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Taxonomic Study of the Cephalopods, particularly the Teuthoidea (Squids) and Sepoidea (Cuttlefish) in the Waters around Sri Lanka

By

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Introduction

THERE has been very little organized effort directed specifically for the exploitation of the Cephalopods on a commercial scale, and the incidental catches made by various fishing methods such as scoop-nets, Beach-seine and trawler nets have contributed to the production of this variety. Very recently, there has been a sudden increase in the interest for the exploitation of this group in view of the demand abroad and available export market. This has resulted in an urgent need for information on the distribution of commercial varieties of Cephalopods, and the development of efficient methods for exploiting them.

In view of the fact that there is hardly any published information available about the Cephalopods in the waters around Sri Lanka, it has become necessary to undertake a preliminary taxonomic study of this group, before venturing into the more detail investigations of the resources of this group. In the course of this preliminary studies, the author was successful in identifying 8 species of Cephalopods falling into the orders Teuthoidea and Sepoidea. However this does not mean that this is a complete list.

A KEY TO SPECIES OF SEPOIDEA AND TEUTHOIDEA IN CEYLON SEAS

1. Shell internal and chalky.
 Fins marginal Order—Sepoidea 3
 Shell internal, usually thin but well developed gladius
 Order—Teuthoidea 2
2. Fins marginal *Sepioteuthis lessoniana*. Lesson
 Fins terminal or nearly so, often rhombic or triangular
 Family—Loliginidae 4
3. Body broad, shell moderately wide, end of body not projecting beyond fins.
 Suckers of tentacular club in about 10 rows, all small with no enlarged median
 suckers.

- Presence of suckers on the points of the buccal membrane and a small tentacular club *Sepia aculeata*.
Ferussac and d'Orbigny.
- Absence of suckers on the points of the buccal membrane and a small tentacular club *Sepia esculenta*. Hoyle.
- Suckers of tentacular club in about 4 or 5 rows, some suckers of inner rows much larger than marginals *Sepia pharaonis*. Ehrenberg.
4. Mantle is long and slender with parallel sides but ending in a blunt point.
Eyes covered by a continuous skin of head, only a minute pore anteriorly 5
Eyes open, perforate, eyeball not covered by skin of head 7
5. Gladius narrow, with straight edges, borders, thickened and darkened.
Left ventral arm of male hectocotylized ; large club suckers with 20 to 22 sharp curved teeth ; two to eight suckers on lobe of buccal membrane
. *Doryteuthis singhalensis*. Ortmann.
Gladius broad, with rounded borders, not thickened near edge 6
6. More than half the length of left ventral arm hectocotylized in males ; suckers of median rows of club not more than twice the diameter of marginal suckers
. *Loligo duvauceli*. d'Orbigny.
Less than half the length of left ventral arm hectocotylized in males ; suckers of median rows of club about twice the diameter of marginal suckers
. *Loligo* Sp. A.
7. Mantle articulates with head in neck region and on each side of funnel by means of grooves and ridges 8
Mantle is permanently fused with head and funnel 9
8. Mantle funnel locking apparatus well developed forming a distinct \perp ; hooks absent on arms ; fins united posteriorly, animals muscular, active
. *Nototodarus sloani philippinensis* Voss.
9. Mantle—funnel locking apparatus is ear shaped, animals, soft, choroidal ; bathypelagic.
Tentacular club with four rows of suckers on hand part
. *Chiroteuthis imperator*. Chun.

SPECIES IDENTIFIED

Family Sepiidae

- (a) *Sepia aculeata* Ferussac and d'Orbigny, 1835–1848. (Fig. 1)

Synonyms :

Acanthosepion aculeatum Rochebrune, 1884, P. 101 ;

Acanthosepion hasselti, Rochebrune, 1884, P. 101 ;

Sepia blainvillei, Ferussac and d'Orbigny, 1848 nec Deshayes, 1835 ; *Sepia indica* Ferussac and d'Orbigny, 1848, P. 281, Pl. 21 ;

canthosepion indicum Rochebrune, 1884, P. 112 ;

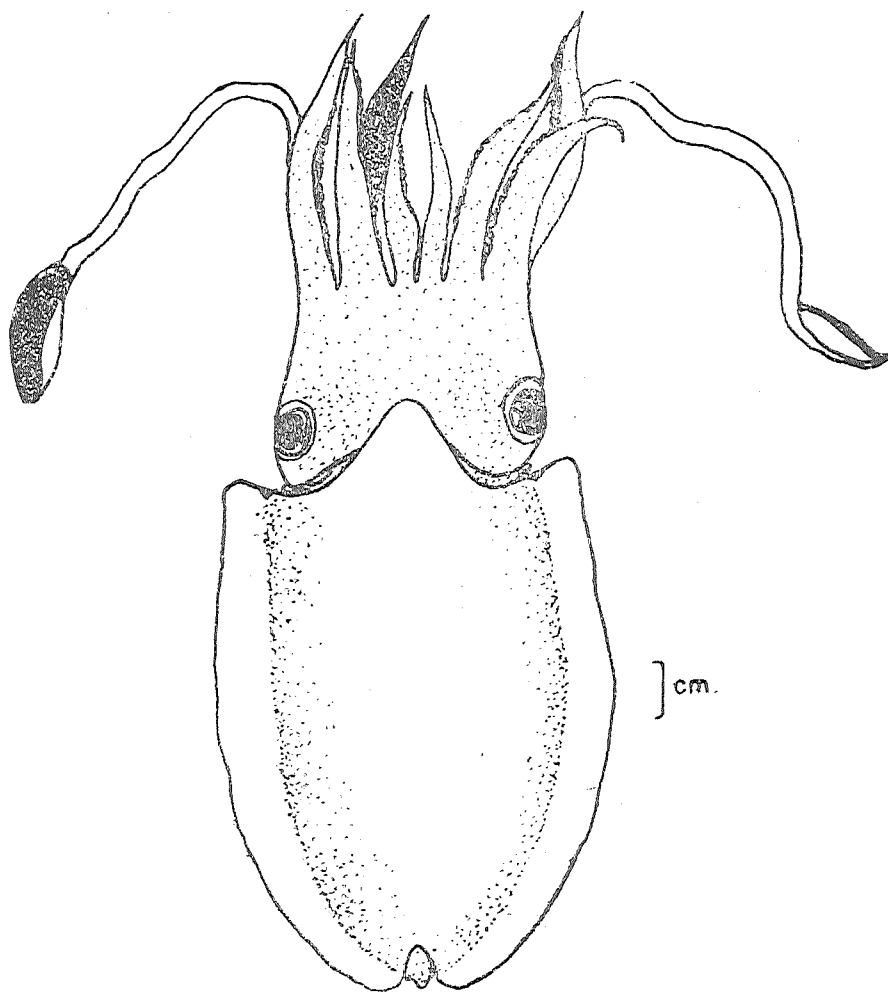


Fig. 1.—*Sepia aculeata* Orbigny.

