OP-087 [Bee Biology]
Impact of viruses on recapping behaviour

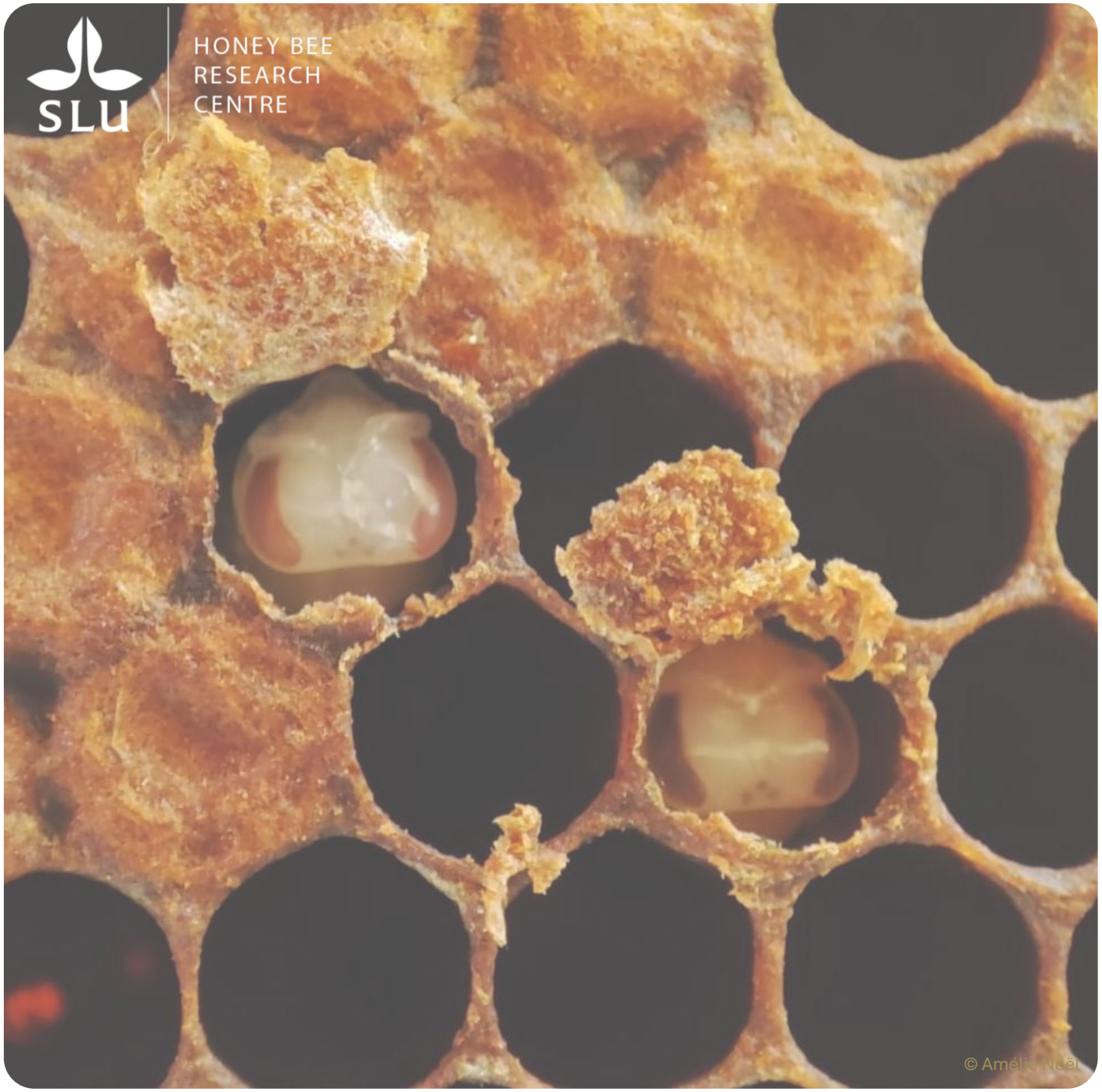
Amélie Noël, Barbara Locke
Honey Bee Research Centre, Swedish University of Agricultural Sciences, Uppsala, Sweden

Background and Purpose
The parasite Varroa destructor is a major threat to the honey bees (Apis mellifera) and to beekeeping worldwide. The pathological effect of varroa on honey bees colonies is not limited to its direct effect, but also to its capacity as a virus vector. However, specific honey bee population have developed resistance to the parasite and are able to regulate the growth of the varroa population within the colony, without the required use of mite-control pesticides. Non-reproduction of the varroa mite is a key feature of this varroa resistance. This is displayed by different behaviours or traits from both adults and brood. One of the behaviours that is gaining renewed interest is the recapping behaviour of varroa-parasitized brood cells by the adult worker bees. Little is known about the underlying triggers of this behaviour. In this study, we investigated the relationship between the viral load of the targeted pupae and the recapping behaviour.

Methodology
We studied the appearance of the cell cappings of brood cells to identify recapping behaviour and the varroa infestation and the prevalence of viruses associated with varroa were recorded for each of these brood cells.

Results and conclusions
This study revealed a link between the pupal viral load and recapping which is a behaviour of adult bees. These findings raise new questions regarding the trigger of this behaviour along with the distinction between recapping behaviour and varroa sensitive hygiene behaviour.

Practical implications for beekeepers
This study provides a deeper understanding of the recapping behaviour and how it is linked with varroa resistance and other resistance behaviours, ultimately to contribute to the development of sustainable strategies for controlling mites and viral diseases using resistant honey bees.



Impact of viruses on recapping behaviour

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Department of Ecology
Sveriges Lantbruksuniversitet
Uppsala, Sweden

26th September 2025, Apimondia, Copenhagen

Introduction

Varroa destructor & associated viruses

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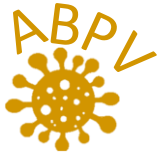
Varroa destructor & associated viruses

- Highly efficient virus vector,



(*Marche* et al., *2019, J. Apic. Res.; Annoscia* et al., *2019, Proc. R. Soc. B; de Miranda* et al., *2013, J. Apic. Res.; Posada-Flórez* et al., *2019, Sci. Rep.; Doublet* et al., *2024, R. Soc. Open Sci.)*

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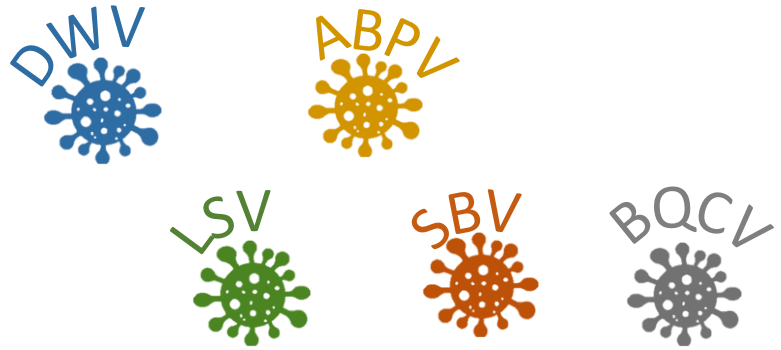
Varroa destructor & associated viruses

- Highly efficient virus vector,
- Increased prevalence and virus load.



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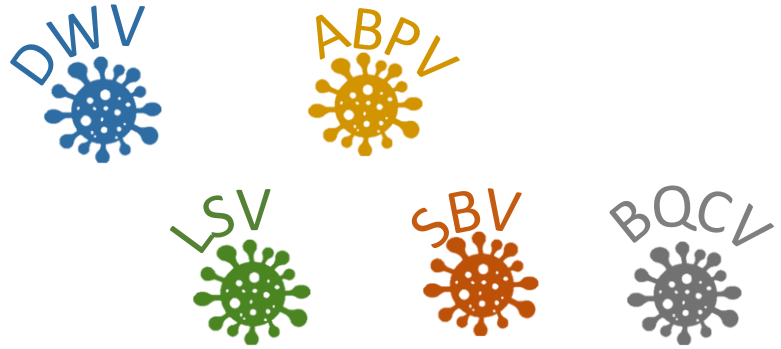
Varroa destructor & associated viruses



- Highly efficient virus vector,
- Increased prevalence and virus load.

→ Non-functional workers → Can lead colony collapse

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Introduction

Resistant trait & behaviours

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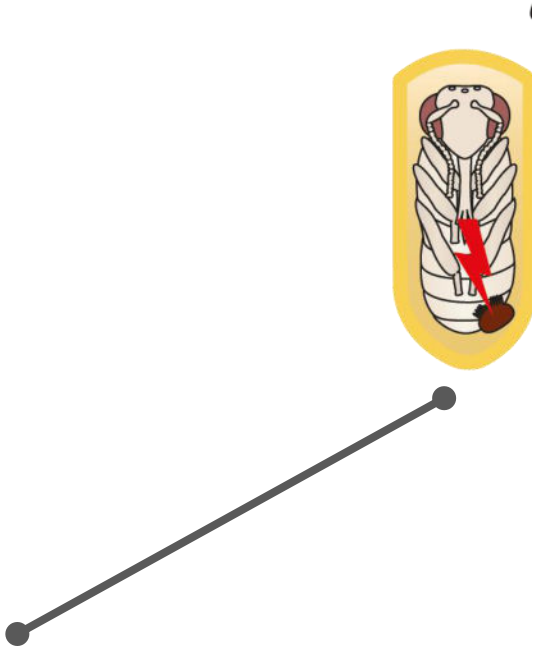

SMR (Suppressed Mite Reproduction)
Impact of the brood on *Varroa* reproduction

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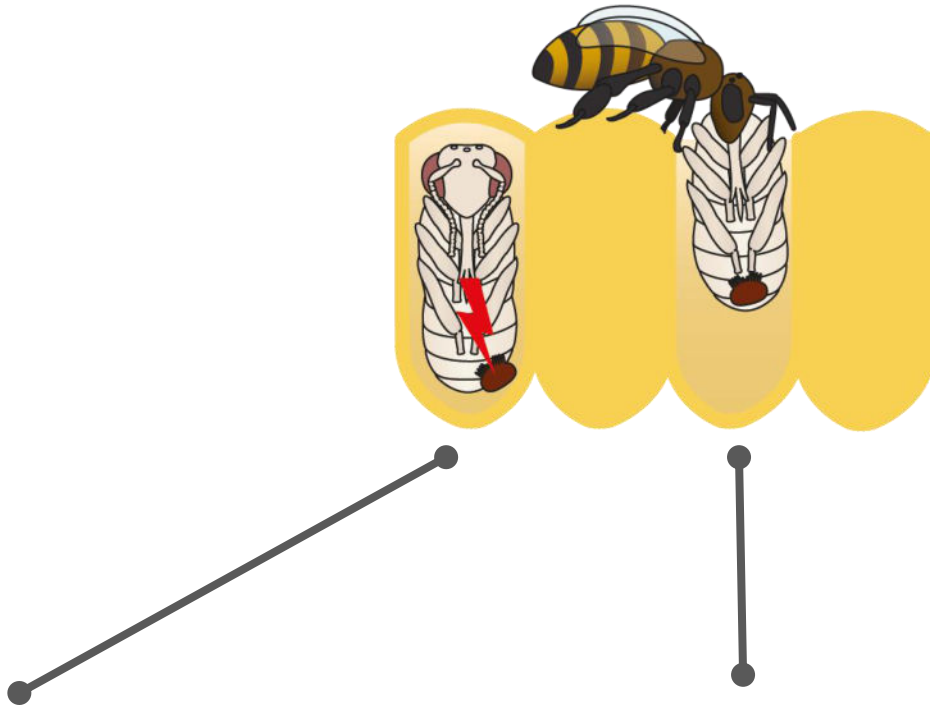
Resistant trait & behaviours



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Detection and removal of *Varroa*-parasitized brood cells.

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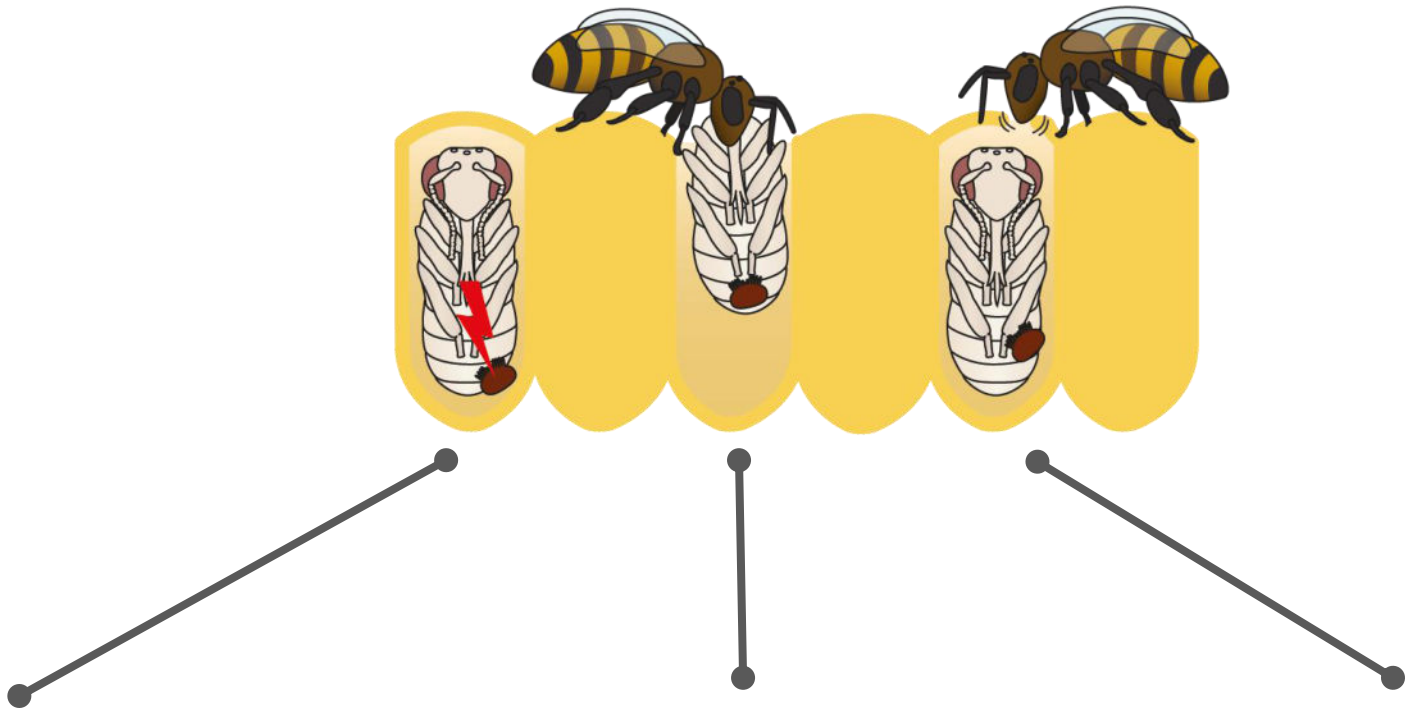

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Recapping
Detection, uncapping and recapping of *Varroa*-parasitized brood cells.

