

New data on the harvestman genus *Nemaspela* Šilhavý, 1966 (Arachnida: Opiliones)

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Summary

Five species of *Nemaspela* Šilhavý, 1966 are diagnosed, figured and (re)described: *N. abchasica* (Ljovuschin & Starobogatov, 1963); *N. birsteini* Ljovuschin, 1972; *N. caeca* (Grese, 1911); *N. kovali* sp. n. (♂♀; Kabardino-Balkaria); *N. sokolovi* (Ljovuschin & Starobogatov, 1963). The female of *N. abchasica* is described for the first time. New faunistic records are reported for four species of *Nemaspela*. Distribution maps are provided for all species.

Introduction

Some data on the troglobiont species of Opiliones inhabiting caves of the Crimea and the Caucasus can be found in Lebedinsky (1914), Charitonov (1941), Ljovuschin & Starobogatov (1963), Ljovuschin (1972), and Martens (2006). Despite the long-term studies in those caves, new harvestmen species can still be found (e.g. Martens, 2006). The greatest number of opilionid species collected from the Crimean and Caucasian caves belong to the genus *Nemaspela* Šilhavý, 1966. The present work is devoted to this genus and is based on newly collected material. Its aims are as follows: (1) to describe a new species from Kabardino-Balkaria; (2) to redescribe four known species; (3) to describe a previously unknown sex for one species; (4) to present revised diagnoses both of the genus and of the studied species; and (5) to provide new faunistic records.

The types and other collected and examined specimens are shared between the following depositories: ZIN=Zoological Institute of the Russian Academy of Science, St Petersburg, Russia (Dr V. A. Krivokhatski); ISEA=Zoological Museum, Institute of Systematics and Ecology of Animals, Novosibirsk, Russia (Dr G. N. Azarkina); ZMMU=Zoological Museum of Moscow State University, Russia (Dr K. G. Mikhailov). Abbreviations used in the text and tables: Fm=femur, Mt=metatarsus, Pt=patella, s.l.=same locality, Tb=tibia, Tr=trochanter, Ts=tarsus. “Clypeus” is the space

between the ocularium and the front margin of the carapace. All measurements are in mm.

Family Nemastomatidae

Genus *Nemaspela* Šilhavý, 1966

The genus *Nemaspela* belongs to the family Nemastomatidae and includes troglobiont species inhabiting caves of the Crimea and the Caucasus. The genus can easily be separated from other genera of the family by the following characters: (1) all species blind, eyes absent; (2) carapace and scutum fused; (3) supracheliceral lamellae smooth; (4) basal segment of male chelicerae with an apophysis (absent in *N. femorecurvata* Martens, 2006 described and known from a single ♂); (5) digits of chela with numerous flat microsetae, apical end of movable digit with one large tooth, fixed digit with two teeth; (6) palps and legs very long, femora of legs with 7–22 pseudosegments; (7) leg coxae covered with tubercles, bearing hairs; (8) glans of penis ending with stylus connected to it, glans covered with spicules; (9) body weakly chitinised, abdomen soft; (10) body colour ochre, with darker, black-brown or ochre-brown, carapace. In the majority of *Nemaspela* species, leg coxae and chelicerae are black to brown or deep brown, darker than the body.

The *Nemaspela* species were formerly assigned to the genus *Buresiolla* Kratochvil, 1958 (see Ljovuschin & Starobogatov, 1963). The latter differs from other nemastomatids, including *Nemaspela*, by the following characters: all leg coxae with pro- and retrolateral rows of hump-shaped tubercles; basal segment of male chelicera not armed; penis without marked glans, its apical part forked (as in the genus *Nemastoma* C. L. Koch, 1836).

Distribution: The Crimean and Caucasian caves.

Species included: Six species, *Nemaspela abchasica* (Ljovuschin & Starobogatov, 1963); *N. birsteini* Ljovuschin, 1972; *N. caeca* (Grese, 1911); *N. femorecurvata* Martens, 2006; *N. kovali* sp. n.; *N. sokolovi* (Ljovuschin & Starobogatov, 1963). All species can easily be separated from each other by the shape of the male cheliceral apophyses (Figs. 21–30) and by the structure of the penis (Figs. 39–43). Females of the majority of species are virtually indistinguishable. All differences between the known species are summarised in Table 1.

Survey of species

***Nemaspela abchasica* (Ljovuschin & Starobogatov, 1963)**
(Figs. 1–2, 11–12, 22, 27, 34, 40, Map 1)*Buresiolla abchasica* Ljovuschin & Starobogatov, 1963: 47–49, figs. 1, 5.*Nemaspela abchasica*: Ljovuschin, 1972: 66; Šilhavý, 1966: 68–69, fig. 5; Staręga, 1978: 202; Martens, 2006: 173–174, figs. 13n–o, 16.

Material: RUSSIA: *W. Caucasus, Krasnodar Territory, Sochi*: 2♀ (ISEA), Kolokolnaya Cave, 15 August 1997, A. G. Koval; 1♂ (ISEA), s.l., 6 May 1998, A. G. Koval; 1♂ (ZMMU), Beloskalskaya Cave, 12 August 1998, A. G. Koval; 1♀ (ZMMU), s.l., 26 June 2006, R. S. Vargovitsh; 1♀ (ZMMU), Akhunsкая Cave, 11 August 1999, A. G. Koval; 1♀ (ZMMU), s.l., 6 August 2002, A. G. Koval; 1♀ (ISEA), s.l., 13 August 1997, A. G. Koval. GEORGIA: 1♀ (ISEA), Abkhazia, Gulripshskii Distr., nr Amtkel, Nizhnyaya Shakuranskaya Cave, 4 June 2006, R. S. Vargovitsh.