Acanthosepion javanicum, 1884, P. 100 ; *Sepia microcotyledon*, Ortmann, 1891, P. 673, Pl. 46, (Fig. 11) ; and *Sepia esculenta* var ? Robbison, 1932, P. 29.

Material

Three Specimens, mantle length 78.0-102.0 mm. from the West Coast of Ceylon and caught by Beach-seine.

Distinctive Characters

Color—white with dark purple pigment on the dorsal surface. The mantle is oval, dorsoventrally flattened, with a blunt posterior end.

Dorsally the anterior margin is produced as a triangular lobe. The head is large, with large eyes and conspicuous lower lids. The buccal membrane is seven pointed and free of suckers. The fins are marginal and long and narrow. The funnel is long, stout and project slightly beyond the bases of the ventral arm. The mantle locking apparatus is stout. The arms are in the order 4.3.2.1., with broad bases and narrow tips. The suckers are quadraserial with low protective membrane on each side. The tentacles are long slender and bear small clubs. The suckers of the tentacular club are arranged in 10 rows

The chalky shell is broad, elliptical, with both ends slightly pointed. Dorsally the shell is convex posteriorly but nearly flat anteriorly with a low median ridge and shallow parallel grooves. Ventrally, the shell is convex in the anterior half and strongly concave in the posterior half. This species is closely related to *Sepia esculenta*. However the presence of suckers on the points of the buccal membrane in the observed samples, made me to classify them as *Sepia aculeata*.

Distribution

Indo-Pacific Gilbert—L. Voss (1963) record this species from Japan, Philippines, off Hong Kong, Australia. Adam and Rees (1966) record this species from the following areas in the Indian Ocean. Bombay, Cochin, Karwar, Mannar, Ennur, Madras, Dighe, Hambantota (Ceylon), Singapore, Penang. Outside the Indian Ocean they record it from Batavian, Sarawak and Sasaki (1929) reports it from as far north as Formosa.

(b) *Sepia pharaonis* Ehrenberg, 1831 (Fig. 2)

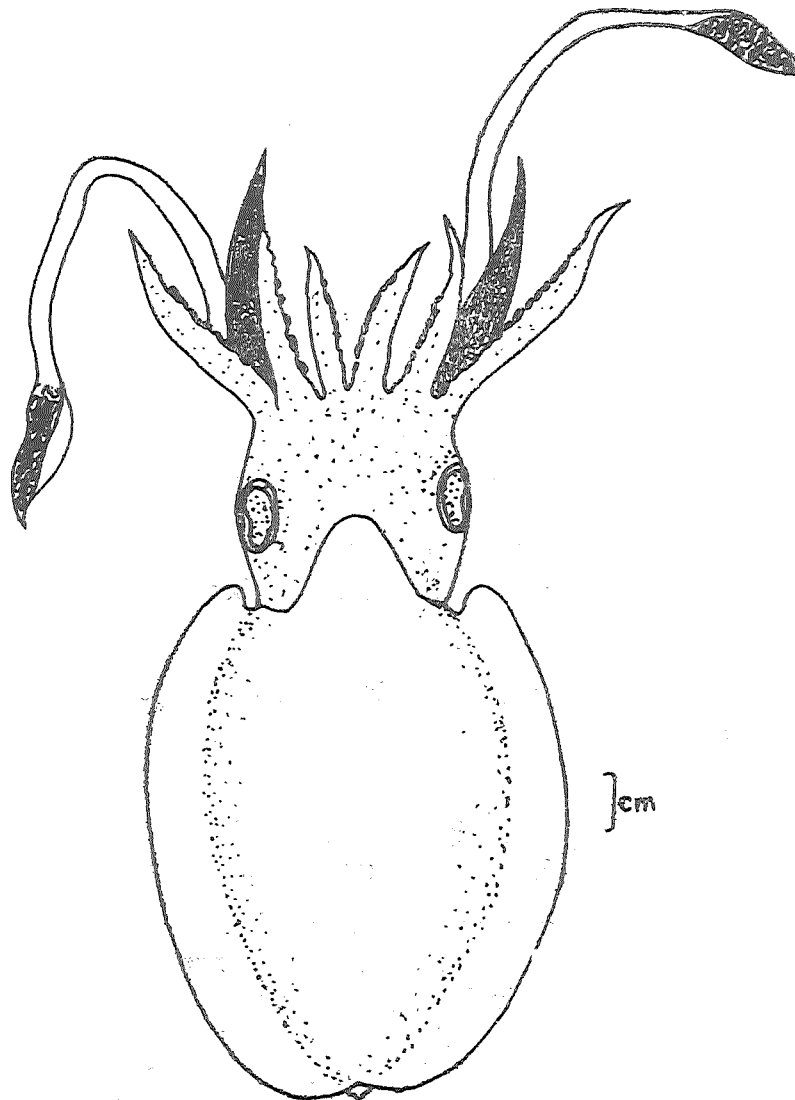


Fig. 2.—*Sepia pharaonis* Ehrenberg.

Synonyms :

Sepia rouxii Furussac and d'Orbigny, 1841, P. 271, Pl. 19 ; *Acanthosepion rouxii* Rochebrune, 184, P. 108 ; *Sepia torosa* Ortmann, 1888, P. 652, Pl. 23, Fig. 2 ; *Sepia framea* Ortmann, 1891, P. 675, Pl. 41, fig. 2 ; *Sepia singhalensis* Goodrich, 1896, P. 3, Pl. 1, figs. 4-8 ; *Ascarosepions singhalensis* Var. *foxi* Robson, 1927, P. 325 ; *Sepia koettlitzii* Hoyle and Standen, 1901, P. 1, Pl. 1 ; *Sepia formosana* Berry, 1912, P. 420, fig. 2, Pl. 9, fig. 7 ; *Crumenasepia hulliana* Iredale, 1926, P. 239, Pl. 35, figs. 1 and 2 ; *Sepia hulliana* Adam, 1939 C, P. 65 ; *Sepia tigris*, Sasaki, 1929, P. 168, Fig. 167, Pl. 28, figs. 13-16 ; *Crumenasepia ursulae* Cotton, 1929, P. 90, Pl. 15, figs. 3 and 4 ; *Sepia ursulae* Adam, 1939 C, P. 66 ; *Sepia (Crumenasepia) ursulae* Cotton and Godfrey, 1940, P. 434, fig. 421 ; *Sepia venusta* Pfeffer, 1884, P. 12, figs. 15 and 15a, (nec Munster, 1847) ;? *Sepia venustoides* Hoyle, 1909, P. 266 (=S. *Venusta* Pfeffer) ; *Sepia sinope* Voss, 1962 (nec Gray, 1849), P. 3.

