

# Reproductive traits affect the invasive capacity of Hymenoptera.

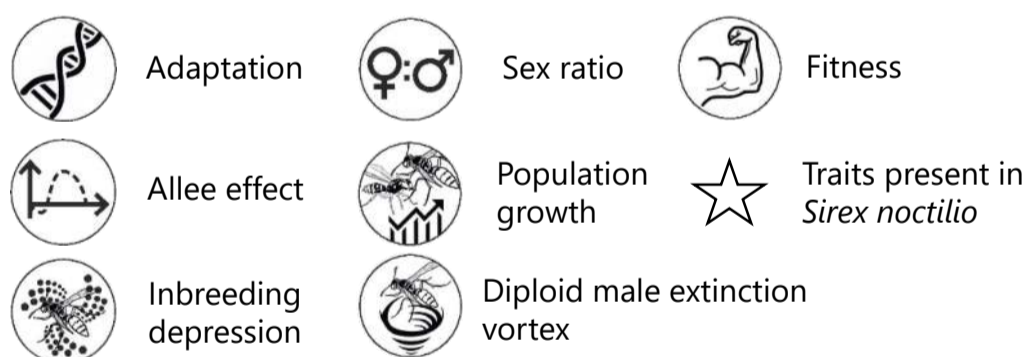
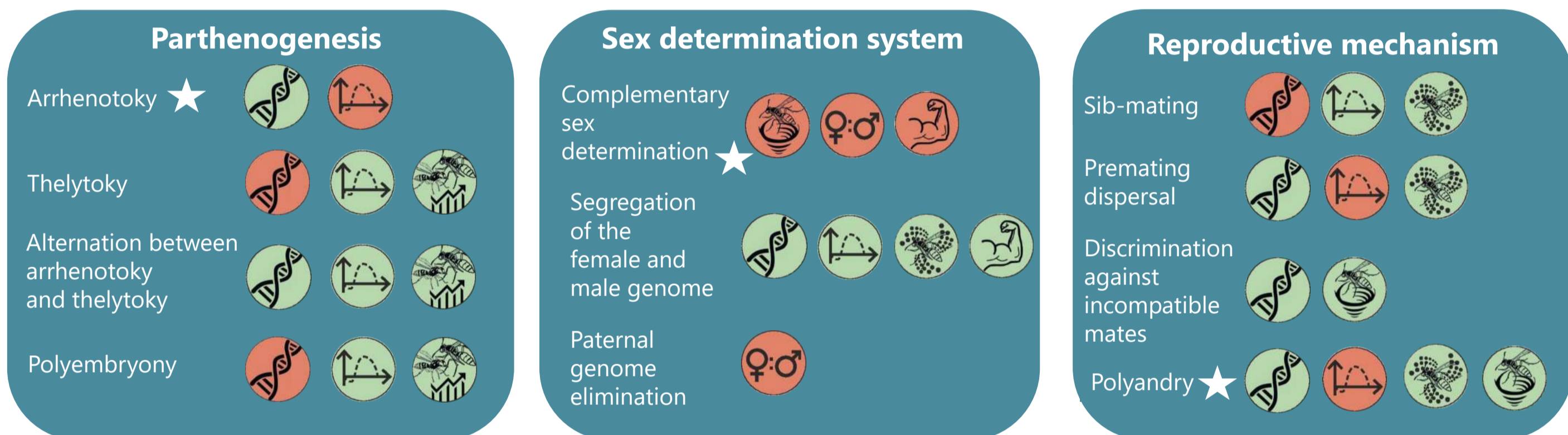
Considering these effects for the design of **management strategies** and **biocontrol programmes** could increase efficiency.

## Influence of reproductive biology on the invasive capacity of Hymenoptera

PRESENTER: **Joséphine Queffelec**

### INTRODUCTION:

Introduced species of Hymenoptera have a great impact on natural and planted forests, either as invasive pests or as biocontrol agents. Understanding how they become established is crucial for the development of effective risk assessment, regulation and control strategies. Reproductive biology is known to influence invasive success in plants, and is used for the development of management strategies but is generally ignored in insects. We propose that management plans for non-native insects should consider insect reproductive traits.



**Figure:** The reproductive traits of Hymenoptera can affect the invasive process by acting on various elements of population dynamics (i.e. population growth, Allee effects, adaptation, inbreeding depression, diploid male extinction vortex, fitness and sex ratio). The green icons represent a positive effect of a reproductive trait on the invasive process, while the red icons represent a negative effect.

### CONCLUSIONS

- Species exhibiting traits that encourage admixture (e.g. **arrhenotoky**, **segregation of the male and female genomes**, **pre-mating dispersal** and **discrimination of genetically incompatible mates**) should remain on quarantine lists after introduction
- Species distribution modelling** should consider the presence of **species closely related to the invasive species** of interest
- The management of **thelytokous or polyembryonic species** that demonstrate a **rapid population growth** should be prioritized to minimize bridgehead effects
- Biological control programmes** could benefit from favouring **arrhenotokous lineages** of the biocontrol agent. This would allow the agent to **remain effective over longer timescales**. However, the use of a sexually reproducing agent requires **large propagule pressure**

### CASE STUDY: *Sirex noctilio*

- The invasive wasp, *Sirex noctilio*, is a **threat for the forestry industry** throughout the southern hemisphere. Its invasion history was influenced by its reproductive traits
- The invasive populations of the wasps are **genetically diverse** and contain **haplotypes that are unique** to the various areas of introduction
- This is due to the multiple introduction and to the catalytic nature of **arrhenotoky** and **polyandry** that lead to **admixture** and to the production of a **highly diverse progeny**
- Polyandry** might have also helped the wasp to overcome the genetic load of **complementary sex determination**, increasing the establishment success

