

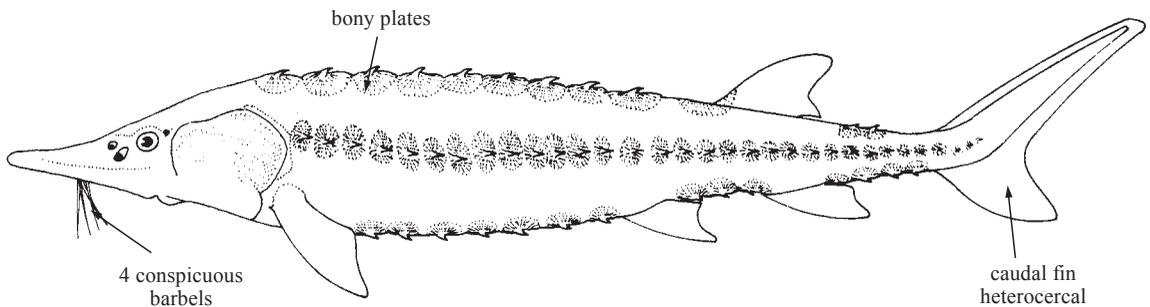
Order ACIPENSERIFORMES

ACIPENSERIDAE

Sturgeons

by W.B. Scott, Kingston, Ontario, Canada

Diagnostic characters: Body heavy, elongate and subcylindrical in section. **Head ending in a hard extended snout;** a spiracle (small opening above and behind eyes) present in *Acipenser*; **mouth inferior, protrusible, preceded by 4 conspicuous barbels;** gill membranes joined to isthmus, not free. A single dorsal fin set far back on body; **caudal fin more or less deeply forked and distinctly asymmetrical, heterocercal, with a fleshy axis bending upward at base of fin and extending rearward to tip of upper lobe, the fin being much wider below than above fleshy axis;** pectoral fins set low; pelvic fins abdominal in position; all fins spineless, except for first pectoral-fin ray which is ossified in some species. Skeleton cartilaginous for the most part. **Head and body covered with bony plates, shields, or bucklers, those on body in 5 rows, 1 row along midline of back, 1 row along each side, and another along the ventrolateral margin of each side.** **Colour:** variable, light brown to dark brown, almost black or slate grey to blue-black.



Habitat, biology, and fisheries: Sturgeons are medium- to large-sized fishes (sexually mature individuals in Area 31 range from 80 to slightly over 200 cm in total length), inhabiting lakes, river basins, and coastal marine waters; generally but not always near the bottom, feeding on benthic organisms, insects, molluscs, crustaceans, and occasionally plant material. All sturgeons spawn in fresh water, those species occurring as adults in estuaries or the sea being anadromous. Of the 3 species occurring in brackish and marine waters along the eastern coast of the USA, the Atlantic sturgeon, *Acipenser oxyrinchus*, is the one which has been most important commercially. Its range extends from Labrador to Florida and the northern Gulf of Mexico (the population to the west of Florida is considered by some authors as a distinct subspecies, *A. oxyrinchus de sotoi*). It grows to about 267 cm in total length (estimated age at that size is 60 years); adults move upriver for spawning and the young spend 4 years in fresh water before gradually returning to the estuaries or nearby coastal waters. This species is highly tolerant of sharp changes in salinity. Most of the catch is taken to the north of Area 31, but the landings today are well below the level of the last century when the Atlantic sturgeon was considered and important commercial fish. The flesh is of good quality and the eggs are sold as caviar. The shortnose sturgeon, *Acipenser brevirostrum*, is a smaller species rarely exceeding 30 cm in total length (at an estimated age of 27 years), although sizes up to 122 cm have been reported. It ranges from New Brunswick to eastern Florida and is most often seen in large tidal rivers, but also taken in brackish and salt water. It is nowhere abundant today and is considered an endangered species in some areas. The flesh is of good quality; the eggs, although not great in number, are suitable for caviar. A third species, the pallid sturgeon, *Scaphirhynchus albus*, which occurs in the Mississippi and Missouri rivers has only once been reported from brackish water. The remaining American sturgeons are either restricted to fresh water, or are found along the Pacific coast.

Similar families occurring in the area

None, no other fish in the area with heterocercal tail, head and body with bony plates, and 4 conspicuous barbels on snout.

Key to the genera and species of Acipenseridae occurring in the area

Note: Only representatives reported from marine or brackish waters.

- 1a. Spiracles absent, caudal peduncle long, depressed (flattened dorsoventrally) and completely covered with bony plates (Fig. 1a); snout depressed, shovel-like; gill rakers fan-shaped; barbels fringed (Fig. 1b) *Scaphirhynchus albus*
- 1b. Spiracles present, caudal peduncle short, laterally compressed, and partially covered with bony plates; snout subconical (Figs. 2a, 3a); gill rakers lanceolate; barbels not fringed (Figs. 2b, 3b) → 2

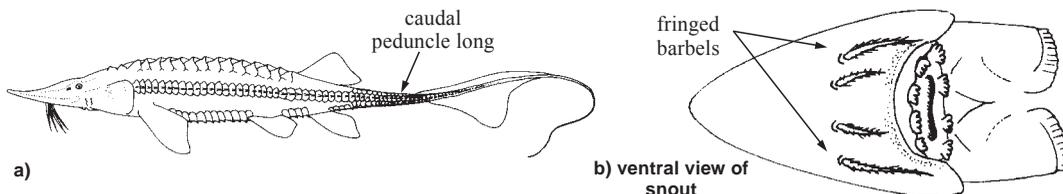


Fig. 1 *Scaphirhynchus albus*

- 2a. Dorsal plates or bucklers widely spaced (up to 1/2 the length of plates), post-dorsal plates usually absent; post-anal plates in a single row when present; soft rays in anal fin 19 to 22; snout short and rounded; peritoneum and viscera blackish; size larger, up to 12 cm (Fig. 2) *Acipenser brevirostrum*
- 2b. Dorsal plates or bucklers crowded; post-dorsal and post-anal plates in pairs; 23 to 30 soft rays in anal fin; snout long and pointed; peritoneum and viscera pale; size larger, to over 250 cm (Fig. 3) *Acipenser oxyrinchus*

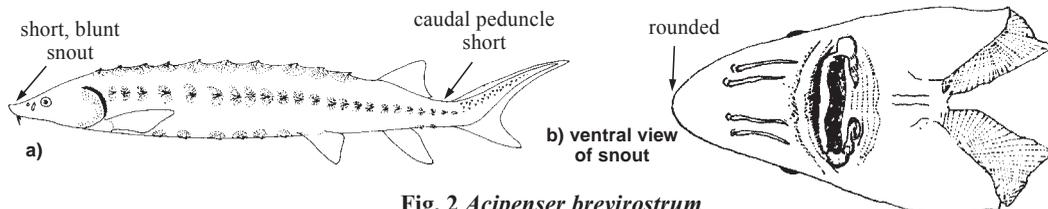


Fig. 2 *Acipenser brevirostrum*

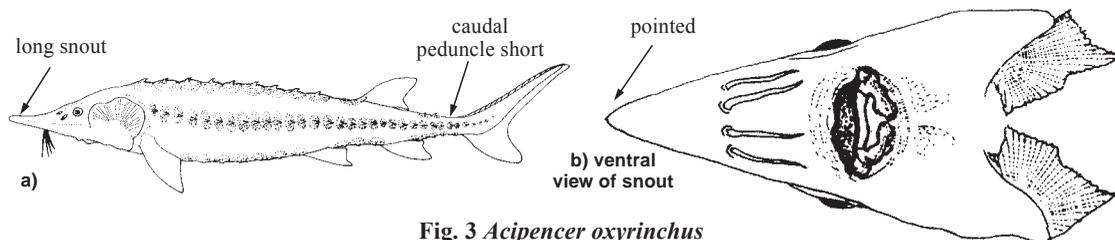


Fig. 3 *Acipenser oxyrinchus*

List of species occurring in the area

- Acipenser brevirostrum* Lesueur, 1818. To 143 cm. E coast of N America, Canada to Florida.
- Acipenser oxyrinchus* Mitchill, 1815. To 403 cm. Canada to N Gulf of Mexico, Bermuda, and French Guiana.
- Scaphirhynchus albus* (Forbes and Richardson, 1905). To 168 cm. Mississippi and Missouri Rivers.

