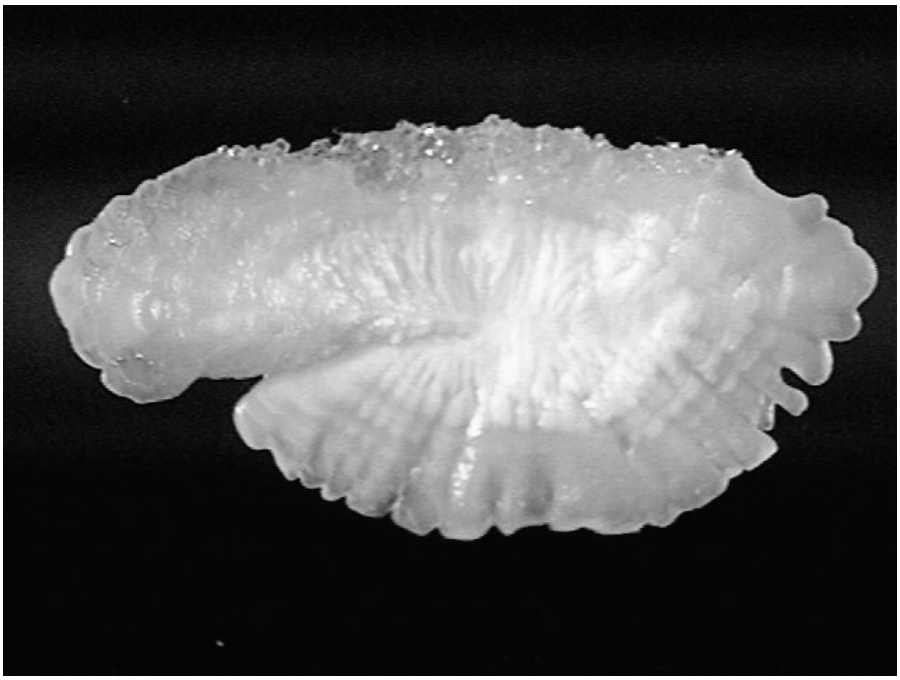
NOAA Technical Memorandum NMFS-SEFSC-599

A GUIDE TO OTOLITHS FROM FISHES OF THE GULF OF MEXICO



By
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National Marine Fisheries Service
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February 2010

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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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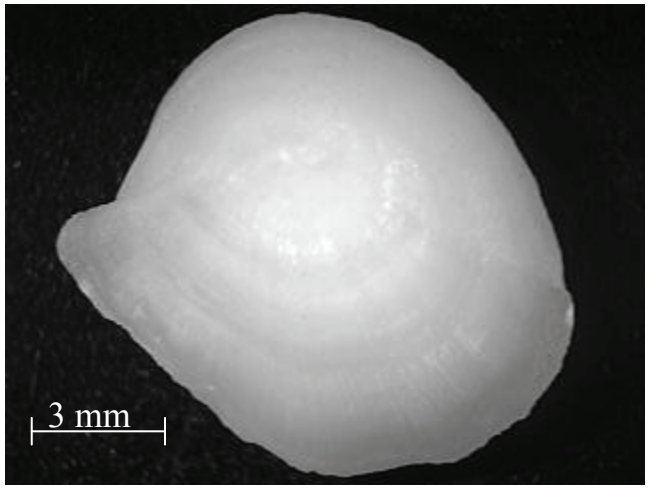
Family Ariidae: Seacatfishes



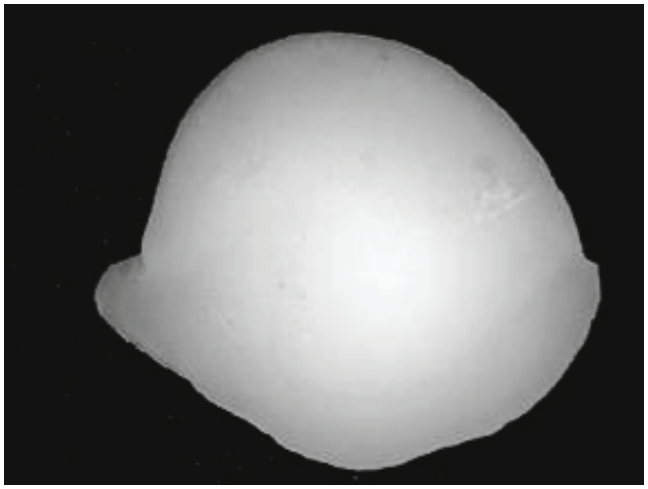
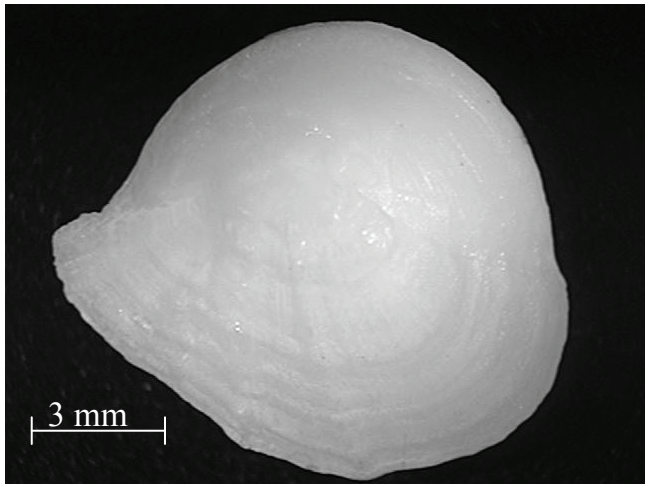


Figure 1. Gafftopsail catfish, *Bagre marinus*
Distribution: Northern GOM to Venezuela
Specimen length: 26.1 cm FL



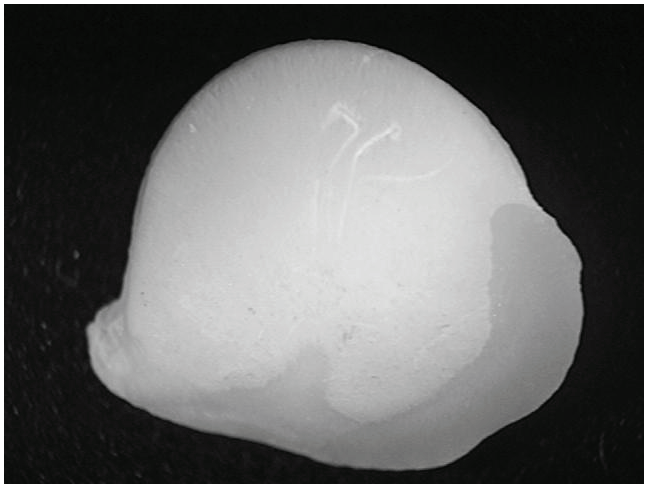


Figure 2. Hardhead catfish, *Arius felis*
Distribution: Northern GOM, southern Florida, and Mexico
Specimen length: 31.0 cm FL

Family Balistidae: Triggerfishes

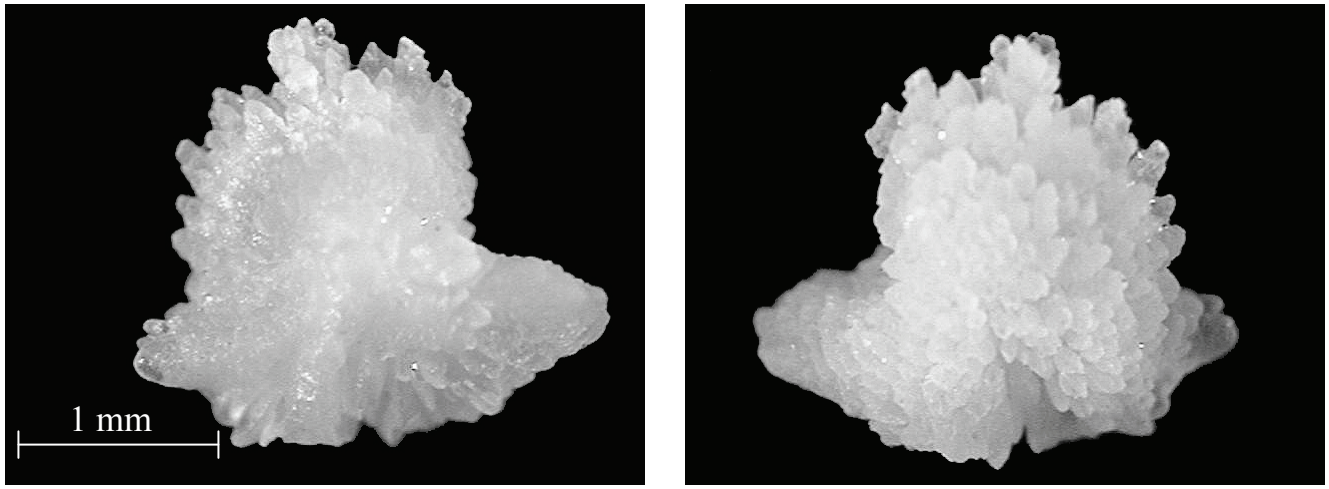


Figure 3. Gray triggerfish, *Balistes capriscus*
Distribution: Nova Scotia to Agentina, Bahamas, GOM
Specimen length: 25 cm TL*

Family Batrachoididae: Toadfishes

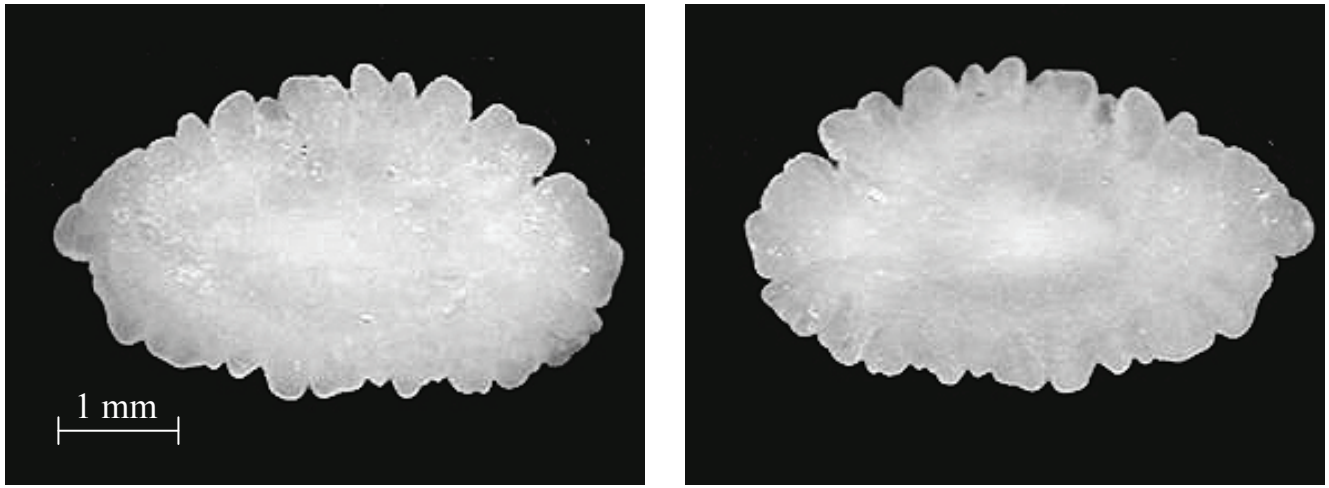
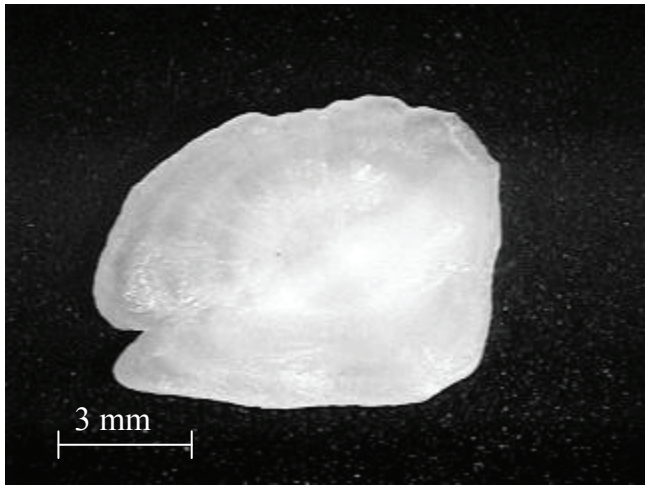


Figure 4. Gulf toadfish, *Opsanus beta*
Distribution: Florida south of Cape Canaveral, Bahamas, GOM
Specimen length: 14.1 cm TL

Family Bothidae: Lefteye flounders



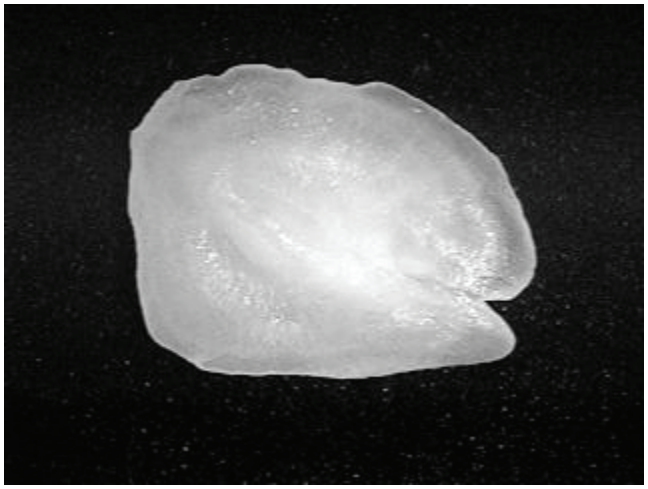
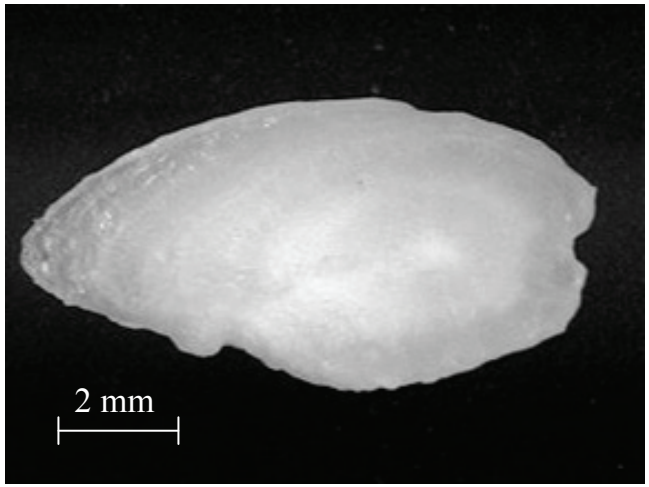


Figure 5. Dusky flounder, *Syacium papillosum*
Distribution: North Carolina and northern GOM to Brazil
Specimen length: 32.2 cm TL



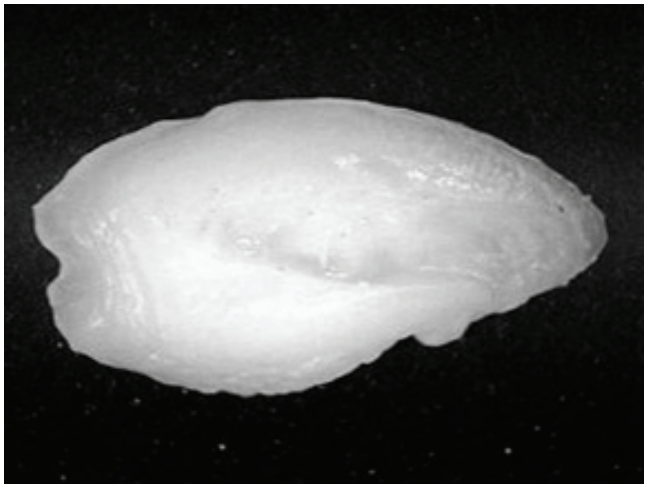


Figure 6. Gulf flounder, *Paralichthys albigutta*
Distribution: North Carolina to Texas, not in southern Florida
Specimen length: 38.0 cm TL

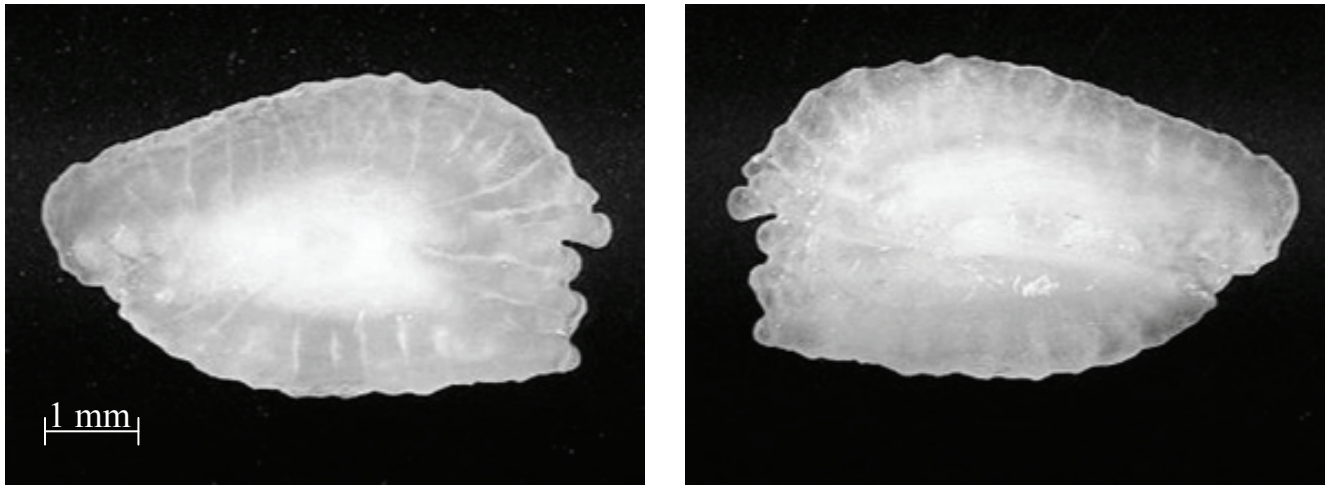


Figure 7. Ocellated flounder, *Ancylopsetta quadrocellata*
Distribution: North Carolina to Florida, GOM
Specimen length: 21.5 cm TL

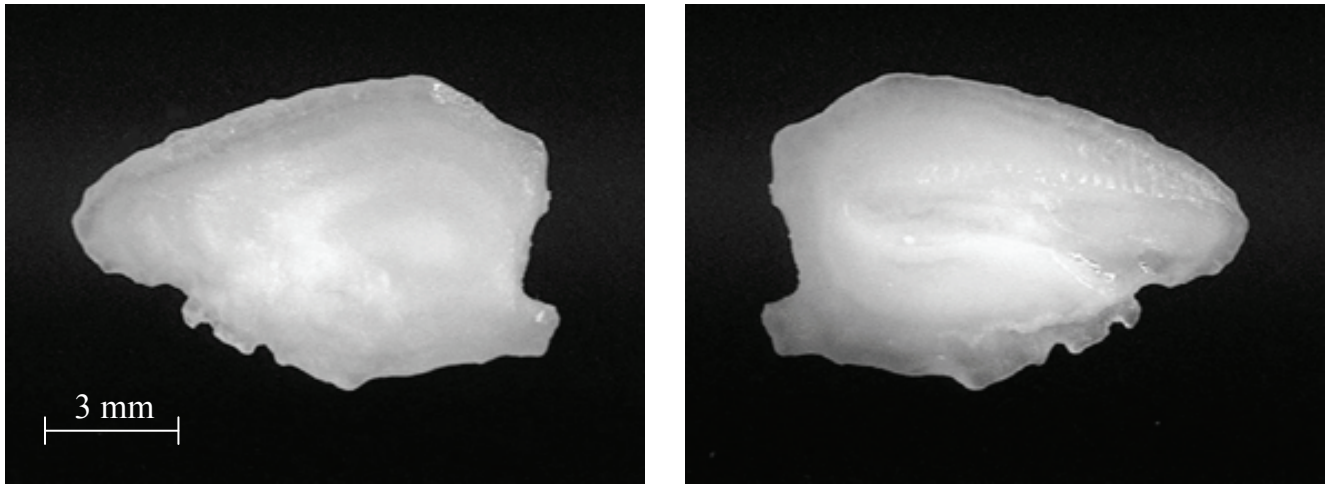


Figure 8. SE flounder, *Paralichthys lethostigma*
Distribution: North Carolina to Texas, absent in southern Florida
Specimen length: 54.5 cm TL

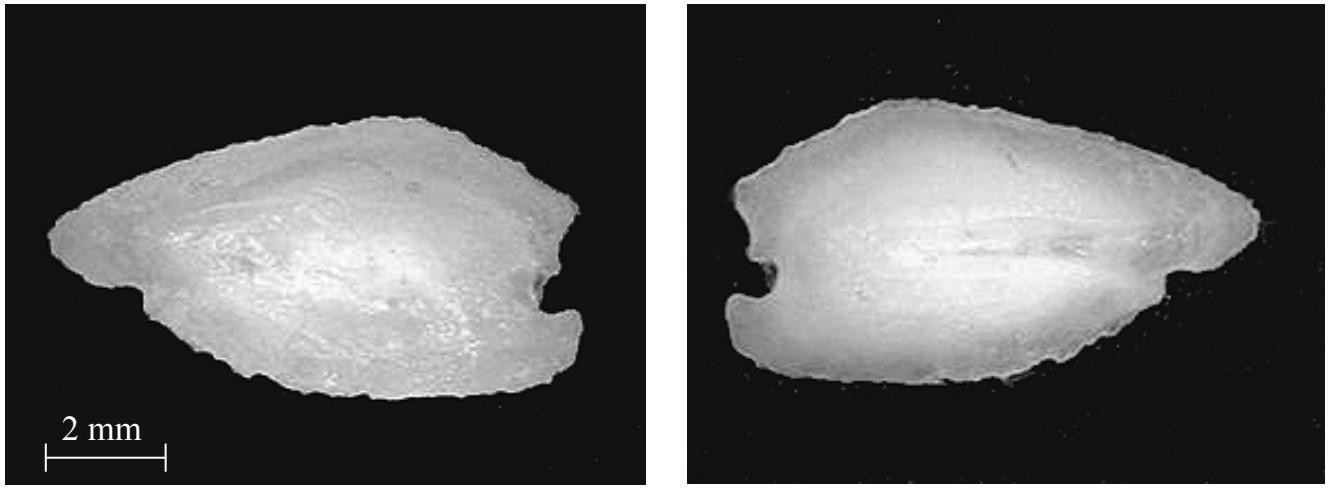


Figure 9. Summer flounder, *Paralichthys dentatus*
Distribution: Maine to southern Florida .
Specimen length: 38.0 cm TL

Family Carangidae: Jacks

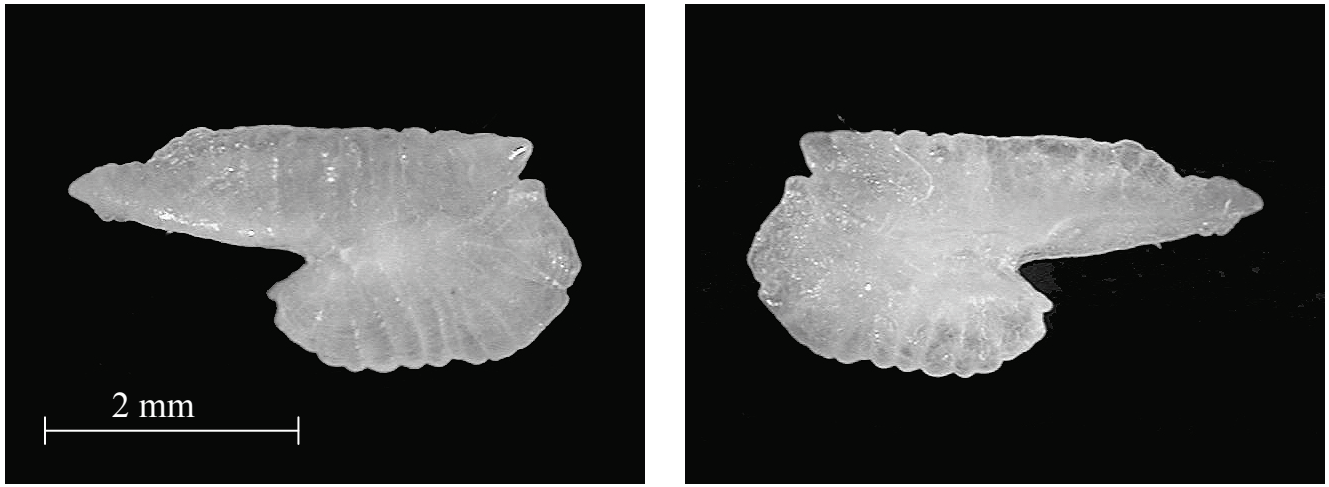


Figure 10. African pompano, *Alectis ciliaris*
Distribution: Worldwide in warm waters
Specimen length: 25.4 cm FL

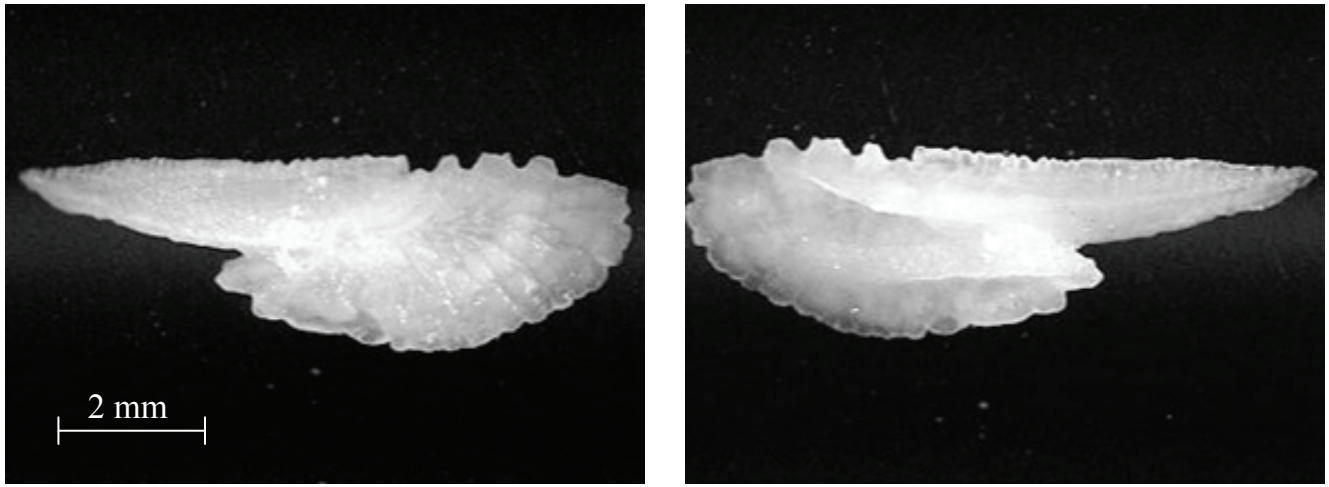


Figure 11. Almaco jack, *Seriola rivoliana*
Distribution: Massachusetts to Argentina, eastern Atlantic
Specimen length: 54.4 cm FL

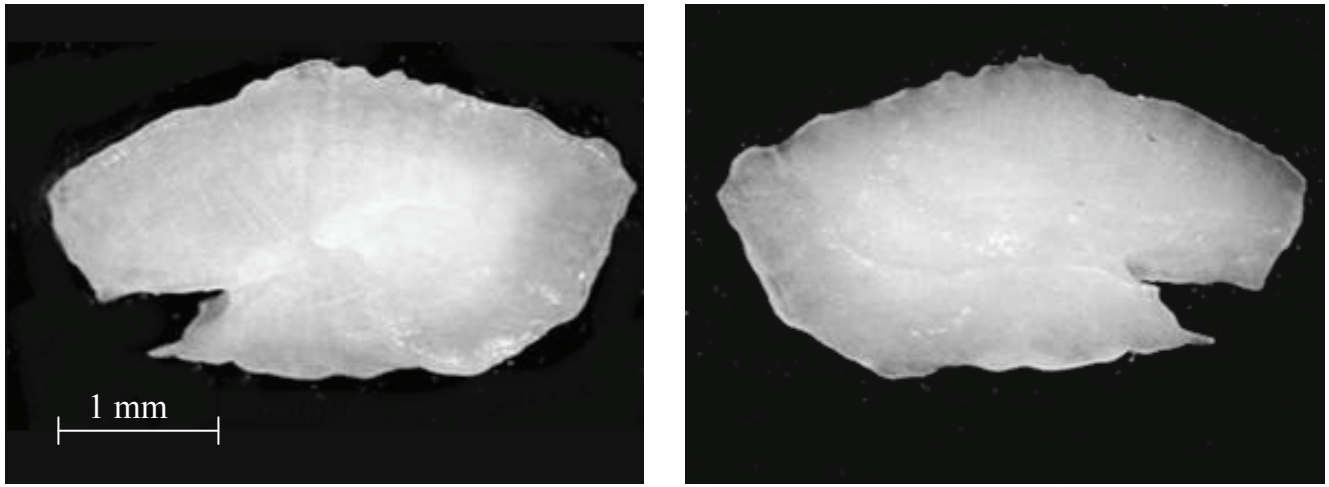
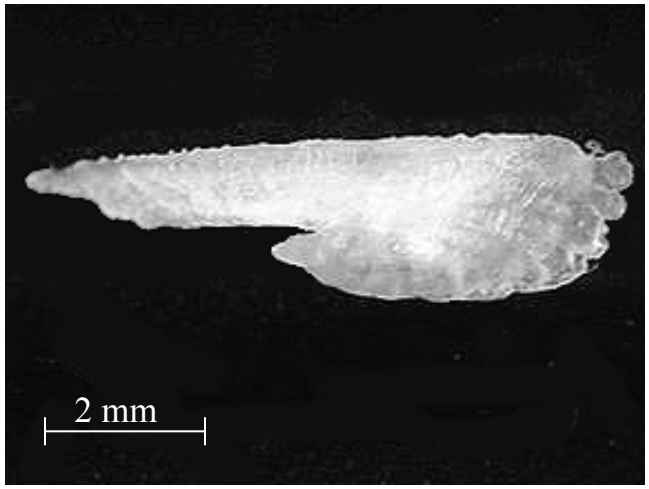


Figure 12. Atlantic bumper, *Chloroscombrus chrysurus*
Distribution: Massachusetts, Bermuda and northern GOM to southeastern Brazil; absent in the Bahamas
Specimen length: 16.1 cm FL



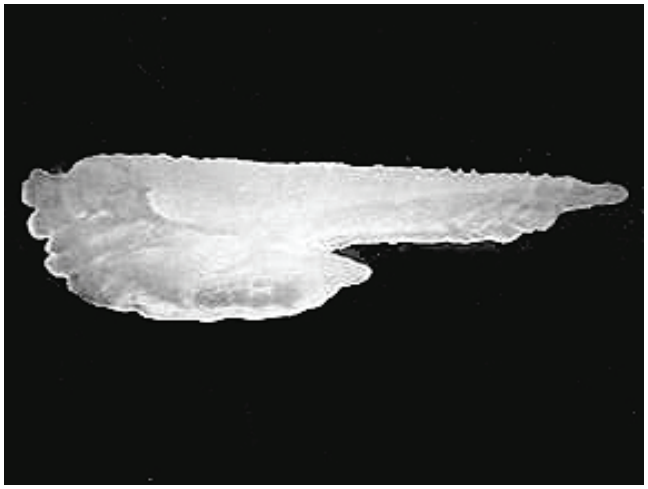
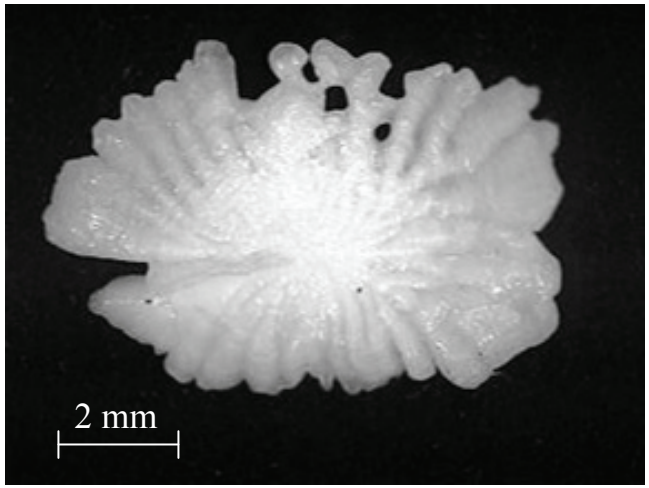


Figure 13. Banded rudderfish, *Seriola zonata*
Distribution: Nova Scotia to southeastern Brazil
Specimen length: 52.0 cm FL



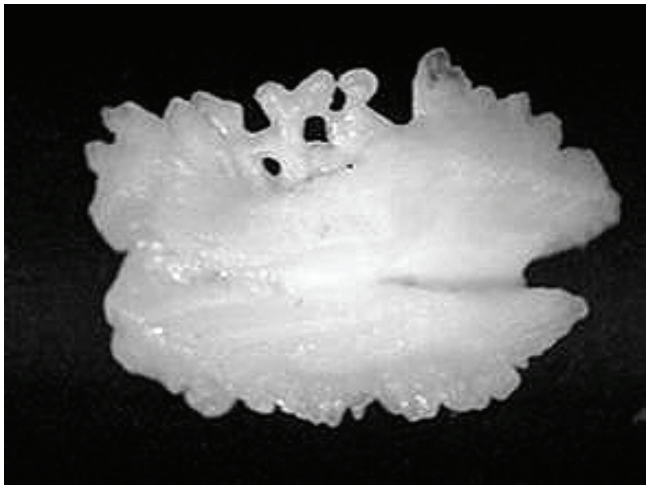


Figure 14. Bigeye scad, *Selar crumenophthalmus*
Distribution: Nova Scotia, Bermuda, and northern GOM to southeastern Brazil; worldwide in warm waters.
Specimen length: 54.3 cm FL

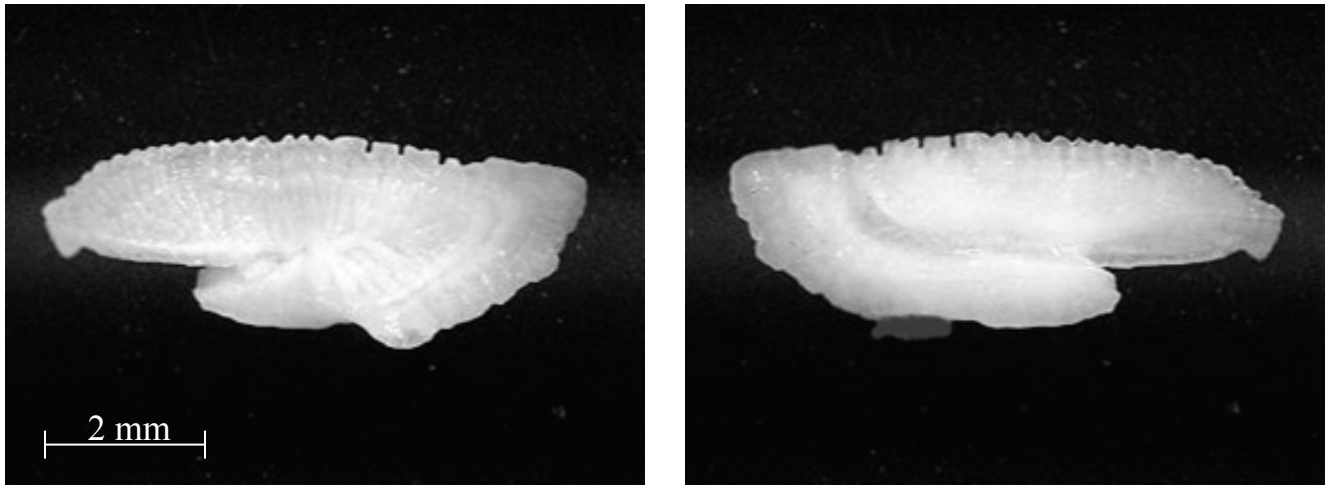


Figure 15. Blue runner, *Caranx crysos*
Distribution: Nova Scotia and northern GOM to Brazil, eastern Atlantic.
Specimen length: 28 cm FL

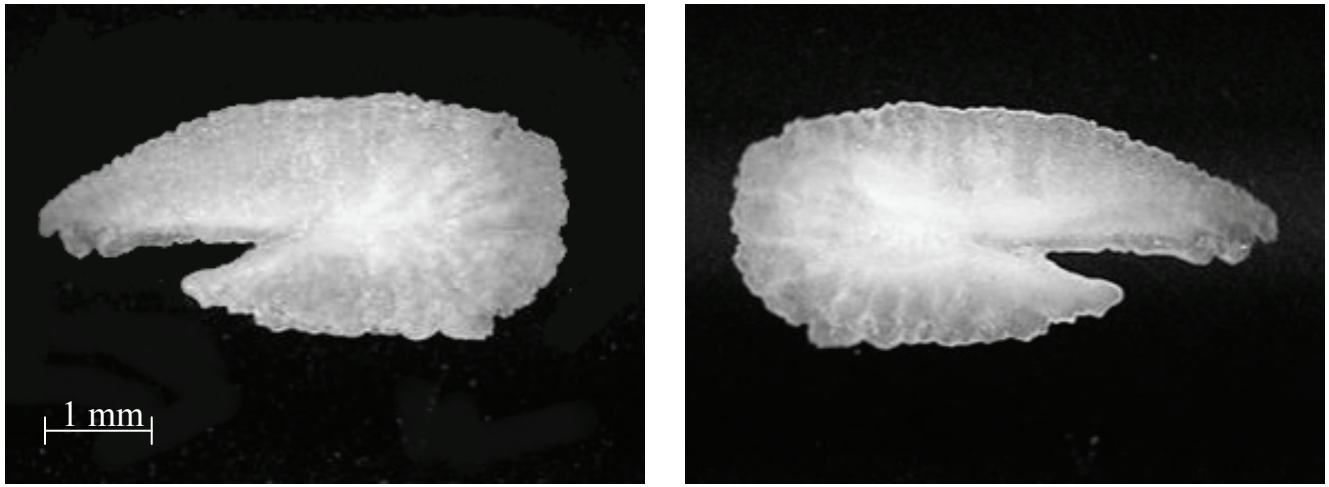
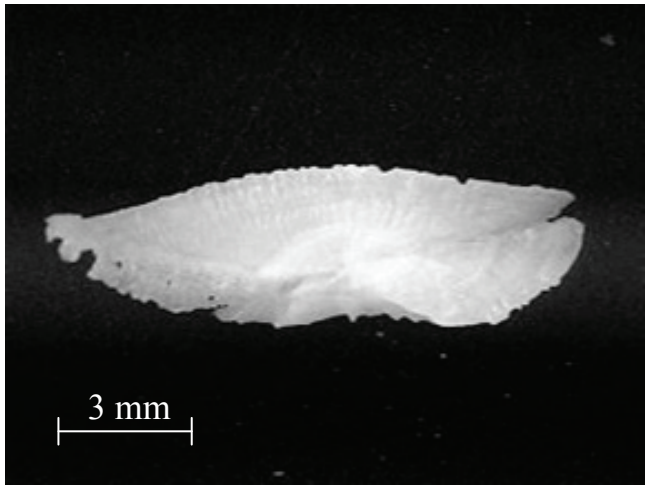


Figure 16. Cottonmouth jack, *Uraspis secunda*
Distribution: Massachusetts and northern GOM to Brazil; worldwide in warm waters
Specimen length: 32.2 cm FL



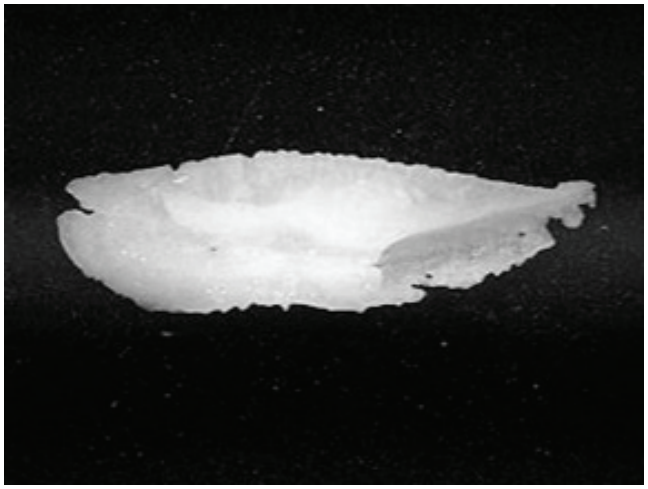
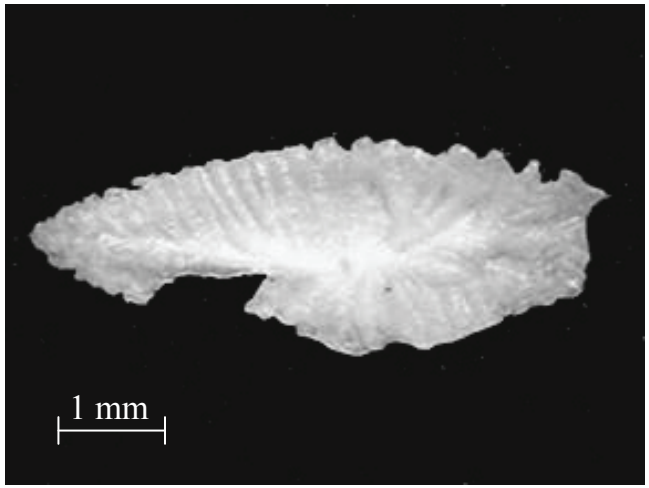


Figure 17. Crevalle jack, *Caranx hippos*
Distribution: Nova Scotia and northern GOM to Uruguay
Specimen length: 60 cm TL*



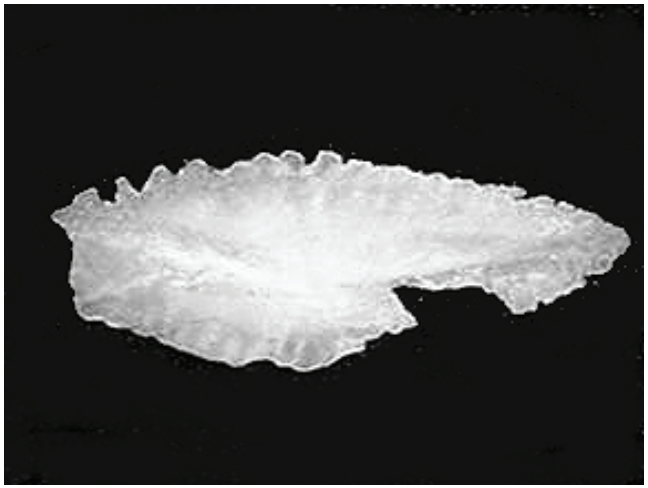


Figure 18. Florida pompano, *Trachinotus carolinus*
Distribution: Massachusetts to southeastern Brazil
Specimen length: 25 cm TL*

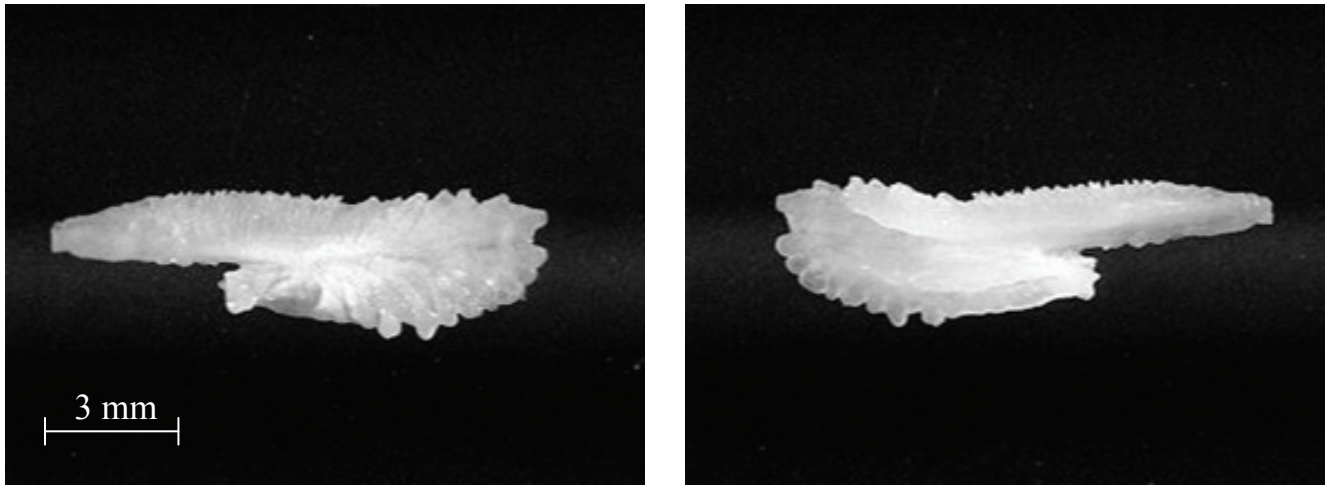


Figure 19. Greater amberjack, *Seriola dumerili*
Distribution: Worldwide in warm waters
Specimen length: 87 cm FL

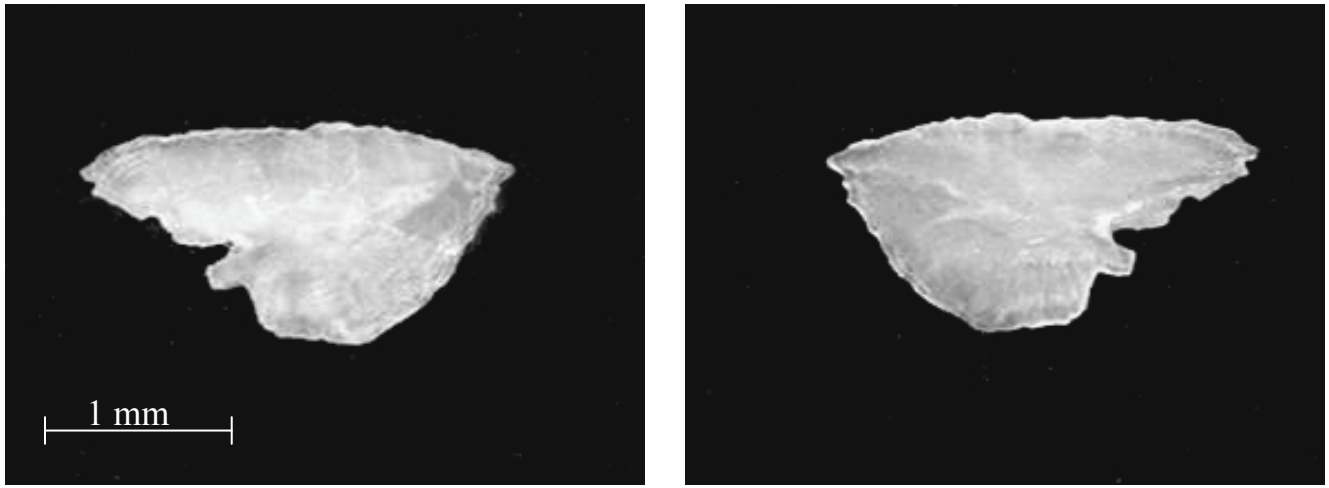
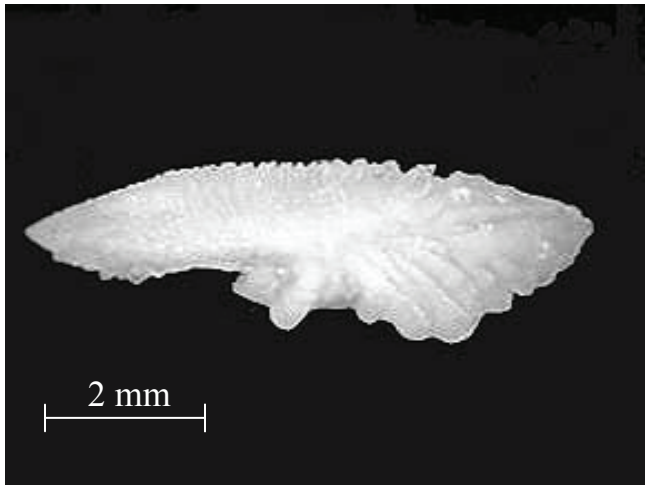


Figure 20. Leatherjacket, *Oligoplites saurus*
Distribution: Maine and northern GOM to Uruguay, Eastern Pacific
Specimen length: 19 cm FL



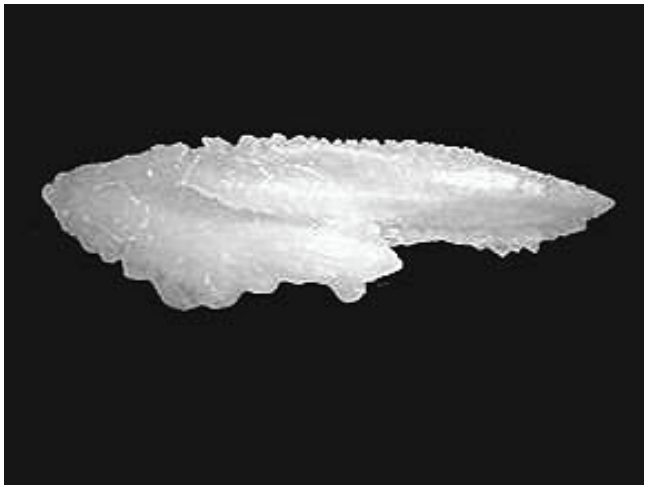
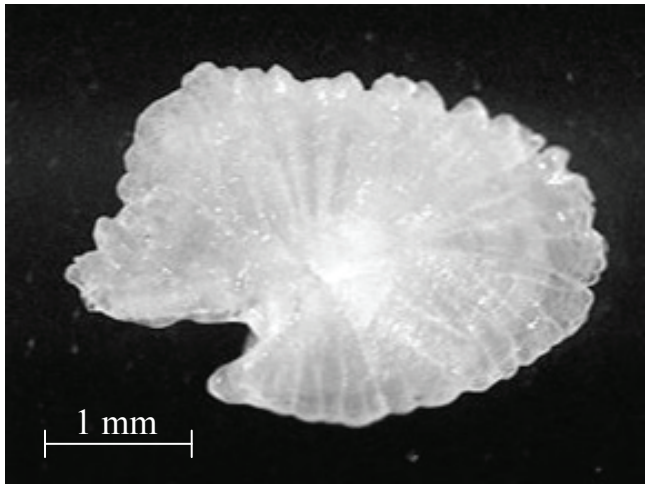


Figure 21. Lesser amberjack, *Seriola fasciata*
Distribution: Massachusetts to Argentina, eastern Atlantic
Specimen length: 54.4 cm FL



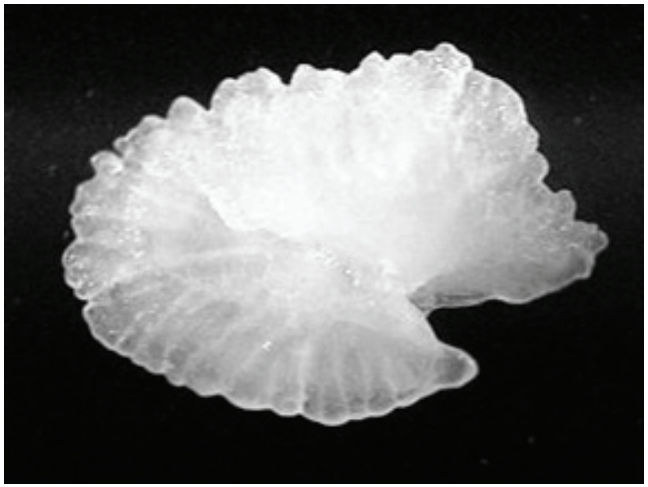
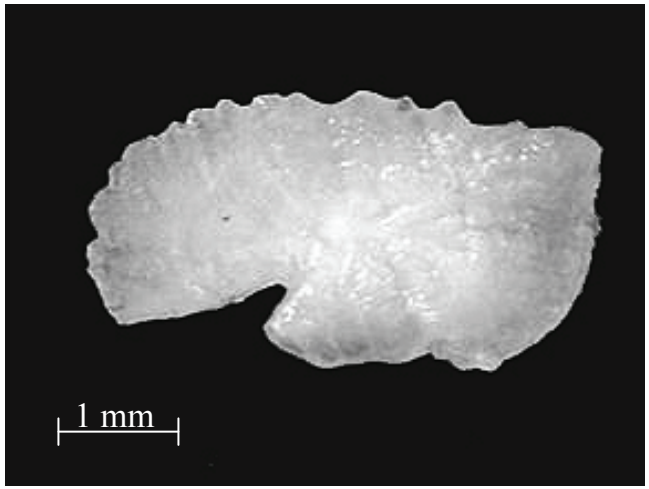


