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***Epimyrma ravouxi* (ANDRÉ, 1896) (Hymenoptera, Formicidae) in the Pieniny Mts – notes on its occurrence and biology**

Abstract. Data are presented on the occurrence of *Epimyrma ravouxi* (ANDRÉ) in the Pieniny Mts (Western Carpathians), the only known locality of this dulotic ant species in Poland. The composition of mixed colonies of the social parasite with its host species [*Leptothorax unifasciatus* (LATR.), *L. albipennis* CURTIS and *L. nadigi* KUTTEB] found there is given.

Key words: ants, social parasites, dulosis, *Epimyrma ravouxi*, *Leptothorax*, fauna of Poland.

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The genus *Epimyrma* EMERY (subfamily Myrmicinae, tribe Formicoxerini) includes 11 Palaearctic species distributed in South and Central Europe, North-West Africa, Crimea, Transcaucasus, Kazakhstan and Kirgizstan. All the species are social parasites; particular forms exhibit an evolutionary transition from active slavery [e.g. *E. ravouxi* (ANDRÉ), *E. stumperi* KUTTER] to a special kind of workerless permanent parasitism, so called degenerate dulosis or murder-parasitism, since, unlike in typical inquilinism, the parasite queen kills the host queens [e.g. *E. corsica* (EMERY), *E. adlerzi* DOUWES, JESSEN et BUSCHINGER]. Their hosts are ants of the genus *Leptothorax* MAYR (subgenera *Myrafant* M. R. SMITH and *Temnothorax* MAYR) (see BUSCHINGER 1989, 1990).

One species of this genus, *E. ravouxi* (ANDRÉ) (= *E. goesswaldi* MENOZZI; see BUSCHINGER 1982) is reported from Poland. It is an expansive Mediterranean form that occurs extensively in mountainous regions of South, West and Central Europe [apart from Poland, it is known from Spain (ESPADALER, RESTREPO 1983), France (ANDRÉ 1896, BUSCHINGER et al. 1981, BUSCHINGER 1982), Germany (GÖSSWALD 1930, 1933, WOLF 1949, 1971, BUSCHINGER 1968,

1982, BUSCHINGER, WINTER 1983, SEIFERT 1993), Switzerland (KUTTER 1977, WINTER 1979, BUSCHINGER et al. 1981), Austria, Italy (BUSCHINGER et al. 1981), Bulgaria, the former Yugoslavia, Greece (BUSCHINGER, DOUWES 1993), and Corsica (BUSCHINGER 1985)]. The species lives in xerothermal habitats with sandy-stony or lime soil.

E. ravouxi is an active slavemaker with a normally developed worker caste, that conducts well-organized raids upon colonies of its host species (WINTER 1979, BUSCHINGER, WINTER 1983). The hosts are various species of the subgenus *Myrafant*: most frequently *Leptothorax unifasciatus* (LATR.) (mainly in the west of Europe), as well as *L. albipennis* CURTIS (= *L. tuberointerruptus* BONDR.), *L. nigriceps* MAYR, *L. tuberosum* (FABR.) (in the east), and *L. affinis* MAYR (in the south).

In Poland, *E. ravouxi* is known solely from the Pieniny Mts (Central Western Carpathians), both from Pieniny Centralne (Central Pieniny; CZECHOWSKA 1976) and from Małe Pieniny (Small Pieniny; WOYCIECHOWSKI 1985). In Pieniny Centralne, one nest was found on Ganek (a ledge in the massif of Trzy Korony) in lichenaceous grassland under a chip of rock. In Małe Pieniny, also only one nest was found on Mt Szafranówka in a "dry pasture". In both cases, *L. nigriceps* was the slave species.

It was only the most recent investigations, carried out in the years 1994–1998 in the Pieniński Park Narodowy (Pieniny National Park; Central Pieniny Mts), that provided a possibility of a closer study of the habitat requirements and biology of *E. ravouxi* in the Pieniny Mts.

