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**Competition between *Lasius niger* (L.) and *Myrmica rugulosa* NYL.
(Hymenoptera, Formicidae)**

[With 12 figures in the text]

1. INTRODUCTION

Lasius (*Lasius*) *niger* (L.) is a common ant species occurring throughout Europe and Palaearctic Asia. It has also been brought to the northern part of Africa and north-western part of the United States of America where it got acclimatized. As a eurytopic species it is frequently met in different habitats ranging from arid to very wet, except for overshadowed forests. Nests of this species are constructed in different ways, depending on the site. They may be situated in the ground, generally with mounds, or in decaying trunks, in clumps of grasses and mosses, under stones, etc. In Poland it belongs to the commonest ant species over the country (PISARSKI 1975).

Myrmica rugulosa NYL. inhabits Europe, mostly northern and central part of it (to the south, however, it reaches Switzerland and to the east the Ural Mountains). It occurs in meadows and pastures with a rather sparse plant cover, in the mountains on river terraces and on dry slopes. It also inhabits clearings and abandoned fields. Nests are built in the ground, occasionally with small mounds. A common species in all parts of Poland (PISARSKI 1975).

1.1. Territoriality in ants

The territory of an ant society is the area guarded by workers of a given colony. It includes the nest and the adjacent foraging area¹.

¹ The following terminology is used throughout the paper: nest — a construction built and inhabited by ants; colony — a nest with the swarm inhabiting it; society — all ant individuals genetically related, that is, a monocalic swarm or a system of swarms forming a polycalic colony. The territory of a polycalic colony consists of foraging areas of all colonies.

The shape and size of territories are determined by a number of factors such as food supply, type of food and its distribution around the nest, number of individuals in the society and its vitality, site conditions, etc. Also the competition between neighbouring colonies of the same or another species can frequently be of basic importance.

So far, little has been known about intraspecific territorial relationships in ants. Mechanisms of interspecific competition have been better identified but also insufficiently. On the basis of the available knowledge a preliminary classification of some species, with a relatively well known bionomics and ethology, has been developed. Namely, taking into account the response to the presence of ants of other species in the same area, a group of the so-called "territorial" species has been distinguished in opposition to the "non-territorial" species (PISARSKI 1973).

Territorial ants include the species actively defending their foraging areas against competitors. In other words, they have territories with delimited boundaries that are watched and cannot be crossed by intruders. The species that do not exhibit such behaviour and defend only their nests belong to the group of non-territorial species.

The above division, although simplified, characterizes rather well the actual situation. However, reservation should be added. Some observations show that the active defense of a territory does not occur immediately after the onset of a colony but only at a certain stage of its development, when the society reaches a definite number of individuals and, consequently, when the area around the nest is sufficiently saturated with individuals (PISARSKI unpubl., CZECHOWSKI unpubl.).

The relationships between colonies representing the two categories of species follow several patterns.

1. Neighbouring colonies of two territorial species compete actively for space, and a distinct, relatively fixed boundary is established between their foraging areas.
2. Individuals of non-territorial species can penetrate the area of other non-territorial species, and even construct their nests there.
3. There is no competition for territory between societies of different non-territorial species.

The group of territorial ants is represented by such species as *Lasius niger* (L.), *L. fuliginosus* LATR., ants of the subgenus *Formica* L. s. str. (for instance, *F. rufa* L., *F. polyctena* FOERST., *F. pratensis* RETZ.), and of the subgenus *Coptoformica* MÜLL. (*Formica exsecta* NYL. and *F. pressilabris* NYL.).

Non-territorial ants include a number of species of the genus *Myrmica* LATR.: *M. rugulosa* NYL. *M. laevinodis* NYL. *M. rubra* (L.), *M. scabrinodis* NYL., and others, including *Leptothorax acervorum* (FABR.), *Lasius flavus* (FABR.), or *Formica fusca* L.

The patterns of behaviour and responses of ants to various situations are

so differentiated that all classifications, necessary for many reasons, provide only a generalized, rough approximation of reality, with many exceptions not conforming to them. This also refers to the classification presented above, which is proved by the situations described in the present paper. Two aspects of the competition between *L. niger*, a typical representative of territorial ants, and *M. rugulosa*, which is a non-territorial species, have been analysed: competition for food and space, that is, for the possibility of nesting in a given place, the latter being inspired by the former. These two kinds of competition are based on the same mechanism.

2. COMPETITION FOR FOOD

2.1 General analysis

Aggressive encounters between workers of different species searching for food are so common in ants that they are considered as a normal situation.

