

## Confirmation of the presence of *Xysticus chippewa* in Europe (Araneae, Thomisidae)

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### Summary

A comparison of Swedish and Estonian material of *Xysticus chippewa* Gertsch, 1953 with North American material revealed no consistent differences in structure. This confirms the presence of *X. chippewa* in Europe as reported by Vilbaste (1969, 1980, 1987).

### Introduction

*Xysticus* C. L. Koch, 1835 is a major world genus of crab spiders (Thomisidae) numbering nearly 350 species (Platnick, 2005). Of these, some 80% belong to the Palaearctic fauna, the remainder being mainly Nearctic. Seven species are thought to be represented in both Palaearctic and Nearctic regions, and hence are Holarctic.

Five of the supposed Holarctic species, all of which occupy ground habitats in northern coniferous forests, are well-researched: *X. britcheri* Gertsch, 1934, *X. canadensis* Gertsch, 1934, *X. emertoni* Keyserling, 1880, *X. luctuosus* (Blackwall, 1836) and *X. obscurus* Collett, 1877 (Marusik *et al.*, 1992; Marusik *et al.*, 1993; Marusik & Logunov, 1996; Marusik *et al.*, 1996; Mikhailov, 1997; Dondale *et al.*, 1997; Marusik *et al.*, 2000).

*Xysticus chippewa* Gertsch, 1953 is of special interest owing to its widespread occurrence in North America (Dondale & Redner, 1978), although reported from Eurasia only from a few widely separated localities. Vilbaste (1969, 1980, 1987) recorded this species from seven moist fen-like sites in Estonia; she also (1969) assigned a male specimen from Uppland, Sweden, which had been identified as *X. acquiescens* Emerton, 1919 by Tullgren (1952), to this species. A number of records of *X. chippewa* from the former Soviet Union are found in the literature, but these are regarded by Mikhailov (1997) as doubtful. These latter localities include the environs of Irkutsk in Siberia (Izmailova, 1989), Komi (Pakhorukov, 1979, cited in Esyunin & Efimik, 1996), and Byelorussia (Pristavko & Zhukovets, 1987), and have been found to pertain to a different species, *X. britcheri*. In order to arrive at an informed opinion regarding the status of *X. chippewa* in Europe, we

assembled the Estonian and Swedish material and compared it with North American material.

### Material and methods

This study is based on material deposited in the following institutions: Institute for Zoology and Botany, Tartu, Estonia (IZT), Swedish Museum of Natural History, Stockholm, Sweden (NHRS), Museum of Evolution, Uppsala University, Uppsala, Sweden (ZMUU), Canadian National Collection of Insects and Arachnids, Ottawa, Ontario, Canada (CNC), American Museum of Natural History, New York, USA (AMNH), E. H. Strickland Entomological Museum, University of Alberta, Edmonton, Canada (SMUA), Royal Saskatchewan Museum, Regina, Saskatchewan, Canada (RSM), and the private collection of Donald J. Buckle, Saskatoon, Saskatchewan, Canada (DJB).

In deciding the status of European specimens of *X. chippewa*, we examined the external genitalia, carapace dimensions, and body coloration of both sexes. A standard ANOVA was used to compare mean differences between European and North American carapace dimensions. Measurements are in mm, expressed to the nearest 0.01 mm.

