

Identification Guide to the Deep-Sea Cartilaginous Fishes of the Indian Ocean



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Its production is the result of a collaborative effort among scientists, fishery observers and the fishing industry who attended the FAO regional workshop held in Flic en Flac, Mauritius, from January 16 to 18, 2013. The general objective of the workshop was to discuss, share experiences and finally draft recommendations for the development of field products aimed at facilitating the identification of Indian Ocean deep-sea cartilaginous fishes.

The present guide covers the deep-sea Indian Ocean, primarily FAO Fishing Areas 51 and 57, and that part of Area 47 that extends from Cape Point, South Africa to the east, e.g. the extreme southwestern Indian Ocean. It includes a selection of species of major, moderate and minor importance to fisheries as well as those of doubtful or potential use to fisheries. It also covers those little known species that may be of research, educational, and ecological importance.

The Indian Ocean deep-sea chondrichthyan fauna is currently represented by 117 shark, 61 batoid and 17 chimaera species. This guide includes full species accounts for 36 shark species selected as being the more difficult to identify and/or commonly caught. Each species is described, depicted with a colour illustration and photo, and key distinguishing features of similar-looking species occurring in the same area are highlighted allowing for easy and accurate identification in the field. An additional 16 shark species, that have very particular characteristics and/or are rarely caught, are displayed with a simplified account that includes a line drawing and other information useful for their correct identification. Finally, short accounts of 52 shark species that could be misidentified with more common species occurring in the area are also included.

The batoids, as the information available on the species being caught in the Indian Ocean is scanty and in order to avoid confusion among users, are dealt with at the family level, whereas the chimaeras at the genus level. Therefore, in order to improve knowledge on the latter groups it is recommended that the caught specimens be preserved for further investigation following the instructions here included.

This guide is intended to help fishery workers collecting catch data in the field in the identification of the cartilaginous fish species they might encounter. It is conceived to be updatable, offering the possibility to add new species accounts as new species are described.

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HOW TO USE THIS GUIDE

Common names in Japanese, Portuguese and Korean (when available)

FAO 3-alpha code

Scientific Name

Authorship

FAO Names (English - French - Spanish)

Colour illustration and main field marks

Additional details

Other similar species

A different colour for each Order

Species coloration and size given as Total Length (TL)

Photo of a specimen immediately after capture

Family common name

Family

Order

Squalus megalops (Macleay, 1881)
Shortnose spurdog - Aiguillat nez court
Galludo nato

Tsumari-tsunozame (Jpn)
Quelme liso (Por)
모조리장어 (Kor)

DOP

Colour
Light grey-brown to dark brown above, lighter below. Pectoral fins dusky above with light posterior margins. Dorsal fins with black tips and white posterior margins and rear tips often inconspicuous in adults. Caudal fin with light dorsal margin.

Size
Maximum length for both sexes about 77 cm TL, though most are smaller than 65 cm TL.

Photo: © Rob Leslie

Similar species

The following species share with *Squalus megalops* the following characteristic: the distance from snout tip to inner margin of nostril is shorter than the distance from inner edge of nostril to front of upper labial furrow.

Squalus altipinnis
First dorsal fin with a more erect anterior margin
Dermal denticle (Dorsal view)

Squalus crassispinus
Precaudal length 2.3 or more times intermarial space
Note: *S. megalops* has precaudal length less than 2.3 times intermarial space

Underside of head

Squaliformes Squalidae - Dogfishes

Squalus lalandei
Nasal flaps not bifurcate
Detail of nostril
Known only from off Alphonse Island, Seychelles

Squalus hemionus
Underside of head

Other similar species

The following species can be distinguished from *Squalus megalops* by the fact that they have the distance from snout tip to inner margin of nostril longer than the distance from inner edge of nostril to front of upper labial furrow.

Squalus blainville
First dorsal fin high with spine about as long as fin base
Precaudal snout usually less than 1.4 times mouth width

Squalus mitsukurii
First dorsal fin lower with spine shorter than fin base
Precaudal snout usually less than 1.4 times mouth width

Squalus edmundsi
First dorsal fin and its associated spine almost upright
Precaudal snout elongated, about 1.5 to 2.4 times mouth width

Squalus nasutus
First dorsal-fin spine much shorter than second dorsal-fin spine
Snout very long

Squalus montalbani
Recorded on the upper continental slope in eastern Indonesia and western Australia

Squalus chloroculus
Recorded on the upper to mid continental slope off southern Australia

Bio-Ecology and Distribution of *Squalus megalops*

A common to abundant small dogfish of temperate and tropical seas, found on the inner and outer continental shelves and upper slopes. Generally found on or near the bottom at depths from close inshore and the intertidal down to 732 m.

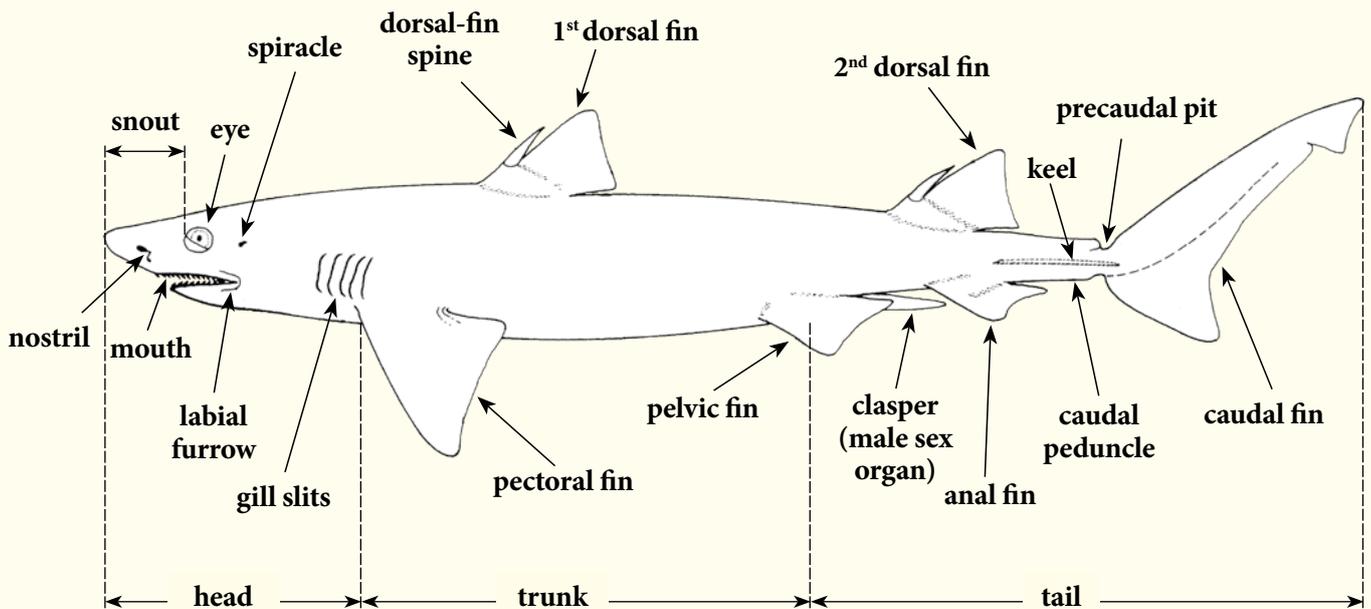
***Squalus megalops* - Shortnose spurdog**

Main distinctive characters of similar species

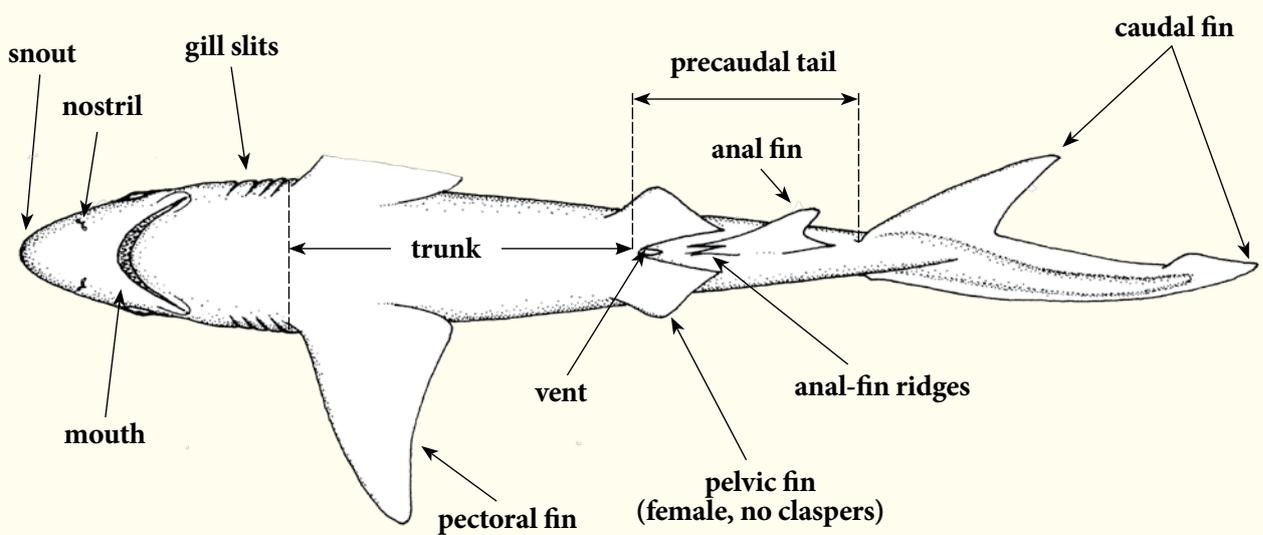
Known geographic distribution. The map is divided in 4 quadrants. If the species was recorded somewhere within the quadrant, the entire quadrant is filled with oblique lines. When the distribution is uncertain, a question mark is included

Information on the biology, ecology and distribution of the species

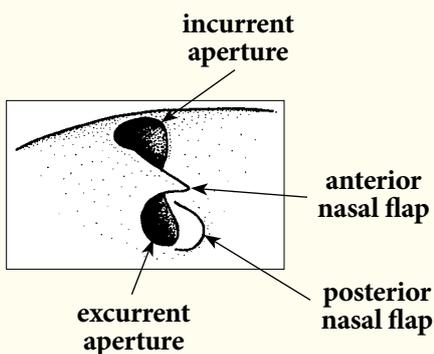
ILLUSTRATED GUIDE OF EXTERNAL TERMINOLOGY USED FOR SHARKS



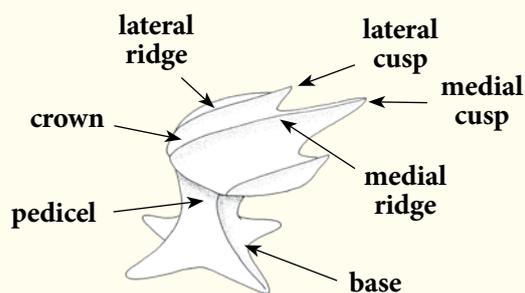
LATERAL VIEW



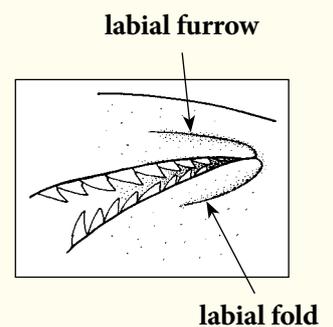
VENTRAL VIEW



Detail of nostril

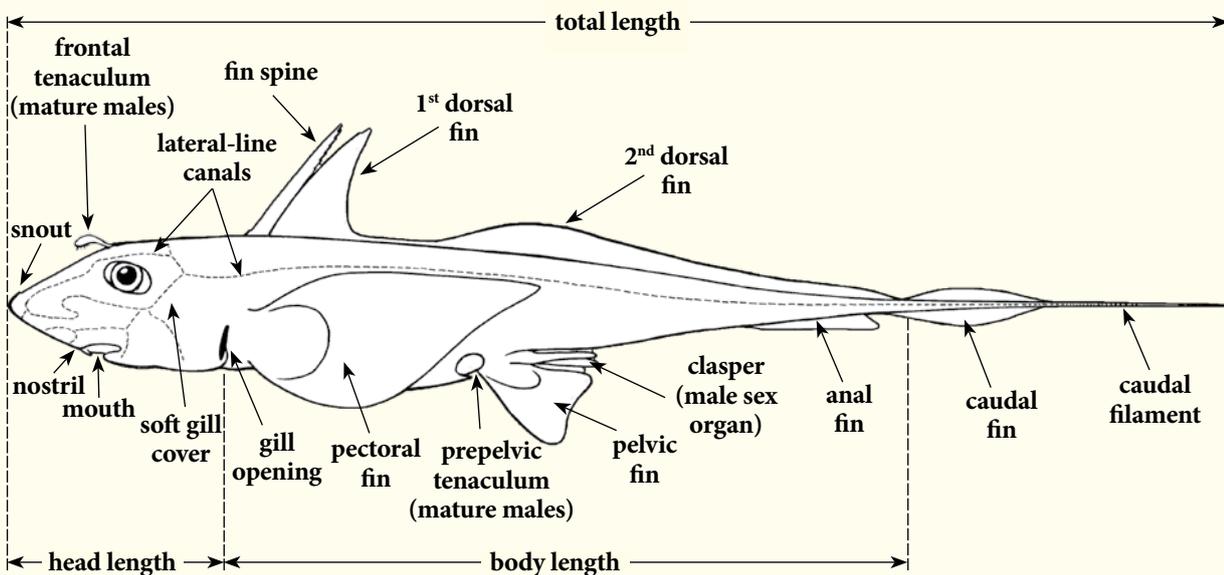
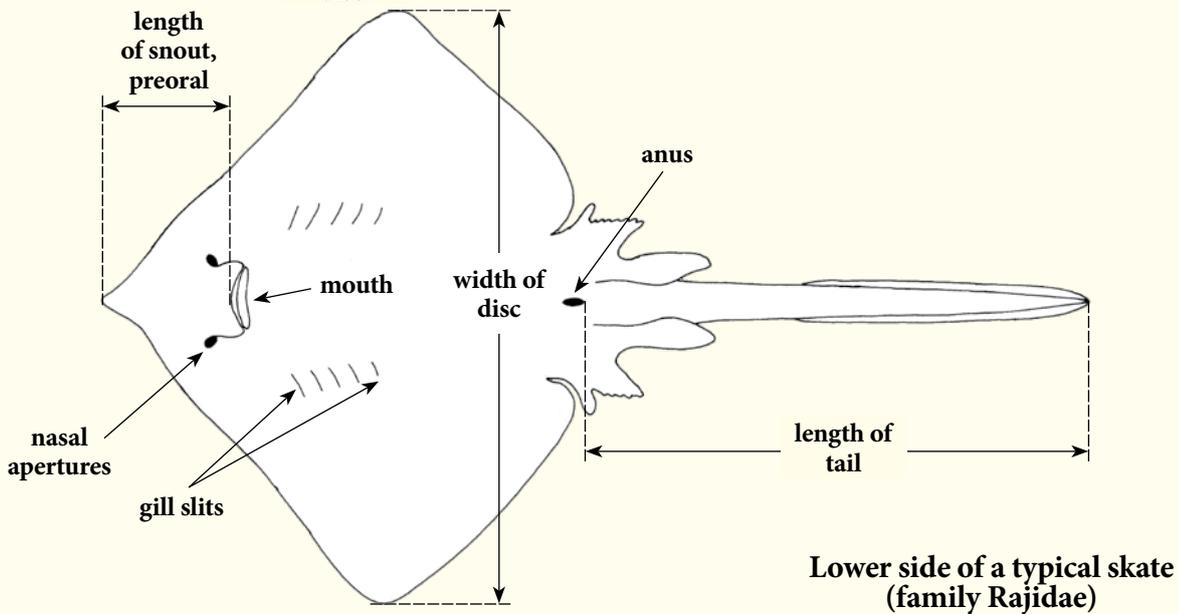
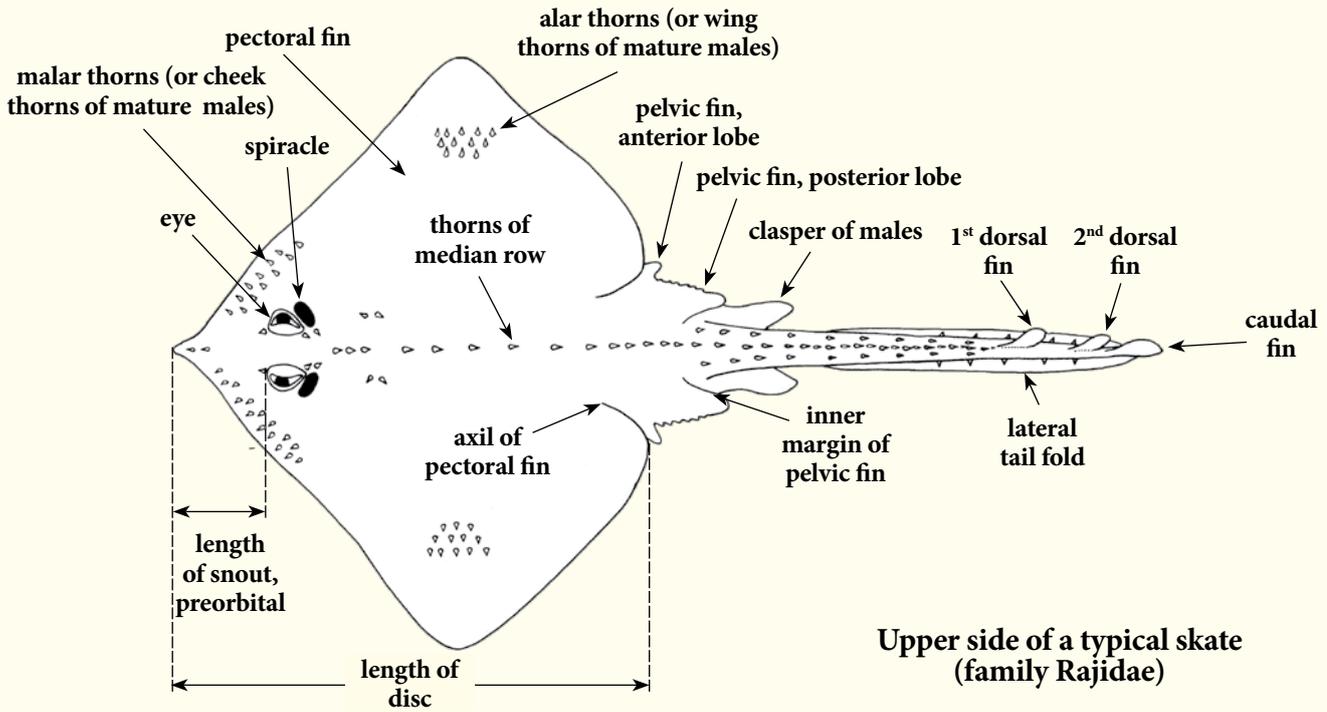


View of a lateral trunk dermal denticle



Mouth corner

ILLUSTRATED GUIDE OF EXTERNAL TERMINOLOGY USED FOR BATOIDS AND CHIMAERAS



Lateral view of a typical Chimaera

GLOSSARY OF TECHNICAL TERMS

Anterior margin: In precaudal fins, the margin from the fin origin to its apex.

Benthic or **Demersal:** referring to organisms that are bottom-dwelling.

Caudal keels: A dermal keel on each side of the caudal peduncle that may extend onto the base of the caudal fin, and may, in a few sharks, extend forward as a body keel to the side of the trunk.

Caudal peduncle: That part of the precaudal tail extending from the insertions of the dorsal and anal fins to the front of the caudal fin.

Circumglobal: Occurring around the world.

Circumtropical: Occurring around the tropical regions of the world.

Claspers: The paired copulatory organs present on the pelvic fins of male cartilaginous fishes, for internal fertilization of eggs.

Cusp: A usually pointed large distal projection of the crown. **Multicuspid** refers to oral teeth or denticles with more than one cusp. In lateral trunk denticles, the posterior ends of the crown may have **medial** and **lateral cusps**, sharp or blunt projections associated with the medial and lateral ridges.

Cusplet: As with a cusp, but a small projection in association with a cusp, and usually mesial and distal but not medial on the crown foot.

Dermal denticle or **placoid scale:** A small tooth-like scale found in cartilaginous fishes.

Endemic: A species or higher taxonomic group of organisms that is only found in a given area.

Free rear tips: The pectoral, pelvic, dorsal, and anal fins all have a movable rear corner or flap, the free rear tip, that is separated from the trunk or tail by a notch and an inner margin. In some sharks the rear tips of some fins are very elongated.

Head: That part of a cartilaginous fish from its snout tip to the last or (in chimaeras) only gill slits.

Inner margin: In precaudal fins including the pectoral, pelvic, dorsal and anal fins, the margin from the fin insertion to the rear tip.

Insertion: The posterior or rear end of the fin base in precaudal fins. The caudal fin lacks insertions except with many batoids and some chimaeroids that have a caudal filament that extends posterior to the fin. See **origin**.

Interdorsal ridge: A ridge of skin on the midback of sharks, in a line between the first and second dorsal fins; particularly important in identifying grey sharks (genus *Carcharhinus*, family Carcharhinidae).

Labial folds: Lobes of skin at the lateral angles of the mouth, usually with labial cartilages inside them, separated from the sides of the jaws by pockets of skin (labial grooves or furrows).

Labial furrows or **labial grooves:** Grooves around the mouth angles on the outer surface of the jaws of many cartilaginous fishes, isolating the labial folds. Primitively there is a distinct **upper labial furrow** above the mouth corner and a **lower labial furrow** below it.

Nictitating lower eyelid: In the ground sharks (order Carcharhiniformes), a movable lower eyelid that has special posterior eyelid muscles that lift it and, in some species, completely close the eye opening (or palpebral aperture).

Origin: The anterior or front end of the fin base in all fins. The caudal fin has **upper** and **lower** origins but no insertion. See **insertion**.

Paired fins: The pectoral and pelvic fins.

Posterior margin: In precaudal fins, the margin from the fin apex to either the free rear tip (in sharks with distinct inner margins) or the fin insertion (for those without inner margins).

Postventral margin: In the caudal fin, the margin from the ventral tip to the subterminal notch of the caudal fin. See **lower** and **upper** postventral margins.

Preanal ridges: A pair of low, short to long, narrow ridges on the midline of the caudal peduncle extending anteriorly from the anal fin base.

Precaudal fins: All fins in front of the caudal fin.

Precaudal pit: A depression at the upper and sometimes lower origin of the caudal fin where it joins the caudal peduncle.

Snout: That part of a cartilaginous fish in front of its eyes and mouth, and including the nostrils.

Subterminal notch: On the caudal fin of most non-batoid sharks and at least one batoid, the notch in the lower distal end of the caudal fin, between the postventral and subterminal margins, and defining the anterior end of the terminal lobe.

Symphysis: The midline of the upper and lower jaws, where the paired jaw cartilages articulate with each other.

Ventral margin: In the caudal fin, the entire ventral margin from lower origin to posterior tip, either a continuous margin or variably subdivided into preventral, postventral, subterminal and terminal margins.

Photographing and preserving specimens for identification

by M. Stehmann and D. Ebert

Experience over many years has shown that the identification of cartilaginous fish species can be problematic. Sometimes rare species may be encountered, and if possible these specimens in addition to being photographed fresh, should be saved and forwarded to experts for possible identification. This can benefit both the scientists, most of whom are interested in these observations, and the public who is interested in having their specimen identified.

Taking photographs for easing identification:

If possible try and place a ruler or other measuring scale alongside the specimen; if no ruler is available, place some other object that may serve as a size reference, e.g. a lens cap, pencil or some object to show a size relationship. A handwritten label that includes a number, the date, location, and other relevant capture information, and may include the person's name should also be included. Plain coloured or an artificial background contrasting the specimen's colour is fine.



Sharks and chimaeras: Take photographs in total lateral, dorsal and ventral views, if possible with fins erected and spread. Add close-ups of details catching your eye, e.g. lateral and ventral view of head to gill slits or to origin of pectoral fins, mouth–nasal region, the jaws with dentition and scale cover detail, individual fins, colour marks.



Photos of *Apristurus laurussonii*: © J. Poulsen

Rays, skates, guitar- and sawfishes: Take photographs in total upper and lower views. Add close-ups of details, such as upper and lower side of head, the saw of sawfish both sides, mouth–nasal region, dorsal and caudal fins (if present), serrated tail spine(s) in stingrays, details of scale coverage (mainly in saw- and guitarfish) and obvious thorn pattern on upper side of disc and tail, colour pattern details like eye–spots.

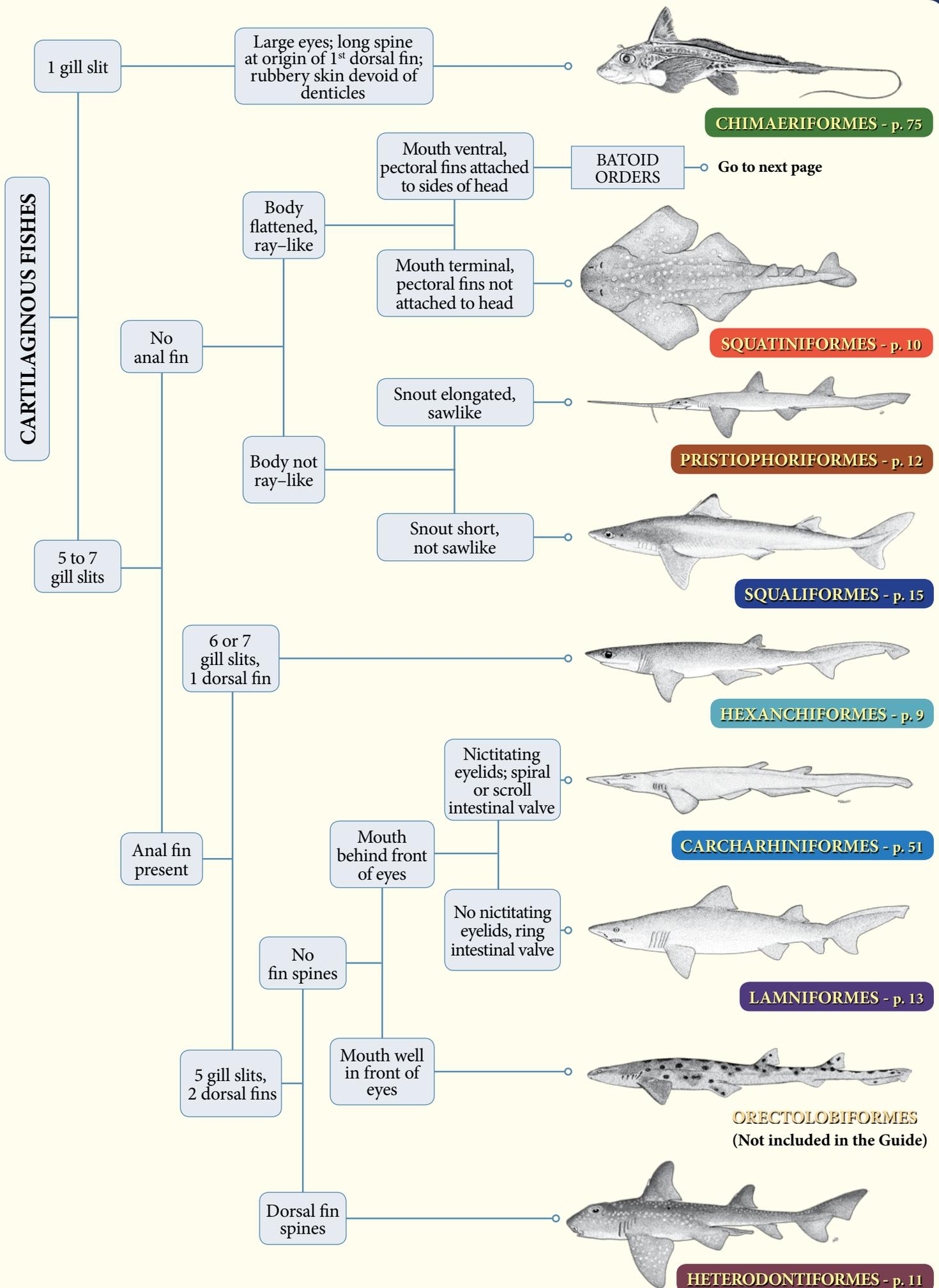


Photos of *Leucoraja naevus*: © M. Stehmann

Preservation of unknown, rare or strange specimens and where to send these:

Beyond, of course, taking photographs first of the fresh specimen, preserving and forwarding such individuals may be very important for science. These may document, e.g. first geographical records, first records of small young or fully grown adults in a given location, or you may have found even a species so far unknown to science. On board a fishing or angling tour vessel, preservation by deep-freezing, on ice, or in a refrigerator will be given as an option. At other occasions, it may become difficult, and preserving in 4% formaldehyde (caution: dangerous to skin, eyes and when inhaled!), one may get in pharmacies or drugstores concentrated, will be the best. Use thick, water- and leakage-proof plastic bags or boxes for storage. Dilute concentrated formalin 1:9 with water and add the liquid to the specimen in the bag or box to be closed firmly – the liquid and its gas are caustic! If possible, inject before formalin into the belly cavity, or cut a small slit through belly to allow penetration of formalin to the innards to prevent from disintegration. Specimens need one to several days for being preserved, depending on their size and thickness. Then pour out liquid formalin, rinse specimen under water, wrap it in moist cloths or paper to prevent it from drying up and keep in plastic bag or box. Make contact with the nearest marine or fishery institute, zoological institute or museum and bring the specimen there, or post it in leakage-proof packing. Internet search may help to find an appropriate addressee nearby.

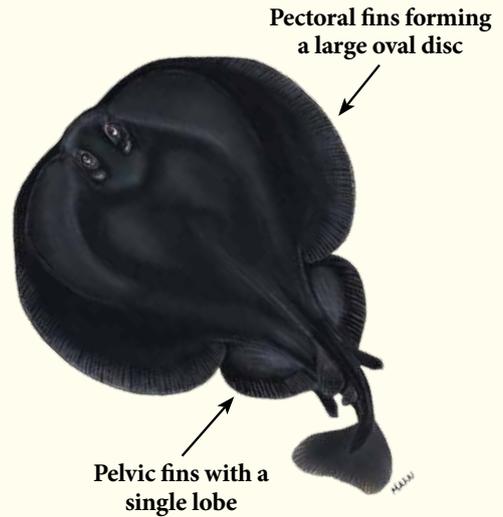
GUIDE TO THE ORDERS OF INDIAN OCEAN DEEP-SEA CARTILAGINOUS FISHES



GUIDE TO THE ORDERS OF INDIAN OCEAN DEEP-SEA BATOID FISHES

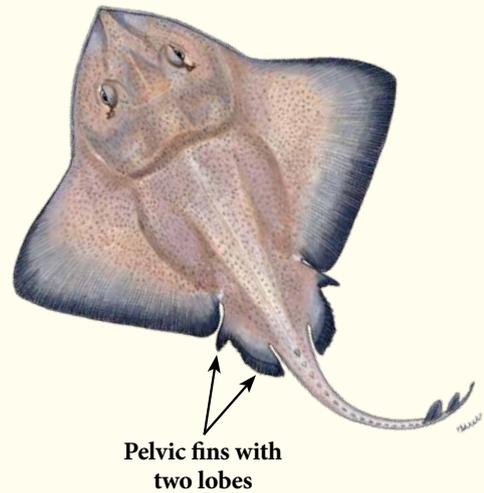
BATOIDS

Pectoral fins forming a large oval disc; uni-lobed pelvic fins; tail massive, with two large dorsal fins and a large caudal fin; large electric organ on each side of head



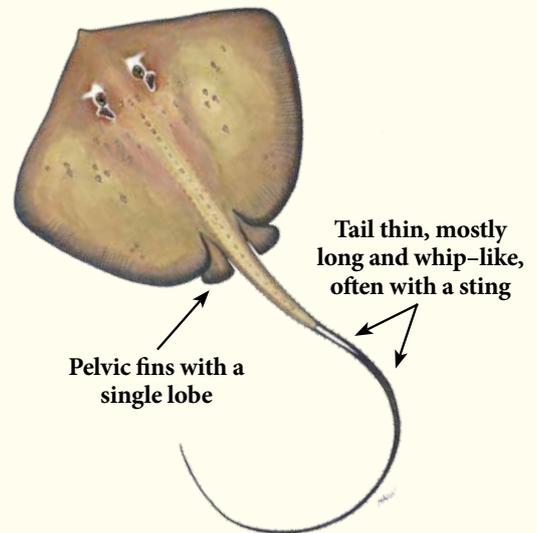
TORPEDINIFORMES - p. 71

Except Guitarfishes, pectoral fins fused with head and trunk to form mostly subrhombic disc; pelvic fins bilobed; tail rather slender, with two small dorsal fins and a rudimentary caudal fin



RAJIFORMES - p. 72

Disc subrhombic to lozenge-shaped; pelvic fins uni-lobed; tail thin, mostly long and whip-like, often with a serrated sting on root



MYLIOBATIFORMES - p. 73

Chlamydoselachidae – Frilled sharks

Chlamydoselachus anguineus Garman, 1884

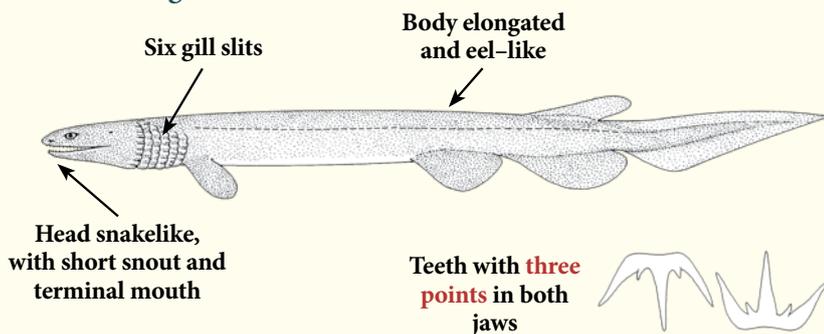
Frilled shark – Requin lézard

Tiburón anguila

HXC



Photo: © Oddgeir Alvheim, IMR



Size
Max. length
196 cm TL.



Depth range
50–1500 m



Note: A distinct species, *Chlamydoselachus africana* Ebert and Compagno, 2009 occurs in the south–western Indian Ocean. Since these two species are morphologically very similar, specimens or tissue samples should be taken when possible.

Hexanchidae – Cow sharks

Hepranchias perlo (Bonnaterre, 1788)

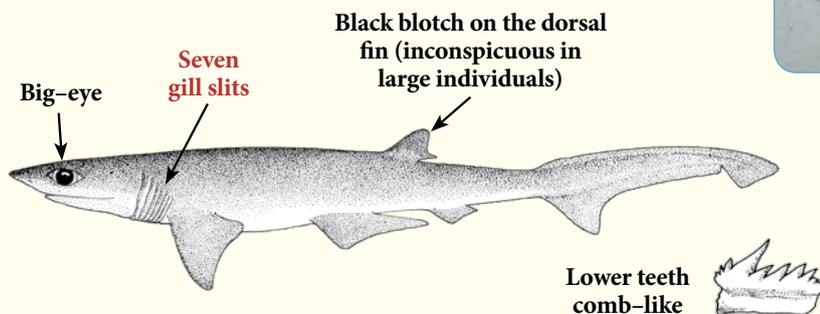
Sharpnose sevengill shark – Requin perlon

Cañabota bocadulce

HXT



Photo: © Oddgeir Alvheim, IMR



Size
Max. length
139 cm TL.



Depth range
100–1000 m



Hexanchus griseus (Bonnaterre, 1788)

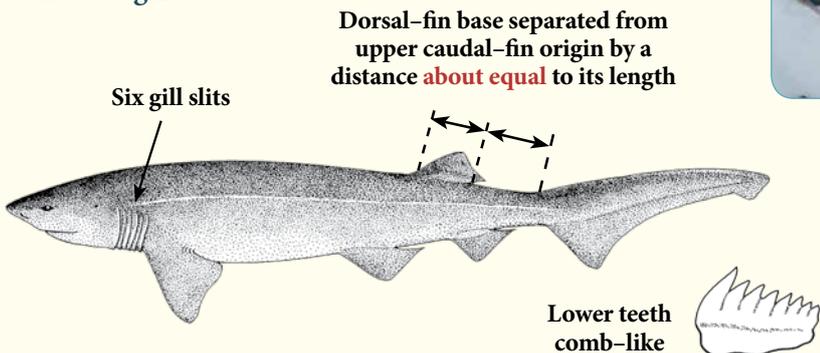
Bluntnose sixgill shark – Requin griset

Cañabota gris

SBL



Photo: © Oddgeir Alvheim, IMR



Size
Max. length
482 cm TL.



Depth range
100–1000 m



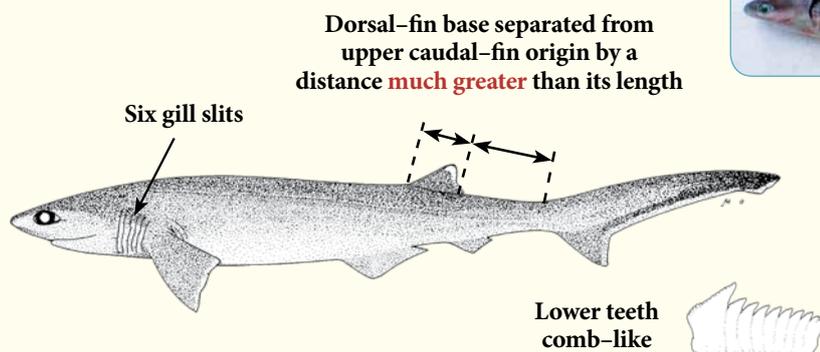
Hexanchus nakamurai Teng, 1962

Bigeyed sixgill shark

HXN



Photo: © Jean-Lou Justine



Size
Max. length
180 cm TL.



Depth range
90–600 m

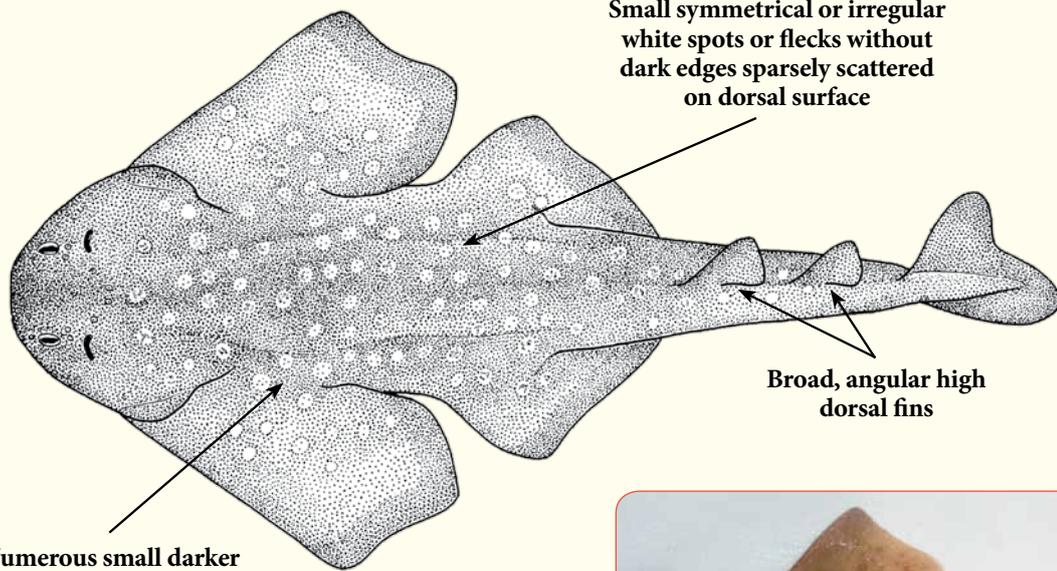


Squatina africana Regan, 1908

African angelshark – Ange de mer africain
Angelote africano

Afurika–kasuzame (Jpn)
Anjo africano (Por)

SUF



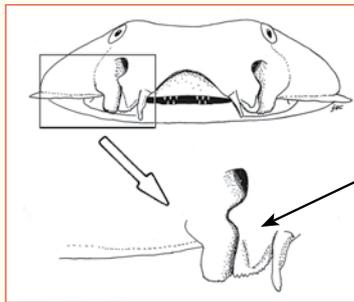
Small symmetrical or irregular white spots or flecks without dark edges sparsely scattered on dorsal surface

Broad, angular high dorsal fins

Numerous small darker brownish spots scattered more or less regularly on dorsal surface



Photo: © Oddgeir Alvheim, IMR



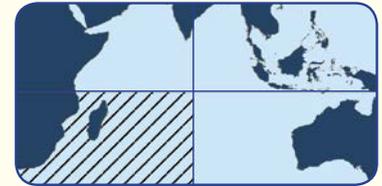
Nasal barbels weakly or not bifurcate

Frontal view of head and detail of nostril

Size
Max. length about 122 cm TL.

