

# **APPLICATION OF HONEYBEE CELL CULTURE IN BIOTECHNOLOGY AND APICULTURE**

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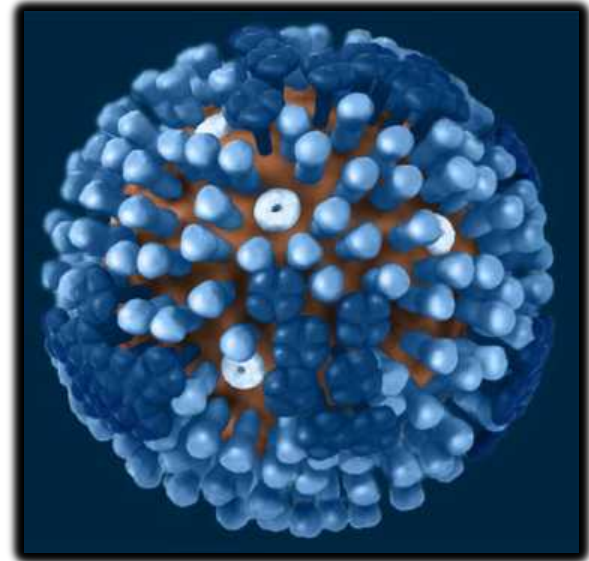


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# INTRODUCTION



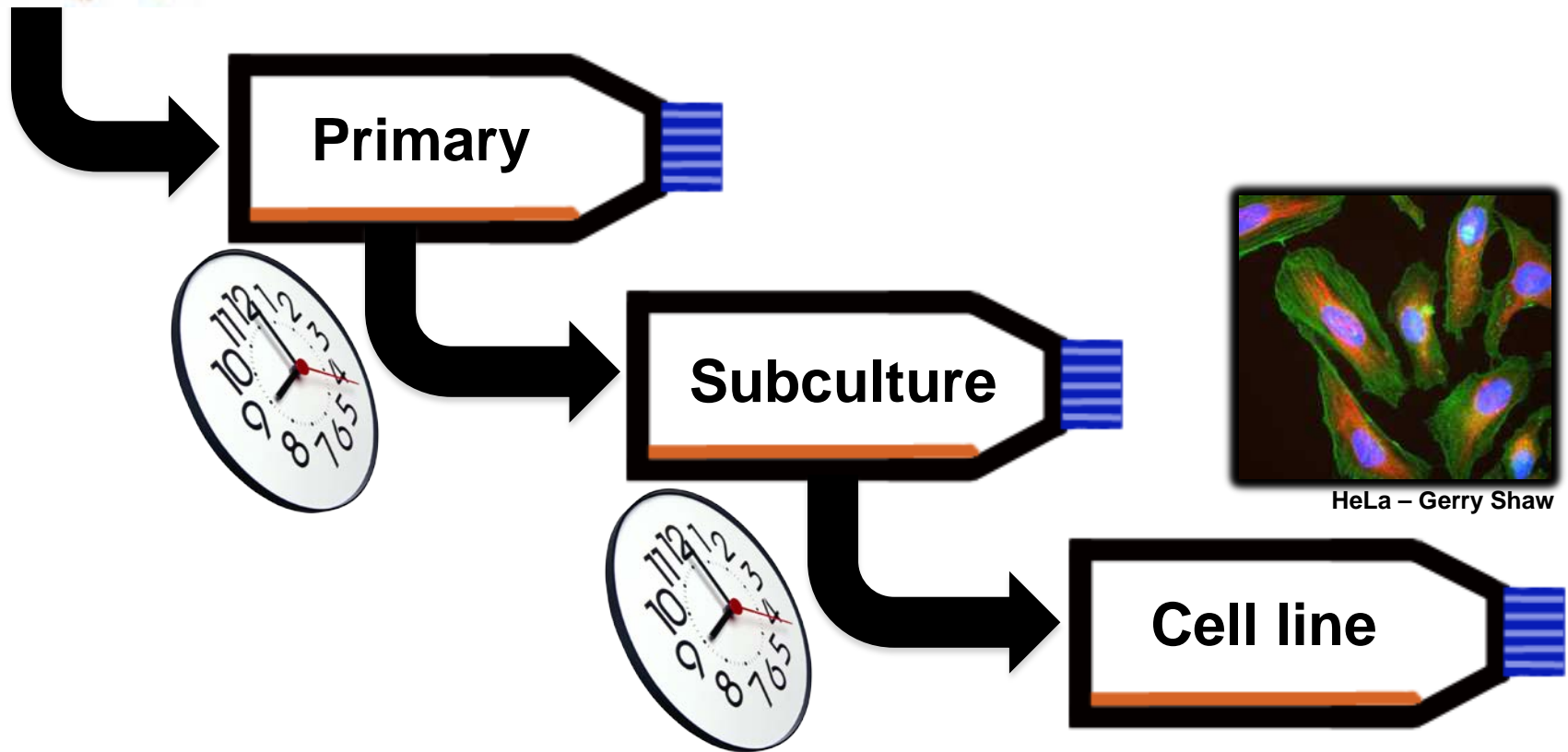
**Many Challenges to  
Bee Health are  
Intracellular**