Figure 22. Lookdown, *Selene vomer*
Distribution: Nova Scotia to Uruguay, eastern Atlantic
Specimen length: 17.0 cm FL



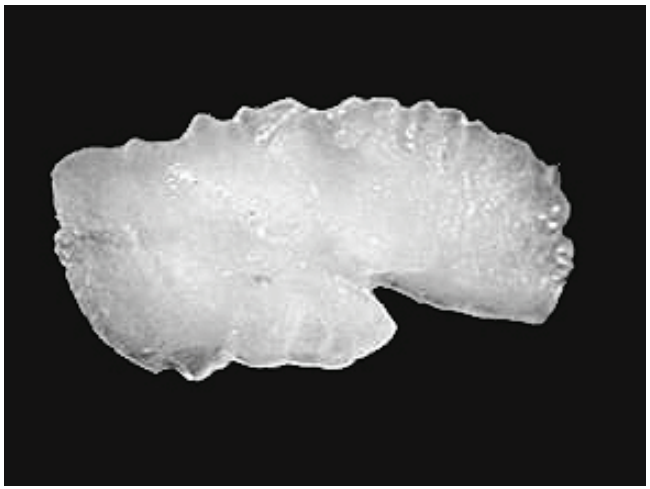
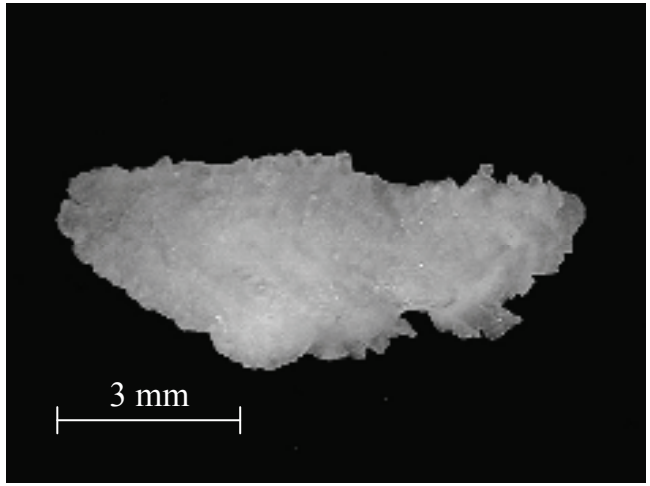


Figure 23. Moonfish, *Selene setapinnis*
Distribution: Nova Scotia to Uruguay; eastern Atlantic
Specimen length: 16.4 cm FL



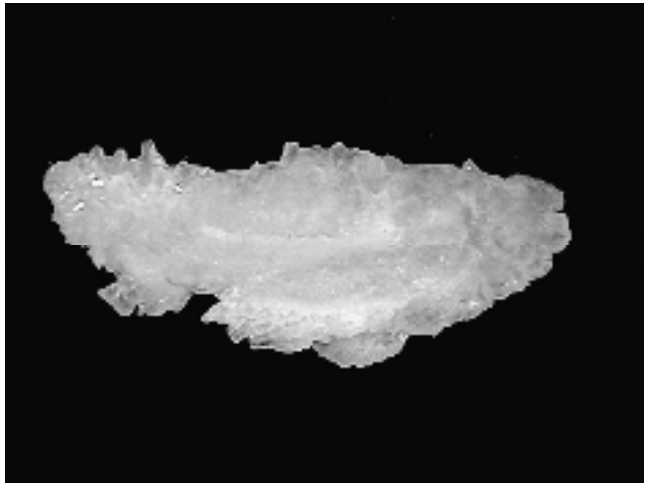
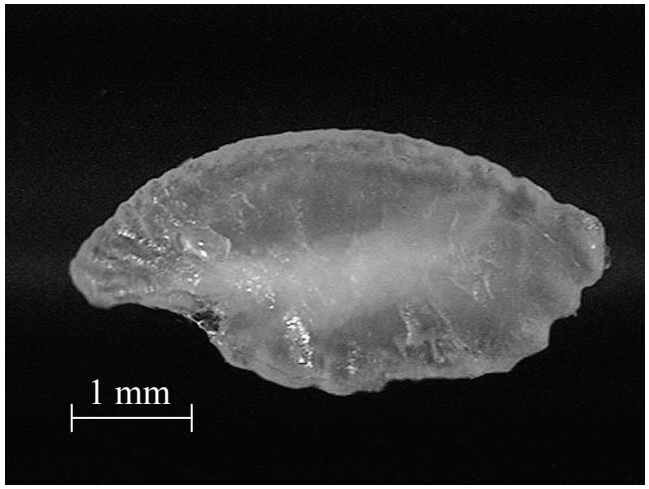


Figure 24. Permit, *Trachinotus falcatus*
Distribution: Coastal waters from Massachusetts to Bermuda and Brazil, GOM, Bahamas, Antilles
Specimen length: 51.2 cm FL



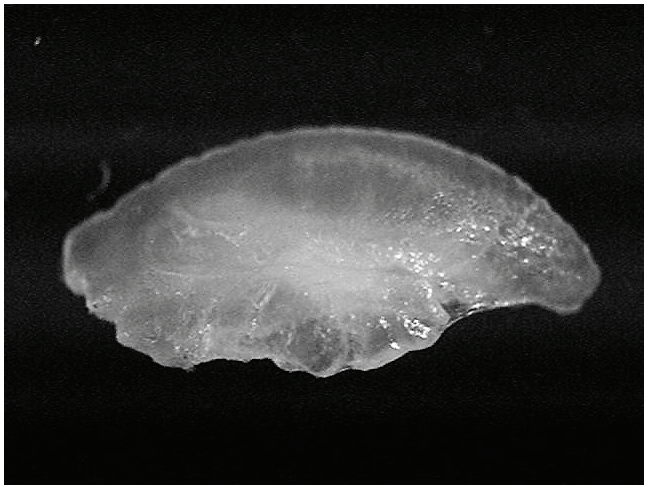
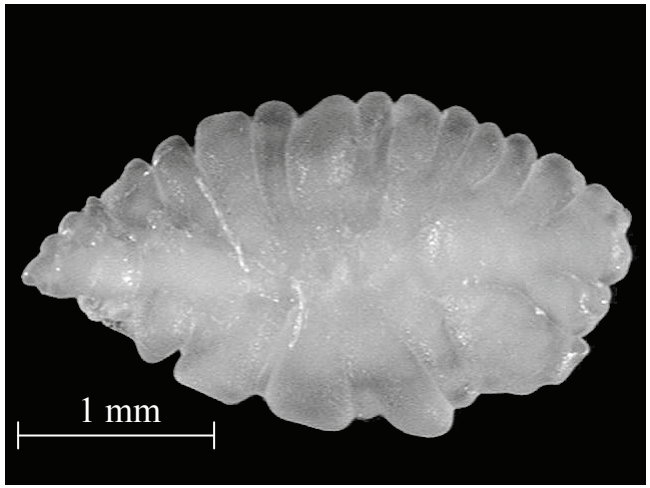


Figure 25. Round scad,
Decapterus punctatus
Distribution: Gulf of Maine
to Argentina
Specimen length: 16.5 cm FL



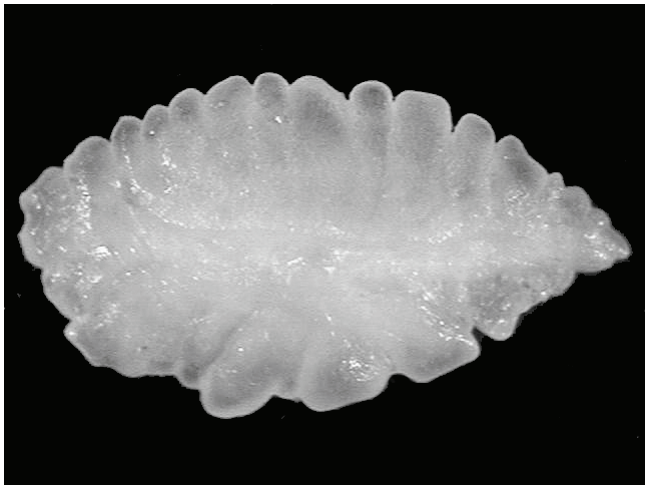
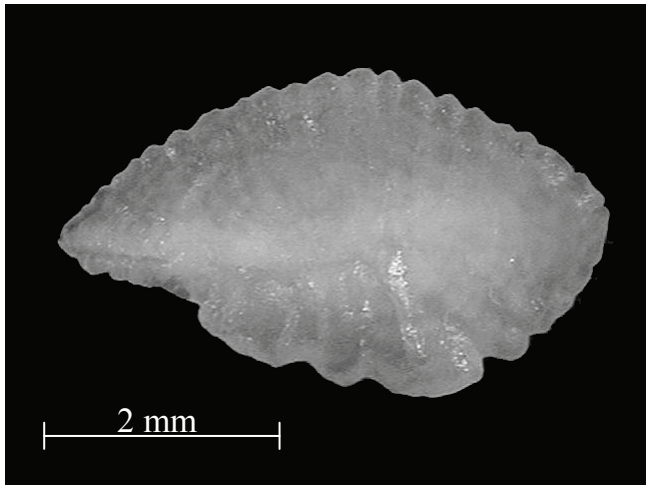


Figure 26a. Rough scad,
Trachurus lathami
Distribution: Gulf of Maine
to Argentina
Specimen length: 5.7 cm FL



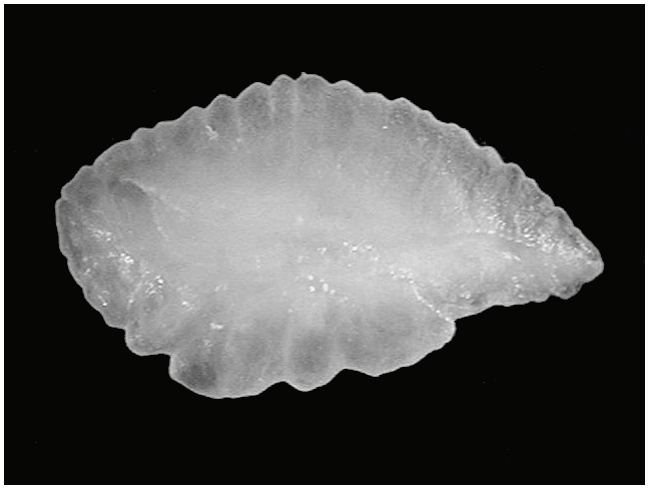
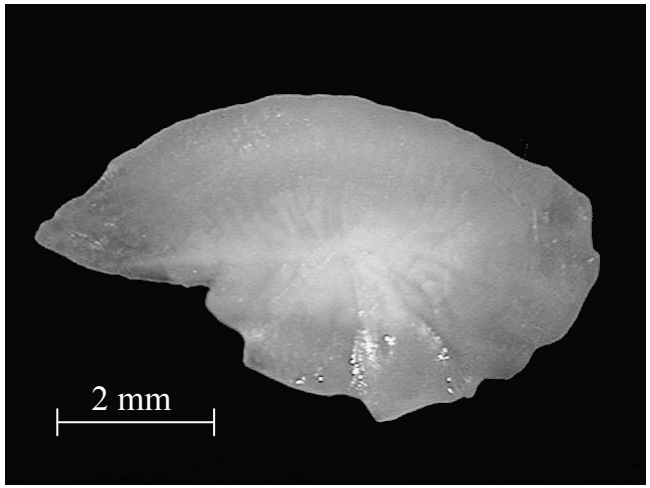


Figure 26b. Rough scad,
Trachurus lathami
Distribution: Gulf of Maine
to Argentina
Specimen length: 12.0 cm FL



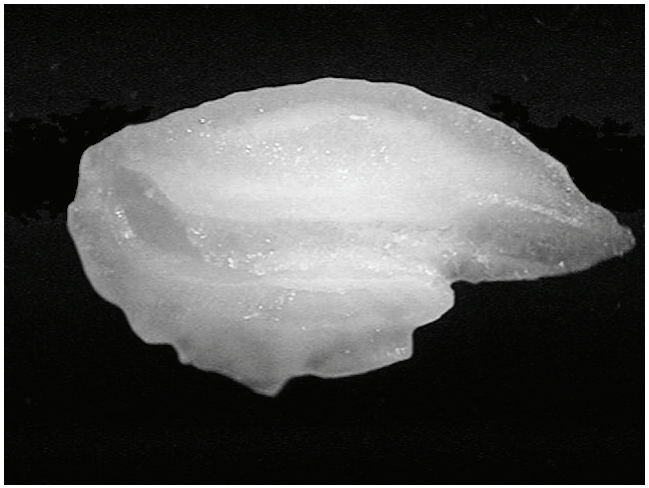
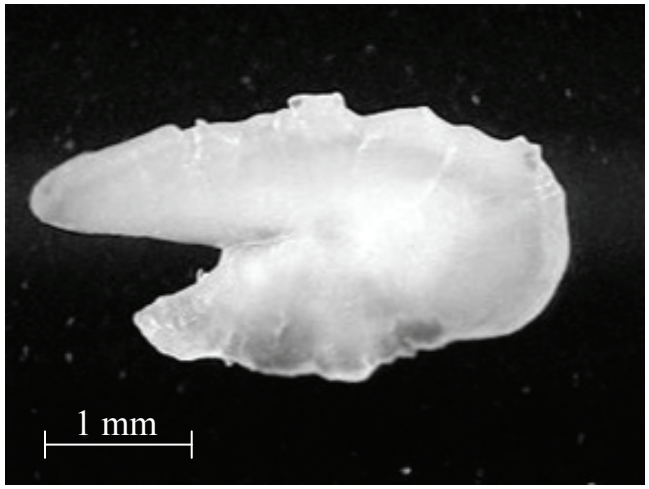


Figure 26c. Rough scad,
Trachurus lathami
Distribution: Gulf of Maine
to Argentina
Specimen length: 20.6 cm FL

Family Clupeidae: Herrings



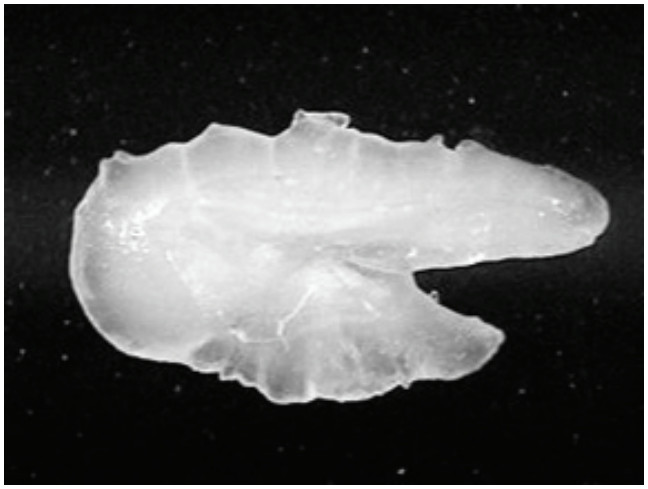
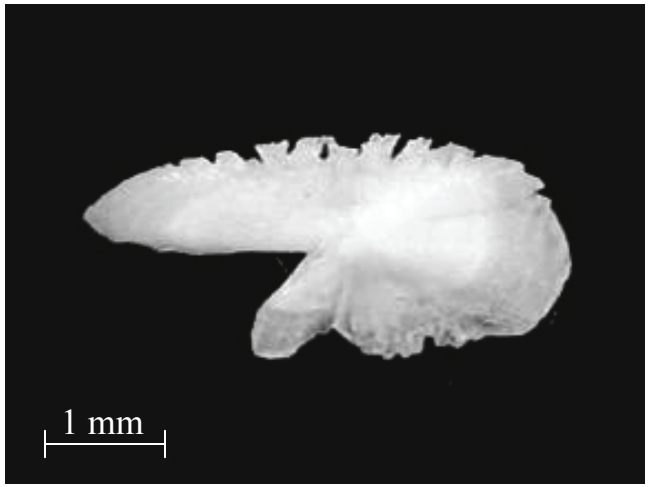


Figure 27. Atlantic thread herring, *Opisthonema oglinum*
Distribution: Cape Cod, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 15.9 cm FL



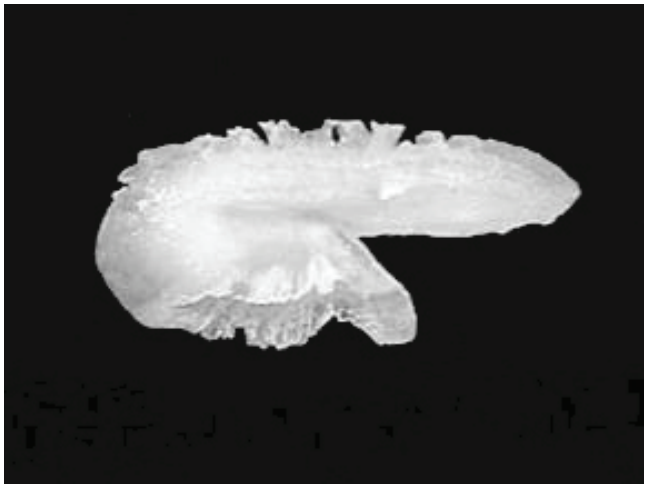
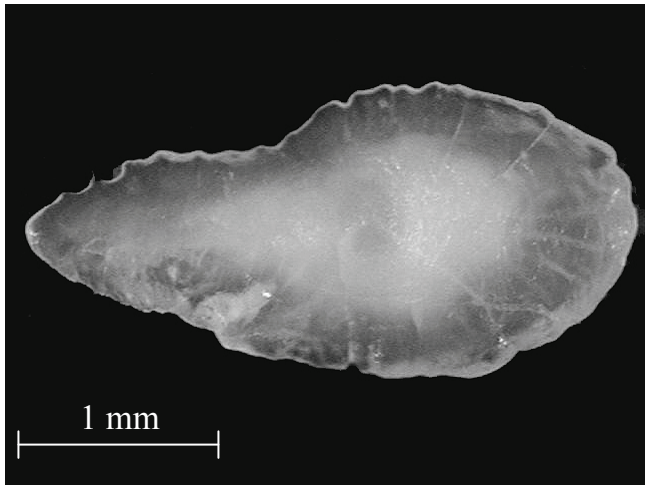


Figure 28. Gulf menhaden, *Brevoortia patronus*
Distribution: Northern GOM to southeastern Florida and southeastern Texas
Specimen length: 25.0 cm FL



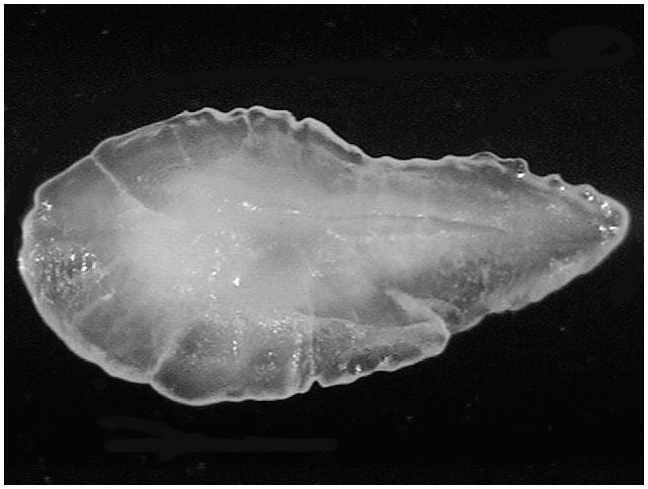
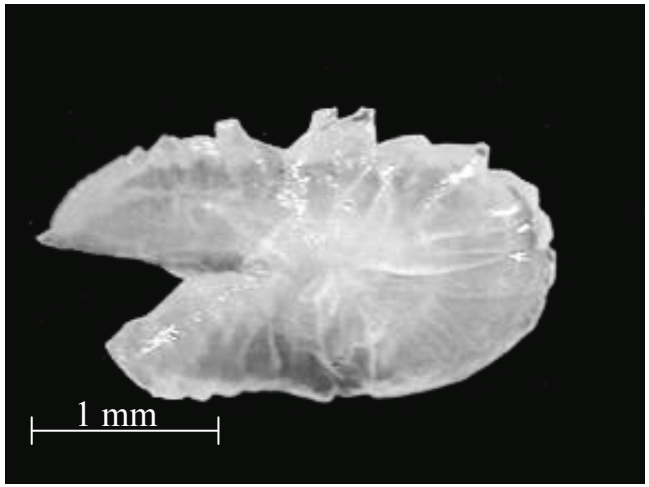


Figure 29. Round herring, *Etrumeus teres*
Distribution: Bay of Fundy to Venezuela
Specimen length: 12.5 cm FL



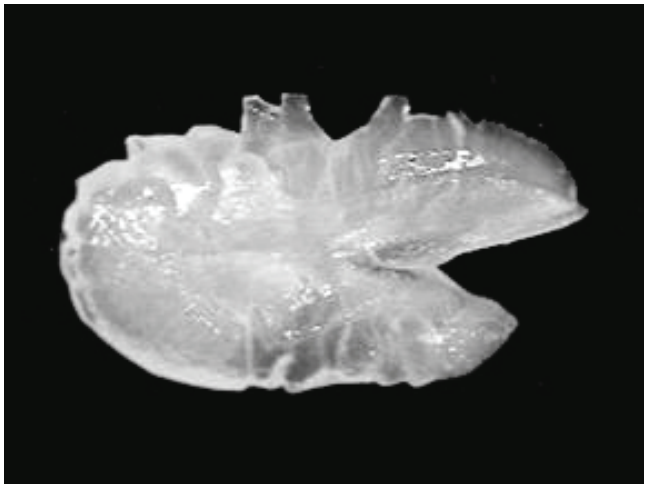


Figure 30. Scaled sardine, *Harengula jaguana*
Distribution: Northeast Florida, Bahamas, and Northern GOM to Brazil
Specimen length: 10.0 cm FL

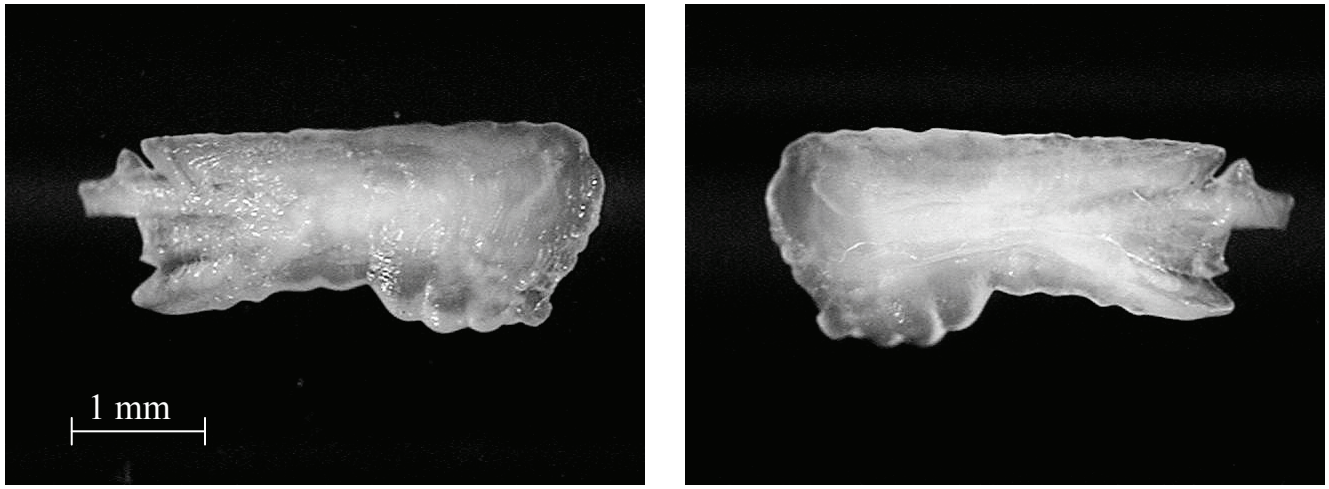


Figure 31. Spanish sardine, *Sardinella aurita*
Distribution: Massachusetts to Argentina, GOM, Bahamas, and Antilles
Specimen length: 18.2 cm FL

Family Cynoglossidae: Tonguefishes

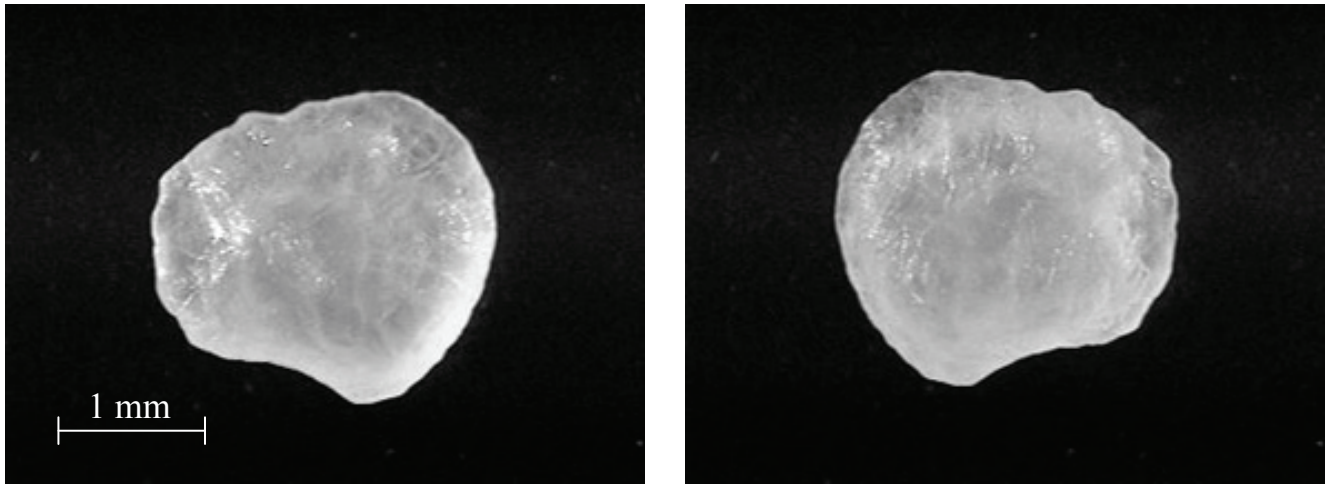


Figure 32. Blackcheek tonguefish, *Symphurus plagusia*
Distribution: New York, Bahamas, and northern GOM to Panama
Specimen length: 13.0 cm TL

Family Elopidae: Tarpons

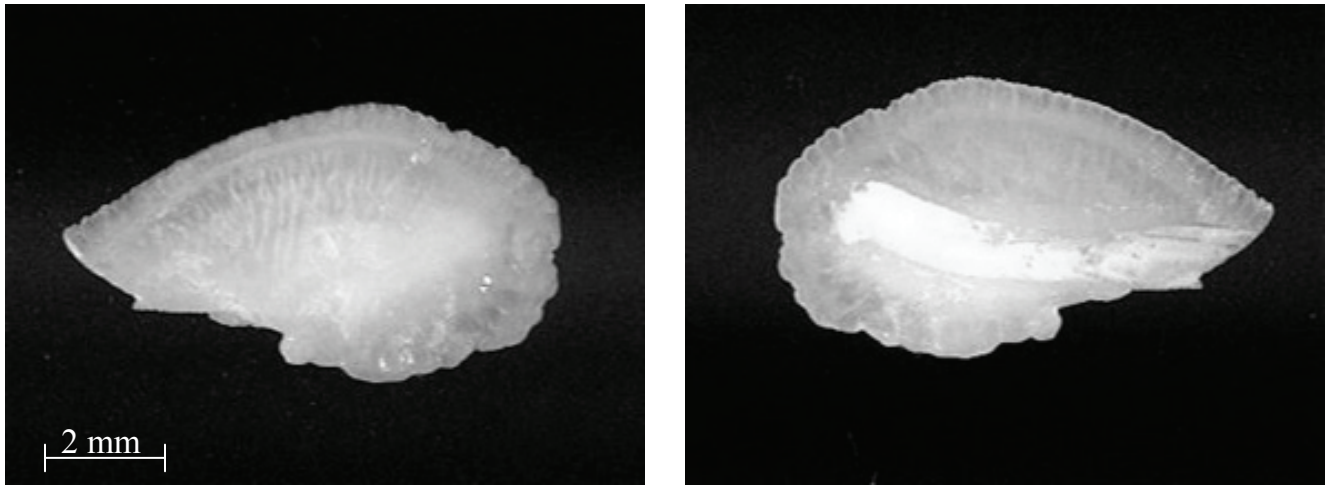


Figure 33. Ladyfish, *Elops saurus*
Distribution: Cape Cod, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 34.0 cm FL

Family Emmelichthyidae: Rovers

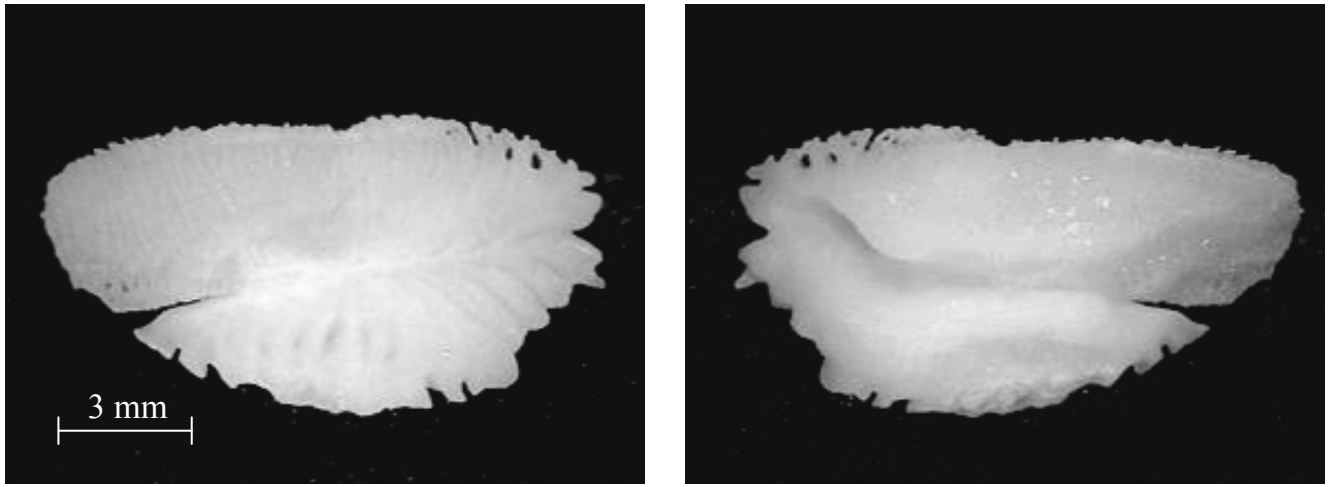
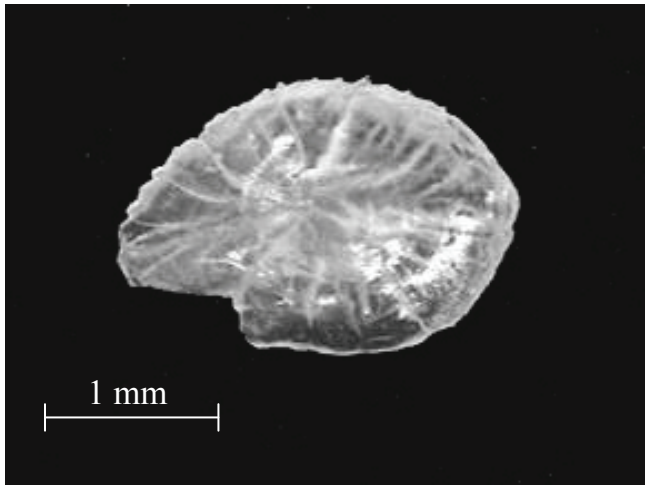


Figure 34. Crimson rover, *Erythrocles monodi*
Distribution: New York, Bahamas, and northern GOM to Panama
Specimen length: 13.0 cm TL

Family Engraulidae: Anchovies



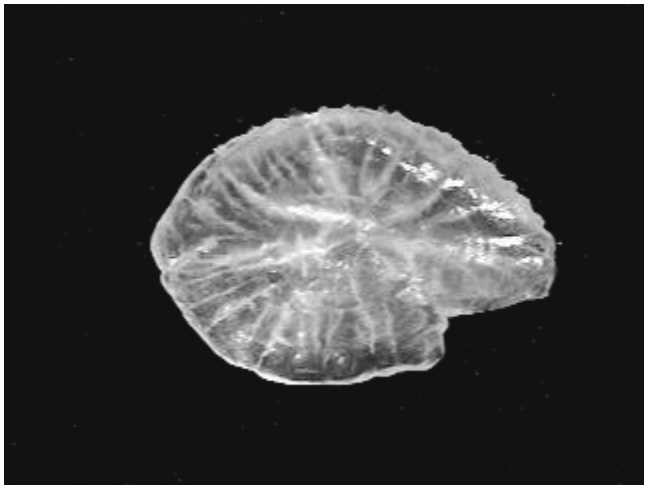
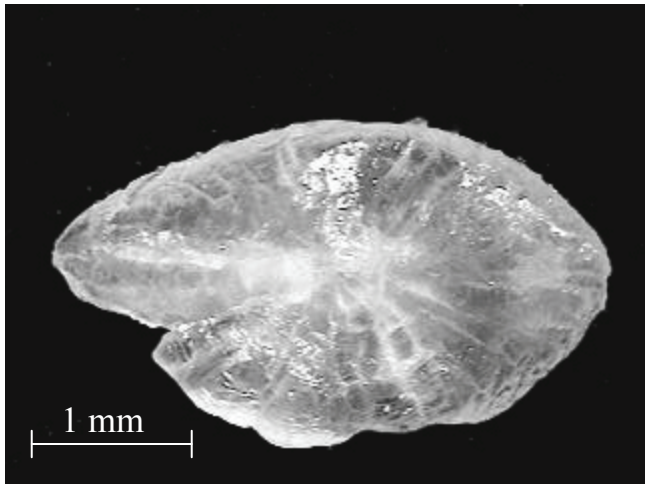


Figure 35. Bay anchovy, *Anchoa mitchelli*
Distribution: Gulf of Maine to Florida and GOM to Yucatan
Specimen length: 13.0 cm FL



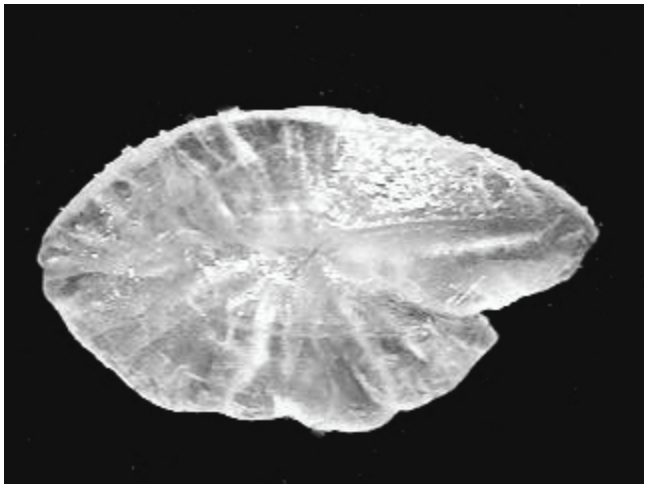


Figure 36. Striped anchovy, *Anchoa hepsetus*
Distribution: Chesapeake Bay and northern GOM to Uruguay
Specimen length: 14.0 cm FL

Family Ephippidae: Spadefish

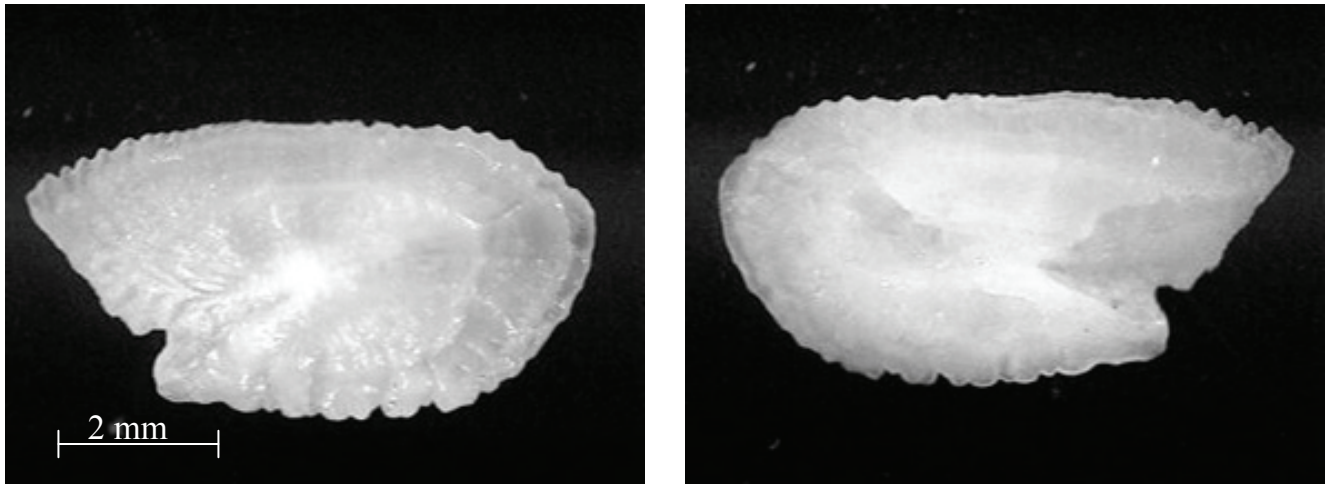


Figure 37. Spadefish, *Chaetodipterus faber*
Distribution: Massachusetts, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 29.7 cm FL

Family Exocoetidae: Flyingfishes

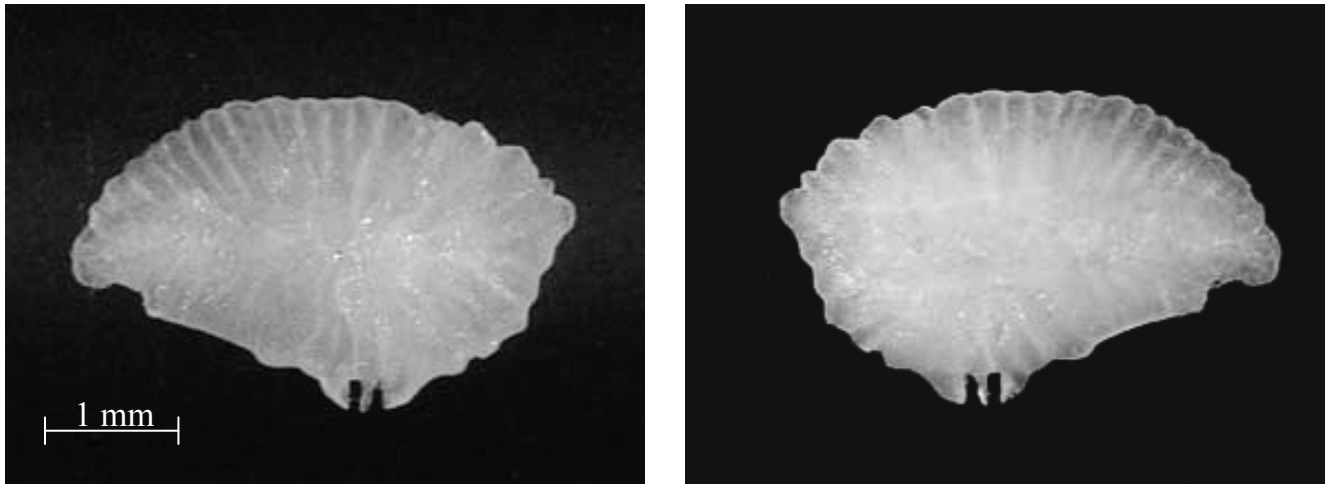


Figure 38. Common halfbeak, *Hyporhamphus unifasciatus*
Distribution: Maine, Bermuda, and northern GOM to Argentina
Specimen length: 18.6 cm FL

Family Gadidae: Cods

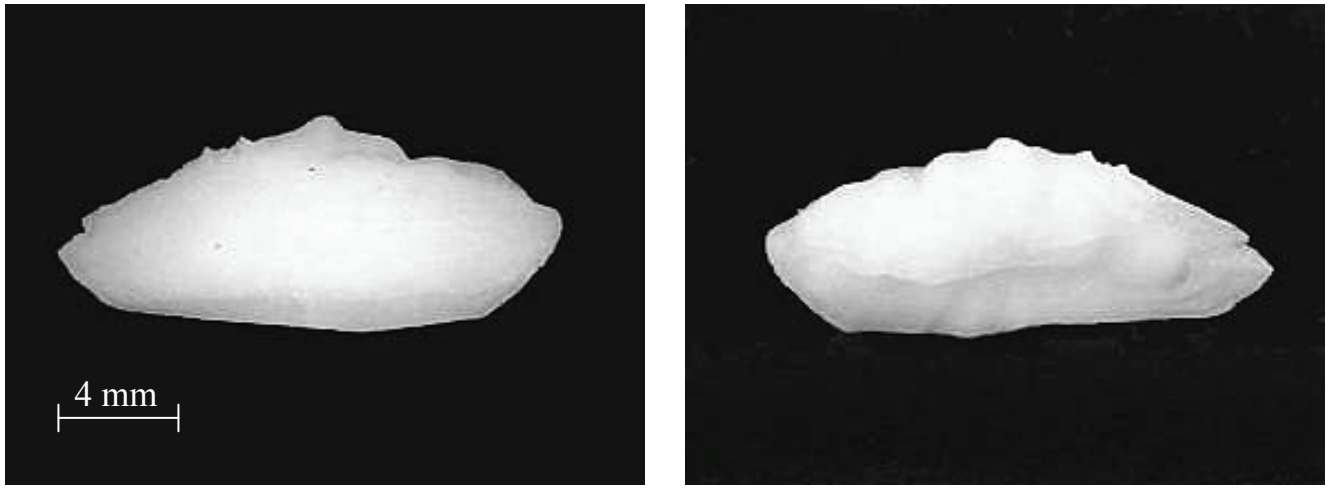


Figure 39. Gulf hake,
Urophycis cirrata
Distribution: Northern GOM
Specimen length: 46.0 cm FL

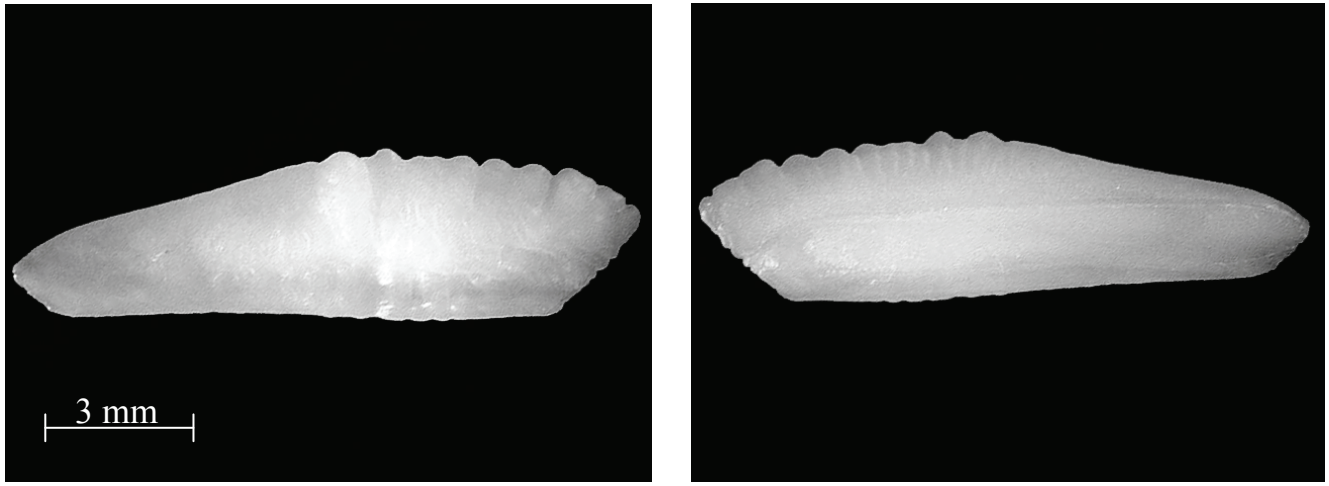
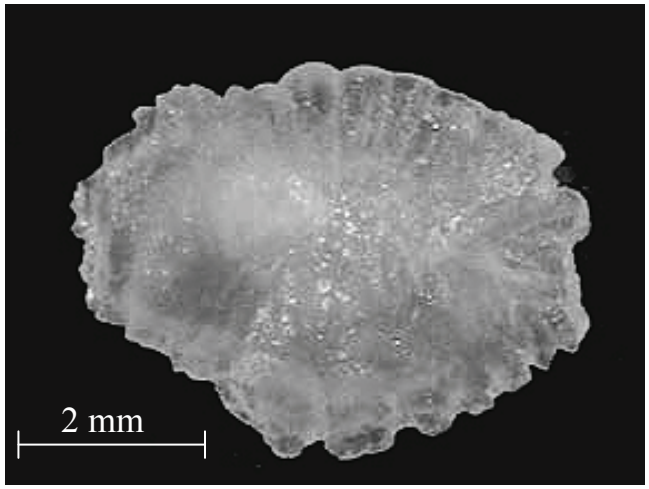


Figure 40. Spotted hake,
Urophycis regia
Distribution: Southern New England to northeastern GOM
Specimen length: 34.0 cm TL

Family Gerreidae: Mojarras



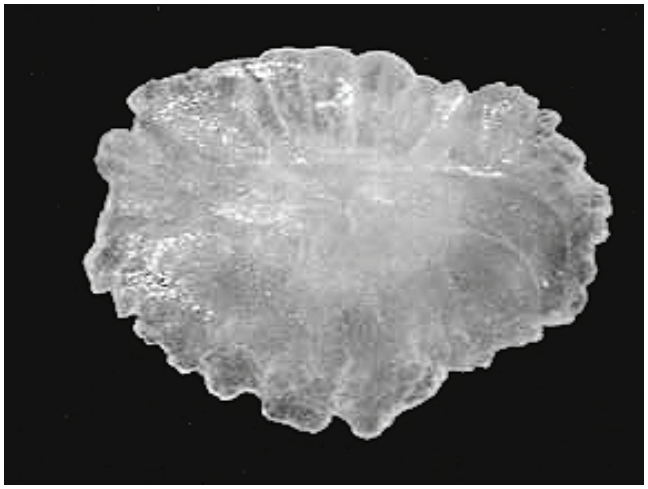
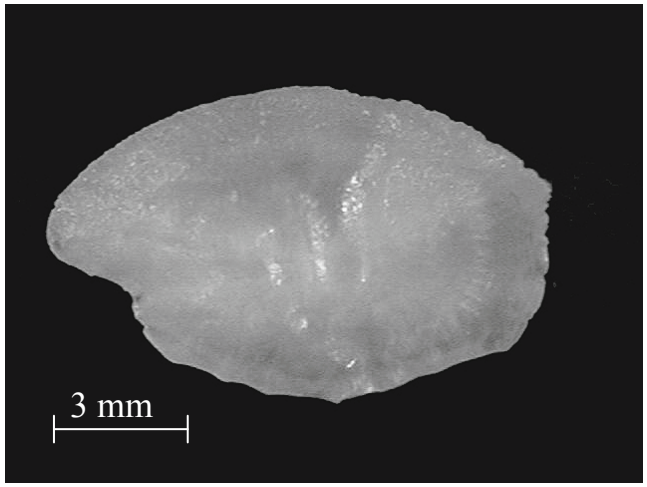


Figure 41. Silver jenny, *Eucinostomus gula*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 8.5 cm FL

Family Haemulidae: Grunts



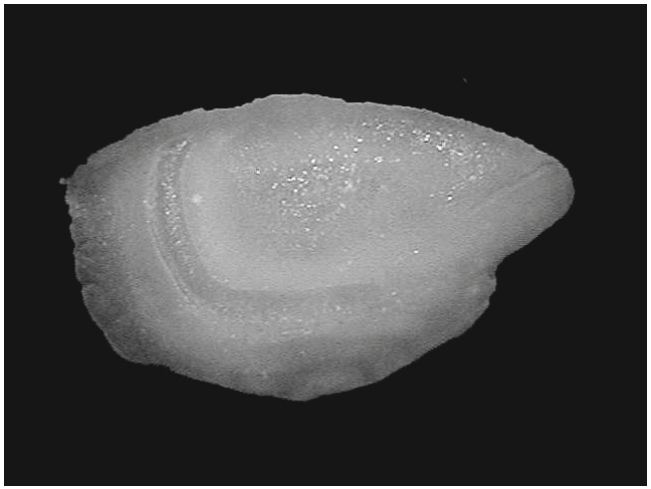
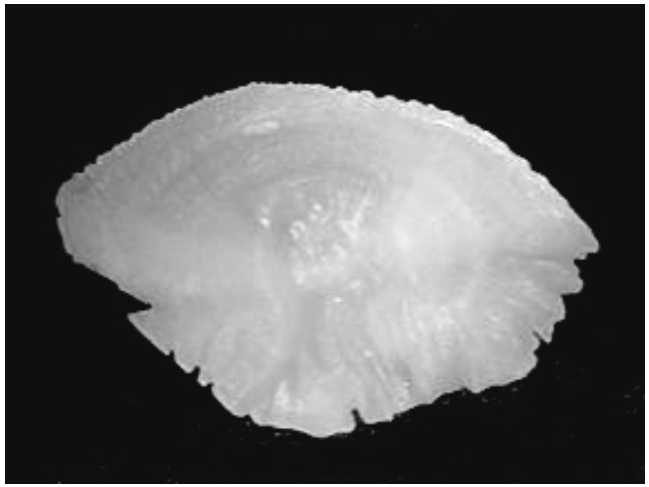


Figure 42. Bluestriped grunt, *Haemulon sciurus*
Distribution: Shallow waters from South Carolina to Bermuda to Brazil, GOM, Bahamas, and Antilles
Specimen length: 24.3 cm FL



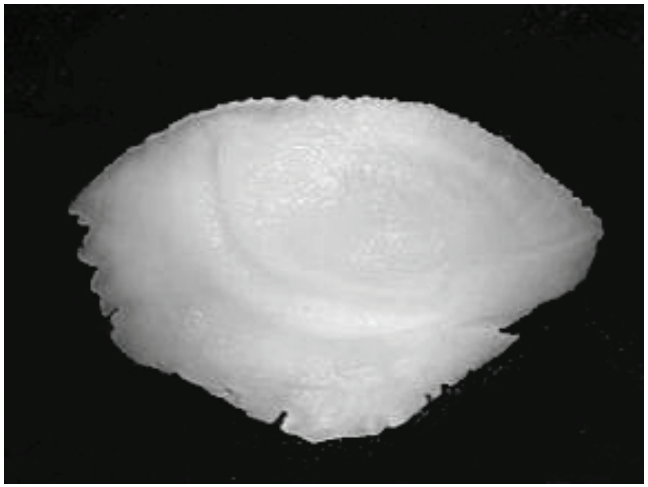
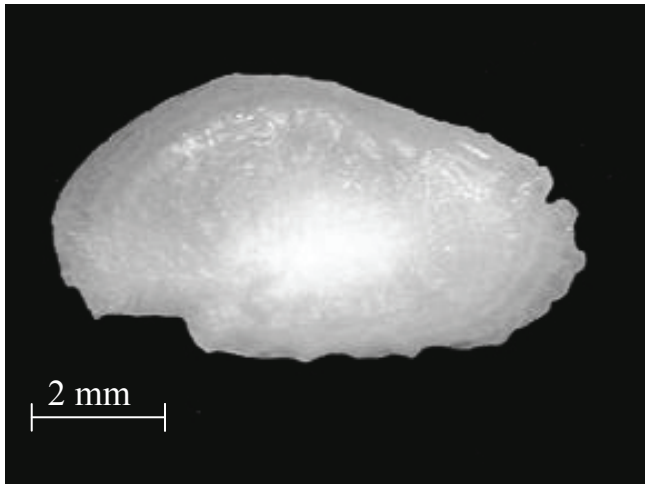


