THE TUNA LIVE-BAIT FISHERY OF MINICOY ISLAND

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Introduction

The island of Minicoy (latitude 8° 7′ N. and longitude 73° 19′ E.) in the Indian Ocean (Figs. 1 *a* and *b*), is famous for the tuna fishery, which forms the most important industry of the Island. It has a total population of about 4,000 of which 640, including boys, are professional fishermen, supplemented by about 300 part-time fishermen at the height of the tuna fishing season. The fishery now brings an annual income of over Rs. 500,000 to the islanders whose other sources of income, which are far less than the above, are only from coconut produce and remittances from sailors serving as deck hands in ocean-going merchant vessels. The tuna which forms the mainstay of the industry is the Oceanic Skipjack, *Katsuwonus pelamis* (Linnaeus) [= *Euthynnus pelamis* (Linnaeus)] locally known as *Kaliphila-mas* which occur in appreciable numbers from September to April, with December to March forming the peak season, though the Yellowfin, *Neothunnus macropterus* (Temminck and Schlegel), known as *Kannali-mas* are also caught. The meat is converted into fish sticks or *mas-min*, a hard dry product obtained by boiling the filletted meat in brine and subsequently smoking it and drying it in the sun. The tuna bait fishery is dealt with in this note while the fishing industry in general of Minicoy is being dealt with elsewhere.

Specimens of fishes of Minicoy Island including tuna live-bait fishes were being collected for the last four years through the co-operation of the Medical Officers stationed there. In October 1956, Mr. M. Kumaran, Laboratory Attender of this Research Station, was sent there to collect specimens of fishes and information on the fishing industry. In February 1958 I was able to visit the Island on board the Research Vessel 'Kalava' of the Indo-Norwegian Project and personally see the tuna bait fishery and check the information collected. It gives me great pleasure to record here my sincere thanks to Dr. P. K. Raghava Varrier, Dr. V. Ramakrishnan and Mr. M. Kumaran for the specimens collected and information furnished. All the figures have been drawn by Mr. Kumaran under my supervision.

Tuna Live-Baits

A variety of small fishes found within the lagoon and in the inshore waters adjacent to the island are used as live-baits (Plate V, Figs. 4–8). The most common among these are the Pomacentrids with *Daya jerdoni* (Day) as the dominant species followed by *Chromis caeruleus* (Cuvier) and *Pomacentrus* spp. The next important group is the Caesiodids with *Caesio caerulaureus* Lacépède, conspicuous as the largest among the bait fishes. Apart from the above there are Labrids, Atherinids, Apogonids and a variety of small-sized adult and juvenile fishes belonging to a number of families. There is no special selection, and any small fish that remains alive in the bait net is transferred to the bait well or storage basket. On occasions when sufficient bait fish are not available from the lagoon the Indian top minnow or the 'killi fish,' *Panchax panchax* (Hamilton), locally called *incha-mas*, which are found in large numbers in the ponds in the island, are collected with the help of wide-meshed cloth and utilized for the purpose.

