This shark, like at least most others in the genus and like porcupine fishes (Diodontidae) and puffers (Tetradontidae, etc.), can greatly inflate its stomach like a balloon when disturbed or harassed, with water or air. It can expand its stomach while in a crevice, wedging itself in and making it very difficult to extract. It is harmless to people, but may bite when harassed.

Size : Maximum size at least 100 cm, adult males 82 to 85 cm, size at hatching 14 to 15 cm.

Interest to Fisheries: None at present, occasionally caught by sportsfishers and divers but probably not utilized.

Literature : Garman (1913); Roedel & Ripley (1950); Kato, Springer & Wagner (1967); Johnson & Nelson (1970); Miller & Lea (1972); Feder, Turner & Limbaugh (1974); Springer (1979).

Remarks : Kato, Springer & Wagner (1967) and Springer (1979) synonymized the swellsharks of the eastern North and South Pacific (C. uter and C. ventriosum), which is followed here.

Cephalurus Bigelow & Schroeder, 1941 — SCYL Ceph

Genus : Cephalurus Bigelow & Schroeder, 1941, Copeia, 1941(2):73.

Type Species : Catulus cephalus Gilbert, 1892, by original designation.

Synonymy: None.

Field Marks : Dwarf, tadpole-like scyliorhinids with huge heads and slender bodies, first dorsal origin somewhat anterior to pelvic origins.

Diagnostic Features : Body strikingly tadpole-shaped, head expanded but trunk and tail slender and cylindrical, tapering to caudal fin; body very soft, semigelatinous, and thin-skinned, with weakly calcified dermal denticles; stomach not inflatable; tail short, length from vent to lower caudal origin less than half of snout-vent length. Head enlarged and considerably depressed, narrowly rounded in lateral view and not wedge-shaped; head very long, about 1/3 of total length in adults; snout very short, less than half of mouth width, thick, and flattened, bluntly pointed in lateral view; snout not expanded laterally, broadly rounded in dorsoventral view; ampullal pores not greatly enlarged on snout; nostrils of moderate size, with incurrent and excurrent apertures only partly open to exterior; anterior nasal flaps broadly triangular, without barbels, well separate from each other and falling somewhat anterior to mouth; internarial space about 1 time the nostril width; no nasoral grooves; eyes dorsolateral on head, narrow subocular ridges present below eyes; mouth angular or semiangular, moderately long, with lower symphysis well behind upper so that upper teeth are exposed in ventral view; labial furrows present along both upper and lower jaws, these very short and ending well behind level of upper symphysis of mouth; bronchial region greatly enlarged, distance from spiracles to fifth gill, slits 3/4 of head length; gill slits lateral on head. Two equal-sized dorsal fins present, origin of first about one-third of its base length in front of the pelvic origins; origin of second dorsal about over the anal origin; pectoral fins small, their width much less than mouth width; inner margins of pelvic fins not fused over claspers in adult males; claspers moderately long, fairly thick and distally pointed, extending well behind the pelvic fin tips; anal fin moderately large, but not greatly elongated, about as large as pelvic and dorsal fins; base length subequal to second dorsal base; origin of anal well behind pelvic bases, and its insertion separated from lower caudal origin by a broad space over half the anal base; caudal fin moderately elongated, slightly less than a fourth of total length in adults. No crest of denticles on the dorsal caudal margin; supraorbital crests absent from cranium. Colour light to dark brown, without a conspicuous colour pattern.

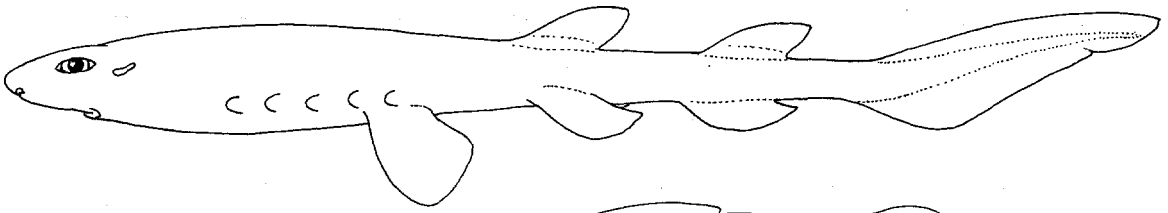
Remarks : Specimens of Cephalurus from Panama, Peru and Chile differ from the type species, C. cephalus, in a number of characters and may represent one of more new species (see also Kato, Springer & Wagner, 1967, and Springer, 1979).

