

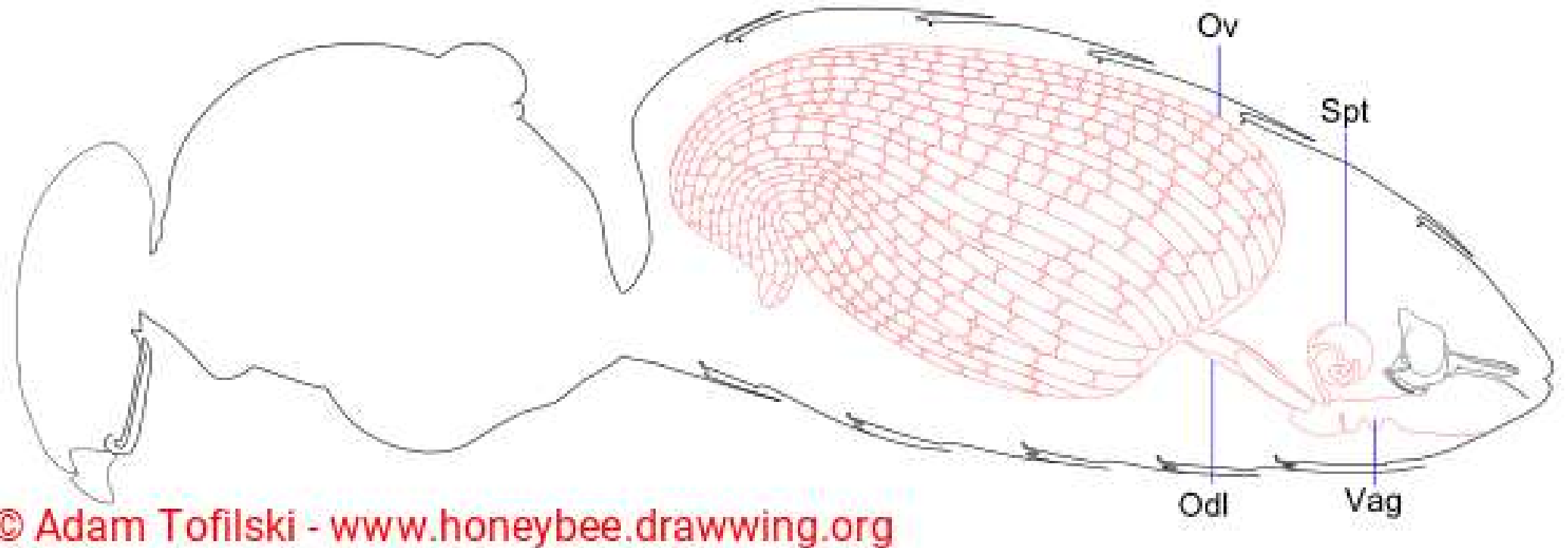
THEORETICAL INTRODUCTION TO INSTRUMENTAL INSEMINATION IN HONEY BEES (AND SOMETHING ON REPRODUCTIVE BIOLOGY)

Janez Prešern



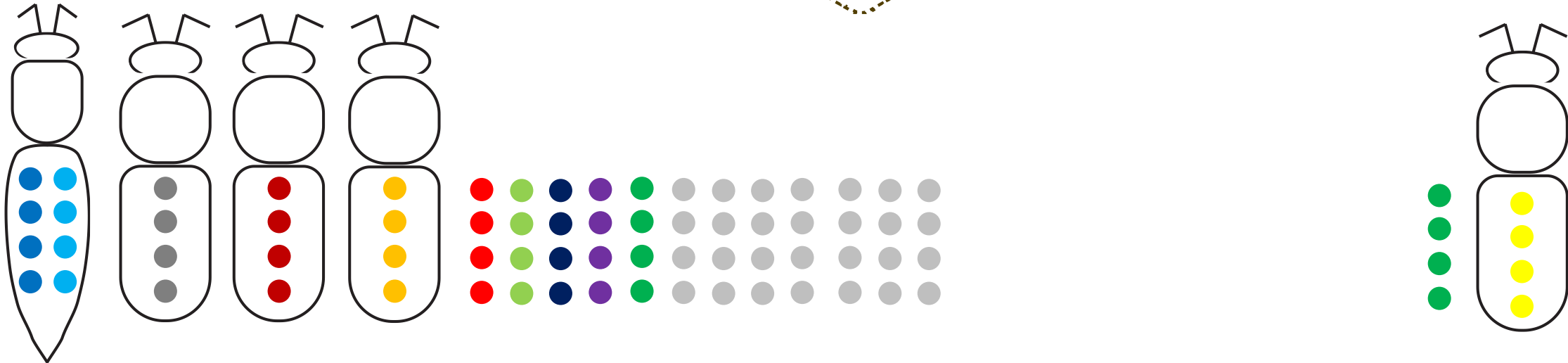
Reproductive biology

- Queen bee
 - Source of female gametes
 - Vector of male gametes



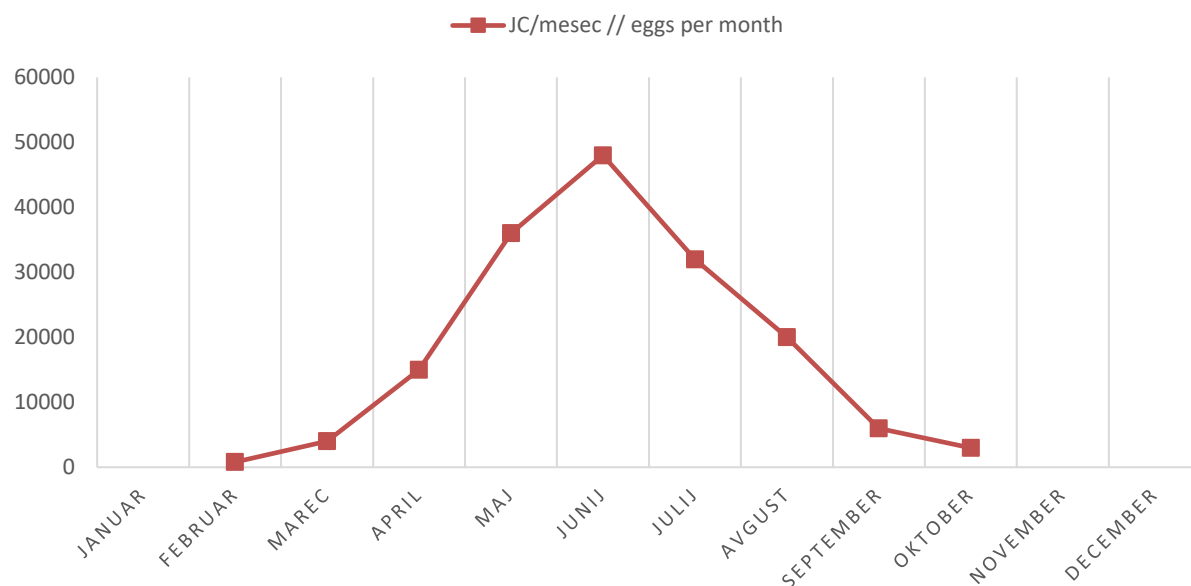
Reproductive biology

10 – 20 (77) *drones*



How to ensure mating control in polyandric species?

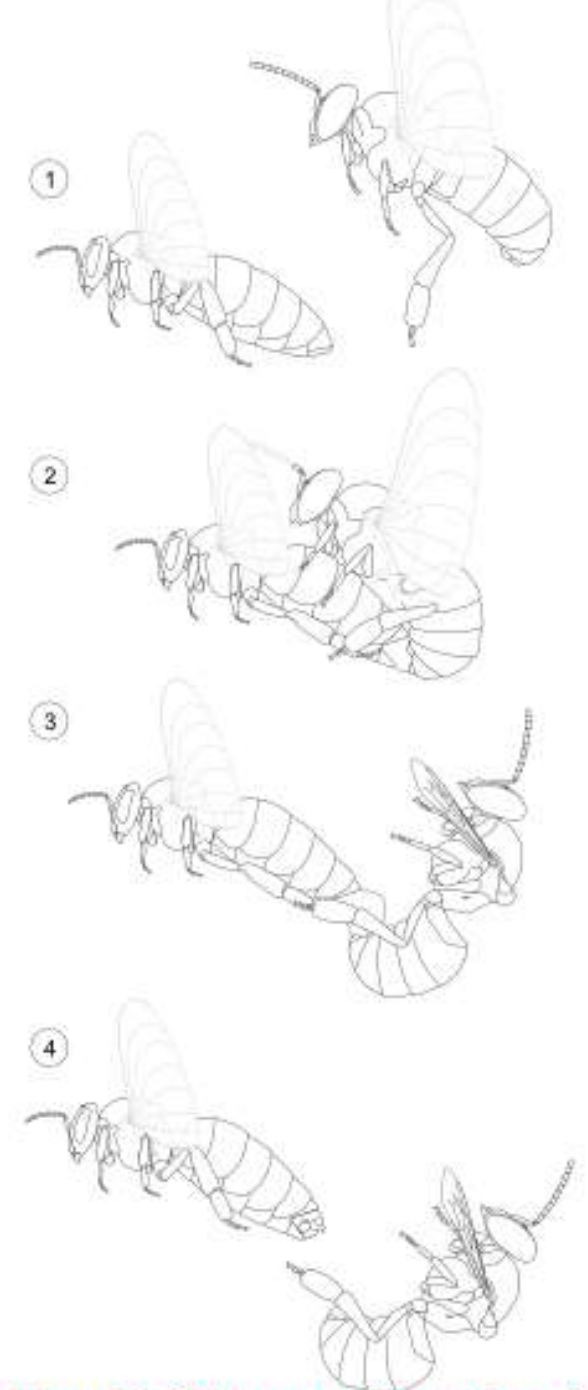
Reproductive biology



| | eggs/day | eggs/month | brood (dm2) | N bees |
|---------|----------|------------|-------------|--------|
| 15. Jan | | | | 17500 |
| 15. Feb | 30 | 800 | 2 | 17500 |
| 15. Mar | 140 | 4000 | 10 | 20000 |
| 15. Apr | 500 | 15000 | 38 | 32000 |
| 15. May | 1200 | 36000 | 90 | 56000 |
| 15. Jun | 1600 | 48000 | 120 | 75000 |
| 15. Jul | 1100 | 32000 | 80 | 65000 |
| 15. Aug | 700 | 20000 | 50 | 50000 |
| 15. Sep | 200 | 6000 | 15 | 35000 |
| 15. Oct | 100 | 3000 | 8 | 25000 |
| 15. Nov | | | | 20000 |
| 15. Dec | | | | 18000 |

