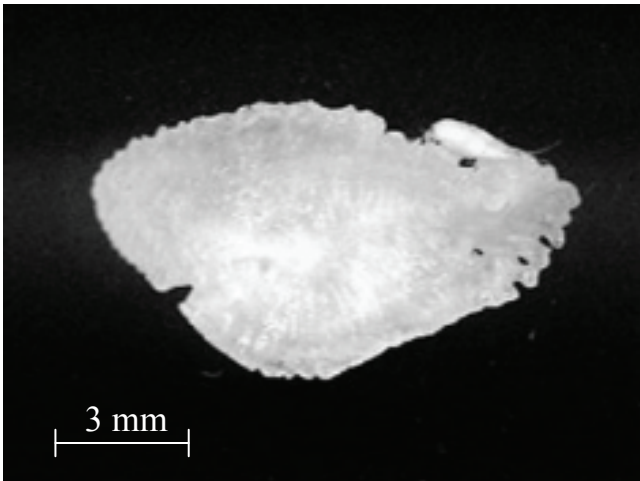


Figure 66. Schoolmaster,
Lutjanus apodus
Distribution: Massachusetts,
Bermuda, and northern GOM
to Brazil
Specimen length: 36.2 cm TL

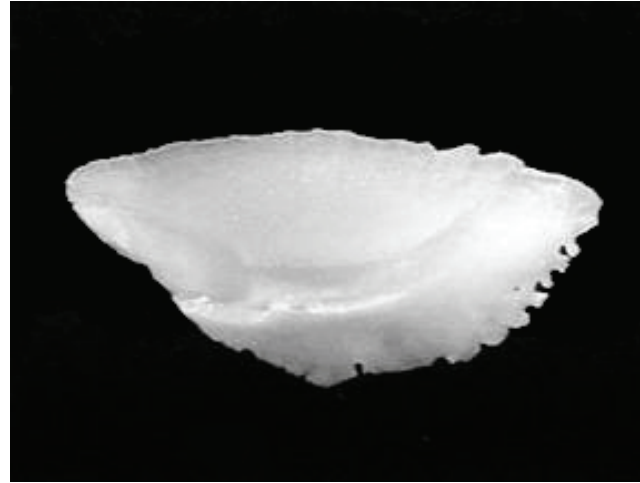
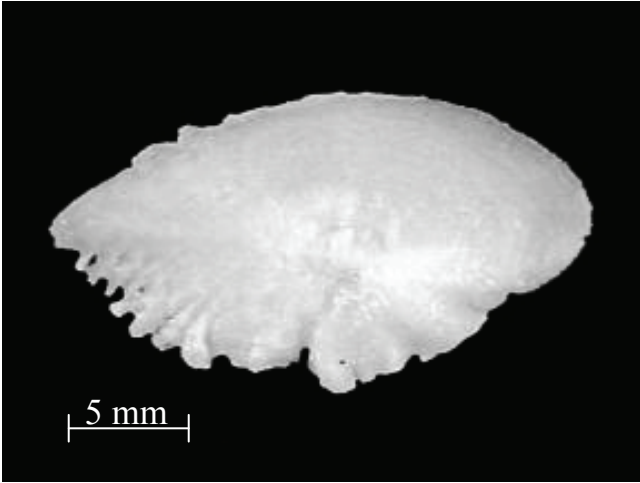


Figure 67. Silk snapper,
Lutjanus vivanus
Distribution: North Carolina,
Bahamas, and northern GOM
to Brazil
Specimen length: 56.5 cm FL

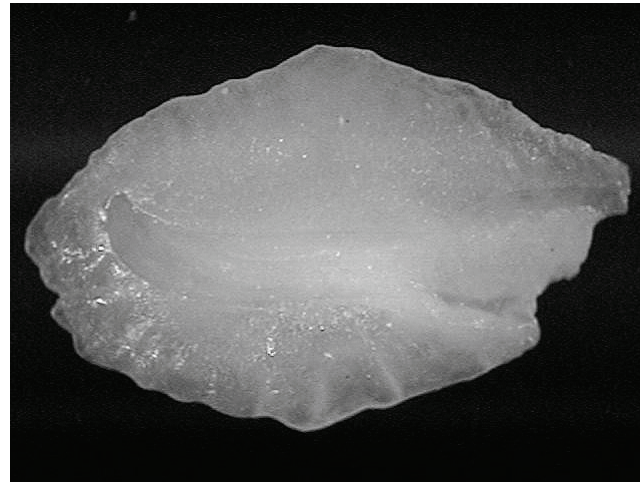
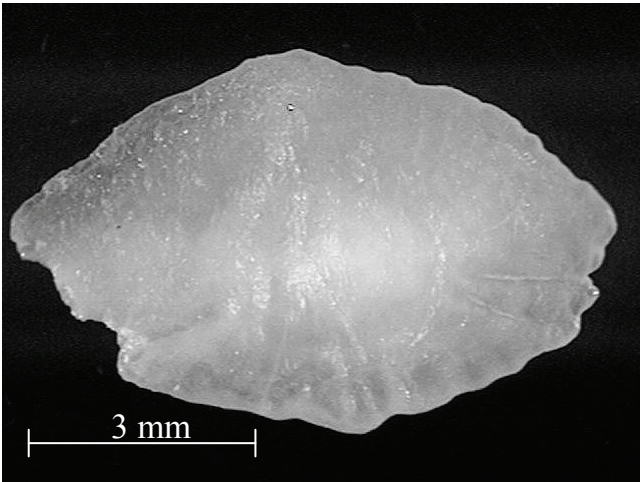


Figure 68a. Vermillion
snapper, *Rhomboplites*
aurorubens
Distribution: South Carolina,
Bermuda, and northern GOM
to southeastern Brazil
Specimen length: 17.9 cm FL

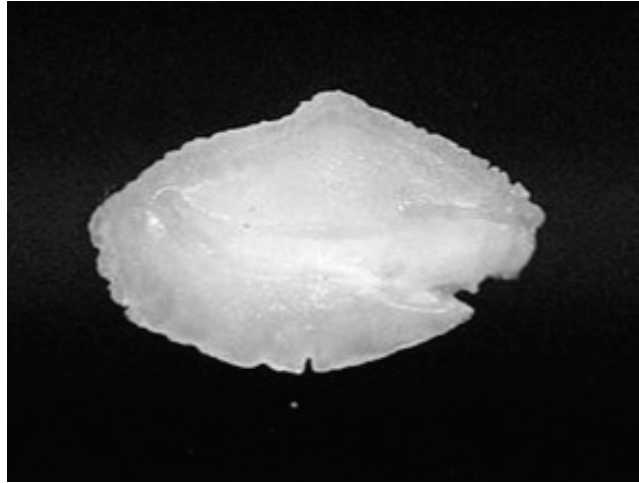
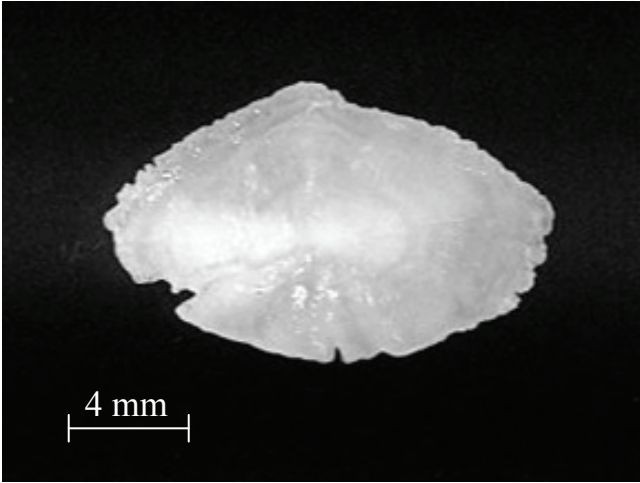


Figure 68b. Vermillion snapper, *Rhomboplites aurorubens*

Distribution: South Carolina, Bermuda, and northern GOM to southeastern Brazil

Specimen length: 24.5 cm FL

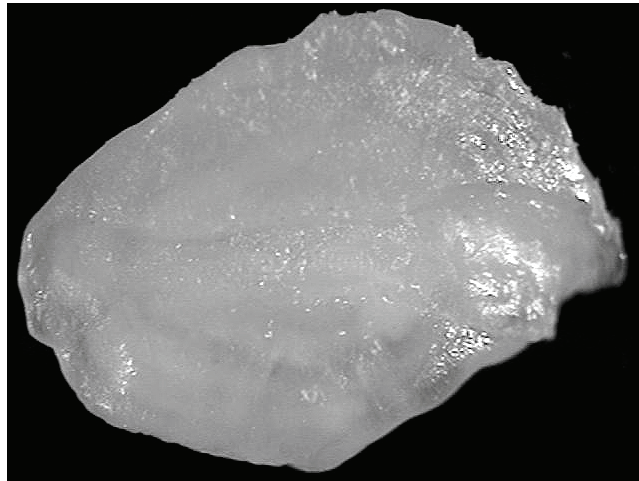
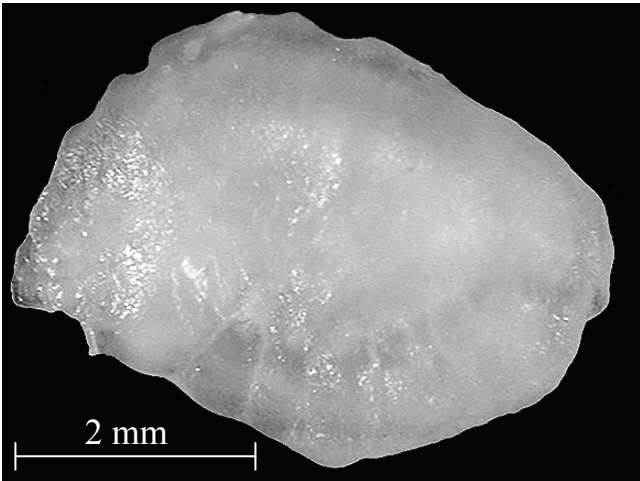


Figure 69a. Wenchman, *Pristipomoides aquilonaris*

Distribution: Florida, GOM, and Antilles to Guianas

Specimen length: 6.6 cm FL

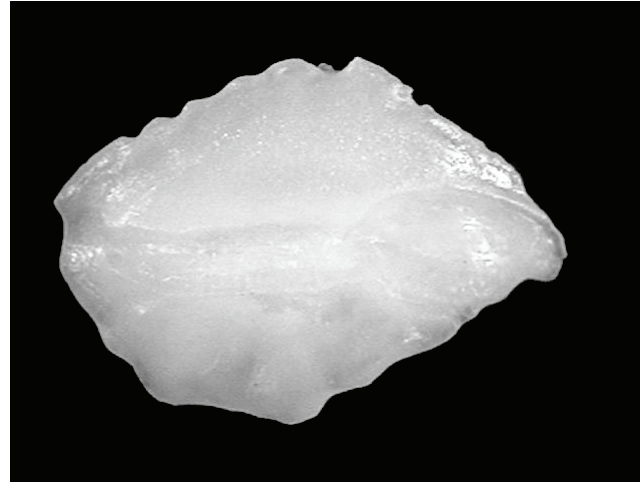
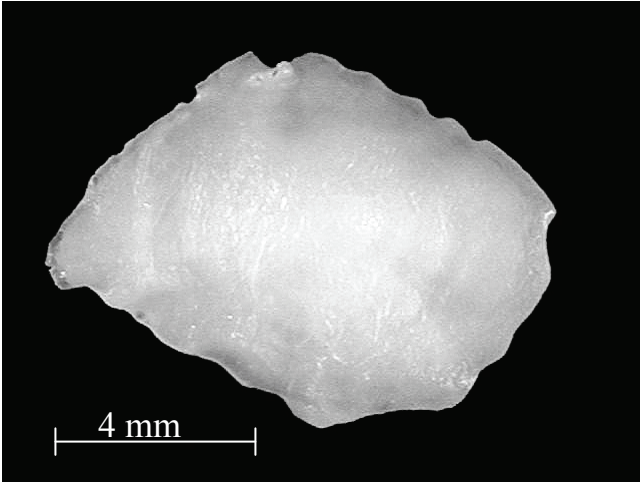


Figure 69b. Wenchman,
Pristipomoides aquilonaris
Distribution: Florida, GOM,
and Antilles to Guianas
Specimen length: 18.1 cm FL

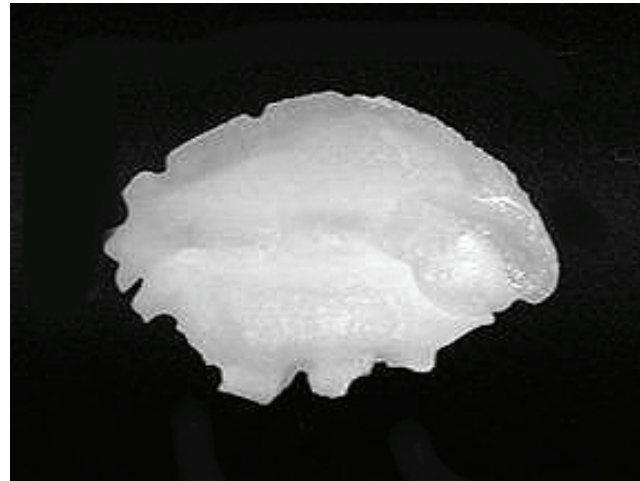
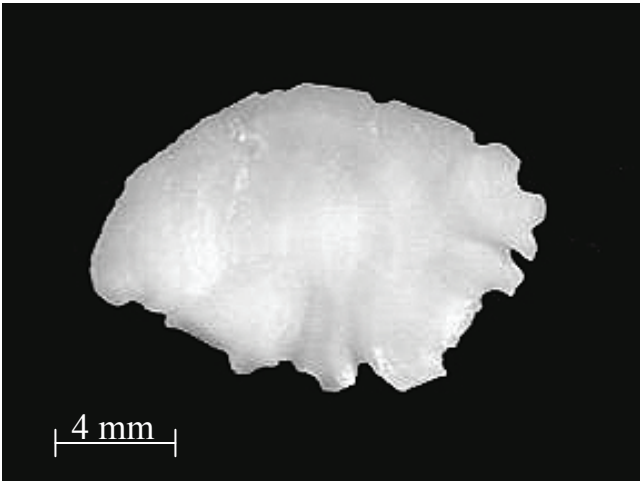


Figure 69c. Wenchman,
Pristipomoides aquilonaris
Distribution: Florida, GOM,
and Antilles to Guianas
Specimen length: 27.5 cm FL

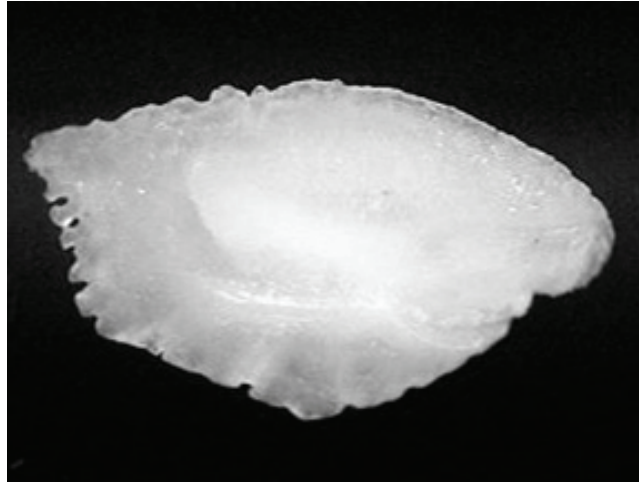
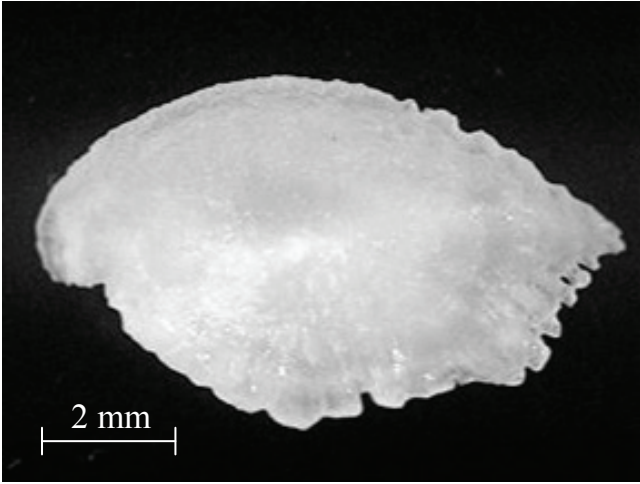


Figure 70. Yellowtail snapper, *Ocyurus chrysurus*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 26.5 cm FL

Family Malacanthidae: Tilefishes

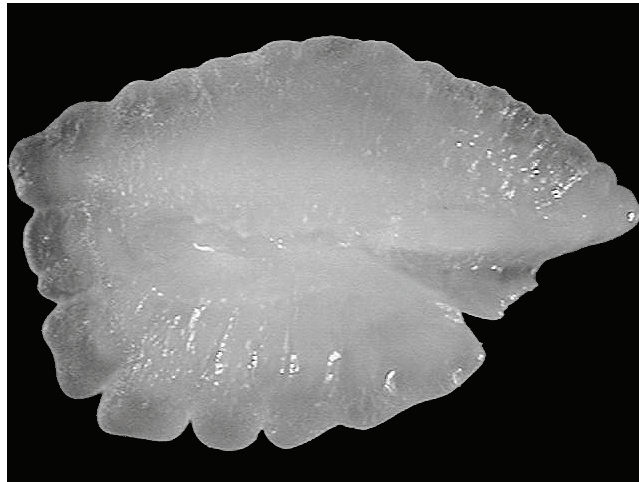
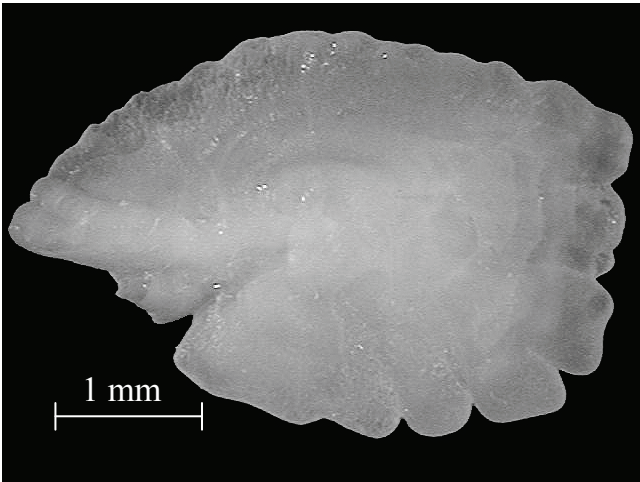


Figure 71a. Anchor tilefish, *Caulolatilus intermedius*
Distribution: Northwestern Florida to Yucatan and Cuba
Specimen length: 17.7 cm TL

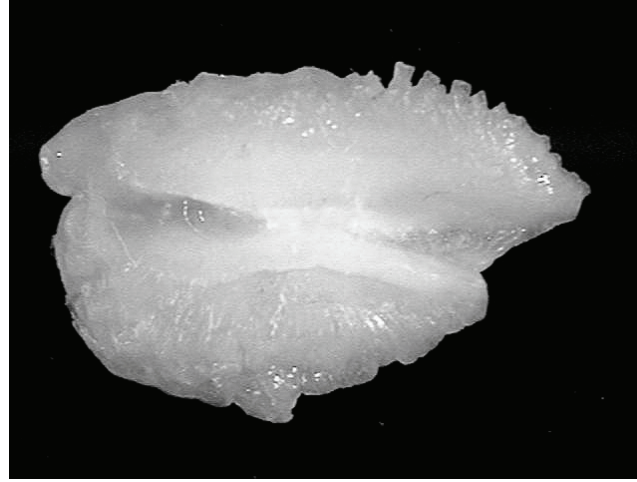
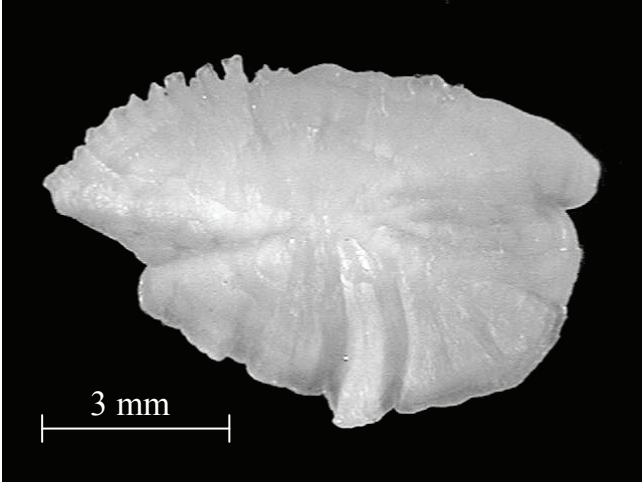


Figure 71b. Anchor tilefish,
Caulolatilus intermedius
Distribution: Northwestern
Florida to Yucatan and Cuba
Specimen length: 33.5 cm TL

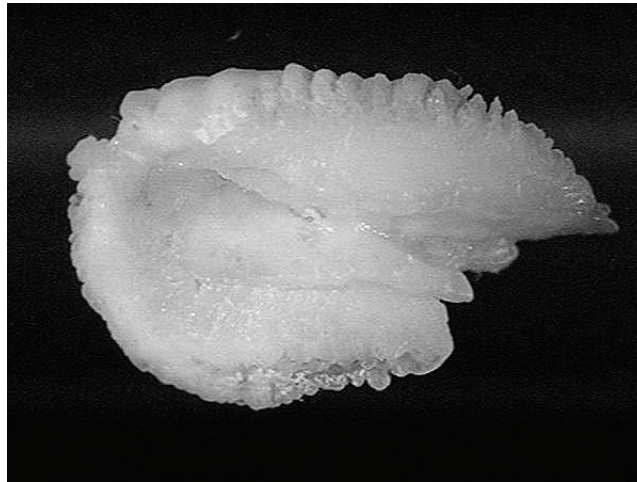
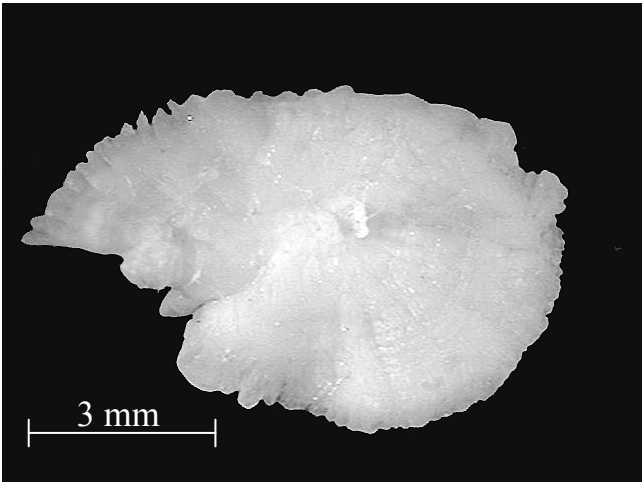


Figure 72. Blackline tilefish,
Caulolatilus cyanops
Distribution: Northwestern
Florida to Yucatan and Cuba
Specimen length: 33.5 cm FL

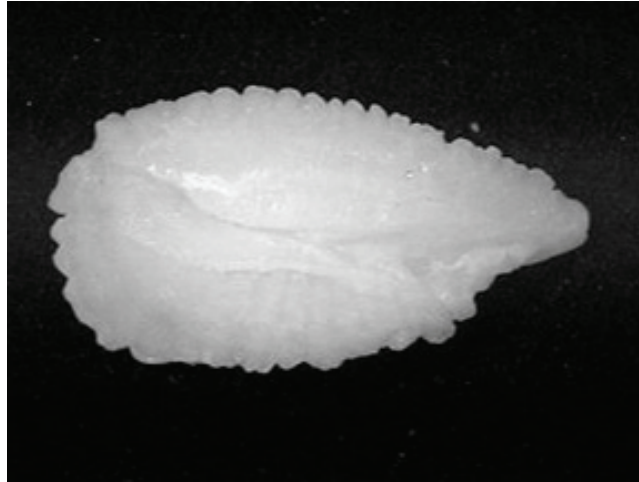
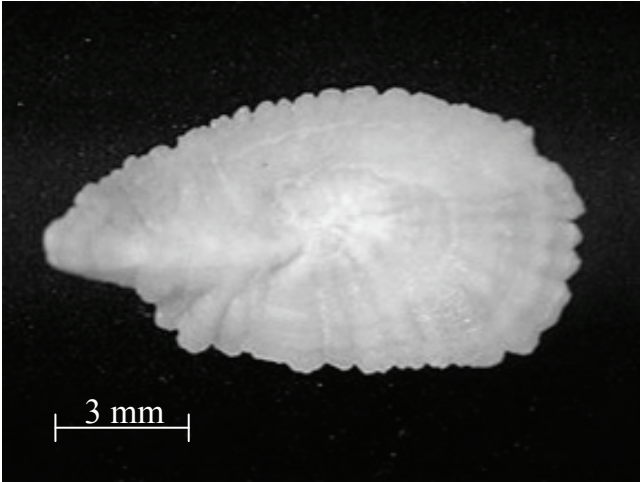


Figure 73. Blue/grey tilefish, *Caulolatilus microps*
Distribution: North Carolina to southeastern Florida and Mexico; northern and eastern GOM
Specimen length: 45 cm TL*

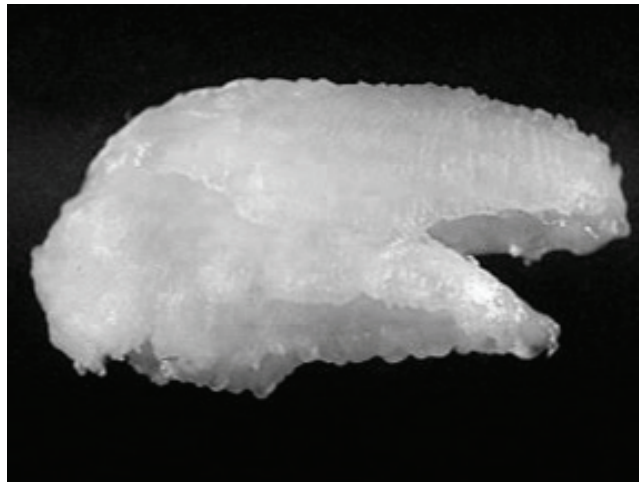
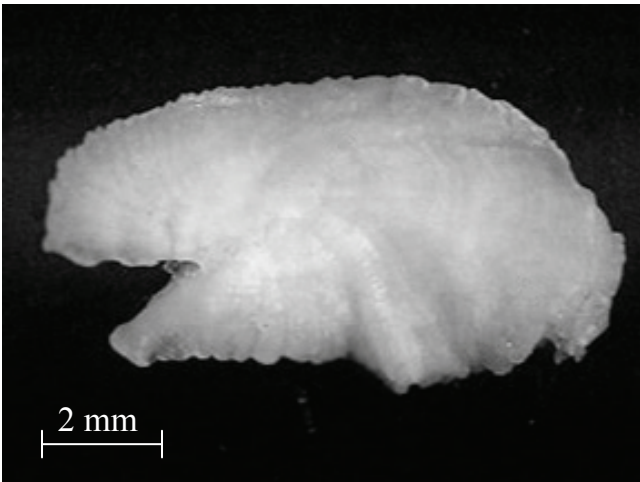


Figure 74. Goldface tilefish, *Caulolatilus chrysops*
Distribution: North Carolina and Dry Tortugas, Florida, to southeastern Brazil
Specimen length: 45 cm TL*

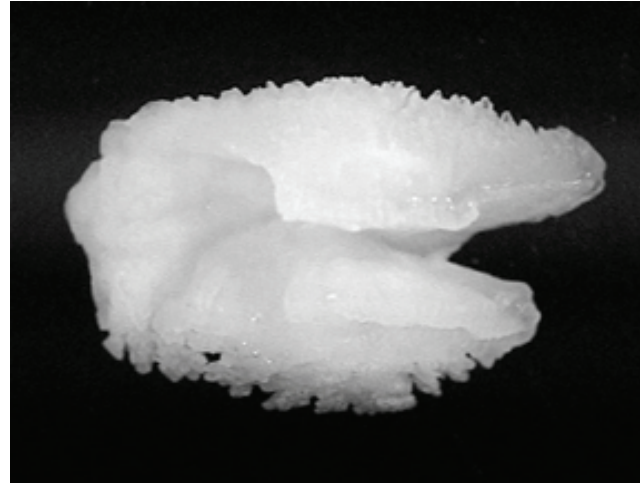
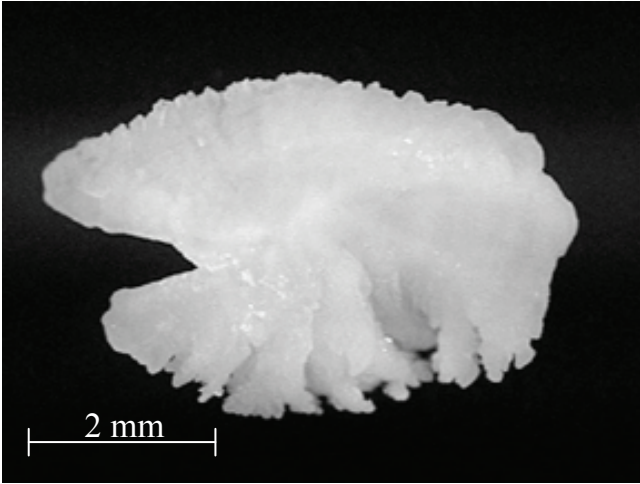


Figure 75. Sand tilefish,
Malacanthus plumieri
Distribution: South Carolina,
Bermuda, and Lesser Antilles
Specimen length: 56.0 cm FL

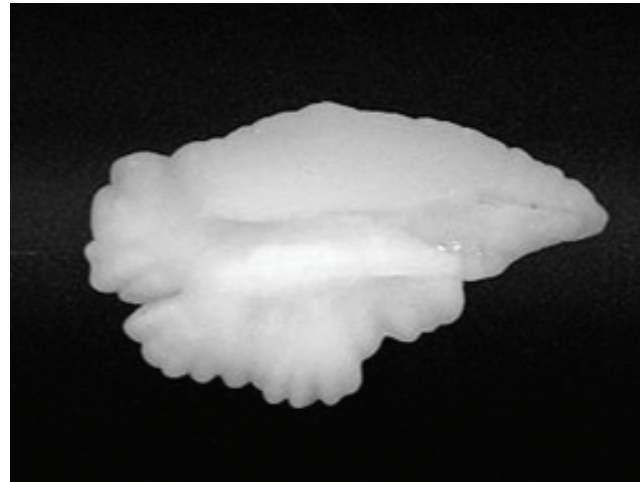
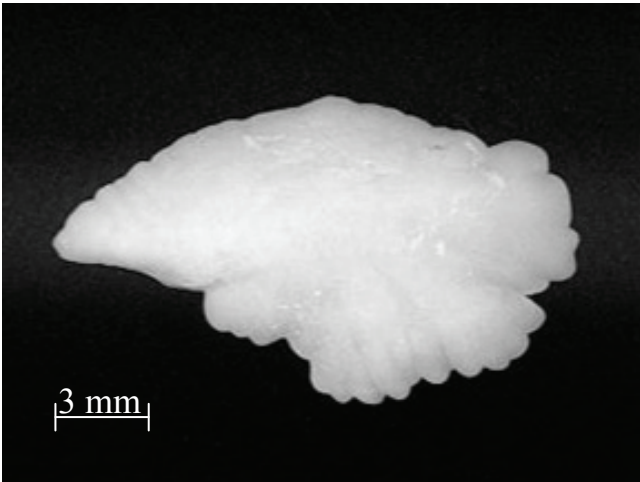


