

RESULTS OF EXPLORATORY TRAWL FISHING ON THE CONTINENTAL SLOPE OF THE SOUTH WEST COAST OF INDIA BY

M.F.V. 'KALAVA'

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INTRODUCTION

So far, extensive deep sea trawling, in waters beyond 100 fathom depths, has not been attempted in Indian waters except for occasional hauls taken by the INVESTIGATOR (Alcock, 1891-1900) and other Expedition vessels (Gunther, 1887, Max Weber, 1913, Norman, 1939). During March-May 1963 M.F.V. 'Kalava' of the Indo-Norwegian Project, carried out 9 exploratory cruises off Alleppey and Ponnani on the South West Coast of India at depths ranging between 150 to 205 fathoms (274-374 m.). Large quantities of bathypelagic fish were taken during these cruises, in areas on the continental slope (Fig. 1). 24 species belonging to 23 genera and 19 families have already been described by Tholasilingam *et al.* (1964). Nearly 82% of the catch was represented by about 11 bathypelagic species taken at the rate of up to 496 kg. per hour of trawl, in the richest grounds. Since such occurrence has not been recorded so far, a quantitative assessment of these bathypelagic fishes along with deep sea prawns, lobsters and squids, has been given in the following paper.

For studying species composition samples of unsorted catch weighing 2 to 5 kg. were collected either on board the vessel or after the vessel had reached the shore. As haul-to-haul analysis did not show any significant variation, the samples from different hauls were pooled together for species analysis. The individual weights of fish and also of prawns, lobsters and other animals were noted. These were weighted against the total catch so as to arrive at the total quantity of the different species of fish and other forms caught in each cruise. Particulars regarding the place from where the catch was taken, the depth at which the net was operated, the duration of each haul, the total catch obtained etc. were taken from the log sheets. The catch per hour of trawling was calculated in order to study the relative abundance of different species of fish, prawns and other animals in the trawling grounds.