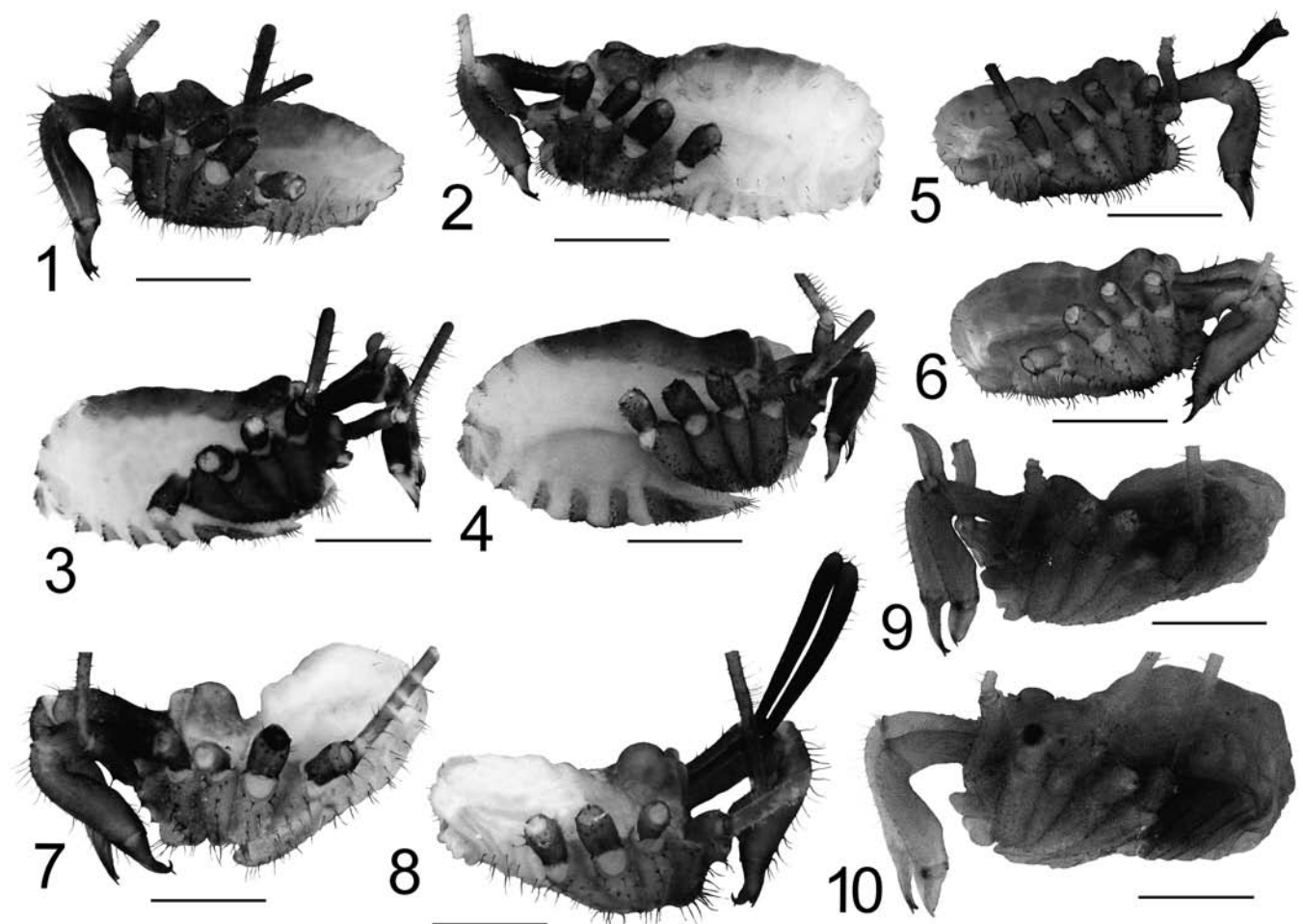
Diagnosis: In the structure of the penis and body, this species is closest to *N. sokolovi*, but can be distinguished by the following characters: male palpal patellae distally without a tooth; basal segment of chelicerae with very low, cone-shaped apophysis (Figs. 22, 27). See also Table 1.

Distribution: Russia: Krasnodar Territory (Martens, 2006; present data); Georgia: Abkhazia (Ljovuschin &

Starobogatov, 1963; Ljovuschin, 1972; Staręga, 1978; present data) (Map 1).

Description: *Male* (from Sochi, Kolokolnaya Cave): Body length 2.17, width 1.25. Chelicerae: basal segment length 0.89, distal segment length 1.02, chela length 0.49, length of apophysis 0.11. Penis length 1.84, width at base 0.24. Length of palp segments: Tr 0.71, Fm 2.46, Pt 2.43, Tb 1.71, Ts 0.95, total 8.26. Length of leg segments: I: Fm 4.53, Pt 0.88, Tb 3.13, Mt 6.32, Ts 2.87, total 17.73. II: Fm 7.52, Pt 1.01, Tb 3.94, Mt ?, Ts ?, total ?. III: Fm 4.48, Pt 0.86, Tb 2.97, Mt 6.71, Ts 3.24, total 18.26. IV: Fm 6.22, Pt 0.87, Tb 3.92, Mt 8.24, Ts ?, total ?

Body weakly chitinised (Figs. 1, 11). Carapace and scutum divided by poorly visible furrow; their surfaces almost smooth, weakly granular. Cephalothorax and abdominal tergites without clear boundaries. Last abdominal tergite, on lateral edge, with longitudinal row of setae. Abdominal sternites distinct, each in middle with longitudinal row of hairs. Supracheliceral lamellae smooth. Ocularium raised, rudimentary (Figs. 1, 11); eyes absent. Chelicerae long; basal segment with small cone-shaped apophysis covered with hairs (Figs. 1, 11, 22, 27); distal and basal segments dorsally with rows of hairs; chela digits with numerous flat microsetae. Palps long, thin, covered with short and long prominent hairs (Fig. 34); trochanter long and slightly curved, ventrally with three large, forward-protruding tubercles, each



Figs. 1–10: Bodies of *Nemaspela* species, lateral views. **1** *N. abchasica*, ♂; **2** Ditto, ♀; **3** *N. caeca*, ♂; **4** Ditto, ♀; **5** *N. sokolovi*, ♂; **6** Ditto, ♀; **7** *N. kovalii* sp. n., ♀; **8** Ditto, ♂; **9** *N. birsteini*, ♂; **10** Ditto, ♀. Scale lines=1 mm.

