V-III4

Field Observations of Young *Ommastrephes bartrami* in Offshore Waters in the Ligurian Sea

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Given the relevant presence of teuthofagous mammals such as *Globicephala melaena, Grampus griseus, Ziphius cavirostris* (Viale 1985, Notarbartolo di Sciara *et al.* 1990), the Ligurian Sea is supposed to be rich in cephalopods, probably of species which at present do not constitute fishery resources. However, the distribution - if not the identity - of such pelagic species is unknown.
Taking Clarke's interesting notes (1966) on oceanic squids of genus *Ommastrephes* as a starting-point, I wondered if it might also be possible in the Mediterranean to see these animals in offshore waters at night. Some cruises on the R/V Minerva (CNR August 1987, July 1988, August 1989, December 1989, February 1990) gave me the opportunity to answer this question. It is a well-know fact that during the night, especially when the sea is very calm, a light put on the surface attracts squids which can then be easily fished with shrimplike artificial lures. In the inshore waters of the Ligurian Riviera I have observed that such catches are composed mainly of *Loligo vulgaris* and to a smaller extent of *Illex coindetii*. The same fishing technique was used in offshore waters.
During the first two cruises on calm nights in which the ship was adrift in proximity to the bottoms of the Ligurian slope where *Aristeus antennatus* is the target species of the trawl-fishery (500-700 m depth), several sightings of young ommastrephid were registered. Optimal conditions were reached a few hours after the ship's engines had stopped and a light which had been put over the side of the boat started collecting small fish and shrimps (Myctophidae, *Pasiphaea sivado, Meganyctiphanes norvegica* etc.) which became food for the cephalopods. However, every caught specimen proved to be *Todarodes sagittatus*. Indeed, this squid is sporadically associated to the trawl mesobathyal catches.
During the 1989-90 cruises the ship reached deeper waters (more than 1000 m depth) up to a maximum of 40 miles from the Ligurian coastline. In the same conditions as described above, finally several specimens of the genus *Ommastrephes* were observed and caught.
In August the squids appeared in small groups (up to six individuals), passing rapidly under the light. They maintained a distance of about 1 m from each other and were seen repeatedly seizing the fish. Five of them were fished both with artificial bait and with a landing-net and preserved in formalin solution.
The second observation took place in December: they appeared in the same circumstances as before, but were less numerous and larger. On board, two large tanks filled with sea water were used to keep the freshly caught specimens. They showed astonishing changes of colour from dark red-brown, when the squid was lifted into the air, to a white and blue colour when it was put in the tank (the latter had white walls and was floodlit in the laboratory). This last coloration was very similar to that of pelagic fish, the dorsum being blue and the ventral surface white with silver hues. However, this colour was seen when there were single specimens in the tank, but on adding a second specimen a furious reaction was observed, with colour changes and emissions of jets of water and clouds of ink. Four specimens were fixed in formalin solution. The post mortem coloration is also very characteristic. A black colour appears on the dorsal surfaces which is sharply delimited laterally; the borderline runs through the middle of the second pair of arms.
On the final occasion in February, watching the sea surface in the above-mentioned conditions I was not able to see any of them, but a member of the crew fished a specimen, together with two *Todarodes sagittatus*, in the last hour of the night.

Examined materials:
14.08.89 Minerva st. 43°49' 09°07'
five specimens: M.L. 11; 14.5; 15.5; 15.5; 17.5 sex undetermined (no signs of hectocotylization on ventral arms).
09.12.89 Minerva st. 43°43' 09°09'
four specimens: males (initial hectocot.) M.L. 19.5; 19.5; 21.3; female M.L. 25.5
05.02.90 Minerva st. 44°08' 09°07'
one female specimen M.L. 27.5
All these fit the description of *Ommastrephes bartrami* given by Young (1972), with the exclusion of details regarding the dentition of suckers.

