

Annual squid (and/or cuttlefish) consumption is 1.8kg per person

— Squid is very important in Japan and accounts for about 7 per cent of its total marine food consumption of 7,500,000 tons per year.

Formerly, a major part of the squid catch in Japan was preserved by sun-drying or half-drying. The word "surume" of "surume-ika" means sun-dried squid. Today, the scene has changed. As much as 60 to 70 per cent of the yearly squid haul, totaling about 500,000 tons, is supplied to consumers in fresh or frozen form. According to a 1975 survey, an average 1.8kg per person was consumed per year

in Japan in varied forms of cooking and serving. This figure was second only to the 2.0kg per person annual consumption of dried fish, salted - dried fish, and dried and processed fish ("fushi" products), which are the primary processed forms of the various kinds of marine edibles, occupying the first place in fresh fish and shellfish category. These figures were followed by 1.4kg of horse mackerel and mackerel, and



Surume-ika fishing along the Sanriku Coast, Tohoku (Northeast) District

1.2kg of skipjack and tuna. In recent years, processed squid has become greatly diversified in appearance. Traditionally, the Japanese have eaten squid as preserved food. It is interesting that, despite this habit, a variety of squid and cuttlefish dishes have come to adorn the tables of the Japanese during the past ten years or so, because of the growth of their preference for fresh squid. The crea-

tion of this new demand owes much not only to the increased production stemming from the development of fishing techniques, but also to the developments in freezing and cold storing technology.

Squid in Japanese waters

Japanese Name
Scientific Name (Family)
English
Español
Français



Surume-ika
Todarodes pacificus (Ommastrephidae)
 Common squid
 Clamar Sagital
 Calmar Sagitté

Squid or cuttlefish, which is a Mollusca and belongs to the Decembrachiata of Cephalopoda, inhabits a wide variety of waters from the coastal areas on the continental shelf to the ocean depths. The principal kinds of squid used now as edibles, or are under consideration for future use, are medium and large-sized "ko-ika" (Sepiidae), "yari-ika" (Loliginidae) and "surume-ika" (Ommastrephidae).

In addition to the types of squid mentioned above, even the small-sized species, "hotaru-ika" (Enoploteuthidae) and "mimi-ika" (Sepiolidae) are used for food in Japan. But the main haul is comprised of "surume-ika" and "ko-ika".



Aka-ika (Baka-ika)
Ommastrephes bartrami (Ommastrephidae)
 Flying squid
 Calamar Sagital
 Calmar Sagitté



Yari-ika
Doryteuthis bleekeri (Loliginidae)
 Squid
 Calamar
 Calmar



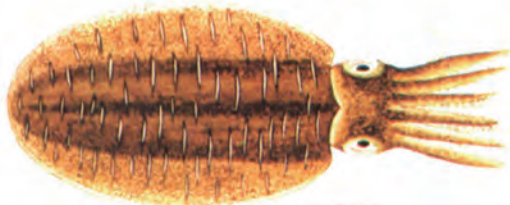
Shiriyake-ika
Sepiella japonica (Sepiidae)
 Cuttlefish
 Jibia
 Seiche



Ko-ika
Sepia esculenta (Sepiidae)
 Cuttlefish
 Jibia
 Seiche



Kensaki-ika
Loligo edulis (Loliginidae)
 Squid
 Calamar
 Calmar



Aori-ika
Sepioteuthis lessoniana (Loliginidae)
 Squid
 Calamar
 Calmar



Kaminari-ika (Mongo-ika)
Sepialycidas (Sepiidae)
 Cuttlefish
 Jibia
 Seiche

La seiche

La seiche, ou le calmar sont des mollusques à dix tentacules de la classe des céphalopodes, ils vivent dans des endroits très divers allant du littoral aux grandes profondeurs. Les principales sortes que nous recherchons pour leur chair ou pour servir à d'autres usages actuels ou futurs, sont des seiches (Ika, en japonais) de grosseur moyenne, il y a la "Ko-ika" (Sepiidae), la "Yari-ika" (Loliginidae) et la "Surume-ika" (Ommastrephidae).

Au Japon la seiche est une importante denrée alimentaire, elle représente à peu près huit pour cent de la consommation nationale des produits marins; totalisant 7.500.000 tonnes par an. On estime que 60 à 70 pour cent de la récolte annuelle des seiches, c'est à dire environ 500.000 tonnes, sont dirigés sur le marché de consommation sous forme de denrées périssables ou congelées.

Cette demande n'est pas seulement attribuable à l'accroissement de la production basée sur l'amélioration au sein de l'industrie de la pêche, mais aussi au développement des techniques de congélation et de réfrigération.

La jibia

La jibia y el calamar, moluscos pertenecientes a la familia de los cefalópodos, habitan en una amplia variedad de profundidades que van desde las zonas costeras sobre la plataforma continental hasta los profundos océanos. Las principales variedades utilizadas actualmente como comestibles o con otros fines, y también las que se encuentran aún bajo consideración para usarlas en el futuro son: "ko-ika" (Sepiidae), "yari-ika" (Loliginidae) y "surume-ika" (Ommastrephidae) de tamaño grande y mediano.

En Japón, la jibia es una fuente alimenticia muy importante que representa aproximadamente un 7% del consumo nacional, cuya cifra alcanza a 7.500.000 tons. por año. Se estima que el 60 ó 70% de la captura anual de jibias que totaliza alrededor de 500.000 tons., es suministrado a los consumidores en forma natural o congeladas.

Esta demanda es atribuible no solamente al incremento de la producción basado en las mejoras realizadas dentro de la industria pesquera sino también al desarrollo de la tecnología de refrigeración y congelamiento.

Japan's Squid Fishery

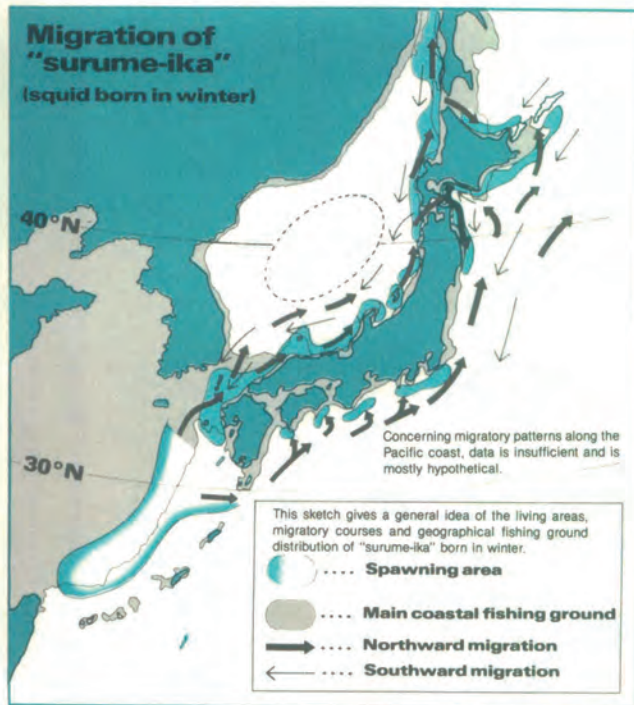
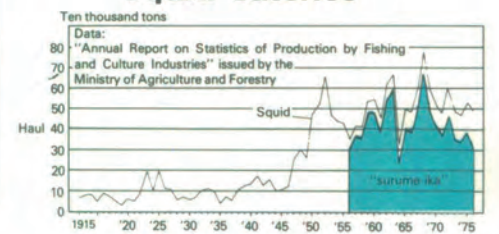


Fig. 1 Fishing techniques as of 1975

Fishing Method	Ten thousand tons					
	1	2	3	4	5	6
Squid angling	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
Pelagic trawling	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
Offshore trawling	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
Small-size trawl net	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
Large-size set net	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
Small-size set net	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
Other fishing methods	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→	→→→→→
	Total: 378,090 tons					
	Total: 24,254 tons					
	Total: 40,580 tons					
	Total: 11,083 tons					
	Total: 8,063 tons					
	Total: 8,125 tons					
	Total: 20,470 tons					

Fig. 2 Yearly changes in squid catches



Resources

"Surume-ika" (*Todarodes pacificus*) is one of the most important marine resources in Japan. This species once accounted for 80 to 90 per cent of the total squid catch, but recently it has decreased to only 70 to 80 per cent. Accordingly, research on "surume-ika" has been the most among the various studies on marine resources. The following is an outline of the state of "surume-ika" resources.