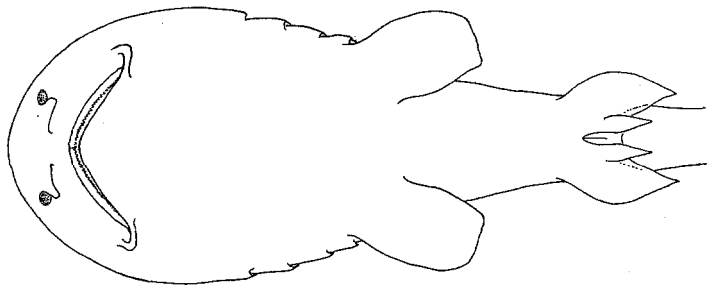
Cephalurus cephalus (Gilbert, 1892) — SCYL Ceph 1

Catulus cephalus Gilbert, 1892, Proc.U.S.Nat.Mus., 14(880):541. Holotype: U.S. National Museum of Natural History, USNM 125094, 243 mm adult male. Type Locality: Off Clarion Island, Revillagigedo Islands, 18°17.5'N, 114°43.3'W at 841 m depth.

Synonymy : None.

FAO Names : En - Lollipop catshark; Fr - Holbiche têtard; Sp - Pejegato renacuajo.



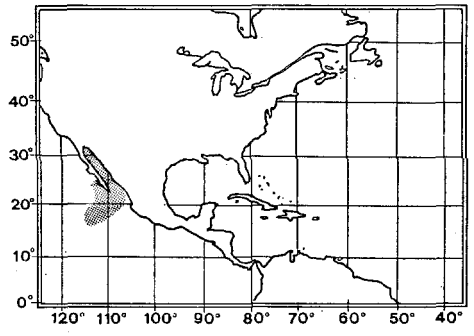


partial ventral view

Field Marks: A tadpole-shaped catshark that is "all head", as suggested by its scientific name, with expanded gill region and small slender body and tail; first dorsal origin somewhat in front of pelvic origins, body extremely soft.

Diagnostic Features: See genus.

Geographical Distribution : Eastern Pacific: Southern Baja California and Gulf of California, Mexico.



Habitat and Biology : A little-known, peculiar little shark of the upper continental slope and outermost shelf, on or near bottom at depths from 155 to 927 m; locally abundant in the Gulf of California. The expanded branchial region of this species and its relatives suggest that they are adapted to bottom areas with low dissolved oxygen levels, as is apparently the filetail catshark, Parmaturus xaniurus, and the triakid Iago omanensis.

Oviparous, one of the live-bearing scyliorhinids, with very thin-walled egg-cases that are apparently retained in the uterus until the young hatch; size of litters 2 (one egg and embryo per uterus).

Size: Maximum about 28 cm; adults maturing at about 19 cm, adult males and females up to at least 24 cm, size at birth about 10 cm. Adult Cephalurus species from Peru and Chile reach 26 to 32 cm.

Interest to Fisheries : None.

Literature : Bigelow & Schroeder (1941, 1948); Mathews & Ruiz (1974); Springer (1979).

Galeus Rafinesque, 1810

SCYL Gal

Genus : Galeus Rafinesque, 1810, Caratt.gen.sp.anim.piant.Sicilia, Palermo, Pt. 1:13.

Type Species : Galeus melastomus Rafinesque, 1810, by subsequent designation of Fowler (1908:53).

