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Selection on Octopus (Octopus vulgaris) and
Sea Breems of the Spanish Cephalopods Bottom
Trawl off North West Africa.

by

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Summary

During February and May 1980 were carried out two cruises - Ibn Sina 8002 and Ibn Sina 8005 - along the coasts of NW Africa, between the latitudes 26°N and 21°N. One of their main objectives was the study of the selectivity of the bottom trawl, currently used by the Spanish Cephalopods fishing fleet, on Octopus and Sea Breems. The average mesh size of the cod end was 60.9 mm. and the material polyamide. The main results obtained were:

	S.F.	L ₅₀ (mm)	L _{25 - 75} (mm)
<u>Octopus vulgaris</u> Lamarck, 1799	1.0	61	39 - 84
<u>Dentex gibbosus</u> (Rafinesque, 1810)	2.2	131	112 - 150
<u>Diplodus senegalensis</u> Cadenat, 1964	2.3	141	130 - 152
<u>Pagellus acarne</u> (Risso, 1826)	2.2	136	119 - 152
<u>Pagellus coupei</u> Dieuzeide, 1960	2.2	134	112 - 155
<u>Spondyllosoma cantharus</u> (Linne, 1758)	2.3	139	124 - 153

Resume

Pendant les mois de Mars et Mai de 1980, deux campagnes ont été réalisées, l'Ibn Sina 8002 et l'Ibn Sina 8005, autour des côtes du NW de l'Afrique entre 26°N et 21°N. Un des principaux objectifs était d'étudier la selectivité d'un chalut de fond espagnol, sur le Poulpe et sur les Sparidés, ce chalut était le même qui est utilisé par la flotille espagnole qui pêche des cephalopodes.

La taille moyenne des mailles du coup de chalut est 60.9 mm et le chalut est fabriqué en polyamide. Les principaux résultats sont:

	S.F.	L ₍₅₀₎ (mm)	L ₍₂₅₋₇₅₎ (mm)
<u>Octopus vulgaris</u> Lamarck,1799	1.0	61	39 - 84
<u>Dentex gibbosus</u> (Rafin.,1810)	2.2	131	112 - 150
<u>Diplodus senegalensis</u> Caden.1964	2.3	141	130 - 152
<u>Pagellus acarne</u> (Risso,1826)	2.2	136	119 - 152
<u>Pagellus coupei</u> Dieuzeide,1960	2.2	134	112 - 155
<u>Spondyliosoma cantharus</u> Lin.,1758	2.3	139	124 - 153

Introduction

The studies on the selectivity of the gears commonly used in the trawl fisheries off NW Africa are scarce. In the case of the cephalopods fishery, the situation is even worse. In spite of that the Octopuses, jointly with the Cuttlefishes and Squids, constitute the most important resource, under the economical point of view, of the region, there exists only one paper (Guerra,1979) on this subject of this species.

At the beginning of 1980 started a Spanish - Moroccan Cooperative Research Program. Whithin this program were carried out two cruises, IBN SINA 8002 and IBN SINA 8005 in February and March respectively, and between the latitudes 21°N and 26°N. One of the main objectives of these cruises was the study of the selectivity, of the most commonly type of gear used in the cephalopods fishery of that area, on the cephalopods and other important commercial fish species.

This paper presents the results obtained for Octopus (Octopus vulgaris Lamarck, 1799) and several Sea Breams (Dentex gibbosus Rafinesque,1810, Diplodus senegalensis Cadenat,1964, Pagellus acarne (Risso,1826), Pagellus coupei Dieuzeide,1960 and Spondyliosoma cantharus Linnaeus,1758), with a Spanish bottom trawl of polyamide and 60 mm. mesh size in the cod end.

Method

The vessel used for the experiments was the R/V IBN SINA (Institute des Peches Maritimes du Maroc, Casablanca). This is a stern trawler with the following main

characteristics: 39 meters L.O.A., 259 G.R.T. and 1100 H.P..

The fishing gear is of the type used by the Spanish Cephalopods fishing fleet operating in that area. The material used in its construction is polyamid. Its design and characteristics are included in figure 1.

The method applied during the 17 fishing operations of the first cruise, and the 22 of the second, was the covered cod-end method. The standar trawling speed and duration of the hauls was of 2.8 knots and 30 minutes respectively. The average horizontal opening of the gear was of 30 meters. The average mesh sizes of the cod end and cover were 60.9 mm. and 25 mm. respectively. Both were measured with an ICES mesh gauge. During the two cruises were done 31 series of measurements of 25 each.

The size determinations were done taking the mantle length of the Octopuses and the total length of the Sea Breams. In both cases, the lectures were referred to the lower centimeter.

The results have been adjusted to a logistic curve. The proportions used for the calculations are running means calculated from the original ones using this formula:

$$p'(l_t) = \frac{P(l_{t-1}) + P(l_t) + P(l_{t+1})}{3}$$

where p is the percentage of retention for each length intervall.

Results and Discussion

The position of the 39 fishing operations, done during the two cruises, are indicated in figure 2. Table I includes the results of the selectivity experiments on the different species. Those of Dentex gibbosus and Diplodus senegalensis correspond to data obtained during the second cruise. During the first one, the catch of these two species was insignificant.

The length distributions of the catches in the cod end and cover of the different species is represented in figures 3 to 10. The selectivity curves and the basic data necessary to obtain them are in figures 11 to 18.

In order to obtain the logist curve, the previous adjustment to a straight line was done by the method of the least squares. Table II includes the results of

these adjustments and the correlation coefficients. Very irregular data have been eliminated, e.g. in *Octopus* (total) the 6 cm. value, in *Pagellus acarne* the 17 cm., and in *Spondyllosoma cantharus* the 16 and 17 cm..

The values obtained for *Octopus* - $S.f._{total} = 1.0$, $S.f._{\sigma} = 0.9$ and $S.f._{\varphi} = 0.9$ - differ of those calculated by Guerra (1979) - $S.f._{total} = 1.7$, $D.f._{\sigma} = 1.8$ and $S.f._{\varphi} = 1.6$ - . It is difficult to compare both results as he had only 203 *Octopuses* in the cod end and 63 in the cover, the mesh size was of 53 mm.-measured with an ICNAF gauge - and the gear was different,

The result of *Pagellus coupei* - s.f. 2.19 - is very similar to those previously obtained by Ikeda (1972) 2.22 and Franqueville et al. (1979) 2.17. The same situation occurs with *Pagellus acarne* where we obtain a selection factor of 2.23 and Ikeda (1979) 2.27. In *Spondyllosoma cantharus* the difference is bigger. For this species Ikeda (1979) obtains 2.59 and we 2.27. However it is also difficult to compare our results with those of Ikeda (1972) because he does not indicate the selection range and the number of specimens included in it.

References

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- POPE, J. A., MARGETTS, A. R., HAMLEY, J. M., AKYUZ, E. F., 1975.-Manual of methods for fish stock assessment. Part III. Selectivity of fishing gear. FAO Fish. Tech. Paper, N° 41 (Rev. 1):65 p.

ESPECIE	F.S.	Lc 0.5	Lc 0.25	Lc 0.75	n.ej. copo	n.ej. s.copo	rango tallas
<u>Octopus vulgaris</u>	1.01	6.13	3.88	8.38	477	229	3-12
<u>Octopus vulgaris</u> ♂	0.91	5.54	3.24	7.84	234	96	3-11
<u>Octopus vulgaris</u> ♀	0.88	5.38	2.52	8.25	287	121	3-12
<u>Dentex gibbosus</u>	2.16	13.11	11.23	15.00	84	35	11-18
<u>Diplodus senegalensis</u>	2.31	14.08	12.95	15.20	3530	1102	12-18
<u>Pagellus acarne</u>	2.23	13.55	11.86	15.24	979	42	13-20
<u>Pagellus coupei</u>	2.19	13.35	11.22	15.48	2627	2233	7-20
<u>Spondyliosema cantharus</u>	2.27	13.85	12.41	15.29	258	107	11-18

Table I.- Results of the selectivity experiments for the different species. F.S. selection factor. Lc 0.5 = 50% retention length, Lc 0.25 = 25% retention length, Lc 0.75 = 75% retention length. n.ej.copo=nr. fish cod end, n.ej.sobr=nr. fish cover.

