

The principal types of fishing methods and gear utilized in cephalopod fisheries are the following:

Cuttlefishes are taken mainly as a bycatch in trawl fisheries for finfishes, even though more specialized small-scale fisheries operating with trawls, dredges, seines, jigs and pots, have developed for these species in certain regions (i.e., Mediterranean).

Coastal squids are caught mainly with otter trawls, pair trawls (Southeast Asia), purse seines and by night-lightfishing methods (especially in the spawning season when the squids aggregate in inshore waters); they also are taken as bycatch in fin and shrimp fisheries. Oceanic squids are captured primarily by jigs (often jigging machines); gillnets are effective on some species.

Octopuses are taken by bottom trawls, pots, dragnets, hooks and spears.

The utilization of cephalopods is manifold, ranging from fresh consumption (eaten raw as “sashimi” in Japan) to various types of processing (dried, canned, frozen, reduced to fishmeal, etc.). Their high protein and low fat content make cephalopods an important element in the diet of human populations.

1.3 Illustrated Glossary of Technical Terms and Measurements

Measurements Used

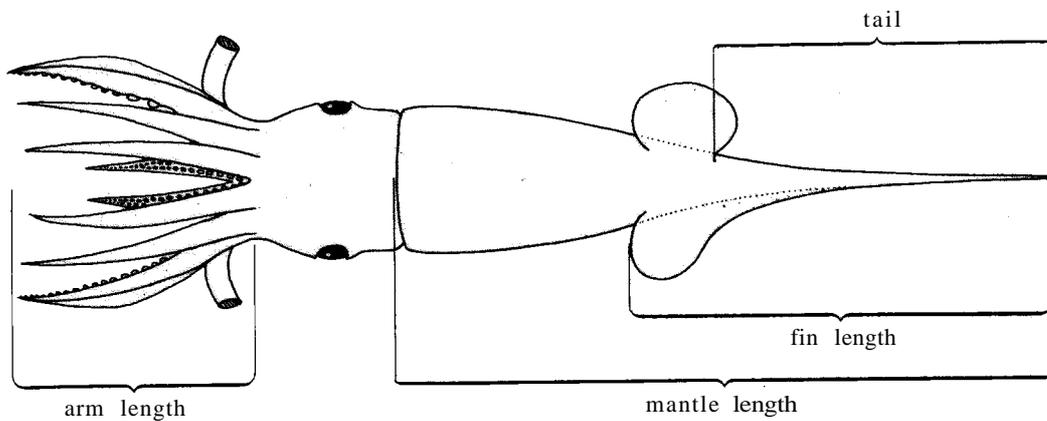


Fig. 2 Schematic illustration of a squid showing measurements for squids and cuttlefishes

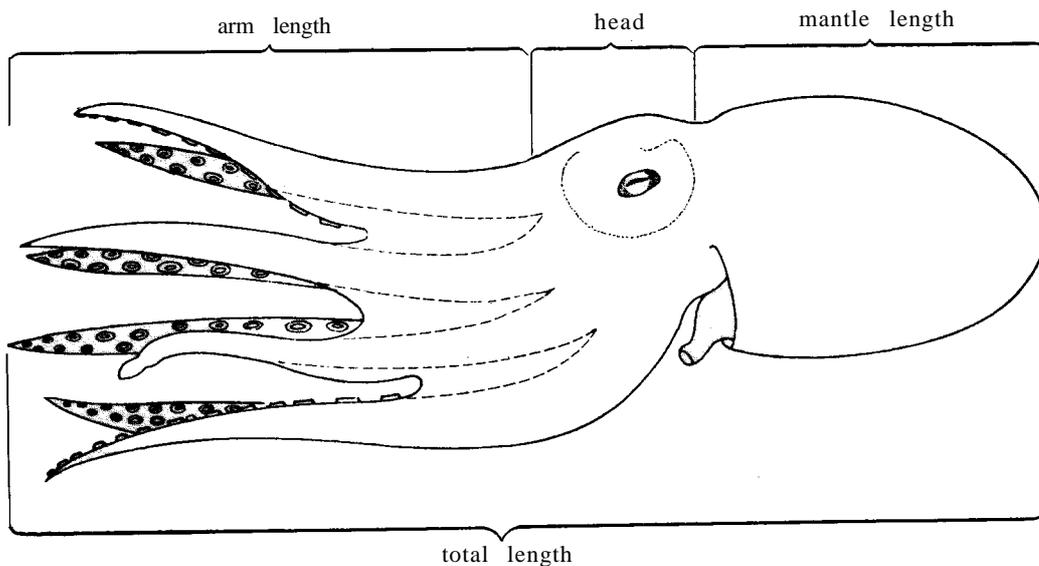


Fig. 3 Schematic illustration of an octopus

Glossary of Technical Terms

Anal flaps - A pair of fleshy papillae that arise at the sides of the anus (Fig. 4).