Figure 76. Tilefish,
Lopholatilus
chamaeleonticeps
Distribution: Nova Scotia to
southeastern Florida and
eastern GOM
Specimen length: 55.0 cm FL

Family Mugilidae: Mullet

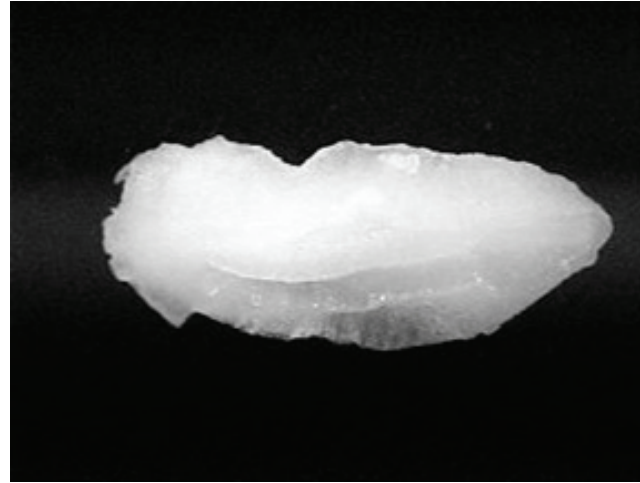
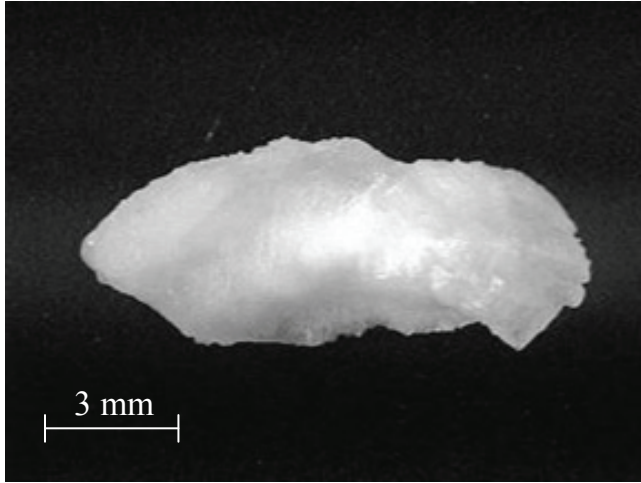


Figure 79. Striped mullet, *Mugil cephalus*
Distribution: Nova Scotia to Brazil, absent from Bahamas.
Nearly worldwide in warm waters
Specimen length: 35.0 cm FL

Family Mullidae: Goatfishes

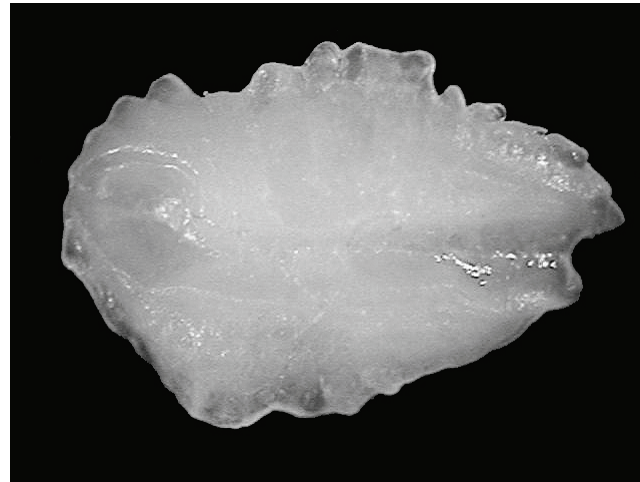
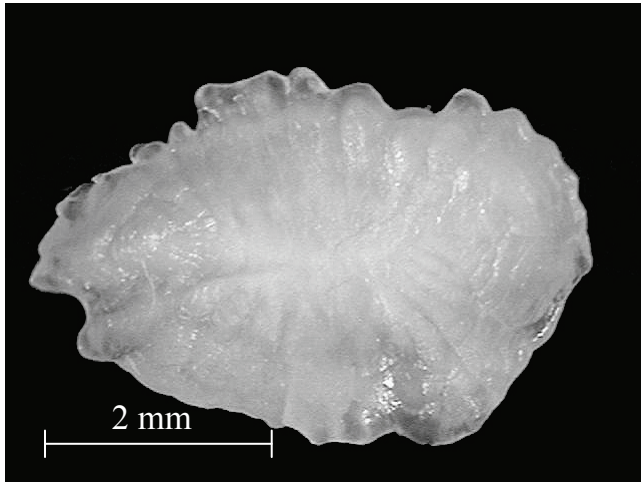


Figure 77. Dwarf goatfish, *Upeneus parvus*
Distribution: North Carolina to Brazil
Specimen length: 15.2 cm FL

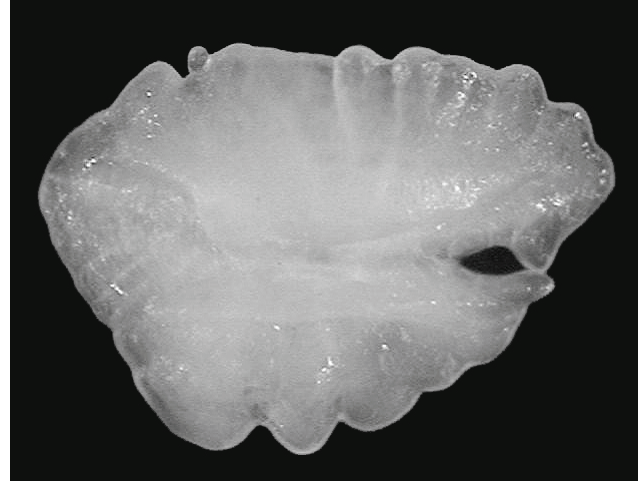
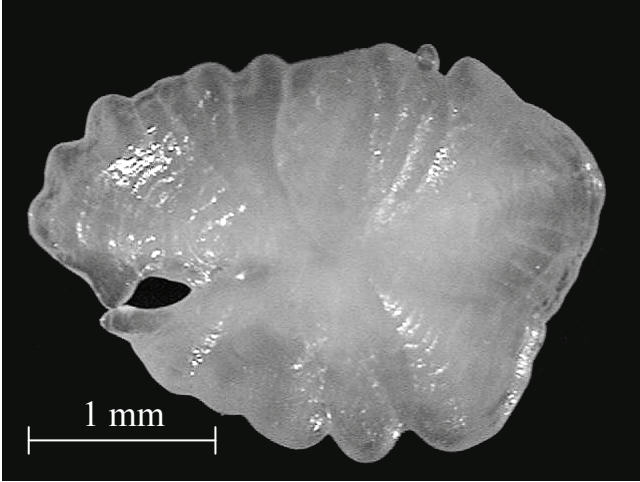


Figure 78. Red goatfish,
Mullus auratus
Distribution: Cape Cod to
Guyana
Specimen length: 14.9 cm FL

Family Pomacanthidae: Angelfish

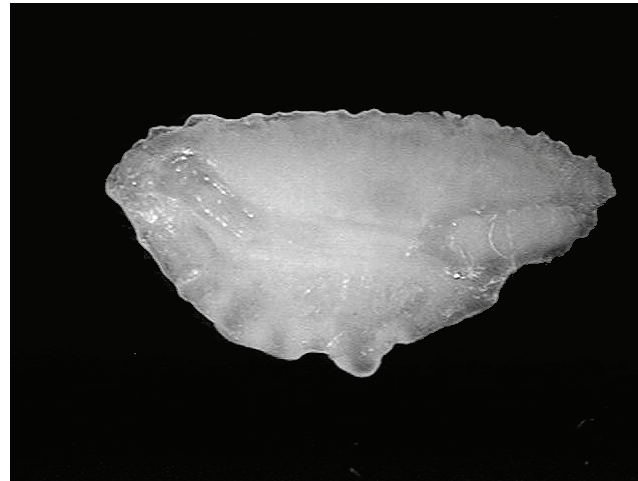
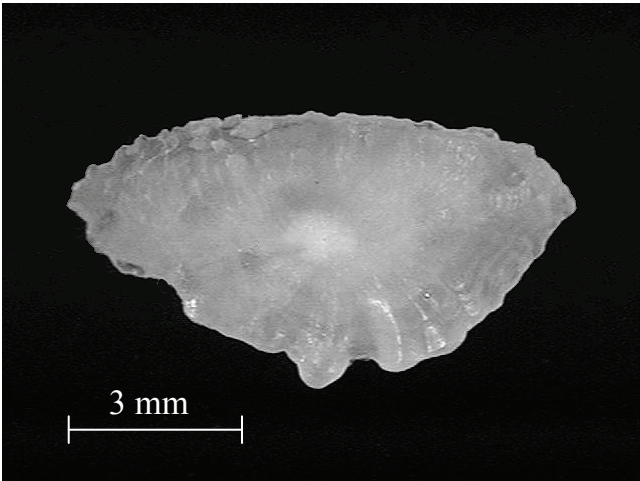


Figure 80. Blue angelfish,
Holacanthus bermudensis
Distribution: New Jersey to
Yucatan
Specimen length: 34.0 cm TL

Family Pomatomidae: Bluefish

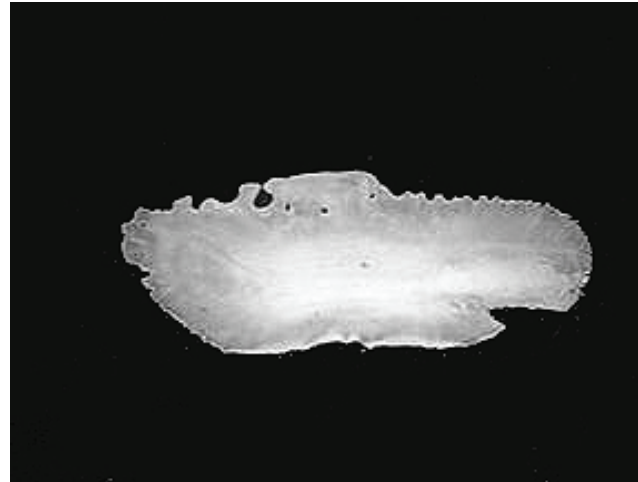
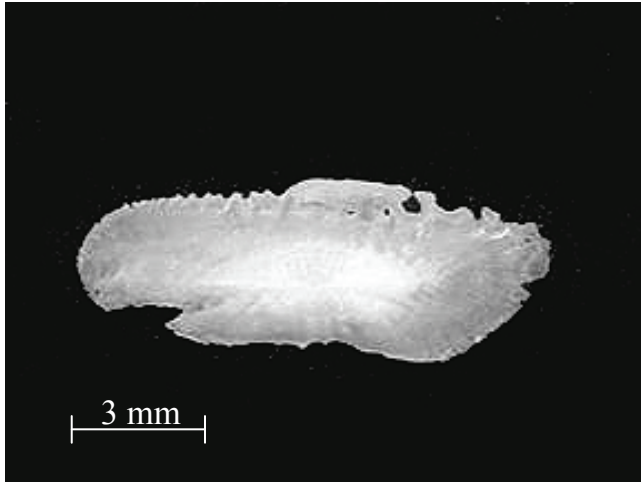


Figure 81. Bluefish,
Pomatomus saltatrix
Distribution: Nova Scotia
and Bermuda to Argentina
Specimen length: 37.0 cm FL

Family Priacanthidae: Bigeyes

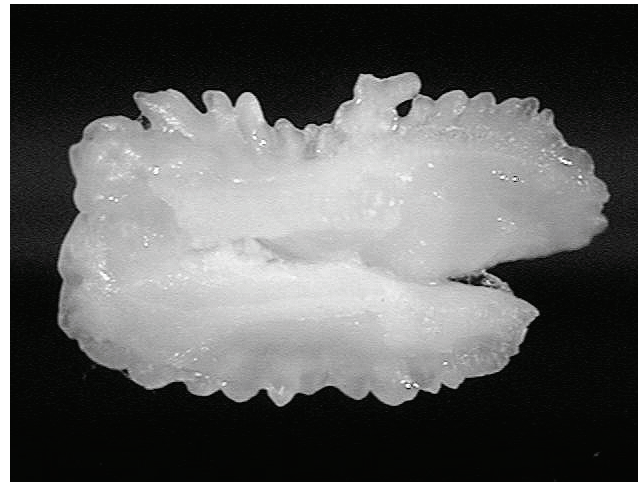
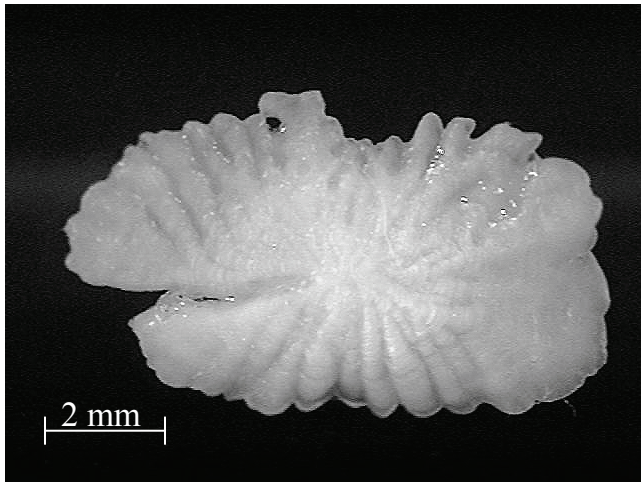


Figure 82. Bigeye,
Priacanthus arenatus
Distribution: North Carolina
to northern Argentina
Specimen length: 46.4 cm FL

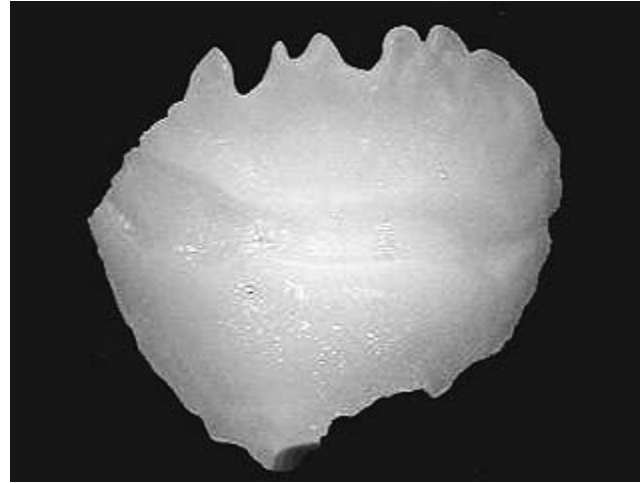
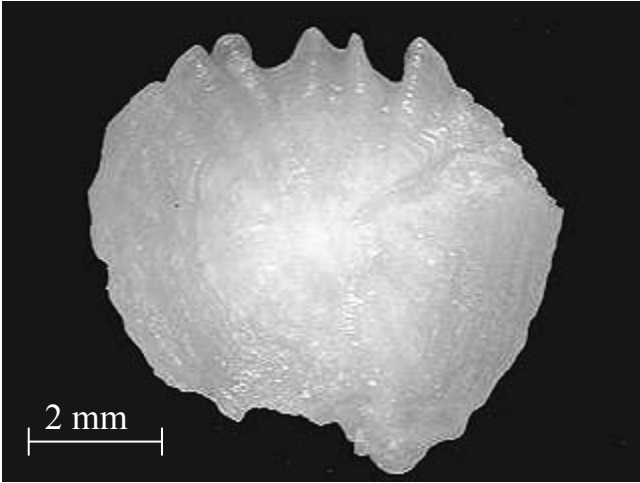


Figure 83. Short bigeye,
Pristigenys alta
Distribution: Maine,
Bermuda, and northern GOM
to northern South America
Specimen length: 20.7 cm TL

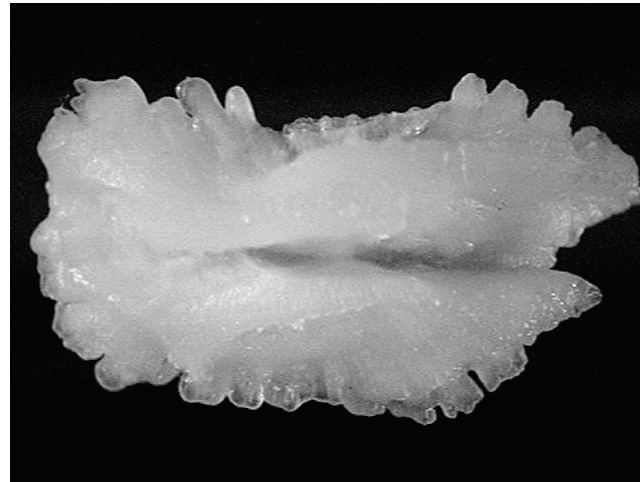
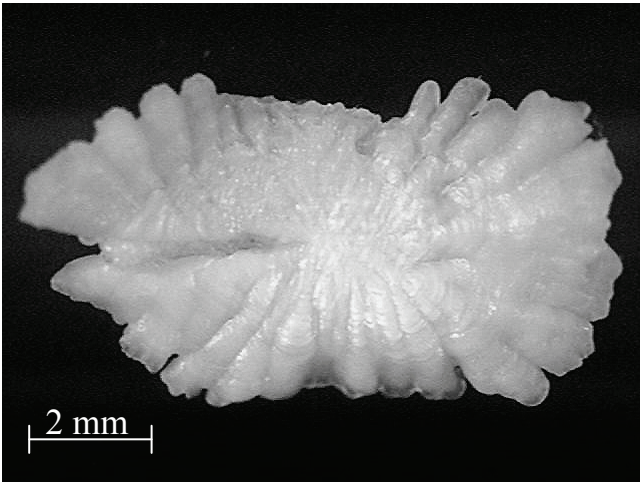


Figure 84. Glasseye snapper,
Priacanthus cruentatus
Distribution: Southern
Florida, Bahamas, and
Caribbean
Specimen length: 50.4 cm FL

Family Rachycentridae: Cobia

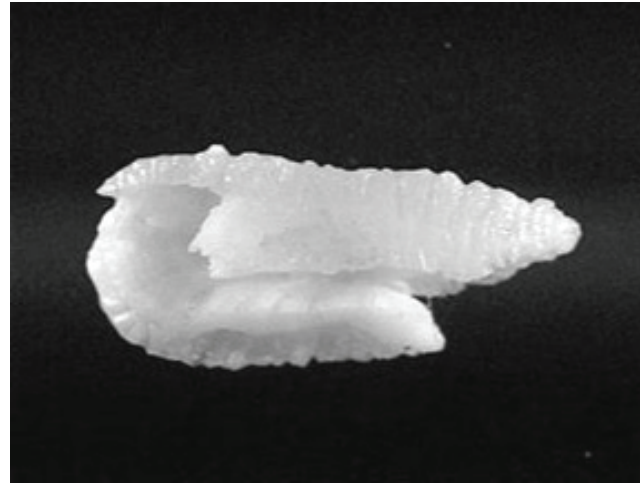
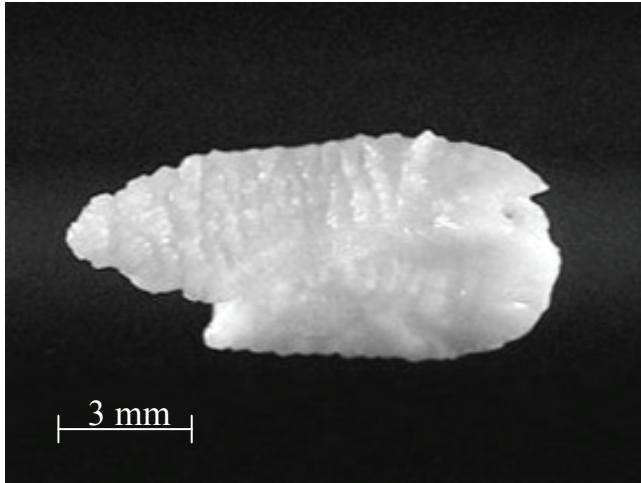


Figure 85. Cobia,
Rachycentron canadum
Distribution: Massachusetts
to Argentina, nearly
worldwide in warm waters
Specimen length: 154 cm FL

Family Scaridae: Parrotfishes

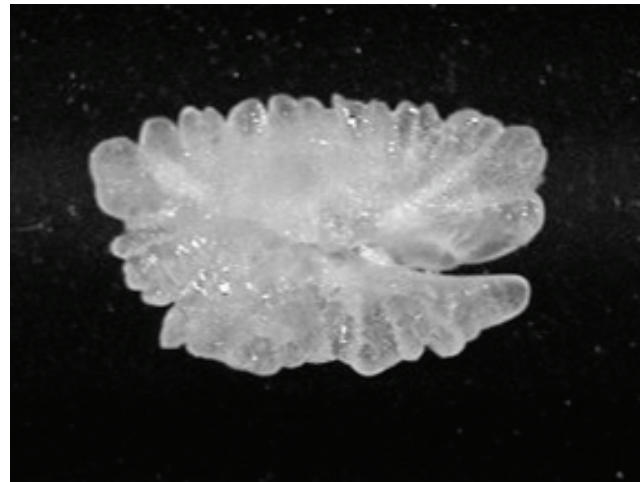
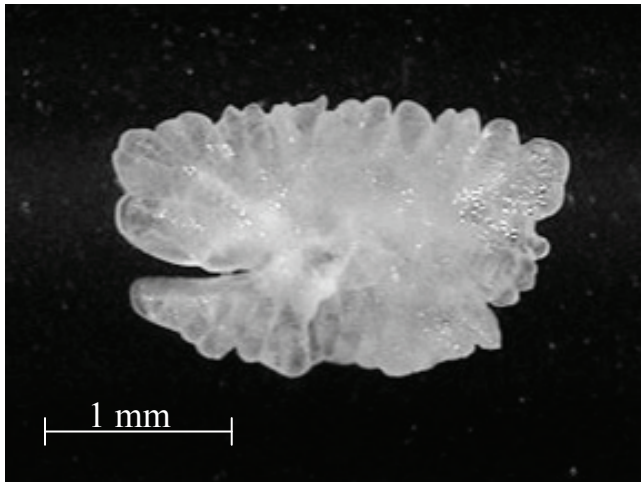


Figure 86. Emerald
parrotfish, *Nicholsina usta*
Distribution: New Jersey and
northern GOM to Brazil
Specimen length: 21.2 cm TL

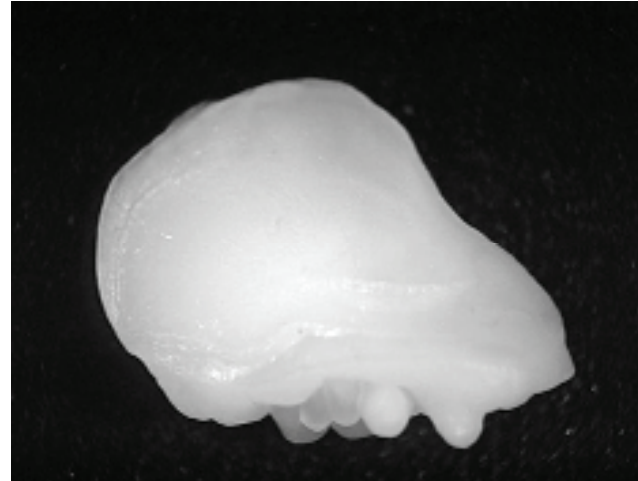
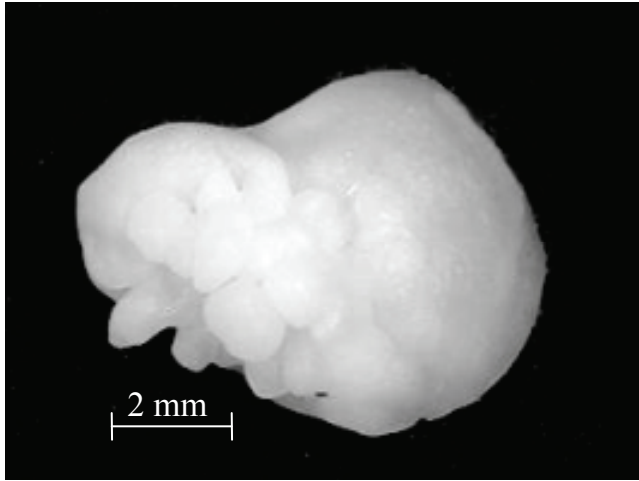


Figure 87a. Atlantic croaker,
Micropogonias undulatus
Distribution: Massachusetts
and northern Mexico; Brazil
to Argentina
Specimen length: 16.7 cm TL

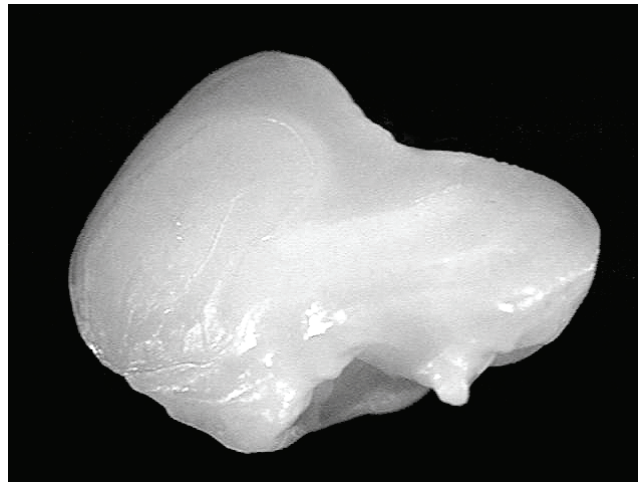
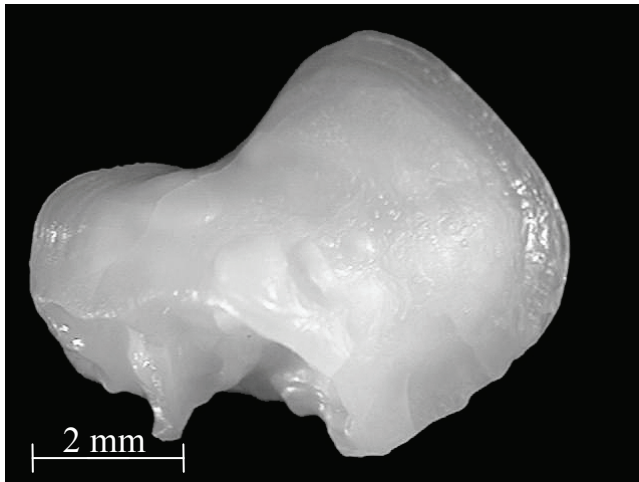


Figure 87b. Atlantic croaker,
Micropogonias undulatus
Distribution: Massachusetts
and northern Mexico; Brazil
to Argentina
Specimen length: 20.0 cm TL

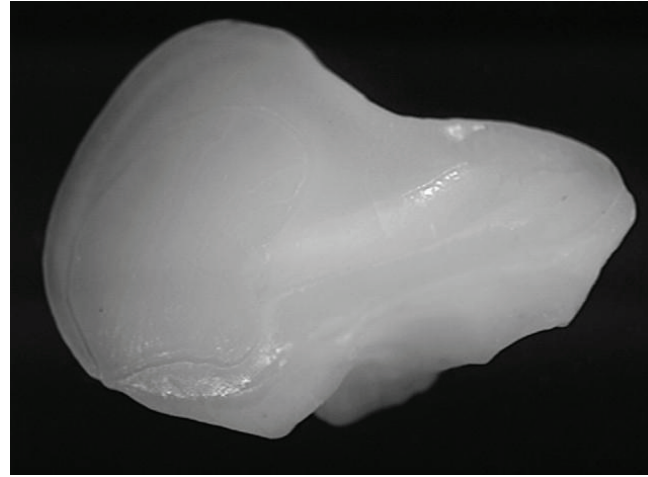
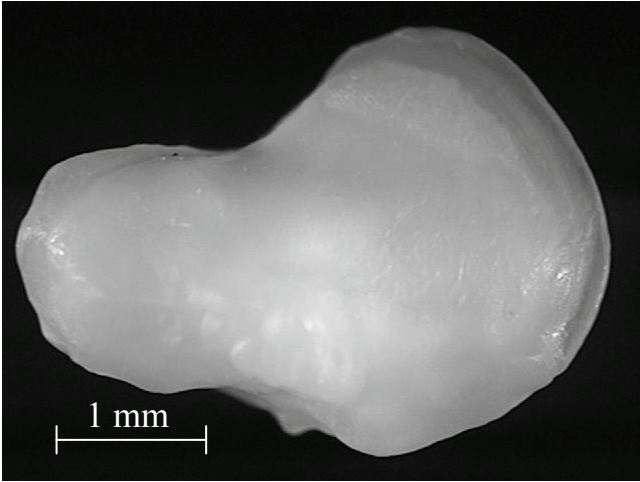


Figure 87c. Atlantic croaker,
Micropogonias undulatus
Distribution: Massachusetts
and northern Mexico; Brazil
to Argentina
Specimen length: 25.5 cm TL

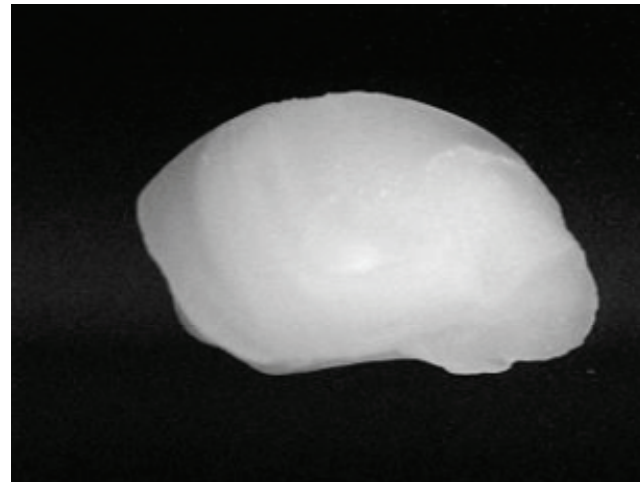
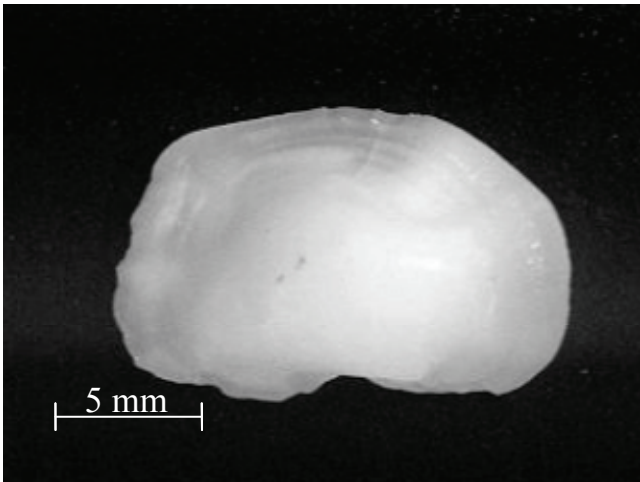


