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The Potentially Commercial Species
of Octopus and Squid of Florida,
the Gulf of Mexico and the
Caribbean Area

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Gilbert Voss
Lee Greshko
Ronald Thomas

Photographs by Roger Hanlon

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Sea Grant Field Guide Series
Number 2
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Foreword

The University of Miami Sea Grant Field Guide Series is published to make available to the commercial and sports fishermen, the general public, and fisheries and conservation personnel easily usable, non-technical, well-illustrated guides for the identification of the marine life of the area. Every means has been used to avoid technical terms where possible. When these must be used to avoid confusion, they are carefully explained and often illustrated. Glossaries are included when thought necessary.

But the guides go further than just identification. Where such knowledge is available, information is given on geographical distribution, depth distribution, abundance, time of spawning, present utilization, means of harvesting and mariculture methods, besides other useful information when known.

The format is uniform in the series for greater ease of use. Actual photographs are used where possible but when greater clarity is required, drawings are used. In general we have attempted to illustrate each species but in cases where two or more species are very similar, this is noted, a single illustration is used, and distinguishing characters are given in the text.

The principle used in selection of species has been not whether the species are now commercially exploited but whether the animal or plant is of sufficient size and occurs in large enough numbers to make it potentially capable of exploitation. In some cases species are included that are known to be harmful or poisonous. This is done to draw attention to their presence and to avoid their mistaken use as food.

The Sea Grant office, University of Miami, will appreciate comments from users of this series for the betterment of the guides, for the inclusion in future printings of species possibly overlooked by the compilers, and especially for suggestions concerning other groups of organisms for which guides are desired. Your comments are solicited.

To Users of the Guide Series

The purpose of field guides is to make possible identification of animals or plants in the "field" without the need for other reference works, dictionaries, microscopes or dissecting equipment. Most field guides fall short of these objectives mainly because of the use of nonexplained technical terms and reference to characters not discernable to the naked eye.

In this guide we have attempted to use no term not in general use; where a technical word is necessary, it is explained at its first use and is illustrated in the introduction. No character is used that is not visible to anyone having normal vision.

We suggest that users first read the introduction in order to find the scope of the guide-area covered, kind of species included, characters used, and to familiarize themselves with the words used in the descriptions and keys.

There are two ways to use this guide. One is to simply thumb through the pages looking at the illustrations until one is found that matches the animal in front of the reader. When this, or a series of species illustrations, is found, the descriptions should then be read in search of further identifying remarks, paying attention to the notes on distribution, depth of capture and type of bottom. If all of these fit reasonably well, there is a high chance that your animal belongs to that species.

The second method is to use the key first and when a reasonable match is found, to then turn to the page number given in the key and check the animal out as described in the paragraph above. In using the key one must be aware that species not covered in this guide may be apparently identified by the key. This is why it is essential that when an animal is identified by the key, the illustrations and descriptions must be used also. If the name given in the key does not correspond to the species illustration and description, either your use of the key was wrong and another alternative is correct or the species is not considered to be potentially valuable and is not included in this guide. If key, illustrations and descriptions agree, you may reasonably expect that your identification is correct.

When using the keys, always be sure to read both alternatives and choose the one most fitting your specimen before going to the next set of choices. In closely related species, each choice will be somewhat fitting to your animal but only one will fit it correctly.

Finally, do not expect your animal to be exactly similar to the illustration, especially in the exact number and position of spots, bands, spines, ridges, and other characters. No two human beings are exactly alike except identical twins. Marine species have similar ranges of differences between individuals.

If at last you are unable to identify your animal from this guide but you are certain that it belongs to the group of animals included in it, your final recourse is to bring or send it to a specialist for his identification made from original, technical scientific source books.

Frederick M. Bayer

Gilbert L. Voss

G U I D E T O T H E

OCTOPUS AND SQUID

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Introduction

Octopus and squid are members of the molluscan class Cephalopoda and thus relatives of such well known animals as conchs, whelks and clams. Unlike these, however, they are active, swift moving animals which live by active hunting. They differ from most other mollusks by the lack of a heavy shell, especially in our western Atlantic species.

From ancient times, octopus and squid have been prized seafoods. They are especially sought after in southern Europe around the Mediterranean, Africa, and the Far East. In addition, they have recently become much prized as laboratory experimental animals. The giant nerve fiber of certain squid are the largest nerve fibers known. It is from the study of these squid fibers that most of our knowledge of nerve transmission in humans has been derived.

There are at present about eighty species of cephalopods known on the coasts of Florida, the Gulf of Mexico and the Caribbean Sea. Their total number will probably well exceed one hundred. They are divided between only a few, perhaps twenty species, that live in coastal waters over or on the continental shelf and the remaining eighty or so that live either in the high seas or in its depths. Of these, only about twelve species seem to be of actual or potential importance. These twelve either are now being fished commercially, occur in sufficiently large numbers to be exploited, or have the potential for successful mariculture. This guide offers identification means and fisheries information on these twelve species. Information concerning the others may be had by referring to the various papers listed in the bibliography.

Fisheries

The world cephalopod fishery is second only to the scale fish fishery in tons and dollars. According to the only modern survey of this fishery (Voss, 1973), approximately 1.5 to 2.0 million metric tons are landed each year and the fishery is only in its infancy. The value to the fisherman is difficult to calculate because prices vary so widely. In the United States and Canada squid bring only about \$20 to \$40 per ton. Elsewhere they fluctuate from \$100 to \$500, rivalling our highest priced seafoods.

In the eastern United States and along the Gulf of Mexico, the catch consists almost entirely of squid; these are sold for fresh or frozen bait and for cheap fish meal. In Mexico both octopus and squid are fished, the former in 1967 having a value to the fisherman of \$300,000. In the Caribbean the fishery is incidental to other types, such as shrimp fishing. The estimated production in 1970 was about 900 tons with a value of about \$500,000 (Voss, 1971). The reason for the lower prices and small production is simple. The major fishing companies are unaware of the potential world market. Moreover, few people in the United States except those of Mediterranean or Oriental extraction are accustomed to eating these animals or know how to prepare them for the table.

Fishing gear

Squid

Three main methods of catching squid seem most useful in our region: seines, trawls and jigs. Trap nets and weirs do not seem advisable because of the possibility of shark damage.

1. Seines. The beach or hand seine is used in some areas for capture of small squid congregated in shallow water. On a large commercial scale, the lampara net of Mediterranean origin is widely used. It is the basic gear for the fishery in Monterey Bay, California (Fields, 1950) and has been used experimentally in Newfoundland. With the lampara net the squid are often attracted to lights, the net set around the school and when pursed down are either brailled or pumped out with a fish pump (Voss, 1973).
2. Bottom trawls. Most of the squid now caught in our area are captured in otter trawls used for scale fish or shrimp. One of the largest trawl fisheries for cephalopods in the world is located on the Saharan Bank off northwest Africa. The nets used are conventional fish trawls (García Cabrera, 1968).
3. Jigging. Jigging is the most productive and universal method of squid fishing. The traditional method employed a single lead jig armed with a circle of barbless hooks around one end. It was lowered singly or in a series into the water to the appropriate depth, jigged up and down and hauled in. In good jigging, several squid would be caught on each jig.

This hand jigging has now been replaced by the Japanese mechanical jigging machine (Quigley, 1964; Igorashi, Mikami and Koboyashi, 1968). This consists of a reel, a roller over the side and higher than the reel and a strong monofilament line weighted at the end and bearing a series of 6-10 squid jigs about three feet apart. This can be hand operated or run by a power take-off. In the operation the line of jigs is dropped free to the desired depth, the crank thrown into gear, and the jigs hauled back up. The squid coming over the roller are reversed on the barbless hooks, fall off and into the squid compartments. A fully outfitted Japanese squid jigging vessel may have as many as two dozen double reel jigging machines and be capable of landing many tons in a single night of fishing (Voss, 1973).

Various size jigs are used for different kinds of squid and are available commercially in Japan.

Octopus

Octopus are taken in the fishery by four methods: hooking, hand-line, pots or trawling.

1. Hooking. Hooking for octopus is the most primitive and unproductive method. It is used mainly in subsistence fisheries and is commonly used in the Caribbean (Voss, 1960, 1971). The fisherman searches out the octopus lairs using either a few drops of oil on the water surface or a glass bottom bucket. When an octopus is located, it is caught using an iron hook on the end of a short pole. The pole is thrust into the hole, given a twist, and the octopus pulled out.
2. Handline. This type of fishing is used in Mexico around Yucatan and Campeche (Solis, 1967; Voss, 1971). Launches or small sloops drift off broadside before the wind. As many lines as possible are trailed across the bottom baited with crabs or artificial lures. When an octopus seizes the bait or lure, the line is hauled in and the octopus caught with a dipnet.
3. Pots. This is a widely used method that can be very productive. Clay, cement, or ceramic pots, conch shells or other suitable objects are fastened together in long lines of several dozen or more in a shot and set on the bottom in favorable areas. They are unbaited and the octopus seek refuge in them or a place to deposit their eggs. Hauled periodically, good catches can be obtained. In Europe these pots are called nummarellas (Voss, 1960, 1971).
4. Trawling. The major octopus trawl fishery of the world is on the Saharan Bank off northwest Africa. The trawls used are regular scalefish trawls fitted with "octopus lifters" or loops of chain on the footrope (García Cabrera, 1968). It is the most productive type of fishing when good trawlable octopus grounds can be located.