ESPECIE	r	a	b
<u>Octopus vulgaris</u>	0.990	-2.990	0.488
<u>Octopus vulgaris</u> ♂	0.991	-2.645	0.477
<u>Octopus vulgaris</u> ♀	0.989	-2.065	0.384
<u>Dentex gibbosus</u>	0.974	-7.628	0.582
<u>Diplodus senegalensis</u>	0.999	-13.758	0.977
<u>Pagellus acarne</u>	0.987	-8.806	0.650
<u>Pagellus coupei</u>	0.991	-6.885	0.516
<u>Spondyliosema cantharus</u>	0.985	-10.590	0.765

Table II.- Results of the linear adjustments and correlation coefficients.

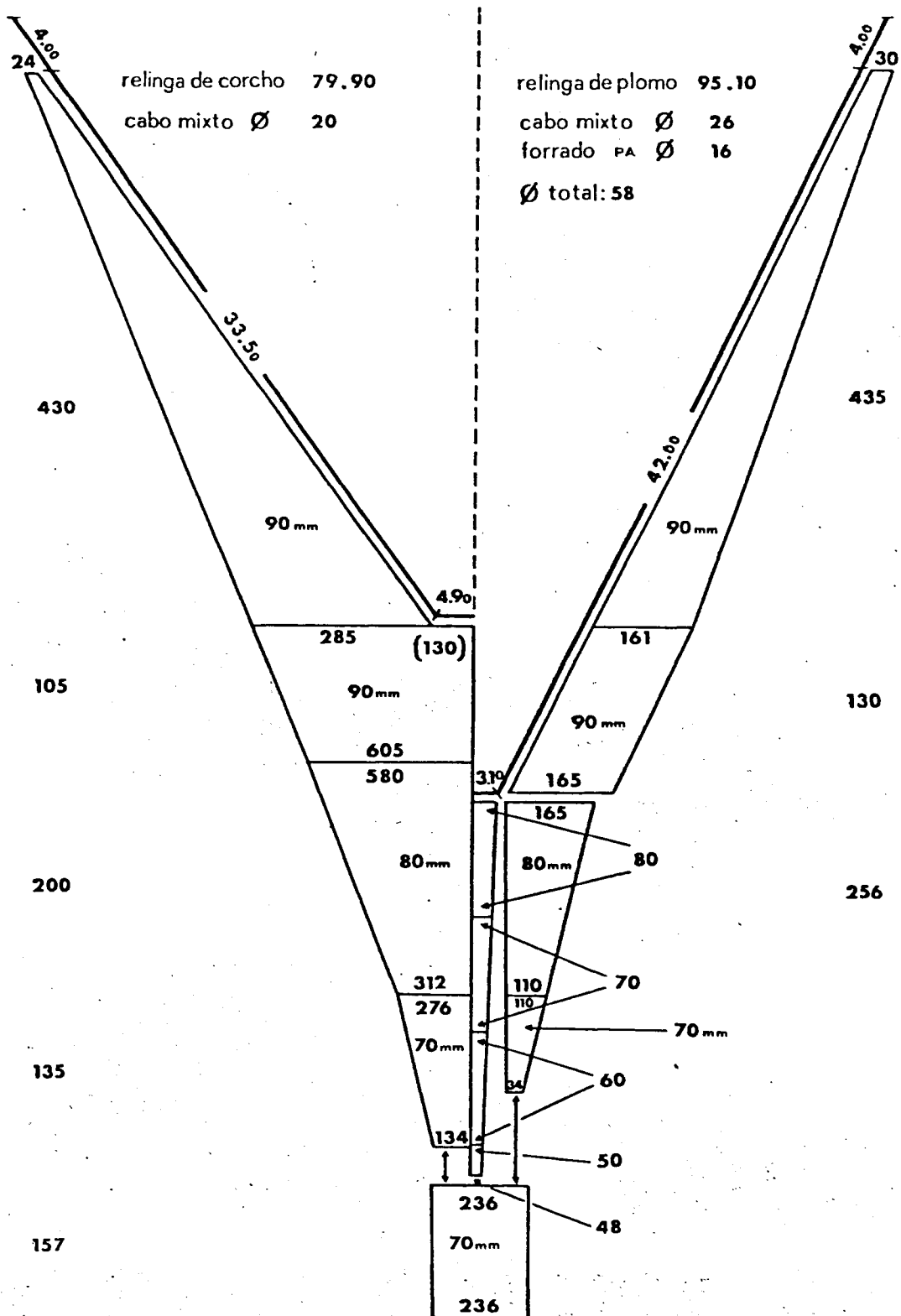


Figure 1

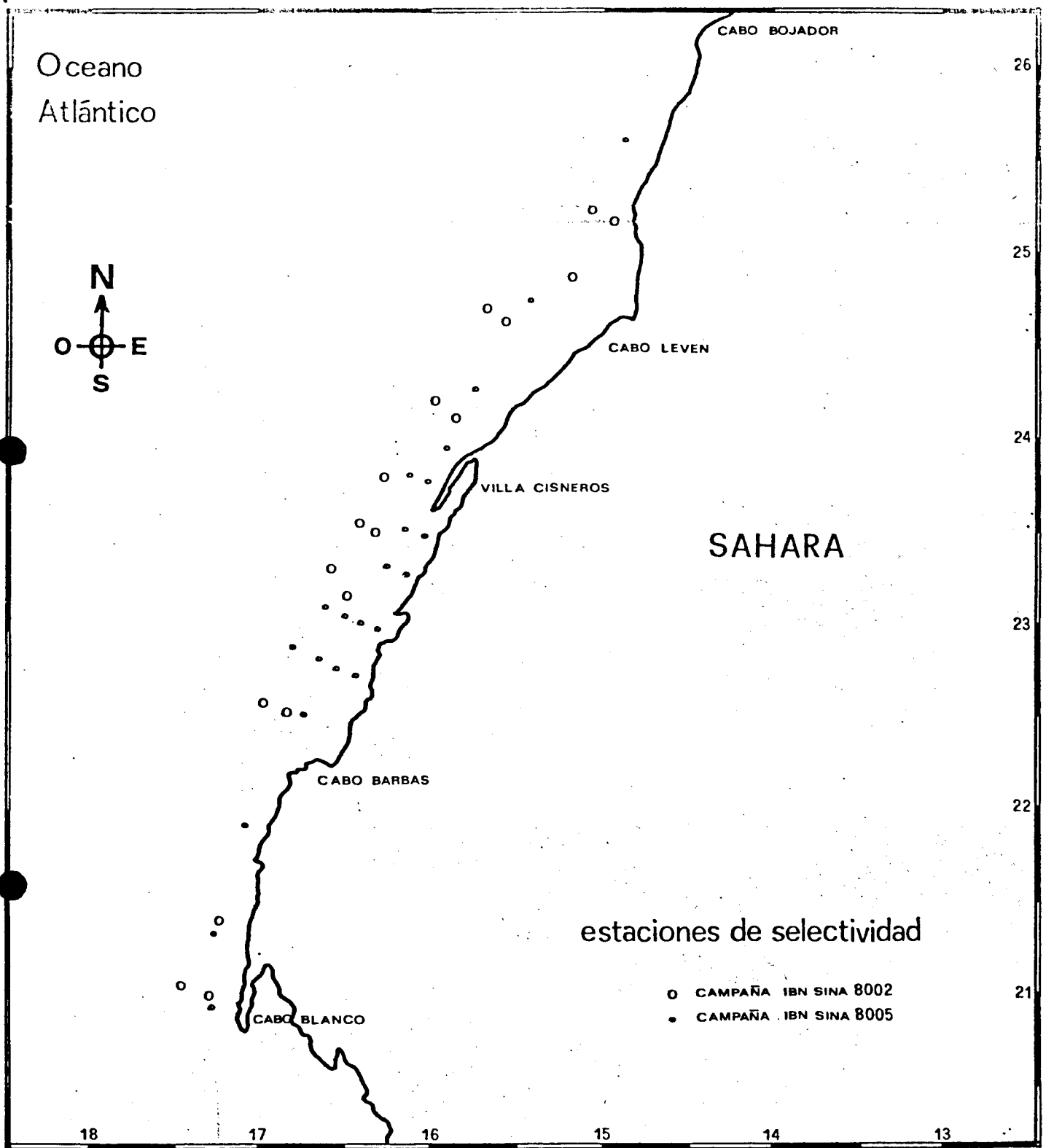


Figure 2.- Situation of fishing stations.