Figure 43. Margate,
Haemulon album
Distribution: Bermuda, Florida, and Bahamas to Brazil
Specimen length: 69.5 cm FL



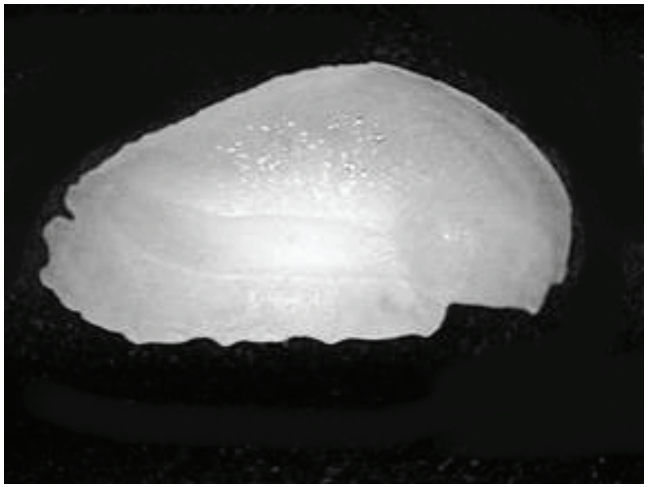
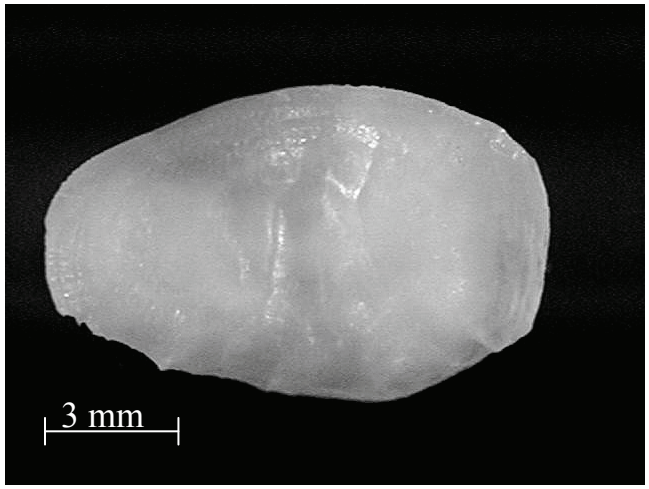


Figure 44. Pigfish,
Orthopristis chrysoptera
Distribution: New York and Bermuda to Florida and Mexico
Specimen length: 20 cm FL



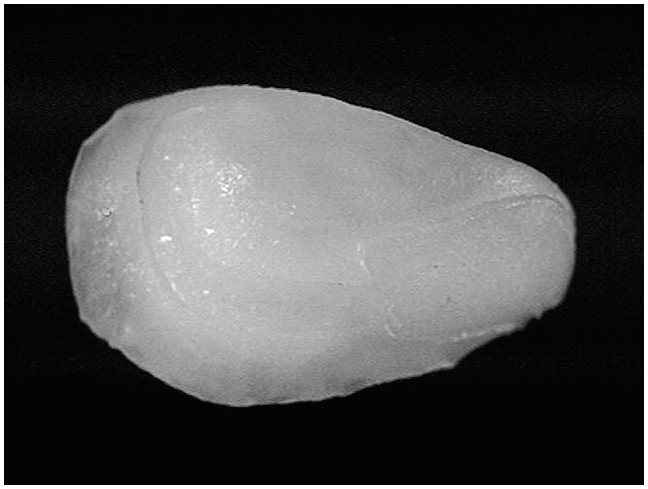
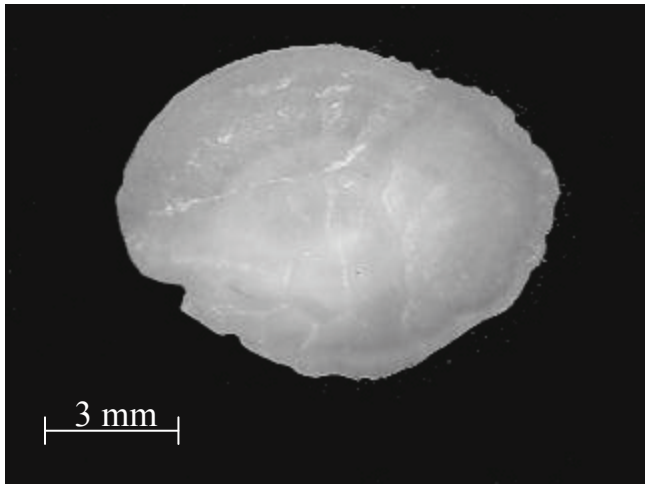


Figure 45. Porkfish, *Anisotremus virginicus*
Distribution: Florida to Bermuda and Brazil, southeastern GOM and Antilles
Specimen length: 25.5 cm TL



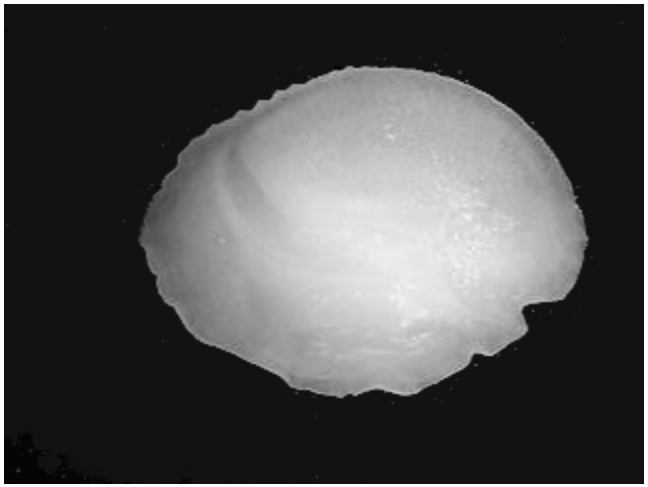


Figure 46. Tomtate, *Haemulon aurolineatum*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 20.4 cm FL

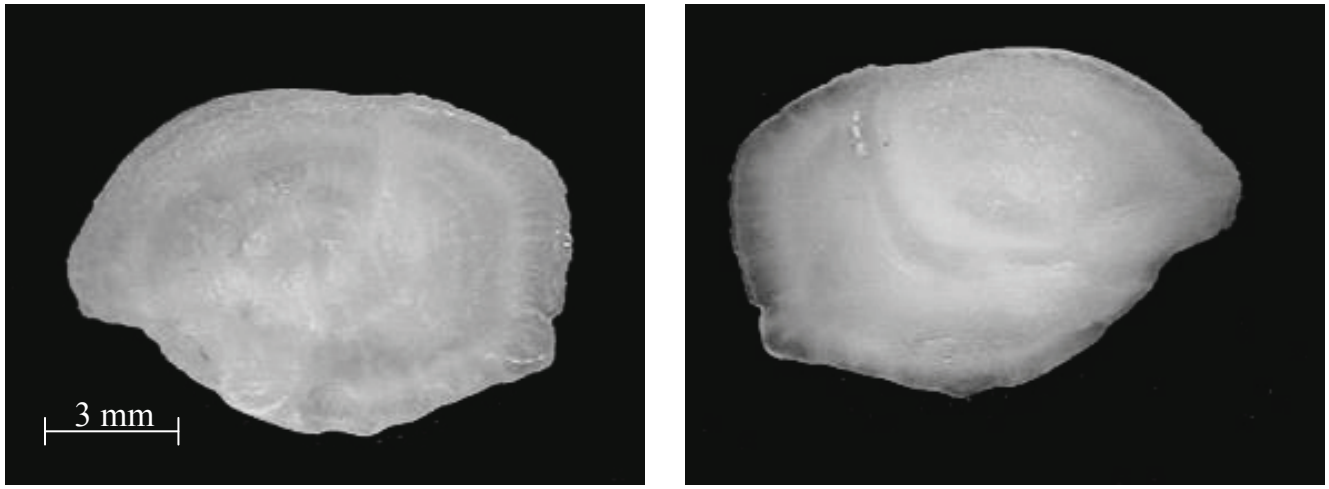


Figure 47. White grunt, *Haemulon plumieri*
Distribution: Maryland, Bermuda, and northern GOM to Brazil
Specimen length: 29.0 cm FL

Family Holocentridae: Squirrelfishes

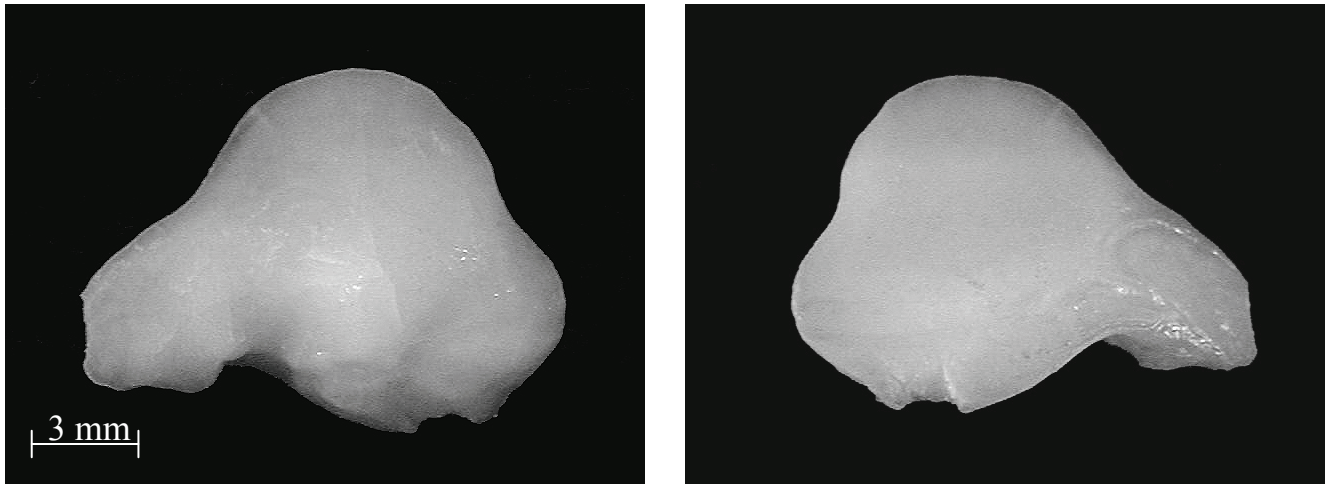


Figure 48. Bigeye soldierfish, *Ostichthys trachypoma*
Distribution: Long Island to Brazil
Specimen length: 20.9 cm FL

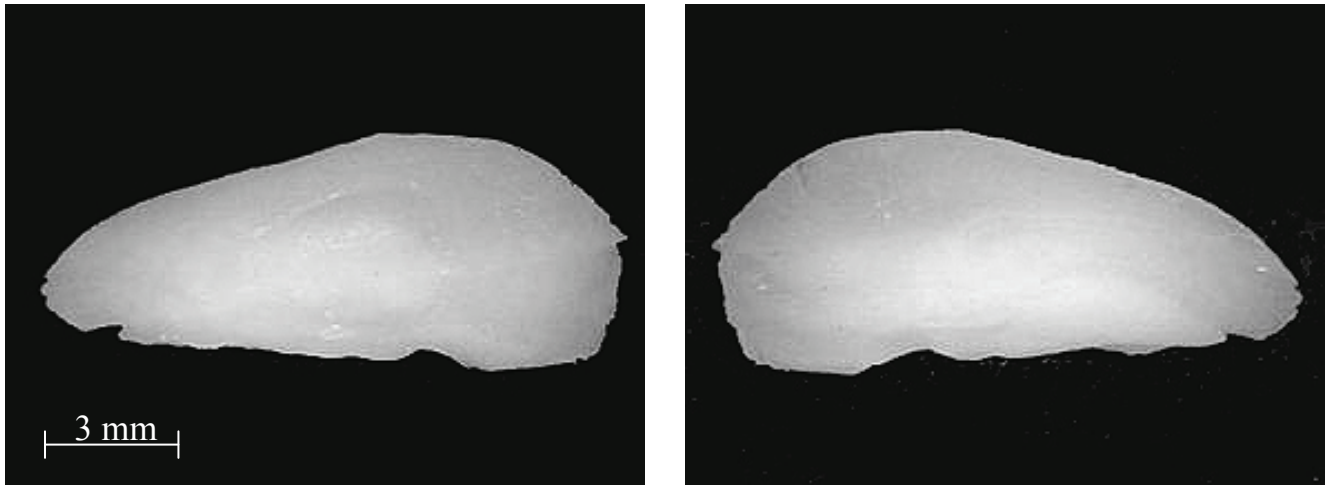


Figure 49. Squirrelfish, *Holocentrus adscensionis*
Distribution: North Carolina and Bermuda to Brazil, eastern Atlantic
Specimen length: 35 cm TL*

Family Labridae: Wrasses

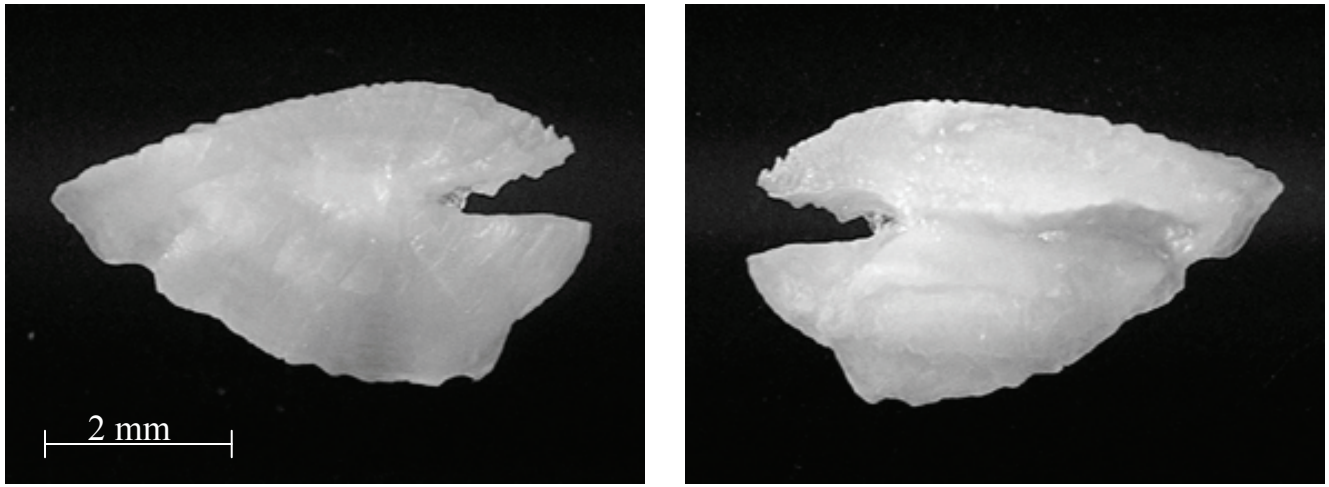
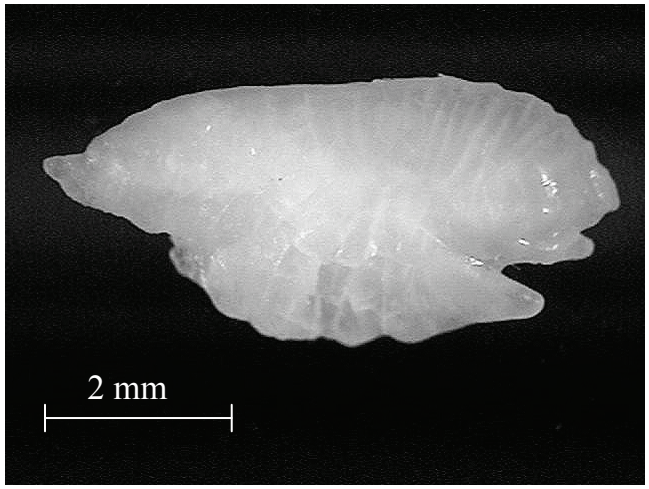


Figure 50. Hogfish, *Lachnolaimus maximus*
Distribution: Nova Scotia, Bermuda, and northern GOM to northern South America
Specimen length: 29.6 FL



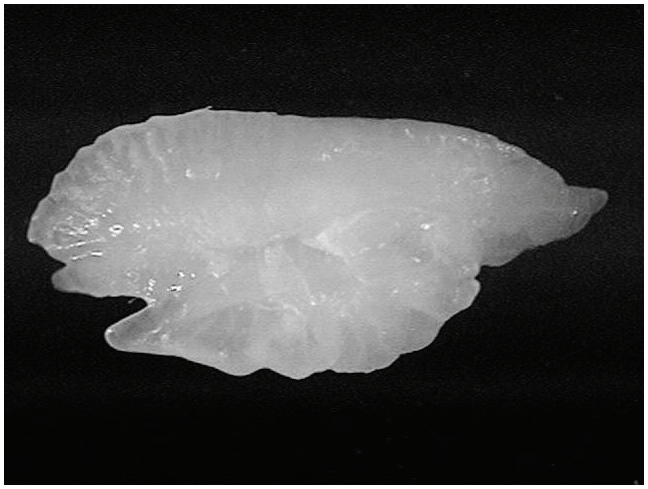


Figure 51. Red hogfish, *Decodon puellaris*
Distribution: Northern GOM to Brazil, Antilles, and Bahamas
Specimen length: 22.5 cm TL

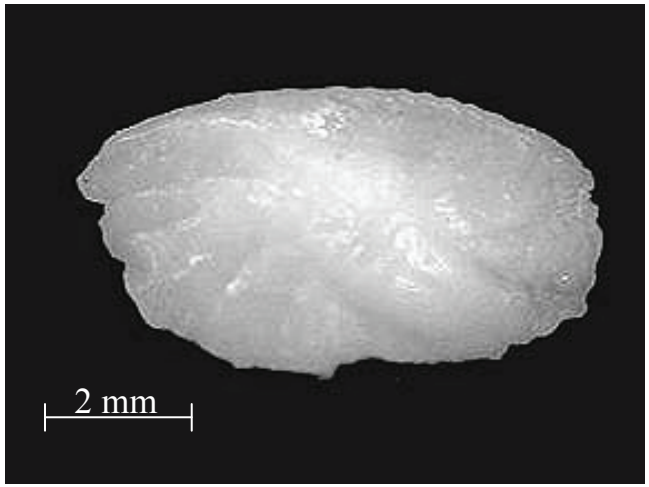


Figure 52. Spanish hogfish, *Bodianus rufus*
Distribution: Bermuda, S Florida, and northern GOM to southern Brazil
Specimen length: 33.7 cm TL

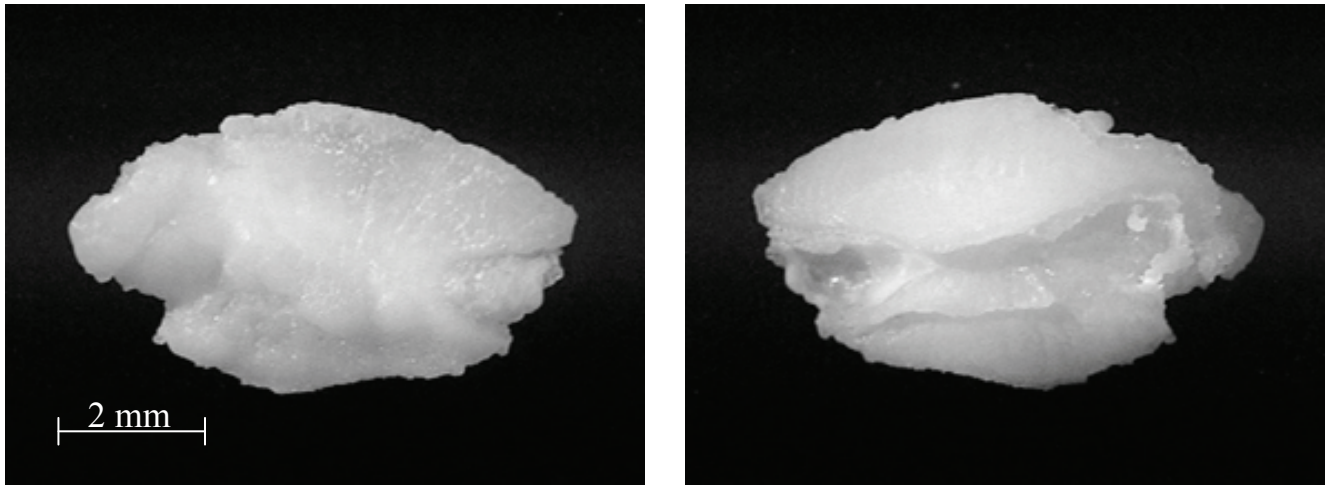


Figure 53. Spotfin hogfish, *Bodianus pulchellus*
Distribution: Southeastern Florida and Bahamas to Honduras and northern South America
Specimen length: 33.2 cm TL

Family Lobotidae: Tripletails

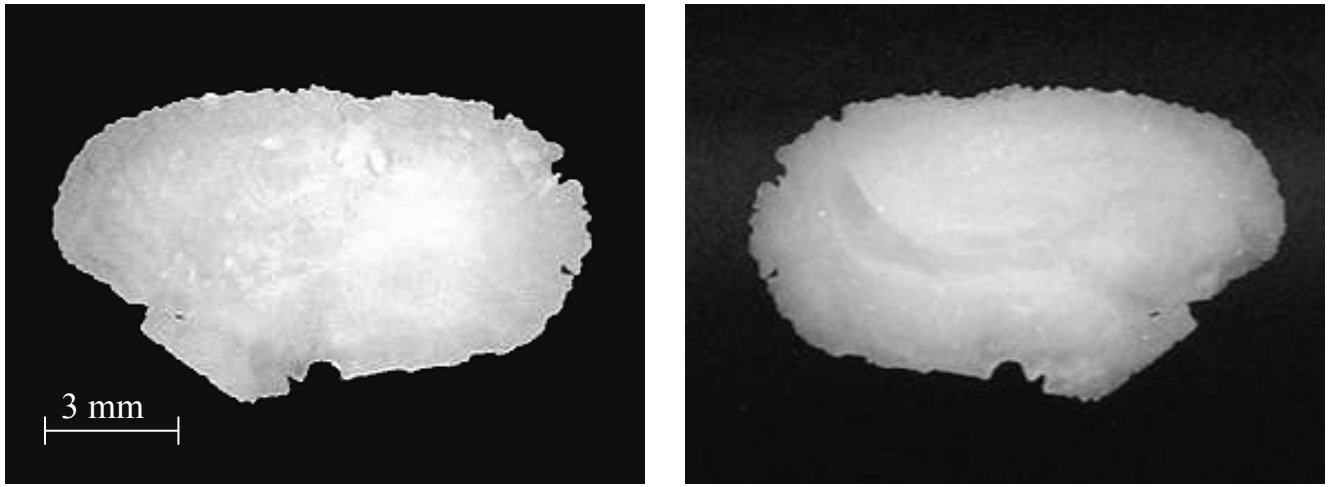
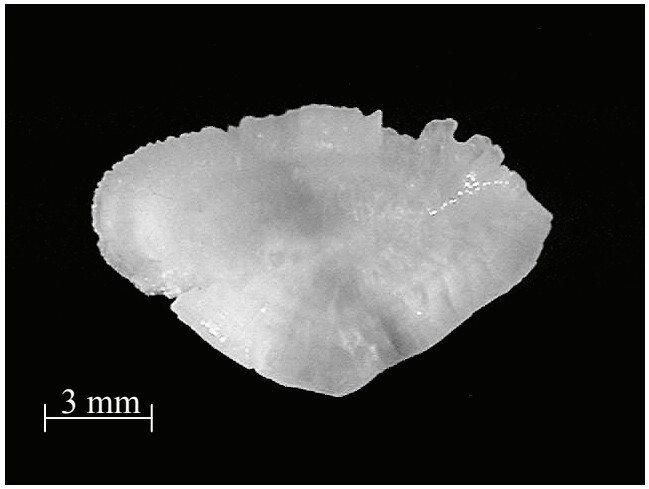


Figure 54. Tripletail, *Lobotes surinamensis*
Distribution: Massachusetts and Bermuda to Argentina, worldwide in tropical and warm waters
Specimen length: 40 cm TL*

Family Lutjanidae: Snappers



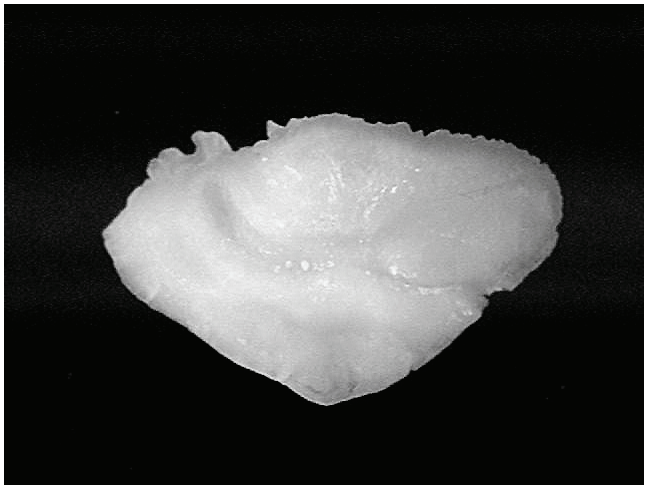
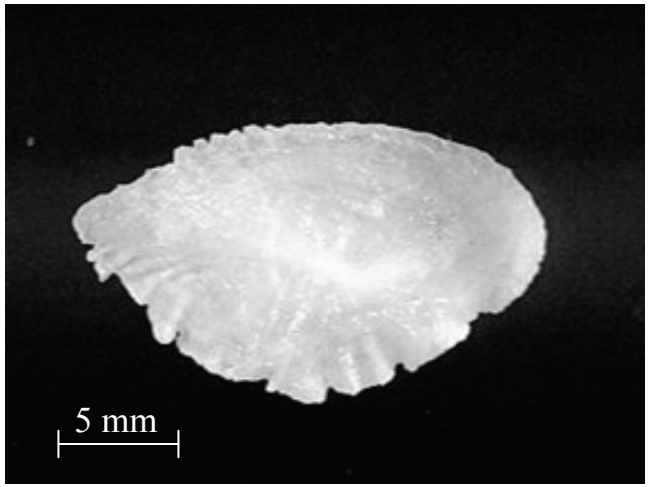


Figure 55. Black snapper, *Apsilus dentatus*
Distribution: Northern GOM to Venezuela
Specimen length: 62.0 cm TL



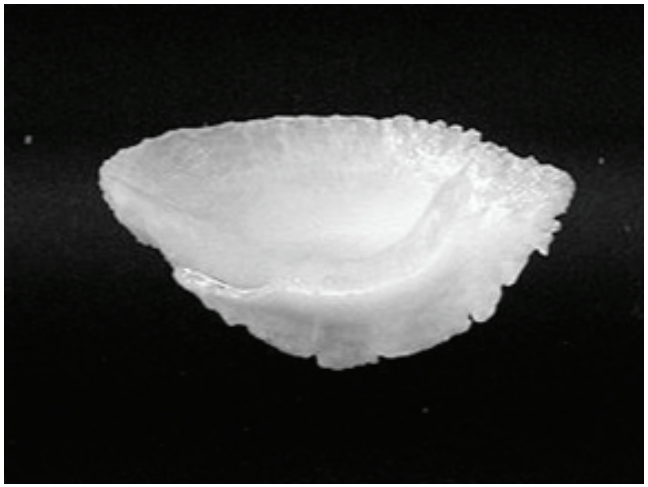


Figure 56. Blackfin snapper, *Lutjanus buccanella*
Distribution: Massachusetts, Bahamas, and northern GOM to southeastern Brazil
Specimen length: 42.0 cm FL

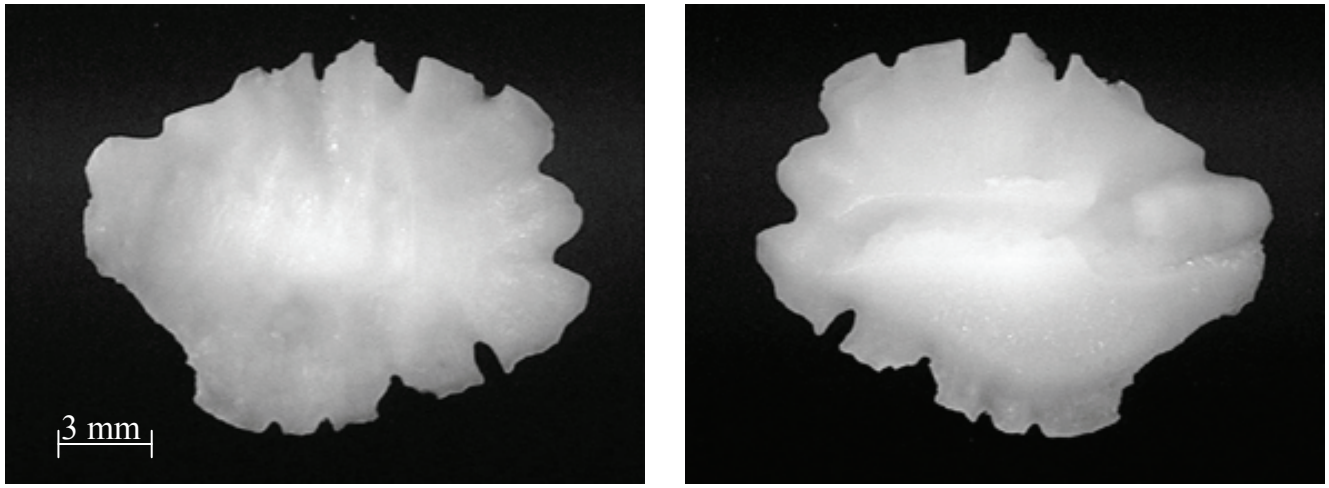


Figure 57. Cardinal snapper, *Pristipomoides macrophthalmus*
Distribution: Straits of Florida, Bahamas, Greater Antilles and Caribbean coasts of Nicaragua and Panama
Specimen length: 44.0 cm FL

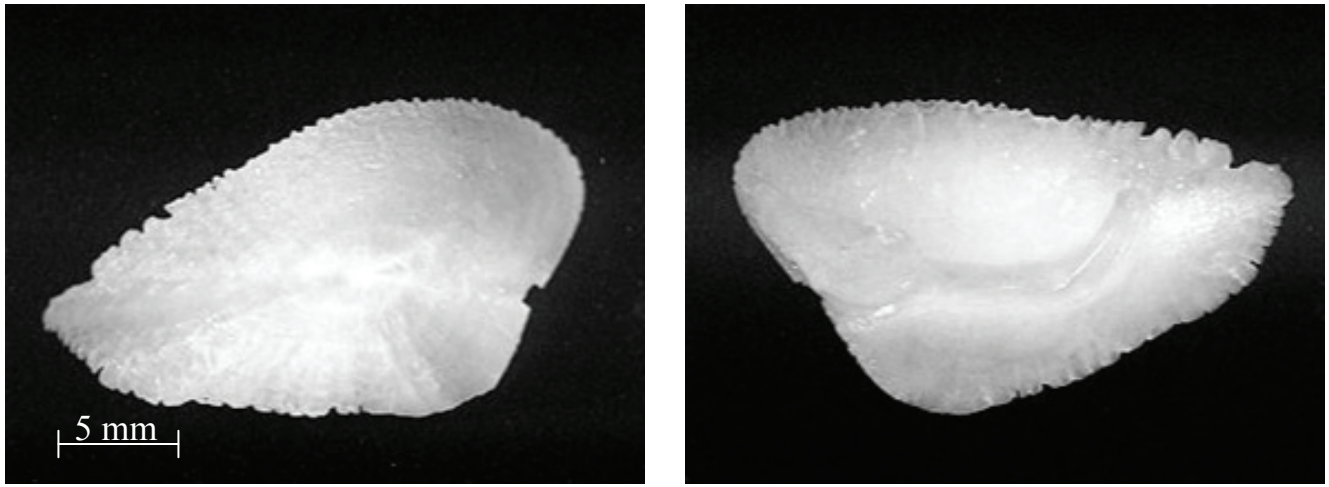
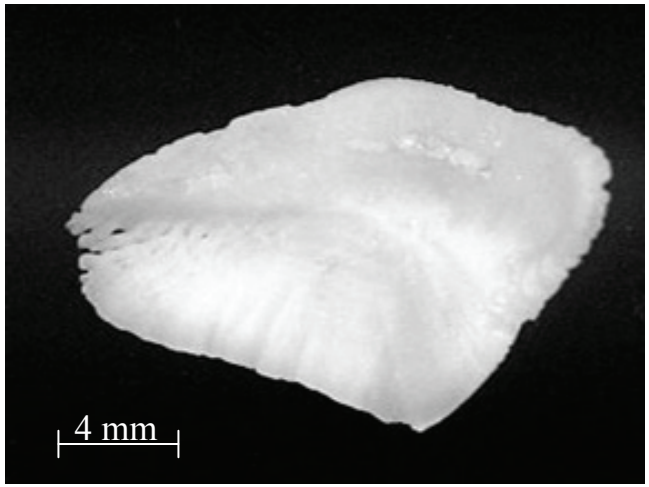


Figure 58. Cubera snapper, *Lutjanus cyanopterus*
Distribution: Southeastern Florida, Bahamas, and Central America to Brazil
Specimen length: 83.0 cm FL



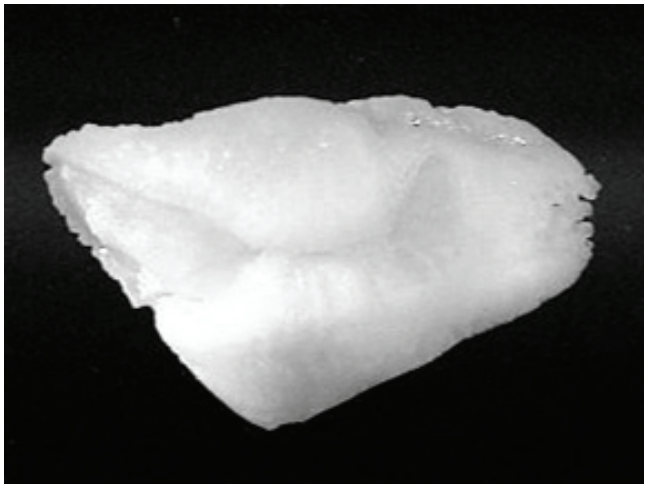
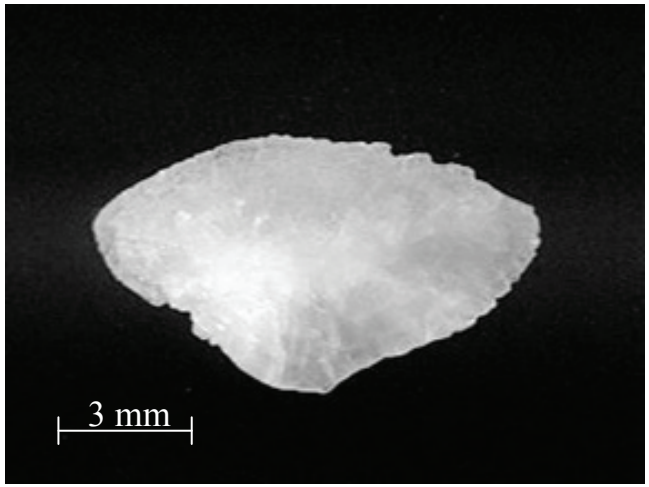


Figure 59. Dog snapper, *Lutjanus jocu*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 75.5 cm FL



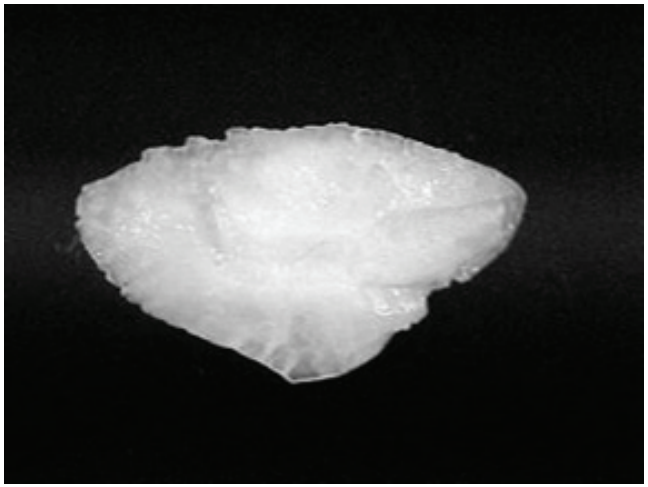


Figure 60. Gray snapper, *Lutjanus griseus*
Distribution: Massachusetts, Bermuda, and northern GOM to southeastern Brazil; Eastern Atlantic
Specimen length: 31.7 cm FL

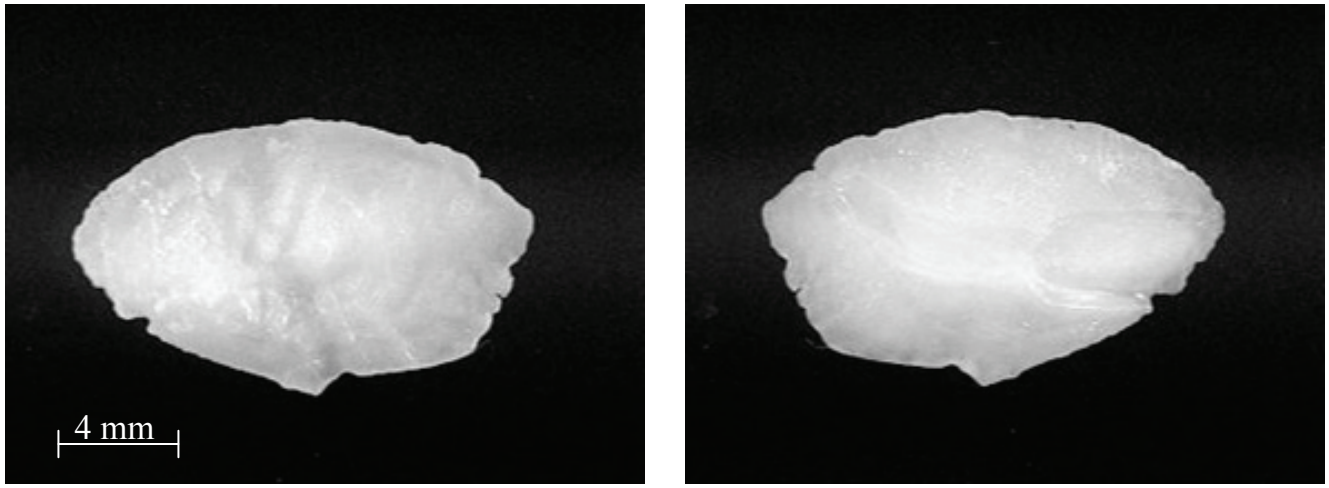


Figure 61. Lane snapper, *Lutjanus synagris*
Distribution: North Carolina, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 33 cm FL

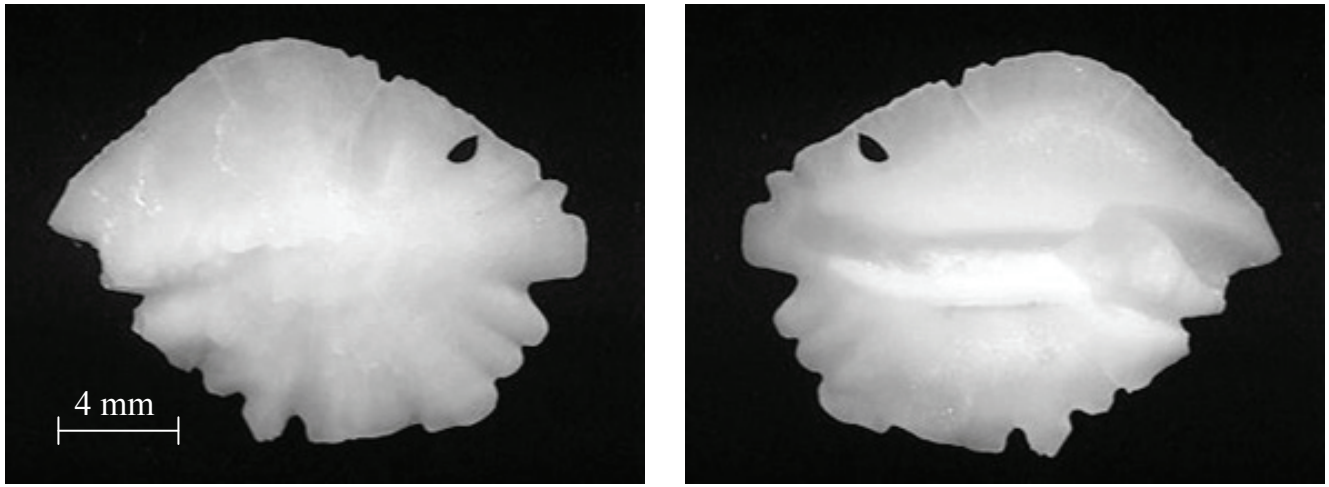
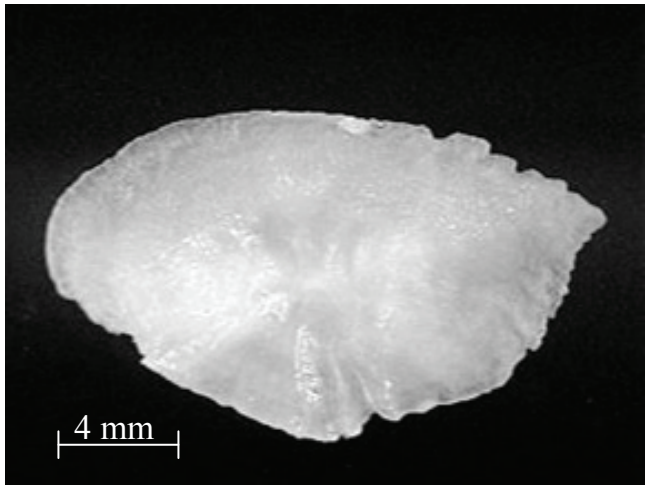


Figure 62. Mahogany snapper, *Lutjanus mahogoni*
Distribution: North Carolina and Bahamas to Guianas
Specimen length: 42.0 cm FL



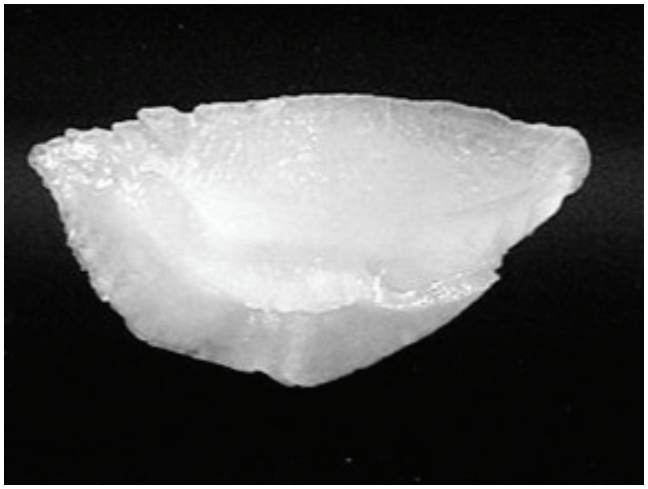
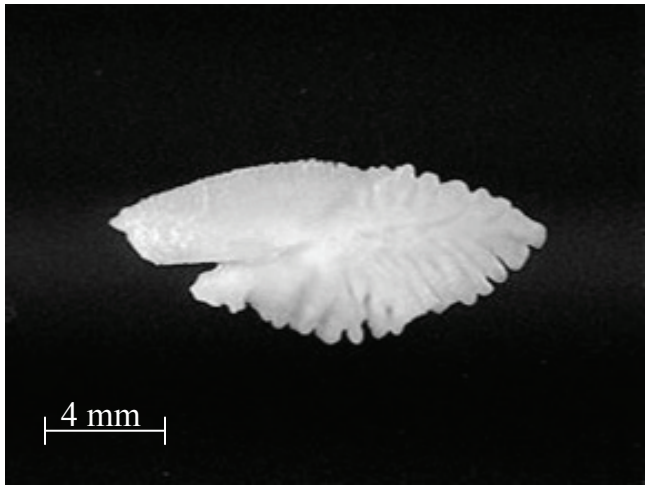


Figure 63. Mutton snapper, *Lutjanus analis*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 46.8 cm FL



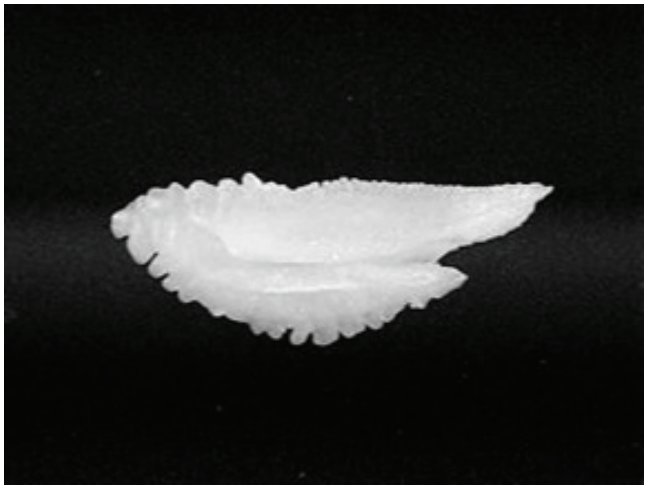
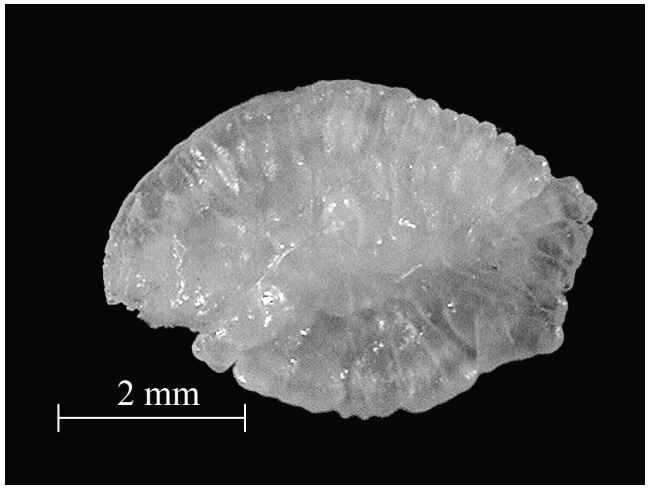


Figure 64. Queen snapper, *Etelis oculatus*
Distribution: Bermuda, Florida, and Bahamas to Brazil, worldwide in tropical waters
Specimen length: 69.5 cm FL



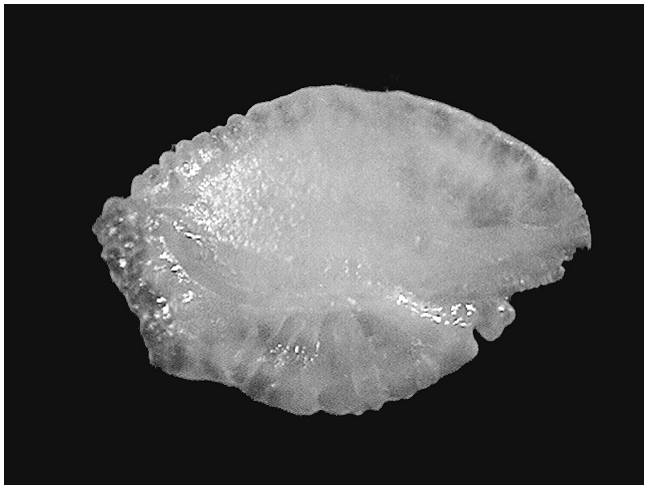
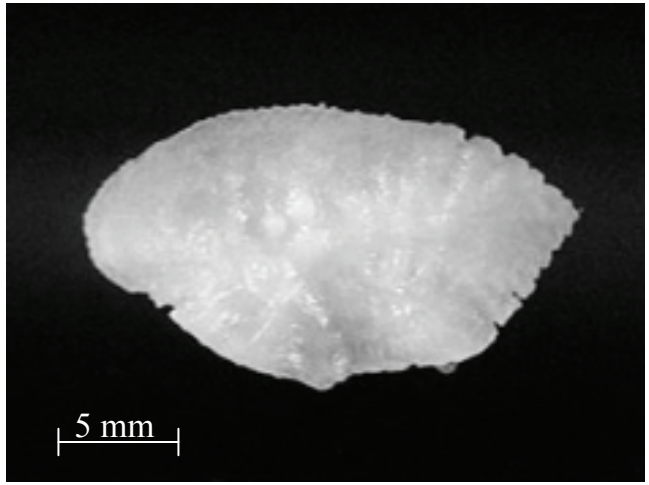


Figure 65a. Red snapper, *Lutjanus campechanus*
Distribution: North Carolina to Florida Keys and GOM to the Yucatan
Specimen length: 9.0 cm FL



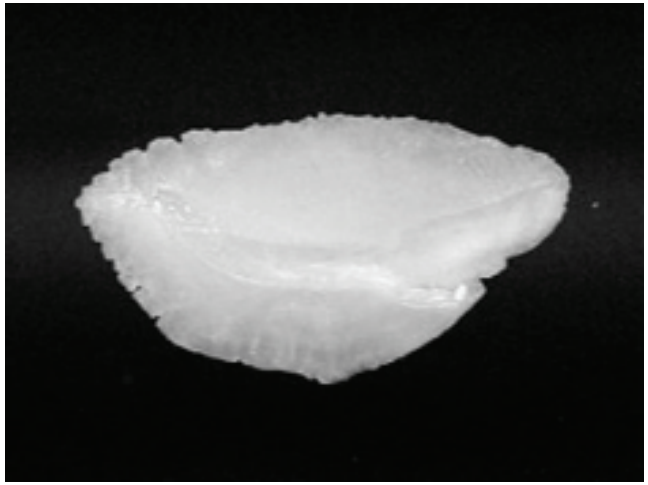
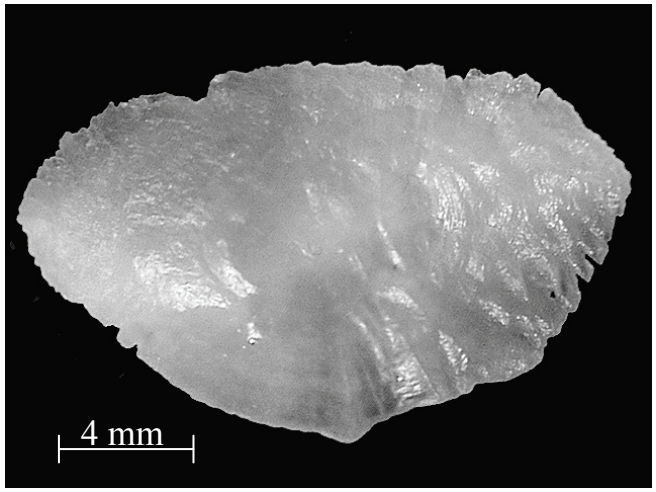


Figure 65b. Red snapper, *Lutjanus campechanus*
Distribution: North Carolina to Florida Keys and GOM to the Yucatan
Specimen length: 52.0 cm FL



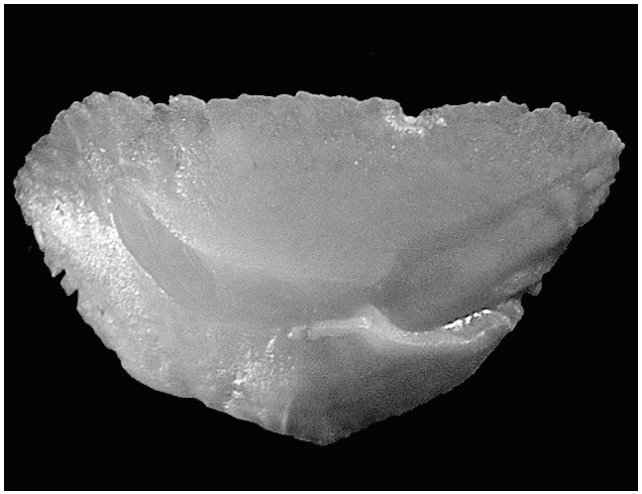
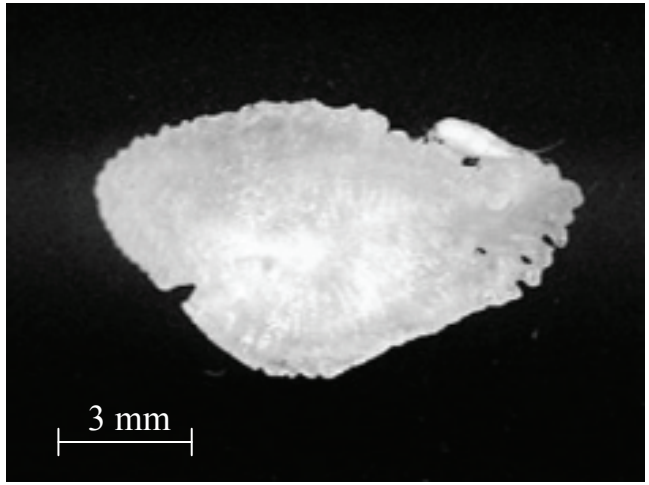


