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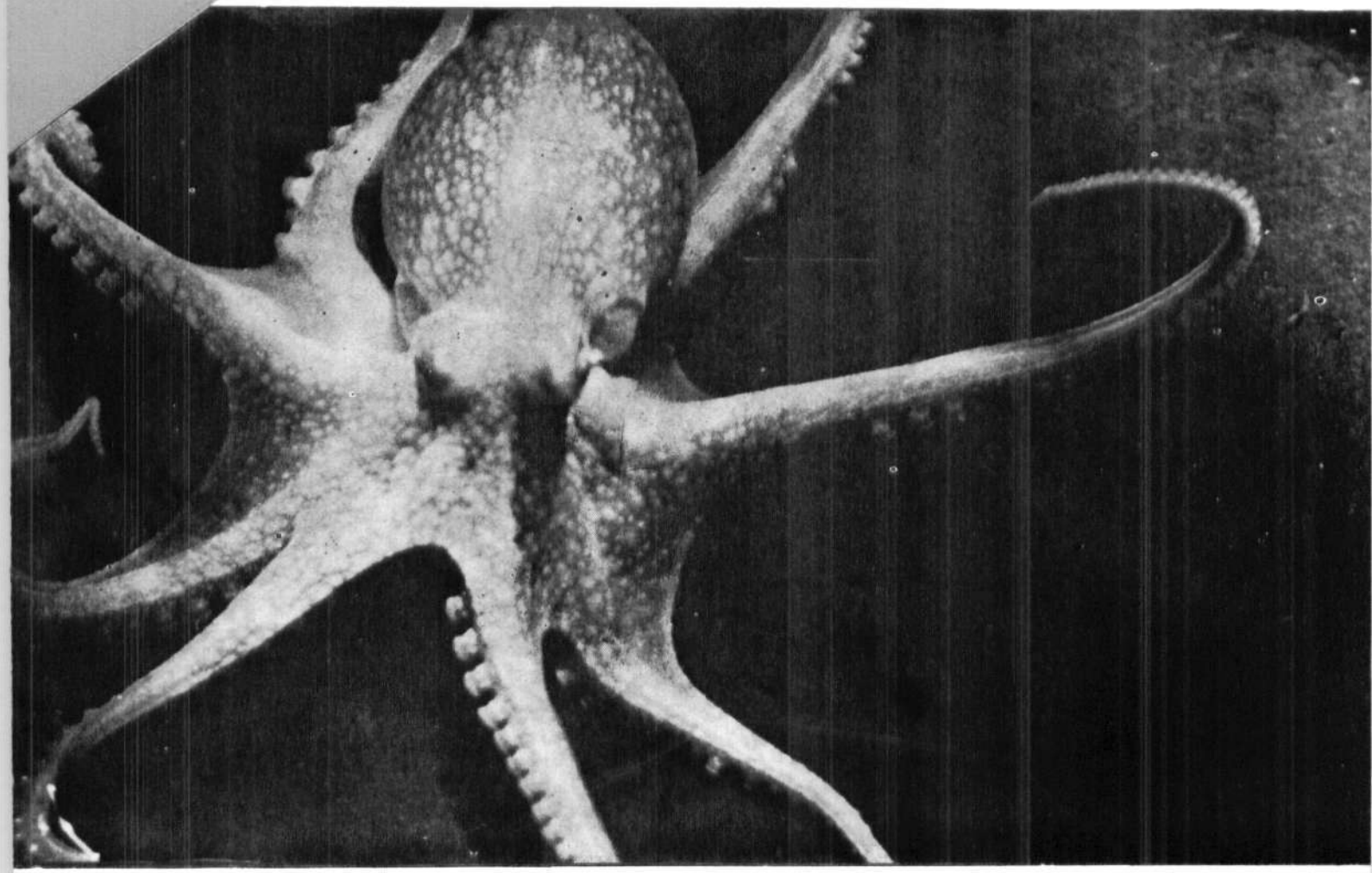

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HAND-JIGGING FOR CUTTLEFISH AT VIZHINJAM WITH A NOTE ON MODERN SQUID JIGGING

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ABSTRACT

At Vizhinjam on the southwest coast of India almost the entire catch of the cuttlefish *Sepia pharaonis* is taken in a modified type of hooks, the hand-jigs. The hand-jig consists mainly of a small iron rod with tires of hooks and a long monofilament line. The baited jig is operated on the sea bottom from a catamaran and normally one cuttlefish is taken per haul. A brief note on the modern squid jigging as practised in Japan is also given.

INTRODUCTION

Though squids and cuttlefish are obtained as a by-catch in the landings by shore seines, boat seines, hooks and lines and trawl nets all along the Indian coast, 'hand-jigging' is employed exclusively for cuttlefish at Vizhinjam (Trivandrum). Almost the entire catch of cuttlefish landed at Vizhinjam is taken by modified hooks (jigs), and a small portion in hooks and lines. Since both these types of gear are taken in the same craft (catamaran) and operated in the same fishing ground, the combined catch is recorded under the gear category 'hooks and lines'. However, it is estimated that over 95% of the cuttlefish taken in hooks and lines at Vizhinjam are got by hand-jigging. This fishery has developed during the last decade.

The hand-jig, so named because of its general similarity to a typical squid jig having one or more circles of hooks attached to a wooden, metal or plastic shaft tied to a line, is purely a local innovation restricted to Vizhinjam and some nearby fishing villages on the southern part of the southwest coast of India where the large-sized cuttlefish *Sepia pharaonis* is abundant. While trawling accounts for almost the entire catch of cuttlefish in the other parts of the Indian coast, trawl fishing is not being attempted in this region because of the uneven nature of the sea bottom.

Locally known as *nangoora choonda*, literally meaning 'anchor hook', because of its resemblance to a grapnel, the hand-jig has mainly three parts : a thin rod with two or sometimes three tiers of hooks, another rod with a weight attached to it, and a 40-60 m long line tied to the latter. The first rod is a piece of umbrella rib about 30 cm long and tied to its one end in a circle are 4 or 5 hooks of No. 9-12 (Plate IB). About three centimetres above this circle, there is another circle of similar hooks. Above this there is a still larger single hook of No. 7 or No. 8. The free end of the rod is tied to a long plastic monofilament line. About 150 cm above the rod, another small rod 30 cm in length is attached on the line parallel to it. An iron weight of about 100-150 g is tied at the middle of this rod with a 30 cm string. The long line is wound on a wooden line holder (Plate IA).

The description given above is of a typical hand-jig but in the jigs used by fishermen, though the basic features are the same, there may be small variations in the size and number of hooks, length of the rod, size of the weight and the length of the long line.

The hand-jig is operated from a catamaran during daytime. After reaching the fishing ground, bait fishes are caught by using hand lines with small hooks (No. 16). For catching the bait fishes, baits such as pieces of small squids, arms of cuttlefish or small fishes are taken when the fishermen start their fishing trips. The bait fishes generally obtained are small fishes such as *Nemipterus*, sardines, sciaenids, carangids, *Chirocentrus*

and ribbon-fish. The fish is cut into small pieces and a piece is either pierced through on the single hook or tied to the rod with a very thin thread. If the bait fish is small, its head portion is hooked on to the single hook and keeping the fish along the rod its tail portion is tied to the rod.

The baited jig is lowered into the water, releasing the required length of the line. When the weight touches the bottom, the fisherman sitting on the catamaran holds the line in the hand or sometimes on the toe. The baited jig will be lying in a horizontal position on the bottom, away from the weight. Since the latter is tied to the second piece of iron rod, the jig is enabled to move freely, staying clear of the line without any entanglement. Usually two units are operated by a person, with one on either side of the catamaran, and likewise two or even three persons conduct fishing simultaneously from a catamaran, except the person steering the craft who uses only one unit of the gear. The cuttlefish, on seeing the bait, entangles it with all its arms trying to pull it and this is felt on the line by the fisherman operating the hand jig. The animal has the habit of holding the prey or bait with all its arms and clinging firmly to it unless disturbed strongly. This habit is taken advantage of in the fishery by hand jigging. When the heaviness of the cuttlefish holding or pulling the bait is felt on the line, the line is gently lifted up for a short while, and after making sure that it is still holding the bait, the line is given a sudden jerk. With this the cuttlefish in hooked on one or more of the hooks of the jig (Plate ID). The gear is then slowly hauled up and when the cuttlefish reaches near the surface, it is collected with a small scoop net. Once out of water, the cuttlefish may drop off the jig but the scoop net prevents such escape. Sometimes the cuttlefish may not be hooked at all but it will cling to the bait until it is hauled up and collected.

In most cases, only one cuttlefish is taken in a haul but when a school of them happen to be around the jig, more than one and sometimes upto three or four, including one clinging on to the weight, are taken in a single haul, though such instances are rare. The magnitude of the catch depends on the availability of cuttlefish in the fishing ground ; however, on an average 10-20 cuttlefishes are taken on a day's fishing. In good seasons the number may go upto 100 or even more per catamaran per day.

Normally the fishing is done 5 to 7 km away from the shore but sometimes upto 10 km, especially in the summer months of February to April when the water is clear and the cuttlefishes migrate to deeper waters. The usual range of the depths of operation is 30-50 m but sometimes fishing is done upto 60-75 m. The fishermen go for fishing early in the morning and return in the afternoon. Since the hand jig units are taken for fishing along with hooks and lines, the duration of fishing depends on the period of combined fishing, which may last for 5-6 hours.

After bringing the catch to the shore it is auctioned to the agents of export firms or to private persons who extract the mantle, clean them and sell them to exporters. Women of the fisherfolk are engaged in removing the head, cuttlebone and viscera. The mantles are skinned, cleaned, washed and kept in ice until the lot is taken in refrigerated vans to the processing plants. The head portion and the nidamental glands are sold for local consumption, while the cuttlebones are collected for export.

Squid Jigging

Because of the rapid strides squid jigging has made in the commercial fishery, much has been written in recent years about this type of fishing. The literature provides a good source of information, and the present review is largely based on the following publications : Ben-Yami (1976), Hamabe *et al.* (1976a, 1976b, 1981), Hamuro and Mizushima (1976), Kasahara and Nasumi (1976), Ogura (1976), Ogura and Nasumi (1976), R. Saito (1976), T. Saito (1976), Yajima and Mitsugi (1976), Okutani (1977), Court (1980), Hurley (1980), Jaunico (1980), Long and Rathjen (1980), Hernado and Flores (1981) and Nelson *et al.* (1983). Of these, particular mention must be made of Ben-Yami (1976) and Hamabe *et al.* (1981) who give detailed account of squid jigging. Many of the other references mentioned above are included in the FAO Fisheries Reports No. 170, Supplement 1, 1976 (Expert Consultation on Fishing for squid and other Cephalopods).

Though squids are caught the world over as a by-catch in a variety of gears such as trawl nets, set nets, lampara, gill nets and purse seines, jigging with light attraction system is practised exclusively for catching squids. The Japanese have developed this type of fishing, and are currently practising on such a large scale that over 70% of Japan's squid landings are realised by jigging. The method has been evolved based on certain aspects of the behaviour of squids. Squids are easily attracted to a fast-moving bait or bait-like object and on contact with it get entangled or often they cling to it with their arms. Any escape bid by sudden jet-propelled backward movement is prevented by the numerous recurved hooks of the jig. Squids are attracted to artificial light and they aggregate close to the illuminated area. As these habits are taken

advantage of in this fishery, the jig is found to be a very effective gear for squids.

Squid jigging in Japan in early times was with simple pole and line jigs and hand-line jigs using pine-root torches for light attraction and this method has remained unchanged for many years. The beginning of modern squid jigging was marked with the progressive replacement of pine-root torches by kerosene and acetylene lamps and later by electric incandescent lamps, with concomitant changes in the fishing gear and fishing methods. Mechanised boats of 10-30 t displacement using hand-line jigs and battery-powered lamps were introduced in the 1930s for fishing in the inshore waters. Further innovation was the introduction of serial jigs (many jigs to a line), manually operated drums and line reels. With the complete automation of the entire fishing operation that followed, ocean going vessels of 100-300 t or even upto 500 t started operating from the 1970s. This has increased the operational range of the vessels which enabled the Japanese to extend the fishing operations beyond their traditional waters to Australia, New Zealand, West Africa and the east coast of North America.

The jig is so named because it is operated by jerking or jigging (moving up and down). A typical jig consists of a shaft-like body or stem made of flexible plastic and one to three circles of sharp barbless steel hooks at the lower end (Plate IC). A steel rod or wire passing through the shaft secures the hook rings to the shaft. The rod has a ring at each end for the attachment of the line. It is used as in angling, when the squid comes up near the surface of the water. The hand-line jigging unit consists of a 20-30 m line with a series of 15 to 20 jigs spaced at regular intervals and a weight at the lower end. In this gear the line consists of short sections tied to the upper or the lower ring of the jigs. The depth of operation of the jig can be adjusted according to the depth of concentration of squids, which is determined by echo sounding. The operation of the gear became more easy with the introduction of a hand-operated drum to release and haul up the line and a roller for the line to move on.

The mechanisation of the jigging operations by the Japanese has accelerated the pace of development of squid fishery in recent times. The main parts of an automatic jigging unit are two drums or reels having a single shaft that passes through a motor assembly, a line with jigs and weight on each drum, two outboard plastic rollers and a netted frame. The drum is oval in shape with six sides, so that the line when payed out and hauled up has a jigging motion. The drums are rotated by means of an electric motor of 1/4 to 1/3 hp. The different jigging units fixed on a boat can be operated independently. The units are mounted on the sides of the boat and when in operation they are tilted outboard. The line is made of nylon monofilament and its diameter varies between 0.8 mm and 2 mm according to the depth of operation. The line near the bottom end has a lesser diameter than that near the surface as the latter is subjected to more strain. It is found that thinner the line the more will be the catch because of less visibility. About 20-50 jigs are attached to each line at intervals of 80-100 cm. A lead sinker weighing 700 g-1 kg or sometimes more, is tied at the lower end of the line to keep it vertical in the water. Such a line with the jigs and sinker is attached by means of a swivel to a 100 m long main line having a diameter of 2 mm. The jig line, when payed out and hauled up, runs through the roller. Each jigging unit is equipped with a push button control box, and this arrangement enables one man to control several units, thus reducing the manpower involved.

