

Molecular Adaptations in MMP Genes Underpin Decompression Sickness

Resistance in Cetaceans

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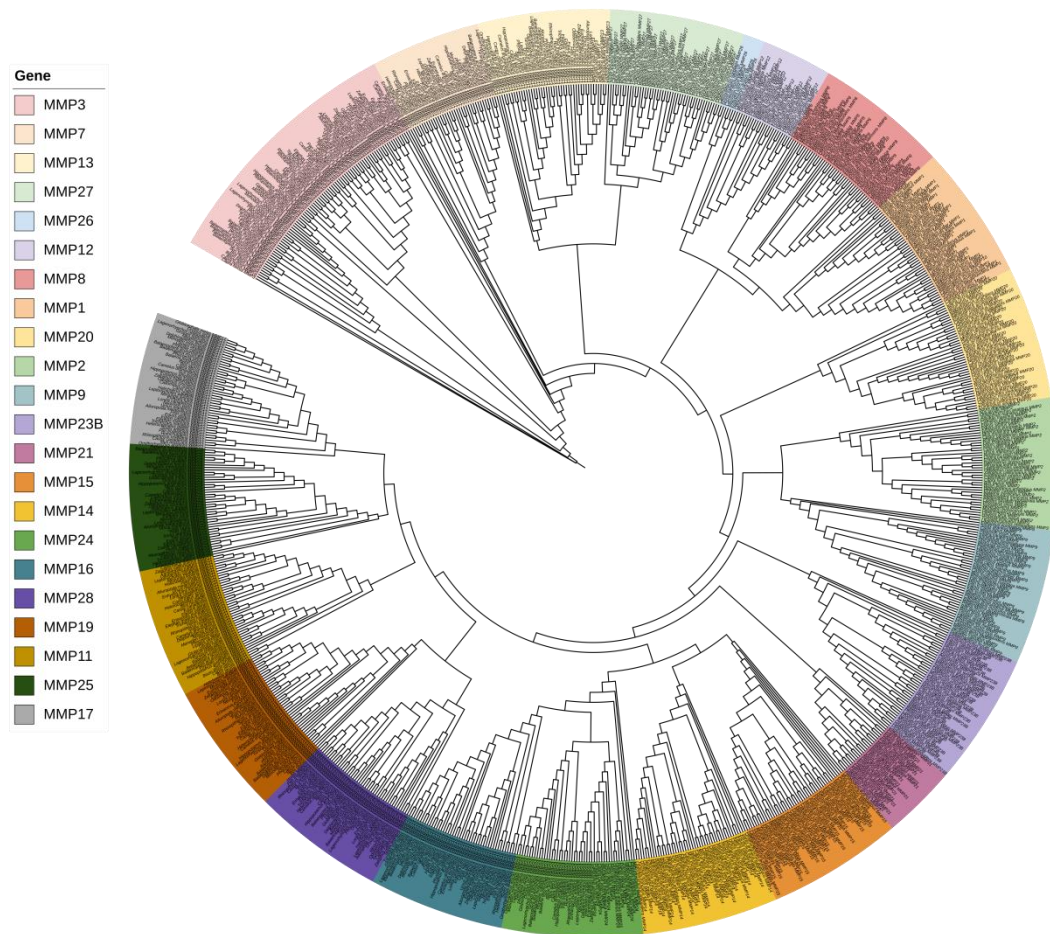


Fig S1. Phylogenetic Tree of MMPs. The phylogenetic relationships among MMPs genes were estimated using the maximum likelihood method. In the tree, different colors represent distinct MMP genes, each forming unique evolutionary branches. The clustering of MMPs genes reflects their classification into specific groups based on their structure and substrate specificity, such as collagenases, gelatinases, membrane-type MMPs, and stromelysins.

