

## Sperm morphological, morphometric and ultrastructural aspects of European (*Apis mellifera*) and Africanized (*Apis mellifera L.*) honeybee drones

Yuri Gonçalves Matos<sup>1\*</sup>, Lilian Leal Dantas<sup>1</sup>, Andreia Maria da Silva<sup>1</sup>, Pedro Augusto Pinheiro Brito<sup>1</sup>, Romário Parente dos Santos<sup>1</sup>, Alexandre Rodrigues Silva<sup>1</sup>

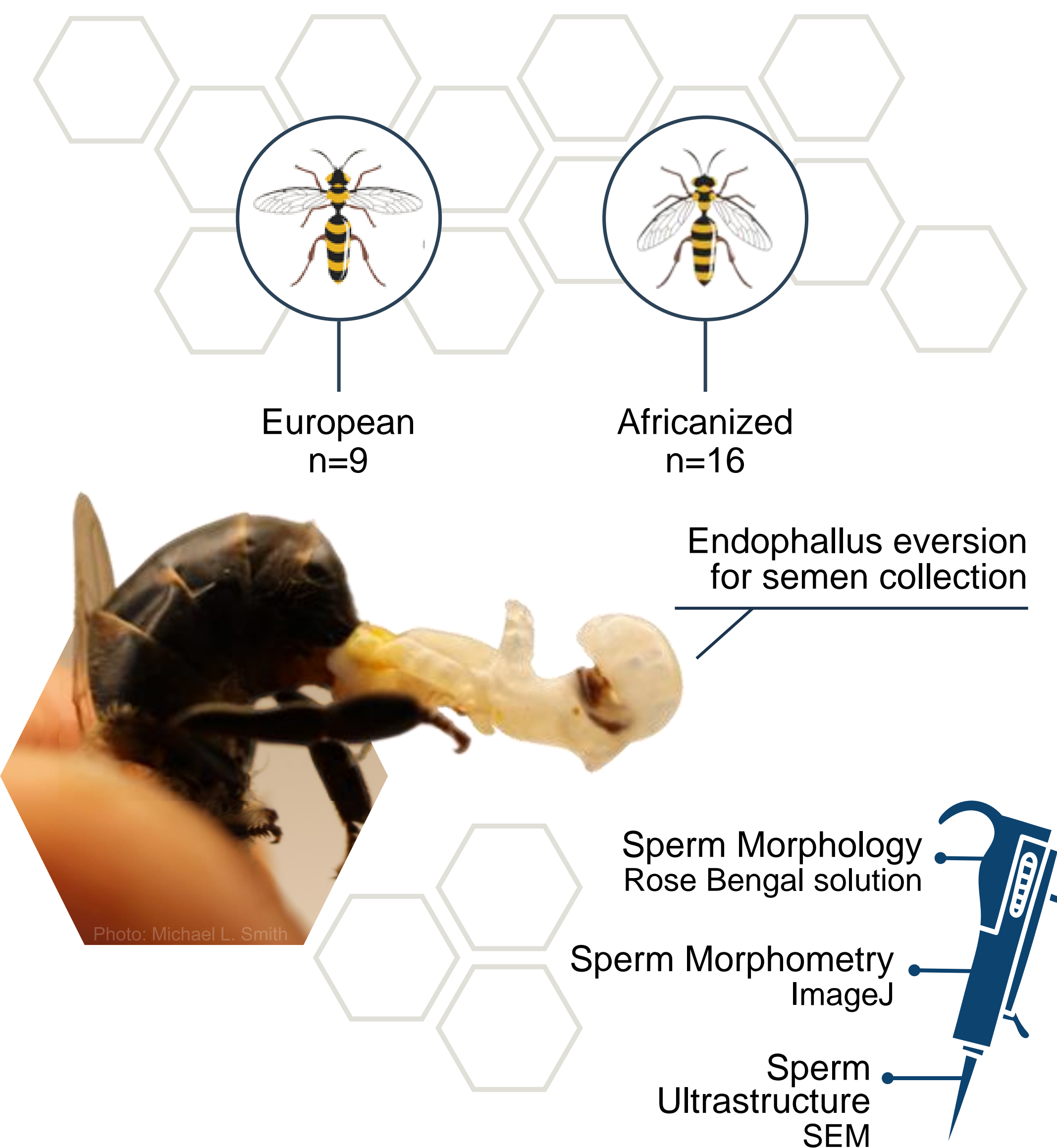
<sup>1</sup>Laboratory of Animal Germplasm Conservation, UFERSA, Mossoró, RN, Brazil; \*Email: [yurigmatos@gmail.com](mailto:yurigmatos@gmail.com)