The length of the stem ranges from 42 mm to 75 mm though there are larger jigs. They are also of a variety of shapes and colours. The colour of jig depends on the colour preference of the squid species. In Japan red and green coloured jigs are more common, though other colours (blue, white, yellow, black, orange or transparent) are also used. In California transparent jigs were found to be very effective, followed by red and pink, and green and silver were the least effective.

Squids are attracted by artificial lights fixed on the vessel and they concentrate near the boundary between the lighted zone of the water and the shadow of the vessel. Therefore the position of this boundary zone in relation to the position of the jigs is of great significance. This can be adjusted by altering the height of the lamps in such a way that the jigging lines enter the water at or near the boundary between the lighted zone and the shadow of the vessel. While the bright lights attract the squids towards the vessel the shaded area between the vessel and the jigging line where they congregate enables them to react to the motion of the jigs. Generally (a row of mercury vapour lamps of 500-2000 watts or incandescent lamps of 2000-4000 watts are used. Though the latter are more commonly used, comparative tests show that mercury vapour lamps are about 2.5 times more efficient in converting

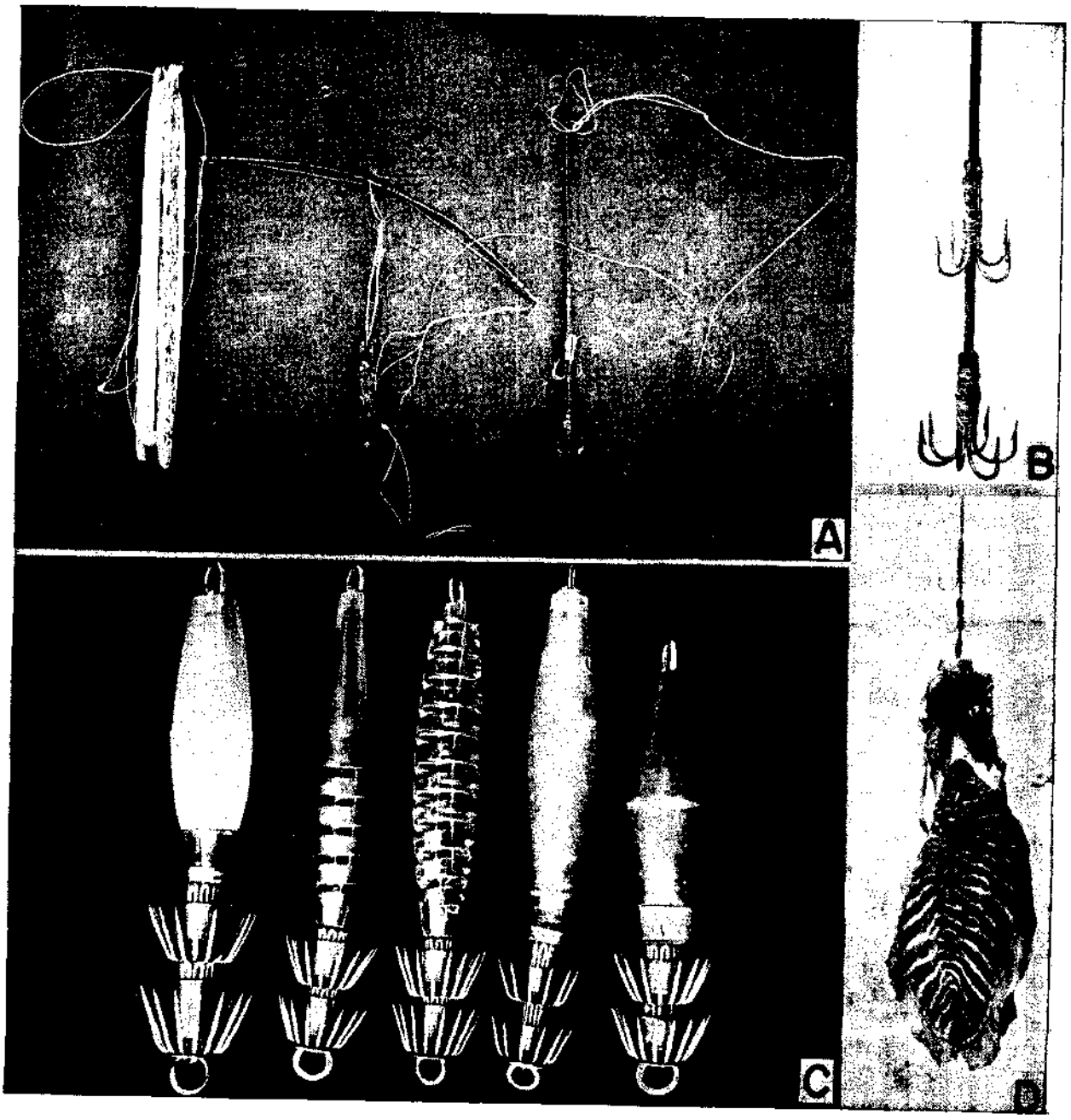

PLATE I. A. Hand jig unit with line, weight, line holder and jig. B. Hand jig. C. Different types of Japanese jigs. D. A cuttlefish caught in a hand jig.

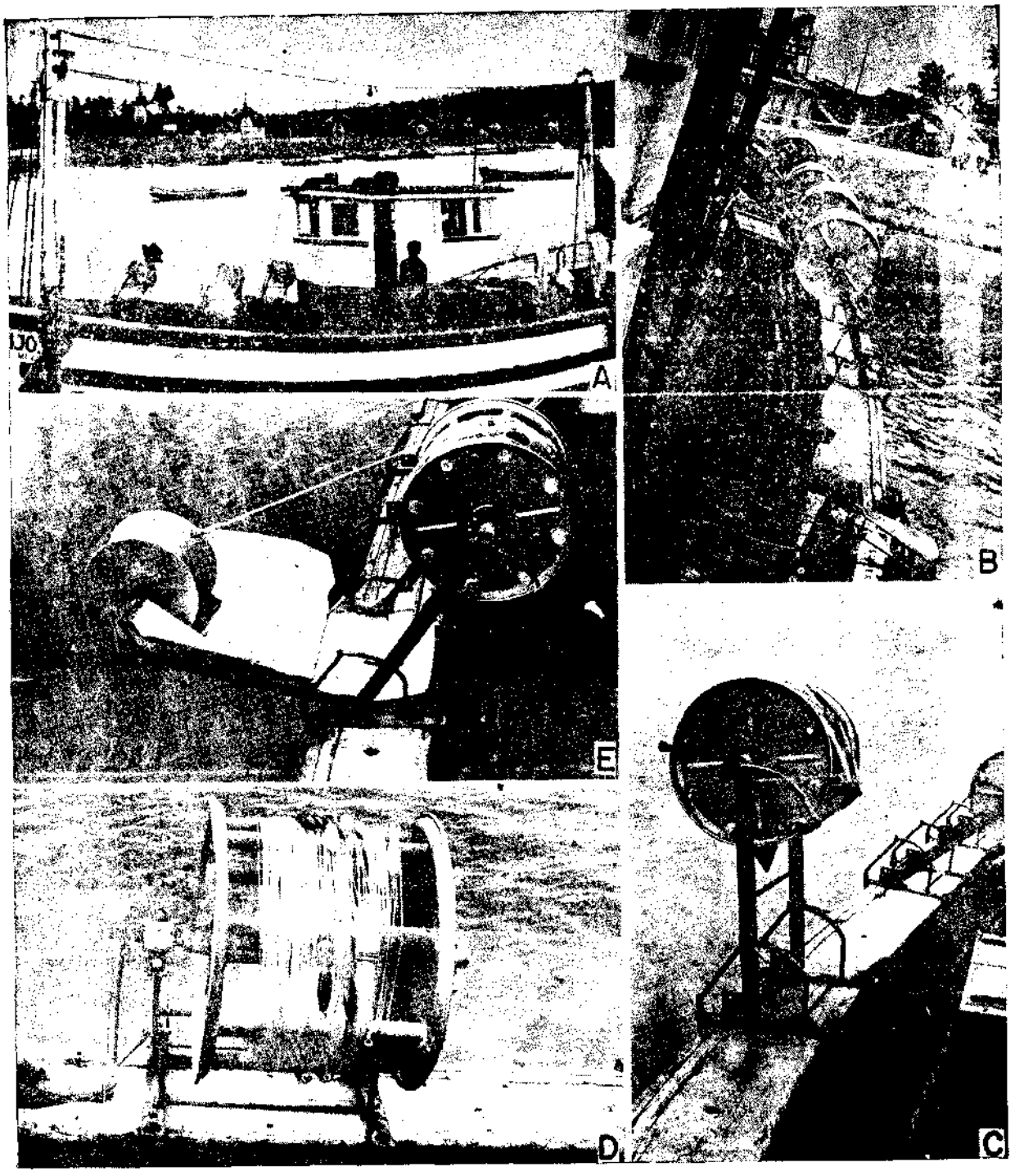

PLATE II. A. A 43' mechanised vessel, *Maijo* rigged for squid jigging with mounted lights and jigging units. B. Arrangement of jigging units on one side of the vessel. C. and D. Close up views of jigging unit. E. A unit in operation.

electric energy into light energy. They also have a longer life, but are costlier than incandescent lamps. Of late, halogen lamps are being used in Japan and they are found to be more efficient and durable.

The lamps are fixed in a horizontal line in the middle of the ship between the foremast and the mizzen mast. If the vessel is larger, two rows of lamps are kept above the deck slightly inward, one on either side of the vessel. Up to a certain level the catch increases with light intensity and after that it decreases. This level is related to the size of the vessel, which is about 2500 watts per one ton displacement for vessels up to 15 t. Therefore the number of lamps and light intensity are determined by the size of the vessel. A 100 t vessel may have a 130 kW generator and 44 lamps of 2000 watts each, arranged in two rows. The light provided on a typical 5.6 t vessel which operates in the nearshore areas is three 2000W bulbs, three 1500W bulbs and three 1000W bulbs with a combined power of 13.5 kW.

On the fishing ground the presence of squid shoals is determined by echo sounding. When the vessel is positioned, a nylon parachute sea anchor is lowered from the bow of the vessel allowing the vessel to slowly drift with the current. To keep the vessel in proper position a mizzen sail or spanker is rigged near the stern ; this also reduces the rolling of the vessel and the chances of the jigging lines getting entangled. The lamps are turned on at dusk. Jigging is done when squids are attracted towards light. The jigging unit is tilted outboard and the line is payed out from the drum. There is a depth control knob in the jigging machine that enables the line to be adjusted to fish at desired depth. There is also provision to stop the machine automatically in case there is sudden entanglement of jigs or line. While the line travels down, a jigging motion is produced due to the oval shape of the drums. Sometimes, after the line reaches the required depth, it is hauled up and lowered down several times at short intervals. Finally the line is fully hauled up at a speed of 60-75 m per minute. As the line passes through the shoal of squids, individual squids are caught on the jigs. Passing over the roller as the line is hauled up and wound on the drum, the squids get unhooked or their arms and tentacles get disentangled from the jigs, fall on the netted frame and slip into a collecting basket. These are then washed, arranged in trays and kept in chilled fish holds. Even the latter processes are carried out automatically in some vessels which are equipped with conveyor belts or water flow pipes to carry the catch continuously to the storage place.

Though fishing continues throughout the night, the catches increase around midnight. Often the peak is at about 0400 to 0500 hrs, and the high catch is popularly known as the *morning harvest*. There are fluctuations in the catch according to the phases of the moon ; the best squid catches are obtained during dark nights and high tides. The catches during a new moon phase are invariably more than around full moon. Strong currents, winds and waves adversely affect jigging operations due to frequent tangles between the lines and jigs of adjacent jigging units. In such cases, only the alternate units are operated.

The advantages of jigging are many. Firstly the method is comparatively simple. Since the jigging machine is fully automated the manpower required is very low. In hand jigging the expenditure involved is not at all high when compared to other methods of fishing. Any existing fishing vessel can easily be converted into a jigger with simple outfits. This can be done at very little cost and without making any structural changes in the vessel. Since jigging is done in the night, other types of fishing can also be done from the same vessel during daytime. As the squids taken in jigging are fresh and without much damage, they are suitable for processing.

Todarodes pacificus is the mainstay of the fishery in Japan, followed by *Ommastrephes bartrami* and these two species form more than 85% of the squids from Japan's waters. In winter, jigging activity is at a minimum, and during this time many of Japan's larger vessels shift their operation to the southern hemisphere, off Australia and New Zealand. Japan has also co-operated with other nations by conducting feasibility jig fishing and these efforts have shown that there are good stocks of squids to sustain profitable fishing. The important species of squids in these regions are *Loligo pealei* and *Illex illecebrosus* in Newfoundland, *Illex argentinus* in Argentina, *Nototodarus sloani gouldi* in Austrslia, *Nototodarus sloani sloani* in New Zealand and *Dodidicus gigas* in California and Mexico.

It is worthy of mention here that the Marine Products Export Development Authority, Government of India, has recently taken some initiative in attempting light fishing for squids, utilising the services of a Japanese fishing expert. One 43'—mechanized fishing boat has been rigged with four hand-operated jigging units and a stick-held dip net with separate

light arrangement for both (Plate II, A-E ; Fig. 1). The experimental fishing was carried out off Cochin and Vizhinjam. In Cochin, squids were obtained both in jigs and dip net and a maximum number of 100-150 squids were caught in a night's fishing for about two hours (Yamasaki, personal communication). At Vizhinjam the attempts had to be given up because the sea conditions were not favourable. The results of these trial operations, though only preliminary, indicate the possibility that squids can be taken by jigs and dip nets with light attraction, in spite of the fact that the trials were conducted when the squid fishing season had almost come to a close and the monsoon conditions had already set in.

