

myopsids are demersal, predominantly near-shore or shelf species, frequently feeding near or on the bottom. Some species tolerate reduced salinities and estuarine situations. Many species show characteristic onshore-offshore migrations in spring and late fall respectively, overwintering in deeper waters. The spawning season often is extended with peaks in early summer and autumn. Many small eggs are encapsuled in gelatinous strings attached to shells and other substrates.

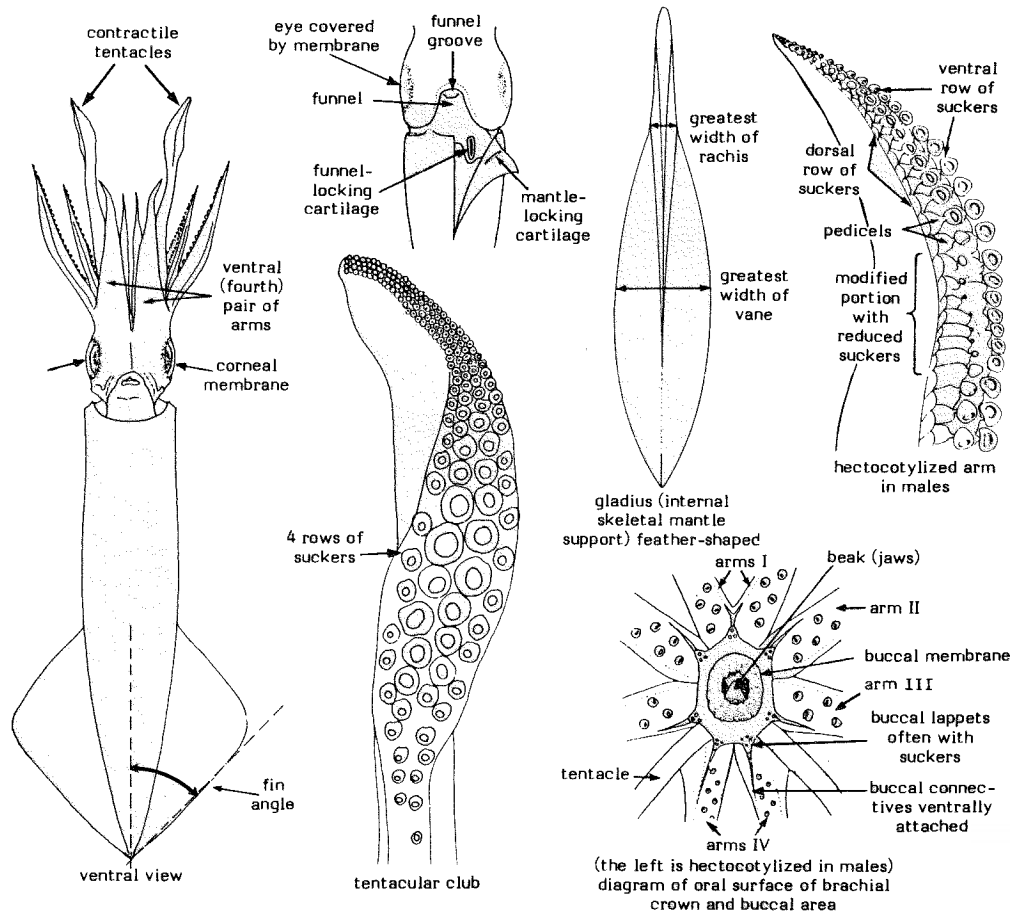
Diagnostic Features : Corneal membrane covering the eye, with a minute pore anteriorly. Arms and clubs with suckers, never with hooks. Suckers present on the buccal lappets. Females with a single gonoduct, not paired; with accessory nidamental glands.

4.1 **FAMILY LOLIGINIDAE** Orbigny, 1848

LOLIG

Loliginidae Orbigny, 1848, in 1834-1848, *Hist.Nat.Ceph.Acet.Viv.Foss.*, 297.

FAO Names :
 En - Inshore squids
 Fr - Calmars, Calmars cotiers, Casserons, Encornets
 SP - Calamares, Calamarines, Calamaretos



Diagnostic Features : Shape variable from short and stout to long and slender. Fins terminal or marginal, but always united posteriorly; funnel-locking apparatus a simple, straight groove. Eyes covered with transparent skin (corneal membrane); buccal connectives attached to ventral borders of fourth arms; 7 buccal lappets supplied with small suckers (except in *Lolliguncula* and *Alloteuthis*); 8 arms and 2 tentacles around mouth; 2 rows of suckers on arms and 4 rows on tentacular clubs, hooks never present. Usually the left arm of the IV (ventral) pair is hectocotylized in males (used to transfer sperm packets from the male to the female); the structure of the modified portion (hectocotylus) of the arm is useful in most species as a diagnostic character (often, the suckers on the hectocotylus are reduced in size or number, or modified into fleshy papillae or flaps (lamellae), or they disappear altogether. Colour: usually reddish-brown, darker dorsally, but quite variable depending on the behavioural situation.

Geographical Distribution : Representatives of this family inhabit literally all shelf and upper slope areas of the world's oceans except the polar seas.

Habitat and Biology : Inshore squids are demersal or semipelagic inhabitants of coastal and continental shelf areas to a maximum depth of about 400 m. Several species are restricted to extremely shallow waters and some of these penetrate into brackish waters. Typically, they carry out diel movements, aggregating near the bottom during the day, but dispersing into the water column at night. Many species are positively phototactic, and hence often are captured with fishing techniques using light.

Many, but not all species are known to carry out seasonal migrations in response to temperate changes. They usually overwinter in deeper offshore waters. They migrate onshore, aggregated by size, with the largest individuals starting in spring and the smaller ones following in summer, then retreating again towards deeper waters in late autumn. Most species, except those inhabiting cold-temperate waters, have an extended spawning season with peaks in spring or early summer and in fall, corresponding to the two major size groups of spawners. Some species are known to be portion-spawners. The small eggs are encapsuled in gelatinous, fingerlike strings ("seamops") and attached to various substrates. Hatchlings resemble the adults. Those from spring and summer broods usually mature and spawn in autumn of the following year, while the offspring of autumn-spawning will tend to participate in the spring spawning in their second year of life, so that the two cycles alternate. The life span of these short-lived animals ranges between 1 and 3 years. Inshore squids are predators on crustaceans, and small and juveniles fishes.