According to recent investigations and studies, it has been confirmed that there are three subpopulations of "surume-ika" with different spawning seasons.

(1) Squid born in winter

- Constitute the largest amount of resources.
- Are widely distributed in Japanese waters from the East China Sea to the Kurile Islands and off the coast of Sakhalin.

(2) Squid born in autumn

- This population is the next important resource to squid born in winter.
- This group spawns from September to November (autumn to early winter), and its spawning areas are the southwestern sea of Kyushu, off the eastern coast of Korea, and the outskirts of the continental shelf in the northern and central East China Sea.

(3) Squid born in summer

- It has been confirmed that there are groups which spawn from June to August along the coasts of the Sea of Japan extending as far as Oki-Hokuriku-Sado, and along the coasts of Izu and Boso of Pacific. Both are localized and represent small groups which complete their life cycle in their spawning areas.

There are several interesting features concerning the number of available "surume-ika". As shown in Fig. 2, good and poor squid catches repeat in an 8 to 10 year cycle.

The locations of good fishing grounds have been subject to heavy fluctuation during the past 30 years, partially because of the changing condition of fishing grounds. It has been observed that recently, the number of squid born in winter is decreasing.

(Data supplied by the Fisheries Agency)

Development of Fishing Techniques

(1) Ecology of "surume-ika"

The main characteristics of the mode of life for "surume-ika" are:

1. It feeds hungrily while swimming freely and quickly over a wide area.
2. As it grows, its grouping instinct becomes stronger.
3. Highly developed senses and eyes pro-

vide quick reaction to light.

4. It lives in 60m to 100m depths during the day, and floats to 20m to 50m from evening into night.

(2) Angling is the leading method

Squid may be caught with both a dragnet and a set shore net, but the leading method is angling.

Approximately 80 percent of the total "surume-ika" catch comes from angling. (See Fig 1.)

Already in the 18th century, the "ikazuno" (hook), skillfully adapted to the habits of squid, was in use. And it is still enjoying widespread application, but with a number of improvements.

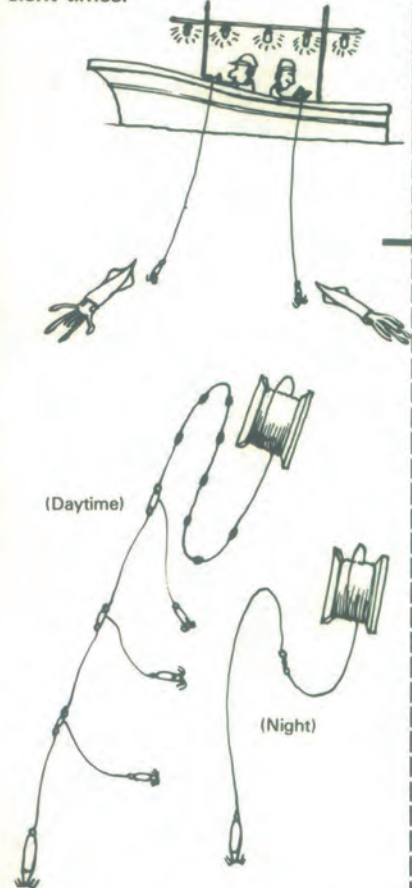
(3) Method using fish lamp

Some methods of fishing involve using a rod and line, or net, during daytime, but in Japan there is also a nocturnal method utilizing an automatic cuttlefish angler wherein fish lamps are employed.

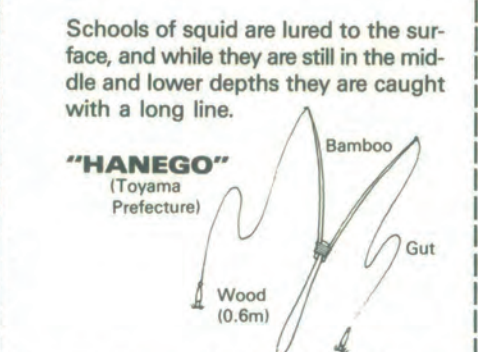
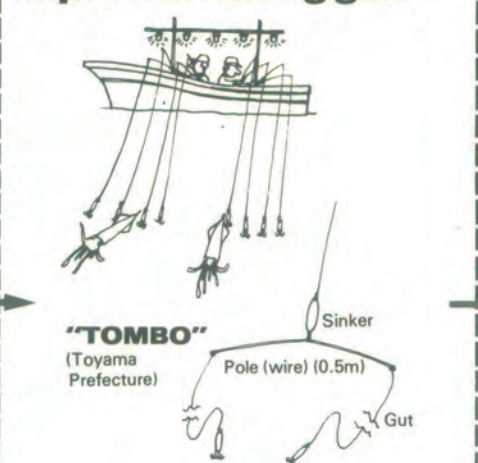
Changes in "Surume-ika" Fishing

Pole and line fishing

This is the simplest fishing method that has been in constant use since ancient times.



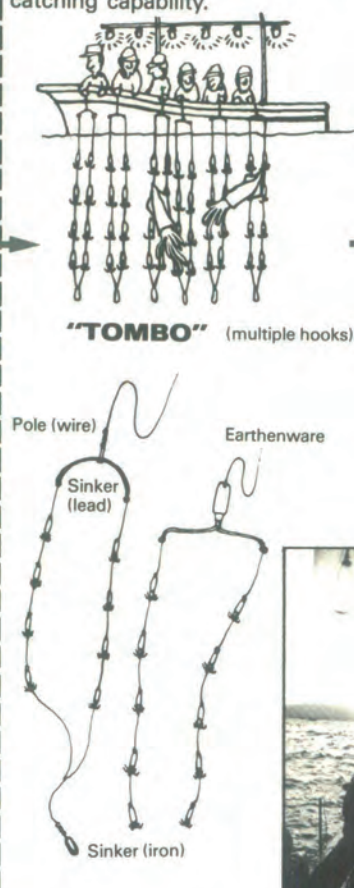
Pole and line fishing with improved fishing gear



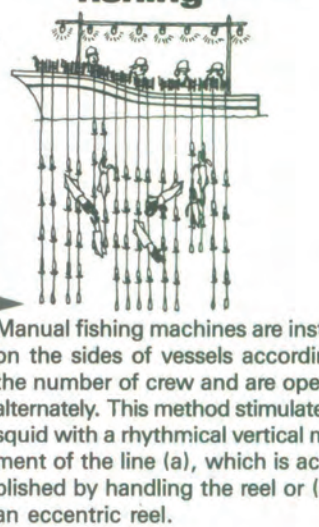
When a school of squid has risen to the surface, they are caught by switching the method to "hanego" with a short line which makes handling easier than the "tombo".

Coupling multiple hook fishing

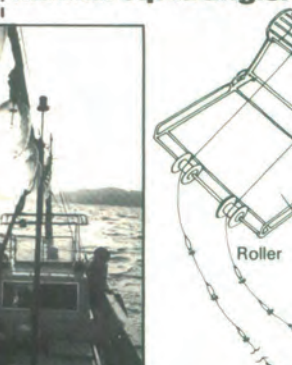
Several hooks on one line improve catching capability.