Figure 65c. Red snapper, *Lutjanus campechanus*
Distribution: North Carolina to Florida Keys and GOM to the Yucatan
Specimen length: 58.4 cm FL



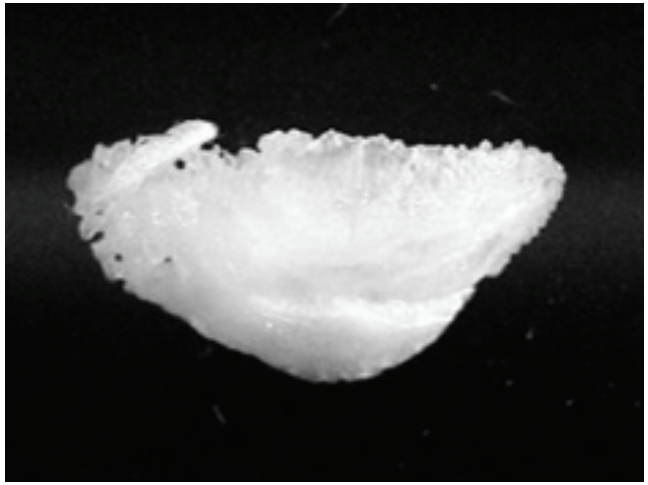
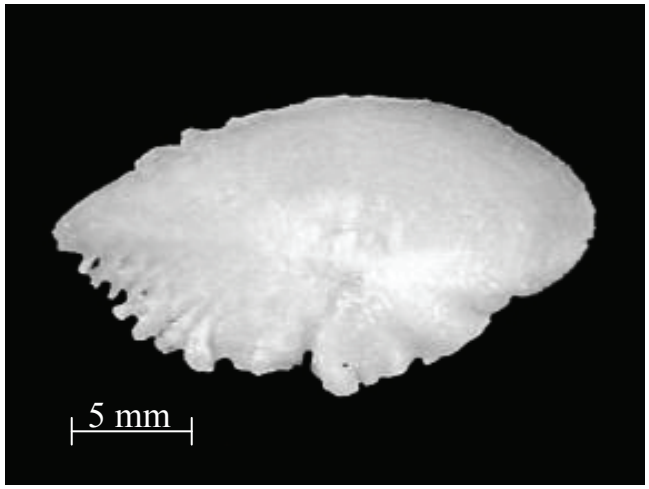


Figure 66. Schoolmaster, *Lutjanus apodus*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 36.2 cm TL



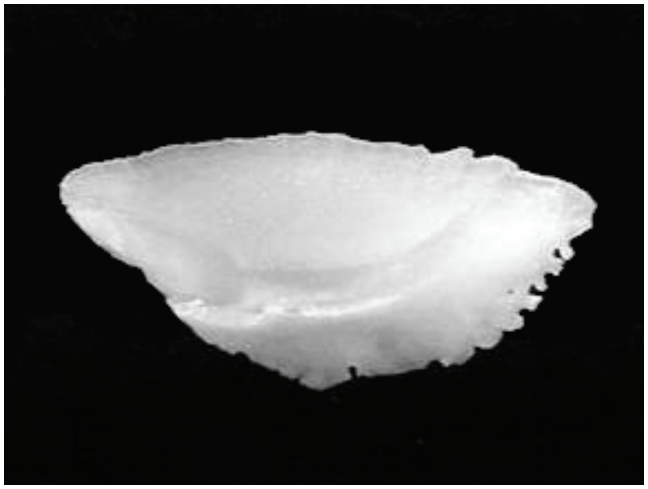
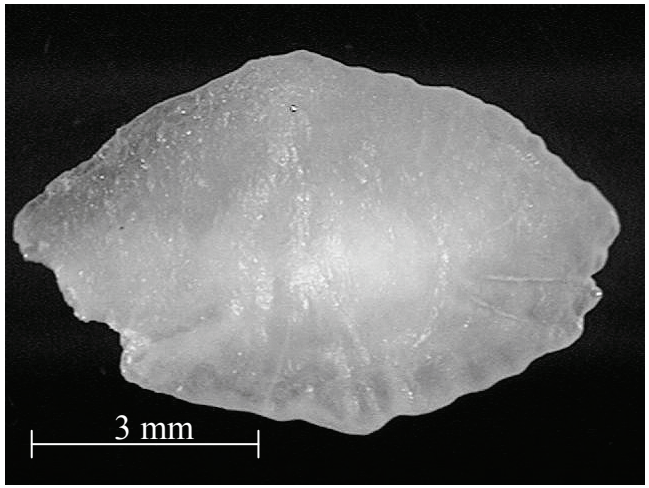


Figure 67. Silk snapper, *Lutjanus vivanus*
Distribution: North Carolina, Bahamas, and northern GOM to Brazil
Specimen length: 56.5 cm FL



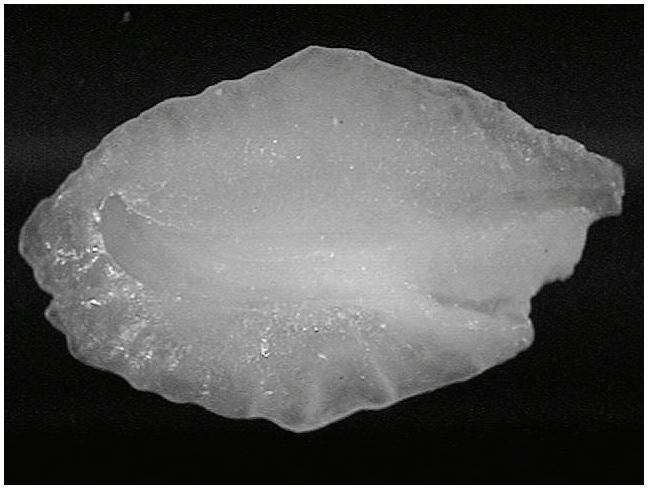
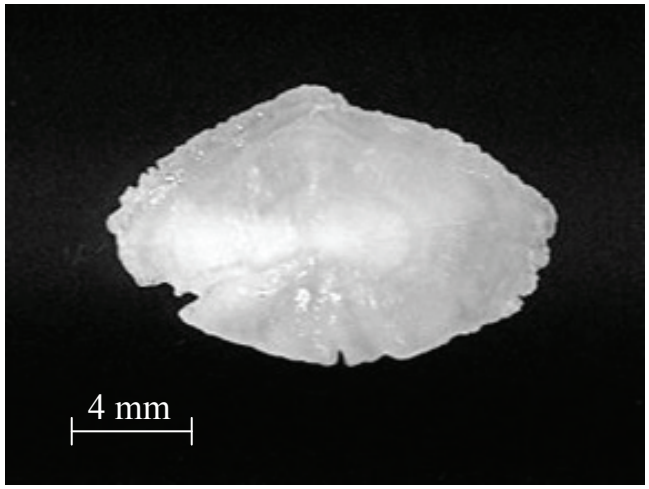


Figure 68a. Vermillion snapper, *Rhomboplites aurorubens*
Distribution: South Carolina, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 17.9 cm FL



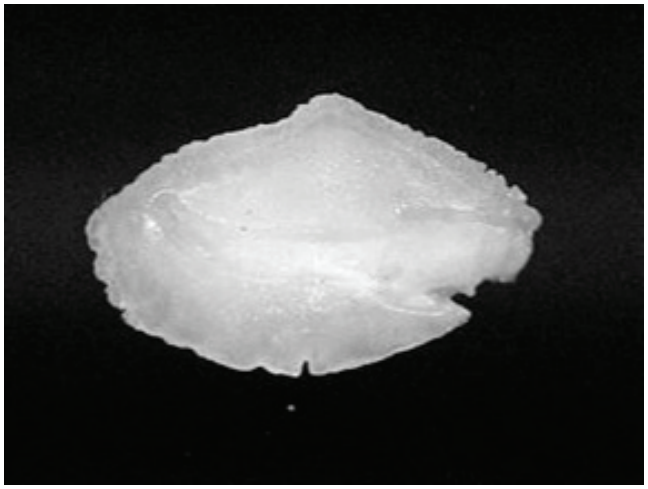
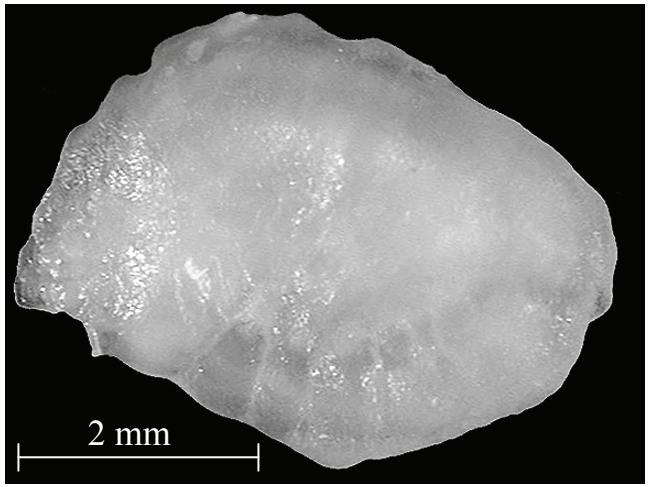


Figure 68b. Vermillion snapper, *Rhomboplites aurorubens*
Distribution: South Carolina, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 24.5 cm FL



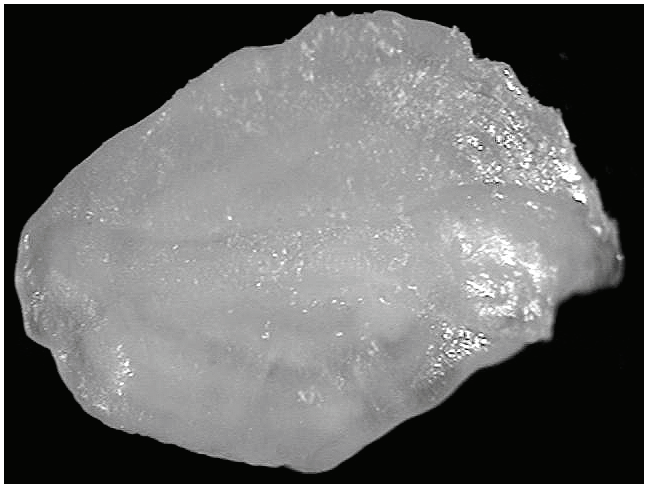
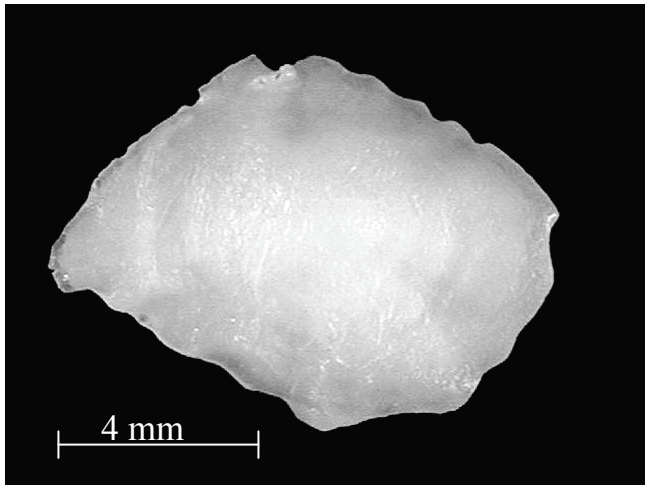


Figure 69a. Wenchman, *Pristipomoides aquilonaris*
Distribution: Florida, GOM, and Antilles to Guianas
Specimen length: 6.6 cm FL



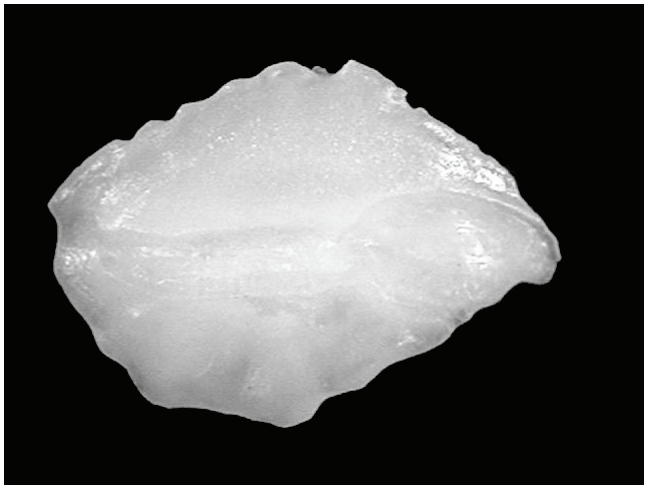
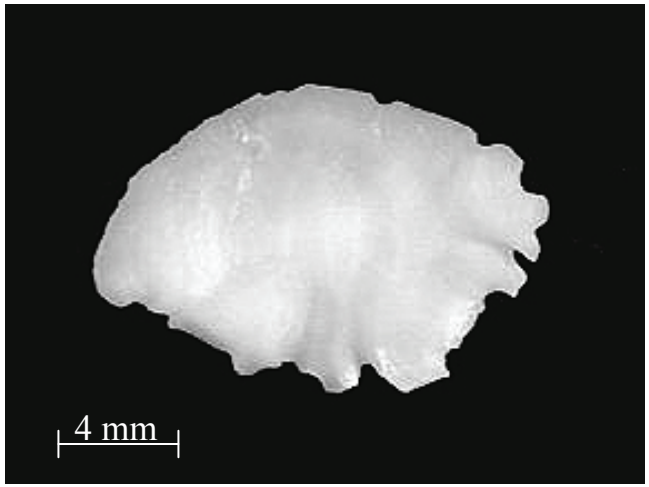


Figure 69b. Wenchman, *Pristipomoides aquilonaris*
Distribution: Florida, GOM, and Antilles to Guianas
Specimen length: 18.1 cm FL



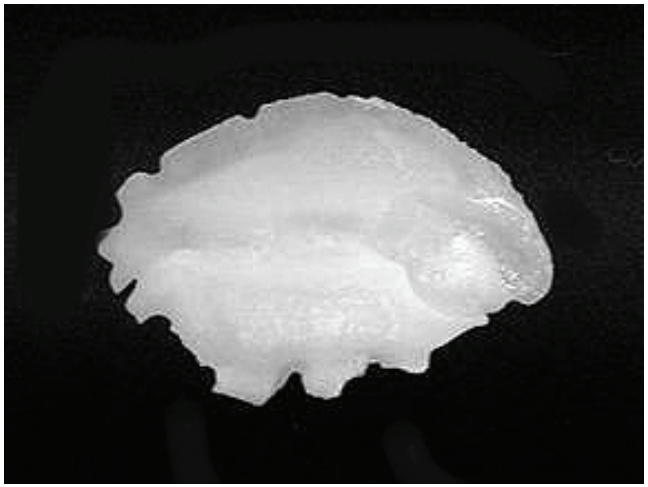


Figure 69c. Wenchman, *Pristipomoides aquilonaris*
Distribution: Florida, GOM, and Antilles to Guianas
Specimen length: 27.5 cm FL

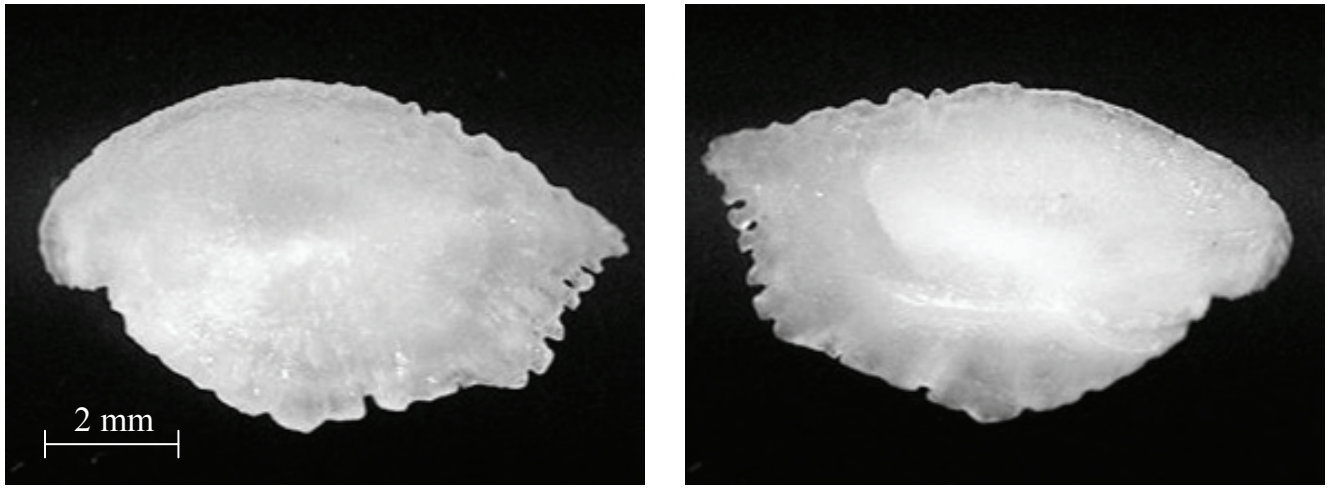


Figure 70. Yellowtail snapper, *Ocyurus chrysurus*
Distribution: Massachusetts, Bermuda, and northern GOM to Brazil
Specimen length: 26.5 cm FL

Family Malacanthidae: Tilefishes

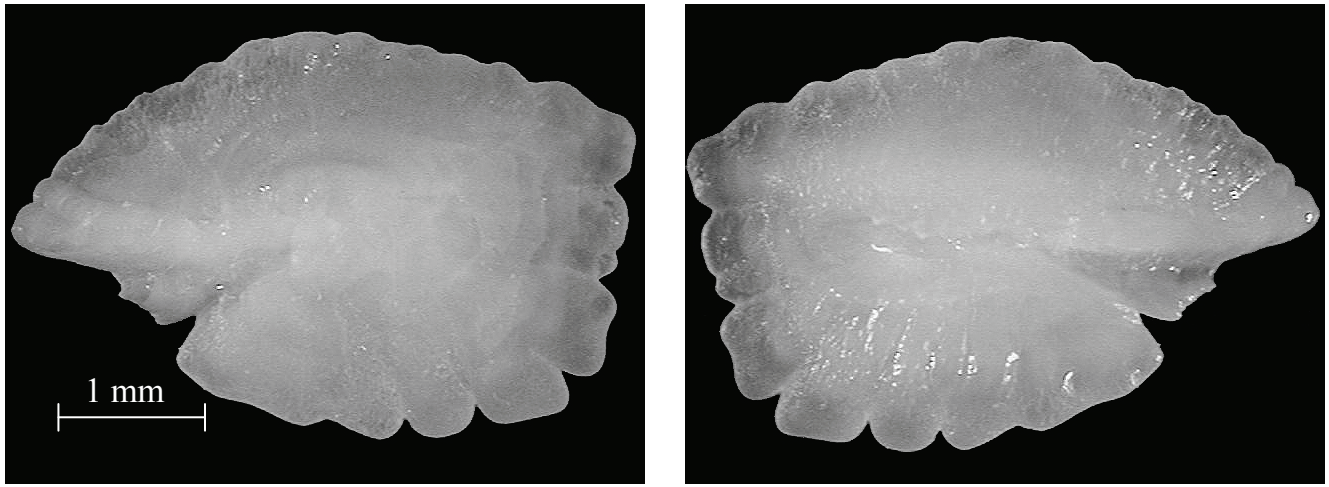
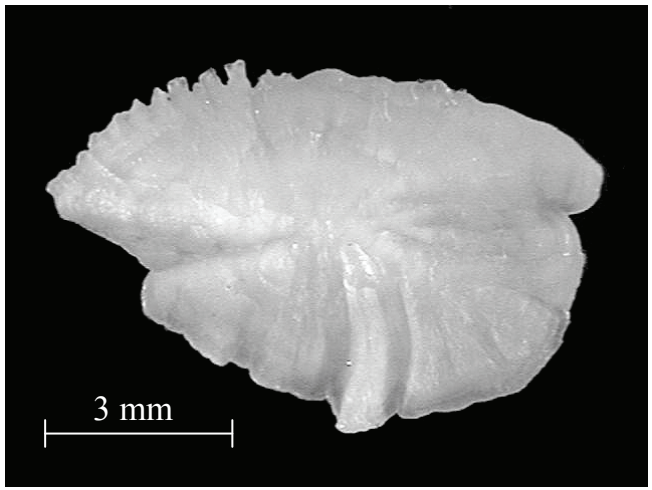


Figure 71a. Anchor tilefish, *Caulolatilus intermedius*
Distribution: Northwestern Florida to Yucatan and Cuba
Specimen length: 17.7 cm TL



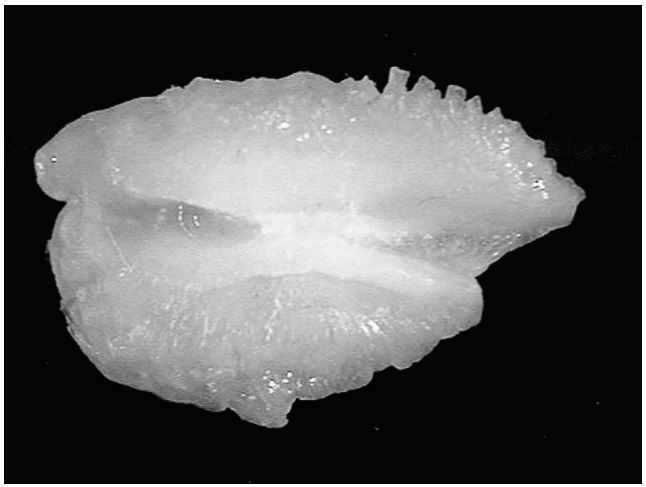
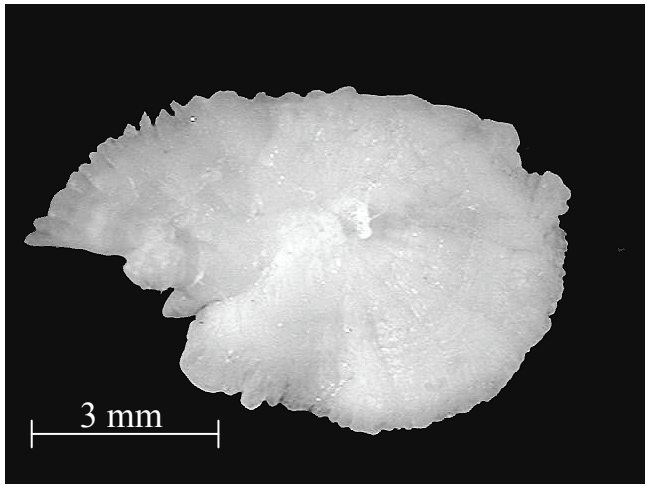


Figure 71b. Anchor tilefish, *Caulolatilus intermedius*
Distribution: Northwestern Florida to Yucatan and Cuba
Specimen length: 33.5 cm TL



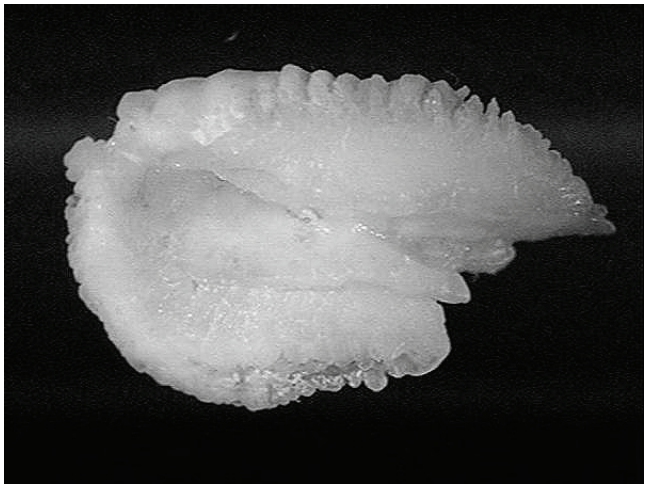


Figure 72. Blackline tilefish, *Caulolatilus cyanops*
Distribution: Northwestern Florida to Yucatan and Cuba
Specimen length: 33.5 cm FL

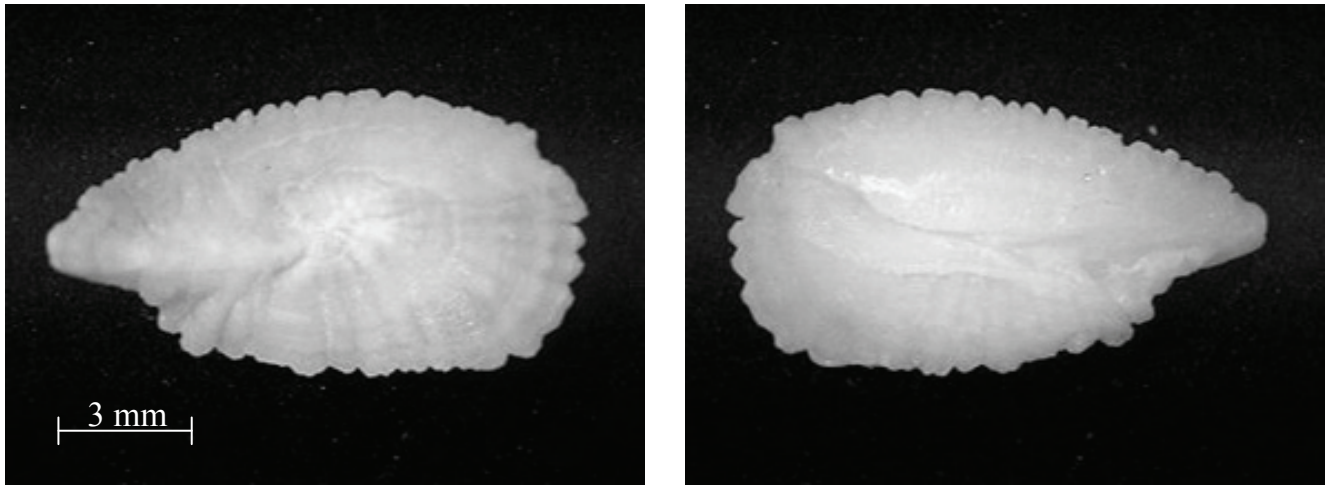


Figure 73. Blueline or grey tilefish, *Caulolatilus microps*
Distribution: North Carolina to southeastern Florida and Mexico; northern and eastern GOM
Specimen length: 45 cm TL*

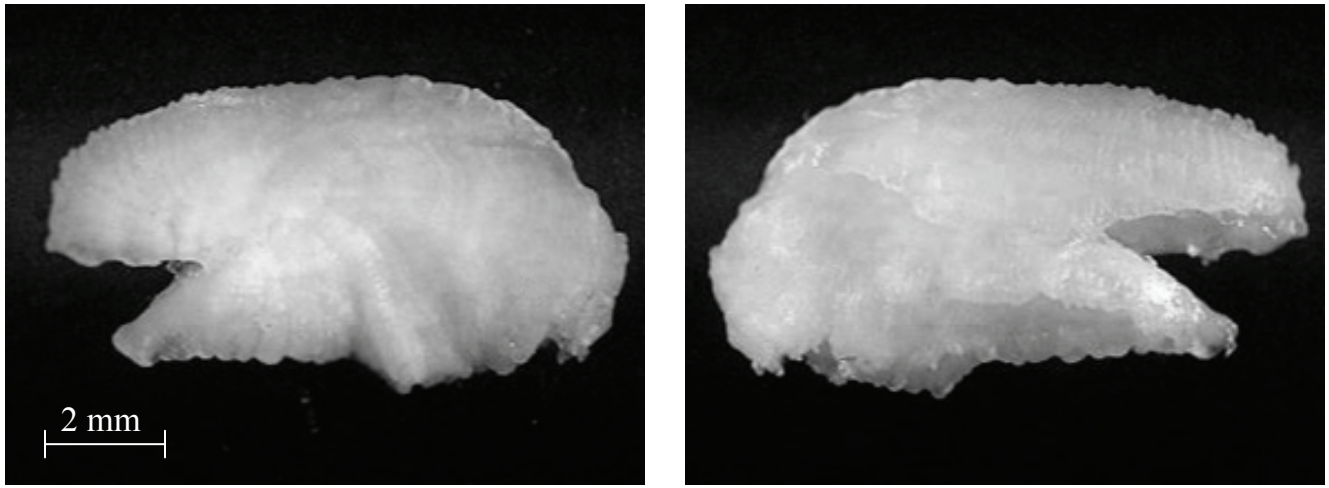


Figure 74. Goldface tilefish, *Caulolatilus chrysops*
Distribution: North Carolina and Dry Tortugas, Florida, to southeastern Brazil
Specimen length: 45 cm TL*

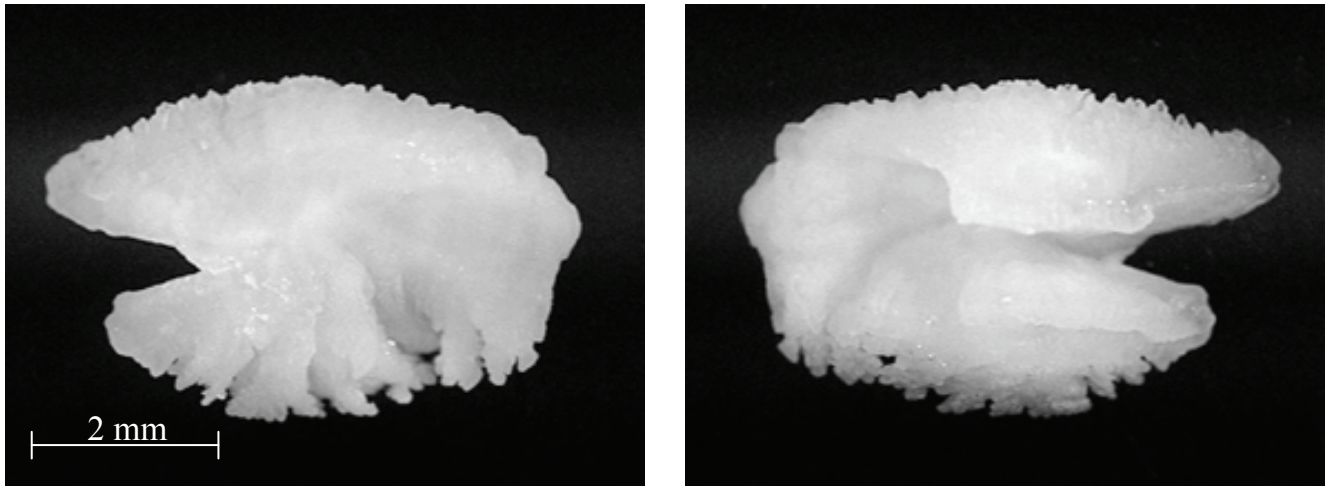


Figure 75. Sand tilefish, *Malacanthus plumieri*
Distribution: South Carolina, Bermuda, and Lesser Antilles
Specimen length: 56.0 cm FL

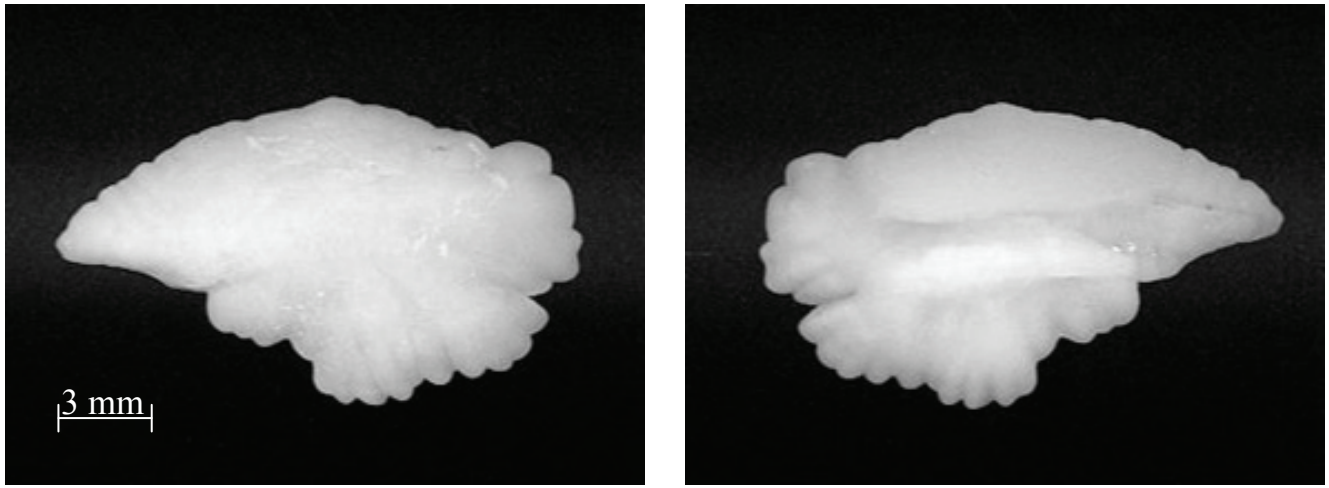


Figure 76. Tilefish, *Lopholatilus chamaeleonticeps*
Distribution: Nova Scotia to southeastern Florida and eastern GOM
Specimen length: 55.0 cm FL

Family Mugilidae: Mullets

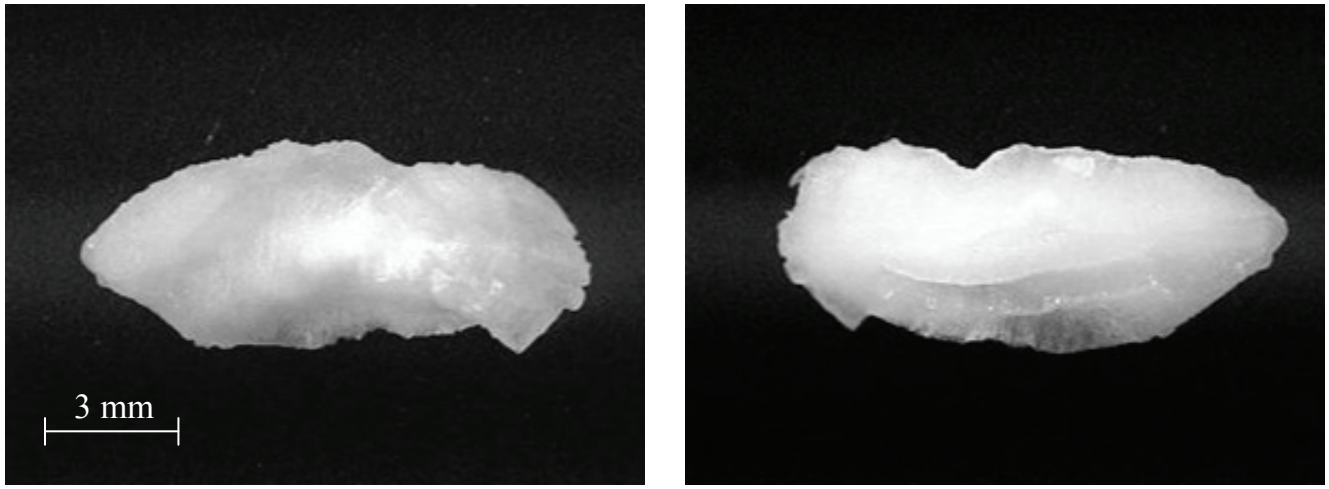


Figure 79. Striped mullet, *Mugil cephalus*
Distribution: Nova Scotia to Brazil, absent from Bahamas. Nearly worldwide in warm waters
Specimen length: 35.0 cm FL

Family Mullidae: Goatfishes

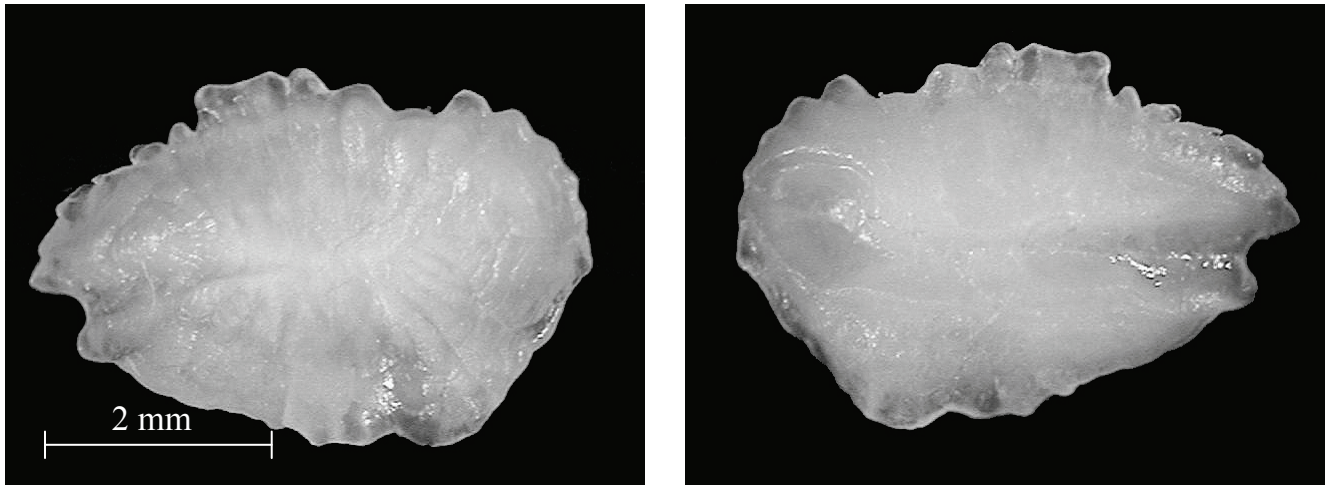
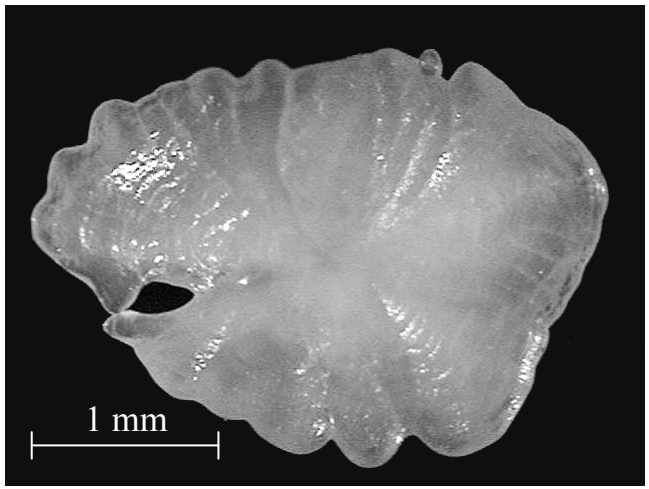


Figure 77. Dwarf goatfish, *Upeneus parvus*
Distribution: North Carolina to Brazil
Specimen length: 15.2 cm FL



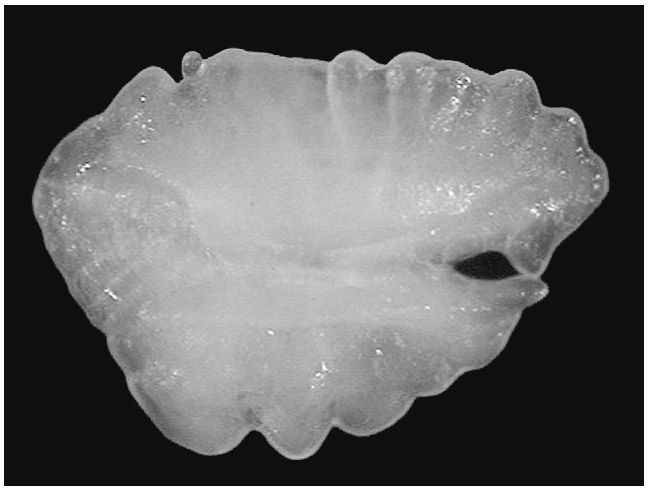
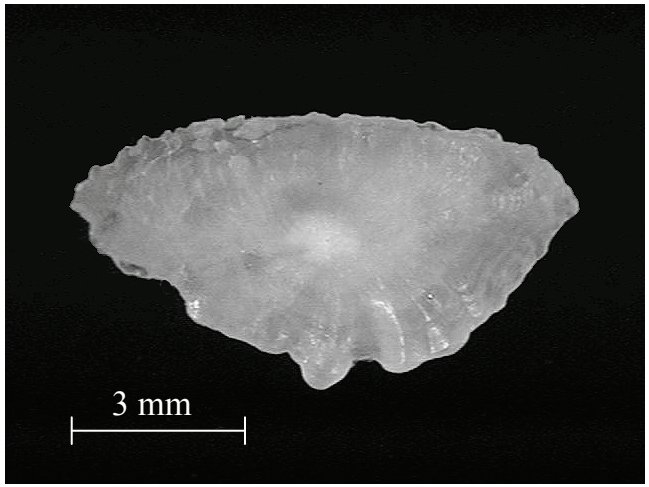


Figure 78. Red goatfish, *Mullus auratus*
Distribution: Cape Cod to Guyana
Specimen length: 14.9 cm FL

Family Pomacanthidae: Angelfish



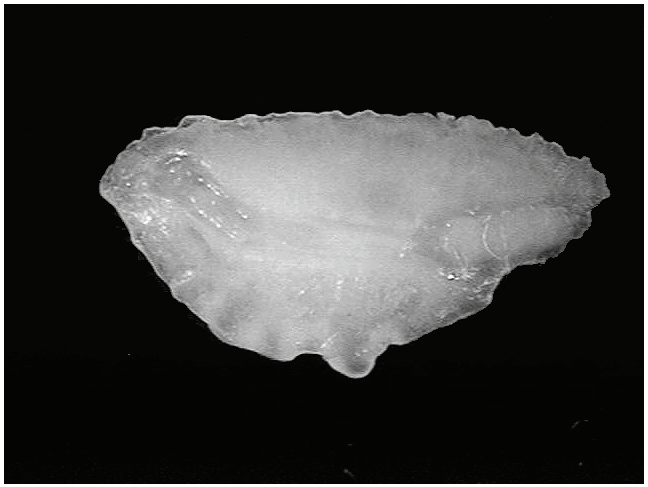


Figure 80. Blue angelfish, *Holacanthus bermudensis*
Distribution: New Jersey to Yucatan
Specimen length: 34.0 cm TL

Family Pomatomidae: Bluefish

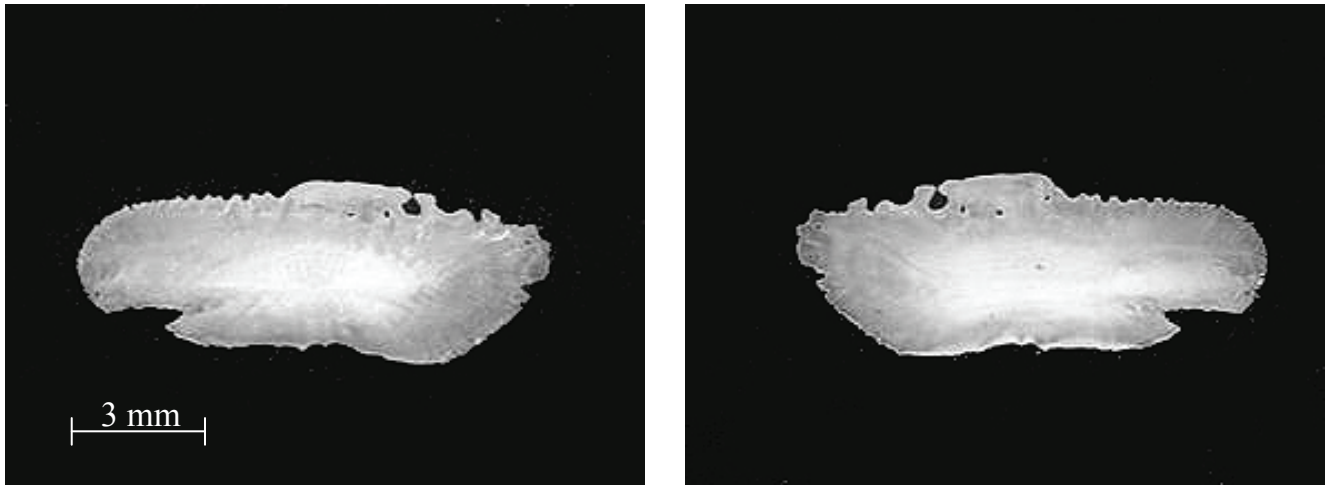


Figure 81. Bluefish,
Pomatomus saltatrix
Distribution: Nova Scotia and Bermuda to Argentina
Specimen length: 37.0 cm FL

Family Priacanthidae: Bigeyes

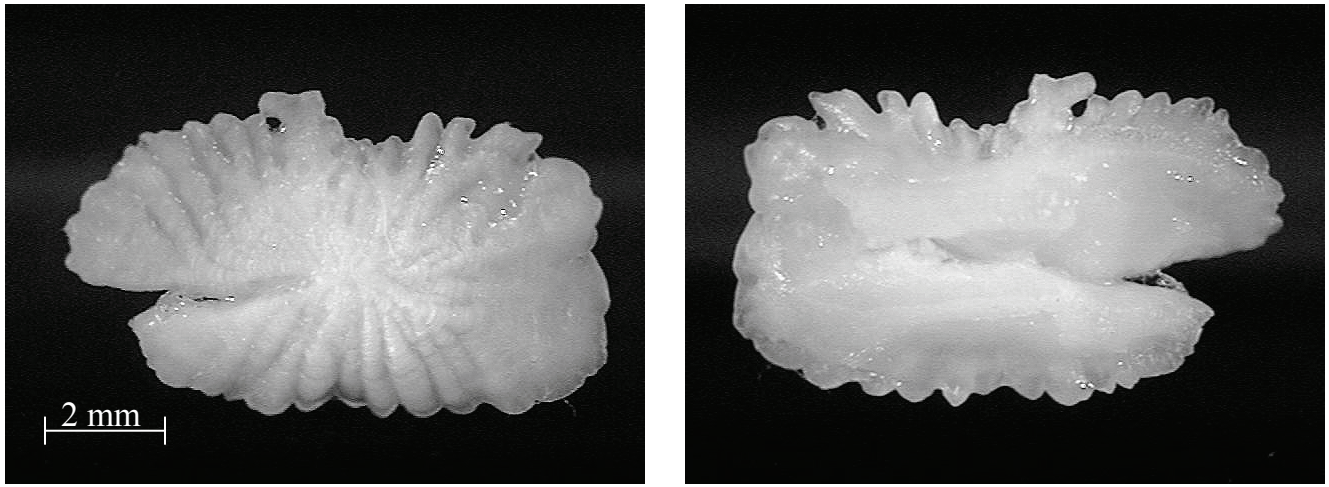
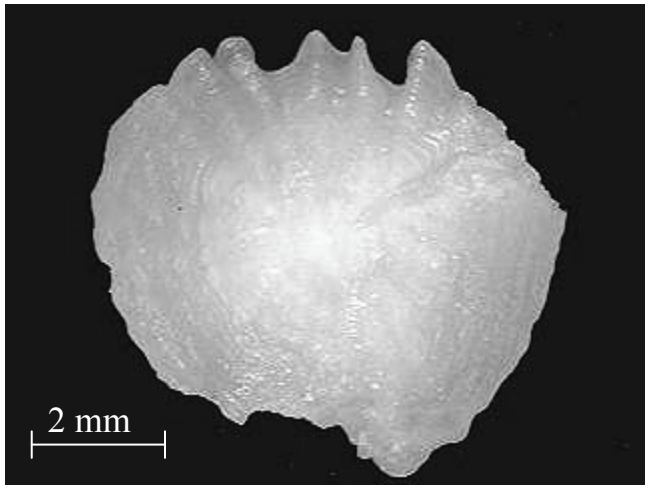


Figure 82. Bigeye,
Priacanthus arenatus
Distribution: North Carolina to northern Argentina
Specimen length: 46.4 cm FL



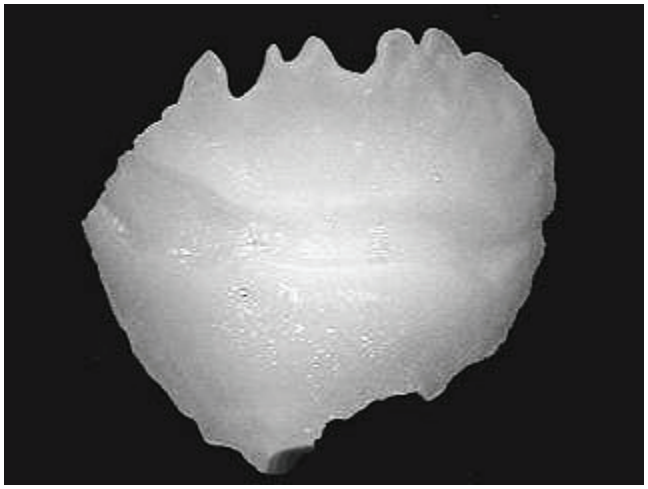
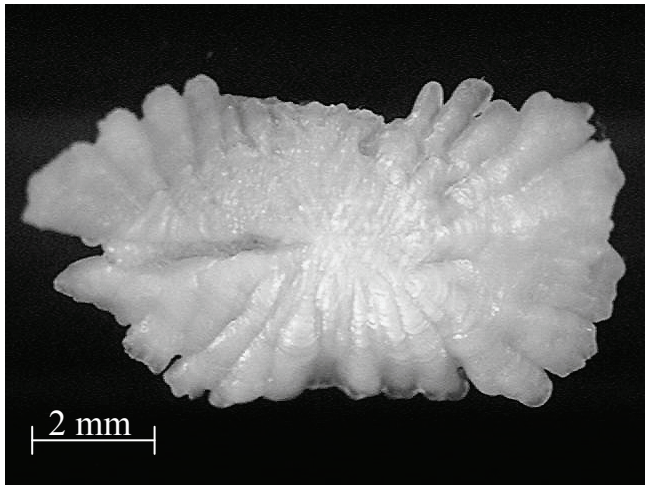


Figure 83. Short bigeye, *Pristigenys alta*
Distribution: Maine, Bermuda, and northern GOM to northern South America
Specimen length: 20.7 cm TL



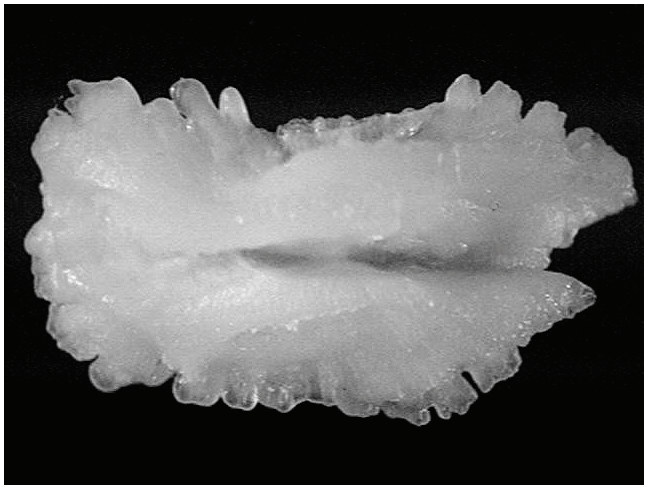


Figure 84. Glasseye snapper, *Priacanthus cruentatus*
Distribution: Southern Florida, Bahamas, and Caribbean
Specimen length: 50.4 cm FL

