

Faunistical and ecological observations
on the Orthoptera fauna of the Hungarian Plain

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Abstract

The author is publishing some data in the framework of his systematic investigations performed since 1963 concerning *Orthoptera* fauna / G a u s z 1966, G a l l é, Jr.- G a u s z 1968, G a u s z 1969/, about the faunistical and coenological picture of the Tisza basin, belonging to the Crisicum, with regard to the *Orthoptera* fauna. Apart from detailed collections, anyway, he has carried out a great number of minor investigations of similar nature, as well. In this work his unpublished faunistical, resp. coenological data are analysed. It is to be mentioned that a part of data do not refer immediately to the Tisza basin. But the fauna of the sandy and sodic areas that are fundamentally characteristic of the Great Hungarian Plain is a special one; therefore, it is advisable to compare it with the biotops of inundation areas. The collecting stations and dates in this work are as follows: Tiszakarád 1964, VII; Vesszős 1966, VIII; Porgány 1966, IX; Tiszakürt 1966, VIII; and from the biotops lying not in the Tisza basin: Ásotthalom 1969, IX; Pehérető 1964, VIII.

Methods

In the collections carried out till 1965, the collection of the fauna took place generally by means of sweeping net applied for some time, similarly to G a u s e ' s /1930/ procedure. Later on, at the collections I have substituted for that a definite number of net strokes and singlings combined with this, according to D i v e r and D i v e r ' s /1933/ method. In some biotops covered with low vegetation, however, I have got on with applying a so-called "time-collection". This raises, of course, difficulties in comparing the collectings carried out with two different methods: although after collecting in the homogeneous grass substance with both methods I have got the result that a grass sweeping performed for an hour is quantitatively analogous with 400 sweeping-net strokes /net emptied after five strokes/. The *Tettigoniidae* species were, at any rate, to be singled in every case. At the collecting stations of Porgány and Vesszős, every collectings gives the average of collecting three times with 5-day intervals, and it is better not to take into consideration, only to indicate at the calculation of dominance the species that occur only in one collecting.

The coenological evaluation of biotops

1. T i s z a k a r á d . The wood of the inundation area belongs to the *Salicetum albae fragillis* I s s l e r association. The *Carpinus* and *Alnus* woodlands of the Northern Tisza regions are missing, the *Juglans* woodlands, however, are frequent. Collecting in two biotops.

a. *Alopecuretum pratensis caricetosum melanostachyae* Soó /57/ association. Cover 100 per cent, vegetation-height changes between broad limits, 5-10-15-/-30-40/cm. The bioton of ecotone type has an extremely high number of species and specimens. The *Saltatoria* populations / U v a r o v 1957, K e y 1950/ are generally favourably influenced by the presence of mosaic vegetation, as observed also here. Faunistically there are remarkable the *St. lineatus* P a n z., demonstrated from the Hungarian Plain first by N a g y /1953/, and the *Chrysochraon dispar* G e r., a typical marshland species. The dominant species of the population are hygrophylous-mesophylous elements.

Ec. type	Area	Species	Np.	D p.c.
Mes.	Eu.-Sib.	<i>Phaneroptera falcata</i>	3	3,1
Hyp.	Cent.-Eu.	<i>Leptophyes albovittata</i>	13	13,5
Hyg.	Palaearc.	<i>Conocephalus fuscus</i>	4	4,2
Mes.	Palaearc.	<i>Tettigonia viridissima</i>	2	2,1
Xer.	Eu.-Sib.	<i>Bicolorana bicolor</i>	1	1,1 /1
Xer.	Palaearc.	<i>Calliptamus italicus</i>	8	8,3
Xer.	Palaearc.	<i>Oedipoda coerulecens</i>	6	6,2
Hyg.	Eu.-Sib.	<i>Chrysochraon dispar</i>	2	2,1
Mes.	East.Eu.	<i>Stenobothrus crassipes</i>	12	12,5
Hyg.	Eu.-Sib.	<i>Stenobothrus lineatus</i>	2	2,1
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	10	10,4
Hyg.	Palaearc.	<i>Chorthippus albomarginatus</i>	22	22,9
Hyg.	Palaearc.	<i>Chorthippus dorsatus</i>	6	6,2

b. *Consolido orientali - Stachyetum annuae* /S o ó 47/ T i m á r 57 association is a weed association between the dam and plough-land. The vegetation is high, here and there as high as 60 cm and the cover is 95 p.c. The quantitative conditions of *Orthoptera* are influenced unfavourably by that, as alleged by C i l a r k /1967/, as well. The occurrence of *Pholidoptera aptera aptera* F a b r. is interesting as it is a species of mountain character and, supposedly, the Bodrop basin has had a role in its presence here.

