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MYRMECOLOGICAL INVESTIGATIONS IN THE ENVIRONS OF KISKÖRE

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Although the myrmecological investigations along the Tisza, begun in 1963, extended over all the three Tisza sectors (Gallé, 1966a, 1966b, 1967b; Gallé and Gausz, 1968), only comparatively few of the observations published from thirteen areas, so far, are dealing with the biotops of the Middle-Tisza. First of all for supplying this defect, in 1968 I chose the northern part of the middle sector of the Tisza for the site of my investigations. The second barrage of Tisza to be built in the environs of Kisköre will highly change the face of the area. Another aim of my investigations has been to study and recognise the original *Formicoidea* fauna getting under inundation.

Characterization of the area

My investigations were carried out in the inundation area, on the dams and in the protected flood area at the left bank of the Tisza, near to the villages Pusztataksony, Kisköre, and Abádszalók. Data of my observations: July 17—30 1968.

The area belongs climatologically to the northern regions of the Middle-Tisza with a somewhat cooler climate (the annual mean temperature being under 10°C) and scanty in rainfall (the annual precipitation rising hardly above 500 mm).

The inundation area of the Tisza is broad, here and there of more kms, a large part of it being under the influence of the repeated spring inundations. The areas are covered dominantly by grazing-lands and planted woods of a substance of young poplars, and in a smaller part by grove-spots of an old substance of *Salicetum albae-fragilis*, the latter ones occurring with both *Salix* and *Populus* con-sociations alike.

The exposition of dam sides is generally: N.W.-S.E. On the N.W.-dam side exposed to the inundation area there occurred, according to my observations, the plant association *Alopecuretum pratensis ranunculeto-sum acris* appearing with *Rumex* facies that is characteristic of the Upper-Tisza. On the S.E.-dam side exposed to the protected flood area there grew here and there a form of this association, becoming a poor *Alopecuretum pratensis festucetosum pseudovinae*, and in other places

there grows a weed vegetation as a result anthropogeneous influences. On the top of the dam the weed border *Schlerochloo-Polygonetum avicularis*, elsewhere generally occurring, can be found but in a few spots.

There were carried out some collections beside the inundation area, as well, in the protected flood area, first of all in grazing-land *Artemisio-Festucetum pseudovinae*, being somewhat alkalized to solonetz, and in an adjacent wood having at present a substance of *Pinus nigra* and being planted in the place of *Festuco pseudovinae-Quercetum*. I have performed a few collections also in an oak-wood of planted substance at the external side of dam.

Methods

At collection and evaluation of the populations I have followed the methods given in the former publications (Gallé, 1966b, 1967a). In the wood and meadows of the inundation area there couldn't take place any exact quantitative collection, because of the very low population density; and not as a consequence of coherence of the wood biotops of an old *Salicetum* substance of higher myrmecological significance, but of their connected character. On the dam sides and on the steppe covered with an *Artemisio-Festucetum pseudovinae* association, squares of a size of 1 sq.m have been applied.

In this way, the speceis of a lesser nest density (e.g. *Formica*) were collected bit by bit, while for collecting the species visiting flowers and plant-lice I have used grass-nets in the grass-like coenoses. As, however, with the latter method only individual speciemens could be collected, an exact dispersion of the colony cannot be established and we may evaluate the results of the grass netting only qualitatively.

For characterizing the ant fauna ecologically and faunistically, I am typifyig the *Hymenoptera* ecologically (according to Móczár, 1953) and using the general types of distribution.

Enumeration of the species collected

From the area 21 *Formicoidea* species have been collected, during the coenological collections 324 nests were taken into account. The following enumeration is containing the names of the species collected, the places of their occurence, the ecological and area types of species: *Ponera coarctata* Latr. — on dam sides; an euryoecic eremophilous, Euro-Mediterranean species.

Myrmica ruginodis Nyl. — from the grazing-land in the inundation area; euryoecic hylophilous species, Euro-Siberian.

Myrmica scabrinodis Nyl. — from dam sides, from pine- and oak woods planted in the protected flood areas; hyper-euryoecic intermediary, Euro-Siberian species.

