

OCTOPODIDAE

Benthic octopuses

by M.D. Norman

Diagnostic characters: Bottom-living muscular octopuses with **8 arms, lacking tentacles**. Each arm possesses 1 or 2 rows of suckers. **Fins absent**. **Rows of cirri adjacent to suckers absent**. Internal shell absent or reduced to small rod-like stylets. **One of third pair of arms (typically right-hand side) modified in mature males (the hectocotyized arm)**, consisting of a gutter along the margin of this arm (spermatophore groove) and a modified tip (ligula) used to grip and pass spermatophores into the oviducts of the female. Funnel locking apparatus absent.

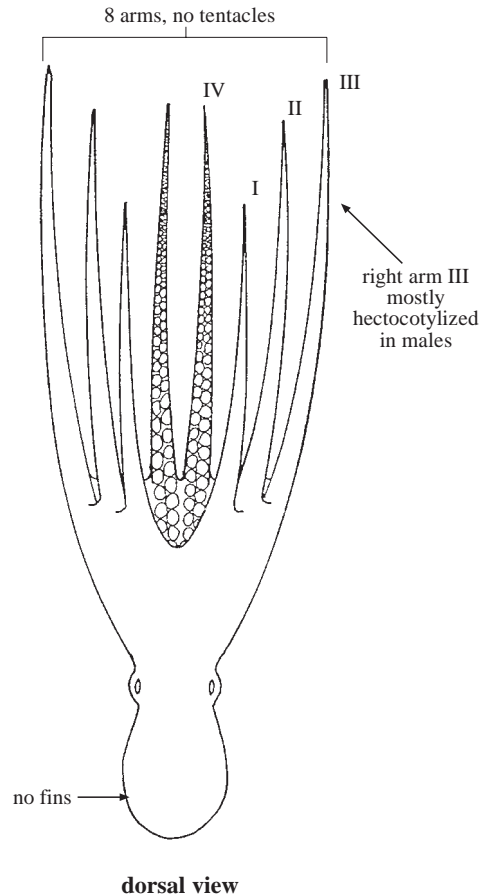
Habitat, biology, and fisheries: Octopuses of the family Octopodidae are all bottom-dwelling and are found from intertidal waters down to abyssal depths (more than 5 000 m). They occur on a wide range of substrates from coral and rocky reefs, to seagrass beds, sand, and mud. All brood their young, the female tending the eggs until hatching. The egg size in different species dictates the behaviour of the hatchlings. Species with small eggs (approximately 1 to 2 mm long) produce many tiny planktonic young which spend at least some time transported in the water column. Species with large eggs (10 to 30 mm long) produce few, large "crawl-away" young. Many octopus species have high fisheries profiles in the area, important in local and subsistence fisheries, as well as forming major export industries. They are collected in subtidal habitats by trawl, lure, and spear, and on intertidal reefs by hand or spear. The majority are harvested for human consumption with certain species collected primarily as bait for finfish fisheries. They are marketed fresh, frozen, or dried. The reported yearly production of all octopods in the Western Central Pacific from 1990 to 1995 ranged from 20 023 t to 25 567 t (FAO Yearbook of Fishery Statistics). The actual annual total harvest in the area is likely to exceed 50 000 t.

Notes on the taxonomy of Octopodidae

The taxonomy of this family is in a very poor state. There are a large number of undescribed or poorly-defined species (more than 80) occurring in the area, many of which form the basis of local and commercial fisheries. The majority of named species are placed in the catch-all genus *Octopus*, which currently contains over 200 nominal species. The limited existing literature frequently uses inappropriate species names, including several European names for species restricted to the Atlantic Ocean (e.g. *Octopus macropus*, *O. vulgaris*).

There is negligible information available on biology, distribution or importance to fisheries for all but a handful of species. The list for the Western Central Pacific region, presented below is preliminary, including better known species and only undescribed species of high profile. It excludes species names coined from the area for which there is inadequate original descriptions or insufficient reference material to enable identification (i.e. dubious taxa).

A further complicating factor in the taxonomy of benthic octopuses is the number of species groups within the broad genus *Octopus* (as it currently stands). Each of these groups contains similar species, often difficult to distinguish in the field. The knowledge of members of 3 groups in particular is very poor. The least resolved species group is the "drop-arm" octopuses, the *Octopus horridus* group. Members are found throughout the tropical Indo-West Pacific region and are characterized by small size, long arms (4 to 10 times mantle length), the capacity to sever ("autotomize") arms at the base (used as a wriggling decoy to predators) and complex skin sculpture producing accurate camouflage against coral, rubble, or algae. They typically occur on intertidal reefs where they are active during daytime low tides. Named species in the area include *Octopus abaculus* and *O. aculeatus* (treated below in species accounts). More than 12 species occur throughout the area and the limits to their distributions are unknown. Western Central Pacific species



are frequently misidentified under the names *Octopus horridus* (a large-egg species restricted to the Red Sea and western Indian Ocean) and *O. defillipi* (a species of a different group restricted to the Mediterranean Sea and Atlantic Ocean). See Norman and Sweeney (1997) for discussion of this species group.

The second group of octopuses is the *Octopus macropus* group. These animals are all moderate to large octopuses (up to 3 kg and more than 1 m in total length) characterized by longer and more robust dorsal arms, high gill counts (10 or more lamellae per demibranch), simple colour patterns of red and white, and nocturnal foraging behaviour. Members occur throughout tropical and temperate waters of the world. Named species include *Octopus alpheus*, *O. aspilosomatis*, *O. dierythraeus*, *O. graptus*, *O. luteus*, *O. nocturnus*, and *O. ornatus* (all treated below). More than 5 undescribed species also occur in the area covered here and the limits to their distributions are unknown. Members of this group are frequently treated incorrectly under the name *Octopus macropus*, an European member of this group restricted to the Mediterranean Sea and Atlantic Ocean. See Norman (1993a) and Norman and Sweeney (1997) for discussion of this species group.

A suite of pygmy species also occur in the area (more than 10 species), mature at under 1 g and with a mantle length less than 30 mm. These tiny species have low gill counts (5 to 7 lamellae per demibranch), short arms (1.5 to 3 times mantle length) and relatively few suckers (less than 150 suckers on each normal arm). Named species include *Octopus bocki* and *O. wolffi* (not treated here). Many pygmy species throughout the Indo-West Pacific region are undescribed. See Norman and Sweeney (1997) for treatment of pygmy octopuses from the Philippines.

Major revisions of octopus taxonomy have been carried out by Robson (1929), Sasaki (1929) and Nesis (1987).

Octopuses of deeper waters

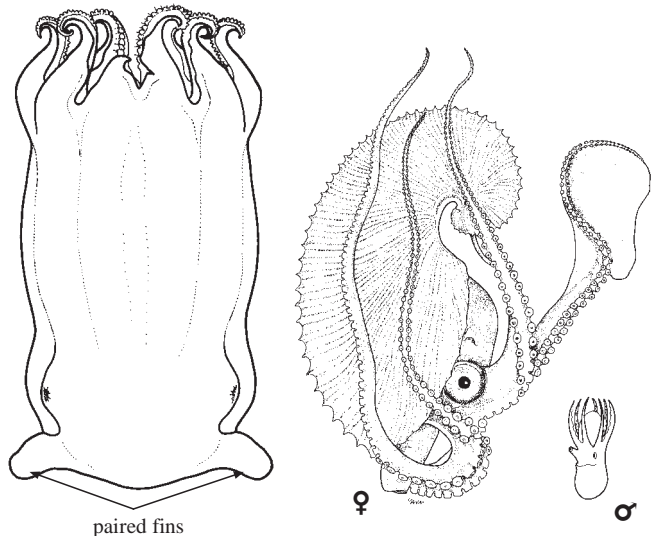
When trawling in deeper waters (more than 200 m), some genera of octopuses may be collected which are not normally encountered in shallower waters. These include species of the poorly-known genera *Scaeuergus* (characterized by a left hand hectocotylied arm in males and a lateral skin ridge around the mantle), *Benthooctopus* (smooth-skinned pale octopuses with large eyes and no ink sac) and *Berrya* (muscular octopuses with loose soft skin, a narrow opening to the mantle cavity and 2 long digit-like papillae over each eye). *Eledone palari* may also be encountered, and is easily distinguished in that it possesses a lateral skin ridge on the mantle and a single row of suckers on each arm (compared with 2 rows in all other members of the family Octopodidae in the area).

