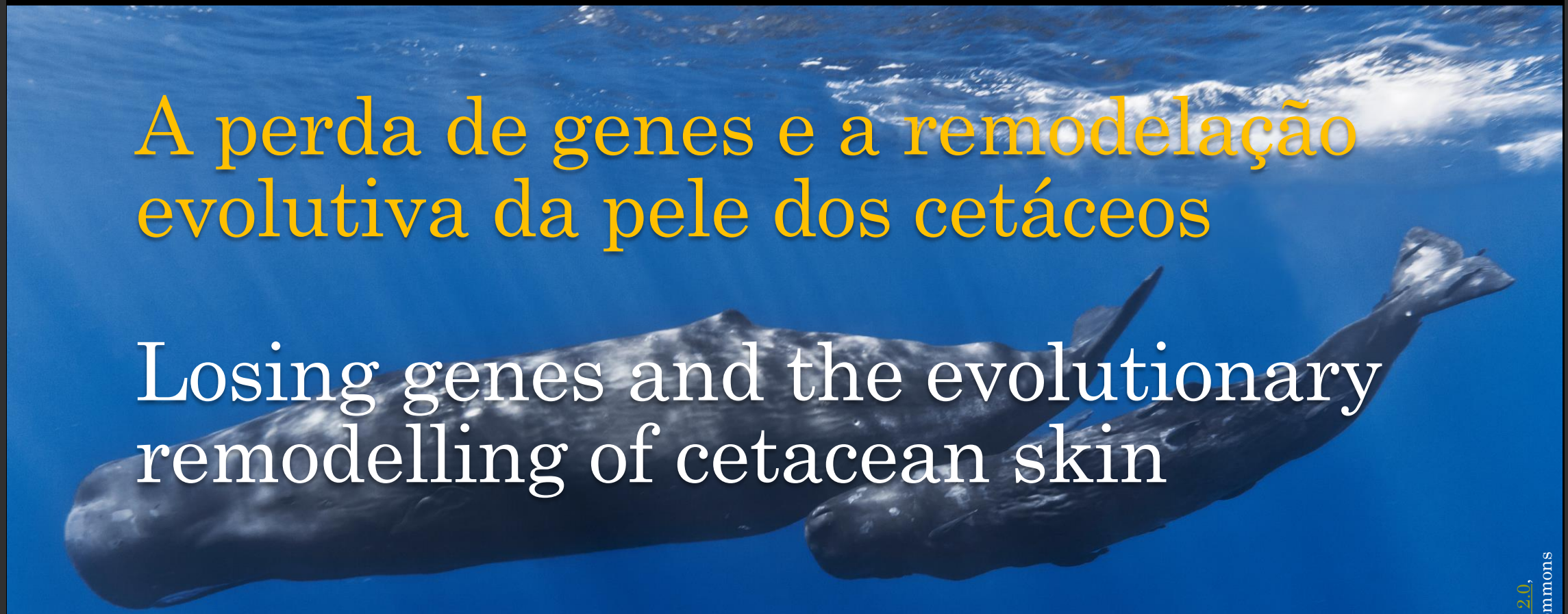
A perda de genes e a remodelação evolutiva da pele dos cetáceos

Losing genes and the evolutionary remodelling of cetacean skin

Gonçalo Espregueira Themudo, Luís Q. Alves, André M. Machado, Mónica Lopes-Marques, Rute R. da Fonseca, Miguel Fonseca, Raquel Ruivo & L. Filipe C. Castro



