

Varroamidens biologi



DEPARTMENT OF AGROECOLOGY

AARHUS UNIVERSITY

BISYGDOMSKURSUS 2026
7. MAY 2026

PER KRYGER
SENIOR RESEARCHER



Varroamider

Der er mindst fire arter af varroamider:

Varroa destructor, *V. jacobsonii*, *V. rinderi* og *V. underwoodi*

Bedst kendt er *Varroa destructor*, et passende navn for den skade de kan forvolde på vores bier

Varroa jacobsonii blev beskrevet i 1904, fra Java

Længe troede man at denne art havde bredt sig fra Asien til Europa og til resten af verden

Varroa destructor blev, ”pinligt”, først beskrevet i 2001

Det er nu den mest udbredte art, udenfor Asien

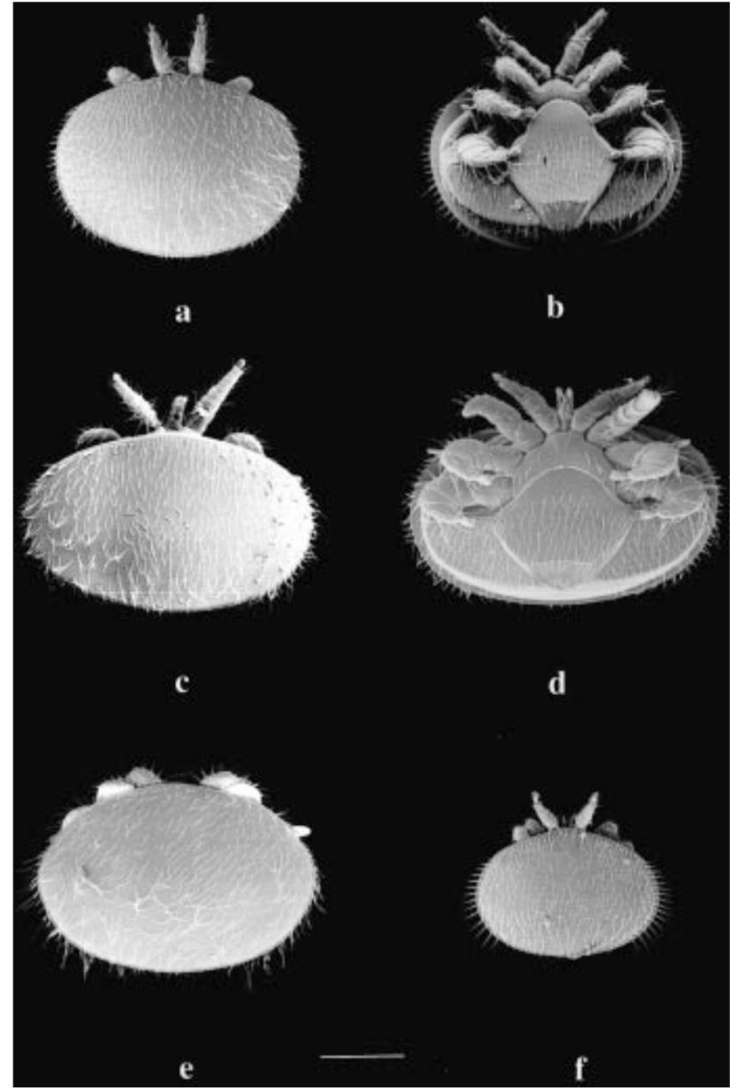
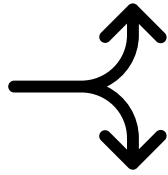
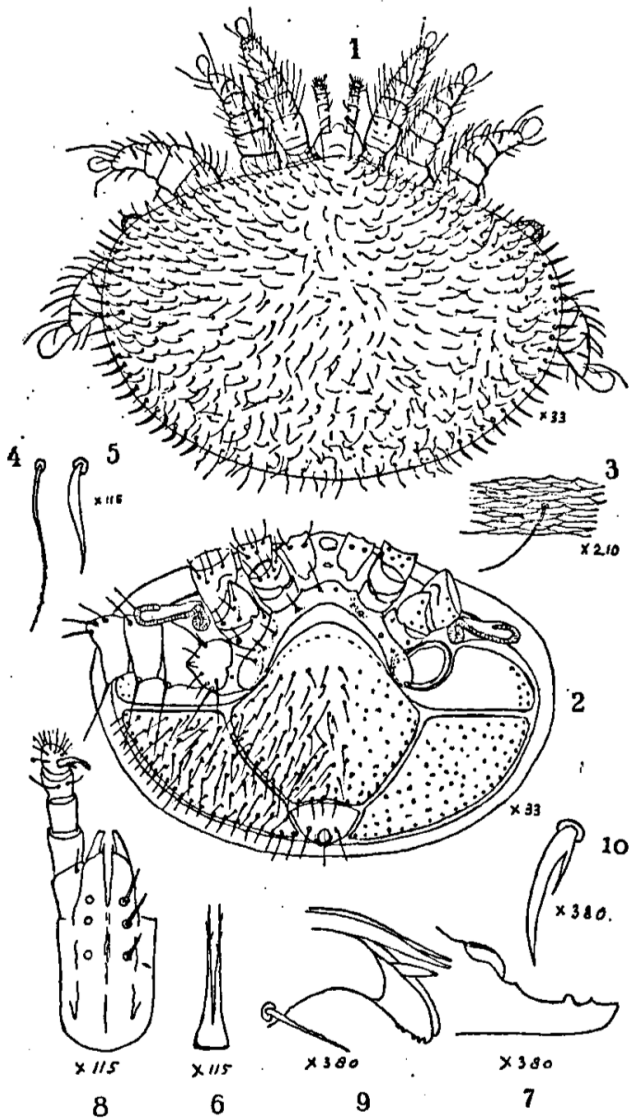


Figure 5. Appearances of the dorsal and ventral surfaces of adult females of *V. jacobsoni* (Java haplotype) (a & b) and *V. destructor* (Korea haplotype) (c & d). Also shown for comparisons are the dorsal surfaces of *V. rindereri* (e) and *V. underwoodi* (f). Bar = approx. 500 μ m.

Varroa jacobsonii Oudemans, 1904

Varroa destructor Anderson & Truman, 2001

Apis cerana

Formering i droneceller med huller i låget.

Varroa kan findes i celler med arbejdsryngel, men bilarverne udvikles ikke, og miderne kan derfor kun formere sig i droneyngel.



Social apoptosis in honey bee superorganisms

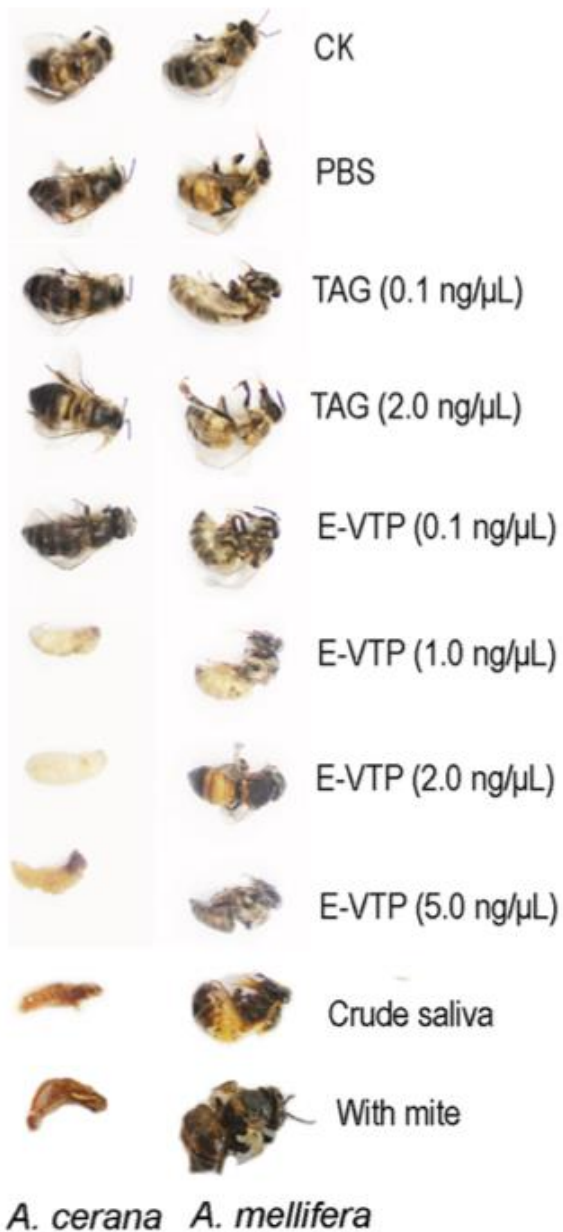
Paul Page^{1,*}, Zheguang Lin^{2,*}, Ninat Buawangpong^{3,*}, Huoqing Zheng², Fuliang Hu², Peter Neumann^{3,4,5}, Panuwan Chantawannakul³ & Vincent Dietemann^{1,5}

Social programmeret celledød i honningbi superorganismer

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Figure 1. Mite-infested brood (above row) and control brood (bottom row) from an *A. cerana* colony (Phatthalung, Thailand). Individuals were removed from their cells one day before emergence was expected. Most infested individuals stopped development at the larval and prepupal stages and died, Photo by Paul Page.



