

## The *Thanatus striatus* species group in the eastern Alps, with description of *Thanatus firmetorum* sp. n. (Araneae: Philodromidae)

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### Summary

Three species of the *Thanatus striatus* group occurring in the eastern Alps and their surroundings are illustrated and discussed. Both *T. atratus* Simon and *T. striatus* C. L. Koch exist at the periphery only, up to the colline zone. From the alpine zone a new species is described from both sexes, *T. firmetorum* sp. n. The following new subjective synonyms are proposed: *Thanatus vulgaris brevipes* Kulczyński, 1903 = *T. atratus* Simon, 1875; *T. jugorum saturator* Simon, 1932 = *T. atratus* Simon, 1875; *T. jugorum* Simon, 1916 = *T. striatus* C. L. Koch, 1845.

### Introduction

Since the classical identification works on European philodromid spiders (Simon, 1932; Tullgren, 1944), some major progress has been made in our knowledge of the genus *Thanatus* (see Logunov, 1996, 1997; Lyakhov, 2000; Szita & Samu, 2000). Furthermore, *Thanatus atratus* Simon has been re-elevated to species rank (Kronstedt, 1983), and commented on by Hansen (1995) and Pozzi & Hänggi (1998). Owing to the small amount of differentiation in genital morphology, this genus still presents severe problems concerning species identification and delimitation. We describe here *Thanatus firmetorum* sp. n. from the alpine zone of the eastern Alps, from specimens which hitherto have been reported as *T. striatus* C. L. Koch (by Thaler, 1997; Rief *et al.*, 2001) or as *T. cf. atratus* (by Muster, 2001). The environmental conditions at their localities differ strongly from those in the lowland habitats of *T. striatus*. We therefore compared specimens from the high Alps with non-alpine material, and detected morphological differences in both sexes. Our knowledge of the other species of the *Thanatus striatus* species group (*sensu* Logunov, 1996) which occur around the eastern Alps is also summarised.

### Material and methods

The terminology of genitalia generally follows Schick (1965) and Dondale & Redner (1978), details of which are illustrated in Figs. 1, 4, 14, 15. The reasons for the usage of some terms not used in the recent reviews by Logunov (1996) and Szita & Samu (2000) are as follows. *Male*: Instead of “secondary ventral tibial apophysis” we use ventral tibial apophysis, as no primary ventral apophysis is present (for an opposing view see Dondale

*et al.*, 1964). For the sperm duct the term “receptaculum seminis” is avoided, as this is commonly understood as being the female seminal receptacle (spermatheca, see Braun, 1965). *Female*: In our opinion the term receptaculum is synonymous with “spermatheca” and therefore cannot be used for the glandular heads, which were named by Schick (1965) spermathecal organs. According to Schick (1965) “bursa copulatrix” is the intromittent division of the vulva, mostly developed as a membranous canal. In our opinion, however, this structure includes the duct of the spermathecal organ, leading to the receptaculum, but which is independent of the hardly detectable introductory orifice. For leg spination, the system of Ono (1988) is adopted. All measurements are in mm.

Abbreviations: private collections: CB=T. Blick; CJ=P. Jäger; CM=C. Muster; CTh=K. Thaler and B. Knoflach; museum collections: MNHN=Muséum national d’Histoire naturelle, Paris; NMB=Naturhistorisches Museum Basel; NMW=Naturhistorisches Museum Wien; SMF=Forschungsinstitut Senckenberg, Frankfurt a. M.; SMTD=Staatliches Museum für Tierkunde, Dresden.

### *Thanatus atratus* Simon, 1875 (Figs. 3, 6, 9, 14, 15, 20–23)

*Thanatus atratus* Simon, 1875: 318 (D ♂♀).

*Thanatus vulgaris brevipes* Kulczyński, 1903: 50, pl. 1, fig. 8 (D♂).

#### Syn. n.

*Thanatus jugorum saturator* Simon, 1932: 859 (D ♀). **Syn. n.**

*Material from eastern Alps*: AUSTRIA: Burgenland: Leithagebirge, Hackelsberg, 190 m, 2♂ 1♀ (CTh), 1–14 August 1975, leg. K. Hebar (Hebar, 1980, sub *T. v. brevipes*). Lower Austria: Hainburg, Braunsberg, 346 m, 1♂ (CJ), 1 June 1993, leg. P. Jäger (Jäger, 1995). ITALY: Southern Tyrol: Castelfeder, 400 m, 2♂ 2♀ (CTh), 1988, leg. M.-T. Noflatscher (Noflatscher, 1990, sub *T. vulgaris*). Lombardia: Lake Garda, Rocca di Manerba, c. 100 m, 3♂ 6♀ (CTh), 16 June 1964, leg. K. Thaler.

