

5. OCTOPUSES (Order Octopoda)

Octopoda Leach, 1818, Zool.Miscell., 3(30):138.

The Order Octopoda apparently became distinct from the Coleoid basic line in the Middle Triassic (Jeletzky, 1966). Octopods are divided into two suborders; Cirrata, mostly deep-sea pelagic and epibenthic forms which possess cirri along the arms and have paddle-shaped fins and Incirrata, moderately deep to shallow-living benthic and epipelagic forms which possess neither cirri nor fins. Only the Incirrata are of commercial interest, with some species of Octopus supporting among the major fisheries for cephalopods.

Diagnostic Features : Eight circumoral arms, no tentacles; fins subterminal (on sides of mantle), widely separated, or absent; shell reduced, vestigial, "cartilagenous", or absent; suckers without chitinous rings, set directly on arms without stalks; eye open to sea with primary and secondary (concentric) lids; branchial canal present on gills between down-folded filaments (some exceptions); liver a single structure with incorporated pancreas; central (rachidian) tooth of radula with 1 large projection and 2 or more small lateral cusps, first and second lateral teeth multicuspid; buccal membrane absent; olfactory organ a ciliated pit.

Suborder Incirrata Grimpe, 1916

Incirrata Grimpe, 1916, Zool.Anz., 46(12):353.

Only one of the eight families, Octopodidae, is commercially exploited, although other species taken incidentally also are utilized.

Diagnostic Features : Eight arms with suckers only, no cirri; fins absent.

5.1 FAMILY OCTOPODIDAE Orbigny, 1845

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Octopodidae Orbigny, 1845, Moll.Viv.Foss., 1:164.

FAO Names : En - Octopuses
Fr - Pieuvres, Poulpes
Sp - Pulpitos, Pulpos

General Remarks on the Family : The systematics of the Octopodidae is in a thoroughly unsettled state and the group is very much in need of systematic revision. Three subfamilies exist. Octopodinae, Eledoninae, and Bathypolypodinae (see generic list); separated by relatively minor characters, they all are easily recognizable as octopuses. There are 21 currently accepted genera in this large family, however, only Octopus commonly supports major fisheries.

Habitat and Biology : Most octopuses are benthic animals. Representatives of the family are usually encountered throughout the world from the coast down to at least 1 000 m depth. Many species have cryptic habits hiding in crevices, empty mollusc shells and seagrass beds during the day and hunting at night, others occur over open trawlable bottoms. Many species lay relatively large eggs which are brooded by the female during a prolonged incubation period. During this time females often almost cease feeding and hence in these species, female mortality after the hatching of the eggs is high. Most brooding species have a direct development and hatchlings almost immediately adopt the benthic life of the adults. In other species, the larvae pass through a pelagic stage prior to switching to benthic life. Particularly cryptic species have a well developed territorial behaviour and therefore rarely form aggregations.

Interest to Fisheries : Octopuses are the most traditional of all cephalopod resources, and have been exploited for more than 2 000 years. Their catches during the last few decades have fluctuated between 150 000 and 230 000 metric tons annually (190 000 tons in 1981, representing 14.6% of world cephalopod fisheries in that year (FAO, 1983). The most important octopus fisheries and markets are located in Asia (particularly Japan) and in the Mediterranean countries. Fishing gears for these resources include pots, traps, spears and hooks for the cryptic species, and bottom trawls and seines for those living in open areas.