Similar families occurring in the area

Note: the order Octopoda, as it currently stands, contains 2 distinct groups of octopuses: finned "cirrate" octopuses (suborder Cirrata) and the more familiar "incirrate" octopuses (suborder Incirrata). The latter includes the family Octopodidae.

Opisthoteuthidae and Cirroteuthidae (suborder Cirrata): cirrate octopuses are soft, semi-gelatinous animals of deeper waters easily distinguished from incirrate octopuses (including the family Octopodidae) by paired fins on the mantle, deep webs and rows of sensory papillae ("cirri") adjacent to the suckers. Cirrate octopuses are rarely captured and, due to their soft flesh, are of no economic value.

Argonautidae (suborder Incirrata): the "argonauts" are muscular pelagic octopuses (genus *Argonauta*) easily distinguished from members of the Octopodidae. Female argonauts have expanded webs on the ends of the dorsal arms which secrete a brittle white shell, the "paper nautilus" shell. This shell is used as an egg case in which the eggs are brooded. The tiny male argonaut lacks a shell and has a detachable third left arm in a pouch. A funnel locking apparatus is present as a lug-and-socket type.



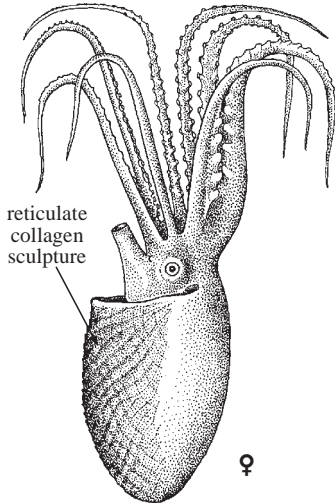
paired fins
Opisthoteuthidae

♀ ♂
Argonautidae

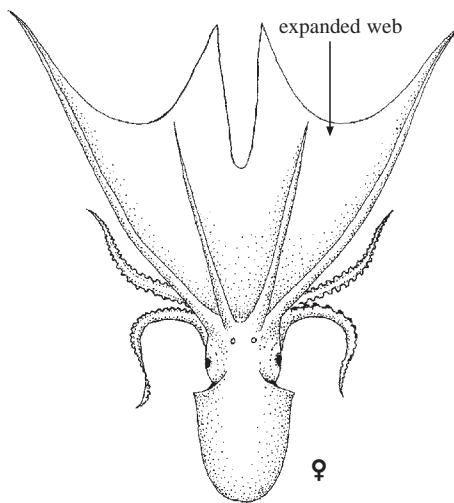
Ocythoidae (suborder Incirrata): contains a single species, the muscular pelagic octopus, *Ocythoe tuberculata*, in which the large female possesses a network of collagen-like ridges in the ventral mantle. The tiny male lacks the collagen sculpture and has a detachable third right arm in a pouch. A funnel locking apparatus is present as a lug-and-socket type.

Tremoctopodidae (suborder Incirrata): contains a single genus and at least 2 species of muscular pelagic "blanket octopuses", the best known being *Tremoctopus violaceus*. Females possess greatly expanded webs along length of dorsal arms, capable of being shed in segments from the tips. The tiny male lacks the dorsal webs and has a detachable third right arm in a pouch. A funnel locking apparatus is present as a transverse flap and shelf.

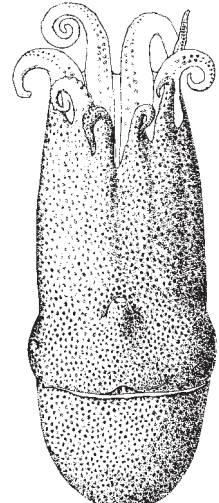
Alloposidae (suborder Incirrata): contains a single species, the deep-water semi-gelatinous octopus, *Haliphron atlanticus* (frequently treated in the literature under the junior synonym, *Alloposus pacificus*). Little is known of this octopus other than the male possesses a detachable third right arm in a pouch. A funnel locking apparatus is present as a transverse flap and shelf.



Ocythoidae

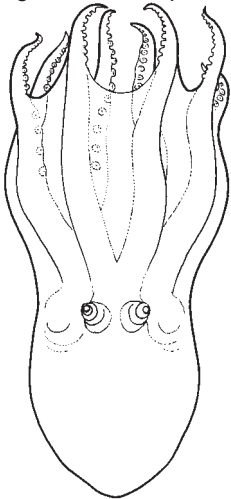


Tremoctopodidae

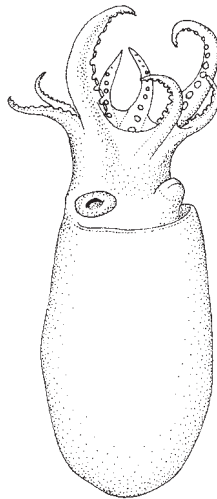


Alloposidae

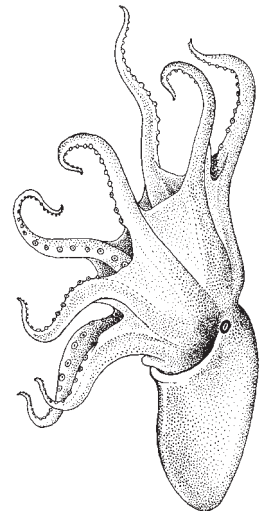
Families Amphitretidae, Bolitaenidae and Vitreledonellidae (suborder Incirrata): These 3 related families of rarely encountered open-water pelagic octopuses are distinguished from members of the family Octopodidae by their gelatinous consistency and a range of internal characters including distinctive radula morphology, the nature of the mantle aperture (double opening in Amphitretidae) and distinctive floorplans to the digestive and reproductive tracts.



Amphitretidae



Bolitaenidae



Vitreledonellidae

Key to the species of Octopodidae occurring in the area

Remarks on key characters: measurements and sucker counts used below refer to submature and mature animals, not juvenile material. In interpreting order of arm lengths, partial arm regeneration can produce confusing combinations. A distinct decrease in sucker diameter along the arms is an indication of partial regeneration from that point.

