

***Sepia papuensis* Hoyle, 1885**

Fig. 168; Plate V, 31

Sepia papuensis Hoyle, 1885, *Annals and Magazine of Natural History*, series 5, 16: 197 [type locality: Challenger Station 188, 09°59'S 139°42'E, Arafura Sea, South of Papua].

Frequent Synonyms: ?*Sepia galei* Meyer, 1909; *Solitosepia submestus* Iredale, 1926; *Solitosepia occidua* Cotton, 1929; *Solitosepia genista* Iredale, 1954; *Solitosepia lana* Iredale, 1954; *S. prionota* Voss, 1962a.

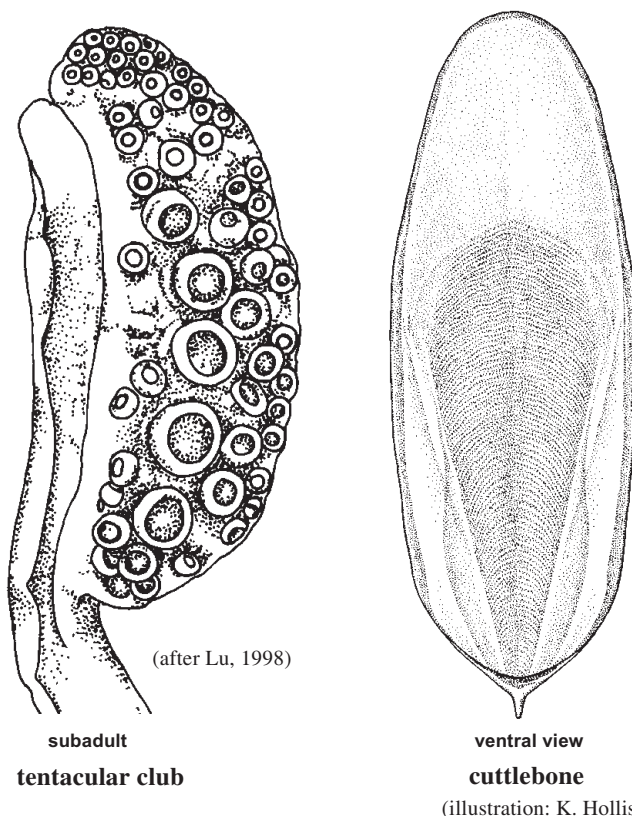
Misidentifications: None.

FAO Names: **En** – Papuan cuttlefish; **Fr** – Seiche de Papouasie; **Sp** – Sepia de Papua.

Diagnostic Features: Mantle oval. Male and female arm lengths subequal; protective membranes wide, well developed as a series of semicircular lappets. Arm sucker arrangement differs between sexes: in males, sucker rows on arms I to III **tetraserial proximally, biserial at distal tips, arms IV suckers tetraserial**; in females, arm **suckers tetraserial**. **Hectocotylus absent**. Club sucker-bearing surface flattened, with **5 or 6 suckers in transverse rows; suckers differ markedly in size**. Swimming keel of club extends well proximal to carpus; dorsal and ventral protective membranes not joined in small specimens, joined at base of club in large specimens; dorsal protective membrane **much longer than ventral protective membrane**, extending proximal to carpus along stalk. Dorsal membrane forms deep cleft at junction with stalk. Cuttlebone length approximately equal to mantle length; outline oblong; bone bluntly rounded anteriorly and posteriorly; dorsal surface creamy white; dorsal surface convex medially, flat laterally; texture smooth, not pustulose; dorsal median and lateral ribs distinct; **median rib broadens anteriorly**. Chitin borders lateral and anterior margins of cuttlebone. Spine long, pointed, curves dorsally, with **ventral keel**. Striated zone and last loculus concave; sulcus shallow, wide, extends entire length of cuttlebone. Anterior striae are **inverted U-shape**. Inner cone limbs are narrow anteriorly, broaden posteriorly, **thin**; outer cone calcified; narrow anteriorly, broadens posteriorly. Dorsal mantle with series of elongate papillae along each side, adjacent to base of each fin, rest of mantle covered with numerous small papillae. Papillae in 2 series: i) a conspicuous series that consists of a pair of large, triangular, flattened primary papillae that emerge from mantle white spots; ii) just posterior and lateral to mantle white spots lies a pair of papillate ridges located along the boundary between a white midline stripe and darker lateral fields. Head with 2 pairs large papillae located over anterior and posterior ends of each eye, numerous scattered, small papillae and one on each eyelid. Arms I to III with papillae. **Colour:** Light brown. Dorsal mantle has white blotches or spots. Paired dorsal eye spots present.

