WORLD ORGANISATION FOR ANIMAL HEALTH

Protecting animals, preserving our future

"Research progress on honey bee diseases and parasites in Asia and the Pacific region"

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Monitoring of colony losses situation in Asia-Pacific region since Colony collapse disorder 2006

- Few records of honey bee losses (both managed (*Apis mellifera* and *Apis cerana*) and wild honey bees (other *Apis* spp.) in Asia
  - China 10.1% (Liu et al., 2016)
- Many reports in North America and good records in South America
  - Variations of colony losses (10-50%)
  - USA (22% (vanEngelssdorp et al., 2008)
  - Canada (16-25% (van der Zee et al., 2015)
  - South America (30% Uruguay (Antúnez et al., 2017), 50% annual losses in Brazil during (Castilhos et al., 2019).

Progress on research on bee health in Asia-Pacific

- More reports of bee viruses prevalence in the region both managed and wild honey bees
- New viruses and variants have been discovered such as Lake Sinai viruses, DWV (A, B, C) and the spill over incidences between managed and wild honey bees (Historically *Varroa*, *Tropilaelaps*, and *Nosema ceranae*)
- Genomics and genetic variations of honey bee species have been elucidated (*A. dorsata, A. cerana, A. florea*) and bee pathogens and parasites (e.g *Nosema* and bee viruses, *Varroa* haplotypes and *Tropilealaps*)
- Host-Parasite interaction using transcriptomics and proteomics
- Synergic effects of Pathogens-Parasites-Pesticides

Biotic threats: Pathogen-Parasites of honey bees in Asia Pacific

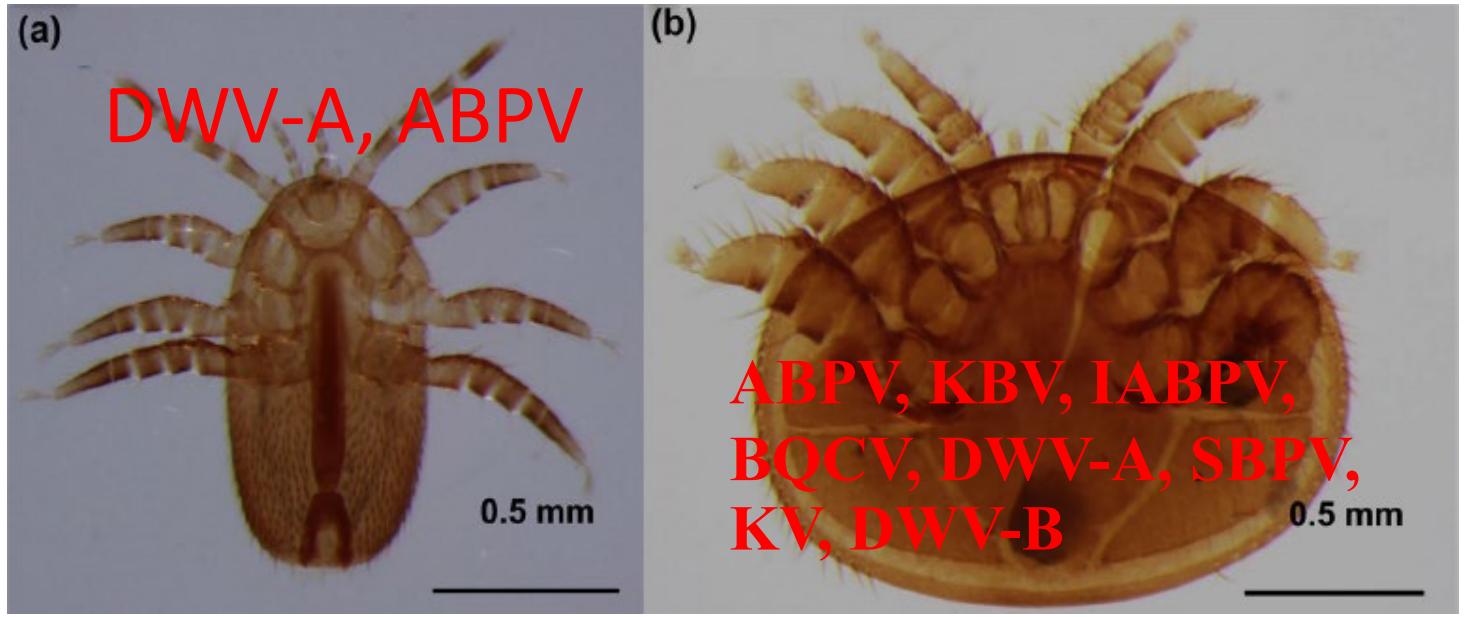
- Bee viruses (ABPV complex and DWV, with parasitic mites)
- Fungi (Chalkbrood and *Nosema ceranae*)
- Bacteria (American fouldbrood and European foulbrood)
- Parasitic mites (*Varroa* spp., *Tropilaelaps* spp., *Euvarroa* spp.)
- Pest and predators (*Vespa* spp., wax moth, Bee eating birds,
- Small hive beetle, ants)