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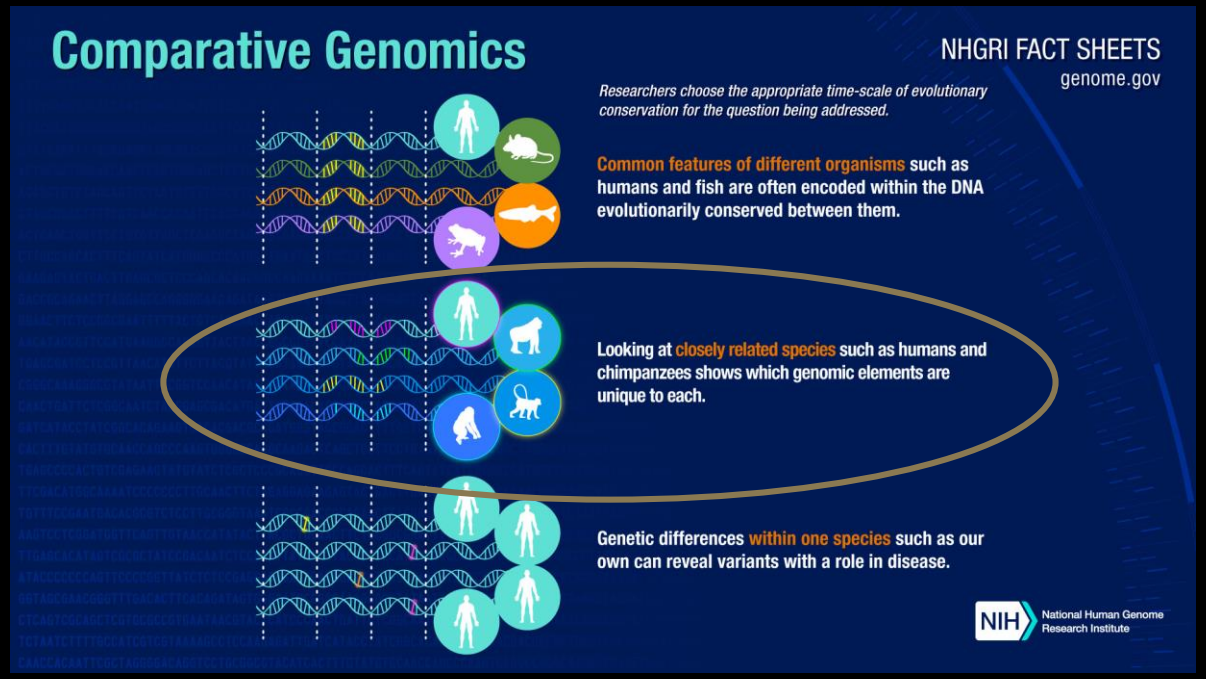
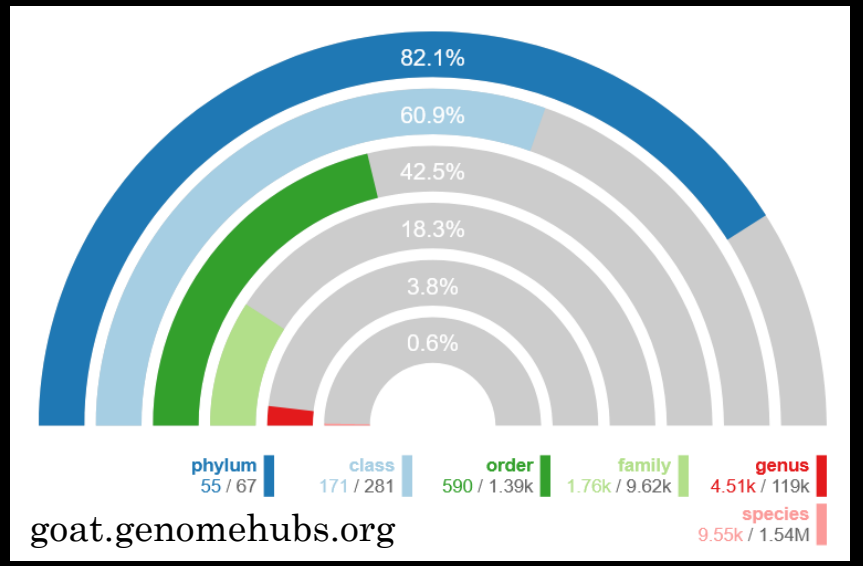
Genotype vs Phenotype





Species with published genomes
27 Cetacea
700 Mammalia
4778 Metazoa (Animals)
10719 Eukaryotes

EARTH BIOGENOME PROJECT
sequencing life for the future of life

ERGA
EUROPEAN REFERENCE GENOME ATLAS

VGP VERTEBRATE GENOMES PROJECT
A PROJECT OF THE G10K CONSORTIUM

GENOME 10K

Gene loss as engine for innovation

Evolution by gene loss

Ricard Albalat and Cristian Cañestro

Abstract | The recent increase in genomic data is revealing an unexpected perspective of gene loss as a pervasive source of genetic variation that can cause adaptive phenotypic diversity. This novel perspective of gene loss is raising new fundamental questions. How relevant has gene loss been in the divergence of phyla? How do genes change from being essential to dispensable and finally to being lost? Is gene loss mostly neutral, or can it be an effective way of adaptation? These questions are addressed, and insights are discussed from genomic studies of gene loss in populations and their relevance in evolutionary biology and biomedicine.