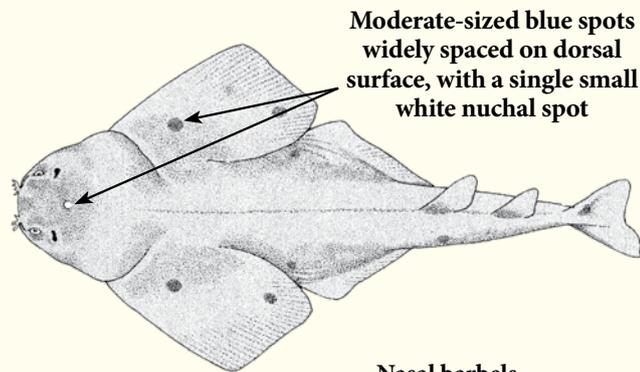


Depth range
100–1000 m



Similar species

Squatina pseudocellata



Moderate-sized blue spots widely spaced on dorsal surface, with a single small white nuchal spot

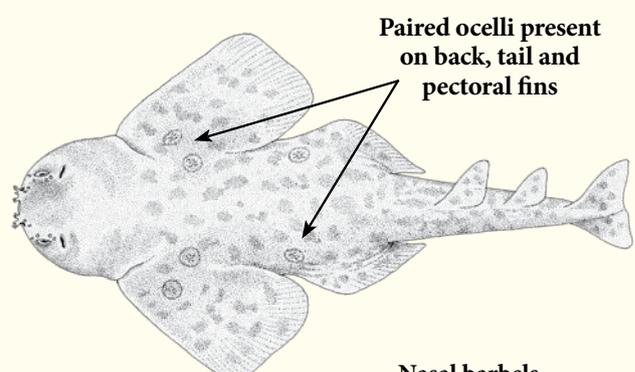


Nasal barbels, strongly bifurcate

Frontal view of head

Endemic to north-western Australia

Squatina tergocellata



Paired ocelli present on back, tail and pectoral fins



Nasal barbels, strongly fringed

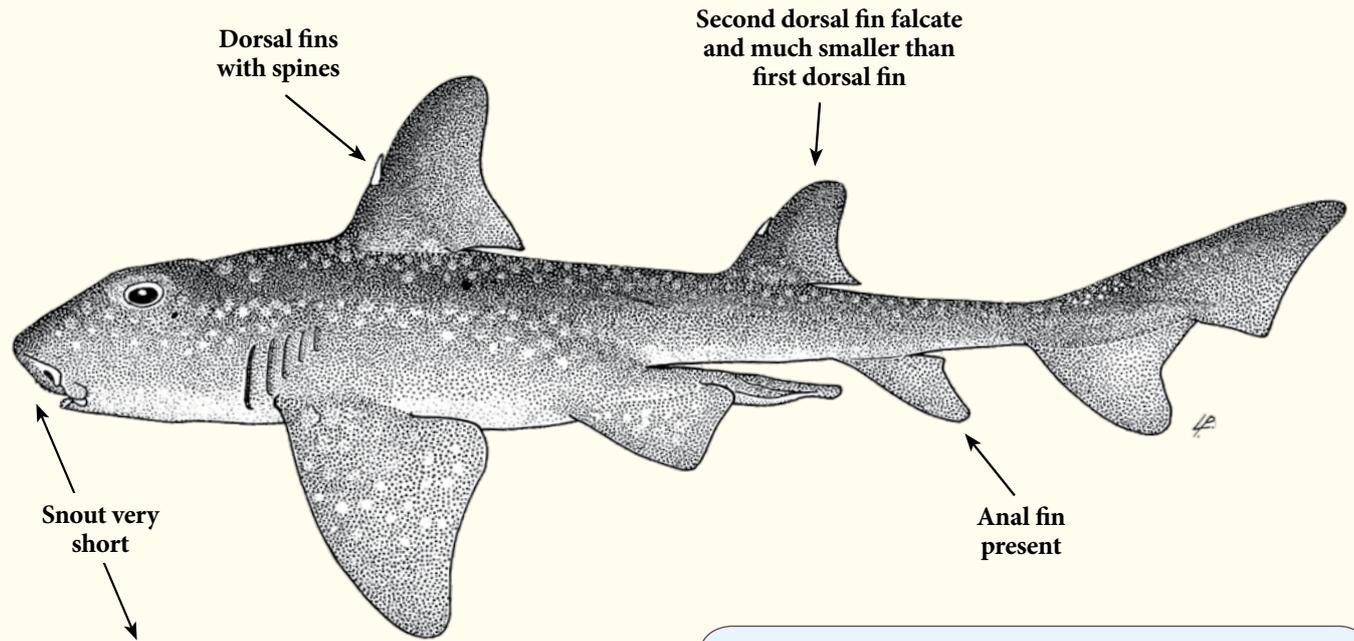
Frontal view of head

Endemic to south-western Australia

Heterodontus ramalheira (Smith, 1949)

Whitespotted bullhead shark – Requin dormeur chabot
Dormilón boquigrande

Tubarão dorminhoco de Moçambique (Por)



Underside of head

Colour

Colour pattern of white spots on variegated darker background including dark saddles in adults. Juveniles with a unique and striking pattern of numerous thin curved parallel dark lines in whorls on fins and body, lost with growth and absent in adults.

Size

Max. length about 83 cm TL.



Photo of a juvenile: © Oddgeir Alvheim, IMR

Bio-Ecology and Distribution of *Heterodontus ramalheira*

A rare, little-known benthic shark of the outer continental shelf and uppermost slope; unusual for the family in being a deep-water species found at 40 to 275 m, with most records below 100 m. Young individuals including a hatchling have been found off southern Mozambique at 110 m. This shark was once recorded on a sandy bottom, but little else known about its habitat preference.



Pliotrema warreni Regan, 1906

Sixgill sawshark – Requin scie flutien

Tiburón sierra del Cabo

Mutsuera-nokogirizame (Jpn)

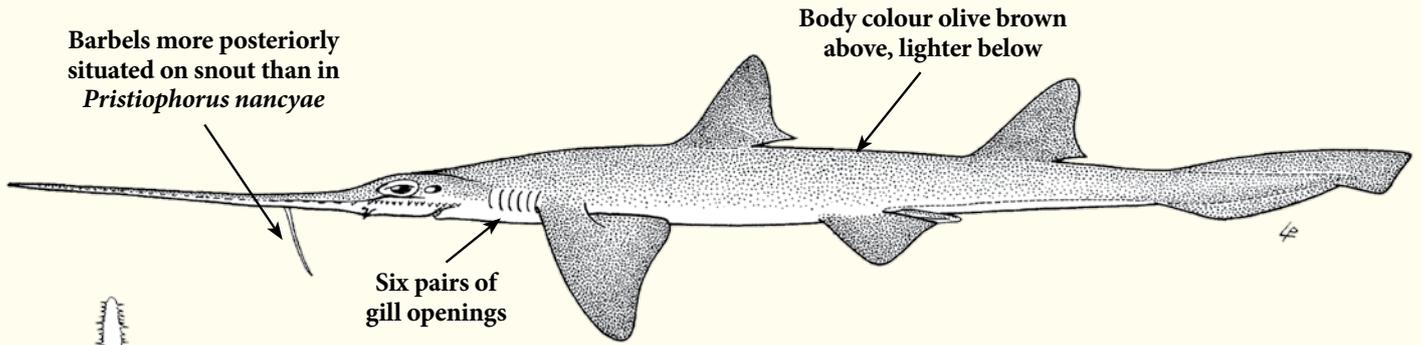
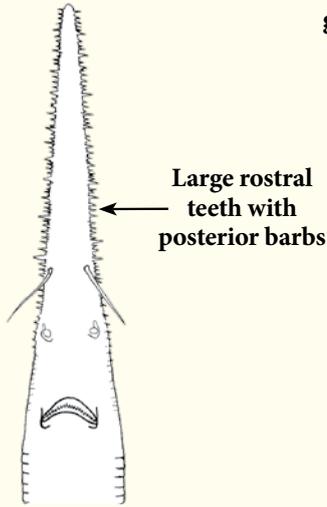


Photo: © Oddgeir Alvheim, IMR

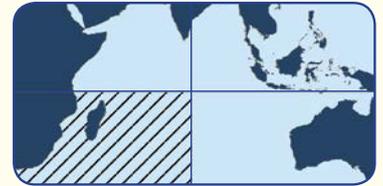


Underside of head

Size
Max. length
at least 136 cm TL.



Depth range
37–500 m



Pristiophorus nancyae Ebert and Cailliet, 2011

African dwarf sawshark

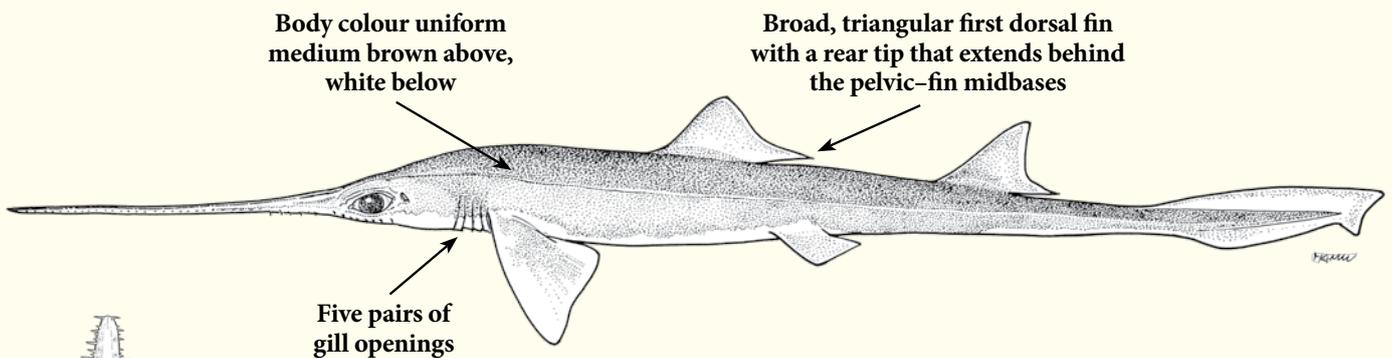
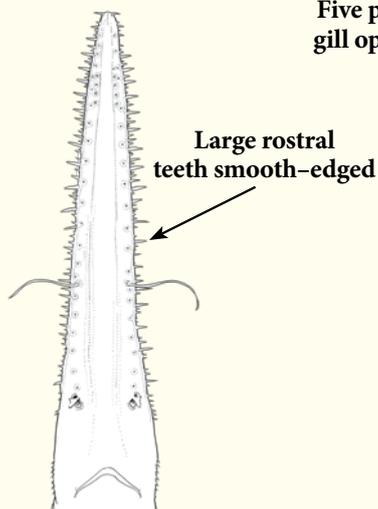


Photo: © Oddgeir Alvheim, IMR



Underside of head

Size
Max. length
about 62 cm TL.



Depth range
286–500 m



Pristiophoridae – Saw sharks
Pristiophoriformes

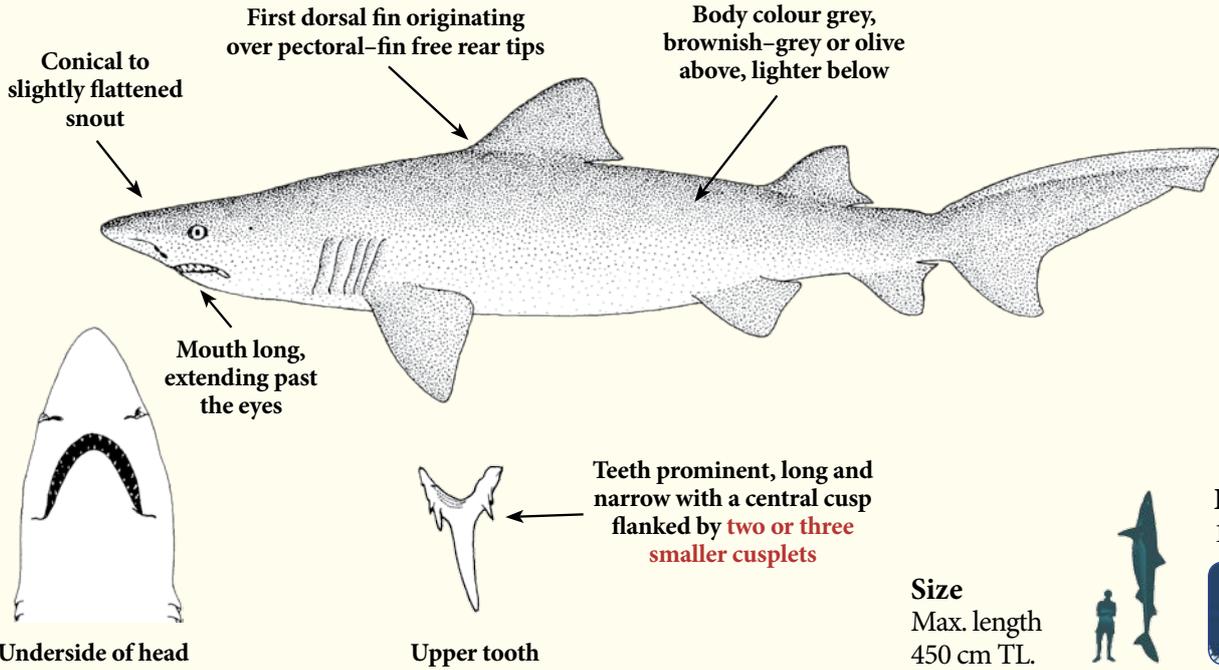
Odontaspidae – Sand tiger sharks

Odontaspis ferox (Risso, 1810)

Smalltooth sand tiger – Requin féroce – Solrayo

범상어 (Kor)

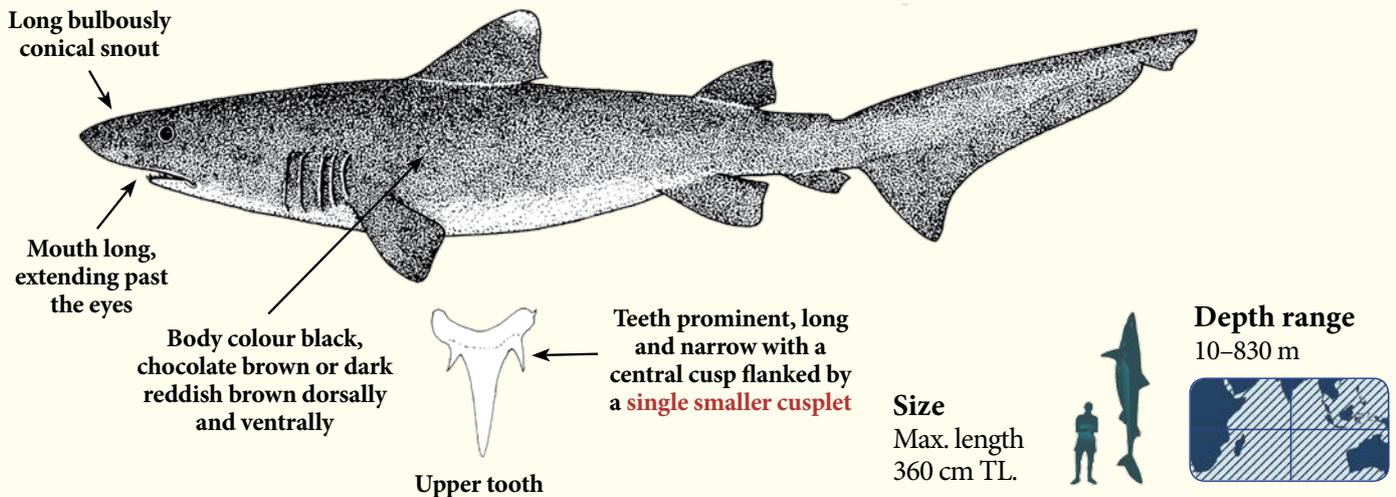
LOO



Odontaspis noronhai (Maul, 1955)

Bigeye sand tiger shark – Requin noronhai – Solrayo ojigrande

ODH

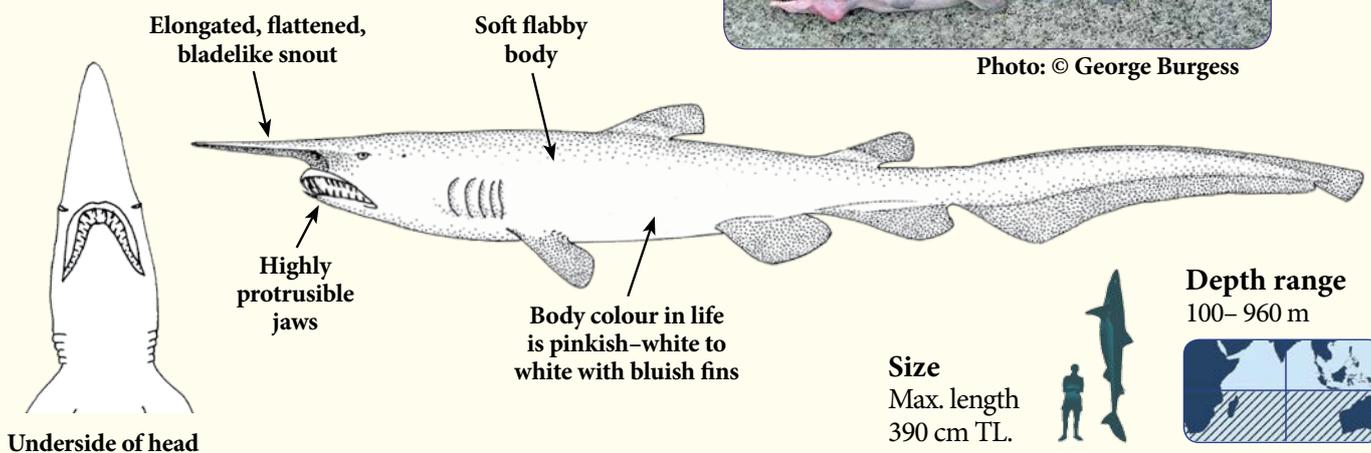


Mitsukurinidae – Goblin sharks

Mitsukurina owstoni Jordan, 1898

Goblin shark – Requin lutin – Tiburón duende

LMO

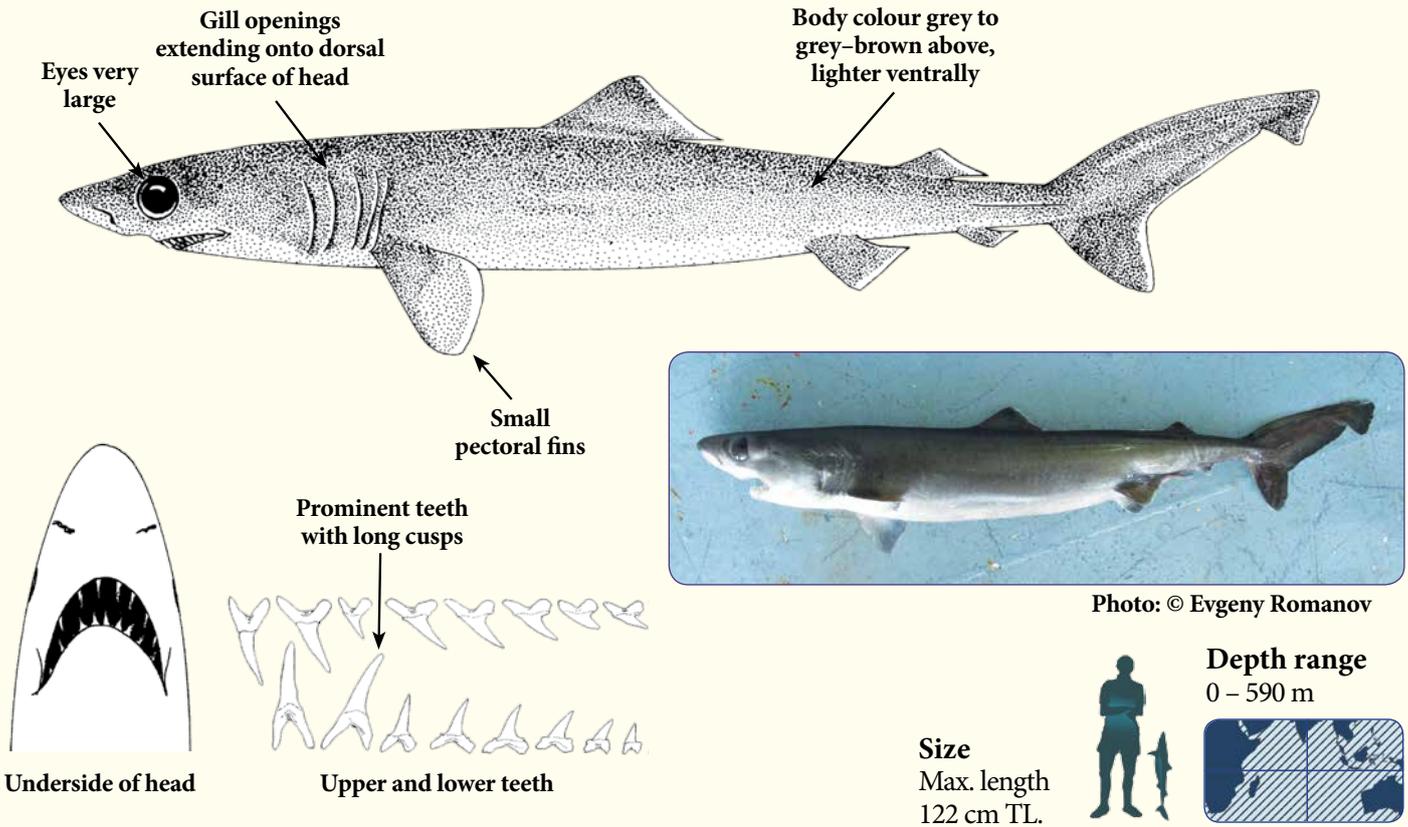


Pseudocarchariidae – Crocodile sharks

Pseudocarcharias kamoharai (Matsubara, 1936)
Crocodile shark – Requin crocodile – Tiburón cocodrilo

강남상어 (Kor)

PSK

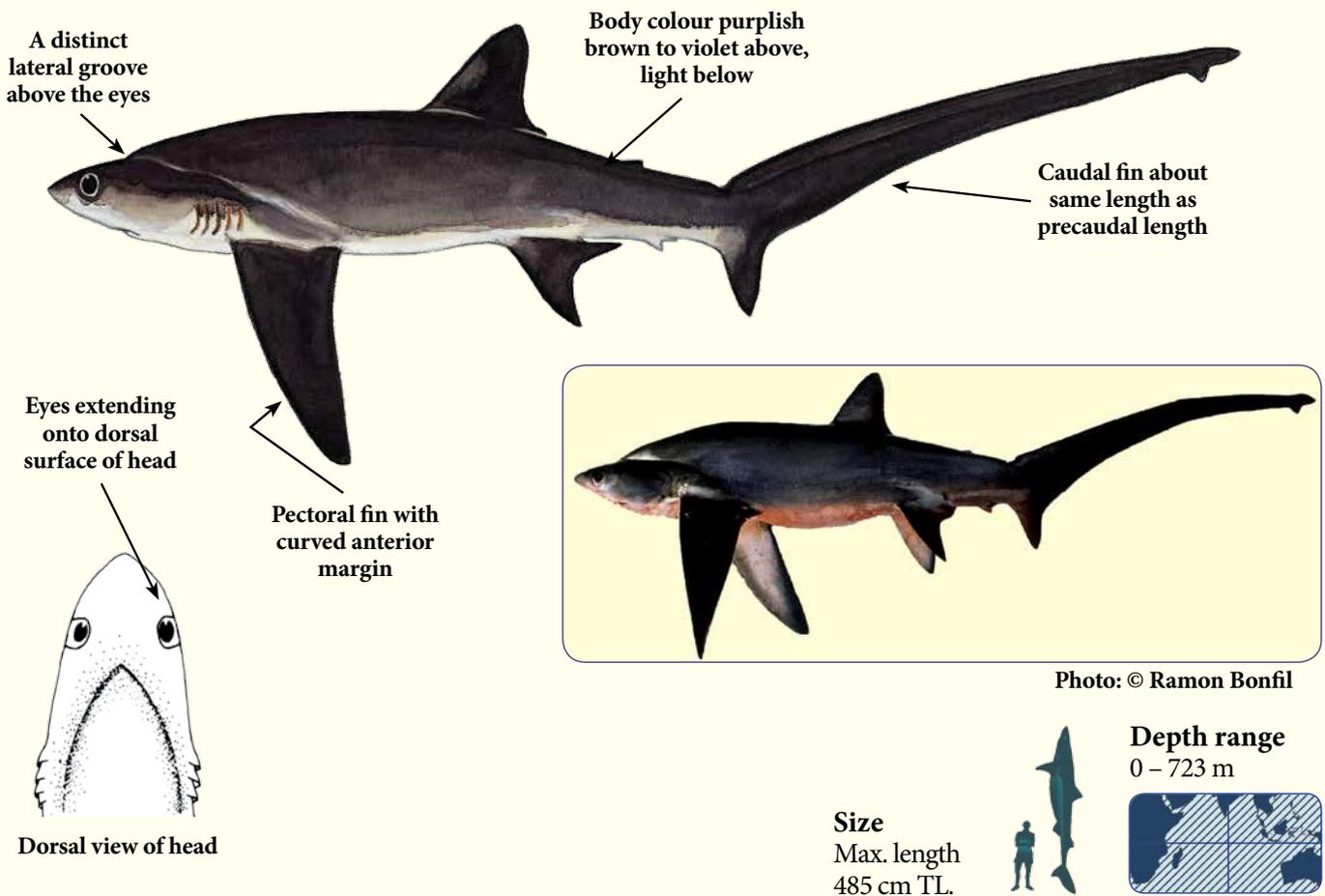


Alopiidae – Thresher sharks

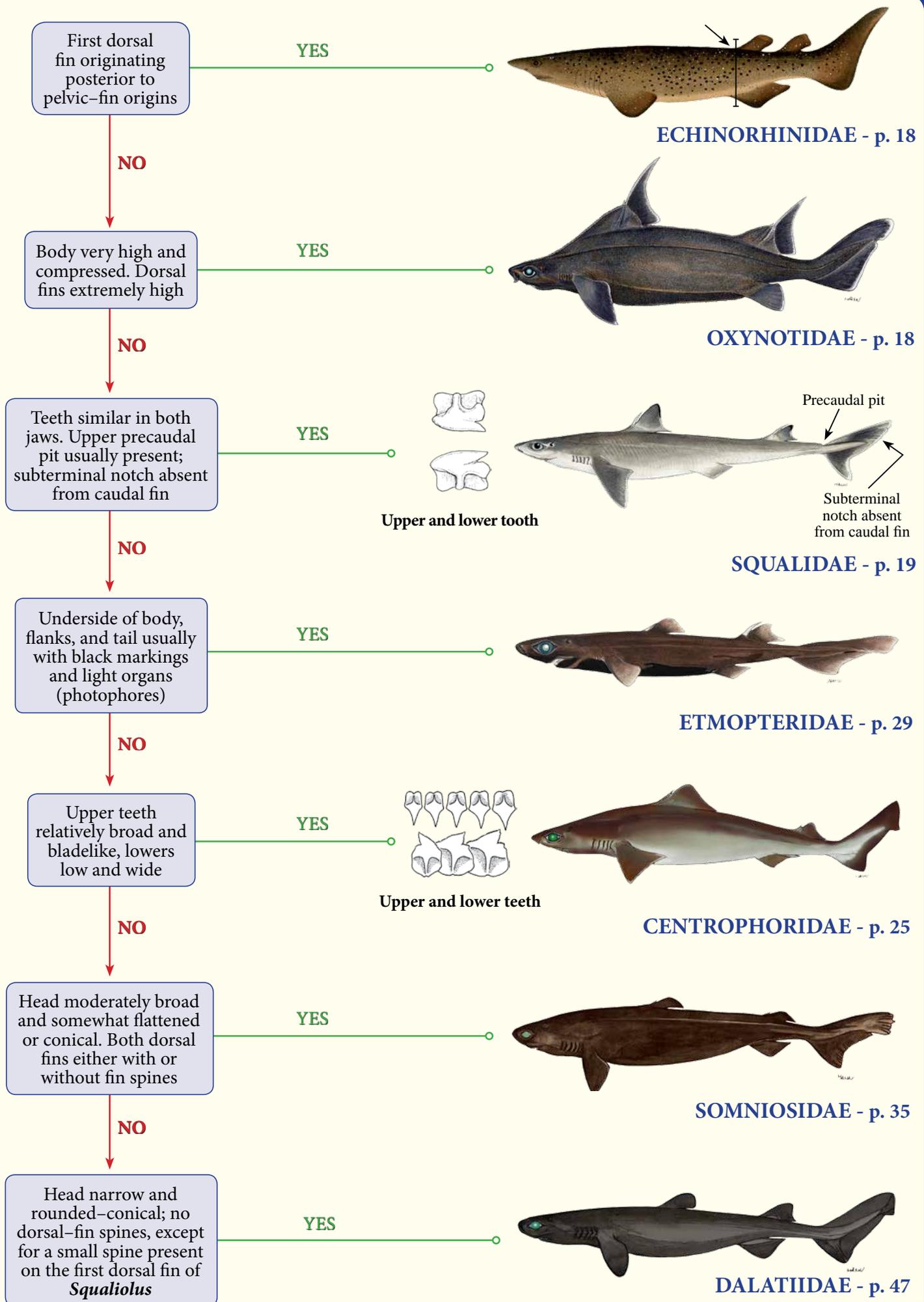
Alopias superciliosus Lowe, 1841
Bigeye thresher – Renard à gros yeux – Zorro ojón

큰눈한도상어 (Kor)

BTH

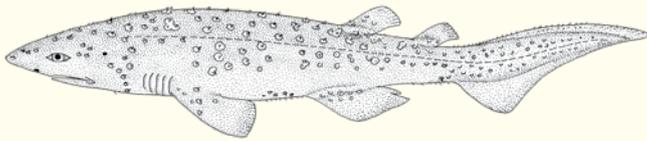


GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP-SEA SQUALIFORMES

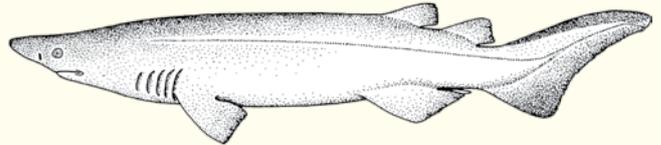


FAMILIES AND SPECIES OF SQUALIFORMES INCLUDED IN THE FIELD GUIDE

ECHINORHINIDAE

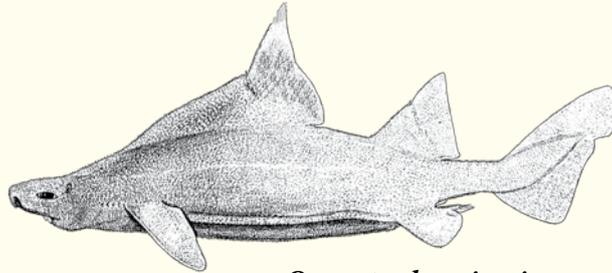


Echinorhinus brucus



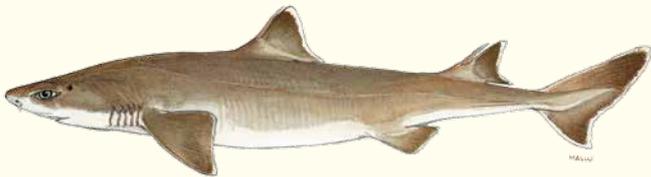
Echinorhinus cookei

OXYNOTIDAE

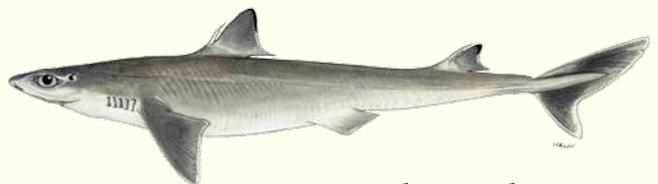


Oxynotus bruniensis

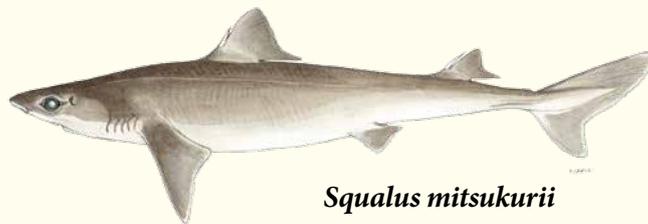
SQUALIDAE



Cirrhigaleus asper



Squalus megalops

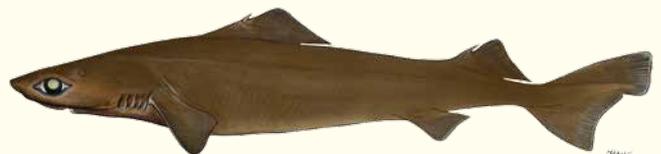


Squalus mitsukurii

CENTROPHORIDAE



Centrophorus granulosus

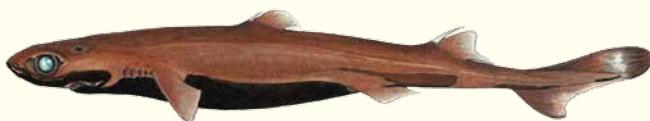


Centrophorus squamosus



Deania calcea

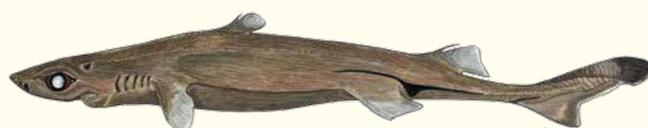
ETMOPTERIDAE



Etmopterus pusillus



Etmopterus granulosus



Etmopterus sculptus

FAMILIES AND SPECIES OF SQUALIFORMES INCLUDED IN THE FIELD GUIDE

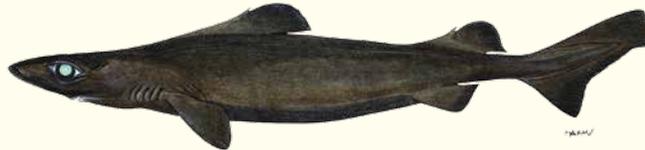
SOMNIOSIDAE



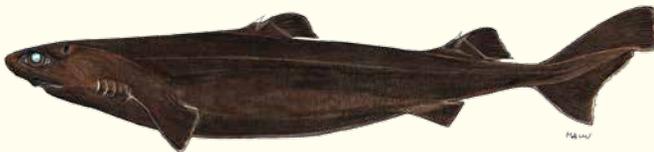
Centroscyrnus coelolepis



Centroscyrnus owstonii



Centroselachus crepidater



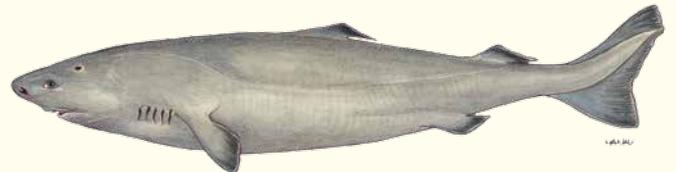
Proscymnodon plunketi



Zameus squamulosus

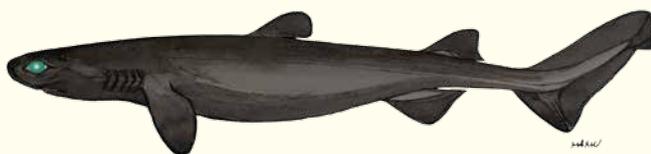


Scymnodalatias albicauda



Somniosus antarcticus

DALATIIDAE



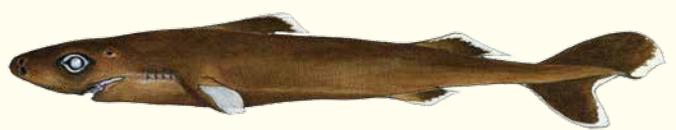
Dalatias licha



Euprotomicrus bispinatus



Isistius brasiliensis



Heteroscymnoides marleyi



Squaliolus aliae

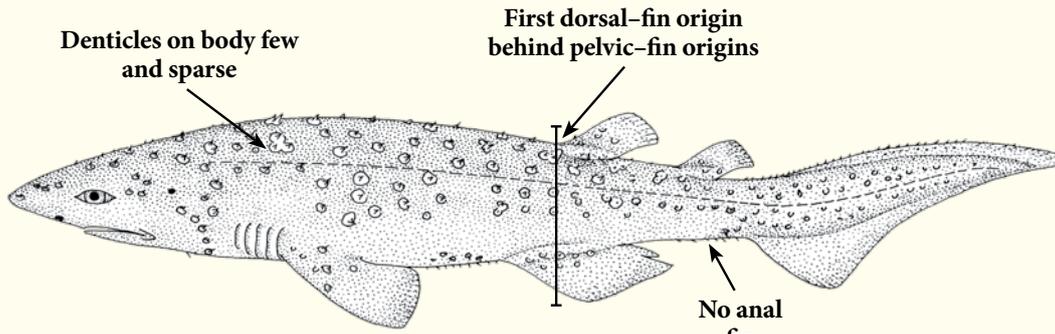
Echinorhinidae – Bramble sharks

Echinorhinus brucus (Bonnaterre, 1788)

Bramble shark – Squale bouclé – Tiburón de clavos

Kikuzame (Jpn)

SHB



Dermal denticles

Denticles enlarged, conspicuous, not stellate and with some fused into plates with multiple cusps

Colour

Uniformly grey or brownish to black or grey-black, usually lighter ventrally.

Size

Maximum length about 310 cm TL.



Depth range

200–900 m

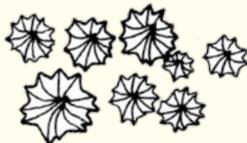
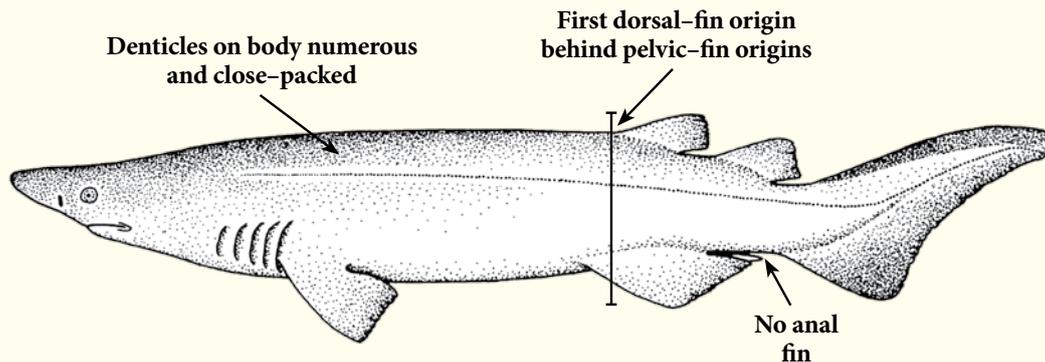


Echinorhinus cookei Pietschmann, 1928

Prickly shark – Squale bouclé du Pacifique – Tiburón negro espinoso

Kogikuzame (Jpn)

ECK



Dermal denticles

Denticles relatively small, with stellate bases and not fused into plates with multiple cusps

Colour

Uniform brown to salty grey or black, with lighter coloring around the mouth and ventral surface of snout.

Size

Maximum length about 400 cm TL.



Depth range

10–1100 m



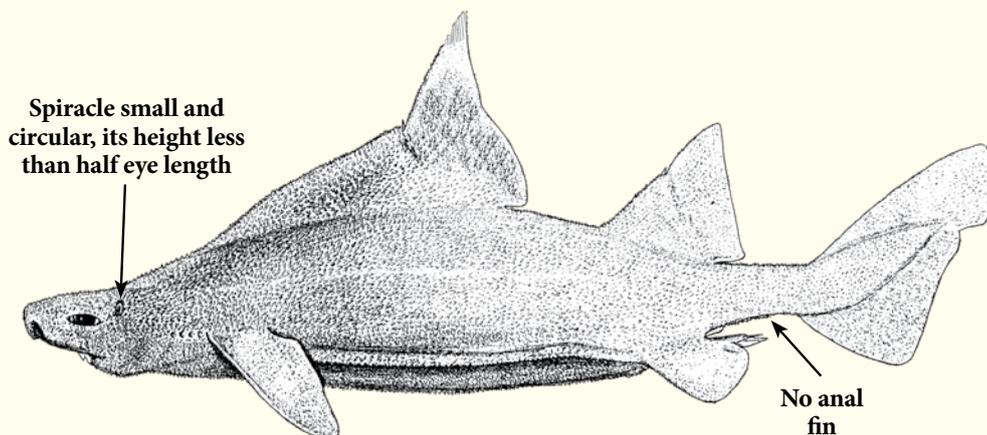
Oxynotidae – Rough sharks

Oxynotus bruniensis (Ogilby, 1893)

Prickly dogfish – Centrine aiguille – Cerdo marino agujeta

Minami-orosizame (Jpn)

OXB



Colour

Uniform grey-brown, without prominent markings.

Size

Maximum length about 90 cm TL.



Depth range

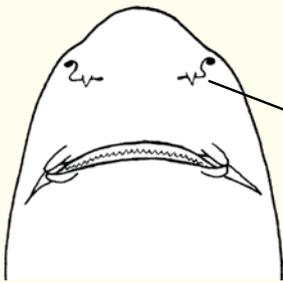
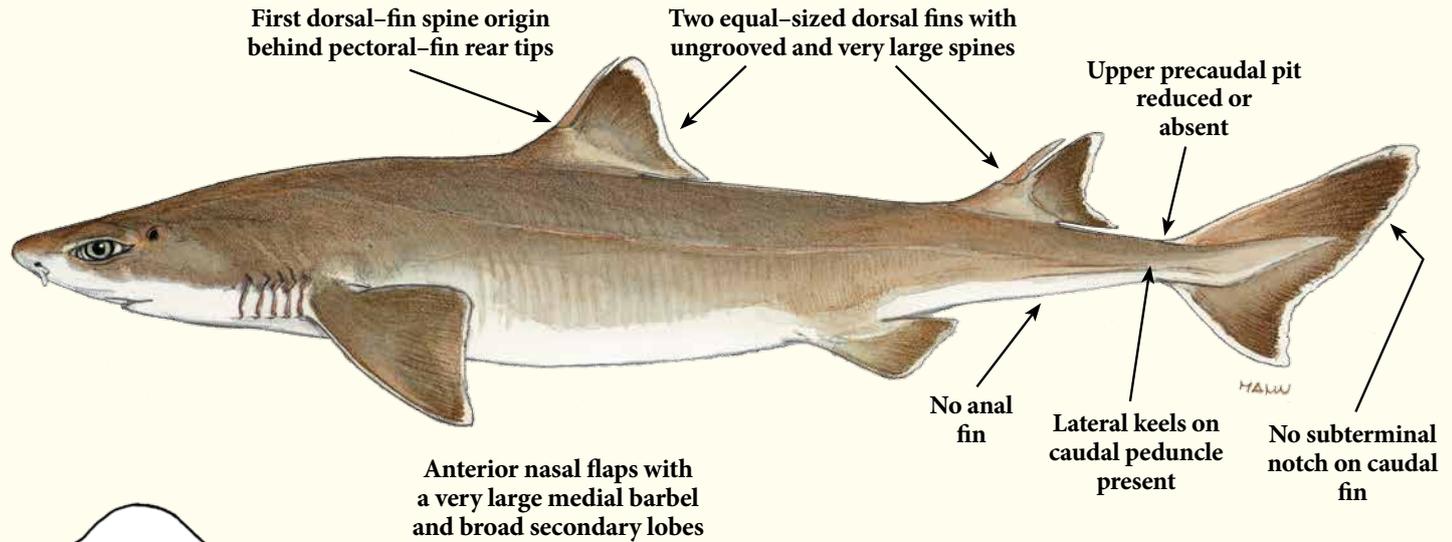
50–1000 m



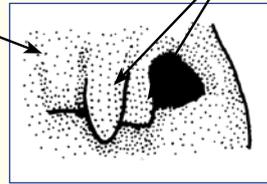
Cirrhigaleus asper (Merrett, 1973)

Roughskin spurdog – Aiguillat à peau rugueuse
Galludo raspa

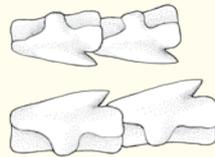
Quelme rugoso (Por)



Underside of head



Detail of nostril



Upper and lower teeth

Colour
Uniform light brown to grey above, whitish below; fins conspicuously white-edged.

