



Apis mellifera resistance to *Varroa destructor* across continents

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Le Conte, Y., Mondet, F., Dalmon, A.

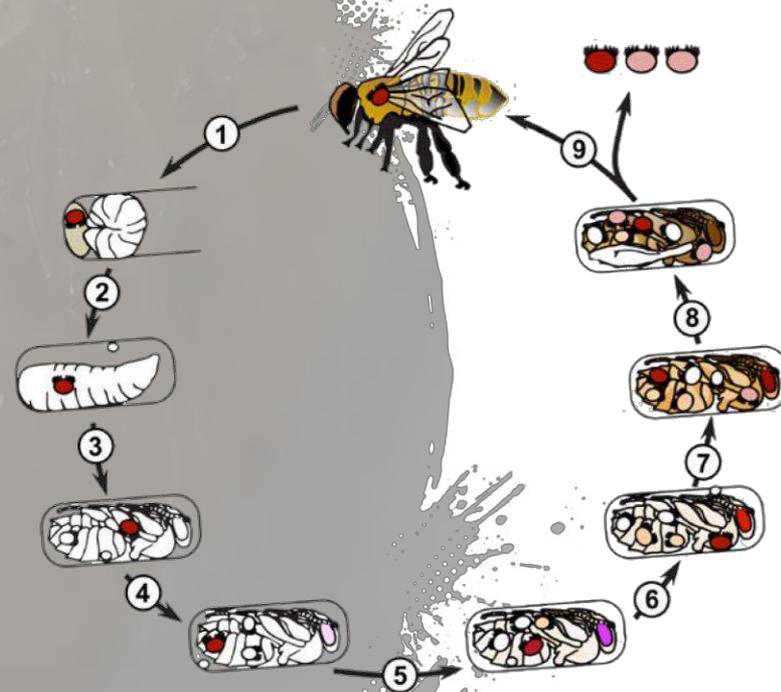
Varroa destructor

Is the most devastating parasite of *Apis mellifera*

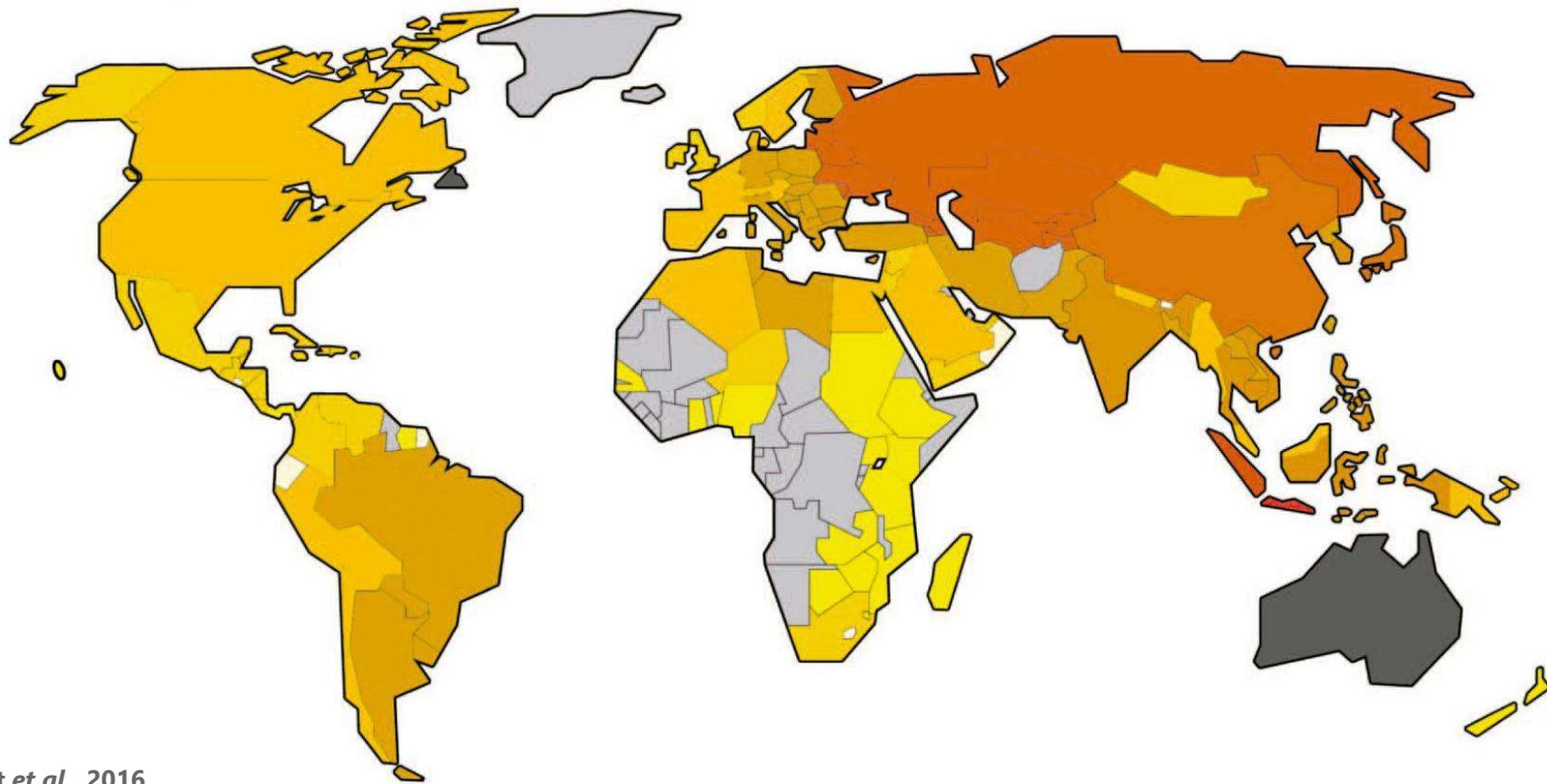
Spends its life inside the hives and reproduces inside the brood cells that contain pupae