Synonymy : Subgenus Pristiurus Bonaparte, 1834 (Genus Scyllium Cuvier, 1817); Genus Pristidurus Bonaparte, 1838 (emendation of Pristiurus?); Subgenus Figaro Whitley, 1928 (Genus Pristiurus Bonaparte, 1934).

Field Marks : Usually firm-bodied scyliorhinids with caudal crests of enlarged denticles, usually rather long and wedge-shaped snouts, short labial furrows, subocular ridges virtually obsolete, large pectoral fins, large anal fin, elongated caudal fins, often barred and blotched colour pattern.

Diagnostic Features: Body not tadpole-shaped,. slender and subcylindrical to rather compressed, tapering slightly to considerably to caudal fin; body firm and thick-skinned, with well-calcified dermal denticles; stomach not inflatable; tail varying from fairly short to moderately long, length from vent to lower caudal origin about 2/5 to 5/6 of snout-vent length. Head slightly depressed, narrowly pointed-rounded in lateral view and somewhat wedge-shaped or not; head short to moderately long, between 1/4 and 1/5 to less than 1/5 of total length in adults; snout fairly short, to moderately elongated, 2/3 to about equal to mouth width, thick to rather thin and flattened, bluntly to almost acutely pointed in lateral view; snout not expanded laterally, broadly to narrowly rounded-parabolic and usually bell-shaped in dorsoventral view; ampullal pores not greatly enlarged on snout; nostrils of moderate size, with incurrent and excurrent apertures only partly open to exterior; anterior nasal flaps broadly triangular and rather low, without barbels, well separate from each other and falling well anterior to mouth; internarial space about 0.7 to 1.2 times the nostril width; no nasoral grooves; eyes virtually lateral on head, subocular ridges below eyes narrow or obsolete; mouth angular or semiangular, moderately long, with lower symphysis well behind upper so that upper teeth are exposed in ventral view; labial furrows present along both upper and lower jaws, these very short to moderately long but ending well behind level of upper symphysis of mouth; branchial region not greatly enlarged, distance from spiracles to fifth gill slits 1/3 to 1/2 of head length; gill slits lateral on head. Two equal-sized dorsal fins present, origin of first varying from over the first third of the pelvic bases to about over their insertions; origin of seond dorsal varies from about over to slightly behind the anal midbase; pectoral fins large, their width somewhat less to considerably greater than mouth width; inner margins of pelvic fins not fused or variably fused and forming an 'apron' over claspers in adult males; claspers short to moderately long, fairly thick and distally pointed and often twisted, extending from less than a fifth to about half of their lengths behind the pelvic fin tips; anal fin large and more or less elongated, about as large as pelvic fins or larger, and considerably larger than the dorsals; its base length 1.6 to slightly over 3 times second dorsal base; origin of anal close to far behind pelvic bases, and its insertion separated from lower caudal origin by a narrow notch to a broad space nearly equal to the anal base; caudal fin more or less elongated, over or somewhat less than a fourth of total length in adults. A well-developed crest of denticles on the dorsal caudal margin and sometimes the upper edge of the caudal peduncle, and in some species on the preventral margin and lower edge of the caudal peduncle, dorsal crest flat on its upper surface and symmetrical; small median denticles between upper crest denticles usually in less than five rows; supraorbital crests absent from cranium. Colour light grey or brown, with or without a conspicuous colour pattern of dark saddles and blotches.

Remarks : Orkin (1952) advocated the rejection of Galeus Rafinesque, 1810 because of prior selection of a type species, Galeus mustelus, by Jordan & Evermann (1896), which antedates Fowlers' (1908) selection of G. melastomus Rafinesque, 1810, as the type of Galeus. If Orkin's recommendation is followed, Galeus Rafinesque, 1810 becomes a junior synonym of Mustelus Linck, 1792 and Pristiurus Bonaparte, 1834, must be used for this genus. As a present expedient I prefer to follow Fowler's type designation because G. melastomus is the only species of Galeus mentioned in Rafinesque's (1810) account that has a description. The other three species, Galeus vulpecula, G. mustelus and G. catulus, although "identifiable" (Orkin, 1952), are mentioned in name only, without references or characters. Since Galeus has received considerable usage since Bigelow & Schroeder's (1948) review of the genus (up to and including its recent revision by Springer, 1979), continued use of Galeus is preferable to its substitution by Pristiurus for promoting nomenclatural stability. Pristiurus has had considerable usage in the older literature.