Size : Mantle length from 2 to 90 cm.

Interest to Fisheries : Loliginids account for approximately 9% of the world cephalopod catch, and are predominantly fished by southeast Asian and Mediterranean countries which also traditionally are the major consumers. There are a few industrial fisheries directed at these species, but they also are taken as bycatch in many nearshore trawl fisheries for shrimps and demersal finfish. Numerous artisanal and subsistence fisheries take inshore squids either in multispecies catches or as prime target species. Gears used include purse seines, dip nets, cast nets, encircling nets, hook-and-line, often rendered more efficient by prior light attraction with torches and lamps.

The flesh of loliginids is highly appreciated and marketed either fresh, frozen or processed into canned or dried products. Squids also are used as bait, i.e., in scombrid hook-and-line fisheries and the traditional Grand Banks troll fishery for cod conducted by the Portuguese.

Inshore squid catches by major fishing areas and countries (Source: FAO, 1983)

Fishing Area	Country or region	% of 1981 catch in the area	catches ('000 metric tons)	
			1980	1981
<u>Loligo pealei</u>				
Northwestern Atlantic	Italy	37.0	2 956	3 920
	Japan	41.1	6 015	4 354
	Mexico		3 188	-
	Spain		7 569	-
	USA	21.6	3 852	2 287
<u>Loligo species</u>				
Northeastern Atlantic (27)	France	45.1	2 563	2 037
	Spain	47.8	1 202	2 162
Eastern central Atlantic	Spain	86.0	7 606	13 680
Mediterranean and Black Sea (37)	Italy	47.5	4 558	4 170
	Spain	37.6	1 835	3 300
Eastern Indian Ocean (57)	Indonesia	22.5	915	1 059
	Thailand	72.3	3 624	3 402
Western central Pacific (71)	Indonesia	13.7	10 227	9 755
	Philippines	39.3	27 011	27 980
	Thailand	46.1	36 203	32 829
Total, all <u>Loligo</u>			127 987	119 059

F= FAO estimate

* **Key to Genera :**

1a. Mantle elongate or short, robust, posteriorly pointed or rounded, but never produced into an elongate, pointed tail; posterior border of fins straight, or only slightly concave, or rounded

2a. Fins very long, over 90% of mantle length, broad, Sepia-like, but much wider and more muscular; mantle very robust (Fig. 1) Sepioteuthis

2b. Fins short to moderately long, less than 90% of mantle length; mantle elongate and narrow to short and stocky

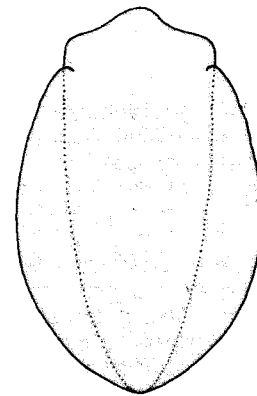
3a. Fins lateral, rhombic in outline, with posterior borders straight or slightly concave; relatively long, usually over 60% of mantle length; mantle elongate, bluntly to sharply pointed (Figs 2, 3); left ventral arm (IV) hectocotylized in males Loligo

4a. Vane of gladius broad, with thin, curved edges (Fig. 2a); posterior end of mantle moderately blunt (Fig. 2b); mantle not very narrow in males; fins usually less than 70% of mantle length Subgenus Loligo **

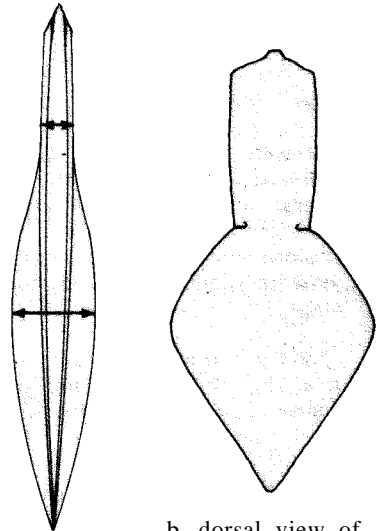
4b. Vane of gladius narrow, with thickened straight edges (Fig. 3a); posterior end of mantle relatively sharply pointed (Fig. 3b); mantle very narrow in males; fins usually longer than about 70% of mantle length Subgenus Doryteuthis **

3b. Fins terminal, rounded (borders convex), short (less than 60% of mantle length); one or both ventral arms (IV) hectocotylized in males

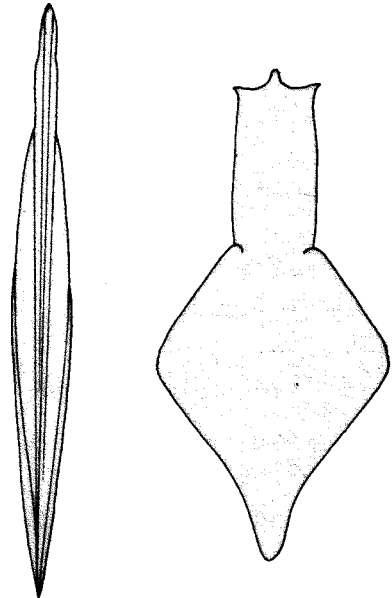
5a. One ventral arm (left IV) hectocotylized in males; mantle stout, rounded posteriorly; fins 50% or more of mantle length



dorsal view of mantle and fins
Sepioteuthis Fig. 1



a. gladius
b. dorsal view of mantle and fins
Loligo, subgenus Loligo Fig. 2



a. gladius
b. dorsal view of mantle and fins
Loligo, subgenus Doryteuthis Fig. 3

* Key refers to adults or subadult stages only

** The subgenera Loligo and Doryteuthis are considered as valid genera by some authors. Further research is required to clarify their status

6a 50% or less of ventral left arm (IV) hectocotylized by modification of suckers (Fig. 4a); fins round to elliptical; mantle very); robust, muscular, bluntly rounded posteriorly; animals relatively large (Fig. 4b)

Lolliguncula

6b. Nearly entire length of left ventral arm (IV) hectocotylized by drastic modification of suckers, membranes and trabeculae (Fig. 5a); fins elliptical to broadly heart-shaped; mantle delicate, very stout, very broadly rounded posteriorly; animals small (Fig. 5b)

