A Check-List of the Spiders in Tuva, South Siberia
with Analysis of their Habitat Distribution
(Arachnida: Araneae)

by

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Synopsis: On the basis of personal collecting and literature data from Tuva (S. Siberia), a check-list of spiders (605 species from 23 families) is presented. A chronological analysis of the spider complexes (based on 573 species) within 23 vegetation types and 4 landscapes is additionally performed.

Contents:
1. Introduction ................................................................. 125
2. Material and methods .................................................. 126
2.1. List of localities ..................................................... 126
2.2. List of habitats studied ............................................. 129
3. List of species ............................................................ 129
4. Analysis of habitats and discussion
   Acknowledgements .................................................. 144
   Literature ............................................................... 156
5. Literature ............................................................... 157

1. Introduction:

Tuva is a rather small administrative unit of Russia lying in the mountains of South Siberia (see Map) and covering ca. 170.5 thousand sq. km. Tuva is a mountain region, with elevations ranging from 650 m a.s.l. (Tuvan hollow) to 3970 m a.s.l. (Mongun-Taiga Mt.). Despite its small size, Tuva encompasses an extremely wide range of landscapes and vegetation types. For instance, in some parts of S. Tuva, within a distance of 50-60 km, all natural zones can be found from semi-desert and dry steppe to Larix-taiga and mountain tundra.

However, such a vast and highly diverse land has remained practically unexplored with regard to the spider fauna until 1989, when one of us (DVL) began to study Tuvan spiders. Before that, only two species, Pardosa lasisi and Yllenus mongolicus, were known to occur in Tuva (STERNBERGS 1981, PROSZYNSKI 1982). Since then, radical progress in the treatment of the spiders in Tuva has been observed and about 40 papers have been published. In the present paper, 605 species found so far in Tuva are listed.

The present paper is thus an up-to-date review of the spider fauna in Tuva, based on original spider collecting done in 1989-1996 during field trips to Tuva.

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2. Material and methods:

The material dealt with here has been shared mostly between the collections of the Institute for Systematics and Ecology of Animals (Novosibirsk, Russia), the Zoological Museum of the Moscow State University (Moscow, Russia), the Institute for Biological Problems of the North (Magadan, Russia), the Zoological Museum of the University of Turku (Turku, Finland) and the California Academy of Sciences (San Francisco, USA).

In the list of localities (see below), names of collectors are abbreviated as follows: DL = D.V. Logunov; OL = O.V. Lyakhov; YM = Yu.M. Marusik; SK = S. Koponen.

The following check-list is believed to have been compiled up to November 1997, and it is arranged alphabetically. If a species has already been reported from Tuva, corresponding locality numbers are underlined. Species new to Russia (altogether 14), as compared to the recent catalogue of the ex-USSR spiders (MIKHAILOV 1997), are marked with an asterisk. The species marked with "?" refer to preliminary determinations; in most cases we need comparative material to check identifications. The question marks "?" among/instead of vegetation type abbreviations mean that data on the habitat preferences of a species are absent or poorly known. Of the 605 spider species listed below, 53 have already been described by us or by our Russian colleagues during the last 5 - 7 years, while 63 species are either undescribed, e.g. Tala vera sp. 1 (cf. petrensis), Xysticus sp. 1, etc., or are of an obscure status. All these species are listed here as undetermined ones with reference, if possible, to their closest relatives.

Of the vegetation types prevailing in Tuva (see KUMINOVA et al. 1985, NAMZALOV & KOROLOUK 1991), we have been able to analyse, with regard to the arachnofauna, 23 formations (see below).

The similarity of spider communities was studied using the Czekanowski-Soerensen index (Ics).

The chorological analysis has been performed in terms of the so-called landscape-typology approach (PRAV DIN 1978, PRAV DIN & MISHENKO 1980). Three main parameters of spider biodiversity throughout the studied ecosystems (vegetation types and landscapes) have been estimated: (1) the general level of biodiversity, i.e. the number of spider species; (2) the taxonomic pattern, i.e. the composition of taxa; and (3) the taxonomic originality, i.e. the proportion of exclusive (indicator) species compared to the whole number of species found. In addition, clustering of the studied spider communities within 23 vegetation types has been performed using the program BIODIV (BAEV & PENEV 1991). The terms used are as follows:

1. The taxonomic index (TI), used in the geobotanical literature and first adopted for zoogeographic purposes by MEDVEDEV (1984), reflects to taxonomic specificity of a particular spider faunula (fauna of a segregated habitat), i.e. a set of dominating taxa. The spider families (usually ca. 3) that form a half (50 %) or more of the species in an entire fauna / faunula are included in the TI. For instance, the families Linyphiidae and Lycosidae comprise together 61 % of the spider community of the mountain tundra landscape (Fig. 4) and hence the TI is Lin-Lyc.

2. Vegetation type is used sensu stricto and adopted from NAMZALOV & KOROLOUK (1991).

3. Exclusive (indicator) species are those restricted to a particular ecosystem (vegetation type or landscape). The proportion of these species is used to indicate the taxonomic originality of an ecosystem (vegetation type or landscape).

4. The index of originality (IO) is counted in a similar way to the taxonomic index, showing spider families contributing 50 % or more of the total number of exclusive (indicator) species in a particular ecosystem (cf. Figs. 4 - 5 and Table 2).

2.1. List of localities (see Map):


03. West Sayany Mts, Oiskiy Mt. Range, 8 - 10 km S of Oiskoye Lake, Olenia Rechka River, 52° 48’ N, 93° 12’ E, 1400-1900 m a.s.l. (27.06 - 11.07.1990, DL; 8.07.1993, DL).


06. Toora-Khem environs, 52° 29’ N, 96° 07’ E, 850 - 870 m a.s.l. (18. - 23.06.1989, DL).


07a. Serlig-Khem River (basin of Bii-Khem River), ca. 8 km upstream of mouth, 52° 08’ N, 96° 55’ E (11.06.1992, A.B. Ryvkin).

126
Map: Situation of Tuva and collecting localities; for sites, see "Material and methods".

08. West Sayany Mts., Kurtushbinskiy Mt. Range, ca. 10 km NW of Shivilig, 52° 14' N, 93° 28' E, 1100-1300 m a.s.l. (5.-7.06.1990, DL).
08a. Turan environs, 52° 09' N, 93° 57' E (summer 1984, A.B. Rychin).
09. Uyak River mouth, 52° 04' N, 94° 22' E, 600-700 m a.s.l. (21.-23.05.1989, DL; 3.-5.06.1995, YM).
10. 4-5 km N of Cherbi, 51° 55' N, 94° 37' E, 850-1000 m a.s.l. (1.07.1990, DL).
11. Seselirg environs (5-10 km NW and SE), 51° 54' N, 94° 11' E, 1100-1500 m a.s.l. (24.-25.07.1989, DL; 20.05.-29.06.1990, DL).
13. ca 20 km S of Balgazy, 6-10 km N of Shuurman, 51° 45' N, 95° 17' E, 1000 m a.s.l. (7.07.1989, DL).
15. 33-35 km E of Kyzyl, ca. 5 km N of Sug-Bazhi, 51° 40' N, 94° 53' E, 900 m a.s.l. (30.06.1990, DL).
16. ca 65 km W of Kyzyl, Otuk-Dash Stand, 51° 35' N, 93° 39' E, 700-800 m a.s.l. (10.05.1990, DL).
17. 6-7 km WSW of Kyzyl, Yenisei River Valley, Agricultural Res. Station, 51° 35' N, 94° 15' E, 650-700 m a.s.l. (25.05.-24.07.1989, DL; 27.05.-1.07.1990, DL).
18. 5-7 km E of Shagonar, Khaiyrykan Mt., 51° 34' N, 93° 08' E (10.05.1990, DL).
19. 10-25 km SSW of Shagonar, Torgalyg environs, 51° 20' N, 92° 50' E, 900-1200 m a.s.l. (8.-10.05.1990, DL).
20. 1-5 km WSW of Khovu-Aksy, Elegest River Valley, 51° 07' N, 93° 36' E, 1000 m a.s.l. (4.-5.05.1990, DL & V.K. Zinchenko).
25. ca. 20 km N of Oo-Shinaa, 3-4 km E of Despen, 50° 48' N, 93° 50' E, 1600 m a.s.l. (17.07.1989, DL).
28. ca. 1.5 km W of Samagaltai, 50° 47' N, 94° 58' E (14.07.1993, DL).
29a. ca. 15 km E of Khandagaity, Ulatari River Valley, 1000 - 1100 m a.s.l., 50° 45' N, 92° 15' E (11.-12.06.1989, DL).
31. ca. 8 km E of Samagaltai, 6-10 km W of Shuurmak, W parts of Khorumnuq-Taiga M. Range, 50° 44' N, 95° 19' E, ~1100 m a.s.l. (10.07.1993, DL; 20.06.-18.07.1996, YM & D.V. Obydov).
33. ca. 15 km E of Oo-Shinaa, 50° 41' N, 93° 50' E (17.-19.07.1993, DL).
35. Sangelen M. Range, the middle reaches of Kargy River, 50° 31' N, 97° 03' E, 1300-1400 m a.s.l. (28.-30.06.1996, YM).
36. Sangelen M. Range, the middle reaches of Kargy River, 50° 35' N, 97° 05' E, 1300-1400 m a.s.l. (2.-4.07.1996, YM).
37. ca. 8 km W of Ak-Erik, Tes-Khem River Valley, 50° 32' N, 94° 37' E (June 1990, OL).
38. ca. 3 km NE of Sagly, 50° 31' N, 90° 20' E (24.07.1993, DL).
39. 20-25 km W of Sagly, the upper reaches of Onachy River, 50° 28' N, 90° 57' E, 1500-1600 m a.s.l. (13.06.1989, DL; 24.07.1993, DL).
40. Sangelen M. Range, the upper reaches of Dzhenn-Aryk (Ck), 50° 28' N, 95° 24' E, 1750-2030 m a.s.l. (16.-18.07.1996, YM).
41. 40-45 km W of Mugur-Aksy, the upper reaches of Kargy River, 50° 26' N, 90° 03' E, 2200-2300 m a.s.l. (17.-18.05.1990, DL).
42. Sangelen M. Range, the upper reaches of Kargy River, 50° 25' N, 96° 41' E, 2230 m a.s.l. (28.06.-4.07.1996, YM & D.V. Obydov).
43. Tsagan-Shibetu M. Range, Barlyk River Valley, confluence with Onachy River, 50° 25' N, 90° 55' E, 2000 -2100 m a.s.l. (13.06.1989, DL; 6.06.1990, OL).
44. Sangelen M. Range, the middle reaches of Dzhenn-Aryk (Ck), 50° 24' N, 95° 26' E, 1450 m a.s.l. (14.-16.07.1996, YM).
45. 8-9 km NE of Mugur-Aksy, the upper reaches of Kuge-Davaa River, Tsagan-Shibetu M. Range, 50° 24' N, 90° 30' E, 2100-2700 m a.s.l. (10.-19.05.1990, DL).
46. 30-35 km NW of Erzin, confluence of Ular-Khem and Erzin Rivers, 50° 23' N, 95° 32' E, 1200-1300 m a.s.l. (11.-12.06.1989, DL).
47. 30-35 km SW of Mugur-Aksy, the upper reaches of Mugur River, Mongun-Taiga Mt., 50° 22' N, 90° 05' E, 3100-3300 m a.s.l. (23.07.1993, DL).
49. ca. 20 km NW of Erzin, Tes-Khem River Valley, 50° 20' N, 95° 03' E, 900-1000 m a.s.l. (31.05.1989, DL; 8.-10.06.1995, YM & SK).
52. Sangelen M. Range, the upper reaches of Balyktyg-Khem River, 50° 18' N, 96° 34' E, 2000-2300 m a.s.l. (26.-28.06.1996, YM).
53. 15-20 km W of Erzin, Onchalaan and Yamaalyg Rocks, 50° 16' N, 94° 54' E, 1150-1350 m a.s.l. (27.05.-12.08.1989, DL; 11.07.1993, DL; 7.-10.06.1995, YM & SK).
55. Erzin environs, 50° 14' N, 95° 09' E, 1165 m a.s.l. (14.08.1989, DL; 9.06.1995, YM & SK).
2.2. List of habitats studied:

GLT — golsy (mountain tundra) landscape:
mwt — Mountain moss-tussock-shrubbery wet tundra;
mst — Mountain moss–lichen–stony tundra;
sm — Subalpine meadow;
s — Scree (talus).