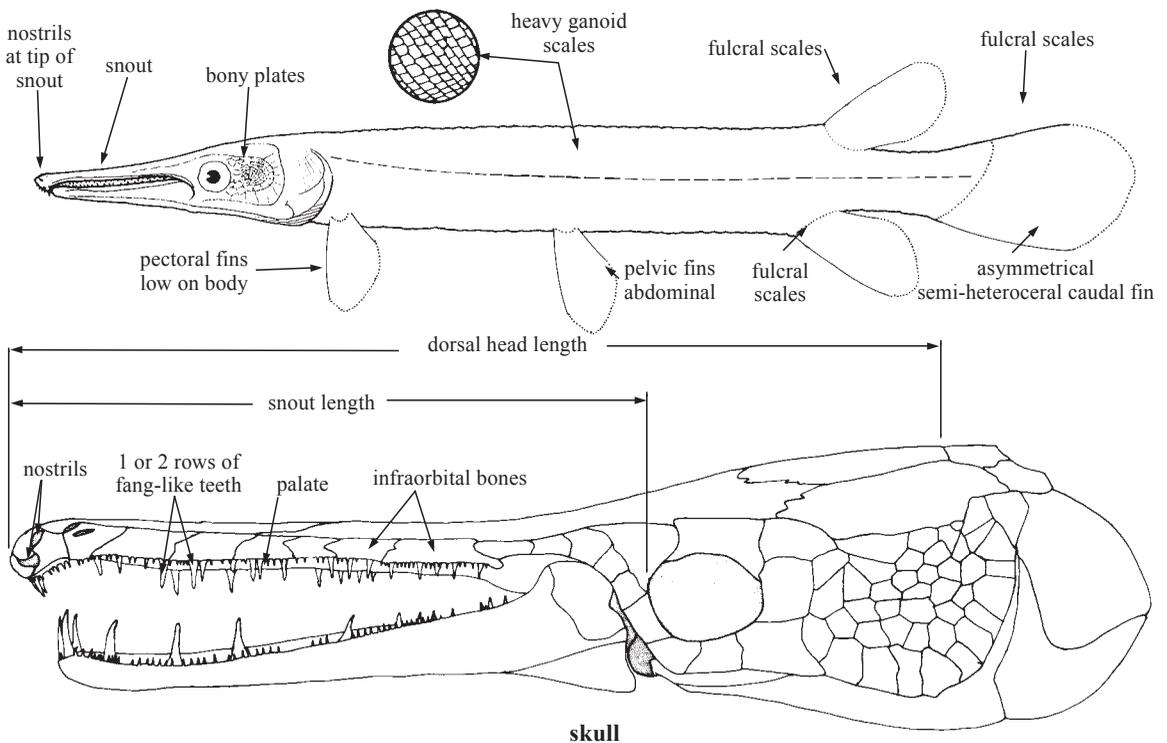
Order SEMIONTIFORMES

LEPISOSTEIDAE

Gars

E.O. Wiley, Museum of Natural History, University of Kansas, USA

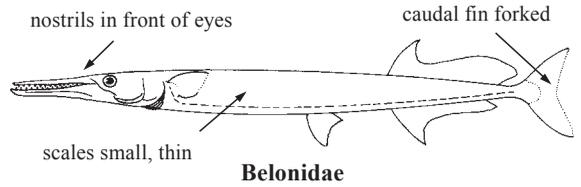
Diagnostic characters: Large, attenuated, round-bodied fishes. **Ethmoid region of skull and lower jaw** **delongated to form a snout bordered by large fangs, with nostril at tip of snout; gill arch with a bilobed 'tongue'**. No spines in fins; dorsal and anal fin short-based and set far back on body, nearer the caudal fin than the pelvic fins; caudal fin rounded, asymmetrical (semiheterocercal, with end of vertebral column upturned); **all medial fins with fulcral scales bordering first ray**; pectoral and pelvic fins placed very low on body, the latter abdominal in position. **Body completely encased in armour of large, heavy, rhombic, not imbricating, ganoid scales, most of which are hinged by an articulation**; this armour considerably reduced flexibility of body; **cheeks covered with numerous plates**. **Colour:** species commonly taken in brackish or coastal marine waters (with the exception of *Lepisosteus oculatus*) usually tan to dark brown above, grading into light tan to almost white below; fins often spotted and a few dark pigment spots are found on the posterior half of the body (but *Lepisosteus osseus* is very variable and may show many spots or none); *Lepisosteus oculatus* differs in having large brown spots on body and top of head.



Habitat, biology, and fisheries: Gars inhabit fresh, brackish, and coastal waters, but spawning takes place entirely in fresh water. Although capable of swift movements, gars are moderately sluggish fishes dwelling near the surface during the summer and moving to deeper water during the winter. They can frequently be seen rolling at the surface where they supplement their respiratory requirements with atmospheric oxygen. All are lurking predators feeding largely on other fishes, but food items are as diverse as crabs and water birds. The species entering brackish or marine waters are caught with a variety of gear, mostly for local consumption, but one species, *Atractosteus spatula*, is of commercial importance along the coast of Texas where it is usually taken in gill nets. A related species, *Atractosteus tristoechus*, may be of commercial value in Cuba. Apart from the flesh, the scales are used for jewelry and other decorative items; the eggs are reported to be toxic.

Similar families occurring in the area

Belonidae: generally smaller than gars; nostrils directly in front of eyes (on tip of snout in gars); scales small, thin, and imbricated, not ganoid; pectoral fins placed midlaterally on body, their bases nearly vertical (low on body and nearly horizontal bases in gars); caudal fin forked and no medial fins with fulcral scales bordering the first fin ray.



Key to the species of marine and brackish water Lepisosteidae occurring in the area

- 1a. Adults with 2 rows of enlarged fangs along the snout (Fig. 1a); an outer row on the infraorbital bones and an inner row along the palatine; gill rakers large and ornate (Fig. 2a, b), 59 to 81 rakers in outer row of first arch → 2
- 1b. Adults with a single row of enlarged fangs along the infraorbital bones (outer row); palatine toothed but lacking enlarged fangs (Fig. 1b); gill rakers small and pear-shaped (Fig. 2c, d), 14 to 33 rakers in outer row of first arch → 4

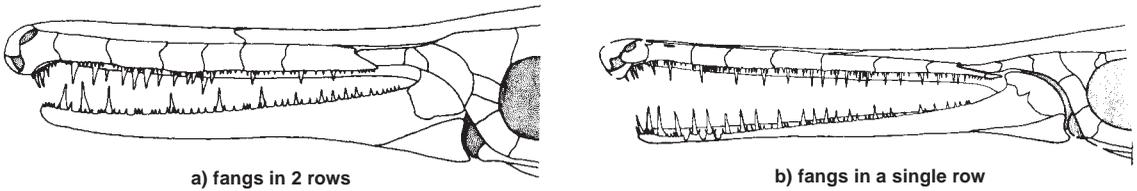


Fig. 1 lateral view of jaws

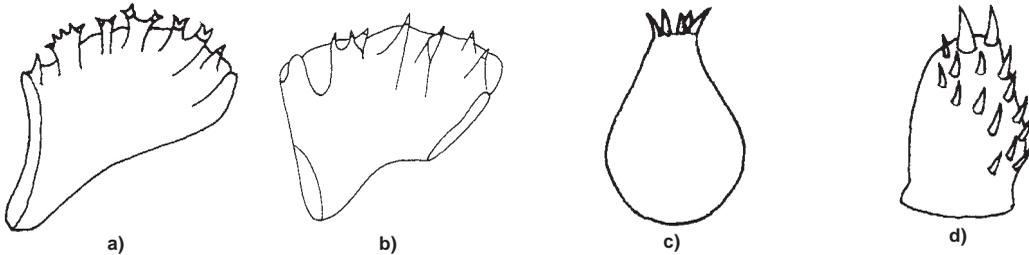


Fig. 2 shapes of gill rakers

- 2a. Lateral-line scales 58 to 62, predorsal scales 48 to 54. → 3
- 2b. Lateral-line scales 51 to 56, predorsal scales 43 to 48 (usually 44 to 47) *Atractosteus tropicus*
- 3a. Total gill rakers on left outside arch 59 to 66 *Atractosteus spatula*
- 3b. Total gill rakers on left outside arch 67 to 81 *Atractosteus tristoechus*

- 4a. Snout length 79 to 83% of head length (Fig. 3a)
 *Lepisosteus osseus*
- 4b. Snout length less than 75% of head length (Fig. 3b, c) → 5
- 5a. Adults with bony plates on ventral surface of isthmus *Lepisosteus oculatus*
- 5b. Adults lacking bony plates on ventral surface of isthmus . *Lepisosteus platyrhincus*

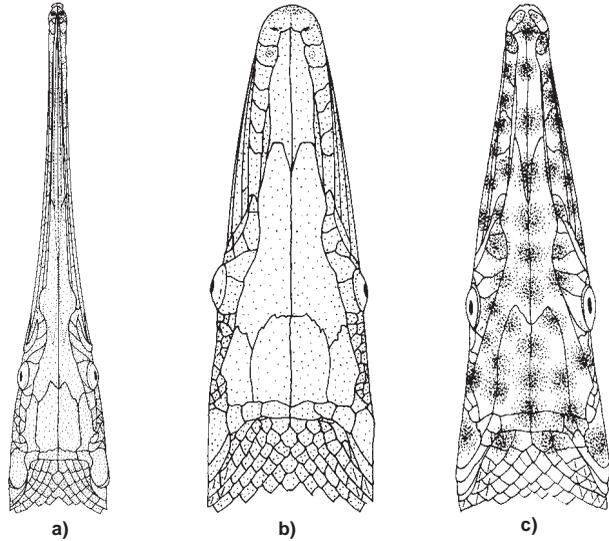


Fig. 3 dorsal view of head

List of species occurring in the area

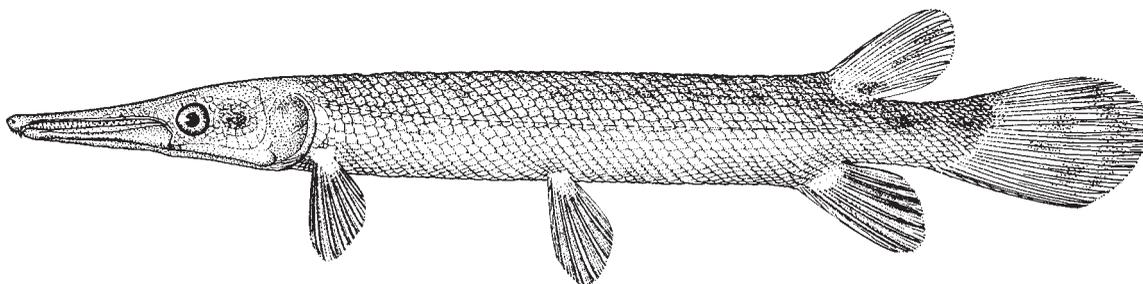
- *Atractosteus spatula* (Lecepede, 1803).
- *Atractosteus tristoechus* (Bloch and Schneider, 1801).
Atractosteus tropicus Gill, 1863. A middle American species found in brackish waters of the Pacific drainages but has not been reported from brackish waters in Atlantic drainages.
- *Lepisosteus oculatus* Winchell, 1864.
- *Lepisosteus ossues* (Linnaeus, 1758).
Lepisosteus platostomus Rafinesque, 1820. To 80 cm. Restricted to fresh waters.
Lepisosteus platyrhincus DeKay, 1842. To 86 cm. Occasionally found in brackish waters of Florida but not fished extensively.

References

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- Robins, C.R. and G.C. Ray. 1986. *A Field Guide to Atlantic Coast Fishes, North America*. Boston, Houghton Mifflin, 354 p.
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Atractosteus spatula (Lacepède, 1803)

LLS

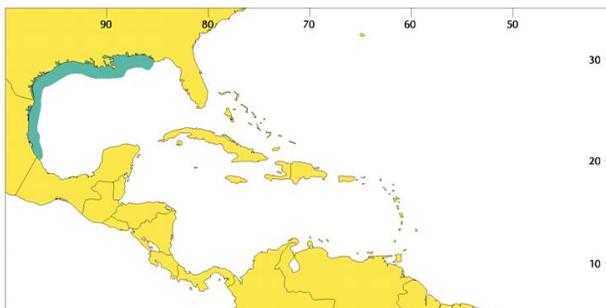
Frequent synonyms / misidentifications: *Lepisosteus spatula* Lacepède, 1803 / None.**FAO names:** **En** - Alligator gar; **Fr** - Garpique alligator; **Sp** - Gaspar baba.

