One mother for two species via obligate cross-species cloning in ants

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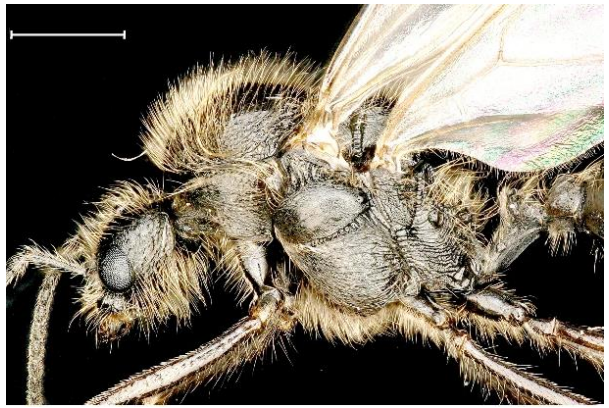

Jin Chen, Nov. 14, 2025

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One mother for two species via obligate cross-species cloning in ants

Y. Juvé, C. Lutrat, A. Ha, A. Weyna, E. Lauroua, A. C. Afonso Silva, C. Roux, E. Schifani, C. Galkowski, C. Lebas, R. Allio, I. Stoyanov, N. Galtier, B. C. Schlick-Steiner, F. M. Steiner, D. Baas, B. Kaufmann & J. Romiguier

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My activity

My research interests focus on links between species ecology and molecular evolution. More particularly, I study genome evolution of species with a eusocial lifestyle or atypical reproductive systems. My main model species is the barbarian harvester ant *Messor barbarus*, a species with an unusual reproductive system where royalty is genetically determined. In this system (social hybridogenesis), two queen genetic lineages can only produce queens and males by their own while they need to hybridize to produce workers. I use approaches in phylogeny, population genetics and experimental biology to resolve the origin of this system along with other general questions in evolutionary biology.

Background

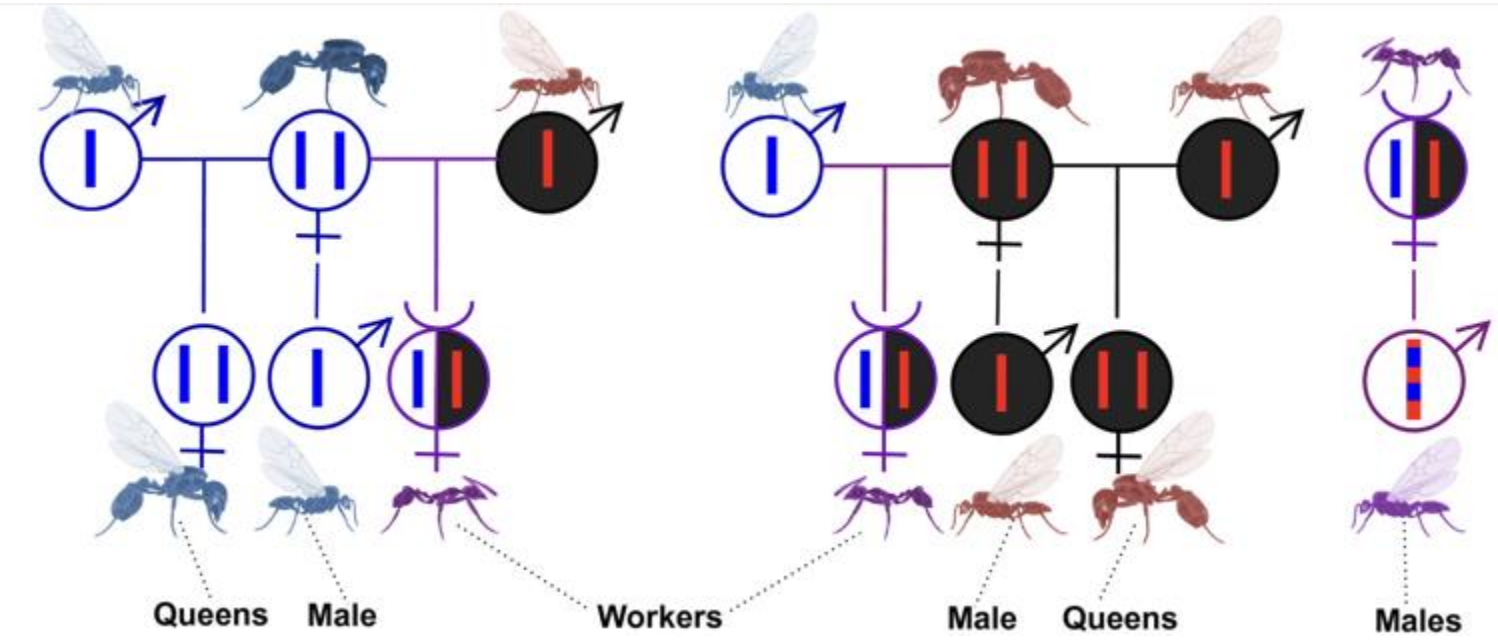
The Precedent for Social Hybridogenesis in ***Messor*** Ants

