**Somniosus** LeSueur, 1818

**Genus:** Subgenus *Somniosus* LeSueur, 1818 (Genus *Squalus* Linnaeus, 1758), *J. Acad. Sci. Philad.*, 1(pt. 2):222 (proposed as a subgenus but used in generic form).

**Type Species:** *Somniosus/Squalus* brevipinna LeSueur, 1818, by monotypy; a junior synonym of *Squalus microcephalus* Bloch & Schneider, 1801.

**Synonymy:** Genus *Somnolentus* Swainson, 1838; Subgenus *Laemargus* Müller & Henle, 1839 (Genus *Scymnus* Cuvier, 1817); Genus *Leiodon* Wood, 1846; Genus *Rhinoscymnus* Gill, 1864; Genus *Heteroscymnus* Tanaka, 1912; Subgenus *Brevisomniosus* Quéro, 1976 (Genus *Somniosus* LeSueur, 1818).

**Field Marks:** Short to moderately long snout, no fin spines on dorsals, no anal fin, slender-cusped teeth without cusplets in upper jaw, bladelike, oblique and relatively short-cusped teeth in lower jaw, denticles with narrow, hooked, cuspidate crowns, lips not fringed and pleated, first dorsal fin on middle of back and usually behind pectoral fins, but well ahead of pelvic fins, second dorsal fin slightly smaller than first, caudal fin somewhat paddle-shaped, with a long lower lobe, size moderate large to very large.

**Diagnostic Features:** Anterior nasal flaps short, not expanded into barbels; snout short to moderately long, broadly rounded to pointed and somewhat flattened, length 2/5 to less than 1/3 of head length and 2/3 to less than 2/5 of distance from mouth to pectoral origins; gill openings moderately wide, last one about as long as first four; lips thin, not fringed, pleated or sectorial; teeth strongly different in upper and lower jaws, upper small, with narrow, acute, erect cusps and no cusplets, not bladelike, lowers much larger, bladelike, interlocked, with a low to moderately high, oblique or semi-erect cusps and distal blade, edges serrated or not; tooth rows 35 to 63/34 to 68. Both dorsal fins spineless; first dorsal fin on middle of back, with origin sometimes extended forward as a low ridge over pectoral bases but usually well behind pectorals, insertion far in front of pelvic origins but slightly closer to pelvic bases than pectorals; second dorsal slightly smaller than first and with base 3/4 length of first dorsal base or less; origin of second dorsal varying from over anterior half of pelvic bases to somewhat posterior to pelvic free rear tips; pectoral fins with short, narrowly to broadly rounded free rear tips and inner margins, not expanded and acute or lobate; caudal fin semisymmetrical and paddle-shaped, with a relatively short upper lobe and long lower lobe, and a strong subterminal notch. No precaudal pits, or lateral keels, or midventral keels on caudal peduncle. Dermal denticles with oblique to erect, ridged hooked, cuspidate narrow crowns, not flat, depressed and blocklike. Cloaca normal, not expanded as a luminous gland. Colour medium grey to blackish, without conspicuous light fin edges.

**Remarks:** There have been reviews of this genus in Bigelow & Schroeder (1957), Bass, d'Aubrey & Kistnasamy (1976), and Quéro (1976). As noted by Quéro (1976), the species of *Somniosus* fall in two very well-defined groups, which can be ranked as subgenera: *Somniosus*, for the two large species *S. microcephalus* and *S. pacificus*; and a group for the small species *S. rostratus* and its synonyms) which Quéro named as a new subgenus, *Brevisomniosus*. However, *Brevisomniosus* is long antedated by *Rhinoscymnus* Gill, 1864 (and also *Heteroscymnus* Tanaka, 1912), which has as its type species *Scymnus rostratus* Rissio, 1826. *Heteroscymnus* was often recognized as a distinct genus before Bigelow & Schroeder 1957 synonymized it with the genus *Somniosus*, and it is herein ranked as a junior synonym of the subgenus *Rhinoscymnus* Gill, 1864.