ILT — inundated landscape:
u — Urema (= flood plain forest of Populus laurifolia–Betula microphylla–Salix spp.);
ism — Inundated steppe–upland meadow (mostly with Caragana spinosa);
mm — Mesophytic meadow;
as — Achnatherum splendens stands (= saz steppe);
bf — Bulrush fen;
rbp — River pebble banks (or lake shores, sometimes saline).

MFLT — mountain forest–steppe landscape:
sss — Sloping shrub–stony steppe;
sm — Sloping meadow shrubbery steppe;
lf — Larix sibirica forest (light coniferous forest);
mf — Taiga forest, including mixed taiga;
bef — Birch (Betula pendula) forest;
sm — Sedge (Carex spp.) moor;
sgg — Shrubby grass glades (= mesophytic grasslands);
s — Scree.

MSLT — mountain steppe landscape:
dns — Desert nanophanerophyte steppe (= tar steppe) (with Nanophyton erinaceus);
dbs — Dry shrub–grass (Caragana-Stipa-Artemisia) steppe;
ssds — Desert sandy shrub–grass (Caragana-Stipa-Artemisia) steppe;
cxs — Cryo-xerophyous, high–mountain (= cryophyte) steppe;
s — Cobble-gramineous stands (including scree).

3. List of species:

Ageleneidae
Agelena labyrinthica (CLERCK, 1758): 11, 12, 21, 23, 27, 30, 36, 44, 51, 53; ILT: U, Ism, As; MFLT: Sss, Sgg; MSLT: Dns, Dbs.

Coelotes sp. 1: 08; MFLT: Sss.

Coelotes sp. 2: 01; MFLT: Mf.

Amaurobiidae
Araneidae

*Aculepeira carbonarioides* (KEYSERLING, 1892): 03, 61; GLT: S, MSLT: S.

*Aculepeira packardi* (THORELL, 1875): 07, 09, 10, 12, 17, 25, 28, 29, 31, 34, 36, 40, 44, 54, 61, 63; MFLT: Sm, Sgg, Lf, Sm; ILT: Mm, Ism; MSLT: S, Dbs, Sds.

*Aculepeira* sp. 1 (cf. *carbonarioides*): 05, 09, 14, 32, 38, 51; MFLT: S, Sss; ILT: As, RpB; GLT: S; MSLT: Dbs, Dns.

*Araaneus albine* (WALCKENAER, 1802): 31; MFLT: Sgg.


*Araeneus marmoreus* CLERCK, 1758: 01, 05, 11, 56; MFLT: Lf, Sgg, Mf; ILT: RpB.

* *Araeneus mongolicus* SIMON, 1895: 53; MSLT: S.

*Araeneus nordmanni* (THORELL, 1870): 05; MFLT: Mf.

"*Araeneus* pallasi" (THORELL, 1875): 32, 34, 63; MSLT: Sds; ILT: Ism, Mm.

*Araeneus quadratus* CLERCK, 1758: 12, 40; ILT: U; MFLT: Sms. 

**"Araeneus" stradiellus** CHARITONOVA, 1951: 32, 63; MFLT: Sms; MSLT: Sds, Dns.

*Araeneus* sp. 1 (cf. *saevus*): 25, 44, 52, 53; MSLT: S, Dbs.

*Araniella displicata* (HENTZ, 1847): 01, 07, 08, 09, 10, 11, 14, 23, 25, 28, 29, 30, 31, 34, 35, 36, 44, 46, 62; ILT: Ism, Mm; MFLT: Sgg, Mf, Lf, Sm, Sms, Sss.

*Araniella proxima* (KULCZYNSKI, 1885): 63; ILT: U (?).

* Araniella yaginumai* TANIKAWA, 1995: 14; ILT: U (?).

*Atea sturmi* (HAHN, 1831): 01, 03, 08; GLT: Sm; MFLT: Mf.

*Atea* sp. 1: 14.

*Cercidia prominens* (WESTRING, 1851): 59; MFLT: Sgg.

*Cyclosa conica* (PALLAS, 1772): 08, 23, 36; MFLT: Lf, Mf.

*Cyclosa* sp. 1 (cf. *oculata*): 12, 27, 32, 34, 57, 58; ILT: Bf, Ism; MSLT: Dbs, Dns; MFLT: Sss.

? *Gibbaranea bituberculata* (WALCKENAER, 1802): 09, 12, 29, 32, 63; MFLT: Sss; MSLT: Dbs, Dns, Sds.

*Hyposingsa albovittata* (WESTRING, 1851): 09, 28, 45, 53; MSLT: Cxs, S; MFLT: Sms.

*Hyposingsa pygmaea* (SUNDEVAL, 1831): 09, 23, 31, 34, 35, 38, 57, 58, 62; ILT: Bf, Mm, Ism; MSLT: Dbs; MFLT: Sss.


*Larinia bossae* MARUSIK, 1986: 17, 34, 51, 57, 63; ILT: U, As, Bf, Ism; MSLT: Dbs, Sds.

*Lariinioides cornutus* (CLERCK, 1758): 03, 07, 23; MFLT: Sm; GLT: Sm.

*Lariinioides folium* (SCHRANK, 1803): 09, 12, 34, 57, 63; ILT: Bf; MFLT: Sms, Sss.

*Lariinioides patagiatus* (CLERCK, 1758): 07, 09, 10, 17, 23, 30, 31, 32, 63; ILT: U, Mm; MFLT: Mf, Lf, Sgg, Sss.

*Neoscona adianta* (WALCKENAER, 1802): 09, 12, 34; MFLT: Sss; MSLT: Dbs.

*Singa nitidula* C.L. KOCH, 1844: 05; ILT: RpB.

"*Zygiella* siroemii" (THORELL, 1875): 07, 31, 49; MFLT: Sms; ILT: U.

Argyronetidae

Argyroneta aquatica* (CLERCK, 1758): 57, 63; ILT: Bf.

Clubionidae


*Cheiracanthium* sp. 1: 09, 21, 29, 32, 34, 49, 53; ILT: Mm, Ism, U; MFLT: Sgg, Sm, Sss.

*Cheiracanthium* sp. 2: 34, 63; MSLT: Sds, Dns.


*Clubiona diversa* O.P.-CAMBRIDGE, 1862: 11, 17, 19, 27, 40, 56; ILT: Mm, U; MFLT: Lf. (MIKHAILOV 1992).

*Clubiona interjecta* L. KOCH, 1879: 11, 12, 51, 63; ILT: As, U; MSLT: Sds. (MIKHAILOV 1992).

*Clubiona kulczynskii* LESSERT, 1905: 04, 05, 06, 07, 08, 09, 11, 13, 23, 31, 40; GLT: Sm; MFLT: Mf, Bef, Sms. (MIKHAILOV 1992).

*Clubiona latericia* KULCZYNSKI, 1926: 07, 23, 63; MFLT: Sm. (MIKHAILOV 1992).

? *Clubiona lutescens* WESTRING, 1851: 63; ILT: U.

*Clubiona neglecta* O.P.-CAMBRIDGE, 1862: 12, 17, 21, 23, 51, 57, 58, 63; ILT: U, As, Mm, RpB; MFLT: Sgg; MSLT: Sds. (MIKHAILOV 1992).

*Clubiona pallidula* (CLERCK, 1758): 07, 08, 14, 30, 34, 49, 58; ILT: As, U, RpB; MFLT: Mf, Bef. (MIKHAILOV 1992).
Clubiona phragmitis C.L. KOCH, 1843: 63; ILT: Bf. (MIKHAILOV 1992)

Dictynaideae

Archaeodictyna consecuta (O.P.-CAMBRIDGE, 1872): 42; MSLT: Cxs (?).
Arctella lapponica HOLM, 1945: 35, 42, 45, 54, 56; MSLT: Cxs.
Argenna prominula TULLGREN, 1948: 26, 27, 30; MFLT: Mf, Lf.
Argenna sp. 1: 31, 34; ILT: As (?).
Dictyna alaskae CHAMBERLIN & IVIE, 1947: 07, 35; MFLT: Mf.
Dictyna arundinacea (LINNAEUS, 1758): 07, 08, 09, 11, 23, 28, 30, 32, 34, 35, 36, 46, 49, 52, 55, 58, 63;
ILT: Mm, U, Rpb, Ism; MFLT: Mf, Lf, Sm, Sgg, Smg, Ss; MSLT: Sds.
Dictyna major MENGE, 1869: 09; ILT: Mm.
Dictyna pusilla THORELL, 1856: 07; MFLT: Mf, Sgg.
Dictyna schmidtii KULCZYNSKI, 1927 (sensu LEITITEN 1967): 04; GLT: Sm; MFLT: Mf, Sgg.
Dictyna uncinata THORELL, 1856: 14, 58, 63; ILT: U; MFLT: Sm.
Embylna annulipes (BLACKWALL, 1846): 07, 08, 09, 14, 32, 34, 49, 63; ILT: U, Ism, Rpb, MFLT: Mf.
? Lathys puta (O.P.-CAMBRIDGE, 1863): 05, 08, 11, 12, 14, 27, 29, 30, 32, 34, 35, 53; GLT: Mst; ILT: Ism;
MFLT: Ss, Sms, Mf, S; MSLT: S, Dns.

Eresidae

? Eresus cinnaberinus (OLIVIER, 1787): 12, 14; MSLT: Dns.

