# Characterization of Ovarian Development and Assessment of Reproductive Success in *Hermetia illucens* Females (Diptera: Stratiomyidae)"

**Dr. Yulia Riabtseva, Supervisor of Multiplication Center, Nasekomo**

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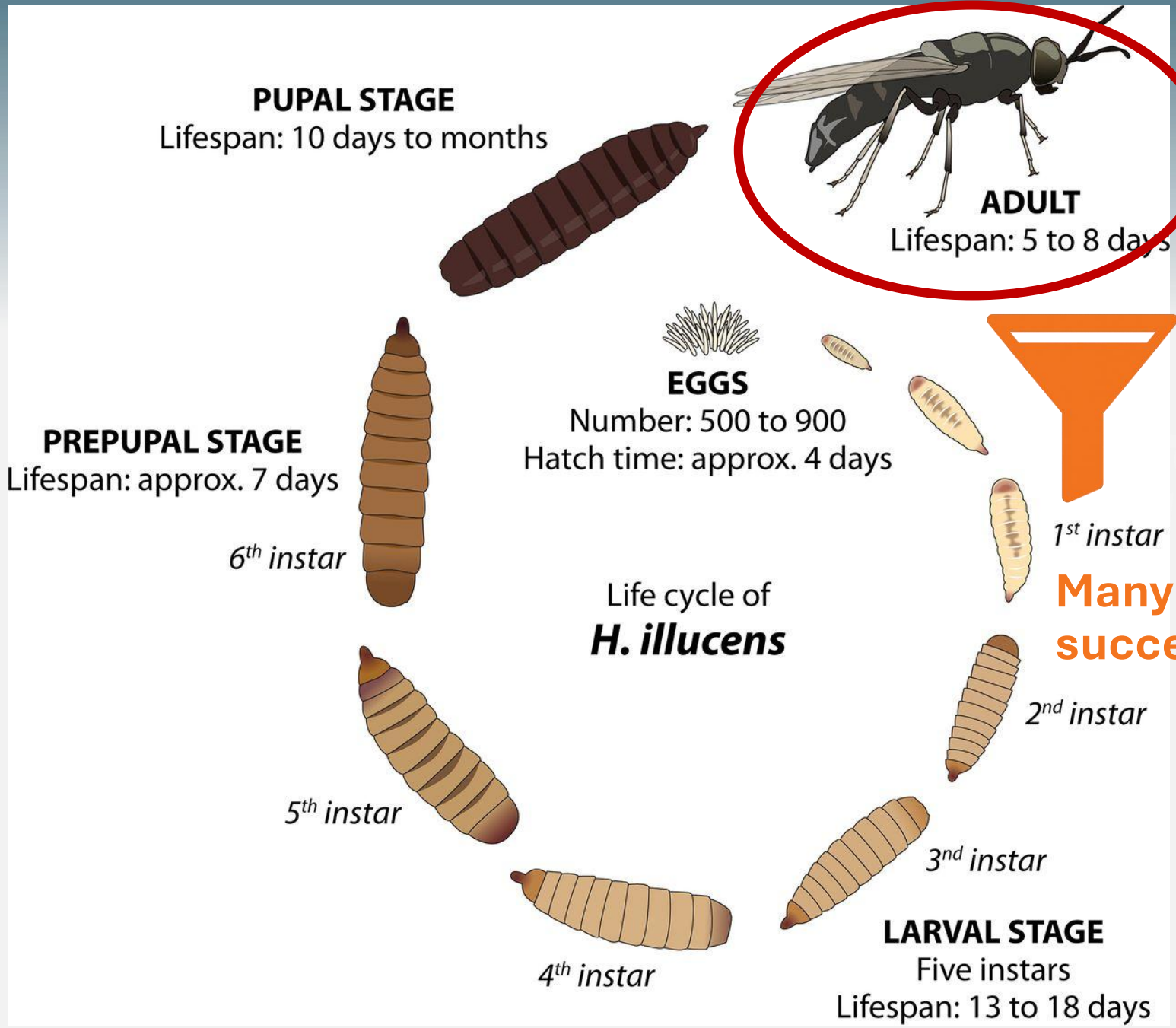


