Mechanism of brood theft in an Indian ant

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Theft in animal kingdom

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.

Animal phylum	Group	Animal phylum	Group
Cnidaria	Hydroids	Mollusca	Slugs
Platyhelminthes			Snails
Annelida			
Arthropoda	Flies		
		Echinodermata	Sea stars, brittle stars
	Beetles		
	Bees, wasps and ants	Chordata	Fish
			Turtles
	Mites and spiders		
			Lizards
			Birds
	Other insects		
	Caprellids, copepods, and amphipods		Mammals
	Crabs		

Items stolen:

- **Food**
- Nest, nesting material
- Brood

Iyengar 2007

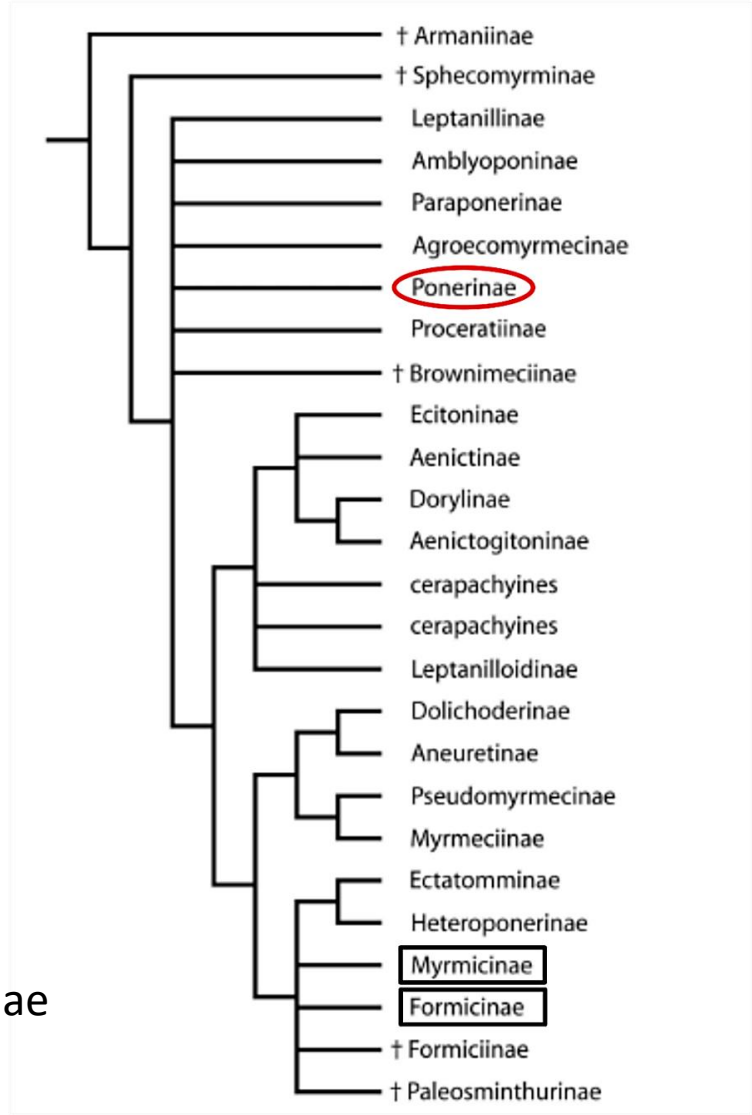
Brood and its theft

Courtesy: www.alexanderwild.com

Context of brood theft:

- Consumption
- For founding new colony
- For slave workers

Observed in subfamilies Formicinae and Myrmicinae in **temperate** regions.



Pollock and Rissing 1989, Breed et al. 2012

Ward 2007

Diacamma indicum

Subfamily: Ponerinae.

Distribution: India, Sri Lanka, Japan.

Body length: ~ 1 cm

Colony size: 12-261 adults.

Social characteristics: Primitively eusocial, monodomous, monogynous.