Gnaphosidae

Callilepis nocturna (LINNAEUS, 1758): 01, 09, 11, 12, 13, 23, 27, 30, 32, 44, 46, 49, 50, 53, 55, 57, 58, 60,
62, 63; ILT: Rpb; MFLT: Sss; MSLT: Sds, Dns, S, Cxs. (MARUSIK & LOGUNOV 1995).
? Drassodes lapidous (WALCKENAER, 1802): 02, 09, 05, 08, 26, 27, 29, 40, 42, 47, 52, 56; GLT: Sm, Mst,
Mwt; ILT: Mm; MFLT: S, Mf, Sss, Sms. (MARUSIK & LOGUNOV 1995).
Drassodes lesserti SCHENKEL, 1936: 11, 12, 13, 18, 23, 31, 32, 34, 38, 46, 49, 50, 51, 53, 55, 63; ILT: As, Ism;
MFLT: Sss; MSLT: Dns, Dbs. (MARUSIK & LOGUNOV 1995).
Drassodes longispinus MARUSIK & LOGUNOV, 1995: 07, 09, 11, 12, 14, 16, 18, 19, 32, 34, MFLT: S, Sss,
Sms; MSLT: Dns. (MARUSIK & LOGUNOV 1995).
Drassodes neglectus (KEYSERLING, 1887): 11, 12, 14, 23, 27, 28, 30, 34, 35, 49, 50, 53, 58; ILT: U, Ism,
Rpb; MFLT: Sms, Ss; MSLT: Dns, Dbs, S. (MARUSIK & LOGUNOV 1995).
Drassodes villosus (THORELL, 1856): 06, 07, 08, 46, 53; MFLT: Sss, Sms; MSLT: Dbs. (MARUSIK & LOGUNOV 1995).
Drassodes sp. 1: 12, 32; MSLT: Dns.
Drassyllus pusillus (C.L. KOCH, 1833): 63; ILT: U.
Drassyllus vinealis (KULCZYNSKI, 1897): 32; MSLT: Dns.
Gnapbosa borea KULCZYNSKI, 1908: 09, 11, 12, 14, 26, 31, 35, 36, 52, 54, 56, 63; GLT: Mwtr; ILT: U; MFLT: S, Sm. (MARUSIK & LOGUNOV 1995).
Gnapbosa leporina (L. KOCH, 1866): 05, 21, 26, 27, 31, 54, 56; GLT: Mwtr; MFLT: Mf, Sm. (MARUSIK & LOGUNOV 1995).
Gnapbosa muscorum (L. KOCH, 1866): 06, 07, 08, 12, 14, 16, 18, 23, 26, 27, 28, 30, 31, 32, 35, 36, 44, 47, 52, 56, 60; GLT: Mst; ILT: U; MFLT: Sms, Ss, Bf; MSLT: S, Dbs, Cxs. (OVTSHARENKO et al. 1992, MARUSIK & LOGUNOV 1995).
Gnapbosa nigerima L. KOCH, 1877: 34; 63; ?. (MARUSIK & LOGUNOV 1995).
Gnapbosa sticta KULCZYNSKI, 1908: 02, 03, 26, 35, 40, 42, 49, 52, 56, 57; GLT: Mwt, Sm; MFLT: Sms. (OVTSHARENKO et al. 1992, MARUSIK & LOGUNOV 1995).
Gnapbosa sp. 1 (cf. orites): 47; GLT: Mst.
Haplodrassus cognatus (WESTRING, 1862): 14, 31; MFLT: Sgg.
Haplodrassus moderatus (KULCZYNSKI, 1897): 07, 08, 14, 31, 40, 56, 63; MFLT: ?. (MARUSIK & LOGUNOV 1995).
Haplodrassus soerenensi (STRAND, 1900): 02, 04, 08, 11, 31, 35, 36, 63; GLT: Sm; MFLT: Sms, Sm. (MARUSIK & LOGUNOV 1995).
Haplodrassus sp. 1: 58, 63; ILT: U.
Micaria aenea THORELL, 1871: 08, 63; ILT: U; MFLT: Sms.
Micaria dives (LUCAS, 1846): 09; ILT: Rpb; MFLT: Sms.
Micaria guttata (C.L. KOCH, 1839): 26; MFLT: Sms.
Micaria lenzi BÖSENBERG, 1899: 12, 13, 14, 30, 32, 34, 49, 51, 53, 58; ILT: Rpb, Bf; MSLT: Dns, Dbs.
Micaria nivosa L. KOCH, 1866: 09, 31; ILT: Rpb; MFLT: Sms.
Micaria rossica THORELL, 1875: 12, 36, 40, 48, 52; MSLT: Dbs; MFLT: Sss, Sm.
Micaria sp. 1 (cf. lenzi): 17; ILT: As.
Micaria sp. 2 (cf. rossica): 12, 32, 34, 53, 58, 63; ILT: Ism, As, Bf; MSLT: Dns, Sds.
Poeciloclophora variana (C.L. KOCH, 1839): 09; ILT: Rpb.
Zelotes exiguus (MÜLLER & SCHENKEL, 1895): 09, 14, 34, 53; ILT: Ism; MSLT: Dbs, S.
Zelotes potanini SCHENKEL, 1963: 02, 09, 10, 12, 13, 17, 18, 19, 27, 29a, 30, 31, 32, 34, 35, 36, 44, 49, 50, 53, 57, 58, 60, 62; GLT: Mst; ILT: As, U, Mm, Rpb; MFLT: Sss, Sms; MSLT: Dns, Dbs, S. (MARUSIK & LOGUNOV 1995).

Hahnidae

Cryphoea silvicola (C.L. KOCH, 1834): 40; MFLT: Lf.
Hahnia sp. 1 (cf. ononidum): 02, 08, 09, 23, 26, 27, 31, 36, 40, 42, 56, 58; GLT: Mwt; MFLT: Mf, Lf, Sgg.

Linyphiidae

Abacoprocnes saltuum (L. KOCH, 1872): 58, 63; ILT: U.
Agyneta sp. 1 (cf. affinisoides): 42, 52; GLT: ?.
Agyneta fuscipalpis (C.L. KOCH, 1836): 26; GLT: Mwt.
Agyneta trifurcata HIPPA & OKSALA, 1985: 35, 40, 52, 54, 56; MFLT: ?.
Allomengea dentisetis (GRUBE, 1861): 17, 55; ILT: Mm. (ESKOV 1992).
Anguliphantes cerinus L. KOCH, 1879): 02, 04; GLT: Sm. (ESKOV 1992: sub. Leptypantes c.).
Anguliphantes dybowskii (O.P.-CAMBRIDGE, 1873): 05; MFLT: Mf. (ESKOV 1992: sub. Leptyphan-
tes d.).
tes k.).


Araeonecus crassiceps (WESTRING, 1862): 34, 57; ILT: Ism.


Bathyphantes eunensis (L. KOCH, 1879): 04, 14, 27, 31, 35, 36, 40, 44, 46; GLT: Sm, S; MFLT: Lf, Mf.


Centromerus clarus (L. KOCH, 1879): 02, 04, 05, 07; GLT: Mwt, Sm; MFLT: Mf. (ESKOV 1992, ESKOV & MARUSIK 1992b).

Centromerus sp. 1 (cf. amurenensis): 35; MFLT: ?.


Ceratinella wideri (THORELL, 1871): 02, 27; GLT: Mwt; MFLT: Mf, Lf.

Cnephocolotes obscurus (BLACKWALL, 1834): 35; MFLT: Mf.

Collinsia caliginosa (L. KOCH, 1879): 35, 36, 52; ILT: Rpb.

Collinsia dentata ESKOV, 1990: 31; ILT: Rpb.


Dactylotisipes video (CHAMBERLIN & IVIE, 1947): 63; ILT: U.


Dipocephalus cristatus angusticeps HOLM, 1973: 02, 04; GLT: Sm, S; ILT: Rpb.

? Dipocephalus marusiki ESKOV, 1988: 30, 63; ILT: U.


Drepanotylus borealis HOLM, 1945: 03, 52; GLT: Sm. (ESKOV 1992).

Entelecaera erythropus (WESTRING, 1851): 09, 12, 30; ILT: U; MFLT: Mf, Sm. (ESKOV 1992).

Entelecaera sombra (CHAMBERLIN & IVIE, 1947): 09, 30, 31, 58, 63; ILT: U; MFLT: Sm.


Episolder nitissimus TANASEVITCH, 1995: 26, 27, 31, 35, 36, 52; GLT: Mwt; MFLT: Lf, Mf. (TANASE-

Fitch 1995).

Erigone atra BLACKWALL, 1833: 03, 08, 12, 14, 26, 27, 30, 31, 36, 40, 48, 56, 58, 60, 63; GLT: Mwt; ILT: Mm; MFLT: Sgg, Sms, S; MSLT: Dns. (ESKOV 1992).

Erigone dentigera O.P.-CAMBRIDGE, 1874: 28, 57; ILT: Ism; MSLT: Dbs.

Erigone dentipalpis (WIDER, 1834): 63; ILT: Ism.


Erigone piechockii HEIMER, 1987: 09, 31, 34, 44, 48, 49, 51, 54, 57, 63; ILT: Ism, Mm, As, U, Rpb.


Erigone similima KEYSERLING, 1886: 03, 07a; GLT: Sm; MFLT: Mf. (ESKOV 1992, ESKOV & MARU-

Sik 1994).


Hilaira sp. 1 (cf. marusikii): 63; ILT: U.
Hylyphantes nigritus (SIMON, 1881): 02, 04; GLT: Mwt, Sm, S.
Incestophantes incestus (L. KOCH, 1879): 35, 36, 52; MFLT: ?
Incestophantes obstusus TANASEVITCH, 1996: 07, 20; ILT: U; MFLT: Mf. (ESKOV 1992: sub. Leptyphan-
tes kochiellus).
Impropbantes complicatus (EMERON, 1882): 26, 27, 31, 36, 40; MFLT: Mf, Lf.
Impropbantes flexilis (TANASEVITCH, 1986): 02; GLT: Sm, Mwt. (ESKOV 1992: sub. Leptyphan-
tes f.).
Ivielum sibiricum ESKOV, 1988: 02, 04, 05, 09, 27, 35, 40, 52, 54, 56, 63; GLT: Mwt; ILT: U; MFLT: Mf, Sm.
(ESKOV 1992).
Kaesneria pullata (O.P.-CAMBRIDGE, 1863): 63; ILT: U.
Lasiarius piliipes (KULCZYNSKI, 1908): 14, 56; MFLT: Lf (?).
Leptyphanites abiskoensis HOLM, 1945: 07; MFLT: Mf.
Leptyphanites cornutus SCHENKEL, 1927: 02, 26, 30; GLT: Sm, Mwt; MFLT: Lf. (ESKOV 1992).
Leptyphanites expunctus (O.P.-CAMBRIDGE, 1875): 35, 56; MFLT: Lf (?).
Leptyphanites migriventris (L. KOCH, 1879): 02, 05, 11, 23, 40; GLT: Sm; MFLT: Lf. (ESKOV 1992).
"Leptyphanites" sayanensis ESKOV & MARUSIK, 1994: 02, 04, 05; GLT: Sm, Mwt; ILT: Rpb. (ESKOV & MARUSIK 1994).
Leptyphanites sibiricus TANASEVICH, 1986: 02, 04; GLT: Mwt, Sm.
Lephyphantes sp. 1 (cf. pepticus): 63; ILT: Bf.
Lep tolerantium robustum (WESTRING, 1851): [01, 02; GLT: Sm. (ESKOV 1992).
Maro flavesens (O.P.-CAMBRIDGE, 1873: [07a; MFLT: ?. (ESKOV & MARUSIK 1994).
Mecynargus sphagnicola (HOLM, 1939): 40; ?.
Metapobactor prominulus (O.P.-CAMBRIDGE, 1872): [31, 56, 63; ILT: U; MFLT: Sss (?).
Micargus herbigadus (BLACKWALL, 1854): [31; MFLT: ?.
Minicia marginella (WIDER, 1834): 35; MFLT: Sgg.
Minicia uralensis TANASEVITCH, 1983: [02, 04; GLT: Sm, S.
Monocerellus montanus TANASEVITCH, 1983: [02, 54; GLT: Mst.
Oedothorax agressis (BLACKWALL, 1853): [04, 05; GLT: Sm; ILT: Rpb; MFLT: Mf. (ESKOV 1992).
Oedothorax retusus (WESTRING, 1851): [02, 07, 17; GLT: Sm; ILT: Mm; MFLT: Mf, Sgg. (ESKOV 1992).
Oreoneites sajanensis ESKOV, 1991: [04; GLT: Sm.
Oreoneites vignatus (THORELL, 1872): [31, 34, 40, 56; ILT: Ism; MFLT: Mf.
Panamomops taurocornis (SIMON, 1881): [26, 27, 31, 34; GLT: Mwt; ILT: Ism; MFLT: Mf, Lf.
Pelecopsis donniana HEIMER, 1987: [02, 08a, 11, 26, 27, 40, 42, 52, 56; GLT: Mwt; MFLT: Mf, Sms. (ESKOV 1992).
Perlongipalpus sp. 1 (cf. pinipumilus): [30; MFLT: Lf.
Poeciloneta petrophila TANASEVITCH, 1989: 52, 54; GLT: Mst.
Scoiargus pilosus SIMON, 1913: 35; ?.
Scotinotylus alpinus (BANKS, 1896): 27, 31; MFLT: Mf.
Scotinotylus altaicus MARUSIK, HIPP & KOPONEN, 1996: 26, 30; GLT: Mwt; MFLT: Mf, S.
Silometopus uralensis TANASEVITCH, 1985: 02, 04, 07, 08a, 26, 31, 44; GLT: Mwt, Sm; ILT: U; MFLT: Mf. (ESKOV 1992).
Sisis transbaikalensis (ESKOV, 1989): 35; MFLT: ?.
Stemynphantes conspersus (L. KOCH, 1879): 02, 05, 07, 11, 20, 31; GLT: Sm; ILT: U; MFLT: Mf, Lf. (ESKOV & MARUSIK 1994).
Thyreosthenius biovius (O.P.-CAMBRIDGE, 1875): 02; GLT: Sm.
Tiso aestivus (L. KOCH, 1872): 08a, 26, 27, 40, 52, 54, 56; MFLT: Mf, Sm. (ESKOV 1992).
Trematocephalus cristatus (WIDER, 1934): 14; ILT: U.
*Trichobacter brevispinosus WUNDERLICH, 1995: 34, 53, 63; ILT: Ism; MSLT: S.
Trichoncus vasconicus DENIS, 1944: 09; MFLT: Sss.
Trichopterca cito (O.P.-CAMBRIDGE, 1872): 09, 30, 53; MFLT: Sm; MSLT: Dbs.
Trochochros scabriculum (WESTRING, 1851): 31; ?.
Walcensaia antica (WIDER, 1834): 08a, 05, 31; MFLT: Lf. (ESKOV 1992).
Yukutopus xerophilus ESKOV, 1990: 09, 30, 32, 49, 53, 63; ILT: U; MFLT: Lf, Sm; MSLT: Dns.

