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# FAUNISTICAL AND ECOLOGICAL INVESTIGATIONS OF ORTHOPTERA IN THE REGION OF THE MIDDLE-TISZA (KISKÖRE)

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The Tisza-valley has a peculiar position in the zoogeographic picture of the Hungarian Plain. Varga (1962) is treating separately, also in his zoogeographic classification of, the *Tisio-Crisicum* that, in his opinion, is near to the region beyond the Tisza in zoological respect. In literature the attempts are anyway frequent, to make a zoogeographic characterization of an area by using the data of *Orthoptera fauna* (Matvejev, 1951; Maran, 1960; A. Liana, 1966). The works of Gausz (1966, 1967) and Gallé and Gausz (1968) began a systematic, orthopterologic elaboration of the Tisza valley with similar aims. This paper is containing the results of investigations of the author in July 17—30. 1968.

## Geographical, climatic conditions

The collecting area takes place in the region of the Middle-Tisza in Hungary, in the district of villages Abádszalók, Kisköre and Pusztataskony. The height fo the area above sea level is 116 m. The average annual temperature is 10—11°C, with a mean temperature of —2,5°C in January and 21°C in July. The annual precipitation is 500—550 mm, of which 300 mm fall to the breeding season. The average of humidity is 60—65 percent, the dominant wind direction is N.E., S.W. The soil is adobe bound weakly: the sand fraction is considerable. The data are according to Bacsó (1959).

## Methods

The methods of the quantitative collections are contained in the paper of Gallé and Gausz (1968). In biotops, if necessary, at every collection-, there were 4×100 grass-net strokes, performed advancing in a straight line, and in the mean time the members of the family *Tettigoniidae* were collected one by one. If the direction of making way is duly changed, the repetition of collection is not necessary in the same biotop. The data enumerated in the Tables are the results of two collections.

I give the state of *Orthoptera* populations after a time-collection for one hour in the plant associations *Echinochloo-Polygonetum* and *Lolio-Potentilletum* of the inundation area, resp. in the associations

*Artemisio-Festucetum pseudovinae* and *Festuco pseudovinae-Quercetum* of the protected inundation area. The single collections are containing also the percentage of larval specimens of the biotop in question. The physiognomical evaluation is given according to Nagy (1949) and Harz (1957, 1962). The spectral distribution of fauna is applied according to Harz (1957, 1962), that of feeding types according to Gangwere (1961). Soó's work (1964) is taken for basis at denominating the plant associations.

## Characterization of biotops and coenoses

All the coenoses investigated are in a genetic connection with the vegetation along the river Tisza. Therefore, the collections took generally place according to plant associations. Sometimes, however, it was necessary to carry out separete collections even in case of identical associations if an important abiotic factor (shading, exposition) or inside the same association the structure of vegetation had changed. In the following, the single units of collection are made known.

1. Young wood planted in the inundation area. First of all young poplar wood with ruderal underwood (substance *Populus alba — Populus canadensis).* The association is *Echinochloo-Polygonetum lapathifolii chenopodietosum albi.* Coverage is changing strongly (80—85 p.c.) as well as the height of vegetation.

2. Meadow in the inundation area (meadow at Szalók).

a) *Glycyrrhizetum echinatae echinochloetosum.* Poor association, strongly grazed, fully covered; the height of vegetation is 5—8 cm.

b) *Agrostetum albae hungaricum caricetosum acutiformis.* Moorland of high vegetation in good state in case of a moderate pasturing. Coverage is full, its height being 25—35—(45) cm. Its underwood is more humid as compared with the former biotop.

c) *Caricetum gracilis Trifolium hybridum facies.* With a more heterogeneous plant height (15—25—30 cm.) than that of the former cover. The two latter associations often form a mixed substance.

3. Reedy meadow in the inundation area. *Scirpo-Phragmitetum alismetosum lanceolati.* It is an association strongly upset by grazing and a systematic reed-cut, with uncertain cover and plant height.

4. Grass-land in the inundation area. Substance of *Caricetum vulpinae* with a constant height (30—40 cm) strongly humid underwood, a cover of 90—95 p.c. It is in an immediate contiguity with the asso ciations of the wood *Salicetum albae fragilis* in the inundation area and of the border cenosis of the dam side.

