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Zoogeographical Analysis and Statial Distribution of Auchenorrhynchs (Homoptera, Cicadina) in the Central Chernozem Region

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Abstract—A map of the biogeographical regionalization of the Central Chernozem Region (Lipetsk, Tambov, Kursk, Belgorod, and Voronezh provinces) is compiled based on the literature and the author's own collections of auchenorrhynchs. Ranges of all the species recorded from the region are given. Thirty nine types of the ranges classified in 13 groups are distinguished based on the distribution of Cicadina in the Palaearctic and in other biogeographical regions. A scheme of the statial distribution of auchenorrhynchs in the region is given. Twenty one types of stations are classified into seven types of a higher rank. The main zonal and azonal elements of the fauna were identified by comparative analysis of the species distribution between zoogeographical and statial groups. Connection between the distributional type of certain species and their habitat preferences was demonstrated.

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Auchenorrhynchs were collected in 1994–1999 in the Central Chernozem Region (CCR) (Lipetsk, Tambov, Kursk, Belgorod, and Voronezh provinces). A total of 360 samples were taken from different biotopes in different areas and more than 20000 specimens of auchenorrhynchs have been collected. Collections were made mainly with the use of a standard sweep net; insects were taken from the net by an aspirator.

An annotated list of 380 species of auchenorrhynchs occurring in the region examined was compiled based on the material collected and on the literature (Dmitriev, 2001, 2004). The goal of the present work was a comprehensive ecological and zoogeographical analysis of the leafhopper fauna of the Central Chernozem Region.

Biogeographical characteristics and regionalization of the CCR are given following the schemes of the biogeographical regionalization of the Palaearctic (Emeljanov, 1974; Isachenko and Lavrenko, 1980).

BIOGEOGRAPHICAL POSITION AND REGIONALIZATION OF THE CENTRAL CHERNOZEM REGION

Central Chernozem Region is situated in the western subcontinental subsector of the western transitional sector of the subboreal belt (Emeljanov, 1974).

The territory of the Central Chernozem Region is situated at the junction of two large biogeographical regions: the region of broadleaf forests [the European (nemoral) Region of the Palaearctic, its Eastern European (plain) Province (Emeljanov, 1974), or the Middle Russian Subprovince of the Eastern European Province of the European Region of broadleaf forests (Isachenko and Lavrenko, 1980)], and the steppe region [the Eastern Pontian Subprovince of the Pontian (plain) Province of Scythian (steppe) Region (Emeljanov, 1974), or the Middle Don Subprovince of the Pontian Steppe Province of the Eurasian Steppe Region (Isachenko and Lavrenko, 1980)]. The largest part of the territory of the region is situated in the transitional forest-steppe zone. The question of the biogeographical status of the forest-steppe is still disputable: some authors (Isachenko and Lavrenko, 1980, etc.) consider it a subzone of the steppe zone (the Eurasian Steppe Region, Eastern European Forest-steppe Province, Middle Russian (Upper Don) Subprovince]. Other authors (Safronova et al., 1999, and others) include it in the zone of broadleaf forests [the Forest-steppe Subzone, Eastern European (Dnieper-Volga) Forest-steppe]. Many zoologists (Emeljanov, 1974, etc.) characterize the territory of forest-steppes as a transitional area between forests and steppes ("There are no animals associated directly with the forest-steppe: species, occurring in the forest-steppe, are typical either of the forests or of the steppes"

(L.S. Berg, cited after Arnoldi, 1965). On the contrary, Mil'kov (1956, 1961), Arnoldi (1965), and some other authors underline the specificity of the forest-steppe.

The analysis of schemes of geobotanical (Kozopolyanskii, 1925; Alekhin, 1934; Komarov, 1938; Meshkov, 1953; Gorelov, 1958), phytogeographical (Tsyganov, 1959; Kamyshev, 1964; Prozorovskii and Zhuchkov, 1965; Kamyshev and Khmelev, 1972; Klyukin et al., 1982; Aleksandrova et al., 1992, 1994; Barabash and Kamayeva, 1994; Slednikov, 1999), zoogeographical (Shchelkanovtsev, 1935; Barabash-Nikiforov, 1955, 1957; Golub et al., 1994; Aleksandrov et al., 1994; Sarychev et al., 1997), landscape (Mil'kov, 1957; Dudnik and Tarasevich, 1966; Bokachev, 1968; Tarasov, 1972; Drozdov, 1994; Ecological-Geographical Regions, 1996; Artem'eva, 1999), soil (Tsyganov, 1959; Ustinov, 1968; Aderikhin and Santalov, 1968), and geomorphological (Ezhov, 1957) regionalization of the Central Chernozem Region and its parts has shown different interpretation of the limits and names of its subdivisions. In this connection, we considered it necessary to elaborate a summarized scheme, where names of sections are associated with the existing schemes of biogeographical regionalization (Emeljanov, 1974; Isachenko and Lavrenko, 1980).

The synoptic scheme of biogeographical regionalization of the Central Chernozem Region (see Figure), considering also publications dealing with regionalization of adjacent territories (Prozorovskii and Zhuchkov, 1965; Kryukov, 1967; Kubantsev, 1967; Man'ko, 1973; Geobotanichne …, 1977; Bilyk, 1978; Kistyakovskii, 1978; Marinin et al., 1978; Denisov and Guryleeva, 1982; Solyanov, 1982; Gushchina, 1988). This map shows only the entities of the highest ranks, i.e., zones (biogeographical regions), subzones, and districts; their brief characteristics are given below. Elaboration of a more detailed scheme and also clarification of some borders, in our opinion, needs additional investigations to be performed by landscape researchers, botanists, zoologists, and soil scientists.

I. The Zone of Broadleaf Forests

The northern and northwestern parts of the CCR belong to the zone of broadleaf forests represented by a continuous forest massif and also by partly or fully isolated woodland areas along the valleys of the Tsna, Voronezh, Usman, and Bityug rivers.

The forest massif to the northwest of Kursk is a continuation of Bryansk forests. Its southern border runs along the Seim River, and its eastern border, along the Tuskar' River (Kamyshev, 1964) and maybe even farther eastward (A Map …, 1996; Safronova et al., 1999).

No common point of view exists on the status of isolated (island) forest massifs. In the majority of regionalization schemes examined by us, they are attributed to the forest-steppe zone (Mil'kov, 1953–1961, etc.). Kamyshev (1964) included these territories in the zone of mixed coniferous-broadleaf forests. Some authors (Aleksandrova et al., 1992; Artem'eva, 1999, etc.) distinguish these forest massifs as a separate district (province, region), but do not discuss its zonal placement. We include these territories in the zone of broadleaf forests on the basis of the following considerations. It was Kozo-Polyanskii (1934; cited after Prozorovskii, 1949) already who mentioned that Tsninskii, Usmanskii, and Khrenovskii forest massifs "stand aside from the zonal scheme" (meaning their differences from forests of the forest-steppe zone). Based on the fact that spruce naturally grows in the Tsninskii forest massif, Gorelov (1958) includes the latter in the zone of broadleaf forests. In his characterization of some forest massifs of the forest-steppe zone, Dokhman (1968) does not mention Tsninskii, Usmanskii, and Khrenovskii forests, including them in the northerner zone.

There, Querceta and Pineto-querceta dominate in watersheds on dark gray forest soils and on leached and podzol chernozems; and Pineto-querceta and Pineta, on sands and clay sands of over-meadow terraces. Such associations as Querceto-pineta myrtilloso-herbosa and Pinus + Quercus–Vaccinium vitis-idea + motley grass, Pineto-tilieta, Pineta hilocominosa and Pineta cladinosa occur in the territory of the Voronezh Biosphere Reserve, to which patches of heather and juniper, and sphagnum bogs are added (Kamyshev, 1964; Vegetation of the European USSR, 1980). All these elements are characteristic of the zone of broadleaf forests. In our opinion, the presence of elements of the steppe fauna and flora in the openings of the pine forest and at its margins is well accounted for by deep position of this forest massif inside the forest-steppe.

