

## History of study and a brief survey of the araneofauna of the Left-Bank Ukraine (Araneae)

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**Abstract:** A brief history of the development of the Ukrainian arachnology from the 70s of the 18th century till recently is given, with a detailed analysis of spider study of the Left-Bank Ukraine. According to original and literature data, 716 spider species from 34 families have been registered in the area in question, 41 species need confirmation. The Linyphiidae is the richest in species family followed by Salticidae and Gnaphosidae. The zoogeographical analysis demonstrated that the main part of the fauna is represented by widespread species. The boundary of distribution of several Asiatic and Mediterranean species passes through the investigated area.

**Key words:** spiders, faunistics, zoogeography, Left-Bank Ukraine

### Introduction

The development of arachnology and the accumulation of faunistic and ecological data have encouraged us to launch systematization of obtained results. The information on Ukrainian spiders is scattered in different papers, mainly written in Russian and unavailable for western specialists. Mikhailov's catalogue of spiders of the territories of the former USSR (MIKHAILOV 1997) points out the records of species for Ukraine as a whole, distinguishing the Crimea and the Carpathians. Kharitonov's catalogue is more precise, but it was published as far back as 1932. Nowadays, summary of recent knowledge is needed. This paper is a preliminary overview of the history of spider study and the data collected in the process of elaboration of a catalogue of spiders of the Left-Bank Ukraine.

### Study Area and Materials

Ukraine, a former republic of the Soviet Union, is situated in East Europe between 44°26' - 52°36' N and 22°9' - 40°15' E, and covers the area of 603 700 km<sup>2</sup>. It borders with Russia in the North and East, and with Poland, Slovakia, Hungary, Moldova, and Romania in the West. The main part of the country is located within the East European, or Russian Plane, with the Carpathians in the West and the Crimea peninsula in the South. The main territory (55% in the forest zone and 90% in the steppe zone) has been ploughed up. Virgin steppes have remained only in nature reserves and unarable lands. Pine, mixed and deciduous (mainly oak) forests grow in flood lands and the flat interfluges of the forest and forest-steppe zones. There is a vast net of meadows, often overgrazed or mowed, bogs and wetlands preserved. Coastal habitats and saline marshes are typical for the southern part; chalk, granite and limestone outcrops are spread in the East.

Three main botanical zones are represented in Ukraine: forest, forest-steppe and steppe.

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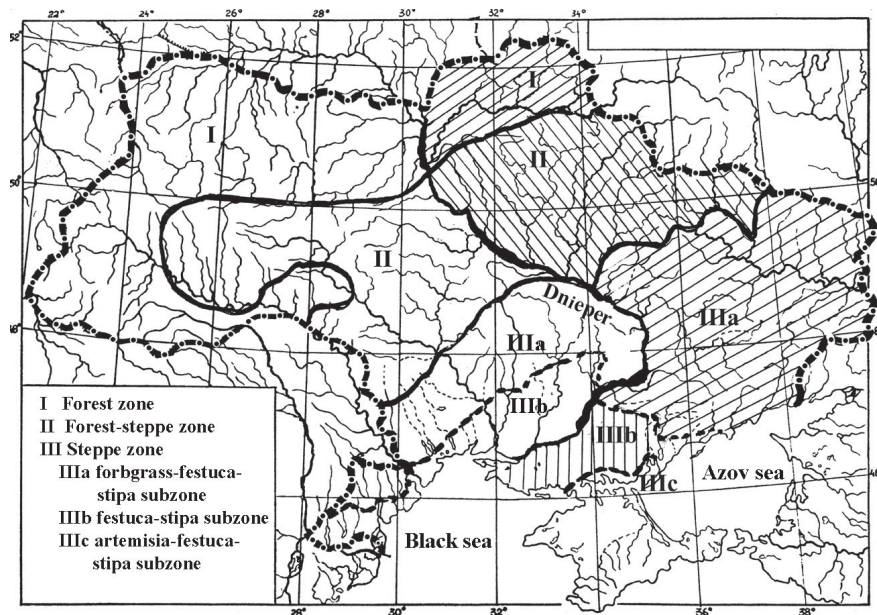


Fig. 1. Map of Ukraine.

