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## Foraging activity of *Hospitalitermes monoceros* (König) (Termitidae: Isoptera) in Western Ghats, India

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### ABSTRACT

Faunistic surveys undertaken at Chinnar Wildlife Sanctuary, located in the rain shadow region of the Western Ghats, Kerala state, could document a few colonies of *Hospitalitermes monoceros* (König) (Termitidae: Isoptera). The observed open air foraging behaviour of this group is detailed here. Some descriptive observations on natural history of *H. monoceros* were also made based on eight colonies of the species located at eight different sites in the sanctuary. The earlier notion about the genus *Hospitalitermes* being restricted to humid conditions in tropical rainforests need not necessarily be true, since their nests were sighted both in moist and arid patches at Chinnar. This indicates their ability to sustain in non humid habitats as well. The orientation strategy and organisation of marching column of foragers, colony defence by soldier castes and an active nest building event were also observed. More studies on the natural history are sure to unveil yet interesting aspects regarding these little known organisms.

**Keywords:** *Hospitalitermes monoceros*, Kerala, Natural history.

### 1. Introduction

The genus *Hospitalitermes* Holmgren (Termitidae: Nasutitermitinae) is distributed from Sri Lanka and India, throughout Southeast Asia, Southern China and across Indonesia archipelago to New Guinea [1]. They are among the few unique termites, foraging in columns in open air during late evenings for epiphytes like lichens, blue green algae growing on the surface of tree trunks, in canopies of tropical forests [3]. *H. monoceros* (König) the hitherto Sri Lankan endemic, was recently documented from India [1]. Observations on their natural history and open air foraging are enumerated here.

### 2. Methodology

#### 2.1 Study area

Chinnar Wildlife Sanctuary is located in Idukki district, Kerala (10°18'23.63"N - 77°12'27.47"E). Observations on host trees, nature and position of nest and foraging event from eight different sites of Chinnar wildlife sanctuary are appended in Table 1.

### 3. Results and Discussion

#### 3.1 Inference on Habitat and Behavior

**3.1.1 Habitat:** After observing and analyzing the nest sites, we opine that the earlier notion about genus *Hospitalitermes* being restricted to humid conditions in tropical rainforests [4] need not be true always. *H. monoceros* nests were sighted both in wet and dry patches at Chinnar, indicating their ability to sustain in non humid habitats as well. Strictly speaking, the study area does not fall under rainforest category, and is categorised as dry deciduous. Rainforests in Chinnar are restricted to the high elevations. It is likely that *H. monoceros* colonies reported as invasive at the Tea gardens in Sri Lanka [7] too would have adapted towards the not so moist habitat which prevailed there. Both *T. arjuna* and *T. elliptica* trees, where most of the nests were found, are characteristic components of dry tropical riverine forests and also tropical moist or dry deciduous forests. However the citing of *H. monoceros* on the trunks and roots of *M. indica*, the semi evergreen tree, indicates their habitat preference for moist mixed deciduous forests as well.

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**Table 1:** Observations of different nesting sites of *H. monoceros*

Study sites	Location	Date and time	Host tree	Nature of nest	Nest position	Nature of zone	Foraging event	Remarks
Site 1	Chinnar forest check post Stream side	02-08-2012 11.30 am	<i>Terminalia arjuna</i>	Pelleted	Inside a crevice of buttress roots	Dry	nil	Nest building in progress
Site 2	Forest Dept Canteen, Chinnar	02-08-2012 1.25 pm	<i>Terminalia arjuna</i>	Papery	Inside a crevice on the trunk base	Dry	nil	Apparently abandoned nest
Site 3	Chinnar forest quarters	03-08-2012 10.10 am	<i>Terminalia elliptica</i>	Pelleted	Tree top 11 ft from ground level	Dry	nil	Active nest
Site 4	Inspection Bungalow premises	03-08-2012 10-11 am	*Thaala tree?	Pelleted	Trunk base	Dry	nil	Active individuals inside the nest
Site 5	Inspection Bungalow premises	03-08-2012 10-11 am	Thaala	Hard inner + Pelleted outer	Trunk base	Dry	nil	Active individuals inside the nest
Site 6	Inspection Bungalow premises	03-08-2012 10.50 am	*Killivi tree?	Pelleted	Trunk base	Dry	nil	Apparently abandoned nest
Site 7	Pampar river side, Chambakad	02-08-2012 6.45 pm-8.20 pm	<i>Mangifera indica</i>	Pelleted	Carton nest	Moist	Present	Outbound procession
Site 8	Chambakad over bridge	03-08-2012 6.30 am	<i>Terminalia arjuna</i>	Pelleted	Carton nest	Moist	Present	Inbound procession

\*name of the tree in local dialect

**3.1.2 Trail:** As described by Bugnion [2], the black narrow trails (fig. 1), as if marked by a black dye of about 2-2.5 cm wide were observed on two trees where arboreal nests (fig. 2) of *H. monoceros* were cited. While foraging, the termites used exclusively the black trail path. However, no trails were observed on trees with nests confined to the base portion. Such trails were observed not only on trees, but on forest floor and also on the nearby small sandy rocks. In such instances the trails being interrupted by forest floor leaf litter and grassy vegetation were visibly vague at many points. The trails were often branched at random. The longest trail observed was about 16 m from the arboreal nest to the forest floor.