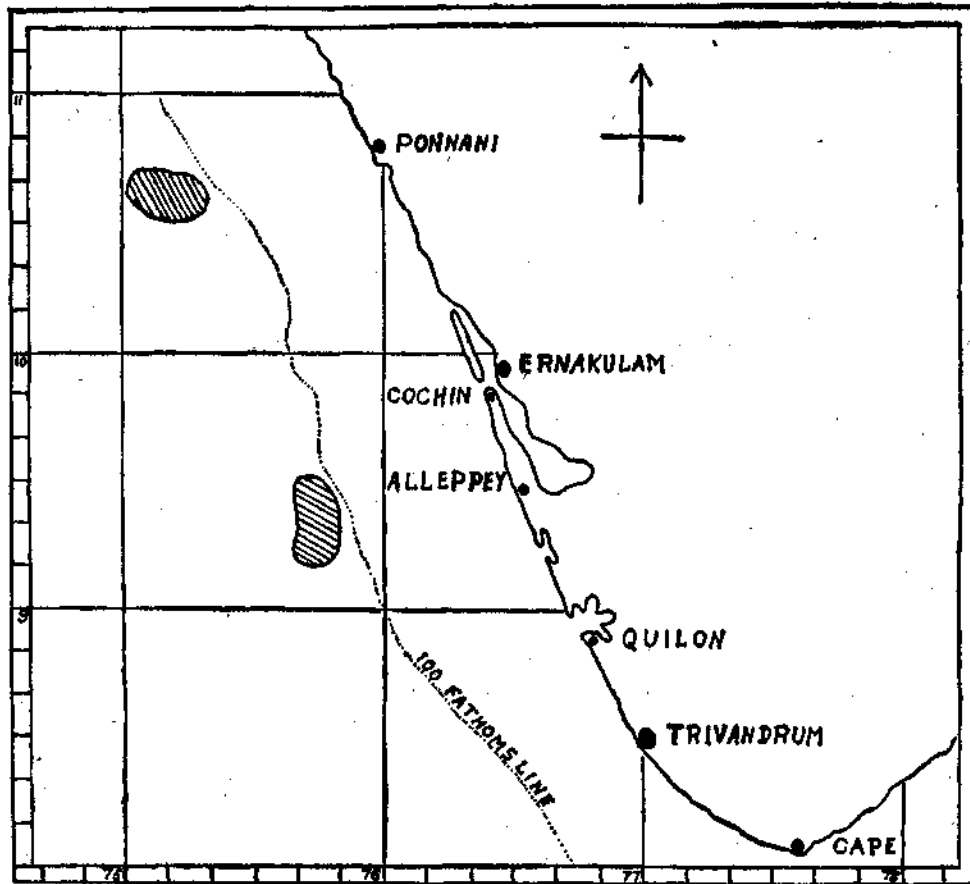


FIG. 1 Map showing the areas trawled by M.F.V. 'Kalava' during March—May 1963.

CATCH DETAILS

Altogether 'Kalava' made nine cruises exploring deeper waters of which eight were to areas 9.75:2 E, 3 E & 3 F off Alleppey (Cruises I, II & IV to IX) and one to areas 10.75:4 A & 4 B off Ponnani (Cruise III). Fig. 2 shows the total catch and catch per trawling hour obtained by 'Kalava' in each cruise. In the first five cruises to Alleppey region (I, II, IV, V & VI), an average yield of 1.32 tonnes was realised for each cruise with a return of 220.21 kg. per trawling hour. In the subsequent three cruises (VII, VIII & IX) a significant rise in the total catch and the catch per hour of trawling was noticed, the average yield per cruise being 2.87 tonnes at a catch rate of 388.90 kg. per trawling hour. The catch realised off Ponnani was poor (0.46 m.t.) at 71.39 kg. per trawling hour.

