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

1) The first thing the user should do is to check the caught specimen against the Guide to the Orders (Pages 7 and 8) to determine to which Order it belongs and follow the colour code or page number to reach the Identification Sheets.

2) If the specimen seems to belong to the Orders Squaliformes, Carcharhiniformes or Chimaeriformes, or if it is a Batoid it should be checked against the respective Guide to the Families to determine to which Family it belongs. If it belongs to one of the other Orders, the user should go directly to the Identification Sheets for each Family.

3) Once reached the Family, the species can be determined by looking at all the Species Sheets.

- The species that are more difficult to identify and/or commonly caught are displayed with a full species account, occupying one or two pages, that include their main distinctive characters and other useful information. The species that look similar and with which the species could be misidentified are displayed at the bottom of the page and when numerous, on the back page.

- The species having very peculiar characteristics and/or rarely caught are displayed with a simplified species account showing their main distinctive features as captions with arrows, and other useful information.
HOW TO USE THIS GUIDE

Scientific Name

Authorship

FAO 3-alpha code

FAO Names (English - French - Spanish)

Colour illustration and main field marks

Additional details

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

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

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

Other similar species

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

Squalus levis

Squalus carcharias

Squalus squalus

Squalus teerlinckii

Squalus albida

Squalus impennis

Squalus maculatus

Squalus maccocca

Squalus laticauda

Squalus australis

Squalus carcharias

Squalus teerlinckii

Squalus albida

Squalus impennis

Squalus maculatus

Squalus maccocca

Squalus laticauda

Squalus australis

Bite Ecology and Distribution of squallus megalops

A common to abundant small dogfish of temperate and tropical seas, found on the inner and some continental shelves and upper slopes. Generally found on or near the bottom at depths from close toshore and the intertidal down to 750 m.
ILLUSTRATED GUIDE OF EXTERNAL TERMINOLOGY USED FOR SHARKS

**Lateral View**
- Snout
- Eye
- Spiracle
- Dorsal-fin spine
- 1st dorsal fin
- 2nd dorsal fin
- Precaudal pit
- Keel
- Mouth
- Labial furrow
- Gill slits
- Pectoral fin
- Pelvic fin
- Caudal fin
- Caudal peduncle
- Pelvic fin (female, no claspers)
- Anal-fin ridges
- Ventr
- Anal fin

**Ventral View**
- Snout
- Nostril
- Gill slits
- Mouth
- Labial furrow
- Pectoral fin
- Caudal fin
- Anal fin
- Peduncle
- Clasper (male sex organ)
- Pelvic fin
- Anal-fin ridges
- Precaudal pit
- Keel
- Vent
- Gill slits

**Detail of Nostril**
- Incurrent aperture
- Excurrent aperture
- Anterior nasal flap
- Posterior nasal flap

**View of a Lateral Trunk Dermal Denticle**
- Lateral ridge
- Lateral cusp
- Medial cusp
- Medial ridge
- Base

**Mouth Corner**
- Labial furrow
- Labial fold
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.
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.

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.

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.
**CARTILAGINOUS FISHES**

1 gill slit

- Body flattened, ray–like
  - Mouth terminal, pectoral fins not attached to head
  - Snout elongated, sawlike
- Body not ray–like
  - Snout short, not sawlike

5 to 7 gill slits

- No anal fin
  - 6 or 7 gill slits, 1 dorsal fin
    - Anal fin present
      - No fin spines
        - 5 gill slits, 2 dorsal fins
          - Dorsal fin spines
          - Mouth well in front of eyes
          - No nictitating eyelids, ring intestinal valve
          - Large eyes; long spine at origin of 1st dorsal fin; rubbery skin devoid of denticles
          - Mouth ventral, pectoral fins attached to sides of head
          - Nictitating eyelids; spiral or scroll intestinal valve
          - Body not ray–like
            - Mouth behind front of eyes
              - No fin spines
                - Mouth well in front of eyes
                  - Dorsal fin spines
                  - Mouth ventral, pectoral fins attached to sides of head
                  - Nictitating eyelids; spiral or scroll intestinal valve
                  - Body not ray–like
                    - Mouth terminal, pectoral fins not attached to head
                      - Snout elongated, sawlike
                      - Body flattened, pectoral fins attached to sides of head
                        - No nictitating eyelids, ring intestinal valve
                          - Large eyes; long spine at origin of 1st dorsal fin; rubbery skin devoid of denticles

**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

- 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

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

**TORPEDINIFORMES - p. 71**
- Pectoral fins forming a large oval disc
- Pelvic fins with a single lobe

**RAJIFORMES - p. 72**
- Pelvic fins with two lobes

**MYLIOBATIFORMES - p. 73**
- Tail thin, mostly long and whip-like, often with a sting
- Pelvic fins with a single lobe
**Chlamydoselachidae – Frilled sharks**

