Intraspecific brood theft in an Indian queenless ant

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Introduction

Theft: The physical removal of an object that is capable of being stolen without the consent of the owner and with the intention of depriving the owner of it permanently.

Items stolen: Food, nest, nesting material, brood etc.

Fig. 1: Brood of ants
(source: www.alexanderwild.com)

Theft of brood in ants: Observed in subfamilies Formicinae and Myrmicinae in temperate regions.

Diacamma indicum

Subfamily: Ponerinae.

Distribution: India, Sri Lanka, Japan.

Colony size: 12-261 adults.

Social characteristics: Primitively eusocial, monodomous, monogynous.

Fig. 2: *Diacamma indicum*
(source: AntWiki)

Brood theft in lab

Sample size: 8

Preferred item for theft: Pupae (14/15)

Percentage of thieves: 1.35 ± 0.73%

Success of theft: 75.3 ± 33.7%

Advantage: Resident

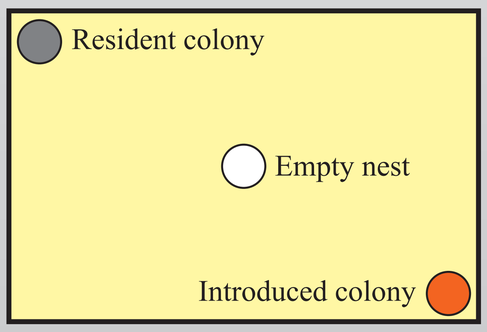

Fig. 3: Lab arena (1.75 m x 1.45 m)

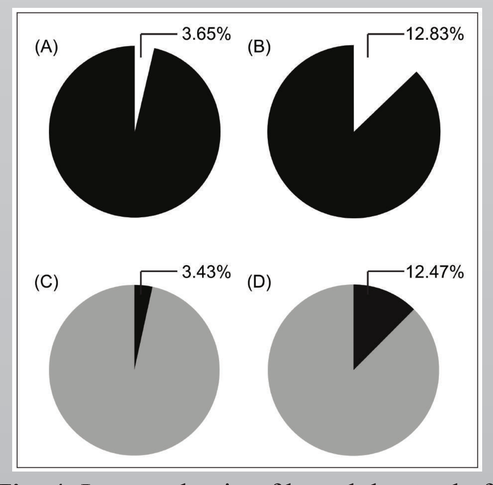

Fig. 4: Loss and gain of brood due to theft

Brood theft in natural habitat

Method: Marked colony released in the vicinity of conspecific nests and recollected after 24 hours.

Direct observation: 2 pupae stolen.

Indirect observation: Recollected colonies had less number of pupae than expected.

(Wilcoxon paired-sample test: Experiment: T = 3, n = 8, p = 0.04; Control: T = 5, n = 8, p = 0.08)

Calculation of expected pupae:

$$R_x = P_x / P_x\text{-}1$$

$$E_{x+1} = P_x \times R_x$$

R_x = Observed pupae no. on day x.
E_{x+1} = Expected pupae no. on day x+1.

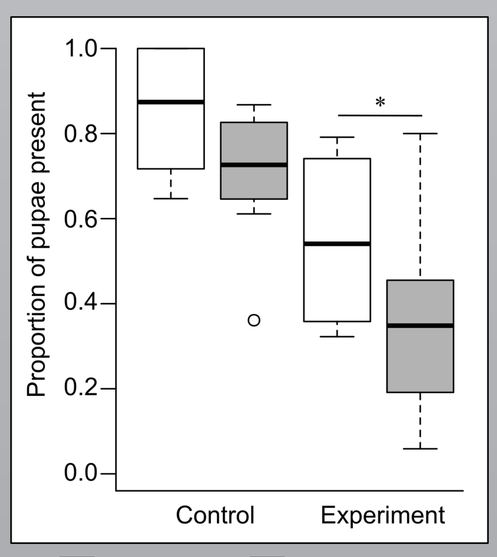

Fig. 5: Comparison of expected vs. recollected pupae

Outcome of procured pupae

Method: Colonies were allowed to procure pupae and were kept under observation for 7 days.