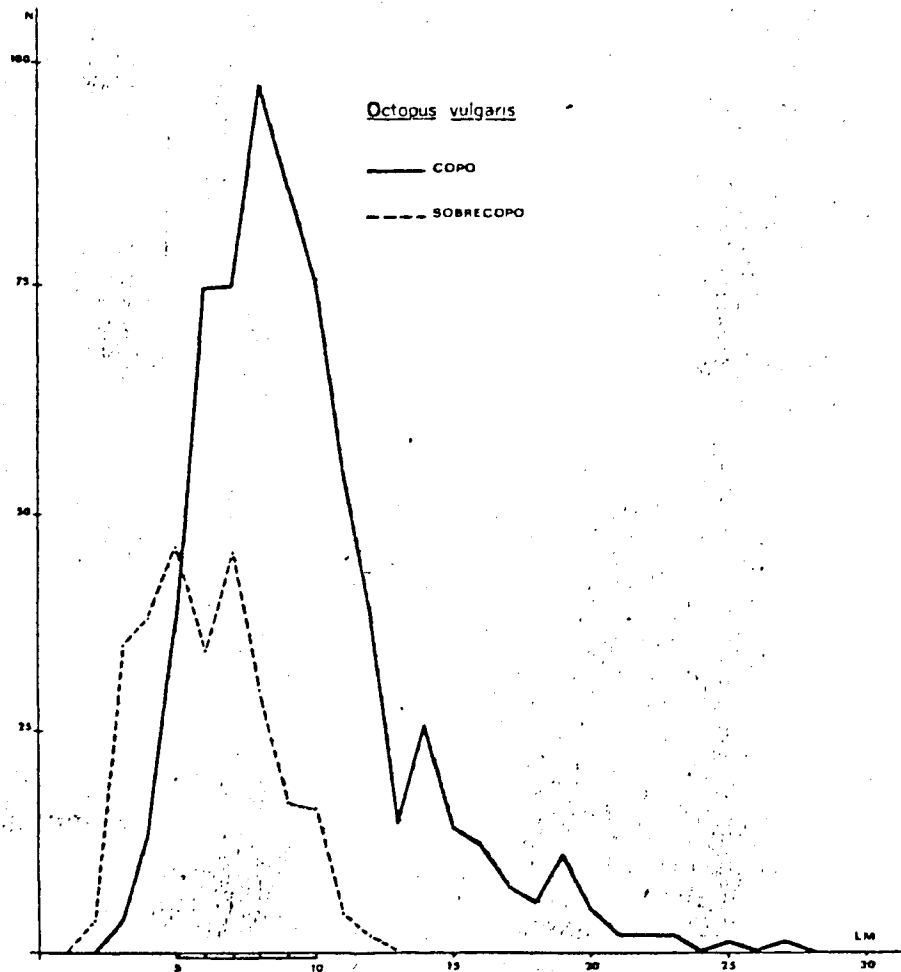


Fig.3.-Length composition of catches of *Octopus vulgaris* Lamarck, 1799 in the cod end (—) and cover (- - -).

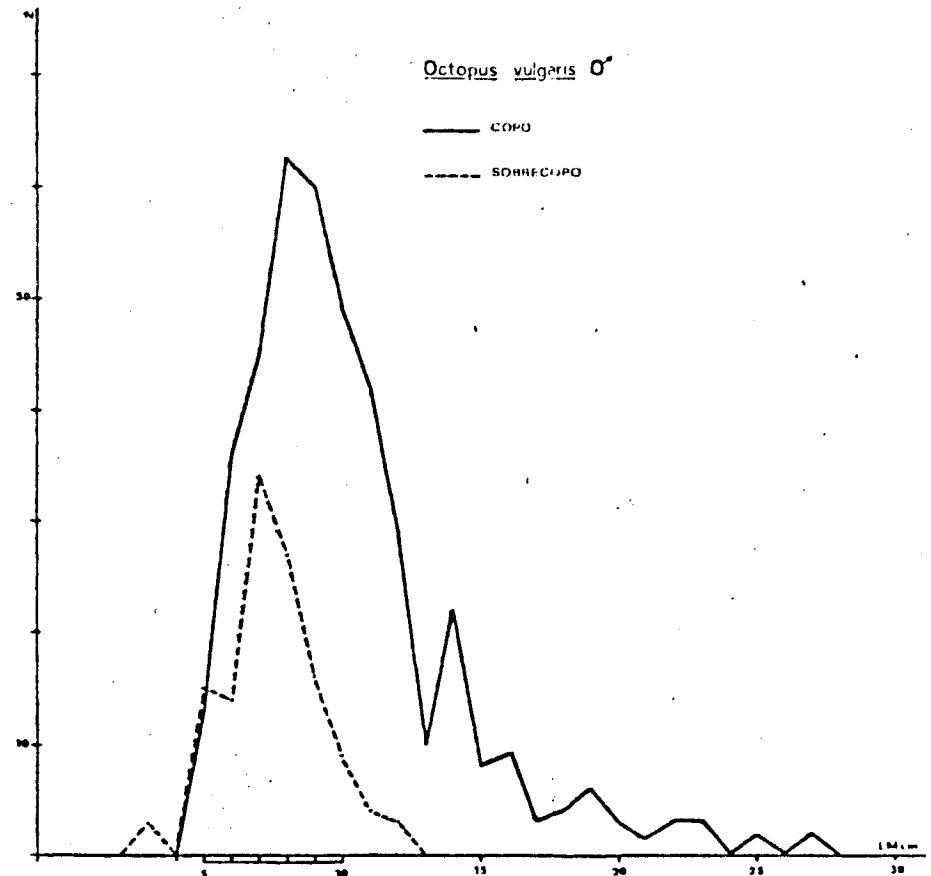
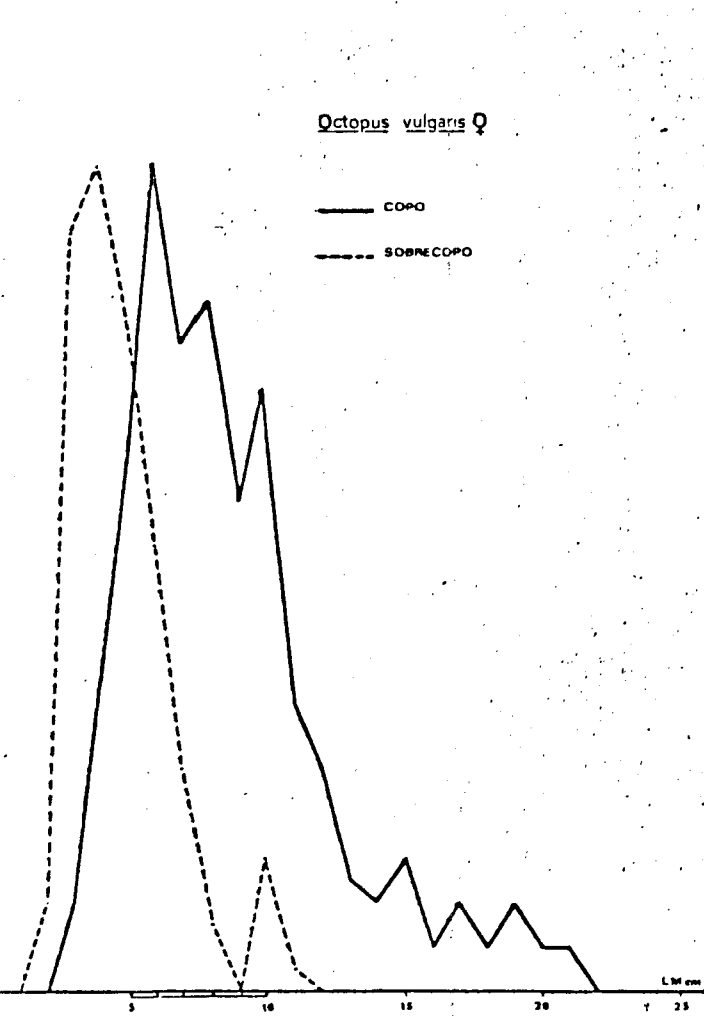


Fig.4.-Length composition of catches of *Octopus vulgaris* ♂ Lamarck, 1799 in the cod end (—) and cover (- - -).

