

On the separation of *Sitticus ranieri* Peckham & Peckham and *S. saxicola* (C. L. Koch) (Araneae, Salticidae)

Torbjörn KRONESTEDT¹ & Dmitri V. LOGUNOV²

¹ Department of Entomology, Swedish Museum of Natural History, Box 50007, SE-104 05 Stockholm, Sweden. E-mail: torbjorn.kronestedt@nrm.se

² Siberian Zoological Museum, Institute for Systematics and Ecology of Animals, Russian Academy of Sciences, Frunze street 11, Novosibirsk 630091, Russia. Present address: Department of Zoology, Manchester Museum, Oxford Road, Manchester M13 9PL, UK. E-mail: dmitri.v.logunov@man.ac.uk

On the separation of *Sitticus ranieri* Peckham & Peckham and *S. saxicola* (C. L. Koch) (Araneae, Salticidae). - *Sitticus ranieri* Peckham & Peckham and *S. saxicola* (C. L. Koch) constitute a close group of species due to the morphology of their copulatory organs. Re-examination of specimens previously identified as *Sitticus saxicola* from Fennoscandia has revealed that they belong to *S. ranieri*. Redescriptions with illustrations of both species are provided. *S. saxicola* has a disjunct distribution, occurring in mainly montane areas in the central parts of Europe and on the Balkan peninsula, as well as in the Russian Far-East (known from Sakhalin). *S. ranieri* shows a wide, hypoarcto-boreal distribution throughout northern Europe and Siberia, extending into North America. North American males of *S. ranieri* from southern British Columbia, Washington, Oregon, and Wyoming differ from those examined from other parts of the range (northern Palaearctic, Alaska, Yukon, Saskatchewan, Manitoba, Colorado) by having slightly different proportions of the bulbus and by lacking a streak of white hairs between the anterior median eyes. Reasons are given for presently not taking these differences into nomenclatorial account.

Key-words: Araneae - Salticidae - *Sitticus* - taxonomy - Holarctic.

INTRODUCTION

Within the jumping spider genus *Sitticus* C. L. Koch, *S. ranieri* Peckham & Peckham, 1909 and *S. saxicola* (C. L. Koch, 1846) constitute a morphologically close species pair in the Holarctic region. Both were redescribed by Prószyński (1971b), the former under the name *S. lineolatus* (Grube, 1861). Re-examination of old material, as well as access to new material, have shown that *S. ranieri* has previously been misidentified as *S. saxicola* in northern Europe. In this paper, diagnostic characteristics of the two species are given together with comments on their distribution.

S. saxicola was originally described on material from Bavaria, Germany. The species is mainly montane in Continental Europe. It has recently also been found in the Far East of Russia (Marusik *et al.*, 1992). The presence of a seemingly disjunct European occurrence of this species in northern Fennoscandia was announced by Holm (1931), followed by Palmgren (1943), Tullgren (1944, 1952), Holm (1950), Hackman (1951), and Granström (1979). The illustration of an epigyne attributed to *S. saxicola* by Tullgren (1952), drawn from a female collected in Swedish Lapland, however, rather appears to show an epigyne of *S. ranieri*. Examination of the corresponding specimen confirmed this assumption. Re-examination of other Fennoscandian specimens attributed to *S. saxicola* revealed that they all had been misidentified.

Sitticus ranieri was for a long time known as a Nearctic species until Prószyński (1971a,b) synonymized it with *Sitticus lineolatus* (Grube, 1861). The identity of *Attus lineolatus* Grube was disclosed by Prószyński (1971a,b) after examination of the holotype. *A. lineolatus* was transferred to *Sitticus* and the Nearctic *Sitticus ranieri* Peckham & Peckham and *S. haydeni* Levi & Levi were placed under *S. lineolatus* as junior synonyms (Prószyński, 1971a, b), as was *S. mazamae* Schenkel (Prószyński, 1971b). However, *S. lineolatus* is an invalid name because *Attus lineolatus* Grube, 1861 is a primary homonym of *Attus lineolatus* Sundevall, 1833 (Platnick, 1993) [the latter now in synonymy with *Salticus cingulatus* (Panzer)], and must therefore be replaced by the next oldest available name, *S. ranieri* (Platnick, 1993). Examination of the holotype and other material identified as *S. ranieri*, as well as the holotype of *S. haydeni*, revealed slight differences from the holotype and other material identified as *S. lineolatus* in the male sex. We have, however, been unable to morphologically distinguish females of the American morph (for which *S. ranieri* was described) from the Siberian morph (for which *S. lineolatus* was described). At present we regard the two morphs as conspecific. Further investigations may well reveal that they differ at the species level. If so, *Icius daisetsuzanus* Saito, 1934 (described from Mt. Daisetsu on Hokkaido in Japan; no material from Japan has hitherto been available to us) may be conspecific with the Siberian morph (see Saito, 1934: pl. 12 fig. 13, pl. 14 fig. 51) and no replacement name required for *S. lineolatus* *sensu* Grube.

DEPOSITORIES

- | | |
|------|---|
| AMNH | American Museum of Natural History, New York, NY, USA (N. I. Platnick) |
| CNBW | Collection of Nationalpark Bayerischer Wald, Grafenau, Germany |
| CNC | Canadian Collection of Insects and Arachnids, Ottawa, Canada (C. D. Dondale) |
| CTh | Collection of K. Thaler, University of Innsbruck, Innsbruck, Austria |
| IBPN | Institute for Biological Problems of the North, Magadan, Russia (Y. M. Marusik) |
| ISEN | Siberian Zoological Museum of the Institute for Systematics and Ecology of Animals, Novosibirsk, Russia (D. V. Logunov) |
| MCZ | Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA (L. Leibenperger) |
| NHMB | Naturhistorisches Museum, Basel, Switzerland (A. Hänggi) |
| NHRS | Swedish Museum of Natural History, Stockholm, Sweden (T. Kronstedt) |
| RBCM | Royal British Columbia Museum, Victoria, B. C., Canada (T. Steigenberger) |
| ZMHU | Zoological Museum of Helsinki University, Helsinki, Finland (J. Terhivuo) |
| ZMUU | Zoological Museum of Uppsala University, Uppsala, Sweden (T. Jaenson) |
| ZMWU | Zoological Museum of Wrocław University, Wrocław, Poland (W. Wesofowska) |
| UWBM | Burke Museum, University of Washington, Seattle, WA, USA (R. Crawford) |

ABBREVIATIONS IN THE TEXT

ALE	=	anterior lateral eyes
AME	=	anterior median eyes
ap	=	apical
d	=	dorsal
Fm	=	femur
I, II, etc.	=	referring to first leg, second leg, etc.
L	=	length
Mt	=	metatarsus
PLE	=	posterior lateral eyes
pr	=	prolateral
Pt	=	patella
rt	=	retrolateral
Tb	=	tibia
Tr	=	tarsus
v	=	ventral

For the leg spination the system adopted is that used by Ono (1988). Measurements are given in millimetres.

Sitticus ranieri Peckham & Peckham, 1909 Figs 1, 2, 4, 5, 8-10, 14, 16, 17, 18-20

Attus lineolatus Grube, 1861: 175 (♂) (name permanently invalid, preoccupied by *Attus lineolatus* Sundevall, 1833, replaced by *Sitticus ranieri* in Platnick, 1993). Holotype from Russia, Yakutia: Vilyuy River in ZMWU, examined. Bonnet 1955: 802.

Sitticus lineolatus; Prószyński, 1971a: 223, figs 37-39 (♂); 1971b: 192, figs 2, 14-21 (♂) 22-30 (♀); Chikuni, 1989: 150, 277, fig. 19 (♂ ♀).

Sittacus ranieri Peckham & Peckham, 1909: 520, pl. 43, fig. 5a-c (♂ ♀) [*Sittacus* is an incorrect subsequent spelling of *Sitticus* Simon, 1901 (ICZN Article 33.3)]. Lectotype examined (see below).

Sitticus ranieri; Roewer, 1954: 1251; Platnick, 1993: 812, 1998: 939, www; Prószyński, www.

Sitticus ranierinus Bonnet, 1958: 4081 [unjustified emendation (ICZN Article 33.2.3)].

Sitticus saxicola (misidentification); Palmgren, 1943: 23, fig. 22 (♂ ♀); Tullgren, 1944: 32, pl. 2 figs 37, 38 (♂ only), 1952: 151, fig. 1 (♀).

Sitticus haydeni Levi & Levi, 1951: 232, figs. 36, 45, 46 (♂). Holotype examined (see below). Roewer, 1954: 1251.