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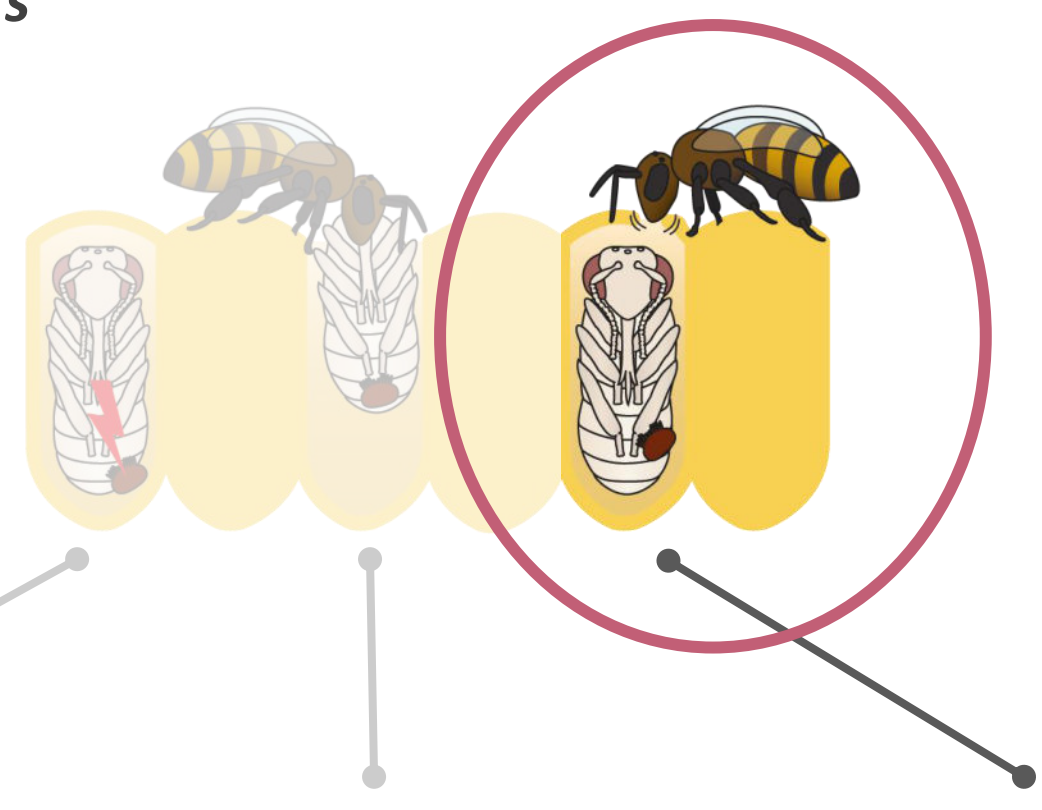

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Recapping behaviour

(*Noël* et al*., 2025, IJP; Oddie* et al*., 2018, Sci. Rep.; Doublet* et al*., 2024, R. Soc. Open Sci., Oddie* et al*., 2021, Sci. Rep., Wagoner* et al*., 2019, Sci. Rep.)*

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Recapping behaviour

✓ Less energy-consuming for the colony: avoid social apoptosis.

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- ✓ Can be trigger by *Varroa*-parasitized cells semiochemical cues.

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Recapping behaviour

- ✓ Less energy-consuming for the colony: avoid social apoptosis.
- ✓ Can be trigger by *Varroa*-parasitized cells semiochemical cues.
- ✓ DWV infection semiochemical cues trigger removal. Recapping?

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Recapping behaviour

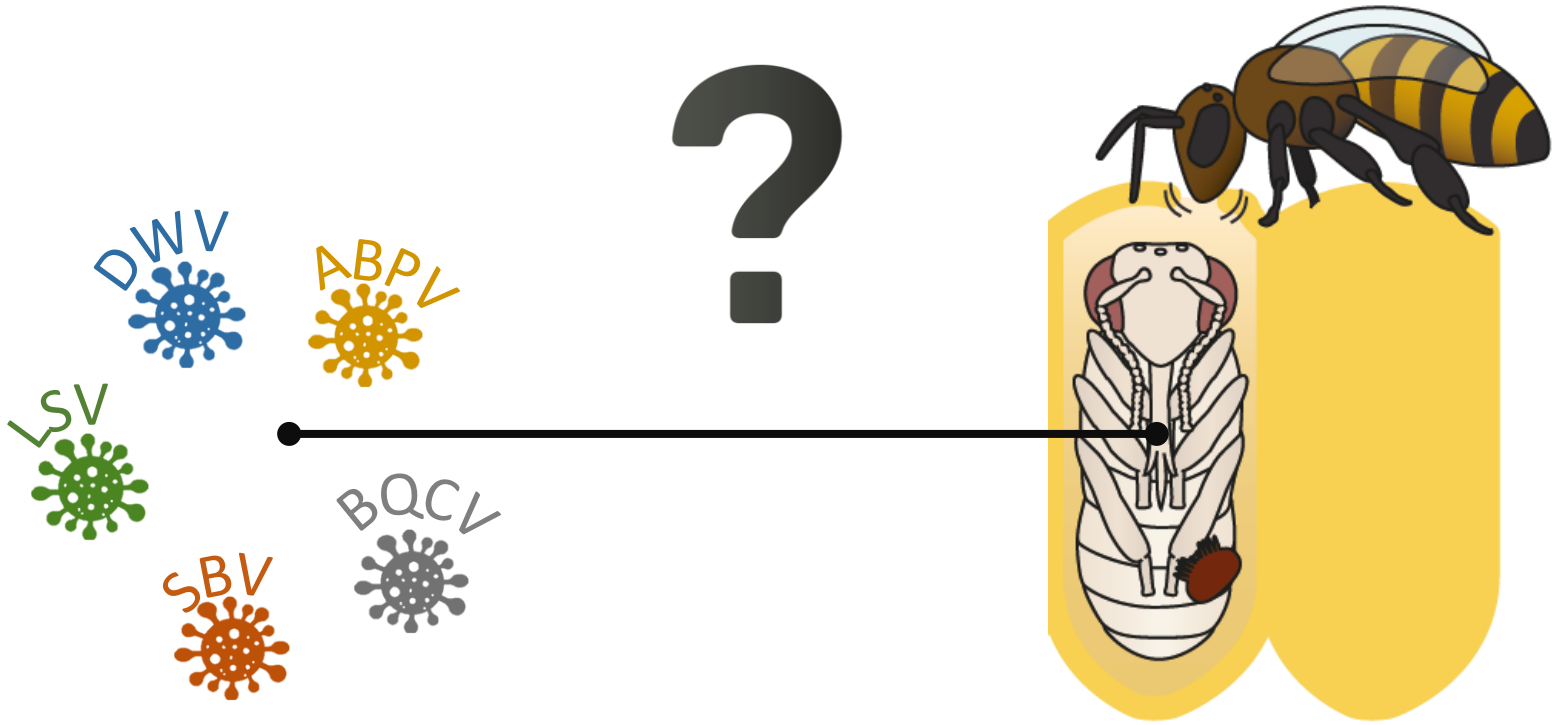
- ✓ Less energy-consuming for the colony: avoid social apoptosis.
- ✓ Can be trigger by *Varroa*-parasitized cells semiochemical cues.
- ✓ DWV infection semiochemical cues trigger removal. Recapping?

→ Highly represent in the resistant population of Gotland.

(*Noël* et al*., 2025, IJP; Oddie* et al*., 2018, Sci. Rep.; Doublet* et al*., 2024, R. Soc. Open Sci., Oddie* et al*., 2021, Sci. Rep., Wagoner* et al*., 2019, Sci. Rep.)*

Question

Do viruses influence recapping behaviour?



HONEY BEE RESEARCH CENTRE

Materials & Methods

Colony Establishment

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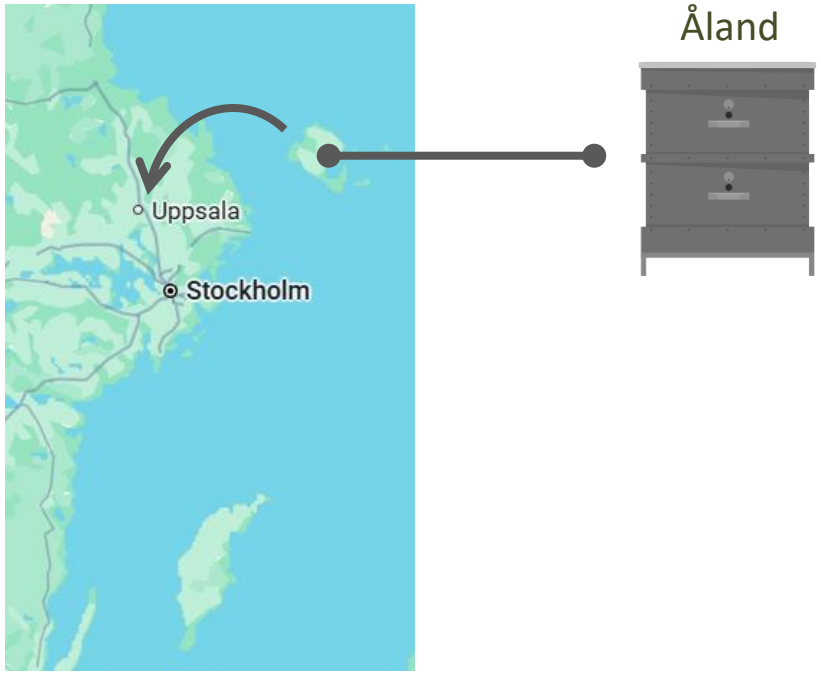
Materials & Methods

Colony Establishment



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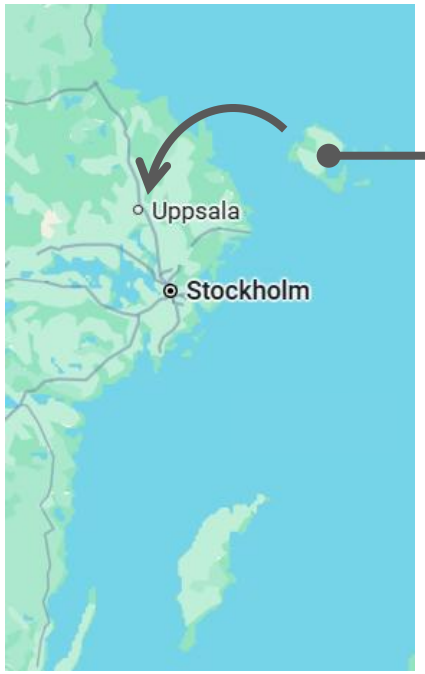

Åland

- ✓ Varroa free
- ✓ Low virus loads

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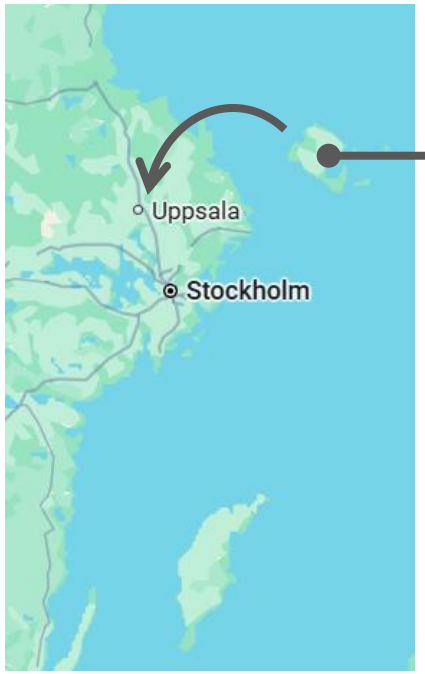

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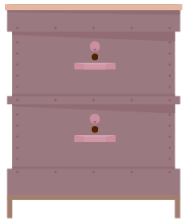
+ Queen from