Loliolus

5b. Both ventral arms (IV) conspicuously hectocotylized in males (Fig. 6a); mantle elongate, narrow, bluntly pointed posteriorly; fins 30 to 35% of mantle length, elliptical to heart-shaped (Fig. 6b)

Loliolopsis

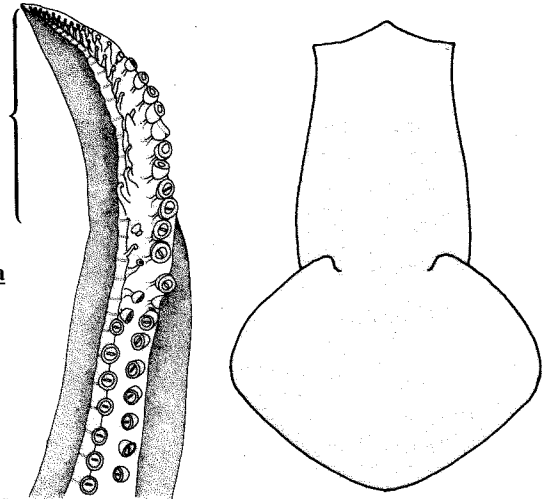
1b. Mantle very long, narrow, its posterior end drawn out into a long, pointed tail, especially in males posterior border or fins strongly concave, extending along tail as narrow membranes (Fig. 7)

7a. Buccal membrane with suckers; trabeculae on protective membranes of tentacular clubs equal in number to adjacent suckers (Fig. 8a) *

Uroteuthis

7b. Buccal membrane without suckers; trabeculae on protective membranes of tentacular clubs twice as numerous as adjacent suckers (Fig. 8b)

Alloteuthis

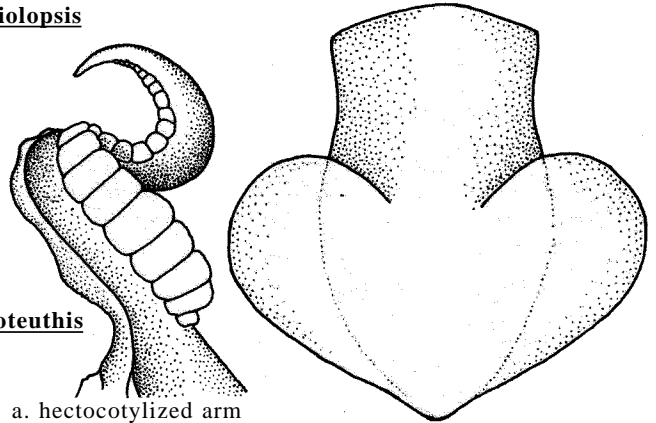


a. hectocotylized arm IV of male

b. dorsal view of mantle and fins

Lolliguncula

Fig. 4

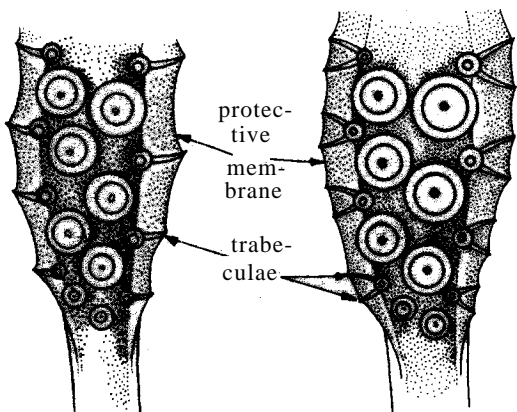


a. hectocotylized arm IV of male

b. dorsal view of mantle and fins

Loliolus

Fig. 5

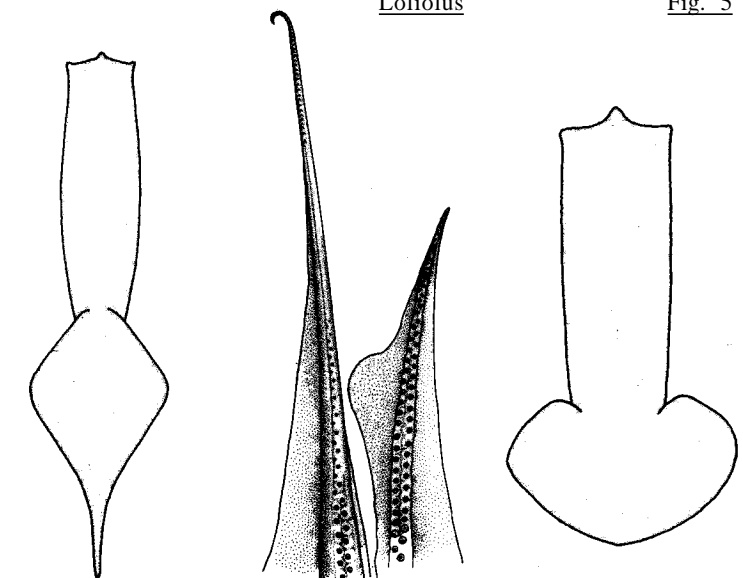


base of tentacular club

a. Uroteuthis

b. Alloteuthis

Fig. 8



dorsal view of mantle and fins

Uroteuthis

a. both arms IV of male hectocotylized

b. dorsal view of mantle and fins

Loliolopsis

Fig. 6

Loligo beka Sasaki, 1929

LOLIG Lolig 7

Loligo beka Sasaki, 1929, J.Coll.Agri., Hokk., 20:121

Synonymy : Loligo sumatrensis Appellöf, 1886

FAO Names : En - Beka squid
Fr - Calmar cracheur
SP - Calamar beka

Diagnostic Features : A relatively small species up to 7 cm mantle length; fins rhomboidal, angles rounded, length greater than 1/2 of mantle length. Tentacular clubs small, narrow; suckers small, quadriserial, those of median 2 rows on manus slightly less than 2 times the diameter of the marginal suckers; rings of suckers on manus with about 20 small, sharp, conical teeth. Arm sucker rings with 3 to 5 (usually 4) very broad, squared, plate-like teeth in distal 3/5, a single flat "tooth" in proximal 2/5; left arm IV hectocotylized in distal 2/3, with about 50 interconnected fleshy papillae (modified sucker stalks) in two longitudinal rows; those of ventral row more thickened, especially proximally; papillae on dorsal row and a few on ventral row distally bearing minute, rudimentary suckers.