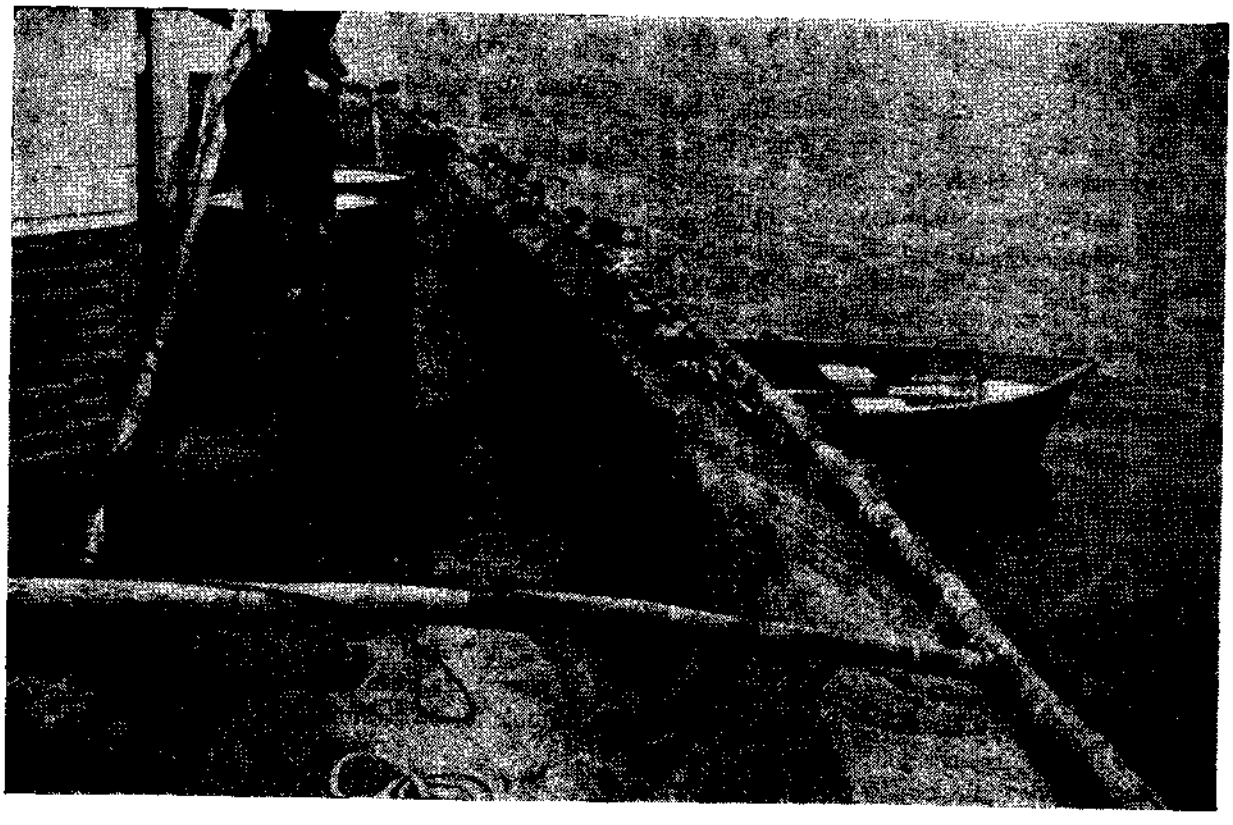

FIG. 1. A type of dip net used in light fishing drawn up on board.

REFERENCES

ABDULLA, I. M. AND A. Z. IDRUS 1978. The fish processing industry in peninsular Malaysia. *Proc. Symp. Fish Utilization Technology and Marketing in the IPFC Region, 18th Session,* Manila, Philippines : 45-60.

ADAM, W 1934. Cephalopoda. Result Sci. Voy. Ind. Orient. Meerl. *Mem. Mus. r. Hist. Nat. Belgique,* **2** (16) : 1-28.

ADAM, W 1937. Notes sur les cephalopodes : VII—sur un cas de regeneration chez *Sepioteuthis lessoniana* Lesson, 1830. *Bull. Mus. r. Hist. nat. Belg.* 13 (45) : 1-4.

ADAM, W. 1938. Sur quelques cephalopodes octopodes des iles Andamans. *Bull. Mus. r. Hist. nat. Belgique,* **14** (7) : 1-25.

ADAM, W. 1939a. Notes sur les cephalopodes. 13. Sur une nouvelle espece de Sepia, *Sepia winckworthi* sp. nov. *Bull. Mus. r. Hist. nat. Belgique,* **15** (32) : 1-11.

ADAM, W. 1939b. The Cephalopoda in the Indian Museum, *Calcutta. Rec. Indian Mus.,* **41** : 61-110.

ADAM, W. 1939c. Cephalopoda. Pt. I. Le genre *Sepioteuthis* Blainville, 1824. *Siboga Exped. Monographie,* **55a** : 1-33.

ADAM, W. 1939d. Les cephalopodes de l'expedition du Siboga Pt. II. Revision des especes Indo-Malaises du genre *Sepia* Linne, 1758. Pt. III. Revision du genre *Sepiella* (Gray) Steenstrup, 1880. *Siboga Exped. Monographie,* **55b** : 35-122.

ADAM, W. 1954. Cephalopoda. Pt. III & IV. Cephalopodes a l'exclusion des genres *Sepia, Sepiella* et *Sepioteuthis. Siboga Exped. Monographie,* **55c** : 123-193.

ADAM, W. 1959. Les Cephalopodes de la mer Rouge. Mission Robert Ph. DOLLFUS en Egypte (1927-1929), *Res. Sci.* 3 *partie,* **28** : 125-193.

ADAM, W. 1960. Cephalopoda from the Gulf of Aquaba. Contr. Knowl. Red Sea. 16. *Bull. Sea-Fish. Res. Stn. Israel,* **26** : 3-26.

ADAM, W. 1965. Redescription deDeux Especes de *Sepia* Insuffisamment Decrites par J. Steenstrup, 1875. *Vidensk. Medd. fra Dansk naturh. Foren.,* **128** : 169-176.

ADAM, W. 1973. Contributions to the knowledge of the Red Sea. No. 47. Cephalopoda from the Red Sea. *Bull. Sea-Fish. Res. Stn. Haifa,* : 9-47.

ADAM, W. 1975. Notes sur les cephalopodes. 26. Une nouvelle espece de *Todarodes todarodes filippovae* sp. nov. de l' Ocean Indian. *Biologie, Bull. Inst. r. Sci. nat. Belg.,* **50** (9) : 1-10.

ADAM, W. 1979. The Sepidae (Cephalopoda, Decapoda) in the collection of the Western Australian Museum. *Rec. W. Aust Mus.,* 7 (2) : 109-212.

ADAM, W., AND W. J. REES. 1966. A review of the cephalopod family Sepiidae. *John Murray Exped. Sci. Rept.,* **11** (1) : 1-165.

ALAGARAJA, K. 1984. Simple methods for estimation of parameters for assessing exploited fish stocks. *Indian J. Fish.,* **31** : 177-208.

ALAGARSWAMI, K. 1966. On the embryonic development of the squid (? *Sepioteuthis arctipinnis* Gould) from the Gulf of Mannar. *J. Mar. Biol. Ass. India.* 8 (2) : 278-284.

ALDRICH, F. A., AND M. M. ALDRICH 1968. On the regeneration of the tentacular arm on the giant squid *Architeuthis dux* Steenstrup (Decapoda, Architeuthidae). *Can. J. Zool.,* **46** (5) : 845-847.

ALLAN, J. K., 1945. Planktonic cephalopod larvae from the Eastern Australian coast. *Rec. Aust. Mus.,* **21** (6) : 317-350.

ANON 1977. Development potential of selected fishery products in the regional member countries of the Asian Development Bank. 7 : *The international market for cephalopods.* SCS/DEV/76/16 : 95 p.

ANON 1981. Three questions on octopus. *Fishery Jour.* 13 (Yamaha Motor Co., Japan) : 1-8.

ANON, 1982. Review of Methods used for studying and Assessing squid resources. *IPFC : RRD/82/5 Date March* 1982, *Sydney, Australia,* 7 p.

ANON, 1983. South China Sea Fisheries Development and Coordinating Programme. Joint ADB/FAO (SCSP-INFOFISH Market Studies. Vol. V. The International Market for Cephalopoda. SCS/DEV/83/24, 53 p.

ARAVINDAKSHAN, P. N., AND M. SAKTIVEL 1973. The location of cephalopod nurseries in the Indian Ocean. *Handbook to the International Zooplankton Collections,* **5** : 70-75.

ASHMOLE, N. P., AND M. J. ASHMOLE 1977. Comparative feeding ecology of sea birds of a tropical oceanic island. *Yale Univ. Peabody Mus. Nat. Hist., Bull.,* **24** : 1-131.

BAL, D. V., AND K. VIRABHADRA RAO 1984. *Marine Fisheries* Tata McGraw Hill Publishing Company Ltd., New Delhi, 470 p.

BALINSKY, B. I. 1981. *Introduction to Embryology.* Philadelphia, Pa. : Saunders College, 688 p.

BAPAT, S. V., N. RADHAKRISHNAN AND K. N. RAMACHANDRA KARTHA. 1972. A survey of the trawl fish resources off Karwar, India. Symposium on Demersal Fisheries, *Proc. Indo-Pacific Fish. Coun.,* **13** (3) : 354-383.

BAPAT, S. V. *et al.* 1982. Fishery resources of the Exclusive Economic Zone of the northwest coast of India. *Bull. Cent Mar. Fish. Res. Inst.,* **33** : 86 p.

BARNARD, K. H. 1947. Rare squid at the cape (*Thysanoteuthis rhombus* Troschel). *J. Conch. Lond.,* **22** : 286.

BELYAEV, G. M. 1962. Beaks of cephalopod molluscs in oceanic bottom deposits. *Okeanologila*, 2 (2) : 311-326.

BELYAEVA, G. F. 1979. Squids of the Indian Ocean as intermediate hosts of helminths. *In* : Bauer, O. N. (Ed.), Abstracts of proceedings : 7th All-Union Conference on Fish-parasites and Diseases. Nauka, Moskow, 1979 : 1-131.

BEN-YAMI, M. 1976. *Fishing with light*. FAO Fishing Manual Fishing News Books Ltd., England, 121 p.

BERRY, S. S. 1912. The Cephalopoda of the Hawaiian Isladns. *Bull. U. S. Bur. Fish.*, 32 : 257-362.

BERTALANFFY, L. VON. 1938. A quantitative theory of organic growth. *Hum. Biol.*, 10 (2) : 181-213.

BIDDER, A. M. 1950. The digestive mechanism of the European squids, *Loligo vulgaris, L. forbesii, Alloteuthis media* and *A subulata. Quart. Jour. Micr. Sci.*, 91 (1) : 1-32.

BOLETZKY, S. V. 1977. Post-hatching behaviour and mode of life in cephalopods. *Symp. Zol. Soc. London*, 381, 557-567.

BOYCOTT, B. B. 1957 The cuttlefish *Sepia. New Biol.*, (25 : 98-118.

BRAZIER, J. 1892. *List of the Cephalopoda in the collection of the Australian Museum.* Sydney, 3 p.

BROCK, J. 1886. Indische Cephalopoden. *Zool. Jb.*, 2 : 591-624.

BRUGGEN, A. C. VAN. 1962. *Thysanoteuthis rhombus* in Algoa Bay. *Ann. of the Natal Museum*, 15 : 267-272.

BURGESS, L. A. 1967. *Loliolus rhomboidalis*, a new species of loliginid squid from the Indian Ocean. *Bull. Mar. Sci.*, 17 (2) : 319-329.

CADDY, J. F. (ed.). 1983a. Advances in assessment of world cephalopod resources. *FAO Fish. Tech. Pap.*, (231) : 452 p.

CADDY, J. F. 1983b. The Cephalopods : Factors relevant to their population dynamics and to the assessment and management of stocks. *In* : Caddy, J. F. (ed.), Advances in assessment of world cephalopod resources. *FAO Fish. Tech. Pap.*, (231) : 416-452.

CAILLIET, G. M. AND D. L. VAUGHAN, 1983. A review of the methods and problems for quantitative assessment of *Loligo opalescens. Biol. Oceanogr.*, 2 : 379-400.

CALLAN, H. G. 1940. The absence of a sex hormone controlling regeneration of the hectocotylus in *Octopus vulgaris* L. *Pubbl. Staz. Zool. Napoli*, 18 : 15-19.

CHANDRA MOHAN, P. AND D. RATNA RAO. 1978. On the occurrence of *Sepietta owenlana* (Cephalopoda) from Visakhapatnam. *Current Sci.*, 47 (22) : 879-880.

CHELLAPPA, D. E. 1959. A note on the night fishing observation from a *kelong. J. Mar. Biol. Ass. India.* 1 (1) : 93-94.

CHIKUNI, S. 1983. Cephalopod resources in the Indo-Pacific Region. *In* : Caddy, J. F. (ed.), Advances in assesament of world cephalopod resources. *FAO Fish. Tech. Pap.*, (231) : 264-305.

CHUN, C. 1910. Die Cephalopoden. I. Teil : Depopsida. *Wissenchaftliche Ergebnisse deutschen Tiefsee—Expedition 'Valdivia'* 1898-1899, 18 : 1-402.

CHUN, C. 1915. Cephalopoda. II. Teil : Myopsida, Octopoda. *Wissenchaftliche Ergebnisse deutschen Tiefsee-Exedition* 'Valdivia' 1898-1899, 18 : 405-552.

CLARKE, M. R. 1962 a. The identification of cephalopod 'Beak' and the relationship between beak size and total body weight. *Bull. Brit. Mus., (N.H.) Zoology* 8(10) : pl. 13-22, 421-480.

CLARKE, M. R. 1962 b. Significance of cephalopod beaks. *Nature*, 193 (4815) : 560-64.