Convergent evolution of social hybridogenesis in *Messor* harvester ants

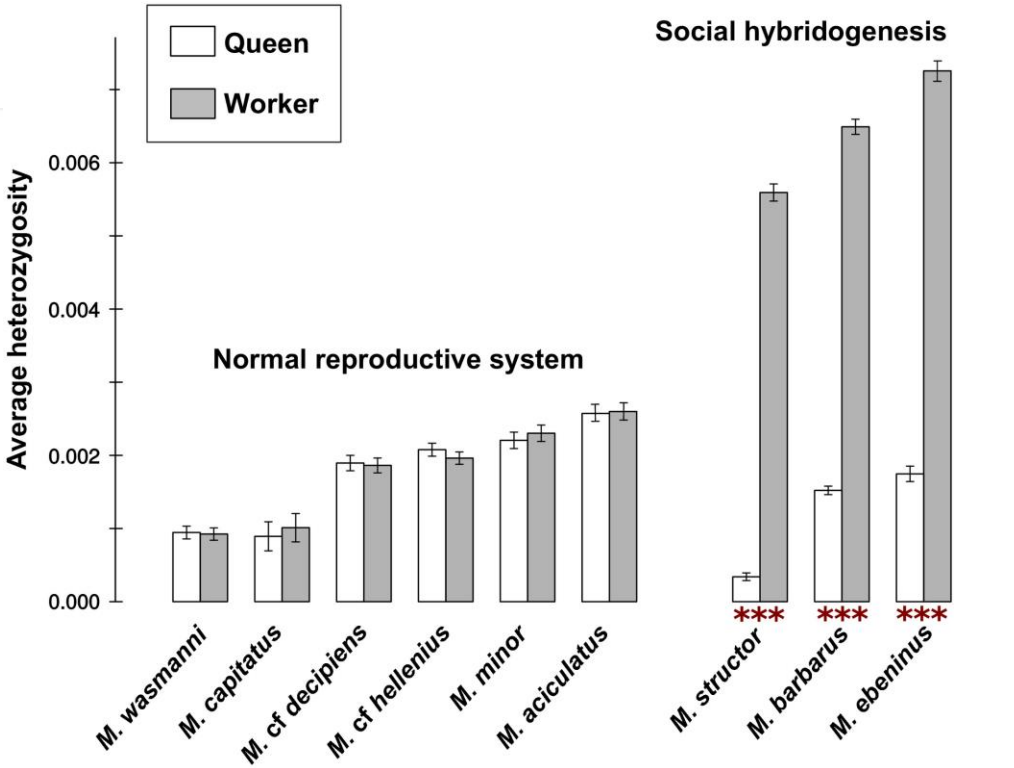
Jonathan Romiguier, Axel Fournier, Sze Huei Yek, Laurent Keller

First published: 04 November 2016 | https://doi.org/10.1111/mec.13899 | Citations: 27

Sex Determination: Haplodiploidy



The schematic diagram of Social Hybridogenesis



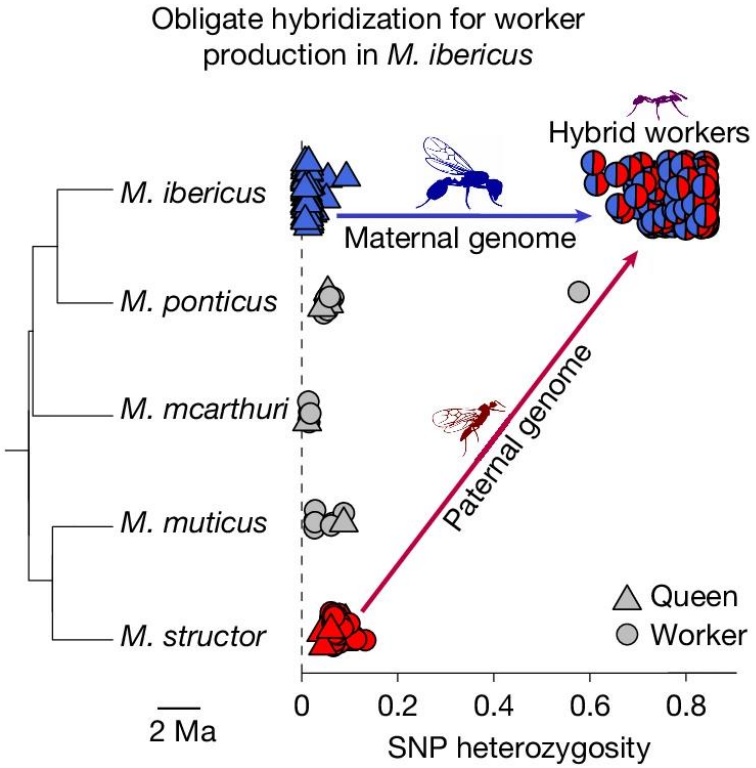
Comparing queen and worker heterozygosity