Myrmica rugulosoides For. — from dam sides; hypereuryoecic intermediary, species.

Leptothorax tuborum F. var. *unifasciata* Latr. — from pinewoods

planted in the protected flood area; euryoecic eremophilous, Euro-Turanian species.

Tetramorium caespitum Latr. — from weed associations in the inundation area and dam sides; hyper-euryoecic intermediary, palearctic species.

Dolichoderus quadripunctatus L. — from poplar-woods in the inundation area, pinewood, in the protected flood area; euryoecic eremophilous, Ponto-Mediterranean species.

Tapinoma erraticum Latr. — from dam sides, pinewoods planted in the protected flood area; euryoecic eremophilous Euro-Turanian species.

Plagiolepis vindobonensis Lomn. — from dam sides; euryoecic eremophilous, South European species.

Camponotus truncatus Spin. — from a pinewood planted in the protected flood area; atenoecic eremophilous, Euro-Mediterranean species.

Camponotus lateralis Ol. var. *piceus* Leach. — from dam sides, pinewoods in the protected flood area; euryoecic eremophilous, Euro-Mediterranean species.

Camponotus caryae Fitch. var. *fallax* Nyl. — from a poplar wood in the inundation area, from a pinewood planted in the protected flood area; stenoeccic eremophilous, Euro-Mediterranean species.

Lasius niger L. — from woods and meadows in the inundation area, from dam sides, grazing-lands in the protected flood areas; hyper-euryoecic intermediary, palearctic species. Its sub-species occurring in a pinewood planted in the protected food area is *Lasius niger* L. ssp. *lasioides* Emery.

Lasius alienus Foerst. — from a grazing-land in the protected flood area; euryoecic eremophilous, palearctic species.

Lasius affinis Schenck. — from dam sides, pinewoods planted in the protected flood area; euryoecic eremophilous, Euro-Siberian species.

Formica sanguinea Latr. — from the dam sides; euryoecic eremophilous, palearctic species.

Formica fusca L. — from dam sides; euryoecic hylophilous, palearctic species. Its very found in the same place is *Formica fusca* var. *glebaria* Nyl.

Formica rufibarbis F. — from dam sides, grazing-lands in the protected flood area, pinewoods planted in the protected flood area; euryoecic eremophilous, Euro-Siberian species.

Formica gagates Latr. — from dam sides; euryoecic eremophilous, Ponto-Mediterranean species.

Formica rufa L. — from dam sides; euryoecic hylophilous, Euro-Siberian species.

From the species in the Tisza-valley we could not find *Ponera coarctata* Latr. so far. Not only for the Tisza-valley but for whole Hungary a new sub-species is *Lasius niger lasioides* Emery, the nest of wich I have observed in a woods of *Festuco pseudovinae-Quercetum roboris pinetosum nigrae*, in the protected flood area.

Formicidae populations of some biotops and the quantitative relations of these populations

In the various biotops the composition and character of the ant population are determined by the physiognomy of biocoenoses and the abiotic ecological complexions.

1. Inundation area. *Formicidae* have occurred in the inundation area in three different biotopic types.

a) Woods in the inundation area. First of all the ant populations of the *Salicetum* groves of old substance are very considerable. The ant populations of the soil are poor owing to the strong influence of flood. The species of the soil levels occurring with a very little and poor colony dispersion is *Lasius niger* L. In like manner, *Lasius niger* L. nestles in the trunks of the old, hollow willows, as well. In the *Salicetum* with poplar consociation, too, there are two various levels. In the soil level, *Lasius niger* L. are nestling here and there; while in the foliage level — where the characteristic, strongly damp environmental influence of the lower levels of the wood in the inundation area is no more felt — also eremophilous species have settled down: *Dolichoderus quadripunctatus* L. (EE) and *Camponotus caryae* Fitch. var. *fallax* Nyl. (SE). The dominant species of them is *Dolichoderus quadripunctatus* L. nesting in every older poplar.

