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NEW PESTS ON TEA LANDS IN SRI LANKA

BLACK ANT, *CREMATOGASTER DORHNI*

Sushila I. Vitarana

(Entomologist, Tea Research Institute of Sri Lanka, Talawakele, Sri Lanka)

INTRODUCTION

The ant species so far recorded as pests or as organisms associated with pests on tea lands in Sri Lanka are the Red Ant *(Oecophylla smaragdina Fabricius)* and *Pheidole* sp. (Cranham, 1966).

An outbreak of the "black ant", *Crematogaster dorhni* Mayr, referred to as "Kodai" or "Koda kumbi" in Sinhalese, was reported from Shawland Estate, Lunugala, Badulla District, in August 1985, as infesting a tea field and leading to abandoning of plucking. About the same time an out-break of *C. dorhni* in the hamlet of Thalapathpitiya, Colombo District caused concern. Large nests of the same ant were observed on fruit trees, such as Rose apple *(Syzygium jumbos)*, Coffee *(Coffea robusta)*, Jak *(Artocarpus integrifolia)*, Ceylon Olive *(Elaeocarpus serratus)*, "Rambutan", *(Nephelium lappaceum)* Mango *(Mangifera indica)* and Sour sop *(Anona muricata)* at the TRI Low-Country Station at Ratnapura from about June-July 1985 and became problematic in August-September when the ants were noticed entering houses. A similar report of an out-break of this ant in the Kandy district reached the author in September 1985. Thus, although it was reported as an uncommon species at least in 1985 the ant had been fairly widespread and coming up to pest proportions.

According to museum records, *Crematogaster dorhni* Mayr is the most widespread and common species of the genus *Crematogaster* in the oriental region (Personal communication, D.P. Wijesinghe, Department of National Museums, Colombo). Although the genus

Crematogaster is urgently in need of taxonomic revision the ant reported from Shawland Estate has been clearly identified as *C. dorhni* Mayr, the same as that found at Thalapathpitiya and Ratnapura. It has been recorded as a pest of tea in North-East India (Das, 1965).

Occurrence

At Shawland Estate the problem was confined to a 4-acre block of tea bounded on one side by a fast flowing stream, on another side by a thicket and on the other side by a ravine. Ant nests were also observed in other tea areas but in very low magnitude.

Almost all the plant species in the thicket were infested heavily. They included Sunflower(*Helianthus annuus*: Fam: Compositae), "Ahu".S. (*Morinda tinctoria*: Fam: Rubiaceae), "Illuk" S. (*Imperata cylindrica* Fam: Graminae), Mikania (*Mikania scandens*: Fam: Compositae) and Dadap (*Erythrina lithosperma*: Sub Fam: Papilionaceae). The other plants in the tea and in the ravine that were infested were (*Eucalyptus grandis* Fam: Myrtaceae), *Gliricidia maculata* (Sub Fam: Papilionaceae) and Dadap (*Erythrina lithosperma*).

Nest

The nest is a honey-comb like structure built around a stem or around an axil of a branch (Fig. 1). The structure consists of evenly thin walled and concentric chambers (Fig. 2). The walls are made up of chewed up leaf matter which sets when dry, acquiring a resemblance to a structure made of cow dung. It also incorporates undigested cut pieces of leaves and also whole leaves especially when the host is a soft herb like Sunflower. In some cases, even in the tea field, a lot of foreign matter available in the environment, such as waste newspaper, is incorporated into the nest structure.