*Chlamydoselachus anguineus* Garman, 1884  
Frilled shark – Requin lézard  
Tiburón anguila

Six gill slits  
Body elongated and eel-like

Head snakelike, with short snout and terminal mouth  
Teeth with three points in both jaws

**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**

*Heptanchias perlo* (Bonnaterre, 1788)  
Sharpnose sevengill shark – Requin perlon  
Cañabota bocadulce

Seven gill slits  
Black blotch on the dorsal fin (inconspicuous in large individuals)

Big-eye  
Lower teeth comb-like

*Hexanchus griseus* (Bonnaterre, 1788)  
Bluntnose sixgill shark – Requin griset  
Cañabota gris

Six gill slits  
Dorsal-fin base separated from upper caudal-fin origin by a distance about equal to its length

Lower teeth comb-like

*Hexanchus nakamuraui* Teng, 1962  
Bigeyed sixgill shark

Six gill slits  
Dorsal-fin base separated from upper caudal-fin origin by a distance much greater than its length

Lower teeth comb-like
**Squatina africana** Regan, 1908

*Afurika–kasuzame (Jpn)*

*Angelote africano (Por)*

**African angelshark – Ange de mer africain**

**Angelote africano**

*Endemic to north–western Australia*

*Size*

Max. length about 122 cm TL.

*Depth range*

100–1000 m

**Similar species**

**Squatina pseudoceilata**

- Nasal barbels, strongly bifurcate

- Frontal view of head

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

**Squatina tergocellata**

- Paired ocelli present on back, tail and pectoral fins

- Nasal barbels, strongly fringed

- Frontal view of head

- Endemic to north–western Australia

**Squatina africana**

- Nasal barbels weakly or not bifurcate

- Frontal view of head and detail of nostril

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

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

- Broad, angular high dorsal fins

- Photo: © Oddgeir Alvheim, IMR
**Heterodontus ramalheira** (Smith, 1949)

Whitespotted bullhead shark – *Requin dormeur chabot*
Dormilón boquigrande

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.

**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.

**Size**
Max. length about 83 cm TL.

**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.

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**Dorsal fins with spines**

**Second dorsal fin falcate and much smaller than first dorsal fin**

**Anal fin present**

**Snout very short**

**Underside of head**

**Photo of a juvenile:** © Oddgeir Alvheim, IMR

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**Heterodontiformes**

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**Heterodontidae – Bullhead sharks**

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**Photo of a juvenile:** © Oddgeir Alvheim, IMR
**Pliotrema warreni** Regan, 1906

Sixgill sawshark – *Requin scie flutien*
Tiburón sierra del Cabo

- **Body colour** olive brown above, lighter below
- **Max. length** at least 136 cm TL.
- **Depth range** 37–500 m
- **Underside of head**
  - Large rostral teeth with posterior barbs
  - Six pairs of gill openings

**Pristiophorus nancyae** Ebert and Cailliet, 2011

African dwarf sawshark

- **Body colour** uniform medium brown above, white below
- **Max. length** about 62 cm TL.
- **Depth range** 286–500 m
- **Underside of head**
  - Large rostral teeth smooth–edged
  - Five pairs of gill openings
**Odontaspis ferox** (Risso, 1810)
Smalltooth sand tiger – Requin féroce – Solrayo

- Conical to slightly flattened snout
- First dorsal fin originating over pectoral-fin free rear tips
- Body colour grey, brownish-grey or olive above, lighter below
- Teeth prominent, long and narrow with a central cusp flanked by two or three smaller cusplets

**Odontaspis noronhai** (Maul, 1955)
Bigeye sand tiger shark – Requin noronhai – Solrayo ojigrande

- Long bulbously conical snout
- Body colour black, chocolate brown or dark reddish brown dorsally and ventrally
- Teeth prominent, long and narrow with a central cusp flanked by a single smaller cusplet

**Mitsukurinidae – Goblin sharks**

**Mitsukurina owstoni** Jordan, 1898
Goblin shark – Requin lutin – Tiburón duende

- Conical to slightly flattened snout
- Soft flabby body
- Highly protrusible jaws
- Body colour in life is pinkish-white to white with bluish fins

- Elongated, flattened, bladelike snout
- Body colour greyish-white to white with bluish fins

**Size**
- Max. length 450 cm TL.
- Max. length 360 cm TL.
- Max. length 390 cm TL.
**Pseudocarchariidae – Crocodile sharks**

*Pseudocarcharias kamoharai* (Matsubara, 1936)

Crocodile shark – Requin crocodile – Tiburón cocodrilo

- Gill openings extending onto dorsal surface of head
- Eyes very large
- Prominent teeth with long cusps
- Body colour grey to grey-brown above, lighter ventrally

**Alopiidae – Thresher sharks**

*Alopias superciliosus* Lowe, 1841

Bigeye thresher – Renard à gros yeux – Zorro ojón

- A distinct lateral groove above the eyes
- Eyes extending onto dorsal surface of head
- Pectoral fin with curved anterior margin
- Body colour purplish brown to violet above, light below
- Caudal fin about same length as precaudal length
- Max. length 485 cm TL.