Liocranidae
Agroeca maculata L. KOCH, 1879: 07; MFLT: Mf.
Agroeca sp. 1: 09, 12, 13, 30, 32, 35, 44, 52; MFLT: S; MSLT: S, Dns.
*"Phrurolithis" sinicus ZHU & MEI, 1982: 09, 14, 31, 32, 53; ILT: Rpb; MSLT: Dbs, S.

Lycosidae
Acantholycosa lignaria (CLERCK, 1758): 13; MFLT: Bef.
Acantholycosa norvegica (THORELL, 1872): 02, 03, 04, 07, 26, 27, 31, 35, 36, 56; GLT: Sm, Mwt; MFLT: S, Sm, Mf.
*Acantholycosa triangulata YU & SONG, 1988: 47; GLT: Mst.
Allohogna singoriensis (LAXMANN, 1770): 21, 49, 57, 58; ILT: saline wasteland.
Alopecosa aculeata (CLERCK, 1758): 03, 04, 06, 07, 08, 11, 19, 22, 26, 27, 30, 35, 36, 40, 54, 56, 58; GLT: Sm, Mwt; S; ILT: U, Rpb; MFLT: Sms, Mf, Lf.
Alopecosa cuneata (CLERCK, 1758): 19, 27, 58, 17; ILT: U; MFLT: Sm.
Alopecosa dimidiata (THORELL, 1875): 09, 12, 23, 27, 30, 50, 53, 55, 63; MFLT: Sss, MSLT: Sds, Cxs, Dbs, Dns, S. (MIKHAILOV 1996; sub. Trochosa d.)
*Alopecosa licenti (SCHENKEL, 1953): 28; MSLT: Dbs.
*Alopecosa pinetorum THORELL, 1856: 05; MFLT: Mf.
Alopecosa pulvulentula (CLERCK, 1758): 02, 19, 31, 54; GLT: Sm; ILT: U.
Alopecosa sibirica (KULczyński, 1908): 36; MFLT: Sms.
Alopecosa solivaga (KULczyński, 1901): 08, 09, 11, 12, 14, 17, 19, 20, 21, 27, 30, 35, 36, 41, 42, 44, 48, 49, 51, 58, 63; ILT: U, As, Rpb; MFLT: Sss, Sm, Sm, Lf; MSLT: Dns.
Alopecosa zuzini LOGUNOV & MARUSIK, 1995: 17, 29, 30, 34, 36, 38, 46, 48, 49, 50, 51, 53, 55, 58, 61, 63; ILT: Ism, As, Rpb, Mm; MSLT: Sss, MSt, Dbs, Ds, Ds. (LOGUNOV & MARUSIK, 1995).
Alopecosa sp.1 (cf. erudita): 09, 21, 27, 28, 30, 32, 34, 53, 58, 63; ILT: Ism, Rpb; MFLT: Sss, Msl; MSLT: Dns, Dbs, Ds, S.
Alopecosa sp. 2 (cf. erudita): 55, 58, 63; MSLT: Sds.
Alopecosa sp. 3 (cf. erudita): 41; MSLT: Cxs.
*Aricia cervina SCHENKEL, 1936: 34, 51, 63; ILT: Mm, As.
Evippa sp. 1 (cf. sibirica): 12, 30, 32, 34, 53; MFLT: Sss; MSLT: Dbs, Dns, S.
Pardosa amentata (CLERCK, 1758): 01; MFLT: Sgg.
Pardosa atrata (THORELL, 1873): 07, 23, 24, 32, 52, 55, 58, 63; ILT: U, Mm, Bf; MFLT: Sm.
Pardosa bukukun LOGUNOV & MARUSIK, 1995: 26, 27, 30, 56; GLT: Mwt; MFLT: Sss, Sms.
Pardosa chionophila  L. KOCH, 1879: 09, 14, 17, 49, 55, 58; ILT: As, U, Rpb, Mm.


Pardosa incilis  (ODENWALL, 1901): 13, 25, 27, 32, 34, 39, 49, 50, 51, 53, 55, 57, 58, 63; ILT: U, Ism, As, Rpb, Bf; MFLT: Sss, Sms; MSLT: Sds, S.

Pardosa indicola  L. KOCH, 1879: 03, 04, 05, 40; GLT: Mwt; MFLT: Mf.

Pardosa jenieica  ESKOV & MARUSIK, 1995: 09, 19, 20, 31, 49, 55; ILT: Mm, Rpb.

Pardosa lasciva  L. KOCH, 1879: 05, 11, 23, 31, 40; MFLT: Lf, Mf.


Pardosa nenilini  MARUSIK, 1995: 39; MFLT: Sm.

Pardosa oksalai  MARUSIK, HIPPÄ & KOPONEN, 1996: 02, 04, 05, 63; GLT: Sm, Mwt; ILT: Bf.

Pardosa oljiuna  LOBANOVA, 1978: 05, 07, 08, 11, 12, 13, 22, 23, 26, 31, 35, 36, 40, 42, 52, 54, 56; GLT: Mwt; ILT: U; MFLT: Mf, Lf, Bef, Sm, Sgg.

Pardosa palustris  (LINNAEUS, 1758): 05, 06, 07, 12, 22, 23, 24, 27, 31, 35, 36, 48, 52, 56; ILT: U; MFLT: Sm, Sgg, Sms, Mf.

Pardosa paratessquorum  SCHENKEL, 1963: 12, 14, 19, 29, 30, 34, 39, 44, 48, 49, 50, 51, 52, 57, 58, 62, 63; ILT: Ism, As, Mm, U, Rpb; MFLT: Sm; MSLT: Dbs, Cxs.

Pardosa plumipes  (THORELL, 1875): 08, 09, 12, 17, 23, 24, 27, 29, 31, 32, 34, 40, 44, 48, 49, 51, 53, 57, 58, 62, 63; ILT: U, Mm, As, Rpb, Bf, Ism; MFLT: Sms, Sgg, Sm.

Pardosa ricta  (ODENWALL, 1901): 12, 27, 29, 30, 31, 32, 34, 38, 39, 40, 44, 45, 49, 50, 51, 53, 55, 58, 63; ILT: Ism, As; MFLT: Sss; MSLT: Dns, Dbs, S, Cxs.

Pardosa schenkelii  LESSERT, 1904: 05, 07, 08, 09, 11, 21, 23, 25, 26, 27; GLT: Mwt, S; MFLT: Mf, Sss, Sms, Sgg.

Pardosa selengensis  (ODENWALL, 1901): 32, 34, 51, 53, 57, 63; ILT: Ism, As, Bf, U, Rpb; MFLT: Sm; MSLT: Sds, Dbs.

Pardosa sphagnicola  (F. DAHL, 1908): 07; MFLT: Sm.

Pardosa tesquorum  (ODENWALL, 1901): 05, 09, 12, 13, 26, 28, 30, 31, 32, 34, 35, 36, 44, 45, 52, 58, 63; ILT: U, Ism, Mm, Rpb; MSLT: Dbs; MFLT: Sms, Mf, Lf, S.


Pardosa sp. 2 (cf. lapponica): 08, 11, 12, 22, 24, 26, 27, 35, 39, 40, 42, 45, 47, 52, 54, 56; GLT: Mst, Mwt; ILT: U, Mm; MFLT: Mf, Lf, Sms.

Pardosa sp. 3 (cf. lugubris): 02, 09, 17, 19; GLT: S; ILT: U.

Pirata hygrophilus  THORELL., 1872: 01; ILT: Rpb.

Pirata praedio  KULCZYNSKI, 1885: 07, 57; ILT: Bf; MFLT: Sm. (LOGUNOV 1992b).

Tricca alpigena  (DOLESHALL, 1852): 02, 08, 35, 40, 42, 56; GLT: Mwt, Sm; MFLT: Mf.

Xerolycosa miniata  (C.L. KOCH, 1834): 09, 13, 17, 49, 51, 63; ILT: As, Mm, Rpb; MFLT: Sgg. *"Xerolycosa" mongolica  (SCHENKEL, 1963): 12, 53, 55; MSLT: Dbs, Dns, S.

Xerolycosa nemoralis  (WESTRING, 1861): 04; GLT: Sm.

Mimetidae

"Ero" sp. 1: 31, 32, 53; MSLT: Dns, S.

Oxyopidae

Oxyopes parvus  PAIK, 1969: 01, 09; 30, 31, 58; ILT: Mm; MFLT: Sgg, Sms, Sm.

Philodromidae


Philodromus alascensis  KEYSERLING, 1884: 17, 23, 30, 43, 44, 50, 56, 57, 63; ILT: Bf, U.