Reproductive biology

- Mating
 - in the air – nuptial flights
 - cca 6 days after hatching



Reproductive biology

- Trotišče | *Drone Congregation Area (DCA)*

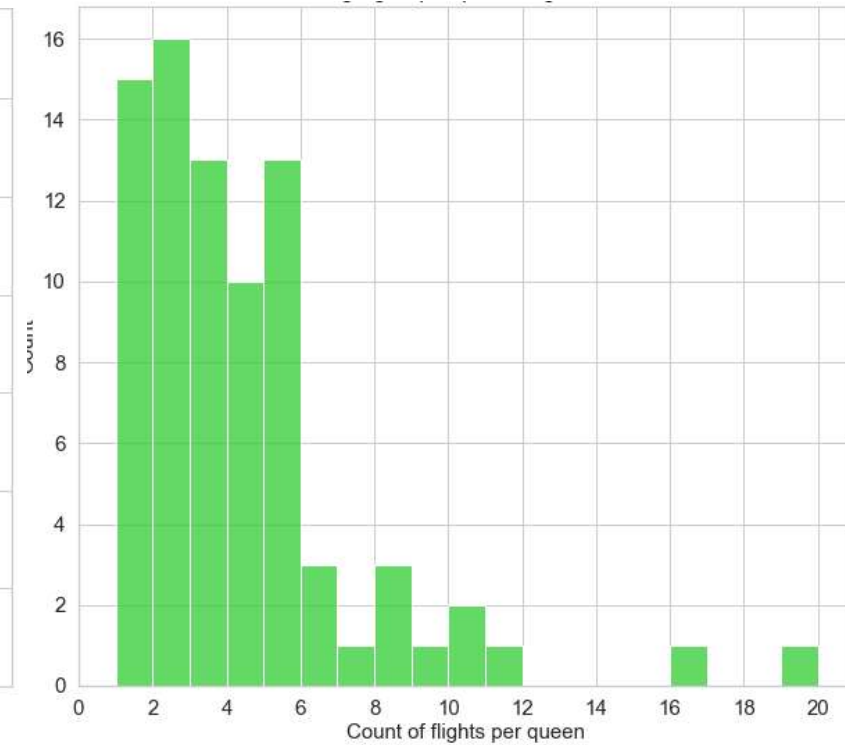
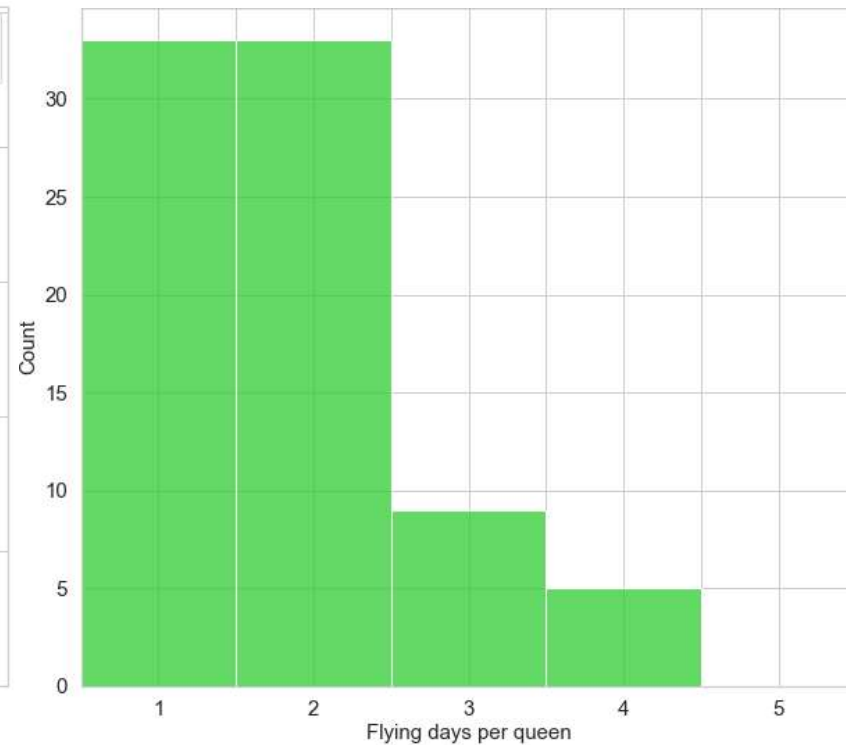
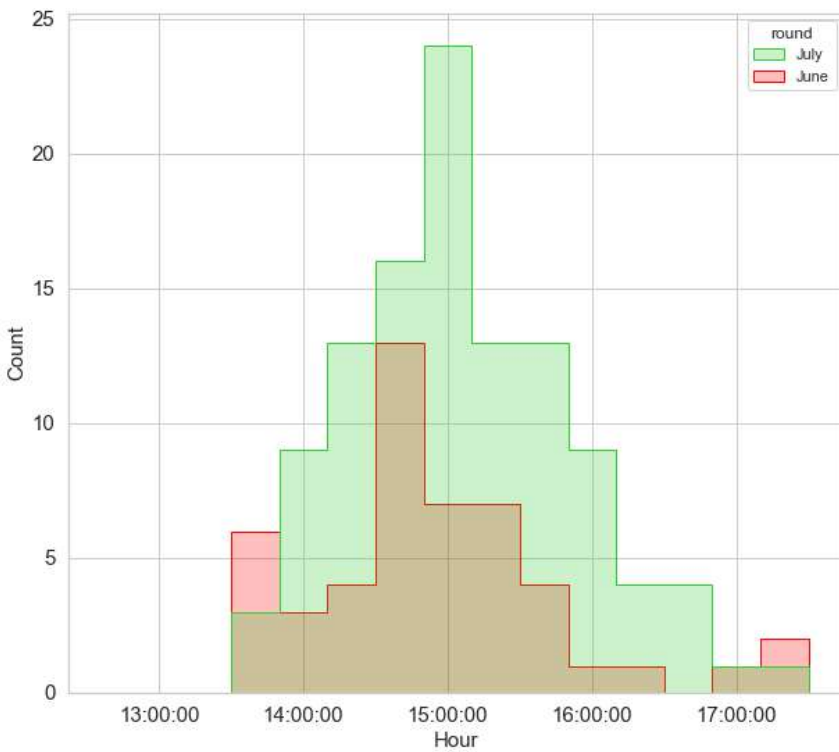


Reproductive biology

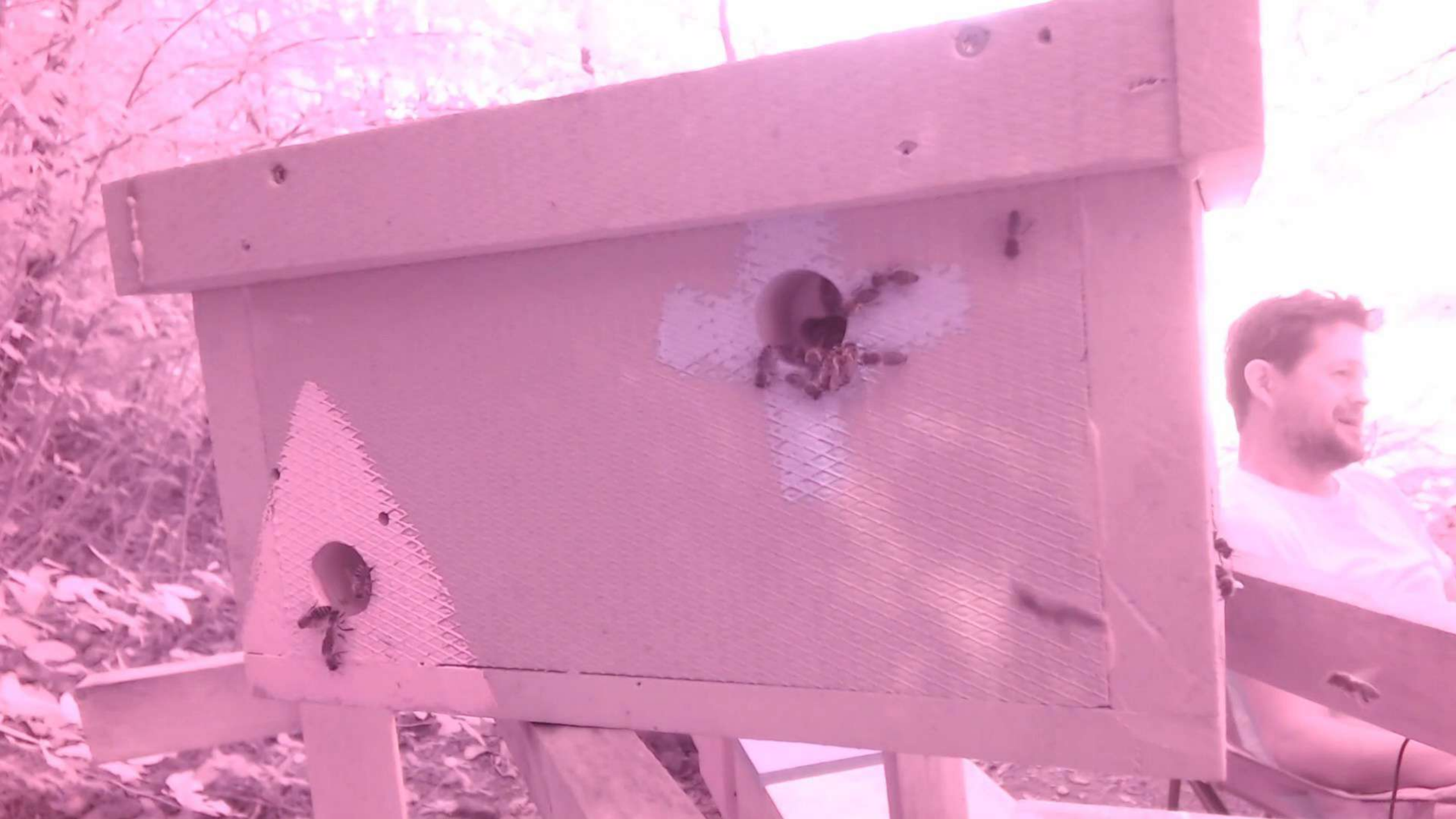
- Trotišče | *Drone Congregation Area (DCA)*