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**Depth range**

- 0 – 590 m
- 0 – 723 m

**Size**

- Max. length
- 122 cm TL.
- 485 cm TL.

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*Photo: © Evgeny Romanov*

*Photo: © Ramon Bonfil*
**GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP–SEA SQUALIFORMES**

1. **First dorsal fin originating posterior to pelvic–fin origins**
   - **YES**
   - ECHINORHINIDAE - p. 18

2. **Body very high and compressed. Dorsal fins extremely high**
   - **YES**
   - OXYNOTIDAE - p. 18

3. **Teeth similar in both jaws. Upper precaudal pit usually present; subterminal notch absent from caudal fin**
   - **YES**
   - SQUALIDAE - p. 19

4. **Underside of body, flanks, and tail usually with black markings and light organs (photophores)**
   - **YES**
   - ETMOPTERIDAE - p. 29

5. **Upper teeth relatively broad and bladelike, lowers low and wide**
   - **YES**
   - CENTROPHORIDAE - p. 25

6. **Head moderately broad and somewhat flattened or conical. Both dorsal fins either with or without fin spines**
   - **YES**
   - SOMNIOSIDAE - p. 35

7. **Head narrow and rounded–conical; no dorsal–fin spines, except for a small spine present on the first dorsal fin of Squaliolus**
   - **YES**
   - DALATIIDAE - p. 47
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

Centrophorus granulosus

CENTROPHORIDAE

Centrophorus squamosus

ETMOPTERIDAE

Deania calcea

Etmopterus pusillus

Etmopterus granulosus

Etmopterus sculptus
FAMILIES AND SPECIES OF SQUALIFORMES INCLUDED IN THE FIELD GUIDE

**SOMNIOSIDAE**

- *Centroscymnus coelolepis*
- *Centroscymnus owstonii*
- *Centroelachus 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

- 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

- 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

- 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**

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

**Size**
Maximum length up to 123.5 cm TL.

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**Similar species**

**Cirrhigaleus australis**

**All Squalus species**

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**Dermal denticle** (Dorsal view)

**Underside of head**

**Detail of nostril**

**Upper and lower teeth**

**Photo:** © Rob Leslie

**Photo:** © George Burgess
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.
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**
- Three points
- Dermal denticle (Dorsal view)

**Similar species**

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

- First dorsal fin moderately high, with a moderately high spine
- Pectoral fins broad and falcate with moderately concave posterior margins
- Nostrils closer to snout tip than upper labial furrow
- Anterior nasal flap with a small medial barbel, bifurcate
- Upper precaudal pit and lateral keels present
- Second dorsal–fin spine with tip about as high as fin apex
- No anal fin
- No subterminal notch on caudal fin
- Upper and lower tooth
- Dermal denticles (Dorsal view)

**Colour**

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

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

**Photo:** © Rob Leslie
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.

### 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
  - Preoral snout usually less than 1.4 times mouth width

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

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

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

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

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

- **Squalus hemipinns**
  - Snout short

- **Squalus lalannei**
  - Nasal flaps not bifurcate

- **Squalus megalops**
  - Known only from off Alphonse Island, Seychelles
  - Note: *S. megalops* has mouth width more than 7.8% total length

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*Squalus megalops* – Shortnose spurdog
**Squalus mitsukurii** Jordan and Snyder, 1903

Shortspine spurdog – Aiguillat épinette
Galludo espinilla

**Size**
Maximum length about 125 cm TL.

**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.

**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.

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**Squalus blainville**
First dorsal fin high with spine about as long as fin base

**Preoral snout** usually less than 1.4 times mouth width

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**Squalus edmundsi**
First dorsal fin and its associated spine almost upright

**Preoral snout** elongated, about 1.5 to 2.4 times mouth width

---

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

### Other similar species

**Squalus nasutus**
- First dorsal-fin spine much shorter than second dorsal-fin spine
- Recorded on the upper continental slope in eastern Indonesia and western Australia

**Squalus lalannei**
- Known only from off Alphonse Island, Seychelles
- Recorded on the upper continental slope in eastern Indonesia and western Australia

**Squalus crassispinus**
- Preoral length 2.3 or more times internarial space
- 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**

**First dorsal fin short and moderately high**

**Second dorsal fin with spine–base over pelvic–fin inner margins**

**Rear tips of pectoral fins narrowly angular and greatly elongated**

**No anal fin**

**Dermal denticles low and rhomboidal**

**Upper and lower teeth**

**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.

**Similar species**

**Centrophorus squamosus**

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

**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

**Photo:** © Paul Clerkin
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.
**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.