- 1a. Dorsal arms distinctly longer and frequently more robust than lateral and ventral arms (Fig. 1a); dorsal webs deeper than ventral webs → 2
- 1b. Arms subequal (Fig. 1b) or lateral arms longer and more robust than dorsal arms (Fig. 1c); webs subequal in depth or dorsal webs shallower than other webs → 9

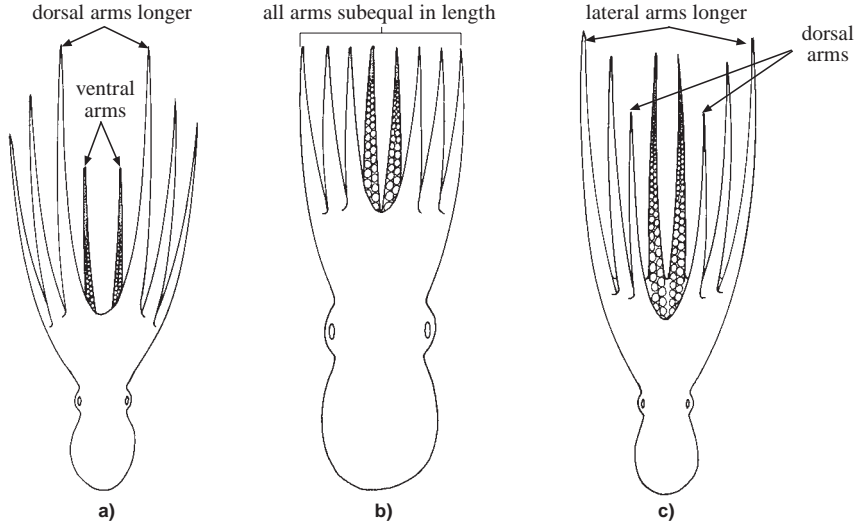


Fig. 1 dorsal view

- 2a. Water pouches present between bases of arms on oral surface of webs (Fig. 2), visible as pores open to exterior at level of 3rd to 4th proximal sucker (pores difficult to find in contracted or smaller preserved specimens); ligula tiny (less than 1% of arm length), calamus absent *Cistopus indicus*

- 2b. Water pouches and pores absent; ligula in submature and mature males well developed, cylindrical with deep groove and a distinct calamus (*Octopus macropus* group) → 3 (only 7 common members treated here of more than 12 species in the area)

- 3a. Colour pattern of pale cream to pink base with irregular short scribbles on dorsal mantle and arm crown (Fig. 3a) *Octopus graptus*

- 3b. Colour pattern of numerous white or red spots; dark scribbles absent → 4

- 4a. Colour pattern on dorsal mantle of distinctive arrangement of cream to white longitudinal stripes over pink to red base colour (Fig. 3b) *Octopus ornatus*

- 4b. Dorsal mantle plain or with spots, longitudinal stripes absent → 5

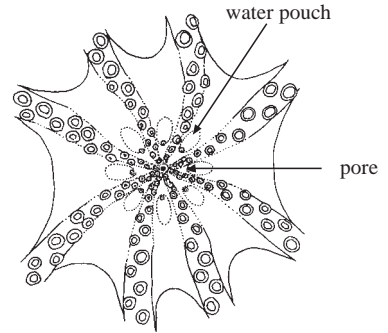
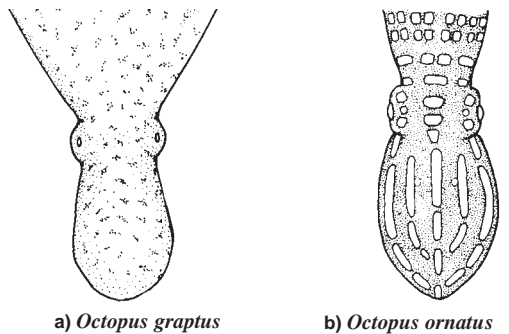


Fig. 2 *Cistopus indicus* (oral view)



a) *Octopus graptus* b) *Octopus ornatus*

Fig. 3 dorsal mantle and arm crown

- 5a. Distinctly elongate species with almost tubular arms and short webs (Fig. 4a); mantle greatly elongated in many specimens (Fig. 4b); deepest web always less than 15% of length of longest arm, typically 10% → 6
- 5b. Moderately elongate species with robust arms and deep webs (Fig. 5); mantle never greatly elongated; deepest web always more than 15% of length of longest arm, typically 20% → 7
- 6a. Colour pattern on dorsal mantle plain red or white, lacking distinctive spots (Fig. 6a) *Octopus aspilosomatis*
- 6b. Colour pattern on dorsal mantle of white spots over orange to deep red base colour (Fig. 6b) *Octopus nocturnus*

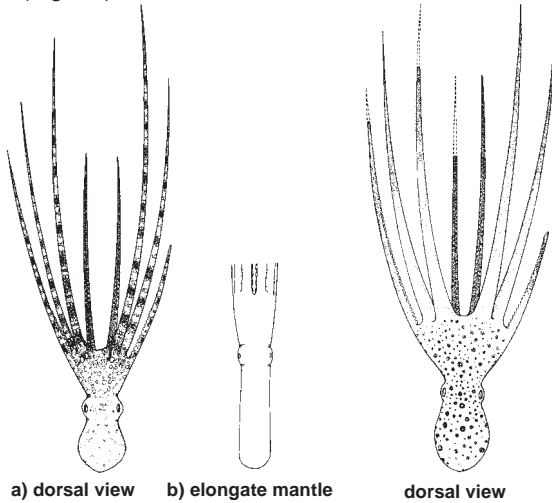


Fig. 4 *Octopus aspilosomatis* Fig. 5 *Octopus dierythraeus*

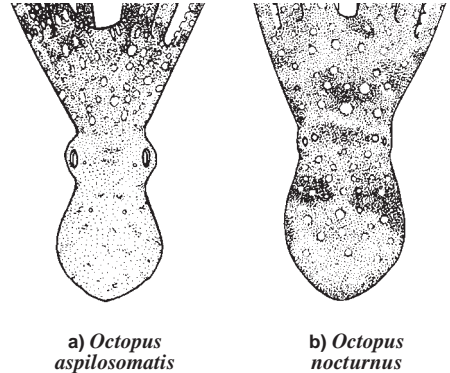


Fig. 6 dorsal mantle and arm crown

- 7a. More than 230 suckers on normal arms of submature and mature animals; more than 100 suckers on hectocotylized arm of males; alarm display in live animals of large red spots over white base colour on dorsal mantle, arm crown, and arms (Fig. 5) *Octopus dierythraeus*
- 7b. Typically less than 230 suckers on normal arms of submature and mature animals; less than 100 suckers on hectocotylized arm of males; alarm display in live animals of white spots over red base colour on dorsal mantle, arm crown, and arms (as in *O. nocturnus*, Fig. 6b) → 8

- 8a. Eggs large (more than 8 mm) and produced in low numbers (less than 500) (known only from intertidal reef flats of the Capricorn Bunker Islands of the southern Great Barrier Reef, Australia) *Octopus alpheus*
- 8b. Eggs small (less than 4 mm) and produced in high numbers (more than 10 000) (known at this stage only from the Philippine Islands) *Octopus cf. luteus*

- 9a. Arms greatly elongated (typically 7 to 9 times mantle length), subequal in length when intact; regular alternating white and pink-brown wide bands present on arms (Fig. 7); mantle walls very thin, almost transparent, branchial hearts visible through mantle walls (Fig. 7); arm autotomy present; ink sac absent *Ameloctopus litoralis*
- 9b. Arms short to long, dorsal arms always slightly shorter than other arms; regular alternating white and pink-brown bands absent; mantle walls muscular, never thin and transparent; arm autotomy present or absent; ink sac present. → 10