Ec. type	Area	Species	No.	D p.c.
Mes.	Eu.-Sib.	<i>Phaneroptera falcata</i>	5	6,1
Hyg.	Centr.Eu.	<i>Leptophyes albovittata</i>	9	11,0
Hyg.	Palaearc.	<i>Conocephalus fuscus</i>	6	7,3
Hyg.	Eu.-Sib.	<i>Roeseliana roeselii</i>	3	3,7
Xer.	Palaearc.	<i>Oedipoda coerulecens</i>	1	1,2
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	15	18,3
Hyg.	Palaearc.	<i>Chorthippus albomarginatus</i>	29	35,4
Hyg.	Palaearc.	<i>Chorthippus dorsatus</i>	14	17,1

2. T i s z a k ű r t . Collecting was only in a single bioton, on a dry damside with vegetation of moderate height. *Cynodonti-Poëtum angustifoliae* / R a p a i c s 26/ S o ő 57 association, height of vegetation 5-7-10 /-20/ cm, cover 90-95 p.c. Even among the species of the association there are several xerophilous components as, e.g., the *Acrida hungarica* H e r b s t , *Omocestus ventralis* Z e t t . , *Aiolopus thalassinus* F a h r . and the psammophilous *Stenobothrus nigromaculatus* H. - S .

From the considerable components of the population, *Pezotettix giornae* R o s s i played a considerable role in the biotons of the Lower-Tisza region between 1964 and 1966 but in the collectings of 1969 its number is already moderate. For explaining this multiplication and the following regression, we had to know more the fluctuation of the single climatic factors in the given aspect. Periodic fluctuations like these can be induced by inundations and the amount of precipitation, by increasing the mortality of the specimens in the state after the diapause. These effects concern, however, not only single species but the entire insect population of the given area.

Ec. type	Area	Species	No.	D	p.c.
Hyg.	Palearc.	<i>Tettix subulata</i>	6		6,1
Hyg.	Palearc.	<i>Tettix tenuicornis</i>	5		5,1
Xer.	Med.	<i>Pezotettix giornae</i>	16		16,3
Xer.	Med.	<i>Aiolopus thalassinus</i>	1		1,0
Xer.	Cent.Eu.	<i>Acrida hungarica</i>	2		2,0
Mes.	East.Eu.	<i>Stenobothrus crassipes</i>	7		7,1
Xer.	Ponto-Med.	<i>Stenobothrus nigromaculatus</i>	3		3,1
Xer.	Palearc.	<i>Omocestus ventralis</i>	3		3,1
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	9		9,2
Hyg.	Palearc.	<i>Chorthippus dorsatus</i>	18		18,4
Mes.	Eu.-Sib.	<i>Chorthippus longicornis</i>	4		4,1
Mes.	Cent.-Eu.	<i>Euchorthippus declivus</i>	24		24,5

3. V e s s z ő s . In the collectings carried out vertically in the typical inundation bioton at the right bank of the Tisza, along the dam-side, I have delimited artificially six collecting areas. Although the single collections cannot be dealt with as independent biotons, nevertheless some differences can be demonstrated.

a. It is the ecotone between the *Salicetum albaefragillis* I s s i e r 26. in the inundation area and *Alopecuretum pratensis ranunculetosum acris* S o ő 57 on the dam-side. The *Orthoptera* fauna is insignificant.

Ec. type	Area	Species	No.	D	p.c.
Hyg.	Palearc.	<i>Conocephalus fuscus</i>	1		25,0
Hyg.	Ponto-Med.	<i>Pteronemobius heydeni</i>	2		50,0
Hyg.	Palearc.	<i>Chorthippus albomarginatus</i>	1		25,0

b. The vegetation on the dam-side of inundation area is a mixture of the association of *Alopecuretum pratensis ranunculetosum acris* and *Alopecuretum pratensis normale*, B o d r o g k ō z y 62. The height of vegetation is 3-5-10 / 15-30/cm, cover 90-95 p.c. It is the area mostly exposed to spring inundations. As a result of that, and of the S.E.-exposition, the vegetation is rarer and that is expressed in the Orthoptera fauna, as well, by the decrease of the dominance of the hygrophilous *Chorthippus* species. *Glyptobothrus biguttulus* L. appears as a considerable population component, as well.

