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# 4. CLAM RESOURCES OF THE ASHTAMUDI LAKE, WITH SPECIAL REFERENCE TO *KATELYSIA OPIMA* (GMELIN) FISHERY

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## ABSTRACT

The clam fishery resources of the Ashtamudi lake are supported by several species belonging to *Villorita*, *Katelysia*, *Meretrix* and *Paphia*. However, *Villorita cyprinoides* and *Katelysia opima* contribute to the bulk of the resource. The extent of the major clam beds, the estimate of the present stock and the magnitude of the existing fishery suggest increased production. The exploitation and utilization of *Katelysia opima*, which has got great export potential, are dealt with in detail. Some steps for the judicious management of the clam resources are also suggested.

## INTRODUCTION

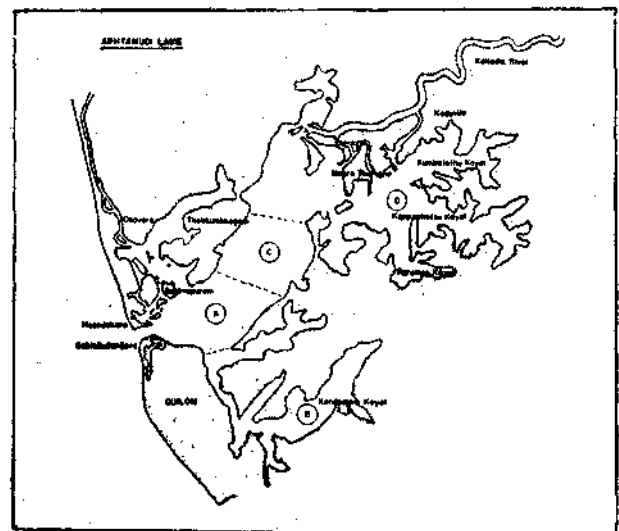
Among bivalve molluscs, clams form an important resource as meat for human consumption and as lime-shell in cement and calcium carbide industries. Very little is known about the clam resource of the Ashtamudi lake situated on the southwest coast of India and second only to the Vembanad lake in Kerala in area and clam production. The only study is that made recently by Appukuttan et al (MS) on *Katelysia opima* (Gmelin). The present paper gives a baseline information on the status of the clam fishery with special reference to the fishery and utilization of 'baby clam', *Katelysia opima*.

## AREA AND METHODS OF STUDY

The Ashtamudi lake is situated between lat. 8°45'-9°28' N and long. 76°28'-77°17'E. It has a waterspread of 32 km² and is connected to the Arabian Sea through a perennial opening, permitting an estuarine condition almost throughout the year. The Kallada river which joins at the northeastern part is the source of freshwater to the lake.

To assess the present status of the clam fishery and its prospects, survey of the Ashtamudi lake [was undertaken in February 1984. For this the entire area was divided into zones, viz. Daisapuram, Ashtamudi mudflat (Neduvathu Thututhu), Kandachira Kayai and Kanjirakottu Ksyal (Fig. 1).

Areas of occurrence of clams were first ascertained by enquiries with regular clam



pickers and also by observing actual fishing.

Stations were fixed at a minimum distance of 200 m from each other. Water samples were collected for temperature, salinity, dissolved oxygen, phosphate, nitrite, nitrate and pH analysis. Wherever the depth was more than 1 m, water samples from the bottom were collected with a Casella bottle for estimating these parameters. Sediments from very shallow areas were collected when the depth was more the sediment that came along with the clams in the clam sampler was collected for determining the nature of the

pickers and also by observing actual fishing. Stations were fixed at a minimum distance of 200 m from each other. Water samples were collected for temperature, salinity, dissolved oxygen, phosphate, nitrite, nitrate and pH analysis. Wherever the depth was more than 1 m, water samples from the bottom were collected with a Casella bottle for estimating these parameters. Sediments from very shallow areas were collected when the

depth was more the sediment that came along with the clams in the clam sampler was collected for determining the nature of the

bottom. All the samples were analysed in the Mobile Laboratory.