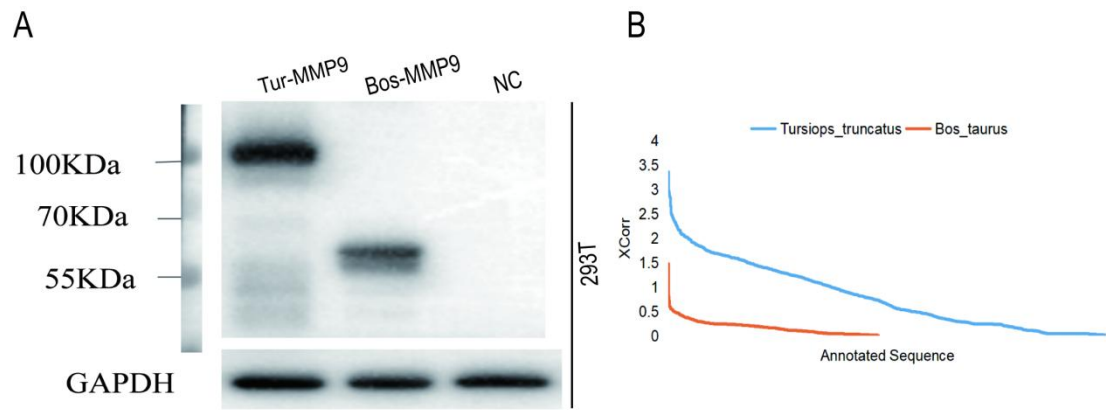


Fig S2. The post-translational modifications of overexpressed *MMP9* in *T. truncatus* and *B. taurus*. A: The overexpressed MMP9 protein bands of *T. truncatus* and *B. taurus* showed migration, suggesting potential post-translational modifications. B: The overexpressed protein bands were analyzed by mass spectrometry, and the identified peptide segments are displayed on the x-axis, with the y-axis representing the XCorr score, indicating the confidence of peptide identification. Blue represents *T. truncatus*, and yellow represents *B. taurus*. The peptide segments from *T. truncatus* not only show modification sites but also exhibit higher matching quality and confidence in the mass spectrometry data, suggesting stronger post-translational modifications. In contrast, most of the peptides from *B. taurus* lack clear modification markers and have lower matching quality, indicating lower levels of modification at these sites. The blots/gels displayed in the figure represent cropped versions. Full-length blots/gels are presented in Fig S4.

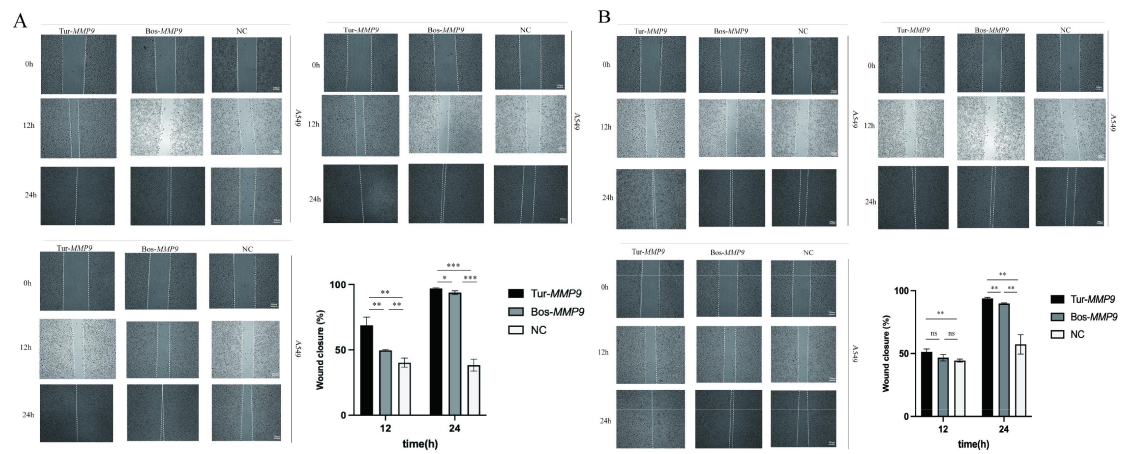


Fig S3. The overexpression of MMP9 in A549 cells was assessed for cell migration over a 0-24 hour period, with the experiment being repeated three times.