Octopus vulgaris ♀

— COPO

- - - SOBRECPO



Dentex gibbosus

— COPO

- - - SOBRECPO

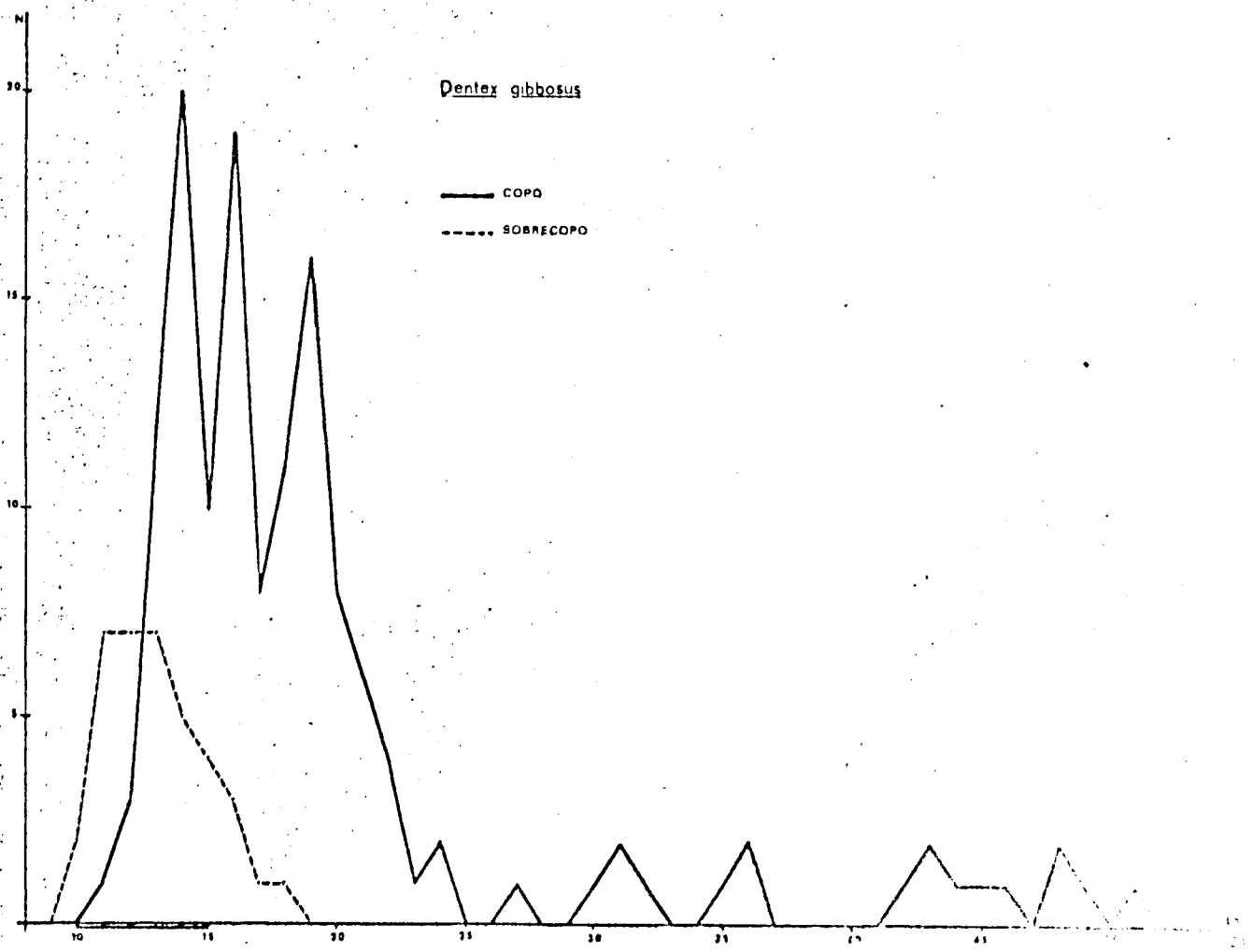


Fig.5.-Length composition of catches of Octopus vulgaris ♀ Lamarck, 1799 in the cod end (—) and cover (- - -).

Fig.6.-Length composition of catches of Dentex gibbosus (Rafinesque, 1810) in the cod end (—) and cover (- - -).

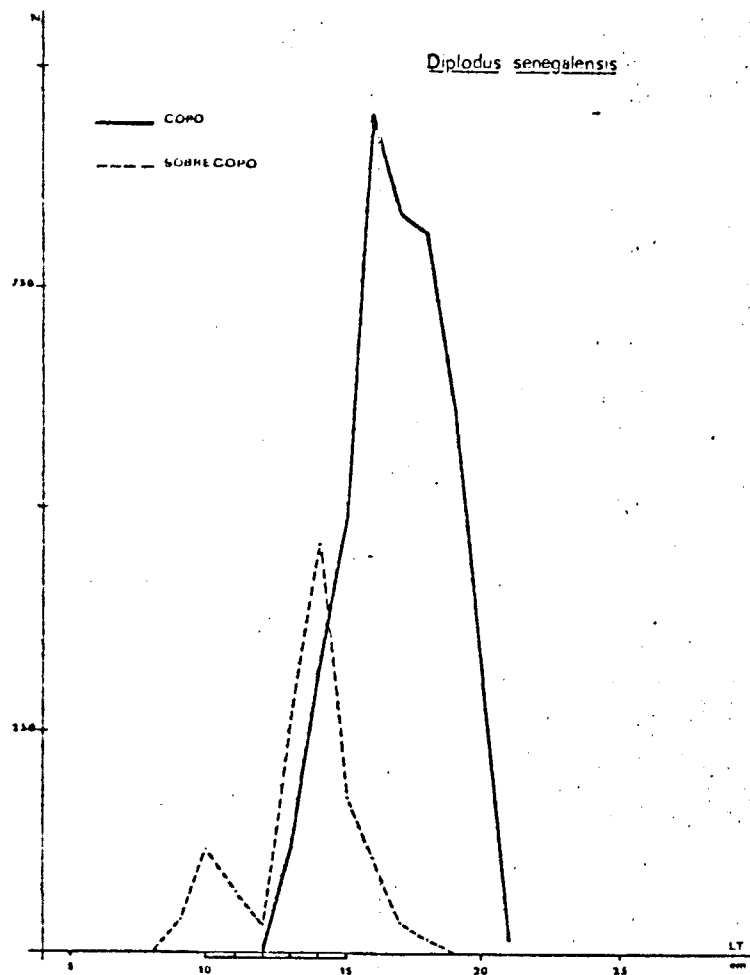


Fig.7.—Length composition of catches of Diplodus senegalensis Cadenat, 1964 in the cod end (—) and cover (- - -).