Octopus aegina Gray, 1849

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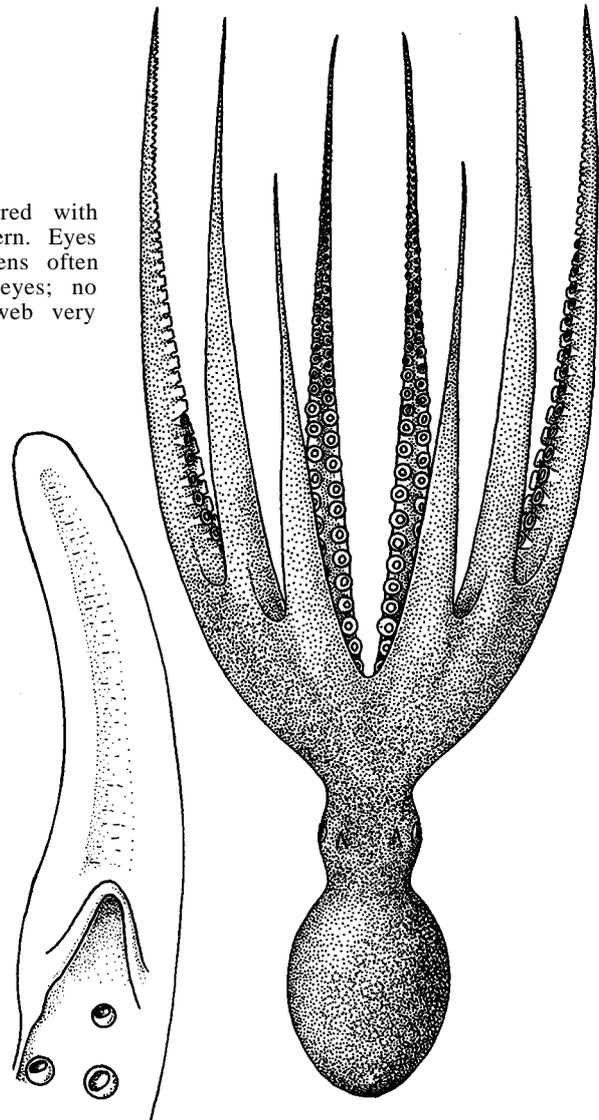
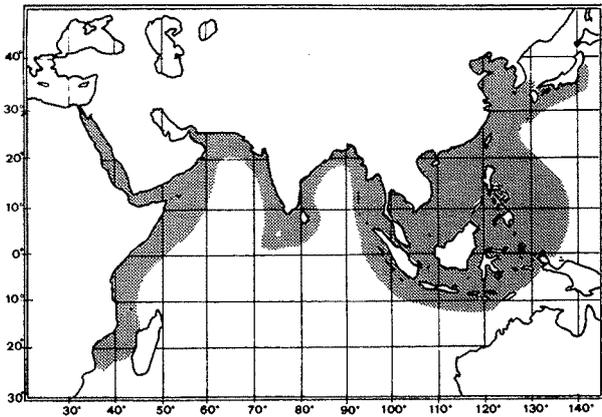
Octopus aegina Gray, 1849, *Cat.Moll.Brit.Mus.*, 1:7.

Synonymy : *Octopus kagoshimensis* Ortmann, 1888.

FAO Names : En - Sandbird octopus
Fr - Poulpe des sables
SP - Pulpo reticulado

Diagnostic Features : Mantle rounded to oval, covered with small tubercles or fine papillae arranged in a reticulate pattern. Eyes prominent, a single cirrus dorsal to each eye; fresh specimens often with a white band across basal surface of head between eyes; no ocellae. Arms long, robust, arms I strikingly the shortest; web very shallow between arms I, moderate depth between other arms; a dark patch of chromatophores appears at the base of each sucker on the dorsal side of each arm; right arm III hectocotyized, ligula short, 5 to 8% of arm length; ligula with very shallow groove; calimus small, distinct; 7 to 10 lamellae on outer demibranch of gill; eggs very small - 2 mm long.

Geographical Distribution : Western Pacific, Indian Ocean, Red Sea, Japan to Mozambique.



tip of hectocotyized right arm III of male

dorsal view

Habitat and Biology : A benthic, not highly cryptic species, common on the continental shelf from 30 to 120 m depth.

Size : Maximum mantle length 10 cm (total length 30 cm), weight 0.4 kg.

Interest to Fisheries : Together with *Cistopus indicusthis* is the commonest species in Indo-Malayan markets. It is trawled on the continental shelf or caught with traps and on hook-and-line. It also supports subsistence fisheries in East Africa.

Local Names : CHINA: Saa liu (sand bird).

Literature : Voss & Williamson (1971, description, biology).

Remarks : Closely related to *O. dollfusi*, which might be a synonym.

Octopus briareus Robson, 1929

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Octopus briareus Robson, 1929, *Ann.Mag.Nat.Hist.*, (10)3:612.

Synonymy : None.

FAO Names : En - Caribbean reef octopus
Fr - Poulpe ris
Sp - Pulpo de arrecife

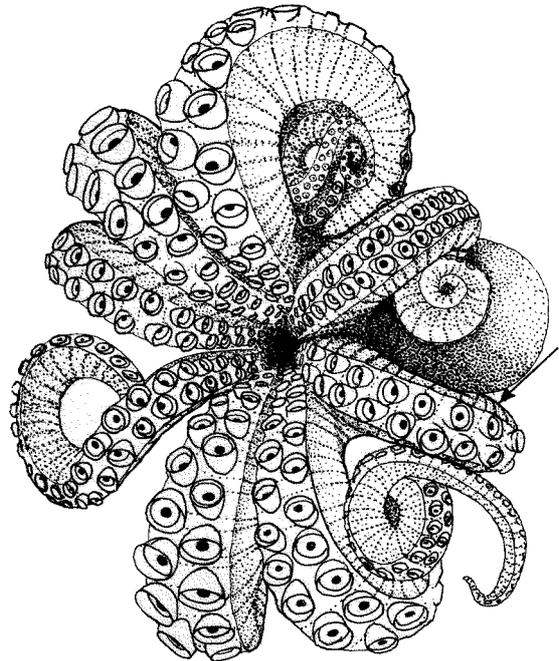
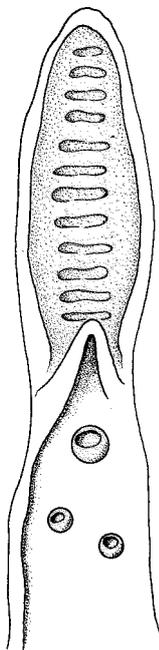
Diagnostic Features : Body chunky, with long arms of unequal length and thickness. Dorsal (I) pair of arms shortest, the least stout, arms II and III longest and very stout; right arm III of males hectocotylyzed by modification of arm tip into a large expanded, ridged and grooved ligula; ligula index (length of ligula expressed as percentage of length of hectocotylyzed arm) 3 or 4; 6 to 8 gill lamellae on outer side of gill.

