

Separation and distribution of *Xysticus cristatus* (Clerck, 1758) and *X. audax* (Schrank, 1803) in eastern Eurasia, with description of a new species from the mountains of Central Asia (Aranei: Thomisidae)

Различение и распространение *Xysticus cristatus* (Clerck, 1758) и *X. audax* (Schrank, 1803) в Восточной Евразии, с описанием нового вида из гор Центральной Азии (Aranei: Thomisidae)

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KEY WORDS: *Xysticus cristatus* group, taxonomy, distribution, eastern Eurasia.

КЛЮЧЕВЫЕ СЛОВА: группа видов *Xysticus cristatus*, таксономия, распространение, восточная Евразия.

ABSTRACT: A new species, *Xysticus pseudocristatus* sp.n., from the mountains of Central Asia is described, figured, diagnosed and mapped. Comparative data (figures and collection localities in eastern Eurasia, including distributional maps) on several closely related species, *Xysticus audax* (Schrank, 1803), *X. cristatus* (Clerck, 1758), *X. thessallicus* Simon, 1916 and *X. promiscuus* O. Pickard-Cambridge, 1876 are given as well.

РЕЗЮМЕ: Описан и диагностирован новый вид, *Xysticus pseudocristatus* sp.n., из гор Центральной Азии. Его распространение показано на карте. Даны также сравнительные данные (рисунки, точки находок в восточной Евразии, карты) для некоторых близкородственных видов: *Xysticus audax* (Schrank, 1803), *X. cristatus* (Clerck, 1758), *X. thessallicus* Simon, 1916 и *X. promiscuus* O. Pickard-Cambridge, 1876.

Introduction

Though the Thomisidae of eastern Eurasia, including Central Asia, have been the subject of considerable interest in recent years [Andreeva, 1975, 1976; Hu & Wu, 1987; Marusik, 1993; Marusik & Logunov, 1990, 1995; Logunov & Marusik, 1994; *etc.*], our knowledge of their distributions within the region are rather scanty. This especially true in regard to the members of the *cristatus* group, which usually present difficulties in their separation [*e.g.* Palmgren, 1983; Jantcher, 2001]. The main goals of this study are (1) to describe a new species hitherto erroneously recorded from Central Asia as either *Xysticus cristatus* (Clerck, 1758), or *X. audax* (Schrank, 1803); and (2) to refine the distribution of

Xysticus cristatus and *X. audax*, both of which are close relatives of the new species, within eastern Eurasia.

Material and methods

Specimens for this study were borrowed from or distributed among the following museums and personal collections: HEC — Hope Entomological Collection, Oxford, UK; HNHM — Hungarian Natural History Museum, Budapest, Hungary; ISEA — Zoological Museum of the Institute for Systematics and Ecology of Animals, Novosibirsk, Russia; NMP — National Museum Praha, Praha, Czech Republic; PCEJ — personal collection of Ms E. Jantscher, Institute of Zoology, Graz, Austria; PCB — personal collection of Mr G. Bergthaler, University of Salzburg, Salzburg, Austria; PSU — Department of Invertebrate Zoology, Perm State University, Perm, Russia; ZMTU — Zoological Museum of Turku University, Turku, Finland; ZMUM — Zoological Museum of the Moscow State University, Moscow, Russia.

In the format of description and the terminology we follow Schick [1965] and Ono [1988], except for BTA that substitutes for ATA/ABA (*sensu* the two latter authors). The sequence of leg segments in measurement data is as follows: femur + patella + tibia + metatarsus + tarsus. All measurements are in mm. Abbreviations used in the figures and in the text: ap — apically; BTA — basal tegular apophysis; d — dorsally; Fm — femur; Mt — metatarsus; MTA — median tegular apophysis; pr — prolaterally; Pt — patella; rt — retrolaterally; RTA — retrolateral tibial apophysis; -Tb — tibia; v — ventrally; VTA — ventral tibial apophysis.

The names of some collectors are abbreviated as follows: Dr. A. M. Basarukin (A.B.); Mr. B. Chichkov (B.C.); Dr. V. V. Dubatolov (V.D.); Dr. R. Yu. Dudko (R.D.); Mr. A. V. Gromov (A.G.); Dr. A. P. Kononenko (A.P.); Dr. A. A. Legalov (A.L.); Dr. D. V. Logunov (D.L.); Dr. I. I. Lyubchanskyy (I.L.); Dr. L. G. Savelyeva (L.S.); Mr. V. K. Zinchenko (V.Z.).

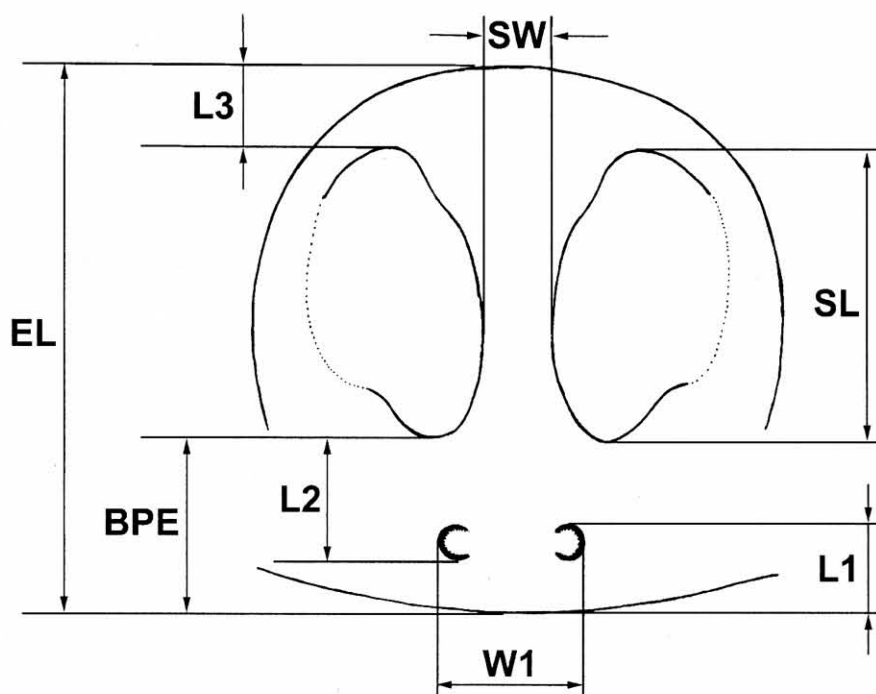


Fig. 1. Explanation of measurement variables: SW — septum width; SL — septum length; EL — epigynal length; BPE — length of the basal part of epigyne; W1 — width-1, viz. that between outlined attachments of the spermathecal apodemes; L1 — length-1, viz. that between epigastric furrow and outlined attachments of the spermathecal apodemes; L2 — length-2, viz. that between outlined attachments of the spermathecal apodemes and the basal part of fossae; L3 — length-3, viz. that between the anterior part of fossae and the anterior edge of epigyne.

Рис. 1. Объяснения промеров: SW — ширина септума; SL — длина септума; EL — длина эпигины; BPE — длина базальной части эпигины; W1 — ширина-1, то есть расстояние между местами прикрепления аподем сперматек; L1 — длина-1, то есть расстояние между эпигастральной щелью и местами прикрепления аподем сперматек; L2 — длина-2, то есть расстояние между местами прикрепления аподем сперматек и базальной частью фосс; L3 — длина-3, то есть расстояние между передней частью фосс и передним краем эпигины.

Reference lists given under each species are by no means incomplete. We included only the works containing the data on the material re-examined by us, or in a few cases [e.g. Ono, 1988; Ono & Yasuda, 1992; Zonstein, 1984, etc.] casting no doubts. Tens of purely faunistics records of both *X. cristatus* and *X. audax* from the ex-USSR are here ignored (or are at least considered as doubtful [e.g. Dunin, 1984, 1989; Eskov, 1988; Guseinov, 1998; etc.]), as most of them are in need of a confirmation upon reference to the pertinent material. All reliable original and literature records of a new species, *X. cristatus* and *X. audax* are mapped; for the latter two species we mapped only Siberian and the Far Eastern records.

Multiple discriminant function analysis was used in an attempt to discriminate among females of the three closely related species (*Xysticus cristatus*, *X. audax* and a new species) using 8 epigynal variables. For each female eight measurements were taken to the nearest 0.01 mm. The scheme of epigynal measurements is given in Fig. 1. The measurements taken are: 1, septum width (SW); 2, septum length (SL); 3, epigynal length (EL); 4, length of the basal part of epigyne (BPE), viz. that between epigastric furrow and the basal part of fossae; 5, width-1 (W1), viz. that between outlined attachments of the spermathecal apodemes; 6, length-1 (L1), viz. that between epigastric furrow and outlined attachments of the spermathecal apodemes; 7, length-2 (L2), viz. that between outlined attachments of the spermathecal apodemes and the basal part of fossae; 8, length-3 (L3), viz. that between

the anterior part of fossae and the anterior edge of epigyne. Only females collected together with males (i.e. certainly identified) were used for a multivariate approach. Separate females of *X. cristatus* and/or *X. audax* (altogether 137) were only provisionally identified and therefore were not used in the analysis. The total numbers of measured females comprise 155 specimens for *Xysticus cristatus*, 111 specimens for *X. audax* and 54 specimens for a new species.

Survey of species

Xysticus pseudocristatus sp.n.

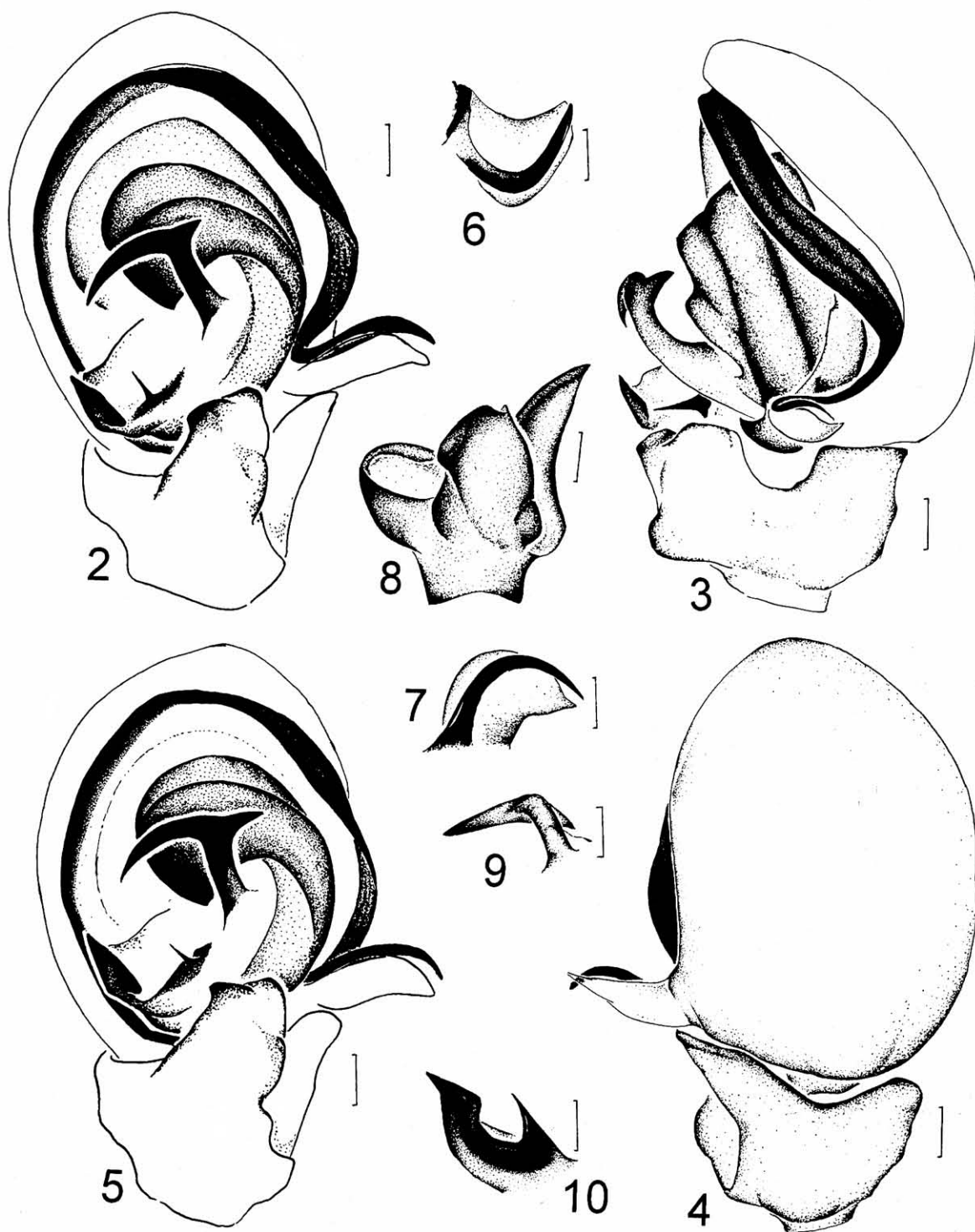
Figs. 2–16.

X. cristatus (misidentified): Pickard-Cambridge, 1885: 66; Yakhontov, 1955: 362; Andreeva, 1975: 338; 1976: 76; Ono, 1978: 271–272, figs. 6–7; Zonstein, 1984: 149; 1996: 141; Hu & Wu, 1987: 346, figs. 274, 1–4; Marusik & Logunov, 1990: 48; 1995 (e.p.): 152–153; Sheikin & Litovchenko, 1992: 136; Zyuzin *et al.*, 1993: 281; 1994: 9; Song & Zhu, 1997: 76–77, figs. 46A–C; Song *et al.*, 1999: 501, fig. 285L.

X. audax (misidentified): Pickard-Cambridge, 1885: 110, 114; Marusik, 1993: 457; Marusik & Logunov, 1995 (e.p.): 151; Zonstein, 1996: 141.

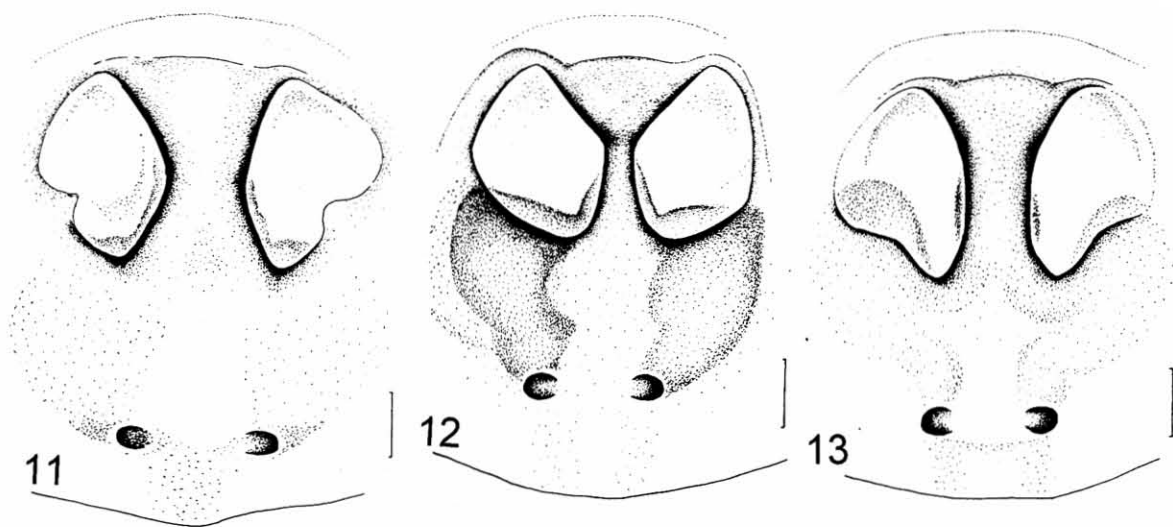
MATERIAL. Holotype ♂ (ISEA), Kazakhstan, Alma-Ata, botanical garden, 43°12'N, 76°54'E, 20–28.05.1996–5.06.1997, A.G.

Paratypes: RUSSIA: *Novosibirsk Area*: 1 ♂ (ISEA), near Novosibirsk, bank of Shadricha River, 1–12.06.1992, V.D. —



Figs 2–10. *Xysticus pseudocristatus* sp.n. (paratypes from S. Kazakhstan, Bol'shoe Almaatinskoe Lake): 2, 5 — male palp, ventral view; 3 — ditto, prolateral view; 4 — ditto, rear view; 6, 7 — embolic tip; 8 — palpal tibia; 9 — median tegular apophysis, rear view; 10 — ventral tegular apophysis, rear view. Scale: 0.1 mm.