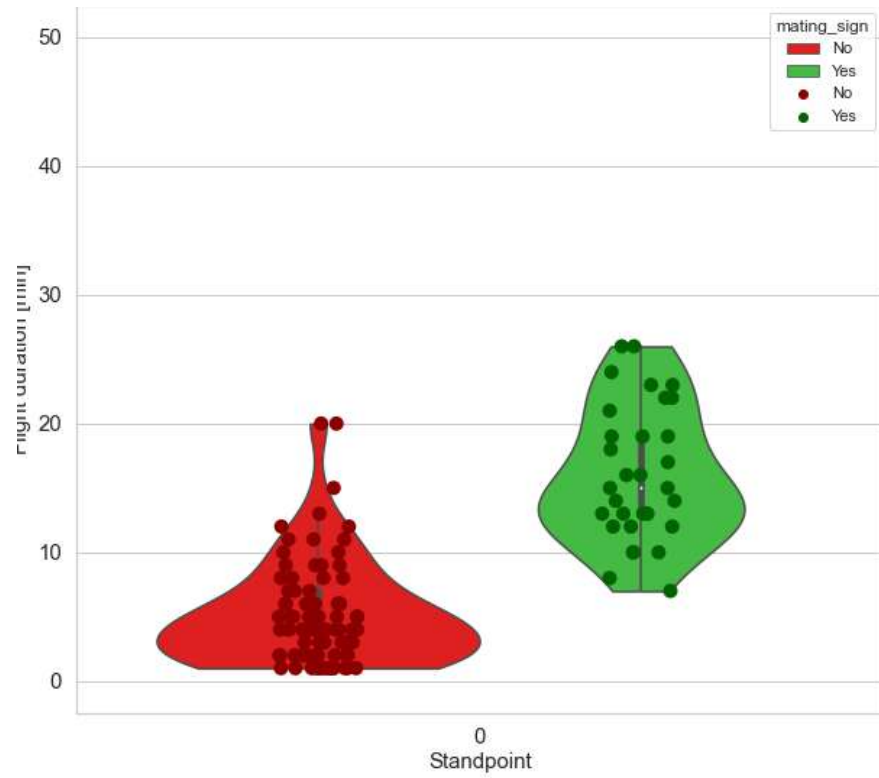
Reproductive biology







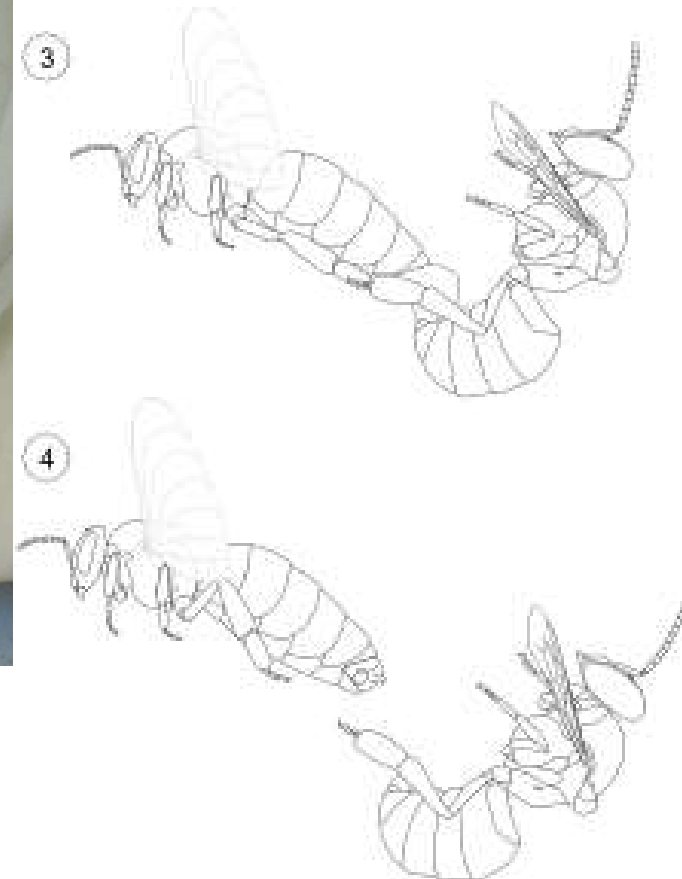
Reproductive biology



Reproductive biology

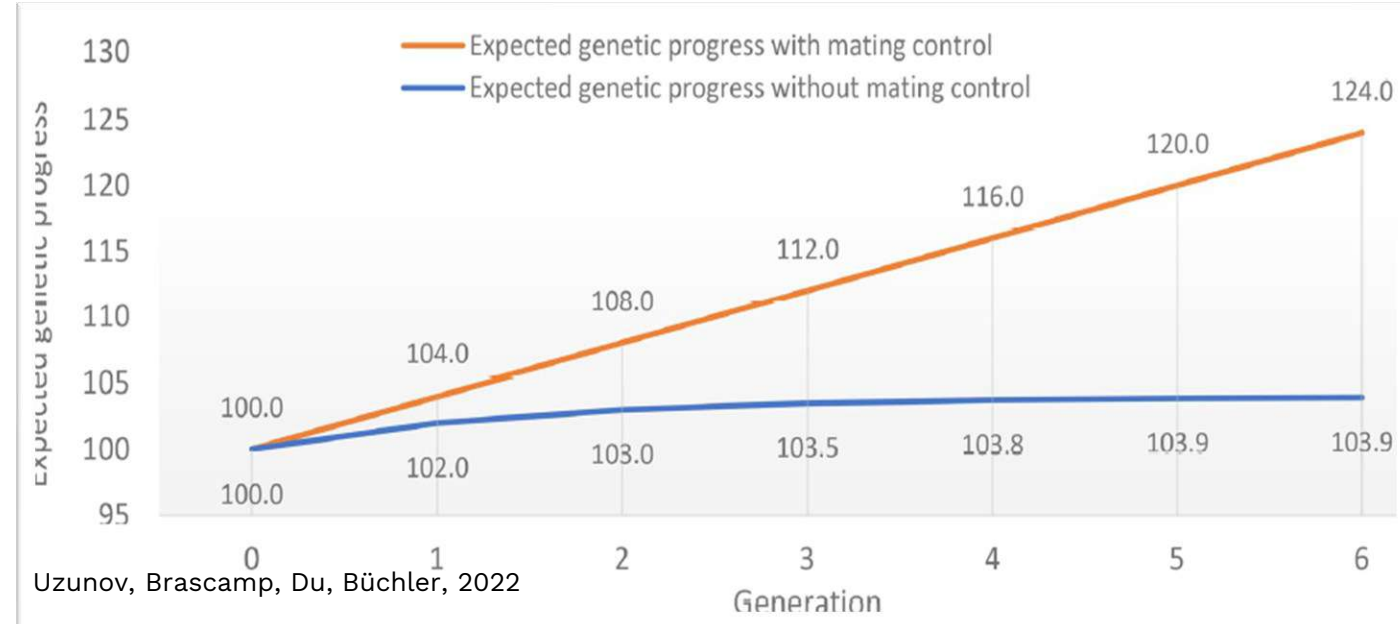
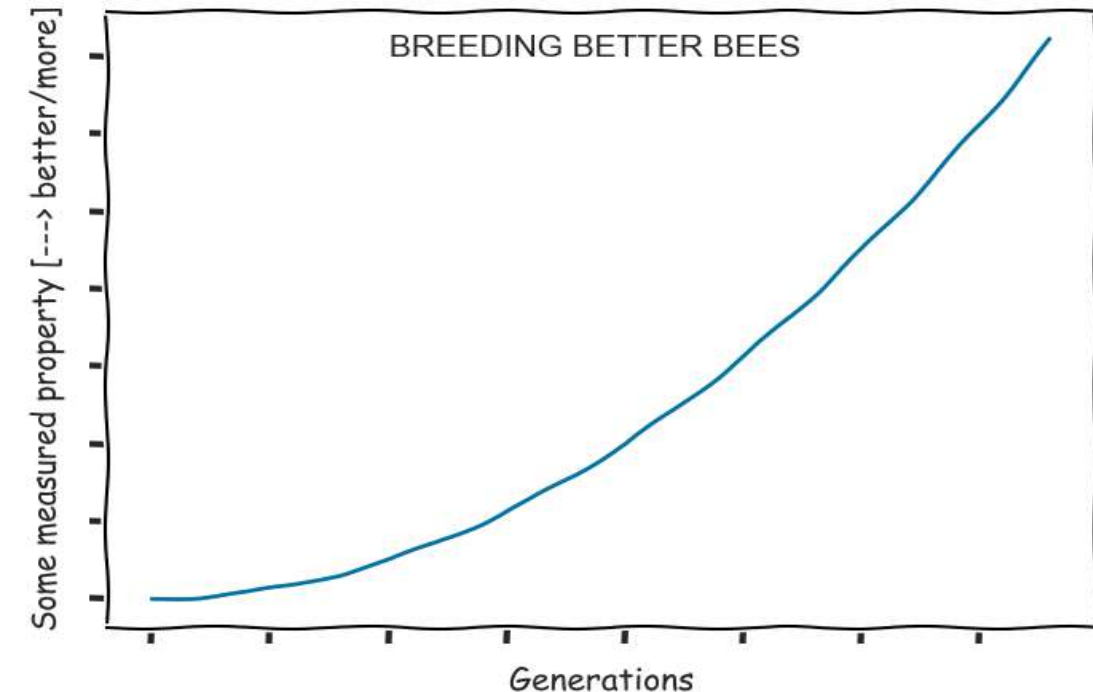


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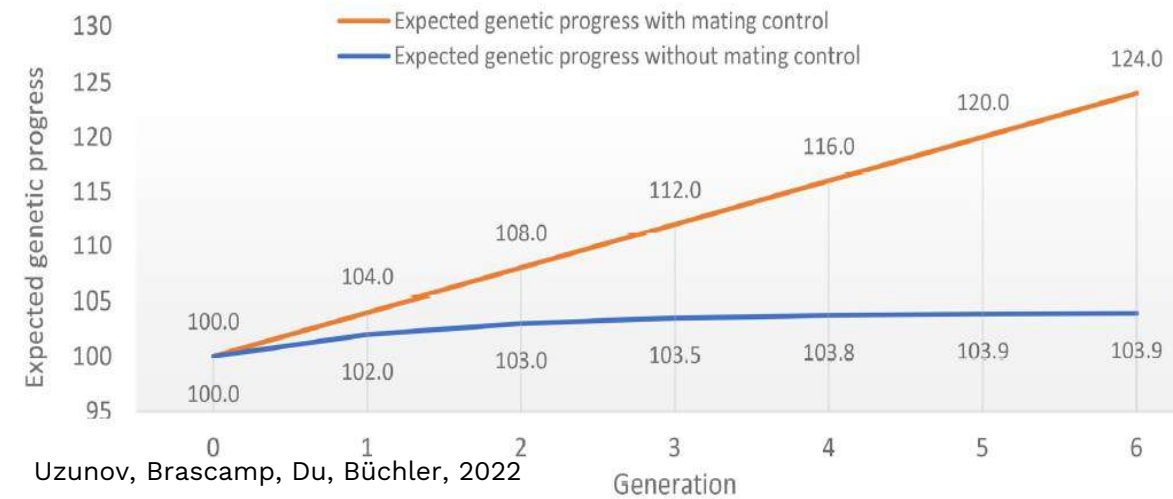
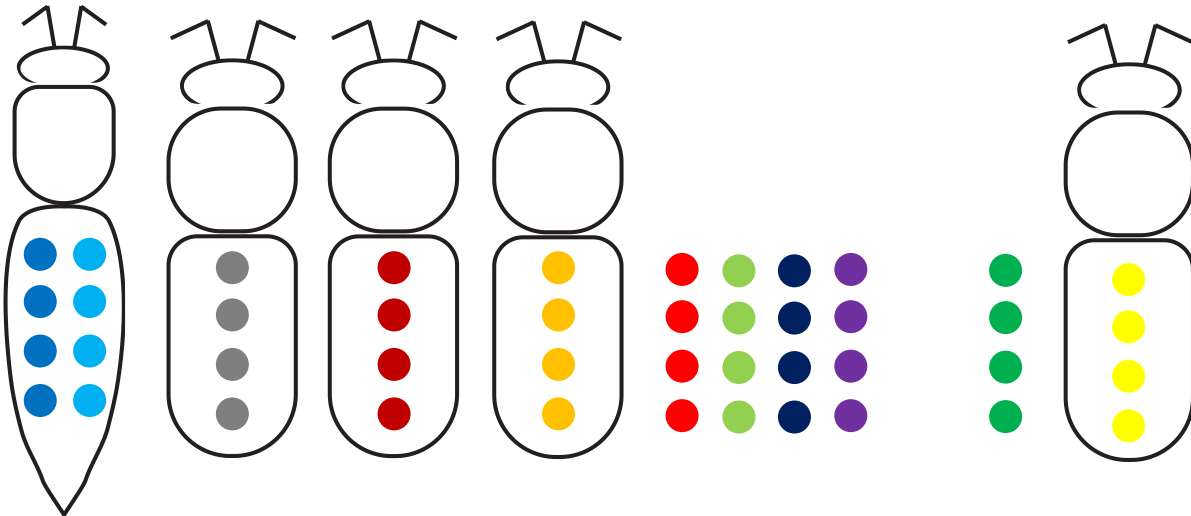
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Selection in apiculture : mating control importance