# INTRODUCTION

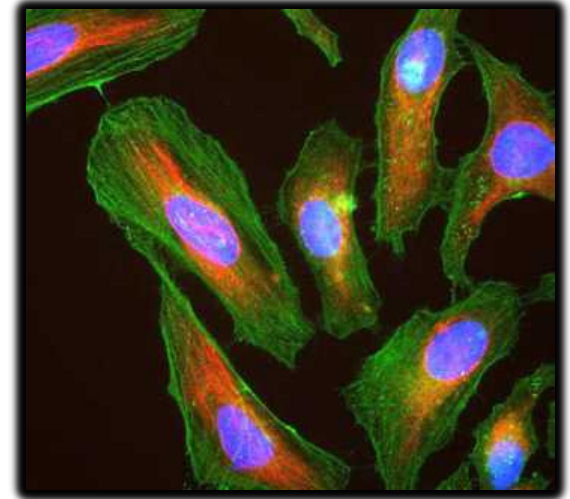


## Tissue Culture as a Tool



# INTRODUCTION

**Over 500 Insect Cell Lines, but  
<10 from Wasps, Bees, and Ants**



HeLa – Gerry Shaw

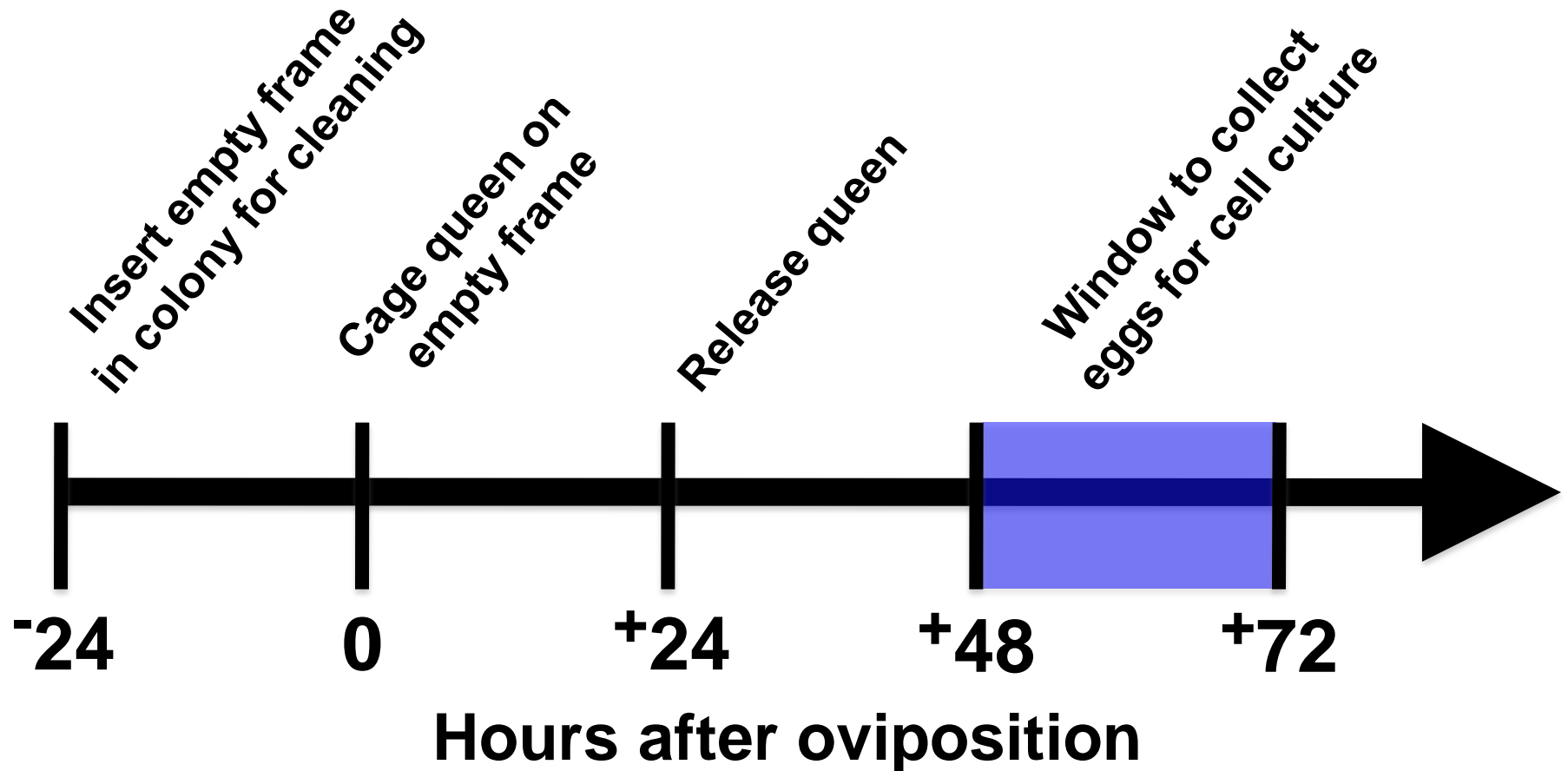
**Honey Bee Cells Refractory to *In Vitro* Growth?**

