FreezeM

A Novel PCR-Based Method for Early Sex Identification in Black Soldier Fly Larvae

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INSECT GENETICS IMP rovement plementatio act

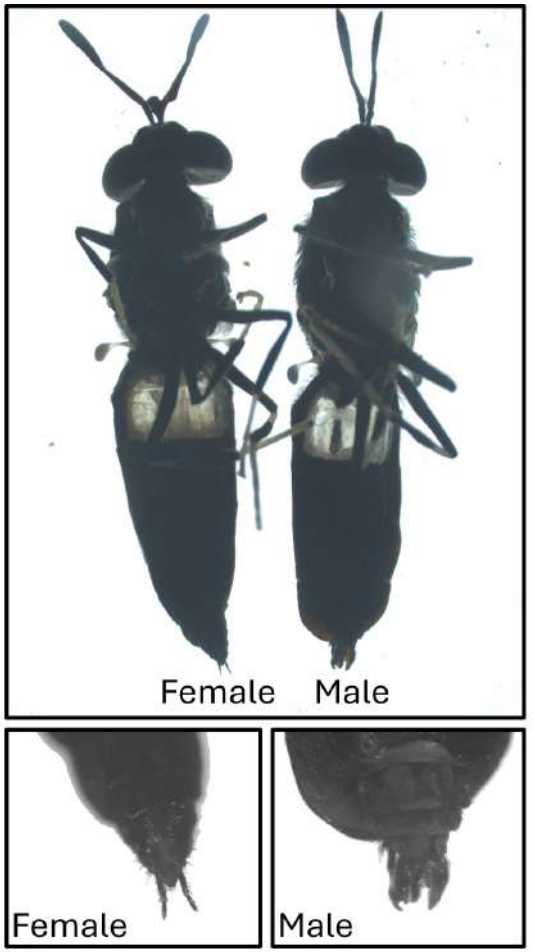
Challenges in BSF Sex Identification

Identification Only at the Adult Stage:

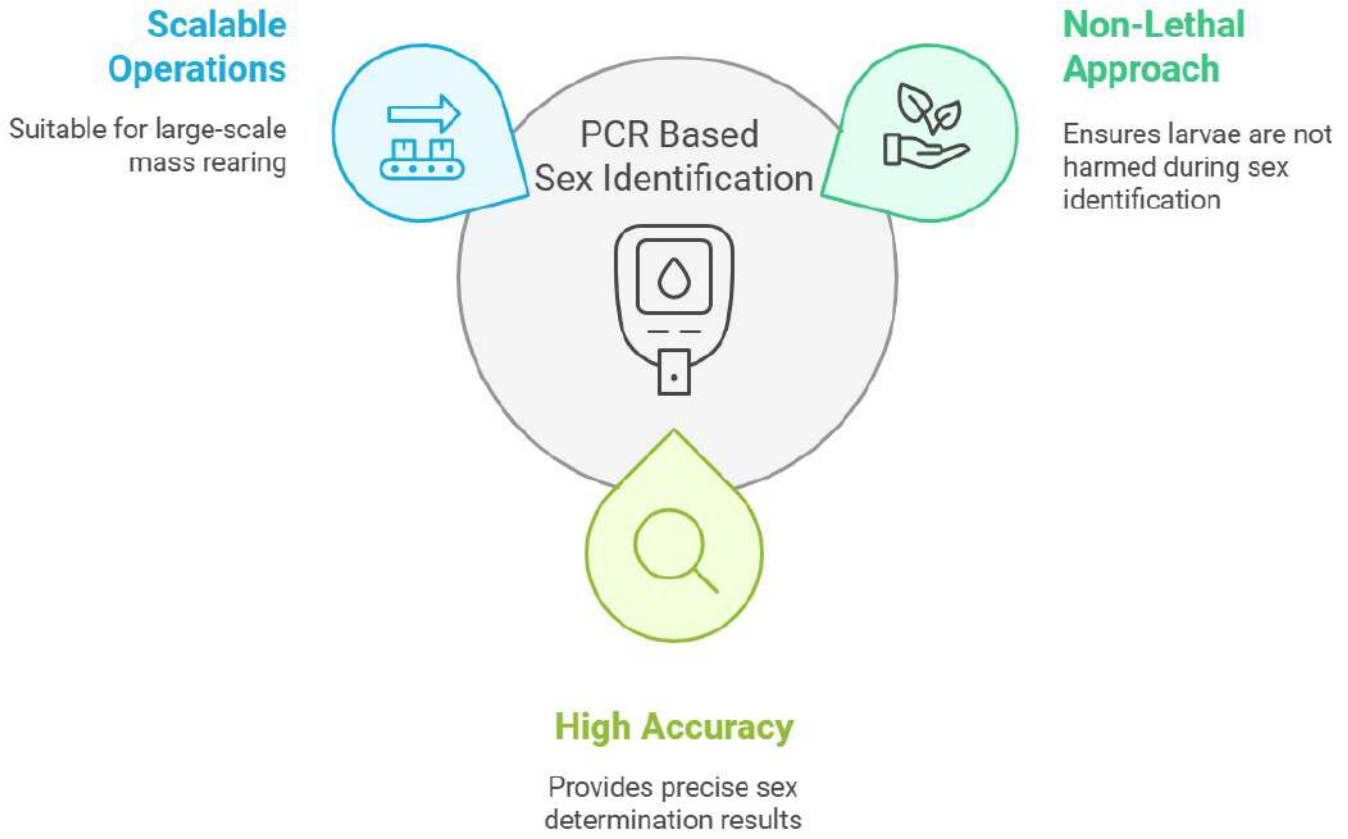
Current methods rely on visual dimorphism, which appears only in adult flies.

