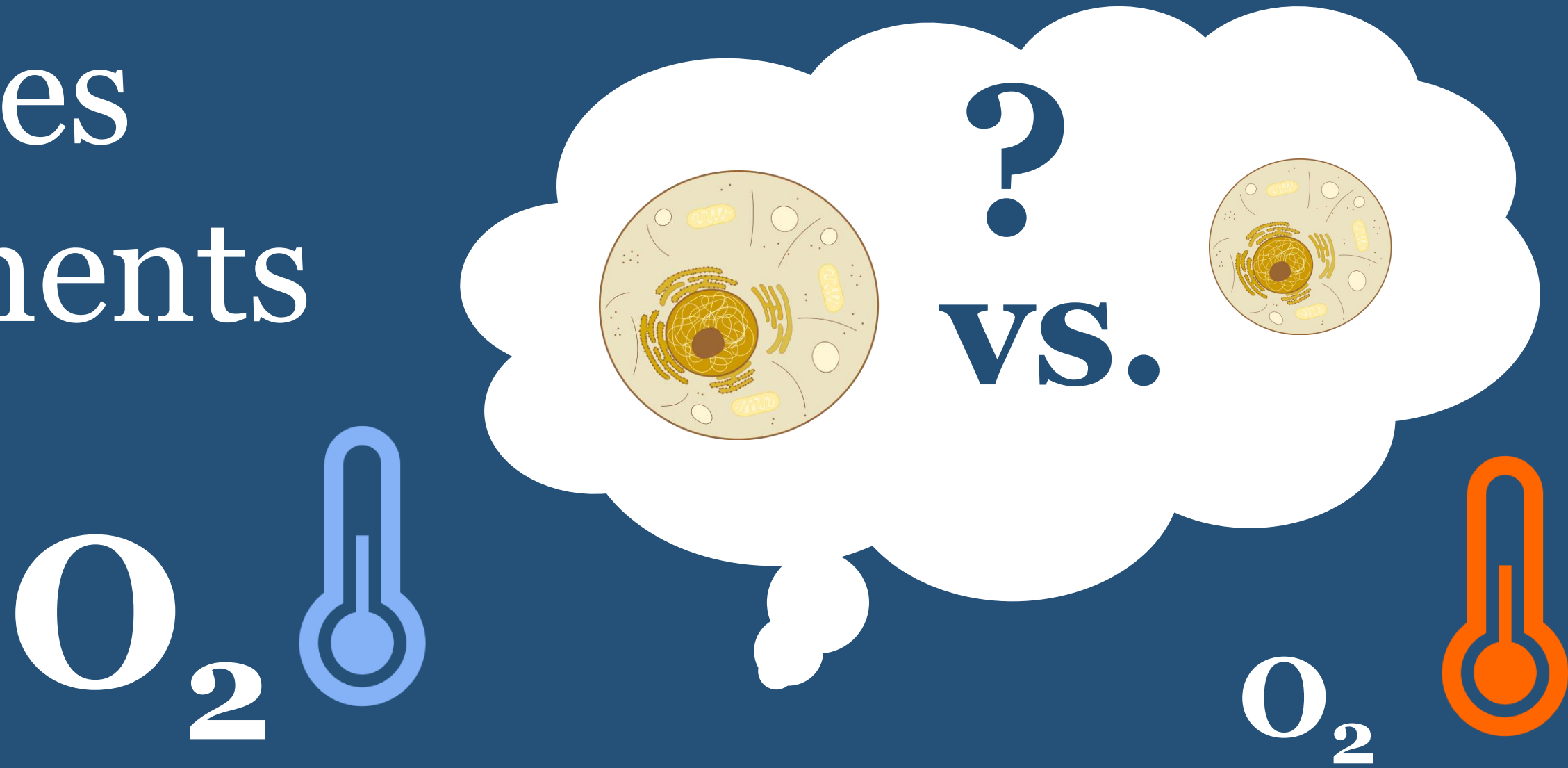


# Systemic orchestration of cell size throughout the body: evolutionary and developmental responses of *Drosophila melanogaster* to environments

