

## A survey of Holarctic Linyphiidae (Araneae).

### 1. A review of the Palearctic genus *Notioscopus* Simon, 1884

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#### Summary

The erigonine genus *Notioscopus* is revised and redelimited. It includes two species distributed in northern Eurasia only: *N. sarcinatus* O. P.-Cambridge, 1872 (type species), and *N. jamalensis* Grese, 1909. The male of *N. jamalensis* is described for the first time, and the female is redescribed for the first time since the original description. Both species are illustrated, and their distribution and habitat requirements are reviewed. *Notioscopus gibbicervix* Denis, 1962 from Tanzania is transferred to *Bursellia* Holm, 1962: *Bursellia gibbicervix* (Denis, 1962) **comb. n.** The position of *N. australis* Simon, 1894 from South Africa, known only from the female, remains unclear. The relationships of *Notioscopus* to other Linyphiidae are briefly discussed.

#### Introduction

The spider genus *Notioscopus* Simon, 1884 currently comprises four species (Platnick, 2005). Two species, *N. sarcinatus* O. P.-Cambridge, 1872 (the type species) and *N. jamalensis* Grese, 1909 are known from the Palearctic. Two other species, *N. gibbicervix* Denis, 1962 and *N. australis* Simon, 1894, known from the Ethiopian region (Tanzania and South Africa respectively), are here considered to belong to other genera. Only the type species is known from both sexes, two (*N. jamalensis* and *N. australis*) are known from females only, and *N. gibbicervix* from only the male holotype (Platnick, 2005; Scharff, 1990). More than two decades ago males of the Siberian species, *N. jamalensis*, were found in numerous localities; however, the male has never been described or illustrated. Because there are two very similar species in Siberia and it is difficult to distinguish them, we decided to undertake this study.

#### Material and methods

The material treated herein is shared between the collections of the Zoological Museum, University of Turku and the Zoological Museum of Moscow State University. The map (Map 1) is based on material studied during this project (see Material examined), and on our earlier identifications published in several papers, and on literature data.

Illustrations were made using a transmitted light microscope with drawing “devices”. SEM-microphotographs were made with a JEOL JSM-5200 in the Zoological Museum, University of Turku. All measurements are in mm. Leg measurements are in the form: fe+pa+ti+mt+ta.

Abbreviations used in SEM-photographs are as follows: Male palp: *Dsa*=distal suprategular apophysis; *Dta*=dorsal tibial apophysis; *E*=embolus; *Ed*=embolic division; *Em*=embolic membrane; *Eo*=embolic opening; *Lta*=lateral tibial apophysis; *Pc*=paracymbium; *Pt*=protegulum; *Spt*=suprategulum; *Ts*=tegular sac. Female epigyne: *Ap*=anterior median plate; *Pp*=posterior median plate.

#### Genus *Notioscopus* Simon, 1884

*Notioscopus* Simon, 1884: 643.

*Type species: Erigone sarcinata* O. P.-Cambridge, 1872 from England. The type species is rather well studied and has 19 taxonomic entries in Platnick's (2005) catalogue; 18 papers contain illustrations of the type species.

*Other species included:* At present only two species can be included, the type species and *N. jamalensis* Grese, 1909.

*Description:* Small-sized dark coloured erigonines, 1.7–2.3 mm long. Spination in both sexes 2-2-1-1. TmIV absent. Position of TmI 0.54–0.61. Males with modified carapace raised behind ocular area and with subconical outgrowth of thoracic part (Figs. 1–8). Sulci absent. Ocular area with hairs more dense and stronger than in other parts of carapace (Figs. 5–8). Chelicerae with large stridulating field (Fig. 36). Male palp with elongate patella. Palpal tibia with one trichobothrium (Figs. 9, 12) and two or more apophyses, lateral, dorsal and intermediate (Figs. 9, 12, 15, 19); lateral apophysis short to very long, dorsal apophysis also different in two species. Paracymbium small, with hooked tip (Figs. 15, 19). Cymbium unmodified. Tegulum with small protegulum and tegular sac (Figs. 16, 18) sometimes hidden in lateral view by protegulum. Embolic division compact, S-shaped and slightly screwed (Figs. 10–11, 13–14, 16–18, 22, 24). Embolus proper short, making a turn of about 90° to axis of embolic division. Dorsal side of base of embolus proper with outgrowth (hump). Epigyne without fovea or scape-like parts. Posterior median plate wider than long, with strong wrinkles (ridges).

*Diagnosis:* Males of this genus can be easily recognised by the subconical outgrowth (hump) on the thorax, the presence of a lateral tibial apophysis on the male palp, the S-shaped embolic division, hammer-shaped in the terminal part, and the short outgrowth (hump-like) on the base of the embolus proper.

In the shape of the carapace, males of this genus resemble two Far Eastern genera, *Ummeliata* Strand, 1942 and *Strandella* Oi, 1960. In *Strandella* the hump is raised upwards (not forwards) just behind the eyes. In addition, *Strandella* has an abdominal pattern. *Ummeliata* males are more similar to those of

*Notioscopus* but the hump extends upwards and slightly forwards and does not adjoin the surface of the carapace. Males of *Ummeliata* also have a long tapering dorsal tibial apophysis and no lateral apophysis.

**Distinguishing species:** Although the two species are very similar in general appearance, they can be easily separated by differences in the male carapace and copulatory organs.

**Distribution:** The genus is distributed from western Europe to eastern Siberia, north to Norwegian Finnmark and the Yamal Peninsula, and south to Switzerland, Serbia, Mongolia and Sakhalin Is. (Map 1). The two species have been found to occur together in only one locality.