The simplest and most frequently followed way of studying competition for food between societies of different ant species is baiting ants with food items, usually sugar, left near their nests. Then observations are made of encounters, repartition of particular baits among different species, sequence of foragers of different species in time at the same bait, and so on. Usually at a given moment the bait is occupied by ants of only one species. When a stronger competitor arrives they either retire without fighting or are forced to leave the bait. For instance, workers of *Formica cinerea* MAYR dislodge *F. fusca* L.; *F. exsecta* NYL. dislodge species of the genus *Myrmica* LATR. Also the workers of *Tetramorium caespitum* (L.) are very aggressive.

2.2. Interactions between *Lasius niger* and *Myrmica rugulosa*

The behaviour of *L. niger* and *M. rugulosa* (and probably of other representatives of the genus *Myrmica*) when they compete for food can be considered as exceptional, as compared to the behaviour of other ant species. This is due to the fact that the two species can commonly use for a long time the bait located between their nests. It frequently happens that the sugar supplied is overcrowded with tens of individuals of each species, mixed with each other, touching themselves, poking, even walking on each other. This is not followed, however, by any or almost any fights. Still, there is competition for food between them, the symptoms of which are very interesting and not typical of other interspecific systems. Namely, while all individuals of *M. rugulosa* present and most workers of *L. niger* are occupied with food consumption, a part of *L. niger* individuals walk around and pull away foragers of the other species from the bait. This is done in the following way. A worker of *L. niger*

sizes its partner with mandibles by a leg, antenna or pedicel, and walking backwards pulls it back, generally a few centimetres from the bait, then leaves it and returns to the group of foraging workers to pull another *M. rugulosa* individual. The removed *M. rugulosa* workers return to the bait without hesitation, immediately or after a few seconds of delay when they remain motionless. It is characteristic that the movements of the two species are very slow. Usually ants are excited during interspecific encounters, which is reflected in their increased mobility. But in the described situation the behaviour of both *L. niger* and *M. rugulosa* is completely quiet, like during habitual activities.

This phenomenon was firstly observed by PISARSKI (personal communication) several years ago, then it was recorded many times. It is so common in the relationships between *L. niger* and *M. rugulosa* that should be considered as characteristic of these ants.

In the mutual responses of the two species there is also another important detail. When a worker of *L. niger* sizes *M. rugulosa* by a leg, the latter widely spreads out the legs as if it would try to resist passively by making dragging more difficult, but besides this it is completely immobile; it does not attempt to tear out or actively cling to the ground surface. If *M. rugulosa* is sized from above by the pedicel, it crouches bending its legs, antennae, head and abdomen, and in this position is completely passive when pulled from the bait.

It is most probable that such behaviour of *M. rugulosa* is a reflex response, because the size by the pedicel from above is one of the positions adopted by ants of the family *Myrmicidae* when adult individuals carry themselves (WILSON 1971). Nevertheless, such response of *M. rugulosa* workers in the case when they encounter ants of another species (and, particularly, so distant systematically as *L. niger*) should be regarded as a curiosity. As some observations indicate (including the behaviour described above), ant communities are formed on the basis of a supraspecific hierarchical structure.

2.3. Description of the observations

The observations of competition for food between *L. niger* workers and ants of the genus *Myrmica* were conducted many times in different parts of the country for several years. Frequently *Myrmica* ants showing this behaviour were not identified to species. Thus, it is possible that this behaviour is not limited to *M. rugulosa*, for which been recorded without any doubt. The most frequent and detailed observations were conducted in the Bieszczady Mountains (the Eastern Carpathians) in 1970–1972, and at the village Jadwisin, near Warsaw, in 1975–1976. In these two regions *M. rugulosa* was observed.

The observations in the Bieszczady Mountains were carried out near the village Ustrzyki Górne, on a slope exposed to the sun, partly covered with grass, partly bare. Due to an abundant occurrence of many ant species, this

site was particularly suitable for studying interspecific relationships (CZECHOWSKI 1977). There were there many colonies of different species, including *M. rugulosa* and *L. niger*. The nests of these two species were generally located under weathering rocky material.