A Saliva Protein of *Varroa* Mites Contributes to the Toxicity toward *Apis cerana* and the DWV Elevation in *A. mellifera*

SCIENTIFIC REPORTS

Yi Zhang & Richou Han

Et spytprotein fra varroamider bidrager til giftvirkning i *Apis cerana* og øget mængde DWV hos *A. mellifera*

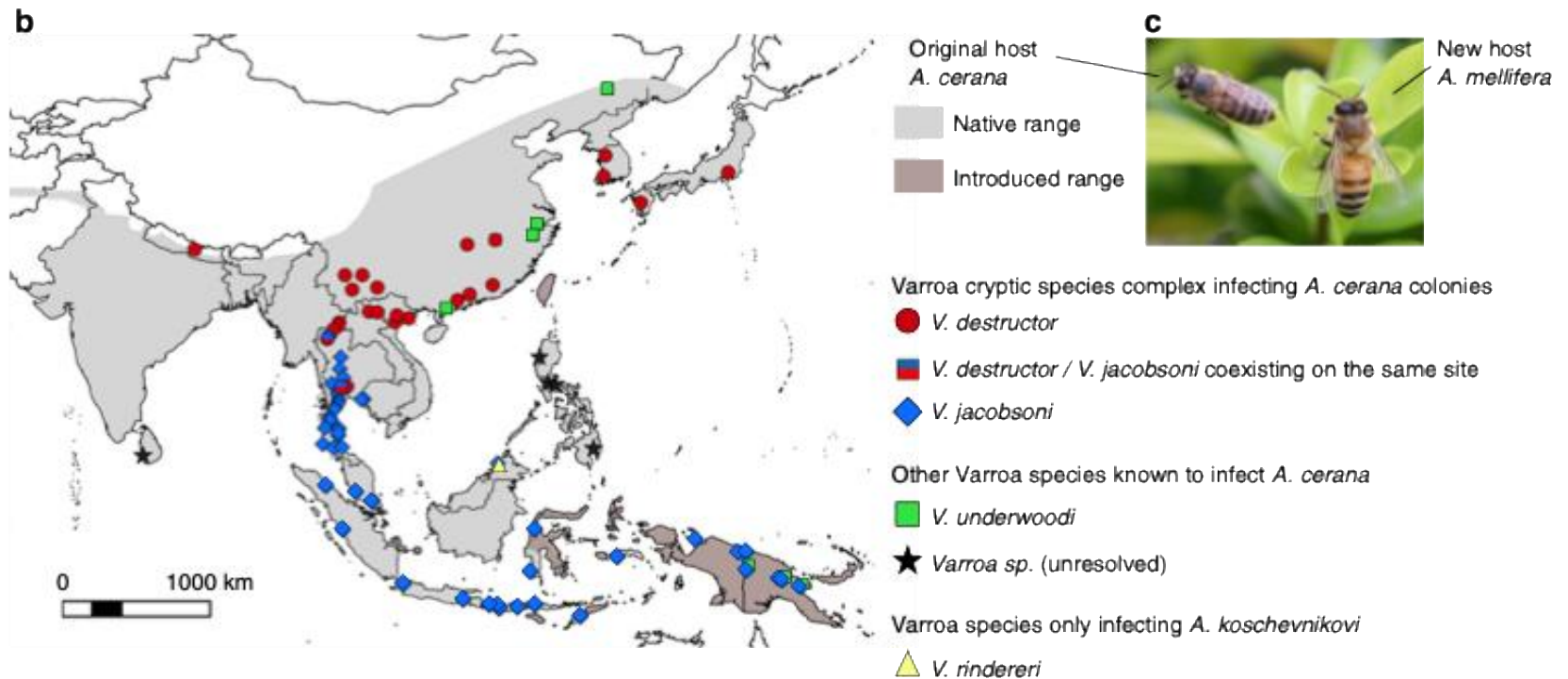
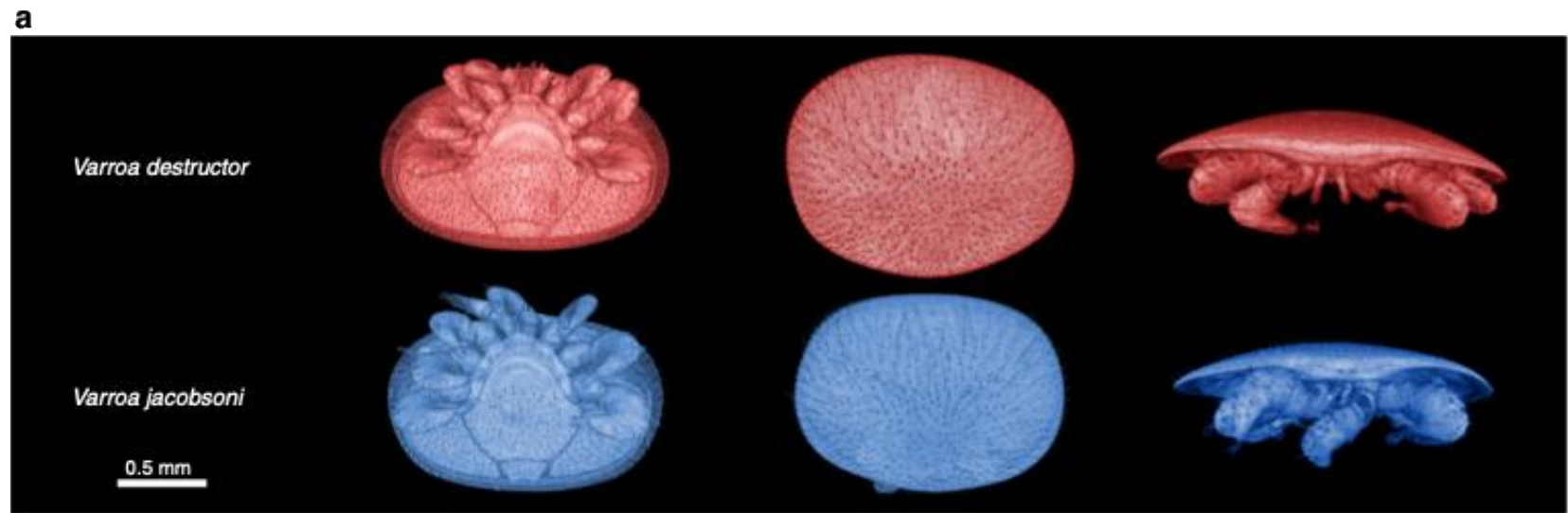
Konklusion: De to studier viser at varroamider kan angribe yngel i *Apis cerana* bifamilier. Modsat yngel af *A. mellifera* arbejdere, dør al yngel ved *A. cerana*. Mider får altså intet afkom i arbejderceller, hvilket hæmmer deres tilvækst.

Divergent evolutionary trajectories following speciation in two ectoparasitic honey bee mites

Maeva A. Techer¹, Rahul V. Rane^{2,3}, Miguel L. Grau¹, John M.K. Roberts², Shawn T. Sullivan⁴, Ivan Liachko⁴, Anna K. Childers⁵, Jay D. Evans⁵ & Alexander S. Mikheyev^{1,6*}

Afvigende evolutivt spor efter Artdannelse af to ektoparasitiske mider på honningbier


COMMUNICATIONS
BIOLOGY



Populations
genetik og
værtsspecifike
varroamider
angriber østlige
og vestlige
honningbier