### Survey of species

***Notioscopus jamalensis* Grese, 1909** (Figs. 2, 4, 7–11, 15–18, 27–28, 30–33, 36, Map 1)

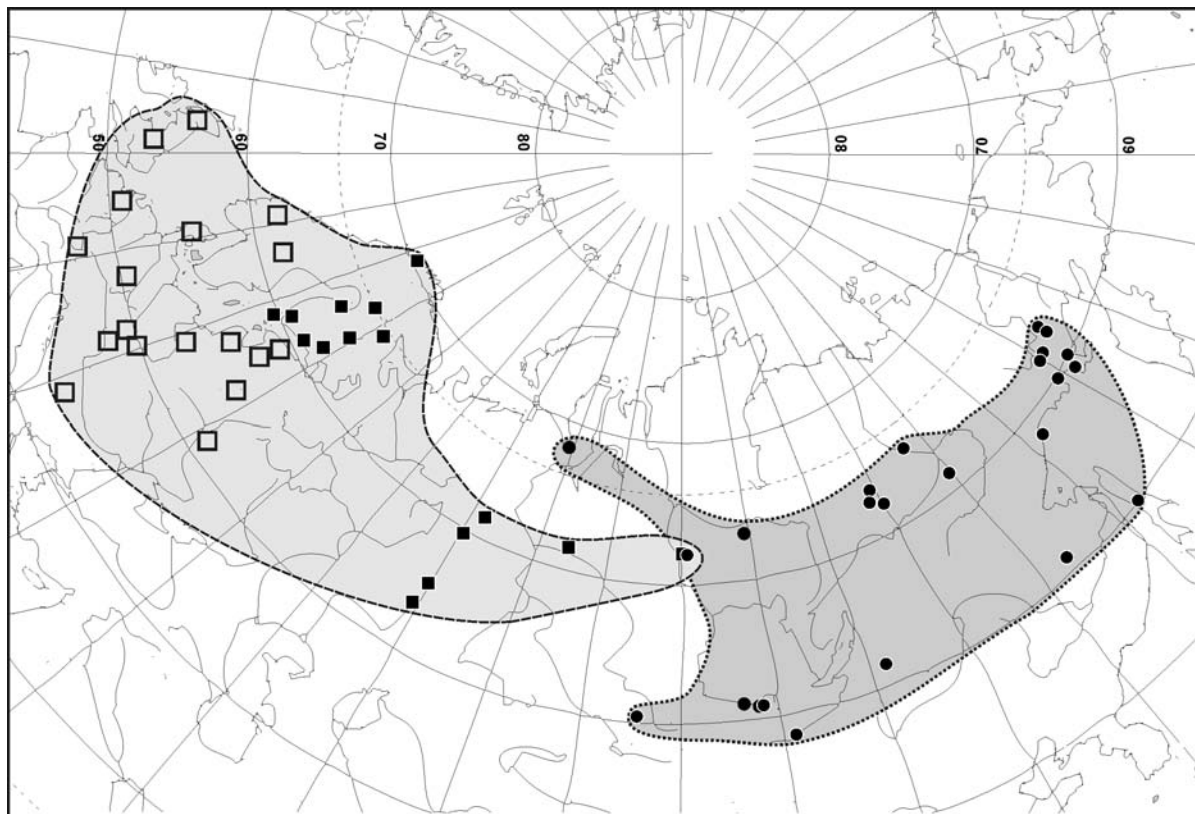
*Notioscopus jamalensis* Grese, 1909: 327, pl. 7, fig. 4 (D♀).

**Faunistic references:** Eskov, 1988: 122; Eskov, 1992: 79; Marusik *et al.*, 1992: 146; Marusik *et al.*, 1993: 74; Eskov, 1994: 82; Marusik *et al.*, 1996: 34; Logunov *et al.*, 1998: 136; Marusik *et al.*, 2000: 60, map 100; Tanasevitch & Trilikauskas, 2004: 84.

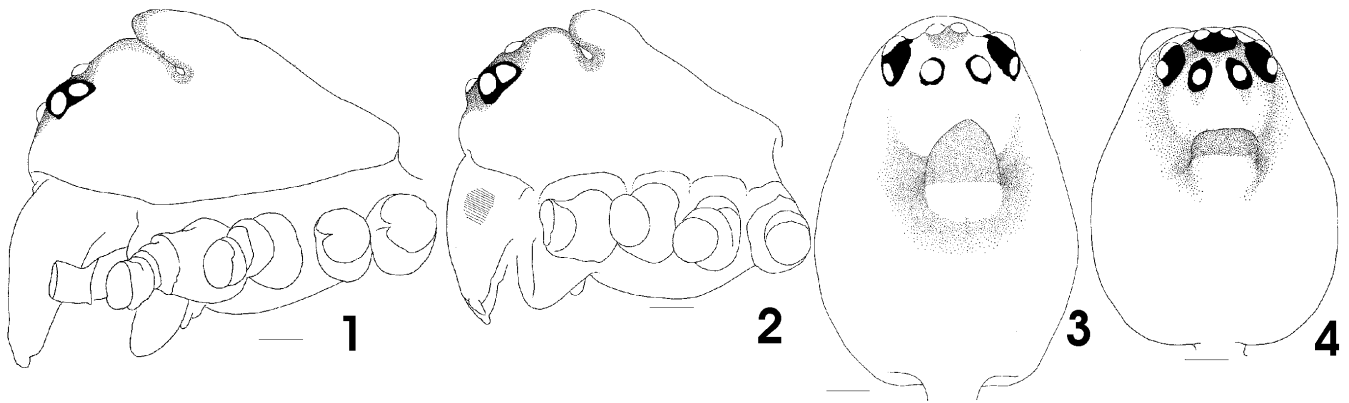
**Material examined:** RUSSIA: *Altai*: SW Altai [100], 10 km S Katanda, Kuragan River, moss+litter, 1♀, 6 July 1983 (H. Hippa); SW Altai [77], Kuragan, *Sphagnum* (50°04'N, 86°10'E), 2♀, 24 July 1983 (H. Hippa). *Tuva*: Kargy River middle flow, 50°31'N, 97°03'E, 1400 m, 3♀, 28–30 June 1996 (Y. M. Marusik); Kargy River middle