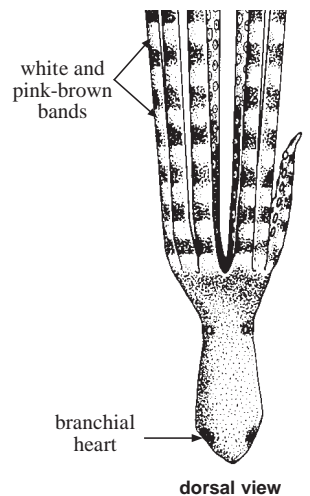
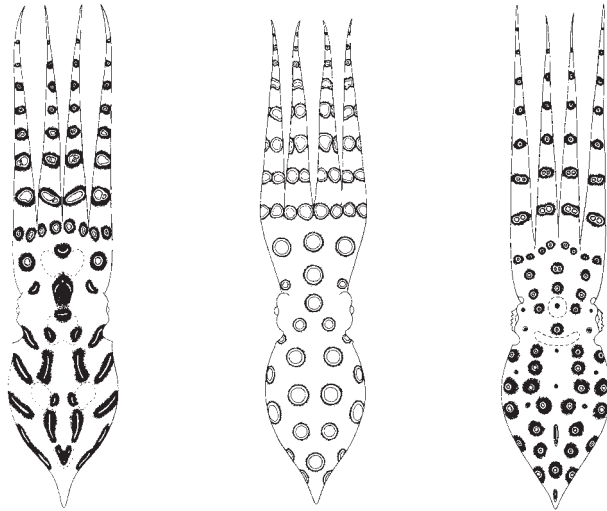


Fig. 7 *Ameloctopus litoralis*

- 10a. Small animals with mantle and arm crown covered in rings or lines (Fig. 7), iridescent blue in live animals; arms short, 1.5 to 3 times mantle length (*Hapalochlaena*) → 11
- 10b. Iridescent tissue absent or, if present, restricted to a pair of false eye-spots ("ocelli") on the arm crown over bases of arms II and III, one below each eye (as in Fig. 13a); arms short to long (more than 2 times mantle length) → 13
- 11a. Iridescent blue lines on dorsal and lateral mantle; rings on arm crown and arms (Fig. 8a) *Hapalochlaena fasciata*
- 11b. Iridescent blue lines never present; small or large iridescent blue rings on all dorsal surfaces → 12
- 12a. Large rings (up to 12 mm in diameter, up to 40% of mantle length) over dorsal and lateral surfaces of mantle, head, arm crown, and arms (Fig. 8b) *Hapalochlaena lunulata*
- 12b. Small rings (up to 2 mm in diameter, approximately 5% of mantle length) over dorsal and lateral surfaces of mantle, head, arm crown, and arms (Fig. 8c) *Hapalochlaena cf. maculosa*



a) *Hapalochlaena fasciata* b) *Hapalochlaena lunulata* c) *Hapalochlaena cf. maculosa*

Fig. 8 dorsal view

(after Roper and Hochberg, 1988)

- 13a. Raised keel (lateral ridge) around lateral mantle (Fig. 9); swollen club-like ligula in mature males (Fig. 10a) *Octopus australis*
(species of the deep-water genus *Scaeurgus* appear similar to this species but are distinguished by a left-hand hectocotylyzed arm in males)
- 13b. Lateral ridge absent; ligula small to spear-like (Fig. 10b), never as a swollen club → 14

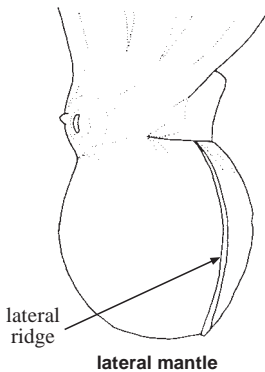


Fig. 9 *Octopus australis*

(from Stranks and Norman, 1993)

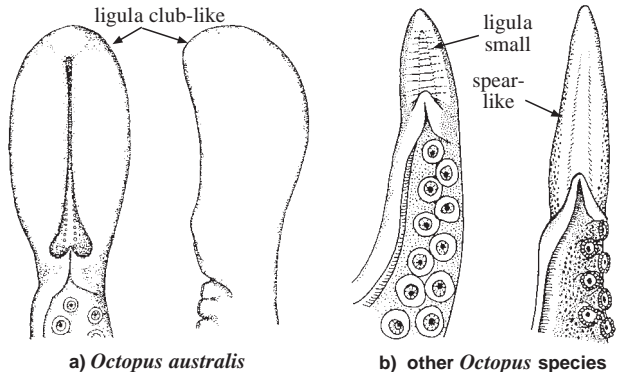


Fig. 10 tip of hectocotylyzed arm of male

(from Stranks and Norman, 1993)

- 14a. Small, elongate octopuses (mantle length to 70 mm, weight to 150 g); arms long, more than 4 times mantle length; arms sever at set level near arm base (arm autotomy), as a decoy to predators; skin typically highly sculptured including raised branched papillae (Fig. 11)
 (*Octopus horridus* group) → 15
 (only 2 distinct members treated here of more than 10 species in the area)
- 14a. Small to large robust octopuses; arms typically less than 4 times mantle length; arms not capable of autotomy at set level near arm base; skin smooth to sculptured → 16
- 15a. Colour pattern of dark brown to black circular reticulations which define a mosaic of distinct round cream spots (Fig. 12a); sucker counts approximately 90 to 120 on hectocotylized arm; ligula of moderate size (approximately 5% of arm length) *Octopus abaculus*
- 15b. Colour mottled grey-brown to dark grey on dorsal and lateral surfaces (Fig. 12b); sucker counts approximately 140 to 175 on hectocotylized arm; ligula small (less than 2% of arm length) *Octopus aculeatus*
- 16a. Large robust species (mantle length more than 140 mm, weight more than 1 kg), moderate to long arms (more than 3 times mantle length), more than 200 suckers on normal arms, more than 140 on hectocotylized arm of males → 17
- 16b. Small to moderate-sized species (mantle length less than 120 mm, weight less than 500 g), short to moderate length arms (2 to 3 times mantle length), less than 200 suckers on normal arms, less than 110 on hectocotylized arm of males → 18
- 17a. False eye-spot (ocellus) present (Fig. 13a), as a dark oval spot surrounded by pale band of skin (not iridescent) and narrow dark outer band (Fig. 13b); dark zebra bars on lateroventral surfaces of all arms in submature and mature animals (Fig. 13c); sucker counts around 400 to 500 on normal arms, 180 to 230 on hectocotylized arm . . . *Octopus cyanea*
- 17b. Ocellus and zebra bars on ventral faces of arms absent; sucker counts 200 to 300 on normal arms, 140 to 160 on hectocotylized arm *Octopus tetricus*

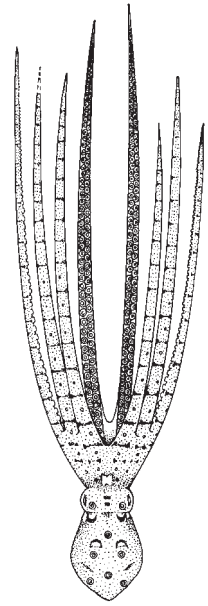
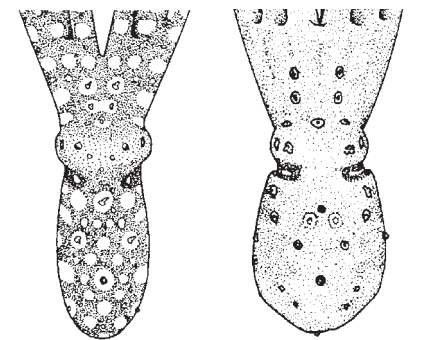