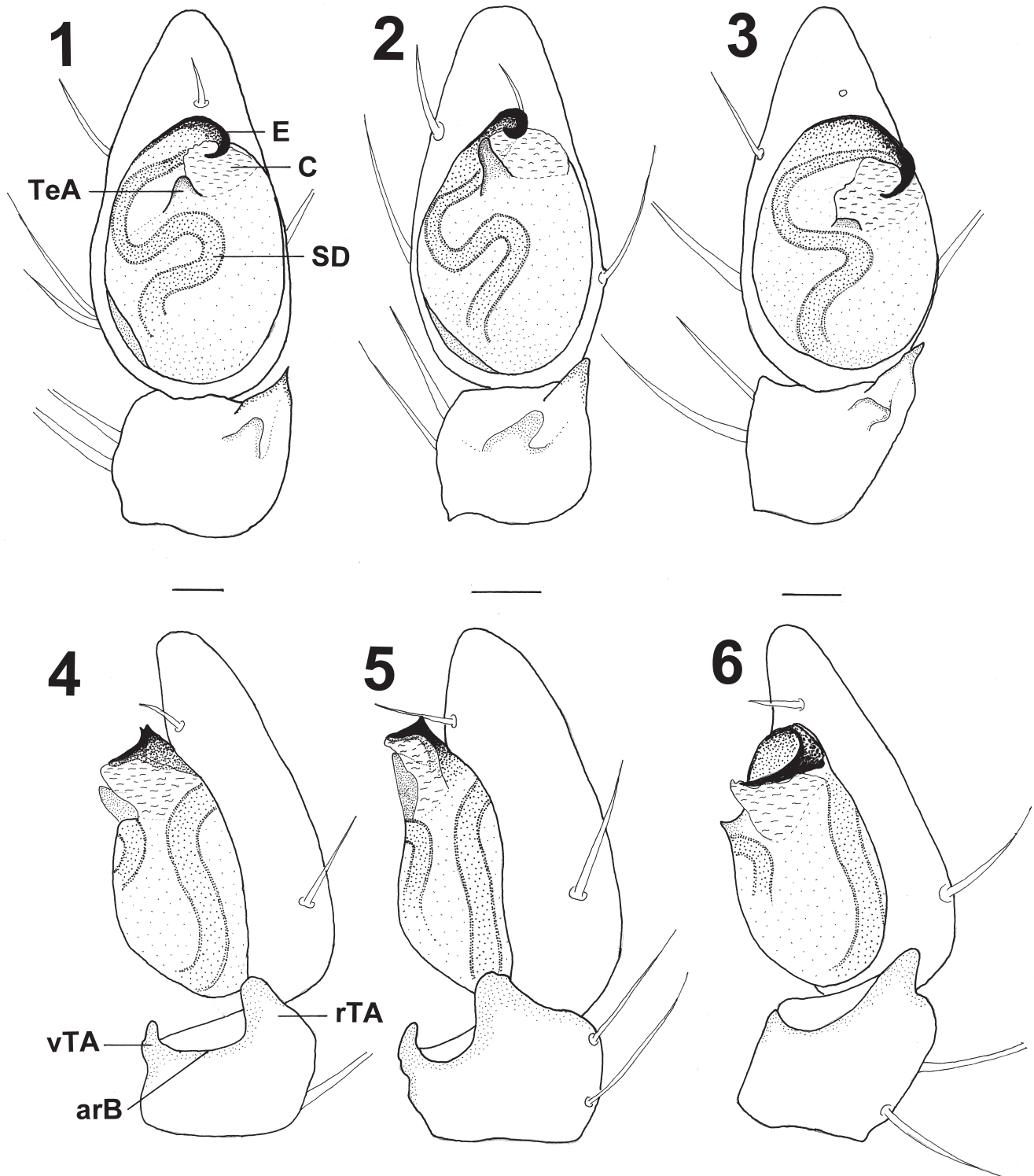
*Other material examined*: FRANCE (MNHN, see Simon, 1932: 885): *Alpes-Maritimes*: Col de S[aint] Martin Ves., 1♀, 14 July 1914 (sub *T. ursus*, no. 24128). *Ardèche*: Bonnefoy, 1♀, 20 July 1913 (sub *T. ursus*, no. 273); Bonnefoy, 3♀, leg. Dalmas (labelled *T. ursus saturator* (!), no. 25657, type series). ITALY: *Emilia-Romagna*: Forli, c. 35 m, 6♂ (CTh), 1992, leg. M. Paoletti & Celano. *Molise*: Matese Campitello, 1200 m, 1♀, 24 September 1990, leg. K. Thaler. *Puglia*: Mt. Gargano, Carpino, c. 200 m, 1♀ (CTh), 16 September 1978, leg. K. Thaler. SWITZERLAND: *Ticino*: Mte. Generoso, 980–1000 m, ♂♂♀♀, 1988–1989, leg. A. Hänggi (S29, S31 in Hänggi, 1992). GERMANY: *Saxony*: Lausitz, Lohsa, 130 m, 1♂ (CB), 16 June–20 July 1999, leg. T. Blick & M.-A. Fritze.

*Description*: Size variation, see Fig. 22. For leg spination see Logunov (1996), Szita & Samu (2000).

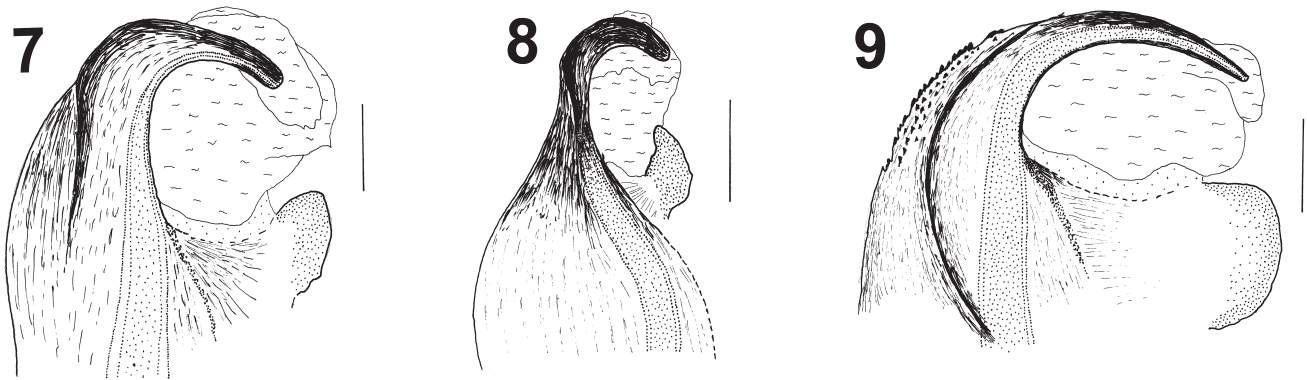
*Male*: *Coloration*: Carapace, sternum, chelicerae and legs variable, yellow to dark brown. Legs usually without spots, femora sometimes darker than distal segments. Pattern of carapace less distinct than in female: with broad median yellow band extending to posterior margin, including a dark line along dorsal groove (Fig. 20), lateral borders lighter, covered with white hairs, clypeus yellow. In the male photographed by Kronstedt (1983) the median band is more distinct and clearly subdivided. Abdomen and spinnerets grey, cardinal mark present. *Palp* (Figs. 3, 6): Tibia with two dorsal spines. Ventral tibial apophysis indistinct,

retrolateral tibial apophysis triangular, anterior retrolateral border of tibia oblique. Sperm duct less strongly curved than in *T. firmetorum* sp. n. and *T. striatus*, tegular apophysis small, arising close to central curve of sperm duct. Embolus (Fig. 9) with comparatively long curved tip, gradually narrowing, its anterior border with sharp keel without sharp step (in contrast to *T. vulgaris*), dorsally with fine granulation. Embolic base gradually merging into tegulum.