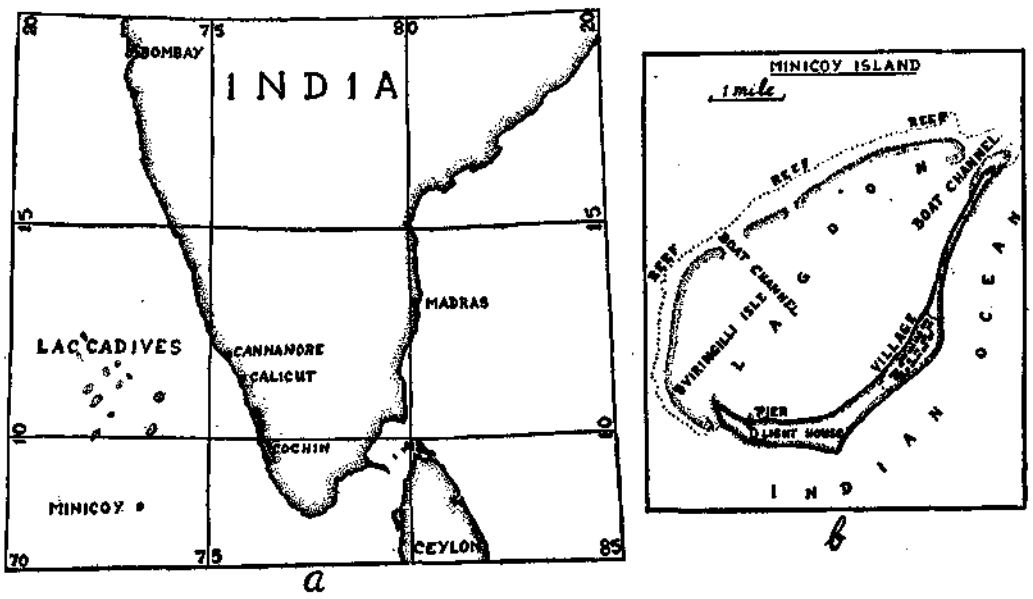


Fig. 1. (*a*) Outline map of South India showing the position of Minicoy Island.
(*b*) Outline map of Minicoy Island.

Collection Methods

Bait fishes are generally caught with the help of a net about 18 square (Fig. 2 *a*) called locally *Nilamahi dou** (*Nilamahi* = A general term for some common species of bait fishes; *dou* = net). Four poles of coconut

stem are fixed at the four corners, the two on one side known as *kuruthandi* being 20′ long and the other two known as *diguthandi* about 25′ long. The net is made of 40 counts 6 ply cotton yarn with the exception of a few rows of border meshes which are of 40 counts 8 ply yarn. The border is strengthened by a stout cotton twine running along the four sides. The meshes are about 0·2″ in the centre while towards the border they are about 0·3″.

To start with, some sort of bait to lure the bait fishes into the net is essential. Generally crabs are caught for this purpose by boys who go in batches after dusk to the seashore on the southern section of the island. These are crushed on board the boat with a small pestle of coral stone and stored in a vessel similar to the water baler, locally known as '*diya-hikka-fe*' (Fig. 2*f*). In the absence of crushed crabs, meat of tuna caught on the previous day is made into a fine paste known as *philimas* and used. The preparation of the bait paste is generally in charge of one of the older men in the group who sets about the process in a methodical manner. The fish having been kept without any preservatives will be in a semi-decomposed state by the next morning and this lends itself well for the operation. It is first filleted longitudinally into two and each half is kept inside out on a plank known as '*pilaka*' about 2′ long and the meat is scraped with a knife (Fig. 2*g*). The head, entrails, fins, skin and other hard and fibrous portions are taken by a boy who puts them in a vessel containing a little water and churns the contents well with a brush. The scraped meat is taken out little by little, kept on the plank and pressed into a fine paste with the help of the knife and stored in another vessel or tin. The preparation of the bait paste commences as soon as the boat leaves for fishing and continues till sufficient bait fishes have been collected and transferred into the live wells in the boat.

The *Nilamahi dou* is operated from *Mas-dhoni* or *Mas-odi* (*Mas* = fish, *dhoni* or *odi* = boat), usually in the early hours of the morning, before proceeding to the tuna fishing grounds. On days when there is no tuna fishing, bait fishes are collected in the evenings and stored alive for subsequent use. Each tuna boat carries three or four bait nets for ready replacement, since the coral substratum frequently damages them. A suitable shallow place in the lagoon with signs of good shoals is selected and the operation begins.

The bait net is lowered into the sea from the side of the tuna boat by four persons, each holding a pole, and crushed crabs, entrails of tuna etc.,

* The local language is "Mahl" which is the same as that in the Maldives. Meanings of words, wherever known, are given in brackets.

are thrown over the net to attract the small fishes, which gather in shoals. The two poles nearest to the boat are held almost vertically, and two ropes are tied to these and are taken below the boat to the opposite side, and held firmly by two men. This prevents the poles from slipping and the ropes are released only when the nets are to be hauled up. Sometimes, dead baits are tied to a rope and dangled above the net. When tuna meat paste is used it is rubbed by a boy on a coir padding at the end of a bamboo pole about 15′ long (Fig. 2 *h*) and a man standing on the side pushes it up and down in the water making the fine particles of the meat spread in all direcions. In the meanwhile a boy will be busy sprinkling with a brush the liquid from the other vessel, containing head and entrails. Attracted by the presence of food, bait fishes gather in shoals to feed on them and as soon as appreciable numbers of them collect over the net it is quickly raised, giving little chance for them to escape and they are immediately transferred with an *em-very* (*em* = bait, *very* = basket) into the live-bait wells known as *em-vy* (*em* = bait; *vy* = compartment) of the boat. If the boats are not proceeding for tuna fishing on the same day the fishes are stored in the storage baskets and tanks known as *labari*.