Fig. 11 typical representative of the *Octopus horridus* group



a) *Octopus abaculus* b) *Octopus aculeatus*
Fig. 12 dorsal mantle and arm crown

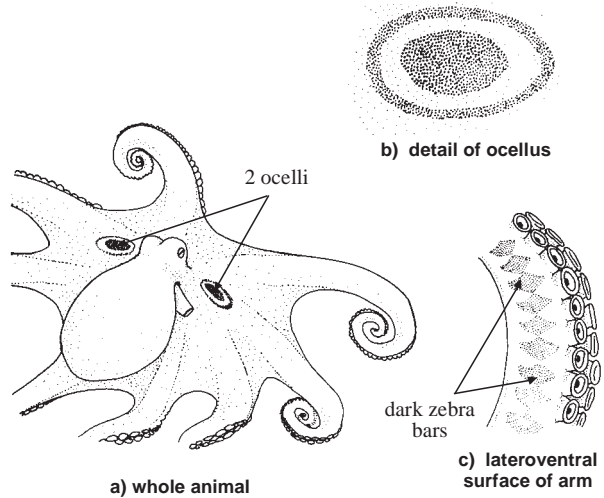


Fig. 13 *Octopus cyanea*

- 18a. Ocelli (“false eye-spots”) present, 1 on each lateral face of arm crown between bases of arms II and III (position shown in Fig. 13a) → 19
- 18b. Ocelli absent → 23

- 19a. Ocellus plain, without iridescent ring, as plain black spot (Fig. 14a) *Octopus exannulatus*
- 19b. Ocellus with iridescent ring within black spot (Fig. 14b) → 20

- 20a. Widely-spaced dark transverse bars on all arms separated by approximately 3 to 5 suckers (Fig. 15a); mature males with 1 to 3 enlarged suckers (12th to 14th) on all arms at level of edge of web *Octopus polyzenia*
- 20b. Dark longitudinal lines down leading edge of arms I to III (Fig. 15b), never transverse bars; enlarged suckers of mature males (if present) on arms II and III (never I) → 21

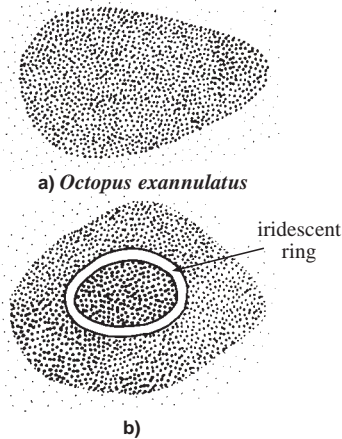


Fig. 14 detail of ocellus

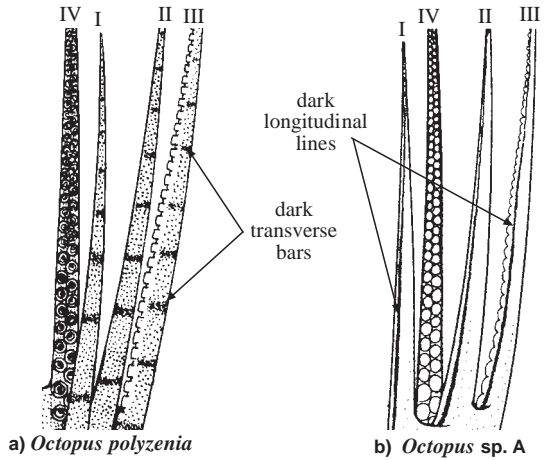


Fig. 15 right arms I to IV

- 21a. Circular cluster of dark spots above each eye forming petals of “flower” pattern (Fig. 16a); 4 longitudinal rows of dark spots (as solid stripes in some colour patterns) on dorsal body; large digit of skin in white spot on dorsal arm crown anterior to eyes; approximately 100 suckers on hectocotyliized arm of males *Octopus mototi*
- 21b. Base colour of whole animal cream-brown with short black longitudinal bar through each eye (Fig. 16b); pedal of black spots on head and longitudinal stripes on dorsal mantle absent; large digit of skin anterior to eyes absent; 65 to 80 suckers on hectocotyliized arm of males *Octopus sp. A*

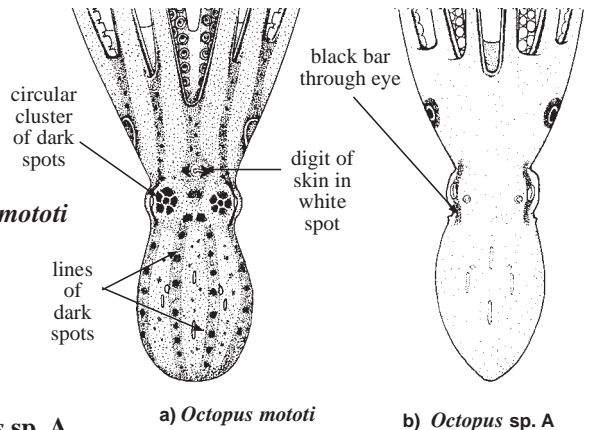


Fig. 16 dorsal view

22a. Pale longitudinal stripe present along midline of dorsal mantle (Fig. 17); pattern of circular cream to green spots bound by dark boundaries over all dorsal and lateral mantle and arm crown (Fig. 17), distinct on lateral faces of arms I to III . . . *Octopus aegina*

22b. Longitudinal stripe along dorsal midline of mantle absent; dark purple/black longitudinal stripe along lateral faces of arms I to III, in marked contrast with white or pink suckers (Fig. 18a); body colour variable from pale purple-brown to deep purple-black; purple black grooves between patches on lateral arm crown form distinctive branching reticulations (Fig. 18a); distinct white triangle under eye (Fig. 18b) . . . *Octopus marginatus*

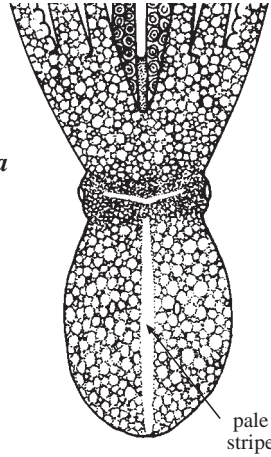


Fig. 17 *Octopus aegina*

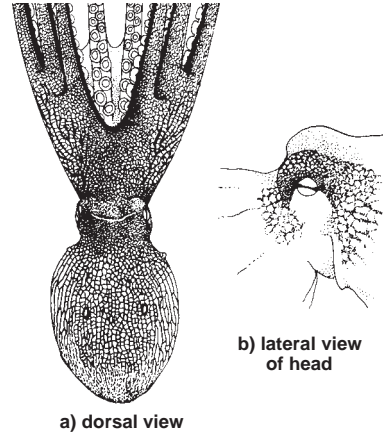


Fig. 18 *Octopus marginatus*

List of species occurring in the area

The symbol ♣ is given when species accounts are included.

- ♣ *Ameloctopus litoralis* Norman, 1992b
- ♣ *Cistopus indicus* (Rapp, 1835)
- ♣ *Hapalochlaena fasciata* (Hoyle, 1886)
- ♣ *Hapalochlaena lunulata* (Quoy and Gaimard, 1832)
- ♣ *Hapalochlaena* cf. *maculosa* (from Roper and Hochberg, 1988)
- ♣ *Octopus abaculus* Norman and Sweeney, 1997
- ♣ *Octopus aculeatus* d'Orbigny, 1835
- ♣ *Octopus aegina* Gray, 1849^{1/}
- ♣ *Octopus alpheus* Norman, 1993a
- ♣ *Octopus aspilosomatis* Norman, 1993a
- ♣ *Octopus australis* Hoyle, 1885
- ♣ *Octopus bocki* Adam, 1945
- ♣ *Octopus cyanea* Gray, 1849
- ♣ *Octopus dierythraeus* Norman, 1993a
- ♣ *Octopus exannulatus* Norman, 1993b
- ♣ *Octopus graptus* Norman, 1993a
- ♣ *Octopus* cf. *luteus* (from Norman and Sweeney, 1997)
- ♣ *Octopus marginatus* Taki, 1964^{2/}
- ♣ *Octopus mototi* Norman, 1993b
- ♣ *Octopus nocturnus* Norman and Sweeney, 1997
- ♣ *Octopus ornatus* Gould, 1852
- ♣ *Octopus polyzenia* Gray, 1849
- ♣ *Octopus pumilus* Norman and Sweeney, 1997
- ♣ *Octopus tetricus* Gould, 1852^{3/}
- ♣ *Octopus tonganus* Hoyle, 1885
- ♣ *Octopus vitiensis* Hoyle, 1885
- ♣ *Octopus wolffi* Wülker, 1913
- ♣ *Octopus* sp. A