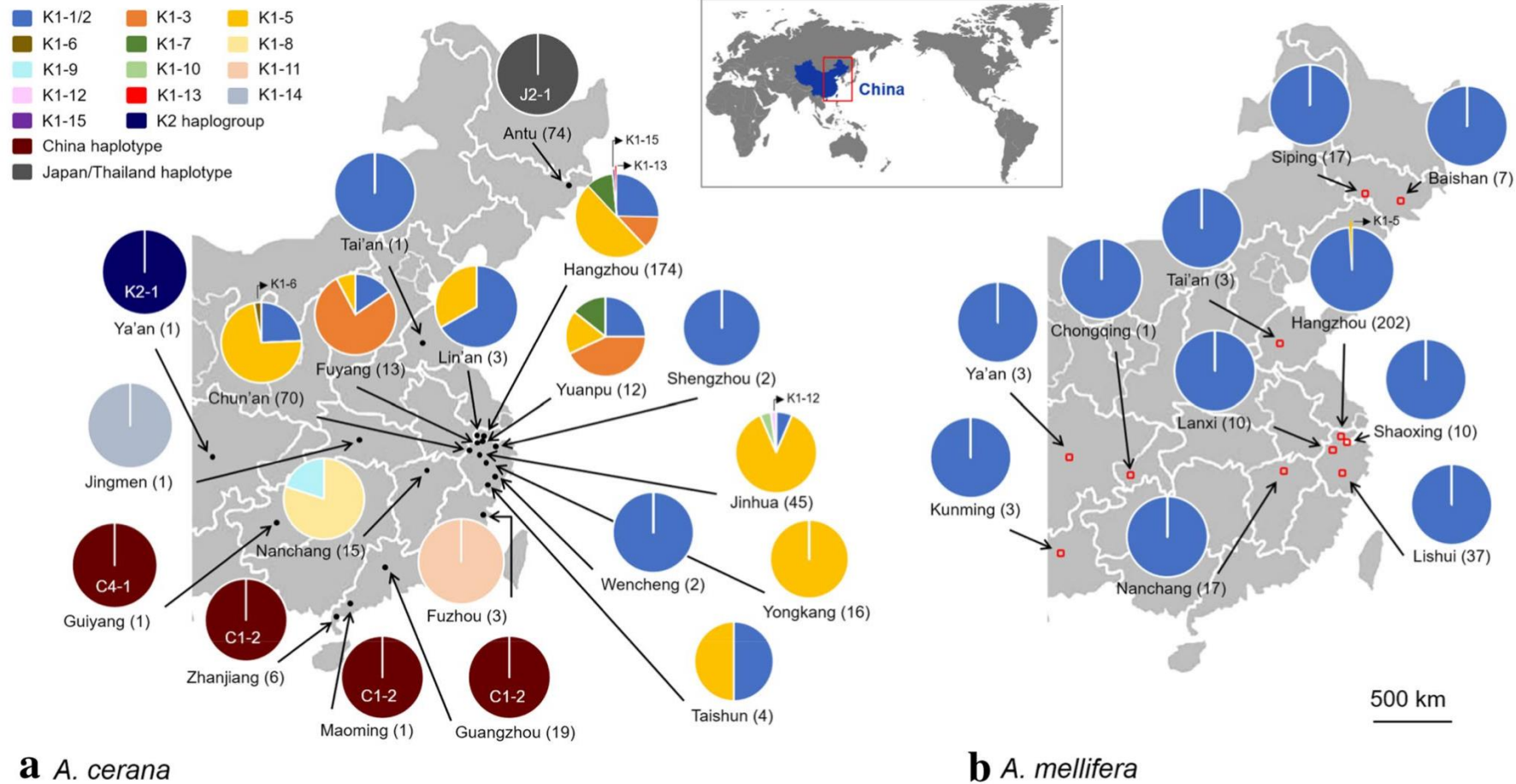


Fig. 1 Maps of eastern China showing sampling localities, haplotypes, and variants of *Varroa destructor* mites infesting **a** *Apis cerana* (black dots) and **b** *Apis mellifera* (red hollow square). The numbers

in parentheses following the locality names indicate sample size of mites sequenced. The haplotype, haplogroup and variant frequencies of the mites sampled at each locality are shown with pie charts

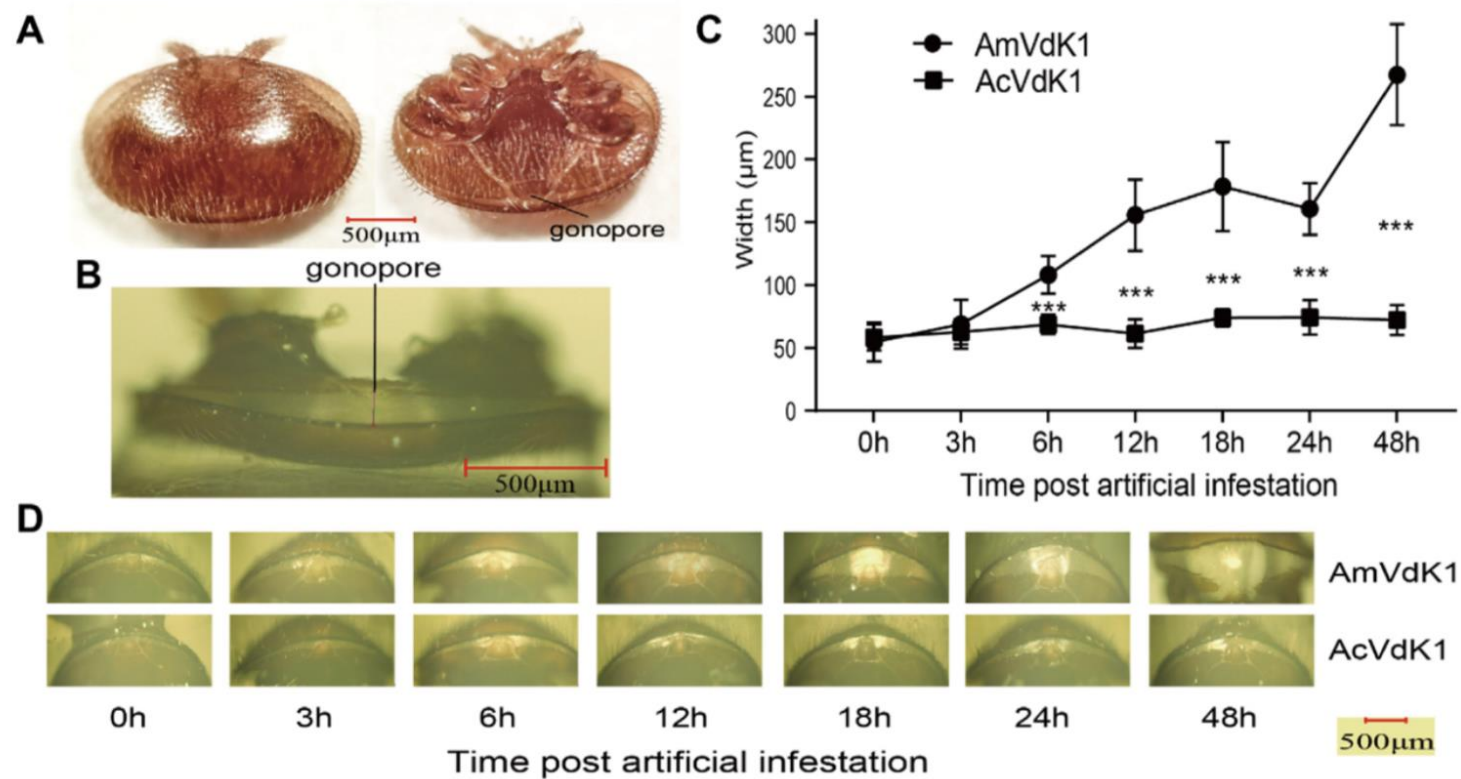
Genomic signatures underlying the oogenesis of the ectoparasitic mite *Varroa destructor* on its new host *Apis mellifera*

Huoqing Zheng^{a,1}, Shuai Wang^{a,1}, Yuqi Wu^{a,1}, Shengmei Zou^{b,c}, Vincent Dietemann^{d,e}, Peter Neumann^{d,f}, Yanping Chen^g, Hongmei Li-Byarlay^{h,i}, Christian Pirk^j, Jay Evans^g, Fuliang Hu^{a,*,2}, Ye Feng^{b,c,*,2}

H. Zheng, S. Wang, Y. Wu et al.

Genomisk signatur understøtter ægproduktion hos *Varroa destructor* på den nye vært *Apis mellifera*

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Ægproduktion hos *Varroa destructor* i droneceller af *Apis mellifera* kan ses ved at kønsåbningen vokser. Her er udvikling fulgt af en varroamide fra *Apis cerana* henholdvis *Apis mellifera* bier på den nye vært. Kun mider der er tilpasset den nye vært, udvikler æg i droneceller i løbet af 48 timer.

Fig. 4. Morphological determination of differences in the initiation of reproduction between ectoparasitic *A. cerana* and *A. mellifera* K1 mites at the early stage of *Apis mellifera* drone brood infestation. (A) Dorsal and ventral views of an *A. mellifera* K1 female mite, indicating the position of the gonopore. (B) Ventral view of an *A. mellifera* K1 female mite displaying gonopore size as the distance from the distal end of the anal sclerite (cribrum) to the dorsal shield. (C-D) Measurement and view of gonopore size of *A. cerana* and *A. mellifera* K1 mites infesting *A. mellifera* drone brood at seven time points post-infestation. AcVdK1: *V. destructor* K1 mite infesting *A. cerana*; AmVdK1: *V. destructor* K1 mite infesting *A. mellifera*.

varroamiden

Ektoparasit, d.v.s. den lever uden på bierne - ikke indeni

Yngelparasit og biparasit

Formering sker i forseglede yngelceller

Af yngelen foretrækker miden droner

På *Apis cerana* kan den kun formere sig på droner

Apis mellifera også i arbejderceller, ikke i dronningeceller



1 af 100 mider sidder på ryggen

Varroa destructor feeds primarily on honey bee fat body tissue and not hemolymph

Samuel D. Ramsey^{a,1}, Ronald Ochoa^b, Gary Bauchan^c, Connor Gulbranson^d, Joseph D. Mowery^c, Allen Cohen^e, David Lim^a, Judith Joklik^a, Joseph M. Cicero^f, James D. Ellis^f, David Hawthorne^a, and Dennis vanEngelsdorp^a

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Edited by Gene E. Robinson, University of Illinois at Urbana-Champaign, Urbana, IL, and approved December 6, 2018 (received for review October 26, 2018)

Varroa destructor æder hovedsageligt af honningbiers fedtlegeme, og ikke hæmolymfe