Albalat, R., Cañestro, C. Evolution by gene loss. *Nat Rev Genet* **17,** 379–391 (2016).

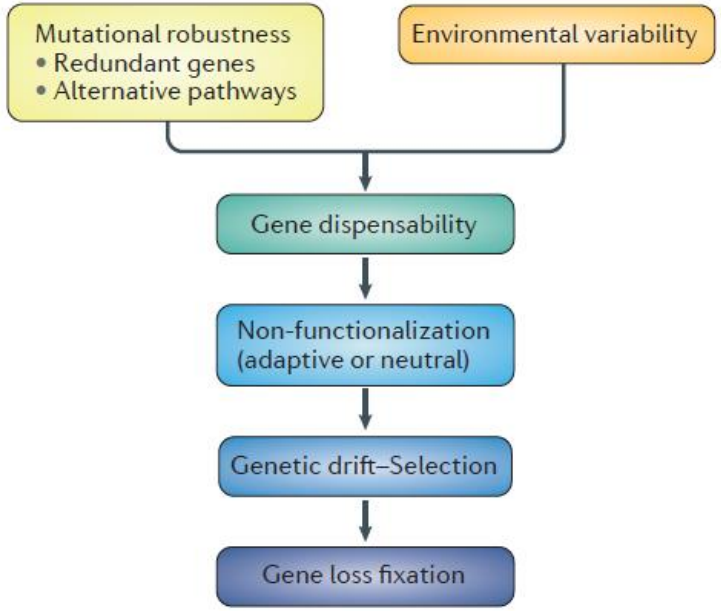
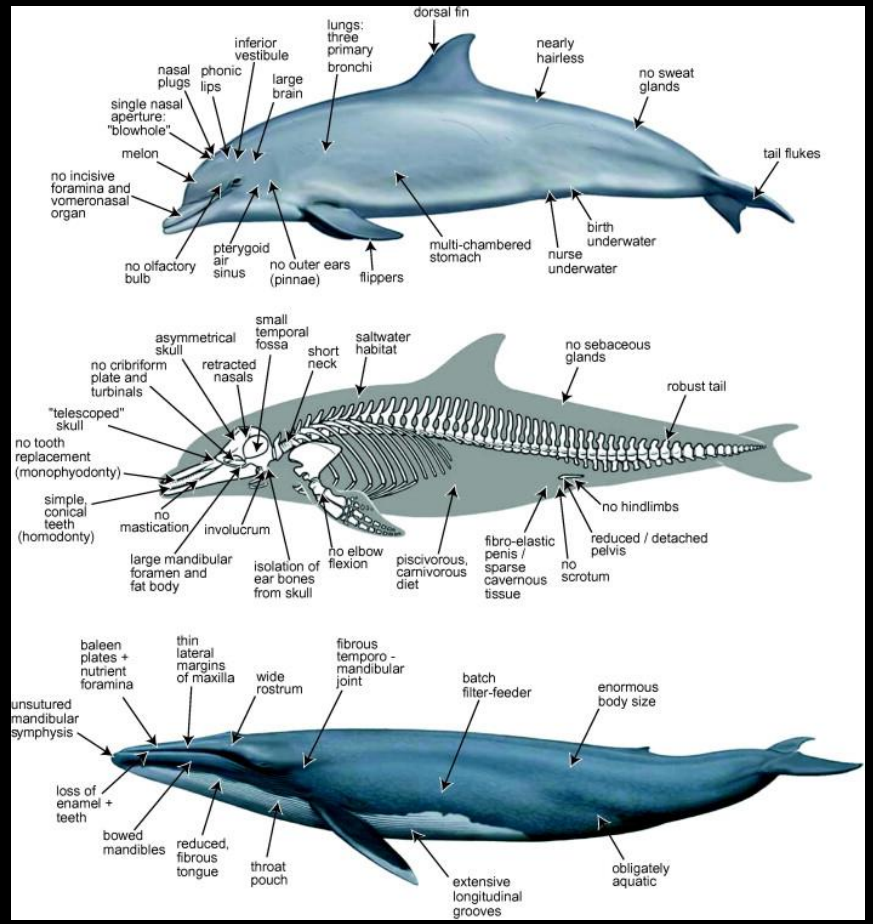