Material

2 Specimens Mantle length 86.0-104.0 mm from the North-West coast of Ceylon especially in the Mannar District.

Distinctive Characters

The mantle is short, and oval in outline. It is pointed posteriorly and strongly flattened dorsoventrally. Dorsally the mantle anterior margin is produced as a long triangular projection. At the anterior end of the fins there are well marked anterior lobes. These fins border the mantle length on either side and posteriorly, they are separated by the end of the body. The head is large and flattened dorsoventrally. It bears large eyes conspicuous lower lids. The buccal membrane is seven pointed, each lappet bearing one or two small suckers. The funnel is large and stout with a locking apparatus. The arms are in the order 4.3.2.1., all are with stout bases, and are keeled for their entire length. The arm suckers are arranged in four rows and have horny rings.

The tentacles are long with stout stalks which bear expanded clubs. The suckers are arranged in about six to eight rows. However, this species is easily differentiated from *S. aculeata*, by having the suckers of the two middle rows greatly enlarged. The chalky shell is elliptical, with pointed anterior and bluntly pointed posterior end.

Distribution

Indian Ocean (Red sea ; Suez canal at Kabret and Port Tanfiq ; Muscat and Yedda Arabia ; Mukalla, S. Arabia ; Mersa Fijab ; Gulf of Aden, Berbera, British Somalilana ; Colombo, off point de galle, Hambantota, Gulf of Mannar, Trincomalee, Ceylon ; Bombay, Rameswaram, Madras, Ennur and Puri, Indian ; Cottselow, Rottnest Island, Perth, Western Australia). Pacific Ocean (Howick Island, Nothirk Queensland, Australia, Hong Kong, Takas, Formosa, Taihoku Market, Formosa, Tokyo, Bay Japan).

Family Loliginidae

The loliginids form an important part of the commercial squids in Sri Lanka.

(a) *Loligo duvauceli* d'Orbigny, 1835 (Fig. 3).

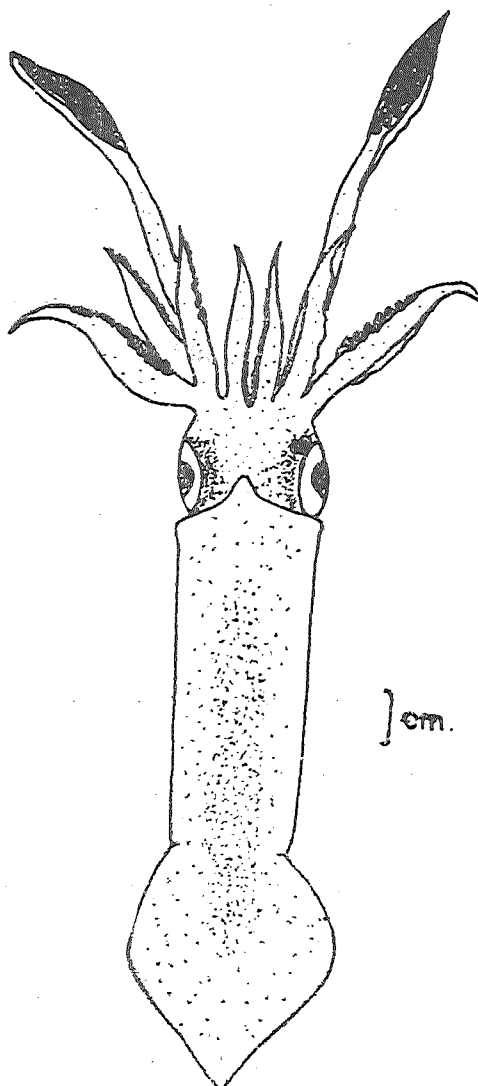


Fig. 3.—*Loligo duvauceli* Orbigny.

Synonyms :

Loligo indica Pfeffer, 1884 ; *Loligo galathea* Hoyle, 1885 ; *Loligo oshimai* Sasaki, 1929

Material

4 specimens, Mantle length 63.0–92.0 mm from Trincomalee and Batticaloa.

Distinctive Characters

Color—In 5% formalin is pinkish brown with numerous small purplish-red chromatophores on mantle, head and arms.

The mantle is long slender and tubular with parallel sides, tapering at its posterior end to a blunt point. Dorsally the anterior margin is produced in the midline into a small rounded lobe. The head is large dorsoventrally flattened and bears large eyes. The fins are small

and they occupy about half the mantle length. They are rhombic with small free lobes anteriorly. The funnel is short and reaches the level of the pupil of the eyes. The arms are long in the order 3.2.4.1. The suckers in the arms are arranged biserially, and are bordered on each side by a trabeculate protective membrane. In the male the left ventral arm is hectocotyized. The tentacles are long and stout. The suckers of the tentacular club are quadriserially arranged with the larger ones towards the centre. Gladius is broad, with rounded border and not thickened near edge.

Distribution

Indian Ocean (Natal coast, South Africa, Coast of India, Burma, Andaman Islands, Malaya)
Pacific Ocean : (Indonesian waters ; Phillipines to Formosa)

(b) *Sepioteuthis lessoniana* Lesson, 1830 (Fig. 4)