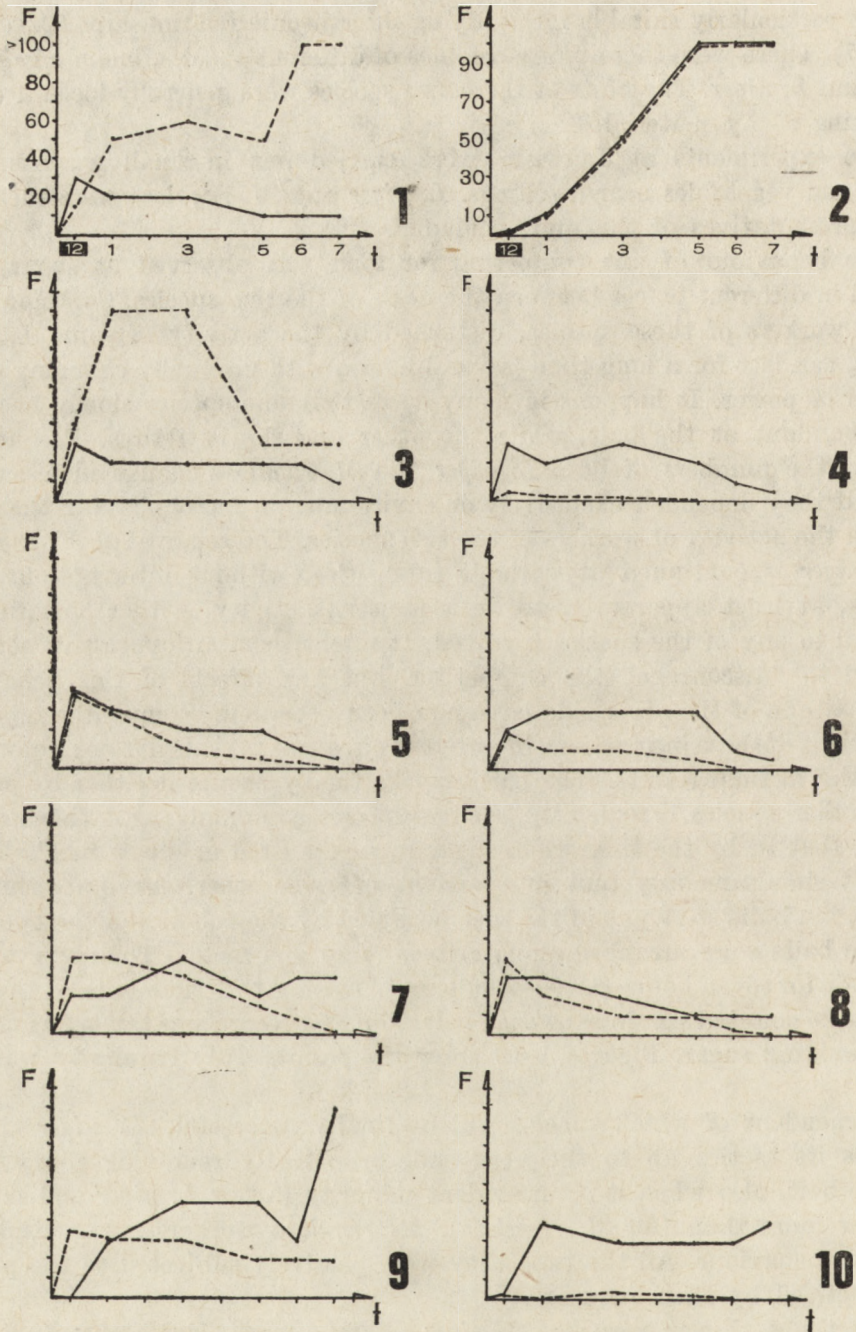
The experiments at Jadwisin were carried out in small gardens with flowers and vegetables near dwellings. *L. niger* and *M. rugulosa* were there the only representatives of the myrmecofauna.

The behaviour of ant competing for food was observed at sugar baits situated in different places between the nests of the two species. Common foraging of workers of these species, disturbed by the activity of some *L. niger* workers, can last for a long time (several hours) with gradually changing configuration of power. It happens in many cases that one species slowly becomes more abundant at the bait, while the other one slowly retires. Frequently, however, the numbers of both *L. niger* and *M. rugulosa* change in a parallel way as if they depended exclusively on environmental factors having the same effect on the activity of workers of the two species. The removal of *M. rugulosa* by *L. niger* is continued at variable intensities, without interruptions, and it seems, at least apparently, to be a nonsens activity neither harmful nor beneficial to any of the species involved. It might seem an oppressive activity expected to "discourage" the competitor, but any effects of this behaviour to the attitude of the other side have not been recorded. Frequently repeated observations of these interactions in different sites and periods did not show any regularities in final results. The bait may be finally occupied either by one or by the other species. Frequently, the two species commonly used the bait till the end, that is, by the time when sugar was exhausted or "petrified". Then, they left simultaneously and independent of each other. At Jadwisin, for instance, ten baits were put in the area occupied by the colonies of the two species. The baits were arranged along a line, every one metre. The observations were made for seven hours (12.00–7.00 p. m.). During this time ants of the two species were counted six times at each bait. The first record was taken 30 minutes after providing sugar. Figures 1–10 show the results. Any regularity was not found.

