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The phenology of nuptial flights of ants (*Hymenoptera, Formicidae*) *

[with 2 text-figs]

Fenologia lotów godowych mrówek (*Hymenoptera, Forminidae*)

Abstract: The flight activities of ants are presented basing on sexual casts caught during the whole growing season of 1982 on the summit of Wysoka Mt. (1052 m above sea level) in Małe Pieniny Mts (Polish Carpathians). Eight ant species were captured, among these six of seven species of the genus *Myrmica* LATREILLE and two of seven of the genus *Leptothorax* MAYR known from this region. The gathering of winged ants from many nests during nuptial flights and male-biased sex ratio of swarming ants was discussed. The method presented in this paper enables a complex estimation of the number of ants of chosen species.

The observations were carried out in Małe Pieniny Mts (Polish Carpatians) on the summit of Wysoka Mt. (1052 m above sea level). This summit is the highest one in this small, 10 km long mountain range running along the Polish-Slovakian border.

The summit of Wysoka Mt. is a small rocky peak about 50 m² in area, sticking out from the surrounding forest, covering an area of 100 hectares. This woodland is surrounded by vast sheep pastures, occupying more then a half of the territory of Małe Pieniny Mts and extending from the stream valley to the altitude of 900 m.

It has been noticed that a great number of winged ants coming from distant areas, gather on this rocky, poorly covered with shrubs top of Wysoka Mt. Ants taking part in the nuptial flight were captured into special traps, situated 3 m above the ground. The trap was an open bottle, partly filled with alcohol and enclosed in a white horn protecting the bottle against excessive sun radiation (Fig. 1). Two traps were emptied at regular intervals twice a month, during the whole growing season of 1982. Ants were being traped beginning from the middle of July to the end of September. The collected material comprises the following eight species, presented here with the number of males and females: *Myrmica scabrinodis* NYL. (66; 11), *M. rubra* L. (30; 1), *M. ruginodis* NYL. (71; 15), *M. sabuleti* MEINERT (5; 0), *M. schencki* EMERY (6; 0), *M. lobicornis* NYL. (1; 1), *Leptothorax acervorum* (FABR.) (7; 0), *Lept. nigriceps*

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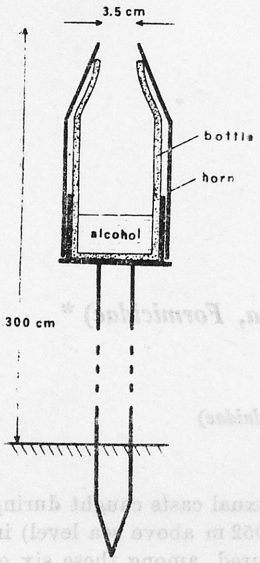

Fig. 1. A trap to catch flying ants

MAYR. (4; 0). Similar sex ratio for some of the presented species was found during catches of swarming ants into entomological nets.

The diagram (Fig. 2) shows the phenology of flying species. Some of these like *M. scabriondis* and *M. rubra* were being trapped constantly for two months, others like *M. lobicornis* and *Lept. nigriceps* were being found in traps for only a half a month.

Fig. 2. The number of flying ants traped in given time intervals (1 — *Leptothorax acervorum*, 2 — *Myrmica scabrinodis*, 3 — *M. schencki*, 4 — *M. lobicornis*, 5 — *M. rubra*, 6 — *M. ruginodis*, 7 — *M. sabuleti*, 8 — *Leptothorax nigriceps*)

The ants caught in traps are in majority typical representatives of communities, mounds of which were found on sheep runs of this region (WOYCIECHOWSKI, 1985). The presented list of ants includes all species of the genus *Myrmica*, known from this region of Carpathians, with the exception of *M. rugulosa* Nyl. Of the genus *Leptothorax*, besides the mentioned above, the following species are found in Małe Pieniny Mts: *Lept. muscorum* (NYL.), *Lept. tuberum* (FABR.), and *Lept. bulgaricus* FOREL.

It has been stated, that in a cluster of mating ants of all species males greatly predominated and made an average 87% of all individuals of the genus *Myrmica*. Such a hight dominance of males is never observed in ant nests (TRIVERS, HARE 1976, ELMES 1982). Therefore one should expect that such biased sex-ratio results from attempts of multiple mating of the males, while the females mate with considerably smaller number of partners. This is the reason why males spend much more time at the place of swarming than females do. Multiple mating of males was observed and KANNOWSKI (1963) considers it a rule in the sexual behaviour of ants.