Severity of biotic threats on managed honey bees (*A. mellifera* > *A. cerana*)

- *Varroa destructor. Varroa jacobsoni* (Asia, North America and South America)
- *Nosema ceranae* (Asia and Pacific region)
- *Tropilaelaps mercedesae* (Southeast Asia, Temperate zone as South Korea and China (but not severe))
- American fouldbrood and European fouldbrood (sporadic findings in Asia –Pacific region)- Good management
- *Vespa velutina* (Asia and Pacific region, as an invasive species)
- Small hive beetle (Asia and Pacific region as an invasive species)
- Bee eating birds (Southeast Asia)

Synergistic effects

- Interaction between pathogens and parasites
  - *Varroa* mite-*Tropilaelaps*-*Nosema*-Bee virus (ABPV complex and DWV)



Wing deformity and shorten longevity for individual bees

Euvarroa mites on *A. florea* drone (left) and *Varroa* mite in *A. mellifera* worker (right)

(Photo by P. Phokasem and P. Chantawannakul)

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Wing deformity in *T. mercedesae* infested *A. mellifera* bees

Photo by P. Phokasem and P. Chantawannakul

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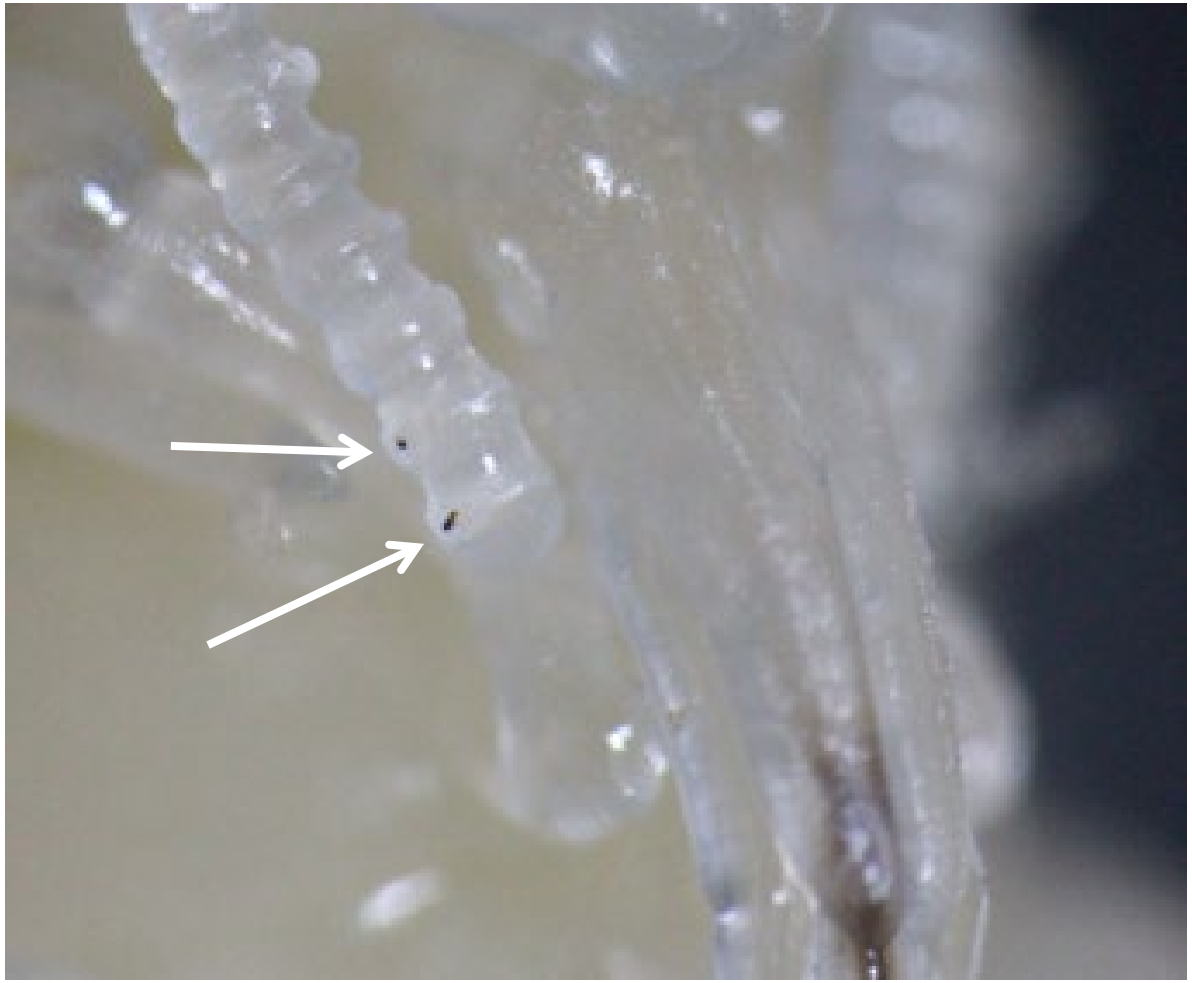
Wounds Site