Manual and Time-Consuming Process:

Identification of sex is performed manually, which is labour-intensive and impractical for large-scale industrial setups.



PCR-Based Solution for BSF Larvae Sex Identification



Method Development

Non-Lethal DNA Extraction Challenges

DNA? Yes!
Survivability? Yes!

Hemolymph Extraction

Cutting Larval Hairs

DNA? Nope
Survivability? Yes!

Larval/Pupal Segment

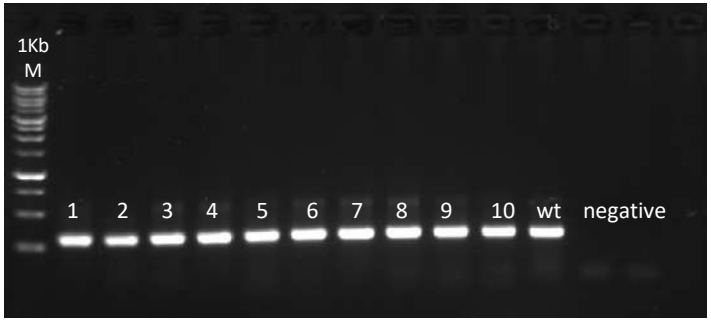
DNA? Yes!
Survivability? Nope

Empty Pupal Case

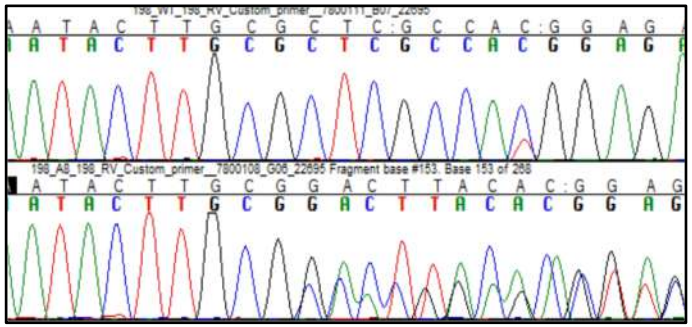
DNA? Nope
Survivability? Yes!