Reproductive biology

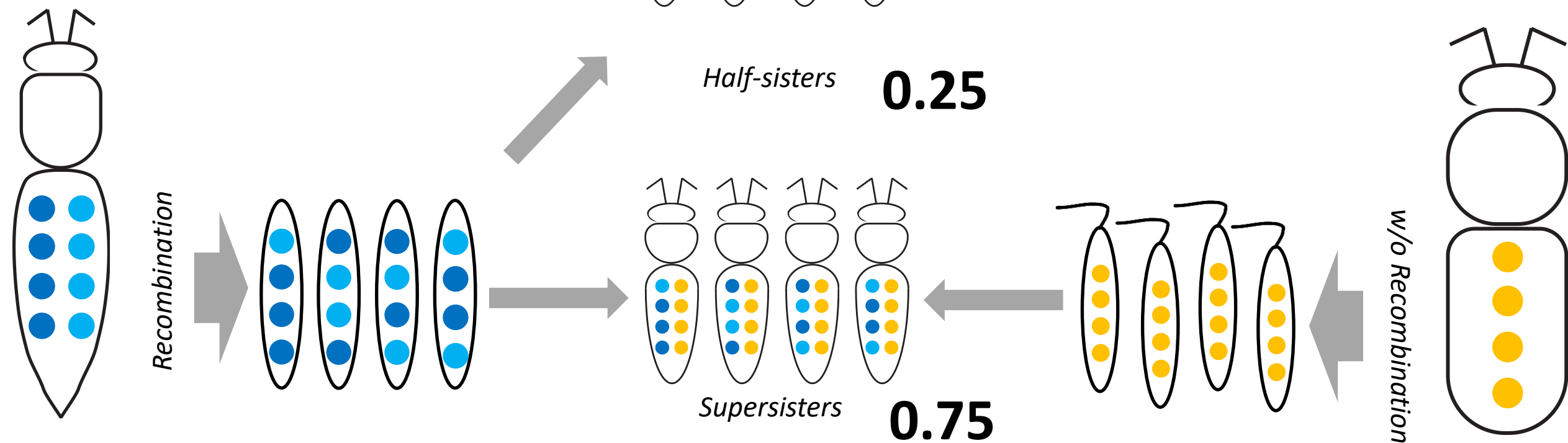
10 – 20 (77) *drones*



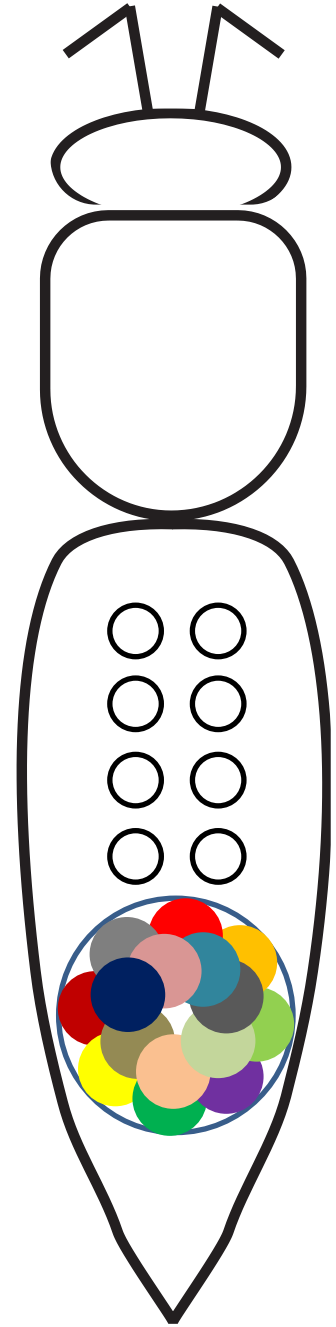
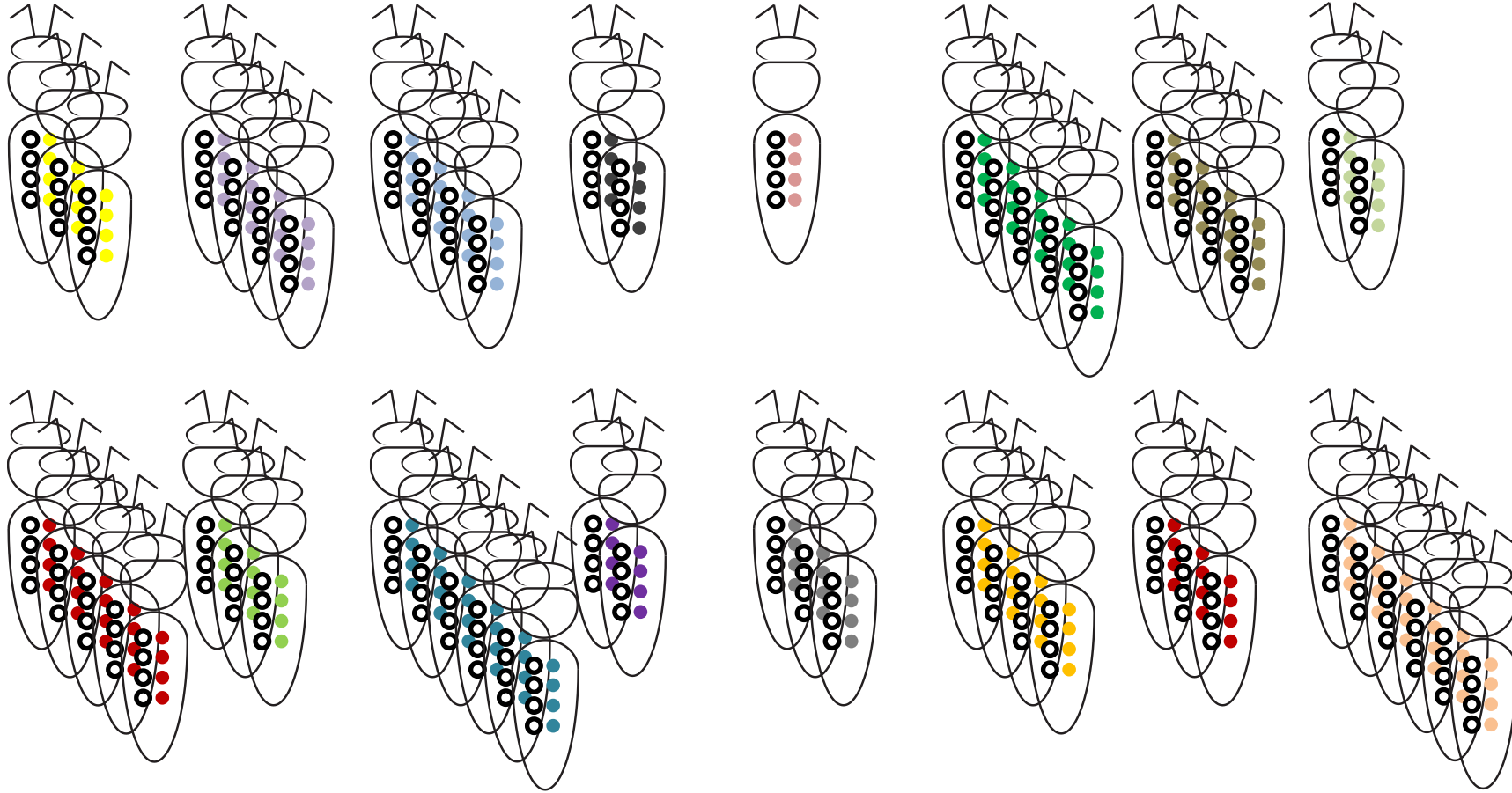
How to ensure mating control in polyandric species?