Figure 2 | **Conceptual framework for gene loss.** The loss

Olson, Maynard V. 'When Less Is More: Gene Loss as an Engine of Evolutionary Change'. *American Journal of Human Genetics*, 1999. https://doi.org/10.1086/302219.

Mammalian diversity



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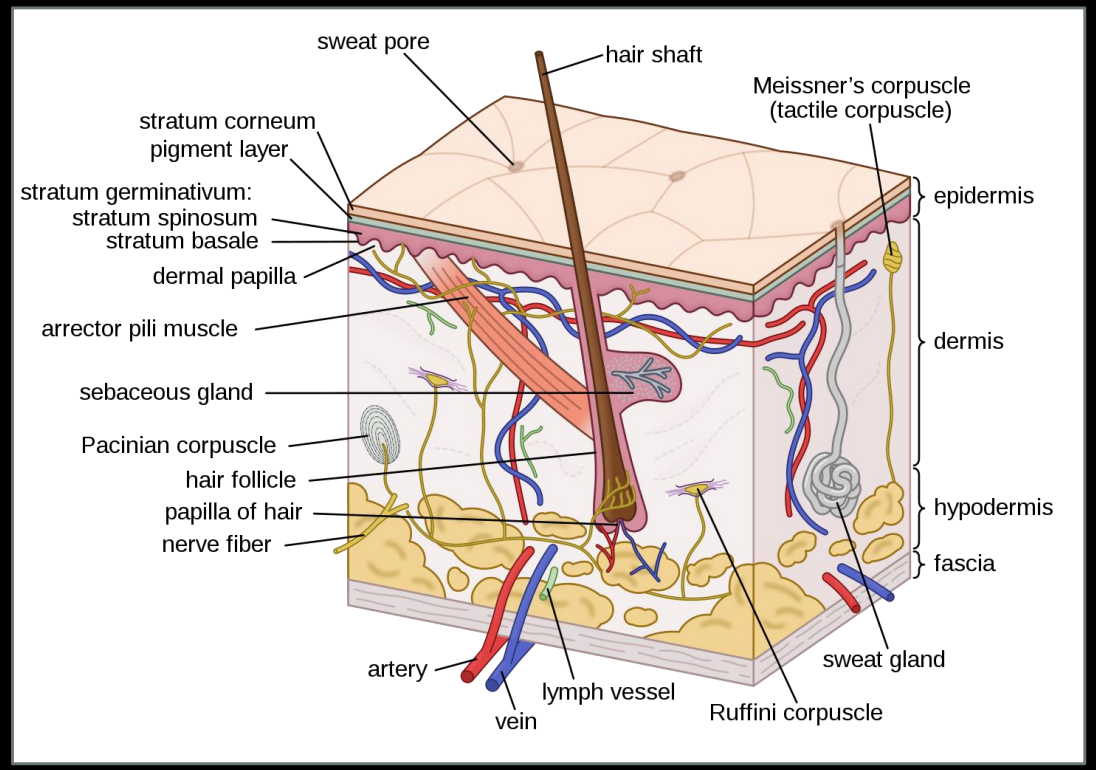
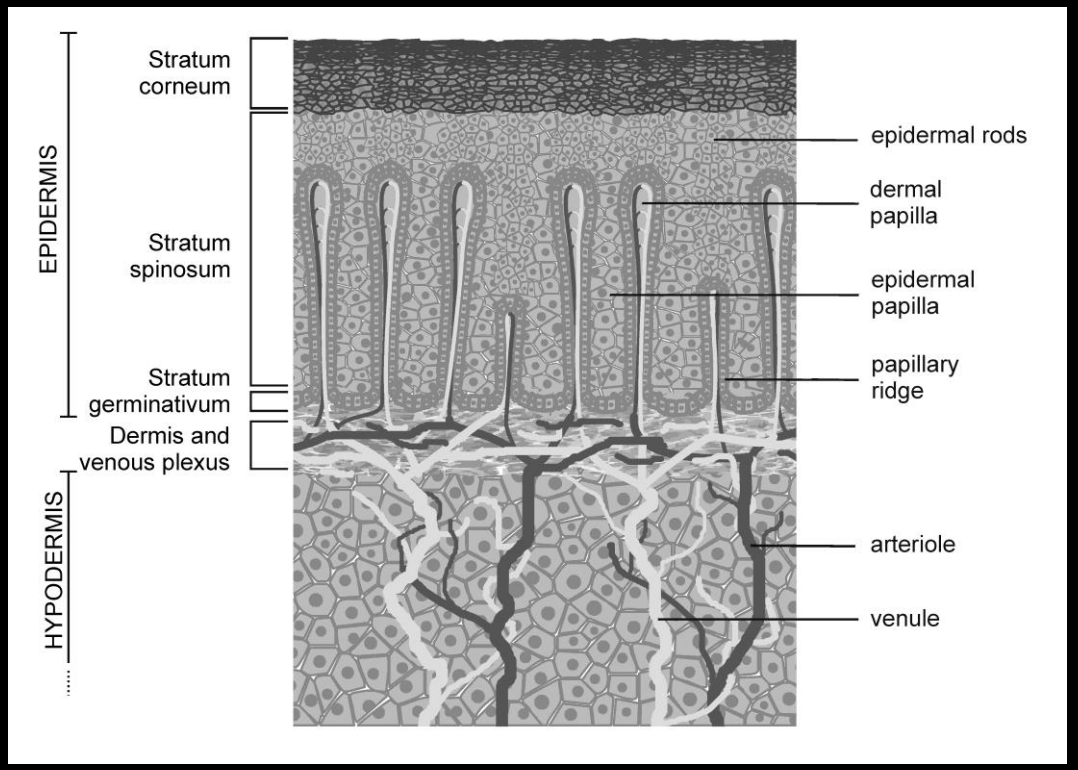
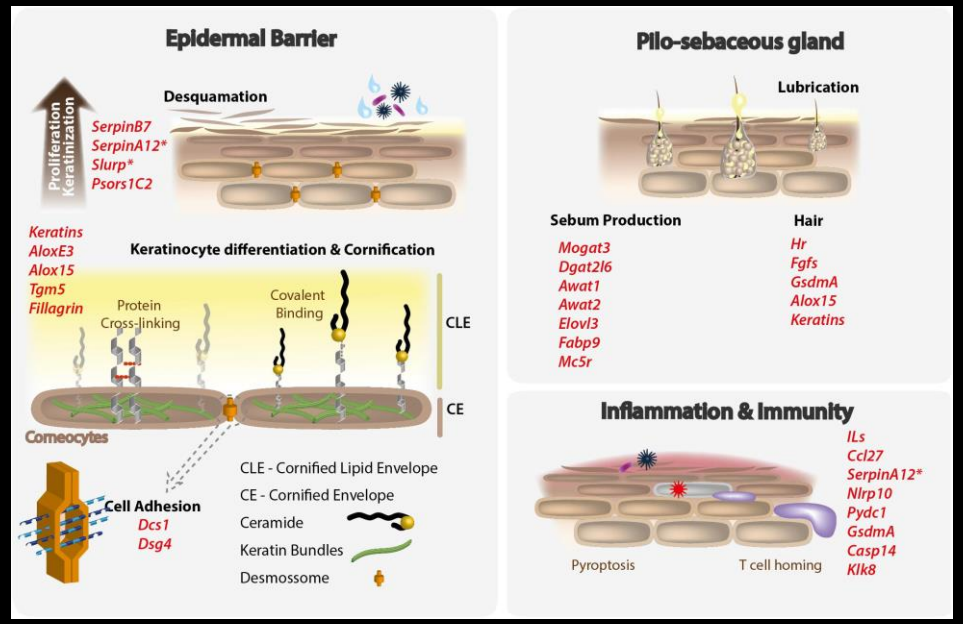
Cetacean skin



