TOPIC:
1) Chagas

APPROACH:
2. Vector biology and eco-epidemiology

The *in vivo* treatment with the plant urease "Jack Bean Urease" impaired reproduction in females of *Rhodnius prolixus* (Hemiptera: Reduviidae)

Keywords: chagas; vector biology; eco-epidemiology; Jack Bean Urease; reproduction; *Rhodnius prolixus.*

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Ureases are enzymes that catalyze the hydrolysis of urea to carbon dioxide and ammonia. In recent decades, it has been postulated that plant ureases are also defense proteins against phytophagous insect species with potential biotechnological application. Previous reports demonstrated that the injection of "Jack Bean Urease" (JBU), the major isoform of urease from the legume *Canavalia ensiformis*, into the hemocele of triatomine insects, resulted in several toxic effects including activation of the immune response. Although the insecticidal effect of JBU was described several years ago, many aspects of its mechanism of action as well as the target organs remains largely uncharacterized. In particular, the effects of JBU on the female reproductive system and the consequences of sublethal doses have not been studied. In this work, we employed the Chagas disease vector *Rhodnius prolixus* as a model to study the effects of JBU on survival, ovarian development and oviposition of females. For the experiments, insects were injected with different doses of JBU in phosphate buffer. Control insects were treated with the same volume of vehicle. The results showed for the first time that a sublethal dose of JBU impaired different reproductive parameters of *R. prolixus* females. All doses tested (0.01, 0.025 and 0.05 µg JBU/mg body weight) significantly decreased the number of eggs and the highest dose tested of 0.05 µg/mg delayed the onset of oviposition and hatching. However, only the dose of 0.01 µg JBU/mg did not cause insect mortality. Surprisingly, this sublethal dose that decreased the number of eggs resulted in increased insect longevity. Ovarian development of JBU-treated females was markedly delayed compared to controls. The ovaries exhibited ovarioles with atretic terminal follicles, which by high-resolution light microscopy showed cellular disorganization and vacuolization. Transmission electron microscopy displayed vacuolization and swelling of the nuclear membrane and mitochondria, findings compatible with cell death by necrosis. The reported findings are particularly relevant considering that reproduction and the achievement of a successful oogenesis are of key importance in the population dynamics of insect vector and pest species.