Open mating: kinship

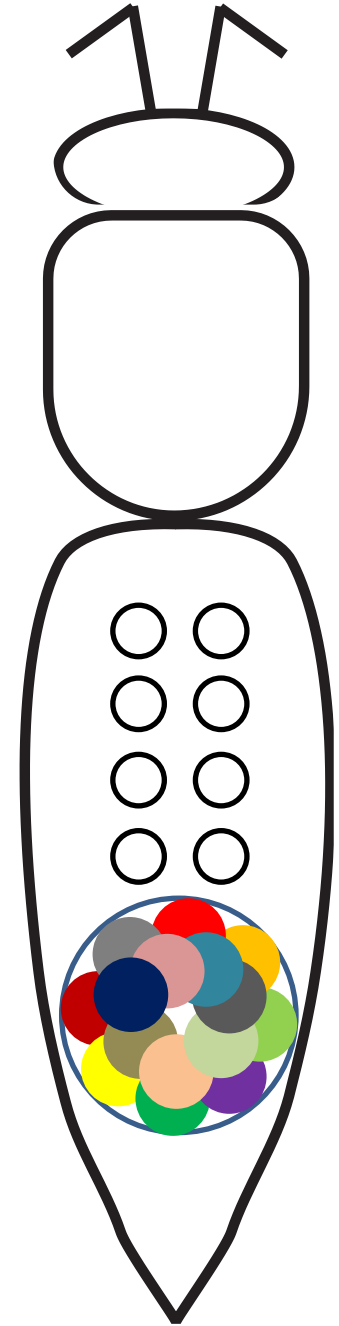
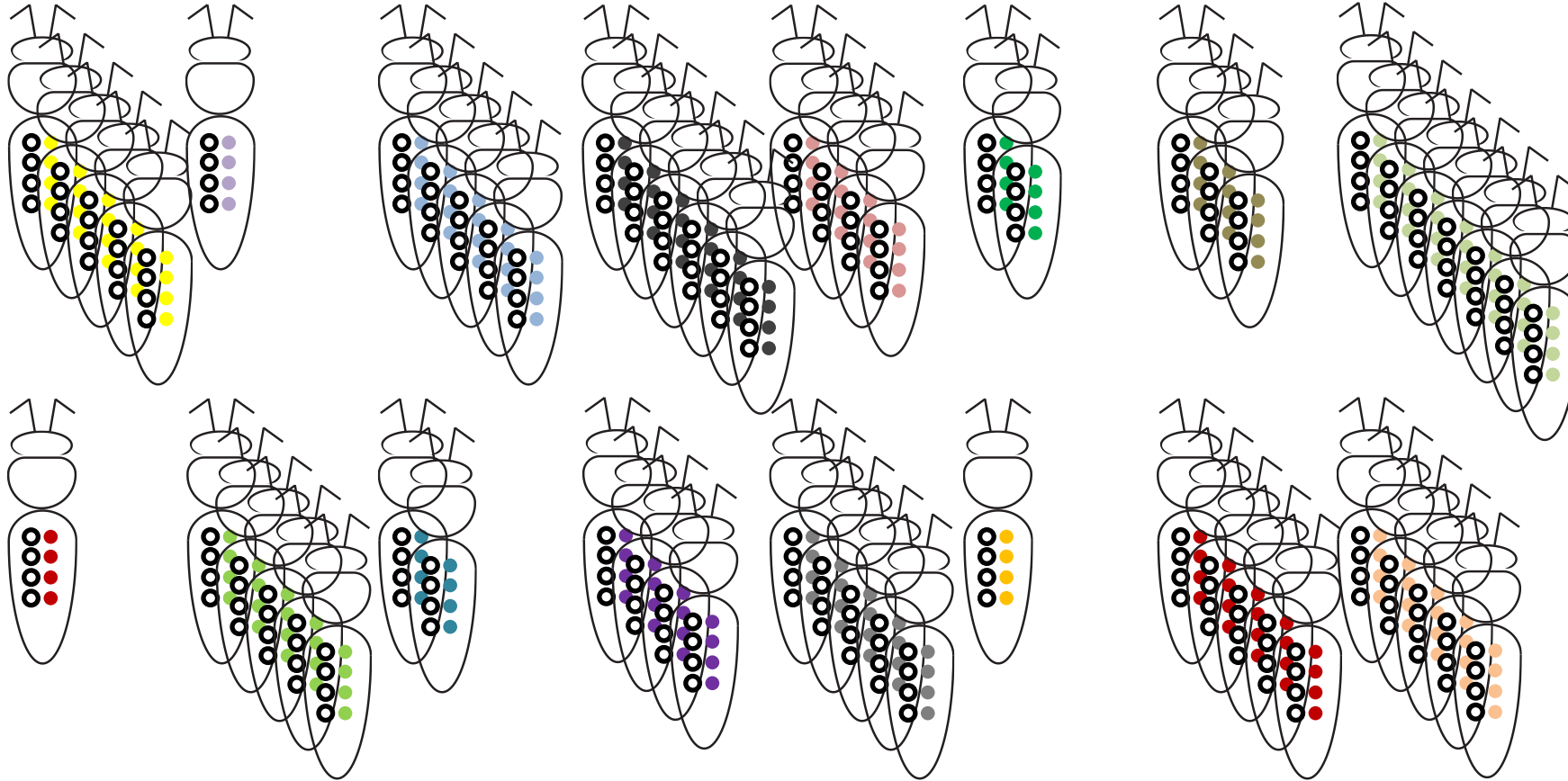
Open mating



Kinship : patriline

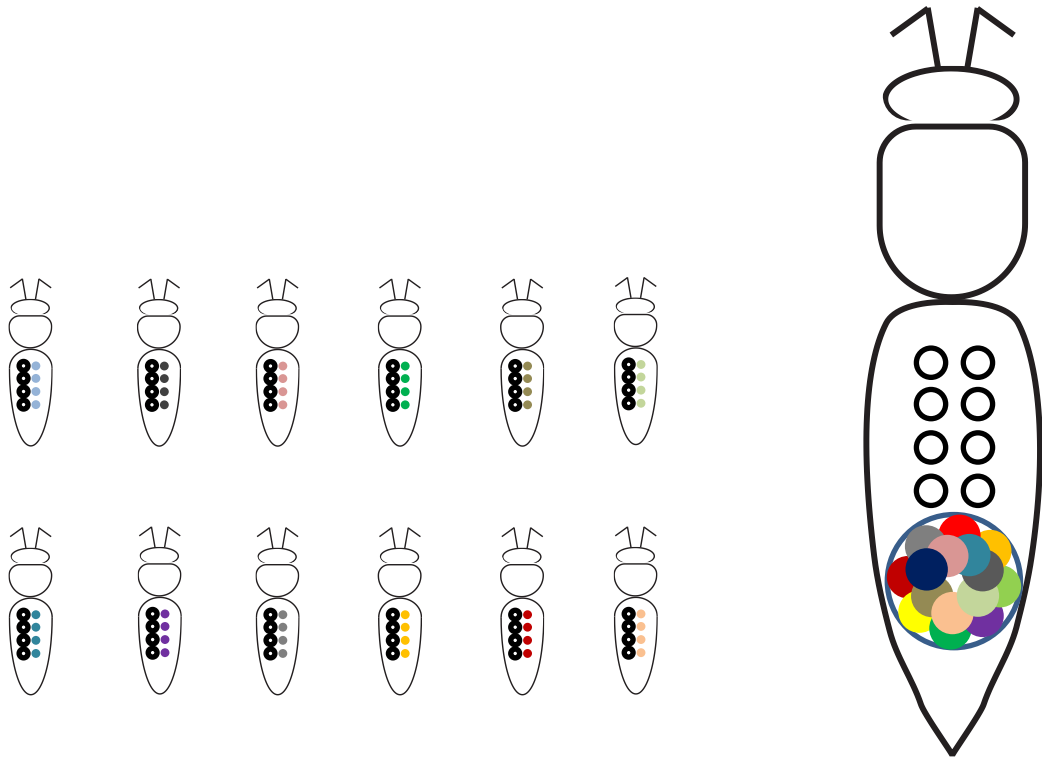


Kinship : patriline

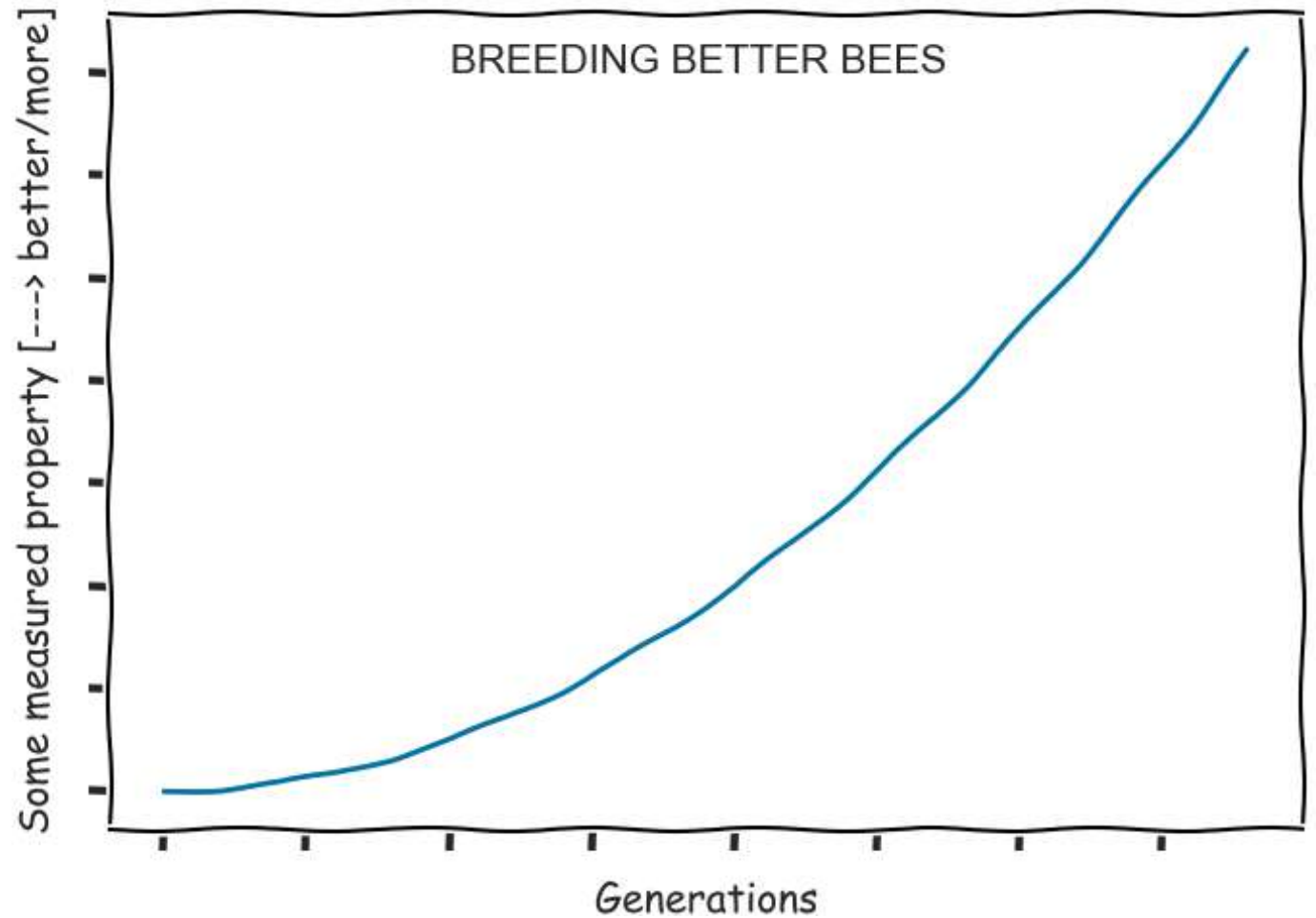
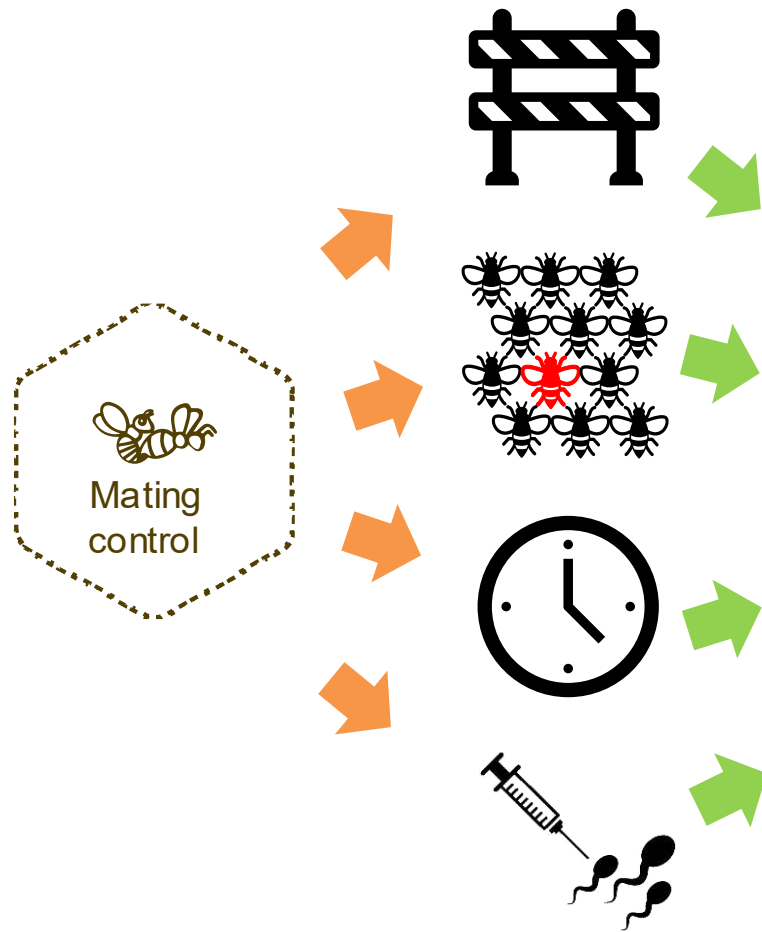


