



The Ephrin receptor: a potential actor in polerovirus transmission by aphids

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The Ephrin receptor: a potential actor in polerovirus transmission by aphids

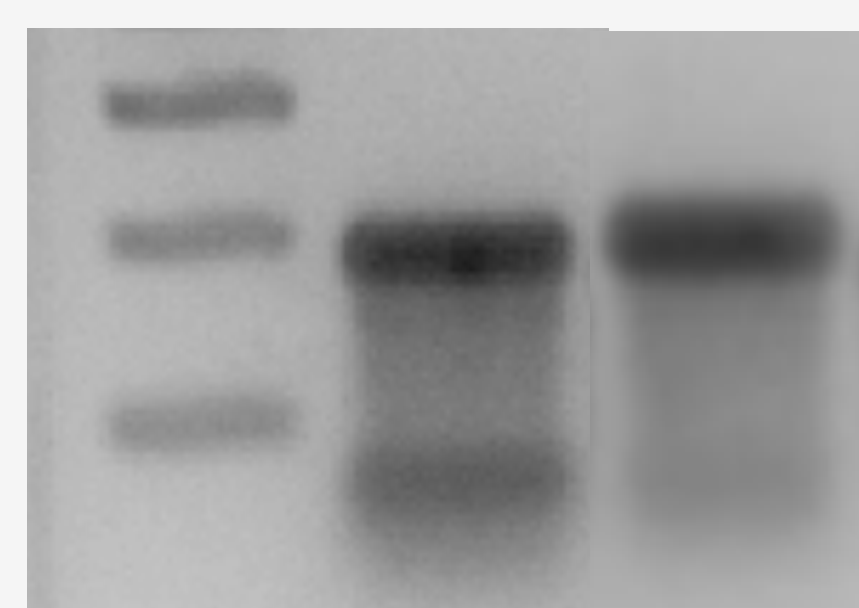
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Poleroviruses are phloem-limited RNA viruses strictly transmitted by aphids in a circulative and non-propagative mode. Virus particles, acquired by aphids on infected plants, successively cross intestinal and accessory salivary gland cells by transcytosis before being released, together with saliva, into a plant during aphid feeding. Virus transport through the epithelia relies on the presence of specific virus receptors. The Ephrin receptor (*Ephr*) from *Myzus persicae* has been identified as a potential partner of the structural proteins of the polerovirus *Turnip yellows virus* (TuYV). In order to address its function in TuYV transmission by *M. persicae*, we developed an RNA interference-based strategy to inhibit *Ephr* expression in *M. persicae*. When fed on a viral source, the *Ephr*-silenced aphids showed a lower internalization of viral genomes into their body and a reduced ability to transmit the virus. Taken together, these experiments strongly suggest implication of *Ephr* in TuYV acquisition by *M. persicae*.