Рис. 2–10. *Xysticus pseudocristatus* sp.n. (паратипы из Ю. Казахстана, Большое Алмаатинское Озеро): 2, 5 — пальпс самца, вентрально; 3 — тоже, пролатерально; 4 — тоже, вид сзади; 6, 7 — конец эмболюса; 8 — голень пальпы; 9 — медиальный тегулярный апофиз, вид сзади; 10 — вентральный тегулярный апофиз, вид сзади. Масштаб: 0,1 мм.



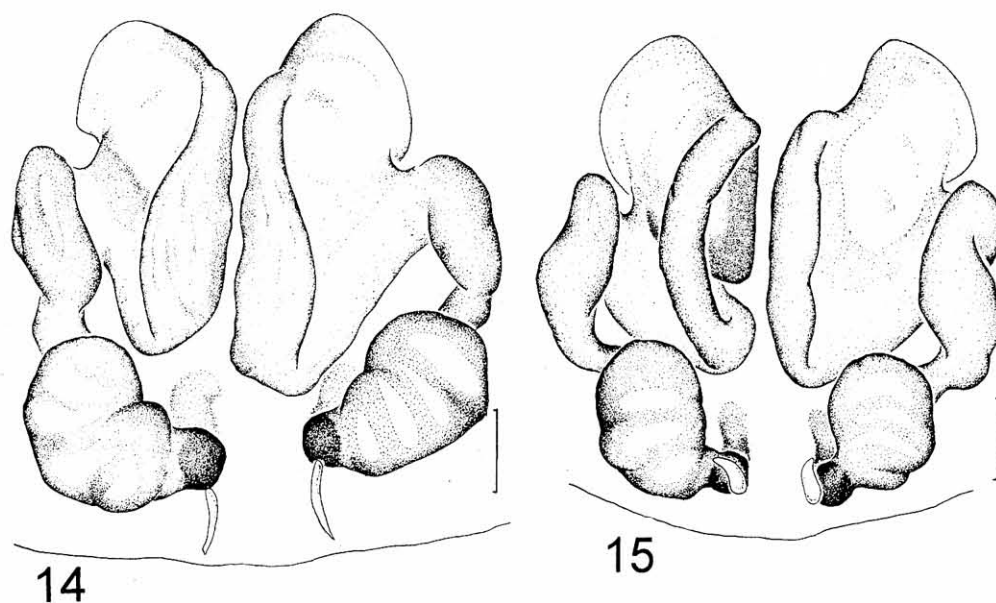
Figs 11–13. Epigynes of *Xysticus pseudocristatus* sp.n. (paratypes from Tajikistan): 11 — Karatau Mt. Range, 12–13 — Turkestanian Mt. Range. Scale: 0.1 mm.

Рис. 11–13. Эпигины *Xysticus pseudocristatus* sp.n. (паратипы из Таджикистана): 11 — хр. Каратау, 12–13 — Туркестанский хребет. Масштаб: 0,1 мм.

Tuva: 2 ♂♂ (ISEA), Erzin Distr., 30–35 km W of Ersin, Shara Nur Lake, 94°32'E, 50°32'N, 900 m a.s.l., 8.06.1995, Yu. M. Marusik. — *KAZAKHSTAN*: *Semipalatinsk* [=Semei] Area: 1 ♂ (ISEA), Makanchi Distr., 38 km NNE of Karabulak, ca 2 km W of Arkaly [=Kishi-Arkaly] Mt., 4.10.1990, T. V. Iskakova. — *Chimkent* [=South Kazakhstan] Area: 1 ♀ (ZMUM), Dzhetyysai Distr., ca 3 km W of Mineral'nye Vody [=KazMinvody], 28.03.1979, coll.; 3 ♂♂, 2 ♀♀ (ISEA), Algabassky Distr., ca 67 km N of Chimkent [=Shymkent], 42°58'N, 69°38'E, 6.05.1994, D. A. Milko; 3 ♂♂ (ISEA), 1 ♀ (ZMUM), Bugunsky Distr., near Arys', *Artemisia* steppe, Arys' River valley, 1–31.05.1988, D.L.; 1 ♂, 1 ♀ (ZMUM), same distr., 1–2 km S of Arys', Kabulsai Boundary, 42°24'N, 68°48'E, 18.04.1999, A.G.; 1 ♂, 1 ♀ (ISEA), same distr., 2–3 km of Arys' 42°24'N, 68°49'E — 42°25'N, 68°50'E, 17–20.04.1999, A.G. — *Alma-Ata* Area: 1 ♂ (ISEA), ca 10 km N of Otar, under stones, 10.05.1988, Ch. K. Tarabaev & M. V. Zarko, 1 ♂ (ISEA), Zhambyl [=Dzhambul] Distr., Akterek, 31.05.1979, S. L. Zonstein; 1 ♂ (ISEA), Almaty [=Alma-Ata], Akademgorodok, 43°13'N, 76°55'E, 26.06.1997, A.G.; 5 ♂♂, 5 ♀♀ (ISEA), together with holotype, 20–28.05.1996–5.06.1997, A.G.; 1 ♂, 3 ♀♀ (ISEA), Kaskelen Distr., near Bol'shoie Almaatinskoe Lake, 43°05'N, 73°59'E, 2500–2600 m a.s.l., 3–10.07.1995, Yu. M. Marusik; 2 ♀♀ (ISEA), Talgar Distr., SW vicinities of Talgar, 1.06.1998, A.G.; 1 ♂ (ISEA), Talgar Distr., Zailiisky Alatau Mt. Range, near Medeo, Talgar Pass, 3200 m a.s.l., 19.06–1.07.1997, A.G.; 1 ♀ (ISEA), Chilik Distr., W vicinities of Karakuduk, 30.07.1998, A.G. — *Taldykorgan* Area: 1 ♀ (ISEA), Andreevka [=Kabanbai] Distr., ca 4 km NW of Andreevka [=Kabanbai], 4.06.1998, A.G.; 1 ♀ (ISEA), Gvardeisk Distr., ca 7 km E of Kospan, 24–25.05.1997, I. B. Skvorkin; 3 ♀♀ (ISEA), near Kaspal, 10.06.1995, O. V. Lyakhov. — *UZBEKISTAN*: *Tashkent* [=Toshkent] Area: 1 ♂ (ZISP), Tashkent, 6.04.1909, N. A. Zarudnyi; 6 ♀♀ (ZMUM), ca 40 km SW of Tashkent [=Toshkent], Gul'bakhor, 29.04.1986, S. Kurbatov. — *Dzhizak* [=Zhizzak] Area: 1 ♀ (ISEA), Turkestan Mt. Range, Zaaminskii Nature Reserve, 36°36'N, 68°22'E, 2100 m a.s.l., 10.06.1997, D. A. Milko. — *Samarkand* Area: 1 ♂, 3 ♀♀ (ISEA), Urgut Distr., ca 38 km S of Samarkand, Zeravshan Mt. Range, Aman-Kutan Pass, 26.04.1993, S. V. Ovchinnikov. — *Kashkadarya* Area: 2 ♀♀ (ISEA), Kyzyl-Su Nature Reserve, 15–30.06.1988, M. Aripdzhanov. — *Bukhara* Area: 6 ♂♂, 2 ♀♀ (PSU), near Yakkabagh, 730–850 m a.s.l., 29.03.1942, D. M. Fedotov. — *KYRGYZSTAN*: 1 ♂ (ZMUM), S slope of Talasskii Alatau Mt. Range, 2.06.1987, S. L. Zonstein; 1 ♂ (ZMUM), Naryn-Too Mt.

Range, the upper reaches of Irisu River, 18.07.1987, S. V. Ovchinnikov; 3 ♀♀ (ISEA), Kurgan-Yar, 1.06.1979, S. L. Zonstein. — *Chu* Area: 1 ♂ (ISEA), near Bishkek [=Frunze], 13.04.1980, S. L. Zonstein; 1 ♂ (ISEA), Kirghizskii Mt. Range, Chon-Kurchak Boundary, 2700 m a.s.l., 20.06.1987, S. V. Ovchinnikov; 2 ♂♂ (ISEA), foothills of Kirghizskii Mt. Range, near Chon-Aryk, beginning of May, S. V. Ovchinnikov. — *Dzhalalabad* Area: 1 ♀ (ZMUM), Dzhany-Dzhol Distr., Chatkal Mt. Range, Sary-Chelek Nature Reserve, near Arkit, under stones, 8.07.1983, K. G. Mikhailov; 1 ♀ (ZMUM), near Dzhalalabad, 24.07.1980, S. L. Zonstein. — *Issyk-Kul'* Area: 1 ♂ (ZMUM), Kungei-Ala-Too Mt. Range, Issyk-Kul' Distr., Chon-Uryukty [Chon-Oryuktyu] River canyon, 2000 m a.s.l., 16.05.1985, S. L. Zonstein; 1 ♀ (ZMUM), Tyup Distr., Santash Boundary, 15.07.1989, S. V. Ovchinnikov; 1 ♂ (ISEA), Tyup Distr., Teploklyuchinka, 10.06.1995, S. V. Ovchinnikov. — *TAJIKISTAN*: 3 ♂♂, 1 ♀ (ISEA), Karatau Mt. Range, Ak-Kutal' Pass, 21.04.1974, Kh. Nasreddinov; 1 ♀ (ZISP), Mairan-Kol', 19.08.1907, N. A. Zarudnyi. — *Kurgan-Tyube* Area: 1 ♀ (ISEA), Dzhalikul' Distr., near Garauly [=Garavuti], canyon, 8.04.1973, E. Seredina; 5 ♀♀ (ISEA), 1 ♀ (ZMUM), Dzhalikul' Distr., near Garauly [=Garavuti], 16.04–23.05.1974, A.P.; 1 ♂ (ZMUM), Dzhalikul' Distr., SW slope of Aktau Mt. Range, near Garauly [=Garavuti], 04.1975, A.P.; 1 ♂ (ISEA), Karategin Mt. Range, Sorbog-Komarou Rivers, Shinglig Kishlak, 22.04.1978, A.P. — *Leninabad* Area: 1 ♂, 5 ♀♀ (ZMUM), Shakhristan Distr., Turkestan Mt. Range, Kusavli-Sai, 20.06–1.07.1974, Yu. Lebedev; 3 ♀♀ (ZMUM), same locality, 06.1975, Yu. Lebedev. — *MONGOLIA*: 1 ♂ (ISEA), Tov Aimak, Bayankhangai Somon, 47°20'N, 105°25'E, 1200 m a.s.l., Yu. M. Marusik.

DIAGNOSIS. The male of *X. pseudocristatus* is most similar to that of *X. cristatus*, but can be easily separated from it by the following characters: (a) the BTA relatively shorter and wider (cf. Figs. 2, 5 and 36, 39); (b) the separate tooth of the BTA wider at its base and stronger (cf. Figs. 10 and 43); the wider RTA (cf. Figs. 3 and 37); and (d) the embolic tip evenly sharp, not widen (cf. Figs. 6, 7 and 44, 45). The female of *X. pseudocristatus* can be distinguished from those of *X. cristatus* and *X. audax* by the longer BPE (cf. Figs. 11–13 and 28–31, 46–50) and the widest insemination ducts of the spermathecae (cf. Figs. 14, 15 and 32–35). The female of *X. pseudocristatus* may also be mixed up with that of *X. thessallicus* from E. Mediterranean, but differs in having the shorter



Figs 14–15. Spermathecae of *Xysticus pseudocristatus* sp.n. (paratypes from Tajikistan). Scale: 0.1 mm.
Рис. 14–15. Сперматеки *Xysticus pseudocristatus* sp.n. (паратипы из Таджикистана. Масштаб: 0,1 мм.

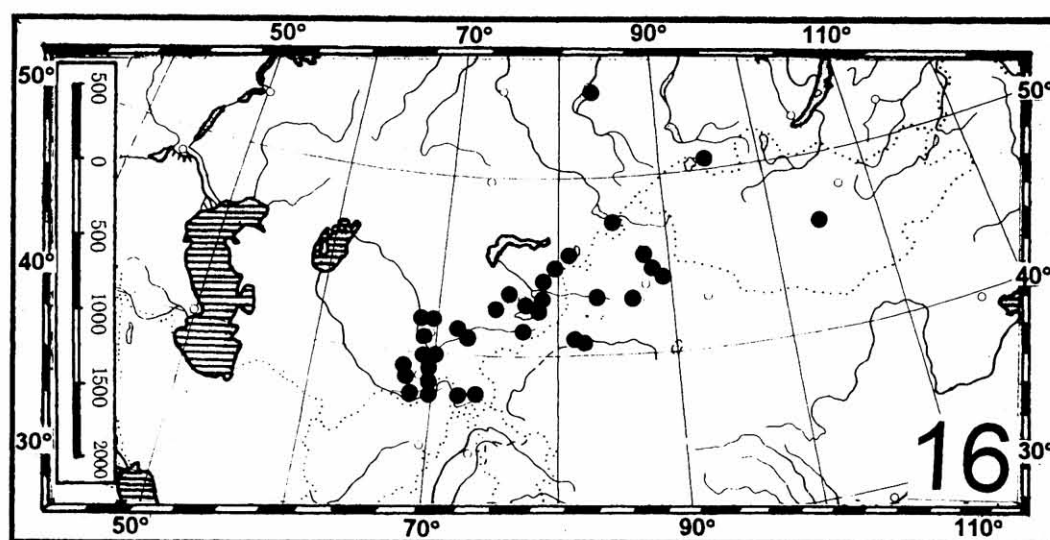


Fig. 16. Distribution of *Xysticus pseudocristatus* sp.n. One dot may represent more than one close locality.

Рис. 16. Распространение *Xysticus pseudocristatus* sp.n. Одна точка может обозначать более, чем один близко расположенный локалитет.

BPE length, the narrower median septum of the epigyne and the wider and stronger insemination ducts (cf. Figs. 11–15 and 18, 19). The male of *X. thessallicus* [see Wunderlich, 1995: figs. 1–2] differs from that of *X. pseudocristatus* in the absence of the tooth on the BTA, the pen-shaped (rather than pickax-shaped) MTA and the presence of the big spiral of the embolus. For differences from *X. audax* (male) and *X. promiscuus* see comments below under corresponding “Diagnoses” of the latter species.

As the females of *X. pseudocristatus*, *X. cristatus* and *X. audax* are poorly distinguishable (almost indistinguishable)

by the copulatory organs, we have tried to apply a morphometric approach to separate them. The results of the multiple discriminant function analysis is presented in Table 1 and Figure 17. The graph (Fig. 17) shows the centroids of all species and their respective 95% confidence circles plotted onto the first two canonical axes. The first canonical axis explains most of epigynal variation (almost 74%; Table 1). On this axis, the epigynal length (EL) and length-2 (L2) contribute to discrimination between *X. pseudocristatus* and the pair *X. cristatus/audax* to a largest degree. The EL mean in *X. pseudocristatus* is 0.68, while in both *X. cristatus* and *X.*

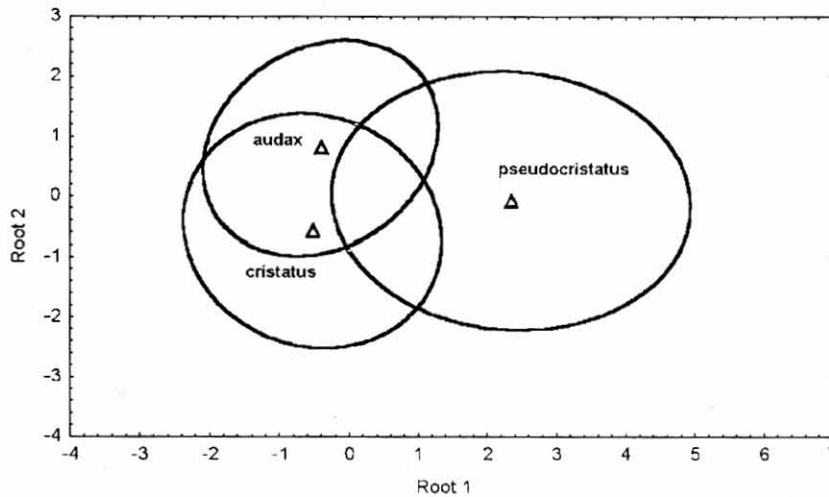


Fig. 17. Canonical graph (axes 1 and 2) of the centroids and their respective 95% confidence circles of the three *Xysticus* species on eight epigynal variables.