Chan et al., *Insect Mol Biol* 2010

Kitagishi et al., *In Vitro Cell Dev Bio* 2011

# METHODS

## Timeline for Egg Collection



# METHODS



**1. Collect Embryos**



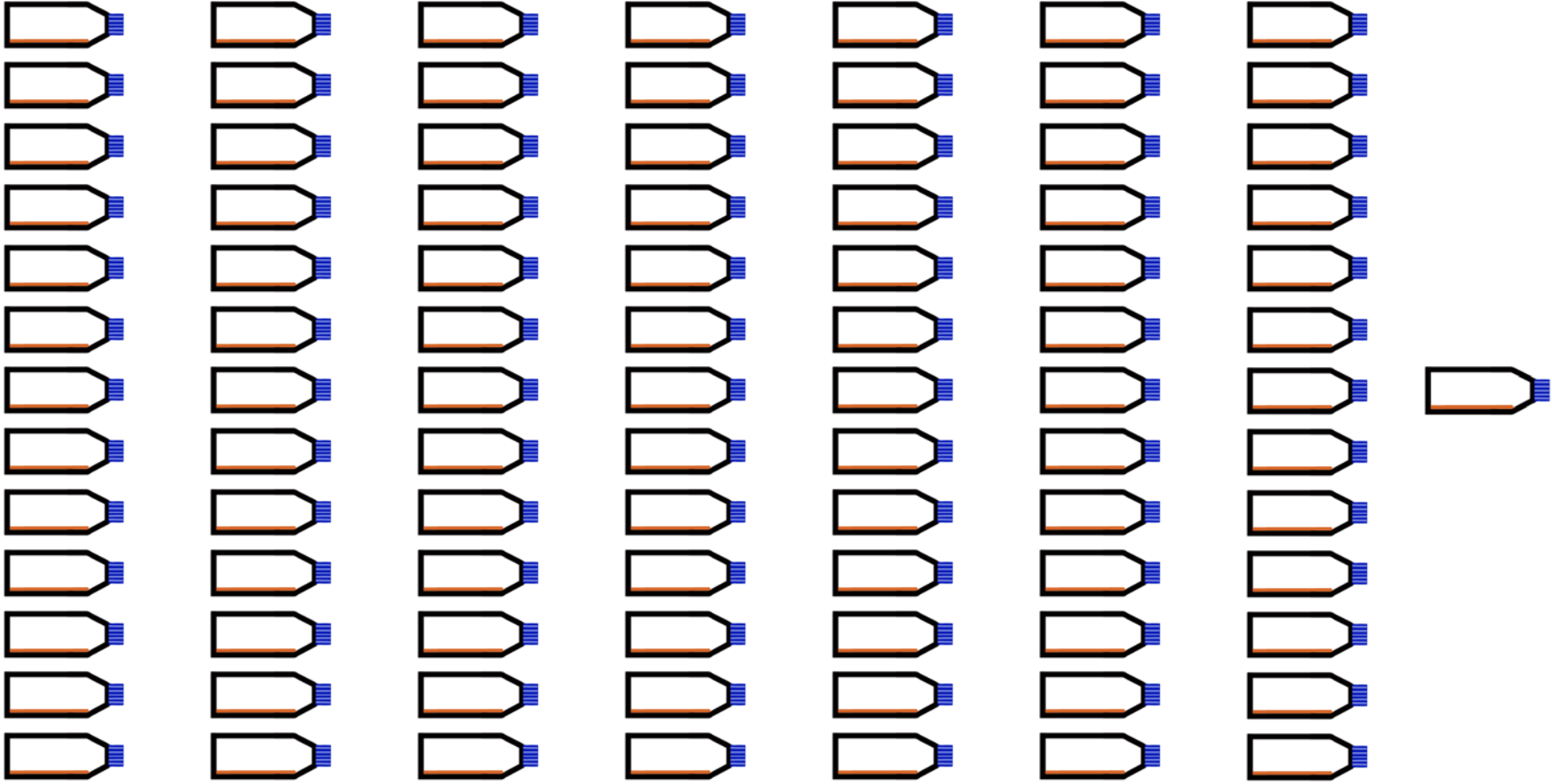
**2. Surface Disinfection**



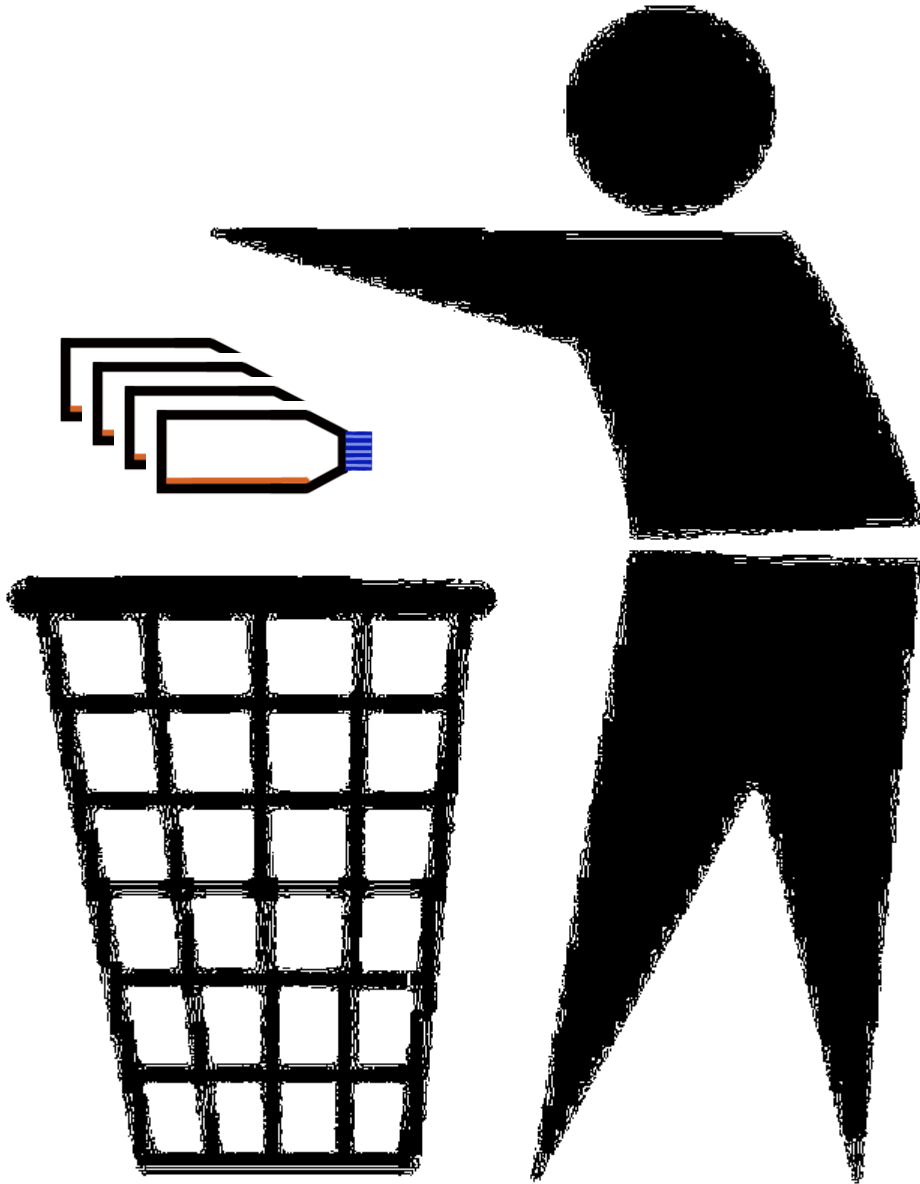