Sitticus mazamae Schenkel, 1951: 45, fig. 45 (♀). Holotype from USA: Oregon, Crater Lake, in NHMB, not examined (figs 24 & 29 in Prószyński, 1971b). Roewer, 1954: 1251.

COMMENTS

To us, Prószyński's (1971a,b) synonymization of *Sitticus ranieri* with *S. lineolatus* sensu Grube is not unambiguously warranted but needs further investigation. When compared with *S. lineolatus* sensu Grube, the male type specimen of *S. ranieri* [examined by Prószyński (1971b) and erroneously called "holotype" instead of lectotype], as well as other males examined by us (listed under American morph below), differ in certain proportions (cf. Figs 1 & 2 and Fig. 24). Moreover, the bulbus in the Siberian morph (*S. lineolatus* sensu Grube) is distally somewhat more tapering and exhibits a more or less pronounced shallow concavity prolaterally (see arrow in inset of Fig. 24). Maybe most significant is the presence of streaks of white hairs, one between the AMEs, continuing a short distance backwards, and one on each side between AME and ALE. These are characteristic in males of the Siberian morph, but absent (or hardly traceable) in the males examined and listed under the American

TABLE I
Differences between *Sitticus ranieri* and *S. saxicola*

	<i>Sitticus ranieri</i>	<i>S. saxicola</i>
Males		
Carapace: details in colour pattern and pilosity of cephalic part	<i>Siberian morph</i> : AMEs surrounded by white hairs, in upper part ("eyebrows") additionally with black hairs; three short longitudinal patches of white hairs at the front: one in the median line between AMEs and one above each ALE (Fig. 16) (the latter may be indistinct) <i>American morph</i> : median longitudinal stripe at the front of carapace absent (Fig. 17).	"Eyebrow" (around upper half of each AME) with numerous white and orange scales close to the eye rim, black hairs outside of them.
Leg I length	Comparatively short (Fig. 14; cf. Fig. 25 for Tb); slight sexual dimorphism [TbIL/TbIVL: ♂♂ (Siberian morph) 0.54-0.60 (N=11), (American morph) 0.55-0.60 (N=10); ♀♀ (from the area inhabited by the Siberian morph) 0.46-0.48 (N=5)]	Comparatively long (Fig. 15; cf. Fig. 25 for Tb); striking sexual dimorphism [TbIL/TbIVL: ♂♂ 0.76-0.84 (N=10); ♀♀ 0.53-0.55 (N=5)]
Palpal segments	Pt, Tb and cymbium dusky brownish and with dark hairs; distal part of blackish brown Fm with patch of white hairs dorso-prolaterally	Pt, Tb and cymbium light brownish; Pt and Tb with whitish hairs (longest laterally on Tb), cymbium with whitish hairs in proximal half, dark ones in distal part
Retrolateral tibial apophysis in ventral view	Evenly curved, sharply pointed: tip directed forwards (Fig. 10)	More or less straight, protruding outwards-forwards at an oblique angle; distalmost part of tip slightly bent towards cymbium and (in lateral view, not shown here) upwards (dorsad) (Fig. 13)
Dorsodistal protrusion of palpal tibia	Slightly convex on prolateral side (<i>arrow</i>), tip rounded (Fig. 8)	Distinctly concave on prolateral side (<i>arrow</i>), tip more set off (Fig. 11)
Females		
Carapace	Face densely furnished with white hairs; without orange hairs	Face with appressed white and orange hairs
Abdomen	Without orange hairs	With scattered orange hairs
Epigyne	Edges of openings to copulatory ducts relatively straight and converging at an acute angle (epigynal atrium V-shaped) (Figs 18 & 19)	Edges of openings to copulatory ducts relatively rounded (epigynal atrium more or less pear-shaped) (Figs 21 & 22)
Spermathecae	Copulatory ducts comparatively long (Fig. 20)	Copulatory ducts comparatively short (Fig. 23)

morph below (cf. Figs 16 & 17). The remark on North American salticids by Crawford (1988: 34) is applicable in this case: "...the potential exists in this family for numerous species with similar genitalia, which differ in color and other sexual display characters."

We could not morphologically distinguish females of the Siberian and American morphs. Further research, including studies of courtship behaviour and DNA, is required to throw further light on the possible distinctness of the two morphs.

DIAGNOSIS. See Table I.

DESCRIPTION

MALE (Siberian morph) (Russia: Chita Area). *Measurements*. Carapace 2.32 long, 1.83 wide, 1.19 high at PLE. Ocular area 1.10 long, 1.38 wide anteriorly and 1.40 posteriorly. Diameter of AME 1.41. Abdomen 2.23 long, 1.83 wide. Cheliceral length 0.68. Clypeal height 0.23. Length of leg segments:

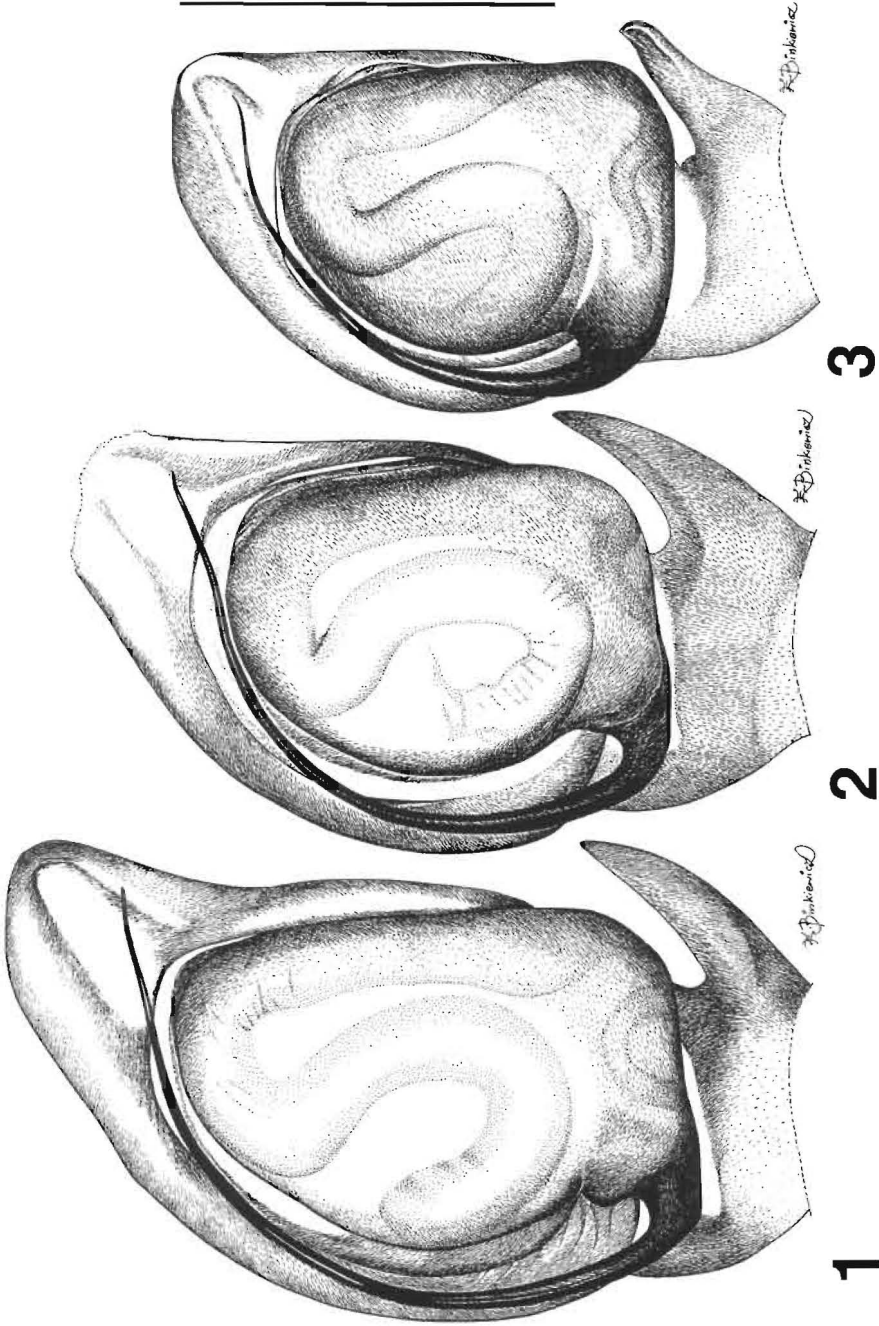
	Fm	Pt	Tb	Mt	Tr	Total
I	1.25	0.68	0.70	0.75	0.48	3.86
II	1.15	0.65	0.60	0.63	0.45	3.48
III	1.18	0.58	0.63	0.75	0.48	3.62
IV	1.88	0.75	1.28	1.18	0.60	5.69

Leg spination. Leg I: Fm d 0-1-1-4; Pt pr and rt 0-1-0; Tb pr 1-2, rt 1-0, v 1-1-2ap; Mt pr and rt 1-1, v 2-2ap. Leg II: Fm d 0-1-1-4; Pt pr and rt 0-1-0; Tb pr 1-1, rt 1-0, v 1-1-2ap; Mt pr and rt 1-1, v 2-2ap. Leg III: Fm d 0-1-1-4; Pt pr and rt 0-1-0; Tb d 1-0, pr and rt 1-1-1, v 1-2ap; Mt pr and rt 1-1-2ap, v 2-2ap. Leg IV: Fm d 0-1-1-5; Pt pr and rt 0-1-0; Tb d 1-1, pr and rt 1-1-1, v 1-0-2ap; Mt d 1-0, pr and rt 1-1-2ap, v 2ap.