Philodromus aureolus  (CELERCK, 1758): 13, 17; ILT: Mm; MFLT: Sgg.

Philodromus cespitum  (WALCKENAER, 1802): 07, 08, 09, 10, 11, 14, 19, 23, 63; MFLT: Mf, Lf, Sgg, Sms, Sm.

Philodromus corticinus  (C.L. KOCH, 1837): 63; ILT: ?.

? Philodromus emarginatus  (SCHRANK, 1803): 55; (?).

Philodromus fallax  SUNDEVALL, 1833: 34, 49, 51, 57, 63; ILT: Bf, Rpb, As, Ism.
Philodromus fuscomarginatus (DE GEER, 1778): 36; MFLT: ?.
Philodromus histrion (LATURELLE, 1819): 09, 11, 12, 17, 19, 32, 49, 53, 58; ILT: As; MFLT: Sss; MSLT: Dbs, Dns.
Philodromus margaritatus (CLERC, 1758): 05, 09, 30; MFLT: S.
Philodromus poecilus (THORELL, 1872): 30, 49, 63; ILT: U; MFLT: Lf.
Philodromus rufus WALCKENAER, 1826: 01, 09, 14, 17, 28, 30, 32, 34, 53, 57, 58, 63; ILT: Rpb, Bf, As, U, Ism; MFLT: Dbs, Dns.
Philodromus sp. 1 (cf. alascensis): 32, 63; ILT: Mm.
Philodromus sp. 2 (cf. histrion): 30, 53; MSLT: Dbs; MFLT: Sss.
Philodromus sp. 3 (cf. margaritatus): 63; ILT: U.
Thanatus arcticus THORELL, 1872: 10, 11, 12, 24, 45, 47, 50, 53, 55, 61; GLT: Mwt; MFLT: Sss, Sgg; MSLT: Dbs, Dns, Cxs. (LOGUNOV 1996a).
Thanatus bungii (KULCZYNSKI, 1908): 05; GLT: Mwt; MFLT: S. (LOGUNOV 1996a).
Thanatus sp. 1: 63; MSLT: Sds.
Tibellus asiaticus KULCZYNSKI, 1908: 08, 17, 28, 32, 34, 51; ILT: As, Mm, Ism; MFLT: Sgg.
Tibellus aspersus DANILOV, 1991: 08, 12, 14, 29, 34, 51, 53, 63; ILT: As, Ism; MFLT: Sgg; MSLT: Dbs.
Tibellus maritimus (MENGE, 1875): 07, 17, 23, 34, 57, 58, 63; ILT: Bf, As, Ism; MFLT: Sgg, Sm.
Tibellus oblongus (WALCKENAER, 1802): 13; MFLT: Sgg.

Pisauridae

Dolomedes bakhkaloj MARUSIK, 1988: 07, 63; ILT: Bf; MFLT: Sm.
Dolomedes plantarius (CLERC, 1758): 01; MFLT: Sm.

Salticidae

Chalcocircus alpicola (L. KOCH, 1876): 02, 27; GLT: Mwt; MFLT: Sms.
Chalcocircus sp. 1 (cf. alpicola): 26; GLT: Mwt.
Chalcocircus glacialis CAPORIACCO, 1935: 14, 19, 32, 36, 45, 50, 53, 55, 58, 60, 63; ILT: Rpb; MSLT: Dbs, Dns, Cxs, S. (LOGUNOV 1992c).
Chalcocircus nigrurus (THORELL, 1875): 14; MSLT: Dbs.
Dendryphantes czekanowskii PROSZYNKI, 1979: 35, 56; GLT: Mwt.
Talavera sp. 1 (cf. petrensis): 14; MSLT: Dbs.
Talavera sp. 2 (cf. trivittata): 54, 63; GLT: Mst; ILT: U.
Yllenus sp. 1 (cf. koreanus): 12, 29a, 49, 53, 55, 61, 63; ILT: Rpb, Ism, As; MSLT: Sds, Dns, Dbs.
Yllenus sp. 2 (cf. hamifer): 12, 16, 45, 50, 55; ILT: Rpb; MSLT: Dns, Dbs, S, Cxs.

Tetragnathidae

Eucta sp. 1: 12, 27, 32, 34, 63; ILT: Ism, As; MFLT: Sms; MSLT: Dbs.
Pachygnatha clercki SUNDEVALI, 1823: 17, 34, 51, 55; ILT: Rpb, Mm, As; MFLT: Sm.
Pachygnatha degeeri SUNDEVAI, 1830: 08; MFLT: Sgg.
Pachygnatha listeri SUNDEVALI, 1830: 01, 09, 12, 14, 17, 31, 48, 49, 51, 58, 63; ILT: U, Bf, As, Mm; MFLT: Sm.
Tetroagnatha dearmata THORELL, 1873: 63; ILT: U, Bf.
Tetroagnatha extensa (LINNÆUS, 1758): 01, 05, 07, 09, 12, 13, 17, 23, 28, 34, 35, 57, 62, 63; ILT: Mm, As; MFLT: Mf, Sm, Sgg, Sms; MSLT: Dbs, Sds.
Tetroagnatha nigrita LENDL, 1886: 07, 63; MFLT: Mf; ILT: U.
Tetroagnatha obtusa C.L. KOCH, 1837: 63; ILT: As.
Tetroagnatha pinicola L. KOCH, 1870: 01, 04, 07, 08, 09, 11, 14, 23, 28, 40, 44; MFLT: Mf, Lf, Sgg; GLT: Sm, S.

Theridiidae

Achaearanea riparia (BLACKWALL, 1834): 01, 03; GLT: Mwt; MFLT: Mf.
Achaearanea tepidariorum (C.L. KOCH, 1841): 12; ILT: U.
Achaearanea sp. 1: 53; MSLT: Dbs.
Arctachaea norica (CHAMBERLIN & IVIE, 1947): 07, 11; MFLT: Sss, Sms.
Crustulina sticta (O.P.-CAMBRIDGE, 1861): 11; MFLT: Sms.
Dipoena prona (MENGE, 1868): 09; ILT: U, Mm.
Dipoena sp. 1: 07; MFLT: Mf; ILT: Ism.
Dipoena sp. 2: 53; MSLT: S.
Enoplognatha serratosignata (L. KOCH, 1879): 09, 27, 45, 52, 60; ILT: Mm; MFLT: Sss, Sms; MSLT: Cxs, S.
Enoplognatha tecta (KEYSERLING, 1884): 17, 34, 51, 63; ILT: Bf, As.
Enoplognatha sp. 1: 12, 27, 53; MSLT: Dbs, Dns; MFLT: Sms.
Enoplognatha sp. 2: 12, 27, 29, 30, 35, 38, 52, 53, 56; MFLT: Sms, S; MSLT: Dns, S.
Euryopis levii HEIMER, 1987: 58; ILT: U.
Euryopis saukea LEVI, 1951: 11, 50; MFLT: Sms; MSLT: Cxs.
Neottiura bimaculata (LINNÆUS, 1767): 17, 13, 14, 23, 58, 63; ILT: Mm, As, U; MFLT: Lf, Sm, Bef.
Robertius luidus (BLACKWALL, 1836): 14, 31; ILT: U; MFLT: ?.
Robertius unguulatus VOGELSANGER, 1944: 30, 63; ILT: Mm; MFLT: Sms, Sm.
Steatoda albomaculata (DE GEER, 1778): 02, 06, 08, 09, 10, 12, 21, 23, 25, 27, 29, 30, 31, 32, 33, 34, 44, 45, 46, 49, 50, 53, 55, 56, 57, 58, 61, 63; ILT: As, Rpb, Ism; MSLT: Dns, Dbs, S, Cxs, Sds; MFLT: Sms, S.
Steatoda bipunctata (LINNÆUS, 1758): 46, 49; ILT: U, Ism.
Steatoda sp. 1: 09, 14, 27, 30, 32, 44, 53, 55; MFLT: S, Sms, Sms; MSLT: Dbs, Dns, S.
Theridion aurantium EMERTON, 1915: 07, 31; MFLT: Mf, Sms.
Theridion impressum L. KOCH, 1881: 07, 08, 09, 10, 11, 12, 14, 23, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 44, 48, 58, 63; ILT: Ism, Rpb, As; MFLT: Sms, Sgg, Sms; Mf, Mf; MSLT: Dbs, Dns.
Theridion montanum EMERTON, 1882: 05, 08, 12, 30, 32, 53; MFLT: Mf, Lf, S; MSLT: Dns, S.
Theridion ohleri (THORELL, 1870): 07, 08, 11, 21, 23, 25, 30, 31, 35, 46; ILT: Ism; MFLT: Lf, Mf, Sgg.
Theridion petraeum L. KOCH, 1872: 12, 15, 33, 49, 51; MSLT: Dbs; ILT: As.
Theridion pictum (WALCKENAER, 1802): 02, 07, 23, 31, 63; GLT: S; ILT: Mm; MFLT: Mf, Lf; MSLT: Sds.
Theridion sibiricum  MARUSIK, 1988: 02, 05, 09, 11, 12, 14, 26, 27, 30, 32, 35, 36, 45, 50, 53; GLT: Mwt; ILT: Ism; MSLT: Dbs, Dns, S, Cxs; MFLT: Sss, S.
Theridion varians  HAHN, 1833: 07, 14, 23, 63; ILT: U; MFLT: Mf, Lf.
Theridion sp. 1 (cf. sibiricum): 09, 53; MFLT: S; MSLT: S.
Theridion sp. 2: 04; GLT: S.
Theridion sp. 3: 08; MFLT: ?.
Thyrotes bellissimus  (L. KOCH, 1879): 03, 07, 23, 36; GLT: S; MFLT: Sm.
Thyrotes oleatus  (L. KOCH, 1879): 05; MFLT: S.