Oral acquisition by aphids of *in vitro* synthesized dsRNA targeting *Ephr*

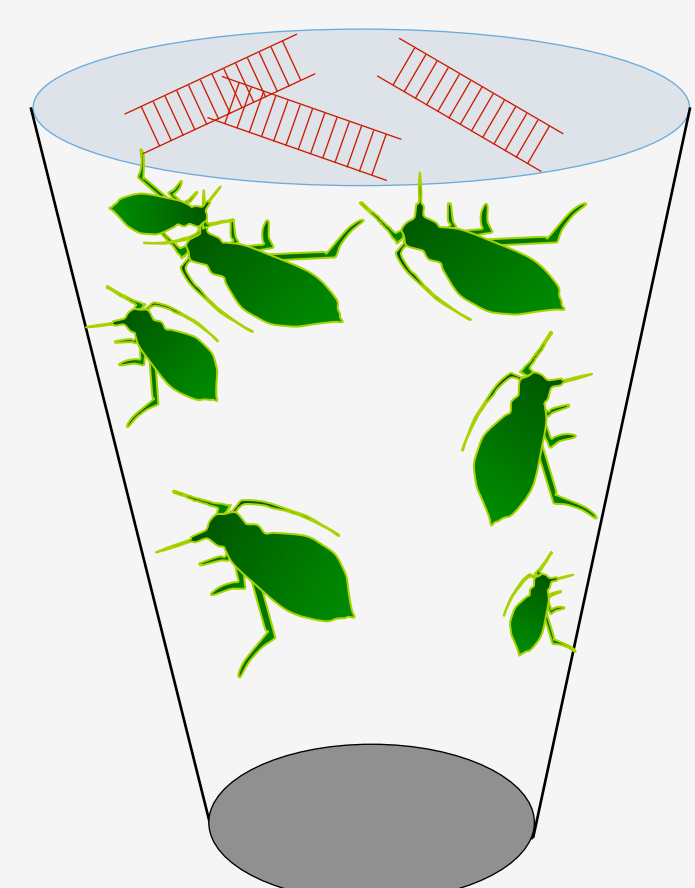
LacZ used as a control

dsRNA-*Ephr*
dsRNA-*LacZ*



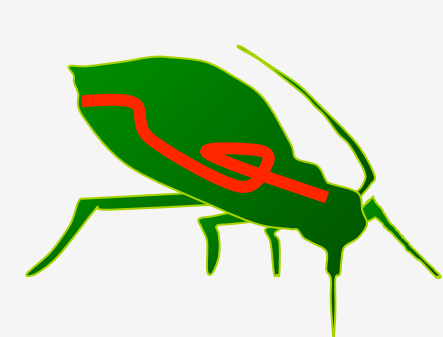
In vitro synthesized dsRNA
(agarose gel)

dsRNA-*Ephr* or dsRNA-*LacZ*

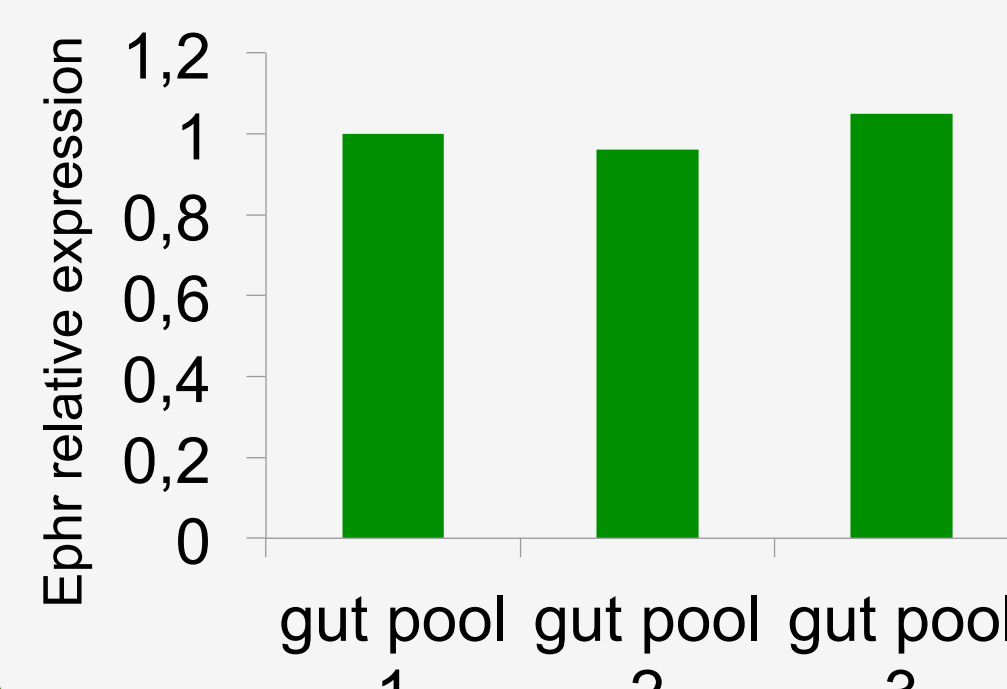


5 days acquisition
by aphids

Ephr-mRNA accumulation in aphids after dsRNA-*Ephr* acquisition

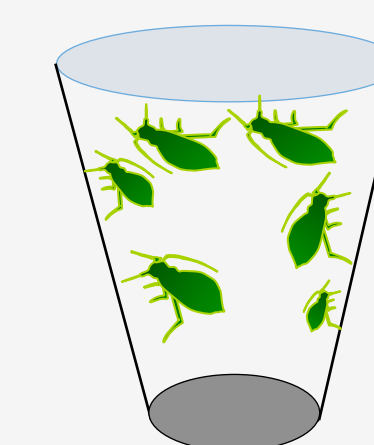


Gut dissection before Q-RT-PCR
analysis



	Exp.1	Exp.2	Exp.3	Exp.4
Relative expression of <i>Ephr</i> (% inhibition)	-54%	-9%	+40%	-57%

