

Deterioration in nest quality triggers relocation without affecting its dynamics in an ant

S. Kolay¹ · S. Annagiri¹

Received: 23 October 2016 / Revised: 17 January 2017 / Accepted: 20 January 2017
© International Union for the Study of Social Insects (IUSI) 2017

Abstract Nests play an important role in the lives of organisms that occupy them and a suitable nesting site has to be selected carefully. Sometimes, a nest of better quality may be available near the current shelter and it may become advantageous to relocate into it rather than occupying a sub-optimal nest. Thus, organisms have to move for the sole purpose of improving their nest. We asked whether colonies of the Indian queenless ant, *Diacamma indicum*, would relocate if a better quality nest was available. We examined the response of the colonies and individual ants when relocating to improve their nests as compared to relocations from completely deteriorated nests when the deterioration was brought about rapidly. Colonies relocated to improve their nest quality as in all cases, low quality nests were abandoned in favour of nests of better quality. The condition of the old nest did not affect the temporal dynamics of relocation. In addition, the degree of deterioration of the old nest affected neither the decision-making process nor the organization of work in the colony during relocation contrary to what has been documented in other species of ants. Thus, the manner in which the colonies move to improve their nests is comparable to the dynamics of relocation when the old nest is totally destroyed. Although relocation is a costly event in terms of energy expenditure and the risks involved, colonies relocate to improve their nest as the costs of occupying a sub-optimal nest presumably outweigh the costs associated with relocation.

Keywords Nest quality · Relocation · Tandem running · *Diacamma indicum*

Introduction

Nests play an important role in the lives of organisms that occupy them. Not only do organisms reproduce and rear their young within the nests, but the nests also provide them with shelter from environmental adversities (Hansell 1993). In the case of social insects, such as ants, wasps, and honeybees, nests also provide colonies a communal platform for coordinating tasks and exchanging information (Wilson 1971). Social insects are known to build complex nests which provide an appropriate environment for sheltering the colonies and rearing their brood. Both time and energy are spent in constructing and maintaining these elaborate nests. However, sometimes, nests have to be abandoned and colonies have to move into a new shelter for a multitude of reasons, such as nest deterioration, competition, predation, availability of resources, and colony growth (McGlynn 2012).

Nest quality is a combination of various physical, chemical, and biological factors, and it is difficult to understand how social insects assess nest quality during relocation (McGlynn 2012). In honeybees, at least six factors, including the height of the nest entrance from the ground, entrance size, cavity volume, and presence of combs inside the chamber, are assessed while selecting a nesting site (Seeley 2010). In *Temnothorax albipennis* and *Temnothorax curvispinosus*, light ingress into the nest, volume, and size of the nest cavity and size of the nest entrance influence nest site selection (Pratt and Pierce 2001; Franks et al. 2003, 2006). Temperature and relative humidity in *Eciton burchellii* and *Formica neorufibarbis* (Mccaffrey and

✉ S. Annagiri
sumana@iiserkol.ac.in

¹ Behaviour and Ecology Lab, Department of Biological Sciences, Indian Institute of Science Education and Research, Kolkata, Mohanpur, West Bengal 741246, India