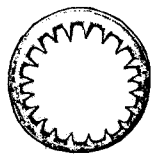
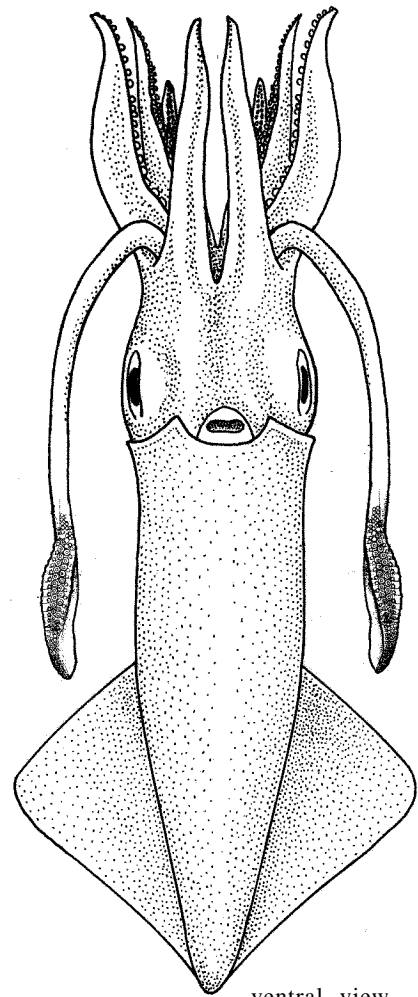
Geographical Distribution : Western Pacific; southern Japan, Taiwan (Province of China), and Hainan Island; mainland distribution unreported.

Habitat and Biology : A neritic, semi-pelagic species; its depth distribution is undetermined.

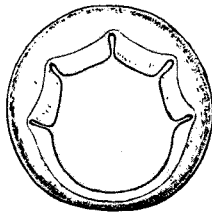
Size : Maximum mantle length 7 cm.

Interest to Fisheries : One of the four loliginid species reported in the Chinese squid catch.

Local Names : JAPAN: Beka.

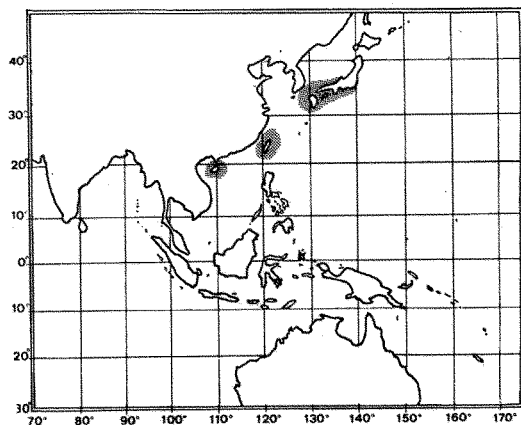


tentacular club sucker ring



arm III sucker ring

ventral view



Loligo (Doryteuthis) bleekeri Keferstein, 1866

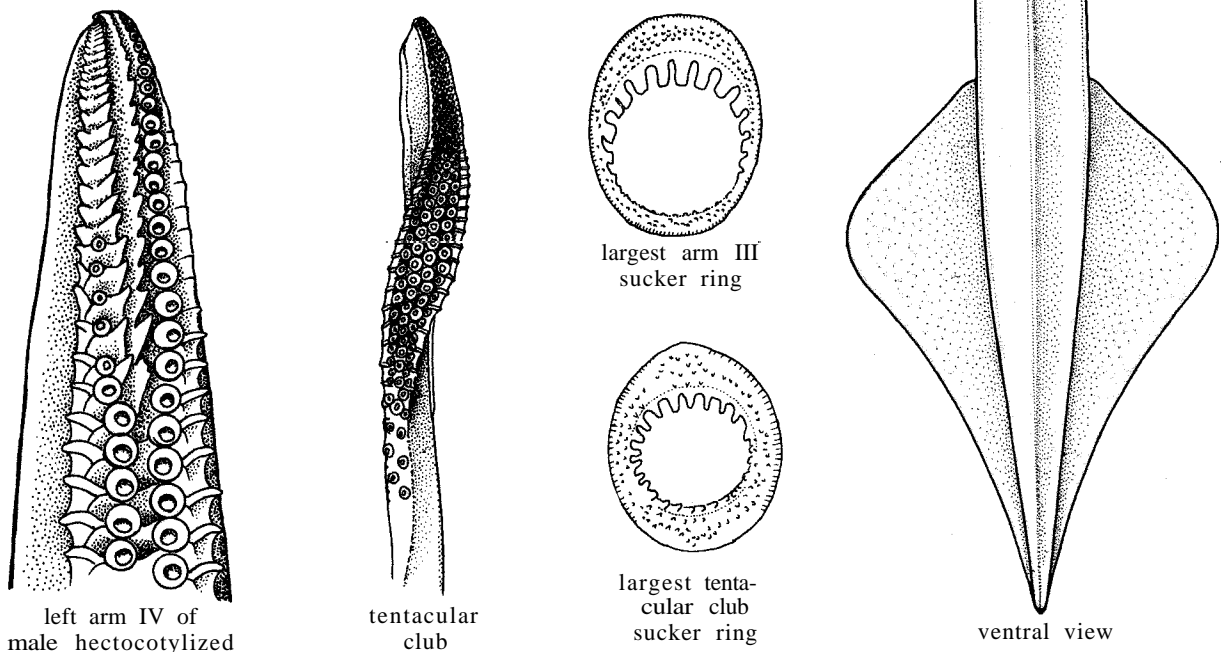
LOLIG Lolig 8

Loligo bleekeri Keferstein, 1866, Bronn's Klass.Ordn.Tier-reichs. 1862-1866:1402.

Synonymy : Doryteuthis bleekeri (Keferstein, 1866).