Coloration. Carapace dark to blackish brown. Eye field black, with a short median longitudinal stripe of white hairs from between AMEs rearwards and with a more or less distinctly marked elongated spot of white hairs behind each ALE. Spot of white hairs in midline between PLEs. Clypeus medium to blackish brown, with white hairs. Sternum and chelicerae dark brown. Maxillae and labium dark brown, with yellow apices. Abdomen: dorsum dark grey-brown, with a pair of light spots (sometimes poorly marked); sides brownish yellow, with inclined, dark brownish grey lines; venter light to yellowish grey. Book-lung covers and spinnerets grey, with yellowish tinge. All legs yellowish to median brown, with numerous dark to blackish brown stains and rings; coxae lighter (yellowish to brownish grey); leg I: see Fig. 14. Palp medium to blackish brown.

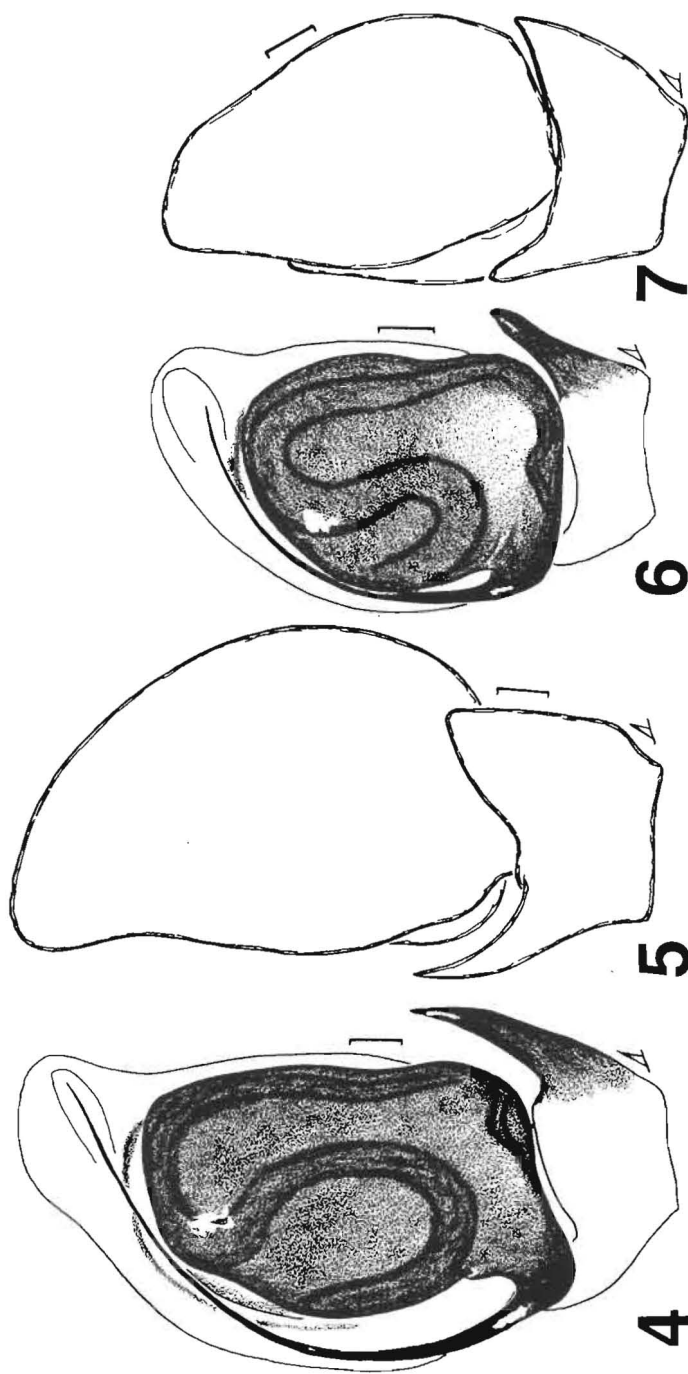
Palp. Structure as in Figs 1, 4, 5, shape of tibia as illustrated in Figs 8-10 (see also Table I).

MALE (American morph) (USA: Washington, Pierce Co., Mt. Rainier Nat. Park). *Measurements*. Carapace 2.20 long, 1.60 wide, 1.13 high at PLE. Ocular area 1.05 long, 1.28 wide anteriorly and 1.30 posteriorly. Diameter of AME 0.38. Abdomen 2.13 long, 1.75 wide. Cheliceral length 0.60. Clypeal height 0.20. Length of leg segments:



Figs 1-3

Left male palp, ventral view. — 1. *Sitticus ranieri* (Siberian morph) (British Columbia: Summit Lake). — 2. *S. ranieri*, lectotype (right palp, mirror image). — 3. *S. saxicola* (Germany: Bavaria). Scale line: 0.5 mm (all same scale).



FIGS 4-7

Left male palp, ventral (4, 6) and dorsal view (5, 7). - 4, 5. *Sitticus ranieri* (Siberian morph) (Russia: the Altai). - 6, 7. *S. saxicola* (Russia: Sakhalin). Scale lines: 0.1 mm.

	Fm	Pt	Tb	Mt	Tr	Total
I	1.15	0.54	0.70	0.60	0.55	3.54
II	1.10	0.58	0.60	0.63	0.45	3.36
III	1.15	0.55	0.60	0.73	0.50	3.53
IV	1.78	0.65	1.33	1.20	0.60	5.56

Leg spination. Leg I: Fm d 0-1-1-4; Pt pr 0-1-0; Tb pr 1-1-1, rt 1-0, v 1-2-2ap; Mt pr 1-1ap, rt 1ap, v 2-2ap. Leg II: Fm d 0-1-1-3; Pt pr and rt 0-1-0; Tb pr 1-1, d and rt 1-0, v 1-1-2ap; Mt pr and rt 1-1ap, v 2-2ap. Leg III: Fm d 0-1-1-5; Pt pr and rt 0-1-0; Tb d 1-1-0, pr and rt 1-1-1, v 2ap; Mt d 1-0, pr and rt 1-2ap, v 2-2ap. Leg IV: Fm d 1-0-1-5; Pt pr and rt 0-1-0; Tb d 0-1-0, pr and rt 1-2-1, v 1-0-2ap; Mt d 0-1-0, pr and rt 1-1ap, v 2-2ap.

Coloration. Carapace medium to dark brown, with black radial veins. Eye field black, covered with black hairs (numerous appressed and, more frontally, scattered long erect ones). Spot of white hairs in midline between PLEs. Clypeus brown, covered with thin light hairs. Sternum, maxillae, labium and chelicerae brown, with light yellow apices. Abdomen: dorsum dark grey-brown, with a pair of rounded white spots in the posterior half; venter greyish to yellowish brown. Book-lung covers yellowish brown. Spinnerets yellowish to greyish brown. All legs yellowish to medium brown, dorsally usually darker (brown); coxae, at least III and IV, light (yellowish). Palp medium to dark brown.

