

Distribution and Reproduction of *Sepia elegans* in the North Tyrrhenian Sea

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Abstract - *Sepia elegans* is relatively abundant south of Livorno between depths of 25 and 285m. During the sampling period about 50% of the specimens were mature, indicating an extended reproductive period.

The population of *Sepia elegans* was sampled over a total of 8475 km² between a depth of 12 and 700 m along the Tuscan coast, from the outlet of the Magra River to the northern coast of Elba Island up to the limits of the Corsican territorial waters. Four trawl surveys, each consisting of 30 one-hour daytime hauls, were made in the spring (late March-early May) and summer (late August-early September) between 1985 and 1986, using a drag net with a 20 mm mesh bag. The area was subdivided into homogenous blocks according to the type of bottom and bathymetric range, and the hauls were distributed between the blocks proportionally to the respective areas and positioned randomly. *Sepia elegans* was captured between 25 and 285 m and most frequently between 60 and 120 m. It was most abundant south of Livorno - on sandy muddy bottoms in the circalittoral level related with the VTC biocenosis and with the DL biocenosis (Peres & Piccard, 1964) bathyal layers - and least abundant north of Livorno. This may have been due to the outlets of the Magra, Serchio and Arno rivers which modify the substrate and degree of salinity.

The hauls brought up 991 specimens weighing a total of 8.38 kg. The mantle length (M.L.) of the largest male was 52 mm, that of the largest female 65 mm. Males and females with an M.L. greater than 45 mm and 52 mm, respectively, were collected in the summer when the species was most abundant - about 350 specimens per trawl as compared to about 100 in the spring. Despite the notable difference between the two seasons, the bathymetric preferences of the species can nonetheless be compared. In the spring the cuttlefish were mainly found between 100 and 200 m, while their preference was not so obvious in the summer; in 1985 they were found predominantly between 50 and 100 m and in 1986 between 100-200 m (the springtime depths). In the summer most of the larger cuttlefish preferred the limits of their specific bathymetric range.

The sex and degree of maturity was determined from a subsample equally distributed by size and bathymetric layers. A total of 166 males and 231 females were checked, grading the degree of maturity according to Mangold's (1963) scale. The percentage of immature (stage 1) males and females was highest in the summer. In both seasons about 50% of the population was ready to spawn, but the greater percentage of mature males occurs in the spring and the females in the summer. The Table shows the maturity stages (in %) of individuals divided by length classes and season.

PERCENTAGES OF SEXUAL MATURITY STAGES																			
M.L. mm	MALES						FEMALES												
	SPRING			SUMMER			SPRING			SUMMER									
	1	2	3	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6	
20	70	20	10	86.7	10	3.3	79.7	2.1	3.8	3.1	11.3	100							
30	17.2	10.3	72.5	24.4	46.3	29.3	36.4	4	8	15.6	28	8	59.1	4.1	18.4	8.2	8.2	2	
40	7.1	18.6	74.3	2.4	21.4	76.2	4.2	4.1	16.7	54.2	20.8				3.4	10.3	46.6	39.7	
50						100						66.7	33.3			3.2	9.7	35.5	51.6
60																		33.3	66.7

The maturity of both sexes is linked more to size than to season, despite the fact that equally mature specimens can differ greatly in size and that beyond a certain size all cuttlefish are mature.

A comparison of equally long small and medium-sized specimens collected in the spring and summer revealed a precocity in the spring specimens. Richard (1966, 1971) observed in reared *Sepia officinalis* that low light intensity and short photoperiod, i.e. a winter-like situation, stimulates sexual maturity, while high temperature, i.e. a summer-like situation, stimulates somatic growth. Our observations may reflect the antagonistic roles of light and temperature as pointed out by Richard.

The degree of maturity of the females was calculated from the size of their largest eggs. Using this method the intermediate stages (2-3-4) of maturity are poorly represented, which could be due to the rapidity with which the eggs develop to their maximum size.

Though our data refer only to the spring and summer, these allow us to conclude that *Sepia elegans* reproduces all year long as Mangold (1963) suggests. They also do not seem to migrate in order to reproduce.

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