Non-Lethal Hemolymph Sampling

Nonfatal DNA extraction from larvae:



PCR-based amplification of desired DNA



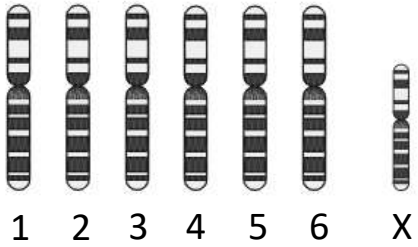
Sequence analysis

This method enables the integration of **genetic screening** into selective breeding programs and supports the establishment of new genetic lines

Genome Sequencing & Target Identification

BSF genome is composed of 7 chromosomes

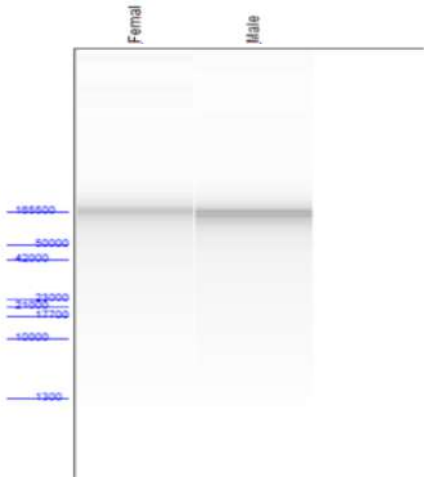
6 Autosomal chromosomes and a X chromosome (#7)