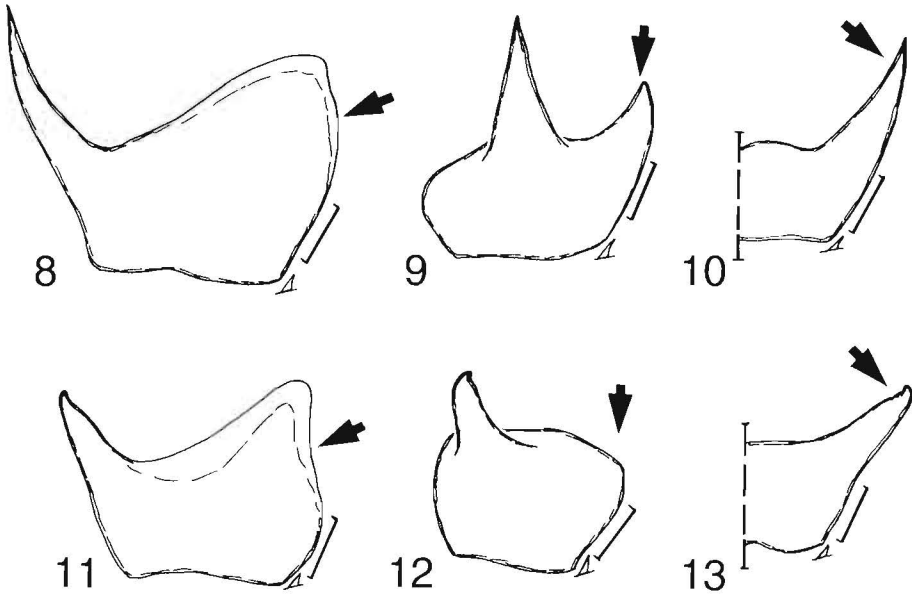
Palp. Structure as in Fig. 2 (see also Table I).

FEMALE (USA: Washington, Pend Oreille Co.). *Measurements.* Carapace 2.52 long, 2.18 wide, 1.40 high at PLE. Ocular area 1.30 long, 1.63 wide anteriorly and 1.63 posteriorly. Diameter of AME 0.45. Abdomen 4.00 long, 3.50 wide. Cheliceral length 0.75. Clypeal height 0.23. Length of leg segments:

	Fm	Pt	Tb	Mt	Tr	Total
I	1.35	0.85	0.75	0.70	0.48	4.13
II	1.28	0.80	0.70	0.65	0.50	3.93
III	1.40	0.63	0.78	0.80	0.60	4.21
IV	2.40	0.95	1.66	1.48	0.65	7.14

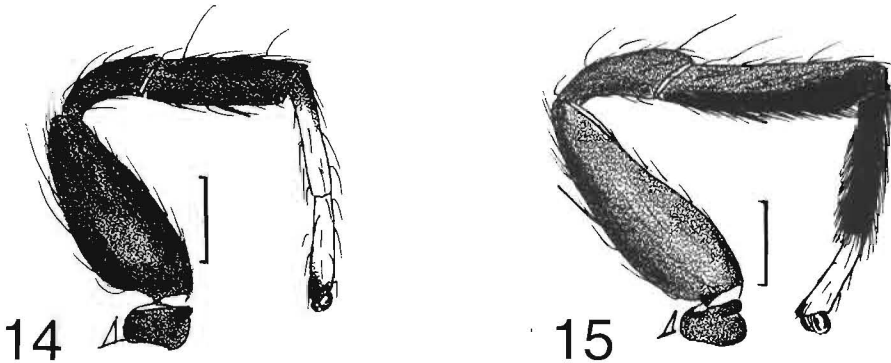
Leg spination. Leg I: Fm d 0-1-1-2; Tb pr 1-1, v 1-2-2ap; Mt pr 1-1ap, v 2-2ap. Leg II: Fm d 0-1-1-4; Tb pr 1-1, v 1-1-2ap; Mt pr 1-1ap, v 2-2ap. Leg III: Fm d 0-1-1-4; Pt pr and rt 0-1-0; Tb pr 1-1-1, rt and v 1-0; Mt pr and rt 1-1-2ap, v 2-2ap. Leg IV: Fm d 1-1-3; Pt pr and rt 0-1-0; Tb d 1-1-0, pr and rt 1-1-1, v 1-0-2ap; Mt pr and rt 1-1-2ap, v 2ap.

Coloration. Carapace brown, with numerous black veins, covered with white appressed hairs. Eye field black, covered with black hairs. Short median stripe of white hairs between PLEs continuing into thin white median line in thoracic part. Clypeus brown, densely covered with white hairs. Maxillae and labium brown, with white apices. Sternum and chelicerae brown. Abdomen: dorsum grey-brown, with one pair of smaller oblique white spots in anterior half followed by one pair of larger oblique white patches at about the middle and by a few light chevron-like markings



FIGS 8-13

Left male palpal tibia, dorsal (8, 11) and retrolateral view (9, 12), tibial apophysis only, ventral view (10, 13). – 8-10. *Sitticus ranieri* (Siberian morph) (Sweden). – 11-13. *S. saxicola* (Italy). Arrows point at differences between the two species. Scale lines: 0.1 mm.



FIGS 14, 15

Right leg I of male, retrolateral view. – 14. *Sitticus ranieri* (Siberian morph) (Sweden). – 15. *S. saxicola* (Italy). Scale lines: 0.5 mm.

posteriorly, all forming a pale median band in some specimens; sides yellowish, with inclined white stripes; venter yellowish. Book-lung covers and spinnerets grey, with a brownish to yellowish tinge. All legs yellow-brown, with pale brownish grey rings; coxae lighter (yellowish). Palp yellow-brown, tarsus somewhat darker.

Epigyne and spermathecae as in Figs 18-20.

16



17

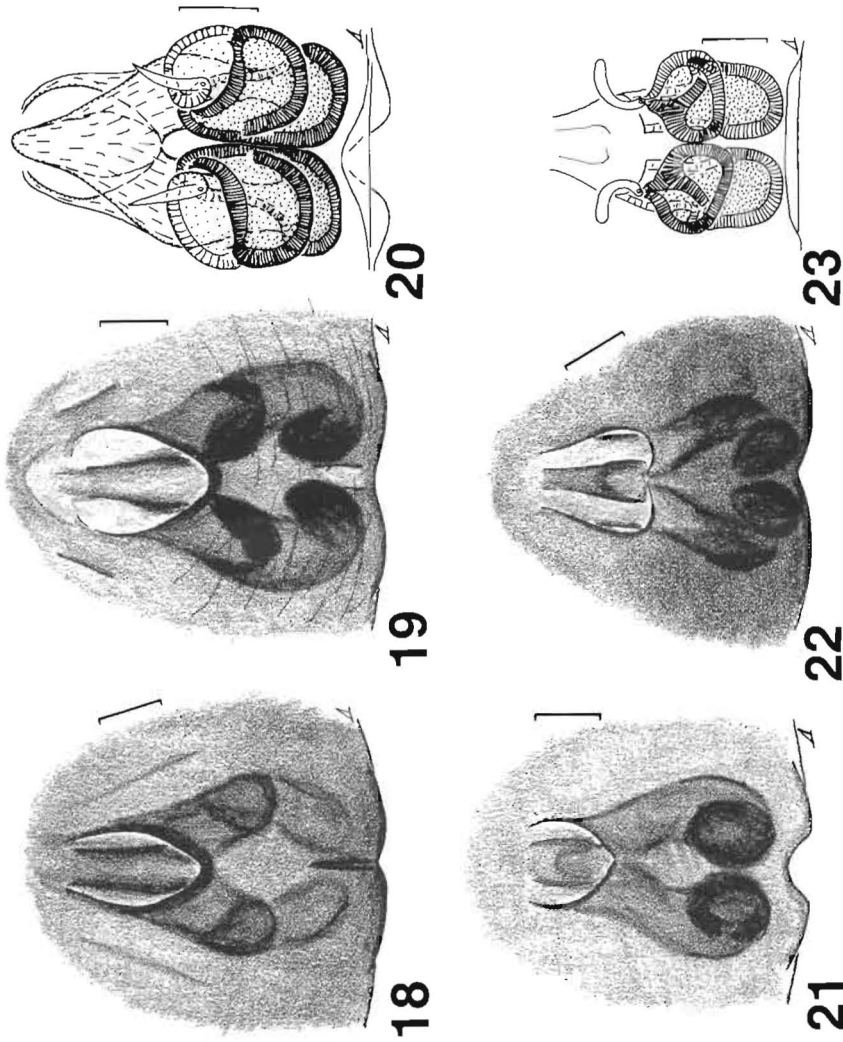


Figs 16, 17

Male of *Sitticus ranieri*, seen from in front. – 16. Siberian morph (Saskatchewan: Black Lake). – 17. American morph (British Columbia: Bridal Lake).