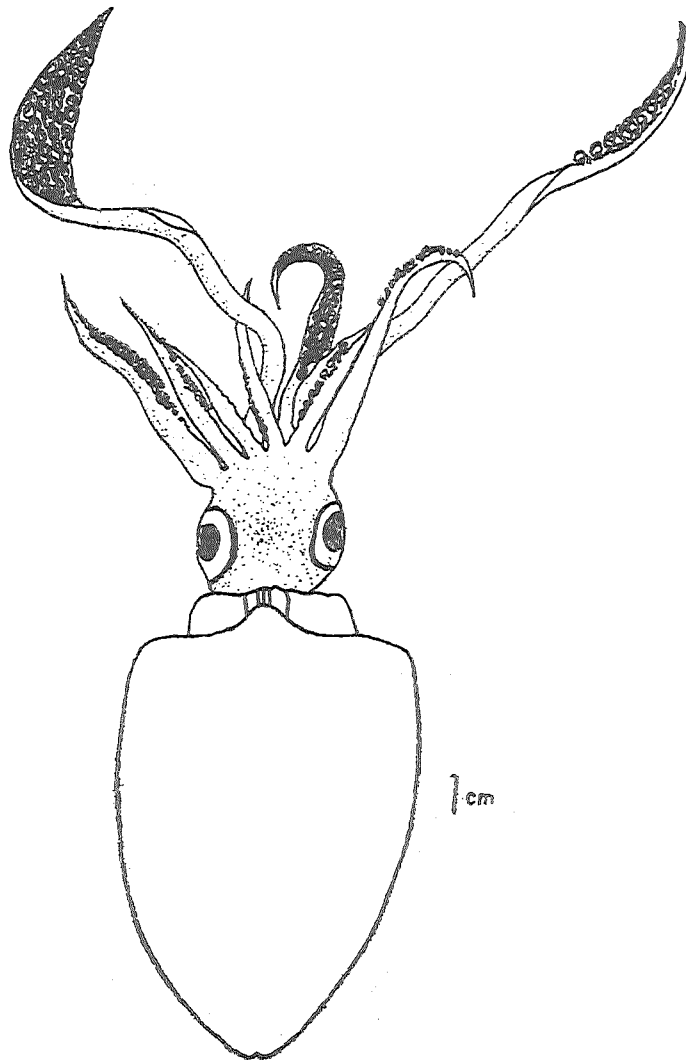


Fig. 4.—*Sepioteuthis lessoniana* Lesson.

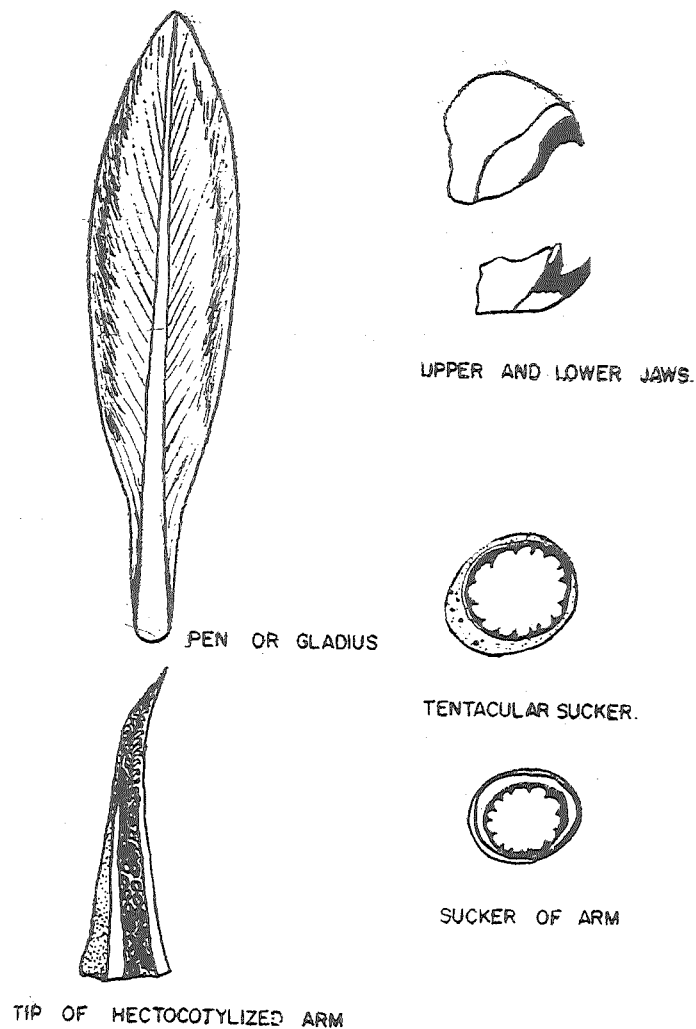


Fig. 5.—Some distinguishing characteristics of *S. lessoniana*.

Synonyms :

Sepioteuthis hemprichii Ehrenberg, 1831, (Type locality, Tor, Red Sea) ; *Sepioteuthis guinensis* Quoy and Gaimard, 1832 ; *Sepioteuthis lunulata* Quoy and Gaimard, 1832, P. 74, Pl. 3 figs. 8–13. *Sepioteuthis mauritiana* Quoy and Gaimard, 1832, P. 76, Pl. 4, figs. 2–6 ; *Sepioteuthis sinensis* Ferrussac and d'Orbigny, 1835–1848, P. 304 ; *Sepioteuthis doreiensis* Ferrussac and d'Orbigny, 1835–1848, Pl. 3, fig. 2 ; *Sepioteuthis arctipinnis* Gould, 1852, P. 137, Pl. 26, fig. 1 ; *Sepioteuthis brevis* Owen 1881, P. 137, Pl. 26, fig. 1, *Sepioteuthis neoguinaica* Pfeffer, 184, P. 4, *Sepioteuthis indica* Goodrich, 1896, P. 5, Pl. 1, figs. 9–19, *Sepioteuthis sieboldi* Joubin 1898, P. 27, *Sepioteuthis malayana* Wülker, 1913, P. 478, figs. 7a–f, *Sepioteuthis krempfi* Robson, 1928, P. 28, figs. 3–4, *Sepioteuthis* sp. Rees and Stuckey, 1952, P. 18, Pl. 29, figs. 3–4.

Material

5 specimens, Mantle length 112.0–230.0 mm from Mannar District (Ceylon), caught mainly by the scoop-net and Beach-siene (Ma-dels). This species is the most common of all the cephalopods found in Ceylon waters. This is usually found in North and West coasts.

Distinctive Characters

Color-Variable, chromatophores are large and very numerous dorsally in the mantle, fin, head and arm, but absent ventrally.

The mantle is long and tubular, but bluntly rounded posteriorly. The head is broad and stout, wider than the mantle, with prominent eyes. There is a small olfactory crest below and ventral to the eyes. The fins are marginal and extends about 1–2 mm from the lateral margin of the mantle. The arm are in the order 3.4.2.1., and all the arms are somewhat flattened and keeled for at least part of their length.

The sessile suckers are bordered on either side on all arms by protective membranes with stout supports, the membrane being largest and deepest on III where the dorsal membrane is much wider than the ventral one.

