



Genomic evidence of Iran-related ancestry in Bronze Age Calabria

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Introduction

By 2200 BCE, the populations of Southern Italy become increasingly linked to long-distance trade relations with the peoples of the Mediterranean regions. Intense contacts with groups of Aegean origin is reflected, around the Middle Bronze Age, by the appearance of Helladic cultural material in southern regions. In addition to this, in Sicily by 1800-1500 BCE a new genetic component is found, namely the "Iran-related ancestry"¹. Harbored in high frequencies by contemporary Southern Italians², its origin, time of appearance and extent is highly debated.

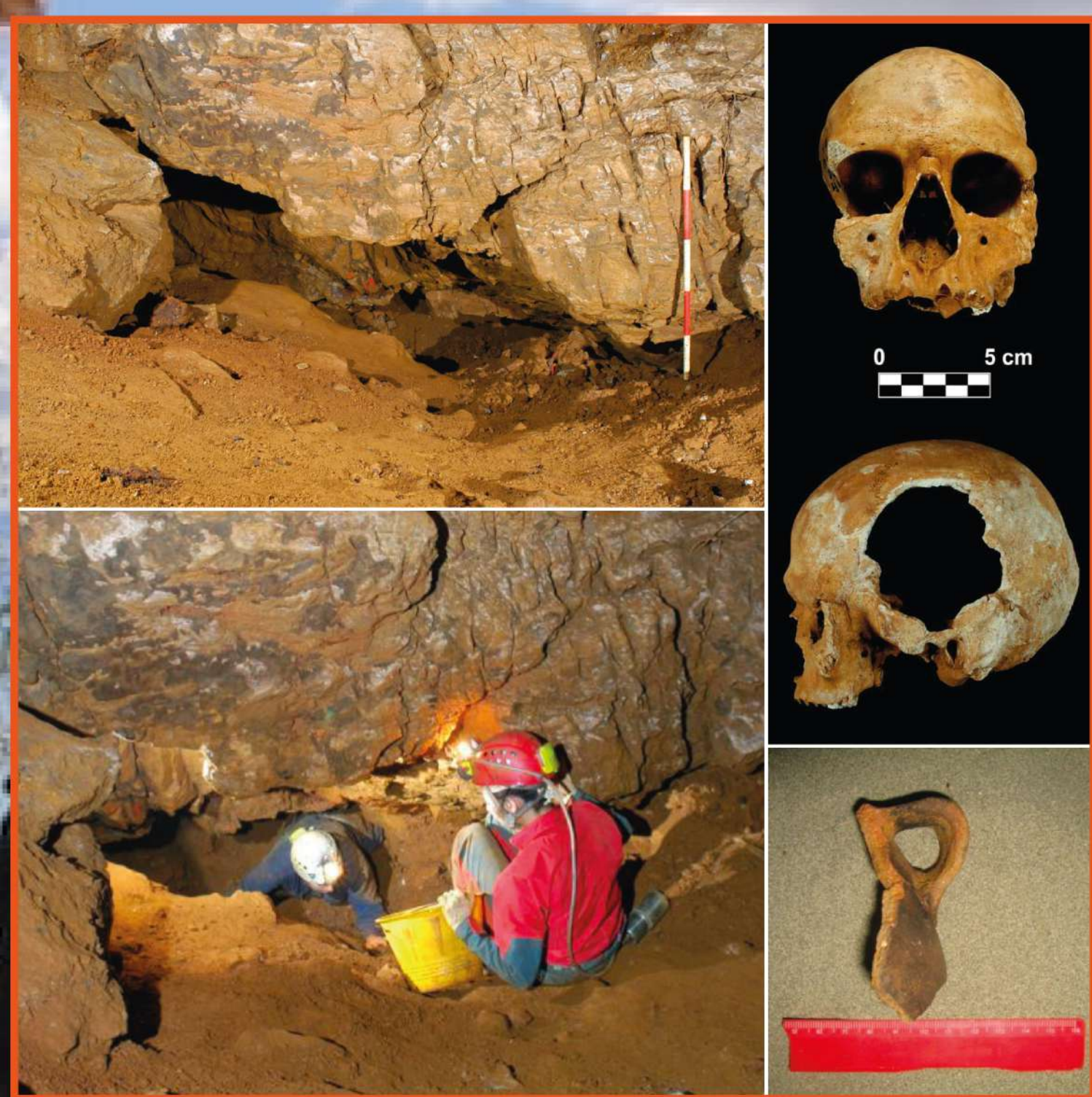


Fig. 1: Details from the excavations at Grotta della Monaca (top and bottom left); one of the individual found in the cave (top and center right); Protoapennine pottery found within the burial area (bottom right).

Methods

The central location of **Calabria** in the Mediterranean Sea may help investigate the origin of this genomic component.