Ec. type.	Area	Species	No.	D	p.c.
Xer.	Ponto-Med.	<i>Acheta desertus</i>	1		1,4
Hyg.	Palearc.	<i>Tetrix subulata</i>	13		18,9
Xer.	Med.	<i>Pezotettix giornae</i>	12		17,4
Xer.	Cent. Eu.	<i>Acrida hungarica</i>	1		1,4
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	15		21,7
Xer.	Palearc.	<i>Omocestus ventralis</i>	2		2,9
Xer.	Palearc.	<i>Glyptobothrus biguttulus</i>	9		13,1
Hyg.	Palearc.	<i>Chorthippus albomarginatus</i>	4		5,8
Hyg.	Palearc.	<i>Chorthippus dorsatus</i>	5		7,3
Mes.	Cent. Eu.	<i>Euchorthippus declivus</i>	7		10,1

c. *Schlerochloo-Polygonetum avicular* / G a m s 27/ S o ō 40. on the dam-top and in its immediate zone is not suitable to sustain a stable Orthoptera population. The height of vegetation is 3-5 cm, the cover interrupted, sometimes with plant-free plots. The species-combination is yet characteristic as it is a favourite dwelling place of a considerable part of geophilous species. The dominance of the mesophilous-hygrophilous elements is low.

Ec. type.	Area	Species	No.	D	p.c.
Hyg.	Eu.-Sib.	<i>Roeseliana roeselii</i>	5		9,6
Xer.	Ponto-Med.	<i>Acheta desertus</i>	1		1,9
Xer.	Med.	<i>Pezotettix giornae</i>	22		41,7
Xer.	Palearc.	<i>Omocestus ventralis</i>	2		3,7
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	3		5,6
Xer.	South Eu.	<i>Omocestus petraeus</i>	1		1,9
Xer.	Palearc.	<i>Glyptobothrus brunneus</i>	6		11,3
Xer.	Palearc.	<i>Glyptobothrus biguttulus</i>	4		7,5
Hyg.	Palearc.	<i>Chorthippus albomarginatus</i>	3		5,6
Hyg.	Palearc.	<i>Chorthippus dorsatus</i>	3		5,6
Mes.	Cent.-Eu.	<i>Euchorthippus declivus</i>	5		5,6

d. *Alopecuretum pratensis cynodontetosum*. B o d r o g k ō z y , 62. Plant height is 5-10-15 / 20-40/ cm, cover 100 p.c. The most typical orthopterous population along the Tisza, with high dominance of hygrophilous-mesophilous elements. The decrease of the specimen number of *Pezotettix giornae* R o s s i is connected with the more limited amount of its nutritive, *Salvia pratensis*.

Ec. type	Area	Species	No. D	p.c.
Mes.	Eu.-Sib.	<i>Phaneroptera falcata</i>	1	1,6
Hyg.	Eu.-Sib.	<i>Roeseliana roeselii</i>	1	1,6
Hyg.	Palaearc.	<i>Tetrix subulata</i>	2	3,3
Hyg.	Palaearc.	<i>Tetrix tenuicornis</i>	1	1,6
Xer.	Med.	<i>Pezotettix giornae</i>	3	4,9
Xer.	Palaearc.	<i>Omocestus ventralis</i>	1	1,6
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	5	8,3
Xer.	Palaearc.	<i>Glyptobothrus biguttulus</i>	3	4,9
Hyg.	Palaearc.	<i>Chorthippus albomarginatus</i>	9	14,6
Hyg.	Palaearc.	<i>Chorthippus dorsatus</i>	27	44,6
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	7	10,1

e. It is a population identical with the former one, the height and frequency of vegetation decreases, but it is more shaded. The spots of rare vegetation on the place of haystacks form a special micro-biotop, first of all with *Euchorthippus declivus* Bris. population. The average frequency of specimens is low if compared with the former collectings.

Ec. type	Area	Species	No. D	p.c.
Hyg.	Eu.-Sib.	<i>Roeseliana roeselii</i>	2	3,4
Hyg.	Palaearc.	<i>Tetrix subulata</i>	3	5,1
Xer.	Med.	<i>Pezotettix giornae</i>	25	41,5
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	2	3,4
Xer.	Palaearc.	<i>Glyptobothrus biguttulus</i>	1	1,8
Hyg.	Palaearc.	<i>Chorthippus albomarginatus</i>	12	19,9
Hyg.	Palaearc.	<i>Chorthippus dorsatus</i>	7	11,6
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	8	13,3

f. *Echinochloa-Chenopodietum polyspermi* / U b r i z s n y 49/
association on a ditch-side along a plough-land, vegetation height being 3-5-10-/-25/ cm, cover 90-95 p.c. Owing to a rather humid environment, the development of micro climate is favourable for hygrophylous species while the dominance of the mesophilous species is decreasing.