Finally, Usmanskii and Khrenovskii forests appear to be the extreme southernmost or southeasternmost borders of the range of many animal species of the European (nemoral) or wider Hiadian distribution. These species include, for example, *Gerris sphagnetorum* Gaun. (Golub and Cherkasova, 1996), *Crypto-*

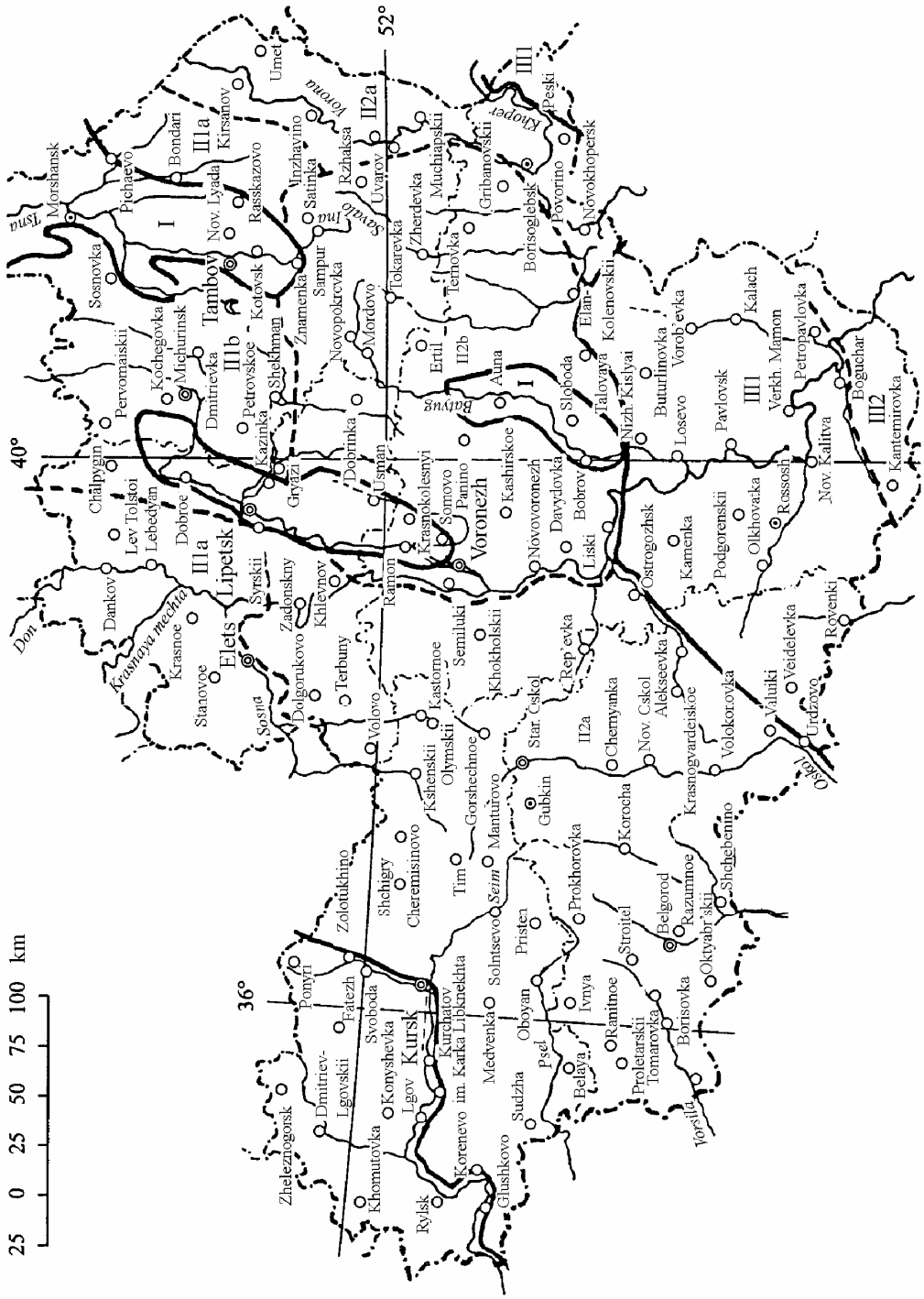

Fig. 1. Biogeographical ranging of Central Chernozem Region. Solid lines mark borders of natural zones (biogeographical regions), dotted lines, borders of districts. Explanations are given in the text.

stemma pusillimum Shlb., *C. waltli* Fieb., *Ceratocombus brevipennis* Popp., *Trigonotylus ruficornis* Geoffr., *Campylosteira verna* Fall., *Acalypta nigrina* Fall., etc. from the order Heteroptera; *Trichius fasciatus* L., *Elater sanguineus* L. [now *Ampedus sanguineus.* – Ed.], etc. from Coleoptera (Golub, 1996); and *Conomelus lorifer dehneli* Nast, *Stroggylocephalus livens* Zett., *Cicadula albingensis* Wagn., etc. of the Cicadina (Dmitriev, 2001). Many ranges are of the boreo-montane disjunctive type (Golub, 1996).

II. The Forest-steppe Zone

The southern border of the zone runs somewhat to the south of Valuiki–Ostrogozhsk–Liski–Novokhopersk, then through the territory of Volgograd Province and again returns to Voronezh Province to the east of the Khoper River. Some authors (Mil'kov, 1953–1961, etc.) draw this border significantly farther southward. Two types of vegetation (forests and meadow steppes) dominate on plakors (= euclimatopes) of the forest-steppe. It is possible to distinguish the following more specific variants of the forest-steppe in the CCR: Central Russian (elevated forest-steppe) and Oka-Don (lowland forest-steppe) ones[1], with northern and southern regions within these variants (Lavrenko, 1970).

Subdivision of the forest-steppe into northern and southern subzones and into Central Russian and Oka-Don regions is rather subjective, a fortiori, steppe fragments being at present largely tilled. This explains different drawing of the biogeographical entities borders in the schemes by different authors; the border of the Oka-Don plain is actually not shown, which may be accounted for by a gradual increase of altitudes on western slopes of the Volga Upland (by contrast to eastern slopes of the Central Russian Upland). In this connection, geobotanists refuse to use such detailed subdivisions of the forest-steppe zone in their large-scaled zonal maps [Safronova et al., 1999; I.N. Safronova (personal communication)]. In this case, the entire CCR should be treated as the Dnieper-Volga forest-steppe. In local biogeography, however, we think it better to follow Lavrenko's scheme. The borders of districts are given following Kamyshev (1964), with some alterations according to more recent publications (Aleksandrova et al., 1992, 1994; Artem'eva, 1999; Slednikov, 1999, etc.).

IIa. The Central Russian forest-steppe is divided by the Oka-Don forest-steppe, associated with the homonymous plain, into two parts: western part, associated with the Central Russian Upland, and eastern part occupying the gentle slopes of the Volga Upland. Different authors draw the border between the Central Russian Plain to the north of Khlevnov along the Don River, along the Voronezh River, or along the watershed between these rivers, whereas Aleksandrova et al. (1992) distinguish the entire territory between Don and Voronezh Rivers as a separate intermediate phytogeographical region. To the south of Khlevnov, all the authors draw the border along the Don River. In our scheme, we used the border given by Ezhov (1957). The western border of the Volga Upland is less distinct; it is drawn according to Mil'kov (1961), Artem'eva (1999), Slednikova (1999), and the *Map of Restored Vegetation* … (1996).

The soil in most of the territory of the Central Russian forest-steppe is represented by leached and partly podzol chernozems; in the southern part, by thick Central Russian chernozems covered with meadow steppes, where *Stipa tirsa* and *S. pennata* dominate the vegetation. Highly specific petrophytic biocenoses develop on stony outcrops of chalk and limestone. Many endemic and relict species are found in the steppes; many of them are "descended Alpines" by their origin. Before agricultural cultivation (*Map of Restored Vegetation* …, 1996), this territory was largely woodland, with predominance mainly of Querceto-fraxinetum.