Kinship : *patrilines*

| Patriline | Young bees | Water collectors | Nectar/pollen collectors | Scent bees | p |
|-----------|------------|------------------|--------------------------|------------|--------|
| 1 | 6 | 18 | 13 | 11 | =0.067 |
| 2 | 3 | 2 | 3 | 8 | =0.234 |
| 3 | 17 | 2 | 14 | 4 | ≤0.001 |
| 4 | 0 | 2 | 5 | 2 | =0.166 |
| 5 | 3 | 1 | 2 | 9 | =0.038 |
| 6 | 2 | 2 | 2 | 0 | =0.568 |
| 7 | 1 | 11 | 9 | 13 | =0.006 |
| 8 | 0 | 1 | 0 | 0 | =0.236 |
| 9 | 7 | 3 | 2 | 0 | =0.014 |
| 10 | 13 | 47 | 14 | 5 | ≤0.001 |
| 11 | 1 | 0 | 0 | 1 | =0.604 |
| 12 | 13 | 1 | 1 | 0 | ≤0.001 |
| 13 | 6 | 13 | 8 | 10 | =0.329 |
| 14 | 45 | 9 | 67 | 57 | ≤0.001 |
| 15 | 6 | 16 | 10 | 10 | =0.130 |
| 16 | 13 | 7 | 5 | 21 | =0.002 |