Altogether, seven *E. ravouxi* nests were found as a result of these studies. They occurred in xerothermal grasslands covering the south facing slopes of the massif of Trzy Korony and of Mt Zamczysko. The nests were inside dry empty stems of various herbaceous plants, most frequently in *Cynanchum vincetoxicum* (= *Vincetoxicum officinale*; *Asclepiadaceae*) (sometimes one colony occupied two or more stems). This plant forms thick tufts encircled, at the foot, by wisps of old and dead stems filled with air (Fig. 1). It grows in xerothermal grasslands all over the Pieniny Mts. During florescence its flowers are frequently visited by *Leptothorax* and *Myrmica* foragers. *L. unifasciatus*, *L. albipennis* and *L. nadigi* KUTTER were hosts of *E. ravouxi*. (The two latter *Leptothorax* species have been recorded as new to Poland thanks to the most recent studies in Pieniny; CZECHOWSKA et al. 1998, CZECHOWSKA, CZECHOWSKI 1999 respectively). *L. (Myrafant) nadigi* is hereby reported, for the first time, as a possible host species of *E. ravouxi*.

A special search for *E. ravouxi* and its host species was conducted at the end of August 1998 on Mt Zamczysko (Western Pieniny), the southern slope of which is mostly overgrown with xerothermal grasslands (Fig. 2). 25 nests were found: 4 of *E. ravouxi* (together with its host species), 13 of *L. albipennis*, 7 of *L. nadigi* and 1 of *L. unifasciatus*. With the exception of one colony of *L. nadigi* from a dry stem of *Stachys germanica* (*Labiatae*), all the others nested in *C. vincetoxicum*. The four *E. ravouxi* colonies contained enslaved individuals of *L. unifasciatus* (one of them also contained *L. albipennis* and *L. nadigi*) although at the site studied, colonies of this species constituted merely 4.8% of



Fig. 1. *Cynanchum vincetoxicum* – a tuft of dry stems, the typical place of *Epimyrra ravouxi* and its host species, is visible (photo W. CZECHOWSKI).



Fig. 2. Mt Zamczysko – the southern slope to a greater extent covered with xerothermal grassland (photo W. CZECHOWSKA).

the total number of the colonies of all *Myrmica* ants. That was evidence of a great preference of this social parasite towards this particular host species which, in fact, is the most frequently mentioned one in the literature.

The precise compositions of the mixed colonies are presented in Table I. Colony 1, queenless, consisting of parasite workers and males and also of slave workers of as many as three species should be regarded as one declining as a result of the (recent) loss of the queen. Colony 2, in which the parasite species was represented only by a queen was, most probably, an incipient one which had developed after parasitizing a host colony the previous autumn. This was confirmed by the presence of (orphaned) host workers and also of host alate sexuals (males); the latter had probably hibernated as larvae (slow brood development). Colonies 3 and 4 might also be considered incipient ones (presence of a parasite queen, lack of parasite workers, presence of host alate sexuals in 4) but it was surprising that there were alate sexuals (males) of *E. ravouxi* (which develop from hibernated larvae; WINTER, BUSCHINGER 1983) before the parasite worker caste appeared. According to the natural course of development it should have been the other way round (GÖSSWALD 1930, 1933, BUSCHINGER, WINTER 1983).

Table I. The composition of the mixed colonies of *Epimyrma ravouxi* with its host *Leptothorax* species collected on the Mt Zamczysko.

No.	Date	<i>E. ravouxi</i>	<i>L. unifasciatus</i>	<i>L. nadigi</i>	<i>L. albipennis</i>	Unidentified
1	21.08.1998	6♀♀ (alate); 3♂♂ (+1 pupa); 11♀♀	14♀♀	1♂	35♀♀	
2	26.08.1998	1 queen	56♀♀; 47♂♂ (+5 pupae)			
3	26.08.1998	1 queen; 1♂	73♀♀ (+5 pupae)			
4	26.08.1998	1 queen; 25♂♂ (+5 pupae)	~50♀♀; 27♂♂			1 larva

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SUMMARY

[Tytuł: *Epimyrma ravouxi* (ANDRÉ, 1896) (Hymenoptera, Formicidae) w Pieninach – uwagi o występowaniu i biologii]

E. ravouxi (ANDRÉ), ekspansywny gatunek śródziemnomorski, jest pasożytem społecznym praktykującym niewolnictwo. Jego ofiarami są gatunki z podrodzaju *Myrafant* M. R. SMITH rodzaju *Leptothorax* MAYR. Jedynym znanym stanowiskiem *E. ravouxi* w Polsce są Pieniny. Praca zawiera dane o tamtejszych miejscach i środowiskach występowania gatunku oraz jego biologii: sposobie gniazdowania, gatunkach niewolniczych (z których *Leptothorax nadigi* KUTTER w tej roli jest wykazany po raz pierwszy) oraz składzie ilościowym mieszanych kolonii.