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Ant communities (*Hymenoptera, Formicoidea*) of moist and wet deciduous forests of Central Europe.

[With 1 Table in the text]

Abstract. Literature data on the myrmecofauna of oak-hornbeam (*Querco-Carpinetum*), fertile mountain beech (*Dentario-Fagetum*) and thermophilous oak (*Potentillo albae-Quercetum*) forests of Central Europe are listed.

Faunistic communities characteristic of particular habitats are the basic elements of zoocoenoses. During zoocoenological and ecological studies it is indispensable to have great knowledge of these and of plant communities as well. In this field, however, botany has left zoology far behind, and investigations into animal communities have only recently been undertaken. The situation is well exemplified by ants – knowledge about their communities is poor in spite of many years of studies, a great number of publications and the fact that the group is known very well in general. The situation arose from an incorrect attitude in methodology adopted in faunistics for along time. This meant that materials were studied from the point of view of particular species, not that of habitats and communities (e.g. KULMATYCKI 1920a, b, 1922, ŁOMNICKI 1931, JACOBSON 1940). In time, however, faunistic papers began to present not only the traditional taxonomic approach but also a synthetic ecological classification of the myrmecofauna (e.g. BEGDON 1932, 1953, 1958, JAGODZIŃSKA 1933, WENGRISÓWNA 1933). But it was not until the middle of the century when the habitat approach won over the old-fashioned specific attitude. Unfortunately, most papers of that period made use of general, incomparable description of the habitat studied. That was the case with JAKUBISIAK (1948), KACZMAREK (1953), STAWARSKI (1966), and others. Data from such papers, even though most reliable,

are practically useless for analyse of ant communities. In the faunistic literature, only recently have habitats been characterized on the basis of explicit phytosociological criteria. Such studies, however, are not numerous and they refer to certain habitats only, among others to peatbogs (WĘGRIS 1962, PĘTAL 1963, 1964, 1967), moist meadows (PĘTAL et al. 1971, JAKUBCZYK et al. 1972, PĘTAL 1976), moist pine forests (MAZUR 1983), moist and wet deciduous forests.

In the phytosociological aspect, 11 plant associations correspond to the habitat types of Central European moist and wet deciduous forests. The most important of these, both in respect of their percentage in the flora and the scope of their habitat spectrum, are oak-hornbeam forests (*Stellario-*, *Galio-* and *Tilio-Carpinetum*; formerly treated as a collective association *Querco-Carpinetum*) and fertile beach forests (*Melico-* and *Dentario-Fagetum*) (MATUSZKIEWICZ 1979). The published myrmecological data refer to oak-hornbeam forests of various types, to mountain fertile beech forests: the Carpathian one (*Dentario glandulosae-Fagetum*) and the Sudeten one (*D. enneaphyllidis-Fagetum*) and to thermophilous oak forests (*Potentillo albae-Quercetum*). These data come mainly from Poland and Germany, and they have been published in the following papers:

– for oak-hornbeam forests: KARPIŃSKI (1956), GASPAR (1965), PARAPURA, PISARSKI (1971), PISARSKI (1981), KRZYSZTOFIAK (1985), SEIFERT (1986), CZECHOWSKI, PISARSKI (1990a, b);

– for beech forests: PĘTAL (1961), PARAPURA, PISARSKI (1971), CZECHOWSKA (1976), KRZYSZTOFIAK (1984), SEIFERT (1986);

– for oak forests: SEIFERT (1986), CZECHOWSKI, PISARSKI (1990b).

The above papers contain information about ant communities in 14 oak-hornbeam forests, 8 oak forests and 5 beech ones. These data are not fully comparable because of the different methods and intensity of studies, which restrict the possibility to analyse and draw conclusions.

The myrmecofauna of the plant communities discussed shows a very uneven distribution – both in its qualitative and quantitative aspects. It is very poor in shady and humid habitats, but its species richness and abundance increase (to a certain limit) when forests become drier and have more light. So far, 42 ant species have been recorded from the above types of forests: 32 in oak forests, 29 in oak-hornbeam forests and 11 in beech ones (Table).