Distribution

Harvest

Northern Australia	none
SE Asia to India	high
Australia, southern Qld and NSW	none
Indo-Malayan Arch. to Vanuatu	none
Great Barrier Reef	none
Philippines	none known
Philippines	low
Indian Ocean and SE Asia	high
Southern Great Barrier Reef	none
Northern Great Barrier Reef	none
Australia, southern Qld and NSW	low
Tropical Pacific	none
Tropical Indo-West Pacific	moderate
Northern Australia	none
Indo-Malayan Archipelago	low
Northern Australia	low
Philippines	moderate
Indian Ocean and SE Asia	low
Tropical Pacific	none
Philippines	low
Tropical Indo-West Pacific	low
Northern Australia	none
Philippines	none known
Australia, southern Qld and NSW	low
Tonga	none known
Tropical Pacific	none known
Tropical Indo-West Pacific	none known
Indo-Malayan Archipelago	very high

^{1/} The genuine *O. aegina* is treated in Roper et al. (1984) under the name of a junior synonym, *O. dollfusi*.

^{2/} *O. marginatus* is treated in Roper et al. (1984) incorrectly under the name of the related *O. aegina*.

^{3/} The species treated under the name *O. tetricus* in Roper et al. (1984) is not identical with *O. tetricus* described originally from eastern Australia.

References

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Cistopus indicus (Rapp, 1835 in Férussac and d'Orbigny, 1834-48)

Frequent synonyms / misidentifications: None / *Octopus macropus* Risso, 1826.

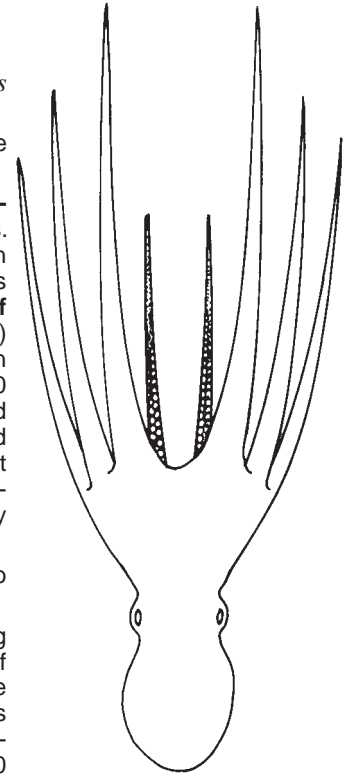
FAO names: **En** - Old woman octopus (from Chinese "Laai Por"); **Fr** - Poulpe vieille femme; **Sp** - Pulpo perforado.

Diagnostic characters: Large species. **Water pouches present, embedded in the web around the mouth, one in each sector between arms.** Pouch opens through a "water pore" situated at the level of third or fourth sucker from the mouth. Arms long, 6 to 7 times mantle length. Dorsal arms longer than ventral arms (arm formula I.II.III.IV). **Right third arm of males hectocotylized with tiny blunt ligula** (less than 1% of arm length) **and no apparent calamus.** Gills with 9 to 11 lamellae per demibranch. In larger animals, around 120 to 190 suckers on each normal arm, 60 to 130 on hectocotylized arm of male (see comments below). One or 2 enlarged suckers (11th to 13th) sometimes visible in mature males on arms I, II, and IV, but never on arm III. **Colour:** pink or cream, to slate grey with iridescent purple sheen on lateral mantle in fresh specimens; skin sculpture consisting of a few scattered low papillae on the dorsal mantle; no large primary papillae.

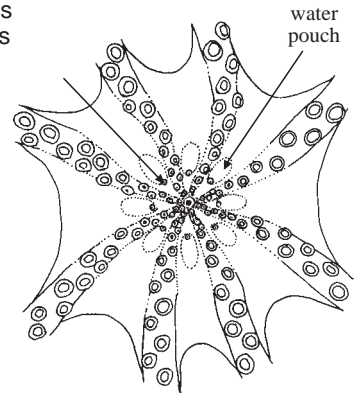
Size: Maximum mantle length 180 mm, total length to over 1 m; weight to 2 kg.

Habitat, biology, and fisheries: Known from muddy coastal waters, living subtidally on soft substrates to depths of at least 80 m. Nothing known of diet or foraging behaviour. No mature females found. The function of the unique water pores is not known. There may be more than 1 species treated under this species name. Specimens from Thailand and Singapore, and west to India appear to show lower sucker counts (around 110 to 140 on normal arms, less than 80 on hectocotylized arm of males) and distinctly enlarged suckers in males, compared with animals from further north and east (180 to 200 suckers on normal arms, 110 to 130 suckers on hectocotylized arm of males, and enlargement of suckers in males slight or absent). These octopuses form major fisheries, important in subsistence, local small-scale and larger commercial fisheries in many coastal Asian countries, harvested primarily by trawlers.

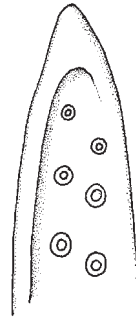
Distribution: *Cistopus indicus*, as it currently stands, occurs in tropical and subtropical coastal waters of the Asian mainland from China, the Philippines, and northern Indonesia, south to Malaysia and west to Pakistan.



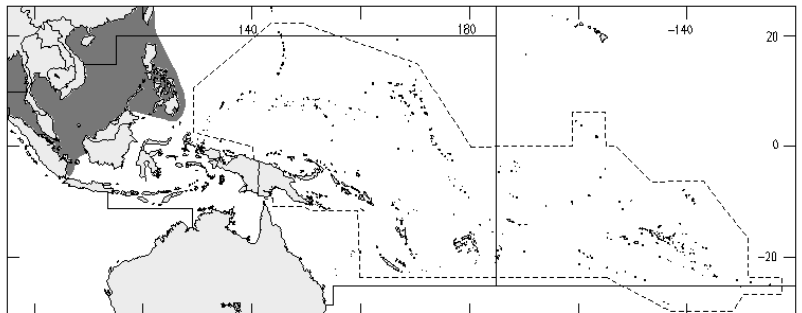
dorsal view



oral view



tip of hectocotylized arm of male



Octopus aegina Gray, 1849

Frequent synonyms / misidentifications: *Octopus dollfusi* Robson, 1828; *O. hardwickei* Gray, 1849 / None.