Figure 88. Black drum,
Pogonias cromis
Distribution: Nova Scotia to
northern Mexico;
southeastern Brazil to
Argentina
Specimen length: 38 cm TL

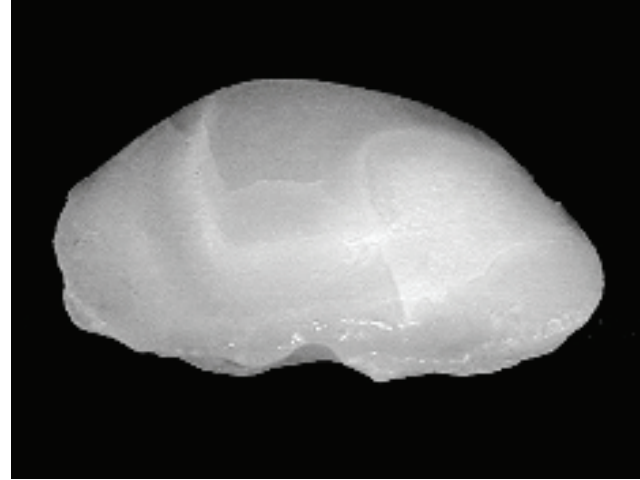
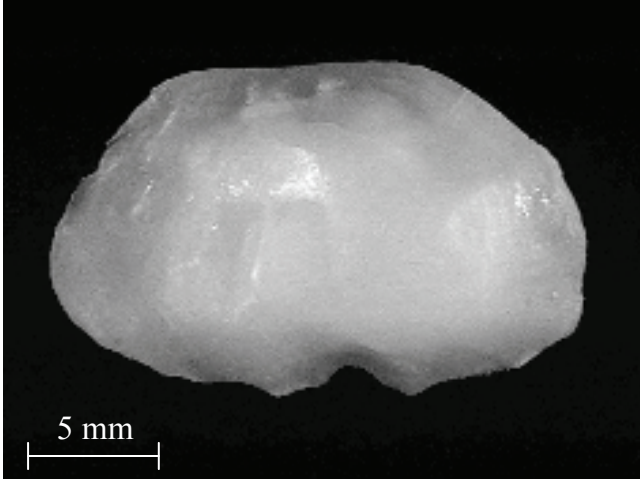


Figure 89. Blackbar drum, *Equetus iwamotoi*
Distribution: North Carolina to Brazil
Specimen length: 43.1 cm FL

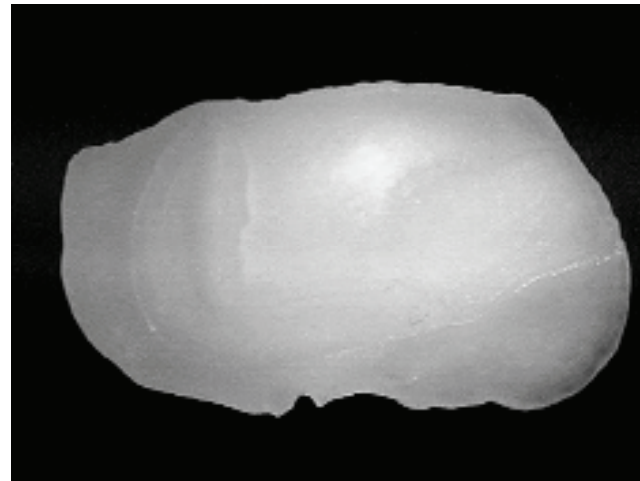
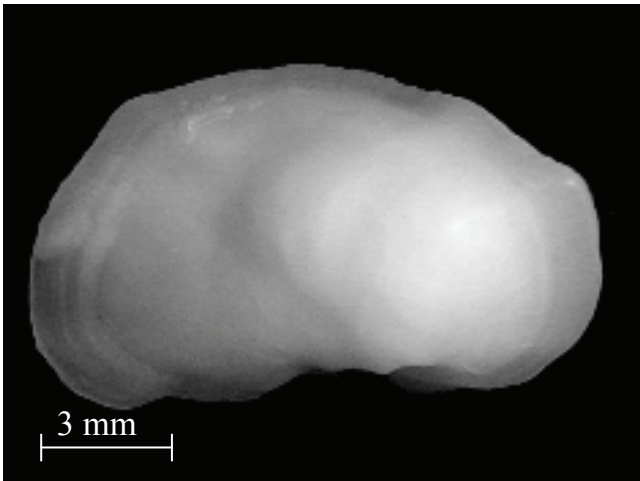


Figure 90. Cubbyu, *Equetus umbrosus*
Distribution: North Carolina to Venezuela
Specimen length: 25.1 cm TL

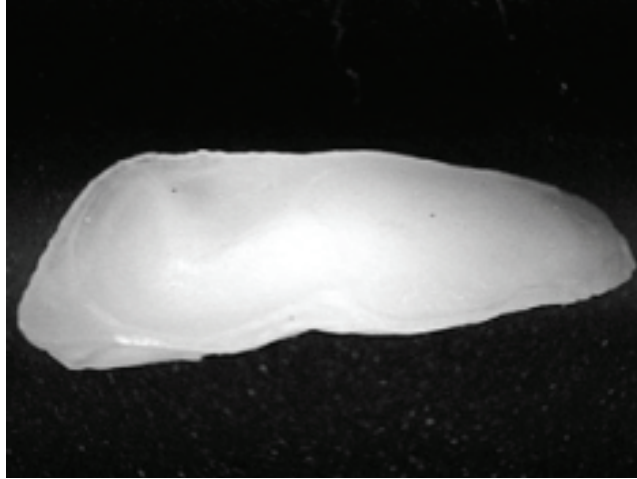
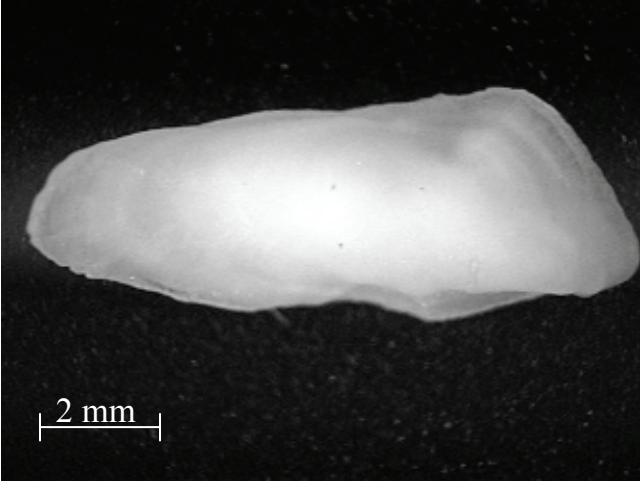


Figure 91. Gulf kingfish,
Menticirrhus littoralis
Distribution: Virginia and
northern GOM to Brazil,
absent from southeast Florida
Specimen length: 32.2 cm TL

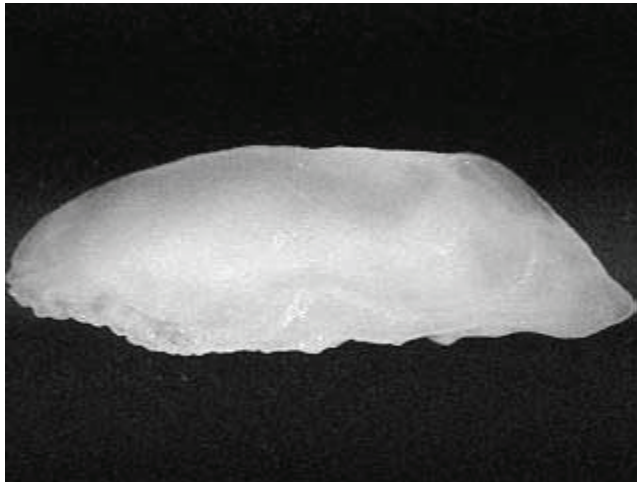
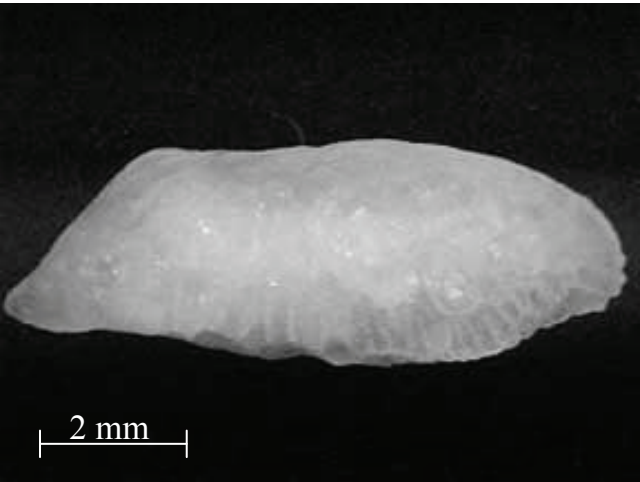


Figure 92. Northern kingfish,
Menticirrhus saxatilis
Distribution: Massachusetts
to southeast Florida, and
GOM to Yucatan
Specimen length: 24.7 cm TL

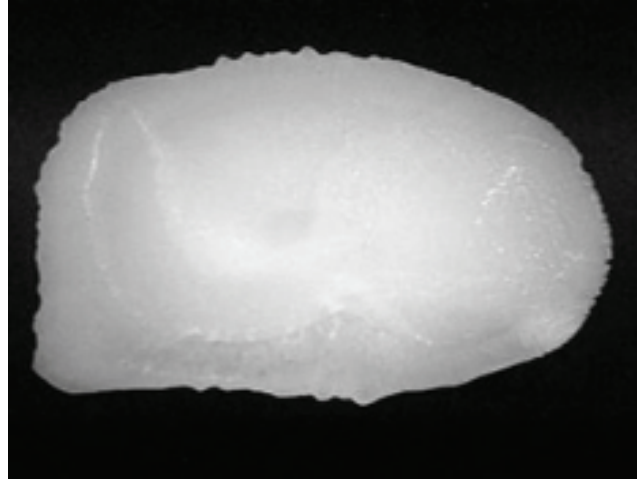
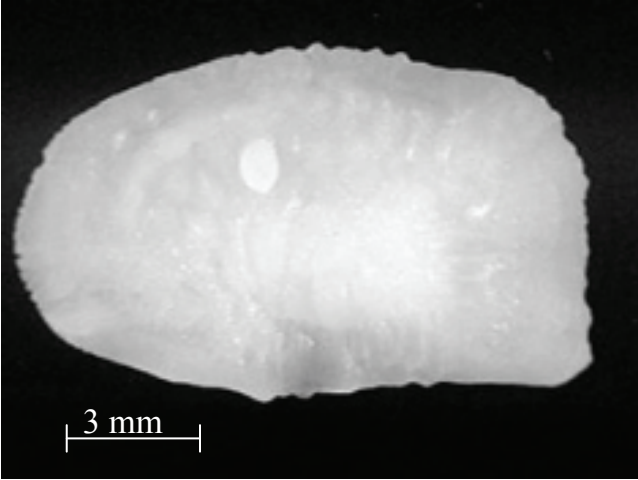


Figure 93. Red drum,
Sciaenops ocellatus
Distribution: Massachusetts
to northern Mexico
Specimen length: 39.0 cm TL

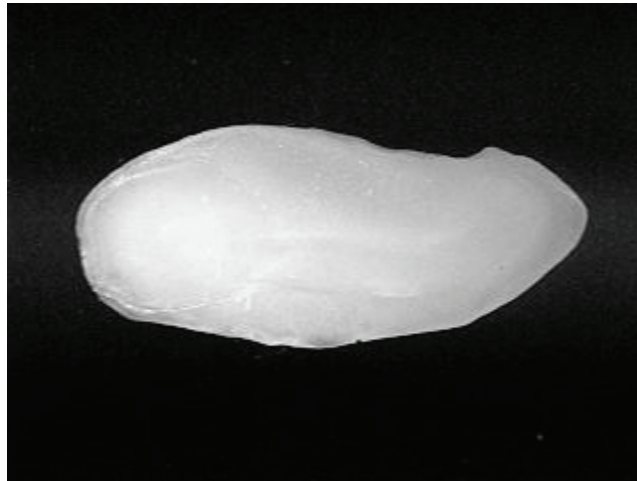
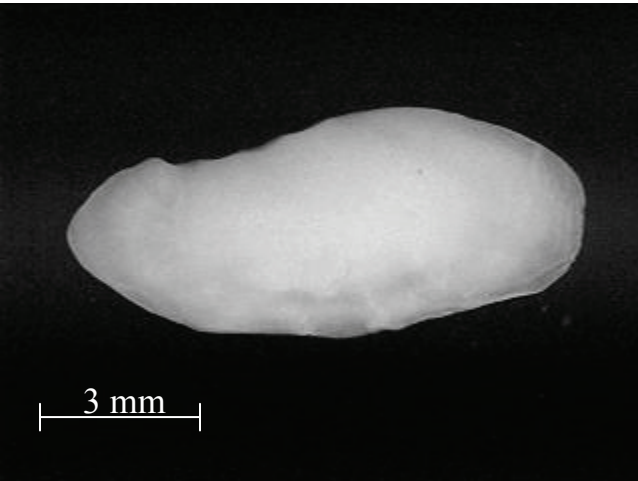


Figure 94. Sand seatrout,
Cynoscion arenarius
Distribution: Florida and
GOM to Bay of Campeche
Specimen length: 23.1 cm TL

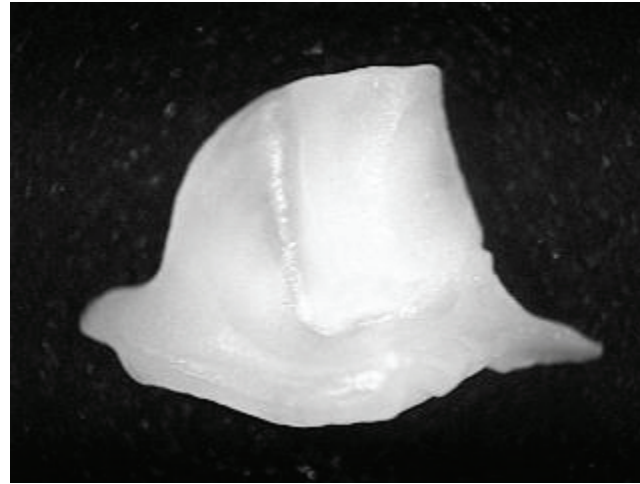
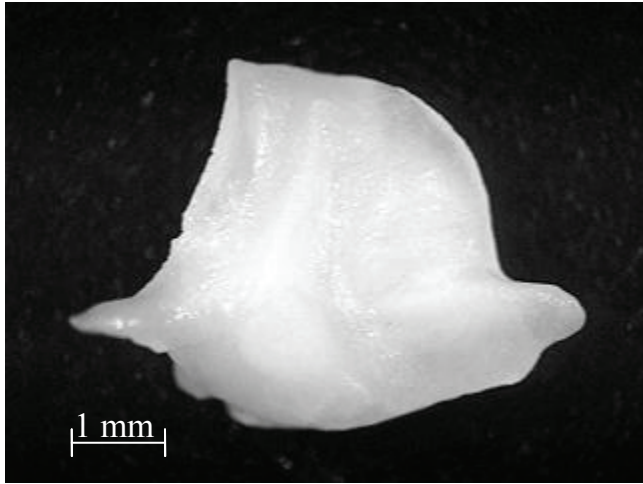
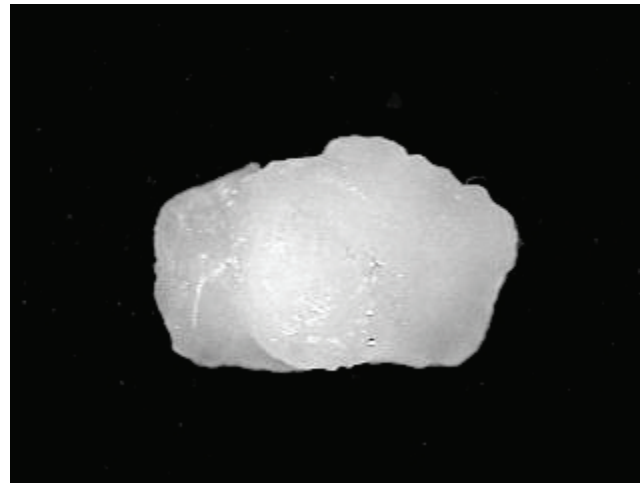
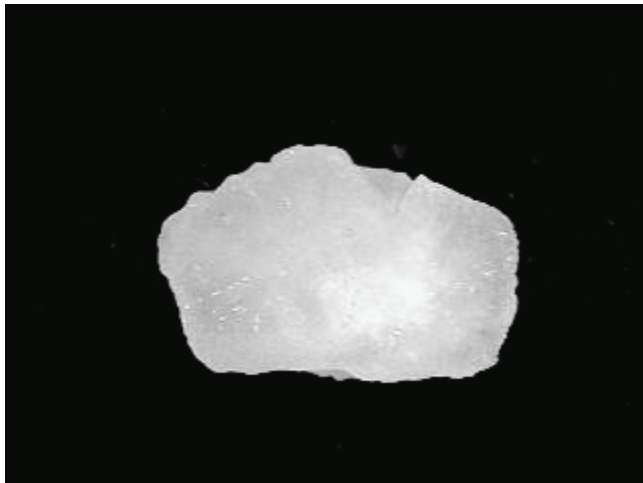


Figure 95. Silver perch,
Bairdiella chrysoura
Distribution: New York to
SE Florida, and Eastern and
Northern GOM to Northern
Mexico
Specimen length: 15.0 cm TL



Silver perch lapillus otoliths

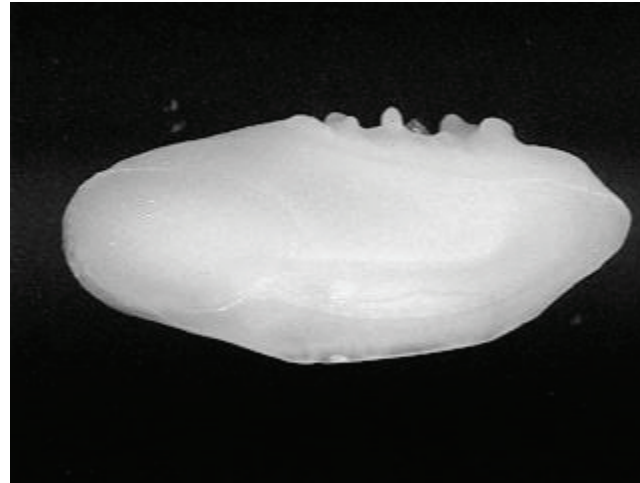
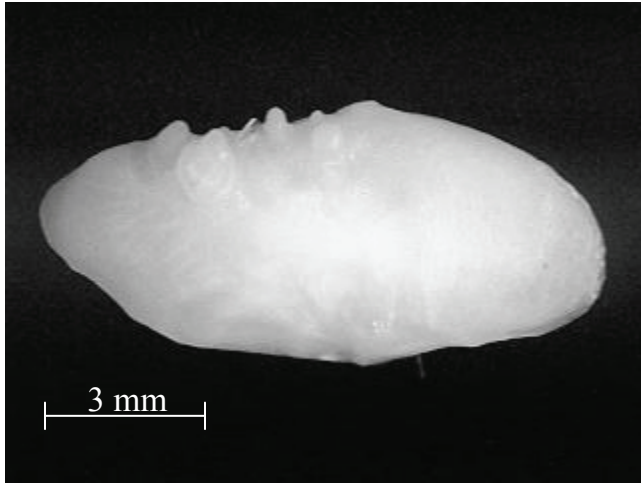


Figure 96. Silver seatrout,
Cynoscion nothus
Distribution: Maryland to
northeast Florida and GOM
Specimen length: 24.4 cm TL

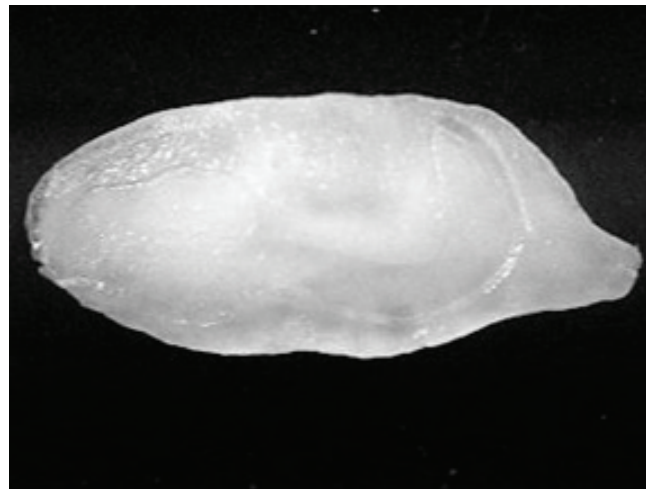
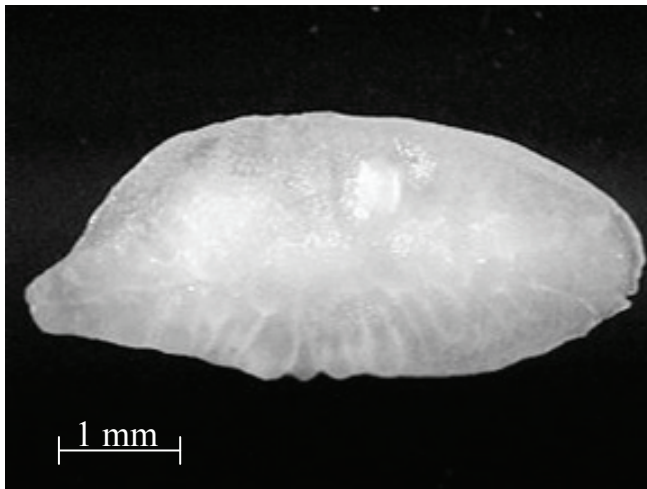


Figure 97. Southern kingfish,
Menticirrhus americanus
Distribution: New York to
Texas and Bay of Campeche
to Argentina
Specimen length: 11.9 cm TL

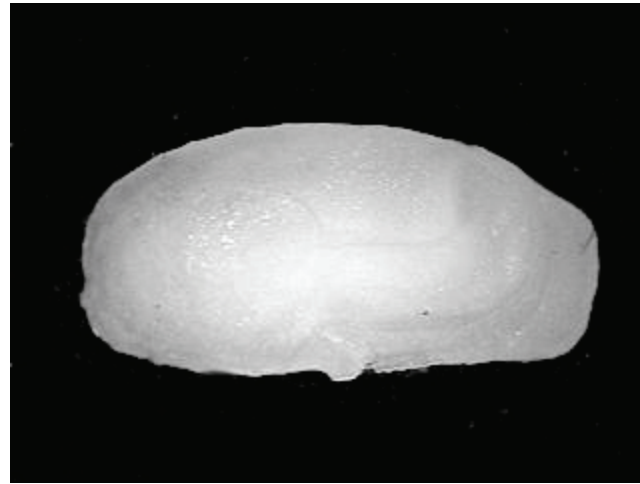
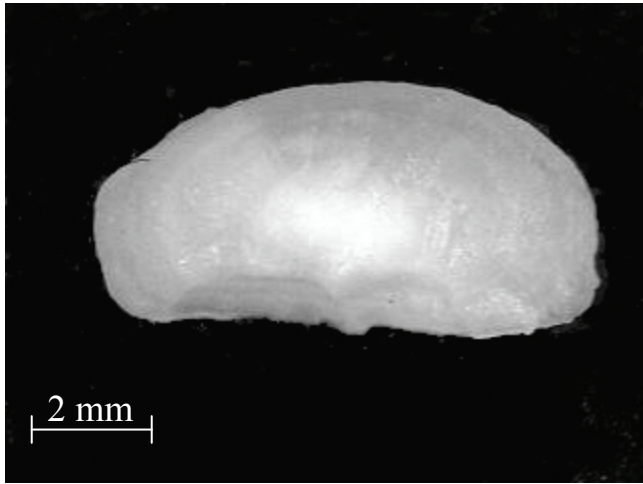


Figure 98. Spot, *Leioostomus xanthurus*
Distribution: Massachusetts to northern Mexico; absent from southeastern Florida
Specimen length: 167 cm FL

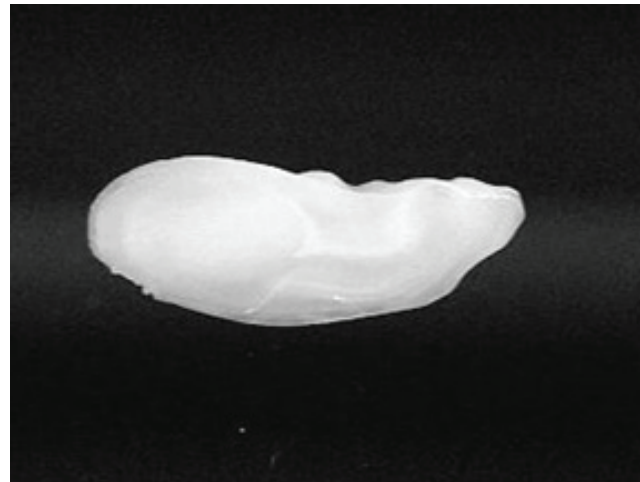
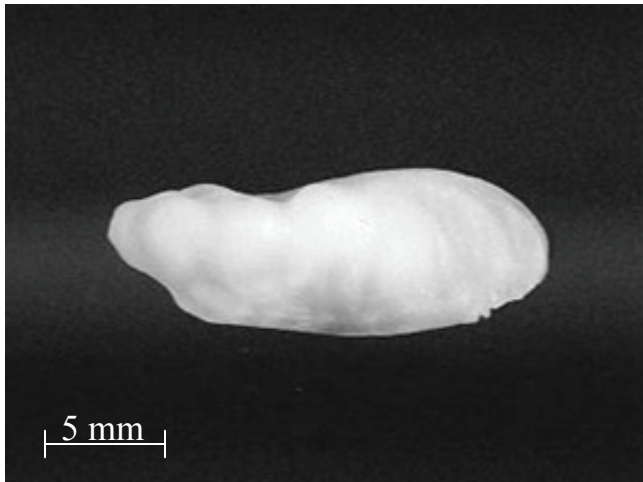


Figure 99. Spotted seatrout, *Cynoscion nebulosus*
Distribution: New York to southeastern Florida and entire GOM
Specimen length: 41.8 cm TL

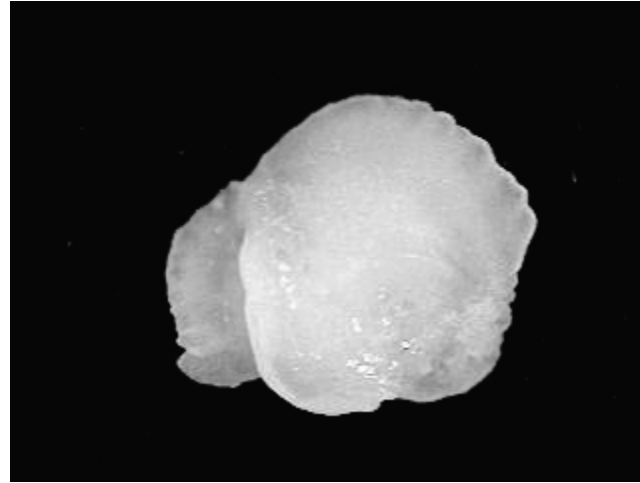
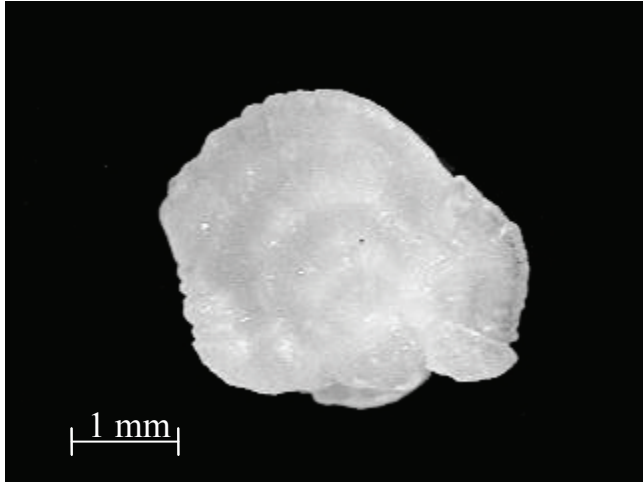
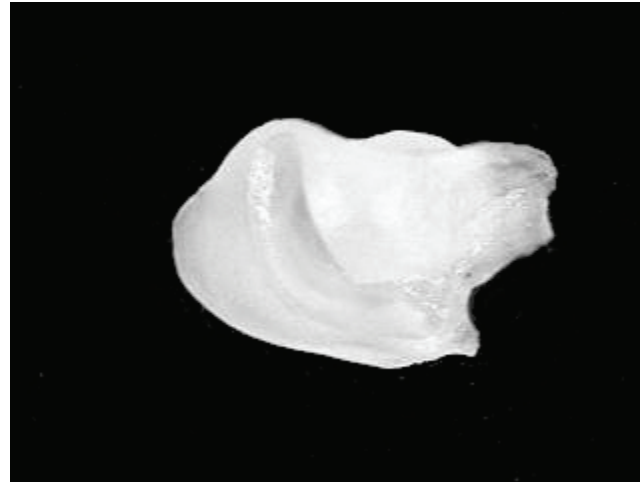


Figure 100. Star drum,
Stellifer lanceolatus
Distribution: Virginia to
Texas, excluding
southeastern Florida
Specimen length: 15.5 cm TL



Star drum lapillus otoliths

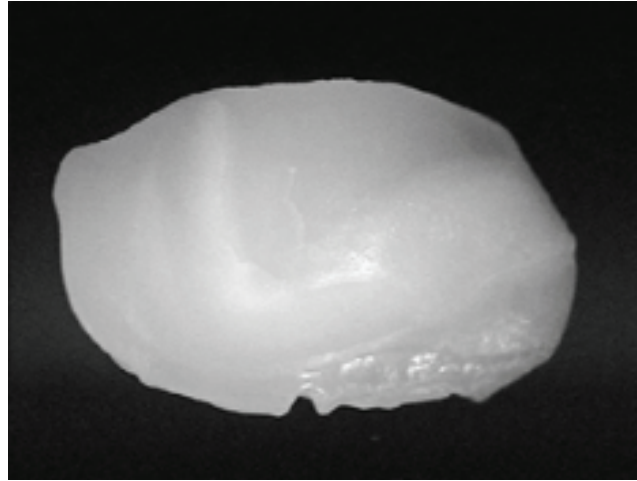
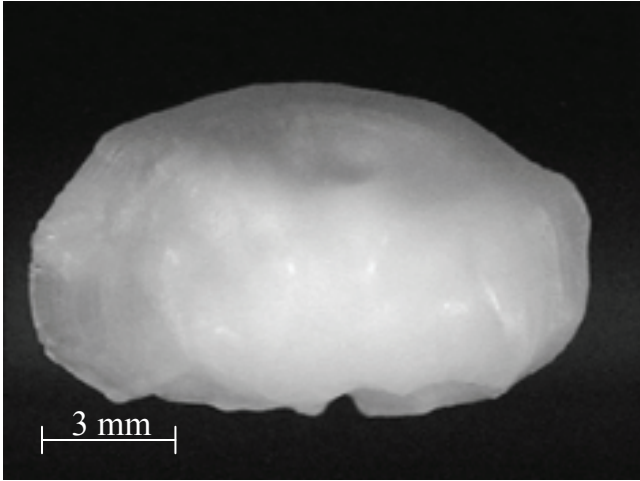