Geographical Distribution : Tropical Western Atlantic: warm waters of southeastern USA, southeastern Gulf of Mexico, Bahamas, Caribbean islands chain and northern South America.

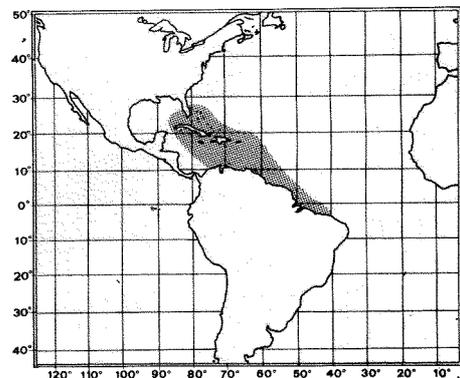
Habitat and Biology : A benthic, cryptic species inhabiting coral reefs in very shallow water, but also found on grass flats, and rocky and sandy bottoms. The spawning season extends from about December to March. Males die after mating. Females lay about 500 eggs in small clusters which they brood and which hatch after 65 days (at temperatures of 23°C). Females usually die after hatching. Recently hatched octopus are large and well advanced and settle immediately in the adult habitat. Longevity is about 1 year. This species feeds on crabs, shrimps, molluscs and sometimes on carrion. Cannibalism is common.

Size : Maximum total length 100 cm and 1.5 kg weight; 60 cm in the warmer parts of the distributional range; common to 40 cm.

tip of hectocotylyzed right arm III of male



oral view



Interest to Fisheries : It is believed that part of the *Octopus vulgaris* catch reported for the western central Atlantic, Fishing Area 31 (almost 7 000 metric tons in 1981) (FAO, 1983), is attributable to *O. briareus*. Although no large-scale fishing operations seem to be directed at *O. vulgaris*, it is fished locally throughout its distributional range. Fishing methods include spearing over open bottoms in very shallow water, extraction from caves and crevices with hooks mounted on poles, and trapping in the traditional clay pots. Octopuses are used fresh for food and as bait.

Local Names : CUBA: Fabiana; USA: Briar octopus, Caribbean reef octopus.

Literature : Voss (1971, resources); Hanlon (1977, laboratory rearing); Roper (1978, Species Identification Sheets, western central Atlantic, fishing area 31).

Remarks : The species has been reared successfully under laboratory conditions and might have some larger-scale aquaculture potential because of its large egg size, direct development, high food conversion efficiency, fast growth, large adult size and its value as a nutritious, marketable food source (Hanlon, 1977).

Octopus burryi Voss, 1950

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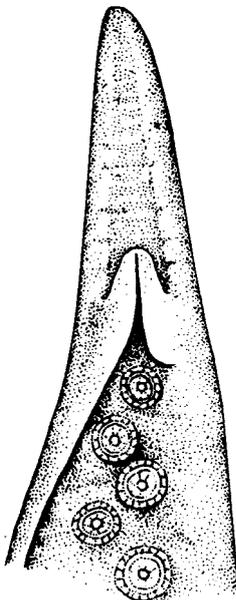
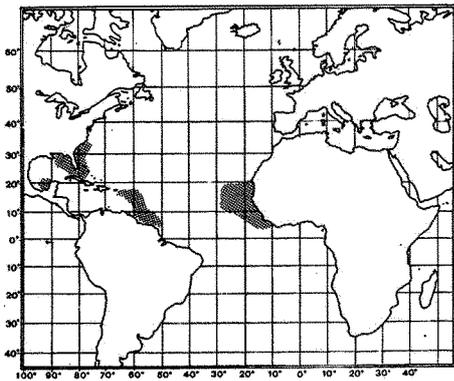
Octopus burryi Voss, 1950, *Rev.Soc.Malac.*, 7(2):76.

Synonymy : *Octopus vincenti* Pickford, 1955.