The *nilamahi dou* is used for collection of bait fish in another manner but the catches are generally utilized as bait for hook-and-line fishing. The poles are removed; two corners of the net are tied to two small poles fixed in the lagoon and the two other corners anchored at the bottom with coral stones so that the net is in a sloping position. A simple contrivance, known as the *fung-dou* (*fung* = coconut palm; *dou* = net) which consists of a coir rope about fifty feet long with a row of coconut palm leaves closely tied all along it is drawn by four to six persons in a steadily decreasing circle towards the fixed net so that the fish are scared and driven towards the net. When the *fung dou* comes close to the *nilamahi dou*, four persons haul up the latter and all the fishes caught are removed. The above fishing is usually done near Viringilli Island, off the Light-house Point.

Storage

The tuna boats proceed directly to the fishing grounds after the collection of bait fishes (Plate V, 1) and the latter remain alive in specially built wells inside the boats which receive a regular circulation of water through a series of holes in the hull. There are three to four compartments for live-baits which are all separated by planks with holes to facilitate water circulation. Excess water accumulated in two compartments, one at each end, where no fish are stored, is continuously baled out by small copper or aluminium vessels known as *diya-hikka-fe*.

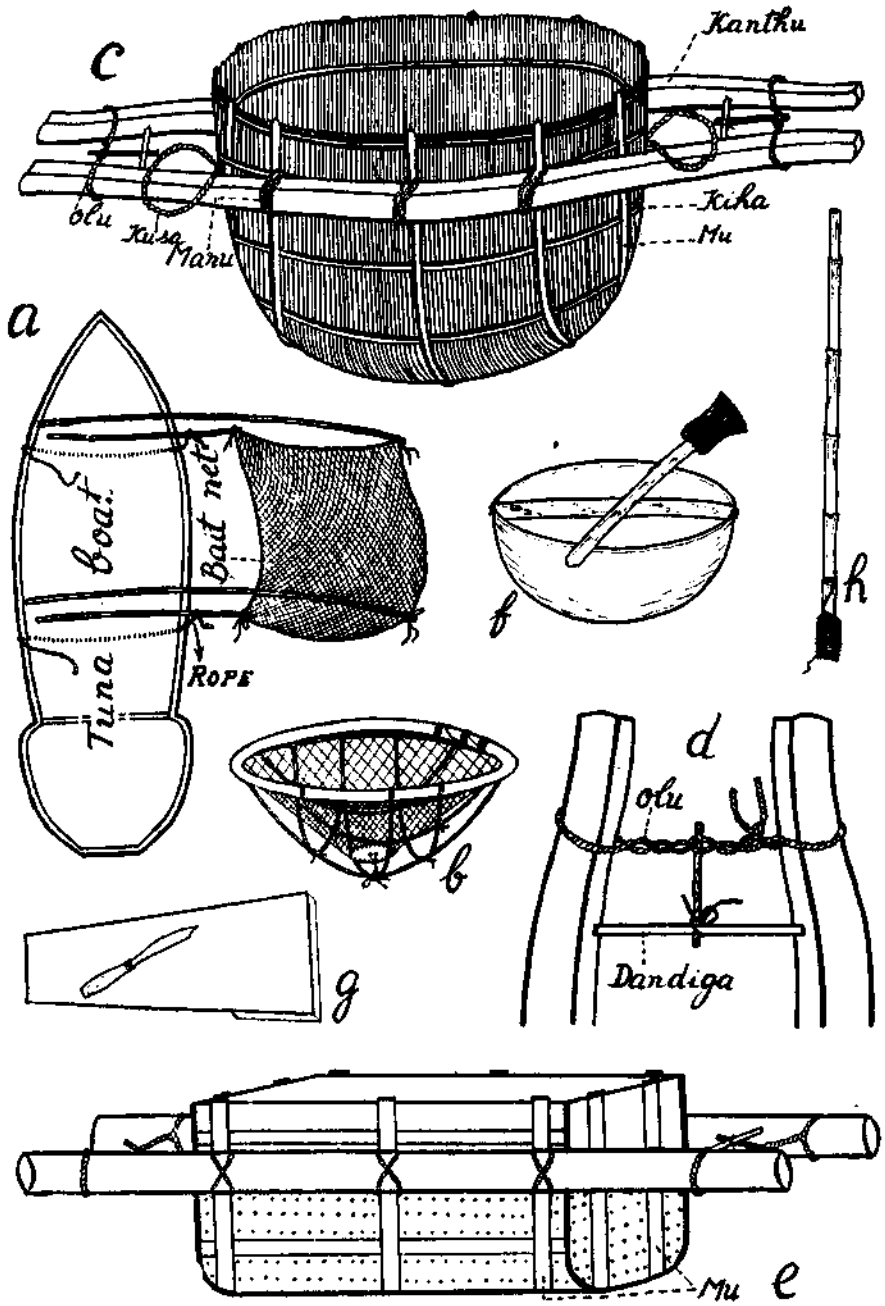


FIG. 2. (*a*) A view from above of the bait net or *Nilamahi dou* operated from the side of a tuna boat (diagrammatic).

(*b*) *Em-very* used for transferring live-bait.

(*c*) Cane live-bait storage basket.

(*d*) A view from above of one end of the cane storage basket, showing wooden beams, cross-rope, etc.

(*e*) Tin live-bait storage tank.

(*f*) *Diya-hikka-fe* with brush used for sprinkling fish remains.

(*g*) The '*pilaka*' and knife used for bait paste preparation.

(*h*) A bait paste pole.

When bait fishes have to be kept alive overnight they are stored in *labari* which are either cane baskets or tanks made of wood and tin. Any excess bait left after a day's fishing is also similarly stored for the next day's use.

