

PROTECTED AREAS OF THE FLOOD PLAIN OF THE LOWER-TISZA REGION, THEIR APOIDEA INSECT POPULATION AND THE CONNECTIONS OF THESE WITH NUTRITIVE PLANTS

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Abstract

The author collected 111 Apoidea species from the area investigated. In the flood plains, the richness of the Apoidea insect populations can be attributed to the connections with nutritive plants. The species combination of the vegetation depends upon the height of the level of plain, the duration and date of flood-waves.

Introduction

The ancient character of the Tisza-valley has strongly been changed by the river control. The anthropogenous effects, the drainage of marshes resulted in the expausion of the areas to be used for agrarian purposes. The Mártély-Körtvélyes stretch of the Tisza-valley was declared a Region Conservation District by the National Nature Conservation Office, in 1971. The single units of the District serve for different aims. Körtvélyes Island is not exposed to any anthropogenous effect, it serves first of all instructional and nature-conservancy purposes. The other investigated area was Tőserdő, a large part of which is a flood-plain forest and forms one of the units

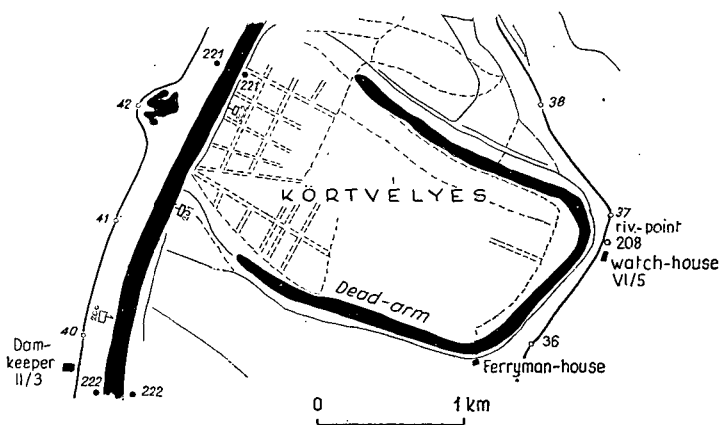


Fig. 1. Investigated area on Körtvélyes Island.

of the Kiskunság National Park as a nature conservation area. The Alpár meadow is connected with the southern part of the forest. The Alpár meadow is, in respect of its character, a wet, stagnant grassland of the flood-plain. All the three areas are exposed to periodical floods of the river Tisza although the western part of Tőserdő, lying on a higher level, is free from the flood-waves. Here shows the level even 7 to 8 m differences and in the clearings of the forest, along the ways, on the tops of sand-hills, the plants of xerophilous character appear. It was an aim of investigation, to compare the Apoidea population of these three areas, taken as a function of the connections with the nutritive plants and to analyze the composition of the Apoidea fauna, with full knowledge of the environmental factors.

Materials and Methods

I have performed 1-hour time collections in all the three investigated areas, in an annual cross-section, during the flying time of the Apoidea. Körtvélyes-Island made an exception. Here I divided the island in two zones and applied 2×1 hour time collections. Density observations were not carried out in either of the areas, the ground being unsuitable for this. The collections took place between 10–15 o'clock. In the course of observations, I have recorded the connections of Apoidea with the nutritive plants. Hymenoptera were collected with butterfly nets but only the Apoidea were elaborated.

Plant associations of the sites of collection

The plant associations of the investigated areas are known on the basis of the works of Gy. BODROGKÖZY.

I. Plant associations of the Large Meadow in Körtvélyes-Island:

1. *Alopecuretum pratensis*
2. *Garici-Typhoidetum arundinaceae*
3. *Glycerietum maximae*

In the northern part of the island, apart from the hoed plants, there have developed still three sub-associations (ANDÓ-BODROGKÖZY-MARIÁN 1974).

II. Plant associations of the Alpár meadow (BODROGKÖZY 1967):

1. *Salvio-Festucetum sulcatae*
2. *Caricetum gracilis*
3. *Carici-Menyanthetum*

III. The plant association of Tőserdő

1. *Fraxino pannonicarum-Alnetum*

The plant associations at ground level have not developed in the forest owing to the shading effect of the crown of leaves. At deeper levels on the marshy clearings, resp. in the forest along the ways we cannot speak of any developed plant associations.