*Female: Coloration:* Generally lighter than in male. Carapace with median band strongly developed, extending to eye field, separated by a median stripe; its posterior borders broadly yellow (Fig. 21). *Epigyne and vulva* (Figs. 14, 15): Comparatively broad, maximum width of lateral pockets 0.46, lateral pockets arched, clearly separated from central division and receptacula, epigynal sutures free, central division longer than wide. Receptacula close to each other, with distinct



Figs. 1-6: **1-3** Left male palp, ventral view; **4-6** Ditto, retrolateral view. **1, 4** *Thanatus firmetorum* sp. n. (Bavaria, Soiernspitze); **2, 5** *Thanatus striatus* C. L. Koch, 1845 (Brandenburg, Lütkenwisch); **3, 6** *Thanatus atratus* Simon, 1875 (Southern Tyrol, Castelfeder). Abbreviations: arB=anterior retrolateral border of tibia; C=conductor; E=embolus; rTA=retrolateral tibial apophysis; SD=sperm duct; TeA=tegular apophysis; vTA=ventral tibial apophysis. Scale lines=0.1 mm.



Figs. 7–9: Tip of embolus, prolateral-distal view. **7** *Thanatus firmetorum* sp. n.; **8** *Thanatus striatus* C. L. Koch, 1845; **9** *Thanatus atratus* Simon, 1875 (same localities as Figs. 1–6). Scale lines=0.05 mm.

diagonal seam, duct of spermathecal organ fused to receptaculum, visible from ventral side.

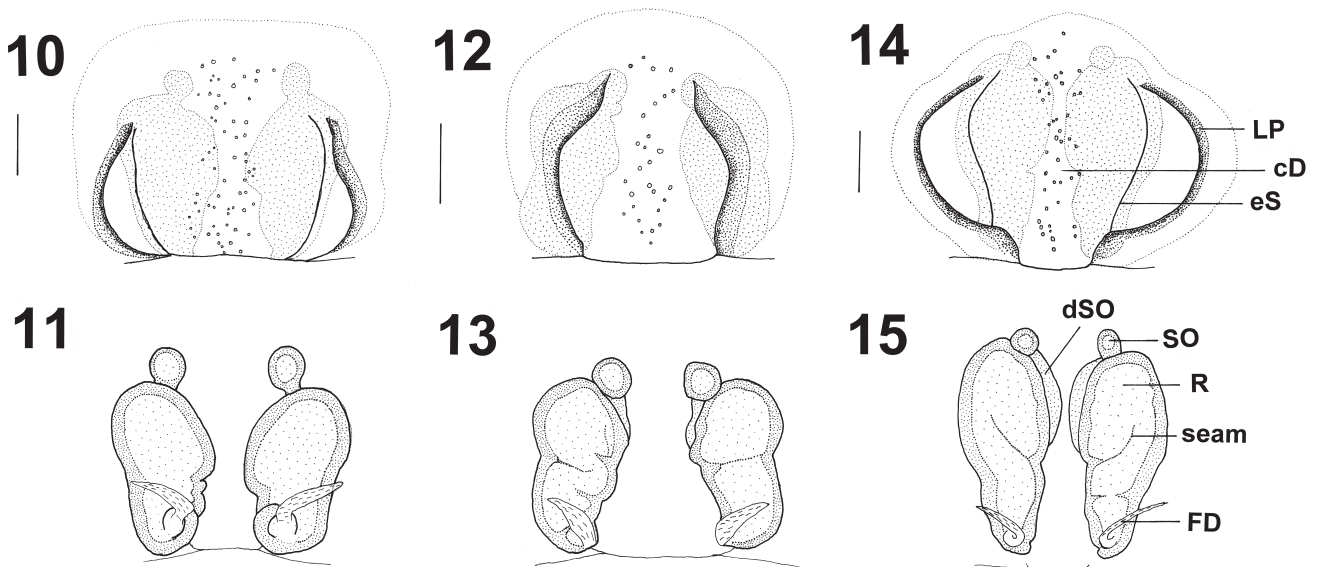
**Synonymy:** This species was revalidated by Kronstedt (1983), when he synonymised it with *T. vulgaris borealis* Tullgren, 1942. It had not been considered by Kulczyński (1903), who described *T. v. brevipes* as new from central Europe (Hungary, Croatia). This subspecies was recently recorded from Venice by Hansen (1995), and discussed in relation to records of *T. atratus* by Pozzi & Hänggi (1998) and Szita & Samu (2000). The examination of specimens from Burgenland, which is near the terra typica of *T. v. brevipes*, and from Switzerland, Italy and Germany revealed no differences. In our opinion, the synonymy of *T. atratus* and *T. vulgaris brevipes* is beyond any doubt. This is corroborated furthermore by the wide distribution of *T. atratus* in Hungary (Szita & Samu, 2000). Also *T. jugorum saturator* Simon, 1932 must be placed as a subjective synonym of *T. atratus* according to the “types” still present at MNHN.

**Distribution and habitat:** Western Palaearctic region between 40° and 60° N, from southern Italy to southern

Sweden, and from France to western Siberia (Logunov, 1996). According to recent captures in Switzerland (Pozzi & Hänggi, 1988), Austria (Malicky, 1972a,b; Hebar, 1980; Jäger, 1995; Priester *et al.*, 1998; Riedl, 2000) and Italy (Noflatscher, 1990; Hansen, 1995), it occurs in central Europe in the colline zone, in xerothermic open habitats (Hänggi *et al.*, 1995, sub *T. vulgaris*). Most records come from the eastern and southern periphery of the Alps, Lower Austria, Burgenland, Venice and Lake Garda (Fig. 23). Only one locality is known from the Alps, Castelfeder near Bozen/Bolzano (Southern Tyrol), which apparently was reached along the valley of the river Etsch/Adige. Habitat preferences may be different in the western Alps and in the Pyrenees, where it lives “dans les prairies élevées” (Simon, 1932: 887).

