

An unusual nesting of the ant *Manica rubida* (Hymenoptera: Formicidae) in nests with mounds

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Abstract

A montane ant *Manica rubida* (Latreille, 1802) is a pioneer ant species of sunny habitats with minimal vegetation cover. It nests in the ground in nests having no above-ground construction, though the entrances may be crater-like due to the amount of excavated soil. A polycalic colony, formed almost exclusively by nests with a relatively large above-ground soil construction on the shaded site with dense vegetation cover, was examined on the edge of the Házlův Kříž peat bog in the Bohemian Forest (Šumava Mts.) in summer 2010. The colony was formed by 18 soil nests: one under a large stone and the rest with relatively large mounds. The mounds were on average 20 cm high, 36.5 cm wide and 50 cm long. No other ant species was noted in these mounds. The builder of these mounds as well as the reason for this unusual form of nesting regarding *M. rubida* was not clear. It is possible that the construction of nests with mounds was an attempt by *M. rubida* to obtain more sunshine in these conditions.

Key words: ecology, *Manica rubida*, nest, succession

INTRODUCTION

The nesting habits of many ground dwelling ants are variable. Although many species tend to build a specific form of nest in suitable conditions, most of them are able to live in nests of many types, e.g. both, with or without an above-ground construction (e.g., CZECHOWSKI et al. 2002; SEIFERT 2007). The form of the nest depends on a “personal preference” of the ants and the size of the ant colony as well as the amount of light, temperature, humidity, the availability of nesting sites, and building material (e.g., SADIL 1955; RASSE & DENERBOURG 2001; VYSOKÝ & ŠUTERA 2001; SEIFERT 2007).

The ant *Manica rubida* (Latreille, 1802) is distributed in Central and Southern Europe, Asia Minor, Crimea, and the Caucasus (CZECHOWSKI et al. 2002). It occurs in the mountains in sunny habitats with sparse and low vegetation (e.g., SEIFERT 2007). The biology of *M. rubida* is relatively unknown. It can form both monogynous and large polygynous and polydomous colonies containing several macrogynous queens and several thousand workers. Concerning the form of nests, *M. rubida* seems to be much less plastic in contrast to many other ground dwelling ants. All members of the genus *Manica* Jurine, 1907 are known to live almost exclusively in the fully subterranean nests, often under large stones (CREIGHTON 1950; WHEELER & WHEELER 1970; CZECHOWSKI et al. 2002; SEIFERT 2007). The nests consist of a reticulum of chambers and galleries in the soil (WHEELER & WHEELER 1970; CAMMAERTS & CAMMAERTS 1987). The entrances are sometimes entirely without above-ground constructions, sometimes (usually in sandy biotopes) they are surrounded by crater-like mounds

formed by excavated soil. This type of nest is typical for all members of the genus *Manica* (WHEELER & WHEELER 1970). The nesting of *Manica* in nests with above-ground mounds were recorded sporadically: WHEELER & WHEELER (1970) reported the presence of *Manica hunteri* (Wheeler, 1914) in the nests originally built by *Formica* Linnaeus, 1758 ants and VYSOKÝ & ŠUTERA (2001) referred to two nests with a small above-ground construction without other details. In this paper I report on the colony of *M. rubida* nesting almost exclusively in the nests with relatively large above-ground constructions.

MATERIAL AND METHODS

The site is near the town of Černá v Pošumaví in the Bohemian Forest (Šumava Mts.), South Bohemia, and is situated on the edge of a peat bog and the Natural Monument of Házlův Kříž (GPS 48°42'N, 14°E), 760 m a.s.l. The locality was visited twice in August 2010. The colony was situated in a small shady meadow on the edge of the peat bog, on a west facing slope. The meadow was triangular in shape (ca. 13×14×16 m; area of ~90 m²) and surrounded by a mature spruce forest (*Picea abies* (L.) Karsten) to the south and southwest, young brushwood with birch (*Betula pendula* Roth) and aspen (*Populus tremula* L.) to the north and northwest, and a relatively wet, high-grassy meadow with *Deschampsia caespitosa* (L.) P. Beauv. to the east.

Nearly the whole soil surface of the site was covered by dense vegetation with *Vaccinium vitis-idaea* L., *Vaccinium myrtillus* L., *Hypericum maculatum* Crantz, *Angelica sylvestris* L., *Potentilla erecta* (L.) Răusch, *Veronica chamaedrys* L., *Galeopsis* sp., *Rhinanthus minor* L., *Thymus pulegioides* L., *Avenella flexuosa* (L.) Drejer, *Agrostis capilaris* L., *Carex brizoides* L., *Holcus mollis* L., and *Phleum pratense* L. The cover of herbs and grasses was 30–40 cm high. Seedlings and young individuals (up to 1 m) of several species of trees and shrubs (*Picea abies*, *Betula pendula*, *Populus tremula*, *Salix aurita* L., *Rhamnus frangula* L.) were also sparsely present. The site was searched using a small garden rake. The size (height, width, length) of each discovered nest mound of *M. rubida* as well as the presence of other ants was recorded.

RESULTS

In total 18 nests of *M. rubida* were recorded from the studied site. Only one nest was situated under a stone, the rest had relatively large soil mounds. Mounds were on average 20 cm high, 36.5 cm wide and 50 cm long (for other statistical characteristics, see Table 1). All the nests were thought to be parts of a single polycalic colony. Both larvae and pupae were present in the nests.

All the mounds were partly or totally overgrown by vegetation, mostly springy turf-moss (*Rhytidiadelphus squarrosus* (Hedw.) Warnst.) and hair-grass (*Avenella flexuosa*).