Diagnostic characters: A large round-bodied fish. **Snout elongate, but broad and relatively short (less than 60% of dorsal head length)** with nostrils at tip and **2 rows of enlarged fangs on either side** (1 outer on infraorbitals, 1 inner on palatines). Roofing bones of skull large and covered with small, rounded, enameloid tubercles; **59 or 60 ornate gill rakers in outer row of first gill arch**. No spines on fins; dorsal and anal fins short-based and set far back on body, caudal fin rounded, slightly asymmetrical; pelvic and pectoral fins placed very low on body, pectoral fins abdominal in position; fucral scales on all medial fins. Body totally encased in an armour of large, heavy, rhomboid, non-imbricating ganoid scales; cheeks covered with numerous plates; **predorsal scales (those in midline in front of dorsal fin) 49 to 54**; scales in lateral line 58 to 62. **Color:** back dark brown to tan, belly white to yellowish; occasionally large brown pigment blotches on caudal peduncle and fins.

Size: Maximum: over 300 cm; common 200 cm.

Habitat, biology, and fisheries: Of the western central Atlanticgars, this is the most tolerant of higher salinities and is relatively common in brackish and marine waters. Spawning, however, occurs entirely in fresh water. Sluggish, but a voracious predator feeding on fishes and crustaceans as well as birds. Separate statistics are not reported for this species. Caught mainly with gill nets and on hook-and-line; occasionally with bottom trawls. Marketed live and fresh for local consumption. The eggs are poisonous. There is a limited sportfishery. The scales have been used for jewelry and other decorative items.

Distribution: Gulf of Mexico from Choctawhatchee Bay, western Florida, to the vicinity of Veracruz, Mexico; in fresh water northward along the Mississippi River drainage to the lower reaches of the Ohio and Missouri rivers. Large fresh-water reservoirs, coastal bays and estuaries, especially along the coasts of Texas and Louisiana. A single specimen (not examined) reported from the Rio Sapoá, Nicaragua.

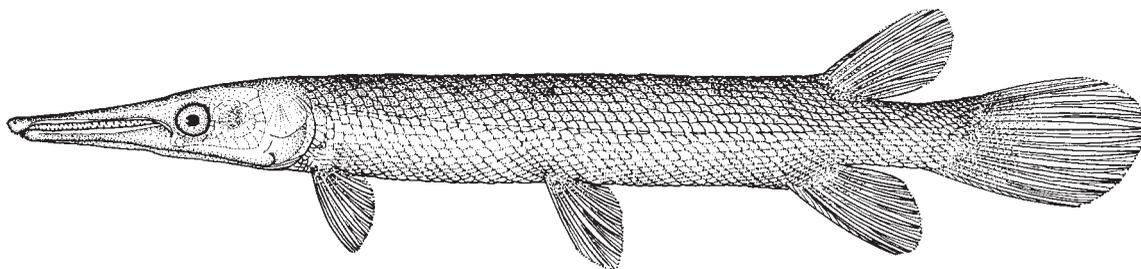


Atractosteus tristoechus (Bloch and Schneider, 1801)

LET

Frequent synonyms / misidentifications: *Lepisosteus tristoechus* Bloch and Schneider, 1801 / None.

FAO names: **En** - Cuban gar; **Fr** - Garpique cubain; **Sp** - Gaspar manjuarí.



Diagnostic characters: A fairly large round-bodied fish. **Snout elongate, but broad and relatively short (less than 60% of dorsal head length)** with nostrils at tip and **2 rows of enlarged fangs on either side** (1 outer row on infraorbitals, 1 inner row on palatines). Roofing bones of skull large, lacking enameloid tubercles; **67 to 81 ornate gill rakers in the outer row of first gill arch**. No spines on fins; dorsal and anal fins short-based and set far back on body, caudal fin rounded, slightly asymmetrical; pelvic and pectoral fins placed very low on body, pectoral fins abdominal in position; fucral scales on all medial fins. Body totally encased in an armour of large, heavy, rhomboid, not imbricating ganoid scales; cheeks covered with numerous plates; **predorsal scales (those in midline in front of dorsal fin) 49 to 51**; scales in lateral line 56 to 62. **Colour:** back dark, belly light; detailed colour pattern not described.

Size: Maximum: probably over 200 cm; common to 100 cm.

Habitat, biology, and fisheries: Found mainly in fresh waters. Adults prey on fishes and even birds. Behaviour probably similar to *Atractosteus spatula*. Some attempts to cultivate this species were made some years ago. It showed a moderate growth rate (to about 30 cm at the end of the first year). The young were preyed upon by *Micropterus salmoides* (introduced to Cuba). Separate statistics are not reported for this species. Caught mainly with gill nets and on hook-and-line. The flesh is edible, but not of best quality; the eggs are poisonous.

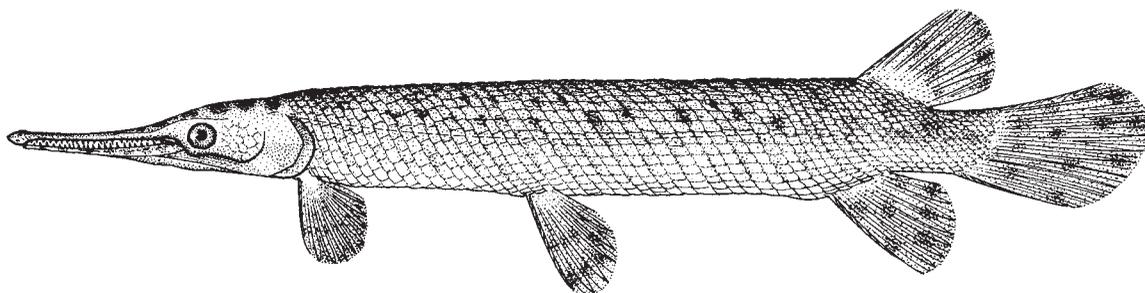
Distribution: So far, only reported from the north-western part of Cuba and the Isle of Youth.



Lepisosteus oculatus Winchell, 1864

Frequent synonyms / misidentifications: None / None.

FAO names: **En** - Spotted gar; **Fr** - Garpique tacheté; **Sp** - Gaspar pintado.

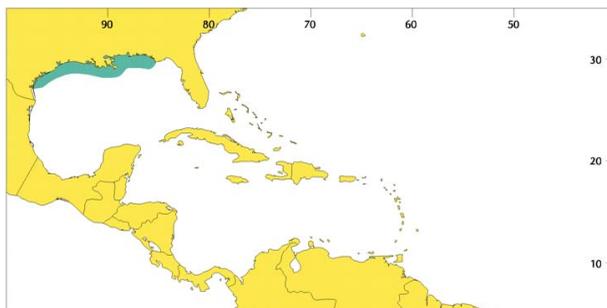


Diagnostic characters: A fairly large round-bodied fish. **Snout moderately elongate (57 to 65% of dorsal head length) and moderately narrow** with nostrils at tip. **Adults with a single row of enlarged fangs on either side (on infraorbitals, 2 rows may be present on young).** **Isthmus (fleshy projection of body separating the gill openings) with small bony ossicles; 15 to 24 small pear-shaped gill rakers in the outer row of first gill arch.** No spines in fins; dorsal and anal fins short-based and set far back on body, pelvic and pectoral fins placed very low on body, pectoral fins abdominal in position; caudal fin rounded, slightly asymmetrical; fucral scales on all medial fins. Body totally encased in an armour of large, heavy, rhomboid, not imbricating ganoid scales; cheeks covered with numerous plates. **Colour: top of head with large, oblong pigment blotches**, body either uniformly dark or blotched above grading into light tan or dark brown below; usually with two brown stripes on either side, one running as a solid stripe or series of blotches from eye to caudal fin, the other on lower body from pectoral fin to caudal fin (this stripe occasionally obliterated by uniform dark pigment on belly).

Size: Maximum: probably over 90 cm; common to 70 cm.

Habitat, biology, and fisheries: Found mainly in fresh waters. Often found in the lower reaches of rivers and estuaries, but less tolerant of salt water conditions than *Atractosteus spatula* or *Lepisosteus osseus*. Largely allopatric from the closely related *Lepisosteus platyrhincus* which inhabits the Florida Peninsula west from the Apalachicola River and north along the eastern coastline to southern Georgia. A voracious predator feeding primarily on fishes and crustaceans. Separate statistics are not reported for this species. Caught mainly with gill nets and on hook-and-line. Marketed fresh for local consumption, but not valued as a food fish.

Distribution: Northern coastline of the Gulf of Mexico from western Florida (Apalachicola River drainage) to central Texas (San Antonio Bay drainage), inland in fresh waters north to Lake Erie.

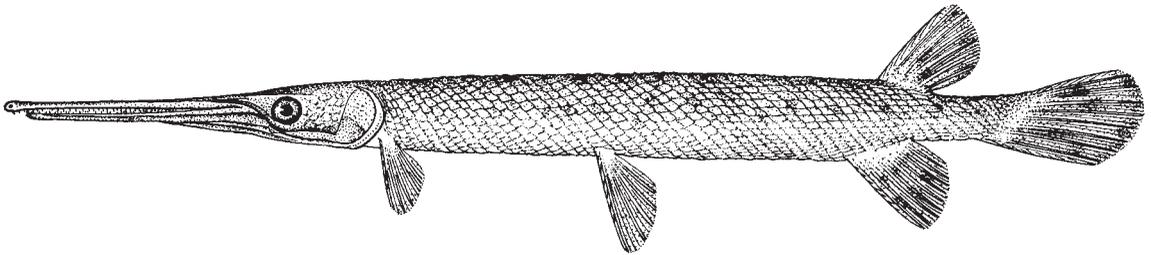


Lepisosteus osseus (Linnaeus, 1758)

LLO

Frequent synonyms / misidentifications: None / None.

FAO names: En - Longnose gar; Fr - Garpique longnez; Sp - Gaspar picudo.