Size
Maximum length up to 123.5 cm TL.



Dermal denticle (Dorsal view)



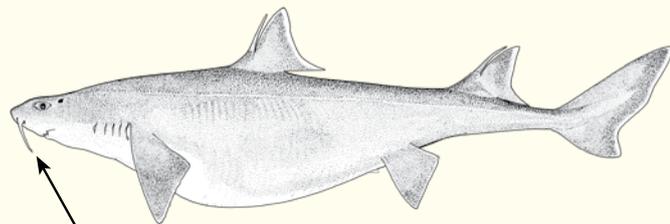
Photo: © Rob Leslie



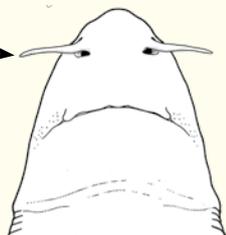
Photo: © George Burgess

Similar species

Cirrhigaleus australis

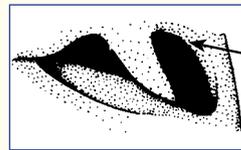


Anterior nasal flaps with very long barbels reaching to level of mouth



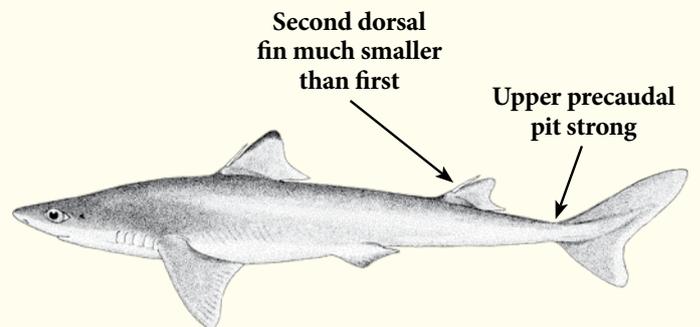
Underside of head

All *Squalus* species



Detail of nostril

Anterior nasal flaps with secondary lobe small and narrow to absent



Second dorsal fin much smaller than first

Upper precaudal pit strong

Bio-Ecology and Distribution of *Cirrhigaleus asper*

A little-known but very distinctive spiny dogfish of the upper continental and insular slopes and outer continental shelves of warm temperate to tropical seas. Found on or near the bottom, at depths of 73 to 600 m. Often caught well offshore on the upper slopes, but sometimes found off bays and river mouths (Eastern Cape and KwaZulu-Natal, South Africa), at depths of 73 to 110 m.

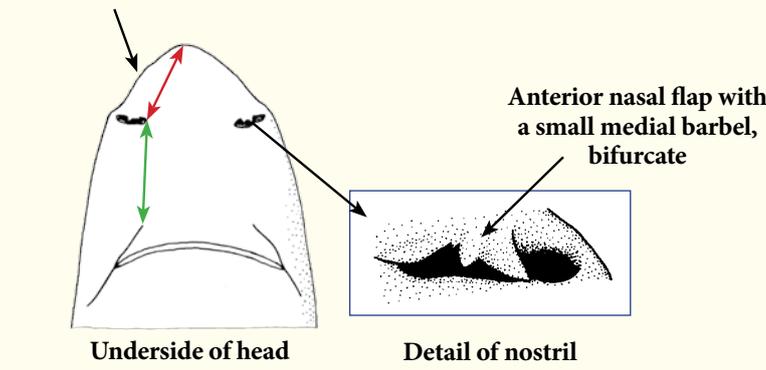
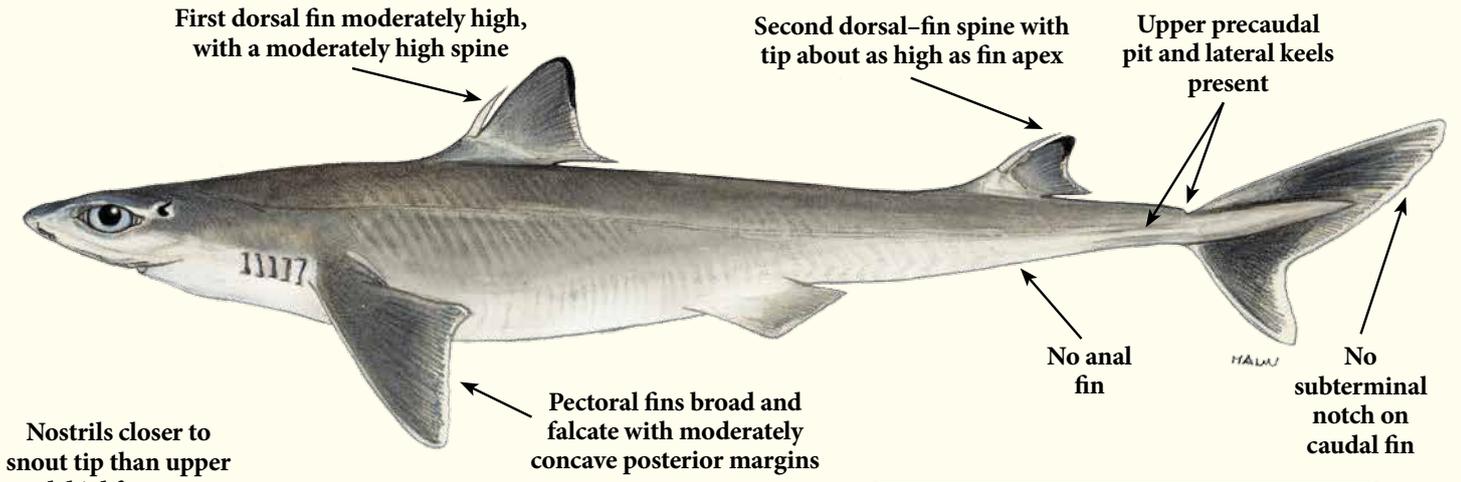
Biology sketchily known. Viviparous with yolk-sac, and with large litters of 18 to 22 young. Eats bony fish and squid.

The recent recognition of *Cirrhigaleus australis* being a separate species from Australian and New Zealand waters suggests that closer examination of this species from some of the widely dispersed areas it is reported to occur may be needed in order to confirm whether it is sporadically distributed or may represent additional species.



Squalus megalops (Macleay, 1881)
Shortnose spurdog – Aiguillat nez court
Galludo ñato

Tsumari-tsunozame (Jpn)
 Quelme liso (Por)
 모조리상어 (Kor)



Colour
 Light grey-brown to dark brown above, lighter below. Pectoral fins dusky above with light posterior margins. Dorsal fins with black tips and white posterior margins and rear tips often inconspicuous in adults. Caudal fin with light dorsal margin.

Size
 Maximum length for both sexes about 77 cm TL, though most are smaller than 65 cm TL.

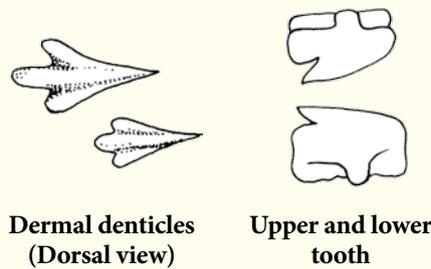
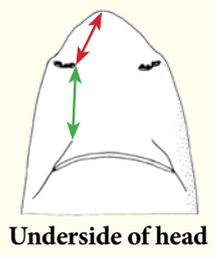


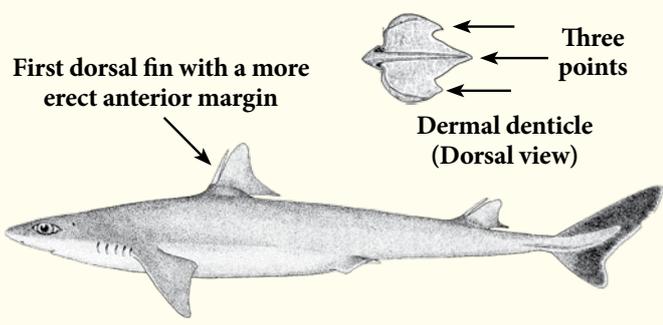
Photo: © Rob Leslie

Similar species

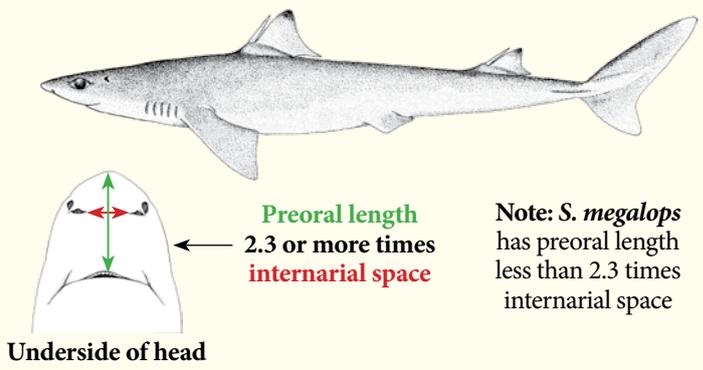
The following species share with *Squalus megalops* the following characteristic: the distance from snout tip to inner margin of nostril is **shorter** than the distance from inner edge of nostril to front of upper labial furrow.



Squalus altipinnis

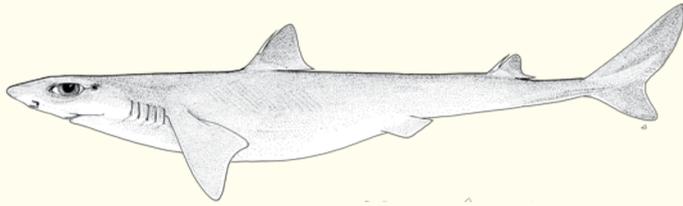


Squalus crassispinus



Note: *S. megalops* has preoral length less than 2.3 times internarial space

Squalus lalannei

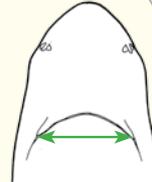
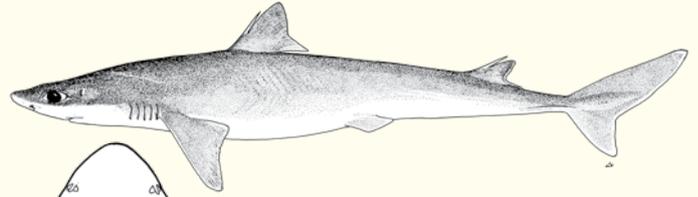


Nasal flaps not bifurcate

Detail of nostril

Known only from off Alphonse Island, Seychelles

Squalus hemipinnis



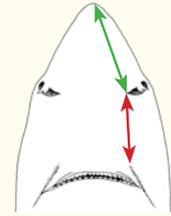
Underside of head

Snout short and mouth width less than 7.7% total length

Note: *S. megalops* has mouth width more than 7.8% total length

Other similar species

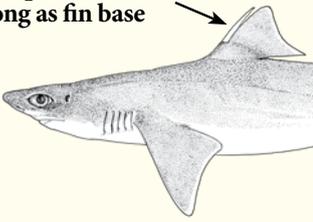
The following species can be distinguished from *Squalus megalops* by the fact that they have the distance from snout tip to inner margin of nostril **longer** than the distance from inner edge of nostril to front of upper labial furrow.



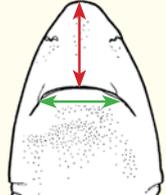
Underside of head

Squalus blainville

First dorsal fin high with spine about as long as fin base



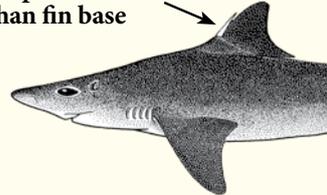
Preoral snout usually less than 1.4 times mouth width



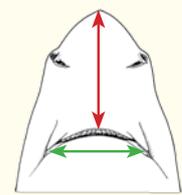
Underside of head

Squalus mitsukurii

First dorsal fin lower with spine shorter than fin base



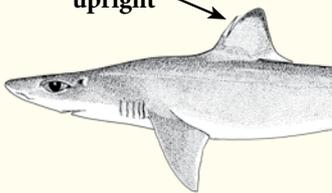
Preoral snout usually less than 1.4 times mouth width



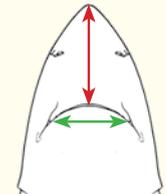
Underside of head

Squalus edmundsi

First dorsal fin and its associated spine almost upright



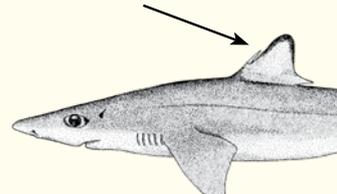
Preoral snout elongated, about 1.5 to 2.4 times mouth width



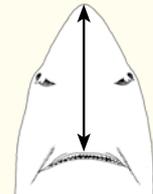
Underside of head

Squalus nasutus

First dorsal-fin spine much shorter than second dorsal-fin spine

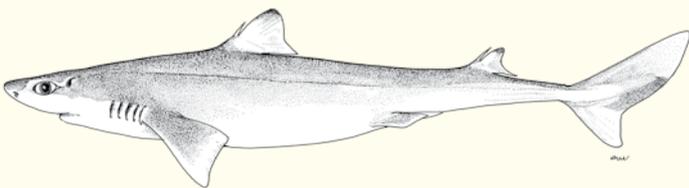


Snout very long



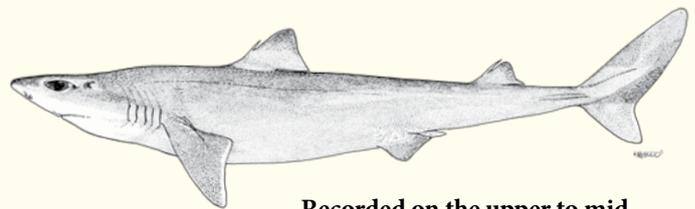
Underside of head

Squalus montalbani



Recorded on the upper continental slope in eastern Indonesia and western Australia

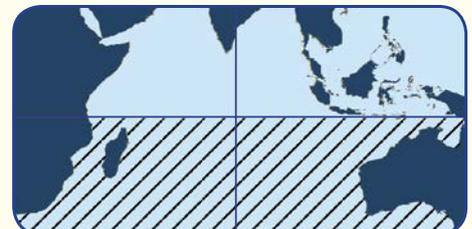
Squalus chloroculus



Recorded on the upper to mid continental slope off southern Australia

Bio-Ecology and Distribution of *Squalus megalops*

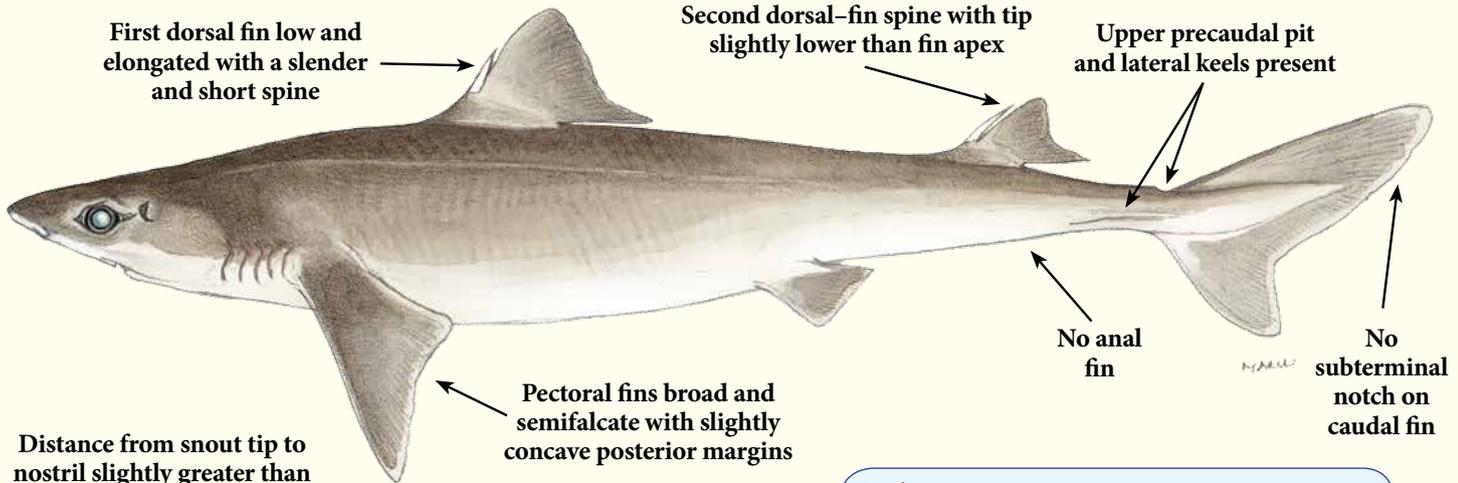
A common to abundant small dogfish of temperate and tropical seas, found on the inner and outer continental shelves and upper slopes. Generally found on or near the bottom at depths from close inshore and the intertidal down to 732 m.



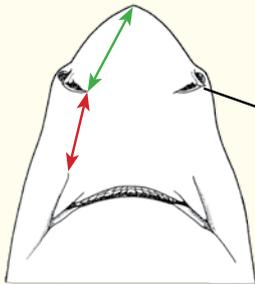
Squalus mitsukurii Jordan and Snyder, 1903

Shortspine spurdog – Aiguillat épinette
Galludo espinilla

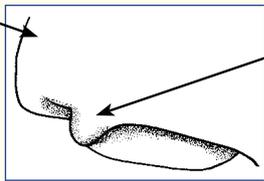
Futo-tsunozame (Jpn)
Quelme mitsukuri (Por)
돛발상어 (Kor)



Distance from snout tip to nostril slightly greater than that from nostril to front of upper labial furrow



Underside of head



Detail of nostril

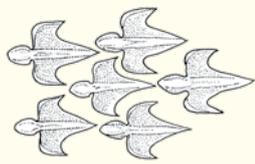
Anterior nasal flap with a small medial barbel

Colour

Grey or grey-brown above, white or lighter grey below. Pectoral fins dusky above with white tips and posterior margins. Caudal fin with a dusky web and lighter base and often a dark patch (black in young) at subcaudal notch.

Size

Maximum length about 125 cm TL.



Dermal denticles (Dorsal view)



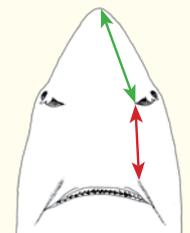
Upper and lower tooth



Photo: © Oddgeir Alvheim, IMR

Similar species

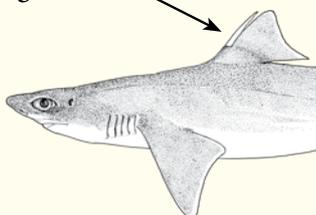
The following species share with *Squalus mitsukurii* the following characteristic: the distance from snout tip to inner margin of nostril is **longer** than the distance from inner edge of nostril to front of upper labial furrow.



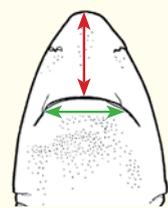
Underside of head

Squalus blainville

First dorsal fin high with spine about as long as fin base



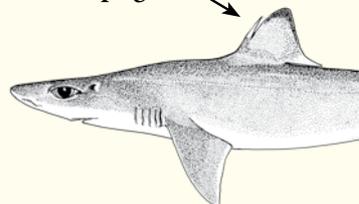
Preoral snout usually less than 1.4 times mouth width



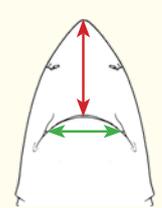
Underside of head

Squalus edmundsi

First dorsal fin and its associated spine almost upright



Preoral snout elongated, about 1.5 to 2.4 times mouth width

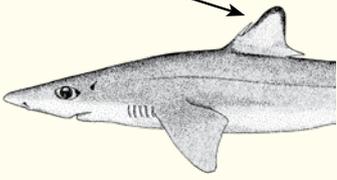


Underside of head

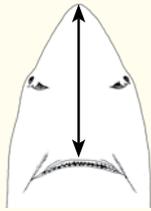
Recorded on the upper continental slope in eastern Indonesia and western Australia

Squalus nasutus

First dorsal-fin spine much shorter than second dorsal-fin spine



Snout very long

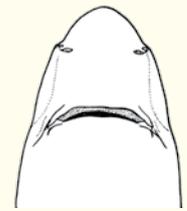
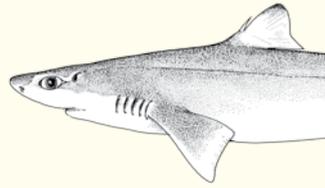


Underside of head

Recorded on the upper continental slope in eastern Indonesia and western Australia

Squalus montalbani

Snout relatively broad, moderately long

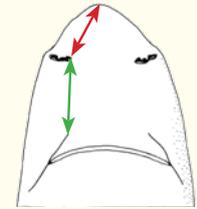


Underside of head

Recorded on the upper continental slope in eastern Indonesia and western Australia

Other similar species

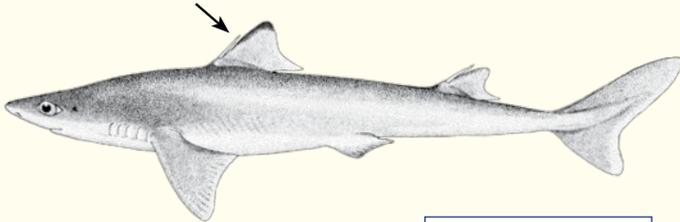
The following species can be distinguished from *Squalus mitsukurii* by the fact that they have the distance from snout tip to inner margin of nostril **shorter** than the distance from inner edge of nostril to front of upper labial furrow.



Underside of head

Squalus megalops

First dorsal fin moderately high, with a moderately high spine

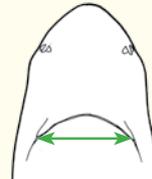
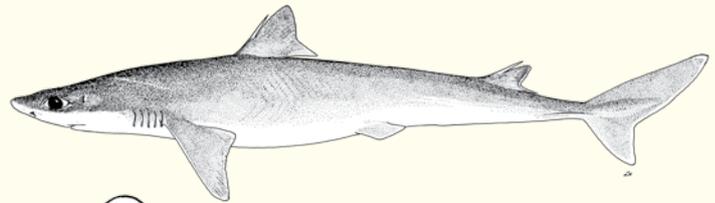


Anterior nasal flap with a small medial barbel, bifurcate



Detail of nostril

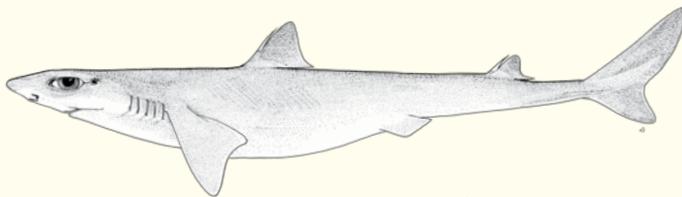
Squalus hemipinnis



Snout short and mouth width less than 7.7% total length

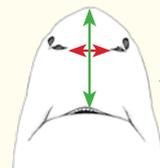
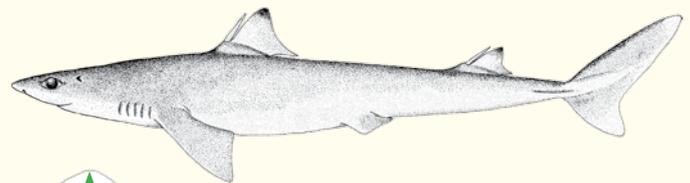
Underside of head

Squalus lalannei



Known only from off Alphonse Island, Seychelles

Squalus crassispinus



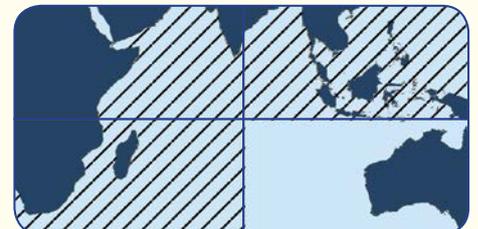
Preoral length 2.3 or more times internarial space

Underside of head

Recorded on the upper continental slope off western Australia

Bio-Ecology and Distribution of *Squalus mitsukurii*

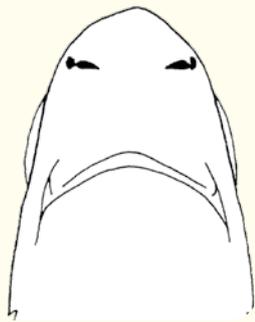
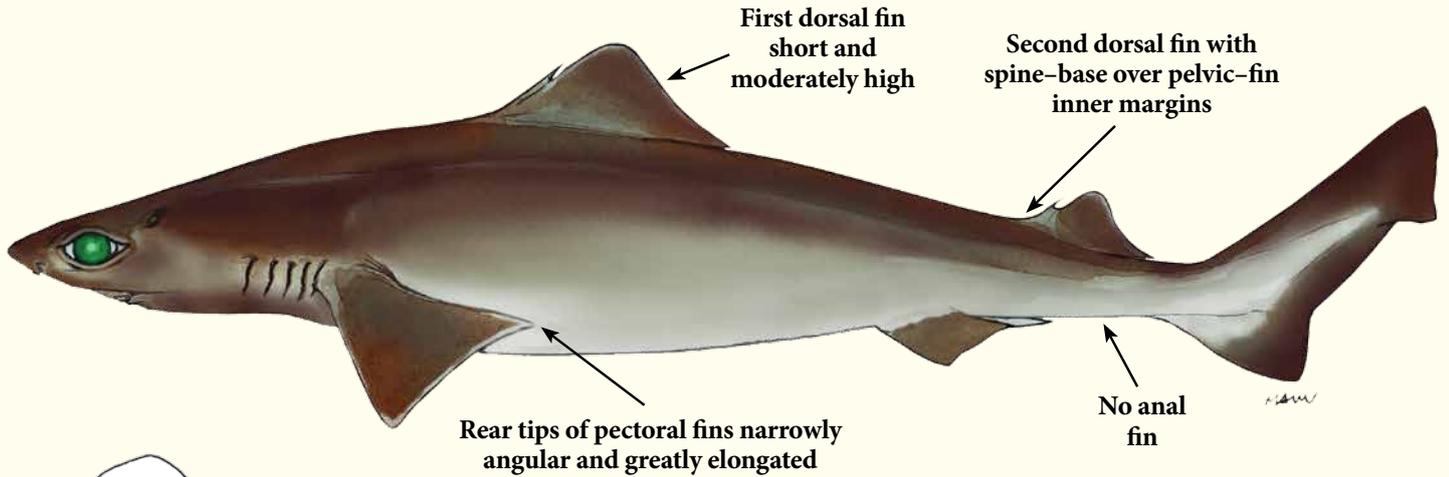
A dogfish of cold temperate to tropical seas. Found near or on the bottom on the continental and insular shelves, upper slopes, submarine ridges and seamounts at depths of 4 to 954 m, mostly between 100 and 500 m. Common to abundant where it occurs, often found in large aggregations or schools.



Centrophorus granulosus (Bloch and Schneider, 1801)

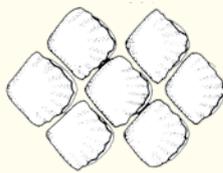
Gulper shark – Squale–chagrin commun
Quelvacho

Uroko–aizame (Jpn)
Lixa granulosa (Por)



Underside of head

Dermal denticles low and rhomboidal



Dermal denticles (Dorsal view)

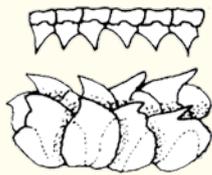
Note: Be aware that young specimens of the gulper shark (size less than 80 cm) present lateral trunk denticles similar to those of *C. squamosus*

Colour

Body dark grey or grey–brown above, lighter below, with dusky fin webs but no prominent blackish fin markings.

Size

Maximum length about 166 cm TL.



Upper and lower teeth



Photo: © Paul Clerkin

Similar species

Centrophorus squamosus

Leaf-shaped denticles on elevated narrow to broad pedicels extending above the denticle bases



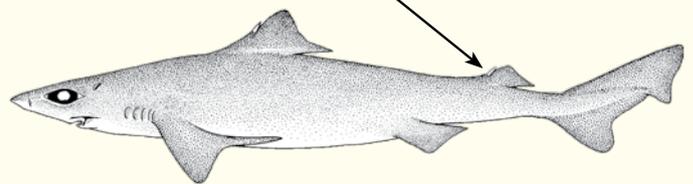
Dermal denticles (Dorsal and lateral view)



Rear tips of pectoral fins hardly angular and slightly elongated

Centrophorus moluccensis

Second dorsal fin very small, with second dorsal–fin spine origin usually well posterior to pelvic–fin rear tips



Centrophorus lusitanicus

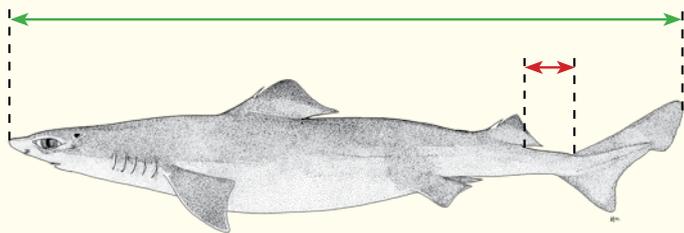
First dorsal fin very low and greatly elongated



Other similar species

Centrophorus seychellorum

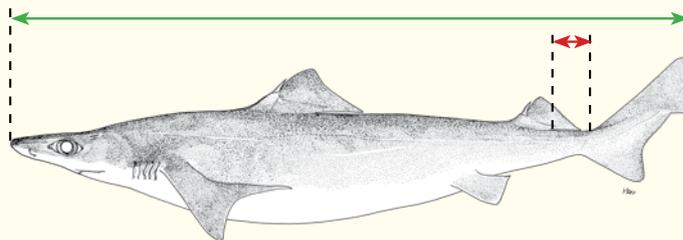
Dorsal–caudal space relatively long,
more than 8% total length



Known only from off
Alphonse Island, Seychelles

Centrophorus isodon

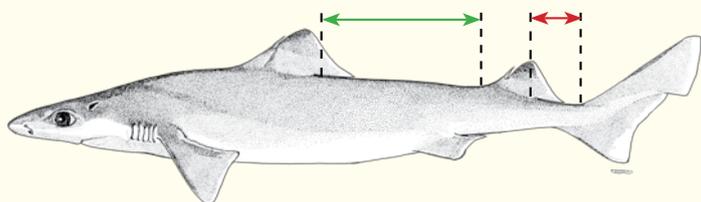
Dorsal–caudal space relatively short,
less than 7% total length



Known from the Maldiv
Islands and possibly Sri Lanka

Centrophorus westraliensis

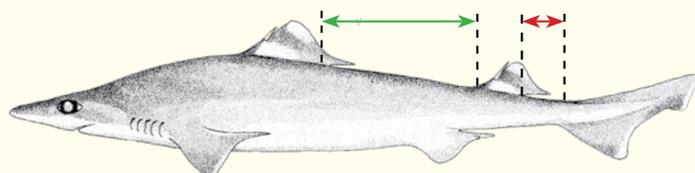
Dorsal fins relatively close together;
interdorsal space less than 2.8 times
dorsal–caudal space



Endemic to the western coast of Australia,
specifically from Shark Bay to Cape Leeuwin

Centrophorus harrissoni

Dorsal fins well separated;
interdorsal space more than 2.8
times dorsal–caudal space

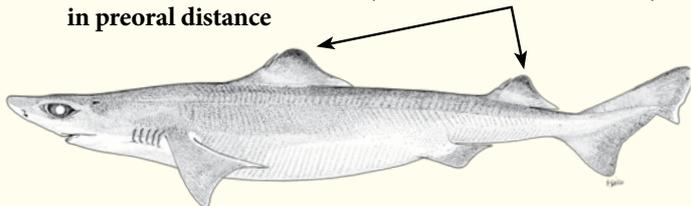


In the Indian Ocean known only
from off Tasmania, Australia

Centrophorus zeehani

Snout relatively short and
thick, depth at front of
mouth is less than 1.9 times
in preoral distance

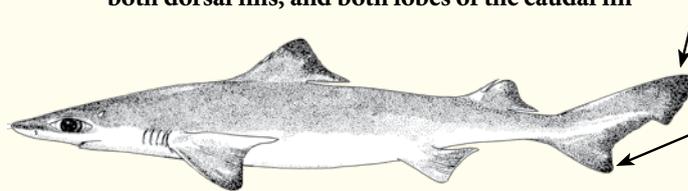
Dorsal–fin apices and
posterior margins dark
(fades somewhat in adults)



Endemic to the southern and
western coast of Australia

Centrophorus atromarginatus

Fins of adults and subadults marked with black tips and
margins, including pectoral and sometimes pelvic fins,
both dorsal fins, and both lobes of the caudal fin

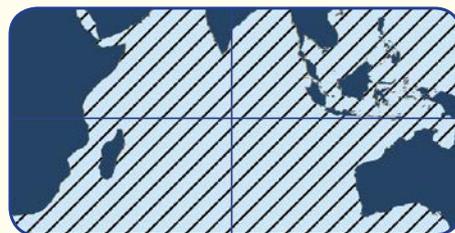


Known to occur off Somalia, India and
Sri Lanka, but distribution is likely wider

Bio–Ecology and Distribution of *Centrophorus granulosus*

A deep–water dogfish of the outer continental shelves and upper slopes, usually on or near the bottom at depths from 50 to 1440 m, but most records between 200 to 600 m.

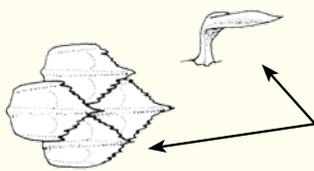
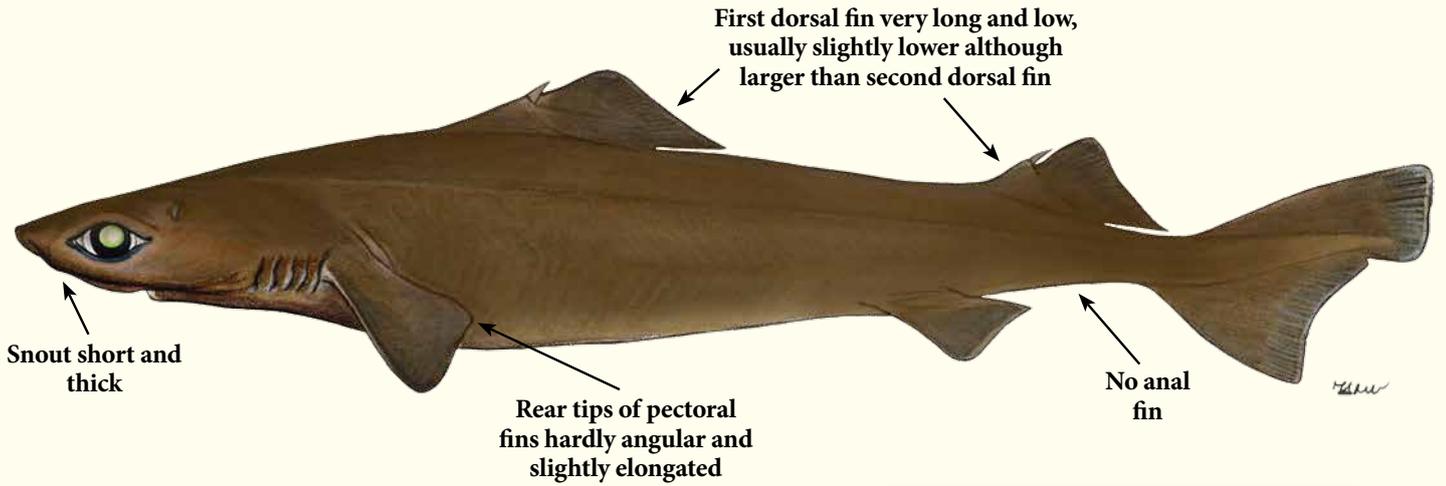
Like other members of this genus, the gulper shark is slow growing, with females maturing in about 16.5 years and males in about 8.5 years. The maximum estimated age for this shark is 39 and 25 years for females and males, respectively.



Centrophorus squamosus (Bonnaterre, 1788)

Leafscale gulper shark – *Squale-chagrin de l'Atlantique*
Quelvacho negro

Momiji-zame (Jpn)
Lixa escamosa (Por)



Dermal denticles
(Dorsal and lateral view)

High rough leaf-shaped, tricuspidate or multicuspidate lateral trunk denticles

Colour

Uniform dark grey, medium to light greyish brown, or brown above and below; underside may be slightly lighter although not conspicuously so.

Size

Maximum length about 164 cm TL.



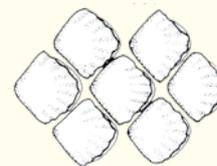
Photo: © Paul Clerkin



Photo: © Oddgeir Alvheim, IMR

Similar species

All other *Centrophorus* species can be distinguished from *Centrophorus squamosus* by the fact that they have lateral trunk denticles with flat sessile crowns on the denticle bases, without separate pedicels, and crowns usually with or sometimes without a posterior medial cusp but no lateral cusps.



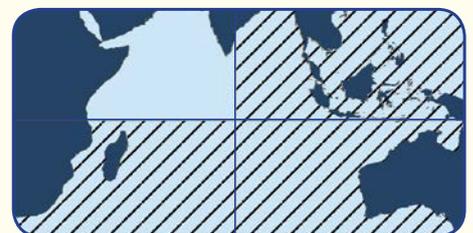
Dermal denticles
(Dorsal view)

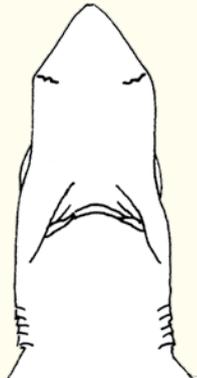
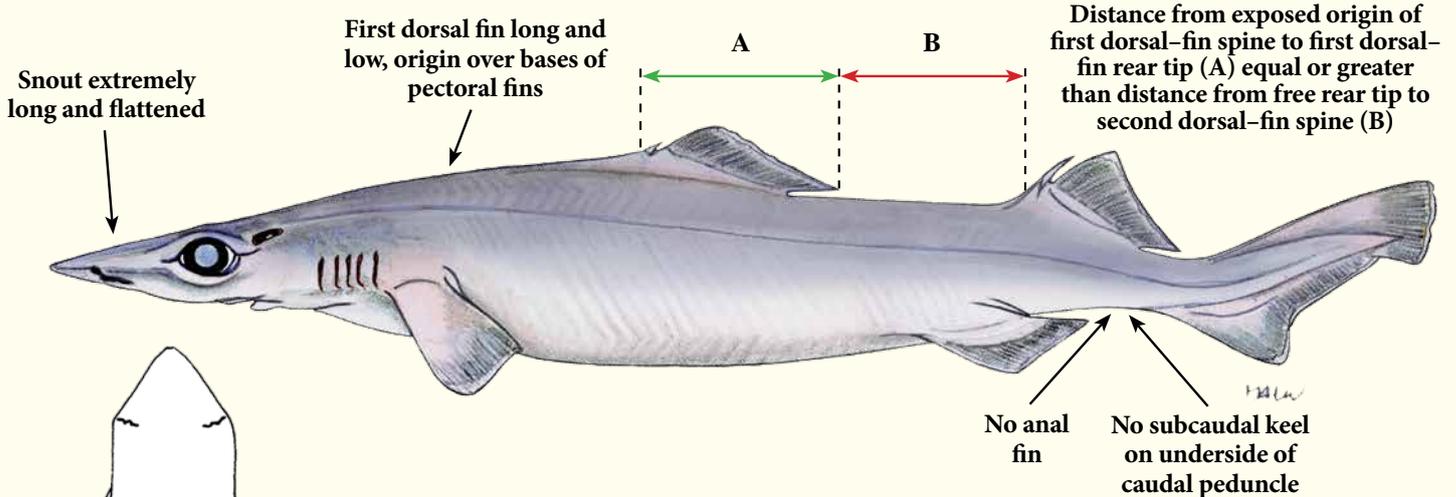


Dermal denticle
(Lateral view)

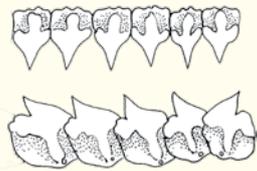
Bio-Ecology and Distribution of *Centrophorus squamosus*

A large deep-water gulper shark of the continental slopes from 229 to 2359 m deep. Off northern KwaZulu-Natal, South Africa, in water 600 to 750 m deep. Off Australia it occurs at depths of 870 to 920 m.





Underside of head



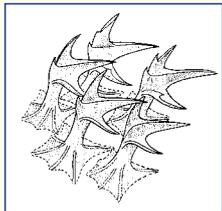
Upper and lower teeth

Colour

Varying from uniform light or dark grey or grey-brown above and below to dark brown; fins darker, fin webs dusky to blackish.

Size

Maximum length about 122 cm TL.