Åland



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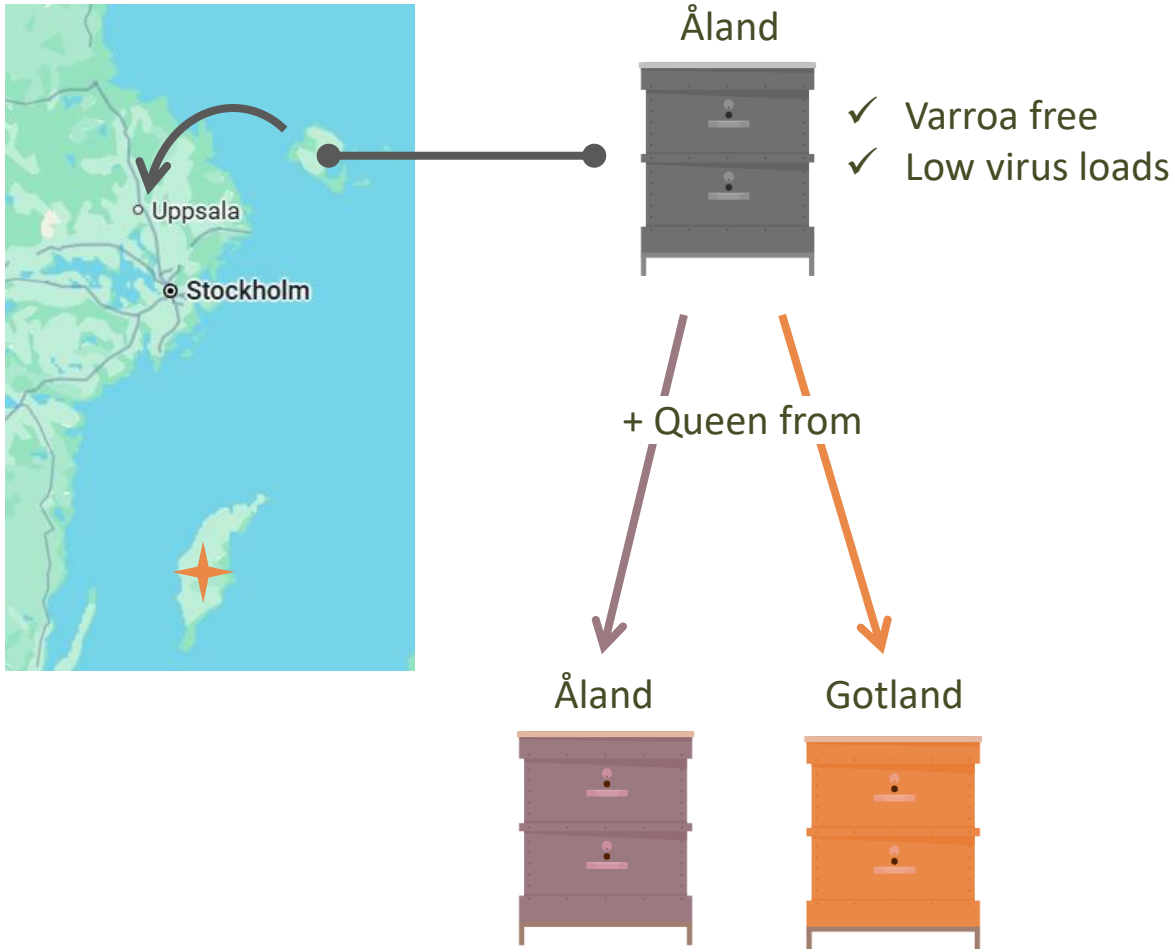

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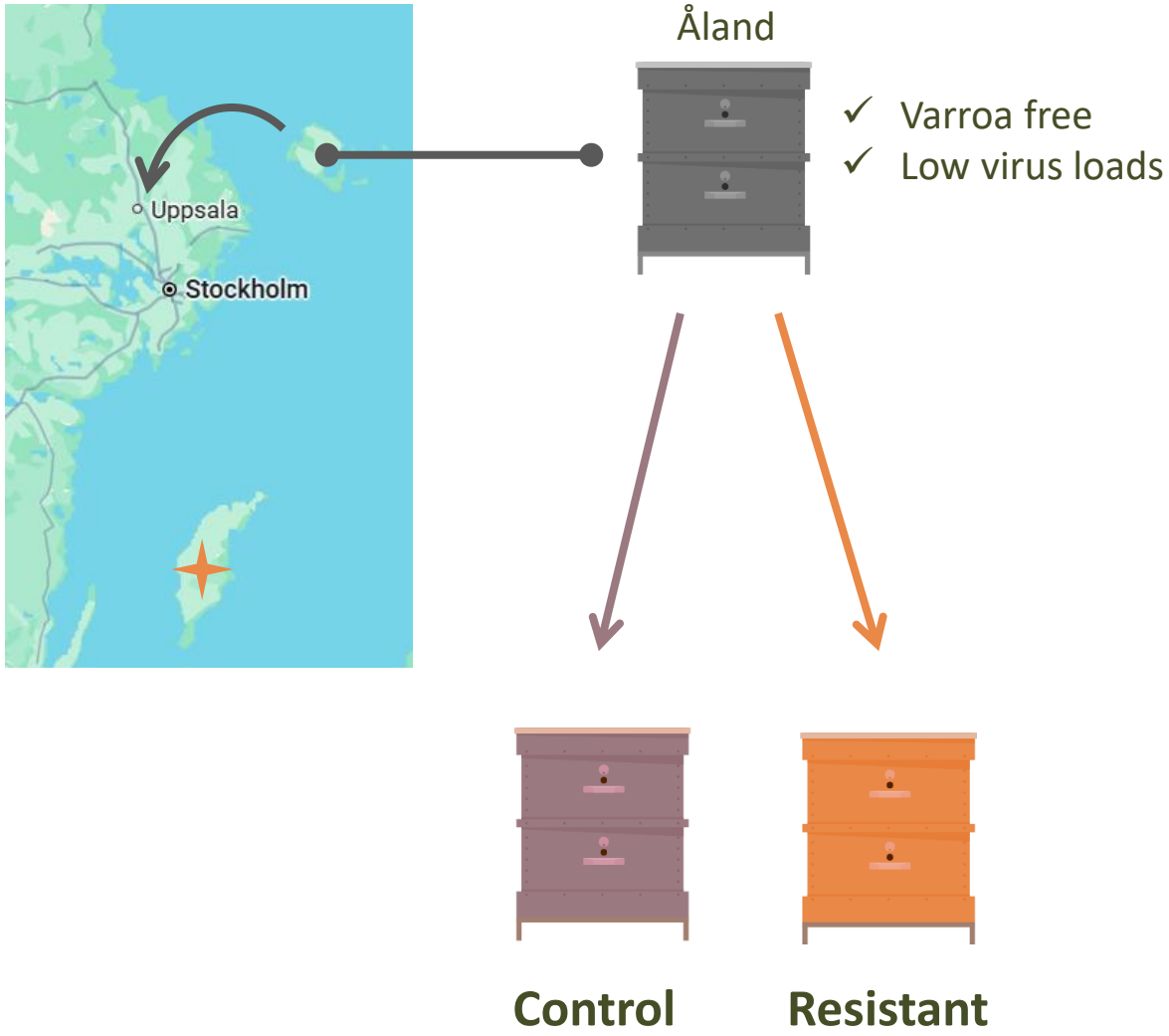

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Colony Establishment

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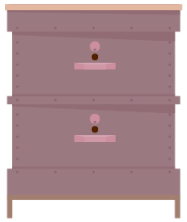
Varroa +



Control **Resistant**

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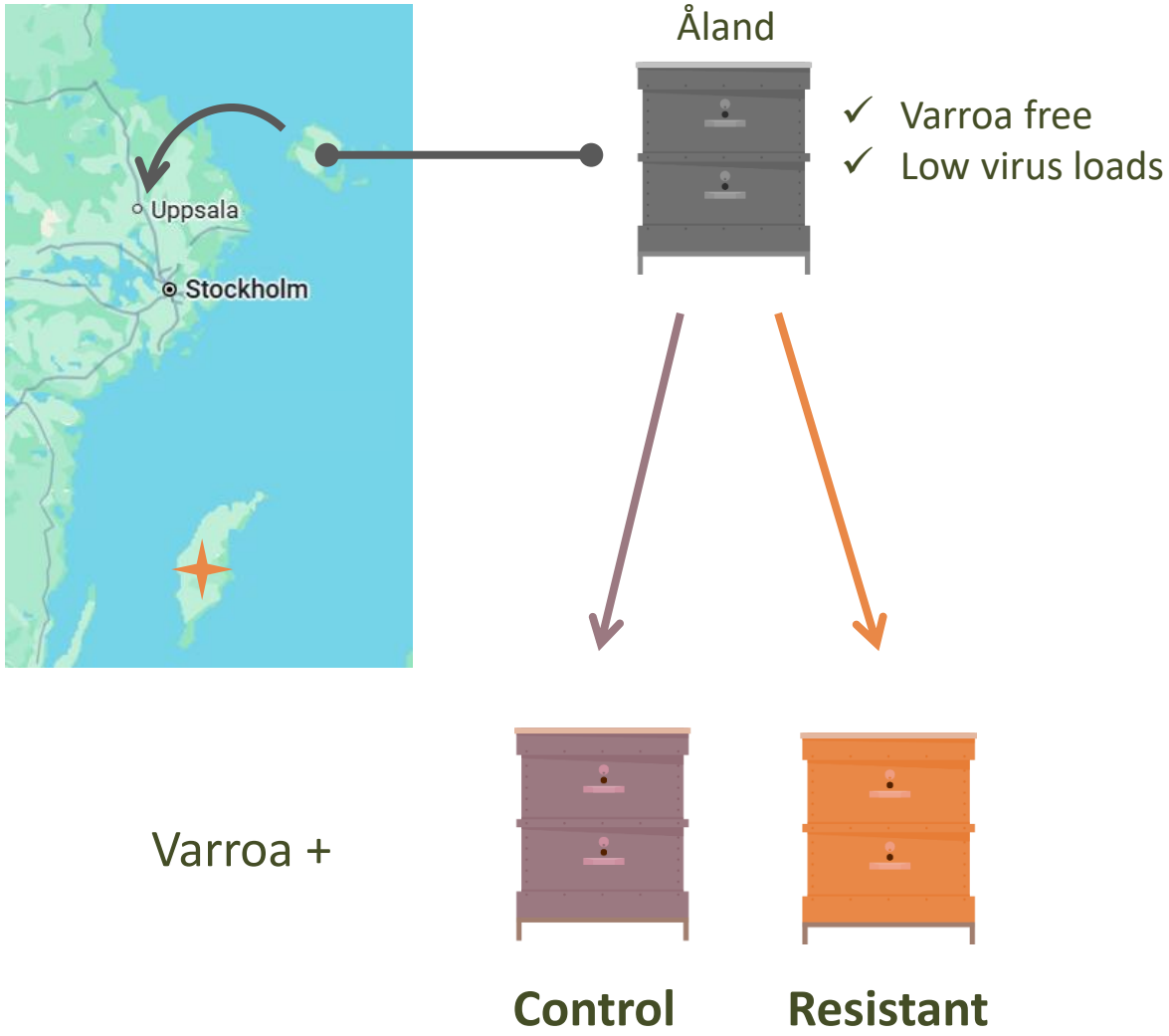

Experimental design

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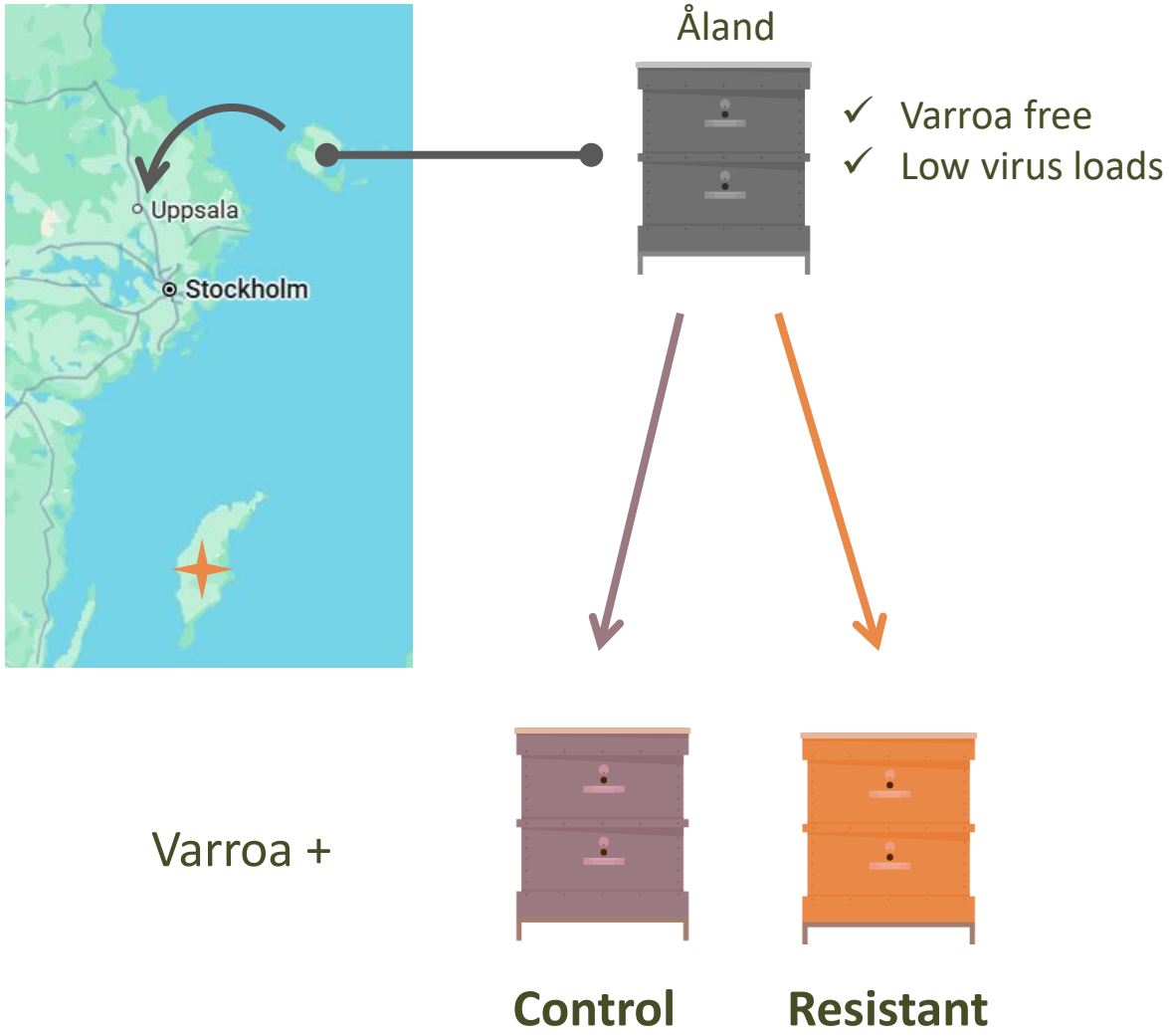
Materials & Methods