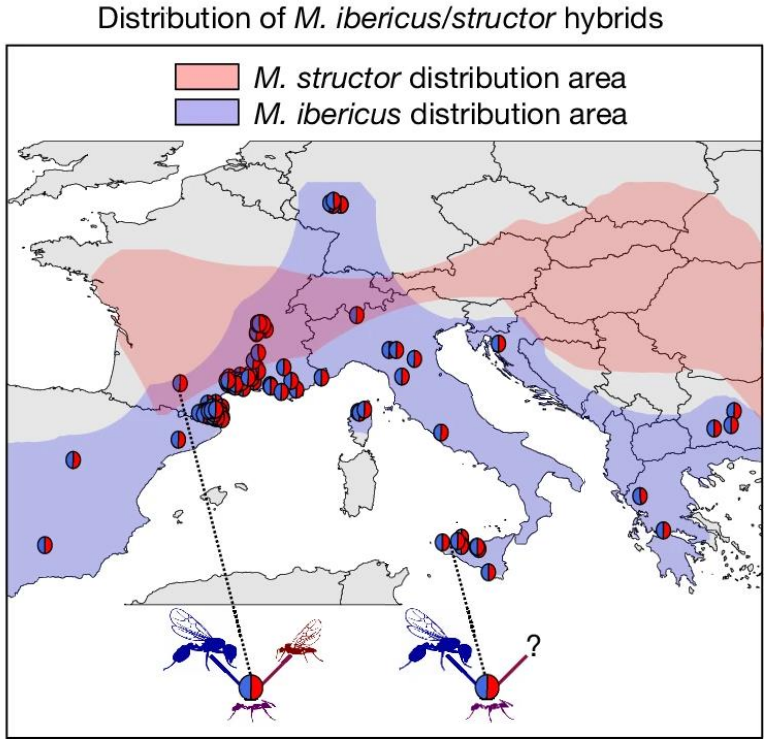
How to overcome the **Species Barrier & geographic constraint**?

Core Findings

A Reproductive Paradox Across Species

M. ibericus workers are **F1 hybrids** between *M. ibericus* (maternal) and a different species, *M. structor* (paternal)!!!



