

# Is extensive MHC class II diversity in striped dolphin (*Stenella coeruleoalba*) in the Mediterranean Sea shaped by recent epizootics?

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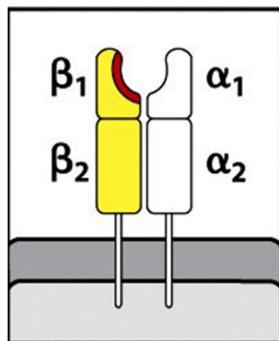
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## INTRODUCTION

The major histocompatibility complex (MHC) are highly polymorphic genes important for adaptive immunity. Due to their association with adaptation and fitness traits, MHC genes have been largely explored in evolutionary ecology and conservation genetics. The maintenance of high genetic diversity on MHC genes is attributed to the action of balancing selection driven by pathogens.

## METHODS

The analysis was performed on MHC class II DQA and DQB genes that code for antigen binding subunits of the membrane receptor.

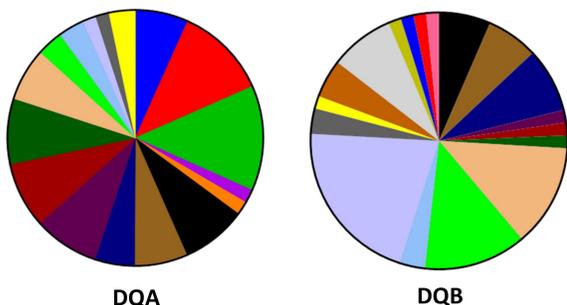


## RESULTS

1. Extraordinary variability with 17 DQA and 18 DQB alleles. There are 29 unique **genotypes** detected in 31 individuals

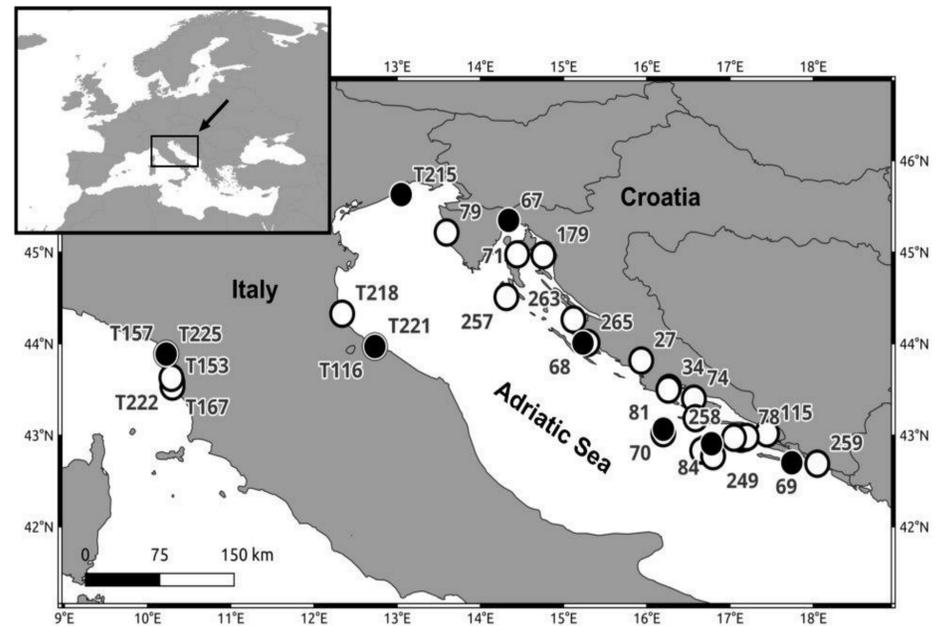
	27	34	71	73	74	78	79	81	89	115	146	179	213	244	246	249	257	258	259	261	263	265	T153 Lig	T157 Lig	T167 Lig	T170 Lig	T212 Lig	T214	T218	T221	T222 Lig
DQA	DQA*01		DQA*09	DQA*06	DQA*06	DQA*11	DQA*09	DQA*11	DQA*09	DQA*01	DQA*05	DQA*19	DQA*07	DQA*02	DQA*01	DQA*07	DQA*07	DQA*03	DQA*03	DQA*11	DQA*13	DQA*12	DQA*02	DQA*11	DQA*11	DQA*08	DQA*13	DQA*07	DQA*01	DQA*02	DQA*17
DQB	DQB*11	DQB*16	DQB*19	DQB*12	DQB*12	DQB*17	DQB*17	DQB*10	DQB*17	DQB*11	DQB*13	DQB*27	DQB*19	DQB*14	DQB*11	DQB*16	DQB*16	DQB*23	DQB*17	DQB*12	DQB*19	DQB*16	DQB*19	DQB*20	DQB*21	DQB*19	DQB*16	DQB*16	DQB*23	DQB*19	DQB*25

2. Atypically high DQA locus variability comparable to DQB, as demonstrated by **allelic richness**

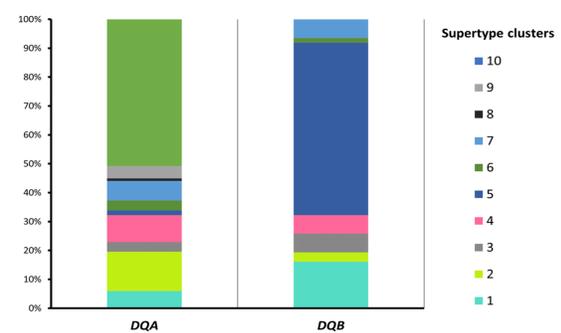


## SAMPLE

In this study we analysed MHC class II loci in 31 striped dolphin individuals from the Mediterranean Sea.



3. Genetic diversity was further extended to substantial functional diversity. Namely, translated alleles formed ten DQA and seven DQB **structural supertypes** capable of binding and presenting a broad range of antigens.



4. Strong influence of **balancing selection over species evolution** is indicated by homogenised allele frequencies, Tajima's D and tests based on non-synonymous to synonymous substitutions rate ratio (PAML, OmegaMap, HyPhy, MEGA)

5. Ewens-Watterson test provided compelling evidence of **recent selective pressure** acting on striped dolphin's DQA gene. The observed homozygosity (0.079) was significantly lower ( $p=0.006$ ) than the expected (0.125).

## HYPOTHESIS

We hypothesize that morbillivirus, which recurrently invaded Mediterranean population over last decades, exerted strong selective pressure on MHC class II DQ loci in striped dolphin. Accordingly, striped dolphin MHC class II genes are potentially interesting model to observe contemporary adaptation to environmental challenges.