

Ecology of ants

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Common pest ants in the urban environment

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Tapinoma melanocephalum (ghost ant)

- Most important species.
 - Nuisance, do not bite or sting.
 - 1.3 - 1.5 mm.
 - Monomorphic workers.
 - Dark head and thorax, translucent gaster and legs.
 - Emit a rotten coconut smell when crushed.
 - Outdoor species, but can be found nesting indoor under moist condition.
 - Prefer sugar-based food.
- 
- Manage with liquid or gel bait for indoors, and repellent perimeter treatment for outdoor situation.
 - Avoid tree branches touching buildings.

Tapinoma indicum (ghost ant)

- Very important species.
- Nuisance, do not bite or sting.
- Very similar to *Tapinoma melanocephalum*, except having brown-coloured gaster and legs.
- Outdoor species.
- Prefer sugar-based food, but may also respond to protein- and oil-based food.
- Manage with liquid or gel bait for indoors, and repellent perimeter treatment for outdoor situation.



- Avoid tree branches touching buildings.

Paratrechina longicornis (crazy ant)

- Very important species.
- Nuisance, do not bite or sting.
- 3 mm, monomorphic workers.
- Dark brown to black; long legged.
- Body with long and coarse hairs.
- Move erratically when disturbed.
- Outdoor species, but forage indoors for food.
- Prefer sugar-based food, but normally a general feeder.



- Manage with perimeter treatment with non-repellent insecticides.
- Baiting is less effective.
- Trim tree branches.

Monomorium pharaonis **(Pharaoh's ant)**

- Important indoor species.
- May bite, but rarely sting.
- 1.5 - 2.0 mm, monomorphic workers.
- Yellow brownish in colour, two nodes.
- Indoor species, but may sometimes nest outdoors in the tropics.
- Prefer protein and oil-based food.
- Baiting is the best method to manage if its nest cannot be located.



- Never spray with pyrethroids against this species - it may further worsen the infestation.



**Some important biological
and ecological
characteristics**

Establishment of new colony

- 2 ways how an ant colony can be established:
 - swarming → pairing → establish!
 - Budding (most household ants).

ALATES LEAVING THEIR NEST TO SWARM



Budding

Movement of one to several queens with some workers carrying immatures to establish a new colony.

Very common in household ants.

Queens are not needed to start new colony; larvae can be turned into queens through special feeding.

Induced Disturbances Cause *Monomorium pharaonis* (Hymenoptera: Formicidae) Nest Relocation

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ABSTRACT Budding and relocation of nests are important characteristics of the Pharaoh ant, *Monomorium pharaonis* (L.), an important pest of artificial structures. Pharaoh ant colony movements induced by several types of disturbances were evaluated in the laboratory. The percentages of workers and brood in the source and new nest sites were determined at Days 0, 1, 3, and 5 following physical disturbance (temporal removal of nestmates), chemical disturbance (application of pyrethroid insecticide), invasion by heterospecific ants, food depletion, and moisture depletion in the laboratory. All disturbances were performed in the source nest, which was connected to an empty new nest site. Almost all workers moved and carried the entire brood to the new nest site when subjected to physical disturbance, chemical disturbance, and ant invasion on Day 1, whereas only <5% of workers were present in the new nest site in the undisturbed control. After these disturbances, the brood was never relocated back to the original nest site in this 5-d study. When subjected to food depletion, ~60% of the brood were found in the new nest site and ~40% of the brood remained in the original nest on Day 5, resulting in a polydomous population. In contrast, moisture depletion did not show any significant effect on colony movement. These results provide useful information about the causes of Pharaoh ant colony budding and guidance about how to develop effective control and prevention strategies.

KEY WORDS *Monomorium pharaonis*, induced disturbance, physical disturbance, chemical disturbance, nest relocation

What could cause budding and nest relocation? (Tay & Lee 2015)

Will cause

Pyrethroid insecticide
Physical disturbance
Other ant invasion

Will partially, or will not cause

Food depletion.
Moisture depletion.

