



ANTS' NECROPHAGY ON ANTS

Naskar K.^{1*} and Raut S.K.²¹Department of Zoology, Achhruram Memorial College, Jhalda, Purulia-723202, West Bengal, India²Ecology and Ethology Laboratory, Department of Zoology, University of Calcutta, 35,

Ballygunge Circular Road, Kolkata - 700019, India

*Corresponding author email: khokan24@gmail.com

ABSTRACT

Necrophagy in ants on the ant species *Camponotus compressus*, *Meranoplus bicolor*, *Pheidole roberti*, *Monomorium pharaonis*, *Crematogaster subnuda*, *Anoplolepis gracilipes*, *Tetraponera rufonigra*, *Paratrechina longicornis*, *Oecophylla smaragdina*, *Solenopsis geminata* occurring at Jhalda, Purulia, West Bengal, India was studied both in field conditions and in experimental trials under field environment. It is revealed that in their natural foraging area *A. gracilipes*, *Ca. compressus*, *Cr. subnuda*, *M. pharaonis*, *O. smaragdina*, *Pa. longicornis*, *Ph. roberti* and *T. rufonigra* are habituated to carry selective corpses either of their own species or of different species lying on the ground, to their nest. Also, in experimentally offered injured, freshly dead and semi-decomposed corpses of different ants, amongst the naturally dead ants corpses occurring in the field, were procured by the ant species, on priority basis, that is, injured, freshly dead individuals corpses to the nest. In all cases, depending on the size and weight of the corpses the ants applied either individual or cooperative transport mechanisms to carry the same.

KEYWORDS: Ants, foraging, necrophagy.

INTRODUCTION

Ants have a wide range of food resources irrespective of plant and animal varieties (Abbott, 1978, Grover *et al.*, 2007, Cook *et al.*, 2011, Schultheiss. *et al.* 2013, Naskar and Raut, 2014a, b, c, 2015a, b, c, d, e, f, 2016a, b, c.). Even they are habituated to use the inorganic materials to ensure their survival (Kaspari, M., S.P. Yanoviak and R. Dudley, 2008, Naskar and Raut, 2016a). They may devour the organic food materials directly from the body of the living organisms or way of feeding the dead, semi-decomposed, or decomposed organisms (Wilson *et al.*, 1958, Howard *et al.*, 1976, Banik *et al.*, 2010, López-Riquelme *et al.*, 2013). Depending on the type of food materials the ants may carry the same, either individually or cooperatively to the nest or engulf these at the source. Customarily, ants could be seen to feed on the corpse of other animals and also they are habituated to carry (Naskar and Raut, 2015, 2018a, 2018b, Czaczkes *et al.*, 2010, 2013) the same when possible, to the nest to feed the colony members. But, they are very much conscious to maintain the hygienic condition of the nests (Nonacs, 1990, Choe *et al.*, 2009, Czechowski *et al.*, 2009, Chapuisat, 2010, Heinze and Walter, 2010, Bos *et al.*, 2012, Diez *et al.*, 2012, 2013, Sun and Zhou, 2013). Because they have developed the habit to remove the left over parts of the food materials and corpse of their fellow members from the nest (Diez *et al.*, 2012, Lopez *et al.*, 2013). Moreover, moribund ants are seen to leave the nest to die in isolation (Heinze and Walter, 2010). Even, they are able to detect the presence of ectoparasite or of fungal spores on the nest-mate body and thus they ensure removal of the same by allogrooming (Lecklerc J.B. and Detrain C., 2016).

Keeping these findings in mind while we were investigating the causes of abundance of large number of dead ant individuals lying on the ground we came across the events of carrying some dead ants by some ant individuals from the said spot to their nest. We continued our observation for several months at frequent intervals and the phenomena of corpse carrying habit by different ant species, even corpse of the same ant species is being carried by the same ant species became clear to us, that the ants carry dead individuals to the nest. Moreover to ascertain, whether the ants select the freshly dead individuals or injured individuals or semi-decomposed individuals we carried out some experiments by offering injured, freshly killed or semi-decomposed ant individuals at the same site amidst the naturally occurring dead ant individuals on the ground. Our findings clearly indicate that, though necrophoresis in ants plays very important role to maintain the social prophylaxis (Leclerc and Detrain, 2016) it is also a very common habit in ants to carry corpses of ants into the nest, of course, definitely to meet up the need of the food of the colony members.

MATERIALS & METHODS

The western side of Achhruram Memorial College, Jhalda, Purulia (Latitude 23°36' North and Longitude 85°98' East), West Bengal, India where the entire ground remains under shade during noon and afternoon due to canopy configuration of the tall trees. Different kinds of ants could be seen roaming around on the ground almost throughout the day. On the ground, almost throughout the study area a large number of corpses of different species of ants viz, *Camponotus compressus*, *Meranoplus bicolor*, *Pheidole roberti*, *Monomorium pharaonis*, *Crematogaster subnuda*, *Anoplolepis gracilipes*, *Tetraponera rufonigra*,

Paratrechina longicornis, *Oecophylla smaragnida*, *Solenopsis geminata* were seen lying here and there. The foraging ants of some of these species were also seen to carry some of these ant corpses, of course, after careful examinations to their destination. In some cases they were seen to consume the corpse at the spot. However, in many cases foragers were seen to examine a corpse several times prior to accept or reject the same. Even, in several occasions it is noted that the same corpse of ant species was examined by the foragers of different ant species, one after another, during our observation period and the corpse which was rejected by the first forager of an ant species was also rejected by the subsequent foragers of the said species. Sometimes, some foragers were seen to carry the part of an ant corpse to the targeted point. Such procurement processes were seen in the field irrespective of ant species.