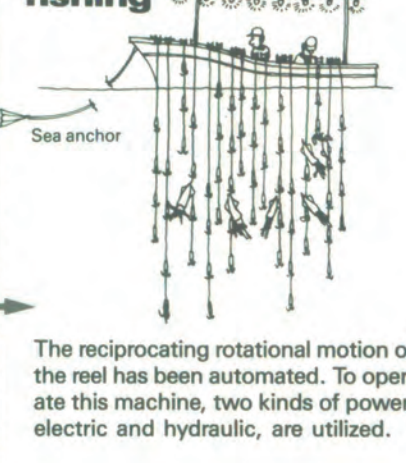
Manual machine fishing



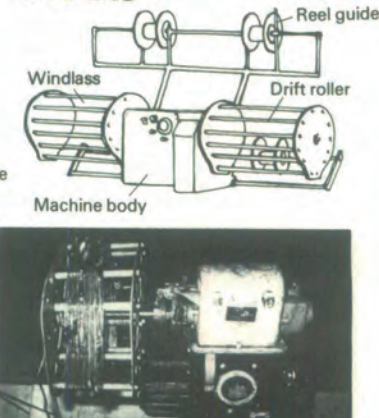
Manual squid angler



Automatic machine fishing



Automatic squid fishing machine



*Illustrations of fishing gear and methods were prepared in accordance with the "World Squid and Octopus Resources and Their Usage", published by the Japan Marine Fishery Resources Research Center.

This latter method has witnessed an overwhelmingly wide application and now plays the leading role in the nation's squid fishing. It is a skillful method drawing on the squid's quick reaction to light.

(4) Development of the fishery

Fig. 2 shows the yearly fluctuations in squid catches in Japan. From these figures, the rapid growth of squid catches through the 1950's can be readily seen. The following may be cited as the main contributing factors:

Postwar rehabilitation

- In the years immediately following World War II, there was a strong drive aimed at promoting fishing production as an immediate remedy.
- Thanks to several administrative measures, the building of fishing vessels was promptly expedited.
- Squid angling, which requires only simple fishing equipment and techniques, can be accomplished easily. Moreover, since the method does not require large-scale equipment, anybody could undertake this type of fishing even with a small boat.

Period of development

- During these years, fishing vessels were gradually motorized and enlarged. Until the 1950's unpowered boats of less than one ton made up the vast majority of vessels used in coastal areas. But toward the latter half of the 1950's powered vessels of less than one ton appeared in increasing numbers, while, at the same time, powered vessels of 1 to 1.5 tons emerged as a new force.
- Substantial improvements in fishing equipment and methods were also made. Simple pole-and-line fishing tackle became multihook type and, further, mechanical anglers appeared. In the 1960's, electrically powered automatic fishing gear was put into practical use, resulting in a rapid growth in productivity.
- Other related equipment were also improved. Such nautical instruments as two-way radios, direction finders, etc., were installed, and even in small coastal vessels sophisticated equipment, like fishfinders, fish lamps, etc., were brought into daily use.

Development of offshore fishing grounds

- From 1961 to 1963 the Fishery Agency and the Experimental and Research

Agencies in each prefecture began to conduct joint studies on the resources of their respective sea areas. As a result, new fishing grounds for "surume-ika" born in autumn were developed in the Sea of Japan.

- Fishermen with comparatively small capital resources who owned medium-sized vessels of more than 30 gross tons and were engaged in dragnet or driftnet seining began to turn to 'surume-ika' fishing. They operated on the Yamato bank as well as elsewhere with excellent results. This is a superb example of a government agency playing the guiding role in the development of a fishing industry by means of basic research.

L'industrie japonaise de la seiche

Ressources

Au Japon, la "surume-ika" (Todarodes pacificus) est l'une des plus importantes. A une époque, cette espèce représentait 80 à 90 pour cent de la pêche totale des seiches, mais ces dernières années elle ne compte plus que pour 70 à 80 pour cent. Les recherches sur la "surume-ika" sont celles qui ont fait le plus de progrès parmi les études sur les ressources animales marines.

Amélioration des méthodes de pêche

Il y a plusieurs méthodes pour pêcher la seiche, y compris l'usage du chalut ou du filet posé. Mais la pêche à la ligne est de loin la méthode la plus populaire, pour cette sorte de pêche on utilise des systèmes de lignes à seiches automatiques qui sont très efficaces, et des pièges lumineux pour la nuit, cette méthode est aussi très efficace vu que la "surume-ika" se laisse très facilement attirer par la lumière.

Industria de la jibia en Japón

Recursos

En Japón, la variedad "surume-ika" (Todarodes pacificus) es una de las más importantes. Antiguamente, esta especie representaba un 80 ó 90 por ciento de la captura anual de jibias, pero en años recientes este porcentaje ha disminuido hasta llegar a un valor que oscila entre un 70 y 80 por ciento. Por consiguiente, la investigación realizada con respecto a la variedad "surume-ika" ha dado también como resultado grandes progresos en el estudio de las fuentes de recursos marinos.

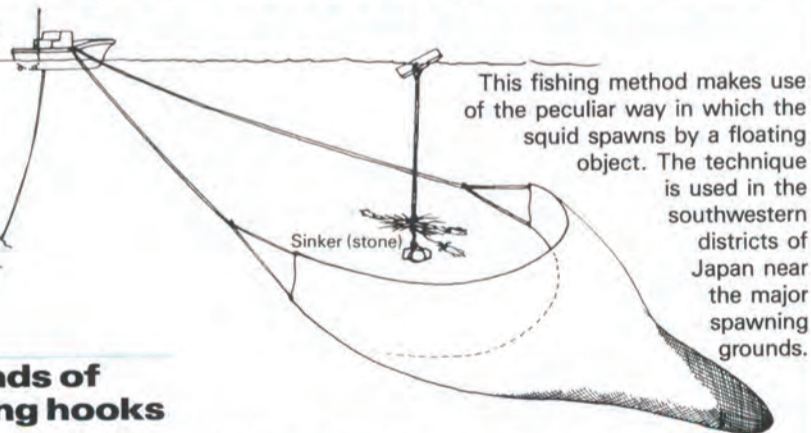
Desarrollo de los métodos de pesca

Hay un gran número de métodos para la captura de la jibia, incluyendo el uso de redes barrederas o redes estacionarias. Sin embargo, el sistema más popular es en el que se utiliza las altamente eficientes máquinas automáticas para la pesca de la jibia y también las luces de señuelo durante la noche, aprovechando de que la variedad "surume-ika" es fácilmente atraída por la luz.

Other squid catching methods

Nest seine Nest net of "kô-ika"

(Chugoku and Kyushu districts)



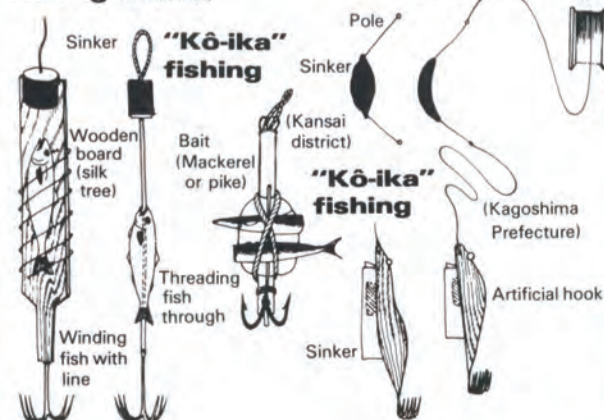
Various kinds of squid fishing hooks



Here is one typical example. There are many different kinds of squid catching hooks which are made by fishermen or distributed as commodities. The different hooks offer a range of local color.

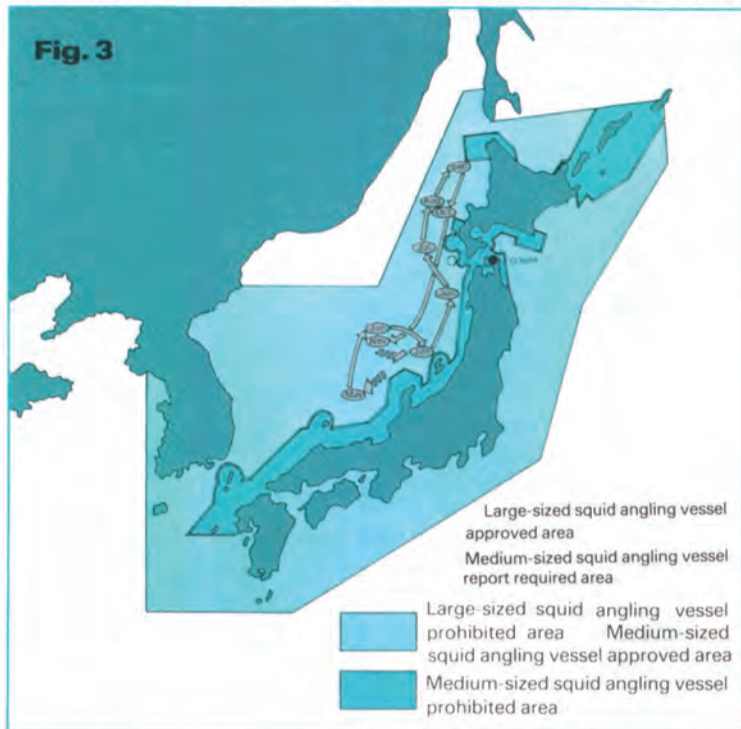
What is shown here is just one example. Different methods are used according to the kinds of squid and their bait taking habits. The two types of bait which can be used are: fresh fish and artificial fish.