Dermal denticles (Dorso-lateral view)

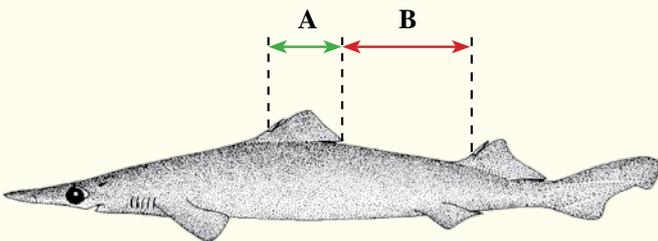


Photo: © Dave Ebert

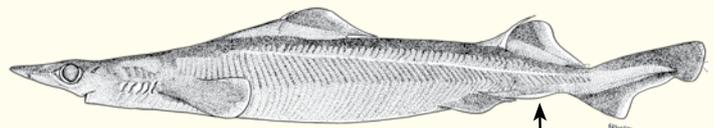
Similar species

Deania quadrispinosa

First dorsal fin rather high, angular, and short; distance from its spine origin to free rear tip (A) about one-half to two-thirds of distance from free rear tip to origin of second dorsal-fin spine (B)



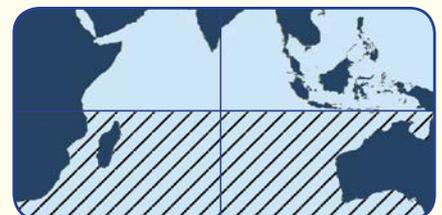
Deania profundorum



A subcaudal keel on the lower surface of the caudal peduncle

Bio-Ecology and Distribution of *Deania calcea*

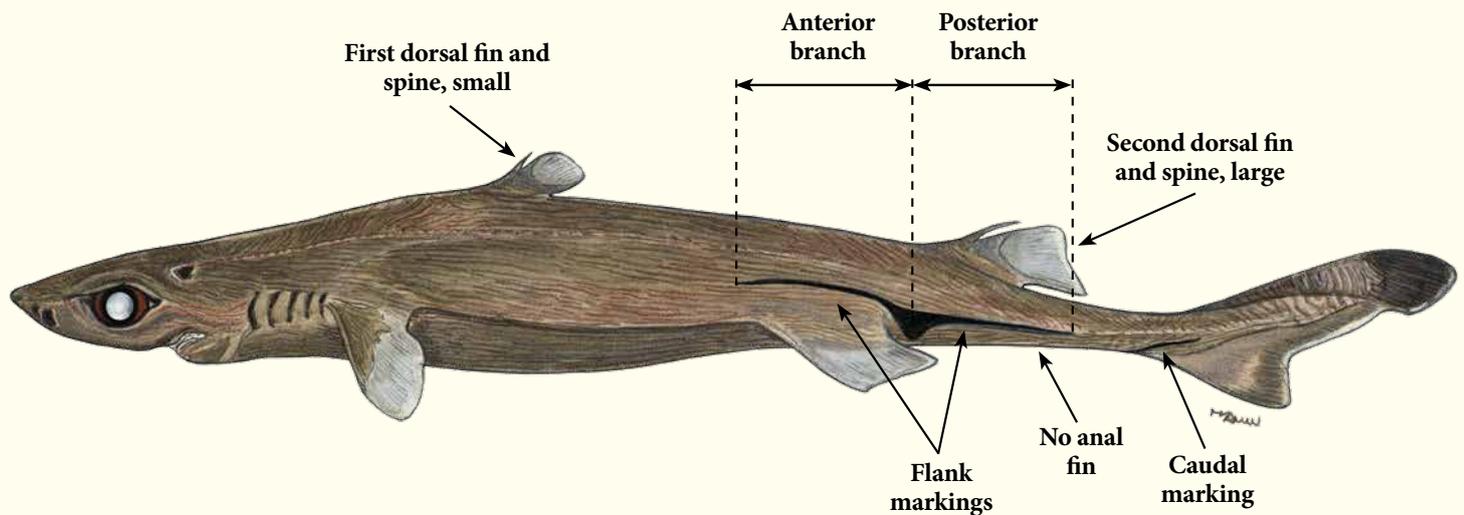
A common deep-water dogfish, sometimes collected in large groups, of the outer continental and insular shelves and upper, middle, and lower slopes from 60 to 1490 m depth, on or near the bottom or well above it.



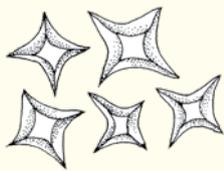
Etmopteridae – Lantern sharks

It's an *Etmopterus* if:

- It does not have an anal fin
- Upper and lower teeth are dissimilar
- Second dorsal fin and fin-spine are larger than the first dorsal fin and fin-spine
- Usually underside of body, flanks, and tail with more or less conspicuous black markings with light organs



Types of Denticles



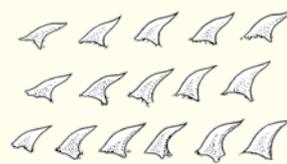
Flat
(make the skin feel smooth)



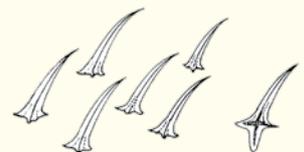
Pointed
(make the skin feel rough)



Stout



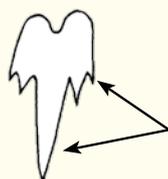
In longitudinal lines



Randomly arranged

Teeth

Note: Because the teeth in the lower jaw have oblique cusps pointing away from the midline, things (e.g. finger) slide easily towards side of mouth, but not towards middle of mouth.



Upper tooth

Upper teeth with a slender cusp and one or more pairs of cusplets



Lower tooth

Lower teeth compressed and knife-like

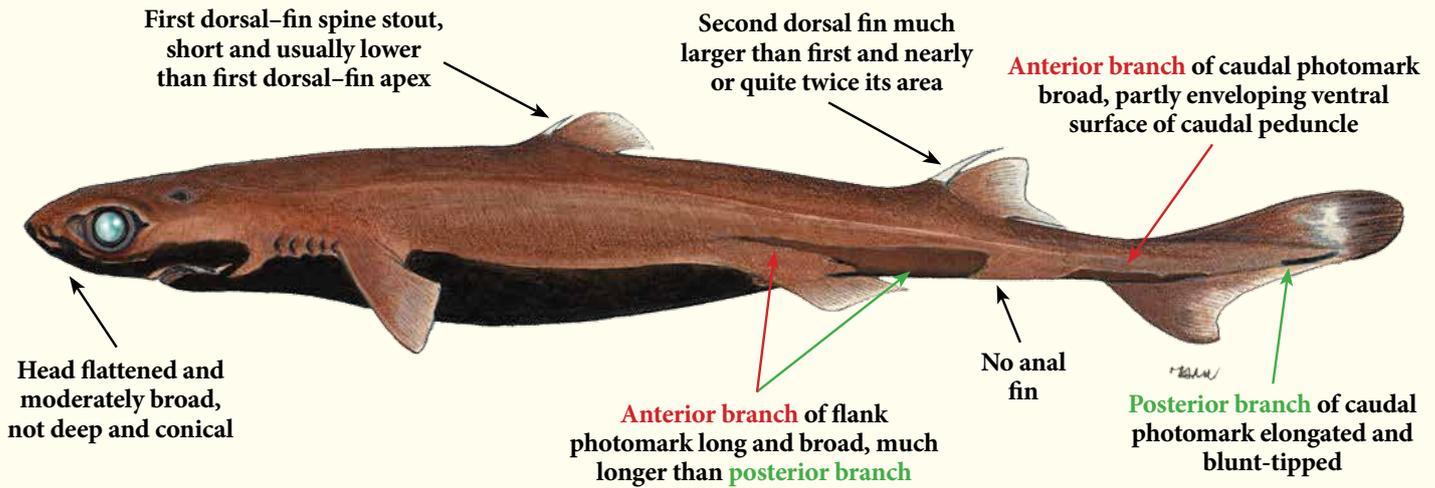
Etmopterus pusillus (Lowe, 1839)

Smooth lanternshark – Sagre nain
Tollo lucero liso

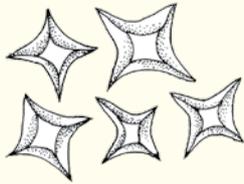
Karasuzame (Jpn)

Lixinha-de-fundura lisa (Por)

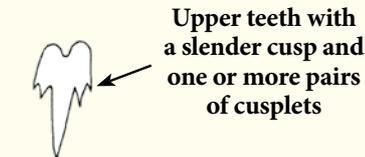
ETP



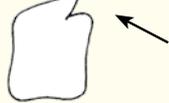
Lateral trunk denticles cusplless, truncated and wide-spaced, giving the body a smooth texture



Dermal denticles (Dorsal view)



Upper teeth with a slender cusp and one or more pairs of cusplets



Lower teeth compressed and blade-like

Upper and lower tooth

Colour

Pale or dark brown to blackish on dorsal surface, underside of snout and abdomen abruptly black. Precaudal fins light distally.

Size

Size moderate with adults to about 48 cm TL.

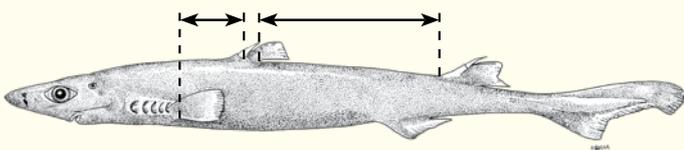


Photos: © Dave Ebert

Similar species

Etmopterus bigelowi

First dorsal fin more anterior, distance from pectoral-fin insertion to first dorsal-fin base three or more times in interdorsal space



All other *Etmopterus* species

Have the skin with a fuzzy or rough texture due to denticles with erect, thorn-like, cuspidate crowns, more or less elevated from their bases.

Bio-Ecology and Distribution of *Etmopterus pusillus*

A common deepwater dogfish, sometimes collected in large groups, of the outer continental and insular shelves and upper, middle, and lower slopes from 60 to 1490 m depth, on or near the bottom or well above it.

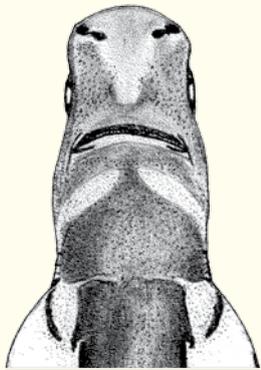
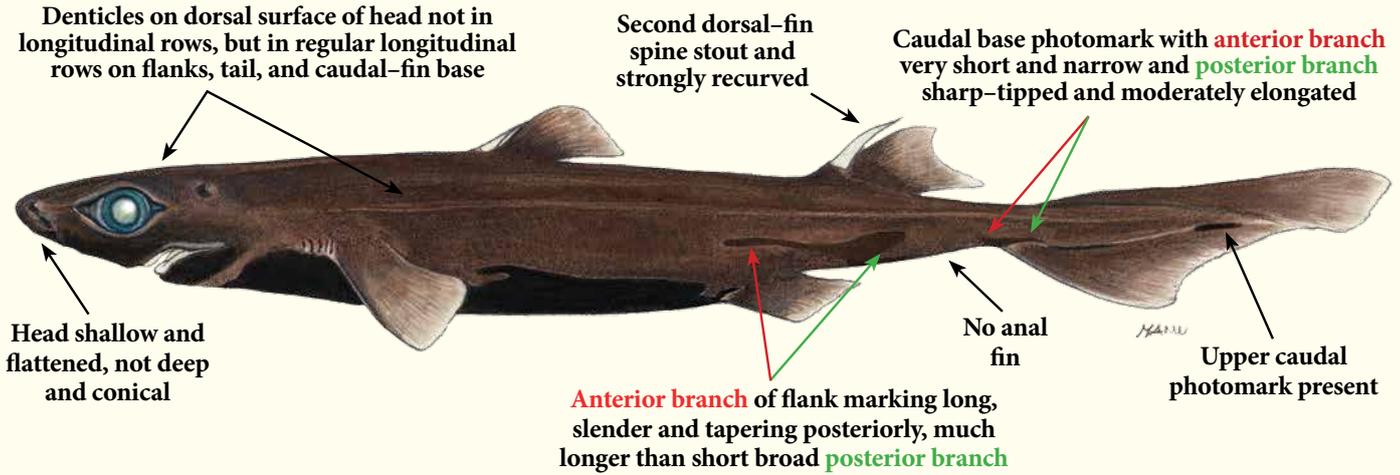


Etmopterus granulosus (Günther, 1880)

Southern lanternshark (Lucifer) – Sagre long nez
Tollo negro narigón

Toge-nise-karasuzame (Jpn)

ETM



Underside of head

Note: The region above pelvic fin, below anterior branch of flank marking is naked (no dermal denticles). Trawl-caught specimens usually have scuff marks – white patches where the skin has rubbed off.

Colour

Grey-brown on dorsal surface, underside of snout, branchial region and abdomen abruptly black.

Size

Maximum length about 88 cm TL.

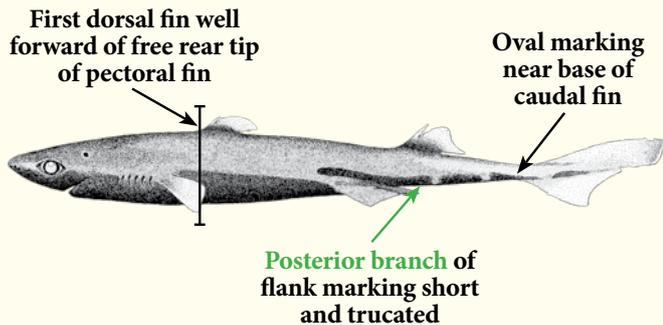


Photo: © Paul Clerkin

Similar species

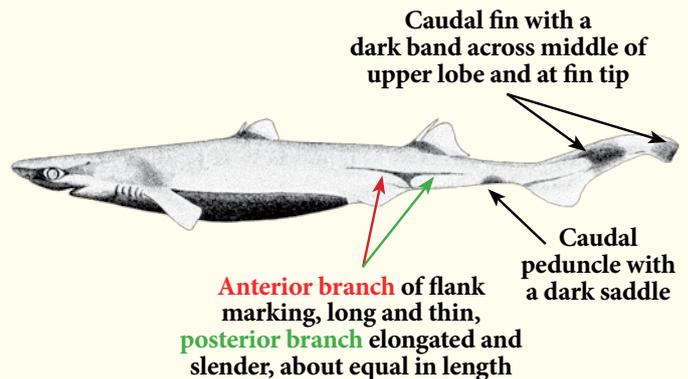
The following species share with *Etmopterus granulosus* the following characteristic: the denticles on dorsal surface of head are not in longitudinal rows, but are in regular longitudinal rows on tail, caudal-fin base and/or flanks.

Etmopterus fusus



Only known from off Broome, Western Australia; possibly from off Java, Indonesia

Etmopterus evansi

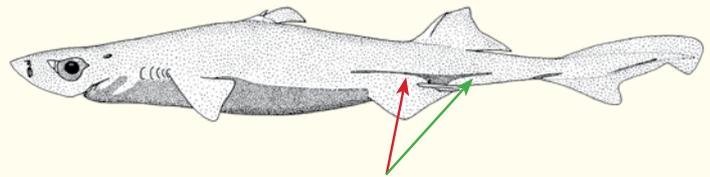


Only known from northern Western Australia and the Arafura Sea, Indonesia

Other similar species

The following species can be distinguished from *Etmopterus granulosus* by the fact that they have the denticles on **dorsal surface of head arranged in linear rows**, which extend to the flanks, caudal peduncle and caudal-fin base.

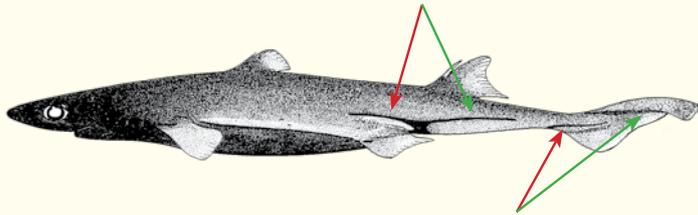
Etmopterus lucifer



Lateral flank marking with **anterior branch** more than twice length of **posterior branch**

Etmopterus brachyurus

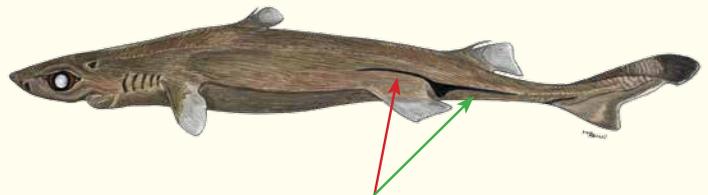
Length of **anterior branch** much shorter than **posterior branch**



Precaudal marking about twice length of **caudal marking**

Only known from Shark Bay to Lancelin, Western Australia

Etmopterus sculptus

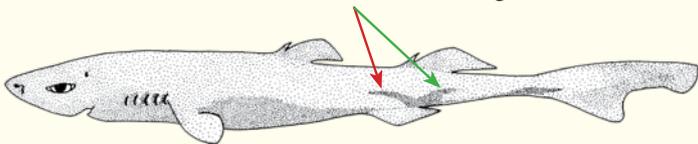


Lateral flank marking with **anterior branch** about equal to or slightly longer than **posterior branch**

The following species can be distinguished from *Etmopterus granulosus* by the fact that they have the denticles on **dorsal surface of head and side of body not arranged in linear rows**.

Etmopterus gracilispinis

Lateral flank marking with long, thick, curving **anterior branch**, **posterior branch** thick, short to medium in length

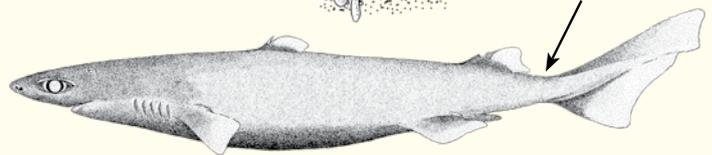


Etmopterus unicolor

Dermal denticles dense, bristle-like



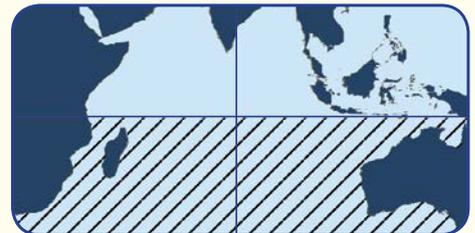
Short caudal peduncle



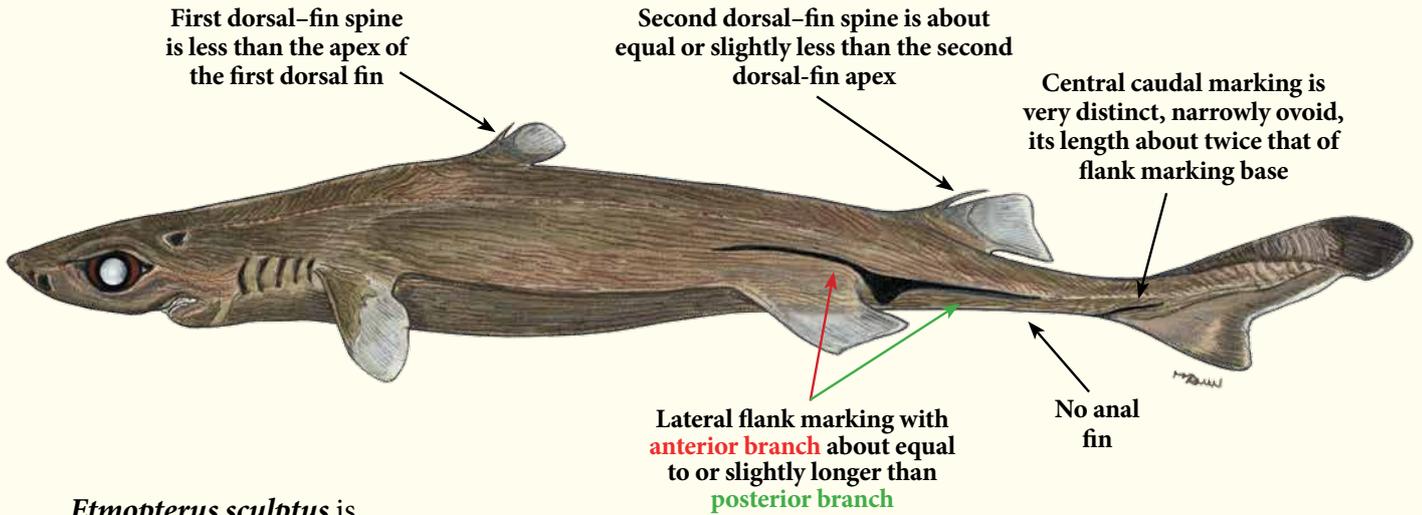
Bio-Ecology, Distribution and Remarks of *Etmopterus granulosus*

A large lanternshark from the upper continental and insular slopes, found on or near the bottom at depths of about 220 to 1500 m, commoner below 600 m.

Interest to fisheries none at present, although taken as an incidental bycatch of trawl fisheries for the Deep-water Cape hake (*Merluccius paradoxus*) fisheries off the west coast of South Africa, and probably caught in deep water trawl fisheries for Orange roughy (*Hoplostethus atlanticus*). This species is discarded from bottom trawl catches off South Africa.



Etmopterus sculptus Ebert, Compagno and De Vries, 2011
Sculpted lanternshark



Etmopterus sculptus is characterized by the fact that it has the denticles on dorsal surface of head arranged in linear rows, which extend to the flanks, caudal peduncle and caudal-fin base.

Colour

In life a dark grey brown above, ventral surface black with narrow, elongated black margin above, in front of and behind pelvic fins. Upper caudal-fin lobe black, lower lobe and tips of fins whitish, not translucent.

Size

Maximum length attained by females 51.5 cm TL and by males 45.5 cm TL.



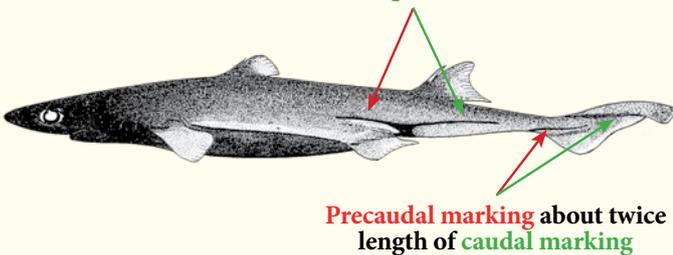
Photo: © Oddgeir Alvheim, IMR

Similar species

The following species share with *Etmopterus sculptus* the following characteristic: the denticles on dorsal surface of head are arranged in linear rows, which extend to the flanks, caudal peduncle and caudal-fin base. *Etmopterus sculptus* can be distinguished by the fact that the length of its anterior flank marking branch is slightly longer than its posterior branch.

Etmopterus brachyurus

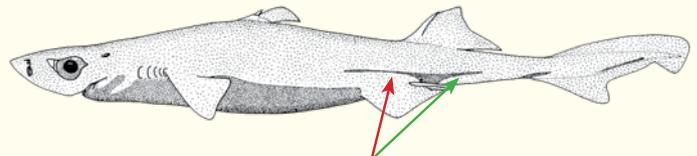
Length of anterior branch much shorter than posterior branch



Only known from Shark Bay to Lancelin, Western Australia

Etmopterus lucifer

Lateral flank marking with anterior branch more than twice length of posterior branch

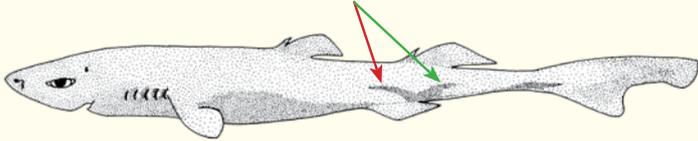


Other similar species

The following species can be distinguished from *Etmopterus sculptus* by the fact that they have the denticles on dorsal surface of head and side of body not arranged in linear rows.

Etmopterus gracilispinis

Lateral flank marking with long, thick, curving **anterior branch**, **posterior branch** thick, short to medium in length

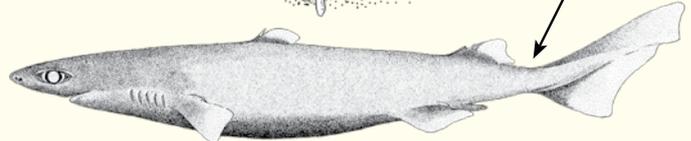


Etmopterus unicolor

Dermal denticles dense, bristle-like



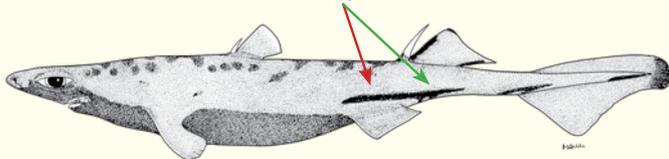
Short caudal peduncle



Coloration a uniform dark brown to brownish-black above and below

Etmopterus compagnoi

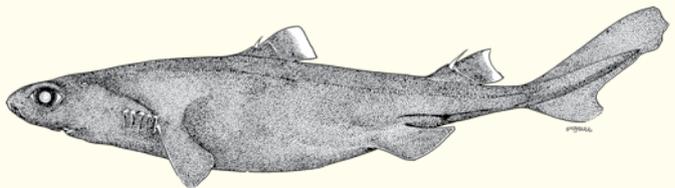
Lateral flank marking with a long **anterior branch**; **posterior branch** medium in length



Coloration brown above becoming dark to blackish below with a rather abrupt transition

Etmopterus viator

Dermal denticles not dense or bristle-like

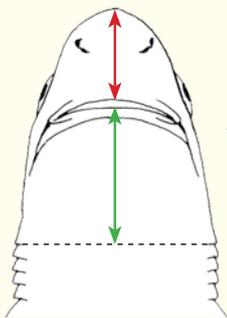
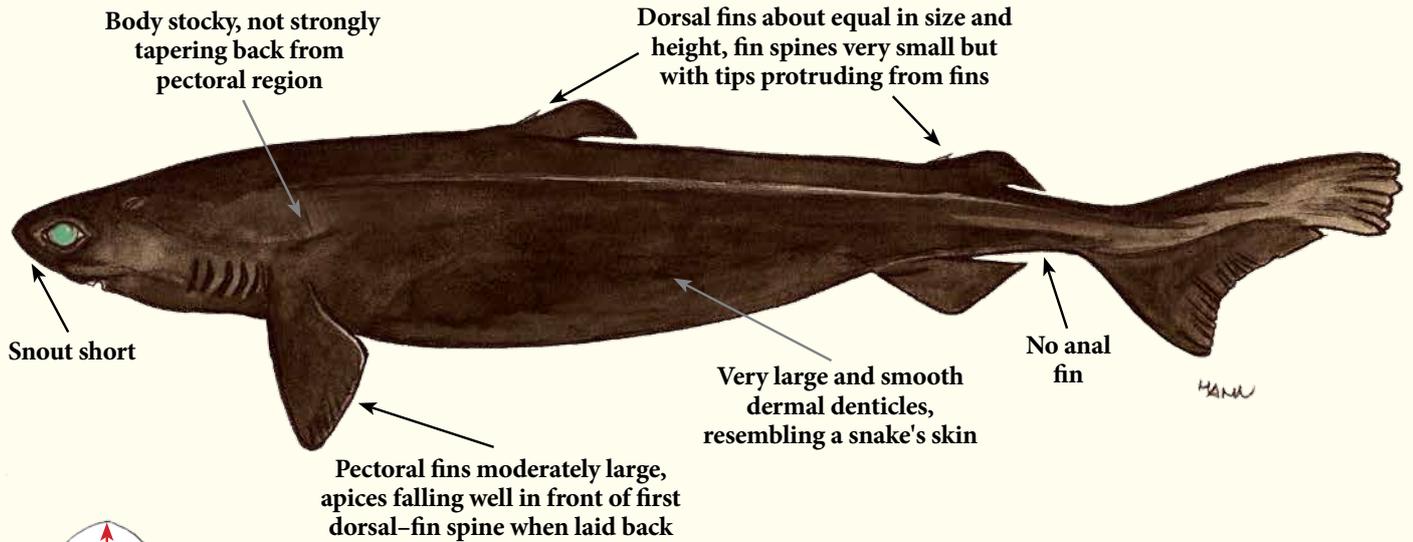


Coloration a uniform dark brown to brownish-black above and below

Bio-Ecology and Distribution of *Etmopterus sculptus*

This species occurs from off Namibia to southern Mozambique, mostly at depths between 450 and 900 m, but with records as shallow as 240 m.

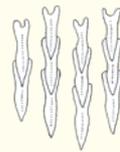




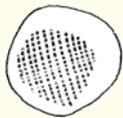
Underside of head

Preoral length much less than distance from mouth to first gill slits and less than mouth width

Lower teeth with very short, strongly oblique cusps and high, narrow roots



Upper and lower teeth



Dermal denticle (Dorsal view)

Colour

Uniformly golden brown to blackish brown.

Size

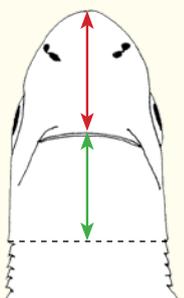
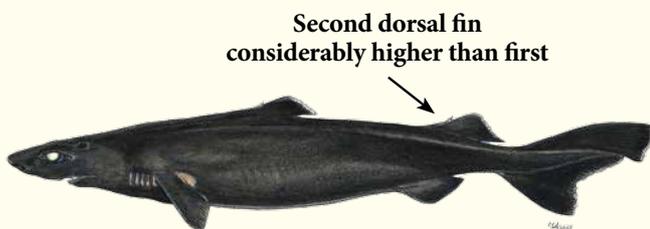
Moderately large, up to 122 cm TL.



Photo: © Paul Clerkin

Similar species

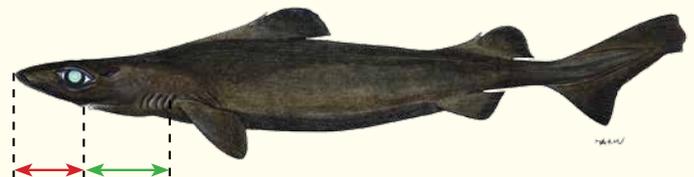
Centroscyrnus owstonii



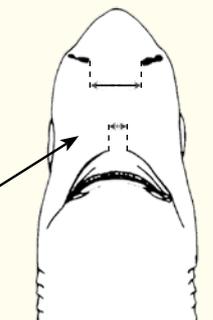
Underside of head

Snout moderately long, preoral length about as long as distance from mouth to first gill slits and about equal to mouth width

Centroselachus crepidater



Snout greatly elongated, preoral length about equal to distance from mouth to pectoral-fin origin



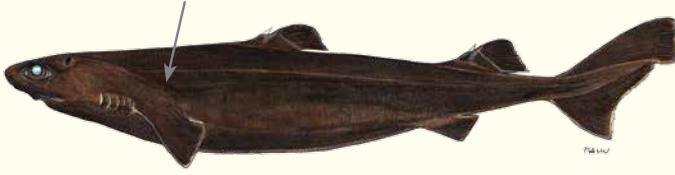
Underside of head

Upper labial furrows extremely long, separated by less than the distance between nostrils

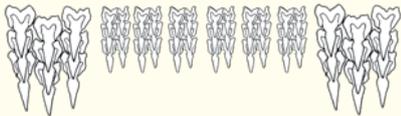
Other similar species

Proscymnodon plunketi

Body, stocky, tapering abruptly from pectoral region

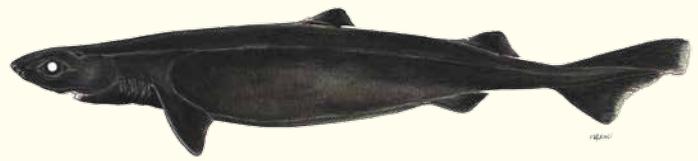


First three rows of upper teeth distinctly smaller than those in rows 4 to 8

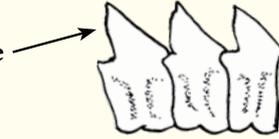


Frontal view of upper teeth

Zameus squamulosus



Lower teeth with relatively high, more or less erect cusps

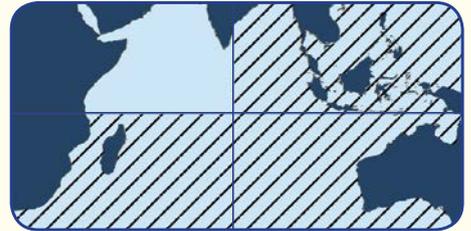


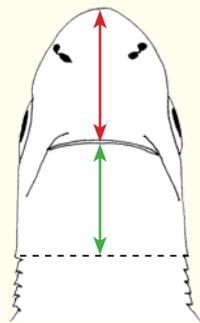
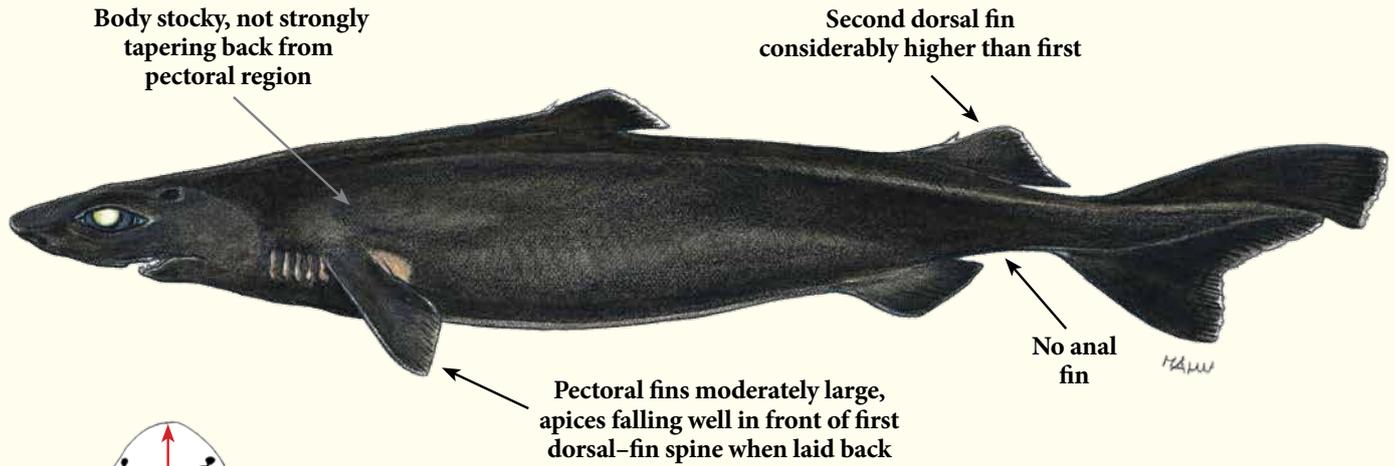
Lower teeth

Bio-Ecology, Distribution and Remarks of *Centroscymnus coelolepis*

A common, wide-ranging but little-known deep-water shark, on or near the bottom on the continental slopes and upper and middle rises. Occurs mostly at depths below 400 m, but with a depth range of 128 to 3675 m. Bottom water temperatures where this species has been captured range from 5 to 13 °C.

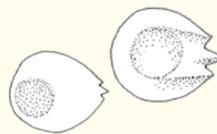
It is caught in bottom trawls, fixed bottom nets, and longline gear, in targeted deep-water shark fisheries and as bycatch in other deep-water demersal fisheries. This species is not targeted in the Indian Ocean, but is taken incidentally as bycatch. It is utilized for fishmeal, dried salted for human consumption, and for its squalene-rich liver oil. In Australian waters it is discarded because of the high mercury content in its flesh.





Underside of head

Snout moderately long, **preoral length** about as long as **distance from mouth to first gill slits** and about equal to mouth width



Dermal denticles (Dorsal view)

Colour

Light grey or brown to dark brown or black, without any conspicuous markings.

Size

Moderately large, up to 120 cm TL.



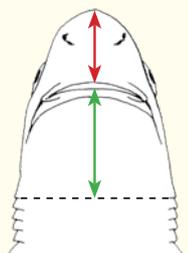
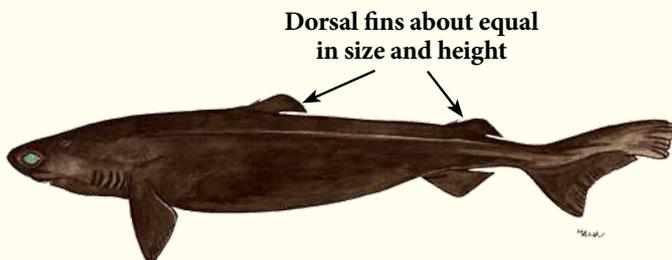
Note: When placed on side, the skin on the belly typically forms a ridge-like fold between pectoral and pelvic fins. Depending on how the animal is positioned it can be very prominent.



Photo: © Rob Leslie

Similar species

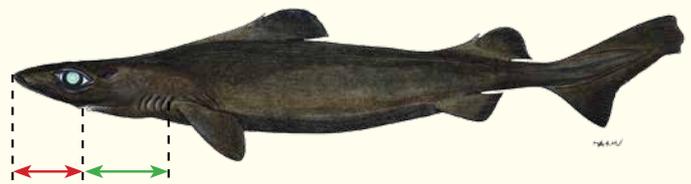
Centroscyrnus coelolepis



Underside of head

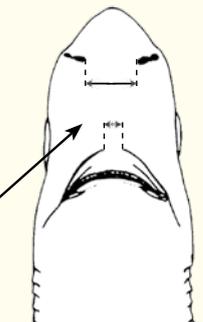
Preoral length much less than **distance from mouth to first gill slits** and less than mouth width

Centroselachus crepidater



Snout greatly elongated, **preoral length** about equal to **distance from mouth to pectoral-fin origin**

Upper labial furrows extremely long, separated by less than the distance between nostrils

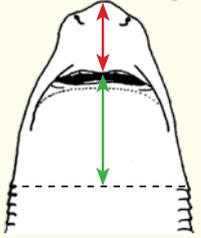
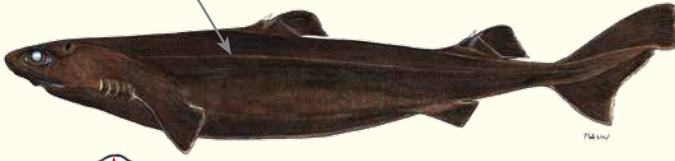


Underside of head

Other similar species

Proscymnodon plunketi

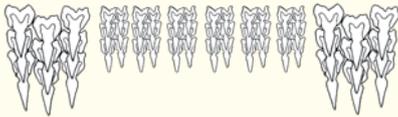
Body, stocky, tapering abruptly from pectoral region



Underside of head

Snout short, **preoral length** much less than **distance from mouth to first gill slits** and less than mouth width

First three rows of upper teeth distinctly smaller than those in rows 4 to 8

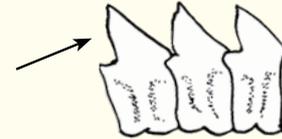


Frontal view of upper teeth

Zameus squamulosus



Lower teeth with relatively high, more or less erect cusps

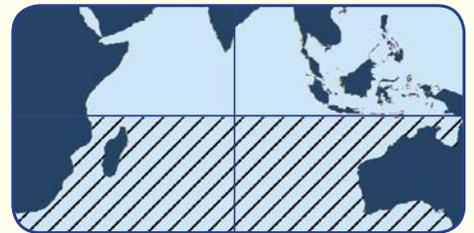


Lower teeth

Bio-Ecology, Distribution and Remarks of *Centroscymnus owstonii*

A rare to common deepwater dogfish of the outer continental shelves and upper continental slopes at depths of 150 to 1459 m, on or near bottom and mostly below 600 m. In the Indian Ocean it mainly occurs off Australia; also recorded in the south-eastern Atlantic Ocean, in Namibian and South African slopes.

Of limited and localized interest to fisheries, although taken by trawlers in the eastern Atlantic as bycatch. Caught occasionally by Japanese tuna longliners and in deep-water demersal trawl fisheries for Orange roughy (*Hoplostethus atlanticus*), but mostly as discarded bycatch. Once common as bycatch in southern Australia Orange roughy fishery and marketed for its squalene-rich liver oil and its flesh, it is currently limited by management restrictions due to concerns over its stability.

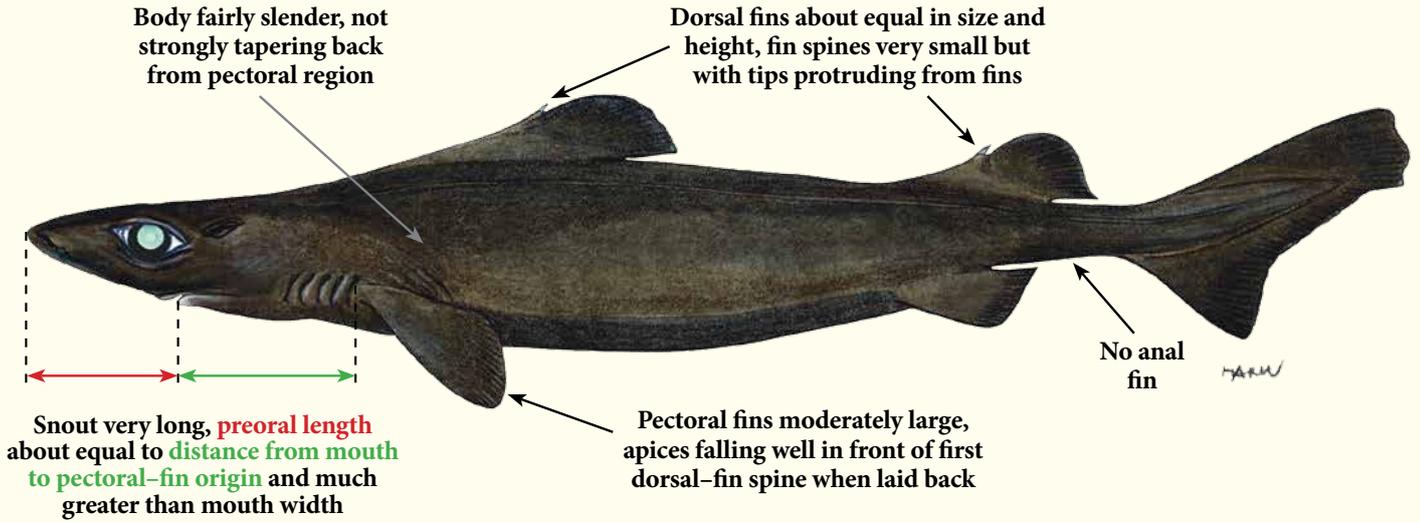


Centroselachus crepidater (Bocage and Capello, 1864)

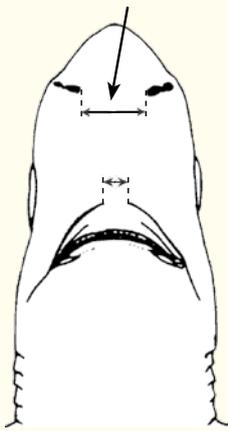
Longnose velvet dogfish – Pailona à long nez
Sapata negra

Fun-naga-yumezame (Jpn)

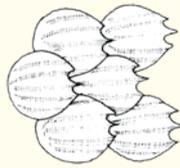
CYP



Upper labial furrows extremely long, separated by less than the distance between nostrils



Underside of head



Dermal denticles (Dorsal view)



Upper and lower teeth

Colour

Uniform black or blackish brown.

Size

Moderate sized, with a maximum length of 105 cm TL.