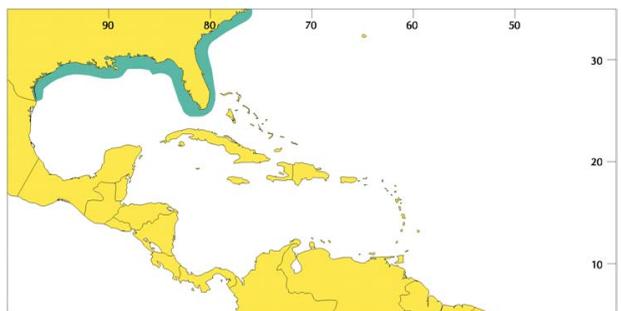


Diagnostic characters: A fairly large round-bodied fish. **Snout extremely narrow and elongate, its length (from tip of snout to anterior edge of orbit) 79 to 83% of dorsal head length (from tip of snout to posterior junction of parietal bones)**, with nostrils at tip. **Adults with a single row of enlarged fangs on either side (on infraorbitals, 2 rows may be present on young).** **Isthmus (fleshy projection of body separating the gill openings) with small bony ossicles; 14 to 31 small pear-shaped gill rakers in the outer row of first gill arch.** No spines in fins; dorsal and anal fins short-based and set far back on body, caudal fin rounded, slightly asymmetrical; pelvic and pectoral fins placed very low on body, pectoral fins abdominal in position; fulcral scales on all medial fins. Body totally encased in an armour of large, heavy, rhomboid, not imbricating ganoid scales; cheeks covered with numerous plates. **Colour:** colour variable; back darker, fading to light or silvery below; sides with or without a series of rounded pigment blotches; **head usually without blotches but if present they are small and rounded;** medial fins and posterior half of body usually with brown to black blotches.

Size: Maximum to probably over 200 cm; common to 150 cm.

Habitat, biology, and fisheries: Adults are frequently found in brackish waters and coastal marine waters, especially in the winter months when they frequent deeper waters. Spawning occurs entirely in fresh water. A voracious predator feeding primarily on fishes and crustaceans. Separate statistics are not reported for this species. Caught mainly with gill nets and on hook-and-line. Marketed fresh for local consumption. Generally considered detrimental to game fishes and a nuisance to fishermen because of the damage it causes to gill nets and trawls. The eggs are poisonous.

Distribution: The Atlantic coastline from New Jersey to southern Texas, inland throughout most of eastern North America from the Great Lakes region and to the Great Plains and south to the Pecos River drainage of New Mexico and the Rio Grande drainage of northern Mexico.



Order ELOPIFORMES

ELOPIDAE

Tenpounders (ladyfishes)

by D.G. Smith, National Museum of Natural History and R. Crabtree, National Marine Fisheries Service, USA

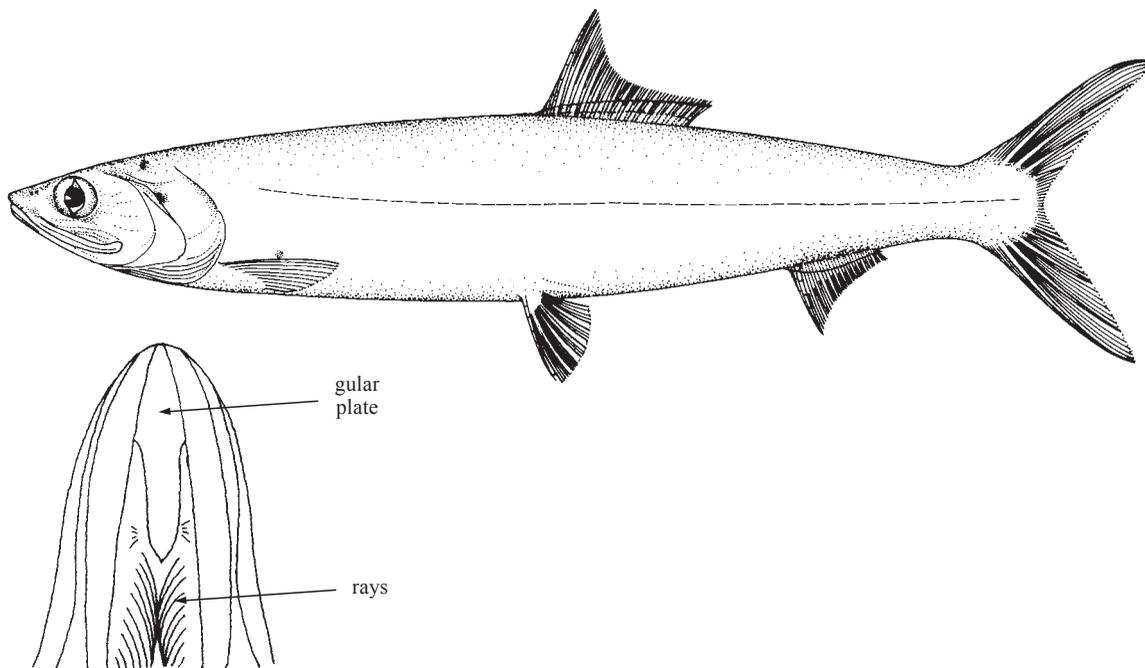
A single species occurring in the area.

Elops saurus Linnaeus, 1766

LAD

Frequent synonyms / misidentifications: None / None.

FAO names: En - Ladyfish; Fr - Guinée machète; Sp - Malacho.



ventral view of head

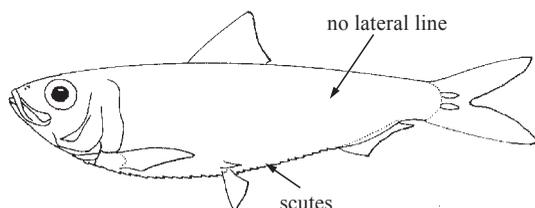
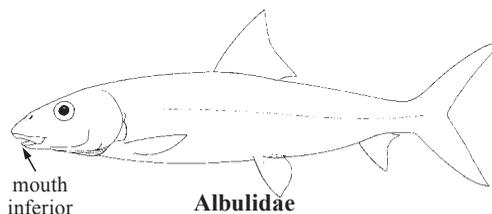
Diagnostic characters: Body elongate, fusiform, moderately compressed. Head low, flat above, curving smoothly into profile of body posteriorly. Eye large, 4.5 to 5.2 in head length. Mouth large, nearly horizontal and almost terminal, the lower jaw slightly shorter; gape ending behind posterior margin of eye; **a gular plate present between arms of lower jaw**. Teeth small and granular, present on jaws, roof of mouth, tongue, and basibranchials. Branchiostegal rays numerous, approximately 34. Gill rakers moderately long on first arch; scarcely denticulate, their entire surface rough, 6 to 8 on upper limb and 10 to 15 on lower limb (excluding rudiments). All fins without spines. Dorsal fin falcate, originating slightly behind midbody and directly over pelvic fins, with 21 to 25 rays. Anal fin falcate, shorter than dorsal fin, with approximately 14 to 17 rays. Caudal fin deeply forked, upper and lower lobes equal. Pectoral and pelvic fins inserted low on side of body, near ventral outline; pelvic fins abdominal, below origin of dorsal fin. Scales small, approximately 100 to 120 in lateral line. Lateral line complete, nearly straight, extending onto base of caudal fin. Vertebrae number around 74 to 86. **Colour:** blue or greenish grey above, silvery on sides; fins sometimes with a faint yellow tinge.

Similar families occurring in the area

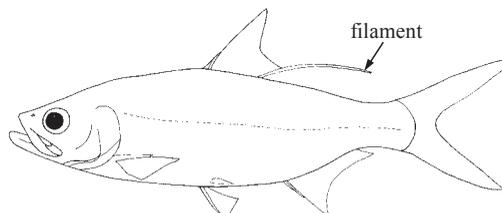
Albulidae: mouth inferior.

Clupeidae: lateral line absent; gular plate absent; most species have scutes along midline of belly.

Megalopidae: scales much larger, 41 to 48 in lateral line; last dorsal-fin ray greatly prolonged.



Clupeidae



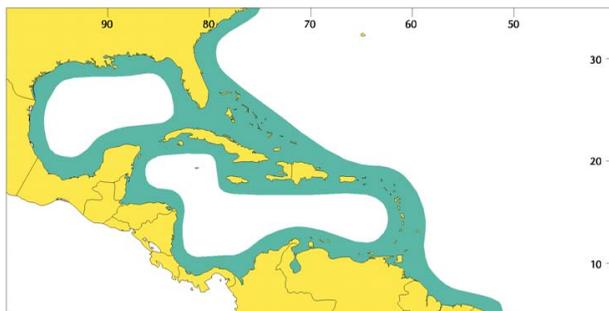
Megalopidae

Size: Maximum size 90 cm, but few are longer than 50 cm; despite the common name, seldom if ever reaches a weight of 10 pounds.

Habitat, biology, and fisheries: Ladyfish are common in estuaries and coastal waters of tropical and subtropical latitudes. The species can be extremely abundant and often occurs in large schools. Ladyfish are tolerant of a wide range of salinities but seldom occur in fresh water. They have been collected over a temperature range of 11 to 35°C. Ladyfish feed principally in midwater on pelagic prey, primarily fish, but decapod crustaceans are also consumed. Ladyfish spawn offshore and have a leptocephalus larva. In the Gulf of Mexico, spawning appears to take place in the autumn, and the metamorphic larvae move inshore the following spring. Little information is available on age and growth. Ladyfish are often caught by recreational anglers but are seldom a targeted species. The species is fished commercially in Florida and sold both for human consumption and as bait to recreational anglers. FAO statistics report landings ranging from 15 to 979 t from 1995 to 1999.

Distribution: Ladyfish occur from Brazil northward to southern New England but are rare north of North Carolina.

Remarks: Although *Elops saurus* has traditionally been treated as a single species, evidence suggests that at least 2 species are involved, distinguished mainly by the number of vertebrae. Individuals from the Gulf of Mexico and the east coast of the United States have 79 to 86 vertebrae, whereas those from the Caribbean have 74 to 78. Larvae of both forms have been found in Florida, where they seem to appear in different seasons. Further studies are needed to resolve the status of these 2 forms. If they turn out to be distinct species, the name *saurus* would apply to the northern one, as it was described from the Carolinas.