### INTRODUCTION & AIM

Considering physiological and reproductive differences between European (*Apis mellifera*) and Africanized (*Apis mellifera L.*) honeybees, understanding sperm characteristics is essential for application of assisted reproductive techniques. This work aimed to compare morphological, morphometric and ultrastructural characteristics of spermatozoa from European and Africanized honeybee drones in Caatinga biome.

### METHOD

Experiment was conducted at the Laboratory of Animal Germplasm Conservation, in Mossoró, RN, Brazil (5°03'37"S;37°23'50"W), during July-August/2024, following the experimental design shown in Figure 1.

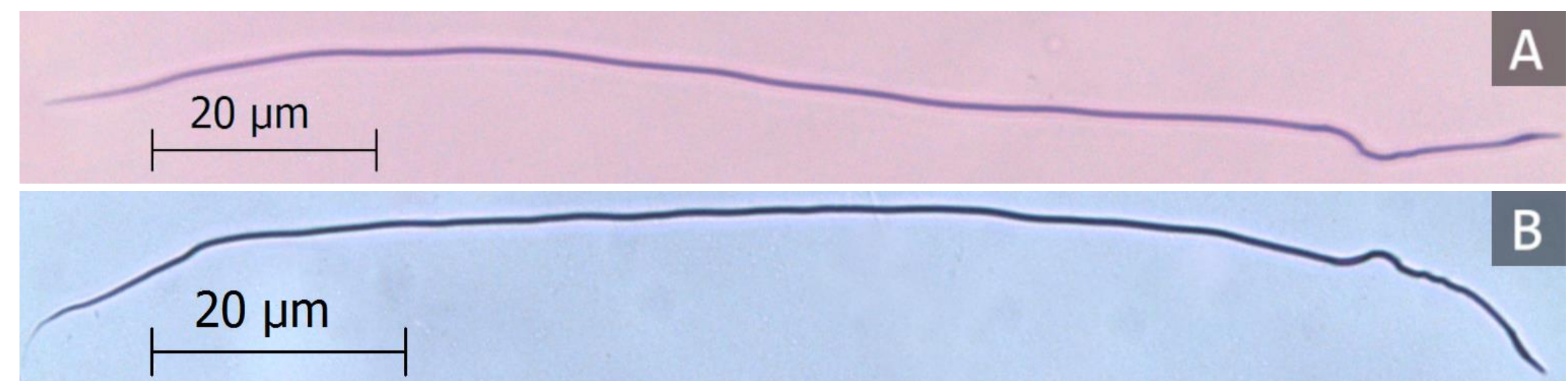


**Figure 1.** Experimental design.

Data were expressed as mean  $\pm$  SE and compared by Student's t-test for sperm morphology and Mann-Whitney test for morphometric parameters ( $P < 0,05$ ).

### RESULTS & DISCUSSION

The percentage of normal spermatozoa in European and Africanized drones were  $10.89 \pm 1.66\%$  and  $12.06 \pm 1.01\%$ , respectively, with no statistical difference, shown in Figure 2; curled tail was the most prevalent defect observed.



