



Corso di Dottorato di Ricerca in Scienze della Vita e dell'Ambiente - Ciclo XXXVII Genomics of Lessepsian invaders

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Introduction

The spread of invasive species, from the Red Sea into the Mediterranean Sea (Lessepsian alien species), is one important driver of biodiversity loss in this basin [4].

Currently available literature on Lessepsian species mainly focuses on ecological data and the few genomic studies carried out so far have not thoroughly investigated the role and impact of adaptive and deleterious variability in the colonisation of the Mediterranean [1, 2, 3].

Among more than 900 invasive marine species we decided to focus on *S. rivulatus* and *P. miles*.

The first one is an herbivorous species that entered the Mediterranean approximately around 1930 and has since spreaded throughout the eastern basin.

P. miles, also known as Devil firefish (or Lionfish) has appeared in the Mediterranean in the first years of the 1990's but its rapid expansion began around 10 years ago. This species is a major threat for biodiversity and it is also dangerous for humans because of its venomous spines.

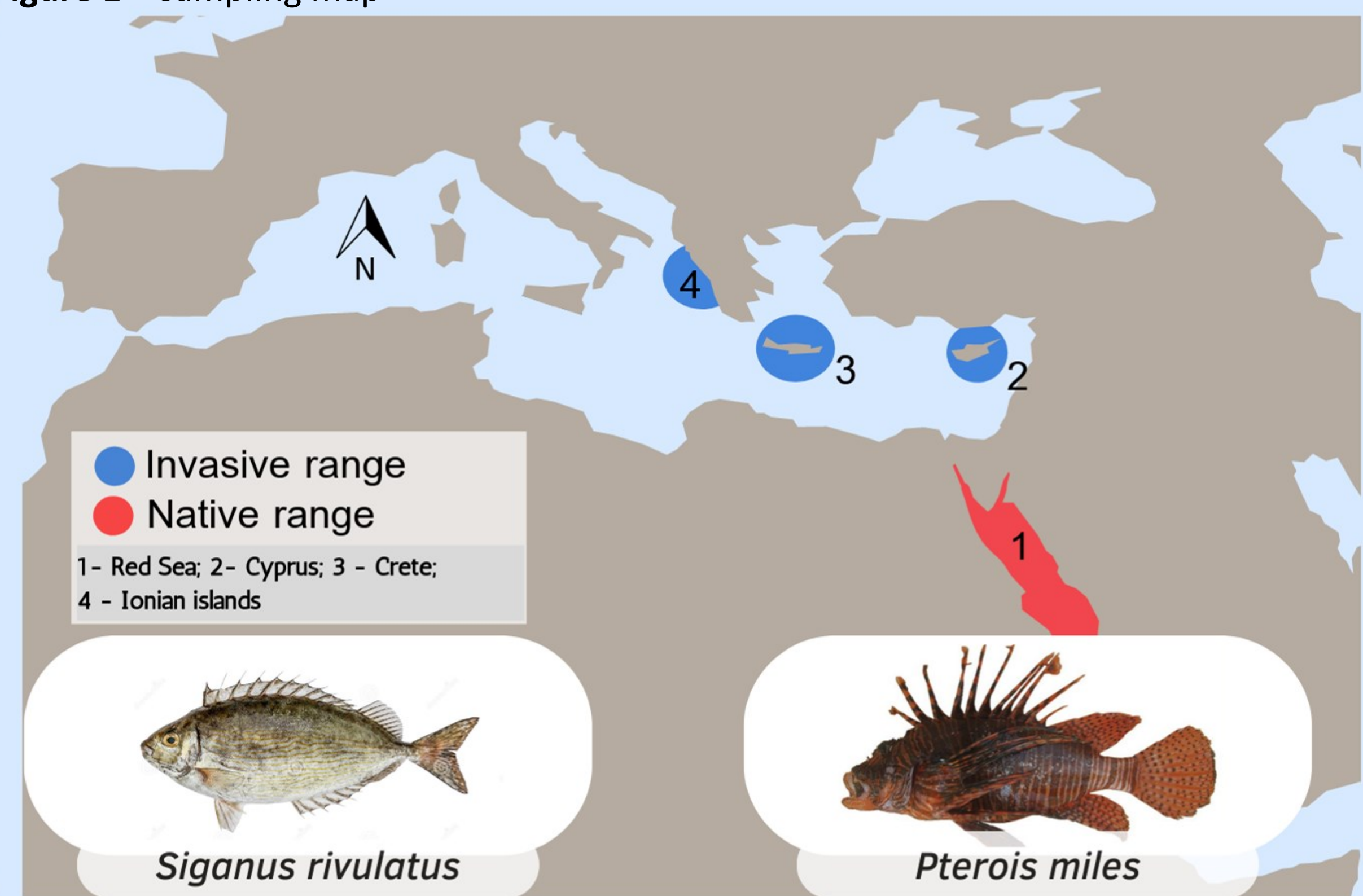
Aim of the project

- Study the impact of adaptive and deleterious genetic variation of these two successful Lessepsian species in the invasion of the Mediterranean Sea.
- Test whether these populations share genomic characteristics that predispose them to easily spread in a new environment.
- Understand the consequences of the invasive processes on the genetic variability of these species.