Thomisidae
Lystiotes maius  ONO, 1979: 01; MFLT: Mf.
Ozyptila arctica  KULCZYNSKI, 1908: 54; GLT: Mwt.
Ozyptila orientalis  KULCZYNSKI, 1926: 11, 26, 35, 52, 54, 58; GLT: Mwt; ILT: Mm; MFLT: Sms. (LOGUNOV & MARUSIK 1994b).
"Ozyptila" pseudodolithea  SIMON, 1880: 12; MSLT: Dns.
Ozyptila raua  SIMON, 1875: 03, 04, 35, 40, 56; GLT: Sm. (LOGUNOV & MARUSIK 1994b).
Ozyptila scabricula  (WESTRING, 1851): 09; MFLT: Sms.
Ozyptila sincera  KULCZYNSKI, 1926: 14, 35, 63; ILT: U; MFLT: Mf.
Synaema globosum  (FABRICIUS, 1775): 09, 14; MFLT: Sms.
Thomisus onustus  WALCKENAER, 1805: 09, 12, 14, 28, 30, 32, 34, 53, 55, 57, 63; ILT: Ism, Lf; MFLT: Sss; MSLT: Dbs, Dns. (LOGUNOV & MARUSIK 1994b).
Xysticus audax  (SCHRANK, 1803): 05, 07, 08, 09, 12, 14, 23, 26, 28, 31, 34, 36, 40, 51, 56, 57; ILT: As, Mm; MFLT: Sms, Sgg, Sss. (LOGUNOV & MARUSIK 1994b).
Xysticus bifasciatus  C.L. KOCH, 1837: 07, 08, 23, 26; MFLT: Sms, Sgg. (LOGUNOV & MARUSIK 1994b).
Xysticus bonneti  DENIS, 1937: 08, 09, 14, 23, 26, 27, 30, 35, 36, 40, 43, 45, 52, 53, 56, 63; GLT: Mwt; MFLT: Sss; MSLT: Cxs, Sds. (LOGUNOV & MARUSIK 1994b).
Xysticus ephippiatus  SIMON, 1880: 07, 09, 12, 14, 17, 26, 28, 30, 32, 34, 44, 63; ILT: Mm, Ism, U, Rpb; MFLT: Sms, Sss. (LOGUNOV & MARUSIK 1994b).
Xysticus hedini  SCHENKEL, 1963: 34; ILT: Ism.
"Xysticus" inaequalis  KULCZYNSKI, 1901: 34; MSLT: Dns. (LOGUNOV & MARUSIK 1994b).
Xysticus laticeps  SCHENKEL, 1963: 32; MSLT: Dns.
Xysticus obscurus COLLETT, 1877: 03, 04, 09; GLT: Sm; MFLT: Sm. (LOGUNOV & MARUSIK 1994b).
Xysticus rugosus BUCKLE & REDNER, 1964: 02, 03, 47; GLT: Mst, Mwt. (LOGUNOV & MARUSIK 1994b).
Xysticus sibiricus KULCZYNSKI, 1908: 05, 06, 56, Sayano-Shushensky Reservation; MFLT: Mf. (LOGUNOV & MARUSIK 1994b).
Xysticus sp. 1: 63; ILT: U, Bf.

Titanoeidae
Titanoea asimilis SONG & ZHU, 1985: 07, 09, 10, 12, 14, 23, 27, 29, 30, 31, 32, 34, 35, 38, 44, 46, 49, 50, 51, 53, 55, 58; ILT: Mm, Rpb; MFLT: S, Sss; MSLT: Dns, Dbs, S, Cxs.
Titanoea nivalis SIMON, 1874: 06, 07, 08, 09, 53; MFLT: Sss, Sm, Mf; MSLT: Dbs, S.
Titanoea sibirica L. KOCH, 1879: 08, 11, 17, 23, 27, 30, 31, 34, 35, 40, 45, 51, 52; ILT: As, Ism; MFLT: Lf, Sss, Sns, Sgg; MSLT: Cxs.
Titanoea sp. 1: 58; ILT: Rpb (?).

Uloboridae
Uloborus walckenaerius (LATREILLE, 1806): 09, 10, 12, 14, 32, 63; ILT: Rpb; MSLT: Dns; Dbs, Sds, S.

Zoridae
Zora sp. 1 (cf. nemoralis): 31, 49, 52, 56, 58; ILT: U.

4. Analysis of habitats and discussion:

According to the list of species, altogether 605 spider species from 23 families have so far been recorded in Tuva. Total family composition (in%) of the Tuvan spider fauna is shown in fig. 1, with the faunal taxonomic index (TI) being Lin-Gna-Sal. Thus, this TI corresponds well with that of the entire spider fauna of the mountains of South Siberia (see MIKHAILOV 1997: fig. 1), but differs from other Siberian faunas (e.g. W., C. and NE Siberia), having a higher percentage of jumping and gnaphosid spiders. In most of the Siberian spider faunas, the TI is Lin, Lin-Lyc or Lin-Lyc-Gna. This difference, i.e. including the gnaphosids and salticids in the TI in Tuva is largely due to two reasons: (1) true steppe (arid) ecosystems are practically restricted to South Siberia, and just in such arid ecosystems do the Gnaphosidae and Salticidae form a large part of the whole spider communities (fig. 5); and (2) the true mountain forest landscape in Tuva (Todzha Plateau and the mountain forest belt of the Tannu-Ola Range, see Map) is practically unexplored, so the total number of forest dwellers (mostly linyphiids; see KOPONEN 1996) is somewhat underestimated in comparison to other Siberian spider faunas. In general, we assume that the 605 spider species so far found in Tuva constitute no more than 75-80% of its real species number.

Despite some gaps in our knowledge of the spider communities of certain vegetation types (e.g. birch forest, see table 1), we consider it possible to conduct a preliminary chorological analysis on the basis of the materials at hand.

On the basis of the similarity of the communities at the value of ca. 0.1 of the Czekanowski-Soenensen index (Ics) (the UPGMA method), the spider communities are divided into two large clusters (fig. 3). Cluster A represents the spider communities of all forest, meadow and mountain tundra vegetation types, including the sedge moor. Cluster B includes the spider communities
found primarily/totally in steppe vegetation types. It is interesting to note that all the spider communities of the mountain tundra (GLT) and mountain steppe (MSLT) landscapes are referred to either cluster A (the former) or cluster B (the latter), while those of the inundated (ILT) and mountain forest-steppe (MFLT) landscapes are distributed between the two large clusters (fig. 3). Moreover, the two latter landscapes show the same taxonomic index (Lin-Gna-Lyc) and index of
Table 1: Species numbers of selected spider families in the studied vegetation types of Tuva; for abbreviations see "Material and methods".

<table>
<thead>
<tr>
<th>Family</th>
<th>GLT mwt</th>
<th>GLT mst</th>
<th>GLT sm</th>
<th>GLT s</th>
<th>ILT u</th>
<th>ILT ism</th>
<th>ILT mm</th>
<th>ILT as</th>
<th>ILT bf</th>
<th>ILT rpb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Araneidae</td>
<td>−</td>
<td>−</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Clubionidae</td>
<td>−</td>
<td>−</td>
<td>1</td>
<td>−</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dictynidae</td>
<td>−</td>
<td>1</td>
<td>1</td>
<td>−</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>−</td>
<td>2</td>
</tr>
<tr>
<td>Gnaphosidae</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>−</td>
<td>13</td>
<td>9</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Linyphiidae</td>
<td>33</td>
<td>12</td>
<td>29</td>
<td>6</td>
<td>60</td>
<td>13</td>
<td>11</td>
<td>4</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Lycosidae</td>
<td>12</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>16</td>
<td>9</td>
<td>10</td>
<td>11</td>
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<td>−</td>
<td>−</td>
<td>−</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Salticidae</td>
<td>6</td>
<td>3</td>
<td>−</td>
<td>−</td>
<td>11</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>−</td>
<td>10</td>
</tr>
<tr>
<td>Tetragnathidae</td>
<td>−</td>
<td>−</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Theridiidae</td>
<td>3</td>
<td>−</td>
<td>−</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Thomisidae</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>−</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>30</td>
<td>46</td>
<td>14</td>
<td>140</td>
<td>69</td>
<td>55</td>
<td>58</td>
<td>35</td>
<td>70</td>
</tr>
</tbody>
</table>

| Family       | MFLT sss | MFLT sms | MFLT lf | MFLT mf | MFLT bef | MFLT sm | MFLT sgg | MFLT s | MSLT dns | MSLT dbs | MSLT sds | MSLT exs | MSLT s |
|--------------|----------|----------|---------|---------|----------|---------|---------|-------|----------|----------|----------|----------|---------|-------|
| Araneidae    | 8        | 7        | 5       | 6       | −        | 3       | 3       | 6     | 1        | 6        | 8        | 6        | 1       | 5     |
| Clubionidae  | 1        | 2        | 3       | 3       | 2        | 3       | 3       | −     | −        | −        | 3        | −        | −       | −     |
| Dictynidae   | 2        | 2        | 2       | 7       | −        | 2       | 3       | 1     | 4        | 3        | 2        | 2        | 2       | −     |
| Gnaphosidae  | 23       | 21       | 4       | 7       | −        | 2       | 1       | 6     | 18       | 18       | 6        | 9        | 11      | −     |
| Linyphiidae  | 4        | 15       | 43      | 88      | 2        | 5       | 9       | 7     | 7        | 4        | −        | 3        | 4       | −     |
| Lycosidae    | 10       | 14       | 8       | 13      | 2        | 10      | 8       | 4     | 6        | 11       | 6        | 3        | 7       | −     |
| Philodromidae| 6        | 4        | 3       | 1       | −        | 2       | 8       | 3     | 6        | 7        | 1        | 2        | 2       | −     |
| Salticidae   | 8        | 10       | 2       | 10      | −        | 3       | 7       | 5     | 11       | 11       | 8        | 4        | 7       | −     |
| Tetragnathidae| −       | 2        | 1       | 3       | −        | 3       | 3       | −     | −        | 2        | 1        | −        | −       | −     |
| Theridiidae  | 10       | 9        | 6       | 11      | 1        | 3       | 2       | 7     | 7        | 8        | 2        | 4        | 9       | −     |
| Thomisidae   | 8        | 9        | 4       | 11      | −        | −        | 5       | −     | 6        | 7        | 3        | 3        | 1       | −     |
| Others       | 5        | 3        | 4       | 5       | −        | 1       | 4       | 1     | 6        | 5        | 1        | 2        | 6       | −     |
| Total        | 85       | 98       | 85      | 165     | 7        | 37      | 59      | 35    | 78       | 84       | 39       | 33       | 53      | −     |

146.
originality (Lin-Sal), differing in both respects from the GLT and the MSLT. Thus, it is safe to assume that the considered landscapes can be combined into two groups: primary (core) landscapes (the GLT and the MSLT) and marginal landscapes (the ILT and the MFLT). The MFLT is situated between primary and marginal landscapes and, for the most part, it consists of ecosystems occurring in primary landscapes.

It is known that one of the most striking peculiarities of marginal landscapes is their higher level of biodiversity in comparison to primary landscapes (Chernov 1975, Mordkovitch pers. comm.). Fig. 2 seems to support this idea as well: both the ILT and the MFLT show twice as high species numbers as the GLT and the MSLT. The taxonomic originality of spider communities in all landscapes is approximately the same, varying from 26% (in the GLT) to 37% (in the MFLT); and this suggests that the mixed nature of marginal landscapes does not mean that they lose their taxonomic originality and hence their independent consideration in the discussion.

Fig. 3: Cluster dendrogram of the spider communities (573 species) in 23 vegetation types based on the Czekanowski-Sørensen similarity index. For abbreviations, see "Material and methods".
below. It is also important to note that although the taxonomic patterns of the GLT and the MSLT are quite different (see fig. 4), the number of found species and the percentage of exclusive species are practically the same, 124 (26%) and 154 (32%) respectively. The MSLT turned out to be the best studied Tuvian ecosystem from the arachnological point of view and, thus, the number of spider species found there is quite reliable.

Both large clusters (A and B) presented in fig. 3 can be further classified into smaller ones at the Ics value of ca. 0.2-0.3. Brief characteristics of them are given below in discussing the spider communities of the landscapes considered.

The goltsy (mountain tundra) landscape, GLT (figs. 2, 4, 5, 6; table 1, 2).

This is an easily delimited but rather poorly studied landscape and hence all figures discussed below are very preliminary. Altogether 124 spider species have been encountered, of which 32 (or 26%) can be considered exclusive species (fig. 2). Almost a half of the entire GLT fauna is represented by the Linyphiidae (47%, fig. 4), but the proportions of the Lycosidae (14%) and Gnaphosidae (11%) are also marked. The GLT taxonomic index is Lin-Lyc (can even be treated as Lin). Actually, the GLT originality is provided only by six spider families (of 23 recorded in Tuva), of which the most species-rich is Linyphiidae (60%, fig. 5) and hence the index of originality is Lin. However, distribution of the latter index over GLT vegetation types shows clear differences between the moss-tussock-shrubly wet tundra (mwt) on the one hand and other formations on the other (table 2). Most probably, this is due to insufficient collecting in all the GLT veg-
Table 2: Exclusive (indicator) species in different vegetation types of Tuva. For abbreviations, see "Material and methods"; figures in parentheses after family names refer to the number of exclusive species and to their proportion (%) of all exclusive species in this vegetation type; the index of originality is in square brackets.