Ec. type	Area	Species	No. D	p.c.
Hyg.	South Eu.	<i>Homorocoryphus nitidulus</i>	3	6,8
Hyg.	Palaearc.	<i>Tetrix subulata</i>	7	15,8
Hyg.	Palaearc.	<i>Tetrix tenuicornis</i>	1	2,3
Xer.	Med.	<i>Pezotettix giornae</i>	21	47,7
Xer.	Palaearc.	<i>Omocestus ventralis</i>	1	2,3
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	2	4,5
Xer.	Palaearc.	<i>Glyptobothrus biguttulus</i>	+	
Hyg.	Palaearc.	<i>Chorthippus albomarginatus</i>	5	11,4
Hyg.	Palaearc.	<i>Chorthippus dorsatus</i>	+	
Mes.	Eu.-Sib.	<i>Chorthippus longicornis</i>	1	2,3
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	3	6,9

4. P o r g á n y . At the left bank of Tisza, opposite to the former collecting station, a broader inundation area takes place. The higher part of dam-side lying on its ploughland side, is of deeper site, being eater-covered frequently even in July. The soil is of somewhat looser structure and richer in sand-fraction. Similarly to the former collecting station, we have distinguished here, too, sic stations and not biotops.

a. It is a rather humid biotop in the inundation area with *Alopecuretum pratensis poëtosum angustifoliae* /E g g l e r 59/ association, the height of vegetation being 3-5-10 cm, cover 100 p.c. The *Orthoptera* fauna is poor without forming a stable population.

Ec.type	Area	Species	No.	D.	p.c.
Hyg.	South Eu.	<i>Homorocoryphus nitidulus</i>	1		3,7
Hyg.	Palearc.	<i>Tetrix subulata</i>	2		7,4
Xer.	Med.	<i>Pezotettix giornae</i>	14		51,6
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	8		29,6
Xer.	Palearc.	<i>Glyptobothrus biguttulus</i>	2		7,4
Hyg.	Palearc.	<i>Chorthippus dorsatus</i>	+		

b. It is a plant association conform to the former one, with similar height and cover conditions. On the sides of cross-dams leading into the inundation area different *Orthoptera* populations have developed as a result of the changing exposition. The role of xerophilous-mesophilous elements is increasing /*Euchorthippus declivus* B r i s ., *Glyptobothrus biguttulos* L./

Ec.type	Area	Species	No.	D.	p.c.
Hyg.	Palearc.	<i>Tetrix subulata</i>	1		2,2
Hyg.	Palearc.	<i>Tetrix tenuicornis</i>	1		2,2
Xer.	Med.	<i>Pezotettix giornae</i>	20		43,4
Xer.	Palearc.	<i>Omocestus ventralis</i>	4		8,7
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	12		28,1
Xer.	Palearc.	<i>Glyptobothrus biguttulus</i>	2		4,3
Hyg.	Palearc.	<i>Chorthippus dorsatus</i>	2		4,3
Mes.	Cent.Eu.	<i>Euchorthippus</i>	4		8,7

c. On the top of dam, similarly to the biotop at Vesszős, there is here, too, the *Schlerochloo-Polygonetum avicularis* association. The *Saltoria* population is formed mostly by mesophilous species. From the inundation biotops we could discover only here *Stenobothrus stigmaticus* Ramb.

Ec. type	Area	Species	No.	D p.c.
Hyg.	Palearc.	<i>Tetrix subulata</i>	1	2,7
Xer.	Med.	<i>Pezotettix giornae</i>	18	48,6
Xer.	Palearc.	<i>Oedipoda coeruleescens</i>	1	2,7
Xer.	Eu.-Sib.	<i>Stenobothrus stigmaticus</i>	+	
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	13	35,1
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	4	10,8

d. On the dam section lying on the side towards the protected inundation area, we have found, besides *Alopecuretum pratensis*, the *Hordeetum murini* association, as well, the vegetation is somewhat higher, the soil less impermeable, cover 90-95 p.c. The dominance of the strongly xerophilous *Glyptobothrus brunneus* Thurnb. is increasing, and also *Acrida hungarica* Herbst can be found. The shading effect of brushwood-heaps enables a special microclimate to be developed being for *Homorocoryphus nitidulus* Scop.

Ec. type	Area	Species	No.	D p.c.
Hyg.	South Eu.	<i>Homorocoryphus nitidulus</i>	1	2,7
Xer.	Med.	<i>Pezotettix giornae</i>	7	18,9
Xer.	Palearc.	<i>Oedipoda coeruleescens</i>	2	5,4
Xer.	Cent.Eu.	<i>Acrida hungarica</i>	3	8,1
Xer.	Palearc.	<i>Glyptobothrus brunneus</i>	8	21,6
Xer.	Palearc.	<i>Glyptobothrus biguttulus</i>	+	
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	15	40,5
Mes.	Cent.Bu.	<i>Euchorthippus declivus</i>	1	2,7

e. The plant association of the lower regions of dam-side can only be determined with difficulty, it is a variety of the former association strongly overrun with weeds. In this way, also the height conditions are variable, the cover is 90-95 p.c. In the fauna, the number of hygrophilous elements is growing.