The latter, according to the geo-botanical ranging (GEO-BOTANICAL RANGING OF THE UKRAINIAN SSR 1977) is divided, in its turn, into three subzones: forbgrass-festuca-stipa steppe, festuca-stipa, and artemisia-festuca-stipa, or semi-desert steppe (Fig. 1). Traditionally, from historical and physiographic point of view, the main river of Ukraine - the Dnieper, divides it into two parts - the so-called Right-Bank Ukraine and the Left-Bank Ukraine, which differ in the specificity of their flora and fauna. So, the Left-Bank part is the area stretching from the left river bank in the West to the frontier in the North and East and to the Azov and Black seashore in the South. The landscape is mainly flat not higher than 360 m above the sea level, with the southwestern hills of the Central Russian Upland in the Northeast and the Donetsk chain of hills in the Southeast.

Spiders were collected in 123 localities in 8 administrative regions. Apart of our private collections we have re-examined also all the collections preserved in the following institutions: Zoological Museum of Moscow State University, Zoological Institute of the Russian Academy of Science, St-Petersburg (Russia), Museum of Nature of the Kharkov State University (Ukraine). Unfortunately, many collections have been lost, not only the old ones, but also some of the modern ones (Table 1), and the presence of many species cannot be proved.

## Results and Discussion

### The history of spider study in Ukraine

Arachnology in Ukraine developed as part of the science of the Russian Empire and later of the USSR. The history was briefly described and presented by Kirill Mikhailov at the 21<sup>st</sup> European Colloquium of Arachnology and its proceedings (MIKHAILOV 2004). The first data about spiders of modern Ukraine were scattered in the works of famous Russian and foreign naturalists. Thus, FALK (1786) and GMELIN (1788) found *Lycosa singoriensis* (LAXMANN, 1770) in the Crimea Peninsula, and that was the first spider species mentioned for Ukraine.

The first period of the accumulation of faunistic knowledge goes back to the 30s of the 18th century: 10 species were recorded for the Zhitomir and the North Kiev Region, 10 species

for the South of Khmel'nitsk Region (EICHVALD 1830, here and further we give the contemporary administrative division); 2 species for the Zaporozhye Region (SCHLATTER 1836); 5 for the Kharkov and 3 for Odessa regions (KRYNICKI 1837); 17 species were found in the vicinities of Kamyanets-Podolsk, Khmel'nitsk Region (BELKE 1853, 1859); 5 species in the Dniepropetrovsk Region (NORDMANN 1863); and one in Melitopol, the Zaporozhye Region (SHATILOV 1866). The first true arachnological review belongs to REINGARD (1874, 1877), who registered 32 species in the Kharkov Region. The well known work by THORELL, 'Verzeichniss Südrussischer Spinnen', was issued in 1875, and enriched significantly the knowledge on spiders of the Russian Empire. It contains 245 records for the contemporary Kharkov, Dniepropetrovsk, Kherson, Odessa regions and the Crimea. Afterwards, at the end of 19th/beginning of 20th century, besides short notes (SCHMIDT 1895, LEBEDINSKY 1914, STRAND 1910, SPASSKY 1914 and others), detailed lists of species for several localities and governments were published by different authors. LUKYANOV (1897) published on the spiders of Chernigov, Kiev and Poltava regions, a total of 79 species; FREIBERG (1897) investigated the vicinity of Dniepropetrovsk, 29 species; GRESE (1909) – Provalye, the Lugansk Region, 55 species; SPASSKY (1927) – Crimea and the Kherson Region, 136 species; PERELESHINA (1931) – the Odessa, Nikolaev, Kherson regions, a total of 47 species. The culmination of the first period of the spider research in the former Russian Empire and the USSR was the 'Katalog der Russischen Spinnen' by KHARITONOV (1932) and its addition (1936). By the early 30s of the 20th century 377 species were registered in Ukraine (excl. western provinces, which were not part of the USSR at that time).

After this period a more than 30-year gap in spider research followed, which can be explained by the historical and political situation in the USSR (the Second World War, repressions), and the third modern period began in the 70s with the PhD thesis by LEGOTAY (1973), mentioning 341 spider species from the Ukrainian Carpathians. Later on, the research of Ukrainian fauna was carried out quite unevenly. There are still many black spots in the central and western parts. According to the catalogue of spiders of the territories of the former Soviet Union (MIKHAILOV 1997), in August 1996, 808 species were registered in Ukraine, including 421 species in the Carpathians and 311 species in Crimea. The research of the Crimean fauna was renovated in 2000 by Kovblyuk, who published the preliminary catalogue of spiders of the Crimea Peninsula, mentioning 473 species (KOVBLYUK 2003b).

