Myrmecological News	10	112	Vienna, September 2007

Abstract*

The possible origin of "mixed" colonies of *Formica* wood ants (Hymenoptera: Formicidae)

Julita KORCZYŃSKA, Marta GAJEWSKA, Małgorzata PILOT, Wojciech CZECHOWSKI & Alexander RADCHENKO

Dr. Julita Korczyńska (contact author), Laboratory of Ethology, Nencki Institute of Experimental Biology, Polish Academy of Sciences, Pasteura 3, PL-02-093 Warsaw, Poland. E-mail: j.korczynska@nencki.gov.pl

Dr. Marta Gajewska, Dr. Małgorzata Pilot Laboratory of Molecular and Biometrical Techniques, Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, PL-00-679 Warsaw, Poland.
E-mail: mgajewska@miiz.waw.pl, mpilot@miiz.waw.pl

Prof. Dr. Wojciech Czechowski, Prof. Dr. Alexander Radchenko, Laboratory of Social and Myrmecophilous Insects, Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, PL-00-679 Warsaw, Poland.
E-mail: wcz@miiz.waw.pl, agradchenko@hotmail.com

Myrmecol. News 10: 112

Palaearctic wood ants, and particularly the species of the *Formica rufa* LINNAEUS, 1761 group, have been the subject of intensive investigations since the dawn of myrmecology. Nevertheless, they still pose taxonomic problems, and often puzzle field researchers. It occurs that workers within a colony bear intermediate species characters or that individuals from the same nest seem to represent different species. The aim of the present study was to estimate the genetic differentiation of two such apparently mixed colonies, and to establish the origin of their spectacular morphological variability (CZECHOWSKI & RADCHENKO 2006).

We studied two colonies from southern Finland, identified on the basis of morphological examinations of workers and young sexuals (FM-1 colony) or only workers (FM-2 colony) as mixed colonies comprising individuals with phenotypes typical of *Formica rufa*, *F. polyctena* FÖRSTER, 1850 or *F. aquilonia* YARROW, 1955. The prevailing species were *F. polyctena* in FM-1, and *F. rufa* in FM-2. Nest samples of all wood ant species occurring in the region, i.e., *F. rufa*, *F. polyctena*, *F. aquilonia*, *F. lugubris* ZETTERSTEDT, 1838, *F. pratensis* RETZIUS, 1783 and *F. truncorum* FABRICIUS, 1804 were used for comparative purposes.

A fragment of the 5' end of the mitochondrial cytochrome b gene (GOROPASHNAYA & al. 2004) was used to analyse phylogenetic relationships among haplotypes of individuals from the colonies of different species and the supposed mixed colonies, and to analyse kinship in the maternal line of individuals from the "mixed" colonies. Six microsatellite loci (GYLLENSTRAND & al. 2002) were used to analyse relatedness among individuals within colonies, and genetic distances between colonies, and to detect putative hybrids.

Our data show that, independently of their phenotype, the workers from the "mixed" colonies were genetically more similar to their own colony than to any of the homogeneous *F. rufa*, *F. polyctena* or *F. aquilonia* colonies. However, while the FM-1 colony consisted of offspring of one queen or several queens related in the maternal line, the FM-2 colony consisted of individuals descending from at least four unrelated queens. We suggest hybridization, namely *F. polyctena* × *F. aquilonia* and *F. polyctena* × *F. rufa* or *F. polyctena* × *F. aquilonia* × *F. rufa*, as the most probable mechanism leading to the existence of both these colonies, which would imply the fertility of the hybrids. Our study suggests that colonies composed of hybrids can persist under natural conditions.

The results obtained also revealed that *F. polyctena* is polyphyletic as regards mtDNA, which can be explained by hybridization followed by introgression of the mtDNA haplotypes of both *F. aquilonia* and *F. rufa*.

References

CZECHOWSKI, W. & RADCHENKO, A. 2006: Do permanently mixed colonies of wood ants (Hymenoptera: Formicidae) really exist? – Annales Zoologici 56: 667-673.

GOROPASHNAYA, A., FEDOROV, V. & PAMILO, P. 2004: Recent speciation in the *Formica rufa* group ants (Hymenoptera, Formicidae): inference from mitochondrial DNA phylogeny. – Molecular Phylogenetics and Evolution 32: 198-206.

GYLLENSTRAND, N., GERTSCH, P.J. & PAMILO, P. 2002: Polymorphic microsatellite DNA markers in the ant *Formica exsecta*. – Molecular Ecology Notes 2: 67-69.

* Based on a presentation at the 2nd Central European Workshop of Myrmecology at Szeged, Hungary, 17 - 19 May 2007