Size: Up to 110 mm mantle length.

Geographical Distribution: Indo-West Pacific: Philippine Islands, Indonesia, Bali, Ternate, Arafura and Coral Seas, northern Australia from southern Western Australia (Freemantle, 32°03'S 115°44'E) to southern NSW (36°35'S 150°16'E), including Gulf of Carpentaria (Fig. 169).



(after Lu, 1998)

(illustration: K. Hollis)

Fig. 168 *Sepia papuensis*

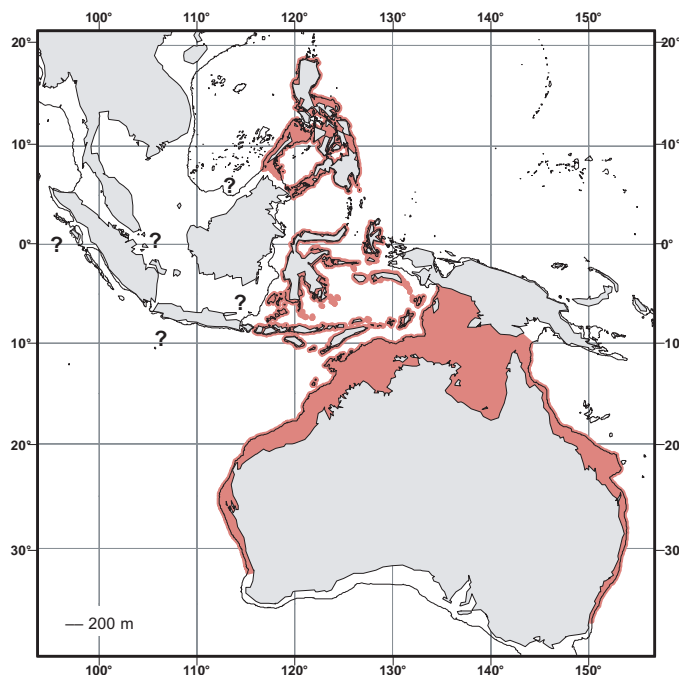


Fig. 169 *Sepia papuensis*
■ Known distribution

Habitat and Biology: Depth range from 10 to 155 m. *Sepia papuensis* is a shelf species found on silt, sand or muddy substrates. This species appears to be night-active and has been observed foraging in beds of seaweed and seagrass. Small individuals have been observed to extend flattened arms to mimic the shape of the seaweed *Halimeda* as camouflage. Behavioural studies have shown that the species exhibits a very wide range of colour patterns associated with substrate colour and texture, and in response to potential attack by predators.

Interest to Fisheries: Species taken as bycatch of prawn and mixed species trawl fisheries. This species was collected in small numbers in demersal trawl and dredge surveys in the Gulf of Carpentaria, Australia, in 1990 and 1991 and probably forms part of the bycatch of Taiwanese trawl fisheries in the region.

Literature: Adam and Rees (1966), Roper and Hochberg (1987), Lu (1998a).

***Sepia pharaonis* Ehrenberg, 1831**

Fig. 170; Plate V, 32–34

Sepia pharaonis Ehrenberg, 1831, In: Ehrenberg, C.G. (1831). Cephalopoda in Mare Rubro viventia. In 'Symbolae Physicae, seu Icones et descriptiones Corporum Naturalium...quae ex itineribus per Libyan, Aegyptum...Habessiniam...Pars Zoologica'. (P.C. Hemprich and C.G. Ehrenberg, eds) [4]: 4 [type locality: Massaouah, Gulf of Suez].

Frequent Synonyms: *Sepia torosa* Ortmann, 1888; *Sepia rouxii* d'Orbigny, 1839–1842; *Sepia formosana* Berry, 1912a; *Crumenasepia hulliana* Iredale, 1926; *Crumenasepia ursulae* Cotton, 1929; *Sepia rouxi* d'Orbigny, 1841; *Sepia formosana* Berry, 1912; *Sepia formosana* Sasaki, 1929; *Sepia tigris* Sasaki, 1929.