The fauna of the Left-Bank Ukraine turned out to be best investigated, which gives sufficient data for the analysis. On the basis of 22 literature sources, KHARITONOV (1932) reported 181 spiders (178 according to the modern classification). In this article we mention only the first and main papers (Table 1). Purposive study of the Polesye (forest zone) began in the 90s of the last century with the Evtushenko's investigations (EVTUSHENKO 1991 a, b, 1993). Before his works, there were only several species known due to Lukyanov's paper (LUKYANOV 1897). Now 385 species are recorded in this area. Many researchers have worked and are still working in the forest-steppe zone: REINGARD (1874, 1877) and THORELL (1875); in the modern period – ASTAKHOVA (1974, 1978), KIRILENKO, LEGOTAY (1981), POLCHANINOVA (2003), and especially GNELITSA (1993, 1997, 2000 b, c, 2001), who investigated the main habitats of the Sumy Region with particular interest to the systematics and ecology of the Linyphiidae. Four hundred forty-seven species are currently known from this region. The research of the steppe zone was carried out by THORELL (1875), FREIBERG (1897), PERELESHINA (1927), SPASSKY (1914, 1927), GRESE (1909) in the 18th – early 20th century (Table 1), and were continued by GURYANOVA (1992, 1993), POLCHANINOVA (1990 b, 1992, 1996) and PROKOPENKO (2001, 2002). As a result, 569 species are presently known from the Ukrainian steppes.

The main lines of recent investigations are ecological-faunistic research, and systematics of some families, particularly Gnaphosidae and Linyphiidae (due to the works by GNELITSA since

**Table 1.** Three periods of the spider research in the Left-Bank Ukraine. Abbreviations: ZIN RAN – Zoological Institute of the Russian Academy of Sciences, St. Petersburg; Zoomuz MSU – Zoological Museum of Lomonosov Moscow State University, Moscow; KhNU–Kharkov National University, Kharkov; STTI – Sumy Teachers’ Training Institute, Sumy; DonNU – Donetsk National University, Donetsk; TNU – Taurian National University, Simferopol; Inst. of Zoology – Institute of Zoology, Kiev; Naturhistoriska Rijkmus – Museum of Nature History, Stockholm; p. c. – private collection.

Author	1836-1930s				1940s-1960s	1970s till recently			
	Year of publication	Number of species recorded	Species deposition			Collector	Years of research	Number of species found	Species deposition
Schmidt	1836	2	ZIN RAN		–	Astakhova	1974-1978	134	Mus. of Nature, KhNU
Krynicky	1837	5	ZIN RAN			Zyuzin	since 1976	10	p.c., Alma-Ata
Reingardt	1874, 1877	32	lost			Talanov, Nazarenko	1989	220	lost
Thorell	1875	88	Naturhis-toriska Rijkmus			Kirilenko, Legotay	1981, 1984	158	lost
Freiberg	1897	29	lost			Polchaninova	since 1984	646	p.c., KhNU
Lukyanov	1897	27	lost			Gnelitsa	since 1990	164	p.c., STTI
Greze	1909	55	Zoomus. MSU			Guryanova	since 1991	130	p.c., Inst. of Zoology
Spassky	1914, 1927	43	ZIN RAN			Evtushenko	since 1991	373	p.c., Inst. of Zoology
Pereleshina	1927	21	Zoomus. MSU			Prokopenko	since 1997	446	p.c., DonNU
Kharitonov	1932, 1936	181				Kovblyuk	since 1997	40	Dpt. of Zoology, TNU
178 species according to the modern classification						716 species recorded, 41 need confirmation			

1990 and those of KOVBLYUK – 2003 a, 2004). A number of papers deal with the fauna inventory of nature reserves and other protected territories (GURYANOVA, KHOMENKO 1991, POLCHANINOVA 1988, 1990 a, 1997, 2001, PROKOPENKO 1998 a, GNELITSA 2000a), transformed lands - coal mine spoiled banks (PROKOPENKO 1998 b, 2001), city parks (PROKOPENKO 2000, 2003, PROKOPENKO, MARTYNOV 2003); and buildings (EVTUSHENKO 2000). These works investigate mainly the ecological aspects of forming and dynamics of the spider communities, and the impact of the anthropogenic pressure on their structure. Several works were devoted to phenology (ZYUZIN, TYSHCHENKO 1978) and trophoecology – spiders in the nestlings' food (POLCHANINOVA, PRISADA 1995) or vice versa, spiders as predators and their preys in agroecosystems (POLCHANINOVA 1990 c, 1993).