***Thanatus firmetorum* sp. n.** (Figs. 1, 4, 7, 10, 11, 16, 17, 22, 23)

*Thanatus striatus*: Wiehle & Franz, 1954: 538 (not seen, presumably misidentification, SMF?).



Figs. 10–15: **10–11** *Thanatus firmetorum* sp. n. (Southern Tyrol, Piz Lat). **10** Epigyne; **11** Vulva, ventral view. **12–13** *Thanatus striatus* C. L. Koch, 1845 (Brandenburg, Lütkenwisch), **12** Epigyne; **13** Vulva, ventral view. **14–15** *Thanatus atratus* Simon, 1875 (Burgenland, Hackelsburg), **14** Epigyne; **15** Vulva, ventral view. Abbreviations: cD=central division; dSO=duct of spermathecal organ; eS=epigynal suture; FD=fertilisation duct; LP=lateral pocket; r=receptaculum; SO=spermathecal organ. Scale lines=0.1 mm.



*Thanatus* sp.: Thaler, 1988: 238.

*Thanatus striatus*: Thaler, 1997: 252–253 (misidentification).

*Thanatus striatus*: Thaler & Knoflach, 1997: 160, 162–163 (misidentification).

*Thanatus* cf. *atratus*: Muster, 2001: 42, 97, 100, 183 (misidentification).

*Thanatus striatus*: Rief *et al.*, 2001: 159, 165, 173 (misidentification).

*Type material*: Holotype ♂, GERMANY, Bavaria, Karwendel, Soiernspitze, 2160 m (SMTD), 20 May–27 June 1998, leg. C. Muster (Muster, 2001, sub *T.* cf. *atratus*).

*Paratypes*: 2♂ together with holotype (CM). AUSTRIA: Northern Tyrol: Innsbruck, Nordkette, 1960 m, 1♀ (NMW), 5–26 August 1997, leg. A. Rief (Rief *et al.*, 2001, sub *T. striatus*). ITALY: Southern Tyrol: Sesvenna Mts., Piz Lat, 2800 m, 1♂ 2♀ (CTh), 13 July 1996, leg. B. & K. Thaler; Ortler Mts., Mt. Scorluzzo, 3090 m, 1♀ (NMB), 17 July 1987, leg. K. Thaler (Thaler, 1988, sub *T.* sp.).

*Further records from eastern Alps*: AUSTRIA: Northern Tyrol: Lechtal Alps, Loreakopf, 2470 m, 1 subad. ♀ (CTh), 10 August 1996, leg. K. Thaler (Thaler & Knoflach, 1997, sub *T. striatus*). Styria: Triebener Tauern, high alpine zone between Ringkogel (2277 m) and Pletzen (2342 m), 1♀ (not seen, presumably SMF), 23 July 1948 (Wiehle & Franz, 1954: 538).

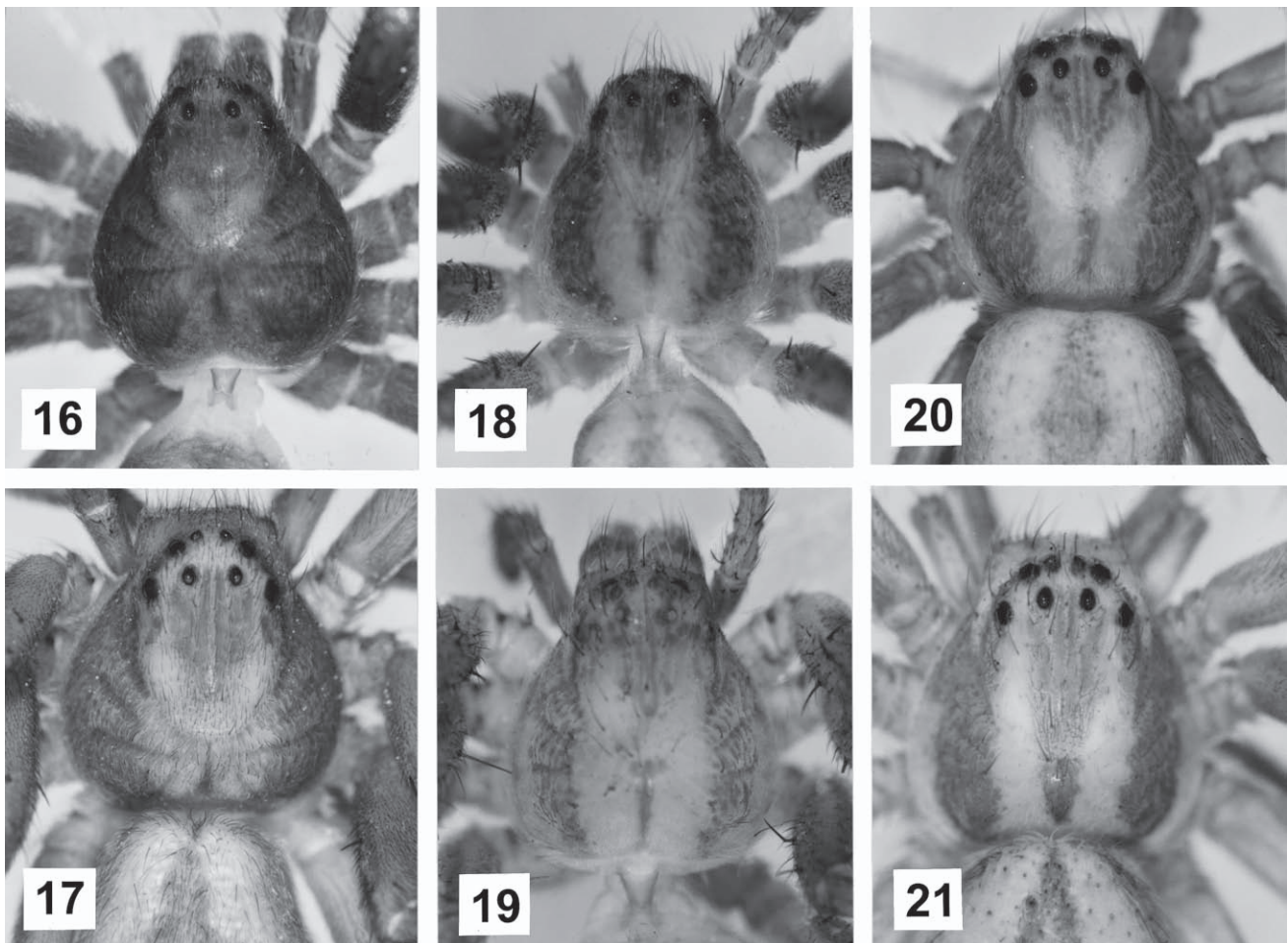
*Specific identity uncertain*: ITALY: Trentino: Mt. Tremalzo, 1700 m, 1♂ (CTh), 14 June 1964, leg. K. Thaler.