Colony Establishment



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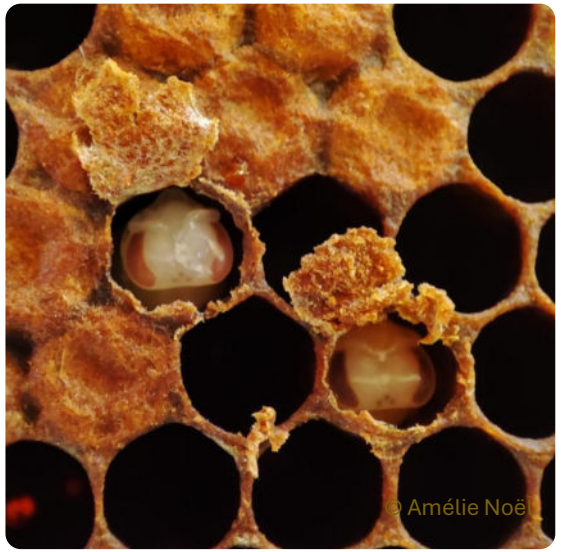

Each colony:

- ✓ 260 to 320 cells open

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Materials & Methods

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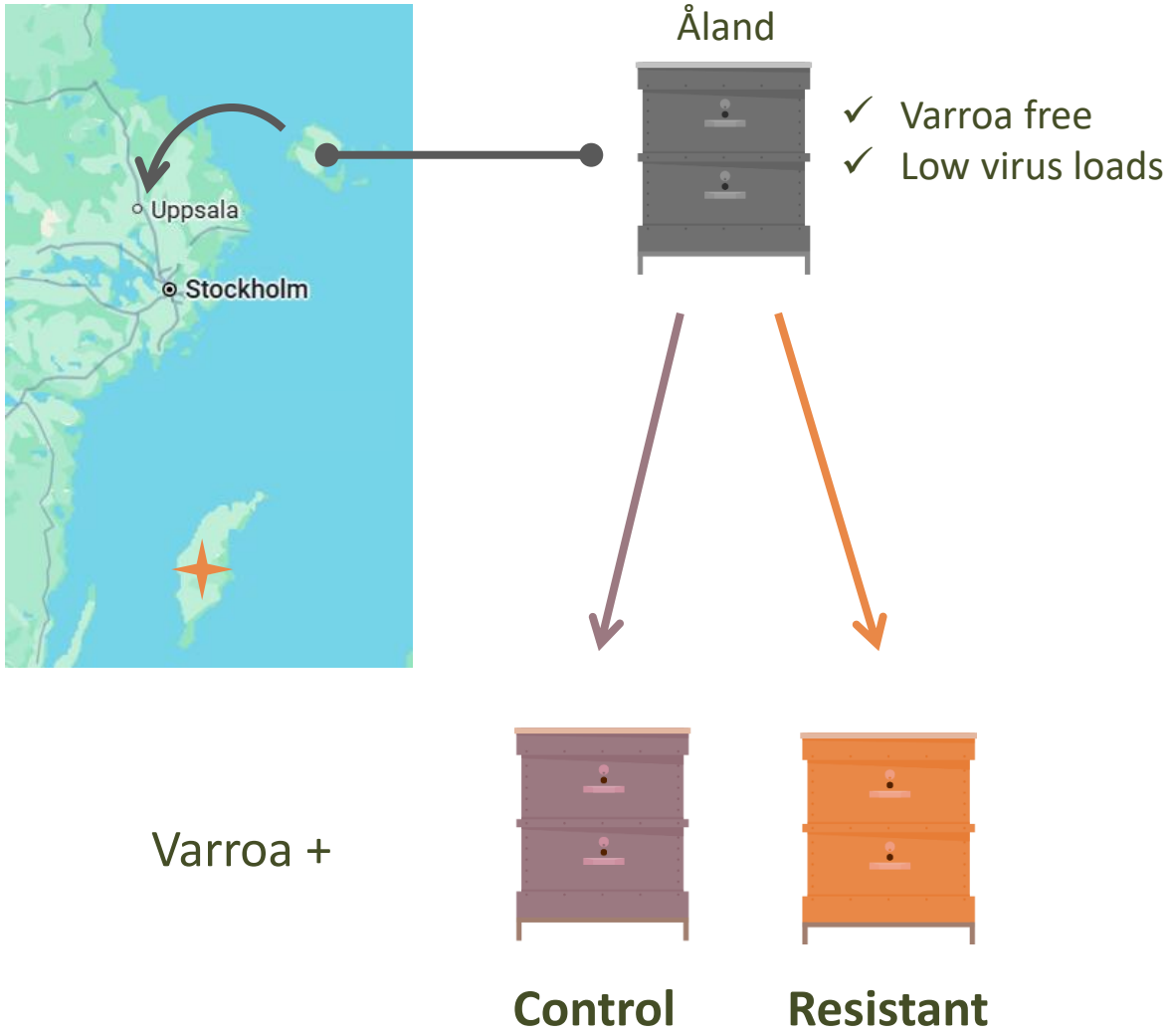

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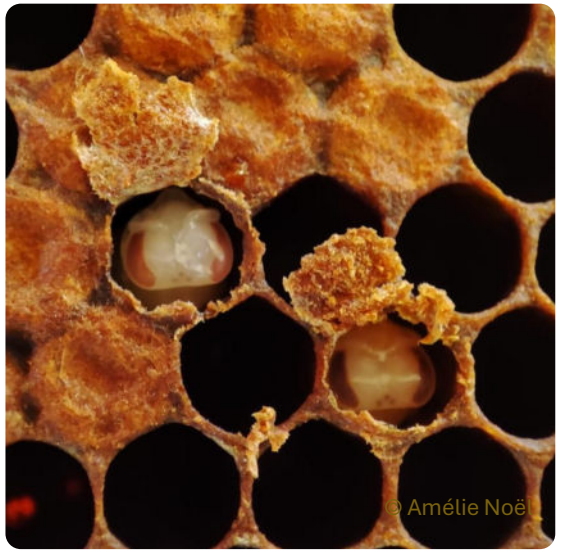

Each colony:

- ✓ 260 to 320 cells open
- ✓ 8 – 11 days post-capping

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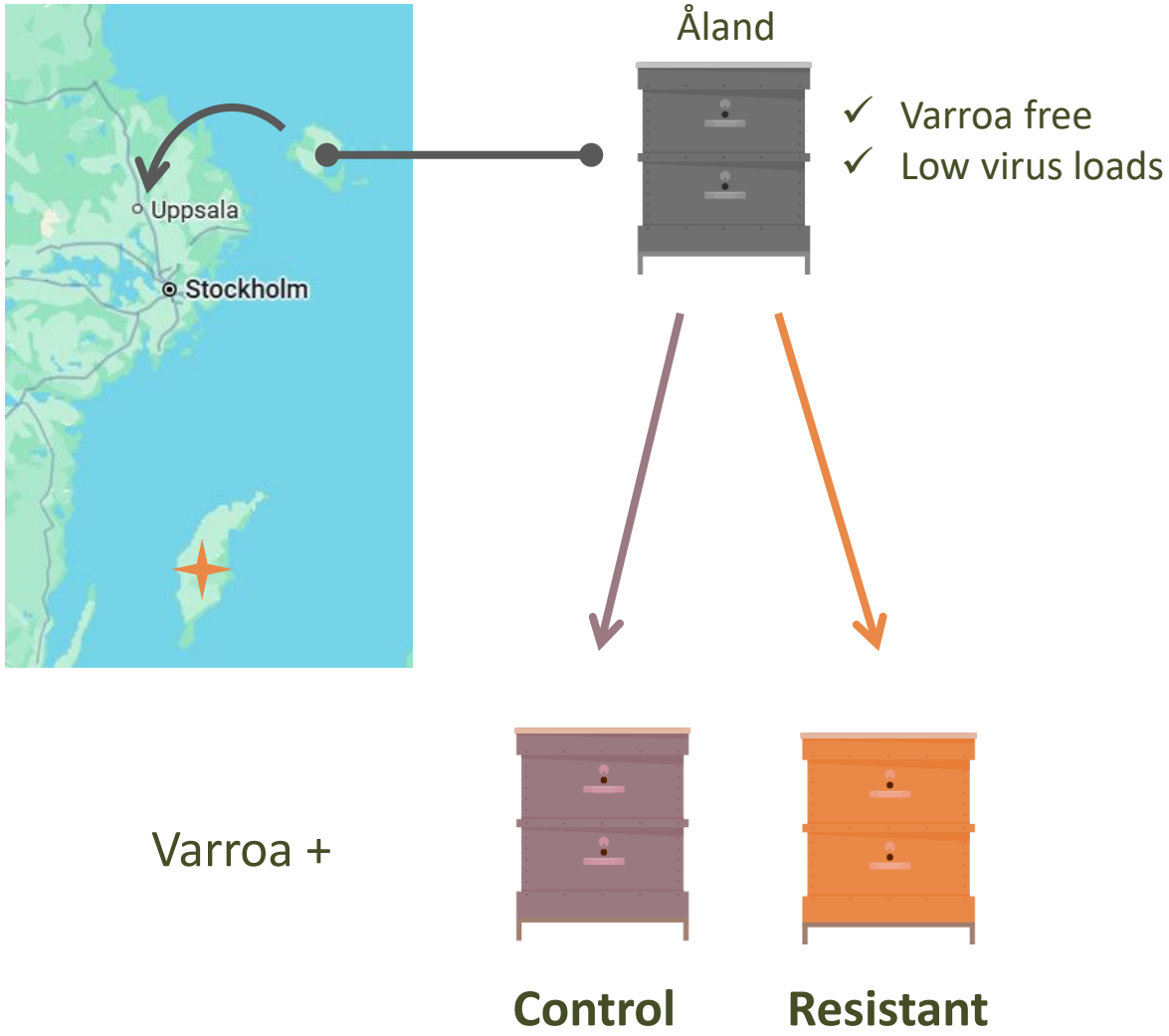
Materials & Methods

Colony Establishment



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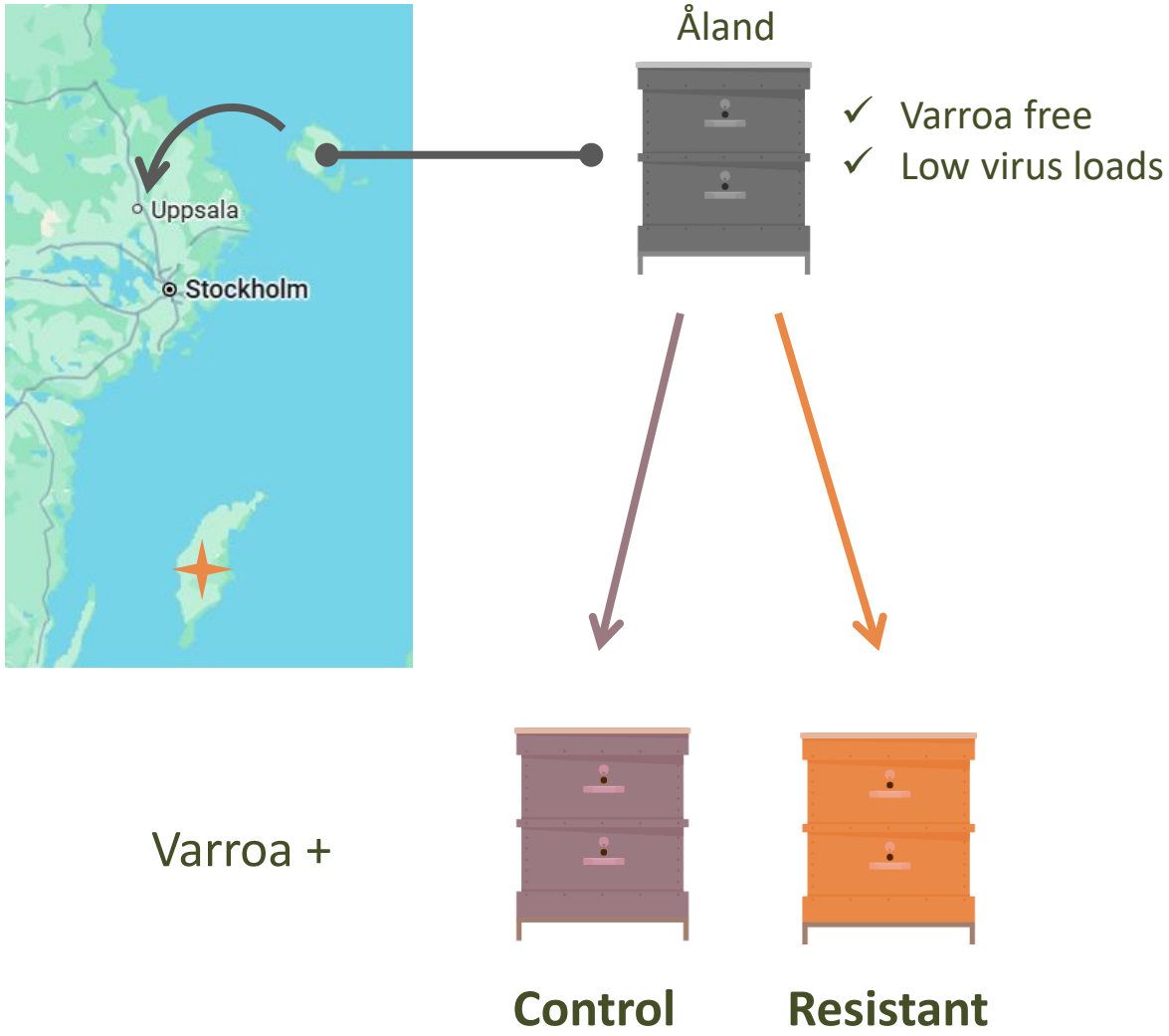