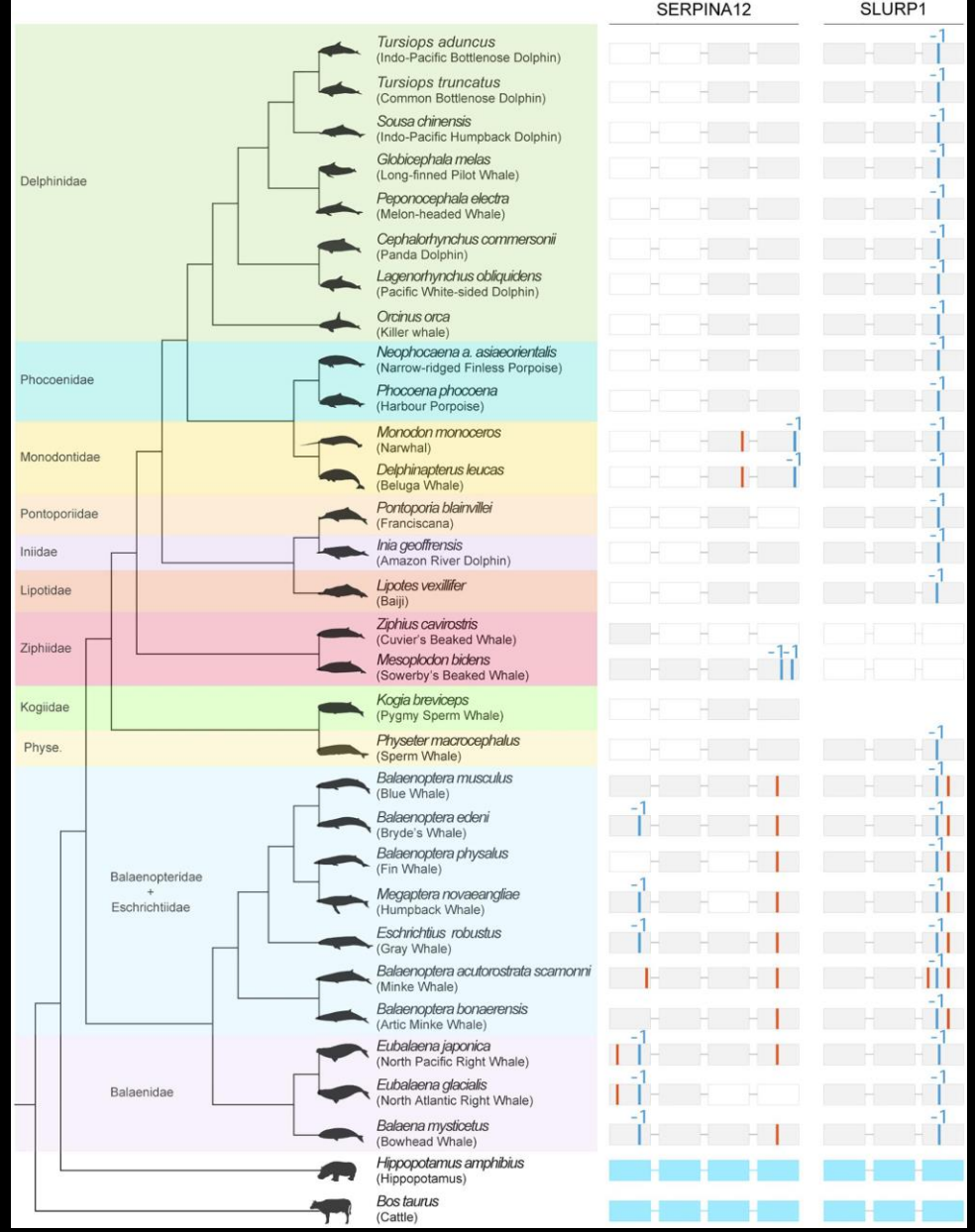


Mouton, M., & Botha, A. (2012). Cutaneous Lesions in Cetaceans: An Indicator of Ecosystem Status?. In A. Romero, & E. O. Keith (Eds.), New Approaches to the Study of Marine Mammals. IntechOpen. https://doi.org/10.5772/54432

Gene loss in cetacean skin



Mammalian skin functions remodeled by processes of gene loss in cetaceans.