Family Rachycentridae: Cobia

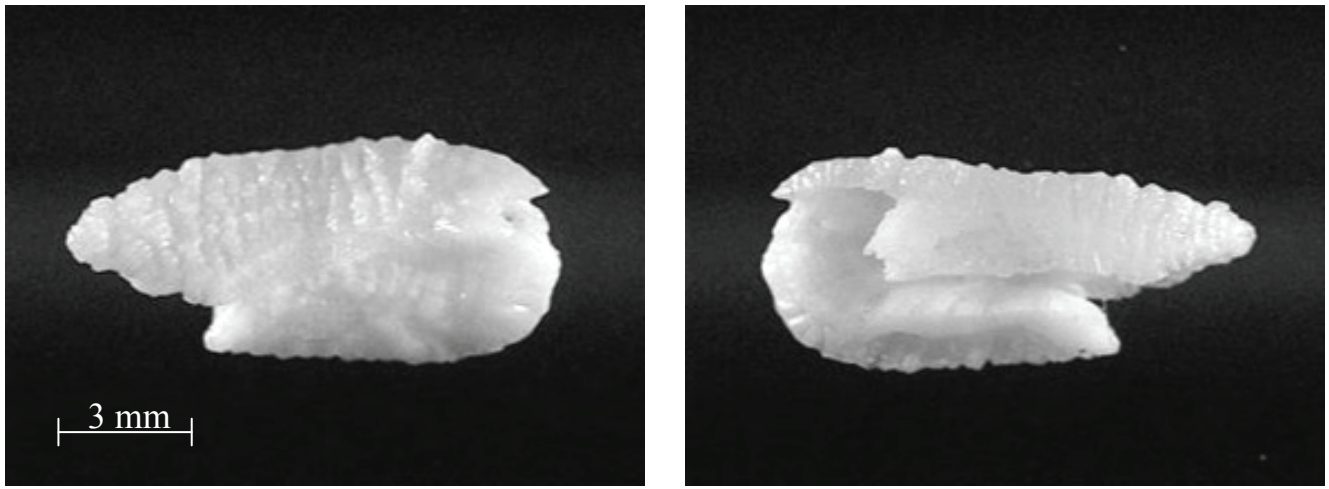


Figure 85. Cobia, *Rachycentron canadum*
Distribution: Massachusetts to Argentina, nearly worldwide in warm waters
Specimen length: 154 cm FL

Family Scaridae: Parrotfishes

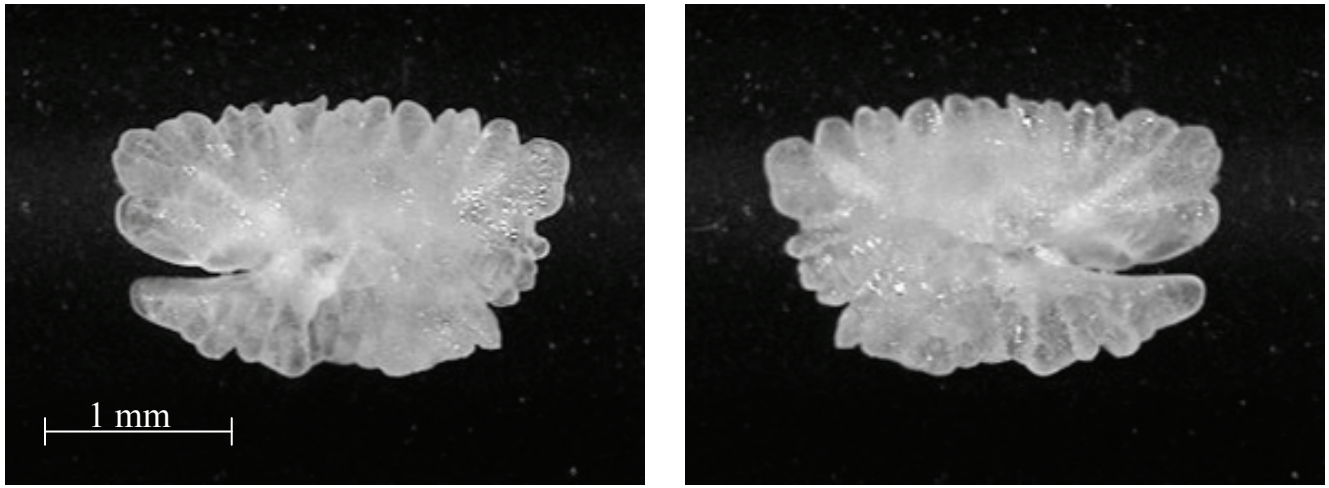
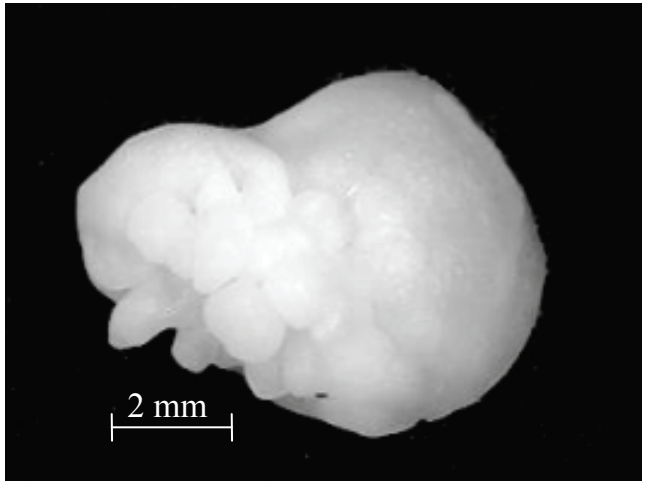


Figure 86. Emerald parrotfish, *Nicholsina usta*
Distribution: New Jersey and northern GOM to Brazil
Specimen length: 21.2 cm TL



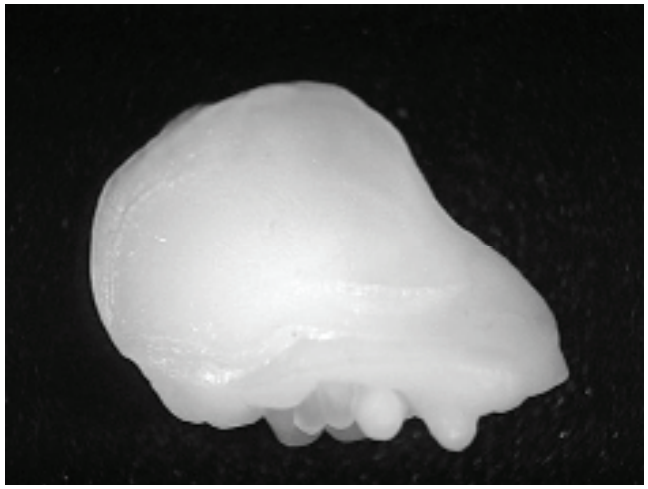
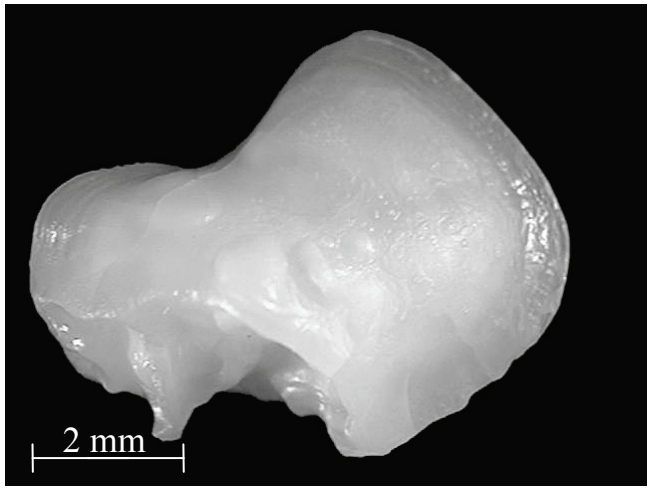


Figure 87a. Atlantic croaker, *Micropogonias undulatus*
Distribution: Massachusetts and northern Mexico; Brazil to Argentina
Specimen length: 16.7 cm TL



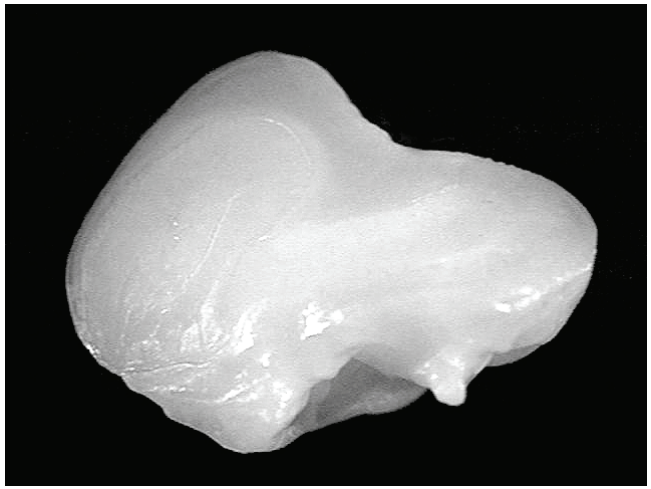
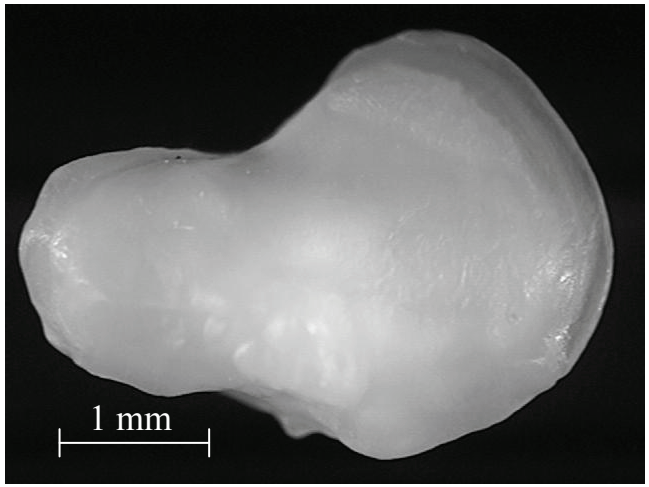


Figure 87b. Atlantic croaker, *Micropogonias undulatus*
Distribution: Massachusetts and northern Mexico; Brazil to Argentina
Specimen length: 20.0 cm TL



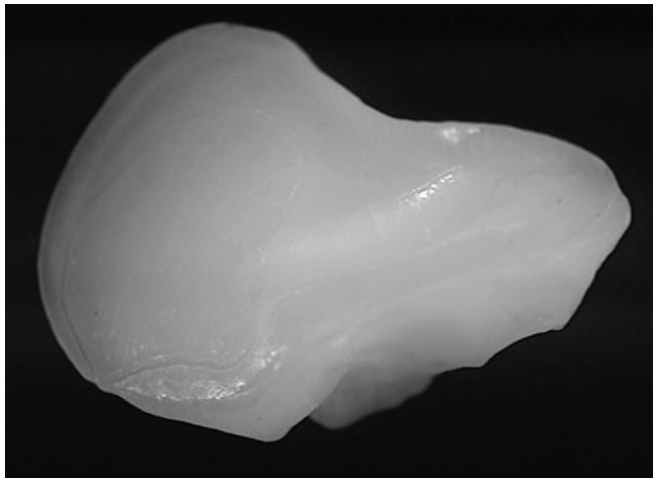
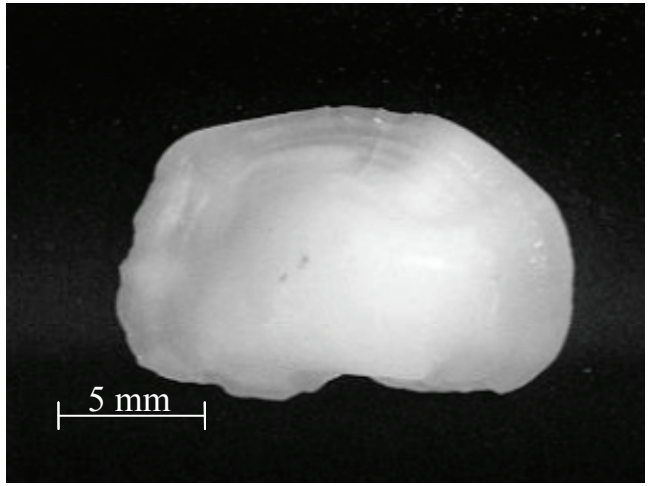


Figure 87c. Atlantic croaker, *Micropogonias undulatus*
Distribution: Massachusetts and northern Mexico; Brazil to Argentina
Specimen length: 25.5 cm TL



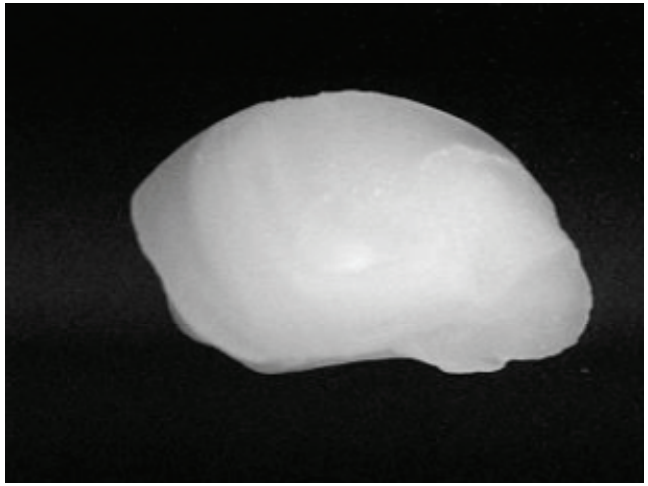


Figure 88. Black drum, *Pogonias cromis*
Distribution: Nova Scotia to northern Mexico; southeastern Brazil to Argentina
Specimen length: 38 cm TL

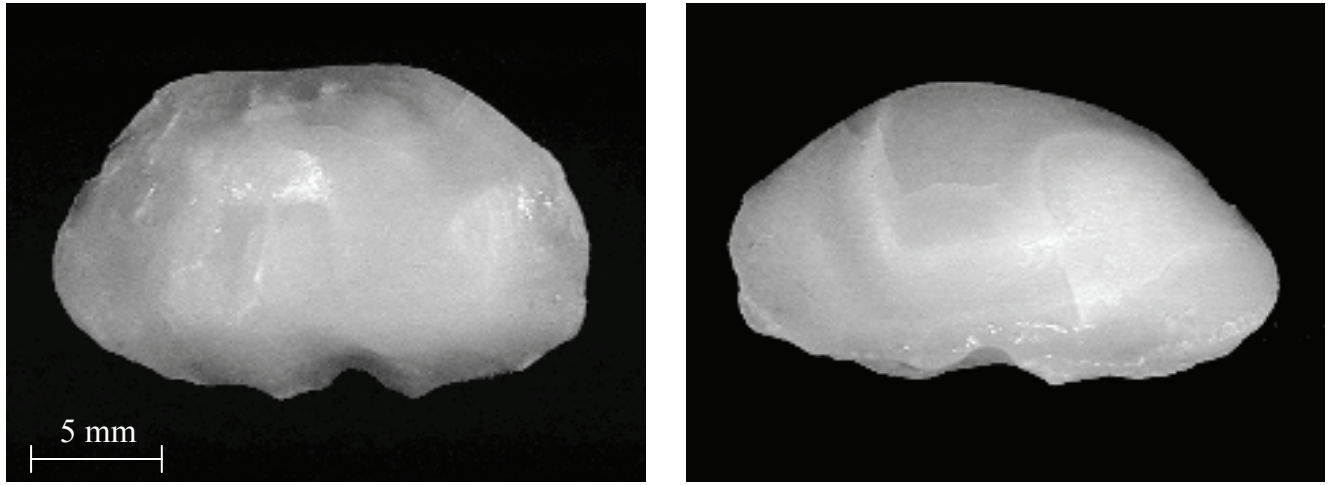


Figure 89. Blackbar drum, *Equetus iwamotoi*
Distribution: North Carolina to Brazil
Specimen length: 43.1 cm FL

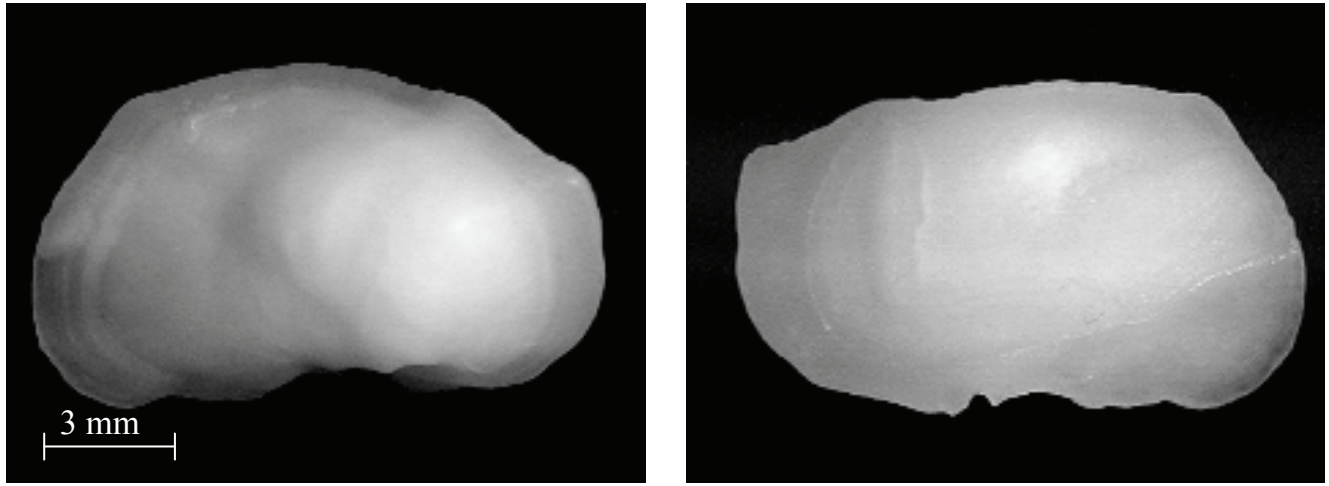
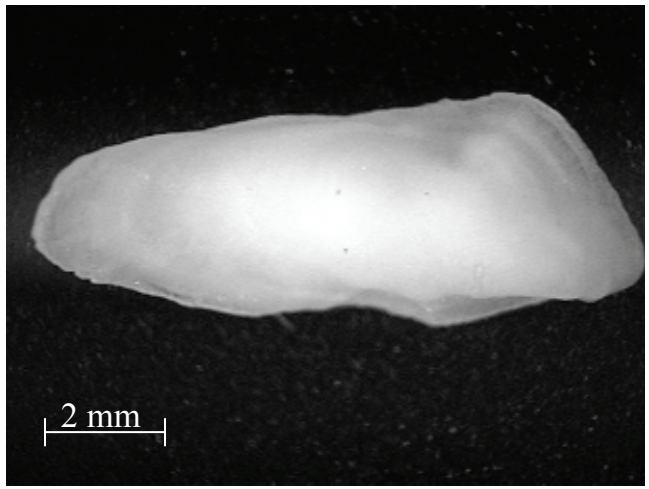


Figure 90. Cubbyu, *Equetus umbrosus*
Distribution: North Carolina to Venezuela
Specimen length: 25.1 cm TL



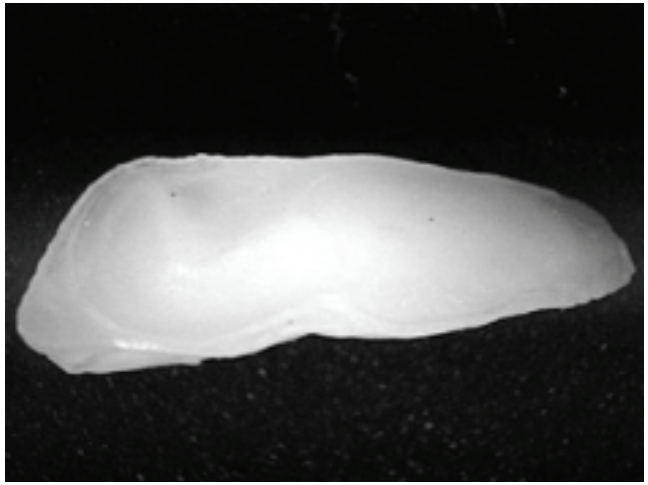
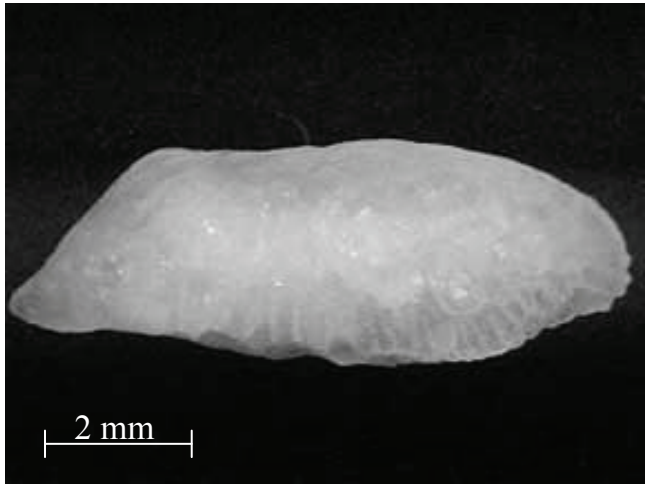


Figure 91. Gulf kingfish, *Menticirrhus littoralis*
Distribution: Virginia and northern GOM to Brazil, absent from southeast Florida
Specimen length: 32.2 cm TL



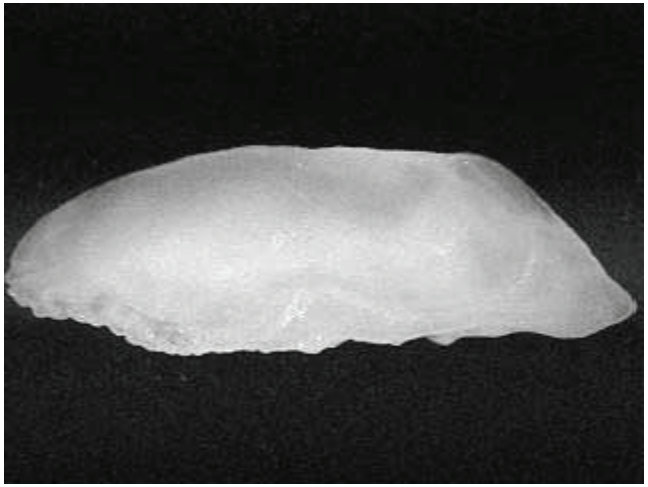
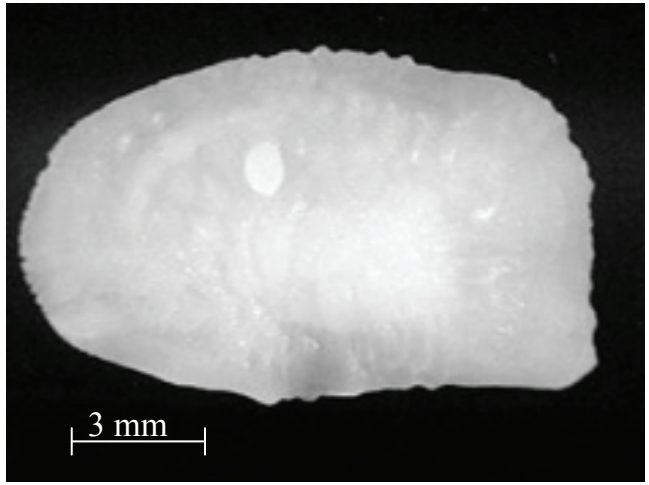


Figure 92. Northern kingfish, *Menticirrhus saxatilis*
Distribution: Massachusetts to southeast Florida, and GOM to Yucatan
Specimen length: 24.7 cm TL



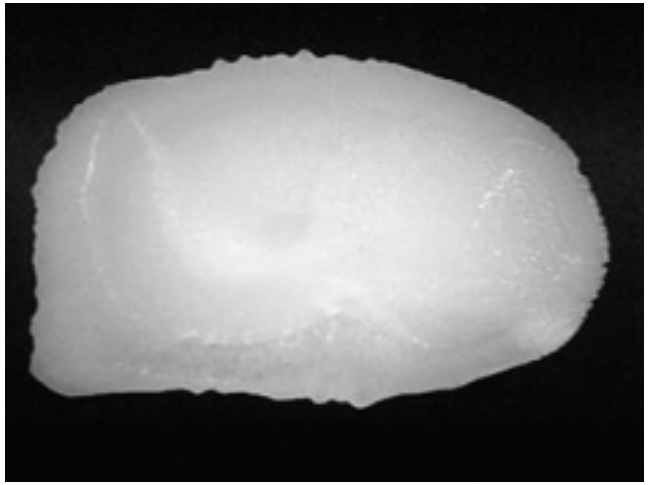
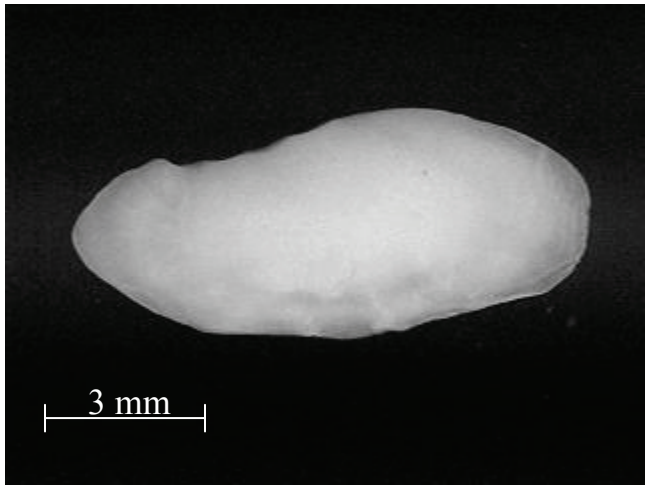


Figure 93. Red drum, *Sciaenops ocellatus*
Distribution: Massachusetts to northern Mexico
Specimen length: 39.0 cm TL



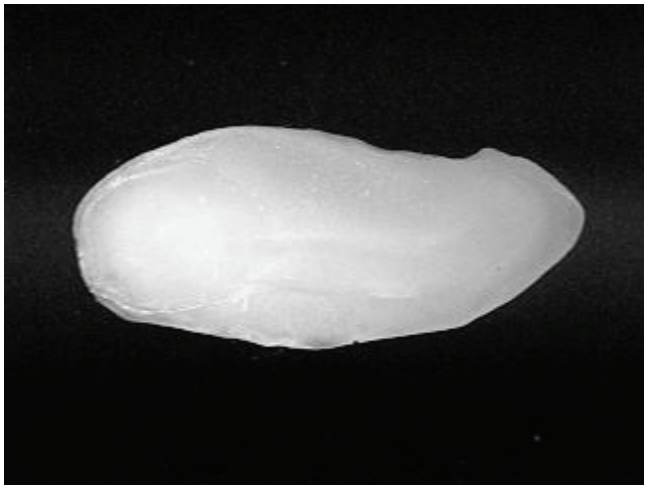
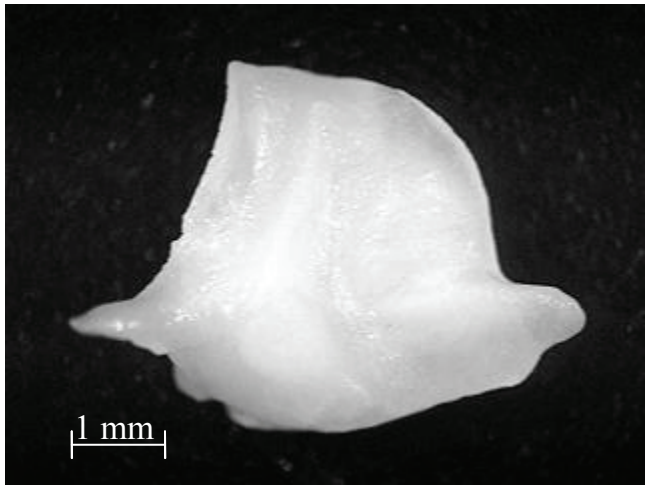


Figure 94. Sand seatrout, *Cynoscion arenarius*
Distribution: Florida and GOM to Bay of Campeche
Specimen length: 23.1 cm TL



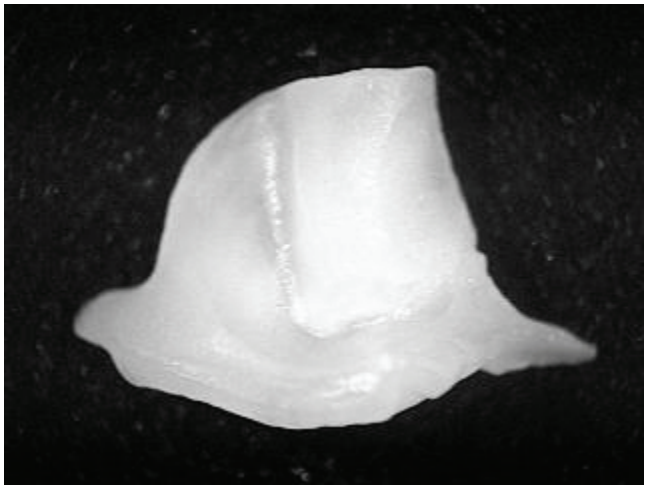
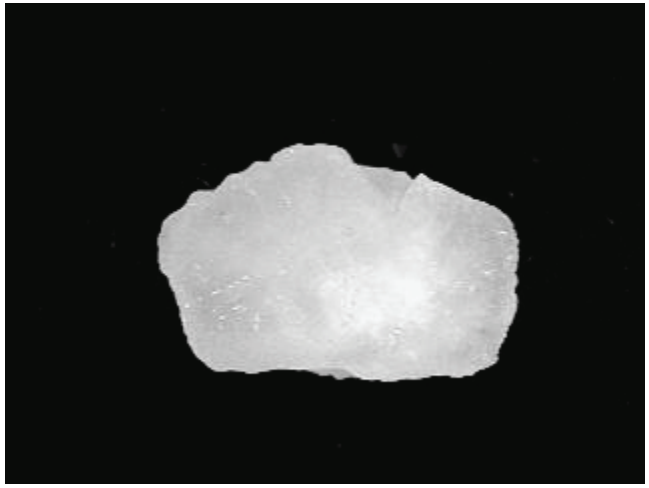
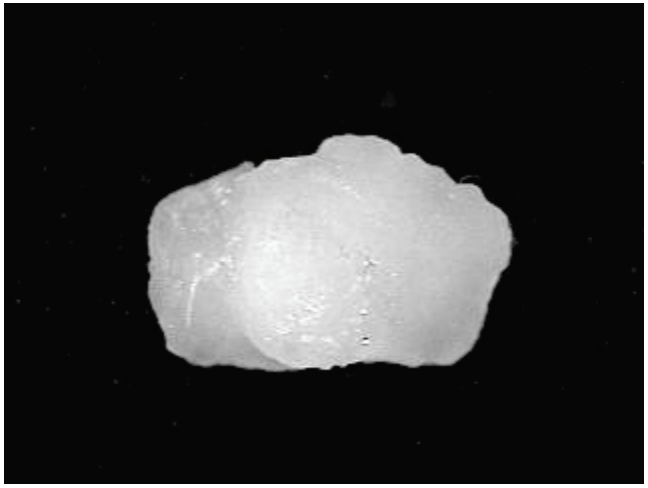
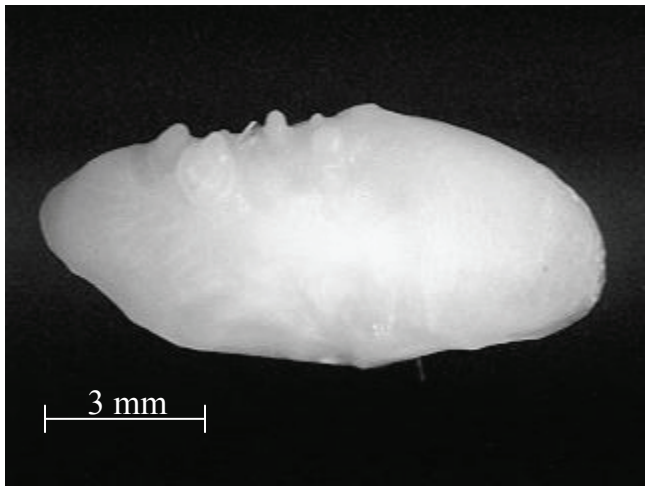


Figure 95. Silver perch, *Bairdiella chrysoura*
Distribution: New York to SE Florida, and Eastern and Northern GOM to Northern Mexico
Specimen length: 15.0 cm TL





Silver perch lapillus otoliths



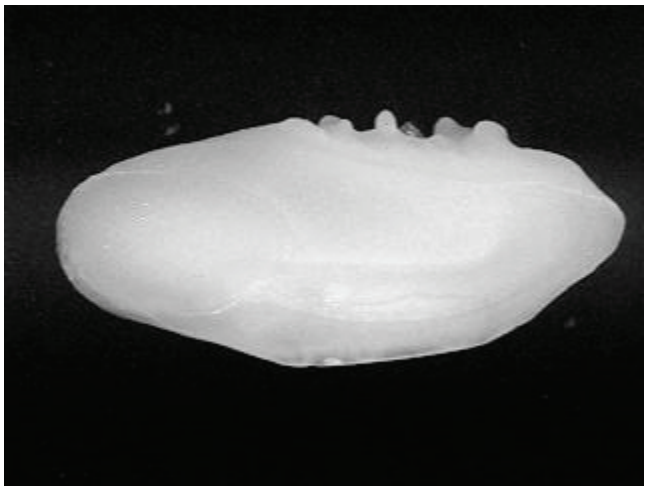
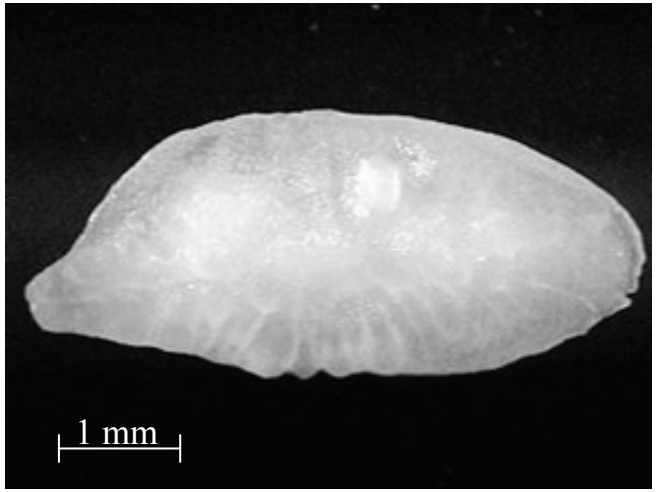


Figure 96. Silver seatrout, *Cynoscion nothus*
Distribution: Maryland to northeast Florida and GOM
Specimen length: 24.4 cm TL



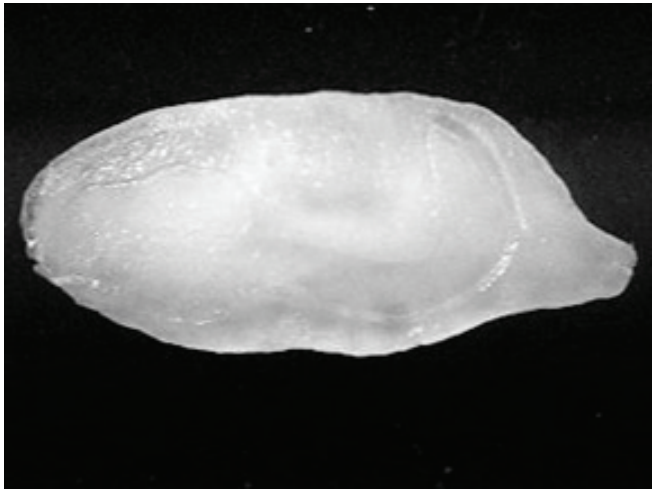
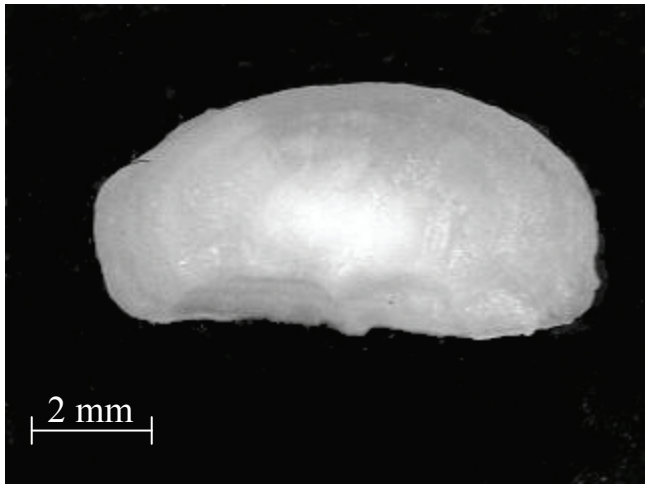


Figure 97. Southern kingfish, *Menticirrhus americanus*
Distribution: New York to Texas and Bay of Campeche to Argentina
Specimen length: 11.9 cm TL



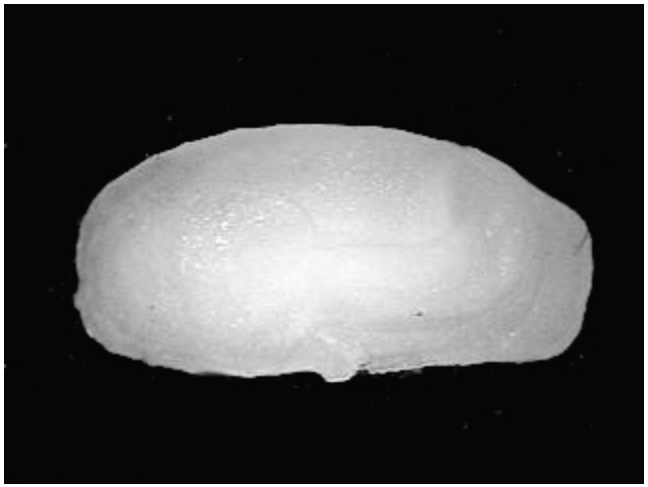
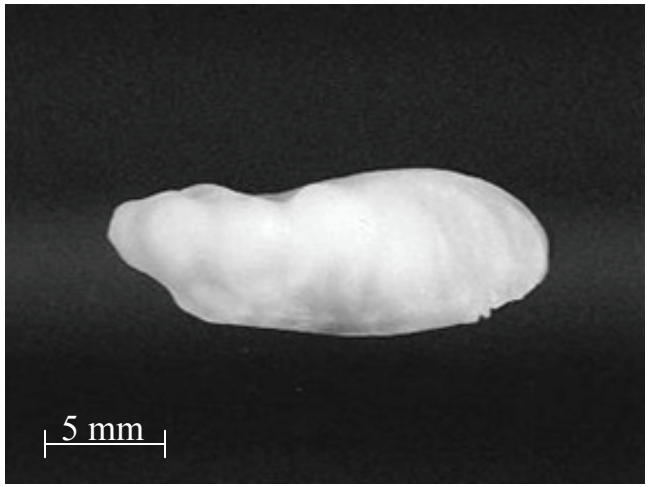


Figure 98. Spot, *Leiostomus xanthurus*
Distribution: Massachusetts to northern Mexico; absent from southeastern Florida
Specimen length: 167 cm FL



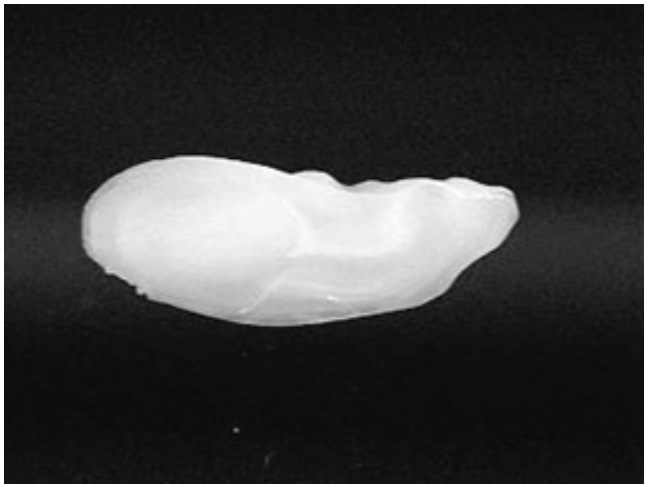


Figure 99. Spotted seatrout, *Cynoscion nebulosus*
Distribution: New York to southeastern Florida and entire GOM
Specimen length: 41.8 cm TL

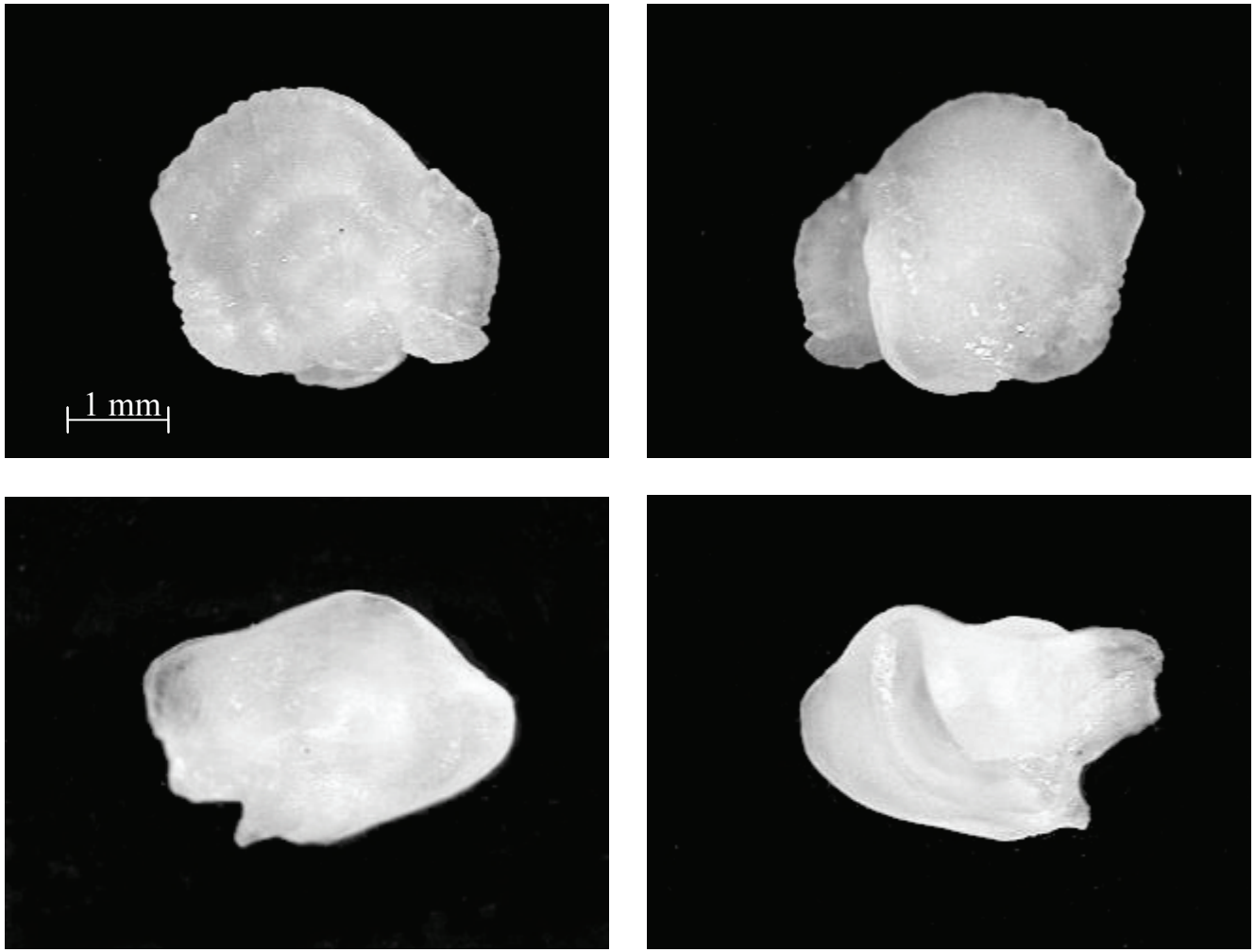


Figure 100. Star drum, *Stellifer lanceolatus*
Distribution: Virginia to Texas, excluding southeastern Florida
Specimen length: 15.5 cm TL

Star drum lapillus otoliths

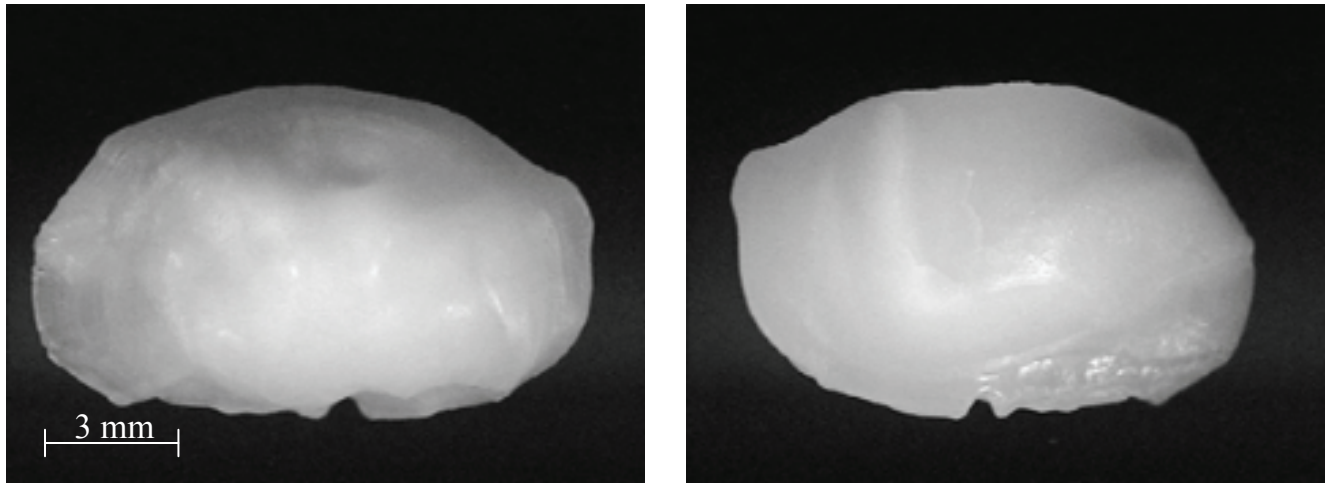


Figure 101. Striped croaker, *Bairdiella sanctaeluciae*
Distribution: Eastern Florida, Cuba, and Bay of Campeche to Guianas
Specimen length: 24.2 cm TL

Family Scombridae: Mackerels

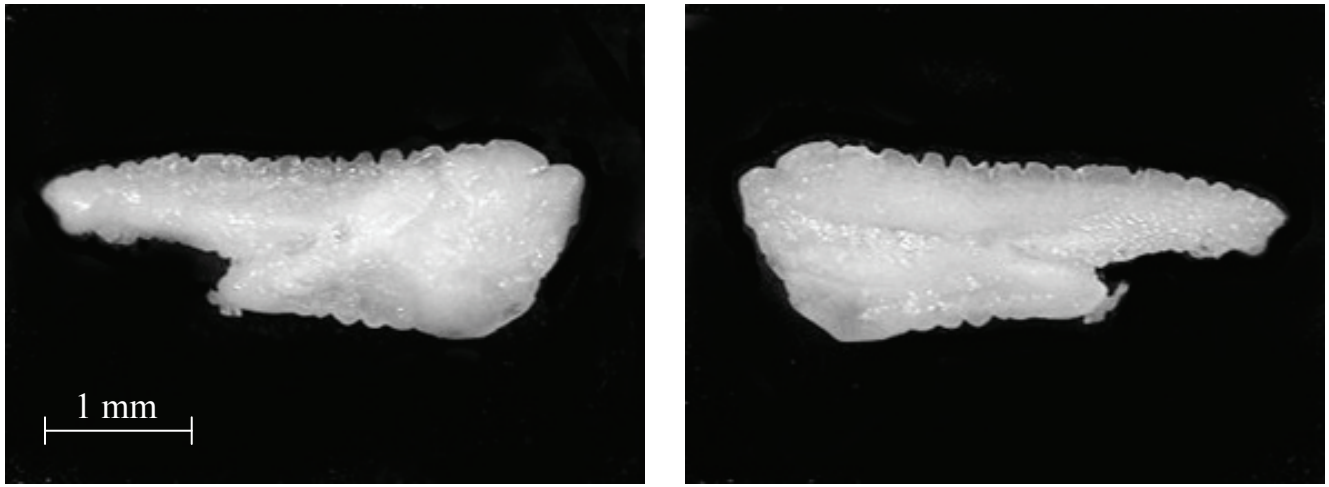


Figure 102. Atlantic bonito, *Sarda sarda*
Distribution: Southeastern Gulf of Lawrence to Argentina
Specimen length: 30 cm TL*

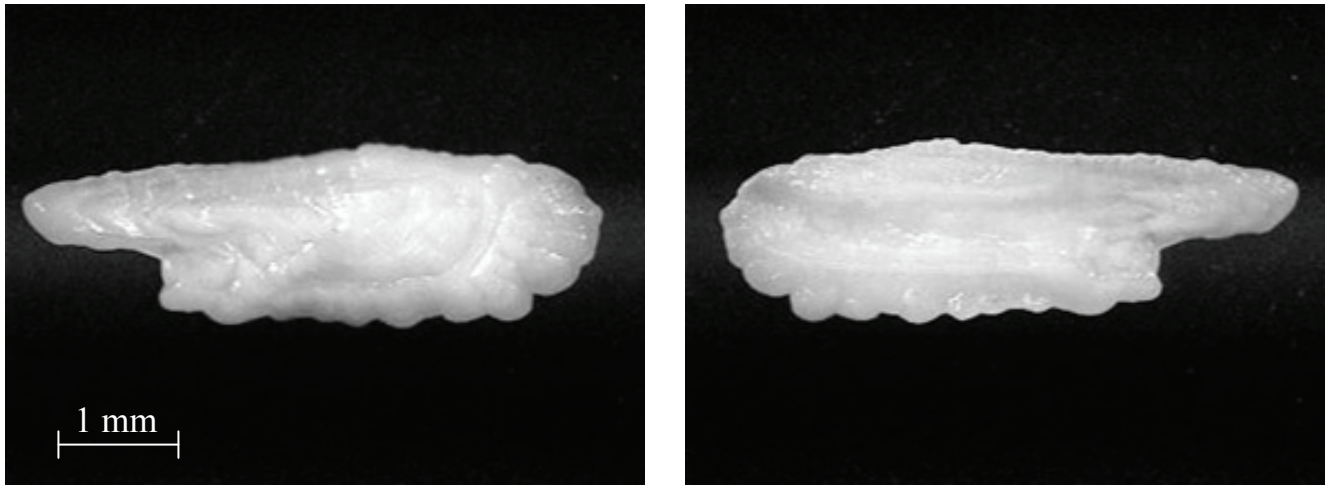


Figure 103. Atlantic mackerel, *Scomber scombrus*
Distribution: Southern Labrador to Cape Hatteras, eastern North Atlantic
Specimen length: 20 cm TL*

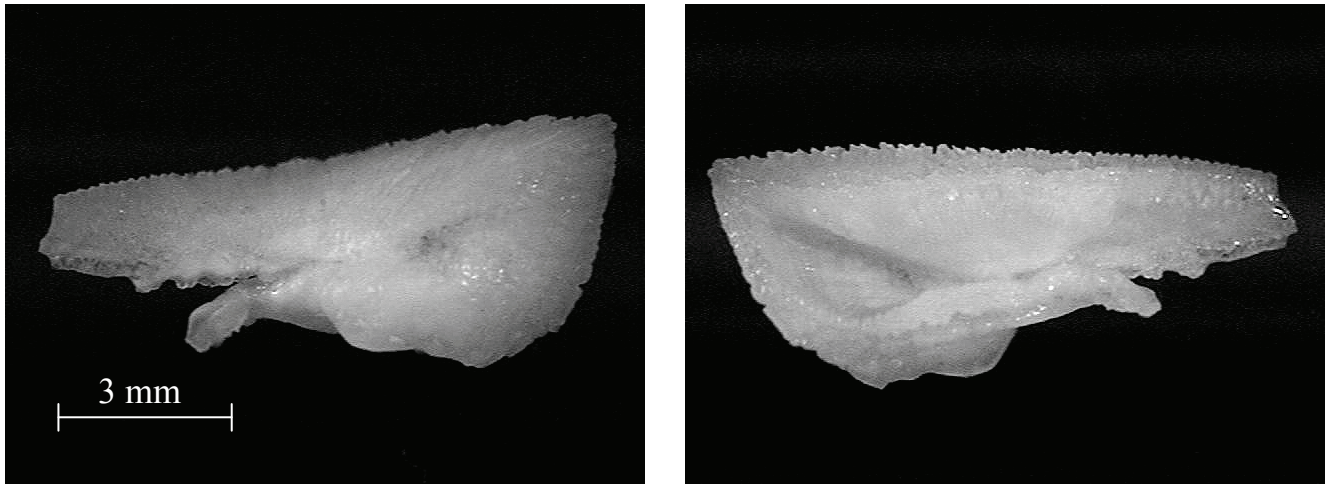


Figure 104. Blackfin tuna, *Thunnus atlanticus*
Distribution: Martha's Vineyard to Brazil, entire GOM
Specimen length: 86.0 cm FL