In the male the left ventral arm is hectocotylized, by a modification of the distal third of the arm. The tentacles are long and stout, with slightly expanded clubs and well developed protective membranes. The tentacular suckers are in four rows. The suckers of the dorsal and ventral marginal rows are two-third the size of the median suckers.

Distribution

One of the most widely distributed loliginids in the Indo Pacific. Gilbert L. Voss has reported this species from the Japanese Islands to Australia and New Zealand and from Hawaii to the eastern Indian Ocean.

c) *Doryteuthis singhalensis* Ortmann, 1891 (Fig. 5).**Synonyms :**

Loligo singhalensis Var *beryllae* Robson, 1928, P. 15, figs. 4–10.

Material

12 Specimens, Mantle length 84.0–136.0 mm, from the East coast of Ceylon.

Distinctive Characters

The mantle is long and slender, and tapers posteriorly to a slender point. The anterior margin is produced dorsally into a distinct lobe. The head is small and compact with large eyes. The ventral surface is deeply excavated for the funnel. The funnel is stout strong, and reaches about to the mid point between the eyes. The fins are large occupying

more than half the length of the mantle. The arms are short, in the order 3.4.2.1. The sessile suckers are arranged biserially. The suckers are somewhat barrel-shaped, the pedicels inserted obliquely.

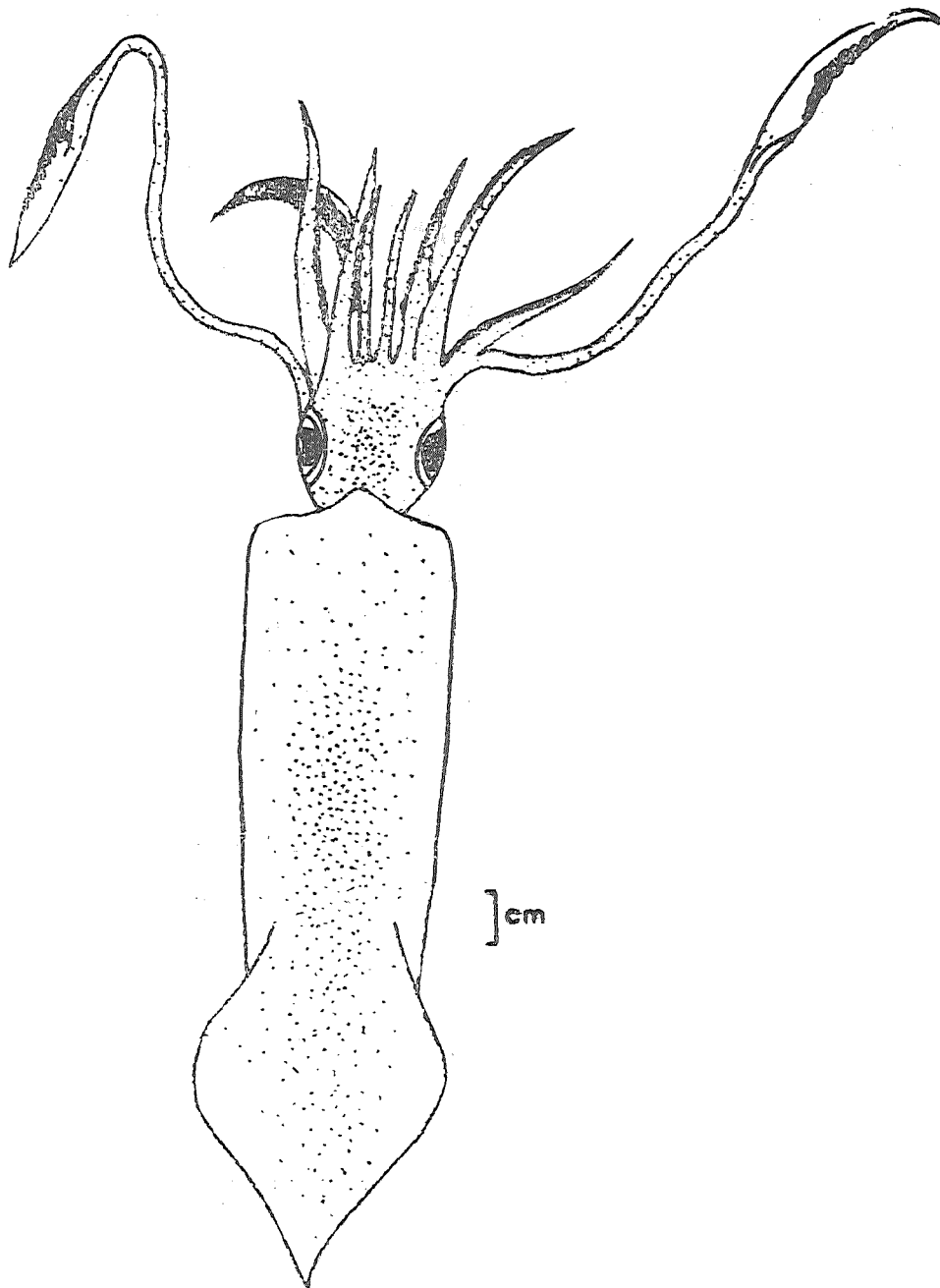


Fig. 6.—*Doryteuthis singhalensis* Ortmann

The left ventral arm is hectocotylized by the modification of the distal half of the sucker bearing portion of the arm. The tentacles are long and slender with a short club. The tentacular suckers are quadraserially arranged. The buccal membrane is seven pointed, smooth, and bears two to eight suckers on the tip of each lappet. The gladius is narrow with almost straight margin, the lateral portion of the vane thickened and darkly colored.