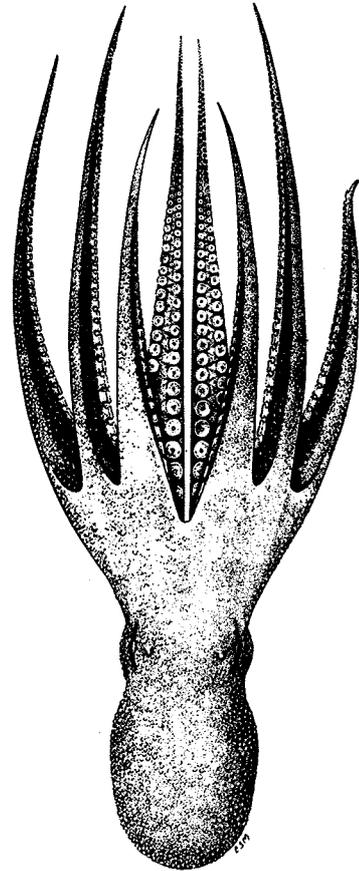
FAO Names : En - Brownstriped octopus
Fr - Poulpe à rayures bleues
Sp - Pulpo granuloso

Diagnostic Features : Mantle, head and arms covered with close-set round papillae; dark blue to purplish-brown band along dorso-lateral surface of each arm; one cirrus over each eye. Right arm III hectocotyized; ligula length 2 to 6% of hectocotyized arm length with weak laminae; calamus with deep groove; 9 to 11 filaments on outer demibranch of gill.

Geographical Distribution : Tropical western Atlantic: North Carolina to northern Brazil. Tropical eastern Atlantic: West Africa.



tip of hectocotyized right arm III of male



dorsal view

Habitat and Biology : A benthic species, associated with bottoms composed of sand, broken coral and shells from 10 m to 200 m on the lower part of the continental shelf.

Size : Maximum mantle length 7 cm.

Interest to Fisheries : Currently taken only as bycatch in trawl fisheries.

Local Names USA : Brownstriped octopus.

Octopus conispadiceus (Sasaki, 1917)

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Polypus conispadiceus Sasaki, 1917, Annot.Zool.Japan, 9(3):367.

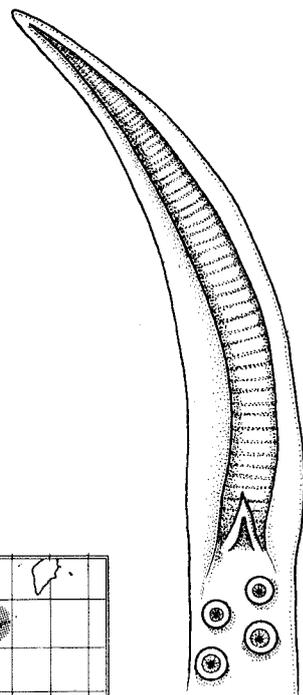
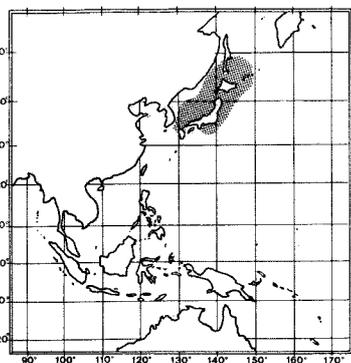
Synonymy : None.

FAO Names : En - Chestnut octopus
Fr - Poulpe casse-noix
SP - Pulpo espadaña

Diagnostic Features : Mantle globular, proportionally small compared with the large, robust arms; surface smooth; one distinct cirrus over each eye. Arms I to III coequal, about 3 times longer than mantle and head; arms IV shorter; right arm III hectocotyized; ligula very conspicuous, 16 to 20% as long as the arm, conical groove deep, narrow, finely striated; calimus acutely pointed, about 1/8 as long as ligula; 20 to 24 gill lamellae (total count).

Geographical Distribution : Western Pacific: Japan, especially around Hokkaido.

Habitat and Biology : A benthic shelf species on sandy to muddy bottoms. It carries out seasonal migrations in response to changes in temperature, tending to alternate between deeper waters in summer and shallower waters in the colder season, but it usually occurs in depths greater than 100 m, so that there is relatively little overlap between the depth ranges of this species, O. dofleini (primarily shallower), and O. araneoides (occurring mostly deeper than 200 m). Mating takes place during the inshore migration. Egg numbers increase with size of females and fluctuate between about 700 and 1 200 (egg diameter ranging between 1.7 and 2.2 mm). The eggs are deposited on the seafloor and brooded by the females throughout the incubation period. During this period females starve and usually die a few days afterwards. The lifespan of this species is assumed to be 3 or 4 years.



tip of hectocotyized right arm III of male

Size : Maximum total length 150 cm and weight 4 kg. Females grow larger than males.

Interest to Fisheries : Abundantly caught by trawl, bottom longline and trap in northern Japan and as bycatch in the Soviet bottom trawl fishery in the Japan Sea and around the southern Kuril Islands. It is the second most abundant species in the market of Hokkaido, next to O. dofleini, but separate statistics are not reported.

Local Names : JAPAN: Yanagi dako.

Literature : Osako & Murata (in press, resources).