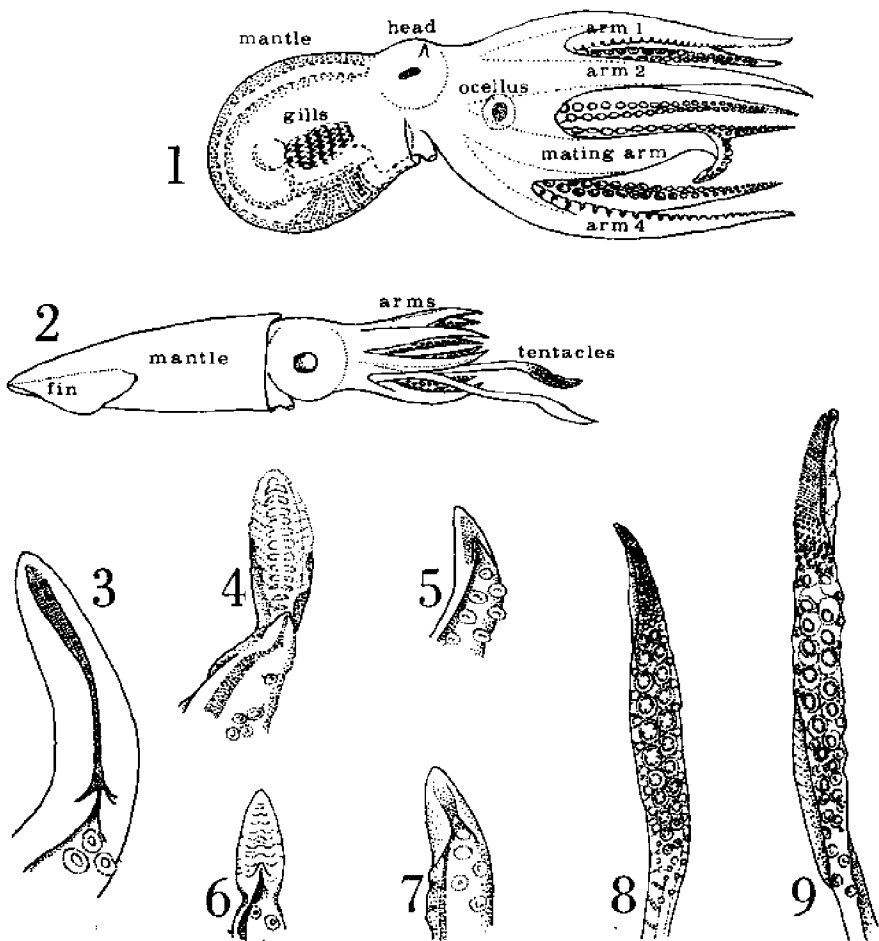
Recipes

Recipes for delicious octopus and squid dishes may be found in most Italian, Spanish and Greek cookbooks. A special cookbook of cephalopod recipes is in preparation. Enquiries may be addressed to the Sea Grant Program at Miami.

Key for Identification

1. Eight arms present; body round or sack-like; no fins (Key Fig. 1) 2
1. Eight arms and two long tentacles; body long and tubular; fins present (Key Fig. 2) 6
2. An eyespot (ocellus) or dark splotch between eyes and base of arms on each side of the head (Key Fig. 1); male with small smooth spoon-shaped organ with in-rolled edges on end of right third arm (Key Fig. 7); eggs large (about 3/5 inch long); known now only from Yucatan and Gulf of Campeche. Octopus maya
2. No eyespot or dark splotch between eye and base of arms 3
3. Upper or first pair of arms longest and sometimes stoutest; living color from blue-green to brick red, both with large, white spots on body and arms; males with large, stout tubular organ on end of right third arm (Key Fig. 3); eggs small Octopus macropus
3. Upper or first pair of arms never the longest or stoutest; no large white spots on body and arms 4
4. Side arms (second and third pair) longest and much stouter than other arms; males with conspicuous ridged spoon-shaped organ on end of right third arm (Key Fig. 4); females with large eggs (about 1/2 inch long) Octopus briareus
4. Side arms about equal in length and stoutness with other arms 5
5. Arms about equal in length and thickness (upper arms a little shorter); males with very small spoon-shaped organ on end of right third arm (Key Fig. 5); females with small eggs (about 1/10 inch long); animal medium to large size. Octopus vulgaris
5. Arms about equal in length and thickness; males with large conspicuous spoon-shaped organ on end of right third arm (Key Fig. 6); females with large eggs (about 1/4 inch long); a few whitish pimples around eyes; animals small when fully adult. Octopus joubini
6. Skin of side of head completely covering eye 7
6. A free circular eyelid around each eye 10

7. Fins nearly as long as the body, together forming an oval outline Sepioteuthis sepioidea
7. Fins about one half or less of body length 8
8. Body short and wide, a dark streak down the upper midline; both fins roundish in outline . . Lolliguncula brevis
8. Body long and somewhat narrow; fins angular on sides 9
9. Adults with slender bodies and fins more than half the length of the body; males with conspicuous reddish "flame" markings on under side; young with short fins; pen with rather straight, thickened margins Dorytheuthis plei
9. Adults with moderately stout bodies and fins about half the length of the body or less, especially in young; males without conspicuous "flame" markings; pen with thin, broadly curved margins Loligo pealei
10. Tentacles with two rows of hooks or claws, those of the upper row small; those of the lower row large Onychoteuthis banksi
10. No hooks or claws on tentacles 11
11. Eight rows of small suckers on tips of tentacles (Key Fig. 9); body slender and tapered to a point Illex illecebrosus
11. Four rows of small suckers on tip of tentacles (Key Fig. 8); body stout and heavy; a thin-skinned oval luminous patch at body margin in upper midline Ommastrephes pteropus



Key Figures 1-9. 1. Terms used with octopus. 2. Terms used with squid. 3. End of mating arm of Octopus macropus. 4. End of mating arm of Octopus briareus. 5. End of mating arm of Octopus vulgaris. 6. End of mating arm of Octopus joubini. 7. End of mating arm of Octopus maya. 8. End of tentacle (club) of Ommastrephes pteropus. 9. End of tentacle (club) of Illex illecebrosus.

DESCRIPTIONS AND ILLUSTRATIONS

Octopus maya Voss and Solis, 1966

Mexican four-eyed octopus

Fig. 1

Recognition Features.--The most conspicuous character is a large round spot on each side of the head between the eyes and the base of the arms. The color is usually dark brown flushing to reddish when alarmed. The arms are long with slender tips. The mating arm of the male is short and stout and has a very small spoon-shaped organ at its tip. Mature females have large eggs about $3/5$ of an inch long. There are nine to ten leaflets on the outer side of the gill.

Geographic Range.--This species is common in shallow grassy bottom along the coasts of Campeche and Yucatan but is unknown outside of that area (Voss & Solis, 1966).

Depth Range.--Known only from shallow water in depths down to about 150 feet (Solis, 1967).

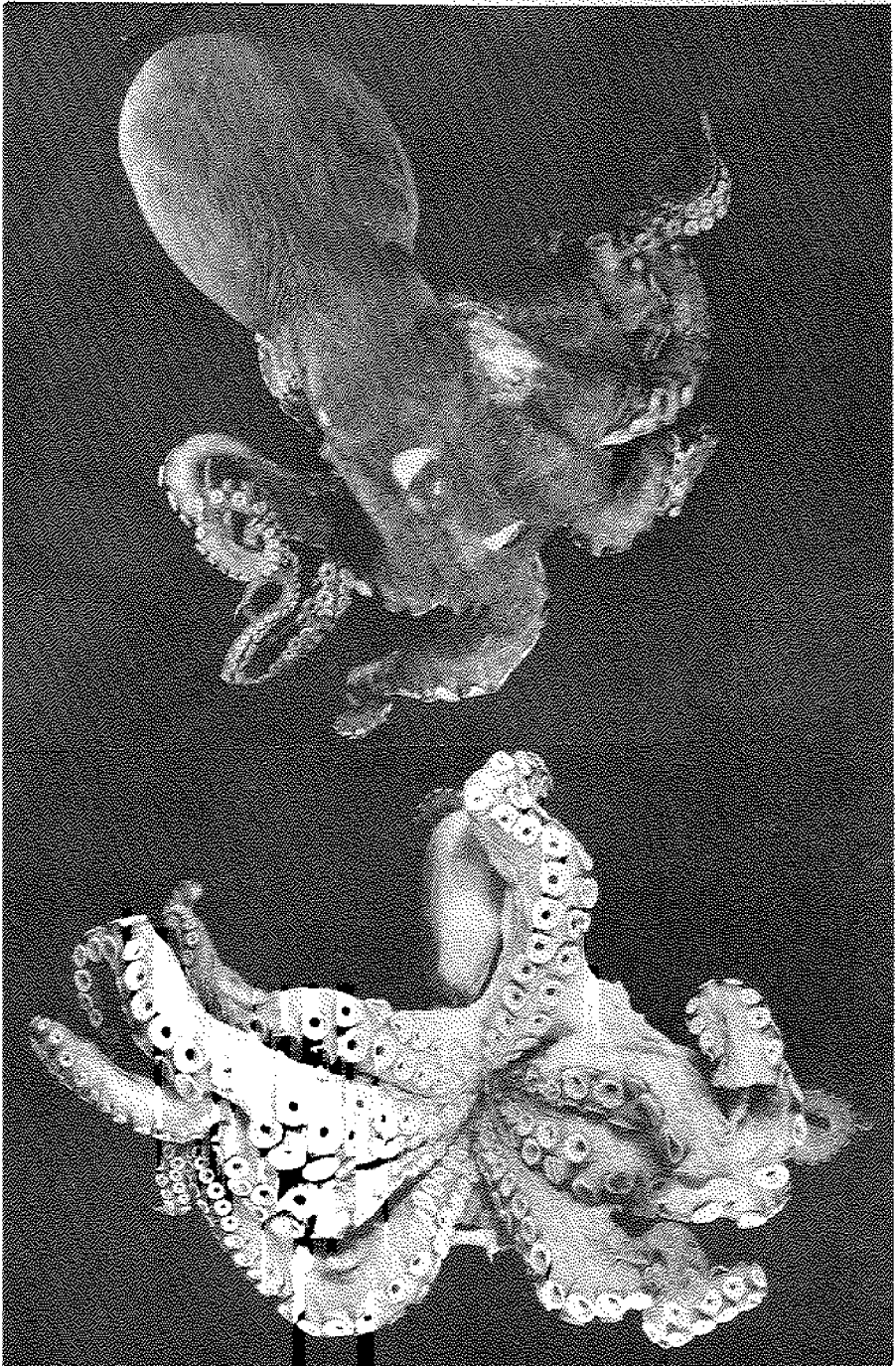
Age and Size.--Adult animals are large reaching a weight of up to 10 pounds and a length of four feet. They probably have an average life span of about one year with occasional specimens reaching two years.

