ECOLOGICAL AND ZOOCOENOLOGICAL INVESTIGATION OF THE FORMICOIDEA FAUNA OF THE FLOOD AREA OF THE TISZA RIVER

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The investigation of the Tisza River begun more than ten years ago is concerned with exploration of the Tisza River basin from the most diverse biological points of view. Until guite recently, however, entomology has played but a minor role in the work of the Tisza River Research Team. Apart from a few data by Zilahi-Sebess (1962) we know of no specifically myrmecological investigations. In the course of investigations carried aut from 1963 onward in the flood area of the Tisza River near Tiszakarád, Tiszadob, Taktaköz, Tőserdő, Labodár, Sasér, Algyő, Nagyfa, Vesszős, Szeged and Zenta 33 species of 13 genera of 3 subfamilies have been found so far. (Table 1.)

Methods of sampling and evalvation

Owing to the bad coenological dispersion it was practically impossible to investigate the terricol ant fauna by the common quadrate method referring to the number of individuals in zoocoenological sampling. Therefore I took the nests as units in the course of sampling referring to these the various coenological constants, indexes with generally a quadrat the size of 1 by 1 or 2 by 2 metres.

For the characterization of the different species I will use the generally established ecological types for *Hymenoptera* (according to Móczár, 1953): Stenooecic eremophilic (SE), Euryoecic eremophilic (EE), Hypereuryoecic intermediary (HI), Euryoecic hylophilic (EH), Stenooecic hylophilic (SH). These constants show well the ecological requirements of each particular species of *Hymenoptera*, however just because of their general nature for the occurence of the *Formicidae* among which the soil effect may be mentioned specially as the most important antibiotic determinant of the endogeic life form. From this point of view the most important things are the physical properties of the soil, especially its hardness and its function, the water balance.

The ant Fauna of the different biotopes

The flood area of the Tisza is a biochor very different from other biotopes of the Great Plain with special environmental effects. The different coenoses within the flood area forming as it were a macrozonation complex in their character generally show a sudden change in transversal direction. The character of the biotopes is determined first of all by the substrate and the medium, the nature of the soil and vegetation. In the largen part of the area flood is the pessimal factor. The flood area of the Tisza may be divided on the basis of the ant species into seven well distinguishable biotopes which are connected with the botanical division of the area (T i m á r and B o d r o g k ö z y, 1959).

1. The river-bank

It is entirely exposed to the variations of the water-level. Therefore no constant ant fauna is formed here.

2. Salicetum triandrae Malcuit

Owing to the powerful flood effect no ant fauna characterizable by constant species is formed in the shrub willow association either. The species found here temporarily occur in conseqense of the drifting effect of the flood or of the wind (female individuals).

3. Meadows in the flood area, culture association

Depending on their character and the degree of the antropogenous influence these open, varied biotopes posses varied plant associations. An ant fauna, which is always terricolous can form only if these biotopes are statued higher than the average spring water level. The ant faunas of different meadows may be very different from the point of view of the composition of species, but *Lasius niger* L. (HI) is always a constant species.

The more frequent species are: *Formica rufibarbis* F. (EE, Taktaköz) on drier meadow, *Myrmica ruginodis* N y l. (EH, Vesszős) and *Myrmica laevinodis* N y l. (EH, Vesszős) in more humid biotopes.

4. Salicetum albae-fragilis I s s l e r and S o ó

The ecological conditions most characteristic of the flood area are created by the wood; it is also most important from the point of view of extent. Its climate is more balanced than that of the other biotopes of the flood area. In accordance with the selecting effect of the flood the arboricol life form is general as oppesed to the terricol form that appears only on higher points.

The wood is most often made up of *Salicetum albaefragilis* plant association. As regards the ant fauna, distinction must be made between woods of purely *Salix,* mixed *Salix-Populus,* and purely *Populus* stands.

a) Salix stand. In such woods the *Salix alba* and *Salix fragilis* forming a low, continuous crown level and often associated with dense *Rubus*

caesius stands *(Salicetum albae-fragilis rubetosum caesii)* secure a humid milieu. Accordingly the *Salix* stand can be characterized by the decidedly hylophil *Myrmica laevinodis* N y l. (Vesszős, Algyő, Sasér, Taktaköz.)

Characteristic species:

Lasius niger L. (HI).
Myrmica laevinodis N y l. (EH).

Common species:

Lasius fuliginosus L a t r. (EI),
Myrmica ruginodis N y l. (EH),
Solenopsis fugax L a t r. (HI).