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Virus quantification

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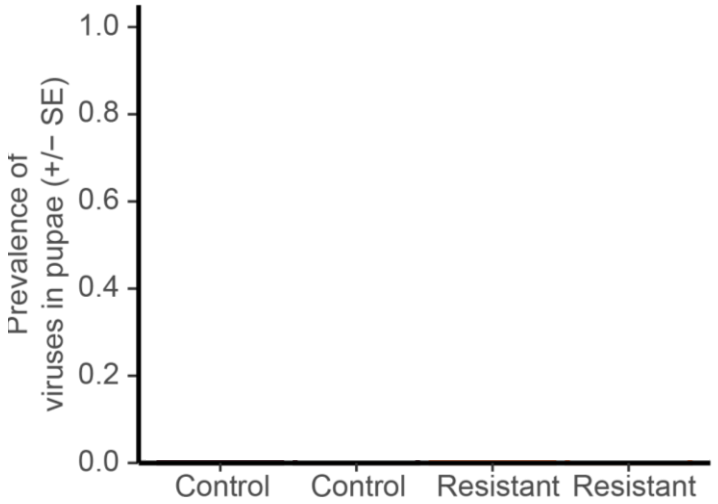
Results

Viruses prevalence



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Results

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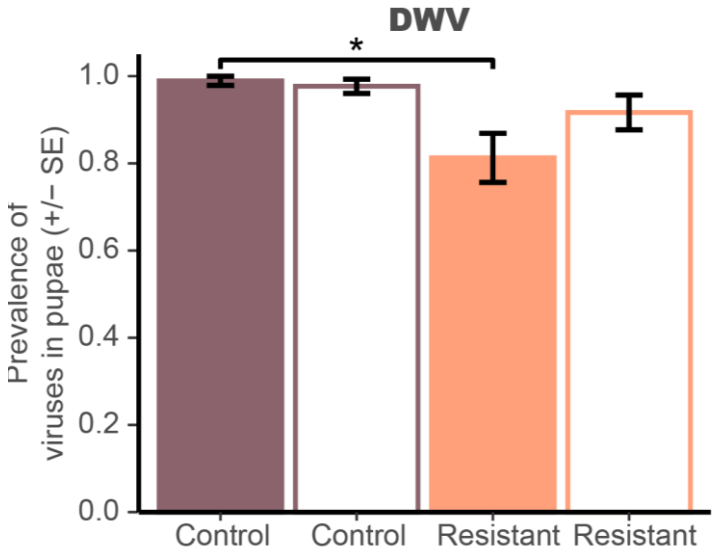

Untouched

Recapped

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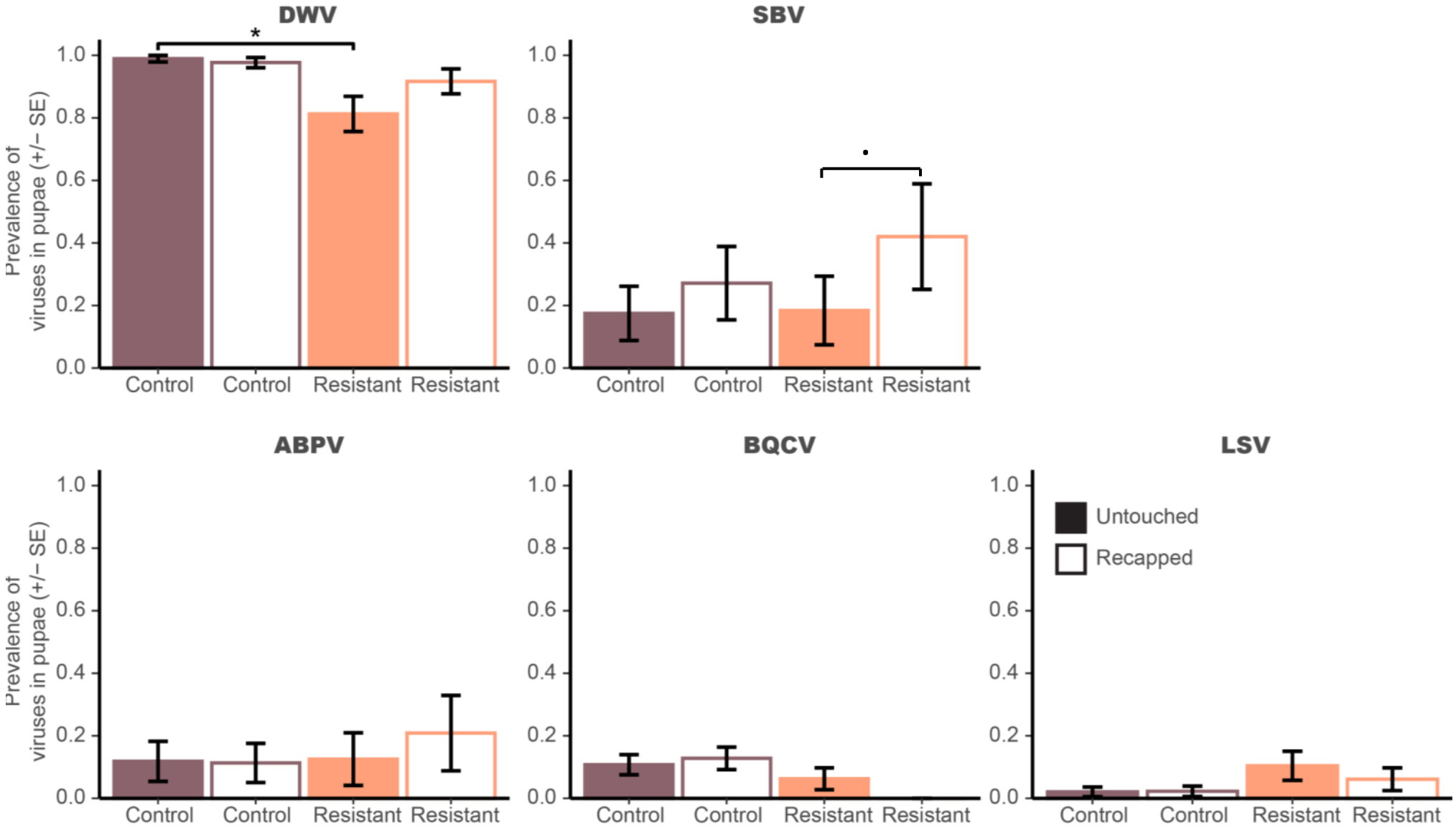
Results

Viruses prevalence



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Results

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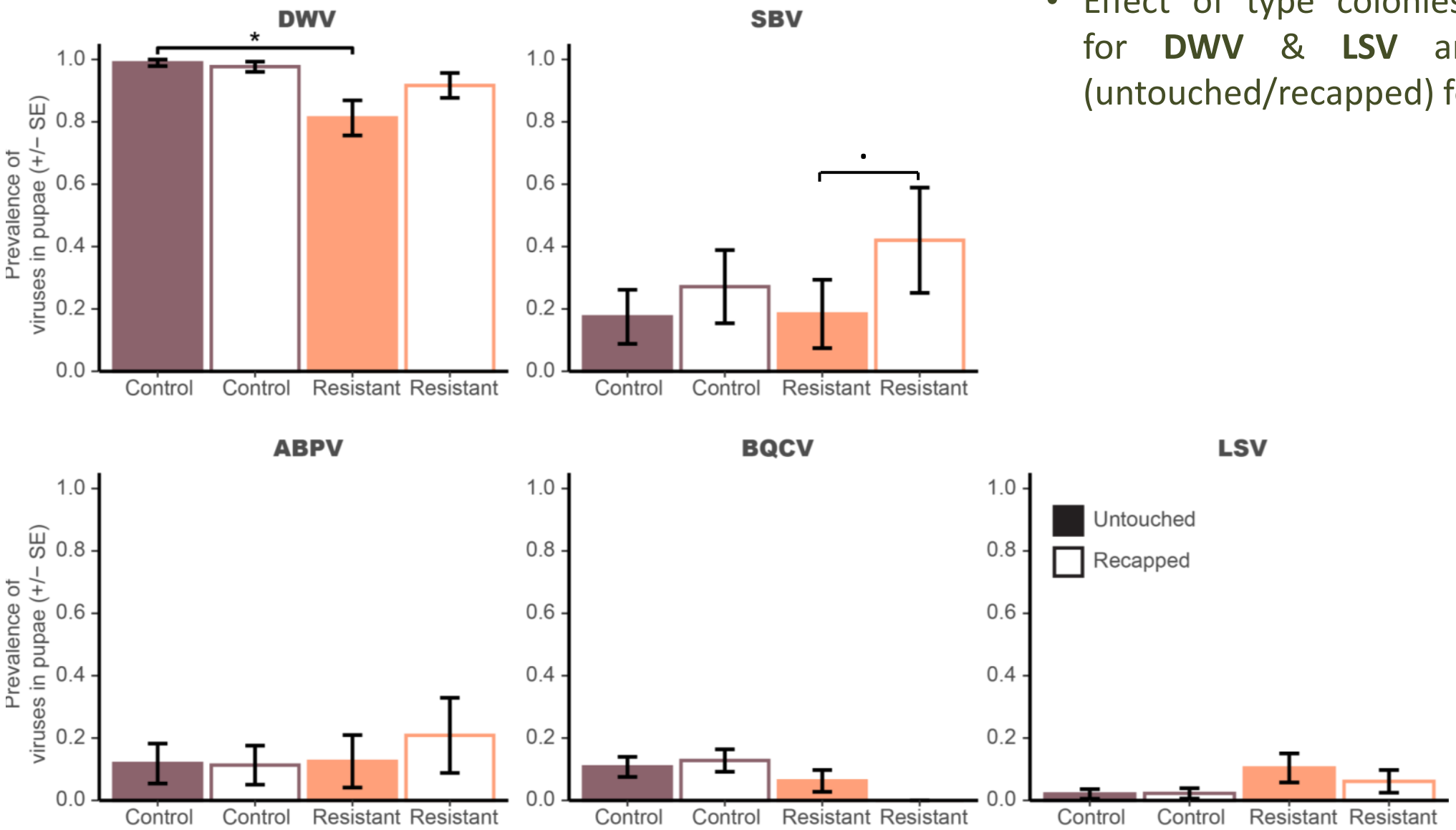

- Effect of type colonies (control/resistant) for **DWV** & **LSV** and type of cells (untouched/recapped) for **SBV**.

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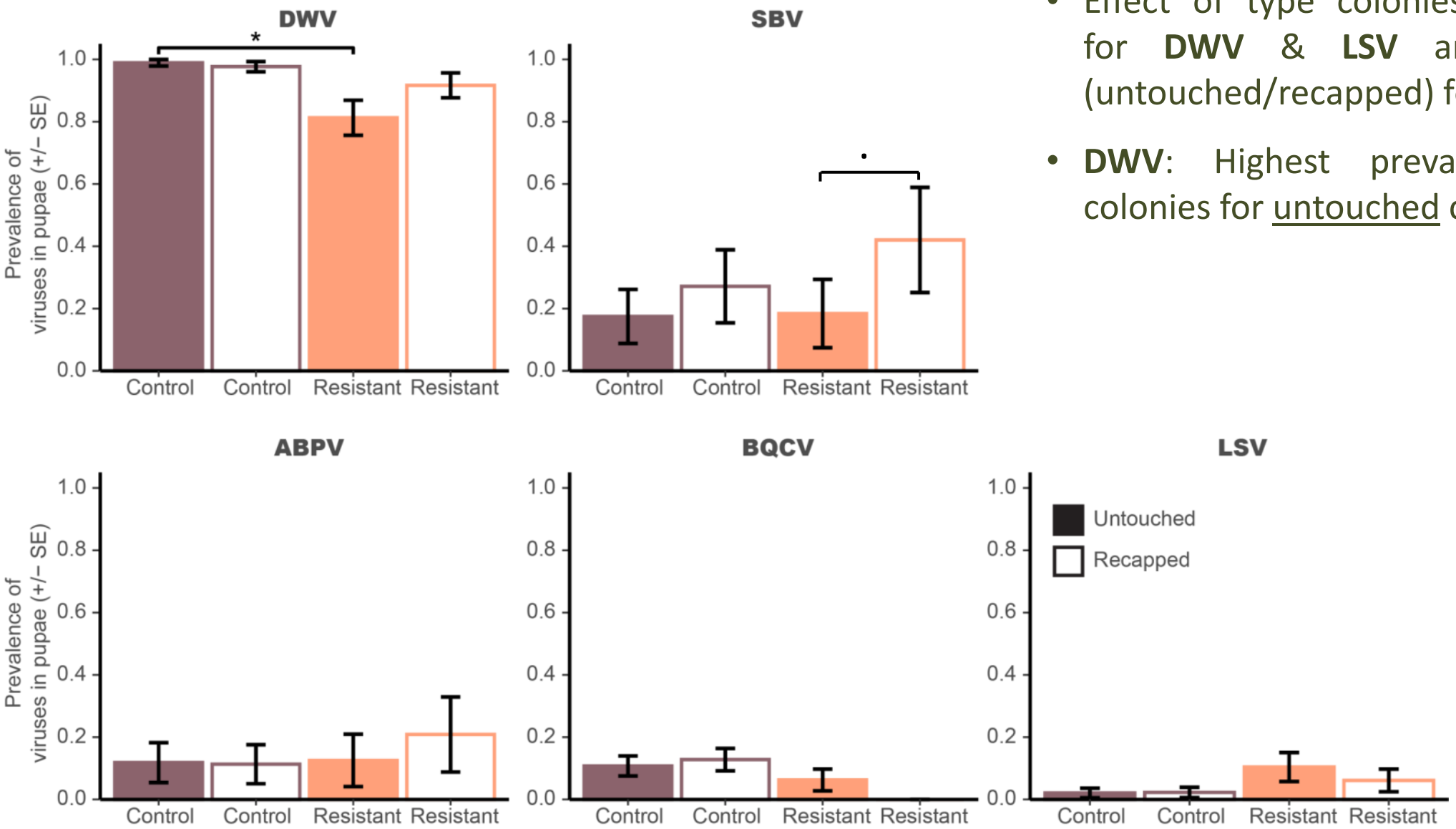
Results

Viruses prevalence



- Effect of type colonies (control/resistant) for **DWV** & **LSV** and type of cells (untouched/recapped) for **SBV**.
- **DWV**: Highest prevalence on control colonies for <u>untouched</u> cells.