Figure 101. Striped croaker,
Bairdiella sanctaeluciae
Distribution: Eastern Florida,
Cuba, and Bay of Campeche
to Guianas
Specimen length: 24.2 cm TL

Family Scombridae: Mackerels

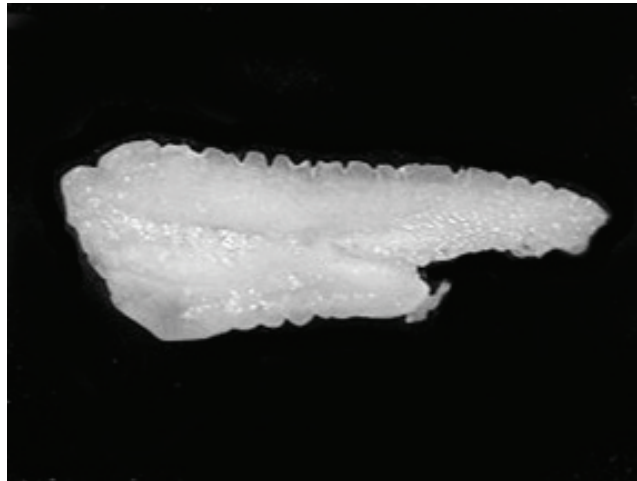
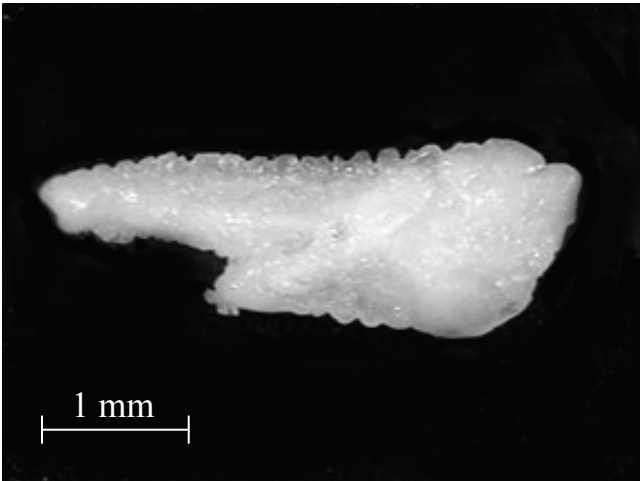


Figure 102. Atlantic bonito,
Sarda sarda
Distribution: Southeastern
Gulf of Lawrence to
Argentina
Specimen length: 30 cm TL*

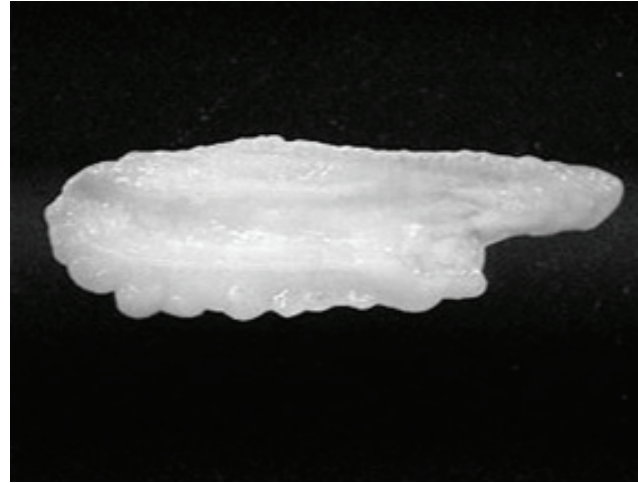
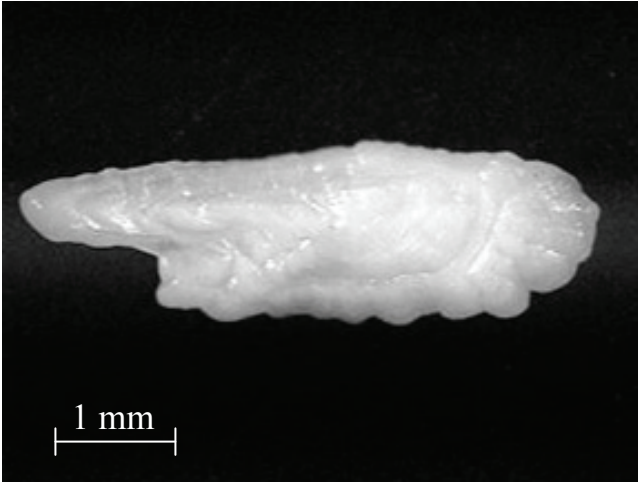


Figure 103. Atlantic mackerel, *Scomber scombrus*
 Distribution: Southern Labrador to Cape Hatteras, eastern North Atlantic
 Specimen length: 20 cm TL*

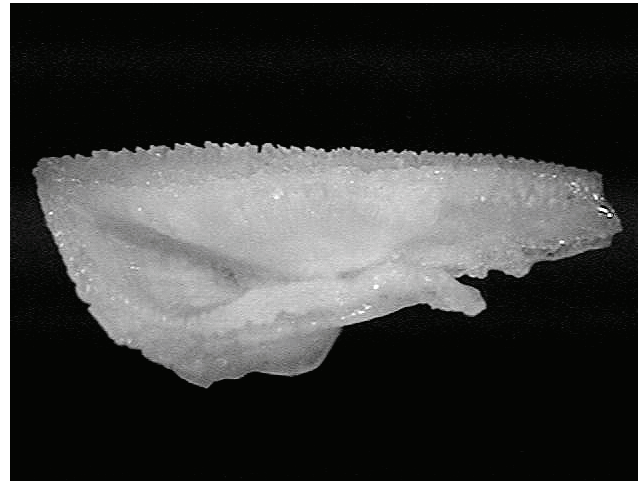
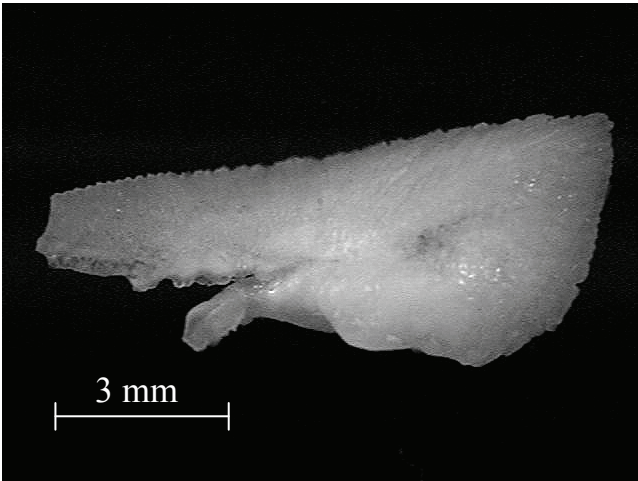


Figure 104. Blackfin tuna, *Thunnus atlanticus*
 Distribution: Martha's Vineyard to Brazil, entire GOM
 Specimen length: 86.0 cm FL

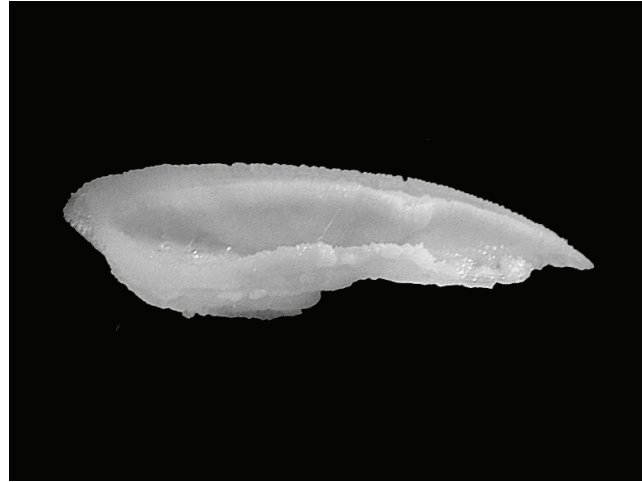
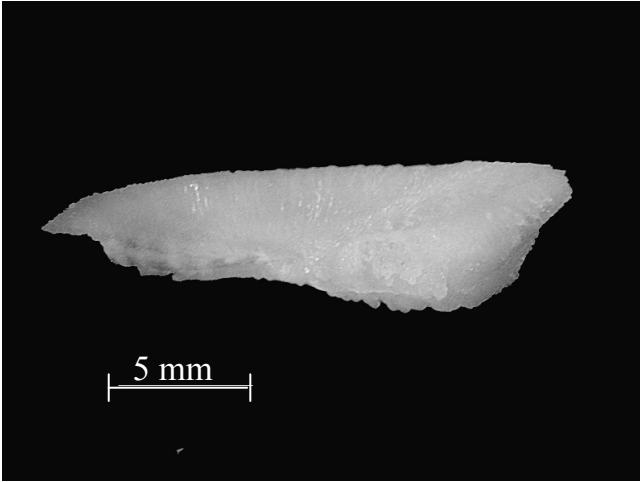


Figure 105. Bluefin tuna,
Thunnus thynnus
Distribution: Labrador to
Brazil, entire GOM
Specimen length: XX

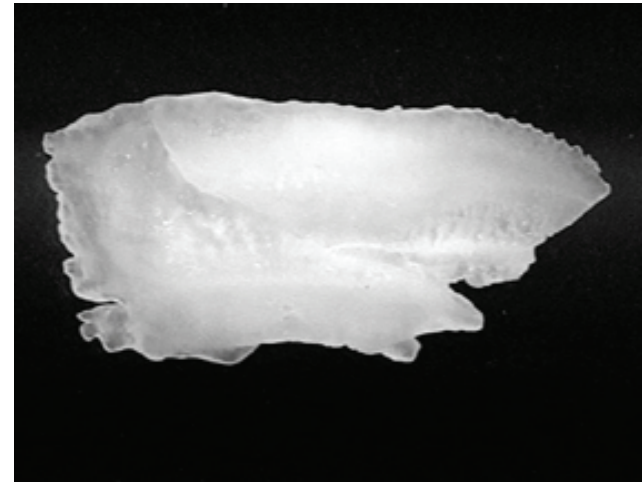
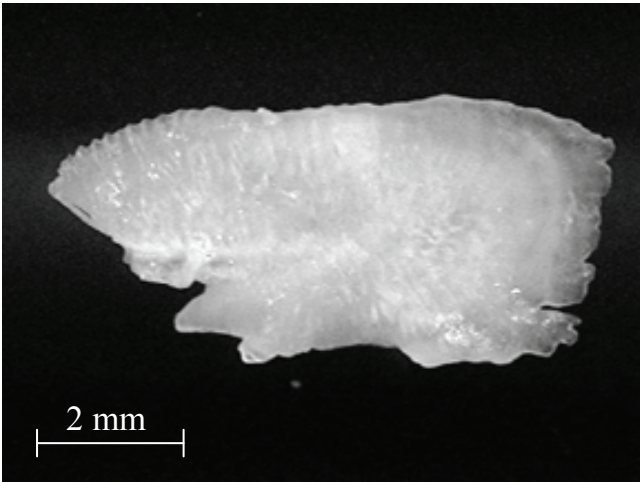


Figure 106. Cero,
Scomberomorus regalis
Distribution: Massachusetts
and northern GOM to
northern Brazil
Specimen length: 43.5 cm FL

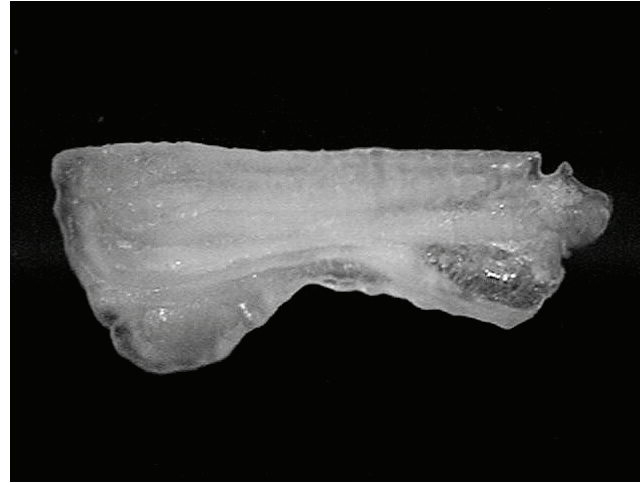
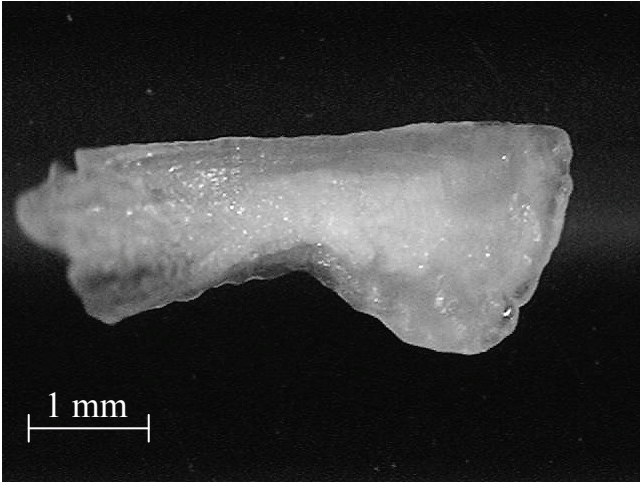


Figure 107. Chub mackerel,
Scomber japonicus
Distribution: Nova Scotia to
Brazil
Specimen length: 23.3 cm FL

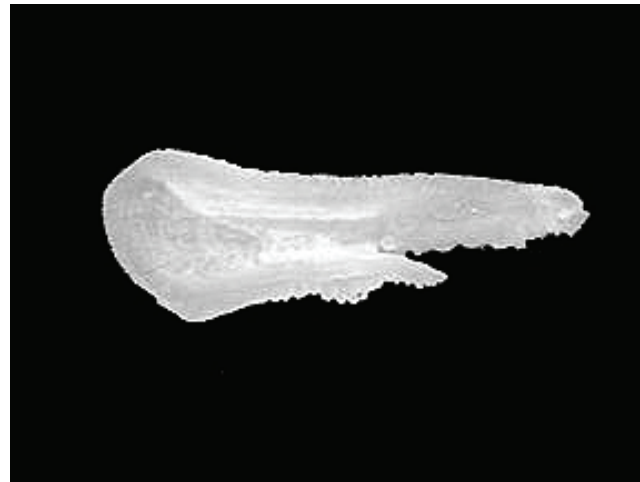
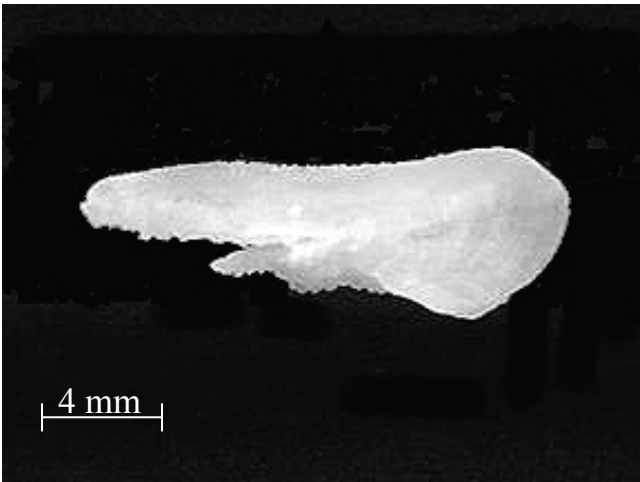


Figure 108. King mackerel,
Scomberomorus cavalla
Distribution: Massachusetts
and northern GOM to
southeastern Brazil
Specimen length: 127 cm FL

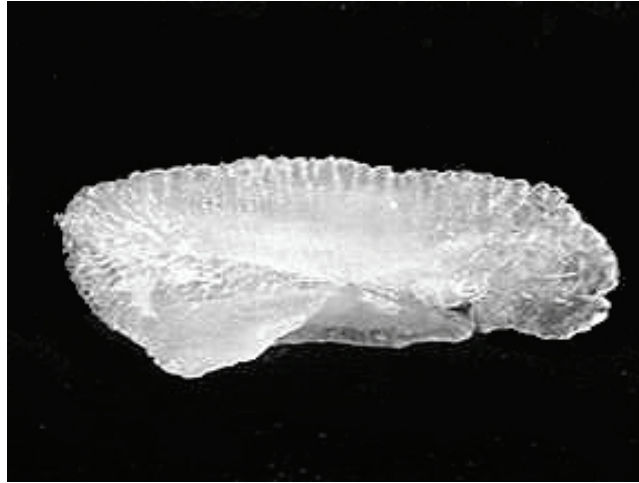
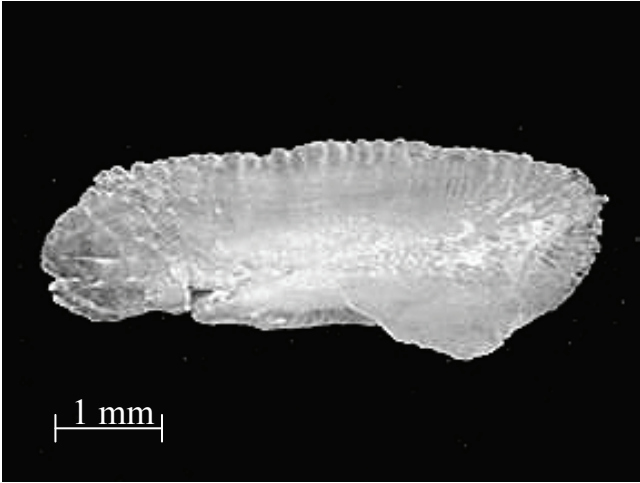


Figure 109. Little tunny,
Euthynnus alletteratus
Distribution: Massachusetts
and northern GOM to Brazil
Specimen length: 55 cm FL

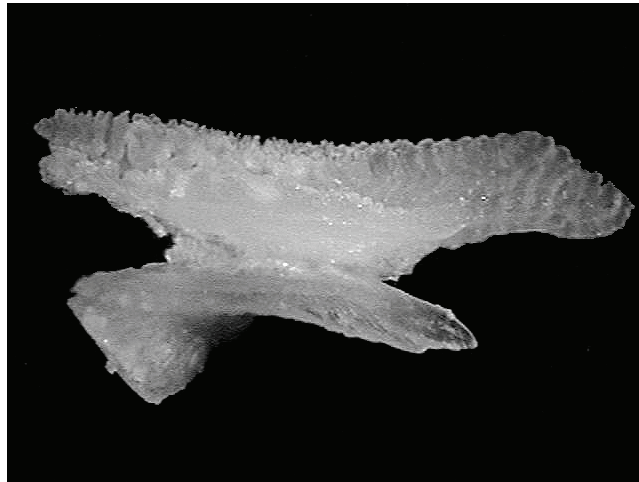
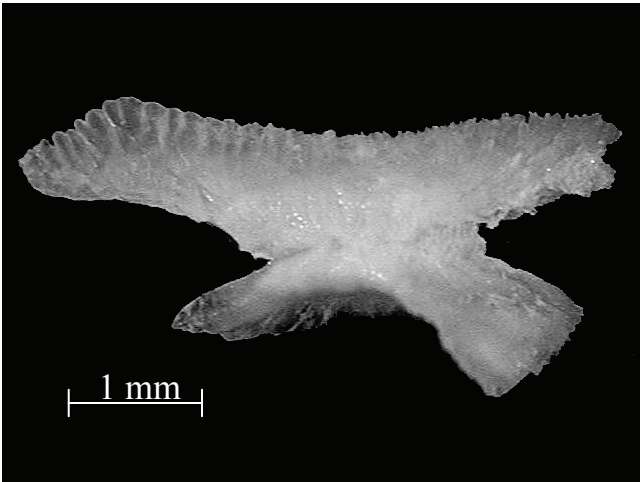


Figure 110. Skipjack tuna,
Katsuwonus pelamis
Distribution: Worldwide in
tropical and subtropical
waters
Specimen length: 56.0 cm FL

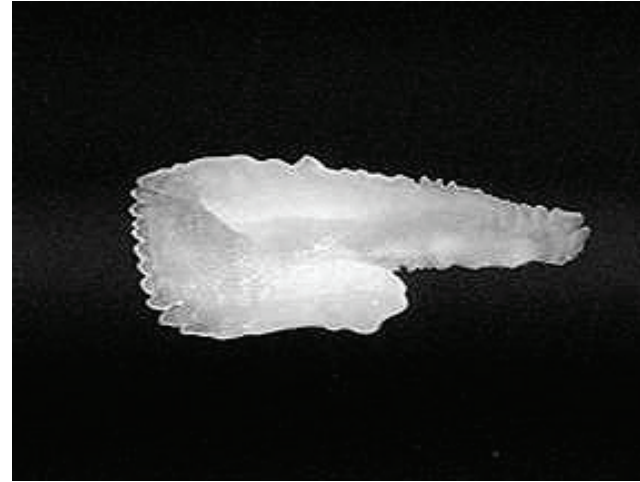
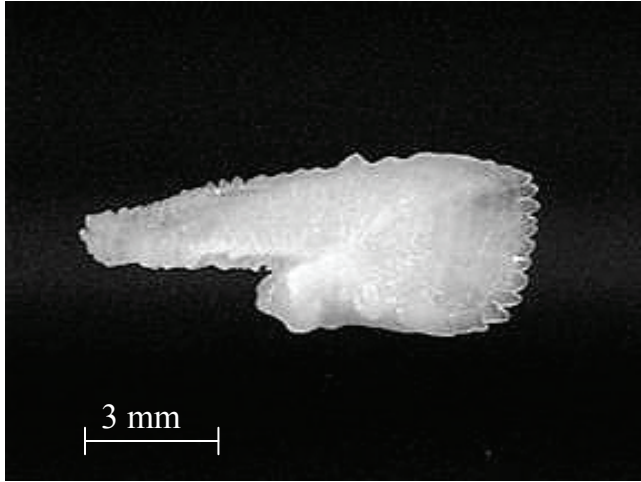


Figure 111. Spanish mackerel, *Scomberomorus maculatus*
 Distribution: Cape Cod to southeastern Florida and GOM
 Specimen length: 67.2 cm FL

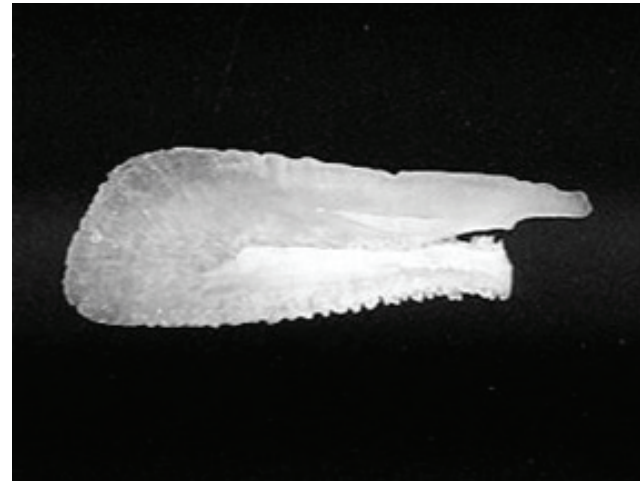
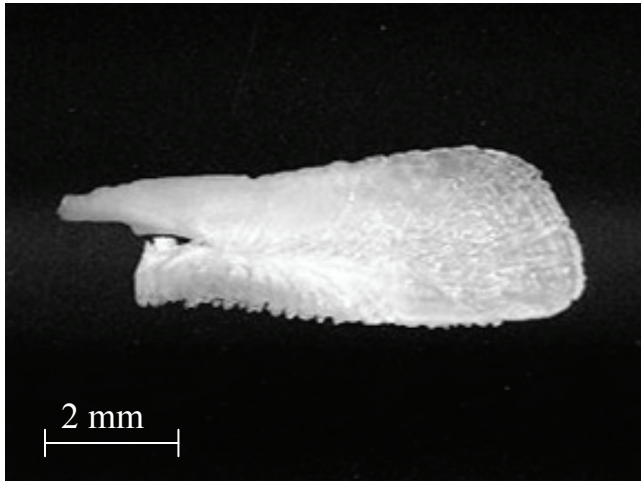


Figure 112. Wahoo, *Acanthocybium solanderi*
 Distribution: New Jersey, Bermuda, and northern GOM to northern South America
 Specimen length: 120 cm FL

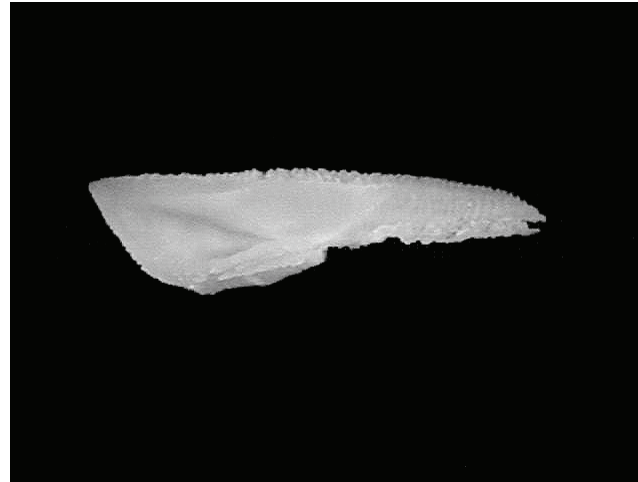
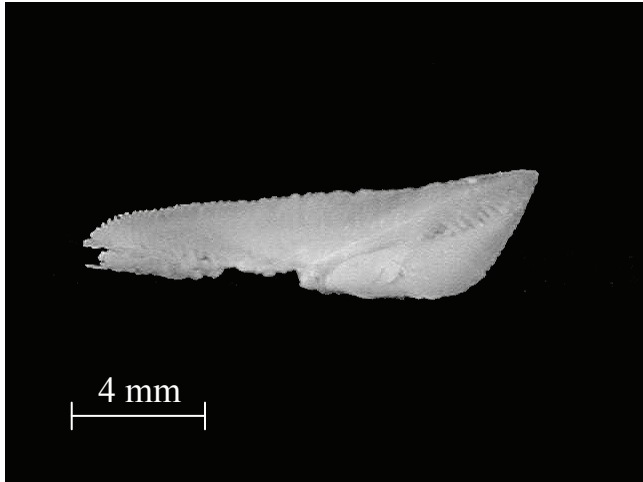


Figure 113. Yellowfin tuna,
Thunnus albacares
Distribution: Nova Scotia to
southern Brazil, entire GOM
Specimen length: XX

Family Scorpaenidae: Scorpionfishes

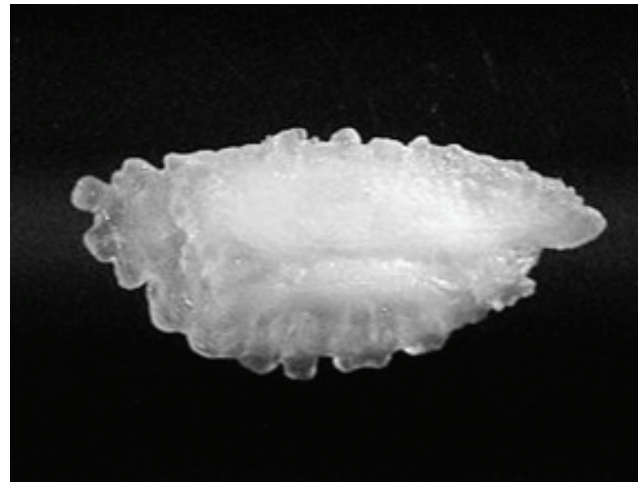
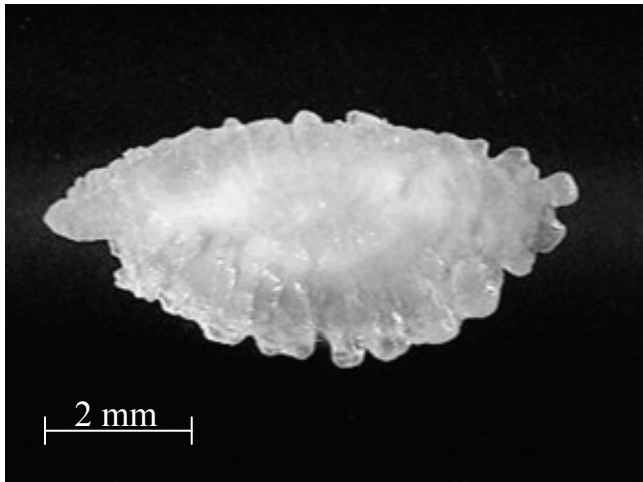


Figure 114. Barbfish,
Scorpaena brasiliensis
Distribution: Virginia and
northern GOM to Brazil
Specimen length: 20.0 cm TL

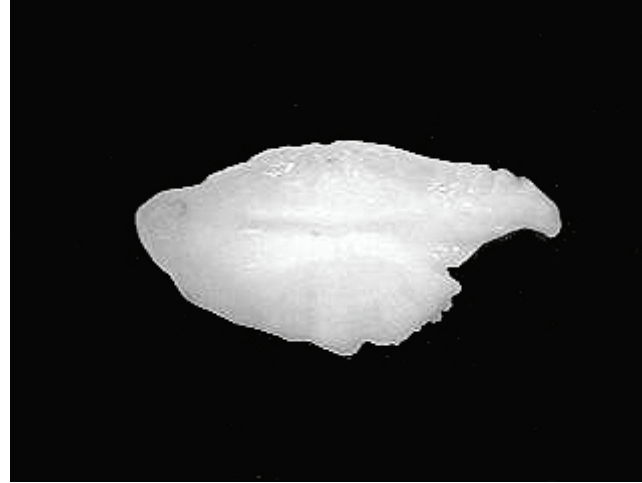
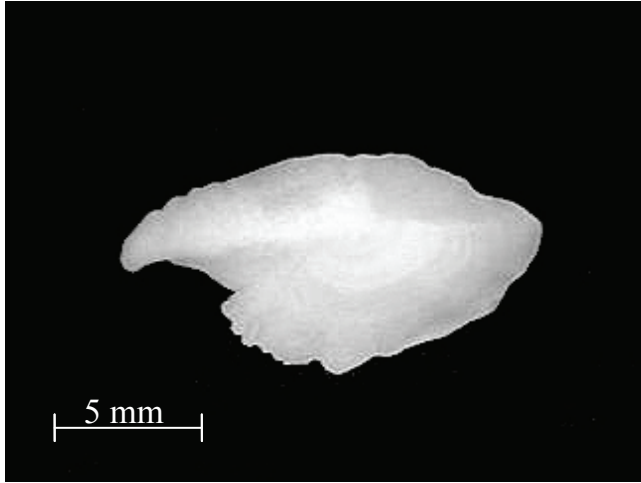


