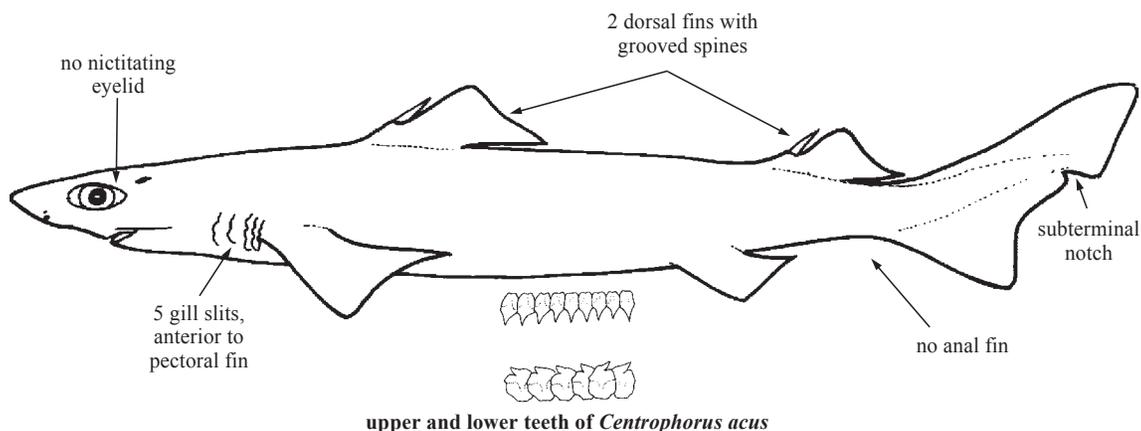


CENTROPHORIDAE

Gulper sharks

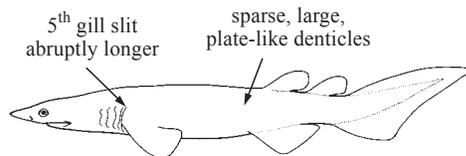
Diagnostic characters: Small to moderately large sharks, with cylindrical or slightly compressed bodies, without ridges between pectoral and pelvic fins and without precaudal pits and caudal keels. **Head with 5 gill slits, all anterior to pectoral fins**, the fifth not abruptly longer than the others; **spiracles always present, large and just behind eyes; eyes on sides of head, without nictitating eyelids**. Snout short to elongated, broad, flattened, not formed as a rostral saw; no barbels on snout; nostrils wide-spaced, internarial width greater than nostril width; mouth short and nearly transverse, lips smooth; **teeth strong-cusped, dissimilar in both jaws, compressed, broad, blade-like, and without cusplets, adjacent teeth imbricated, upper teeth much smaller than lowers**. **Two dorsal fins with a long strong grooved spine present** on their anterior margins; dorsal fins large, angular, broad, and with weakly concave posterior margins; first dorsal fin larger or subequal in area to second dorsal fin; origin of first dorsal fin far in front of pelvic-fin origins, over or just behind pectoral-fin insertions, and always in front of pectoral-fin free rear tips; **no anal fin; caudal fin strongly asymmetrical, with subterminal notch present** and with a lower lobe varying from virtually absent to short; pelvic fins subequal to or smaller than second dorsal fin. Dermal denticles close-set, not greatly enlarged and plate-like. **Colour:** body and fins greyish to blackish brown, without conspicuous black marks and luminescent organs.



Habitat, biology, and fisheries: Gulper sharks mostly occur in deep water near the bottom on the continental and insular slopes from 200 to at least 2 400 m, with one photographed from a bathyscaphe on the ocean floor below 4 000 m and another in the open ocean between the surface and 1 250 m depth in water nearly 4 000 m deep. Occasional individuals venture onto the continental shelves up to 50 m, and one was found by a diver in shallow water. These dogfishes are circumglobal in most seas, and range from the tropics to high latitudes up to Iceland in the North Atlantic. Some of the species form immense schools, and are among the most abundant deep-water sharks. Gulper sharks feed mostly on bony fishes and cephalopods, but also small sharks, chimaeras, shrimp, lobsters, and tunicates. Reproduction is ovoviviparous, with 1 to 12 young per litter. In the Far East and the eastern Atlantic these sharks are commonly fished with line gear, demersal and pelagic trawls, and fixed bottom nets for human consumption and for their livers, which are extremely large, oily, and have a high squalene content. This is possibly the most important family of deep-water sharks for fisheries purposes.

