



FOOD HIDING BEHAVIOUR OF ANT *CAREBARA AFFINIS* (JERDON)

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ABSTRACT

For the first time, food hiding behaviour by the Ant *Carebara affinis* (Jerdon, 1851) is reported here from Acharya Jagadish Chandra Bose Indian Botanic Garden, which is an urban garden situated at Howrah, West Bengal, India. Multiple roles played by the species as predators, scavengers and in seed dispersal is emphasised here.

Key words: Ant, Formicidae, Acharya Jagadish Chandra Bose Indian Botanic Garden, frog, decomposition, predators, scavengers, Howrah, carcass, minor castes, soil nest, urban garden, food hiding

Ants, classified under family Formicidae is one of the most successful insect groups on earth. Their eusocial way of living, feeding habits and nesting behaviour help them to flourish in a massive way. Global data reveals that there are 14,108 species of ants known (Antweb, 2023). India inhabits 861 species/subspecies of ants (AntWiki, 2023) and West Bengal is the most species diverse Indian state with 382 species/ subspecies (Bharti et al., 2016). Studies show that different species of ants can coexist in a particular habitat. It has been reported that 104 species of ants were found in Malaysia in just 20 m² leaf litter and rotting logs (Agosti et al., 1994). Most of the ants are terrestrial but their niche could be different. In the ground soil, some prefer to live deep under while a few choose to make their nest just beneath the soil surface. There are ants which live under leaf litter or inside rotten logs as they do not prefer fluctuations in temperature. It is usually seen that ants adapt themselves with the increasing urbanization and human activities, because we could collect several species including rare forms from highly polluted city environments.

Ants like *Paratrechina longicornis* (Latreille, 1802), *Trichomyrmex mayri* (Forel, 1902), *Lepisiota sericea* (Forel, 1892) found to build their nest in manmade concrete structures. The species *Oecophylla smaragdina* (Fabricius, 1775), *Polyrhachis dives* Smith (1857) almost all species of the genus *Tetraponera*, and many species of the genus *Crematogaster* adapt themselves in arboreal life to avoid the large competition in the soil surface. Ants can construct their nests in very short span of time and this gives them opportunity to establish themselves near their preferred food sources.

Most ant species are omnivorous and consume plants as well as animal-based food materials (Stradling, 1974). Ants like *Camponotus*, *Anoplolepis*, *Myrmecaria* are known as generalists and devour different kinds of food items, while genus *Pheidole*, *Messor*, *Pheidologeton*, *Monomorium*, *Tetramorium* are known for their seed dispersal ability and called as specialist seed harvesters (Narendra and Kumar, 2006). Usually members of the subfamily Ponerinae, many of the Myrmicinae and army ants largely or solely rely on different kinds of invertebrate preys. They consume different groups of invertebrates like termites, collembolans and it is also very common to see one species of ant predate on other species.

A study conducted in a tropical rainforest of Borneo reveals that with increasing altitude, predatory ants and their preys like termite or other ground dwelling ants decrease in comparison to omnivorous ants (Bruhl, 1999). Nesting habits and food preference help different species to segregate their niche and coexist in a particular habitat; for example different species of *Leptogenys* display minor differences in their nesting behaviour but significant difference in their food choices (Steghaus-Kovac and Maschwitz, 1993); and species of *Polyrhachis* show a significant nesting behaviour but nutrition play a minor role (Liefke, 1998).

MATERIALS AND METHODS

Study of diversity and association of ants was done at the Acharya Jagadish Chandra Bose Indian Botanic Garden (22°33'23.31''N 88°17'7.95''E). Sample specimens were collected using soft brush soaked in 70% alcohol, and field photography and videography

were done with a Nikon d5600 camera . Identification was done using standard literature.

RESULTS AND DISCUSSION

Carebara affinis (Jerdon, 1851) a common, terrestrial species of ants which was frequently encountered in the study area. They make their nest on ground and form very long trail with thousands of members to carry food materials from long distances to their nest. They are usually known as seed collectors as they are commonly found carrying seeds of grasses and their nests can be easily recognized by the heap of seeds found outside their nests. At the same time, they also act as ferocious predators as they encounter to fetch live insects, larvae, earthworms etc. A large colony (both major and minor castes) of *Carebara affinis* was noticed in the study area, busy to bring soil particles, dry and fresh leaves and small wooden materials and hurriedly burying a fresh frog carcass. When it was first observed they almost covered 90% of animal body with the above-mentioned materials (Fig. 1). The soil covered frog was recovered for observation and photography (Fig. 2, 3). Once the frog was taken away, ants started moving around in the vicinity, but not leaving the place completely. After a gap of ten minutes, frog was kept open a little away

from the previous place. Within seconds the worker minors rushed in, inspected the carcass and a few of them started communicating to the members, away. Again, the entire colony began their work and started bringing soil, small pieces of dry leaves and twigs and covered the carcass. It took 90 minutes to cover the body, by more than nine hundred individuals of the Ant colony. While most of the ants were busy to cover the animal body, a few worker ants both major and minor castes were seen to cut soft tissue from the terminal body parts especially from webbed toes (Fig. 4). Once it was completely hidden, the entire structure was looking like an Ant nest (Fig. 5). The colony made a few entrances through which they were cutting away soft tissues and carrying them to the nest (Fig. 6).