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How many workers and queen are required to start a colony of the Pharaoh ant

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The roles of the queen, brood, and worker castes in the colony growth dynamics of the pharaoh ant *Monomorium pharaonis* (Hymenoptera: Formicidae)

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Abstract

Known for its high reproductive rate, sociotomy, and unique nesting habits, the Pharaoh ant *Monomorium pharaonis* (Linnaeus, 1758) is one of the most successful tramp ant species. In this study, combinations of different caste groups were used to examine the effects of each caste on queen and worker population growth dynamics over time. The initial number of queens in an incipient colony significantly affected queen population growth and accounted for 42.2% of the overall variability over a six-month period. Queen population growth significantly increased as the initial number of queens increased in the incipient colonies, and in most cases, each colony retained its original number of queens (eight). The brood quantity had little effect on queen population growth and was responsible for an increase of only 2.2% in the overall variability, and the worker number had no effect on queen population growth. Worker population growth was primarily affected by the initial queen number of the incipient colony, although the effects of queen, brood, and worker number on worker population growth were all significant. Overall, our results showed that the number of caste components required for colony success was much lower than expected. A mere 50 workers and one queen were sufficient for colony survival and productivity irrespective of the presence of brood.

Key words: Pharaoh ant, caste regulation, queen phenotypes, sociotomy, colony budding, colony growth dynamics.

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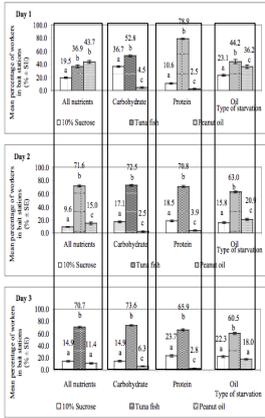
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**50 workers
1 queen
Brood not required**

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Nutritional preference of the Pharaoh's ant after a week of starvation

From all nutrients - preferred protein and lipid on first day, and subsequently preferred proteinaceous food only.

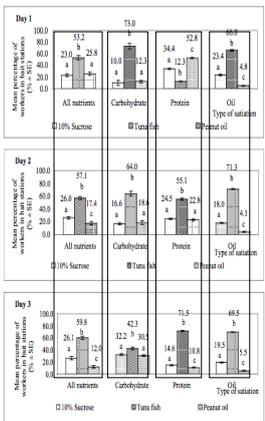
From carbohydrate - showed a slightly higher preference to carbohydrate on first day, but still preferred proteinaceous food. After that, preferred proteinaceous food.

From protein - showed preference towards proteinaceous food.

From lipid - showed higher response towards lipid, but gradually back to proteinaceous food.

Summary - After being starved for a week, Pharaoh ants showed an initial preference towards the food type they were starved from, but their main preference is still towards proteinaceous food.

Eow et al. 2005 - Sociobiology 45: 15 - 29.



Nutritional preference of the Pharaoh's ant after a week of satiation

With all nutrients - normal response - control sets.

With carbohydrate - showed a distinct higher preference towards protein on first day and subsequent days.

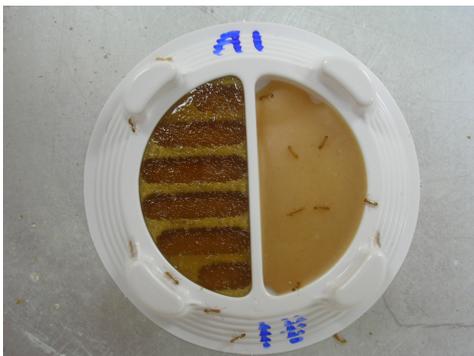
With protein - showed a preference to carbohydrate and lipid food only on the first day, but preferred proteinaceous food from second day onwards.

With lipid - showed a distinct higher preference towards protein on first day and subsequent days.

Summary - After being satiated for a week, Pharaoh ants showed an initial preference towards the food type they were starved from, but their main preference is still towards proteinaceous food.

Eow et al. 2005 - Sociobiology 45: 15 - 29.

Overcoming food preference changes: dual-module baits

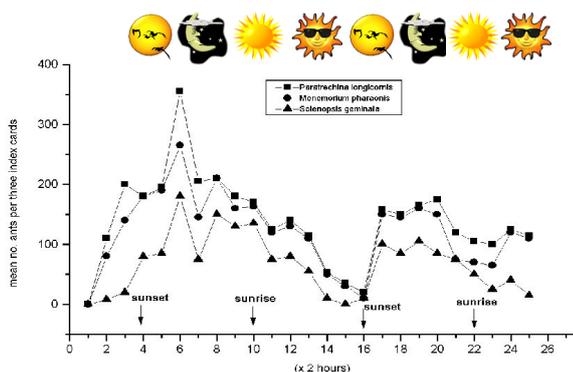


Foraging behaviour



Worker ants forage for food and water.
Foraging behaviour varies with species.
Mark-recapture studies had been used to estimate foraging territory and distance.
In the tropics, foraging activity usually peaks at night.
Pheromone trails are used to follow between food and moisture sources, and the nest.
Ants also use structural guidelines when foraging.