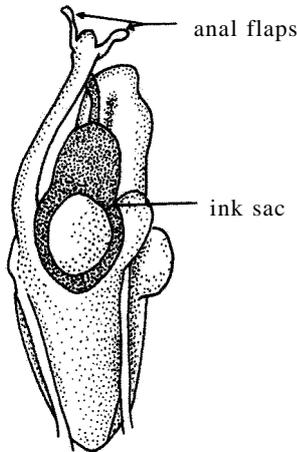


Fig.4

Anterior - Toward the head-end or toward the arm-tips of cephalopods.

Arm formula - Comparative length of the arms expressed numerically in decreasing order, e.g., 3.4.2.1 or 3.2.4.1.

Armature - Refers to the presence and arrangement of suckers and/or hooks on the arms and tentacular clubs of cephalopods.

Buccal lappet - Small, subtriangular flap at tip of muscular band that supports the buccal membrane; may bear suckers (Fig. 5).

Buccal membrane - Thin web of tissue that encircles the mouth, reinforced by 6 to 8 buccal supports Fig. 5).

Buccal membrane connectives - Muscular bands that connect the supports of the buccal membrane to the bases of the arms (Fig. 5)

Buccal suckers - Small suckers on the buccal lappets/membrane (Fig. 5)

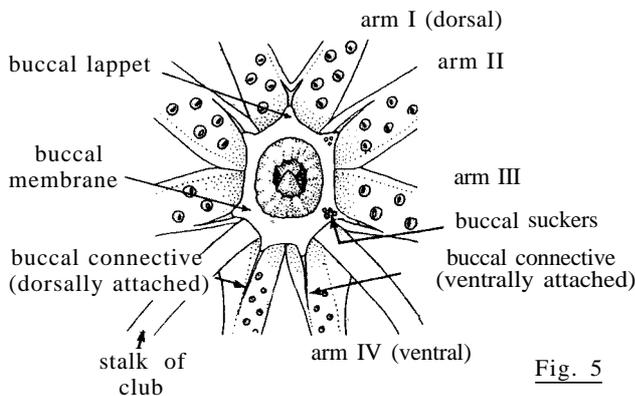


Fig. 5

Calcified - Chalky, calcareous by deposition of calcium salts (calcium carbonate).

Calimus - The conical papilla or projection on the hectocotylus of octopods at the proximal terminus of the sperm groove, distal to the last sucker (Fig. 6) (see Ligula).

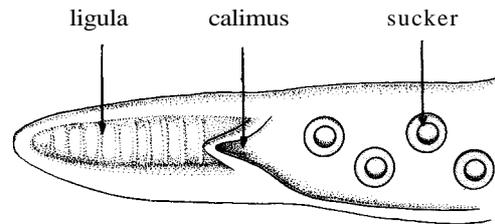


Fig.6

Carpal cluster (Carpal pad) - A usually distinct group of suckers and knobs on the carpus of the tentacular club (Fig. 7).

Carpal knobs - Small, rounded, hemispherical protuberances on the carpus to which carpal suckers from the opposite club adhere during the locking of the clubs (Fig. 7).

Carpal suckers - Small suckers on the carpus of the club that usually adhere to knobs on the opposite carpus during the locking of the clubs (Fig. 7).

Carpus - The proximal zone of (small) suckers (and knobs) on the tentacular club (Fig. 7).

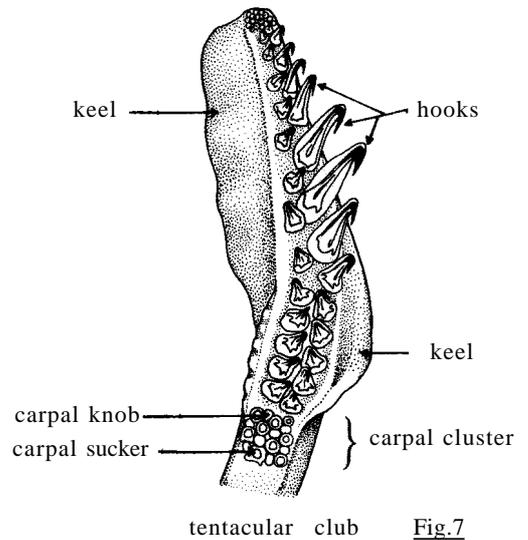


Fig.7

Cartilaginous scales - Cartilage-like structures in the skin of certain squids; may be overlapping and scale-like, or multifaceted knobs or papillae (Fig. 8).