Octopus cyaneus Gray, 1849

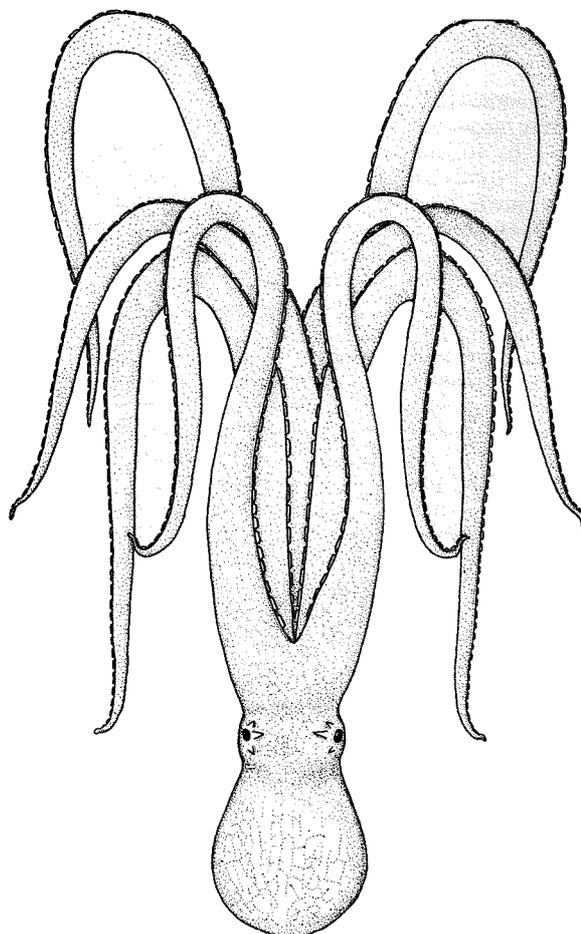
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Octopus cyanea Gray, 1849, *Cat.Moll.Brit.Mus.*, 1:15.

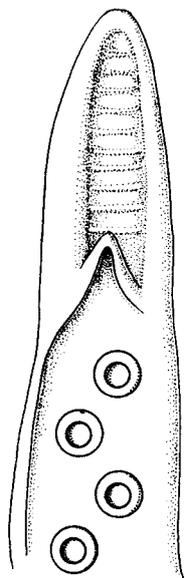
Synonymy : *Octopus marmoratus* Hoyle, 1885; Joubin, 1894; Berry, 1909; *Octopus horsti* Joubin, 1898.

FAO Names : En - Big blue octopus
Fr - Gros poulpe bleu
SP - Pulpo azulón

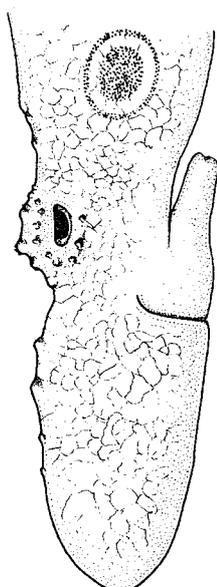
Diagnostic Features : A large octopus. Mantle round to oblong, smooth-skinned (non-papillose) with a few large tubercles; one large cirrus over each eye, usually with 2 secondary, smaller tubercles; a dark purplish, ringed ocellus or "eye spot" located on web on each side between the eye and the base of arms III and IV. Arms stout, robust, coequal, arms IV slightly longer; right arm III hectocotylized; calamus and ligula very small (0.4 to 1.4% of arm length); ligula groove shallow with about 10 often obscured transverse ridges; About 10 filaments on outer demibranch of gill. Colour: mantle mottled, reticulate, arms with purple-brown blotches.



dorsal view



tip of hectocotylized
right arm III of male



lateral view
of body and head

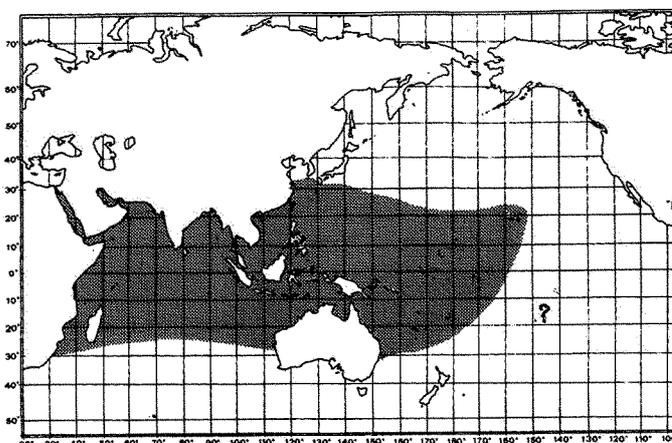
Geographical Distribution : Throughout the Indo-Pacific region: East Africa to Hawaiian Islands in tropical and warm waters including the Red Sea, India and Australia.

Habitat and Biology : A benthic species occurring in shallow waters on coral reefs. Unlike many other octopuses, it hunts during daylight hours.