Spawning.--Females spawn from November through December, laying about 1500-2000 eggs. The eggs are large reaching $3/5$ of an inch in length. The female guards them until hatching, which takes about 50 to 60 days. The young are large at hatching and immediately take up a bottom life (Solis, 1967).

Commercial Fishing Gear.--These animals are mainly fished from a small boat with numerous baited lines drawn slowly across the bottom. The animals are dipped with a net when the lure is brought to the surface (Solis, 1967; Voss, 1971). Some experimental trawling has recently been done. They are also caught by octopus hook, artificial lures and pots.

Mariculture potential.--The culture potential for this species is very good. Since the eggs are large, suitable food should be easily obtainable. Culture in enclosed screened pens seems most suitable. Experimental rearing has been attempted in Mexico (Solis, 1967).

Remarks.--A similar but much smaller species, Octopus hummelincki Adam, 1936 is widely distributed in the coral reefs from Miami to the Guyanas and Brazil. It seldom reaches a total length of more than six inches.



Octopus macropus Risso, 1826
White spotted octopus
Fig. 2

Recognition Features.--The arms are long and the upper pair is always the longest. Color blue-green with large white spots over mantle, head and arms. When disturbed the animal turns brick red and the spots become prominent. The mating arm of the male has a long, slender spoon-shaped organ at its tip. Mature females have very small eggs about 1/10 of an inch long. There are about nine to thirteen leaflets on the outer side of the gill.

Geographic Range.--This species is distributed world wide in warm waters. On our coasts it is found from Bermuda to south Florida and the Caribbean Sea (Voss, 1971). Its range is incompletely known. It lives on rocky and sandy to grassy bottom.

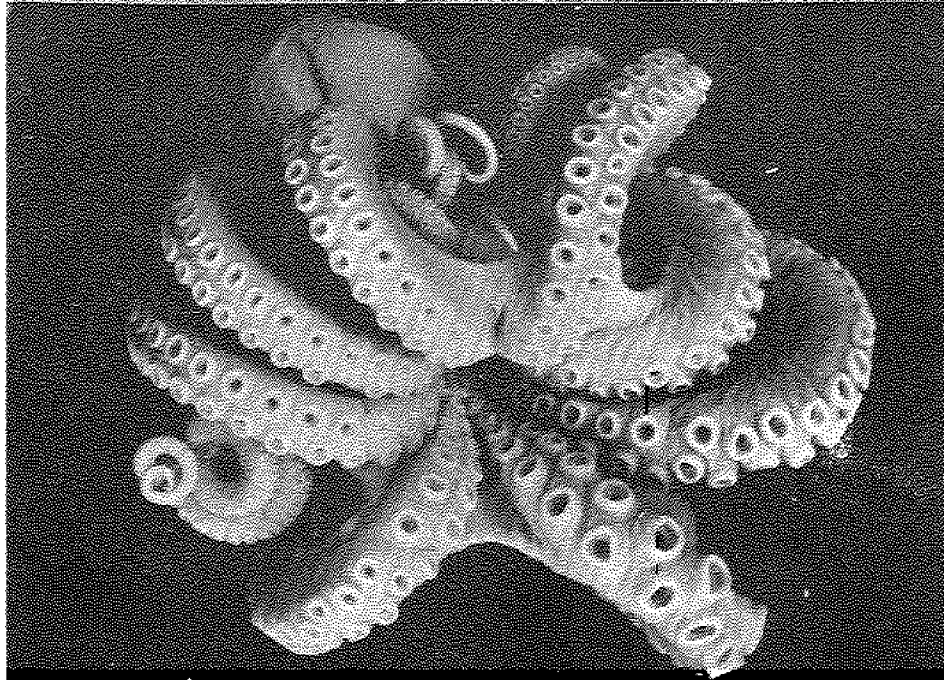
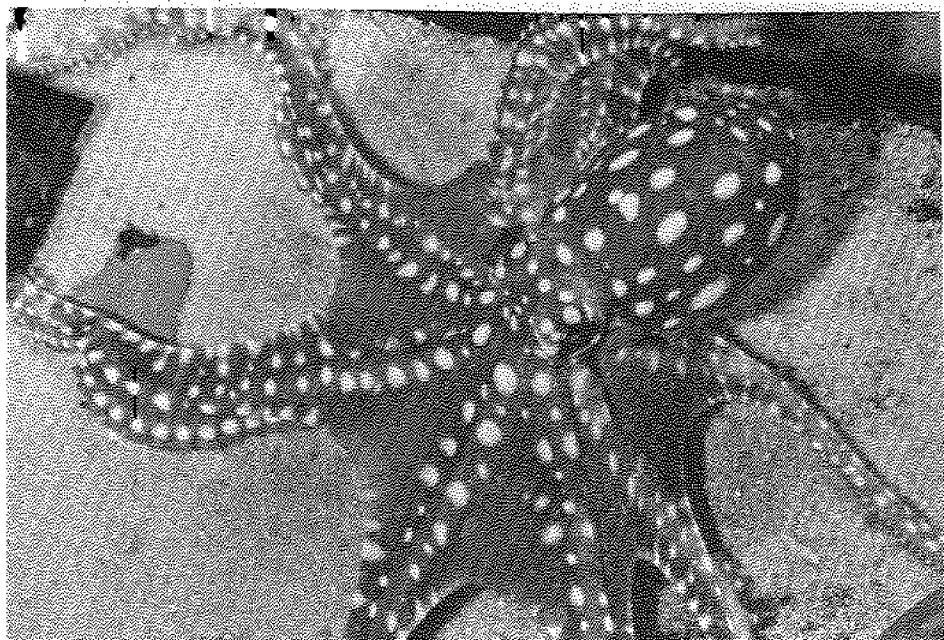
Depth Range.--It has been taken from reefs, the shallow reef flats and by trawling in 35-50 feet (Voss & Phillips, 1957).

Age and Size.--Little is known about the life history of this species. It is assumed that the life span is only one year. The adults reach a weight of several pounds and about three feet in overall size.

Spawning.--Spawning occurs during the winter and early spring. The eggs are only about 1/4 inch in length and therefore the young must hatch out and assume a planktonic life for some time. Supposed larvae of this species have been taken from the waters of the Florida Current.

Commercial Fishing Gear.--This species is not fished within our area. Since it lives in somewhat deeper water it will probably best be caught with a trawl but a few specimens have been hand collected near coral reefs.

Mariculture Potential.--Not known but presumably poor because of the small size of the eggs.



Octopus briareus Robson, 1929

Reef octopus

Fig. 3

Recognition Features.--Arms long and unequal, the upper pair shortest, the second and third pair longest and stoutest. Color bluish-green to greenish brown but darker colored when alarmed. Mating arm of the males with a large, grooved, spoon-shaped organ at the tip. Mature females with eggs about half-inch in length. Six to eight leaflets on each gill outer surface.

Geographic Range.--Southeastern United States and southern Gulf of Mexico to the Bahamas, throughout the Caribbean Sea and southward to the Guianas (Wolterding, in manuscript; Voss, 1956). It inhabits coral reef tracts, rocks, and sand and turtle grass beds.