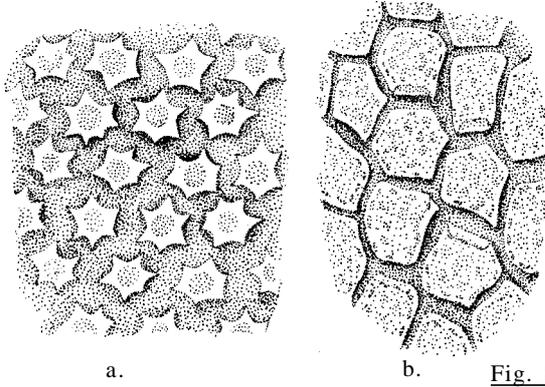


Fig. 8

Chitin(ous) - A horny polysaccharide substance (fingernail-like) that forms the sucker rings, hooks and beaks.

Chromatophores - Pigment-filled muscular sacs in the skin under individual nervous control that collectively provide the background colour, colour patterns, and colour play of cephalopods.

Circumoral appendages - The eight arms (squids, cuttlefishes and octopuses) and two tentacles (squids and cuttlefishes) or the very numerous arms (*Nautilus*) that arise from the head and encircle the mouth of cephalopods (Fig. 5).

Cirri - Arm: elongate, fleshy, finger-like papillae along the lateral edges of the oral surface of the arms, especially in cirrate octopods (Fig. 9).

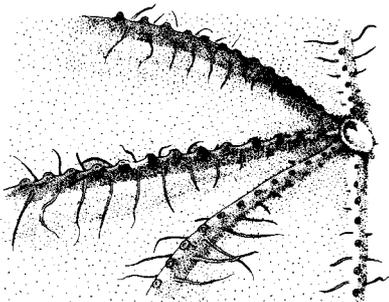


Fig. 9

Body: fleshy protuberances of the skin that can be erected as papillae, usually over the eyes (Fig. 10).

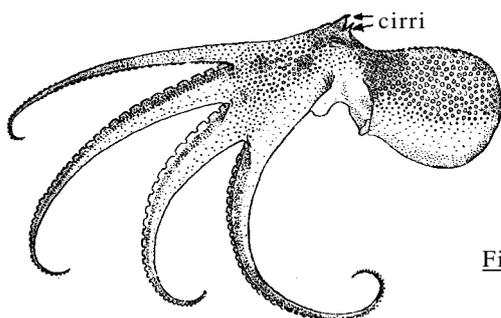


Fig.10

Cones, conus - The spoon-like or cup-like conical posterior terminus of the gladius or cuttlebone; homologous to the phragmacone of fossil teuthoids (Fig. 11).

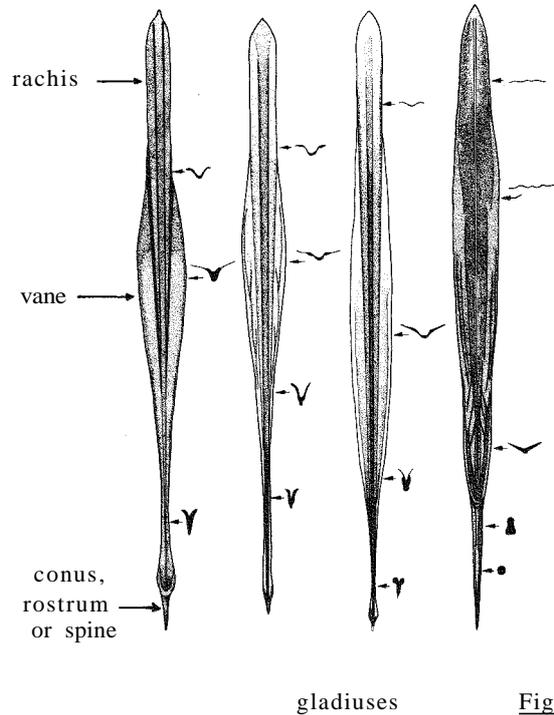
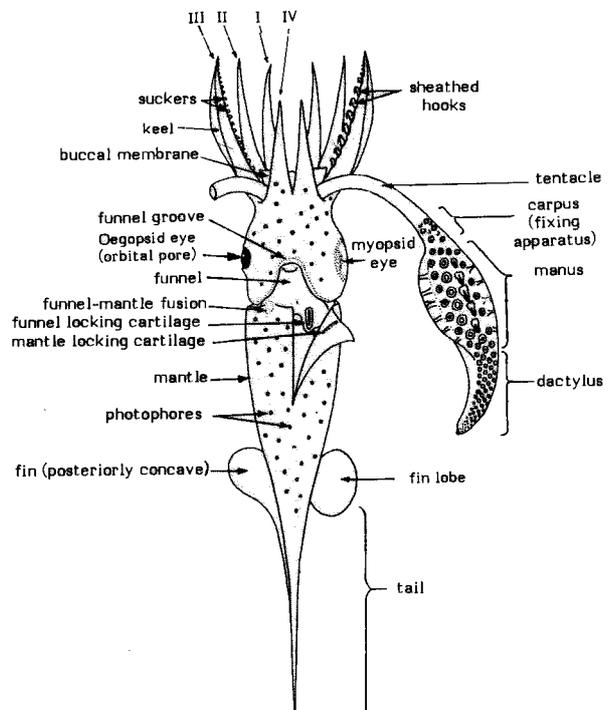