FAO Names : En - Spear squid
Fr - Calmar lancette
SP - Calamar lanceolado

Diagnostic Features : Mantle very elongate, narrow, a fleshy ridge along ventral midline, indistinct in females. Fins large, thick, length $\frac{2}{3}$ of mantle length. Tentacles short; tentacular clubs narrow, suckers small, nearly uniform in size, those of medial 2 rows of manus only slightly larger than marginal rows; manal sucker rings with about 30 long blunt, separate teeth, the 10 to 14 distal ones the largest. Arms very short and small in relation to body size; left arm IV hectocotylized in distal $\frac{1}{3}$ to $\frac{1}{4}$ where arm tip is thickened and blunt; modified sucker stalks become longer with thicker bases towards tip; suckers become very minute and rudimentary in the modified section, especially in the dorsal row, with very thickened basal papillae; dorsal basal papillae very greatly thickened, then transformed into tightly arranged, bicuspid, lamelliform flaps; a narrow, serrated membrane separates the two rows of modified sucker papillae at the tip.



Geographical Distribution : Japan, excluding northern half of Hokkaido; southern Korea.

Habitat and Biology : A neritic species occurring from surface waters to depths of approximately 100 m. From the offshore overwintering areas the squids migrate onshore in early spring and spawn in shallow waters. Eggs are laid in clusters attached to various substrates, rocks, seaweeds, shells, etc.

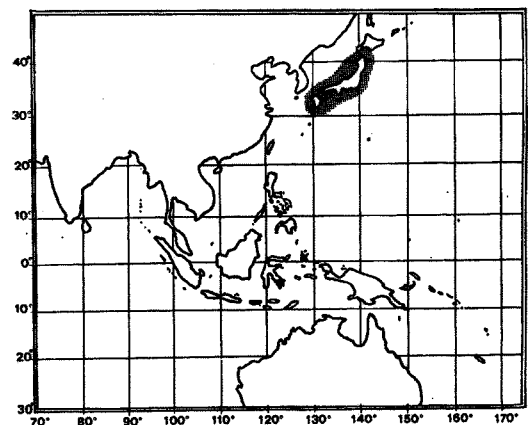
Size : Maximum mantle length 40 cm.

Interest to Fisheries : The most extensively utilized loliginid squid in Japan. The fishery is located in the Sea of Japan and the Pacific coast northward to mid-Honshu during February to July (peak April and May); it is caught with set nets, trap nets, trawl nets and blanket nets. The feasibility of aquaculture is presently under intensive study, e.g., artificial spawning beds have been built, but the results are not yet available.

Local Names : JAPAN: Chiyoki, Sasaika, Sayanaga, Shakuhiika, Tenashi, Teppo, Tsutsuika, Yariika.

Literature : Araya & Ishi (1974, fishery and biology, Japan; under the name *Doryteuthis bleekeri*); Tomiyama & Hibiya (1978).

Remarks : Some authors consider *Doryteuthis* a subgenus while others give it generic standing.



Loligo chinensis Gray, 1849

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Loligo chinensis Gray, 1849, *Cat.Moll.Brit.Mus.*, 74.

Synonymy : *Loligo formosana* Sasaki, 1929; *Loligo etheridgei* Berry, 1918.

FAO Names : En - Mitre squid
Fr - Calmar mitre
SP - Calamar mitrado

Diagnostic Features : Mantle elongate, slender, bluntly pointed posteriorly, no longitudinal ridge on ventral midline. Fins rhombic, long, over 2/3 of mantle length. About 12 medial manal suckers of tentacular clubs enlarged to 1 1/2 times the diameter of the lateral suckers and 2 times the largest arm sucker; large rings with 20 to 30 sharp, separate teeth, 6 to 12 larger ones interspersed with 1 to 4 smaller ones. Larger sucker rings of arms II and III with 10 to 15 sharp teeth distally, with degenerate teeth or smooth proximally; left arm IV hectocotylized at distal 1/3 by modification of more than 30 suckers and stalks in each row into slender, conical papillae that remain larger in the ventral row.

Geographical Distribution : Western Pacific: South and East China Seas to Japan; Arafuru Sea, northeastern Australia to New South Wales.

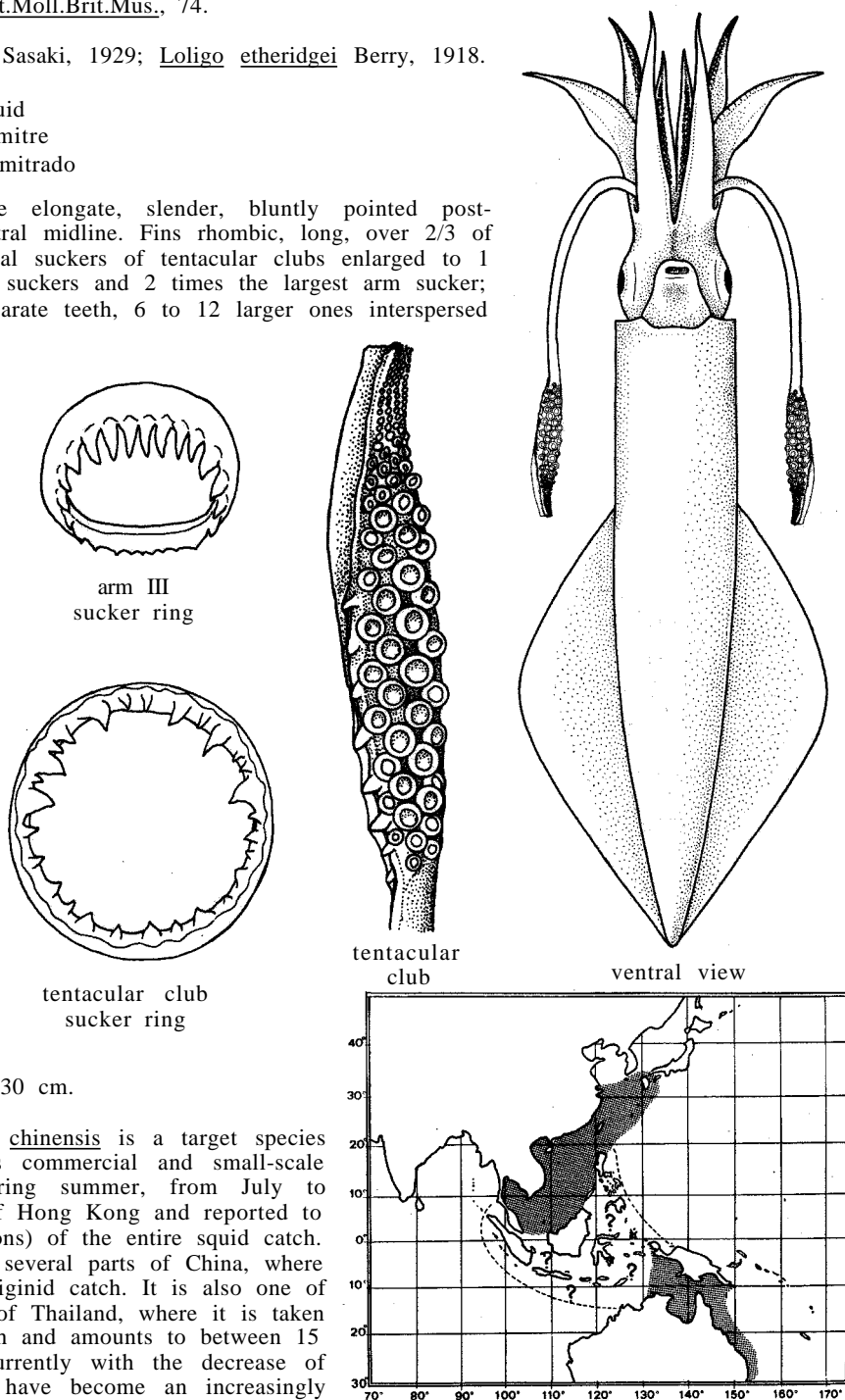
Habitat and Biology : A neritic species ranging from approximately 15 to 170 m depth. Like many other squid, it is positively phototactic and forms large aggregations at certain periods of the year. Some spawning may occur throughout the years, but peaks are observed in spring and in fall (February to May and August to November).