Another species of *Somniosus* may be present in the eastern Atlantic but has yet to be named. Bigelow & Schroeder (1957) and Quéro 1976 noted that a *Somniosus* specimen in the Bocage Museum in Lisbon, Portugal, captured off Portugal, differed from all other species in having an extremely long head, long, pointed snout, and a long, slender caudal peduncle. Unfortunately this specimen was lost in the fire that recently destroyed the Bocage Museum, and no other specimens like it are in existence in other museum collections. A figure of this specimen is given here.
The treatment of species used here differs from Bigelow & Schroeder (1957), Quéro (1976) and Cadenat & Blache (1981) in recognizing only Somniosus microcephalus, S. pacificus, and S. rostratus; Fulgosi & Gandolfi (1983) independently came to similar conclusions on the number of valid species in this genus.

**Key to Species**

1a. Lower teeth with low roots and high, slender, semierect cusps. Number of tooth rows 57 to 63/33 to 36. A short lateral keel present on caudal fin base. Small sharks, with adults less than 1.5 m. ................................................................. S. rostratus

1b. Lower teeth with high roots and low, broad, oblique cusps. Number of tooth rows 35 to 52/48 to 58. No lateral keel on caudal fin base. Gigantic sharks, with adults to 4 or more metres.

2a. Interdorsal space at least as long as prebranchial length ................................................................. S. microcephalus

2b. Interdorsal space about 2/3 of prebranchial length ................................................................. S. pacificus

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**Somniosus microcephalus** (Bloch & Schneider, 1801)


**Synonymy**: Squalus carcharias Gunnerus, 1766 (not Linnaeus, 1758 = Carcharodon carcharias); Squalus squatina Pallas, 1814 not Linnaeus, 1758 = Squatina squatina); Squalus (Acanthorhinus norvegianus Blainville, 1816 nomen nudum), also Blainville, 1825, as S. norvegianus; S. squalus or Somniosus brevipinna Lesueur, 1818; Squalus borealis Scoresby, 1820; Scymnus gunneri Thiennemann, 1828; Scymnus glacialis Faber, 1829; Scymnus micropterus Valenciennes, 1832; Leiodon echinatum Wood, 1846; Somniosus antarcticus Whitley, 1939? see discussion below).

**FAO Names**: En - Greenland shark; Fr - Laimargue du Groenland; Sp - Tollo de Groenlandia.

**Field Marks**: Short, rounded snout, heavy cylindrical body and small precaudal fins, two spineless, equal-sized dorsal fins, no anal fin, long ventral caudal lobe, first dorsal fin on back slightly closer to pelvics than pectoral fins, interdorsal space greater than distance from snout to second gill slits, no keels on base of caudal fin, upper teeth lanceolate, lower teeth with short, low, strongly oblique cusps and high, narrow roots.

**Diagnostic Features**: Head moderately long, length from snout to pectoral fins 23% total length in specimen 299 cm total length; snout short and broadly rounded. Cusps of lower teeth short and low, strongly oblique, roots very high total tooth rows 45 to 52/48 to 53. Insertion of first dorsal fin slightly closer to pelvic bases than pectoral bases; interdorsal space greater than distance from snout tip to second gill slits. No lateral keels present on base of caudal fin. Caudal peduncle short, distance from second dorsal insertion to upper caudal origin less than twice second dorsal base, distance from pelvic insertions to lower caudal origin less than dorsal caudal margin. Vertebral column without well-defined calcified centra, notochord secondarily expanded. Size large, exceeding 4 m.
Geographical Distribution: North Atlantic and Arctic: From Cape Cod and the Gulf of Maine and Gulf of St. Lawrence to Ellesmere Island, Greenland, Iceland, Spitzbergen, the Arctic USSR (White Sea), and Norway to the North Sea and occasionally south to the Seine River mouth, France and possibly Portugal. South Atlantic and Antarctic: South Africa (Cape Columbine), Kerguelen Island, and possibly Macquarie Island.