Size : Maximum total length 120 cm and weight 4 kg.

Interest to Fisheries : It is taken throughout its range in local and subsistence fisheries, especially with traps; also speared at night, using light attraction devices. It is probably the most important of the reef-dwelling species. Used for human consumption.

Local Names : USA: Hawaii: He'e.



Octopus defilippi Verany, 1851

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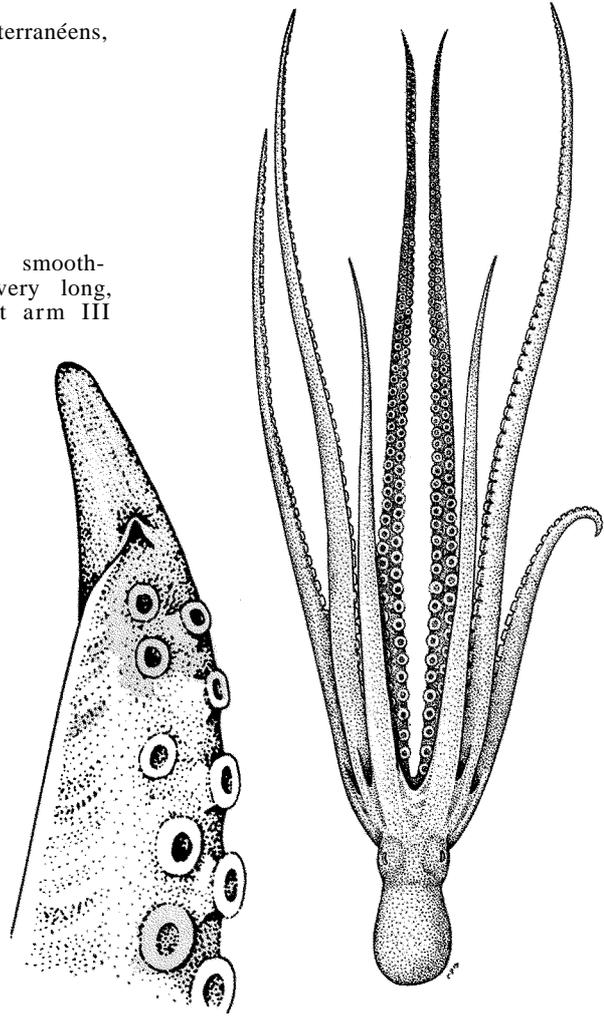
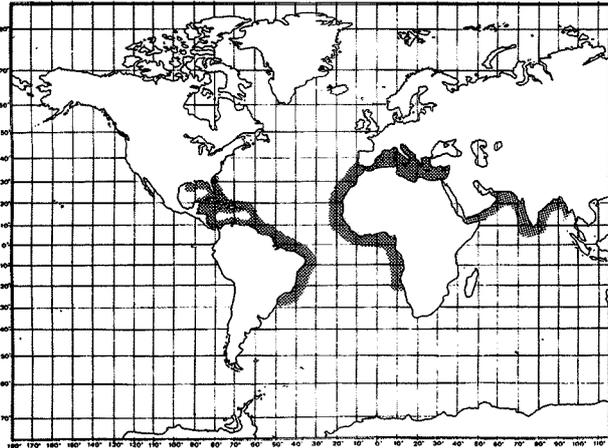
Octopus defilippi Verany, 1851, Mollusques Méditerranéens, 1:30, pl. 11.

Synonymy : Macrotritopus species.

FAO Names : En - Lilliput longarm octopus
Fr - Poulpe à longs bras
Sp - Pulpito patilargo

Diagnostic Features : Mantle relatively very small, smooth-skinned, no pigmented ocellus, spot, or ring. All arms very long, slender, asymmetrical; arms II and III longest; right arm III hectocotylized, very short, with ligula 1.8 to 2.5% of arm length, groove very shallow, calimus very small. Eleven gill lamellae on outer demibranch.

Geographical Distribution : Mediterranean Sea; eastern Atlantic from Morocco to Angola, Cape Verde Islands; western Atlantic: Bahamas, Gulf of Mexico, Caribbean Sea to Brazil; Indian Ocean: Arabian Peninsula to Burma.



tip of
hectocotylized
right arm III
of male

dorsal view

Habitat and Biology : A little known benthic species taken on sandy to muddy bottom from 6 to 60 m depth, but occasionally reported down to 200 m. Its larvae and juveniles are pelagic (called "Macrotritopus larva") and characterized by extremely long arms III. Females lay over 10 000 small eggs (2.1 mm long) that may be brooded in the arms.

Size : Maximum mantle length 9 cm.

Interest to Fisheries : Taken only as bycatch to demersal fisheries directed at other species.

Local Names : ITALY: Polpessa di rena; SPAIN: Pulpo judio; USA: Lilliput longarm octopus.