Sampling and DNA extraction

We sampled at least 10 individuals from each selected location in the Mediterranean (Figure 1, Figure 2) and from the Red Sea. Then we extracted the DNA from these samples

Figure 1 – sampling map



Bibliography

- 1 - Azzurro, E., Nourigat, M., Cohn, F., Ben Souissi, J., & Bernardi, G. (2022). Right out of the gate: the genomics of Lessepsian invaders in the vicinity of the Suez Canal. *Biological Invasions*, 24(4), 1117-1130.
- 2 - Bernardi, G., Azzurro, E., Golani, D., & Miller, M. R. (2016). Genomic signatures of rapid adaptive evolution in the bluespotted cornetfish, a Mediterranean Lessepsian invader. *Molecular ecology*, 25(14), 3384-3396.
- 3 - Chiesa, S., Azzurro, E., & Bernardi, G. (2019). The genetics and genomics of marine fish invasions: a global review. *Reviews in Fish Biology and Fisheries*, 29(4), 837-859.
- 4 - Templado, J. (2014). Future trends of Mediterranean biodiversity. In *The Mediterranean Sea* (pp. 479-498). Springer, Dordrecht.

Figure 2 - Methods

Methods

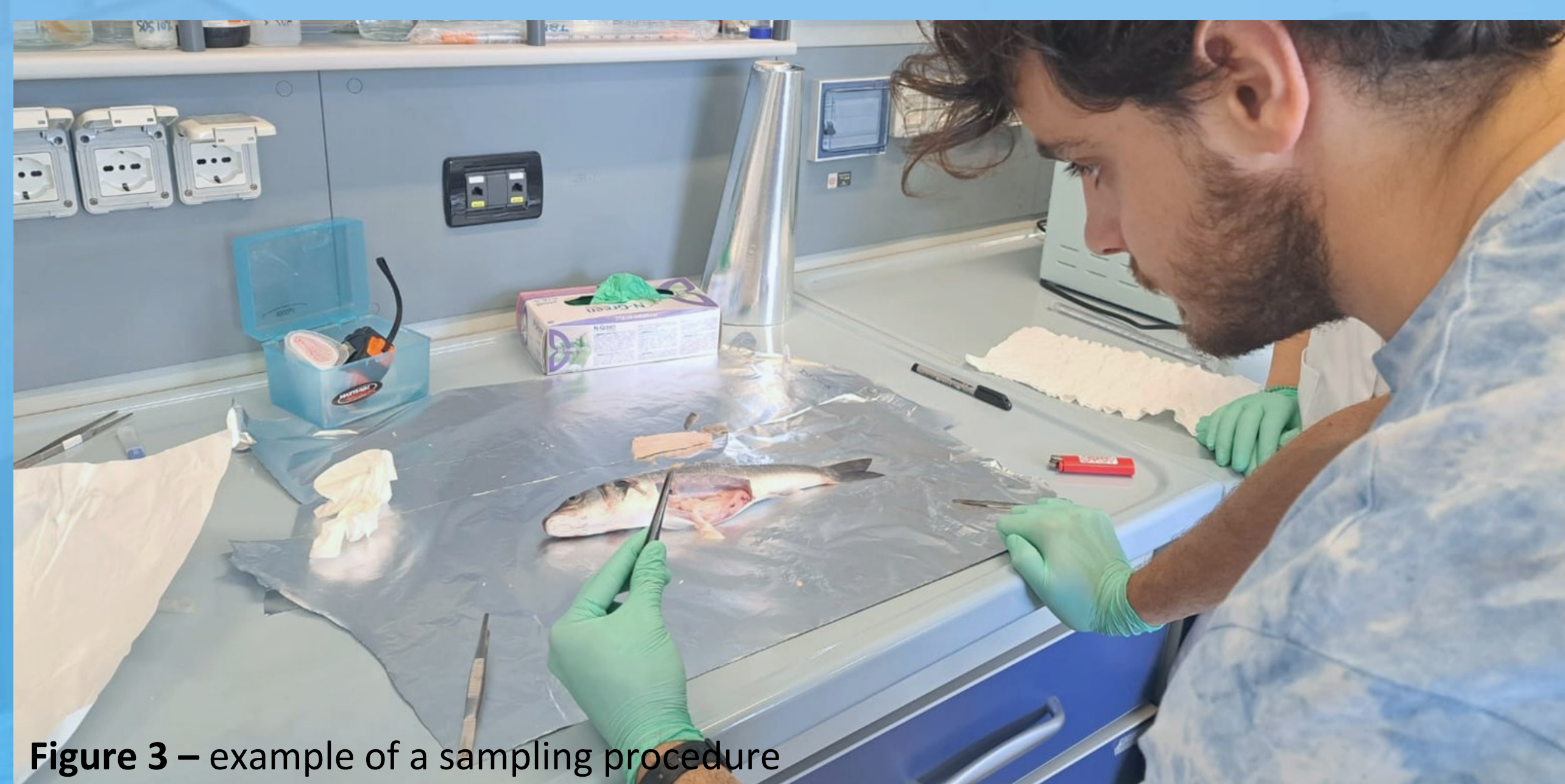
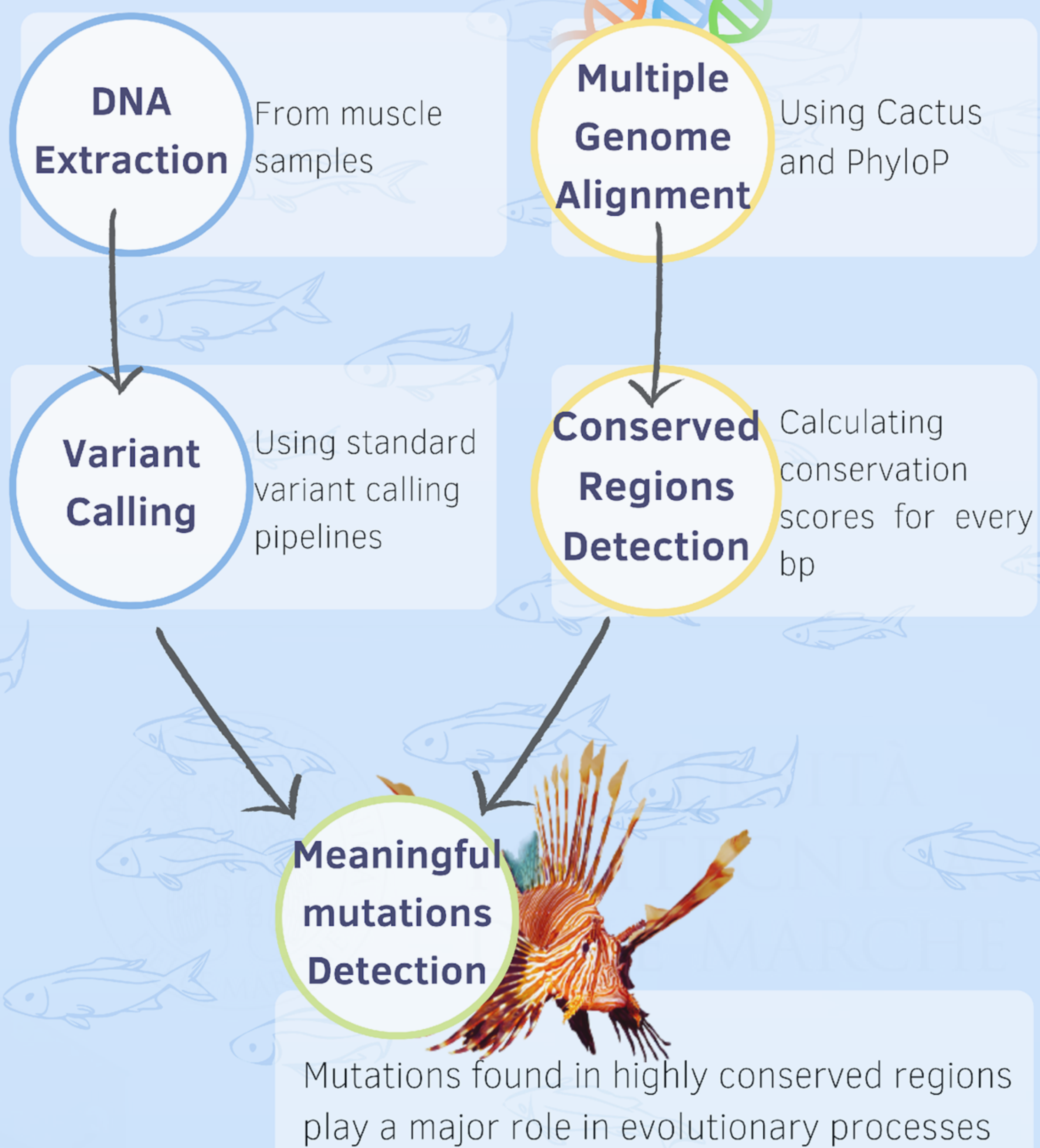


Figure 3 – example of a sampling procedure

Side projects

Fitness consequences and ancestry loss in the Apennine brown bear after a simulated genetic rescue intervention - Maroso et al. 2023

Paper accepted in conservation Biology



Investigating the relationship between sex biased dispersal and mito-nuclear discordance, using a forward simulation method (SliM) – Giannelli et al.

Paper in preparation