**3. Inoculate in Medium**

# RESULTS

**Established 92 Primary Cultures, 2009-2012**



# RESULTS



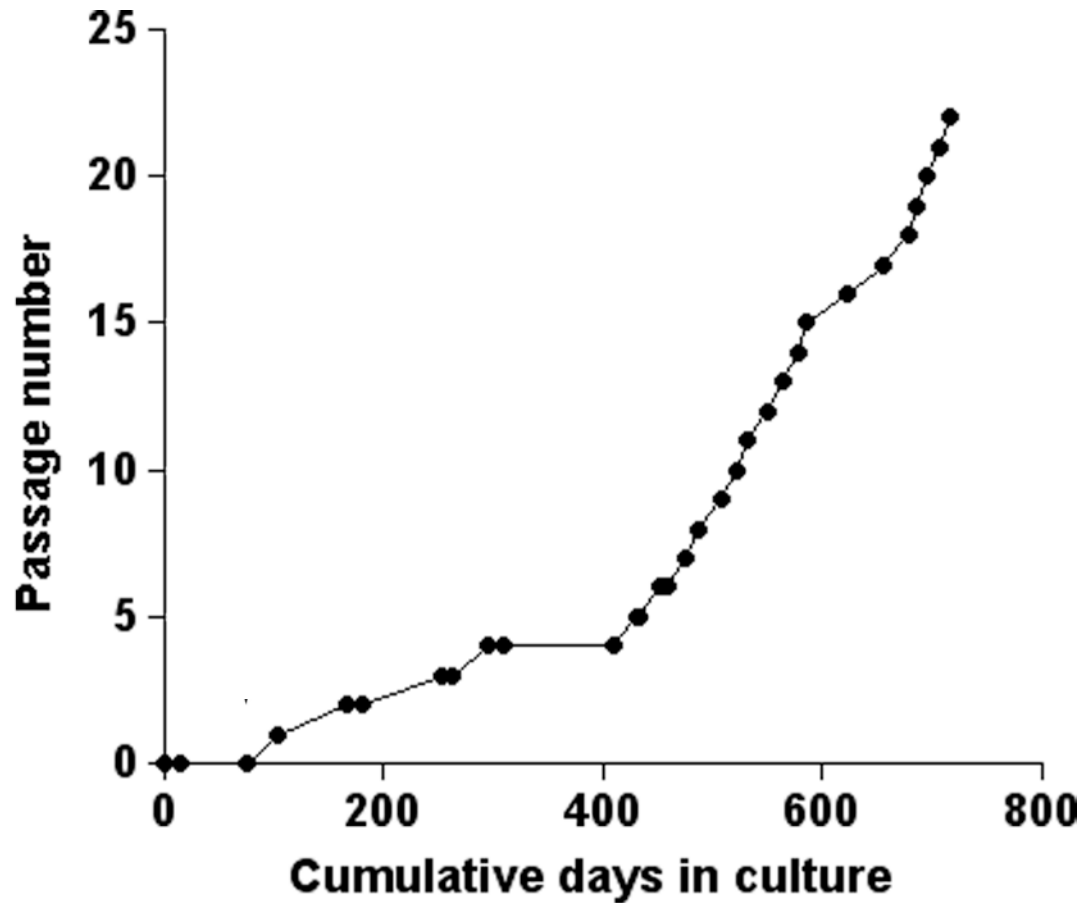
- **Many Primaries Survived >6 months, Allowing for Subculture**
- **Low Success Rate (1 out of ~100 Primaries)**
- **Long Adaptation Period (>1 year)**
- **Single, Adherent Cell Type**