*Etymology*: The specific epithet is derived from “Firmetum”, which refers to the dominant plant community (Caricetum firmae) at the collecting sites of the species.

*Diagnosis*: *Thanatus firmetorum* sp. n. differs from other members of the *striatus* group by its large size and

by the combination of male and female genital characters: epigyne resembling *T. atratus*, tibial apophyses like *T. striatus*, tegular apophysis hump-shaped, embolus distinctive (see also “Affinities”).

*Description*: *Male*: *Coloration*: Prosoma dark brown without median and lateral bands, sometimes with central heart-shaped yellowish spot, white hairs at carapace edges inconspicuous (Fig. 16). All legs uniform brown, without spots. Sternum brown. Chelicerae yellow-brown. Labium and maxillae proximally brown, distally pale. Abdomen grey, dorsally with cardinal mark. Spinnerets yellowish grey. *Measurements* ( $n=4$ ): Prosoma length 2.40–2.70, width 2.15–2.40; opisthosoma length 2.75–3.00; cymbium length 0.80–0.82. Leg segments in Table 1. *Leg spination* (holotype): Femur I d 0-0-1-1, II–IV d 0-1-1-1, I–IV pl and rl 0-0-0-1-1-1; patella III–IV rl 1-0; tibia I–IV pl and rl 1-1-1, v 2-2-2 ap, III–IV d 0-0-1; metatarsus I–IV v 2-2-0, III rl 1-0-0, IV pl and rl 1-1-0. *Palp* (Figs. 1, 4): Tibia with single dorsal spine. Ventral and retrolateral tibial apophyses well developed, anterior retrolateral border of tibia broadly U-shaped. Tegular apophysis small, hump-shaped. Sperm duct strongly S-curved, abruptly narrowing near embolic tip. Embolus (Fig. 7) massive, gradually narrowing towards its tip, with pronounced dorsal keel, at its base gradually merging into tegulum.



Figs. 16–21: Colour pattern of carapace. **16–17** *Thanatus firmetorum* sp. n. **16** Male (Bavaria, Soiernspitze); **17** Female (Southern Tyrol, Piz Lat). **18–19** *Thanatus striatus* C. L. Koch, 1845. **18** Male; **19** Female (both from Brandenburg, Lütkenwisch). **20–21** *Thanatus atratus* Simon, 1875. **20** Male; **21** Female (both from Southern Tyrol, Castelfeder).

Male	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	2.10–2.30	0.90–1.00	1.60–1.85	1.45–1.60	0.95–1.20	7.05–7.90
II	2.45–2.60	1.00–1.10	1.95–2.20	1.70–1.90	1.10–1.25	8.35–8.95
III	2.30–2.55	0.90–1.05	1.75–2.00	1.55–1.75	1.05–1.15	7.60–8.45
IV	2.50–2.70	0.90–1.05	1.95–2.20	1.85–2.10	1.15–1.25	8.40–9.25
Female	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	2.35–2.50	1.05–1.20	1.75–1.90	1.45–1.70	1.10–1.30	7.80–8.60
II	2.75–3.00	1.15–1.20	2.10–2.35	1.75–2.10	1.20–1.40	8.85–10.05
III	2.55–2.90	1.10–1.20	1.75–2.00	1.65–1.80	1.10–1.30	8.15–9.30
IV	2.60–2.90	1.05–1.20	2.00–2.40	1.90–2.20	1.15–1.40	8.75–10.00

Table 1: *Thanatus firmetorum* sp. n. Leg segment lengths of male ( $n=4$ ) and female ( $n=4$ ).

*Female: Coloration* (Fig. 17): As in male, legs sometimes with black spots, femora dorsally with two converging yellow stripes, distal segments usually lighter. *Measurements* ( $n=4$ ): Prosoma length 2.90–3.10, width 2.65–2.85; opisthosoma length 3.90–4.40. Leg segments in Table 1. *Leg spination* (♀ from Piz Lat): Femur I–IV d 0-0-1-1, I pl 0-0-0-1-1-1, II–IV pl 0-0-0-0-0-1, I–IV rl 0-0-0-0-0-1; patella IV rl 1-0; tibia I–II pl 0-0-1, III pl 0-1-1, IV pl 1-1-1, I–III rl 0-0-1, IV rl 1-1-1, I–IV v 2-2-2 ap; metatarsus I–IV v 2-2-0, III pl and rl 0-0-1, IV pl 1-1-1, rl 1-1-0. *Epigyne and vulva* (Figs. 10, 11): Comparatively broad, maximum width of lateral pockets 0.41. Lateral pockets arched, their lateral borders not evenly convex, as in *T. atratus* clearly separated from central division and receptacula, but central division wider than long. Distance between receptacula  $\frac{1}{4}$  of their diameter, receptacula apparently without transverse seams, ducts of spermathecal organs not visible from ventral side, posterior end of receptaculum strongly bent dorsally.

*Remarks:* The identity of the single male from Mt. Tremalzo, a glacial refuge on the southern margin of the Alps, is uncertain. This specimen resembles *T. striatus* in some characters: dimensions (Fig. 22, prosoma length 1.85, width 1.70, opisthosoma length 2.05, cymbium length 0.60), lighter carapace coloration, long tegular apophysis. The embolus, however, is similar to *T.*

*firmetorum*. We therefore assign this specimen provisionally to *T. firmetorum*. Further specimens, especially females, are required to clarify the status of this population.