A sampler designed by G. P. Kumaraswamy Achary was used for collecting samples of clams (Fig. 2, E). This is a hand-operated dredge having a rectangular iron frame 0.25 m

long. There are small spikes on both the longer rims of the dredge. A 75-cm nylon netting of 10 mm mesh is tied to the frame. The codend of the net is open, which can be closed by tying a thread. A nylon rope is attached to the dredge for dragging it on the bottom. One haul with the dredge covering

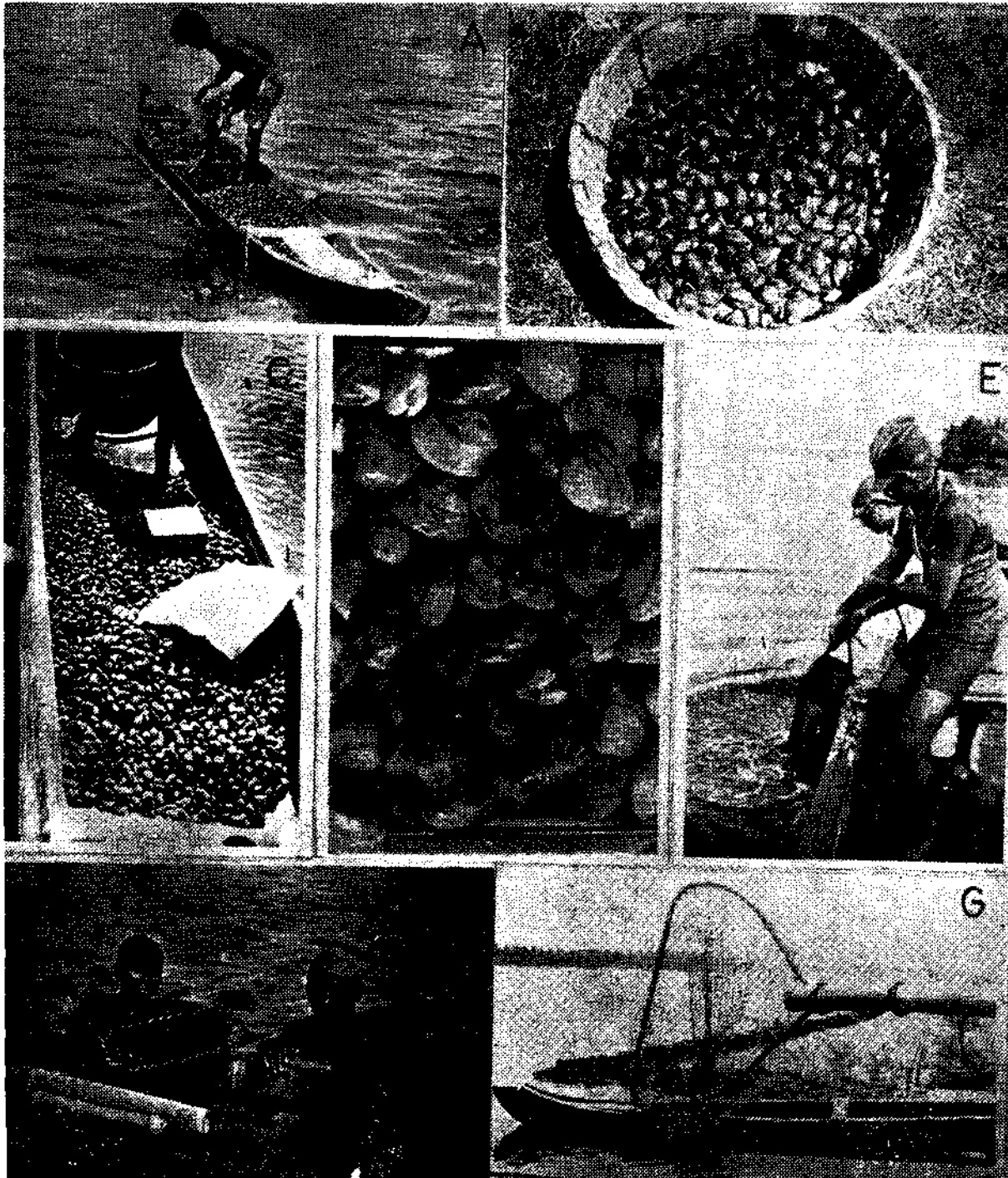


FIG. 2, A-G: A. A canoe full of black clam, *Villorita cyprinoides* from Kanjirakottu Kayal. B. Black clam, *Villorita cyprinoides*. C. Black clam for sale in the coastal villages around Ashtamudi. D. Baby clam, *Katelysia opima*. E. Clam sampler in operation. F. Divers unloading the black clam catch in to the canoe. G. Hand-dredge used for collecting baby clam.