Рис. 17. Канонический граф (оси 1 и 2) центроидов и перекрытия их доверительных контуров (95%) у трех видов *Xysticus* по восьми промерам.

Table 1. Standardized coefficients for first two canonical vectors from the discriminant function analysis of 8 epigynal variables from the three *Xysticus* species.

Таблица 1. Стандартизированные коэффициенты для первых двух канонических векторов, полученных методом дискриминантного анализа 8 переменных величин эпигины у 3 видов *Xysticus*.

Variable	Canonical vectors	
	1	2
1. SW	-0,074	0,400
2. SL	0,217	0,731
3. EL	0,591	-0,112
4. BPE	0,187	-0,028
5. W1	0,004	-0,218
6. L1	-0,022	-0,478
7. L2	0,304	0,126
8. L3	0,029	-0,495
Cumulative Percent	73.80	26.20

audax is 0.54; the L2 mean is 0.25 in *X. pseudocrisatus* and 0.19 in both *X. cristatus* and *X. audax*. The septum length (SL) and the length of the basal part of epigyne (BPE) also contribute to a considerable extent to discrimination on the first axis (Table 1). Therefore, one can easily conclude that the epigyne of *X. pseudocrisatus* is clearly larger in comparison to both *X. cristatus* and *X. audax*. To the authors' opinion, the BPE length seems to be the most promising (=most readily available for observation) quality epigynal characters to sort out the females of *X. pseudocrisatus* from both *X. cristatus* and *X. audax*.

On the second axis, the sizes of the median septum (SL and SW) are only important components to discriminate between species. Moreover, they are the only small differences seen between the females of *X. cristatus* (means: SL=0.20, SW=0.09) and *X. audax* (means: SL=0.23, SW=0.10). In

other words, the median septum in *X. audax* is slightly longer and thicker than in *X. cristatus*.

The total percent of correct posterior assignments of specimens is 75.3%. The squared Mahalanobis distances between *X. pseudocrisatus* and the pair *X. cristatus/audax* is about 8.5 (8.42–8.51), while between the latter two species is distinctly smaller, as low as 1.98. Thus, the morphometric distinction among the females of *X. pseudocrisatus* and the pair *X. cristatus/audax* is much evident than between females of the two latter species, of which females are practically indistinguishable by epigynal variables. To reliably separate the species *X. cristatus* and *X. audax*, males are obligatory required [but see Jantscher, 2001].

COMMENTS. On the basis of the original figure only [vide

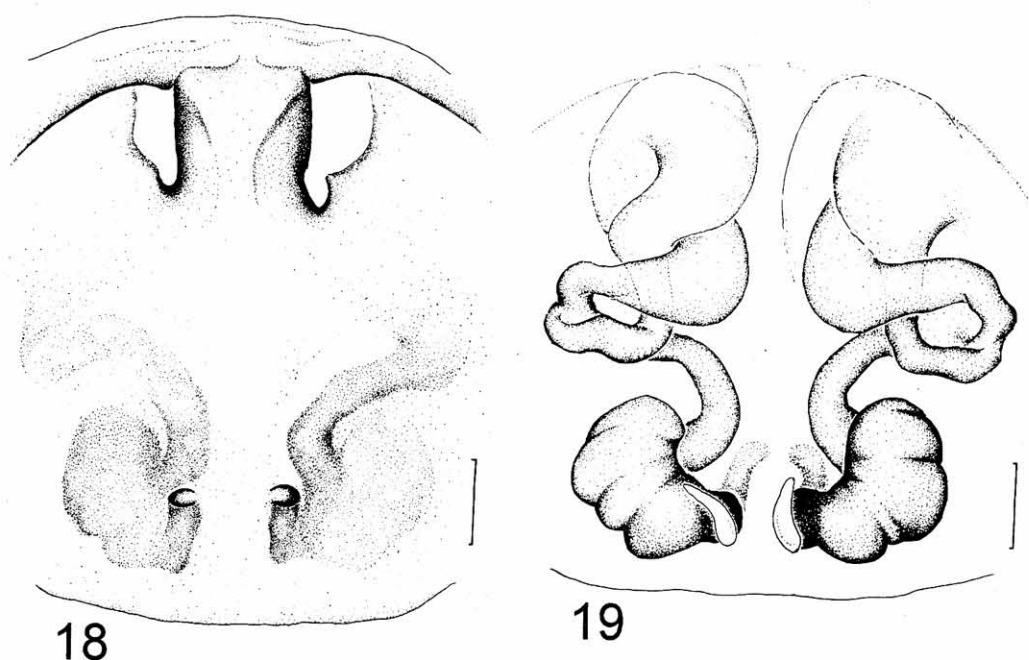
Verzhbitskii, 1902: fig. 3], it is obvious that the species *Xysticus kulczynskii* described by the latter author from Azerbaijan (Kusary) after a single female belongs to the *cristatus* group, but its actual status (e.g. its relationship to either *X. thessallicus* or *X. pseudocrisatus*) is unclear. The problem remains open until the holotype of *X. kulczynskii*, of which a depositarium is unknown to us, has been re-examined.

DISTRIBUTION. Central Asian subboreal range; from the Nepal-Himalayas (Thakkhola) [Ono, 1978: sub *X. cristatus*], Pamir [Pickard-Cambridge, 1885: sub both *X. cristatus* and *X. audax*] and Tibet [Song *et al.*, 1999: sub *X. cristatus*] in the south west, through the mountains of Central Asia to Novosibirsk Area in the north and Central Mongolia in the east (Fig. 16).

It almost sure that the records of *X. cristatus* from Kaschmir, Ladakh and Karakorum (altitudes from 2000 to 3200 a.s.l.) [vide Caporiacco, 1935; Reimoser, 1935] are to be referred to *X. pseudocrisatus* as well.

HABITAT. This species has been reported from a number of different arid (often mountain) and forest habitats, viz. walnut mountain forests (in grass; Tien-Shan) [Zonstein, 1984: sub *X. cristatus*], lucerne fields (in Uzbekistan) [Yakhontov, 1955: sub *X. cristatus*], wormwood semidesert (in S. Kazakhstan) [Marusik & Logunov, 1990: sub *X. cristatus*], and *Gossypium* fields (under stones; in Tajikistan) [present data].

DESCRIPTION. MALE (paratype from the type locality). Measurements. Carapace 2.20 long, 2.10 wide. Abdomen 2.40 long, 1.90 wide. Clypeal height 0.18. Cheliceral length 0.65. MOA-WA 0.54, MOA-WP 0.58, MOA-L 0.51, AME 0.13, ALE 0.19, PME 0.13, PLE 0.15, AME-AME 0.30, AME-ALE 0.16, PME-PME 0.35, PME-PL 0.31. Length of the leg segments. Leg I — 2.10 + 1.00 + 1.60 + 1.80 + 1.00. Leg II — 2.25 + 1.05 + 1.70 + 1.65 + 1.00. Leg III — 1.55 + 0.60 + 1.05 + 0.95 + 0.65. Leg IV — 1.55 + 0.60 + 1.10 + 1.00 + 0.75. Spination of leg I: Fm d 0-1-1-1-1, pr 11 spines situated irregularly along segment; Pt pr and rt 0-1-0, v 0-2ap; Tb pr and rt 1-1-1, v 2-2-2-2-2ap; Mt pr and rt 1-1-1ap, v 1-2-0-2-2ap. Coloration (typical for most of *Xysticus* species). Carapace brown, with numerous brownish yellow lines, a wide median brown-yellow band and a V-shaped white spot. Clypeal area yellow. Sternum, maxillae, labium and chelicer-



Figs 18–19. Female copulatory organs of *Xysticus thessallicus* from Turkey (Kirkapac): 18 — epigyne; 19 — spermathecae. Scale: 0.1 mm.
Рис. 18–19. Копулятивные органы самки *Xysticus thessallicus* из Турции (Киркапач): 18 — эпигина; 19 — сперматеки. Масштаб: 0,1 мм.

ae brown-yellow. Abdomen: dorsum yellow-brown, with a typical median, hering-borne, pattern; venter gray-brown. Book-lung covers gray. Spinnerets brown. All legs brown, with dorsal and ventral longitudinal yellow stripes on femora, patellae and tibia. Palpal structure as in Figs. 2–10.

FEMALE (paratype from the type locality). Measurements. Carapace 3.20 long, 3.10 wide. Abdomen 3.90 long, 3.70 wide. Clypeal height 0.28. Cheliceral length 1.13. MOA-WA 0.80, MOA-WP 0.83, MOA-L 0.63, AME 0.15, ALE 0.23, PME 0.13, PLE 0.15, AME-AME 0.52, AME-ALE 0.25, PME-PME 0.57, PME-PL 0.55. Length of the leg segments. Leg I — 2.80 + 1.30 + 2.05 + 1.95 + 1.15. Leg II — 2.80 + 1.35 + 2.05 + 1.95 + 1.10. Leg III — 1.85 + 0.90 + 1.25 + 1.15 + 0.85. Leg IV — 1.85 + 0.90 + 1.25 + 1.15 + 0.85. Spination of leg I: Fm pr 0-1-1-1-0; tibia v 0-1-2-2-2ap; Mt pr and rt 1-1-1ap, v 2-2-0-2-2ap. Coloration (typical for most of *Xysticus* species). Carapace light brown, with numerous yellow lines and a wide median yellow band. Clypeal area and chelicerae yellow. Maxillae and labium yellow-brown. Sternum yellow, dotted with brown. Abdomen yellow-white, dorsum with a typical median, hering-borne, pattern. Book-lung covers yellow. Spinnerets brown-yellow. All legs yellow, with dorsal and ventral longitudinal white stripes on femora, patellae and tibia. Epigyne and spermathecae as in Figs. 11–15.

ETYMOLOGY. The specific epithet points to the close relationships of the new species to *X. cristatus*, with which it has been mixed up for a long time.

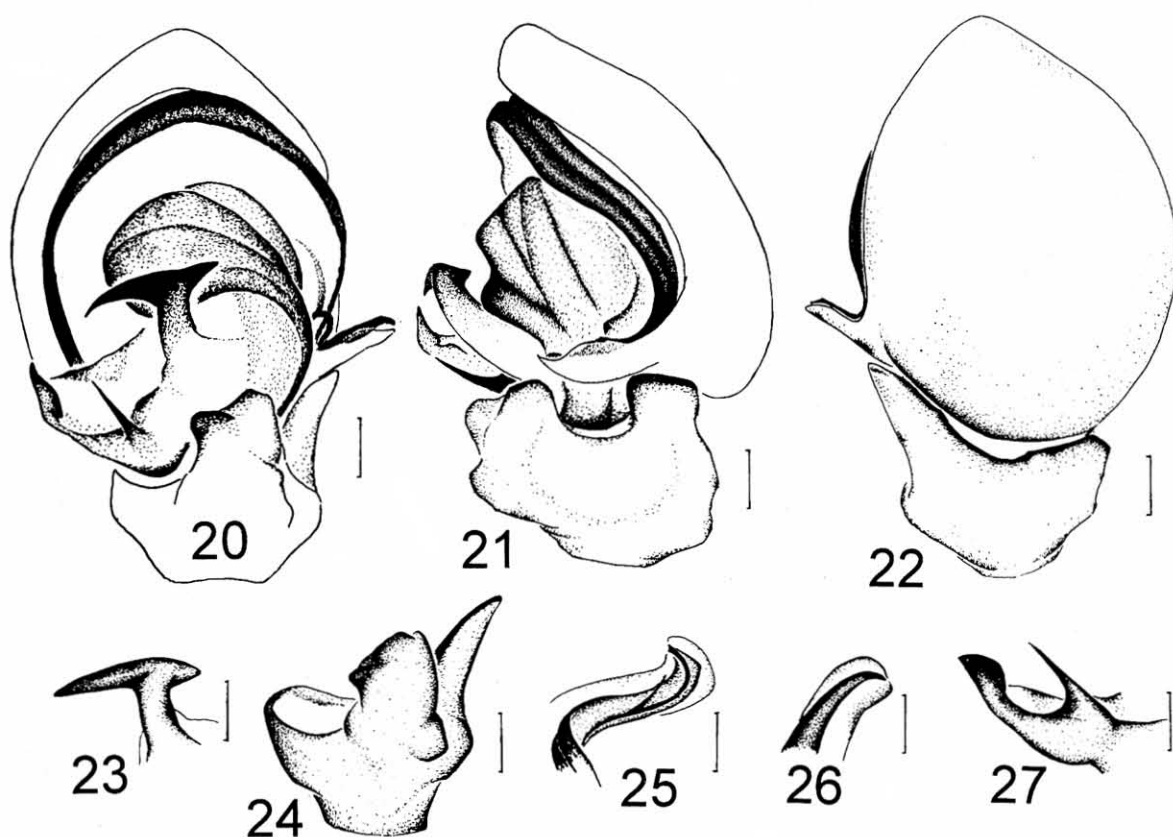
Xysticus audax (Schrank, 1803)
Figs. 20–31, 34, 35, 51.

X. audax: Savelyeva, 1970: 85; 1979: 141; Azheganova *et al.*, 1976: 45; Utotchkin, 1988: 12; Ono, 1988: 117–121, figs. 121–126;

Pakhorukov & Efimik, 1988: 31; Polyagin & Pakhorukov, 1988: 35; 1992: 16; Ono *et al.*, 1990: 10–11; Esysunin, 1991: 35; 1996: 77; Ono & Yasuda, 1992: 5–6, 13; Logunov, 1992: 66; Marusik *et al.*, 1992: 153; 2000 (*e.p.*): 115; Esysunin *et al.*, 1993: 219; Kurenschikov, 1993: 31; Logunov & Marusik, 1994 (*e.p.*): 182; Pakhorukov *et al.*, 1995: 35; Efimik, 1995: 107; 1997: 136; Kim & Kurenschikov, 1995: 95; Efimik & Gulyashchikh, 1995: 127; Utotchkin & Savelyeva, 1995 (*e.p.*): 65–66; Ukhova & Esysunin, 1996: 112; Esysunin & Efimik, 1996 (*e.g.*): 174–175; Matsuda, 1997: 37; Logunov *et al.*, 1998 (*e.p.*): 143; Azarkina, 1999: 75.

X. cristatus (misidentified): Pakhorukov & Efimik, 1988: 31; Efimik, 1995: 107; 1996: 77; 1997: 136; Efimik & Gulyashchikh, 1995: 127; Marusik *et al.*, 1996: 39; Esysunin & Efimik, 1996 (*e.g.*): 173; Ukhova & Esysunin, 1996: 112.