Hos voksne bier

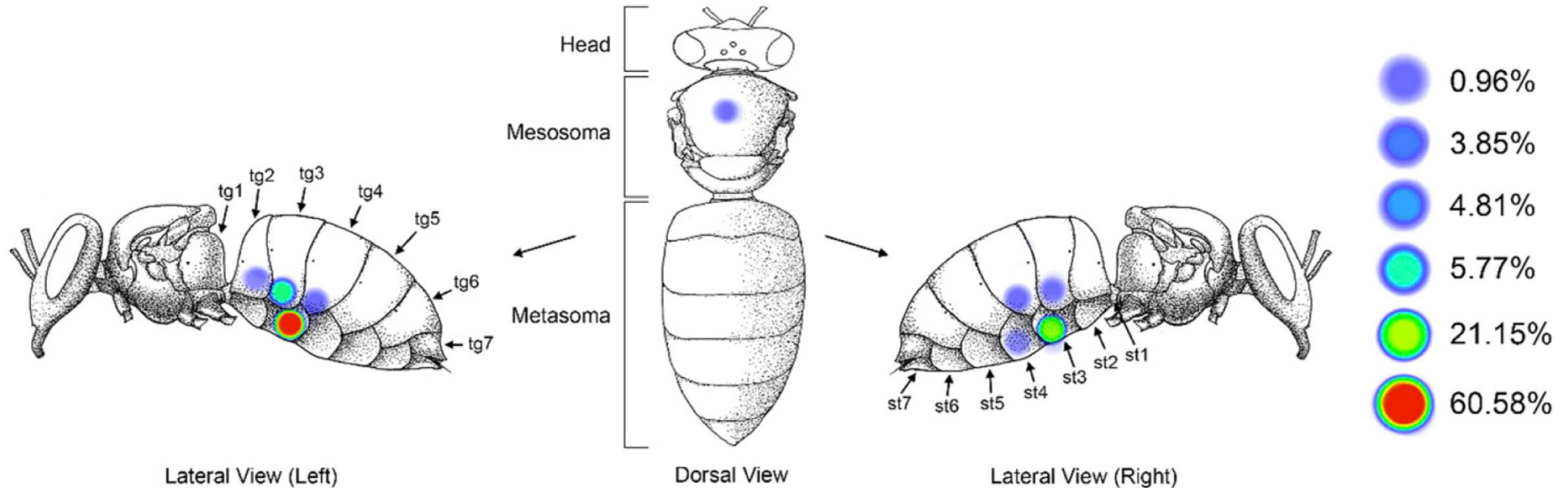


Fig. 1. *V. destructor* shows consistent preference for the underside of the metasoma of adult host bees, an area predominated by fat body tissue just beneath the cuticle. (Left) Diagram showing frequency of *Varroa* found in each location on 104 parasitized worker bees in five trials (st, sternite; tg, tergite). *Varroa* were found on the underside of metasoma as opposed to locations on the mesosoma or head (generalized linear model, GLM: $X_2^2 = 6.5$, $P < 0.001$). Mites strongly preferred the third segment of the metasoma to any of the other 23 locations (GLM: $X_2^2 = 4.5$, $P < 0.001$). Mites were also found preferentially on the Left side of the host (χ): $\chi^2 = 24.02$, $P < 0.001$.



2 af 3 mider lever skjult i ynglen



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Tilvækst i bifamilien

Opformeringen af mider sker langsomt

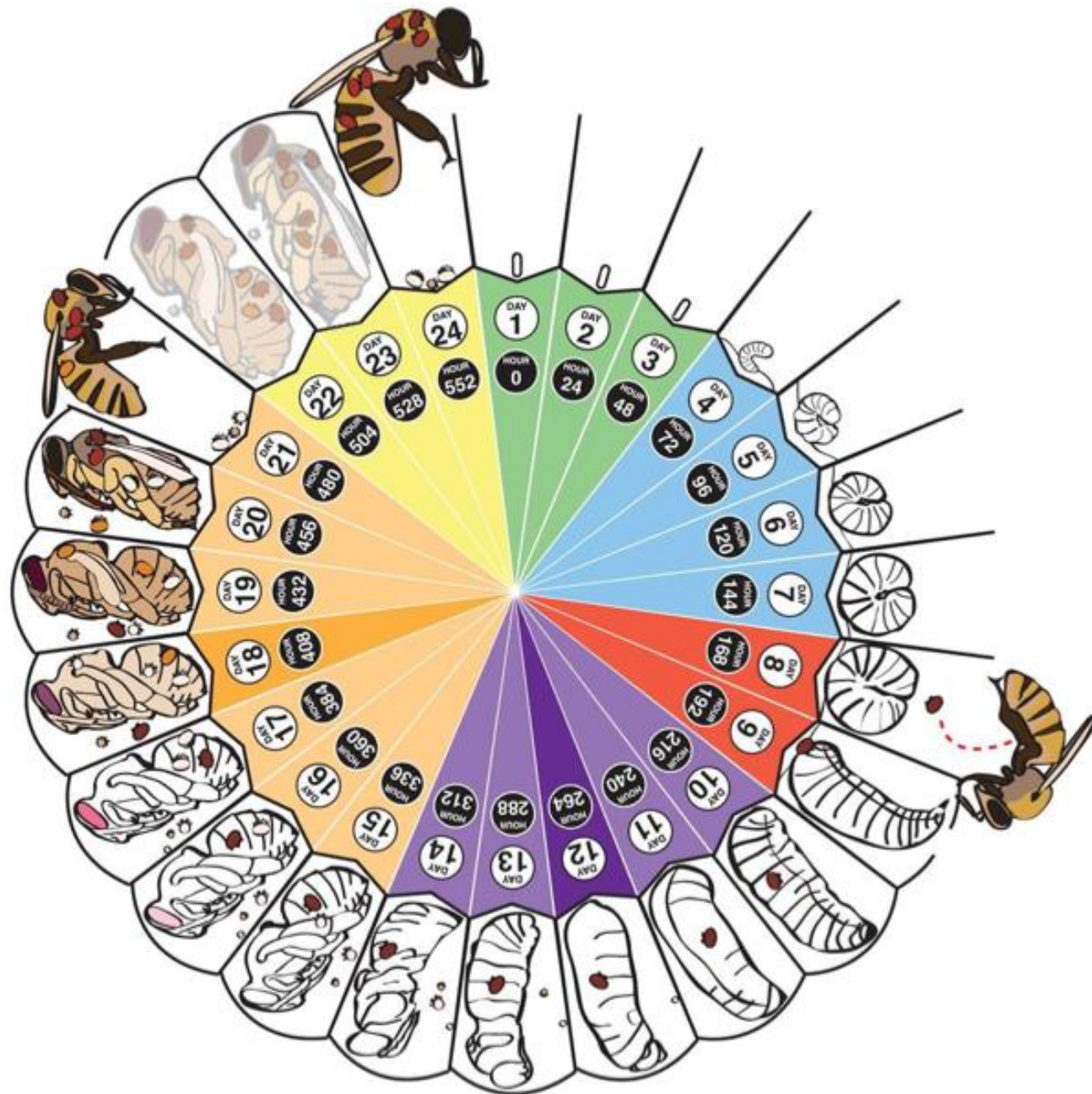
1-3 mider for hver arbejderbi, der klækkes