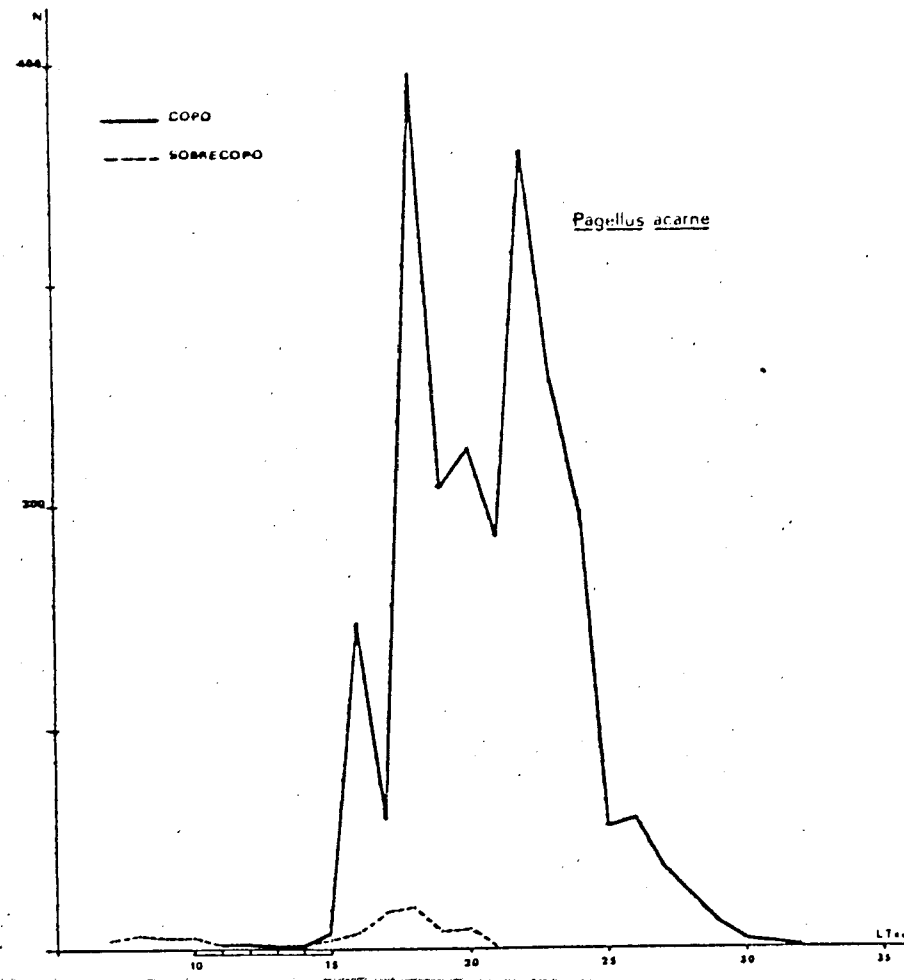


Fig.8.—Length composition of catches of Pagellus acarne (Risso, 1826) in the cod end (—) and cover (- - -).

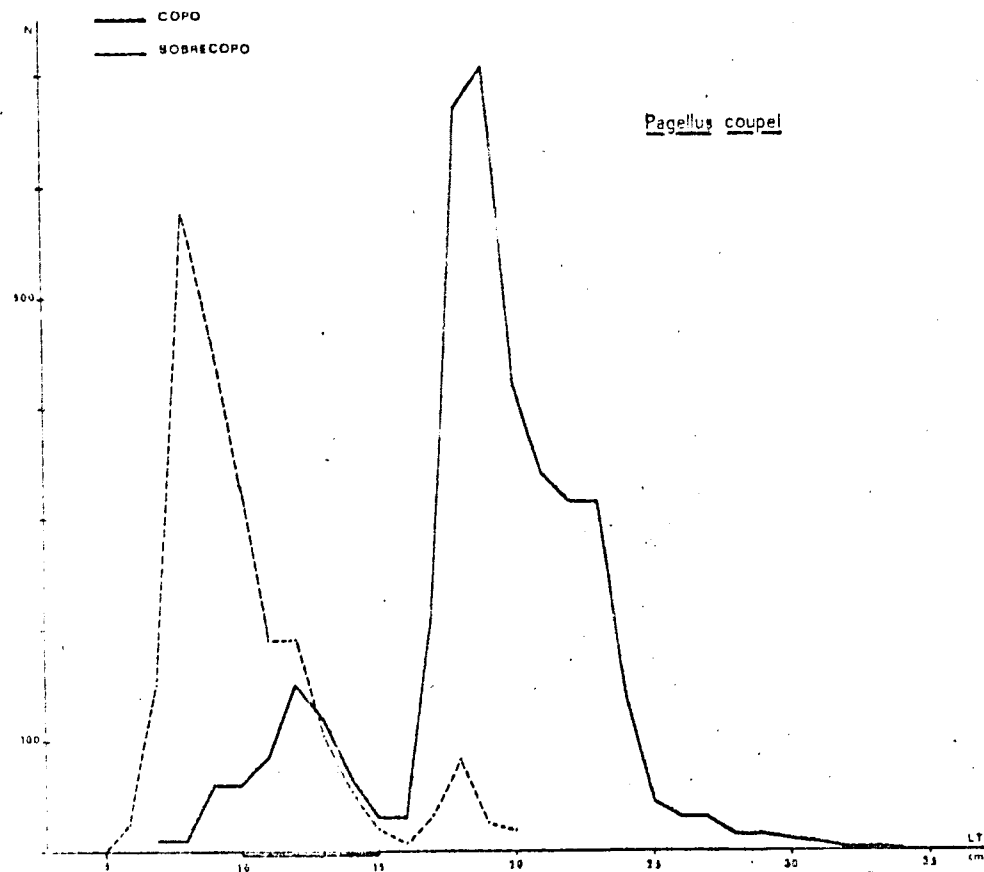


Fig.9.-Length composition of catches of Pagellus coupel Dieuzeide, 1960 in the cod end (—) and cover (- - -).

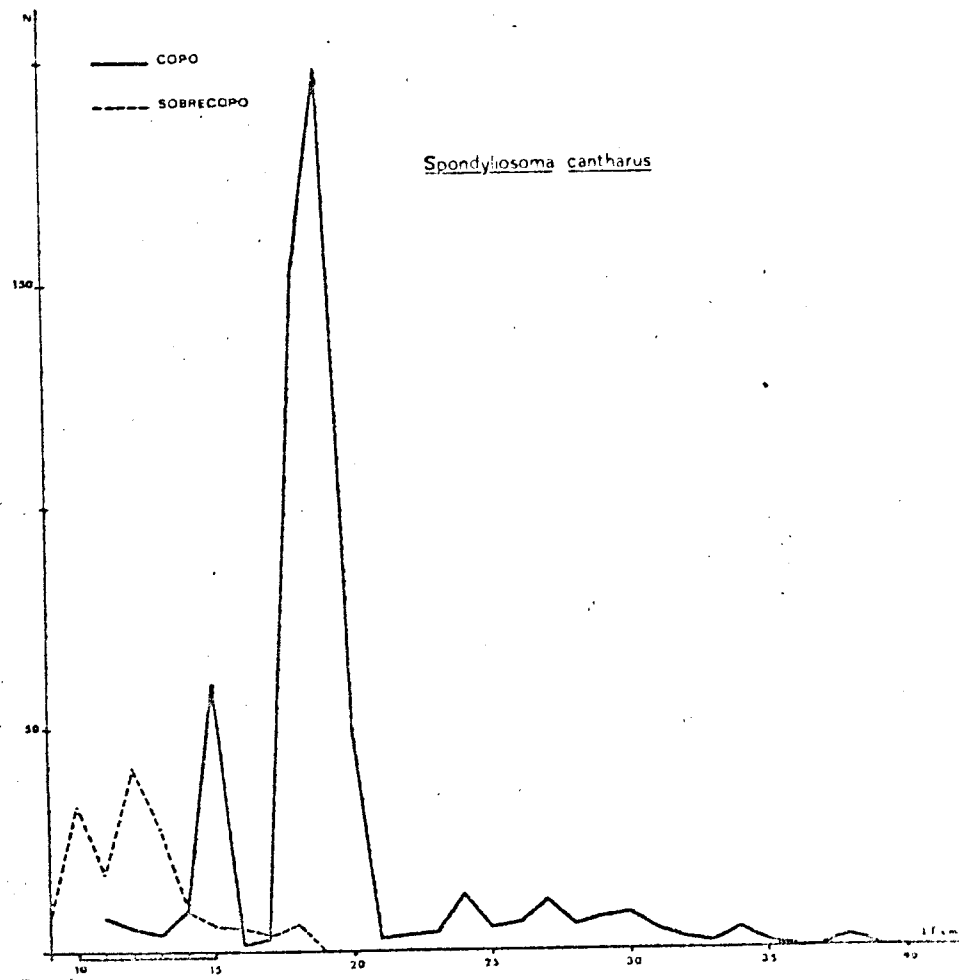


Fig.10.-Length composition of catches of Spondyliosoma cantharus (Linne, 1758) in the cod end (—) and cover (- - -).

