

## Predation of Ants and Termites by Army Ants, *Nomamyrmex esenbeckii* (Formicidae, Ecitoninae) in the Brazilian Amazon

by

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### ABSTRACT

In four different localities in the Brazilian Amazon we registered raids of army ants (*Nomamyrmex esenbeckii*). The prey were ants of the genera *Atta*, *Odontomachus* and *Camponotus* and termites of the genus *Nasutitermes*. The behavior of the army ant and its prey were registered. Our observations expand the number of prey recorded in the literature. It is possible that the dietary regime of these army ants is more flexible than previously believed and is related to food availability.

Key words: *Atta*; *Camponotus*; *Nasutitermes*; *Odontomachus*.

Neotropical army ants (Hymenoptera: Formicidae, Ecitoninae) are an ancient taxon of nomadic social predators (Brady 2003) that specialize in preying upon immature stages of ants, termites and some wasps as well as many other insects (Rettenmeyer 1963; Schneirla 1971). Among social insects, the army ants have an unusual type of foraging behavior, involving a large group of workers (O'Donnell *et al.* 2005). In the Neotropical region, species of army ants, like *Eciton burchellii* and *Labidus praedator*, build trails on the soil surface and litter. These two species are key predators in tropical forests (Roberts *et al.* 2000). However, trails of many species of army ants are not easily seen, as they begin the search for prey under the soil surface, hidden under the litter layer. Very little is known about their behavior, diet and impact in the soil and litter communities (Berghoff *et al.* 2003). This is the case with the army ant *Nomamyrmex esenbeckii*, a subterranean species also capable of surface activity (Scheirla 1971), where in some cases the raid is not easily detectable on the soil surface (Swartz 1998). The workers of *N.*

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*esenbeckii* are robustly built, with short-thick appendages. Their trails are large, but not so common in relation to many species of *Eciton* and *Labidus* (Longino 2006). Eighty to ninety percent of the diet of *N. esenbeckii* consists of ant larvae and pupae (Rettenmeyer 1963). All reports about the prey of *N. esenbeckii*, mention leaf-cutting ants of the tribe Attini, especially *Atta*, as the main dietary regime. The ant species *Acromyrmex rugosus*, bees and termites are also cited (Borgmeier 1955; Rettenmeyer 1963; Swartz 1998). Sánchez-Peña & Mueller (2002) describe one new distribution record for *N. esenbeckii* and record a raid on *Atta mexicana* in Northeastern Mexico. An observation of an attack of *N. esenbeckii* on a *Pheidole* nest at the “Parque Nacional do Corcovado” in Costa Rica was registered by Longino (2006).

We are recording field observations related to attacks of *N. esenbeckii*, done in four localities of the Brazilian Amazon. Three are situated at the State of Amazonas: 1) km 41 of the ZF3 road, a non paved road perpendicular to BR174, a federal road that connects the states of Amazonas and Roraima; 2) km 34 of the ZF3 road (2°56' S; 59°55' W), in the LBA station (Large Scale Biosphere-Atmosphere Experiment in Amazon), situated near the Cuieiras river; 3) km 29 of the state “road”AM-010 (2°56' S; 59°55' W), at the “Reserva Florestal Adolpho Ducke – RFAD”, a reserve situated near the city of Manaus. The fourth locality is situated in the State of Roraima, in an ecological station called “Parque Nacional de Viruí” (01°29' N; 61°00' W).

At the first location, on June 2004 at 0900 h, an attack of *N. esenbeckii* on an *Atta* mound was observed. The mound was about 2 m in diameter and at that time only a few *Atta* adults were present around it. The incoming individuals of *N. esenbeckii* were entering into the nest to carry out the *Atta* immatures (eggs and pupae). The prey (adults) showed little or no reaction to the predator. Only minor and media *Atta* workers were observed, no major workers or soldiers. No direct confrontation was observed.

In the second location, the observation was done on October 2005 at 0755 h. A termite nest (Isoptera, *Nasutitermes*) was attacked by *N. esenbeckii*. During the attack, the termites abandoned the nest and the predator had free access to remove the immature (pupae) of the termite colony. There were few confrontational episodes, with the termites being dominated by *N. esebenckii*.

In the third location, on April 2006 at 1000 h, a failed attack of *N. esebenckii* on a termite mound was observed. The predators were coming from

the inside of an opening in the soil, running to a wooden building column of the RFAD. The ants entered into an abandoned termite nest (Isoptera) supported by the column. Approximately 25 minutes later, the ants returned from the abandoned termite nest without carrying prey and proceeded to a second opening in the soil, more or less 10 m away from the first opening. Another raid, with many more ants in comparison to the first one, and this time carrying termite immatures, came from inside the adjacent primary forest, situated at a distance of about 5-6 m. This raid also disappeared into the second soil opening. This column was observed for about 40 minutes and some specimens were sampled for identification. The great majority of the immatures that were being carried by the workers of *N. esenbeckii* were pupae and eggs of *Atta*. One of the immatures was a pupae of *Odontomachus* (identified by the head and propodeum).

In the fourth location, we made the new distribution record for *N. esenbeckii* in the state of Roraima and in the study site (Kempf 1972; Brandão 1991). On March 2007 at 1500 h, a long and conspicuous column of *N. esenbeckii* was observed running up and down the trunk of a dead but still standing palm tree. There were many ants of the genus *Camponotus* in the palm tree and surroundings, all of them moving very fast and at random. The largest workers of *Camponotus* were carrying their pupae. Moving downwards, many worker specimens of *N. esenbeckii* were also carrying pupae of *Camponotus*. The raid was observed for more than 40 minutes, but no direct confrontation was observed between the individuals of *Camponotus* and *N. esenbeckii*.

As far we know, there is no report in the literature about *N. esenbeckii* attacking ants of the genera *Odontomachus* and *Camponotus*. Swartz (1998) proposed that the reason for *N. esenbeckii* to spend energy and lose thousands of individuals in battles with ants of the genera *Atta* would be the reward of the good nutritional quality of their prey. Powell and Clark (2004), in the first long-term study of the predator-prey interaction between *N. esenbeckii* and *Atta*, established *N. esenbeckii* as the only known predator capable of successfully attacking and killing mature colonies of *Atta* leaf-cutting ants. Our observations increase the number of species that are preyed upon by *N. esenbeckii* in the Brazilian Amazon and suggest that *N. esenbeckii*, although the greatest predator of *Atta* colonies, can also choose other ants and soil invertebrates as prey. Taking into consideration the field observations, we

suggest that the dietary regime of *N. esenbeckii* is more flexible than what was up till now recorded in the literature, and may be more related to food availability than prey quality.

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