References

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- Smith, D. G. 1989. Order Elopiformes; families Elopidae, Megalopidae, and Albulidae: Leptocephali. In *Fishes of the Western North Atlantic*, edited by E. B. Böhlke. *Mem. Sears Found. Mar. Res.*, 1(9):961-972.

MEGALOPIDAE

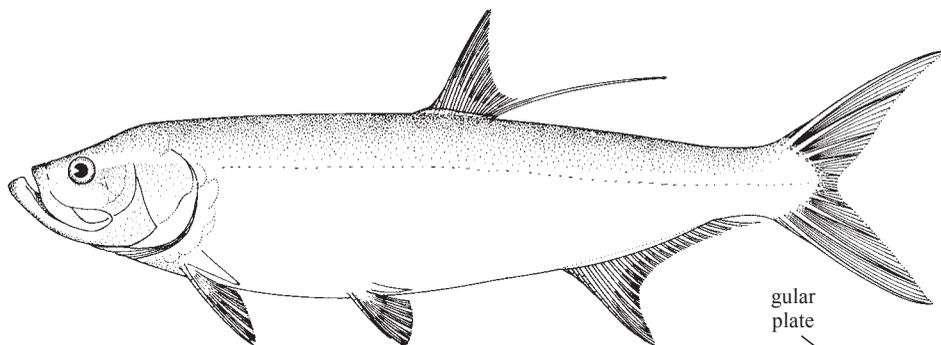
Tarpons

by D.G. Smith, National Museum of Natural History, USA and R.E. Crabtree, National Marine Fisheries Service, USA
A single species occurring in the area.

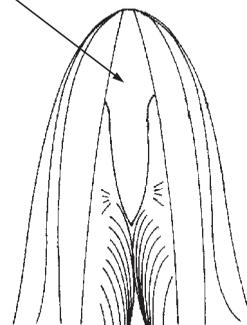
Megalops atlanticus (Valenciennes, 1847)

TAR

Frequent synonyms / misidentifications: None / None.
FAO names: En - Tarpon; Fr - Tarpon argenté; Sp - Tarpón.



gular
plate

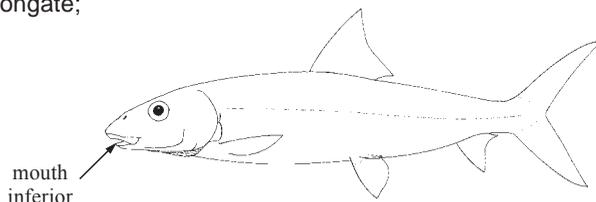


ventral view of head

Diagnostic characters: Body moderately elongate and highly compressed. Head moderately short and deep, its dorsal outline nearly straight and horizontal, the back somewhat elevated, the ventral outline strongly curved anteriorly. Eye large, 3.3 to 4.7 in head length. Mouth large and oblique, lower jaw prominently projecting; a gular plate present between arms of lower jaw. Teeth small, bluntly villiform, and present on jaws, vomer, palatines, pterygoids, tongue, and basibranchials. Branchiostegal rays numerous, approximately 23. Gill rakers long and slender, scarcely denticulate, 19 to 21 on upper limb and 36 to 40 on lower limb. All fins soft rayed. Dorsal fin short-based, with 13 to 15 rays, located behind pelvic fins but entirely before anal fin, falcate, with a greatly prolonged final ray. Anal fin strongly falcate, with 21 to 25 rays, final ray somewhat elongate, but much less so than that of the dorsal fin. Caudal fin deeply forked, lobes about equal in length. Pectoral and pelvic fins inserted low on body, with elongate axillary scales; pelvic fins abdominal in position. Scales large, firm, with crenulate anterior border and membranous posterior border. Lateral line complete and relatively straight, though anterior part slightly curved ventrally; pores branched; 41 to 48 scales. Gas bladder large, highly vascularized and modified to serve as an air-breathing organ. Vertebrae 53 to 57. **Colour:** bright silvery all over, the back darker than the belly.

Similar families occurring in the area

Albulidae: mouth inferior; last dorsal-fin ray not elongate; scales smaller.

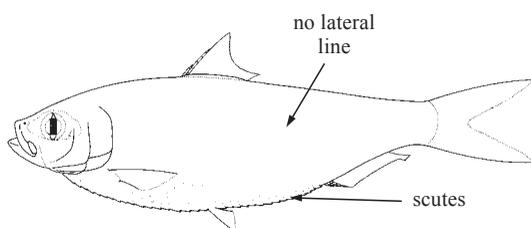


mouth
inferior

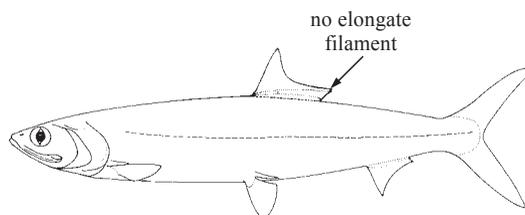
Albulidae

Clupeidae: lateral line absent; gular plate absent; most species with scutes on midline of belly.

Elopidae: scales much smaller, about 100 on lateral line; last dorsal-fin ray not elongate.



Clupeidae

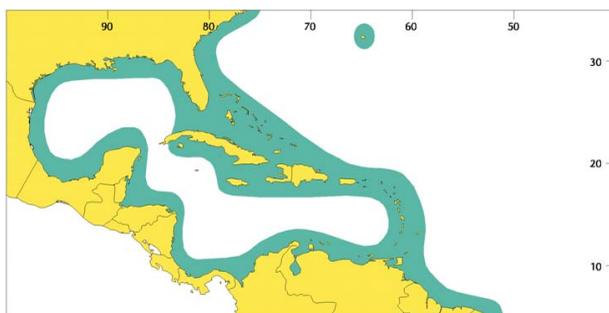


Elopidae

Size: Maximum over 220 cm and 120 kg. Males are smaller than females and rarely exceed 50 kg.

Habitat, biology, and fisheries: Tarpon occur in a wide variety of habitats ranging from fresh-water lakes and rivers to offshore marine waters. Large tarpon targeted by recreational anglers are most abundant in estuarine and coastal waters. Tarpon have a leptocephalus larva and spawn offshore. Spawning off Florida occurs from mid-May through mid-August, but off Costa Rica, spawning occurs year round. Metamorphic larvae are typically found inshore in mangrove-lined estuaries but also occur in temperate *Spartina* marshes. Young-of-the-year tarpon occur in small stagnant pools of varying salinity. In tropical areas, juvenile tarpon typically occur in mangrove habitats, often in water with low dissolved oxygen levels. Tarpon occur in salinities ranging from fresh water to more than 45‰ and are capable of surviving temperatures of at least 40°C. They suffer mortalities at temperatures of 10° to 12°C. The tarpon's habit of rising to the surface and breathing air is unusual among marine species. Anglers often detect the presence of schools of tarpon by observing individuals "rolling" at the surface. Air breathing is accomplished by way of a highly vascularized swimbladder that functions as an air-breathing organ. This adaptation allows tarpon to survive in water with low dissolved oxygen concentrations such as commonly encountered by juveniles. Tarpon are facultative air-breathers, and in well oxygenated waters are able to meet their oxygen requirements without breathing air. Tarpon are relatively long lived and can reach ages greater than 50 years. They reach sexual maturity at 80 to 120 cm. Tarpon are among the most highly esteemed recreational fishes in the world. Their large size, abundance in inshore waters, and spectacular leaps when hooked make them favourites of inshore anglers. FAO statistics report landings ranging from 16 to 283 t from 1995 to 1999. Fisheries for tarpon are best developed in Florida and Costa Rica but occur throughout the Gulf of Mexico and Caribbean Sea.

Distribution: Tarpon are restricted to the tropical and subtropical Atlantic. In the western Atlantic, tarpon regularly occur from the eastern shore of Virginia to central Brazil and throughout the Caribbean Sea and Gulf of Mexico. They have been observed in the Panama Canal for many years, and at least 1 capture on rod-and-reel has been reported from the Pacific coast of Panama at a location estimated to be 175 miles from the canal. There are numerous anecdotal accounts of tarpon occurring on the Pacific coast of Panama, but it is unclear if Pacific populations have become established. In the eastern Atlantic, tarpon occur from Mauritania to Angola.



References

- Hildebrand, S. F. 1963. Family Elopidae. In *Fishes of the Western North Atlantic*, edited by H. B. Bigelow. *Mem. Sears Found. Mar. Res.*, 1(3):111-131.
- Wade, R. A. 1962. The biology of the tarpon, *Megalops atlanticus*, and the ox-eye, *Megalops cyprinoides*, with emphasis on larval development. *Bull. Mar. Sci. Gulf and Carib.*, 12(4):545-622.

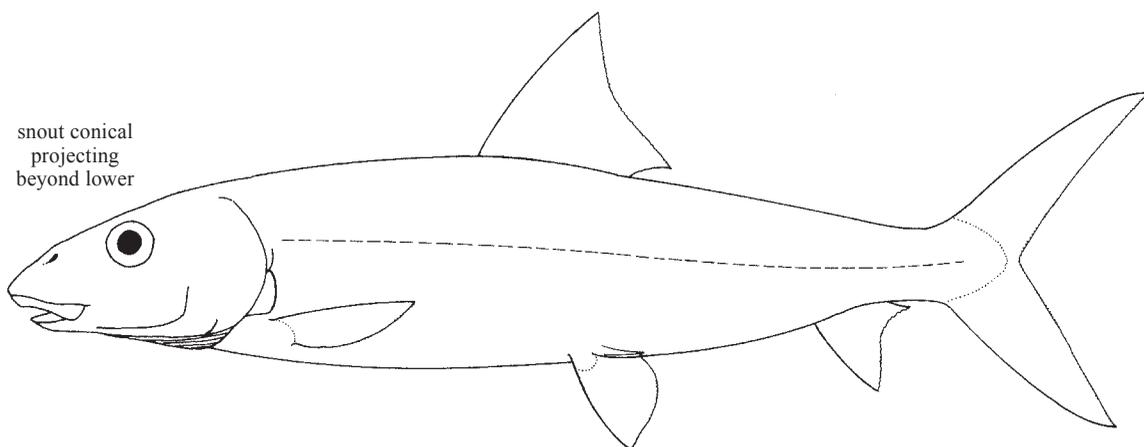
Order ALBULIFORMES

ALBULIDAE

Bonefishes

by D.G. Smith, National Museum of Natural History, USA and R.E. Crabtree, National Marine Fisheries Service, USA

Diagnostic characters: Maximum size 80 cm. Body moderately elongate, fusiform, little compressed, belly rounded. Head curving smoothly into profile of body. Eye large. **Snout conical, projecting well beyond lower jaw. Mouth inferior;** a small gular plate present between arms of lower jaw, small and often overlooked. Teeth small, granular, in patches on jaws and on roof and floor of mouth. Branchiostegal rays about 10 to 15. **Gill rakers rudimentary,** consisting of small patches of minute, villiform teeth. **All fins without spines.** Dorsal fin falcate, located at about midbody, originating slightly in front of pelvic fins, with about 16 to 21 soft rays. Anal fin falcate, with 7 to 9 soft rays, located well behind dorsal fin. Caudal fin deeply forked, upper and lower lobes equal. Pectoral and pelvic fins inserted low on side of body, near ventral outline; pelvic fins abdominal, located under posterior part of dorsal fin. **Scales moderate in size, about 60 to 90 along lateral line.** **Colour:** bluish green dorsally, often with several faint saddles of slightly darker colour; silvery on sides, with several faint, narrow, longitudinal lines; belly white.