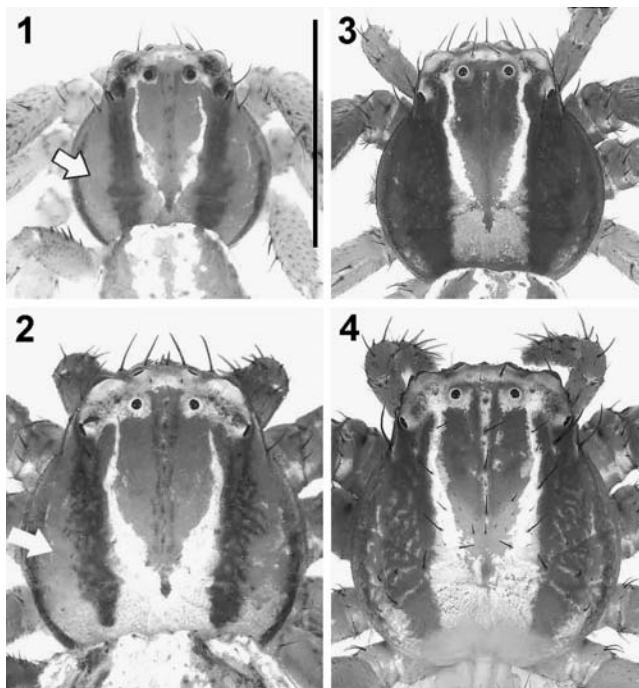
### *Xysticus chippewa* Gertsch, 1953 (Figs. 1, 2, 5–10, 16, 17, 20, 21)

*Xysticus chippewa* Gertsch, 1953: 430, figs. 17–20 (descr. ♂♀). Vilbaste, 1969: 61, figs. 51A–C, 52A–B (♂♀). Identity of Vilbaste's material as *X. chippewa* here confirmed.

*Xysticus acquiescens* Tullgren, 1952: 157, figs. 4a, b (♂, misidentification). Identity as *X. chippewa* here confirmed.

*Type:* Holotype ♀, Manistique, Schoolcraft County, Michigan, USA (45°57'N, 86°14'W), 2 September 1949, leg. W. J. Gertsch (AMNH), examined.

*Other material examined:* ESTONIA: 1♂ 1♀, Emajõe flood-plain (58°24'N, 26°19'E), 3 July 1962 (IZT); 1♂, Pedja (58°34'–58°42'N, 26°19'–26°24'E), 26 May 1961, leg. A. Kuusik (IZT); 1♂, Pedja, 2 July 1962 (IZT); 1♂ 1♀, Saare järv (58°39'N, 26°46'E), 11 June 1963, leg. Vilbaste (IZT); 3♀, Järvesoo (58°59'N, 25°28'E), 27 July 1953, leg. J. Vilbaste (IZT); 1♀, Lisaku, Muraka soo (59°06'N, 27°10'E), 17 June 1953, leg. J. Vilbaste (IZT). SWEDEN: 4♀, Uppland, Älvkarleby, Mararna (60°37'N, 17°37'E), 5 July 1968, leg. Å. Holm (ZMUU); 1♂, Uppland, Älvkarleby, Båtfors (60°28'N, 17°19'E), 17 July 1947, leg. T. E. Leiler (NHRS). CANADA: *Yukon Territory:* 4♀, Swim Lakes (62°12'N, 132°53'W), 17 July 1960, leg. J. E. H. Martin (CNC). *Northwest Territories:* 3♀, Norman Wells (65°17'N, 126°51'W), 16 May 1958, leg. C. D. Bird (CNC); 2♂, 10 June 1949, leg. W. R. M. Mason (NHRS); *Manitoba:* 2♂, Telford (49°51'N, 95°23'W), 8 July 1964, leg. Ives (NHRS); *Ontario:* 1♂, James Bay, North Point 51, Cochrane District (51°31'N, 80°26'W), 5–9 July 1976, leg. R. I. G. Morrison (CNC); 1♂ 1♀, Marmora, Hastings County (44°29'N, 77°41'W), 17 May–1 June 1952, leg. R. C. Mitchell (CNC); 1♂ 1♀, 10–15 August 1952, leg. C. Boyle (NHRS); 1♂, Braeside, Renfrew County (45°28'N, 76°24'W), 11 June 1987, leg. L. LeSage & R. Skidmore, sweeping spurge (CNC). *Saskatchewan:* 1♀, Emma Lake (53°36'N, 105°54'W), 30 July 1962, leg. D. J. Buckle (DJB); 8♂ 8♀, Lady Lake (52°02'N, 102°37'W), May–October 1962–70, leg. D. J. Buckle (DJB); Bankside Lake (53°14'N, 102°24'W), 7 July 1992, leg. J. Koziak (RSM); 1♀, MacDowall (53°01'N, 106°01'W), 9 August 2003, leg. Anna Leighton (DJB). *Alberta:* 1♀, Lake (59°34'N, 110°08'W), 8 July 2002 (SMUA). USA: *Maine:* 9♂ 7♀, Washington County, Milbridge (44°32'N, 67°52'W), 29 June–28 August 2002–2004, leg. D. T. Jennings & F. Graham Jr (CNC); 1♀, Penobscot