5. Moist, weedy, grazing-meadov. Association *Lolio-Pontentilletum anserinae,* coverage 95—100 p.c., height 5—7—10 cm.

6. Dam side. The side towards the inundation area is generally of N.W.-exposition. It is formed by the susbstances, often mixed, of *Alopecuretum pratensis festucetosum pseudovinae* and *Alopecuretum pratensis ranunculetosum acris Rumex acetosa facies.* Heigh 5—10—15—(25) cm, with full coverage. On the side towards the plough-land there can usually be found only *Alopecuretum pratensis festucetosum*

*pseudovinae* with an undefinable complex of weed-associations *(Daucus, Silene, Erigeron, Polygonum, Xanthium).* Exposition is S.W., cover 90—95 p.c., height 5—10—15 cm. On the outer side of dams there are here and there planted oak-woods; the vegetation is here somewhat more homogeneous. Because of the great variation of dam-side conditions, the fauna was established with six collections, the details being contained in the part concerning the *Saltatoria* fauna.

7. Underwood of a coniferous wood planted in the protected inundation area, being a *Pinus nigra* substance planted supposedly in the place of an oakwood felled. On the basis of underwood, the association is *Festuco pseudovinae-Quercetum roboris,* full cover, height 5—10—25 cm. The area is highly shaded, with a sodic steppe in its neighbourhood.

8. Alkali granzing-land in the protected inundation area. *Artemisio-Festucetum pseudovinae pannonicum festucetosum pseudovinae,* height is the most frequently 3—5—10 cm, coverage 75—90 p.c., here and there with rock-spots.

## The Saltatoria associations of biotops

The collections in 15 biotops, resp. proceedings have resulted in 728 imagos and 179 larvae of 34 species. Apart from that, we collected 150 specimens or so, for establishing the qualitative relations in the single biotops. The additional data are mentioned in due places, without taking them into consideration in analysing the quantitative relations of the assocaition. We had better to use the word proceeding for the collections on the dam side, instead of biotop.

Table 1

| Ec. type | Area type | Species | No. | P. c. |
|---|---|---|---|---|
| Mes. | Eu.-Sib. | Phaneroptera falcata Poda. | 2 | 5.72 |
| Hyg. | Central Eu. | Leptophyes albovittata Koll. | 2 | 5.72 |
| Hyg. | Palearc. | Conocephalus fuscus Fabr. | 2 | 5.72 |
| Hyg. | Eu.-Sib. | Conocephalus dorsalis Latr. | 2 | 5.72 |
| Hyg. | Eu. | Pholidoptera griseoaptera Deg. | 5 | 14.30 |
| Mes. | Eu. | Ephipiggera ephipigger Fieb. | 1 | 2.86 |
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 1 | 2.86 |
| Hyg. | Eu.-Sib. | Chrysochraon dispar Germ. | 1 | 2.86 |
| Xer. | Palearc. | Glyptobothrus biguttulus L. | 4 | 11.34 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 6 | 17.16 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 2 | 5.72 |
| | | larvae | 6 | 17.16 |

1. Young wood with weedy underwood in the inundation area. They are first of all hygrophilous species, with graminivorous feeding in a low percentage. Here isn't developed any definite *Saltatoria* associaton. The significant species are: *Chrysochraon dispar* Germ. and *Ephipiggera ephipigger* Fieb. The former species is mentioned by Nagy (1953) like a moorland factor near to being annihilated in the Hungarian Plain. *Ephipiggera ephipigger* Fieb. is mainly a species in the hilly country here; altough mentioned by Móczár (1942) from the surroundings of Jászberény, its occurence in the Plain is nevertheless remarkable. On the other hand, in the Polish Plain it is considered as common by A. Liana (1966). Among the data of collections, the *Tettigonia viridissima* L. collected separately is not taking place.

2. Meadow in the inundation area.

a) The *Orthoptera* fauna of the weed association of grazing-land character is not constant, either. It is formed mainly by the associations of the surrounding high reed-grass, being therefore of strongly hygrophilous character. The percentage of larvae is corresponding to the average, the species of carnivorous feeding are missing.