Size : Maximum mantle length 30 cm.

Interest to Fisheries : *Loligo chinensis* is a target species or a welcome bycatch of numerous commercial and small-scale fisheries throughout its range. During summer, from July to September, it is heavily exploited off Hong Kong and reported to make up about half (2000 to 3000 tons) of the entire squid catch. It also supports seasonal fisheries in several parts of China, where it accounts for up to 90% of the loliginid catch. It is also one of the major squid species in the Gulf of Thailand, where it is taken in waters between 15 and 30 m depth and amounts to between 15 and 40% of the trawl catch. Concurrently with the decrease of finfish catches in that area, squids have become an increasingly important resource since the mid-sixties and early seventies (Sakurai, 1972). Exploratory light-lure fishing has been tried successfully on the Thai west coast. Catches in other countries bordering the Bay of Bengal are presently of minor importance. The species is also taken by Taiwanese trawlers in north Australian waters and is believed to occur in minor quantities in Indonesian, Malaysian and Philippine catches.

Loligo chinensis is taken with a variety of gears, including different kinds of bottom trawls, purse seines, dip-, and cast nets, hook-and-lines, scoop nets, and bamboo stake nets, sometimes involving light attraction with torches and lamps. It is usually marketed dried, but also fresh and frozen.

Local Names : CHINA: Tor yau yue; JAPAN: Hirakensakiika.



Literature : Tomiyama & Hibaya (1978); Okutani (1980); Chikuni (in press, resources in the Indo-Pacific Region; and references therein).

Remarks : Probably this is a wide-ranging species throughout the Indo-West Pacific region, but identification must be made of specimens from the entire suspected geographical range.

Loligo duvauceli Orbigny, 1848

LOLIG Lolig 10

Loligo duvauceli Orbigny, 1848, in 1834-1848, *Hist.Nat.Ceph.acetab.*, 318.

Synonymy : *Loligo oshimai* Sasaki, 1929; *Loligo indica* Pfeffer, 1884.

FAO Names : En - Indian squid
Fr - Calmar indien
Sp - Calamar indico

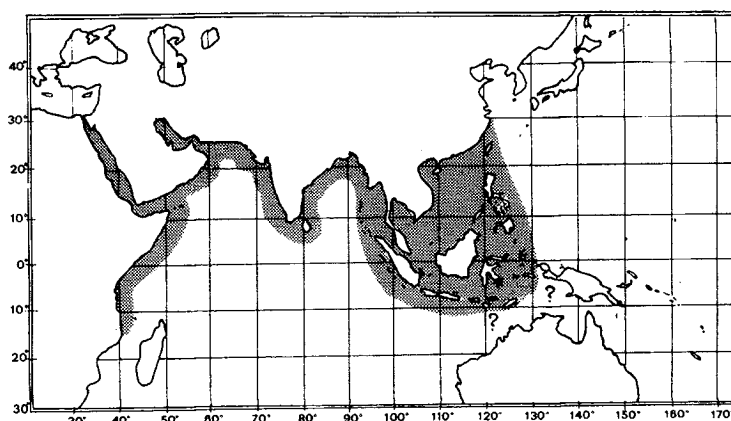
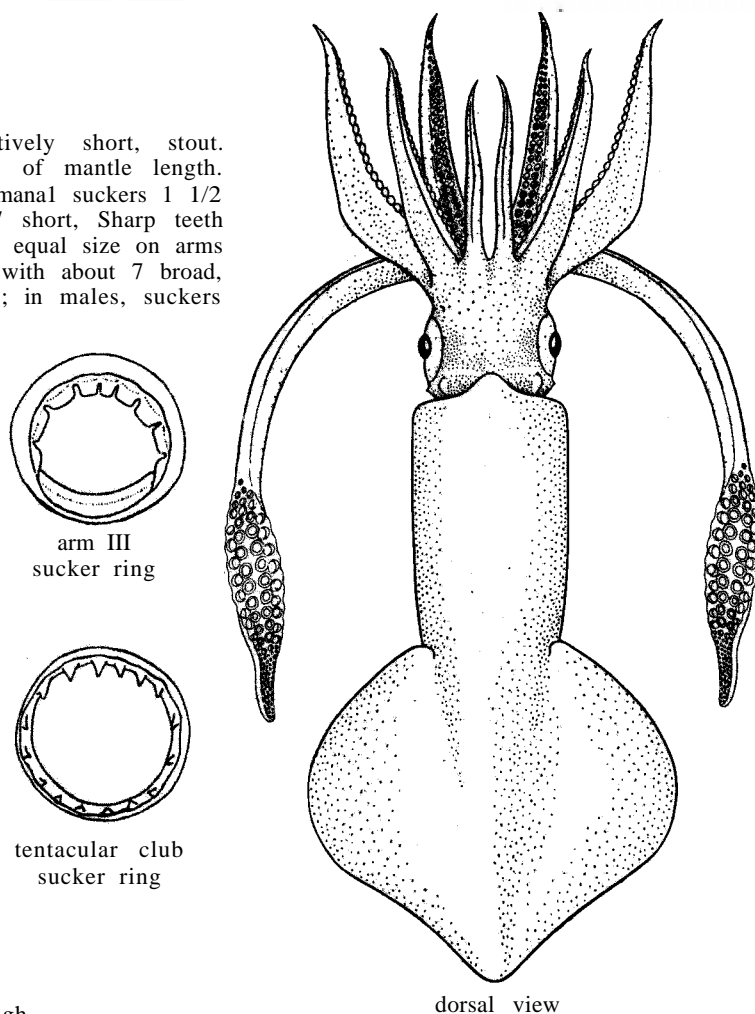
Diagnostic Features : Mantle relatively short, stout. Fins rhombic, broad, short, just over 50% of mantle length. Tentacular clubs expanded; large median anal suckers 1 1/2 times larger than marginals, with 14 to 17 short, Sharp teeth around ring. Arm suckers of female of about equal size on arms II and III, rings smooth proximally, toothed with about 7 broad, blunt teeth distally (the central one pointed); in males, suckers of arm II and III greatly enlarged, with 9 to 11 broad, squared to rounded, truncate teeth in the distal 2/3 of ring, proximal 1/3 smooth; left arm IV of male hectocotylized for more than 1/2 its length, with 2 rows of large papillae, some with minute suckers on tip; ventral rows larger, turned outward, comblike; an oval photophore on each side of rectum and ink sac.