Dog 2-6 nye mider med hver ny drone

Skyldes den forskellige forseglingsperiode hos de to kaster

- 12 døgn hos arbejderbier og 15 døgn hos droner

Bedre reproduktionsrate ved 32° C, end ved 34,5° C



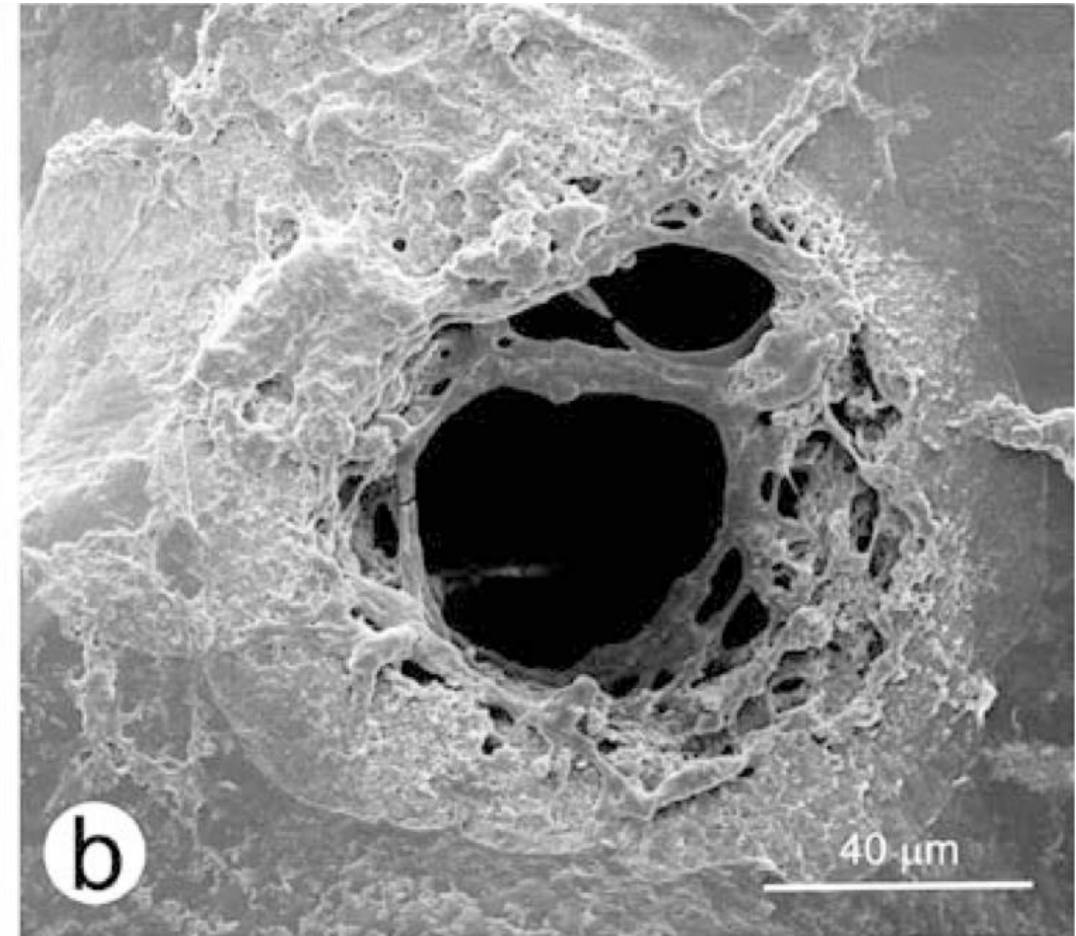
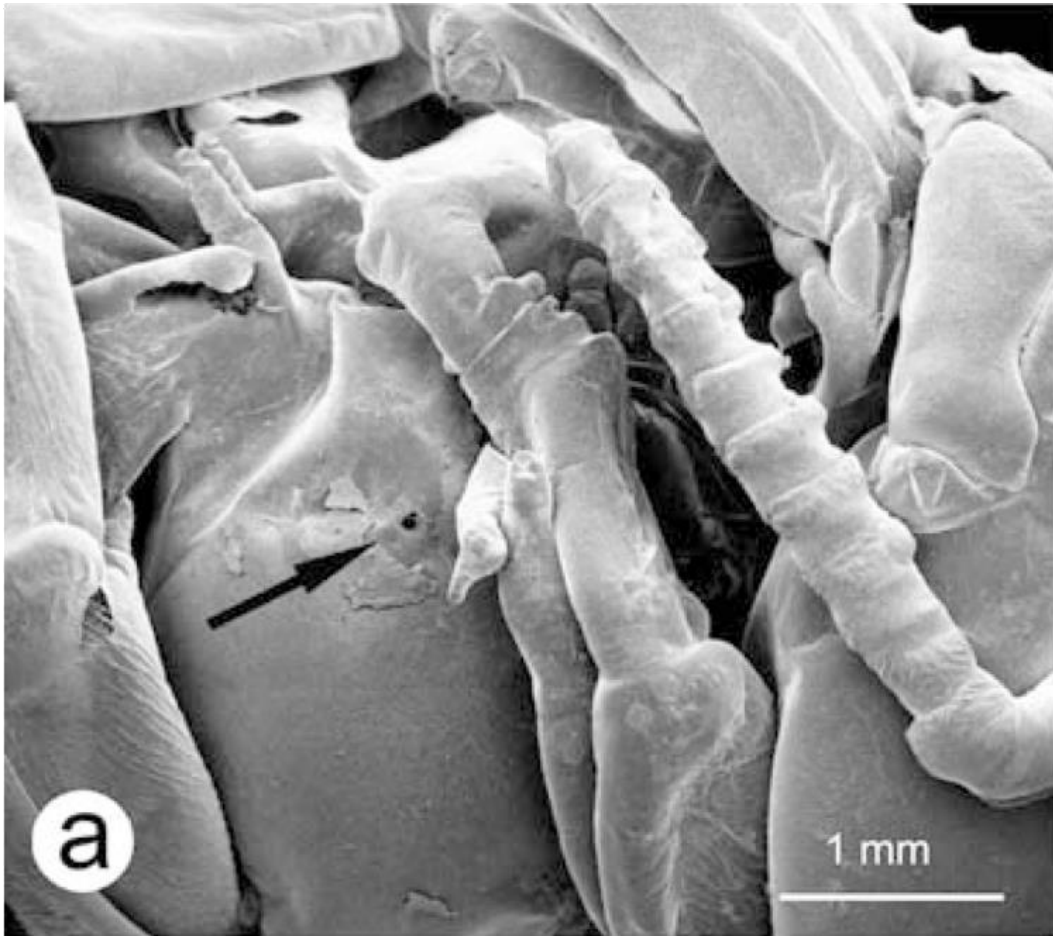
- egg
- larval stage pre-infestation
- *Varroa* enters cell (approx. 15 hours before capping)
- pre-pupal stage
- first *Varroa* egg
- pupal stage
- male *Varroa* reaches sexual maturity
- drone emerges 3 days after worker

- foundress mite
- egg
- male proto- / deutonymph
- female protonymph
- female deutonymph
- adult male
- pre-adult female
- adult female

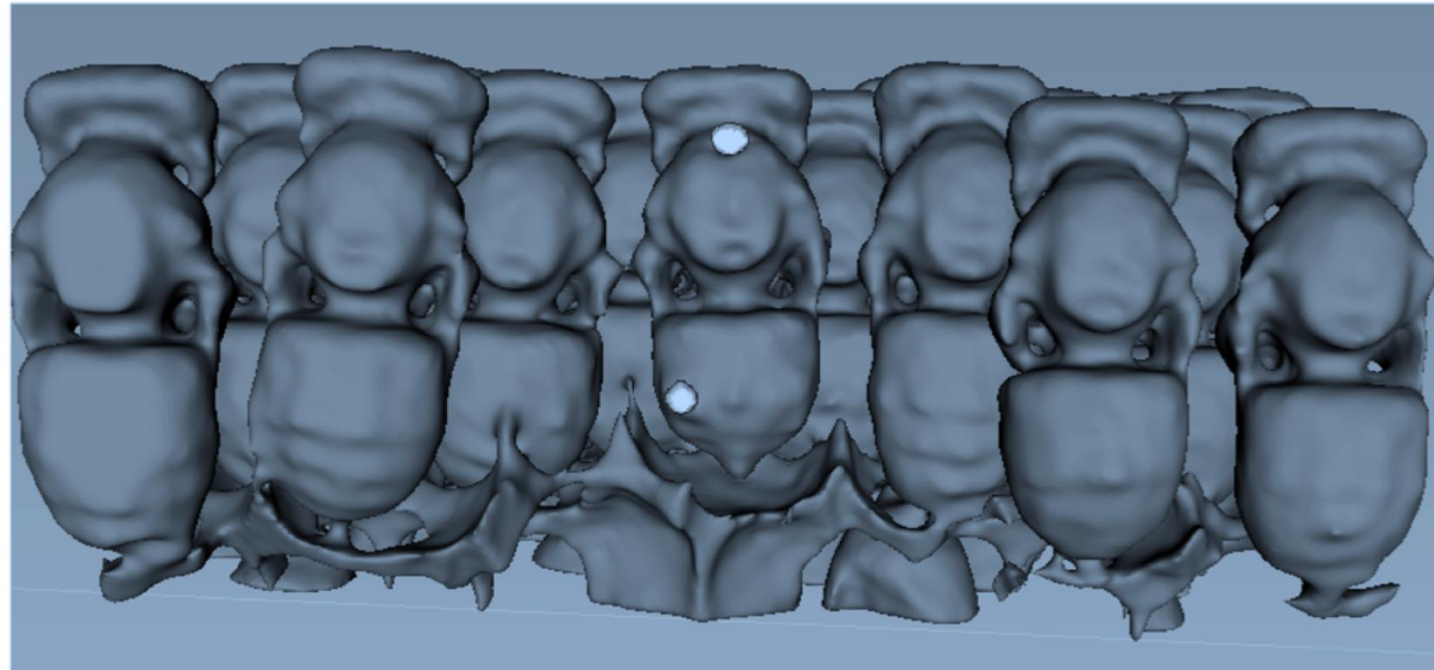
Communal use of integumental wounds in honey bee (*Apis mellifera*) pupae multiply infested by the ectoparasitic mite *Varroa destructor*

Ghazwan Kanbar and Wolf Engels

Fælles brug af sår i honningbier puppers ydre skelet med flere varroamider i cellen. Her æder miderne fra samme sår hæmolymfe (altså ikke fra fedtlegeme). Det er en form for yngelpleje!



mide og afkom æder 5 % af biens vægt



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DOI: [10.1007/s13592-020-00805-x](https://doi.org/10.1007/s13592-020-00805-x)

Original article



CT-supported analysis of the destructive effects of *Varroa destructor* on the pre-imaginal development of honey bee, *Apis mellifera*

Sándor KESZTHELYI¹, Tamás SIPOS¹, Ádám CSÓKA², Tamás DONKÓ²

CT scan understøttet analyse af varroamidens destruktive effekt på yngeludvikling af honningbier. Her æder de hæmolymfe!

Figure 5. Computer-based three-dimensional reconstructions of honey bee pupae infested by *V. destructor* in the comb. *V. destructor* are marked by white spots.



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Droneyngel fratagelse

Kan dronecellernes yngel undværes?

Hvor mange af jer anvender denne teknik?