Cane bait basket (Fig. 2 *c*).—This is locally known as *labarikandu*. The cane for making the *labari* is brought from the mainland of India. The mouth of the basket is somewhat elliptical with the longer side measuring 5′ to 6′ and shorter side 4′. The height is about 4′ and the bottom is rounded. The basket is strengthened by horizontal rings (*kiha*) and longitudinal half-rings (*mu*) made of stout cane or sticks. The uppermost *kiha* has ropes on the sides called *maru* and the two narrow sides of the basket have ring-shaped rope-handles called *kusa* (= ear) attached to the *mu*. Two long pieces of wood (*kanthu*) 11′ × 8″ × 4″, slightly curved outwardly in line with the curvature of the basket, are fixed along the upper *kiha* with the *maru* on either side. Two cross sticks or *dandiga* (= rod) are fixed at either end to hold the two wooden beams in position and a rope (*olu*) which is tied at the two extremities (Fig. 2 *d*), is tightened by twisting it by means of a rod in the middle.

Incidentally, it may be stated here that the cane *labari* of Minicoy has considerable resemblance to the store basket for bonito live-bait used in Japan, as shown by Hornell (1950).

Tin bait basket (Fig. 2 *e*).—This store tank known as *fy-labari* (*fy* = tin) is about 5′ long, 3′ broad and 3′ high and is rectangular in shape with slightly curved bottom. Generally the long sides and the bottom are made of tin and the narrow sides of wooden planks of 1″ thick. The sides and bottom are strengthened by 3″ wooden reapers of 1″ thickness, as shown in the figure. Stems of *kanthu* wood are fixed to the sides as in the cane *labari*. The bottom and lower half of the sides have small holes, 0·2″ to 0·3″ in diameter, for the passage of water. There are about 120 such holes at the bottom, 100 along each long side and 60 each along the narrow sides. The tin is painted with tar on the outside.

The *labari* is left floating in the lagoon with the live-bait inside, attached to an iron or stone anchor. When empty the basket is left upside down in the sea or taken to the shore and left exposed to the sun.

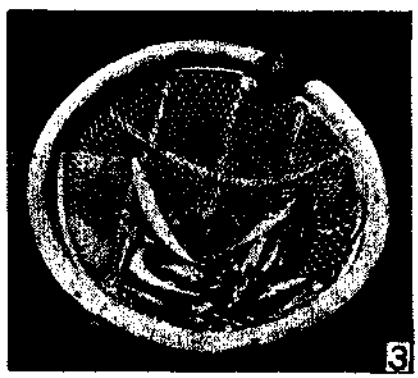
The transfer of fish from *nilamahi dou* to bait wells of the boat and from *labari* to bait wells is done with the help of *em-very* (Fig. 2 *b* and Plate V, 3). It has a diameter of about 9″ and depth of 4″. The mouth is made of cane or twig of some tree bent in the form of a ring. There is an aluminium