In-frame premature stop codons
Single-nucleotide deletions
Lost exons

Not only skin

Molecular evolution tracks macroevolutionary transitions in Cetacea

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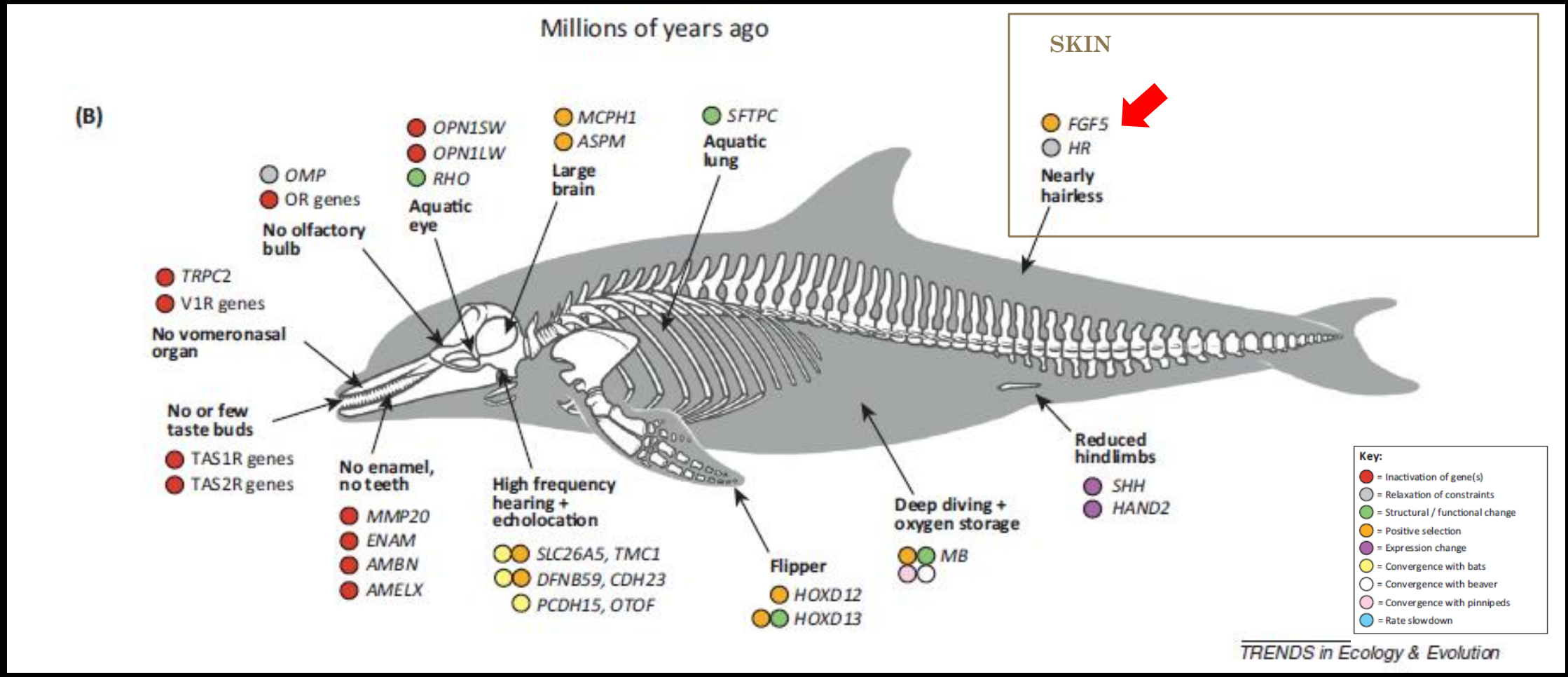

What does this mean?

- Dramatic change in environment lead to relaxation of selection pressure
- Environment-led, gene followed, morphology as consequence (highly recursive)
- Redundancy becomes more limited (needs time to rebuild)
- Consequences for conservation?
- Open question: Are more recent genes more easily lost?

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Front. Mar. Sci., 28 October 2020 | https://doi.org/10.3389/fmars.2020.592375

***Losing* Genes: The Evolutionary Remodeling of Cetacea Skin**

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