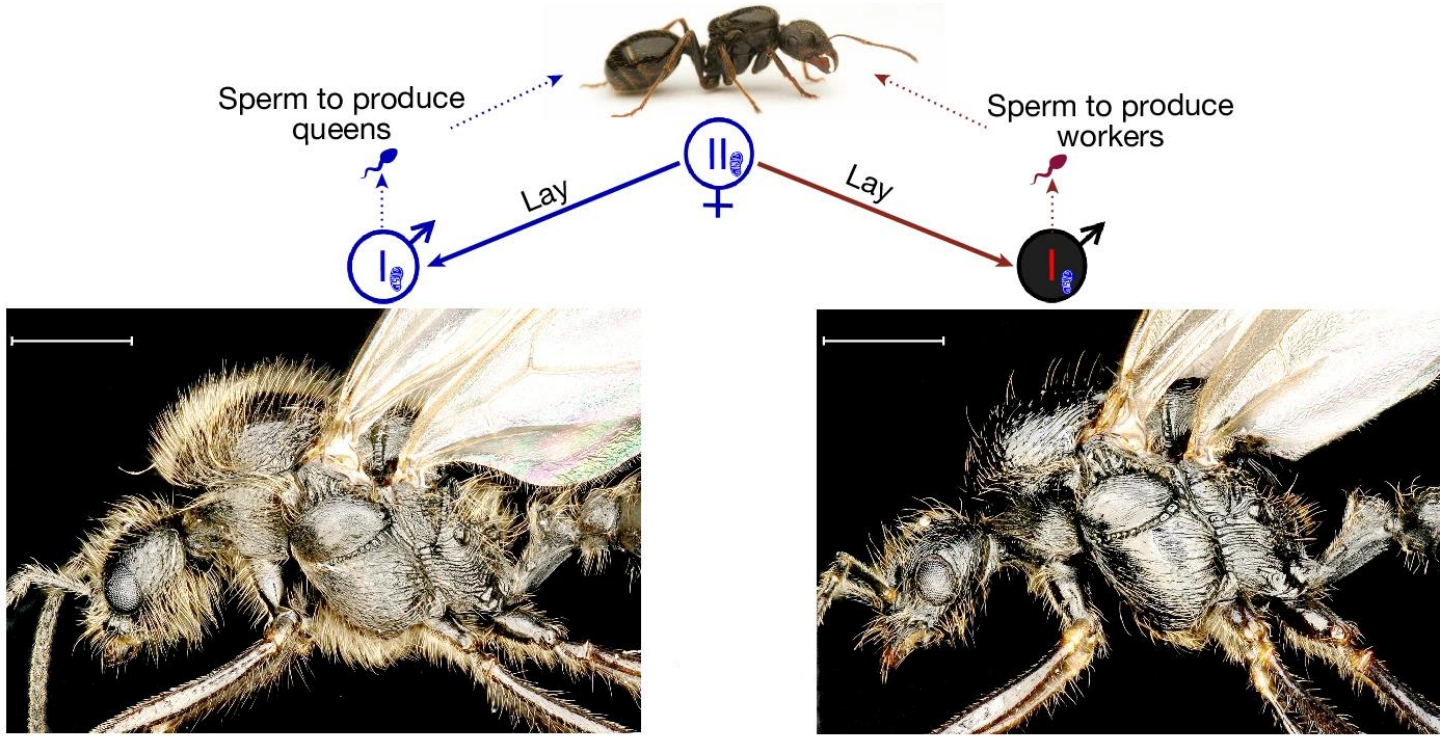


HOW?