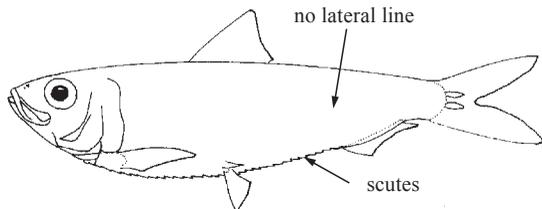


Habitat, biology, and fisheries: Bonefishes occur in coastal waters on sand or mud bottoms, in areas of relatively high salinity. They are bottom feeders, rooting in the substratum for crustaceans and various other small invertebrates and fishes. They are active fishes, generally travelling in small groups and covering large areas while foraging. Like *Elops*, *Megalops*, and the eels, bonefishes have a compressed, transparent leptocephalus larva. They spawn offshore and the young larvae are found in the open sea. They are caught in local fisheries, mainly with gill nets or occasionally cast nets; no separate statistics available; marketed fresh.

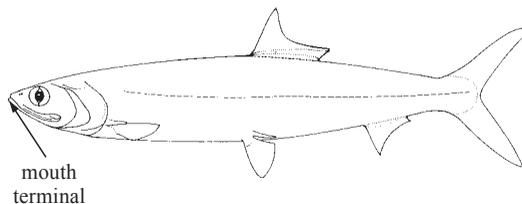
Remarks: The Albulidae contains 2 main groups of species, which at various times have been recognized as genera or subgenera. *Albula (Dixonina) nemoptera* lives in somewhat deeper water and is confined to the western Atlantic and eastern Pacific. The *Albula (Albula) vulpes* group lives in shallower water and is found in all tropical seas. It was formerly believed that *Albula vulpes* was a single cosmopolitan species. Recent work has shown that this "species" is actually a complex of several similar but genetically distinct species; the true *Albula vulpes* is found only in the Atlantic.

Similar families occurring in the area

Clupeidae: lateral line absent; gular plate absent; most species have scutes along midline of belly.
 Elopidae and Megalopidae: mouth terminal.



Clupeidae



Elopidae

Key to the species of Albulidae occurring in the area

- 1a. Last ray of dorsal and anal fin not prolonged; snout only moderately conical, projecting only about 1/3 of its length beyond tip of lower jaw; posterior end of mouth not reaching eye (Fig. 1) *Albula (Albula) vulpes*
- 1b. Last ray of dorsal and anal fin markedly prolonged; snout sharply conical, projecting more than 1/3 of its length beyond tip of lower jaw; posterior end of mouth reaching nearly to middle of eye (Fig. 2) *Albula (Dixonina) nemoptera*

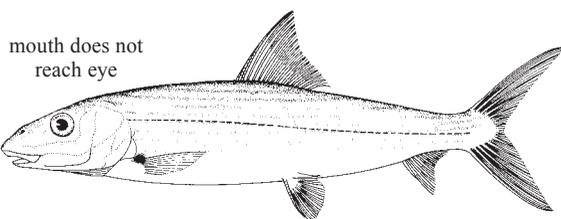


Fig. 1 *Albula vulpes*

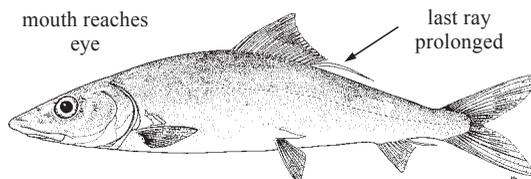


Fig. 2 *Albula nemoptera*

List of species occurring in the area

The species structure of *Albula* is not well understood. Two species are currently recognized in the area, 1 in each subgenus, but evidence is accumulating that at least 1 other species exists. Myomere counts of larvae also indicate some differentiation between populations in the Gulf of Mexico and the Caribbean. Further study is needed to determine the number of species that exist in the western Atlantic.

Albula (Dixonina) nemoptera (Fowler, 1911). To 35 cm. Caribbean; the same or a similar species occurs in the E tropical Pacific.

Albula (Albula) vulpes (Linnaeus, 1758). To 75 to 80 cm. As understood here, this species occurs only in the tropical W Atlantic, from Florida to South America.

Reference

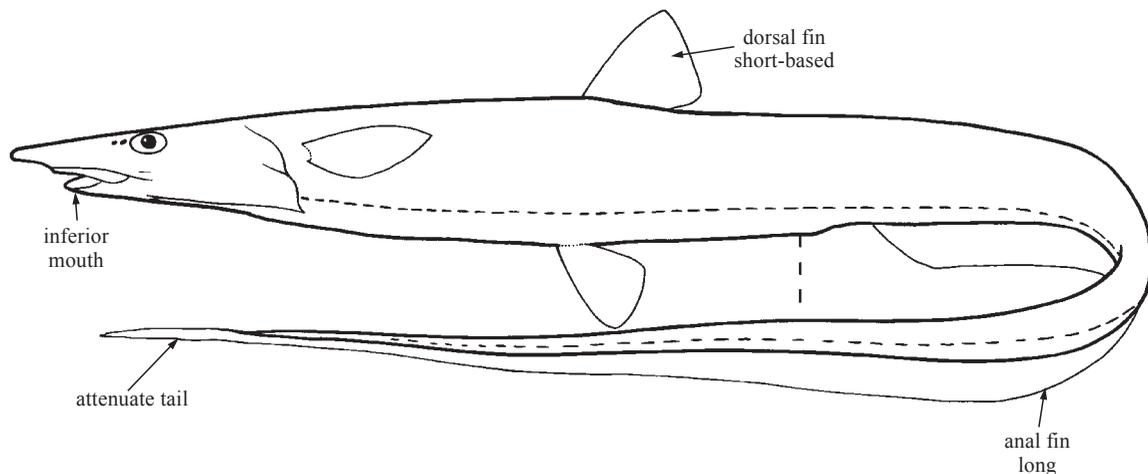
Hildebrand, S. F., 1963. Family Albulidae. In *Fishes of the Western North Atlantic*, edited by H.B. Bigelow. *Mem. Sears Found. Mar. Res.*, 1(3):132-147.

HALOSAURIDAE

Halosaurs

by D.G. Smith, National Museum of Natural History, Washington, D.C., USA

Diagnostic characters: Medium-sized fishes, to approximately 1 m in total length, but much of this consists of the attenuate tail. Body elongate; tail slender and attenuate, frequently broken and regenerated; anus slightly before midlength. Head elongate, its length contained approximately 3 times in preanal length. Eye well developed. Snout prolonged, extending well in front of mouth, tip rounded or pointed, often depressed. Anterior and posterior nostrils close together, in front of eye. **Mouth inferior, overhung by snout**, moderate in size, gape ending approximately under or slightly before front of eye. Teeth small, granular, in patches on jaws and palatopterygoid. **Dorsal fin short-based, on midtrunk, slightly closer to anus than to tip of snout, all rays segmented** (the anteriormost ray reduced and unsegmented in *Aldrovandia*); **anal fin long, extending from just behind anus to tip of tail**; pectoral fin well developed, on side of body at or above lateral midline; pelvic fins present, located abdominally, under or slightly in front of dorsal fin; caudal fin absent. Scales relatively large, overlapping, covering body in well-defined horizontal and vertically oblique rows; scales of lateral line enlarged; head partially scaled. Lateral line well developed, canals large and cavernous on head and body; lateral line runs along lower side of body, near ventral outline in lateral view. **Colour:** variable, ranging from black to light grey or tan; sides of body and opercle often silvery in fresh specimens; no bars, stripes, spots or other distinct markings. Inside of mouth and pharyngeal cavity sometimes black.

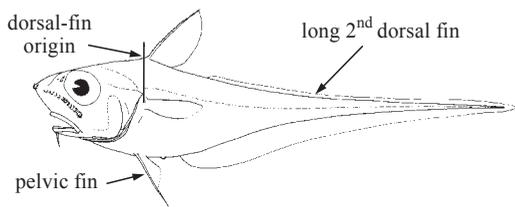


Habitat, biology, and fisheries: Halosaurs live on or near the bottom in moderate to deep water, usually between about 500 and 3 000 m. They are bottom feeders, preying mainly on crustaceans and other small invertebrates. Males develop markedly enlarged olfactory organs at maturity, suggesting that they locate their mates through pheromones. Like eels and elopiforms, halosaurs have a pelagic, leptocephalous larva. Although they are occasionally taken in deep bottom trawls, halosaurs have no commercial importance.

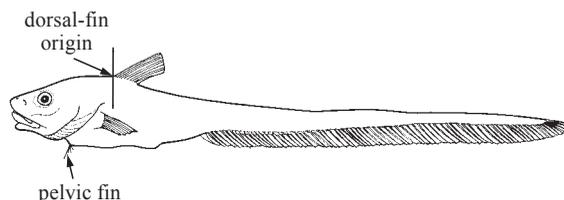
Similar families occurring in the area

Macrouridae: anterior dorsal fin directly above pectoral fin; a long, low second dorsal fin extending to end of tail; pelvic fin directly under pectoral fin; snout short.