Figure 115. Blackbelly
rosefish, *Helicolenus*
dactylopterus
Distribution: Maine to
Argentina
Specimen length: 36.0 cm TL

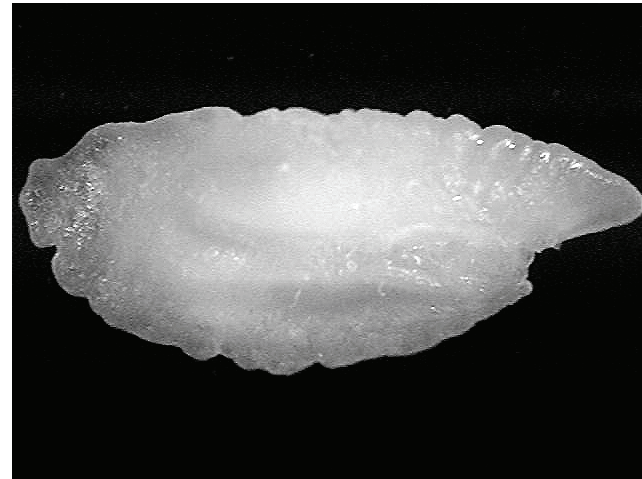
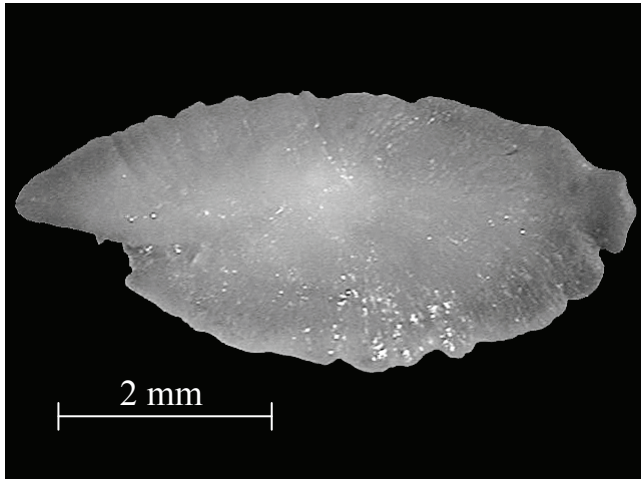


Figure 116. Hunchback
scorpionfish, *Scorpaena*
dispar
Distribution: Florida to
Brazil, GOM
Specimen length: 12.4 cm TL

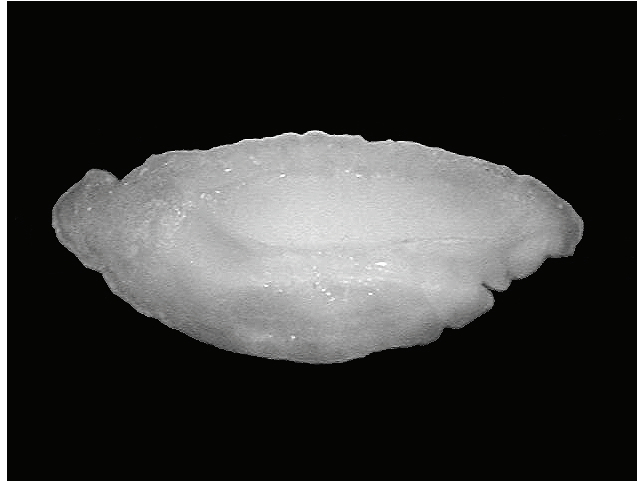
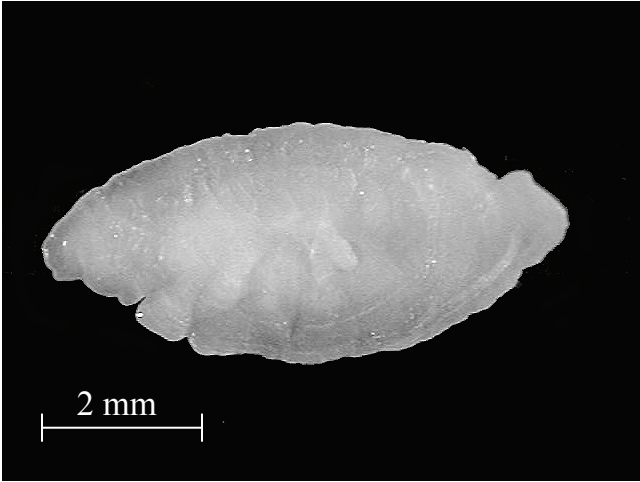


Figure 117. Longfin scorpionfish, *Scorpaena agassizi*
Distribution: North Carolina to Brazil, northern and southern GOM
Specimen length: 15.9 cm TL

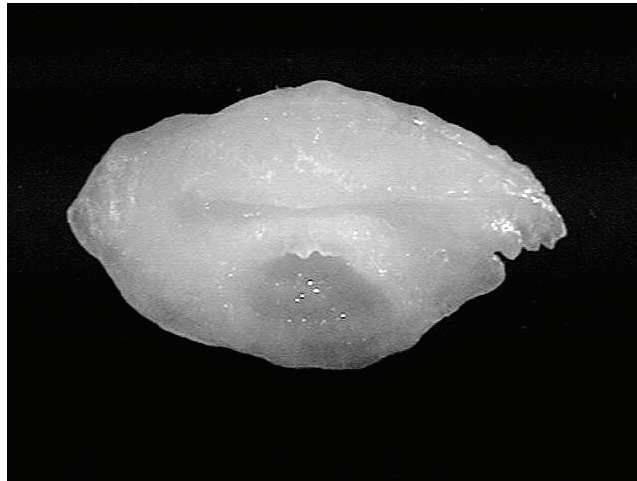
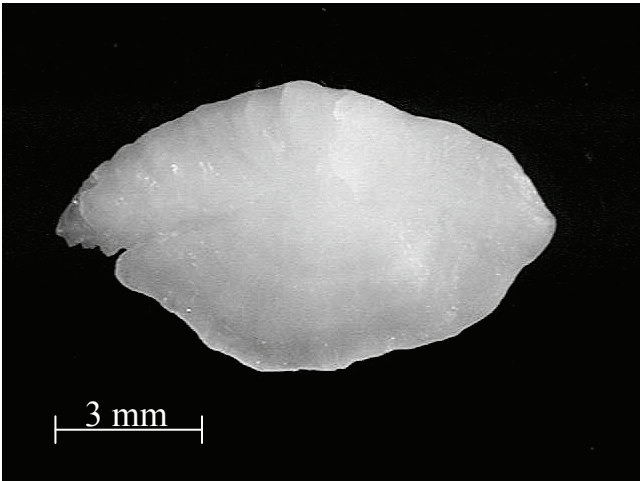


Figure 118. Longspine scorpionfish, *Pontinus longispinis*
Distribution: South Carolina to Brazil, entire GOM
Specimen length: 19.5 cm TL

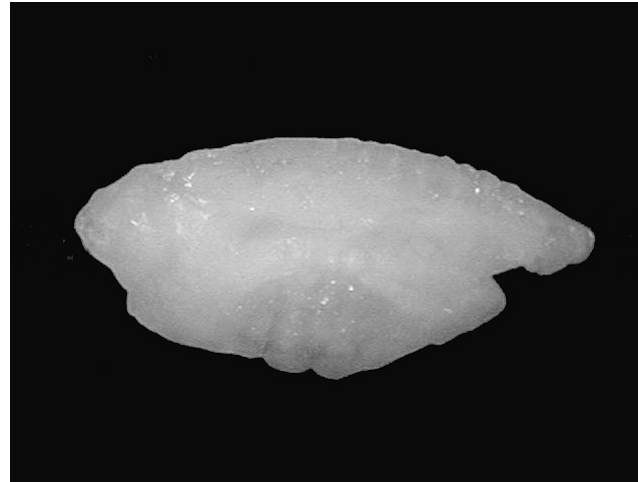
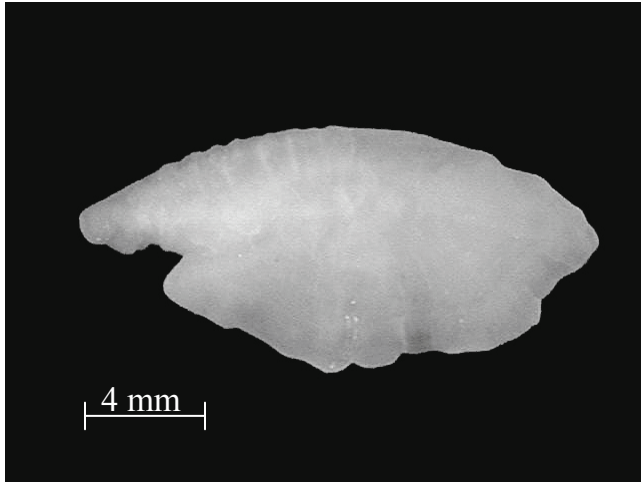


Figure 119. Spinycheek scorpionfish, *Neomerinthe hemingwayi*
 Distribution: New Jersey to south Florida, entire GOM
 Specimen length: XX

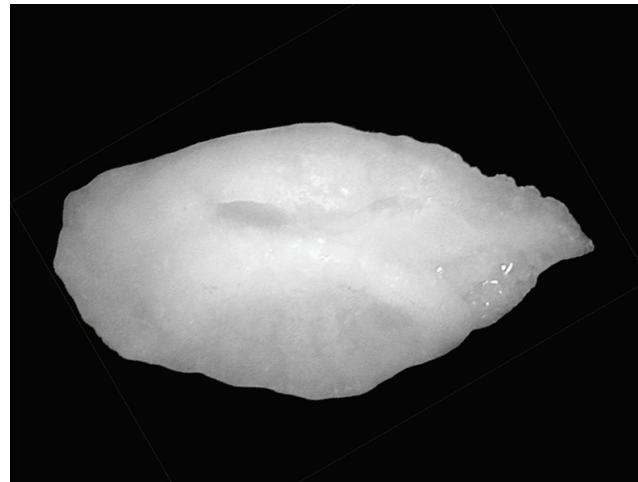
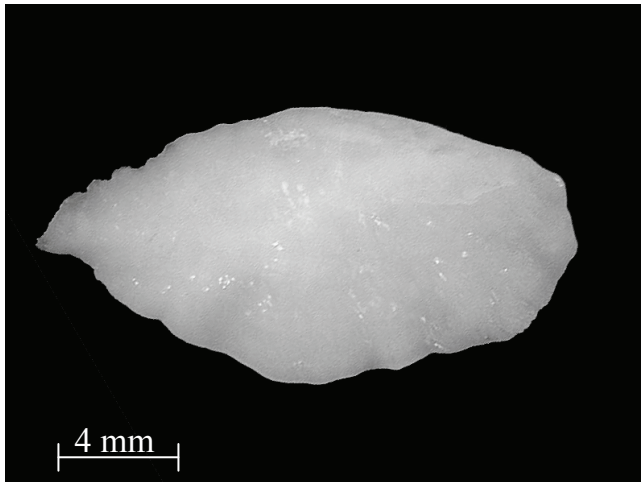


Figure 120. Spotted scorpionfish, *Scorpaena plumieri*
 Distribution: Massachusetts to Brazil, GOM, Bahamas, Antilles
 Specimen length: 46.0 cm TL

Family Serranidae: Sea basses

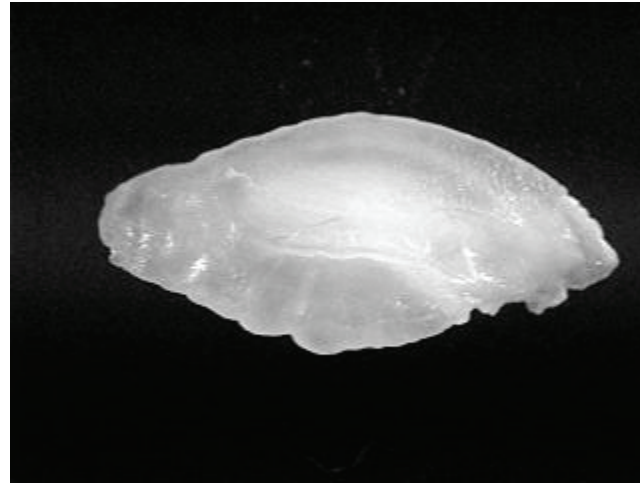
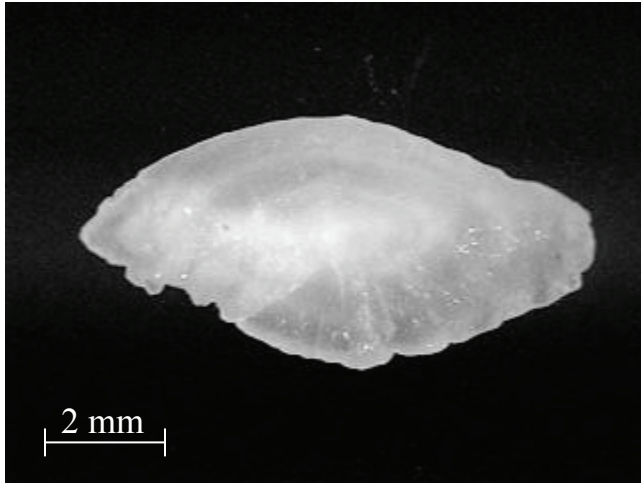


Figure 121. Bank sea bass,
Centropristis ocyurus
Distribution: North Carolina
to northeast Florida, GOM
Specimen length: 18.4 cm TL

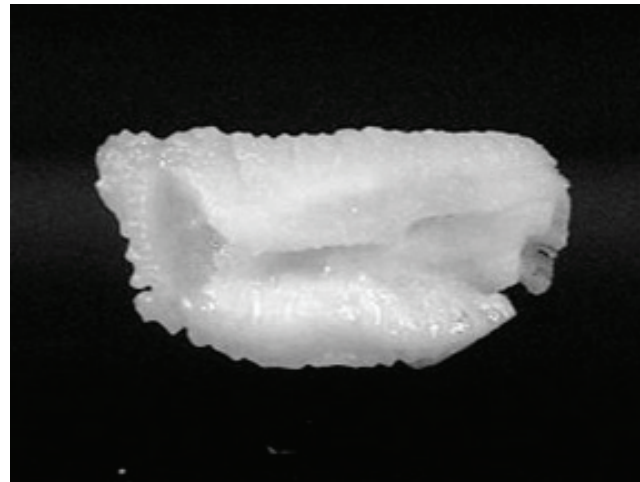
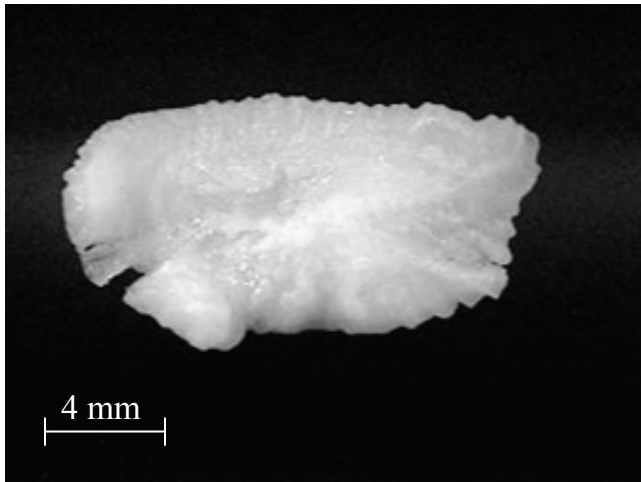


Figure 122. Black grouper,
Mycteroperca bonaci
Distribution: Massachusetts,
Bermuda, and northern GOM
to southeastern Brazil
Specimen length: 121.5 cm
FL

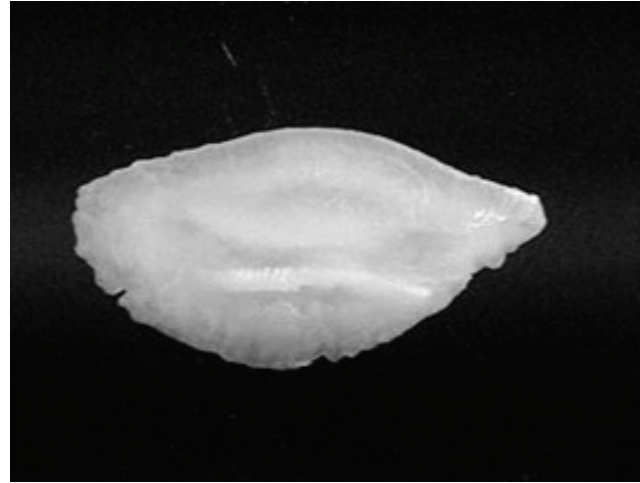
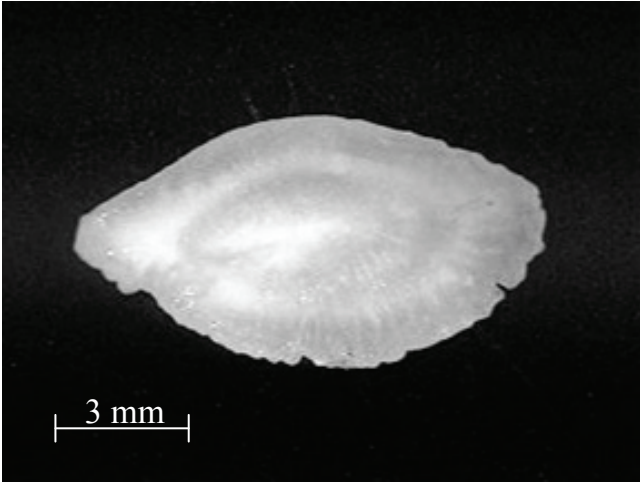


Figure 123. Black sea bass,
Centropristis striata
Distribution: Maine to
northeastern Florida and
eastern GOM
Specimen length: 30.3 cm TL

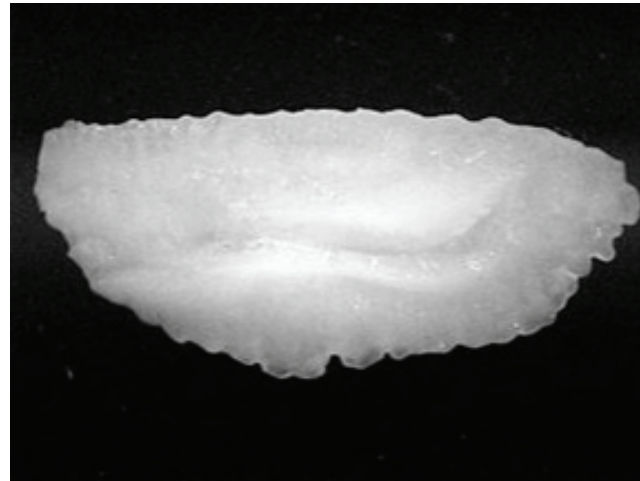
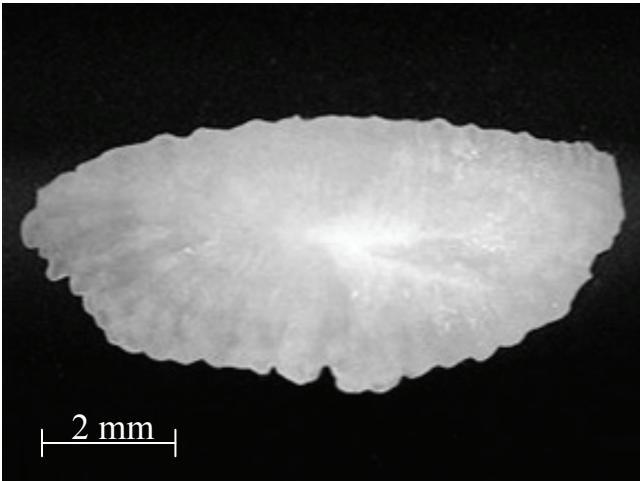


Figure 124. Comb grouper,
Mycteroperca rubra
Distribution: Texas and
Greater Antilles to Brazil
Specimen length: 50.0 cm TL

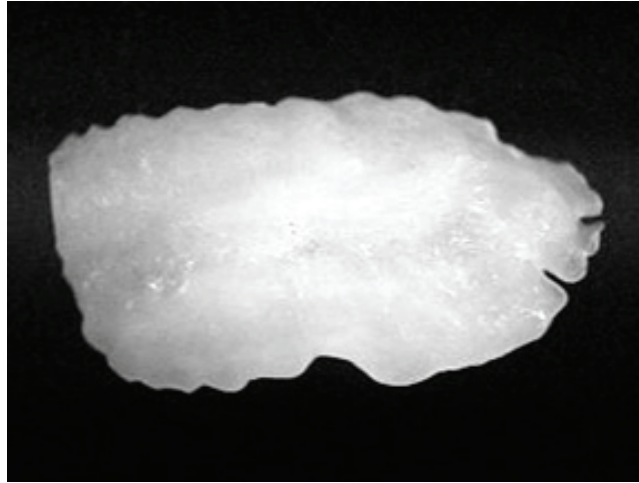
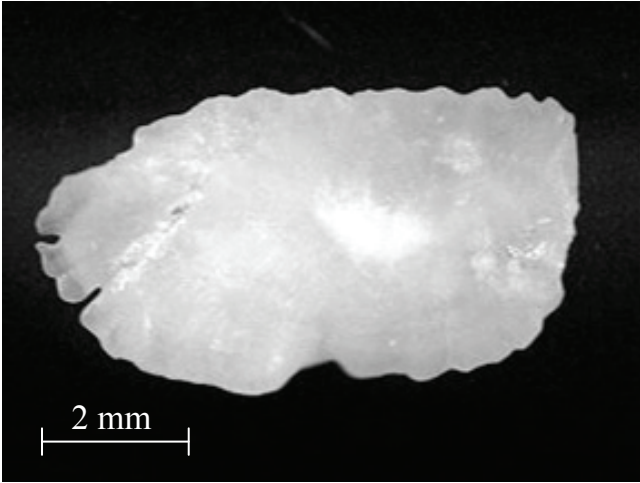


Figure 125. Coney,
Epinephelus fulvus
Distribution: Bermuda,
southeastern Florida, and
Bahamas to southeastern
Brazil
Specimen length: 25.5 cm TL

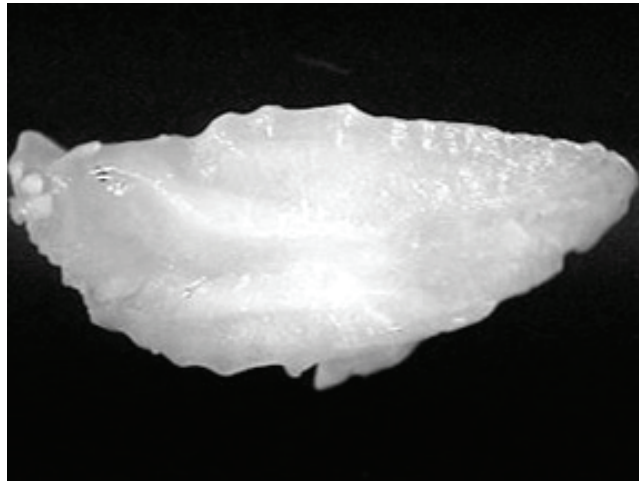
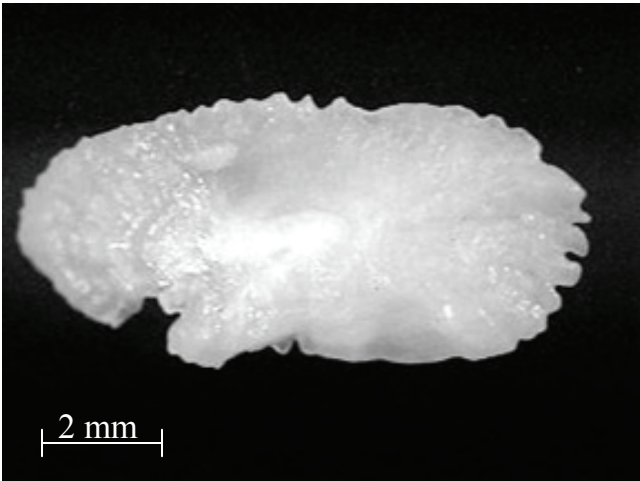


Figure 126. Creole-fish,
Paranthias furcifer
Distribution: Bermuda,
southeastern Florida, and
northern GOM to Brazil;
eastern Atlantic and eastern
Pacific
Specimen length: 39.7 cm TL

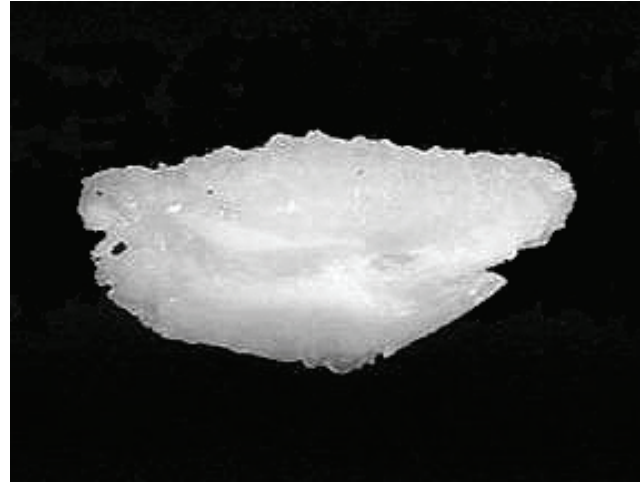
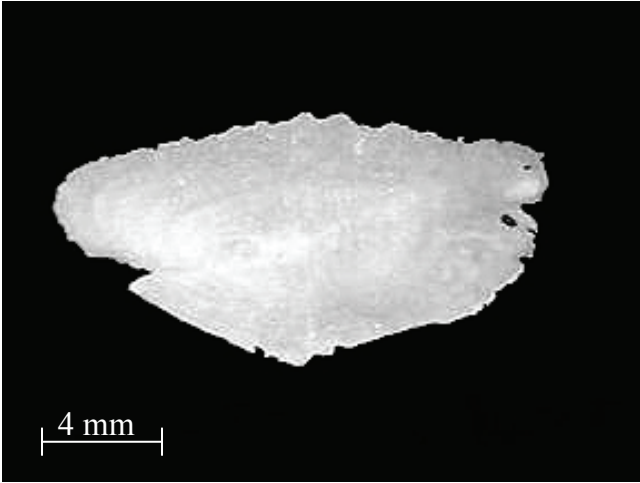


Figure 127. Gag,
Mycteroperca microlepis
Distribution: Massachusetts,
Bermuda, and Northern
GOM to Seastern Brazil
Specimen length: 75.6 cm FL

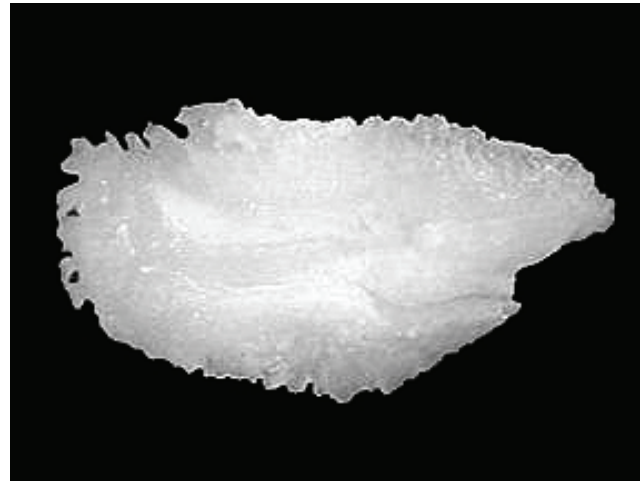
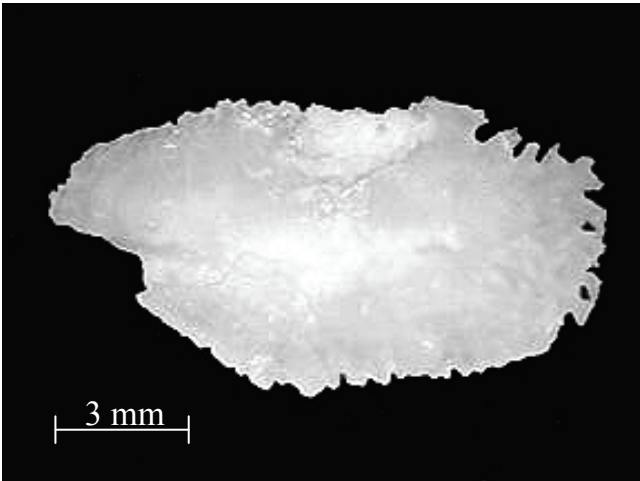


Figure 128. Goliath grouper,
Epinephelus itajara
Distribution: Bermuda,
Florida and Northern GOM
to Seastern Brazil
Specimen length: 70.2 cm TL

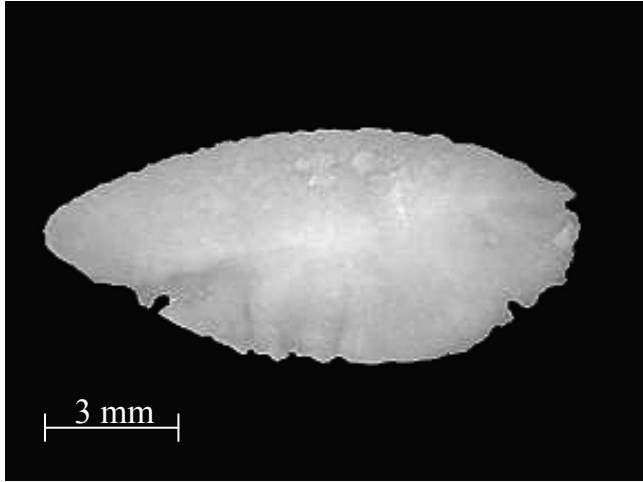


Figure 129. Graysby,
Epinephelus cruentatus
Distribution: Bermuda,
Florida, Bahamas, and
northern GOM to
southeastern Brazil
Specimen length: 32.1 cm TL

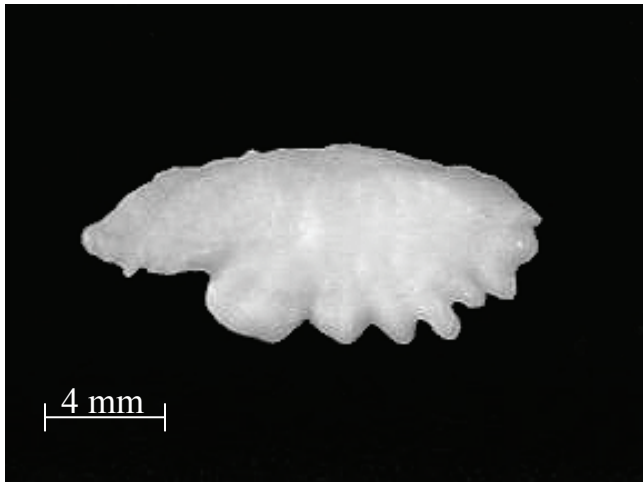


Figure 130. Longtail bass,
Hemanthias leptus
Distribution: South Carolina
and northern GOM to
northern Brazil
Specimen length: 42.0 cm TL

