

# ORGANOCHLORINE COMPOUNDS AND STABLE ISOTOPES DO NOT SUPPORT SEGREGATION BETWEEN WESTERN MEDITERRANEAN BOTTLENOSE DOLPHIN SUBPOPULATIONS

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## Summary

To study the population structure of bottlenose dolphins and potential isolation of subpopulation units in the western Mediterranean, we investigated geographical variation in isotopic patterns ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) and concentration of organochlorine (OC) compounds (PCBs, DDTs, and HCB) present in the body tissues of bottlenose dolphins (*Tursiops truncatus*) from different regions: Catalonia, Valencia and the Balearic Islands. No significant ( $P>0.05$ ) differences were observed neither in the OC concentrations,  $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$  nor in PCB profiles, thus giving no support to the existence of long-term segregation between the investigated putative subpopulations.

**Keywords:** Bottlenose dolphin, Mediterranean Sea, Organochlorines, Stable isotopes

## Introduction

In mammals, 90% of organochlorine intake is via food, for which reason their pollutant profile reflects that of the waters in which they live and feed. Therefore, populations inhabiting different geographical areas tend to show qualitatively and quantitatively different pollutant loads. In this study we determined stable isotopes and concentration and profile of the PCBs present in the blubber of bottlenose dolphins inhabiting different areas in the western Mediterranean with the aim of investigating regional variation and improving understanding on population structure.

## Material and methods

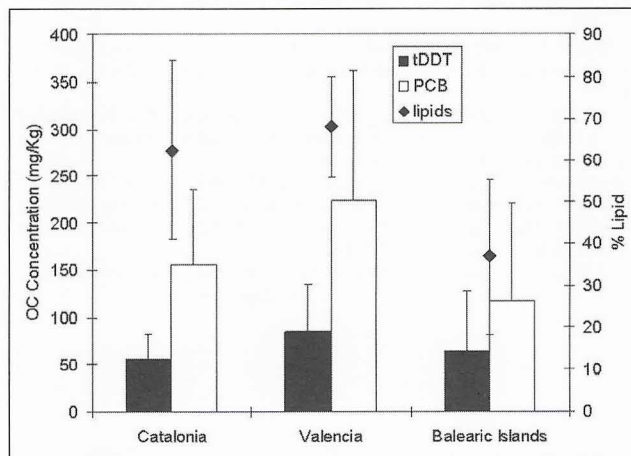
Stranded bottlenose dolphins from the Mediterranean coasts of Spain [Catalonia (n=8), Valencia (n=10), Balearic Islands (n=7)] were sampled in 1990-2000. Sex and length of the individuals were recorded. Organochlorine compounds were measured in blubber by gas chromatography and electron capture detection. Concentrations were expressed as mg/kg calculated on the basis of extractable fat. Stable isotopes were analysed by EA-IRMS (elemental analyser isotope ratio mass spectrometry) in skin; results were expressed in standard  $\delta$  notation relative to carbonate PeeDeeBelemnite and atmospheric nitrogen, where:

$\delta^{13}\text{C}$  or  $\delta^{15}\text{N}(\text{‰}) = (R_{\text{sample}}/R_{\text{standard}} - 1) \times 1000$  and  $R = (^{13}\text{C}/^{12}\text{C})$  or  $(^{15}\text{N}/^{14}\text{N})$ , respectively.

Data were tested for normality with a Kolmogorov-Smirnov test of goodness of fit. As the data distributed normally, differences in lipid content and organochlorine compounds were examined between groups using analysis of variance (ANOVA). Discriminant analysis was used to test the significance of multivariate differences in PCB patterns (relative abundance of the various congeners in relation to the tPCB) between groups. All calculations were carried out using SPSSX statistical package.

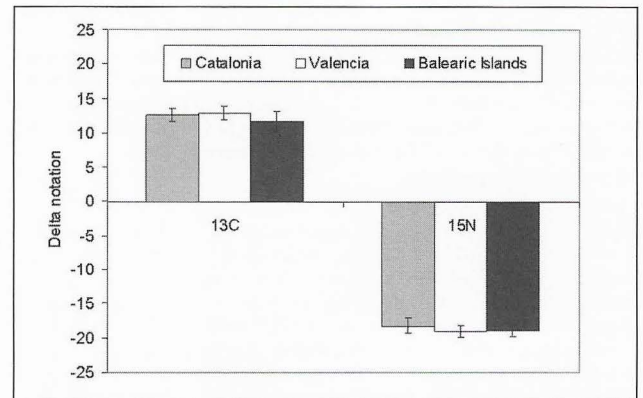
## Results and discussion

Figure 1 shows the mean and the standard deviation of the percentage of lipid extraction and organochlorine concentrations in blubber.



**Fig. 1.** Concentrations (mean + SD) of PCBs, tDDT and %lipid, in blubber samples of bottlenose dolphins from different Mediterranean areas.

Figure 2 shows the mean and the standard deviation of  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  in the skin of bottlenose dolphins, split by locality of sampling.



**Fig. 2.** Mean  $\pm$  SD of  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  in skin samples of bottlenose dolphins from different Mediterranean areas.

No significant (anova,  $P>0.05$ ) differences were found between areas either in the concentration of any of the OCs,  $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$  or in the PCB profile. Dolphins from Catalonia and Valencia showed higher OC values than Balearic individuals, but the difference was not significant ( $P>0.05$ ) because the variability within groups was very high. This high within-group variability is attributed to the heterogeneous age and sex composition of the sample, variables that strongly influence individual pollutant load (1).

The analyses failed to show any clear segregation between the Mediterranean subareas, although comparisons were statistically weak because of the high individual variability and insufficient number of samples in some subareas. Further research is needed to improve knowledge on bottlenose dolphin population structure in the region.

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## References

1 - Aguilar A., Borrell A., and Pastor T., 1999. Factors affecting variability of persistent pollutant levels in cetaceans. *J. Cetacean Res. Manage.*, (Special Issue 1) : 83-116.