

Giant squid

The giant squid, *Architeuthis*, is renowned as the largest invertebrate in the world. The largest squid so far recorded, which measured 55 ft (16.8 m) in total length (from tip of the fins to tip of the longest tentacle), was found stranded on a Newfoundland seashore in 1878. Considerable effort to view this elusive creature in its deep-sea habitat has been expended, but until the morning of September 30, 2004, no one had ever reported an observation of a live giant squid in the wild. On that morning, images of a live giant squid in its natural environment were captured by an underwater digital camera and depth recorder system in the deep sea off the Ogasawara Islands in the western North Pacific. This is the first evidence showing the behavior and biological characteristics of a live giant squid in the wild.

Previous records

During the midnineteenth to early 20th century, 19 nominal species of *Architeuthis* were reported from oceanic localities around the world. Most of them were so inadequately described and poorly understood that the systematics of *Architeuthis* are still misleading. Today *A. dux* in the northern Atlantic, *A. sanctipauli* in the Southern Hemisphere, and *A. japonica* in the northern Pacific are suggested as valid species, although some systematists consider that all may be synonymous with *A. dux*, the first described species of the genus. A few sightings and strandings of dead and/or moribund giant squids have been reported, especially from seashores of Europe, Newfoundland, New Zealand, South Africa, and Japan. This indicates that the giant squids are widely distributed primarily in the subarctic, subantarctic, and temperate waters of the world oceans. They do not live in the colder waters of the Arctic and Antarctic oceans. Giant squids have also been reported from stomach contents of sperm whales harpooned during 1960-1980, prior to the worldwide prohibition of commercial whaling. Studies on the feeding habits of sperm whales, regardless of the different areas and localities where they were captured, revealed that most of their prey consisted of unfamiliar, large deep-sea squids, including *Architeuthis*. The giant squids were generally few in number in the stomachs; however, when estimating prey composition in volume, they became a quantitatively important prey for sperm whales caught off northwestern Africa, New Zealand, and South Africa. Judging from sperm whale distribution and feeding behavior, the giant squid is estimated to live in the deep sea at about 500-2000 m (1640-6560 ft) and is especially abundant in the waters off the Madeira Islands in the Atlantic and off northwestern New Zealand in the Pacific.

Characteristics

Although the giant squid lives in the deep sea, its external appearance is almost the same as those of common squids living in shallower waters, irrespective of the giant squid's huge size (Fig. 1). It has a long cylindrical, massive mantle with relatively small heart-shaped fins, a squarish head with large round eyes, and eight long arms with two rows of suckers. The most dramatic characteristic of the giant squid is the pair of extremely long tentacles which generally make up to two-thirds of the total length. Giant squids are unique among cephalopods as they can hold the long tentacle shafts together with a series of small suckers and corresponding knobs along the tentacles, enabling the shafts to be "zipped" together. This results in a single shaft bearing a pair of tentacle clubs in a clawlike arrangement at the tip. The giant squids do not have bioluminescent organs (photophores), which are common in small- to medium-sized deep-sea squids. As with many deep-sea squids, the giant squid incorporates minute pouches of ammonium solution within its flesh to provide neutral buoyancy. Live animal orientation and hunting techniques by giant squids had previously been unknown, although many authors presumed them to be sluggish predators.

Fig. 1 A giant squid *Architeuthis* sp., fished up off Okinawa, Japan, on December 23, 2002: 141 cm (55.5 in.) mantle length. The Ryukyu woman is shown for size comparison.