Among auchenorrhynchs, collected in the CCR, the following species were found only in the Central Russian forest-steppe: *Alloscelis vittifrons* Iv., *Paradelphacodes gvosdevi* Mit., *Tibicina haematodes* Scop., *Cercopis intermedia* Kbm., *Utecha trivia* Germ., *Evacanthus interruptus* L., *Endria nebulosa* Ball, *Streptanus aemulans* Kbm., etc.

Differences between the Central Russian and Oka-Don forest-steppes are determined by different altitudes (in uplands, soil drainage is better and the temperature regime is more favorable: during spring and autumn frosts, cold air "flows down" from slopes), and also by different geological history of these territories (uplands remained ice-free during the Quaternary).

IIb. Oka-Don forest-steppe is associated with the Oka-Don Plain. The following plants prevail there

[1] P. Smirnov (1947, cited after *Vegetation of the European USSR*, 1980) suggested separation of the Central Russian and Volga regions of the forest-steppe, associated with the corresponding heights.

among herbaceous vegetation: *Stipa pennata, S. tirsa*, *Festuca pseudovina*, *Filipendula vulgaris*, *Trifolium alpestre*, and *Galium verum*. A wide occurrence of saline soils (solonetzs and typical solonetz chernozems) is characteristic of the Oka-Don forest-steppe. Only a small part of the territory is occupied by forests, as it also was in the times when soils were not actively cultivated (Prozorovskii, 1949; Map of Restored Vegetation …, 1996). Depressions in the forest-steppes are occupied mainly by aspen groves.

The following halophilous auchenorrhynchs were recorded by us only from the Oka-Don forest-steppe: *Macropsidius abrotani* Em., *Austroasca pontica* Kirejtshuk, *Laburrus abrotani* Em., *Paramesus major* Hpt., *Psammotettix atropidis* Em., *P. majusculus* Lnv., etc.

II_1. The northern subzone of the forest-steppe. There, steppefied meadows prevail in open areas; in this connection, A.P. Shennikov (1938, cited after Kamyshev, 1964) and later Kamyshev (1964) suggested that the subzone of the northern forest-steppe should be named the "forest-meadow." Following Aleksandrova et al. (1992, 1994), Artem'eva (1999), and Slednikova (1999), we draw a border between northern and southern forest-steppes to the south of Elets along the valleys of the Bystraya Sosna and Don rivers, then along the line Lipetsk–Gryazi–Znamenka somewhat to the north of Kirsanov (to the north of the Vorona River). It should be noted that the eastern border between the two subzones does not coincide in the works of Tambov (Artem'eva, 1999; Slednikova, 1999) and Penza (Solyanov, 1982) botanists and landscape researches.

II_2. The southern subzone of the forest-steppe. In this subzone, some plants characteristic of the steppes dominated by associations motley-grass + fescue + feather grass appear, including *Paeonia tenuifolia*, *Crambe tataria*, *Phlomis pungens*, etc. Among Cicadina, the following xerophilic species are found: *Chlorita krasheninnikovi* Zachv., *Pseudophlepsius binotatus* Sign., *Praganus hofferi* Dlab., *Henschia acuta* Löw, etc.

III. The Steppe Zone

To the steppe zone, southern parts of Belgorod and Voronezh provinces (to the south of the line Valuiki–Novokhopersk) and eastern part of Voronezh Province (to the east of the Khoper River) belong. There, rich motley-grass + fescue + feather grass and fescue + feather grass steppes dominate on common chernozems. The border between these two types of steppes is differently drawn in works of different authors. This is mainly associated with the fact that the steppe is tilled and, therefore, it is impossible nowadays to reliably trace the differences in the steppe vegetation. Following Kamyshev (1964), Barabash and Kamaeva (1994), and *Map of Restored Vegetation*… (1996), we draw this border along the rivers Boguchar–Don–Kriusha. Motley grass + tussock steppes are included in the northern subzone of the steppe.

The following species of Cicadina are found in the steppe zone of the CCR: *Reptalus quinquecostatus* Duf., *R. melanochaetus* Fieb., *Dicranotropis beckeri* Fieb., *Dictyophara pannonica* Germ., *Peltonotellus punctifrons* Horv., *Dorycephalus baeri* Kouch., *Micantulina stigmatipennis* M. R., *Empoasca pteridis* Dhlb., *Kazachstanicus volgensis* Fieb., *Jassargus ukrainicus* Logv., etc.

III_1. Rich motley-grass + fescue + feather grass steppes. The following species dominate the herbage: *Stipa tirsa*, *S. lessingiana*, *Bromopsis riparia*, *Helictotrichon schellianum*, *Anemone sylvestris*, *Lathyrus pannonicus* with *Stipa zalesskii*, and *Caragana frutex*.

III_2. Motley-grass + fescue + feather grass steppes. The herbaceous cover is represented by *Stipa lessingiana*, *S. capillata*, *Salvia nutans*, *S. tesquicola*, *Medicago romanica* with *Stipa zalesskii*, *Salvia stepposa*, and *Galatella angustissima*.

The differences between these two districts are so insignificant, that at present geobotanists do not distinguish rich motley grass and motley grass steppes (Safronova et al., 1999; I.N. Safronova, personal communication). However, at present such species as *Dictyophara multireticulata* M. R., *Caliscelis affinis* Fieb., *Scorlupella montana* Beck., *Chlorita tessellata* Leth., *Selenocephalus obsoletus* Germ., *Stenometopiellus angorensis* Zachv., *Errastunus daedaleus* Logv., etc. are found only in the district of motley-grass + fescue + feather grass steppes.

A hemi-psammopytic edaphic variant of motley-grass + fescue + feather grass steppe occurs on left-bank terraces of the Don River (Lavrenko, 1970; Isachenko and Lavrenko, 1980; Map of Restored Vegetation..., 1996). On the whole, such steppes are characteristic of southerner regions; in the CCR, they are represented only by small fragments, distributed northwards as far as the latitude of Voronezh. The following herbs can be found there: *Stipa capillata*, *Agropy-*

ron dasyanthum, *Festuca beckeri*, *Koeleria sabuletorum*, *Leymus racemosus*, *Helichrysum arenarium*, *Euphorbia seguieriana*, and *Artemisia marschalliana*. Lavrenko (1936) [cited after Lavrenko (2000)] mentions a high proportion of psammophilous endemics, characteristic of the flora of these regions. Shchelkanovtsev (1935) and Skuf'in (1978) also emphasize the authenticity of the insect faunal complex of the hemi-psammophytic steppes. In spite of this fact, loamy-sand steppes remain very poorly studied, because these territories are either tilled or used for pastures. The further more detailed regionalization will probably result in separation of the hemi-psammophytic steppes as an independent biogeographical region.

DISTRIBUTION OF CICADINA BETWEEN ZOOGEOGRAPHICAL GROUPS

In our opinion, the most detailed biogeographical subdivision of the Palaearctic is that by Emeljanov (1974). Recently, this scheme was published in a more convenient revised form (Krivokhatskii and Emeljanov, 2000). The zoogeographical analysis of the Cicadina fauna of the CCR is based mainly on these works. Based on the analysis of the Cicadina distribution in the CCR, 39 types of ranges classified into 13 groups were distinguished. It should be noted that only a few Cicadina occur in the Arctic belt; 7 species (*Javesella pellucida* F., *J. obscurella* Boh., *Forcipata forcipata* Fl., *Notus flavipennis* Zett., *Colladonus torneellus* Zett., *Errastunus ocellaris* Fall., and *Psammotettix striatus* L.) out of those collected in the CCR were reported from the Arctic (Vilbaste, 1969). Therefore, we omit "boreo-subtropical" from names of wide zonal ranges.