Similar families occurring in the area

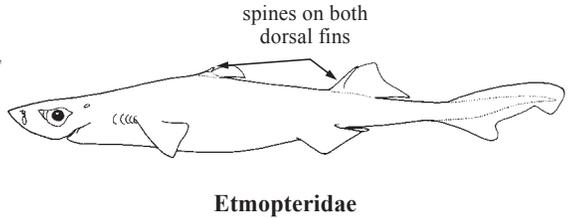
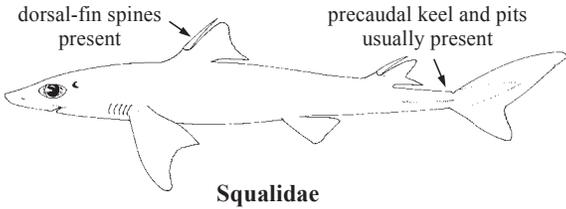
Echinorhinidae: body set with sparse, large, plate-like denticles; spiracles small and well behind eyes; fifth pair of gill slits abruptly longer than others; mouth broadly rounded; teeth not imbricated, upper teeth nearly as large as lower teeth, with cusplets present in large juveniles and adults; no dorsal-fin spines; first dorsal-fin origin over or posterior to pelvic-fin origins; pelvic fins much larger than second dorsal fin.



Echinorhinidae

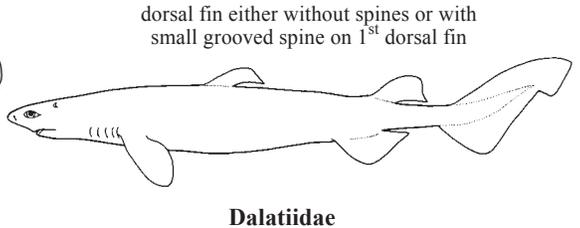
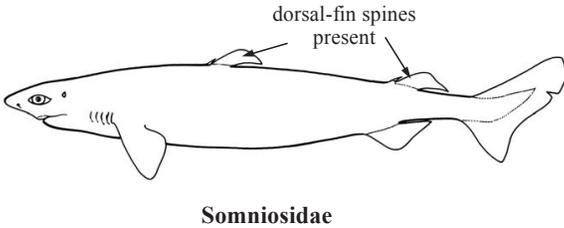
Squalidae: upper teeth nearly as large as lower teeth; precaudal keels and usually precaudal pits present; dorsal-fin spines without grooves; second dorsal fin falcate; no subterminal notch on caudal fin.

Etmopteridae: cusplets present on non-imbricated upper teeth; origin of first dorsal fin over or behind the pectoral-fin free rear tips, second dorsal fin larger than first dorsal fin and more or less falcate; body usually with conspicuous black markings and luminescent organs; most species smaller, adult at below 70 cm.



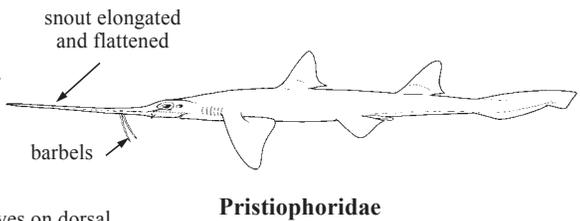
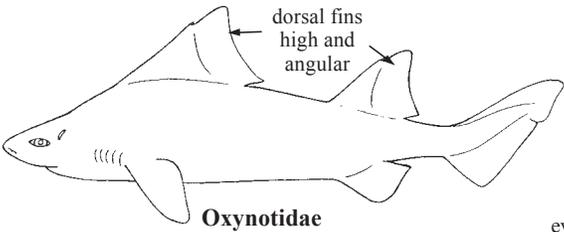
Somniosidae: upper teeth narrow and not imbricated; lateral keels present on abdomen; origin of first dorsal fin usually behind pectoral-fin free rear tips; dorsal-fin spines greatly reduced in species in the area, absent in species found elsewhere.