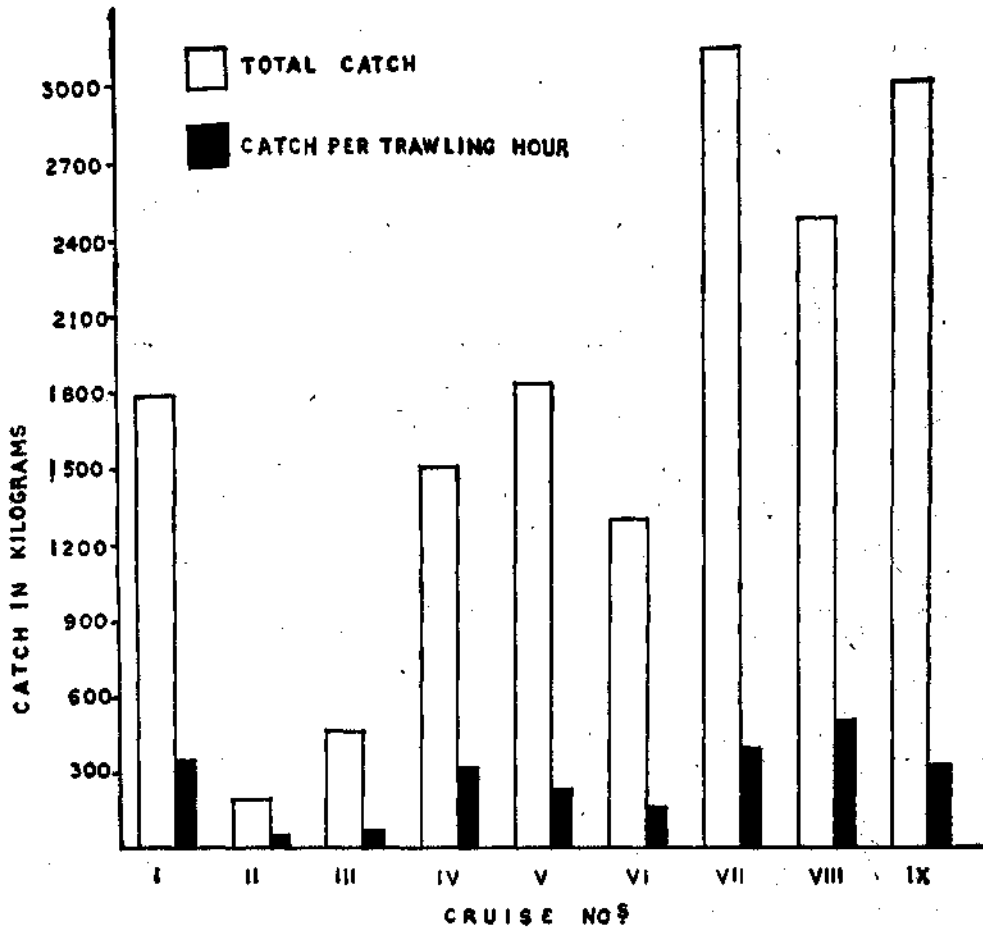


FIG. 2 Total catch and catch per trawling hour in kg obtained by KALAVA in cruises I-IX in March-May 1963.

DETAILS OF CATCH COMPOSITION

*An analysis of the species composition of the catch obtained in these cruises showed that most of them were deep sea fishes seldom seen in regions nearer to the shore. Of the 24 species obtained in these collections, 14 had already been reported as new records for the Arabian sea in an earlier communication (Tholasilingam *et. al.* loc. cit.). The details of the catch of 11 species of deep sea fish which were more abundantly caught (the rest being included under 'Other fishes') and also of prawns, lobsters and squids are shown in Table I. Their total catch and catch per hour of trawling have been graphically represented in Figs. 3 & 4.