Core Findings

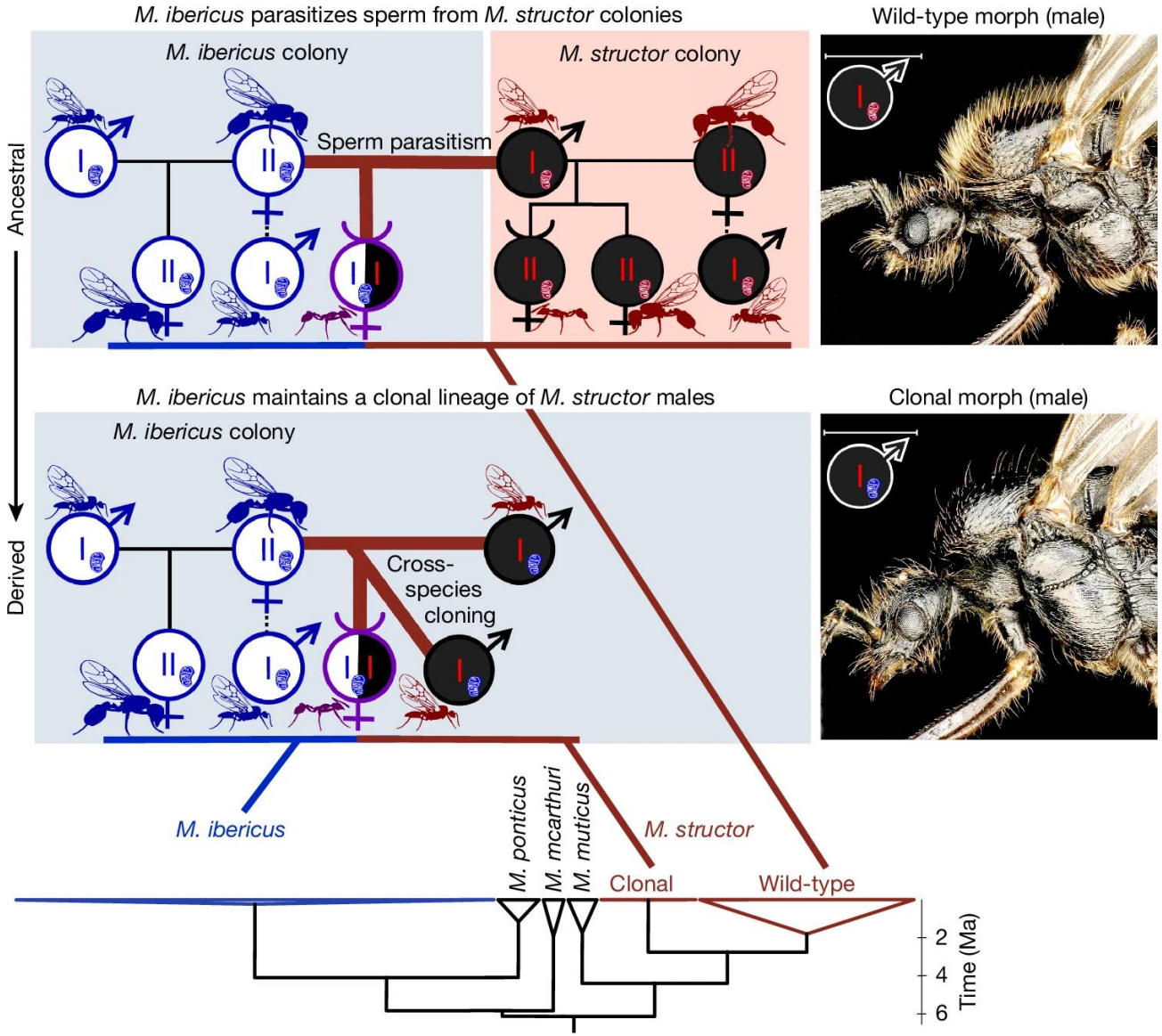
Cross-Species Cloning by the Queen

Nuclear-Mitochondrial Mismatch

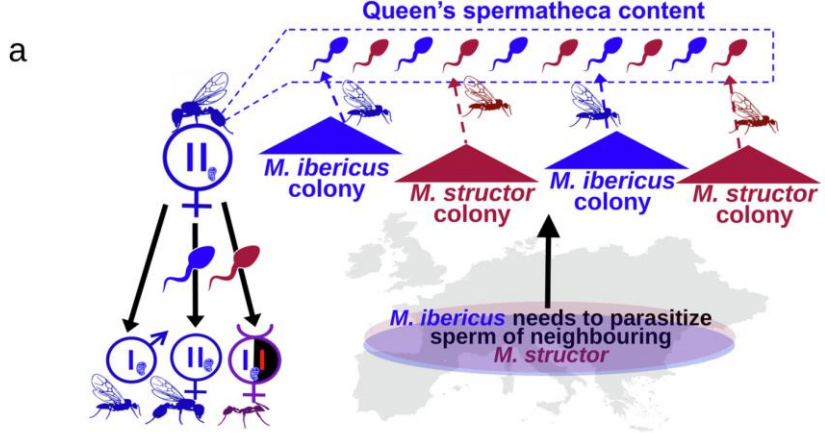