GLT

mwt LINHYPIIDAE (3; 38%): Agyneta affinisoides, A. fuscipalpus, Panamomops dybowskii; THOMISIDAE (1; 13%): Oxyptila arctica; SALTICIDAE (4; 50%): Chalciscirtus sp. 1, Dendryphantes chekanowski, Pellones lapponicus, Sitticus lineolatus – [Sal].

mst GNAPHOSIDAE (2; 22%): Gnaphosa sp. 1; Parasyrisca logunovi; LYCOSIDAE (2; 22%): Acantholycosa triangulata, Pardosa baraun; LINHYPIIDAE (9; 56%): Erigone remota, Hilaira glacialis, Monocerellus montanus, Poeciloneeta petrophila, Walckenaeria koenboutsjei – [Lin].

sm LYCOSIDAE (1; 13%): Xerolycosa nemoralis; LINHYPIIDAE (6; 74%): Anguliphantes cerinus, Araneus vorkuensis, Drepanotylus borealis, Leptorhoptrum robustum, Oreonetes sajanensis, Thyreostenius biouva; THOMISIDAE (1; 13%): Ozyptila rauda – [Lin].

s THERIDIIDAE: Theridion sp. 2.

ILT

u ARANEIDAE (2; 6%): Araniella proxima, A. yaginumai; THERIDIIDAE (2; 6%): Achaearanea tepidariorum, Euprosis levii; PISAURIDAE (1; 3%): Pisaura ancrea; CLUBIONIDAE (3; 9%): Clubiona lutescens, C. pseudosaxatilis, C. subsultans; GNAPHOSIDAE (3; 9%): Drassyllus pusillius, Micaria aenea, Zelotes barkol; LINHYPIIDAE (15; 46%): Nacrophorces saltuum, Bathypantes setiger, Colliniésa submissa, Dactylopistes video, Diplophalus maruski, Hilaira sp. 1, Kaestneria pullata, Leptophantes tavanovski, Poeciloneeta variagata, Préstigia kuchzynski, Savygina centuriatica, Stenymphantes sibiricus, Trematochelarus cristatus, Walckenaeria auranticeps, W. kazakhstanica; PHILODROMIDAE (1; 3%): Philodromus sp. 3; SALTICIDAE (5; 15%): Heliophanus dubius, Neon rayi, N. reticulatus, Salticus cingulatus, Sitticus mirandus; ZORIDAE (1; 3%): Zora sp. 1 – [Lin-Sal].

ism LYCOSIDAE (1; 11%): Alopecosa subraufa; LINHYPIIDAE (6; 67%): Araneus crassiceps, Dactylopistes video, Erigone dentipalpis, Leptophantes kaszabi, Microlinyphia impigra, Pelecopis minor; THOMISIDAE (1; 11%): Xysticus hedini; SALTICIDAE (1; 11%): Tuvaphantes arat – [Lin].

mm DICTYIIDAE (1; 17%): Dictyna major; LINHYPIIDAE (4; 66%): Allomenega scopigera, A. dentiseta, Polyphemus alticeps, Floronia bucculenta; PHILODROMIDAE (1; 17%): Philodromus sp. 1 – [Lin].

as TETRAGNATHIDAE (1; 14%): Tetragnatha obtusa; DICTYIIDAE (1; 14%): Argenna sp. 1; GNAPHOSIDAE (1; 14%): Micaria sp. 1; LYCOSIDAE (1; 14%): Alleghonea singoriensis; LINHYPIIDAE (1; 14%): Epigytholus tuvensis; SALTICIDAE (2; 29%): Bianor inexploratus, Harmocharis latens.

bf ARGYRONETIDAE (1; 17%): Argyroneta aquatica; CLUBIONIDAE (1; 17%): Clubiona phragmitis; LINHYPIIDAE (2; 33%): Leptophantes sp. 1, Walckenaerianus amakensis; PHILODROMIDAE (2; 33%): Philodromus praeeditus, Thanatus striatus – [Lin-Phi].

rp8 ARANEIDAE (1; 8%): Singa nitidula; TITANOECDIA (1; 8%): Titanoea sp. 1; GNAPHOSIDAE (2; 17%): Gnaphosa chola, Poecilochroa variana; LYCOSIDAE (2; 17%): Alopecosa sp. 3, Pirata hygrophilus; LINHYPIIDAE (3; 25%): Collinésia calignosa, C. dentata, Sibirocyba incerta; SALTICIDAE (3; 25%): Heliophanus patagiantis, Sitticus albolineatus, S. penicillatus – [Lin-Sal].

MFLT

sss AGELENIDAE (1; 20%): Coelotes sp. 1; GNAPHOSIDAE (3; 60%): Drassodes pseudocollesi, Parasyrisca belengis, Zelotes puritanus; LINHYPIIDAE (1; 20%): Trichoncus vasconicus – [Gna].

149
**THERIDIIDAE** (1; 13%): Crustulina sticta; **GNAPHOSIDAE** (1; 13%): Micaria guttulata; **LYCOSIDAE** (1; 13%): Alopecosa sibirica; **LINYPHIDAE** (2; 25%): Hilairea gibbosa, Panamomops depilis; **THOMISIDAE** (2; 25%): Ozyptila scabricula, Synaema globosum; **SALTICIDAE** (1; 13%): Tivaphantes insolitus – [Lin-Tho].

**CLUBIONIDAE** (1; 8%): Clubiona stagnatilitis; **HAHNIIIDAE** (1; 8%): Cryphoca silvicola; **GNAPHOSIDAE** (1; 8%): Gnaphosa microps; **LYCOSIDAE** (1; 8%): Alopecosa albostriatata; **LINYPHIDAE** (7; 58%): Incestophantes aneus, Lasius pilibes. Lephyphantes expunctus, L. laricetorum, Maro saaristoi, Perlongipalpus sp. 1, Walkenaeria antica; **THOMISIDAE** (1; 8%): Ozyptila atomaria – [Lin].

**ARANEIDAE** (1; 2%): Araneus nordmanni; **THERIDIIDAE** (1; 2%): Theridon palmgreni; **DICTYNIDAE** (1; 2%): Dictyna alaskae; **AGELENIIDAE** (1; 2%): Coelotes sp. 2; **LIOCRANIDAE** (1; 2%): Agroeca maculata; **LYCOSIDAE** (2; 20%): Lephyphantes piezator; **LINYPHIDAE** (33; 65%): Agyneta beata, A. conigera, Anguliphanthes dysbowsski, A. karpinski, Ceratinnula brevis, Colliniida distincta, Cnephlocotes obscurus, Dicymbium facetum, Diplacentria bidentata. Eriogene hypoarctica, Eustrandia grandaeva, Gonatium rubellum, Hilairea frigida interecta, Holminaria prolata, Lephyphantes abiskoensis, L. pseudoobilatus, L. quadrigraculatus, Lophomma cognatum, Maro sibiricus, Notioscopus jamalensis, Oryphantes gemitus, Paraeboria nesiesca, Pelecospis palmgreni, Pergrerinus deforss, Pityophyantes physigianus, Poecilomena theridiiformis, Porrhomma pygmaeum, Saitiatlas marxi, Scitoonotus alpinus, Silometopoides sphagnicola, Silometopoides elegans, Thaleria orientalis, Walkenaeria capitata; **THOMISIDAE** (6; 12%): Coriarchae depressa, Lysiteles maius, Ozyptila trux, Pissistis undulata, Tnnarus rimosus, Xysticus sibiricus; **SALTICIDAE** (6; 12%): Bionar aemulus, Dendryphantes hastatus, D. rudis, Evarcha falcatata, E. proszynskii, Pseudeuophrys erraticus – [Lin].

**LYCOSIDAE** (1; 20%): Acantholycosa lignaria.

**CLUBIONIDAE** (1; 20%): Clubiona latericia; **LYCOSIDAE** (2; 40%): Pardosa nentili, P. sphagnicola; **LINYPHIDAE** (1; 20%): Asiophantes sibiricus; **SALTICIDAE** (1; 20%): Marpissa radiata – [Lyc-Lin].

**ARANEIDAE** (2; 20%): Araneus alsine, Cercidia prominens; **TETRAGNATHIDAE** (1; 10%): Pachygnatha degeeri; **GNAPHOSIDAE** (1; 10%): Haplodrassus cognatus; **LYCOSIDAE** (2; 20%): Pardosa amentata, P. lussi; **LINYPHIDAE** (2; 20%): Bollyphantes index, Minicia marginella; **PHILODROMIDAE** (1; 10%): Tibellus oblongus; **SALTICIDAE** (1; 10%): Synageles venator – [Lin-Lyc-Ara].

**THERIDIIDAE** (1; 50%): Thymoites oleatus; **PHILODROMIDAE** (1; 50%): Philodromus margaritatus.

**MSLT**

**ARANEIDAE** (1; 7%): Araneus grossus; **DICTYNIDAE** (3; 21%): Dictyna uvu, Emblyna mongolica, E. logunovi; **ERESIIDAE** (1; 7%): Eresus cinnaberinus; **GNAPHOSIDAE** (2; 14%): Drassodes sp. 1, Drassyll immersis; **LINYPHIDAE** (1; 7%): Agyneta levi; **PHILODROMIDAE** (1; 7%): Thanatus obsunurensis; **THOMISIDAE** (3; 21%): Ozyptila pseudobiltea, Xysticus inaequalis, X. laticeps; **SALTICIDAE** (2; 14%): Pellenes pulcher, Philegra profuga – [Tho-Dic-Gna/Sal].

**THERIDIIDAE** (1; 1%): Achaearanea sp. 1; **DICTYNIDAE** (2; 22%): Dictyna ubydovi, Devade indistincta; **LYCOSIDAE** (1; 1%): Alopecosa licenti; **LINYPHIDAE** (1; 11%): Incestophantes logunovi; **THOMISIDAE** (2; 22%): Xysticus sesterlig, X. striatipes; **SALTICIDAE** (2; 22%): Chalcocircus nigritus, Talavera sp. 1 – [Dic-Tho-Sal].

**LYCOSIDAE** (1): Alopecosa sp. 2; **PHILODROMIDAE** (1): Thanatus sp. 1; **SALTICIDAE** (1): Synageles rami tus.

**DICTYNIDAE** (2; 22%): Archaeodictyna consecuta, Arctella lapponica; **GNAPHOSIDAE** (4; 44%): Drassodes kaszibi, Echemus sibiricus, Gnaphosa tuvinica, Micaria mongunica; **LINYPHIDAE** (1;
cation types and poor/wrong differentiation between the mst and the mwt. Therefore, we assume that the separation of the mst and the mwt shown in fig. 3 (clusters Aa and Ab), as well as the differences in the index of originality (table 2), must now be treated as an artifact and a matter for further more detailed studies. The dendrogram (fig. 3) could easily be explained if both Aa and Ab clusters are combined.