CLARKE, M. R. 1966. A review of the systematics and ecology of oceanic squids. *Adv. Mar. Biol.*, 4 : 91-300.

CLARKE, M. R. 1980. Cephalopoda in the diet of sperm whales of the southern hemisphere and their bearing on sperm whale biology. *Discovery Rept.* 37 : 1-324.

CLARKE, M. R. AND C. C. LU. 1974. Vertial Distribution of Cephalopods at 30°N 23°W in the North Atlantic. *J. Mar. biol. Ass. U.K.* (1974) 54 : 969-984.

CLARKE, M. R. AND C. C. LU. 1975. Vertical Distribution of Cephalopods at 18° N and 25°W in the North Atlantic, *Ibid.*, (1975) 55 : 165-182.

CLARKE, M. R. AND N. MAC LEOD. 1974. Cephalopod remains from a sperm whale caught off Vigo Spain. *J. Mar. Biol. Assoc. U.K.*, 54 : 959-968.

CLARKE, M. R. AND N. MAC LEOD. 1976. Cephalopod remains of whales caught off Iceland. *J. Mar. Biol. Assoc. U.K.*, 56 : 733-749.

CLARKE, M. R. 1977. Beaks, nets and numbers. *Symp. Zool. Soc. Lond.*, 38 : 89-126.

CMFRI, 1957. Annual Report of the Chief Research Officer for the year ending 31st March 1956. *Indian J. Fish.*, 4 (2) : 387-418.

CMFRI, 1980. Industrial fisheries off Visakhapatnam coast. based on exploratory surveys during 1972-1978. *Mar. Fish. Infor. Serv. T & E Ser.*, No. 15 : 1-15.

CMFRI. 1981. By-catch of the shrimp fishing in India. *Mar. Fish. Inform. Serv.* T & E. Ser. No. 28 : 1-13.

CMFRI. 1982. Trends in marine fish production in India—1981. *Mar. Fish. Infor. Serv.* T & E. *Ser.* No. 41 : 1-32.

COLLINS, S. AND M. DUNNING. 1981. Tasman squid studies demonstrate gill netting effective. *Aust. Fish.*, 40 (8) : 4-6.

COTTON, B. C., AND F. K. GODFREY. 1940. The Mollusca of south Australia. Pt. 2. Scaphopoda, Cephalopoda, Aplaco phora and Crepipoda. Adelaide, 317-600.

COURT, W. G. 1980. Japan's squid fishing industry. *Mar. Fish Rev.*, 42 (7-8) : 1-9.

COUSTEAU, J. Y., AND P. DIOLE. 1973. *Octopus and Squid—The Soft Intelligence.* A & W Visual Library, New York, 304 p.

CSIR. 1962. *The Wealth of India. Raw Materials Vol. 4 Supplement. Fish and Fisheries.* Com. Sci. Ind. Res., New Delhi, 132 p.

DAYARATNE, N. M. P. J. 1978. A preliminary study on the cuttle fish catches from the Wadge Bank trawler fishery. *Bull. Fish. Res. Stn. Sri Lanka*, 29 : 21-35.

DEES, LOLA T. 1961. Cephalopods : cuttlefish, octopus, squides *Fish. Leaf.* (524) : 1-10.

DEFRETIN, R. AND A. RICHARD. 1967. Ultrastructure de la glande optique de *Sepia officinalis* L. (Mollusque, Cephalopode) Miss en evidence de la secretion et de son controle photoperio dique. *C. R. Hebd. Seances Acad. Sci., Ser. D* **265** : 1416-1418.

DELL, R. K. 1952. The recent Cephalopoda of New Zealand. *Bull. Dom. Mus. Wellington,* (16) : 1-157.

DESHMUKH, V. M. 1973. Fishery and biology of *Pomadasys hasta* (Bloch). *Indian J. Fish.,* **20** (2) : 497-522.

DEVADOSS, P. AND P. K. MAHADEVAN PILLAI. 1973. Observations on the food of juveniles of *Psettodes erumei* (Bloch). *Indian J. Fish.,* **20** (2) : 664-667.

DEVADOSS, P. AND P. K. MAHADEVAN PILLAI. 1979. Observations on the food and feeding habits of the eel *Muraenesox cinereus* (Forskal) from Porto Novo. *Indian J. Fish.,* **26** (1 & 2): 244-247.

DONG, Z. 1981. The Present status of the prospects of cephalopod resources in the West Pacific. *J. Fish. China,* **5** (3) : 263-70 (Not consulted in original)

DRACOVICH, A. AND J. A. KELLY JR. 1963. A biological study and some economic aspects of squid in Tampa Bay, Florida. *Proc. Gulf and Carib. Fish. Inst.,* 15th Annual Session (1962) 87-102.

DRAGOVICH, A. AND T. POTTHOFF. 1972. Comparative study of food of skipjack and yellowfin tunas off the coast of West Africa. *Fish. Bull. U.S.,* **70** : 1087-1110.

DRUZHININ, A. D. 1972. Observations on the trawl fishery of Southern Burma. Symposium on Demersal Resources, *Proc. Indo-Pacific Fish. Coun.,* **13** (3) : 151-209.

DRUZHININ, A. D. 1973. On the fishery resources of the Gulf of Aden and some adjacent areas. FAO, Rome, DP 9/12 PDY 64/501/7.

DULHUNTY, A. F., AND GAGE, P. W. 1971. Selective effect of an Octopus Toxin on action potentials. *J. Physiol. (London),* **218** : 433-445.

DURCHON, M. AND A. RICHARD. 1967. Etude, en culture organo-typique, du role endocrine dela glande optique dans la maturation ovarienne chez *Sepia officinalis* L. (Mollusque, Cephalopode). *C. R. Hebd. Seances Acad. Sci., Ser. D* **264** : 1497-1500.

EFP. 1979a. Fishing news and notes. Survey of EEZ. *Explo. Fish. Project Newsletter.* **2** (2) : 21-23.

EFP. 1979b. Results of operation of M. V. *Matsyanireekshani* along northwestern part of Indian EEZ during May to October, 1979. Survey of EEZ Series. No. 2. *Exp. Fish. Project,* Bombay : 1-15.

EFP. 1979c. Results of the exploratory fishing conducted during 1978-79. *Bull. Explo. Fish. Project.* **9** : 66 pp.

EFP. 1982. Results of exploratory survey of fishery resources of Wadge Bank. *Progress Report 1. Explo. Fish. Project,* Bombay : 26 p.

FAO. 1983. Year book of Fishery Statistics 1981 : Catches and Landings. *FAO Yearb. Fish. Stat.* (52).

FAO/UN. 1961. Report to the Government of India on a survey of the Fishery Resources of the Bay of Bengal. Project FAO/ETPA 158-53, based on the work of V. M. Naumov, FAO/TA Marine Fisheries Biologist.

FERAL, JEAN-PIERRE. 1978. La regeneration des de la seiche *Sepia officinalis* (Cephalopoda, Sepioidea) (1). I-Etude Morphologique. *Cahiers de Biologie Marine,* XIX : 355-361.

FIELDS, W. G. 1965. The structure, development, food relations, reproduction and life history of the squid, *Loligo opalescens* Berry. *Calif. Dept. Fish and Game, Fish Bull.* (131) : 1-108.

FILIPPOVA, J. A. 1968. New data on the Cephalopoda of the Indian Ocean. *Proc. Symp. Mollusca,* Mar. Biol. Ass. India, Pt. 1 : 257-264.

FISCUS, C. H. 1982. Predation of marine mammals on squids on the eastern North Pacific Ocean and the Bering Sea. *Mar. Fish. Rev.,* **44**(2) : 1-10.

FISHERY AGENCY OF JAPAN. 1976. Report on cruise of the R. V. SHOYO MARU in the North Arabian Sea Survey, in cooperation with the IOP, FAO, to assess the pelagic fish stocks, 2 October 1975—14 January 1976. *Res. Dev. Div., Fish. Agen. Japan,* 110 pp.

FISHERY AGENCY OF JAPAN. 1977. Report on cruise of the R. V. SHOYO MARU in the North Arabian Sea, in cooperation with IOP, FAO, to assess the pelagic fish stocks, 2 October 1976—13 January 1977. *Res. Dev. Div., Fish. Agen. Japan.* 165 p.

FLECKER, H. AND COTTON, B. G. 1955. Fatal bites from Octopus. *Med. J. Aust.,* **2** : 329-331.

FREEMAN, S. E. AND TURNER, R. J. 1970. Muculotoxin, a potent toxin secreted by *Octopus maculosus* Hoyle. *Toxicol. Appl. Pharmacol.,* **16** : 681-690.

GAGE, P. W. AND A. F. DULHUNTY. 1979. Effects of toxin from the Blue-ringed Octopus *Haplochlaena maculosa.* In : Marine Toxins and other bioactive marine Metabolites Ed. Y. Hashimoto, *Jap. Sci. Soc. Press.* Ch. 3 : 85-106.

GEORGE, A. I., M. S. NAZIR AHMED AND T. N. SIVADASAN ASARI 1976. Observations on the carangid fishery of Vizhinjam coast, Trivandrum, with special reference to *Decapterus dayi.* (Wakiya). *Bull. Dept. Fish. Kerala,* 1 (1) : 9-15.

GEORGE, P. C., B. T. ANTONY RAJA AND K. C. GEORGE. 1977. Fishery Resources of Indian Economic Zone. *Silver Jubilee Souvenir,* Integ. Fish. Proj., October, 1977 : 79-116.

GHIRETTI, F. 1960. Toxicity of octopus saliva against Crustaceans. *Ann. N. Y. Acad. Sci.* 90, 726-741.

GOODRICH, E. S. 1896. Report on a collection of Cephalopoda from the Calcutta Museum. *Trans. Linn. Soc. London,* **7** : 1-24.

GOPALAKRISHNAN, P. 1970. Some observations on the shore ecology of the Okha coast. *J. Mar. Biol. Ass. India,* **12** (1 & 2) : 15 - 34.

GOULD, A. A. 1852. 12. Mollusca and shells United States Exploring Expedition 1838-1842 under the command of C. Wilkes, 510 p.

GRAVELY, F. H. 1941. Shells and other animal remains found on the Madras beach. I. Groups other than snails etc. (Mollusca : Gastropoda). *Bull. Madras Govt. Mus. (New Ser.). Nat Hist.*, 5 (1) : 112 p.

GRIEB, T. M., AND R. D. BEEMAN. 1978. A study of spermatogenesis in the spawning population of the squid, *Loligo opalescens In* : Recksiek, C. W. and H. W. Frey (eds.) Biological, oceanographic, and acounstic aspects of the market squid, *Loligo opalescens* Berry. *Calif. Dept. Fish. and Game, Fish Bull.*, 169 : 11-21.

GRIFFIN, L. E. 1900. The anatomy of *Nautilus pompilius*. *Mem. Nat. Acad. Sci.*, 8 (5) : 1-197.

GRIMPE, G. 1926. Biologische Beobachtungen an *Sepia officianales*. *Verhandl. D. Zool. Gen. Suppl. Zool. Anz.* 31 : 148-153.

GULLAND, J. A. (Ed.). 1970. The fish resources of the ocean. FAO/Fishing News (Books) Ltd., Surry, England, 255 p.

HAMABE, M., C. HAMURO AND M. OGURA. 1982. *Squid jigging from* small boats. FAO Fishing Manuals, Fishing News Books Ltd., Farnham, England, 74 p.

HAMABE, M., T. KAWAKAMI, Y. WATABE AND T. OKUTANI. 1976a. Perspectives for Japanese Overseas squid fisheries. *FAO Fish. Rep.* 170 (Suppl. 1) : 47-52.

HAMABE M. T. KAWAKAMI, Y. WATABE T. OKUTANI AND K. IKEDA. 1976b. Review of cephalopod resources and their exploitation by Japan. *FAO Fish. Rep.* 170 (Suppl. 1) : 1.3·

HAMURO, C. AND S. MIZUSHIMA. 1976. Concept and design of the 99 GT Squid jigging vessel. *FAO Fish. Rep.* 170 (Suppl. 1) : 103-106.

HANKO B. 1913. Uber einen gespaltenen arm von *Octopus vulgaris*. *Wilhelm Roux Arch. Entw. Mech. Org.* 37 : 217-222.

HERDMAN W. A. 1903-1906. *Report to the Government of Cyelon on the Pearl Oyster Fisheries of the Gulf of Mannar (with Supplementary Reports upon the Marine Biology of Ceylon Naturalists). Roy. Soc. London* 1 : 1-307 : 2 : 1-300 : 3 : 1-384 : 4 : 1-326 : 5 : 1-452.

HERNANDO A. M. (JR) AND E. C. FLORES. 1981. The Philippines squid fishery : A review. *Mar. Fish. Rev.* 43 (1) : 13-20.

HIDA, T. S. AND W. T. PEREYRA. 1966. Results of bottom trawling in Indian Seas by R/V ANTON BRUNN in 1963. *Proc. Indo-Pacific Fish. Coun.* 11 (2) : 156-171.

HIXON, R. F. 1983. *Loligo opalescens*. In Ed. P. R. Boyli Cephalopod Life-Cycles. Vol. I. Species accounts. Academic Press. pp. 95-114.

HODGKIN, A. L. 1964. The conduction of the nervous Impulse. Liverpool Univ. Press, Liverpool, England, pp. 20-29.

HORNELL, J. 1917. The edible molluscs of Madras Presidency. *Madras Fish. Bull.*, 11 : 1-51.

HORNELL, J. 1922. The common molluscs of South India. *Madras Fish. Bull.*, 14 : 97-215.

HORNELL, J. 1950. Fishing in many waters. Chapter XV. Fishing for *Octopus*, Cuttlefish and Squid. *Cambridge Univ. Press. Cambridge*, 130-135.

HORNELL, J. 1951. *Indian Molluscs. Bombay Nat. Hist. Society, Bombay*, 96 p.

HOWARD, F. G. 1981. Cephalopods : An under utilized resource. *Scotish Fisheries Bulletin*, 46 : 26-29.