MATERIAL EXAMINED

Siberian morph (corresponding to *S. lineolatus* sensu Grube, 1861). **SWEDEN**. Torne Lappmark: Tuopti, 21 June 1928, 1♂ (Å. Holm, ZMUU); Kårsavagge, 580 m asl, 5-15 July 1976, 2♂ (Å. Holm, ZMUU); Abisko National Park, Mt. Nuolja, 650 m asl, 29 June 1977, 1♀ (Å. Holm, ZMUU); Abisko, SW of Abisko Östra, pitfall traps, 10-17 June 1978, 2♂ 1♀, 24 June-2 July 1978, 2♂ (Å. Holm, ZMUU); Kebnekaise, Aug. 1944, 1♀ (S. Österling, NHRS). – **FINLAND**. Lapponia inarensis: Inari, 1908 (T. Itkonen, ZMHU), 1♂. – **RUSSIA**. Chita Area: Kyra Distr., Sokhondo Reserve, ca. 1700 m asl, mountain moss-lichen bog with *Betula nana*, 11 June 1991, 2♂ (D. V. Logunov, ISEN). Chukotka: Amguema River basin, km 174 on the road Egvekinot-Iultin, 19 June 1989, 8♂ (+2 subad.♂) (Y. M. Marusik, ISEN). Krasnoyarsk Territory: W part of Kryzhyna Mt. Range, ca. 40 km NE of Cheremshanka, 1400-1800 m asl, mountain tundra, 7-12 July 2000 (R. Dudko, ISEN). Magadan Area: Solnechnyi village (environs of Magadan), under stones, 20 June 1987, 1♀ (Y. M. Marusik, ISEN); Upper reaches of Kolyma R., 61°40'N 147°30'E, summer 1987, 2♂ 2♀ (S. Bukhhalo, ISEN); Babushkina Bay (ca. 125 km E of Magadan), summer 1995, 1♂ (K. Regel, IBPN). Murmansk Area: Kola peninsula, 7 km S of Monchegorsk, June-August 1994, 3♂ 1♀ (M. Kozlov, ISEN). Tuva: Tes-Khem Distr., 20 km NW of Khol'-Oozhu village, Kangai-Kyry Mt., ca. 2100 m asl, mountain tundra, 9 July 1989, 1♂ (D. V. Logunov, ISEN). Yakutia: "Wilui" (=Vilyuy River), 1♂ (Maak,



FIGS 18-23

Epigyne, ventral view (18-19, 21-22), and spermathecae, dorsal view (20, 23). - 18-20. *Sitticus ranieri* (18, Russia: Kola peninsula; 19, 20, Russia: Magadan Area). - 21-23. *S. saxicola* (21, Italy; 22, 23, Russia: Sakhalin). Scale lines: 0.1 mm.

ZMWU, holotype of *Attus lineolatus* Grube, 1861). For other material studied by DVL, see Logunov (1992) and Danilov & Logunov (1994). – **CANADA**. British Columbia: Summit Lake, Alaska Highway at mile 392, 17 & 24 June, 1 July 1959, 1♂ 3♀ (R. E. Leech, CNC), 1 mile W Summit Lake, on moss-lichen mountain, 1 June 1981, 1♂ (C. D. Dondale, CNC); border with Alaska, Klondyke Highway, under rocks above treeline, 5 June 1981, 1♂ (C. D. Dondale, CNC). Manitoba: Churchill, 14 July 1949, 1♀ (J. B. Wallis, CNC); Hudson Bay Railway, at mile 256, Spring Lake, 12 July 1917, 1♂ (J. H. Emerton, MCZ). Northwest Territories: Salmita, 15 July 1953, 1♀ (J. G. Chillcott, CNC); 20 miles E Tuktoyaktuk, 3-5 July 1971, 3♂ 1♀ (W. R. M. Mason, CNC). Saskatchewan: Black Lake, summer 1981, 1♂ (T. A. Pearce, CNC). Yukon Territory: Carcross, sand dunes, 4 June 1981, 1♀ (C. D. Dondale, CNC); Dempster Highway at km 132, tundra and stony mountain side, 22 June 1981, 1♀ (C. D. Dondale, CNC). – **USA**. Colorado: Gunnison Co., Elk Mts, Copper Creek Valley, 10,500 ft asl, 2-11 July 1954, 1♂ (H. Levi, MCZ); Gunnison Co., Elk Mts, Copper Lake, 11,100 ft asl, 2 July 1954, 1♂ (H. Levi, MCZ).

American morph (*S. ranieri* sensu Peckham & Peckham, 1909). **CANADA**. British Columbia: Vancouver Is., Forbidden Plateau, 4000 ft., 6-9 August 1950, 1♂ (R. Guppy, AMNH); Bridal Lake 43 km W of Creston, 5900 ft asl, outside of a beehive, 22 July 1990, 1♂ (D. W. Knight, RBCM); Glacier, on logs, 1♂ (G. W. & E. G. Peckham, MCZ, lectotype). – **USA**. Oregon: Wallowa Mts., Dollar Lake, 23 July 1956, 1♂ 1♀ (B. Malkin, AMNH) [material identified by J. Prószyński, the copulatory organ of the female is probably the one depicted in Prószyński (1971: figs 23 & 28), now absent from the vial]. Washington: Clallam Co., Olympic Nat. Park, Eagle Point, 6000 ft. asl, 22 July 1978, 1♂ 1♀ (R. Crawford, UWBM); Pend Oreille Co., Deemer Creek, 4600 ft asl, boggy riparian meadow, pitfall, 11-14 June 1986, 1♀ (R. Crawford, UWBM); Pierce Co., Bearhead Mtn. summit, 6000-6089 ft asl, under rock, 15 Aug. 1982, 1♀ (J. P. Pelham, UWBM), Mt. Rainier Nat. Park, Panorama Point, 6880 ft. asl, pitfall, 5-13 Aug. 1976, 1♂ (D. H. Mann, UWBM). Wyoming: Teton National Park, Holly Lake, above timberline, rocks, 19 July 1950, 2♂ 1♀ (H. Levi, MCZ); Yellowstone National Park, July 1931 (W. J. Gertsch, AMNH, holotype of *S. haydeni*); Yellowstone National Park, Mammoth Hot Springs, 28 July 1950, 1♂ (H. Levi, MCZ).

DISTRIBUTION

Fig. 26

Sitticus ranieri was described from eastern Siberia by Grube (1861, sub *Attus lineolatus*), but it was not until Prószyński (1971a) examined the holotype that its identity became clear. In the meantime the species was described from North America under three different names. The species (sub *S. lineolatus*) has recently become known as being wide-spread in Siberia (cf. records summarized in Logunov & Marusik, 2000). It has also been reported from Japan (Hokkaido) (Chikuni, 1989; Matsuda, 1997) and may be conspecific with the species described under the name *Icius daisetsuzanus* (see Saito, 1934; Matsuda, 1997). With the findings reported here, the known range of *S. ranieri* is extended westwards to northern Fennoscandia, thus making it a Holarctic hypoarcto-boreal element. Its distribution in the Nearctic is restricted to the northern boreal and hypoarctic region of Canada (eastwards to Newfoundland: Dondale *et al.*, 1997) and to montane areas in USA (Washington, Oregon, Wyoming, Colorado). However, as emphasized above, a renewed study on the conspecificity of what is now standing as one species in North America is wanting.

Sitticus saxicola (C. L. Koch)

Figs 3, 6, 7, 11-13, 15, 21-23

Euophrys saxicola C. L. Koch, 1846: 17, pl. 471 figs. 1284, 1285 (♂♀). Type material from Germany: Bavaria, Mt. Stück (=Mt. Stückstein, cf. Fischer, 1993) lost (Prószyński, 1971b).

Attus saxicola; Bösenberg, 1903: 426, 430, pl. 41 figs 631 A-D (♂ ♀).

Sitticus saxicola; Tullgren, 1944: 31, fig. 19a, pl. 2 fig. 36 (♀ only); Bonnet, 1958: 4082; Prószyński, 1971b: 188, figs 1, 3-13 (♂ ♀), 1991: figs 1389.1-4 (♂ ♀), www; Harm, 1973: 394, figs 6, 52, 57, 58, 64 (♂ ♀); Logunov & Wesolowska, 1995: 173, figs 9-16 (♂ ♀); Platnick, 1993: 813, 1998: 939 (in part), www (in part); Fuhn & Gherasim, 1995: 248, figs 114A-F (♂ ♀); *abka, 1997: 95, figs 364-369 (♂ ♀).

Attus cingulatus Simon, 1868: 50 (♂). Holotype from Switzerland: Zermatt, not located.

Sitticus cingulatus; Roewer, 1954: 1244.

