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# The first Australian record of subterranean guano-collecting ants

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## Abstract

An arthropod community was found in guano of the inland cave bat (*Vespadelus findlaysoni*) roosting in the abandoned Eregunda mine, a 25 m adit located east of Blinman in the central Flinders Ranges, South Australia. This guano community is remarkable because meat ants (*Iridomyrmex purpureus* Smith) were observed to enter the mine, collect fresh guano, and carry it back to the nest. This opportunistic behaviour has not previously been reported in Australian or overseas hypogean guano communities. Bat guano is eaten directly by many guanobitic and guanophilic invertebrates as high nitrate food, or, more commonly the more readily digested glycogen rich bacteria and fungus are eaten. Although not strictly a cave, the lack of suitable bat roosts in nearby caves, and the stable environmental conditions present, make this site locally important as a representative hypogean guano arthropod community.

Keywords: Ant, biospeleology, Flinders Ranges, Formicidae, guano.

## Introduction

The presence of ants in a hypogean environment is interesting as few species have been recorded from cave habitats, with only limited numbers exhibiting troglomorphies recorded worldwide (Wilson 1962). No ants were recorded by Hamilton-Smith (1967) in his checklist of Australian cavernicolous arthropods and relatively few have been recorded since. Humphreys (1998) records a possibly cave-adapted species of *Paratrechina* attending meenoplids (Homoptera) in caves in the Cape Range peninsula and the Kimberley region, Western Australia. Humphreys and Eberhard (2001) record a guanophilic species of *Pachycondyla* from Upper Daniel Roux Cave (6CI-56), Christmas Island, but it possesses no troglomorphies. Several ant species including *Camponotus* ?*obniger* (*consobrinus* complex Erichson), *Cerapachys* ?*edentatus* Forel and *Rhytidoponera metallica* Smith, have all been recorded from the maternal chamber of Bat Cave (5U-2), Naracoorte, although these species are considered to be accidental to the cave environment (T. Moulds, unpubl. data).

A small population of the inland cave bat (*Vespadelus findlaysoni* Kitchener, Jones & Caputi) roosts in the abandoned Eregunda mine, east of Blinman in the central Flinders Ranges, South Australia. The population of approximately 20-30 individuals was observed in October 2002 and April 2003. The horizontal mine adit, approximately 25 m in length (Figure 1), is the most significant bat roost in the region (E. Rubessa, pers. comm. 2003). The current roosting area is nearest to the entrance, although two older, drier guano deposits, deeper into the adit provide evidence of movement of the bat roost during previous periods of occupation. This mine is an important site for hypogean guano arthropods in the Flinders Ranges as few other active bat roosts remain, due to disturbance from past guano mining.

## Observations

In April 2003 I collected arthropod specimens from the small guano deposit under the active roost and from the surrounding walls. A sample of guano was also collected for extraction in a Tullgren funnel. Specimens have been sorted to family level and beyond where possible.

This guano arthropod community is interesting due to the presence and behaviour of common meat ants (*Iridomyrmex purpureus* Smith). A trail of meat ants was observed from the entrance of the mine adit leading to the fresh guano under the active bat roost. At the active roost site, ants were observed collecting fresh guano in their

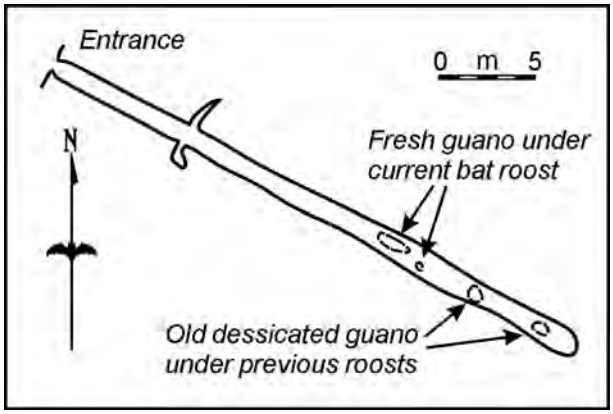


Figure 1. Plan view of Eregunda mine, central Flinders Ranges, South Australia.

mandibles and carrying it out of the mine to their nest entrance, approximately 30 m from the mine entrance. Approximately 10 ants were collecting guano at any one time, with groups of two to four individuals spaced every 30-40 cm traveling along the adit. This accounted for a large proportion of the fresh guano falling to the mine floor. This is the first record of the systematic gathering of bat guano by ants in an Australian mine or cave. The ants possess no troglomorphies, as would be expected given the opportunistic exploitation of the guano resource. No ants were observed attacking guanophilic arthropods.

The remainder of the guano arthropod community exhibits a standard structure, with a range of predatory species including pseudoscorpions, beetle adults and larvae, and spiders consuming psocids, fly larvae and other guanivore/fungivore species (*sensu* Gnaspini and Trajano 2000; Moulds 2004). No guanivore species were observed during April, although further sampling during summer months will undoubtedly reveal their presence. Several psocids were observed *in situ* although no specimens were collected. Despite the bats being in torpor, and the associated lack of fresh guano, the arthropod community was still active. Older drier guano piles, located deeper in the adit (Figure 1) supported few arthropods compared with the guano under the active roost.

## Discussion

The collection of guano by a single colony of *I. purpureus* is noteworthy as it demonstrates the opportunistic nature of this species. It is unknown if this behaviour is more widespread than the single example reported and further observations in other guano caves throughout Australia will aid in determining the extent of this behaviour in this and other ant species. The lack of ants exploiting this rich resource may be due to a number of reasons. The accessibility of guano may be a factor as the active guano pile is located in the twilight zone of the mine while the majority of guano is located well into the dark zone at Naracoorte. Guano in Eregunda mine is a relatively short distance from the entrance (Fig. 1), while sizeable guano deposits in Bat Cave are situated approximately 100-150 m from the entrance. The most important factor is probably the quantity and quality of resources available to ants outside both caves. Guano may be eaten directly for its relatively high nitrate content (Hutchinson 1950). Alternatively bacteria and fungus growing upon guano as it ages is also eaten by guanobitic and guanophilic invertebrates. It is unknown why this colony of *I. purpureus* was collecting fresh guano. Further observations are needed to clarify if guano is being used as a food source or for another purpose.

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