The subgenus Figaro was proposed by Whitley (1928) for a new Australian catshark, Pristiurus boardmani that differed from well-known species of Galeus by having an additional crest of enlarged denticles on the preventral caudal margin. Whitley (1939) raised the rank of Figaro to genus, but Fowler (1941) and Bigelow & Schroeder (1948) synonymized it with Galeus. Springer (1966) recognized Figaro without comment, but later included it in Galeus. Recently Chu et al. (1983) revived Figaro for Pristiurus boardmani Whitley, 1928, Dichichthys melanobranchius Chan, 1966, and the new Figaro piceus Chu et al. 1983 (a possible synonym of D. melanobranchius); they defined the genus primarily by its subcaudal denticle crest. Two additional species have subcaudal crests: Pristiurus murinus Collett, 1904, usually placed in Galeus; and Parmaturus pilosus Garman, 1906, the type-species of the genus Parmaturus. If all these species are placed in the genus Figaro it becomes a heterogeneous assemblage defined by a single character; moreover, Figaro becomes a junior synonym of Parmaturus, and species of Parmaturus without the subcaudal crest (P. xaniurus and P. campechensis) become orphans, even though they are phenetically more similar to P. pilosus and D. melanobranchius than to P. boardmani. Hence a temporary solution to the problem, that advocated by Springer (1979), is adopted here: to not recognize Figaro and include P. boardmani in Galeus and D. melanobranchius and F. piceus in Parmaturus.

The problem with Springer's (1979) arrangement is that Galeus and Parmaturus may ultimately prove to be generically inseparable. Although typical species of Galeus, such as G. melastomus, are strongly differentiated from typical Parmaturus such as P. pilosus, some of the other species in these genera, including G. boardmani, G. murinus, G. schultzi, and P. melanobranchius, are more or less intermediate. Hence the characters separating these genera as given in the key to genera and in the diagnostic features may not work for all species.

Reviews of this genus are in Bigelow & Schroeder (1948), Springer (1966), Springer & Wagner (1966), and Springer (1979). There may be an undescribed species of Galeus, of more typical form than G. boardmani, in Australian waters.

Key to Species

1a. A crest of denticles present on the preventral caudal margin as well as the dorsal margin

2a. Pelvic fins very large and broadly rounded. Colour plain ..... **G. murinus**

2b. Pelvic fins moderately large and angular. A colour pattern of saddles and bars present..... **G. boardmani**

1b. No crest of denticles on the preventral caudal margin

3a. Labial furrows very short, confined to mouth corners. Snout broadly rounded, usually considerably less than mouth width ..... **G. schultzi**

3b. Labial furrows more elongated, extending well beyond mouth corners. Snout more angular and pointed, usually nearly equal to, or about equal to mouth width

4a. Dorsal fins and sometimes upper and lower caudal lobes with black tips ..... **G. sauteri**

4b. Dorsal and caudal fins without black tips, usually edged with white

5a. Mouth lining white, indistinct saddle markings present or absent from body. Base of precaudal tail fairly low and cylindrical

6a. Distance from tip of snout to incurrent aperture of nostril greater than eye length. Anal base shorter than space between pelvic and anal bases ..... **G. nipponensis**

6b. Distance from tip of snout to incurrent aperture of nostril less than eye length. Anal base longer than space between pelvic and anal bases ..... **G. eastmani**

5b Mouth lining usually black, bold saddle markings usually present on body (absent in some G. piperatus). Base of precaudal tail fairly high and compressed

