

**Analysis of the Sexual Development of *Eledone cirrhosa*  
(Cephalopoda, Octopoda) in the Northern Tyrrhenian Sea through two  
maturity indices**

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An analysis of the monthly development of two maturity indices was carried out as a preliminary phase of a study on the sexual maturity of *Eledone cirrhosa* (Lam., 1798). Through the assessment of the relative weights of the components of the reproductive system it has been possible to utilize the gonadosomatic index (MORIYASU, 1988) and the Hayashi index (HAYASHI, 1970) modified for octopuses according to GUERRA (1975) (Table 1). Eleven monthly samplings were carried out from March 1989 to February

Table 1

	Gonadosomatic index (GSI)	Hayashi index (HI)
♂♂	$((tW + NW)/W) \cdot 100$	$NW/(NW + tW)$
♀♀	$(oW/W) \cdot 100$	$odW/(odW + oW)$

W = specimen weight; tW = testis weight;  
oW = ovary weight; NW = Needham sac mass weight;  
odW = oviducts and annex glands weight.

1990, collecting 762 specimens (313 males, 379 females and 70 undetermined specimens). Samples were collected using a trawl-net in the Northern Tyrrhenian Sea, between the Isles of

Elba and Giannutri at depths ranging between 92 and 350 m, with highest frequencies between 100 and 130 m. Through the size-frequency distribution analysis (BHATTACHARYA, 1967), it was possible to single out a cohort to be followed every month. First the maturation stages were determined through the macroscopic analysis of the gonads (MANGOLD-WIRZ, 1963; MORIYASU, 1988) and then they were compared with the two indices. Table 2 shows the existence of a good correlation, since a well defined mean value index corresponds to each maturation stage.

Table 2

	♂♂				♀♀			
	GSI	SD	HI	SD	GSI	SD	HI	SD
Immature specimens	2.130	2.017	0.132	0.045	0.277	0.138	0.135	0.037
Maturing specimens	8.061	1.727	0.206	0.096	2.331	1.851	0.101	0.035
Mature specimens	7.386	1.203	0.654	0.163	8.885	4.017	0.057	0.011

The GSI enables only two phases to be distinguished in the maturation process of the males, as previously reported by MORIYASU (1988). Fig. 1 shows the monthly variation of the maturity indices. The graphics refer to two different cohorts, as the cohort singled out in the previous period of investigation disappears from the fishery area after reaching the reproductive period (BOYLE, 1983). For the males, during the months of June, July and August, the HI exceeds the value of 0.5, above which the

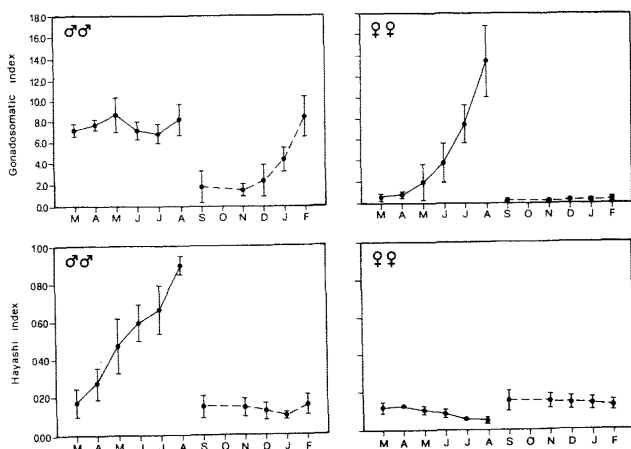


FIG. 1

males are supposed to be mature (MORIYASU, 1988). Mature females are found in a shorter period with respect to the males, the peak of maturity is shown in August (GSI = 13.45, HI = 0.052). From September to February the analyzed data refer to a new cohort, the individuals are at the beginning of the maturation stages. By observing the global variation of the indices, it is possible to point out that the maturation process starts previously in the males with respect to the females. Essentially our results are in agreement with those reported by PALUMBO & WURTZ (1983-'84) in the Ligurian Sea and by MORIYASU (1988) in the Gulf of Lions, even if some differences have been found relative to the period of maturity: in the Gulf of Lions the maturation process starts earlier in both sexes and mature females are found for a longer period.

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