Characters	<i>N. abchasica</i>	<i>N. birsteini</i>	<i>N. caeca</i>	<i>N. kovali</i> sp. n.	<i>N. sokolovi</i>	<i>N. femorecurvata</i>
Apophysis of male chelicera	Very low, cone-shaped (Figs. 22, 27)	Long, sickle-shaped (Figs. 24, 29)	Low and clavate, strongly widened at apex (Figs. 25, 30)	Very long; tip with 2–3 tubercles (Figs. 21, 26)	Long, forked at tip (Figs. 23, 28)	No apophysis (Martens, 2006; fig. 14)
Body	Only with setae and hairs (Figs. 1–2)	Only with setae and hairs (Figs. 9–10)	Besides setae and hairs, abdominal sternites with longitudinal row of microdenticles; coxae, trochanters, and genital operculum covered with same microdenticles (Figs. 3–4)	Only with setae and hairs (Figs. 7–8)	Only with setae and hairs (Figs. 5–6)	Only with setae and hairs (Martens, 2006; fig. 15)
Palp	Normal structure, without a tooth; femur straight; patella always shorter than femur (Fig. 34)	Normal structure, without a tooth; femur straight; patella equal to or only slightly shorter than femur (Fig. 33)	Normal structure, without tooth; femur straight; patella equal to or slightly longer than femur (Fig. 32)	Male patella with apical tooth directed mesally; femur straight; patella always shorter than femur (Figs. 35, 36)	Male patella with apical tooth directed mesally; femur straight; patella always shorter than femur (Figs. 31, 36)	Femur recurved; patella equal to femur (Martens, 2006; fig. 14)
Palp trochanter	Long, slightly curved; ventrally with forward-protruding tubercles (3 in ♂, 4 in ♀) (Fig. 34)	Long, slightly thickened and bent distally; in both sexes with 3 tiny tubercles (Fig. 33)	Very long, almost straight; with tiny, sometimes poorly visible tubercles (3 in ♂, 6–7 in ♀) (Fig. 32)	Short, slightly swollen and visibly curved; with forward-protruding tubercles (2 in both sexes) (Fig. 35)	Short and visibly curved; in both sexes with 2–3 forward-protruding tubercles; distal tubercle bifurcated (Fig. 31)	Very long, almost straight (Martens, 2006; fig. 14)
Ocularium	High, raised (Figs. 1–2)	Low (Figs. 9–10)	Very low (Figs. 3–4)	High, slightly swollen (Figs. 7–8)	Very low, slightly swollen (Figs. 5–6)	No data
Penis	Glans slightly thickened, gradually merging into long stylus (Fig. 40)	Glans slightly thickened, gradually merging into long stylus (Ljovuschin, 1972; fig. 2)	Glans cone-shaped, sharply narrowing to very short, kidney-shaped stylus (Fig. 42)	Corpus with small keels near glans; stylus short, hook-shaped and widened at tip; glans slightly thickened, gradually merging into short stylus (Fig. 39)	Glans slightly thickened, gradually merging into long stylus (Figs. 41, 43)	Glans slightly thickened, gradually merging into short stylus (Martens, 2006; fig. 14)

Table 1: Diagnostic characters of the species of *Nemaspela*.

with a hair at its tip. Legs long, coxae covered with tubercles and hairs; femora long, pseudosegments located in medial part, their numbers: I 9–10; II 12–15; III 7–9; IV 10–12. Claws of all legs long, crescent-shaped and identical. Penis long (Fig. 40), glans gradually merges into stylus. Stylus long and thin, expanded at base. Glans covered with spicules directed basally.

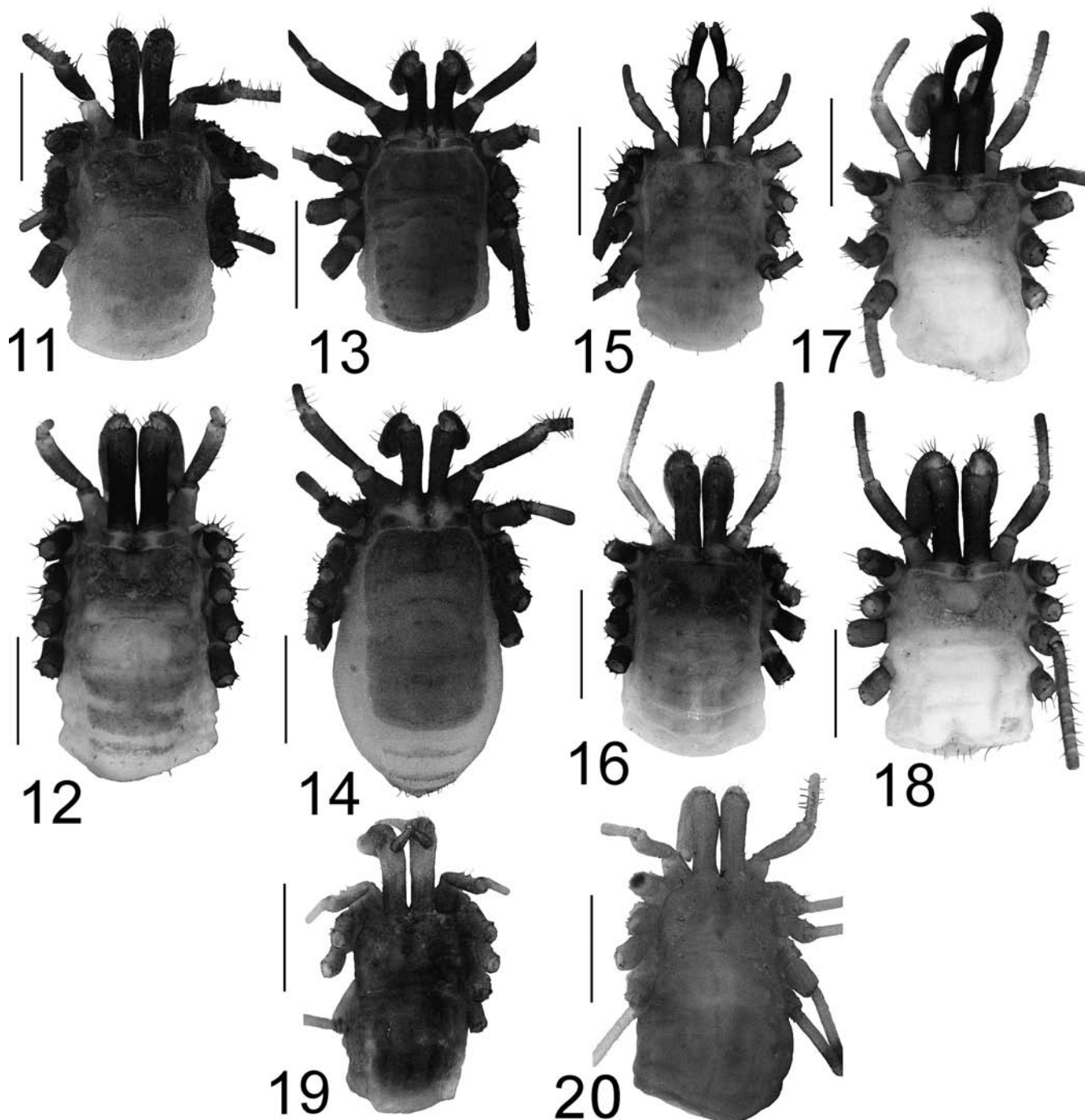
Female (from Sochi, Kolokolnaya Cave): Body length 2.69, width 1.54. Chelicera: basal segment length 0.62, distal segment length 1.01, chela length 0.39. Length of palp segments: Tr 0.73, Fm 2.62, Pt 2.49, Tb 1.79, Ts 1.03, total 8.66. Length of leg segments: I, II and III ?; IV: Fm 6.03, Pt 0.81, Tb ?, Mt ?, Ts ?, total ?

