CHAPTER 10

PRESENT STATUS OF THE HOLOTHURIAN FISHERY

The processing of beche-de-mer is an age old industry introduced by the Chinese in India. Hornell (1917) gave history and revival of the industry at that time. Later, Krishnamoorthi (1957), Chari (1964), James (1973, 1991a) studied the holothurian resources from India. Jacob (1973), Shenoy, (1977), Durairaj (1982) and Durairaj et al. (1984) reported about the processing of beche-de-mer. In olden times, beche-de-mer and pearls were sent in exchange for porcelain, silks and sweet meats. In olden days the divers collected the holothurians without the aid of masks or fins. In early sixties, masks were locally fabricated and used extensively to collect the material. This facilitated clear visibility under water. The divers still could not afford to use rubber flippers because of the prohibitive cost. In late seventies, ordinary aluminium plates were used as flippers to increase the efficiency and manurability under water. This naturally resulted in better catches. It can be seen from the above statements that the industry has undergone vast changes over the years.

10.1 Species contributing to the fishery

The commercially important holothurians occur in Palk Bay
and the Gulf of Mannar of the southeast coast of India, of which H. (H.) scabra is the most important species, H. spinifera occurs in lesser numbers while Bohadschia marmorata is available occasionally at Kilakarai centre in the Gulf of Mannar. Recently, James and Bahrudeen (1990) reported on the fishery of Actinopyga echinites from the Gulf of Mannar. Small quantities of H. atra are also collected for processing nowadays.

The species H. (H.) scabra called Vella attai in Tamil, grows to a length of 40 cm and the body wall is 1 cm in thickness. The H. spinifera is sold separately with good price in the international market. It is locally called Raja attai. B. marmorata is known as Nool attai, grows to 40 cm length. The A. echinites is the deep-water red fish grows to 26 cm and weighs upto 430 g. During the year 1990, 26.5 tonnes of A. echinites was collected for processing.

10.2 Fishing methods

Holothurians were caught by skin divers, tallu valai and bottom trawlers.

10.2.1 Skin diving

Holothurians were fished by skin divers during low tide in the intertidal region. Usually, the divers go for fishing by
0700 hours and come back between 1500 to 1700 hours, using a boat. Nearly, 8-14 fishermen go in a boat. The number of persons depend on the size of the boat. On board, the fishermen form into two groups, one group goes for fishing, till then the other group waits in the boat and vice versa. Fishing was done approximately for 3 to 4 hours at a depth of 4-20 m (Plate VI,1).

For fishing, skin divers used aluminium plate as improvised flippers, mask and nylon bag of 20 mm mesh size, to keep the fished holothurians. Most of the catches are made by skin diving (Plate VI, 2,3 & 4).

10.2.2 Trawl net

The trawl is a very effective gear for capturing benthic organisms. These are conical bags which narrow at the cod end attached to moving boats, and while moving, their mouths are kept open. The trawlers are operated for fishing prawns and fish while holothurians are caught as bycatch in bottom trawl nets.

10.2.3 Tallu valai

Till now no special net is devised for the capture of holothurians exclusively. The tallu valai units were operated at Tuticorin and Vedalai of the Gulf of Mannar, in the shallow waters of 3-6 m depth. The net used in these boats was
Plate VI  Fishing and processing of *Beche-de-mer*

1. Fishing of holothurians by skin divers using mask.
2. Skin divers using round aluminium flippers and nylon net at their hip to store the fished holothurians.
3. Transportation of holothurians from coast to sea shore.
4. A basket with holothurians
5. Heap of holothurians on the beach
6. Degutting of holothurians
called madi valai and was operated by three persons during March to September. The boat used for this was Tuticorin type boat Catamarans (James, 1967). The tallu valai units were used mainly for prawn fishing and holothurians were also caught accidentally.

The net called madi valai (bag net) consists of a bag like portion with side wings. The bag is about 9 m long and 1.8 m wide at the mouth. The cod end measured about 60 cm and had a mesh of 0.5 cm. The bag is preceded by the hemp wings which measure 46 m on either side and are in turn followed by the warps of the same length. At the junction of the hemp wing and the warp a single float is attached to the head rope and a sinker to the foot rope.