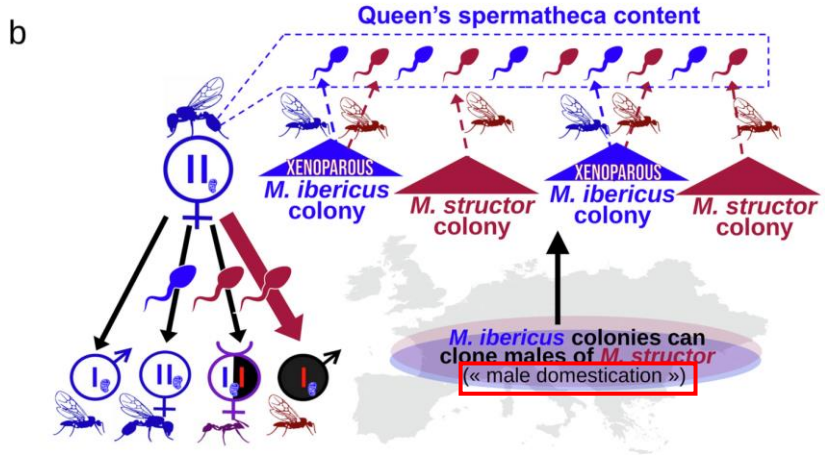
Core Findings

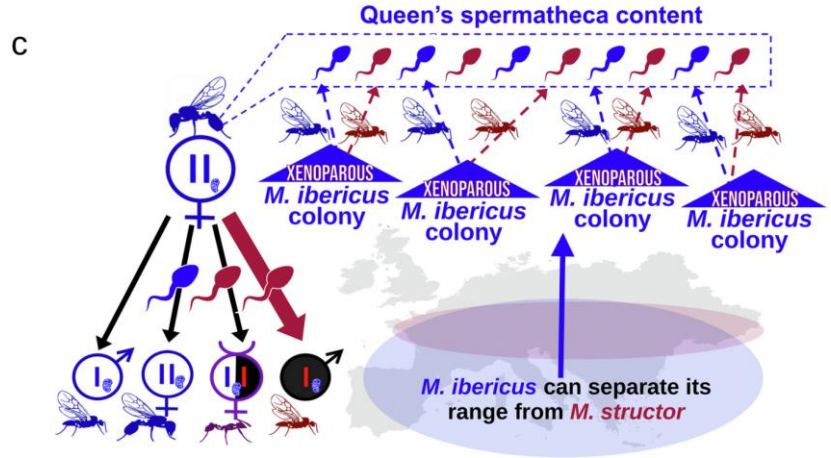
From Parasitism to Domestication



M. structor is divided into 'clonal' and 'wild-type' lineages