As to the nests of the different species, no *synusium* division can be found.

b) Mixed *Salix-Populus* stand. Similarly to the case of the pure *Salix* stand type there is a humid milieu up to the level of the crowns of the willows; accordingly, a society of arboricol ants agreeing with the former and characterizable with hylophil species appears at about 1—3 m (Fig. 1.). Above the *Salix* crowns and the *Populus* trunks and branches where the very humid „flood area effect" does not came into display there often appears the *Dolichoderus quadripunctatus* L. (EE), sometimes only at a height of 8—10 metres (Nagyfa, Tiszakarád).

c) Pure *Populus* stand. In these coenoses the vapour content and the degree of shading decrease vertically upward. Therefore, the picture of the *Formicoidea* society changes according to the *synusia* differentiated on the basis of the ecological requirements (investigation at Sasér, Fig. 2.):

Synusium A: *Lasius niger* L. (HI),
Synusium B: *Myrmica ruginodis* N y l. (EH),
Lasius niger L. (HI),
Lasius brunneus L a t r. (EE),
Synusium C: *Lasius emarginatus* O l. (EE),
Synusium D: *Dolichoderus quadripunctatus* L. (EE).

5. Wood — embankment ecotone

Between the wood and the embankment there is sometimes a well definable ecotone (Fig. 1.). The constant ant society is mainly terricol.

Constant species (at Sasér, Labodár, Vesszős) are:

Lasius niger L. (HI),
Myrmica ruginodis N y l. (EH).

In case of higher water content, vapour content and more intensive dew formation (Taktaköz):

Constant species are:

Myrmica laevinodis N y l. (EH),
Lasius niger L. (HI).

Common species:

Formica rufa L. (EH).

6. Dike-side grass-land

The sides of the dikes have varied plant associations. The most im-

portant ecological determinants of the terricol ant fauna are: the shading effect of the vegetation, the exposition, the water content and the hardness of the soil. Constant species are generally: *Lasius niger* L. (HI), *Plagiolepis pygmaea* Latr. (EE), *Serviformica* sp. (*Formica fusca* L. or *Formica rufibarbis* F.). Common species may be: *Solenopsis fugax* Latr. (HI), *Formica sanguinea* Latr. (EE) and *Lasius flavus* F. (EI).

On dike-sides with less vegetation: *Tatramorium caespitum* L.; in the case of not very hard soil (hardness according to Arany under 60) with maximally 50 to 60% vegetation cover, *Messor structor* Latr. (EE), *Plagiolepis vindobonensis* Lomn. (EE) and *Lasius alienus* Foerst. (EE) may appear as constant or common species.

Among the types of biotopes of the Tisza river-side it is the dike-side that shows the greatest similarity to the myrmecological picture of the lowland steppes (Brian, 1964; Brian, Hibble and Stradling, 1965).

7. Wayside ecotone

The constant species of the ruderal ecotone appearing by the side of the ways on top of the dikes are *Tetramorium caespitum* L. (HI), in more southernly territories (Szeged— Labodár) *Tetramorium caespitum* L. (HI) and *Messor structor* Latr. (EE).

The distribution of the ecological types

The balance of the ant fauna of the flood area may characterized by the predominance of the eremophilic species in accordance with the lowland situation. The relatively great, nearly 30% value of the hylophilic species which are generally rare under 300 m height above sea level is due to the special environmental effect.

Stenooecic eremophilic: 6,67%,
Euryoecic eremophilic: 50%,
Hypereuryoecic intermediary: 13,34%,
Euryoecic hylophilic: 29,99%.

The distribution of species according to ecological types in the different coenoses can be seen in Fig. 3.