flow, 50°35'N, 97°05'E, 1300 m, 1♀, 2–4 July 1996 (Y. M. Marusik); Sangelen Mt. Range, Dzen-Aryk (creek) upper flow, 50°28.50'N, 95°24.74'N, 1750 m, 3♀, 16–18 July 1996 (Y. M. Marusik). *Krasnoyarsk Prov.*: Evenkiya, Taimura River, Neptene River mouth, larch taiga, in moss, 2♂ 4♀, 30 July–3 August 1982 (K. Y. Eskov); Mirnoye Field Station (62°20'N), Bolshaya Varlamovka River, boggy valley forest, in moss, ♂♂ ♀♀, 29 August 1979 (K. Y. Eskov); Mirnoye Field Station (62°20'N), 1♀, 29 June 1978 (K. Y. Eskov); Mirnoye Field Station (62°20'N), spruce stand, 1♂ 1♀, 10–16 August 1978 (K. Y. Eskov). *Yakutia*: West Yakutia, Kempendyai River, 80 km from mouth, *Sphagnum* bog, 1♂ 2♀, 1–15 August 1988 (K. Y. Eskov). *Khabarovsk Prov.*: Okhotsk Dist., Gyrbykan River (Ulya River basin), Skalisty Creek, larch forest with shrubs, 1♂ 2♀, 15 August–3 September 1986 (I. Sukachova). *Sakhalin Island*: [19] C part, Uskovo R. (tributary of Tym' River), c. 12 km NNE of Tymovskoye Town, 50°56.098'N, 142°45.541'E, 1♀, 6 August 2001 (Y. M. Marusik). *Magadan Area*: Upper Kolyma River flow, environs of Sibit-Tyellakh Vill., "Aborigin" Field Station, 61°57'N, 149°40'E, 8♂ 16♀, August 1985 (Y. M. Marusik); 137th km of Kolyma HWy, 60°25'N, 151°30'E, Ola River, valley forest, 20♂♀, 28 September 1994 (Y. M. Marusik); "Aborigin" Field Station, alder shrub stand near creek, *Sphagnum* tussock, 2♂ 2♀, 24 August 1984 (K. Y. Eskov). MONGOLIA: *Arkhangai Aimak*: Ondrer-Ulaan, Tsakhir, Chulut Gorge, 48°07'N, 100°22'E, 2100 m, under logs and stones in forest, 2♀, 10–13 June 1997 (Y. M. Marusik).

**Description:** Total length (male/female) 2.0/2.3. Carapace 0.77/0.86 long, 0.66/0.64 wide. Leg I: 0.64+0.23+0.59+0.49+0.41/0.6+0.24+0.5+0.47+0.39. TmI=0.6–0.61. Male carapace modified: thoracic part with outgrowth (lobe) directed forwards and with blunt end (Figs. 4, 7–8). Base of outgrowth has no distinct margin with thorax (Fig. 7). Ocular area with hairs and small tubercles, visible in SEM only (Figs. 7–8). Palp as in Figs. 9–11, 15–18. Patella long (~tibia). Tibia with two apophyses, lateral and dorsal. Lateral apophysis



Map 1: Range of *Notioscopus jamalensis* (circles) and *N. sarcinatus* (squares, open squares for country records).