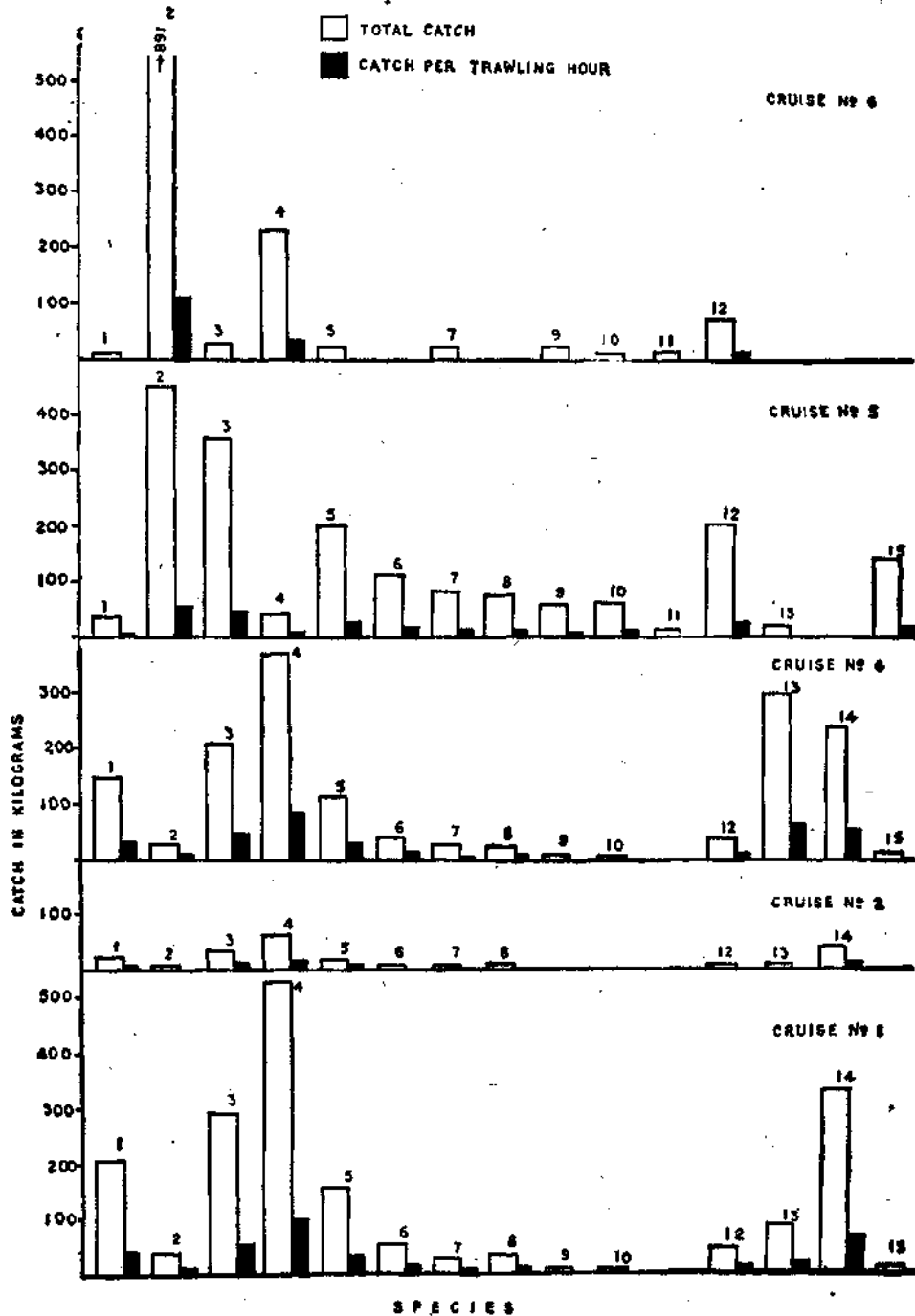


FIG. 3 Total catch and catch per trawling hour in kg. of fish prawns, lobsters, and squids obtained by KALAVA in March—May 1963. Cruises Nos. I, II and IV to IX were to areas off Alleppey and cruise No. III to areas off Ponnani. 1. *Chlorophthalmus agassizi*. 2. *Cubiceps natalensis* 3. *Neoscopelus macrolepidotus* 4. *Neobythites steaticus* 5. *Eptnula orientalis*. 6. *Hypopleuron caninum*. 7. *Synagrops japonicus* 8. *Polymixia nobilis*. 9. *Physiculus argyropastus*. 10. *Malacocephalus laevis*. 11. *Bembrops caudimacula* 12. Other fishes. 13. Prawns. 14. Lobsters. 15. Squids (Total catch and catch per hour of trawling amounting to less than 3 kg have been omitted from Figs. 3 and 4)