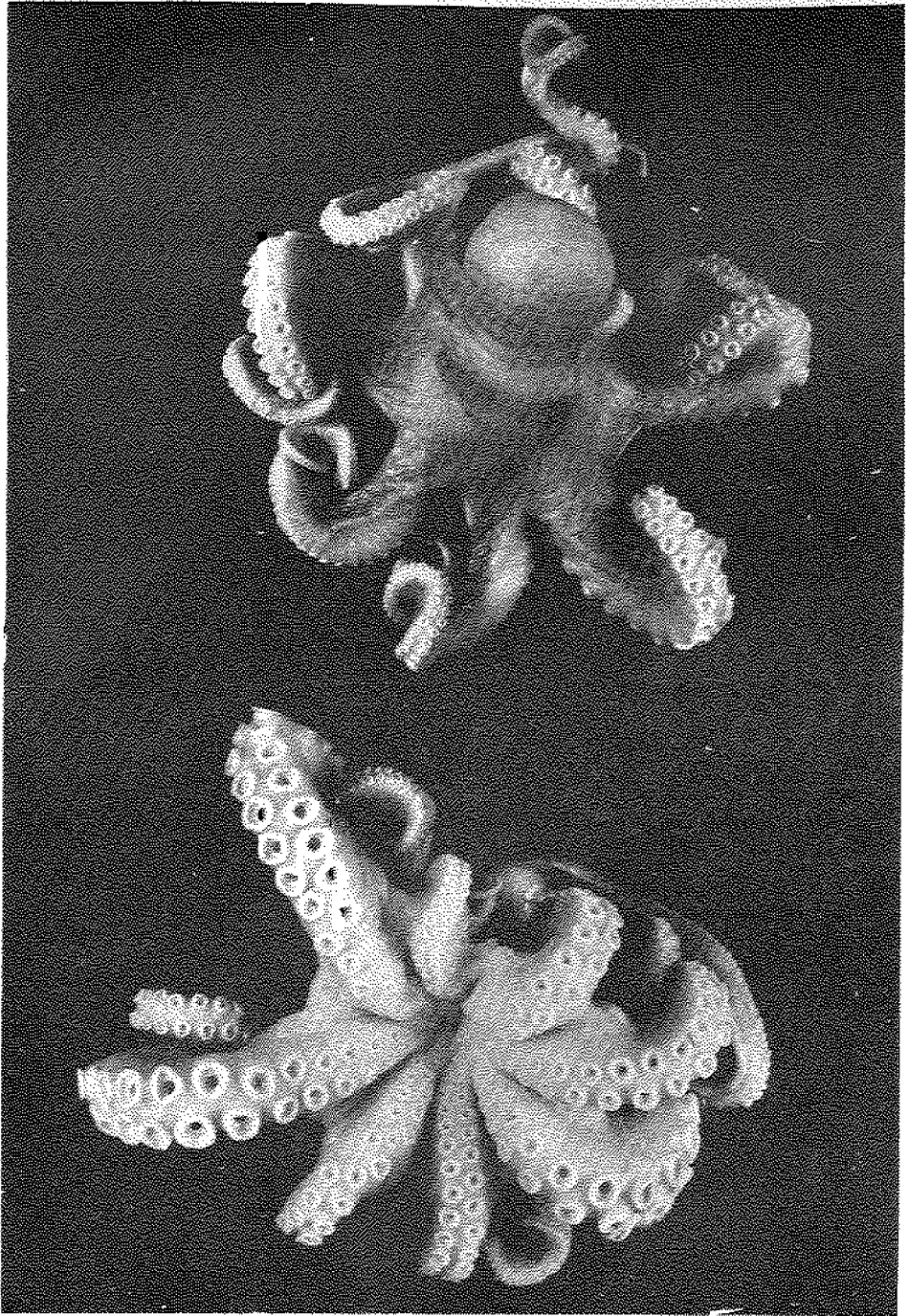
Depth Range.--Normally in very shallow water and seldom taken by trawling.

Age and Size.--This species has an average life span of one year though there may be exceptions. Males die shortly after mating and the females after their eggs have hatched. Adults reach a weight of about two or three pounds and an overall length of about two feet (Wolterding, in manuscript).

Spawning.--Spawning occurs from about December to March. The large eggs, about 1/2 inch in length, are laid in flat series or small clusters of about 500 total. The eggs hatch in 50-70 days. The large hatchlings immediately assume the adult habitat on the bottom (Wolterding, in manuscript).

Commercial Fishing Gear.--This species is commonly fished with water glass and octopus hook in Cuba but is amenable to a pot fishery or to trawling (Voss, 1960, 1971).

Mariculture Potential.--This species is easily raised in aquaria. Culture techniques include removing the eggs from the mother and placing them in aquaria with a high degree of aeration. Hatching occurs in about two months. Young are hand fed for about two weeks or until they will attack live food themselves. Other methods of early feeding are being studied. Young have been raised through about three aquaria generations using these techniques. Modifications would be needed for mass-culture (Wolterding, in manuscript).



Octopus vulgaris Cuvier, 1797

The common octopus

Fig. 4

Recognition Features.--Color variable but commonly mottled brown, white and tan. It is chunky in appearance with stout arms of which the upper pair is always the shortest. Mating arm of male shorter with a minute spoon-shaped organ at tip. Mature females with small eggs less than 1/10 inch in length. There are seven to eleven leaflets on the outer side of each gill.

Geographic Range.--World wide in distribution. In the western Atlantic it is known from off New York to Florida, the Gulf of Mexico and Caribbean Sea southward to the Guianas (Pickford, 1945; Voss, 1956, 1971). It lives on all types of bottom.

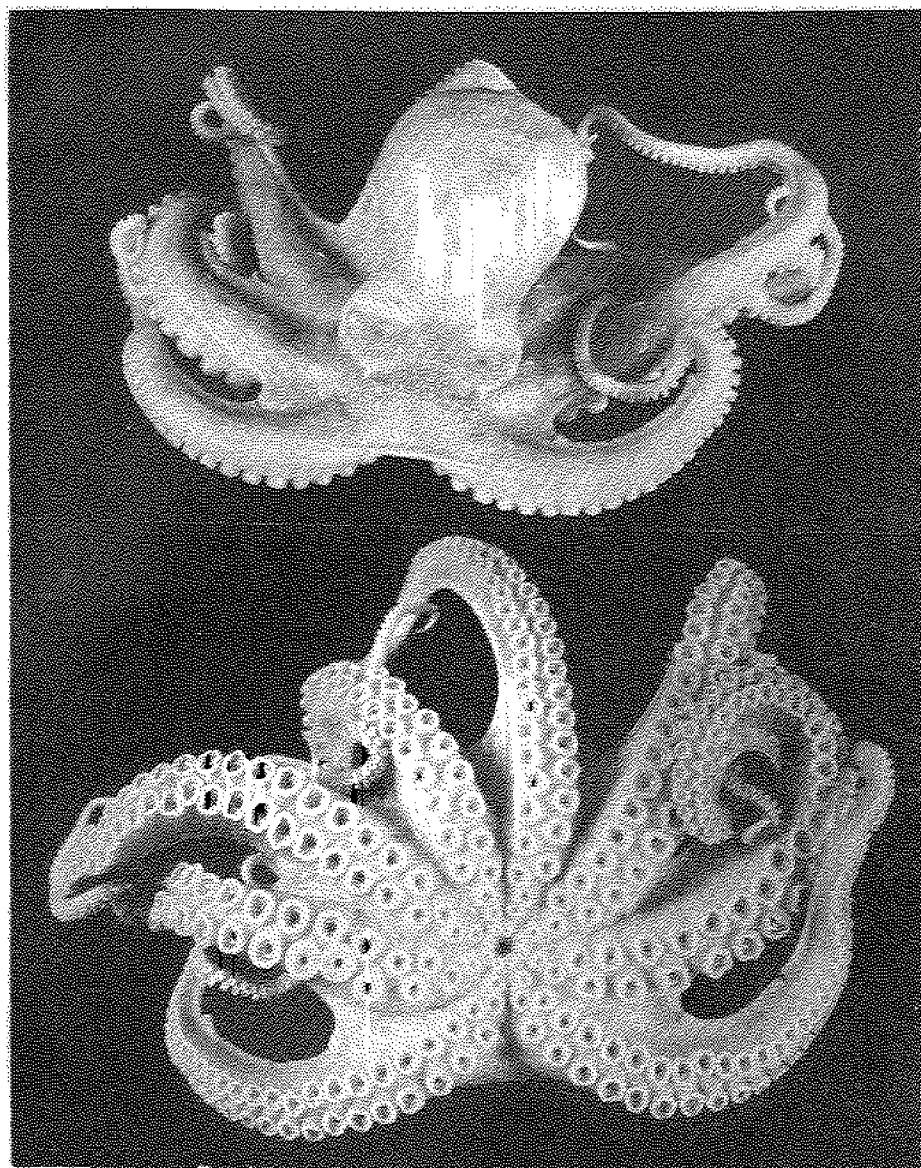
Depth Range.--This animal lives from shallow water to the outer edge of the continental shelf (Voss, 1971). It is commonly taken by crawlers.

Age and Size.--This species only lives for one to two years. Males usually die after mating and the females after their clutch of eggs have hatched. Full grown adults may weigh 10 pounds and have an overall length of three feet.

Spawning.--Females spawn between March and October, laying as many as 150,000 eggs in clusters in holes in the rocks, large empty shells and other refuges. The female guards her eggs for the thirty to fifty days necessary to hatch them out. The young, because of the small size of the eggs are very small and remain in the plankton for several weeks before dropping to the bottom. They probably reach maturity in under one year.

Commercial Fishing Gear.--They are fished for in Mexico and Cuba using strings of clay pots strung out on a long line on suitable bottom, by using a water glass and pole with a hook on the end, and by handlining using a baited line and a dip net (Voss, 1960). The major commercial fishing methods are conventional otter trawls with "octopus lifters" on the foot rope, somewhat like tickler chains used in shrimping (García Cabrera, 1968).

Mariculture Potential.--This species offers good potential for mariculture when a suitable food has been found for the young. Some advances have been made in Japan but so far this species has not been amenable to farming.



Octopus joubini Robson, 1929
Pygmy octopus
Fig. 5

Recognition Features.--The animal is very small with short, relatively equal length arms. Color reddish brown with several large white pimples around the eye. Disturbed, it may turn a creamy white. The mating arm of the male has a comparatively large spoon-shaped organ at the tip. Mature females with eggs about 1/4 inch long. About 6 leaflets on outer surface of each gill.

Geographic Range.--From Georgia southward to the Gulf of Mexico and the Caribbean Sea to the Guianas. It lives on shallow sandy bottom, often in clam shells (Voss, 1956).