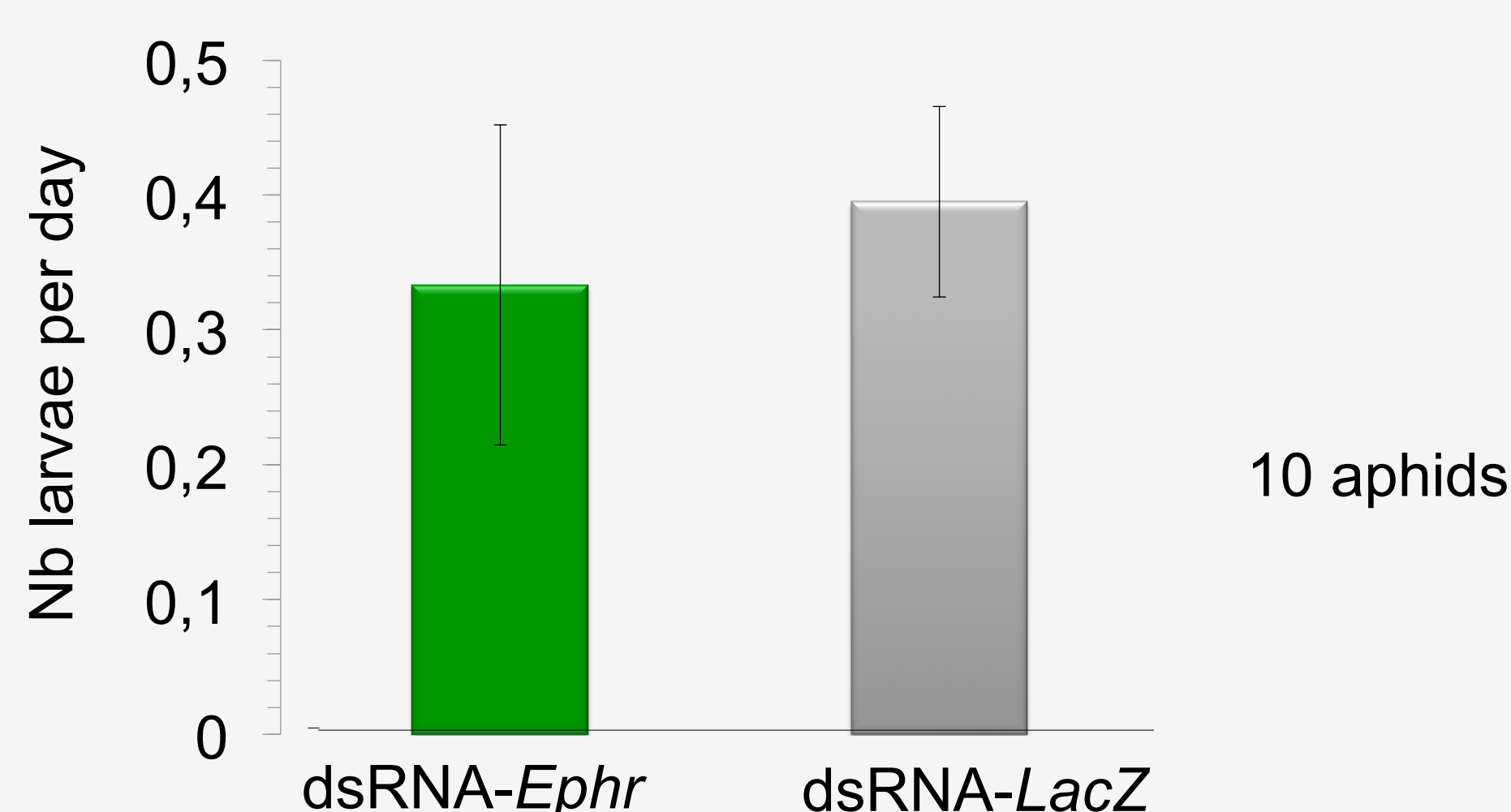
Inhibition of *Ephr*-mRNA accumulation
after dsRNA acquisition is not
reproducibly observed



Ephr expression is unstable in
aphid's guts after *in vitro* feeding

May be responsible for the
lack of reproducible
silencing of *Ephr*?