Fordele ved droneyngelfratagelse

Ulemper ved droneyngelfratagelse

Der er andre ideer / hypoteser!

Droneyngel beskytter

De mider der opformeres i droneyngel
gør ikke skade på arbejderbierne

Fjernes droneyngel, tvinges miderne i stedet for til
arbejdercellerne

Dermed vil større andel af arbejdsbierne skades i
yngelfasen

Skal droneyngelfratagelse genovervejes?

Hvilefasen

Uheldigt ord har sneget sig ind faglitteraturen:

Foretiske mider, det er forkert

Varroamider er altid parasitter, også på de voksne bier

Hvilefasen sænker varroamidernes opformering

Funktionen er ikke kendt, men miderne er en uge ude af cellerne

Langsom modning af æg og sæd?

Mulig tilpasning til yngelfri perioder?

Øger chancen for spredning til andre bifamilier

Skadevirkning



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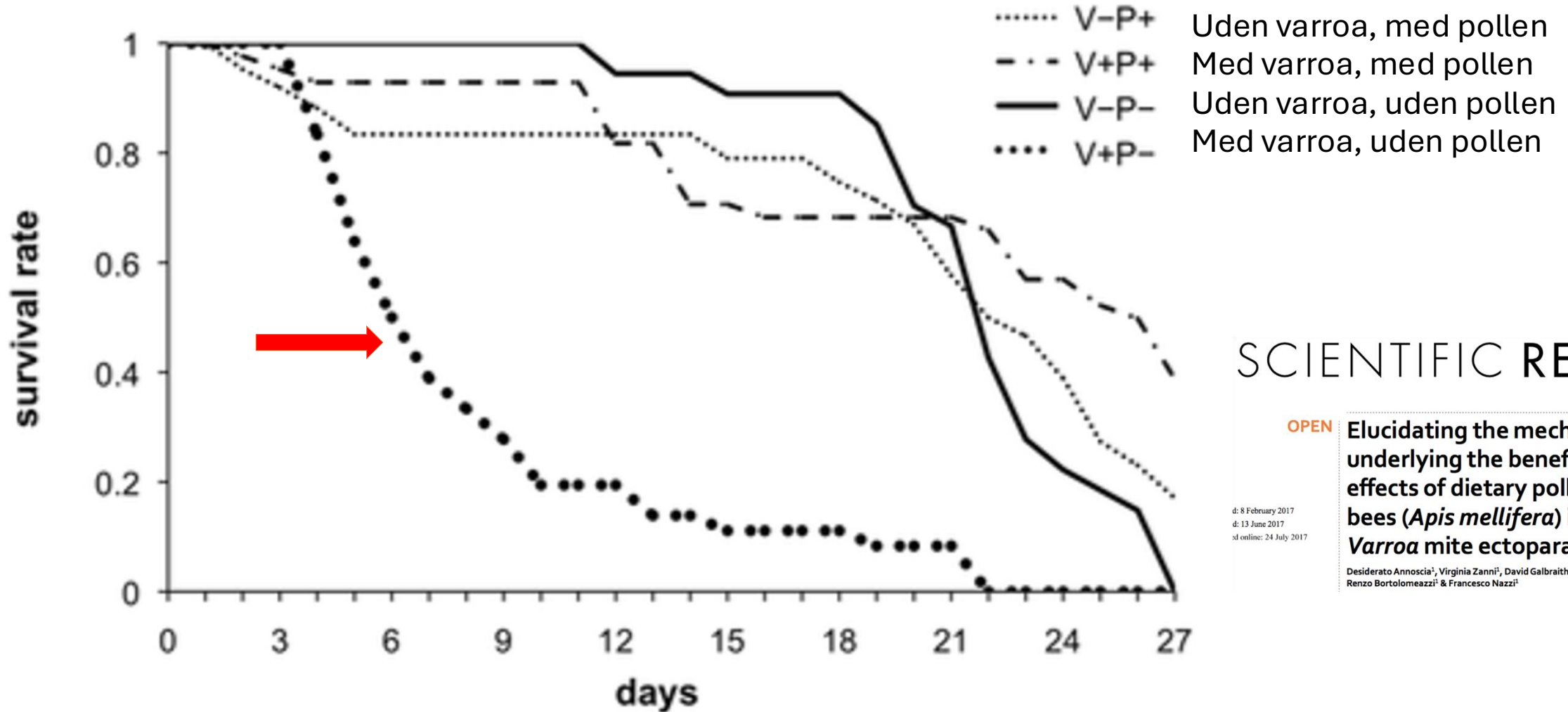
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Undersøgelse af pollens helsegivende effekter på honningbier der har været vært for varroamider i puppestadiet. **Markant kortere liv**



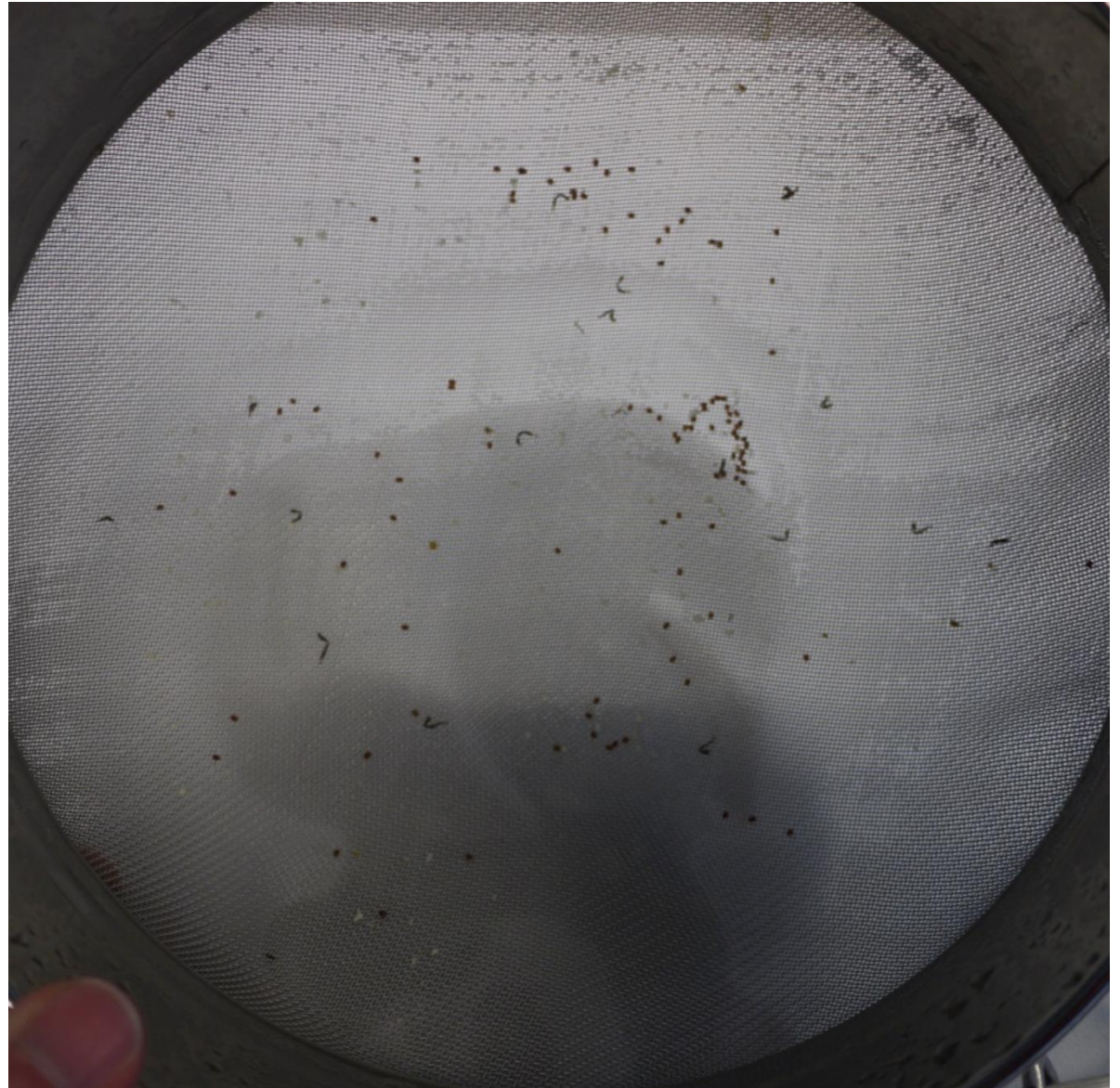
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OPEN

Elucidating the mechanisms underlying the beneficial health effects of dietary pollen on honey bees (*Apis mellifera*) infested by *Varroa* mite ectoparasites