"kô-ika" and "aka-ika" fishing



Fishermen's Choice

"To specialize in squid fishing" offshore or "To engage in multiple activities" on the coast.



According to fishery regulations, Japan's squid fishing vessels are divided into three groups:

- (1) Small-sized vessels
..... Less than 30 gross tons
- (2) Medium-sized vessels
..... More than 30 gross tons but less than 100 gross tons
- (3) Large-sized vessels
..... Over 100 gross tons

As shown in Fig. 3, the government has established legal fishing grounds according to vessel size for medium and large vessels. It also has adopted a system of notification for areas where fishing is approved in order to restrict the number of vessels. As for the fishing process itself, the government has imposed restrictions on the intensity of fish lamps, fishing season, etc., for all vessels, including those in the small-sized category.

Trends among Fishermen Engaged in Coastal Squid Fishing

This group, first of all, is gradually making all its vessels large-sized in order to expand their fishing grounds. Since the fishermen of this group are independent, they will not continue to expand vessel size beyond a

certain point, but will seek the optimum sized vessels corresponding to their own capital resources. In this respect, management policy is divided into two groups:

- a) Men who turn in their small squid fishing boats for larger models to specialize in offshore squid fishing:
This group is continuously moving from one fishing ground to another seeking migrating schools of "surume-ika". The hauls are unloaded at the nearest designated fishing port every few days. Each vessel is constantly exchanging information on fishing conditions with sister vessels working various sea areas. (Mainly comprised of 15, 20 and 29 ton type vessels.)
- b) Men who perform multiple fishing operations depending primarily on squid fishing:
This group keeps squid fishing as its main business, but during the offseason or in the event of poor catches will operate a combination of other types of offshore fishing such as angling, long-lining, gill-netting, etc. (Composed mainly of 7 to 10 ton and 14 to 15 ton vessels.)

Mr. Kunida
He derives great pleasure in studying charts during his leisure hours at home.
Fig 3 shows the various fishing grounds he worked last year.



Mr. Nakajima
He plans to challenge in new fishing techniques every year. The photo shows his making a trout fishing gear by himself.



Système de l'industrie des pêches

D'après le système de l'industrie des pêches, la flotte de pêche à la seiche du Japon se divise en trois groupes:

1. Petit tonnage ... Moins de 30 tonnes.
2. Moyen tonnage ... Plus de 30 tonnes mais moins de 100 tonnes.
3. Gros tonnage ... Plus de 100 tonnes.

Comme on peut le voir en Fig. 3, le gouvernement a établi des terrains de pêche réglementaires d'après la grosseur des bateaux de moyen et de gros tonnage. Afin de réduire le nombre des bateaux, il a aussi adopté un système de notification pour les régions où la pêche est approuvée. En ce qui concerne le travail, le gouvernement a imposé des restrictions sur l'intensité des pièges lumineux, sur les saisons de pêche, etc., et ceci pour tous les bateaux, y compris ceux de petit tonnage.

Sistema de la industria pesquera

De acuerdo al sistema de la industria pesquera, la flota japonesa para la pesca de la jibia se divide en tres grupos:

1. Tamaño pequeño ... Menos de 30 tons.
2. Tamaño mediano ... Más de 30 tons. pero menos de 100 tons.
3. Tamaño grande ... Más de 100 tons.

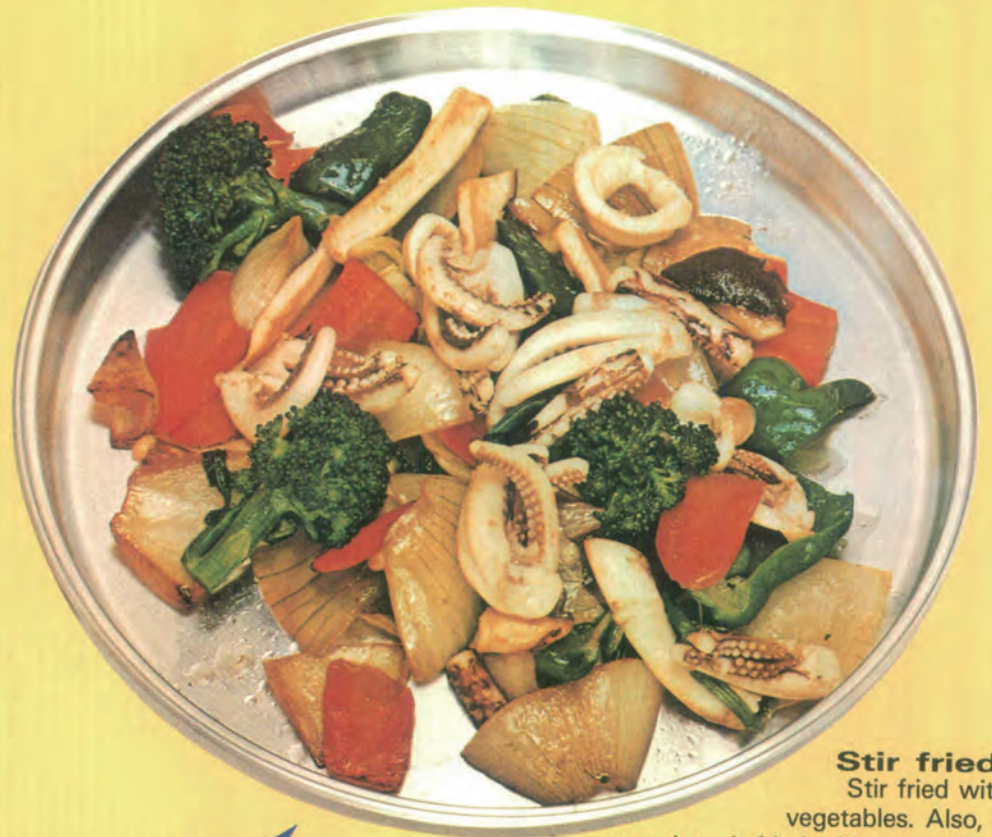
Como se ve en la fig. 3, el gobierno ha establecido pesqueras legales de acuerdo al tamaño mediano o grande de las embarcaciones. También adoptó un sistema de notificación en zonas donde la actividad ha sido aprobada con el fin de restringir el número de embarcaciones. En cuanto a la actividad, el gobierno ha impuesto restricciones sobre la intensidad de las lámparas de señuelo, temporada de pesca, etc., para todas las embarcaciones incluyendo también las de pequeño tamaño.

Amazingly wide use of squid

There are innumerable recipes for squid, and the Japanese love them all. They include everything from broiling through boiling to deep-frying and even eating the fresh meat raw, and they're always easy to prepare. Also, various types of preprocessed squid are available on the market.



Fried:
Fried round slices.



Stir fried:
Stir fried with vegetables. Also, it may be stir fried with some other type of meat.



Broiled:
Spit-roasting to avoid curling up when heated.

Various ways of cooking



Dressed:
Miso-dressed par boiled tentacle meat.



Boiled:
Stewed with various vegetables.



Eaten raw:
Sliced meat covered with "Tarako" (cod's roe)

Squid Meat and Its Ingredients

Squid is quite generally different from fish, not only in the external appearance, but also in the structure, texture, and chemical ingredients of its meat.