MATERIAL. RUSSIA: *Arkhangel'sk Area*: 1 ♂ (PSU), Arkhangel'sk, the bank of Severnaya Dvina River, 11.08.1937, A. Birulya; 1 ♂ (PSU), same locality, 10.07.1939, coll. ?; 6 ♂♂ (PSU), same locality, tundra and on spines, date and coll. ? — *Kaluga Area*: 1 ♂ 4 ♀♀ (PSU), Veinskii Leskhov, Kireevskaya Station, summer 1928, A. P. Tchernyshev. — *Kostroma Area*: 1 ♂ (ZMUM), Manturovskii Distr., near Davydovo, *Filipendulameadows* (sweeping), 11.06.1982, E. M. Veselova. — *Moscow Area*: 2 ♂♂ (ZMUM), Podol'sk Distr., near Malino, wood sorrel spruce forest, 19–29.05.1987, T. K. Sergeeva; 1 ♂, 1 ♀ (ZMUM), Solnechnogorsk Distr., near Peshki, spruce forest, 10–16.05.1984, A. A. Suvorov. — *Smolensk Area*: 1 ♀ (ISEA), Tosna River, 22.07.1928, S. V. Pokrovskii. — *Komi Republic*: 2 ♀♀ (PSU), Pechero-Ilychskii Reserve, summer 1937, P. Belonogov; 2 ♂♂ (PSU), the Polar Urals, Neroika Mt., Patok Lake, 800 m a.s.l., snow patch, 26.06.1990, coll. ?; 2 ♂♂, 2 ♀♀ (PSU), the N. Urals, Vishera Reserve, Ol'khovka River, 26.06.1994, O. Tarkunova; 4 ♂♂, 7 ♀♀ (PSU), same reserve, Vishera River, 6.08.1994, S. L. Esysunin & O. Mazura. — *Perm Area*: 5 ♂♂, 15 ♀♀ (PSU), Kishertskii Distr., "Preduralie" Forestry, dry meadows, 4.08.1983, E. O. Khaitmetova; 1 ♂, 1 ♀ (PSU), same locality, spruce forest (in litter), 17.09.1989, T. I. Gridina; 1 ♂ (PSU), Chusovaya River, near Verkh Osl'yanka, 24.07.1996, N. Shadrin; 10 ♂♂, 8 ♀♀ (PSU), Baseghi Reserve, Severnyi Basegh Mt., tundra and sweeping on dwarf-birch

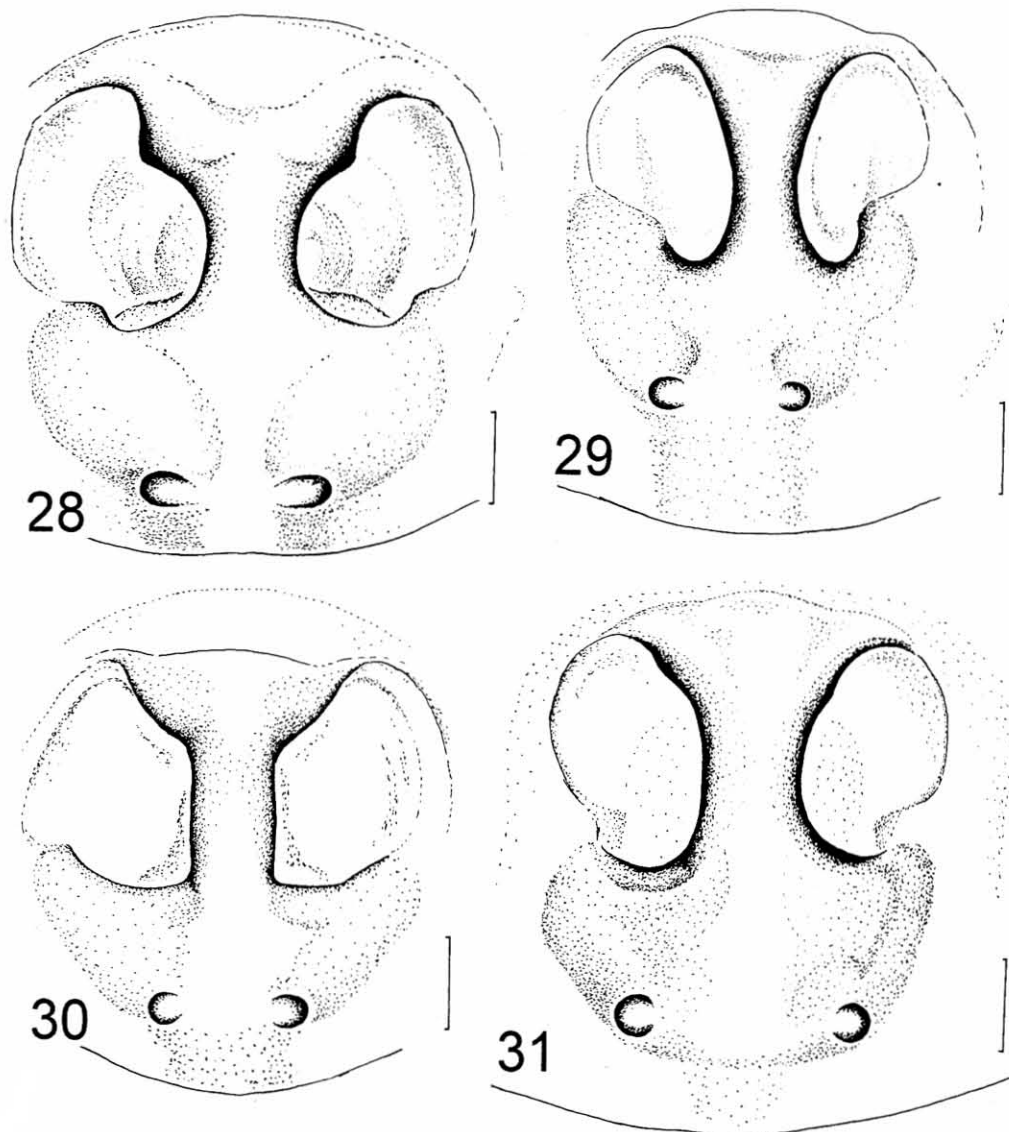


Figs 20–27. *Xysticus audax* (Altai, Artybash): 20 — male palp, ventral view; 21 — ditto, prolateral view; 22 — ditto, rear view; 23 — median tegular apophysis, rear view; 24 — palpal tibia; 25–26 — embolic tip; 27 — ventral tegular apophysis, rear view. Scale: 0.1 mm.

Рис. 20–27. *Xysticus audax* (Алтай, Артыбаш): 20 — пальпус самца, вентрально; 21 — то же, пролатерально; 22 — то же, вид сзади; 23 — медиальный тегулярный апофиз, вид сзади; 24 — голень пальпы; 25–26 — конец эмболюса; 27 — вентральный тегулярный апофиз, вид сзади. Масштаб: 0,1 мм.

thicket, 18.06.1984, S. L. Eshunin; 1 ♂, 2 ♀♀ (PSU), near Kungur, summer 1947, coll. ?; 2 ♂♂ (PSU), Kungur Distr., "Osinovoe Ozero", 18.05.1995, T. I. Gridina; 1 ♀ (PSU), same distr., near Zuyata, Sylva River, 11.05.1995, T. I. Gridina; 1 ♂ (PSU), same distr., Spasskaya Gora, steppe slopes (sweeping), 6.06.1987, coll. ?; 3 ♂♂ (PSU), near Krasnovishersk, Kvarkush Mt. Range, open spruce forest, 10.07.1946, coll. ?; 1 ♀ (PSU) near Perm, ca 3 km NE of Verkhnyaya Kuriya, pine forest, 26.05–9.06.1990, V. O. Koz'minykh; 1 ♀ (PSU), Bardym Distr., near Chuvashovo, 1.08.1992, N. R. Imanaeva. — *Bashkortostan*: 3 ♀♀ (PSU), Bashkirian Reserve (Karpovo cordon), dry meadow, 2.07.1985, V. E. Efimik; 1 ♂ 1 ♀ (PSU), Bashkirian Reserve (Sargaya), pine-birch forest, 17.07.1985, V. E. Efimik; 5 ♂♂, 6 ♀♀ (PSU), Avalyak Mt. Range, Bol'shoi Iremel' Mt. (Katan), 30.05.1985, V. E. Efimik. — *Chelyabinsk Area*: 3 ♀♀ (ISEA), Il'menskii Reserve (Lysaya Mt.), 11–21.06.2000, M. P. Zolotarev; 1 ♂, 2 ♀♀ (PSU), near Sibirka, dry meadows, 20.06.1984, coll. ?; 2 ♂♂, 7 ♀♀ (PSU), Satka Distr., near Sibirka, *Carex*-stand, 15.06.1984, coll. ?; 2 ♀♀ (PSU), Il'menskii Reserve, pine forest, 22.08.1992, S. G. Kichigina. — *Ekaterinburg Area*: 2 ♀♀ (PSU), Ivdel' Distr., near Burmantovo, 22.06–1.07.1949, K. N. Bel'tyukova; 2 ♂♂, 6 ♀♀ (PSU), Visimskii Reserve, summer 1989, N. L. Ukhova; 4 ♂♂, 4 ♀♀ (PSU), forb meadows, 25.06.1993, T. Lokteev. — *Tyumen Area*: 2 ♂♂, 7 ♀♀ (PSU), Surgut Distr., Yuganskii Reserve, summer 1987, T. Pereyaslovets; 1 ♀ (ISEA), near Noyabr'sk, 1–7.08.1993, I. G. Kolomiets. — *Novosibirsk Area*: 1 ♂ (ISEA), Kolyvan' Distr., near Chrenyi Mys, 29.05.1997, A. V. Barkalov; 1 ♀ (ISEA), Chulym Distr., near Sherstobitovo, *Sphagnum* bog, 7.08.1992, V.D.; 1 ♀

(ISEA) Iskitim Distr., near Legostaev, 11–13.07.2000, M. N. Koshmenskaya. — *Altai Province*: 3 ♂♂, 2 ♀♀ (ISEA), Tret'yakovo Distr., ca 15 km W of Mokhnato-Gladkaya Mt., Glubokaya River valley, 7–9.06.1999, D. V. Ryzhkov; 1 ♂ (ZMUM), Turochak Distr., near Artybash, Teletskoe Lake, *Betula*, *Abies* & *Pinus sibiricus* mixed forest, in litter, 7–13.07.1982, S. I. Golovatch; 1 ♂, 1 ♀ (ISEA), same locality, 500 m a.s.l., 31.05–5.06.1967, A.P.; 1 ♂ (ISEA), same locality, 15.05.1991, A. A. Alekseev; 2 ♀♀ (ZMTU), SW Altai, Gorno-Altai, 20.06.1983, H. Hippa; 1 ♀ (ISEA), Zmeinogorsk Distr., left bank of Belaya River, near Beloretskii, 51°00'N, 82°45'E, 11.06.1999, D. V. Ryzhkov; 1 ♀ (ISEA), Tret'yakovskii Distr., near Mokhnato-Gladkaya Mt., Tigiretskii Reserve, 50°55'N, 82°44'E, 6.06.1999, D. V. Ryzhkov; 1 ♂ (ISEA), Shebalino Distr., near Cherga, 4.06.1996, V.Z.; 1 ♂, 1 ♀ (ISEA), the NE Altai, mixed forest, 06–07.1999, coll. ?; 1 ♂ (ISEA), Charyshskii Distr., ca 6 km E of Sentelek, right bank of Charysh River, 600 m a.s.l., 51°12'N, 83°50'E, 21.06.2000, G. N. Azarkina; 1 ♀ (ISEA), same distr., Bashchelakskii Canyon, Belaya River valley, herb meadow, 600 m a.s.l., 51°10'N, 83°56'E, 5.07.2000, G. N. Azarkina; 1 ♀ (ISEA), same distr., near Sentelek, herb meadow, 600 m a.s.l., 51°11'N, 83°42'E, 20.06.2000, D. B. Ryzhkov; 1 ♀ (ISEA), same locality, 600 m a.s.l., 51°11'N, 83°42'E, 14.08.1998, G. N. Azarkina; 1 ♀ (PSU), near Tashtyp, 2.05.1912, Sushkin's expedition. — *Khakassia*: 1 ♀ (ISEA), Kuznetskii Alatau Mt. Range, Terensug River valley, 7–15 km NE of Balyksu, 18.05.1997, R.D. — *Krasnoyarsk Province*: 1 ♂ (ZMUM), near Bor, 13.06.1988, A. B. Ryvkin; 1 ♀ (ISEA), Ermakovskoe Distr., ca 15 km E of Ermakovskoe, glades of pine-birch forest, 26.06.1990,

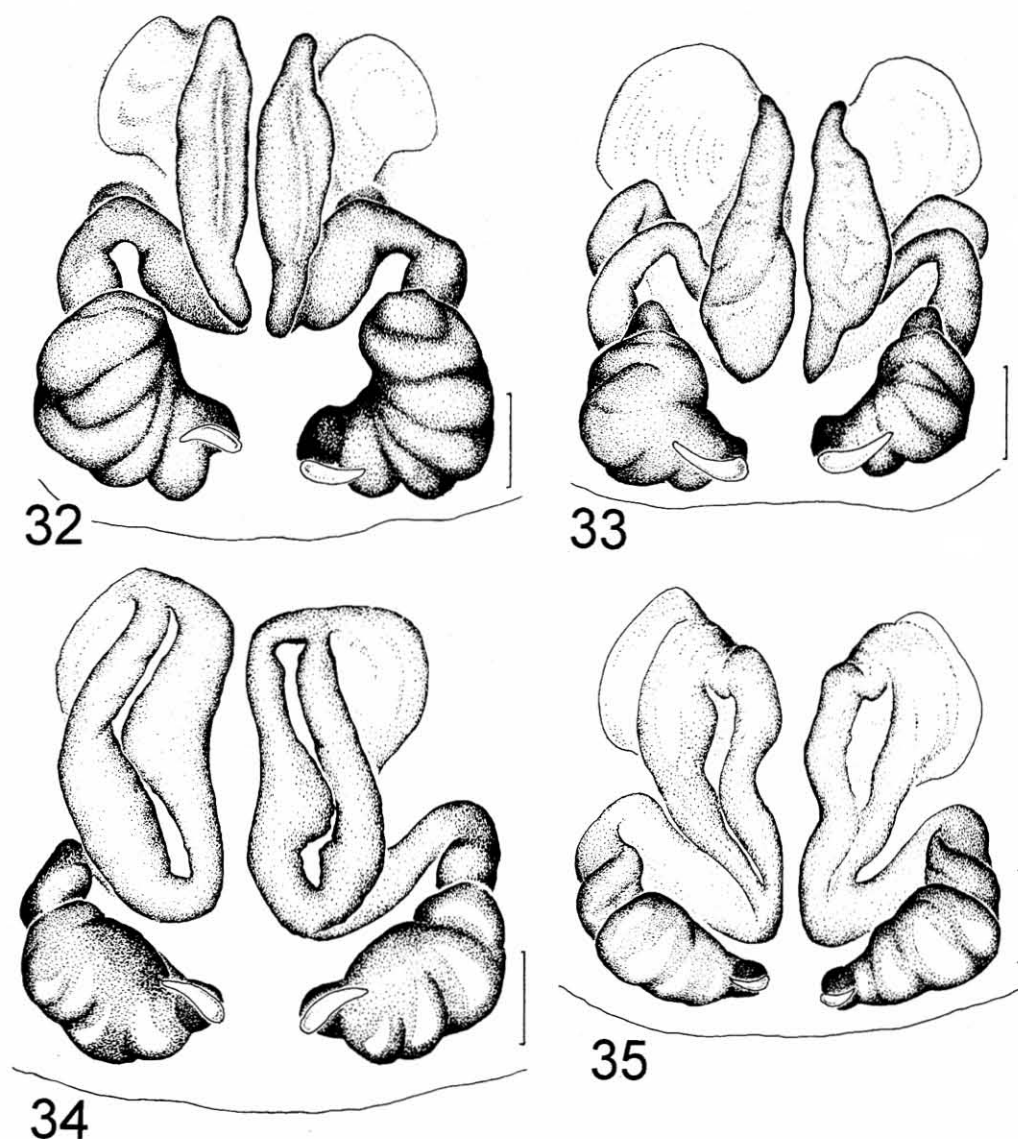


Figs 28–31. Epigynes of *Xysticus audax*: 28 — Tyumen Area, Yuganskii Reserve; 29 — Semipalatinsk Area, Semenovka; 30 — the Altai; 31 — Chelyabinsk Area, Miass. Scale: 0.1 mm.

Рис. 28–31. Эпигины *Xysticus audax*: 28 — Тюменская область, Юганский запов., 29 — Семипалатинская область, Семеновка; 30 — Алтай; 31 — Челябинская область, Миасс. Масштаб: 0,1 мм.