Ateleopodidae: dorsal fin above pectoral fin; pelvic fin under or ahead of pectoral fin; snout short and bulbous; scales very small or absent.



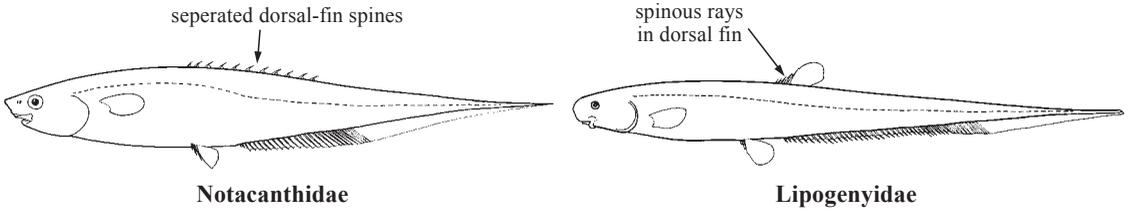
Macrouridae



Ateleopodidae

Notacanthidae: dorsal fin consists of a series of separated spines not connected by a membrane.

Lipogenyidae: dorsal fin with 4 to 6 unsegmented spines. Mouth sucker-like.



Key to the species of Halosauridae occurring in the area

Note: Trawled specimens often lose their scales; scale pockets remain, however, and these are usually sufficient to indicate where scales have been.

- 1a. Top of head scaled at least as far forward as level of nostrils (Fig. 1a); lateral-line scales slightly enlarged, 1 such scale for each transverse row of body scales (Fig. 1b) → 2
- 1b. Top of head naked (Fig. 2a); lateral-line scales markedly enlarged, 1 such scale for each 2 to 3 transverse rows of body scales (Fig. 2b) → 3

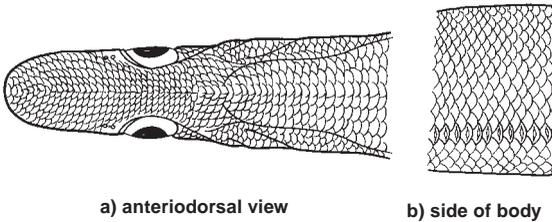


Fig. 1 Halosaurus

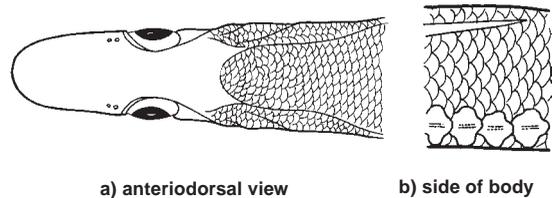


Fig. 2 Aldrovandia

- 2a. Dark colour on roof of mouth does not extend lateral to palatopterygoid arcade; dark colour on floor of mouth extends only slightly anterior to tongue, leaving anteriormost part pale (Fig. 3); 12 to 20 pale pyloric caeca *Halosaurus ovenii*
- 2b. Entire lining of mouth dark (Fig. 4); 8 to 12 dark pyloric caeca *Halosaurus guentheri*

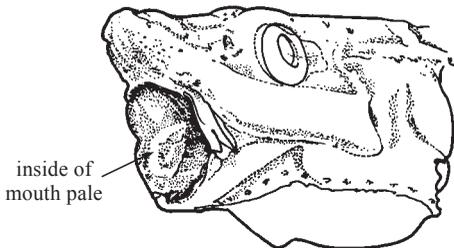


Fig. 3 oblique frontal view of head

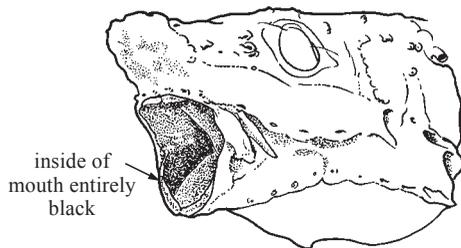


Fig. 4 oblique frontal veiw of head

- 3a. First dorsal-fin ray as long as second and segmented; scales on opercle; sheath of lateral line darkly pigmented in adults; pyloric caeca pale and in a double row . . . *Halosauropsis macrochir*
- 3b. First dorsal-fin ray much shorter than second and unsegmented; no scales on opercle; sheath of lateral line unpigmented; pyloric caeca black and in a single row → 4

- 4a. Anal opening dark blue or black, surrounded by a white field → 5
- 4b. Anal opening white, surrounded by a dark field → 6

- 5a. Lateral-line scales contiguous; 1 lateral-line scale to every 2 body scales, 22 or 23 before anus; preoral portion of snout very long, less than 2 times in total snout length
 *Aldrovandia rostrata*
- 5b. Lateral-line scales not contiguous but separated by body scales; 1 lateral-line scale to every 3 body scales, 18 to 20 before anus; preoral portion of snout shorter, 2.25 to 2.5 in total snout length *Aldrovandia gracilis*

- 6a. Palatine tooth patches of the 2 sides in contact medially; 13 to 15 gill rakers on anterior arch; preoral portion of snout about 2 times in total snout length; dorsal origin over or very slightly behind base of pelvic fin *Aldrovandia affinis*
- 6b. Palatine tooth patches of the 2 sides separated medially; 19 to 23 gill rakers on anterior arch; preoral portion of snout about 3 times in total snout length; dorsal origin distinctly behind base of pelvic fin → 7

- 7a. Lateral-line scales before anus 24 to 28; palatine tooth patch separated from pterygoid patch by less than half its own length; pectoral rays 11 to 13 *Aldrovandia phalacra*
- 7b. Lateral-line scales before anus 16 to 21; palatine tooth patch separated from pterygoid patch by 1 to 4 times its own length; pectoral rays 9 to 11 *Aldrovandia oleosa*

List of species occurring in the area

Aldrovandia affinis (Günther, 1877). To 173 mm snout-vent length. Atlantic coast of US, Gulf of Mexico, and Caribbean; also E Atlantic and Indo-West Pacific. 700 to 2 200 m.

Aldrovandia gracilis (Goode and Bean, 1896). To 210 mm snout-vent length. Caribbean and Gulf of Mexico; 1 000 to 2 000 m.

Aldrovandia oleosa Sulak, 1977. To 167 mm snout-vent length. Atlantic coast of USA to N South America, also E Atlantic and possibly Indo-West Pacific; 1 200 to 2 000 m.

Aldrovandia phalacra (Vaillant, 1888). To 137 mm snout-vent length. Atlantic coast of USA to Bahamas, also E Atlantic and Indo-West Pacific; 500 to 2 500 m.

Aldrovandia rostrata (Günther, 1878). To 153 mm snout-vent length. One record from the area, off the S Bahamas; elsewhere in the middle and E Atlantic; 2 500 to 5 000 m.

Halosauropsis macrochir (Günther, 1878). To 271 mm snout-vent length. Atlantic coast of USA and Bahamas; also E Atlantic and Indian Ocean; 1 200 to 3 300 m.

Halosaurus guentheri Goode & Bean, 1896. To 240 mm snout-vent length. Caribbean, Gulf of Mexico, Atlantic coast of USA; also E Atlantic; 500 to 1 500 m.

Halosaurus ovenii Johnson, 1863. To 180 mm snout-vent length. Caribbean and Gulf of Mexico, also E Atlantic; 500 to 1 500 m.

References

McDowell, S. B. 1963. Family Halosauridae. In *Fishes of the Western North Atlantic*, edited by D.M. Cohen. *Mem. Sears Found. Mar. Res.* 1(6):32-123.

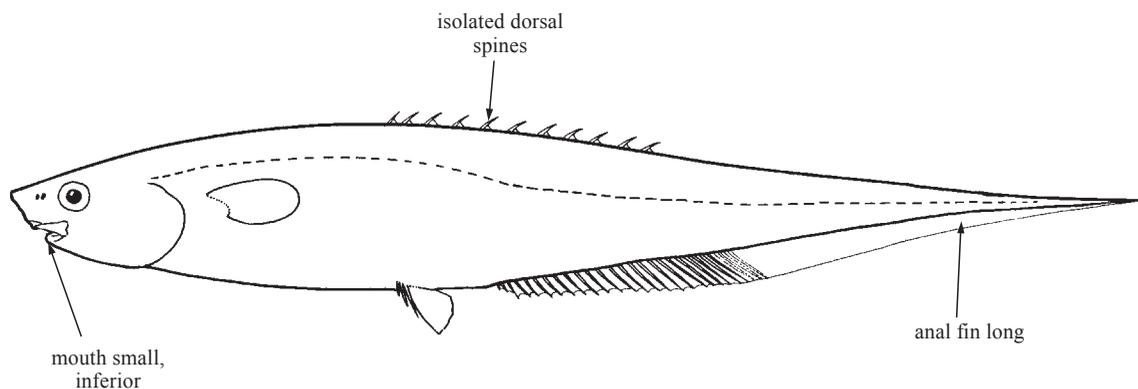
Sulak, K. J. 1977. *Aldrovandia oleosa*, a new species of the Halosauridae, with observations on several other species of the family. *Copeia*, 1977(1):11-20.

NOTACANTHIDAE

Spiny eels

by D.G. Smith, National Museum of Natural History, Washington, D.C., USA

Diagnostic characters: Maximum size 40 to 50 cm. Body moderate to moderately elongate; **tail slender and tapering to a point, often broken and regenerated**; anus somewhat before midlength. Head moderately deep to moderately elongate, somewhat compressed, its length contained 2 or 3 times in preanal length. Eye well developed. Snout projects beyond mouth, tapering to a rounded tip. Anterior and posterior nostrils close together, in front of eye. **Mouth relatively small, inferior, overhung by snout**, gape ending in front of or under eye; **maxilla without teeth, nearly excluded from gape by premaxilla**. Teeth small, pointed, in a single row on premaxilla, in one to several rows on palatine and dentary. **Dorsal fin consists of a series of unsegmented spines, isolated from each other and not connected by a membrane**, its length variable, beginning on head or trunk and extending behind anus, but ending well before end of tail; **anal fin long, extending from just behind anus to tip of tail, anterior rays spinous**; pectoral fin well developed, located on midside, a short but distinct distance behind gill opening; pelvic fins abdominal, slightly in front of anus; caudal fin absent. Scales small and overlapping, covering most of head and body. Lateral line complete, on dorsal half of body anteriorly, becoming midlateral on tail; canals and scales not notably enlarged. **Colour:** light grey to dark brown, lining of mouth and branchial chamber black; no distinct markings or patterns.