Table 2

| Ec. type | Area type | Species | No. | D p,c. |
|---|---|---|---|---|
| Hyg. | Palearc. | Tetrix subulatus L. | 1 | 2.43 |
| Hyg. | Eu.-Sib. | Mecostethus grossus L. | 1 | 2.43 |
| Hyg. | Eu.-Sib. | Parapleurus alliaceus Germ. | 3 | 7.36 |
| Mes. | Eastern Eu. | Stenobothrus crassipes Charp. | 1 | 2.43 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 23 | 56.10 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 6 | 14.58 |
| | | larvae | 6 | 14.58 |

b) Moorland of moist subsoil. It is a biotop densely populated by a stable *Orthoptera* fauna, an association corresponding by and large to the species composition of the *Saltatoria* population group *Mecostethus grossus* mentioned by Nagy (1949). In Gausz's collections along the Tisza this association does not occur and its role is negligible also in the area at the Upper-Tisza (Gallé — Gausz, 1968). Aslo the hygrophilic marshland species *Conocephalus fuscus* Fabr. and *Conocephalus dorsalis* Latr. are important in the association.

c) Moorland of drier subsoil. The *Orthoptera* density is much greater than even that of the former biotop. A slight increase of the number of the mesophilous elements and the decrease of dominance of the *Conocephalus* species are characteristic of it. The amount of soil moisture and its temperature are important factors in developing the annual picture of *Orthoptera* populations; therefore, the egg deposition of hygrophilous elements is promoted by the comparatively wetter weather in that year

(Choudhouri, 1958). Anderson and Wright (1952) suppose, however, even during a single season, strong changes in the association, as a consequence of the qualitative alterations of vegetation. Changes of that type are very considerable in developing the associations of the inundation area that is labile from the climactic point of view. Because

Table 3

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Mes. | Eu.-Sib. | Phaneroptera falcata Poda. | 1 | 1.64 |
| Hyg. | Palearc. | Conocephalus fuscus Fabr. | 4 | 6.56 |
| Hyg. | Eu.-Sib. | Conocephalus dorsalis Latr. | 10 | 16.40 |
| Hyg. | Eu.-Sib. | Roeseliana roeselii Hgb. | 1 | 1.64 |
| Hyg. | Eu.-Sib. | Mecostethus grossus L. | 5 | 8.20 |
| Hyg. | Eu.-Sib. | Parapleurus alliaceus Germ. | 26 | 42.64 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 5 | 8.20 |
| | | larvae | 9 | 14.72 |

of the yearly repeated inundations, the occurence of the *Parapleurus-Mecostethus* association that is characteristic here only of the inundation area cannot be explained after all. There couldn't be demonstrated either

Table 4

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Palearc. | Conocephalus fuscus Fabr. | 2 | 1.60 |
| Hyg. | Eu.-Sib. | Roeseliana roeselii Hgb. | 1 | 0,80 |
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 2 | 1.60 |
| Hyg. | Eu.-Sib. | Mecostethus grossus L. | 13 | 10.40 |
| Hyg. | Eu.-Sib. | Parapleurus alliaceus Germ. | 17 | 13.60 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 4 | 3.20 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 52 | 41.60 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 8 | 6.40 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 10 | 8.00 |
| | | larvae | 16 | 12.80 |

of these species being present during the collections performed outside the inundation area.

3. Reedy meadow in the inundation area. The moistest biotop, its fauna is considerably poorer, the number of larvae is, on the other hand,

high enough. The species are, for the most part, in connection with the view, *Dociostaurus macroccanus* Thunbg. is interesting reappearing adjacent plant association *Caricetum gracilis*. From the faunistic point of in Hungary often only after interruptions of longer periods. It is worth while being mentioned separately that a male specimen and a female one of one of the most xerophilous *Orthoptera* species have been collected from cut reed stumps.

