Occurence of the unihorn octopus *Scaergus unicirrhus* in the Sicilian Channel. II - Bathymetric distribution

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Very little is known about the vertical distribution of the unihorn octopus *Scaergus unicirrhus* Orbigny 1840, within the Mediterranean Sea (MANGOLD-WIRZ, 1963 ; SANCHEZ, 1986 ; MANGOLD & BOLETZKY, 1987), and information is particularly poor as regards the Sicilian Channel (JEREB & RAGONESE, 1990).

Although trophic and/or reproductive related vertical migrations are generally reported for octopuses, they have only been hypothesized for this species (Verany, in MANGOLD-WIRZ, 1963; ROPER *et al.*, 1984), as no direct evidence was available.

An attempt to indirectly validate this assumption of vertical migrations was made, using data collected during two years (May 1985 to February 1987) of seasonal, randomly stratified trawl surveys carried out within the Sicilian Channel (daily hauls of 1 hour duration ; cod-end mesh size- 20 mm/side ; see LEVI, 1990 for further details).

The analysis if the yield maps in numbers showed some seasonal variation in the distribution pattern of the unihorn octopus (dig.). Due to the geographical and seasonal constraints however, a correlation of this variation with a migratory habit was not clear.

The seasonal changes in the mean values of the catches in number (C), of the individual body weight (BW) as well as those of the mantle length (DML) and of the gonadosomatic indices (GW/BW) have been analyzed for different bathymetric strata (each stratum = 50 m.), for both sexes taken separately. A great variability was noticed and no cyclic pattern was identified, while only a slight correlation existed between the variables considered, which was almost never significant (at 95%) considering both the linear (Pearson coefficient : P) and the rank (Spearman coefficient : S) statistical approach utilized (see SOKAL & ROHLF, 1981, for statistical terminology). The gonadosomatic index in females and the numerical value of the catches in males appeared to be significatively correlated with depth (S = -0.428 and S = -0.445 respectively) only when both years were considered as a whole (i.e., combining seasonal data).

Basically, the abundance as well as the size variation and the maturity stages seem to be quite independent from bathymetry as well as from seasonal cycles.

Information on the physical-chemical characteristics of the water in the three main "sub-areas" explored (eastern, central and western, respectively) were also analyzed in relation to the species distribution. Although remarkably "adaptable" to different relatively "cold" (13-14 Ca) and "salty" (S > 38%) waters definitely below the upper limit of the thermocline, which is situated around 50 m depth. In fact only one specimen was caught above this limit, at 46 m depth. These results tend to support a relative sedentary life-style for this species as well as a great adaptability, as already observed in other areas (PERES & PICARD, 1964), confirming also MANGOLD's opinion (MANGOLD-WIRZ, 1963) that *S. unicirrhus* is unlikely to undergo substantial migrations.

The observed distibutional variations in the present case are more likely to be related to the sampling "noise" and to the multispecific aims of the research program.

Taking into consideration the observed difficulties in the sampling procedures and the problems related to the "interpretation" only mark and recapture experiments would give a satisfactory answer about the existence of a migratory behavior for *Scaerqus unicirrhus*.

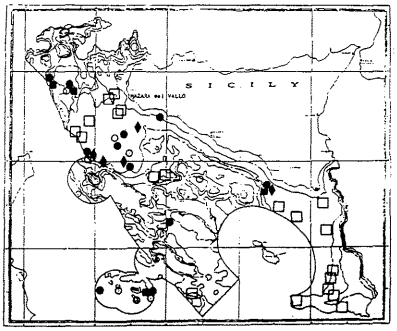

Fig. - Occurence of *S.unicirrhus* in the different seasons.

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On the association of the unihorn octopus *Scaeurgus unicirrhus* with white corals (Anthozoa-Madreporaria) in the Sicilian Channel

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The madreporarian formations (also know as the "white coral") which characterize some bathyal bottoms of the Mediterranean basin (PERES & PICARD, 1964) have been implicity looked at as a possible habitat for the productive activity of some bathyal cephalopods (MANGOLD-WIRZ, 1963). Among them is the unihorn octopus *Scaeurgus unicirrhus* Orbigny, 1840, whose vertical distribution goes from shallow waters to 800 m depth (MANGOLD-WIRZ, 1963; SANCHEZ & ALVAREZ, 1988).