Myrmica laevinodis; *M. ruginodis*, *Stenamma westwoodi*, *Camponotus ligniperdus*, *Lasius brunneus*, *L. niger*, *L. flavus*, and *L. fuliginosus* are species common to all the types of forests. The most constant among these are: *M. ruginodis* (78%), *L. brunneus* (63%), *L. niger* (52%), and *M. laevinodis* [48% of the total number (27) of the forests analysed]. The above-mentioned species also belong to the group of the most abundant ones. For instance, in lowland (Mazovian) linden-oak-hornbeam forests 76% of nests, on average, belong to *M. ruginodis* 15% to *M. laevinodis* and 7% to *L. brunneus*, while in oak forests the share of *M. ruginodis* reaches 90% (CZECHOWSKI, PISARSKI 1990b). In south-German upland oak-hornbeam forests nests of *M. ruginodis* constitute, on average, 26%, and those of *L. brunneus*, *S. westwoodi* and *Leptothorax nylanderi* – 25% each, in oak forests there – *Leptothorax unifasciatus* – 18%, *L. nylanderi* and

Table. Occurrence of ants in moist and wet forests of Central Europe. P-Q – *Potentillo-Quercetum*, Q-C – *Querco-Carpinetum*, D-F – *Dentario-Fagetum*

No.	Species \ Type of forest	P-Q	Q-C	D-P
1	*Ponera coarctata* (LATR.)	+		
2	*Myrmica laevinodis* NYL.	+	+	+
3	*Myrmica ruginodis* NYL.	+	+	+
4	*Myrmica rugulosa* NYL.	+	+	
5	*Myrmica scabrinodis* NYL.	+	+	
6	*Myrmica sabuleti* MEIN.	+		
7	*Myrmica lobicornis* NYL.	+	+	
8	*Myrmica schencki* EM.	+		
9	*Stenamma westwoodi* WESTW.	+	+	+
10	*Diplorhoptrum fugax* (LATR.)	+		
11	*Leptothorax* (*Leptothorax*) *affinis* MAYR.	+		
12	*Leptothorax* (*Leptothorax*) *nigriceps* MAYR.	+		
13	*Leptothorax* (*Leptothorax*) *nylanderi* (FOERST.)	+	+	
14	*Leptothorax* (*Leptothorax*) *parvulus* (SCHENCK)	+		
15	*Leptothorax* (*Leptothorax*) *sordidulus* MULL.	+		
16	*Leptothorax* (*Leptothorax*) *tuberum* (FABR.)		+	
17	*Leptothorax* (*Leptothorax*) *unifasciatus* (LATR.)	+		
18	*Leptothorax* (*Mychothorax*) *acervorum* (FABR.)	+	+	
19	*Leptothorax* (*Mychothorax*) *muscorum* (NYL.)	+	+	
20	*Leptothorax* (*Mychothorax*) *gredleri* MAYR	+		
21	*Tetramorium* (*Tetramorium*) *caespitum* (L.)	+	+	
22	*Dolichoderus* (*Hypoclinea*) *quadripunctatus* (L.)		+	
23	*Camponotus* (*Camponotus*) *herculeanus* (L.)			+
24	*Camponotus* (*Camponotus*) *ligniperdus* (LATR.)	+	+	+
25	*Camponotus* (*Myrmentoma*) *fallax* (NYL.)	+	+	
26	*Lasius* (*Lasius*) *brunneus* (LATR.)	+	+	+
27	*Lasius* (*Lasius*) *niger* (L.)	+	+	+
28	*Lasius* (*Lasius*) *alienus* (FOERST.)	+		+
29	*Lasius* (*Lasius*) *emarginatus* (OL.)	+		
30	*Lasius* (*Cautolasius*) *flavus* (FABR.)	+	+	+
31	*Lasius* (*Chtonolasius*) *meridionalis* (BONDR.)		+	
32	*Lasius* (*Chtonolasius*) *mixtus* (NYL.)		+	
33	*Lasius* (*Chtonolasius*) *umbratus umbratus* (NYL.)		+	+
34	*Lasius* (*Dendrolasius*) *fuliginosus* (LATR.)	+	+	+
35	*Formica* (*Serviformica*) *fusca* L.	+	+	
36	*Formica* (*Serviformica*) *rufibarbis* FABR.		+	
37	*Formica* (*Serviformica*) *cunicularia* LATR.		+	
38	*Formica* (*Formica*) *truncorum* FABR.	+	+	
39	*Formica* (*Formica*) *pratensis* RETZ.		+	
40	*Formica* (*Formica*) *rufa* L.	+	+	
41	*Formica* (*Formica*) *polyctena* FOERST.		+	
42	*Formica* (*Raptiformica*) *sanguinea* LATR.	+	+	

* The list has a critical character: it does not include those species whose occurrence in a given habitat was considered accidental or those that inhabited only non-typical sites (ecotones, clearings).