Aphid fecondity is not affected by dsRNA-*Ephr* acquisition



Nb larvae daily produced by aphid
during 5 days after dsRNA acquisition

Aphid feeding is positively affected by dsRNA-*Ephr* acquisition

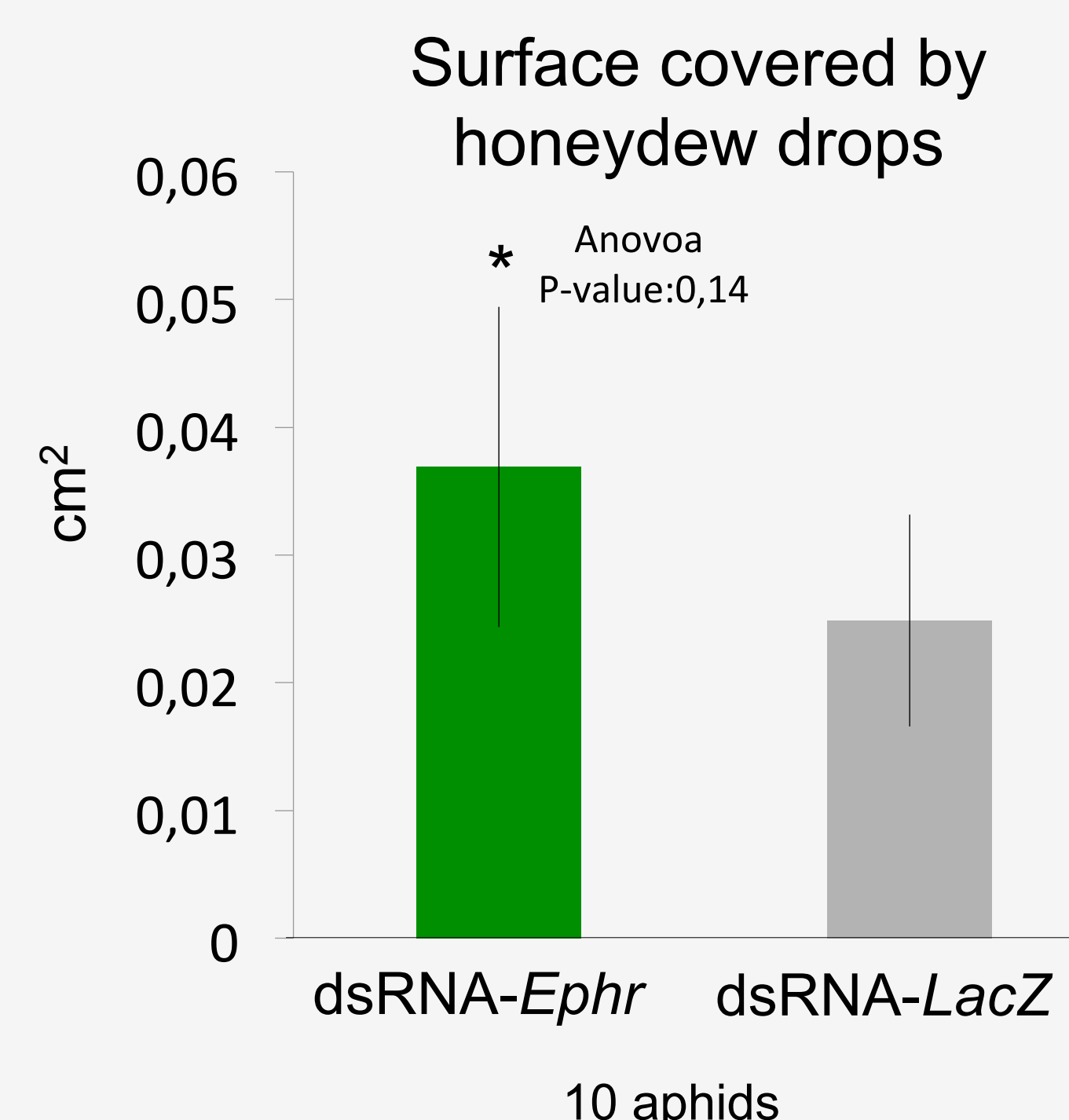
Artificial feeding medium

Ephr-silenced aphids