Independent of which species will be finally successful, *L. niger* always continues its tactics up to the very end, persistently removing competitors from the bait, also when it is an evident minority (a few *L. niger* and several dozens or more than 100 *M. rugulosa*). *M. rugulosa* workers never displayed aggressive behaviour. All the time they were passively subjected to the procedure practiced by their partners.

Sometimes, though very rare, *L. niger* acts in a more drastic way. In a solitary case a dead *M. rugulosa* was found, and a few ones were wounded at one of the baits. But the conflicts as such have never been recorded.

The behaviour similar to that described above also occurs under completely natural conditions. It was recorded at Jadwisin in 1975. At that time *L. niger*



Figs. 1-10. Changes in the numbers of *Lasius niger* (solid line) and *Myrmica rugulosa* (dashed line) at particular baits with time. F — number of ants at a bait; t — time in hours, p. m.

and *M. rugulosa* from closely situated nests commonly used honeydew secreted by aphids, probably *Aphis fabae* SCOPOLI (information by Prof. Dr. H. SZELEGIEWICZ) occurring on the nasturtium (*Tropaeolum majus* L.). It should be reminded here that *M. rugulosa* as a non-territorial species can construct nests and search for food within the foraging area of *L. niger*. Particular colonies of aphids on various shoots of the same plant were occupied either by one or by the other species. And in these circumstances *L. niger* foragers removed *M. rugulosa* from food. Such cases were only occasional, when an individual of *M. rugulosa* tried to exploit the honeydew already "reserved" by the neighbours, which happened very rarely. Generally, there were no conflicts during the common use of the foraging area, and this was due to the partition of particular food resources between the two partners. It may be suggested, however, that this situation, already established at the time of observations, was preceded by an acute competition following the pattern described above.

2.4. Interpretation of the phenomenon

It is possible that ineffective and at least apparently senseless behaviour of *L. niger* in the case of competition for experimentally supplied sugar was an effect of the fact that the artificially created conditions deviated too much from situations usually occurring in nature. Under natural conditions ants generally do not find such abundant and readily available food supply, like sugar baits. So, in such situations the competitive mechanisms usually effective under normal conditions, may fail, even though *L. niger* intensify their action. The attractiveness of the "artificial" food is so great that the number of *M. rugulosa* foragers considerably increases, and *L. niger* workers, which are usually successful, cannot cope with them. It was observed that *L. niger* workers became "impatient" with time. This is shown by a gradual increase in the distance of removal of *M. rugulosa* foragers. Firstly this distance varies from 1 to 2 cm, then it is several centimetres (but it rarely exceeds 5 cm).

3. COMPETITION FOR LIVING SPACE

3.1. Time, area and object of the observation

The observations were conducted at Jadwisin in August 1976. The societies of *L. niger* and *M. rugulosa* inhabited vegetable gardens at dwellings (in the same place where most of the observations on competition for food between these species were carried out).

The societies of *M. rugulosa* may be polygynous and, consequently, they can form polycalic colonies made up of a large number of colonies densely spaced

over a rather large area. A polycalic colony of this type was under study. A net of numerous although small colonies of *M. rugulosa*, with low numbers of individuals, occupied an area of about 25 m².

Among the nests of *M. rugulosa* there were also small colonies of *L. niger* forming a society of similar type. In the regions subject to gardening treatments *L. niger* societies usually occur in the form of numerous but small colonies dispersed on a rather large area, and probably they are in contact with each other (PISARSKI and CZECHOWSKI 1978).

3.2. Description of the observations

During regular observations in August there occurred a process of the expulsion of *M. rugulosa* swarms by *L. niger* from the areas so far peaceably occupied by the two societies. *L. niger* individuals invaded successively the nests of *M. rugulosa* and removed their inhabitants until the latter retired. The abandoned nests were immediately settled by *L. niger* swarms.