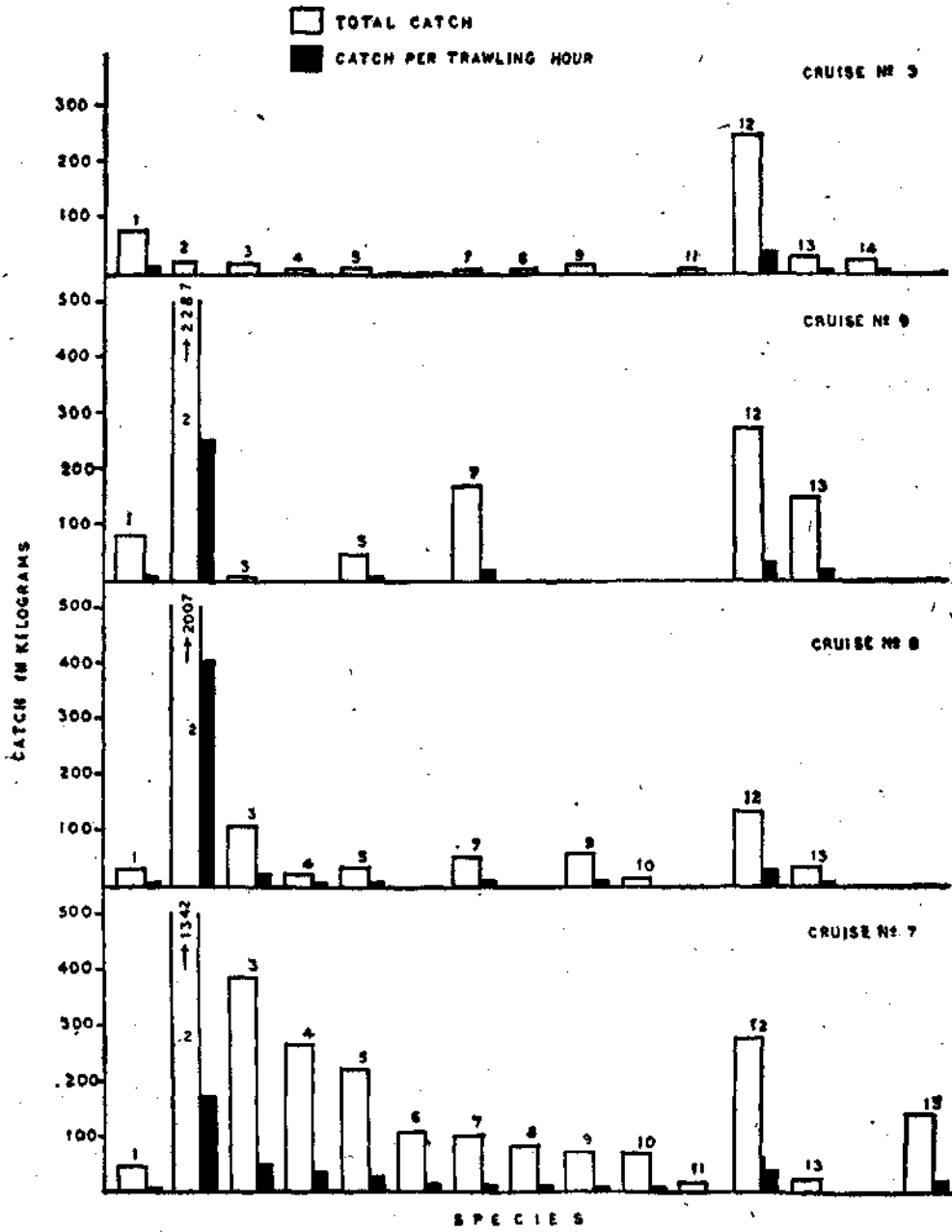


FIG. 4. Total catch and catch per trawling hour in kg of fish, prawns, lobsters and squids obtained by KALAVA in March—May 1963. Species 1 to 15 same as given in Fig. 3.

TABLE I

Details of catch obtained by 'Kalava' from deep sea off Alleppey and Ponnani—March-May '63

Cruise Date	Area	Depth range (in metres)	Effort		Species <i>Chlorophthalmus agassizi</i>	<i>Cubiceps natalensis</i>	<i>Neosopelus macrolepidotus</i>	<i>Neobythites steaticus</i>	<i>Epinnula orientalis</i>	<i>Hypopleuron caninum</i>	<i>Synagrops japonicus</i>
			H	M							
Cruise No. 1 13/14-3-63	Alleppey 9.75 2E.	274-329	5	20	205	36	286	526	152	50	25
Cruise No. 2 18/19-3-63	Alleppey 9.75 3E.	329-331	4	00	23	4	32	58	17	5	2
Cruise No. 3 21/22-3-63	Ponnani 10.75 4A4B.	293-329	6	30	79	19	14	7	10	..	6
Cruise No. 4 27/28-3-63	Alleppey 9.75 3F.	329-340	4	45	146	26	203	374	108	35	18
Cruise No. 5 2/3-4-63	Alleppey 9.75 3F.	329-374	8	00	35	447	358	39	198	107	79
Cruise No. 6 16/17-4-63	Alleppey 9.75 3F.	320-365	8	00	11	891	24	228	21	..	21
Cruise No. 7 23/24-4-63	Alleppey 9.75 3F.	315-338	8	00	46	1342	384	267	220	108	101
Cruise No. 8 2/3-5-63	Alleppey 9.75 3F.	326-338	5	00	27	2007	104	17	28	..	51
Cruise No. 9 7/8-5-63	Alleppey 9.75 3F.	311-329	9	10	80	2287	5	..	44	..	167

TABLE I—(Contd.)

Details of catch obtained by 'Kalava' from deep sea off Alleppey and Ponnani—March-May 1963.