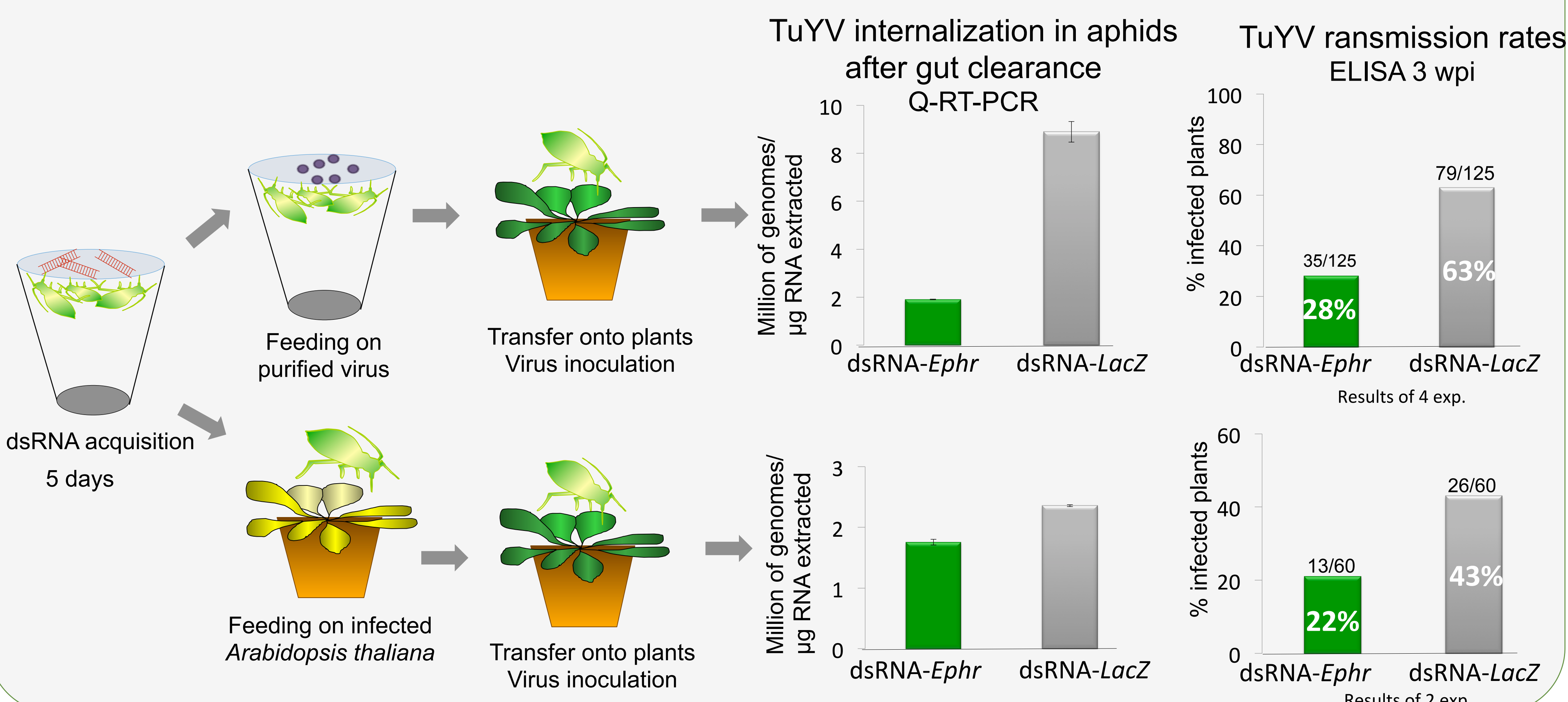
pH indicator paper



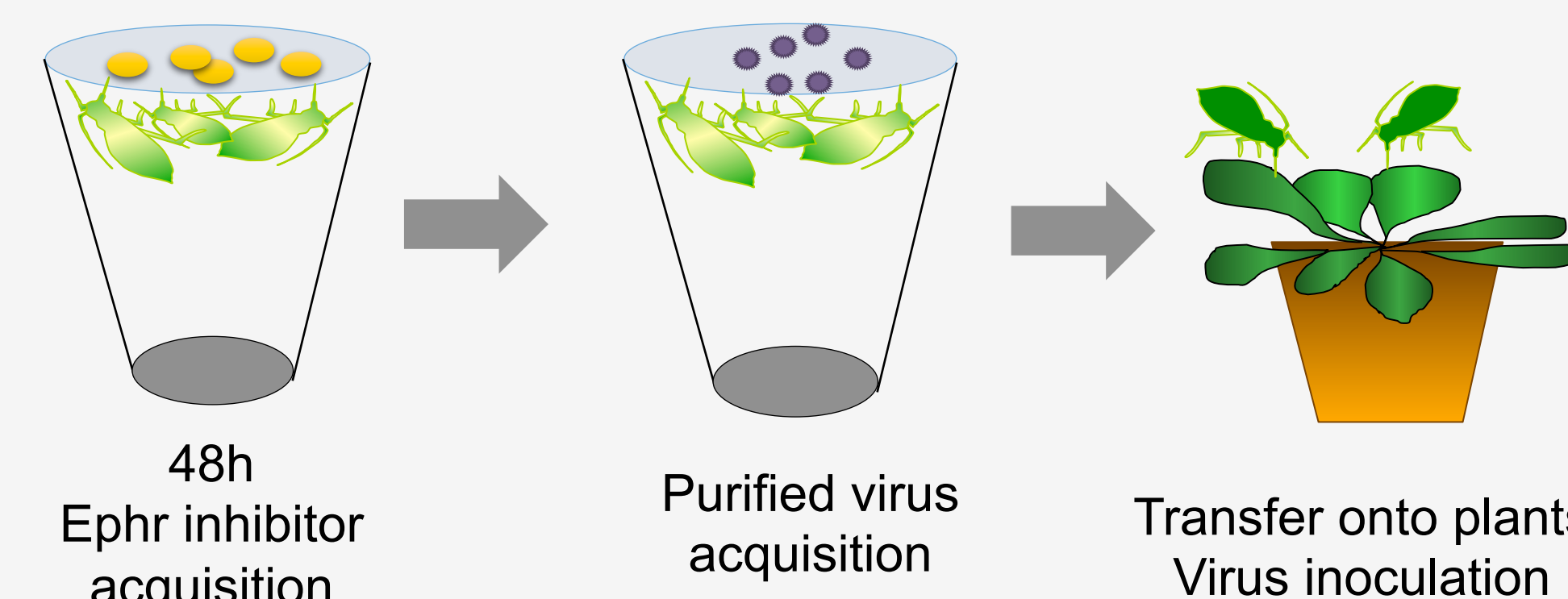
Honeydew collect during 24h
image analysis with ImageJ software