Evaluation of the results of the investigation

There were collected 111 Apoidea species from the areas investigated. From among these 58 were collected on Körtvélyes-Island, 49 in Alpár meadow, and 69 in Tőserdő. In the list of species (Table I) the faunistically rare species are enumerated. There are ranked as such rare species in the Carpathian basin the *Macropis labiata* F. collected on Körtvélyes Island, as well as *Andrena argentata* SM. (MÓCZÁR, L.-WARNCKE, K. 1972), *Ammobates vinctus* GERST., *Epeolus fasciatus* FRIESE, and *Epeoloides coecutiens* F., occurring in the Alpár meadow.

It is proved by climatological investigations that the temperature of flood-plain clearings is higher than that of the adjacent areas of the Great Plain (ANDÓ 1959). It may be imagined that the large number of the thermophilous species in the areas investigated can be explained, in some degree, also with this (Table 3). At the evaluation of the ecological distribution of species, in all the three areas, the thermophilous species and those of large ecological amplitude amount to more than 3/4 part of the Apoidea population.

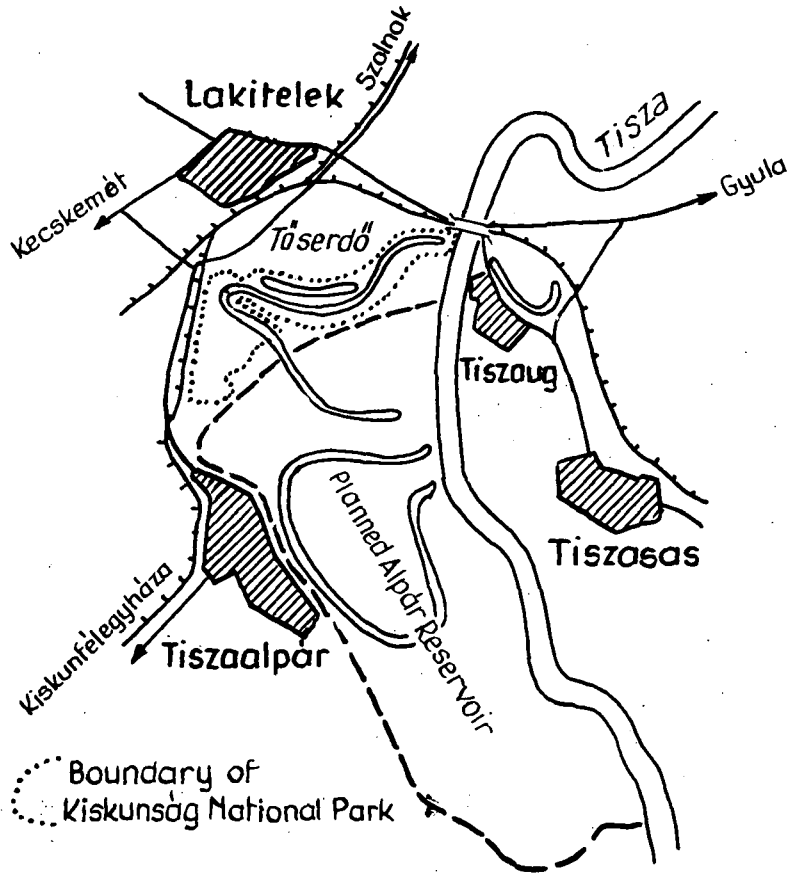


Fig. 2. Map of the area investigated (Alpár meadow, Tőserdő).

The number of Apoidea species occurring in the area of collection is closely connected with the richness of vegetation, resp., to a certain extent, with the number of the collecting days. The richness of vegetation is a function of the dates and lastings of flood-waves. The species number of the Apoidea insect population is directly proportional to the richness of the vegetation depending on the flood-waves. In the time of the spring flowering aspect, Körtvélyes Island was covered by flood-waves in 1975, 1976, and 1977. the genera of the early spring and early summer osmia and Eucera are, therefore, completely missing from the fauna. The level of the Alpár