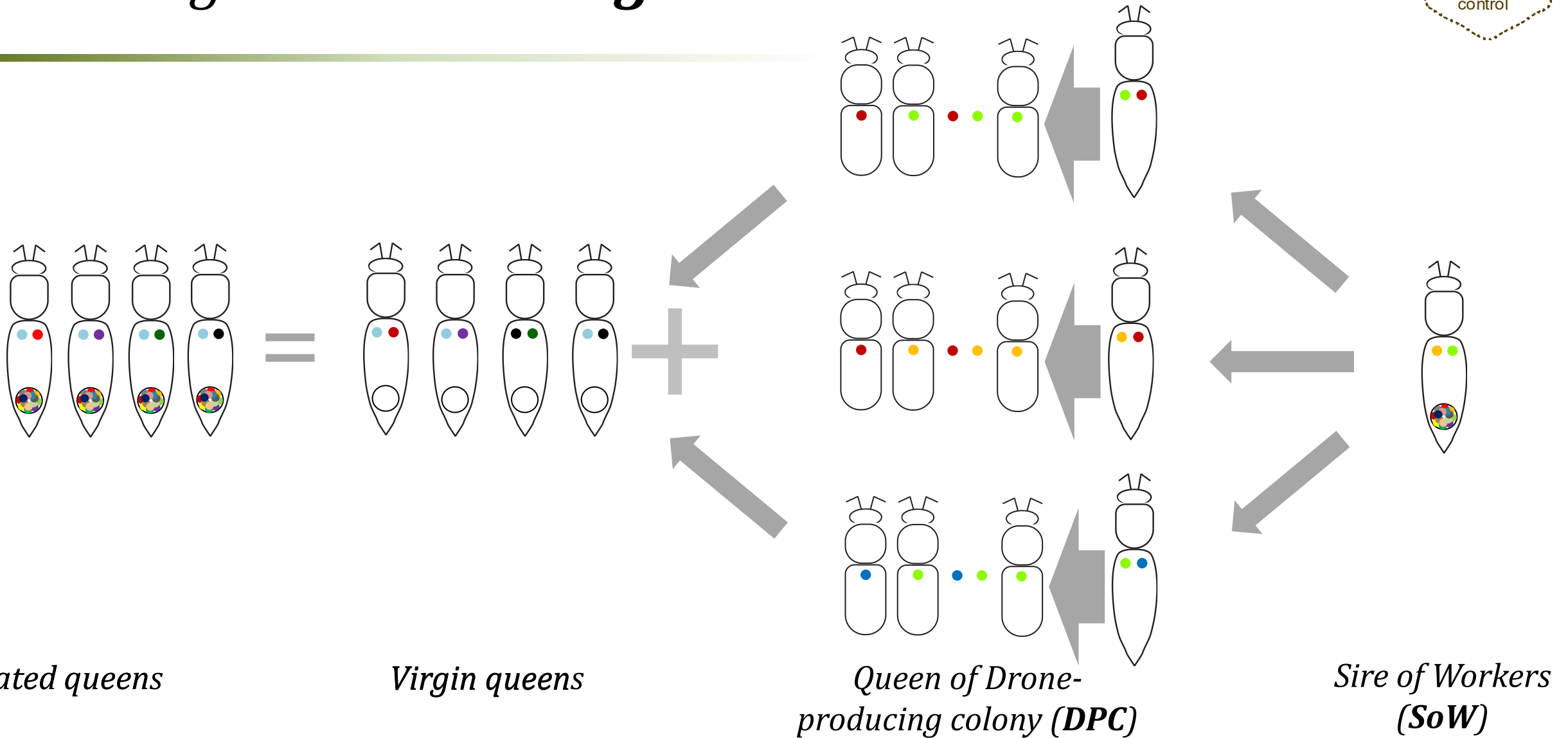
Mating control



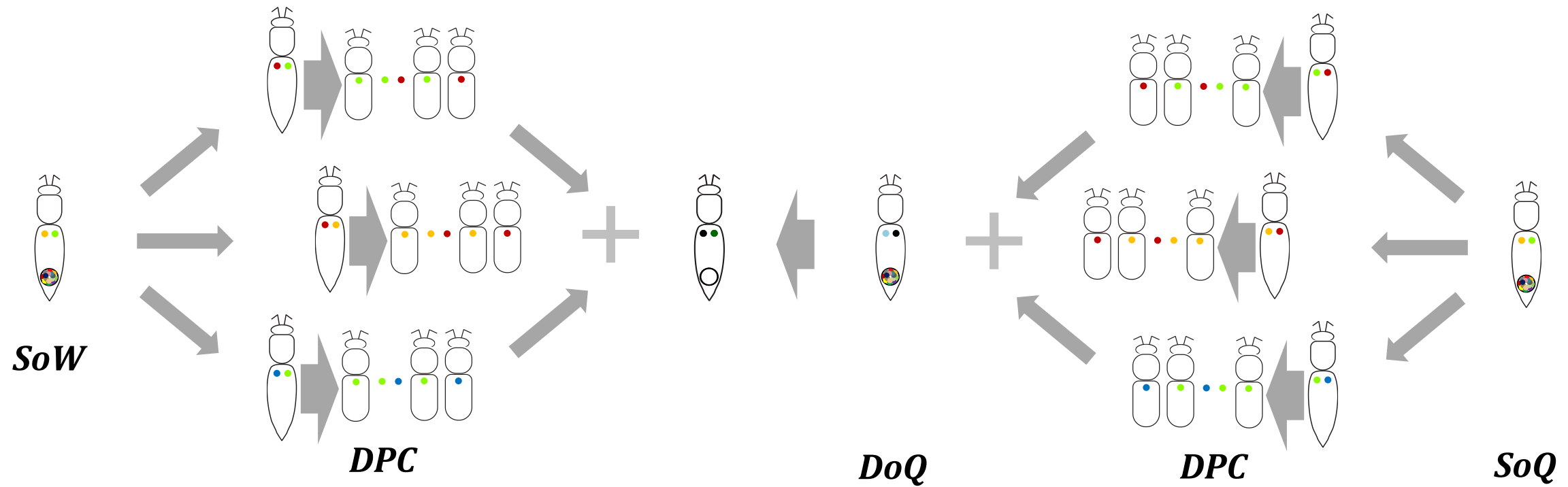
Mating control: mating station



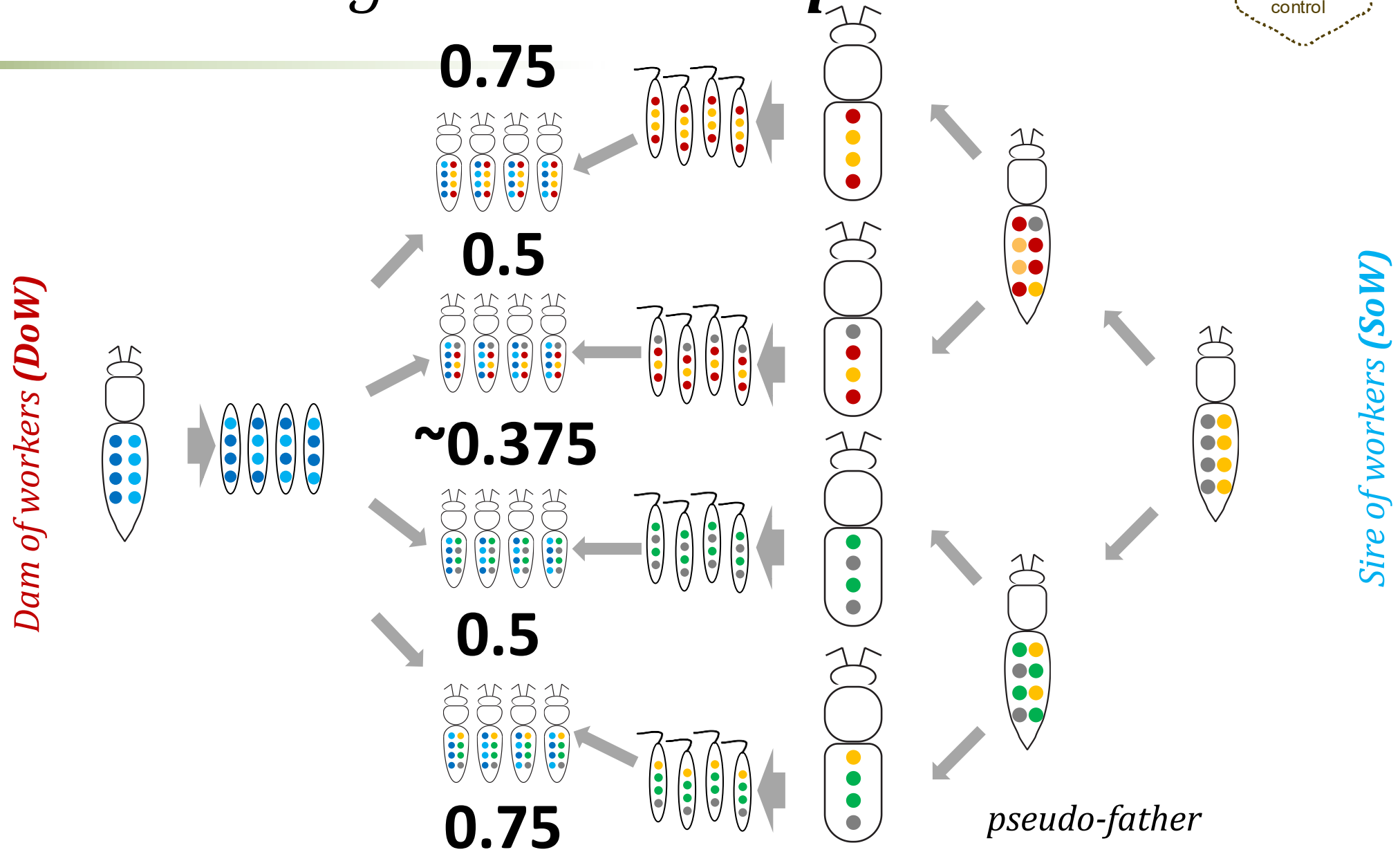
Mating control: mating station



*Mating control: mating station: **father?***



Mating control: mating station: *kinship*

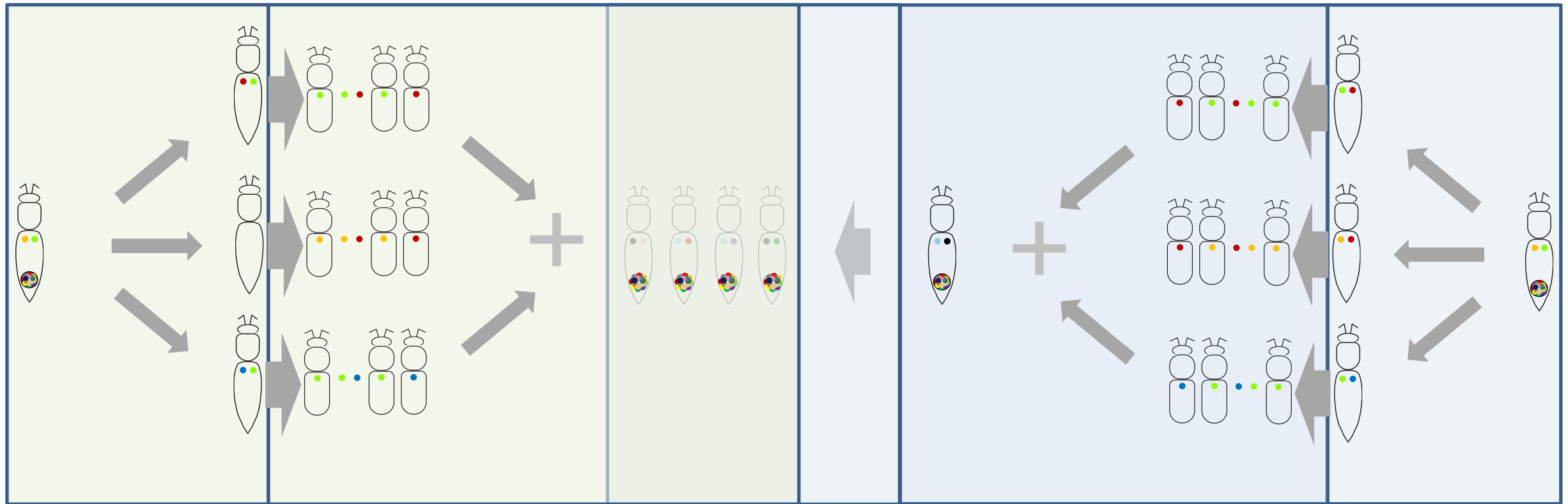


Mating control: mating station: *timeline*



Parents of workers

Parents of queens



Leto 1
Year 1

Leto 2
Year 2

Leto 3
Year 3

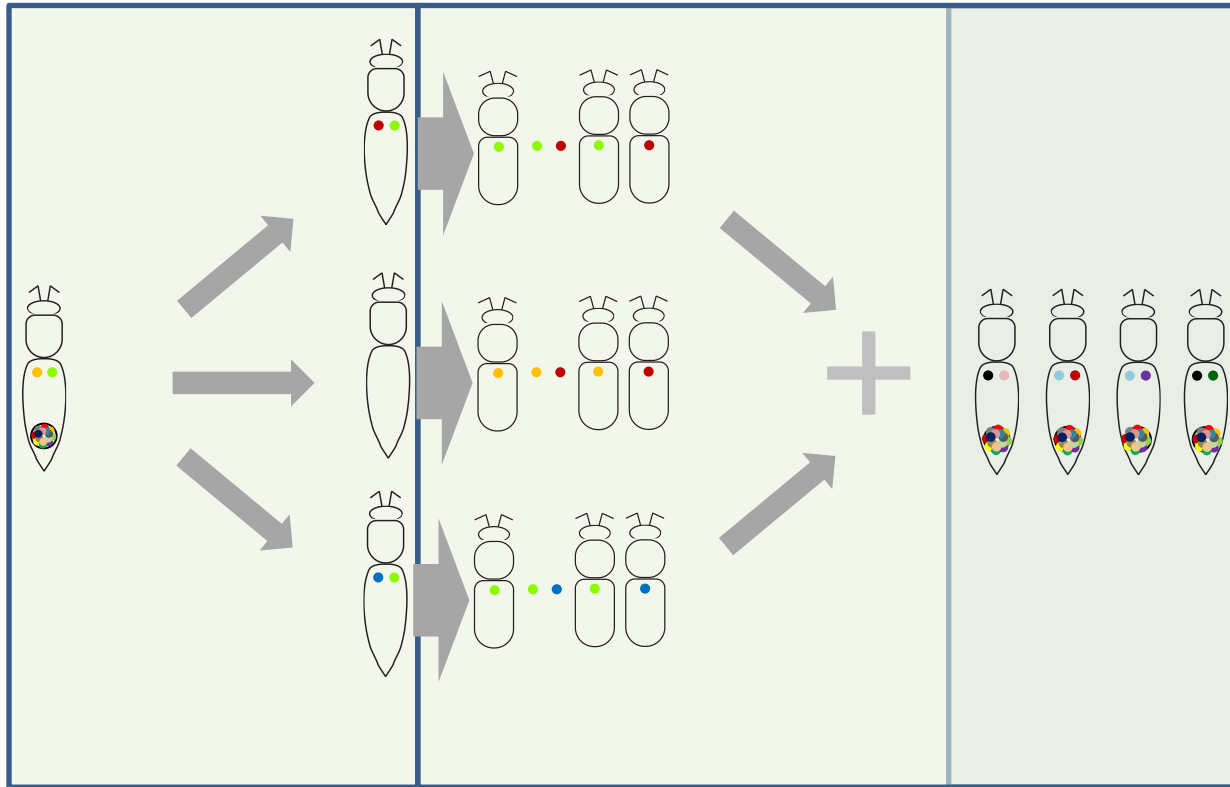
Leto 2
Year 2

Leto 1
Year 1