Dalatiidae: upper teeth narrow and not imbricated; origin of first dorsal fin behind pectoral-fin free rear tips; dorsal-fin spine either present on first dorsal fin only (*Squaliolus*) or absent.



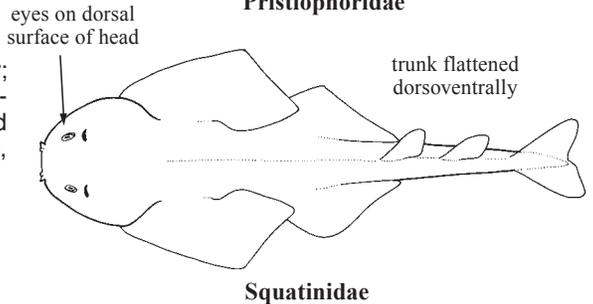
Oxynotidae: upper teeth narrow and not imbricated; body high and compressed; conspicuous lateral keels present on abdomen; dorsal fins very high and angular; dorsal-fin spines large but buried in the dorsal fins with only the tips exposed.

Pristiophoridae: snout elongated into a flattened blade with lateral teeth; barbels present in front of nostrils.



Squatinae: trunk much flattened dorsoventrally; eyes on upper side of head; anterior margins of pectoral fins extending forward past gill openings and partly concealing them; pelvic fins also very broad, wing-like.

All other shark families: anal fin present.



Key to the species of Centrophoridae occurring in the area

- 1a. Snout greatly elongated, first dorsal fin very low and keel-shaped, origin over pectoral-fin bases; second dorsal-fin spine much larger than first; pectoral-fin free rear tip rounded; a low ventral keel on pelvic-caudal space in front of caudal fin (Fig. 1) ***Deania profundorum***
- 1b. Snout moderately elongated; first dorsal fin high and more angular, origin over pectoral-fin inner margin (in species found in the area); second dorsal-fin spine slightly larger than first, pectoral-fin free rear tip angular to elongated; no ventral keel on pelvic-caudal space → 2

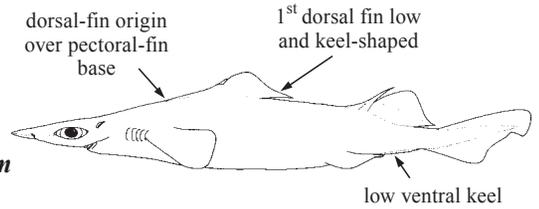


Fig. 1 *Deania profundorum*

- 2a. Lateral trunk denticles with leaf-like flattened crowns on elevated narrow to broad pedicels extending above the denticle bases, and with medial and lateral cusps on their posterior ends (Fig. 2) → 3
- 2b. Lateral trunk denticles with flat sessile crown atop the denticle bases, without separate pedicels and with or without a posterior medial cusp (Fig. 3) → 4

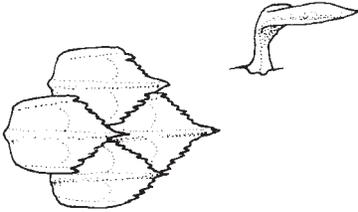


Fig. 2 dermal denticles (*Centrophorus squamosus*)

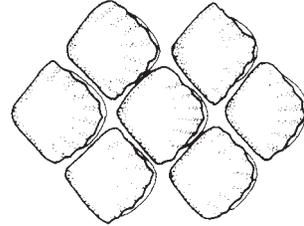


Fig. 3 dermal denticles (*Centrophorus granulosis*)