General appearance similar to that of male (Figs. 2, 12), differing from it by the following characters: body usually larger, apophysis on basal segment of chelicera absent, palpal trochanter ventrally with 4 tubercles, number of pseudosegments on femora IV 12.

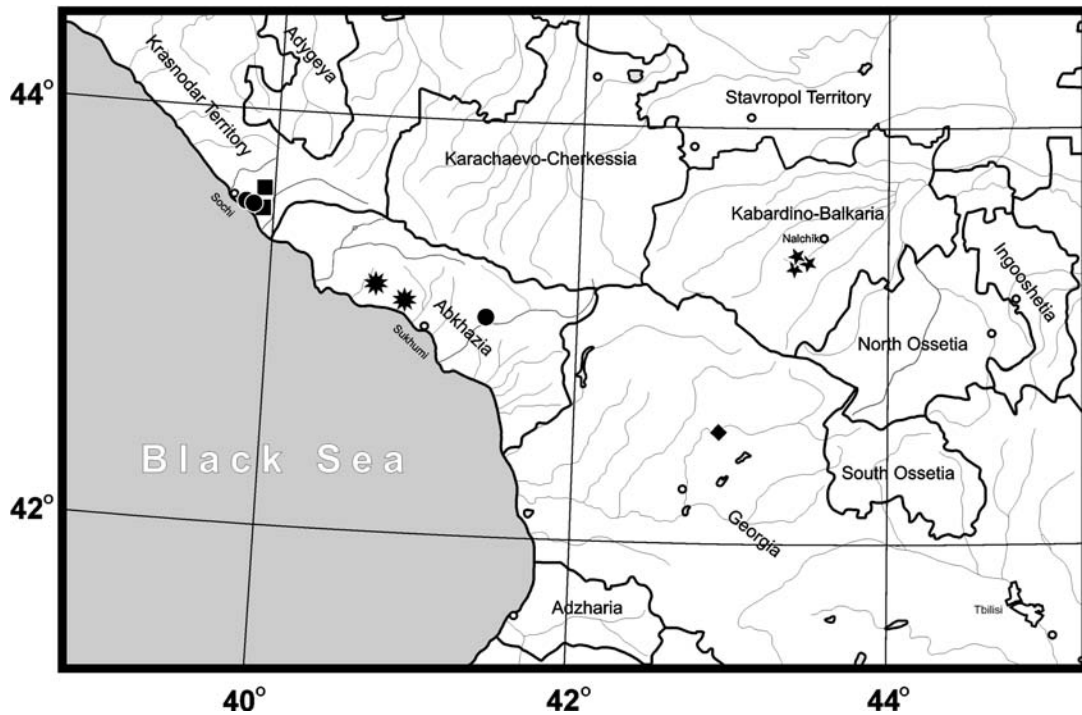
Nemaspela birsteini Ljovuschin, 1972 (Figs. 9–10, 19–20, 24, 29, 33, Map 1)

Nemaspela birsteini Ljovuschin, 1972: 66–70; figs. 2–3.
Nemaspela birsteini: Starega, 1978: 202.

Types: Holotype ♂ (ZMMU) from Georgia, Abkhazia, Gudauta Distr., nr Duripshi, Tarkiladze Cave, 7 August



Figs. 11–20: Bodies of *Nemaspela* species, dorsal views. 11 *N. abchasica*, ♂; 12 Ditto, ♀; 13 *N. caeca*, ♂; 14 Ditto, ♀; 15 *N. sokolovi*, ♂; 16 Ditto, ♀; 17 *N. kovali* sp. n., ♂; 18 Ditto, ♀; 19 *N. birsteini*, ♂; 20 Ditto, ♀. Scale lines=1 mm.



Map 1: Distribution of *Nemaspela* species: ● = *N. abchasica*; ★ = *N. birsteini*; ◆ = *N. femorecurvata*; ★ = *N. kovali*; ■ = *N. sokolovi*.

1939, Y. A. Birshstein. Paratype: 1♀ (ZMMU), together with holotype.

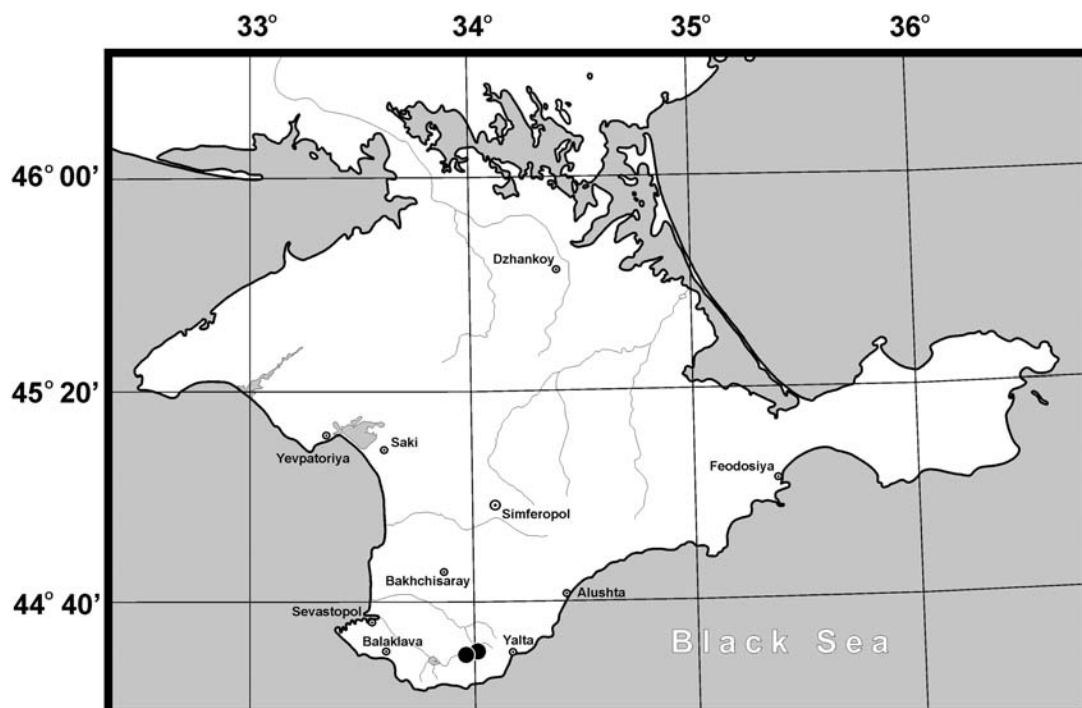
Diagnosis: This species can easily be separated from the other species of *Nemaspela* by the long, sickle-shaped apophysis on the basal segment of the male chelicerae.

Distribution: Abkhazia, type locality only (Ljovuschin, 1972; Staręga, 1978; present data) (Map 1).

