Hypotrigona (Hymenoptera: Meliponini): Morphology, behaviour, chemistry, and genomics

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INTRODUCTION

Stingless bees are mainly found in the tropical and subtropical regions of the world. Important ecologically and culturally, stingless bees are effective pollinators, good to use in green houses, and are surrogates for honey bees. There are about 20 species in Kenya, and most of them have morphological features that can differentiate them. However, *Hypotrigona* species are the most poorly defined, and they are difficult to differentiate even for the taxonomist. Furthermore, nest site and nest architecture vary between stingless bee genera, and even within species of the same genus.

OBJECTIVES

Overall objective

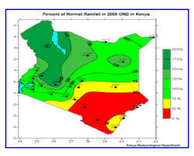
To contribute to knowledge on developmental and behavioural biology of stingless bees, to conserve biodiversity and improve domestication and commercialisation of meliponiculture in Kenya.

Specific Objectives

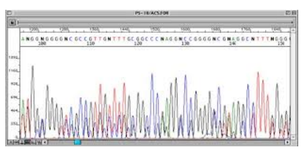
- To characterise *Hypotrigona* species: *H. gribodoi*, *H. araujoi*, and *H. pelliera,* using morphological and molecular tools.
- To determine developmental cycle, from eggs through to the adult forms of *H. gribodoi*, *H. araujoi,* and *H. pelliera*.
- To determine molecular mechanism that differentiates the queen-worker in *H. gribodoi.*

METHODOLOGY

Field collections
•Material for genetics, morphometrics
•Cultural information
•Distribution and habitats



Morphology
•Morphometrics
•Traditional comparative analysis



Genetics
•Next generation sequencing
•Mitochondrial DNA sequencing

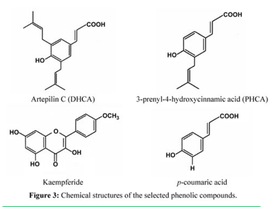
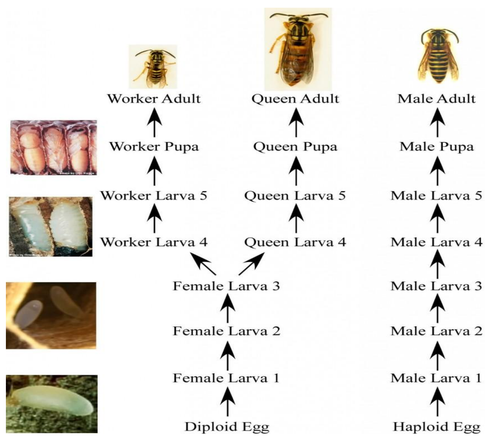


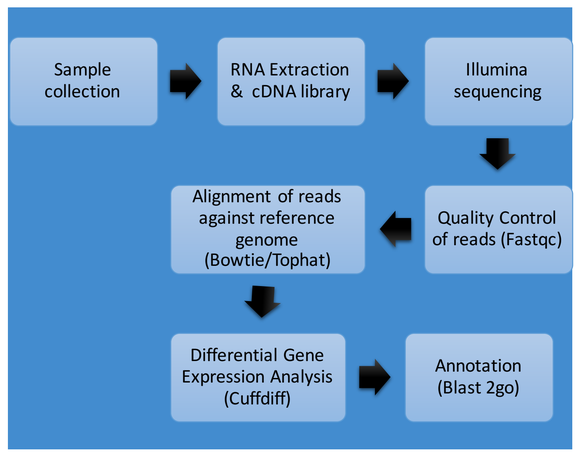
Figure 3: Chemical structures of the selected phenolic compounds.

•Chemical profile of the propolis
•Chemical analysis of the nest entrance

Behaviour
•External nest architecture
•Internal nest architecture
•Developmental cycle



Developmental cycle:
Stingless bee worker can lay trophic or reproductive egg -Unique characteristic



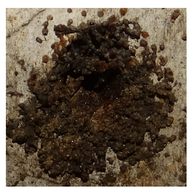
Polyphenism and gene expression-Transcriptome analysis

Nest Entrance and Architecture

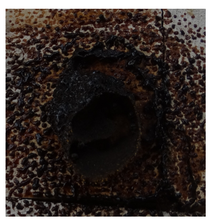
H. ruspollii nest

H. araujoi nest

H. gribodoi nest

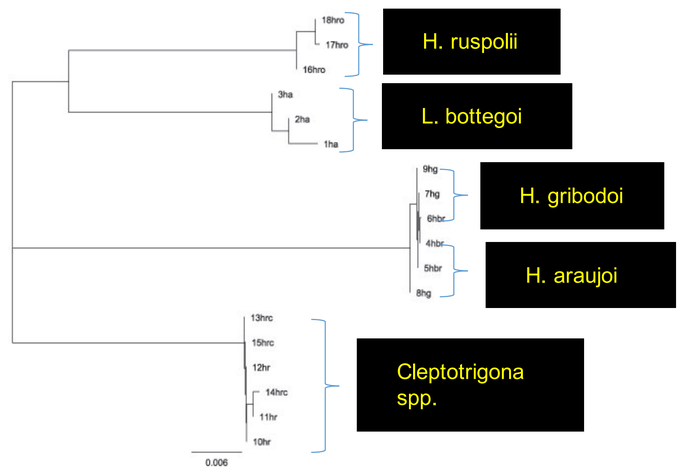


Cleptotrigona nest



L. bottegoi nest

RESULTS



NJ tree separating the *Hypotrigona* species and two other species identified from the collection (*Liotrigona* and *Cleptotrigona*).

CONCLUSION

- This study contributes to our knowledge in stingless bee caste differentiation and improves the present perspective of polyphenism in bees.
- The study will result in better understanding of the behavior and development of *Hypotrigona* species.

IMPACT

- Improvement of meliponiculture.
- Improvement in identifying *Hypotrigona* species and other closely related species (*Liotrigona* and *Cleptotrigona*).

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