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# Strategy on the predation of arboreal weaver ant *Oecophylla smaragdina* (Fabricius) on a ground nesting ant *Camponotus compressus* (Fabricius)

**Khokan Naskar[1,3], Srimanta Kumar Raut[2] and Sangita Maiti Dutta[3]***

[1]*Department of Zoology, Achhruram Memorial College, Jhalda, Purulia 723202, West Bengal, India*
[2] *Ecology and Ethology Laboratory, Department of Zoology, University of Calcutta, Ballygunge Circular Road, Kolkata 700019, West Bengal, India.*
[3]*Biodiversity and Environmental Studies Research Centre, Department of Biological Sciences, Midnapore City College, Kuturia, Paschim Medinipur 721129, West Bengal, India.*
*Email: smaitiduttazoo@gmail.com*

**ABSTRACT:** The weaver ant *Oecophylla smaragdina* (Fabricius) occurring in Jhalda, Purulia of West Bengal, India feeds on different kinds of prey animals. These ants attack the ant *Camponotous compressus* in their natural habitats to feed on them. *C. compressus* are larger in size in respect to the predator ant *O. smaragdina*. Therefore, they have developed the art of group attack to capture the prey individual. In this article, described how *O. smaragdina* targeted and immobilized its prey on way of biting the body parts to ensure stretching the trapped individual prior to carry the same cooperatively to the canopy nest.
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**KEY WORDS:** Weaver ant, prey, predator behaviour, art of group attack

The widely distributed (Wetterer, 2017) Asian weaver ants *Oecophylla smaragdina* (Fabricius) are predacious in habit as they prey upon various types of arthropods, arachnids and other invertebrates (Belcher and Kuster, 2004; Gathalkar and Barsagade, 2016; Babu and Patil, 2021). Thus, in several cases these ants have been proved effective to control the pest population (Peng *et al.,* 2012; Offenberg *et al.*, 2013; Pierre and Idris 2013). In their natural habitat they actively seek out for honeydew (Blüthgen and Fiedler 2002), while in experimental conditions they never spared jaggery, sugar cubes, honey, fragments of biscuits, fish and meat (Selvam and Nalini, 2021). Also the role of *O. smaragdina* in shaping the plant-pollinator interactions did not escape the sight of Rodríguez Gironés and coworkers (2013). Reports on the predatory behaviour of *O. smaragdina* though available on various prey animals; information on their predation of other ant species is not documented. However, Gotwald (1972) described the predatory behaviour of *O. longinoda* (Latreille) on *Anomma* (Savage) driver ants. During the course of studies on the bioecology of some ant species noted the predation behaviour of *O. smaragdina* on *Camponotus compressus* (F.) (Hymenoptera, Formicidae), ant in its natural habitat. The arboreal ants *O. smaragdina* are very common in different trees of Jhalda (Latitude- $23^0$ 22' N; Longitude- $85^0$ 59' E) area of Purulia district, West Bengal, India. They regularly descend from their arboreal nests to forage on the ground. They exhibit

* Author for correspondence

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opportunistic foraging behaviour, searching for and capturing a variety of arthropod prey items, including adults, eggs, and larvae. Though, customarily ants prey upon many invertebrates it is not clearly known how many of these ant predators prey upon other ant species.

In the course of experimental studies on the food preference of ants, noted the capturing behaviour of *O. smaragdina* four times to the prey ant *Camponotus compressus,* of course, in a group as *C. compressus* is quiet larger in size in respect to the size of an *O. smaragdina* worker. The nests of *O. smaragdina* were located high in the canopy of a large mango tree (*Mangifera indica* L.) while foraging *C. compressus* were observed emerging from their nest at the base of a moringa tree (*Moringa oleifera* Lam.) locating 2.5 meters away. Documented the observations by recording data on sequential events on the capturing process of the powerful prey and by photographs. Such incidents were seen on sunny days between 10.30 am and 3.50 pm during September-October (dew season) period in the study site.