**Reproductive biology – underexplored enough**

**Many larvae depend on few successful matings**

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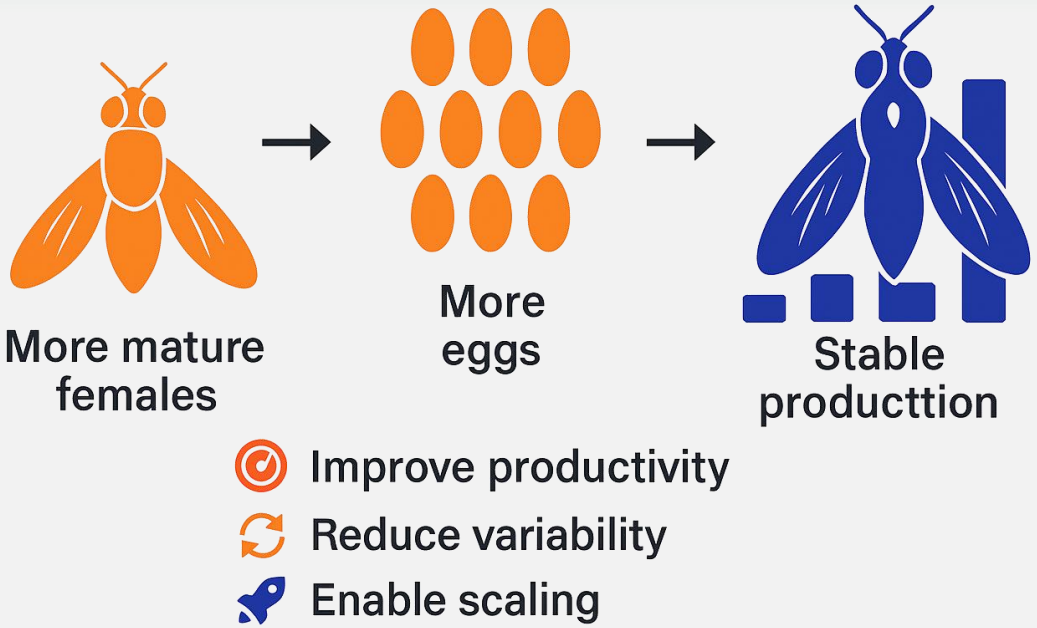


**Our goal** was to characterize the development of the female reproductive system and to evaluate novel approaches for assessing sexual maturation and reproductive status in BSF.

**To do that, we:**

(1) *Classified* the ovarian maturation process into developmental stages.

(2) *Examined* ovarian traits and insect sizes for each developmental stage;

(3) *Utilized* these parameters to assess the female reproductive status.