Misidentification: None.

FAO Names: En – Pharaoh cuttlefish;
Fr – Seiche pharaon; Sp – Sepia faraón.

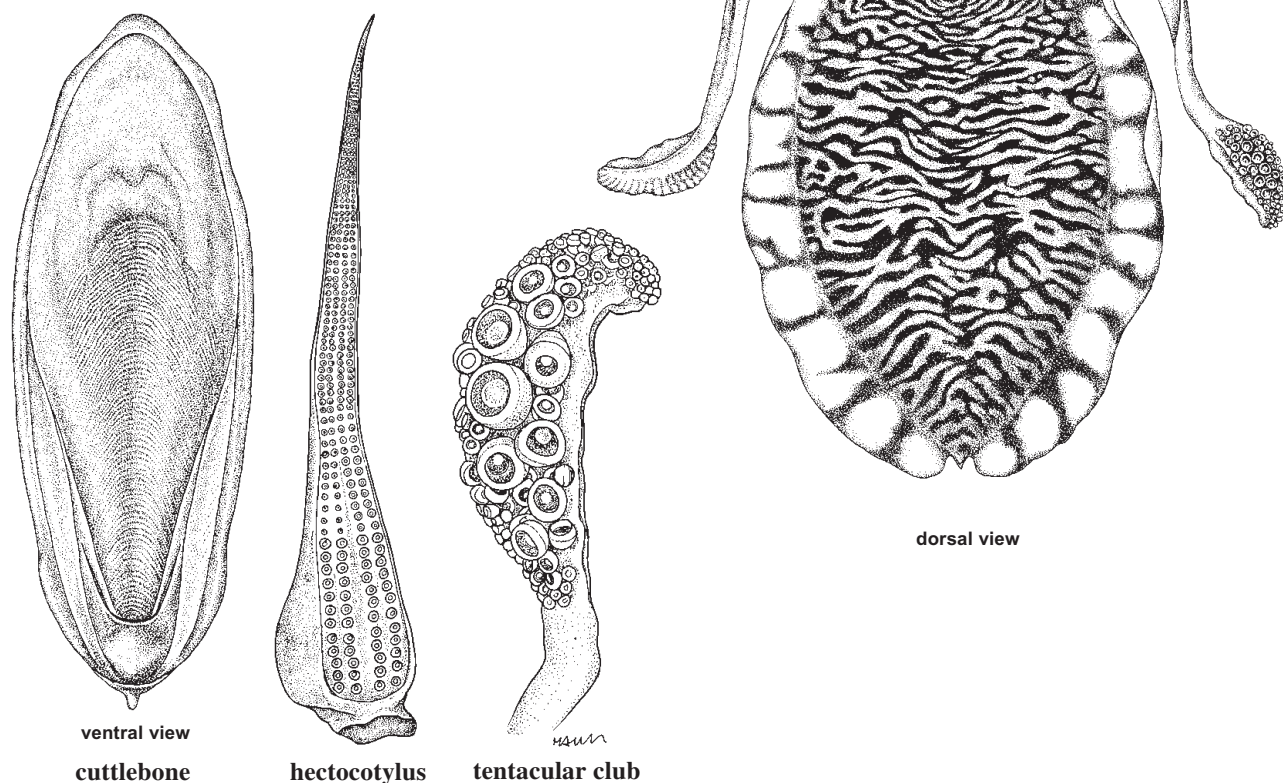


Fig. 170 *Sepia pharaonis*

Diagnostic Features: Mantle oval. Male and female arm lengths subequal. Arm suckers tetraserial. Hectocotylus present on left ventral arm: **10 to 12 rows of normal size suckers proximally, 6 rows of reduced suckers medially**, then normal size suckers distally to arm tip. Suckers of hectocotylus in **2 dorsal series are much smaller than those in 2 ventral series**; oral surface of modified region wide, swollen, fleshy, with transversely grooved ridges; with shallow median furrow; suckers in 2 dorsal and 2 ventral series displaced laterally, with gap between them. Club sucker-bearing surface flattened, with **8 suckers in transverse rows**; suckers differ markedly in size: 5 or 6 median suckers enlarged (3 or 4 of these are greatly enlarged). Swimming keel of club terminates at proximal end of carpus. Dorsal and ventral protective membranes **not joined at base of club**; dorsal and ventral membranes same length; extend proximal to carpus along stalk. Dorsal membrane forms shallow cleft at junction with stalk. Buccal membrane with **a few, minute suckers** (each lappet bearing 1 or 2 small suckers). Cuttlebone outline oblong; bone bluntly rounded anteriorly; acuminate, acute, posteriorly; dorsal surface creamy white; dorsal surface evenly convex; texture smooth; dorsal median rib distinct, rib broadens anteriorly; lateral ribs indistinct. Chitin borders lateral and anterior margins of cuttlebone. Spine short, pointed, curves dorsally, keel(s) absent. Striated zone concave; last loculus flat; sulcus **deep, wide, extends** entire length of cuttlebone; sulcus **flanked by rounded ribs**. Anterior striae are **inverted U-shape**; limbs of inner cone extend anteriorly to end of striated zone. Inner cone limbs are narrow anteriorly, broaden posteriorly with **distinctive