Wound site on antennae of pupae (purple eyed stage)

Phokasem et al., Scientific reports 2019

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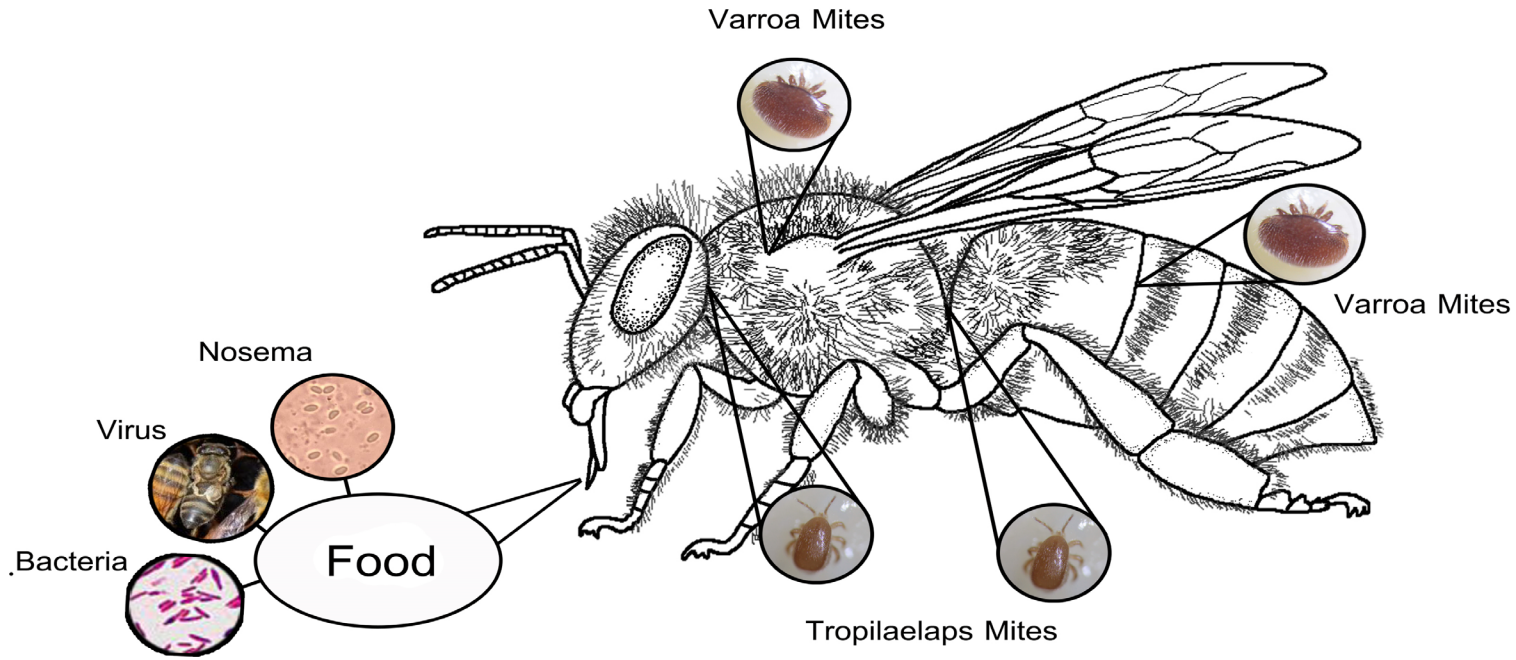
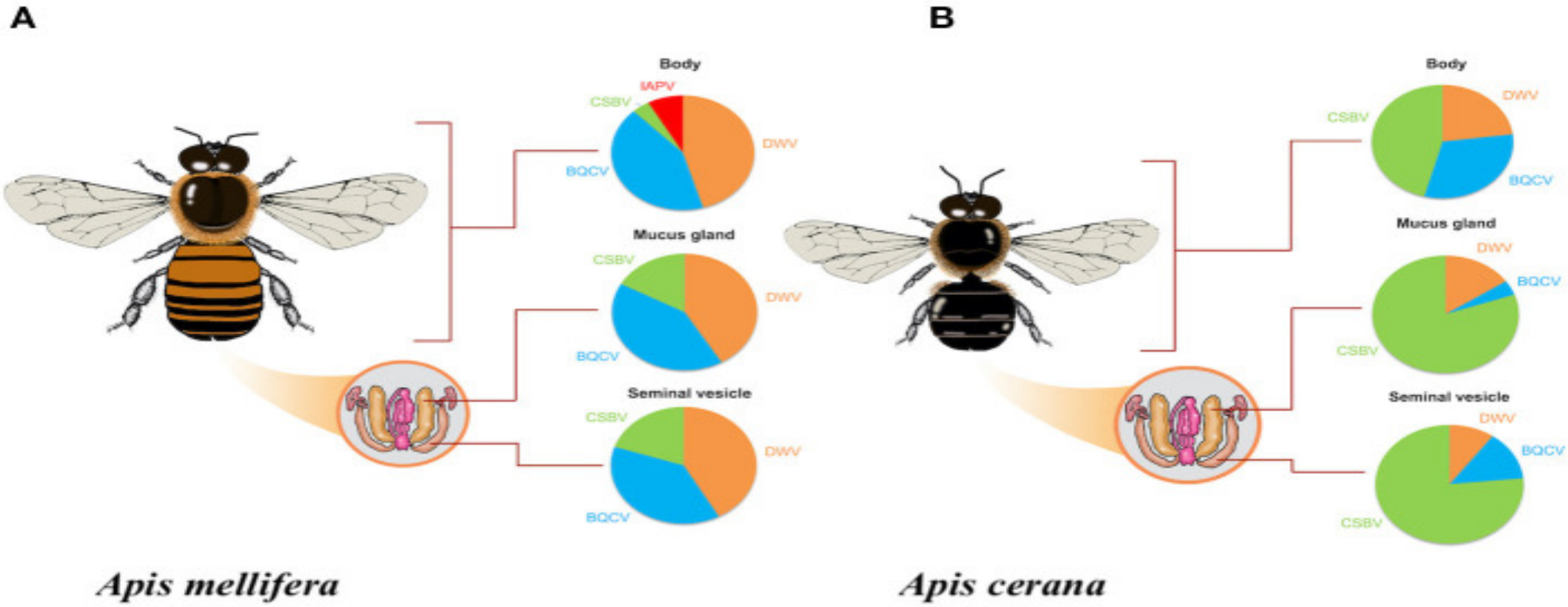
Horizontal transmission