*Affinities:* Based on the characters of both sexes, *T. firmetorum* sp. n. must be included in the *striatus* species group, as defined by Logunov (1996). The new species seems closely related to *T. striatus*. Specimens from the northern and central Alps are easily distinguished from *T. striatus* by their larger size (Fig. 22), darker coloration (Figs. 16, 17 vs. 18, 19) and genital morphology. Females differ conspicuously by the wide distance between the epigynal sutures and the lateral pockets, while males differ in the shape of the tegular apophysis and embolus. Additionally, both taxa are clearly separated in their ecology. *Thanatus striatus* lives in grasslands at low altitudes, while *T. firmetorum* sp. n. occurs in cushion habitats in the alpine zone. Other similar species are *T. lanatus* Logunov, 1996 from the Far East and *T. dahurianus* Logunov, 1997 from Transbaikalia. Compared with the figures provided by Logunov (1996, 1997), the epigynes seem hardly distinguishable, but the palps differ in the shape of the retrolateral tibial apophysis, the tegular apophysis and the embolus. *Thanatus dahurianus* differs furthermore in its smaller carapace (width ♂ 1.20, ♀ 1.53), and in its yellow leg coloration. The new species *T. firmetorum* can easily be distinguished from its congeners in the *striatus* group listed by Logunov (loc. cit.), by the shape of the tibial apophyses and the embolus. Two other taxa described by Simon (1875, 1916) from the Alps and Pyrenees, respectively, must also be considered. *Thanatus ursus* Simon, 1875 was described from one male from Basses-Alpes (Failllefeu) “dans une prairie à 2000 m”, and *T. jugorum* Simon, 1916 from Mt. Canigou “à de grandes altitudes” (Pyrénées-Orientales, females only), and later rediscovered in Spain (Simon, 1932). *Thanatus ursus* differs from *T. firmetorum* sp. n. by its smaller size (carapace width 1.7, length leg I 6.0, leg IV 5.4), and was considered a synonym of *T. striatus* by Simon (1932: 885). The only male (probable holotype) which was traced in MNHN fully corroborates this decision.

*Distribution and habitat:* From the evidence presented, *T. firmetorum* sp. n. should be considered as an endemic species of the Alps. It is known only from a few sites in the northern Calcareous Alps and the central Alps (Fig. 23), whereas it is absent in the Ötztal Alps. An

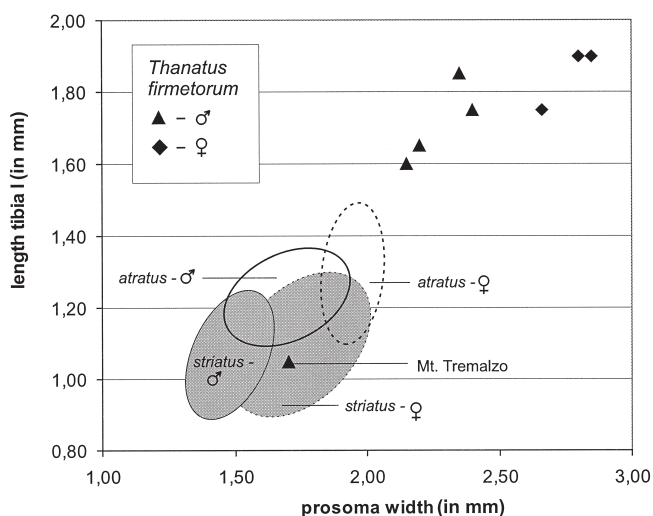


Fig. 22: Scatter diagram, showing size differences between *T. striatus*, *T. atratus* (data from Szita & Samu, 2000) and *T. firmetorum* sp. n.



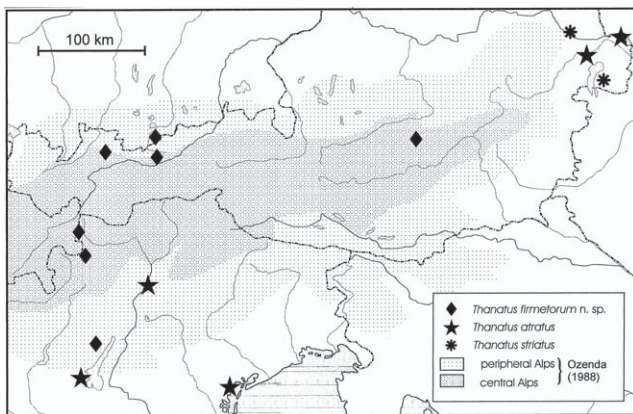


Fig. 23: Distribution of *T. atratus*, *T. firmetorum* sp. n. and *T. striatus* in the eastern Alps and surroundings.

isolated record in Styria suggests a wide distribution in limestone regions. Its presence in the southern Alps should be confirmed. The new species was collected in scree and cushion habitats above the timberline between 2000 and 3000 m. Hypotheses about details of its glacial survival must be postponed until more data on its present distribution become available.

***Thanatus striatus* C. L. Koch, 1845** (Figs. 2, 5, 8, 12, 13, 18, 19, 22, 23)

*Thanatus striatus* C. L. Koch, 1845: 92, fig. 1022 (D ♀).

*Thanatus ursus* Simon, 1875: 319 (D ♂).

*Thanatus striatus*: Simon, 1932: 858, figs. 1308–1309 (♂♀), 885 (syn. *T. ursus*).

*Thanatus jugorum* Simon, 1916: 210 (D ♀). **Syn. n.**

*Thanatus jugorum*: Simon, 1932: 859, fig. 1310 (♀).

**Material from eastern Alps:** AUSTRIA: Lower Austria/Vienna: Lobau, 160 m, 1♀ (CTh), 16–30 June 1972, leg. H. M. Steiner.