### **The survey of the spider fauna**

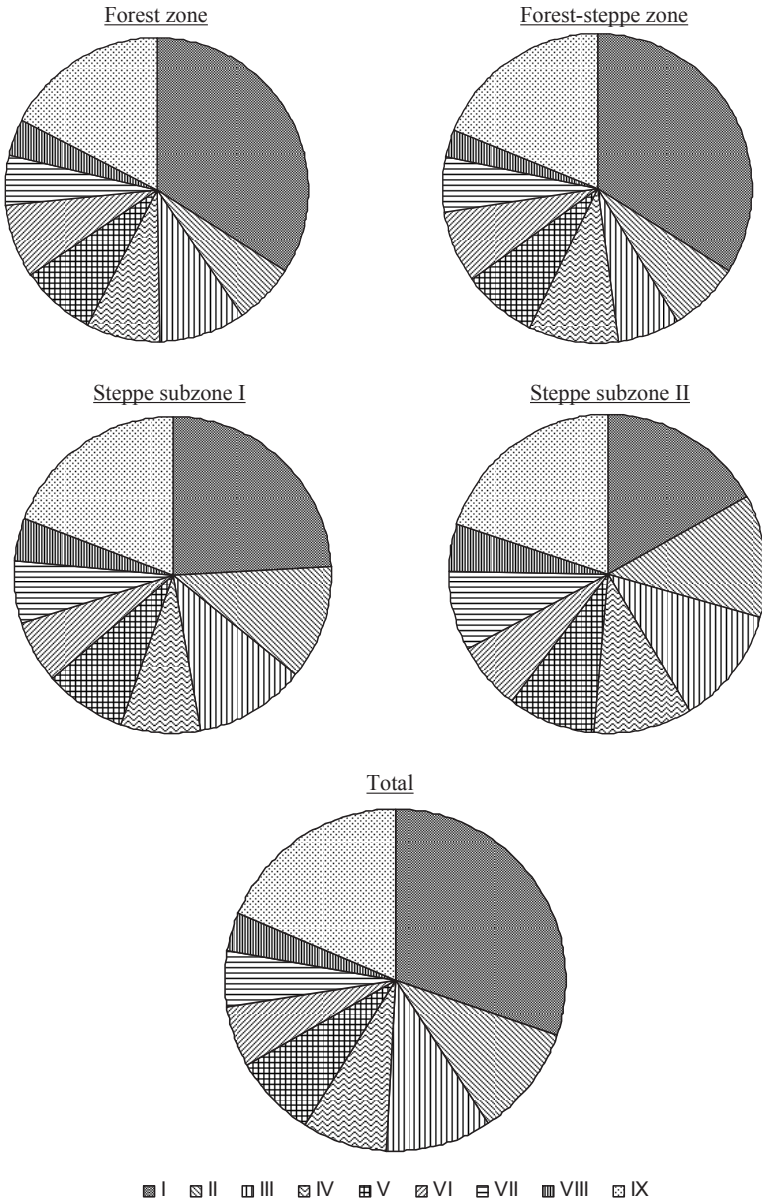
According to personal and literature data, by September 2005, 716 spider species from 34 families have been recorded in the Left-Bank Ukraine. Twenty two species were described from the area, 16 of them are valid. The records of 41 species cannot be confirmed because of the lack of material. We have put them in an additional list, and will further deal with only 675 species.