No *M. rubida* nests were found inside the high-grassy meadow and forests. *M. rubida* occurred on several suitable sites in the surroundings, e.g., on the southern side of the spruce forest, not further than 80 m from the meadow with the mounds. At these sites, however, *M. rubida* lived in normal, fully subterranean nests.

No other ants were recorded from the site, with an exception of one nest of *Leptothorax acervorum* (Fabricius, 1793). Some small species of ants, however, could possibly have been overlooked.

Table 1. Characteristics of mounds of the *Manica rubida* nests at Házlův Kříž.

Character	Height (cm)	Length (cm)	Width (cm)
Arithmetic mean	20	50	36.5
Median	20	45	30
Mode	20	45	30
Maximum	30	100	70
Minimum	10	20	15
Standard deviation	4.9	20.5	15.2

DISCUSSION

I found no record of such a massive nesting of *M. rubida* in the nests with mounds in the literature. The anomalous nesting habit of *M. rubida* at the examined site might be a plastic reaction to the unfavourable environmental conditions. *M. rubida* usually inhabits fully subterranean nests on sites with sparse vegetation in the surroundings. On the other hand, the site seems to be quite unsuitable for this heliophilous species, because the geomorphology and woodland vegetation on two sides rob it of direct sunshine.

The situation may speculatively be explained by the history of the site. Yet the longevity and residence of *M. rubida* colonies has to be studied. *Myrmica* ants, which are close relative to *Manica* (Jansen 2010), usually have small nests and relatively short lived and highly mobile colonies (Elmes et al. 1998). On the other hand, ants with numerous colonies and large nests are usually less mobile and can persist for many years at one site (Hölldobler & Wilson 1990). Based on numerous colonies and relatively large nests, it is probable that large polycalic colonies of *M. rubida* can have lived in one place for several years at least. The brushwood to the north a northwest is young and its height and extent is still increasing. This is obvious from the small seedlings occurring at the edge of the site and from old and recent air photos (www.mapy.cz). It is possible that *M. rubida* was “trapped” at the site by the succession of vegetation during the last few years and it has had no way to escape at present.

In any event, it is likely that *M. rubida* has been forced to inhabiting nests with mounds to obtain more sunshine and better conditions regarding temperature and humidity.

It is not clear which ant species built the mounds. It is possible that the mounds were built by *M. rubida* itself. On the other hand, the ability of *M. rubida* to inhabit the nest mounds of other species is known from the literature (Wheeler & Wheeler 1970). It is possible that the mounds were built by another ant species and *M. rubida* occupied them later. In general, the construction of mounds were not as loose as is typical for the mounds of *Lasius niger* Linnaeus, 1758 nor as compact as for those of *Lasius flavus* (Fabricius, 1782); they resemble rather the nests of *Formica fusca* Linnaeus, 1758. On the other hand, there is no positive evidence that these mounds were built by *F. fusca* alone and the resemblance between the architecture of the nests of *F. fusca* and the discussed mounds may simply be caused by the similar body sizes of *M. rubida* and *F. fusca*. In any event, the presence of evidently freshly appositioned soil on the surfaces of most of the mounds indicates that *M. rubida* is at least able to rebuild and repair the above-ground constructions of adopted nests. Further, based on this observation, *M. rubida* seems to be more plastic in the form of inhabited nest than described in the literature.

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REFERENCES

- CAMMAERTS R. & CAMMAERTS M.C., 1987: Nest topology, nestmate recognition, territorial marking and homing in the ant *Manica rubida* (Hymenoptera, Formicidae). *Biology of Behaviour*, 12: 65–81.
- CREIGHTON W.S., 1950: The ants of North America. *Bulletin of the Museum of Comparative Zoology of Harvard College*, 104: 1–585.
- CZECHOWSKI W., RADCHENKO A. & CZECHOWSKA W., 2002: *Ants (Hymenoptera, Formicidae) of Poland*. Warszawa, Museum and Institute of Zoology PAS, 200 pp.
- ELMES G.W., THOMAS J.A., WARDLAW J.C., HOCHBERG M.E., CLARKE R.T. & SIMCOX D.J., 1998: The ecology of *Myrmica* ants in relation to the conservation of *Maculinea* butterflies. *Journal of Insect Conservation*, 2: 67–78.
- HÖLLDOBLER B. & WILSON E. 1990: The ants. *Harvard University Press*, 732 pp.
- JANSEN G. & SAVOLAINEN R., 2010: Molecular phylogeny of the ant tribe Myrmicini (Hymenoptera: Formicidae). *Zoological Journal of the Linnean Society*, 160: 482–495.
- RASSE P. & DENEUBOURG J.L., 2001: Dynamics of nests excavation and nest size regulation of *Lasius niger* (Hymenoptera: Formicidae). *Journal of Insects Behaviour*, 14: 433–449.
- SADIL J. 1955: *Naši mravenci [Our ants]*. Orbis, Praha, 224 pp. (in Czech).
- SEIFERT B., 2007: *Die Ameisen Mittel- und Nordeuropas*. Lutra Verlags- und Vertriebsgesellschaft, Tauer, 368 pp.
- VYSOKÝ V. & ŠUTERA V. 2001: *Mravenci severozápadních Čech [Ants of Northwestern Bohemia]*. Albis International, Ústí nad Labem, 211 pp. (in Czech).
- WHEELER G.C. & WHEELER J., 1970: The natural history of *Manica* (Hymenoptera: Formicidae). *Journal of the Kansas Entomological Society*, 43: 129–162.
- Online <http://www.mapy.cz>

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