VIEW POINT
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Revisiting Ancient mtDNA Equid Sequences From Pompeii

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In an mtDNA study on equids recovered from the ancient Roman towns of Pompeii and Herculaneum (covered in ash by the eruption of Mount Vesuvius in AD 79), Di Bernardo et al. [2004a,b] presented six equid mtDNA sequences, which they labeled as CAV1-5 and CAVH, respectively. The Pompeii equid skeletons had been excavated from the stables (Fig. 1) at the house of the *Casti Amanti* (chaste lovers), so called because of frescoes depicting a romantic scene. The owner of this house was probably Caius Iulius Polybius, a wealthy politician and baker in ancient Pompeii, as shown by the fact that the house contains an open oven and four wheat grindstones [Genovese and Cocca, 2000].

The authors convincingly identified mtDNA types retrieved from skeletons CAV1 to CAV4 and CAVH as being of horse origin, while CAV5 presented a puzzle. They stated that "Our findings provide evidence that the remains analyzed are those of horse and mules and do not include either donkeys or hinnies" [Di Bernardo et al., 2004a] and that "The peculiar sequence polymorphisms shown by CAV5 could suggest to belong to a haplotype, which has either not yet been documented in (. . .) GenBank or has since disappeared" [Di Bernardo et al., 2004b].

I would like to suggest that, in this Pompeii equid, the authors have inadvertently hybridized a horse mtDNA sequence with an ass mtDNA sequence: the first 177 nucleotides match closely with asses in Genbank, while the second section of 193 nucleotides of their sequence matches closely with horses in Genbank. These two sections correspond exactly to the two different PCR primer pairs that the authors used. This hybrid sequencing artifact can be explained by the fact that the two primer pairs overlap only slightly and can recognize both horse and ass mtDNA.

Interestingly, the horse section of the Pompeii hybrid sequence is a G type [Vilà et al., 2001; Gurney et al., 2010], which Di Bernardo et al. also found in their Herculaneum horse CAVH. In fact, the

Fig. 1. Excavated stable at the house of the Casti Amanti in ancient Pompeii, Italy. (Photograph courtesy of Giovanni Lattanzi, Guilianova)

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Herculaneum horse sequence is identical to the horse section of the Pompeii hybrid sequence, except for a single nucleotide difference. This single nucleotide difference is however close to the internal primer.

The ass section of the Pompeii hybrid sequence is also interesting in that its closest matches are with domestic donkeys that are related via their mtDNA lineage with the Somali wild ass [Kimura et al., 2010]. The Somali lineage seems to be the typical mtDNA type found in Italian asses today, whereas other European countries have significant proportions of asses with the Nubian motif [Beja-Pereira et al., 2004]. The ancient Pompeii ass sequence, if confirmed, may represent valuable early evidence of the Somali ass lineage in ancient Italy.

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