D.L.; 1 ♀ (ISEA), same distr., near Yartsevo, 16.08.1989, D. L. Grodnitskii; 2 ♀♀ (ZMUM), the middle reaches of Yenisei River, near Ustr'-Pit, 58°55'N, 91°55'E, 07.1995, L. R. Rybalov; 1 ♀ (ISEA), Nazarovo Distr., near Bor, pine forest, 20–22.08.1991, N. A. Gladkevich; 1 ♂, 1 ♀ (ISEA), Boguchany Distr., near Sosnovka, 12.06.1974, M. T. Šternbergs; 1 ♂ (ISEA), Ermakovskoe Distr., 2–3 km N of Aradan, Uls River valley, forest edge, 8–9.07.1990, D.L. — Tuva: 1 ♀ (ISEA), Tes-Khemsii Distr., ca 1.5 km W of Samagaltai, Caragana steppe, 14.07.1993, D.L.; 1 ♂ (ISEA), Todzhinskii Distr., Azas Nature Reserve, near Azas Lake, sweeping in mixed forest, 19–23.06.1989, D.L., 11 ♀ (ISEA), Todzhinsky Distr., Azas Nature Reserve, near Azas Lake, mesophytic meadows, 21.06.1989, D.L. — Irkutsk Area: 1 ♂ (ISEA), 5–7 km SW of Slyudyanka, Slyudyanka River valley, mixed forest, 11.06.1997, A. Yu. Dudko & D. Lomakin; 3 ♀♀ (PSU), near Bunbui (=Bunbuiscoe), 10.06.1917, P. Valdaev. — Chita Area: 1 ♀ (ISEA), Chernyshevsk Distr., near Aksenovo-Zilovskoe, 13–15.06.1997, A. Yu. Dudko & D. Lomakin; 1 ♂ (ISEA), Onon Distr., ca 18 km

SWW of Nizhii Tsasuchei, Butyvken Lake, Pinus forest, 25–27.06.1995, I.L. & V. I. Smirnova. — Khabarovsk Province: 1 ♂ (ISEA), near Chegdomyn, 18.06.1999, A. G. Blyummer; 3 ♂♂, 2 ♀♀ (ISEA), 20–25 km SE of Khabarovsk, Bol'shoi Khekhtsy Mt. Range (Nature Reserve) 200–300 m a.s.l., in litter under oaks and nut-trees, and sweeping in wet open oak forest, 7–18.06.1987, D.L. — Sakhalin Area: 3 ♀♀ (ISEA), Sakhalin Is., near Aleksandrovsk-Sakhalinskii, Mgachi, 22.06–6.07.1988, A.B.; 1 ♀ (ISEA), Sakhalin Is., Aniva Distr., near Novoaleksandrovsk, 20.06.1987, A.B.; 11 ♂♂, 1 ♀ (ZMUM), same locality, 28.05.1988, A.B. ♀ (ISEA), Sakhalin Is., near Yuzhno-Sakhalinsk, 23.09.1988, A.B.; 2 ♂♂ (ISEA), same locality, 21–25.06.1989, V.Z. & N. A. Gladkevich; 1 ♀ (ISEA), Sakhalin Is., 5–10 km E of Yuzhno-Sakhalinsk, Turistov Valley, 3.09.1988, A.B.; 2 ♀♀ (ISEA), Sakhalin Is., Korsakov Distr., near Solov'evka, 18.06.1989, V.Z.; 1 ♂ (PSU), Sakhalin Is. (northern part), Nadezhdy Peninsular, 9.07.1908, coll. ?; 2 ♀♀ (ZMUM), same locality, 17.10.1988, A.B.; 1 ♀ (ZMUM), Sakhalin Is., near Aniva, 27.05.1988, A.B.; 1 ♀ (ZMUM),



Figs 32–35. Spermathecae of *Xysticus cristatus* (32–33) and *X. audax* (34–35): 32 — Novosibirsk Area, Chany Lake; 33 — Chelyabinsk Area, Mias; 34 — Chelyabinsk Area, Il'menskii Reserve; 35 — Krasnoyarsk Province, Sosnovka. Scale: 0.1 mm.

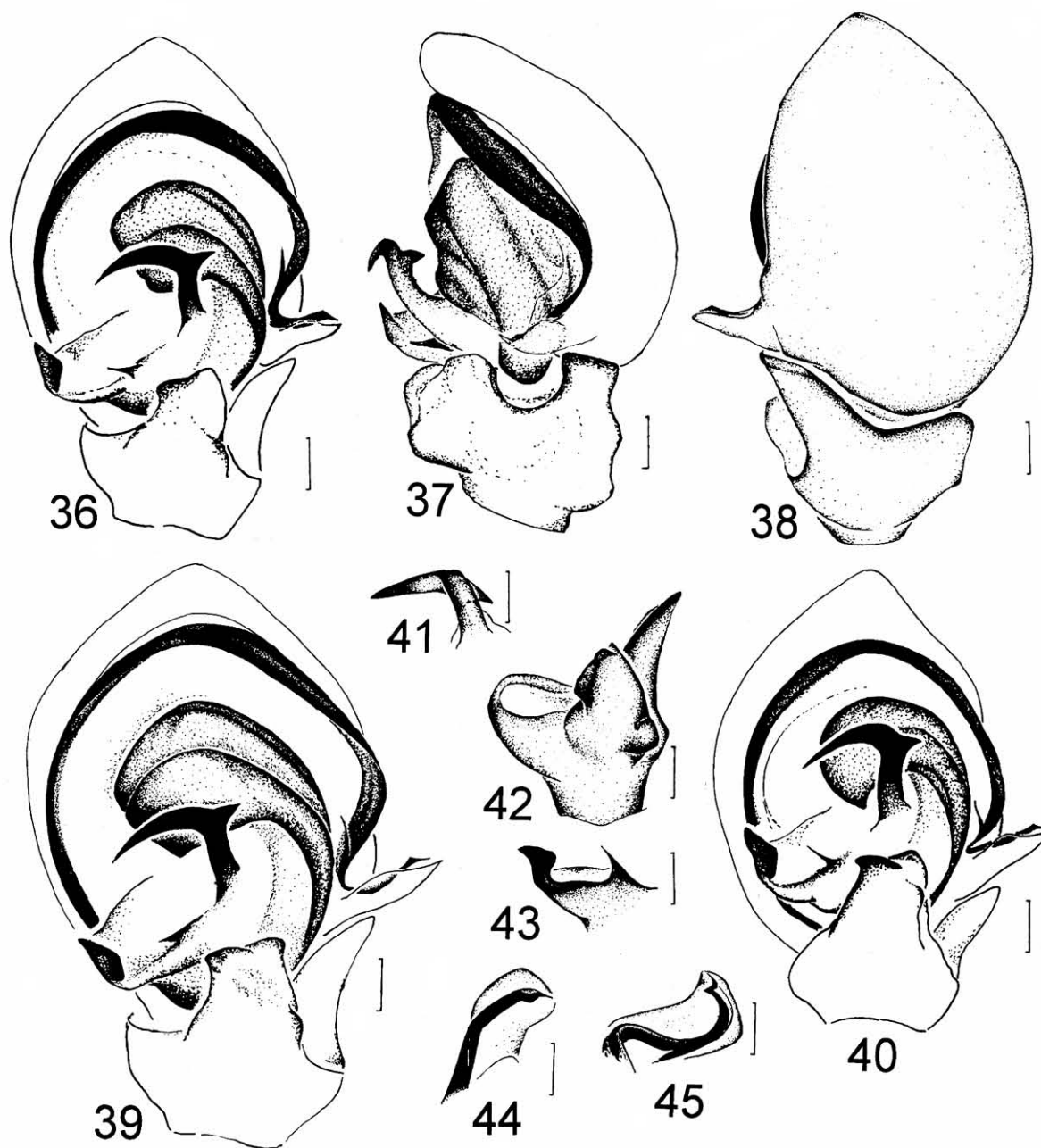
Рис. 32–35. Сперматеки *Xysticus cristatus* (32–33) и *X. audax* (34–35): 32 — Новосибирская область, оз. Чаны; 33 — Челябинская область, Миасс; 34 — Челябинская область, Ильменский запов.; 35 — Красноярский край, Сосновка. Масштаб: 0,1 мм.

Sakhalin Is., Smirnykhovskii Distr., Matrosovka River, Vozvrashcheniya Mt., 9.09.1988, A.B.; 2 ♀♀ (ZMUM), Sakhalin Is., Poronayskii Distr., the upper reaches of Rukutama River, 17–24.04.1988, A.B. — *Magadan Area*: 1 ♂, 2 ♀♀ (PSU), island, Magadan Gulf, 25.06.1987, O. Yu. Mosina; 1 ♂ (ZMUM), Khasyn Distr., 20.06.1977, coll. ?. — *Maritime Province*: 1 ♀ (ZMUM), Chuguevka Distr., Bulyga-Fadeevo, mixed forest, 19.07.1991, A. V. Tanasevitch. — *KAZAKHSTAN: Kokchetav Area*: 1 ♀ (ISEA), Kuibyshevskii Distr., near Ruzaevka, 13.07.1981, I. B. Knor. — *Akmola [=Astana, Tselinograd] Area*: 1 ♂, 1 ♀ (ISEA), Balkashino Distr., Kokshetau Mt. Range, ca. 1–3 km E of Petrovka, 18–20.05.1997, A.G.; 3 ♀♀ (ISEA), Balkashino Distr., ca. 1–3 km E of Petrovka, Kokshetau Mts., 18–20.06.1997, A.G. — *Semipalatinsk [=Semei] Area*: 3 ♂♂, 3 ♀♀ (ISEA), Beskaragaiskii Distr., ca. 8 km NW of Semenovka, *Pinus* forest, 5–9.06.1998, A.G. — *East Kazakhstan Area*: 1 ♂ (ISEA), SW Altai Mts., Markakol' Distr., E of Markakol' Lake, Tesnoi Spring, 21.06.1997, R.D. & V.Z.; 1 ♂

(PSU), Bol'shenarymskii Distr., 19.07.1972, coll. ?; 1 ♀ (PSU), near Zimovie, 06.1969, L.S.

Comparative material. AUSTRIA: 1 ♂ (PCEJ), Styria, Ehrenhausen, on low vegetation, 2.05.1999, E. Jantscher. — SLOVAKIA: 1 ♂ (ISEA), Maly Tatry, 25 rv E Liptovský Miculáš, 22–25.06.1996, A. V. Barkalov. — CZECH REPUBLIC: 1 ♂, 2 ♀ (NMP), Bohemia, 19.05.1961, J. Buchar, 1 ♂ (NMP), same locality, 22.06.1967, J. Buchar; 2 ♂♂ (NMP), same locality, 15.04.1951, J. Buchar; 1 ♂ (NMP), same locality, 21.05.1931, coll. ?.

DIAGNOSIS. *X. audax* is most closely related to both *X. cristatus* and *X. pseudocristatus*, but its males can be easily separated by the following characters: (a) the sharp ends of the pickax-shaped MTA almost equal in their length (different in the related species) (cf. Figs 20 and 2, 5, 36, 39); and (b) the longest tooth of the BTA (cf. Figs. 27 and 10, 43). For differences from the females of *X. pseudocristatus* see above



Figs 36–45. Male palps of *Xysticus cristatus* from Novosibirsk Area (36–38, 40–45) and Hungary (39): 36, 39–40 — male palp, ventral view; 37 — ditto, prolateral view; 38 — ditto, rear view; 41 — median tegular apophysis, rear view; 42 — palpal tibia; 43 — ventral tegular apophysis, rear view; 44–45 — embolic tip. Scale: 0.1 mm.

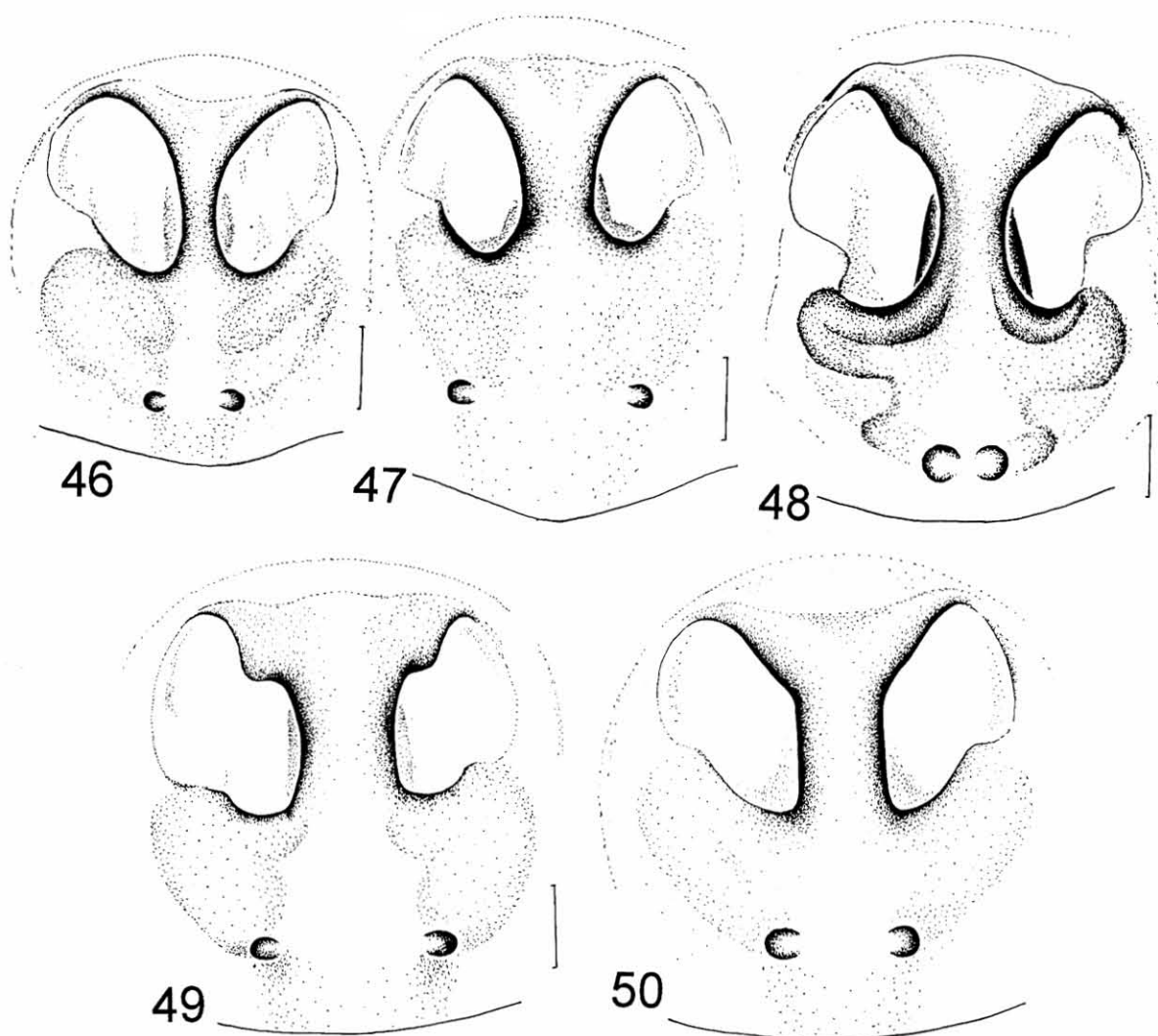
Рис. 36–45. Пальпы самцов *Xysticus cristatus* из Новосибирской области (36–38, 40–45) и Венгрии (39): 36, 39–40 — палец самца, вентрально; 37 — тоже, пролатерально; 38 — тоже, вид сзади; 41 — медиальный тегулярный апофиз, вид сзади; 42 — голень пальпы; 43 — вентральный тегулярный апофиз, вид сзади; 44–45 — конец эмболюса. Масштаб: 0,1 мм.

comments under “Diagnosis” of the latter species. The females of *X. audax* and *X. cristatus* are almost indistinguishable, therefore males are required to separate these species.

DISTRIBUTION. This is a trans-Eurasian temperate species; from Iceland in the west through the temperate belt of Eurasia to Sakhalin and Japan (Hokkaido and Honshu) in the

east. All the Siberian and the Far Eastern collection localities are shown in Fig. 51.

The records of *X. audax* from Crete and Turkey [vide Roewer, 1959] may actually belong to *X. thessallicus*. Besides, the record from Iran (Kerman) [Roewer, 1955] seems to also need a confirmation upon reference to the pertinent material.



Figs 46–50. Epigynes of *Xysticus cristatus*: 46–47 — Novosibirsk Area; 48 — Chelyabinsk Area, Miass; 49 — Tuva; 50 — East Kazakhstan Area. Scale: 0.1 mm.

Рис. 46–50. Эпигины *Xysticus cristatus*: 46–47 — Новосибирская область; 48 — Челябинская область, Миасс; 49 — Тува; 50 — Восточно-Казахстанская область. Масштаб: 0,1 мм.