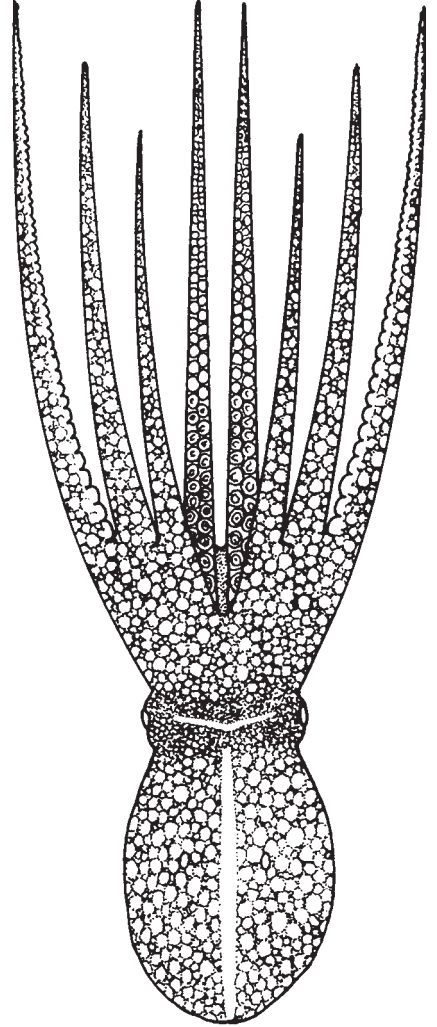
FAO names: **En** - Marbled octopus; **Fr** - Poulpe nain; **Sp** - Pulpo marmóreo.

Diagnostic characters: Moderate-sized robust species. Arms relatively short, 2 to 3 times mantle length. Lateral and ventral arms longest (arm formula IV=III.II.I). Web deep on lateral arms, very shallow between dorsal arms. Right third arm of males hectocotylized with moderate length sharp ligula (4 to 6% of arm length) with distinct calamus. Gills with 8 or 9 lamellae per demibranch. In larger animals, around 110 to 130 suckers on each normal arm, around 60 to 70 on hectocotylized arm of male. Mature males with 2 or 3 enlarged suckers (6th to 8th) on arms II and III (slightly enlarged on arms IV). **Colour:** pattern of reticulations formed by dark grooves defining large, and smaller intermediate, circular patches; reticulated pattern most distinctive on dorsal arm faces; cream coloured longitudinal stripe along dorsal midline of mantle; cream transverse head bar visible in many specimens; skin sculpture of regular round patches and grooves matching colour pattern; diamond of longitudinal skin ridges on dorsal mantle.

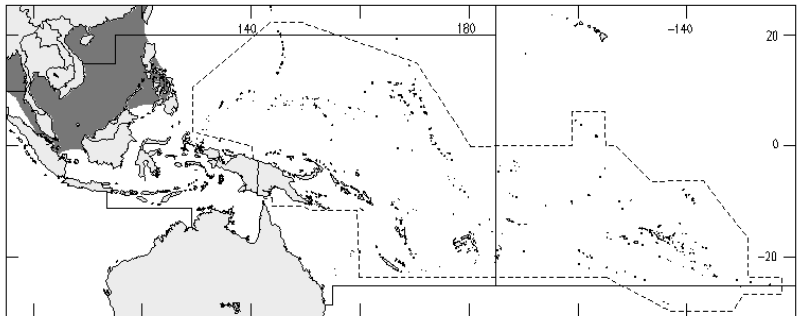
Size: Maximum mantle length 90 mm, total length to around 300 mm; weight to around 100 g.

Habitat, biology, and fisheries: Known from muddy coastal waters found subtidally on soft substrates to depths of at least 40 m. Nothing known of diet or foraging behaviour. This octopus is a major fisheries species throughout coastal mainland Asia, important in commercial trawl fisheries, particularly from the Gulf of Thailand and South China Sea. Exported throughout the world on a large scale along with *Octopus* sp. A (tens of thousands of tonnes annually). Both species are sold and prepared under the name "baby octopus" (at least in Australia and the United States). *Octopus aegina* has frequently been treated under the name of a junior synonym, *Octopus dollfusi*. Large catches of this species reported from Gulf of Thailand under the name *Octopus "dollfusi"*.

Distribution: Found in coastal waters of continental Asia, from China south to Malaysia and west to at least Madras, India. Also reported from the Philippines.



dorsal view



Octopus cyanea Gray, 1849

Frequent synonyms / misidentifications: *Octopus magnocellatus* (Taki, 1964); *O. marmoratus* Hoyle, 1885 / *O. bimaculatus* Verrill, 1883.

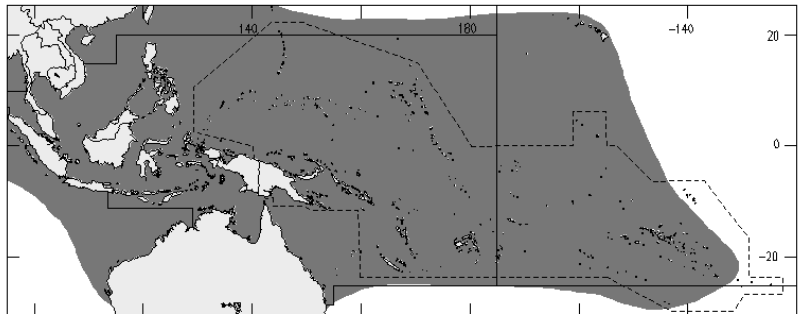
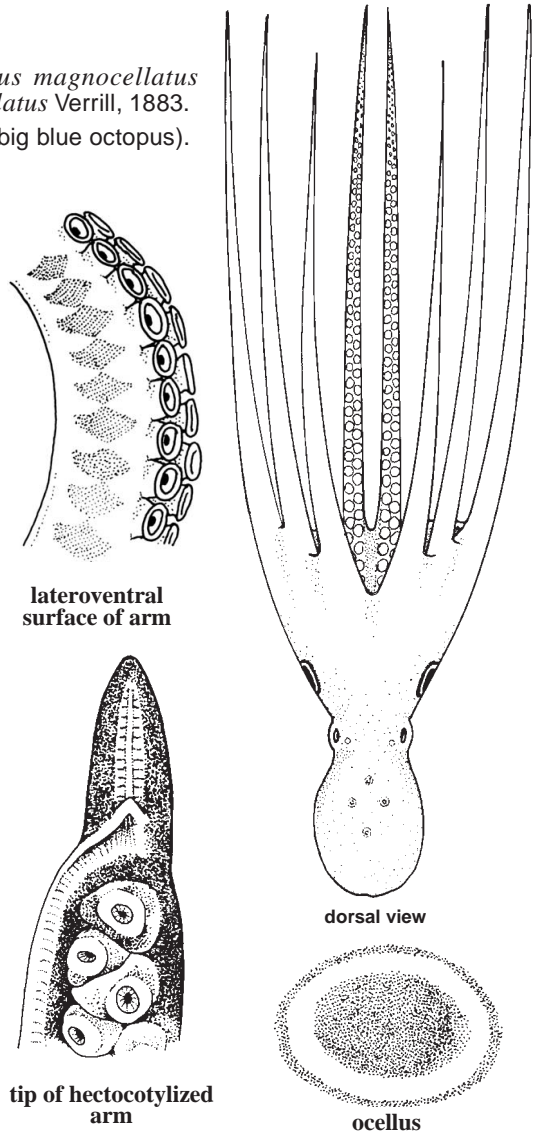
FAO names: En - Day octopus (formerly reported as big blue octopus).

Diagnostic characters: Large and robust ocellate octopus. Arms robust and long, 4 to 6 times mantle length. Dorsal arms slightly shorter than other arms (arm formula IV=III=II.I). Right third arm of males hectocotylized with **tiny ligula (1 to 2% of arm length)**. Gills with 9 to 11 lamellae per demibranch. In larger animals, 400 to 500 suckers on each normal arm, 180 to 230 on hectocotylized arm of male. Mature males with 2 to 4 enlarged suckers (12th to 14th) on arms II and III (slightly enlarged on arm IV). **Colour:** variable from dark chocolate brown through mottled patterns to pale grey; **ocellus present as plain black spot surrounded by pale and dark rings; dark zebra bars on ventrolateral faces of all arms in sub-mature and mature animals;** skin sculpture of irregular patches separated by distinct grooves interspersed by large primary papillae, including diamond of 4 papillae on dorsal mantle and large papilla over each eye.