- 3a. Free rear tips of pectoral fins broadly angular and not reaching past first dorsal-fin spine origin (Fig. 4); denticles of adults with multiple lateral cusps (Fig. 2) ***Centrophorus squamosus***
- 3b. Free rear tips of pectoral fins expanded into short narrow angular lobes that reach past first dorsal-fin spine origin (Fig. 5); denticles of adults with a pair of lateral cusps . . . ***Centrophorus cf. acus***

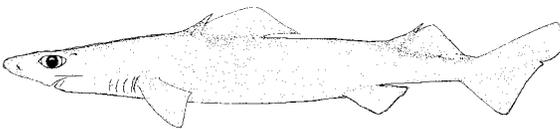


Fig. 4 *Centrophorus squamosus*

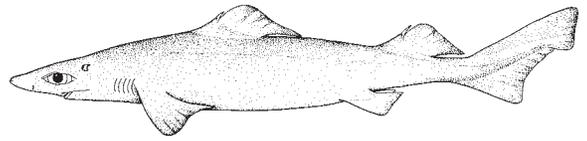


Fig. 5 *Centrophorus cf. acus*

4a. Snout moderately short and broad; free rear tips of pectoral fins slightly elongated, usually not extending behind first dorsal-fin spine (Fig. 6); lateral trunk denticles of adults fairly narrow and teardrop-shaped, with a narrow cusp (Fig. 7); postventral margin of caudal fin virtually straight in adults; a large species reaching about 161 cm. ***Centrophorus niaukang***

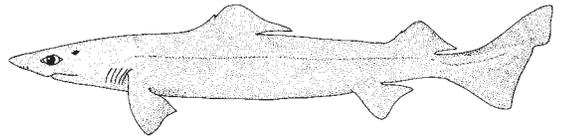


Fig. 6 *Centrophorus niaukang*

4b. Snout rather longer and narrower; free rear tips of pectoral fins greatly elongated, extending well behind first dorsal-fin spine; lateral trunk denticles of adults broad and rhomboidal (Fig. 3); postventral margin of caudal fin notched in adults; smaller species with maximum size usually below 100 cm. → 5

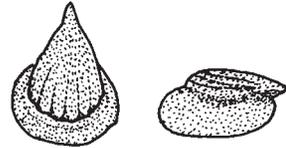


Fig. 7 dermal denticles (*Centrophorus niaukang*)

5a. Space between second dorsal-fin insertion and upper caudal-fin origin 6.1 to 8.0% of total length (Fig. 8); body dark grey or grey-brown above, slightly lighter below. . ***Centrophorus granulosus***

5b. Space between second dorsal-fin insertion and upper caudal-fin origin 8.6% of total length (Fig. 9); colour light brownish on back and flanks, white below. ***Centrophorus cf. tessellatus***



Fig. 8 *Centrophorus granulosus*

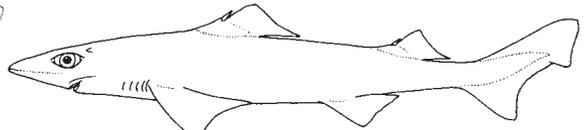


Fig. 9 *Centrophorus cf. tessellatus*

List of species occurring in the area

The shark symbol  is given when species accounts are included.

-  *Centrophorus cf. acus* Garman, 1906.
-  *Centrophorus granulosus* (Bloch and Schneider, 1801).
-  *Centrophorus niaukang* Teng, 1959.
-  *Centrophorus squamosus* (Bonnaterre, 1788).
-  *Centrophorus cf. tessellatus* Garman, 1906.
- Centrophorus* sp.
-  *Deania profundorum* (Smith and Radcliffe, 1912).

Note: The genus *Centrophorus* is of urgent need of revision in Area 31, and species recognized here are provisional. *Centrophorus acus* and *Centrophorus tessellatus* were described from Japan but later recorded in Area 31; they may represent undescribed species or possibly misidentifications of described species. In addition, there is a long-snouted species of *Centrophorus* in Area 31 (Gulf of Mexico), close to the Australian *Centrophorus harrissoni* McCulloch, 1915 but which has sometimes been confused with *Centrophorus granulosus* and termed *Centrophorus uyato*. It is not considered further here pending revision of western north Atlantic *Centrophorus*.