Figs. 1–4: Carapace in ethanol. **1–2** *Xysticus chippewa* (Uppland, Sweden). **1** Male; **2** Female. **3–4** *X. ulmi* (Skåne, Sweden). **3** Male; **4** Female. Arrows point to broad pale area in *X. chippewa*. Scale line=2 mm.

County, Orono (44°52'N, 68°40'W), November 1977, leg. Joyce Longcore (CNC); 1♂, Kennebec County, Augusta (44°18'N, 69°46'W), 7 June 1997, leg. R. E. Nelson (CNC).

**Diagnosis:** Specimens of *X. chippewa* bear considerable resemblance to those of the Palaearctic *X. ulmi* (Hahn, 1831). In both sexes of *X. chippewa* the dark submedian bands on the carapace are separated from the marginal bands by a broad pale area (Figs. 1, 2: arrow), whereas in *X. ulmi* the submedian and marginal bands tend to obscure or even eliminate the pale areas (Figs. 3, 4). In the male palpus of *X. chippewa* the two tegular apophyses are in close proximity at their bases (Figs. 5–8, 16, 17); in *X. ulmi* these apophyses are well separated at their bases (Figs. 11–13, 18, 19). In the epigynum of *X. chippewa* the atrial sclerites are quite flat (Figs. 9, 20, 21); in *X. ulmi* females these sclerites are convex (Figs. 14, 22, 23). In *X. chippewa* females the spermathecae are relatively short and terminate anteriorly in a simple curve (Fig. 10), whereas in *X. ulmi* the spermathecae are longer, more slender, and terminate anteriorly in a distinct loop (Fig. 15). Individuals of both species tend to be found in moist habitats, and females of both species construct their egg sacs among the tops of wetland plants such as *Calamagrostis* spp. (D. T. Jennings, pers. comm. in Maine) or sedges (Nielsen, 1932).

**Description:** *Male* (from Uppland, Sweden, Figs. 1, 5–7): Total length 4.40; carapace 2.30 long, 2.15 wide. Carapace off-white, with brown submedian stripes and margins, and with a broad pale area separating stripes from margins. Sternum dull yellow, finely speckled with brown. Legs yellowish, flecked with brown; femur I with 8 erect prolateral macrosetae. Abdomen creamy white, spotted or streaked with brown laterally; venter pale

yellow, spotted with brown. Palpus with broad blunt retrolateral tibial apophysis and oblique ventral apophysis; embolus long, slender; tegular apophyses close together, distal one with proximal margin somewhat undulating.

**Variation** ( $n=5$ ): Total length  $4.04 \pm 0.39$ ; carapace  $2.05 \pm 0.22$  long,  $1.94 \pm 0.17$  wide. Carapace sometimes almost totally white, with only a few brown or reddish marks. Abdomen sometimes dull yellow, lacking dark markings entirely. Femur I with variable number of erect prolateral macrosetae.

**Female** (from Uppland, Sweden, Figs. 2, 9, 10): Total length 6.65; carapace 2.56 long, 2.80 wide. Coloration much as in male, but generally paler. Epigynum with atrial sclerites converging posteriorly, neither well separated nor touching, flat, somewhat angular on lateral margins. Copulatory tubes approximately one-third length of spermathecae; spermathecae rather short, terminating anteriorly in simple curve, with several prominences defined by shallow grooves.

**Variation** ( $n=10$ ): Total length  $6.40 \pm 0.98$ ; carapace  $2.81 \pm 0.31$  long,  $2.67 \pm 0.30$  wide. Atrial sclerites variable in shape such that no two specimens are precisely alike among the females examined.