HOYLE, W. E. 1885a. Brief notice of the 'Challenger' Cephalopoda (p. 472). *Rep. Scient. Resul. Voy. 'Challenger'* (1873-76), Narrative 1, 657 p.

HOYLE, W. E. 1885b. Diagnoses of new species of Cephalopoda collected during the cruise of H.M.S. 'Challenger'. Part I. The Octopoda. *Ann. Mag. nat. Hist. Ser.* 5, 15 : 222-236.

HOYLE, W. E. 1885c. Diagnoses of new species of Cephalopoda collected during the cruise of H.M.S. 'Challenger' Part II. The Decapoda. *Ann. Mag. nat. Hist. Ser.* 5, 16 : 181-203.

HOYLE, W. E. 1885d. Preliminary report on the Cephalopoda collected by H.M.S. 'Challenger'. Part I. The Octopoda *Proc. Roy. Soc. Edinburgh*, 13 : 94-114.

HOYLE, W. E. 1885e. Preliminary report on the Cephalopoda collected by H.M.S. 'Challenger'. Part II. The Decapoda *Proc. Roy. Soc. Edinburgh*, 13 : 281-310.

HOYLE, W. E. 1886. Report on the Cephalopoda collected by H.M.S. 'Challenger' during the years 1873-1876. *Rep. Scien Resul. Voy. 'Challenger'* (Zoology), 16 (44) : 1-245.

HOYLE, W. E. 1904a. *Sepia burnupi* n. sp. from Natal. *J. Conch. London*, 11 : 27-28.

HOYLE, W. E. 1904b. Report on Cephalopoda collected by Prof. Herdman at Ceylon, 1902. *Rep. Ceylon Pearl Oyster Fish.* 2, Suppl. 14 : 185-200.

HOYLE, W. E. 1905. The Cephalopoda. *In :* S. Gardiner. *The Fauna and Geography of the Maldive and Lacceadive Archipelagoes*, 2, Suppl. 1; 575-988.

HOYLE, W. E. 1907a. The Cephalopoda. The marine fauna of Zanzibar and East Africa from collections made by Cyril Crossland in 1901-1902. *Proc. Zool. Soc. London*, 450-461.

HOYLE, W. E. 1907b. Reports on the marine biology of the Sudanese Red Sea. 6. On the Cephalopoda. *J. Linn. Soc* (Zool.), 31 : 35-43.

HURLEY, A. C. 1977. Mating behaviour of the squid *Loligo opalescens*. *Mar. Behav. Physiol.*, 4 : 195-203.

HURLEY, G. V. 1980. Recent development in the squid, *Illex illecebrous* fishery of Newfoundland, Canada. *Mar. Fish Rev.*, 42 (7-8) : 15-22.

IMBER, M. J. 1975. Lycoteuthid squids as prey of petrels in New, Zealand Seas. *N. Z. J. Mar. Freshw. Res.*, 9 : 483-492.

IMBER, M. J. 1978. The squid families Cranchiidae and Gonatidae. (Cephalopoda : Teuthoidea) in the New Zealand region. *New Zealand J. Zool*, 5 (3) : 445-484.

INSTITUTE OF MARINE RESEARCH. 1975. Report on Cruise Nos. 1 and 2 of R/V DR. FRIDTJOF NANSEN, Indian Ocean Fishery and Development Programme. Pelagic Fish Assessment Survey of North Arabian Sea. Bergen, Institute of Marine research, 15 p.

ISHI, M. 1977. Studies on the growth and age of the squid, *Ommastrephos bartrami* (Le Sueur) in the Pacific off Japan *Bull. Hokkaido Reg. Fish. Res. Lab.*, (42) : 25-36.

IVERSEN, I. L. K. AND L. PINKAS. 1971. A pictorial guide to beaks of certain eastern Pacific Cephalopods. *In* : Food habits of Albacore, bluefin tuna and Bonito in Californian Waters. *Fish. Bull.*, 152 : 83-105.

JAMES, P. S. B. R. 1967. The ribbon fishes of the family Trichiuridae of India. Memoir 1, *Mar. Biol. Ass. India*, 228 p

JAUNICO, M. 1980. Development in South American squid fisheries. *Mar. Fish. Rev.*, 42 (7-8) : 10-14.

JAYABALAN, N. AND K. RAMAMURTHI. 1977. Cephalopods of Porto Novo. *J. Annamalai Univ.* (Sci.), 31 : 29-34.

JAYAPRAKASH, A. A. 1974. Food and feeding habits of juveniles of 'Koth' *Otolithoides brunneus* (Day) in Bombay waters. *Indian J. Fish.*, 21 (1) : 127-140.

JMFRCC. 1980. Report of feasibility study 1978 on squid jigging fisheries in the southwestern Pacific Ocean, 178 p.

JONES, R. 1981. The use of length composition date in fish stock assessments (with notes on VPA and COHORT analysis). *FAO Fish. Circ.*, (734) : 55 p.

JONES, S. 1968. The molluscan fishery resources of India. *Proc. Symp. Mollusca*, Mar. Biol. Ass. India, Pt. 111 : 906-918.

JOTHINAYAGAM, J. T. 1981. Studies on *Sepiella inermis* (Ferrusac and d'Orbigny) population occurring along the Madras coast. *Proc. Symp. Echol. Anim. Popul.*, Zool. Surv. India, Pt. 1 : 83-89.

JUANICO' MARCELO, 1983. Squid Maturity Scales for population analysis. In : Caddy J.F. (ed). Advances in Assessment of Cephalopod Resources. *FAO Fish. Tech. Pap.* (231) : 341-378.

KAGWADE, P. V. 1969. Food and feeding habits of *Polynemus heptadactylus* Cuv. and Val. *Indian J. Fish.*, 16 (1 & 2), 188-197.

KALAVATI, C. AND C. C. NARASIMHAMURTI. 1977. *Steinhausia spraguei* n.s.p.a microsporidian parasite of the excretory cells found inthe renal appendages of *Sepia elliptica*. *Rivista Parassit.* 38(2-3 : 271-275.

KALAVATI, C. AND C. C. NARASIMHAMURTI 1980. A new dicyemid mesozoan *Dodecadicyema loligoi* n. gen., n. sp. from the renal appendages of *Loligo* sp. *Poc. Indian Acad. Sci (Anim. Sci.)*, 89 (3) : 287-292.

KALAVATI, C., C. C. NARASIMHAMURTI AND T. SUSEELA 1978. A new species of *Dicyemmennea, D. coromandelensis* n. sp. from *Sepia elliptica* Hoyle. *Proc. Indian. Acad. Sci.*, 87 B (6) : 161-167.

KAREKAR, P. S. AND D. V. BAL. 1958. The food and feeding habits of *Polynemus indicus* (Shaw). *Indian J. Fish.*, 5 (1) : 77-94.

KARNEKAMP, C. 1979. An aberrantly shaped sheild of *Sepia* sp. and a response to this. *Kreukel. Amst.*, 15 (7-8) : 60.

KARPOV, KONSTANTIN, A. AND G. M. CAILLIET 1978. Prey composition of the Market Squid, *Loligo opalascens* Berry in relation to depth and location of capture, size of squid and sex of spawning squid. *Calif. Coop. Ocean Fish. Invest. Repts.* 20 : 51-57.

KSAAHARA, S. AND T. NASUMI. 1976. Present status and future aspects of the fishery for the common squid *Todarodes pacificus* (Steenstrup) in the sea of Japan. *FAO Fish. Rep.*, 170 (Suppl. 1): 30-46.

KAWAKAMI, T. 1980. A review of sperm whale food. *Sci. Rep. Whales Res. Inst.*, (32) : 199-218.

KAWATA, H., K. KATAYA, U. AND T. TAKAHASHI 1955. Studies on the complete utilization of whole fish IV. The chemical composition of some fish viscera and the soluble feed made from cuttlefish liver. *Bull. Japan. Soc. Sci. Fish.*, 21 (7) : 503-508.

KLOSS, C. B. 1902. *Andaman and Nicobars*, Reprint 1971, Vivek Publishing House, Delhi, 373 p.

KORE, B. A. AND M. C. JOSHI 1975. Food of the squid *Loligo duvauceli* d'Orbigny. *Proc. Indian Acad. Sci.*, 81 B (1) : 20-28.

KRISHNAMURTHI, B 1957. Fishery resources of the Rameswaram Island. *Indian J. Fish.*, 4 (2) : 229-253.

KRUMHOLZ, L. A. AND D. P. DE SYLVA. 1958. Some foods of marlins near Bimini, Bahamas. *Fla. Ocar. Res. Publ.*, 28 : 1-31

KUMARAN, M 1964. Studies on the food of *Euthynnus affinis affinis* (Cantor), *Auxis thazard* (Lacepede), *Auxis thynnoides* Bleeker and *Sarda orientalis* (Temminck and Schlegel) *Proc. Symp. Scombroid Fishes*, Mar. Biol. Ass. India, Pt. 11 : 599-606.

KUTHALINGAN, M. D. K., G. LUTHER, S. LAZARUS AND K PRABHAKARAN NAIR 1982. Experimental trawling off Vizhinjam *Mar. Fish. Infor. Serv. T & E Ser.*, No. 40 : 5-7.

LANE, F. W. 1962. *Kingdom of the octopus. The life history of* the *Cephalopoda*. The worlds of science (Zoology) Pyramid Publications, New York. 287 p.

LANGE, A. M. AND M. PSISSENWINE, 1980. Biological considerations relevant to the management of squid (*Loligo pealei* and *Illex illecebrosus*) of the northwest Atlantic. *Mar. Fish. Rev.*, 42 (7-8) : 23-38.

LANGE, A. M. T., AND M. P. SISSENWINE 1983. Squid resources of the northwest Atlantic. *In :* Caddy, J. F. (ed.), Advance. in assessment of world cephalopod resources. *FAO Fish. Tech. Pap.* (231) : 21-54.

LANGE, M. M. 1920. On the regeneration and finer structure of the arms of the cephalopods. *J. exp. Eool.* 31 (1) : 1-57.

LONG, D. AND W. F. RATHJEN 1980. Experimental jigging for squid off the Northeast United States *Mar. Fish. Rev.*, 42 (7-8) : 60-66.

LU, C. C. AND M. R. CLARKE. 1975. Vertical distribution of cephalopods at 40°N, 53°N and 60°N at 20°W in the North Atlantic. *J. Mar. biol. Assn. U.K.* (1975) 55 : 153-163.

LU, C. C. AND M. R. CLARKE. 1975. Vertical distribution of cephalopods at 11°N, 20°W in the North Atlantic. *Ibid.* (1975) 55 : 369-389.

LUTHER ,G,. P. N. RADHAKRISHNAN NAIR, G. GOPAKUMAR AND K. PRABHAKARAN NAIR 1982. Present status of small-scale traditional fishery at Vizhinjam. *Mar. Fish. Infor. Serv TN & E Ser.*, o. 38 : 1-16.

MAES, V. O. 1967. The littoral marine molluscs of Cocos—Keeling Islands (Indian Ocean). *Proc. Acad. Nat. Sci. Phila.*, **119** (4) : 93-217.

MAHADEVAN, S. AND K. NAGAPPAN NAYAR 1967. Underwater ecological observations in the Gulf of Mannar off Tuticorin. *J. Mar. Biol. Ass. India*, **9** (1) : 147-163.

MAHADEVAN S. AND K. NAGAPPAN NAYAR 1974. Ecology of pearl oysters and chank beds. The commercial molluscs of India. *Bull. Centr. Mar. Fish. Res. Inst.*, **25** : 106-121.

MAKSIMOV, V. P. 1969. Pitanie bol'skegla zogo tuntsa (*Thunnus obesus* Lowe) i mechry by (*Xiphias gladius* L.). Vostochnoi chasti tropicheskogo i Atlantikil, Atl. Nauchno-Issled. Int. Rybn. Khoz. Okenogr. (Atl. NIRO). **25** : 87-99 (Engl. transl. Fish. Res. Bd. Can. Transl. Ser. 2248).

MAISY, A. L. 1916. The Cephalopoda of the Indian Museum. *Rec. Indian Mus.*, **12** : 185-247.

MAISY, A. L. 1927. The Cephalopoda of the South African Museum. *Ann. S. African Mus.*, **25** : 151-167.

MATSUMOTO, G. 1976. Transportation and maintenance of adult squid (*Doryteuthis bleekeri*) for physiological studies. *Biol. Bull.*, **150** : 279-285.

MAY R. M. 1933. La formation des terminaisons nerveuses dans les ventouses du bras regenere du cephalopode *Octopus vulgaris* Lam. *Ann. St. Oceanogr. Salammbo* **7** : 1-15.

MENON, K. K. P. 1978. Fish processing industry in India. *Proc. Symp. Fish Utilization Technology and Marketing in the IPFC Region*, 18th Session, Manila, Philippines, 73-84.

MERCER, M. C. 1974. Modified Leslie - Delury assessments of the northern pilot whale (*Gobicephalus malaena*) and annual production of the short-finned squid (*Illex illecebrosus*) based upon their interaction at Newfoundland. *ICNAF Res. Doc.*, 74/49 : 14p.

MERCER, M. C., R. K. MISRA, G. V. HURLEY. 1980. Sex determination of the ommastrephid squid *Illex illecebrosus* using Beak morphometrics. *Can. J. Fish. Aquat. Sci.*, **37** : 283-286.

MIENIS, H. K. 1977. Squid from the stomach of a deep water shark. *Correspondentieblad ned. Malac. Veren.*, **178** : 707.

MIENIS, H. K. 1978. Who found *Spirula* or *Argonauta* on the Mediterranean coast of Israel or in the Red Sea *Levantina*, **15** : 170-172.

MIMURA, K. AND STAFF OF NRFRL 1963. Synopsis of biological data on yellowfin tuna, *Neothunnus macropterus* Temminck and Schlegal, 1842. *FAO Fish. Rep.* **6** (2) : 319-349.