I. Interregnal ranges are those extending beyond the Palaearctic: Holarcto-Oriento-Australian, Palaearcto-Ethiopian-Oriental, Holarcto-Oriental, Palaearcto-Oriental, Western Palaearcto- Ethiopian, and Holarctic ranges. This distribution is characteristic of 25 species (6.8%) of Cicadina, collected in the CCR; most of them are Holarctic species.

II. Boreo-subtropical ranges, a group of wide zonal ranges (transpalaearctic, superatlantic, and Western Palaearctic ranges), which are characteristic of 55 species (14.5%). The majority of Cicadina with the boreo-subtropical distribution are transpalaearctic and Western Palaearctic species.

III. Hespero-Hiadian ranges, a group of ranges in the Hiadian Subregnum of the Palaearctic, extending to the Hesperian (evergreen) Region of the Tethyan Subregnum. This distribution is characteristic of 26 species (6.8%); their ranges are subdivided into two groups: Hespero-Hiadian and superatlantic Hespero-Hiadian ranges.

IV. Southern ranges. The group was established for species distributed in the Tethyan Subregnum and occurring also in nemoral regions of the Palaearctic. Five ranges (panpalaearctic southern, superatlantic southern, Western Palaearctic southern, panatlantic southern, and Northern Tethyan- Stenopean ranges) are described for 30 species (7.9%) with this distribution.

V. Hiadian ranges include Hiadian (general), superatlantic Hiadian, and western Hiadian ranges. This is the largest group (80 species, 20.9%).

VI. Tethyan ranges. A small group that includes a single range (Tethyan range).

VII. Subboreal ranges. Ranges of this group (superatlantic subboreal and western subboreal ranges) are stretched along the subboreal belt. They include the Scythian region of the Palaearctic, extending also into the European and Sethian regions. The group comprises seven species (1.9%).

VIII. Euro-Hesperian ranges. The group includes a single Euro-Hesperian range pertaining to 22 species (5.8%). This group, together with two groups below, covers ranges in two adjacent Palaearctic regions.

IX. Euro-Scythian ranges. The group combines 4 ranges pertaining to 18 species (4.7%): Euro-Scytho-Stenopean [included in the group of Euro-Scythian ranges although it protrudes into the eastern nemoral (Stenopean) region of the Palaearctic], Euro-Scythian, Euro- Western Scythian, and Eastern-European-Ponto-Kazakhstan ranges.

X. Scytho-Sethian ranges. The group combines four ranges, more or less completely occupying the Scythian Region of the Palaearctic and the Irano-Turanian Subregion of the Sethian Region: Scythian-Irano-Turanian, Scytho- Northern Turanian, Western Scythian- Irano-Turanian, and Western-Scythian-Northern-Turanian ranges. This distribution is characteristic of 21 species (5.5%).

XI. European ranges. European distribution is characteristic of 40 species (10.4%). Their ranges can be subdivided into 2 groups: European (general) and Central and Eastern European ranges.

Table 1. Distribution of Cicadina of the Central Chernozem Region between types of ranges

Types of ranges	Number of species	%
Holarcto-Oriental-Australian	1	0.3
Palaearcto-Ethiopian-Oriental	1	0.3
Holarcto-Oriental	1	0.3
Palaearcto-Oriental	4	1.1
Western Palaearctic- Ethiopian	1	0.3
Holarctic	17	4.5
Transpalaearctic	23	6.1
Superatlantic	6	1.6
Western Palaearctic	26	6.8
Hespero-Hiadian	19	5.0
Superatlantic Hespero-Hiadian	7	1.8
Panpalaearctic southern	3	0.8
Superatlantic southern	7	1.8
Western Palaearctic southern	14	3.7
Panatlantic southern	5	1.3
Northern Tethyan- Stenopean	1	0.3
Hiadian	32	8.3
Superatlantic Hiadian	26	6.8
Western Hiadian	22	5.8
Tethyan	2	0.5
Superatlantic subboreal	4	1.1
Western subboreal	3	0.8
Euro-Hesperian	22	5.8
Euro-Scytho-Stenopean	2	0.5
Euro-Scythian	8	2.1
European- Western Scythian	6	1.6
Eastern European- Ponto-Kazakhstan	2	0.5
Scythian- Irano-Turanian	1	0.3
Scythian- Northern Turanian	2	0.5
Western Scythian- Irano-Turanian	5	1.3
Western Scythian- Northern Turanian	13	3.4
European	33	8.6
Central and Eastern European	7	1.8
Scythian	13	3.4
Western Scythian	22	5.8
Ponto-Kazakhstan	3	0.8
Pontian	4	1.1
Introduced	3	0.8
Range unknown	9	2.4
Total	380	100.0

XII. Scythian ranges. The Scythian distribution is characteristic of 42 species (11.1%), collected in the CCR. This type comprises Scythian (general), western Scythian, Ponto-Kazakhstan, and Pontian ranges.

XIII. Introduced species and species with an unknown range. This group includes 12 species (3.2%) of Cicadina. Introduced species are *Stictocephala bisonia* Kopp & Yonke (this Nearctic species was intro-

Table 2. Distribution of Cicadina ranges in the Central Chernozem Region by zonal×sectoral entities

Belts	Sectors											Total
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	
Boreo-subtropical	42				13	26						81
Boreal	32				26	22						80
Southern	5		1	1	7	14	27	5				60
Subboreal	2	8	15		4	9	33	35	7	5	4	122
Total	81	8	16	1	50	71	60	40	7	5	4	343

Notes: I, Panpalaearctic; II, Western Eastern-continental; III, Pancontinental; IV, Western Eurycontinental eastern; V, Superatlantic; VI, Western; VII, Panatlantic; VIII, Western Pancontinental; IX, Western transitional; X, Western eurycontinental; XI, Western subcontinental. Species with unknown ranges, introduces species, and species with interregnal ranges are not included.

duced in Europe and has become widespread there); *Macropsis illota* Horv. [this species was earlier known from the Stenopean Region of the Palaearctic and was recorded from Europe for the first time by Dmitriev (1999)]; *Macropsis elaeagni* Em. (this Northern Turanian species was apparently introduced in Europe with its host, *Elaeagnus angustifolia*). Ranges of nine species are unknown; most of these species were confused with their close allies. The range of each species is given below, in the description of the habitat distribution; distribution of species between types of ranges is given in Table 1. The majority of the Cicadina species known from the CCR possess Hiadian ranges (120 species, 31.3%). The Tethyan group includes 67 species (17.7%), they belong mainly to the Scythian fauna. Ranges of other species belong to the both parts of the Palaearctic. Auchenorrhynchs of the CCR have closest associations with the European and Scythian regions, partly including the CCR territory. Of the species collected by me, 40 (10.4%) are European, 45 (11.9%) Scythian, and 17 (4.4%) Euro-Scythian. Some Irano-Turanian and widespread Tethyan species penetrate the CCR via the steppe zone. Connections with the Hesperian (Mediterranean) fauna and especially with the fauna of the Euro-Siberian (taiga) Region of the Palaearctic exist partly via the zone of broadleaf forests.

The distribution of auchenorrhynchs between the zonal × sectoral entities is represented in Table 2. It should be noted that the largest number of species has wide panpalaearctic (81 species) or Western Palaearctic (71 species) sectoral distribution. Narrow sectoral (subboreal) ranges prevail (122 species), largely for account of species with narrow sectoral ranges (panatlantic and Western pancontinental ones).

HABITAT DISTRIBUTION OF CICADINA IN THE CENTRAL CHERNOZEM REGION

The habitat distribution of species is determined first of all by their associations with vegetation. Different species are found in different biotopes and also in different vegetation layers. In addition, Cicadina have different requirements for habitat humidity. Taking into account these characters, we distinguished 21 types of stations and classified auchenorrhynchs of the CCR inhabiting them into 7 groups.

I. Groups of Species Occurring in Forest Habitats

Emeljanov (1969) distinguished three groups of species associated with forests in Central Kazakhstan. In the CCR, both the diversity of forest biotopes and the number of Cicadina species associated with these biotopes are greater. Therefore, we distinguish some additional forest groups.

