

Mercury contents in *Eledone cirrhosa* from the Northern Tyrrhenian Sea

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It is known that the cinnabar anomaly of Mount Amiata (Italy) strongly influences the mercury content in the abiotic and biotic components of the ecosystem of the Northern Tyrrhenian Sea. (BALDI *et al.*, 1979; BARGHIGIANI *et al.*, 1991).

Hg analyses of several different species of marine organisms used for food from the area shown in Fig. 1 demonstrated a phenomenon of metal accumulation to concentrations often much higher than $0.7 \mu\text{g g}^{-1}$ fresh weight, the maximum limit accepted by the EC for the edible parts of marine organisms (BARGHIGIANI *et al.*, 1991).

The subject of this paper is the study of Hg concentration in muscle tissue of *Eledone cirrhosa*, a small octopus-like cephalopod. This is the most abundant cephalopod species in the Northern Tyrrhenian Sea, it is widespread in the Mediterranean Sea, and is also largely used as human food, with an average production of 100 t per year just by the Porto S. Stefano fishing fleet (DE RANIERI *et al.*, 1988).

The sampling of specimens was performed monthly by trawl surveys from March 1989 to August 1990 in the study area indicated in Fig. 1. Length, weight, sex and maturative stage were determined for each specimen. Hg analyses were performed on muscle tissue. Total Hg was determined by atomic absorption spectrometry on cold vapour before sample mineralization with nitric acid in a pressurized digestion system at 120°C for 6 h.

From Fig. 2 it appears that *Eledone cirrhosa* accumulated high amounts of mercury which were correlated with the specimens size, notwithstanding the short life cycle of just two years (BELCARI *et al.*, 1990). It must be pointed out that many specimens had mercury contents over the EC limit. On the basis of the maturative stage it was possible to single out a single cohort and to follow it monthly during the whole life cycle; Fig. 3 reports the average monthly Hg concentrations related to the studied cohort throughout the life cycle. The analyses on males and females (Fig. 4) demonstrated that no statistically significant difference in mercury accumulation existed between the two sexes. The comparison with samples at the same maturative stage collected in the Ligurian Sea (Table 1), about 100 miles north of the study area, showed a greater Hg accumulation in our specimens which was statistically significant ($t=6.582$; $p<0.001$).

In conclusion, from our results it appears that this organism is a strong Hg concentrator and that a high consumption of specimens collected in contaminated areas such as the northern Tyrrhenian Sea could be dangerous for human health. Furthermore, due to its particular life cycle *Eledone* could be useful as a Hg biomonitor for evaluating environmental variations of the metal at different times. Indeed, according to what was observed by BELCARI *et al.* (1990), on the basis of the month of collection and the maturative stage, it is possible to evaluate approximately the age of the specimens.

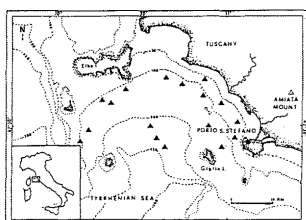


Fig. 1. Study area with sampling stations.

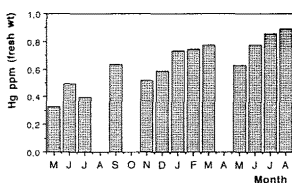


Fig. 3. Average monthly Hg concentration of samples of a single cohort.

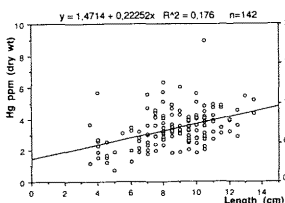


Fig. 2. Hg concentration versus length of organisms of a single cohort.

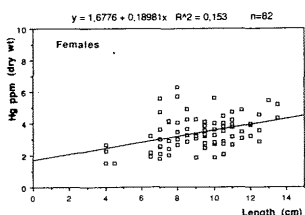
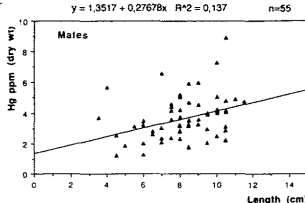


Fig. 4. Hg concentration versus organism length in males and females of a single cohort.

Table 1 - Comparison with samples at the same maturative stage collected in the Ligurian sea.

	STUDY AREA	LIGURIAN SEA
No. of specimens	15	10
Length cm	6.5-9	8-10
Hg (ppm \pm S.D. d.w.)	3.310 \pm 1.252	1.136 \pm 0.215

REFERENCES

- BALDI F., BARGAGLI R. and RENZONI A., 1979. - The distribution of mercury in the surficial sediments of the Northern Tyrrhenian Sea. *Mar. Pollut. Bull.* 10, 301-303.
- BARGHIGIANI C., PELLEGRINI D., D'ULIVO A. and DE RANIERI S., 1991. - Mercury assessment and its relation to selenium levels in edible species of the Northern Tyrrhenian Sea. *Mar. Pollut. Bull.* 22, 406-409.
- BELCARI P., FEDI E. and SARTOR P., 1990. - Analysis of the sexual development of *Eledone cirrhosa* (Cephalopoda, Octopoda) in the northern Tyrrhenian Sea through two maturity indices. *Proc. 32th Congress I.C.S.E.M.*, Perpignan, 15-20 October 1990. 32 (1), 241.
- DE RANIERI S., BELCARI P., BIAGI F., MORI M. and PELLEGRINI D. 1988. - Valutazione delle risorse demersali tra l'Isola d'Elba e l'Isola di Giannutri: primi risultati delle campagne 1985. In: *Atti seminari per la pesca e l'acquacultura*. Ministero Marina Mercantile and C.N.R. Eds. Roma 1986. Vol. 3, 1167-1196.