**Figure 2.** Sperm morphology from European (A) and Africanized (B) honeybee drones.

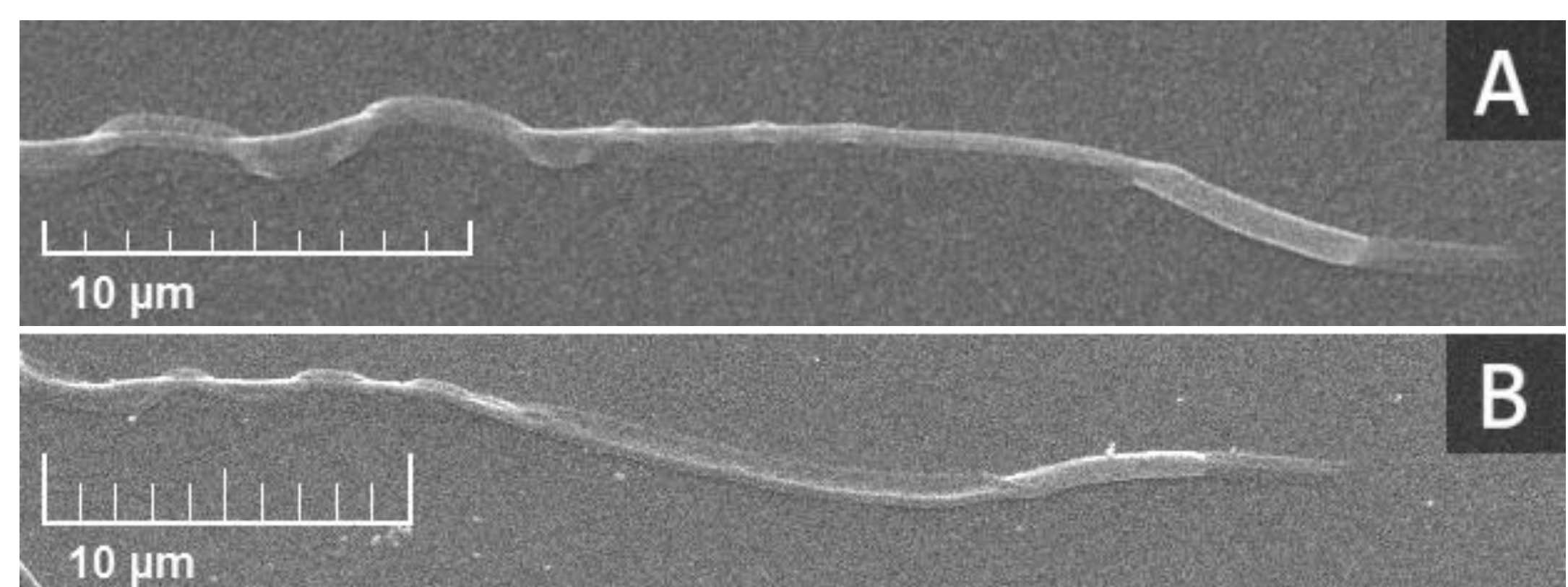
Morphometric measurements revealed significantly longer sperm heads in European drones, as shown in Table 1.

**Table 1.** Morphometric measurements ( $\mu\text{m}$ ) of spermatozoa from Africanized and European honeybee drones in Caatinga biome.

Groups	Head	Tail	Total
European	$10.04 \pm 0.03^a$	$249.7 \pm 0.64^a$	$259.7 \pm 0.65^a$
Africanized	$9.33 \pm 0.04^b$	$250.2 \pm 0.70^a$	$259.9 \pm 0.73^a$

<sup>a,b</sup> Statistical differences are denoted by lowercase letters.

Ultrastructural evaluation allowed detailed identification of the conical acrosomal vesicle and the defined nucleus surface, which was not clearly possible with conventional rose Bengal staining (Figure 3). In head-flagellum coupling, the major mitochondrial derivative and the axoneme were visualized in parallel, but no differences were identified between groups.



**Figure 3.** Ultrastructure of sperm from European (A) and Africanized (B) honeybee drones.

### CONCLUSION

Although there is a morphometric difference in spermatozoa between European and Africanized drones, particularly in head length, the overall morphological and ultrastructural characteristics are similar, suggesting a comparable basis for future applications in reproductive biotechnologies.