10.3 Fishing season and areas along southeast coast

10.3.1 Fishing season

The Northeast monsoon commences in October-November and lasts upto March-April. During this period, the sea is relatively calm and fishing is carried out chiefly in the Gulf of Mannar as during this time the Palk Bay becomes rough. The Southwest monsoon commences in March-April and lasts till October-November when the Gulf of Mannar becomes rough and all fishing operations have to be suspended. During this period
intense fishing was done on Palk Bay.

10.3.2 Fishing areas

Gulf of Mannar

At Tuticorin, the holothurian fishery was conducted round the year by skin divers and tallu valai. The divers collect the holothurians mainly from the islands, especially from the Kaswar theevu and Van theevu at 4–12 m depth which is nearly 5 km away from the shore. The tallu valai units were operated in shallow waters between March and September. The species H. (M.) scabra constituted the major catch and H. spinifera occurred very rarely.

At Kilakarai, fishing was done mainly by skin divers. The holothurians were fished mainly from Nalla Thanni theevu, Yana Par theevu, Pallyamunai theevu, Pursumpatty theevu, Edamurrai theevu, Theedal theevu, Kilinjan Par theevu, Appa theevu and Vala theevu, at 2–16 m depth, the theevu meaning Island. The distance from the coast to the fishing islands was approximately 20 km and the gap between the islands was nearly 1 to 2 km. The species landed at Kilakarai were H. (M.) scabra, H. spinifera, Bohadschia marmorata. Of these, H. (M.) scabra predominates in the commercial catch.

At Vedalai, the holothurian fishery depends on divers and tallu valai, and fishing was done mainly from Manali theevu and
Musal theevu which is nearly 5 km away from the coast. Though both *H. (M.) scabra* and *H. spinifera* were collected, *H. (M.) scabra* formed a major fishery.

**Palk Bay**

At Rameswaram, the holothurians were collected by skin divers and trawlers as bycatch. The divers fished the holothurians mainly from Dhanuskodi at a depth of 4-16 m, which was about 15-20 km away from the coast. At Rameswaram, *H. (M.) scabra* and *H. spinifera* were recorded. The trawlers were operated at 10-20 m and the important species fished by trawl nets were *H. (M.) scabra* and *H. spinifera* with a greater occurrence of *H. (M.) scabra*.

Tirupalakudi is one of the major centres on the Palk Bay side where fishery is going on for the last few decades. Fishery depends on the skin divers and the fishing activity was carried out from Panaikulam and Attankarai of the Palk Bay coast, which is nearly 20 km away from the coast. The important species available were *H. (M.) scabra* and *H. spinifera*.

Based on the above observations, it was found that in the Gulf of Mannar, the season for holothurian fishing was from October to March, with peak intensities in December and January,
whereas at Palk Bay, the season began from March and ended in October, with a peak in April and May. At some places, season may advance due to monsoon.

10.4 Particulars of catch

The details of holothurian landings and their species composition from the Gulf of Mannar and Palk Bay of southeast coast of India, during 1988-1990 are presented in Tables 18-21 and Figs 20-24.

10.4.1 Species composition

From table 18, it appears that at Tuticorin, 100% of holothurians caught were H. (M.) scabra during 1988-1990, with a total catch of 33.35 tonnes. At Kilakarai, the species were H. (M.) scabra, H. spinifera and B. marmorata which constituted 69.79%, 30.18% and 0.03% during 1988-1989, and 91.43%, 8.43% and 0.14% in 1989-1990 respectively. The total catch recorded from this centre was 31.15 tonnes. At Vedalai, the holothurians fished were H. (M.) scabra and H. spinifera having 98.92% and 1.08% in 1988-1989, 99.2% and 0.8% during 1989-1990 with a total production of 12.66 tonnes.