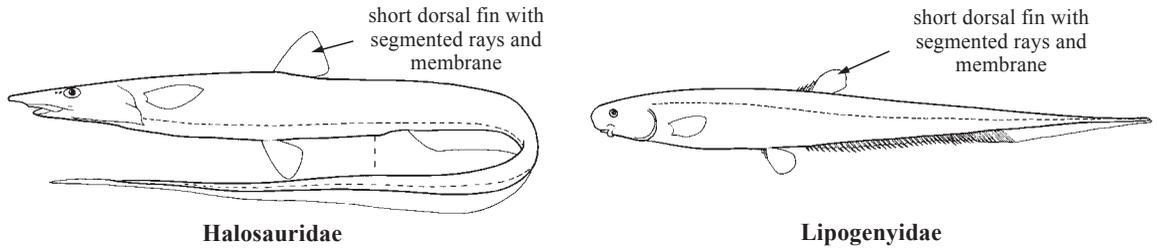
Habitat, biology, and fisheries: Notacanthids live on the bottom at depths of approximately 200 to 3 500 m. They feed on various small invertebrates, including crustaceans, echinoderms, polychaetes, bryozoans, and hydrozoans. Their olfactory organs are well developed and are undoubtedly used in finding food. Notacanthids show little sexual dimorphism, although males tend to be smaller than females and have a larger olfactory organ. The larva is a leptocephalus, similar to that of the halosaurs, eels, and elopiforms. Notacanthids are occasionally taken in deep bottom trawls, but they have no commercial value.

Similar families in the area

Notacanthids are unlikely to be confused with any other fishes except perhaps the Halosauridae and Lipogenyidae. The peculiar spinous dorsal fin, without connecting membranes, the slender, tapering tail, and the long anal fin distinguish them from all other families in the area.

Halosauridae: dorsal fin short, with soft rays connected by membrane.

Lipogenyidae: dorsal fin with both spines and segmented soft rays, connected by a membrane and forming a single, short-based fin.



Key to the species of Notacanthidae occurring in the area

- 1a. Dorsal-fin spines 6 to 15; greatest body depth less than 3 in preanal length (Fig. 1) *Notacanthus chemnitzii*
- 1b. Dorsal-fin spines 26 to 40; greatest body depth more than 3 in preanal length (Fig. 2) → 2

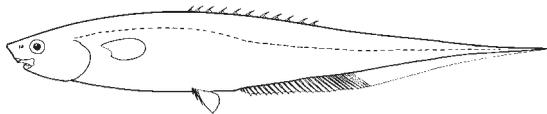


Fig. 1 *Notacanthus*

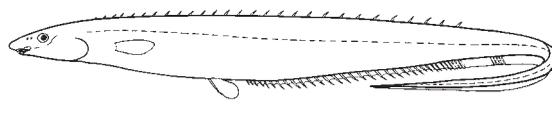


Fig. 2 *Polyacanthonotus*

- 2a. Posterior end of mouth not reaching anterior margin of eye; 22 or more gill rakers on anterior arch. *Polyacanthonotus rissoanus*
- 2b. Posterior end of mouth reaching to or beyond anterior margin of eye; 21 or fewer gill rakers on anterior arch → 3
- 3a. Anterior and posterior nostrils close together, greatest distance between them 33 to 62% of horizontal eye diameter; maximum size 350 to 550 mm; vertebrae 254 or more *Polyacanthonotus challengerii*
- 3b. Anterior and posterior nostrils farther apart, greatest distance between them 67 to 103% of horizontal eye diameter; maximum size less than 300 mm; vertebrae 245 or fewer *Polyacanthonotus merretti*

List of species occurring in the area

- Notacanthus chemnitzii* Bloch, 1788. To 1 m. Worldwide, from subarctic to subantarctic latitudes; in the area Atlantic coast of US and Gulf of Mexico; 200 to 1 000 m.
- Polyacanthonotus challengerii* (Vaillant, 1888). To 55 cm. Occurs largely N of the area, but may extend into the northernmost part; also E Atlantic and Indo-Pacific; 1 300 to 3 700 m.
- Polyacanthonotus merretti* Sulak, Crabtree, and Hureau, 1984. To 30 cm. Atlantic coast of US, Gulf of Mexico, and Caribbean; 1 000 to 1 600 m.
- Polyacanthonotus rissoanus* (De Filippi and Vérany, 1859). To 40 cm. Occurs largely N of the area, but may extend into the northernmost part; also E Atlantic; 1 000 to 2 000 m.

References

McDowell, S. B. 1963. Family Notacanthidae. In *Fishes of the Western North Atlantic*, edited by D.M. Cohen. *Mem. Sears Found. Mar. Res.* 1(6):124-207.

Crabtree, R. E., K. J. Sulak, and J. A. Musick, 1985. Biology and distribution of species of *Polyacanthonotus* (Pisces: Notacanthiformes) in the western North Atlantic. *Bull. Mar. Sci.*, 36(2):235-248.

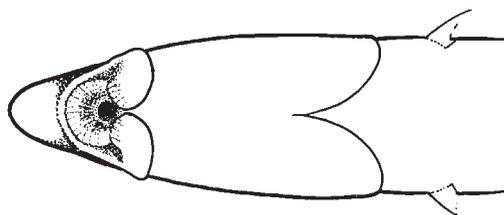
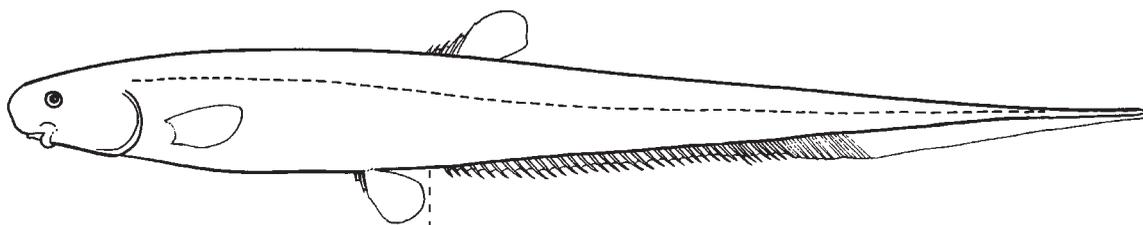
Sulak, K. J., R. E. Crabtree, and J.-C. Hureau. 1984. Provisional review of the genus *Polyacanthonotus* (Pisces, Notacanthidae) with description of a new Atlantic species, *Polyacanthonotus merretti*. *Cybium*, 8(4):57-68.

LIPOGENYIDAE**Spiny sucker eel**

by D.G. Smith, National Museum of Natural History, Washington, D.C., USA

A single species in this family.*Lipogenys gillii* Goode and Bean, 1896

NNL

Frequent synonyms / misidentifications: None / None.**FAO names:** En - Spiny sucker eel.

anterior part of body (ventral view)

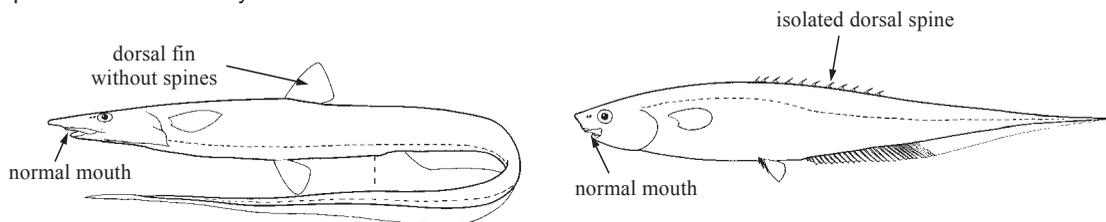
Diagnostic characters: Body moderately elongate; **tail slender and tapering to a point.** Head narrow, somewhat compressed, tapering anteriorly to a rounded point as seen from above, more broadly rounded as seen from side. Eye well developed. Snout projects beyond mouth. Anterior and posterior nostrils close together, about halfway between eye and tip of snout. **Mouth inferior, small and sucker-like; upper lip with thick, pleated folds; posterior end of maxilla bent sharply downward, forming a flap-like structure; fleshy papillae on snout bordering upper lip. Teeth absent. Dorsal fin short-based, located above anus, the first 4 to 6 rays hard and spinous, increasing in length from front to back, the remainder soft and segmented, membrane connecting all rays except first 1 to 3 spines. Anal fin long, extending from just behind anus to tip of tail, anterior rays spinous, posterior rays segmented, the transition gradual.** Pectoral fin slightly below midside, behind gill opening; pelvic fin abdominal; caudal fin absent. Scales small, covering most of head and body. Lateral line complete, on dorsal half of body anteriorly, becoming midlateral on tail; canals and scales not notably enlarged. **Colour:** light brown or grey, lining of gill chamber dark brown. No markings or patterns.

Size: To approximately 35 to 40 cm.

Similar families occurring in the area

Halosauridae: mouth normal, not sucker-like; dorsal fin without spines or with a single, short spine connected to remainder of fin by membrane.

Notacanthidae: mouth normal, not sucker-like; dorsal fin without segmented rays, rather a series of isolated spines unconnected by a membrane.



Halosauridae

Notacanthidae

Habitat, biology, and fisheries: This fish lives on the bottom in approximately 600 to 2 000 m and feeds mostly on organic material contained in bottom sediment drawn up by the sucker-like mouth. Little is known about its biology; there is no obvious sexual dimorphism. *Lipogenys gillii* is rarely seen and has no commercial value.

Distribution: Known from off the Atlantic coast of Canada and the USA, from Nova Scotia to New Jersey; may extend into the northern part of the area in deep water. The species has recently been reported from off Japan and New Zealand and may well be found worldwide in suitable habitat.

Remarks: Although *Lipogenys* is usually placed in its own family, primarily because of the peculiar and highly modified mouth, its anatomy is similar in most respects to that of the Notacanthidae. Indeed, one recent study placed *Lipogenys* as the sister group of *Polyacanthonotus* within the Notacanthidae. A single species is currently recognized, but critical comparisons have not been made between populations.

Reference

McDowell, S.B. 1963. Family Lipogenyidae. In *Fishes of the Western North Atlantic*, edited by D.M. Cohen. *Mem. Sears Found. Mar. Res.* 1(6):208-228.