Individual differences in the behaviour of *Formica fusca* workers (Formicidae)

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Introduction: Ant workers can consistently differ in their behaviour in various situations, like in emerging tasks. Ant colonies (the reproductive unit) can also exhibit consistent differences in behaviour, similarly to workers. Hence personality of social insects appears at least on two levels: individual and colonial [1].

Formica fusca, the common black ant is a facultative polygyne species, with several hundred workers per colony. Our aims were to measure repeatability of workers' behaviour and investigate what effect the reproductive attribution (queen number) and the body size of the workers (head width) have on it.

Materials and Methods:

***Formica fusca*:** colonies (n=9) were collected from East Hungary near Debrecen. All of these colonies contained fertilized queens, workers, larvae and pupae. The tested workers were marked individually.

Study method: The workers were tested individually in circular open-field arena for 300 seconds. Different test setups were used: two different sized open-field arenas [Fig.1: 1; 4], three different novel objects (neutral novel objects [Fig.1:1], freshly defrosted dead non-nest-mate workers [Fig.1:2], formic acid drops [Fig.1:4]), and two methods for delivery the ant to the arena (was allowed to explore [Fig.1:5-6] or was forced to explore).

Investigated variables (* marks repeatable ones): walking latency*, wall latency, first object visited*, antenna emergence*, body emergence, number of times the refuge visited*, number of enters in the refuge*, time spent in the refuge*, aggressive behaviour [Fig. 3] *(bite and/or spaying acid), total number of the visited objects* [Fig.2] [3]

Statistical analysis: All statistical analyses were carried out in the R interactive statistical environment. GLMM (glmer); family: poisson, binomial. Repeatability (rpt.binom, rpt.count) [4]

Experimental setups:

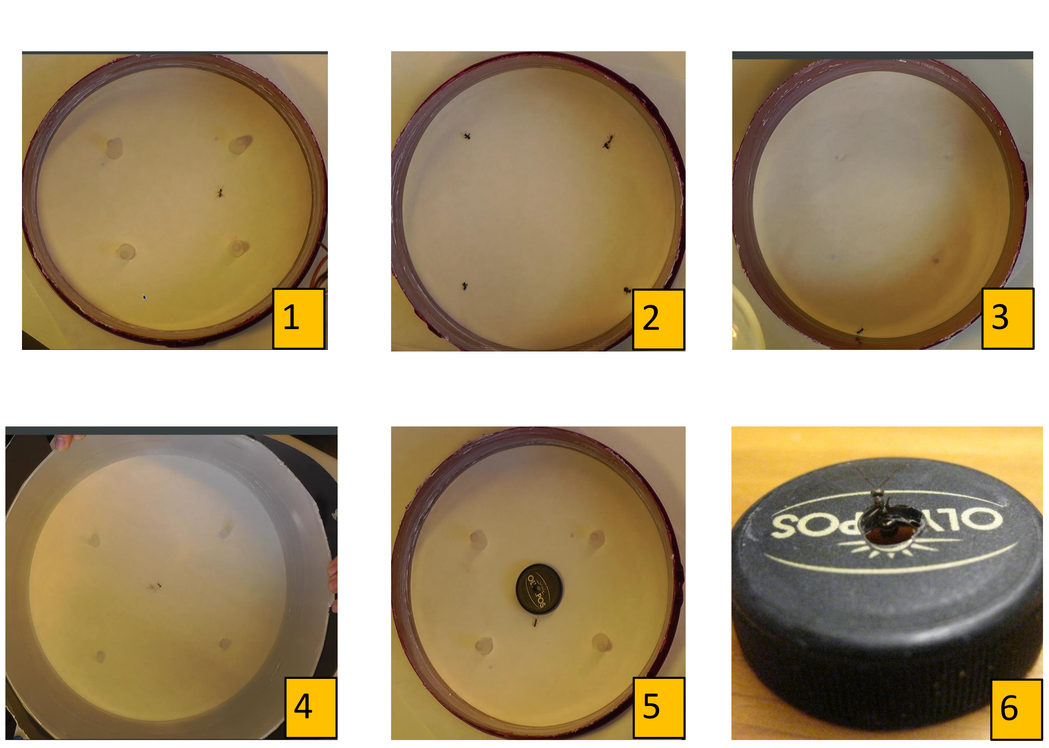

Figure 1. Behavioural tests (1-6)