Table 5

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Palearc. | Conocephalus fuscus Fabr. | 4 | 8.51 |
| Hyg. | Eu.-Sib. | Conocephalus dorsalis Latr. | 9 | 19.17 |
| Hyg. | Palearc. | Tetrix subulata L. | 3 | 6.39 |
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 1 | 2.13 |
| Hyg. | Eu.-Sib. | Mecostethus grossus L. | 4 | 8.51 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 16 | 34.82 |
| Xer. | Southern Eu. | Dociostaurus maroccanus Thunbg. | 2 | 4.26 |
| | | larvae | 17 | 36.21 |

4. Grass-land in the inundation area. It is a territory of somewhat deeper site than the former biotop, being in connection with the plant associations of the dam side. The association agrees with the *Orthoptera* populations of the mean plain mesophilous-hygrophilous meadows. It is a little poorer in species but the percentage of larvae is high.

Table 6

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Central Eu. | Leptophyes albovittata Koll. | 2 | 3.56 |
| Hyg. | Palearc. | Conocephalus fuscus Fabr. | 12 | 21.46 |
| Hyg. | Eu.-Sib. | Conocephalus dorsalis Latr. | 15 | 26.80 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 3 | 5.34 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 1 | 1.78 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 4 | 7.12 |
| | | larvae | 19 | 33.94 |

5. Grazing-land in the inundation area. As compared with the former association in the inundation area, it is a biotop somewhat more xerophilous. This is proved also by the occurence of *Calliptamus italicus*

L. and *Omocestus haemorrhoidalis* Charp. The bulk of association is formed, however, also here by the hydrophilous *Chorthippus* species; the carnivorous and forbivorous elements missing almost completely.

Table 7

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Palearc. | Tetrix subulata L. | 1 | 1.33 |
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 2 | 2.66 |
| Xer. | Palearc. | Calliptamus italicus L. | 3 | 4.00 |
| Hyg. | Eu.-Sib. | Mecostethus grossus L. | 2 | 2.66 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 1 | 1.33 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 30 | 40.04 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 18 | 24.04 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 4 | 5.32 |
| | | larvae | 14 | 18.62 |

6. Dam side

a) The lower one-third of the side towards the inundation area. The border cenosis of *Salicaetum albae fragilis,* as well, belongs to the association *Alopecuretum pratensis ranunculetosum acris.* In spite of the characteristic species of ecotone (*Homorocoryphus nitidulus* Scop., *Leptohyes albovittata* Koll.), an increase of the number of mesophilous

Table 8

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Central Eu. | Leptophyes albovittata Koll. | 3 | 5.76 |
| Hyg. | Palearc. | Homorocoryphus nitidulus Scop. | 1 | 1.92 |
| Hyg. | Eu.-Sib. | Roeseliana roeselii Hgb. | 1 | 1.92 |
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 3 | 5.76 |
| Xer. | Med. | Pezotettix giornae Rossi | 2 | 3.84 |
| Mes. | Eastern Eu. | Stenobothrus crassipes Charp. | 3 | 5.76 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 3 | 5.76 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 8 | 15.42 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 12 | 23.14 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 2 | 3.84 |
| | | larvae | 14 | 26.88 |

elements can rather be observed. Nevertheless, the role of species of the association *Stenobothrus crassipes — Omocestus haemorrhoidalis* characteristic of the river sectors in the Southern Plain of Hungary — is negligible. On the other hand, *Pezotettix giornae* Rossi can be found.

b) The upper two-thirds of the side towards the inundation area, an association identical with the former one. On the top of dam, the usual weed-association along ways, *Schlerochloo — Polygonetum avicularis,* can be observed, its *Orthoptera fauna* is, however, negligible, therefore I haven't performed any separate collection there. Yet it is necessary to record the strongly xerophilous species *Stenobothrus stigmaticus*

Table 9

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Central Eu. | Leptophyes albovittata Koll. | 3 | 5.25 |
| Hyg. | Eu.-Sib. | Conocephalus dorsalis Latr. | 1 | 1.75 |
| Hyg. | Eu.-Sib. | Roeseliana roeselii Hgb. | 2 | 3.50 |
| Mes. | Eastern Eu. | Stenobothrus crassipes Charp. | 14 | 24.60 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 1 | 1.75 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 11 | 19.30 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 3 | 5.25 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 6 | 10.50 |
| Xer. | Palearc. | Glyptobothrus brunneus Thunbg. | 1 | 1.75 |
| | | larvae | 14 | 24.60 |