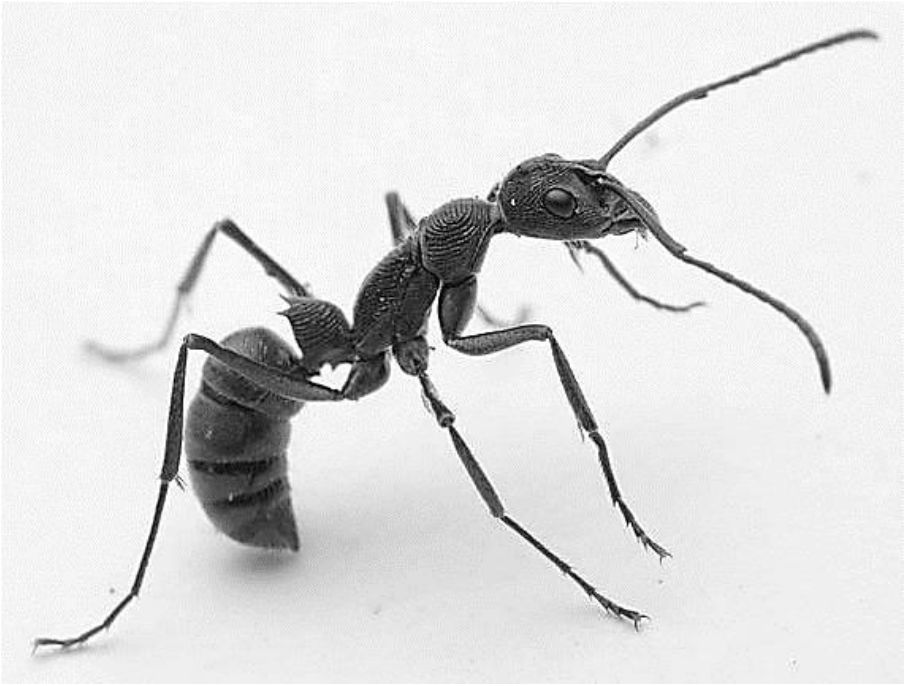


Image Courtesy: AntWiki

Viginier et al. 2004, Kaur et al. 2012

Brood theft in *D. indicum*

- Conspecific brood theft present in *D. indicum*.
- Theft were observed both in laboratory environment as well as natural habitat.
- Relocation makes colonies vulnerable to theft.
- Thieves preferred to steal pupae.
- Stolen pupae integrated into thief colony.

Successful theft

Unsuccessful attempt

Paul et al. 2016

Objective

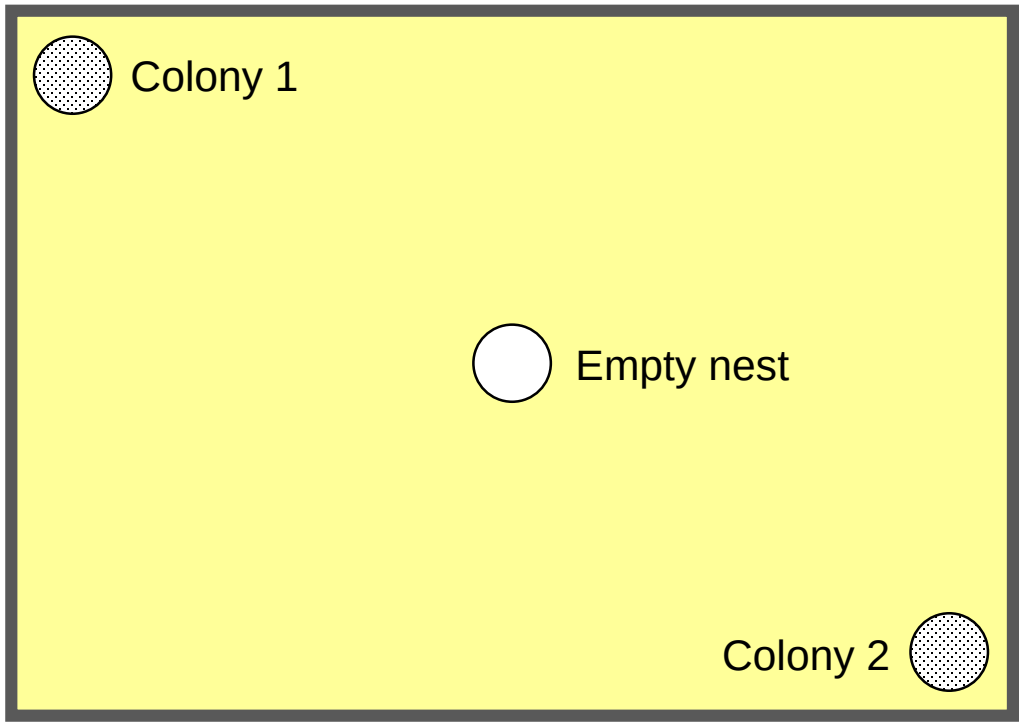
Question: Why are only some stealing attempts successful?