7a. Dorsal saddle blotches on back 15 to 18. Free rear tip of anal fin reaches or extends past lower caudal origin. A large species, adults over 50 cm ..... **G. melastomus**

7b. Saddle blotches when present, usually 11 or less. Free rear tip of anal fin falling in front of lower caudal origin. Smaller species, adults less than 45 cm

8a. Snout more elongated, preoral snout 7.4 to 8.5% of total length. Mouth longer and more narrowly arched. Saddle blotches grey or blackish grey..... **G. polli**

8b. Snout shorter, preoral snout 5.8 to 7.8% of total length. Mouth shorter and more broadly arched. Saddle blotches, when present, brown

9a. Monospondylous precaudal centra 29 to 33 ..... **G. piperatus**

9b. Monospondylous precaudal centra 33 to 39..... **G. arae**

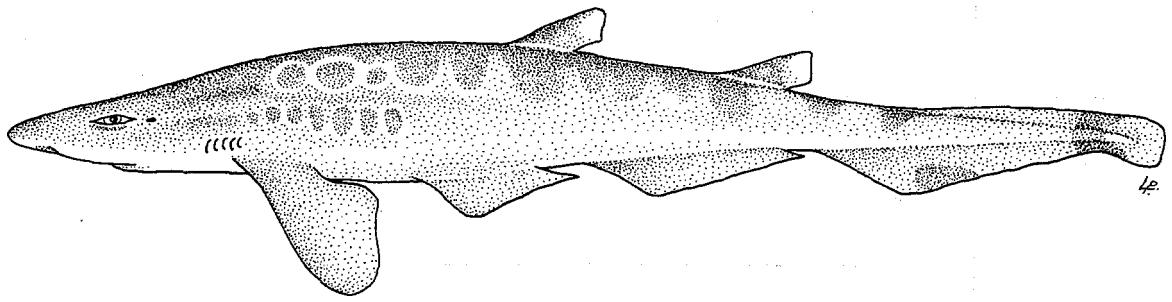
Galeus arae (Nichols, 1927

SCYL Gal 2

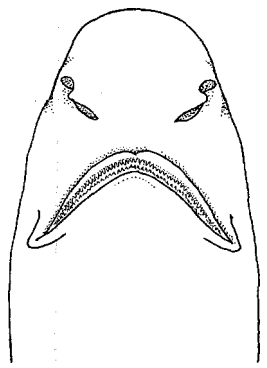
Pristiurus arae Nichols, 1927, American Mus.Novit., (256):1, fig. 1. Holotype: American Museum of Natural History, New York, AMNH 8677, 159 mm, immature female. Type Locality: Off Miami Beach, Florida, in 366 m depth.

Synonymy : Galeus cadenati Springer, 1966; Galeus arae antillensis Springer, 1979.

FAO Names: En - Roughtail catshark; Fr - Chien à queue rude; Sp - Pintarroja rabolija.



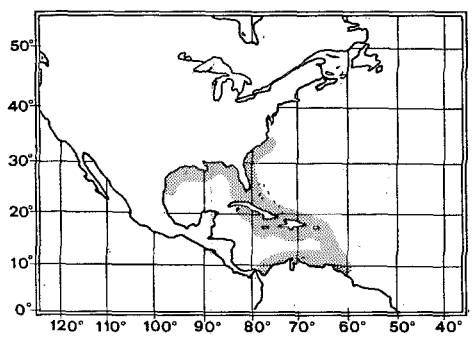
Field Marks: See diagnostic features and key to species.



underside of head

Diagnostic Features: Precaudal tail noticeably compressed at base. Snout moderately long and pointed, preoral length about 5 to 7% of total length; prenarial snout equal or greater than eye length; eyes virtually lateral on head, without prominent subocular ridges; mouth fairly large but short, very broadly arched, its width 6.2 to 9.1% of total length; labial furrows moderately long, not confined to mouth corners. Pelvic fins small, low, and angular; interspace between pelvic and anal bases much shorter than anal base; anal base short to long, 10 to 15% of total length, less than or slightly greater than interdorsal space, its origin varying from under midlength of interdorsal to just behind first dorsal insertion; no subcaudal crest of enlarged denticles on preventral caudal margin. A colour pattern of variegated dark saddled blotches on body and dark bands on caudal fin, saddles varying from well-defined and outlined with whitish to obscure, when present, usually less than 11 in number; usually additional dark markings on flanks; dorsal fins and caudal tip without black terminal marking; mouth lining dark. Monospondylous precaudal centra 33 to 39. Size small to moderate, adults up to about 40 cm.