Habitat and Biology: An abundant littoral and epibenthic shark of the continental and insular shelves and upper slopes down to at least 1200 m. The Greenland shark is one of the larger sharks and by far the largest of Atlantic-Arctic and Antarctic fishes. In the Arctic and boreal Atlantic it occurs inshore in the intertidal and at the surface in shallow bays and river mouths during the colder months but tends to retreat into water 180 to 550 m deep when the temperature rises. At lower latitudes in the North Atlantic (Gulf of Maine and North Sea) it inhabits the continental shelves, and may move into shallower water in the springer and summer. In the southern hemisphere it is found in deepwater (677 m) off South Africa and in 145 to 370 m depth off Kerguelen Island. Water temperatures of places inhabited by these sharks range from 0.6 to 12 °C.

This is a proverbially sluggish shark that gives almost no resistance to capture; individuals up to 4.9 m long have been lured to the surface with baits and hauled out of the water with gaffs. It is easily fished through holes in the Arctic ice. In the Arctic summer Greenland sharks usually are close to the bottom but swim upwards to the surface for prey.

Development is ovoviviparous; as most females taken are not gravid but have large numbers of large, yolky eggs, it was thought until relatively recently that the Greenland shark might be oviparous. One female 5 m long had 10 young about 37 cm long in 1 uterus; and these were presumably full term because their yolk-sacs were resorbed.

Although seemingly slow-moving, this shark is apparently able to capture large and active prey. Fishes are important food items and include herring, spiny eels, salmon and char, smelt, a variety of gadoids including cod, ling, pollock, and haddock, several flatfish including Atlantic and Greenland halibut, wolf-fish, redfish (Sebastes), sculpins, lumpfish, and skates and their egg-cases. The Greenland shark regularly devours marine mammals, including seals (a common prey item, possibly taken alive) and small cetaceans (possibly mostly as carrion); old stories of it attacking living great whales are apparently unfounded. Greenland sharks voraciously devour carrion and offal of all sorts from whaling, sealing, and fishing operations, and will gather to feast in great numbers around whaling stations, whale kills, fish processing operations, and ice flows with skinned seal carcasses. These sharks will glut themselves on such abundance, and seem insensate to blows from clubs or cutting instruments while gorging. Parts of drowned horses, and an entire reindeer were found in large Greenland sharks. Other prey includes sea birds, squids, crabs, amphipods, marine snails, brittle stars, sea urchins, and jellyfish.

The Greenland shark has an unusual copepod parasite that attaches itself to the corneas of the eyes; usually only a single copepod is present on each eye. The copepods are highly conspicuous and may even be luminescent; and it has been speculated that their relationship to the shark is mutualistic and beneficial, with the copepods serving as lures to bring prey species in proximity to their hosts. Field observations are necessary, however, to determine if the parasites actually serve as lures.

Despite the great size of this shark and its apparent fondness for mammalian prey it has never been indicted in attacks on people. The Greenland shark is regarded as harmless by fishermen but is considered potentially dangerous by some writers. There are old, unsubstantiated and possibly mythical tales of Greenlanders in kayaks being attacked by these sharks.

Size: Maximum total length at least 640 cm and possibly to 730 cm, but most adults between 244 to 427 cm; adult males reach at least 343 cm, adult females to at least 500 cm. Size at birth uncertain, but probably full-term fetuses were 37 cm long.

Interest to Fisheries: The Greenland shark has long been fished in Greenland, Iceland and northern Norway for its liver oil, but its meat is also used fresh and dried for human and sled-dog food. The meat is toxic when fresh, unless carefully washed, but is harmless dried or semi-putrid. Eskimos have used the skin of the Greenland shark for making boots, and used the sharp lower dental bands as knives for cutting hair.