**Other material examined:** FRANCE (MNHN, see Simon, 1932: 885): “Alps”, 1♂ (sub *T. ursus*, no. 670, presumably type specimen, as this is the only male present; right palp present in microvial, left palp missing), 2♀ (sub *T. ursus*, no. 11904). *Pyrénées-Orientales*: Canigou, 2♀ (labelled “*T. ursus*, type *T. jugorum*”, no. 4751—therefore probably type specimens). GERMANY: *Brandenburg*: Gandow, Lütkenwisch, 17 m, 2♂ 1♀ (CM), 10 April–19 June 1997, leg. J. Kaprolat & S. Müller. *Saxony*: Lausitz, Lohsa, 130 m, 1♂ (CB), 17 May–16 June 1999, leg. T. Blick & M.-A. Fritze. CZECH REPUBLIC: *Bohemia*: Novobystricka Highland, Senotin, 645 m, 1♂ (CJ), 13–28 May 1994, leg. O. Syrovatka.

**Description:** Size variation, see Fig. 22. For leg spination see Logunov (1996), Szita & Samu (2000).

**Male: Coloration:** Carapace, sternum, chelicerae and legs yellow to brown, distal segments of legs lighter, without spots. Carapace with light median band, its posterior borders yellow (Fig. 18). Abdomen grey, with pale cardiac mark and dark lateral stripes. **Palp** (Figs. 2, 5): Tibia with two to several dorsal spines. Ventral and retrolateral tibial apophyses well developed, anterior retrolateral border of tibia narrowly U-shaped. Sperm duct strongly S-curved, its distal part hardly visible. Tegular apophysis thin and pointed, nearly touching apical margin of embolus. Embolus (Fig. 8) basally clearly distinct from tegulum, bottle-shaped with distinct neck, apical keel short and weak, its tip twisted.

**Female: Coloration:** Usually paler than in male, distinct by presence of numerous spots on legs and

sternum, opisthosomal pattern typically consisting of cardiac mark and two pairs of dark longitudinal stripes. *Epigyne and vulva* (Figs. 12, 13): Maximum width of lateral pockets 0.21, lateral pockets situated above receptacula (from ventral side), masking epigynal sutures. Receptacula separated by half their diameter, seams transverse, duct of spermathecal organ fused to receptaculum, visible from ventral side.

**Affinities, synonymy:** see *T. firmetorum* sp. n. The specimens still available at MNHN, which probably are types, fully corroborate the synonymy *T. ursus*=*T. striatus*, which was indicated by Simon (1932). Also *T. jugorum* must be accepted as a new synonym of *T. striatus*—this had already been indicated on the label accompanying the specimens (from the hand of De Dalmas?).

**Distribution and habitat:** Holarctic region between 40° and 70°N, reaching the arctic circle (Dondale & Redner, 1978; Logunov, 1996). In central Europe in wet and mesophilic meadows in lowlands and in coastal habitats (Hänggi *et al.*, 1995). In Austria *T. striatus* is known only from the eastern plains, from Vienna and from Lake Neusiedl (Zulka *et al.*, 1997; Zulka & Milasowszky, 1998; Fig. 23). The few records from high mountain localities in the eastern Alps refer to *T. firmetorum* sp. n. In the Pyrenees, however, *T. striatus* is present also in alpine grassland (Simon, 1932; see also Bosmans & De Keer, 1985: 48), according to the synonymy *T. jugorum*=*T. striatus*. Therefore the male reported by Denis (1957) as *T. jugorum* may also belong to *T. striatus*, although it is impossible to be sure from his drawing.

## Discussion

Many European *Thanatus* species occupy a wide geographical range. This holds true for *T. striatus*, which is distributed across the Holarctic lowlands, and shows remarkably little variation in genital morphology between Europe (Szita & Samu, 2000), central Asia (Logunov, 1996) and North America (Dondale & Redner, 1978). However, two closely related species were recognised recently from montane regions of northern Asia, *T. lanatus* Logunov, 1996 from the Far East and *T. dahurianus* Logunov, 1997 from Transbaikalia. Similarly, in the eastern Alps there exists an alpine species closely related to *T. striatus*: *T. firmetorum* sp. n. This may represent an evolutionary lineage, which speciated in peripheral isolation in this main European mountain system.