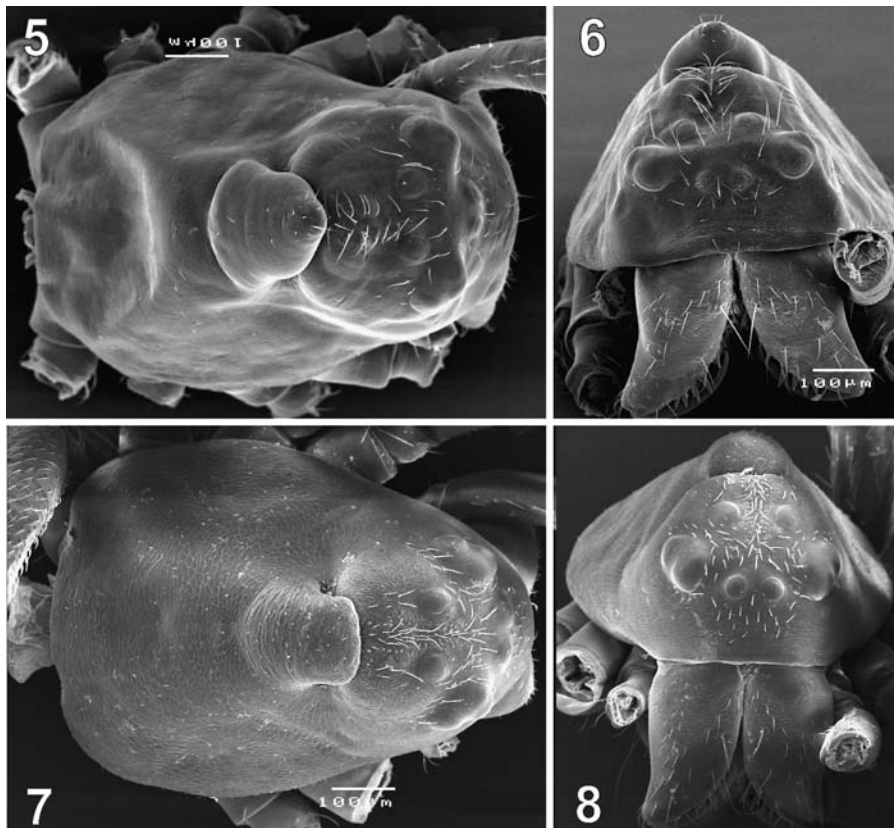


Figs. 1–4: Male carapace. 1, 3 *Notioscopus sarcinatus*. 2, 4 *N. jamalensis*. 1, 2 Lateral view; 3, 4 Dorsal view. Scale lines=0.1 mm.

long, wide at base, sharply tapering, tip curving backwards (dorsally) (Figs. 9, 15). Ventral side of tibia with tooth-like outgrowth (Figs. 11, 17–18), retrolateral side with one trichobothrium. Dorsal apophysis lamellate, with sharply pointed tip (Figs. 9, 15). Cymbium unmodified. Paracymbium small, basal part with three setae (Fig. 15), apical part hook-like. Tegulum with small, almost undeveloped prottegulum and tegular sac hidden in lateral view (Figs. 15–18). Tegulum about 1/3 diameter of subtegulum. Embolic division compact, embolus unscrewed, with large dorsal hump on basal part. Epigyne as in Figs. 27, 28, 30–33, without fovea or outgrowths. Anterior median plate of epigyne with small droplet-like central lobe. In ventral view posterior median plate visible as narrow strip. In caudal view, it is trapezoidal, its surface with strong wrinkles (ridges)

visible both in light and electron microscopes (Figs. 30, 30a, 33).

*Diagnosis:* *Notioscopus jamalensis* can be easily distinguished from *N. sarcinatus* by the shape of the male carapace and copulatory organs. The thoracic lobe is blunt in the Siberian species and conical in the European one. The patella of *N. jamalensis* is about the same length as the tibia (longer in *N. sarcinatus*). There are prominent differences in the shape and size of the tibial apophyses, the lateral apophysis being long and tapering in *N. jamalensis* and short and finger-like in *N. sarcinatus*. The dorsal apophysis is lamellate with sharp edges in the Siberian species and rounded in the European. The epigyne of *N. jamalensis* has no rectangular anterior median plate like that of *N. sarcinatus*.

