

## Abstract\*

**Interspecies hierarchy and social control in ant communities (Hymenoptera: Formicidae)**

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Interspecific hierarchy in ant communities was originally described by KACZMAREK (1953) who coined the terms "dominants", "subdominants" and "influents". However, his concept was not supported experimentally, but rather was based on records achieved by catching with an entomological net. This idea was developed by PISARSKI (1973) and GALLÉ (1975, 1978). The first experimental demonstration of interspecific hierarchy was made by REZNIKOVA (1980), based on the method of baiting observations. The role of behavioural plasticity in sophisticated inter-relations between dominating *Formica* and subdominating *Serviformica* species was firstly studied experimentally by STEBAEV & REZNIKOVA (1972) and REZNIKOVA (1975, 1982) by manipulations with limited food resources. The hierarchical structure of ant communities was later investigated by many myrmecologists (VEPSÄLÄINEN & PISARSKI 1982, ROSENGREN 1986, SAVOLAINEN & al. 1989, PALMER & al. 2000, SANDERS & GORDON 2003, GIBB & HOCHULI 2004, and others). Here, I summarize long-term data on the concept of "interspecific social control" in hierarchically organized ant assemblages that was first developed on the basis of transplantation experiments (REZNIKOVA 1994, 1999).

The original data on the zonal and biotopical distribution of 70 ant species in the southern Western Siberian Plain and adjacent regions were analysed. The results showed that, against a background of a considerable diversity of ant fauna, model communities dominated by *Formica pratensis* RETZIUS, 1783 retain constant species composition and the quantitative ratio of nests over the area from the northern forest steppe to the southern boundary of the steppe zone. In such coadaptive complexes (sensu: DLUSSKYI 1981), stable interspecies relationships and characteristic management of density regulation develop. We conducted field transplantation experiments in which some ants' nests were removed or replaced. In other series of experiments, we manipulated with population densities and sizes of ant colonies by means of adopted pupae. Both series of experiments were carried out in different landscapes where the ant communities were dominated by different species: *Formica polyctena* FÖRSTER, 1850, *F. pratensis* or *F. uralensis* RUZSKY, 1895. A new form of interspecies interaction in ant communities has been revealed and named "interspecies social control": ants of dominant species actively regulate the level of dynamic density of subdominant species and exterminate "superfluous" individuals. Comparative experimental data revealed the threshold values of the dynamic density of subordinate species at which their coexistence with dominants is still possible. Supplemental laboratory experiments enabled us to suggest that the fine management of the biotic relationship in ant communities is based on the ability of the dominating species to estimate numbers of encoun-

ters with individuals of subordinate species fairly accurately. – Elaborated within the frame of a HAS-RAS Academic Exchange Project and supported by the RFBR (05-04-48104).

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