Result: Individual and colonial personality

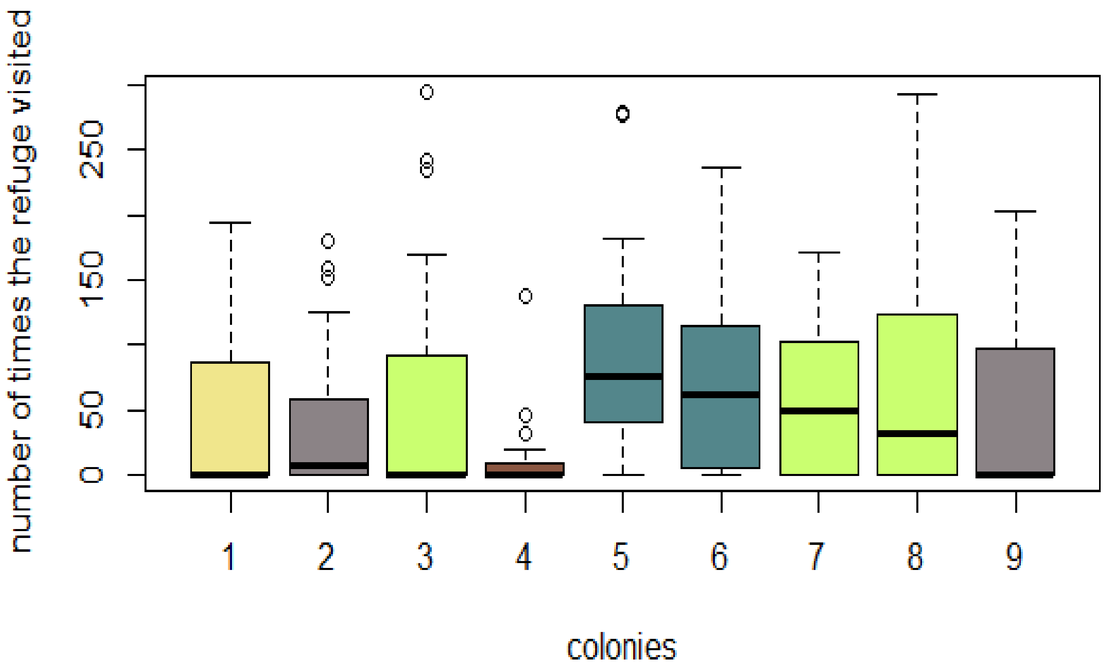

Figure 2.: Number of times the refuge visited
Glmer, Number of obs: 541, groups(colony): ID: 184; colony :9; Repeatability: R_ID=0.5985 (IC=1.05-1.28), R_colony=0.2693 (IC=0.32-1.02), test p <0.05 , head width p<0.05; z=-3.504.

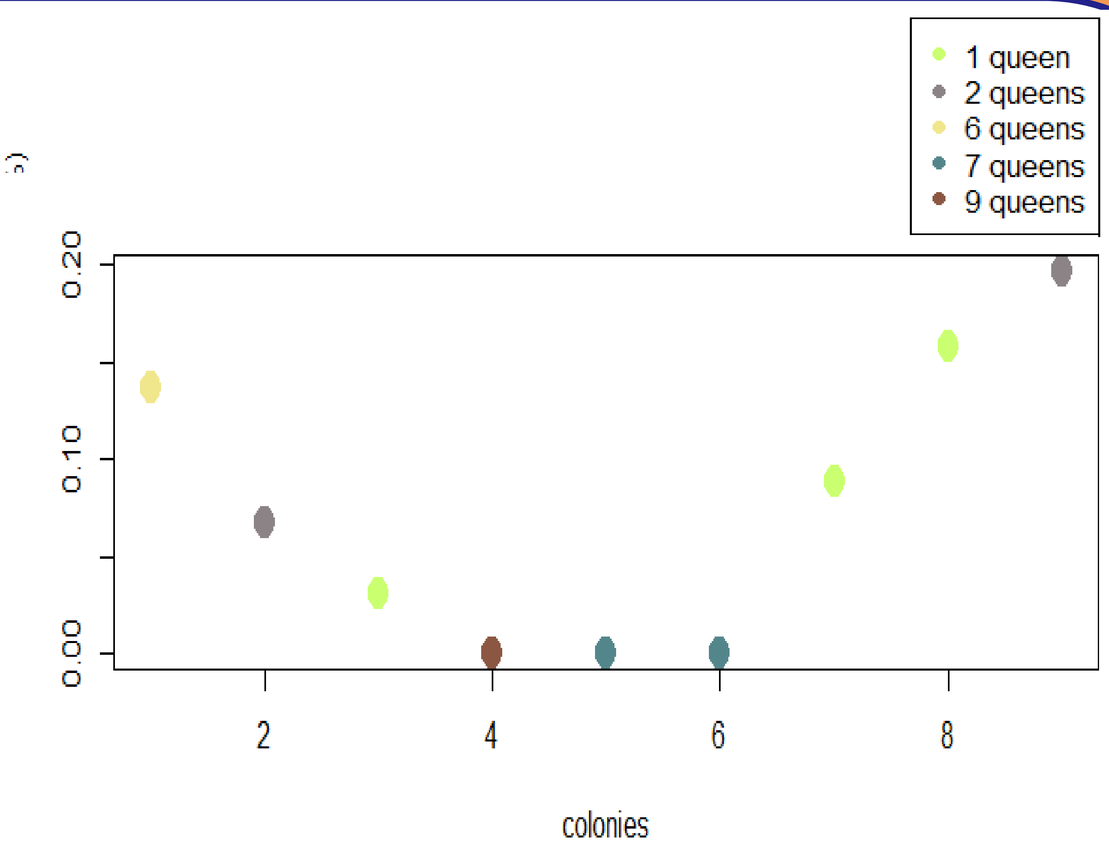

Figure 3.: Presence of aggressive behaviour (%)
Glmer, Number of obs: 541, groups(colony):9, Repeatability: R_colony = 0.4854792 (IC=0.55841252-3.8919585), queen number p= 0.0688; z= 1.820, IC= n.s

Discussion:

Our results show that there are significant behavioural differences between *F. fusca* workers and between the colonies, and they behave consistently. Furthermore the repeatability for the colonial behaviour looks stronger. The differences between the colonies are not explained by the number of the queens. There is an effect of the test setups on the number of the visited object. Body size has also influenced ants' behaviour. The consistency of behaviour suggests that individual and colonial personality exist in this species, however the relationship between them require more experiments.

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MARIE CURIE ACTIONS

Lendület program

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