Detailed observations were made of two conflicts occurring within different groups of nearby nests of *M. rugulosa*. One of these conflicts was observed for the first time on 31 July. It ended on 13 August. The second conflict took place some metres from the area of the first one, and the action of *L. niger* was continued from 14 to 21 August. The first conflict was particularly interesting

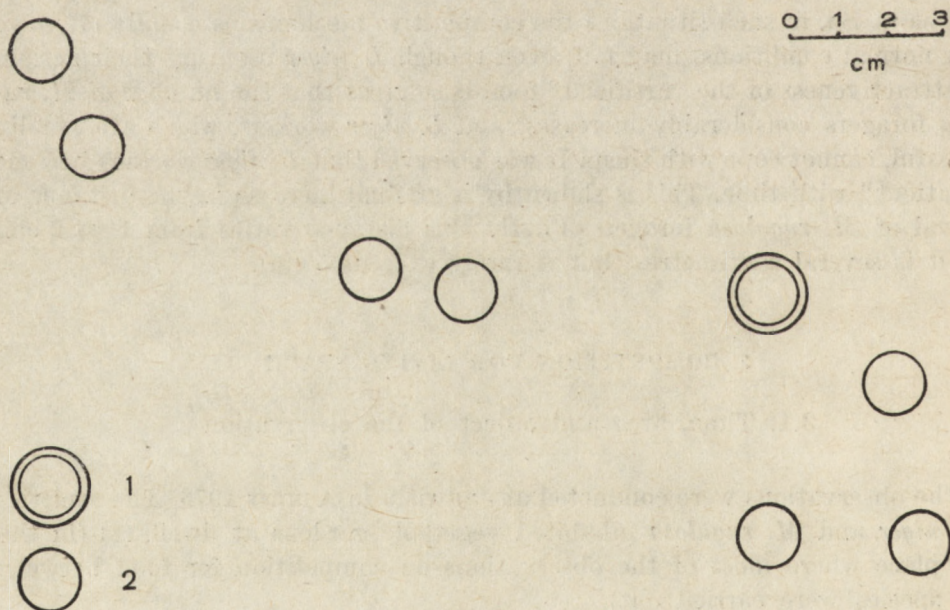


Fig. 11. The area of a conflict between *Lasius niger* and *Myrmica rugulosa*. 1 — central nest surrounded by ants of the two species; 2 — peripheral nests invaded by *L. niger*.

because of its duration and course. The group of *M. rugulosa* colonies attacked by *L. niger* was situated at the edge of the garden, on a bare stripe of the ground. At the time when the conflict was noticed for the first time, the peripheral *M. rugulosa* nests had already been occupied by *L. niger* which carried out normal building operations in them. But the entrance to the largest, central nest was surrounded by a compact group of representatives of the two species. Outside the ring of ants surrounding the nest, single, dispersed *L. niger* and *M. rugulosa* searched the nearby area within a radius of several centimetres. An unusual character of this situation was underlined by the increased activity of ants, though the area was exposed to sunlight and the air temperature was high (about 30°C at the ground level). Under such conditions the activity of ants is usually considerably reduced. The workers of neighbouring colonies of both *L. niger* and *M. rugulosa* did not emerge from their nests almost at all. At the besieged nests there was a continuous movement of individuals. Workers of the two species went in and out with similar frequencies. *L. niger* pulled away *M. rugulosa* from the entrance in the way described above (Fig. 12), and the latter returned immediately.

There were no considerable changes in ant behaviour on successive days. Only their proportions varied, either *L. niger* or *M. rugulosa* workers being more abundant. The number of ants usually increased in the evening hours, when it was cooler. At that time several ten individuals of each species were active, while only several to a dozen or so at noon. But independent of the total number of ants and configuration of power, *L. niger* workers continued to pull away their partners. The movements of ants involved in this activity were slow so that any excitement could not be seen. Single *M. rugulosa* workers emerged from the nest, passed through the ring around the entrance, collected dry particles of grass, stones, etc., then returned and tried to block the entrance. At the