At Rameswaram, the annual percentage occurrence of H. (M.) scabra and H. spinifera constituted 52.08% and 47.92%
Table 18. Species wise catch composition of holothurian landings from different centres during 1988-1990.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H.sc</td>
<td>H.sp</td>
<td>B.m</td>
<td>H.sc</td>
<td>H.sp</td>
<td>B.m</td>
<td>H.sc</td>
<td>H.sp</td>
<td>B.m</td>
</tr>
<tr>
<td>Tuticorin</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>12.45</td>
<td>100.00</td>
<td>--</td>
<td>20.90</td>
<td>100.00</td>
<td>--</td>
</tr>
<tr>
<td>Kilakarai</td>
<td>69.79</td>
<td>30.18</td>
<td>0.03</td>
<td>27.40</td>
<td>91.43</td>
<td>8.43</td>
<td>0.14</td>
<td>3.75</td>
<td>72.40</td>
</tr>
<tr>
<td>Vedalai</td>
<td>98.92</td>
<td>1.08</td>
<td>--</td>
<td>2.93</td>
<td>99.20</td>
<td>0.00</td>
<td>--</td>
<td>9.73</td>
<td>99.13</td>
</tr>
<tr>
<td>Rameswaram</td>
<td>52.08</td>
<td>47.92</td>
<td>--</td>
<td>10.00</td>
<td>97.79</td>
<td>2.21</td>
<td>--</td>
<td>5.26</td>
<td>67.84</td>
</tr>
<tr>
<td>Tirupalakudi</td>
<td>87.11</td>
<td>12.89</td>
<td>--</td>
<td>93.66</td>
<td>93.41</td>
<td>6.59</td>
<td>--</td>
<td>40.44</td>
<td>89.01</td>
</tr>
</tbody>
</table>

H.sc = H. (H.) scabra; H.sp = H. spinifera; B.m = B. maromata
### Table 19. Gear wise catch composition of holothurian landings from different centres during 1988-1990.

<table>
<thead>
<tr>
<th>Centre</th>
<th>1988-89 Diving</th>
<th>Talluvalai</th>
<th>Trawl</th>
<th>1989-90 Diving</th>
<th>Talluvalai</th>
<th>Trawl</th>
<th>Average (1988-90) Diving</th>
<th>Talluvalai</th>
<th>Trawl</th>
<th>Overall total (in kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuticorin</td>
<td>94.17</td>
<td>5.83</td>
<td>--</td>
<td>98.51</td>
<td>1.49</td>
<td>--</td>
<td>96.89</td>
<td>3.11</td>
<td>--</td>
<td>33328.68</td>
</tr>
<tr>
<td>Kilakarai</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>31719.54</td>
</tr>
<tr>
<td>Vedalai</td>
<td>21.31</td>
<td>78.69</td>
<td>--</td>
<td>64.71</td>
<td>35.29</td>
<td>--</td>
<td>54.66</td>
<td>45.34</td>
<td>--</td>
<td>12652.17</td>
</tr>
<tr>
<td>Rameswaram</td>
<td>74.21</td>
<td>--</td>
<td>25.79</td>
<td>--</td>
<td>100.00</td>
<td>48.63</td>
<td>--</td>
<td>51.37</td>
<td>--</td>
<td>15262.75</td>
</tr>
<tr>
<td>Tirupalakudi</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>100.00</td>
<td>--</td>
<td>--</td>
<td>134223.65</td>
</tr>
</tbody>
</table>
### Table 20. Total landings (in tonnes) of holothurians in Gulf of Mannar and the Palk Bay coast.

<table>
<thead>
<tr>
<th>Centre</th>
<th>1988-89</th>
<th>1989-90</th>
<th>1990-90</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gulf of Mannar</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuticorin</td>
<td>12.45</td>
<td>20.90</td>
<td>33.35</td>
</tr>
<tr>
<td>Kilakarai</td>
<td>27.40</td>
<td>3.75</td>
<td>31.15</td>
</tr>
<tr>
<td>Vedalai</td>
<td>2.93</td>
<td>9.73</td>
<td>12.66</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>42.78</td>
<td>34.38</td>
<td>77.16</td>
</tr>
<tr>
<td><strong>Palk Bay</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rameswaram</td>
<td>10.00</td>
<td>5.26</td>
<td>15.26</td>
</tr>
<tr>
<td>Tirupalakudi</td>
<td>93.80</td>
<td>40.44</td>
<td>134.24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>103.80</td>
<td>45.70</td>
<td>149.50</td>
</tr>
</tbody>
</table>

**Total % of catch in 1988-90** 74.40%
respectively in 1988-1989, 97.79% and 2.21% in 1989-1990 having a total catch of 15.26 tonnes. At Tirupalakudi, the main species were *H. (M.) scabra* and *H. spinifera*. Of these, *H. (M.) scabra* was dominant. The percentage occurrence of the two species was 87.11% and 12.89% during 1988-1989, 93.41% and 6.59% in 1989-1990. The total catch recorded in this centre was 134.24 tonnes.

