Genetic variability of captive breeding populations of *Tetragonisca angustula*

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INTRODUCTION

- Studies have shown that animal breeding led to a decrease in their genetic diversity;
- Managed captive populations of bees have shown low genetic variability;
- Here we analyzed wild and captive populations of *Tetragonisca angustula*, a highly eussocial stingless bee;
- This project aimed to investigate the degree of genetic health by microsatellites genotyping and mitochondrial DNA (mtDNA) sequencing.

MICROSATELLITES

- A total of 430 adult workers from nine meliponaries were sampled as well as 89 wild bees from São Sebastião (SSB) and Parque Nacional do Iguaçu (PNI), Brazil (Fig. 1).
- Nine microsatellites loci were analyzed (Tang03-11-12-17-57-60-65-68-70).

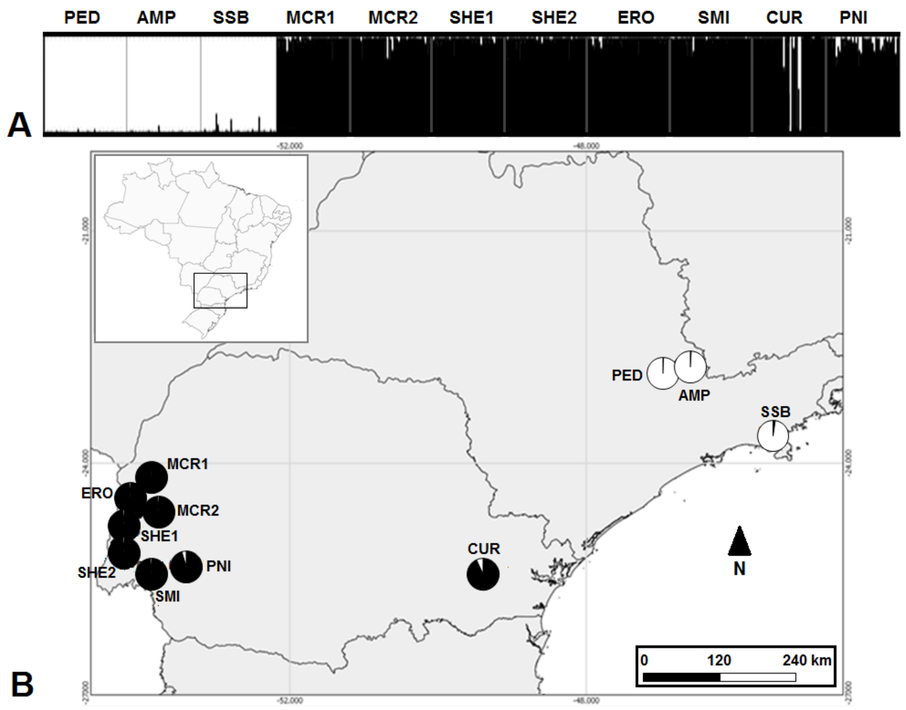

Figure 1: (A) Probability of posterior assignment (vertical axis) of individual genotypes (horizontal axis) for the two groups (white and black) defined by STRUCTURE. **(B)** Map of São Paulo (SP) and Paraná (PR) states showing the ratio of the two groups represented in every population of *Tetragonisca angustula*. Circle sizes represent the genomic contribution.

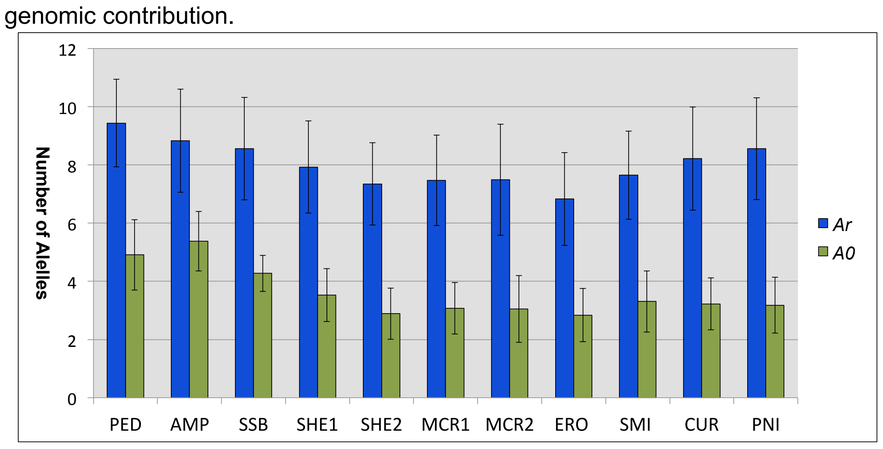

Figure 2: Mean number of alleles and mean number of effective alleles per captive and wild populations.

