

## Abstract\*

## Social isolation and worker survival in the obligatory slave-making ant *Polyergus rufescens* (LATREILLE, 1798) (Hymenoptera: Formicidae)

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In ants, social isolation (preventing an individual from contacts with other colony members) is a strong stress factor. It significantly reduces the lifespan of the isolated individuals, although this effect may vary markedly depending on the species and the behavioural status of the worker. Isolated workers may survive as long as 8 weeks (*Camponotus fellah* DALLA TORRE, 1893) (BOULAY & al. 1999) or even several months (*Ectatomma tuberculatum* OLIVIER, 1792 and *Camponotus ligniperda* STÄRCKE, 1942) (GODZIŃSKA & al. 1999), or as little as a few hours only (*Eciton burchelli* WEBER, 1941) (FRANKS & PARTRIDGE 1994). Young workers still acting as nurses usually survive longer than older individuals already acting as foragers (BOULAY & al. 1999).

We present here the data on the effects of social isolation on the survival of workers of an obligatory slave-making ant, *Polyergus rufescens* (LATREILLE, 1798), and its slave species, *Formica fusca* LINNAEUS, 1758, taken from the same natural mixed colony. After a 3-day isolation with unrestricted access to food and water, the level of worker mortality differed dramatically between the two species. When workers of both species were kept singly the mortality of *F. fusca* was very low (below 1%), while in *P. rufescens* the worker mortality reached 28%. In natural mixed colonies, workers of *P. rufescens* depend largely on their slaves, including feeding. Hence, their high mortality observed in our tests could result either from stressful effects of complete social isolation, or from absence of the care usually obtained from slave workers, or from both these factors. To throw more light on this question, in the next experiment we compared the survival of workers from the mixed colony of *P. rufescens* and *F. fusca* kept singly or together with another worker of the same or different species. Whereas the mortality of *P. rufescens* kept singly was very high, it decreased markedly if a *P. rufescens* worker was kept together with its *F. fusca* nestmate. The mortality of *P. rufescens* was also lower in dyads composed of two *P. rufescens* workers, but that effect was significant only during the first 2-3 days of isolation (Fig. 1). These results demonstrate that social contacts with a single

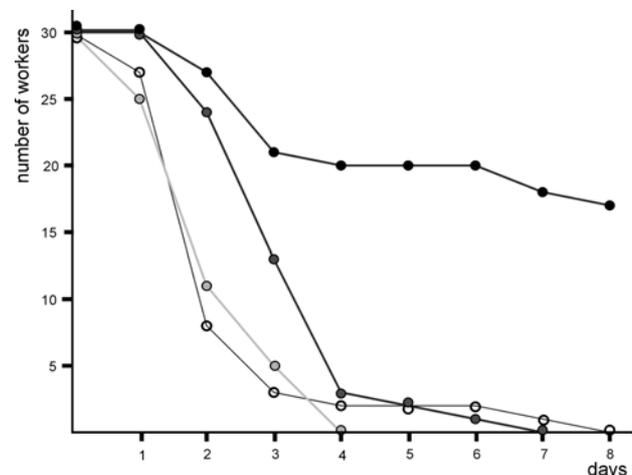


Fig. 1: Mortality of *Polyergus rufescens* workers under different isolation conditions: white dots – isolated singly; light grey dots – first of pair isolated with another *P. rufescens*; dark grey dots – second of pair isolated with another *P. rufescens*; black dots – isolated with *F. fusca*.

individual may have a protective effect against isolation stress even if they are not associated with true caregiving.

### References

- BOULAY, R., QUAGEBEUR, M., GODZIŃSKA, E.J. & LENOIR, A. 1999: Social isolation in ants: evidence of its impact on survivorship and behavior in *Camponotus fellah* (Hymenoptera, Formicidae). – *Sociobiology* 33: 11-134.
- FRANKS, N.R. & PARTRIDGE, L.W. 1994: Lanchester's theory of combat, self-organization, and the evolution of army ants and cellular societies. In: REAL, L.A. (Ed.): *Behavioral mechanisms in evolutionary ecology*. – University of Chicago Press, Chicago, pp. 390-408.
- GODZIŃSKA, E.J., SZCZUKA, A. & KORCZYŃSKA, J. 1999: Maximum longevity of workers of three ant species under laboratory conditions (Hymenoptera: Formicidae). – *Polskie Pismo Entomologiczne* 68: 47-55.

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