Figure 20 depicts the monthly catches of holothurians landed at Tuticorin. In March 1989, 11.0 tonnes of *H. (M.) scabra* were caught. The gear wise percentage occurrence of holothurians indicated that diving was done from March 1988 to May 1988, September 1988 to May 1989 and October 1989 to February 1990. The tallu valai was operated during March 1988 to August 1988 and June 1989 to September 1989. It was found that 100% catches were recorded by diving in the month of September 1988, November 1988 to May 1989, October 1989 to February 1990. 100% catch was recorded by tallu valai which is similar to the results obtained by skin diving during the month of June to August 1988 and June to September 1989.

Figure 21 indicates that in Kilakarai, the fishing of holothurians was seasonal from March to October during the years of study. The maximum catch (13.6 tonnes) of *H. (M.) scabra* was recorded in December 1989 and 5.0 tonnes of *H. spinifera* was
Fig. 20. Monthly landing of holothurians and their percentage occurrence, using skin diving and tallu valai from Tuticorin (March 1988-February 1990).

Fig. 21. Monthly landing of different species of holothurians by skin diving and their percentage occurrence from Kilakarai (March 1988-February 1990).
landed in November 1988. The species *Bohadschia marmorata* was landed rarely with 7.8 kg and 5.0 kg during the month of February 1989 and 1990.

At Vedalai, gear wise catch was recorded. In tallu valai, *H. (M.) scabra* was fished in all the months during 1988-1990, with a maximum catch of 1.6 tonnes in November 1989. *H. spinifera* was recorded in August and October 1988, January and December 1989 and January 1990, with a dominant catch of 20 kg in January 1990. Diving was performed in the month of October in both the years. Maximum catches of *H. (M.) scabra* and *H. spinifera* recorded in October 1989 were 6.0 tonnes and 50 kg respectively (Fig. 22).

At Rameswaram (Fig. 23) the catches recorded by skin diving were maximum in July 1988 (13 tonnes) and in March 1988 (4 tonnes). In trawlers, *H. (M.) scabra* was collected more during March 1989 (1.4 tonnes) and *H. spinifera* was fished more in September 1988 (46 kg). The total catch of holothurians landed at this centre was 4.75 tonnes during March 1988.

At Tirupalakudi (Fig. 24) the holothurians were caught from July 1988 to October 1989 except in the months of November and December 1988. The peak landings of the holothurian *H. (M.) scabra* were found in February 1989 (39.5 tonnes) while those of
Fig. 22. Total catches of holothurians using skin diving and tallu valai from Vedalai (March 1988-February 1990).
Fig. 23. Total catches of holothurians by trawlers and skin diving from Rameswaram (March 1988- February 1990).

Fig. 24. Total landings (in tonnes) of holothurians by skin diving and their percentage occurrence from Tirupalakudi (March 1988- February 1990).
H. spinifera in August 1988 (6.0 tonnes) respectively. The percentage composition of different species of holothurians showed that H. (H.) scabra recorded was 100% in October 1988, March and June 1989.

It is clear from the above that H. (H.) scabra recorded maximum catch in all the fishing centres on the Gulf of Mannar and Palk Bay which constituted 90.51% and 78.43% respectively, during 1988-1990. This indicated that H. (H.) scabra was exploited maximum along the southeast coast, whereas H. spinifera and B. marmorata together constituted 9.49% in the Gulf of Mannar and 14.38% in Palk Bay. There was a vast resource of other holothurians along the southeast coast. At some places notably Tirupalakudi, H. (H.) scabra was exploited heavily (89%). To diversify the fishing intensity of the above species and to develop the beche-de-mer industry, other commercially important species of holothurians should be exploited. Thereby the resources of H. (H.) scabra can be conserved and managed in a better way, and ecological balance can also be maintained.

10.4.2 Gearwise catch composition

The catch composition of holothurians using different gears such as skin diving, tallu valai and trawls, collected from different centres of the southeast coast of India are presented
in Table 19 and Figs. 20-24.

Table 19 shows that at Tuticorin, diving and tallu valai were used having a percentage of 96.89 and 3.11% respectively, with a total catch of 33328.68 kg during 1988-1990. At Kilakarai, 100% of the holothurians were caught by skin diving and recorded a total landing of 31179.34 kg in 1988-1990. At Vedalai, the main catch was by skin diving and tallu valai, the percentages of catch estimated being 54.66% and 45.34% respectively, with a net production of 12652.17 kg in 1988-1990.