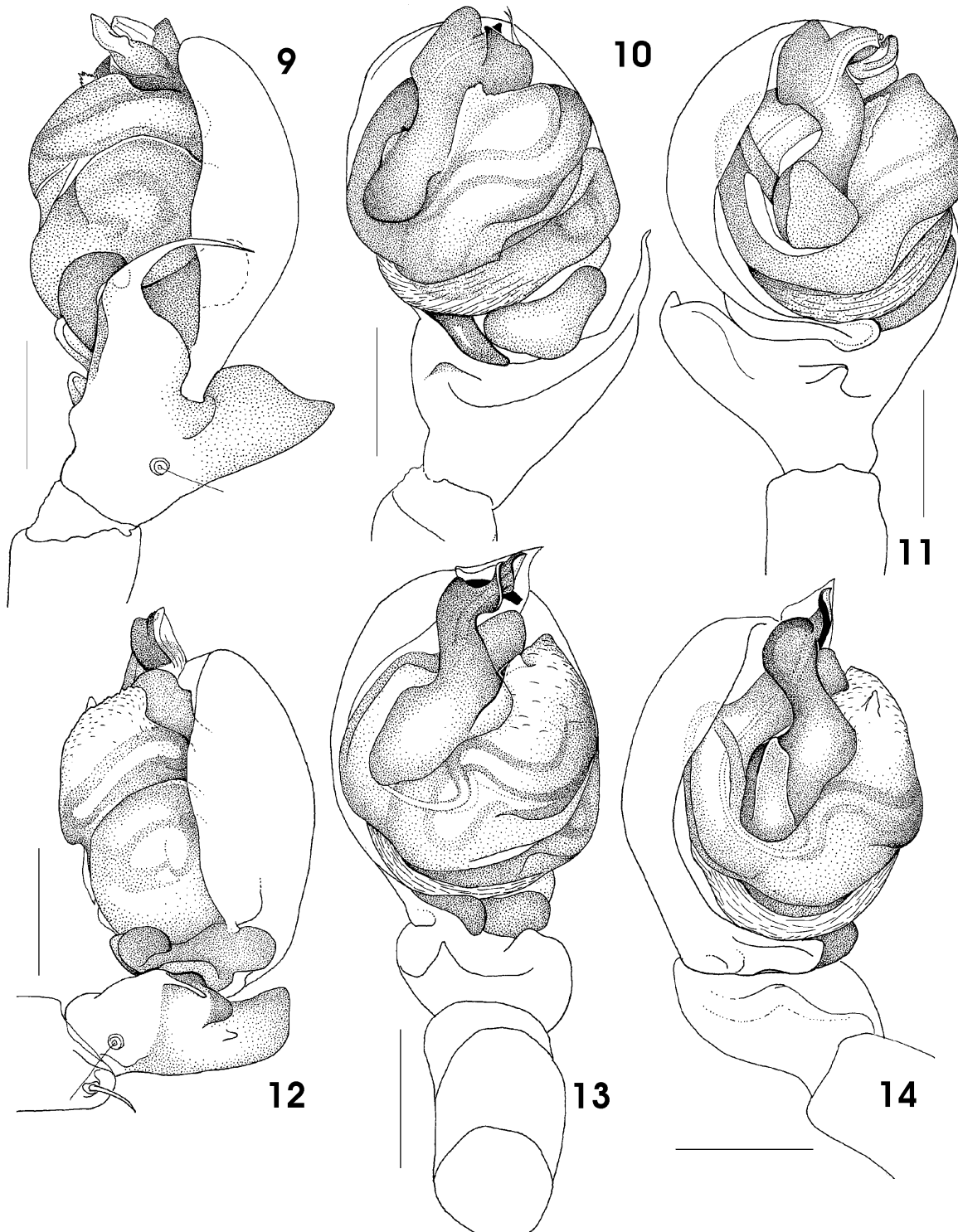


Figs. 5–8: Male carapace. 5–6 *Notioscopus sarcinatus*. 7–8 *N. jamalensis*. 5, 7 Dorsal view; 6, 8 Frontal view. Scale lines=0.1 mm.

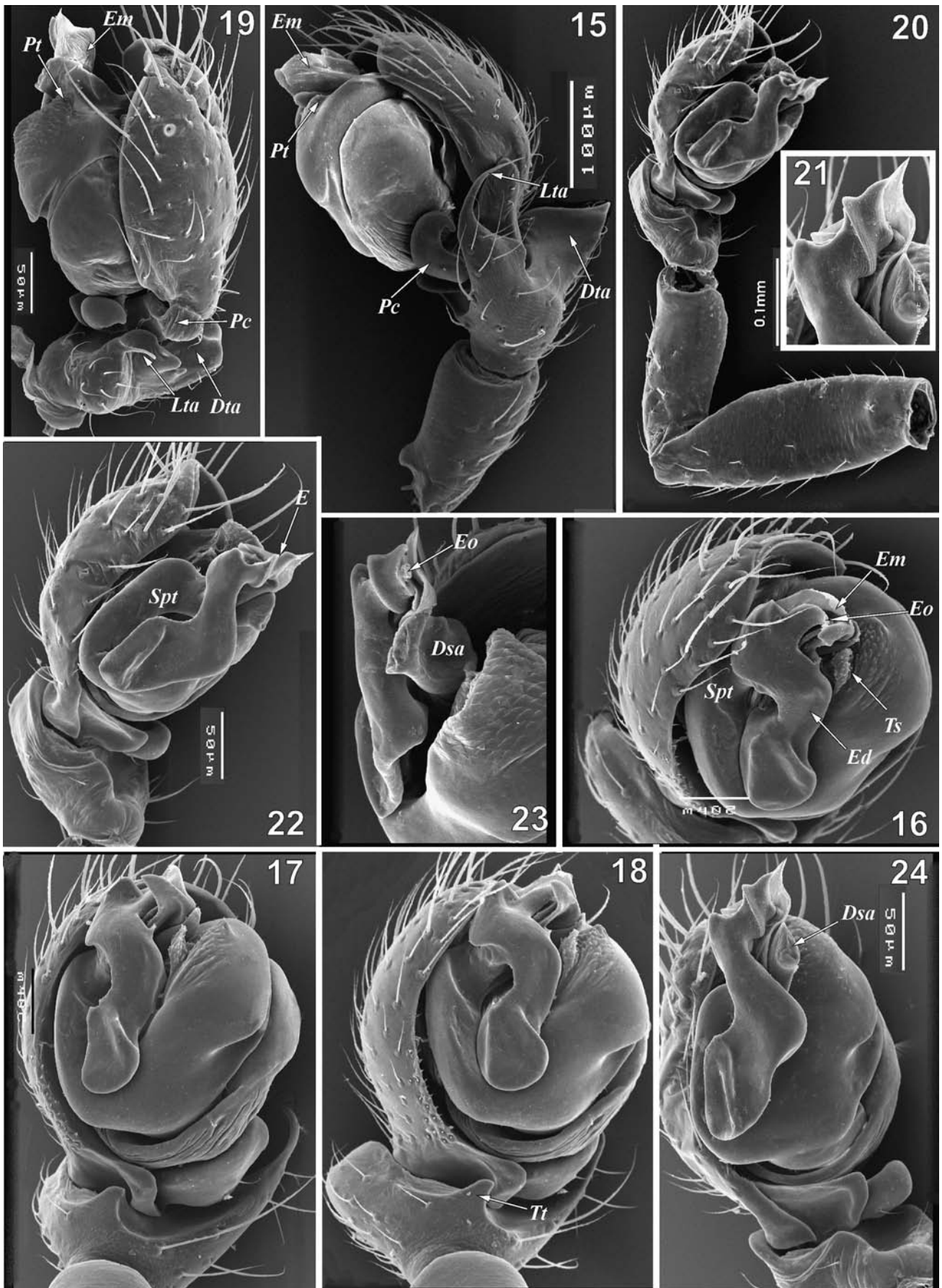


*Distribution:* *Notioscopus jamalensis* has a Siberian boreal range (Marusik *et al.*, 2000) and is known from south Yamal (*c.* 67.5°N) to middle Lena River (65°N), northeast to upper Kolyma (*c.* 63°N) and southward to Altai, Tuva (Marusik *et al.*, 2000), central Mongolia (Marusik & Logunov, 1999) and central Sakhalin (present data), see Map 1. Its range overlaps with the sibling *N. sarcinatus* only in Yenisei River Middle flow, Mirnoye Field Station (cf. Eskov, 1988). Only in South Yamal does it penetrate to the tundra zone.

