

LIFE HISTORY FITNESS OF F1 HYBRIDS OF TEX AND PA21 POPULATIONS OF *DAPHNIA PULEX*

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BACKGROUND

- Daphnia are small water fleas.
- Some clones of Daphnia can produce both sexually and asexually.
- Evolutionary theory suggests that fitness decreases with hybridization as a result of negative epistatic interactions between alleles that rose independently in genetic backgrounds, making hybrids incompatible with parents' species (Simon et al., 2018).
- Heterosis can occur due to deleterious effects of negative epistatic interactions, making hybrids fitter than their parents (Bernardes et al., 2017).
- Hybridization is crossing between individuals of same species or different species.
- Interspecific hybrids: Hybrids of two different species.
- Intraspecific hybrids: Hybrids of different genotypes of same species.

PURPOSE

To determine whether hybrids present heterosis (higher fitness) or hybrid depression (lower fitness).

METHODOLOGY

SAMPLING

- Tex & PA21 parental isolates sampled from Textiles road, Michigan; F1 hybrids from crossing experiments.

MEASURING

- F1 hybrids and Tex parentals were grown under standard conditions (18C, 18:6 [light: dark], and 500,000 cells per ml of algae *Scenedesmus obliquus*) for two generations (Moy et al., 2021).
- Third-generation (well) females allowed reproducing.
- 10-30 neonates (babies) collected per clone/genotype.
- Neonates collected and grown for 0-2 days.
- Measured using Leica Application Suite V4 at 8X magnification.
- Size determined based on the distance between the top of the head and to the base of the tail. The tail is not included in the measurement.

DATA

- One-way ANOVA, Two-way ANOVA and Tukey tests: R studio (Sarrazin & Sperfeld., 2022)