b) Grazing-land, meadows in the inundation area. These are very damp and can generally be characterized by the plant associations *Glycyrrhizetum echinatae echinochloetosum* and *Lolio-Potentilletum anserinae*. In compliance with the ecological milieu, also the ant population is responded by a hygrophilous dominant species, *Myrmica ruginodis* Nyl. (EH), and less frequently by *Lasius niger* L. (HI), like an accessory species.

c) Weed borders. The third coenoses of physiognomic type in the inundation area are the weed borders (*Sclerochloa-Polygonetum avicularis* and *Amarantho-Chenopodietum albi*). In the biotops covered with these associations, *Tetramorium caespitum* was found like a nestling species by the flood. *Tetramorium caespitum* L. (HI) appeared as a species preferring the weed border, also in the course of other investigation at the Tisza.

2. Dam sides. The population of both dam sides are similar in character that may be explained by the flora of dam sides consisting of associations of identical construction. The list of species of the ant populations of dam sides can be seen in Table I. The Table containing the dominance and constancy of species (D percent and C/1 sq.m., both referred to the nests) is showing well the similarities and differences between the ant fauna of the two dam sides. On the dam sides of N.W.-exposition *Solenopsis fugax* Latr. and *Lasius niger* L. are the constant-dominant species. The quantity of *Solenopsis fugax* Latr. does not change, on the dam side of S.E.-exposition either, partly because both dam sides are affording satisfying environmental conditions to this species of wide ecological amplitude, partly because it is differing from the other species by its obligate endogeious way of life, taking part but a little in the natural struggle for life of the other species and thus

being not displaced by other species. The smaller dominance of *Lasius niger* L. on the dam sides of S.E.-exposition is explained by the fact that its role and place are taken over by species of similar biocoenotic

Table 1

| e.t. | species | D p.c. C | | D p.c. C | | D p.c. C | |
|-------------------------|---|----------|----|----------|---|----------|-----|
| Exposition of dam side: | | N.W. | | S.E. | | Mean | |
| EE | <i>Ponera coarctata</i> Latr. | 1,16 | 1 | - | - | 0,58 | 0,5 |
| HI | <i>Myrmica scabrinodis</i> Nyl. | 2,32 | 1 | 10,67 | 6 | 6,50 | 3,5 |
| HI | <i>Myrmica rugulosoides</i> For. | - | - | 1,78 | 1 | 0,89 | 0,5 |
| HI | <i>Solenopsis fugax</i> Latr. | 46,40 | 10 | 46,28 | 8 | 46,34 | 9,0 |
| HI | <i>Tetramorium caespitum</i> Latr. | 2,32 | 2 | 7,12 | 2 | 4,72 | 2,0 |
| EE | <i>Tapinoma erraticum</i> Latr. | - | - | 7,12 | 4 | 3,56 | 2,0 |
| EE | <i>Plagiolepis vindobonensis</i> Lomn. | - | - | 3,56 | 2 | 1,78 | 1,0 |
| EE | <i>Camponotus lateralis</i> Ol. var. <i>piceus</i> Leach. | 2,32 | 1 | 1,78 | 1 | 2,05 | 1,0 |
| HI | <i>Lasius niger</i> L. | 41,76 | 10 | 14,28 | 4 | 28,00 | 7,0 |
| EE | <i>Lasius affinis</i> Schenck. | 1,16 | 1 | 3,56 | 2 | 2,36 | 1,5 |
| EE | <i>Formica sanguinea</i> Latr. | - | - | 0,89 | + | 0,445 | + |
| EH | <i>Formica fusca</i> L. | 1,16 | 1 | 1,78 | 1 | 1,47 | 1,0 |
| EE | <i>Formica gagates</i> Latr. | - | - | 0,89 | + | 0,445 | + |
| EE | <i>Formica rufibarbis</i> F. | 1,16 | 1 | + | + | 0,58 | 0,5 |
| EH | <i>Formica rufa</i> L. | + | + | - | - | + | + |

+ = The nest of species at the border of the quadrat or only individual have occurred.

