

# Embryonic development of parthenogenetic and sexual eggs in lower termites

## Running title Differences of parthenogenetic ability in two termite species

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### Abstract

Termites are ancient social insects worldwide. In this research, developmental stages of embryos in the sexual and parthenogenetic eggs of *Reticulitermes chinensis* and *R. aculabialis* were observed and categorized. The embryonic development eggs was detected by DAPI staining, single transcriptome sequencing analysis and RT-PCR. The ovarian development of FF and FM groups in *R. flaviceps* occurred in the early developmental stages, whilst in *R. aculabialis*, this occurred mainly in the late developmental stage. The difference was significant in micropyle number between the *R. flaviceps* FF colony type and the *R. aculabialis* FF colony type. There were no significant differences in the number of micropyles between other groups. In *R. flaviceps*, 86% of unfertilized eggs stopped development during the formation of the blastoderm, with the yolk cell gathering extensively at the egg center. Single-cell transcriptome sequencing analysis were annotated many genes in this two species termite. According this answer we analyzed the egg-to-larvae genes expression, and found that the expression levels of PKA, MAP2K1, MAPK1/3, HGK, MKP and Pax6 gene in RaFF were significantly higher than RfFF ( $P < 0.05$ ). We found a significantly lower oocyte cleavage rate in *R. flaviceps* than in *R. aculabialis*, resulting in fewer developed oocytes in *R. flaviceps*. In both species, activation and one or two cleavage events of oocytes occurred during ovulation, but in *R. flaviceps* the development of unfertilized eggs stopped. We suggest that genes with significant expression differences may play an important role in oocyte and embryonic development in termites.

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