RESULTS

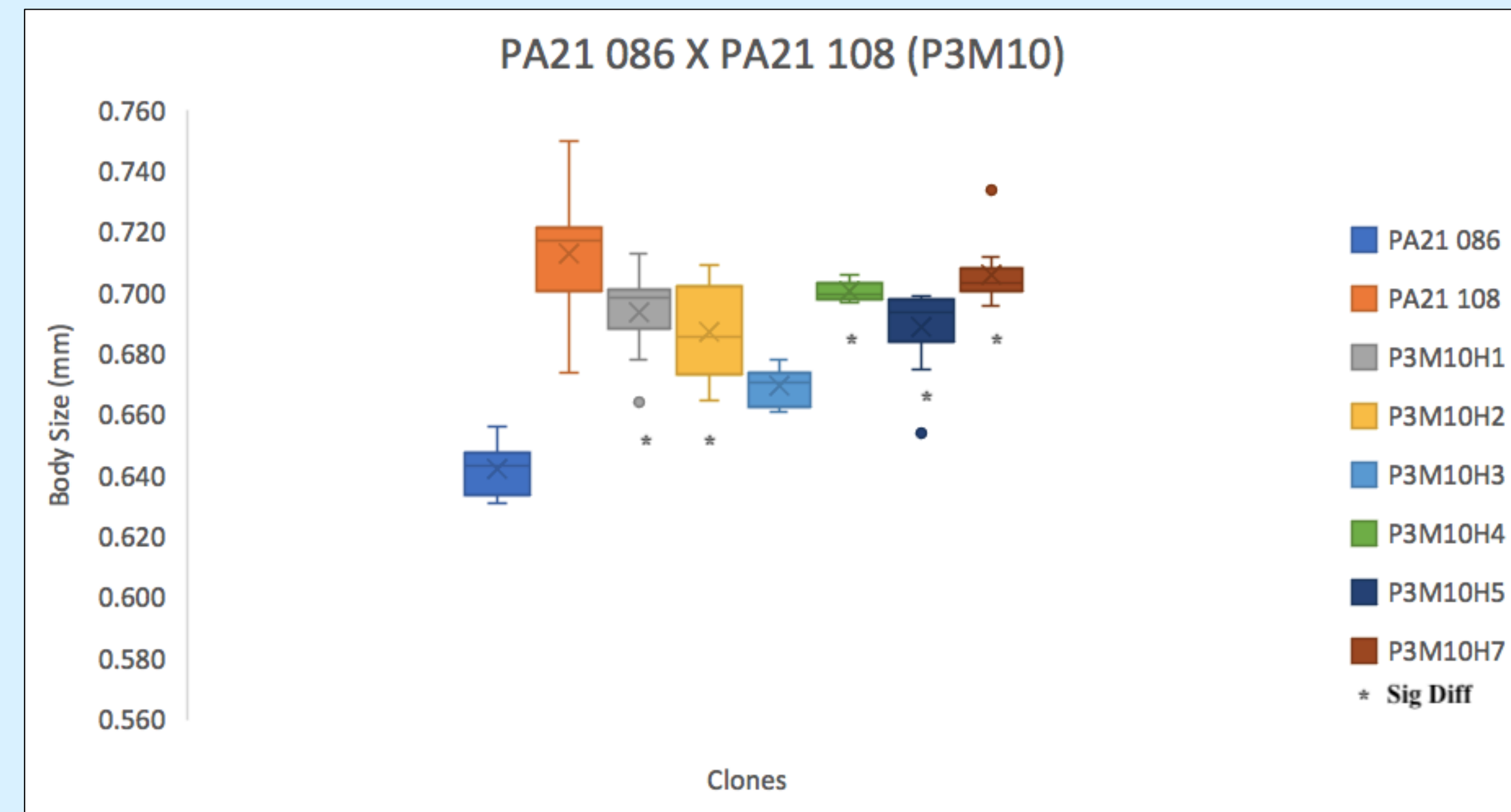


Figure 1: PA21 086 x PA21 108 hybrids with significant difference of ~0.05 mm found in 5 out of 6 F1 lines.

Figure 2: Tex65 X Tex85 hybrids with significant difference of ~0.04 mm found in all F1 lines. P2M5H1 and P2M5H6 were both found to be significantly smaller than both parents.