Description: Male: Body length 1.89, width 1.14. Chelicera: basal segment length 0.82, distal segment length 0.88, chela length 0.44, length of apophysis 0.49. Length of palp segments: Tr 0.61, Fm 2.01, Pt 1.94, Tb 1.48, Ts 0.85, total 6.89. Length of leg segments: I: Fm

4.82, Pt 0.91, Tb 3.52, Mt 6.71, Ts 2.83, total 18.79. II ? . III: Fm 4.78, Pt 0.90, Tb 3.41, Mt 7.08, Ts 2.23, total 18.4. IV: Fm 6.39, Pt 0.78, Tb 4.13, Mt 9.02, Ts 4.28, total 24.6.

Body weakly chitinised (Figs. 9, 19). Carapace and scutum divided by poorly visible furrow; their surfaces almost smooth, weakly granular. Cephalothorax and abdominal tergites without clear boundaries. Last abdominal tergite, on lateral edge, with longitudinal row of setae. Abdominal sternites distinct, each in middle with longitudinal row of hairs. Supracheliceral lamellae smooth. Ocularium low, rudimentary (Figs. 9, 19); eyes



Map 2: Distribution of *Nemaspela caeca* in the Crimea.

absent. Chelicerae long; basal segment with long sickle-shaped apophysis covered with hairs (Figs. 9, 19, 24, 29); distal and basal segments dorsally with rows of hairs; chela digits with numerous flat microsetae; movable digit with large denticle at tip, fixed digit with two such denticles. Palps long, thin, covered with short and long protruding hairs (Fig. 33); trochanter long, slightly thickened and bent distally; ventrally with three small tubercles, each with a long hair at tip. Legs long, coxae covered with tubercles and hairs; femora long, pseudosegments situated in medial part, their numbers: I 10–11; II ?; III 9–10; IV 10. Claws of all legs long, crescent-shaped and identical. Penis absent from studied specimen.

Female: Body length 2.22, width 1.54. Chelicera: basal segment length 0.74, distal segment length 1.01, chela length 0.54. Length of palp segments: Tr 0.71, Fm 2.29, Pt 1.98, Tb 1.53, Ts 0.82, total 7.33. Length of leg segments: I: Fm 4.32, Pt 0.85, Tb 3.66, Mt 6.08, Ts ?, total ?. II: Fm 7.23, Pt 0.92, Tb 5.62, Mt 11.72, Ts 5.81, total 31.3. III: Fm 4.28, Pt 0.69, Tb 2.94, Mt 6.15, Ts 3.28, total 17.34. IV: Fm 6.08, Pt 0.86, Tb 3.77, Mt 9.04, Ts 4.18, total 23.93.

Similar to male (Figs. 10, 20), but body larger, apophysis on basal segment of chelicera absent, and number of femoral pseudosegments: I 7; II 12; III 8; IV 11.

Nemaspela caeca (Grese, 1911) (Figs. 3–4, 13–14, 25, 30, 32, 42, Map 2)

Nemastoma caecum Grese, 1911: 108, figs. 1–2.

Buresiolla caecum: Ljovuschin & Starobogatov, 1963: 41–45, figs. 1–2.

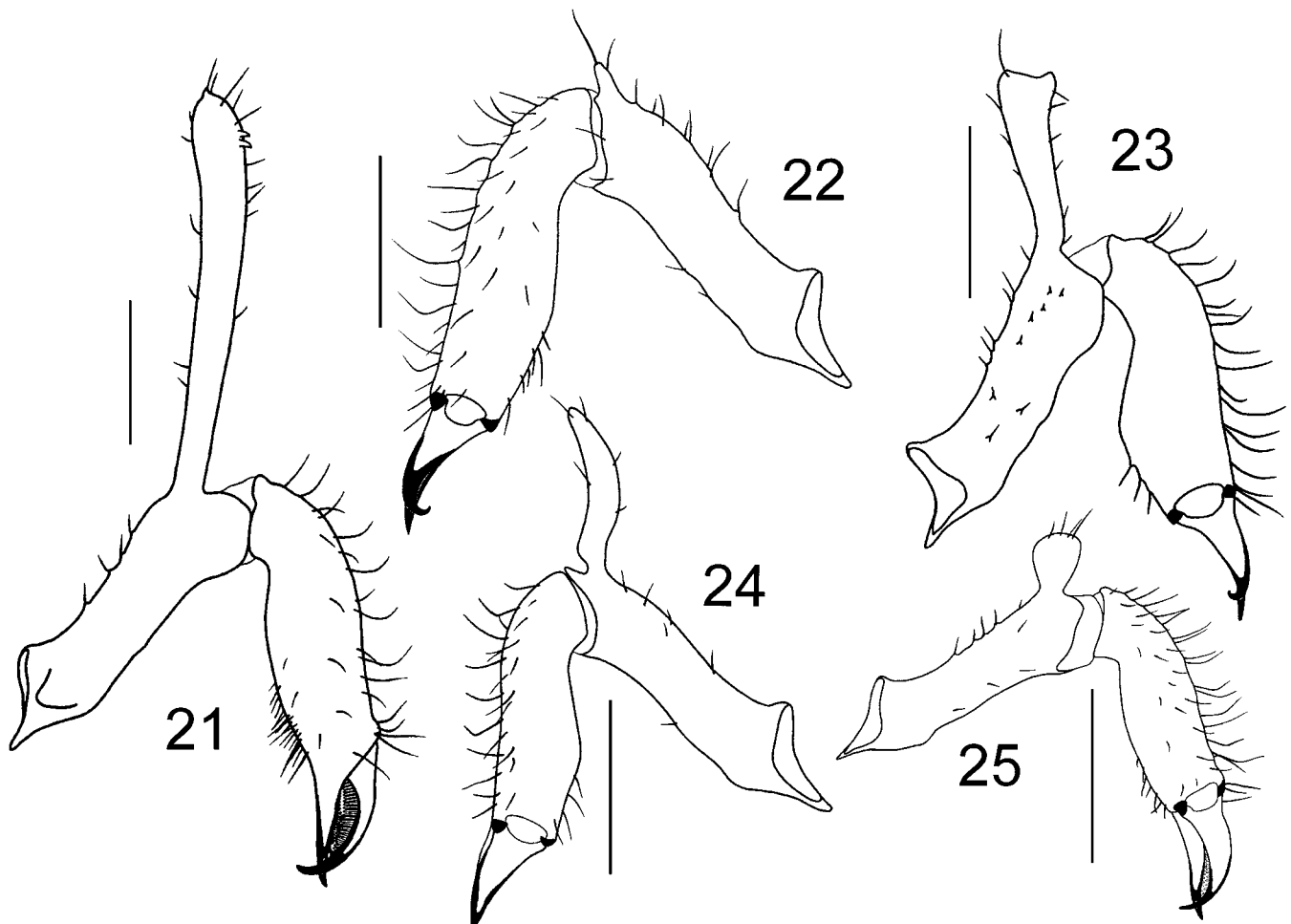
Nemaspela caeca: Ljovuschin, 1972: 66; Šilhavý, 1966: 68–69, fig. 6; Staręga, 1978: 202; Chevrizov, 1979: 11, fig. 50.