Ec. type	Area	Species	No.	D p.c.
Hyg.	Eu.-Sib.	<i>Pezotettix giornae</i>	11	21,6
Xer.	Med.	<i>Acrida hungarica</i>	+	
Xer.	Cent.-Eu.	<i>Stenobothrus fischeri</i>	2	4,0
Xer.	Palearc.	<i>Omocestus ventralis</i>	6	11,7
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	20	39,2
Xer.	Palearc.	<i>Glyptobothrus brunneus</i>	9	17,6
Hyg.	Palearc.	<i>Chorthippus dorsatus</i>	1	2,0
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	2	4,0

5. F e h é r t ó . The steppe of sodic has in floristical respect considerably changed after the fishery being established, and the original vegetation has only remained in a few places. The *Orthoptera* fauna differs in many respects from that of the biotops in the inundation area.

a. In case of *Achillea-Festucetum pseudovinae* /Magyar 28/ S o d /33/ 45 association the height of vegetation is 3-5-10 /-15/ cm, the cover 60-70 p.c., here and there with alkali spots. All the dominant species are of xerophilous character /*Aiolopus thalassinus* F a b r., *Acrida hungarica* H e r b s t., *Omocestus petraeus* B r i s ., *Glyptobothrus brunneus* T h u n b g./ From the locusts the *Gampsocleis glabra* and *Platycoleis affinis* F r i v. are rather rare,

Ec. type	Area	Species	No.	D	p.c.
Xer.	Cent.Eu.	<i>Gampsocleis glabra</i>	3		3,5
Mes.	Ponto-Med.	<i>Platycoleis affinis</i>	2		2,3
Mes.	Eu.-Sib.	<i>Decticus verrucivorus</i>	+		
Xer.	Ponto-Med.	<i>Acheta desertus</i>	2		2,3
Xer.	Palaearc.	<i>Calliptamus italicus</i>	3		3,5
Xer.	Med.	<i>Oedalcus decorus</i>	4		4,8
Xer.	Palaearc.	<i>Oedipoda coerulescens</i>	6		7,2
Xer.	Med.	<i>Aiolopus thalassinus</i>	14		16,8
Xer.	Cent.-Eu.	<i>Acrida hungarica</i>	10		11,9
Xer.	Ponto-Med.	<i>Stenobothrus nigromaculatus</i>	+		
Xer.	Palaearc.	<i>Omocestus ventralis</i>	2		3,3
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	3		3,5
Xer.	South Eu.	<i>Omocestus petraeus</i>	7		8,4
Xer.	Palaearc.	<i>Glyptobothrus brunneus</i>	18		21,5
Xer.	Eu.-Sib.	<i>Glyptobthrus mollis</i>	6		7,2
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	4		4,8

b. A strongly alkalinized biotop, lying somewhat higher than the former one, is the plant association *Camphorosmetum annuae*, /R a p a i c s 16/ S o o 33, vegetation height being 3-5 cm, cover 20-30 p.c. Compared to the former biotop, its number of species is highly decreased. Only xerophilous species can be discovered.

Ec. type	Area	Species	No.	D	p.c.
Xer.	Ponto-Med.	<i>Mantis religiosa</i>	8		17,5
Xer.	Cent.Eu.	<i>Gampsocleis glabra</i>	1		2,2
Xer.	Palaearc.	<i>Calliptamus italicus</i>	1		2,2
Xer.	Palaearc.	<i>Oedipoda coerulescens</i>	2		4,3
Xer.	Med.	<i>Aiolopus thalassinus</i>	19		41,2
Xer.	Palaearc.	<i>Omocestus ventralis</i>	2		4,3
Xer.	South Eu.	<i>Omocestus petraeus</i>	6		13,0
Xer.	Palaearc.	<i>Glyptobothrus brunneus</i>	7		15,3

c. *Astero-Agrostetum albae*, B o d r o g k 8 z y, 60., association with a changing vegetation height cover 95-100 p.c. It is wetter as compared with the former sodic biotops. That is proved by the less xerophilous fauna, with a remarkable species: *Tetrix kraussi* S a u l c y .

Ec.type	Area	Species	No.	D	p.c.
Hyg.	Palaearc.	<i>Conocephalus fuscus</i>	5		7,1
Hyg.	Palaearc.	<i>Tetrix subulata</i>	6		8,5
Xer.	Eu.-Sib.	<i>Tetrix kraussi</i>	2		2,8
Hyg.	Palaearc.	<i>Tetrix tenuicornis</i>	3		4,2
Xer.	Med.	<i>Pezotettix giornae</i>	6		8,5
Xer.	Palaearc.	<i>Calliptamus italicus</i>	3		4,2
Xer.	Med.	<i>Oedipoda decorus</i>	7		9,8
Xer.	Palaearc.	<i>Oedipoda coerulescens</i>	5		7,1
Xer.	Med.	<i>Aiolopus thalassinus</i>	4		5,6
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	12		16,9
Mes.	Cent.Eu.	<i>Euchorthippus declivus</i>	18		25,3