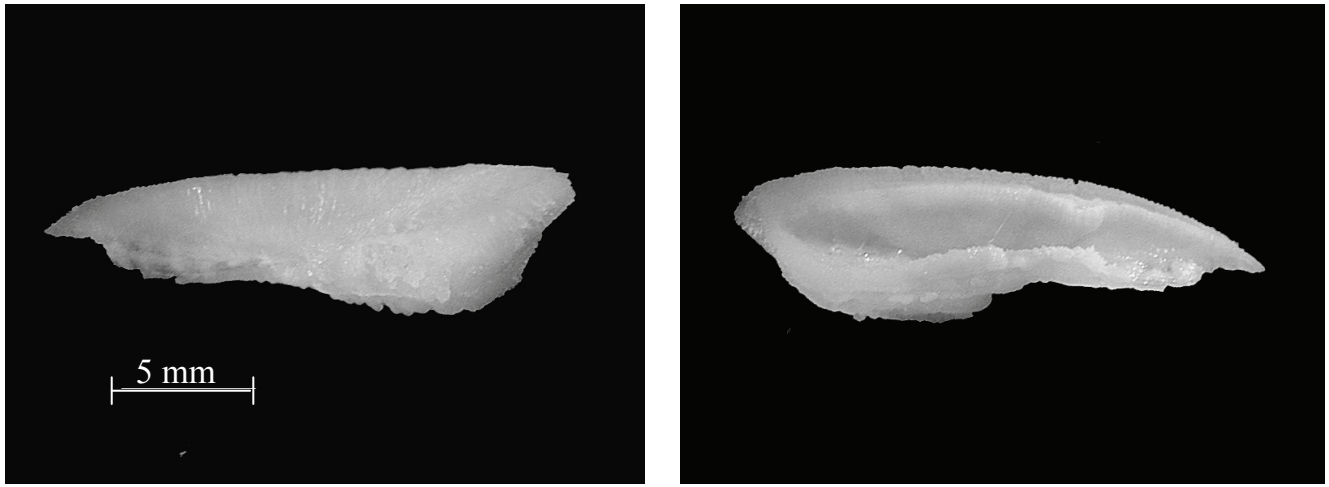


Figure 105. Bluefin tuna, *Thunnus thynnus*
Distribution: Labrador to Brazil, entire GOM
Specimen length: XX

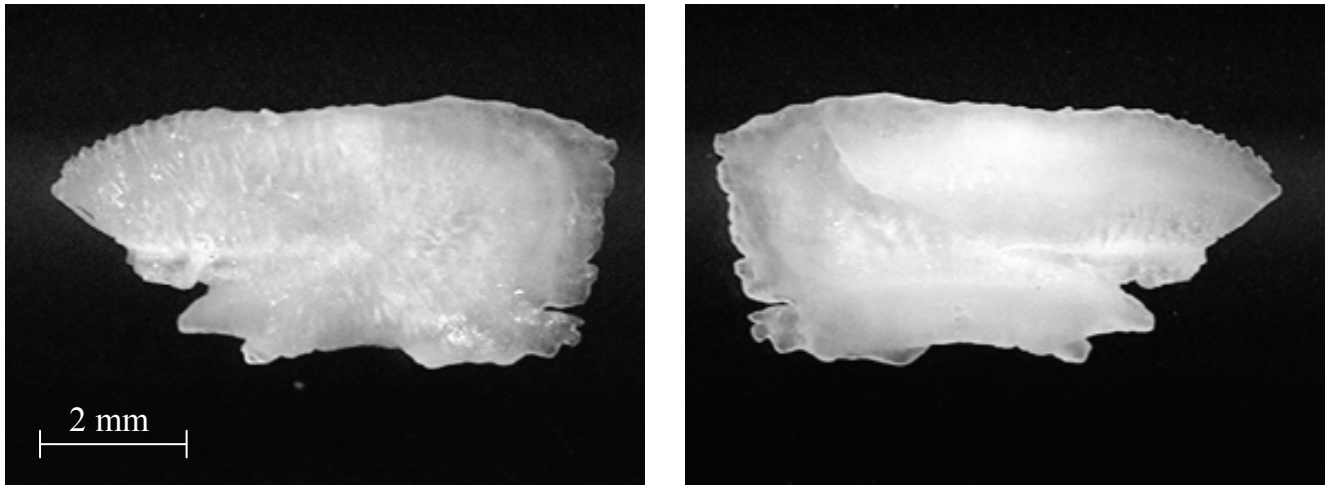
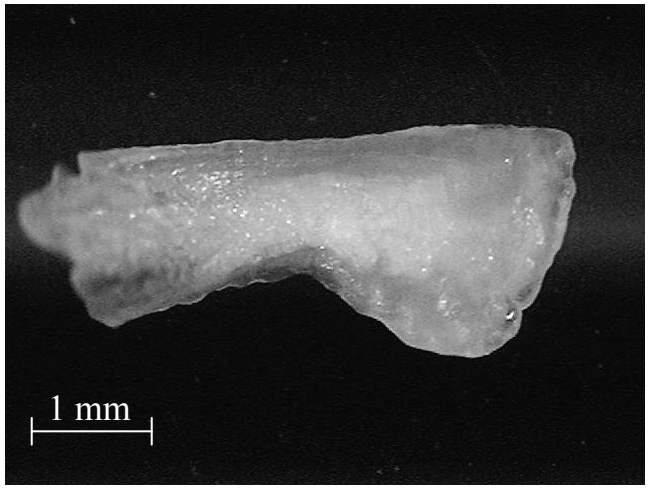


Figure 106. Cero, *Scomberomorus regalis*
Distribution: Massachusetts and northern GOM to northern Brazil
Specimen length: 43.5 cm FL



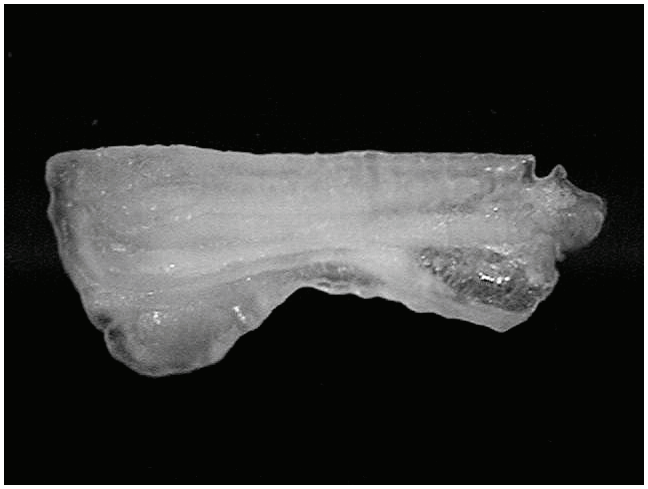


Figure 107. Chub mackerel, *Scomber japonicus*
Distribution: Nova Scotia to Brazil
Specimen length: 23.3 cm FL

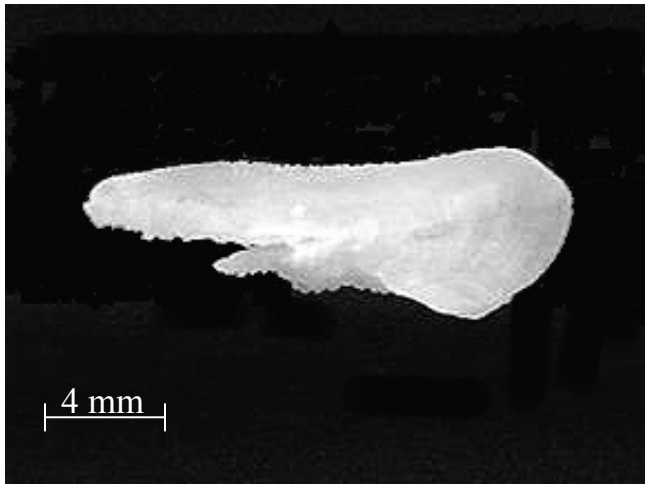


Figure 108. King mackerel, *Scomberomorus cavalla*
Distribution: Massachusetts and northern GOM to southeastern Brazil
Specimen length: 127 cm FL

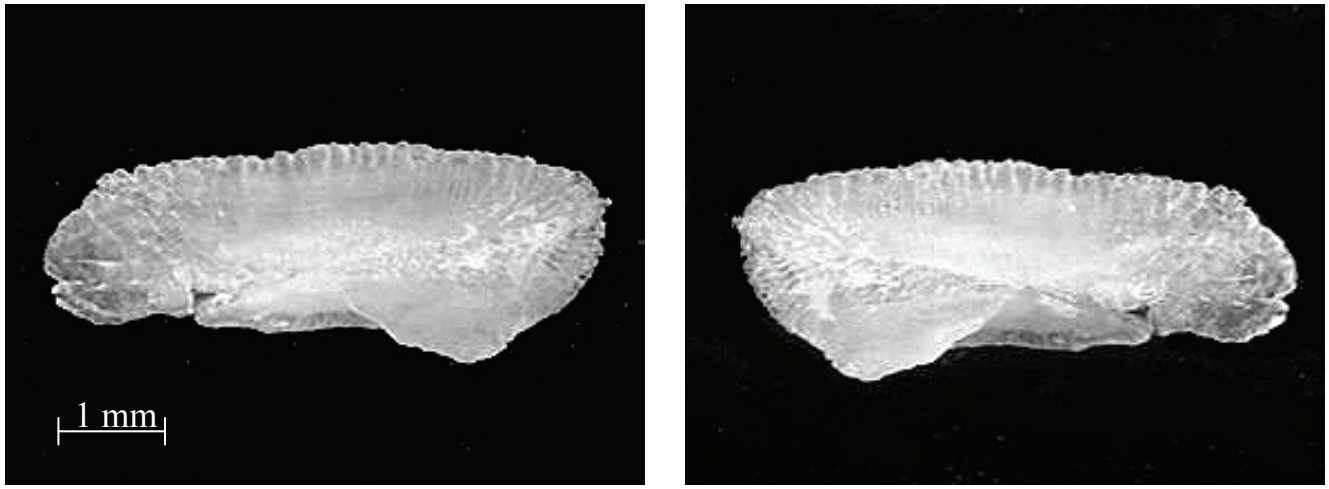


Figure 109. Little tunny, *Euthynnus alletteratus*
Distribution: Massachusetts and northern GOM to Brazil
Specimen length: 55 cm FL

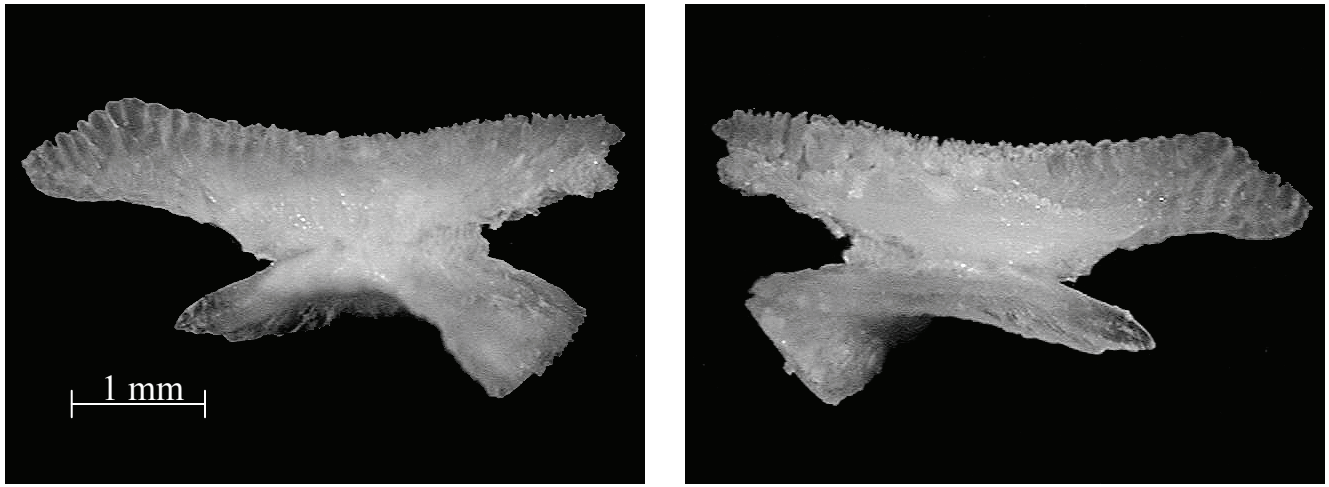


Figure 110. Skipjack tuna, *Katsuwonus pelamis*
Distribution: Worldwide in tropical and subtropical waters
Specimen length: 56.0 cm FL

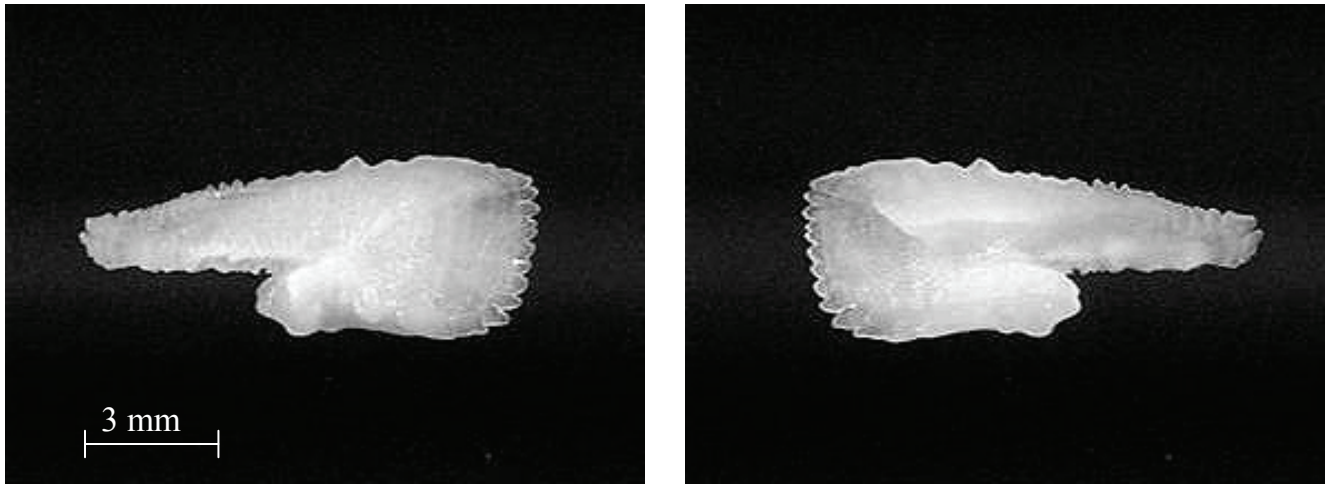


Figure 111. Spanish mackerel, *Scomberomorus maculatus*
Distribution: Cape Cod to southeatern Florida and GOM
Specimen length: 67.2 cm FL

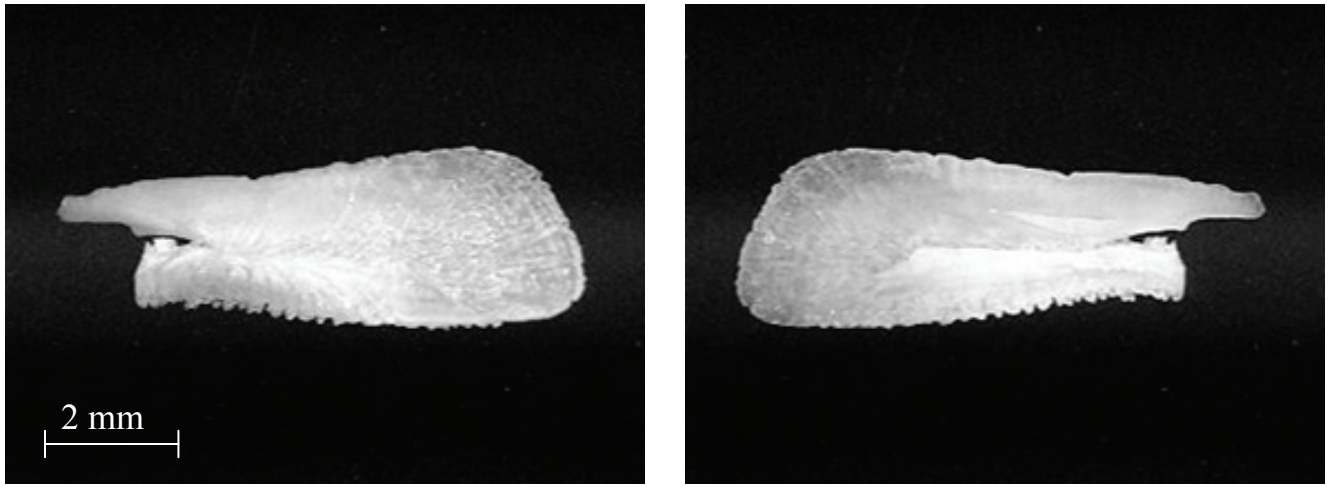
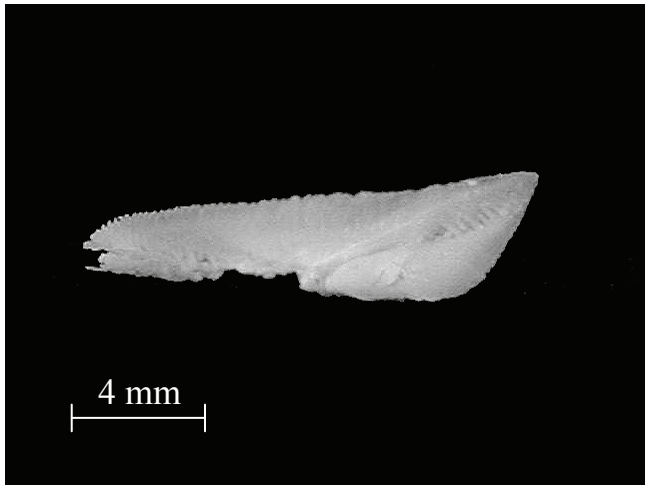


Figure 112. Wahoo, *Acanthocybium solanderi*
Distribution: New Jersey, Bermuda, and northern GOM to northern South America
Specimen length: 120 cm FL



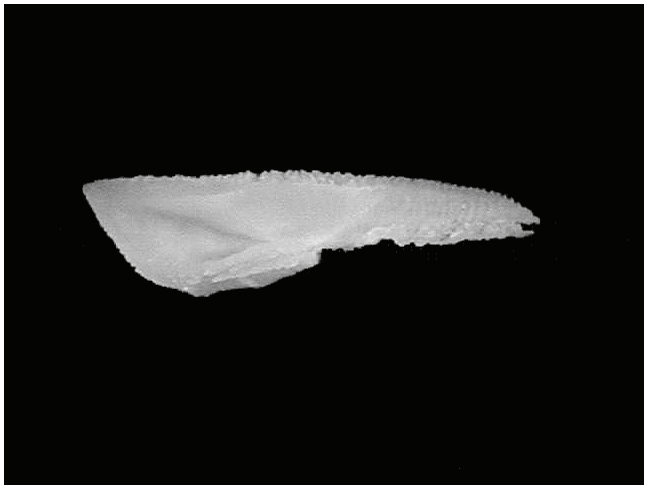
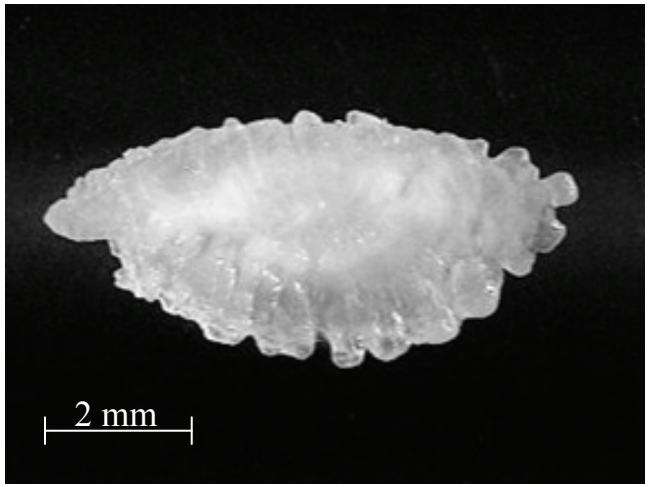


Figure 113. Yellowfin tuna, *Thunnus albacares*
Distribution: Nova Scotia to southern Brazil, entire GOM
Specimen length: XX

Family Scorpaenidae: Scorpionfishes



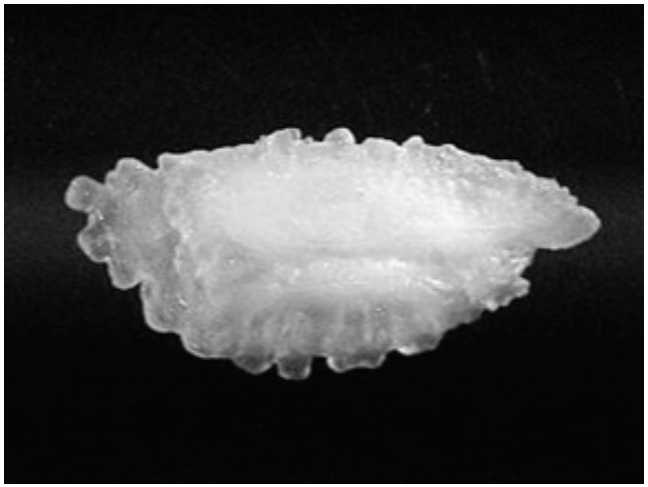
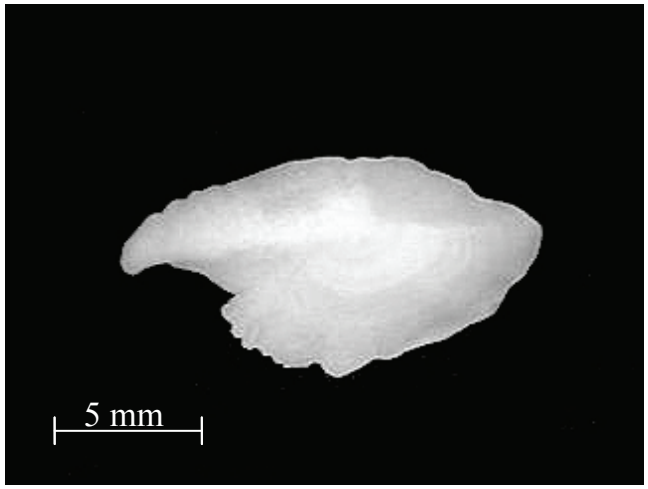


Figure 114. Barbfish, *Scorpaena brasiliensis*
Distribution: Virginia and northern GOM to Brazil
Specimen length: 20.0 cm TL



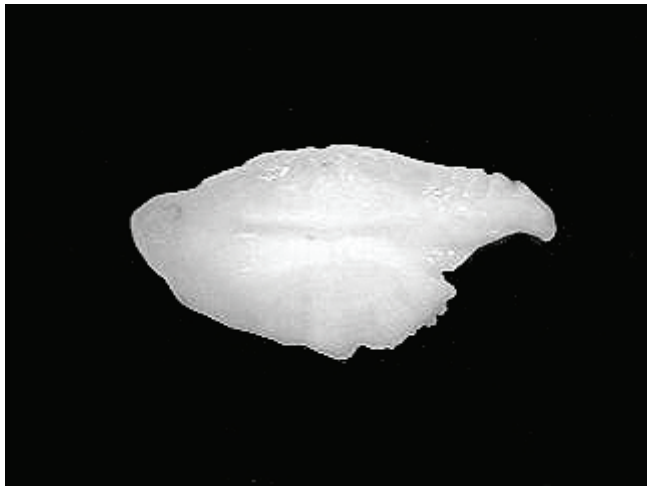
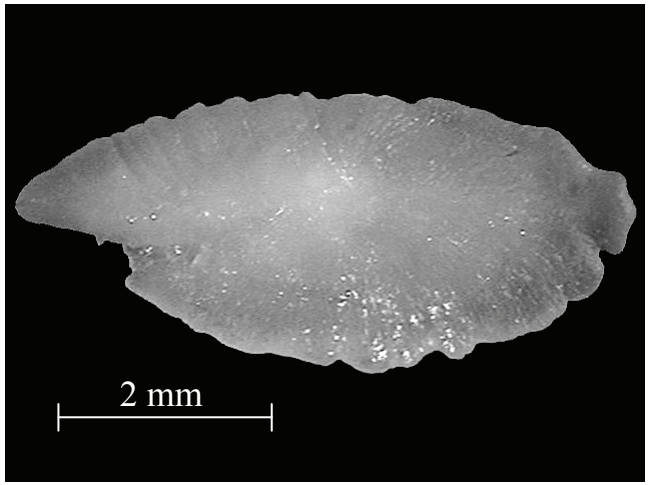


Figure 115. Blackbelly rosefish, *Helicolenus dactylopterus*
Distribution: Maine to Argentina
Specimen length: 36.0 cm TL



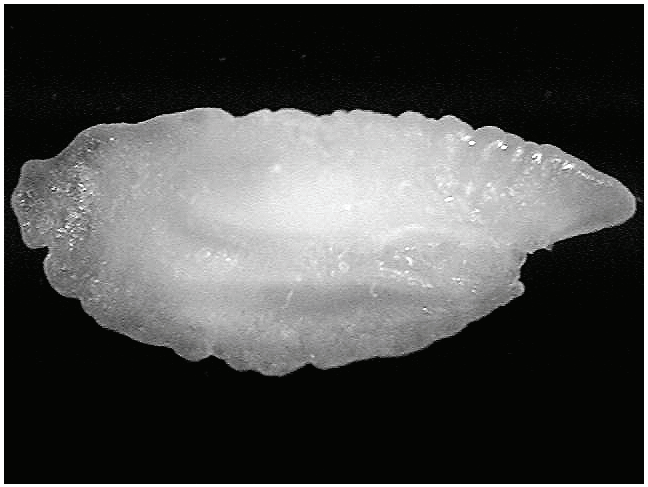
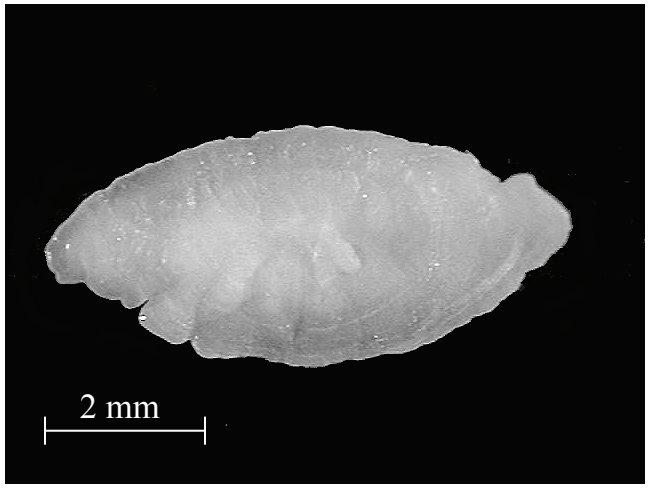


Figure 116. Hunchback scorpionfish, *Scorpaena dispar*
Distribution: Florida to Brazil, GOM
Specimen length: 12.4 cm TL



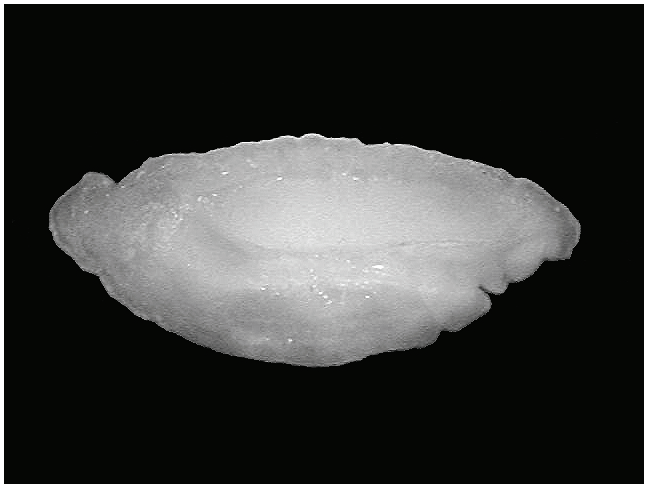
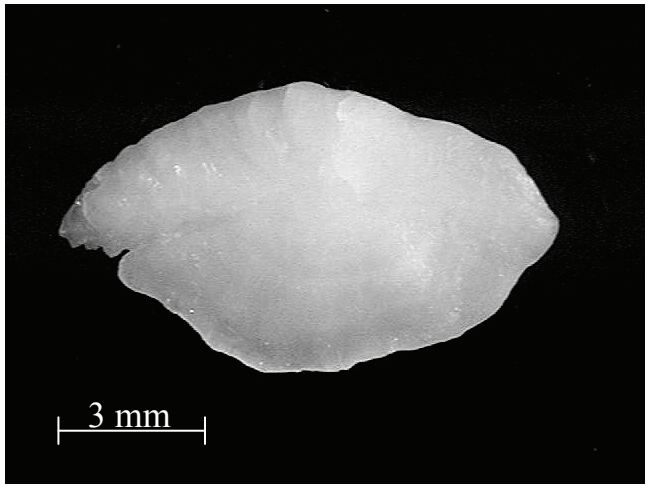


Figure 117. Longfin scorpionfish, *Scorpaena agassizi*
Distribution: North Carolina to Brazil, northern and southern GOm
Specimen length: 15.9 cm TL



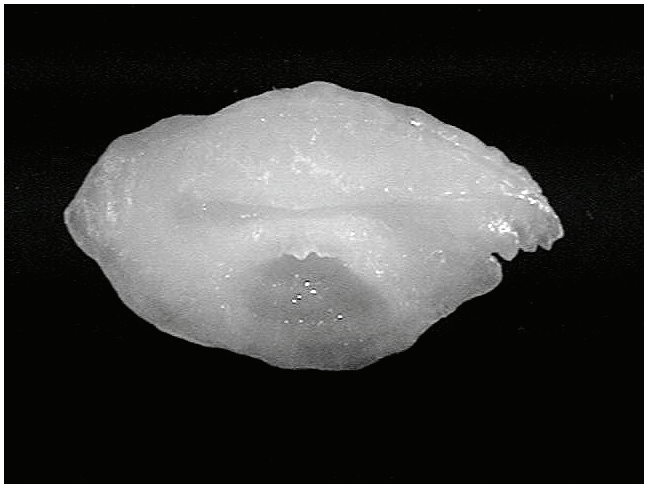
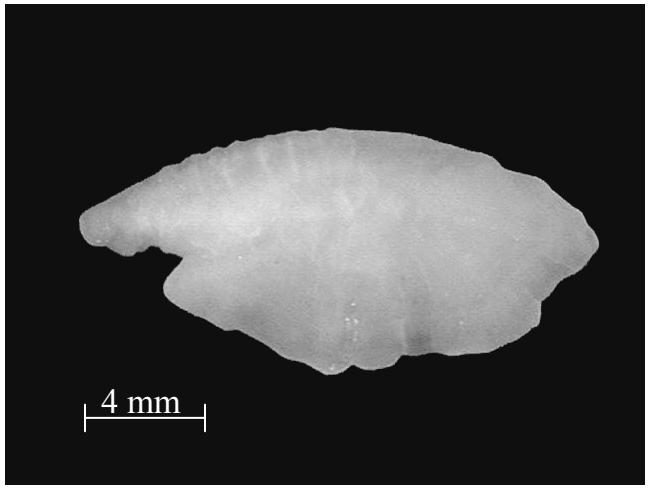


Figure 118. Longspine scorpionfish, *Pontinus longispinis*
Distribution: South Carolina to Brazil, entire GOM
Specimen length: 19.5 cm TL



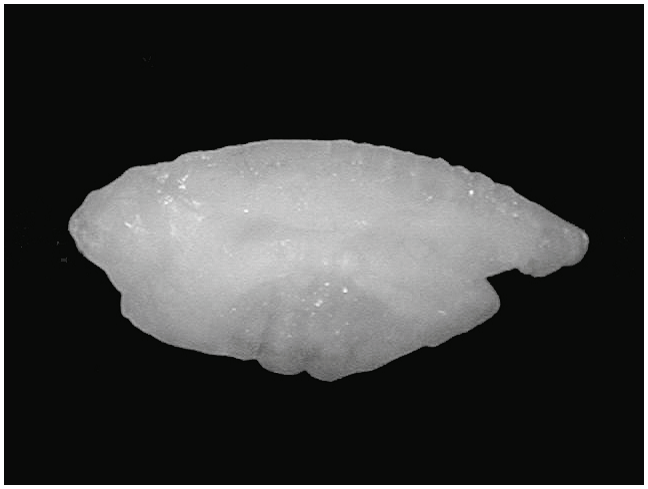
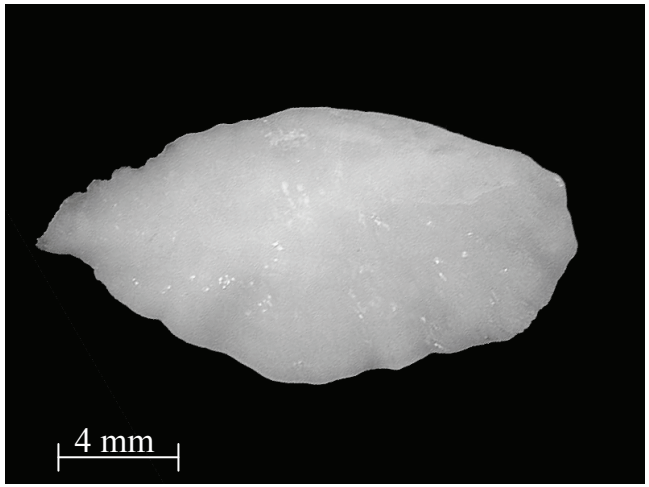


Figure 119. Spinycheek scorpionfish, *Neomerinthe hemingwayi*
Distribution: New Jersey to south Florida, entire GOM
Specimen length: XX



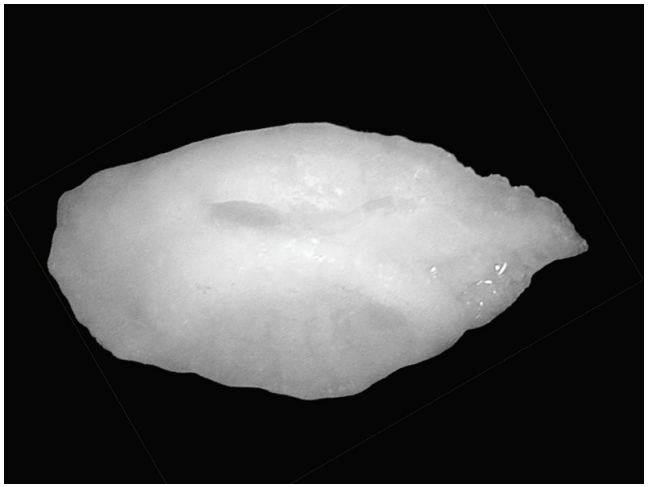


Figure 120. Spotted scorpionfish, *Scorpaena plumieri*
Distribution: Massachusetts to Brazil, GOM, Bahamas, Antilles
Specimen length: 46.0 cm TL

Family Serranidae: Sea basses

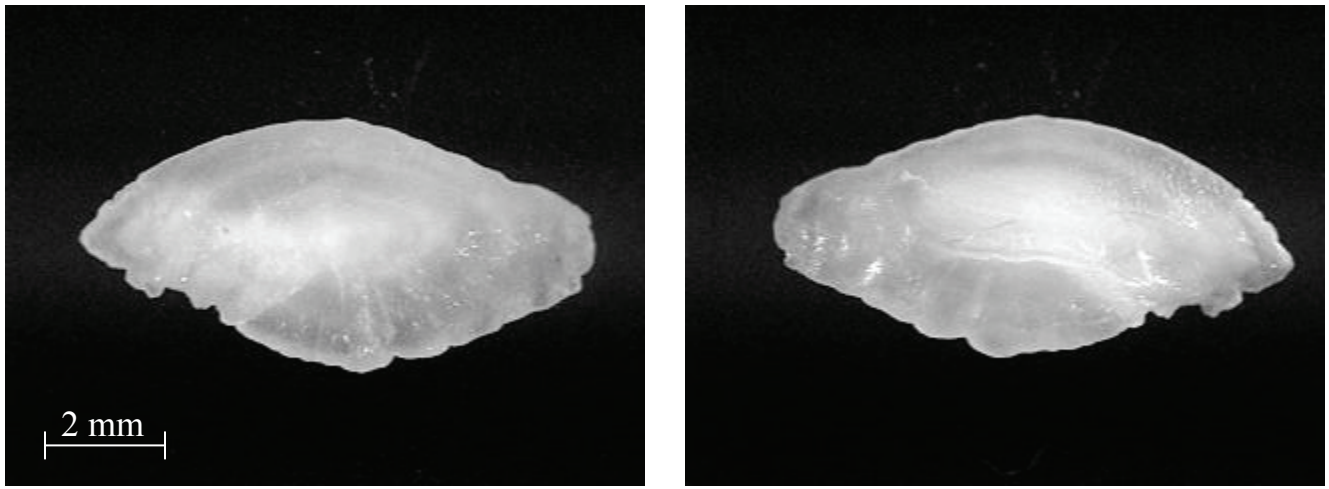


Figure 121. Bank sea bass, *Centropristis ocyurus*
Distribution: North Carolina to northeast Florida, GOM
Specimen length: 18.4 cm TL

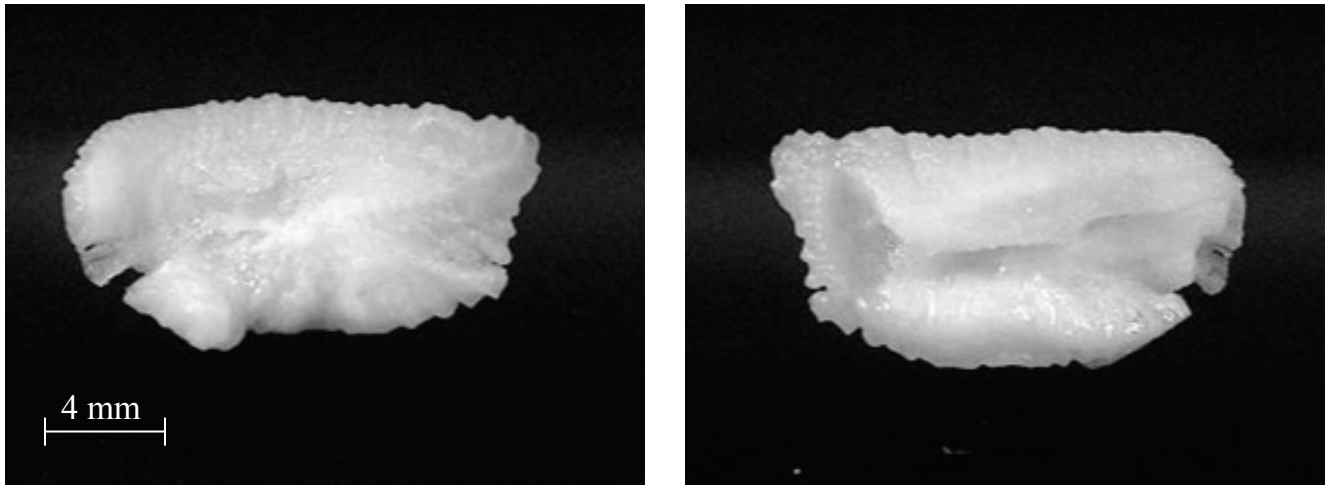


Figure 122. Black grouper, *Mycteroperca bonaci*
Distribution: Massachusetts, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 121.5 cm FL

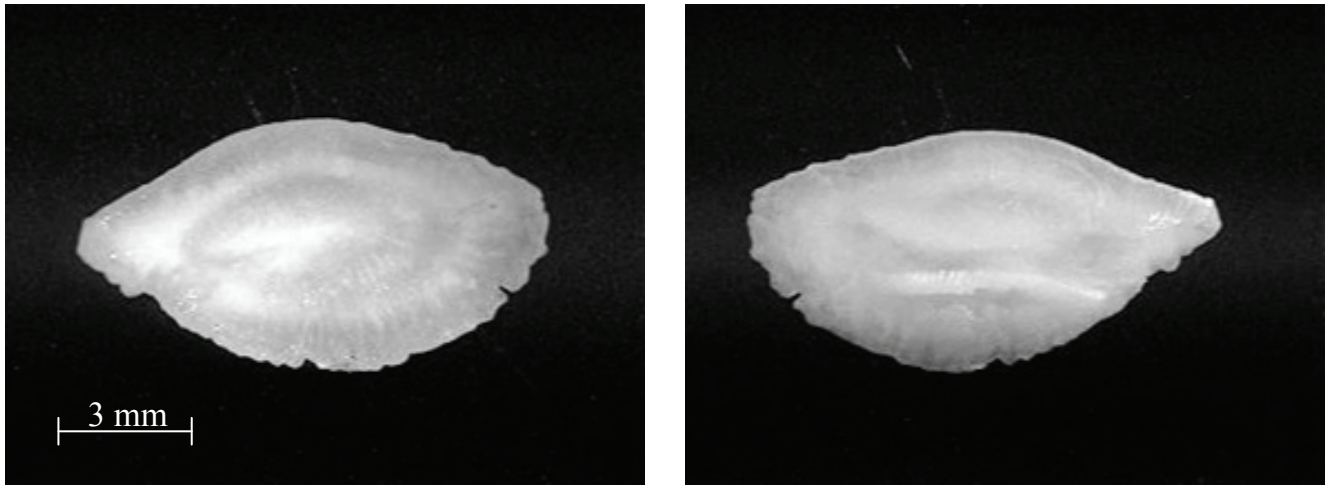


Figure 123. Black sea bass, *Centropristis striata*
Distribution: Maine to northeastern Florida and eastern GOM
Specimen length: 30.3 cm TL

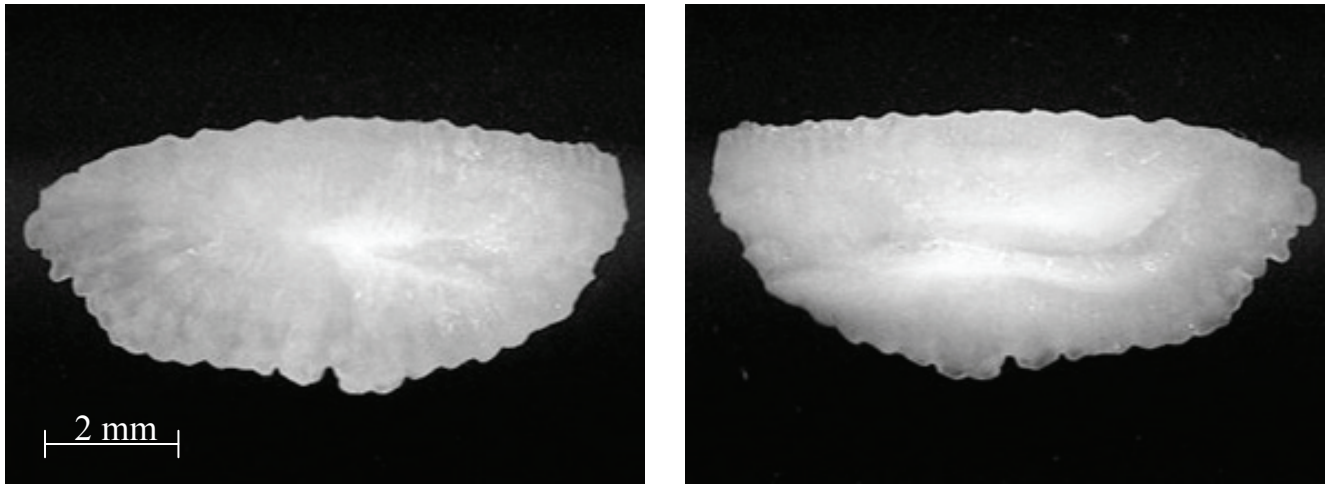
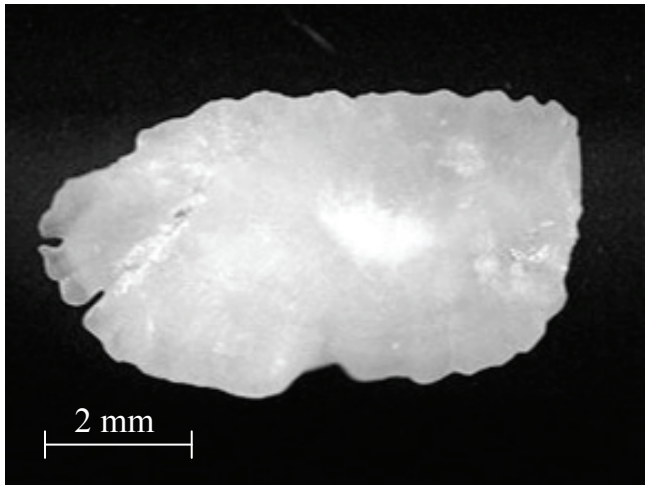


Figure 124. Comb grouper, *Mycteroperca rubra*
Distribution: Texas and Greater Antilles to Brazil
Specimen length: 50.0 cm TL



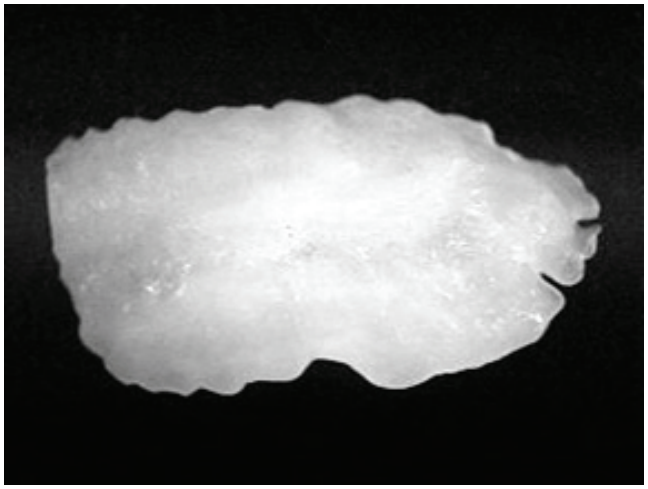
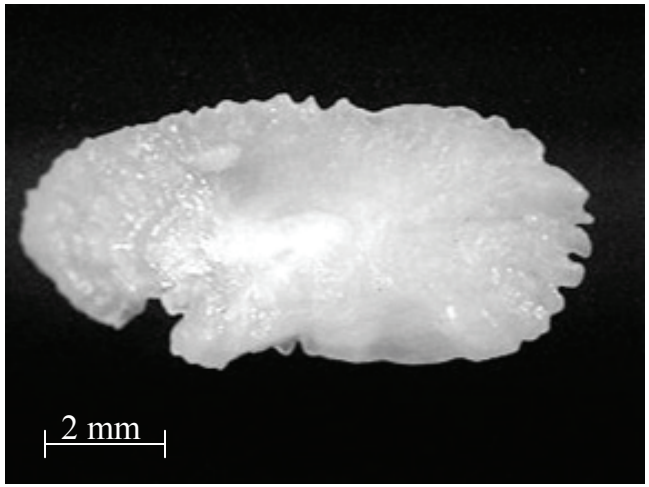


Figure 125. Coney, *Epinephelus fulvus*
Distribution: Bermuda, southeastern Florida, and Bahamas to southeastern Brazil
Specimen length: 25.5 cm TL



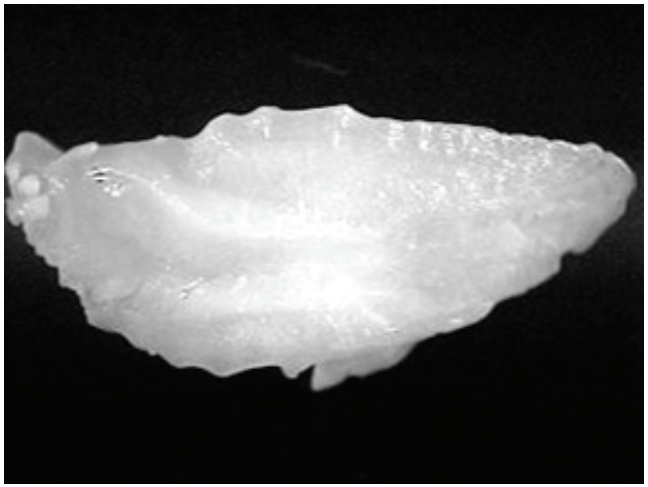


Figure 126. Creole-fish, *Paranthias furcifer*
Distribution: Bermuda, southeastern Florida, and northern GOM to Brazil; eastern Atlantic and eastern Pacific
Specimen length: 39.7 cm TL

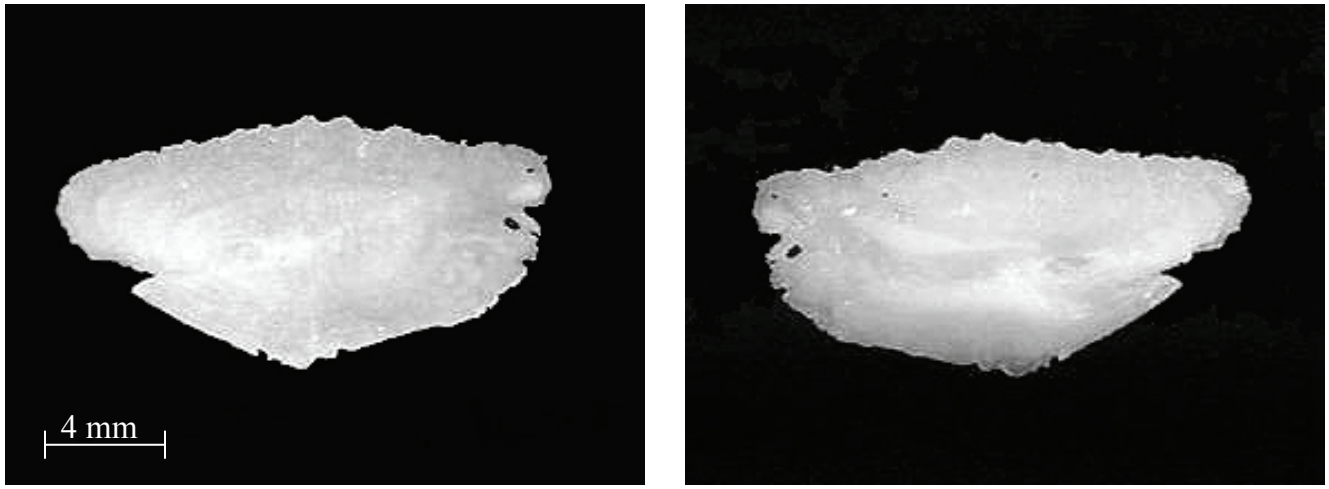


Figure 127. Gag,
Mycteroperca microlepis
Distribution: Massachusetts, Bermuda, and Northern GOM to Seastern Brazil
Specimen length: 75.6 cm FL