Octopus dofleini (Wulker, 1910)

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Polypus dofleini Wulker, 1910, *Abh.Bayer.Akad.Wissen.*, 3(Suppl.I):7.

Synonymy : *Polypus dofleini* Wulker, 1910; *Octopus dofleini apollyon* (Berry, 1912); *Octopus hongkongensis* Hoyle, 1885; *O. gilbertianus* (Berry, 1912); *O. punctatus* Gabb, 1862.

FAO Names : En - North Pacific giant octopus
Fr - Poulpe géant (du Pacifique nord)
Sp - Pulpo gigante

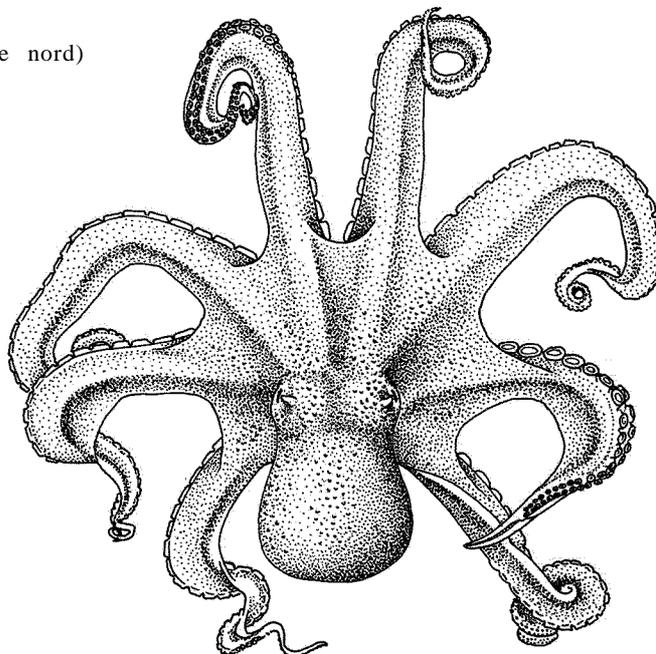
Diagnostic Features : Animal gigantic, the largest of all octopods. Mantle ovate, soft, skin loose, warty, warts often connected with ridges; warts coarser, stelliform in young; 3 or 4 cirri over each eye; web well developed, depth up to 1/4 the way out the arms. Arms thick, long, arms I to III coequal, arms IV shortest; right arm III very prominently hectocotyized, with the ligula occupying 16 to 25% of total length of arm; ligula tapers to blunt terminus; groove depth with numerous fine striations (laminae); calimus small, acute 24 to 30 gill lamellae (total count).

Geographical Distribution : North Pacific: northern California northward through Alaska to Japan.

Habitat and Biology : A benthic, shallow water species occurring from the low tide level to about 200 m depth. Medium to large-sized octopuses are known to migrate seasonally off Japan. They approach the coast between October and November, return to deeper waters from February to March, migrate inshore again in late April and May forming aggregations in June and July, and then migrate back to deeper waters through August and September. Mating takes place during the autumn inshore migration in waters of less than 100 m depth with the males transferring their enormous spermatophores (up to 115 cm long) to the females. Males move back to deeper waters and die several months later, while females continue migrating into shallower waters. Depending on their size, females may produce between 30 000 and 60 000 eggs which are deposited in May and June in nests on rocky or sandy bottoms, less than about 50 m deep. The eggs are brooded by the females during the 6 or 7 months prior to hatching. During this period females almost cease feeding and die shortly afterwards. Hatchlings measure about 10 mm total length. They are planktonic until they reach about 20 to 50 mm total length, and thereafter become benthic (by about March of the following year). They reach adult size (minimum 10 kg weight) in about 3 years. Their lifespan varies between 3 and 4 years.

Size : Maximum total length 300 cm (500 cm?); maximum weight 50 kg; common-between 2 and 10 kg. Females mature at about 10 kg; they grow larger than males.

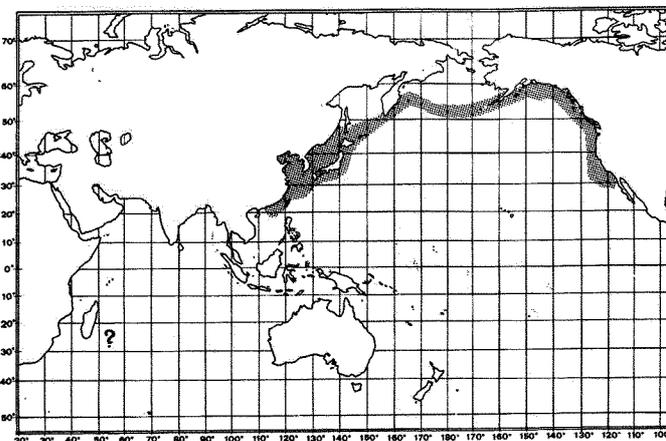
Interest to Fisheries : The most common species of octopuses in northern Japan. Since the beginning of the fisheries off Hokkaido, in 1955, about 20 000 metric tons are being caught per year (including minor quantities of *O. conispadiceus* and *O. araneoides*) (Osako & Murata, in press). It is fished from May to August in shallower waters; down to 60 m depth with wooden traps and from December to February; in depths between about 70 and 150 m with longlines from April to July and from November to February with modified trolls, trailed over the bottom. In the eastern Pacific, giant octopus is taken incidentally in trawl fisheries. The Californian catch is very low and scattered. Fishing depth in the Bering Sea used to be about 40 to 50 m in October but is gradually