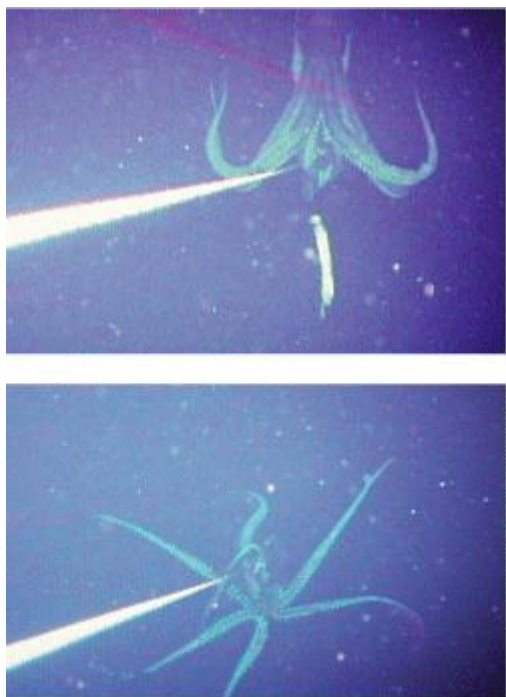
Observation in the wild

An individual giant squid attacked the lower squid bait of the camera system at 900 m (2950 ft) over a sea-floor depth of 1200 m (3937 ft) off Chichi-Jima Island (26°57.3'N, 142°16.8'E) at 09:15 a.m. on September 30, 2004. The system contained a digital camera, timer, strobe, depth sensor, data logger, and depth-activated switch. The camera captured JPEG images of around 150 KB every 30 seconds for 4-5 hours. The system weighed about 3 kg (6.6 lb) in the air and 1.5 kg (3.3 lb) in the water. The system was attached to the end of a vertical long-line which was 1000 m (3280 ft) in length.

The first image (Fig. 2, top) captured by the digital camera showed that the giant squid approached the bait horizontally and wrapped the bait in a ball with its two long tentacles, with the other arms spreading widely. In the bottom image taken 30 seconds later, the squid was disappearing from view as it actively swam away from the camera system. The giant squid appeared again after a few minutes because it became snagged on the squid jig (a fishing device jerked up and down or drawn through the water) by the club of one of these long tentacles. For the next 80 minutes, the squid repeatedly approached the line, spreading its arms widely or enveloping the line as it tried to detach from the jig. During this period, the camera system was drawn upward by the squid and/or current from a depth of 900 m (2950 ft) to 600 m (1968 ft). Over the subsequent 3 hours, the squid and system slowly returned to the planned deployment depth of 1000 m (3280 ft). During this

period, the camera captured only the line and tentacle club at the corner of the camera frame. For the last hour, the line was out of the frame, suggesting that the squid was tired and could not pull the line strongly enough to turn the camera toward it. Finally the line came into the camera frame again when the giant squid started to swim forcefully and detach itself from the system. Four hours and 13 minutes after becoming snagged, the tentacle broke and the squid escaped from the jig.

Fig. 2 First image (top) of the giant squid in the wild, and an image showing arms spreading (bottom). (Courtesy of the Proceedings of the Royal Society: T. Kubodera and K. Mori, First-ever observations of a live giant squid in the wild, *Proc. R. Soc. Lond. (Biol. Sci.)*, 272(1581): 2583-2586, 2005)



The severed tentacle remained attached to the line and was subsequently retrieved from the camera system. The recovered section of tentacle was still functioning, with the large suckers of the tentacle club repeatedly gripping the boat deck and any offered fingers. The tentacle portion was 5.5 m (18 ft) long and the club length was 72 cm (28 in.), with the largest sucker being 28 mm (1.1 in.) in diameter. Based on calculations between club length, sucker diameter, and mantle length, the size of the squid was estimated to be 1.6-1.7 m (5.2-5.6 ft) in mantle length and approximately 4.7 m (15.4 ft) from the tip of the fins to the tip of the arms. Combined with the retrieved tentacle, the squid should be more than 8 m (26 ft) in total length.

New findings

The photographs indicate that the giant squid was hunting at 900 m (2950 ft) during the day. Sperm whales feed at this depth during the day and at 400-500 m (1312-1640 ft) at night. Giant squids probably rise in the water column at night to feed in these shallower depths. Based on the images, giant squids are probably much more active predators than previously suggested and appear to attack their prey from a horizontal orientation. The giant squids can retract their long tentacles once a prey has been captured. The tentacles apparently coil into an irregular ball in much the same way that pythons rapidly envelop their prey within coils of their body immediately after striking. The long tentacles are clearly not weak fishing lines dangled below the body. The tentacle resisted for more than 4 hours the pull of the camera system in the ocean current and that of its own swimming (finning and/or jetting). The giant squid had the swimming ability and power to pull the camera system against the current for several hours and enough strength to break off the tentacle by itself after 4 hours of grappling. This encounter has given us important knowledge on the habitat and behavior of the giant squid, although there is still much to learn about these spectacular animals.

See also: [Cephalopoda](#); [Deep-sea fauna](#); [Marine ecology](#); [SQUID](#); [Teuthoidea](#)

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