

Queen Health – Evaluation of Imported and Local Queens in Canada

Patricia Wolf Veiga



National Bee Diagnostic Centre
Technology Access Centre

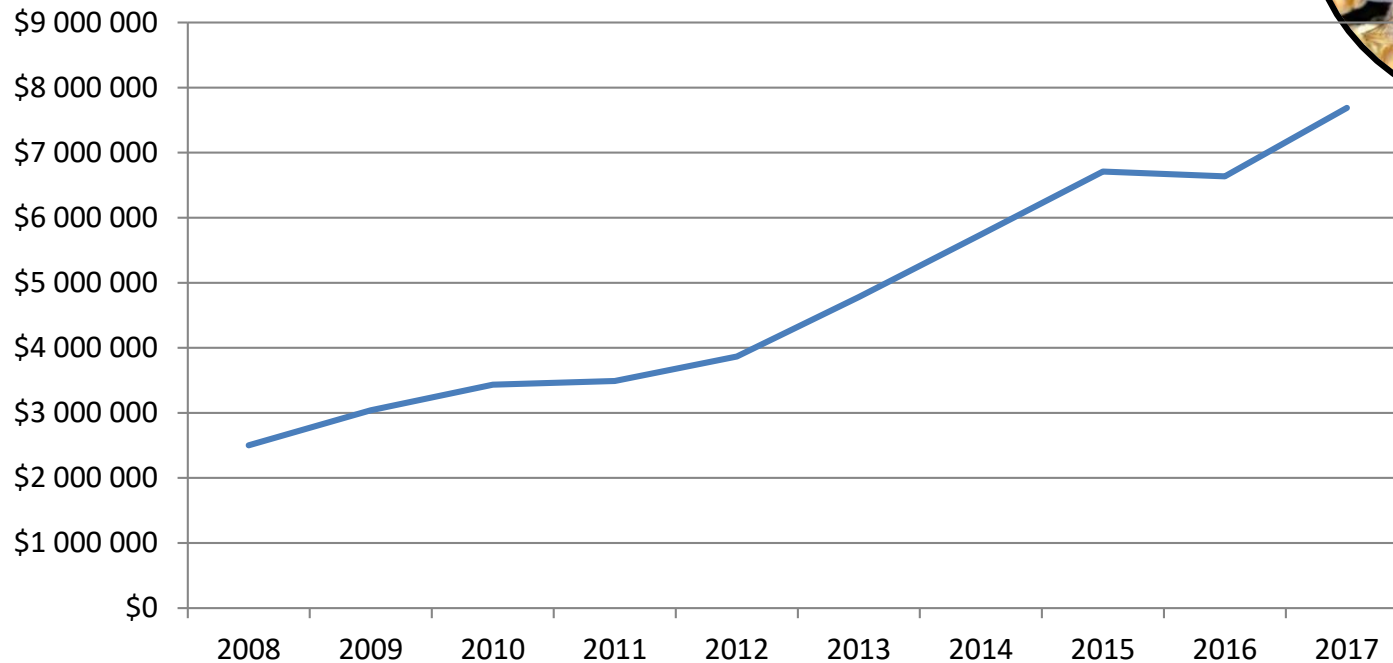
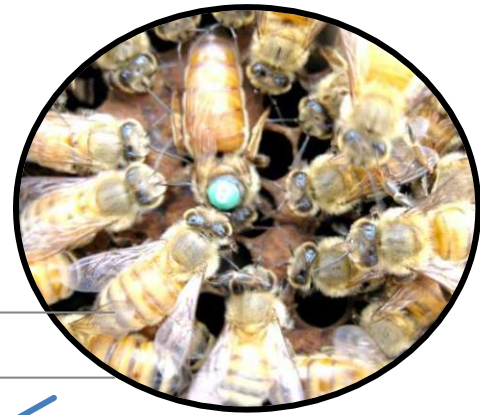
National Bee Diagnostic Centre

Beaverlodge, AB

NBDC is the first comprehensive laboratory in Canada to provide a full array of diagnostic services exclusively for bee pathogens.

We are one of the NSERC funded Technology Access Centres, committed to applied research, training , outreach and innovation.