Xysticus cristatus (Clerck, 1758)

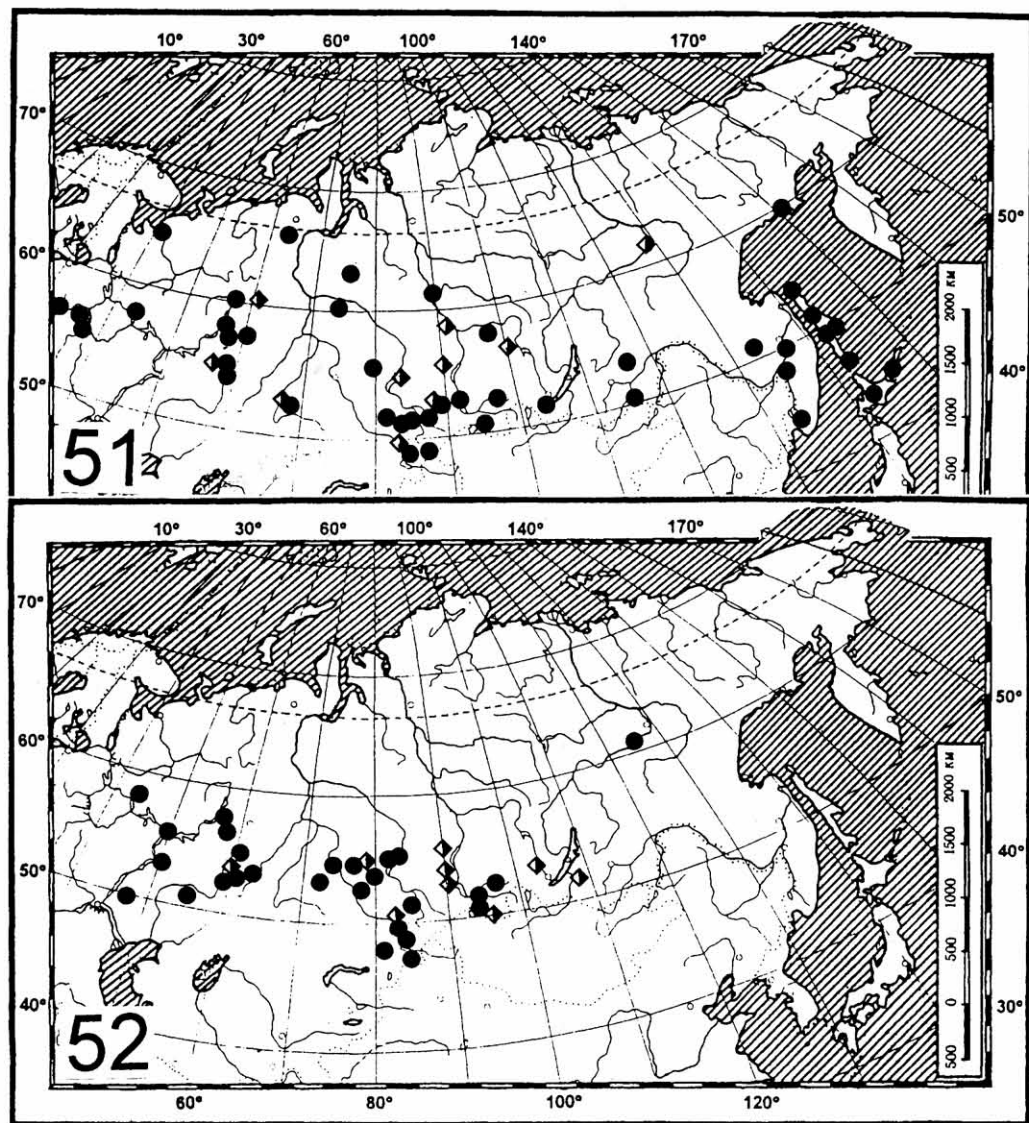
Figs. 32–33, 36–50, 52.

Xysticus cristatus: Savelyeva, 1970: 85; 1979: 141; Azheganova *et al.*, 1976: 45; Utotchkin, 1988: 12; Polyanin & Pakhorukov, 1988: 75; Marusik & Logunov, 1995 (*e.p.*): 152–153; Eskov & Marusik, 1995: 73, 79; Kuznetsov, 1995: 70; Utotchkin & Savelyeva, 1995: 66; Esysunin & Efimik, 1996 (*e.g.*): 173; Efimik & Zolotarev, 1998: 145.

Xysticus audax (misidentified): Savelyeva, 1970: 85; 1979: 141; Koponen & Marusik, 1992: 166; Marusik *et al.*, 1993: 77; 2000 (*e.p.*): 115; Logunov & Marusik, 1994 (*e.p.*): 182; Marusik & Logunov, 1995 (*e.p.*; the record from the Saur Mt. Range): 152–153; Logunov *et al.*, 1998 (*e.p.*): 143.

MATERIAL. UKRAINE: Kiev Area: 3 ♀♀ (PSU), near Kanev, pine forest, 16–26.05.1937, L. Krashtal' & Yavorskaya. — RUSSIA: Kostroma Area: 2 ♂♂, 1 ♀ (ZMUM), Manturovo Distr., near Davydovo, *Deschampsia-Antoxanthum* meadows, 26.06–

30.07.1982, E. M. Veselova. — Astrakhan' Area: 1 ♀ (ISEA), ca 50 км NE of Astrakhan', Aksaraiskii (near railway fork), 26–28.05.1996, V.D. & I.L.; 2 ♀♀ (ISEA), Baskunchak Lake, semidesert, 30.05–1.06.1996, V.D. & I.L. — Volgograd Area: 1 ♂, 2 ♀♀ (ISEA), near Pallasovka, dry steppe, 25.05–5.06.1995, V. V. Dubatolov & I.L. — Samara Area: 7 ♂♂, 10 ♀♀ (PSU), near Samara, date and coll. ?. — Tatarstan: 1 ♂ (PSU), Stolbishchenskii Distr., birch forests, 23–24.05.1956, coll. ?. 1 ♀ (PSU), Chistopol'skii Distr., 11.07.1951, coll. ?. — Bashkortostan: 2 ♂♂ (ISEA), near Belimovo, gramineous herbage, 20–21.08.1998, M. P. Zolotarev. — Orenburg Area: 6 ♂♂, 9 ♀♀ (PSU), near Orenburg, poplar stand, date ?, V. Kuznetsov; 1 ♂, 1 ♀ (PSU), same locality, 26.05.1925, coll. ?. — Komi Republic: 1 ♀ (ISEA), ca 60 km SE of Syktyvkar, near Dan', birch-pine forest (on sand), 21.04.1988, I. M. Marova. — Perm Area: 3 ♂♂ (PSU), Lugovoi Sovkhoz, meadows, 4.06.1987, S. L. Esysunin; 24 ♂♂, 8 ♀♀ (PSU), Kungur Distr., Spasskaya Gora, steppe slopes (sweeping), 6.06.1987, S. L. Esysunin; 1 ♂ 1 ♀ (PSU), near Perm, Dolgoe Lake, 28.06.1992, V. O. Koz'minykh; 1 ♂ (PSU), Kishertsii Distr., "Preduralie"

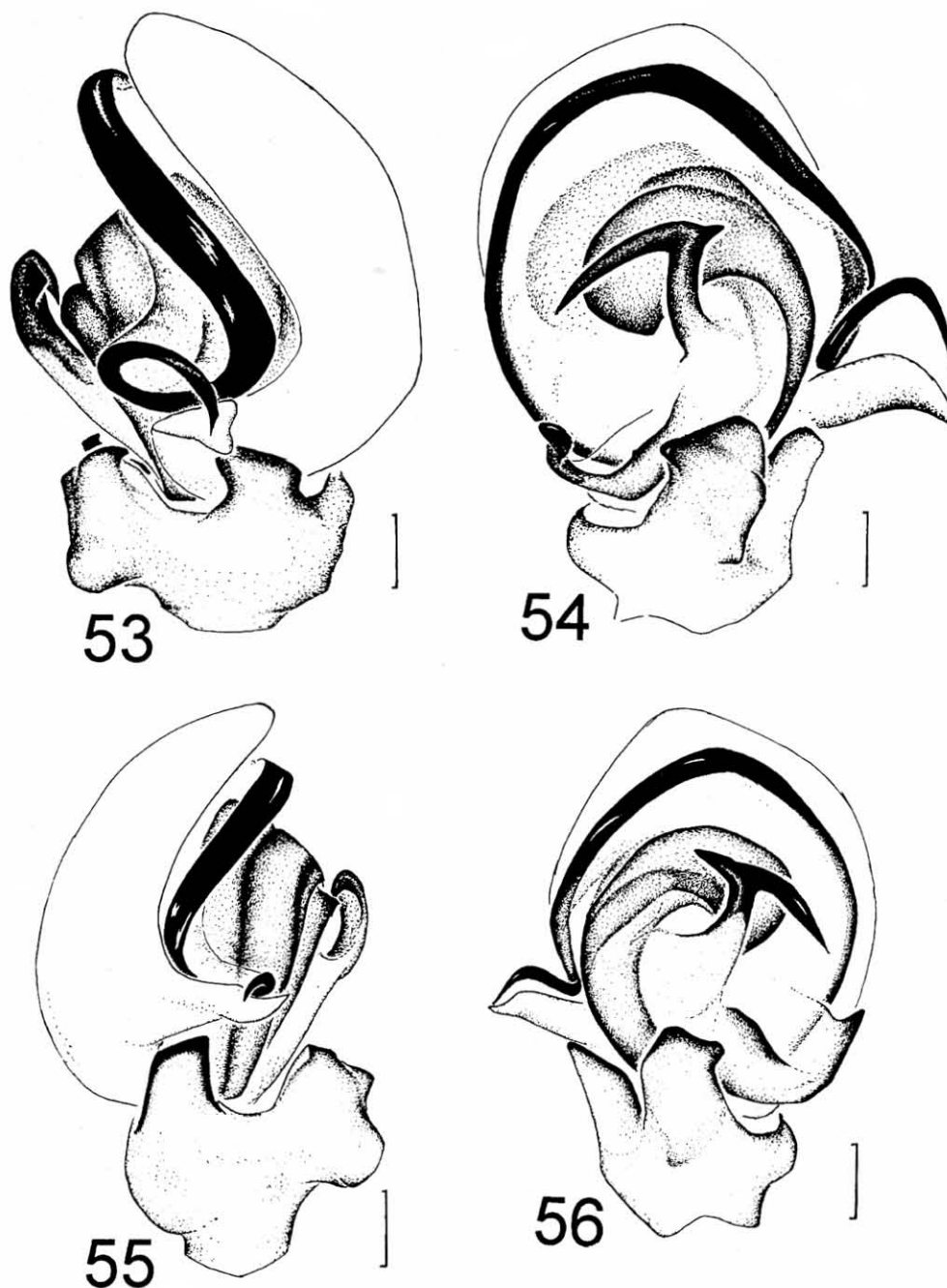


Figs 51–52. Collection localities of *Xysticus audax* and *X. cristatus* in Siberia and the Russian Far East. One dot may represent more than one close locality. Closed circles point to records made from both sexes, semi-open rombs — records made from females only.

Рис. 51–52. Точки находок *Xysticus audax* и *X. cristatus* в Сибири и русском Дальнем Востоке. Одна точка может обозначать более, чем один близко расположенный локалитет. Черные кружки указывают на находки, сделанные по обоим полам, полузакрашенные ромбы — находки, сделанные только по самкам.

Forestry, spruce forest (in litter), 17.09.1989, T. I. Gridina. — *Chelyabinsk Area*: 4 ♂♂, 3 ♀♀ (ISEA), Kizil'skii Distr., near Ural Vil, feather-forb stony steppe, 17–19.05.1996, M. P. Zolotarev; 1 ♂, 1 ♀ (ISEA), Varnenskii Distr., near Alexeevka, Toguzak River, 12–22.05.1996, M. P. Zolotarev; 5 ♀♀ (PSU), Ilimskii Reserve, pine forest, 22.08.1991, S. G. Kichigina; 1 ♂, 3 ♀♀ (ISEA), same distr., near Morozovka, on glade of birch-pine forest, 20.05.1996, M. P. Zolotarev; 3 ♀♀ (ISEA), near Miass, sainfoin fields, 21.07.1999, B.C.; 1 ♂, 10 ♀♀ (PSU), Troitskii Reserve, 28.06.1987, coll. ?; 6 ♀♀ (ISEA), near Miass, 10.06.1999, B.C.; 1 ♂ (ISEA), same locality, 6.07.1998, B.C.; 1 ♂, 1 ♀ (ISEA), same locality, 29.05.1997, B.C.; 1 ♀ (ISEA), Troisk Distr., Beloklyuchevka, ca 3 km downstream of Uli River, 06–07.1996, M. P. Zolotarev. — *Ekaterinburg Area*: 1 ♂ (PSU), near Krasnoufimsk, date and coll. ? — *Kurgan Area*: 1 ♀ (ISEA), Shumikha, 20.05.1990, N. A. Utkin; 1 ♂, 1 ♀ (ISEA), Pritobol'nyi Distr., near Berezovo, 28.05.1990, V. Smirnov; 2 ♀♀ (ISEA), near Kurgan, Uval,

8.06.1989, N. A. Utkin; 1 ♂, 1 ♀ (ISEA), near Ukrainets, 25.05.1990, V. Smirnov & Maiorov. — *Novosibirsk Area*: 1 ♂, 8 ♀♀ (ISEA), near Chany Lake, 26.05–15.08.1989, V. P. Pekin; 1 ♀ (ISEA), same locality, 1.07.1994, I.L.; 1 ♂, 1 ♀ (ISEA), Bolotnoe Distr., near Chebula, 11.06.1994, A.L.; 3 ♂♂, 10 ♀♀ (ISEA), near Kochenevo, 4.06.1994, A.L.; 1 ♂ (ISEA), Kochenevo Distr., near Chik, steppe, 6.06.1991, A.L.; 1 ♂, 5 ♀♀ (ISEA), near Novosibirsk, meadows, 6.06.1994, A.L.; 2 ♂♂, 2 ♀♀ (ISEA), Novosibirsk Distr., near Kol'tsovo, 8.06.1986, D.L.; 1 ♀ (ISEA), Novosibirsk Distr., near Koltsovo, pine forest (sweeping), 23.08.1987, D.L.; 2 ♀♀ (ISEA), Kolyvan' Distr., Kolyvanskoe Plateau, dry meadows, 21.06.1994, A.L.; 2 ♀♀ (ISEA), Tchistovodnyi Distr., ca 28 km W of Novokrasnoe, Zolotaya Griva, saline meadows, 23.06.1994, O. E. Kosterin; 1 ♀ (ISEA), ca 5 km SW of Sarykamyshehenka, meadow steppe, 9.08.1992, V.D.; 5 ♀♀ (ISEA), near Ordynskoe, 18.06.1994, A.L.; 1 ♀ (ISEA), Chany Lake, meadows, 5.07.1990, A. V. Barkalov; 1 ♀ (ISEA), Moshkovo Distr., 3–5 km S of Zherebtsovo, birch

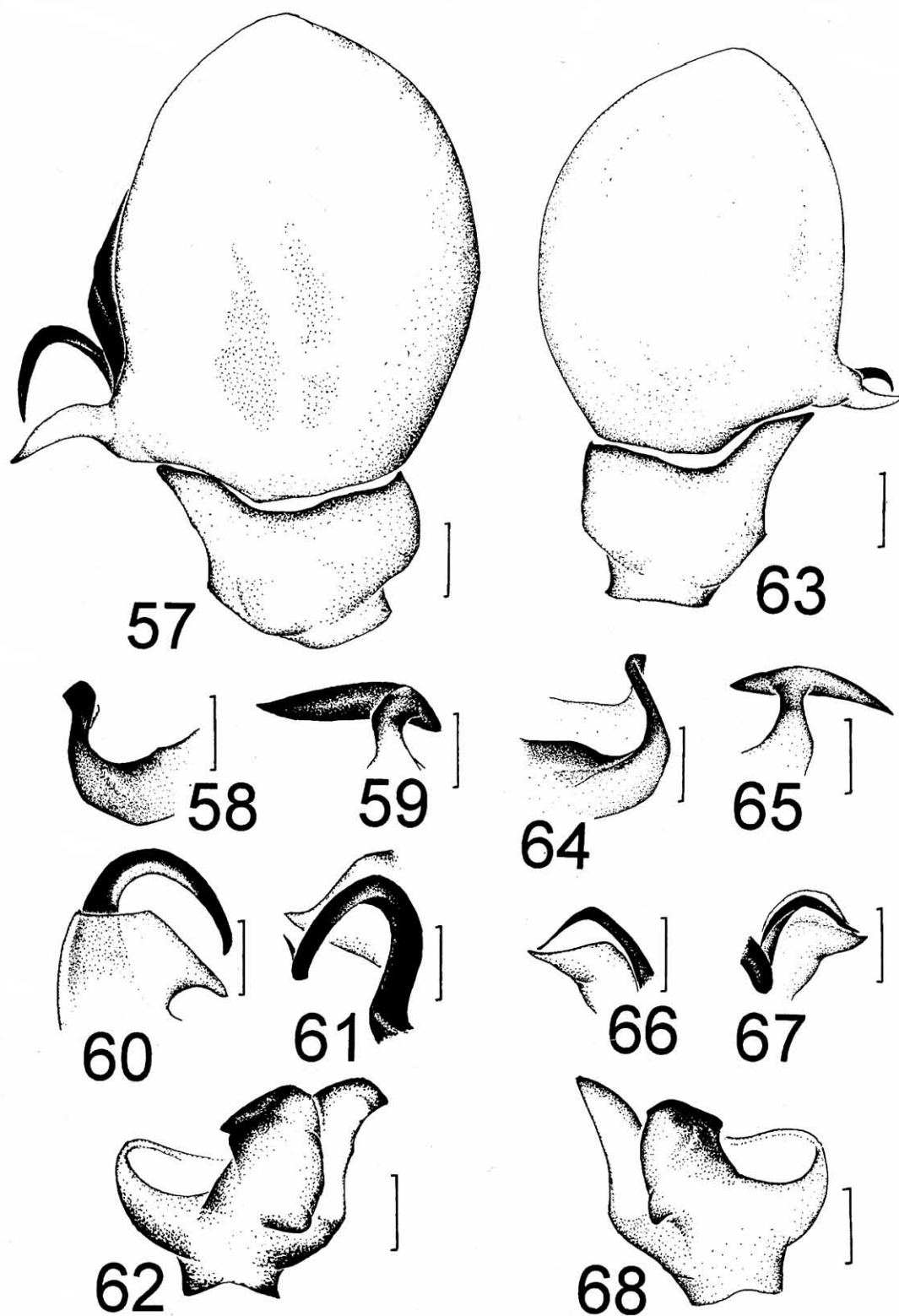


Figs 53–56. Male palps of *Xysticus promiscuus* from Israel; a newly collected specimen (53–54) and the holotype (55–56): 54–55 — male palp, ventral view; 53, 56 — ditto, prolateral view. Scale: 0.1 mm.