Data collected during two years (May 1985 to February 1987) of seasonal, randomly stratified trawl surveys carried out in the Sicilian Channel (daily hauls of 1 hour duration; cod-end mesh size 20 mm/side; see LEVI, 1990 for further details), evidenced a wider distribution and a greater abundance of this species within the area investigated than previously believed.

Information from the literature (BOURGOIS & FARINA, 1961 and others) as well as from the local fishermen, indicate that the white coral formations are quite common and rather wide-spread within the Sicilian Channel.

In this context it seemed interesting to investigate the association of the unihorn octopus with the madrepore reefs (mainly *Madrepora oculata* and *Lophelia pertusa*), which seemed to be supported by direct as well as indirect evidence.

As direct evidence, data collected showed :

a) - *S. unicirrhus* catches were more abundant on rough bottoms, where the hauls could not be repeated;

b) - shelf borders, continental slopes and slopes of submerged mounts ("guyots") seem to be the preferred habitat both for the unihorn octopus and the madrepores ;

c) - females in advanced maturity stages (i.e., with "large" but still "striated" eggs of about 2-2.5 mm length in the ovary) were frequently observed (pers. obs.), but only 6 specimens of the 206 examined carried some "smooth" eggs, indicating a fully mature condition (MANGOLD-WIRZ, 1963);

d) - the percentage of females in the catches decreased linearly (from 70% to -0) with the increasing size of the specimens which, together with point c), suggests a decreasing probability of mature females to be captured;

e) - an attempt of cluster-analysis among some specific "biocenosis indicators" showed a relation between *S. unicirrhus* and *Cidaris cidars*, an echinoderm closely associated with the white coral community (PERES & PICARD, 1964);

Among indirect evidence, the following information is presented :

a) - although eggs of this species were never recorded in nature, laboratory experiments indicate that females lay their eggs on hard substrata (BOLETZKY, 1984);

b) - juveniles are supposed to be planktonic but their occurrence in plankton samples is extremely rare (ROPER, 1977);

c) - newly hatches juveniles have 4 suckers on the arms instead of the 3 typical for other octopuses with a planktonic stage, and they can show very early the "sedentary" behavior of the adults.

These observations allow us to hypothesize on the following life cycle scheme (see also the Fig.):

1 - *Scaeurgus unicirrhus* mature females choose the madreporian reefs to spawn and subsequently care for the eggs;

2 - Once the young hatch, juveniles spend a moderately long period of time on the same bottom, where it is presumably easier to minimize predation pressure;

3 - sub-adult individuals spread over wider areas and different bottoms, where they continue to grow and approach sexual maturity.

Although other kinds of information are needed to confirm the above mentioned hypothesis (i.e., underwater films, experimental "bow-net" fishery on the "rough" bottoms), this is likely to explain the peculiar distribution observed for the unihorn octopus within the Sicilian Channel.

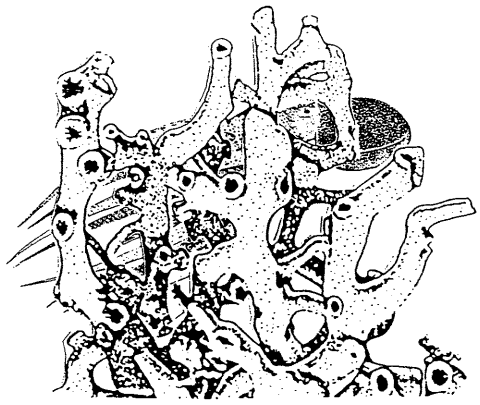

Fig.- An hypothetical reconstruction of the association of *S. unicirrhus* and madreporian reefs (*Lophelia pertusa*). Drawings are not to scale.

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