Fig.11

Corneal membrane - The very thin, transparent skin that covers the eyes of myopsid and sepioid cephalopods (Fig. 12).

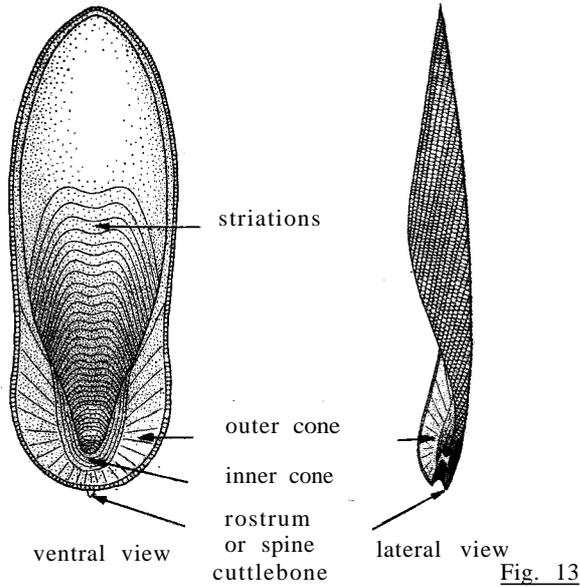


a composite diagram illustrating basic squid (teuthoid) features

ventral view

Fig.12

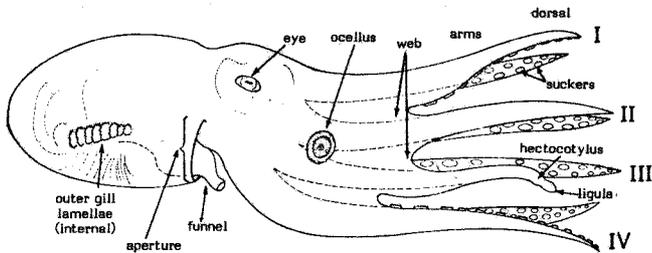
Cuttlebone - The calcareous (chalky) oblong, supporting plate in the dorsal part of the mantle of cuttlefishes (see Sepion) (Fig. 13).



Dactylus - The distal, terminal section of the tentacular club, often characterized by suckers of reduced size (Fig. 12).

Distal - Away from the body or point of origin; toward the peripheral parts (opposite of proximal).

Dorsal - The uppermost or back surface of a cephalopod, opposite the ventral surface where the funnel is located (Fig. 14).



schematic lateral view of octopus features Fig. 14

Fin angle - The angle between the longitudinal axis of the mantle and the posterior border of one fin (Fig. 15).

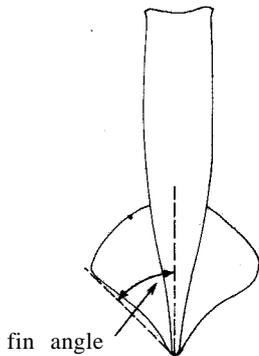


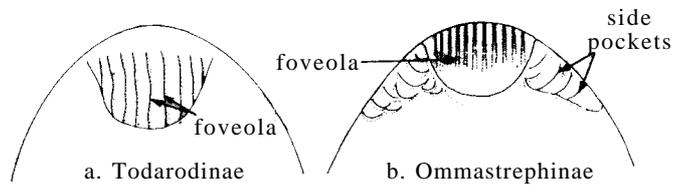
Fig. 15

Fin lobe - The portion of each fin that protrudes anteriorly from the anterior point of attachment of the fin to the mantle (Fig. 12).

Fins - The pair of muscular flaps that arise along the dorsolateral surface of the mantle of sepioids, teuthoids, and cirrate octopods; used for locomotion, steering and stabilization (Fig. 12).

Fixing apparatus - The mechanism of suckers and knobs on the carpal region of the tentacular club that permits the two clubs to be locked together during capture of prey (Fig. 7) (see Carpus).