MITOCHONDRIAL DNA

- The mitochondrial genes *cytochrome c oxidase subunit 1* (*COI*) and *cytochrome b* (*Cytb*) were partially amplified by the primer pairs mtD06/ mtD09 and mtD26/mtD28 (Simon et al. 1994), respectively.
- The two gene sequences were concatenated, totalizing 764 bp.

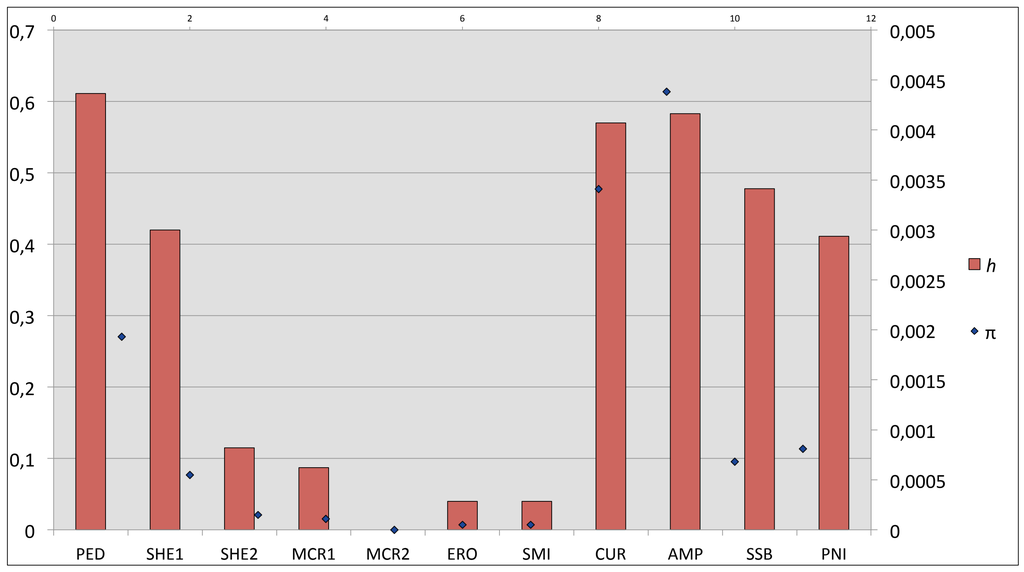

Figure 3: Mitochondrial DNA diversity (*h*: haplotype diversity and π: nucleotide diversity) for captive and wild populations.

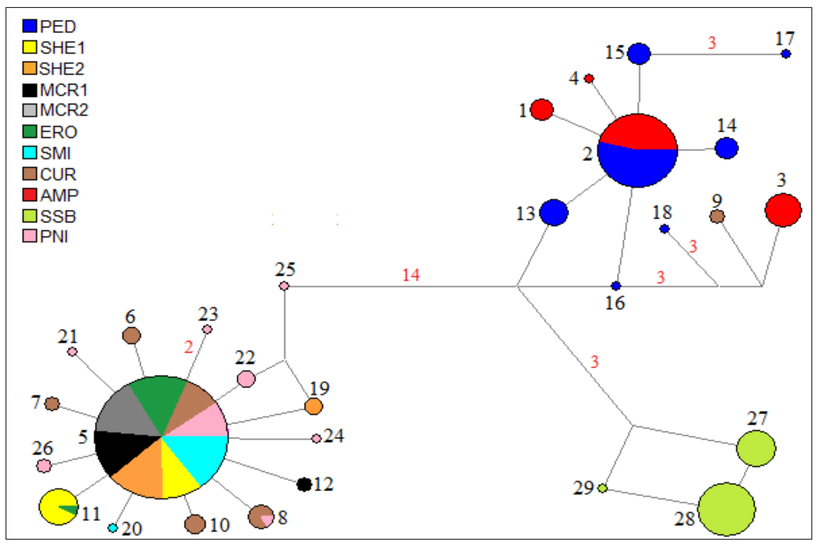

Figure 4: Haplotype network showing the 11 populations of *Tetragonisca angustula* represented by colors according to the legend. Each circle represents one haplotype designated by black numbers aside. The circles is proportional to the haplotype frequency. Red numbers indicate nucleotide substitutions. Line between haplotypes without number indicates one substitution.

CONCLUSIONS

- As expected according to the literature, we verified low NH and mtDNA diversity for managed populations of *T. angustula* here surveyed, but in contradiction the nuclear variability was high.
- Colony divisions seem to not be harmful to the population genetic health in captive conditions.
- Males thus seem to have a key role in maintaining the high genetic variability, preventing the negative consequences of inbreeding.
- We strongly recommend to not transport nests between SP and PR states, to prevent loss of the local genetic identity.