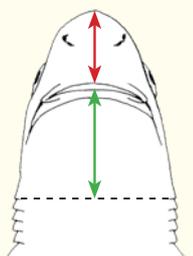
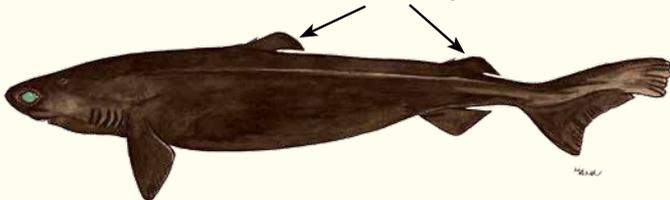


Photo: © Paul Clerkin

Similar species

Centroscymnus coelolepis

Dorsal fins about equal in size and height

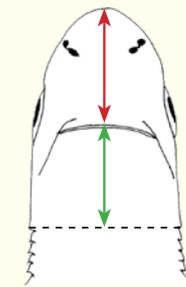
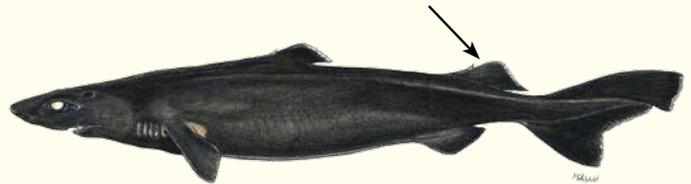


Underside of head

Preoral length much less than **distance from mouth to first gill slits** and less than mouth width

Centroscymnus owstonii

Second dorsal fin considerably higher than first



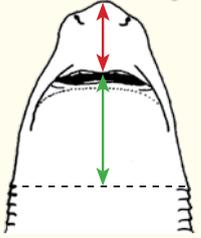
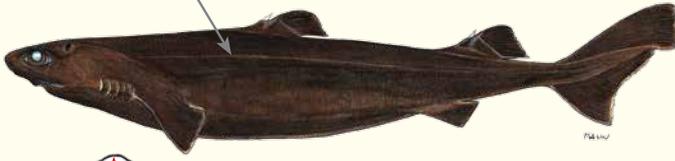
Underside of head

Snout moderately long, **preoral length** about as long as **distance from mouth to first gill slits** and about equal to mouth width

Other similar species

Proscymnodon plunketi

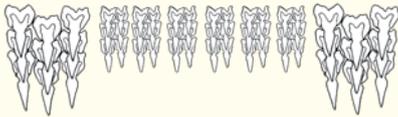
Body, stocky, tapering abruptly from pectoral region



Underside of head

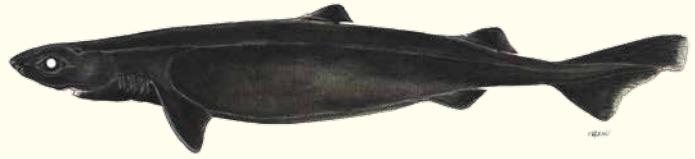
Snout short, **preoral length** much less than **distance from mouth to first gill slits** and less than mouth width

First three rows of upper teeth distinctly smaller than those in rows 4 to 8

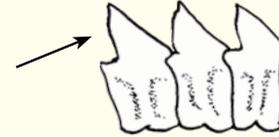


Frontal view of upper teeth

Zameus squamulosus



Lower teeth with relatively high, more or less erect cusps



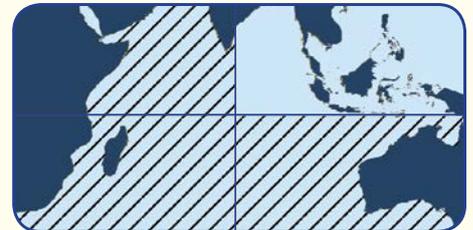
Lower teeth

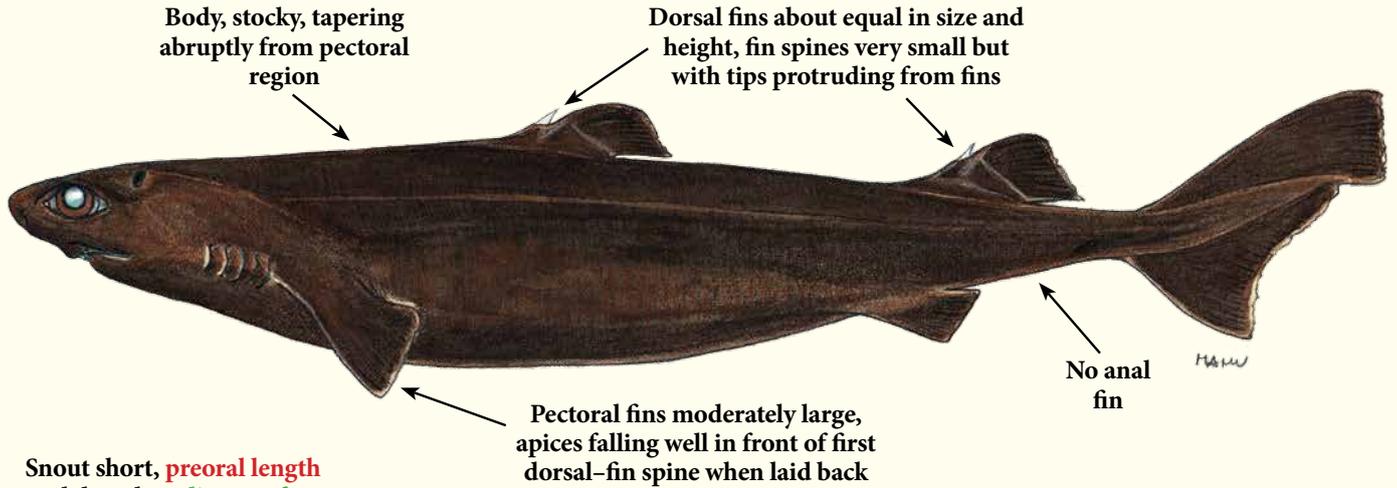
Bio-Ecology, Distribution and Remarks of *Centroselachus crepidater*

Found on the upper continental and insular slopes on or near the bottom at depths of 200 to 1500 m.

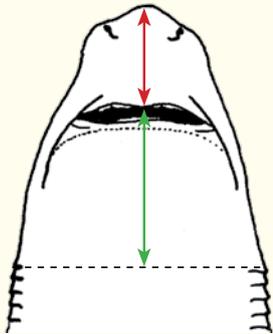
Females appear capable of breeding throughout the year. Age at maturity is about 9 years for males and 20 years for females; oldest individual was a female estimated at 54 years and the oldest male about 34 years. Diet consists mainly of fish and cephalopods.

Interest to fisheries limited, it is caught as bycatch and utilized for fishmeal, and marketed for its flesh and high squalene content. Catches of this species in Australian waters are now limited by a small quota and banned below 700 m, due primarily to its low productivity.



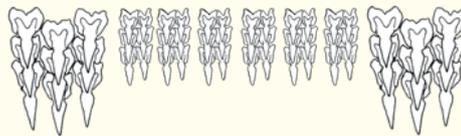


Snout short, **preoral length** much less than **distance from mouth to first gill slits** and less than mouth width



Underside of head

First three rows of upper teeth distinctly smaller than those in rows 4 to 8



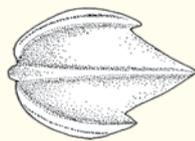
Frontal view of upper teeth

Colour

Uniformly grey-brown, juveniles more greyish.

Size

A large species, maximum length up to 170 cm TL.



Dermal denticle (Dorsal view)

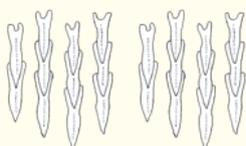
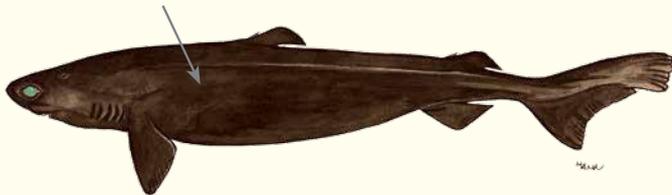


Photo: © Paul Clerkin

Similar species

Centroscymnus coelolepis

Body stocky, but not strongly tapering back from pectoral region

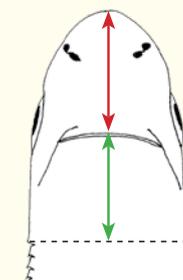
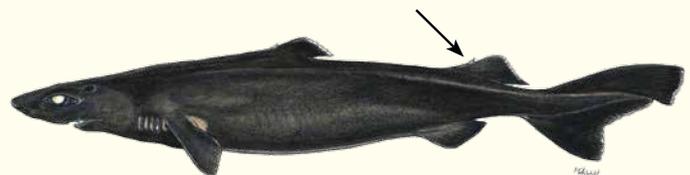


First three rows of upper teeth similar to those adjacent

Frontal view of upper teeth

Centroscymnus owstonii

Second dorsal fin considerably higher than first

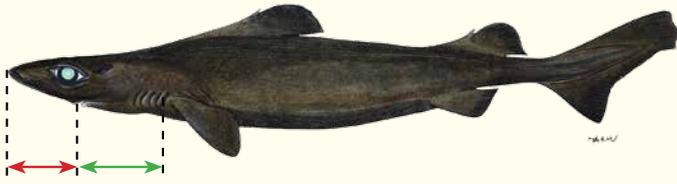


Snout moderately long, **preoral length** about as long as **distance from mouth to first gill slits** and about equal to mouth width

Underside of head

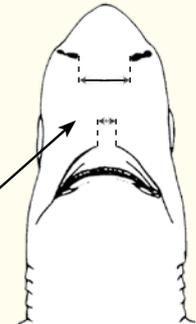
Other similar species

Centroselachus crepidater



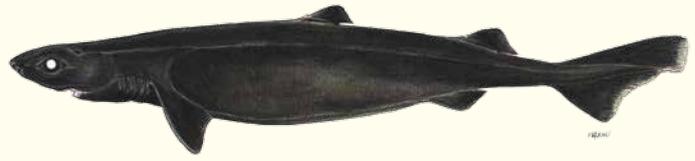
Snout greatly elongated, **preoral length** about equal to **distance from mouth to pectoral-fin origin**

Upper labial furrows extremely long, separated by less than the distance between nostrils

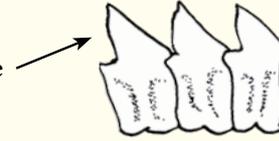


Underside of head

Zameus squamulosus



Lower teeth with relatively high, more or less erect cusps

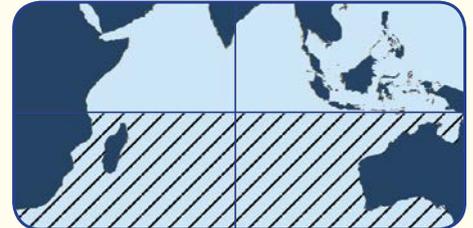


Lower teeth

Bio-Ecology, Distribution and Remarks of *Proscymnodon plunketi*

A common bottom shark of the continental and insular slopes at depths of 219 to 1550 m though commonest between 550 to 732 m. Females mature at 129 to 170 cm total length; males mature at 100 to 131 cm total length. Size at birth is between 32 and 36 cm. Occurs in large schools near the bottom, with schools segregated by size and sex. Development viviparous with a yolk-sac and with large litters of up to 36 young. Feeds on cephalopods and bony fishes.

This is a very common deepwater shark off New Zealand and Australia in waters deeper than 550 m. It is caught with deepset longlines and with deepwater demersal trawls targeting Orange roughy (*Hoplostethus atlanticus*). Discarded in Australia but presumably utilized in New Zealand for fishmeal and for squalene in its liver oil.

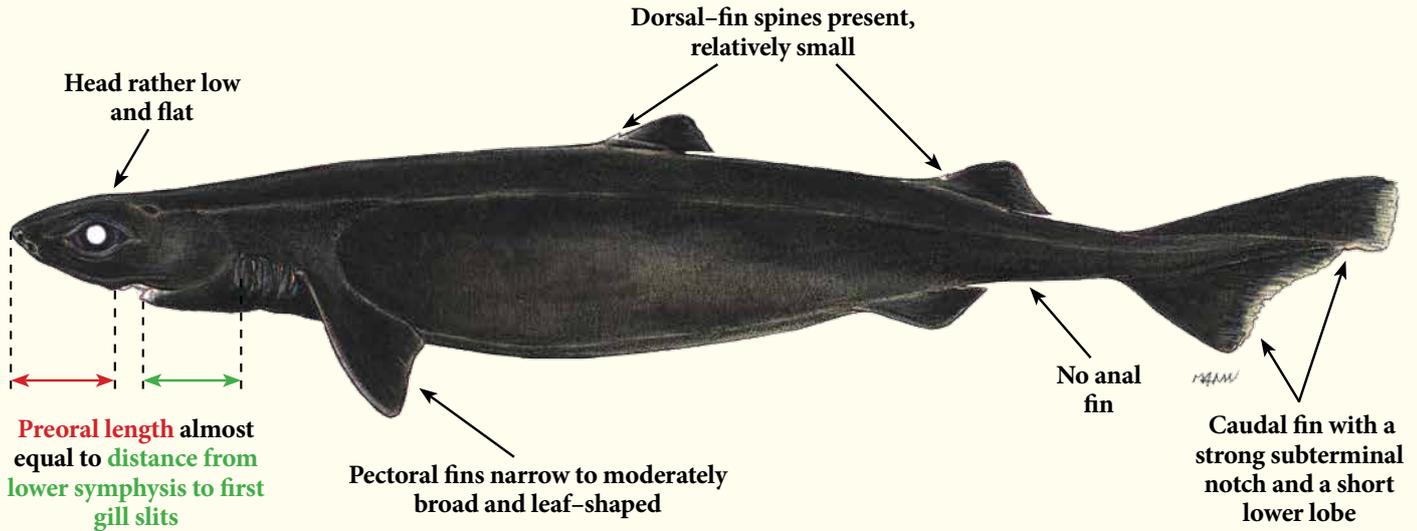


Zameus squamulosus (Günther, 1877)

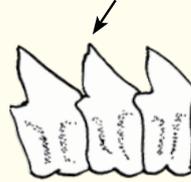
Velvet dogfish – Squal–grogneur velouté
Bruja terciopelo

Biroudozame (Jpn)

SSQ



Lower teeth with relatively high, more or less erect cusps



Lower teeth

Colour

Uniformly black to dark brownish with no conspicuous markings.

Size

Moderate size with a maximum length of 84 cm TL.

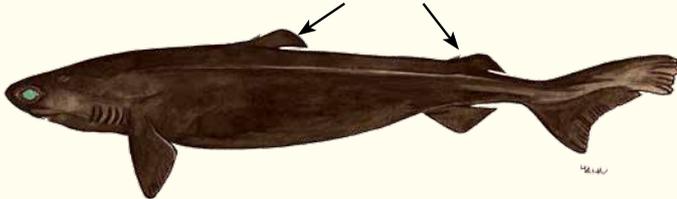


Photos: © Evgeny Romanov, CAP RUN-ARDA

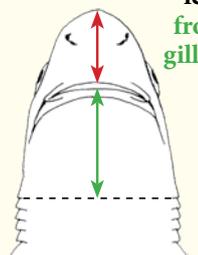
Similar species

Centroscymnus coelolepis

Dorsal fins about equal in size and height

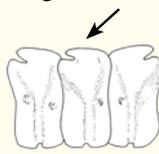


Preoral length much less than distance from mouth to first gill slits and less than mouth width



Underside of head

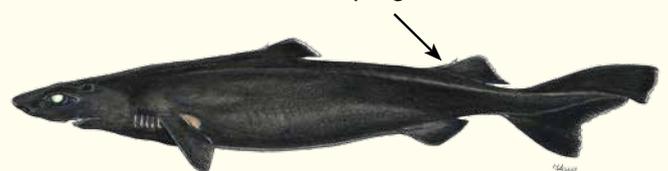
Lower teeth with very short, strongly oblique cusps and high, narrow roots



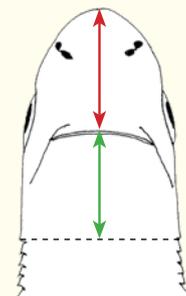
Lower teeth

Centroscymnus owstonii

Second dorsal fin considerably higher than first



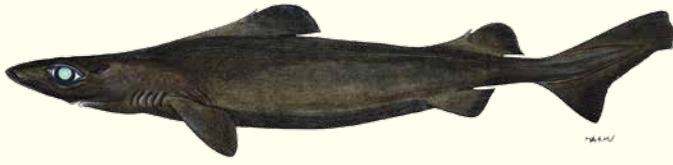
Snout moderately long, preoral length about as long as distance from mouth to first gill slits and about equal to mouth width



Underside of head

Other similar species

Centroselachus crepidater

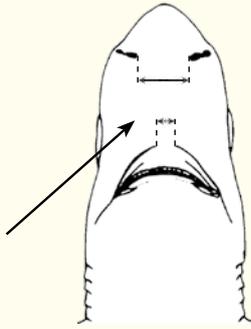


Lower teeth with moderately long, semioblique cusps and moderately high, fairly broad roots



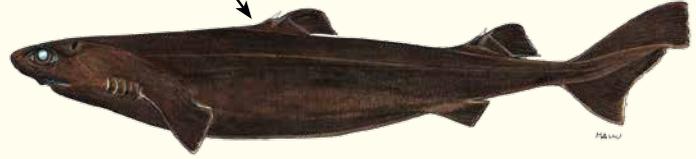
Lower teeth

Upper labial furrows extremely long, separated by less than the distance between nostrils

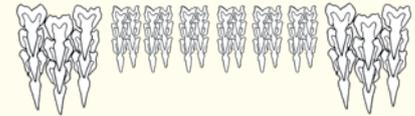


Proscymnodon plunketi

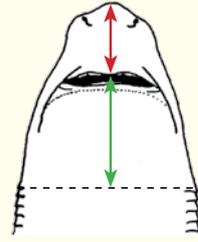
Body, stocky, tapering abruptly from pectoral region



First three rows of upper teeth distinctly smaller than those in rows 4 to 8



Frontal view of upper teeth

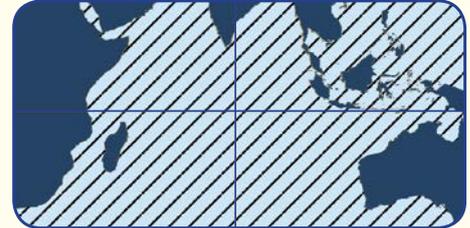


Underside of head

Bio-Ecology, Distribution and Remarks of *Zameus squamulosus*

A poorly known epipelagic and oceanic deepwater shark usually found off continental and insular slopes, on or near the bottom at depths of 550 to 1450 m, but also well off the bottom at depths between 0 to 580 m in water 2000 to 6000 m deep.

This relatively small somniosid is of limited fisheries interest. It is caught incidentally by bottom trawls and set gillnets, and by bottom and pelagic longline gear. There is no species-specific information on the numbers of these sharks that are caught as bycatch, but it is likely low since they do not seem to be abundant where they are known to occur. Also caught infrequently by tuna longliners in the epipelagic zone.

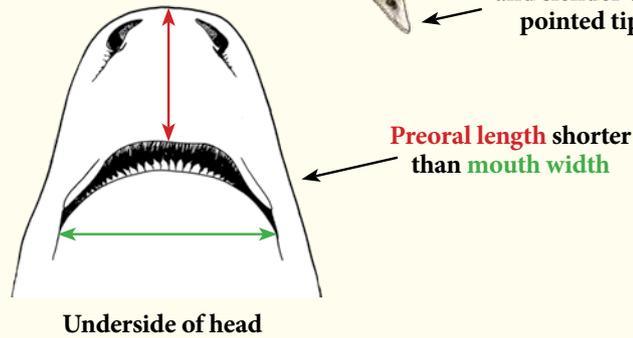
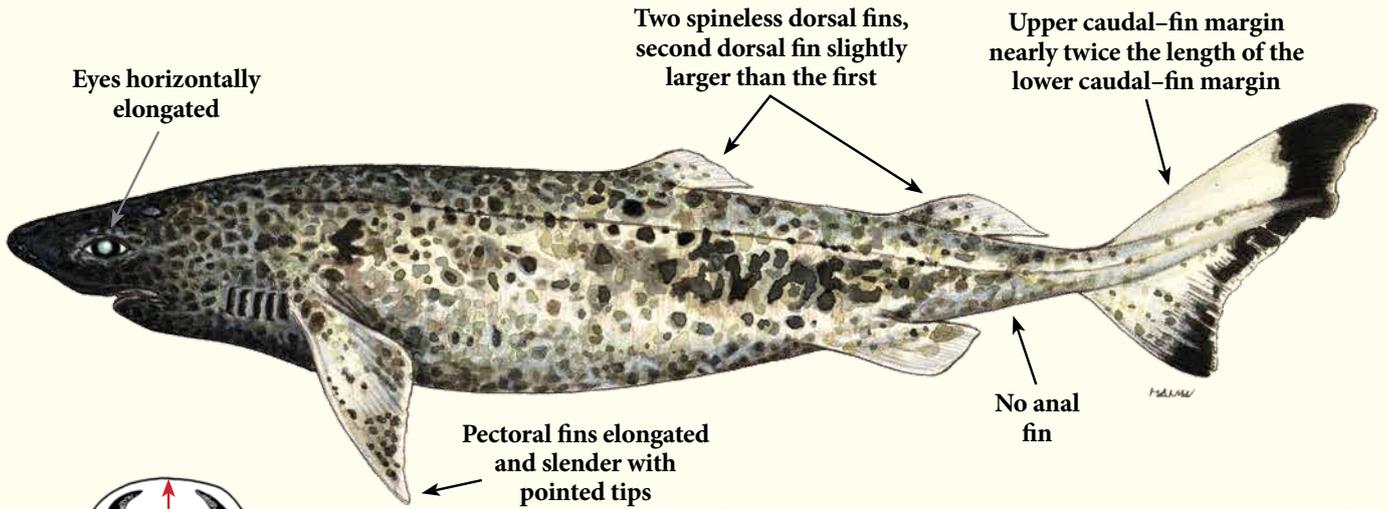


Scymnodalotias albicauda Taniuchi & Garrick, 1986

Whitetail dogfish – *Squale grogneur à queue blanche*
Bruja cola blanca

Ojirozame (Jpn)

YSA



Colour

Dark brown or mottled greyish above, lighter brownish grey below, fins with whitish grey margins, conspicuous white blotches on caudal-fin base and web except for dark terminal lobe.

Size

A moderate sized shark that reaches 111 cm TL.

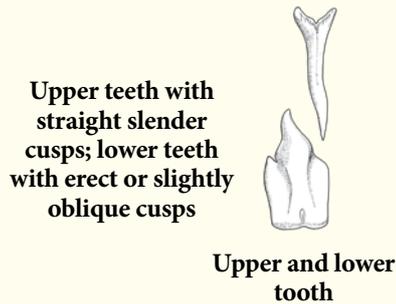


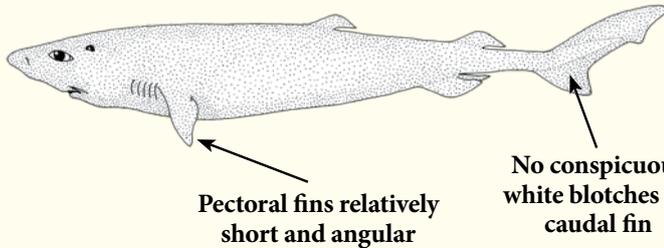
Photo: © Dave Ebert

Similar species

Scymnodalotias sherwoodi

Body uniformly dark grey or black

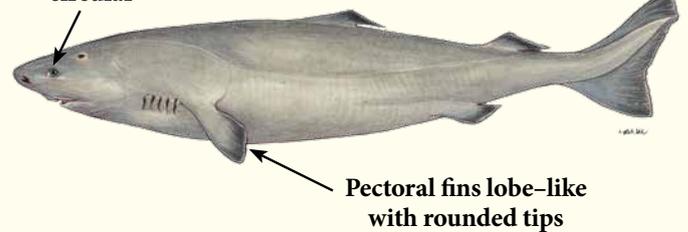
Size small, attaining 85 cm TL



Somniosus antarcticus

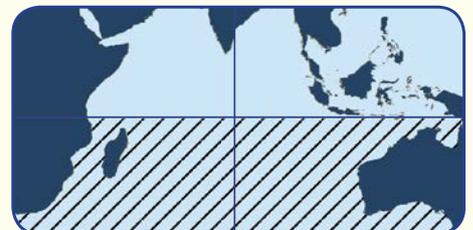
Body uniformly grey to blackish

Eyes almost circular



Bio-Ecology and Distribution of *Scymnodalotias albicauda*

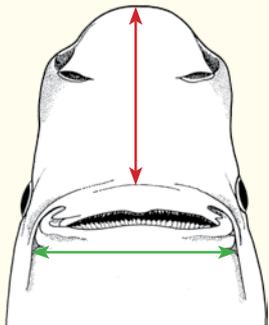
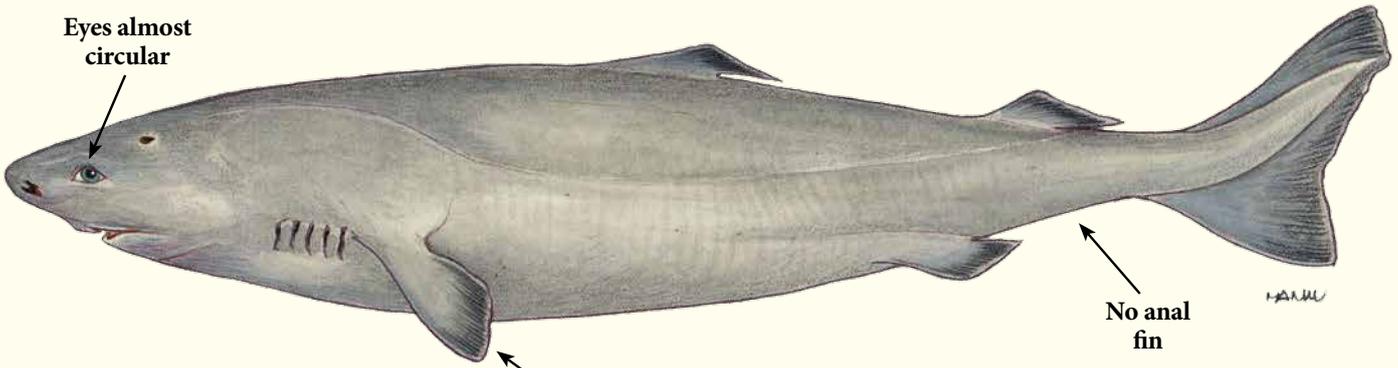
Oceanic in the epipelagic zone, where it is a rare catch of tuna longlines from 0 to approximately 200+ m in water approximately 1400 to 4000 m deep, also off a submarine ridge at 512 m near the bottom. It may be mesopelagic or bathypelagic as suggested by its dark body coloration, and could rise to near the surface at night, but this is speculative.



Somniosus antarcticus Whitley, 1939

Southern sleeper shark – Laimargue de l'Antarctique
Tollo meridional dormilón

Minami-ondenzame (Jpn)



Underside of head

Snout short and broadly rounded, **preoral length** subequal to **mouth width**

Upper teeth long, slender; cusps of lower teeth short and low, strongly oblique, roots very high



Upper and lower tooth

Colour

Uniformly grey to blackish, without conspicuous light or dark fin edges.

Size

Size large, to at least 456 cm, and possibly 600 cm TL.



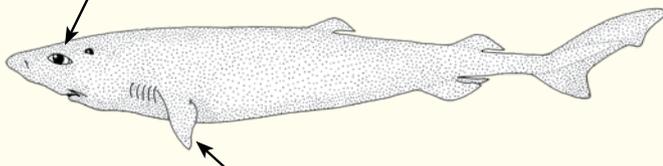
Photo: © Pablo Reyes

Similar species

Scymnodalatias sherwoodi

Eyes horizontally elongated

Size small, attaining 85 cm TL

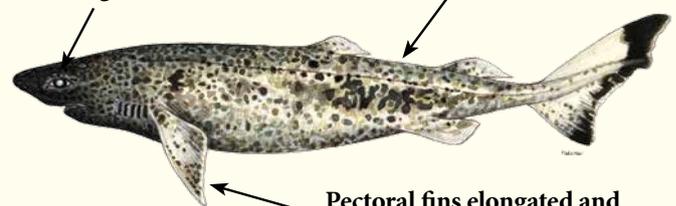


Pectoral fins relatively short and angular

Scymnodalatias albicauda

Eyes horizontally elongated

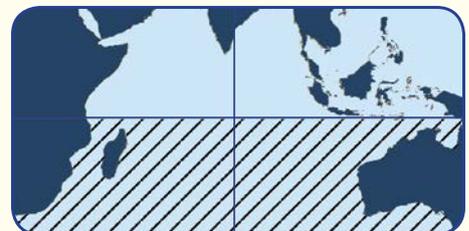
Dark brown or mottled greyish above, lighter brownish grey below, fins with whitish grey margins

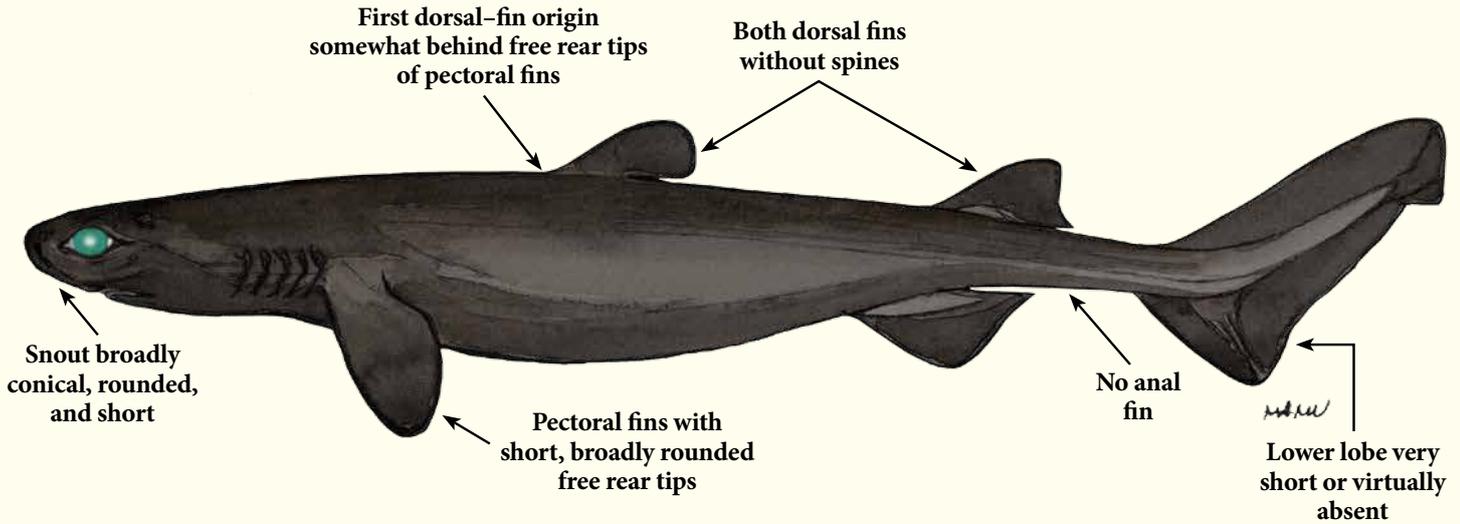


Pectoral fins elongated and slender with pointed tips

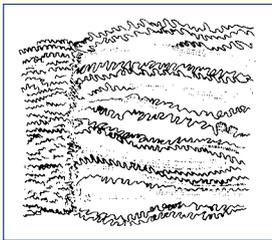
Bio-Ecology and Distribution of *Somniosus antarcticus*

An abundant littoral and epibenthic shark of the continental and insular shelves and upper slopes down to at least 1440 m. In the southern hemisphere it is found in deep-water (677 m) off South Africa, in 245 to 370 m depth off Kerguelen Island, and off Macquarie Island between 300 to 1440 m. Water temperatures of places inhabited by these sharks range from 0.6 to 12 °C.

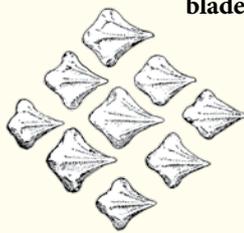




Lower teeth very large, bladelike, with broad, erect, triangular cusps, small distal blades, and serrated edges



Detail of fringed lips



Dermal denticles (Dorsal view)



Lower tooth

Colour

Greyish to black or blackish brown, sometimes violet with black spots.

Size

A moderately large shark with a maximum length of 180 cm TL.



Photo: © Asobi Tsuchiya



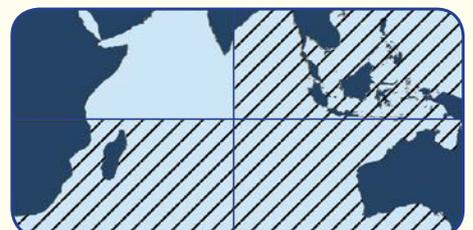
Photo: © Paul Clerkin

Similar species

Dalatias licha can be distinguished from other similar species for having the following characteristics: a very short snout, less than 1/3 of head length; lips thick and pleated; lower teeth with strongly serrated edges; the caudal fin with a weak ventral lobe and no spines on dorsal fins.

Bio-Ecology and Distribution of *Dalatias licha*

A common but sporadically distributed deep-water, warm-temperate and tropical shark of the outer continental and insular shelves and slopes from 37 to at least 1800 m depth, commonest below 200 m. It occurs most frequently on or near the bottom but readily ranges well off the substrate. Its large oily liver allows it to attain neutral buoyancy, so it can move or hover above the bottom without the necessity of utilizing dynamic lift from fins and body.

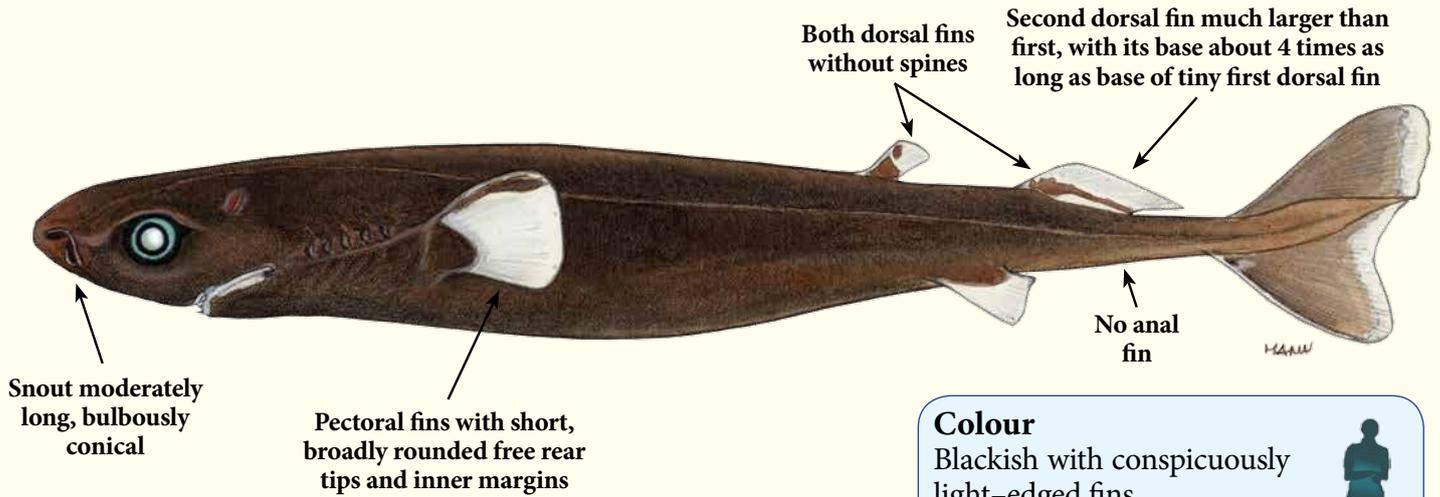


Euprotomicrus bispinatus (Quoy & Gaimard, 1824)

Pigmy shark – *Squale pygmée* – *Tollo pigmeo*

Oki-kobitozame (Jpn)

EUP



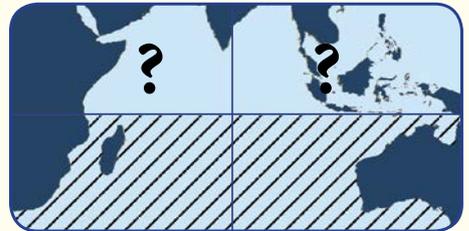
Colour
Blackish with conspicuously light-edged fins.

Size
Size very small up to 27 cm TL.



Bio-Ecology and Distribution of *Euprotomicrus bispinatus*

The pigmy shark is an epipelagic, mesopelagic, and perhaps bathypelagic inhabitant of the central water masses of the north and south Pacific, south Atlantic, and southern Indian Ocean, at water depths from 1829 to 9938 m. It occurs at or near the surface at night and apparently descends to at least midwater depths during the day.

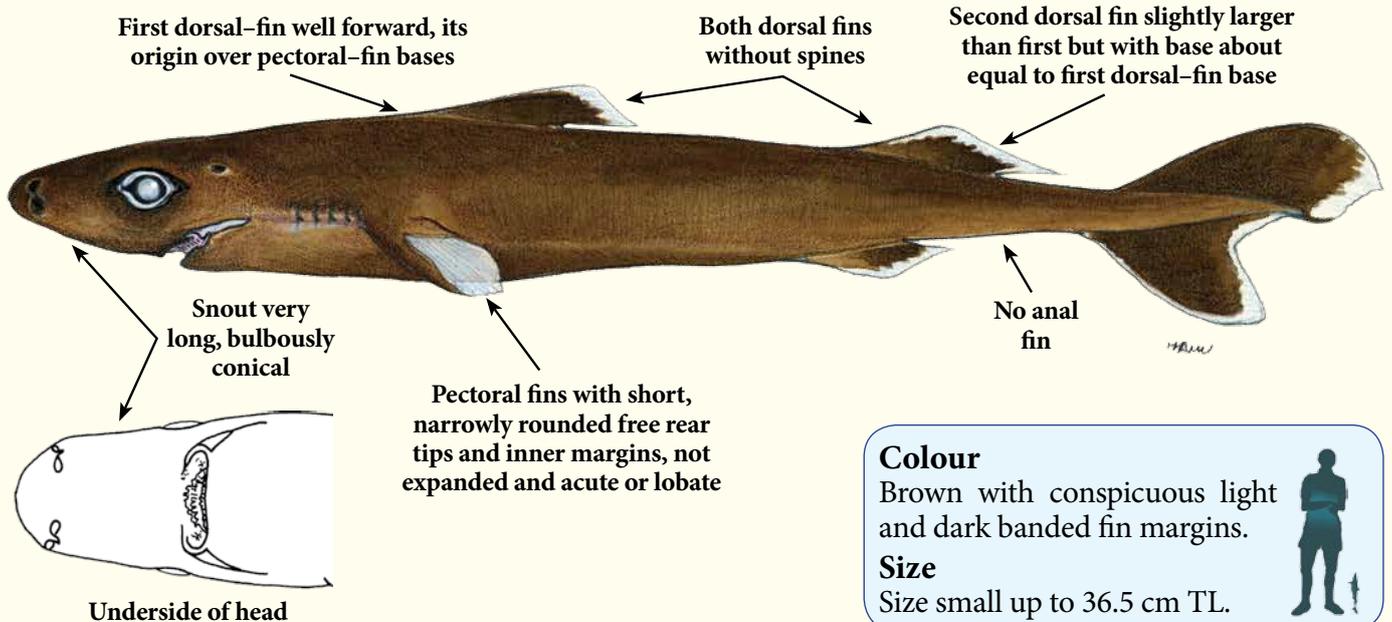


Heteroscymnoides marleyi Fowler, 1934

Longnose pigmy shark – *Squale mignon*
Tollo pigmeo trompudo

Nagahana-kobitozame (Jpn)

HYY



Colour
Brown with conspicuous light and dark banded fin margins.

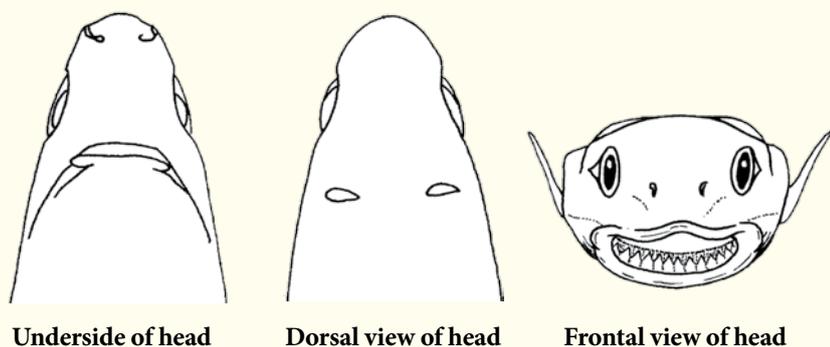
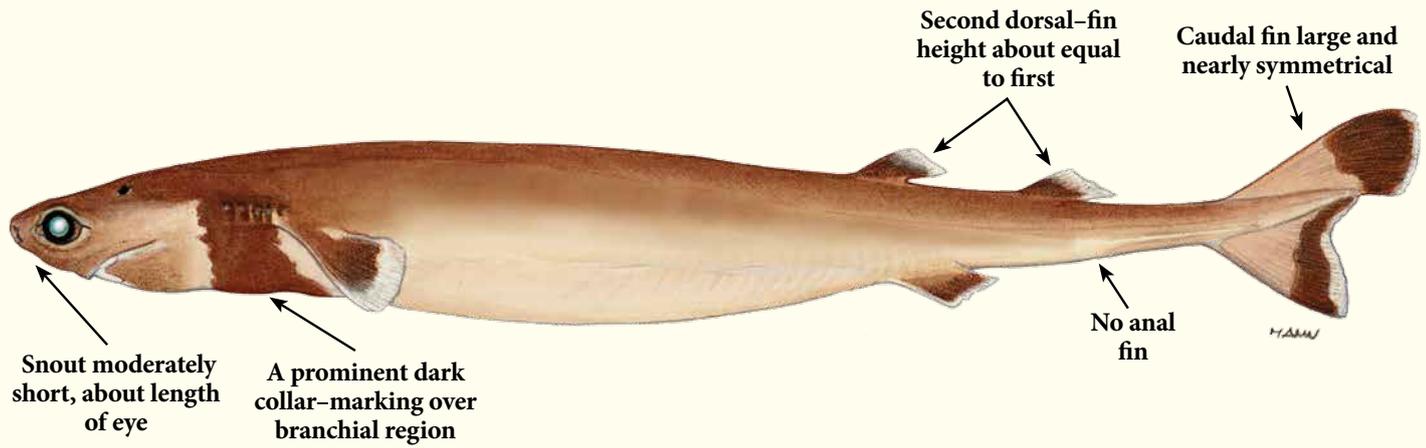
Size
Size small up to 36.5 cm TL.