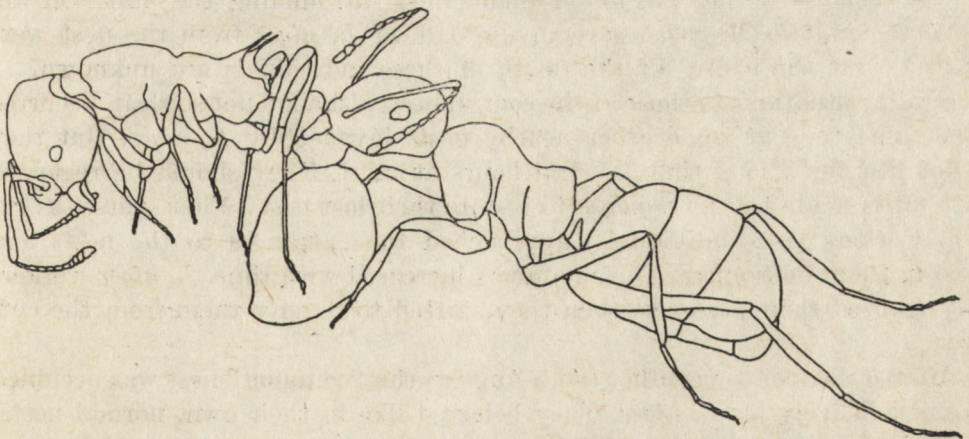


Fig. 12. A *Lasius niger* worker pulling a *Myrmica rugulosa* worker.

same time other workers removed particles of earth like during the normal deepening of the nest. At a certain moment *M. rugulosa* carrying a dead insect approached the nest. Being completely calm it forced the way through *L. niger* workers crowded at the entrance, and not being hitched it entered the nest with the prey.

Building operations carried out by ants sporadically during the period of drought, were considerably intensified after the rain, which is usually the case. At that time *L. niger* workers removed from the nest large amounts of earth, and deposited it around the entrance. Instead, *M. rugulosa* workers continuously collected the freshly removed earth to carry it again into the nest. Simultaneously, in other nests only *L. niger* worked but at a considerably lower rate. Despite the counteraction of *M. rugulosa*, the "common" nest was more and more enlarged, which was shown by the growing amount of earth on the ground surface.

Two times during these observations baits were left in different places at a distance of 30 cm from the nest. In each case they were firstly occupied almost exclusively by *M. rugulosa*. A rather readily seen path was formed between the bait and the nest by ants of this species running in the two directions more rapidly than usually. *M. rugulosa* workers not only consumed sugar bait but also carried particles of sugar into the nest, not being disturbed by *L. niger*. Gradually *M. rugulosa* became less interested in the baits, while the number of *L. niger* increased. After a few hours the situation was reversed. The baits were occupied almost exclusively by *L. niger* and, in turn, ants of this species formed a foraging path to the common nest. At one of the baits this cycle occurred between 3 and 8 p.m., at another one from 1 to 5 p.m. During the period of common feeding *L. niger* workers pulled away, like usually, their competitors from the bait.

Heavy fightings between the workers were not recorded. However, one dead *M. rugulosa* worker was found among ants surrounding the nest. On another occasion, two *M. rugulosa* removing a dead *L. niger* from the nest were observed. But the causes of the death of these individuals are unknown.

Similar situations to those at the central nest, although not so clear, occurred at the same time at some other nearby nests invaded by *L. niger*. But they did not last for a long time, several hours at most. They should be regarded as attempts made by *M. rugulosa* to restore their lost nests. First sparse *M. rugulosa* workers (1-2 individuals) approached the entrances to the nests and stayed in them motionless. Their numbers increased with time. *L. niger* workers firstly ignored their presence, then they started to remove them from the entrance.

After 5 days of the conflict (on 5 August) the "common" nest was occupied almost exclusively by *L. niger*. They behaved like in their own, normal nests. *M. rugulosa* individuals almost did not reveal their presence although a large number of them remained inside, which was disclosed later. This situation

was maintained for 4 days, and on 9 August the situation looked like at the beginning. *M. rugulosa* workers tried, even more frequently than so far, to enter the nests invaded by *L. niger*.

On 13 August there occurred a mass emigration of the *M. rugulosa* swarm from the nest. Ants moved with their offspring, including larvae, pupae and young, colourless individuals, to one of the *M. rugulosa* colonies situated about 3 m apart. For several hours there was a two-way movement of ants between the two nests. Particular individuals run at a distance of several to more than 10 cm from each other. Many *M. rugulosa* also run around the entrance to their former nest. They moved in a decided way and much more rapidly than in any situation observed before. In sum, about several hundred *M. rugulosa* were seen simultaneously on the ground surface during the removal. The number and behaviour of *L. niger* did not differ from the earlier ones.

The course of the conflict observed later in the same place was almost identical as that described above. Other *M. rugulosa* and *L. niger* colonies were involved in it. The nests abandoned by *M. rugulosa* were occupied by *L. niger* societies for ever. The observations were not continued for almost the whole September, it may be suggested, however, that *M. rugulosa* were permanently expelled by *L. niger* from their nests. The survey of myrmecofauna at the end of September showed that only one group of *M. rugulosa* colonies persisted, but it contained many individuals. The remaining area was exclusively inhabited by *L. niger*.