T	COPO	S.COPO	TOTAL	P	Pm
3.0	4	34	38	.1053	.1266
4.0	14	37	51	.2745	.2770
5.0	37	45	82	.4512	.4509
7.0	74	44	118	.6271	.6134
8.0	96	30	126	.7619	.7419
9.0	82	16	98	.8367	.8113
10.0	76	15	91	.8352	.8629
11.0	55	5	60	.9167	.8935
12.0	39	3	42	.9286	.9484

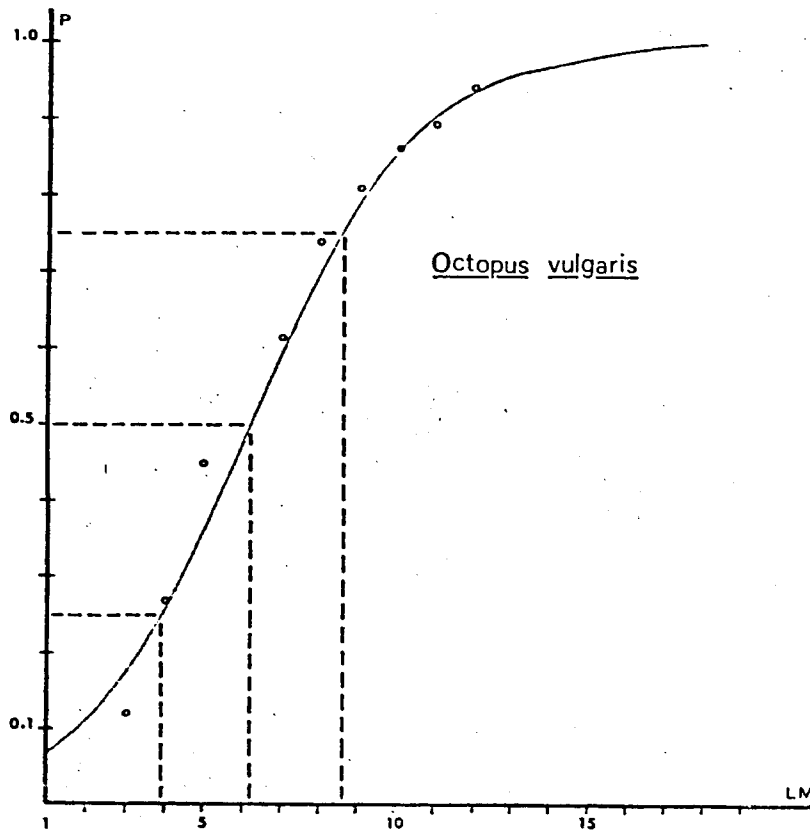


Fig.11.-Selection curve for Octopus vulgaris Lamarck.

T	COPO	S.COPO	TOTAL	P	P _m
3.0	1	2	3	.3333	.1880
4.0	3	10	13	.2308	.3185
5.0	18	28	46	.3913	.4591
6.0	37	12	49	.7551	.6105
7.0	37	17	54	.6852	.7268
8.0	37	13	50	.7400	.7558
9.0	32	6	38	.8421	.8131
10.0	36	6	42	.8571	.8807
11.0	33	2	35	.9429	.9333

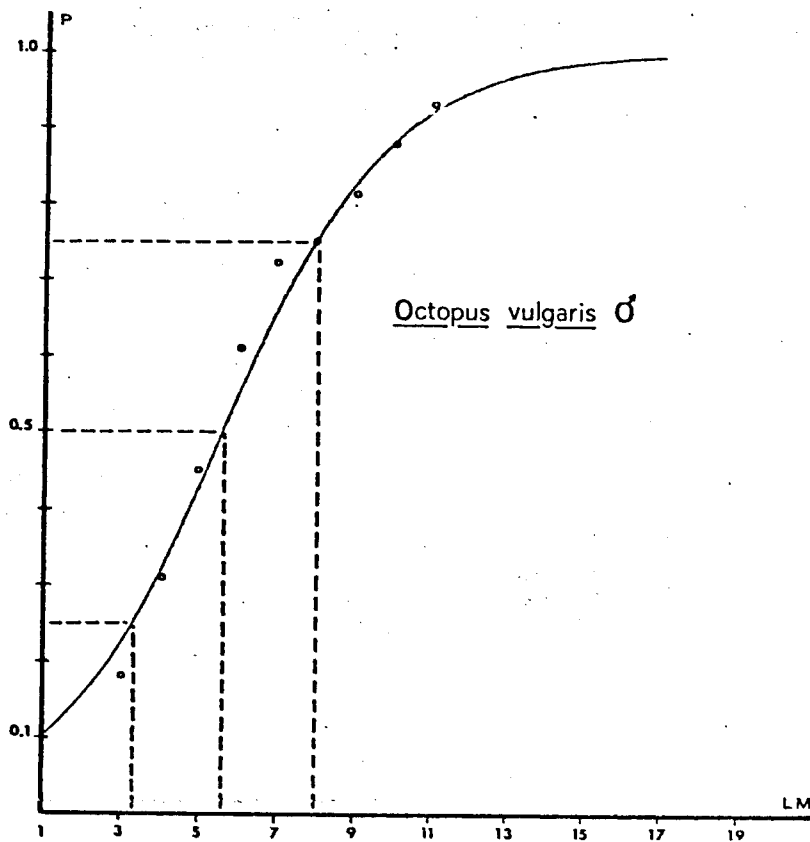


Fig.12.- Selection curve for *Octopus vulgaris* ♂ Lamarck, 1799.

T	U.S.	S.COPO	TOTAL	P	P _M
3.0	1	2	3	.3333	.2222
4.0	7	19	27	.3333	.4040
5.0	24	15	33	.5455	.4953
6.0	34	22	56	.6071	.5724
7.0	25	27	62	.5645	.6518
8.0	58	16	74	.7838	.7272
9.0	50	10	60	.8333	.8353
10.0	40	5	45	.8889	.8674
11.0	22	3	25	.8800	.8795
12.0	20	3	23	.8696	.9165

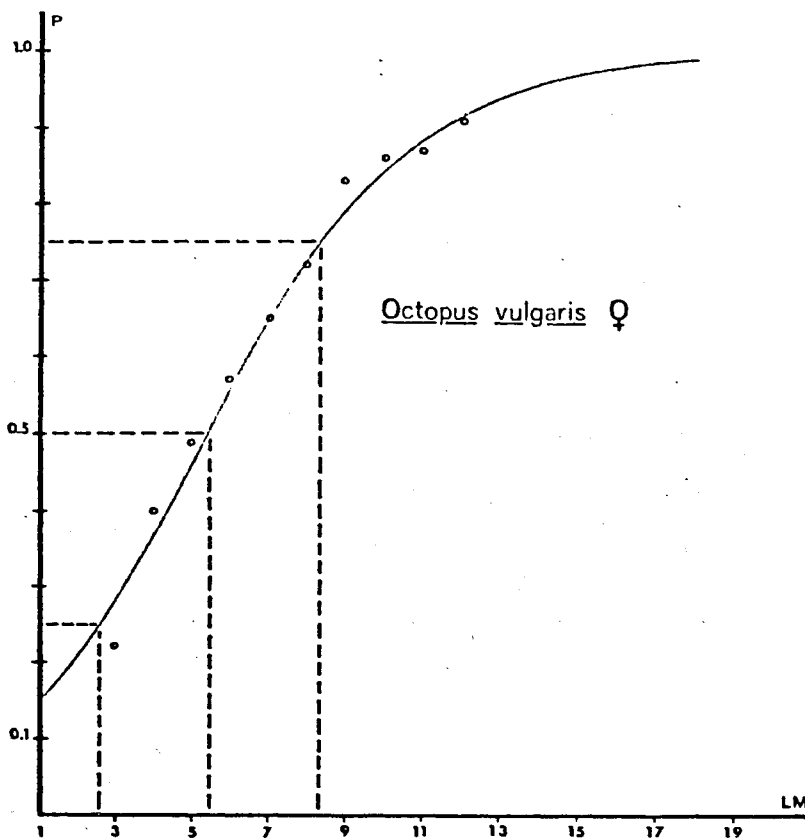


Fig.13.-Selection curve for Octopus vulgaris ♀ Lamarck, 1799.