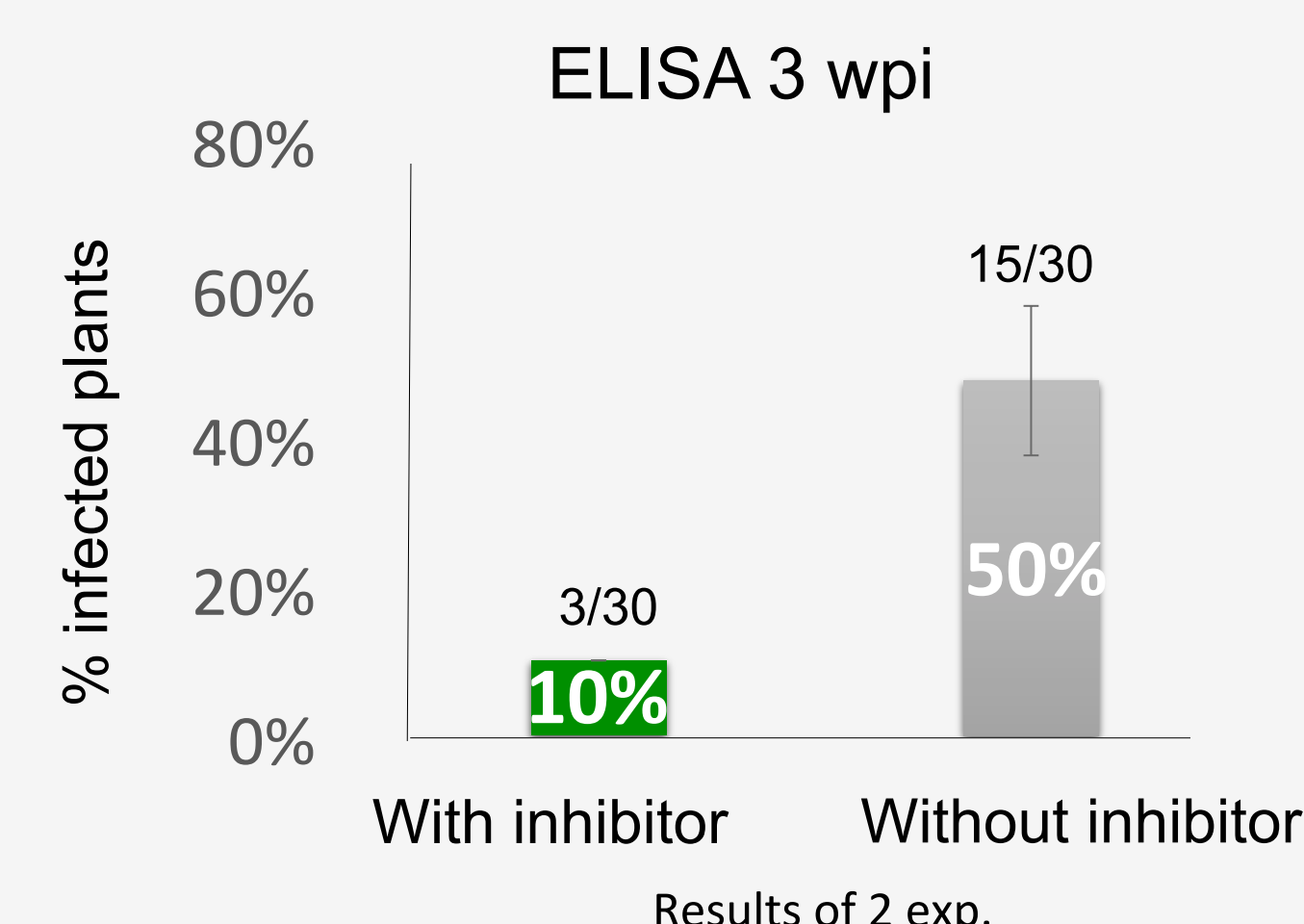
Acquisition of dsRNA-*Ephr* reduces virus internalization in aphids and virus transmission to plants



Virus transmission is decreased after acquisition of mamalian *Ephr* inhibitor*



*Max Tognolini, Dipartimento di scienze degli alimenti e del farmaco, Parma, Italy



Conclusions

A 5 day-acquisition of dsRNA-*Ephr* by aphids reproducibly induced a lower internalization of TuYV genome into aphid's body, although reduction of *Ephr*-mRNA accumulation could not be systematically confirmed. Aphids fed on dsRNA-*Ephr* reproducibly transmitted TuYV with a lower efficiency while their feeding behavior was not reduced and their fecondity not altered. Feeding aphids on *Ephr* inhibitor before virus acquisition also reduces virus transmission. Taken together, these experiments strongly suggest implication of *Ephr* in polerovirus transmission. Whether *Ephr* encodes a true virus receptor or a co-receptor still needs to be elucidated.