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INTRAPOPULATION GROWTH VARIATION ANALYSIS USING FEMUR LENGTH: THE CASE OF MARTIGUES PLAGUE VICTIMS (SOUTH OF FRANCE – 1720-1721)

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- Individual's living conditions influence his/her stature by 20% (Koepke, 2016).
- Bioarchaeological context: stature analysis has been used to evaluate past populations' living conditions.

Aims:

- (1) evaluate whether all groups, divided according to age, gender and location at the archaeological site, were equally affected by these famines;
- (2) investigate how differently men and women suffered from them;
- (3) link age classes with starvation episodes in that region.

Material

- In this work we analyse the skeletons of **95 adults**:
 - victims of the *Great Plague of Marseilles* (1720-1722);
 - exhumed from mass graves located at the city of Martigues (Provence - France) (Tzortzis, 2009);
 - suffered several starvation episodes before the epidemic (Séguy, 2017).

Methods

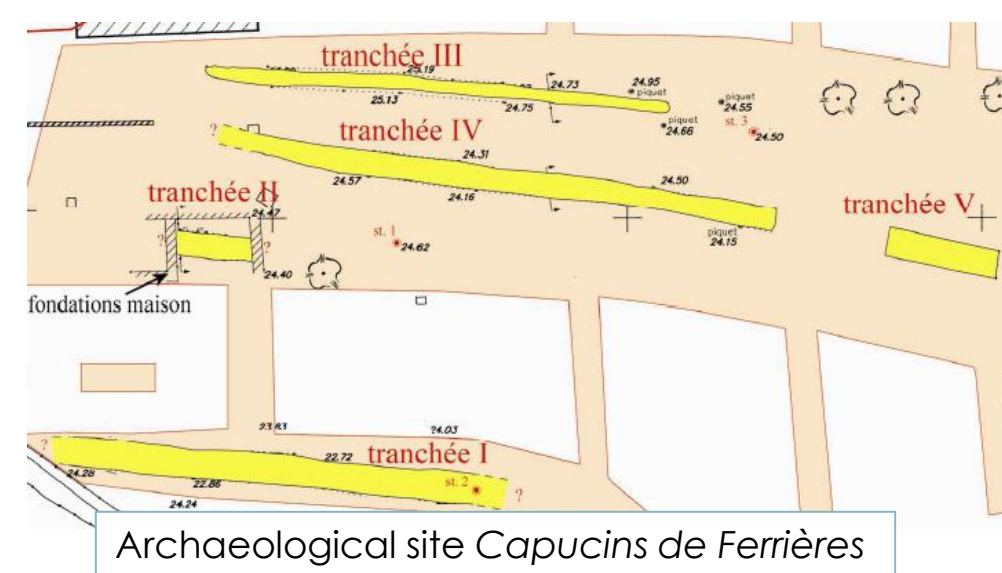
Femur length analysis

We directly examine femur length, instead of predicted statures, to avoid modelling errors.

Factorial Analysis of Mixed Data (FAMD)

Variables: sex, age class, inhumation place and femur length.

Investigation of historical sources.



Results

(1) Variables: sex, inhumation place and femur length (FAMD)

No pattern of stature variation linked to the inhumation place was observed.

(2) Variables: sex, age class and femur length (FAMD)

- Significant difference between the mean of groups 1 and 3 (*Student's t-test*)
 - Group 1: women (almost only) from age classes young-mature, mature and mature-old.
 - Group 3: women from age classes young and old.
- **Variation in women stature:** the youngest and the oldest are taller than the others.
- Variation of mean among male groups (2 and 4) is not statistically significant.
- Considering both genders, the average statures of different age groups do not differ in a statistically significant manner (*ANOVA test*).

(3) Famines

Victims of 1720-22 plague were born between **1702 and 1625** (90% between 1702 and 1655)