MISAKI, H. AND T. OKUTANI 1976. Studies on early life history of Decapodan Mollusca—VI. An evidence of spawning of an oceanic squid, *Thysanoteuthis rhombus* Troschel, in the Japanese waters. '*Venus*', *Jap. Jour. Malacology*, **35** (4) : 211-213.

MOJUMDER, P. 1969. Food of the catfish *Tachysurus thalassinus* (Ruppell). *Indian J. Fish.*, **16** (1 & 2) : 161-169.

MOJUMDER, P. AND S. S. DAN 1979. Studies on food and feeding habits of catfish *Tachysurus tenuispinis* (Day). *Indian J. Fish.*, **26** (1 & 2) : 115-124.

MOSES, S. T. 1948. A preliminary report on the Cephalopoda of Baroda. *Bull. Dept. Fish. Baroda State*, **13** : 1-3.

MOSES, S. T. 1949. A preliminary report on the cephalopods of Baroda. *Proc. 35th Indian Sci. Congr.*, 198.

MOYNIHAN, M. 1975. Conservation of displays and comparable sterotyped patterns among cephalopods. In : Eds. Bacrends, Beer and Manning : *Function and Evolution in Behaviour*, Chapter 13 : 276-291.

MOYNIHAN, M. 1983. Notes on the behaviour of *Idiosepius pygmaeus* (Cephalopoda : Idioseplidae). *Behaviour*, **85** : (1-2) : 42-57.

MOYNIHAN, M. AND A. RODANICHE, 1977. Communications, Crypsis and mimicry among Cephalopods. In : How animals communicate (Seb-cock, T.A. Ed). Indiana Univ. Press, Bloomington.

MOYNIHAN, M. AND A. F. RODANICHE. 1982. Behaviour and Natural History of the Caribbean reef squid *Sepioteuthis sepioidea* with a consideration of social, signal and defensive pattern. for difficult and dangerous environments. pp. 1-151. Verlag Paul Parey. Berlin and Hamburg.

MPEDA 1976. Processing of cuttlefish and squid for export. *Indian Sea Foods*, XII (2 & 3) : 21-29.

MPEDA 1985. *Statistics of marine products exports* 1983. The Marine Products Export Development Authority, Cochin 264 p.

MUKUNDAN, C. 1968. Molluscs in Indian tradition and economyl *Souvenir, Symp. Mollusca*, Mar. Biol. Ass. India, Cochin, January 12-16, 1968 : 45-52.

MURATA, M. AND M. IAMI, 1977. Some information on the ecology of the oceanic squid, *Ommastrephes bartrami* (Lesueur) and *Onychoteuthis boreali japanicus* Okada in the Pacific Ocean of Northeastern Japan. *Bull. Hokkaido Reg. Fish. Res. Labs*, (42) : 1-23.

MURATA, M., M. ISHI, AND M. OSAKO 1981. On the regeneration of tentacle of the oceanic squid *Ommastrephes bartrami* (Lesueur). *Bull. Hokkaido Reg. Fish. Res. Lab.*, 46 : 1-14.

MUTHU, M. S., K. A. NARASIMHAM, G. SUDHAKARA RAO, Y. APPANNA SASTRY AND P. RAMALINGAM 1975. On the commercial trawl fisheries off Kakinada during 1967-70. *Indian J. Fish.*, **22** (1 & 2) : 171-186.

NAGABHUSHANAM, R. 1968a. Physiology of chromatophores in Cephalopoda. *Proc. Symp. Mollusca*, Mar. Biol. Ass, India, Pt. II : 568-571.

NAGABHUSHANAM, R. 1968b. Studies on neurosecretion in Mollusca. *Proc. Symp. Mollusca*, Mar. Biol. Ass. India, Pt. II : 572-579.

NAIR, R. V. AND K. K. APPUKUTTAN. 1973. Observations on the food of deep sea sharks *Halaelurus hispidus* (Alcock), *Eridacnis radcliffei* Smith and *Iago omanensis* Compagno and Springe *Indian J. Fish.*, **20** (2) : 575-583.

NAIR, S. GOPALAN 1958. A preliminary account of the fisheries of Vizhinjam. *Indian J. Fish.*, **5** (1) : 32-55.

NARASIMHAM, K. A., G. SUDHAKARA RAO, Y. APPANNA SASTRY AND W. VENUGOPALAN 1979. Demersal fishery resources off Kakinada with a note on economics of commercial trawling. *Indian J. Fish.*, 26 (1 & 2) : 90-100.

NARASIMHAMURTI, C. C. 1979. The emeriid, *Aggregata kudoi* n. sp. from *Sepia elliptica*. *Angewandte parasit*, 20 (3) : 154-158.

NATARAJAN, N. AND R. NATARAJAN 1980. Food and feeding habits of *Psettodes erumei* (Bloch and Schn.) and *Pseudorhombus arsius* (Ham. Buch.). *Matsya*, 6 : 30-42.

NATSUKARI, Y. 1983. Taxonomical and morphological studies on the Loliginid squids—III. *Nipponololigo*, a new subgenus of the Genus *Loligo*. *Venus, The Jap. Jour. Malacol.*, 42 (4) 313-318.

NAZUMI, T. 1975 Notes on the species of squids collected in the Tajima region of the Japanese Sea, 1974. *Bull. Hyogo Pref Fish Stn.*, 15 : 9-13 (in Japanese)

NELSON, M. *et al.*, 1983. On the fishery and biology of the giant squid *Dosidicus gigas* in the Gulf of California, Mexico *In:* Caddy, J. F. (ed), Advances in assessment of world cephalopod resources. *FAO Fish Tech. Pap.*, 231 : 306-340

NISHIMURA S. 1966. Notes on the occurrence and biology of the oceanic squid, *Thysanoteuthis rhombus* Troschel in Japan. *Publ. Seto. Mar. Biol. Lab.*, 14 (4) : 327-349.

NIXON, N. AND J. B. MESSENGER 1977. The biology of the cephalopods. Proceedings of a Symposium held at the Zoological Society of London on 10 and 11 April 1975. *Symp. Zool. Soc. London*, 38 : 615 p.

OGURA, M. 1976. Fishing tackle and fishing efficiency in squid *jigging*. *FAO Fish. Rep.*, 170 (Suppl. 1) : 99-102.

OGURA, M. AND T. NASUMI 1976. Fishing lamps and light attraction for squid jigging. *FAO Fish. Rep.*, 170 (Suppl. 1 : 93-98.

OKADA, Y. 1933. Animal of *Spirula*. *Venus*, 3 (1) : 144-145.

OKUTANI, T. 1970. A small collection of gastropod and decapod molluscs from the Scychelles Bank, Indian Ocean, by the trawling vessel KOYO-MARU, 1968. *Venus, The Jap. Jour. of Malacology*, 29 (4) : 123-130.

OKUTANI, T. 1973a. Preliminary note on planktonic Oegopsid cephalopod larvae obtained by the International Indian Ocean Expedition. *J. mar. biol. Ass. India*, 15 (1) : 213-217.

OKUTANI, T. 1973b. Guide and keys to squid in Japan. *Bull. Tokai. Reg. Fish. Res. Lab.*, (74) : 83-111.

OKUTANI, T. 1977. Stock assessment of cephalopod resources fished by Japan. *FAO Fish. Tech. Pap.*, (173) : 62 p.

OKUTANI, T. 1980. Useful and latent cuttlefish and squids of the world. Published from National Coop. Ass. of Squid Processors for the 15th Anniv. of its foundation : 66 p.

OKUTANI, T. AND SUZUKI, K. 1975. Concurrence of bathpyelagic *Spirula spirula* and epipelagic *Argonauta boettgeri* in stomach contents of a yellowfin tuna from the Indian Ocean. *Venus, The Jap. Jour. of Malacology*, 34 (1 & 2) : 49-51.

OKUTANI, T. AND TUNG, I. H. 1978. Review of biology of commercially important squids in Japanese and adjacent waters. 1. *Symplectoteuthis oualaniensis* (Lesson). *Veliger*, 21 (1) : 87-94.

OOMMEN, V. P. 1966. The Octopoda of the Kerala coast. I. A new species of the genus *Berrya*, Adam 1943. *Bull. Dept.. Mar. Biol. Oceanogr. Univ. Kerala*, 2 : 51.

OOMMEN, V. P. 1967. New records of octopoda from the Arabian Sea. *Bull. Dept. Mar. Biol. Oceanogr., Univ. Kerala*, 3 : 29.

OOMMEN, V. P. 1971. *Octopus varunae*, a new species from the west coast of India. *Bull. Dept. Mar. Biol. Oceanogr., Univ Cochin*, 5 : 69.

OOMMEN, V. P. 1975. New records of decapod cephalopods from the Arabian Sea. *J. mar. biol. Ass. India*, 17 (2) : 186-190.

OOMMEN, V. P. 1976. A new species of the genus *Opisthoteuthis* Verrill, 1883 (Cephalopoda : Mollusca) from the southwest coast of India. *J. mar. Biol. Ass. India*, 18 (2) : 368-374.

OOMMEN, V. P. 1977a. Two octopods new to Arabian Sea. *Indian J. Fish.*, 24 (1 & 2) : 25-32.

OOMMEN, V. P. 1977b. Studies on the food, feeding and fishery of certain cephalopods from the west coast of India. *Bull. Dept. Mar. Sci. Univ. Cochin*, 8 : 73-152.

ORTMANN, A. S. 1891. Cephalopoden von Ceylon. *Zool. Jb. Syst.*, 5 : 669-678.

OSAKO, M. AND M. MURATA 1983. Stock assessment of cephalopod resources in the Northwestern Pacific. *In :* Caddy, J. F. (ed.), Advances in assessment of world cephalopod resources. *FAO Fish. Tech. Pap.*, (231) : 55-144.

OWEN, R. 1832 Memoir on the Pearly Nautilus *Nautilus pompilius* Linnaeus, London, 68 p.

PADMANABHAN, V. 1970. On new fish products—Cuttlefish and squids. Quart. Newsletter, Govt. of India, Indo-Norwegian Project, 2 (2 & 3): 4-6.

PANDIT, A. R. AND N. G. MAGAR 1972. Chemical composition of *Sepia orientalis* and *Loligo vulgaris*. *Fish Technol*, 9 (2): 122-125.

PARIN, N. V. 1967. The materials on the distribution and biology of the snake mackerel—*Gempylus serpens* Cuv. (Pisces) Gempylidae in the Pacific and Indian Ocean : *Vopr. Icthhyology*, 7 (6) : (in Russian), 990-999.

PARONA, C. 1900. Sulla dicotomia della braccia nei cefalopod. *Boll. Musei Lab. Zool. Anat. Comp. r. Univ. Genova*, 96 : 1-7.

PAULY, D. AND N. DAVID 1981. ELEFANI, a BASIC program for the objective extraction of growth parameters from length frequency data. *Meeres forsch*, 28 (4) : 205-211.

PAYNE, R. L. 1978. Note on possible priorities for future commercial fisheries of demersal and small pelagic species. *Report of the FAO/Norway Workshop on the Fishery Resources of the North Arabian Sea*, 2 : 194-201.

PFEFFER, G. 1912. Die Cephalopoden der Plankton—Expedition. Zugleich eine monographische Ubersicht der Oepgopsiden Cephalopoden. *Ergebnisse der Plankton—Expedition der Humbodt—Stiftung*, 2 : 1-815.

PERRIN, W. F., R. R. WARNER, C. H. FISCUS AND D. B. HOLTS 1973. Stomach contents of porpoise *Stenella* spp. and Yellowfin tuna, *Thunnus albacares*, in mixed-species aggregations. *Fish. Bull U.S.*, 71 : 1077-1092.

PICKFORD, G. E. 1946. *Vampyroteuthis infernalis* Chun. An archaic dibranchiate cephalopod. I. Natural history and distribution. *Dana Rept.*, 29 : 1-40.

PICKFORD, G. E. 1949a. Distribution of the eggs of *Vampyroteuthis infernalis* Chun. *J. mar. Res.*, 8 (1) : 73-83.

PICKFORD, G. E. 1949b. *Vampyroteuthis infernalis* Chun. An archaic dibranchiate cephalopod. II. Extrnal anatomy. *Dana Rept.*, 32 : 1-132.

PICKFORD, G. E. 1952. The Vampyromorpha of the Discovery Expedition. *Discovery Repts.*, 26 : 197-210.

PICKFORD, G. E. 1959. Vempyromorpha. *Galathea Rept.*, 1 : 243-253.

PICKFORD, G. E. 1974. *Cistopus indicus* (Orbigny) : A common Indo-Malayan species of Octopus. *J. mar. biol. Ass. India*, 16 (1) : 43-48.

PORTMANN, A. 1952. Les luas dorsaux de *Tremactopus violaceus* delle chiaje. *Revue Suisse Zool.*, 59 (13) : 288-293.

PRASAD, R. R. AND P. V. RAMACHANDRAN NAIR 1973. India and the Indian Ocean fisheries. *J. Mar. Biol. Ass. India*, 15 (1) : 1-19.

RABINDRANATH, P. 1966. Biology and seasonal distribution of the pelagic food fishes of Travancore coast. *Kerala Univ. Publ.*, 1-140.

RADHAKRISHNAN, N. 1973. Pelagic fisheries of Vizhinjam. *Indian J. Fish.*, 20 (2) : 584-598.

RAHAMAN, A. A. 1967. Gonad and hapatic indexes of the Indian cephalopods *Sepioteuthis arctipinnis* Gould and *Sepia aculeata* Ferrussae and d'Orbigny. *Proc. Indian Acad. Sci.* 67 B (3) : 104-113.

RAHAMAN, A. A. 1980. Ecological observations on spawning of a few invertebrates of the Madras coast. *J. Madurai Kamaraj Univ.* (Sci.), 9 (1) : 71-77.

RAJAGOPAL, K. V., S. RAVICHANDRA REDDY AND K. SAKUNTALA 1977. Fish baits : Need for collection, care, preparation and propagation in India. *Seafood Export Juor.*, 9 (5) : 9-13.