Geographical Distribution : Western North Atlantic: South Carolina to Florida, northern Gulf. of Mexico, Cuba, Hispanola, Puerto Rico, Jamaica, the Lesser Antilles, and Caribbean coast from Belize to Colombia.



Habitat and Biology : An abundant warm-temperate and tropical, deepwater bottom-dwelling shark of the western Atlantic upper continental and insular slopes on or near bottom at 292 to 732 m depth; rarely specimens occur over the edge of the Caribbean insular shelf in waters up to 142 m depth. Water temperatures at capture sites were between about 4.6 to 11.1° C. This shark is irregularly distributed along the narrow band of slope it inhabits, sometimes occurring in hundreds and sometimes not at all in trawl hauls over suitable habitat. There is partial segregation by depth, adults but very few juveniles being found below 450 m but with mixed adults and juveniles in shoaler waters less than 450 m.

Mode of development uncertain; possibly oviparous in the Caribbean island subspecies G. a. antillensis, but possibly ovoviviparous in the continental G. a. arae.

Apparently eats mainly deepwater shrimp.

Size : Maximum about 43 cm, adult males 27 to 36 cm, adult females, 26 to 43 cm.

Interest to Fisheries: None at present.

Literature : Springer (1966, 1979); Springer & Wagner (1966); Bullis (1967).

Remarks : Springer (1979) recognizes three subspecies of this species from adjacent areas: G. a. arae from south Carolina to Florida, northern Gulf of Mexico, and the Caribbean coast from Belize to Nicaragua; G. a. antillensis from the northern slopes of Cuba, Hispaniola, Puerto Rico, Jamaica, and many of the Leeward Islands of the Caribbean southward to Martinique; and G. a. cadenati from Panama and Colombia. G. a. cadenati was formerly considered a full species (Springer, 1966), but later reduced to a subspecies of G. arae (see Springer, 1979).

Galeus boardmani (Whitley, 1928)

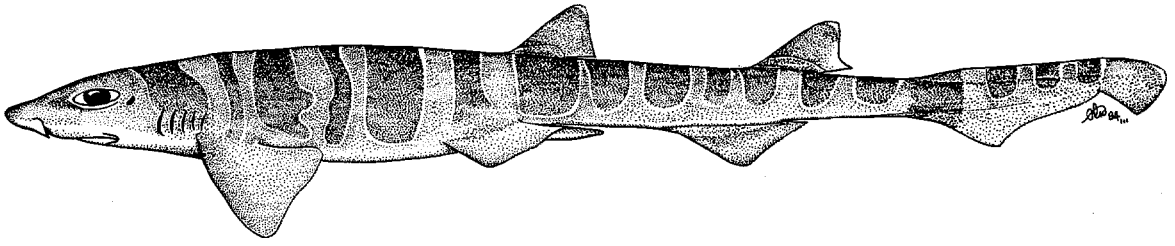
SCYL Gal 3

Pristiurus (Figaro) boardmani Whitley, 1928, Rec.Aust.Mus. 16(4):238, pl. 18, fig. 3. Holotype: Australian Museum, Sydney, AMS IA.2483, 540 mm adult male. Type Locality: NNE of Montague Island, New South Wales, Australia, depth of 165 m.