6. *A s o t t h a l o m*. It is the remainder of *Festuco-Quercetum roboris* association, common in the Hungarian Plain for a long time past /B o d r o g k 8 z y, 1957/, with a great lot of Mediterranean components in its vegetation. The *Orthoptera* fauna is particularly characteristic and peculiar enough as compared with those in the inundation and sodic biotops.

a. *Pinus nigra* is a planted stand, the height of trees being 50 cm, the soil is a bare sand ridge. A faunistically interesting species is *Acrotylus longipes* C h a r p ., first demonstrated from Hungary by N a g y /1959/. Similarly psammophilous but less rare species are: *Calliptamus barbarus parvus* M a r ., *Sphingonotus caeruleans* L., *Acrotylus insubricus* S c o p . *Myrmeleotettix antennatus* F i e b .

Ec.type	Area	Species	No.	D	p.c.
Xer.	Cent.Eu.	<i>Platycleis denticulata</i>	1		1,8
Xer.	Ponto-Med.	<i>Calliptamus barbarus parvus</i>	7		12,2
Xer.	Palaearc.	<i>Oedipoda coerulescens</i>	6		10,5
Xer.	Eu.	<i>Sphingonotus caeruleans</i>	3		5,3
Xer.	Med.	<i>Acrotylus insubricus</i>	15		26,3
Xer.	Ponto-Med.	<i>Acrotylus longipes</i>	11		19,3
Xer.	Cent.Eu.	<i>Acrida hungarica</i>	4		7,0
Xer.	Palaearc.	<i>Glyptobothrus brunneus</i>	3		5,3
Xer.	East.Eu.	<i>Myrmeleotettix antennatus</i>	6		10,5
Xer.	South Eu.	<i>Dociostaurus brevicollis</i>	1		1,8

b. *Festucetum vaginatae danubiale* S o d 29. association is *Stipa joannis* facies. The height of vegetation is 15-20-35 /-45/ cm, cover 90-95 p.c. The comparatively high vegetation of the wood-clearing enables the occurrence of less xerophilous species. Instead of *Euchorthippus declivus* B r i s. we can discover here *Euchorthippus pulvinatus* F. W. For the *Acrotylus* species the high cover is unfavourable and also other psammophilous species are missing, the frequency of specimens being considerably lower.

Ec. type.	Area	Species	No.	D	p.c.
Mes.	Med.	<i>Phaneroptera quadripunctata</i>	3		9,4
Xer.	Ponto-Med.	<i>Calliptamus barbarus parvus</i>	2		6,2
Xer.	Med.	<i>Acrotylus insubricus</i>	1		3,1
Xer.	Med.	<i>Aiolopus thalassinus</i>	+		
Xer.	Cent.Eu.	<i>Acrida hungarica</i>	1		3,1
Xer.	Palaearc.	<i>Omocestus ventralis</i>	3		9,4
Xer.	South Eu.	<i>Omocestus petraeus</i>	+		
Xer.	Palaearc.	<i>Glyptobothrus brunneus</i>	17		53,2
Xer.	Eu.-Sib.	<i>Glyptobothrus mollis</i>	1		3,1
Hyg.	Palaearc.	<i>Chorthippus dorsatus</i>	1		3,1
Xer.	Palaearc.	<i>Euchorthippus pulvinatus</i>	3		9,4

c. *Festucetum vaginatae danubiale*, - *salicetosum marinifoliae*.

/M a g y a r 33/ S o o 39. It is a considerably lower and scattered vegetation, the cover being 80-85 p.c. It is characteristic of the association that the species number is low and that the not expressedly psammophile xerophilous species are dominant.

Ec. type	Area	Species	No.	D	p.c.
Xer.	Med.	<i>Acrotylus insubricus</i>	2		4,8
Xer.	Ponto-Med.	<i>Stenobothrus nigromaculatus</i>	+		
Xer.	South Eu.	<i>Stenobothrus fischeri</i>	+		
Xer.	Palaearc.	<i>Omocestus ventralis</i>	10		23,7
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	2		4,8
Xer.	Palaearc.	<i>Glyptobothrus brunneus</i>	22		52,4
Xer.	Palaearc.	<i>Euchorthippus pulvinatus</i>	5		11,9
Xer.	East.Eu.	<i>Myrmeleotettix antennatus</i>	1		2,4

d. *Astragalo-Festucetum sulcatae* S o d /39/ 57 association, *Salix rosmarinifolia* facies. The height of the vegetation grown on sand-hills is 10-15-30 cm, cover 90-95 p.c. The dominance of the sand-steppe species is rather high but the number of single specimens in the association is low.