1. A group of coniferous forest species is represented by a single species living on pines.

Western Palaearctic *Grypotes puncticollis* H.-S.

2. A group of small-leaved forest species is represented mainly by meso-hygrophilous oligophagous and polyphagous species living on willows, poplars, birches, and alder. This group is the most numerous among forest ones (46 species, 12.1%).

Transpalaearctic species: *Oncopsis flavicollis* L., *Kybos populi* Edw.; superatlantic species: *Rhytidodus decimusquartus* Schrank; Western Palaearctic species: *Idiocerus herrichii* Kbm., *I. stigmaticalis* Lew., Hespero-Hiadian species: *Populicerus populi* L.; superatlantic Hespero-Hiadian species: *Macropsis graminea* F., *Idiocerus lituratus* Fall., *Metidiocerus elegans* Fl.; Hiadian species: *Aphrophora costalis* Mats., *Oncopsis*

alni Schrank, *O. tristis* Zett., *Macropsis cerea* Germ., *Populicerus confusus* Fl., *Kybos butleri* Edw., *K. rufescens* Mel., *Linnavuoriana decempunctata* Fall., *L. sexmaculata* Hardy; superatlantic Hiadian species: *Aphrophora salicina* Goeze, *Populicerus nitidissimus* H.-S., *P. laminatus* Fl., *K. smaragdulus* Fall., *K. lindbergi* Lnv., *K. virgator* Rib., *K. abstrusus* Lnv., *Edwardsiana salicicola* Edw., *Sagatus punctifrons* Fall.; Western Hiadian species: *Macropsis fuscinervis* Boh., *M. notata* Proh., *Tremulicerus tremulae* Estl., *Populicerus albicans* Kbm.; Western Palaearctic southern species: *Myndus musivus* Germ., *Zygina nivea* M.R.; superatlantic subboreal species: *Sahlbergotettis salicicola* Fl.; western subboreal species: *Kybos oshanini* Zachv.; Euro-Hesperian species: *Tremulicerus distinguendus* Kbm.; European species: *Cixius stigmaticus* Germ., *Oncopsis appendiculata* Wagn., *O. subangulata* J. Shlb., *Macropsis haupti* Wagn., *M. viridinervis* Wagn., *Edwardsiana alnicola* Edw., *E. gratiosa* Boh.; Western Scythian species: *Macropsis vicina* Horv.; Ponto-Kazakhstan species: *Rhytidodus nobilis* Fieb.; species with unknown range: *Macropsis prasina* Boch.

3. A group of broadleaf forest species, associated with various species of broadleaf trees. The group includes polyphagous species (*Edwardsiana* spp., *Eurhadina* spp., etc.), and also oligophagous and monophagous species (*Macropsis illota* Horv., *Iassus lanio* L., *Edwardsiana ruthenica* Zachv., etc.). Some xero-mesophylous species of Cicadina were recorded only in broadleaf forests growing on slopes of ravines (e.g., *Dictyophara multireticulata* M. R., *Tibicina haematodes* Scop., and *Penthimia nigra* Goeze).

Palaearcto-Oriental species: *Edwardsiana rosae* L.; Holarctic species: *Cixius nervosus* L.; Hespero-Hiadian species: *Cicadetta montana* Scop., *Eurhadina pulchella* Fall., *Aguriahana stellulata* Burm.; superatlantic species: *Typhlocyba quercus* F.; Western Hiadian species: *Edwardsiana crataegi* Dgl., *E. plebeja* Edw.; Western Palaearctic southern species: *Acericerus vittifrons* Kbm.; Euro-Hesperian species: *Dyctyophara multireticulata* M. R., *Tibicina haematodes* Scop., *Pediopsis tiliae* Germ., *Iassus lanio* L., *Penthimia nigra* Goeze, *Alebra wahlbergi* Boh.; European species: *Cixidia pilatoi* D'Urso & Guglielmino, *Edwardsiana staminata* Rib., *Ribautiana ognevi* Zachv., *R. ulmi* L., *Eurhadina kirschbaumi* Wagn., *E. saageri* Wagn., *Arboridia velata* Rib., *A. versuta* Mel.; Central and Eastern European species: *Edwardsiana ampliata* Wagn., *E. ruthenica* Zachv.;[2] introduced species: *Macropsis illota* Horv., *M. elaeagni* Em.

4. A group of deciduous forest species combines wide generalists of different deciduous trees.

Transpalaearctic species: *Cixius cunicularis* L.; western Palaearctic species: *Platymetopius major* Kbm.; Hespero-Hiadian species: *Zygina flammigera* Fourcr.; Hiadian species: *Edwardsiana ishidae* Mats., *E. menzbieri* Zachv., *Alnetoidia alneti* Dhlb., *Zygina angusta* Leth.; superatlantic southern species: *Fieberiella septentrionalis* Wagn.; western Palaearctic southern species: *Platymetopius guttatus* Fieb., *Jassargus obtusivalvis* Kbm.; superatlantic subboreal species: *Edwardsiana diversa* Edw.; Euro-Hesperian species: *Alebra albostriella* Fall., *Eurhadina concinna* Germ., Euro- Western Scythian species: *Alebra neglecta* Wagn., *Arboridia erecta* Rib.; European species: *Fagocyba douglasi* Edw., *Edwardsiana avellanae* Edw., *E. hippocastani* Edw., *E. prunicola* Edw., *Zygina tiliae* Fall.

5. A group of species associated with forest shrub layer includes two species living on plants of the genus *Rubus*.

Central and Eastern European species: *Macropsis brabantica* Wagn.; Hiadian species: *M. fuscula* Zett.

6. A group of species associated with forest herbge. Based on own observations and literature, we came to a conclusion that the number of heliophobic species associated exclusively with the forest herbage is small. Only the following species can be included in this group:

Holarctic species: *Macrosteles variatus* Fall.; superatlantic Hiadian species: *Stiroma affinis* Fieb.; Western Palaearctic species: *Macropsis scutellata* Boh., *Planaphrodes nigrita* Kbm., *Eupteryx urticae* F.; range unknown: *Aphrodes makarovi* Zachv.

7. A group of forest species is formed of widely polyphagous taxa associated with herbaceous, tree, and shrub layers.

Holarcto-Oriental species: *Empoasca vitis* Göthe; Western Palaearctic- Ethiopian species: *E. decipiens* Paoli; Holarctic species: *Colladonus torneellus* Zett.; Western Palaearctic species: *Ribautiana tenerrima*

[2] Probably, introduced into Kazakhstan.

H.-S., *Allygus mixtus* F., *Allygidius commutatus* Fieb.; Hespero-Hyadian species: *Speudotettix subfusculus* Fall.; Hiadian species: *Centrotus cornutus* L., *Kyboasca bipunctata* Osh.; Euro-Hesperian species: *Allygus modestus* Scott, *Allygidius atomarius* F.; European species: *Allygidius furcatus* Ferr., *A. mayri* Kbm.

II. Groups of Species with Steppe Habitats

8. A group of shrub steppe species is small (Emeljanov, 1969); in CCR, it is represented by a single species.

Panatlantic southern species: *Selenocephalus obsoletus* Germ.

9. A group of motley grass + graminean steppe species. Representatives of the group are the following species: *Caliscelis affinis* Fieb., *Peltonotellus punctifrons* Horv., *Scorlupella montana* Beck., *Cercopis intermedia* Kbm., *Cicadetta podolica* Eichwald, *Errastunus daedaleus* Logv.

Western Palaearctic southern species: *Cercopis intermedia*; Western Scythian- Irano-Turanian species: *Scorlupella montana*; Western Scythian species: *Caliscelis affinis, Peltonotellus punctifrons, Cicadetta podolica*; Pontian species: *Errastunus daedaleus*.

10. A group of tussock steppe species is not on the whole typical of the CCR; however, some representatives of this group were collected from the driest places in a virgin steppe.

