Temperature related changes in wing size and shape in two sibling species, *Drosophila melanogaster* and *D. simulans* (Diptera: Drosophilidae)

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Introduction and Aim of the Study

- Various environmental factors influence morphological variability in many organisms.
- Morphological variability is essential for acting natural selection, i.e. adaptation of organisms to certain environmental conditions.
- Numerous studies have confirmed that temperature affected phenotypic changes in many organisms.
- Influence of temperature on phenotypic changes has been well demonstrated in *Drosophila* (developmental time, fertility, viability, body size, pigmentation, etc.).
- Thus far, the effect of temperature on morphological variability in two sibling species, *Drosophila melanogaster* and *D. simulans*, has not been investigated using geometric morphometric techniques.
- Therefore, the goal of the present study was to investigate the effect of temperature on wing size and shape in these two species.

Material and Methods

- Landmark-based geometric morphometric data were used to analyze the effect of temperature on wing size and shape in two *Drosophila* species (Figure 1).
- Flies of both species were separately reared in 220 ml glass vials, on cornmeal-sugar-agar-yeast medium, at two temperatures (25 °C and 19 °C), humidity of 60%, and 12h L: 12h D cycle.
- Position of the landmarks on each (right) wing picture is determined using TpsDig program (Figure 1).
- Influence of different thermal regimes on wing shape and size variation were analyzed using MorphoJ and CoordGen6 programs, respectively.

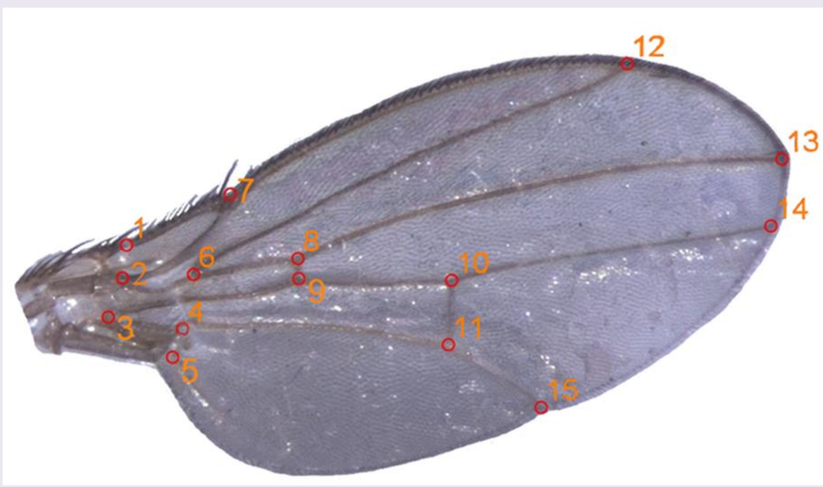

Figure 1. Positions of the landmarks on the right wing

Results

- Temperature significantly influenced wing centroid size in *D. simulans* males and females ($p = 0.0422$) (Figure 2), as well as wing shape in both sexes in both species ($p < 0.0001$) (Figure 3).