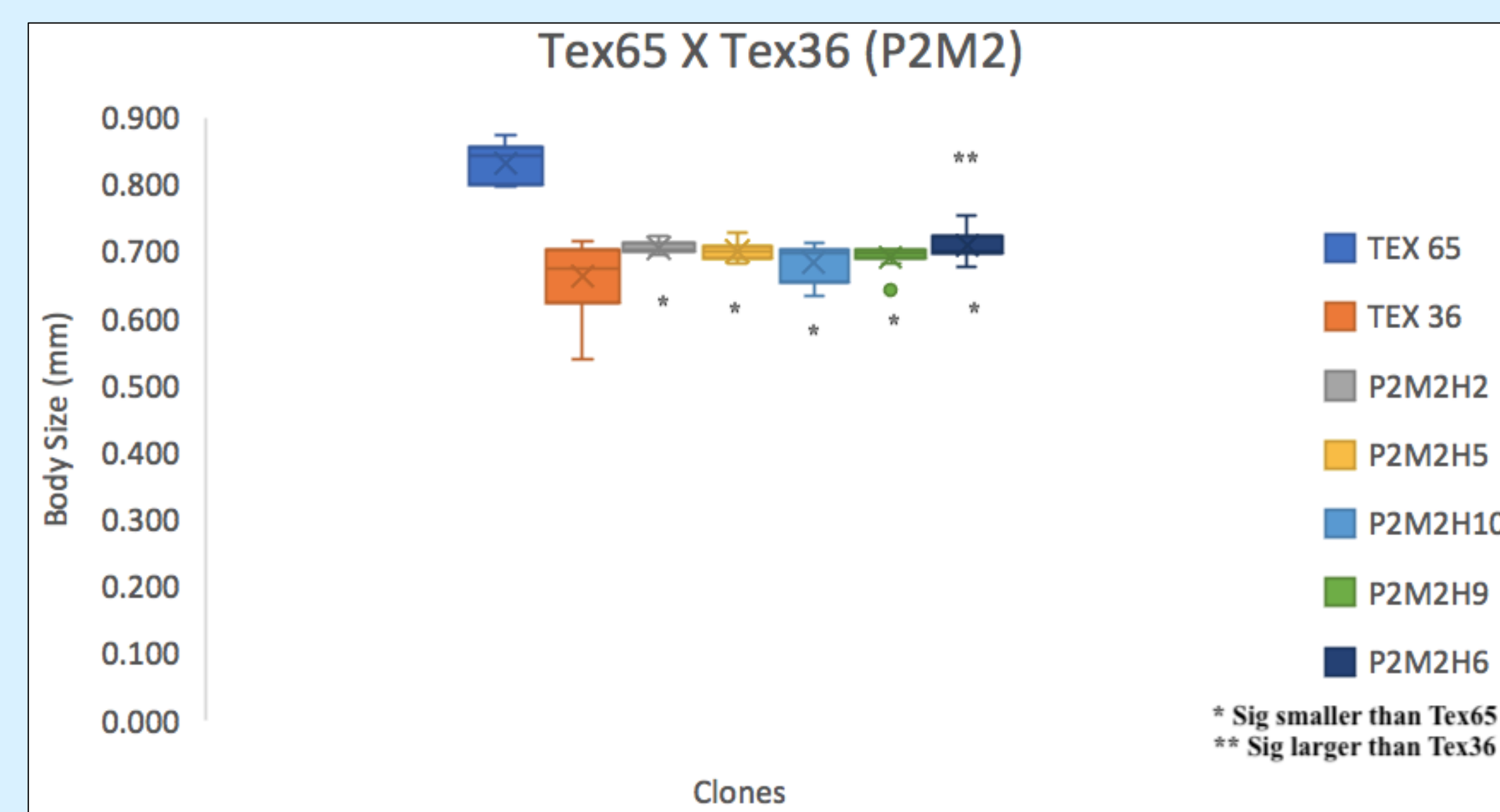
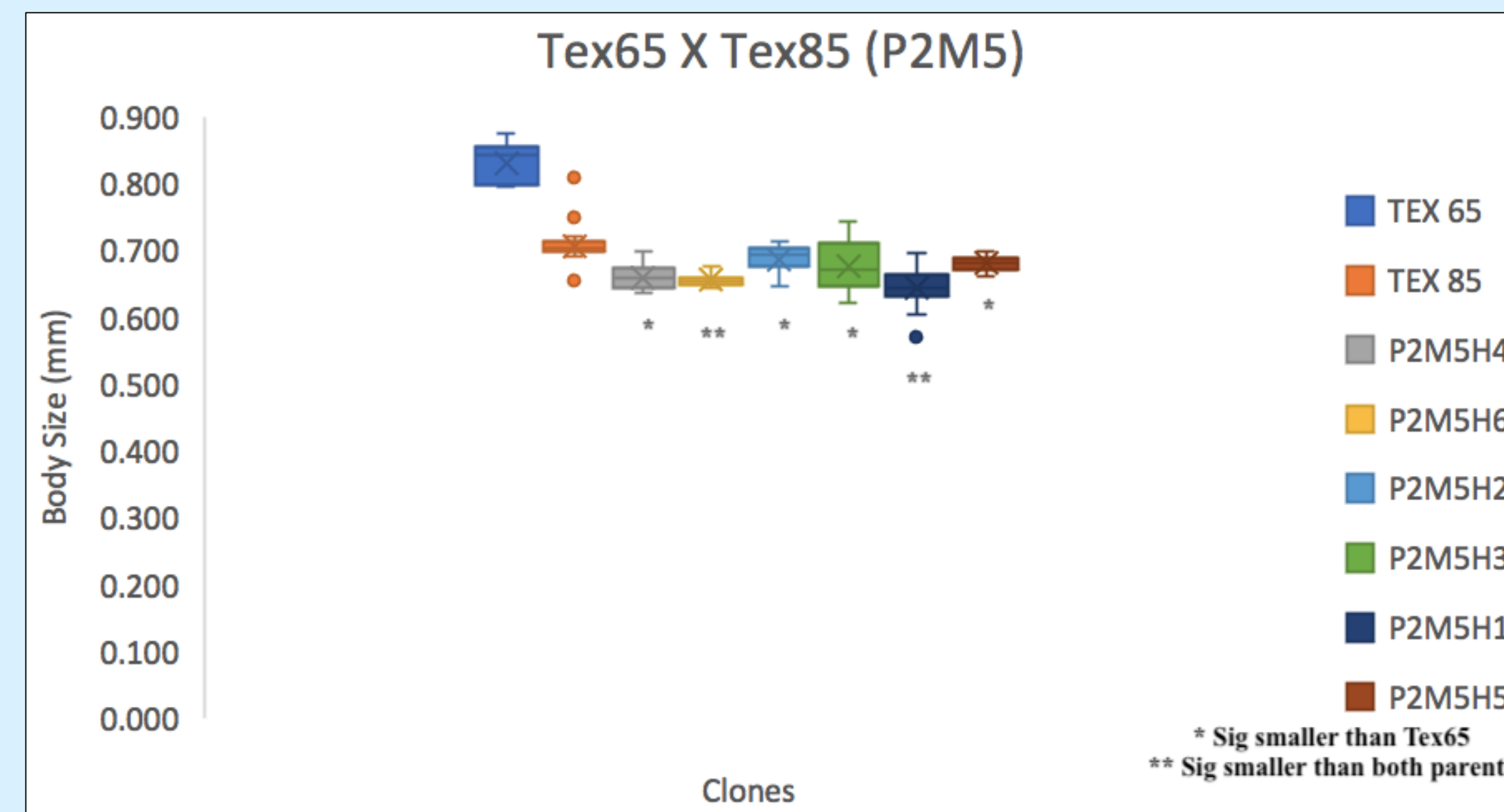


Figure 3: Tex65 X Tex36 hybrids with significant difference of ~0.13 mm found in all F1 lines.