Also causes damages because it transmits viruses

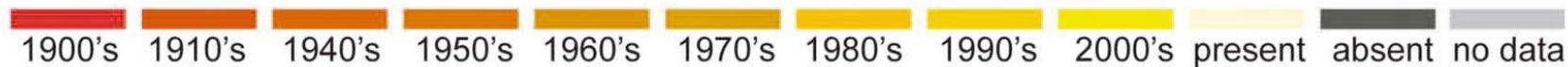
Colonies that are not treated normally die after a few years



Global spread of *V. destructor* in *A. mellifera*



Wilfert *et al.*, 2016



Some populations of *A. mellifera* survive varroa infestation without treatment



- Signif. diff. from mite-susceptible population
- Non signif. diff.
- Not yet been measured

AHB africanized honey bees

EHB european honey bees

AHB

EHB

EHB

EHB

EHB

AHB

Brazil

South Africa

Fernando de
Noronha

Primorsky,
Russia

Gotland,
Sweden

Avignon,
France

Arnot Forest,
NY, USA

Treinta y Tres
Uruguay

Hygienic
behaviour



Grooming
behaviour



Small colony
size



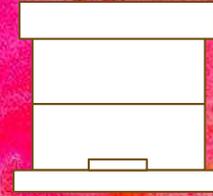
Reduced
development
time



Reduced mite
reproduction



In Uruguay honey bees are africanized



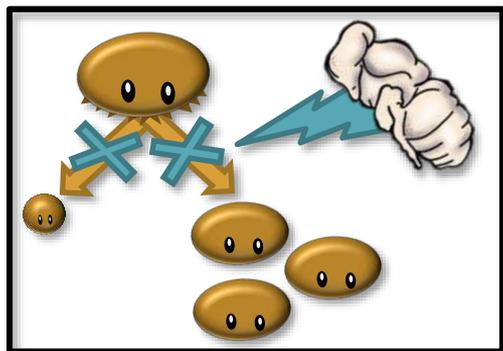
The aim of this work was to
characterize possible traits associated
with the natural survival of these
populations



Grooming



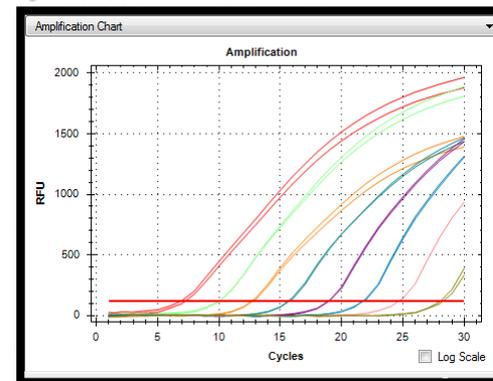
Varroa-Sensitive Hygiene (VSH)