There were 12 instances where *O. smaragdina* ant isolated one *C. compressus* individual from the row of *C. compressus*, and 8 events where *O. smaragdina* trapped *C. compressus* individual moving alone in the foraging ground. In cases of snatching a *C. compressus* individual from the row an *O. smaragdina* was seen to give a sudden bite to a leg. The said *C. compressus* perhaps, because of biting pain moved out of the row where she had to encounter with many other *O. smaragdina* but finally trapped by the predators' group attacking strategy. In three instances, a solitary *C. compressus* was observed being attacked by a pair of conspecifics, which bit its legs. In the remaining five cases, group attacks were initiated after a single *O. smaragdina* worker bit the leg of a *C. compressus* individual. Surprisingly, in all cases within few seconds the attacked *C. compressus* was encircled by many *O. smaragdina* individuals (Fig. 1A). Of the assembled *O. smaragdina* some were seen in direct attacking state, i.e. each leg of the prey was deactivated due to bite of either one or more individuals. Also the movement of appendages was seized through the strong biting at the terminal point of the same by the predator ant. Then, each of these biting act, *O. smaragdina* individual was seen to stretch the prey's body for a period of 12-18 minutes so as to stop any kind of movement and/or counter blow of the trapped prey individuals. But, in some cases when the prey individual, even after adoption of such strategy to immobilize the same, tried to escape the predator's trap the predator ants were seen to ride over the body of the prey individual to give a bite at the cervix as well as moved close to the body of the prey to bite the abdominal part. Also, in some cases one predatory individual was seen to find access to bite the petiole even ventrally to induce paralysis (Fig. 1B). That is, grasped the prey biting the legs, antenna, petiole and gaster. Moreover, following grasping in respect to prey individual's repeated attempt to get rid of the danger, on way of undulation of her body, some *O. smaragdina* workers triggered to bite the wall of the abdomen, thorax and cephalic portion of and on. Finally, the prey became silent. But, *O. smaragdina* did not move at least for a period of 3-7 minutes from that spot of the foraging ground. Thereafter, they were seen to move in a coordinated way; forward by applying pulling and pushing strategies by holding the prey in a stretched condition.

It is evident that *C. compressus* being much larger in size are victimized by the much smaller sized *O. smaragdina* but in a cooperative manner through group activities. It seems that the biting of *O. smaragdina* is painful to *C. compressus* and thus only one bite to a leg is enough to detract the prey individual from the trail of the same. It is most likely that *O. smaragdina* releases certain chemicals during such an operation so as to ensure the arrival of many more foragers moving around.

However, the recruitment of additional workers is a time-consuming process. When a large number of workers gather around a *C. compressus* individual, it cannot be excluded that they release chemical signals. In this context information provided by Vidhu and Evans (2011a, b; 2014, 2015a, b) and Gathalkar and Barsagade (2016) that (i) the major and/or intermediate worker castes of

Figs. 1A-B Chronological behavioural sequences during capturing the ant prey *C. compressus* by the weaver ants *O. smaragdina*

A — On the right side of the photograph: targeted *C. compressus* is snatched away from the row; in the middle of the photograph: the strategy the weaver ants applied to seize her activity

B — An *O. smaragdina* is trying to bite the cervix of the prey individual, another one is trying to bite the petiole of the prey ventrally, still another one is trying to bite the abdominal wall

*O. smaragdina* during the course of bite to the prey are habituated to spray formic acid instantly together with a group of volatile compounds by lifting and their gaster towards the site of bite; (ii) the formic acid then enters into the victim's body through the puncture made by mandibles while volatile compounds act as a pheromone and direct the other ants to join the act of predation, and (iii) they are brutally aggressive, are strategic devices applied by *O. smaragdina* during predation. Thus, it could safely be concluded that the behavioural events exhibited by *O. smaragdina* ants during the present study are very much influenced by the factors.

From the photographs it is clear that the weaver ants positioned themselves at all possible points encircling the body of the prey individual where workers found the body part of the prey to bite. Such type of group attack have also been noted in *Oecophylla longinoda* while capturing the *Anomma* ant prey (Gotwald, 1972). Moreover, immobilization of prey individual through prolonged stretching by *Oecophylla* ants is a common device as is evident from the studies of Weber (1949), Ledoux (1950), Way (1954), Gressitt (1956) and Vanderplank (1960). Elongation of doriliane ants is also in practice by the predacious ants *Eciton burchelli* (Westwood) and *Labidus coecus* (Latreille) (Schneirla, 1971). Predators typically launch surprise attacks to immobilize their prey. Immobilization may be achieved by inflicting physical damage, such as biting and creating wounds, or by injecting toxic substances. Since, *O. longinoda*, *Eciton burchelli*, *Labidus coecus* are devoid of such prey capturing weapons they have developed the art of stretching the prey individual for a considerable length of time to kill the same and to torn the body of the prey individual into pieces to facilitate transporting the same to the nest (Schneirla, 1971; Gotwald, 1972).

In the present study it is clear that *O. smaragdina* stretched the prey ant *C. compressus* to kill the same but the body of the prey was never separated into pieces. Rather, the weaver ants transported the prey individual as such to the destination. Though previous workers are in opinion that the aim of stretching of prey is to torn the body into pieces it is very hard to accept the idea. Removing a leg from the prey's body would not simplify the transportation process. In fact, it would complicate the task of carrying the prey. Because cooperative transportation (Czaczkes and Ratnieks, 2013; McCreery and Breed, 2014; Buffin and Pratt, 2016; Naskar and Raut, 2018; Naskar *et al.*, 2023; Burchill *et al.*, 2023), especially vertically would prove effective and faster if the body of the prey could be kept high up from the surface to avoid any kind of hurdle or obstructions. This could be substantiated from the facts of association of a good number of weaver ant workers encircling the workers engaged in stretching the prey ant (Gotwald, 1972). Food value of *O. smaragdina* is very high and accordingly they are consumed by the tribal people by different means (Vidhu and Evans, 2015a; Mitra *et al*., 2020).

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