Discussion: a) Species identity
In the opinion of Nesis (1982/1987), the genus *Ommastrephes* includes only one species, *O. bartrami*, with three formally undescribed subspecies: a North Atlantic (M.L. to 86 cm); a North Pacific (M.L. to 53 cm) and a southern subspecies (M.L. to 65 cm). In particular, the North Pacific subspecies is probably the best known (Araya 1983), as it sustains a fishery yield of 150,000 t/year. In the past, three species have been recognized.
For the Mediterranean records, which have generally been sporadic, the authors concerned have used the name *O. bartrami* (Naef 1923; Issel 1925; Torchio 1967, 1971). However, recently Roper et al. (1984) assigned the Mediterranean forms to *O. caroli* . As a consequence, for the most recent specimens found in the Mediterranean both the terms *O. caroli* (Guescini and Manfrin 1986) and *O. bartrami* (Ragonese and Jereb in press) have been used for what is probably the same form. Following the remarks of Bello (1986) and while waiting for a revision of the genus, I prefer to mantain the name *O. bartrami* for these Ligurian specimens.
b) Significance of Ligurian records.
This species is poorly represented in the Ligurian and Mediterranean collections as generally only very rare big specimens are preserved; in these cases the doubt remains that they are exceptional finds. I am of the opinion that to have found young specimens on three occasions in the same area - in spite of the limited search allowed by the ship timetable i.e. a total of few hours - is indicative of their regular presence. The sizes of the examined specimens suggest that they belong to the same cohort, which has been monitored over a period of six months, precisely as is the case - although with an enormous difference in numbers - in the north Pacific at approximately the same latitude (Araya, 1983).
During the cruises of the Minerva I was not able to see large specimens, neither in the summer nor in the winter,but their presence in the area is testified by two specimens stranded at Santa Margherita Ligure (Museum of Natural History of Genoa; a female 59 cm ML studied by Issel, 1925) and from recent observations during offshore sport fishing (Orsi and Fida in preparation).

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V-III5

Etude comparative de la relation taille-poids de *Eledone cirrhosa* des Mers Catalane et Tyrrhenienne Septentrionnale

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Eledone cirrhosa (Lamarck, 1798) est un octopode commun en Méditerranée occidentale. Diverses études sur quelques uns des aspects de sa biologie ont été réalisées dans ce secteur (Mangold-Wirz, 1963; Sánchez 1979; Moriyasu, 1983; Fedi 1988, parmi tant d'autres). Etant donné que c'est également une espèce commune et bien connue de l'Atlantique Nord, un travail de comparaison entre les peuplements atlantiques et méditerranéen a été mené à bien (Boyle et al., 1988). On y a remarqué quelques différences entre les deux peuplements: dans la morphométrie et dans le cycle de vie. Malgré ces nombreuses études, aucune n'a jamais effectué de travail comparatif entre les divers peuplements méditerranéens.
A partir d'information recueillie, d'une part par l'Institut des Sciences de la Mer de Barcelone au cours de l'année 1989 sur des pêches commerciales au chalut réalisées entre 72 et 630 m; d'autre part L'Universite de Pise sur des pêches au chalut effectuées en 1986 et 1987 entre 5 et 600 m de profondeur, on a procédé à une comparaison des rapports taille-poids pour les mois où l'on avait des échantillons des deux provenances. Nous sommes bien conscients que pour mener à bien une comparaison correcte, il faut disposer de données relevant de la même méthodologie, sur un même laps de temps. Cependant, nous pensons qu'une première approche du problème peut nous donner un point de départ pour analyser et connaître les peuplements d'Eledone cirrhosa en Méditerranée. Pour comparer les deux peuplements, on a pris en compte la relation entre la longueur du manteau (LDM) et le poids total (W), et on a comparé les données des deux peuplements (que nous appellerons catalan et tyrrhénien) sur un même mois; puis les échantillonnages réalisés en mer Tyrrhénienne en 1986 et 1987 entre eux. Les paramètres de la courbe de régression LDM/W ont été calculés avec l'équation: W= a*LDM**b.