**Distribution:** In Europe, known with certainty only from Sweden and Estonia; in North America, widespread in the Boreal region from Yukon Territory to Maine, south to Michigan.

**Ecology:** Vilbaste's (1969, 1987) Estonian specimens were collected in fens, bogs, flood plains, or meadows. North American collections are from grasses and sedges in freshwater marshes, bogs, sloughs, or the banks of rivers. In North America, males mature in late May, females in early June; occasional females persist until November. Females with egg sacs were recorded from late July through August. Two egg sacs, collected on 28 July 1964 at Lady Lake, Saskatchewan, contained respectively 118 and 106 eggs. Three sacs, collected on 22 August 2002 in Maine, contained respectively 35, 46 and 48 newly hatched spiderlings.

**Geographical variation:** Examination of the external genitalia revealed no detectable differences between European and North American specimens (cf. Figs. 5–7, 9 with Figs. 8, 16, 17, 20, 21). Results from the carapace measurements are as follows (mean, followed by one standard deviation):

	Carapace length	Carapace width
<b>5 European ♂</b>	$2.05 \pm 0.22$	$1.94 \pm 0.17$
<b>10 N. American ♂ (from Dondale &amp; Redner, 1978)</b>	$2.08 \pm 0.13$	$1.95 \pm 0.13$
<b>10 European ♀</b>	$2.81 \pm 0.31$	$2.67 \pm 0.30$
<b>17 N. American ♀ (from Dondale &amp; Redner, 1978)</b>	$2.56 \pm 0.20$	$2.40 \pm 0.19$

Mean carapace length and width do not differ significantly between European and North American males, but differ at the 5% level of significance for female carapace length, and at the 1% level of significance for female carapace width, based on the sample sizes given. We have no ready explanation for this. Coloration,

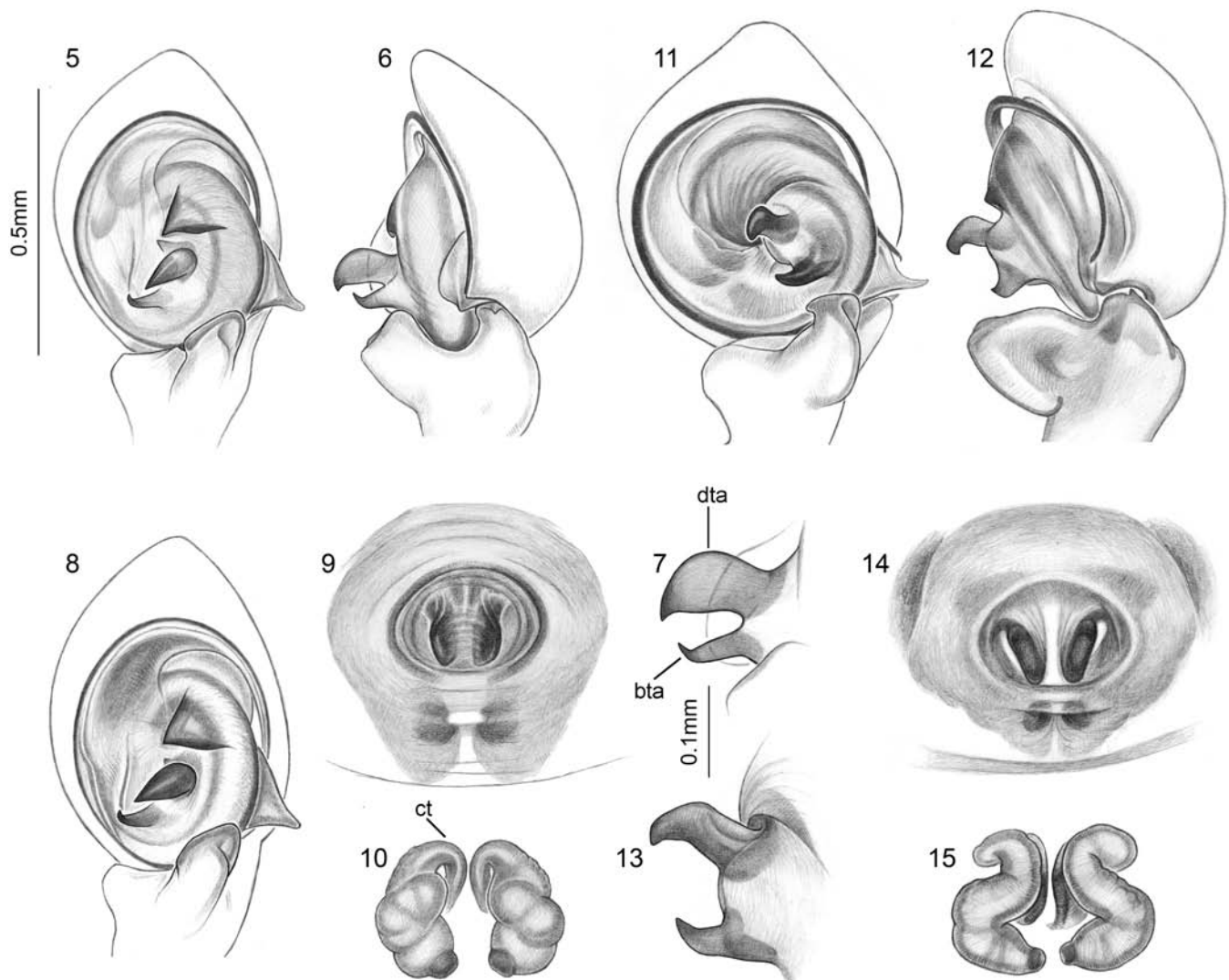
though variable, appears to differ in no obvious respect. We conclude that *X. chippewa*, as far as structural characteristics indicate, may be regarded as an Holarctic spider.