Table 1. *Apoidea species of the sites investigated*

Species	Körtvélyes Island (1)		Alpár meadow (2)		Töserdő (3)	
	♀	♂	♀	♂	♀	♂
	1.	2.	3.	4.	5.	6.
<i>Prosopis cornuta</i> SM.	+					
<i>P. annularis</i> K.	+					
<i>P. angustata</i> SCHCK.	+	+				
<i>P. gracilicornis</i> MOR.		+				
<i>P. brevicornis</i> NYL.	+					
<i>P. gibba</i> SAUND.		+			+	
<i>P. euryscapa</i> FÖRST.		+				
<i>P. confusa</i> NYL.						+
<i>P. communis</i> NYL.				+	+	+
<i>Colletes daviesanus</i> SM.			+	+	+	+
<i>Melitta tricincta</i> K.	+	+			+	+
<i>M. nigricans</i> ALFKEN	+	+		+	+	+
<i>M. leporina</i> Pz.				+		+
<i>Macropis fulvipes</i> F.			+			
<i>M. labiata</i> F.		+				
<i>Dasygoda plumipes</i> Pz.	+			+	+	+
<i>Andrena seminuda</i> F.			+			
<i>A. falsifica</i> PERK.			+		+	
<i>A. labiata</i> F.			+	+		
<i>A. limata</i> SM.			+			
<i>A. haemorrhoea</i> F.			+			
<i>A. hypopolia</i> SM.			+			
<i>A. argentata</i> SM.			+			
<i>A. helvola</i> L.			+			
<i>A. flavipes</i> Pz.	+	+	+	+		
<i>A. labialis</i> K.				+	+	
<i>A. ovatula</i> K.	+	+	+		+	+
<i>A. cordialis</i> MOR.	+					
<i>A. tibialis</i> K.	+					
<i>Nomada fucata</i> Pz.		+				
<i>N. flavopicta</i> K.	+	+				
<i>Ammobates vinctus</i> GERST.			+			
<i>Halictus simplex</i> BLÜTHG.	+	+			+	
<i>H. 4-cinctus</i> F.	+	+				
<i>H. veneticus</i> EBMER	+	+				
<i>H. maculatus</i> SM.	+	+			+	
<i>H. eurygnathus</i> BLÜTHG.	+	+				
<i>H. subauratus</i> (ROSSI)	+	+	+	+	+	+
<i>H. perkinsi</i> BLÜTHG.	+		+		+	
<i>H. kessleri</i> BRAMS.	+					
<i>H. geminatus</i> PÉREZ	+					
<i>Lasioglossum leucozonium</i> (SCHCK.)	+					+
<i>L. morbillosum</i> (KRIECHB.)	+					
<i>L. zonulum</i> (SM.)					+	
<i>L. 4-notatum</i> (SCHCK.)	+	+				
<i>L. punctatissimum</i> (SCHCK.)		+				
<i>L. puncticolle</i> (MOR.)		+				
<i>L. nitidiusculum</i> (K.)		+				
<i>L. malachurum</i> (K.)	+	+			+	+
<i>L. calceatum</i> (SCOP.)	+		+			+
<i>L. albipes</i> (F.)	+		+			
<i>L. villosulum</i> (K.)	+					
<i>L. nigripes</i> (LEP.)		+				