Using **1240K capture enrichment**, we generated genome-wide data from 12 individuals found in the Middle Bronze Age cave burial of "**Grotta della Monaca**" (Cosenza, dated 1700-1380 BCE)³.

We processed the data using state-of-the-art bioinformatic pipelines⁴ and explored the first ever paleogenomic dataset from the region.

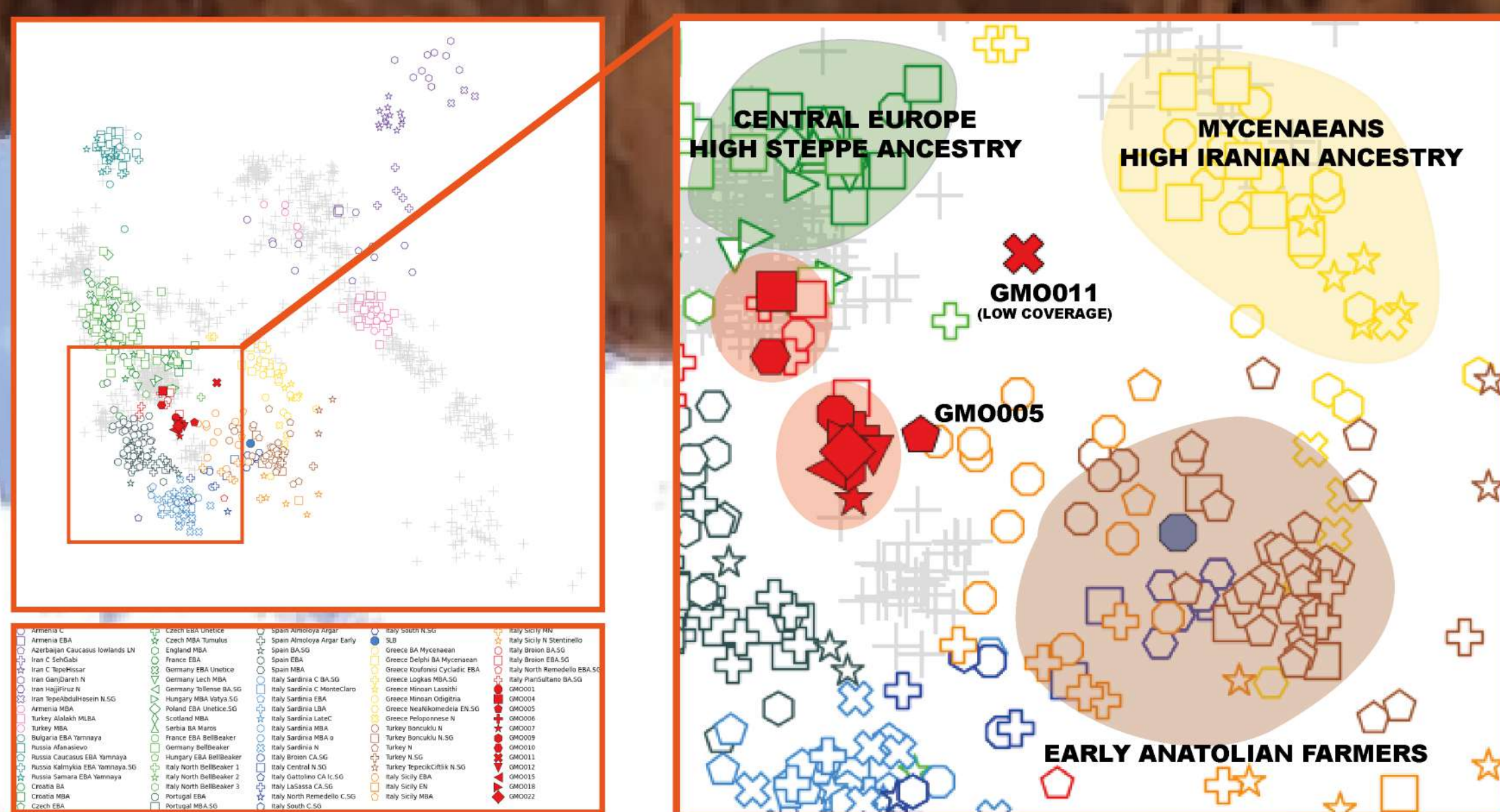


Fig. 2: Principal Component Analysis performed on the 12 genotypes from Grotta della Monaca, projected with ancient samples on the genomic variability of modern Eurasians.

Results

We generated 30K to 760K SNPs from the samples. On Principal Component Analysis, the individuals were divided into three genomic clusters. Excluding a low coverage individual, most of them (n=8) form a group with each other. Two outliers (GMO004 and GMO010) were shifted towards coeval central Europeans. Interestingly, individual GMO005 shows a slight directional shift towards Minoans and Mycenaeans.