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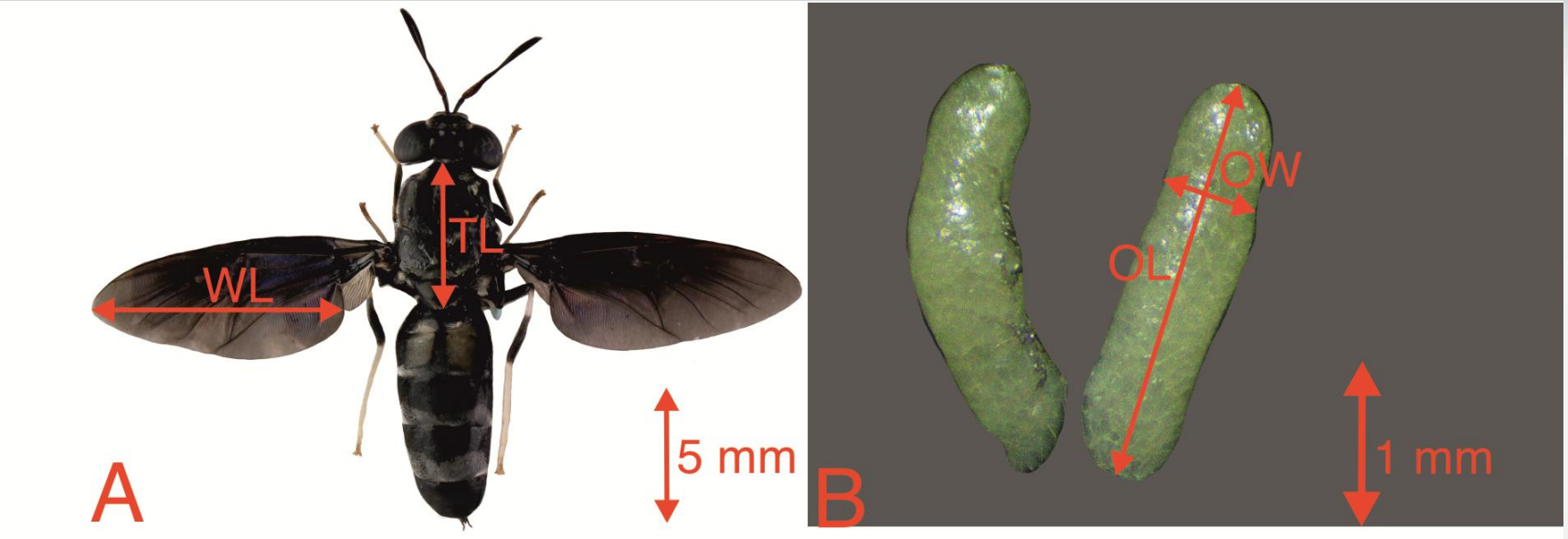
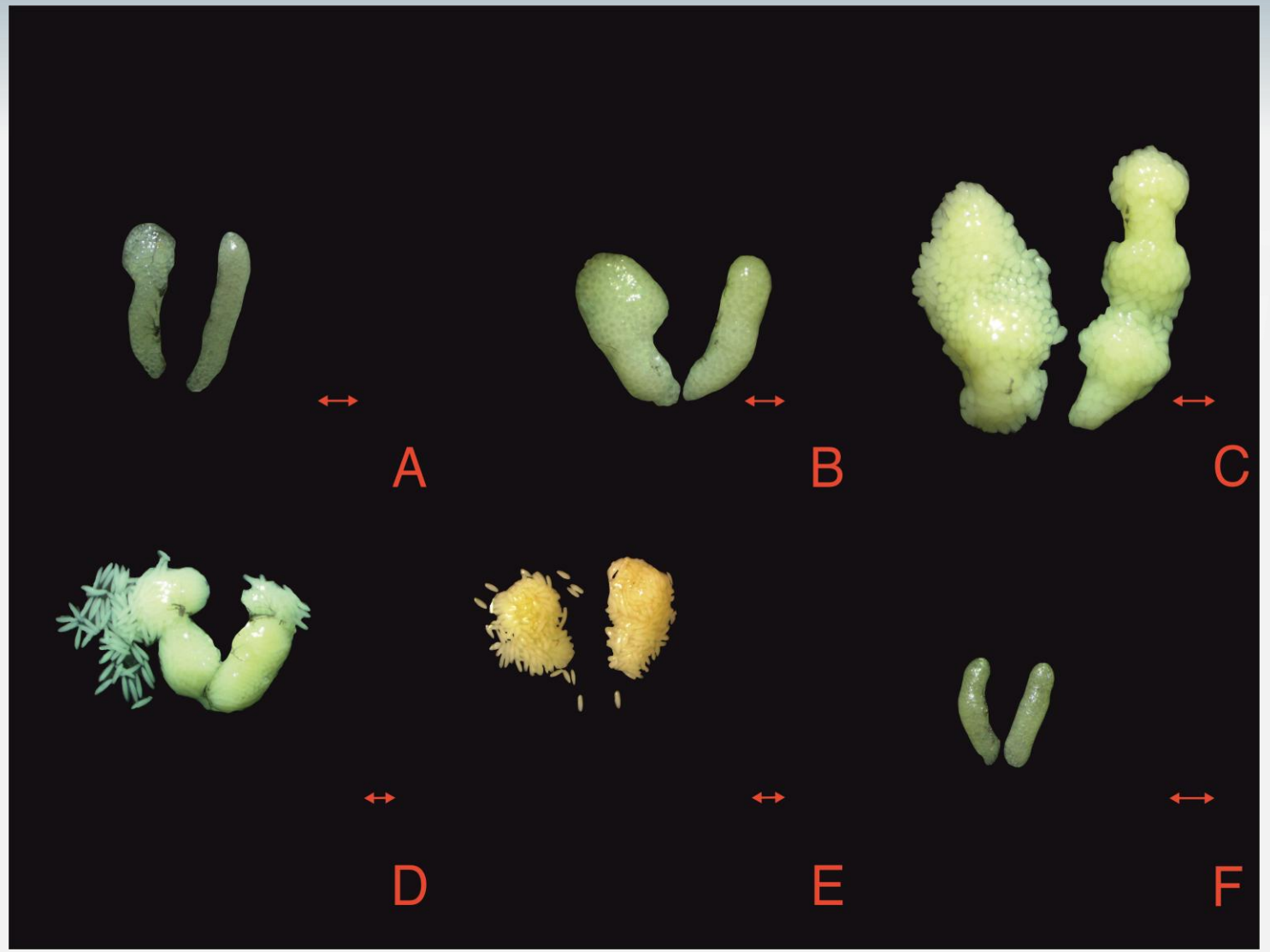
# MATHERIAL AND METHODS