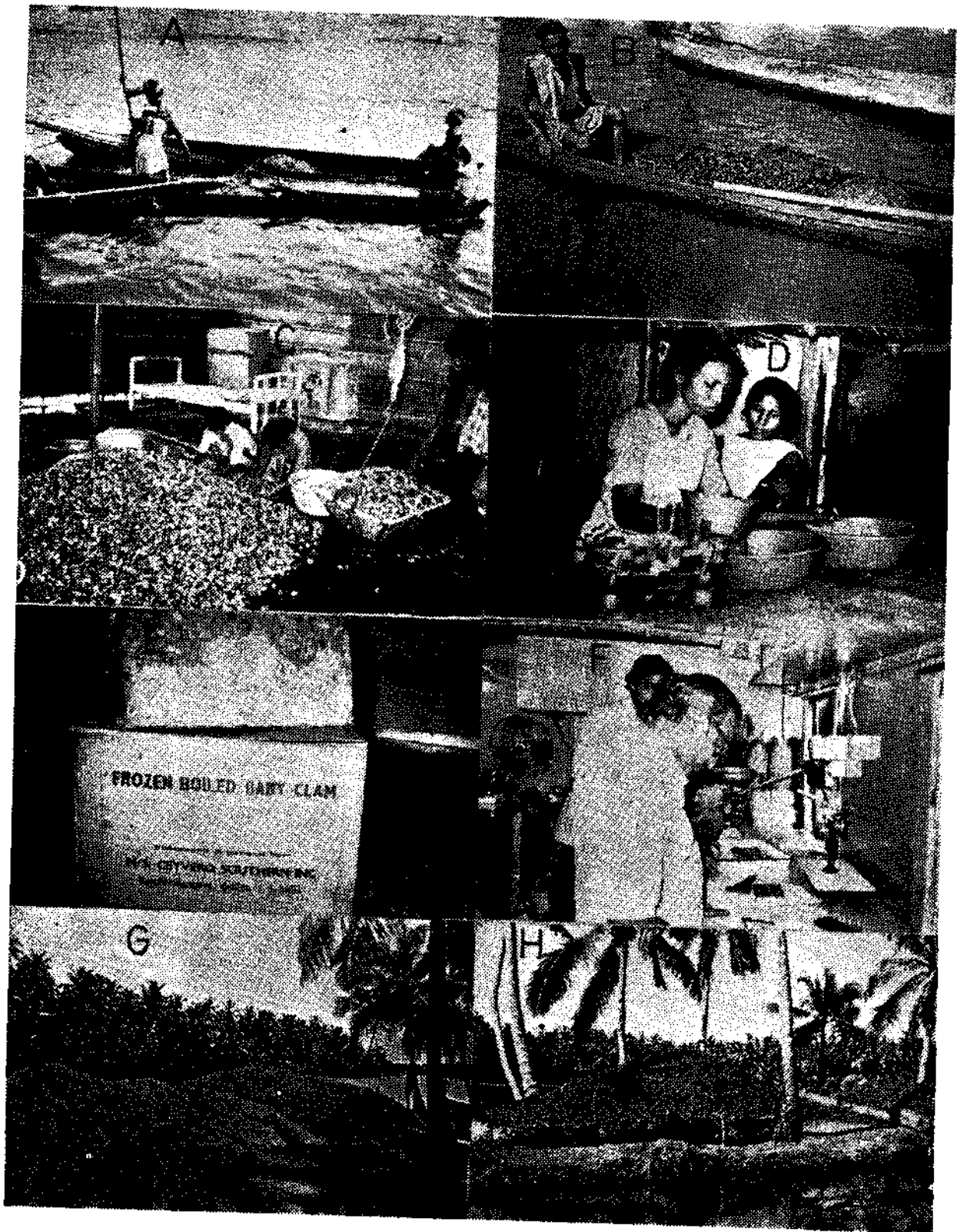


Fig. 3. A.—H. A. Hand drudge is being operated from the canoes for baby clam collection at Dalavapuram. B. Baby clam is being taken to the processing shed. C. Grading the clams before taking them to the purification tanks. D. Grading the boiled and shucked meat. E. 2-kg frozen slab of clam meat for export. F. Analysing clam samples inside the Mobile Laboratory during survey. G. Baby clam shells stocked for industrial use at Neendakara. H. Heaps of black clam shells at Munro Thuruthu.

one metre distance gives the clams available in 0.25 sq. m area.

