Behavioural effect of *Rickia wasmannii* (Laboulbeniales) on *Myrmica scabrinodis* workers

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Introduction The interactions of Laboulbeniales (Ascomycetes) fungi and ants (Hymenoptera: Formicidae) are understudied. These fungi can spread abundantly on the ant body (**Fig. 1**) and we supposed that this structural cuticular change can influence the behaviour of the infected ants. The most frequently found Laboulbeniales in Europe is *Rickia wasmannii* (**Fig. 2**), which often infects *Myrmica* ants (**Fig. 1**) and is therefore an easily available model species. Almost no data about the effect of *R. wasmannii* on the host ant is known. Our aim was to get knowledge about the effect of *R. wasmannii* on the bravery and aggression of *Myrmica scabrinodis*.

Materials and Methods Twelve colonies were collected from N-Hungary (six infected colonies from Rakaca and six uninfected one from Aggtelek) and twelve others from E-Hungary (six infected colonies from Újléta and six uninfected one from Csíkgát. All of these colonies contained fertilized queens and hundreds of workers, larvae and pupae. The ants were kept in artificial lab nests with complex food resources (cockroaches twice a week, honey water ad libitum). The colonies were stored in the laboratory for minimum a week as an acclimation period before testing.

In the bravery test 432 workers from twentyfour colonies were used. The specimens were put in thin black closed tubes (length=60mm, d=5mm; **Fig. 3**) for one minute. With the removal of the plugs, the measuring of the time of leaving the tube was started.

For the aggression test 120 worker pairs (infected vs. uninfected) were used. Two facing glass tubes (length = 53mm, d = 15mm; **Fig. 4**) connected formed the arena in this experiment. The number of different behaviour patterns (biting, threatening and proposal) was registered.

Fig. 1: *Rickia wasmannii* on *Myrmica scabrinodis* (photo: Walter P. Pfliegler 2013)

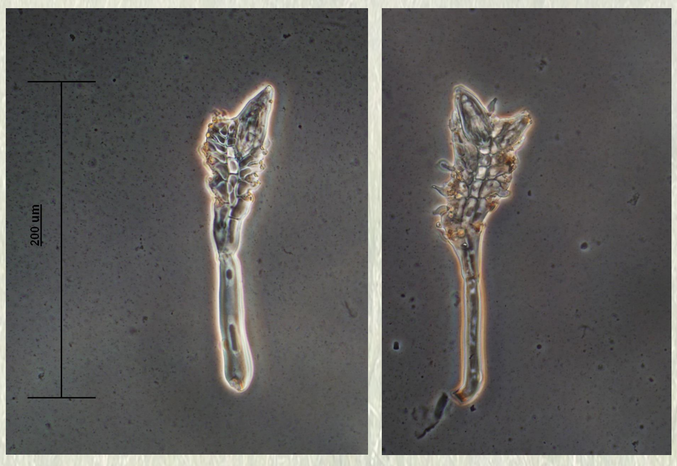

Fig. 2: Thallus of *Rickia wasmannii* (photo: Walter P. Pfliegler 2013)

Fig. 3: Test setup of the bravery test

Fig. 4: Test setup of one-to-one aggression test

Fig. 5: Aggtelek-Rakaca Difference between bravery of infected and uninfected *M. scabrinodis* workers (GLMM: z=13,66; p = 0,00001; n = 216)

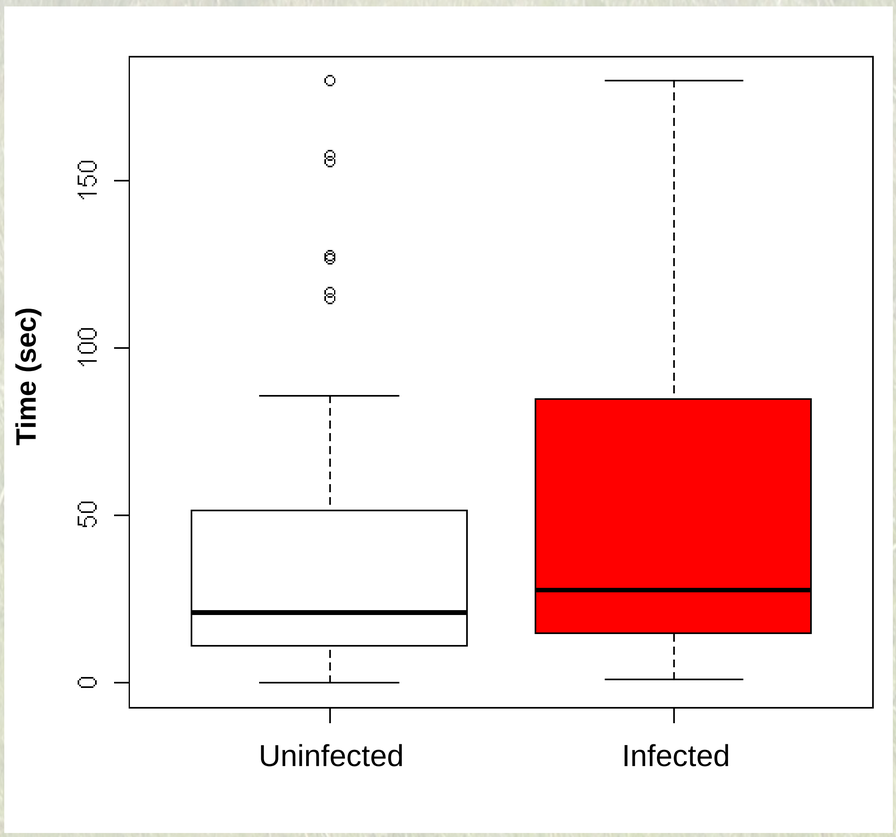

Fig. 6: Csíkgát-Újléta Difference between bravery of infected and uninfected *M. scabrinodis* workers (GLMM: z = 26,43, p = 0,00001, n = 216)

Results and Discussion Significantly different behaviour was found between infected and uninfected individuals in the bravery test on the basis of the Generalized Linear Mixed Model (**Fig. 5-6**). This observation supports the results of Spegazzini (1914) who found infected specimens to be slower.

The results were similar in the one-to-one aggression test. The uninfected individuals were more aggressive than infected ones. (Aggtelek-Rakaca site: GLMM: z = 2,9, p = 0,003, n = 120. Csíkgát-Újléta site: GLMM: z = 4,16, p = 0,00001, n = 120)

Based on our results, the infection by *R. wasmannii* can cause behavioural change of *M. scabrinodis* workers. These changes such as reduced bravery and aggression can be a disadvantage in territorial fights or battle for resources.

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References

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