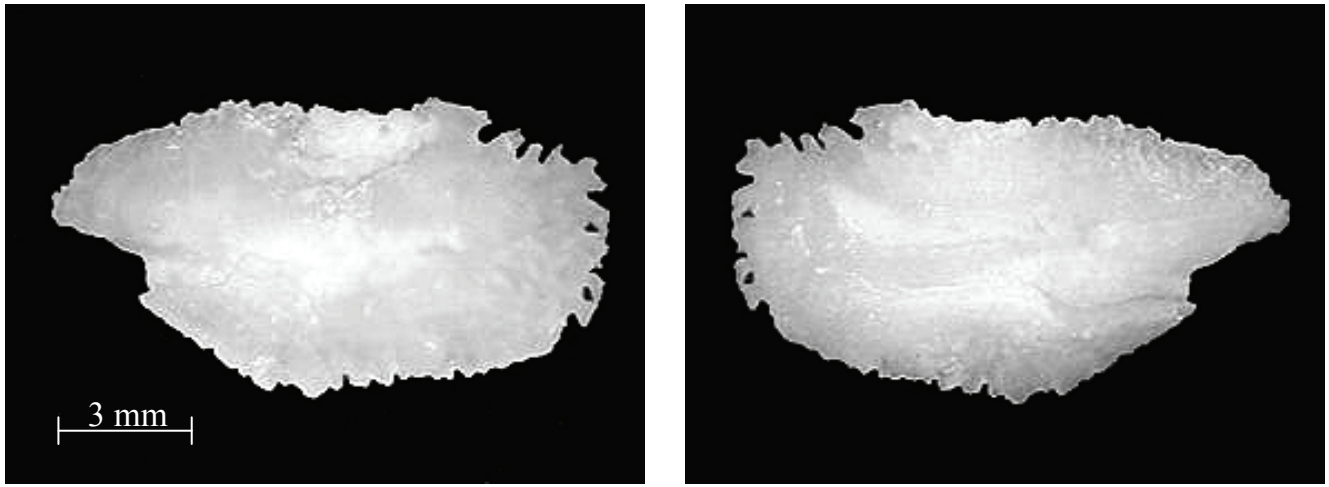


Figure 128. Goliath grouper,
Epinephelus itajara
Distribution: Bermuda, Florida and Northern GOM to Seastern Brazil
Specimen length: 70.2 cm TL

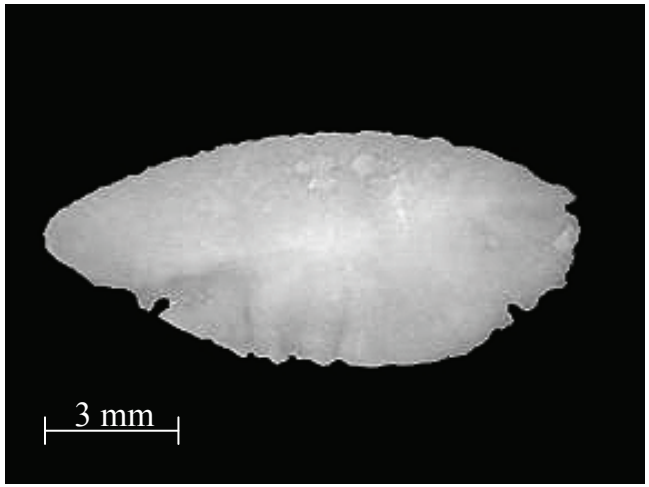


Figure 129. Graysby, *Epinephelus cruentatus*
Distribution: Bermuda, Florida, Bahamas, and northern GOM to southeastern Brazil
Specimen length: 32.1 cm TL

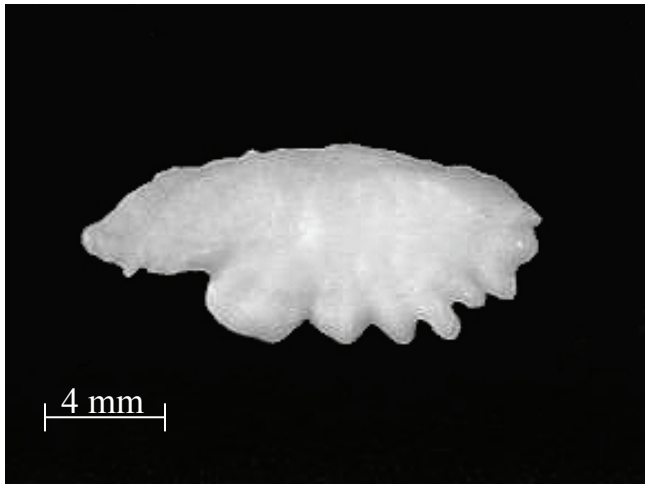


Figure 130. Longtail bass, *Hemanthias leptus*
Distribution: South Carolina and northern GOM to northern Brazil
Specimen length: 42.0 cm TL

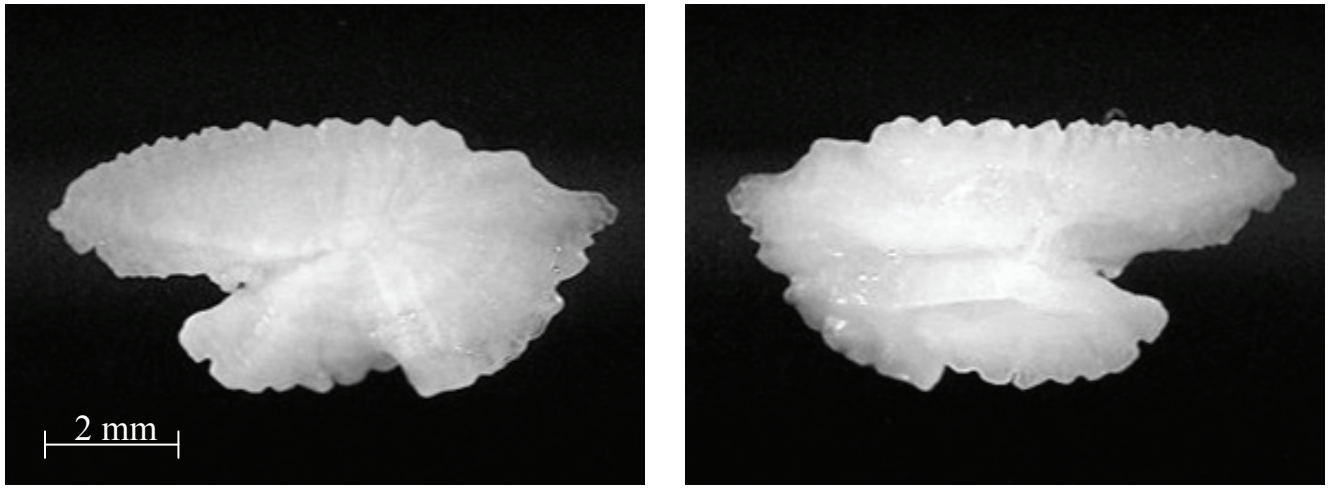


Figure 131. Marbled grouper, *Epinephelus inermis*
Distribution: Bermuda, southern Florida, and western Bahamas to northern South America
Specimen length: 66.5 cm FL

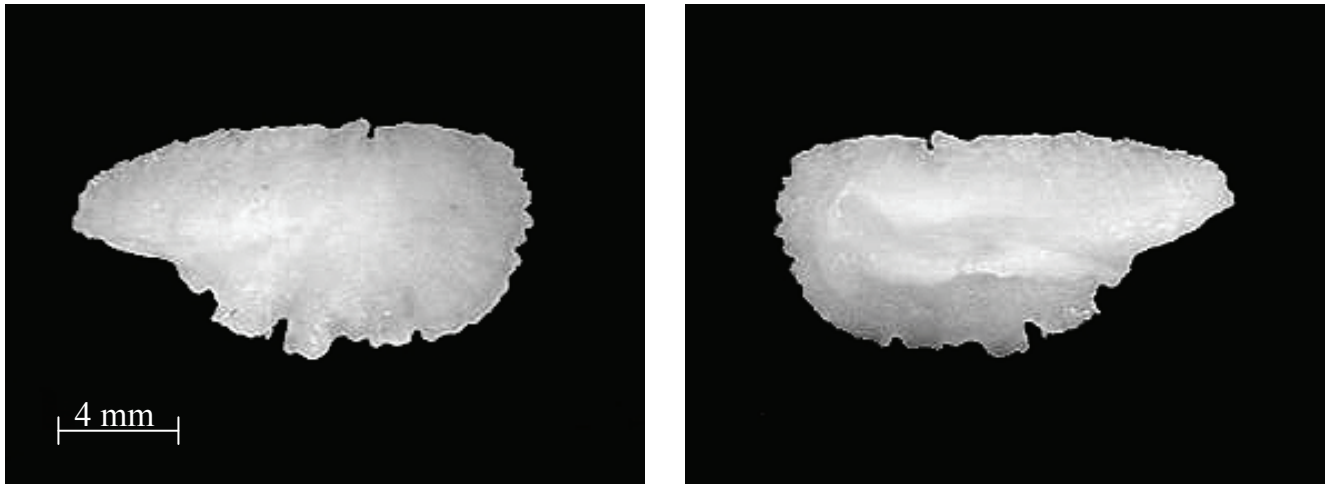
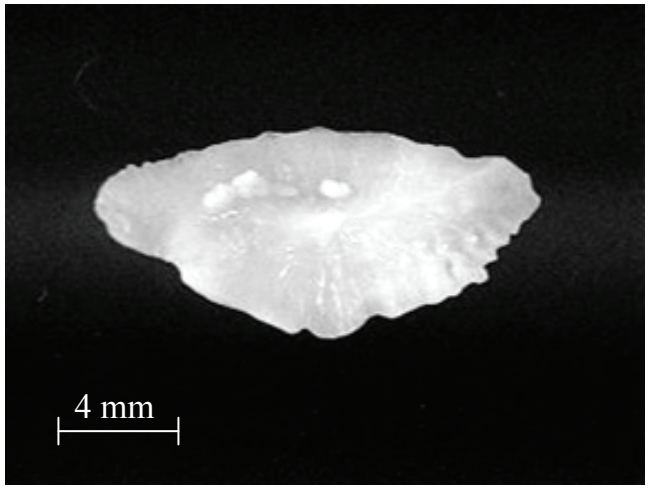


Figure 132. Misty grouper, *Epinephelus mystacinus*
Distribution: Bermuda, SE Florida, and Bahamas to Brazil
Specimen length: 40.0 cm TL



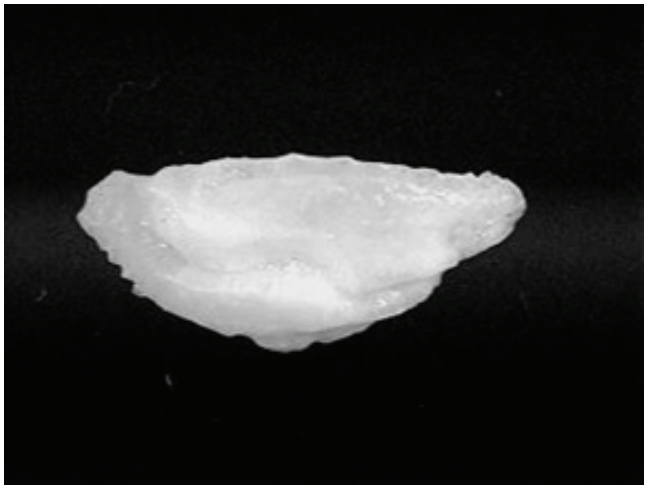
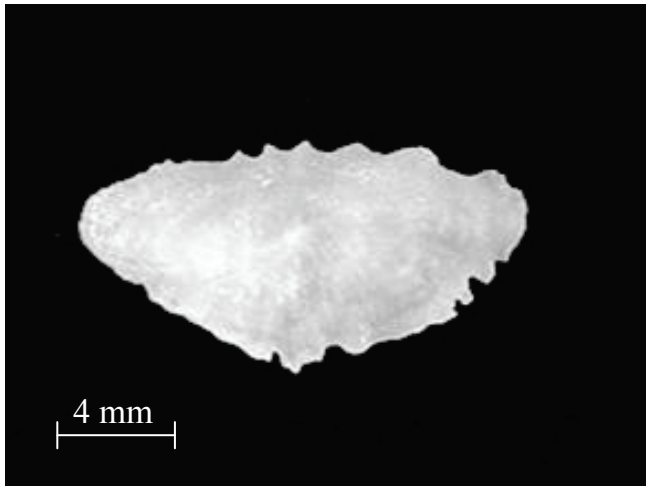


Figure 133. Red hind, *Epinephelus guttatus*
Distribution: North Carolina, Bermuda, Bahamas, and southeastern GOM to Brazil
Specimen length: 49.5 cm FL



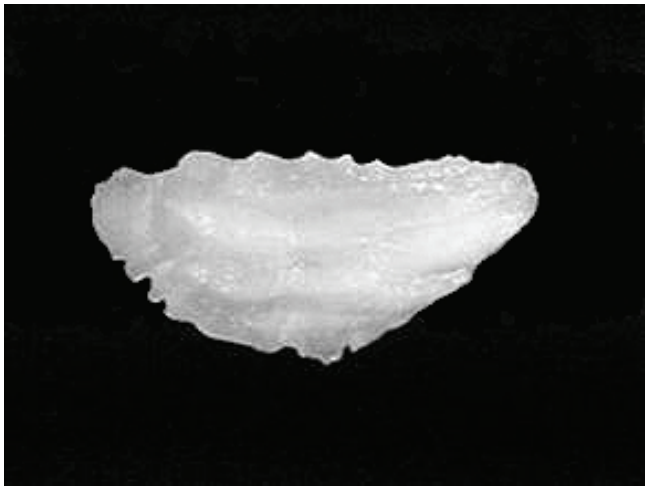


Figure 134. Red grouper, *Epinephelus morio*
Distribution: Massachusetts, Bermuda and northern GOM to southeastern Brazil
Specimen length: 43.0 cm TL

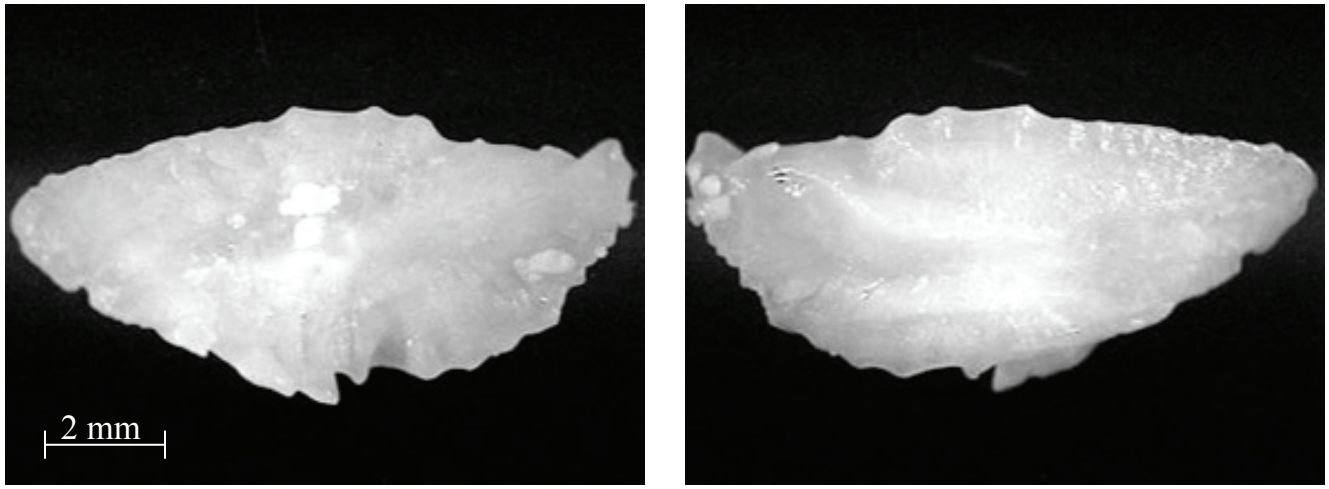


Figure 135. Rock hind, *Epinephelus adscensionis*
Distribution: Massachusetts, Bermuda, and northern GOM to southeastern Brazil
Specimen length: 37.0 cm TL

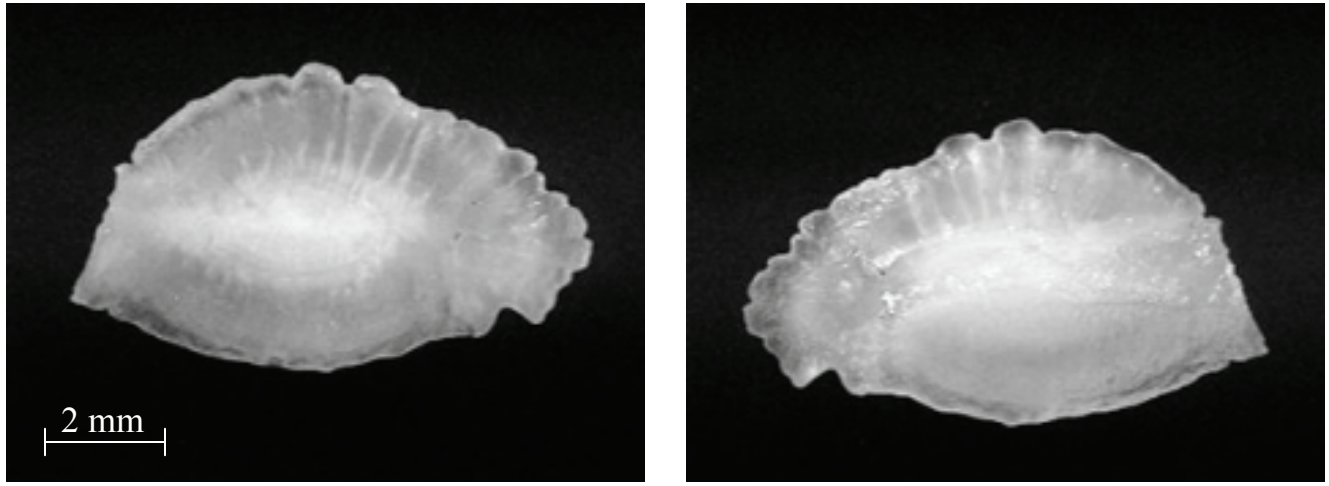
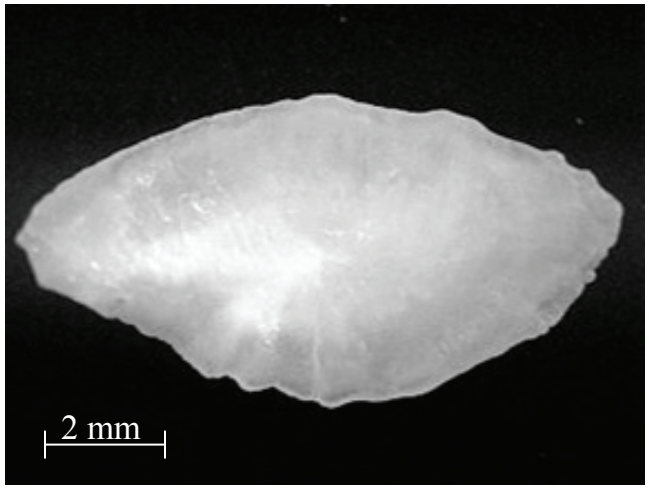


Figure 136. Rock sea bass, *Centropristis philadelphica*
Distribution: North Carolina to Florida and northern GOM
Specimen length: 28.3 cm TL



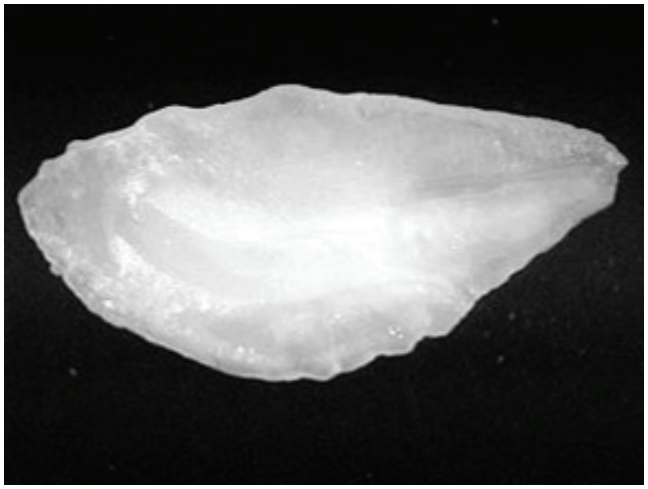
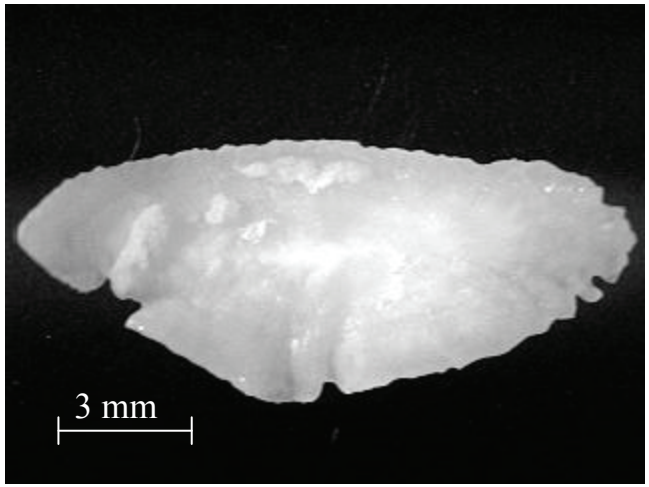


Figure 137. Sand perch, *Diplectrum formosum*
Distribution: North Carolina, Bahamas, and northern GOM to Brazil
Specimen length: 28.6 cm TL



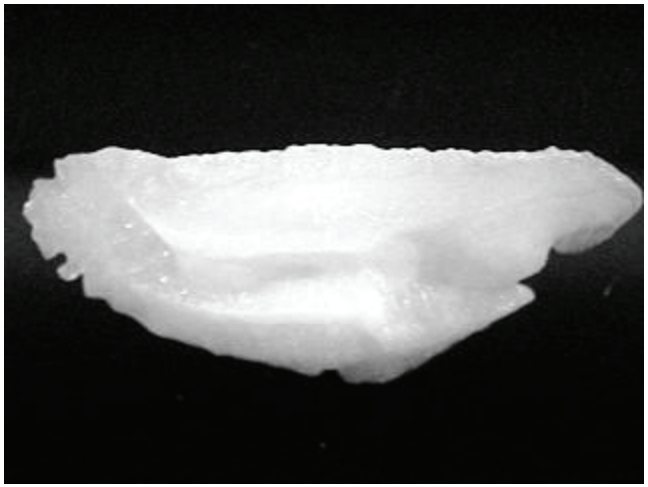


Figure 138. Scamp, *Mycteroperca phenax*
Distribution: Massachusetts and northern GOM to Venezuela
Specimen length: 53.4 cm TL

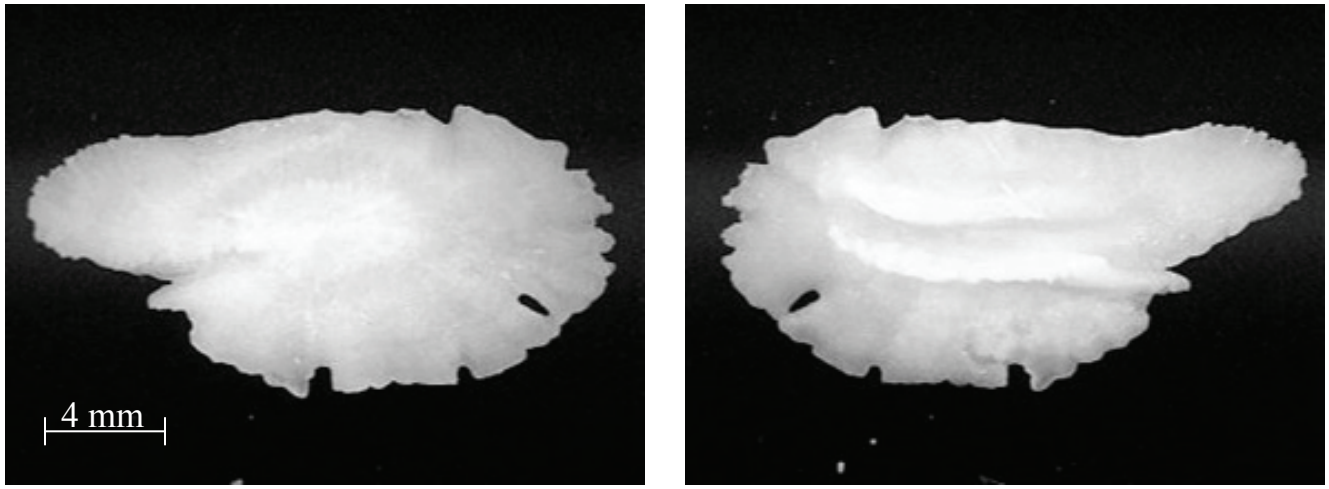


Figure 139. Snowy grouper, *Epinephelus niveatus*
Distribution: Massachusetts and northern GOM to southeastern Brazil, eastern Pacific
Specimen length: 72.5 cm TL

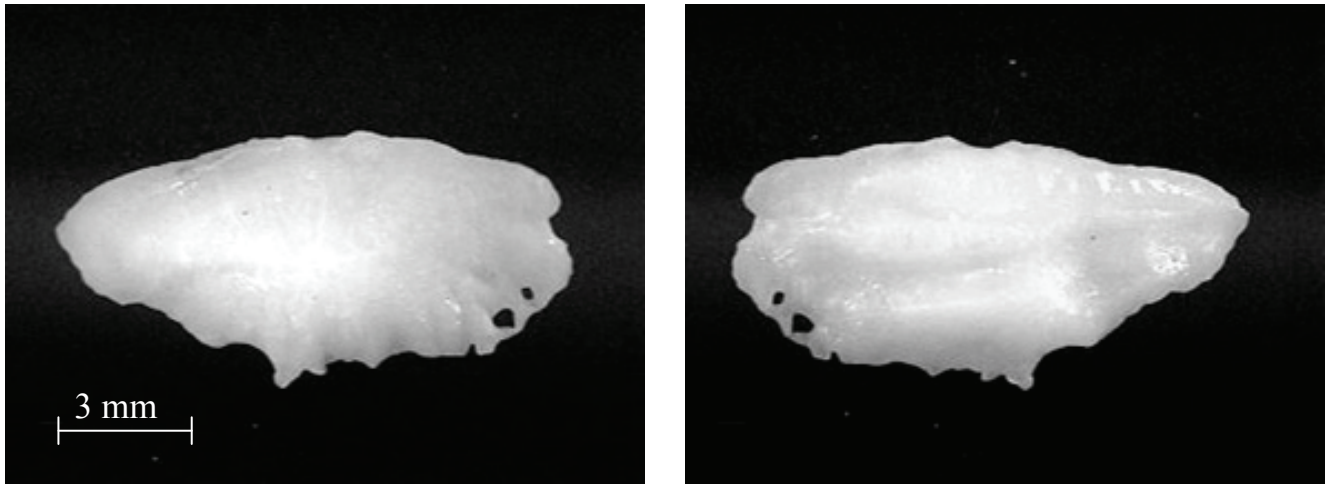
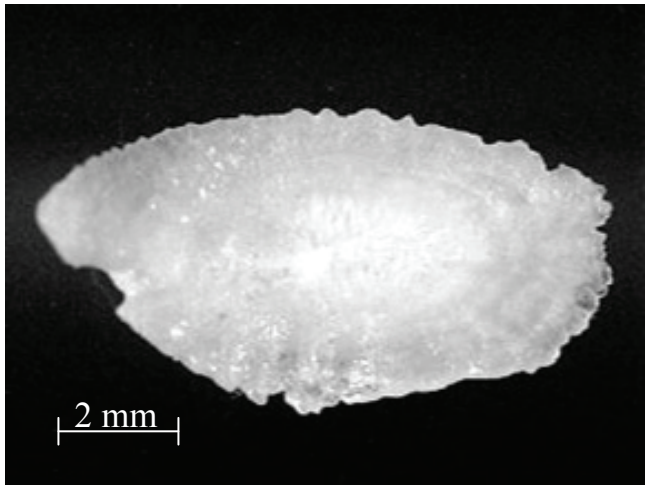


Figure 140. Spanish flag, *Gonioplectrus hispanus*
Distribution: Texas and Bahamas, Greater and Lesser Antilles, Caribbean Islands
Specimen length: 25.8 cm TL



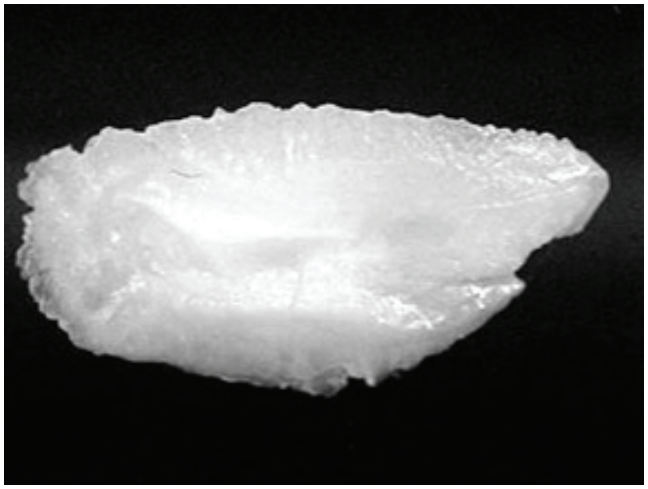


Figure 141. Speckled hind, *Epinephelus drummondhayi*
Distribution: South Carolina, Bermuda, and northwestern and southeastern Florida
Specimen length: 49.0 cm TL

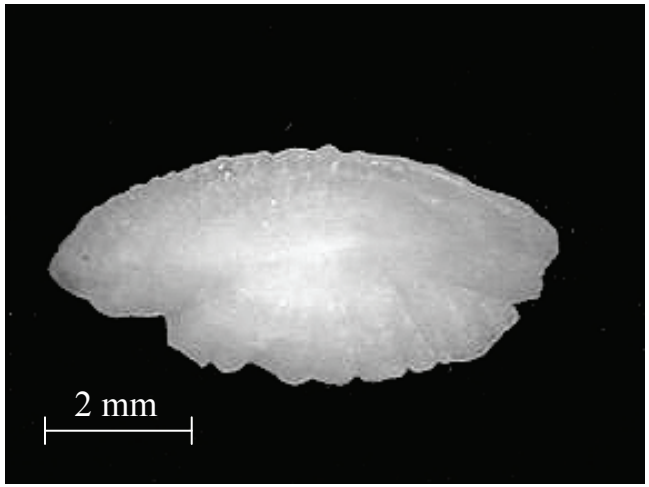


Figure 142. Tattler, *Serranus phoebe*
Distribution: Bermuda, South Carolina, northeastern GOM, and Yucatan to northern South America
Specimen length: <10 cm TL (est)

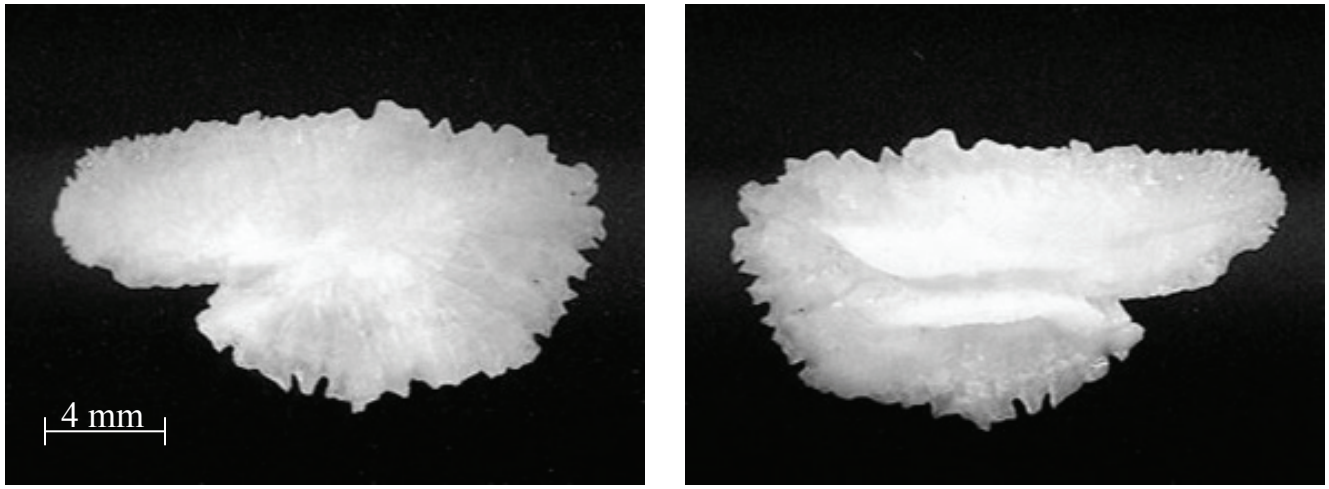


Figure 143. Warsaw grouper, *Epinephelus nigritus*
Distribution: Massachusetts and Bermuda to southeastern Brazil
Specimen length: 99.5 cm TL

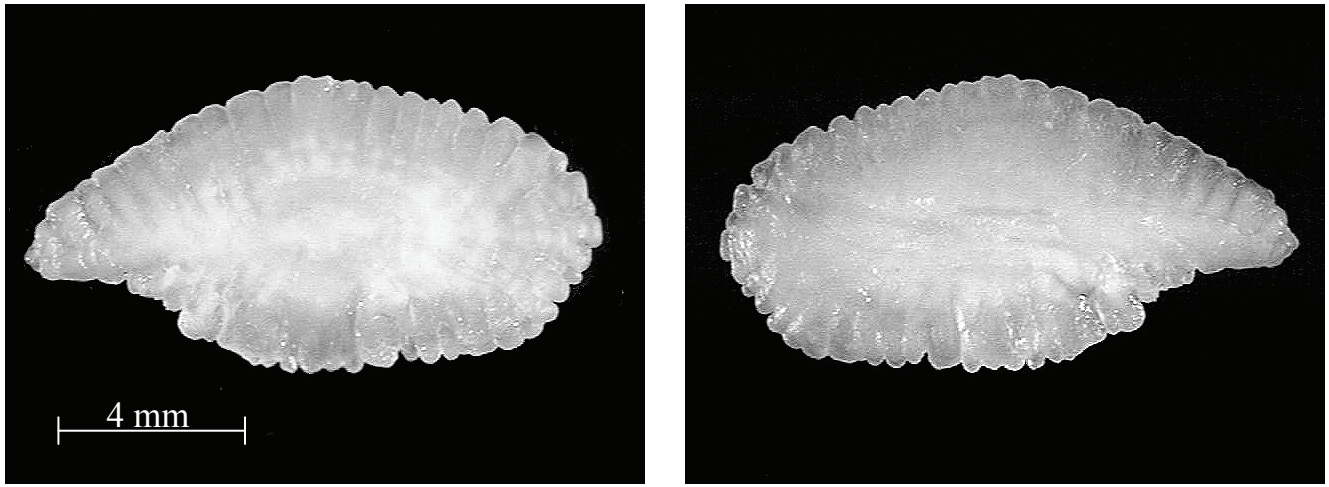
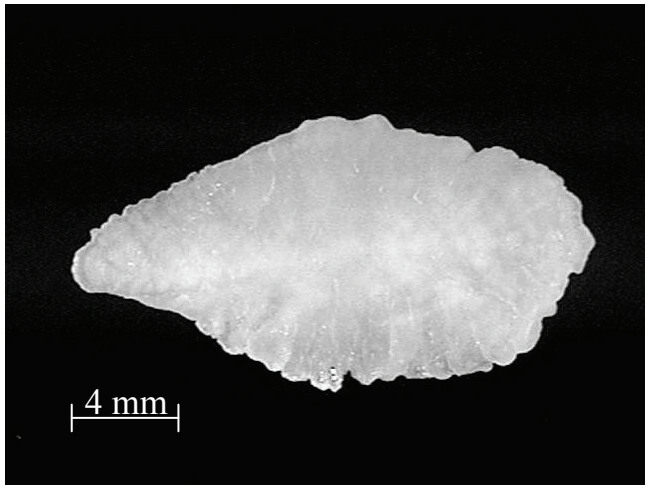


Figure 144a. Yellowedge grouper, *Epinephelus flavolimbatus*
Distribution: Florida and northern GOM to Brazil
Specimen length: 18.9 cm TL



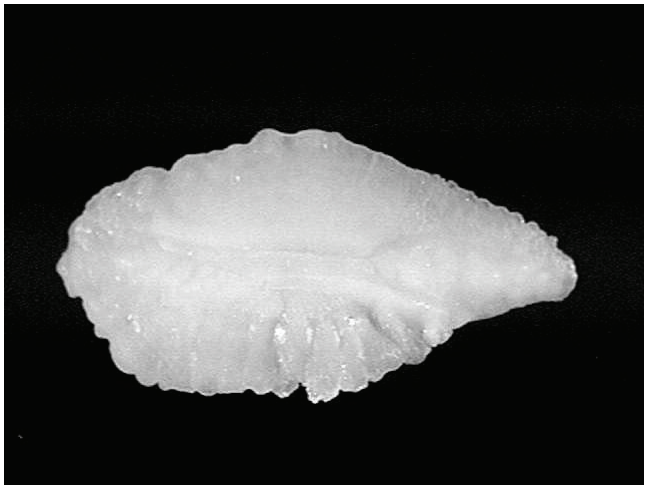
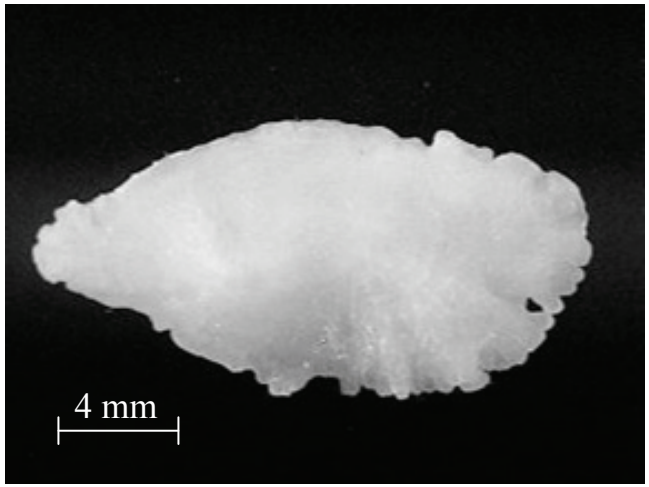


Figure 144b. Yellowedge grouper, *Epinephelus flavolimbatus*
Distribution: Florida and Northern GOM to Brazil
Specimen length: 33.0 cm TL



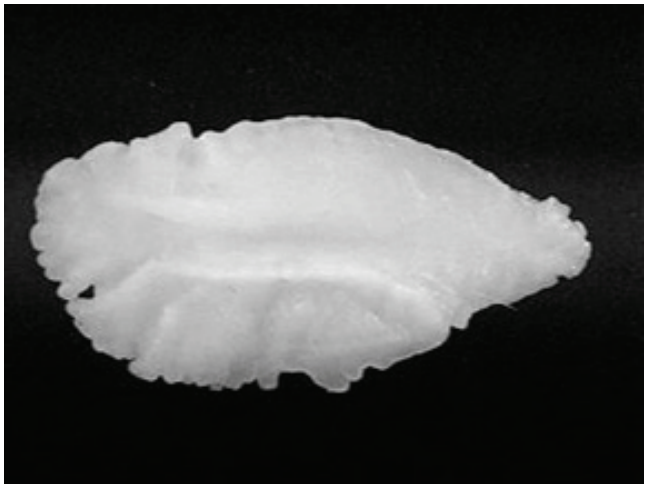
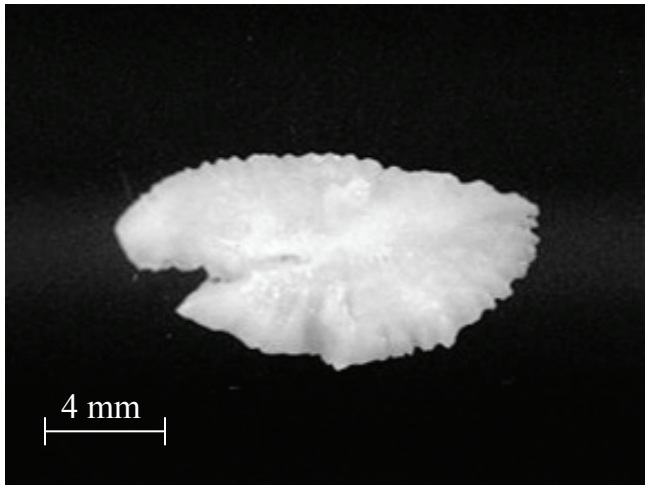


Figure 144c. Yellowedge grouper, *Epinephelus flavolimbatus*
Distribution: Florida and northern GOM to Brazil
Specimen length: 42.6 cm TL



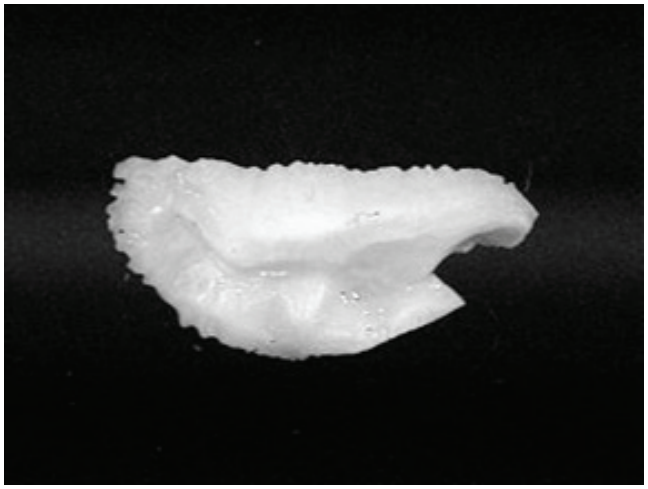
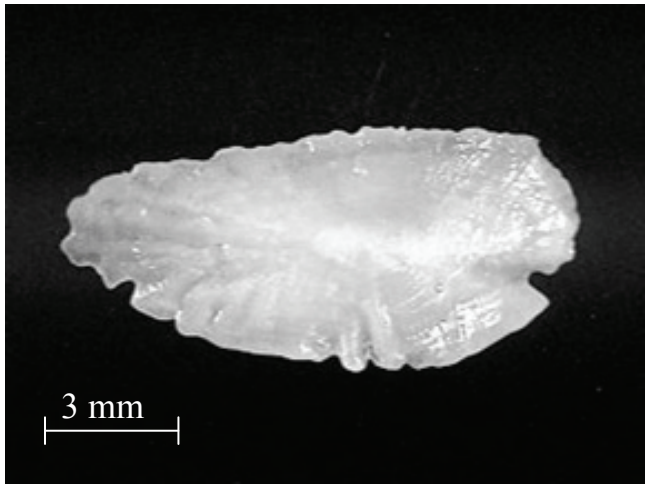


Figure 145. Yellowfin grouper, *Myctoperca venenosa*
Distribution: Bermuda, Florida, and southeastern GOM to Brazil
Specimen length: 87.5 cm FL



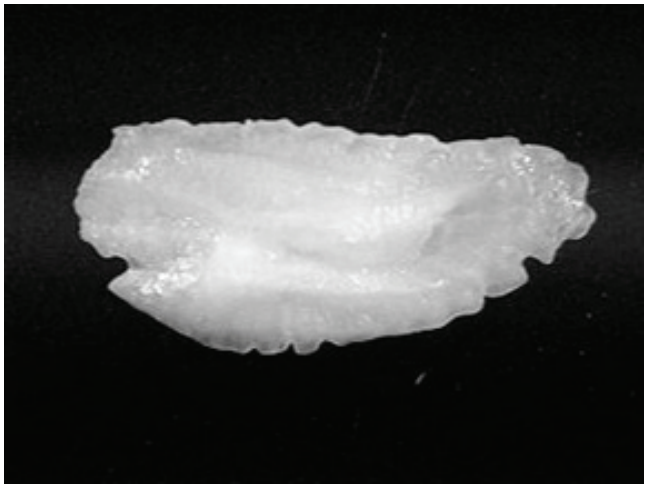


Figure 146. Yellowmouth grouper, *Mycteroperca interstitialis*
Distribution: Bermuda, southeastern Florida, and Bahamas to Brazil
Specimen length: 56.0 cm FL

Family Soleidae: Soles

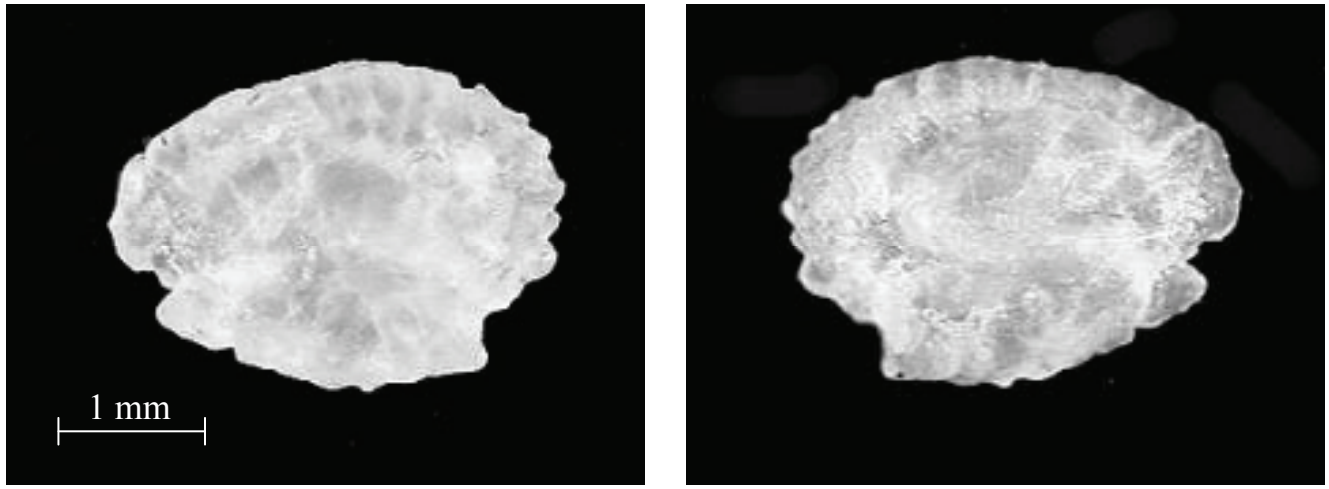


Figure 147. Hogchoker, *Trinectes maculatus*
Distribution: Massachusetts and northern GOM to Venezuela
Specimen length: 11.0 cm TL

Family Sparidae: Porgies

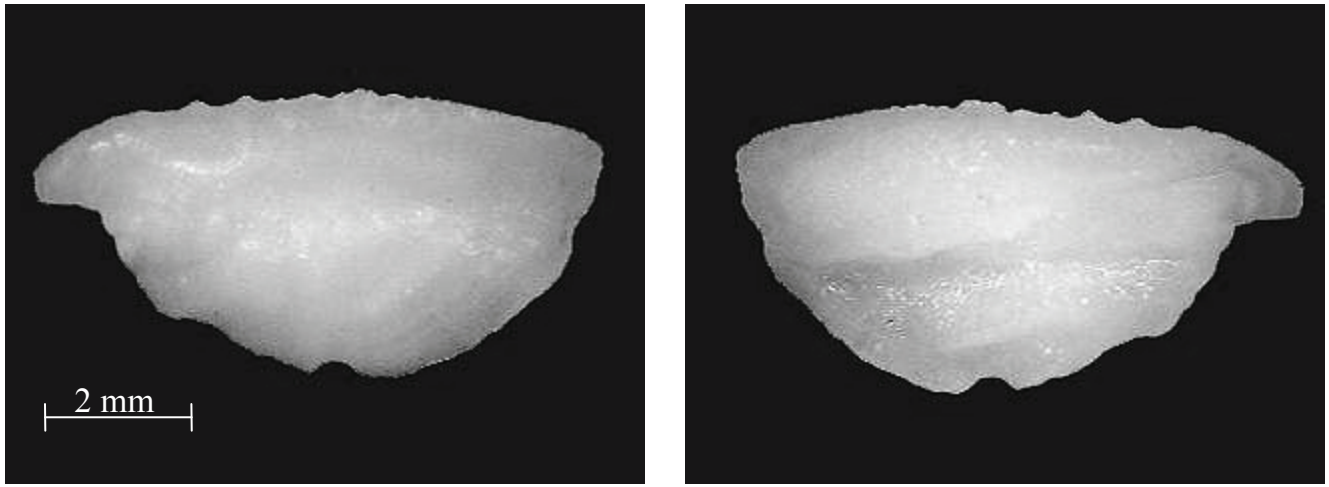
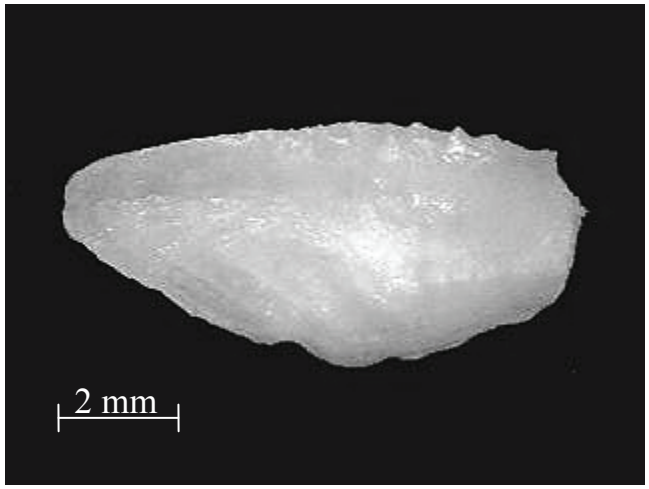


Figure 148. Grass porgy, *Calamus arctifrons*
Distribution: Southeastern Florida to Louisiana
Specimen length: 26.5 cm TL



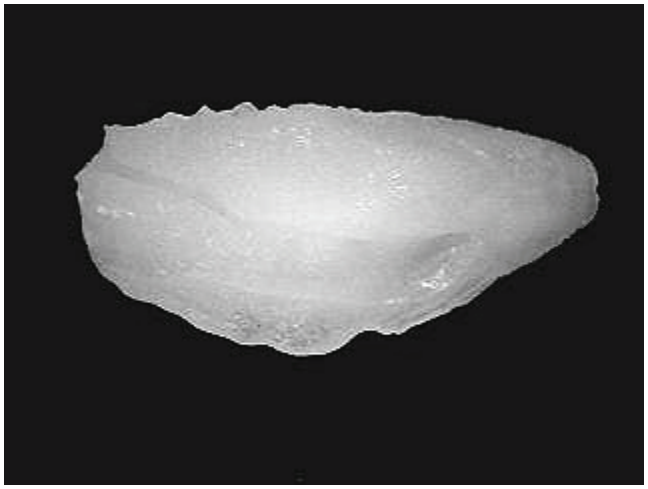
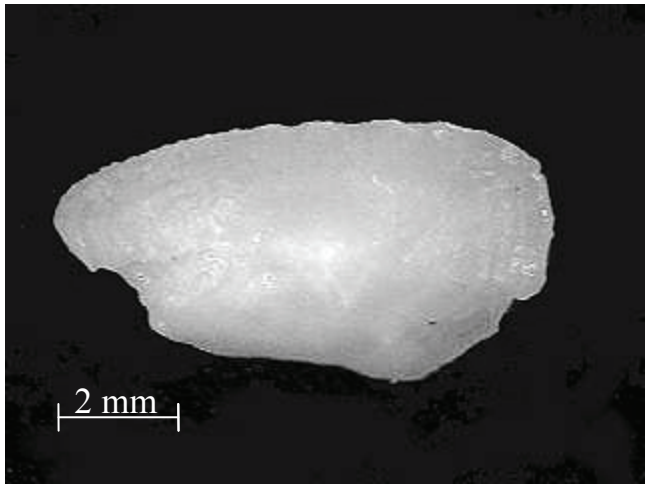


Figure 149. Jolthead porgy, *Calamus bajonado*
Distribution: Rhode Island, Bermuda, and northern GOM to Brazil
Specimen length: 32.4 cm TL



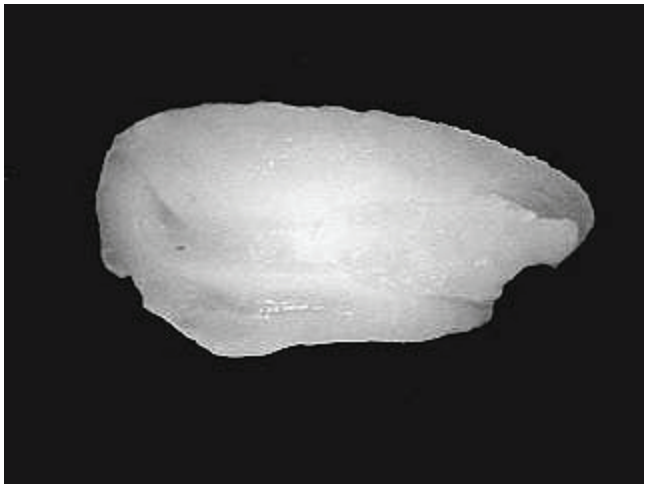
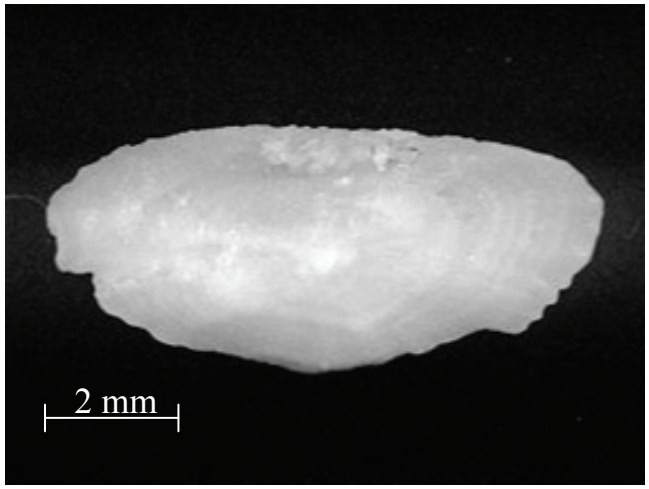