As shown in Fig.1, the muscular system of the torso is composed of two kinds of alternately laminated muscular fibers (a) and (b), the former circling through the torso to form lateral parallel lines, the latter running vertically from the outer layer of the skin to the inner side.

The muscular structure of the torso is simpler than in ordinary fish; thus, when dried, it can readily be torn into pieces laterally. Conversely, the head and tentacles, the muscular structure of which is more complicated than the torso, are not easy to bite off with the teeth.

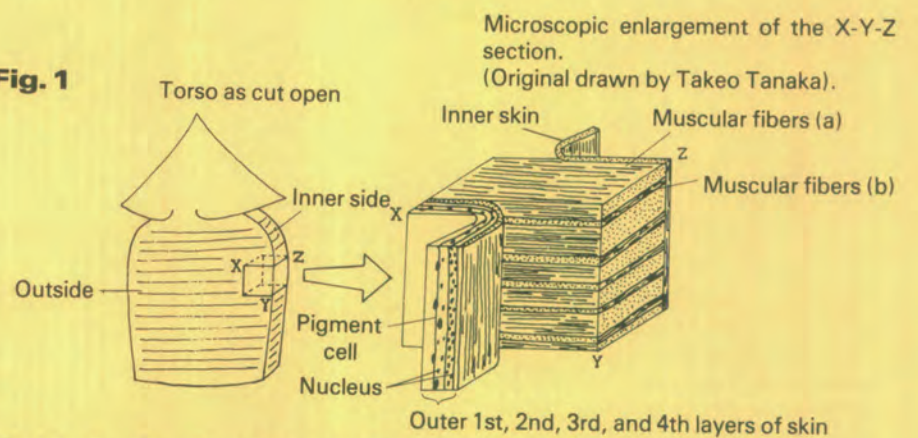
The outer skin is comprised of four layers; the first through the third being a network type structure, the fourth being of parallel fibers running vertically. The torso, when

boiled or broiled, curls due to terminal contraction of the fibers of the fourth layer. Table 1 shows the chemical breakdown of squid. As far as calories are concerned, squid meat is superior to that of sea bream. The basic ingredient, protein, is of a texture similar to that of an ordinary fish, except that squid protein has a high fresh water or diluted salt water solubility with the result that its meat, when subjected to bleaching in water, loses about 50 per cent of its protein content.

Squid meat, which contains almost the same essence, both quantitatively and qualitatively, as the pink meat of common fish, boasts a rich and somewhat sweet taste.

Squid is easy to digest, especially when eaten raw or boiled, but less so when broiled or dried.

Fig. 1



Microscopic enlargement of the X-Y-Z section. (Original drawn by Takeo Tanaka).

Table 1 Comparison of Squid and Sea Bream Meat

		Water	Protein	Glycogen	Fat	Ash	Calorie per 100g
"Surume-ika" (caught in mid-August)	Torso	76.67	21.0	0.21	1.11	1.68	102.67
	Head and tentacles	76.51	20.3	0.24	0.91	1.61	97.88
Sea bream	Caught in mid-July	79.45	18.10	0.21	0.69	1.54	79.49
	Caught in mid-Sept.	76.71	19.41	0.34	2.17	1.36	98.56

(Source: Teruhiko Sato)

Processed



Surume: Sun-dried



Saki-ika processing



Delicacies:

- a. "Saki-ika" (shredded dried squid)
- b. Smoked
- c. "Noshi-ika" (flat-rolled dried squid)



Canned: Various methods available.



Salt-stored: Preserved in entrails/salt mixture.



Salted guts: Fermented salt-pickled meat and entrails.



Frozen: Processed frozen meat for home cooking.



Paste: Added to various secondary-processed foods.

Processed

A Variety of Uses

Food	• Fresh fish	a. "Sashimi" (sliced raw fish), "sushi", etc.	
	b. A variety of recipes.		
Food	• Processed food	a. "Surume" (dried squid).	
	b. Salted and dried, salted.		
	c. Canned.		
	d. Smoked.		
	e. Fermented:	"Ika-miso" (bean paste with squid), paste, salted squid guts and preservation in "miso".	
	f. Paste:	"Kamaboko" (boiled fish paste), "Chikuwa" (fish paste in stick form), sausage.	
	g. Boiled with soy sauce for preservation.		
	h. Delicacies:	"Saki-ika" (shredded dried squid), "Noshi-ika" (flat-rolled dried squid).	
Non-edibles	• Vitamin B ₁	Eye	
	• Material for fish soy sauce.	Liver	
	• "Ika-abura" (cuttlefish oil)	Liver	
	• Feed	Liver	
	• Pigment (sepia)	"Sumi-bukuro" (ink-filled sac)	

Preservation of Freshness

Squid has a number of good qualities as an edible, one of which is its rich flavor. Unfortunately, this very factor also attracts bacteria, and that causes it to spoil quickly. Thus the importance of special measures

to preserve the freshness of squid so that it may be depended on as one of Japan's food staples. The followings are methods currently in domestic use to achieve this end:

Treatment aboard



Carried alive.

How to keep freshness during distribution process on the land



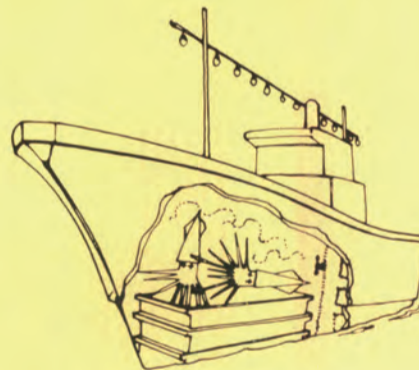
Sold raw at the local market.



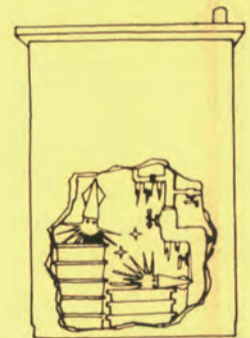
Packed in ice



Kept iced in a low-temperature place.



Rapidly frozen aboard ship.



Preserved in a low-temperature refrigerator

Edibles vs. Non-edibles

Squid tops all other marine products in terms of the ratio of edible to non-edible portions. The edible portions of "surume-

ika" account for 80 to 85 per cent of the body by weight, compared to only 50 to 60 per cent for fish in general.

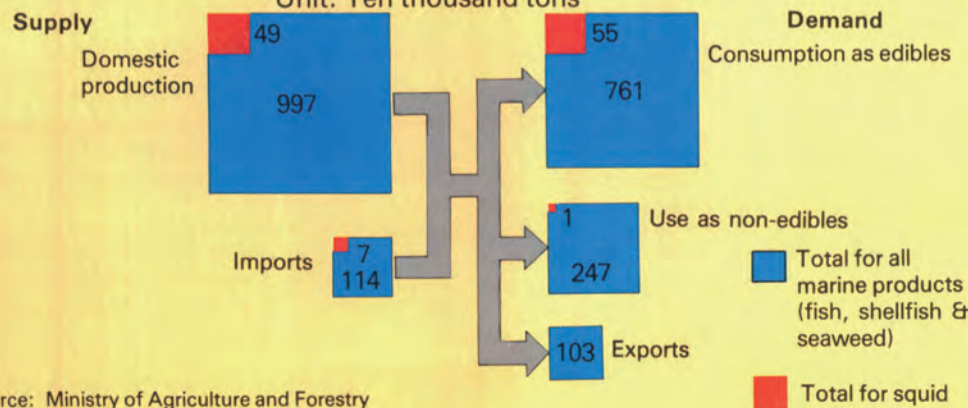
Edible vs. Non-edible Portions of "Surume-ika"

Body size	Average weight (g)	Edible portions (torso, head and legs)		Non-edible portions (liver, reproductive organ, "Sumi-bukuro", horny part of mouth, bone)	
		(g)	(%)	(g)	(%)
Small	122	104	85.3	18	14.7
Medium	219	184	83.8	35	16.2
Large	411	336	81.7	75	18.3

Source: Kokichi Oshima

General Supply/Demand Condition (1976)

Unit: Ten thousand tons



Source: Ministry of Agriculture and Forestry

Vu que la seiche sert de nourriture dans d'autres parties du monde, en Chine, dans le Sud-Est Asiatique et dans les pays Méditerranéens, elle est pour nous une ressource alimentaire de première importance. Voici quelques avantages qui font qu'elle est très estimée:

- * Un plus grand pourcentage de parties comestibles que les poissons.
 - * Délicieuse, goût agréablement doux.
 - * Se prête à de nombreuses recettes.
- Mais la seiche ne se garde pas très longtemps, ce qui fait que des précautions doivent être prises pour qu'elle puisse conserver sa fraîcheur jusqu'à la cuisine de la ménagère.