At Rameswaram, holothurians are fished by diving (48.63%) and trawlers (51.37%), the total catch estimated being 15262.75 kg during 1988-1990. At Tirupalakudi, the holothurians were collected mainly by divers (100%) with a total landing of 134223.05 kg during the year 1988-1990.

It is evident that fishing of holothurians by skin divers was common at all the centres. Tallu valai was operated at Tuticorin and Vedalai on the Gulf of Mannar and trawl was used at Rameswaram. In this context, it is important to mention that the percentage occurrence of holothurians caught by skin divers was 83.85% in Gulf of Mannar and 74.32% in Palk Bay and by tallu valai 16.15% in the Gulf of Mannar and by trawl 25.69% in Palk Bay.
An overall view shows that the percentage of holothurians caught by skin divers, tallu valai and trawlers were 80.05%, 9.69% and 10.27% respectively. This confirms the view that holothurian resources are exploited more by skin divers.

Table 20 shows that the holothurians landed from the Gulf of Mannar were 25.72 tonnes and from Palk Bay 74.75 tonnes, during 1988-1990, which constituted 25.6% and 74.4% respectively. In this context, it is important to state that the Palk Bay coast is productive and the resources are heavily exploited.

The estimated total landings for the Gulf of Mannar were 154.32 tonnes and for Palk Bay coast they were 897.00 tonnes during 1988-1990. Thus, the estimated total catch of holothurians along the southeast coast was 1051.32 tonnes in 1988-1990, and on conversion to, beche-de-mer (dried product), it was roughly estimated at 88.10 tonnes, based on the report made by Basker and James (1989) (Table 21).

10.5 Catch per Unit Effort (CPUE)

The Catch Per Unit Effort (CPUE) was estimated from five different centres during March 1988 to February 1989 and March 1989 to February 1990 and are given in Fig. 25.

At Tuticorin, the fishing effort was recorded maximum by
Table 21. Estimated total landings of holothurians and production of beche-de-mer along southeast coast (1988-90)

<table>
<thead>
<tr>
<th>Coast</th>
<th>Average catch per centre (in tonnes)</th>
<th>No. of centre</th>
<th>Total catch in the coast (in tonnes)</th>
<th>Beche-de-mer production (in tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf of Mannar</td>
<td>25.72</td>
<td>6</td>
<td>154.32</td>
<td>12.93</td>
</tr>
<tr>
<td>Falk Bay</td>
<td>74.75</td>
<td>12</td>
<td>897.00</td>
<td>75.17</td>
</tr>
<tr>
<td>Net total production</td>
<td></td>
<td></td>
<td>1051.32</td>
<td>88.10</td>
</tr>
</tbody>
</table>
Table 22. Export figures of *beche-de-mer* from India during 1978-1989.

<table>
<thead>
<tr>
<th>Year</th>
<th>Weight of <em>beche-de-mer</em> (in Kg)</th>
<th>Value of <em>beche-de-mer</em> (in Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>24537</td>
<td>1076560</td>
</tr>
<tr>
<td>1979</td>
<td>31231</td>
<td>1522941</td>
</tr>
<tr>
<td>1980</td>
<td>34013</td>
<td>1872314</td>
</tr>
<tr>
<td>1981</td>
<td>47841</td>
<td>2628757</td>
</tr>
<tr>
<td>1982</td>
<td>37143</td>
<td>1723558</td>
</tr>
<tr>
<td>1983</td>
<td>71853</td>
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<td>1984</td>
<td>20715</td>
<td>1797948</td>
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<tr>
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<td>1168213</td>
</tr>
<tr>
<td>1986</td>
<td>32864</td>
<td>3803858</td>
</tr>
<tr>
<td>1987</td>
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<td>7937977</td>
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<tr>
<td>1988</td>
<td>22682</td>
<td>4994371</td>
</tr>
<tr>
<td>1989</td>
<td>51572</td>
<td>12302933</td>
</tr>
</tbody>
</table>

Source: James (1989).
Fig. 25. The Catch Per Unit Effort of holothurian landings using skin diving, trawlers and tallu valai (March 1988-February 1990).
skin divers during February 1989 (30.08 kg) and March 1989 (24.51 kg) and at Kilakarai, December 1988 and December 1989, the intensity of fishing was dominant with 62.74 kg and 19.43 kg respectively. At Vedalai in the Gulf of Mannar coast, the fishing effort was found more in October 1989 (20.17 kg). While in the Palk Bay coast, particularly at Tirupalakudi the intensity was recorded in February 1989 (54.6 kg) and March 1989 (18.00 kg) and at Rameswaram, 12.44 kg was found during March 1988.