3.3. Interpretation of the phenomenon

The course, and particularly, the way which the described process was terminated, univocally show its essence — the expulsion of subdominant species by predominating one when food is in short supply in the commonly occupied area. Like in the case of competition for food resources, the expulsion of *M. rugulosa* swarms from their nests is carried out "bloodless". The oppressive activity of *L. niger* can last for different time till the final success is reached. Its duration varies from a few to more than ten days and even longer, depending probably on the number of individuals in the *M. rugulosa* colony. The described situation was observed for two weeks, it is not known, however, for how long it had been continued before being observed.

Because generally *M. rugulosa* colonies can be established within the territories of *L. niger* without any conflicts, it may be suggested that in this case the unusual behaviour of ants was an effect of specific environmental conditions. The more so as the action of *L. niger* was of large-scale character; in a short time it was spread on a rather large area and many colonies participated in it. In addition, it occurred in the area where the societies of the two species coexisted without earlier conflicts.

The only possible explanation to this conflict seems to lie in the changes of trophic conditions on the site inhabited by ants. In the preceding year the basic food supply of the two species consisted of very abundant aphids feeding on the nasturtium, while in 1976, that is, in the year of the conflict, there were neither nasturtium nor any other flowers in the garden. Therefore, it may be suggested that the available food supply for ants was considerably reduced, as compared with that in the preceding season. So, a critical situation could readily emerge. It is probable that in such situation the dominant species (*L. niger*) had to expel competitors to maintain its existence.

4. DISCUSSION

L. niger belongs to rather aggressive ants and, in addition, can develop a special strategy to overcome a stronger enemy¹. But they use a "bloodless" way of solving conflicts with *M. rugulosa* societies. The active behaviour of *L. niger* and passive one of *M. rugulosa* workers during the conflict prove that *L. niger* dominate this two-species community.

Formica sanguinea LATR. in similar situations (trophobiosis of two ant species with aphids occurring on the same plant) make periodical massacres of their "table companions", that is, *Formica cinerea* MAYR swarms (CZECHOWSKI 1975).

A possible analysis of these two behavioural patterns, in analogical situations, from the point of view of the superiority, either evolutionary or social, of one species to the other does not seem to be the proper approach. The two patterns only reflect the adaptations to environmental conditions, and as such they are simply adequate to the requirements and physical possibilities of particular ants in different situations.

F. sanguinea workers kill a large number of their competitors because just in this way they can be most successful in competition for food. Inherited

¹ In 1972, in the Bieszczady Mountains, a colony of *Formica exsecta* NYL. was experimentally moved to another place, near a *L. niger* nest. The distance between the two nests was about 50 cm. The conflict was started when the first scouts of *F. exsecta* searching the area reached the *L. niger* nest. During the battle, when *F. exsecta* gained an advantage, *L. niger* carried out an organized and precise outflanking movement at the nest of the enemy, which decided the results of the conflict. At a certain moment a column of ants emerged from the nest of *L. niger*. They followed a curved path, and passing by the field of the battle they went towards the *F. exsecta* mound. The column was about 3 cm wide, and the speed of the head was a few centimetres per minute. When the column was at the height of the *F. exsecta* nest, at a distance of about 30 cm from it, ants at the head were attacked by its defenders. At that time all *L. niger* individuals approached the nest of *F. exsecta* and, as a result, the configuration of power was completely changed. The line of the front was then twice as long and, consequently, the density of *F. exsecta* dropped along this line. Shortly after this crucial moment *F. exsecta* workers left their nest (CZECHOWSKI 1977).

predispositions to fight and a considerable physical force of these ants ensure them an advantage in conflicts with *F. cinerea* at insignificant losses.

The situation of *L. niger* is completely different. It may be expected that their fights with *M. rugulosa* would result in considerable losses destroying the two societies. This was the case in earlier experiments in which large numbers of *M. rugulosa* workers were moved to the places near a *L. niger* nest. Although the situation of *M. rugulosa* was very unfavourable, they killed many defenders of the "attacked" colony.

So, under natural conditions, *L. niger* and *M. rugulosa* avoid conflicts, at least, in the form of direct fights. Owing to such relationships, *L. niger* as the dominant has an advantage in utilizing available food resources of the common foraging area, without any losses. Of course, a common profit must be the condition of such relationship; *M. rugulosa* must also have an advantage. It may be the possibility of a relatively safe nesting in the territories of *L. niger* societies, and also the possibility of utilizing without conflicts the surplus food supply within the foraging area of the host.