Bergem et al., *BMC Dev Biol* 2008



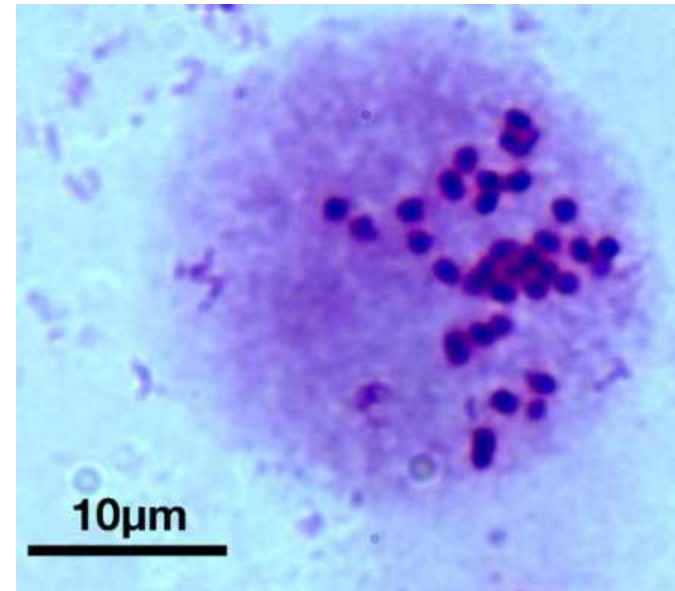
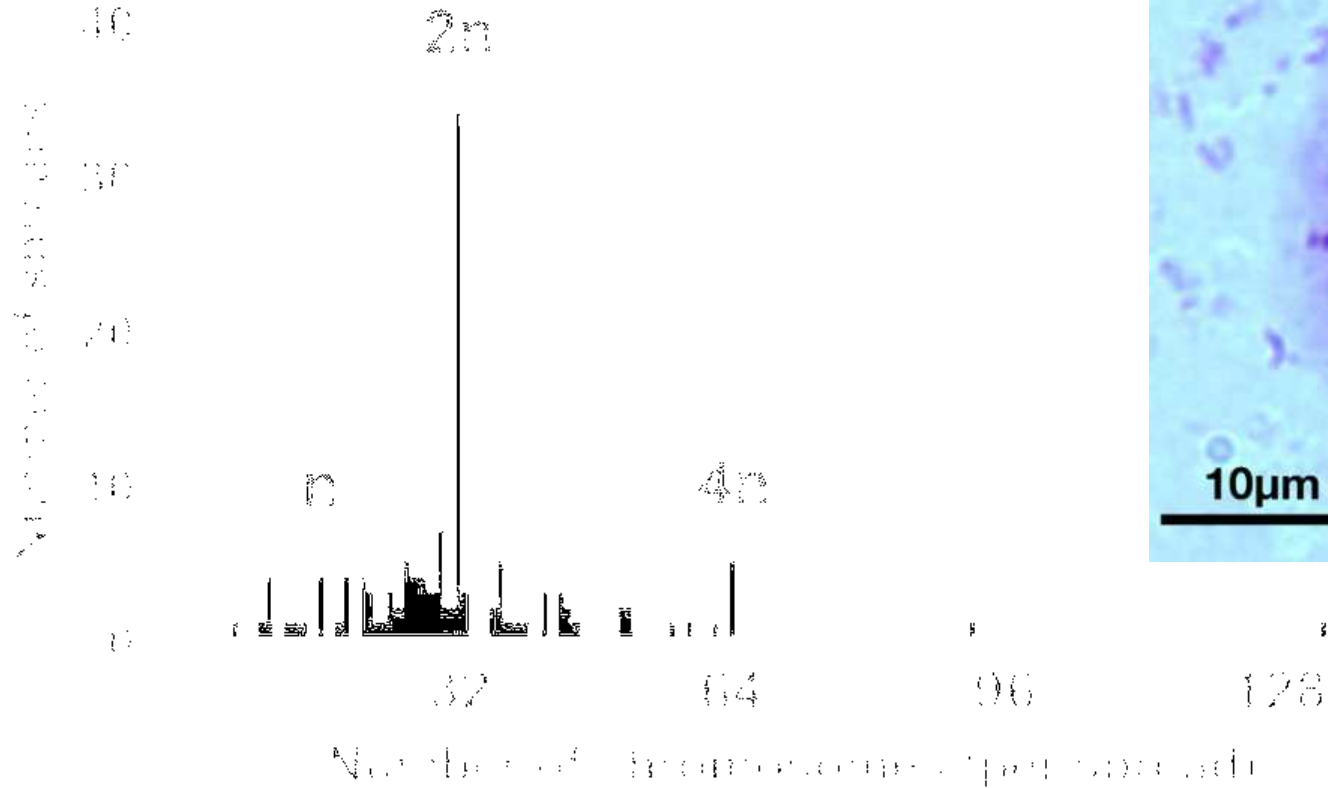
# RESULTS