Foveola - Transverse, membranous fold of skin that forms a pocket in the funnel groove of some oegopsids (Fig. 16) (see Side pockets).

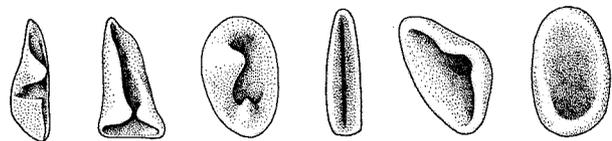


funnel groove Fig. 16

Funnel - The ventral, subconical tube through which water is expelled from the mantle cavity during locomotion and respiration (reproductive and waste products and the ink also pass through the funnel) (Figs 12, 14). Archaic term - siphon.

Funnel groove - The depression in the posteroventral surface of the head in which lies the anterior portion of the funnel (Fig. 16).

Funnel locking-cartilage - The cartilaginous groove, pit, pocket, on depression on each ventrolateral side of the posterior part of the funnel that joins with the mantle component to lock the funnel and mantle together during locomotion, so water is expelled only through the funnel and not around the mantle opening (Figs 12, 17) (see Mantle locking-cartilage).



funnel locking-cartilage Fig. 17

Funnel organ - The glandular structure fused to the internal surface of the funnel, generally a single W-shaped form in octopods and a dorsal inverted V-shaped component with opposed ventral oblong components in decapods (Fig. 18).

Funnel valve - The semilunar muscular flap in the dorsal surface of the distal opening of the funnel (Fig. 18).

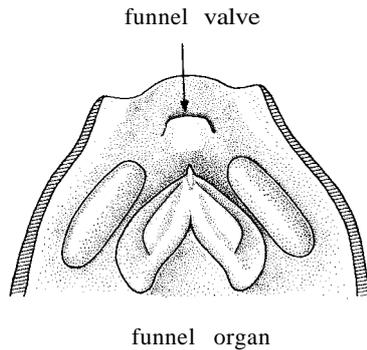
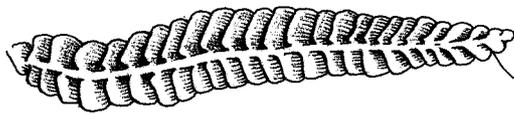


Fig. 18

Gill lamellae - The leaf-like convoluted individual components of the gill through which gas exchange occurs (Figs 19, 22).

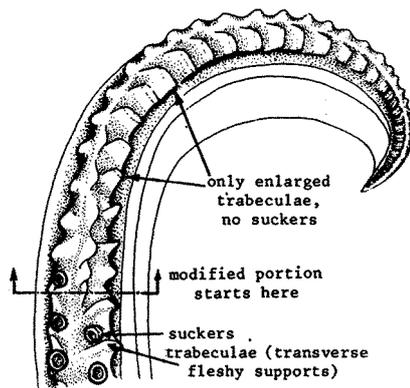


gill lamella

Fig. 19

Gladius - The feather or rod-shaped chitinous supporting structure in the dorsal midline of teuthoids and non-sepiid sepioids; the homolog of the shell of ancestral forms (Fig. 11) (= Pen)

Hectocotylus - One (or more) arm(s) of male cephalopods modified for transferring spermatophores to the female; modifications may involve suckers, sucker stalks, protective membranes, trabeculae (Figs 6, 20) (see Calimus, Ligula).



hectocotylized arm
(*Illex oxygonius*)

Fig. 20

Hooks - Chitinous, claw-like structures ontogenetically derived from the suckers on the arms and/or clubs of some oegopsids (Fig. 7).

Ink sac - The structure that manufactures and stores the ink of cephalopods; it lies along the intestine and empties via a duct into the rectum (Fig. 4).

Keel - (1) A flattened, muscular extension along the aboral surface of some arms to render them more hydrodynamic (Fig. 12); (2) 1 or 2 expanded muscular membranes on the tentacular club of some groups (Fig. 7).

Lateral - Pertaining to the side(s) of an organism or structure, away from the centre or midline.

Light organ - A simple or complex structure that produces bioluminescence by intrinsic (self-generated) or extrinsic (bacterial) means (also termed **photophore**) (Figs 12, 21).

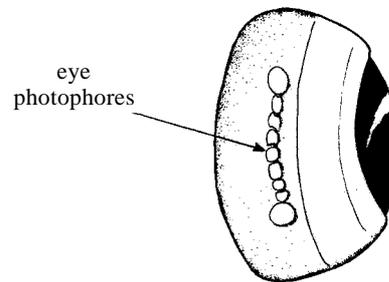


Fig. 21

Ligula - The spatulate to spoon-shaped, terminal structure of the hectocotylus of octopods, that contains the calimus basally (proximally) and usually a series of transverse ridges and grooves on the oral surface (Fig. 6) (see Calimus, Hectocotylus).