Attus montigenus Thorell, 1875: 108 (♂). Bösenberg, 1903: 426, 434, pl. 42 figs 638 A-C (♂). Holotype from Poland or Czech Republic: Riesengebirge, in Naturhistorisches Museum Berlin, not examined (illustrated in Prószyński, 1971b).

Sitticus montigenus; Bonnet, 1958: 4076.

Sitticus littoralis (incorrect synonymy); Roewer, 1954: 1246.

DIAGNOSIS. See Table I.

DESCRIPTION

MALE (Germany: Bavaria). *Measurements*. Carapace 2.32 long, 1.65 wide, 1.10 high at PLE. Ocular area 1.03 long, 1.48 wide anteriorly and 1.34 posteriorly. Diameter of AME 0.38. Abdomen 2.25 long, 1.88 wide. Cheliceral length 0.68. Clypeal height 0.18. Length of leg segments:

	Fm	Pt	Tb	Mt	Tr	Total
I	1.47	0.78	1.00	0.95	0.63	4.83
II	1.16	0.63	0.63	0.68	0.53	3.63
III	1.05	0.49	0.63	0.70	0.48	3.35
IV	1.95	0.69	1.20	1.18	0.65	5.67

Leg spination. Leg I: Fm d 0-1-1-3; Pt pr 0-1-0; Tb pr 1-0, v 1-2-2ap; Mt pr 1-1ap, v 2-2ap. Leg II: Fm d 0-1-1-3; Pt pr 0-1-0; Tb pr 1-1, rt 0-1, v 1-2-2ap; Mt pr 1-1, v 2-2ap. Leg III: Fm d 0-1-1-3; Pt pr and rt 0-1-0; Tb d 1-0, pr and rt 1-1-1, v 1-2ap; Mt pr rt and v 2-2ap. Leg IV: Fm d 1-1-3; Pt pr and rt 0-1-0; Tb 1-1-0, pr and rt 1-1-1, v 1-0-2ap; Mt pr and rt 1-2-2ap, v 2ap.

Coloration. Carapace dark brown, with black veins and narrow band of white hairs along lateral rims. Carapace covered with orange, white and black appressed hairs (especially dense in eye field). Eye field black, with a more or less contrasting black Δ -shaped area between PLEs, intersected by a narrow longitudinal median stripe of white hairs; patch of white hairs at inner side of each PLE. Clypeus brown, poorly covered with recumbent light and erect black hairs. Sternum and chelicerae brown. Maxillae and labium brown, with white apices. Abdomen: dorsum multi-coloured, with a pattern of black, white and orange hairs, in posterior half with a pair of large light patches, sometimes confluent, with white hairs. In front of each patch a black area present, anterior to it a smaller light dot. A pattern of small chevron-like bars posteriad to the large white patches. Sides brownish yellow with inclining dark brown lines; venter brownish yellow. Book-lung covers and spinnerets brownish yellow. All legs light brown, with dark brown stains and rings, but Fm I dark brown dorsally, Tb I and Mt I ventrally black with a well marked black edging, and Tr I

contrastingly light yellowish with numerous white hairs (Fig. 15). Mt I dorsally with a patch of white hairs in each half. Palp yellowish brown, but basal parts of femora dark brown.

Palp. Structure as in Figs 3, 6, 7, shape of tibia as in Figs 11-13 (see also Table I).

FEMALE (Germany: Bavaria). *Measurements.* Carapace 2.68 long, 2.08 wide, 1.35 high at PLE. Ocular area 1.23 long, 1.65 wide anteriorly and 1.60 posteriorly. Diameter of AME 0.48. Abdomen 3.25 long, 2.70 wide. Cheliceral length 0.73. Clypeal height 0.18. Length of leg segments:

	Fm	Pt	Tb	Mt	Tr	Total
I	1.30	0.78	0.80	0.70	0.50	4.08
II	1.28	0.80	0.65	0.65	0.48	3.86
III	1.33	0.70	0.70	0.83	0.50	4.06
IV	2.35	0.98	1.45	1.38	0.65	6.81

Leg spination. Leg I: Fm d 0-1-1-3; Tb pr 1-1, v 1-2-2ap; Mt pr 1-1, v 2-2ap. Leg II: Fm d 0-1-1-3; Pt pr 0-1-0; Tb pr 1-1, v 1-2-2ap; Mt pr 1-1, v 2-2ap. Leg III: Fm d 1-1-3; Pt pr and rt 0-1-0; Tb d 1-0, pr and rt 1-1-1, v 1-2ap; Mt pr and rt 1-1-2ap, v 2ap. Leg IV: Fm d 1-1-3; Pt pr and rt 0-1-0; Tb d 1-0, pr and rt 1-1-1, v 1-2ap; Mt pr and rt 1-1-2ap, v 1-0-2ap.

Coloration as described for the male, but different in the following: carapace posterior to ocular area lighter brown; a pair of whitish spots behind ALEs; leg I coloured as remaining legs (yellowish brownish, with dark brown stains and rings); palp yellow, with brown femora.

Epigyne and spermathecae as in Figs 21-23.

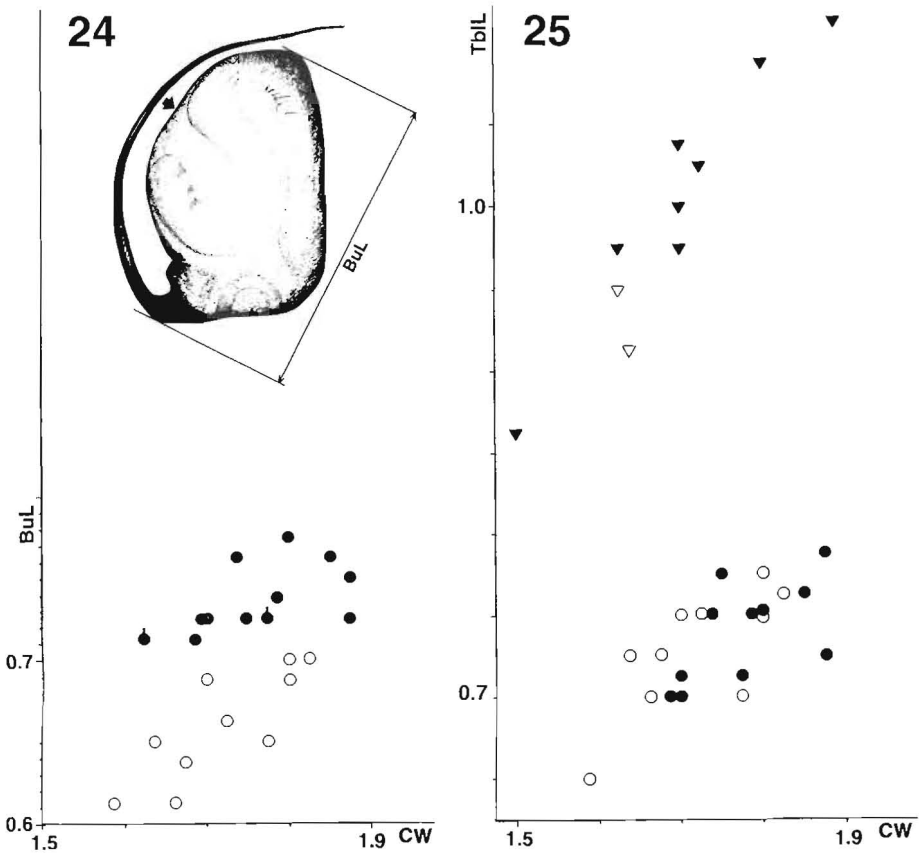
MATERIAL EXAMINED

AUSTRIA. Tyrol: Kaisergebirge, Brentenjoch, 1200 m asl, 10 June 1966, 1 ♀ (K. Thaler, CTh), Kaisertal, 900 m asl, 9 June 1966, 1 ♂ (K. Thaler, CTh). – **ITALY.** Trentino: Bezzecca (nr Lake Garda), Corno, 1500 m asl, 27 May 1963, 1 ♂ 2 ♀ (K. Thaler, CTh). – **SWITZERLAND.** Wallis: Saas-Tal, 1 ♂ (E. Schenkel, NHMB); Fiesch, 2 ♂, 1 ♀ (E. Schenkel, NHMB). – **GERMANY.** Bavaria (Bayern): Bayerischer Wald National Park, 750-1340 m asl, on spruce trunks (mostly dead trees; Weiss 1995) and rocks, 1993-94, 8 ♂ 5 ♀ (I. Weiss, CNBW). – **POLAND.** Tatra, 1 ♂, Galicia, Przemysł, 1 ♀ (Collectio Thorell, NHRS). – **RUSSIA.** Sakhalin: Aniva Distr., Chekhova Peak, ca. 1000 m asl, 1 ♂ (A. M. Basarukin, ISEN); Kholmok Distr., Slepikovskogo Peninsula, 6-9 June 1992, 1 ♂ (A. M. Basarukin, ISEN); Okha Distr., Pil'tun Bay, 6 July 1991, 1 ♀ (A. M. Basarukin, ISEN); Tamarinsk Distr., Lake Ainskoye, Ptichya River, 13 June 1984, 1 ♀ (A. M. Basarukin, ISEN).