**Courtship and mating:** Courtship was observed in a pair of *X. chippewa* under laboratory conditions by the third author at Lady Lake, Saskatchewan. When presented with the female, the male soon began to bind the female's legs with silk, first on one side then on the other. The male then moved under the female's abdomen from the rear, and immediately inserted his right embolus into the female's right copulatory opening. The haematodocha swelled, then partly deflated, with several repetitions during the next 3.5 minutes. The male then moved to the left side, but was unable to insert the left embolus. He returned to the right side and achieved several more insertions with the right embolus. Abdominal twitching occurred at intervals, and macrosetae on the leg tibiae were raised during haematodochal swellings. It seems worth mentioning that the binding of the

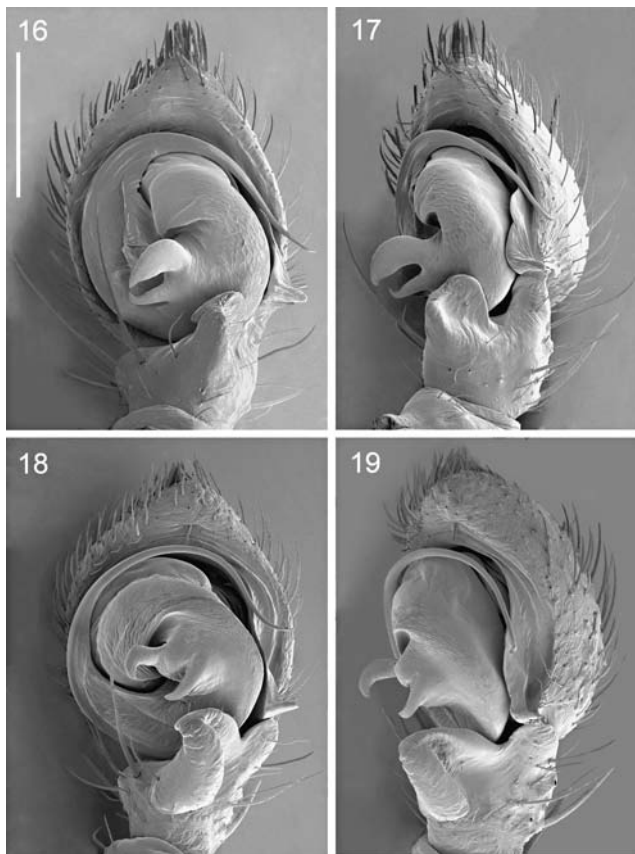
female's legs by the male, which has been called the "bridal veil", has been observed in other species of *Xysticus* such as *X. cristatus* (Clerck, 1758) (Bristowe, 1958) and *X. lanio* C. L. Koch, 1835 (Bellmann, 1997).