Bio-Ecology and Distribution of *Heteroscymnoides marleyi*

A dwarf oceanic shark. The holotype was found on a beach in a subtropical area (KwaZulu-Natal, South Africa), but additional specimens have been collected in the open ocean in the epipelagic zone in cold southern waters, in the South Atlantic and eastern South Pacific between the surface and 502 m in waters 830 to over 4000 m deep.





Colour
Pale brown above, becoming lighter below, with a conspicuous dark collar-like marking around the gill region; fins dark, but with pale to translucent edges.

Size
A small shark with a maximum length of about 56 cm TL.

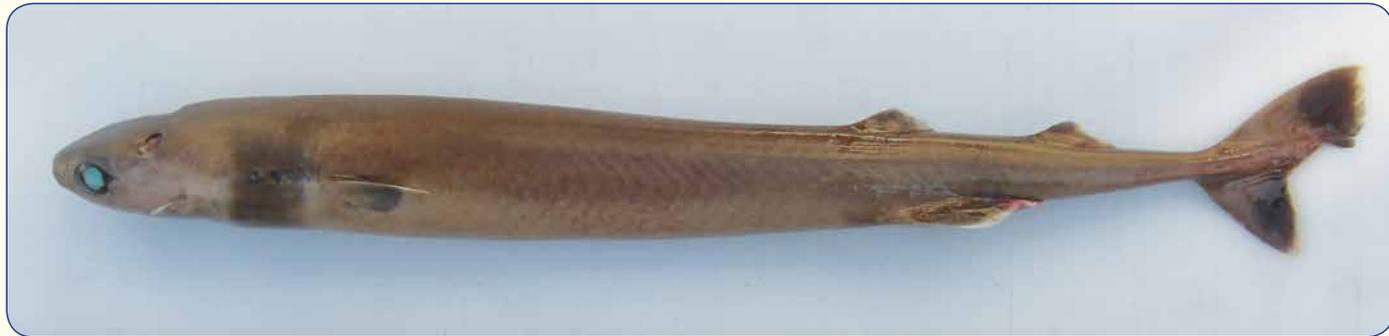


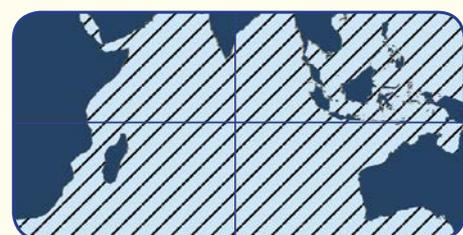
Photo: © Evgeny Romanov, CAP RUN-ARDA

Similar species

Isistius brasiliensis can be distinguished from other similar species for the fact that it has the first dorsal-fin insertion about over pelvic-fin origins and a conspicuous dark collar-like marking around the gill region.

Bio-Ecology and Distribution of *Isistius brasiliensis*

A wide-ranging tropical oceanic shark, with epipelagic to bathypelagic habits. It is caught at night, sometimes at the surface, but usually below it at depths between 85 to 3500 m, however its preferred depth range and maximum depth are uncertain. Apart from those captured at the surface, specimens are generally taken in midwater nets fished over a wide depth range, and it is difficult to tell at what depth these sharks were captured. This shark is thought to be a vertical migrator on a diel cycle, coming to the surface and to the level of midwater trawl hauls at night and presumably dropping below this during the daytime as few if any of these sharks have been taken during the daytime. This implies a long vertical distance travelled, in excess of 2000–3000 m up and down in the ocean basins.



Squaliolus aliae Teng, 1959

Smalleye pygmy shark

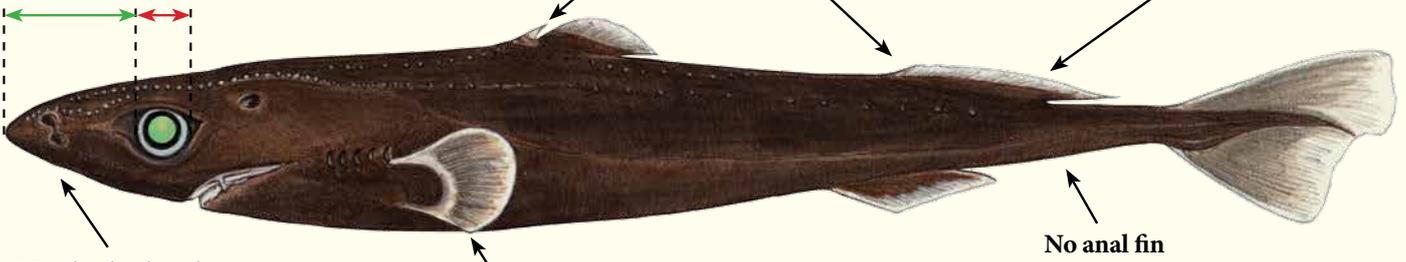
Tsuranaga-kobitozame
(Jpn)



Eye length 43 to 66% (mostly less than 60%) of preorbital snout length

First dorsal fin with a spine, covered by skin or not, but second dorsal fin without a spine

Second dorsal fin much larger than first, base about twice as long as first dorsal-fin base



Head cylindrical, snout very long, bulbously conical but slightly pointed

Pectoral fins with short, narrowly rounded free rear tips and inner margins, not expanded and acute or lobate

No anal fin

Colour

Uniformly black to blackish-brown with conspicuously light-margined fins.

Size

One of the smallest living sharks reaching a maximum length of 22 cm TL.



Photo: © Dave Ebert

Similar species

Squaliolus laticaudus

Eye length 61 to 82% of preorbital snout length

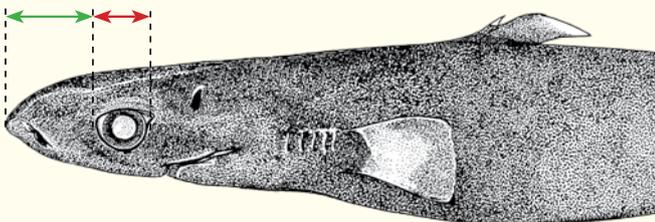


Photo: © Cambraia Duarte, P.M.N. (c)ImagDOP

Bio-Ecology and Distribution of *Squaliolus aliae*

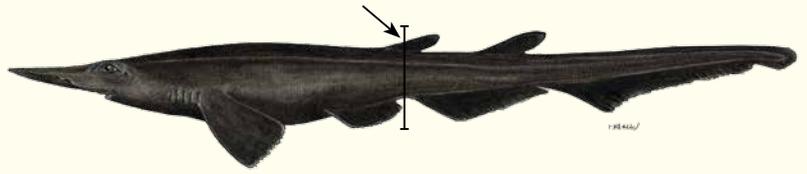
This species appears to overlap the distribution of its congener (*Squaliolus laticaudus*), but may occur closer to continental landmasses. It has an epipelagic or mesopelagic habitat ranging over waters from 200 to 2000 m, although it is also caught near or on the bottom by trawlers.



GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP-SEA CARCHARHINIFORMES

First dorsal-fin base opposite or behind pelvic-fin bases

YES



SCYLORHINIDAE - p. 53

NO

Precaudal pits present. Dorsal caudal-fin margin undulated

YES

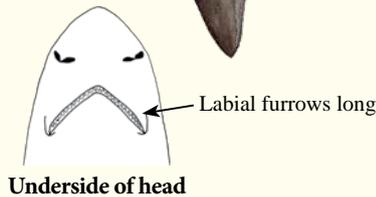
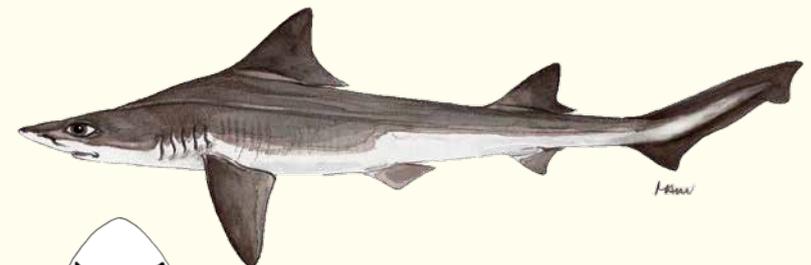


CARCHARHINIDAE - p. 70

NO

Labial furrows relatively long with uppers extending partway or all the way anterior to level of symphysis

YES

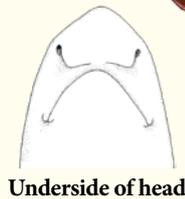
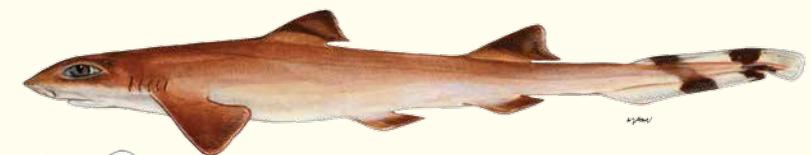


TRIAKIDAE
(Not included in the Guide)

NO

Snout rounded-parabolic or subangular in dorso-ventral profile, without a deep groove in front of eye. First dorsal fin short, its base closer to pelvic fins than pectoral fins

YES

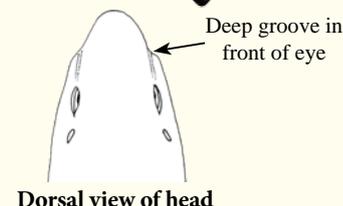
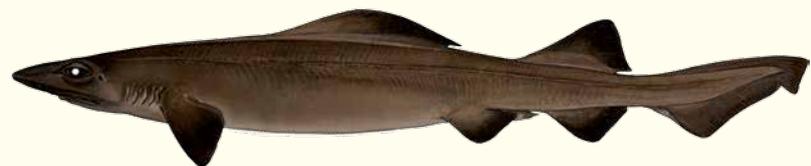


PROSCYLLIIDAE - p. 67

NO

Snout bell-shaped in dorso-ventral profile, with a deep groove in front of eye. First dorsal fin more or less elongated, its base closer to pectoral fins than pelvic fins

YES



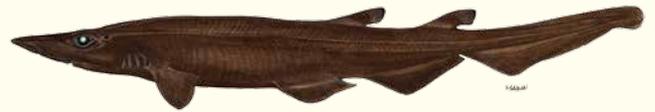
PSEUDOTRIAKIDAE - p. 69

FAMILIES AND SPECIES OF CARCHARHINIFORMES INCLUDED IN THE FIELD GUIDE

SCYLIORHINIDAE



Apristurus longicephalus



Apristurus melanoasper



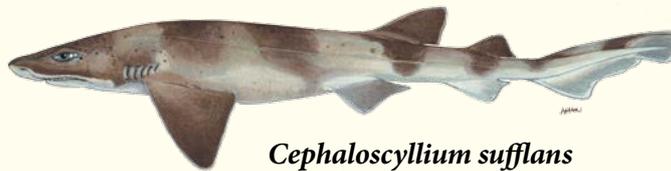
Apristurus microps



Bythaelurus clevai



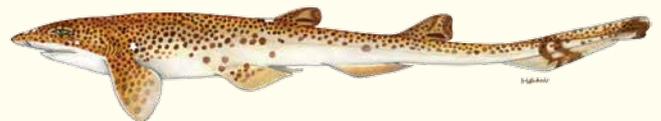
Bythaelurus lutarius



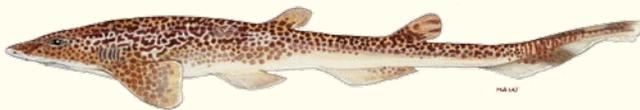
Cephaloscyllium sufflans



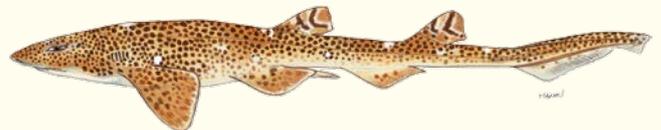
Holohalaelurus favus



Holohalaelurus grennian



Holohalaelurus melanostigma



Holohalaelurus punctatus



Scyliorhinus comoroensis

PROSCYLLIIDAE

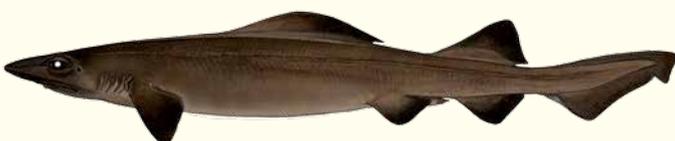


Ctenacis fehlmanni



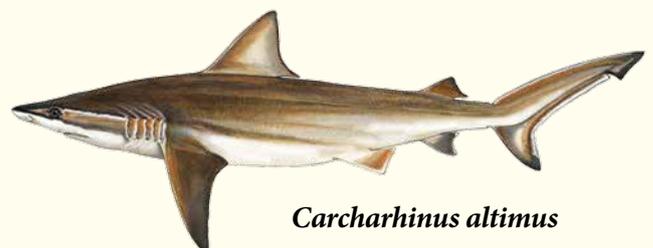
Eridacnis radcliffei

PSEUDOTRIAKIDAE



Pseudotriakis microdon

CARCHARHINIDAE

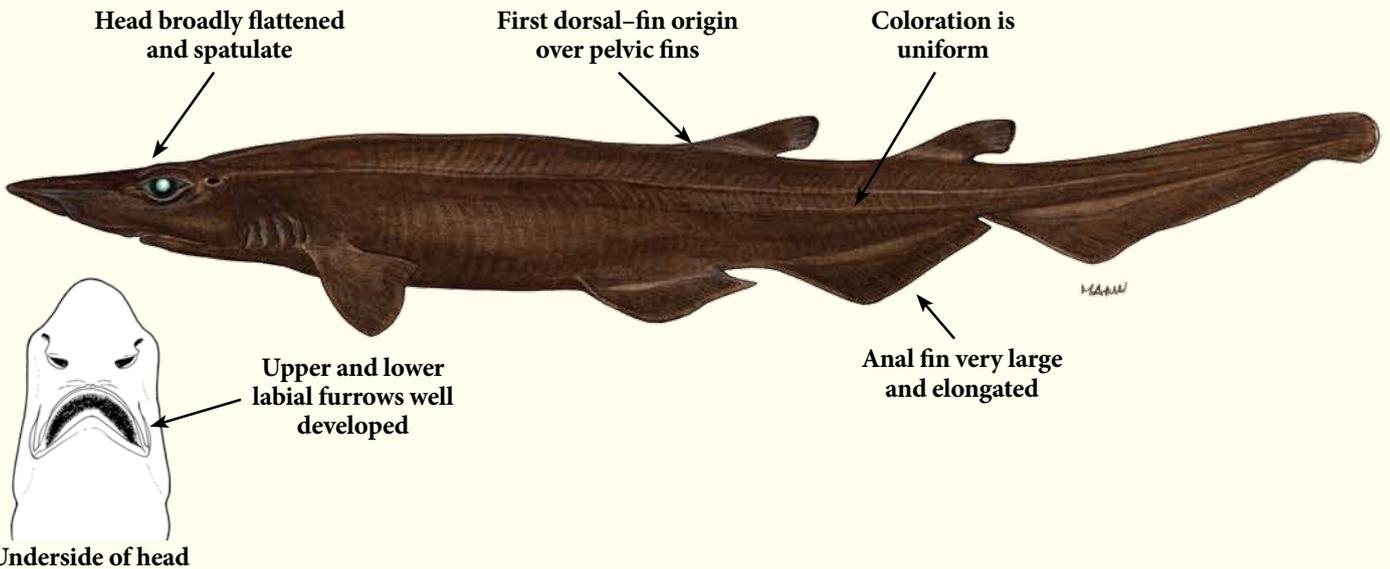


Carcharhinus altimus

Scyliorhinidae – Catsharks

It's an *Apristurus* if:

- the head is broadly flattened and spatulate
- the labial furrows are very long
- the dorsal fins are rear-sited and have no spines; first dorsal-fin origin is over the pelvic fins
- the anal fin is very large and elongated and is separated from elongated caudal fin by a notch only
- the coloration is uniform

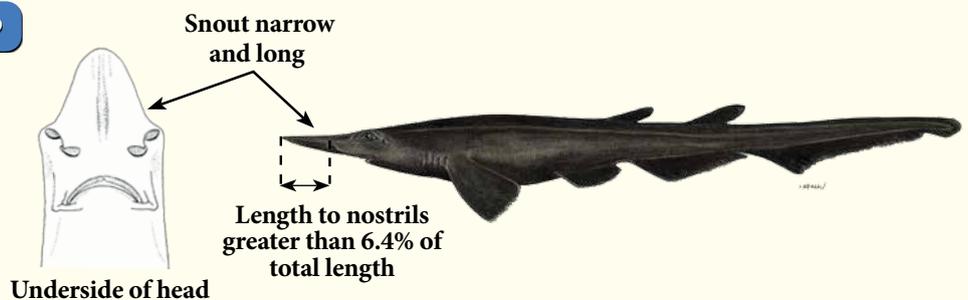


The *Apristurus* can be divided in three species groupings based on differences in the length of snout and labial furrows, the shape of body and other more specific characters such as the intestinal valve counts, form of the supraocular lateral-line canal and morphology of egg cases.

Apristurus longicephalus-group

In the Indian Ocean it includes:

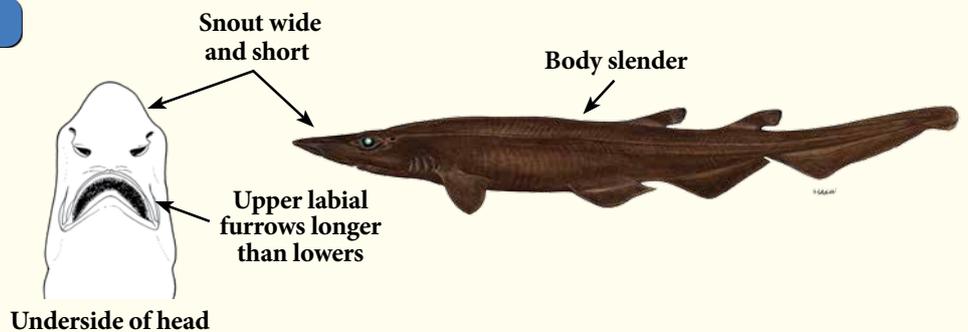
Apristurus australis
Apristurus longicephalus



Apristurus brunneus-group

In the Indian Ocean it includes:

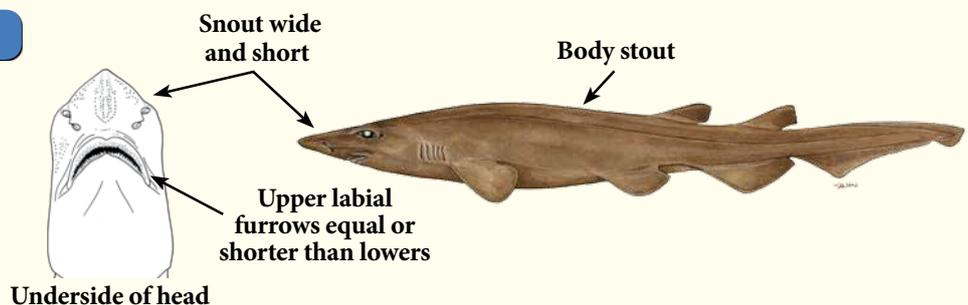
Apristurus indicus
Apristurus investigatoris
Apristurus melanoasper
Apristurus platyrhynchus
Apristurus saldanha
Apristurus sinensis



Apristurus spongiceps-group

In the Indian Ocean it includes:

Apristurus ampliceps
Apristurus bucephalus
Apristurus microps
Apristurus pinguis

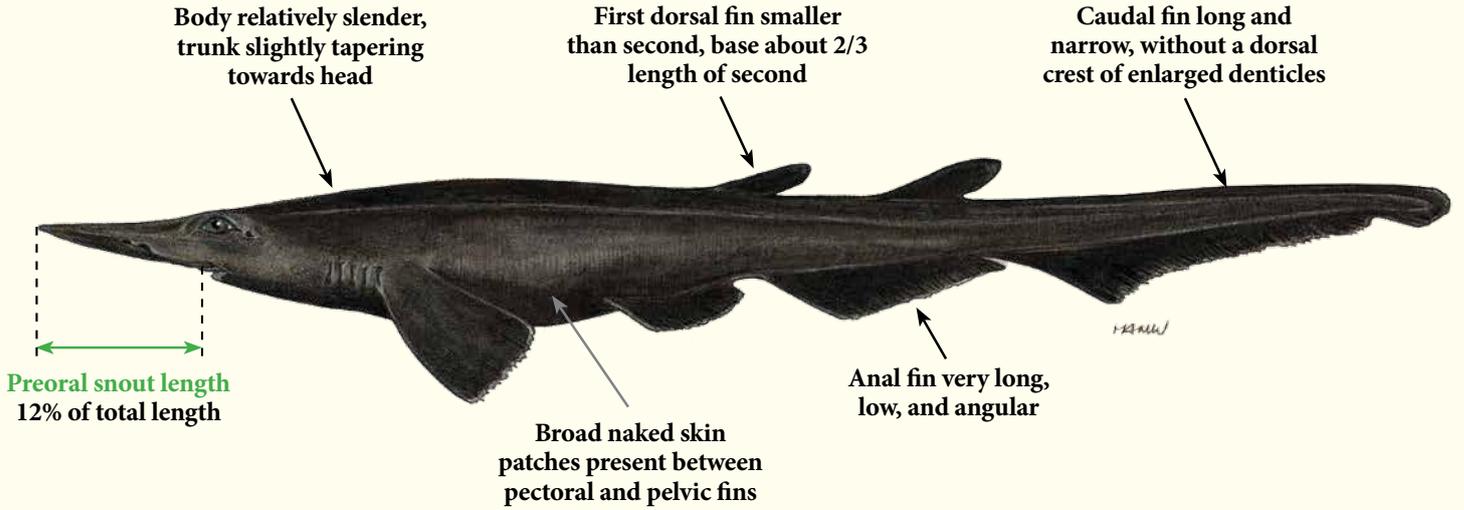


Apristurus longicephalus Nakaya, 1975

Longhead catshark – Holbiche à grande tête
Pejegato cabezón

Tengu-herazame (Jpn)

CSF



Colour

Dark brownish to grey-black, without conspicuous markings.

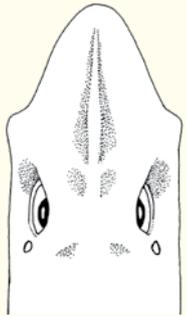
Size

Maximum length at least 59 cm TL.

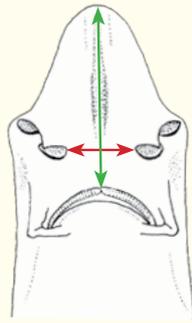


Snout long, basally broad but distally narrowly parabolic and bell-shaped

Internostril width 2.8 times or less into preoral snout length



Dorsal view of head



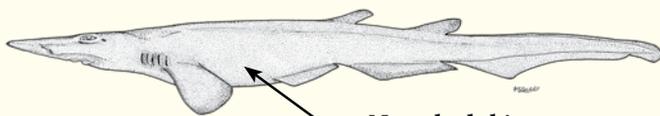
Underside of head



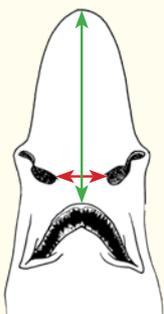
Photo: © D. Ebert

Similar species

Apristurus australis



No naked skin patches between pectoral and pelvic fins



Underside of head

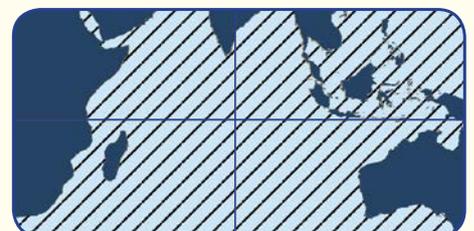
Internostril width 2.9 times or more into preoral snout length

All other *Apristurus* species

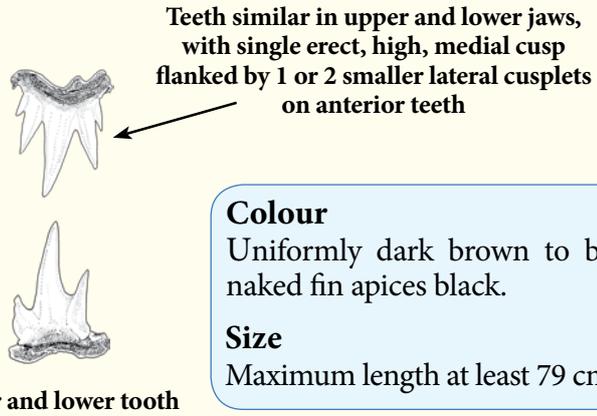
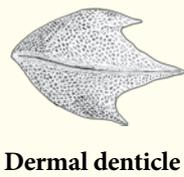
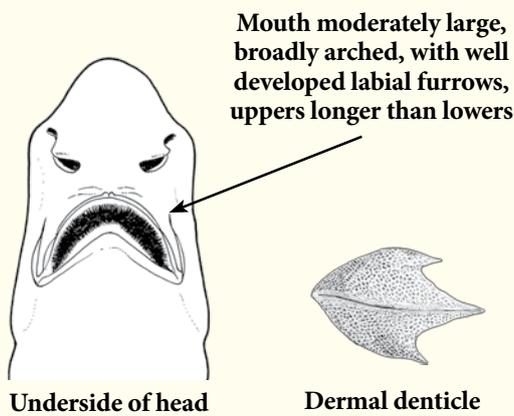
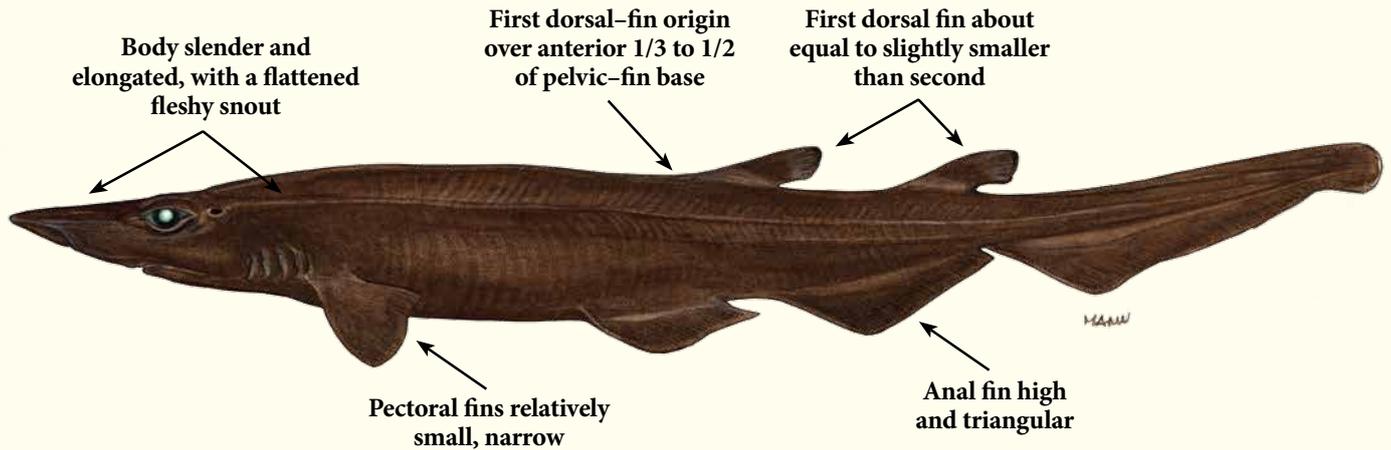
Have the snout relatively wide and short, with its length less than or equal to its width.

Bio-Ecology and Distribution of *Apristurus longicephalus*

A little-known deepwater longnose *Apristurus* occurring on the upper continental slopes, on or near the bottom at 500 to 1140 m depth.



Black roughscale catshark



Colour
Uniformly dark brown to black; naked fin apices black.

Size
Maximum length at least 79 cm TL.

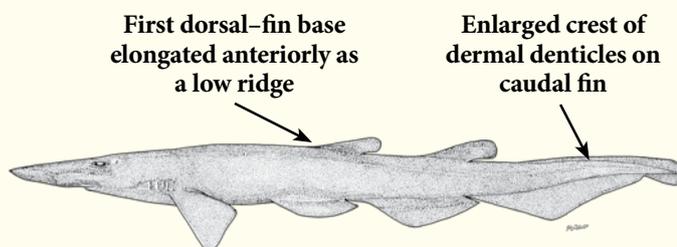


Photo: © P. Porché

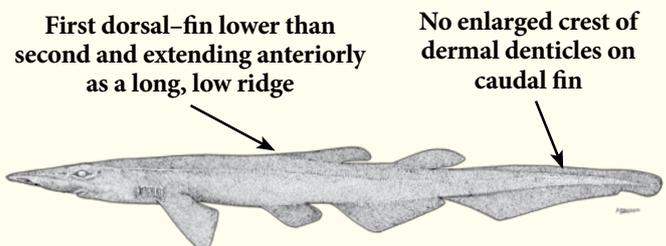
Similar species

The following species share with *Apristurus melanoasper* the following characteristics: the **body is slender** and the **upper labial furrows are longer than the lowers**.

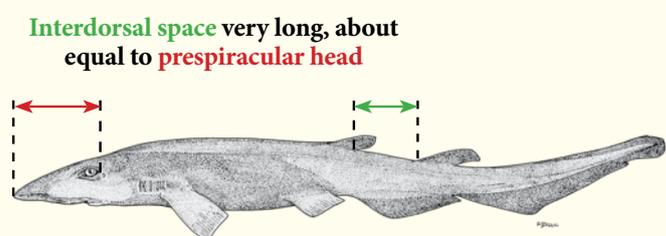
Apristurus investigatoris



Apristurus indicus

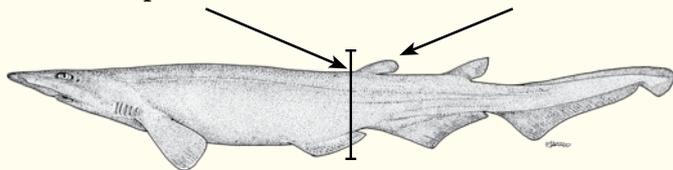


Apristurus saldanha



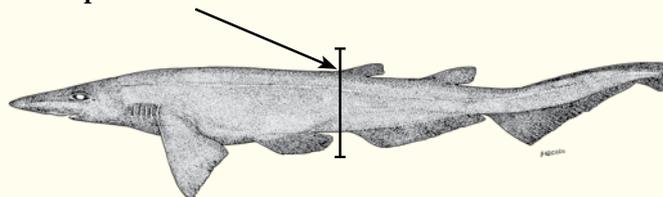
Apristurus sinensis

First dorsal-fin origin somewhat in front of pelvic-fin insertions First dorsal fin much smaller than second



Apristurus platyrhynchus

First dorsal-fin origin behind pelvic-fin insertions

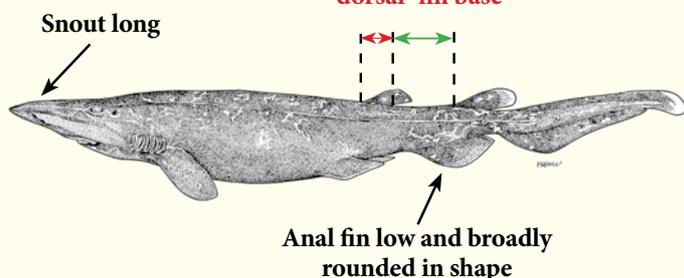


Other similar species

The following species can be distinguished from *Apristurus melanoasper* by the fact that they have a **stout body** and the **upper labial furrows subequal or shorter than the lowers**.

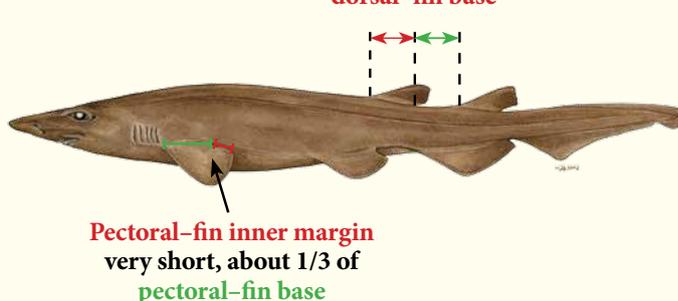
Apristurus ampliceps

Interdorsal space greater than first dorsal-fin base



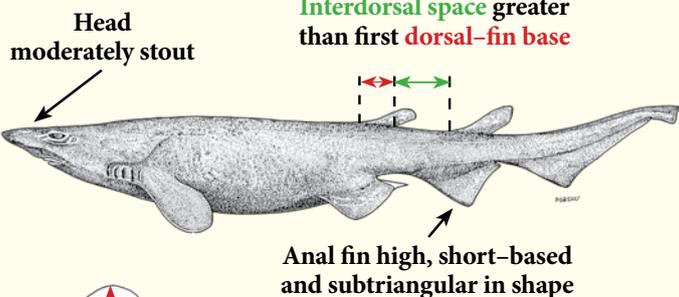
Apristurus microps

Interdorsal space equal or slightly less than first dorsal-fin base



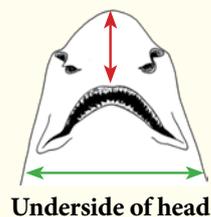
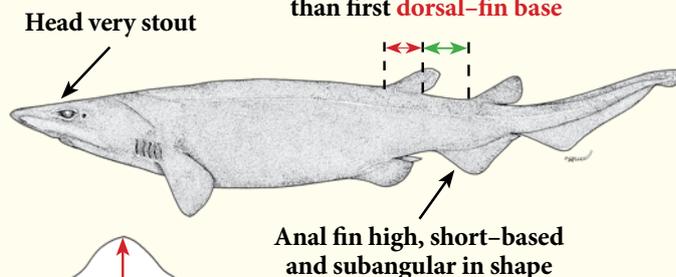
Apristurus pinguis

Interdorsal space greater than first dorsal-fin base

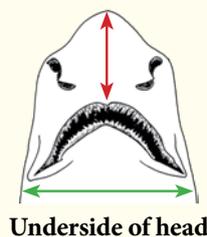


Apristurus bucephalus

Interdorsal space greater than first dorsal-fin base



Preoral snout length less than 1.7 times in maximum head width

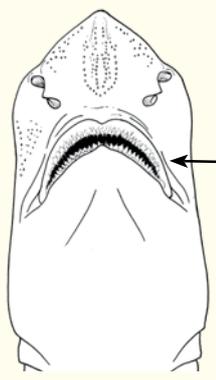
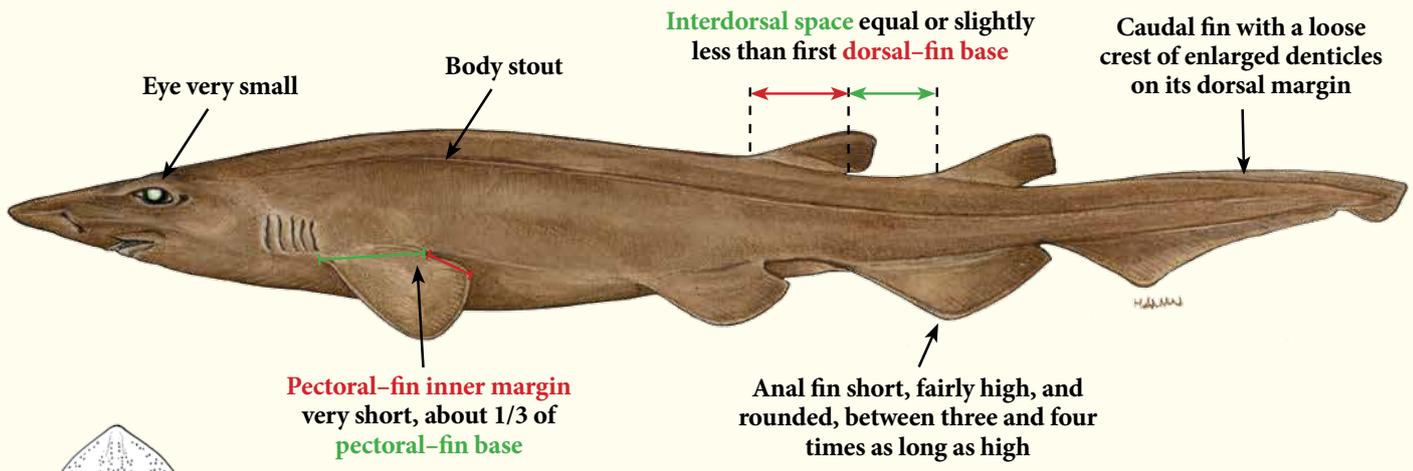


Preoral snout length more than 1.7 times in maximum head width

Bio-Ecology and Distribution of *Apristurus melanoasper*

This species occurs on the continental mid-slopes and seamounts from 512 to 1520 m. Egg cases have been described for this species and fit the characteristics of other *Apristurus* species such as *A. indicus*, *A. investigatoris*, *A. saldanha*, *A. sinensis*, and *A. platyrhynchus* with long tightly coiled tendrils posteriorly and short blunt horns anteriorly.





Underside of head

Colour
Dusky brown or grey-brown to purplish-black, without conspicuous markings on fins.

Size
Maximum length at least 61 cm TL.

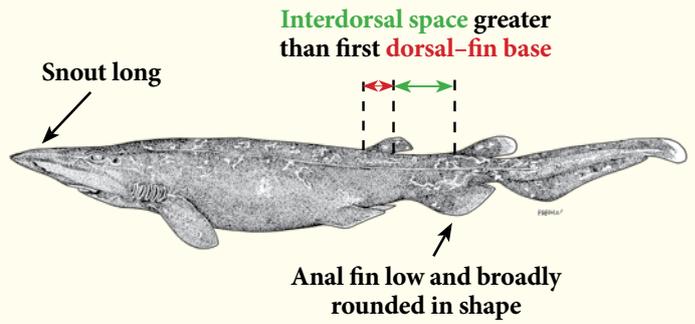



Photo: © Rob Leslie

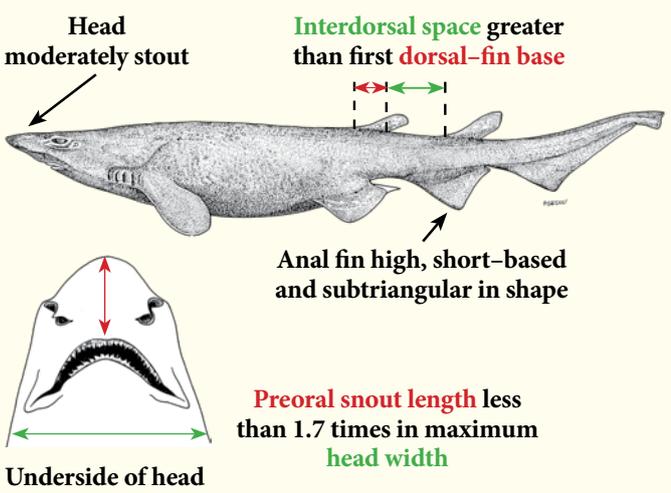
Similar species

The following species share with *Apristurus microps* the following characteristics: the **body is stout** and the **upper labial furrows are subequal or shorter than the lowers**.

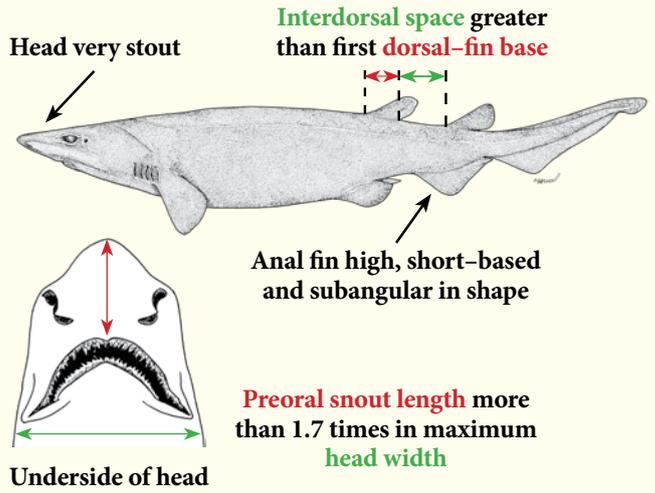
Apristurus ampliceps



Apristurus pinguis



Apristurus bucephalus



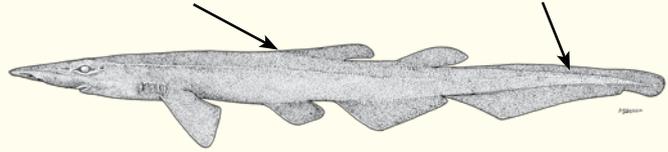
Other similar species

The following species can be distinguished from *Apristurus microps* by the fact that they have a **slender body** and the **upper labial furrows longer than the lowers**.