*Habitat:* This species was reported from the Yenisei River from boggy spruce and open pine forests (Eskov, 1988). In Evenkia it was collected in larch forest with green mosses (Eskov, 1988). In the upper Kolyma area, *N. jamalensis* occurs at elevations of 450–1400 m, chiefly in moss. It is most numerous in *Polytrichum* moss cover in open larch forests. In the locality (Mirnoye Field Station) where both *Notioscopus* species were found, they occupy different habitats.



Figs. 9–14: Male palp. 9–11 *Notioscopus jamalensis*. 12–14 *N. sarcinatus*. 9, 12 Retrolateral view; 10, 13 Ventral view; 11, 14 Prolateral view, apically. Scale lines=0.1 mm.



Figs. 15–24: Male palp. **15–18** *Notioscopus jamalensis*. **19–24** *N. sarcinatus*. **15, 19** Retrolateral view; **16, 23** Apical view; **17, 24** Ventral view; **18, 20, 22** Prolateral view; **21** Tip of embolic division. Abbreviations: *Dsa*=distal suprategular apophysis; *Dta*=dorsal tibial apophysis; *E*=embolus; *Ed*=embolic division; *Em*=embolic membrane; *Eo*=embolic opening; *Lta*=lateral tibial apophysis; *Pc*=paracymbium; *Pt*=protegulum; *Spt*=suprategulum; *Ts*=tegular sac.



*Notioscopus sarcinatus* (O. P.-Cambridge, 1872) (Figs. 1, 3, 5–6, 12–14, 19–26, 29, 34–35, Map 1)

*Erigone sarcinata* O. P.-Cambridge, 1872: 757, pl. 65, fig. 13 (D♂).

*Coryphaeolanus lapponicus* Schenkel, 1939: 98, fig. 1 (♀).

*Notioscopus sarcinatus*: Locket & Millidge, 1953: 285, fig. 172C, E–H (♂♀); Wiehle, 1960: 481, figs. 888–895 (♂♀); Merrett, 1963: 405, fig. 73A–C (♂); Miller, 1971: 268, pl. 56, figs. 8–9 (♂♀); Palmgren, 1976: 85, fig. 16.1–4 (♂♀); Millidge, 1977: 6, fig. 7 (♂); Roberts, 1987: 82, figs. 35c, 39a (♂♀).

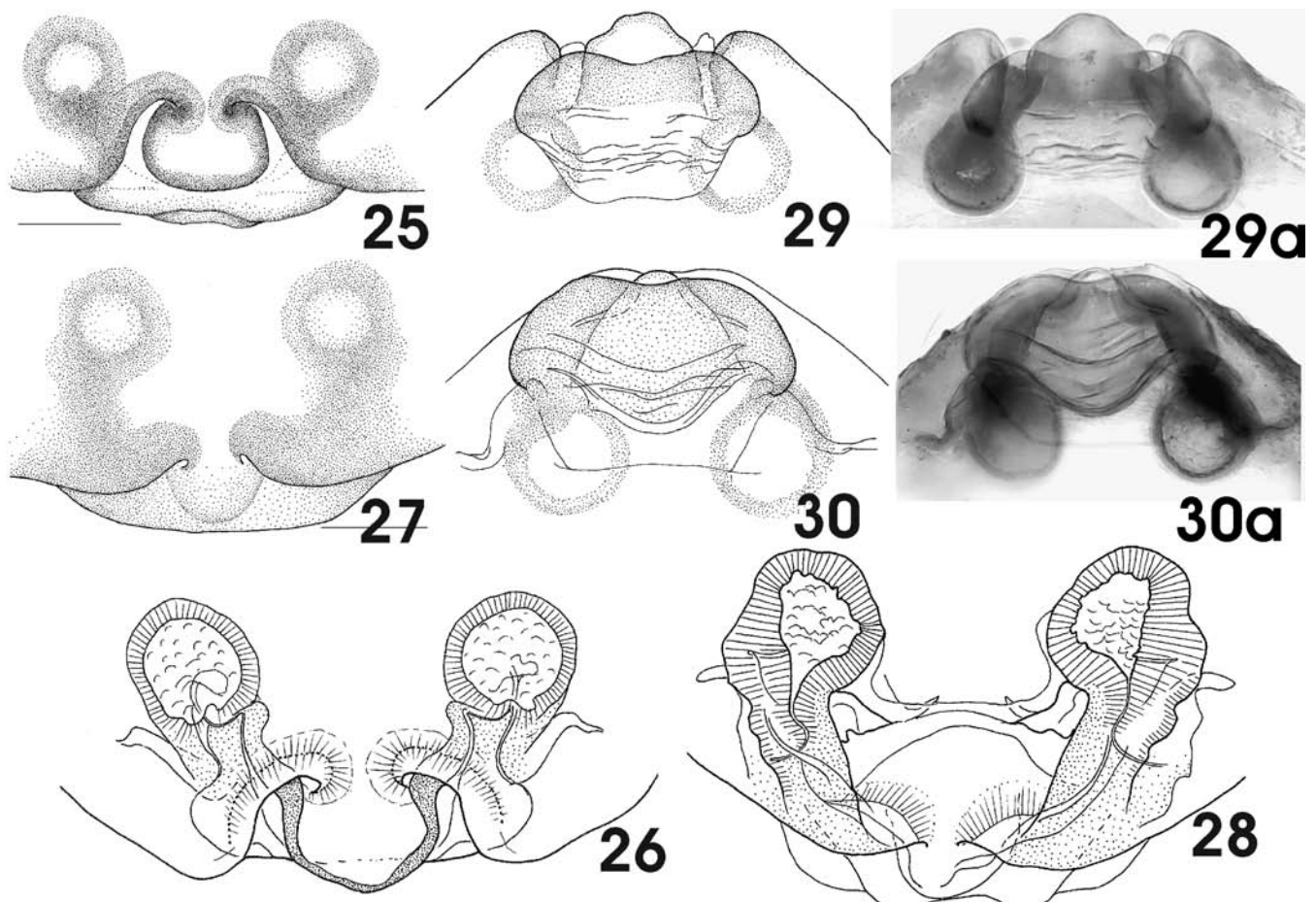
**Material examined:** NORWAY: Finnmark: Porsanger, Vieksajokka, 70°22'N, bog, 5♀, 1 July–26 August 1978 (S. Koponen). FINLAND: Vehkalahti, Lankila, *Sphagnum-Carex* bog, 1♂ 1♀, 7 October 1968 (M. Saaristo); Ilomantsi, Maukkula, *Sphagnum* bog, 1♂ 1♀, 8 November 1967 (M. Saaristo); Luumäki, Sarvilahti (676:54), bog, 4♂ 5♀, September 1968 (M.-R. Honkalinna); Ilomantsi, Kallioniemi (696:70), peat bog, 2♂ 8♀, 2 October 1970 (P. T. Lehtinen); Korppoo, Vidskär (6656:190), *Sphagnum* in birch–aspen stand, 1♀, 13 May–29 June 1993 (S. Koponen); Oravainen (702:26), open bog, 1♂, 25 September 1976 (P. T. Lehtinen); Turku, Kärämäki, Pomponrahka (671:24), peat bog, 4♂ 3♀, 7 September 1972 (I. Oksala); Kuusamo, Juuma, Myllykoski (735:60), 5♀, 8 July 1966 (P. T. Lehtinen); Kittilä, Aakenusjoki (751:40), *Sphagnum* and *Salix* litter, 1♂ 2♀, 20 June 1967 (M. Saaristo). RUSSIA: Krasnoyarsk Prov.: Mirnoye Field Station (62°20'N), Varlamovka River, *Hypnum* bog, 27♂♀, 4 September 1979 (K. Y. Eskov).