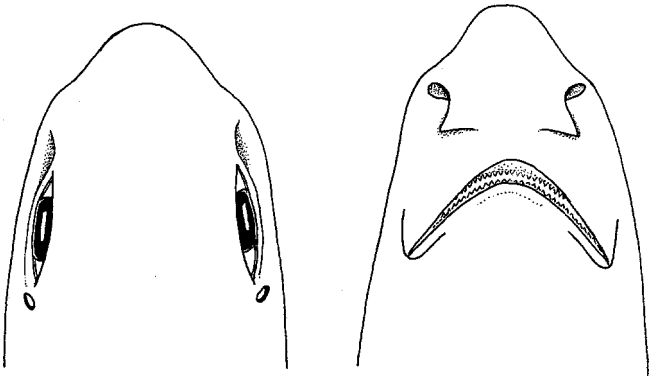
Synonymy : Figaro boardmani socius Whitley, 1939.

Other Scientific Names Recently in Use: Figaro boardmani (Whitley, 1928).

FAO Names : En - Australian sawtail catshark; Fr - Chien égoïne; Sp - Pintarroja australiana.



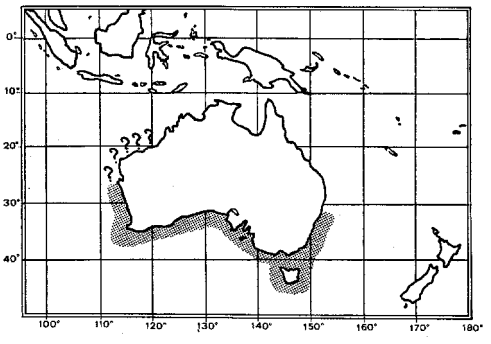
Field Marks : The only scyliorhinid with a double caudal crest and prominent saddle markings.



dorsal view of head underside of head

Diagnostic Features: Precaudal tail not compressed at base. Snout moderately long and subangular, preoral length about 7% of total length; eyes dorsolateral on head, with narrow subocular ridges; mouth fairly large and long, broadly arched, its width about 8% of total length; labial furrows moderately long, not confined to mouth corners. Pelvic fins small, low, and angular; interspace between pelvic and anal bases subequal to anal base; anal base short, 11% of total length, less than interdorsal space; a well-developed subcaudal crest of enlarged denticles on preventral caudal margin, extending onto ventral surface of caudal peduncle. A colour pattern of variegated dark, saddle blotches. on body and dark bands on caudal fin, saddles well-defined and outlined with whitish; saddled blotches usually present on back and tail and 12 or 13 in number; no additional dark spots on flanks; dorsal fins and caudal tip without black terminal marking; mouth lining light. Size moderate, adults to 61 cm.

Geographical Distribution : Western South Pacific and eastern Indian Ocean: southern coasts of Australia from New South Wales, Victoria, Tasmania, South and Western Australia.



Habitat and Biology : A little-known but common Australian catshark of temperate and subtropical waters, from the outer continental shelf and upper slope, presumably on or near bottom at depths from 128 to 823 m.

Size : Maximum about 61 cm, males mature at 54 cm.

Interest to Fisheries: None?

Literature : Whitley (1939, 1940); Fowler (1941); Springer (1979).

Remarks : The writer examined the holotype in the Australian Museum (Sydney), from which the illustration is derived. The species differs from some other species of Galeus, including G. arae, G. melastomus, G. murinus, G. eastmani, and G. sauteri, in lacking twisted terminal tips on its claspers. Whitley (1939, 1940) considered specimens from the Great Australian Bight as a separate subspecies, Figaro boardmani socius; this was based on apparent differences in colour pattern from typical boardmani from New South Wales.