Objectives:

- How does the process of relocation affect brood theft?
- What are the defense mechanisms of the victim colonies?
- What are the strategies adopted by the thieves to bypass defense?

Experimental setup

n = 10

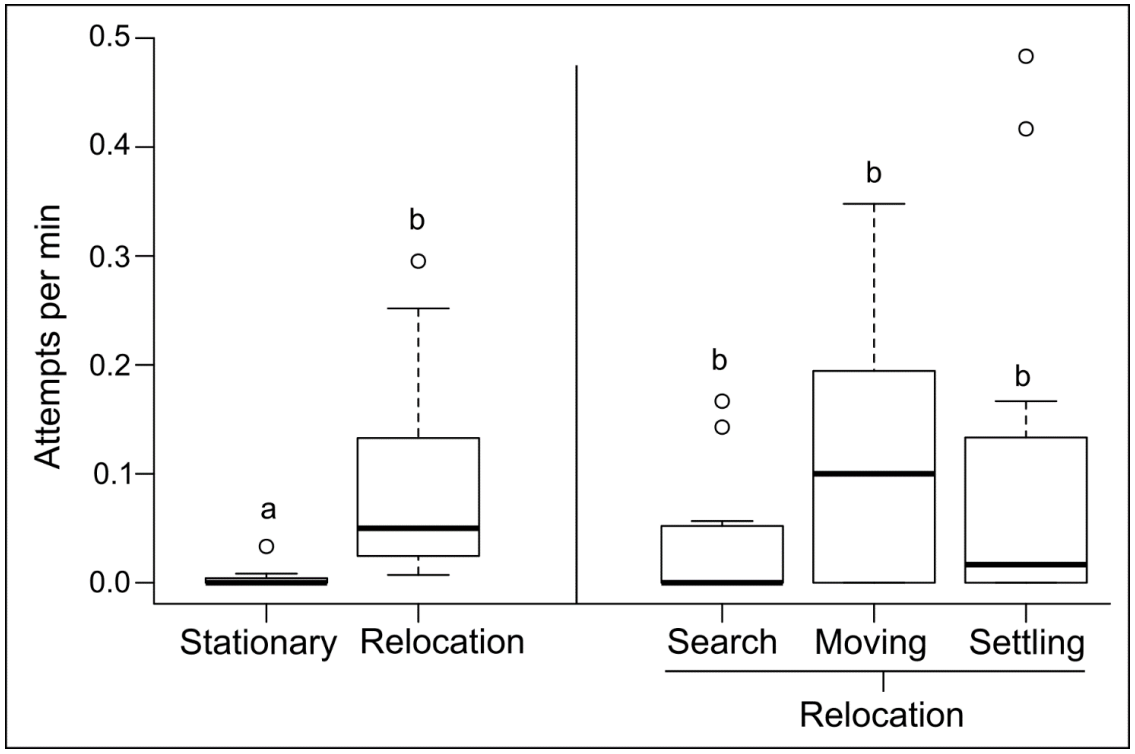


Lab arena (1.75 m x 1.45 m)

The colonies and empty nest placed simultaneously in arena.
Stationary phase: Both undisturbed
Relocation phase: Both colonies disturbed by removing cover

Impact of relocation

Vulnerability of colonies during relocation impact theft, not the process of relocation.



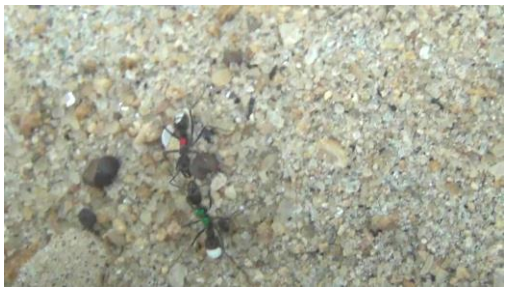
Stationary vs relocation:
Wilcoxon paired-sample test
n = 11, T = 0.0, p = 0.001

Sub-phases of relocation:
Friedman test
χ^2 = 2.05, df = 2, p = 0.35

Defence against theft

Behaviour	Description
Antennal Boxing (AB)	Ants face each other and repeatedly beat each other with antennae in quick succession.
Chase (CH)	One ant chases the other till the one being chased runs away.
Immobilization (IM)	One or more ants bite another ant, and drag or hold it down in one place while biting.