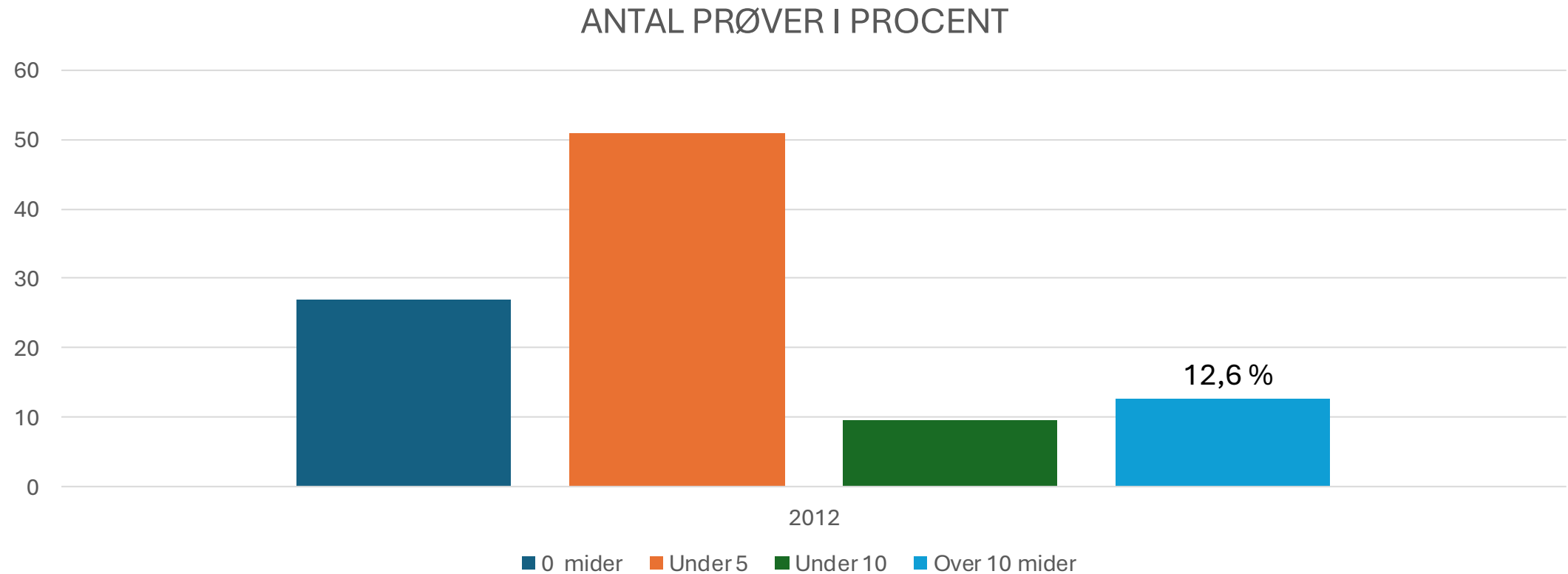
d: 8 February 2017
d: 13 June 2017
sd online: 24 July 2017

Desiderato Annoscia¹, Virginia Zanni², David Galbraith², Anna Quirici¹, Christina Grozinger², Renzo Bortolomeazzi¹ & Francesco Nazzi¹



Varroatryk - mider pr. 100 bier

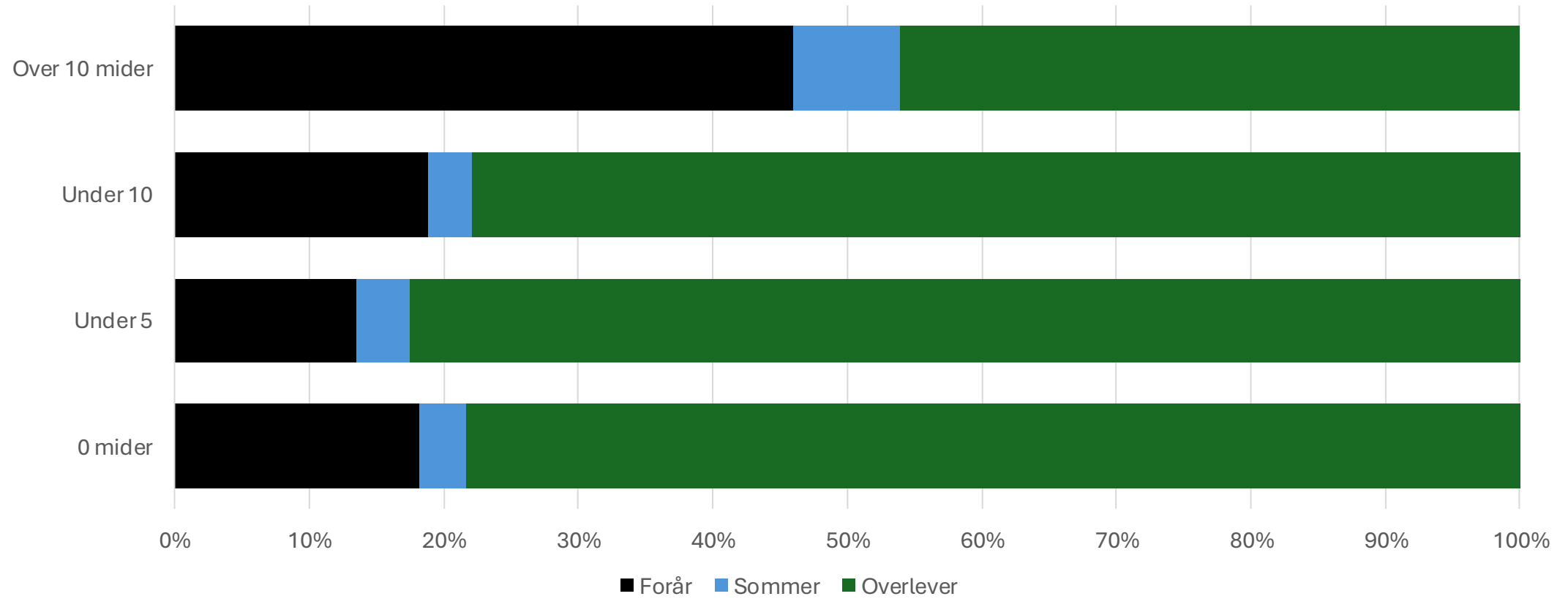
Fra Epilobee studiet SEPTEMBER 2012



Varroa tryk og overlevelse



Hvornår dør bierne?





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Varroasyge smitter

Miden kan skifte bi i blomster

Udbredes effektivt i samme bigård

Røveri spiller en hovedrolle

Lad os se lidt forskning på området

Der er flere forsøg, jeg har valgt ét

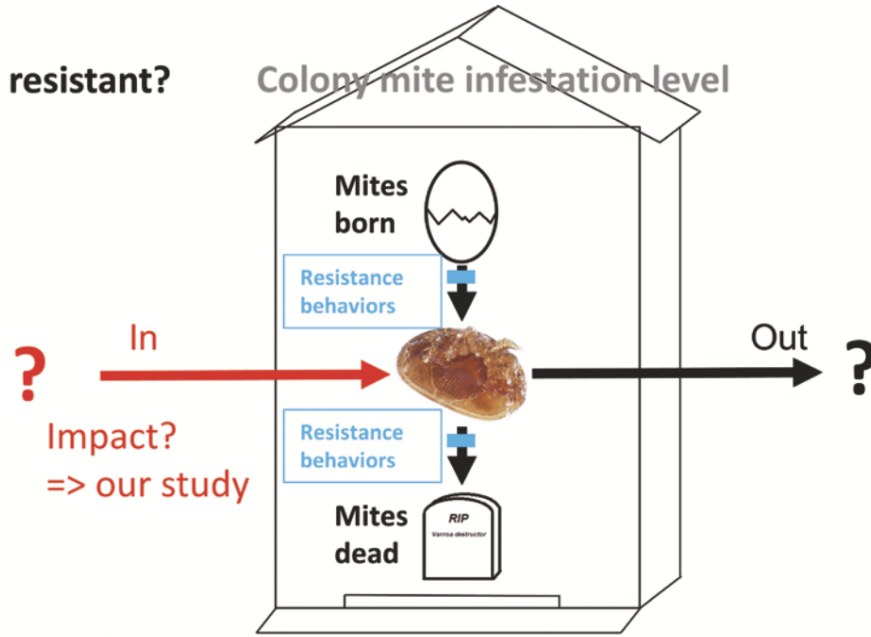
Do *Varroa destructor* bias colony infestation selection?