HONEY BEE RESEARCH CENTRE

Results

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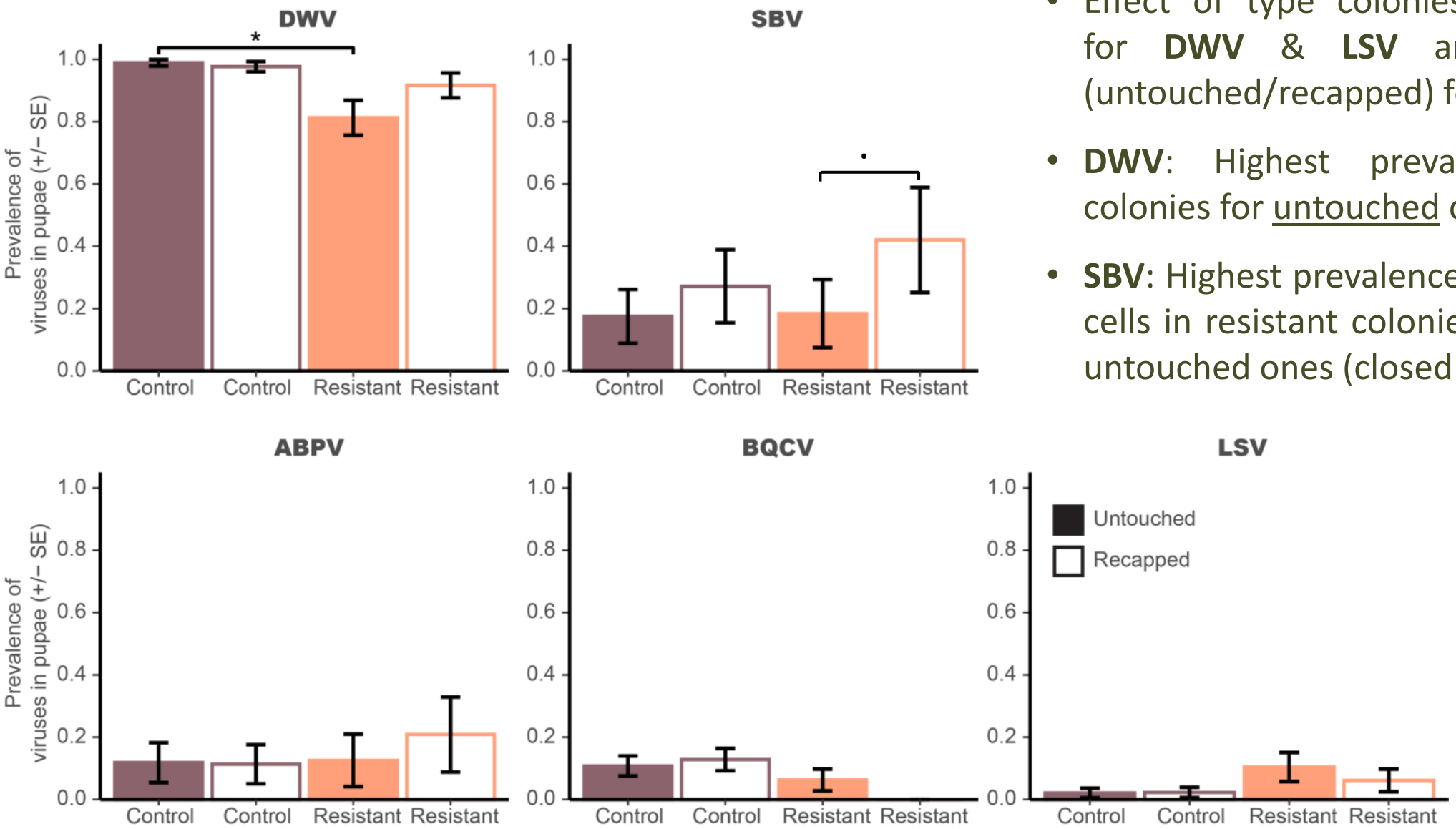

- Effect of type colonies (control/resistant) for **DWV** & **LSV** and type of cells (untouched/recapped) for **SBV**.
- **DWV**: Highest prevalence on control colonies for untouched cells.
- **SBV**: Highest prevalence of SBV in recapped cells in resistant colonies, in comparison of untouched ones (closed to significance)

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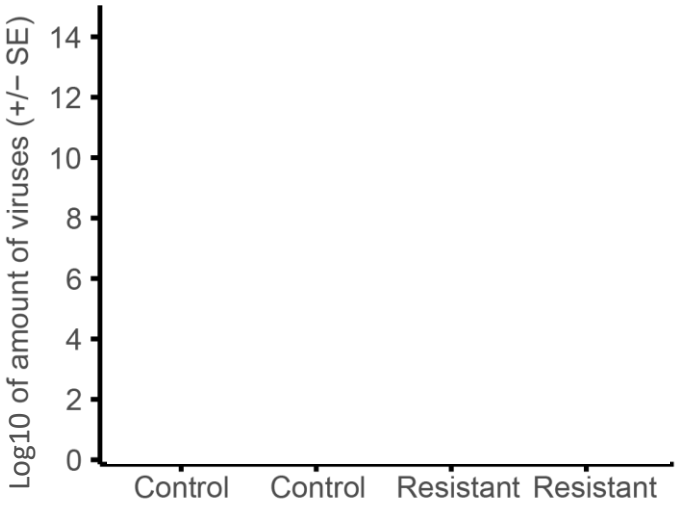
Results

Viruses loads



HONEY BEE
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CENTRE

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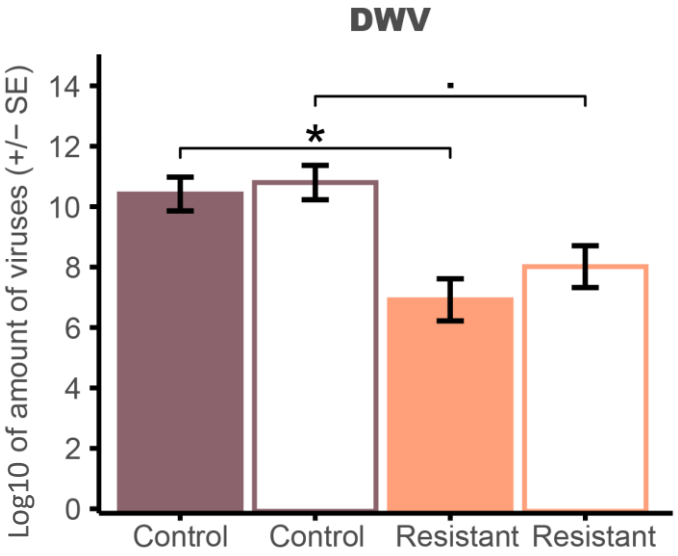

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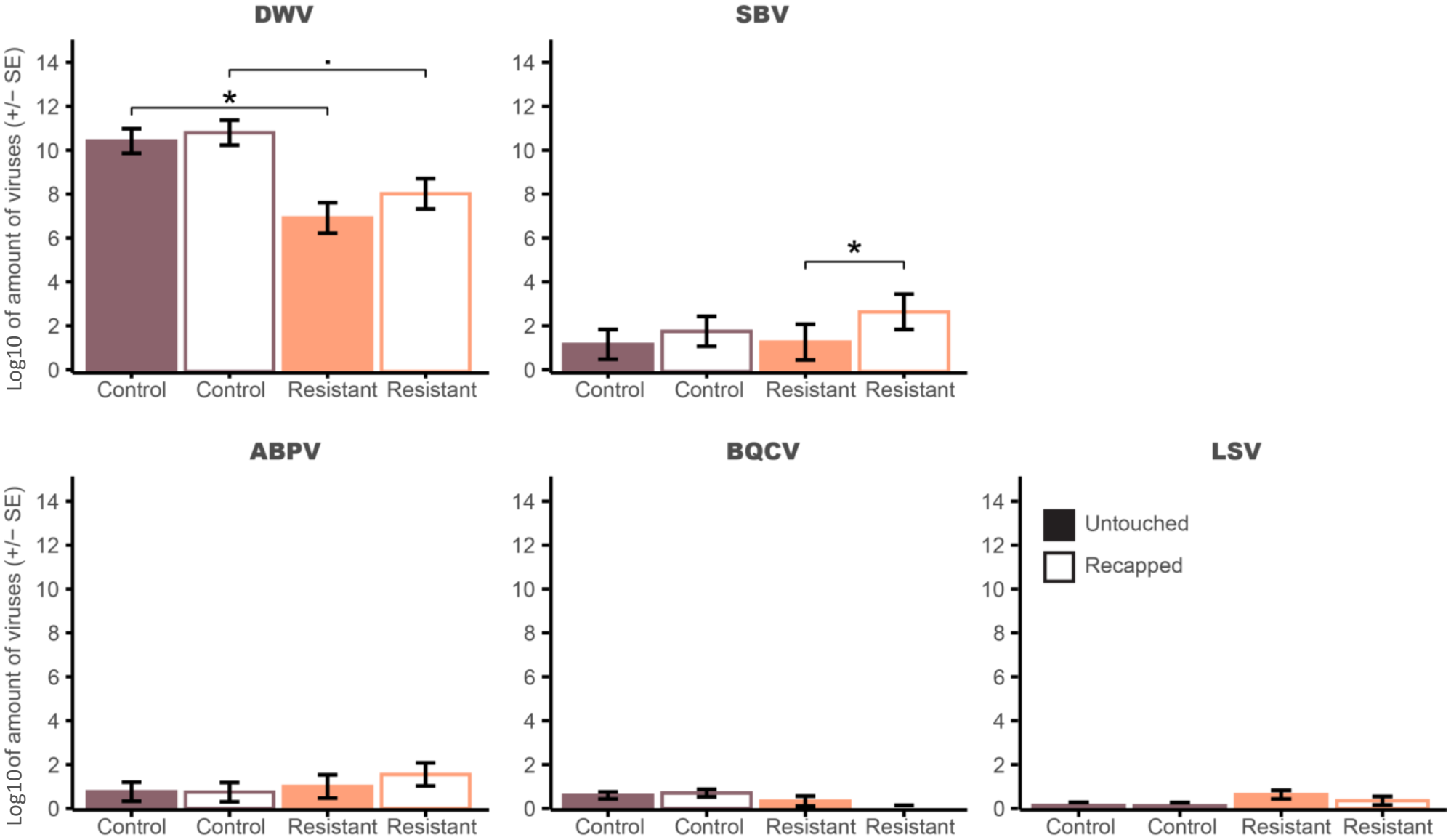
HONEY BEE RESEARCH CENTRE

Results

Viruses loads



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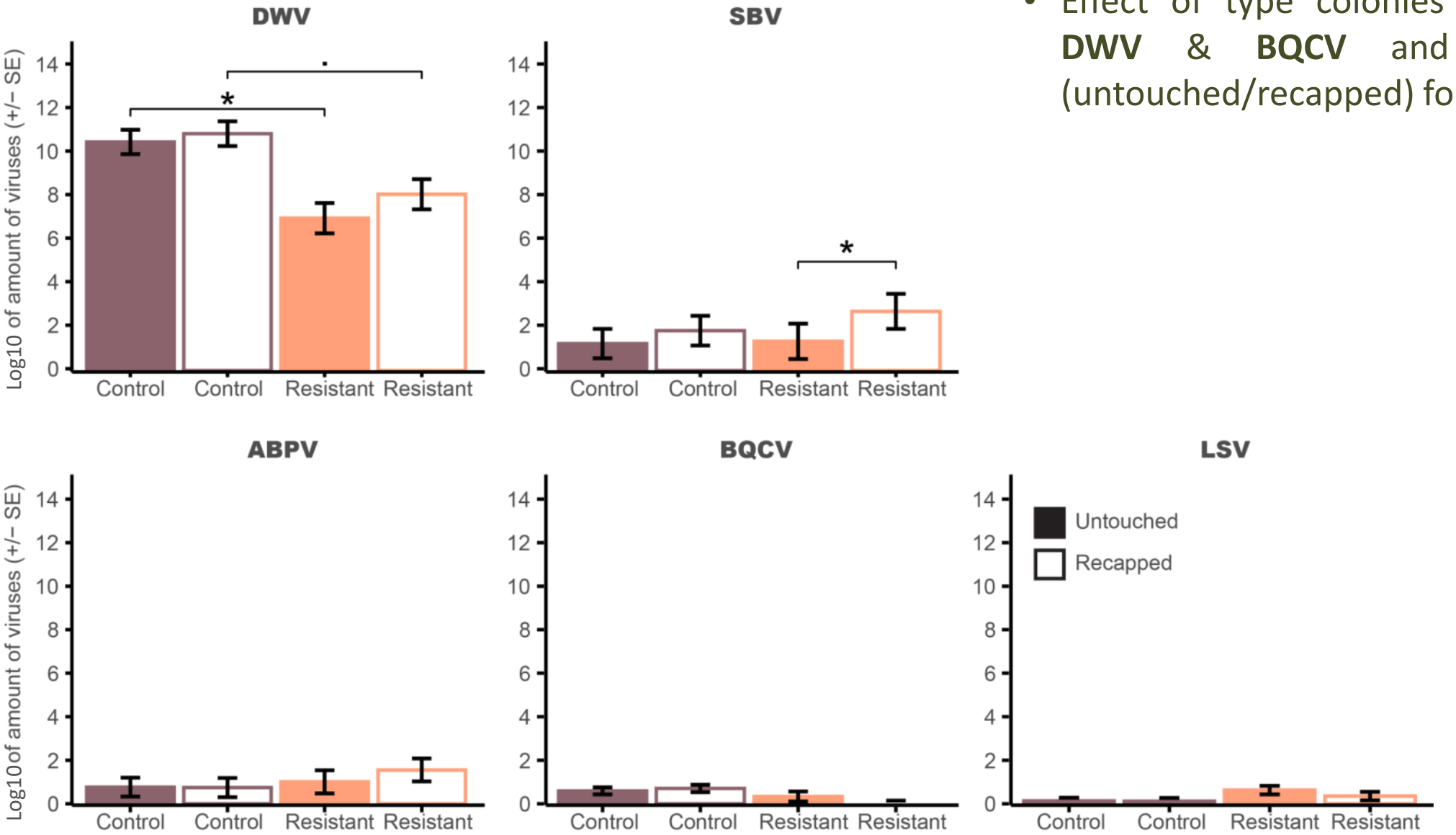

