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44 years of settlement behavior and population dynamics of hill-building wood ants (1966 - 2010) in Freiburg area (SW-Germany)

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The occurrence of hill-building wood ants of the *Formica rufa*-group was comprehensively surveyed repeatedly (1966, 1969, 1972, 1976, 1978, 1991, 1992, 1997, 2008, 2009, 2010) in 1640 ha area (300 - 800 m above MSL) east of Freiburg / Br. (SW-Germany) and their settlement behavior and population dynamics analysed. Between 208 and 314 (mean 265) occupied nests were found each year, mostly *F. rufa* (L.) and *F .polyctena* (Foerst.). *F. pratensis* (Retz.) and *F. lugubris* (Zett.). represented only 10 and 5%, respectively, and *F. truncorum* (Fabr.) even less. The ant community exhibited a clear shift in species composition and a shift into the higher altitudes of the study area. A decline of *F. rufa* and an increase in *F. polyctena* corresponded to changes in the percentage of nests belonging to colonies and colony size. At first 75% of both species belonged to colonies, but this proportion declined for *F. rufa*, while *F. polyctena* developed more and larger colonies.

The average density was 16.2 nests per 100 ha, but the majority of the study area remained largely free of ants. In contrast, several large settlements were regularly encountered in a small space. Out of 82 (500 × 500 m) cells laid over the study area, approximately 30 were regularly occupied by *F. rufa* with densities of about four nests per cell, while *F. polyctena*, at densities of about eight nests per cell, was limited to far fewer squares. The correlation of the species' densities (*F. polyctena* with *F. lugubris*, *F. rufa* with *F. pratensis*) within the cells was weak. Occurrence of some of the species appears mutually exclusive; *F. rufa* and *F. polyctena* occurred mostly in different cells.

The continued occurrence of small areas of high population density suggests that the study area is suitable for settlement only at a few places. The ants tended to settle close to conspecific nests; the distance to the nearest neighbor was usually less than 50 m. The resulting small size of the territory of a given species seems to be offset by the favorable local conditions and benefits from neighboring conspecific nests.