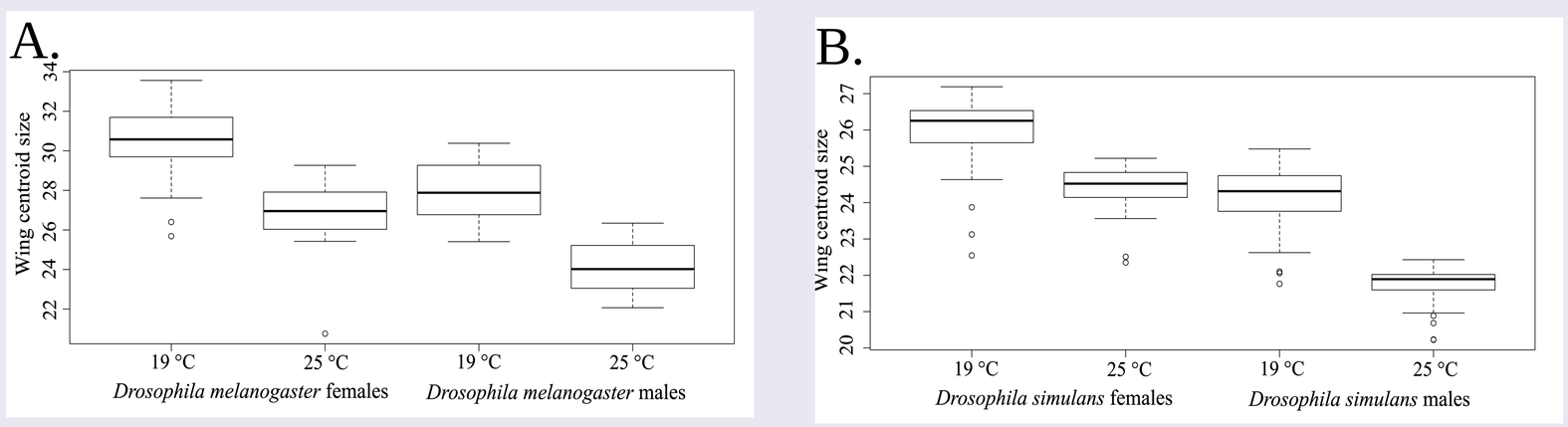

Figure 2. The effect of temperature on wing size in: **A.** *D. melanogaster* and **B.** *D. simulans*.

The median with the first and the third quartiles is presented in boxes, with the range of variation and outliers.

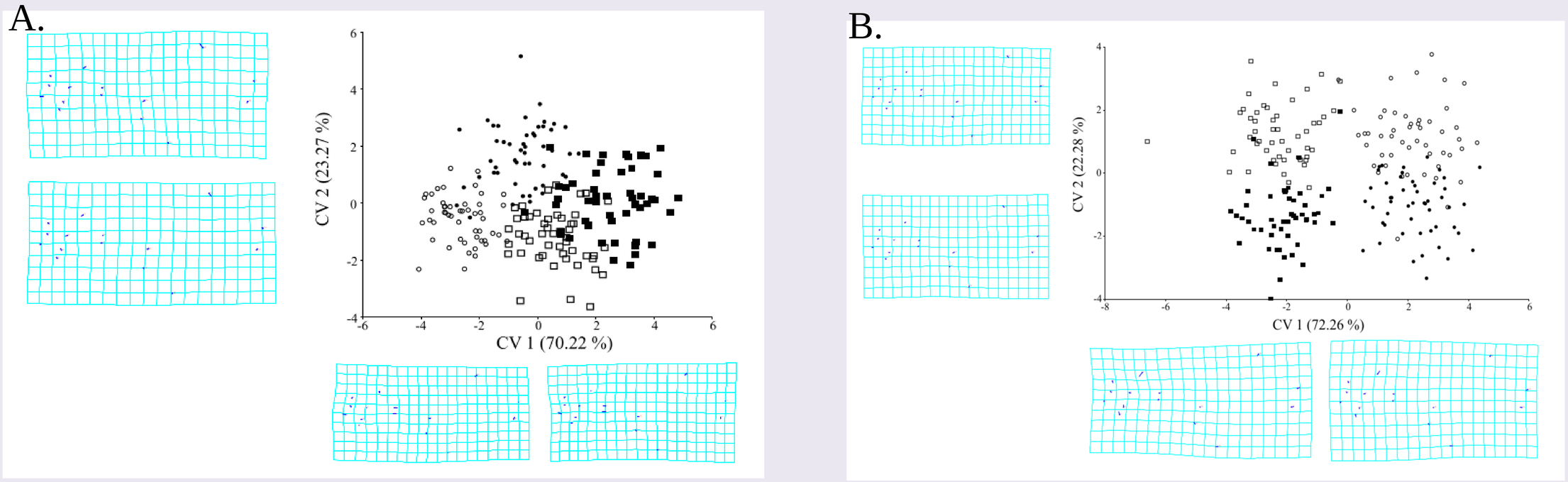

Figure 3. The effect of temperature on wing shape in two sibling *Drosophila* species: **A.** *D. melanogaster* and **B.** *D. simulans*, obtained by Canonical Variate Analysis (CVA). Rectangles: black – males reared at 19 ℃, white – females reared at 19 ℃; circles: black – males reared at 25 ℃, white – females reared at 25 ℃.

Conclusions

- Different thermal regimes had a greater effect on wing shape variation than on size variation in two *Drosophila* species.
- As more variable trait, wing shape could be further related with flying efficiency under different thermal regimes.

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