Рис. 53–56. Пальпы самцов *Xysticus promiscuus* из Израиля; недавно собранный экземпляр (53–54) и голотип (55–56): 54–55 — палец самца, вентрально; 53, 56 — тоже, пролатерально. Масштаб: 0,1 мм.

forest, 7.07.1992, S. E. Tchernyshev; 3 ♀♀ (ISEA), near Novosibirsk, feather-forb steppe, 26.05–6.06.1994, A.L.; 1 ♀ (ISEA), Ordynsk Distr., ca 7 km W of Ust'-Aleus, 1–2.08.1997, A.L. & V. Titov; 1 ♂ (ZMTU), Novosibirsk, Akademgorodok, 14.06.1983, H. Hippa; 1 ♂ (ISEA), same locality, 10.06.1990, D.L.; 1 ♀ (ISEA), Novosibirsk Distr., Klyuch-Kamyshenskoe Plateau, upland meadows, 26.05.1994, A.L.; 16 ♂♂, 16 ♀♀ (ISEA), Karasuk Distr., 20–25 km SW of Karasuk, meadow steppe, 7.05–28.06.1989, V. P. Pekin; 5 ♀♀ (ISEA), Krasnozerskoe Distr., near Krasnozerkoe, June–26.07.1989, A. A. Alekseev; 1 ♂ (ISEA; left palpus only)

near Bugotak, 12.06.1995, O. G. Berezina; 1 ♀ (ISEA), near Novosibirsk, 9.06–9.07.1996, A.L. — *Altai Province*: 1 ♂ (ISEA), Shebalino Distr., near Cherga, 4.06.1994, V.Z.; 1 ♀ (ISEA), ca. 15 km NW of Leninogorsk, Belaya Uba River valley, near Poperechnoe, 9.06.1996, R.D. — *Khakassia*: 1 ♀ (ISEA), Altaiskii Distr., ca 40 km SE of Belyi Yar, 3–5 km E of Novorossiiskoe, Berezovskoe Lake, salt marsh, 22–23.06.1990, D.L.; 1 ♀ (ISEA), ca 8 km E of Birikchul', mesophytic meadows, 16.07.1990, D.L.; 1 ♀ (ISEA), Shira Distr., Itkul' Lake, stony-steppe slopes, 21–22.07.1990, D.L. — *Krasnoyarsk Province*: 1 ♀ (ISEA), near Achinsk, 19.08.1991, N.



Figs 57-68. Male palps of *Xysticus promiscuus* from Israel; a newly collected specimen (57-62) and the holotype (63-68): 57-63 — male palp, rear view; 58, 64 — median tegular apophysis, rear view; 59, 65 — ventral tegular apophysis, rear view; 60-61, 66-67 — embolic tip; 62, 68 — palpal tibia. Scale: 0.1 mm.

Рис. 57-68. Пальпы самцов *Xysticus promiscuus* из Израиля; недавно собранный экземпляр (57-62) и голотип (63-68): 57-63 — пальпс самца, вид сзади; 58, 64 — медиальный тегулярный апофиз, вид сзади; 59, 65 — вентральный тегулярный апофиз, вид сзади; 60-61, 66-67 — конец эмболюса; 62, 68 — голень пальпы. Масштаб: 0,1 мм.

A. Gladkevitch. — *Tuva*: 5 ♂♂, 8 ♀♀ (ISEA), Pii-Khem Distr., near Ust'-Uyuk, sloping shrubby steppe (sweeping), 900–1000 m a.s.l., 21.05.1989, D.L.; 1 ♂, 9 ♀♀ (ISEA), Todzhinsky Distr., Azas Nature Reserve, sloping shrub steppes, 21.06.1989, D.L.; 1 ♂ (ISEA), Kyzyl Distr., near Kyzyl, right bank of Yenisei River, 700–800 m a.s.l., sweeping on herbs, 20.05.1989, D.L.; 1 ♀ (ISEA), Ovyurskii Distr., NE bank of Ubsu-Nur Lake, meadow, ca. 760 m a.s.l., 18.07.1993, D.L.; 3 ♀♀ (ISEA), Tandinskii Distr., Chagytai Lake, dry steppe with open larch forest (sweeping), 1100–1200 m a.s.l., 28.06.1989, D.L.; 1 ♀ (ISEA), Erzin Distr., ca. 20 km NW of Erzin, Dus-Khol' Lake, ca. 800 m a.s.l., 31.05.1989, D.L.; 1 ♀ (ISEA), Shiviligh-Khem River valley, poplar-larch forest, 30.05.1990, O. V. Lyakhov; 2 ♂♂, 1 ♀ (ISEA), Tes-Khem Distr., East Tannu-Ola Mt. Range, 18–20 km NW of Khol'-Oozhu, 2100 m a.s.l., 50°48'N, 94°18'E, mountain steppe meadow, 17.06.1995, D.L. — *Irkutsk Area*: 1 ♀ (PSU), near Balagannoe, 10.06.1924, Vingaradov & Obolensky. — *Buryatia*: 1 ♀ (ISEA), near Ulan-Ude, 24.07.1990, M. T. Šternbergs. — *Yakutia*: 1 ♂, 3 ♀♀ (ZMTU), Ulaach-Aan, taiga, 11.07.1977, S. Koponen; 3 ♀♀ (ZMTU), 5–10 km W of Oktemtsy (=Oktomey), taiga, sloping steppe and meadows, 8–10.07.1977, S. Koponen; 1 ♂, 1 ♀ (ZMUM), near Zhigansk, 15–17.07.1989, K. Yu. Eskov. — **KAZAKHSTAN**: *Pavlodar Area*: 1 ♀ (ISEA), Pavlodar, 2.05.1990, Kondrashov. — *Semipalatinsk [=Semei] Area*: 2 ♂♂, 2 ♀♀ (ISEA), Zharma Distr., Karakol'tas Mt. Range, ca. 11 km SSW of Zharma, ca. 1 km N of Kriushi, 48°41'N, 80°49'E, 4.06.1998, A.G. — *East Kazakhstan Area*: 1 ♂ (ISEA), Kurchum Distr., E of Bukhtarma Reservoir, ca. 10 km SSW of Slavyanka, steppe, 8.05.1999, R.D. & V.Z.; 1 ♀ (ISEA), same distr., W spurs of Naryn Mt. Range, ca. 12 km S of Slavyanka, saline stands, 8.05.1999, R.D.; 2 ♂♂, 4 ♀♀ (ISEA), same distr., spurs of Naryn Mt. Range, left bank of Kaindy River, 10–15 km SE of Slavyanka, 5–7.05.1999, R.D. & I.L.; 1 ♂ (PSU), Ust'-Kamenogorsk, left bank of Irtysh River, 13.05.1981, L.S.; 2 ♂♂, 1 ♀ (PSU), near Dubogalinsk, 25–29.05.1966, L.S.; 2 ♂♂ (PSU), near Ust'-Kamenogorsk, right bank of Irtysh River, Artemovka, 31.05.1969, L.S.; 1 ♂ (PSU), same locality, 5.06.1983, L.S.; 1 ♂ (PSU), near Ust'-Kamenogorsk, 28.08.1970, L.S.; 8 ♀♀ (PSU), near Cheremshanka, 10–29.06.1967, L.S.; 1 ♂ (ISEA), near Serebryansk, 16.06.1995, E. Yu. Kolpakova; 1 ♂ (ISEA), near Glubokoe, 5.06.1996, V.Z.; 2 ♀♀ (ISEA), Kalbinskii Mt. Range, ca. 60 km WNW of Ust'-Kamenogorsk, Dongaly Mt., 4.06.1997, R.D. & V.Z.; 1 ♀ (ISEA), same locality, 1.06.1997, R.D. & V.Z.; 1 ♀ (ISEA), near Serebryansk, 9–10.07.1996, V.Z.; 1 ♂ (ISEA; det. hitherto as *X. audax*), Zaisan Distr., Saur Mt. Range (Saikhan Pass), 1880 m a.s.l., mountain meadow, 27.06.1990, K. Yu. Eskov.

Comparative material. **HUNGARY**: 1 ♂ (HNHM), Tolna County Felsőnána Vill., alfalfa field, Barber traps, 3.06.1994, F. Samu; 1 ♂ (HNHM), Tolna County Felsőnána Vill., alfalfa field, Barber traps, 29.04.1994, F. Samu; 1 ♂ (HNHM), Pest County Nadykovácsi Vil., meadows, Barber traps, 9.05.1994, F. Samu; 1 ♂ (HNHM), Pest County, Páty Vil., meadows, Barber traps, 5.05.1994, F. Samu. — **CZECH REPUBLIC**: 27 ♂♂, 4 ♀♀ (ISEA), South Bohemia, Třebou-Preseka, 11.04–5.05.1995, V. Růžička. — **AUSTRIA**: 1 ♀ (PCEJ), Styria, Ehrenhausen, on carthy underground, 16.05.1999, E. Jantscher; 3 ♂♂ (PCEJ), Styria, Gleinstätten, 46°45'N, 15°22'E, pitfall, 2.04–29.04.1995, E. Jantscher; 1 ♂ (PCEJ), Styria, Fresing, 46°45'N, 15°27'E, pitfall, 29.04–2.06.1995, E. Jantscher; 3 ♂♂ (PCB), Schwand im Innkreis, political province Upper Austria, pitfall traps, 420 m a.s.l., 48°10'29"N, 12°57'46"E, 22.05–16.06.1993, G. Bergthaler; 1 ♂ (PCB), Pilgersham bei St. Marienkirchen am Hausruck, political province Upper Austria, pitfall traps, 570 m a.s.l., 48°10'27"N, 13°35'17"E, 27.04–13.05.1997, G. Bergthaler.

DIAGNOSIS. The male of *X. cristatus* is most similar to that of *X. pseudocristatus* (for differences see comments above under "Diagnosis" of the later species). The female of *X. cristatus* is most similar (almost identical) to that of *X. audax*, with small differences in the structure of the spermathecae (cf. Figs 32, 33 and 34, 35) [see also Jantscher, 2001]. Besides, on the basis of the morphometric approach (see above), one can conclude that the median septum in *X. audax* is slightly longer and thicker than in *X. cristatus*. To our mind,

it is actually impossible to rely on the characters of the females copulatory organs for distinguishing *X. cristatus* and *X. audax* [but see Jantscher, 2001]. Males seem to be always required to trustworthy separation among these species. For differences from *X. audax* (males) and *X. promiscuus* see comments below under the respective "Diagnoses".

DISTRIBUTION. The species seems to display a Euro-Siberian temperate distributional pattern, as it seems to be limited in its distribution to the east by Transbaikalia and Yakutia (Fig. 52).

The record of *X. cristatus* from Inner Mongolia (China) [Wu & Song, 1989: fig. 5; ♂] seems to actually belong to *X. pseudocristatus*, viz. it could be the easternmost record for the latter species [to the moment, it is Central Mongolia (Fig. 16)]. Besides, the records of *X. cristatus* from Kaschmir, Ladakh and Karakorum (altitudes from 2000 to 3200 a.s.l.) [vide Caporiacco, 1935; Reimoser, 1935] are almost certain to be those of *X. pseudocristatus*.

All the collection localities from Siberia are shown in Fig. 52.

Xysticus promiscuus O. Pickard-Cambridge, 1876 Figs. 53–68.

X. promiscuus O. Pickard-Cambridge, 1876: 581.

X. promiscuus: Wunderlich, 1985: 752.

X. cristatus (misidentified): Levy, 1976: 18–21, figs. 28–32; 1985: 90–92, figs. 133–137.

MATERIAL. ISRAEL: 1 ♂ (HEC; holotypes), 1 juv. (HEC, paratype), "Alexra [Palestina], 1876"; 1 ♂ (ISEA), near Ezuz, 2.03.1991, coll. ?.

DIAGNOSIS. *X. promiscuus* is somewhat similar to the members of the *cristatus* group, with one of which (*X. cristatus*) is was erroneously synonymized by Levy [1976]. The male can easily be separated from other congeners by the absence of the tooth on the BTA (cf. Figs. 58, 64 and 10, 27, 43) and the spiral embolic tip (cf. Figs. 54, 61 and 2, 20, 36). The female of *X. promiscuus* differs in the absence of the developed median septum of the epigyne and fossae [see Levy, 1985: figs. 135–136].

DISTRIBUTION. The Near East (Israel and Palestina).

Xysticus thessallicus Simon, 1916 Figs. 18, 19.

X. thessallicus: Wunderlich, 1985: 752–753, figs. 1–7.

MATERIAL. 1 ♀ (NMP) Turkey, E of Bergama, Kirkapac, 25.04.1997, Z. Kpac.

DIAGNOSIS. Only the females of *X. thessallicus* maybe similar to those of the congeners of the *cristatus* group [e.g. Karol, 1968: fig. 2, sub *X. pelini*], but the long BPE (Fig. 18) and especially the coiled insemination ducts (Fig. 19) are obviously different in this species. For a synonymy list and a fuller diagnosis of *X. thessallicus* see Wunderlich [1995].

DISTRIBUTION. E. Mediterranean (Turkey, Crete, and Greece) [Wunderlich, 1995].