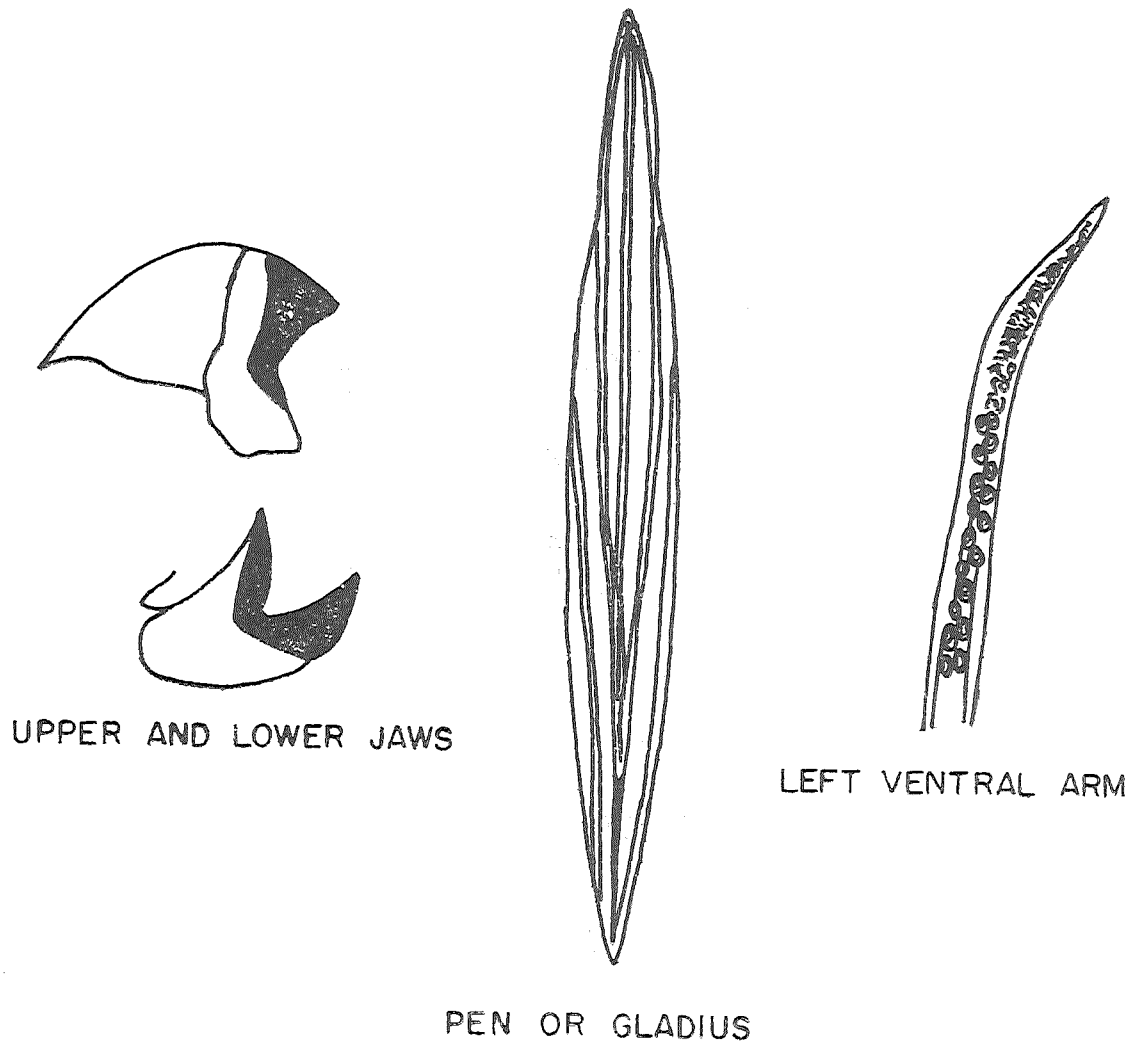


Fig 7. —Some distinguishing characteristics of *D. Singhalensis*

Distribution

Indian Ocean (Ceylon, Sand heads, River Hooghly, Bengal, Bay of Bengal) Western Pacific (Siboga stn 142, and Amboine, Indonesia, Balamban, Negro, Bantangas, Cebu, Onoi, Mindano, Philippines).

(d) *Loligo* species A (Fig. 6).

Material

6 Specimens, Mantle length 78.0–98.0 mm from Mannar District (Ceylon).

Distinctive Characters

The mantle is long and slender, tapering into a blunt point posteriorly. Anteriorly the margin is produced into a narrow rounded lobe. The head is small and compact with large eyes. It is slightly flattened and excavated ventrally for the funnel. The fins are rhombic in outline both the anterior and posterior margins are nearly straight. The arms

are moderately long, in the order 3.4.2.1. All the arms are distinctly keeled for their entire length and are strongly compressed, especially I and III. The arm suckers are biserially arranged and are bordered on each side by a trabaculate protective membrane. In male

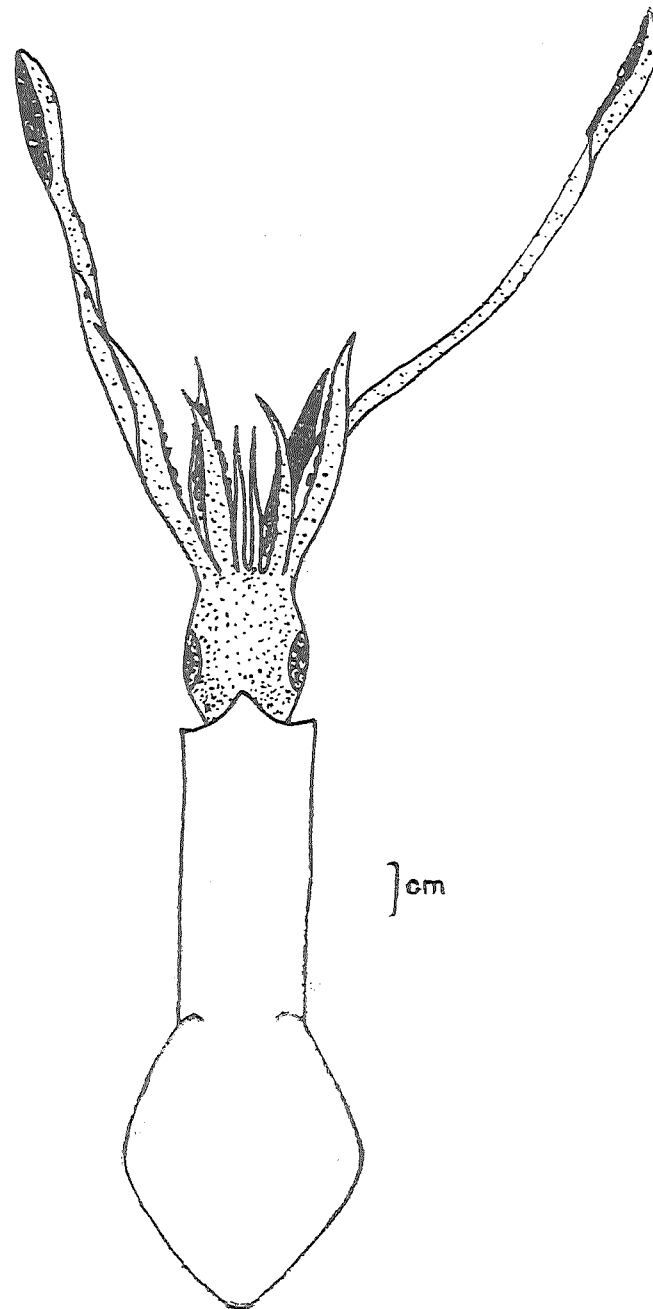


Fig. 8.—*Loligo sp.*

the left ventral arm is hectocotylized. The tentacles are compressed with a keel extending to the tip of the club. The tentacular suckers are quadriserial: On the hand the suckers of the inner rows are about twice as large as those of the marginal rows. The buccal membrane is seven pointed with seven stout supports. Each lappet bears two or four small rounded suckers at the tip.