Nemastoma caecum: Redikorzev, 1936: 33.

Phalangodes taurica Lebedinsky, 1914: 18, tab. 1, figs. 1–1a.

Material: UKRAINE: *Crimea*: 1♂ 1♀ (ISEA), Boryu-Teshik Cave, 24 July 1996, A. G. Koval; 1♀ (ISEA), Ayu-Teshik-2 Cave, 13 June 2002, A. G. Koval; 1♀ (ISEA), s.l., 13 June 2002, A. G. Koval; 1♂ (ISEA), Zheltaya (Sokolinskaya) Cave, 26 July 2001, A. G. Koval; 1♀ (ISEA), Vitlyaburunsкая Cave, 7 April 1999, A. G. Koval; 1♂ (ISEA), Kokkozskaya-2 Cave, 25 July 2001, A. G. Koval; 1♂ 1♀ (ISEA), Ai-Petrinskaya Yaila, Oreshkek Cave, 28 July 2005, R. S. Vargovitsh; 2♂ (ISEA), s.l., Kamnepadnaya Cave, 29 July 2005, R. S. Vargovitsh; 1♂ 1♀ (ISEA), s.l., Kaskadnaya Cave, 1 August 2005, R. S. Vargovitsh.

Diagnosis: *N. caeca* can easily be separated from the other species by the following characters: basal segment of male chelicerae with low clavate apophysis, strongly widened apically (Figs. 25, 30); abdominal sternites with longitudinal rows of microdenticles; coxae and trochanters of legs and genital operculum covered with



Figs. 21–25: Male chelicerae of *Nemaspela* species, prolateral views. **21** *N. kovali* sp. n., left; **22** *N. abchasica*, right; **23** *N. sokolovi*, left; **24** *N. birsteini*, right; **25** *N. caeca*, left. Scale lines=0.5 mm.

microdenticles (Figs. 3–4); glans cone-shaped, sharply narrowed to stylus; stylus very short, kidney-shaped (Fig. 42). See also Table 1.

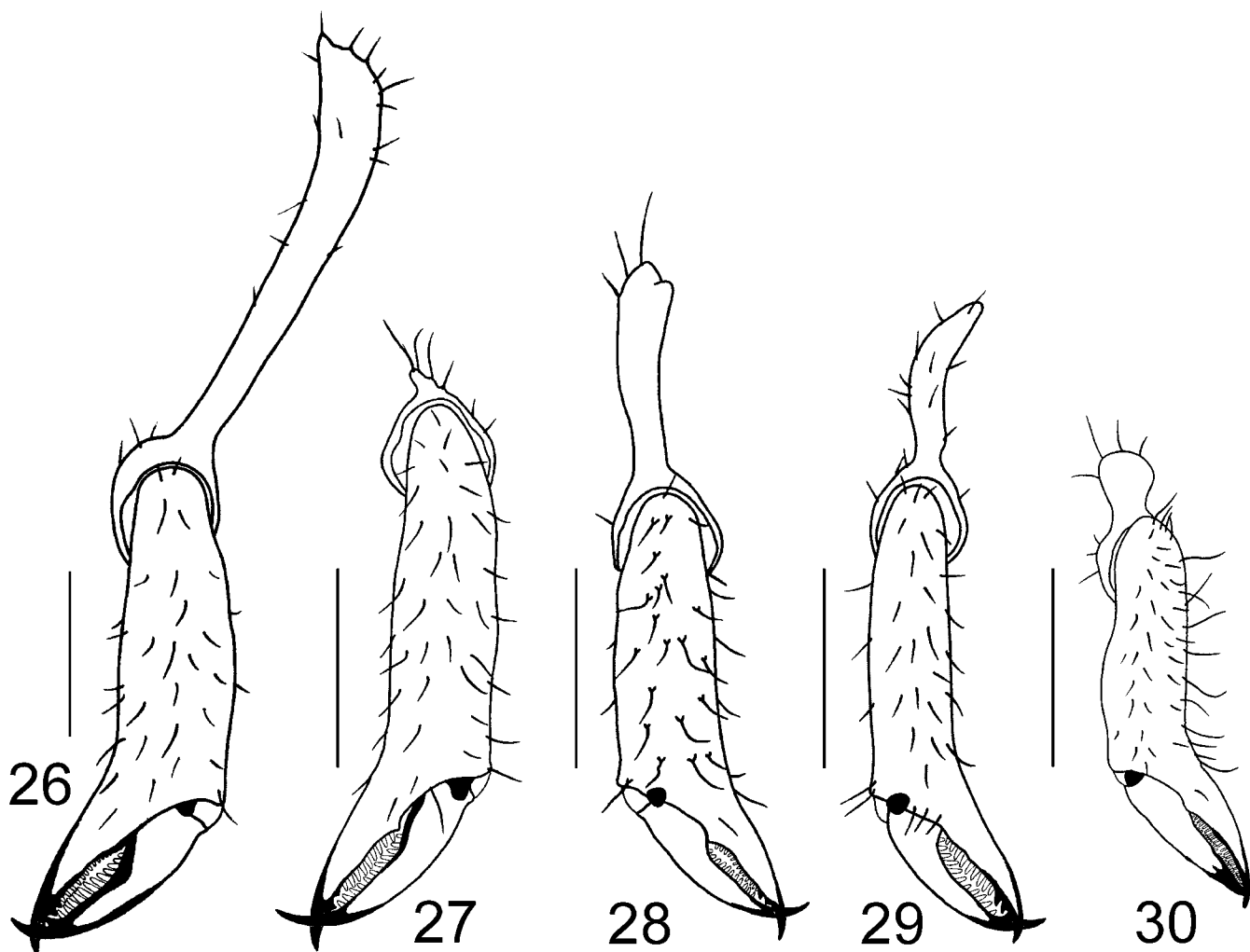
Distribution: Ukraine: the Crimean caves (Grese, 1911; Lebedinsky, 1914; Ljovuschin & Starobogatov, 1963; Ljovuschin, 1972; Starega, 1978; Chevrizov, 1979; present data) (Map 2).