role but being more thermophilous, like *Myrmica scabrinodis* Nyl. and *Myrmica rugulosoides* For., and that this side of the dam is showing a tendency to become weedy; in the weed associations, however, *Lasius niger* L. is not a significantly constant-dominant species. The weedy character is shown, anyway, also by the increased of *Tetramorium caespitum* L. on the outer dam side, while *Tapinoma erraticum* Latr. and *Plagiolepis vindobonensis* Lomn. are thermophilous, getting a suitable abiotic chance to live only on this dam side. On the basis of the investigations so far, this datum concerning *Plagiolepis vindobonensis* Lomn. is meaning the most northern site of occurrence of the *Plagiolepis* species of southern distribution along the Tisza. The tendency of the substance of *Plagiolepis* decreasing towards North is shown also by the dominance of *Plagiolepis* that is here smaller than in the more southern habitats. *Formica sanguinea* Latr. in its large colony found on the dam-"side" kept the species *Formica rufibarbis* F. and *Camponotus lateralis* Ol. var. *piceus* Leach. like slaves. Two-third part of the substance of *Formica fusca* L. belongs to the *glebaria* Nyl. varietas on the N.W. side of the dam while on the outer dam side only *glebaria* occurred.

As mentioned, the weed border *Schlerochloo-Polygonetum avicularis* on the top of the dam is here of smaller myrmecological significance. Where it occurs, its characteristic and lonely species is *Tetramorium caespitum* Latr. while *Messor structor* Latr. that is also frequent in this coenosis in the area to the south of Kisköre, is no more occurring here and to the north from here.

3. Protected graznig-land in the inundation area. On its sodic soil, the total coverage of the vegetation deteriorated by grazing is 60—70 percent. Corresponding to the vegetation of monotonous and poor construction, the *Formicida* part of zoo-coenosis is represented only as many as three species:

Table 2

| Ec. type | species | D p. c. | C/lm ² |
|----------|--------------------------------------|---------|-------------------|
| HI | <i>Lasius niger</i> <u>L.</u> | 86,00 | 10 |
| EE | <i>Lasius alienus</i> <u>Foerst.</u> | 10,32 | 3 |
| EE | <i>Formica rufibarbis</i> <u>F.</u> | 3,44 | 1 |

Although this coenosis is similar to that of dam sides in respect of physiognomy, it is separated from that, apart from the poorer vegetation, by the drier environmental influence, too. It is explained by the difference in the abiotic ecological factors that beside *Lasius niger* L. also the expressively thermophilous *Lasius alienus* Foerst. appears.

4. Pinewood. In the underwood of the pinewood of rare substance planted in the protected flood area, that of the original oakwood (*Festuco pseudovinae-Quercetum roboris*) is preserved. The coverage of grass level is 96—98 percent. The ant fauna of soil level is corresponding to that of steppe oakwoods, first of all owing to the dominant species *Leptothorax tuberum unifasciata* Latr. and *Myrmica scabrinodis* Nyl.:

Table 3

| Ec. type | species | D p. c. | N-m ² |
|----------|---|---------|------------------|
| HI | <i>Myrmica scabrinodis</i> <u>Nyl.</u> | 61,42 | 2 |
| EE | <i>Leptothorax tuberum</i> <u>F.</u> var. <i>unifasciata</i> <u>Latr.</u> | 24,90 | 5 |
| EE | <i>Camponotus lateralis</i> <u>Ol.</u> var. <i>piceus</i> <u>Leach.</u> | 4,98 | 15 |
| HI | <i>Lasius niger</i> <u>L.</u> ssp. <i>lasioides</i> <u>Em.</u> | 1,66 | 75 |
| EE | <i>Tapinoma erraticum</i> <u>Latr.</u> | 1,66 | 75 |
| SE | <i>Camponotus truncatus</i> <u>Spin.</u> | 1,66 | 75 |
| EE | <i>Formica rufibarbis</i> <u>F.</u> | + | |