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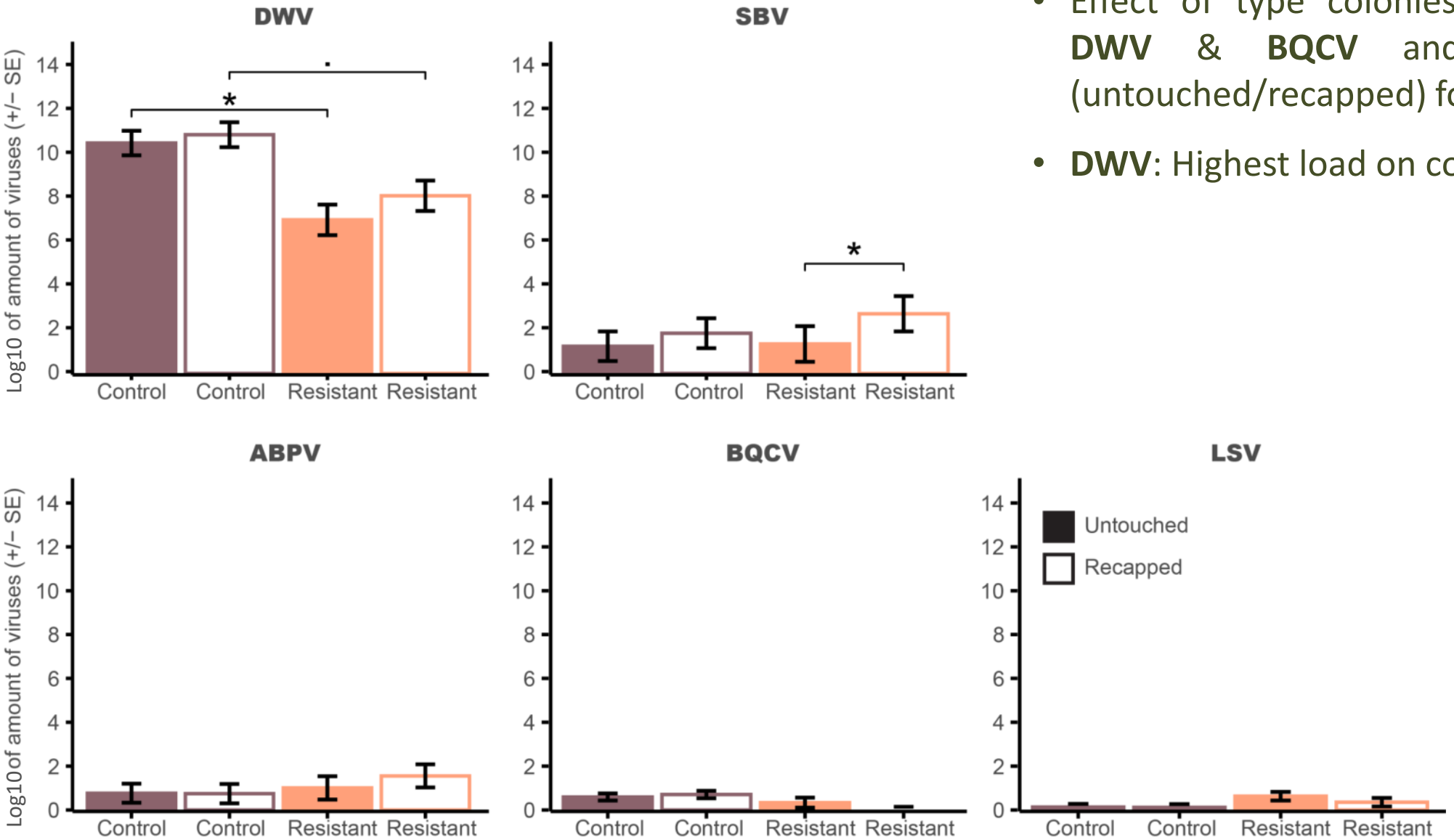
HONEY BEE RESEARCH CENTRE

Results

Viruses loads



- Effect of type colonies (control/resistant) **DWV** & **BQCV** and type of cells (untouched/recapped) for **SBV**.
- **DWV**: Highest load on control colonies.

HONEY BEE RESEARCH CENTRE

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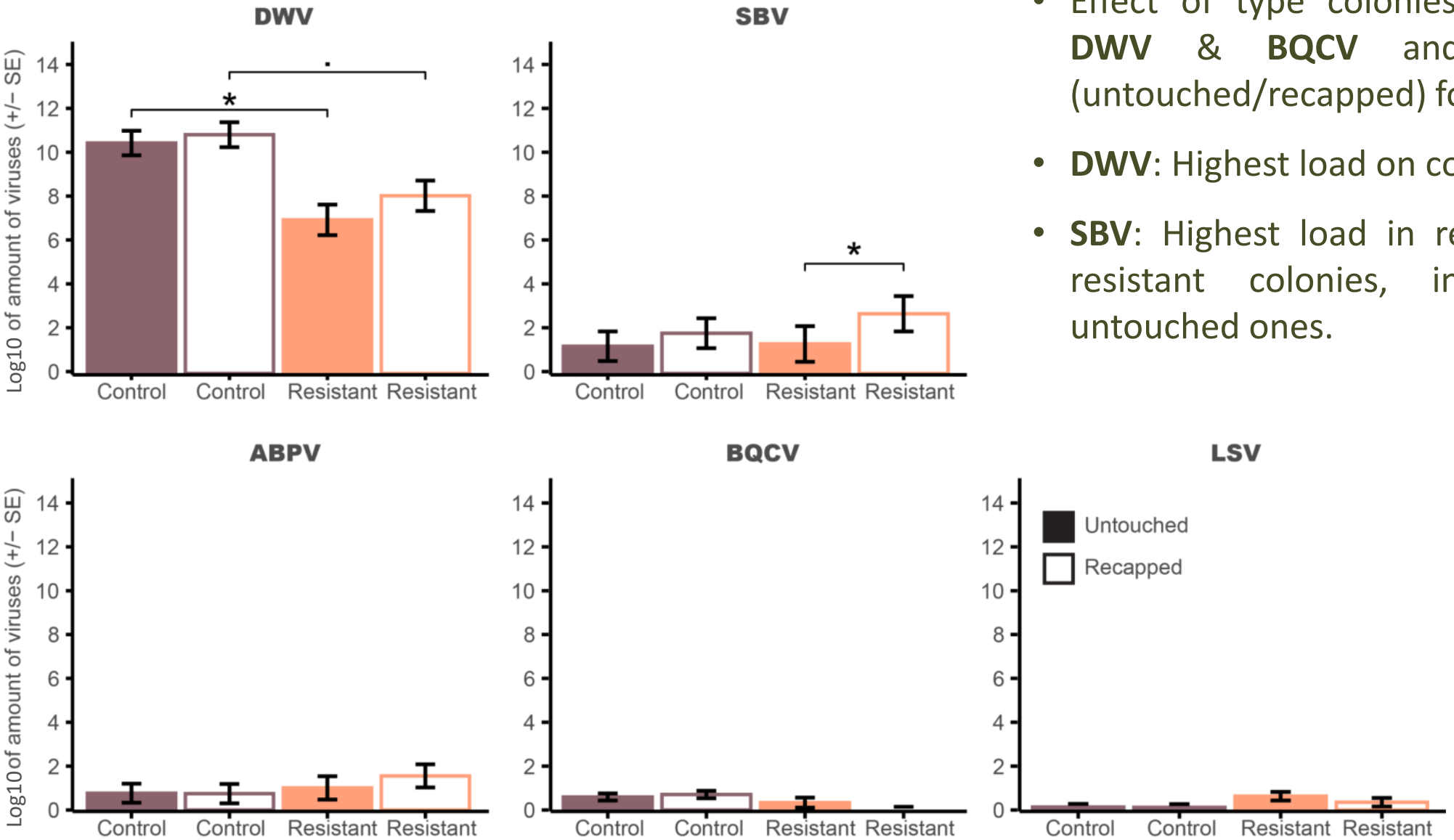
Viruses loads



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- **DWV**: Highest load on control colonies.
- **SBV**: Highest load in recapped cells from resistant colonies, in comparison of untouched ones.

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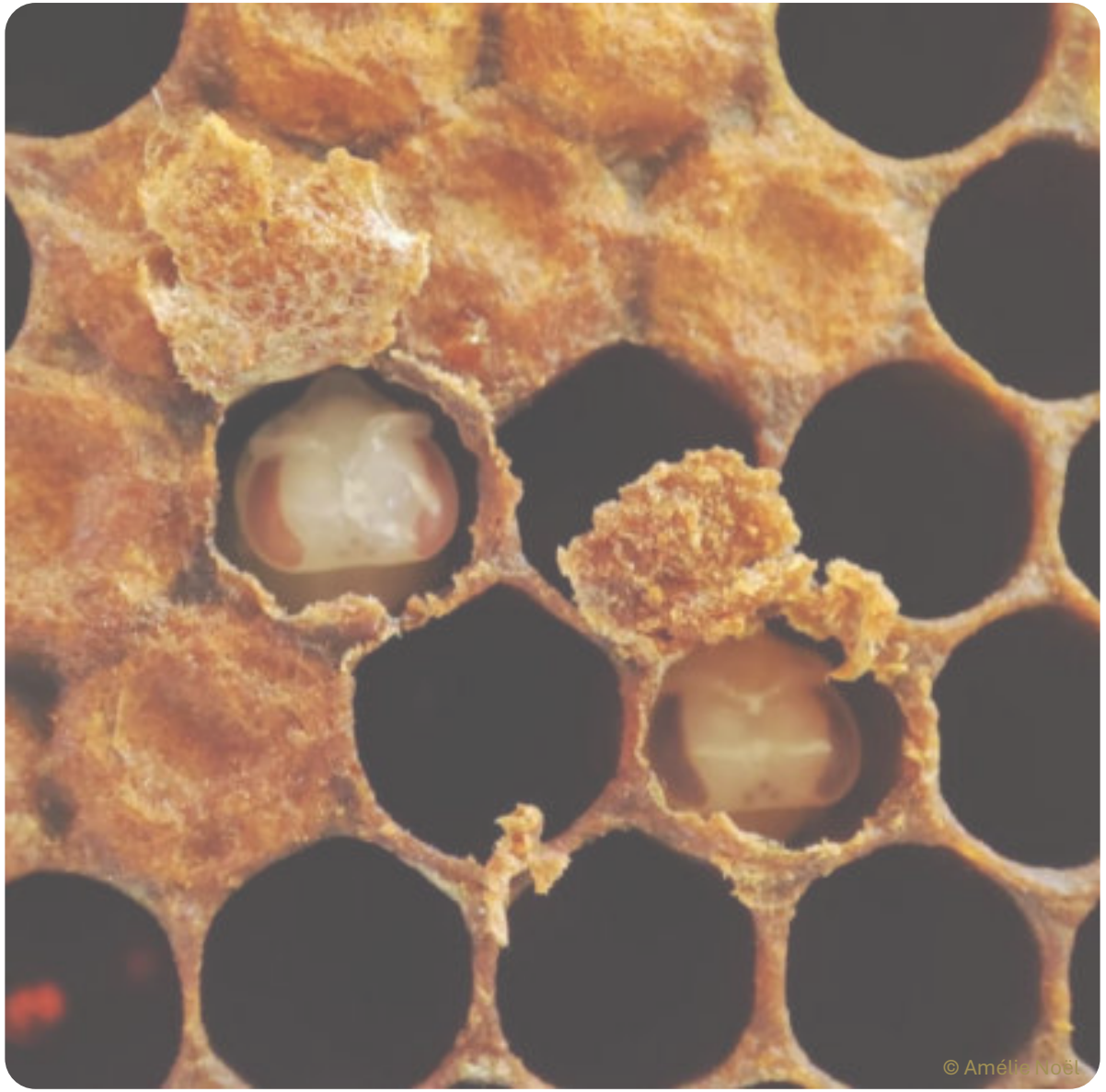
Take-home message



Do viruses influence recapping behaviour?