Description: Male (from Crimea, Boryu-Teshik Cave): Body length 1.84, width 1.12. Chelicera: basal segment length 1.03, distal segment length 0.83, chela length 0.40, length of apophysis 0.21. Penis length 1.37, width at base 0.16. Length of palp segments: Tr 0.81, Fm 2.27, Pt 2.38, Tb 1.76, Ts 0.98, total 8.2. Length of leg segments: I: Fm 4.21, Pt 0.88, Tb 3.22, Mt 6.88, Ts 2.94, total 18.13. II: Fm 8.22, Pt 1.00, Tb 6.34, Mt 13.58, Ts 5.32, total 34.46. III: Fm 4.53, Pt 0.82, Tb 3.18, Mt 7.02, Ts 3.43, total 18.98. IV: Fm 6.42, Pt 0.93, Tb 4.08, Mt 9.44, Ts 3.64, total 24.51.

Body weakly chitinised (Figs. 3, 13). Carapace and scutum divided by poorly visible furrow; their surfaces almost smooth, weakly granular. Cephalothorax and abdominal tergites without clear boundaries. Last abdominal tergite, on lateral edge, with longitudinal row of setae and microdenticles. Anal operculum with similar microdenticles. Abdominal sternites distinct, each in middle with longitudinal row of hairs and microdenti-

cles. Genital operculum from middle part to posterior margin covered with numerous microdenticles, distal part densely covered with hairs. Supracheliceral lamellae smooth. Ocularium rudimentary, low and sloping (Figs. 3, 13); eyes absent. Chelicerae of normal length (Figs. 25, 30); basal segment with clavate apophysis, strongly widened apically, with hairs on tip; dorsal side of both segments covered with rows of hairs; chela digits with numerous flat microsetae. Palps long and thin (Fig. 32), covered with short and long protruding hairs; patella equal to or longer than femur; trochanter very long, almost straight, ventrally with three tiny, sometimes poorly visible tubercles, each with a large hair at tip. Legs long, coxae and trochanters covered with numerous microdenticles, tubercles and hairs; femora long, pseudosegments situated in medial part, their numbers: I 7–11; II 15–20; III 6–8; IV 12. Claws of all legs long, crescent-shaped and identical. Penis long (Fig. 42); stylus very short, kidney-shaped. Glans covered with spicules directed basally.

Female (from Crimea, Boryu-Teshik Cave): Body length 2.69, width 1.22. Chelicera: basal segment length 0.68, distal segment length 0.88, chela length 0.44. Length of palp segments: Tr 0.80, Fm 2.22, Pt 2.32, Tb 1.70, Ts 0.98, total 8.02. Length of leg segments: I: Fm



Figs. 26–30: Male chelicerae of *Nemaspela* species, frontal views. 26 *N. kovali* sp. n., left; 27 *N. abchasica*, left; 28 *N. sokolovi*, right; 29 *N. birsteini*, right; 30 *N. caeca*, right. Scale lines=0.5 mm.

3.71, Pt 0.88, Tb 2.77, Mt 5.78, Ts 2.84, total 15.98. II: Fm 6.42, Pt 0.94, Tb 5.31, Mt 11.16, Ts 4.34, total 28.17. III: Fm 3.89, Pt 0.84, Tb 2.91, Mt 5.92, Ts 3.24, total 16.8. IV: Fm 5.92, Pt 0.82, Tb 3.74, Mt 9.68, Ts 3.66, total 23.82.

Similar to male (Figs. 4, 14), but differs from it by the following characters: body usually larger; apophysis on basal segment of chelicera absent; trochanter of palp ventrally with 6–7 tubercles; number of femoral pseudo-segments: I 9–11; II 13–14; III 8–9; IV 9–10.

***Nemaspela femorecurvata* Martens, 2006 (Map 1)**

Nemaspela femorecurvata Martens, 2006: 171–173, figs. 14–15.

Diagnosis: This species differs from other species of *Nemaspela* in the absence of an apophysis on the basal segment of the male chelicerae and in the recurved femora (see Martens, 2006: fig. 14).

Distribution: Georgia: Lambrolauri Distr., Ratscha Mt. Range, Sakishore Cave (Martens, 2006) (Map 1).

Description: See Martens (2006).

***Nemaspela kovali* sp. n. (Figs. 7–8, 17–18, 21, 26, 35–39, Map 1)**

Types: Holotype ♂ (ZIN) from Russia, C. Caucasus, Kabardino-Balkaria, source of Belaya River, Fontanka Cave, 23 June 1999, A. G. Koval. Paratypes: RUSSIA: C. Caucasus, Kabardino-Balkaria: 1♀ (ZIN), source of