Vertical transmission



(Phokasem et al., Frontiers in Veterinary Science, 2021)

Interaction between biotic threats (pathogens and parasites) and abiotic factors

- Pesticides-aggravate honey bee health and pathogen affects
- Land use (habitat fragmentation, deforestation)
- Climatic factors (flooding, drought)- pathogen landscape and food sources
- Honey bee management- loads of pathogens and disease control

Research Network makes global impacts

- OIE network
- Apimondia (the International Federation of Beekeepers' Association)
- COLOSS (Prevention of Colony LOSSes) (Bee researcher network)

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COLOSS network (https://coloss.org/)

"Prevention of honey bee COlony LOSSes"

Véto-pharma
Committed to apiculture

1715 members from 104 countries (08/2021)

Ricola Foundation
Nature & Culture

President: P Neumann (CH)

Vice presidents: P Chantawannakul (Thailand), G Williams (USA)

Executive Committee:
M Bouga (GR), R Brodschneider (AT), T Blaquière (NL), N Carreck (UK), R Dall`Olio (IT), V Dietemann (CH), A Gajda (PL), A Gregorc (SL), L Kristiansen (SE), CWW Pirk (RSA), A Özkirim (Turkey), V Soroker (Israel)

1. South America
K Antúnez (Uruguay)

2. North America
JD Ellis (USA), P Giovenazzo (Canada)

3. Australia, New Zealand
O Borowik (New Zealand)

4. Asia
P Chantawannakul (Thailand)& H. Zheng (China)

5. Africa
CWW Pirk & H Human (RSA)

Core projects

1. Monitoring Colony losses
R Brodschneider (AT), A Gray (UK)

2. BEEBOOK
V Dietemann (CH), N Carreck (UK), JD Ellis (USA), P Neumann (CH), J. Evans (US) P.Chantawannakul (TH)

3. B-RAP (Bridging Research & Practice)
L Fabricius Kristiansen (SE), L Morawetz (AT),

Task forces

1. Varroa - control

2. Apitox

3. . Nutrition

4. Sustainable Bee Breeding

5. Small hive beetle

6. *Vespa velutina*

7. Viruses

8. Survivors

Main priorities of COLOSS

Improve the health of honey bees internationally by:

a. coordinating honey bee monitoring and research, including the development of standard methods (Bee book I-IV)

b. disseminating knowledge and providing training related to improving the well-being of honey bees (B-RAP)

COLOSS expertise

1. Development of standard research methods

2. Coordinating and conducting large-scale honey bee monitoring and research projects

3. Disseminating knowledge and providing training related to the needs of bees

4. Advocating for honey bees, and their conservation, especially to government legislators and administrators

5. Networking and capacity building

16+1 Conferences

>50 workshops

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COLOSS ASIA-Oceania-Pacific

- City networks in Asia initiatives
  - COLOSS Asia 1st Chiang Mai 2020 (physical and virtual)
  - COLOSS Asia 2nd Okinawa 2021 (virtual)
  - COLOSS Asia 3rd Hangzhou 2022 (physical and virtual)
  - COLOSS Asia 4th Taipei 2023 (probably physical)

- SOLATINA-COLOSS
  - "Joining forces across continent" The first meeting of the two bee research societies, SOLATINA and COLOSS, will be held on 22nd September, 9-14h GMT-3 (Uruguay time) / 14-19h GMT+2 (Central European Time). There will be two roundtables on monitoring honeybee colony losses and on varroa-resistant honey bees with interesting participants to give insights from around the globe.

B-RAP (Bridging Research And Practice)

The survey- Asian adaptation to include Asian honey bees and practices

Participating members so far:
Thailand
Myanmar
South Korea
Nepal
Vietnam
Sri Lanka
Chinese Taipei

We would like to have more members joining to cover all geographical areas!!

-a national contact for the survey

-Help translate the questions to the local language

-Facilitate to distribute the survey to your country's' beekeepers

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Thank you for your attention

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COLOSS Website (https://coloss.org/)

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