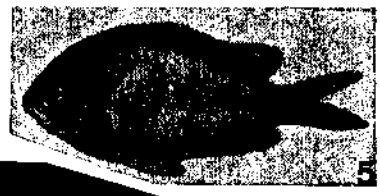
plate or coconut shell or tortoise shell about 2″ in diameter known as *fooga* (= plate), fixed to the centre of the net, which is made of 6 ply, 40 counts yarn with 0·2″ mesh. Outside are six curved sticks, three in each direction which do not touch the net but serve as a protective frame outside it. To keep the net in position the plate is fixed to the frame by a string at the bottom. The *em-very* is used also for throwing live-baits into the sea during tuna fishing.

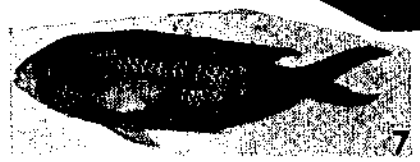
General Remarks

Tuna fishing is carried out in the open sea around Minicoy and since *Katsuwonus pelamis* could be caught in appreciable numbers only after the fish is chummed close to the boat with the help of live-bait, the availability of sufficient quantities of live-bait will be a very important factor in the matter of further development of the tuna fishery in the seas around Minicoy and the Laccadives. Though no difficulty is said to be experienced at present, in any programme of intensified tuna fishing operations the problem of adequate supplies of live-bait is bound to arise. In the meanwhile introduction of *Tilapia* into these islands which has proved so successful in Hawaii, (Brock and Takata, 1955) appears to be a matter that deserves serious consideration. There is no need to fear that this fish would affect adversely the balance of life in the above islands and there are a large number of tanks where it is bound to flourish well.

In countries like the United States and Japan where tuna fishery is of great commercial importance, considerable work has been done on the bait fishes. It may be of interest to note that while in those countries clupeoid fishes, especially the engraulids, are the most important, in Minicoy, percoid fishes constitute the live-baits. In Japanese waters *Engraulis japonicus* is the dominant bait fish (Fisheries Agency, 1955) and there does not appear to be any scarcity of it there. On the other hand considerable depletion in stocks of the anchoveta, *Cetengraulis mysticetus*, has been reported from certain localities in the eastern Pacific (Schaefer, 1955 and Peterson, 1956) and even transplantations aimed at its revival in the Gulf of Nocoya have been carried out. In Hawaii, where tuna fishery is of great importance, study of bait fishes has been receiving increasing attention in recent years (June, 1951 and 1951 *a*; Tester and Takata, 1953 and Brock and Takata, 1955). In view of the restricted availability there of the *nehu*, *Stolephorus purpureus*, a small delicate anchovy, which forms from 85 to 95 per cent of the live-bait used, attempts have been made to use the *aholehole*, *Kuhlia sandvicensis* and *Tilapia mossambica* as substitutes (Tester and Takata and Brock and Takata, *op. cit.*) with promising results especially with the latter,







FIGS. 1–8. 1. A tuna fishing boat proceeding to the fishing grounds after collection of bait fish from the live-bait basket or cane *labari* seen on the right side. 2. A live-bait basket anchored in the lagoon. 3. An "*em-very*" with some fish inside. 4. *Pomacentrus tripunctatus* Cuvier. 5. *Chromis caeruleus* (Cuvier). 6. *Archamia lineolatus* (Cuvier). 7. *Daya jerdoni* (Day). 8. *Caesio caerulaureus* Lacépède.

The western sector of the Indian Ocean is a potentially rich tuna fishing ground and it has already come within the orbit of operation of the Japanese tuna fishing fleet. Minicoy and other islands of the Laccadive Archipelago are bound to play a very important role in the development of the tuna fishing operations in the region. The importance of bait fishes in this connection is of special significance as the scarcity of these is reported to be one of the causes for the absence of tuna fishery in the Laccadive group of islands. A detailed study of the bait resources of this area is being taken up and the results of these investigations should indicate to what extent tuna fishing operations could be extended to other islands of the Laccadive Archipelago.

Summary

A brief account of the tuna live-bait fishery of Minicoy Island in the Indian Ocean is given in the article. The common species are mentioned and their methods of capture and storage are described and figured. The importance of bait fish study in any intensified tuna fishing programme in the Laccadive Archipelago is pointed out.

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