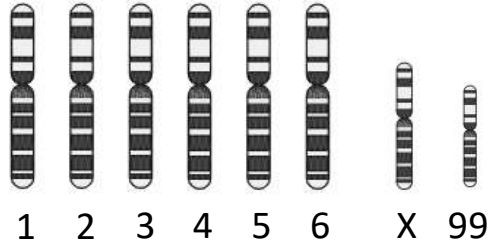


Objective: assembly of two genomes 1 Male and 1 Female

1. HMW DNA
2. Sequencing
3. Genome assembly done by-

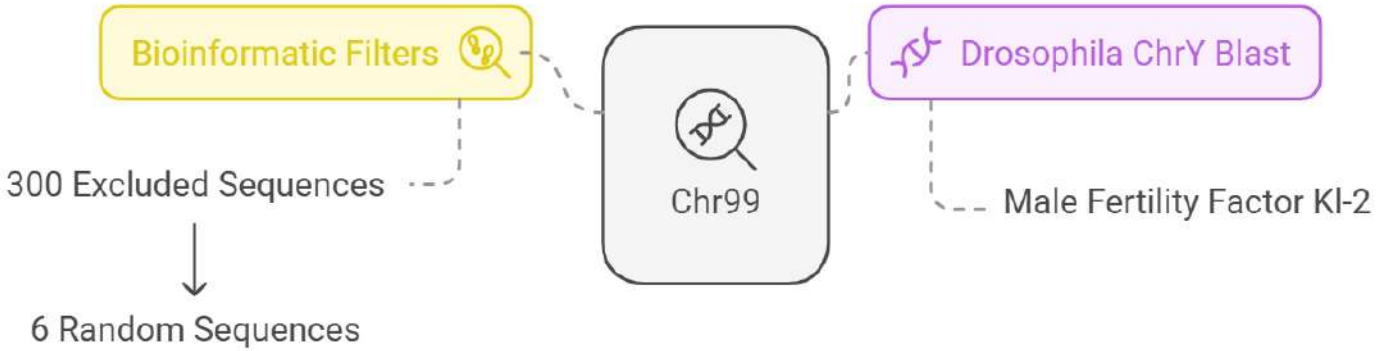
nrgene

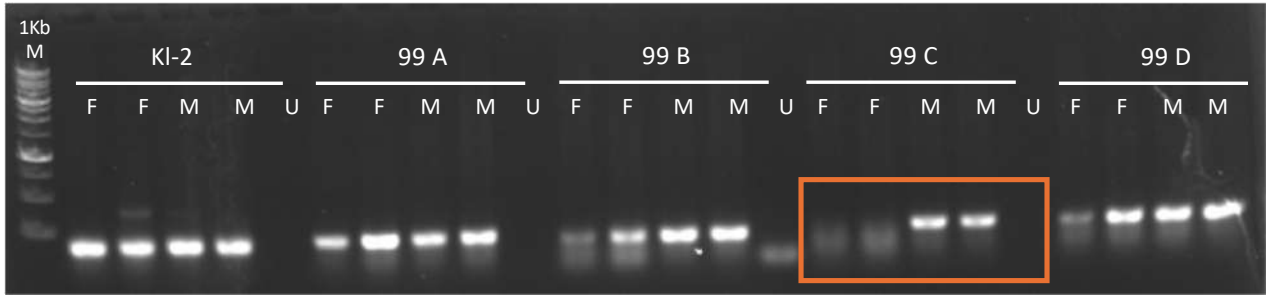


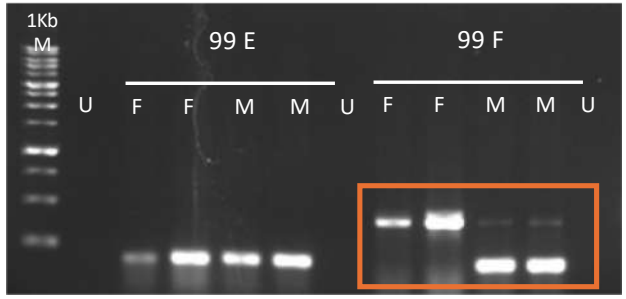


Was the Y chromosome identified???

Discovery of the Genetic Marker



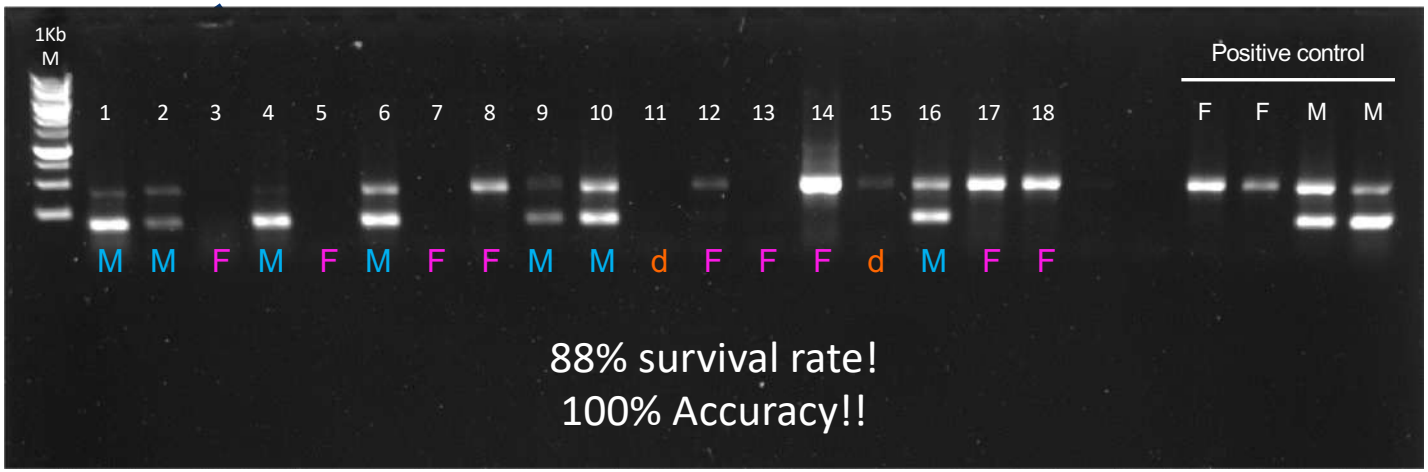




Results & Validation

Nonfatal DNA
extraction from larvae:

F- female
M- male
d- dead



Advantages of PCR-Based Larval Identification for BSF Breeding

Supports Sex Identification for Breeding

Enables fast and accurate identification of male and female larvae, improving selective breeding and optimizing production efficiency.

Expands Genetic Screening Applications

The method can be applied to various genetic markers, including those related to growth, feed efficiency, and environmental adaptation.

Integrates with AI-Driven Systems

Provides high-quality datasets for training AI tools, enabling automated sex determination and streamlining operations for increased efficiency.

Our Team

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Thank you!

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