## AME-711 Start Date – July, 2011



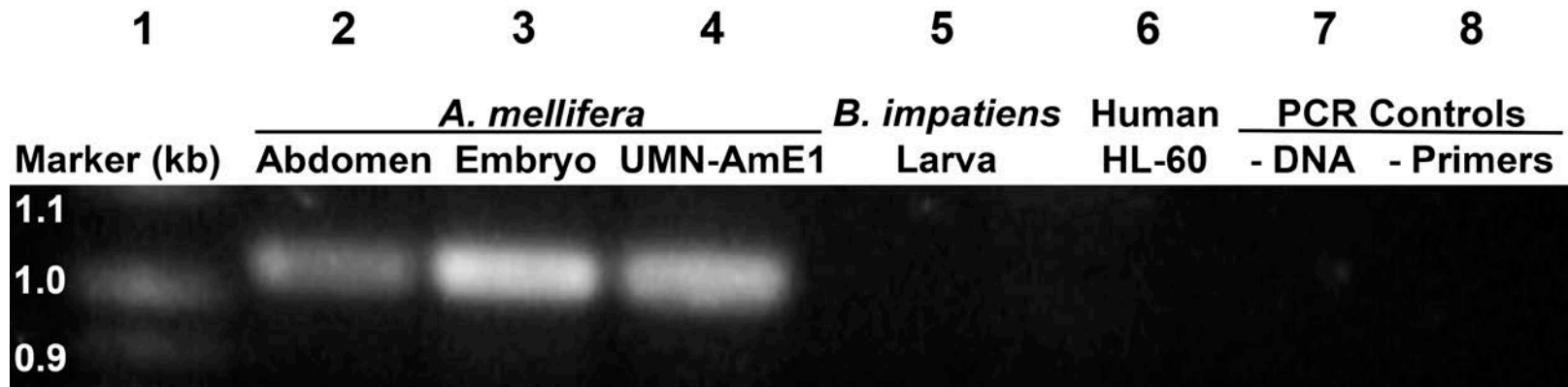
# RESULTS

## AME-711 Ploidy

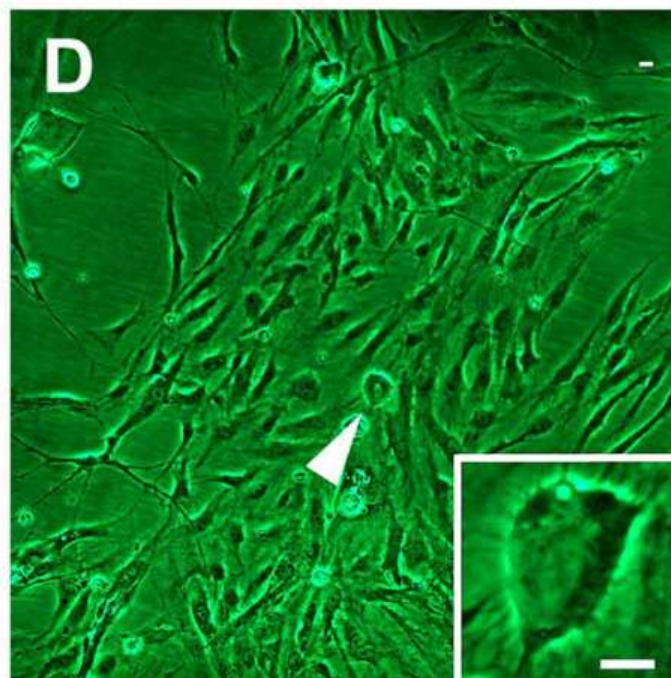