Literature

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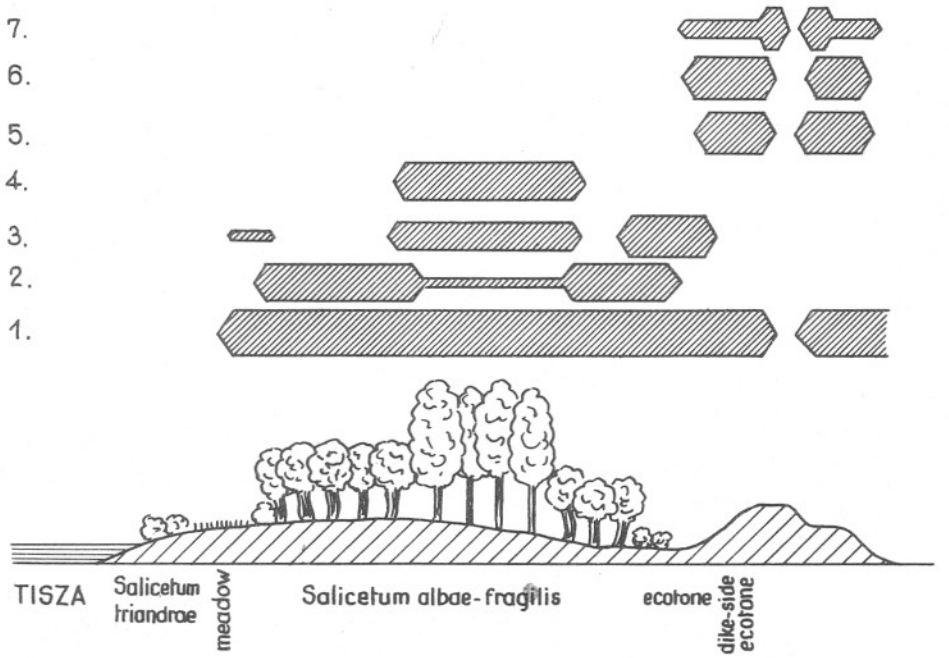
Figures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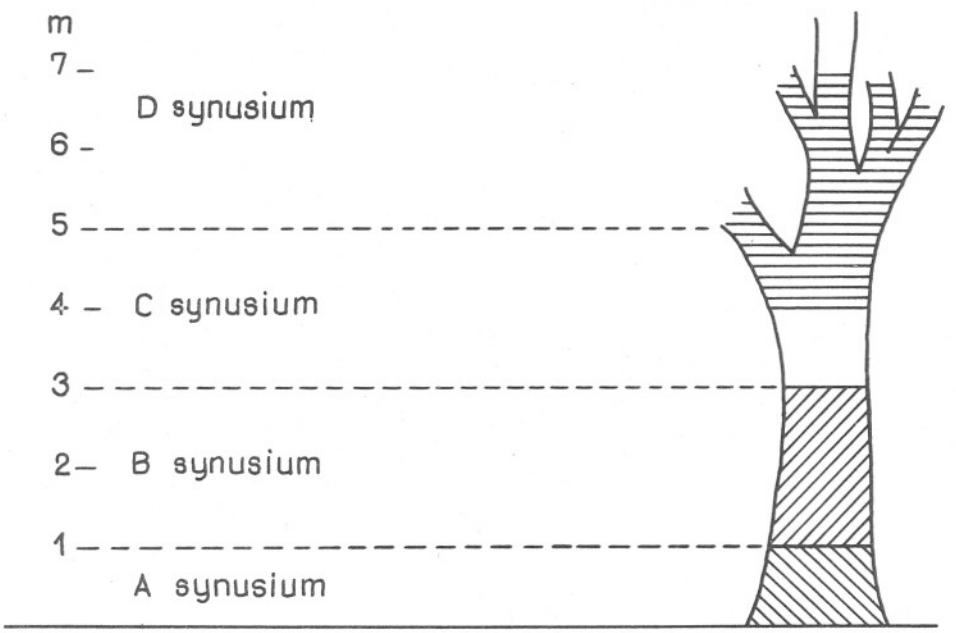
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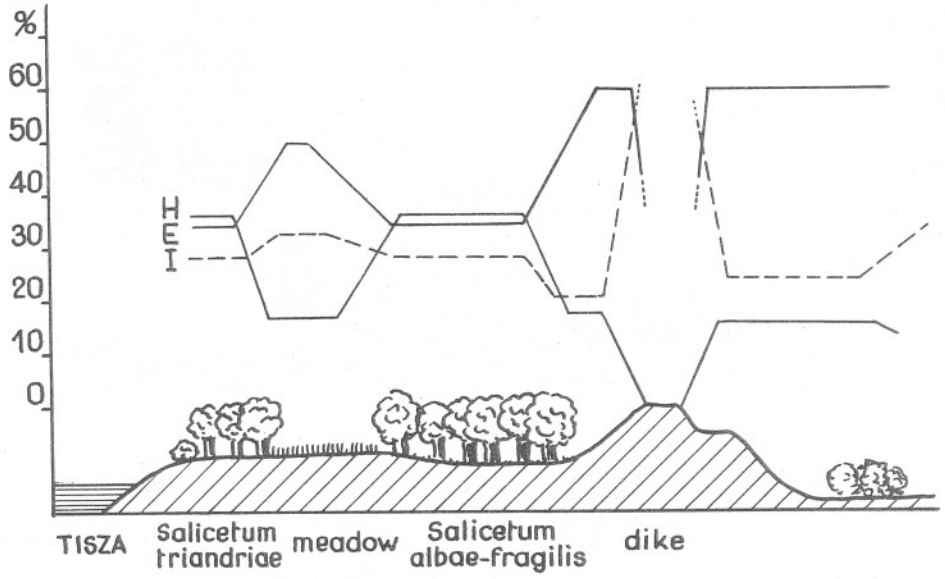

Fig. 1. Constant species in the typical biotopes of the flood area. 1. *L. niger*, 2. *M. laevinodis*, 3. *M. ruginodis*, 4. *D. quadripunctatus*, 5. *P. pygmaea*, 6. *Serviformica sp.*, 7. *T. caespitum*.

Fig. 2. The level distribution of ant nests (Sasér, 1965).

Fig. 3. Percentage distribution of ecological types in the biotope types of the flood area. H: hylophilic, E: eremophilic, I: intermediary