Apristurus indicus

First dorsal-fin lower than second and extending anteriorly as a long, low ridge

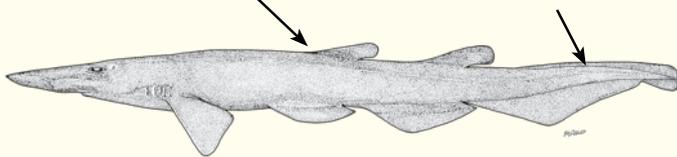
No enlarged crest of dermal denticles on caudal fin



Apristurus investigatoris

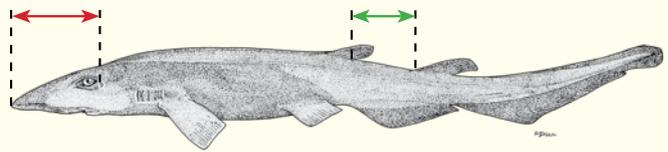
First dorsal-fin base elongated anteriorly as a low ridge

Enlarged crest of dermal denticles on caudal fin



Apristurus saldanha

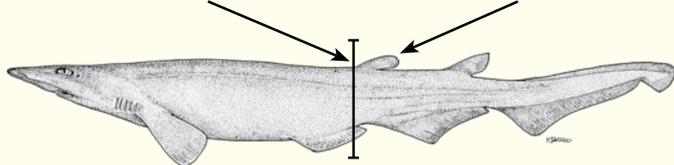
Interdorsal space very long, about equal to prespiracular head



Apristurus sinensis

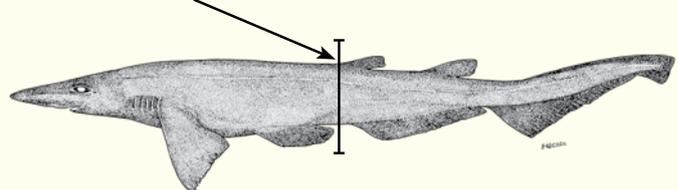
First dorsal-fin origin somewhat in front of pelvic-fin insertions

First dorsal fin much smaller than second



Apristurus platyrhynchus

First dorsal-fin origin behind pelvic-fin insertions



Bio-Ecology and Distribution of *Apristurus microps*

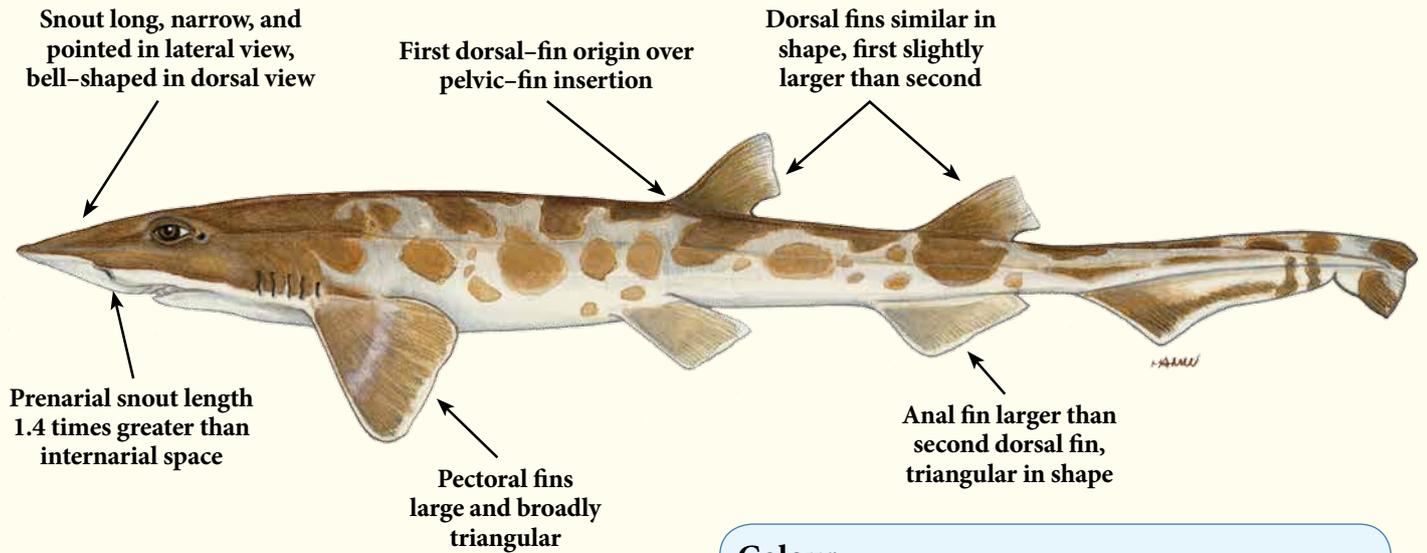
This species occurs on the continental slopes, on or near the bottom at depths of 700 to 2200 m. South African specimens have been collected on soft bottom habitats between 700 to 1200 m deep.

Adult males have cuts and scars suggesting bites by conspecifics. Eats small midwater bony fishes, shrimp, and squid. A small unidentified squaloid was found in the stomach of one individual. Several prey items are midwater inhabitants suggesting that these shark may forage at times far off the bottom.



Bythaelurus clevai (Séret, 1987)

Broadhead catshark



Colour
Grey above, with a pattern of dark brown saddles on back and caudal fin and with variegated dark brown blotches on flanks; whitish below.

Size
Maximum length to 42 cm TL.



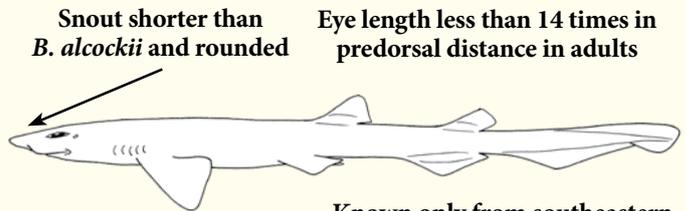
Similar species

Bythaelurus lutarius



Prenarial snout length about equal to internarial space

Bythaelurus hispidus

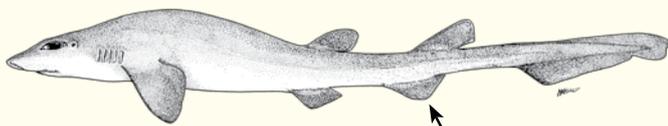


Snout shorter than *B. alcockii* and rounded

Eye length less than 14 times in predorsal distance in adults

Known only from southeastern India and Andaman Islands

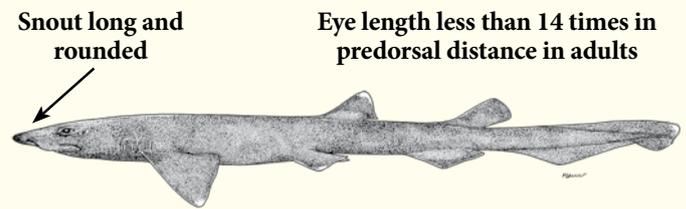
Bythaelurus incanus



Anal-fin base as long or longer than interdorsal space

Known only from off the Ashmore Terrace, northern Western Australia

Bythaelurus alcockii



Snout long and rounded

Eye length less than 14 times in predorsal distance in adults

Known only from the Arabian Sea

Bio-Ecology and Distribution of *Bythaelurus clevai*

This species occurs on the upper insular slopes from 400 to 500 m deep. Recorded southwest of Madagascar, common off Tulear.



Bythaelurus lutarius (Springer & D'Aubrey, 1972)

Mud catshark – Holbiche des vases
Pejegato fanguero

Pata-roxa de lodo (Por)

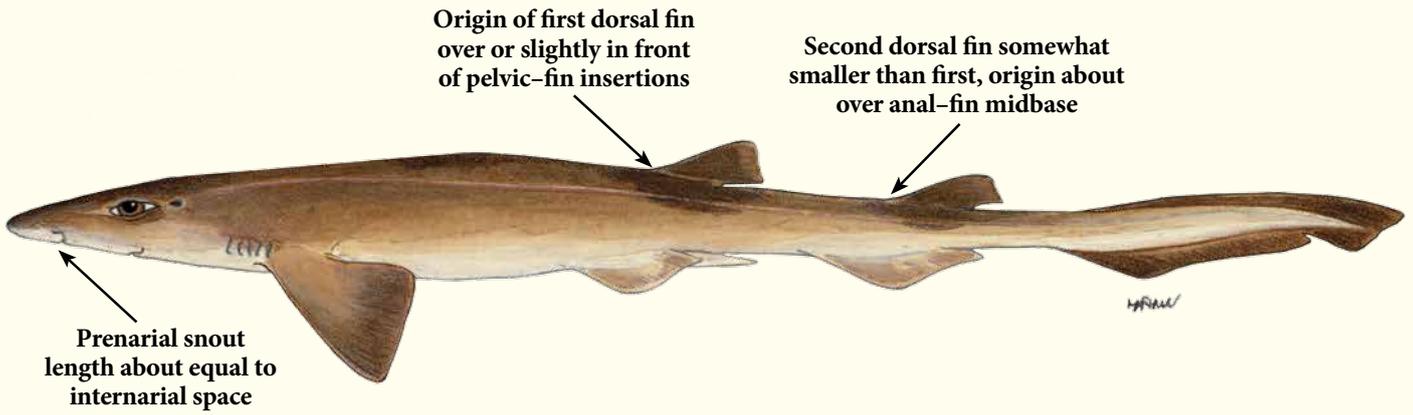


Photo: © Oddgeir Alvheim, IMR

Colour

Grey-brown above and lighter below, sometimes with obscure saddle bands.

Size

Maximum length to 39 cm TL.



Similar species

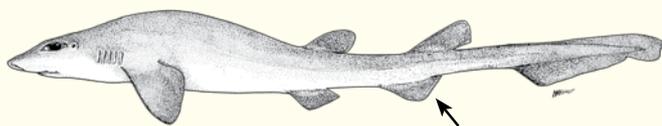
Bythaelurus clevai

Eye length more than 14 times in predorsal distance in adults



Prenarial snout length 1.4 times greater than internarial space

Bythaelurus incanus



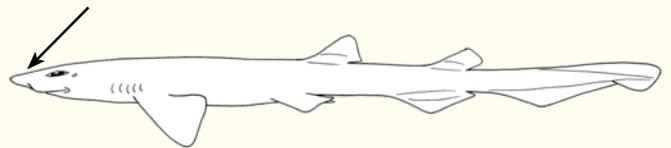
Anal-fin base as long or longer than interdorsal space

Only known from off the Ashmore Terrace, northern Western Australia

Bythaelurus hispidus

Snout shorter than *B. alcockii* and rounded

Eye length less than 14 times in predorsal distance in adults

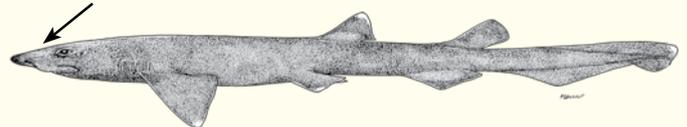


Only known from southeastern India and Andaman Islands

Bythaelurus alcockii

Snout long and rounded

Eye length less than 14 times in predorsal distance in adults



Only known from the Arabian Sea

Bio-Ecology and Distribution of *Bythaelurus lutarius*

A deepwater tropical catshark of the continental slope of the western Indian Ocean, on or just above muddy bottoms at 338 to 766 m depth.



Cephaloscyllium sufflans (Regan, 1921)

Balloon shark – Holbiche soufflée
Pejégato balón

Pata-roxa ensuflada (Por)

CPH

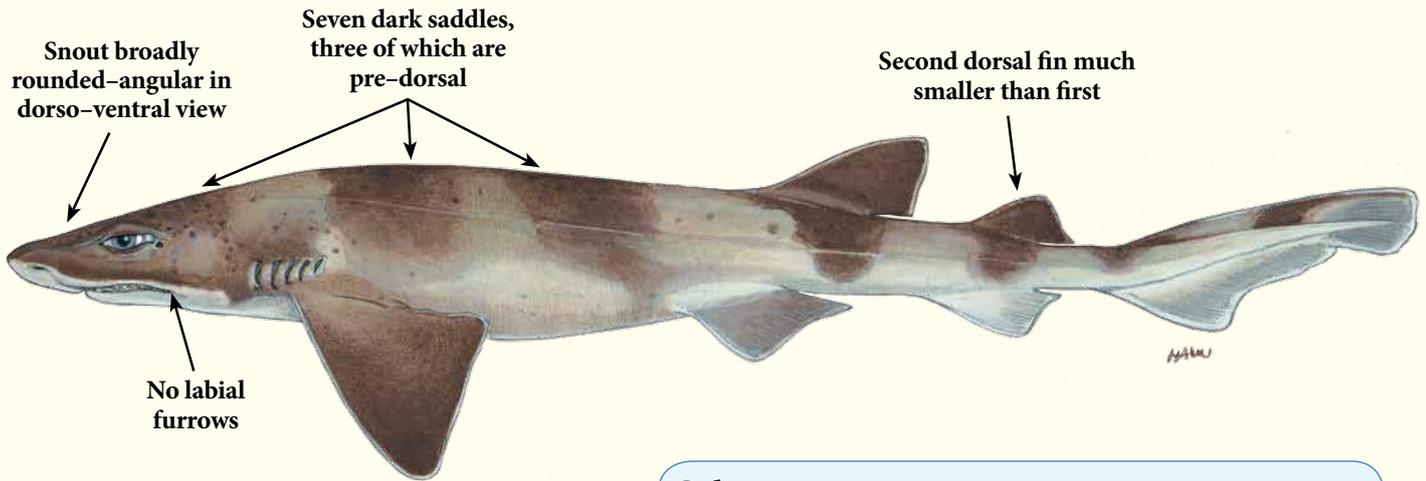


Photo: © Dave Ebert

Colour

Pattern of seven light grey-brown saddles on a lighter, pale grey-brown background, these saddles obscure or absent in adults; pectoral fins dusky above, underside unspotted; fins without conspicuous light margins.

Size

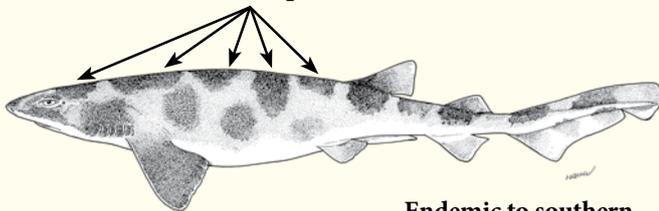
Maximum length to 110 cm TL.



Similar species

Cephaloscyllium albipinnum

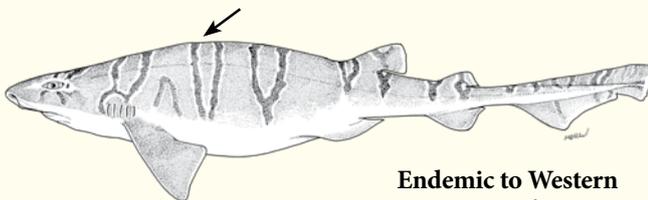
Ten or eleven dark saddles, five of which are pre-dorsal



Endemic to southern Australia

Cephaloscyllium hiscosellum

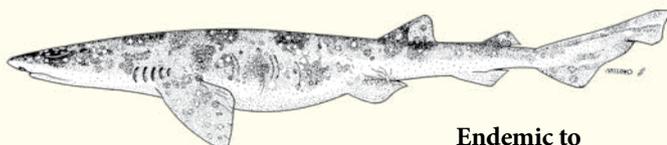
Colour pattern of numerous narrow, transverse saddles



Endemic to Western Australia

Cephaloscyllium speccum

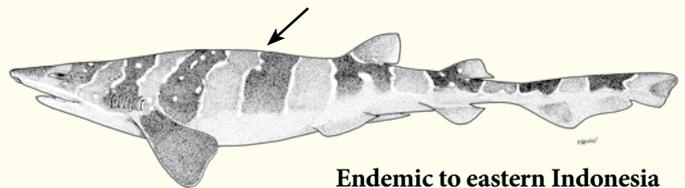
A strongly variegated colour pattern of close-set dark saddles and blotches, numerous dark spots and occasional light spots on a lighter background



Endemic to north-western Australia

Cephaloscyllium cooki

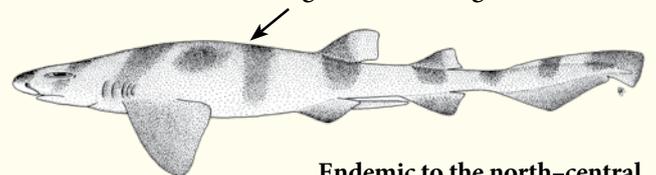
Dorsal body coloration dark, with eight very dark, well defined saddles outlined in white



Endemic to eastern Indonesia and north-western Australia

Cephaloscyllium silasi

Colour pattern of seven moderately broad dark brown saddles on a light brown background



Endemic to the north-central Indian Ocean

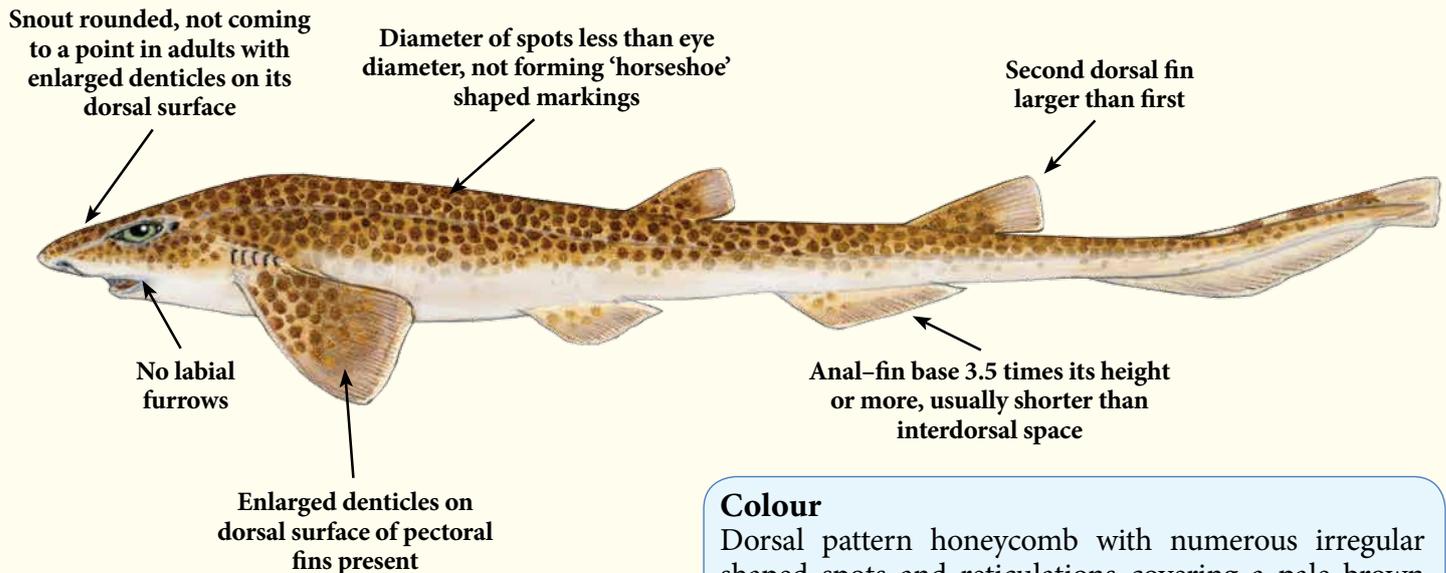
Bio-Ecology and Distribution of *Cephaloscyllium sufflans*

A common warm-temperate and subtropical off-shore catshark on the continental shelf and uppermost slope at depths from 40 to 440 m, commonly on sand and mud bottoms.



Holohalaelurus fавus Human, 2006

Honeycomb izak – Holbiche criblée – Tiburón gato miel



Colour

Dorsal pattern honeycomb with numerous irregular shaped spots and reticulations covering a pale brown background; white spots above pectoral fins absent; ventral surface uniformly grey-brown.

Size

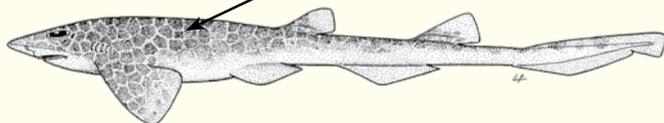
Maximum length to at least 51.5 cm TL.



Similar species

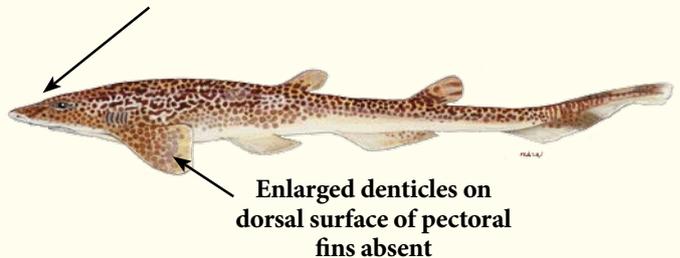
Holohalaelurus regani

Diameter of spots greater than eye diameter, forming 'horseshoe' shaped markings



Holohalaelurus melanostigma

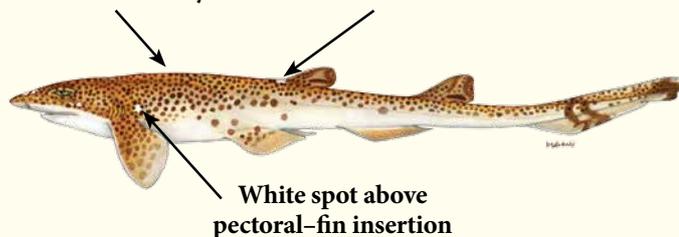
Enlarged denticles on dorsal surface of snout absent



Holohalaelurus grennian

Slightly enlarged denticles on dorsal midline of body

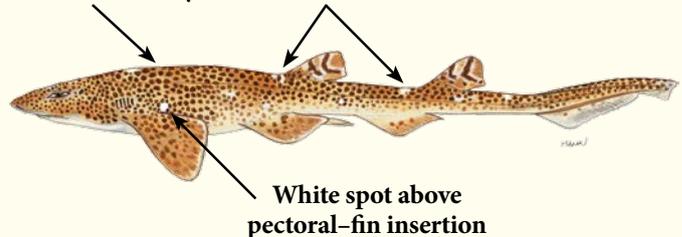
White spots occasionally in front of dorsal-fin origins, but not both dorsal fins



Holohalaelurus punctatus

No enlarged denticles on dorsal midline of body

White spot at origin of each dorsal fin



Bio-Ecology and Distribution of *Holohalaelurus fавus*

This species appears to have a preference for water deeper than 200 m, but shallower than 1000 m. Although records are somewhat scarce due to misidentification with other similar looking Izak catshark species, the depth range appears to be approximately 200 to 740 m.



Holohalaelurus grennian Human, 2006

Grinning izak

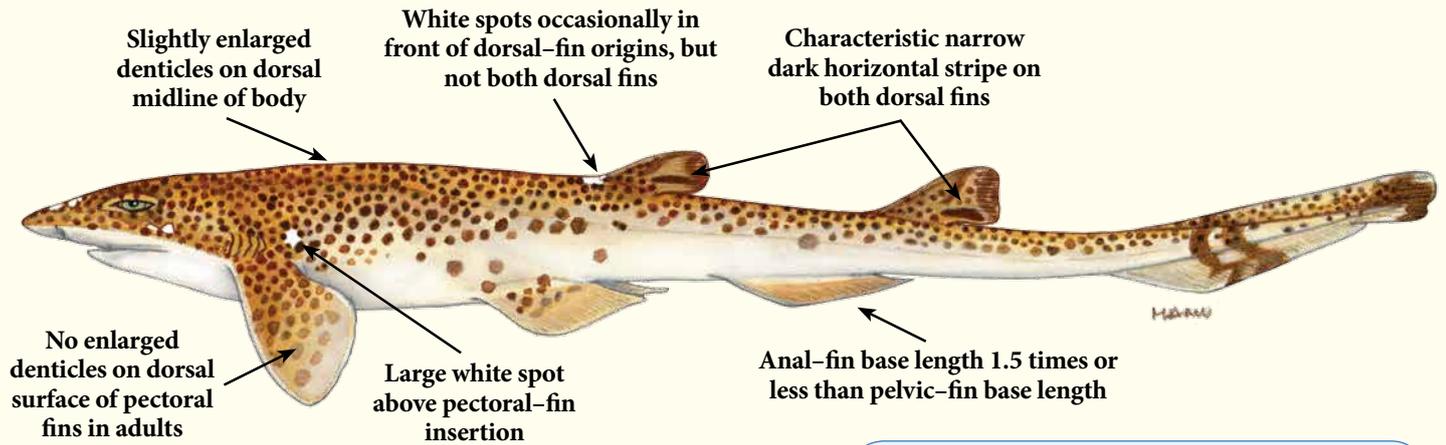


Photo: © Oddgeir Alvheim, IMR

Colour

Dorsal background yellow brown with numerous small solid dark brown spots; white spots present, but not numerous; ventral surface uniformly white to pale grey.

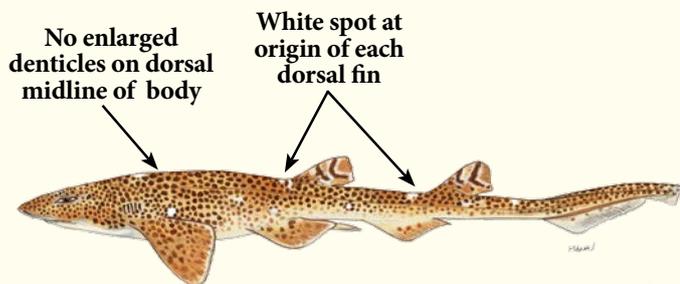
Size

Maximum length to 27.3 cm TL.

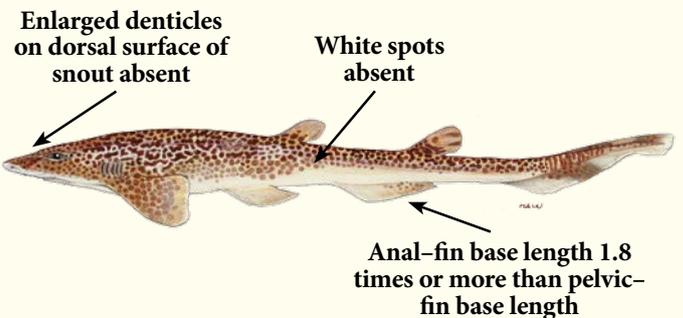


Similar species

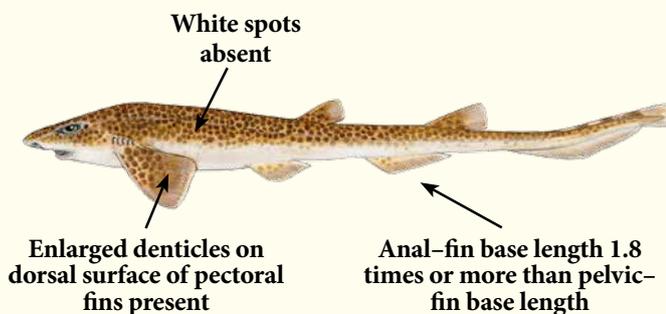
Holohalaelurus punctatus



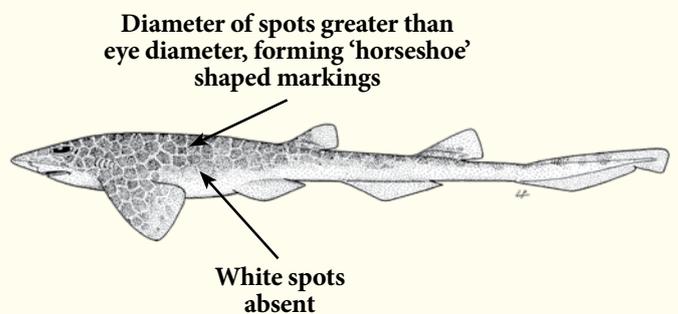
Holohalaelurus melanostigma



Holohalaelurus favus



Holohalaelurus regani



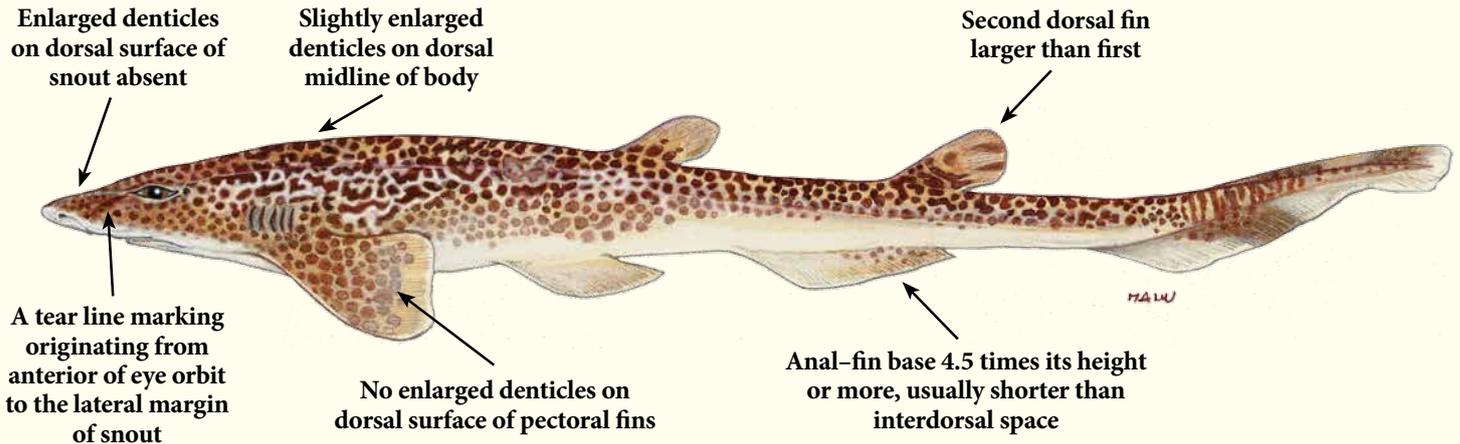
Bio-Ecology and Distribution of *Holohalaelurus grennian*

A very small catshark from the outer continental shelf and upper slope from 238 to 353 m, known only from a few specimens off Kenya, Tanzania, southern Mozambique, and possibly from off Somalia.



Holohalaelurus melanostigma (Norman, 1939)

Crying izak catshark



Colour

Dorsal background greyish-brown with numerous large darker brown spots covering the entire dorsal surface and fusing together with growth to form short to long stripes, blotches, reticulations and rings extending posteriorly to the origin of the caudal fin. White spots absent above from pectoral-fin bases and dorsal-fin origins.

Size

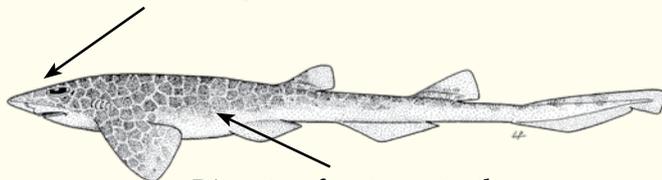
Maximum length to at least 38.4 cm TL (adult males).



Similar species

Holohalaelurus regani

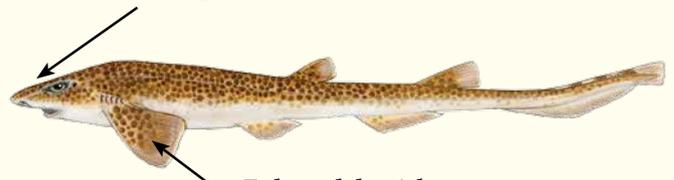
Enlarged denticles on dorsal surface of snout present



Diameter of spots greater than eye diameter, forming 'horseshoe' shaped markings

Holohalaelurus fавus

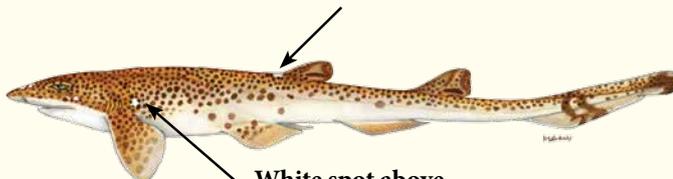
Enlarged denticles on dorsal surface of snout present



Enlarged denticles on dorsal surface of pectoral fins present

Holohalaelurus grennian

White spots occasionally in front of dorsal-fin origins, but not both dorsal fins

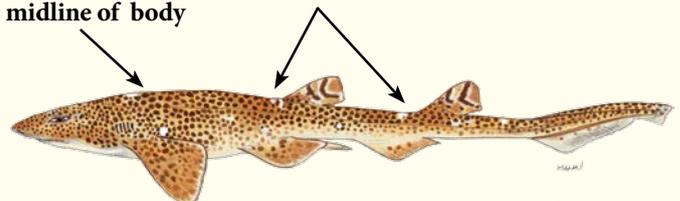


White spot above pectoral-fin insertion

Holohalaelurus punctatus

No enlarged denticles on dorsal midline of body

White spot at origin of each dorsal fin



Bio-Ecology and Distribution of *Holohalaelurus melanostigma*

A deepwater catshark of upper continental slopes from 607 to 658 m, known only from northern Tanzania, near Pemba Island, and southern Kenya.



Holohalaelurus punctatus (Gilchrist, 1914)

African spotted catshark – Holbiche à gorge tachetée
Pejegato moteado

Pata-roxa africana (Por)

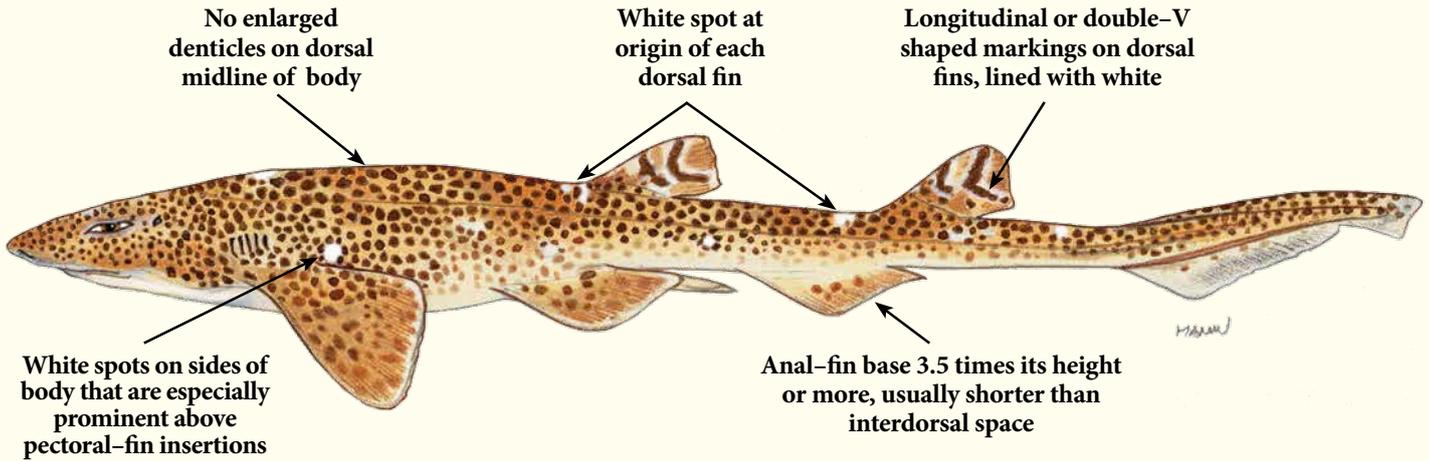


Photo: © Oddgeir Alvheim, IMR

Colour

Pattern variable but usually with very small, regular, closely spaced dark brown spots on yellow-brown ground colour of back giving a leopard-like appearance.

Size

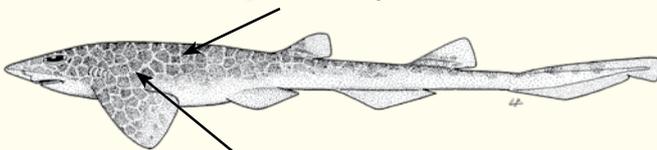
Maximum length to about 33 cm TL.



Similar species

Holohalaelurus regani

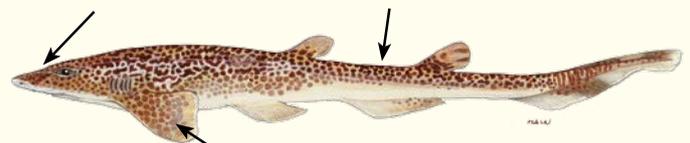
Diameter of spots greater than eye diameter, forming 'horseshoe' shaped markings



White spots never present

Holohalaelurus melanostigma

Enlarged denticles on dorsal surface of snout absent

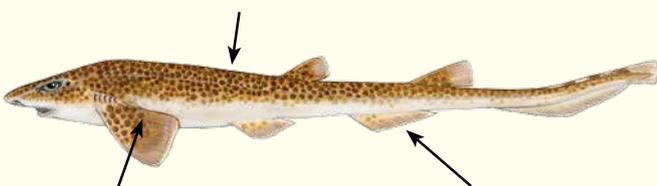


White spots absent

Enlarged denticles on dorsal surface of pectoral fins absent

Holohalaelurus favus

White spots absent

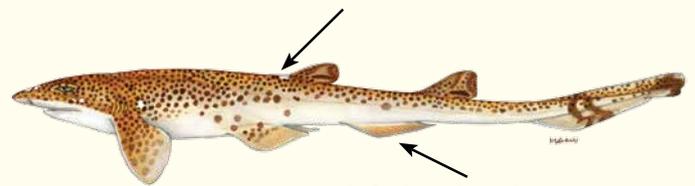


Enlarged denticles on dorsal surface of pectoral fins present

Anal-fin base length 1.8 times or more than pelvic-fin base length

Holohalaelurus grennian

White spots occasionally in front of dorsal-fin origins, but not both dorsal fins



Anal-fin base length 1.5 times or less than pelvic-fin base length

Bio-Ecology and Distribution of *Holohalaelurus punctatus*

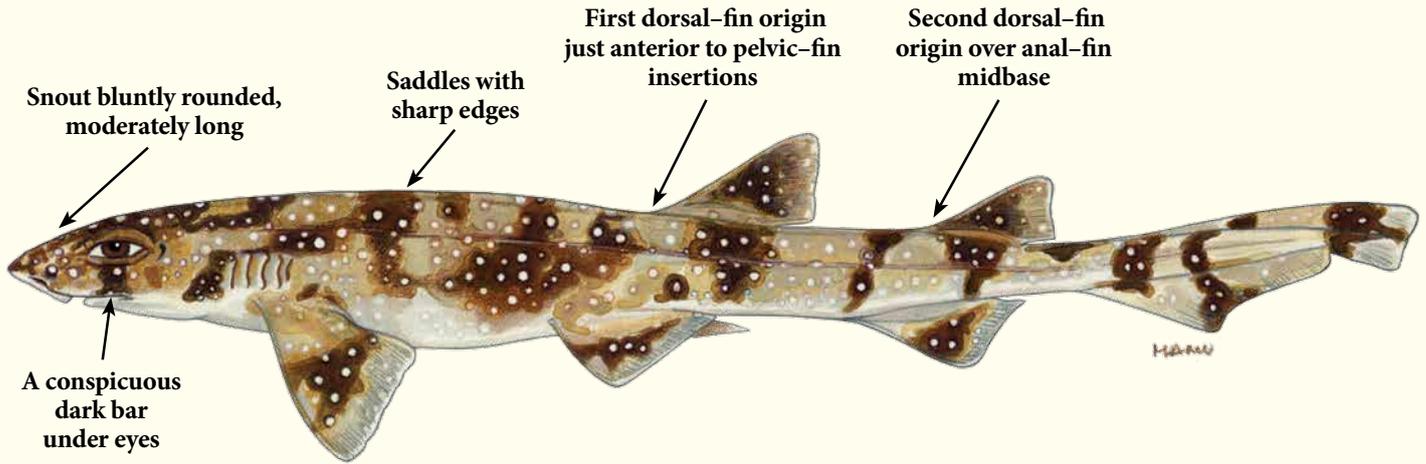
A small bottom shark of deepish water of the uppermost continental slopes from 220 to 420 m. Common or formerly common off KwaZulu-Natal and Mozambique.



Scyliorhinus comoroensis Compagno, 1988

Comoro catshark – Roussette des Comores

Tiburón gato Comoro



Colour

Pattern with bold, discrete dark grey-brown saddles and large blotches on a light-grey brown background, with scattered numerous small white spots the size of eye pupil or slightly larger; white spots in saddles and spaces between them but not close-set; no small bold dark spots.

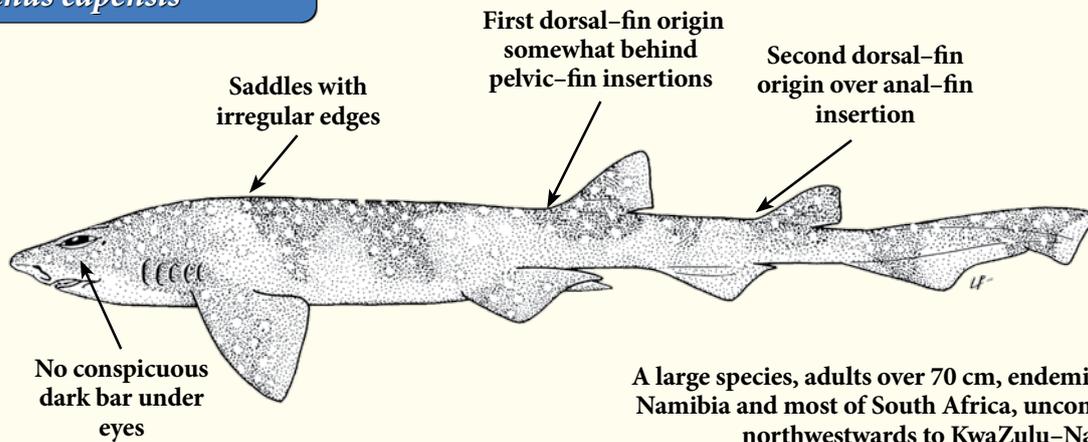
Size

Maximum length to about 46 cm TL.



Similar species

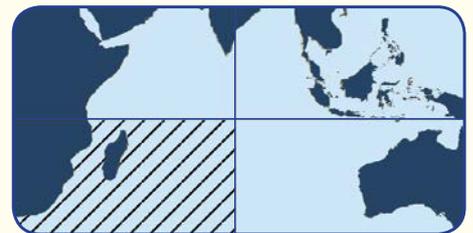
Scyliorhinus capensis



A large species, adults over 70 cm, endemic to southern Namibia and most of South Africa, uncommon to rare northwestwards to KwaZulu-Natal

Bio-Ecology and Distribution of *Scyliorhinus comoroensis*

A small catshark of insular slopes living on the bottom at 200 to 400 m depth. Dr. P. Fourmanoir collected a single specimen of this shark off Moroni, Grande Comore, in 1983 and provisionally identified it as *Scyliorhinus capensis* (B. Seret, pers. comm.). Compagno (1989) compared this specimen with *S. capensis* and determined that it represented a new species. Live individuals of this species have been photographed in deep water by the research submersible *Jago* while studying the coelacanth *Latimeria chalumnae*.