**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.

**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.
**Deania calcea** (Lowe, 1839)

Birdbeak dogfish – Squale savate – Tollo pajarito

**Hera–tsuzozame** (Jpn)

**Deania calcea** (Lowe, 1839)

- **Size**
  - Maximum length about 122 cm TL.

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

- **Snout**
  - Extremely long and flattened

- **Underside of head**
  - No anal fin
  - No subcaudal keel on underside of caudal peduncle

- **First dorsal fin**
  - Long and low, origin over bases of pectoral fins
  - Distance from exposed origin of first dorsal–fin spine to first dorsal–fin rear tip (A) equal or greater than distance from free rear tip to second dorsal–fin spine (B)

- **A B**

- **Upper and lower teeth**

**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.

Photo: © Dave Ebert

**Dermal denticles** (Dorso-lateral view)

Hera–tsuzozame (Jpn)

Birdbeak dogfish – Squale savate – Tollo pajarito

Deania calcea (Lowe, 1839)

Squaliformes Centrophoridae – Gulper sharks

DCA
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**

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

- **Lower tooth**
  - Lower teeth compressed and knife-like

**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.
**Etmopterus pusillus** (Lowe, 1839)

Smooth lanternshark – Sagre nain
Tollo lucero liso

**Karasuzame** (Jpn)
Lixinha–de–fundura lisa (Por)

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**Size**
Size moderate with adults to about 48 cm TL.

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

**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.

**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.
Etmopterus granulosus (Günther, 1880)
Southern lanternshark (Lucifer) – Sagre long nez
Tollo negro narigón

Denticles on dorsal surface of head not in longitudinal rows, but in regular longitudinal rows on flanks, tail, and caudal-fin base

Second dorsal-fin spine stout and strongly recurved

Caudal base photomark with anterior branch very short and narrow and posterior branch sharp–tipped and moderately elongated

Anterior branch of flank marking long, slender and tapering posteriorly, much longer than short broad posterior branch

Head shallow and flattened, not deep and conical

No anal fin

Upper caudal photomark present

Anterior branch of flank marking long, slender and tapering posteriorly, much longer than short broad posterior branch

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

First dorsal fin well forward of free rear tip of pectoral fin

Oval marking near base of caudal fin

Posterior branch of flank marking short and truncuated

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

Etmopterus evansi

Caudal fin with a dark band across middle of upper lobe and at fin tip

Anterior branch of flank marking, long and thin, posterior branch elongated and slender, about equal in length

Caudal peduncle with a dark saddle

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

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.

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**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.

**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
- Precaudal marking about twice length of caudal marking

Only known from Shark Bay to Lancelin, Western Australia

### *Etmopterus lucifer*

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

**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.
Centroscymnus coelolepis Bocage and Capello, 1864

Portuguese dogfish – Pailona commun – Pailona

Body stocky, not strongly tapering back from pectoral region

Dorsal fins about equal in size and height, fin spines very small but with tips protruding from fins

Snout short

Pectoral fins moderately large, apices falling well in front of first dorsal-fin spine when laid back

Very large and smooth dermal denticles, resembling a snake's skin

No anal fin

Upper and lower teeth

No anal fin

Dermal denticle (Dorsal view)

Upper and lower teeth

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

Dermal denticle (Dorsal view)

Underside of head

Similar species

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

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

Snout short

Pectoral fins moderately large, apices falling well in front of first dorsal-fin spine when laid back

Very large and smooth dermal denticles, resembling a snake's skin

No anal fin

Upper and lower teeth

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

Dermal denticle (Dorsal view)

Underside of head

Similar species

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

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

Colour

Uniformly golden brown to blackish brown.

Size

Moderately large, up to 122 cm TL.
**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.
**Centroscymnus owstonii** Garman, 1906

*Roughskin dogfish – Pailona rapeux – Sapata lija*

**Body**
- Stocky, not strongly tapering from pectoral region
- 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

**Pectoral fins**
- Moderately large, apices falling well in front of first dorsal-fin spine when laid back

**Underside of head**
- 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

**Dermal denticles**
- (Dorsal view)

**Photo:** © Rob Leslie

**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.

**Similar species**

**Centroscymnus coelolepis**
- Dorsal fins about equal in size and height

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

**Size**
- Moderately large, up to 120 cm TL.

**Colour**
- Light grey or brown to dark brown or black, without any conspicuous markings.
Centroscymnus owstonii – Roughskin dogfish

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

**Body**
- Fairly slender, not strongly tapering back from pectoral region
- Underside of head
  - Snout very long, preoral length about equal to distance from mouth to pectoral-fin origin and much greater than mouth width
  - Upper labial furrows extremely long, separated by less than the distance between nostrils

**Dorsal fins**
- About equal in size and height
- Fin spines very small but with tips protruding from fins
- Second dorsal fin considerably higher than first