The Greenland shark is mostly fished with hook-and-line, longline gear or gaffs, but is often taken in seal and whale nets and cod traps.
**Literature**: Whitley (1939); Bigelow & Schroeder (1948); Norman & Fraser (1949); Bjerkå (1957); Koefoed (1957); Garrick & Schultz (1963); Templeman (1963); Beck & Mansfield (1969); Lineaweaver & Backus (1970); Bass, d'Aubrey & Kistnasamy (1976); Quéro (1976); Duhamel & Hureau (1982).

**Remarks**: *Somniosus antarcticus* was named by Whitley (1939) from a sketch and descriptive data from a *Somniosus* specimen found dead on a beach at Macquarie Island in the Antarctic. The specimen itself was not preserved, but tooth and skin samples were saved; however, it is uncertain whether these samples still exist. The descriptive data and sketch definitely indicate that the specimen represented a number of the subgenus *Somniosus* closest to *S. microcephalus*, but these are sufficiently generalized to prohibit the differentiation of *S. antarcticus* from *S. microcephalus*. As with certain other sharks, Whitley apparently named *S. antarcticus* primarily because of its southern hemisphere locality.

Bass, d'Aubrey & Kistnasamy (1976) reported a southern hemisphere *Somniosus* from South Africa as "*S. microcephalus* or a closely related species". Duhamel & Hureau (1982) reported several specimens from waters off Kerguelen Island as *S. microcephalus*. As southern hemisphere *Somniosus* have never been compared in detail with northern material, identification of these sharks as *S. microcephalus* must be considered tentative. However, available information does not justify the recognition of *S. antarcticus* on locality alone, and so this species is here placed as a tentative synonym of *S. microcephalus*.

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**Somniosus pacificus** Bigelow & Schroeder, 1944


**Synonymy**: None.

**FAO Names**: En - Pacific sleeper shark; Fr - Laimargue dormeur; Sp - Tollo negro dormilón.

**Field Marks**: Short, rounded snout, heavy cylindrical body and small precaudal fins, two spineless, equal-sized dorsal fins, no anal fin, long ventral caudal lobe, first dorsal fin on back closer to pelvics than pectoral fins, interdorsal space less than distance from snout tip to first gill openings, no short keels on base of caudal fin, upper teeth lanceolate, lower teeth with short, low, strongly oblique cusps and high narrow roots.

**Diagnostic Features**: Head moderately long, length from snout to pectoral fins from 25 to 30% total length in specimens from 106 to 430 cm total length; snout short and broadly rounded; cusps of lower teeth short and low, strongly oblique, roots very high; total tooth rows 35 to 45/53 to 58. Insertion of first dorsal fin closer to pelvic bases than pectoral bases; interdorsal space less than distance from snout tip to first gill slits. No lateral keels present on base of caudal fin. Caudal peduncle short, distance from second dorsal insertion to upper caudal origin 1.8 times second dorsal base or less, distance from pelvic insertions to lower caudal origin less than dorsal caudal margin. Lateral trunk denticles with erect, narrow-crowns and hooked cusps, giving skin a rough, bristly texture. Vertebral column without well-defined calcified centra, notochord secondarily expanded. Size large, exceeding 4.3 m.
**Geographical Distribution**: North Pacific: Japan along Siberian coast (USSR) to Bering Sea and southward to southern California (USA), and Baja California (Mexico).

**Habitat and Biology**: A common boreal and temperate shark of the North Pacific continental shelves and slopes. At high latitudes with cold surface waters it ranges into the littoral and even the intertidal (one large individual was found trapped in a tide pool) as well as the surface; however in lower latitudes with temperate water it becomes a deepwater epibenthic shark, never coming to the surface and ranging down to at least 2000 m in the extreme southern end of its range (off southern California and Baja California).

Development is probably ovoviviparous, but pregnant females have yet to be found, and for some reason (such as segregation of pregnant females beyond the usual fisheries gear that captures these sharks or extremely low fecundity with a small fraction of adult females pregnant at any one time) are rare as in the closely related Greenland shark (*S. microcephalus*). However, adult females with up to 300 large eggs have been occasionally taken.