Suppression of Mite Reproduction (SMR)



Differences of varroa (Genotyping)

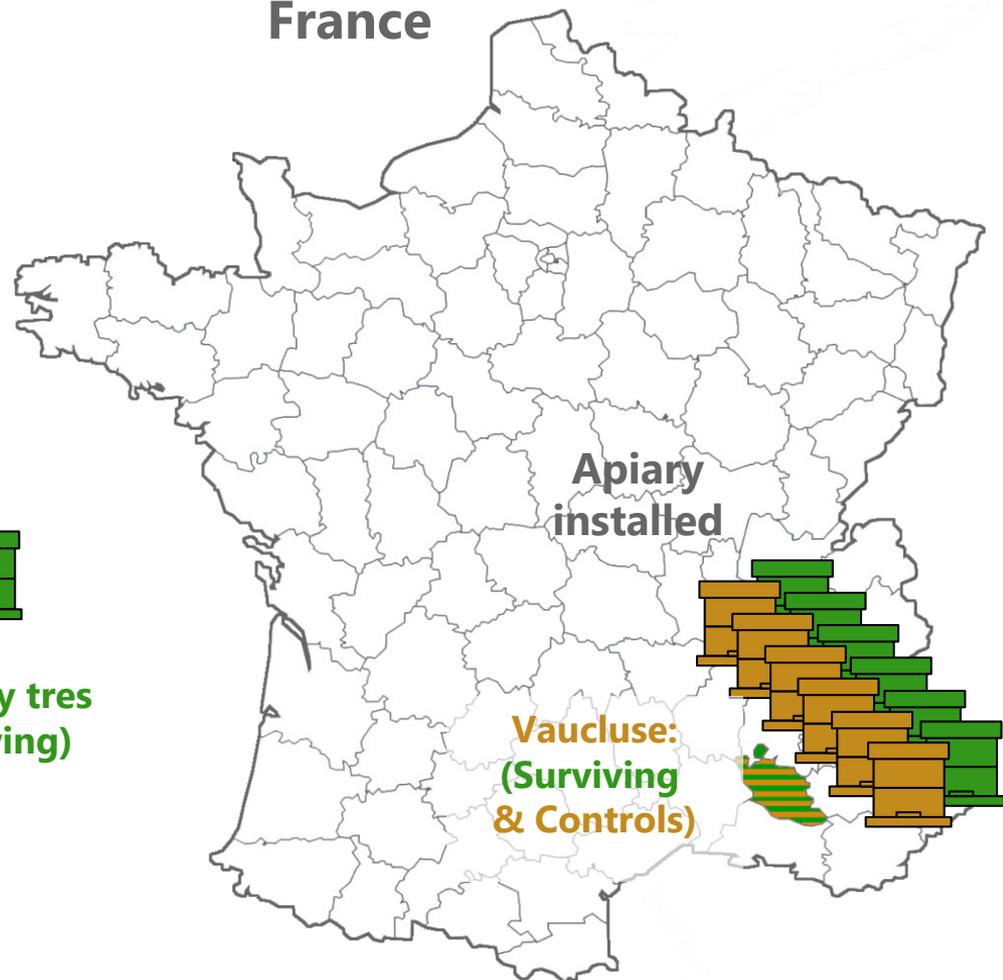


DWV quantification and sequencing

Uruguay



France



Artificial infestation:

Morning

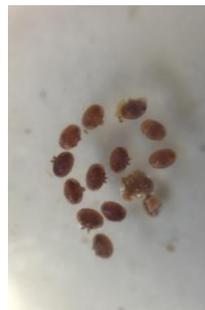


Find old larvae



Mark cells

Afternoon



Collect mites



Find cells



Infest cells

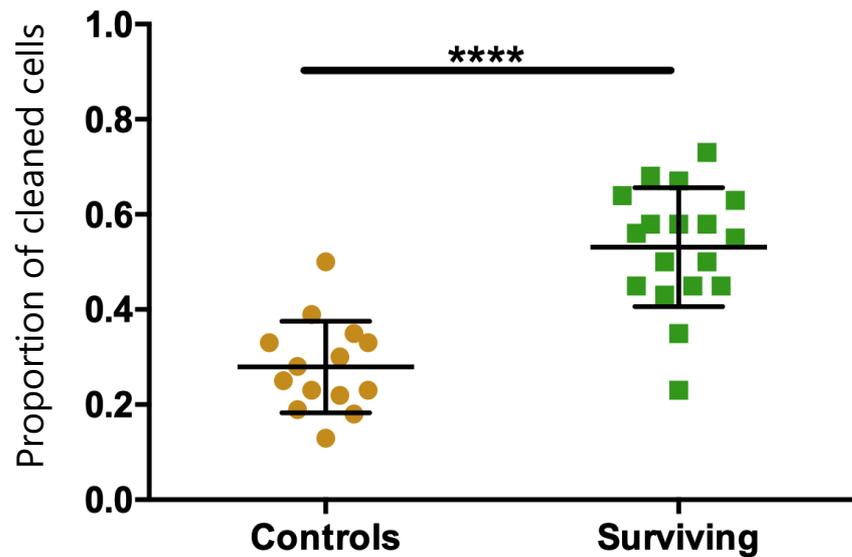
Open the hive



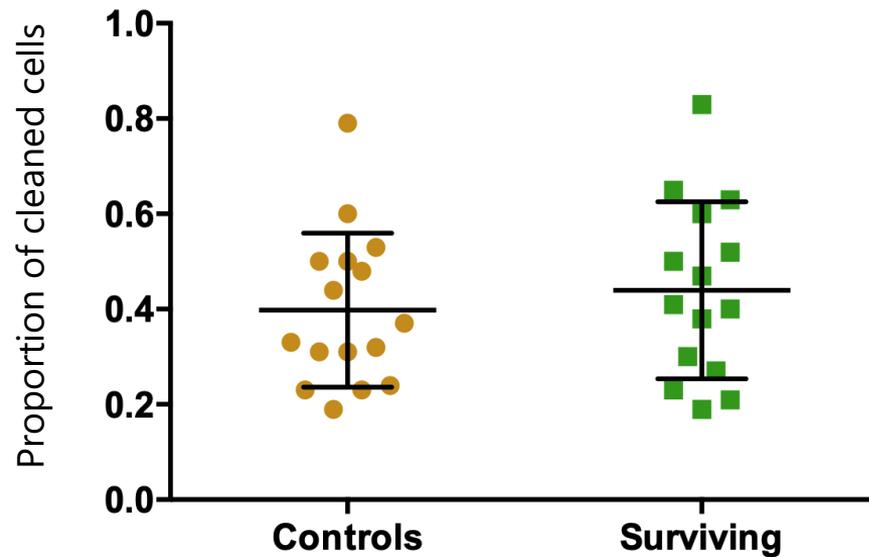
7 days later: VSH Index



Uruguay

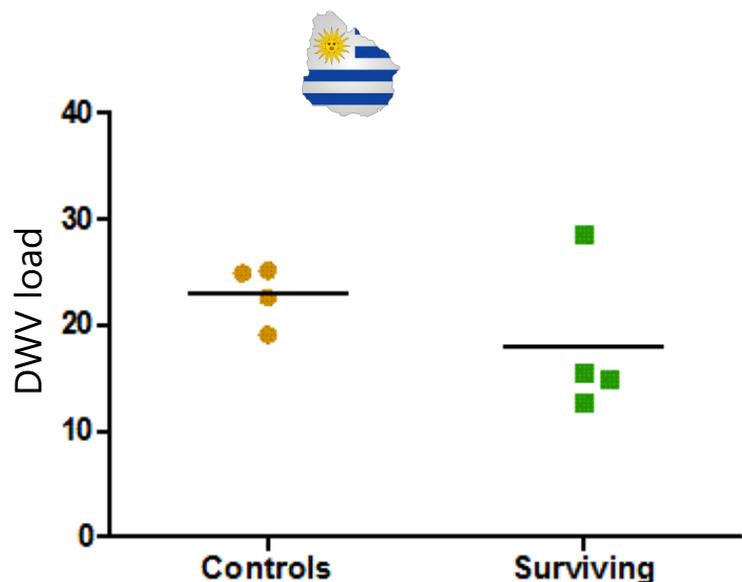


France

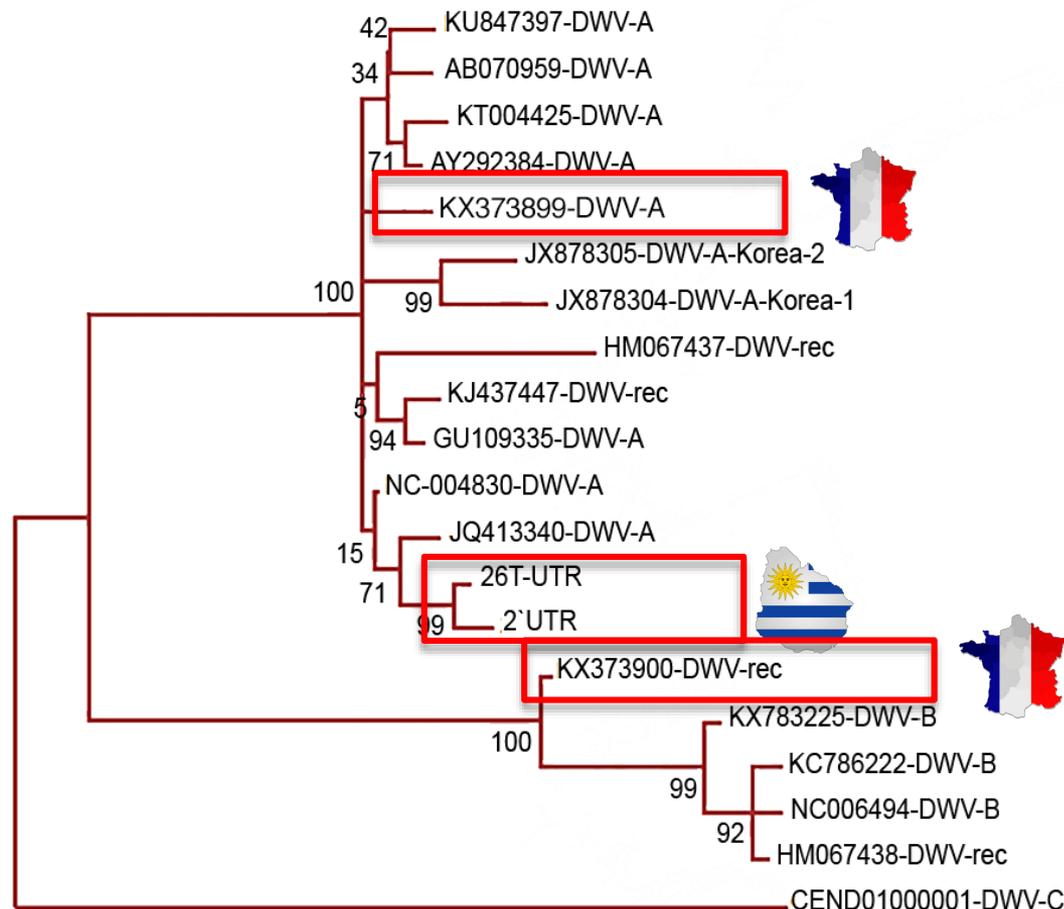


DWV quantification and sequencing

Absolute quantification by RT-qPCR



With primers from Kevill *et al.*, 2017
DWV circulating in Uruguay is DWV-A

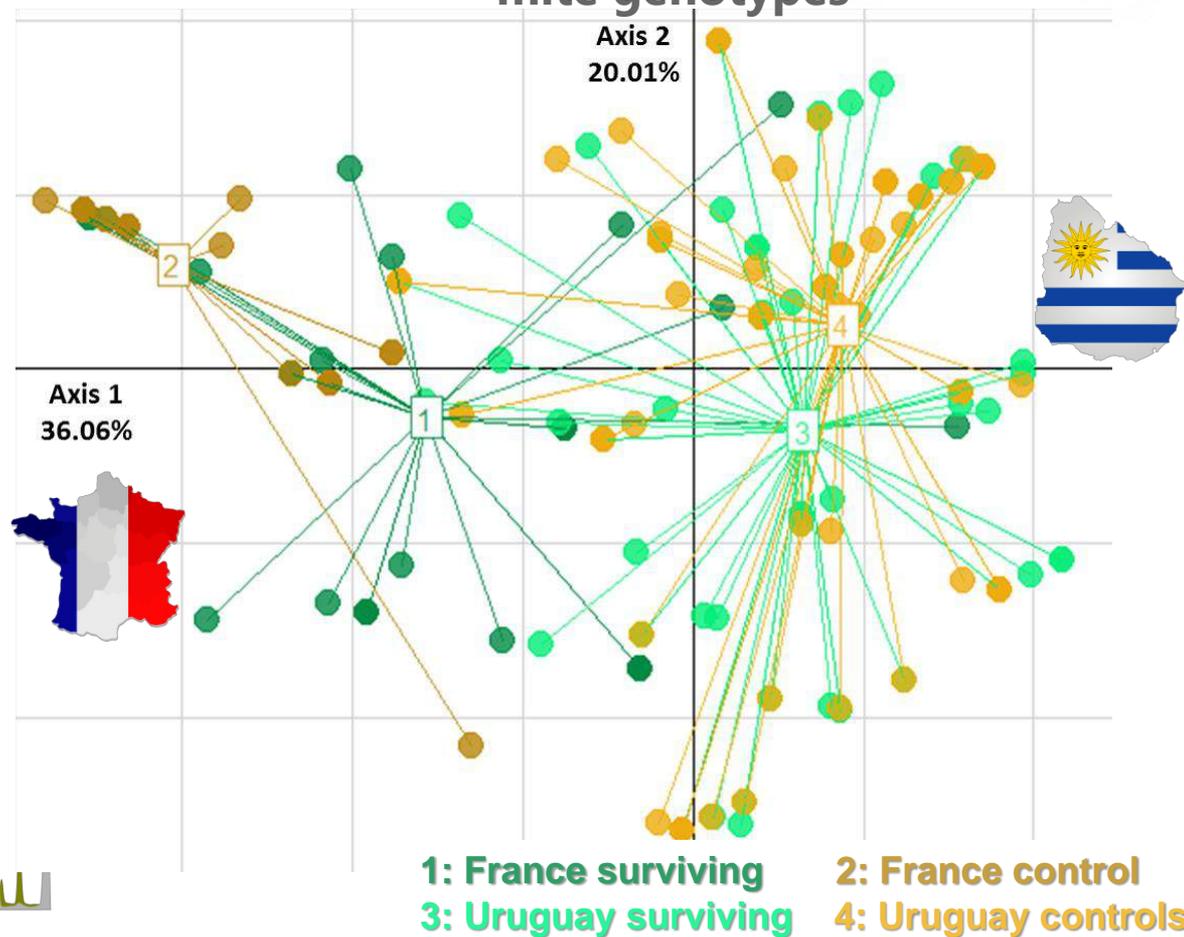