<i>L. laticeps</i> (SCHCK.)									+																						
<i>Rhopitoides canus</i> EV.										+																					
<i>Megachilis ericetorum</i> LEP.											+																				
<i>M. willoughbiella</i> K.												+																			
<i>M. centuncularis</i> L.													+																		
<i>M. argentata</i> F.														+																	
<i>M. rotundata</i> F.															+																
<i>M. melanopyga</i> COSTA																+															
<i>M. rubrimana</i> MOR.																	+														
<i>M. pilidens</i> ALFKEN																		+													
<i>Lythurgus chrysurus</i> FONSC.																			+												
<i>Osmia aenea</i> L.																				+											
<i>O. bicolor</i> SCHRK.																					+										
<i>O. aurulenta</i> PZ.																						+									
<i>O. rufa</i> L.																							+								
<i>O. atrocoerulea</i> SCHILL.																								+							
<i>O. spinulosa</i> K.																									+						
<i>Eriades maxillosus</i> L.																										+					
<i>E. emarginatus</i> NYL.																											+				
<i>E. truncorum</i> L.																												+			
<i>E. crenulatus</i> NYL.																													+		
<i>Anthidium strigatum</i> PZ.																													+		
<i>A. florentinum</i> F.																														+	
<i>A. tenellum</i> MOCS.																														+	
<i>A. lituratum</i> PZ.																															+
<i>A. manicatum</i> L.																															+
<i>Coelioxys elongata</i> LEP.																															+
<i>C. acuminata</i> NYL.																															+
<i>C. rufocaudata</i> SM.																															+
<i>C. brevis</i> EV.																															+
<i>C. aurolimbata</i> FÖRST.																															+
<i>Stelis aterrima</i> PZ.																															+
<i>Tetralonia nana</i> MOR.																															+
<i>T. ruficornis</i> F.																															+
<i>T. salicariae</i> LEP.																															+
<i>Eucera nigrifacies</i> LEP.																															+
<i>E. clypeata</i> EV.																															+
<i>E. pollinosa</i> SMITH																															+
<i>E. tuberculata</i> F.																															+
<i>Anthophora crinipes</i> LEP.																															+
<i>A. furcata</i> PZ.																															+
<i>A. acervorum</i> var. <i>squalens</i> DOURS.																															+
<i>Epeolus fasciatus</i> FRIESE																															+
<i>Epeoloides coecutiens</i> F.																															+
<i>Xylocopa cyanescens</i> BRÜLLÉ																															+
<i>X. violacea</i> L.																															+
<i>Ceratina cyanea</i> K.																															+
<i>C. nigroaenea</i> GERST.																															+
<i>Bombus lucorum</i> L.																															+
<i>B. belferanus</i> SEIDL.																															+
<i>B. silvarum distinctus</i> VOGT																															+
<i>B. derhamellus</i> K.																															+
<i>B. lapidarius</i> L.																															+
<i>B. terrestris</i> L.																															+
<i>B. agrorum</i> F.																															+
<i>B. muscorum</i> F.																															+
<i>Psithyrus rupestris</i> F.																															+
<i>Apis mellifica</i> L.																															+

Table 2. Connections of the flower-visiting wild-bee population of the areas investigated

Körtvélyes Island (1)			Alpár meadow (2)			Tőserdő (3)		
Plant species	N	P	Plant species	N	P	Plant species	N	P
<i>Thalictrum flavum</i>		+	<i>Ranunculus repens</i>	++		<i>Consolida orientalis</i>	+	+
<i>Rubus caesius</i>	++		<i>Thalictrum lucidum</i>		+	<i>Ranunculus sp.</i>	++	
<i>Glycyrrhiza echinata</i>	++		<i>Potentilla reptans</i>	+	++	<i>Thalictrum lucidum</i>		+
<i>Vicia cracca</i>	++	+	<i>P. anserina</i>	+	++	<i>Rubus caesius</i>	++	
<i>Lythrum salicaria</i>	++	+	<i>Medicago lupulina</i>	++	+	<i>Trifolium aureum</i>	++	+
<i>L. virgatum</i>	++	+	<i>Trifolium hybridum</i>	++	+	<i>T. repens</i>	++	+
<i>Euphorbia lucida</i>	++		<i>T. pratense</i>	++	+	<i>Tetragonolobus siliquosus</i>	++	+
<i>Symphytum officinale</i>	++	+	<i>Lotus corniculatus</i>	++	+	<i>Lotus corniculatus</i>	++	+
<i>Prunella vulgaris</i>	++	+	<i>Coronilla varia</i>		++	<i>Coronilla varia</i>		++
<i>Stachys sp.</i>	++	+	<i>Vicia cracca</i>	++	+	<i>Vicia faba</i>	++	+
<i>Mentha aquatica</i>	++	+	<i>Euphorbia lucida</i>	++		<i>V. cracca</i>	++	+
<i>Matricaria inodora</i>	+	++	<i>Lythrum salicaria</i>	++	+	<i>V. villosa</i>	++	+
<i>Chrysanthemum vulgare</i>		++	<i>L. virgatum</i>	++	+	<i>Lythrum salicaria</i>	++	+
<i>Inula britannica</i>	+	++	<i>Calystegia sepium</i>	+		<i>L. virgatum</i>	++	+
<i>Crepis sp.</i>	+	++	<i>Symphytum officinale</i>	++	+	<i>Galium verum</i>	++	+
<i>Lysimachia nummularia</i>		+	<i>Prunella vulgaris</i>	++	+	<i>Asclepias syriaca</i>	++	+
			<i>Stachys palustris</i>	++	+	<i>Glycyrrhiza echinata</i>	++	
			<i>Mentha aquatica</i>	++	+	<i>Daucus carota</i>	+	
			<i>M. arvensis</i>	++	+	<i>Symphytum officinale</i>	++	+
			<i>M. pulegium</i>	++	+	<i>Knautia arvensis</i>	+	+
			<i>Plantago major</i>		+	<i>Scabiosa ochroleuca</i>	+	++
			<i>Matricaria inodora</i>	+	++	<i>Althaea officinalis</i>	+	++
			<i>Taraxacum officinale</i>	+	++	<i>Malva silvestris</i>	+	+
			<i>Lysimachia nummularia</i>		+	<i>Euphorbia lucida</i>	++	
			<i>L. vulgaris</i>		+	<i>Echium vulgare</i>	++	
			<i>Inula britannica</i>	+	++	<i>Verbena officinalis</i>	+	
						<i>Glechoma hederacum</i>	++	+
						<i>Prunella vulgaris</i>	++	+
						<i>Lamium purpureum</i>	++	+
						<i>Ballota nigra</i>	++	
						<i>Linaria vulgaris</i>	++	+
						<i>Rorippa silvestris</i>	+	++
						<i>Stenactis annua</i>	+	++
						<i>Erigeron canadensis</i>		+
						<i>Inula britannica</i>	+	++
						<i>Matricaria inodora</i>	+	++