Ramb., *Calliptamus italicus* L. and *Acrida hungarica* Herbst, found there. Apart from these data a strong increase in number of the xerophilous species is remarkable, altough their dominance is not significant. This is proved by the dominant species of the associatoin being *Stenobothrus crassipes* Charp. and also the highly xerophilous *Glyptobothrus brunneus* Thunbg. being observed there.

c) The upper two-thirds of the dam-side towards the protected inundation area, with S.E.-exposition. As compared with the former biotop, it can be observed, that there is a further increase of xerophilous and mesophilous elements. The rates of the dominancy are characteristic for the *Orthoptera* associations of the plain, and the *Euchorthippus declivus* Bris. is an important species of the association.

d) The lower one-third part of the side towards the protected inundation area, with S.E. — exposition. As compared with the former biotop, it is more shaded, of a moister microclimate, with a varied species association. The association is characterized by species of opposite ecological demands coexisting. From the carnivorous species, *Tessalana vittata* Charp. is worthy of attention, collected first from the biotops

Table 10

| Ec. type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Central Eu. | Leptophyes albovittata Koll. | 3 | 6.12 |
| Mes. | Eastern Eu. | Stenobothrus crassipes Charp. | 8 | 16.32 |
| Mes. | Eu.-Szib. | Omocestus haemorrhoidalis Charp. | 3 | 6.12 |
| Xer. | Palearc. | Glyptobothrus brunneus Thungb. | 3 | 6.12 |
| Xer. | Palearc. | Glyptobothrus biguttulus L. | 7 | 14.28 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 4 | 8.16 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 6 | 12.24 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 2 | 4.08 |
| Mes. | Central Eu. | Euchorthippus declivus Bris. | 3 | 6.12 |
| | | larvae | 10 | 20.40 |

along the Tisza. The association is also characterized by the appearence of *Omocestus ventralis* Zett. and the increasing dominance of *Euchorthippus declivus* Bris.

Table 11

| Ec type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Palearc. | Homorocoryphus nitidulus Scop. | 2 | 2.94 |
| Xer. | Southern Eu. | Tessalana vittata Charp. | 3 | 4.41 |
| Hyg. | Eu.-Sib. | Roeseliana roeselii Thunbg. | 1 | 1.47 |
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 1 | 1.47 |
| Mes. | Eastern Eu. | Stenobothrus crassipes Charp. | 5 | 7.35 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 4 | 5.88 |
| Xer. | Palearc. | Omocestus ventralis Zett. | 3 | 4.41 |
| Xer. | Palearc. | Glyptobothrus brunneus Thungb. | 2 | 2.94 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 14 | 20.62 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 9 | 13.23 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 5 | 7.35 |
| Mes. | Central Eu. | Euchorthippus declivus Bris. | 8 | 11.76 |
| | | larvae | 11 | 16.17 |

e) The upper two-thirds of the side towards the protected inundation area, with E-exposition, and an older oak-wood, planted at the lower

part of dam. Owing to the more unfavourable exposition and stronger shade, the fauna is more hygrophilous as compared with the former biotop. The xerophilous species are missing except *Tessalana vittata* Charp. Owing to the poor vegetation and the unfavourable microclimatic conditions, also the density of specimens and percentage of larvae is considerably lower.

Table 12

| Ec.type | Area tyipe | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Central Eu. | Leptophyes albovittata Koll. | 1 | 2.77 |
| Xer. | Southern Eu. | Tessalana vittata Charp. | 2 | 5.54 |
| Xer. | Palearc. | Glyptobothrus biguttulus L. | 1 | 2.77 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 7 | 19.49 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 4 | 11.08 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 12 | 33.42 |
| | | larvae | 9 | 24.93 |

f) The lower one-third part of the side towards the protected inundation area, with E-exposition; the border cenosis is common with the underwood of the oak-wood planted. As a consequence of the better quality of vegetation, the density of individual specimens is higher. Also here I have collected a female specimen of *Dociostaurus maroccanus* Thunbg. The higher dominance of *Chorthippus longicornis* Latr. is asserting itself, as well, as compared with other *Chorthippus* species.