**Pectoral fins**
- Moderately large, apices falling well in front of first dorsal-fin spine when laid back

**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.

**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

**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

**Photo:** © Paul Clerkin
Centroselachus crepidater – Longnose velvet dogfish

Other similar species

**Proscymnodon plunketi**
- Body, stocky, tapering abruptly from pectoral region
- 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

**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.
Proscymnodon plunketi (Waite, 1910)
Plunket shark – Pailona austral
Pailona austral

Body, stocky, tapering abruptly from pectoral region

Dorsal fins about equal in size and height, fin spines very small but with tips protruding from fins

Pectoral fins moderately large, apices falling well in front of first dorsal–fin spine when laid back

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

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

Frontal view of upper teeth

Dermal denticle (Dorsal view)

Similar species

Centroscymnus coelolepis

Body stocky, but not strongly tapering back from pectoral region

First three rows of upper teeth similar to those adjacent

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

Colour
Uniformly grey–brown, juveniles more greyish.

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

Photo: © Paul Clerkin

Minami–biroudozame (Jpn)
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.

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

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*Proscymnodon plunketi* – Plunket shark
**Zameus squamulosus** (Günther, 1877)

*Velvet dogfish – Squale–grognieur velouté*

*Bruja terciopelo*

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**Head**
- Rather low and flat
- Preoral length almost equal to distance from lower symphysis to first gill slits

**Pectoral Fins**
- Narrow to moderately broad and leaf-shaped

**Dorsal Fin**
- Spines present, relatively small

**Caudal Fin**
- With a strong subterminal notch and a short lower lobe

**Dorsal Fin Spots**
- Present, relatively small

**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

**Size**
- Moderate size with a maximum length of 84 cm TL.

**Colour**
- Uniformly black to dark brownish with no conspicuous markings.

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**Similar Species**

**Centroscymnus coelolepis**
- Dorsal fins about equal in size and height

**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

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**Photos:** © Evgeny Romanov, CAP RUN–ARDA

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**Squaliformes**

**Somniosidae – Sleeper sharks**

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**43**
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.

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.
**Scymnodalatias albicauda** Taniuchi & Garrick, 1986

**Whitetail dogfish – Squale grogneur à queue blanche**

**Bruja cola blanca**

- Eyes horizontally elongated
- Pectoral fins elongated and slender with pointed tips
- Preoral length shorter than mouth width
- Upper and lower tooth
- Upper teeth with straight slender cusps; lower teeth with erect or slightly oblique cusps
- Underside of head
- Two spineless dorsal fins, second dorsal fin slightly larger than the first
- No anal fin
- Upper caudal-fin margin nearly twice the length of the lower caudal-fin margin

**Similar species**

**Scymnodalatias sherwoodi**

- Body uniformly dark grey or black
- Pectoral fins relatively short and angular

**Somniosus antarcticus**

- Size small, attaining 85 cm TL
- No conspicuous white blotches on caudal fin

**Bio–Ecology and Distribution of Scymnodalatias 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

Eyes almost circular
Pectoral fins lobe-like with rounded tips
Snout short and broadly rounded, preoral length subequal to mouth width
Underside of head
Upper and lower tooth

Eyes horizontally elongated
Pectoral fins relatively short and angular

Similar species

Scymnodalatias sherwoodi
Eyes horizontally elongated
Size small, attaining 85 cm TL

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.
Dalatias licha (Bonnaterre, 1788)
Kitefin shark – Squale liche – Carocho

**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.

**Biography 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.

**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.

**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.
**Bio–Ecology and Distribution of *Euprotomicrus bispinatus***

The pygmy 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.

**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.
Isistius brasiliensis (Quoy & Gaimard, 1824)
Cookie cutter shark – Squalelet féroce
Tollo cigarro

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.

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.

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.

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
**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.

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**Similar species**

*Squaliolus laticaudus*

Eye length 61 to 82% of preorbital snout length

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**Colour**

Uniformly black to blackish–brown with conspicuously light–marginated fins.

**Size**

One of the smallest living sharks reaching a maximum length of 22 cm TL.
Precaudal pits present. Dorsal caudal–fin margin undulated.

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

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.

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.