Western Scythian- Irano-Turanian species: *Stenometopiellus angorensis* Zachv.; Western Scythian species: *Dorycephalus baeri* Kouch., *Praganus admirabilis* Mit., *P. hofferi* Dlab.

11. A group of euryxerophilic species, found in various xerophytic stations: steppes, deserts, less frequently in steppefied meadows and in saline habitats.

Tethyan species: *Chlorita tessellata* Leth.; Western Palaearctic southern species: *Neoaliturus haematoceps* M.R.; Scytho-Irano-Turanian species: *Pseudophlepsius binotatus* Sign.; Western Scythian- Irano-Turanian species: *Chlorita akdzhusani* Zachv., *Laburrus handlirschi* Mats.; Western Scythian- Northern Turanian species: *Dictyophara pannonica* Germ., *Chlorita krasheninnikovi* Zachv., *Psammotettix comitans* Em.; Scythian species: *Kazachstanicus volgensis* Fieb., *Henschia acuta* Löw.

III. A Group of Species from Near-water Habitats

By contrast to Emeljanov (1969), we found it necessary to distinguish only a single group of species associated with near-water vegetation. This group is close to the A.F. Emeljanov's "group of thermophilous aquatic and marsh species." It combines mainly species occurring in open and frequently saline habitats; many of these species are trophically associated with reed or other plants growing in water and along water bodies.

12. A group of species of near water habitats.

Western Palaearctic species: *Delphax crassicornis* Panz.; Hiadian species: *Macrosteles cyane* Boh.; Western Hiadian species: *Chloriona glaucescens* Fieb., *Chloriona smaragdula* Stil, *Coryphaelus gyllenhalii* Fall.; superatlantic Hiadian species: *Erzaleus metrius* Fl.; Tethyan species: *Paramesus major* Hpt.; Northern Tethyan- Stenopean species: *Changeondelphax velitchkovskyi* Mel.; superatlantic southern species: *Chloriona unicolor* H.-S.; European species: *Paralimnus rotundiceps* Leth.; Scythian species: *Metalimnus oltfusus* Em.; Western Scythian species: *Paralimnus zachvatkin* Em.; Eastern European-Ponto-Kazakhstan species: *Ederranus discolor* J. Shlb.

IV. Groups of Species of Saline Habitats

Solonetzs and salt flats are rather widely distributed in the CCR. These habitats are characterized by a rather specific faunal complex of Cicadina which can be subdivided into 2 groups.

13. A group of solonetz-meadow species combines the most mesophilic auchenorrhynchs associated mainly with the forest-steppe zone.

European- Western Scythian species: *Eupteryx artemisiae* Kbm, 1868, *Anptergstemma ivanoffi* Leth.; Scytho- Northern Turanian species: *Eupteryx semipunctata* Fieb.; Scythian species: *Laburrus abrotani* Em., *Ophiola paradoxa* Lnv.; Western Scythian species: *Macropsidius abrotani* Em.

14. A group of solonetz and salt flat species comprises Cicadina characteristic of the more southern territories (steppe and desert zones).

Panatlantic southern species: *Psammotettix majusculus* Lnv.; Western Scythian- Northern Turanian species: *Doratura salina* Horv., *Psammotettix atropidis* Em.; Pontian species: *Austroasca pontica* Kir.

VI. Groups of Species of Meadow Habitats

Analysis of the meadow fauna shows no Cicadina species to be closely associated with meadow habitats. Mesophilic species are found not only in meadows, but also in the herbaceous layer of forests. Species occurring in dry meadows are also rather common in the steppes. This fact agrees rather well with the theory of the secondary origin of herbaceous vegetation in river flood-lands associated with human agricultural activity (Vegetation of the European USSR, 1980). Only a few species were recorded (mainly, according to literature) exclusively from meadows. It is noteworthy, however, that many of these species are rare and known from the CCR only from the literature. The further study of their ecology may reveal their wider associations with different habitats.

15. A group of meadow species. Only *Diplocolenus logvinenkoae* Em., rather common in flood-land meadows of the CCR, and also known from Ukraine, Kazakhstan, and Kirghizia, where it was also found in meadows, can be referred to as a characteristic representative of this group.

Transpalaearctic species: *Megadelphax sordidulus* Stål; superatlantic Hiadian species: *Neophilaenus infumatus* Hpt.; Euro-Hesperian species: *Hauptidia distinguenda* Kbm.; Western Scythian- Northern Turanian species: *Psammotettix agrestis* Logv., *Diplocolenus logvinenkoae* Em.; Central and Eastern European species: *Arboridia potentillae* Mor.; Ponto-Kazakhstan species: *Psammotettix volgensis* Prid.; range unknown: *Chlorita viridula* Fall.

VI. Groups of Species Occurring in Meadow and Forest Habitats

As it was mentioned, many mesophilic species of Cicadina are equally common in the meadows and in various woodland habitats. Some species change meadow habitats in northern part of the range to forest habitats in the south.

16. A group of species occurring in the woodland marshes and meadows combines the most hygrophilic species of the suborder Cicadina associated mainly with graminean and sedge vegetation of waterlogged habitats and moist parts of forests and meadows. By its composition, the group is related to the Emeljanov's (1969) group of cryophilic water and marsh species.

Holarctic species: *Javesella obscurella* Boh., *Forcipata citrinella* Zett., *Macrosteles fieberi* Edw.; transpalaearctic species: *Kelisia ribauti* Wagn., *Stroggylocephalus agrestis* Fall.; western Palaearctic species: *Stenocranus minutus* F., *Notus flavipennis* Zett., *Eupteryx stachydearum* Hardy, *Macrosteles horvathi* Wagn.; Hespero-Hiadian species: *Kelisia guttula* Germ., *Micantulina micantula* Zett., *Cicadula flori* J. Shlb., *C. quadrinotata* F., *Limotettix striola* Fall.; superatlantic Hespero-Hiadian species: *Kelisia vittipennis* J. Shlb., *Arthaldeus pascuellus* Fall.; Hiadian species: *Stenocranus fuscovittatus* Stål, *Euconomelus lepidus* Boh., *Muellerianella extrusa* Scott, *Stroggylocephalus livens* Zett., *Cicadula persimilis* Edw., *Macustus grisescens* Zett., *Athysanus quadrum* Boh., *Metalimnus steini* Fieb.; superatlantic Hiadian species: *Megamelus notula* Germ., *Javesella forcipata* Boh., *Ommatidiotus dissimilis* Fall., *Forcipata forcipata* Fl., *Cicadula frontalis* H.-S., *Athysanus argentarius* Met., *Metalimnus formosus* Boh., *Cosmotettix costalis* Fall.; Western Hiadian species: *Xanthodelphax stramineus* Stål, *Macrosteles viridigriseus* Edw., *Cicadula albingensis* Wagn., *Cosmotettix edwardsi* Lindb.; superatlantic subboreal species: *Kelisia praecox* Hpt.; Euro-Hesperian species: *Muellerianella brevipennis* Boh., *Anoscopus serratulae* F., *Streptanus sordidus* Zett.; European species: *Conomelus lorifer dehneli* Nast, *Delphacodes venosus* Germ., *Acanthodelphax denticauda* Boh., *Aspinosus* Fieb., *Anoscopus albiger* Germ., *Eupteryx florida* Rib., *Macrosteles oshanini* Razv.

17. A group of moist meadow woodland species combines hygromesophilic and eumesophilic inhabitants of the herbaceous layer in more or less humid meadows and forest biotopes. Two species from this group (*Cixius similis* Kbm. and *Cicadella viridis* L.) are found not only on grass, but also on shrubs and trees.