Distribution

Pinas Island ; Palawan Island ; Samar ; Manila

Family Ommastrephidae

Nototodarus sloani philippinensis Voss, 1962 (Fig. 7)

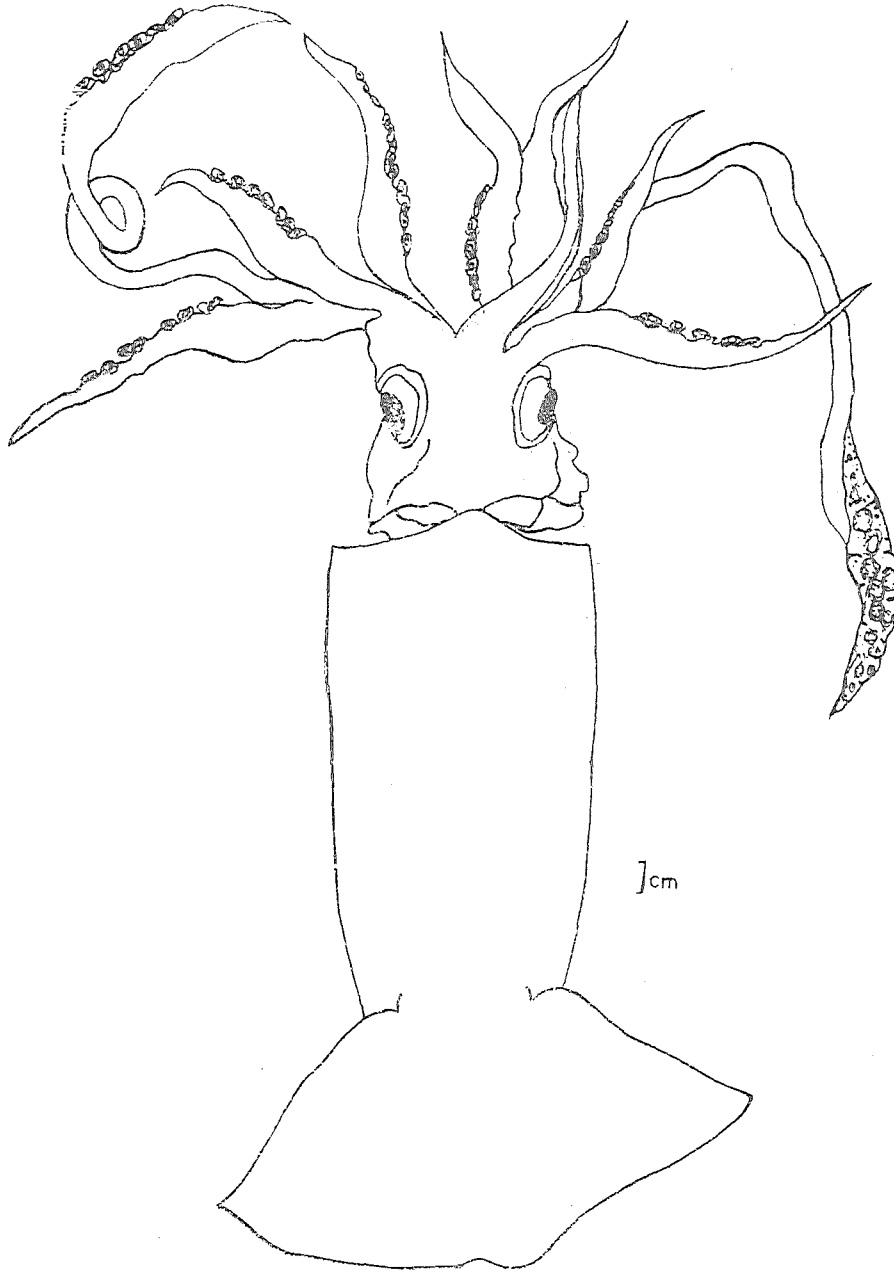


Fig. 9.—*Nototodarus sloani philippinensis* Voss.

Material

4 Specimens, Mantle length 155.0–290.0 mm. from the deep sea, west of Ceylon, collected from the Japanese Research vessel 'Hoyo-Maru'. These Oceanic squids were caught by the hand-line method using jigs.

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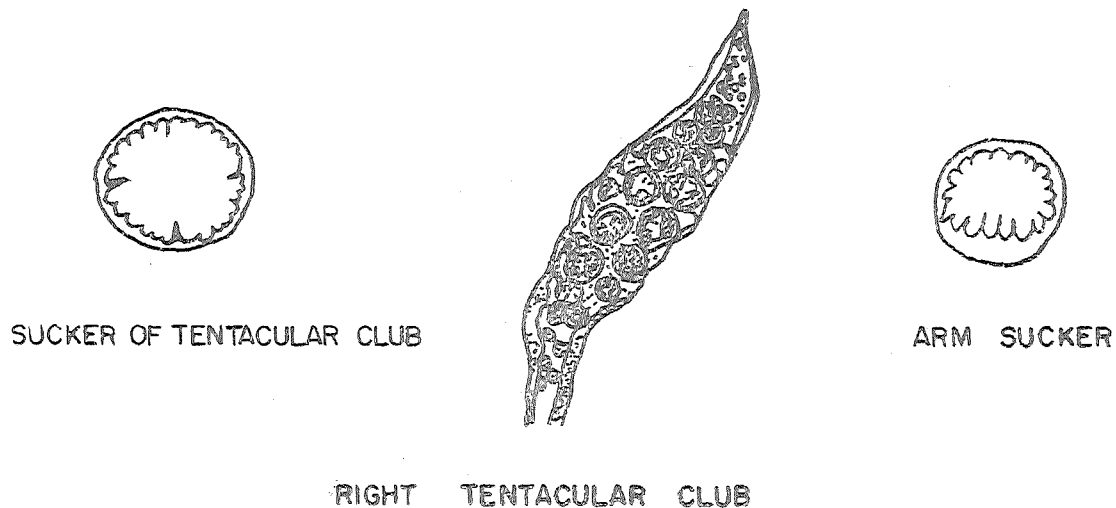