These sharks feed on a wide variety of surface and bottom animals, including flatfishes, Pacific salmon, rockfishes, harbor seals, octopuses, squids, crabs, tritons, and carrion. It is not known if seals and fast-swimming pelagic fish such as salmon are captured alive by these lumbering, sluggish sharks or are picked up as carrion. The small mouths and long heads and oral cavities of these sharks suggest that they are powerful suction feeders, but this has yet to be observed. Pacific sleeper sharks commonly are attracted to traps set at great depths for sablefishes (Anoplopoma), and get trapped themselves or else eat catch and bait-can and escape.

**Size**: Maximum captured and measured an adult female of 430 cm total length, but larger individuals estimated at 7 or more metres long have been photographed in deep water; another adult female was 3.7 m long.

**Interest to Fisheries**: Unknown.

**Literature**: Roedel & Ripley (1950); Bigelow & Schroeder (1948, 1957); Bright (1959); Gotshall & Jow (1965); Hart (1973).

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**Somniosus rostratus** (Risso, 1826)


**Synonymy**: *Heteroscymnus longus* Tanaka, 1912; *Somniosus bauchotae* Quéro, 1976.

**FAO Names**: En - Little sleeper shark; Fr - Laimargue de la Méditerranée; Sp - Tollo boreal.

**Field Marks**: Short, rounded snout, two spineless, equal-sized dorsal fins, no anal fin, long ventral caudal lobe, first dorsal fin on back closer to pectorals than pelvic fins, short keels on base of caudal fin.
**Diagnostic Features:** Head short, length from snout to pectoral fins from 20 to 23% total length in specimens above 70 cm total length; snout short and broadly rounded; cusps of most lower teeth large, high, and semioblique, roots low; total tooth rows 57 to 63/33 to 36. Insertion of first dorsal fin closer to pectoral bases than pelvic bases; interdorsal space equal or greater than distance from snout tip to second gill slits. A short lateral keel present on base of caudal fin. Caudal peduncle short, distance from second dorsal insertion to upper caudal origin 2 times second dorsal base or less, distance from pelvic insertions to lower caudal origin subequal to dorsal caudal margin. Lateral trunk denticles with flat, wide, crowns and horizontal cusps, giving skin a smooth texture. Vertebral column with well-defined centra. Size small, not exceeding 1.4 m.

**Geographical Distribution:** Eastern North Atlantic: Madeira, France; western Mediterranean. Western Pacific: Japan.

**Habitat and Biology:** A rare to sporadically common, little-known small sleeper shark of the outer continental shelves and upper slopes, occurring on or near the bottom at depths of 200 to 1000 m. Development ovoviviparous. Probably eats deepwater bottom fishes and invertebrates. This species was long thought to have luminous organs, but Fulgosi & Gandolfi (1983) recently showed that the structures in question are really pit organs. Hence this species agrees with the large species of Somniosus (subgenus Somniosus) in lacking light organs.

**Size:** Maximum total length about 140 cm; adult males 71 cm; adult females 82 to 134 cm; size at birth between 21 and 28 cm.

**Interest to Fisheries:** Minimal, caught on longlines and with bottom trawls in the eastern Atlantic and used for fishmeal and possibly for human consumption.

**Literature:** Bigelow & Schroeder (1948, 1957); Maul (1955); Tortonese (1956); Quéro (1976); Cadenat & Blache (1981); Fulgosi & Gandolfi (1983).