Fig. 1 - Whole nest of *Crematogaster dorhni*, made around an axil of a branch

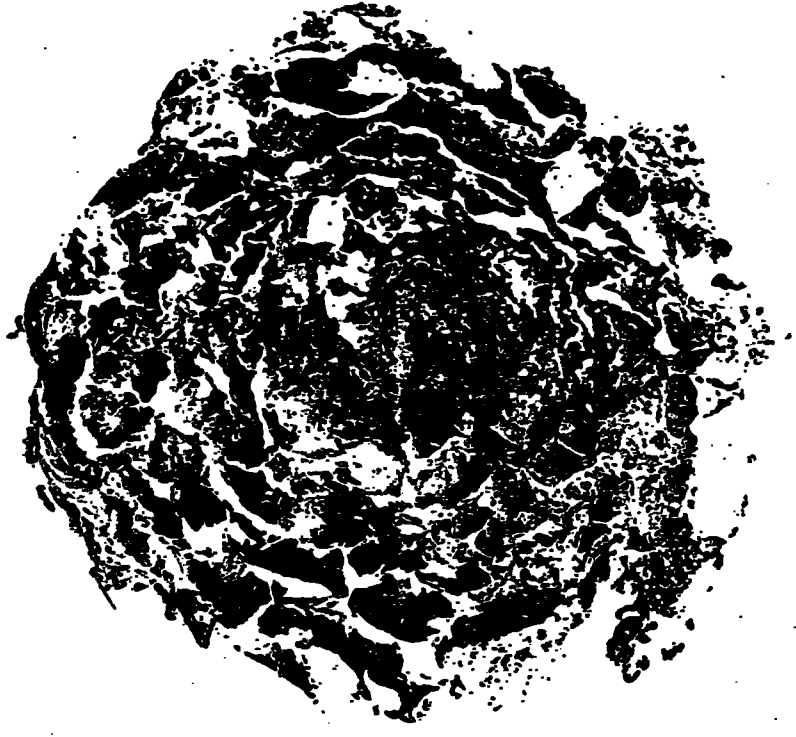

Fig. 2 - Nest of *C. dorhni* dissected in half showing concentric chambers

Colony

The size of the nest and its colony varies according to the size of the host plant, the small species with thinner branches, harbouring smaller nests than the tall plants with thicker branches.

One of the large nests collected from 'Ahu'.S. tree in the thicket at Shawlands Estate was examined and counted to estimate its population. While collecting, spillage of some colony inhabitants due to the excitement of the collector and drop off at leaving the nest on the ground briefly was unavoidable. Therefore, a 10% correction has been made to the counts obtained.

Number of small ants (workers)	43,210
Number of large ants (reproductives)	116
TOTAL	43,326

With 10% correction the adults total up to 47,658.

The ratio of immature stages (eggs + larvae + nymphs) to the adult individuals approximated to 1:1. Thus, the total population of a large colony approaches 100,000.

Taxonomic characteristics

Compound eyes and three ocelli are well developed in the reproductive adults. Worker ants lack ocelli. The base of antenna is clearly visible. Frontal carinae are not expanded laterally. What appears to be frontal carinae are the markings of the internal fulcra of the cranium which becomes visible when cleared in boiling Potassium hydroxide. The clypeus, a sclerite on the lower part of the face is only slightly expanded upwards (Fig. 3). This cranial characters and larval features described below places this ant in the sub family Pseudomyrmicinae (Imms, 1924; Borer and Delong, 1981).