Canada imports of queens



In 2017, Canada imports of queens were \$ 7.6 million:

United States - \$7.1 million

Australia - \$0.2 million

Chile- \$0. 2 million

Others: < \$0.1 million (New Zealand; Denmark)

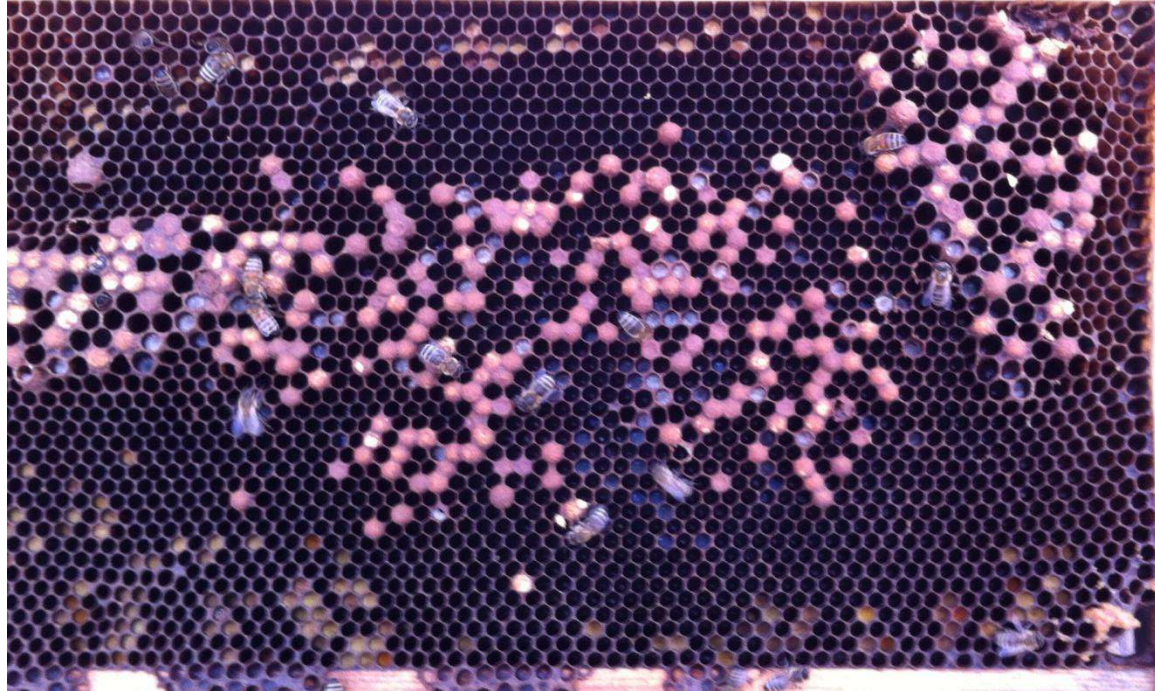
Source: Statistics Canada (CATSNET, May 2018)

Table 2: Top four ranked possible main causes of honey bee colony mortality by province, as cited by beekeepers who responded to the 2016/2017 winter loss survey.

Province	1 st .	2 nd .	3 rd .	4 th .
NL	NA	NA	NA	NA
PE	Poor queens	Weak colonies in the fall	Starvation	Other
NS	Poor queens	Weak colonies in the fall	Starvation	Don't know
NB	Don't know	Starvation	Weak colonies in the fall	Other
QC	Poor queens	Weak colonies in the fall	Weather	Starvation
ON	Poor queens	Starvation	Weak colonies in the fall	Ineffective Varroa control
MB	Weak colonies in the fall	Poor queens	Starvation	Don't know
SK	Winter weather	Ineffective Varroa control	Nosema	Poor queens
AB	Ineffective Varroa control	Winter weather	Nosema	Poor queens
BC	Weather	Starvation	Poor queens	Weak colonies in the fall

‘Poor Queens’

- Premature queen replacement;
- Drone layer
- Poor brood pattern
- Susceptibility to diseases



Queen Health – Evaluation of Imported and Local Queens

Queens Sources:

- Queens produced by in Canada
- Queens imported from other countries



New Queens

As they arrive



- Sperm count and sperm viability
- Pathogen :
 - Nosema
 - Tripanosomids
 - Viruses



Local Queen Sources:

- Alberta
- British Columbia
- Saskatchewan
- Ontario
- Quebec

Imported Queen Sources:

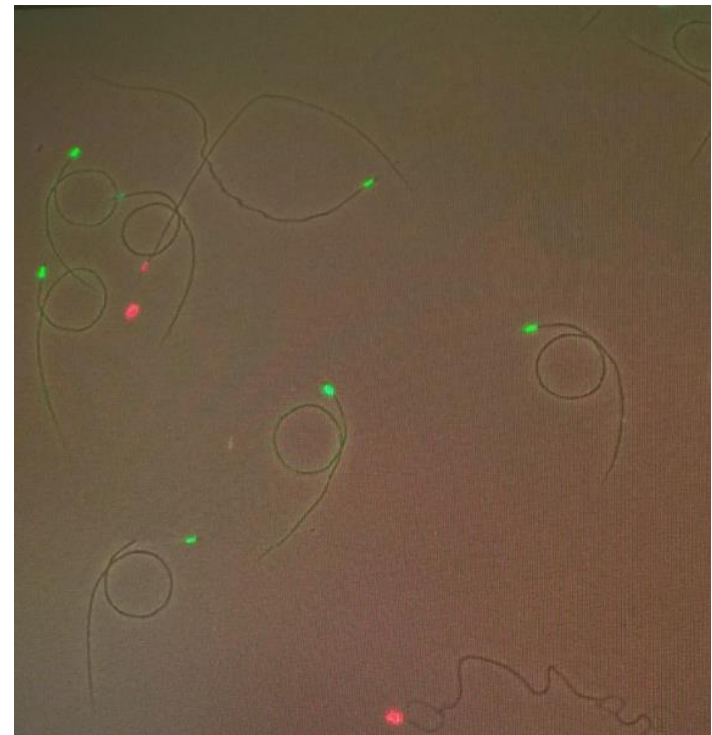
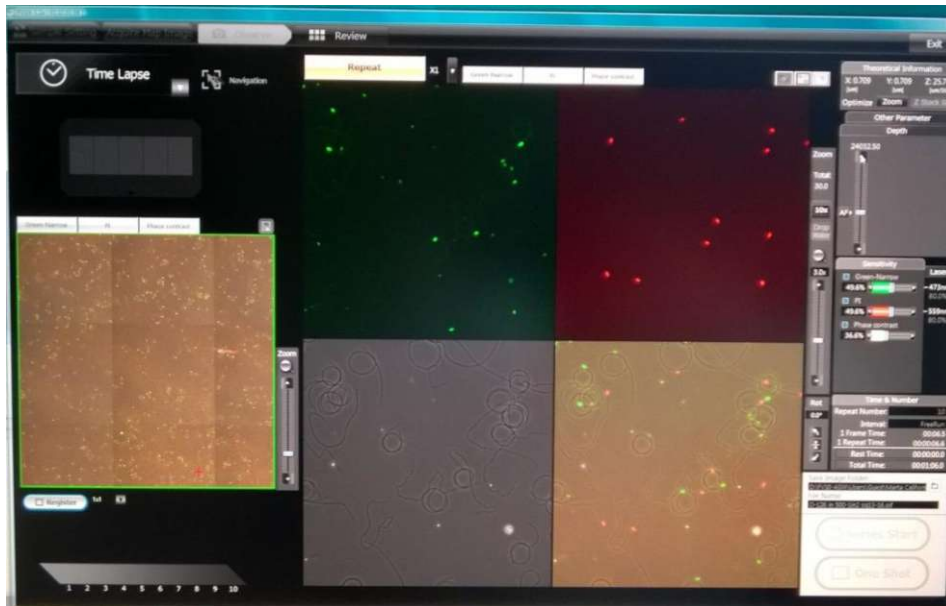
- California
- Hawaii
- Australia
- Chile
- New Zealand

Number of queens analyzed 2014 -2017: 167 Local and 176 Imported

Local Queen Sources (“Canadian Queens”)