To verify whether the ants have any preference for the corpse of a particular species and also for the corpse of freshly dead or semi-decomposed corpse or the live one available in injured state, we offered all these kinds of corpse of different ant species as well as the injured ones amongst the corpses of the ants belonging to different

species lying on the ground at the study site. Observations were carried out on different dates, at frequent intervals, on sunny days for a period of five hours at a stretch in daytime, in all cases. Due attention was paid to note the fate of experimentally offered ant materials continuously for the period of five hours after supplying the same on the ground.

RESULTS

Of the ten ant species noted at the study site species viz. *Anoplolepis gracilipes*, *Camponotus compressus*, *Monomorium pharaonis*, *Oecophylla smaragnida*, *Pheidole roberti*, *Paratrechina longicornis*, *Tetraponera rufonigra*, were seen (Fig.1A-D) to carry the corpses of different ant species either individually or cooperatively to their nest (Table 1). In experimental trials only six ant species exhibited such behavior during our study period (Table 2). In all trials the offered ant specimens were procured instantly by the foragers after coming in contact with the same if they belonged to injured or freshly dead ant specimens. In contrast rarely they had the choice for the semi-decomposed ones.

TABLE 1. Corpse of ant species consumed at the spot or carried to the nest by the ant species occurring in their natural habitats at Jhalda, Purulia, West Bengal, India.

Foraging ant species	Corpse of the ant species consumed at the site or carried to the nest
<i>Anoplolepis gracilipes</i>	<i>Anoplolepis gracilipes</i> , <i>Tetraponera rufonigra</i> ,
<i>Camponotus compressus</i>	<i>Camponotus compressus</i> , <i>Crematogaster subnuda</i> , <i>Meranoplus bicolor</i> , <i>Monomorium pharaonis</i> , <i>Oecophylla smaragnida</i> , <i>Pheidole roberti</i>
<i>Crematogaster subnuda</i>	<i>Crematogaster subnuda</i>
<i>Monomorium pharaonis</i>	<i>Crematogaster subnuda</i> (by splitting the corpse into small parts)
<i>Oecophylla smaragnida</i>	<i>Oecophylla smaragnida</i> , <i>Crematogaster subnuda</i>
<i>Paratrechina longicornis</i>	<i>Crematogaster subnuda</i> (Head portion)
<i>Pheidole roberti</i>	<i>Crematogaster subnuda</i>
<i>Tetraponera rufonigra</i>	<i>Tetraponera rufonigra</i>

TABLE 2. Results of experimental trials on the consumption of corpses of ants at the supplied site or carried to the nest by the ant species

Foraging ant species	Corpse of the ant species used as foods
<i>Camponotus compressus</i>	<i>Camponotus compressus</i> , <i>Crematogaster subnuda</i>
<i>Crematogaster subnuda</i>	<i>Crematogaster subnuda</i> , <i>Pheidole roberti</i>
<i>Meranoplus bicolor</i>	<i>Crematogaster subnuda</i>
<i>Monomorium pharaonis</i>	<i>Camponotus compressus</i> (by splitting the parts)
<i>Oecophylla smaragnida</i>	<i>Oecophylla smaragnida</i> , <i>Camponotus compressus</i>
<i>Pheidole roberti</i>	<i>Crematogaster subnuda</i>



FIGURE 1A. *Paratrechina longicornis* carrying a corpse of *Camponotus compressus*



FIGURE 1B. *Anoplolepis gracilipes* carrying a corpse of *Camponotus compressus*



FIGURE 1C. *Oecophylla smaragdina* carrying a corpse of *Camponotus compressus*.



FIGURE 1D. *Anoplolepis gracilipes* carrying a corpse of *Tetraoponera rufonigra*.

DISCUSSION

It is well evident that the ants, irrespective of species are habituated to use the corpse of their own species and/or other species as their food. This habit perhaps, developed in exigency of situation to fulfill the requirement of proteins, especially animal proteins of the colony members. Though the ants feed on different types of animal carcasses (Wilson *et al.*, 1958, Howard *et al.*, 1976, Banik *et al.*, 2010) to meet up their protein demands it is undoubtedly, a unique adaptation of the ants to enable them to compensate the need of protein, in absence of other proteinaceous, especially, animal food sources, to maintain the health of the colony members.

However, it seems that the ants are very much aware of the fact of hygienic condition of the colony perhaps to avoid any kind of infection. Most likely, for the said reason they have shown the preference for injured and freshly dead ant specimens over other kinds of specimens offered experimentally. Since, in field condition some corpses of ants belonging to different species were refused by all the visitors irrespective of species, it is granted that almost all kinds of ants are equally sensitive to detect such unacceptable corpses because of some particular reason. Thus, to save colony they are habituated to remove the corpse to a distant place from the colony (Diez *et al.*, 2012) or by disassociation of the sick ants from the colony (Boss *et al.*, 2011) or by introducing the habit of isolation of moribund ants from the society to die in isolation (Chapuisat, 2010, Heinze and Walter, 2010).

It is concluded that ants irrespective of species are habituated to feed on the corpses of their own species or of different species to ensure their survival. It is not known whether they would prefer their own corpses over other animal source food items is a matter of further research. Thus, though ants are necrophagous, this article provides first information on their necrophagy nature either on their own species or of different ant species.

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