Apart from collecting clams with the dredge, samples were taken from the regular fishery for qualitative studies and for comparing with the sampler collections.

## OBSERVATIONS AND RESULTS

A. Dalavapuram: Dalavapuram area (Fig 1 A) harbours a rich clam bed of about 15 ha which sustains regular fishery. The species of clams is [*Kate/ysia op/ma* (fig. 2, D)]; stray numbers of *Meretrix meretrix* and *Paphia* sp are also met with. Twelve stations were fixed in this area. The depth of these stations ranged from 0.5m to 3.5 m. The sediment was composed of coarse, medium and fine sand clay.

Water temperature varied from 29°C to 31.3°C at the surface and from 23.6°C to 31 °C at the bottom. Surface salinity range was 23-28.3700 and the bottom salinity 22-28700- Dissolved oxygen varied between 3.06 ml/l and 5.10 ml/l for surface waters and between 3.40 ml/l and 6.12ml/i for bottom waters. The phosphate values were 1.23-2.31 (ig/l for surface, 1.77-4.48 t\*g/l for bottom; nitrate: 23.65-30.65 ^wg/l and 23.65-35.32 ug/l; nitrate: 20.01-70 /\*g/l and 10-50.03 i^g/l ; pH: 7-8.5 for surface and 7.5-8.5 for bottom waters.

*Fishing methods and fishery:* Appukuttan et al (MS) have given the different methods employed in clam fishing which vary from the simple, traditional, hand-picking to scooping and dredging (fig. 2.) The fishing is generally done at low tides for 3-4 h and till the canoe is full with clams or the high tide begins. A canoe with 2 persons takes about 200-300 kg of clams per day. In the fishery for edible purpose, only the medium and large-sized clams are taken.

There is clam fishing throughout the year, with peak in February-March. During March-May 1982. there were 20 clam pickers and 40 canoes on an average per day. As the export demand for clam meat increased, the number of

persons as well as canoes also increased, and on a single day in February 1984 there were 160 canoes with 271 persons fishing for clams.

Appukuttan et al (MS) gave the catch of *Kate/ysia opima* from Ashtamudi take during March 1982 to February 1983 as 5^436.5 t. There has been good fishing in subsequent years and though the exact catch figures are not available, judging from the demand for clam meat in the export trade, the present level of production is estimated at 6,000 t to 6,500 t. Based on the present survey it is estimated that the existing stock of *Kate/ysia opima* in this area is around 10,000 t.

*Size range:* The size frequency of *Kateiysie op/ma* collected with the sampler from Dalavapuram clam bed during February 1984 is given Fig. 4A. The size ranged from 5 to 44 mm with a dominant mode at 17 mm; there were smaller modes at 26, 35 and 41 mm. Since spawning takes place during December-February (Appukuttan et ai MS), there is a dominance of smaller size groups up to 20 mm. In the fishery the maximum exploited size is 30-40 mm.

*Utilization:* About 5% of the total clam production is consumed locally and the rest is being exported as frozen 'baby clam' Fig. 3 C, D, E). The export of clam meat which began in 1981 has reached 608.6 t, worth Rs. 7.6 million in 1983. The major buyer of Indian 'baby clam' is Japan; other importing countries are the U. A. E., U. S. A. and the Federal Republic of Germany.

During 1982-83 the price paid to the clam-picker varied from 20 to 40 paise per kg of whole clam, and Rs 3.50 to 7.00 for the meat; during the 1984 survey it was Rs. 1.25 and Rs. 7.50-12.00 respectively.

The bulk of the shells is taken to Tamil Nadu for the calcium carbide industry, and a small portion is used locally for producing lime (Fig. 3, G).