NBDC lab





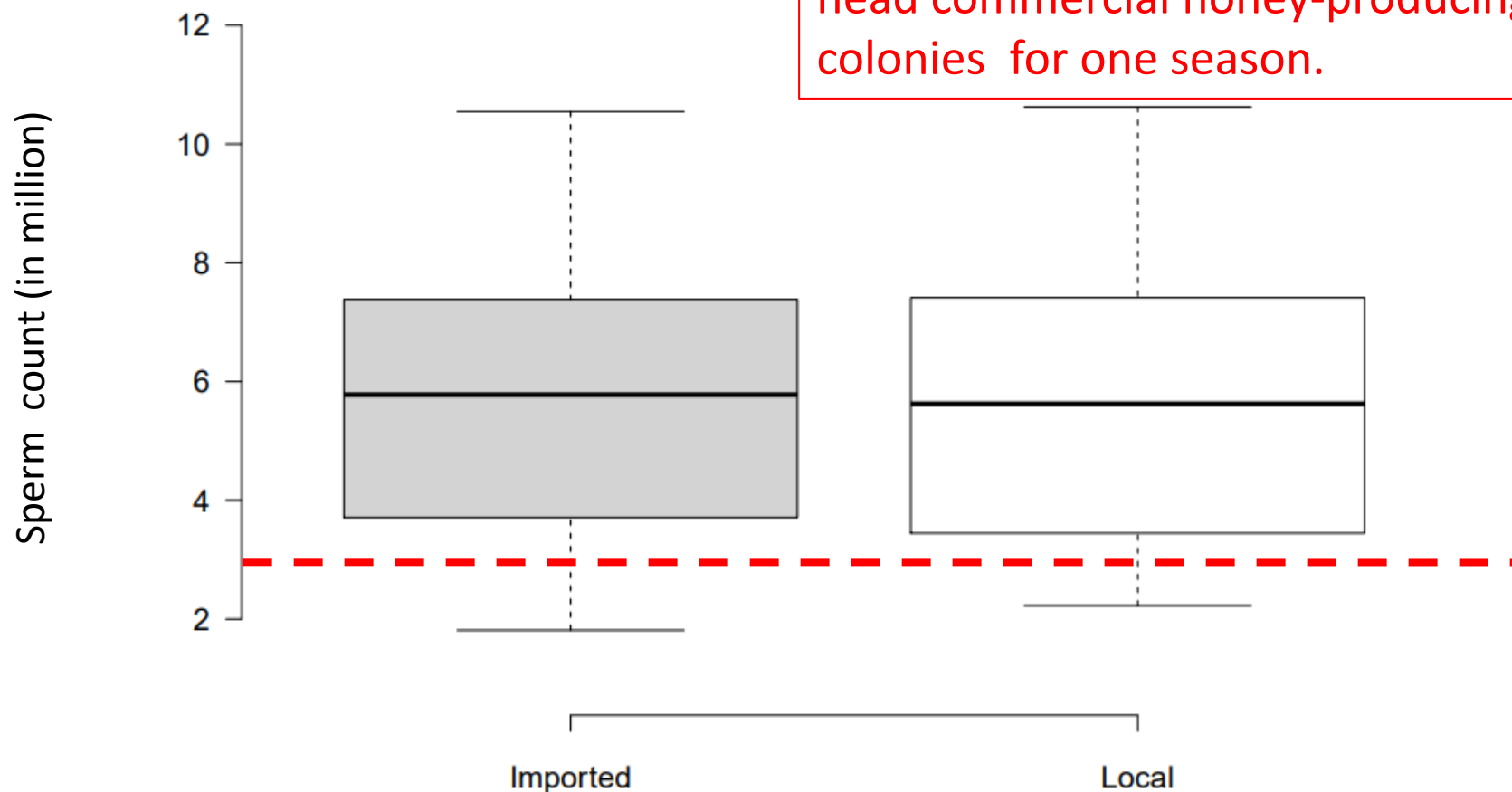
SYBR 14= Live
PI= Dead



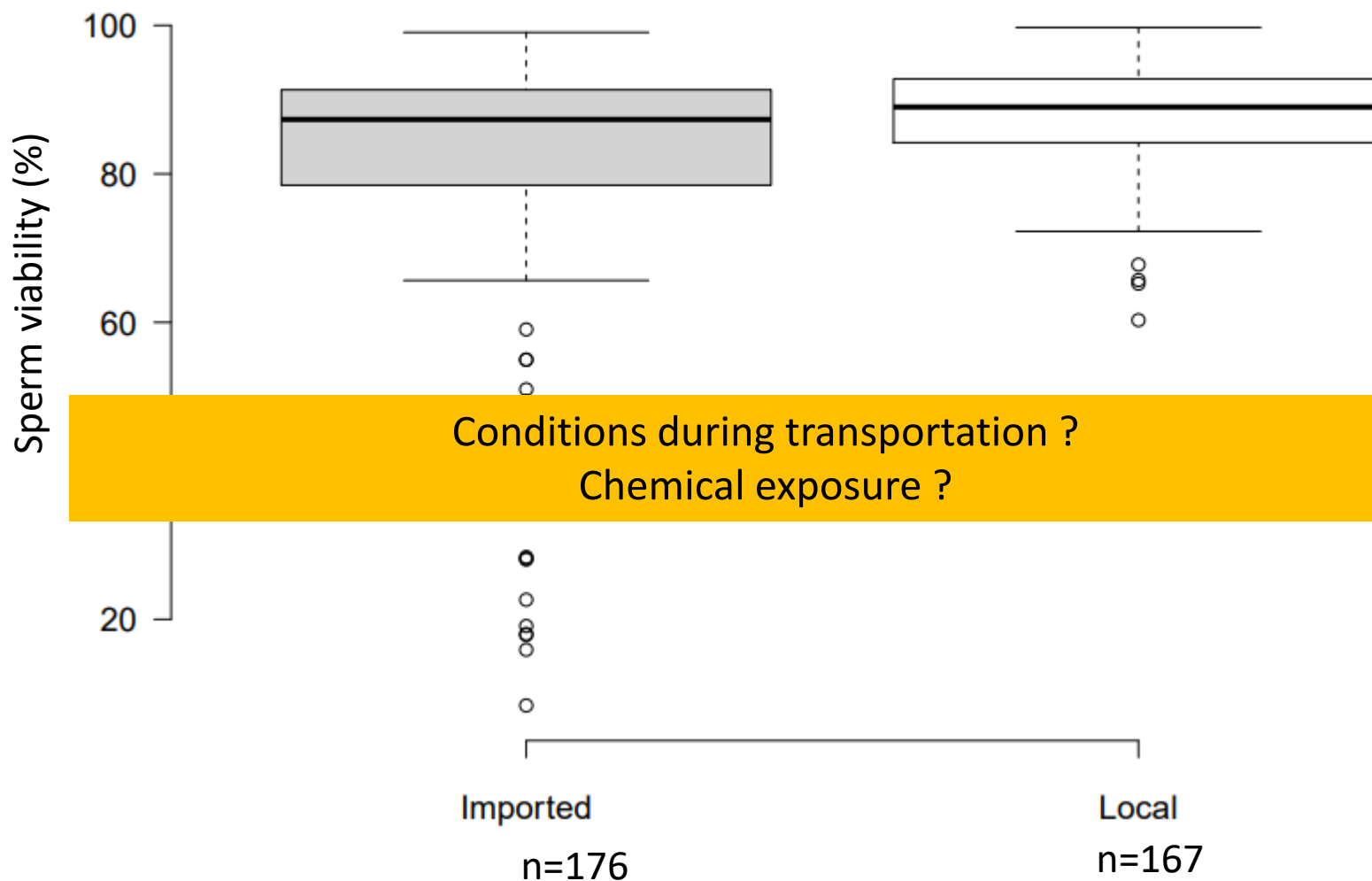


Sperm Count Imported vs Local 2014-2017