thick bulbous swelling**; outer cone calcified; narrow anteriorly, broadens posteriorly. Dorsal mantle with series of elongate papillae along each side, adjacent to base of each fin, or covered with numerous small papillae. **Colour:** Pale brownish or reddish purple. Head and arms with transverse zebra-stripe pattern. Dorsal mantle has white blotches or spots, transverse saddle mark, and has a transverse zebra-stripe pattern (saddle mark in females; stripes especially in males; small specimens may show stripe markings or few markings). Fins with longitudinal white band at base, bordered by narrow band of ground-coloured pigment along each side; white stripe solid on anterior 3/4 of body, interrupted by blocks of ground-coloured pigment on posterior 1/4 of mantle.

Size: Up to 420 mm mantle length; weight to 5 kg.

Geographical Distribution: Indian Ocean and western Pacific: including the Red Sea and Arabian Sea south to Zanzibar and Madagascar, Andaman Sea to South China Sea, East China Sea, Taiwan Province of China, Japan (Kyushu and possibly southern Honshu), eastern Indonesia and northern Australia (from Monte Bello Island, Western Australia, 20°26'S 115°37'E, to at least Townsville, Queensland, 19°16'S 146°41'E, including Gulf of Carpentaria). Wadge Bank (Fig. 171).

Habitat and Biology: *Sepia pharaonis* is a neritic demersal species which occurs down to 130 m. In the Gulf of Thailand and the Andaman Seas, animals are found from the coastal shallows to 100 m depth, with most caught between 10 and 40 m. Around Hong Kong, animals migrate to shallower waters during the mating season, where large numbers of adults congregate in 40 to 80 m on the continental shelf from November to February. During February and March, they move to the coast where spawning takes place from April to May in water temperatures between 18 and 24°C. Eggs are laid in clusters and attached to plants, shells and other hard substrates in approximately 5 to 20 m depth.