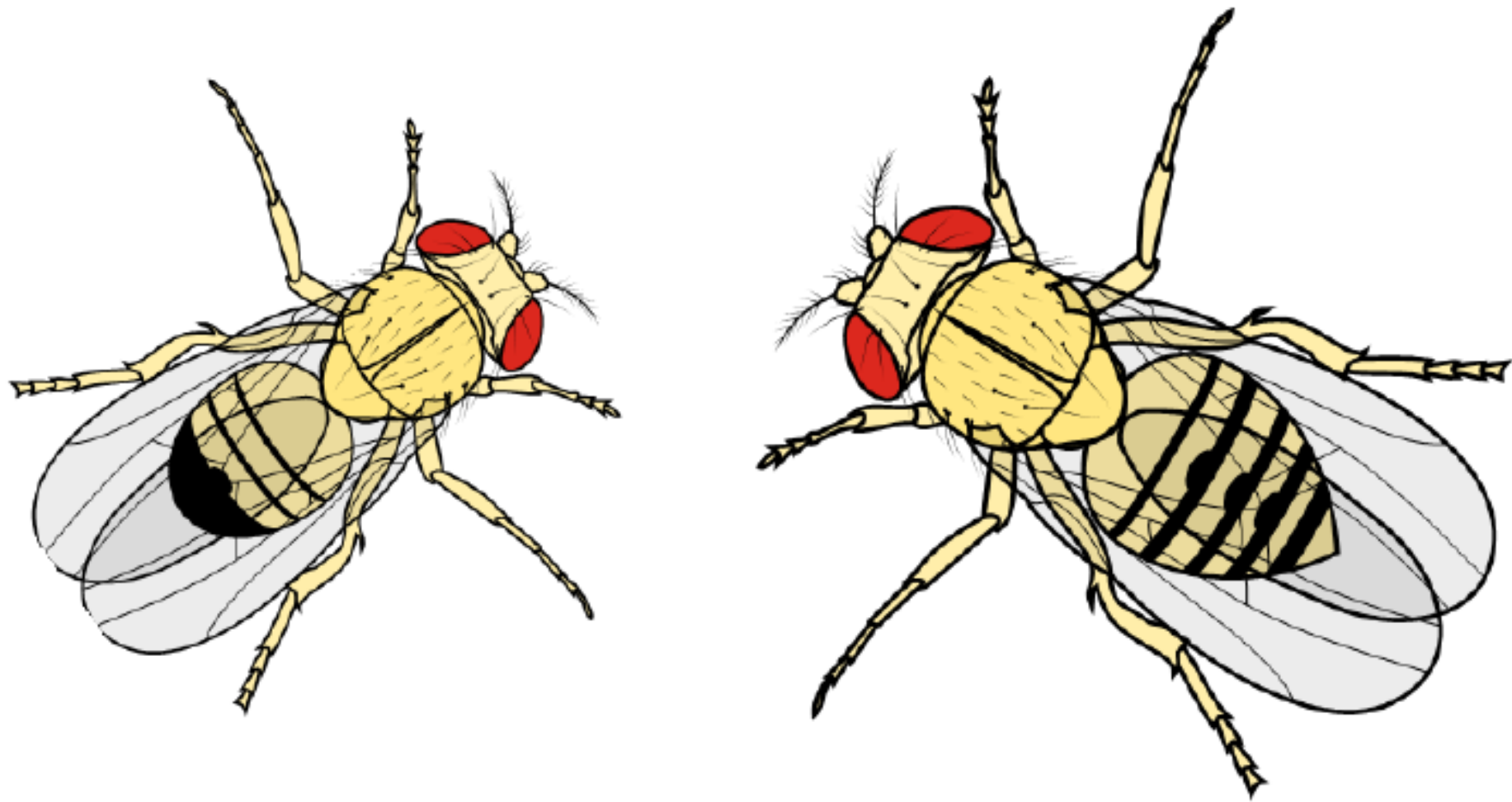
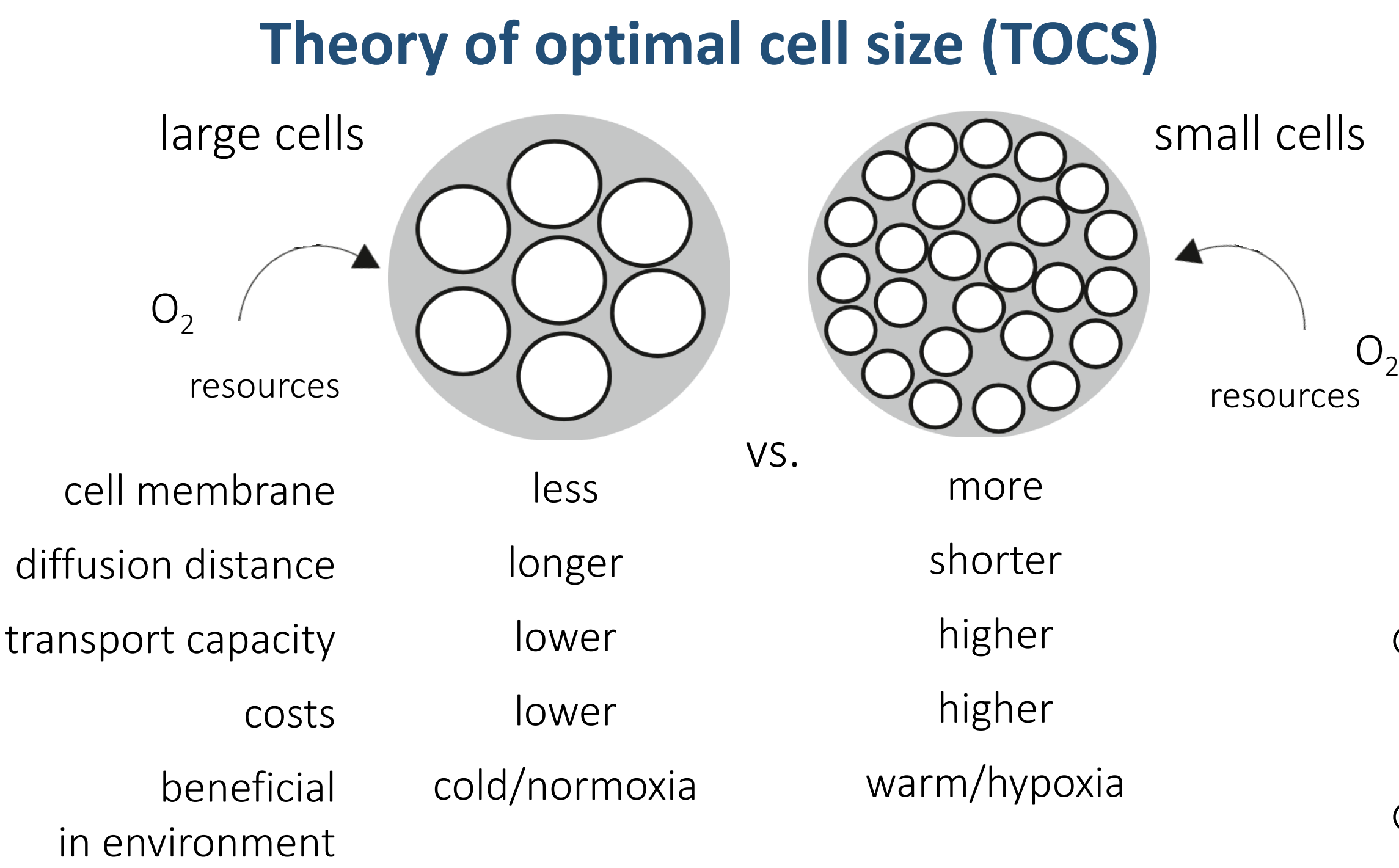
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## 1. INTRODUCTION