Table 13

| Ec.type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Palearc. | Tetrix tenuicornis Sahlb. | 2 | 3.22 |
| Hyg. | Palearc. | Tetrix subulata L. | 1 | 1.61 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 2 | 3.22 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 16 | 25.86 |
| Hyg. | Eu.-Sib. | Chorthippus dorsatus Zett. | 9 | 14.57 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 18 | 28.98 |
| Xer. | Southern Eu. | Dociostaurus maroccanus Thunbg. | 1 | 1.61 |
| | | larvae | 13 | 20.93 |

7. Underwood of a pinewood planted in the protected inundation area. Mesophilous and hygrophilous elements are in high percentage. From grasshoppers, the carnivorous forms are more significant, semini-

vorous forms are more significant, seminivorous species have not been found. The xerophilous *Platycleis affinis* Fieb. may have immigrated from the adjacent steppes, like *Oedipoda coerulescens* L., as well.

Table 14

| Ec.type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Hyg. | Eu. | Pholidoptera griseoaptera Deg. | 1 | 1.16 |
| Xer. | Ponto-Med. | Platycleis affinis Fieb. | 2 | 2.32 |
| Xer. | Southern Eu. | Tessalana vittata Charp. | 5 | 5.80 |
| Xer. | Palearc. | Oedipoda coerulescens L. | 2 | 2.32 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 5 | 5.80 |
| Xer. | Palearc. | Glyptobothrus biguttulus L. | 9 | 10.44 |
| Hyg. | Palearc. | Chorthippus albomarginatus De Geer | 28 | 32.68 |
| Mes. | Eu.-Sib. | Chorthippus longicornis Latr. | 3 | 3.48 |
| Mes. | Central Eu. | Euchorthippus declivus Bris. | 14 | 16.24 |
| | | larvae | 17 | 19.76 |

8. Alkali grazing-land in the protected inundation area. The weedy, poor alkali steppe has reminded us very much of the *Orthoptera* fauna of sodic steppe with wormwoods in the region beyond the Tisza, given by Nagy (1943). The difference is perhaps only that here the dominance of *Dociostaurus brevicollis* Eversm. is insignificant and also elements of transitory character may be found in large numbers. Species of decisive importance are: *Omocestus petraeus* Bris., *Aiolopus thalassinus* Fabr. The number of larvae is very low, the dominant species are present, almost without any exception ,in the form of imagos.

Table 15

| Ec.type | Area type | Species | No. | D p.c. |
|---|---|---|---|---|
| Xer. | Ponto-Med. | Platycleis affinis Fieb. | 1 | 2.00 |
| Xer. | Southern Eu. | Tessalana vittata Charp. | 1 | 2.00 |
| Xer. | Palearc. | Oedipoda coerulescens L. | 1 | 2.00 |
| Xer. | Med. | Aiolopus thalassinus Fabr. | 9 | 18.00 |
| Mes. | Eu.-Sib. | Omocestus haemorrhoidalis Charp. | 5 | 10.00 |
| Xer. | Southern Eu. | Omocestus petraeus Bris. | 12 | 24.00 |
| Mes. | Central Eu. | Euchorthippus declivus Bris. | 14 | 28.00 |
| Xer. | Southern Eu. | Dociostaurus brevicollis Eversm. | 3 | 6.00 |
| | | larvae | 4 | 8.00 |

## Evaluation of the Orthoptera fauna of the area

We find the considerable differences in the ecological comprison of *Orthoptera* observed in the northern, resp. southern parts of the Hungarian Plain in Gausz's monograph (1968). A similar evaluation of the collecting stations at Kisköre is advisable, as well. It is important to notice that the first line of the data recited is giving the percentage of species number, and the second line that of specimen number. In cenological respect, the latter data are, of course, more important.