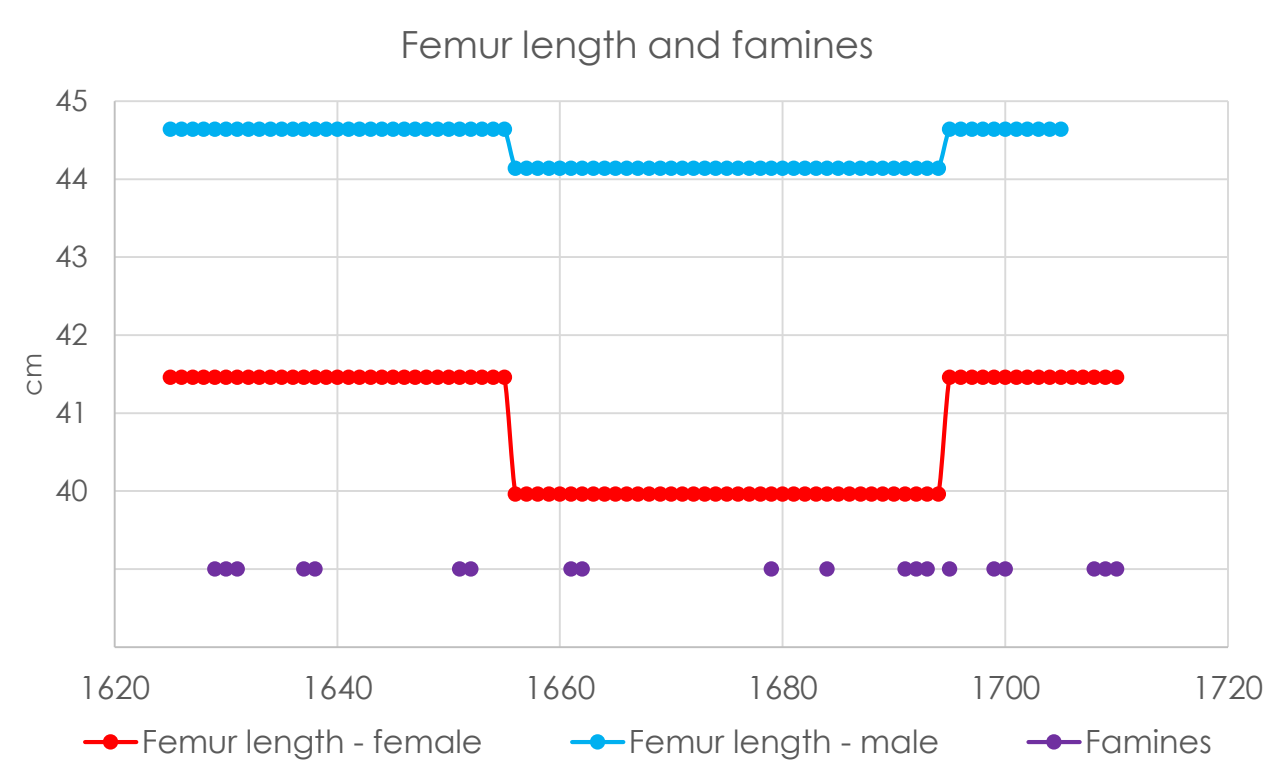
1695 – 1702 – born period of individuals classed as “young”;

1684 – 1710 – several episodes of starvation;

Uterine life and development period during the penury;

1625 – 1655 – born period of individuals classed as “old”;

Both classified in the groups with higher statures (3 and 4).



Groupe 1						Mean: 39,96cm
	Young	Young-mature	Mature	Mature-old	Old	Total
Women	0	5	8	11	0	24
Men	0	0	0	1	0	1
Total	0	5	8	12	0	25
Groupe 2						Mean: 44,14 cm
	Young	Young-mature	Mature	Mature-old	Old	Total
Women	0	0	1	1	0	2
Men	0	5	10	14	0	29
Total	0	5	11	15	0	31
Groupe 3						Mean: 41,46 cm
	Young	Young-mature	Mature	Mature-old	Old	Total
Women	9	0	0	0	12	21
Men	0	0	0	0	0	0
Total	9	0	0	0	12	21
Groupe 4						Mean: 44,64 cm
	Young	Young-mature	Mature	Mature-old	Old	Total
Women	0	0	0	0	0	0
Men	4	0	0	0	10	14
Total	4	0	0	0	10	14

Results of the FAMD considering sex, age class and femur length.

Discussion

Gender inequality hypothesis: women's stature correlated with age, while male's stature are homogeneous.

- Our analysis suggests that women were the most affected by changes in life conditions.
- **“Osteological paradox”** (Wood, 1992):
 - The youngest and the oldest were the most vulnerable during the penury period:
 - Younger: growing and development period;
 - Older: vulnerable because of advanced age.
- Event though, **they had higher stature than the other age group and survived the famines.**
- We hypothesize that:
 - they survived because they had better life conditions than their contemporaries;
 - differential life conditions made them taller than the other age group.

Future perspectives:

- Examine the occurrence of **physiological stress markers** in the bones and teeth and also the variation in **dental microwear** to verify the consistency of these results.
- Comparison with other populations from the same region and/or period.

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