Mating control: mating station: accelerated timeline



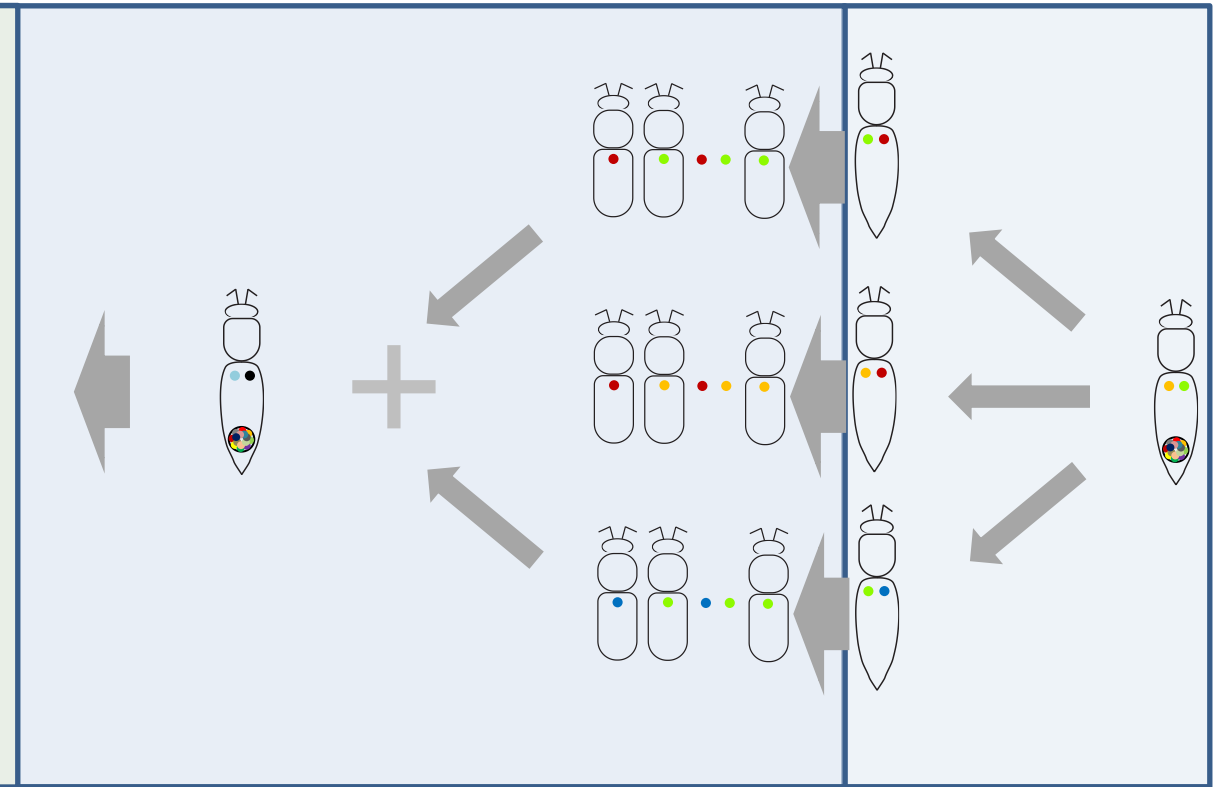
Starši delavk
Parents of workers



Leto 1
Year 1

Leto 2
Year 2

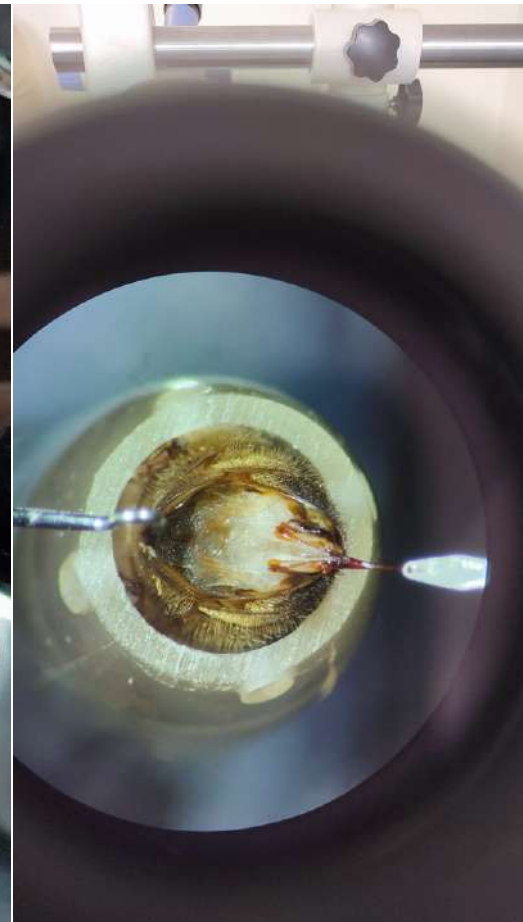
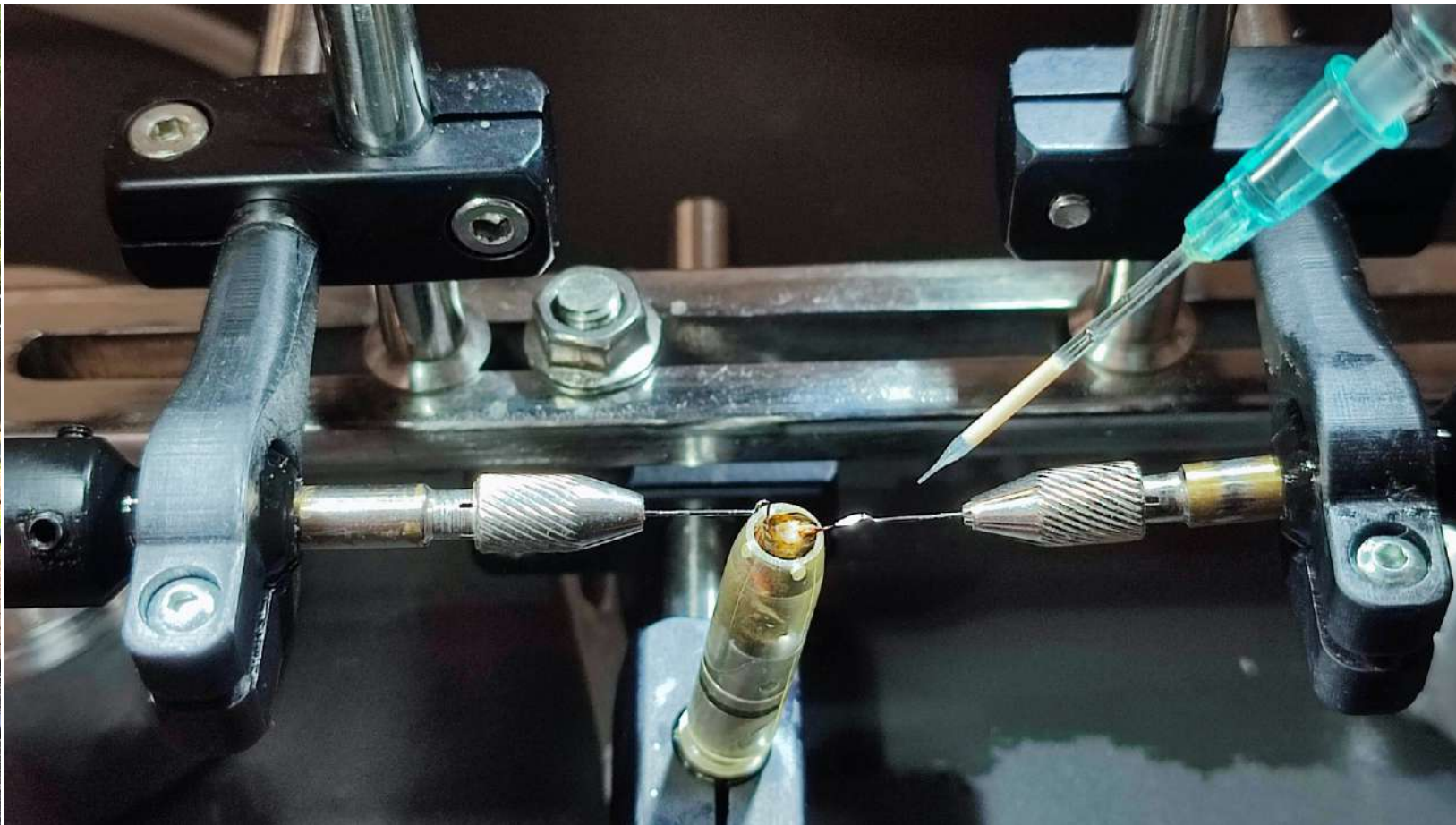
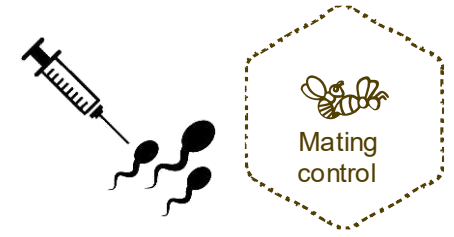
Starši matic
Parents of queens



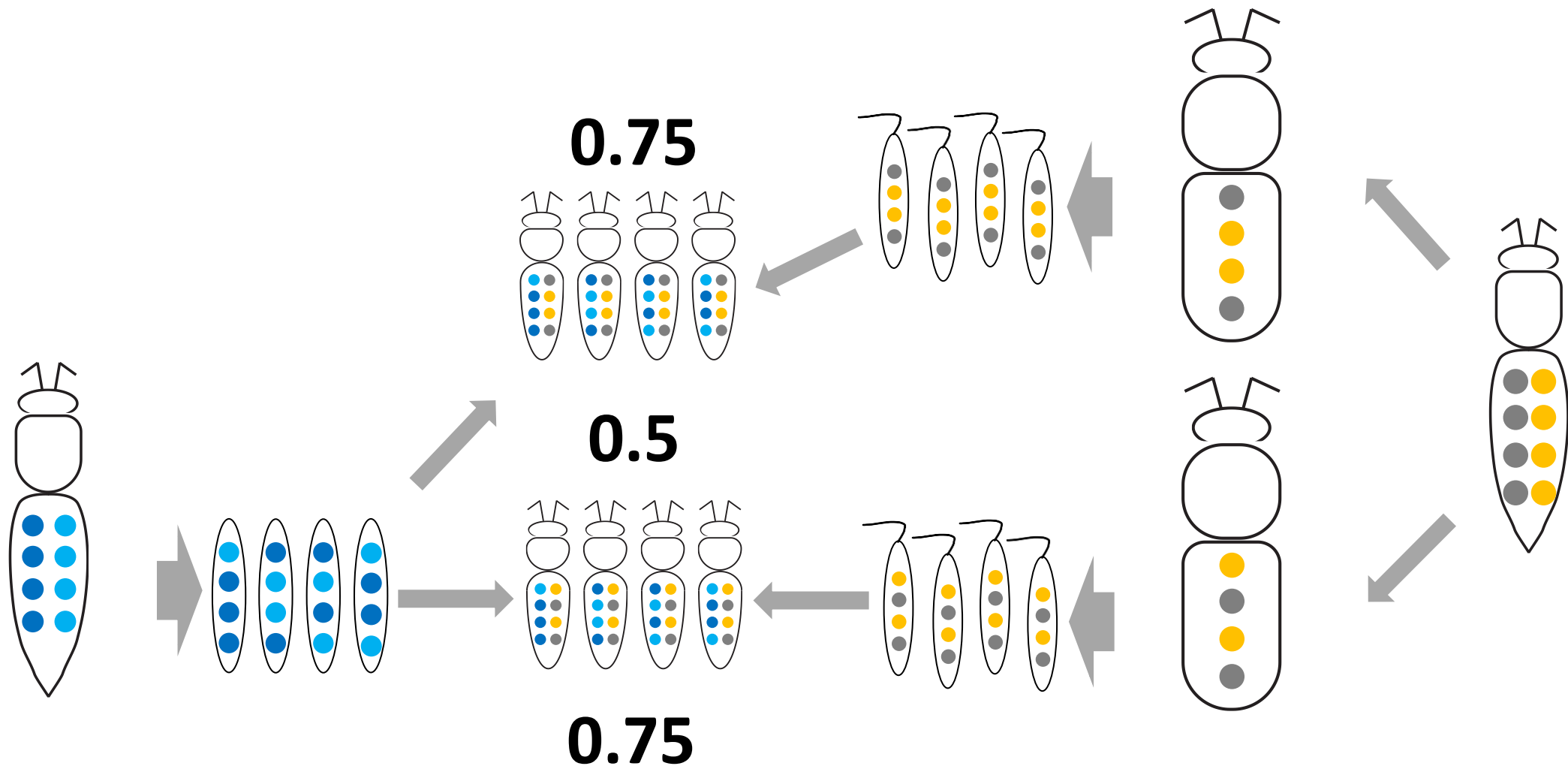
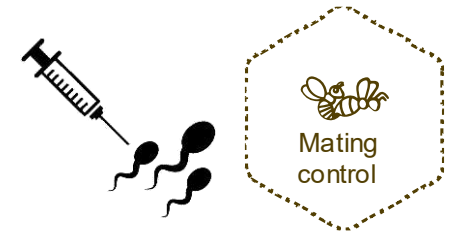
Leto 2
Year 2

Leto 1
Year 1

Mating control: instrumental insemination



Mating control: instrumental insemination



End comments & Discussion

- *Thanks for your attentions!*