- Ovary Length (**OL**),
- Ovary Width (**OW**),
- Ovary Index (**OI=OL/OW**)
- Additionally, Wings Length (**WL**) and Thorax Length (**TL**) were measured as indicators of female size

# RESULTS AND DISCUSSION




**The female reproductive system development stages :**

**A – undeveloped ovaries;**

**B – developing ovaries;**

**C – pre-egg laying stage;**

**D, E – egg laying stage,**

**F – after egg-laying,**

*scale bar = 1 mm*

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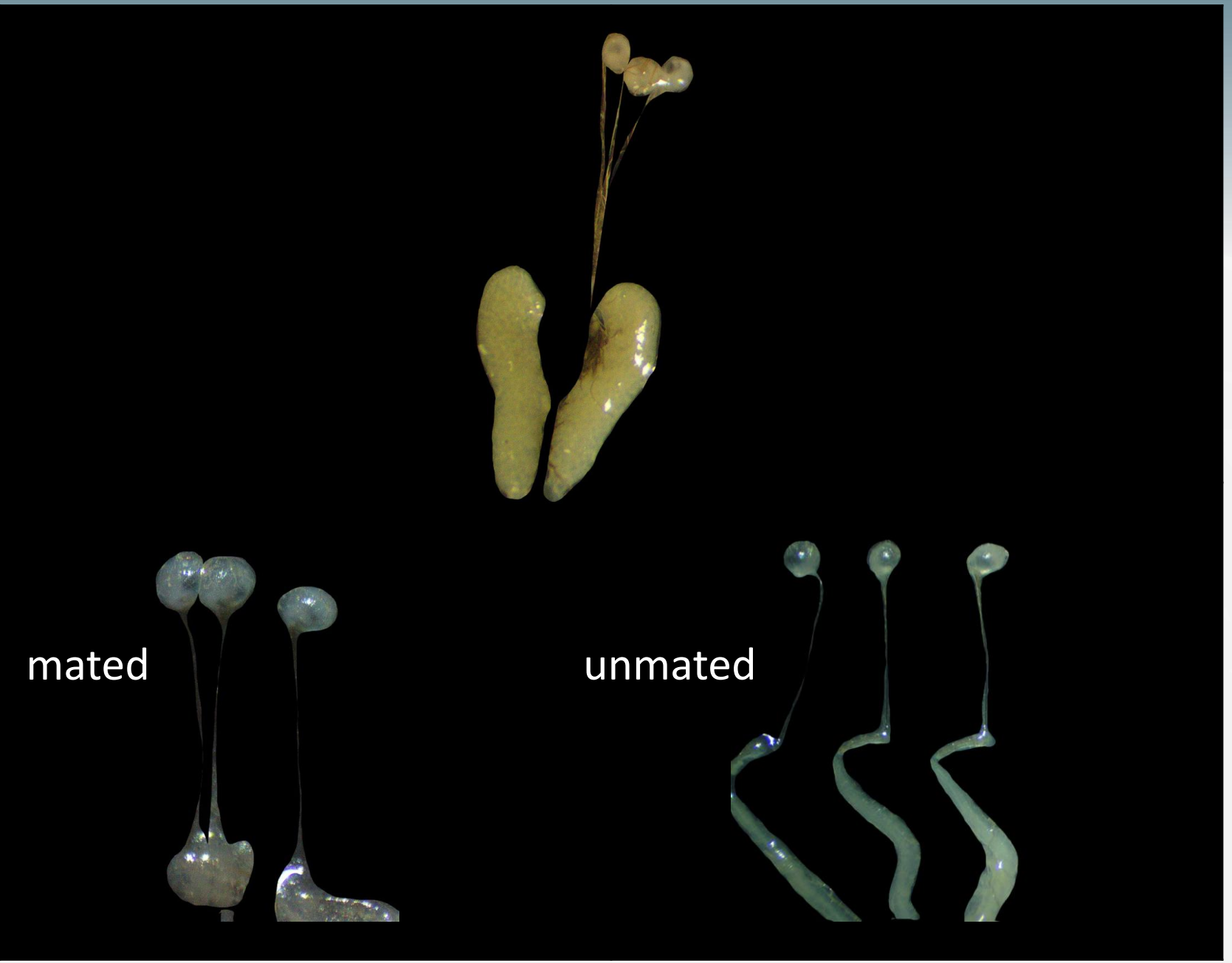
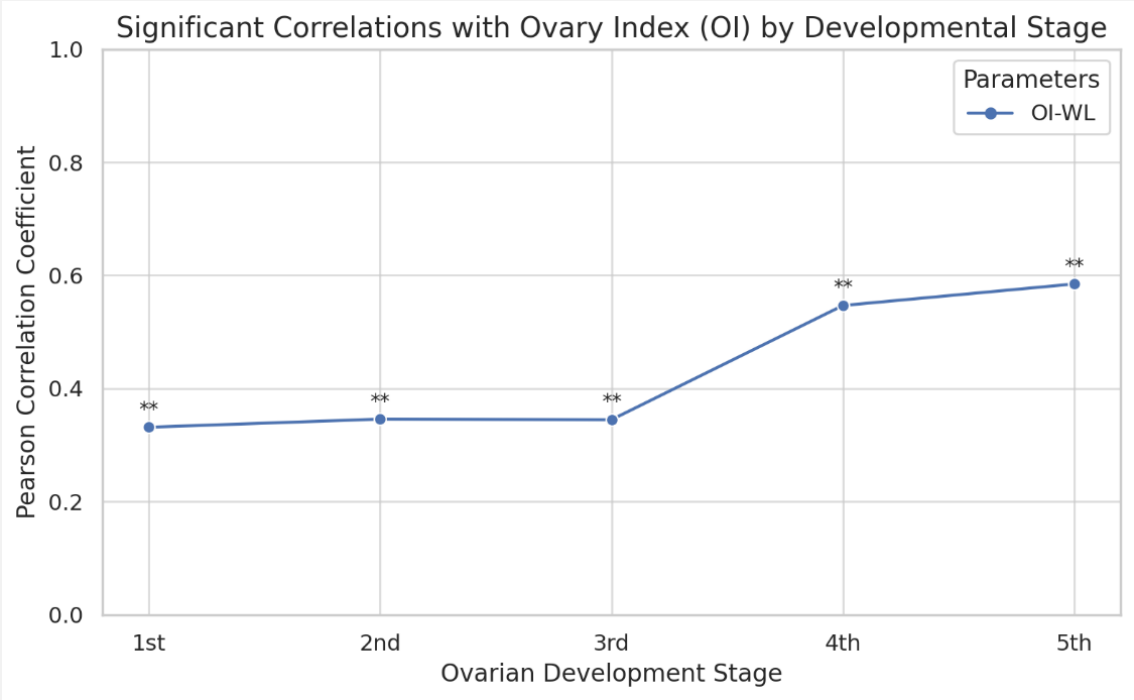
# RESULTS AND DISCUSSION