Puesto que la jibia es también muy apreciada como un sabroso y nutritivo alimento en otras partes del mundo tales como en China, países del Sudeste Asiático y del Mediterráneo, ésta representa una de nuestras más importantes fuentes de recursos marinos. He aquí algunas de sus características sobresalientes:

- * Mayor porcentaje de partes comestibles que cualquier otro pez común.
 - * Sabor delicioso.
 - * Adecuada para una amplia variedad de recetas culinarias.
- Sin embargo, la jibia tiene el inconveniente de echarse a perder muy fácilmente, de ahí la necesidad de tomar precauciones para preservarla fresca desde el momento de su captura hasta la consumición final.

Squid Can Be Useful Worldwide

Idea for the Exploitation of Marine Resources

At present around 450 to 500 species of squid have been identified living in the seas of the world.

The problem is, how many of them can be of use to mankind.

For squid to benefit mankind, they must satisfy the following conditions:

(1) Uniformity of size at exploitable phase, medium or large from 15 to 30 centimeters in length.

(2) Aggregating habits at least once through their life span, during either feeding, migrating, mating or spawning season.

(3) Edibility

In general, the third condition is stressed taking into account, of course, a nation's dietary habits as well as individual tastes. From the standpoint of commercial fishing, however, the first and second conditions must first be satisfied.

This is because food preferences of the people depend heavily on their respective methods of processing marine products and their uses. If the processing technique is properly developed, the psychological attitude of people who are not acquainted with squid meat as a food can be improved.



Takashi Okutani, Doctor of Science, Resources Division, Tokai Regional Fisheries Research Laboratory, Specialty: Marine Biology (Mollusca)

Here is a review of squid and cuttlefish resources considered to be edible by man. First, mention must be made of "kō-ika" (Sepiidae), of which 90 to 100 species are known, and "yari-ika", (Loliginidae), of which there are about 60 varieties.

Maintaining coastal habitats neither migrates in the open sea, unlike "surume-ika" (Ommastrephidae), and both come in diversified kinds.

Thus, their distribution is limited to circum-littoral zones, and as a result they can be caught even by primitive fishing methods, whether by use of a spear or a simple four-armed scoop net.

Even catching by hand is possible during their spawning season when they migrate to the shore to groups.

These methods have long been employed

in Japan, as well as in Southeast Asian countries.

Next, "surume-ika", a kind of squid belonging to the family Ommastrephidae inhabiting offshore areas, approaches coastal waters at a certain period in their life cycle. To catch this type of squid on a large commercial scale requires large-sized vessels supported by various kinds of modern fishing equipment and technology.

It must be mentioned, however, that "surume-ika", is almost always found in the areas surrounding the habitats of "kō-ika" and/or "yari-ika". The distribution of "surume-ika" is almost always found in the open sea, is determined by the geographical arrangement and topographies of adjacent land or islands.

In countries where fishing for squid (or cuttlefish) has yet to be developed, it is recommended that initial efforts be made to catch "yari-ika" and/or "kō-ika" which inhabit waters near coasts or islands. In this way, these nations upon recognizing the importance of squid as a source of marine protein, can eventually follow the course taken by Japan in the development of offshore squid angling. Trawl fisheries are the mainstay of "kō-ika" fishing. As for "surume-ika" or "yari-ika", angling by means of jigs as it has developed over the years is effective and economical, and boasts at least two advantages over trawling:

- (1) There is no fear of damage to the product, yielding fish with the skin intact.



Sun-drying of Surume-ika is rarely seen because drying process has already become automated.

- (2) Being a selective method, fish under commercial size are not caught.

It is recommended that countries contemplating squid fisheries make a study of Japanese squid jigging methods, as well as on squid resources (particularly those of "surume-ika"), so an analogy of between these methods and theirs. However, in practical application of fishing methods or equipment, it is necessary that local biologist-ecologist experts be consulted to determine appropriate fishing techniques. Finally, mention must be made of the reproductive power of the squid, which was once thought to be great, has proved to be less than imagined according to the findings of the recent research.

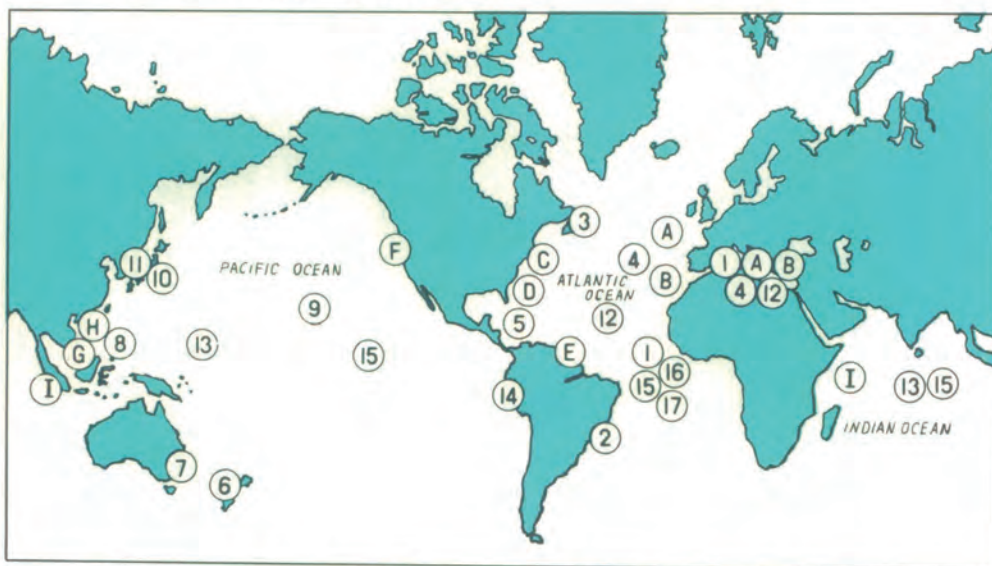
The fact that "surume-ika" in Japanese waters lives for only about a year, maturing in a short period of time led to the belief that the conventional fishing intensity would not cause a serious curtailment of the stock size. However, it is now believed

that the squid is not so durable against external pressure judging from the following facts: that is, it travels quickly over a vast area of the sea, has delicate reproductive mode, and its habitats are easily influenced by physical oceanographic conditions.

The problem facing the developing countries in undertaking squid fishing by small-sized vessels does not involve the resources, which are abundant now, but rather is concerned into the ways to help increase squid consumption through development of effective processing.

Note: Fig. 1 does not include "kō-ika" and the like (Sepiidae), which are found in the circumlittoral areas in the tropical to subtropical zones along the Eurasian and African continents as well as islands in the marginal seas. No Sepiidae are found along either North or South America.

Fig. 1 Distribution Map of Major Species of "Yari-ika" (A-I) and "Surume-ika" (1-17) families



A. <i>Loligo forbesi</i>	B. <i>L. vulgaris</i>	C. <i>L. pealei</i>	D. <i>L. Plei</i>
E. <i>L. surinamensis</i>	F. <i>L. opalescens</i>	G. <i>L. edulis</i>	H. <i>L. chimensis</i>
I. <i>L. duvaucelii</i>			
1. <i>Todaropsis eblane</i>	2. <i>Illex argentinus</i>	3. <i>I. illecebrosus</i>	4. <i>I. coindetii</i>
5. <i>I. oxygonius</i>	6. <i>Nototodarus sloani</i>	7. <i>N. s. gouldi</i>	8. <i>N. s. philippinensis</i>
9. <i>N. s. hawaiiensis</i>	10. <i>N. nipponicus</i>	11. <i>Todarodes pacificus</i>	12. <i>T. sagittatus</i>
13. <i>S. Symplectoteuthis</i>	14. <i>Dosidicus gigas</i>	15. <i>Ommastrephes bartrami</i>	16. <i>O. pteropus</i>
17. <i>O. caroli</i>			

by T. Okutani

La seiche à travers le monde L'accroissement des ressources marines

Jusqu'à maintenant on a identifié entre 450 et 500 espèces de seiches vivant dans les mers de notre monde.