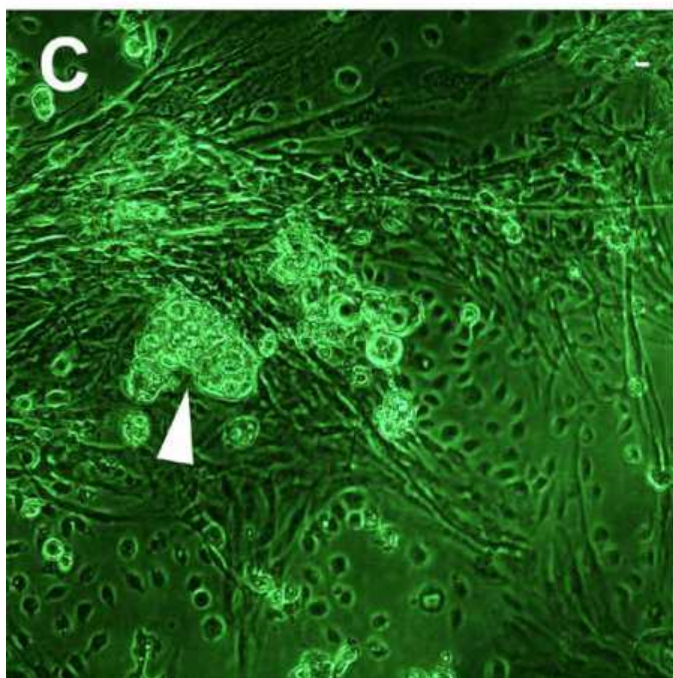
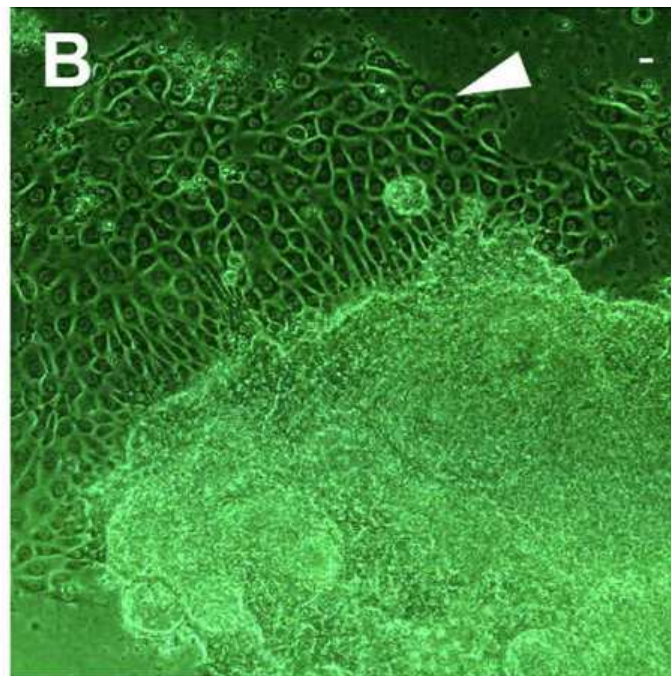
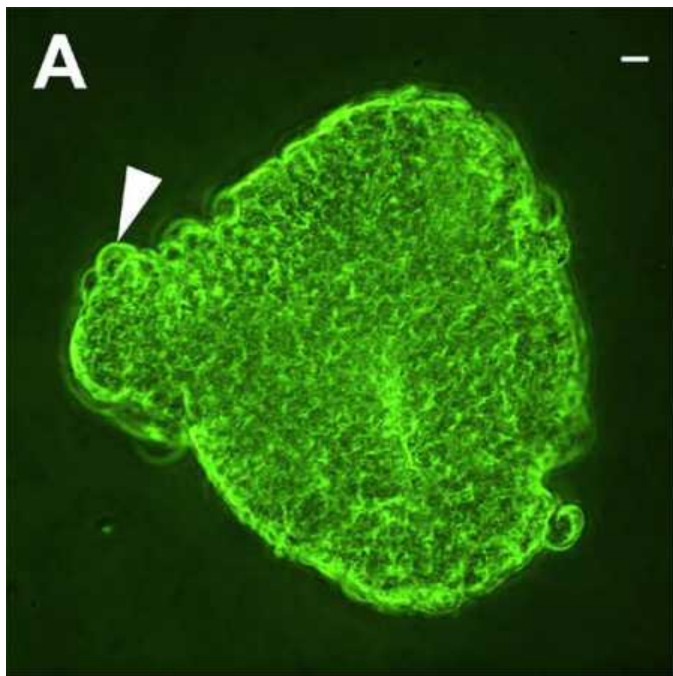