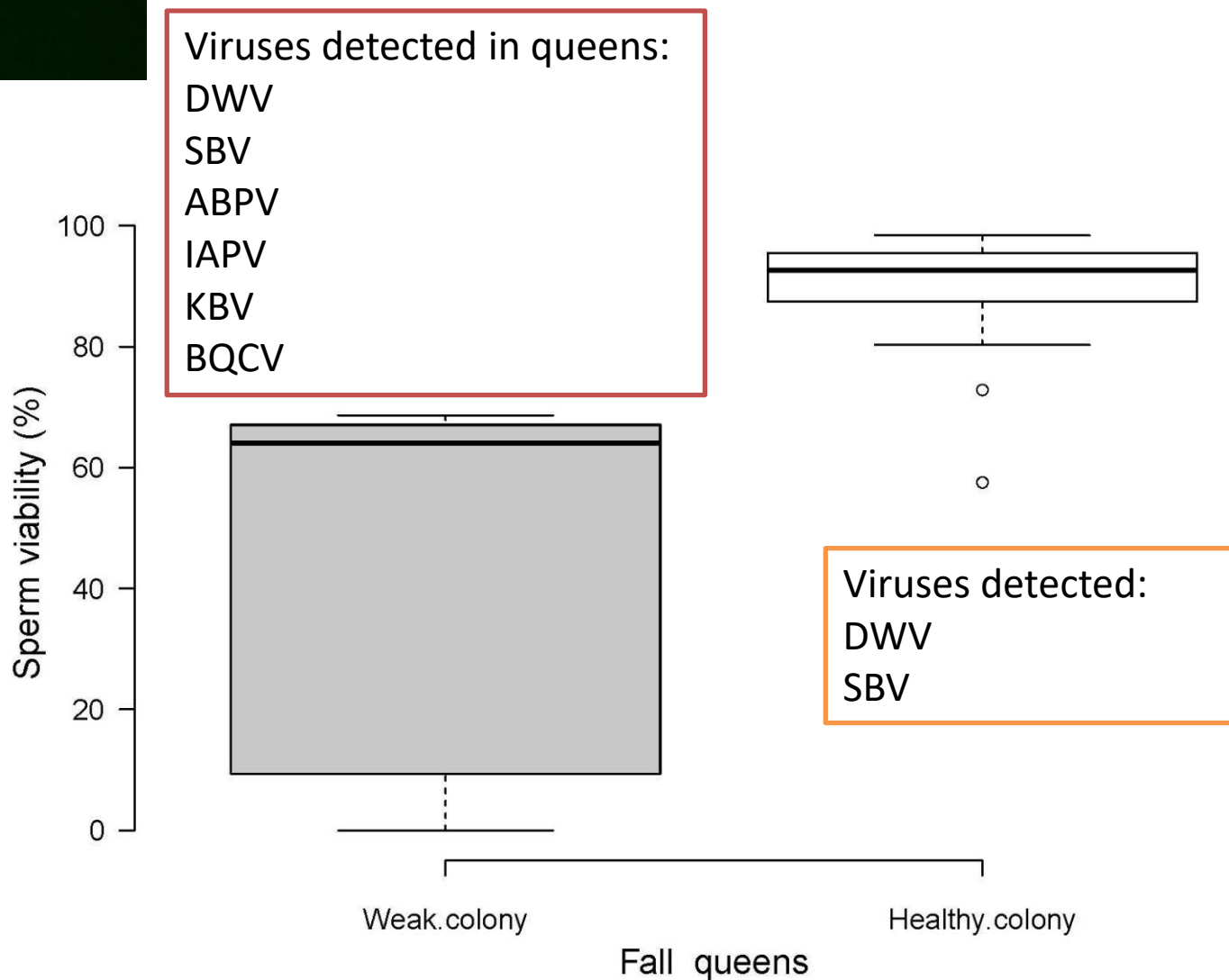
“Poorly mated”: fewer than 3 million stored sperm. Queens are unable to head commercial honey-producing colonies for one season.