Nous allons passer en revue les ressources en seiches considérées propres à la consommation humaine. Tout d'abord il nous faut mentionner la "ko-ika" (Sepiidae), dont 90 à 100 sortes sont bonnes, et la "yari-ika" (Loliginidae), qui se compose d'environ 60 variétés. Au contraire de la "surume-ika" (Ommastrephidae) qui vit en haute mer, ces deux espèces vivent dans les régions côtières et toutes les deux se composent de nombreuses variétés.

Donc, les endroits où elles vivent se limitent à des zones régionales, et elles peuvent être attrapées par n'importe quelle méthode de pêche.

Ensuite, vient la "surume-ika" (Ommastrephidae), une sorte de seiche qui fait partie des espèces vivant en haute mer, mais qui se rapproche des côtes à un certain moment de l'année. Attraper cette espèce de seiche demande le support de chalutiers de gros tonnage équipés d'un matériel de pêche varié et moderne.

Dans les pays où la pêche à la seiche n'en est qu'à ses débuts, il est recommandé de porter les premiers efforts sur la pêche à la "yari-ika" ou "ko-ika", lesquelles vivent près des côtes ou près des îles. De cette façon, les pays ayant reconnu l'importance de la seiche en tant que source de protéines marines, pourront suivre le Japon dans l'accroissement de la pêche à la seiche en haute mer.

La Jibia — Desarrollo de los Recursos Marinos

Haste la fecha han sido identificadas entre 450 y 500 especies de jibias en los océanos de la tierra.

A continuación presentamos una reseña de los recursos de la especie de la jibia considerados comestibles por los humanos. Primero, debe mencionarse que existen entre 90 y 100 clases utilizables de "ko-ika" (Sepiidae) y aproximadamente 60 variedades de "yari-ika" (Loliginidae). Estas variedades habitan en las zonas costeras, a diferencia de "surume-ika" (Ommastrephidae) que flota en el mar abierto.

De este modo, su distribución está limitada a zonas marinas regionales, con el resultado de que pueden capturarse prescindiendo de métodos de pesca especiales.

La variedad "surume-ika" (Ommastrephidae), una clase de jibia perteneciente al género que habita en zonas lejos de la costa, se acerca solamente a esta en cierta estación del año. Para la captura de esta clase de jibia se requieren transportadores de gran tamaño y además varias clases de modernos equipos para pesca.

En países donde todavía no se encuentra desarrollada la captura de la jibia, se recomienda en primer término la pesca de "yari-ika" o "ko-ika", ya que habitan en aguas cerca de la costa o islas. De esta forma, al reconocer tales naciones la importancia de la jibia como una fuente marina de proteínas, pueden seguir eventualmente el curso seguido por Japón en el desarrollo de los recursos marinos lejos de la costa.

Opening the Way for the New Age of Squid Fishing



Yamaha fishing vessel DY-33-0 (3 gross tons)

YAMAHA has long been supplying FRP boats for squid angling, in sizes ranging from 3 to 20 gross tons, in particular, those of 4.9, 9, and 18 tons. All of them are distinguished by their high speed, and many shipowners equip them with such modern navigation equipment as two-way radios, direction finders and loran. Further efforts are being made by these fishermen to extend fishing grounds and increase catching efficiency through the use of fish finders, automatic squid anglers and high-power fish lamps.

The types of fishing boats desired by shipowners differ considerably from region to region. In general, "stocky type" boats with wide beam in relation to length are favored for the Pacific coast fishing of eastern Japan, while the "slim type" vessels with a narrower beam are predominant in the Sea of Japan coastal areas of western Japan.

This difference in the type of vessel is attributable to the variation in the sea conditions of individual regions and in vessel capability as required by the owners. Fishermen in western Japan place emphasis on the ability of boats to develop high speed and resist a following wave, thus they desire for slim type vessel. On the other hand, since fishermen in eastern Japan place emphasis on proper rolling angle and cycle, they favor broad beam boats for high anti-rolling capability.

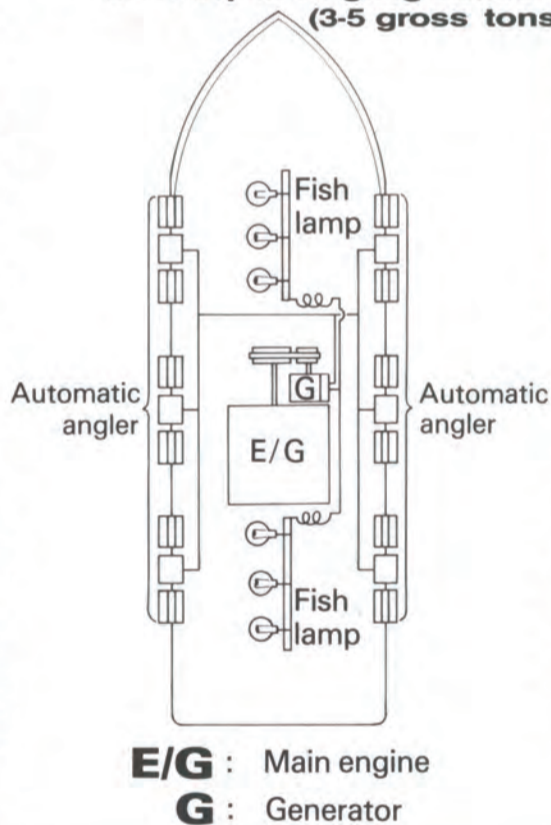
Squid angling is larger in scale on the Pacific side of Japan than in the western Japan sea districts. Small-sized coastal vessels operating in waters off eastern Japan are generally larger than those in the Sea of Japan. Moreover, those operating off the east coast are equipped with improved fishing apparatus, and their main engine, generator and fuel tank are of larger capacity.

Two important pieces of fishing equipment are the automatic squid angler and the fish lamp. What concerns the shipowners most is how to outfit their boats with as many angling devices as possible and how to raise the power of their fish lamps.

Fig. 1 shows an arrangement of fishing

equipment on board 3 to 6 gross ton vessels. The generator is run from power provided by the main engine, and the resultant electricity activates the fish lamps and the angling devices. The boats are allowed to drift during the operation, thus eliminating necessity of additional power from the main engine.

Fig.1 Arrangement of Equipment on A Squid Angling Vessel (3-5 gross tons)



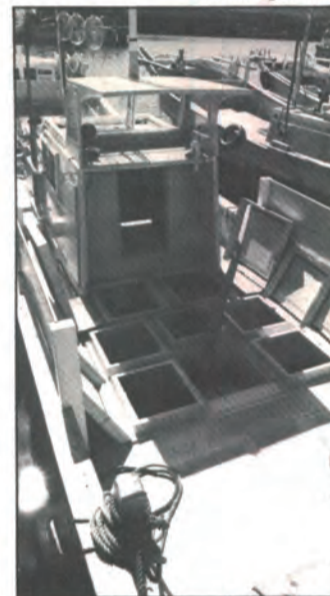
Also important is the method by which the catch is carried. Squid caught by vessels operating in coastal waters are not outfitted with refrigeration equipment. The catch is either packed fresh with ice or left swimming in wells on board. The fish-hold is of an insulated construction with bulkheads and lid-covers filled with plastic foam to prevent temperature rise in the interior of the hold.