The material collected during the survey is insufficient to determine whether any significant differences exist in the sex ratio of the trapped species.

The presented diagram (Fig. 2) contains one informality caused by the fact that the sample collected between the first and the 15th of September was destroyed. The result representing this time interval is based upon one single catch into an entomological net, carried out one year earlier on the 7th of September. The result of this catch presents a percentage share of 117 individuals of 3 species, taking into account the number of ants from the half of August as a basis for calculations.

To sum up, it can be stated that ants cover the distance and height of several hundred metres, sometimes even more, to find a satisfactory mating partner. Females cover this distance twice. We can assume, that the list of caught ants presented includes those species in which the local mate competition (LMC — mating rival among closely related males from the same nest) practically does not exist. This supposition is discrepant from the suggestion of HAMILTON (1964) and ALEXANDER & SHERMAN (1977) according to which LMC is the main reason for female biased sex ratio in fertile offspring. An 87% contribution of males observed during the mating flights shows that multiple mating is more common for males than for females. We can expect, that the presented method of catch of sexuals makes it possible to carry out an overall estimation of the number of ants at least of the genus *Myrmica*.

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REFERENCES

ALEXANDER R. D., SHERMAN P. W. 1977. Local mate competition and parental investment in social insects. Science, Washington, **196**: 494—500.

ELMES G. W. 1982. The fenology of five species of *Myrmica* (*Hym. Formicidae*) from South Dorset, England. Ins. soc., Paris, **29**: 548—559.

HAMILTON W. D. 1964. The genetical evolution of social behaviour. I and II., J. theor. Biol., London, **7**: 1—52.

KANNOWSKI P. B. 1963. The flight activities of Formicine ants. Symposia Genetica et Biologica Italica., Pavia, **12**: 74—102.

TRIVERS L., HARE H. 1976. Haplodiploidy and the evolution of the social insects. Science, Washington, **191**: 249—263.

WOYCIECHOWSKI M. 1985. The ants (*Hymenoptera, Formicidae*) of Małe Pieniny Mts — Carpathians. Acta zool. cracov., Kraków, **28**: 283—296.

STRESZCZENIE

W czasie całego sezonu wegetacyjnego 1982 odławiano kasty seksualne mrówek, które odbywały swą rójkę na szczycie Wysokiej — 1052 m n.p.m. (Karpaty, Małe Pieniny).

Owady chwytano w pułapki umieszczone 3 m nad powierzchnią skalnego wierzchołka. Pułapkami były szklane butelki osłonięte metalową tuleją i napełnione w niewielkiej części alkoholem (Fig. 1). Schwytane owady wyjmowano z pułapek w regularnych odstępach czasu dwa razy w miesiącu.

Schwytano 8 gatunków mrówek, w tym 5 spośród 6 znanych w omawianym rejonie gatunków z rodzaju *Myrmica* LATREILLE, oraz 2 gatunki z rodzaju *Leptothorax* MAYR (Fig. 2). Odławiane gatunki były w większości typowymi przedstawicielami myrmekofauny pastwisk odległych o kilkaset metrów i rozciągających się o co najmniej 150 m niżej od miejsca zbiorowej rójki. Tak odległe od macierzystego gniazda, wspólne dla osobników z bardzo wielu kolonii, miejsce rójki świadczy o tym, że nie istnieje rywalizacja blisko spokrewnionych samców (braci) o partnerkę (Local Mate Competition), przynajmniej u mrówek z rodzaju *Myrmica*. Należy więc przypuszczać, że LMC nie jest u mrówek zjawiskiem powszechnym, mającym wpływ na proporcję płci produkowanego w gniazdach płodnego potomstwa.

Zwrócono uwagę na 87% udział samców w chmurze rojących się mrówek, co uznano za rezultat wielokrotnych kopulacji samców, zjawisko częstsze niż u samic.

Opisana metoda odłowu mrówek w czasie rójki stwarza możliwości globalnej oceny liczebności czy proporcji gatunków z rodzaju *Myrmica*.

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