The ecological demand of species

| | I | II |
|---|---|---|
| Xerophilous ones | 41,18 | 10,90 |
| Mesophilous ones | 20,58 | 23,10 |
| Hygrophilous ones | 38,24 | 66,00 |

The biogeographic spectrum of species

| | I | II |
|---|---|---|
| Europo-Siberian ones | 29,40 | 39,82 |
| Central-European ones | 5,88 | 7,35 |
| Palearctis ones | 32,34 | 41,74 |
| European ones | 5,88 | 0,96 |
| Ponto-Mediterranean ones | 2,94 | 0,41 |
| Southern-European ones | 14,70 | 3,97 |
| Eastern-European ones | 2,94 | 4,25 |
| Mediterranean ones | 5,88 | 1,50 |

The amount of larvae is 24.52 percent of the imagos, on the average. In faunistical respect, there are remarkable the *Ephipiggera ephipigger* Fieb., rare in the Plain, the *Chrysochraon dispar* Germ. collected in marshy biotops, and the *Dociostaurus maroccanus* Thunbg., collected generally rarely.

The *Saltatoria* associations are generally of character analogous to the *Orthoptera* associations from the Nyírség described by Nagy (1943). It is anyway important to notice that the psammophilous species are here entirely missing. A part of the biotops inside the inundation area is suitable for feeding natural, stable associations, and even a part of species could be found only in the meadows of the inundation area (*Chrysochraon dispar* Germ., *Parapleurus alliaceus* Germ., *Mecostethus grossus* L.). The populations of low density of *Conocephalus fuscus* Fabr. — *Conocephalus dorsalis* Latr. are typically characteristic of the shaded associations of closer substance with high reed-grass.

In short sectors, resp. levels of the dam side a variation of abiotic factors may cause, even without any change in the plant associations, important differences in the development of density of the *Saltatoria* specimens and of the internal pattern of associations. The percentage of larvae is showing a similar value in nearly every biotop (save the

sodic steppe). A cause of that is that in this year the drier period of the summer aspect was considerably shorter than the average, without determinating the vegetation even on the dam sides of southern exposition. The same causes give some explanation of the differences in the picture of fauna, too, to the advantage of the species of hygrophilous ecological demand.

It is proved also by collections in the adjacent biotops that the faunistic picture of the immediate environs of the Tisza is strongly specialized, the conditions of associations showing rather great differences even in a distance of some kms apart from the river.

The role of *Roeseliana roeselii* Thunbg. that is nearly the unique character carnivorous species in other collecting stations along the Tisza is taken here by *Tessalana vittata* Charp. The density value of *Tettigonoidea* is corresponding to the average. In the fauna spectrum, a decisive dominance of the Europo-Siberian and Palearctic elements can be observed, the percentage of Mediterranean elements being negligible as compared with the biotops in the southern Plain of Hungary.

## Summary

In the course of collections carried out in the environs of Kisköre, I have demonstrated 34 Orthoptera species in that area. The faunistically interesting species are: *Ephipiggera ephipigger* Fieb., *Chysochraon dispar* Germ., *Dociostaurus maroccanus* Thunbg. The species found are almost without exception from plain areas.

The major association types are: 1. wood in the inundation area (*Pholidoptera griseoaptera* Deg. — *Chorthippus albomarginatus* De Geer), — 2. weed association in the inundation area (*Chorthippus albomarginatus* De Geer — *Chorthippus dorsatus Zett.*), — 3. shaded high reed-grass in the inundation area (*Chorthippus albomarginatus* De Geer — *Conocephalus fuscus* Fabr. — *Conocephalus dorsalis* Latr.), — 4. moist moorland in the inundation area (*Chorthippus albomarginatus* De Geer — *Parapleurus alliaceus* Germ. — *Mecostethus grossus* L.), — 5. dam side (*Stenobothrus crassipes* Charp. — *Chorthippus albomarginatus* De Geer — *Chorthippus dorsatus* Zett.), — 6. meadow in the protected inundation area (*Glyptobothrus biguttulus* L. — *Chorthippus albomarginatus* De Geer — *Euchorthippus declivus* Bris.), — 7. alkali grazing-land in the protected inundation area (*Aiolopus thalassinus* Fabr. — *Omocestus petraeus* Bris. — *Euchorthippus declivus* Bris.).

In respect of the ecological demand of species, the number of hygrophilous elements is the most important, altough the marking out of the collective area in a direct connection with the Tisza-valley has some role therein. In the biogeographic spectrum the Europo-Siberian, Palearctic and Central-European species are the most important ones.

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