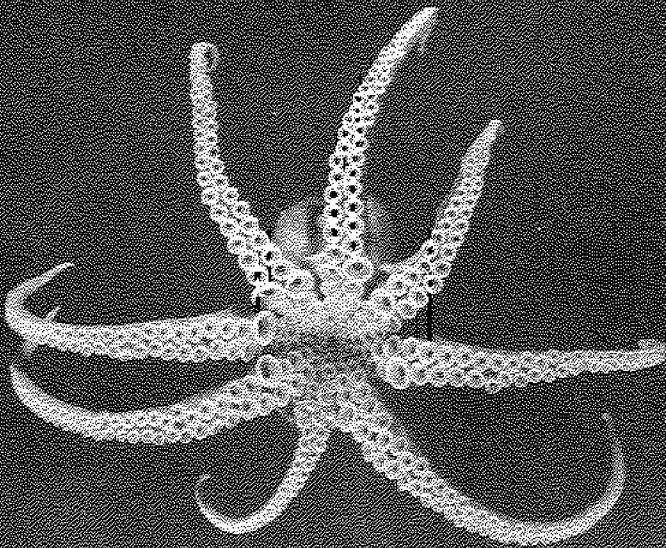
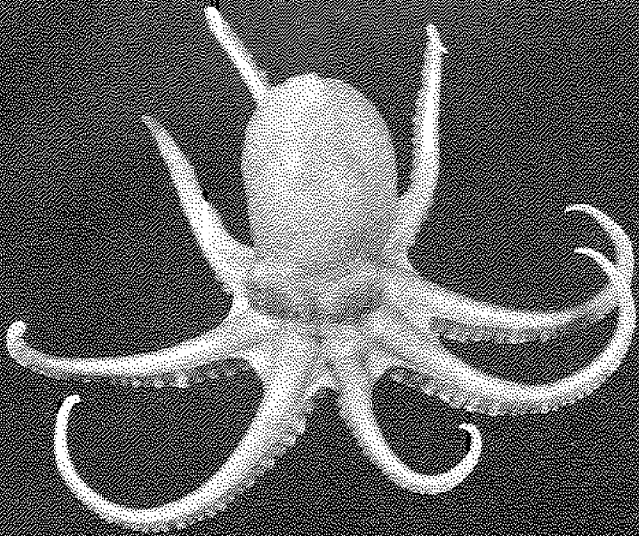
Depth Range.--This species lives only in shallow water down to a depth of about 30 feet.

Age and Size.--The animal reaches maturity in only 4-1/2 months and probably lives for about one year. Their maximum size is only about five to six inches, total length (Thomas & Opresko, 1973).

Spawning.--This species has been under culture at the Rosenstiel School of Marine and Atmospheric Science at Miami for several years. The eggs are about 1/4 inch in length and about 50 to 100 are laid in a clutch. There are two spawnings each year, one from November to January, the other from April to June. The young are well developed at hatching and immediately take up a bottom life (Thomas & Opresko, 1973).

Commercial Fishing Gear.--No commercial fishing is done for this species and because of its small size, it is doubtful if one could be developed.

Mariculture Potential.--This species has been kept in culture for several years and has now gone through five generations in the aquarium. Because of its small size, two spawning periods each year and short life span with large eggs, this should be one of the most productive species for farming. Because of its small size, it should demand a high price as a delicacy.



Sepioteuthis sepioidea (Blainville, 1823)

Reef squid

Fig. 6

Recognition Features.--Body and fins oval in outline with stout head and short arms. The eyes are covered by the skin of the side of the head. Color reddish green or reddish brown sometimes with darker bars across the body and fins. When alarmed it blanches and four conspicuous dark spots appear on the upper surface of the body and fins.

Geographic Range.--This species lives around and over reef areas in Bermuda, south Florida, the Bahamas and the Caribbean islands from Cuba to Trinidad and Curaçao. Its distribution along the South and Central American mainland is not known (Voss, 1971).

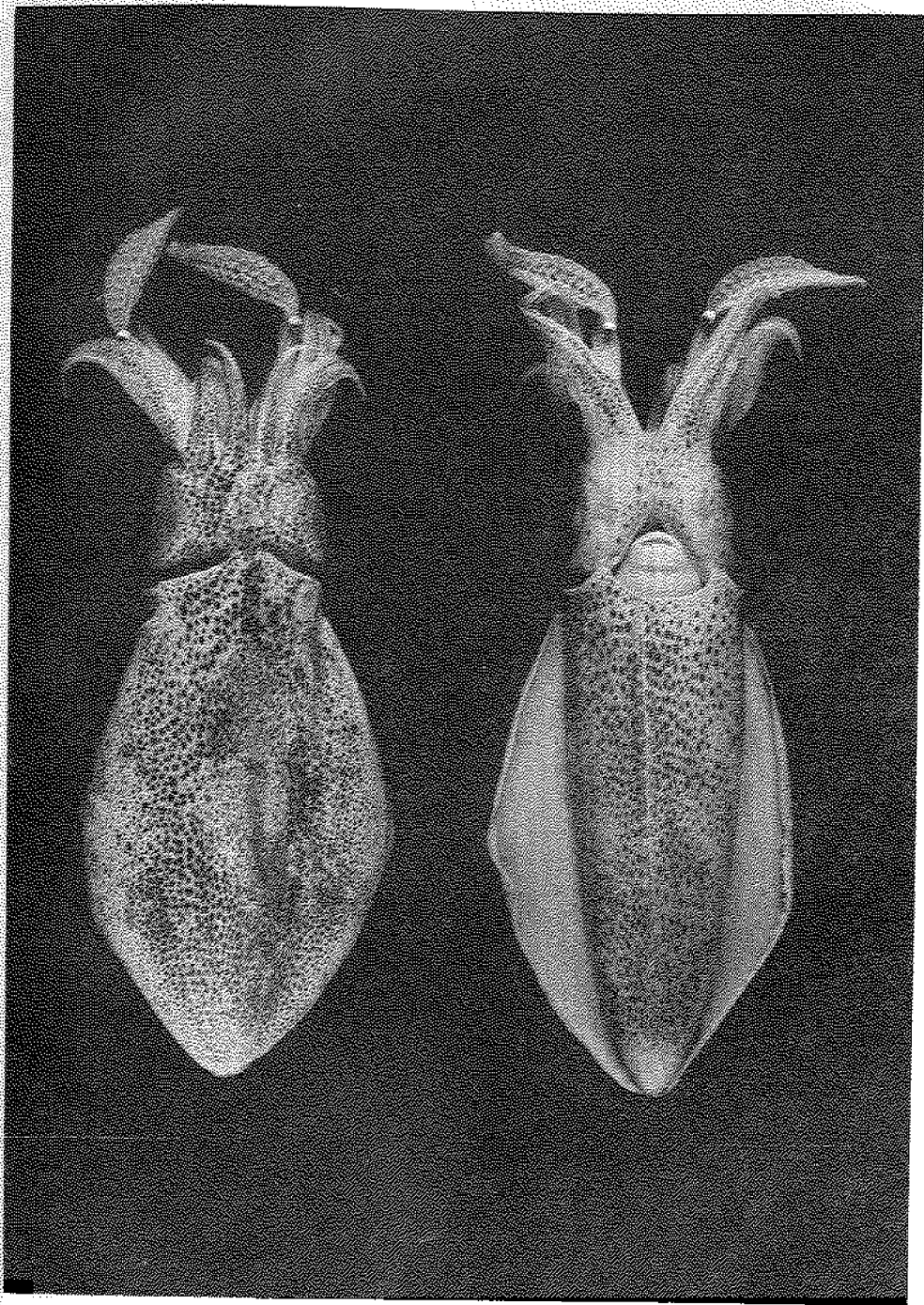
Depth Range.--Lives in surface waters over and near coral reefs.

Age and Size.--The life span appears to be one year. Sexual maturity is reached in about seven months. Adult animals reach a total length of about one foot. (LaRoe, 1971).

Spawning.--Spawning occurs from September through March and perhaps all year round. The eggs are few in number and large, about three to five eggs being enclosed in a single egg capsule or finger (Arnold, 1965; LaRoe, 1971). Several of these are attached to rocks or other hard objects. The eggs hatch in about 36 days from spawning.

Commercial Fishing Gear.--This species is not fished commercially at present. Night-light and purse seine or jigging seem to be the most promising gear. Because of their preferred habitat in the reefs, trawling does not seem practicable.

Mariculture potential.--Because of the large eggs and resulting large hatchlings, this species offers a strong possibility for culturing. Experiments at Miami show that the eggs can be hatched easily. The young are fed first on mysid shrimp and then switched progressively from brine shrimp to small fish, such as guppies and mollies. The young reach a length of 4-1/2 inches and about 2-1/3 ounces in less than five months. Cultured specimens reached sexual maturity in 146 days from hatching (LaRoe, 1971).



Lolliguncula brevis (Blainville, 1823)

Thumbstall squid

Fig. 7

Recognition Features.--Body shape short and chunky with broad round fins. Color reddish brown with as dark or darker color on the under surface. There is a narrow dark line down the midline of the back.

Geographic Range.--This is a common squid along the mainland from Delaware (Mafner, 1964) to the Gulf of Mexico, the Caribbean mainland to the Guianas. Because it is limited to waters of lowered salinities it does not occur among the Caribbean islands except for Cuba (Voss, 1965).