<i>Chrysanthemum vulgare</i>		++
<i>Carduus acanthoides</i>	++	+
<i>C. nutans</i>	++	+
<i>Cirsium canum</i>	++	+
<i>Centaurea sp.</i>	++	+
<i>Cichorium intybus</i>	++	+
<i>Crepis sp.</i>		+
<i>Melandrium album</i>	+	+
<i>Chenopodium album</i>		+
<i>Muscari racemosum</i>	++	

Note: N=nectar, P=pollen. The comparatively more nectar, resp. pollen production is marked by ++.

meadow is higher than the area mentioned above. Thus the water mass is smaller in the time of flood-waves and passes sooner. The vegetation sooner regenerates than on the deeper lying Körtvélyes Island. From the area surveyed at Tóserdő only the parts bordering on the Alpár meadow were covered with water in the time of flood-waves. Here means the vegetation in annual cross-section a continuous pollen and nectar source for Apoidea. From the point of view of the connection of Apoidea with nutritive plants, the vegetation is here the richest (Table 2). The connections with nutritive plants are the primary determinants of the formation of the Apoidea fauna. In the higher lying flood-plain areas, getting not under water-covering, the bulk of the flower-visiting insect population is represented in Spring by the species of the *Andrena*, *Halictus*, *Osmia*, *Anthophora*, and *Bombus* genera. The melliferous weeds of the *Taraxacum officinale* and Labiate families have served for nutritive sources. Such plants are: *Lamium purpureum* and *Glechoma hederacum*. Particularly the individuals of *Bombus agrorum* F. visited these two plant species with a special predilection at Tóserdő in Spring. Apart from labiates, the papilionaceae are very good melliferous plants (HALMÁGYI-KERESZTESI 1975). The *Vicia* species, having extrafloral nectar glands, as well, serve first of all as nectar sources for Apoidea in May and June. At Tóserdő, *Vicia cracca* and *V. villosa* served as a rich nectar source for the individuals of *Eucera clypeata* Ev., *E. nigrifacies* LEP., *E. pollinosa* SMITH. The

Table 3. Evaluation of the flower-visiting Apoidea population, according to ecological types of distribution

	Körtvélyes Island (1)		Alpár meadow (2)		Tóserdő (3)	
	species	percent	species	percent	species	percent
Thermo- and xerophilous	22	37.93	20	40.82	31	44.93
Indifferent	23	39.66	18	36.73	23	33.33
Hygro- and psychrophilous	10	17.24	6	12.24	14	20.29
Not evaluated	3	5.17	5	10.21	1	1.45
Sum total	58	100.00	49	100.00	69	100.00