Ec. type.	Area	Species	No.	D	p. c.
Xer.	Med.	<i>Pezotettix giornae</i>	+		
Xer.	Palearc.	<i>Oedipoda coerulescens</i>	1		4,8
Xer.	Ponto-Med.	<i>Acrotylus insubricus</i>	3		13,6
Xer.	Cent. Eu.	<i>Acrida hungarica</i>	1		4,8
Mes.	Eu.-Sib.	<i>Omocestus haemorrhoidalis</i>	2		9,6
Xer.	Palearc.	<i>Glyptobothrus brunneus</i>	3		13,6
Xer.	Palearc.	<i>Euchorthippus pulvinatus</i>	3		13,6
Xer.	East Eu.	<i>Myrmeleotettix antennatus</i>	8		38,4
Xer.	South Eu.	<i>Dociostaurus brevicollis</i>	+		

Evaluation of results

At comparing the Orthoptera fauna in the investigated areas, I have followed H a r z's /1957/ ecological and biogeographic classification applied before in my works, too. As from the six collecting stations the localities Porgány and Vesszős are near to each other these taken collectively into consideration. In both Tables, the distribution of the Orthoptera fauna is given according to the number of specimens.

Distribution of species according to their ecological demands

	Tizsakarád	Tizsakürt	Vesszős +	Fehértő	Ásotthalom
			Porgány		
Hygrophilous	63,59	29,62	23,94	6,96	0,65
Mesophilous	27,19	44,88	30,86	19,38	3,27
Xerophilous	9,22	25,50	45,25	73,66	96,08

Distribution of species according to their biogeographic spectrum

	Tizsakarád	Tizsakürt	Vesszős +	Fehértő	Ásotthalom
			Porgány		
Euro-Siberian	23,47	14,28	23,38	11,43	1,96
Central-European	12,74	26,52	10,47	17,89	4,58
Palaartic	56,57	32,68	34,18	31,42	50,96
Eastern-European	6,95	7,14	-	-	9,81
Mediterranean	-	16,32	30,11	26,84	17,00
Ponto-Mediterranean	-	3,06	0,37	5,96	13,08
South-European	-	-	1,49	6,46	0,65
European	-	-	-	-	1,96

In the Tables the fundamental differences in regard to the geographical site, resp. the soil conditions of the collecting stations are made sufficiently clear. In our case the comparison is, of course, to be applied with due circumspection as we have obtained the material from the single collecting stations on the basis of biotops, resp. collectings of changing numbers. In this way, there may appear rather great differences even between areas lying comparatively near to each other. All the same, biotops like these can be compared with each other if there are between them considerable differences of distance or soil structure.

We can easily observe the progressivity concerning the biotops in the Tisza basin(advancing in N-S direction, the percentage of xerophilous species highly increases. In the sodic and sandgrass associations the role of the xerophilous species is still more important and the hygrophilous species do change with an opposite sign.

Some progressivity can be observed in the distribution according to the biogeographic spectrum, as well. That could be much more obvious if the collectings gave the picture of an identical phase in the same year. Nagy /1943/ regards the effects of aspect changes at the *Saltatoria* populations to be considerable, and also B a l o g h and L o k s a /1948/ drew a similar conclusion. The yearly changes of the single specimens of *Pezotettix giornae* R o s s i, that showed masses between 1964 and 1966 in the biotops at the Southern Tisza, at the collections in 1969 in the same area appeared to be much lower. And as it exerted a considerable influence on the percentage of the specimens of the species of Mediterranean distribution, even the number of specimens of Mediterranean distribution, that is generally much higher in the sand-grass areas, could not be manifested. For eliminating failures like these, it is absolutely necessary that the collectings take place in nearly identical periods.

Taking all these into consideration, we may establish that the percentage of the occurrence of the Ponto-Mediterranean and Mediterranean species in the Southern region of the Tisza basin and in case of the sand-grasses is much higher as compared with other biotops. To a lesser extent, the same holds in respect of the South-European species and, with an opposite sign, of the Euro-Siberian elements. In the collecting stations of the Upper-Tisza there may occur also mountain elements /*Stenobothrus lineatus* P a n z, *Bicolorana bicolor* P h i l./, The palearctic species occur generally with a considerable amount in the biotops of any type, owing to their higher ecological tolerance limit.

The collections of Vesszős and Porgány give the conditions of the *Saltatoria* populations at both banks of the river in an identical height. The cause of differences may be found in that the river deposits different sediments on the two banks. Thus, in the present case, the soil is richer at the collecting stations of the left bank. /Porgány/ in sand fraction, and at that of the right bank /Vesszős/ in silt fraction. The soil conditions exert an influence on the populations of these territories indirectly, through the vegetation.

Summary

In the course of collections in the Tisza basin, in sodic, resp. sand-grass biotops, there have been collected 2365 specimens of 47 species from six collecting stations and inside them from 22 collecting areas.