Organisms have evolved vast disparities in body size and cellularity. Although the body size of ectotherms in environmental gradients has been well studied, little is known about its cellular basis.

**Aim:** To explore the links between body size changes and cell size



### Research questions:

- What are evolutionary and developmental responses of flies to the environments?
- Does cell size change consistently across organs in a body?

## 2. METHODS

### Two study models of fruit flies

#### Developmental plasticity

- Genotypes originating from wild population with body size and cell size changes induced through phenotypic plasticity
- Four developmental conditions

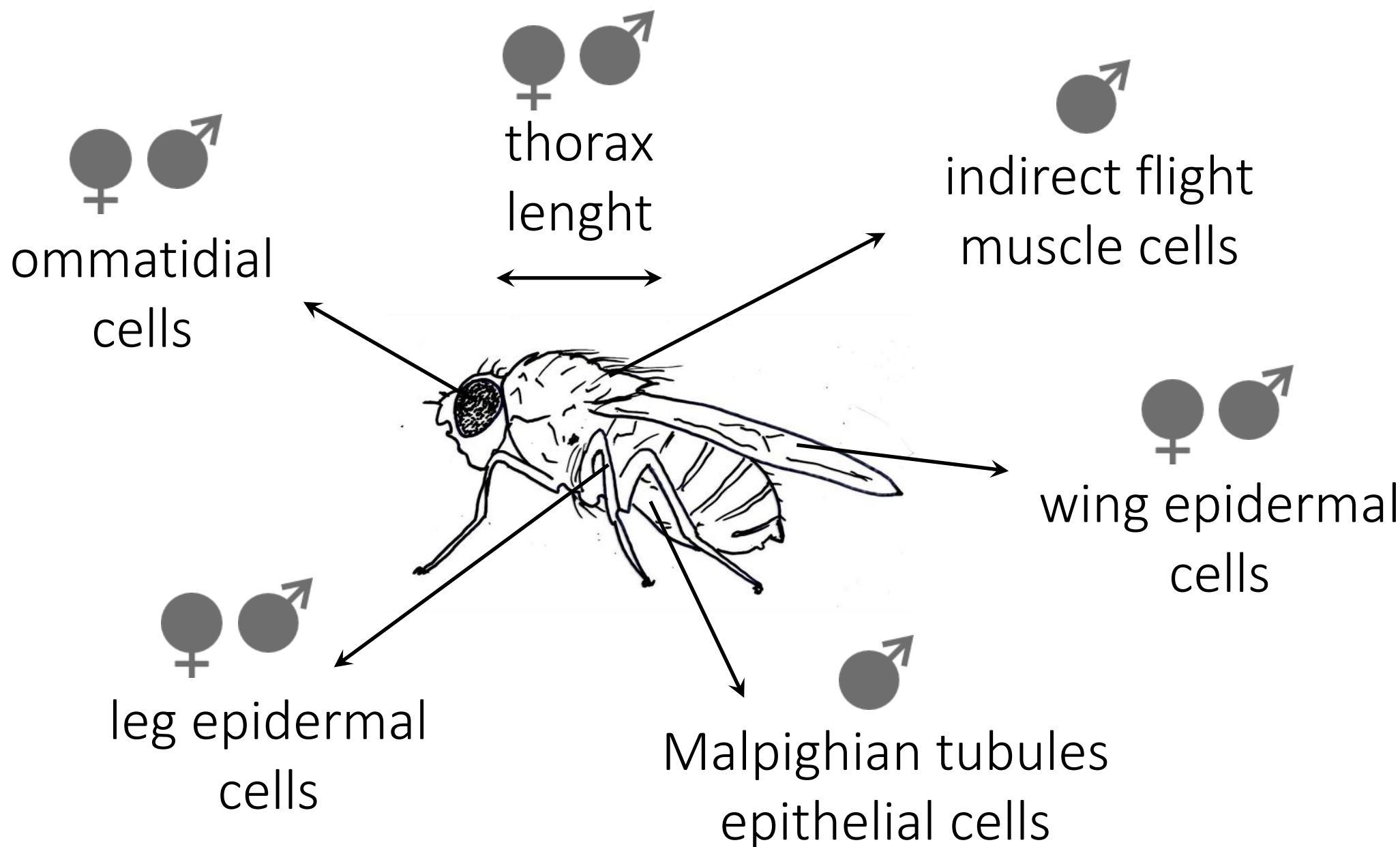


#### Experimental evolution

- Genotypes with body and cell size fixed by evolutionary processes
- Three selective thermal environments (21% O<sub>2</sub>)