The proportion of exclusive species turned out to be highest in the moss-lichen-stony tundra (mst). However, such disproportion also seems to be due to insufficient collecting. For instance, only 14 spider species have been collected in mountain scree (fig. 6: s), while the similar biotope of the MFLT is already represented by 35 species (fig. 8). So, insufficient collecting in the scree of mountain tundra, to our mind, is one reason why the spider community of this biome is outside any cluster (fig. 3), while its real position seems to be in cluster Aa.

The inundated landscape, ILT (figs. 2, 4, 5, 7; table 1, 2).

This unique landscape consists of a set of unrelated vegetation types differing both physiognomically and in species composition (both plants and animals). The number of spider species found is 270, of which 96 (36%) are exclusive (fig. 2); the taxonomic pattern is shown in fig. 4, with the taxonomic index, like in most Siberian faunas, Lin-Gna-Lyc and the index of originality Lin-Sal (fig. 5). The taxonomic originality over the ILT vegetation types is shown in table 2. Practically everywhere linyphiids form the bulk of exclusive species, with the exception of the urema and especially the river pebble banks where the salticids number 15 and 25 percent of exclusive species, respectively.

Among the treated vegetation types of the ILT (fig. 7; table 1), the urema is characterized by the highest level of both species diversity (140) and taxonomic originality (24%). In almost all vegetation types, except the river pebble banks where the gnaphosids and lycosids are more numerous, the Linyphiidae noticeably predominate. It is important to note that although the urema is a forest vegetation type, its spider community is situated in the dendrogram close to meadow and swampy formations (fig. 3: cluster Aa), but not close to other forests involved (cluster Ab). Thus, being physiognomically a forest, the urema can be considered a “meadow” from the arachnological point of view. This observation agrees well with the botanical data provided by KUMINOVA et al. (1985), showing poor floristic linkages of the urema with Tuvan forests.

The spider community of the bulrush fen (35 species) is not included in any cluster (fig. 3) despite a low percentage of originality (fig. 7: 17%). This could mean that its spider community is formed by an occasional set of species.

The spider communities of three vegetation types of the ILT (as, ism and rp) represent a well marked separate cluster (fig. 3: Ba) of inundated (semi)arid ecosystems. Practically all of them show no differences in the level of species diversity, the taxonomic pattern (fig. 7; table 1) and the index of originality (table 2).

The rest of the ILT vegetation types (mm) is linked with the meadow formations of the mountain forest-steppe landscape (fig. 3: Ac); for other details see below.

The mountain forest-steppe landscape, MFLT (figs. 2, 4, 5, 8; table 1, 2).

This is the best-represented and most complicated landscape often called “exposure forest-steppe” (LAVRENKO et al. 1991), pointing to the dependence of both steppe (S-slopes) and for-
est (N-slopes) ecosystems upon their slope exposition (i.e. the so-called exposure differentiating of landscape). Analogues of this landscape can be found only in Mongolia and in S. Siberian regions neighbouring Tuva. Altogether 354 spider species have been found in the MFLT, of which 132 (or 37%) are treated as exclusive (fig. 2). The MFLT taxonomic index is Lin-Gna-Lyc (fig. 4), the index of originality is Lin-Sal (fig. 5), both indices being the same as in the ILT and in most Siberian spider faunas (see MIKHAILOV 1997: fig. 1). The taxonomic originality over the MFLT vegetation types is shown in table 2.

Among the MFLT vegetation types, the Linyphiidae predominate in the forest formations (44% of all forest spider species), while the Gnaphosidae and the Lycosidae predominate in the steppe-like ones (see table 1). However, the spider community of the sloping shrub-stony steppes (sss) is the only one combined with those of the mountain steppe formations (fig. 3: cluster Bb), while the sloping meadow shrubby steppe (sms) is found among other meadow formations (fig. 3: cluster Ac). This can be easily explained by considering the taxonomic indices of both the sss and the sms, Gna-Lyc-The and Gna-Lin-Lyc, respectively. Thus, in spite of the dominating gnaphosids in both vegetation types, occurrence of the linyphiids is more important in linking the

152
sms together with other meadow formations. Furthermore, the indices of originality in these formations are quite different as well; Gna in the sss and Lin-Tho in the sms (table 2). So, while occurring in physiognomically similar vegetation types (sss and sms), these two spider communities have nothing in common when analysed in detail.

The spider community of the taiga forest (fig. 8: mf) turned out to be the richest, 165 species with 31% of them being exclusive. At the same time, the spiders of the birch forest (fig. 8: bef; table 1) have remained practically unstudied, 7 recorded species constitute, in our view, no more than 5-7% of the expected fauna. This is why the spider community of the birch forest is outside any of the large clusters shown in fig. 3. It is also important to note that 73 exclusive species, or 55% of all exclusive species, recorded from the MFLT, are those of the forest formations, most of them being naturally linyphiids. Contrary to forest spiders, the spider communities of sloping steppes (sss, sms) and meadow glades (sgg) show a rather low percentage of exclusive species (fig. 8), probably due to the fact that most of these species also occur either in the steppe formations of the MSLT or the meadow formations, including the uremea (see above). Such differences between the number of exclusive species of forest and steppe formations could be partially explained by the lack of reliable arachnological data from the true mountain forest landscape (sensu KUMINOVA et al. 1985). As noted above, this landscape has remained unstudied, and a part of its species is in fact included in the taiga forest community (table 1: mf). Thus, in reality, some of the most exclusive species of the mf are common for the MFLT and mountain forest landscapes and the actual level of originality must be lower than that shown in fig. 8: mf.

The spider communities of all the meadow and swampy formations of the MFLT, as well as those of the uremea and the inundated mesophytic meadows, are combined into a single cluster (fig. 3: Ac). These are all similar: a clear dominant group with regard to species diversity is lacking (but everywhere linyphiids are rather numerous) and values of originality are low (8-14%), see figs. 7, 8). Both the taxonomic index and the index of originality over these spider communities show no consistency (tables 1, 2), e.g. the latter index of the sms is Lin-Tho but that of the sgg is Lin-Lyc-Ara, etc. Thus, most of the spider communities combined into cluster Ac (fig. 3) show mixed composition and their closeness to each other is largely explained by the occurrence of eurytopic species.

The mountain steppe landscape, MSLT (figs. 2, 4, 5, 9; table 1, 2).

This is the most peculiar landscape in Tuva (and in all S. Siberia), as a number of Turanian and North Turanian-Dzhungarian biotic elements are shown (LAVRENKO et al. 1991; EMELIANOVA 1972) to occur there; this points to the old (floro)faunogenetic connections between the semiarid regions of S. Siberia and those of the Ancient Mediterranean. Therefore, both the taxonomic pattern and the index of originality of the MSLT are found to be close to those of Middle Asian spider faunas (cf. MIKHAILOV 1997: fig. 1). This is well seen in the composition of indices of originality over the MSLT vegetation types as shown in table 2, with the Gnaphosidae, Dictynidae and Salticidae predominating.

The MSLT taxonomic index is Gna-Sal-The-Ara (fig. 4) and the index of originality is Sal-Gna-Dic (fig. 5), i.e. both species diversity and taxonomic originality are mostly formed by two families: Gnaphosidae and Salticidae. Another oddity of the MSLT is that it is the only landscape where the Dictynidae play a role in forming the index of originality (fig. 5; table 2). Both these peculiarities obviously separate the MSLT spider community from those of all other landscapes discussed above. Altogether 154 spider species have been encountered in the MSLT, of which 50 (or 32%) are found to be exclusive species (fig. 2). Most of the MSLT exclusive species (32 species, 64%) are gathered in the dns, dbs and cxs (fig. 9; table 1).

However, the spider community of the high-mountain (= cryophyte) steppe (cxs) differs from the others in all taxonomic parameters. Firstly, its taxonomic pattern is of mixed nature, i.e. there is no clear dominant group (table 1). Secondly, despite the lowest level of species diversity
Figs. 10-15: Distribution of species numbers (1) and percentages of exclusive (indicator) species (2) of six spider families in different landscapes of Tuva. For abbreviations, see "Material and methods".
Figs. 16-21: Distribution of species numbers (1) and percentages of exclusive (indicator) species (2) of 18 spiders families in different landscapes of Tuva. Fig. 21 shows generalized data for 13 families with 1-3 species. For abbreviations, see "Material and methods".
(33 species), the exs spider community had the highest taxonomic originality (fig. 9) formed by two spider groups only: gnaphosids and dictynids (66% of exclusive species, see table 2). So, this spider community is small but quite specialized; and due to this it is placed in a separate position in the dendrogram (fig. 3: Bd), outside other steppe formations of Tuva.

The separate position of the desert sandy shrub-grass steppes (Sds) community in the dendrogram (fig. 3: Bc) is somewhat unexpected. From general considerations, one could assume it should be near/inside cluster Bb, as the dry shrub-grass steppes (Dbs) and the sds are always neighboring and, moreover, the former are transformed into the latter under special edaphic factors and when destroyed by human activity (KUMINOVA et al. 1985). Probably the last fact is very important, and we can consider the spider community of the sds to be primarily formed by a mixed set of migrants from other steppe formations. If so, this explains the low level of diversity in this community (39 species) and the lowest value of its taxonomic originality (fig. 9), as well as its separate position within the large "steppe" cluster B on the dendrogram.

The last cluster to be discussed is Bb (fig. 3). It consists of true steppe formations, which show a similar level of spider diversity (figs. 8, 9) and differ from other formations by the dominance of gnaphosids in their taxonomic indices (table 1). At the same time, the indices of originality are quite different (table 2), e.g. Gna in the sss and Dic-Tho-Sal in the Dbs. This means that the strong closeness of these spider communities (the Icz ca. 0.4) seen in fig. 3 is explained by the species mainly/only restricted to steppe vegetation types, i.e. steppe stenobions.

The distribution of species numbers and percentages of exclusive species over the landscapes studied are shown in figs. 10-21 for selected spider families with 9 or more encountered species ("Others" shows generalized data for 13 small families with 1-3 species, see the checklist above). On the basis of these diagrams, the following conclusions seem to be possible.

1) Most of the families show their maximal diversity and percentage of exclusive species in the inundated and forest-steppe landscapes, this being in good agreement with the general picture for all the families (fig. 2).

2) In most families, maximum of originality is shown in either the ILT (figs. 15, 16, 18, 19) or the MFLT (figs. 10, 13, 14), with the exception of the dictynid and jumping spiders (fig. 12, 17), which show a consistent increase in this percentage of originality from the GLT to the MSLT.

3) The Thomisidae show the minimum of both species diversity and level of originality in the ILT, and this could mean that they avoid the inundated communities (at least in Tuva).

4) Only six families have exclusive species in the GLT, namely Gnaphosidae, Linyphiidae, Lycosidae, Salticidae, Theridiidae and Thomisidae; for their composition see fig. 5.

5) Although the Linyphiidae show the minimum of species diversity (14 species or 9%; fig. 4, 14) in the MSLT, at least one species is always found to be exclusive in all vegetation types (table 2). This could indicate that the linyphiid fauna of arid communities is mainly/only formed by very specialized species.

6) Both the salticids and gnaphosids (figs. 13, 17) are richest in the ILT and the MFLT, but not in the MSLT as might be expected. Thus, their marked contribution to arid spider communities is caused not by their increase but is due to the decrease of the species number of the linyphiids (cf. fig. 14).

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