From faunistical point of view significant species are: *Bicolorana bicolor* Phil., *Platycleis denticulata* Panz., *Acrotylus longipes* Charp., *Stenobothrus lineatus* Panz., *Calliptamus barbarus parvus* Mar.

In the various biotops the following *Saltatoria* populations could be established: /1/ Ecotone of the inundation area of the Northern region of river: *Chorthippus albomarginatus* - *Leptophyes albovittata* Tiszakarád a,b/; /2/ dryer grass-land on the dam-side: *Euchorthippus declivus* - *Omocestus haemorrhoidalis* /Tiszakürt, Vesszős b, d, e, Porgány b,c,d,e, Fehértó c/; /3/ grass-land in the inundation area overrun with weeds: *Omocestus haemorrhoidalis* - *Glyptobothrus brunneus* /Vesszős c, Porgány f/ /4/ wetter grass-land in the inundation area overrun with weeds: *Homorocoryphus nitidulus* - *Tetrix subulata* /Vesszős f, Porgány a/; /5/ sodic pasture: *Glyptobothrus brunneus* - *Omocestus petraeus* - *Aiolopus thalassinus* /Fehértó a,b/; /6/ Bare sand-ridge: *Acrotylus longipes* - *Acrotylus insubricus* - *Calliptamus barbarus* /Ásotthalom a/; /7/ Needlegrass-sandgrass: *Glyptobothrus brunneus* - *Euchorthippus pulvinatus* /Ásotthalom b,c/; /8/ Half-hard sandgrass: *Myrmeleotettix antennatus* - *Acrotylus insubricus* /Ásotthalom d/.

All these populations are showing a great enough difference as compared with Nagy's /1949/ collectings in Tihany; that is, anyway, natural owing to the various biotops. However, as a result of the collectings carried out in a limited number, the results are to be received with some critique.

References

- Bodrogkőzy, Gy. /1957/: Die Vegetation der Weisspappel-Haine in dem Reservat "Emlékerdő" bei Szeged-Ásotthalom. Acta Biol. Szeged 3, 132-139.
- Balogh, J., Lóksa, I. /1948/: Quantitative biosoziologische Untersuchung der Arthropod-Welt ungarischer Sandgebiete. Arch. Biol. Hung. 2, 74-80.
- Clark, D. P. /1967/: A population study of *Phaulacridium vittatum* Sjöstr. /Acrididae/. Aust. J. Zool 15, 799-872.
- Diver, C., Diver, D. /1933/: Contributions towards a survey of the plants and animals of South Haven Peninsula, Studland Heath, Dorset, III. Orthoptera. I. Anim. Ecol. 2, 36-69.

- D e m p s t e r , J. P. /1963/: The population dynamics of grasshoppers and locusts. Biol. Rev. 38, 490-529.
- G a l l é , L., Jr. , G a u s z , J. /1968/: Data for knowledge of the entomology of the Upper-Tisza district /*Orthopteroidea* and *Formicoidea*/. Tiscia 4, 83-101.
- G a u s e , G.F. /1930/: Studies on the ecology of the *Orthoptera*. Ecology 11, 307-325.
- G a u s z , J. /1966/: Untersuchungen über die Orthopteren Fauna von Takta-köz. In: B e r e t z k , P. et al.: Kollektive Arbeit-Tiscia /Szeged/ 2, 67-83.
- G a u s z , J. /1969/: Faunistical and ecological investigations on the *Orthoptera* fauna at Kisköre /Middle-Tisza district/. - Tiscia /Szeged/ 5, in press.
- H a r z , K. /1957/: Geradflügler Mittel-Europas. - Jena, 1-489.
- K e y , K.H.L. /1950/: : A critique on the phases of locusts. - Quart. Rev. Biol. 25, 363-407.
- N a g y , B. /1943/: Adatok a Tiszántul *Orthoptera* faunájának ismeretéhez /Data to knowledge of the *Orthoptera* fauna of the region lying beyond the Tisza/. - Fol. Ent. Hung. 8, 33-44.
- N a g y , B. /1949/: Quantitative and qualitative investigation of the *Saltatoria* on the Tihany Peninsula. - Ann. Inst. Biol. Pervest. 1, 96-121.
- N a g y , B. /1953/: Bátorliget egyenesszárnyu faunája - /*Orthoptera-Saltatoria* fauna of Bátorliget/, in S z é k e s s y , V. Bátorliget élővilága /Natural history of Bátorliget/. - Budapest.
- N a g y , B. /1958/: Ökológiai és faunisztikai adatok a Kárpát medence sáskáinak ismeretéhez /Oecological and faunistical data to the knowledge of the locusts in the Carpathian basin/. Fol. Ent. Hung. 11, 218-227.
- U v a r o v , B. P. /1957/: The aridity factor in the ecology of locusts and grasshoppers of the Old World. - Arid Zone Research, Paris, UNESCO 8, 164-198.