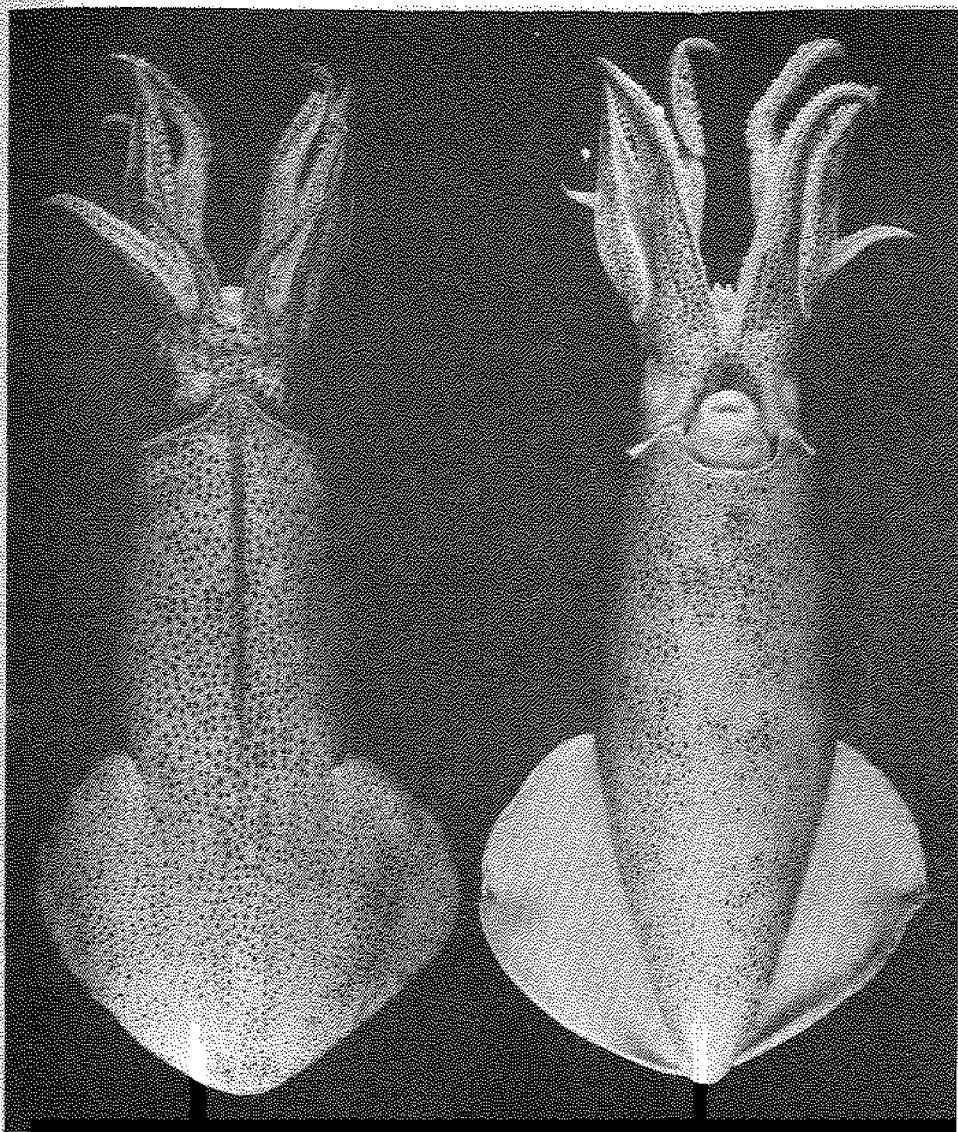
Depth Range.--The thumbstall squid lives in shallow water along the coast and in estuaries and probably lives in waters less than fifty feet deep.

Age and Size.--This squid has not been reared in captivity and its life span is unknown. Adults reach a total length of about six to seven inches.

Spawning.--There is some evidence to suggest that this squid may breed throughout the year in Florida waters. Egg capsules are from about 4 to 5-1/2 inches long, round at one end and attached to hard objects in clusters at the small end, apparently by a short stalk (LaRoe, in manuscript). Growth seems to be rapid.

Commercial Fishing Gear.--There is no regular fishery for this potentially important species. It was formerly caught in large quantities in fish weirs or pound nets along the Virginia, Delaware and Maryland coasts. In our waters they are now caught primarily by otter trawl while shrimp fishing. Considerable catches are made, often in sounds and bays as these are the only squids known to be capable of living in brackish water.

Mariculture Potential.--This species has small eggs and therefore has all the difficulties of rearing inherent in small egg species. However, it is very hardy, can withstand considerable change in temperature and salinity, and if a proper culture food can be found, offers a strong possibility for successful culture. It should be a preferred species in the market for it is chunky, small, and should compete well with some of the small European species now imported canned into the United States.



Doryteuthis plei (Blainville, 1823)

Arrow squid

Fig. 8

Recognition Features.--Adult animals slender with large fins more than half the body length. Males with large reddish flame markings on the under side of the body. Arms short. Pen with straight, thickened sides.

Geographic Range.--This squid is confined to tropical waters from Bermuda and south Florida, the southern Gulf of Mexico and the Caribbean Sea and the Guianas (Voss, 1956, 1960).

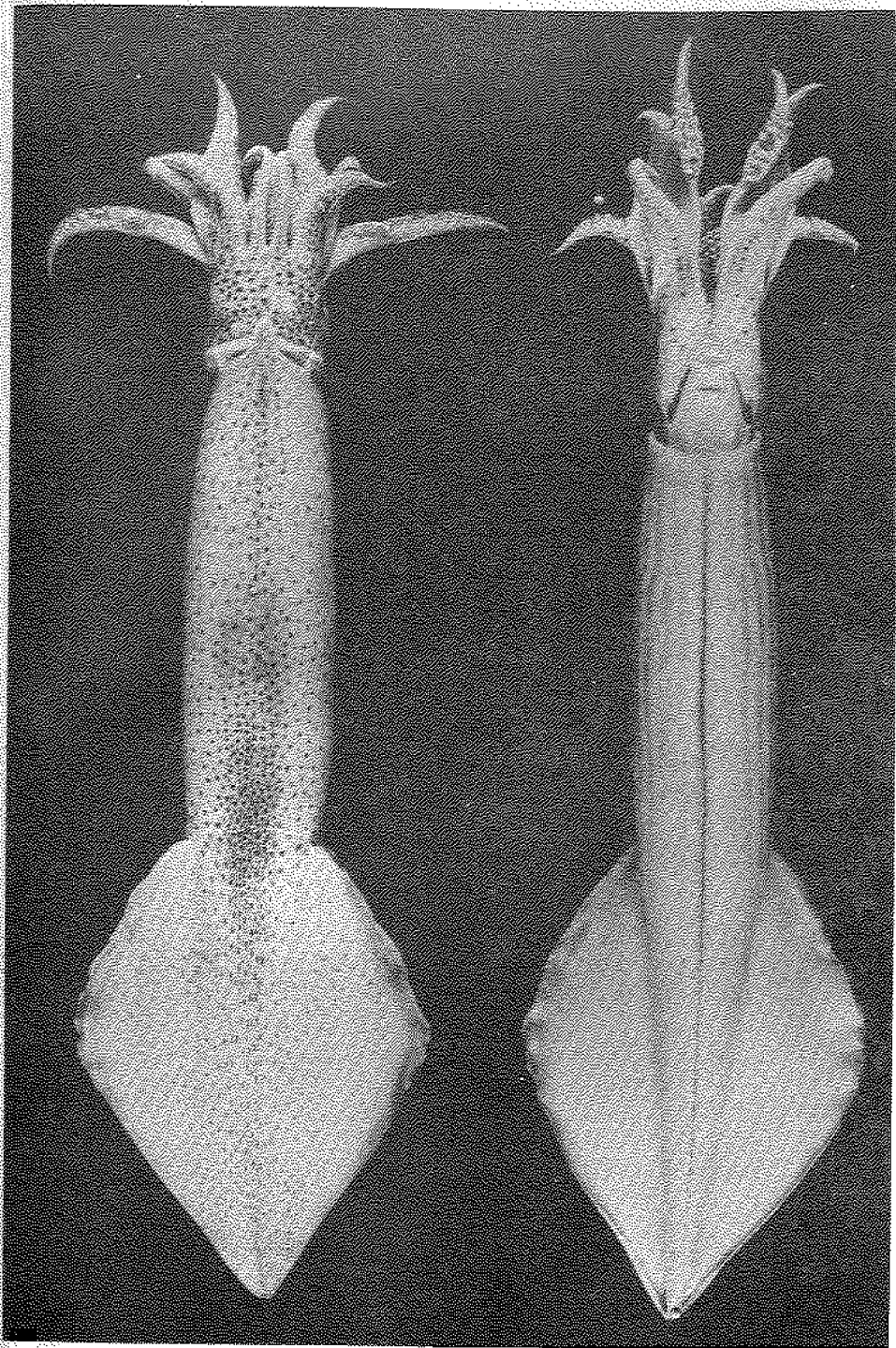
Depth Range.--Surface to several hundred feet.

Age and Size.--These animals reach a total length of about 2 to 2-1/2 feet. They may live for two years but probably average one year life span.

Spawning.--Spawning seems to occur twice each year, March and September through October. The eggs are laid in slender strings or "fingers" grouped together to form "mops" (Roper, 1965). Hatching occurs about 10 days after egg laying and maturity is reached within one year (LaRoe, 1971).

Commercial Fishing Gear.--Caught by trawling or by the use of lights and dip nets. There is a small fishery at Progreso, Yucatan (Voss, 1971). This species is important not only as food but for medical research on giant nerve fibers (Villegas & Villegas, 1960).