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A conflict like described above was also observed in June 1978 at Radość near Warsaw.

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STRESZCZENIE

[Tytuł: Konkurencja między *Lasius niger* (L.) i *Myrmica rugulosa* NYL. (Hymenoptera, Formicidae)]

Lasius niger (L.) i *Myrmica rugulosa* NYL. należą do dwóch różnych typów etologicznych mrówek. *L. niger* jest gatunkiem terytorialnym — jego społeczeństwa aktywnie bronią swych pól troficznych przed mrówkami o podobnej etologii, podczas gdy mrowiska *M. rugulosa* nie mają takich strzeżonych obszarów. Zazwyczaj mrówki *M. rugulosa* są tolerowane na terytoriach społeczeństw *L. niger*.

Karmniki z cukrem wykładane na obszarze zajęтым przez mrówki tych dwóch gatunków wykorzystywane są jednocześnie przez furazerów z obu społeczeństw. Nie obserwuje się wówczas walk między mrówkami, natomiast robotnice *L. niger* ustawicznie odciągają od cukru osobniki *M. rugulosa*. Schwytana za pomostek przez *L. niger* mrówka *M. rugulosa* przybiera skuloną pozycję i bez żadnych oporów pozwala się odnieść na odległość kilku centymetrów od karmnika, po czym, pozostawiona, natychmiast wraca. Przypadki analogicznego zachowania się mrówek, choć nie tak często, zdarzają się również w warunkach naturalnych podczas rywalizacji obu gatunków o prawo do korzystania ze spadzi mszyc występujących na ich wspólnym polu troficznym.

W sierpniu 1976 roku w Jadwisinie koło Warszawy obserwowano zjawisko wypierania rojów *M. rugulosa* przez mrówki *L. niger* z terenu dotychczas zgodnie zajmowanego przez oba społeczeństwa. Mrówki *L. niger* wdzierały się do kolejnych gniazd *M. rugulosa* i nieprzerwanie w ciągu kilku-kilkunastu dni wynosiły na zewnątrz gospodarzy mrowiska, zmuszając ich w końcu do ustąpienia. Opuszczone gniazda zajmowane były natychmiast przez *L. niger*. Żadnych walk nie stwierdzono. Przypuszcza się, że przyczyną tego zjawiska było pogorszenie się warunków pokarmowych na polu troficznym, co zmusiło gatunek dominujący (*L. niger*) do pozbycia się konkurentów.

РЕЗЮМЕ

Заглавие: Межвидовая конкуренция между *Lasius niger* (L.) и *Myrmica rugulosa* NYL. (Hymenoptera, Formicidae)]

Lasius niger (L.) и *Myrmica rugulosa* NYL. относятся к двум разным по своей этиологии типам муравьев. *L. niger* является видом, сообщества которого активно обороняют свои трофические поля от других муравьев, имеющих сходную этиологию. В то время, как муравейники *M. rugulosa* не имеют таких охраняемых территорий. Обычно сообщества *L. niger* допускают на свои территориях муравьев *M. rugulosa*.

Кормушки с сахаром, разложенные на территории, занятой муравьями обоих видов, используются одновременно фуражирами обоих сообществ. Не наблюдается при этом борьбы между муравьями, но рабочие *L. niger* постоянно оттягивают от сахара особи *M. rugulosa*. Схваченный *L. niger* муравей *M. rugulosa* скорчивается и без сопротивления дает отнести себя на несколько сантиметров от кормушки, пущенный — немедленно возвращается обратно. Случаи подобного поведения, хоть не так часто, случаются также в естественных условиях при конкуренции обоих видов за право пользования падью тлей, встречающихся на их совместном трофическом поле.

В августе 1976 года автор наблюдал в Ядвигине около Варшавы явление вытеснения сообществ *M. rugulosa* муравьями из вида *L. niger* с территории, которую оба вида занимали до того в согласии. Муравьи *L. niger* врывались непрерывно на протяжении нескольких дней в очередные гнезда *M. rugulosa* и выносили наружу хозяев муравейника, заставляя их таким образом в конце концов покинуть территорию. Оставленные гнезда занимали немедленно *L. niger*. Борьбы не наблюдалось. Причиной этого явления было, по-видимому, ухудшение кормовых условий на трофическом поле, что заставило доминирующий вид (*L. niger*) избавиться от конкурентов.