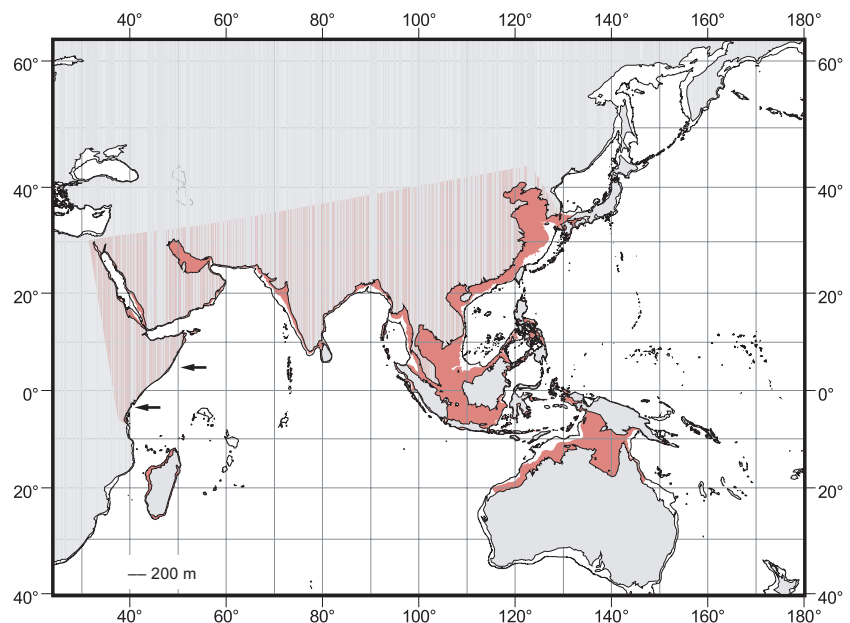


Fig. 171 *Sepia pharaonis*
■ Known distribution

In the Gulf of Thailand, spawning occurs all year round, with peak months during January and February and from July to September. The ratio of males to females is 1:3. During the spawning season, 4 or 5 adults congregate, sometimes near a boulder. During mating, the males adopt a very bold striped pattern. Both males and females raise their dorsal arms vertically and the female elevates lappets on her mantle: 6 on the base of each fin and 2 over each eye. The males approach either head on, or with ventral arms spread, they swim from behind and over her back. Mating takes place head on, each holding the other with the arms. Mating may occur more than once with a single pair. Females lay white eggs that are attached singly to hard surfaces.

In Iranian waters, *S. pharaonis* is the dominant cephalopod species. The main spawning season occurs between the southwest and northeast monsoon periods in November and December. In Yemen, *S. pharaonis* is one of the species with greatest commercial value; experts have estimated the standing stocks and an annual exploitable yield has been recommended.

Sepia pharaonis rises to the lower part of the water column to feed at night, mainly on crustaceans and a variety of small demersal fishes. During maturation, there is a shift of emphasis from somatic growth to gonadal development and vitellogenesis. Research observations suggest that energy and nutrients for maturation are supplied mainly by diet rather than stored resources: the species does not use protein from muscle tissue for developing and growing its reproductive tissues. *Sepia pharaonis* appears to be an intermittent multiple spawner. In captive animals, the life cycle is less than 10 months. Estimated growth rates for wild animals show higher values for females than for males.

Interest to Fisheries: This species supports industrial or artisanal fisheries throughout its range. With *S. esculenta* Hoyle, 1885, it is the most abundant cuttlefish species caught in the Philippines and the Samar and Visayan Seas, with the highest catches reported in the Lingayen Gulf and Carigara Bay. In Iran, the fishing activity occurs during the spawning season, when adults migrate from deeper waters to shallower waters in the littoral zone. *Sepia pharaonis* is caught by bottom trawlers in the Oman Sea, and by traps in the Persian Gulf and is one of the most important cuttlefish species fished in both areas. The species is important to the commercial cephalopod fishery of Thailand, being highly abundant in the Gulf and the Andaman Sea, where it is the most common species of cuttlefish caught. The species contributes about 90% of the cuttlefishes caught off Australia by Chinese pair trawlers. Off the North West Shelf and Timor Seas, sepiids (mainly *S. pharaonis*) tend to replace squids as the dominant cephalopods caught. Domestic fisheries in these waters take this species as bycatch of prawn and mixed species trawl fisheries. In the Hong Kong area, it is the most abundant cuttlefish species and it is of greatest commercial importance in this area and along the whole coast of Kwangtung and Fukien, with about 400 tonnes landed annually in Hong Kong. Animals in this region are caught by spearing, lure-hooking and trawling. In southern Thailand, in addition to otter and pair trawls, the trammel net and hook-and-line are commonly used for catching *S. pharaonis*, with bottom otter and pair trawls used offshore, and push nets and lift nets used in inshore and coastal waters. Squid traps, in which egg clusters are placed to entice squids to enter, are also widely used and cuttlefishes, all mature animals ready to spawn, are a major bycatch. These traps accounted for 5% of total Thai cephalopod catch in 1994 (i.e. over 7 000 tonnes). Off the southwest coast of India, a modified type of hook, a baited hand-jig, is used to catch this species. *Sepia pharaonis* has been grown successfully in culture, and techniques are currently being improved in Thailand to culture these animals commercially. The flesh is thick, tender and excellent for human consumption.

Local Names: CHINA: Mak mo, Foo baan woo chack; JAPAN: Torafu-kouika, Mongouika.