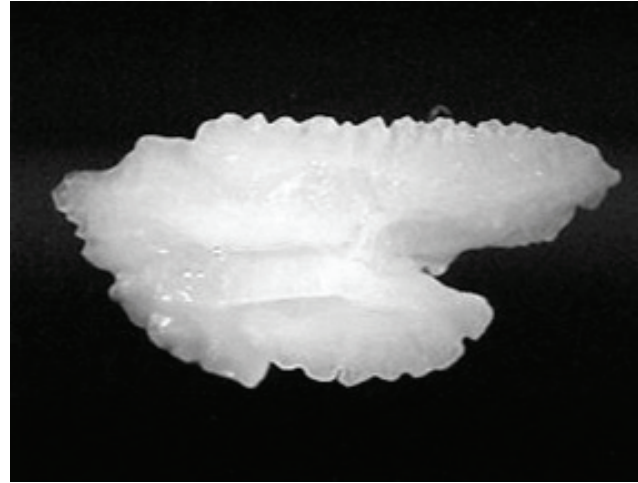
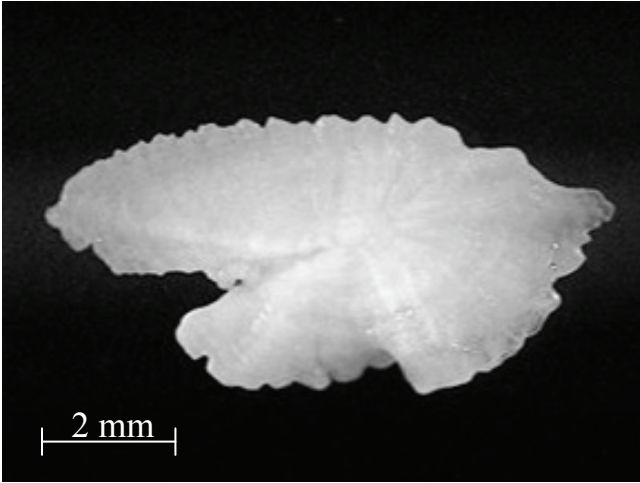


Figure 131. Marbled grouper,
Epinephelus inermis
Distribution: Bermuda,
southern Florida, and western
Bahamas to northern South
America
Specimen length: 66.5 cm FL

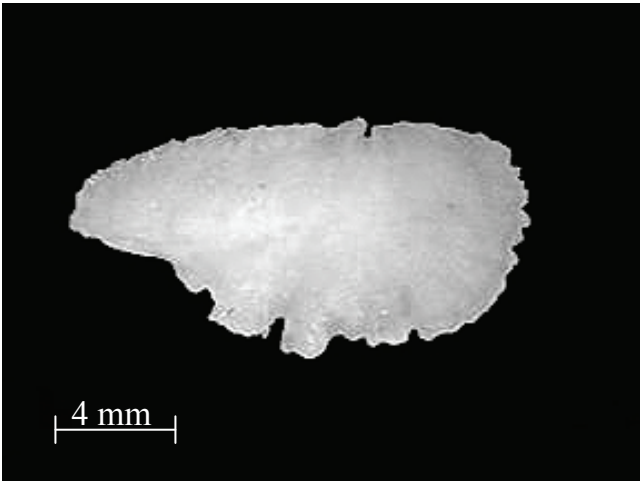


Figure 132. Misty grouper,
Epinephelus mystacinus
Distribution: Bermuda, SE
Florida, and Bahamas to
Brazil
Specimen length: 40.0 cm TL

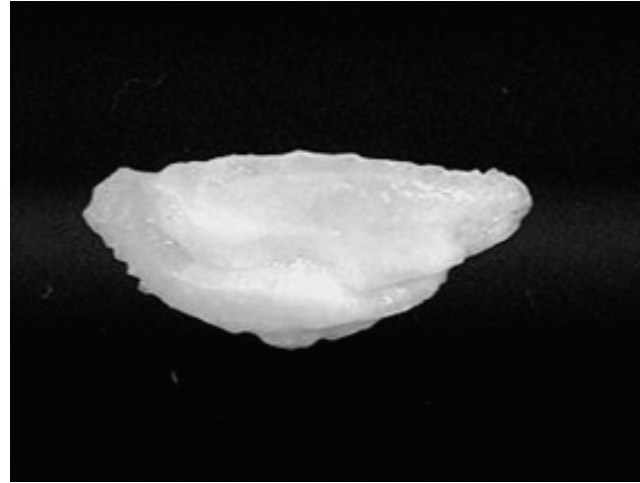
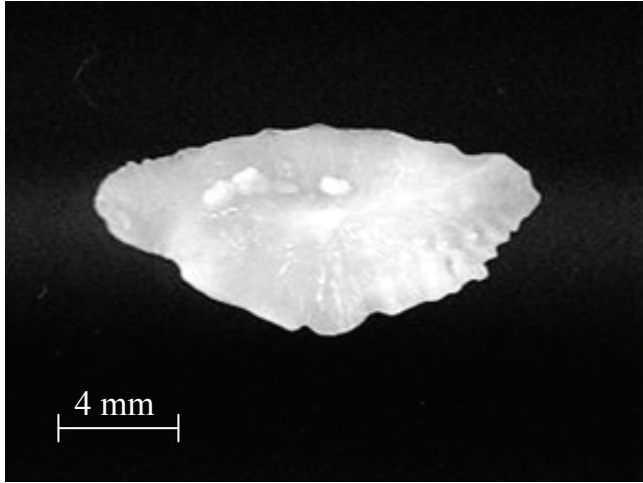


Figure 133. Red hind,
Epinephelus guttatus
Distribution: North Carolina,
Bermuda, Bahamas, and
southeastern GOM to Brazil
Specimen length: 49.5 cm FL

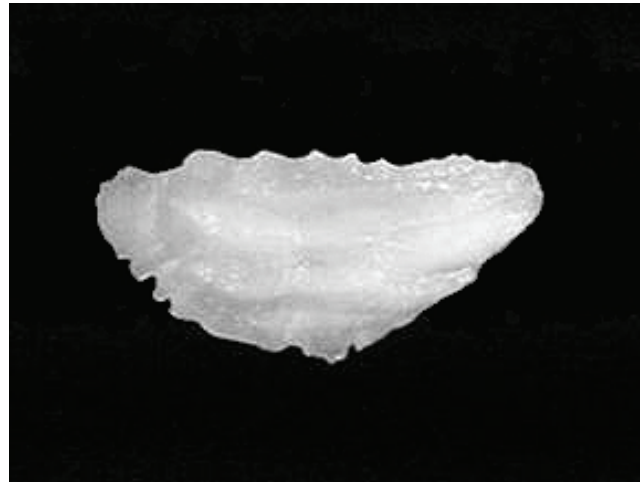
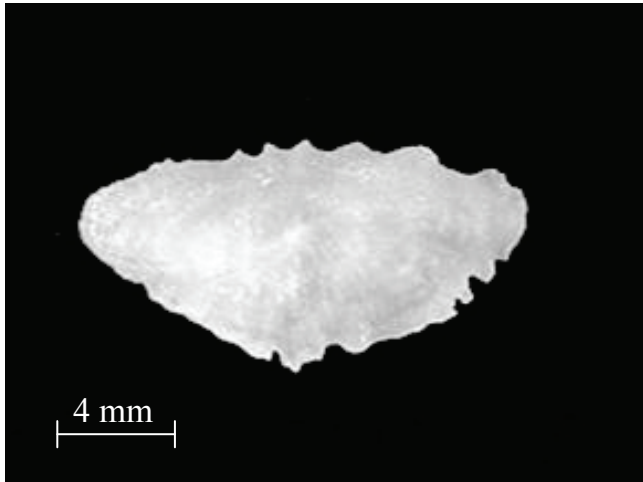


Figure 134. Red grouper,
Epinephelus morio
Distribution: Massachusetts,
Bermuda and northern GOM
to southeastern Brazil
Specimen length: 43.0 cm TL

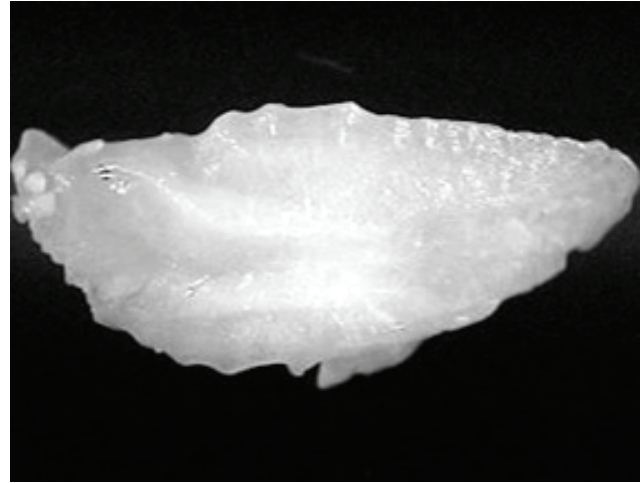
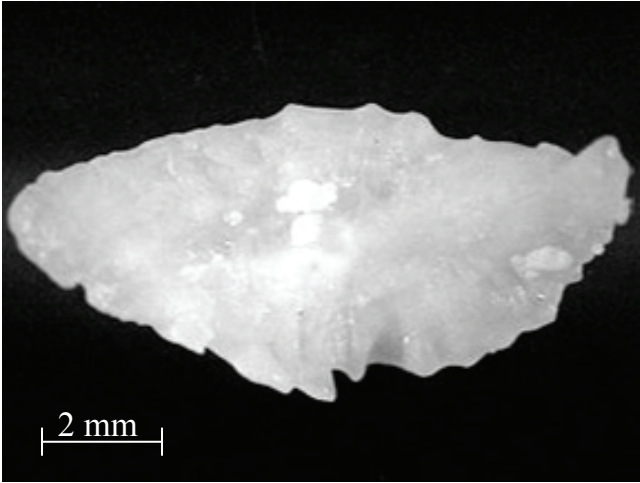


Figure 135. Rock hind, *Epinephelus adscensionis*
Distribution: Massachusetts, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 37.0 cm TL

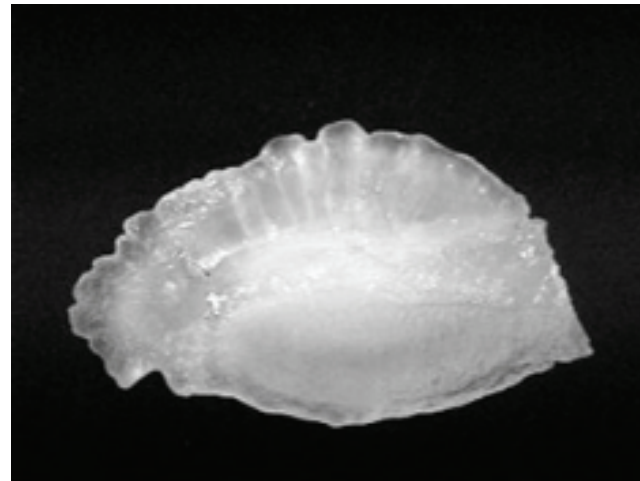
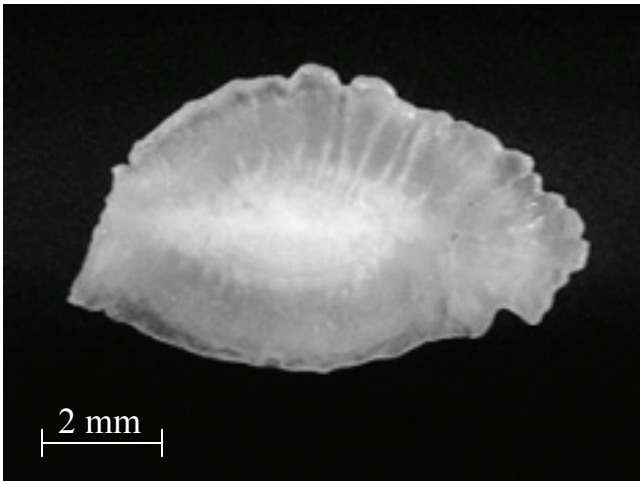


Figure 136. Rock sea bass, *Centropristis philadelphica*
Distribution: North Carolina to Florida and northern GOM
Specimen length: 28.3 cm TL

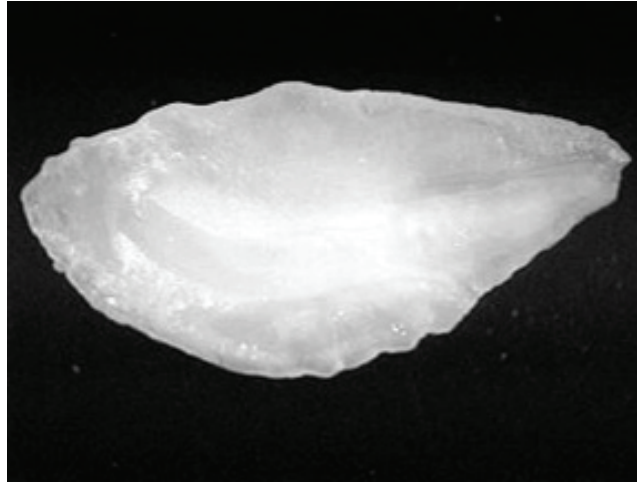
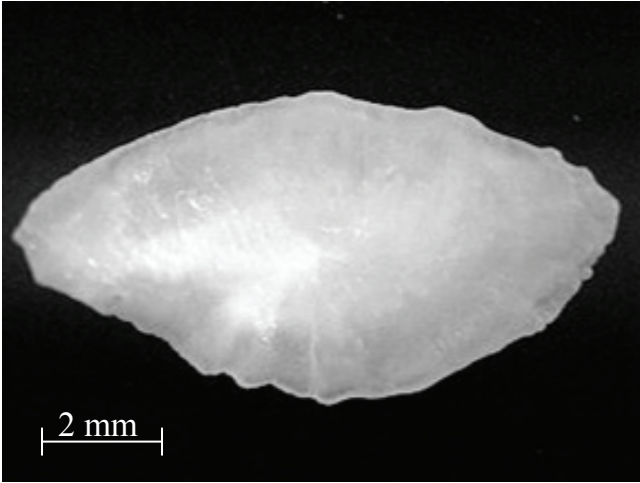


Figure 137. Sand perch,
Diplectrum formosum
Distribution: North Carolina,
Bahamas, and northern GOM
to Brazil
Specimen length: 28.6 cm TL

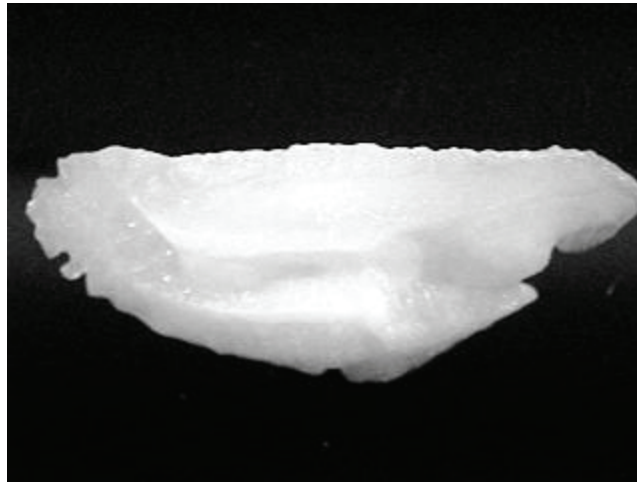
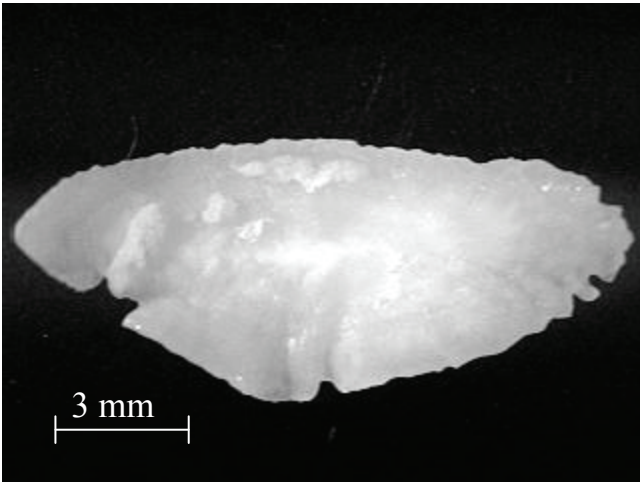


Figure 138. Scamp,
Mycteroperca phenax
Distribution: Massachusetts
and northern GOM to
Venezuela
Specimen length: 53.4 cm TL

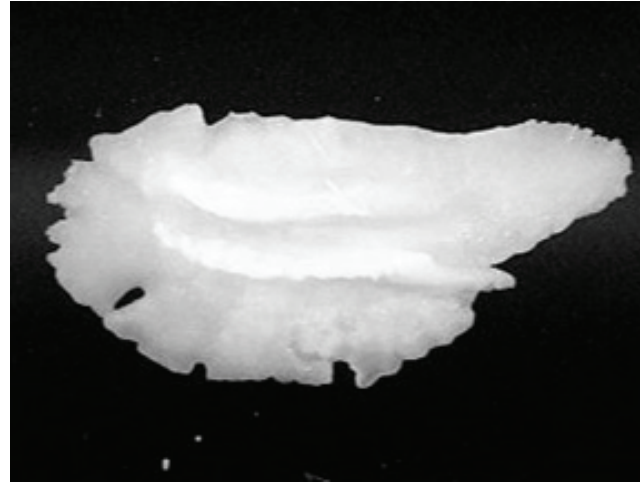
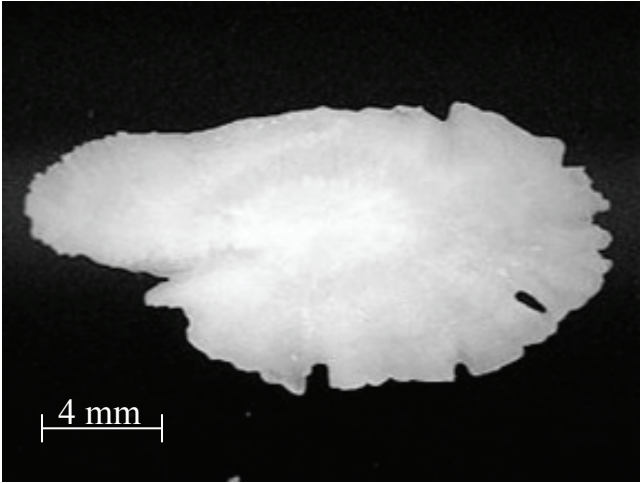


Figure 139. Snowy grouper,
Epinephelus niveatus
Distribution: Massachusetts
and northern GOM to
southeastern Brazil, eastern
Pacific
Specimen length: 72.5 cm TL

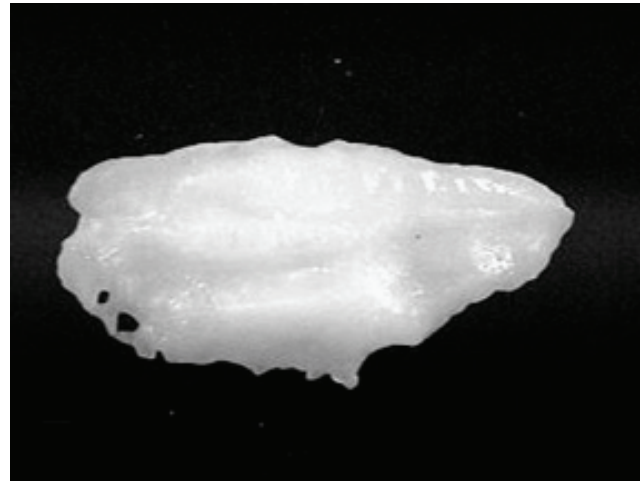
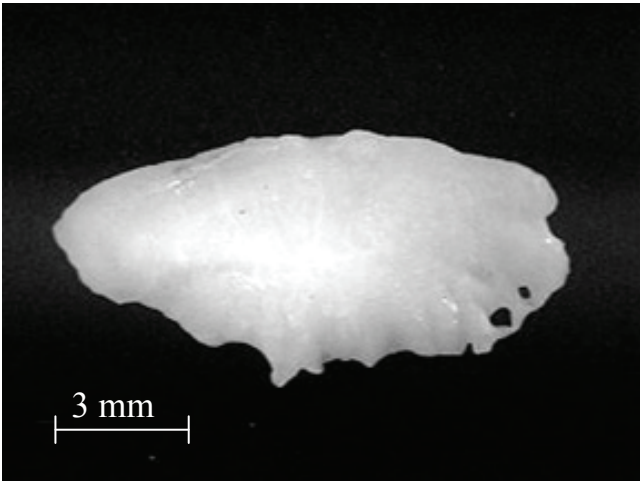


Figure 140. Spanish flag,
Gonioplectrus hispanus
Distribution: Texas and
Bahamas, Greater and Lesser
Antilles, Caribbean Islands
Specimen length: 25.8 cm TL

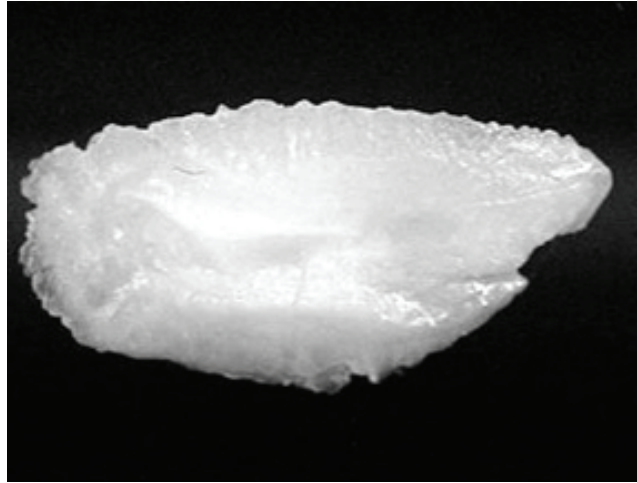
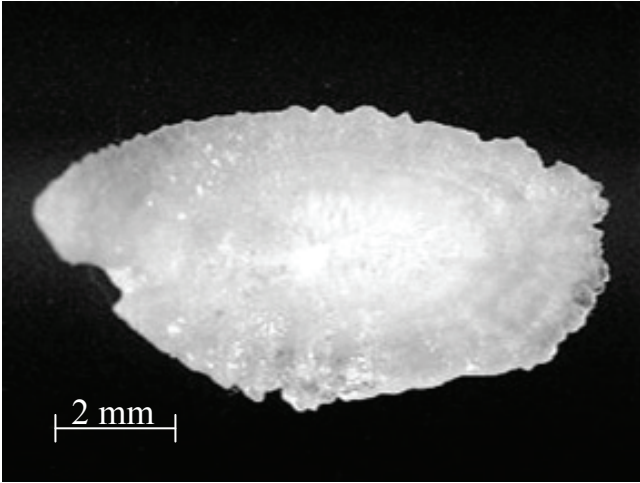


Figure 141. Speckled hind, *Epinephelus drummondhayi*
Distribution: South Carolina, Bermuda, and northwestern and southeastern Florida
Specimen length: 49.0 cm TL

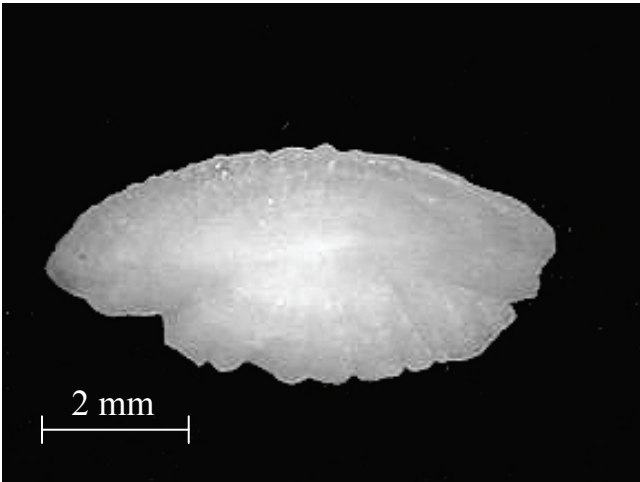


Figure 142. Tattler, *Serranus phoebe*
Distribution: Bermuda, South Carolina, northeastern GOM, and Yucatan to northern South America
Specimen length: <10 cm TL (est)

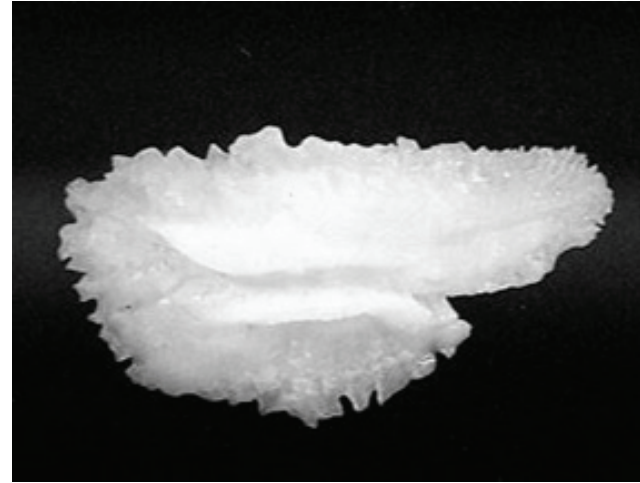
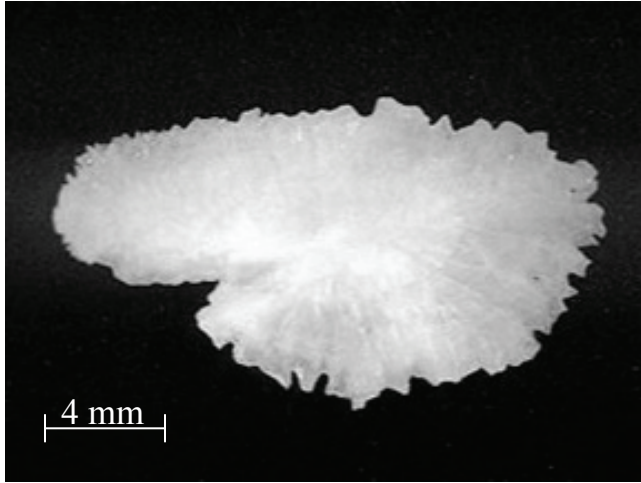


Figure 143. Warsaw grouper, *Epinephelus nigritus*
 Distribution: Massachusetts and Bermuda to southeastern Brazil
 Specimen length: 99.5 cm TL

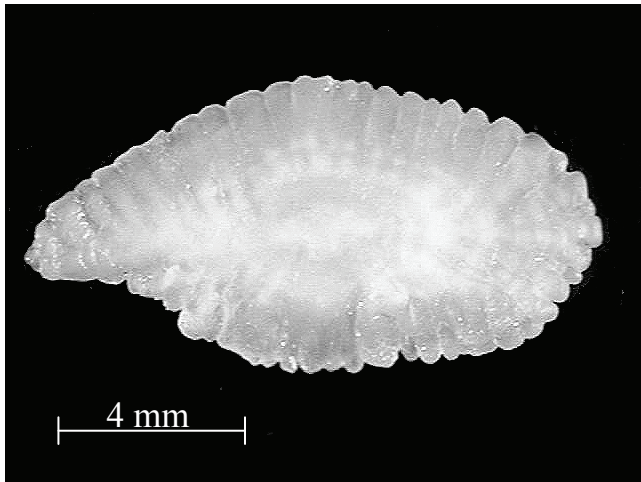


Figure 144a. Yellowedge grouper, *Epinephelus flavolimbatus*
 Distribution: Florida and northern GOM to Brazil
 Specimen length: 18.9 cm TL

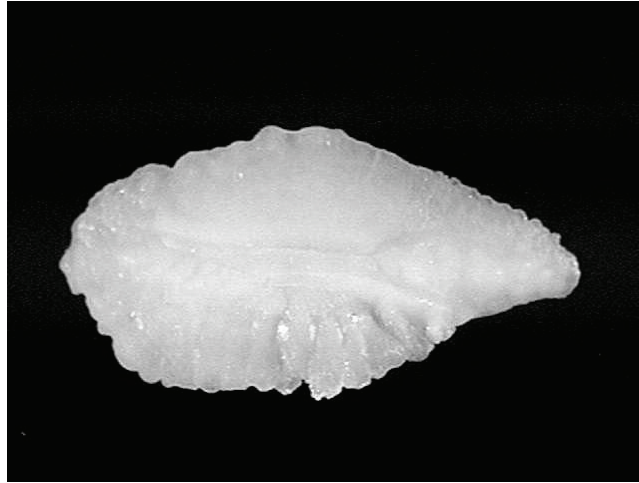
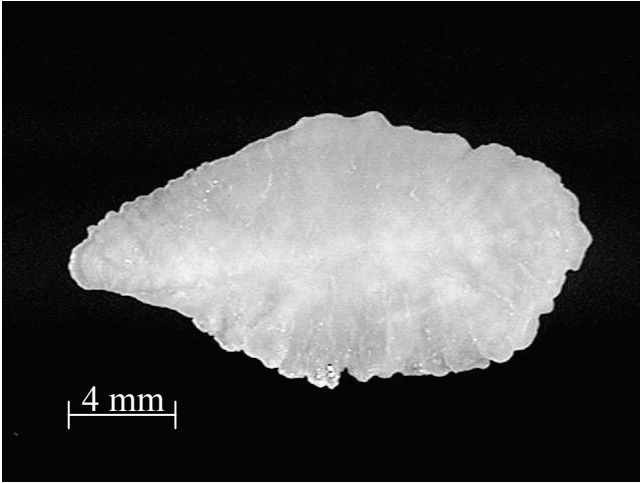


Figure 144b. Yellowedge grouper, *Epinephelus flavolimbatus*
Distribution: Florida and Northern GOM to Brazil
Specimen length: 33.0 cm TL