Mariculture Potential.--The eggs of this species are very small resulting in very small young which, at present, are difficult to feed. If this can be overcome, some potential exists. They have been held in holding tanks (both juveniles and adults) for up to four months.



Loligo pealei Lesueur, 1821

Common squid

Fig. 9

Recognition Features.--Color reddish to greenish brown often with very fine reddish lines on the under surface of the body. Body moderately stout with fins about half the length of the body. The pen has thin curved sides.

Geographic Range.--The "common" squid of eastern North America has a range from Nova Scotia to Florida and the Gulf of Mexico. It also occurs in Bermuda, the Bahamas and at least the north coast of Cuba (Voss, 1956, 1960). Its range south of these points is uncertain because of confusion with other closely related species distinguishable only by specialists.

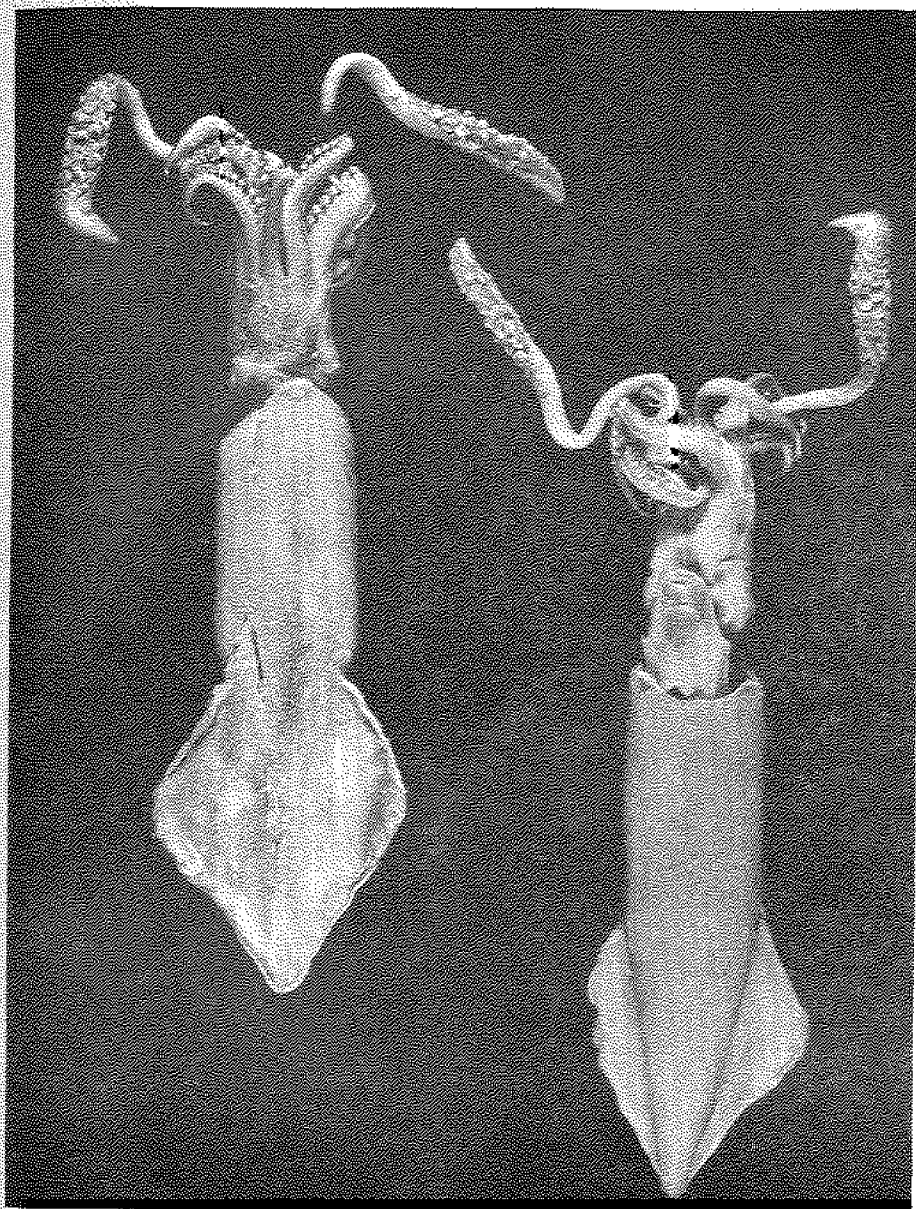
Depth Range.--From surface waters to a depth of about 600 feet with a mean range of about 180 feet.

Age and Size.--This species has an average life span of one year but some individuals live for two or three years (Verrill, 1882). The size of full grown adults is about 18 inches overall.

Spawning.--Spawning occurs in temperate waters from June to November. The very small eggs are enclosed in a gelatinous finger-like capsule containing 50 to 100 eggs each. These are attached by one end to solid objects on the bottom in clusters of from half a dozen to several hundred forming the so-called sea mops, often formed of the egg capsules of several females. The young squid at hatching are poorly developed and take up a planktonic life for some weeks. Young squid grow at a rate of about 3/4 inch a month for the first few months of life (Verrill, 1882).

Commercial Fishing Gear.--The common squid is most frequently caught with otter trawls in the course of bottom fishing. They can also be caught with the Japanese jigging machine.

Mariculture Potential.--Because of the small size of the eggs and the difficulty of providing the proper food for the very small young, this species has not so far been successfully reared in captivity.



Onychoteuthis banksi (Leach, 1817)

Hooked squid

Fig. 10

Recognition Features.--Tentacles with two rows of large sharp, claw-like hooks. The pen shows through the back as a narrow dark strip or line down the midline. The eyes have free eyelids. The body is stout but tapers quickly to a sharp point at the rear. The fins are small.

Geographic Range.--This species is world wide, perhaps being the most widely distributed squid known (Voss, 1956).

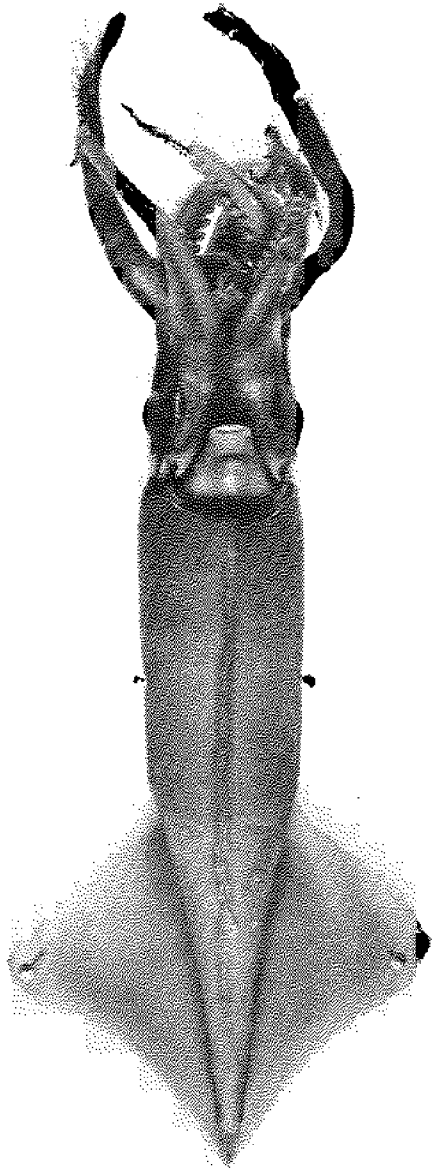
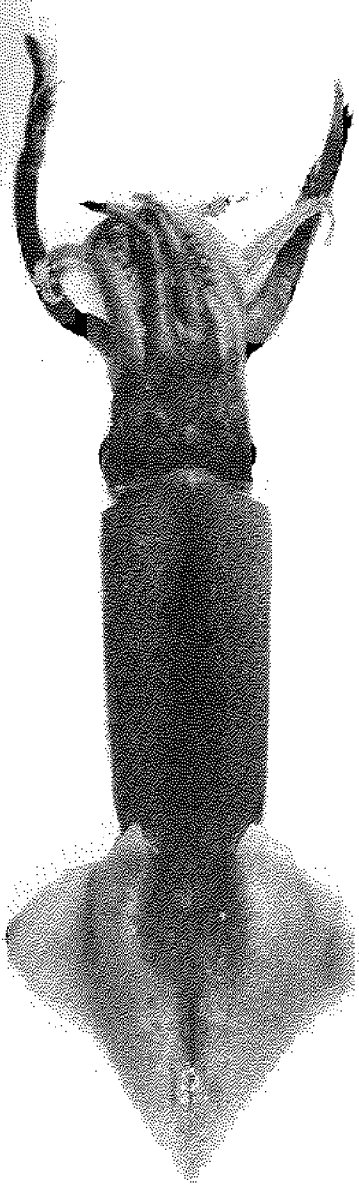
Depth Range.--This species occurs from the surface downward for several hundred feet. It is purely oceanic in habitat.

Age and Size.--Nothing is known of the life span of this species. It is probably limited to one or two years. It reaches an overall length of about one foot.

Spawning.--Nothing is known of the spawning of this animal.

Commercial Fishing Gear.--At present this species does not support a fishery. It can be caught by night-light and dip net, with trawls or with squid jigs.

Mariculture Potential.--None.



Illex illecebrosus (Lesueur, 1821)

Arrow squid

Fig. 11

Recognition Features.--Eight rows of small suckers on the end of the tentacles. Body slender and tapering gradually behind. Fins small and at end of body. Eye surrounded by a free eyelid. A broad band of purplish red down middle of back.