flowers of *Vicia faba* were visited by the *Xylocopa* species. In the flood-plains, *Vicia cracca* began flowering after the passing of flood-waves, in midsummer. Its flowers were visited in the Alpár meadow by the individuals of *Eucera clypeata*. In midsummer, in the flood-plains, apart from the *Lythrum* species, the Compositae species, giving mostly but little nectar, represent a considerable part of vegetation. The Compositae — apart from some melliferous species, like *Carduus nutans*, *C. acanthoides*, exerting an attractive effect on the *Halictus* and *Lasioglossum* species — first of all produce pollen (GULYÁS-PESTI 1966). At Tóserdő, the *Halictus* and *Lasioglossum* species were attracted by the *Carduus* species. In the Alpár meadow and on Körtvélyes Island, the *Crepis* species and *Matricaria inodora* were visited by the individuals of *Halictus subauratus* (ROSSI), *H. perkinsi* BLÜTHG. On Körtvélyes Island and in the Alpár meadow, at the deeper levels, the melliferous *Lythrum* species serve to the *Melitta nigricans* ALFKEN, *M. tricincta* K., *Tetralonia salicariae* LEP. species for a pollen and nectar source in July and August. In this time, in the flood-plains, the best melliferous plants of the area, *Symphytum officinale* and *Vicia cracca* form bushes.

In midsummer, in the flood-plains, 80 to 90 percent of the pollen and nectar production is supplied by the *Lythrum* and *Compositae* species for Apoidea. At the end of September, owing to the considerable decrease in food, there flew only the *Bombus* species of long flying radius and of considerable metabolic process, as well as their parasites and a few *Halictus* and *Lasioglossum* species.

In the Alpár meadow and first of all on Körtvélyes Island, because of the flood-waves, and depending on the level, no richer vegetation developed. The water-cover and silting up of 2 to 4 m is tolerated but by few plants. The vegetation generally regenerates in 3 to 5 weeks. The species combination of vegetation is the most poor on Körtvélyes Island having the deepest level (Table 2). The vegetation is the most varied from among the areas investigated at Tőserdő, with the highest level. The Apoidea fauna is here the richest in species.

In the course of the flower-visiting observations, a contradiction appeared between the nectar production of some plant species and the flower-visitation of Apoidea. The *Melandrium album* is melliferous, what is confirmed by literary data, as well. The Apoidea visit it, on the other hand, according to my observations, hardly, because the nectar is sucked out by the nocturnal moths. *Linaria vulgaris* is melliferous but the corolla close to the nectarium is gnawed out by the *Bombus terrestris* workers and thus the secondary nectar-predatory honey-bee can get nectar through the corolla gnawed through. The *Mentha* species are visited by honey-bees with great predilection. Its nectar-secretion is great, its sugar content is, however, low. The plants of the *Compositae* family produce first of all pollen. The *Prosopis* species visited, according to my observations, first of all the flowers of *Inula britannica*, *Matricaria inodora* bringing little nectar. Here they stayed for a rather long time. These Apoidea swallow down pollen, having no organ for collecting (MÓCZÁR 1960). The flowers of *Coronilla varia* are visited by the *Andrena*, *Halictus*, *Lasioglossum* species. They collect pollen because they have no nectar gland.

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Az Alsó-Tisza folyamszakasz védett hullámtéri területei méhalkatú rovarnépességük és tápnövény kapcsolataik

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Kivonat

A megvizsgált területről 111 méhalkatú fajt gyűjtött be a szerző. A hullámtereken a méhalkatú rovarnépességek fajgazdagsága a tápnövénykapcsolatokra vezethető vissza. A vegetáció fajkombinációja a térszint magasságtól, valamint az árhullámok elhúzóásától, illetve időpontjától függ.

Zavisnost izmedju populacija Apidae i biljki hraniteljki na plavnom području donjeg toka reke Tise

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Abstract

Sa ispitivanog područja autor je prikupio 111 vrsta Apidae. Na plavnim područjima bogatstvo vrsta populacija Apidae zavisi od biljki hraniteljki. Kombinacija vrsta u odnosu na sastav vegetacije zavisi od nivoa biotopa, kao i od vremena prestanka plavljenja.

Пчелообразные насекомые, их связь с питающими растениями на пойменных защищённых территориях нижнего течения Тисы

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Резюме

С исследуемой территории автору удалось собрать 111 видов пчелообразного типа. Большая видовая разнообразность пчелообразных насекомых на поймах связана с их отношением к питающим растениям. Видовая комбинация вегетации зависит от высоты рельефа, от времени и продолжительности павоков.