**Description:** Total length (male/female) 1.97/2.2. Carapace 0.84/0.87 long, 0.63/0.61 wide. Leg I: 0.69+0.23+0.61+0.5+0.41/0.64+0.26+0.59+0.49+0.39. TmI=0.54–0.57. Thoracic outgrowth with conical tip (Figs. 3, 5–6), base of outgrowth clearly separated from thorax by

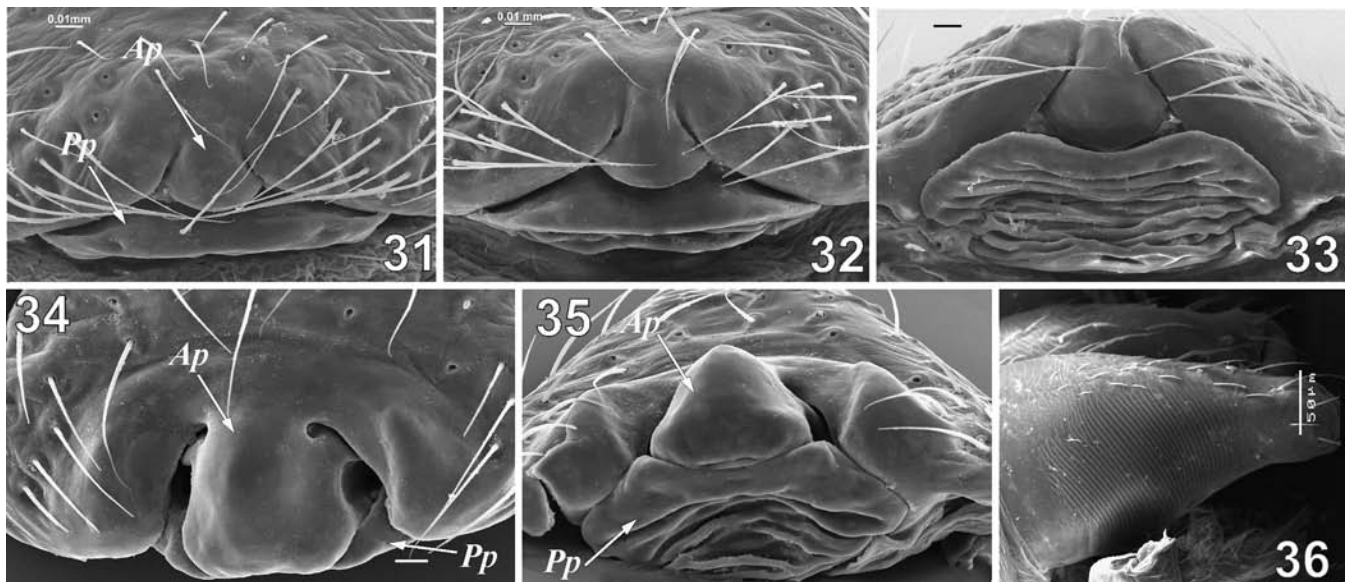
furrow (Fig. 5). Palp as in Figs. 12–14, 19–24. Patella long, longer than tibia, equal in length to cymbium (Fig. 20). Tibia with several apophyses (Figs. 12, 19): small filamentous lateral apophysis, short massive blunt dorsal apophysis and two small apophyses between them. Paracymbium small, basal part with wrinkles (Fig. 19). Tegulum with small but well developed protegulum (Figs. 12, 19) and with small tegular sac. Tegulum relatively large, about  $\frac{1}{2}$  diameter of subtegulum. Embolic division with large tailpiece, embolus screwed, with small hump (outgrowth) on its base. Epigyne as in Figs. 25–26, 29, 34–35, without fovea or outgrowths, anterior median plate rectangular (Figs. 25, 34). In caudal view epigyne with 5 triangular extensions (Fig. 29). Posterior median plate slightly wider than long, oval-shaped, with strong wrinkles.