Steering house



Yamaha fishing vessel DY-43-0K (5 gross tons)



Yamaha fishing vessel DY-40A-0A (4 gross tons)

Pour la pêche à la seiche on utilise des bateaux de 3 à 20 tonnes, Yamaha a lancé à cet usage des bateaux en FRP de 4,9,9 et 18 tonnes. Les propriétaires qui les équipent d'appareils de navigation dernier cri (équipement de communication radio, sextant, récepteur loran, etc.). Les propriétaires cherchent à étendre de plus en plus leurs terrains de pêche et à obtenir une plus grande efficacité de travail grâce aux nouveaux appareils de pêche tels que le sonar, le système de lignes automatiques pour attraper les seiche et un puissant éclairage pour les attirer.

YAMAHA ha estado suministrando un gran número de barcos FRP para la pesca de la jibia, en una amplia variedad de modelos que van desde 3 hasta 20 tons., y también aquellos de 4,9,9, y 18 tons. Todos estos barcos se distinguen por su alta velocidad, y además vienen provistos con el más moderno instrumental de navegación (equipo de radiotransmisión, radiocompás, receptor loran etc.). También, le permitirán ampliar su pesquera y mejorar la eficiencia en la pesca con la ayuda de nuevos aparatos tales como: buscador de peces, dispositivo para pesca automática de la jibia y luz señuelo de alta luminosidad.

Research on Australian Octopus Resources



Yamaha DT-46-0A. The same type as an octopus fishing boat for Australia

Under an agreement signed between Japan and Australia, the National Federation of Fisheries Cooperative Associations and the Overseas Fisheries Cooperation Foundation, both Japanese, will jointly conduct research on the fishery resources of Australia. The undertaking is aimed at eliminating octopuses which are damaging the lobsters inhabiting the seas of western Australia, while at the same time utilizing them as edibles.

To serve the project, a YAMAHA FRP fishing boat is being provided to the government. The vessel, a model DT-46 equipped with an ME 950 main engine, has the following specifications: 4.98 gross tons, 14.08 meters overall length, maximum speed of 12.5 knots, and equipment to permit efficient hauling of a long line fitted with octopus traps. The ship, already launched, is scheduled to start operation in March, 1978.

A la suite des accords qui ont été signés entre le Japon et l'Australie, deux organismes japonais, la Fédération Nationale des Associations de Coopératives de Pêche et la

Fondation de coopération pour la Pêche en Haute Mer, ont décidé de se joindre au programme de recherche Australien sur les ressources en poulpes. Pour faciliter ses recherches, le gouvernement de l'Australie Occidentale a porté son choix sur un bateau de pêche en FRP de Yamaha. Ce bateau, modèle DT-46 équipé d'un moteur principal ME-950, a les caractéristiques suivantes: Longueur hors tout, 14,08 mètres; 4,98 tonnes et une vitesse maximum de 12,5 noeuds.

Según lo acordado entre Japón y Australia, Federación Nacional de Asociación Cooperativas Pesqueras y la Cooperación Internacional de Pesca, ambas entidades Fundación para japonesas, han decidido llevar cabo conjuntamente la investigación que tie por objetivo determinar los recursos marino de la especie de la jibia en el territo australiano. Para realizar tal proyecto el gobierno de estado de Australia Occidental ha elegido como barco pesquero al FRP de YAMAHA. El barco, modelo DT-46 con motor ME-950 tiene las siguientes características: 14,08 m de longitud total, 4,98 toneladas brutas pudiendo alcanzar una velocidad máxima de 12,5 nudos.

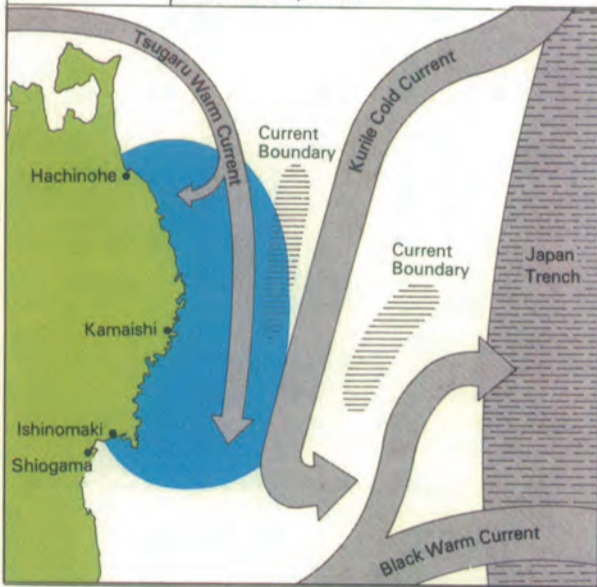
Typical Rias Coast

The area colored in blue is called the Sanriku Coast. To the north it boasts innumerable terraced hills, while its southern portion consists of a series of capes and deep inlets; thus forming a complicated coastline.



Bay along the south Sanriku Coast

Geographical grouping of coastal fishing grounds	
Open seas	Unbroken coast line
	Rias coast
	Peninsula salient
	Inlets of large bay
	Seas dotted with islands
Inland seas	Sand and mud zones
	Reef zones
	Lagoons
	Brackish waters
Inland waters	Rivers
	Lakes and ponds



Squid fishing Tôni Bay



Oyster shell ripping Funakoshi Bay



Scallop farm Yamada Bay



Launching ceremony for a squid fishing vessel (9.5 gross tons) Ofunato Port



Haul of cultured oysters Yamada Bay

The waters off the Sanriku Coast constitute one of the world's most productive fishing grounds.

The Black Warm Current and the Kurile Cold Current converge to produce an admixture of both warm and cold water areas. Thus, an oceanic front (current boundary) develops to provide a place for fish to form schools. The main kinds of fish living in this area include mackerel pike, sardine, mackerel, squid, skipjack and tuna, all of which are migratory species belonging to the Black Current. Because of this the fishing ports of Hachinohe, Kamaishi, Shiogama and Ishinomaki have developed and flourished.

Coastal fisheries, using small-sized boats of 1 - 5 gross tons actively employ various kinds of angling, long line, gill net and stick-held dip net methods.

Yamaha Fishery Journal

Set net fisheries have long been established in the deep inlets, catching yellowtail and sardines, while the catch of salmon has been increasing recently, as well.

These coastal areas are also noted for fish farming. A number of self-employed small-scale fishermen are cultivating such shellfish as scallops and oysters, as well as seaweed, like kelp, "wakame" and laver.

La Côte de Rias. La mer le long de cette côte est l'un des meilleurs terrains de pêche au monde. C'est ici que se rencontrent deux courants, l'un chaud, le Kuro-shio, l'autre froid, le courant des Kouriles, avec le courant qui en résulte (front océanique) ils offrent un endroit qui convient particulièrement aux

poissons. Parmi les principaux habitants du Kuro-shio qui vivent à cet endroit, nous trouvons le maquereau japonais, la sardine, le maquereau commun, la seiche, la sériole, le thon, etc.

Pour la pêche côtière on utilise surtout de petits bateaux de 1 à 5 tonnes, lesquels sont d'une grande utilité pour de nombreuses méthodes de pêche, telles que la pêche à la ligne, la pêche au chalut et au carrelet.

La pêche au filet fixe se pratique depuis déjà bien longtemps à l'entrée des petits bras de mer s'enfonçant à l'intérieur des terres. En ces lieux, les parcs à coquillages et la récolte des algues marines ont aussi une grande activité.

Pesca costera. La zona del mar frente a las costas constituye una de las mejores pesqueras del mundo. La cálida Corriente

Negra y la Corriente Fría Kuril se encuentran en este punto con la corriente resultante (frente oceánico), suministrando un lugar ideal para que los peces vivan en cardúmenes. Las principales especies de peces que viven en esta zona incluyen a la caballa, sardina, jibia, atún, etc., siendo todos estos habitantes de la Corriente Negra.

Actualmente, en las operaciones de pesca costera realizadas por medio de barcos de pequeña envergadura que van desde 1 hasta 5 tons., se emplean activamente varios métodos para la captura de peces, tales como: línea de longitud, red de agalla y red de fondeo.

La pesca con redes estacionarias se ha utilizado desde hace mucho tiempo en los estuarios o golfos donde el mar penetra profundamente dentro de la tierra, y donde además se está llevando en forma muy activa el cultivo de ostras, almejas y algas marinas.