I	COPO	S.COPO	TOTAL	P	Pm
11.0	1	7	8	.1250	.1417
12.0	3	7	10	.3000	.3522
13.0	12	7	19	.6316	.5772
14.0	20	5	25	.8000	.7153
15.0	10	4	14	.7143	.7926
16.0	19	3	22	.8636	.8223
17.0	8	1	9	.8889	.8897
18.0	11	1	12	.9167	.9352

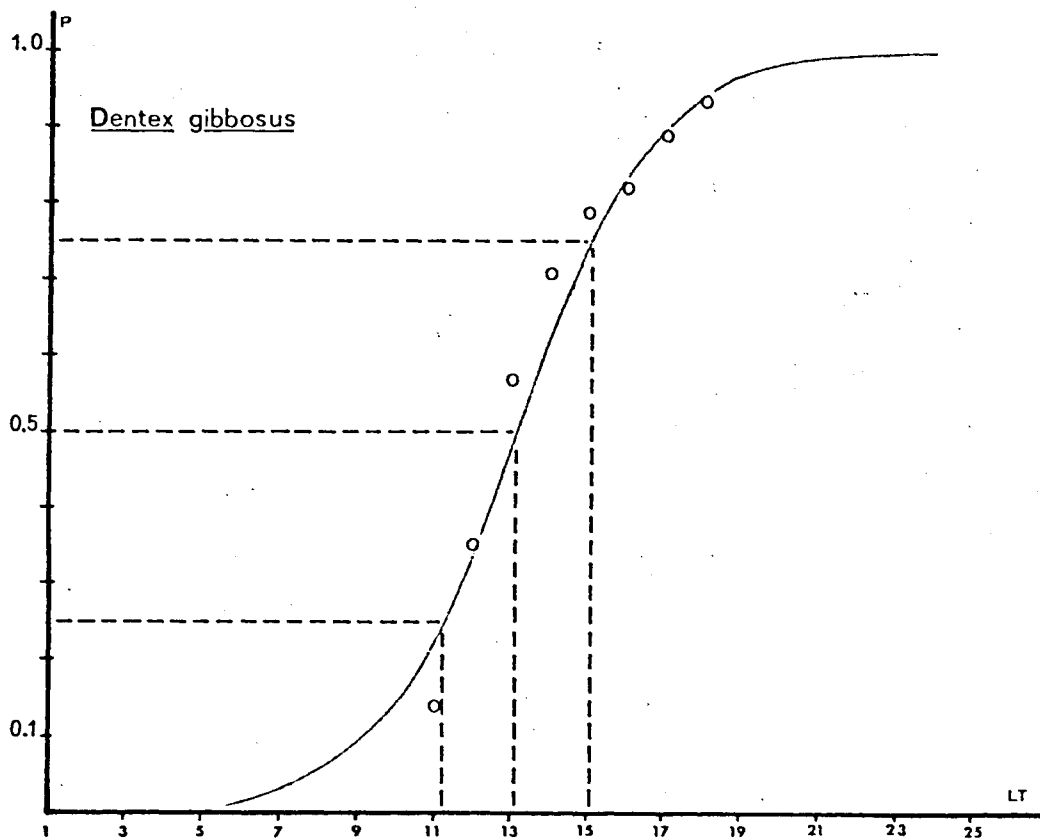


Fig.14.-Selection curve for Dentex gibbosus (Rafinesque,1810).

T	COPO	S.COPO	TOTAL	P	P _M
12.0	2	32	34	.0588	.1231
13.0	123	273	396	.3106	.2599
14.0	320	460	780	.4103	.4853
15.0	491	177	668	.7350	.6804
16.0	947	110	1057	.8959	.8639
17.0	835	34	869	.9609	.9458
18.0	812	16	828	.9807	.9805

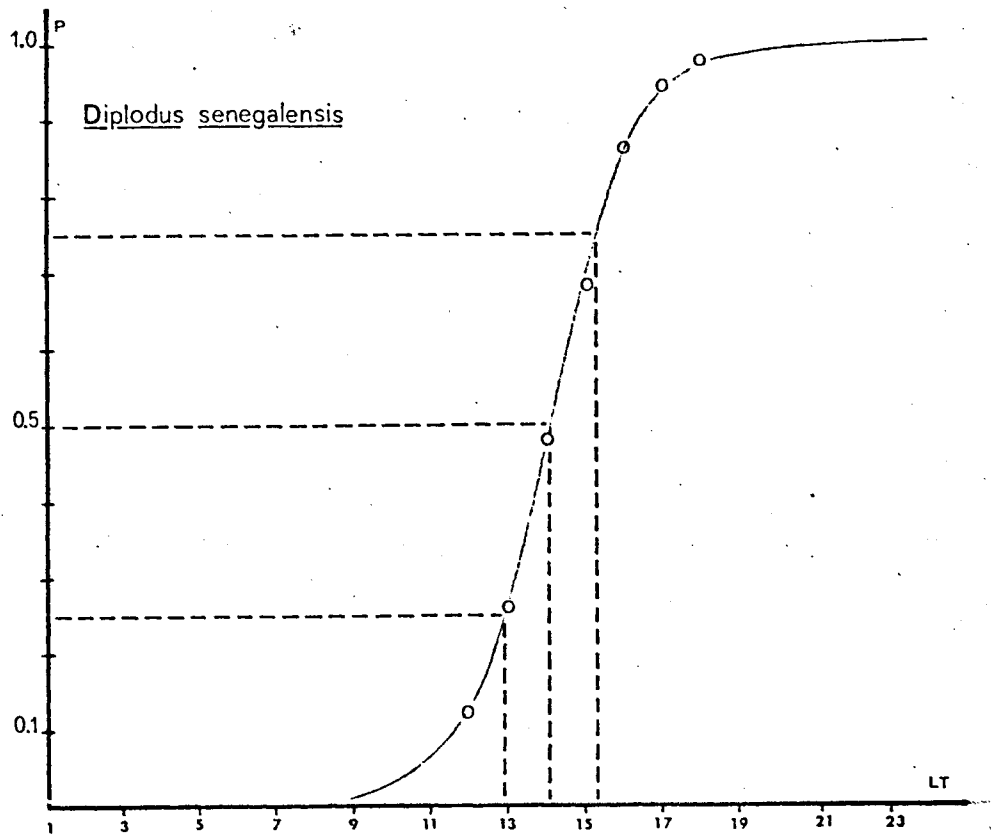


Fig.15.-Selection curve for *Diplodus senegalensis* Cadenat,1964.

T	COPO	S.COPO	TOTAL	P	Pn
13.0	1	1	2	.5000	.3333
14.0	1	1	2	.5000	.5758
15.0	8	3	11	.7273	.7270
16.0	144	7	151	.9536	.8798
18.0	392	17	409	.9584	.9613
19.0	208	6	214	.9720	.9667
20.0	225	7	232	.9696	.9806