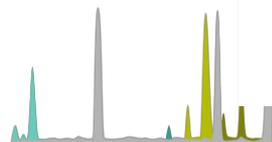


0.02

With primers from Dalmon *et al.*, 2017

Population structure of varroa

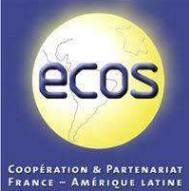
Principal Component Analysis based on mite genotypes



- Signif. diff. from mite-susceptible population
- Non signif. diff.
- Not yet been measured

Different behaviors are contributing to colony survival in the two surviving honeybee populations

	Brazil	South Africa	Fernando de Noronha	Primorsky, Russia	Gotland, Sweden	Avignon, France	Arnot Forest, NY, USA	Treinta y Tres Uruguay
Hygienic behaviour	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Grooming behaviour	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Reduced mite reproduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>					
Divergence in mite population						<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
DWV population						DWV-A VDV-1 REC		DWV-A



Thanks!

Any questions?

- Alexis Beaurepaire
- Karina Antúnez
- Belén Branchiccela
- Loreley Castelli
- Ciro Invernizzi
- Yves Le Conte
- Fanny Mondet
- Anne Dalmon
- Cristina Sann
- Carlos Silva
- Gustavo Ramallo
- Pablo Cracco
- Arnoldo Moreni