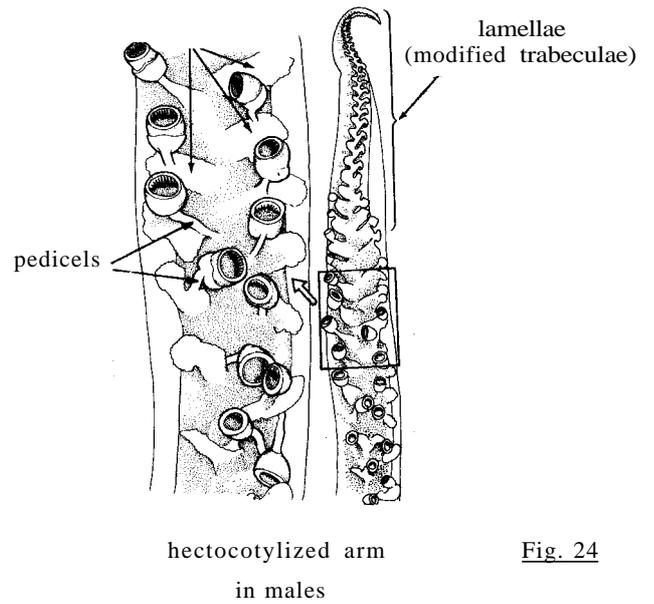
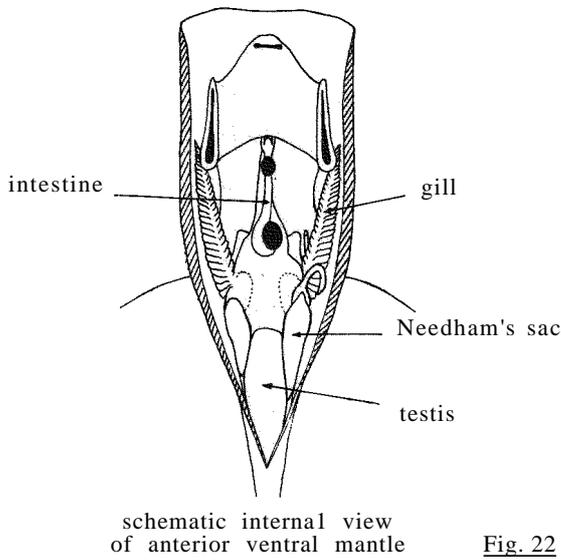
Mantle - The fleshy (muscular) tubular or sac-like body of cephalopods; provides propulsion through jet-like expulsion of water; contains the viscera (Figs 12, 14).

Mantle locking-cartilage - The cartilaginous ridge, knob or swelling on each side of the ventrolateral, internal surface of mantle that locks into the funnel component of the apparatus during locomotion (Figs 12, 18) (see Funnel locking-cartilage).

Manus - Central or "hand" portion of club between the dactylus distally and the carpus proximally (Fig. 12).

Medial(n) - Pertaining to a structure located towards, on, or along the midline.

Needham's sac - The elongate, membranous container at the terminus of the male reproductive tract that stores completed spermatophores (Fig. 22) (= spermatophore sac).



Ocellus - A pigmented spot or patch usually consisting of a central locus of concentrated chromatophores with one or more concentric rings of chromatophores. Ocellae occur on some octopuses, and their normally vivid pigmentation make them stand out against the background colouration (Fig. 14).

Olfactory papilla - A bump-like to finger-like protuberance on the posterolateral surface of each side of the head; of presumed olfactory function.

Orbital pore - Minute pore in the anterior part of the transparent tissue that covers the eyes of sepoids and myopsids (see Orbital sinus) (Fig. 12).

Orbital sinus - An anteriorly directed indentation in the eyelid of oegopsids (Fig. 23) (see Orbital pore).