DISTRIBUTION

Fig. 26

The occurrence of *Sitticus saxicola* in Europe is so far as known mainly restricted to montane areas in Central Europe (France, Switzerland, Italy, Austria, Germany, Czech Republic, Slovak Republic, Poland, Romania) as well as in Croatia (Risnjak) and Yugoslavia of today (Prószyński, 1971b). The records from Ukraine: Cherkassy Area (Pichka, 1974) and from the European part of Russia: Kursk and Voronezh Areas (Pichka, 1965, 1984) are in need of verification.



FIGS 24, 25

24. Bulbus length (BuL)/carapace width (CW) ratios in males of *Sitticus ranieri* (○ = American morph, ● = Siberian morph; filled circles with bar refer to two males from Colorado). Arrow in inset pointing at concavity in the Siberian morph (cf. text). – 25. Tibia I length (TbIL)/carapace width (CW) ratios in males of *Sitticus saxicola* (▼ = European specimens, ▽ = specimens from Sakhalin) and *S. ranieri* (○ = American morph, ● = Siberian morph).

The species has mostly been found at higher altitudes (from 700 to 2000 m asl). Records from lower altitudes in Europe are few [Poland: Kraków area (Prószyński, 1971b)]. Early records from Germany: Rhineland and Westphalia (Bösenberg, 1903) were not specified to localities but there are areas of higher altitudes (above 700 m asl) in both provinces; a more recent record from the Harz was apparently from a high altitude locality (Harm, 1973). All Hungarian localities mentioned in Chyzer & Kulczyński (1891) are situated in present-day Slovak Republic, Romania (Suligul, Borsec) and Croatia (Risnjak), all of them more or less montane. The records from Yugoslavia (Serbia): Topčider (sub *S. montigenus*) and Kopaonik, both mentioned in Stojičević (1929), are in need of verification. Recent records from Sakhalin (summa-

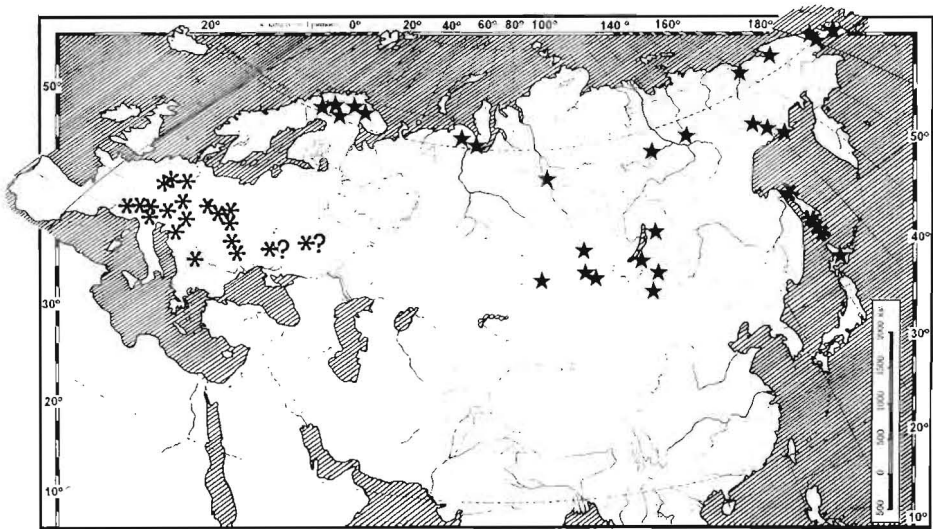


FIG. 26

Distribution of *Sitticus ranieri* (★) and *S. saxicola* (*) in the Palearctic region. *? denote finds of *S. saxicola* in need of verification (cf. text).

rized in Logunov & Marusik, 2000), indicate that *S. saxicola* has a disjunctive, amph-Eurasian subboreal distribution (sensu Gorodkov, 1984; see also Logunov, 1996) (Fig. 26). So far, no morphological differences have been found between Sakhalin and West Palearctic specimens. A recent record from the Altai (Marusik *et al.*, 1996) is erroneous and pertains to *S. ranieri* (already reported under the name *S. lineolatus* by Logunov & Wesółowska, 1995). A record of *S. saxicola* from Russia: Samara area (Krasnobaev & Matveev, 1993) is a misidentification of a female *Sitticus distinguendus* (own observation). A record from Kazakhstan (Ust'-Kamenogorsk) (Savelyeva, 1990) is most probably also erroneous.

ACKNOWLEDGEMENTS

We want to express our gratitude to the following persons for loan of material: Dr. Rodney L. Crawford (UWBM), Dr. Charles D. Dondale (CNC), Dr. Ambros Hänggi (NHMB), Dr. Thomas Jaenson (UUZM), Ms. Laura Leibensperger (MCZ), Dr. Y. M. Marusik (IBPN), Dr. Norman I. Platnick (AMNH), Ms. Tara Steigenberger (RBCM), Dr. Juhani Terhivuo (UZMH), Dr. Ingmar Weiss, St. Oswald, Germany (material collected and identified by him, now in CNBW), and Dr. Wanda Wesółowska (ZMWU). We are indebted to Dr. K. Thaler, Institut für Zoologie und Limnologie der Universität, Innsbruck, Austria, for placing material from his collection at our disposal. We are also obliged to Ms. Elizabeth Binkiewicz (NHRS) for producing a part of the drawings. Dr. Dondale, Dr. Thaler, and Dr. Marek 'abka, Siedlce, Poland are gratefully acknowledged for comments on the manuscript.