Owing to the highly different constancy of species, I have gives more practically the minimiareal of the nests of the species in question, expressed in square metres ($N\text{-m}^2$). From the species enumerated, *Tapi-noma erraticum* nestled at the edge of wood, its presence being, therefore, not characteristic of the pinewood. In like way, *Formica rufibarbis* F., too, is a species establishing a contact between two coenoses, nestling in the adjacent grazing-land, and its members visit the wood coenosis first of all for insect husting, and partly for gathering the honeydew of plant-lice (probably *Cinara* species) living on the young pine-shoots. I have found the nest of the otherwise obligately arboricolous *Camponotus truncatus* Spin. in a tree-branch brokedown and, as the members of this colony are participating in the traffic of the materials of soil level, it is reasonable to indicate this species also in the Table concerning the soil.

The species nesting on pine trunks and branches are: *Leptothorax tubereum* F. var. *unifasciata* Latr., *Dolichoderus quadripunctatus* L., *Camponotus truncatus* Spin., *Camponotus caryae* Fitch. var. *fallax* Nyl.; the dominant species of the population is *Dolichoderus quadripunctatus* L., the occurrence of which on pines along the Tisza was not knows so far.

5. Oakwood planted. In the course of the collection in the oakwood planted in the protected flood area only a single species, *Myrmica scabrinodis* Nyl. was found. Supposedly the anthropogeneus influence, the physiognomical under-development of coenosis, as well as the sub-soil are ethe factors responsible for the other species missing that are characteristic of the steppe oakwoods.

Faunistic and ecological characterization of the ant fauna

The 21 ant species collected in the district of the villages Kisköre—Pusztataskony—Abádszalók belong to the Palearctic, Euro-Siberian, Euro-Turanian, European, Euro-Mediterranean and Ponto-Mediterranean area types.

The percentage of the fauna elements on the basis of species numbers it as follows:

| | |
|---------------------|------------|
| Palearctic | 30 percent |
| Euro-Siberian | 25 percent |
| Euro-Turanian | 15 percent |
| European | 5 percent |
| Euro-Mediterranean | 20 percent |
| Ponto-Mediterranean | 5 percent |

Comparing these values with the percentage got at the Upper-Tisza (Gallé and Gausz, 1968), it is obvious that at the Upper-Tisza the Euro-Siberian and European species are represented in a higher percentage while in the district of Kisköre the essentially greater percentage of the Euro-Mediterranean species is remarkable. As the quantity of the Euro-Mediterranean species in Tisza-kürt — that belongs also to the Middle-Tisza — was 21,44 pc., we may set down as a fact that the area

investigated at present, on the basis of the ant fauna, is still belonging faunistically to the Middle-Tisza.

The distribution of the ecological types is:

Table 4

| ecological types | on the basis of | |
|-----------------------------------|-------------------------|-------------------|
| | No. of species p. c. | D. p. c. p. c. |
| stenooecic eremophilous /SE/ | 9,08 | 0,532 |
| euryoecic eremophilous /EE/ | 54,48 | 29,508 |
| hyper-euryoecic intermediary /HI/ | 22,70 | 51,206 |
| euryoecic hylophilous /EH/ | 13,62 | 18,754 |

As it is apperant, the euryoecic eremophilous type is dominant among the ecological types in respect of the number of species. Anyhow, the percentages calculated on the basis of species numbers do agree, aside from some minor differences, with the percentages got from other Tisza sectors (Gallé and Gausz, 1968) while the percentages on the basis of dominances are more similar to the values got from the Upper-Tisza.

Summary

In the course of the myrmecological collections carried out the district of Kisköre — Abádszalók — Pusztataskony, the occurrence of 21 *Formicoidea* species could be observed. From these species, *Ponera coarctata* Latr., and from the sub-species: *Lasius niger lasioides* Emery are new for the Tisza. The ecological character and the faunistic peculiarities of the ant fauna are demonstrating a mixed character of the termophilous-xerophytic substances at the Middle-Tisza and of populations having plenty of montanic elements at the Upper-Tisza. The species form five different ant populations in connection with the abiotic and biotic conditions of the biotops of various types.

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