MALES

Année/mois	R	A	B	VB	N
86/Mars	0.963	0.459	2.627	0.002	275
87/Mars	0.954	0.364	2.742	0.007	102
89/Mars	0.901	0.501	2.630	0.061	17
86/Avril	0.808	1.561	2.105	0.087	29
87/Avril	0.980	0.449	2.608	0.003	81
89/Avril	0.928	1.235	2.218	0.079	21
86/Septembre	0.927	0.717	2.334	0.002	524
87/Septembre	0.925	0.452	2.536	0.006	198
89/Septembre	0.951	0.999	2.338	0.018	35
86/Novembre	0.933	0.369	2.650	0.005	227
89/Novembre	0.907	0.831	2.535	0.034	43
FEMELLES					
86/Mars	0.931	0.438	2.686	0.004	289
87/Mars	0.964	0.264	2.886	0.007	96
89/Mars	0.901	0.828	2.556	0.039	41
86/Avril	0.940	1.276	2.221	0.025	28
87/Avril	0.967	0.316	2.780	0.004	146
89/Avril	0.957	1.989	2.120	0.022	30
86/Septembre	0.929	0.630	2.416	0.002	489
87/Septembre	0.947	0.397	2.614	0.003	242
89/Septembre	0.954	0.780	2.634	0.020	37
86/Novembre	0.929	0.518	2.482	0.004	230
89/Novembre	0.948	0.565	2.928	0.018	56

R=Coefficient de la corrélation, A,B=paramètres de la régression; VB=variance de la pente de la courbe; N=nombre d'individus.
Les deux courbes ainsi obtenues ont été comparées au moyen du test de Student.

MALES				FEMELLES			
t	gl	mois	années	t	gl	mois	années
1.181	373	Mars	86/87	1.941	381	Mars	86/89
0.426	115	Mars	87/89	1.548	133	Mars	87/89
0.011	288	Mars	86/89	0.631	326	Mars	86/89
1.668	106	Avril	86/87	3.292	170	Avril	86/87
1.362	98	Avril	87/89	4.156	172	Avril	87/89
0.275	46	Avril	86/89	0.466	54	Avril	86/89
2.258	718	Septembre	86/87	2.755	727	Septembre	86/87
1.400	229	Septembre	87/89	0.132	275	Septembre	87/89
0.034	555	Septembre	86/89	1.489	522	Septembre	86/89
0.585	266	Novembre	86/89	2.989	282	Novembre	86/89

t=t de Student; gl=degrés de liberté (pour un niveau de signification de 0.05 la valeur de t est de 1.96).

Nous pouvons observer, dans les mâles, que le t de Student n'est différent de façon significative que dans un cas dans les deux échantillonnages du mois de septembre recueillis en mer tyrrhénienne. Les comparaison effectuées sur les échantillonnages réalisés en mer tyrrhénienne et en mer catalane, ne comportent en aucun cas de différence significative. Dans les cas des femelles, 4 comparaisons apparaissent différentes: de façon significative: celle du mois d'avril entre les deux échantillonnages tyrrhéniens , celle de l'échantillonnage tyrrhénien de 1987 avec le catalan de 1989, celle des deux échantillonnages tyrrhéniens du mois de septembre, enfin, celle qui a été réalisée sur les échantillonnages catalan et tyrrhénien du mois de novembre présente de différence significative également. Le fait que peu de différences apparaissent entre les divers échantillonnages (5 sur 20) et qu'elles surviennent pour la plupart dans des échantillonnages réalisés sur la même zone, nous amène à penser que le rythme de croissance en taille et poids est vraisemblablement similaire pour les peuplements des mers Catalane et Tyrrhénienne Septentrionale. Une légère variation d'une année sur l'autre pourrait éventuellement être dûe à des conditions d'environnement différentes.

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