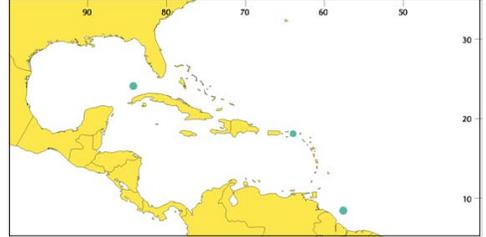
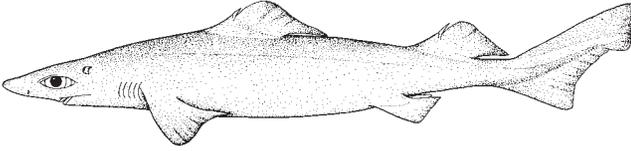
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***Centrophorus cf. acus* Garman, 1906**

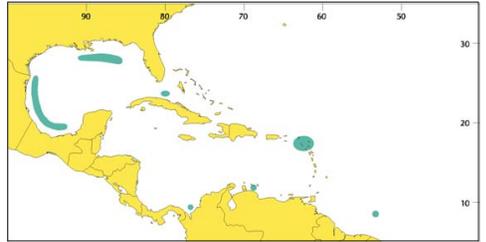
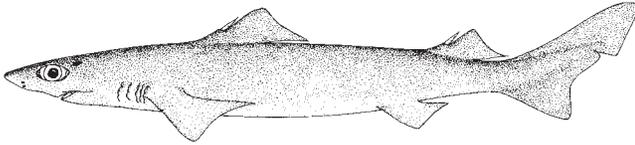
En - Needle dogfish; **Fr** - Squale-chagrin aiguille; **Sp** - Quelvacho agujón.

Maximum total length at least 161 cm. On the outer continental shelves and slopes near the bottom in depths of 630 to 915 m. Biology little-known. Mode of utilization and fishing gear uncertain. In Area 31, nominal from the northern Gulf of Mexico (USA), Dry Tortugas, Leeward Islands, and French Guiana; western Pacific off Japan. Identification of this species is provisional, and material referred to *Centrophorus acus* (S. Springer, pers. comm.) from the western north Atlantic may be an undescribed species.

***Centrophorus granulosus* (Bloch and Schneider, 1801)**

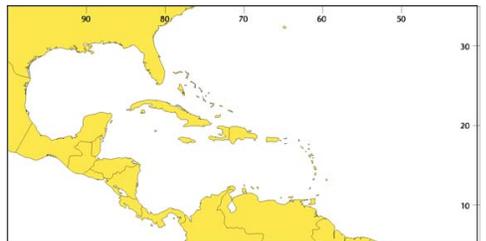
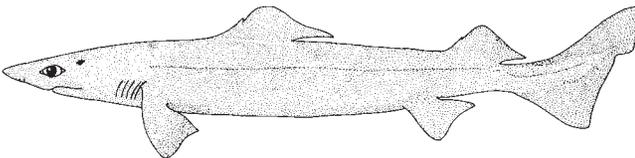
En - Gulper shark; **Fr** - Squale-chagrin commun; **Sp** - Quelvacho.

Maximum total length about 100 cm. On the outer continental shelves and slopes near the bottom in depths from 50 to 1 400 m. Feeds mainly on bony fishes. Mode of utilization and fishing gear uncertain. In the area, western north Atlantic, Gulf of Mexico; wide-ranging in the eastern Atlantic, Mediterranean, western Indian Ocean, and western Pacific. Often erroneously reported as *Centrophorus uyato* (Rafinesque, 1810), which is based on a species of *Squalus* from the Mediterranean Sea.

***Centrophorus niaukang* Teng, 1959**

En - Taiwan gulper shark; **Fr** - Squale-chagrin quelvacho; **Sp** - Quelvacho chino.