# RESULTS AND DISCUSSION

| | 1-st development stage | 2-nd development stage | 3-rd development stage | 4-th development stage | 5-th development stage |
|---|---|---|---|---|---|
| **OI-TL** | 0.1449 | 0.1078 | 0.1321 | 0.2347 | 0.02795 |
| **OI-WL** | 0.3314** | 0.3458** | 0.3447** | 0.5467** | 0.5848** |
| **OL-TL** | 0.265 | 0.6535** | 0.1425 | 0.1355 | -0.0795 |
| **OL-WL** | 0.4611** | 0.5923** | 0.4394** | 0.5973** | 0.3617** |
| **OW-TL** | 0.1853 | 0.1298 | 0.1986 | 0.1177 | 0.03956 |
| **OW-WL** | 0.1461 | 0.1395 | 0.2944 | 0.2735 | 0.1965 |
| **TL-WL** | 0.4968** | 0.7703** | 0.7728** | 0.7343** | 0.7219* |

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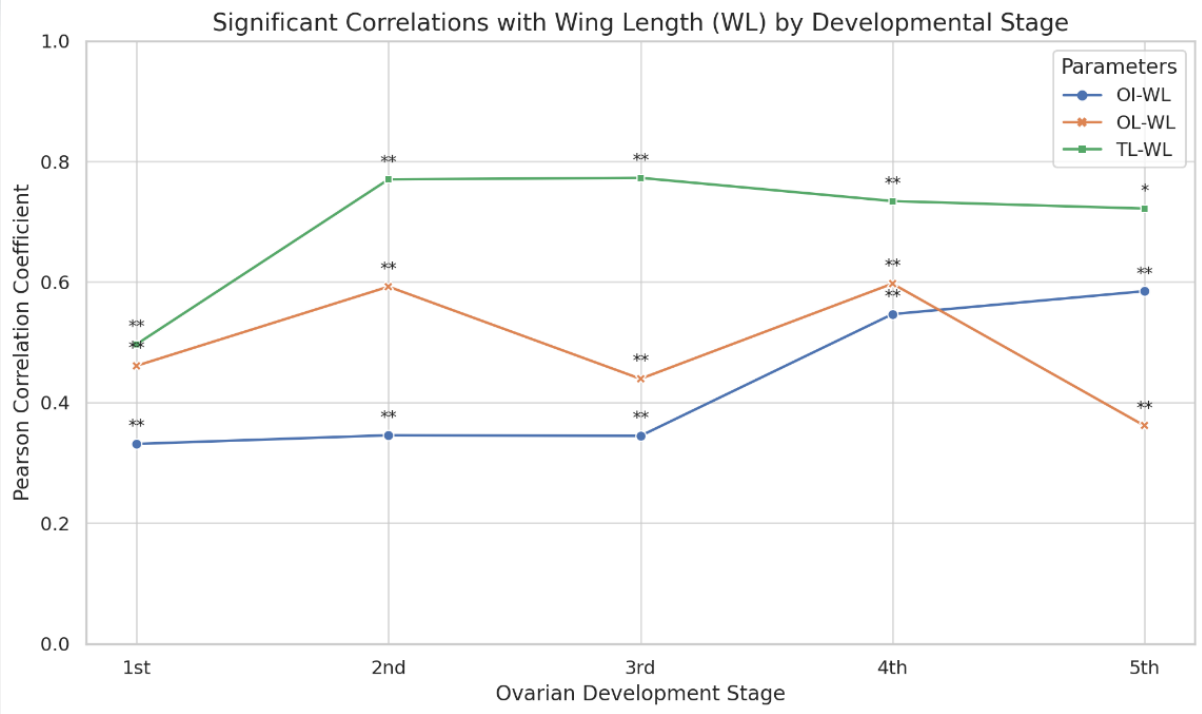