Lasius alienus – 14% each (SEIFERT 1986). In the Sudeten beech forests *M. ruginodis* is the dominant (50%), and then come *L. brunneus* and *L. fuliginosus* (25% each) (SEIFERT 1986); in the Carpathian beech forests the density of nests is usually so low that it is difficult to refer to any dominance structure of the communities there.

No doubt, the compiled lists of species (Table) are not complete. For instance, thermophilous oak forests are undoubtedly settled by *Dolichoderus quadripunctatus* and species of the subgenus *Chtonolasius* RUZS. (*Lasius meridionalis*, *L. mixtus*, *L. umbratus*) although they have not been recorded from there yet. On the other hand, in oak and oak-hornbeam forests there have been found some photophilous and xerophilous species which enter only degraded, too light and too dry forests. In such sites, the place of the originally dominant polytopes of humid habitats (*Myrmica ruginodis*) and oligotopes of moist forests (*Lasius brunneus*, *Stenamma westwoodi*, *Leptothorax nylanderi*) is taken by eurytopes (*Myrmica laevinodis*, *Lasius niger*, *L. flavus*) and oligotopes of dry habitats (*Leptothorax unifasciatus*, *L. parvulus*, *Lasius alienus*). For instance, in a small linden-oak-hornbeam forests near Warsaw the ant community was dominated by *M. laevinodis* (63%) and *L. flavus* (22%) (according to data from soil samples; PISARSKI 1981), and in urban linden-oak-hornbeam tree stands in Warsaw the most abundant were *M. laevinodis* (38%), *L. brunneus* (28%) and *L. niger* (17%) (according to data from Barber's traps; CZECHOWSKI, PISARSKI 1990a), while in anthropogenized oak forests in Germany the most numerous were nests of *Leptothorax unifasciatus* (33–24%), *L. parvulus* (34–15%) and *Lasius alienus* (33–22%) (in natural oak forests the shares of these species are much lower) (SEIFERT 1986).

The density of nests in the forests under discussion varies, the highest being in oak forests (4.3–0.1/m^2), medium in oak-hornbeam forests (0.3–0.01/m^2) and the lowest (close to zero) in beech ones. Relatively many nests occur in uplands in the south of Central Europe, where soils have been formed as a result of decay of indigenous rock – on average 2.5/m^2 in oak forests and 0.5/m^2 in oak-hornbeam ones (SEIFERT 1986). In lowlands of the northern part, covered with sandy glacial drift, the density of nests is lower – on average 0.1/m^2 in oak forest and 0.05/m^2 in oak-hornbeam ones (CZECHOWSKI, PISARSKI 1990b).

Basing on the hitherto available data it may be assumed that moist and wet deciduous forests in Central Europe are inhabited by one ant association whose leading species are *Myrmica ruginodis*, *M. laevinodis*, *Stenamma westwoodi*, *Leptothorax nylanderi*, *Lasius brunneus*. This association is fully developed in thermophilous oak forests, whereas in oak-hornbeam forests and fertile beech ones it occurs in qualitatively impoverished more or less poor variants.

The present data make it possible to characterize generally the myrmecofauna of the forests discussed and to provide an outline of its variability, but they are not sufficient for a precise determination of the differentiation of particular variants of the basic association. In conclusion, it is necessary to stress the need for further development of zoocoenological studies in typical plant communities and for explicit definitions of habitats with species discussed in all kind of zoological papers.

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STRESZCZENIE

[Tytuł: Zespoły mrówek (*Hymenoptera, Formicoidea*) świeżych i wilgotnych lasów liściastych Europy Środkowej]

W pracy zestawione są dane literaturowe na temat występowania mrówek w środkowoeuropejskich świeżych i wilgotnych lasach liściastych: grądach (*Querco-Carpinetum*), żyznych buczynach górskich (*Dentario-Fagetum*) i dąbrowach świetlistych (*Potentillo albae-Quercetum*). Myrmekofauna tych środowisk liczy łącznie 42 gatunki. Wymienione lasy zasiedla ten sam zespół mrówek, którego głównymi gatunkami są: *Myrmica ruginodis* Nyl., *M. laevinodis* Nyl., *Stenamma westwoodi* Westw., *Leptothorax nylanderi* (Foerst.) i *Lasius brunneus* (Latr.). Zespół ten jest w pełni wykształcony w dąbrowach świetlistych, a w wariantach mniej lub bardziej jakościowo zubożonych występuje w grądach i buczynach.

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