Geographical Distribution : Indo-Pacific: Indian Ocean periphery, including the Red Sea and the Arabian Sea, extending eastwards from Mozambique to the South China Sea and the Philippines Sea, northward to Taiwan (Province of China).

Habitat and Biology : A neritic, shallow-water species occurring in depths between 30 and 170 m, forming large aggregations during the spawning season. Spawning occurs throughout the year, but usually peaks when water temperatures increase, i.e. in February and from June to September off Madras; from February to March, from May through July, and from September to October off Cochin. The smallest sexually mature individuals are one year old; longevity is estimated at 3 years.

This species feeds on crustaceans (such as mysids, euphausiids and ostracods), fishes and squids. Cannibalism is common.

Size : Maximum mantle length 29 cm; maximum weight 1.5 kg. The size in Indian catches ranges from 6 to 28 cm; it grows larger off the Indian west coast than off the east coast. Length at first maturity is about 11 cm in males and 12 cm in females on the west coast; 7.6 cm in males and 8.6 cm in females on the east coast (Silas *et al.*, 1982).



Interest to Fisheries : *Loligo duvauceli* is exploited throughout its distributional range, mainly by artisanal subsistence fisheries. Off Hong Kong it is taken by purse seiners using light in waters not deeper than 40 m, usually between May and September; in the Gulf of Thailand it is one of the target species of the trawl fishery; all along the coasts of India it regularly occurs in trawl and seine catches; and in the Gulf of Aden it is the second most important species in commercial trawl catches.

Local Names : CHINA: Chin sui yau yue, Yau jai.

Loligo edulis Hoyle, 1885

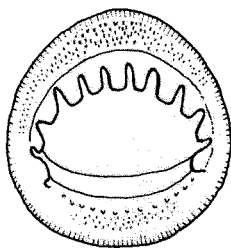
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Loligo edulis Hoyle, 1885, *Ann.Mag.Nat.Hist.*, (5)16:186.

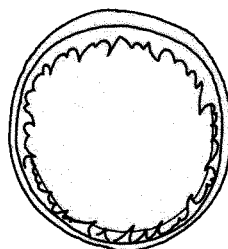
Synonymy : *Doryteuthis kensaki* used by some Japanese authors.

FAO Names :
 En - Swordtip squid
 Fr - Calmar épée
 Sp - Calamar espada

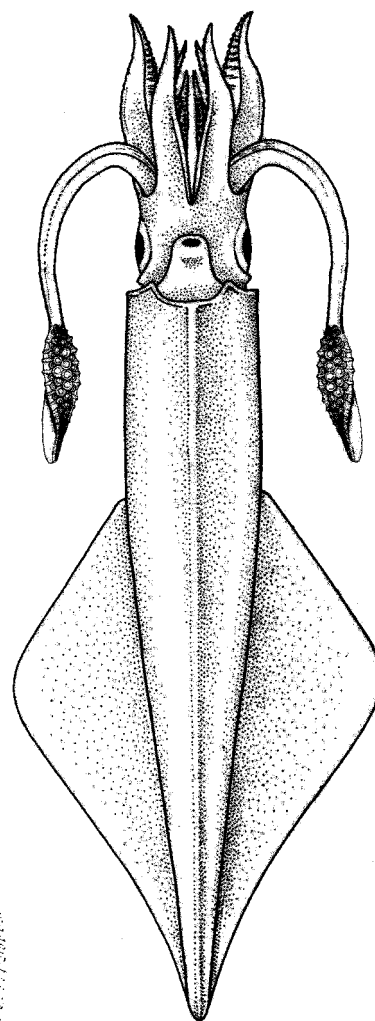
Diagnostic Features : Mantle moderately stout to elongate, slender in mature males, which have a ridge along ventral midline. Fins rhombic, attaining 70% of mantle length in adults, their posterior margin slightly concave. Tentacular clubs expanded, lanceolate; about 16 medial manal suckers 1½ times larger than the marginals (= to largest arm suckers), with 30 to 40 sharp conical teeth, 20 to 30 small ones interspersed between 10 larger ones. Arm sucker rings with 8 to 11 distinct, squared, truncate teeth in distal 2/3, smooth or with rudimentary denticles proximally; slightly more than 1/2 of left arm IV hectocotylyzed by enlargement of about 50 pairs of sucker stalks into swollen papillae, each with a minute rudimentary sucker on the tip; papillae slightly larger in ventral row; a fusi-form photophore on each side of rectum.