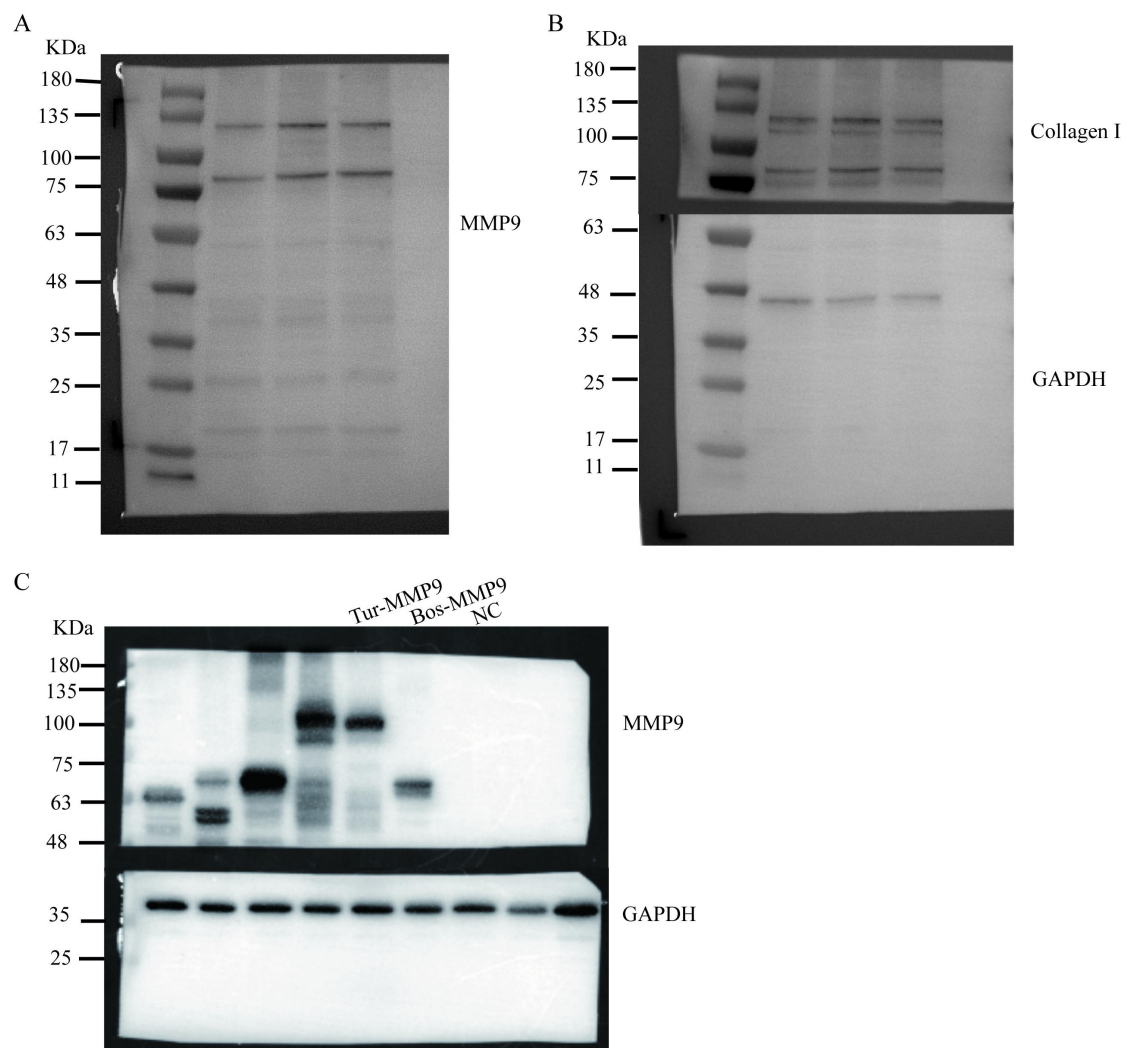


Fig S4. Full-length blots/gels of MMP9 in A549 cells (A); Collagen I , GAPDH in A549 cells (B) Full-length blots/gels of MMP9 in 293 T cells (C).