RAJU, G. 1964. Observations on the food and feeding habits of the oceanic skipjack *Katuswonus pelamis* (Linnaeus) of the Laccadive Sea during the years 1958-59. *Proc. Symp. Scombroid Fishes*, Mar. Biol. Ass. India, Pt. II : 607-625.

RANCUREL, P. 1971. Less contenus stomacauxd ' *Alepisaurus ferox* daus le Sud-oues Pacifique (Cephalopods). *Cah. O.R.S.T. O.M. Ser. Oceanogr.* 8 (4) 3-87.

RANCUREL, P. 1976. Note suries Cephalopodes des contenus stomacaux de *Thunnus albacares* (Bonnaterre) dans le Sud" ouest Pacifique. *Ibid.*, 14(1) : 71-80.

RAO, K. SRINIVASA 1964. Observations on the food and feeding habits of *Scomberomorus guttatus* (Bloch and Schneider) and the juveniles of *S. lineolatus* (Cuvier and Valenciennes) *S. commerson* (Lacepede) from the waltair coast. *Proc. Symp. Scombroid Fishes*, Mar. Biol. Ass. India Pt. II : 591-598.

RAO, SUBBA M. V. 1977. Molluscs of Digha coast, West Bengal. 2. Bivalvia, Scaphopoda and Cephalopoda. *Newsl. Zool. Surv. India*, 3 (5) : 298-302.

RAO, K. VENKATASUBBA 1968. Some aspects of the biology of ' ghol ' *Pseudosciaena diacanthus* (Lacepede). *Indian J. Fish.*, 10 (2) : 413-459.

RAO, K. VIRABHADRA 1954. Biology and fishery of the Palk-Bay squid *Sepioteuthis arctipinnis* Gould. *Indian J. Fish.*, 1 : 37-66.

RAO, K. VIRABHADRA 1958. Molluscan Fisheries. *Fisheries of the West Coast of India. Cent. Mar. Fish. Res. Inst.*, : 55-59.

RAO, K. VIRABHADRA 1969a. Molluscs have many uses. *Indian Frmg.*, 29 (9) : 41-45.

RAO, K. VIRABHADRA 1969b. Distribution pattern of the major exploited marine fishery resources of India. *Bull. Cent. Mar. Fish. Res. Inst.*, 6 : 1-69.

RAO, K. VIRABHADRA 1973. Distribution pattern of the major exploited marine fishery resources of India. *Proc. Symp. Living Resources of the Seas around India*, CMFRI Special Publication : 18-101.

RAO, K. VIRABHADRA AND K. DORAIRAJ 1968. Exploratory trawling off Goa by the Government of India fishing vessels. *Indian J. Fish.*, 15 (1 & 2) : 1-14.

RAO, S. R., S. M. SHAH AND R. VISVANATHAN 1968. Calcium, Strontium and Radium content of molluscan shells. *J. Mar. Biol. Ass. India*, 10 (1) : 159-165.

RAY, H. C. 1937. Contribution to the knowledge of the molluscan fauna of Maungmagan, Lower Burma (with descriptions of one new genus and species of the Family Turridae (Gastropoda)). *Indian Mus.*, Calcutta, 8 : 1-150.

RAYUDU, G. V. AND P. CHANDRA MOHAN 1982. A note on the fishery of squids and cuttlefish of Visakhapatnam. *Seafood Exp. Jour.*, 14 (4) : 23-27.

REES, W. J. 1949. Note on the hooked squid, *Onychoteuthis banksi*. *Proc. malac. Soc. Lond.*, 28 : 43-45.

RIGGENBACH, E. 1901. Beobachtung uber selbstverstummehung *Zool. Anz.*, 24 : 587-593.

ROBSON, G. C. 1921. On the Cephalopoda obtained by the Percy Sladen Trust Expedition to the Indian Ocean in 1905. *Trans Linn. Soc. London*, 17 (2) : 429-442.

ROBSON, G. C. 1924a. Preliminary report on the Cephalopoda (Decapoda) procured by the S. S. ' Pickle '. *Rep. Fish. mar. biol. Surv. Union S. Africa*, 3, *Spec. Rept.*, 9 : 1-14.

ROBSON, G. C. 1924b. On the Cephalopoda obtained in South African waters by Dr. J. D. F. Gilchrist in 1920-1921. *Proc, Zool. Soc. London* : 589-686.

ROBSON, G. C. 1926a. Notes on the cephalopoda. No. 1. Descriptions of two new species of *Octopus* from southern India and Ceylon. *Ann. Mag. nat. Hist.*, Ser. 9, 17 : 159-167.

ROBSON, G. C. 1926b. The Cephalopoda obtained by the S. S. ' Pickle ' (Supplementary Report). *Fisheries and Marine Biological Survey Report*, No. 4, *for the year* 1925, 1-6.

ROBSON, G. C. 1929. *A Monograph of the Recent Cephalopoda.* Part I. *Octopodinae*. British Museum (Nat. Hist.) London, 236 p.

ROBSON, G. C. 1932. A monograph of the recent cephalopoda. Part II. The Octopoda (excluding the Octopodinae), London. British Museum (Natural History), 359 p.

ROPER, C. F. E. 1966. A study of the genus *Enoploteuthis* (Cephalopoda : Oegopsida) in the Atlantic ocean, with a redescription of the type species, *E. leptura* (Leach, 1817). *Dana Rept.*, 66 : 1-46.

ROPER, C. F. E., M. J. SWEENEY AND C. E. NAUEN 1984. Cephalopods of the world. An annotated and illustrated catalogue of species of interest to fisheries. *FAO Fish. Synop.*, (125) 3 : 277 p.

ROPER, C. F. E. AND R. E. YOUNG. 1975. Vertical distribution of pelagic cephalopods. *Smithsonian Contr. Zool.*, No. 209 : 1-51.

ROPER, C. F. E., R. E. YOUNG AND G. L. VOSS 1969. An illustrated key to the families of the order Teuthoidea (Cephalopoda). *Smithson. Contrib. Zool.*, 13 : 32 p.

ROSENBERG, P. 1973. The Giant Axon of the squid : A useful preparation for neurophisiological and pharmacological studies. F. Reiner Ed. *Methods of neurochemistry*, Vol. IV, Marcel Dekker, New york, 327 pp.

SAITO, R. 1976. The Japanese fishery (jigging) for *Nototodarus sloani sloani* in New Zealand waters. *FAO Fish. Rep.*, 170 (Suppl. 1) : 53-60.

SANDERS, M. J. 1979. Development of fisheries in areas of the Red Sea and Gulf of Aden. Preliminary stock assessment for the cuttlefish *Sepia pharaonis* taken off the coast of the People's Democratic Republic of Yemen. FAO Field Document, FAO-FI-RAB- 77/008, 58 p.

SANDERS, M. J. 1981. Revised stock assessment for the cuttlet fish *Sepia pharaonis* taken off the coast of the Peoples' Democratic Republic of Yemen. RAB/77/008/13. 44p. FAO, Project for the development of fisheries in areas of the Red Sea and Gulf of Aden, Cairo, Egypt.

SANDERS, M. J. AND M. BOUHLEL 1981. Interim report of a mesh selection study conducted in the People's Democratic Republic of Yemen on the cuttlefish *Sepia pharaonis*. FAO/UNDP Project on Development of Fisheries in areas of the Red Sea and Gulf of Aden : 35 p.

SANDERS, M. J. AND M. BOUHLEL 1983. Mesh selection study conducted in the People's Democratic Republic of Yemen on the cuttlefish *Sepia pharaonis*. *In :* Caddy, J. F. (ed.), Advances in *assessment of World Cephalopod Resources, FAO Fish. Tech. Pap.*, 231 : 181-203.

SANJEEVA RAJ, P. J. AND M. KALYANI 1971. *Euprymna morsei* (Verrill, 1881) (Sepiolidae : Cephalopoda) from the Indian Coast. *J. mar. biol. Ass. India*, 13 (1) : 135-137.

SANTHANAKRISHNAN, G. 1982a. Diversified markets for Indian marine products. *Seafood Export Jour.*, 14 (4) : 9-12.

SANTHANAKRISHNAN, G. 1982b. Dried squid. Part I. A value-added diversified product and its potential export markets *Seafood Export Jour.*, 14 (6) : 9-11.

SANTHANAKRISHNAN, G. 1982c. Dried squid. Part 2. A note on processing, packing and storing. *Seafood Export Jour.* 14 (7) : 1-13.

SANTHANAKRISHNAN, G. 1984. Diversification of products and markets. Octopus and un-exploited marine resource for diversification. *Seafood Export Jour.*, 15 (9) : 11-16.

SARVESAN, R. 1969a. Catalogue of molluscs. 2. Cephalopoda. *Bull. Cent. Mar. Fish. Res. Inst.*, 9 : 23-25.

SARVESAN, R. 1969b. Some observations on parental care in *Octopus dollfusi* Robson (Cephalopoda : Octopodidae). *J. Mar. Biol. Ass. India*, 11 (1 & 2) : 203-205.

SARVESAN, R. 1974. V. Cephalopods. *In :* The Commercial Molluscs of India. *Bull. Centr. Mar. Fish. Res. Inst.*, 25 : 63-83.

SARVESAN, R. 1976. On the occurance of *Sepia trygonia*. (Rochebrune) (Cephalopoda : Sepiidae) in Gulf of Mannar, *Indian J. Fish.*, 23 (1 & 2) : 256-260.

SASAKI, M. 1929. A monograph of the dibranchiate cephalopods, of the Japanese and adjacent waters. *Fac. Agric. Hokkaido Univ.*, Suppl., 20 : 1-357.

SASTRY, H. M. C. AND L. M. SRIKAR 1982. Protein and related changes in cuttlefish *Sepia aculeata* in iced storage. *Symposium Son Harvest and Post-harvest Technology of Fish, 24-27 November 1982, Cochin, Soc. Fish. Technologists.* Abstract.

SATO, T. 1976. Results of exploratory fishing for *Dosidicus gigas* (d' Orbigny) off California and Mexico. *FAO Fish. Rep.*, 170 (Suppl. 1) : 61-67.

SATO, T. AND H. HATANAKA 1983. A review of assessment of Japanese distant-water fisheries for cephalopods. *In :* Caddy, J. F. (ed.), Advances in assessment of world cephalopod resources. *FAO Fish. Tech. Pap.*, (231) : 145-180.

SATYAMURTHI, S. T. 1956. The mollusca of Krusadai Island (In Gulf of Mannar). II. Scaphopoda, Pelecypoda and Cephalopoda. *Bull. Madras Govt. Mus. (New Ser.) Nat. Hist. Sect.*, 1 (2) Pt. 7 : 202 p.

SAUNDERS, W. B. 1981. The species of living *Nautilus* and their distribution. *Veliger*, 24 (1) : 8-17.

SEKHARAN, K. V., M. S. MUTHU, K. VENKATA SUBBA RAO, V. RAMAMOHANA RAO, P. MOJUMDER AND S. REUBEN 1973. Exploratory trawling on the continental shelf along the north-western part of the Bay of Bengal. *Proc. Symp. Living Resources of the Seas around India*, CMFRI Spl. Publication : 280-337.

SHEBEY, D. J. AND S. F. VIK, 1980. 'Sake-ika' : Dried squid processing squipment and markets. *Marine Fisheries Review*, 42 (7-8) : 92 p.

SHENOY, A. S. 1985. Squids from India to Japan. *Infofish marketing Digest, (FAO)*, No. 2 : 43-44.

SHIN, P. K. S. 1982. The Hong Kong Squid Fishery. In Review of National Squid Fisheries, IPFC/RRD/82/Inf. 8 (a), March 1982, Sydney, Australia, 10 p.

SILAS, E. G. 1963. Synopsis of biological data on dogtooth tuna *Gymnosarda unicolor* (Ruppel) 1838 (Indo-Pacific). *FAO Fish. Rep.*, 6 (2) : 877-899.

SILAS, E. G. 1968. Cephalopoda of the west coast of India collected during the cruises of the research vessel 'VARUNA', with catalogue of the species known from the Indian Ocean. *Proc. Symp. Mollusca.* Mar. Biol. Ass. India, Pt. I : 277-359

SILAS, E. G. 1969a. Exploratory fishing by R. V. VARUNA. *Bull. Cent. Mar. Fish. Res. Inst.*, 12 : 86 pp.

SILAS, E. G. 1969b. Pelagic fisheries of the Indian Ocean *Indian Frmg.*, 19 (9) : 63-66.

SILAS, E. G., S. K. DHARMARAJA AND K. RENGARAJAN 1976 Exploited marine fishery resources of India—a synoptic survey with comments on potential resources. *Bull. Cent. Mar. Fish Res. Inst.*, 27 : 25 p.

SILAS, E. G., K. S. RAO, R. SARVESAN, K. P. NAIR AND M. M. MEIYAPPAN 1982. The exploited squid and cuttlefish resources of India : A review. *Mar. Fish. Infor. Serv. T & E Ser.*, No. 34 : 1-16.

SILAS, E. G. AND P. P. PILLAI 1982. Resources of tunas and related species and their fisheries in the Indian Ocean. *Bull. Cent. Mar. Fish. Res. Inst.*, 32 : 174 p.

SIVALINGAM, D. AND S. KRISHNA PILLAI, 1983. Preliminary experiments on breeding of cephalopods. *Proc. Symp. Coastal Aquaculture.*, Part 2, Mar. Biol. Assn. India, 633-635.

SIVAPRAKASAM, T. E. 1967. Observations on the food and feeding habits of *Papastromateus niger* (Bloch) of the Saurashtra coast. *Indian J. Fish.*, 10 (1) : 140-147.

SREENIVASAN, A. 1962. Two cases of bacterial discolouration of squids. *Curr. Sci.*, 31 (9) : 381-382.

SREENIVASAN, P. V. 1974. Observations on the food and feeding habits of the 'Torpedo Travally' *Megalaspis cordyla* (Linnaeus) from Vizhinjam Bay. *Indian J. Fish.*, 21 (1) : 76-84.