Matthieu Guichard^{1,*}

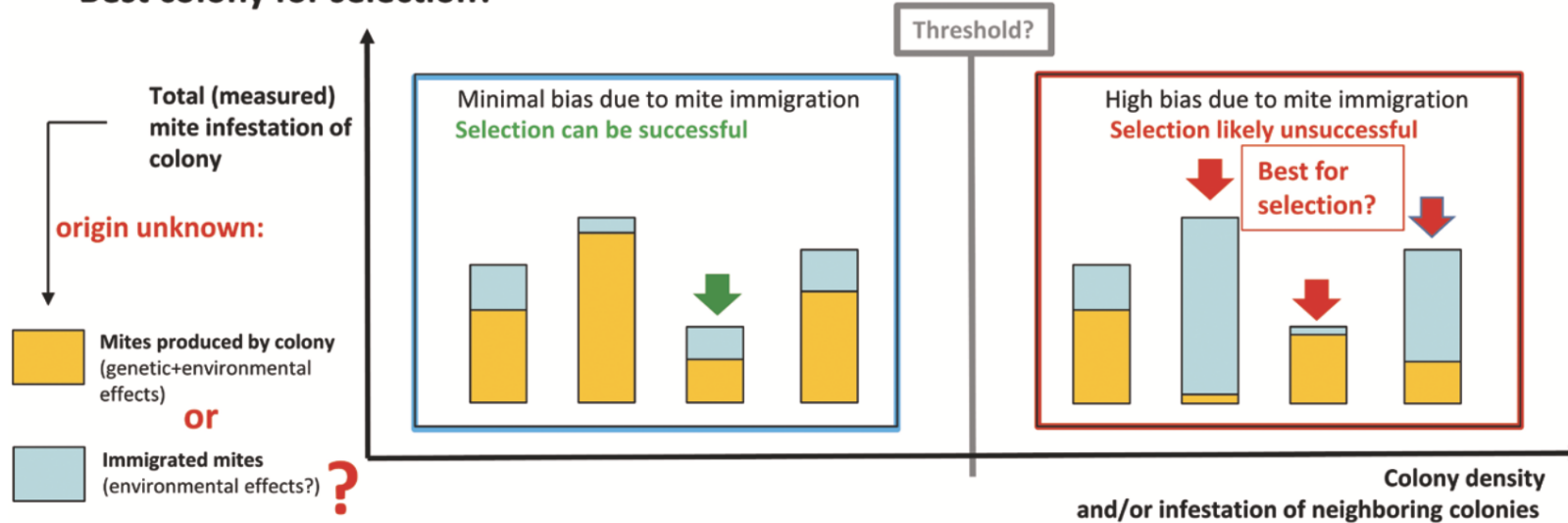
Graphical Abstract

More mites = less resistant?

Colony mite infestation level



Best colony for selection?



mellem

i forbindelse

Hvordan Kan dette undersøges?

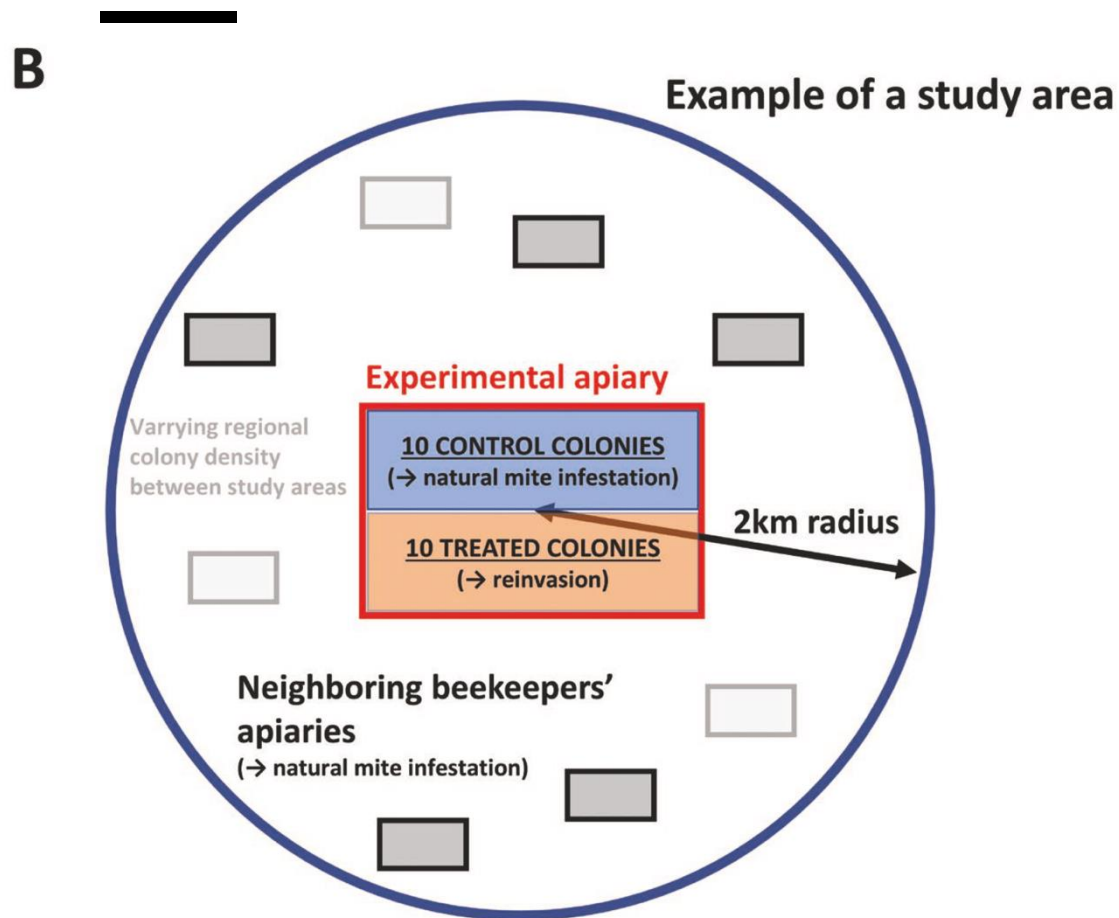


Fig. 1. A) Map of the three study areas. Each experimental apiary (red square) and the 2-km radius surrounding the study area (blue circle) are represented. The overlapping area between the two eastern zones (HE and GH) contained no apiaries. Landcover data from the swissTLMRregio map provides polygons with land use information: orange = built-up area and inhabited zone, green = forest, area without polygons: agricultural area. Map background and swissTLMRregio map © Swisstopo, reproduced with permission. B) Graphical representation of a 2-km radius study area with the experimental apiary in its center and a variable number of apiaries of neighboring beekeepers (gray tones).

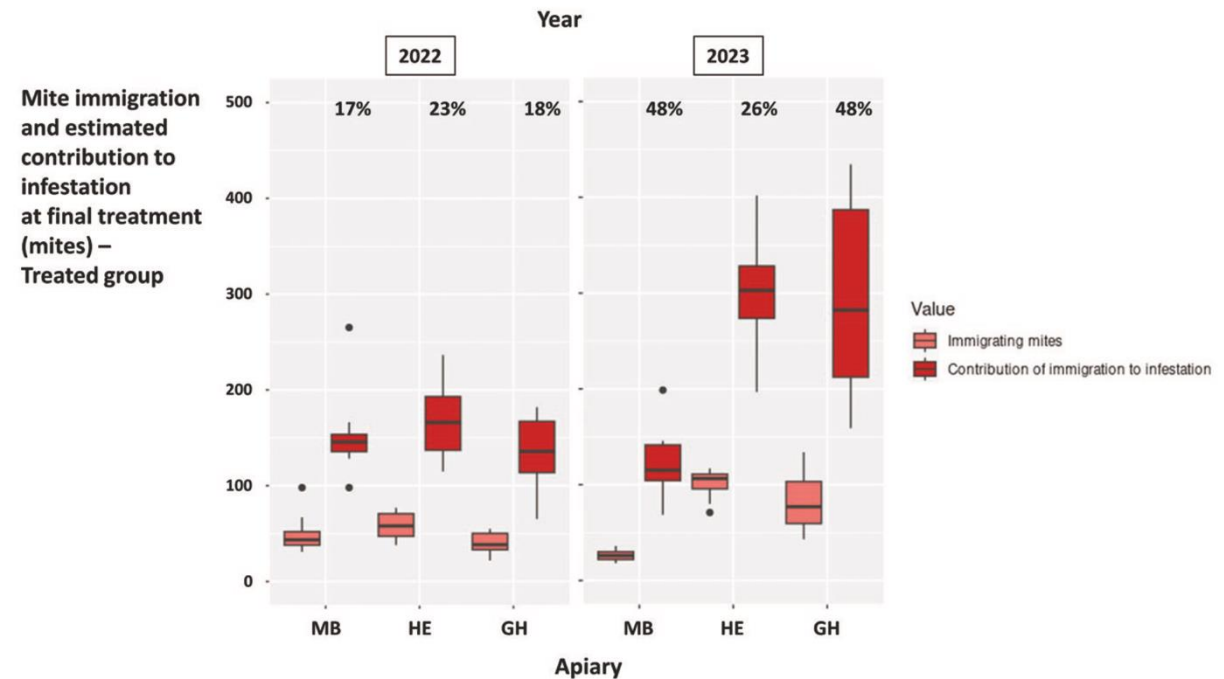


Fig. 6. Number of immigrating mites of the treated colonies from the three experimental apiaries MB, HE, and GH in 2022 and 2023 and their estimated contribution to final colony infestation level. The box plots represent the minimum value, first quartile, median, third quartile, and maximum values. The dots indicate points located more than 1.5 times above or below the interquartile range. The percentages in the upper part indicate the proportion of mites in the control colonies at the time of the final oxalic acid treatment that could be attributed to mite immigration.

Budskabet er, mellem 17 og 48 % af varroamiderne er kommet til bifamilierne udefra

Varroamiden giver varroasyge bier

Varroa slår ihjel uden virus i løbet af 4-5 år

Med virus går det hurtigere, mere om det efter pausen

Derfor skal I se bitab om vinteren som et tegn:

- Enten har I behandlet for sent, eller
- Jeres behandling er svigtet, eller
- Mider er kommet til efter behandling

Eller en kombination af ovenstående!

Det er et tegn på at I skal blive bedre til håndtere varroa!

Post mortem

Hvordan tæller man varroa i en død bifamilier?

Skær tavlen over vandret.
Varroamidens ekskrementer er i cellernes øvre del