Procurement: No bias towards self or foreign pupae. *(Mann-Whitney U test: U = 6249, df1 = 111, df2 = 111, p = 0.85)*

7-day observation:

- n = 8, total pupae = 371
- Pupae eclosed = 262 (70.6%)
- No difference in treatment towards self or foreign pupae.
- No pupae were consumed or newly eclosed ants were harmed.
- All newly eclosed ants integrated with the colony.

Fig. 6: Method

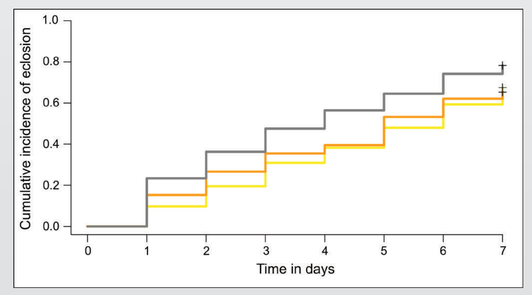

Fig. 7: Eclosion of pupae

Defence against theft

Aggression:

- Antennal boxing
- Chase
- Immobilization

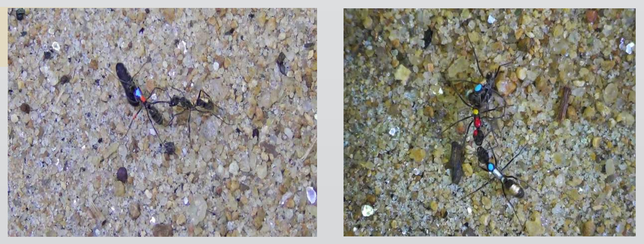

Fig. 8: Agression towards thieves

Strategy of thieves

GLMM ($p < 0.05$):

- Duration of stay
- Aggression received
- Status of pupae

Post-hoc ($p < 0.05$):
Success of theft is more:

- Shorter stay > longer stay
- No aggression > aggression
- Unattended pupae > attended pupae

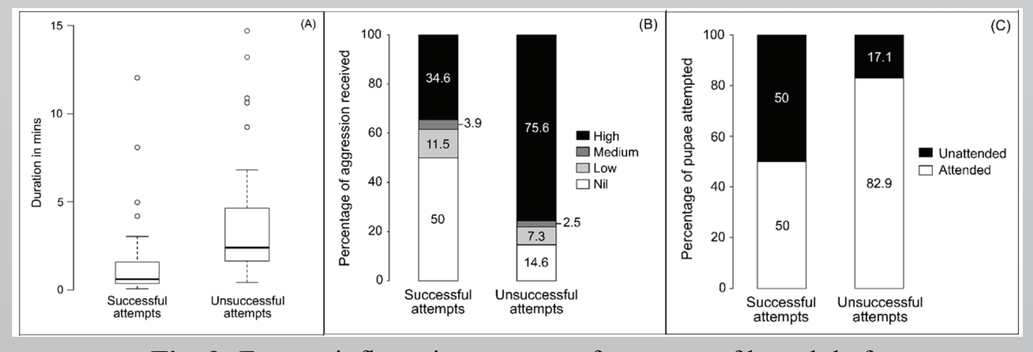

Fig. 9: Factors influencing success of attempts of brood theft

Conclusions

- First study to report brood theft in Ponerinae and in the tropics.
- *Diacamma indicum* prefers to steal conspecific pupae.
- Relocation makes colonies susceptible to brood theft.
- Agression towards thieves is key to defense mechanism.
- Thieves adopt various strategies for success.
- Ants emerged from stolen pupae integrated into the colony.

Publications

• **Paul, B.**, Paul, M. & Annagiri, S., 2016. Opportunistic brood theft in the context of colony relocation in an Indian queenless ant. *Scientific Reports*, 6 (36166).

• **Paul, B.**, & Annagiri, S. Tricks of the trade: mechanism of brood theft in a ponerine ant (in preparation).

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