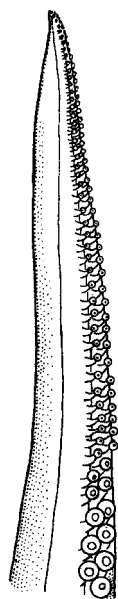
arm III
sucker ring



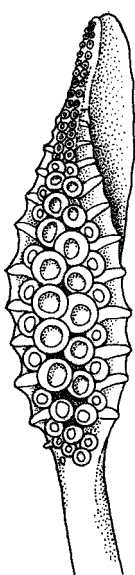
tentacular club
sucker ring



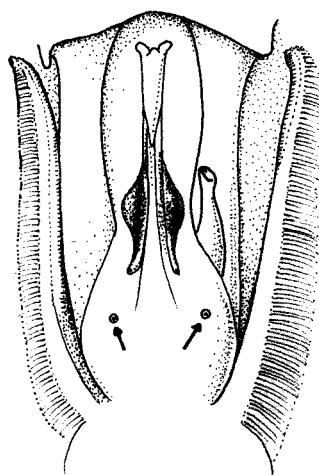
ventral view



left arm IV of male
hectocotylyzed



tentacular
club



photophores on
ink sac

Geographical Distribution : Western Pacific: Northern Australia, Philippine Islands, northern South China Sea to central Japan.

Habitat and Biology : A neritic species occurring in 30 to 170 m depth. It overwinters in deeper waters, migrating inshore in spring and summer forming large aggregations and spawning places on sandy bottoms in 30 to 40 m depth.

Size : Maximum mantle length 30 cm and weight 0.5 kg in Hong Kong; in other areas up to 40 cm; common size in commercial catches between 15 and 25 cm.

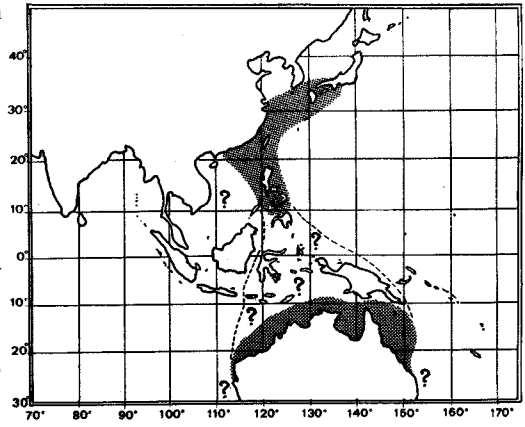
Interest to Fisheries : In Hong Kong, swordtip squid is the major commercial squid taken by pair trawlers from July to September. Annual landings of this species increased over the last years, amounting to 6 100 metric tons in 1979. The species also supports local fisheries in western Japan, the Philippines, and probably in Alas Straits, Indonesia. It is also reported to be taken by Chinese trawlers from Taiwan (Province of China) in Australian waters. Other gears include jigs and set nets.

The flesh of this species is of good quality and brings high prices. It is processed into a dried product (Gotosurume) and also used for sashimi (raw).

Local Names : CHINA: Tor yau yue; JAPAN: Gotouika, Kensakiika, Mawashikko (juveniles), Mehikariika.

Literature : Tomiyama & Hibiya (1978); Okutani (1980); Dunning (1982).

Remarks : Specimens of 10 to 20 cm mantle length taken in set nets South of the Aomori Prefecture in Japan, have been classified as Mehikariika (believed to be a different species) on account of the difference in both mantle and fin length. Recent studies, however, have proved that both these forms belong to the same species and that the differences are attributable to growth stages (Tomiyama & Hibiya, 1978).



Loligo edulis budo Wakiya & Ishikawa, 1921

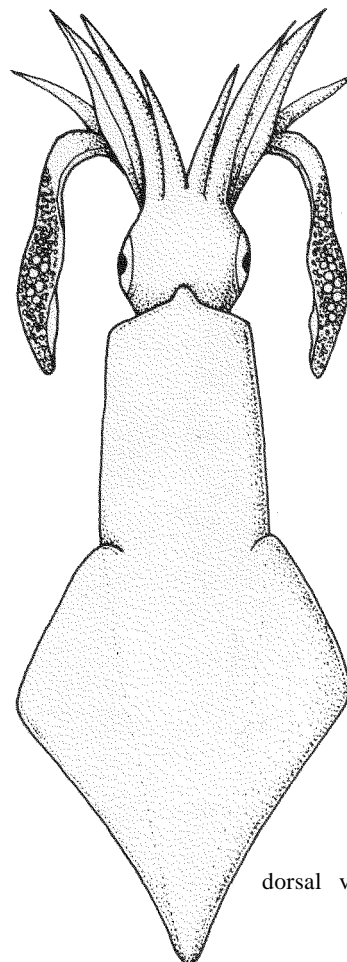
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Loligo budo Wakiya & Ishikawa, 1921, Zool.Mag.Tokyo, 33:285.

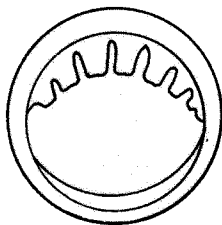
Synonymy : Loligo edulis grandipes Sasaki, 1929.

FAO Names :
En - Budo squid
Fr - Calmar budo
SP - Calamar budo

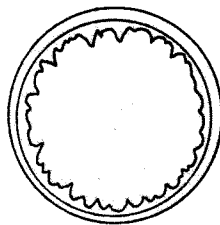
Diagnostic Features : Mantle moderately stout with a reduced ventral ridge. Fins about 60 to 65% of mantle length; rhomboidal. Head, arms and especially tentacles very much enlarged. Medial manal suckers of tentacular clubs very large, 2 times the diameter of largest suckers on arm III. Arm sucker rings with 7 to 8 large, truncate teeth graded to a smooth plate proximally.



dorsal view



arm III sucker ring



tentacular club sucker ring