#### Acknowledgements

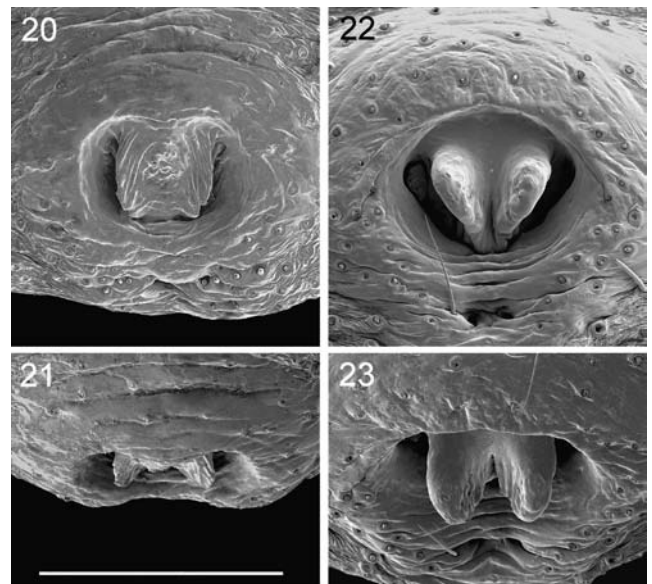
We are indebted to Jaan Viidalepp, Institute for Zoology and Botany, Tartu for lending Vilbaste's Estonian material and for providing essential information on the Estonian collecting sites. Mats Eriksson, Museum of Evolution, Uppsala University, Uppsala kindly lent Holm's Swedish material. Kirill G. Mikhailov, Zoological Museum of the Moscow State University, supplied valuable information on collecting sites in the former Soviet Union. Daniel T. Jennings donated his Maine collection of *X. chippewa* to the CNC and supplied information regarding the habitats and productivity as observed by him in Maine. The late



Figs. 5–15: **5–10** *Xysticus chippewa*. **5** Left male palpus, ventral view (Uppland, Sweden); **6** Ditto, retrolateral view; **7** Ditto, detail of tegular apophyses, retrolateral view; **8** Left male palpus, ventral view (Ontario, Canada); **9** Epigynum, ventral view (Uppland, Sweden); **10** Spermathecae, dorsal view (Uppland, Sweden). **11–15** *X. ulmi* (Skåne, Sweden). **11** Left male palpus, ventral view; **12** Ditto, retrolateral view; **13** Ditto, detail of tegular apophyses, retrolateral view; **14** Epigynum, ventral view; **15** Spermathecae, dorsal view. Abbreviations: bta=basal tegular apophysis, ct=copulatory tube, dta=distal tegular apophysis. Scale lines=0.5 mm (5, 6, 8–12, 14, 15), 0.1 mm (7, 13).



Figs. 16–19: **16–17** *Xysticus chippewa*, left male palpus (Northwest Territories, Canada). **16** Ventral view; **17** Retrolateral view. **18–19** *X. ulmi*, left male palpus (Skåne, Sweden). **18** Ventral view; **19** Retrolateral view. Scale line=0.3 mm.



Figs 20–23: **20–21** *Xysticus chippewa*, epigynum (Yukon Territory, Canada). **20** Ventral view; **21** Anterior view; **22–23** *X. ulmi*, epigynum (Skåne, Sweden). **22** Ventral view; **23** Anterior view. Scale line=0.3 mm.

Willis J. Gertsch, former curator of Arachnida at the American Museum of Natural History, gave permission to examine the holotype of *X. chippewa*. Ms Andrea Klintbjer, Department of Entomology, Swedish Museum of Natural History, Stockholm created the excellent original drawings for this paper.