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## References

- BOSMANS, R. & DE KEER, R. 1985: Catalogue des Araignées des Pyrénées. Espèces citées, nouvelles récoltes, bibliographie. *Docums Trav. Inst. r. Sci. nat. Belg.* **23**: 1–68.
- BRAUN, R. 1965: Beitrag zu einer Revision der paläarktischen Arten der *Philodromus aureolus*-Gruppe (Arach., Araneae). I. Morphologisch-systematischer Teil. *Senckenberg. biol.* **46**: 369–428.
- DENIS, J. 1957: Araignées du Massif calcaire des Eaux-Bonnes (Basses Pyrénées). *Bull. Soc. Hist. nat. Toulouse* **92**: 245–258.
- DONDALE, C. D., TURNBULL, A. L. & REDNER, J. H. 1964: Revision of the Nearctic species of *Thanatus* C. L. Koch (Araneae: Thomisidae). *Can. Ent.* **96**: 636–656.
- DONDALE, C. D. & REDNER, J. H. 1978: The insects and arachnids of Canada, Part 5. The crab spiders of Canada and Alaska. Araneae: Philodromidae and Thomisidae. *Research Branch, Agriculture Canada, Publ.* **1663**: 1–255.
- HÄNGGI, A. 1992: Spinnenfänge in Magerwiesen und Brachen aus dem Tessin Unkommentierte Artenlisten. *Arachnol. Mitt.* **4**: 59–78.
- HÄNGGI, A., STÖCKLI, E. & NENTWIG, W. 1995: Lebensräume mitteleuropäischer Spinnen. *Miscnea faun. helv.* **4**: 1–459.
- HANSEN, H. 1995: Über die Arachniden-Fauna von urbanen Lebensräumen in Venedig—III. Die epigäische Spinnen eines Stadtparkes (Arachnida: Araneae). *Boll. Mus. civ. Stor. nat. Venezia* **44**: 7–36.
- HEBAR, K. 1980: Zur Faunistik, Populationsdynamik und Produktionsbiologie der Spinnen (Araneae) des Hackelsberges im Leithagebirge (Burgenland). *Sber. öst. Akad. Wiss. (I)* **189**: 83–231.
- JÄGER, P. 1995: Spinnenaufsammlungen aus Ostösterreich mit vier Erstnachweisen für Österreich. *Arachnol. Mitt.* **9**: 12–25.
- KRONSTEDT, T. 1983: Spindlar på Ölands Stora alvar. *Ent. Tidskr.* **104**: 183–212.
- KULCZYŃSKI, L. 1903: Aranearum et Opilionum species in insula Creta a comite Dre Carolo Attems collectae. *Bull. int. Acad. Sci. Lett. Cracovie* **1903**: 32–58.
- LOGUNOV, D. V. 1996: A critical review of the spider genera *Apollophanes* O. P.-Cambridge, 1898 and *Thanatus* C. L. Koch, 1837 in North Asia (Araneae, Philodromidae). *Revue arachnol.* **11**: 133–202.
- LOGUNOV, D. V. 1997: Taxonomic notes on some Central Asian philodromid species (Aranei Philodromidae). *Arthropoda Selecta* **6**: 99–104.
- LYAKHOV, O. V. 2000: Contribution to the Middle Asian fauna of the spider genus *Thanatus* C. L. Koch, 1837 (Aranei: Philodromidae). *Arthropoda Selecta* **8**: 221–230.
- MALICKY, H. 1972a: Spinnenfunde aus dem Burgenland und aus Niederösterreich (Araneae). *Wiss. Arb. Burgenld* **48**: 101–108.
- MALICKY, H. 1972b: Vergleichende Barberfallenuntersuchungen auf den Apetloner Hutweiden (Burgenland) und im Wiener Neustädter Steinfeld (Niederösterreich): Spinnen (Araneae). *Wiss. Arb. Burgenld* **48**: 109–123.
- MUSTER, C. 2001: Biogeographie von Spinnentieren der mittleren Nordalpen (Arachnida: Araneae, Opiliones, Pseudoscorpiones). *Verh. naturw. Ver. Hamb. (NF)* **39**: 5–196.
- NOFLATSCHER, M.-T. 1990: Zweiter Beitrag zur Spinnenfauna Südtirols: Epigäische Spinnen an Xerothermstandorten bei Säben, Gunttschna und Castelfeder (Arachnida: Aranei). *Ber. naturw.-med. Ver. Innsbruck* **77**: 63–75.
- ONO, H. 1988: *A revisional study of the spider family Thomisidae (Arachnida: Araneae) of Japan*. Tokyo, Natural Science Museum.
- OZENDA, P. 1988: *Die Vegetation der Alpen im europäischen Gebirgsraum*. Stuttgart, Fischer.
- POZZI, S. & HÄNGGI, A. 1998: Araignées nouvelles ou peu connues de la Suisse (Arachnida: Araneae). *Mitt. schweiz. ent. Ges.* **71**: 33–47.
- PRIESTER, A., STEINBERGER, K.-H. & WAITZBAUER, W. 1998: Zur epigäischen Spinnenfauna eines Xerothermstandortes am Hainburger Schlossberg (Niederösterreich) (Arachnida: Araneae). *Verh. zool.-bot. Ges. Österreich* **135**: 151–170.
- RIEDL, B. 2000: Bestandsaufnahme ausgewählter Arthropodengruppen eines naturnahen Trockenrasens auf dem Südwesthang des Braunsberges bei Hainburg (Niederösterreich). *Verh. zool.-bot. Ges. Österreich* **137**: 77–126.
- RIEF, A., EBENBICHLER, G. & THALER, K. 2001: Epigäische Spinnen (Arachnida: Araneae) im Bereich der Waldgrenze bei Innsbruck (Nordtirol, Österreich). *Ber. naturw.-med. Ver. Innsbruck* **88**: 141–182.
- SCHICK, R. X. 1965: The crab spiders of California (Araneae, Thomisidae). *Bull. Am. Mus. nat. Hist.* **129**: 1–180.
- SIMON, E. 1875: *Les Arachnides de France* **2**: 1–350. Paris, Roret.
- SIMON, E. 1916: Descriptions de plusieurs espèces d'Arachnides récemment découvertes en France (Troisième note). *Bull. Soc. ent. Fr.* **1916**: 209–211.
- SIMON, E. 1932: *Les Arachnides de France* **6**(4): 773–978. Paris, Roret.
- SZITA, E. & SAMU, F. 2000: Taxonomical review of *Thanatus* species (Philodromidae, Araneae) of Hungary. *Acta zool. hung.* **46**: 155–179.
- THALER, K. 1988: Arealformen in der nivalen Spinnenfauna der Ostalpen (Arachnida: Aranei). *Zool. Anz.* **220**: 233–244.
- THALER, K. 1997: Beiträge zur Spinnenfauna von Nordtirol—4. Dionycha (Anyphaenidae, Clubionidae, Heteropodidae, Liocranidae, Philodromidae, Salticidae, Thomisidae, Zoridae). *Veröff. Mus. Ferdinandeum Innsb.* **77**: 233–285.
- THALER, K. & KNOFLACH, B. 1997: Funde hochalpiner Spinnen in Tirol 1992–1996 und Beifänge (Araneae ... Coleoptera). *Ber. naturw.-med. Ver. Innsbruck* **84**: 159–170.
- TULLGREN, A. 1944: Fam. 1–4. Salticidae, Thomisidae, Philodromidae och Eusparassidae. *Svensk Spindelfauna* **3**: 1–138, pl. 1–18. Stockholm.
- WIEHLE, H. & FRANZ, H. 1954: 20. Ordnung: Araneae. In H. Franz (ed.), *Die Nordost-Alpen im Spiegel ihrer Landtierwelt. Eine Gebietsmonographie* **1**: 473–557. Innsbruck, Wagner.
- ZULKA, K. P. & MILASOWSKY, N. 1998: Conservation problems in the Neusiedler See-Seewinkel National Park, Austria: an arachnological perspective. In P. A. Selden (ed.), *Proceedings of the 17th European Colloquium of Arachnology, Edinburgh 1997*: 331–336. Burnham Beeches, Bucks., British Arachnological Society.
- ZULKA, K. P., MILASOWSKY, N. & LETHMAYER, C. 1997: Spider biodiversity potential of an ungrazed and a grazed inland salt meadow in the National Park 'Neusiedler See-Seewinkel' (Austria): implications for management (Arachnida: Araneae). *Biodivers. Conserv.* **6**: 75–88.