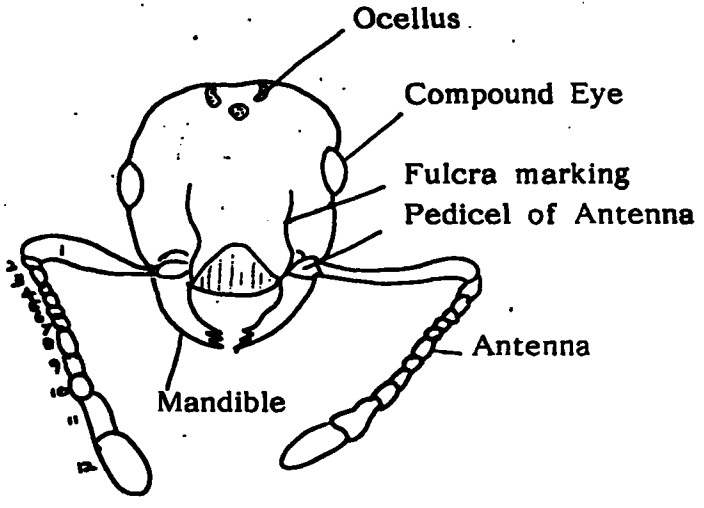

Fig. 3 - Head of reproductive (x 250)
-- anterior view

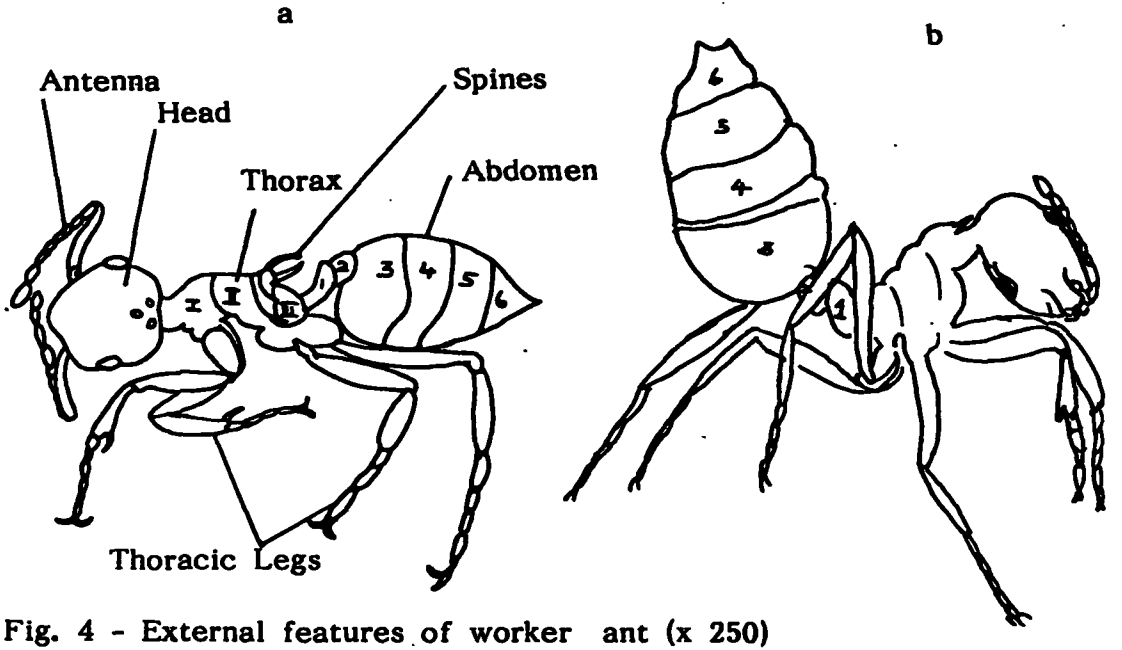

Fig. 4 - External features of worker ant (x 250)
a. With abdomen straight
b. With abdomen in flexed position while in motion

Pedicel, the stem of the abdomen between the thorax and the gaster is made up of two segments (Fig.4).

The specific character of this ant is its peculiar way of flexing its abdomen upwards most of the time while in motion.

The small worker ants are brown in colour. The adults have blackish brown head and thorax while the abdominal terga are almost black. Thus, the individuals which come out of the nest generally appear to be black.

The head of the larva is pushed ventrally by the expansion of the thorax (Fig. 5).

Behaviour and economic importance

When disturbed the ants run around vigorously and even fall off the host plant. The latter act is observed to be a deliberate attempt in an escape mechanism.

While in motion, the ants stop every few seconds to 'bite' the victim using their piercing mandibles, and the mandibular bite is considerably painful. A single bite lasts 5-10 seconds.

The venom of this ant does not seem to be a very potent one. The author who is slightly sensitive to mosquito bites, deliberately exposed her arm to ant colonies for several minutes at a time both in the field and indoor, but no blisters were formed by their 'sting'.

The colony populations are such that a victim can receive a large number of bites at the same time and this can excite the victim so much as to repel him away from the nest site. This leads to abandoning plucking of the affected area which results in crop being not harvested.