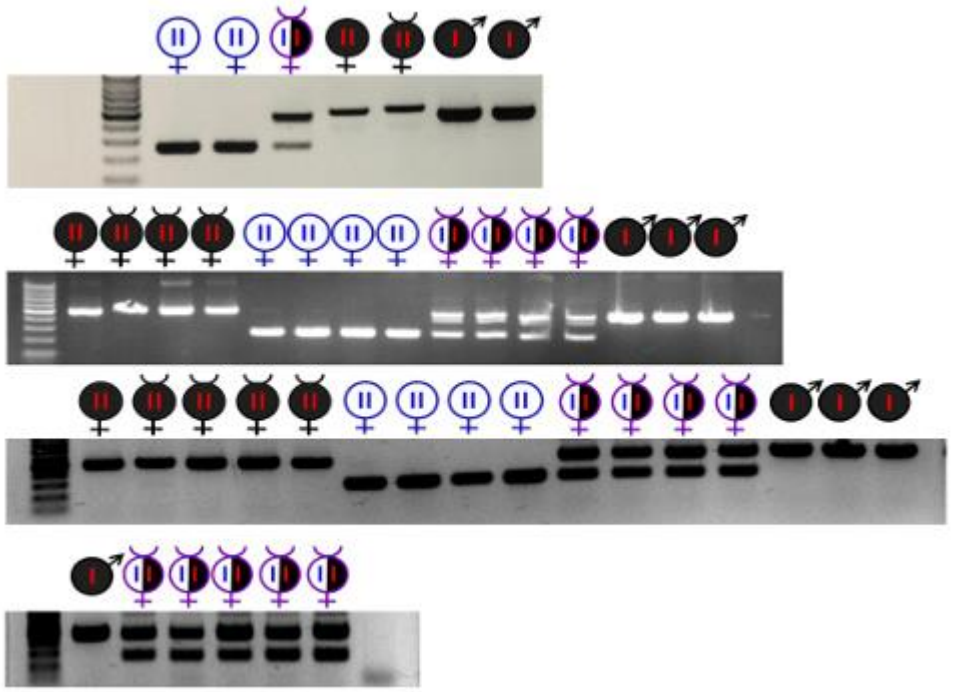




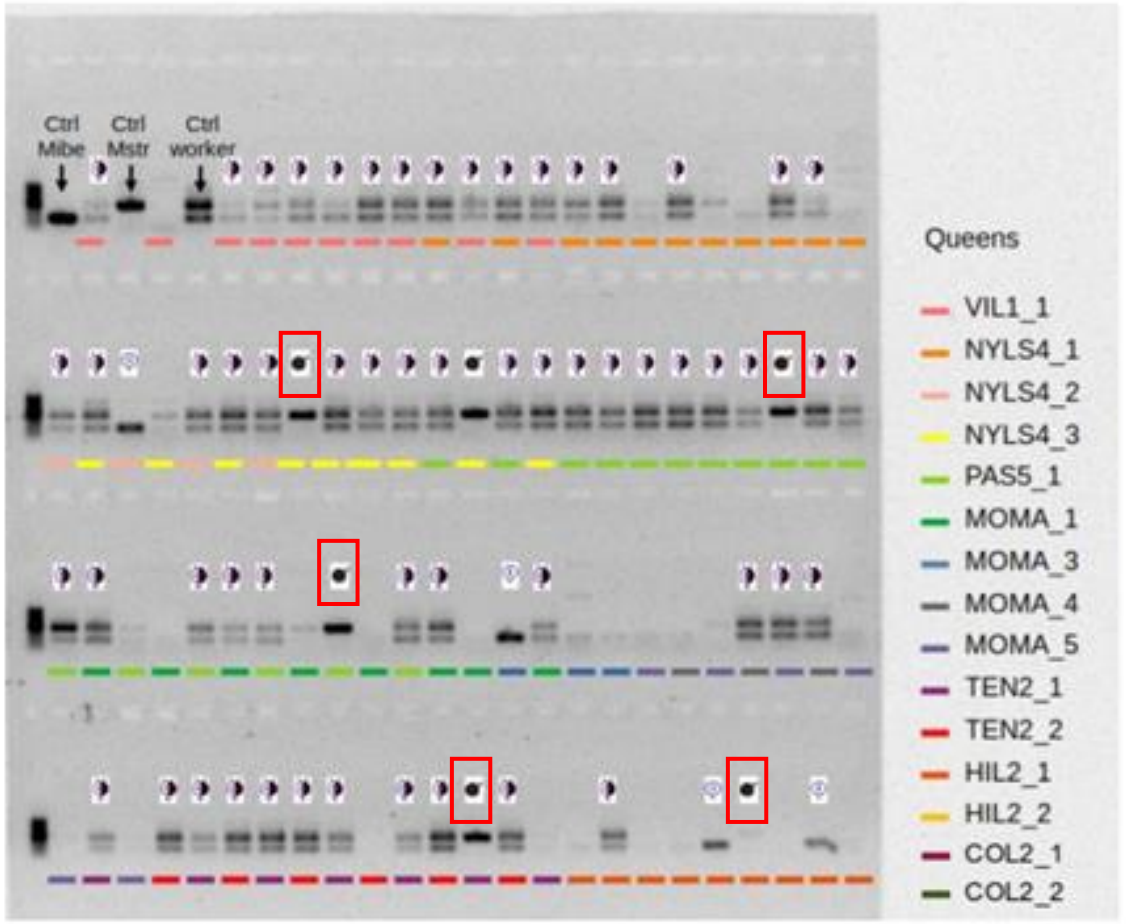


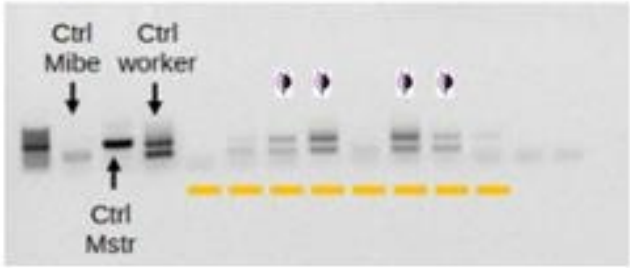
Hypothesis

Who Lays the Eggs?