## References

- BELLMANN, H. 1997: *Kosmos-Atlas Spinnentiere Europas*. Stuttgart, Franckh-Kosmos.
- BRISTOWE, W. S. 1958: *The world of spiders*. London, Collins.
- DONDALE, C. D. & REDNER, J. H. 1978: The insects and arachnids of Canada. Part 5. The crab spiders of Canada and Alaska (Philodromidae and Thomisidae). *Research Branch, Agriculture Canada, Publ.* **1663**: 1–255.
- DONDALE, C. D., REDNER, J. H. & MARUSIK, Y. M. 1997: Spiders (Araneae) of the Yukon. In H. V. Danks & J. A. Downes (eds.), *Insects of the Yukon*: 73–113. Ottawa, Biological Survey of Canada (Terrestrial Arthropods).
- ESYUNIN, S. L. & EFIMIK, V. E. 1966: *Catalogue of the spiders (Arachnida, Aranei) of the Urals*. Moscow, KMK Scientific Press.
- GERTSCH, W. J. 1953: The spider genera *Xysticus*, *Coriarachne*, and *Oxyptila* (Thomisidae, Misumeninae) in North America. *Bull. Am. Mus. nat. Hist.* **102**: 413–482.
- IZMAILOVA, M. V. 1989: [The spider fauna of southern East Siberia]. Irkutsk, Irkutsk University Publisher. [In Russian.]
- MARUSIK, Y. M., ESKOV, K. Y. & KIM, J. P. 1992: A check list of spiders (Aranei) of northeast Asia. *Korean Arachnol.* **8**: 129–158.
- MARUSIK, Y. M., ESKOV, K. Y., KOPONEN, S. & VINOKUROV, N. N. 1993: A check-list of the spiders (Aranei) of Yakutia, Siberia. *Arthropoda Selecta* **2**(2): 63–79.
- MARUSIK, Y. M., HIPPA, H. & KOPONEN, S. 1996: Spiders (Araneae) from the Altai area, southern Siberia. *Acta zool. fenn.* **201**: 11–45.
- MARUSIK, Y. M. & LOGUNOV, D. V. 1996: [Poorly known spider species of the spider families Salticidae and Thomisidae (Aranei) of the Soviet Far East]. In *Entomological Studies in the North-East of the USSR* **2**: 131–140. Vladivostok, USSR Academy of Sciences, Institute of Biological Problems of the North (dated 1991, first distributed March, 1996). [In Russian.]
- MARUSIK, Y. M., LOGUNOV, D. V. & KOPONEN, S. 2000: *Spiders of Tuva, south Siberia*. Moscow, IBPN Far Eastern Branch, Russian Academy of Sciences.
- MIKHAILOV, K. G. 1997: *Catalogue of the spiders of the territories of the former Soviet Union (Arachnida, Aranei)*. Moscow, Zoological Museum of the Moscow State University.
- NIELSEN, E. 1932: *The biology of spiders* **1**: 1–248. Copenhagen, Munksgaard.
- PLATNICK, N. I. 2005: *The world spider catalog, version 5.5*. <<http://research.amnh.org/entomology/spiders/catalog.html>>
- PRISTAVKO, V. P. & ZHUKOVETS, E. M. 1987: [Spiders as an object of ecological monitoring in the Berezinskij Nature Reserve]. *Ent. Obozr.* **44**: 184–189. [In Russian.]
- TULLGREN, A. 1952: Zur Kenntnis schwedischer Spinnen. I. *Ent. Tidskr.* **73**: 151–177.
- VILBASTE, A. 1969: [Eesti Ämblikud I (Die Spinnen Estlands I)]. Tallinn, Valgus. [In Estonian, with Russian and German summaries.]
- VILBASTE, A. 1980: The spider fauna of Estonian mires. *Eesti NSV Tead. Akad. Toim.* **29** (Biol. **4**): 313–327.
- VILBASTE, A. 1987: [Eesti Ämblikud (Aranei). Annoteeritud Nimesitik. (Estonian spiders (Aranei). An annotated check-list)]. Tallinn, Valgus. [In Estonian, with Russian and English summaries.]