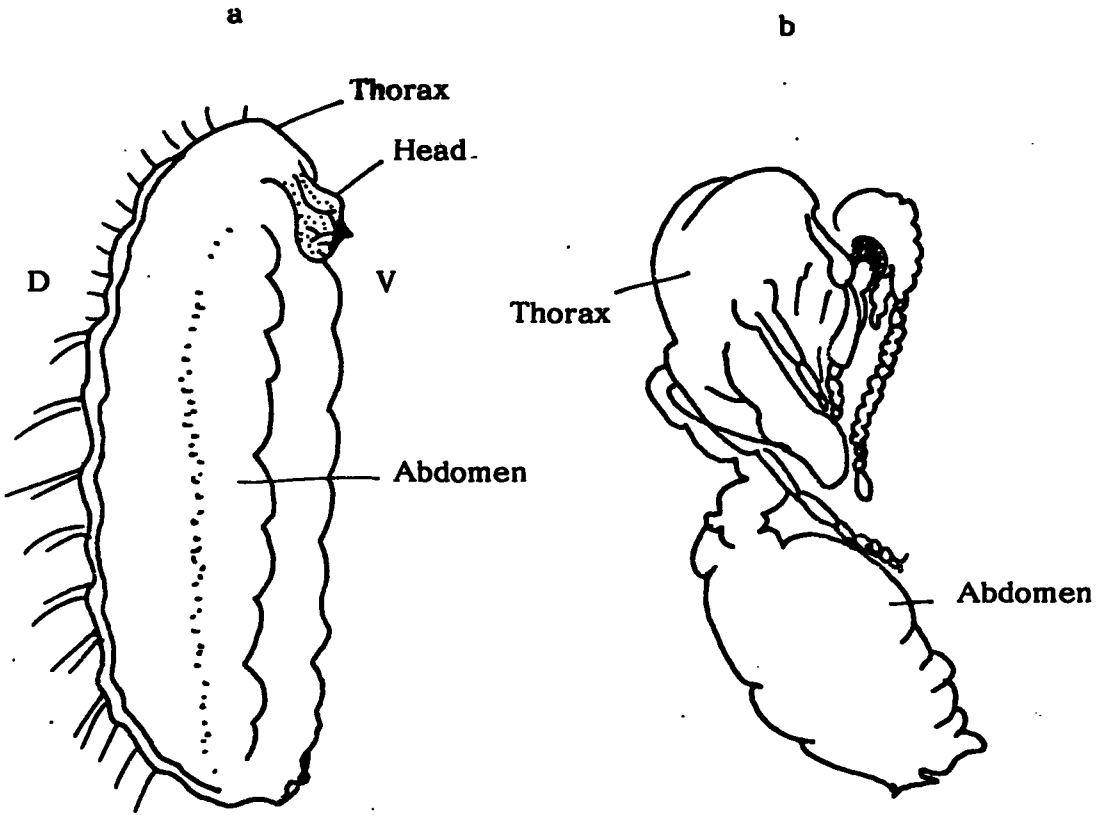

Fig. 5 - Immature stages of *C. dorhni*
a. Larva (x 250). b. Pupa (x 250)

Symbionts

One common feature among all the nests is the occurrence of scale insects on the host stem around which the nest is built. Even though no scale insect out-breaks have been noticed prior to the ant out-break, and the number of scale insects within any nest is very small, especially so in the case of tea, there seems to be a symbiotic relationship between the ant and the scale insect.

In the case of all vegetation in and around the affected tea fields at Shawland Estate, all the ant nests were associated with small colonies of the brown bug, *Saissetia coffeae*.

In the case of Coffee it is *Pseudococcus longi-spinus* which is usually attended by ants and *Saissetia coffeae* which is usually spread by ants, that are associated with *C. dorhni* nests.

In the Colombo district, the scale *Anomala coccus crematogastri* is reported to be associated with this ant (Personal communication, Abeysinghe). The same ant species in north-east India is associated with the coccid *Saissetia formicarii* Green which is never found on exposed stems of leaves of tea bushes (Das, 1965).

CONTROL MEASURES

One factor that draws the attention of the researcher who plans control measures is the symbiotic relationship between the ant and the coccid. In the case of tea and other plants on tea lands *Saissetia coffeae* was always forming the nucleus of the ant nest. Thus, an indirect method of control through eradication of the coccid by a systemic chemical sounds plausible. But in practice this was proved ineffective. This may be due to the fact that the coccid was

always in very insignificant numbers compared to the size of the ant colony. Perhaps the ant was using the coccid colony as a nucleus for its nest construction and ceased to depend on the coccids in due course. If that is so, destruction of the coccids after the ant nests have been noticed would not have any bearing on the activity of the ant.

Therefore, direct control with contact and stomach poisons was studied. Among the chemicals tested were chlorpyrifos ("LORSBAN"), diazinon special formulation ("KNOXOUT"), Cypermethrin ("CYMBUSH") and parathion special formulation ("PENNCAP-M").

Conventional insecticide formulations of emulsion concentrates of chlorpyrifos and cypermethrin brought about immediate killing of foraging ants but did not affect the nest inmates and as a consequence the residual population was observed to result in heavier infestation in due course.

On the other hand, the new insecticidal formulations of microencapsulated poisons, "Penncap-M" and "Knoxout" were almost equally effective.

1. "Penncap-M" - microencapsulated methyl parathion of 22% strength was made into a 1.6% solution by diluting at 1 gallon of commercial formulation with water and making up to 90 gallons solution.

2. "Knoxout" 2 FM - made into a 1.0% solution by mixing 4.8 gallons of commercial formulation with water and making up to 90 gallons solution.

These two insecticidal formulations are stomach poisons but not contact poisons because the active ingredient is encapsulated.

The microcapsules sprayed on the branches and at the base of the host plant are picked up by the worker ants and passively carried inside the nests. The small size of the capsule, 20-50 micron in diameter, facilitates easy passage from the site of application to the interior of the nest.

Of the two encapsulated formulations "Penncap-M" is more effective as far as field application is concerned.

When the pest population is heavy, repeat spray application is necessary especially in the case of large trees where some of the ants may avoid the chemical by staying up and foraging on the branches for a few days. Repeat applications may be given at 2-week intervals. This would not be necessary in the case of tea.

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