STEENSTRUP, J. J. 1856. Hectocotyldannelsen hos octopodslaegsterne *Argonauta* og *Tremactopus*, oplyst ved Iagttagelse at lignende Dannelser hos Blacksprunt-terne i Almindelighed K. *danske Vidensk. Selsk. Skr.*, 5 *R.*, 4 : 186-215, 2 pl.

SULLIVAN, D., AND J. M. CULLEN. 1983. Food of the squid *Notodarus gouldi* in Bass Strait. *Aust. J. Mar. Freshw. Res.*, 34 : 261-85.

SULOCHANAN, P. AND M. E. JOHN 1982. Cephalopod resources in southwest coast of India. *Symposium on Harvest and Post-harvest Technology of Fish*, 24-27 *November*, 1982, *Cochin* Soc. Fish. Technologists, Abstract.

SUMMERS, W. C. 1969. Winter population of *Loligo pealei* in the Mid-Atlantic bight. *Boll. Bull.*, 137 (1) : 202-216.

SUMMERS, W. C. 1983. *Loligo pealei.* In Ed. P. R. Boyle *Cephalopod Life Cycles*, Vol. 1 : Species accounts. Academic Press. pp. 115-142.

SURAYANARAYANAN, A. AND K. K. ALEXANDER 1980. Biochemical studies on the molluscan muscle. 2. Studies on the muscles of some bivalves and cephalopods. *J. Anim. Morph. Physiol.* 27 (1-2) : 180-189.

SUSEELAN, C. AND K. V. SOMASEKHARAN NAIR 1969. Food and feeding habits of the demersal fishes off Bombay. *Indian J. Fish.*, 16 (1 & 2) : 56-74.

TAKAHASHI, T. 1965. Squid meat and its processing. *In :* Fish as Food. G. Borgstrom (ed.), Academic Press, New York : 339-354.

TAKI, I. 1981. A catalogue of the Cephalopoda of Wakayama Prefecture. *In :* A catalogue of molluscs of Wakayama Prefecture, The Province of Kii. 1. Bivalvia, Scaphopoda and Cephalopoda. Sato mar. biol. Lab. Japan, 301 p.

TALBOT, F. H. AND M. J. PENRITH 1963. Synopsis of biological data on species of the genus *Thunnus* (*Sensu lato*) (South Africa). *AFO Fish. Rep.*, 6 (2) : 608-646.

TAMPI, P. R. S. 1959. The ecological and fisheries characteristics of a salt water lagoon near Mandapam. *J. Mar. Biol. Ass. India*, 1 (2) : 113-130.

TANIKAWA, E. AND M. SUNO 1952. Studies on the complete utilization of the squid (*Ommastrephes sloanii pacificus*) 5. Nutritive value and digestibility of squid meat. *Bull. Fac. Fish. Hokkaido Univ.*, 3 (1) : 73-94.

TASAKI, I. 1968. *Nerve Excitation.* Charles C. Thomas Springfield Illinois, pp. 200-26.

THIELE, J. 1915. *In :* Chun, C. Wiss. Ergebn. Deutsche Tiefsee Exped., Bd. 18 Pt. 2.

THOLASILINGAM, T., G. VENKATARAMAN, K. N. KRISHNA KARTHA AND P. KARUNAKARAN NAIR 1968. Results of the exploratory trawl fishing on the continental slope of the southwest coast of India by M. F. V. 'Kalava'. *Indian J. Fish.* 11 (2) : 547 558.

THORE, S. 1945. On the Cephalopoda of Professor O. Carlgren's Expedition to South Africa in 1935. K. fysiogr. Sallsk. Lund Forh., 15 : 49-57.

TOLL, R. B. AND S. C. HESS. 1981. Cephalopods in the diet of the sword fish, *Xiphias gladius* from the Florida Strait. *Fish. Bull. U.S.* 79(4) : 765-774.

TRETHEWIE, E. R. 1965. Pharmacological effects of the venom of the common octopus, *Hapalochlaena maculosa. Toxicon* 3 : 55-59.

TUNG, IH-HSIU 1976. On the reproduction of common squid, *Symplectoteuthis oualaniensis* (Lesson). *Rep. Inst. Fish.* Biol. Taipei, 3 (2) : 26-48 (in Chinese with English summary).

TUNG, IH-HSIU, CHI-SHENG LAN AND CHIEN-CHIN-HU 1973. The preliminary investigation for exploitation of common squid resources. *Rep. Inst. Fish. biol., Taipei*, 3 (1) : 211-247 (in Chinese with English summary).

TSENG, A. R. 1974. Fishery management issues in the Indian Ocean. Indian Ocean Programme, FAO, Rome, IOFC/DEV/74/35 : 39 p.

UNDP/FAO 1974a. Survey Results 1972/73. *Progress Report No.* 6 : 141 p.

UNDP/FAO 1974b. Plankton—Fish eggs and larvae studies. *Progress Report No.* 7 : 21 p.

UNDP/FAO 1976a. Survey Results 1973/74. *Progress Report No.* 12 : 32 p.

UNDP/FAO 1976b. Survey Results 1974/75. *Progress Report No.* 13 : 21 p.

UNDP/FAO 1976c. Pelagic fishery Investigation on the southwest coast. *Final Report of the Norwegian Agency for International Development* (NORAD) *and the Institute of Marine Research Bergan* : 55 p.

UNDP/FAO 1976d. A synopsis of the information on pelagic resources off the southwest coast of India. *Progress Report No.* 18 : 31 p

UNDP/FAO 1977. Report of acoustic survey along the southwest coast of India, November 1976. Progress Report, 1. FAO, Rome FIRS-IND/75/0348 : 28 p.

UNNITHAN, K. A. 1982. Observations on the biology of cuttlefish *Septella inermis* at Mandapam. *Indian J. Fish.*, 29 (1 & 2) : 101-111.

VERGHESE, G. 1981. Present status of small scale fisheries in Lakshadweep. *Bull. Cent. Mar. Fish. Res. Inst.*, 30 B : 60-64.

VELAIN, C. 1877. Remarques generales an sujet de la faune des iles St. Paul et Amsterdam, Suivies d'une description de la faune malacologique des deux iles. *Archs. Zool. exp. gen.*, 6 : 1-144.

VENKATARAMAN, R. AND K. DEVADASAN 1978. Marine products processing industry in India : Its growth and future prospects *Proc. Symp. Fish Utilization Technology and marketing in the IPFC Region, 18th Session*, Manila, Philippines : 38-44.

VERRILL, A. E. 1881a. Report on the cephalopods and on some additional species dredged by the U. S. Fish Commission Steamer ' Fish-hawk ', during the season of 1880. *Bull. Mus. Comp. Zool.*, 8 : 99-116.

VERRILL, A. E. 1881b. Regeneration of lost parts in the squid *Loligo pealei. Amer. J. Sc.*, (3rd ser.), 21 : 333-334.

VERRILL, A. E. 1882. Report on the cephalopods of the northeastern coast of America. *Rep. U. S. Comm. Fish and Fisheries*, 1879, 7 : 211-455.

VOSS. G. L. 1956. A review of the cephalopods of the Gulf of Mexico. *Bull. mar. Sci. Gulf. Carib.*, 6 (2) : 85-178.

VOSS, G. L. 1962. South African cephalopods. *Trans. R. Soc. S. Africa*, 36 (4) : 245-272.

VOSS, G. L. 1963. Cephalopods of the Phillippine Islands. *Bull. U. S. nat. Mus.*, 234 : 1-180.

VOSS, G. L. 1967. Some bathypelagic cephalopods from South African waters. *Ann. S. African Mus.*, 50 (5) : 61-88.

VOSS, G. L. 1973. Cephalopod resources of the world. *FAO Fish. Circ.* (149) : 75 p.

VOSS, G. L. 1977. Present status and new trends in cephalopod systematics. *Symp. Zool. Soc. London*, 38 : 49-60.

VOSS, G. L. AND D. S. ERDMAN 1959. *Thysanoteuthis rhombus*, a large cephalopod new to Western Atlantic. *Mar. Lab. Univ. Miami, Nautilus*, 73 (1) : 23-25.

VOSS, G. L. AND G. R. WILLIAMSON 1971. *Cephalopods of Hongkong*. Government Press, Hongkong : 138 p.

VOVK, A. N. 1972. Method of determining maturing stages in gonads of the squid *Loligo pealei. Zoologicheskiy Zhurnal* (USSR), 51 (1) : 127-132. (Translation Ser. No. 2337, 1973, Fish Res. Bd. Can.)

WELLS, M. J. 1962. Brain and Behaviour of Cephalopods. Heines mann, London.

WELLS, M. J. 1966. Cephalopod Sense organs. *In* Physiology of Mollusca, Edited by K. M. Wilbur and C. M. Younge, New York, Academic Press. Vol. 2 : 523-45.

WELLS, M. J. 1978. Octopus : Physiology and behaviour of an advanced invertebrate. Chapman and Hall London and John Wiley and Sons, New York, 417 p.

WELLS, M. J. AND J. WELLS. 1972.Sexual display and mating of *Octopus vulgaris* Cuvier and *O. cyanea* gray and attempts to alter performance by manupulating the glandular condition of animals. *Animal Behav.* 20 : 293-308.

WILLIAMS, F. 1964. The Scombroid fishes of East Africa. *Proc. Symp. Scombroid Fishes*, Mar. Biol. Ass. India, Pt. I : 107-164.

WILLIAMS, 1967. Longline fishing for tuna off the coast of East Africa, 1958-1960. *Indian J. Fish.*, 10 (1) : 233-290.

WILLY, A. 1902. *Contribution to the natural history of the pearly nautilus Part 6. of Zoological Results based on material from New Britain, New Guinea, Loyalty Islands.* (34) Cambridge.

WINCKWORTH, R. 1926. A list of Cephalopoda in the Colombo Museum. *Spolia Zeylan.*, 13 : 323-331.

WICNKWORTH, R. 1936. Marine Mollusca from South India and Ceylon. 4. A new Indian *Sepia. Proc. Malac. Soc. London* 22 : 16-23.

WOLFF, G. A. 1984. Identification and estimation of size from the beaks of 18 species of Cephalopods from the Pacific Ocean. *NOAA Tech. Rept. NMFS* 17 : 1-50.

WOLFF, G. A. AND J. H. WORMUTH. 1979. Biometric Separation of the beaks of two morphologically similar species of the squid family Ommastrophidae. *Bull. Mar. Sci.* 29(4) : 587-592.

WORMS, J. 1983. World fisheries for cephalopods : A synoptic overview. *In :* Caddy J. E. (ed.), Advances in Assessment of world cephalopod Resources, *FAO Fish. Tech. Pap.*, (231) : 1-20.

WORMUTH, J. H. 1976. The biogeography and numerical taxonomy of the Oegopsid squid family Ommastrephidae in Pacific Ocean. *Bull. Scripps. Inst. Oceanogr.*, 23 : 90 p.

WULKER, G. 1920. Ueber Cephalopoden des Roten Meeres. *Sneckenbergiana*, 2 : 48-58.

YAJIMA, S. AND S. MITSUGI 1976. Japanese squid jigging gear. *FAO Fish. Rep.*, 170 (Suppl. 1) 85-88.

YAMANAKA, H. 1976. Summery Report on cruise of R. V. *SOHYO MARU* in the Northern Arabian Sea, Oct. 1975-Feb. 1976. Far Seas Fisheries Research Laboratory, Japan Fisheries Agency pp. 1-9 with 30 figs, 7 tables, 6 plates and 2 appendices.

YAMANAKA, H., Y. NISHIGAWA AND J. MORITA 1976. Summary Report on cruise of the R. V. SHOYO MARU in the North Arabian Sea. FAO/UNDP Indian Ocean Programme Technica Report No. 11, 47 p.

YAMAZAKI, T. AND M. CHUENCHITPONG. 1981. Survey Report on squid stick-held dip net at Ban PHE District. *SEAFDEC Training Dept.* MP/No. **10** : 1-14.

YAMAZAKI, T. P., MASTHAWEE AND S. SAKARANG. 1983. Survey Report on a *new type of squid lift net. SEAFDEC Training Dept.* TD/MP/15 : 1-16. June 1983.

YAMASHITA, Y. 1976. The octopus Fishery of Hokkaido. Suppl. to the Report of the Expert Consultation on Fishing for Squid and other cephalopods. FAO Fish. Rep. (170) Suppl. 1, 142-143.

YEOH, Q. L. AND Z. MERICAN 1978. Processing of non-commercial and low-cost fish in Malaysia. *Proc. Symp. Fish Utilization Technology and Marketing in the IPFC Region, 18th Session,* Manila, Philippines : 572-580

YOUNG, R. E. 1975. A brief review of the biology of the oceanic squid, *Symplectoteuthis oualaniensis* (Lesson). *Comp. Biochem. Physiol.* **52 B** : 141-143.

YOUNG, J. Z. 1962. Courtship and mating by the coral reef octopus (*O. horridus*). *Proc. Zool. Soc. London,* **138** : 157-62.

YOUNG, J. Z. 1965. The Central Nervous System of *Nautilus. Philos. Trans. R. Soc. Biol. Sci.,* 249 : 1-25.

YOUNG, J. Z. 1971. Anatomy and Nervous system of *Octopus vulgaris.* Clarandon Press, Oxford.

YOUNG, J. Z. 1977. Brain, behaviour and Evolution. *Symp. Zool. Soc. London,* **38** : 377-434.

YOSHIKAWA, N. 1978. Fisheries in Japan. Squid and cuttlefish, Publ. by Japan Marine Products Photo Materials Association. Tokyo, 162 p.

ZUEV, G. V. 1971. *Cephalopods from the northwestern part of the Indian Ocean, Moscow,* 223 pp.

ZUEV, G. V. AND K. N. NESIS 1971. *Squid (Biology and Fishery),* Pishchevaya Promyshlennost Press, Moscow.

ZUPANOVIC, S. AND S. Q. MOHIUDDIN 1973. A survey of the fishery recources in the northeastern part of the Arabian Sea. *J. mar. Biol. Ass. India,* **15** (2) : 496-537.