Holarctic species: *Javesella pellucida* F., *Streptanus aemulans* Kbm.; transpalaearctic species: *Kelisia pallidula* Boh., *Lepyronia coleoptrata* L., *Evacanthus acuminatus* F., *E. interruptus* L., *Cicadella viridis* L.; Western Palaearctic species: *Macrosteles septemnotatus* Fall., *Hardya tenuis* Germ.; Hespero-Hiadian species: *Hyledelphax elegantulus* Boh., *Javesella dubia* Kbm.; Hiadian species: *Macrosteles sexnotatus* Fall.; superatlantic Hiadian species: *Cixius similes* Kbm., *Eupteryx cyclops* Mats.; Western Hiadian species: *Eupteryx aurata* L., *E. calcarata* Oss., *Arthaldeus striifrons* Kbm.; western subboreal species: *Stenocranus major* Kbm.; Euro-Hesperian species: *Eupteryx vittata* L.; species with unknown range: *Mulleriranellla fairmairei* Perr.

Table 3. Habitat distributions of Cicadina in the Central Chernozem Region

Habiatats	Number of species	%
Coniferous forest	1	0.3
Small-leaved forest	46	12.1
Broadleaf forest	27	7.1
Deciduous forest	18	4.7
Forest shrublet	2	0.5
Forest herbage	6	1.6
Forest	13	3.4
Steppe shrublet	1	0.3
Motley grass + graminean steppe	6	1.6
Tussock grass steppe	4	1.1
Euryxerophilic	10	2.6
Near water	13	3.4
Solonetz-meadow	6	1.6
Solonetz and salt flat	4	1.1
Meadow	8	2.1
Marsh and meadow woodland	47	12.3
Moist meadow woodland	20	5.3
Dry meadow woodland	22	5.8
Meadow woodland	53	13.8
Meadow-steppe	44	11.6
Eury-xero-mesophilic	25	6.6
Undetermined		1.1
Total	380	100.0

18. A group of meadow woodland species consists of eumesophilic and xeromesophilic inhabitants of dry meadows and forests (mainly pine forests). Two species (*Empoasca pteridis* Dhlb. and *Arboridia pusilla* Rib.) were recorded from grass and also from shrubs and trees.

Palaearcto-Oriental species: *Austroasca vittata* Leth.; transpalaearctic species: *Eupelix cuspidata* F., *Mocuellus collinus* Boh.; Western Palaearctic species: *Euscelidius schenkii* Kbm.; Hespero-Hiadian species: *Koswigianella exigua* Boh., *Turrutus socialis* Fl.; Hiadian species: *Ophiola decumana* Kontk.; superatlantic Hiadian species: *Psammotettix poecilus* Fl.; Western Hiadian species: *Chlorita paolii* Oss.; Western Palaearctic southern species: *Asiraca clavicornis* F., *Dictyophara curopaca* L.; superatlantic subboreal species: *Enantiocephalus cornutus* H.-S.; Euro-Scytho-Stenopean species: *Rhoananus hypochlorus* Fieb.; European- Western Scythian species: *Eupteryx adspersa* H.-S.; Euro-Hesperian species: *Neophilgenus campestris* Fall., *Psammotettix nodosus* Rib.; European species: *Arboridia pusilla* Rib., *Mocydiopsis attenuata* Germ.; Central and Eastern European species: *Zyginidia viaduensis* Wagn., *Balclutha calamagrostis* Oss., *Psammotettix makarovi* Mor.; species with unknown range: *Empoasca pteridis* Dhlb.

19. A group of meadow and woodland species was distinguished for species with rather wide spectrum of habitats that occur in various meadow and forest communities. Similarly to the preceding groups, some species are found both on herbs and woody plants.

Holarcto-Oriento-Australian species: *Balclutha punctata* F.; Palaearcto-Oriental species: *Laodelphax striatellus* Fall.; Holarctic species: *Ribautodelphax albostriatus* Fieb., *Dikraneura variata* Hardy, *Macrosteles laevis* Rib., *Deltocephalus pulicaris* Fall., *Endria nebulosa* Ball, *Thamnotettix confinis* Zett., *Psammotettix confinis* Dhlb., *P. striatus* L.; transpalaearctic species: *Philaenus spumarius* L., *Neophilaenus lineatus* L., *Arboridia parvula* Boh.; superatlantic species: *Dicranotropis hamata* Boh., *Elymana sulphurella* Zett., *Arocephalus languidus* Fl.; Western Palaearctic species: *Agallia brachyptera* Boh., *Anaceratagallia ribauti* Oss., *Anoscopus histrionicus* F., *Macrosteles quadripunctulatus* Kbm.; Hespero-Hiadian species: *Aphrophora alni* Fall., *Doratura stylata* Boh., *Graphocraerus ventralis* Fall., *Errastunus ocellaris* Fall.; superatlantic Hespero-Hiadian species: *Ribautodelphax collinus* Boh., *Diplocolenus abdominalis* F.; Hiadian species: *Batracomorphus allionii* Turt., *Anoscopus flavostriatus* Don., *Rhopalopyx preyssleri* H.-S., *Elymana kozhevnikovi* Zachv., *Stictocoris picturatus* C. Shlb.; superatlantic Hiadian species: *Eurysula lurida* Fieb., *Eupteryx notata* Curt.; Western Hiadian species: *Cixius distinguendus* Kbm., *Xanthodelphax flaveolus* Fl., *Zygina hyperici* H.-S., *Hesium domino* Reut., *Jassargus flori* Fieb.; superatlantic southern species: *Recilia horvathi* Then; panpalaearctic southern species: *Gravesteiniella boldi* Scott, *Tettigometra obliqua* Panz.; Euro-Hesperian species: *Reptalus panzeri* Löw, *Utecha trivia* Germ., *Anoscopus albifrons* L., *Eupteryx atropunctata* Goeze; Euro-Scythian species: *Ditropsis flavipes* Sign., *Empoasca affinis* Nast, *Handianus flavovarius* H.-S.; Eastern European-Ponto-Kazakhstan species: *Adarrus emeljanovi* Mit.; European species: *Eupteryx tenella* Fall.; introduced species: *Stictocephala bisonia* Kopp & Yonke.

VII. Groups of Species from Meadow and Steppe Habitats

Many Cicadina species occur in various meadow and steppe biotopes.

20. A group of meadow-steppe species is represented by species occurring in meadow and steppe biotopes (frequently saline ones).

Palaearcto-Oriental species: *Neoaliturus fenestratus* H.-S.; transpalaearctic species: *Planaphrodes bifasciata* L., *Platymetopius undatus* De G.; superatlantic species: *Planaphrodes laeva* R.; Western Palaearctic species: *Muirodelphax aubei* Perr., *Hephathus nanus* H.-S., *Emelyanoviana mollicula* Boh.; superatlantic southern species: *Batracomorphus irroratus* Lew., *Neoaliturus guttulatus* Kbm., *Psammotettix kolosvarensis* Mats., *Diplocolenus frauenfeldi* Fieb.; Western Palaearctic southern species: *Reptalus melanochaetus* Fieb., *Hyalesthes obsoletus* Sign., *Tettigometra atra* Hag., *T. griseola* Fieb., *Handianus procerus* H.-S.; panpalaearctic southern species: *Tettigometra impressopunctata* Duf., *Micantulina stigmatipennis* R., *Mocydia crocea* H.-S.; western subboreal species: *Artianus interstitialis* Germ.; Euro-Scythian species: *Reptalus quinquecostatus* Duf., *Zyginidia pullula* Boh.; European- Western Scythian species: *Chlorita dumosa* Rib.; Scythian- Northern Turanian species: *Handianus arnoldii* Em.; Western Scythian- Irano-Turanian species: *Psammotettix pictipennis* Kbm.; Western Scythian- Northern Turanian species: *Reptalus rufocarinatus* Kusn., *Chlorita prasina* Fieb., *Ch. forcipigera* Kir., *Taurotettix beckeri* Fieb., *Mogangina bromi* Em.; Scythian species: *Metropis mayri* Fieb., *Laburrus pellax* Horv., *Pantallus alboniger* Leth., *Mendrausus pauxillus* Fieb.; Western Scythian species: *Dicranotropis beckeri* Fieb., *Tettigometra depressa* Fieb., *Macropsidius sahlbergi* Fl., *Chlorita thymi* Em., *Hauptidia cretacea* Mor., *Diplocolenus parcanicus* Dlab., *Mocuellus quadricornis* Dlab.; Ponto-Kazakhstan species: *Emeljanovianus magnus* Mit.; Pontian species: *Alloscelis vittifrons* Iv.; species with unknown range: *Aphrodes bicincta* Schrank.