dorsal view



tip of hectocotyized right arm III of male



becoming deeper in recent years (possibly in response to changing hydrographical conditions). The species is used locally for human consumption and as bait in longline fisheries.

Local Names : JAPAN: Mizo dako; USA: North Pacific giant octopus.

Literature : High (1977, distribution and notes on biology); Osako & Murata (in press, biology and fishery, Japan).

Octopus dollfusi Robson, 1928

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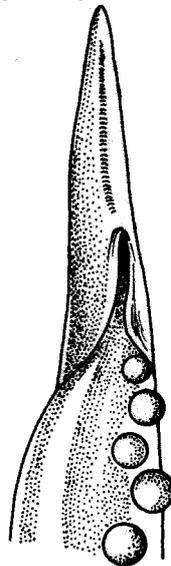
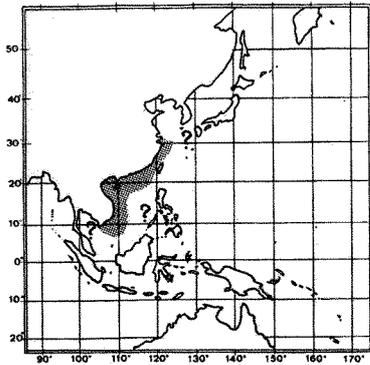
Octopus dollfusi Robson, 1928, Serv.Oceano.Pêches Indo., 10:43.

Synonymy : None.

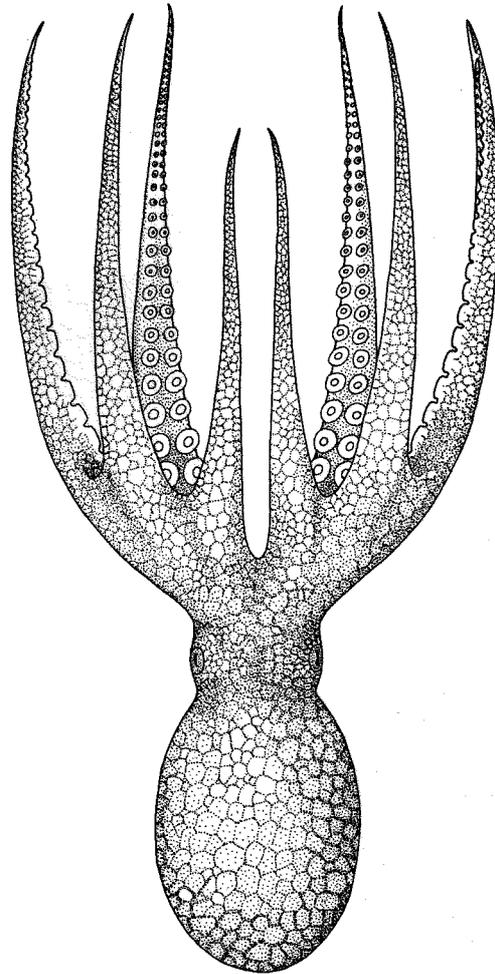
FAO Names : En - Marbled octopus
Fr - Poulpe nain
SP - Pulpo marmóreo

Diagnostic Features : Mantle oblong to elongate oval. Head small with inconspicuous eyes; no eye cirrus. Arms moderately long and stout, dorsal arms much the shortest; mantle, head, and arms covered dorsally with numerous, large warts interspersed with smaller papillae, each unit bordered by a darkly pigmented line, giving a distinct reticulate pattern; right arm III hectocotyized: spermatophoric groove very strong, ligula 8 to 10% of arm length, elongate with a deep groove and well-developed calimus; a few enlarged suckers at bases of arms II and III in males; 8 or 9 lamellae per demibranch on the gills.

Geographical Distribution : Indo-China; Hong Kong; limits unknown.



tip of hectocotyized
right arm III of male



dorsal view

Habitat and Biology : A benthic species living in holes in the bottom or inside empty mollusc shells in extremely shallow waters close to the coast down to a few metres depth.

Size : Maximum mantle length 9 cm, weight 0.2 kg.

Interest to Fisheries : In Hong Kong currently no commercial fishery; taken only as bycatch in demersal trawl fishery.

Local Names :

Literature : Voss & Williamson (1971, description).

Remarks : Closely related to O. aegina.