Geographic Range.--This species is widely distributed in the western Atlantic from Newfoundland to Florida (Voss, 1965). The southern end of its range is not known but in southern Florida and the Caribbean it is replaced by another species, Illex coindetii, which is indistinguishable except to a specialist (Roper, Lu & Mangold, 1969).

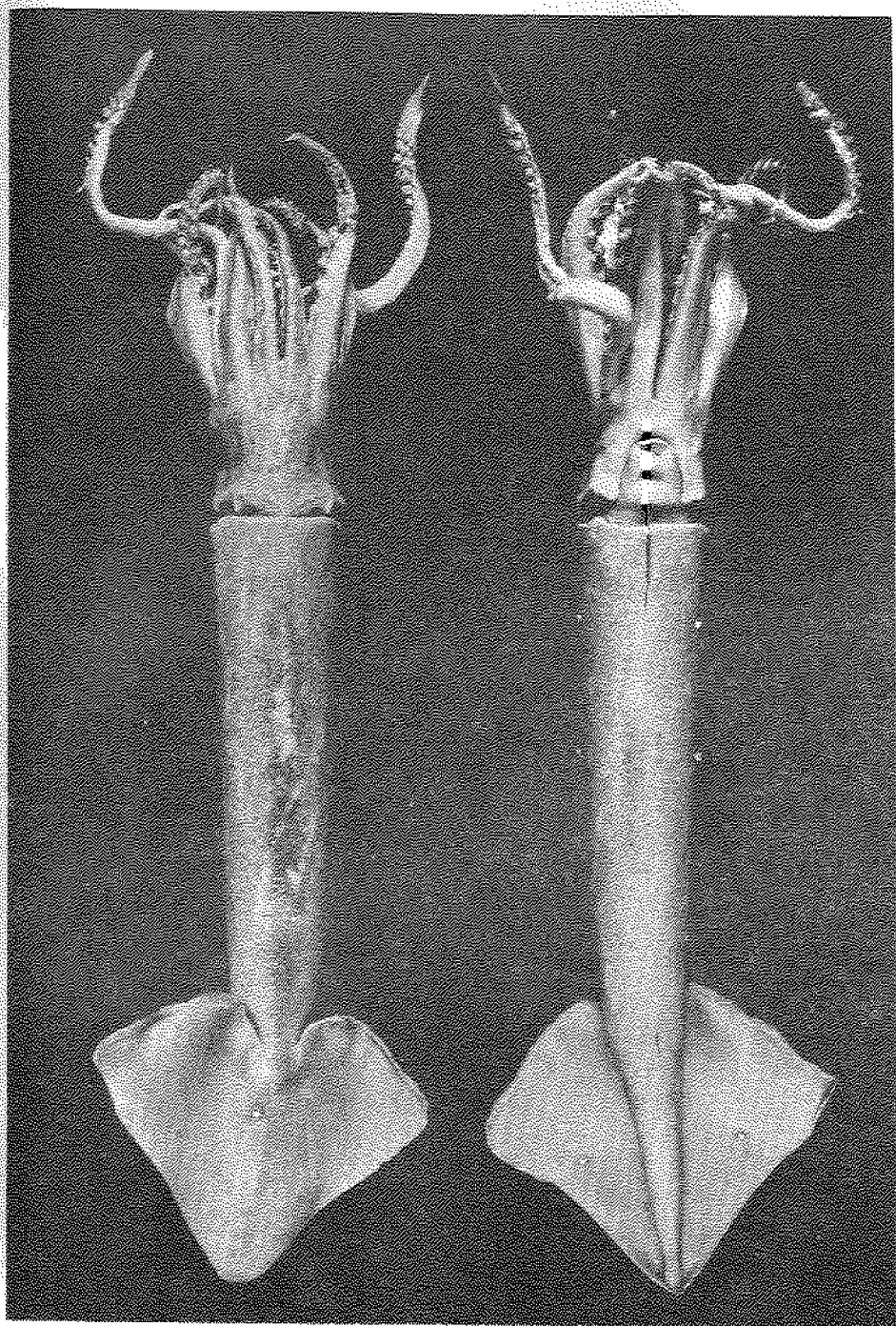
Depth Range.--Along the continental slope and shelf from shallow water downwards to about 2000 feet.

Age and Size.--Nothing is known of the life span of this species. It probably only lives for one or two years. It reaches an overall length of about 2 to 2-1/2 feet.

Spawning.--Nothing is known of the spawning of this species. Neither its eggs or larvae have been positively identified.

Commercial Fishing Gear.--It is caught along the Atlantic coast in bottom trawls. In Newfoundland it is the basis of a large fishery (Squires, 1957). There it is caught either in large anchored trap nets or more commonly by either hand jigging or with the standard Japanese jigging machine.

Mariculture Potential.--On the basis of present knowledge, none.



Ommastrephes pteropus Steenstrup, 1855

Orange-back squid

Fig. 12

Recognition Features.--Four longitudinal rows of suckers on tips of tentacles. Eye surrounded by free eyelid. A large oval thin-skinned patch on the front edge of the back of the body. This patch glows greenish orange at night. Body stout, muscular with fins less than one half the body length.

Geographic Range.--This species is widely distributed in the open ocean in tropical and temperate waters. It is found commonly beyond the edge of the continental shelf (Voss, 1956, 1971).

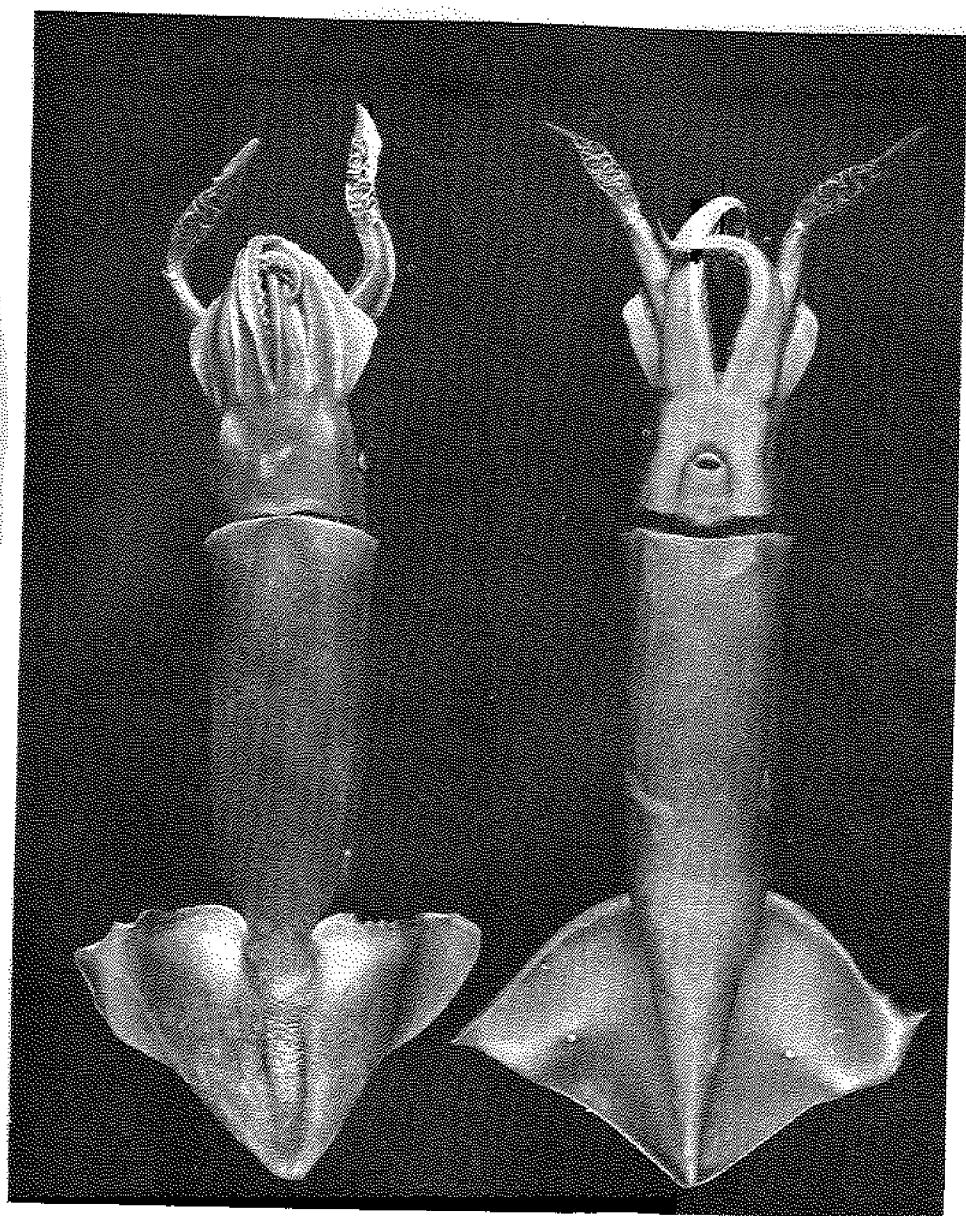
Depth Range.--From the surface to about 2000 feet. It is a powerful swimmer and hunts for food, mainly fish, throughout the range (Clarke, 1966).

Age and Size.--Nothing is known of its life span although it probably lives several years. It may attain an overall length of about three feet.

Spawning.--Nothing is known of the spawning of this species. Its suspected larvae have occasionally been taken in plankton nets.

Commercial Fishing Gear.--Japanese jigging machine; electric light and jig with pole; light and dip nets.

Mariculture Potential.--None based on present knowledge.



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