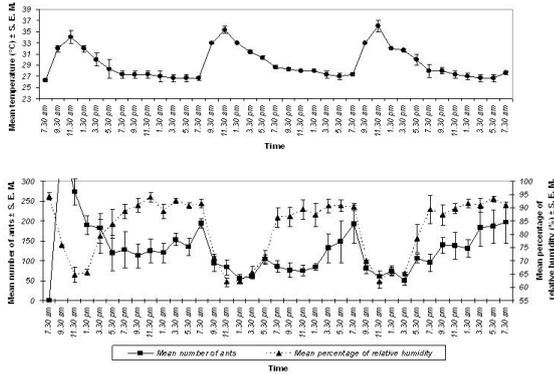
Foraging patterns of *P. longicornis*, *M. pharaonis* and *S. geminata*



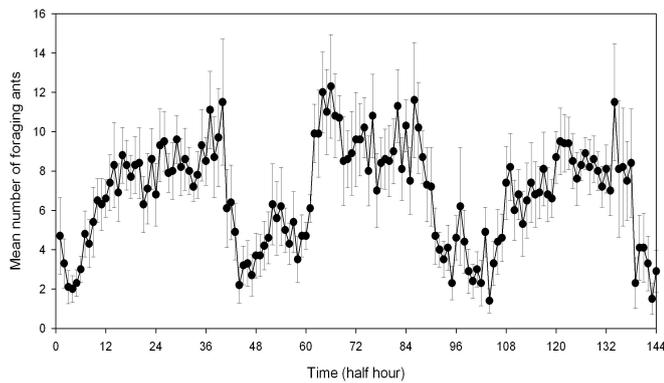
Foraging activity patterns of *P. longicornis*, *M. pharaonis* and *S. geminata*

- Foraging activity patterns for all three species were relatively similar.
- Activity peaked at 2 – 4 hours after sunset and ceased at 1500.
- Foraging activity was negative correlated with ambient temperature.
- Hooper & Rust (1997) – foraging activity *S. xyloni* peaked at 2 – 7 hours after sunset.

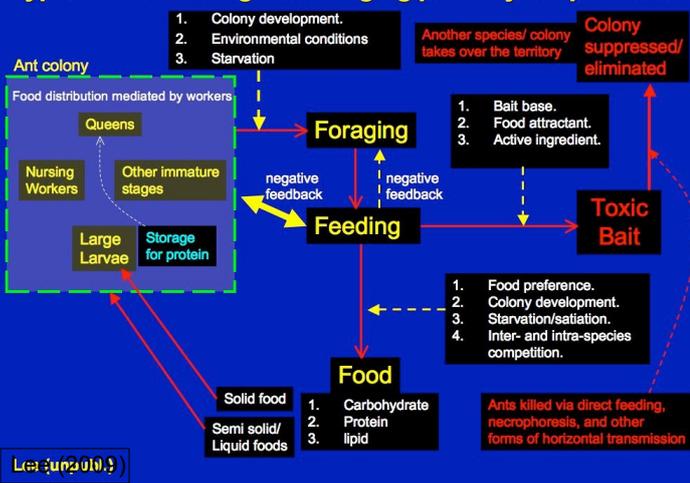
Foraging activity of field *Tapinoma indicum* populations in relation to temperature & humidity (Chong & Lee 2006 - *Sociobiology* 48: 875 - 883)



Foraging rhythm of *Monomorium orientale* (Loke & Lee 2005 - *Sociobiology* 46: 595 - 602)



Hypothetical feeding and foraging pathways in pest ants



Nesting habit

- Most pest ant species nest outdoor, while a few nest indoor.
- It is essential to know nesting habit of the species, so that proper treatment can be executed.

Nest outdoor	Nest indoor
Fire ants	Pharaoh ants
Big-headed ants	Thief ants
Crazy ants	Ghost ants
Ghost ants	



Where do ants commonly nest outdoors?

- Under potted plant.
- Crack and crevices near the drainage system
- Crack and crevices in brickwork.
- Wall cavities.
- Under the slabs.
- In the soil.
- In leaf axils.