Size: Maximum mantle length 160 mm, total length to over 1 m; weight to 6 kg.

Habitat, biology, and fisheries: Known from clear tropical waters, from intertidal reefs to depths of at least 25 m, on coral reefs amongst both live corals and dead coral rubble. Preys primarily on crabs and other crustaceans, foraging throughout the day with peak activity at dusk and dawn. Occupies lairs in coral or rock, often visible by midden of large crab carapaces. Females lay up to 600 000 eggs in festoons, each egg around 1 mm long. Important fisheries species collected in large numbers throughout its range in local subsistence and small-scale fisheries. Frequently sold in fish markets, particularly through the central and southern tropical Pacific, in countries such as Fiji, Tonga, Solomons, New Caledonia, Papua New Guinea, and Philippines. Harvested using spear, lures, traps, and chemical irritants to flush animals from lairs.

Distribution: Found widely throughout shallow waters of the tropical Indo-West Pacific region, from Hawaii in the east to the east African coast in the west. Reported as far north as southern Japan and as far south as New South Wales, Australia.



Octopus graptus Norman, 1993a

Frequent synonyms / misidentifications: None / None.

FAO names: En - Scribbled night octopus.

Diagnostic characters: Large robust and muscular species. Arms long, 4.5 to 7 times mantle length. Dorsal arms longer than ventral arms (arm formula I.II.III.IV). Webs moderately deep, deepest 16 to 22% of longest arm. Right third arm of males hectocotylyzed with large cylindrical ligula (around 6% of arm length), with deep groove. Gills with 13 or 14 lamellae per demibranch. In larger animals, around 200 to 280 suckers on each normal arm, around 80 to 90 on hectocotylyzed arm of male. Suckers on longer dorsal arms proportionally larger than other arms, but none markedly enlarged. **Eggs large (to 40 mm) and produced in low numbers (to 700).** **Colour:** white to pink base colour with **dark irregular spots and short lines ("scribbles") over dorsal surfaces**; distal tips of all arms grading to crimson purple; skin sculpture simple, consisting of scattered low papillae evenly distributed over dorsal surfaces.

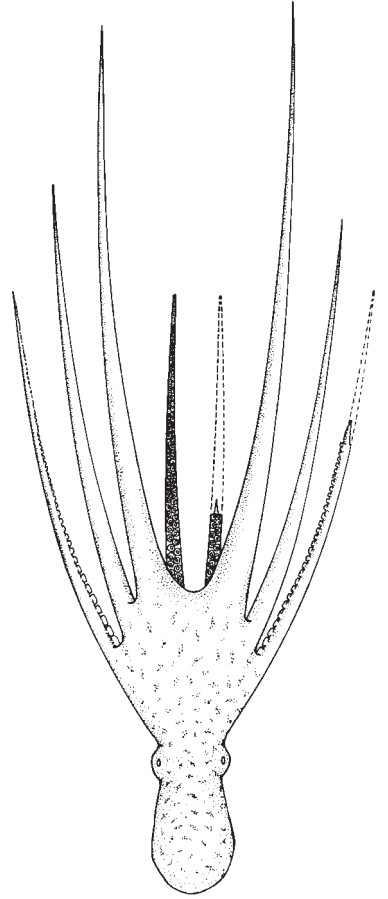
Size: Maximum mantle length 200 mm, total length to over 1.3 m; weight to 5 kg.

Habitat, biology, and fisheries: Known from muddy coastal waters, living subtidally on soft substrates to depths of at least 40 m. Trawl capture data shows this species is caught at night, presumably when it is emerged from lairs and foraging. Captive animals emerge at night to forage, taking a range of prey including crustaceans, bivalves and fish. Females lay large eggs, attached singly to the roof of a lair, not in festoons. This large octopus is commercially harvested as bycatch in prawn trawl fisheries, sold for both human consumption and as bait.

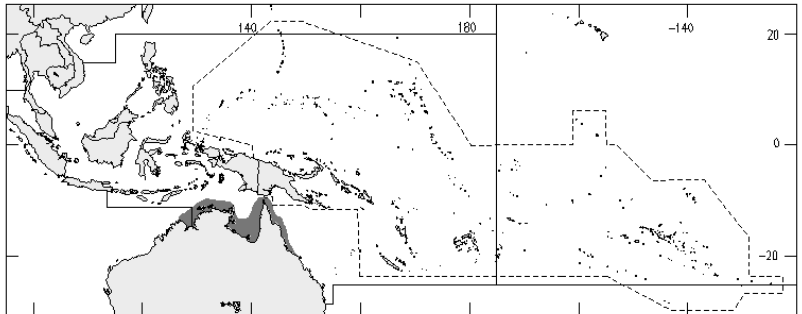
Distribution: Restricted to tropical muddy coastal waters of northern Australia from the Great Barrier Reef to northern Western Australia.



tip of hectocotylyzed arm



dorsal view



Octopus cf. luteus (from Norman and Sweeney, 1997)

Frequent synonyms / misidentifications: None / *Octopus macropus* Risso, 1826.

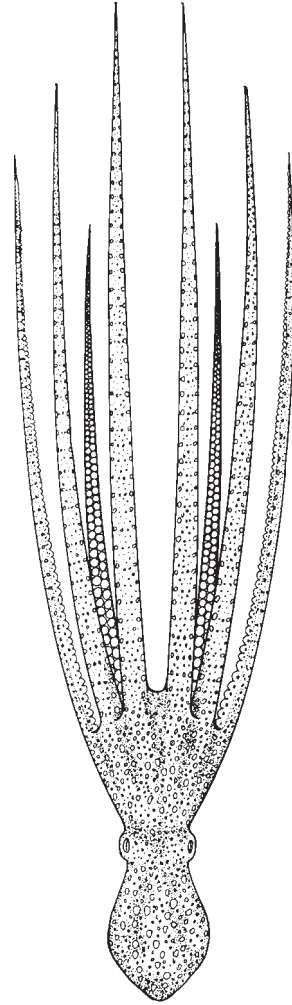
FAO names: En - Small-spot night octopus.

Diagnostic characters: Large elongate species. Arms long, 4.5 to 5.5 times mantle length. Dorsal arms longer than ventral arms (arm formula I.II.III.IV). Webs moderately deep, deepest around 15 to 20% of longest arm. Right third arm of males hectocotylized with large cylindrical ligula with deep groove. Gills with 12 or 13 lamellae per demibranch. In larger animals, greater than 200 suckers on each normal arm, approximately 80 to 90 on hectocotylized arm of male. Suckers on longer dorsal arms proportionally larger than other arms, but none markedly enlarged. **Eggs small type in submature females examined. Colour:** pink to bright red base colour with **many small white spots over dorsal mantle**, arm crown, webs, and arms; **skin sculpture of raised papillae in centres of white spots, interspersed by smaller low papillae over all dorsal and lateral surfaces.**

Size: Maximum mantle length at least 90 mm, total length to over 0.5 m; weight to at least 500 g.

Habitat, biology, and fisheries: Little known of the biology and distribution of this species. Material examined was collected from coral rubble and rocky reefs at depths between 1 and 82 m. Females lay small type eggs, no mature females examined. This octopus is taken in local subsistence harvests and in line and trawl fisheries as bycatch. This species shows similarities with *Octopus luteus* Sasaki, 1929, from Taiwan Province of China and coastal waters of mainland China. Resolution of the identity of this species is not possible until more mature material is available.

Distribution: At this stage, the species treated here is only known from the Philippines.



dorsal view