Remarks: The diagnostic features given above were obtained from a range of sources and examination of Australian specimens. They should be treated with caution because animals currently referred to as *S. pharaonis* are probably representatives of a species complex. One species from southeast India, *S. ramani* Neethiselvan, 2001, has been described recently. *Sepia ramani* differs from *S. pharaonis* in having a longer club with 15 to 24 subequal enlarged suckers. *Sepia pharaonis* has 6 enlarged medial club suckers, 3 or 4 of which are much larger than the rest. *Sepia ramani* has 14 to 16 transverse rows of normal size suckers on the proximal end of the hectocotylyzed arm, instead of 10 to 12 rows, as in *S. pharaonis*. In other traits, these 2 species are very similar. The hectocotylus differs between *S. pharaonis* from Japan and Australia. Given its fisheries importance, the status of this putative species needs to be examined and specimens from throughout its range compared with those from the type locality to accurately determine its population structure and/or species boundaries.

Literature: Adam and Rees (1966), Silas *et al.* (1982), Valinassab (1983), Nair (1986), Okutani *et al.* (1987), Gutsal (1989) Chu *et al.* (1992), Kukharev *et al.* (1993), Khaliluddin (1995), Chantawong and Suksawat (1997), Chotiyaputta and Yamrungrung (1998), Lu (1998a), Rocha *et al.* (1998), Gabr *et al.* (1999).

Sepia plangon* Gray, 1849*Fig. 172; Plate V, 35**

Sepia plangon Gray, 1849, *Catalogue of the Mollusca in the British Museum. Part I. Cephalopoda Antepedia*: 104 [type locality: Australia, New South Wales, Port Jackson, 33°51'S 151°16'E].

Frequent Synonyms: *Solitosepia plangon adhaesa* Iredale, 1926.

Misidentifications: None.

FAO Names: **En** – Striking cuttlefish; **Fr** – Seiche impressionnante; **Sp** – Sepia impresionante.

Diagnostic Features: Mantle broad, oval. Male and female Arm lengths subequal; protective membranes narrow. Arm suckers tetraserial. Hectocotylus present on left ventral arm: 5 rows of normal size suckers proximally, **5 rows of reduced suckers medially**, then normal size suckers distally to arm tip. Suckers **equal in size**, reduced suckers only slightly smaller than normal arm suckers; oral surface of modified region not wide, fleshy, but normal, as on opposite arm. Club sucker-bearing surface flattened, with **5 suckers in transverse rows**; suckers differ markedly in size: some greatly enlarged (median series largest followed by those immediately bordering ventral series). Swimming keel of club extends well proximal to carpus; dorsal and ventral protective membranes **joined at base of club** but fused to tentacular stalk. Dorsal and ventral membranes **same length**; extend proximal to carpus along stalk. Dorsal membrane forms **deep cleft at junction with stalk**. Cuttlebone outline oblong; acuminate, acute, anteriorly; bluntly rounded posteriorly; dorsal surface pinkish; dorsal surface convex medially, flat laterally; granulose; dorsal median rib distinct; sides approximately parallel; lateral ribs indistinct. Chitin borders lateral and anterior margins of cuttlebone. Spine long, pointed, straight, parallel to bone, **with ventral keel**. Striated zone concave; last loculus flat; sulcus **deep, narrow**, extends entire length of cuttlebone; **sulcus flanked by rounded ribs** (giving striae a wavy appearance). Anterior striae are **inverted V-shape**. Inner cone limbs are **uniform width**, narrow, U-shape posteriorly; outer cone calcified; narrow anteriorly, broadens posteriorly. **Colour:** Reddish purple, light brown, or dark brown, or sometimes with whitish mottle. During the breeding season, the head and dorsal mantle of males have narrow, irregular light-coloured transverse stripes. Fins pale with broad light greenish band along base.