**3.1.3 Foraging event:** In the present study, the observed foraging advanced at around 6.45 pm, and was led by a few soldiers, which were soon followed by workers as described by Miura and Matsumoto [6] from Borneo. Within no time, a big swarm of termites as a procession emerged from the nest and marched along the conspicuous black trail. The trail bifurcated into a short and a

long one and moved in two directions. The long one marched as an uninterrupted column towards the forest floor perhaps for foraging onto another nearby tree, while the short trail was confined to the base of the host tree as if involved in some nest building activities. More and more individuals were emerging out of the small hole on the tree trunk, to join the long trail and this continued for more than one and a half hours, leading to a conclusion that they were millions of them inside the nest. The inbound trail on the same tree could not be located, instead a retreating segment of an arboreal nest bound trail on another *T. arjuna*, tree close by at about 6.30 am the next day could be observed. The workers were not carrying any food balls and within half an hour, the entire procession disappeared into the nest hole.

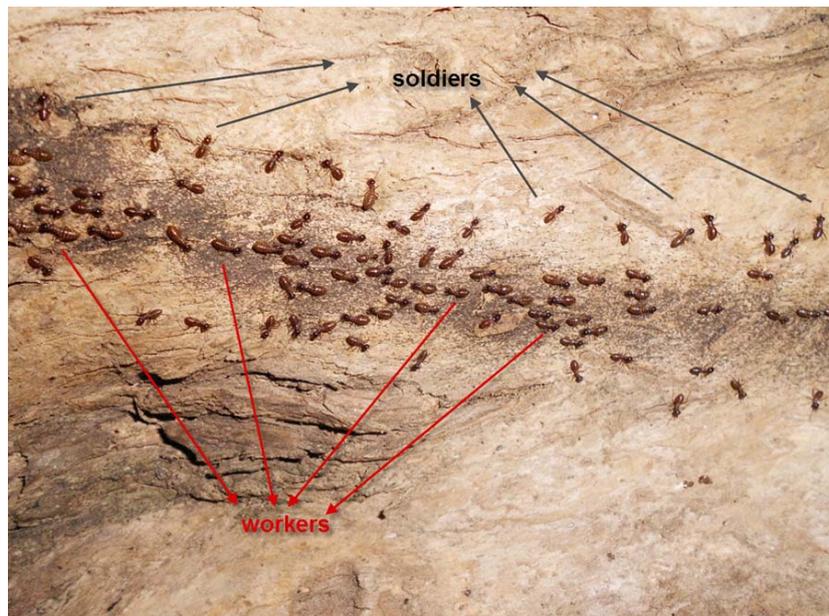
**3.1.4 The orientation strategy and organisation:** The orientation strategy and the organisation of the marching column of the foraging colony were observed. With their nasus facing outwards, the soldiers were lined up on either side of the foraging workers (fig.3), approximately at equal intervals of 1 cm.



**Fig 1:** Processional black trails on trees



**Fig 2:** Arboreal nest on tree



**Fig 3:** Orientation strategy of processional column

**3.1.5 Colony defence by soldier castes:** (fig. 4). The entrance of the nests was guarded by a few soldiers. During the foraging march too, they were lined up laterally on either side as mentioned above. In two instances where the lined up soldiers were far apart, rather than the usual 1 cm, small *Crematogaster* ants were successful in intruding inside the worker column. But before the ants could trap any of them, they were driven out successfully by the guarding soldiers. It was rather strange to observe that the

soldiers who were initially unaware about the ant intrusion were soon agile, but only after being bounded by a few workers. This triggered a conspicuous side to side oscillatory movement of the soldiers, ultimately driving away the ants out of the column, probably by squirting the terpene secretions from the nasus. This documented instance proves that apt positioning of the soldiers is crucial in wading away their enemies.



**Fig 4:** *H. monoceros* –soldier caste (dorsal view)

**3.1.6 Nests:** *H. monoceros* individuals were strictly confined to their nests during day time. On a close surveillance at a nest within a crevice at the base of *T. arjuna* tree (fig 5), at about noon, we could observe an active nest building event in progress (fig. 6), which continued uninterrupted for one to two hours.

Nesting sites could have been chosen as per a temperature/humidity gradient, since a difference in the nesting sites were observed between moist and dry zones in the forest. In all the 6 cases where *H. monoceros* nests were spotted on trees at their bases, the trees were situated in comparatively drier zones, whereas

in the two instances of arboreal nests, the nests were seen in more moist zones in the forest. The arboreal nests were at about 11 to 12 ft from ground level. Nest interior was very fragile, papery thin and with numerous chambers.

Though we could not observe any inquiline from the nests, we could observe a rare case where one of the arboreal nests of *H. monoceros* had a totally different texture towards its inner side. The inner area was yellowish brown, more physically solid, quite sturdy and less granulate and had more soil as its components, differing

much from the outer area of the nest, which was of the usual fragile nature. A possibility of this outer shell, being the nest of a totally another group of termites cannot be ruled out. A cohabitation of *Hospitalitermes* nests with members of another group, has been reported from Borneo [5].

The nest first sighted in April, 2012 at Champakkad, Chinnar which led to our detailed study was an abandoned one and was found attached to a man-made rocky structure, the 'Dolmen', or the postal tomb. Usually the nests are seen on tree trunks, branches or roots. This has been the first documentation of a *Hospitalitermes* nest on an inanimate substrate.



**Fig 5:** Nest inside the crevice at tree base



**Fig 6:** Nest building in progress

#### 4. Conclusion

The open air foraging activity of *H. monoceros* along with its descriptive natural history including trail marking, nest making, colony defense etc. were reported for the first time from India based on eight different colonies of Chinnar Wildlife Sanctuary. The earlier notion about the genus *Hospitalitermes* being restricted to humid conditions in tropical rainforests need not necessarily be true, since their nests were sighted both in moist and arid patches at Chinnar. This indicates their ability to sustain in non humid habitats as well.

Though termites in general are a familiar group, many of their life processes need further explorations. The bionomics and nesting dynamics of open air foragers like *Hospitalitermes*, are less studied. Studies on their natural history are sure to yield exciting results.

#### 5. Acknowledgments

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