Fig. 10.—Some distinguishing characteristics of *N. Sloani philippinensis*

Distinctive Characters

The mantle is cylindrical and tapers at the level of the fins of a narrow posterior point. Unlike in other forms the mantle is heavy, thick and muscular. The fins are small, wider than long, convex on the anterior margin and concave on the posterior margin. The funnel is stout compact and deeply set into the funnel groove. The head is stout, as broad as the mantle and deeply excavated ventrally for the funnel. There are three olfactory crests, one dorsal, one lateral, and one ventral. The eyelid is large and bears a deep distinct sinus on the amero-ventral border. The arms are of medium length, unequal in the order 2.3.1.4. The suckers of the arms are arranged biserially. The tentacles are short and stout, with an enlarged and broadened clubs. The club is surrounded by a broad protective membrane with supports. The sucker-bearing portion of the tentacle is about three-fourth of the total length. The suckers of the hand portion are in four rows, the suckers of the median rows being three or four times the size of the small marginal ones.

Distribution

Luzon, Jolo Island, Philippines.

Family Chiroteuthidae

Chiroteuthis (Chirothauma) imperator Chun, 1910 (Fig. 8).

Material

2 specimens, Mantle length 200.0–270.0 mm, from Trincomalee.

Distinctive Characters

The mantle is thick, chroidal, and soft. It is cylindrical for slightly less than half its length. The head is long and narrow with large deeply set eyes. The eyelids are oval. The fins are thick, fleshy and rounded. There is no funnel excavation, and the neck is long and slender. The funnel is small and inconspicuous. The arms are of very unequal length in the order 4.3.2.1. and are some what squarish in cross section. All the arms except IV have protective membranes with supports both dorsally and ventrally. The arm suckers are biserial and subglobular. The tentacles are very long and the stalks, are rounded in

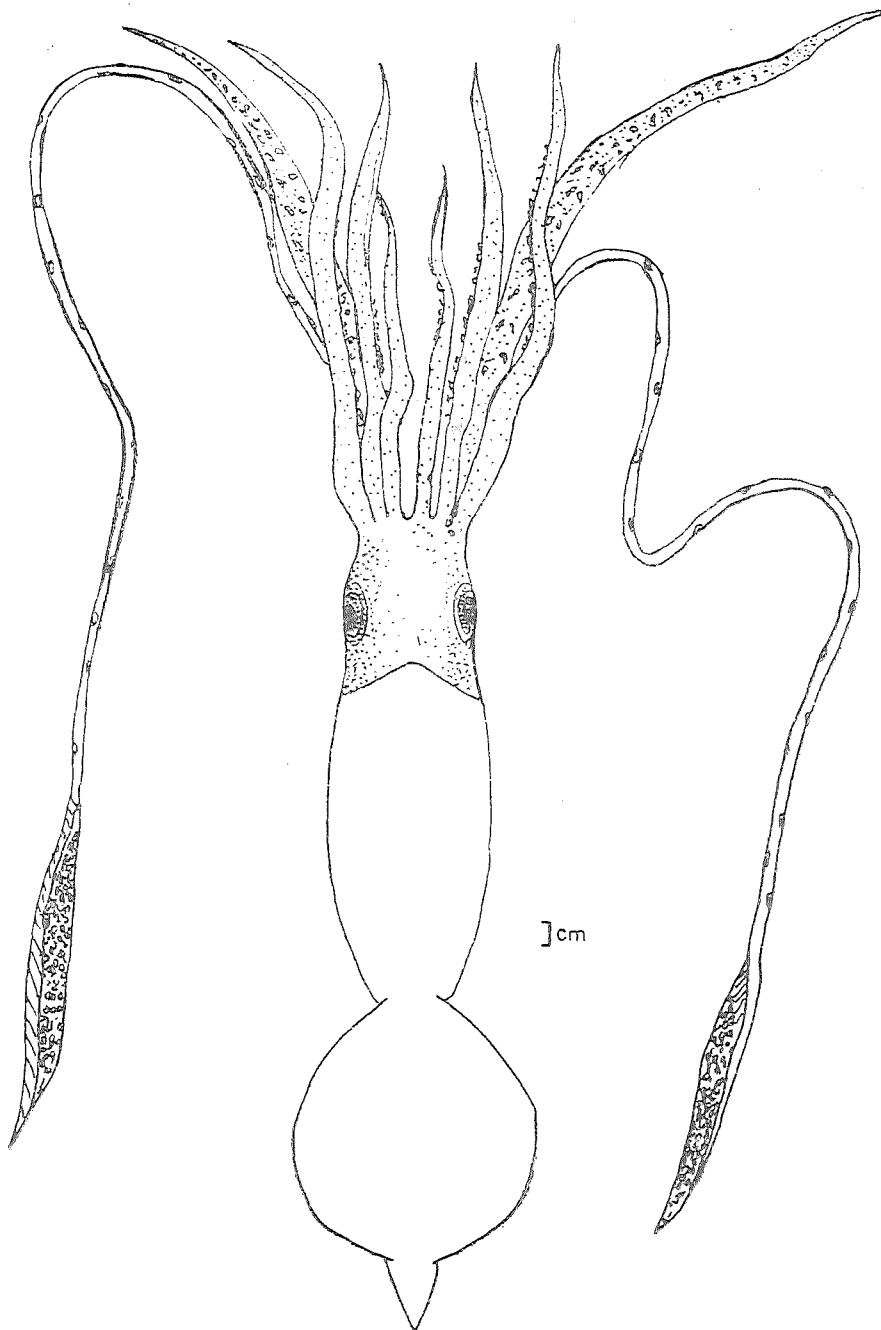


Fig. 11.—*Chiroteuthis (Chirothauma) imperator* Chun.

cross section. The club is bordered for its entire length on either side by a broad protective membrane, with numerous supports. The tentacular suckers are arranged in four rows. They are cone shaped and supported by long penduncle. There are about 36 photophores on the aboral surface of the tentacular stalk. (According to Gilbert L. Voss only 26). The buccal membrane has seven lappets and seven connectives.

Distribution

Indian Ocean (Bay of Bengal, Gulf of Oman, and Arabian Sea.)

Pacific Ocean (Japan, Philippines and Ambione).

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