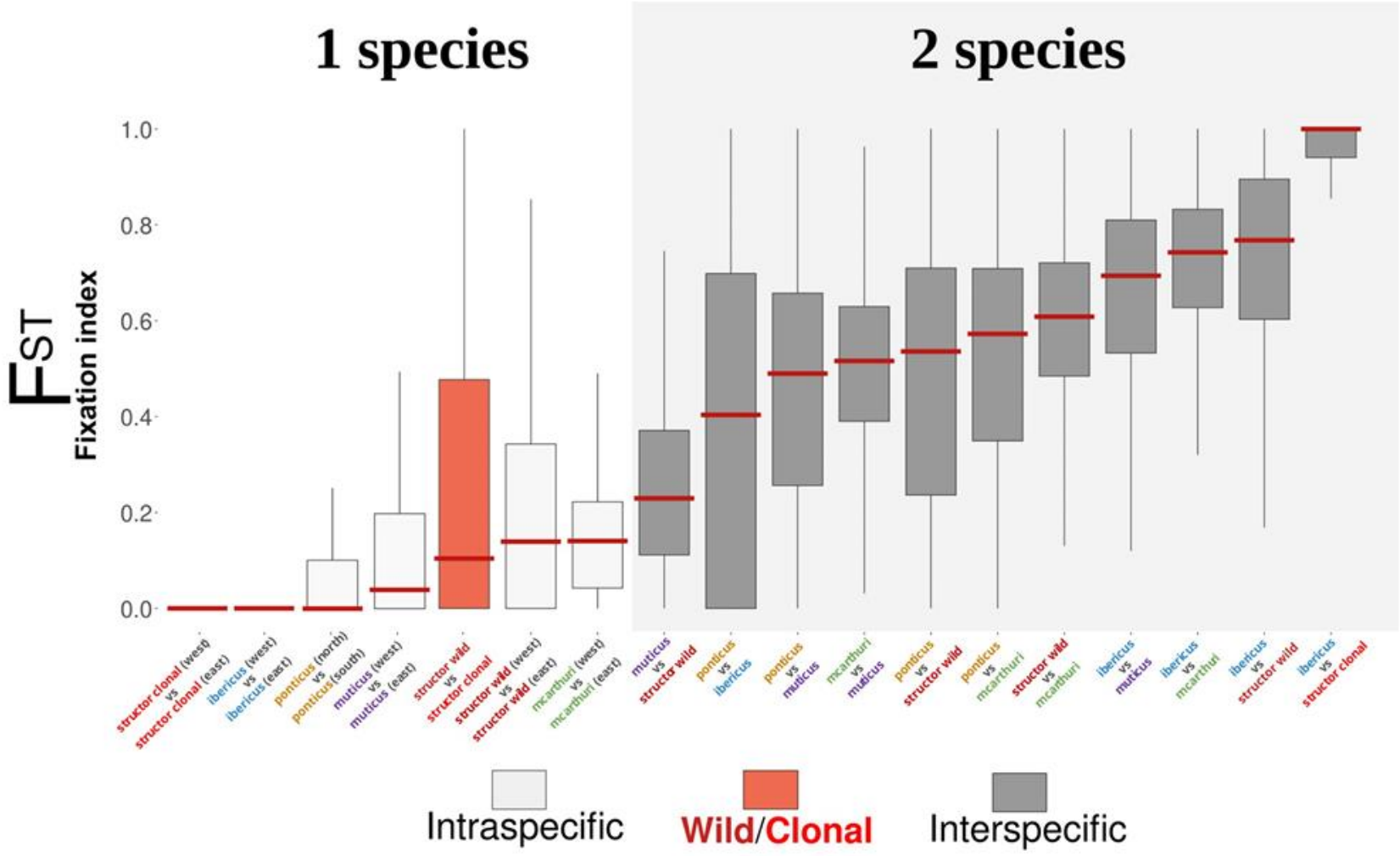
A PCR-based test to identify species





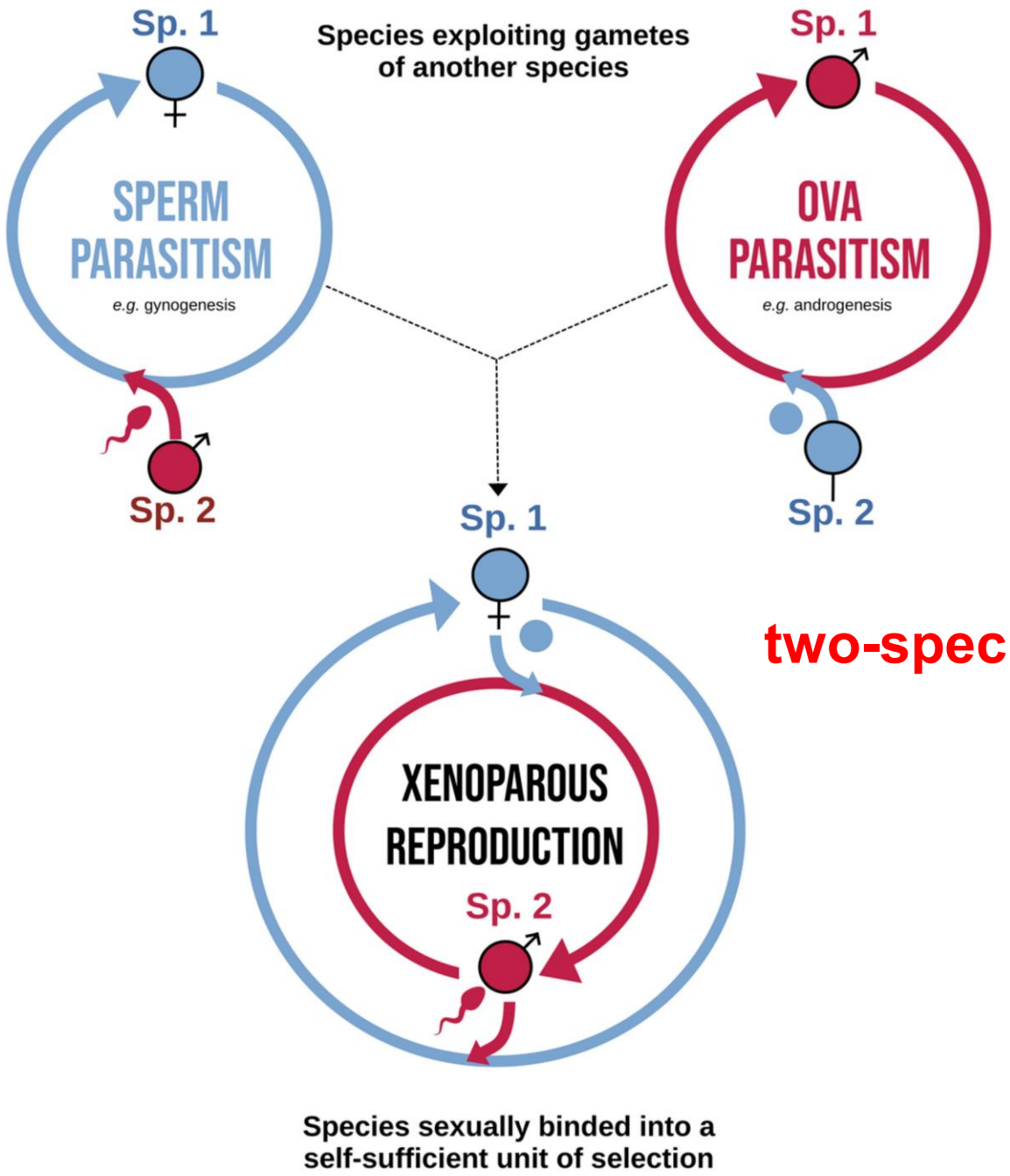
Deeper Analysis

Is the Clonal Lineage a New Species?



Xenoparity

A female must produce individuals of another species as an obligate part of her life cycle.



two-species superorganism

Summary

- *M. ibericus* workers are inter-species hybrids.
- Paternal species (*M. structor*) is geographically absent.
- Queen produces *M. structor* males via cross-species cloning (Androgenesis).
- Evolutionary path from Sperm Parasitism to Male Domestication.
- A "Two-Species Superorganism" demonstrating Xenoparity.

Thank you for your attention!!!

Time for Q&A