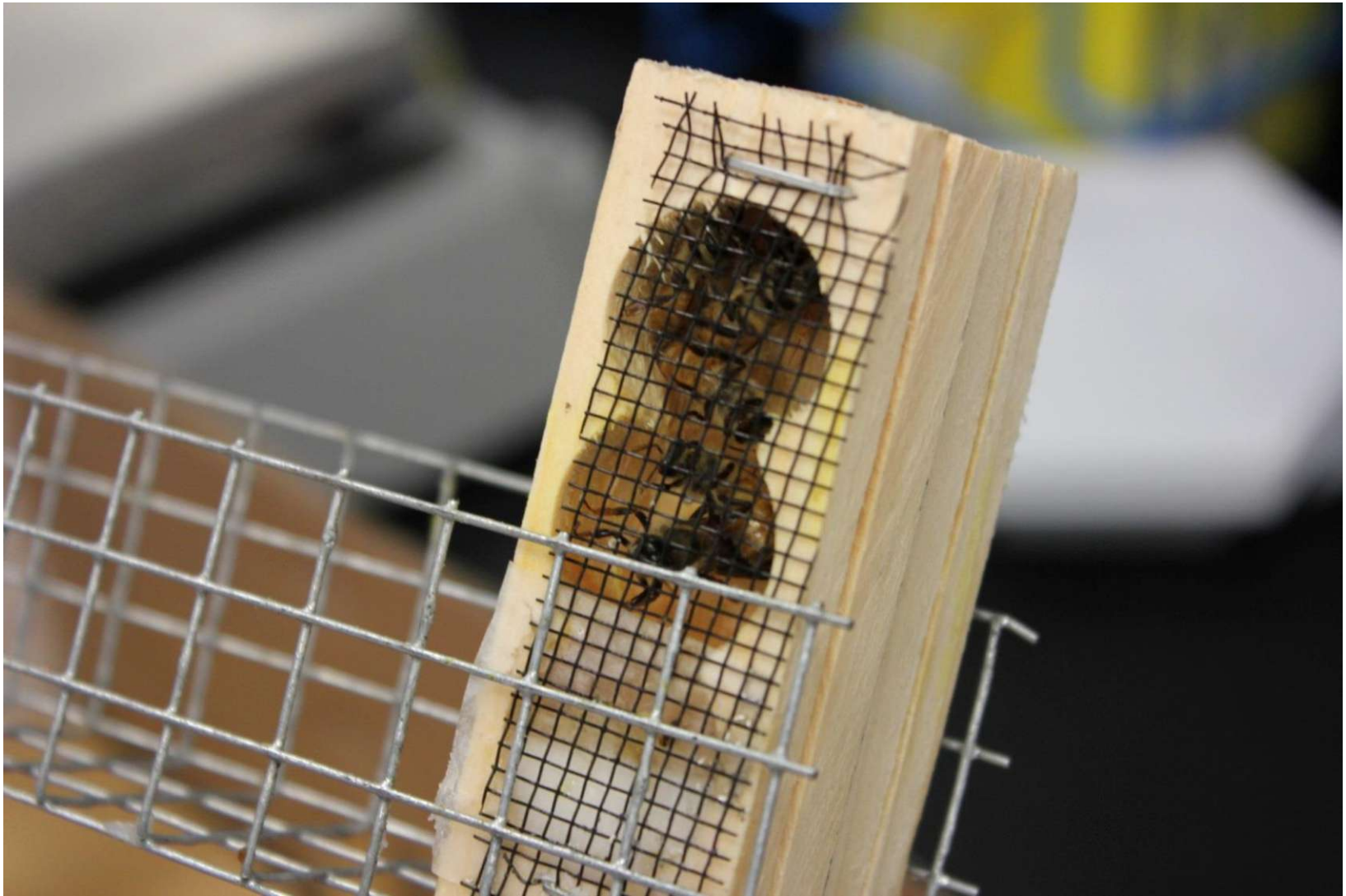


Sperm Viability Imported vs Local Queens 2014-2017

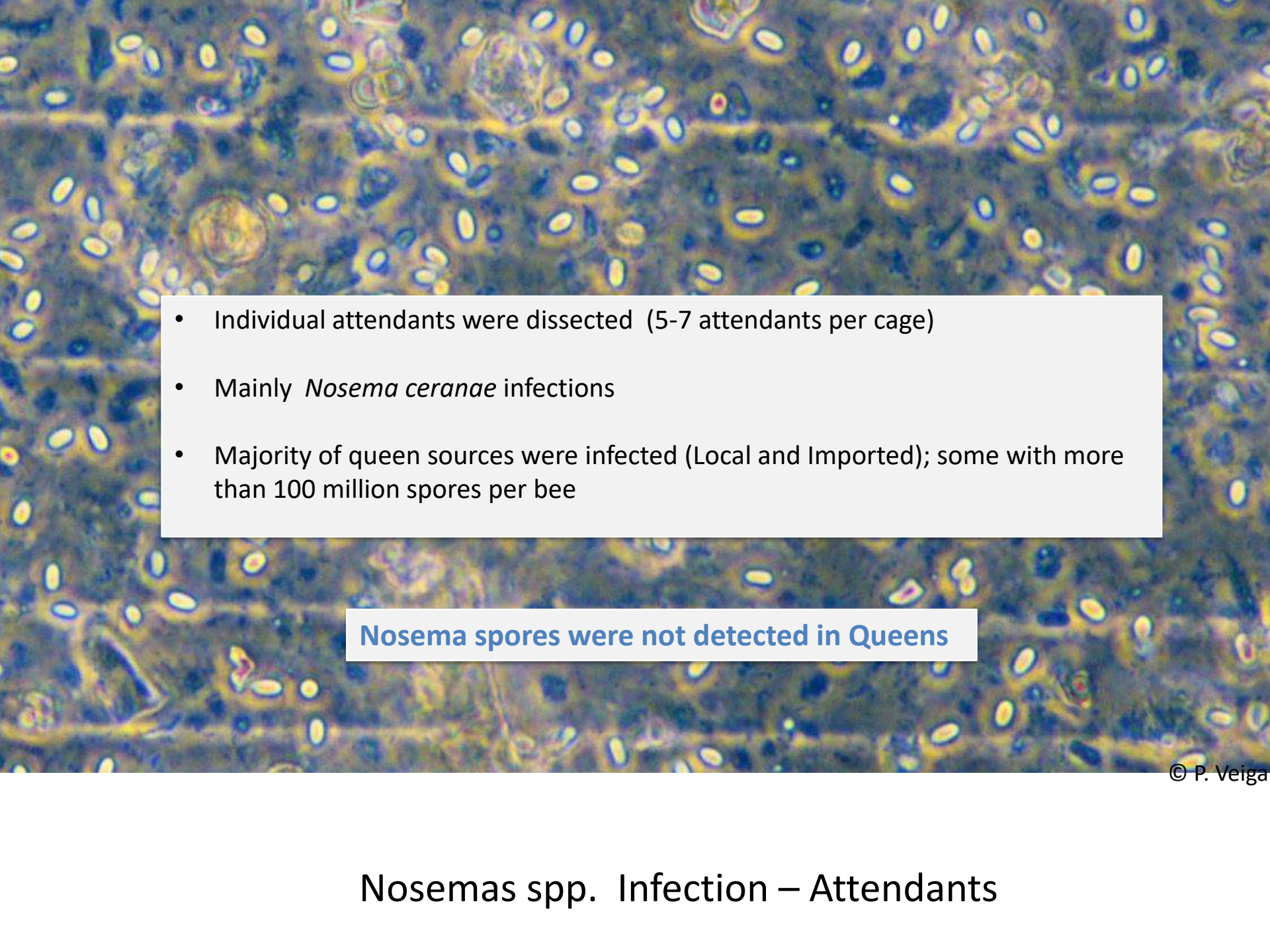


Sperm Viability and Queen failure





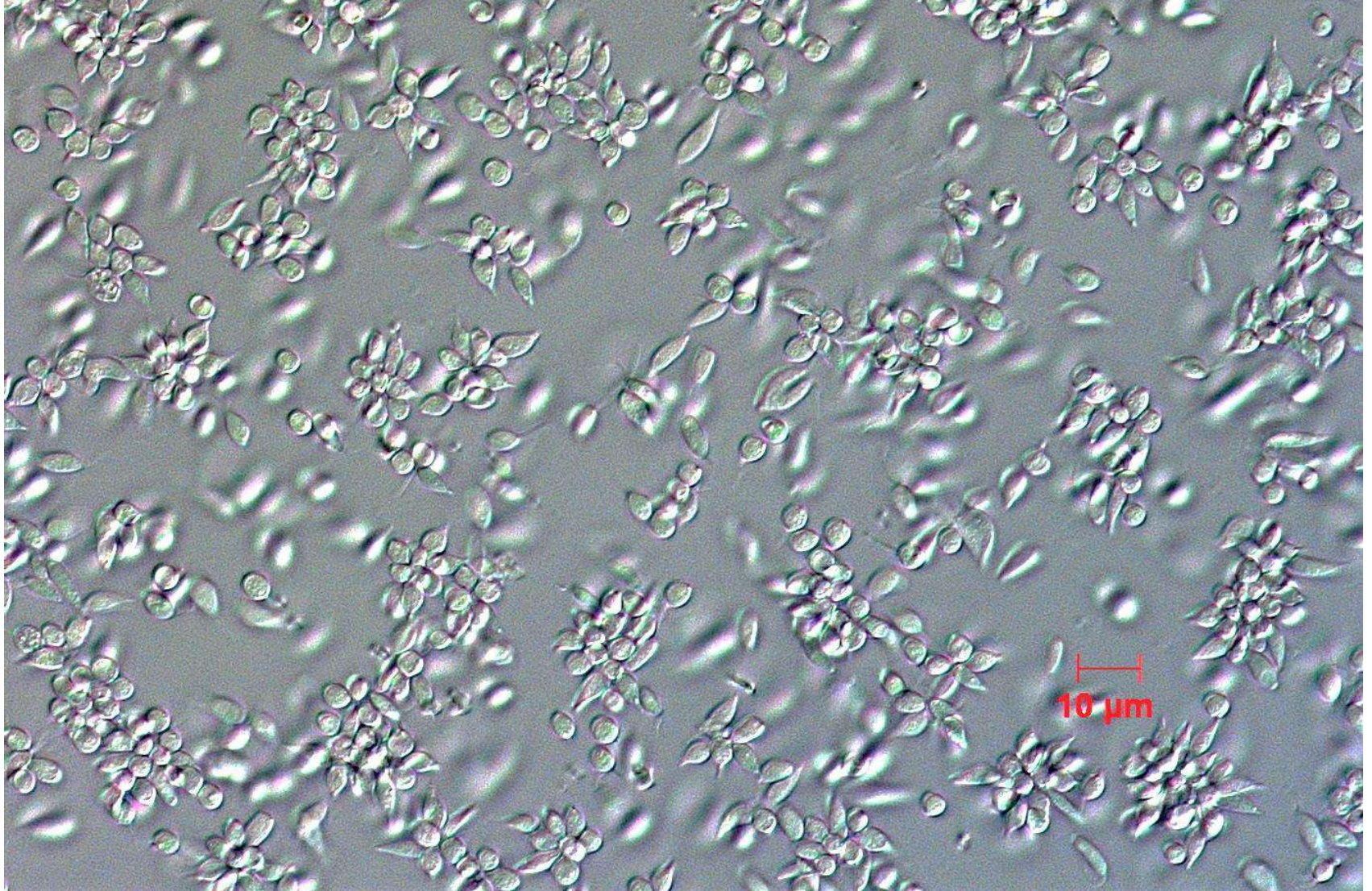
*Mystery Box :
Queen, Attendants and what else?*

- 
- Individual attendants were dissected (5-7 attendants per cage)
 - Mainly *Nosema ceranae* infections
 - Majority of queen sources were infected (Local and Imported); some with more than 100 million spores per bee