**Diagnosis:** The conical thoracic outgrowth on the male carapace, male palpal patella longer than tibia, short filamentous lateral tibial apophysis and rectangular anterior median plate of the epigyne are characteristic.

**Distribution:** Although *N. sarcinatus* is treated by Platnick (2005) as a Palearctic species, it is restricted to the western half of Eurasia and is known from western Europe to the Yenisei River (Eskov, 1988, 1994), see Map 1. The northernmost limit of distribution lies north of 70°N in Fennoscandia, see Material examined, and at 62°N in West Siberia (Eskov, 1988). The southernmost records are from Switzerland (Blick *et al.*, 2004) and Serbia (at 44°N; Deltshv *et al.*, 2003).



Figs. 25–30: Epigyne. 25, 26, 29 *Notioscopus sarcinatus*. 27, 28, 30 *N. jamalensis*. 25, 27 Ventral view, general appearance; 26, 28 Ventral view, after maceration; 29, 30 Caudal view. Scale lines=0.1 mm.



Figs. 31–36: Epigyne and chelicera. **31–33, 36** *Notioscopus jamalensis*. **34–35** *N. sarcinatus*. **31, 32, 34** Epigyne, ventral view; **33, 35** Epigyne, caudal view; **36** Chelicera, lateral view. Abbreviations: *Ap*=anterior median plate; *Pp*=posterior median plate.

**Habitat:** In Yenisei River middle flow, where it overlaps with *N. jamalensis*, *N. sarcinatus* was found in open *Sphagnum*–*Hypnum* bog with dwarf birch. In Finland, *N. sarcinatus* is known from *Sphagnum* in particular, both in bogs and boggy forests; according to Palmgren (1976), it apparently lives only in *Sphagnum* and favours shady peatlands. In the United Kingdom it occurs among wet, usually tall moss (*Sphagnum*, *Polytrichum*), often under pine or other trees in swampy places, often in heathland areas, also in fens (Harvey *et al.*, 2002). In central Europe it has been found especially in moist localities, often near water, in bogs and moist meadows, but also sometimes in forests (Hänggi *et al.*, 1995).

### Misplaced species

It is very improbable that species found in the Ethiopian region can be congeneric with North Palaearctic species. Although there are several cases of Afro-Holarctic distribution, e.g. in *Pelecopsis* and *Walckenaeria*, the ranges of these genera are continuous, while in *Notioscopus* there is a disjunction between the Alps and Tanzania.

### *Notioscopus australis* Simon, 1894

*Notioscopus australis* Simon, 1894: 667 (D♀).

**Note:** This species was described on the basis of the female from South Africa. The description is rather brief and has no detailed diagnosis or figures. We were not able to restudy the type. It is very likely that this species was placed in *Notioscopus* mistakenly. *Notioscopus* has no peculiar somatic characters in females that allow the genus to be distinguished with certainty. Considering the above and the fact that such ranges (North Palaearctic and South Africa) are not known among spiders, it is easy to suggest that *N. australis* Simon, 1894 may belong to one of the endemic African linyphiid genera.

### *Bursellia gibbicervix* (Denis, 1962) comb. n.

*Notioscopus gibbicervix* Denis, 1962: 191, figs. 28–32 (D♂).

**Note:** We studied the male holotype of *N. gibbicervix* Denis, 1962, described from Oldeani Mt., Ngorongoro, Tanzania (deposited in the Royal Museum for Central Africa, Tervuren). It does not belong to *Notioscopus* or to the African genus *Callitrichia* Fage, 1936, to which at least one former *Notioscopus* species belongs. *Notioscopus gibbicervix* has a different type of carapace modification, and an entirely different embolic division with a long embolus. Comparison with other African genera reveals similarities with the genus *Bursellia* Holm, 1962 (type species *B. glabra* Holm, 1962). They have a similar modification of the carapace, almost identical shapes of the palpal femur and tibia, and the same types of ventro-retrolateral tibial apophysis and long embolus (see Holm, 1962). Therefore we transfer the species to the genus *Bursellia*. A redescription of *B. gibbicervix* will be given in a separate paper.

### Discussion

Millidge (1977) placed *Notioscopus* in the *Leptorhoptrum/Lophomma* group. Judging from the embolic division, protégulum with tegular sac, lateral tibial apophysis, elongate palpal patella, and shape of the epigyne, *Notioscopus* is similar to *Lophomma*. However, males have entirely different modifications of the carapace. Males of *Lophomma* have a slightly raised cephalic part, sulci and long furrows associated with them. There are also significant differences in the embolic division: two-armed in *Lophomma* and one-armed in *Notioscopus*. The hump on the base of the embolus proper in *Notioscopus* cannot be homologised with the anterior apophysis of the embolic division because it is placed dorsally to the embolus (ventrally in *Lophomma*). In the shape of the embolic division (compact, longer than wide, straight or slightly S-shaped,



with hump or apophysis above embolus proper) *Notioscopus* is similar to *Troxochrus* [type species *T. scabriculus* (Westring, 1851)] and *Donacochara* [type species *D. speciosa* (Thorell, 1875)]. It is also similar to *Glyphesis* [type species *G. servulus* (Simon, 1881)], but the latter has an entirely different shape of the suprategulum. Judging from various characters, like shape of male carapace, length of male palpal sclerites, and paracymbium, the most closely related genus seems to be *Troxochrus*.

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