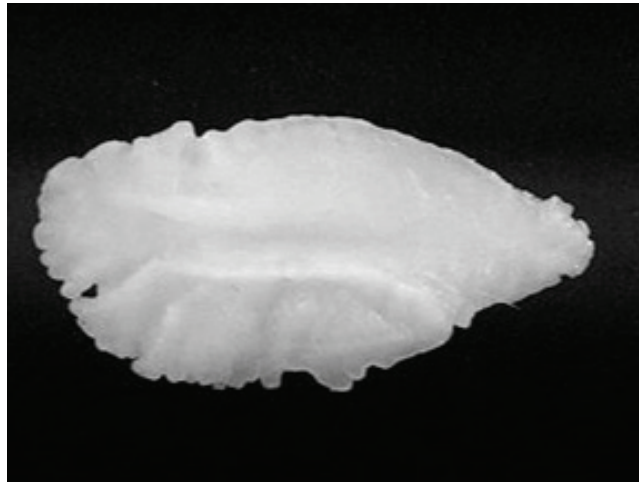
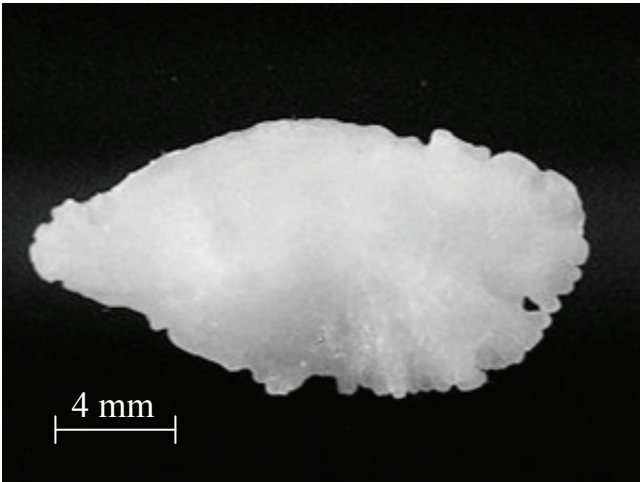


Figure 144c. Yellowedge grouper, *Epinephelus flavolimbatus*
Distribution: Florida and northern GOM to Brazil
Specimen length: 42.6 cm TL

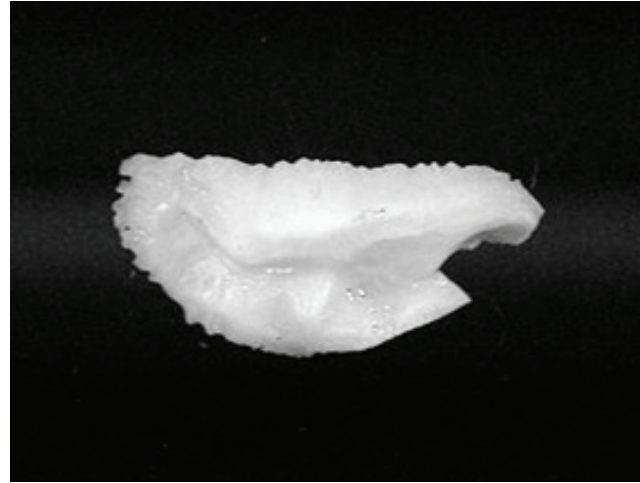
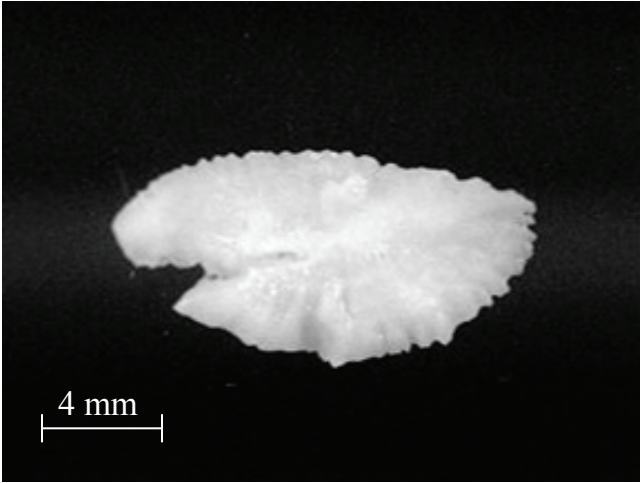


Figure 145. Yellowfin grouper, *Myctoperca venenosa*
Distribution: Bermuda, Florida, and southeastern GOM to Brazil
Specimen length: 87.5 cm FL

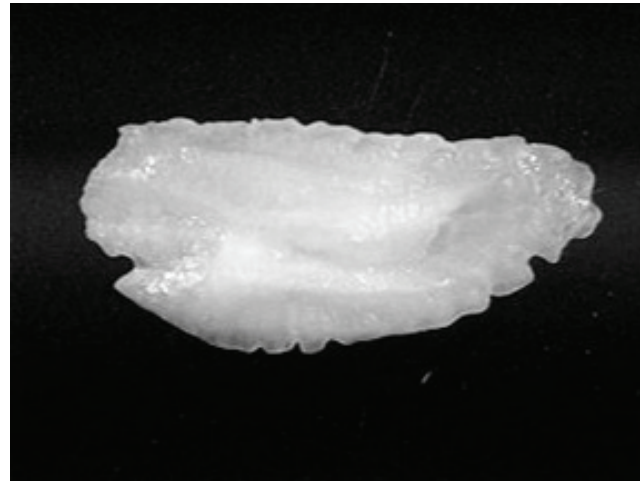
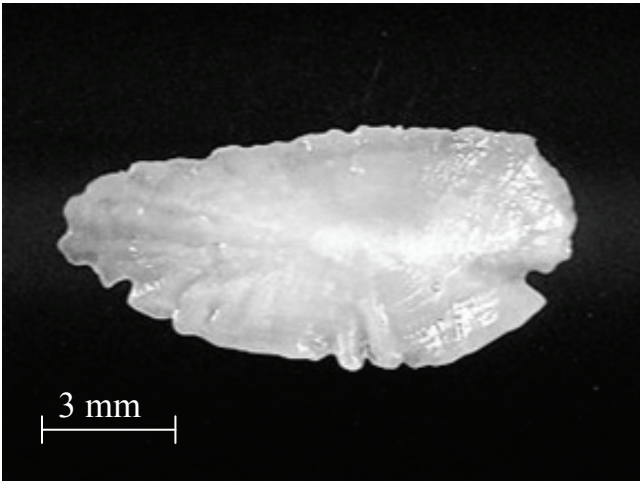


Figure 146. Yellowmouth grouper, *Mycteroperca interstitialis*
Distribution: Bermuda, southeastern Florida, and Bahamas to Brazil
Specimen length: 56.0 cm FL

Family Soleidae: Soles

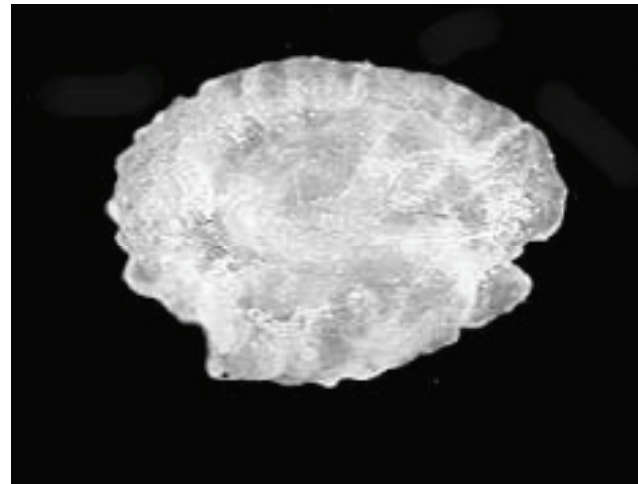
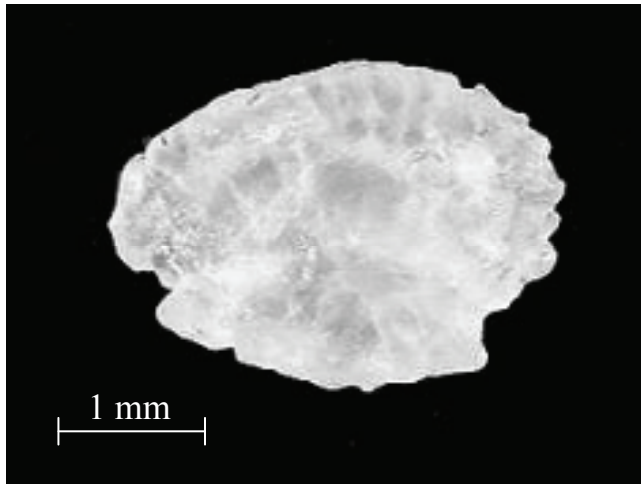


Figure 147. Hogchoker,
Trinectes maculatus
Distribution: Massachusetts
and northern GOM to
Venezuela
Specimen length: 11.0 cm TL

Family Sparidae: Porgies

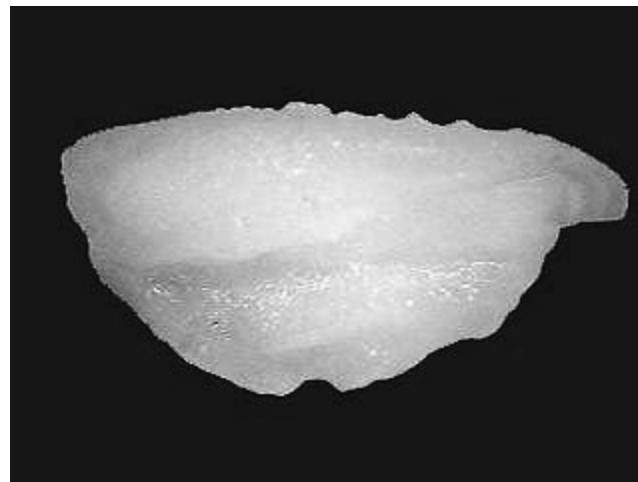
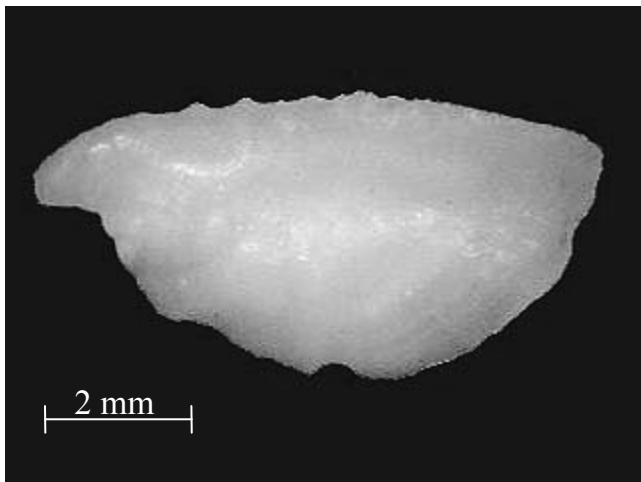


Figure 148. Grass pogy,
Calamus arctifrons
Distribution: Southeastern
Florida to Louisiana
Specimen length: 26.5 cm TL

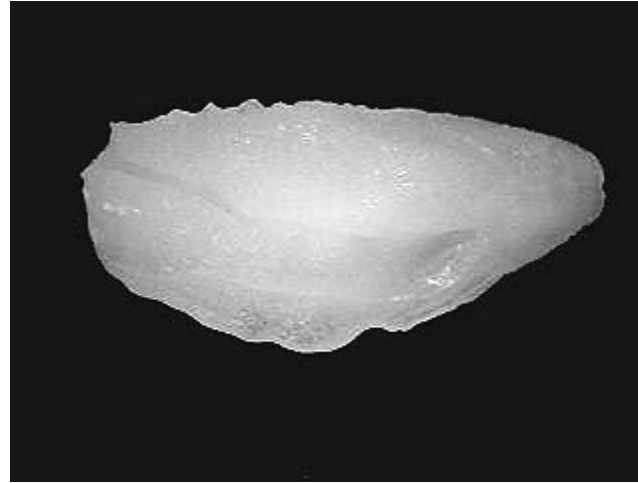
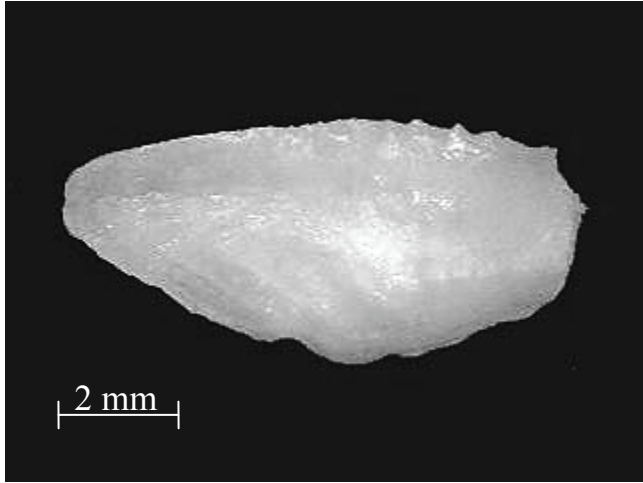


Figure 149. Jolthead pogy,
Calamus bajonado
Distribution: Rhode Island,
Bermuda, and northern GOM
to Brazil
Specimen length: 32.4 cm TL

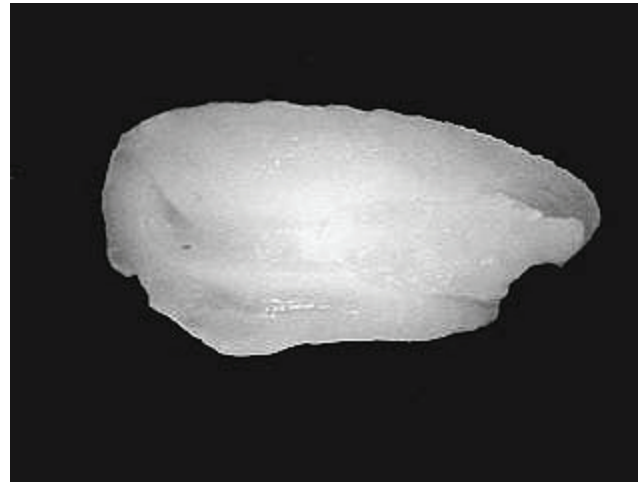
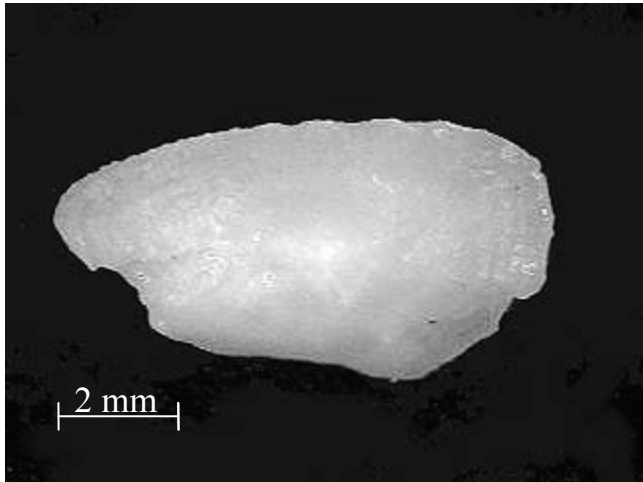


Figure 150. Knobbed pogy,
Calamus nodosus
Distribution: North Carolina
to southeastern Florida and
GOM
Specimen length: 31.0 cm TL

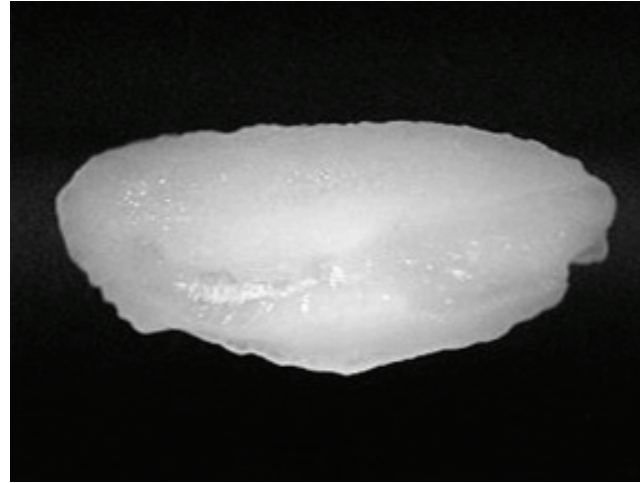
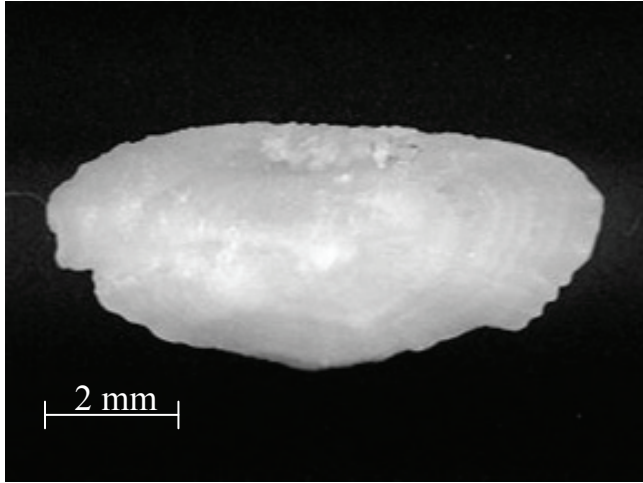


Figure 151. Littlehead pogy,
Calamus proridens
Distribution: Northeastern
Florida and northern GOM to
Bay of Campeche
Specimen length: 30.8 cm FL

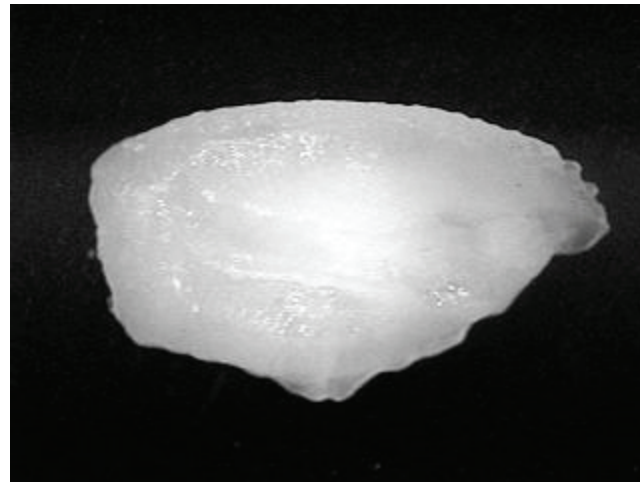
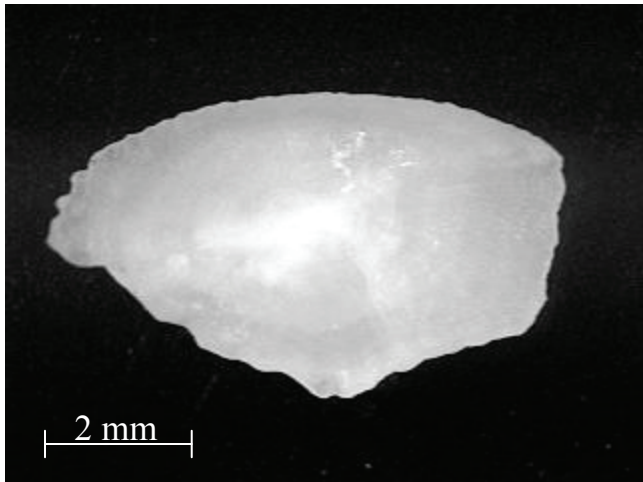


Figure 152. Longspine pogy,
Stenotomus caprinus
Distribution: North Carolina
to Georgia, and GOM to
Yucatan
Specimen length: 16.0 cm FL

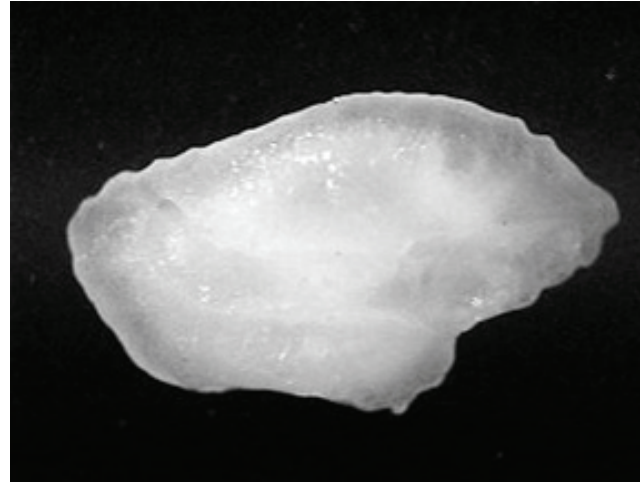
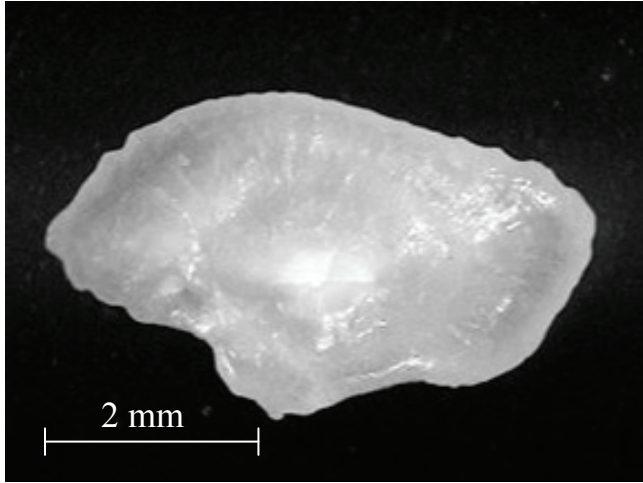


Figure 153a. Pinfish,
Lagodon rhomboides
Distribution: Massachusetts,
Bermuda, and northern GOM
to Florida Keys and Yucatan
Specimen length: 14.3 cm FL

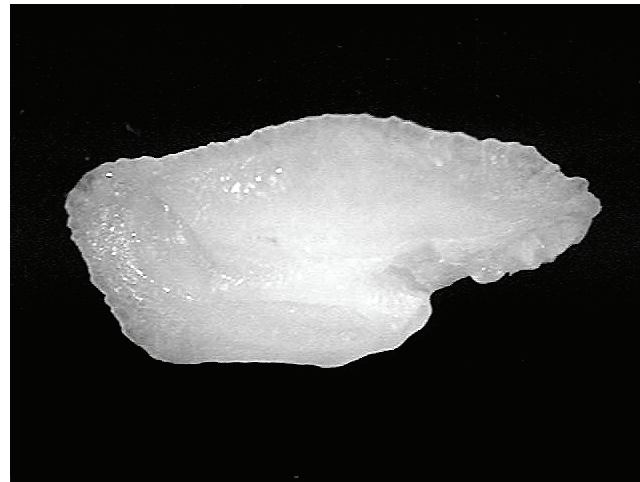
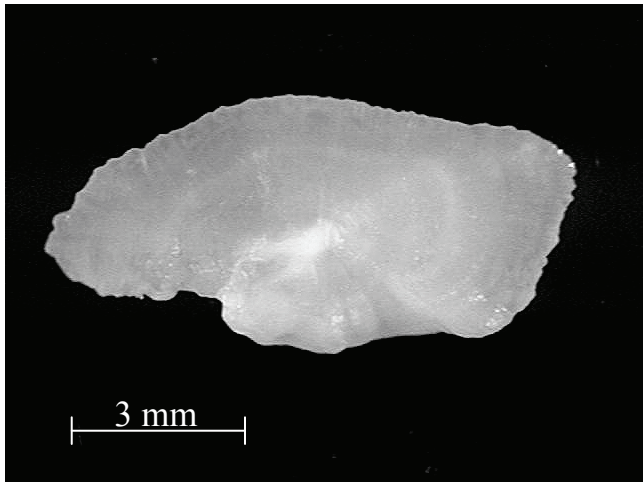


Figure 153b. Pinfish,
Lagodon rhomboides
Distribution: Massachusetts,
Bermuda, and northern GOM
to Florida Keys and Yucatan
Specimen length: 22.9 cm FL

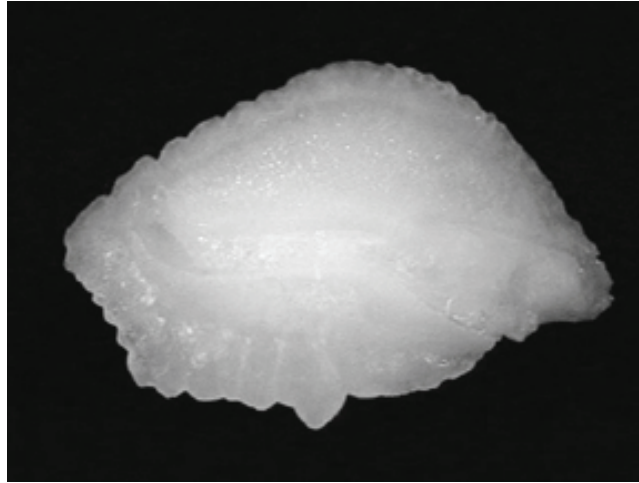
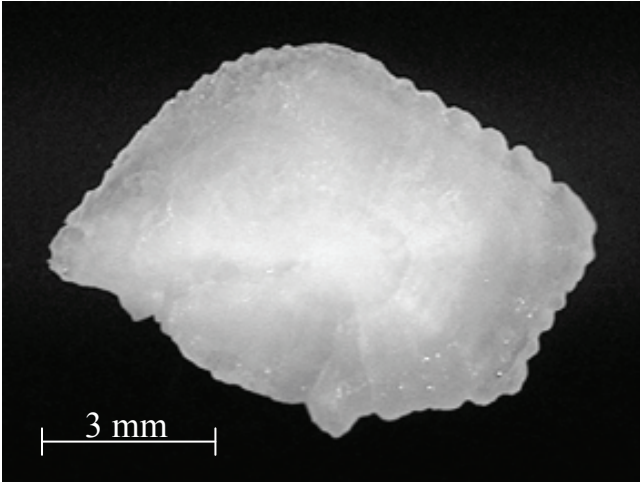


Figure 154. Red pogy,
Pagrus pagrus
Distribution: New York and
northern GOM to Argentina,
eastern Atlantic
Specimen length: 20 cm TL
(est)

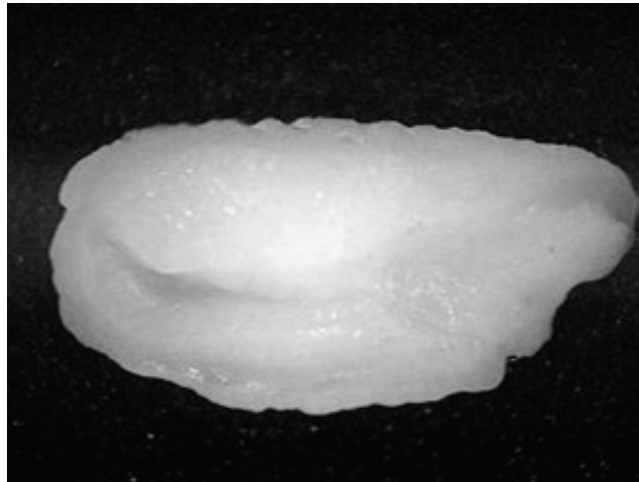
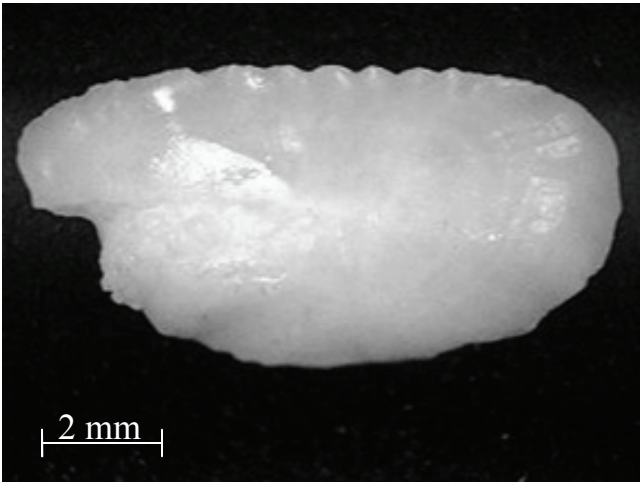


Figure 155. Saucereye pogy,
Calamus calamus
Distribution: North Carolina,
Bermuda, and northern GOM
to Brazil
Specimen length: 43.2 cm TL

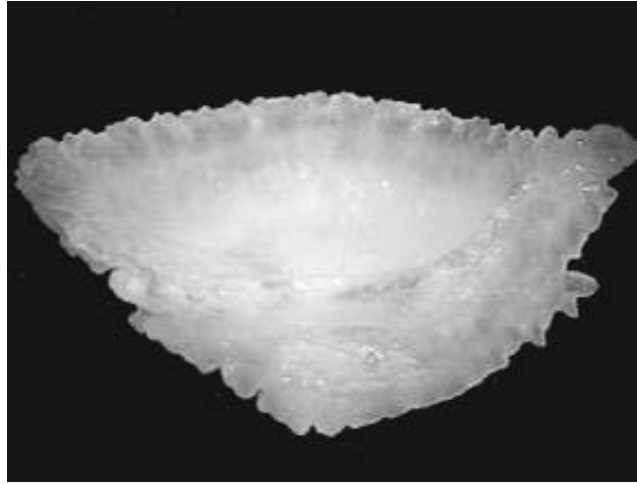
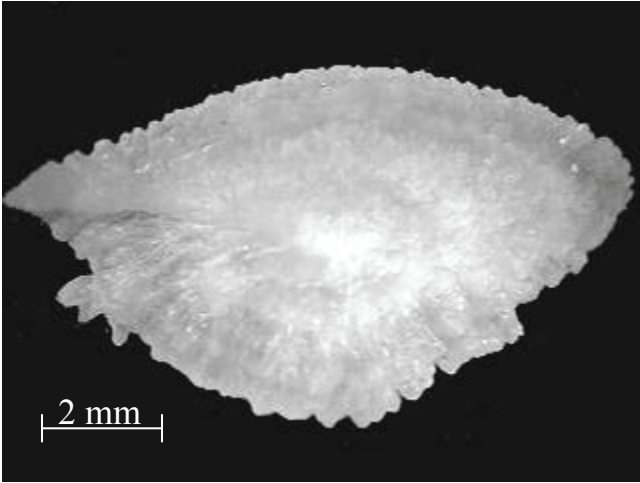


Figure 156. Sheepshead,
Archosargus
probatocephalus
Distribution: Nova Scotia
and northern GOM to Brazil
Specimen length: 35.3 cm FL

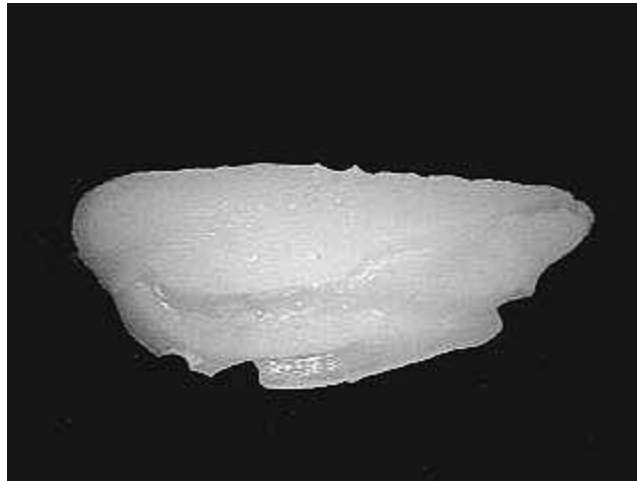
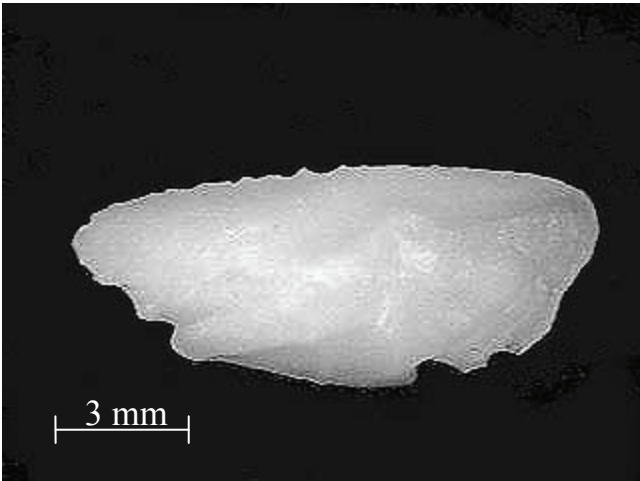