SCYLIORHINIDAE - p. 53
CARCHARHINIDAE - p. 70
TRIAKIDAE (Not included in the Guide)
PROSCYLLIIDAE - p. 67
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
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

**Body** relatively slender, trunk slightly tapering towards head.

**First dorsal fin** smaller than second, base about 2/3 length of second.

**Caudal fin** long and narrow, without a dorsal crest of enlarged denticles.

**Anal fin** very long, low, and angular.

**Preoral snout length** 12% of total length.

**Broad naked skin patches** present between pectoral and pelvic fins.

**Internosotil width** 2.8 times or less into preoral snout length.

**Internosotil width** 2.9 times or more into preoral snout length.

**No naked skin patches** between pectoral and pelvic fins.

**internosotil width** 2.9 times or more into preoral snout length.

**Internosotil width** 2.9 times or more into preoral snout length.

**Colour**
Dark brownish to grey–black, without conspicuous markings.

**Size**
Maximum length at least 59 cm TL.

**Similar species**

**Apristurus australis**

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

**All other Apristurus species**

**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.
**Apristurus melanoasper** Iglésias, Nakaya & Stehmann, 2004

**Black roughscale catshark**

- **Size**: Maximum length at least 79 cm TL.
- **Colour**: Uniformly dark brown to black; naked fin apices black.

**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 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 platyrhynchos**

- 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**

- Snout long
- Anal fin low and broadly rounded in shape

**Apristurus microps**

- Interdorsal space greater than first dorsal-fin base
- Pectoral-fin inner margin very short, about 1/3 of pectoral-fin base

**Apristurus pinguis**

- Head moderately stout
- Anal fin high, short-based and subtriangular in shape
- Preoral snout length less than 1.7 times in maximum head width

**Apristurus bucephalus**

- Head very stout
- Anal fin high, short-based and subangular in shape
- 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. platyrhyncus* with long tightly coiled tendrils posteriorly and short blunt horns anteriorly.
**Apristurus microps** (Gilchrist, 1922)
Smalleye catshark – Holbiche porc – Pejegato puerco

**Eye very small**

**Body stout**

**Pectoral-fin inner margin**
very short, about 1/3 of pectoral-fin base

**Mouth long,**
large, and broadly arched

**Underside of head**

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

**Anal fin short,**
fairly high, and rounded, between three and four times as long as high

**Caudal fin**
with a loose crest of enlarged denticles on its dorsal margin

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

**Size**
Maximum length at least 61 cm TL.

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**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 bucephalus**

- **Interdorsal space**
greater than first dorsal-fin base

- **Anal fin**
low and broadly rounded in shape

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**Apristurus pinguis**

- **Head**
moderately stout

- **Interdorsal space**
greater than first dorsal-fin base

- **Anal fin**
high, short–based and subtriangular in shape

- **Preoral snout length**
less than 1.7 times in maximum head width

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**Apristurus bucephalus**

- **Head very stout**

- **Interdorsal space**
greater than first dorsal-fin base

- **Anal fin**
high, short–based and subangular in shape

- **Preoral snout length**
more than 1.7 times in maximum head width

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**Apristurus ampliceps**

- **Interdorsal space**
greater than first dorsal-fin base

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**Photo:** © Rob Leslie

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**Apristurus microps** (Gilchrist, 1922)
Smalleye catshark – Holbiche porc – Pejegato puerco
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 saldanha**

- First dorsal–fin base elongated anteriorly as a low ridge
- Enlarged crest of dermal denticles on caudal fin
- Interdorsal space very long, about equal to prespiracular head

**Apristurus investigatoris**

**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

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**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

Size
Maximum length to 42 cm TL.

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.

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

Similar species

**Bythaelurus lutarius**

Prenarial snout length about equal to internarial space

**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 longer 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 hispidus**

Snout shorter than **B. alcockii** 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**

*Origin of first dorsal fin over or slightly in front of pelvic-fin insertions*  
*Second dorsal fin somewhat smaller than first, origin about over anal-fin midbase*

*Prenarial snout length about equal to internarial space*

**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

**Bythaelurus alcockii**

- Eye length less than 14 times in predorsal distance in adults
- Only known from southeastern India and Andaman Islands

**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 soufflue**

**Pejegato balón**

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

**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 specrum**

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 offshore catshark on the continental shelf and uppermost slope at depths from 40 to 440 m, commonly on sand and mud bottoms.
**Holohalaelurus favus** Human, 2006

**Honeycomb izak – Holbiche criblée – Tiburón gato miel**

**Carcharhiniformes**

**Scyliorhinidae – Catsharks**

**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

**Holohalaelurus punctatus**

No enlarged denticles on dorsal midline of body

**Bio–Ecology and Distribution of Holohalaelurus favus**

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.