Aggressive interactions help to defend against intruders.



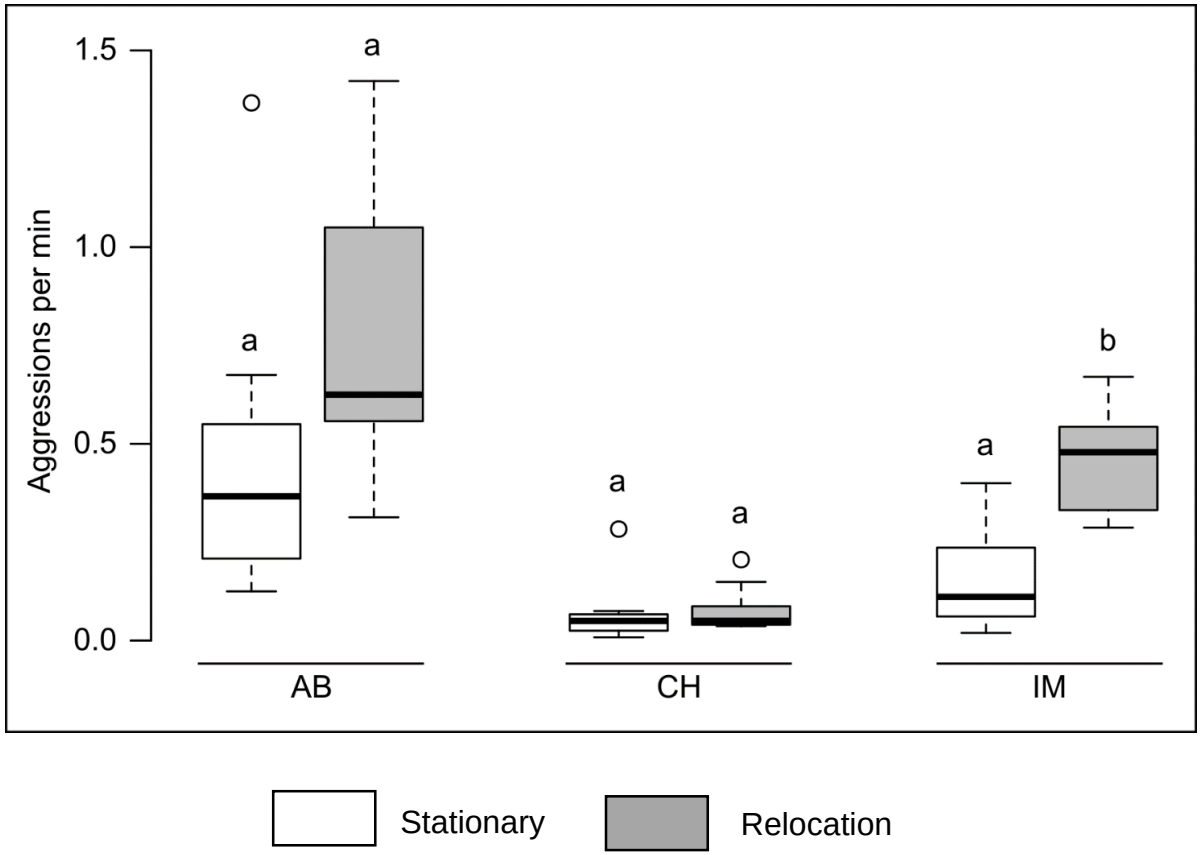
AB

CH

IM

Defence against theft

Immobilization was the most effective aggression, as it was displayed at a significantly higher rate when attempts of theft were high.