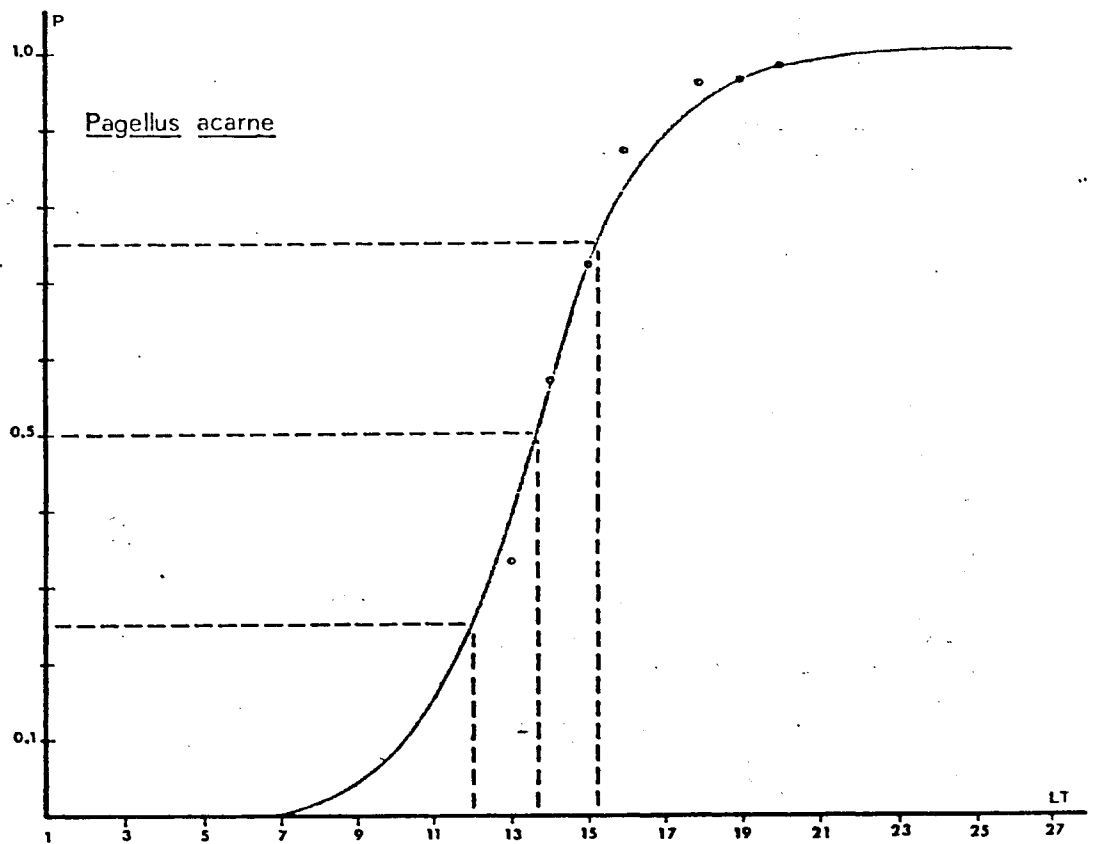


Fig.16.-Selection curve for Pagellus acarne(Risso,1826)

T	COPO	S.COPO	TOTAL	P	Pm
7.0	8	152	160	.0500	.0212
8.0	8	575	583	.0137	.0581
9.0	58	466	524	.1107	.0929
10.0	60	329	389	.1542	.1953
11.0	86	182	268	.3209	.3092
12.0	152	184	336	.4524	.4341
13.0	119	106	225	.5289	.5074
14.0	66	56	122	.5410	.5462
15.0	29	22	51	.5686	.6418
16.0	31	7	38	.8158	.7535
17.0	219	31	250	.8760	.8616
18.0	667	80	747	.8929	.9116
19.0	706	25	731	.9658	.9393
20.0	422	18	440	.9591	.9750

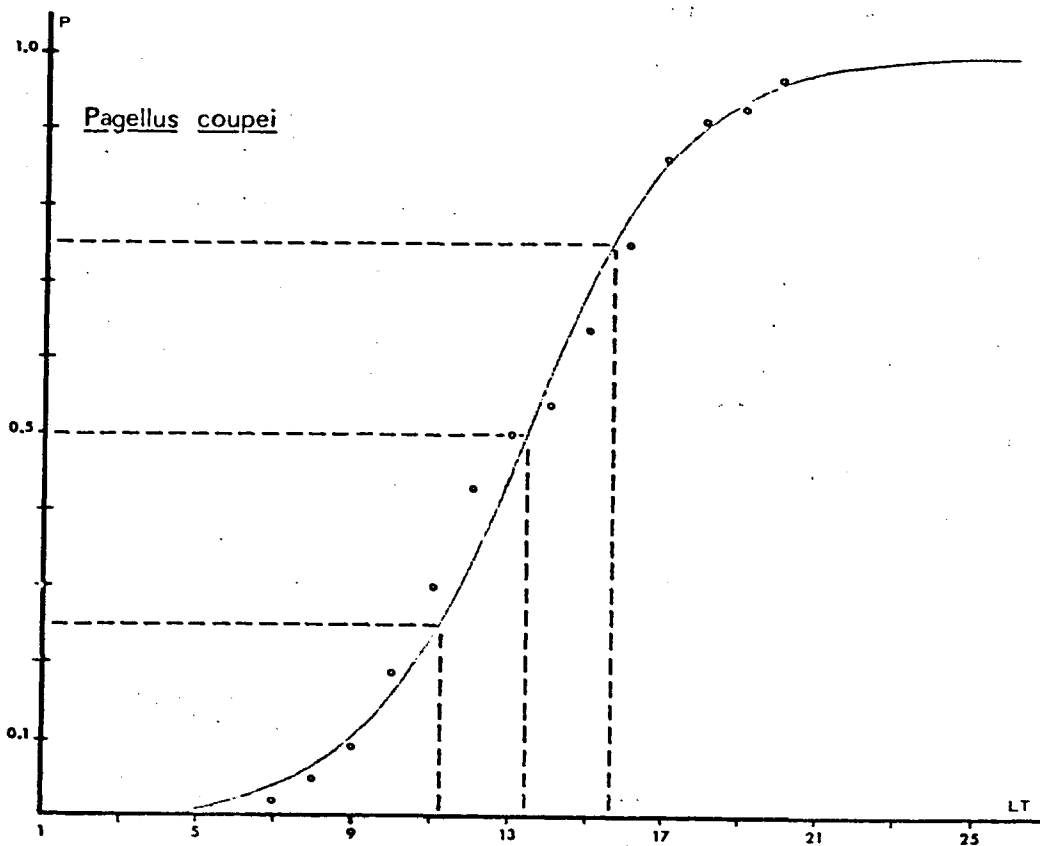


Fig.17.-Selection curve for Pagellus coupei Dieuzeide,1960.

T	COPO	S.COPO	TOTAL	P	Pm
11.0	7	17	24	.2917	.1335
12.0	5	41	46	.1087	.1751
13.0	4	28	32	.1250	.2446
14.0	9	9	18	.5000	.5114
15.0	60	6	66	.9091	.7905
18.0	153	6	159	.9623	.9571

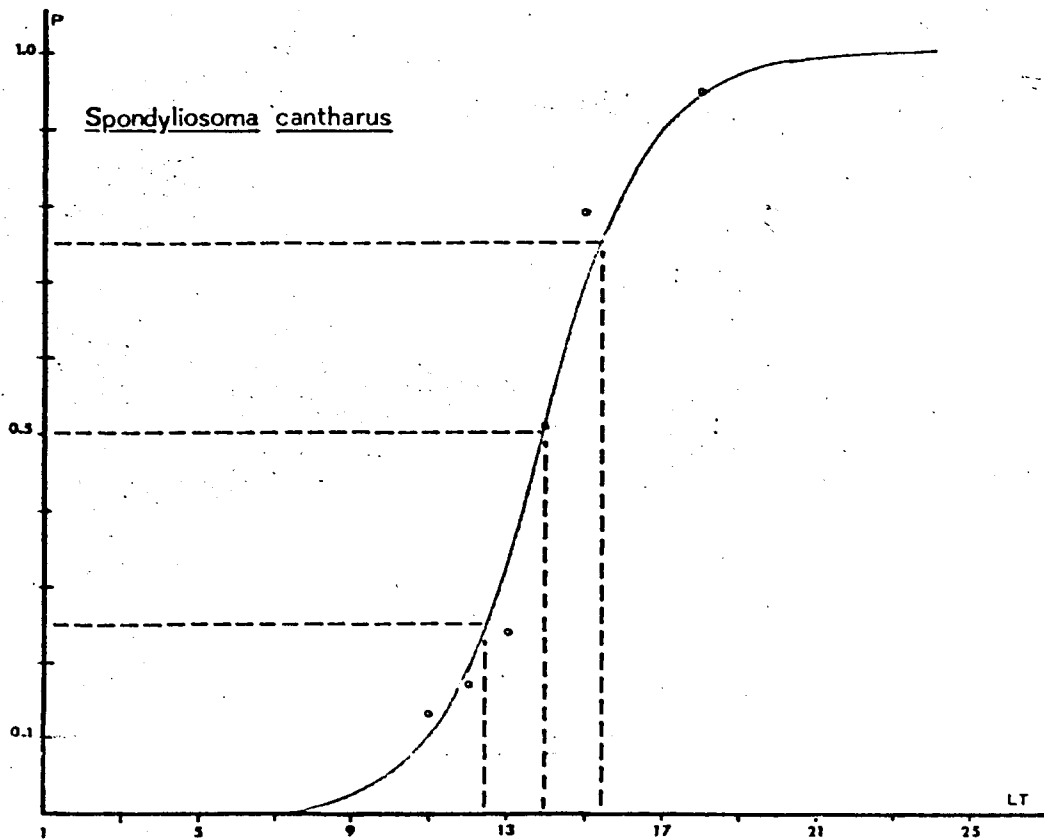


Fig.18.-Selection curve for Spondyliosoma cantharus(Linne,1758).