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# Biometric study of small cetaceans in Galicia (NW Spain)

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## INTRODUCTION

The morphological study of cetaceans provides information on growth rates, sexual dimorphism, or even differences between populations. This study aims to determine if there are differences and similarities between fin areas (dorsal fin, flippers, flukes and all these together) of four species: common dolphin (*Delphinus delphis*), striped dolphin (*Stenella coeruleoalba*), bottlenose dolphin (*Tursiops truncatus*) and harbour porpoise (*Phocoena phocoena*). In addition, within each species it is intended to determine if there is a relationship between total length (TL) and fin areas and if there is some sexual dimorphism.

## MATERIAL & METHODS

Biometrics were recorded from stranded animals from 1990 to 2020. Biometrics were obtained with a meter quote and the areas with ImageJ program. Statistical analyzes were performed in RStudio. Differences and similarities between fin areas and TL of these species were analyzed using multivariate analysis, Tukey's test, indices and correlations (*D. delphis* (n=119), *S. coeruleoalba* (n=12), *T. truncatus* (n=16) and *P. phocoena* (n=23)). Sexual dimorphism was analyzed by comparing available data (n=1293: up to 14 biometrics) (*D. delphis* (n=840); *S. coeruleoalba* (n=157); *T. truncatus* (n=175) and *P. phocoena* (n=121)) through various statistical analyses: descriptive statistics, simple sampling, stratified sampling, exploratory analysis and multivariate analysis.

## RESULTS

Dorsal fins and flukes of *D. delphis* and *S. coeruleoalba* do not present statistical differences between them, being considered a single group (Table 1). Furthermore, in these species TL is not well correlated with none of the fin areas, presenting variable fins morphology depending on age. In *T. truncatus* and *P. phocoena* there are statistical differences from the rest of the species. In addition, there is a high correlation between TL and area of the dorsal fin, flukes and the sum of all fins, so they either maintain a proportionality or the data available is not representative in terms of age (Table 2).

Adult males of *D. delphis* and *T. truncatus* are significantly larger than adult females, while in *P. phocoena*, adult females are the ones that present the largest size; indicating in the three species a clear sexual dimorphism in the TL (\* statistical differences). In *S. coeruleoalba* there is not statistical differences between males and females. The measurement of the tip of rostrum to mid-point of genital slit (B1) represents a sexual dimorphic character in all species studied. Other representative biometric of sexual dimorphism is the tip of rostrum to mid-point of umbilicus (B2).

Table 1. Tukey's test results.

Relation	Dorsal fin	Right flipper	Left flipper	Fluke
PPH - DDE	0,0043	0,0014	0,0001	0,1220
SCO - DDE	0,9738	0,4112	0,3904	0,9906
TTR - DDE	0,0000	0,0000	0,0000	0,0070
SCO - PPH	0,0493	0,5289	0,3564	0,3621
TTR - PPH	0,0000	0,0000	0,0000	0,0004
TTR - SCO	0,0000	0,0000	0,0000	0,0274

*P. phocoena* (PPH), *D. delphis* (DDE), *S. coeruleoalba* (SCO) and *T. truncatus* (TTR).

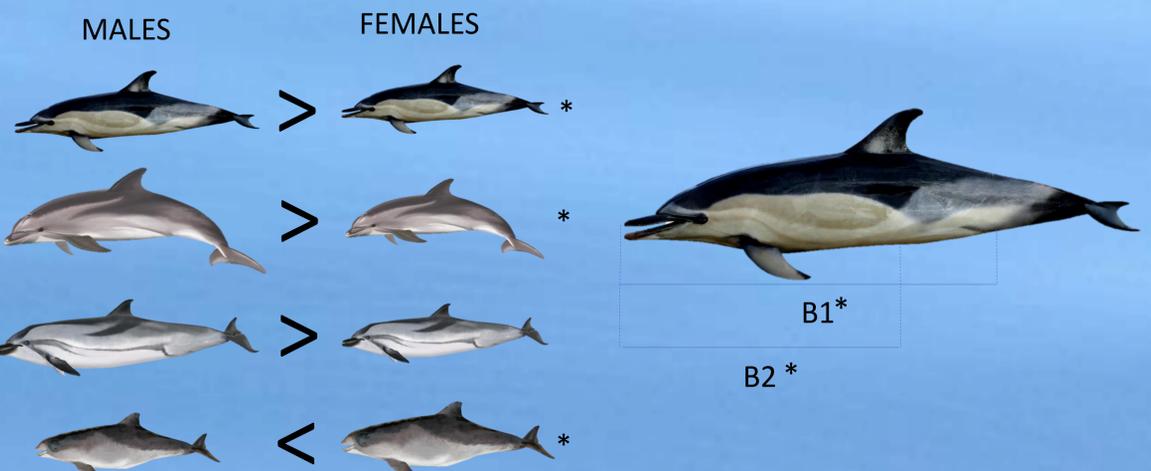


Table 2. Number of samples and determination coefficient for correlations of TL - fin areas.

	DDE		SCO		TTR		PPH	
	N	R <sup>2</sup>						
TL - Dorsal fin	49	0,61	11	0,77	11	*	7	*
TL - Flipper	189	0,71	21	0,74	23	0,89	34	0,61
TL - Fluke	43	0,63	10	0,81	10	*	7	*
TL - Sum of all fins	40	0,77	10	*	9	*	6	*

\*R<sup>2</sup> > 0,90. *P. phocoena* (PPH), *D. delphis* (DDE), *S. coeruleoalba* (SCO) and *T. truncatus* (TTR).

## CONCLUSIONS

In *D. delphis* and *S. coeruleoalba*, TL is not correlated with fin areas, so their fins have variable morphology depending on age.

In *T. truncatus* and *P. phocoena*, TL is well correlated with fin areas, so their fins either maintain a proportionality or the data available is not representative in terms of age.

Adult males of *D. delphis* and *T. truncatus* were significantly larger than adult females.

Adult females of *P. phocoena* were significantly larger than adult males.

The measurement of the tip of rostrum to mid-point of genital slit and the measurement of the tip of rostrum to mid-point of umbilicus are a sexual dimorphic character in all species studied.