*Meretrix meretrix*, locally called 'valla k^kka', occurs in very small numbers along with *Kate/ysia opima*, especially in the upper reaches of this clam bed of Thekkumbhagam. The size range of the clam taken in the sampler

In February 1984 was 10-51 mm (Fig. 4 B). The dominant mode was at 20 mm with two smaller modes at 29 and 44 mm. The entire catch is used for local consumption. It is gathered that there was illegal dredging of white clam shells till about 1982 in the northern part of the Ashtamudi at the entrance to Chavara canal.

**B. Ashtamudi Hudflat:** The Ashtamudi mudflat is on the eastern side of the Dalavapuram bed, about 10 km from the bar mouth (Fig 1B). It is a very shallow submerged mudflat, the maximum depth being about 1 m. The bottom sediment consists of coarse sand and mud. There was plenty of weeds on the bottom.

Only two stations were fixed in this zone, as there was no clam fishery. In both the stations the surface water temperature was 30°C, salinity 24-25‰ and dissolved oxygen 3.40-4.08 ml/l; phosphate gave a single value of 1.77 mg/l, and nitrite 30.65-32.99 µg/l. The pH of the water was 9.

The clam sampler was used at both the stations. There were a good number of *Modiolus* and dead shells of *Sanguinolaria*. A few seed clams (*Meretrix*) were hand-picked. However, adult clams were absent.

**C. Kandachira Kayal:** This zone is situated south of Dalavapuram zone and consists of many narrow creeks and inlets. Six stations were fixed during the survey. The depth of these stations was 1-2 m. The bottom sediments consisted of fine sand and mud. At some stations the sediments were black in colour, emitting strong smell of hydrogen sulphide because of extensive coconut retting.

The surface temperature ranged between 30.5°C and 31.4°C. salinity 22-24‰ dissolved oxygen 2.70-4.03 ml/l, Phosphate was estimated at 2.31 mg/l, nitrite 28.32 µg/l and pH 8.5-9.

In the clam sampler collection, no live clams were collected except for plenty of *Modiolus*: dead shells of *Villorita* and *Sanguinolaria* were hand-picked. It is learnt that previously there were live clams and small scale clam picking for domestic consumption.

Both white and black clams are brought in small canoes from Dalavapuram and Chavara areas and sold to coastal households. The price is about 25 paise for a measure by coconut shell which may contain 50-60 small and 20-25 large clams. Sometimes women bring fresh clam meat to the market and sell at the rate of 40-50 a rupee.

**D. Kanjirakottu Kayal:** This is a very extensive area forming the eastern segment of the Ashtamudi lake which branches off into 3 arms, Kumbaiathu Kayal, Kanjirakottu Kayal and Perumon Kayal with their many creeks (Fig. 1D). This is a very rich ground for the black clam *Villorita cyprinoides*, locally called 'Karim'.

Thirty-one stations were fixed in this zone and the depth of clam grounds was 1-3.5 m. The nature of bottom varied greatly from gravel to clay but mostly it was muddy with fine sand and clay.

Temperature ranged between 30°C and 32.8°C for surface waters and between 30.2°C and 31.5°C for bottom waters. Saline conditions prevailed even at the uppermost reaches of the lake. Surface salinity range was 10.75-25‰ and for bottom salinity 21-26‰. Dissolved oxygen ranged between 2.72 ml/l and 6.78 ml/l for surface waters and between 0.34 ml/l and 6.12 ml/l for bottom waters. Other parameters estimated are: phosphate 0.89-2.85 µg/l for both surface and bottom; nitrite 30.65-32.99 µg/l for surface and 28.32 µg/l for bottom; nitrite 20.01-30.02 µg/l for surface and 20.01-40 µg/l for bottom; pH 5-9 for Surface and 5-9 for bottom.

In the Manakkadavu area there is good *Villorita* fishery. During February-April which is the peak season, about 150 people do clam fishing here, and the fishing may continue up to June. Clams are collected either by hand-picking or with a rectangular or semicircular metal frame attached with a net-bag. The frame is dragged on the bottom, pushing the clam into the net. The catch is emptied into canoes or submerged baskets. The meat is sold to coastal households and also in the markets at Kundara, Kallada and nearby places. Women do clam-picking in very shallow waters. Many women who work in the nearby cashew factories go for

clam-picking when there is no work in the factory. There are about 100 such women who pick clams both for domestic consumption and for sale.