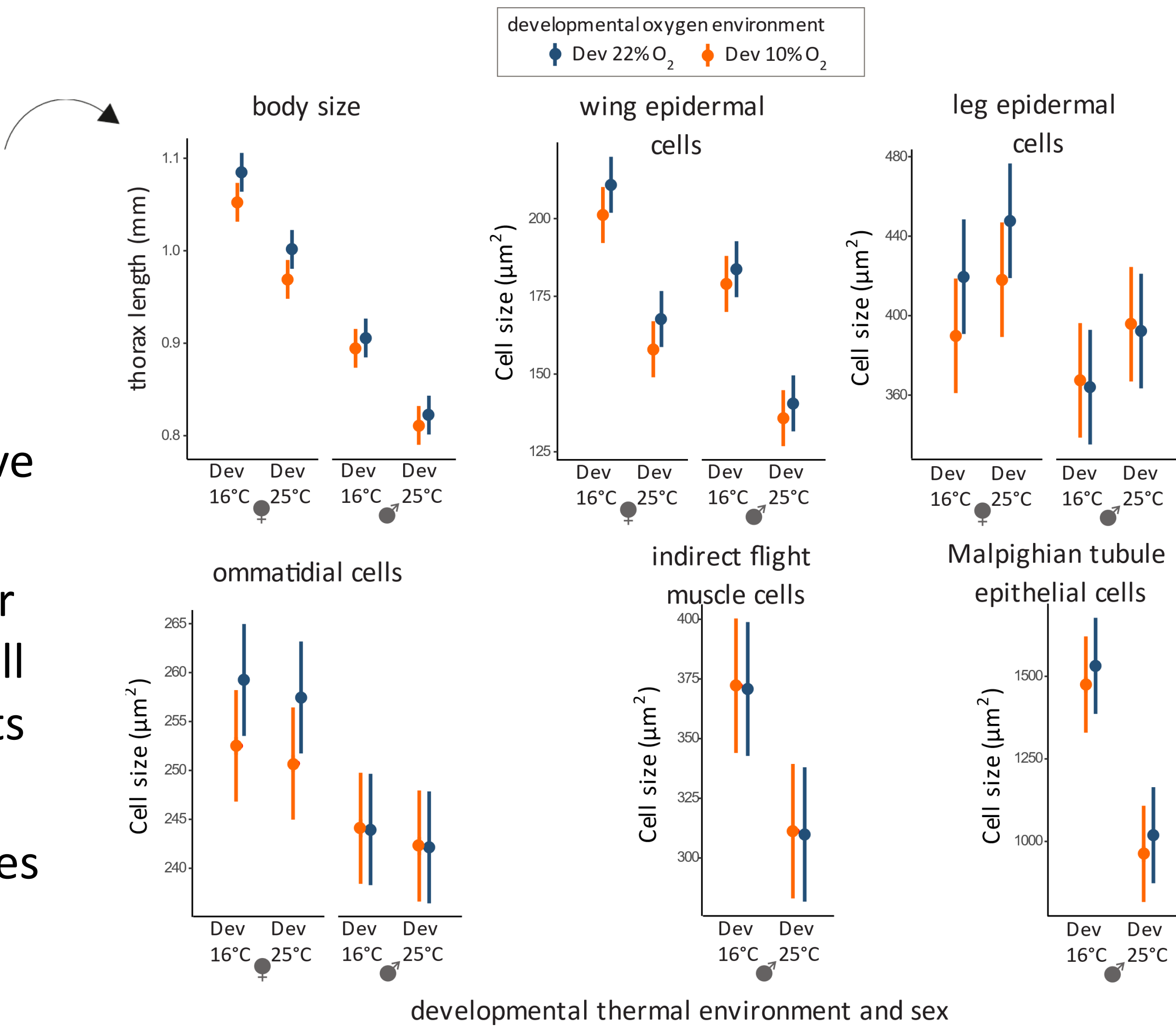
### Body and cell size measurements



## 3. RESULTS

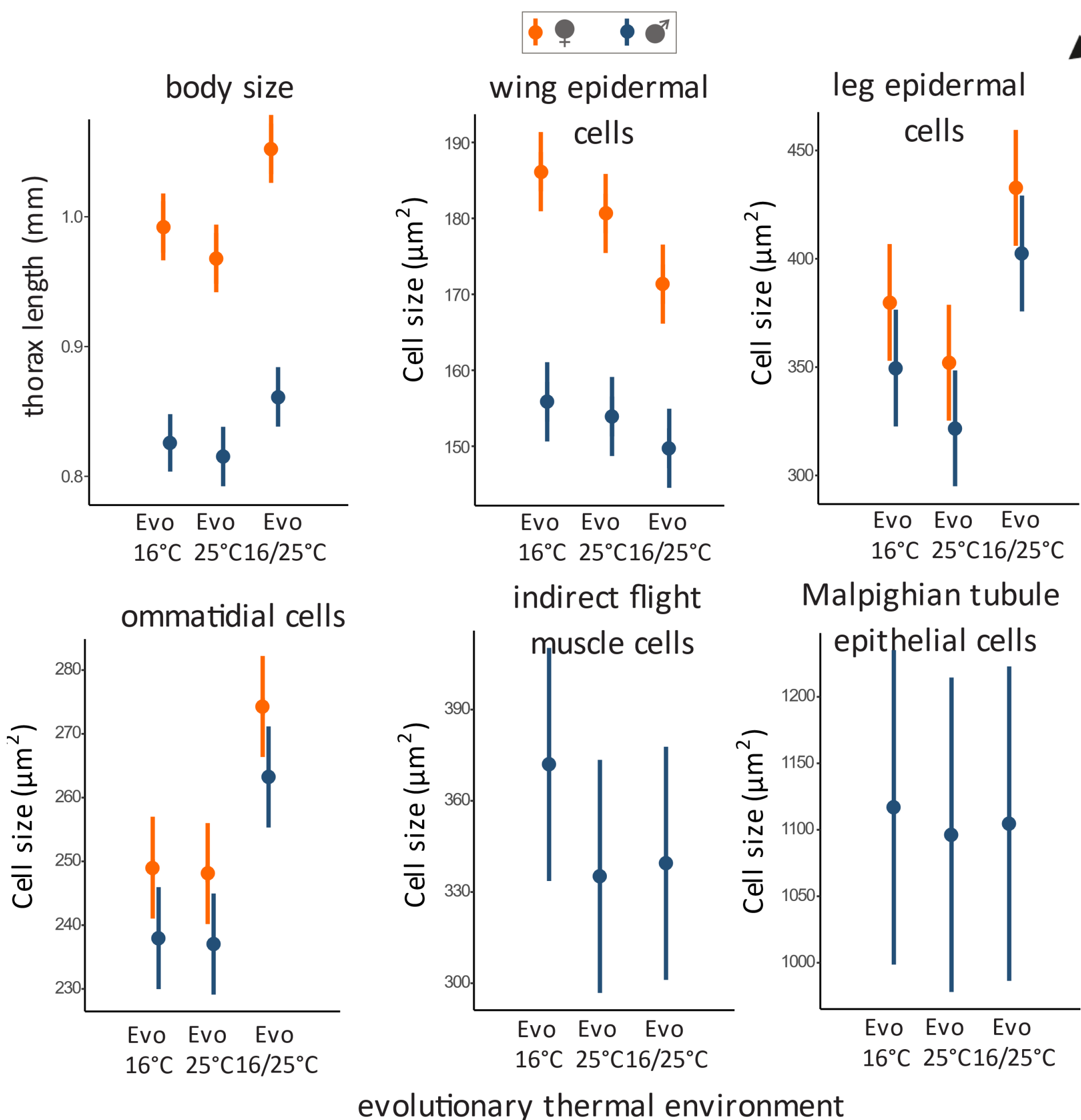
### Developmental plasticity

- Females -> larger with larger cells
- Males -> less responsive to oxygen conditions
- Temperature -> greater effects on body and cell size than oxygen effects
- High temperature -> decrease of all cell types except for cells in leg



### Experimental evolution

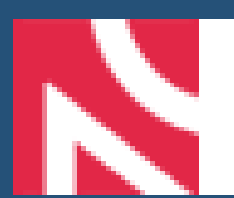
- Females -> larger with larger cells
- Males -> less responsive to evolutionary conditions
- Fluctuating environment -> the greatest inconsistencies in body and cell size
- Warm environment -> weak but consistent decrease of all cell types compared to cold



## 4. CONCLUSIONS

- ➔ Environmental conditions affected the phenotypic characteristics of flies, leading to systemic cell size changes across the body (with some inconsistencies) coupled with shifts in adult body size
- ➔ Inconsistencies indicate a more complex nature of cell size responses with some level of tissue autonomy and suggest caution in conclusions based on extrapolations from measures of single cell type
- ➔ Cell size should be included more often in studies of insect responses to climate changes and the origin of life history traits

### Acknowledgments:



National Science Centre in Poland (OPUS to M.C. 2016/21/B/NZ8/00303)



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