As a result of our research, 385 species have been registered in the forest zone, 447 in the forest-steppe, 565 in the steppe, among them 518 in the forbgrass-festuca-stipa subzone (further Steppe I), and 407 in the festuca-stipa one (further Steppe II). The third, semi-desert subzone has not been investigated so far (Table 2). As we can see, the fauna of the first steppe subzone is the richest. It is stipulated by both objective reasons – vast territory and habitat diversity (from flood land and ravine forests in the North to dry steppes, coastal biotopes and saline marshes in the South), and subjective one – being better investigated. As in many regional faunas in Palearctic, family Linyphiidae is best represented; Gnaphosidae and Salticidae are 3 times less numerous in species (Table 2). Their comparative richness among the species of the second rank is determined by the fauna of the southern areas. The next rich in species families are Lycosidae, Theridiidae, Araneidae, and Thomisidae. Eight main families make up 81% of the fauna. Their ratio changes towards the South. Naturally, in the forest and forest-steppe zone, the share of Linyphiidae increases, while that of Salticidae, Gnaphosidae, Philodromidae, and Thomisidae decreases. It is especially noticeable in the second steppe subzone, where the difference between Linyphiidae and Gnaphosidae amounts to less than 5% (Fig. 2). The number of Lycosidae decreases in the forest zone, while that of Araneidae and Theridiidae differs without a visible zonal trend (Fig. 2).

We have analyzed the zoogeographic composition of the araneofauna of the Left-Bank Ukraine and, according to the current distribution of species, 21 main chorotypes were distinguished and further grouped into 7 complexes. I – Cosmopolitan and Multiregional, II – Holarctic, III – Transpalearctic and Transeurasiatic, IV – West-Central Palearctic (9 groups, more or less widely distributed from Europe to the East, but do not reach the Pacific Ocean); V – European, VI – Mediterranean - Asiatic, VII – disjunctive (Euro-American, Amphipalaearctic, etc). The classification was adopted from GORODKOV (1984). As expected, the majority of species have wide areas. Holarctic ones amount to 15 % (Fig. 3), Transeurasiatic - 14%, Transpalearctic are of less importance (5%). These species with circum- and transareas, together with the complex of Cosmopolitan and Multiregional ones, comprise 36% of the fauna. The West-Central Palearctic complex is the most numerous - 46.5%; of these the group of Euro-Siberian species is the biggest (14% of the fauna as a whole). The widely distributed West-Central Palearctic species (from Europe and North Africa to West or Middle Siberia and Central Asia) and Westpalearctic (not further than West Siberia, Kazakhstan and Caucasus) are poorly represented (about 5%). A complex with different kinds of European ranges makes up 13%. As a whole these species are widespread in Europe, and only 2.7% of the fauna is restricted to East Europe, or Middle and East, or South and East Europe. Eleven species are distributed from the Mediterranean region to Central or Middle

**Table 2.** Species composition of the spider families in different zones and subzones of the Left-Bank Ukraine. Abbreviations: Steppe I – Forbgrass-festuca-stipa subzone, Steppe II – Festuca-stipa subzone, NS – Number of species.