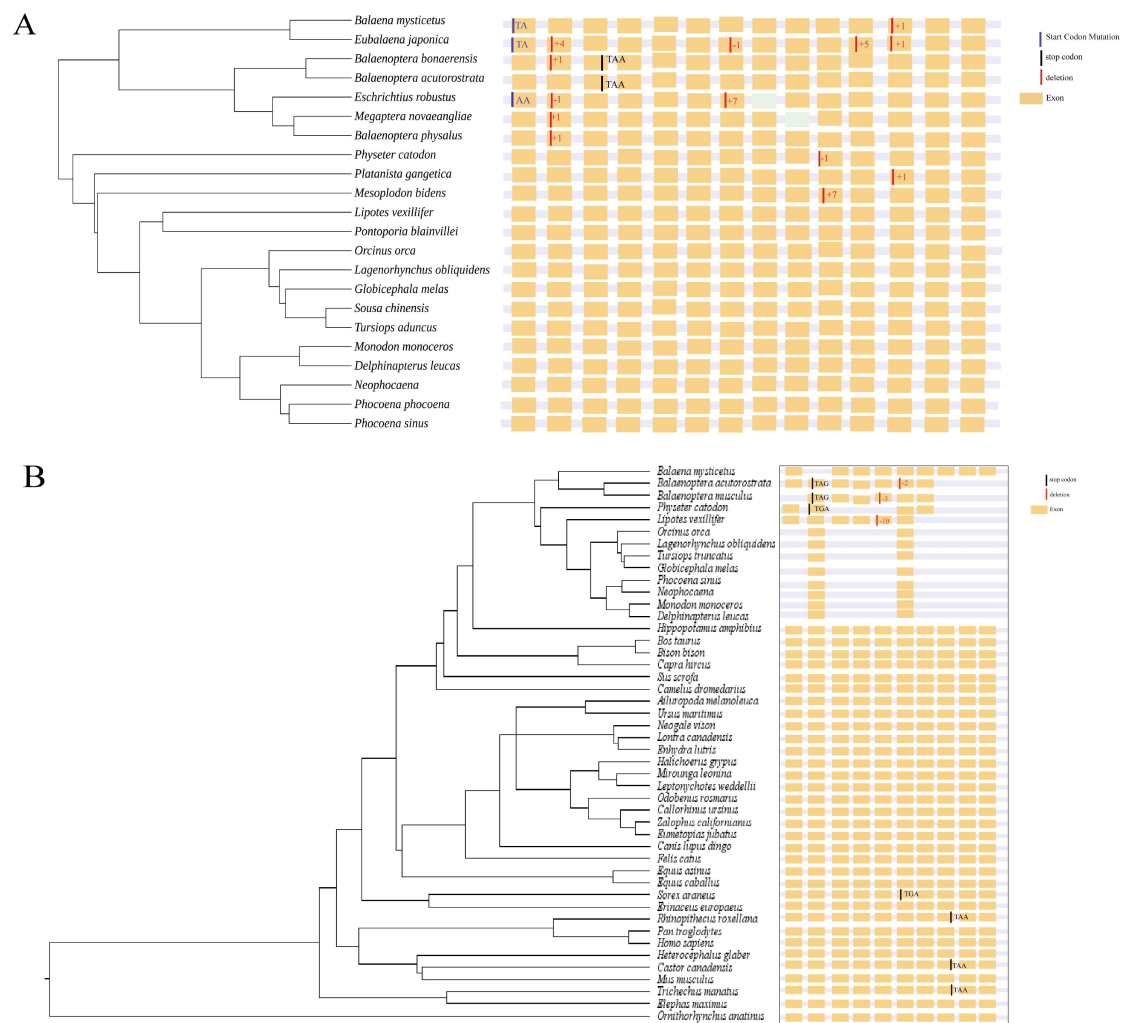


Fig S5. The frameshift mutations of *MMP20* in odontocetes and mysticetes (A); the frameshift mutations of *MMP12* in mammals, which are deleted in most cetaceans (B).