REFERENCES

- BONNET, P. 1955, 1958. Bibliographia araneorum. Vol. 2. *Douladoure, Toulouse*, pp. 1-918 (A-B), pp. 3027-4230 (N-S).
- BÖSENBERG, W. 1903. Die Spinnen Deutschlands 5-6. *Zoologica, Stuttgart* 14: 385-465.
- CHIKUNI, Y. 1989. Pictorial Encyclopedia of Spiders in Japan. *Kaisei-sha Publ. Co., Tokyo*, 310 pp. (In Japanese).
- CHYZER, C. & KULCZYŃSKI, W. 1891. Araneae Hungariae. Vol. 1. *Ed. Academiae Scientiarum Hungaricae, Budapest*, 171 pp. + 6 pls.
- CRAWFORD, R. L. 1988. An annotated checklist of the spiders of Washington. *Burke Museum Contributions in Anthropology and Natural History* 5: 1-48.
- DANILOV, S. N. & LOGUNOV, D. V. 1994 (1993). Faunistic review of the jumping spiders of Transbaikalia (Aranei Salticidae). *Arthropoda Selecta* 2(4): 25-39.
- DONDALE, C. D., REDNER, J. H. & MARUSIK, Y. M. 1997. Spiders (Araneae) of the Yukon (pp. 73-113). In: DANKS, H. V. & DOWNES, J. A. (eds). Insects of the Yukon. *Biological Survey of Canada (Terrestrial Arthropods)*, Ottawa, 1034 pp.
- FISCHER, J. 1993. Wiederrunde der Springspinne *Sitticus saxicola* in Bayern (Araneae: Salticidae). *Arachnologische Mitteilungen* 6: 34-35.
- FUHN, I. E. & GHERASIM, V. F. 1995. Fauna României. Arachnida. Vol. 5, fasc. 5. Familia Salticidae. *Editura Academiei Române, Bucuresti*, 301 pp.
- GORODKOV, K. B. 1984. Range types of insects of tundra and forest zones of the European part of the USSR (pp. 3-20). In: GORODKOV, K. B. (ed.). Provisional atlas of the insects of the European part of the USSR. *Nauka, Leningrad*, 60 pp. (In Russian).
- GRANSTRÖM, U. 1979. The spider fauna in the different vegetation types of the Njulla-massive, Abisko National Park, Swedish Lapland. *Fauna norrlandica* 7: 1-6.
- GRUBE, A. E. 1861. Beschreibungen neuer, von den Herren L. v. Schrenck, Maack, C. v. Ditmar u. a. im Amurlande und in Ostsibirien gesammelter Araneiden. *Bulletin de l'Académie impériale des Sciences de St.-Petersbourg* (3) 4: 161-180.
- HACKMAN, W. 1951. Spindlar insamlade av W. Hellén och N. E. Saris i Kilpisjärvi. *Memoranda Societatis pro Fauna et Flora fennica* 27: 65-67.
- HARM, M. 1973. Zur Spinnenfauna Deutschlands, XIV. Revision der Gattung *Sitticus* Simon (Arachnida: Araneae: Salticidae). *Senckenbergiana biologica* 54: 369-403.
- HOLM, Å. 1931. Spindelfaunan inom Abisko Nationalpark. Spindlar - Araneae. *Kungliga svenska Vetenskapsakademiens Skrifter i Naturskyddsärenden* 19: 1-9.
- HOLM, Å. 1950. Studien über die Spinnenfauna des Torneträskgebietes. *Zoologiska Bidrag från Uppsala* 29: 103-213.
- KOCH, C. L. 1846. Die Arachniden. Vol. 14, fasc. 1 & 2: 1-88, pls. 469-480. *J. L. Lotzbeck, Nürnberg*.
- KRASNOBAEV, Y. P. & MATVEEV, V. A. 1993. Catalogue of the spiders of the Middle Povolzhye. *Samarskaya Luka, Samara*, 74 pp. (In Russian).
- LEVI, H. W. & LEVI, L. R. 1951. Report on a collection of spiders and harvestmen from Wyoming and neighboring states. *Zoologica, N.Y.* 36: 219-237.
- LOGUNOV, D. V. 1992. The spider family Salticidae (Araneae) from Tuva. II. An annotated check list of species. *Arthropoda Selecta* 1(2): 47-71.
- LOGUNOV, D. V. 1996. Preliminary report on the Euro-Siberian faunal connections of jumping spiders (Araneae, Salticidae). *Acta zoologica fennica* 201: 71-76.
- LOGUNOV, D. V. & MARUSIK, Y. M. 2000. Catalogue of the jumping spiders of northern Asia (Arachnida, Araneae, Salticidae). *KMK Scientific Press, Moscow*, 299 pp.
- LOGUNOV, D. V. & WESOŁOWSKA, W. 1995. New data on some poorly known Palaearctic species of *Sitticus* (Araneae: Salticidae). *Genus* 6: 163-175.

- MARUSIK, Y. M., ESKOV, K. Y., LOGUNOV, D. V. & BASARUKIN, A. M. 1992. A check-list of spiders (Arachnida Aranei) from Sakhalin and Kurile Islands. *Arthropoda Selecta* 1(4): 73-85.
- MARUSIK, Y. M., HIPPA, H. & KOPONEN, S. 1996. Spiders (Araneae) from the Altai area, Southern Siberia. *Acta zoologica fennica* 201: 11-45.
- MATSUDA, M. 1997. A check-list of the spiders from Hokkaido, Japan. *Bulletin of the Higashi Taisetsu Museum of Natural History* 19: 1-46. (In Japanese with English summary).
- ONO, H. 1988. A revisional study of the spider family Thomisidae (Arachnida, Araneae) of Japan. *National Science Museum, Tokyo*, 252 pp.
- PALMGREN, P. 1943. Die Spinnenfauna Finnlands. II. Pisauridae, Oxyopidae, Salticidae, Clubionidae, Anyphaenidae, Sparassidae, Ctenidae, Drassidae. *Acta zoologica fennica* 36: 1-112.
- PECKHAM, G. W. & PECKHAM, E. G. 1909. Revision of the Attidae of North America. *Transactions of the Wisconsin Academy of Sciences, Arts and Letters* 16: 355-646.
- PICHKA, V. E. 1965. On the ecology of spiders of central forest steppe. *Zoologicheskii Zhurnal* 44: 527-536. (In Russian with English summary).
- PICHKA, V. E. 1974. On the fauna and ecology of spiders of the environs of Kanev Town (forest-steppe of UkrSSR). *Vestnik Zoologii* 6: 23-30. (In Russian with English summary).
- PICHKA, V. E. 1984. On the fauna and ecology of spiders of the Central-Chernozym Reserve (pp. 65-75). In: *Ekologo-faunisticheskie issledovaniya Tsentral'noi Lesostepi Evropeiskoi chasti SSSR. TsNIL Glavokhoty RSFSR, Moscow*. (In Russian).
- PLATNICK, N. I. 1993. Advances in Spider Taxonomy 1988-1991. With Synonymies and Transfers 1940-1980. *New York Entomological Society and American Museum of Natural History, New York*, 846 pp.
- PLATNICK, N. I. 1998 (1997). Advances in Spider Taxonomy 1992-1995. With Redescriptions 1940-1980. *New York Entomological Society and American Museum of Natural History, New York*, 976 pp.
- PLATNICK, N. I. www. The World Spider Catalog. (Salticidae updated Oct. 20, 2000). <http://research.amnh.org/entomology/index.html>
- PRÓSZYŃSKI, J. 1971a. Redescriptions of the A. E. Grube's East Siberian species of Salticidae (Aranei) in the collection of the Wrocław Zoological Museum. *Annales zoologici, Warszawa* 28: 205-226.
- PRÓSZYŃSKI, J. 1971b. Revision of the spider genus *Sitticus* Simon, 1901 (Aranei, Salticidae). II. *Sitticus saxicola* (C. L. Koch, 1848) and related forms. *Annales zoologici, Warszawa* 28: 183-204.
- PRÓSZYŃSKI, J. 1991. Salticidae (pp. 488-523). In: HEIMER, S. & NENTWIG, W. (eds). *Spinnen Mitteleuropas. Paul Parey, Berlin & Hamburg*, 543 pp.
- PRÓSZYŃSKI, J. www. Salticidae (Araneae) of the World. Part II. Catalogue of Salticidae (Araneae) - synthesis of quotations in the world literature since 1940, with basic taxonomic data since 1758. (Version 2000.) <http://spiders.arizona.edu/salticid/main.htm>
- ROEWER, C. F. 1954. Katalog der Araneae von 1758-1940, bzw. 1954. Vol. 2, fasc. b, pp. 927-1751. *Institut royal des Sciences naturelles de Belgique, Bruxelles*.
- SAITO, S. 1934. Spiders from Hokkaido. *Journal of the Faculty of Agriculture, Hokkaido imperial University* 33: 267-362.
- SAVELYEVA, L. G. 1990. Salticids (Araneae, Salticidae) from the Upper Priirtyshie. In: *Okhrana okruzhayushei sredy i prirodopol'zovanie Priirtysh'ya. Tezisy, No. 2:172-174. Ust'-Kamenogorsk*. (In Russian).
- SCHENKEL, E. 1951. Spinnentiere aus dem westlichen Nordamerika, gesammelt von Dr. Hans Schenkel-Rudin. Zweiter Teil. *Verhandlungen der naturforschenden Gesellschaft in Basel* 62: 24-62.
- SIMON, E. 1868. Monographie des espèces européennes de la famille des Attides (Attidae

- Sundewall. - Saltigradae Latreille). *Annales de la Société entomologique de France* (4) 8: 11-72, 529-726.
- STOJICJEVIĆ, D. 1929. Les Araignées de Serbie. *Muzej srpske zemlje* 19: 1-65. (In Serbian, with French title).
- THORILL, T. 1875. Diagnoses Araneorum Europaeorum aliquot novarum. *Tijdschrift voor Entomologie* 18: 81-108.
- TULLGREN, A. 1944. Svensk Spindelfauna 3. Egentliga spindlar. Araneae. Fam. 1-4. Salticidae, Thomisidae, Philodromidae och Eusparrassidae. *Entomologiska föreningen, Stockholm*, 138 pp. + 18 pls.
- TULLGREN, A. 1952. Zur Kenntnis schwedischer Spinnen. I. *Entomologisk Tidskrift* 73: 151-177.
- WEISS, I. 1995. Spinnen und Weberknechte auf Baumstämmen im Nationalpark Bayerischer Wald (pp. 184-192). In: RŮŽIČKA, V. (ed.). Proceedings of the 15th European Colloquium of Arachnology. *Institute of Entomology, České Budějovice*, 240 pp.
- * ABKA, M. 1997. Fauna Polski. Vol. 19. Salticidae. Pająki skaczące (Arachnida: Araneae). *Muzeum i Instytut Zoologii PAN, Warszawa*, 189 pp.