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References

- Andreeva E. M. 1975. Distribution and ecology of spiders (Aranei) in Tajikistan // *Fragmenta faunistica PAN*. T.20. No.19. P.325–352.
- Andreeva E.M. 1976. [The Spiders of Tajikistan]. Dushanbe: Donish. 195 pp. [in Russian].
- Azarkina G. N. 1999. [Materials on the spider fauna (Arachnida, Aranei) of the NW-Altai and its foothills] // *Irisova N. L. et al. (eds). Osobo okhranyaemye prirodnye territorii Altai'skogo kraia i sopredel'nykh regionov, taktika sokhraneniya vidovogo raznoobraziya i genofonda. IV regional'naya nauchno-prakticheskaya konferentsiya. Barnaul. P.73–75* [in Russian].
- Azheganova N. S., Kopyl'tsova L. S. & Parfenova T. V. 1976. [Spiders in the lower forest stratum in the environs of the Biological Station Verkhnyaya Kvazhva] // *Biogeografiya i Kraevedenie. Perm: Perm Pedagogical Institute et al. Vyp.4. P.42–48* [in Russian].
- Caporinacci L. di. 1935. Arachnidi dell'Himalaia e del Karakoram, raccolti dalla Missione italiana al Karakoram // *Memorie Societa entomologica italiana. Vol.13. P.161–263*.
- Dunin P. M. 1984. [Fauna and ecology of spiders (Aranei) of the Apsheon Peninsula (Azerbaijan SSR)] // *Utotchkin A. S. et al. (eds). Fauna i ekologiya paukooobraznykh. Perm. P.45–60* [in Russian].
- Dunin P. M. 1989. [Fauna and altitudinal distribution of spiders (Arachnida, Aranei) of the Azerbaijan part of the southern macroslope of the Caucasus Major] // *Lange A. B. (ed.). Fauna i ekologiya paukov i skorpionov. Moscow: Nauka Publ. P.31–39* [in Russian].
- Efimik V. E. 1995 (1994). [Spiders (Aranei) of the Bashkirian State Reserve] // *Pakhorukov N. M. et al. (eds). Fauna i ekologiya paukov. Perm: PGU press. P.98–116* [in Russian].
- Efimik V. E. 1997. [Biotopical distribution of the Bashkirian spiders] // *Vestnik Permskogo Universiteta. No.3. P.128–138* [in Russian].
- Efimik V. E. & Gulyashchikh E. V. 1995 (1994). [Spider fauna of the pine-broad-leaved forests of the South Urals] // *Pakhorukov N. M. et al. (eds). Fauna i ekologiya paukov. Perm: PGU press. P. 116–131* [in Russian].
- Efimik V. E. & Zolotarev M. P. 1998. [The additional data to fauna and ecology of the spider (Arachnida: Aranei) of the Chelyabinsk Area] // *Utkin N. A. (ed.). Besposvonochnye zhivotnye Yuzhnogo Zauralya i sopredel'nykh territoriy. Materialy Vserossiskoi konferentsii. Kurgan: Izdatel'stvo Kurganskogo Universiteta. P.140–146* [in Russian].
- Eskov K. Yu. 1988. [Spiders of Middle Siberia] // *Rogacheva E. V. (ed.). Materialy po faune Srednei Sibiri i prilozhashikh raionov Mongolii. Moscow. P.101–155* [in Russian with English summary].
- Eskov K. Yu. & Marusik Yu. M. 1995. On the spiders from Saur Mt. Range, Eastern Kazakhstan (Arachnida: Araneae) // *Beiträge zur Araneologie. Bd.4 (für 1994). S.55–94*.
- Esyunin S. L. 1991. [Arachnids of the "Baseghi" Reserve (Pseudoscorpiones, Opiliones, Aranei, Parasitiformes: Ixodidae) — an annotated check list] // *Eskov K. Yu. (ed.). Flora i Fauna zapovednikov SSSR. Moscow. Vyp.38. P.3–38* [in Russian].
- Esyunin S. L. 1996. [The spider fauna of the Yugansk Nature Reserve] // *Strel'nikova O. G. (ed.). Ekosistemy srednego Priob'ya. Ekaterinburg. No.1. P.67–79* [in Russian].
- Esyunin S. L. & Efimik V. E. 1996. Catalogue of the spiders (Arachnida, Aranei) of the Urals. Moscow: KMK Scientific Press. 228 pp.
- Esyunin S. L., Golovatch S. I. & Penev L. D. 1993. The fauna and zoogeography of spiders inhabiting oak forests of the East European Plain (Arachnida: Araneae) // *Ber. nat.-med. Verein Innsbruck. Bd.80. P.175–249*.
- Hu J. L. & Wu W. G. 1989. Spiders from agricultural regions of Xinjiang, Uygur Autonomose Region, China (Arachnida, Araneae). Shandong Univ. Publ. House. 435 pp. [in Chinese].
- Jantscher E. 2001. Diagnostic characters of *Xysticus cristatus*, *X. audax* and *X. macedonicus* (Araneae: Thomisidae) // *Bull. Br. arachnol. Soc. Vol.12. Pt.1. (in press)*.
- Guseinov E. F. 1998. [Spiders of the Lenkoran nature zone and Apsheon Peninsula of Azerbaijan. Avtoreferat]. Baku. 16 pp. [in Russian].
- Karol S. 1968. Description de deux espèces nouvelles de Thomisidae (Araneae) de Turquie // *Bulletin du Muséum national d'Histoire Naturelle (2^e Série). T.39 (for 1967). No.5. P.908–911*.
- Kim J. P. & Kurenshchikov D. K. 1995. Preliminary spider species list (Arachnida, Aranei) of Khabarovsk Territory southern part // *Korean Arachnology. Vol.11. P.55–72*.
- Koponen, S. & Marusik, Yu. M. 1992. Spiders (Araneae) from Central Yakutia, Siberia // *Entomologica Fennica. Vol.3. P.163–166*.
- Kurenshchikov D. K. 1993. [On the crab-spider fauna (Aranei: Thomisidae, Philodromidae) of Priamurie] // *Chteniya pamyati A.I. Kurentsova. No.3. P.29–35*. [in Russian].
- Kuznetsov S. F. 1995 (1994). [Additional materials to the study of spiders (Aranei) in the environs of Orenburg] // *Pakhorukov N. M. et al. (eds). Fauna i ekologiya paukov. Perm: PGU press. P.67–73* [in Russian].
- Levy G. 1976. The spider genera *Xysticus* (Araneae: Thomisidae) in Israel // *Israel Journal of Zoology. Vol.25. P.1–37*.
- Levy G. 1985. Araneae: Thomisidae. Fauna Palaestina, Arachnida II. Jerusalem: the Israel Academy of Sciences and Humanities. 115 pp.
- Logunov D. V. 1992. [On the spider fauna of the Bolshekhkhtsyrskiy Reservation (Khabarovsk Province). I. Families Araneidae, Lycosidae, Philodromidae, Tetragnathidae, Theridiidae, Thomisidae] // *Siberian Biological Journal. Vol.4. P.56–68* [in Russian with English summary].
- Logunov D. V. & Marusik, Yu. M. 1994. A faunistic review of the crab spiders (Araneae, Thomisidae) from the Mountains of South Siberia // *Bulletin de l'Institut royal des Sciences Naturelles de Belgique, Entomologie. Vol.64. P.177–197*.
- Logunov D. V. & Marusik Yu. M. & Koponen S. 1998. A check-list of the spiders in Tuva, South Siberia with analysis of their habitat distribution // *Ber. nat.-med. Verein Innsbruck. Bd.85. P.125–159*.
- Marusik Yu. M. 1993. [Redescription of spiders of the families Heteropodidae and Thomisidae (Aranei) described by O. P.-Cambridge from the material of the second Yarkand mission] // *Entomologicheskoe Obozrenie. Vol.72. No.2. P.456–468* [in Russian with English summary].
- Marusik Yu. M., Eskov K. Yu. & Kim J. P. 1992. A check-list of spiders (Aranei) of Northeast Asia // *Korean Arachnology. Vol.8. No.1/2. P.129–158*.
- Marusik Yu. M., Eskov K. Yu., Koponen S. & Vinokurov N. N. 1993. A check-list of the spiders (Aranei) of Yakutia, Siberia // *Arthropoda Selecta. Vol.2. No.2. P.63–79*.
- Marusik Yu. M., Hippa H. & Koponen S. 1996. Spiders (Araneae) from the Altai area, Southern Siberia // *Acta Zoologica Fennica. Vol.201. P.11–45*.
- Marusik Yu. M. & Logunov D. V. 1990. The crab spiders of Middle Asia, USSR (Aranei, Thomisidae). 1. Descriptions and notes on distribution of some species // *Korean Arachnology. Vol.6. No.1. P.31–62*.
- Marusik Yu. M. & Logunov D. V. 1995. The crab spiders of Middle Asia (Aranei, Thomisidae) // *Beiträge zur Araneologie. Bd.4 (für 1994). S.133–175*.
- Marusik Yu. M., Logunov D. V. & Koponen S. 2000. Spiders of Tuva, South Siberia. Magadan: IBPS DVO RAS. 252 pp.
- Matsuda M. 1997. A check-list of the spiders from Hokkaido, Japan // *Bulletin of the Higashi Taisetsu Museum of Natural History. Vol.19. P.1–46*.
- Ono H. 1978. Thomisidae aus dem Nepal-Himalaya. I. Das Genus *Xysticus* C. L. Koch 1835 (Arachnida: Araneae) // *Senckenbergiana biologica. Bd.59. Hft.3/4. S.267–288*.
- Ono H. 1988. A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan. Tokyo: National Science Museum. 252 pp.
- Ono H., Marusik Yu. M. & Logunov D. V. 1990. Spiders of the

- family Thomisidae from Sakhalin and the Kurile Islands // *Acta Arachnologica*. Vol.39. No.1. P.7–19.
- Ono H. & Yasuda N. 1992. [Records of thomisid spiders (Arachnida, Araneae) from Hokkaido, Japan] // *Bull. Sounkyo Mus. Nat. Hist.* No.12. P.1–13.
- Pakhorukov N. M. & Efimik V. E. 1988. [On the spider fauna of the Bashkirkii Reserve] // *Utotchkin A. S. (ed.). Fauna i ekologiya paukovobraznykh. Perm: PGU press.* P.15–34 [in Russian].
- Pakhorukov N. M., Eshunin S. L. & Polyaniin A. B. 1995 (1994): [Spider fauna (Arachnida: Aranei) of the Research Forestry "Preduralie"] // *Pakhorukov N. M. et al. (eds). Fauna i ekologiya paukov. Perm: PGU press.* P.25–38 [in Russian].
- Palmgren P. 1983. Die *Philodromus aureolus*-Gruppe und die *Xysticus cristatus*-Gruppe (Araneae) in Finnland // *Annales Zoologici Fennici*. Vol.20. P.203–206.
- Polyaniin A. B. & Pakhorukov N. M. 1988. [The spider fauna of the forest zone of southern Transuralia] // *Utotchkin A. S. (ed.). Fauna i ekologiya paukovobraznykh. Perm: PGU press.* P.61–80 [in Russian].
- Polyaniin A. B. & Pakhorukov N. M. 1992. [Spiders of grass-bush level in some biocoenoses of Il'meskii Reserve] // *Ovtsharenko, V. I. (ed.). Fauna i ekologiya paukov, skorpionov i lozhnoskorpionov SSSR. Trudy Zoologicheskogo Instituta AN SSSR. Vol.226 (for 1990).* P.12–18 [in Russian with English summary].
- Pickard-Cambridge O. 1876. Catalogue of a collection of spiders made in Egypt, with descriptions of new species and characters of a new genus // *Proc. Zool. Soc. London*. P.541–630.
- Pickard-Cambridge O. 1885. Scientific results of the second Yarkand Mission. Araneidea. Calcutta. 115 pp.
- Reimoser E. 1935. Araneida. // *Wissenschaftliche Ergebnisse der niederländischen Expeditionen in den Karakorum und die angrenzenden Gebiete in den Jahren 1922, 1925 und 1929/30. Leipzig*. S.169–176. (not seen).
- Roewer C. Fr. 1955. Die Araneen der Österreichischen Iran-Expedition 1949/50 // *Sitzungsberichte Österr. Akad. Wiss. Abteilung I. Biologie, Mineralogie, Erdkunde und verwandte Wissenschaften. Bd.164. Hft.9.* S.751–782.
- Roewer C. Fr. 1959. Die Araneae, Solifuga und Opiliones der Sammlungen des Herrn Dr. K. Lindberg aus Griechenland, Creta, Anatolien, Iran und Indien // *Göteborgs Kungliga vetenskaps- och vitterhetssamhälles handlingar. Ser.B. Bd.8. No.4.* S.3–47.
- Savelyeva L. G. 1970. [Fauna and zoogeographical relations of spiders in East Kazakhstan Area] // *Biologiya i geografiya (Alma-Ata: Ministerstvo vysshego i srednego special'nogo obrazovaniya KazSSR).* No.6. P.78–88 [in Russian].
- Savelyeva L. G. 1979. [Zoogeographical complexes of the spiders (Aranei) from East Kazakhstan] // *Priroda i khozyaistvo Vostochnogo Kazakhstana. Alma-Ata.* P.139–148 [in Russian].
- Schick R. X. 1965. The crab spiders of California (Araneida, Thomisidae) // *Bulletin of the American Museum of Natural History*. Vol.129. No.1. P.1–180.
- Sheikin O. A. & Litovchenko A. M. 1992. [Cases of unilateral symbiotic connections between spiders *Xysticus cristatus* (Cl., 1757) and *Theridium impressum* L. Koch, 1881] // *Ovtsharenko, V. I. (ed.). Fauna i ekologiya paukov, skorpionov i lozhnoskorpionov SSSR. Trudy Zoologicheskogo Instituta AN SSSR. Vol.226 (for 1990).* P.136–137 [in Russian with English summary].
- Song D. X. & Zhu, M. S. 1997. Fauna Sinica. Arachnida: Araneae: Thomisidae, Philodromidae. Beijing: Science Press. 259 pp.
- Song, D. X., Zhu, M. & Chen, J. 1999. The spiders of China. Hebei Science and Technology Publishing House. 640 pp.
- Ukhova N. L. & Eshunin S. L. 1996. [To the arachnid fauna (Arachnida) of the Visimski Reserve] // *Mishin, A. S. et al. (eds). Problemy zapovednogo dela. 25 let Visimskomu zapovedniku (Materialy nauchnoi konferentsii. Tezisy dorkladov).* Ekaterinburg. P.110–112 [in Russian].
- Utotchkin A. S. 1988. [To the fauna of the crab spiders (Aranei, Thomisidae) of the Urals] // *Utotchkin, A. S. (ed.). Fauna i ekologiya paukovobraznykh. Perm: PGU press.* P.9–14 [in Russian].
- Utotchkin A. S. & Savelyeva L. D. 1995. Review of the spider genus *Xysticus* C. L. Koch, 1835 (Arachnida Aranei Thomisidae) in the East Kazakhstan Area // *Arthropoda Selecta*. Vol.4. No.1. P.65–69.
- Verzhbitskii E. 1902. [On the spiders of the Caucasus Province] // *Zapiski Kievskogo obshchestva estestvoispytatelei*. Vol.17. Vyp.2. P.461–504, tab.VI [in Russian].
- Wu L. & Song D. X. 1989. [Notes on some crab spiders from Inner Mongolia, China] // *Journal of Inner Mongolian Teacher University (Natural Science Edition)*. No.4. P.29–34 [in Chinese with English summary].
- Wunderlich J. 1995. Zur Kenntnis west-paläarktischer Arten der Gattungen *Psammotis* Menge 1875, *Xysticus* C. L. Koch 1835 und *Ozyptila* Simon 1864 (Arachnida: Araneae: Thomisidae) // *Beiträge zur Araneologie*. Bd.4 (für 1994). S.749–774.
- Yakhontov V. V. 1955. [Arthropodocoenosis of the lucerne fields on north of Uzbekistan. I. Order Aranei — spiders] // *Zool. Zhurnal*. T.34. No.2. P.359–364 [in Russian].
- Zonstein S. L. 1984. [To the fauna and ecology of spiders (Aranei) of lower strata of walnut-fruit forests of southern Kirghizia] // *Protsenko A. I. (ed.). Entomol. issled. v Kirghizii. Frunze: Ylym. No.17.* P.144–151 [in Russian].
- Zonstein S. L. 1996. Order Araneae // *Shukurov et al. (eds.). Genetical fund cadaster of Kyrgyzstan. Vol.II. VIRA, BACTERIA, ANIMALIA (Protozoa, Porifera, Coelenterata, Plathelminthes, Nematelminthes, Acanthocephales, Annelida, Bryozoa, Mollusca, Tardigrada, Arthropoda).* Bishkek. P.132–153 [in Russian].
- Zyuzin A.A., Tarabaev C.K. & Feodorov A.A. 1993. The spider fauna of the Karatau mountain range // [C.R.] XIIIe Coll. europ. Arachnol., Neuchâtel 2–6 sept. 1991 // *Bull. Soc. neuchâtel. Sci. nat.* T.116. Fasc.1. P.279–285.
- Zyuzin A. A., Tarabaev C. K. & Feodorov A. A. 1994. [The spiders (Arachnida: Araneae) collected in the eastern part of Kyzylkum Desert and the eastern surroundings of Aral Sea] // *Selevinia*. Vol.1. P.3–11 [in Russian].