

= Goblin shark =

The goblin shark (*Mitsukurina owstoni*) is a rare species of deep @-@ sea shark . Sometimes called a " living fossil " , it is the only extant representative of the family Mitsukurinidae , a lineage some 125 million years old . This pink @-@ skinned animal has a distinctive profile with an elongated , flattened snout , and highly protrusible jaws containing prominent nail @-@ like teeth . It is usually between 3 and 4 m (10 and 13 ft) long when mature , though it can grow considerably larger . Goblin sharks inhabit upper continental slopes , submarine canyons , and seamounts throughout the world at depths greater than 100 m (330 ft) , with adults found deeper than juveniles .

Various anatomical features of the goblin shark , such as its flabby body and small fins , suggest that it is sluggish in nature . This species hunts for teleost fishes , cephalopods , and crustaceans both near the sea floor and in the middle of the water column . Its long snout is covered with ampullae of Lorenzini that enable it to sense minute electric fields produced by nearby prey , which it can snatch up by rapidly extending its jaws . Small numbers of goblin sharks are unintentionally caught by deepwater fisheries . The International Union for Conservation of Nature (IUCN) has assessed it as Least Concern , despite of its rarity , citing its wide distribution and low incidence of capture .

= = Taxonomy = =

American ichthyologist David Starr Jordan described the goblin shark in an 1898 issue of Proceedings of the California Academy of Sciences , recognizing the peculiar fish not only as a new species , but also a new genus and family . He based his account on an immature male 107 cm (42 in) long caught in Sagami Bay near Yokohama , Japan . The specimen had been acquired by shipmaster and naturalist Alan Owston , who had given it to Professor Kakichi Mitsukuri at the University of Tokyo , who in turn had brought it to Jordan . Thus , Jordan named the shark *Mitsukurina owstoni* in honor of these two men . The common name " goblin shark " is a translation of its old Japanese name *tenguzame* , a tengu being a Japanese mythical creature often depicted with a long nose and red face . Another name for this species is elfin shark .

Shortly after Jordan 's description was published , several scientists noted the similarity between *Mitsukurina* and the extinct Mesozoic shark *Scapanorhynchus* . For a time , the prevailing view was to treat *Mitsukurina* as a junior synonym of *Scapanorhynchus* . Eventually , more complete fossils revealed many anatomical differences between *Scapanorhynchus* and *Mitsukurina* , leading modern authors to again regard them as distinct genera . Several goblin shark specimens were described as separate species from 1904 to 1937 , none of which are now considered valid . This taxonomic confusion arose because the specimens ' jaws were fixed at varying degrees of protrusion during preservation , giving the appearance of proportional differences in the head .

= = Phylogeny and evolution = =

Phylogenetic studies based on morphology have generally placed the goblin shark as the most basal member of the order Lamniformes , known as mackerel sharks . Studies using genetic data have also supported a basal position for this species . The family Mitsukurinidae , represented by *Mitsukurina* , *Scapanorhynchus* , and *Anomotodon* , dates back to the Aptian age of the Cretaceous period (c . 125 ? 113 Ma) . *Mitsukurina* itself first appears in the fossil record during the Middle Eocene (c . 49 ? 37 Ma) ; extinct species include *M. lineata* and *M. maslinensis* . *Striatolamia macrota* , which lived in warm shallow waters during the Paleogene (c . 66 ? 23 Ma) , may also be a *Mitsukurina* species . As the last member of an ancient lineage , and one that retains several " primitive " traits , the goblin shark has been described as a " living fossil " .

= = Description = =

The goblin shark has a distinctively long and flat snout , resembling a sword blade . The proportional length of the snout decreases with age . The eyes are small and lack protective nictitating membranes ; behind the eyes are spiracles . The large mouth is parabolic in shape . The jaws are highly protrusible and can be extended almost to the end of the snout , though normally they are held flush against the underside of the head . It has 35 ? 53 upper and 31 ? 62 lower tooth rows . The teeth in the main part of the jaws are long and narrow , particularly those near the symphysis (jaw midpoint) , and are finely grooved lengthwise . The rear teeth near the corners of the jaw are small and have a flattened shape for crushing . Much individual variation in tooth length and width occurs , in whether the teeth have a smaller cusplet on each side of the main cusp , and in the presence of toothless gaps at the symphysis or between the main and rear teeth . The five pairs of gill slits are short , with the gill filaments inside partly exposed ; the fifth pair is above the origin of the pectoral fins .

The body is fairly slender and flabby . The two dorsal fins are similar in size and shape , both being small and rounded . The pectoral fins are also rather small and rounded . The pelvic and anal fins have long bases and are larger than the dorsal fins . The caudal peduncle is flattened from side @-@ to @-@ side and lacks keels or notches . The asymmetric caudal fin has a long upper lobe with a shallow ventral notch near the tip , and an indistinct lower lobe . The soft , semitranslucent skin has a rough texture from a covering of dermal denticles , each shaped like a short upright spine with lengthwise ridges . In life , this species is pink or tan due to visible blood vessels beneath the skin ; the color deepens with age , and young sharks may be almost white . The fins ' margins are translucent gray or blue , and the eyes are black with bluish streaks in the iris . After death , the coloration quickly fades to dull gray or brown . Adult sharks usually measure between 3 and 4 m (9 @.@ 8 and 13 @.@ 1 ft) long . However , the capture of an enormous female estimated at 5 @.@ 4 ? 6 @.@ 2 m (18 ? 20 ft) long in 2000 showed this species can grow far larger than previously suspected . The maximum weight on record is 210 kg (460 lb) for a 3 @.@ 8 @-@ m @-@ long shark .

= = = Etymology = = =

The generic name honors Keigo Mitsukuri , a Japanese zoologist who studied at University College London during the 1860s . The specific name honors Alan Owston , an English collector of Asian wildlife .