**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.
**Holohalaelurus grennian** Human, 2006

**Grinning izak**

**Size**
Maximum length to 27.3 cm TL.

**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.

**Similar species**

- **Holohalaelurus punctatus**
  - No enlarged denticles on dorsal midline of body
  - White spot at origin of each dorsal fin

- **Holohalaelurus favus**
  - White spots absent
  - Enlarged denticles on dorsal surface of pectoral fins present

- **Holohalaelurus melanostigma**
  - Enlarged denticles on dorsal surface of snout absent
  - White spots absent
  - Anal-fin base length 1.8 times or more than pelvic-fin base length

- **Holohalaelurus regani**
  - Diameter of spots greater than eye diameter, forming 'horseshoe' shaped markings
  - Anal-fin base length 1.8 times or more than pelvic-fin base length
  - White spots absent

**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**

**Similar species**

- **Holohalaelurus regani**
  - Enlarged denticles on dorsal surface of snout present

- **Holohalaelurus favus**
  - Enlarged denticles on dorsal surface of snout present

- **Holohalaelurus grennian**
  - 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 melanostigma**

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

**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).
**Holohalaelurus punctatus** (Gilchrist, 1914)

**African spotted catshark – Holbiche à gorge tachetée
Pejegato moteado**

- **Diameter of spots greater than eye diameter, forming 'horseshoe' shaped markings**
- **White spot at origin of each dorsal fin**
- **Longitudinal or double-V shaped markings on dorsal fins, lined with white**
- **White spots on sides of body that are especially prominent above pectoral-fin insertions**
- **No enlarged denticles on dorsal midline of body**
- **Anal-fin base 3.5 times its height or more, usually shorter than interdorsal space**

**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 favus**
- White spots absent
- Enlarged denticles on dorsal surface of pectoral fins present

**Holohalaelurus melanostigma**
- Enlarged denticles on dorsal surface of snout absent
- White spots absent
- Enlarged denticles on dorsal surface of pectoral fins absent

**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**

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**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*. 

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**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.

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**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.
Ctenacis fehlmanni (Springer, 1968)
Harlequin catshark – Requin chat arlequin
Tollo coludo arlequín

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.

**Size**
Maximum length to 52 cm TL.

**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.

**Underside of head**
Preoral snout length about 2/3 of mouth width

**Body rather stocky**

**First dorsal–fin origin slightly anterior to free rear tips of pectoral fins**

**Anal–fin origin slightly posterior to second dorsal–fin origin**

**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.
**Eridacnis radcliffei** Smith, 1913

*Pygmy ribbontail catshark – Requin chat pygmée*
*Tollo coludo pigmeo*

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).

**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).
**Pseudotriakis microdon** de Brito Capello, 1868

False catshark – Requin à longue dorsale
Musolón de aleta larga

**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.

**Size**

Maximum length to about 295 cm TL.

**Colour**

Uniform plain dark brown to blackish except for darker fins.

**Similar species**

**Planonasus 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.

Photo: © Paul Clerkin
**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).
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.

Similar sized dorsal fins

Disc rounded anteriorly

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

Region of nostril and mouth

TORPEDINIDAE

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

Region of nostril and mouth
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.

**RAJIFORMES**

**RHINOBATIDAE**

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.

Rostrum soft, flabby, flexible

Flexible and delicate rostral cartilage, when present

**ARHYNCHOBATIDAE**

Rostrum rigid, stiff, not flexible

**RAJIDAE**

Stiff rostral cartilage extended to snout tip

**Detail of snout skeleton**

After Whitehead et al. (1984)
GUIDE TO THE FAMILIES OF INDIAN OCEAN DEEP-SEA MYLIOBATIFORMES

**Myliobatiformes**

- **Hexatrygonidae**
  - Snout long, over six times eye diameter; nasal curtain short, broad, not overlapping mouth; floor of mouth without lobate papillae
  - Only one species, *Hexatrigon bickelli* Heemstra and Smith, 1980 occurs in the Indian Ocean deep-sea

- **Plesiobatidae**
  - Five-paired gill openings; spiracles close behind eyes
  - Only one species, *Plesiobatis daviesi* (Wallace, 1967) occurs in the Indian Ocean deep-sea

- **Urolophidae**
  - 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

**Plesiobatidae - p. 74**

**Urolophidae - p. 74**
**Plesiobatis daviesi** (Wallace, 1967)

*Deep–water stingray*

*Usu–ei* (Jpn)

*Urolophus expansus* McCulloch, 1916

*Wide stingaree*

*Usu–ei* (Jpn)

**Description**

- **Snout** moderately elongated, broadly angular, thinning anteriorly to lobe-like tip.
- **Eyes** small and dorsolateral on head, just anteromedial to spiracles.
- **Disc** covered with small, very fine dermal denticles on upper surface.
- **Tail** short, moderately stout, not whiplike, without dorsal fin.
- **One or more long, serrated stinging spines** originate slightly anterior to midpoint of tail.

**Depth range**

275–680 m

**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.

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**Urolophus expansus** McCulloch, 1916

*Wide stingaree*

**Description**

- **Eyes** relatively large, about one-half inter-orbital distance.
- **Anterior profile** obtuse.
- **Disc** dorsal surface smooth.
- **Caudal fin** moderately elongated.
- **One barbed spine** on tail.
- **Disc** broad, rhomboidal, width about 1.1 times length, broadest just behind level of spiracles.
- **Tail** elongated, anteriorly depressed, becoming oval in cross-section.