In tallu valai, fishing effort was more in October 1988 (0.27 kg) September 1989 (0.20 kg) at Tuticorin, while at Vedalai, it was 1.45 kg during December 1988 and 2.03 kg during November 1989. In trawls the fishing effort was more during October 1988 (0.43 kg) and March 1989 (0.70 kg) at Rameshwaram.

10.6 Export

During the year 1981, 48 tonnes of beche-de-mer worth Rs. 26.69 lakh, while in 1983, 71.85 tonnes of beche-de-mer worth Rs. 36.97 lakhs was exported. Due to the ban imposed in 1982 on the export of beche-de-mer below 3 inches size (75 mm), the trade dwindled to a certain extent, and value fluctuated to 17.98 and 11.68 lakhs during 1984 & 1985 respectively. Whereas again in 1987 and 1989, 82.34 and 123.03 lakhs worth of beche-de-mer was exported from India. (Table 22). Beche-de-mer (Plate VII, e & f)
is mainly exported to Singapore, Hongkong and other Southeast Asian countries.

10.7 Beche-de-mer processing

Degutting: The sea cucumbers were brought to the shore and were heaped. A slit of 20-30 mm was made at the posterior end of each animal with a sharp knife. The intestine, respiratory tree and the gonads were removed by bending the individual after which it was cleaned in sea water (Plate VI, 5 & 6).

Boiling: Boiling is an important step in processing the holothurians and the quality depends on the shape of the vessel used and the stirring done (Plate VII, b). The fishermen used oil drums (Tin) of 200 litre capacity and aluminium vessels for boiling. The usage depends on the availability of the material on hand. Initially, sea water was boiled then the degutted sea cucumbers were put slowly. Boiling was done roughly for 30-45 minutes the exact boiling time depending upon animal size. Beche-de-mer shrinks slightly and gradually become hard. Hardness is the best way to judge the quality. Constant stirring of holothurians using a wooden
spatula improves the rolling of beche-de-mer. The entire sample is then buried in a pit near the beach for 12 hours, after which the lot is taken out. The chalky white patches deposited on the ventral side are cleaned, washed and boiled in sea water once again for 30 minutes with constant stirring. While boiling, it is important to see that the boiling pan should get constant heat on all the sides as this ensures good quality of the product. Coconut husks, coconut shells, mangrove wood and some other hard woods were being used as fire material.

**Drying:** The boiled specimens were spread on the palmrah mat or coirmat and dried in sunlight for 3-4 days (Plate VII, c).

**Smoking:** During rainy season, the boiled specimens were smoked by placing them on top of the iron wire mesh placed on top of fire source. The heat on the iron net absorbs the moisture content of the specimens. While smoking, the specimens were turned up and down uniformly.
Odour: The product should be free from bad odour. When it comes in contact with water it has an offensive odour.

Colour: Dark colour is generally preferred. The chalky white ventral surface of sandfish *H. (M.) scabra* should be avoided (Plate VII, d).

Moisture content: *Beche-de-mer* stored in a humid atmosphere tends to absorb moisture and becomes soft. 20 to 30 percent moisture content by weight may be allowed. A hard dry product is preferred to a soft, moisture laden one.

Spoilage: Products should be free from bacterial and chemical spoilage.

Packing and storing: The graded product is packed in polythene bags arranged and kept on a palm-leaf woven basket and stitched with gunny bags before shipment. The packed product awaiting shipment should be stored in a dry place. When the product is to be stored for a long time in humid conditions, re-drying is generally necessary.
Plate VII  Processing of Beche-de-mer

a. Involvement of women in degutting of holothurians
b. Boiling of the degutted holothurians
c. Beche-de-mer dried on Palmarh
d. Uncleaned beche-de-mer
e. Different sizes of beche-de-mer
   (a) 1.5 inch
   (b) 2.5 inch
   (c) 3 inch
   (d) above 3 inch
f. Export size of beche-de-mer (3 inch)
PLATE VII

a

b

c

d

e