Cruise Date	Area	Species	<i>Polymixia nobilis</i>	<i>Physiculus argyropastus</i>	<i>Malacocephalus laevis</i>	<i>Bembrops caudimaculata</i>	Other fish	Prawns	Lobsters	Squids	Total Catch	Catch per hour
Cruise No. 1 13/14-3-63	Alleppey 9.75 2E.	.	30	8	4	..	46	85	329	10	1792	336.22
Cruise No. 2 18/19-3-63	Alleppey 9.75 3E.	.	3	1	1	..	5	4	36	1	192	48.00
Cruise No. 3 21/22-3-63	Ponnani 10.75 4A4B	.	7	12	..	6	248	31	25	..	464	71.39
Cruise No. 4 27/28-3-63	Alleppey 9.75 3F.	.	22	6	3	..	32	296	234	7	1510	317.90
Cruise No. 5 2/3-4-63	Alleppey 9.75 3F.	.	79	52	59	10	203	22	..	142	1830	228.75
Cruise No. 6 16/17-4-63	Alleppey 9.75 3F.	.	..	17	8	6	73	..	..	..	1300	162.50
Cruise No. 7 23/24-4-63	Alleppey 9.75 3F.	.	79	69	67	16	277	22	..	142	3140	392.50
Cruise No. 8 2/3-5-63	Alleppey 9.75 3F.	.	..	59	15	..	136	35	..	..	2479	495.80
Cruise No. 9 7/8-5-63	Alleppey 9.75 3F.	.	..	..	..	..	273	147	..	..	3003	327.48

1. *Cubiceps natalensis*.—This deep sea fish was caught abundantly from the fifth cruise onwards since when it was the most dominant catch. In the last three cruises the average yield was 1.88 tonnes with a return of 254.22 kg. per trawling hour. The size range in the collections was 11 to 19 cm.

2. *Chlorophthalmus agassizi*.—This was one of common deep sea fishes and was obtained in all the cruises though in moderate quantities. The maximum catch of this fish was obtained in the first and fourth cruise with an average yield of 0.18 tonnes at a catch rate of 34.82 kg. per trawling hour. The range in size was 8-23 cm.

3. *Neoscopelus macrolepidotus*.—Of a large number of myctophids obtained in the collections, this was the most abundant and on many occasions made a significant contribution to the catch. The maximum collections were in cruises 1, 4, 5, and 7 with an average figure of 0.31 tonnes realising an yield of 47.20 kg. per trawling hour. The length range was 7-21 cm.

4. *Neobythites steaticus*.—Of the two brotulids that occurred in the catches, this was more abundant and was found in almost all the collections. The maximum catch was observed in the first cruise and in some subsequent cruises also (cruises 4, 6 and 7) good catches of this fish were realised, with an average of 0.29 tonnes at the rate of 41.88 kg. per trawling hour. Their size range was 12-25 cm.

5. *Epinnula orientalis*.—Though this fish was caught in all the cruises, this was more abundant in cruises 1, 4, 5 and 7 when the average catch realised was 0.17 tonnes at the rate of 26 kg. per trawling hour. They measured 15-25 cm.

6. *Hypopleuron caninum*.—The contribution of this fish to the total catch was much less than the other brotulid, *Neobythites steaticus*. The maximum catch of this fish was taken in cruises 5 and 7 with an average of 0.11 m.t. the catch per hour of trawling being 13.44 kg. Their length was 28-46 cm.

7. *Synagrops japonicus*.—This fish belonging to an Indo-Pacific deep water genus, was caught in all the cruises, though in small quantities. Only in cruises 7 and 9 more than 100 kg. of this fish was obtained, resulting in an yield of 15.61 kg. per trawling hour.

8. *Polymixia nobilis*.—This fish was recorded in six out of the nine cruises, the best catches being in the fifth and seventh cruises with an average figure of 0.79 tonnes and a return of 9.8 kg. per trawling hour. The length ranged from 12 to 17 cm.

9. *Physiculus argyropastus*.—This is the only fish belonging to the family Gadidae that was recorded in the collections. The catch in general was poor, the maximum return being 11.77 kg. per trawling hour. The size ranged from 8 to 25 cm.

10. *Malacocephalus laevis*.—The landings of this fish was very poor, except in cruises 5 and 7 when comparatively better catches (over 50 kg.) were realised at the rate of 7.88 kg. per trawling hour. The size range was 19-31 cm.