There is good demand for clam shell and 10 kg of shells fetch Rs. 1.25-1.50. Bigger canoes with 3-4 men are employed for collecting clams of all sizes. A heap of about 50 t of clam shells stocked for sale was observed in Munrothuruthu (fig 3 H).

The Kumbalathu Kayal of this zone is very rich in *Villorita* resource. Here also the peak fishing season is February-April, and from mid-June to October-November is the closed period. Over 150 people including 20-25 women go for clam fishing in good season. About 75-90 canoes are employed every day. Normally one person with a canoe takes about 100 kg of clams. People of all communities except Brahmins go for clam fishing and consume clam meat.

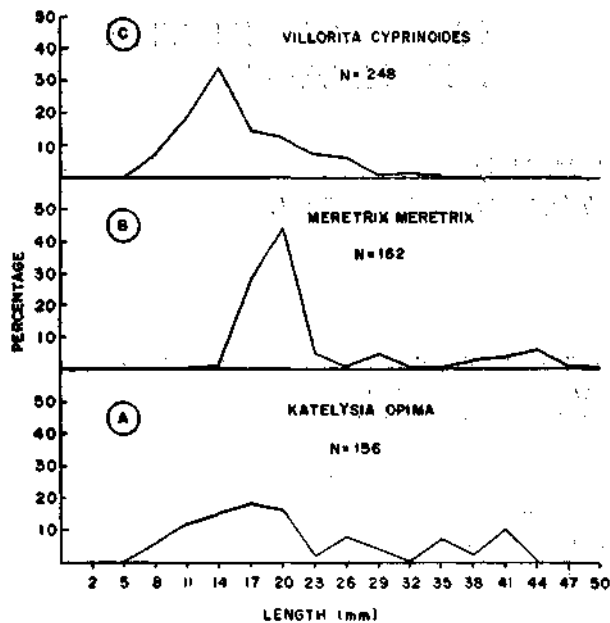


Fig 4. Length frequency distribution of clams\*.  
 A. *Katelaysia opima* B. *Meretrix mtrtrrix*  
 C. *Villorita cyprinoides*

Near Kumbalam on the southern bank of the Kumbalathu Kayal there is a lime kiln and a stocking place for shells. Recently collected clams are stocked under water in enclosures

for completely decaying the meat. These are mostly very small clams collected for the shell. Fishermen collect the shells in canoes and sell to merchants at the rate of Rs. 1.60 per basket of about 20 kg.

Based on a few day's observation during the survey, the annual production is estimated at 5,600 to 6,000 t. This clam bed is spread over about 50 ha though it is patchy at many places with very stray occurrence of clams. The estimate of the present stock of *Villorita cyprinoides* is approximately 12,000 t.

The clams ranged in length from 14 mm to 47 mm.

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Nair et al (1983) have studied in detail the physicochemical features of water and nutrients of sediment of this lake. According to them the heavy flow of fresh water from Kaliada river into this lake; minor times pollution by effluents from the Punalur Paper Mills,

With the beginning of export of clam meat in 1981 the production of *Katelaysia opima* has increased but in 1984-85 there was a lull in export demand and with this an indiscriminate fishing for small clams started for the shell for industrial purposes. This created an alarming situation but the export was resumed and the fishermen concentrated on 30-49-mm size clams suitable for export. Though the fishermen claim that there is a self-imposed restriction that under-sized clams should not be collected, such restrictions are not often observed. During January-March period seed clams and young ones are plenty, and to prevent their exploitation from Dalavapuram area regulation of the mesh size of the hand-dredge to 30 mm is recommended.

At present there is no licensing system for fishing in Ashtamudi lake. Such a system as followed in the Vembanad lake (Rasalam and Sebastian 1976) can be considered for adoption for this estuary also for preserving the valuable clam resources.

Though there is every possibility of increasing the production of black clam *Villorita cyprinoides* from the estimated 50-ha bed/ indiscriminate fishing of smaller sizes (<20 mm) was observed in certain areas. Such practice should be put to an end.

Vigorous quality control of the clam meat processed for export should be maintained. A consignment sent during September-October 1986 was rejected by Japan because of the presence of traces of kerosene.

To augment production, farming *Katylisia op/ma* by transplantation of seed clams to suitable areas in the estuary is suggested.

Another suggestion is that the meat of black clam can be canned or pickled, so that the consumer demand will increase.

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