Wilcoxon paired-sample tests:

AB:
n = 10, T = 9, p = 0.064

CH:
n = 10, T = 20, p = 0.492

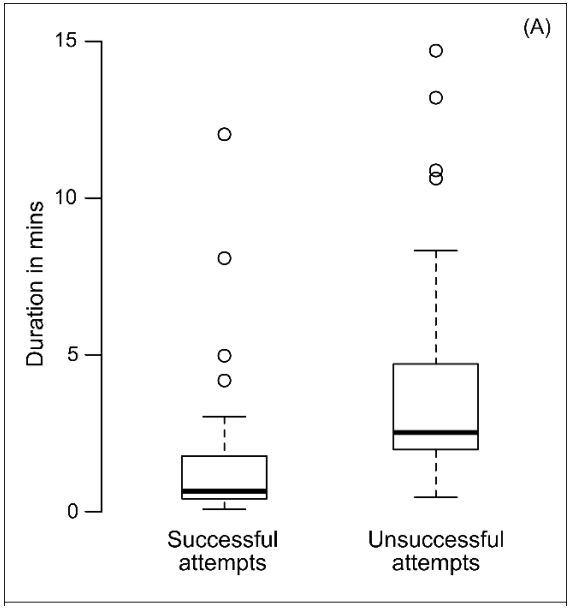
IM:
n = 10, T = 1, **p = 0.004**

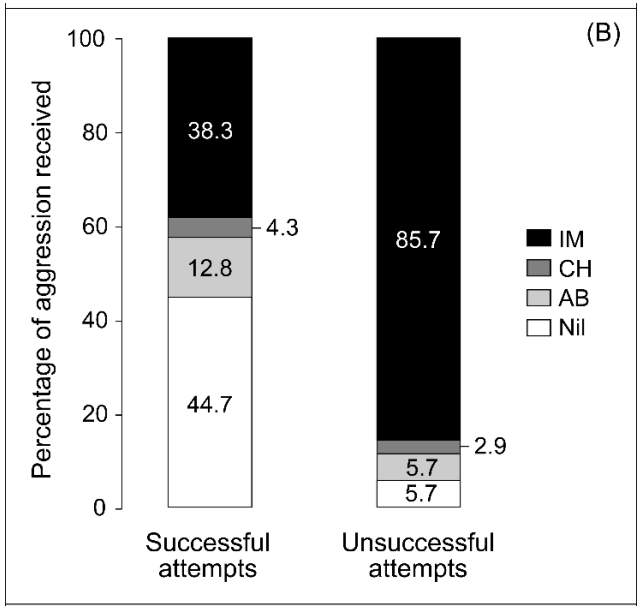
Strategies of thieves

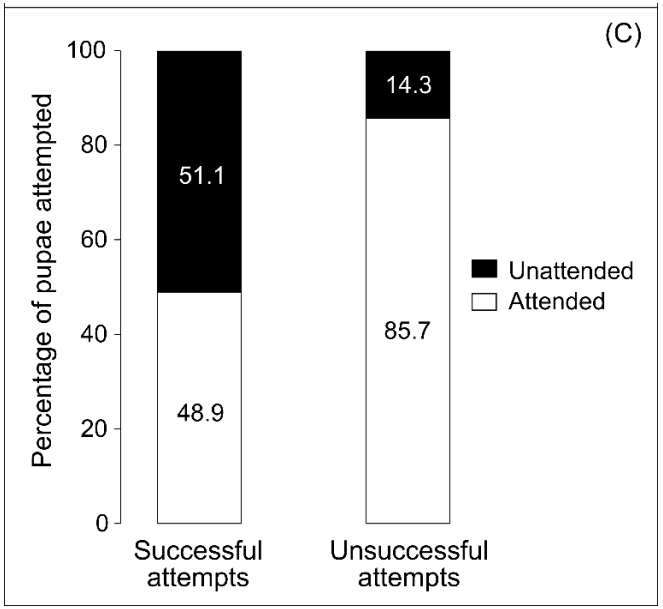
n = 82 attempts of theft

GLMM ($p < 0.05$):

- Duration of stay – staying for shorter duration
- Aggression received – avoiding immobilization
- Status of pupae – stealing pupae not held in mandibles







Conclusions

- Exposed state during relocation makes colonies vulnerable to brood theft, but the process of relocation does not impact theft.

- Aggression towards thieves is key to defence mechanism.

- Thieves adopt various strategies for success - acting quickly, staying furtive and stealing unattended brood items.

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