# RESULTS

## *Cytochrome c oxidase subunit I (Cox I)*

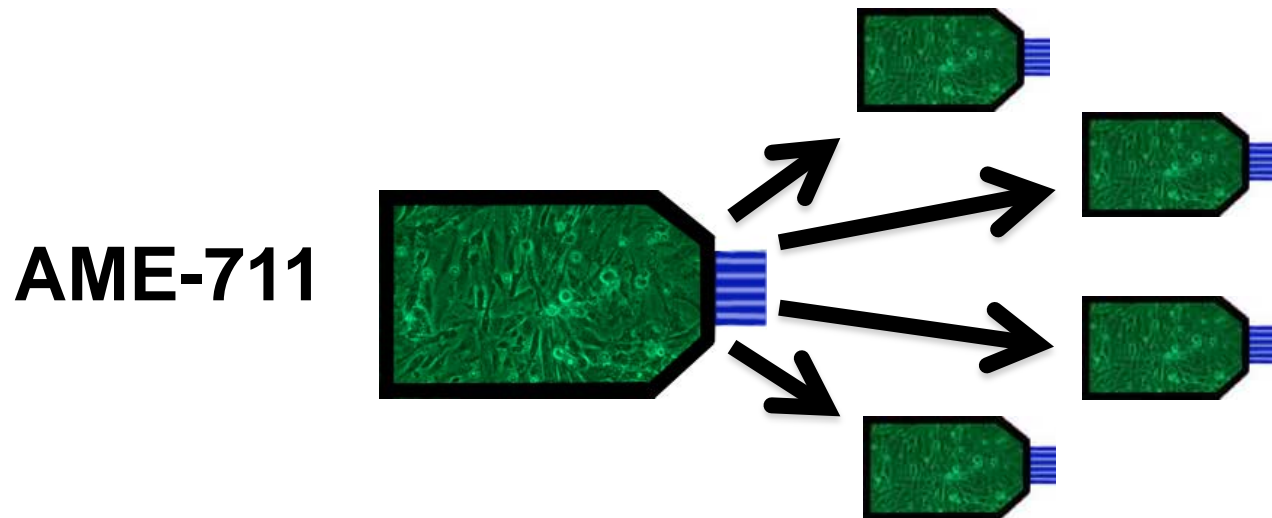


Agrees with: Crozier et al., *Mol Biol Evol* 1989; Hall & Smith, *PNAS* 1991;  
Crozier & Crozier, *Genetics* 1993; Corona et al., *J Exp Biol* 1999



# APPLICATIONS

- Homogenous, Replicate Cultures
- Can be Recovered from Cryopreservation
- Examine Infection, Transmission, Host Response
- Platform for Transgenesis





# ACKNOWLEDGEMENTS

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