21. A group of euryxeromesophilic species, occurring in various xero-mesophytic and meso-xerophytic habitats, including forest ones. Four eury-xero-mesophilic species (*Gargara genistae* F., *Macropsis sibirica* Kusn., *Handianus cytisi* Zachv., and *H. ignoscus* Mel.) associated with shrublets.

Palaearcto-Ethiopian-Oriental species: *Gargara genistae* F.; Holarctic species: *Pinumius areatus* Stål; transpalaearctic species: *Pentastiridius leporinus* L., *Doratura homophyla* Fl., *Laburrus impictifrons* Boh., *Euscelis distinguendus* Kbm., *Rhopalopyx vitripennis* Fl.; superatlantic species: *Anaceratagallia venosa* Fourc.; Western Palaearctic species: *Doratura impudica* Horv.; panpalaearctic southern species: *Platymetopius rostratus* H.-S.; Euro-Scytho-Stenopean species: *Jassargus repletus* Fieb.; Euro-Scythian species: *Chlorita mendax* Rib., *Doratura exilis* Horv., *Ophiola transversa* Fall.; Western Scythian- Northern Turanian species: *Handianus ignoscus* Mel.; Scythian species: *Eurybregma nigrolineata* Scott, *Bobacella corvina* Horv., *Psammotettix koeleriae* Zachv., *Macropsis sibirica* Kusn.; Western Scythian species: *Hyalesthes philesakis* Hoch, *Metropis inermis* Wagn., *Ommatidiotus inconspicuous* Stål, *Jassargus ukrainicus* Logv., *Emeljanovianus signatus* Hpt., *Handianus cytisi* Zachv.

Association of four species with any station was not determined.

Pontian species: *Paradelphacodes gvosdevi* Mit.; species with unknown range: *Chlorita nervosa* Fieb., *Goniagnathus* sp., and *Recilia coronifera* Marshall.

The distribution of auchenorrhynchs of the Central Chernozem Region between groups of stations is given in Table 3.

COMPARATIVE ANALYSIS OF ZOO-GEOGRAPHICAL AND STATION DISTRIBUTION OF CICADINA

Distribution of auchenorrhynchs in the Central Chernozem Region by zoogeographical and station groups is shown in Table 4. Only the most general entities are represented in this table for the sake of economy. This lack of specification, however, does not affect the analysis. Also, the order of groups is somewhat changed in the table; groups are arranged more or less according to the aridity of the climate in the ranges or to the increase of xerophytization of the habitats.

As Table 4 shows, species associated with forest stations possess diverse ranges. The largest fraction of forest species is widespread in the Hiadian Subregnum of the Palaearctic (these are mostly species occurring in small-leaved forests); many species have European ranges; most of them occur in broadleaf forests and form the bulk of their fauna. A rather high percentage

Table 4. Comparative distribution of Cicadina of the Central Chernozem Region by zoogeographical and habitat groups

Habital groups	Zoogeographical groups													Total
	I	II	V	XI	III	VIII	IX	VII	IV	XII	X	VI	XIII	
Forest	6	14	33	25	9	11	2	3	4	2			4	113
Forest-meadow	16	26	41	13	17	10	6	3	7				3	142
Meadow		1	1	1		1				1	2		1	8
Near water		1	5	1			1		2	2		1		13
Meadow-steppe	3	13					7	1	13	23	8		1	69
Steppe									3	9	8	1		21
Saline							2		1	6	1			10
Undetermined										1			3	4
Total:	25	55	80	40	26	22	18	7	30	44	19	2	12	380

Table 4. (Contd.)

Habitual groups	Zoogeographical groups					
	IV	XII	X	VI	XIII	Total
Forest	4	2			4	113
Forest-meadow	7				3	142
Meadow		1	2		1	8
Near water	2	2		1		13
Meadow-steppe	13	23	8		1	69
Steppe	3	9	8	1		21
Saline	1	6	1			10
Undetermined		1			3	4
Total:	30	44	19	2	12	380

Notes: I, interregnal ranges; II, bore0-subtropical ranges; III, Hespero-Hiadian ranges; IV, southern ranges; V, Hiadian ranges; VI, Tethyan ranges; VII, subboreal ranges; VIII, Euro-Hesperian ranges; IX, Euro-Scythian ranges; X, Scytho-Sethian Ranges; XI, European ranges; XII, Scythian ranges; XIII, introduced species and species with unknown ranges.

of species is characteristic of boreo-subtropical (species occurring in small-leaved forests and polyphagous woodland species), Hespero-Hiadian (the majority of species is represented by polyphagous woodland species), Euro-Hesperian (mainly species occurring in broadleaf forests) species, and also species with interregnal ranges. Species with ranges including parts of the Tethyan Subregnum of the Palaearctic are associated there mainly with flood-land forests and forests growing in ravines and, less frequently, with mountain forests. Forest species include zonal elements of the fauna (species occurring in broadleaf forests) and also intrazonal, including azonal (species occurring in forests, deciduous forests, and small-leaved forests), extrazonal (species occurring in coniferous forests), and intrazonal (species occurring in forest herbage) elements.[3]

The distribution of ranges of woodland meadow species is characterized by approximately the same regularities as the distribution of forest species. Species of this group possess very diverse ranges; however, by contrast to forest species, the fraction of wide ranges (interregnal, boreo-subtropical, HesperoHiadian, and Hiadian) is noticeably higher. Similarly to the group of forest species, the largest number of species possesses Hiadian ranges. Broader ranges of the species of this complex are well explained by broader ecological valence of the species, many which are polyphagous or oligophagous on gramineans. In addition, as it was mentioned above, they are able to adopt different habitats: in northern regions, they are found in the warmer open habitats, whereas in more southern regions they prefer shaded, often excessively humid stations. Thus, woodland meadow species are mainly azonal elements of the Cicadina fauna of the CCR.

No associations with any types of range are characteristic of species occurring in near-water habitats.

[3] Classification of intrazonal plant groupings was elaborated by V.V. Alekhin (1936; cited from Chernov, 1975).

Almost equal numbers of species are associated with Tethyan and Hiadian subregna of the Palaearctic. Similar to the preceding group, species occurring near water also are mainly azonal elements of the regional fauna.

Species from meadow-steppe habitats can be rather easily subdivided into two groups, differing in their relation to the habitat humidity. Some of them, e.g., *Muirodelphax aubei* Perr., *Hephathus nanus* H.-S., *Rhopalopyx vitripennis* Fl., etc. are eurytopic species occurring both in the more or less mesophytic and in highly xerophytic environment. They are azonal elements of the CCR fauna with wide ranges (southern or even boreo-subtropical ones). Other species, by contrast, being xero-mesophilic and meso-xerophilic, are associated mainly with the forest-steppe zone and the subzone of the northern steppe. These species include, e.g., *Pantallus alboniger* Leth., *Emeljanovianus magnus* Mit., *Psammotettix koeleriae* Zachv., etc.; their ranges stretch mainly along the Scythian region of the Palaearctic. These are the zonal elements of the fauna.

Species of steppe habitats are characterized by ranges situated within the Scythian Region of the Palaearctic or slightly extending into the neighboring regions, mainly the Setian Region (this is especially true for euryxerophilic species). Steppe species, together with meadow-steppe species, form the second large zonal species group after the group of species occurring in broadleaf forests.

The arealogical pattern of species from saline habitats is similar to that of the steppe species, but the former are extra-intrazonal elements of the fauna.

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