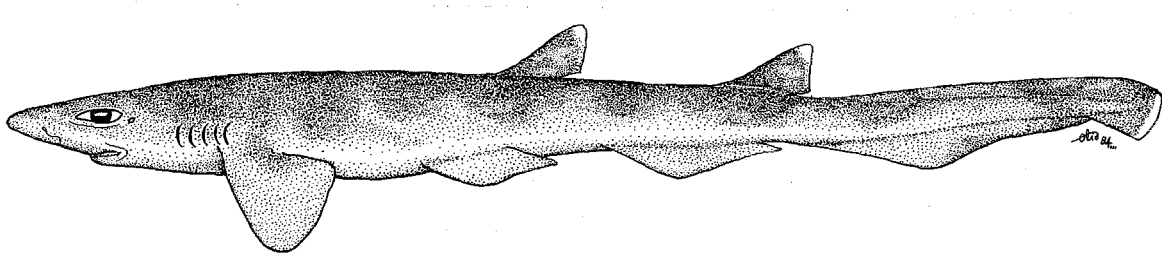
Galeus eastmani (Jordan & Snyder, 1904)

SCYL Gal 3

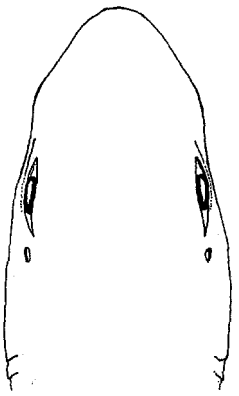
Pristiurus eastmani Jordan & Snyder, 1904, Smithson.Misc.Collect., 45:230, pl. 60. Holotype: Stanford University SU-7740, 345 mm female. Type Locality: Off Izu, Japan.

Synonymy : None.

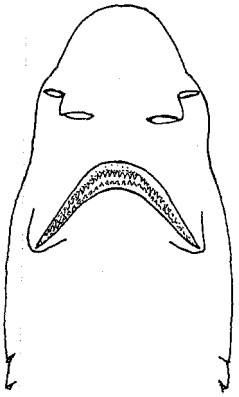
FAO Names : En - Gecko catshark; Fr - Chien gecko; Sp - Pintarroja salamanquesa.



Field Marks: Galeus with light mouth, long and narrow snout, prenarial snout shorter than eye, no subcaudal crest, obscure colour pattern, slender body, and small anal fin.



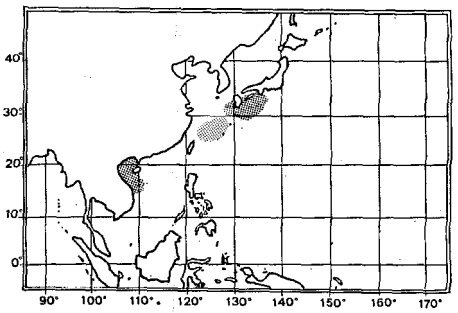
dorsal view of head



underside of head

Diagnostic Features : Precaudal tail not greatly compressed as base. Snout moderately long and narrowly parabolic, preoral length about 5 to 6% of total length; prenarial snout shorter than eye diameter; eyes virtually lateral on head, with slight subocular ridges; mouth moderately large and long, broadly arched, width about 6% of total length; labial furrows moderately long, not confined to mouth corners. Pelvic fins small, low and angular; interspace between pelvic and anal bases much shorter than anal base; anal fin short, its base about 12% of total length and much shorter than interdorsal space; anal origin under anterior half of interdorsal space. No subcaudal crest of enlarged denticles on preventral caudal margin. A colour pattern of obscure dark saddle blotches on body and caudal fin, dorsal fins and caudal tip whitish; mouth lining light. Monospondylous precaudal centra 33 to 36. Size small, adults to at least 40 cm..

Geographical Distribution : Western North Pacific: Japan, East China Sea, Viet Nam.



Habitat and Biology : A little-known, but very common small shark in Japanese waters, found in deep water near the bottom. Development oviparous, with a single egg laid per oviduct. In Japanese waters this species shows sexual segregation, with reported schools of mostly females. Egg-case 6 x 1.6 cm.

Size : Possibly to 50 cm maximum, adult males maturing at about 31 to 32 cm and reaching at least 36 cm; adult females maturing at about 36 to 37 cm and reaching at least 40 cm.

Interest to Fisheries : None at present.

Literature : Springer & Wagner (1966); Nakaya (1975); Springer (1979).

Remarks : The illustration is taken from the holotype.

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