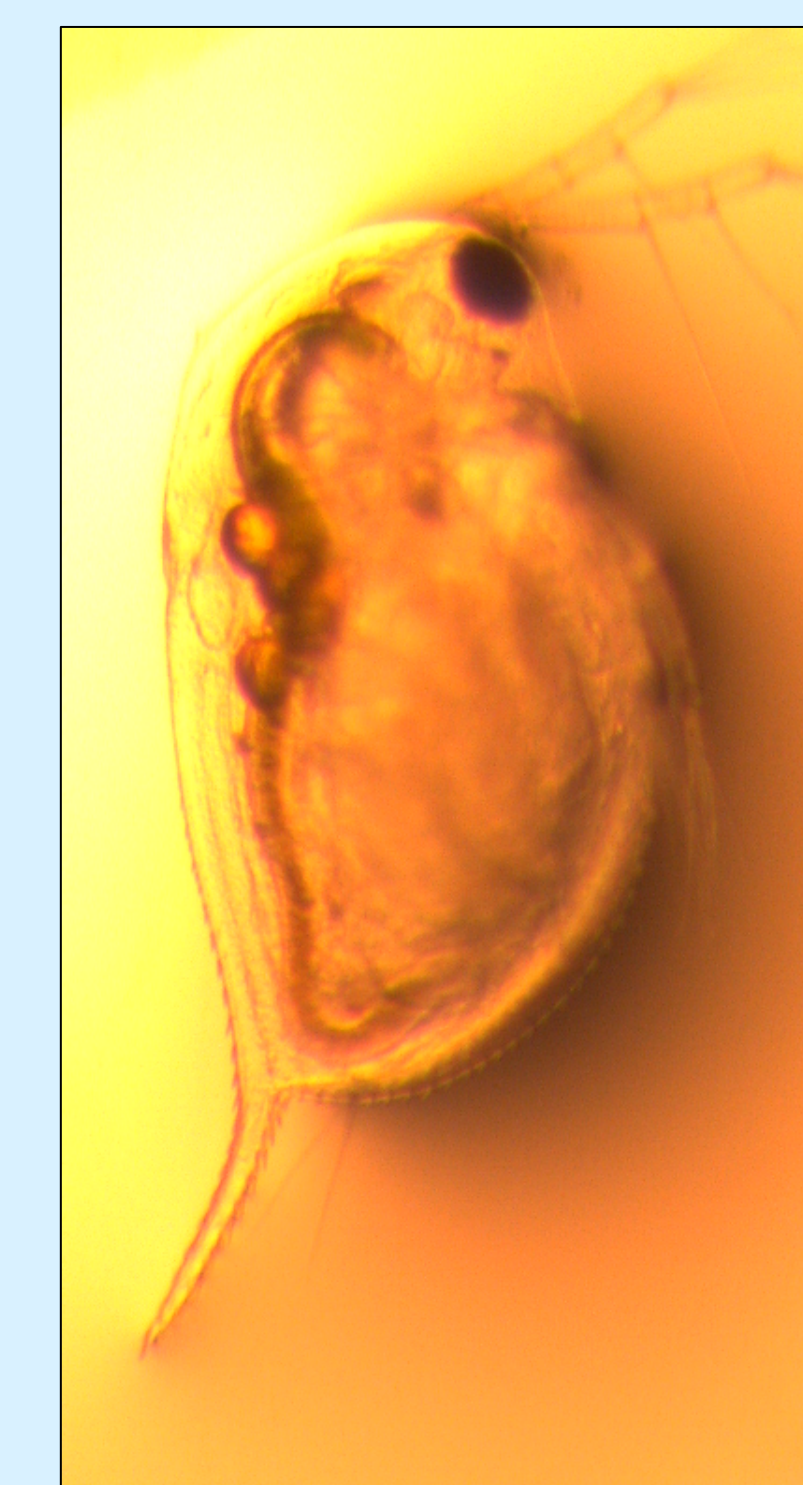


Figure 4: P2M2H5 hybrid baby prepared for measurement

DISCUSSION

- 37 of 50 Tex Population F1 hybrids showed significant differences.
- 20 of 29 PA21 Population F1 hybrids showed significant differences

TEX AND PA21 DIFFERED IN RESULTS

- Most of the Tex hybrids showed hybrid depression while a few performed equally well as the parents; a few hybrids were significantly larger than the maternal genotype Tex20.
- Most of the PA21 hybrids showed signs of heterosis while a few performed equally well; No signs of hybrid depression were seen in PA21 hybrids.
- Parental isolates were significantly different from each other.
- Variations were found among F1 siblings.
- A great addition to research in hybridization.
- Help predict hybrid fitness in hybrids.

IMPLICATIONS FOR FUTURE RESEARCH

Examining other life history traits, observing hybrids' genetic makeup compared to parents, and interspecific hybrids.

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