By modelling the genome composition of the individuals using qpAdm⁵, we found that **GMO005 exhibits 16.1% ± 3.8% of Iran-related ancestry**, which is also found in high frequencies among populations of Aegean origin.

Conversely, all other individuals can be modeled as a mix of Western Hunter Gatherers, Early Anatolian Farmers and "Yamnaya-related" ancestry.

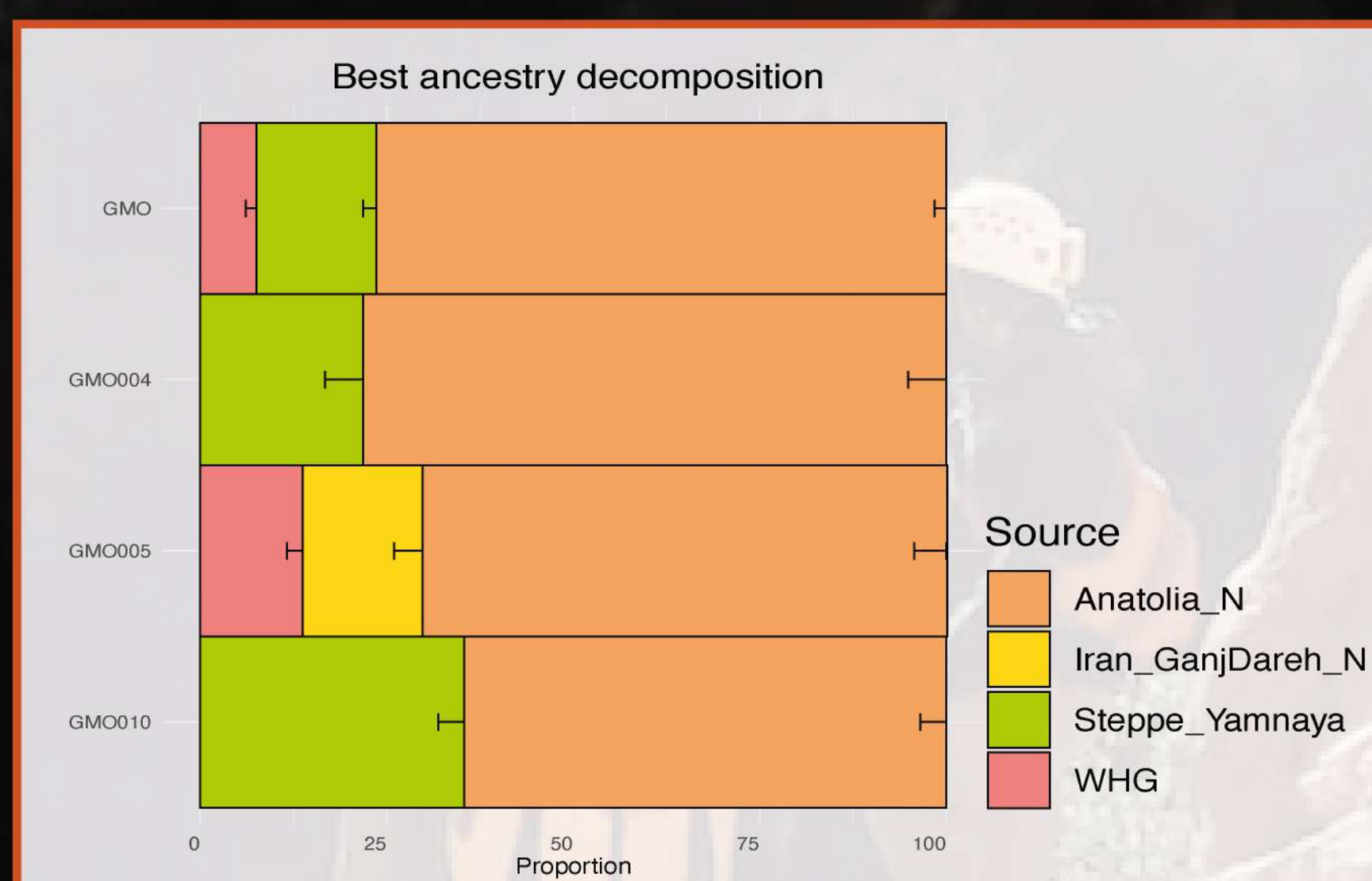


Fig. 3: Modelling the different genetic clusters representing the individuals of Grotta della Monaca.

Conclusions

- **Iran-related ancestry** must have reached Calabria before the Mycenaean commercial expansion (attested by 1200 BCE).
- We propose a well-established **integration** of Calabrian indigenous with people of Aegean origin by 1380 BCE.
- We showcased the presence of **Steppe-ancestry** in Calabria by the Middle Bronze Age.

References

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