**Depth range**

130–420 m

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

**CHIMAERIDAE**

- **Chimaera spp.**
  - Snout short and blunt
  - Anal fin present

- **Hydrolagus spp.**
  - Snout elongated and tapering
  - Anal fin present

- **Neoharriotta spp.**
  - Snout short and blunt
  - Anal fin absent

**RHINOCHIMAERIDAE**

- **Harriotta spp.**
  - Lateral head profile convex; mouth located slightly in front of or over eyes; dorsal fin lobe caudal margin without tubercles
  - Head profile convex

- **Rhinochimaera spp.**
  - Lateral head profile straight; mouth located well in front of eyes; dorsal fin lobe caudal margin with tubercles
  - Head profile straight
**Harriotta raleighana** Goode and Bean, 1895

Narrownose chimaera – Chimère de Raleigh

Quimera de Raleigh

**Chimaeriformes**

**Rhinochimaeridae** – Longnose chimaeras

**Forehead sloping to rostrum**

**Moderate-sized eye**

**Snout moderately long**

**Dorsal-fin spine equal or longer than 1st dorsal-fin height**

**Caudal fin with short filament and no tubercles on upper edge**

**Anal fin absent**

**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.**

**Harriotta haeckeli**

**Similar species**

**Bio–Ecology and Distribution of Harriotta raleighana**

**Colour**

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

**Size**

Maximum length about 120 cm TL (70 cm precaudal length).
### DEEP-SEA CARTILAGINOUS FISH SPECIES INCLUDED IN THE GUIDE

#### SHARKS

**HEXANCHIFORMES**
- Chlamydoselachus anguineus – Frilled shark
- Heptranchias perlo – Sharpnose sevengill shark
- Hexanchus griseus – Bluntnose sixgill shark
- Hexanchus nakamurai – Bigeyed sixgill shark

**SQUATINIFORMES**
- Squatina africana – African angelshark

**HETERODONTIFORMES**
- Heterodontus ramalheira – Whitespotted bullhead shark

**PRIstiophoriformes**
- Pliotrema warreni – Sixgill sawshark
- Pristiophorus nancyae – African dwarf sawshark

**LAMNIFORMES**
- Odontaspis ferox – Smalltooth sand tiger
- Odontaspis noronhai – Bigeye sand tiger shark
- Mitsukurina owstoni – Goblin shark
- Pseudocarcharias kamoharai – Crocodile shark
- Alopias superciliosus – Bigeye thresher

**SQUALIFORMES**
- Echinorhinus brucus – Bramble shark
- Echinorhinus cookei – Prickly shark
- Oxynotus bruniensis – Prickly dogfish
- Cirrigaleus asper – Roughskin spurdog
- Squalus megalops – Shortnose spurdog
- Squalus mitsukurii – Shortspine spurdog
- Centrophorus granulosus – Gulper shark
- Centrophorus squamosus – Leafscale gulper shark
- Deania calcea – Birdbeak dogfish
- Etmopterus pusillus – Smooth lanternshark
- Etmopterus granulosus – Southern lanternshark
- Etmopterus sculptus – Sculpted lanternshark
- Centroscymnus coelolepis – Portuguese dogfish
- Centroscymnus owstonii – Roughskin dogfish
- Centroscymnus crepidater – Longnose velvet dogfish
- Proscymnodon planketi – Plunket shark
- Zameus squamulosus – Velvet dogfish
- Scymnodiacetes albicauda – Whitetail dogfish
- Somniosus antarcticus – Southern sleeper shark
- Dalatias licha – Kitefin shark
- Euprotomicrus bispinatus – Pigmy shark
- Heteroscyllium melanocephalum – Longnose pigmy shark
- Isistius brasiliensis – Cookie cutter shark
- Squallaulus analis – Smalleye pigmy shark

#### CARCAREHINIFORMES
- Apristurus longicephalus – Longhead catshark
- Apristurus melanopterus – Black roughscale catshark
- Apristurus microps – Smalleye catshark
- Bythaelurus clevai – Broadhead catshark
- Bythaelurus lutarius – Mud catshark
- Cephaloscyllium sufflans – Balloon catshark
- Holohalaelurus favius – Honeycomb catshark
- Holohalaelurus grennian – Grinning izak
- Holohalaelurus melanosigma – Crying izak catshark
- Holohalaelurus punctatus – African spotted catshark
- Scyliorhinus omoroi – Comoro catshark
- Ctenacis fehlmanni – Harlequin catshark
- Eridacnis radcliffei – Pigmy ribbontail catshark
- Pseudotriakis microdon – False catshark
- Carcharhinus altimus – Bignose shark

#### BATOIDs

**MYLIOBATIFORMES**
- Plesiobatis daviesi – Deep-water stingray
- Urolophus expansus – Wide stingaree

#### CHIMAERAS

- Harriotta raleighana – Narrownose chimaera
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.