11. *Bembrops caudimacula*.—The quantity of this fish caught was quite insignificant, the maximum catch amounting to only 16 kg. The range in size was 19-21 cm.

12. "Other fish".—The proportion of 'Other fish' in the catches was greater in cruises 3, 5, 7 and 9 and on many occasions Myctophids were the most dominant group. Some of the other fishes that comprised this category were flat fish eels, uranoscopids etc.

13. *Prawns*.—Among the deep sea prawns obtained in these collections *Penaeopsis rectacutus* and *Aristaeus semidentatus* formed the bulk of the catch. Though they were not caught in abundant quantities in most of the cruises, yet in some their catch was significant. The maximum (296 kg.) was obtained in the fourth cruise, yielding a return of 62.32 kg. per hour of trawling.

14. *Lobsters*.—In the first and third cruises off Alleppey good collections of lobsters *Puerulus sewelli* were obtained, the average catch being 282 kg. yielding a return of 10.08 kg. per trawling hour.

15. *Squids*.—Over 100 kg. of squids were caught in cruises 5 & 7 but their catches were, however, insignificant in the rest of the cruises.

GENERAL OBSERVATIONS

The total quantity of fish landed by 'Kalava' for all the nine cruises together amounted to 15.71 tonnes, the average catch per cruise working out to 1.75 tonnes at the rate of 196.95 kg. per trawling hour. The catch realised off Alleppey was much higher than off Ponnani, the respective totals being 15.25 tonnes and 0.46 tonnes caught at the rate of 291.75 kg. and 71.39 kg. per trawling hour respectively. However, the total effort put in in Ponnani areas was low (only 6.50 hours) and hence the returns from the two areas do not bear comparison.

The percentage composition of the 11 species of fish that were quantitatively studied and of prawns, lobsters and squids to the total catch is given below:—

<i>Cubiceps natalensis</i>	44.9%
<i>Neobythites steaticus</i>	9.7%
<i>Neoscopelus macrolepidotus</i>	9.0%
<i>Epinnula orientalis</i>	5.1%
<i>Chlorophthalmus agasszi</i>	4.2%
<i>Synagrops japonicus</i>	3.0%
<i>Hypopleuron caninum</i>	1.9%
<i>Polymixia nobilis</i>	1.4%
<i>Physiculus argyropastus</i>	1.4%
<i>Malacocephalus laevis</i>	1.0%
<i>Bembrops caudimacula</i>	0.2%
'Other fish'	8.2%
Prawns	4.1%
Lobsters	4.0%
Squids	1.9%

It is seen that *Cubiceps natalensis* was the most dominant fish in the catches as a whole, constituting nearly half of the total. Next in order of abundance came *Neobythites steaticus* and *Neoscopelus macrolepidotus* which more or less made equal contributions (9.7 and 9.0%) to the total catch. The next important category was 'Other fish' which was followed by *Epinnula orientalis*, *Chlorophthalmus agasszi* and *Synagrops japonicus* in that order of importance. Both prawns and lobsters together made a significant contribution, constituting 8% of the total catch.

As a result of these exploratory cruises, the existence of hitherto unknown rich fishing grounds on the continental slope off Alleppey and Ponnani has come to light. The composition of the catch has been found to be different

from those obtained in coastal waters. Though many of these fishes were found to be edible and tasty, the initial prejudice of the local people to eating new variety of fish which they have not hitherto seen, has to be overcome. During the present cruises, only a few areas off Alleppey and Ponnani have been fished; but the results indicate that extension of fishing northwards and southwards of the areas trawled may reveal the existence of more fishing grounds rich not only in fish but also in prawns and lobsters. This will pave the way for commercially exploiting hitherto untapped deep sea fishery resources.

SUMMARY

A brief account of the trawling operations carried out by M.F.V. 'Kalava' on the continental slope off Alleppey and Ponnani in March-May '63 at depths ranging between 150 and 205 fathoms (274-374 metres) is given. Of more than 24 species of deep sea fish obtained, details of the catch of 11 species and also of prawns, lobsters and squids are given. As a result of these exploratory cruises existence of hitherto unknown fishing grounds on the continental slope has come to light.

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