Figure 150. Knobbed porgy, *Calamus nodosus*
Distribution: North Carolina to southeastern Florida and GOM
Specimen length: 31.0 cm TL



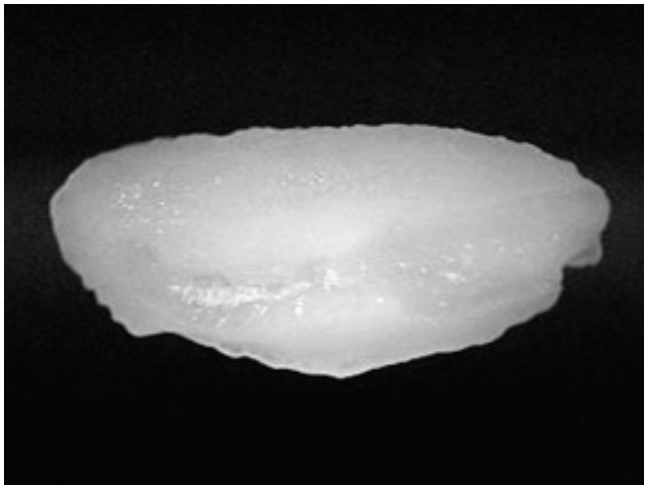
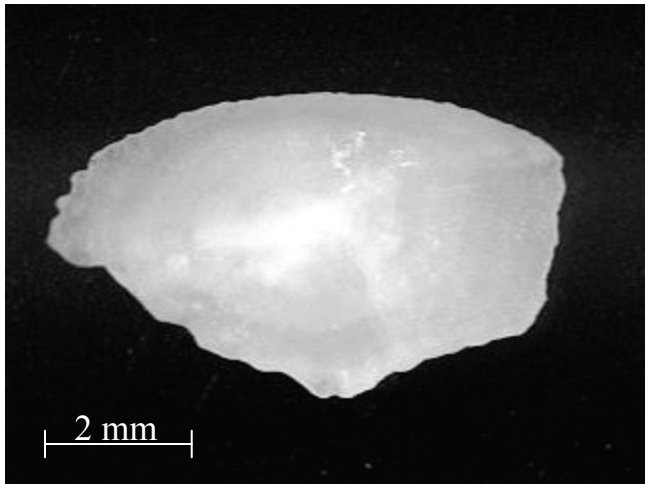


Figure 151. Littlehead porgy, *Calamus proridens*
Distribution: Northeastern Florida and northern GOM to Bay of Campeche
Specimen length: 30.8 cm FL



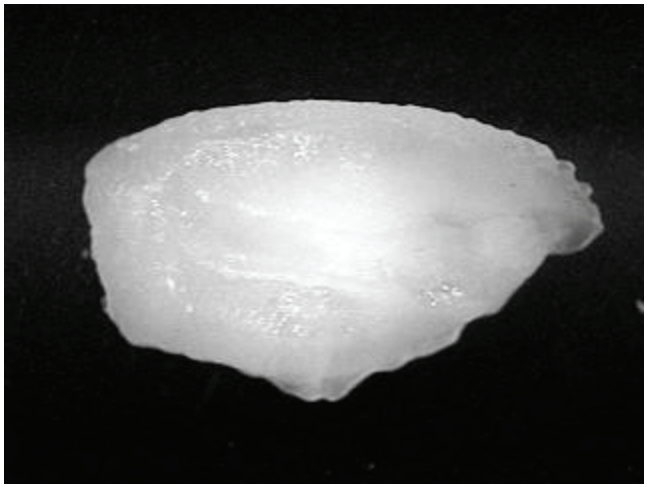
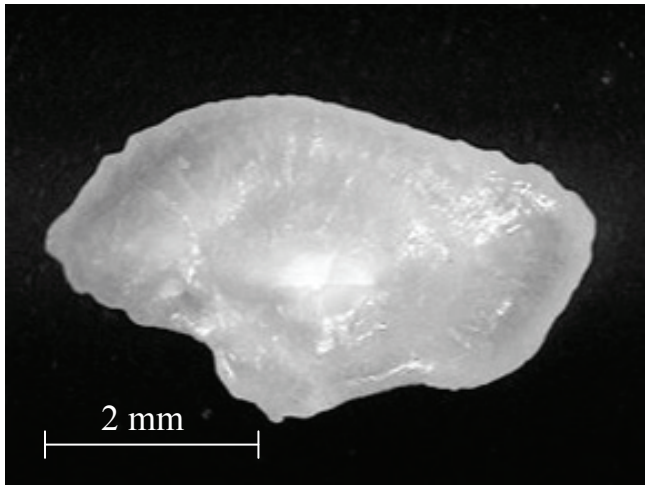


Figure 152. Longspine porgy, *Stenotomus caprinus*
Distribution: North Carolina to Georgia, and GOM to Yucatan
Specimen length: 16.0 cm FL



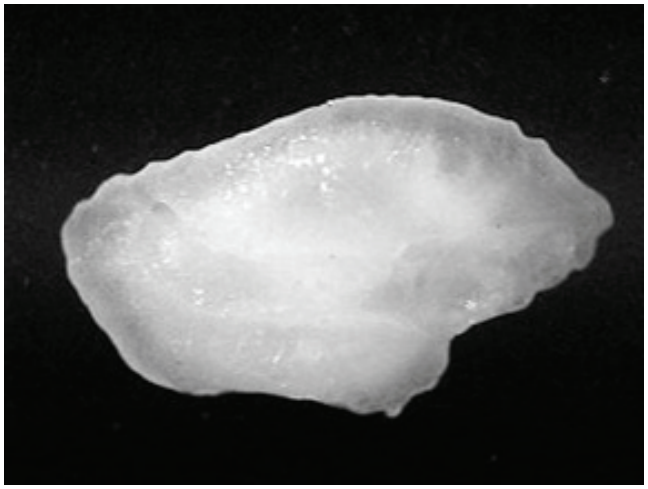
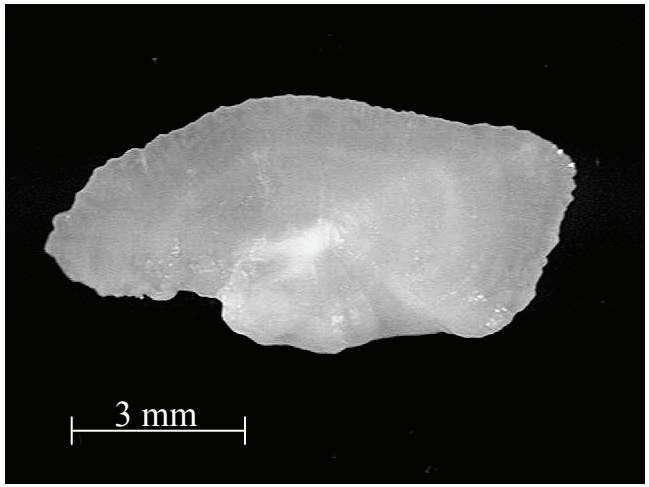


Figure 153a. Pinfish, *Lagodon rhomboides*
Distribution: Massachusetts, Bermuda, and northern GOM to Florida Keys and Yucatan
Specimen length: 14.3 cm FL



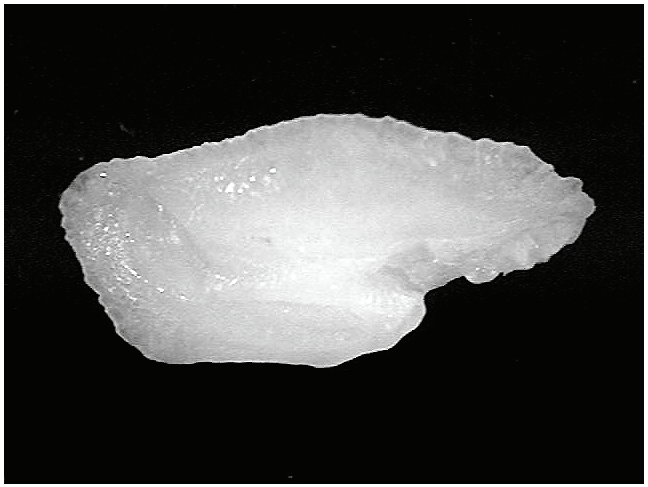
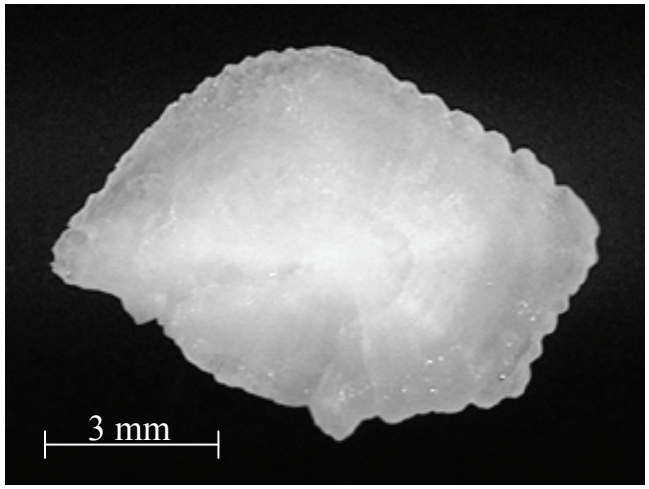


Figure 153b. Pinfish, *Lagodon rhomboides*
Distribution: Massachusetts, Bermuda, and northern GOM to Florida Keys and Yucatan
Specimen length: 22.9 cm FL



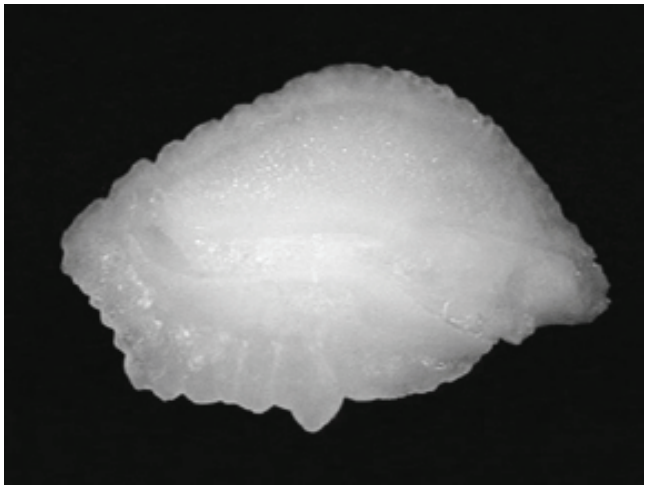
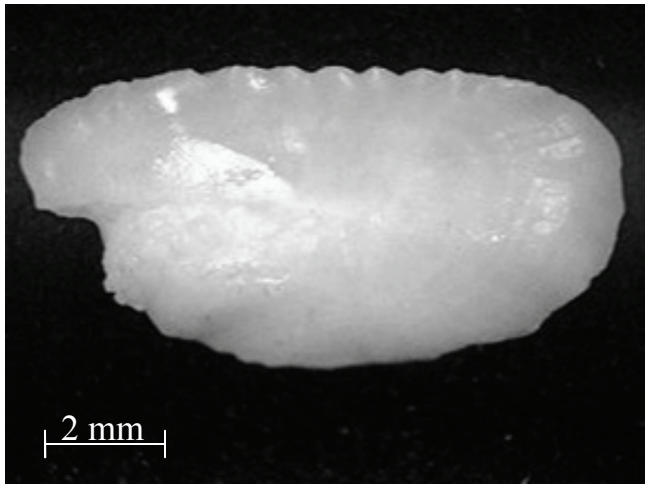


Figure 154. Red porgy, *Pagrus pagrus*
Distribution: New York and northern GOM to Argentina, eastern Atlantic
Specimen length: 20 cm TL (est)



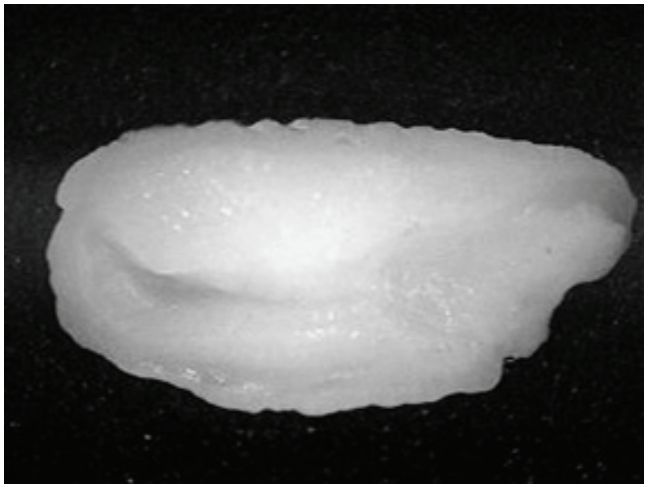


Figure 155. Saucereye porgy, *Calamus calamus*
Distribution: North Carolina, Bermuda, and northern GOM to Brazil
Specimen length: 43.2 cm TL

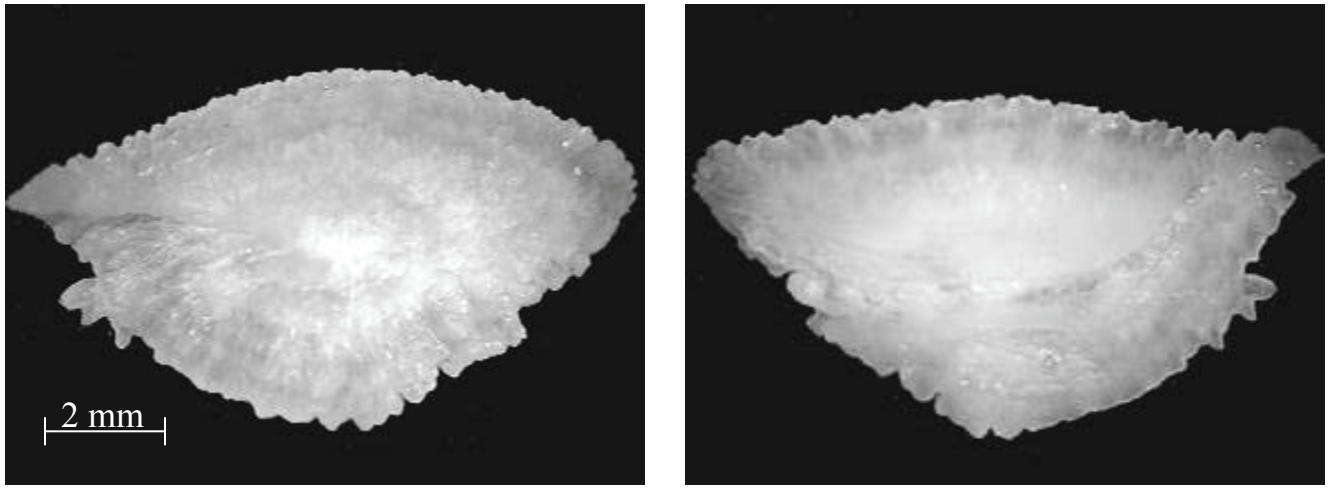


Figure 156. Sheepshead, *Archosargus probatocephalus*
Distribution: Nova Scotia and northern GOM to Brazil
Specimen length: 35.3 cm FL

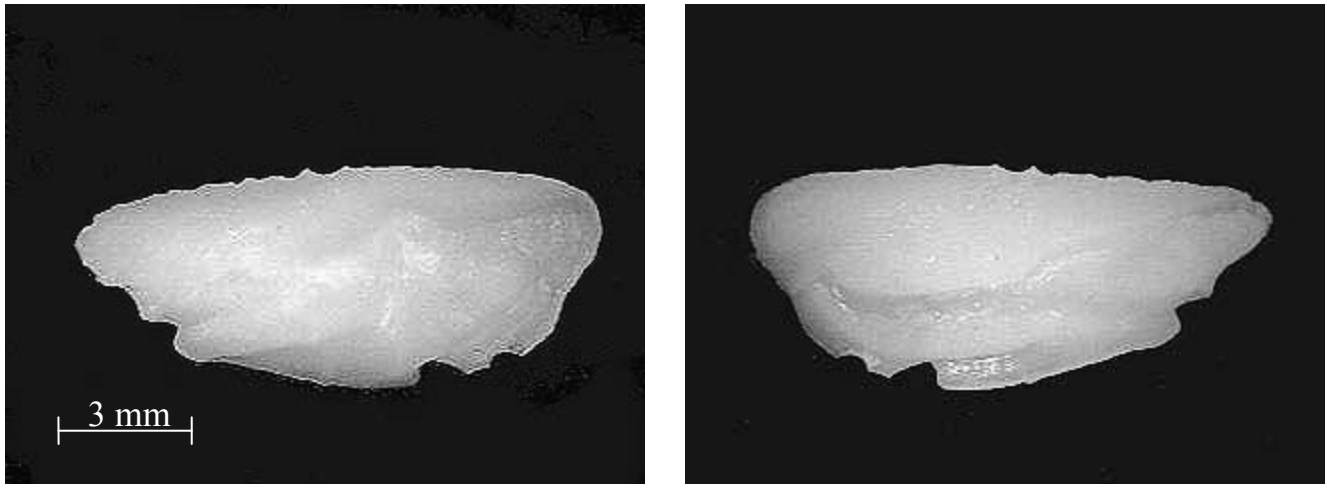


Figure 157. Whitebone porgy, *Calamus leucosteus*
Distribution: North Carolina to southern Florida and GOM
Specimen length: 39.8 cm TL

Family Sphyraenidae: Barracudas

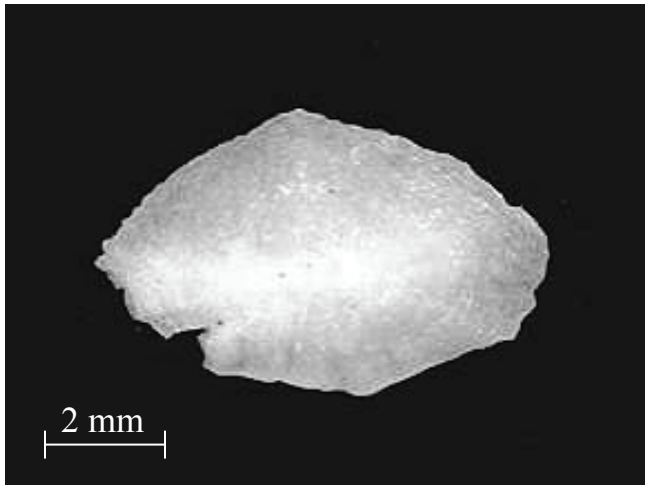
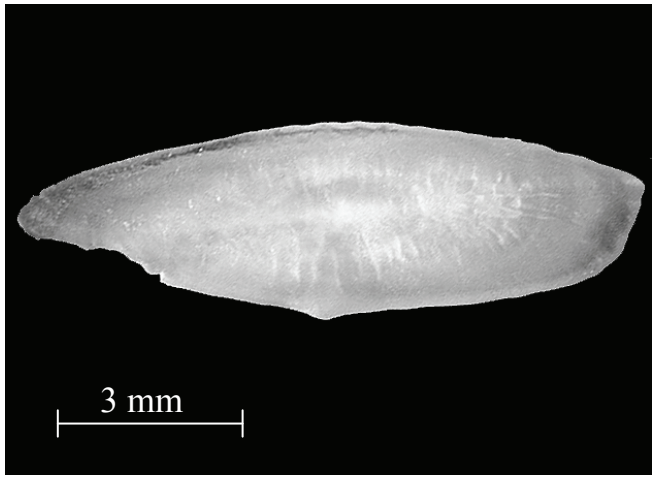


Figure 158. Great barracuda, *Sphyraena barracuda*
Distribution: Massachusetts to southeastern Brazil, nearly worldwide in warm waters
Specimen length: 46.0 cm TL



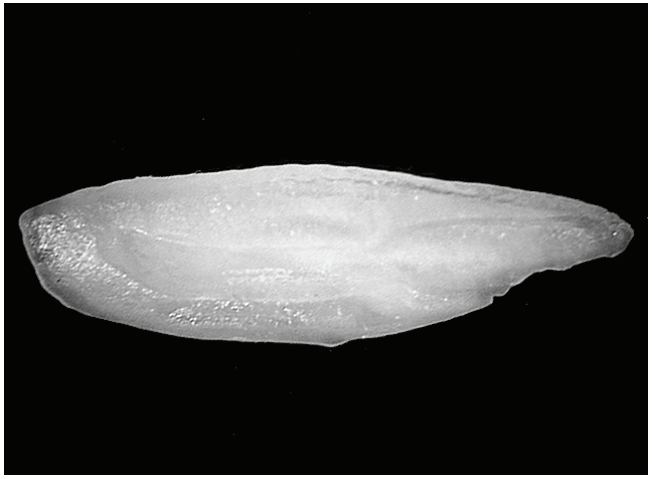
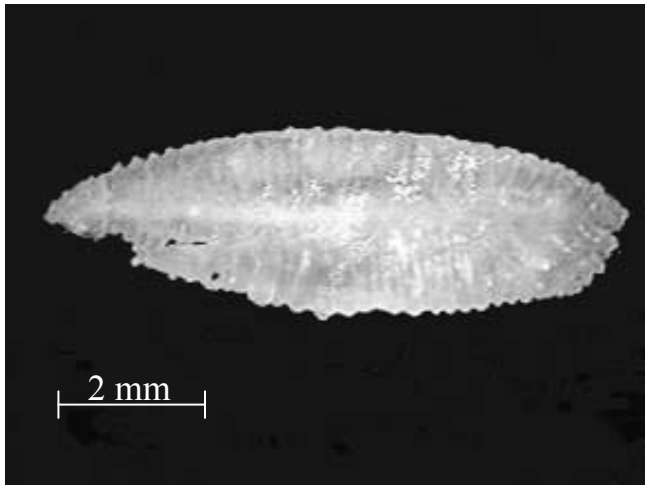


Figure 159. Guaguanche, *Sphyraena guachancho*
Distribution: Massachusetts to Brazil, entire GOM, Antilles, Bahamas
Specimen length: 39.5 cm FL



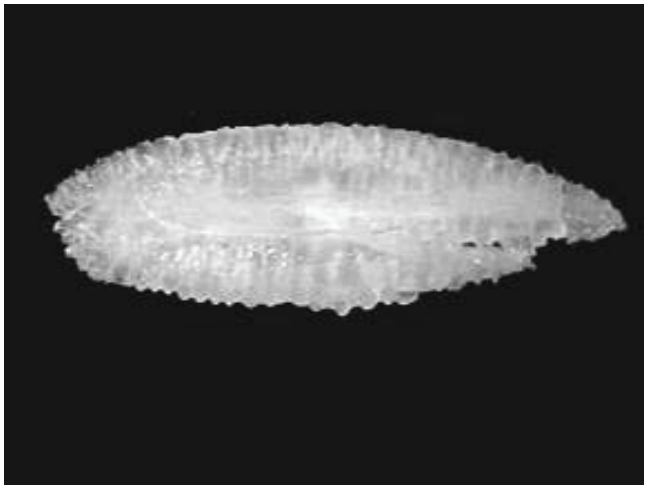
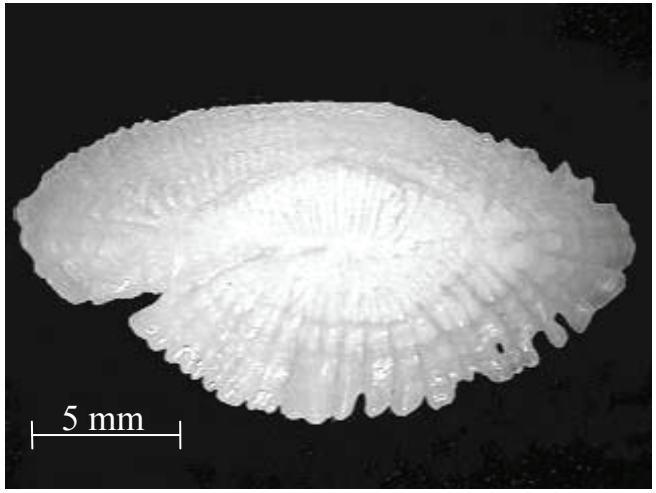


Figure 160. Sennet, *Sphyraena picudilla*.
Distribution: Northern Florida to southern Brazil, eastern GOM, Lesser Antilles
Specimen length: Unknown

Family Stromateidae: Butterfishes



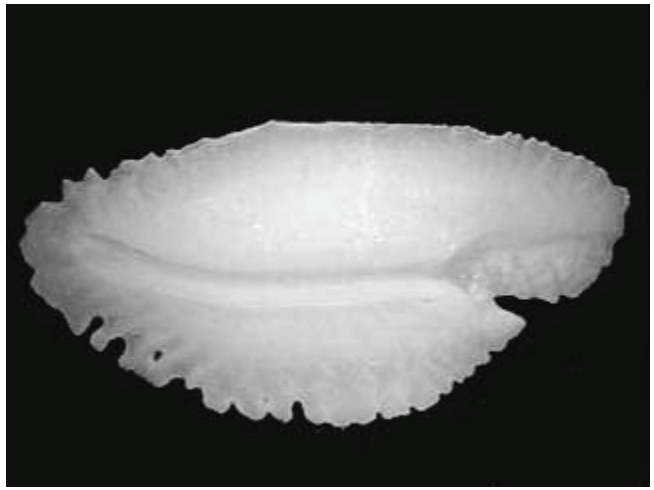
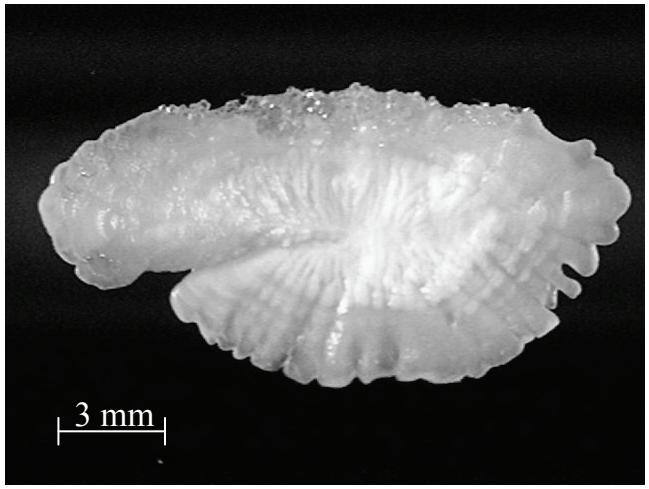


Figure 161. Barrelfish, *Hyperoglyphe perciformis*
Distribution: Nova Scotia to southeastern Florida and eastern GOM
Specimen length: 78.3 cm TL



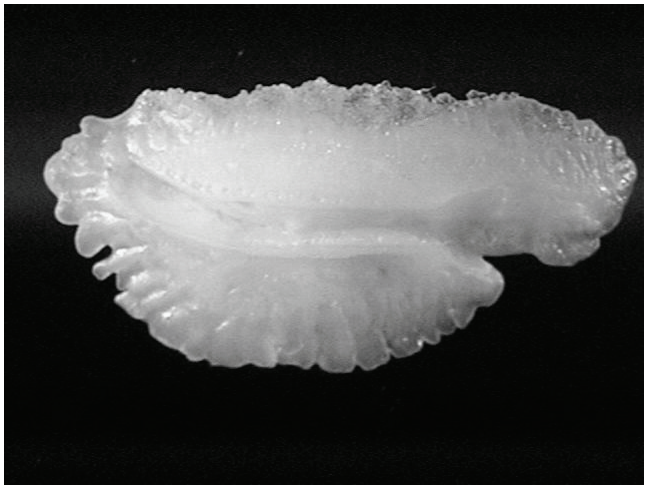
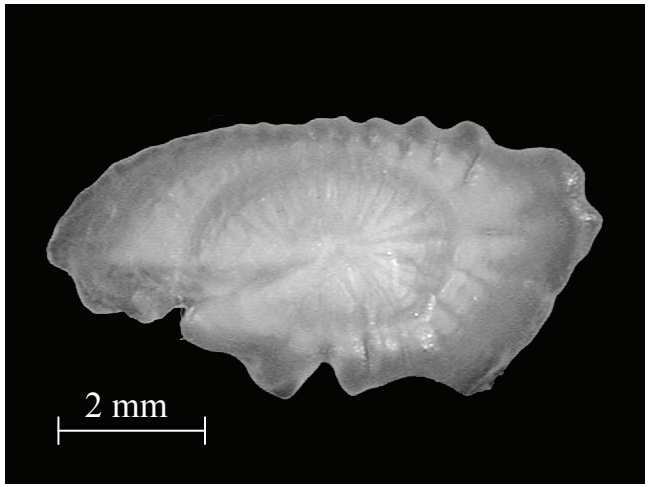


Figure 162. Black driftfish, *Hyperoglyphe bythites*
Distribution: Southern Florida, GOM
Specimen length: 52.7 cm FL



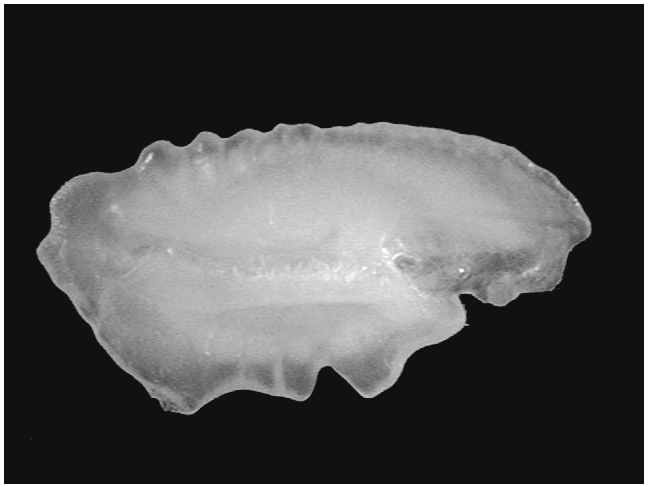


Figure 163. Gulf butterfish, *Peprilus burti*
Distribution: Virginia to Florida, entire GOM
Specimen length: 17.0 cm FL

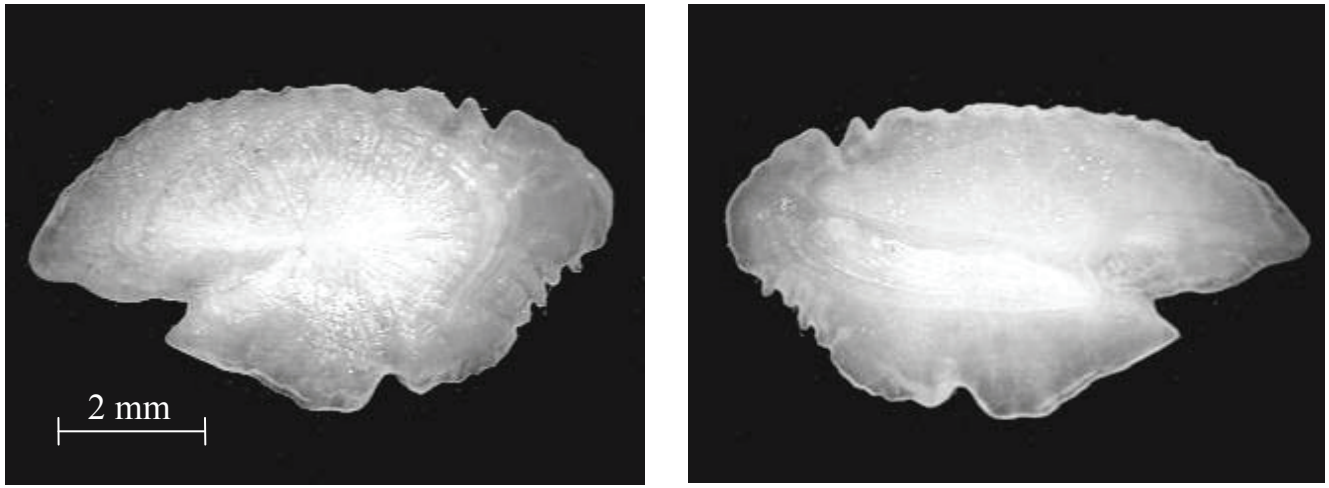


Figure 164. Harvestfish, *Peprilus alepidotus*
Distribution: Chesapeake Bay and northern GOM to Argentina
Specimen length: 16.0 cm FL

Family Synodontidae: Lizardfishes

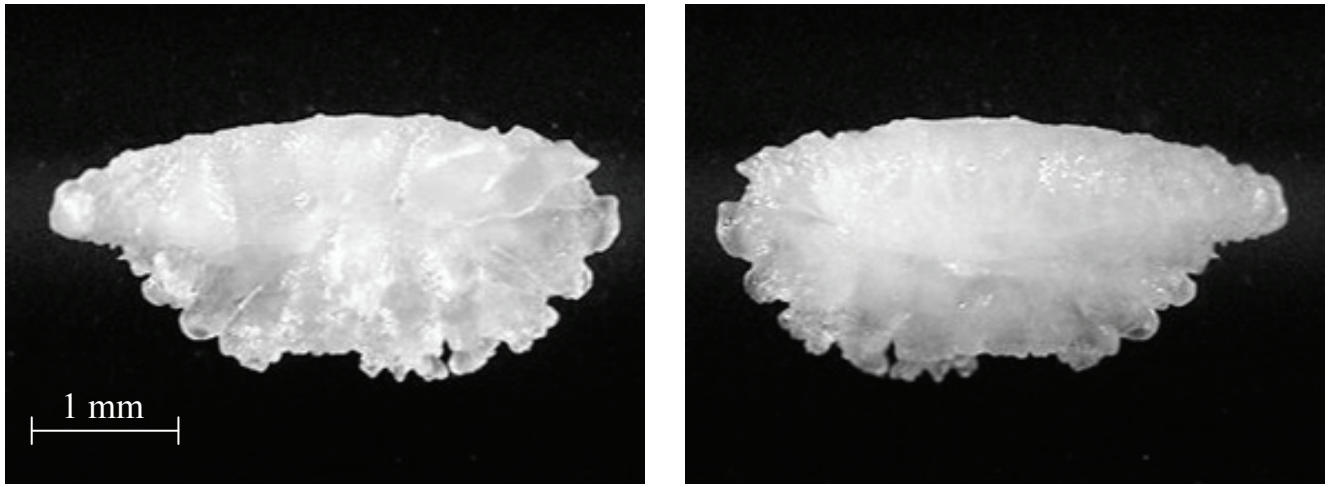


Figure 165a. Inshore lizardfish, *Synodus foetens*
Distribution: Massachusetts and northern GOM to Brazil
Specimen length: 16.0 cm FL

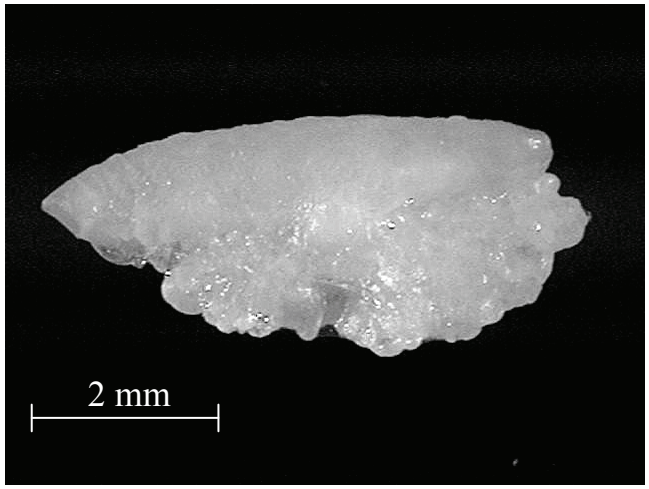


Figure 165b. Inshore lizardfish, *Synodus foetens*
Distribution: Massachusetts and northern GOM to Brazil
Specimen length: 25.5 cm FL

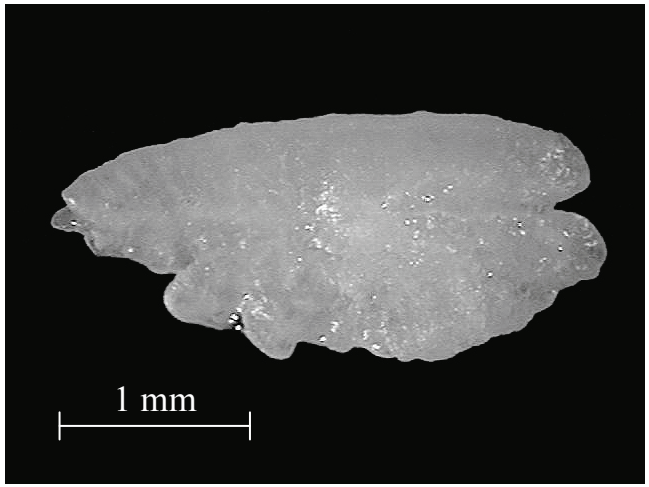
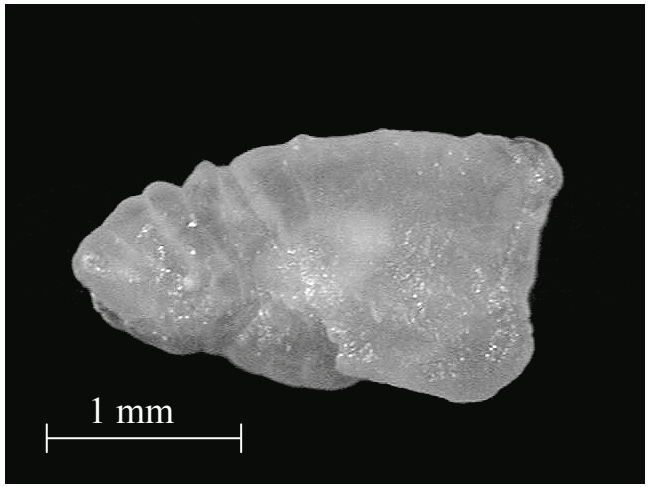


Figure 165c. Inshore lizardfish, *Synodus foetens*
Distribution: Massachusetts and northern GOM to Brazil
Specimen length: 39.0 cm FL



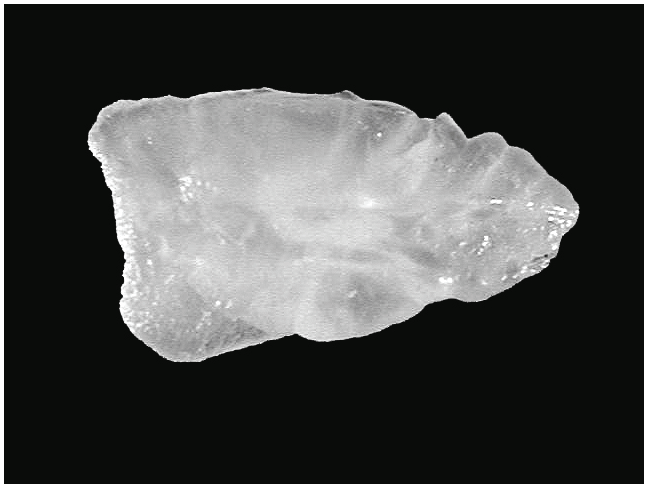


Figure 166. Red lizardfish, *Synodus synodus*
Distribution: Massachusetts to Brazil, GOM, Caribbean, and West Indies
Specimen length: 12.1 cm FL

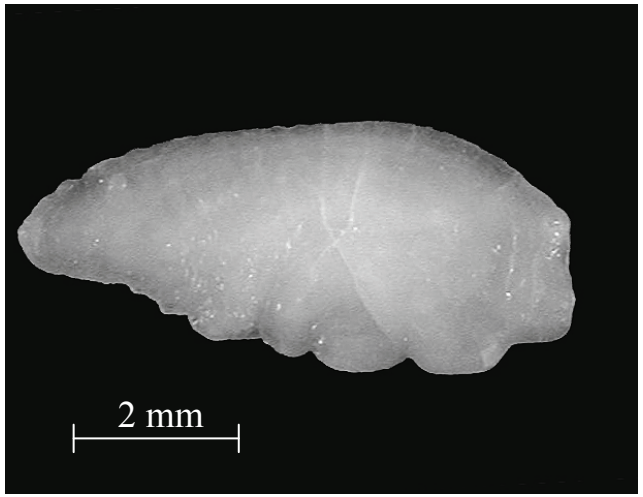


Figure 167. Shortjaw lizardfish, *Saurida normani*
Distribution: North Carolina to Florida Keys, eastern GOM
Specimen length: 21.2 cm FL

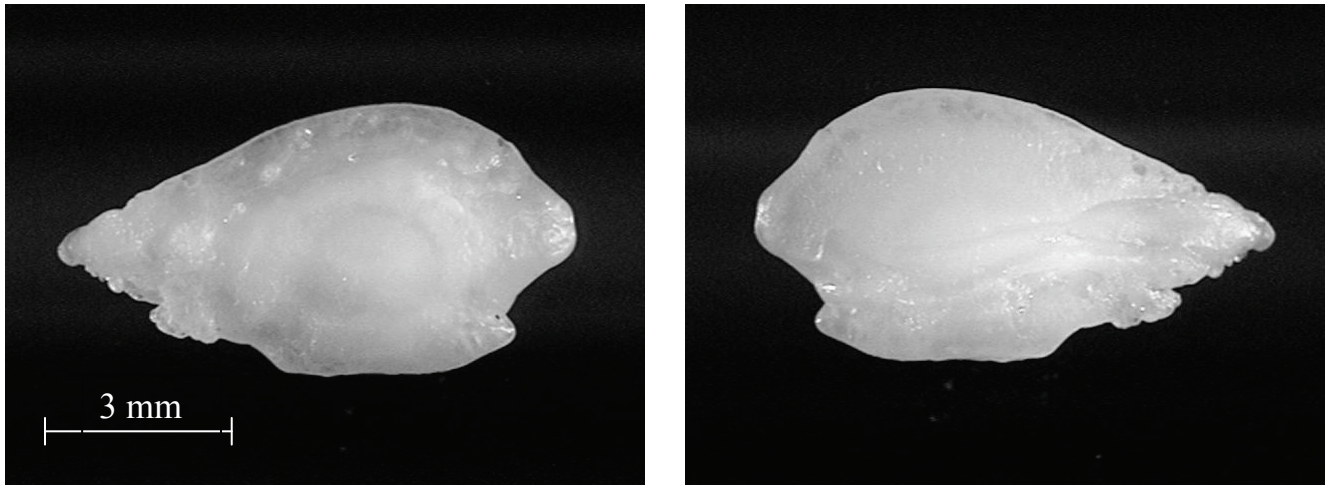


Figure 168. Snakefish, *Trachinocephalus myops*
Distribution: North Carolina to Florida Keys, eastern GOM, Bermuda, Caribbean
Specimen length: 19.2 cm FL

Family Triglidae: Searobins

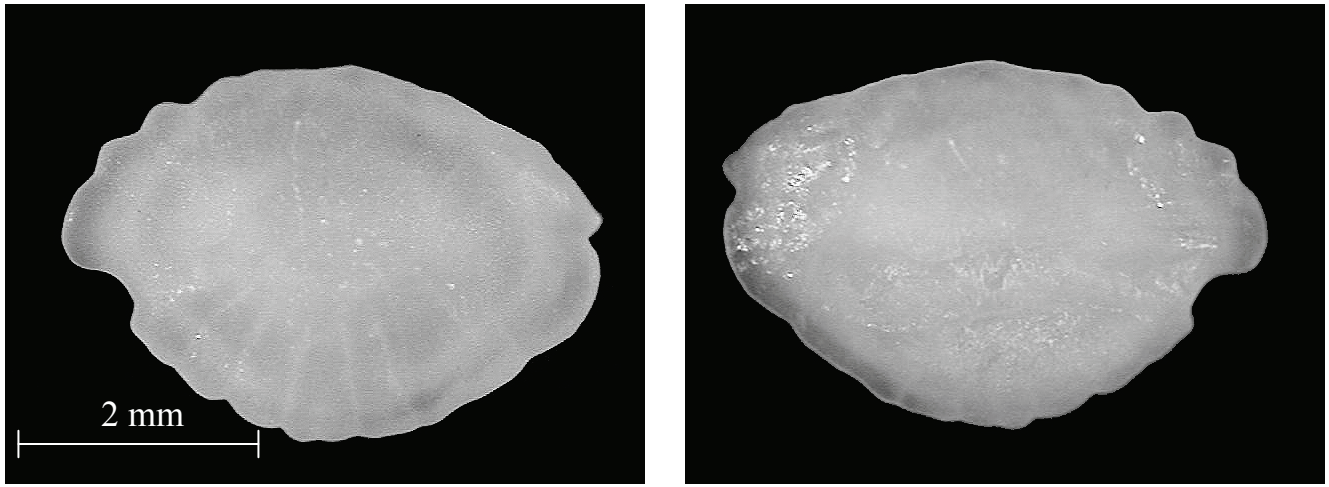


Figure 169. Bigeye searobin, *Prionotus longispinosus*
Distribution: Northern and western GOM
Specimen length: 14.6 cm TL

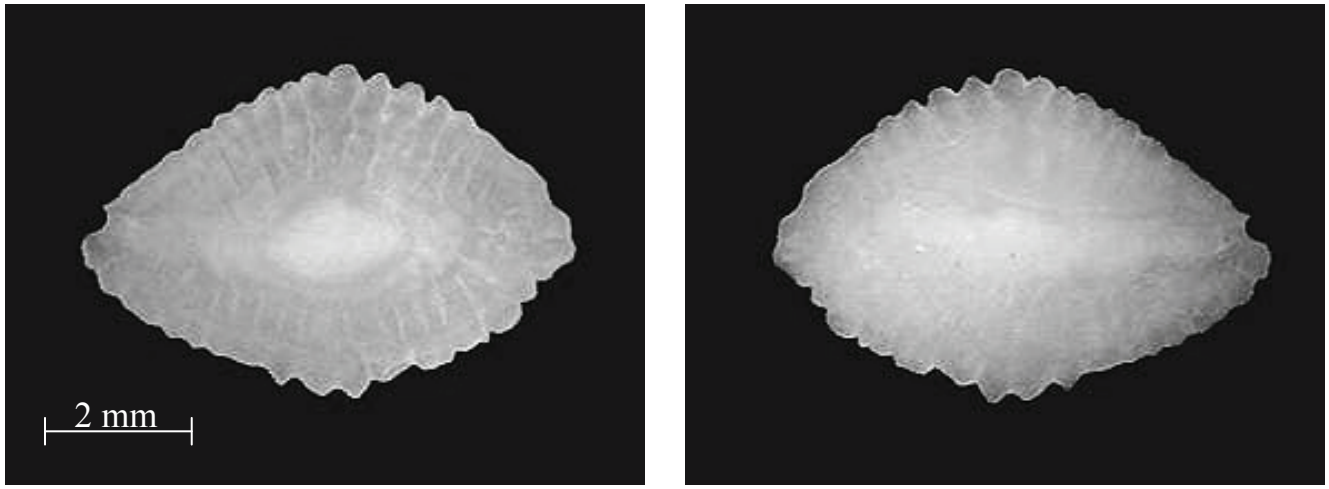


Figure 170. Bighead searobin, *Prionotus tribulus*
Distribution: Chesapeake Bay to northern Florida and GOM
Specimen length: 19.8 cm TL

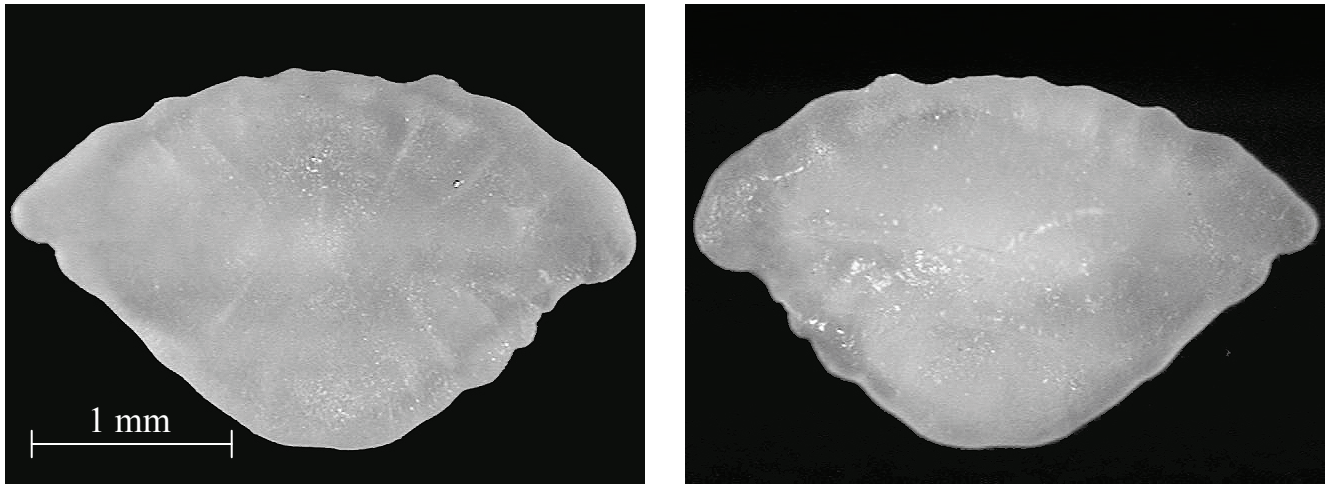


Figure 171. Horned searobin, *Bellator militaris*
Distribution: North Carolina to Colombia, entire GOM
Specimen length: 9.1 cm TL

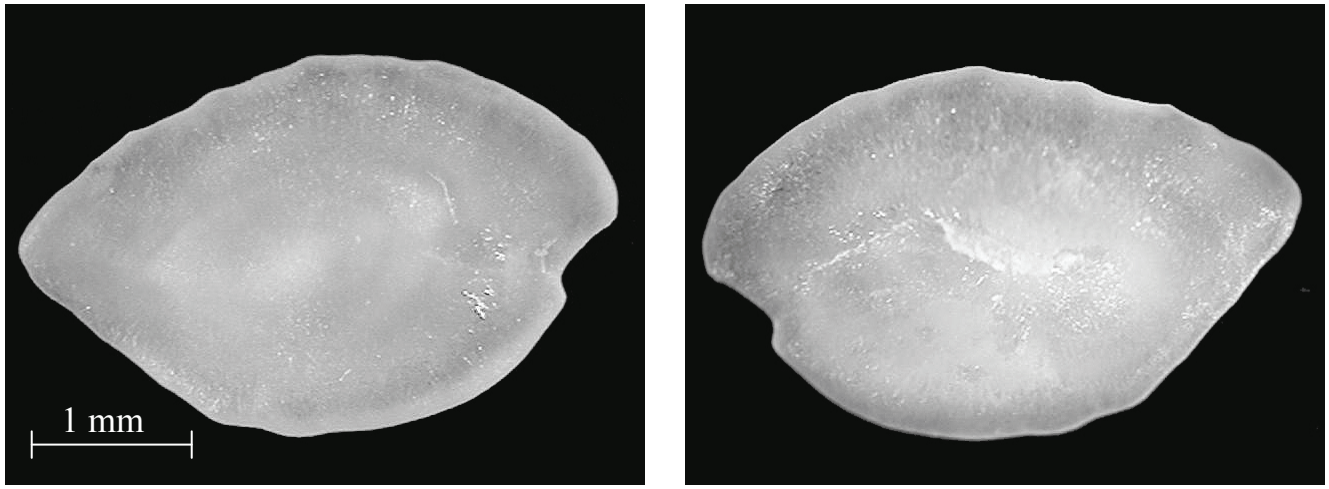


Figure 172. Shortwing searobin, *Prionotus stearnsi*
Distribution: North Carolina to French Guiana, entire GOM
Specimen length: 13.1 cm TL

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