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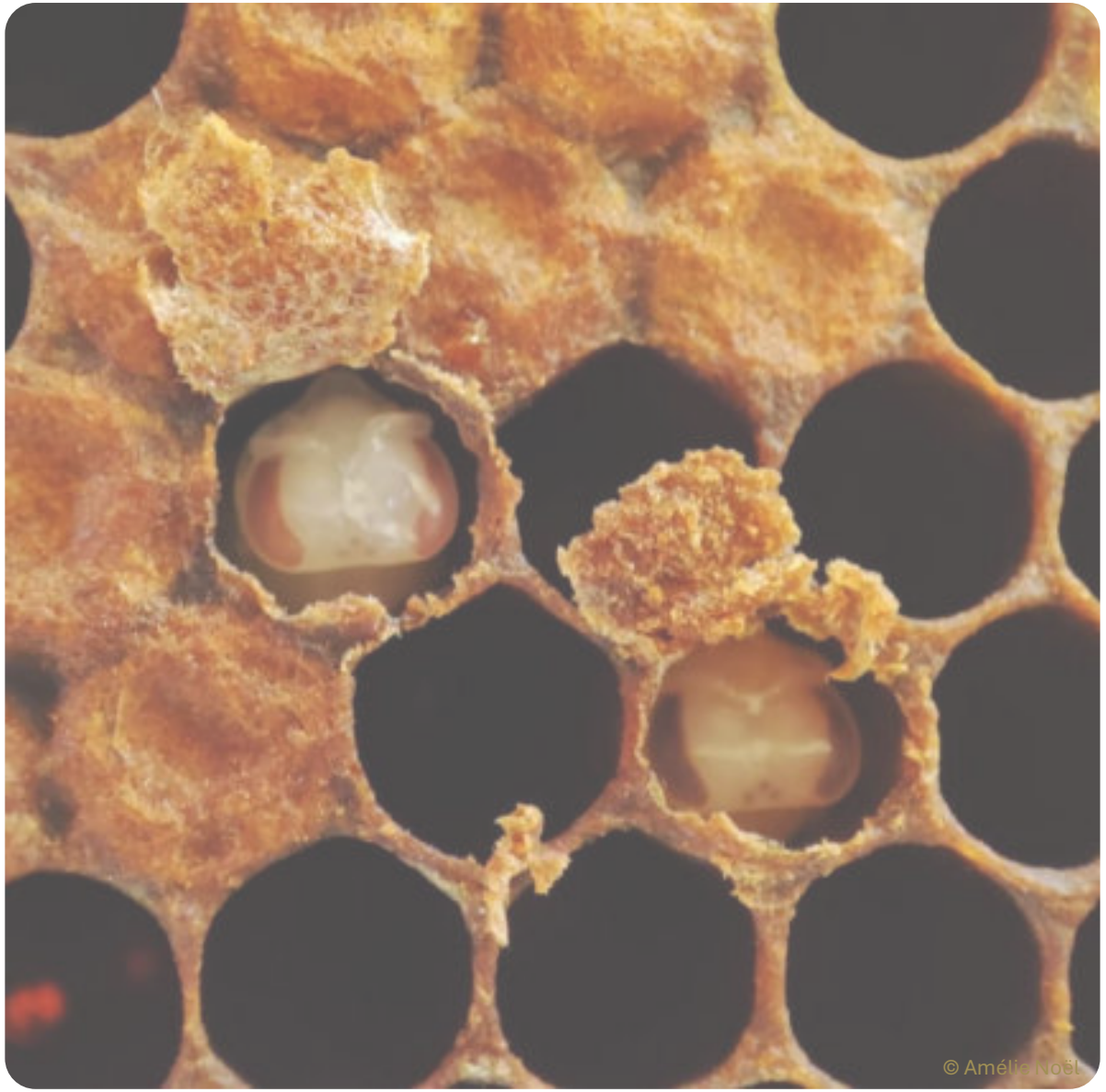

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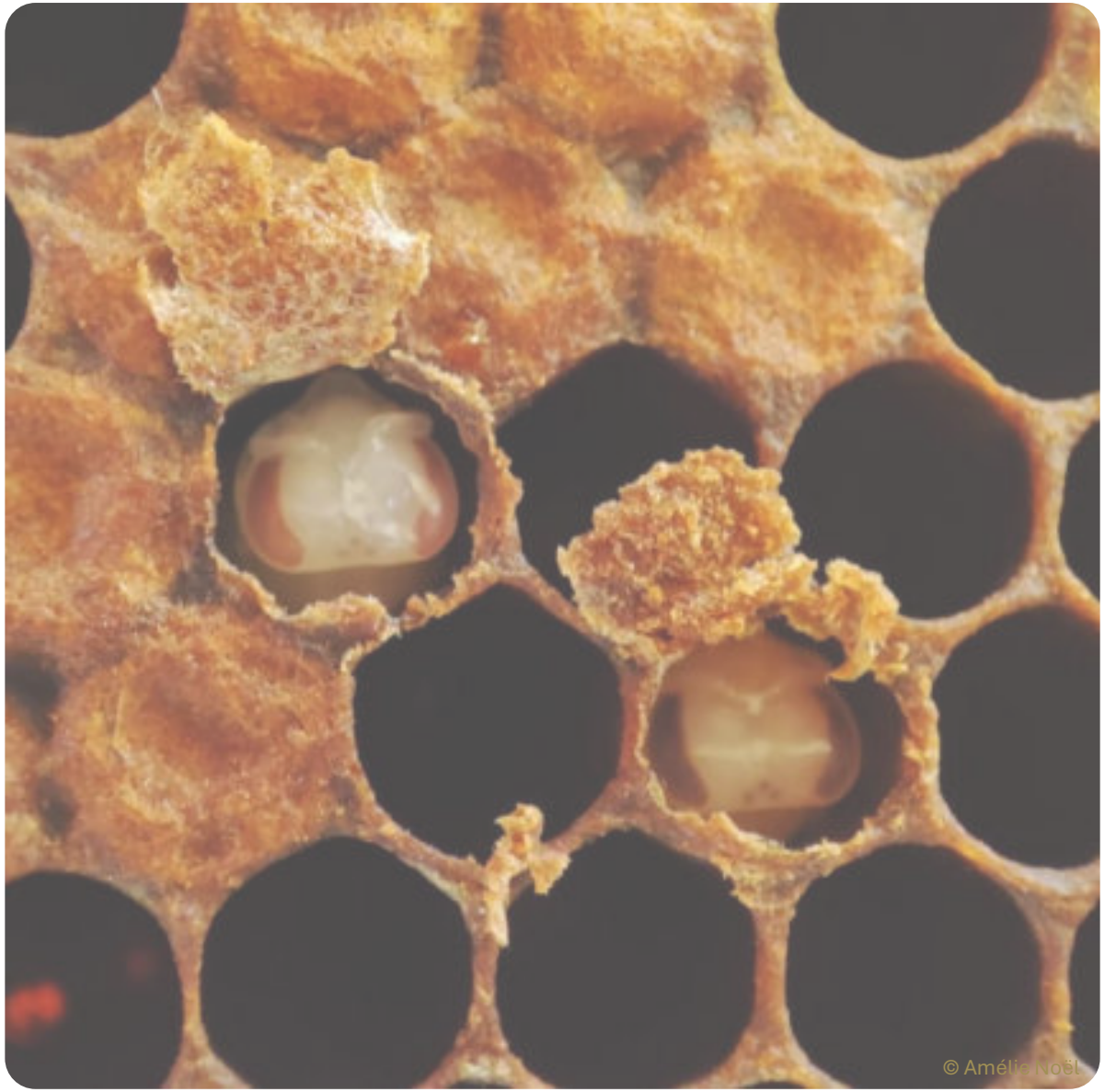
✓ It seems that there is a difference in recapping depending on the type of virus.

HONEY BEE RESEARCH CENTRE

Take-home message



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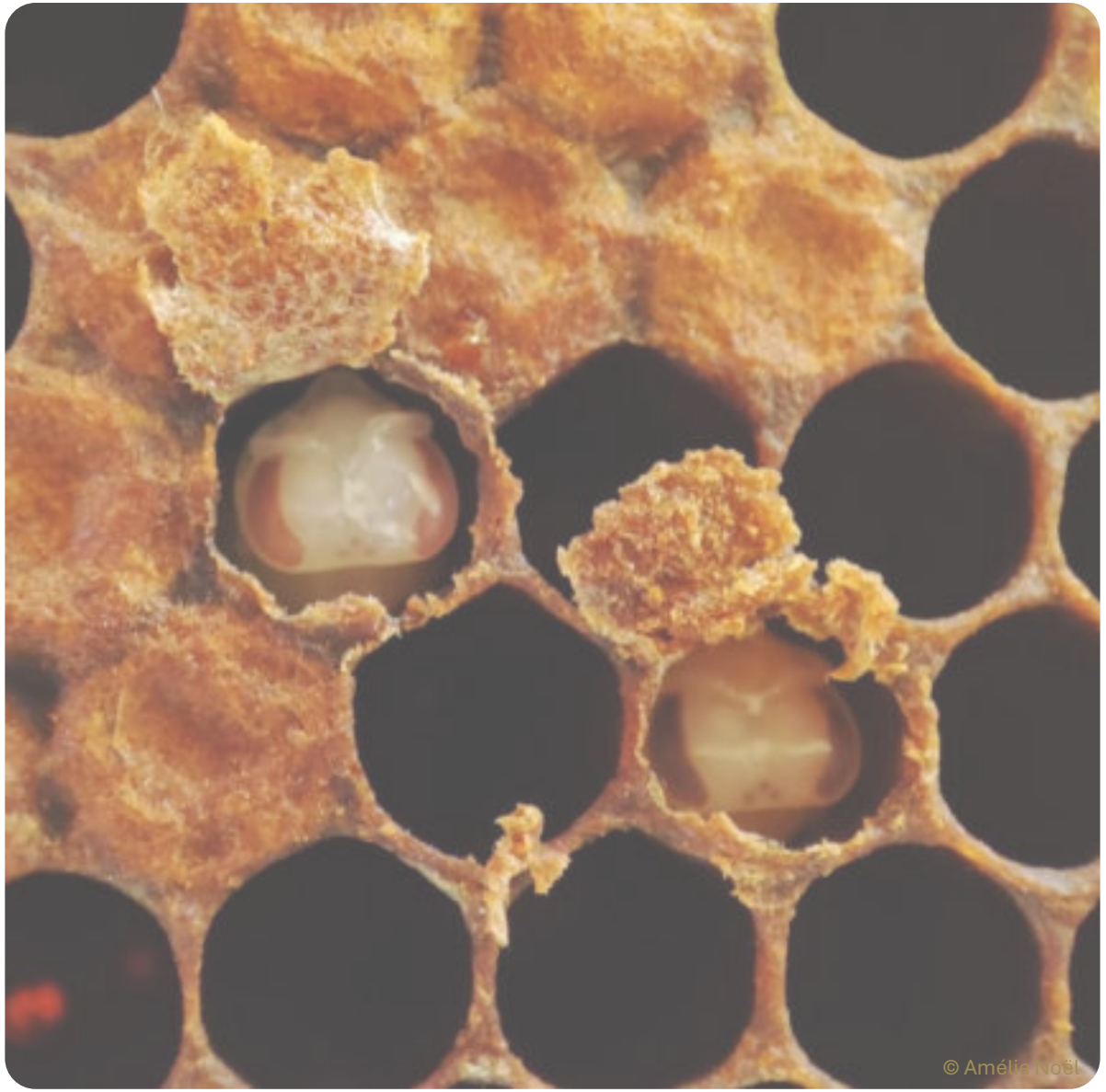

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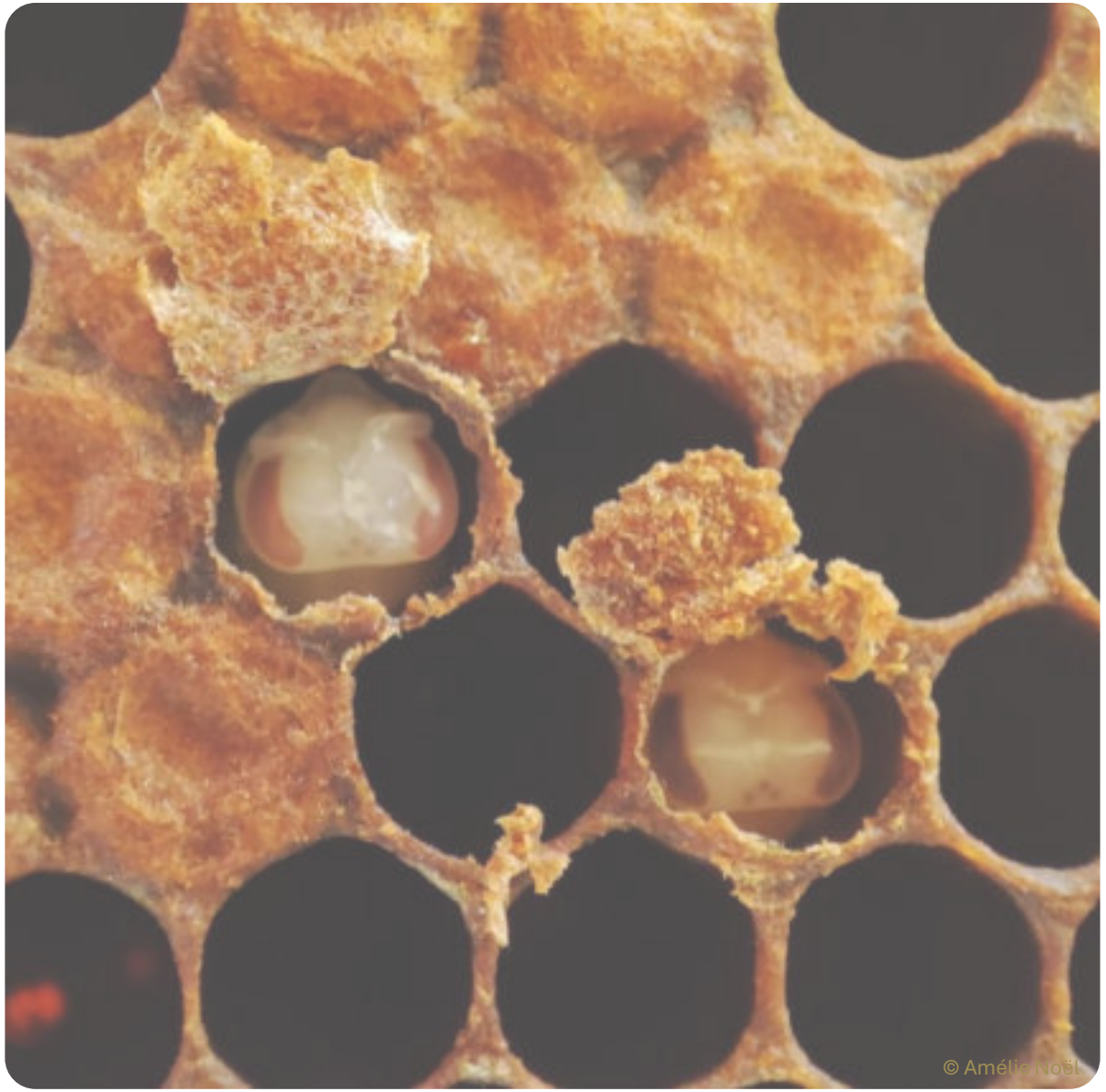

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- ➢ Soon to be submitted. ☺

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Thank you for your attention

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