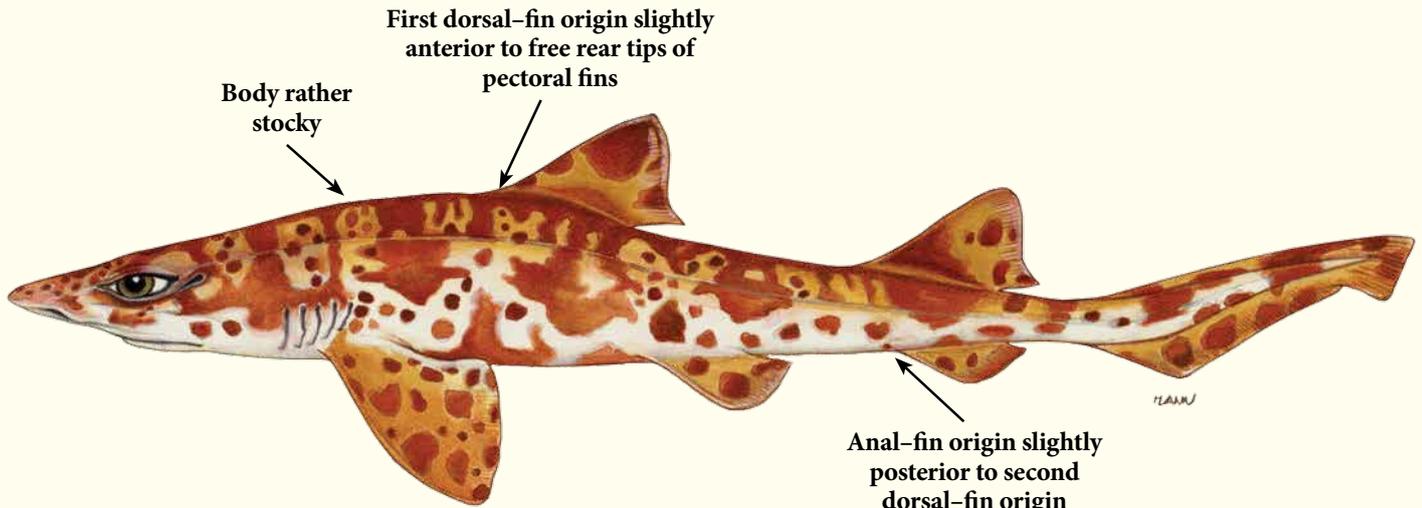


Ctenacis fehlmanni (Springer, 1968)

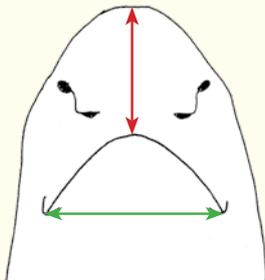
Harlequin catshark – Requin chat arlequin
Tollo coludo arlequín

Madara-dochizame (Jpn)

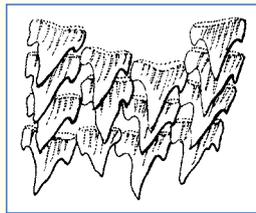
CPE



Preoral snout length
about 2/3 of mouth
width



Underside of head



Upper teeth

Colour

A unique pattern of large, reddish-brown, irregular dorsal saddle blotches on body, interspersed with smaller round spots and vertical bars, as well as spots on fins.

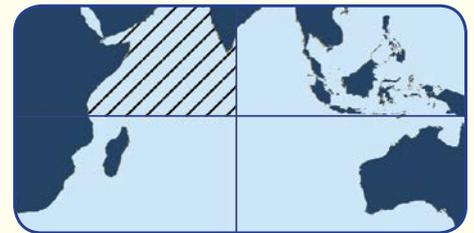
Size

Maximum length to 52 cm TL.



Bio-Ecology and Distribution of *Ctenacis fehlmanni*

A poorly known tropical bottom shark from the outer continental shelf off Somalia, known only from the holotype collected during the International Indian Ocean Expedition, from additional specimens collected by Russian research vessels, and from five additional specimens collected in 2011 off Oman at a depth of over 300 m.



Eridacnis radcliffei Smith, 1913

Pygmy ribbontail catshark – Requin chat pygmée
Tollo coludo pigmeo

Onaga–dochizame (Jpn)



Short anterior nasal flaps that do not reach mouth

Dorsal fins fairly large and high, with anterior margin of first dorsal fin at a low angle to body axis

Ribbon-like caudal fin with prominent dark banding

Anal-fin height less than half height of dorsal-fins

Preoral snout less than 1.5 times mouth length

Labial furrows rudimentary or absent

Underside of head

Colour
Brown, with prominent dark banding on tail and dark markings on dorsal fins.

Size
Maximum length to 24 cm TL.



Similar species

Eridacnis sinuans

Dorsal fins moderately large and high, with anterior margin of first dorsal at a high angle to body axis

Ribbon-like caudal fin with faint dark banding

Preoral snout over twice mouth length

Underside of head

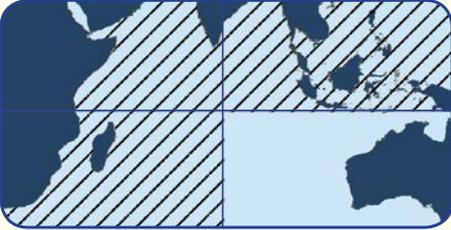


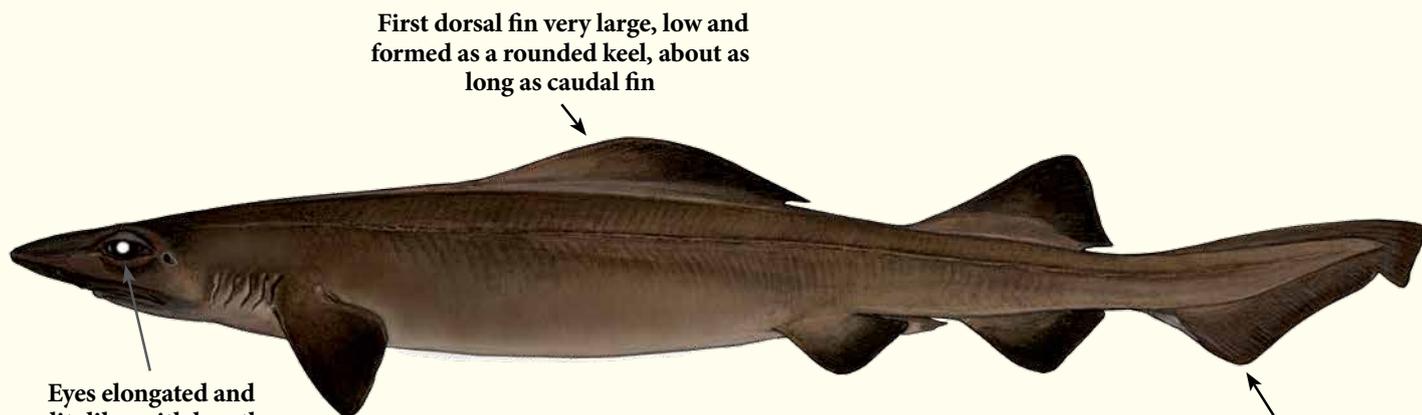
Photo: © Oddgeir Alvheim, IMR

Endemic to the southwestern Indian Ocean, off South Africa, Mozambique and Tanzania on the outer continental shelf and upper continental slope

Bio-Ecology and Distribution of *Eridacnis radcliffei*

A deepwater tropical benthic shark that often occurs on mud bottoms, on the upper continental and insular slopes and the outer shelves at depths from 71 to 766 m. Wide-ranging in the Indo-West Pacific, but with spotty records from Tanzania, the Gulf of Aden, India (Gulf of Mannar and Bay of Bengal), the Andaman Islands, Vietnam, the Philippine Islands, and Taiwan (Province of China). The pigmy ribbontail shark is common in some areas where it occurs (particularly southern India and the Philippine Islands).



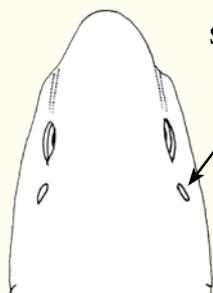


First dorsal fin very large, low and formed as a rounded keel, about as long as caudal fin

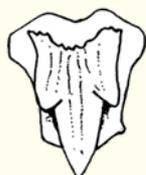
Eyes elongated and slit-like, with length over two times height

Teeth small, with acute narrow cusps, lateral cusplets, and strong basal ledges and grooves, not bladelike and similar in both jaws

Ventral caudal-fin lobe absent or very weak



Spiracles are present and very large



Upper tooth

Colour

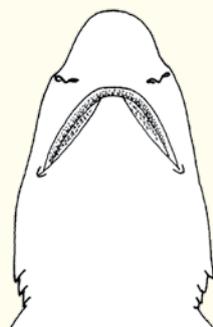
Uniform plain dark brown to blackish except for darker fins.

Size

Maximum length to about 295 cm TL.



Dorsal view of head



Underside of head

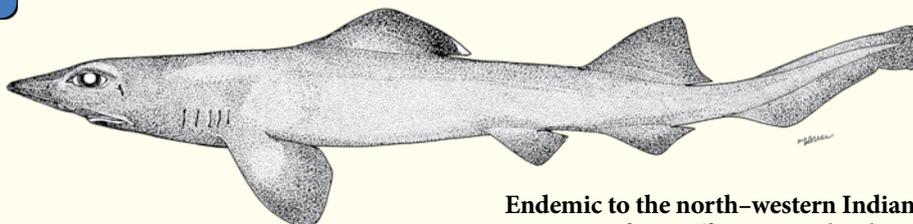


Photo: © Paul Clerkin

Similar species

Planonassus parini

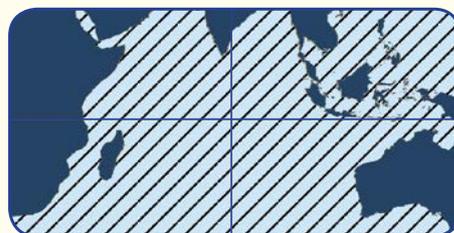
First dorsal fin not low and keel-like, rather high, about as high as second dorsal fin, and angular, shorter than dorsal caudal-fin margin



Endemic to the north-western Indian Ocean from off Socotra Island

Bio-Ecology and Distribution of *Pseudotriakis microdon*

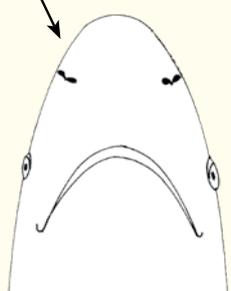
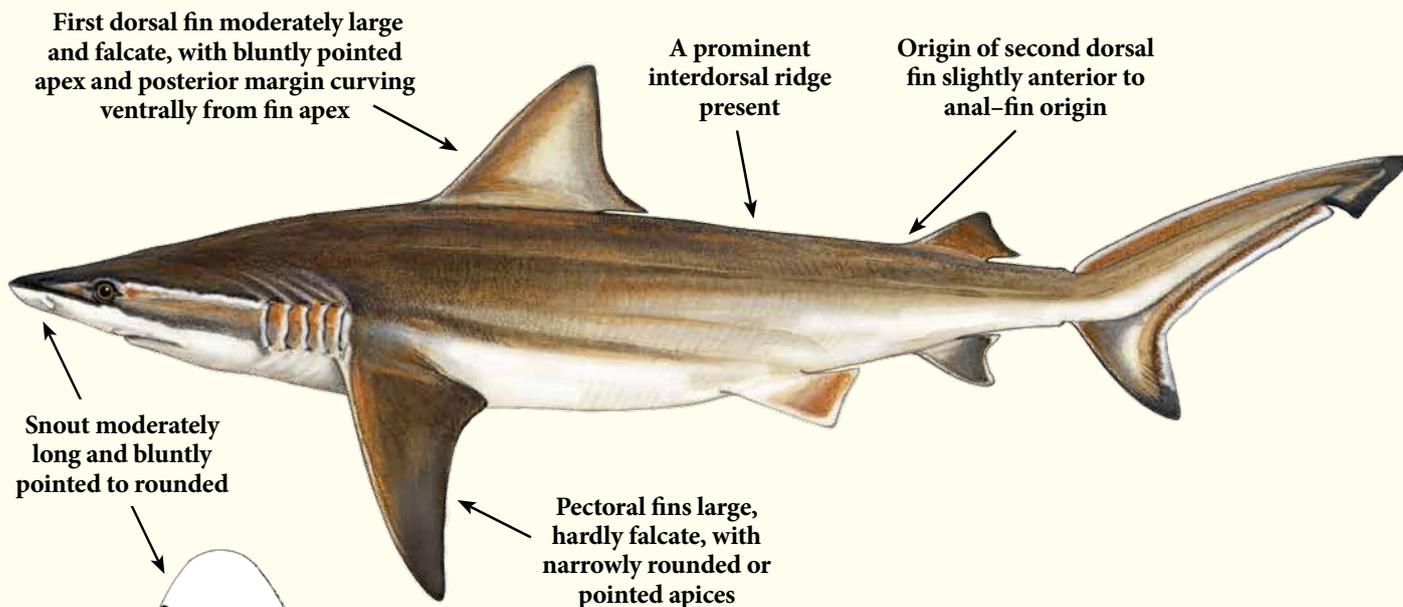
A large deepwater bottom shark of the continental and insular slopes at depths from 100 to 1890 m; occasionally wandering onto continental shelves. It occurs on the Madagascar Ridge, southern Indian Ocean, Aldabra Islands Group, Seychelles, and Western Australia.



Carcharhinus altimus (Springer, 1950)

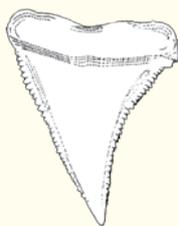
Bignose shark – Requin babosse
Tiburón baboso

Habire (Jpn)
Marracho baboso (Por)
긴코상어 (Kor)



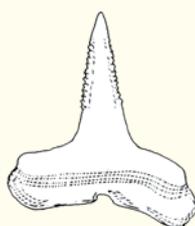
Underside of head

Upper teeth with broad, strongly serrated, triangular, erect to slightly oblique, very high cusps



Upper tooth

Lower teeth with erect, narrow serrated cusps and transverse roots



Lower tooth

Colour

Light grey above, sometimes bronzy, white below, with dusky fin tips (except for pelvic fins) but no conspicuous markings; white marking on flanks inconspicuous.

Size

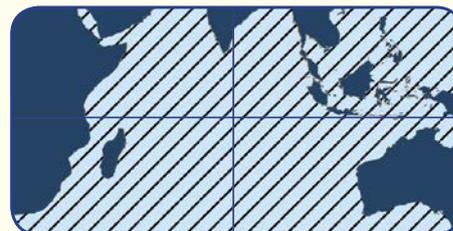
Maximum length to about 300 cm TL.



Photo: © Apex Predators Program, NOAA/NEFSC

Bio-Ecology and Distribution of *Carcharhinus altimus*

A common, large, offshore, bottom-dwelling warm-temperate and tropical shark usually found in deeper water near the edge of continental and insular shelves and the uppermost slopes, at depths of 80 m or more down to at least 250 to 430 m. In the Indian Ocean it has been recorded in South Africa, Madagascar, Red Sea, Oman, Maldives, India, possibly Sri Lanka, Indonesia, and Australia (Western Australia).



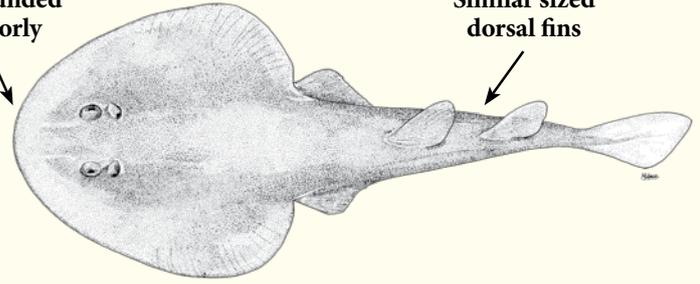
Carcharhiniformes – Carcharhinidae – Requiem sharks

GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP-SEA TORPEDINIFORMES

TORPEDINIFORMES

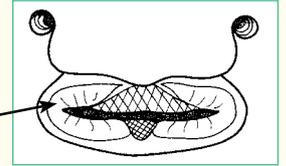
Mouth nearly straight, not distensible, labial cartilages and folds strong at corners of mouth; two, one, or no dorsal fins, if two present both of similar size; shape of disc rounded anteriorly

Disc rounded anteriorly



Similar sized dorsal fins

Mouth transverse and entirely surrounded by a deep groove or labial folds

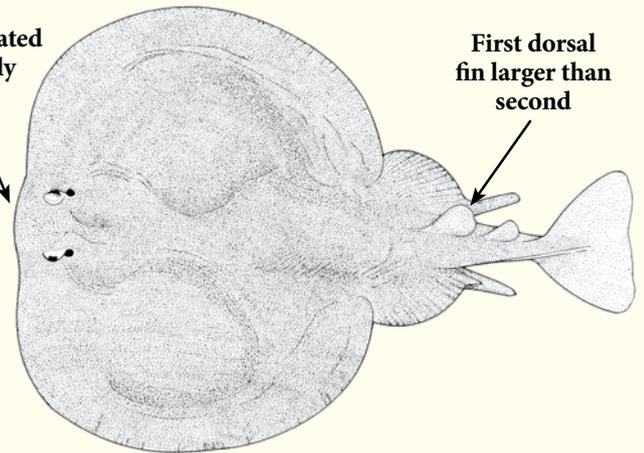


Region of nostril and mouth

NARCINIDAE

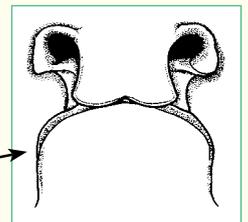
Mouth broadly arcuate, distensible, labial cartilages and folds absent at corners of mouth; two dorsal fins, the first much larger than the second; shape of disc truncate or emarginate anteriorly

Disc truncated anteriorly



First dorsal fin larger than second

Mouth arcuate and not entirely surrounded by a deep groove or labial folds



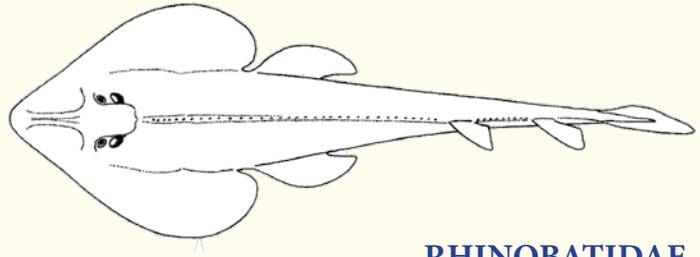
Region of nostril and mouth

TORPEDINIDAE

GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP-SEA RAJIFORMES

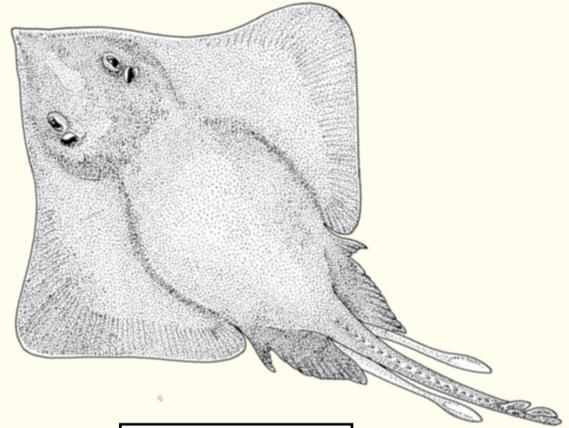
RAJIFORMES

Body rather shark-like, except gill slits on underside of head; long, tail section massive, bearing two large, not widely separated dorsal fins and a large caudal fin; pectoral fins dorso-ventrally flattened, elongated to form a rather narrow body disc

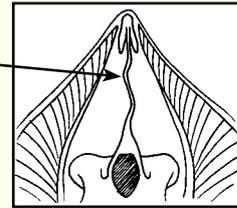


RHINOBATIDAE

Rostrum soft, flabby, flexible



Flexible and delicate rostral cartilage, when present

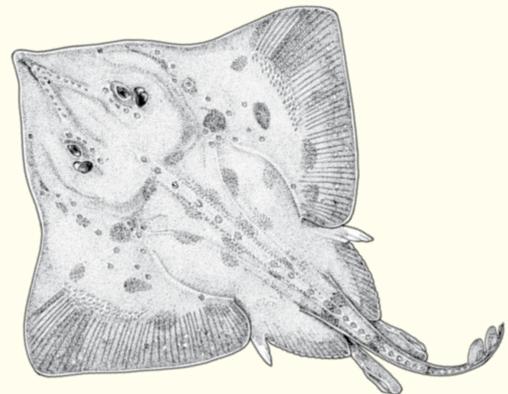


Detail of snout skeleton
After Whitehead *et al.* (1984)

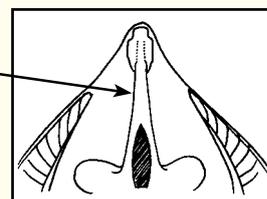
Pectoral fins completely fused with sides of head and greatly flattened dorsoventrally to form a large disc. Tail distinctly marked off from body disc, rather slender and, if present, dorsal fin(s) and caudal fin very small to rudimentary

ARHYNCHOBATIDAE

Rostrum rigid, stiff, not flexible



Stiff rostral cartilage extended to snout tip



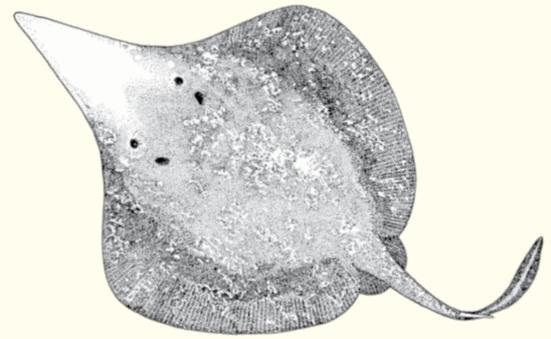
Detail of snout skeleton
After Whitehead *et al.* (1984)

RAJIDAE

GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP-SEA MYLIOBATIFORMES

MYLIOBATIFORMES

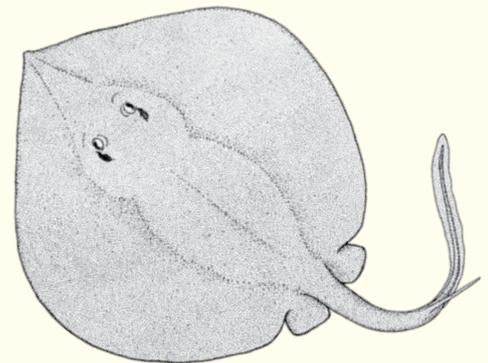
Six-paired gill openings; spiracles well separated from eyes



Only one species, *Hexatrygon bickelli* Heemstra and Smith, 1980 occurs in the Indian Ocean deep-sea

HEXATRYGONIDAE

Snout long, over six times eye diameter; nasal curtain short, broad, not overlapping mouth; floor of mouth without lobate papillae

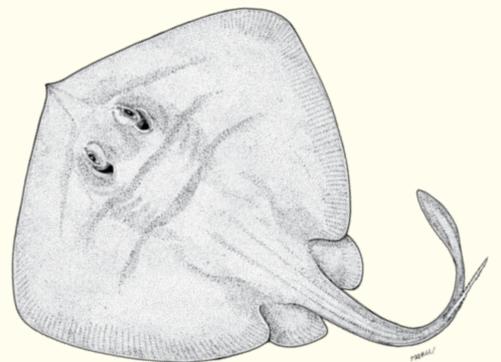


Only one species, *Plesiobatis daviesi* (Wallace, 1967) occurs in the Indian Ocean deep-sea

PLESIOBATIDAE - p. 74

Five-paired gill openings; spiracles close behind eyes

Snout short, much less than six times eye diameter; nasal curtain very long, narrow, and overlapping mouth; floor of mouth with lobate papillae



Only one species, *Urolophus expansus* McCulloch, 1916 occurs in the Indian Ocean deep-sea

UROLOPHIDAE - p. 74

Plesiobatis daviesi (Wallace, 1967)

Deep-water stingray

RPD

Usu-ei (Jpn)

Ratão de profundidade (Por)

Myliobatiformes Plesiobatidae - Giant stingarees

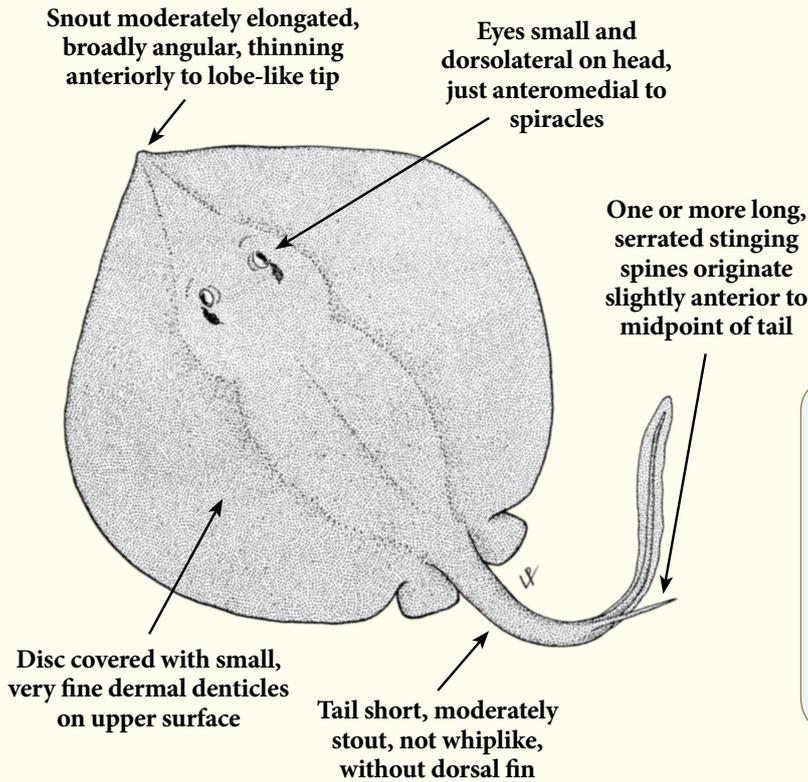


Photo: © K.K. Bineesh

Colour

In life dorsal surface a uniform purplish-brown or purplish-grey, sometimes with irregular dusky blotches or spots; white below with dusky margin on disk, underside of tail dark.

Size

Size large with adults to at least 270 cm TL.



Depth range
275-680 m

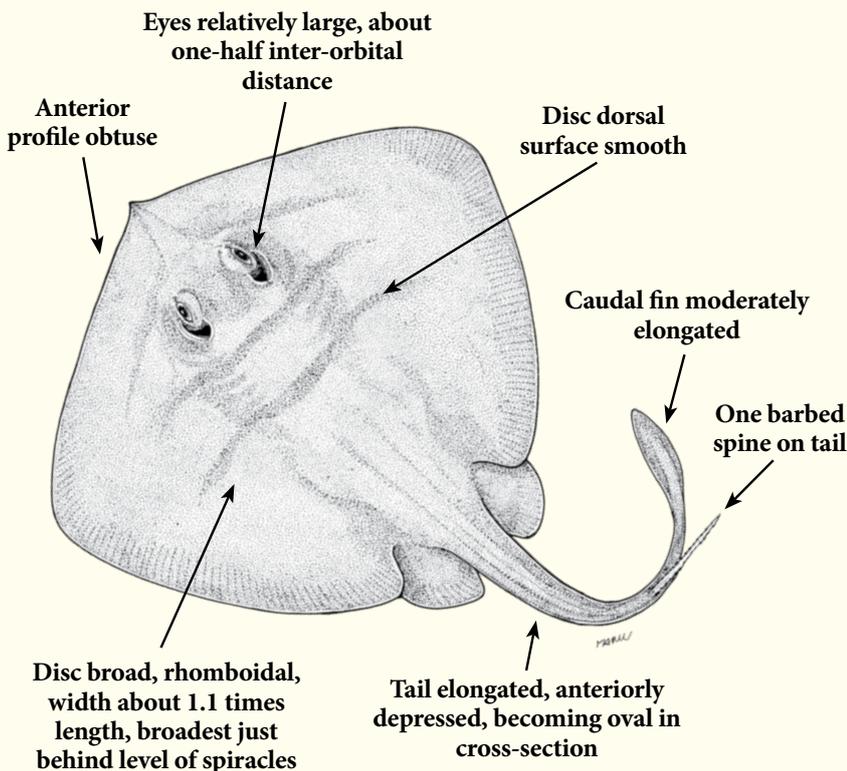


Urolophus expansus McCulloch, 1916

Wide stingaree

RUE

Myliobatiformes Urolophidae - Stingarees



Colour

Greyish green above with faint blue-grey bars extending laterally in front of each eye, and two crossbars posterior to eyes; whitish to yellow below with darker disc margins; tail with blotches.

Size

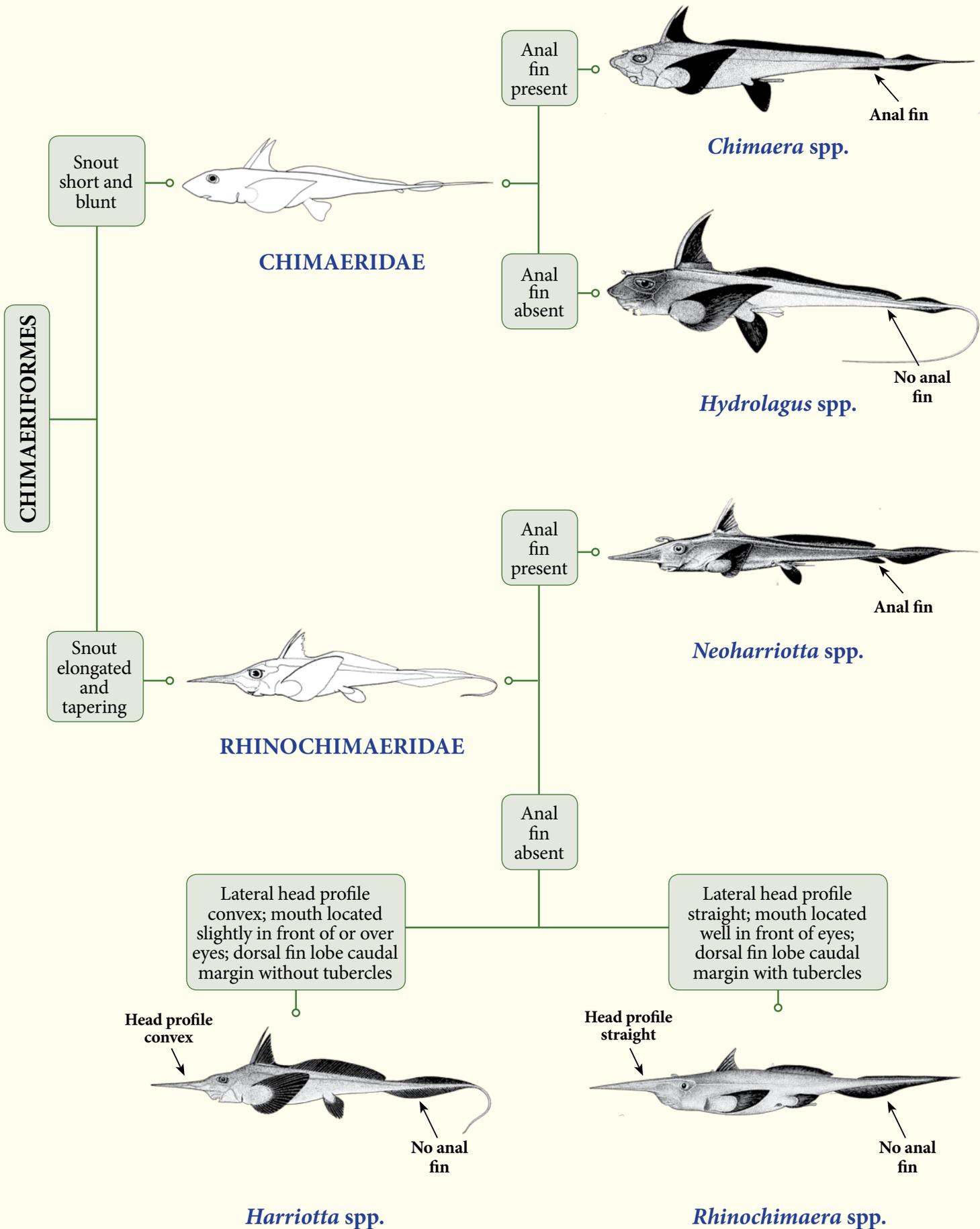
Adults to at least 52 cm TL.



Depth range
130-420 m



GUIDE TO THE FAMILIES AND GENERA OF INDIAN OCEAN DEEP-SEA CHIMAERIFORMES



Harriotta raleighana Goode and Bean, 1895

Narrownose chimaera – Chimère de Raleigh
Quimera de Raleigh

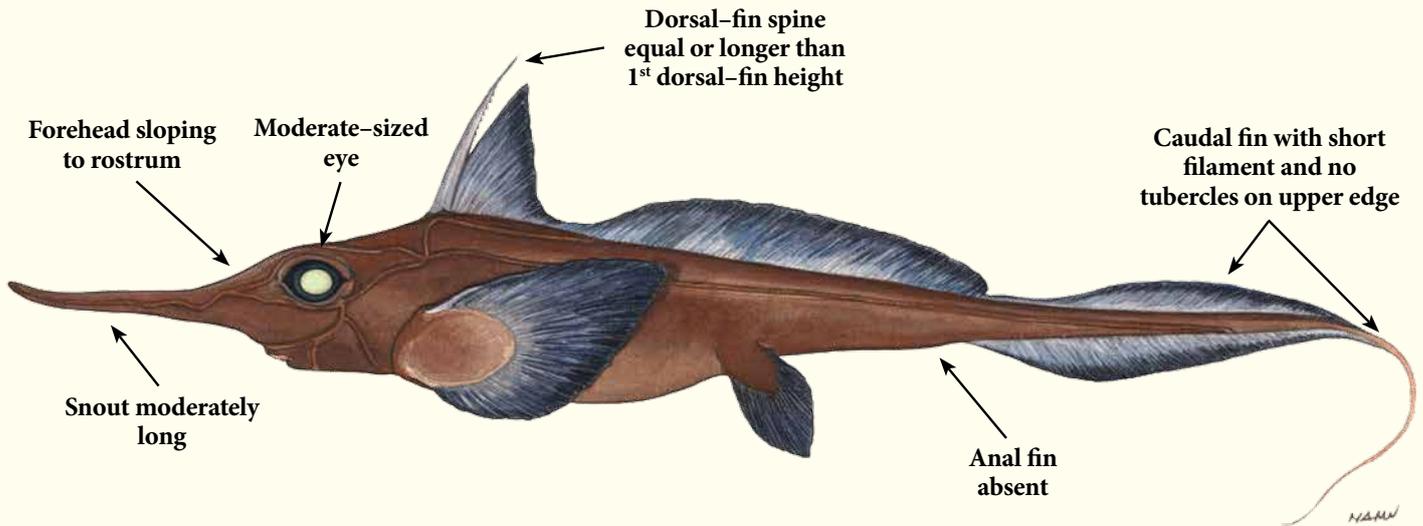


Photo: © M. Stehmann

Colour

Body colour uniform dark brown; fin edges much darker, pelvic fins blackish.

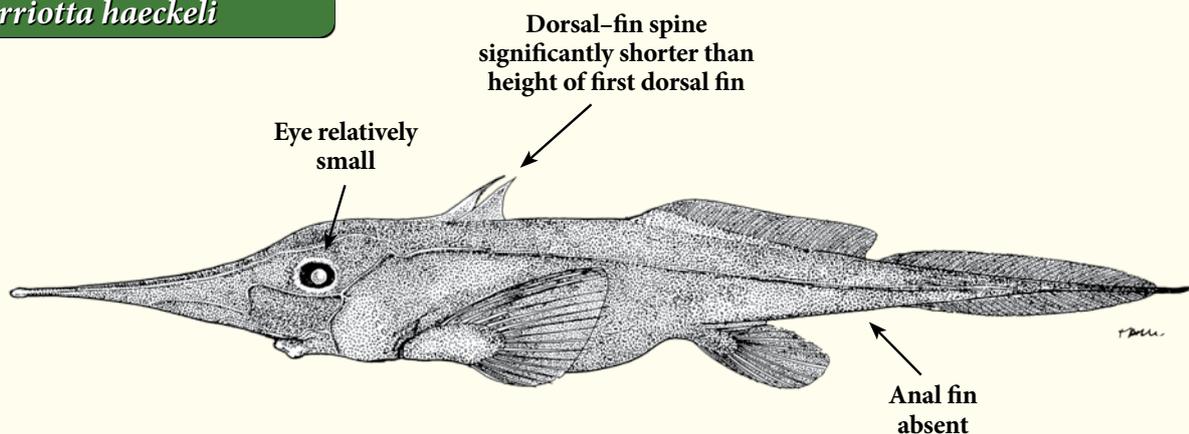
Size

Maximum length about 120 cm TL (70 cm precaudal length).



Similar species

Harriotta haeckeli



Bio-Ecology and Distribution of *Harriotta raleighana*

Poorly known deepwater longnose chimaera with a depth range of 380 to 2600 m, although an unconfirmed Indian Ocean record was from only 100 m depth. It has been observed at depth by remote operated vehicles over soft mud and gravelly bottom substrates and on occasion in association with other deepwater chimaeras (*Hydrolagus* spp.). There appears to be an ontogenetic shift between 300 and 1000 m depth with large individuals occurring deeper than smaller individuals.



DEEP-SEA CARTILAGINOUS FISH SPECIES INCLUDED IN THE GUIDE

SHARKS

HEXANCHIFORMES

<i>Chlamydoselachus anguineus</i> – Frilled shark	9
<i>Heptranchias perlo</i> – Sharpnose sevengill shark	9
<i>Hexanchus griseus</i> – Bluntnose sixgill shark	9
<i>Hexanchus nakamurai</i> – Bigeyed sixgill shark	9

SQUATINIFORMES

<i>Squatina africana</i> – African angelshark	10
---	----

HETERODONTIFORMES

<i>Heterodontus ramalheira</i> – Whitespotted bullhead shark	11
--	----

PRISTIOPHORIFORMES

<i>Pliotrema warreni</i> – Sixgill sawshark	12
<i>Pristiophorus nancyae</i> – African dwarf sawshark	12

LAMNIFORMES

<i>Odontaspis ferox</i> – Smalltooth sand tiger	13
<i>Odontaspis noronhai</i> – Bigeye sand tiger shark	13
<i>Mitsukurina owstoni</i> – Goblin shark	13
<i>Pseudocarcharias kamoharai</i> – Crocodile shark	14
<i>Alopias superciliosus</i> – Bigeye thresher	14

SQUALIFORMES

<i>Echinorhinus brucus</i> – Bramble shark	18
<i>Echinorhinus cookei</i> – Prickly shark	18
<i>Oxynotus bruniensis</i> – Prickly dogfish	18
<i>Cirrhigaleus asper</i> – Roughskin spurdog	19-20
<i>Squalus megalops</i> – Shortnose spurdog	21-22
<i>Squalus mitsukurii</i> – Shortspine spurdog	23-24
<i>Centrophorus granulosus</i> – Gulper shark	25-26
<i>Centrophorus squamosus</i> – Leafscale gulper shark	27
<i>Deania calcea</i> – Birdbeak dogfish	28
<i>Etmopterus pusillus</i> – Smooth lanternshark	30
<i>Etmopterus granulosus</i> – Southern lanternshark	31-32
<i>Etmopterus sculptus</i> – Sculpted lanternshark	33-34
<i>Centroscymnus coelolepis</i> – Portuguese dogfish	35-36
<i>Centroscymnus owstonii</i> – Roughskin dogfish	37-38
<i>Centroselachus crepidater</i> – Longnose velvet dogfish	39-40
<i>Proscymnodon plunketi</i> – Plunket shark	41-42
<i>Zameus squamulosus</i> – Velvet dogfish	43-44
<i>Scymnodalantias albicauda</i> – Whitetail dogfish	45
<i>Somniosus antarcticus</i> – Southern sleeper shark	46
<i>Dalatias licha</i> – Kitefin shark	47
<i>Euprotomicrus bispinatus</i> – Pigmy shark	48
<i>Heteroscymnoides marleyi</i> – Longnose pigmy shark	48
<i>Isistius brasiliensis</i> – Cookie cutter shark	49
<i>Squaliolus aliae</i> – Smalleye pigmy shark	50

CARCHARHINIFORMES

<i>Apristurus longicephalus</i> – Longhead catshark	54
<i>Apristurus melanoasper</i> – Black roughscale catshark	55-56
<i>Apristurus microps</i> – Smalleye catshark	57-58
<i>Bythaelurus clevai</i> – Broadhead catshark	59
<i>Bythaelurus lutarius</i> – Mud catshark	60
<i>Cephaloscyllium sufflans</i> – Balloon catshark	61
<i>Holohalaelurus favus</i> – Honeycomb catshark	62
<i>Holohalaelurus grennian</i> – Grinning izak	63
<i>Holohalaelurus melanostigma</i> – Crying izak catshark	64
<i>Holohalaelurus punctatus</i> – African spotted catshark	65
<i>Scyliorhinus comoroensis</i> – Comoro catshark	66
<i>Ctenacis fehlmanni</i> – Harlequin catshark	67
<i>Eridacnis radcliffei</i> – Pigmy ribbontail catshark	68
<i>Pseudotriakis microdon</i> – False catshark	69
<i>Carcharhinus altimus</i> – Bignose shark	70

BATOIDS

MYLIOBATIFORMES

<i>Plesiobatis daviesi</i> – Deep-water stingray	74
<i>Urolophus expansus</i> – Wide stingaree	74

CHIMAERAS

<i>Harriotta raleighana</i> – Narrownose chimaera	76
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This fully illustrated guide is designed to assist with the identification of a selection of deep-sea cartilaginous fishes of the Indian Ocean that are of major, moderate or minor importance to fisheries. It encompasses FAO Fishing Areas 51 and 57, and that part of Area 47 that extends from Cape Point, South Africa to the east, e.g. the extreme southwestern Indian Ocean.

The Indian Ocean deep-sea chondrichthyan fauna is currently represented by 117 shark, 61 batoid and 17 chimaera species. This guide includes full species accounts for 36 shark species selected as being the more difficult to identify and/or commonly caught. Each species is described, depicted with a colour illustration and photo, and key distinguishing features of similar-looking species occurring in the same area are highlighted allowing for easy and accurate identification in the field. An additional 17 shark species, that have very particular characteristics and/or are rarely caught, are displayed with a simplified account that includes a line drawing and other information useful for their correct identification. Finally, short accounts of 52 shark species that could be misidentified with more common species occurring in the area are also included.

The batoids, as the information available on the species being caught in the Indian Ocean high seas is scanty and in order to avoid confusion among users, are dealt with at the family level, whereas the chimaeras at the genus level.

This guide is intended to help fishery workers collecting catch data in the field in the identification of the cartilaginous fish species they might encounter. It is conceived to be updatable, offering the possibility to add new species accounts as new species are described.

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