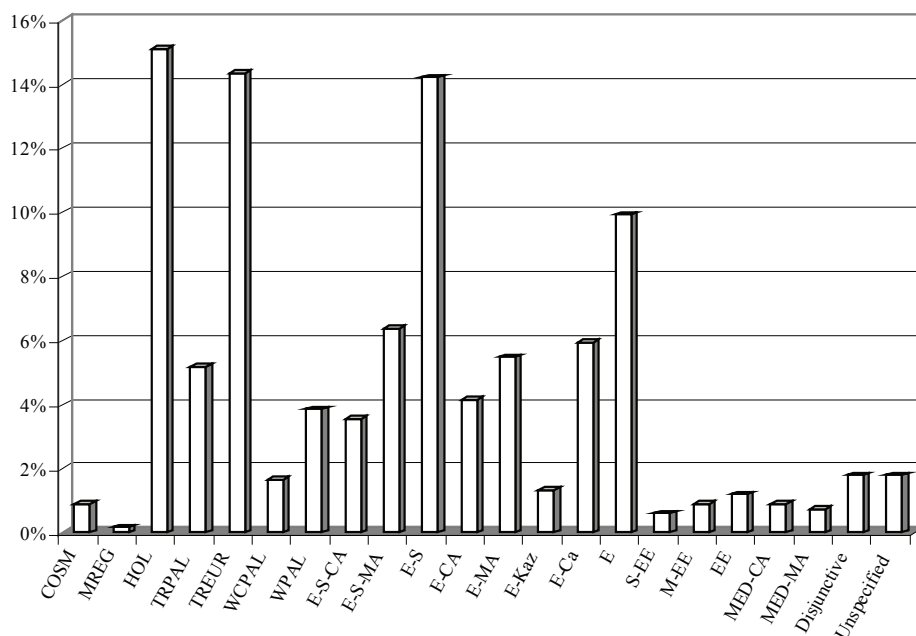
Families	Total		Forest zone		Forest-steppe		Steppe I		Steppe II	
	NS	%	NS	%	NS	%	NS	%	NS	%
Atypidae	2	0.3	0	0.0	2	0.4	1	0.2	1	0.2
Scytodidae	1	0.1	1	0.3	1	0.2	1	0.2	1	0.2
Pholcidae	3	0.4	2	0.5	3	0.7	3	0.6	3	0.7
Segestriidae	1	0.1	0	0.0	1	0.2	1	0.2	0	0.0
Dysderidae	5	0.7	1	0.3	1	0.2	5	1.0	3	0.7
Oonopidae	1	0.1	1	0.3	0	0.0	0	0.0	0	0.0
Mimetidae	3	0.4	2	0.5	1	0.2	3	0.6	2	0.5
Oecobiidae	1	0.1	1	0.3	0	0.0	0	0.0	0	0.0
Eresidae	1	0.1	0	0.0	1	0.2	1	0.2	1	0.2
Uloboridae	1	0.1	0	0.0	1	0.2	1	0.2	1	0.2
Nesticidae	1	0.1	0	0.0	1	0.2	0	0.0	0	0.0
Theridiidae	52	7.7	31	8.1	35	7.8	43	8.3	36	8.8
Linyphiidae	204	30.2	130	33.8	151	33.8	125	24.1	69	17.0
Tetragnathidae	13	1.9	10	2.6	13	2.9	13	2.5	10	2.5
Araneidae	40	5.9	30	7.8	34	7.6	34	6.6	29	7.1
Lycosidae	55	8.1	30	7.8	41	9.2	41	7.9	41	10.1
Pisauridae	3	0.4	3	0.8	3	0.7	3	0.6	2	0.5
Agelenidae	7	1.0	5	1.3	5	1.1	6	1.2	4	1.0
Argyronetidae	1	0.1	1	0.3	1	0.2	1	0.2	1	0.2
Hahniidae	4	0.6	3	0.8	3	0.7	2	0.4	1	0.2
Dictynidae	22	3.3	9	2.3	10	2.2	15	2.9	12	2.9
Titanoecidae	6	0.9	2	0.5	3	0.7	3	0.6	5	1.2
Oxyopidae	3	0.4	1	0.3	2	0.4	2	0.4	2	0.5
Anyphaenidae	1	0.1	1	0.3	1	0.2	1	0.2	1	0.2
Liocranidae	9	1.3	4	1.0	7	1.6	8	1.5	7	1.7
Clubionidae	17	2.5	12	3.1	13	2.9	14	2.7	11	2.7
Miturgidae	9	1.3	4	1.0	6	1.3	8	1.5	7	1.7
Zodariidae	2	0.3	0	0.0	0	0.0	2	0.4	1	0.2
Gnaphosidae	72	10.6	26	6.8	34	7.6	60	11.6	52	12.8
Zoridae	6	0.9	4	1.0	5	1.1	5	1.0	4	1.0
Sparassidae	1	0.1	1	0.3	1	0.2	1	0.2	1	0.2
Philodromidae	24	3.6	15	3.9	12	2.7	23	4.4	19	4.7
Thomisidae	36	5.3	20	5.2	26	5.8	32	6.2	32	7.9
Salticidae	68	10.1	35	9.1	29	6.5	60	11.6	48	11.8
	675	100	385	100	447	100	518	100	407	100



**Fig. 2.** Contribution to species diversity by the main spider families in different zones/subzones of the Left-Bank Ukraine. I – Linyphiidae, II – Gnaphosidae, III – Salticidae, IV – Lycosidae, V – Theridiidae, VI – Araneidae, VII – Thomisidae, VIII – Philidromidae, IX – Others. Abbreviation and species ratio as in Table 2.

Asia; twelve species have different kinds of disjunctive areas. One species, *Agelenopsis potteri* (BLACKWALL, 1846), was introduced from North America.