**Remarks:** I tentatively include the Japanese Heteroscymnus longus and the Mediterranean S. bauchotae in synonymy of S. rostratus. I examined a specimen of the Japanese longus and agree with Bigelow & Schroeder (1957) and Quéro 1976 that it is difficult to separate from S. rostratus. S. bauchotae was separated from S. rostratus by its rounded, truncated first dorsal free rear tip, more angular, posteriorly concave pectoral fins (less angular in S. rostratus), presence of a lateral keel on the caudal base (supposedly absent in S. rostratus), distance from second dorsal origin to lower caudal origin about twice second dorsal base (about equal to it in S. rostratus), and in having narrower lower teeth relative to their base heights (bases slightly higher than wide in S. bauchotae, vice versa in S. rostratus). S. bauchotae was described from a single specimen, 130 cm long (Quéro, 1976. I suspect that the first dorsal rear tip of the holotype of S. bauchotae is abnormally truncated, possibly as the result of damage and subsequent regrowth of the fin tip. The pectoral fin shape, tooth shape, and postdorsal space length characters may be indicative of individual variation rather than species distinction. A caudal keel was pictured on a Mediterranean S. rostratus with an elongated first dorsal rear tip, broadly rounded pectoral apices, postdorsal space slightly longer than the second dorsal base, but with tooth bases higher than wide (Tortonese, 1956, fig. 100). A Japanese specimen of rostratus on hand with elongated first dorsal rear tip, postdorsal space 1.3 times second dorsal base, nearly straight posterior margins but narrowly rounded apices on its pectoral fins, and lower teeth with bases slightly higher than wide has well developed caudal keels. I suspect that the caudal keels are characteristic of S. rostratus but may have been overlooked in some accounts of the species (such as Maul, 1955). A specimen of S. pacificus on hand lacks the keels.

After the above remarks were written the writer received the paper of Fulgosi & Gandolfi (1983), which essentially duplicated his conclusions on the validity of S. bauchotae and S. longus, but based on a number of specimens of S. rostratus from the Mediterranean Sea. All of these specimens have the small caudal keels.

**Type Species**: *Squaliolus laticaudus* Smith & Radcliffe, 1912, by original designation.

**Synonymy**: None.

**Diagnostic Features**: Anterior nasal flaps very short, not expanded into barbels; snout very long, bulbously conical but slightly pointed, length about half head length and about equal to distance from mouth to pectoral fins; gill openings very small, uniformly wide; lips thin, not fringed, pleated or suckorial; teeth strongly different in upper and lower jaws, uppers small, with narrow, acute, erect cusps and no cusplets, no bladelike, lowers much larger, bladelike, interlocked, with a high, moderately broad, nearly erect cusp and distal blade, edges not serrated; tooth rows 22 to 23/16 to 21. First dorsal fin with a spine, covered by skin or not, but second dorsal without a spine; first dorsal fin well anterior, origin about opposite inner margins or free rear tips of pectoral fins, insertion well anterior to pelvic origins and lower to pectoral bases than pelvics; second dorsal fin much larger than first, base about twice as long as first dorsal base; origin of second dorsal fin over front half of pelvic bases; pectoral fins with short, narrowly rounded free rear tips, and inner margins, not expanded and acute or lobate; caudal fin nearly symmetrical, paddle-shaped, with a short upper and long lower lobe and a strong subterminal notch. No precaudal pits or midventral keels, but with low lateral keels on caudal peduncle. Dermal denticles flat and blocklike, not pedicellate, no posterior cusps on flat, depressed crowns. Cloaca normal, not expanded as a luminous gland. Colour blackish or blackish-brown with conspicuously light-margined fins.

**Remarks**: The arrangement of this genus follows Seigel et al. (1977) and Seigel (1978).

**Field Marks**: The only shark with a fin spine on its first dorsal but not its second; very small size, spindle-shaped body, long, bulbously conical, pointed snout, second dorsal fin with base about twice as long as that of first, first dorsal fin with origin opposite inner margins or rear tips of pectoral fins, no anal fin, dark colour with conspicuously light-margined fins.


**Habitat and Biology**: A wide-ranging, tropical epipelagic species that occurs near continental and island land masses, sometimes over the shelves, but usually over the slopes at depths from 200 to 500 m. Unlike its relatives *Euprotomicrus bispinatus* and *Isistius*...