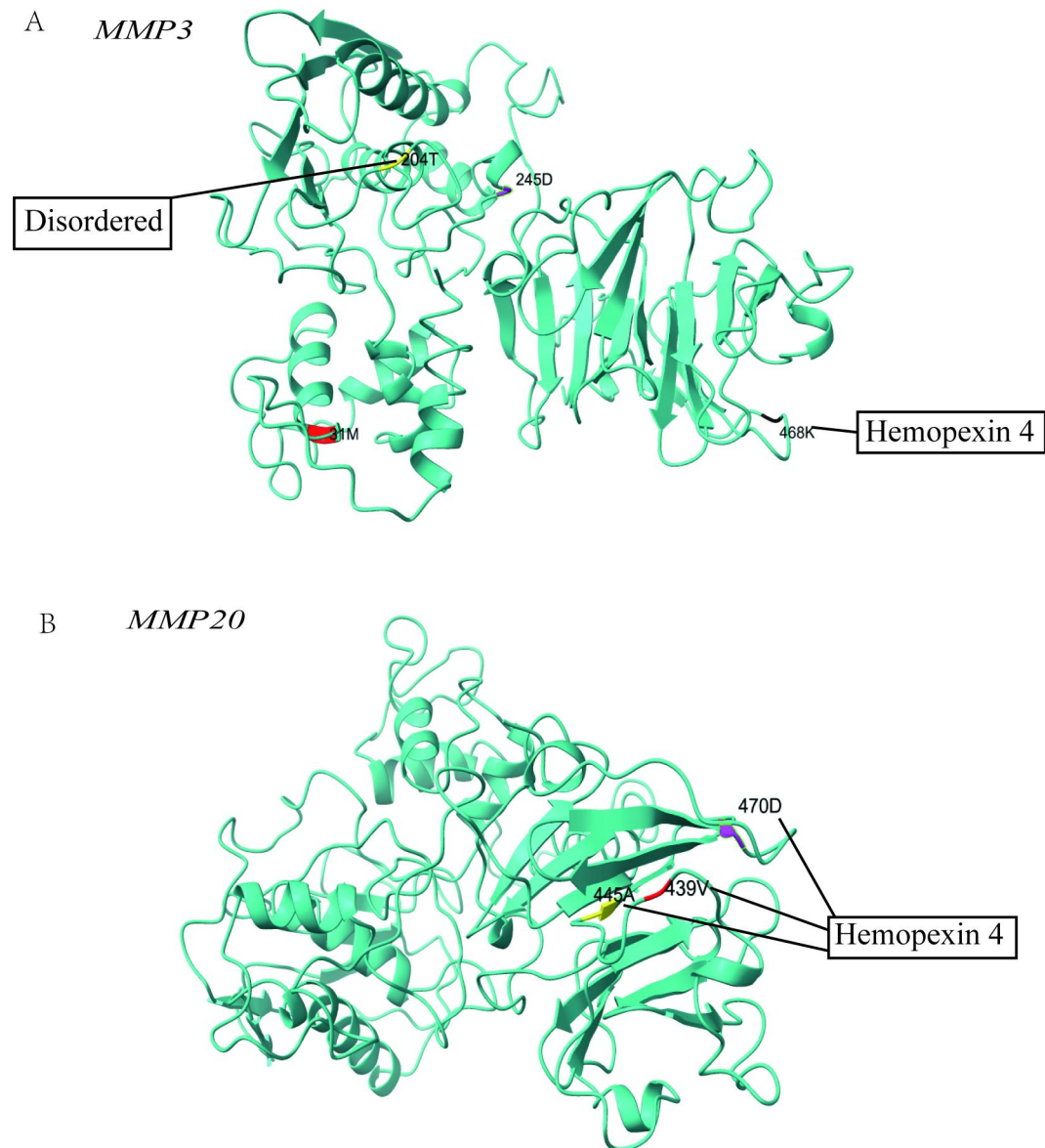


Fig S7. Mapping the positively selected sites of *MMP3* and *MMP20* onto the three-dimensional structure of the genes.