A number of species have their borders of distribution in the investigated area. To our mind, there are no endemics, because there is no physiographical restricted areas. Four species, being found only in the area are known mainly from the type localities. Except one, they were recorded in the southern steppes, and may occur in similar habitats eastwards, in Russia. We consider them to be Pontic species (*Harpactea azovensis* KHARITONOV, 1956, *Larinia elegans* SPASSKY, 1939,



**Fig. 3.** Zoogeographical composition of the spider fauna of the Left-Bank Ukraine. Chorotypes: COSM – Cosmopolitan, MREG – Multiregional, HOL – Holarctic, TRPAL – Transpalearctic, TREUR – Transeurasiatic, WCPAL – west-central-Palearctic, WPAL – westpalearctic, E-S-CA – Euro-Sibero-central Asiatic, E-S-MA – Euro-Sibero-middle Asiatic, E-S – Euro-Siberian, E-CA – Euro-central Asiatic, E-MA – Euro-middle Asiatic, E-Kaz – Euro-Kazakhstanian, E-Ca – Euro-Caucasian, E – European (wide), S-EE – South-East European, M-EE – middle-east European, EE – east European, MED-CA – Mediterranean-central Asiatic, MED-MA – Mediterranean-middle Asiatic, Disjunctive, Unspecified.

*Drassodes charkoviae* (THORELL, 1875), *Philodromus dilutus* THORELL, 1875). In Left Bank Ukraine we have not found species with southern boundaries of distribution, while there is a bulk of species whose northern limit of distribution reaches the area. They came from the Mediterranean realm (*Minicia candida* DENIS, 1946, *Sintula retroversus* (O.P.-CAMBRIDGE, 1875), *Pardosa vittata* (KEYSERLING, 1863), *Trachyzelotes barbatus* (L. KOCH, 1866), *T. malkini* (PLATNICK, MURPHY, 1984), *Philodromus glaucinus* SIMON, 1870, *Singa lucina* (SAVIGNY, AUDOUIN, 1826), or have another origin (*Agelena orientalis* C. L. KOCH, 1837, *Tegenaria lapicidinarum* SPASSKY, 1934, *Dictyna armata* THORELL, 1875, *Trachyzelotes lyonneti* (SAVIGNY, AUDOUIN, 1826). Ten species are spread in Central, Middle Asia or Kazakhstan, in arid areas, and reach East European steppes but do not get over the Dnieper. However, taking into consideration the scarce knowledge of the araneofauna of the Right-Bank steppes, we may expect them to appear westwards (*Pelecopsis laptevi* (TANASEVITCH, FET, 1986), *Sauron fuscicornis* ESKOV, 1995, *Mustelicoso dimidiata* (THORELL, 1875), *Pirata cereipes* (L. KOCH, 1826), *Devade tenella* (TYSTSHENKO, 1965), *Gnaphosa cumensis* PONOMARJOV, 1981, *Leptodrassus memorialis* SPASSKY, 1940, *Talanites strandi* SPASSKY, 1940, *Xysticus mongolicus* SCHENKEL, 1863, *Mogrus larissae* LOGUNOV, 1995). Both *Minicia caspiana* TANASEVITCH, 1990 and *Synageles scutigera* PROSZYNSKI, 1979 have North and West borders, *Gnaphosa moesta* THORELL, 1875 has North and East ones; and, finally, two European species do not spread eastwards (*Zodarion rubidum* SIMON, 1914, *Sintula spiniger* BALOGH, 1935).

In conclusion we want to emphasize that the study of spiders in the area continues. The comparatively short list of species may be explained not only by insufficient data, but also by the flat landscape, mainly transformed in agroecosystems.



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## Преглед на изследванията върху паяците (Araneae) на Левия бряг (Украйна) с нови данни

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### (Резюме)

В статията е представен кратък преглед на проучванията върху паяците на Украйна от 70-те години на 18 век до наши дни, като е обърнато особено внимание на тези, отнасящи се до аранеофауната на Левия бряг. Обобщените литературни и авторови данни показват, че до момента на изследваната територия са установени 716 вида паяци от 34 семейства, а 41 вида се нуждаят от потвърждение. Семейство Linyphiidae е представено с най-много видове, следват го Salticidae и Gnaphosidae с приблизително три пъти по-малко таксони от видовата група. Зоогеографският анализ показва, че основната част от фауната е съставена от видове с широки ареали. Освен тях, са регистрирани и голям брой медитерански и азиатски видове, чиито граници на разпространение минават през изследваната територия.