High degree of social organization, manipulation of the situation and time management is evident from the event. Similar kind of behaviour was found by Singh et al. (2020) where a study was conducted with rat carcass in which *Carebara diversa* (Jerdon, 1851) had covered the whole rat carcass with soil particles and they were present all stages of decomposition (fresh, bloated, active decay, advanced decay, and dry-remains stage) and it was observed that this activity prevents oviposition or colonization of flies and beetles.



Fig. 1. *Carebara affinis* ant colony covered the dead prey with soil and other materials



Fig. 2. Dead frog uncovered (ventral view)



Fig. 3. Dead frog uncovered (dorsal view)

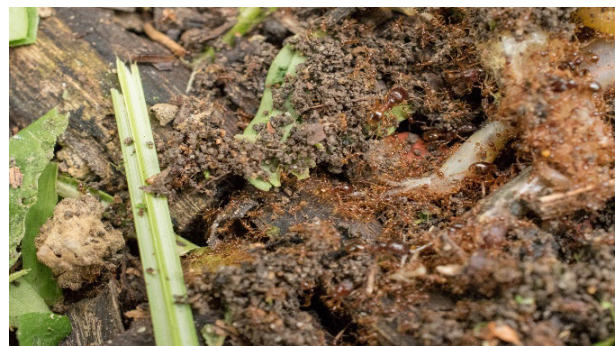


Fig. 4. Major and minor *C. affinis* ants cut soft flesh from webbed toes



Fig. 5. Dead frog again covered by *C. affinis* ant colony (observation after 90 minutes)



Fig. 6. Entrance in nest like structure through which ant communicated with its prey

As per Qin et al. (2019) when there are surplus food materials, *Solenopsis invicta* Buren, 1972 bury them for future use; but during shortage there will be a hustle to clear as much food possible to the nest. Such cognitive behaviour is common among crows, that, during breeding time, on getting surplus food, or when there is less food and more members around, crows used to hide food and later take away conveniently from the place without fail. Different kinds of hoarding behaviour have been reported in Red Foxes (Fisher, 1951; Henry, 1977), rodents like hamsters, squirrels, birds like Canada Jay and woodpeckers. It is common sight that ants carry dead or live prey in whole or parts, like insects, larvae, fish etc. But hiding behaviour was noticed for the first time and with their cooperative division of labour, they could slowly cut the body parts in to small pieces and the entire frog was taken away to the nest. As it is not possible to carry huge materials to the nest, they used to cut it into pieces and carry them; at the same time, they are intelligent enough to understand the risk of losing it to larger predators like birds or other mammals. That may be the reason to bury the prey. At the same time by burying, it can be preserved for more time from drying up and can prevent from insects.

Diptera or other insect groups could enhance decomposition of the body, so it is wise to hide it immediately, as different studies showed decomposition rate is much slower in buried ones than exposed body (Lundt, 1964; Payne, 1965; Payne and King, 1968). Different species of ants are known for their food storage behaviour like, *Pheidole* or *Pogonomyrmex*, the seed harvester ants, store seeds inside their nest for future use (Judd, 2006; Mackay and Mackay, 1984). It has been reported that *Solenopsis invicta* keep dead preys inside their mound and these dead preys are used in the absence of fresh prey (Gayahan and Tschinkel, 2008). In case of *Solenopsis invicta*

only a few individuals and mostly the minor ants of colony participate in burying activity (Qin et al., 2019) whereas in this present study both major and minor castes of *Carebara affinis* participated in food hiding as well as a few individuals seen to tear flesh from the frog's body simultaneously (Fig. 7). This study emphasises the role of *Carebara affinis* in ecosystem as a scavenger, as well as their efficiency through collective and systematic effort to successfully fulfilling the food requirements. *Camponotus compressus* (F.) and *Paratrechina longicornis* (Latreille) were found tending



Fig. 7. Major and minor *C. affinis* ants participate in food hiding behaviour

on various homopterans in this study area thereby emphasising their role as pests, but *Carebara affinis* was never found associated with homopterans, rather they were found engaged in seed dispersal or act as scavenger or predator and this way they help to clean their surroundings. Long term studies in controlled condition are required further to correlate this behaviour in its evolutionary perspective.

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AUTHOR CONTRIBUTION STATEMENT

Field study, identification and photography were done by PD, Manuscript preparation and editing were done by SS and PD, whole supervision of the work was done by SS.

CONFLICT OF INTEREST

No conflict of interest.

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