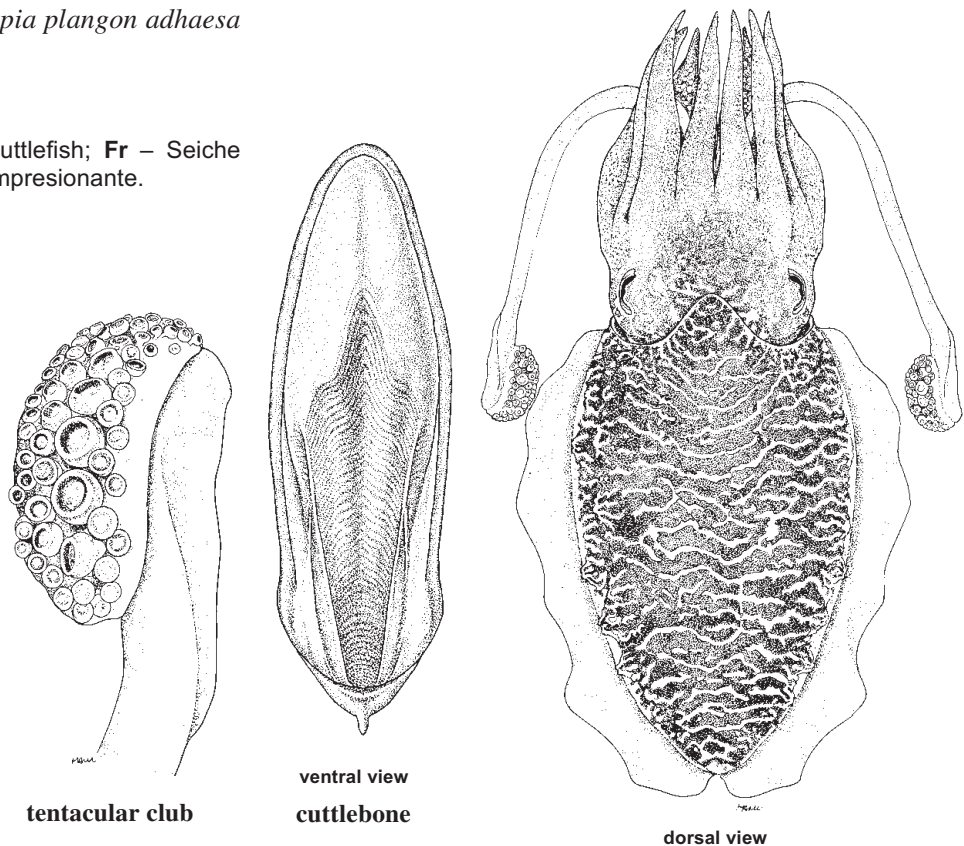


Fig. 172 *Sepia plangon*

Size: Up to 135 mm mantle length.

Geographical Distribution: Southwestern Pacific: eastern Australia from Gulf of Carpentaria to Sydney, NSW 33°53'S 151°13'E (Fig. 173).

Habitat and Biology: Depth range intertidal to 83 m. *Sepia plangon* frequently is found among seaweed and seagrass. It is active during the day, foraging for crustaceans and fishes. It often can be seen resting on the sea floor, raising the anterior end of the body by using its arms as stilts. Females are plain coloured, without pattern, during courtship.

Interest to Fisheries: Species taken as bycatch of prawn and mixed species trawl fisheries.

Literature: Adam and Rees (1966), Lu (1998a).

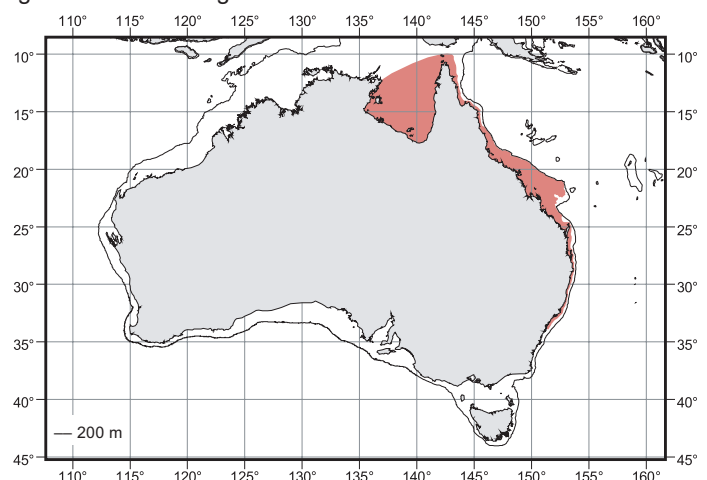


Fig. 173 *Sepia plangon*
Known distribution