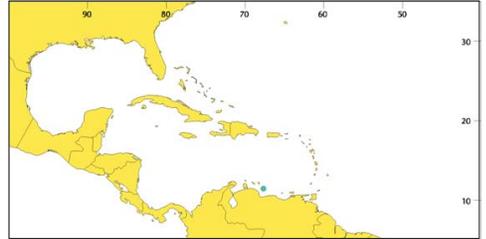
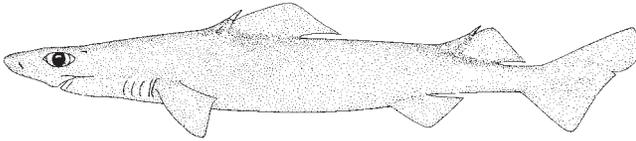
Maximum total length to at least 161 cm, one of the largest gulper sharks. Lives near the bottom on the outer continental shelves and upper slopes at depths from 250 to 720 m in Area 31 and from 250 to 1 400 m elsewhere. This shark is live-bearing, with litters of 1 to 6 young, and eats bony fishes, squids, small dogfish sharks, and lobsters. Taken in bottom trawls and on deep-set longlines; utilized for fish meal and for human consumption elsewhere. Found just north of Area 31 off northern north Carolina and Virginia, USA, and likely to occur within it. Wide-ranging but sporadically distributed in the North Atlantic and the Indo-West Pacific. Often confused with *Centrophorus granulosus* and *Centrophorus lusitanicus*. Nomenclature provisional.



Centrophorus squamosus (Bonnaterre, 1788)

En - Leafscale gulper shark; **Fr** - Squalé-chagrin de l'Atlantique; **Sp** - Quelvacho negro.

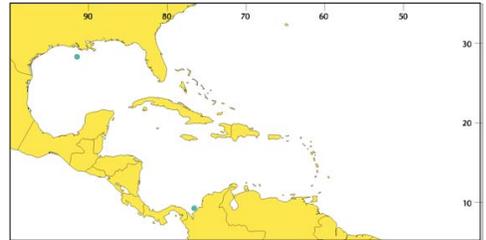
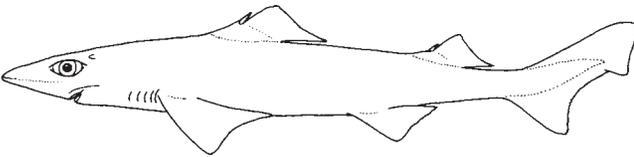
Maximum total length to about 160 cm. Occurs near the bottom on the continental slopes at depths from 229 to 2 359 m, also pelagically in the upper 1 250 m of water 4 000 m deep. This shark is live-bearing, with litters of 5 to 8 young. It eats bony fishes, cephalopods, crustaceans, and chimaeras. Caught with bottom trawls, line gear and fixed bottom nets; dried and salted for human consumption, also used for fish meal. In Area 31 collected off Venezuela but probably more widely distributed; wide-ranging in the eastern Atlantic and Indo-West Pacific.



Centrophorus cf. tessellatus Garman, 1906

En - Mosaic gulper shark; **Fr** - Squalé-chagrin mosaïque; **Sp** - Quelvacho mosaico.

Maximum total length at least 89 cm. On the outer continental shelves and slopes near the bottom at depths from 260 to 728 m. Biology essentially unknown. Mode of utilization and fishing gear uncertain. In Area 31, nominal from northern Gulf of Mexico (USA); also, Japan and the Hawaiian Islands. Identification of this species is highly provisional, and material from the western north Atlantic referred to *Centrophorus tessellatus* may be an undescribed species.



Deania profundorum (Smith and Radcliffe, 1912)

En - Arrowhead dogfish; **Fr** - Squalé-savate lutin; **Sp** - Tollo flecha.

Maximum total length to 76 cm. On the upper continental and insular slopes, found on or near the bottom from 280 to 1 790 m. Eats small bony fishes, including lanternfish, squid, and crustaceans. Interest to fisheries unknown. In Area 31, Atlantic coast of the USA off North Carolina; wide-ranging in the eastern Atlantic, western Indian Ocean, and the western Pacific.