Figure 157. Whitebone
porgy, *Calamus leucosteus*
Distribution: North Carolina
to southern Florida and GOM
Specimen length: 39.8 cm TL

Family Sphyraenidae: Barracudas

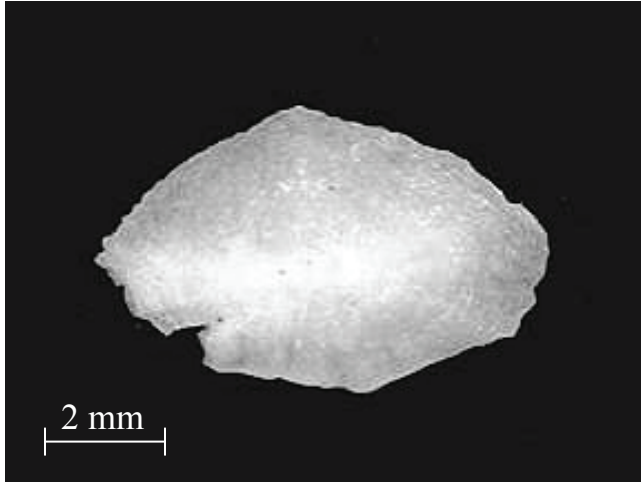


Figure 158. Great barracuda,
Sphyraena barracuda
Distribution: Massachusetts
to southeastern Brazil, nearly
worldwide in warm waters
Specimen length: 46.0 cm TL

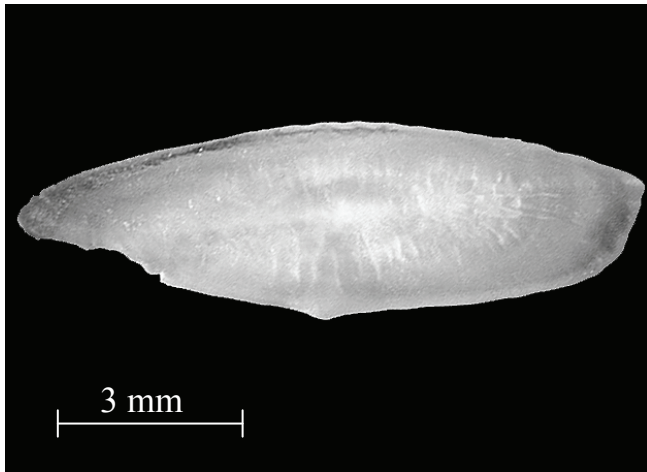


Figure 159. Guaguanche,
Sphyraena guachancho
Distribution: Massachusetts
to Brazil, entire GOM,
Antilles, Bahamas
Specimen length: 39.5 cm FL

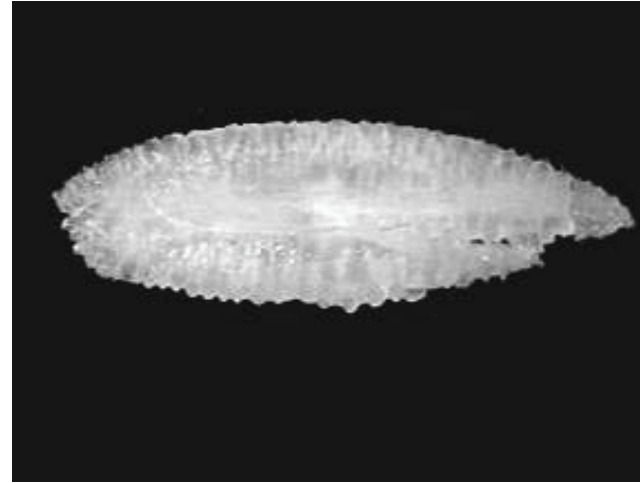
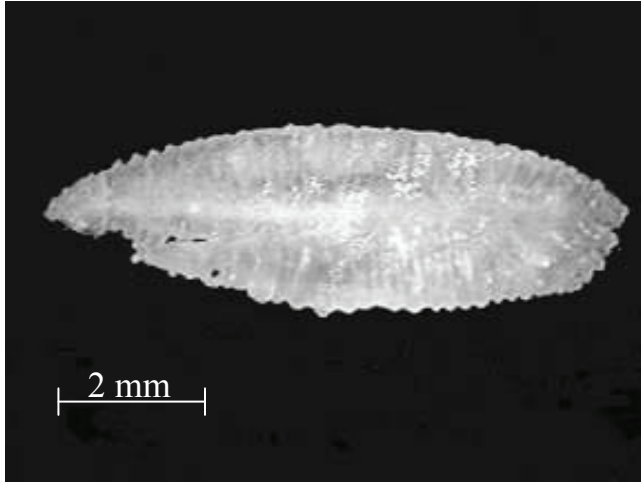


Figure 160. Sennet,
Sphyraena picudilla.
Distribution: Northern
Florida to southern Brazil,
eastern GOM, Lesser Antilles
Specimen length: Unknown

Family Stromateidae: Butterfishes

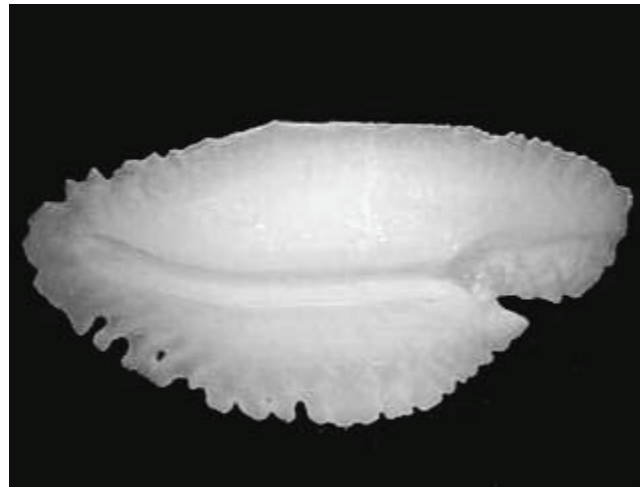
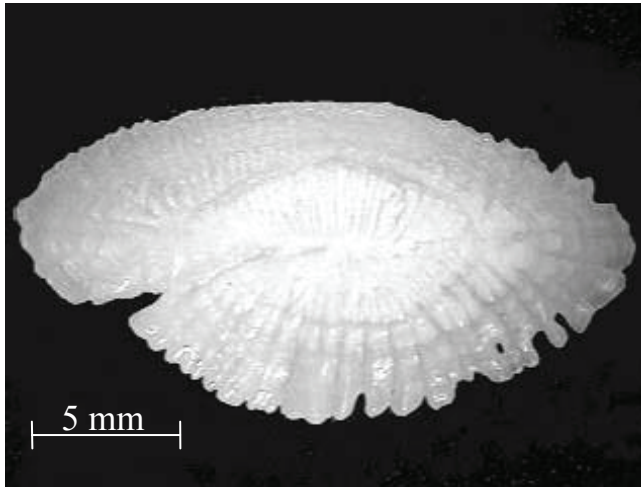


Figure 161. Barrellfish,
Hyperoglyphe perciformis
Distribution: Nova Scotia to
southeastern Florida and
eastern GOM
Specimen length: 78.3 cm TL

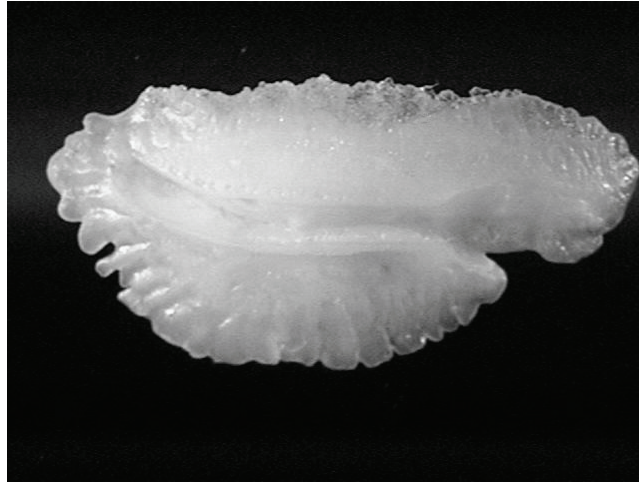
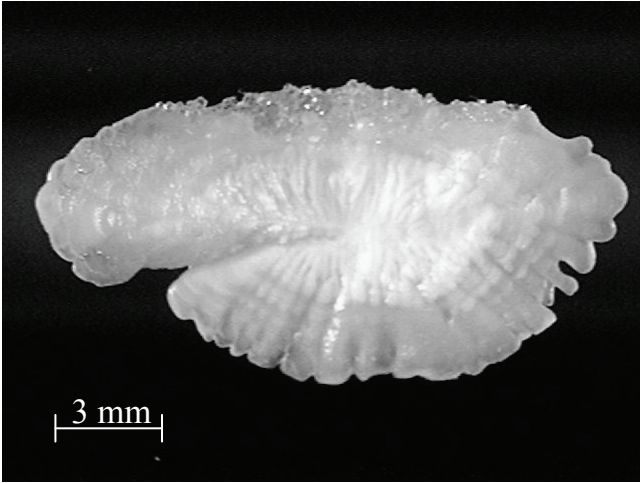


Figure 162. Black driftfish,
Hyperoglyphe bythites
Distribution: Southern
Florida, GOM
Specimen length: 52.7 cm FL

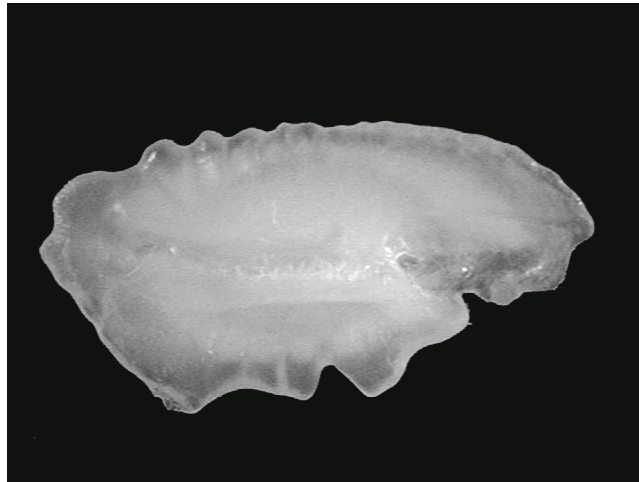
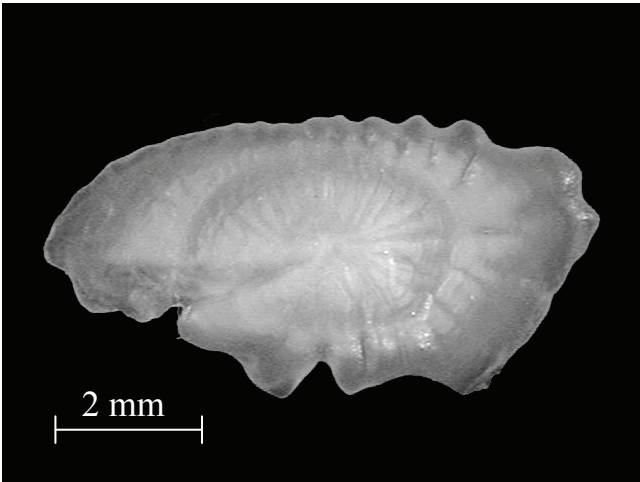


Figure 163. Gulf butterfish,
Peprilus burti
Distribution: Virginia to
Florida, entire GOM
Specimen length: 17.0 cm FL

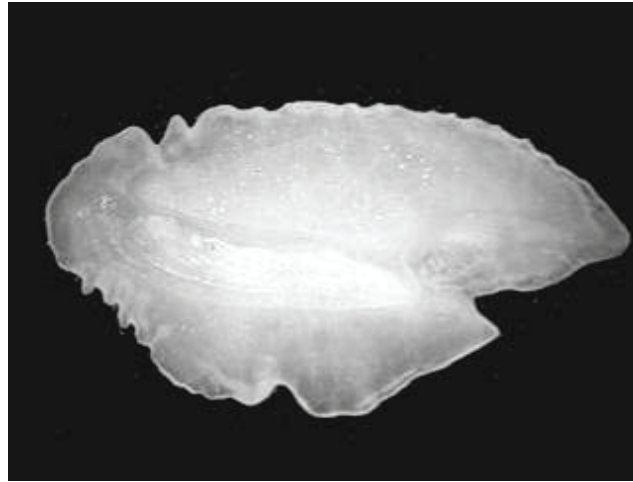
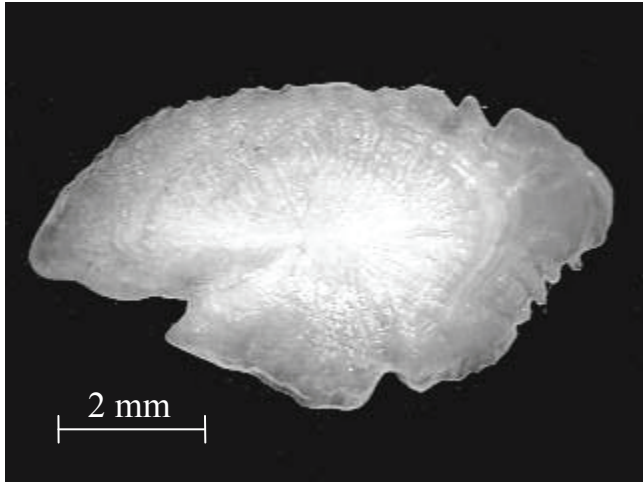


Figure 164. Harvestfish,
Peprilus alepidotus
Distribution: Chesapeake
Bay and northern GOM to
Argentina
Specimen length: 16.0 cm FL

Family Synodontidae: Lizardfishes

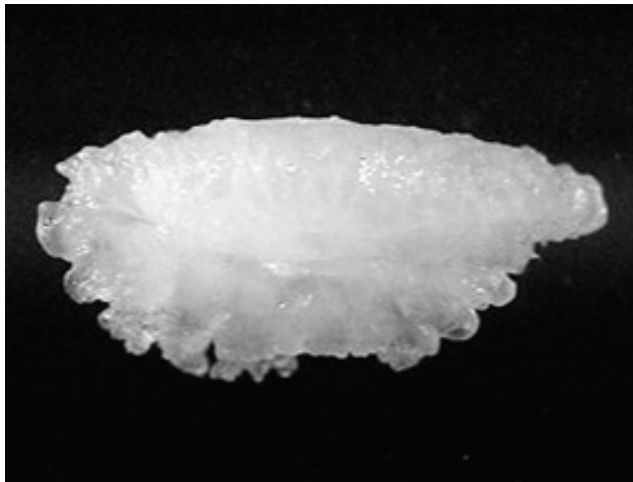
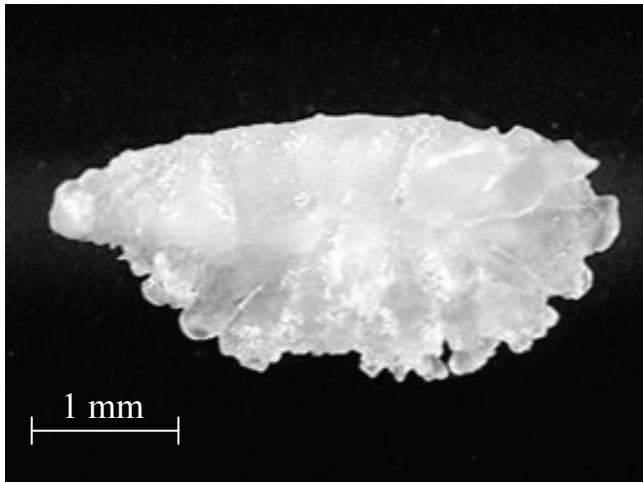


Figure 165a. Inshore
lizardfish, *Synodus foetens*
Distribution: Massachusetts
and northern GOM to Brazil
Specimen length: 16.0 cm FL

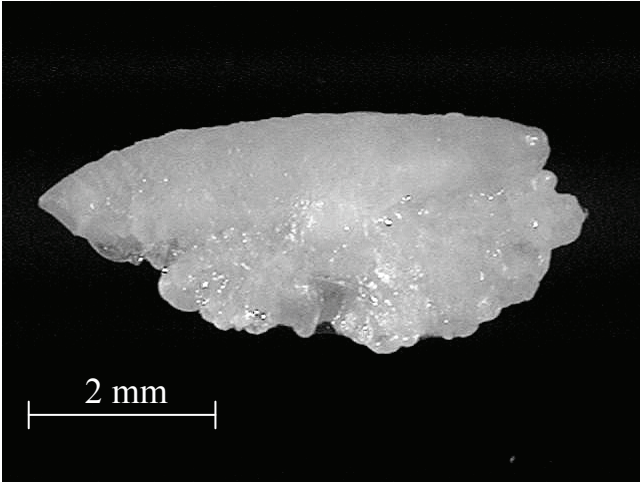


Figure 165b. Inshore lizardfish, *Synodus foetens*
Distribution: Massachusetts and northern GOM to Brazil
Specimen length: 25.5 cm FL

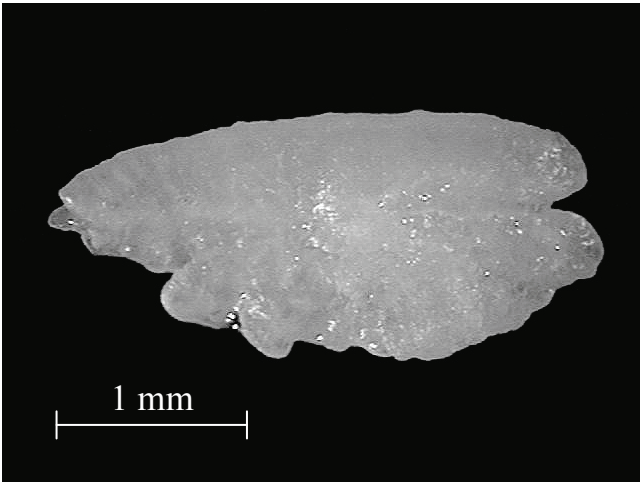


Figure 165c. Inshore lizardfish, *Synodus foetens*
Distribution: Massachusetts and northern GOM to Brazil
Specimen length: 39.0 cm FL

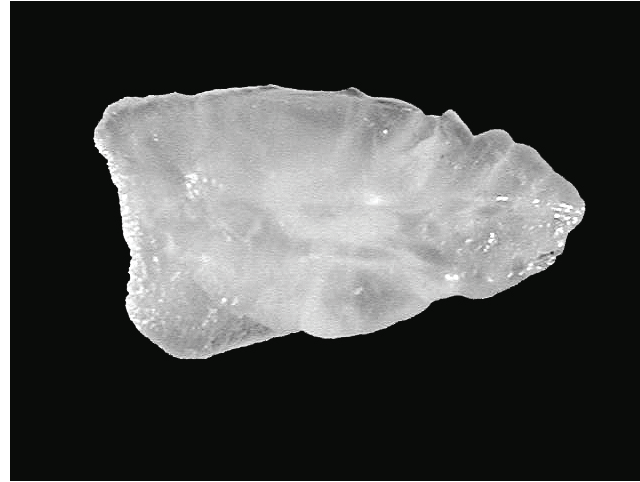
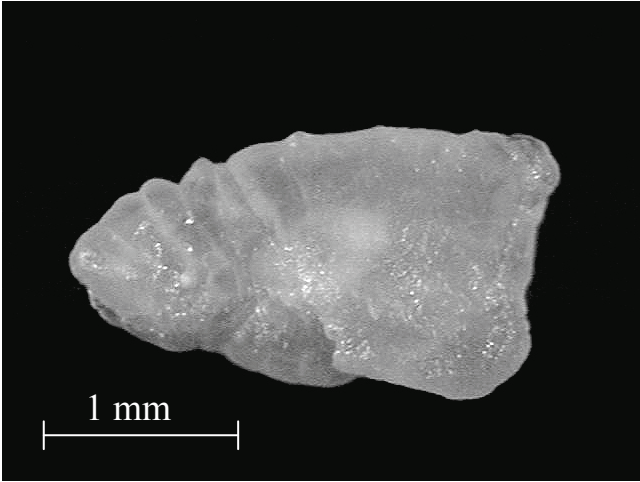


Figure 166. Red lizardfish,
Synodus synodus
Distribution: Massachusetts
to Brazil, GOM, Caribbean,
and West Indies
Specimen length: 12.1 cm FL

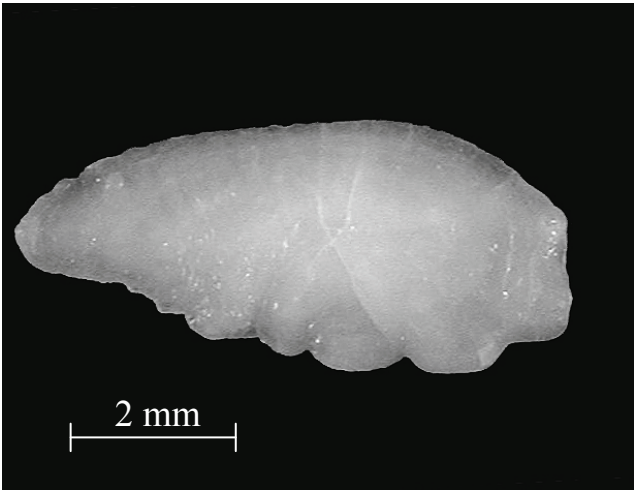


Figure 167. Shortjaw
lizardfish, *Saurida normani*
Distribution: North Carolina
to Florida Keys, eastern
GOM
Specimen length: 21.2 cm FL

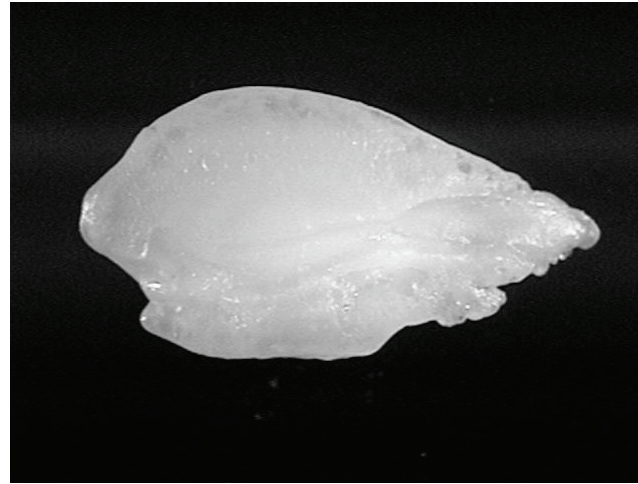
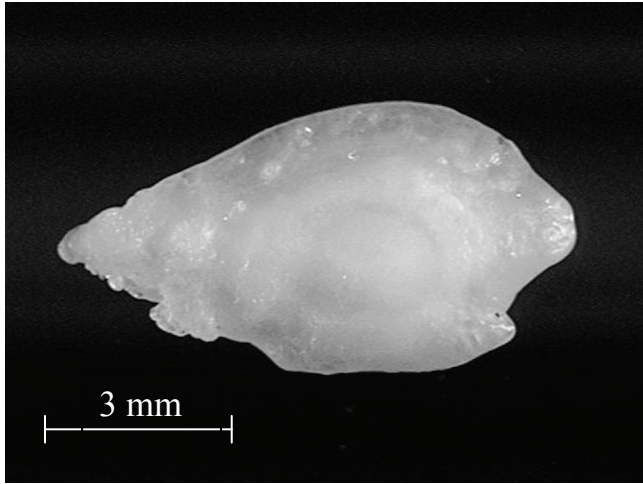


Figure 168. Snakefish,
Trachinocephalus myops
Distribution: North Carolina
to Florida Keys, eastern
GOM, Bermuda, Caribbean
Specimen length: 19.2 cm FL

Family Triglidae: Searobins

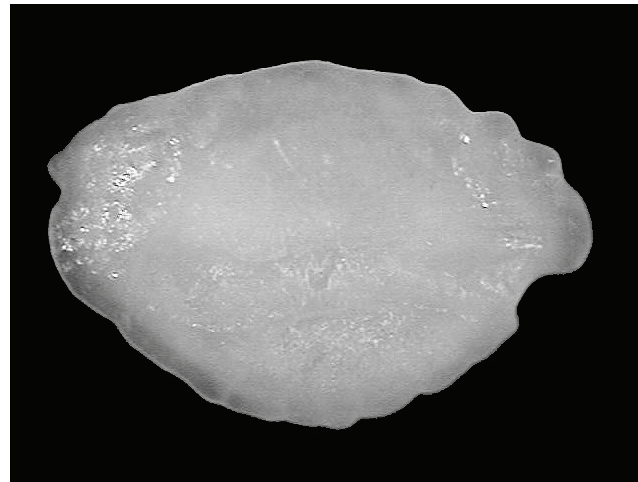
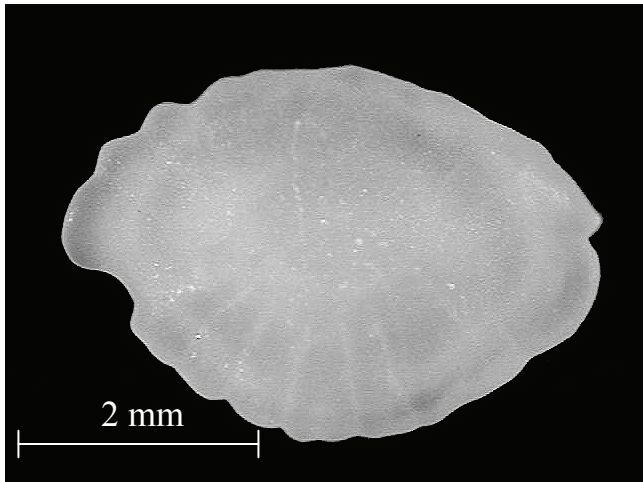


Figure 169. Bigeye searobin,
Prionotus longispinosus
Distribution: Northern and
western GOM
Specimen length: 14.6 cm TL

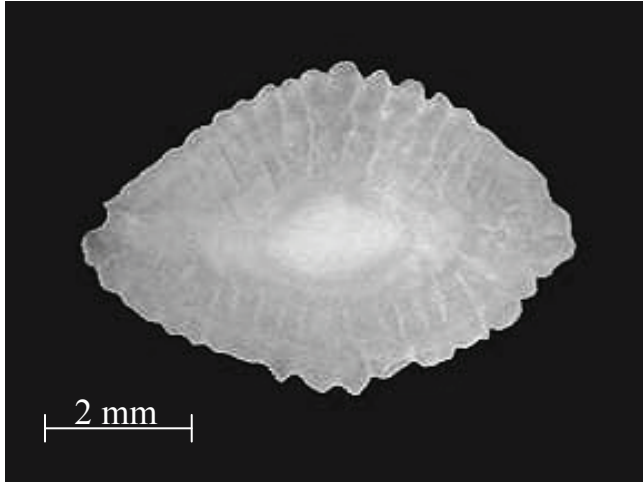


Figure 170. Bighead searobin, *Prionotus tribulus*
Distribution: Chesapeake Bay to northern Florida and GOM
Specimen length: 19.8 cm TL

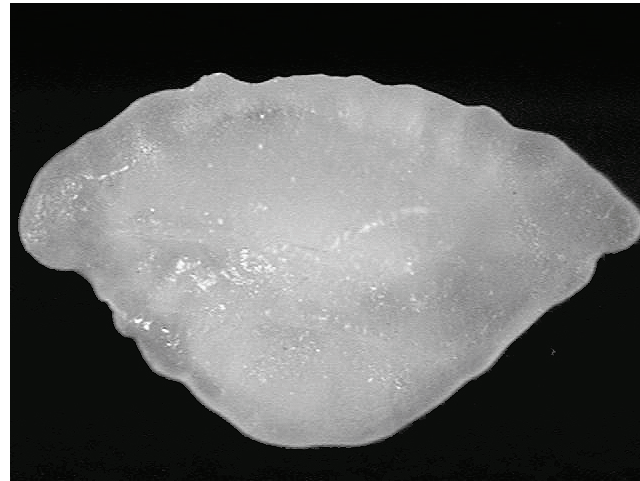
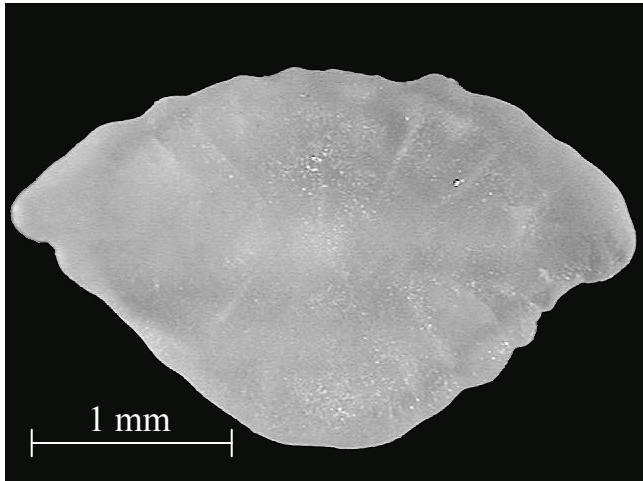


Figure 171. Horned searobin, *Bellator militaris*
Distribution: North Carolina to Colombia, entire GOM
Specimen length: 9.1 cm TL

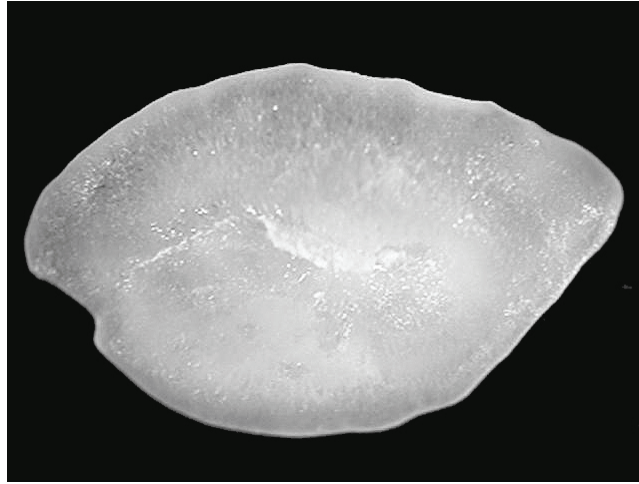


Figure 172. Shortwing searobin, *Prionotus stearnsi*
Distribution: North Carolina to French Guiana, entire GOM
Specimen length: 13.1 cm TL

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