Nosema spores were not detected in Queens

© P. Veiga

Nosemas spp. Infection – Attendants



Trypanosomatids

© R. Schwarz

- Attendants were tested for *Crithidia mellifica* and *Lotmaria passim*
- Only *Lotmaria passim* was detected



Viral Analysis



Black Queen Cell virus

- Queens were tested for 7 honey bee viruses (BQCV, DWV, SBV, IAPV, KBV, ABPV, CBPV)
- BQCV, DWV and SBV were detected.
- Multi-viral infection in 20% -55 % of queens;
- DWV was detected in the sperm



Recommendations

- Improvement of conditions during transportation – establish standards
- Avoid overwinter weak colonies
- Re-caging queens - helps to mitigate risk of diseases introduction



Dr. Carlos Castillo



Patricia Wolf Veiga



Wendy Smith



Jamie Lee Martin

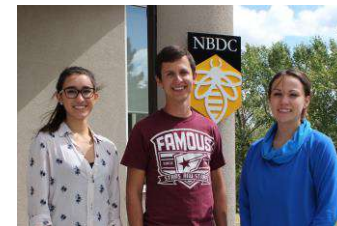


Emily Ryan



Eric Stromgren

Acknowledgements



NBDC-TAC Summer Students



NBDC-TAC Summer Students