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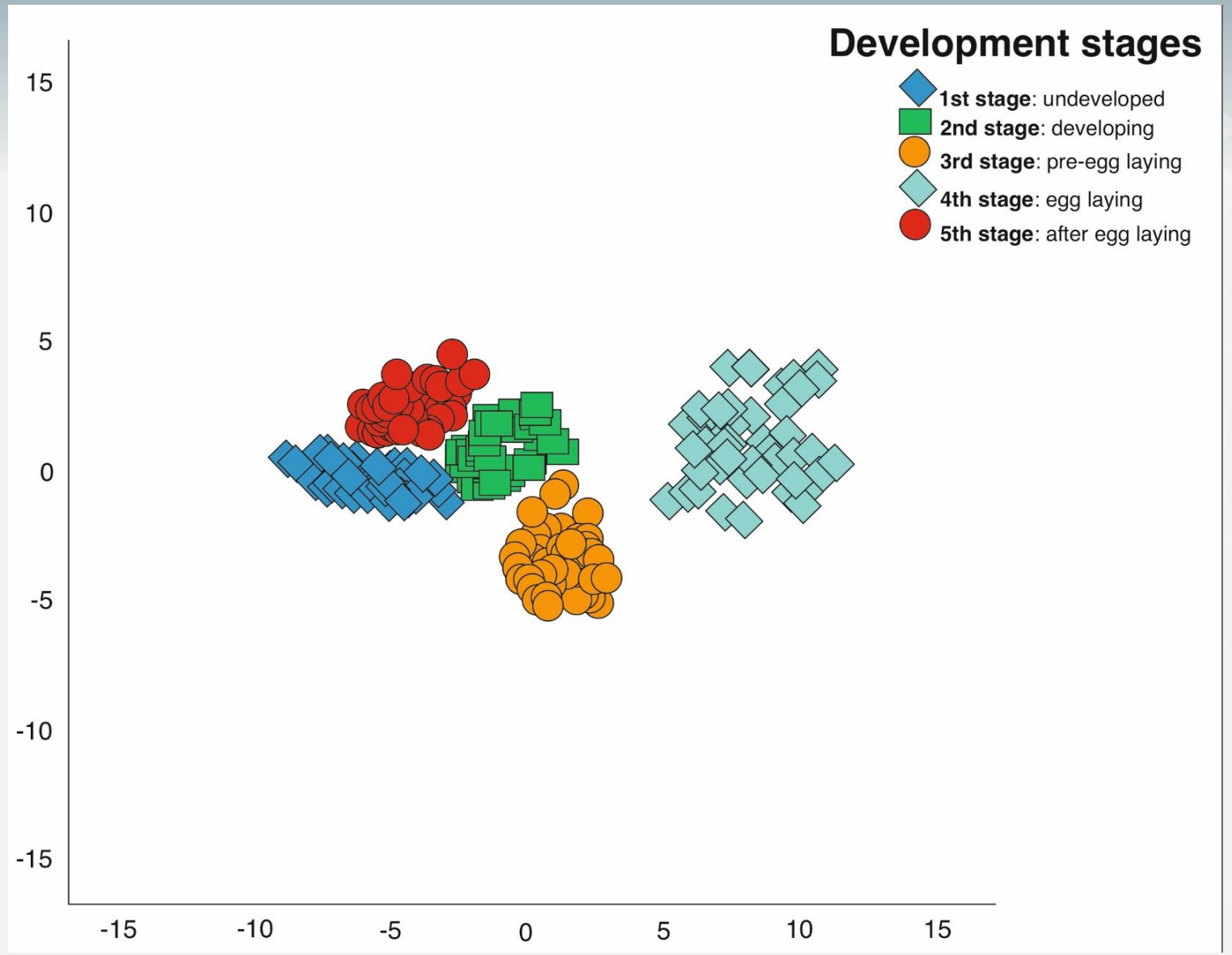


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# Conclusion

- Reproduction is a critical bottleneck in BSF mass-rearing systems but remains underexplored.
- We classified female ovarian development into **five distinct**, morphologically defined stages.
- The Ovary Index (**OI**) and Ovary Length (**OL**) are reliable indicators of reproductive maturity ($p < 0.001$).
- Wing Length (**WL**) significantly correlates with both **OI** and **OL**, especially at later stages.
- Thorax Length (**TL**) shows high correlation with **WL** but is less informative for assessing reproductive status.
- Discriminant analysis confirms that ovarian morphology effectively differentiates reproductive stages.
- Morphometric assessment offers a fast, non-destructive method to optimize timing of female selection and boost egg production.
- These findings support a precision-based approach to BSF breeding for industrial-scale efficiency.

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# Thank you for attention!

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