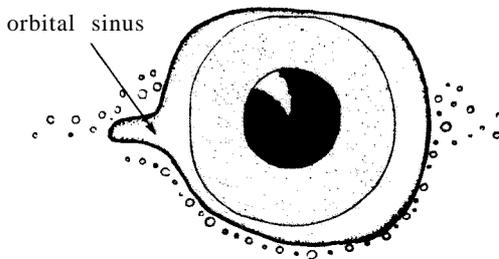


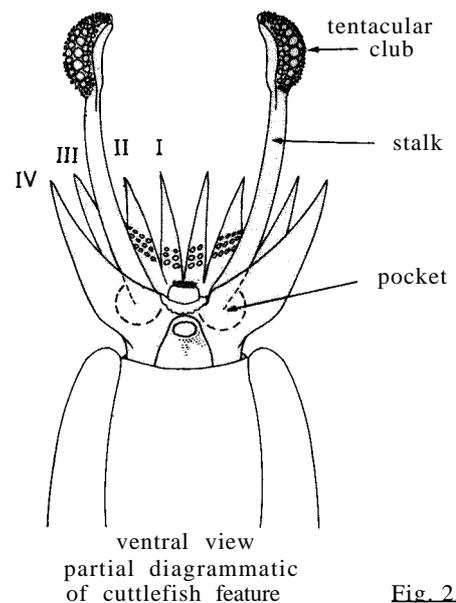
Fig. 23

Pedicel - A short, tubular stalk that supports a sucker in sepoids and teuthoids (Fig. 24).

Pen - See gladius.

Photophore - An organ of greater or lesser complexity that produces and distributes bioluminescence, either intrinsically through biochemical reaction or extrinsically through luminescent bacteria (Figs 12, 21) (see Light organ).

Pocket - An open depression in the antero-ventral surface of the head of sepoids into which the feeding tentacles are retracted when not in use (Fig. 25).



Posterior - Toward the tail-end of cephalopods.

Protective membrane - Thin web-like integument along the lateral angles of the oral surface of the arms and clubs lateral to the suckers, supported by muscular rods called trabeculae (Fig. 26) (see Trabeculae).

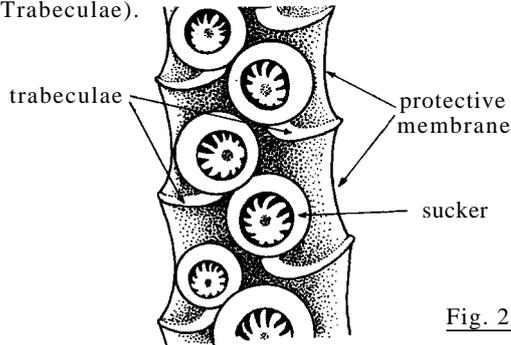


Fig. 26

Proximal - Toward the body or nearest or next to the point of origin or attachment; (opposite of distal).

Rachis - The thickened central axis that usually extends the entire length of the gladius. Free rachis is the portion that does not support vanes (Fig. 11) (see Gladius, Vane).

Radula - The chitinous, ribbon-like band in the mouth of cephalopods containing several transverse rows of teeth (Fig. 27).

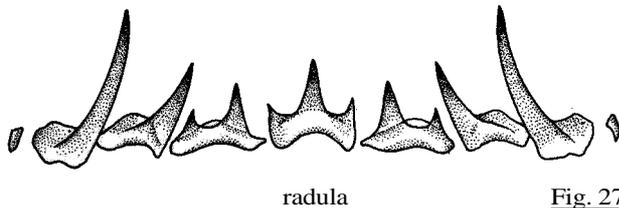


Fig. 27

Rostrum - A spike-like posterior extension of the gladius or cuttlebone, exterior to the conus (Figs 11, 13) (see Spine).

Secondary web - The narrow membrane that connects the primary web to the arms in some cirrate octopods; e.g., Cirroteuthidae.

Sepion - The calcareous dorsal supporting structure in the mantle of cuttlefishes (Fig. 13) (= cuttlebone).

Side pockets - Small membranous folds of the integument that form pockets lateral to the foveola (Fig. 16) (see Foveola).

Sperm receptacle - A bulbous structure in the buccal region of some female cephalopods, e.g., loliginids, for the retention of viable sperm until they are required for fertilization.

Spermatophore - A tubular structure manufactured by male cephalopods for packaging sperm; capable of holding millions of sperm, being transferred intact, and attaching to the female until fertilization begins (Fig. 28).

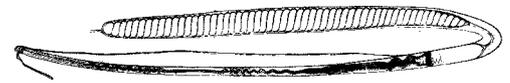


Fig. 28

Spermatophore pad - A fleshy patch of tissue, usually in the mantle cavity of some female cephalopods (e.g. loliginids), to which spermatophores adhere after mating until fertilization occurs.

Spine - The sharp spike-like extension on the posterior tip of the gladius or cuttlebone (Fig. 13) (see Rostrum).

Suckers - Muscular, suction-cup structures on the arms and tentacles (rarely on the buccal membrane) of cephalopods; some are stalked, placed on muscular rods that contract (squids and cuttlefishes); some are sessile, embedded without stalks on the oral surface of the arms (octopuses) (Fig. 29a). They are usually counted either in longitudinal or in transverse (oblique) rows (Fig. 29b).

