Ecdysone Receptor (*EcR*) role in the oogenesis of the cockroach *Blattella germanica*

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BACKGROUND

The role of Ecdysone hormone in oogenesis has been mostly characterized in insects with meroistic ovaries, such as *Drosophila melanogaster*. However, it is interesting to further explore its role in phylogenetically basal species, and therefore the cockroach *Blattella germanica,* an hemimetabolous insect with panoistic ovaries, is presented as a good model.

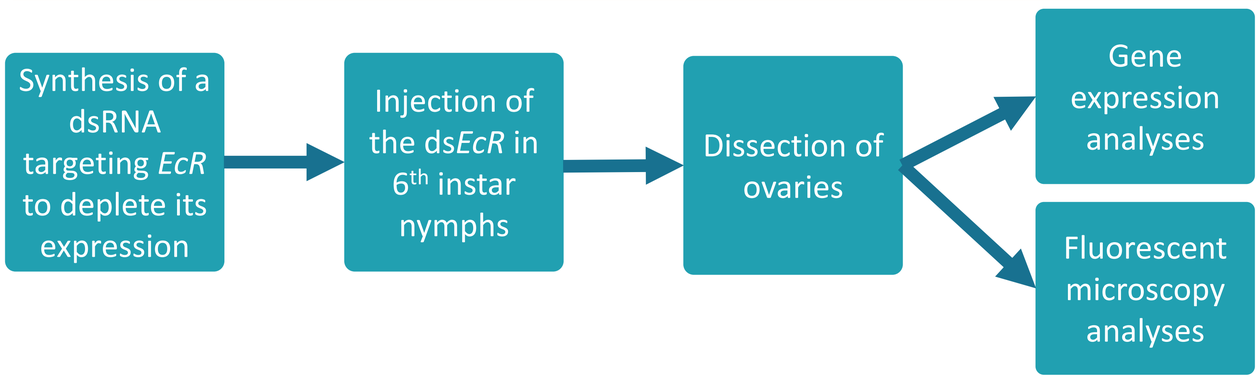
Our group observed that administration of 20-hidroxyecdysone (20E), the active form of the hormone, in sixth-instar nymphs and adults produced an increment in the number of differentiated ovarian follicles[1]. Thus, we wanted to assess the effect of a depletion in 20E. To do so, we interfered the Ecdysone receptor (*EcR*) in sixth instar nymphs and adults.

QUESTIONS

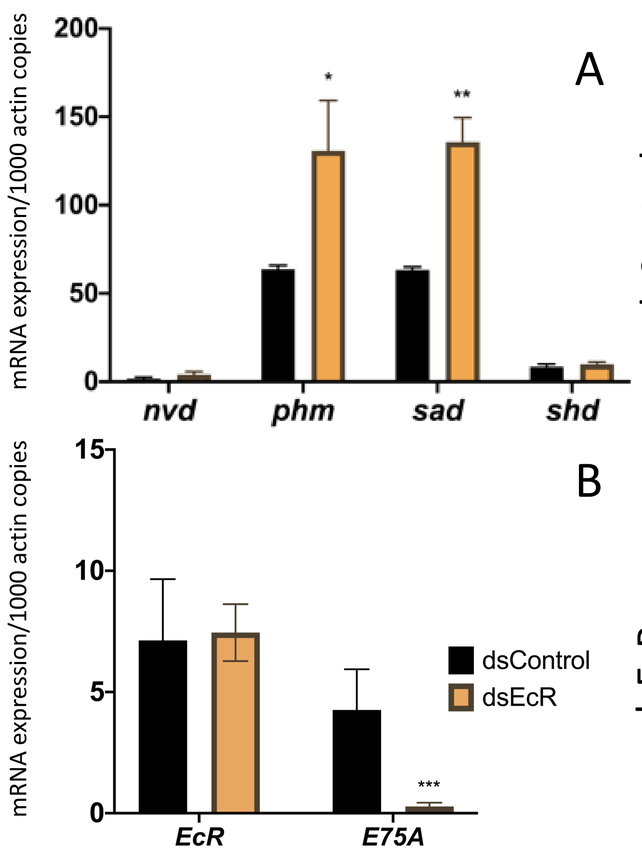
Our work aims to unravel:

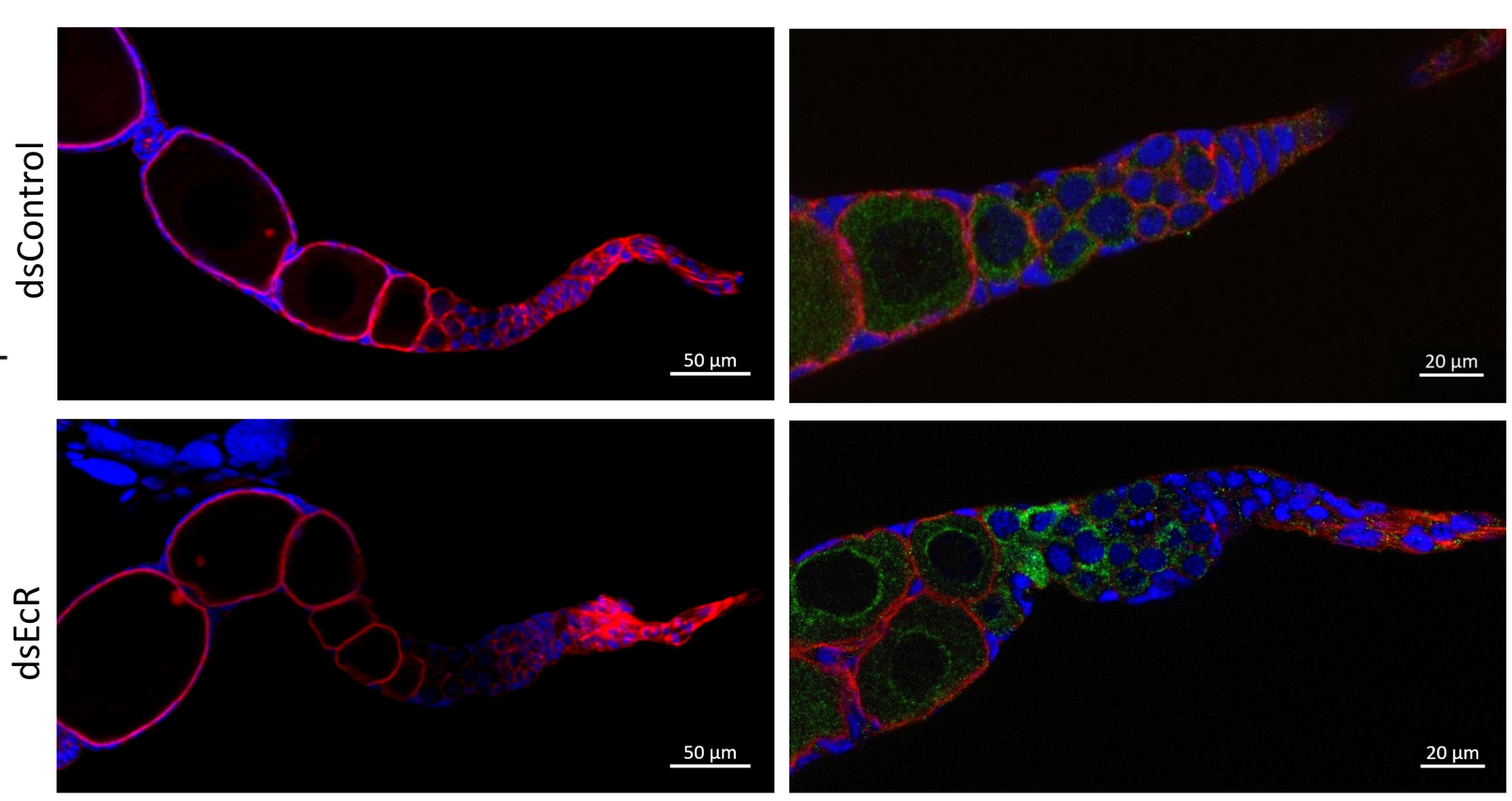
- How are the ovary and oogenesis affected by depleting *EcR*?
- How does the expression of genes involved Ecdysone's synthesis and signalling change after depleting *EcR* expression?

METHODOLOGY



RESULTS





A-B. Relative expression of *neverland (nvd), phantom (phm), shadow (sad) and shade (shd)*, genes that participate in the synthesis of Ecdysone, and *EcR* and *E75A*, an ecdysone-dependent early response gene, in the ovary from dsControl and ds*EcR*-treated nymphs (columns represent mean values ± S.D). ds*EcR*-treated ovaries show higher expression levels of *phm* and *sad*, suggesting a possible activation of the Halloween genes, thus, of the Ecdysone's biosynthesis. However, *E75A* is strongly reduced in treated specimens, suggesting that Ecdysone signalling is not induced in the ovary.

C-F. Ovariole from ovaries of dsControl (C,D) and ds*EcR*-treated (D,F) 6-day-old sixth instar nymphs. Actin filaments appear in red (TRITC-Phalloidin staining), DNA appears in blue (DAPI staining) and *EcR* appears marked with anti-*EcR* in green. ds*EcR*-treated ovaries show a higher number of differentiated ovarian follicles and the germarium appears swollen up. Furthermore, cell organization in the germarium is lost, as there is an intermingle of different oocytes in a "diffused" stage of differentiation.

CONCLUSIONS

Results show an increase in the differentiation or proliferation of oocytes at the germarium level and start of the vitellarium, although *E75A* indicates that there is no signaling of Ecdysone. Therefore, the lack of Ecdysone seems to also promote differentiation of the stem cells and increase the number of differentiated ovarian follicles. However, further research is needed to fully understand the mechanisms by which Ecdysone participates in oogenesis of *Blattella germanica*.

[1]Ramos S., Chelemen F., Pagone V., Elshaer N., Irles P., Piulachs M.D. Eyes absent in the cockroach panoistic ovaries regulates proliferation and differentiation through ecdysone signalling. *Insect Biochem Mol Biol*. 2020;123:103-407. doi: 10.1016/j.ibmb.2020.103407.

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