= = Distribution and habitat = =

The goblin shark has been caught in all three major oceans , indicating a wide global distribution . In the Atlantic Ocean , it has been recorded from the northern Gulf of Mexico , Suriname , French Guiana , and southern Brazil in the west , and France , Portugal , Madeira , and Senegal in the east . It has also been collected from seamounts along the Mid @-@ Atlantic Ridge . In the Indo @-@ Pacific and Oceania , it has been found off South Africa , Mozambique , Japan , Taiwan , Australia and New Zealand . A single eastern Pacific specimen is known , collected off southern California . This species is most often found over the upper continental slope at depths of 270 ? 960 m (890 ? 3 @,@ 150 ft) . It has been caught as deep as 1 @,@ 300 m (4 @,@ 300 ft) , and a tooth has been found lodged in an undersea cable at a depth of 1 @,@ 370 m (4 @,@ 490 ft) . Adults inhabit greater depths than juveniles . Immature goblin sharks frequent the submarine canyons off southern Japan at depths of 100 ? 350 m (330 ? 1 @,@ 150 ft) , with individuals occasionally wandering into inshore waters as shallow as 40 m (130 ft) . In April 2014 , fishermen in Key West , Florida , while fishing in the Gulf of Mexico caught a goblin shark in their fishing net , only the second one ever to be caught in the Gulf . The shark was photographed and released back into the water .

In July 2014 , a goblin shark was found in a fishery net in Sri Lanka , reported in Valaichchenai eastern coastal line in Sri Lanka . The shark was about 4 ft (1 @.@ 2 m) long and weighed about 7 @.@ 5 kg (17 lb) . The shark was given to the NARA (National Aquatic Resource Research & Development Agency) for further research .

== Biology and ecology ==

Although observations of living goblin sharks are scant, its anatomy suggests its lifestyle is inactive and sluggish. Its skeleton is reduced and poorly calcified, the muscle blocks along its sides (myomeres) are weakly developed, and its fins are soft and small. Its long caudal fin, held at a low angle, is also typical of a slow @-@ swimming shark. The long snout appears to have a sensory function, as it bears numerous ampullae of Lorenzini that can detect the weak electric fields produced by other animals. Due to the snout's lack of rigidity, it is unlikely to be used for stirring up prey from the bottom as has been proposed. Vision seems to be less important than other senses, considering the relatively small optic tectum in the shark's brain. Yet unlike most deep @-@ sea sharks, it can change the size of its pupils, thus probably does use its sight in some situations. Goblin sharks may fall prey to the blue shark (*Prionace glauca*). Parasites documented from this species include the copepod *Echthrogaleus mitsukurinae*, and the tapeworms *Litobothrium amsichensis* and *Marsupiobothrium gobelinus*.

=== Feeding ===

The goblin shark feeds mainly on teleost fishes such as rattails and dragonfishes. It also consumes cephalopods and crustaceans, including decapods and isopods. Garbage has been recorded from the stomachs of some specimens. Its known prey includes bottom @-@ dwelling species such as the blackbelly rosefish (*Helicolenus dactylopterus*), and midwater species such as the squid *Teuthowenia pellucida* and the ostracod *Macrocypridina castanea rotunda*. Thus, the goblin shark appears to forage for food both near the sea floor and far above it.

Since it is not a fast swimmer, the goblin shark may be an ambush predator. Its low @-@ density flesh and large oily liver make it neutrally buoyant, allowing it to drift towards its prey with minimal motions so as to avoid detection. Once prey comes into range, the shark's specialized jaws can snap forward to capture it. The protrusion of the jaw is assisted by two pairs of elastic ligaments associated with the mandibular joint, which are pulled taut when the jaws are in their normal retracted position; when the shark bites, the ligaments release their tension and essentially "catapult" the jaws forward. At the same time, the well @-@ developed basihyal (analogous to a tongue) on the floor of the mouth drops, expanding the oral cavity and sucking in water and prey.

=== Life history ===

Little is known about goblin shark reproduction because a pregnant female has yet to be found and studied. It likely shares the reproductive characteristics of other mackerel sharks, which are viviparous with small litter sizes and embryos that grow during gestation by eating undeveloped eggs (oophagy). The birth size is probably close to 82 cm (32 in), the length of the smallest known specimen. Males mature sexually at about 2 @.@ 6 m (8 @.@ 5 ft) long, while female maturation size is unknown. No data is available on growth and aging.

== Human interactions ==

Given the depths at which it lives, the goblin shark poses no danger to humans. A few specimens have been collected alive and brought to public aquariums, though they survived only a short time. One was kept at Tokai University and lived for a week, while another was kept at Tokyo Sea Life Park and lived for two days. Its economic significance is minimal; the meat may be dried and salted, while the jaws fetch high prices from collectors. At one time, the Japanese also used it for liver oil and fertilizer. This shark is not targeted by any fisheries, but is occasionally found as bycatch in bottom gillnets and trawls, hooked on longlines, or entangled in fishing gear. Most captures are isolated incidents; one of the few areas where it is caught regularly is off southern Japan, where around 30 individuals (mostly juveniles) are taken each year. A black scabbardfish (*Aphanopus*

carbo) fishery off Madeira also takes two or three goblin sharks annually . In April 2003 , over a hundred goblin sharks were caught off northwestern Taiwan ; the cause of the event was unknown , though observers noted it was preceded by a major earthquake . The species had never been recorded in the area before , nor has it been found in such numbers since . The International Union for Conservation of Nature (IUCN) has listed the goblin shark under Least Concern . In addition to its wide range , most of its population is thought to reside in unfished environments because few adults are caught . Therefore , it is not believed to be threatened by human activity .