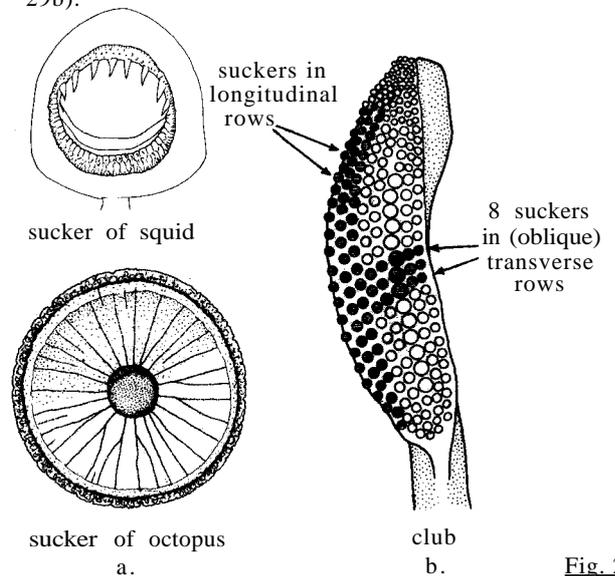


Fig. 29

Sucker ring - Chitinous, often serrated or denticulate ring that encircles the opening of suckers of squids and cuttlefishes (Fig. 31).

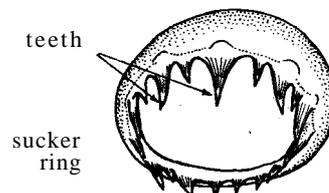


Fig. 30

Swimming membrane (keel) - An elongate, muscular vane along the aboral surface of arms of cephalopods that functions to streamline and support the arms during swimming (Figs 7, 12).

Tail - The posterior extension of the mantle, frequently elongate. Fins or tapered terminations of fins may extend posteriorly along the tail (Fig. 12).

Tentacles - Elongate, stalked circumoral appendages of cuttlefishes and squids used for prey-capture; distal ends contain clubs with suckers (or hooks); stalks usually devoid of suckers. Tentacles can retract into pocketson the head of cuttlefishes, or merely contract, in squids (Figs. 12, 25).

Tentacular club - Terminal portion of a tentacle; armed with suckers (or suckers and/or hooks), used for capturing prey (Figs 7, 12, 25).

Trabeculae - Muscular rods that support the protective membranes on the arms and clubs of cephalopods; occasionally membranes are reduced and/or trabeculae are elongated, so they extend beyond the edge of the membrane, papilla-like (Fig. 26).

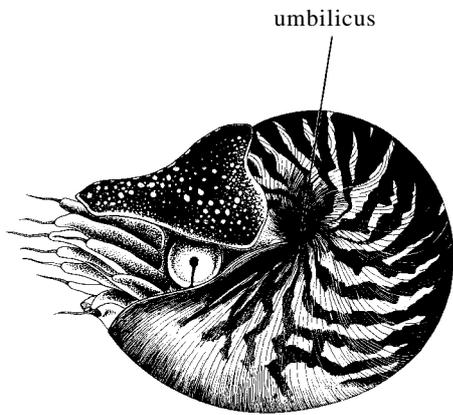
Umbilicus - The central core of the chambered Nautilus shell, representing the juvenile shell with its initial coils (Fig. 31).

Vane - Thin lateral expansion of the gladius that arises from the rachis (Fig. 11) (see Rachis).

Ventral - The lowermost or belly surface of a cephalopod; the surface on which the funnel is located; opposite the dorsal surface (Figs 12, 14).

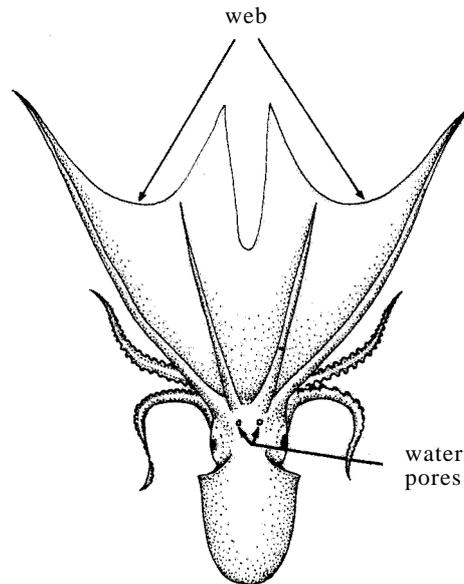
Water pores - Small orifices at base of the web of some pelagic octopuses, e.g., Tremoctopus (Fig. 32).

Web - A membranous sheet of greater or lesser extent that extends between the arms of many octopuses, giving an umbrella-like appearance when the arms are spread out, e.g., on cirroteuthids (Figs 14, or 32).



lateral view

Fig. 31



dorsal view

Fig. 32