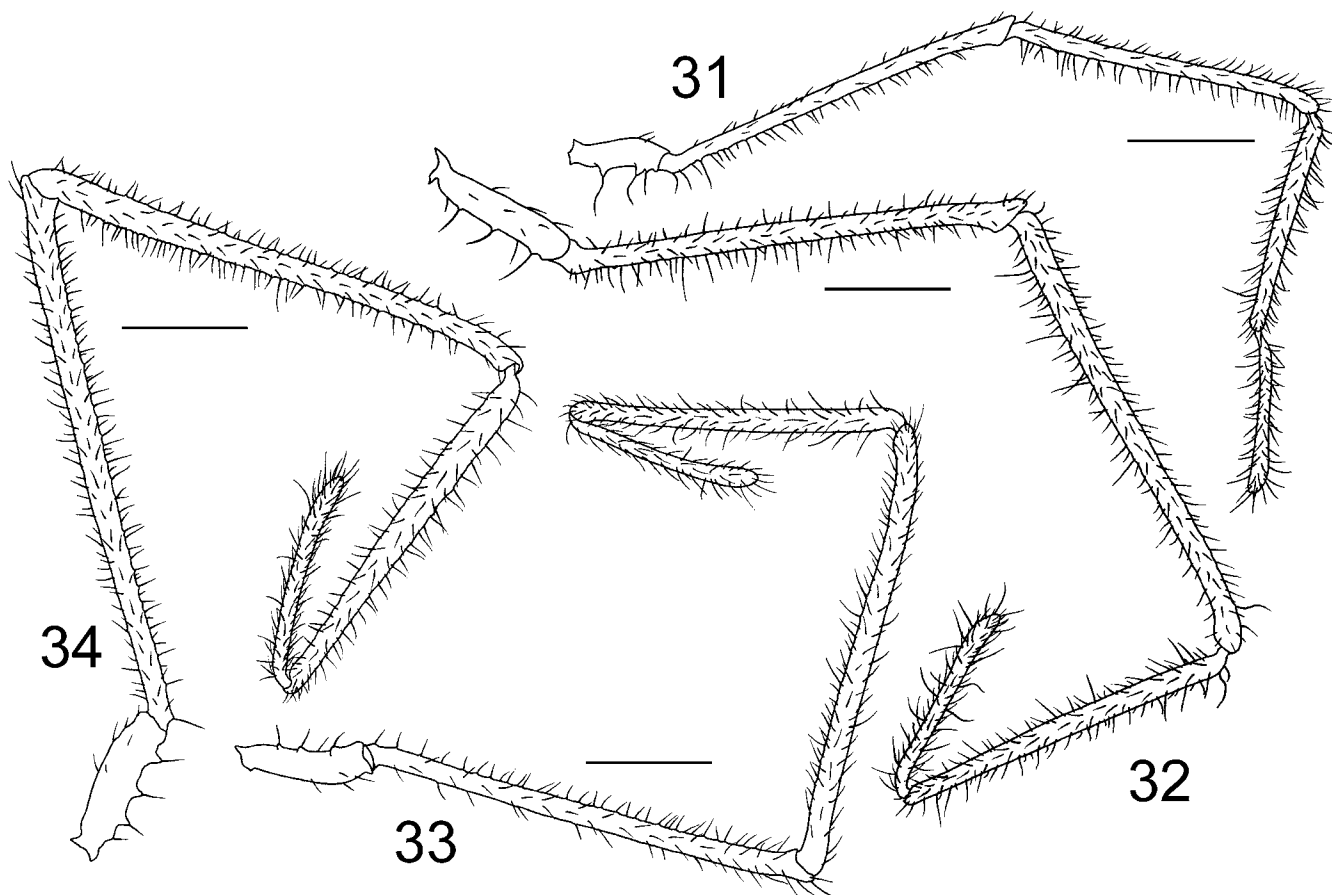
Belaya River, Fontanka Cave, 10 June 2000, A. G. Koval; 1♂ (ZMMU), s.l., 21 May 1998, A. G. Koval; 1♂ (ISEA), s.l., 20 July 2000, A. G. Koval; 3♂ 2♀ (ISEA), s.l., 23 June 1999, A. G. Koval; 1♂ 1♀ (ISEA), s.l., 30 July 2001, A. G. Koval; 1♂ (ISEA), s.l., 28 August 1998, A. G. Koval; 1♂ (ISEA), canyon of upper stream of Nalchik River, Omega-15 Cave, 2 August 2000, A. G. Koval; 1♀ (ZMMU), s.l., 28 May 1998, A. G. Koval; 1♂ (ISEA), s.l., 22 July 2002, A. G. Koval; 1♂ (ZMMU), same river canyon, Omega-12 Cave, 25 June 1999, A. G. Koval; 1♀ (ISEA), s.l., 6 August 1999, A. G. Koval; 2♂ 1♀ (ZIN), canyon of River Elekansu, Otte-Shik Cave, 8 August 1999, A. G. Koval.

Etymology: This species is named in honour of the collector, Dr Aleksandr G. Koval (All-Russian Institute of Plant Protection, Pushkin, St Petersburg, Russia).

Diagnosis: In its general appearance, *N. kovali* is similar to *N. sokolovi*, but clearly differs in having a much longer apophysis on the basal segment of the male chelicerae (Figs. 21, 26 cf. Figs. 23, 28). Also, the male of *N. kovali* has the penis with small keels near the glans, and a short hook-shaped stylus, widening at its tip (Fig. 39). See also Table 1.

Distribution: Russia: Kabardino-Balkaria (present data) (Map 1).

Description: *Male* (paratype from Kabardino-Balkaria, Fontanka Cave): Body length 1.92, width 1.22. Chelicera: basal segment length 0.92, distal segment length 1.02, chela length 0.51, length of apophysis 1.42.



Figs. 31–34: Male palps of *Nemaspela* species, retrolateral views: **31** *N. sokolovi*, right; **32** *N. caeca*, right; **33** *N. birsteini*, left; **34** *N. abchasica*, right. Scale lines=0.5 mm.

Penis length 1.81, width at base 0.26. Length of palp segments: Tr 0.56, Fm 2.19, Pt 1.72, Tb 1.30, Ts 0.86, total 6.63. Length of leg segments: I: Fm 4.12, Pt 0.84, Tb 2.28, Mt 5.98, Ts 2.46, total 15.68. II: Fm 6.93, Pt 0.91, Tb 5.42, Mt 8.12, Ts 5.17, total 26.55. III: Fm 4.25, Pt 0.80, Tb 2.63, Mt 6.38, Ts 2.42, total 16.48. IV: Fm 5.92, Pt 0.88, Tb 3.21, Mt 7.14, Ts 3.42, total 20.57.

Body weakly chitinised (Figs. 8, 17, 37–38). Carapace and scutum divided by poorly visible furrow; their surfaces almost smooth, weakly granular. Cephalothorax and abdominal tergites without clear boundaries. Last abdominal tergite, on lateral edge, with longitudinal row of setae. Abdominal sternites distinct, each in middle with longitudinal row of hairs. Supracheliceral lamellae smooth. Ocularium high and convex, rudimentary (Figs. 8, 17); eyes absent. Chelicerae long (Figs. 8, 17, 21, 26); basal segment with very long apophysis with 2–3 apical tubercles, covered with hairs; distal and basal segments dorsally with rows of hairs; chela digits with numerous flat microsetae. Palps long and thin (Fig. 35), covered with short and long protruding hairs; patella distally with apical tooth directed mesally (Fig. 36); trochanter short and visibly swollen, ventrally with two forward-protruding tubercles, with long hairs on tips. Legs long, coxae covered with tubercles and hairs; femora long, pseudosegments situated in medial part, their numbers: I 13–14; II 18–22; III 11–12; IV 13–14. Claws of all legs long, crescent-shaped and identical. Penis long (Fig. 39). Glans somewhat swollen, gradually merging into stylus. Corpus near glans with small lateral keels. Stylus hook-shaped, widening at tip. Glans covered with spicules directed basally.

Female (paratype from Kabardino-Balkaria, Fontanka Cave): Body length 1.78, width 1.32. Chelicera: basal

segment length 0.81, distal segment length 1.02, chela length 0.41. Length of palp segments: Tr 0.57, Fm 2.38, Pt 1.92, Tb 1.42, Ts 0.91, total 7.20. Length of leg segments: I: Fm 4.68, Pt 0.83, Tb 2.79, Mt 5.24, Ts 2.47, total 16.01. II: Fm 7.78, Pt 0.99, Tb 5.58, Mt 10.22, Ts ?, total ?. III: Fm 4.72, Pt 0.79, Tb 2.52, Mt 5.22, Ts 2.42, total 15.67. IV: Fm 5.56, Pt 0.88, Tb 3.08, Mt 7.76, Ts 2.94, total 20.22.

Similar to male (Figs. 7, 18), but basal segment of chelicerae without apophysis, patella distally without tooth directed mesally, and number of femoral pseudo-segments: I 11; II 21; III 10; IV 13–14.

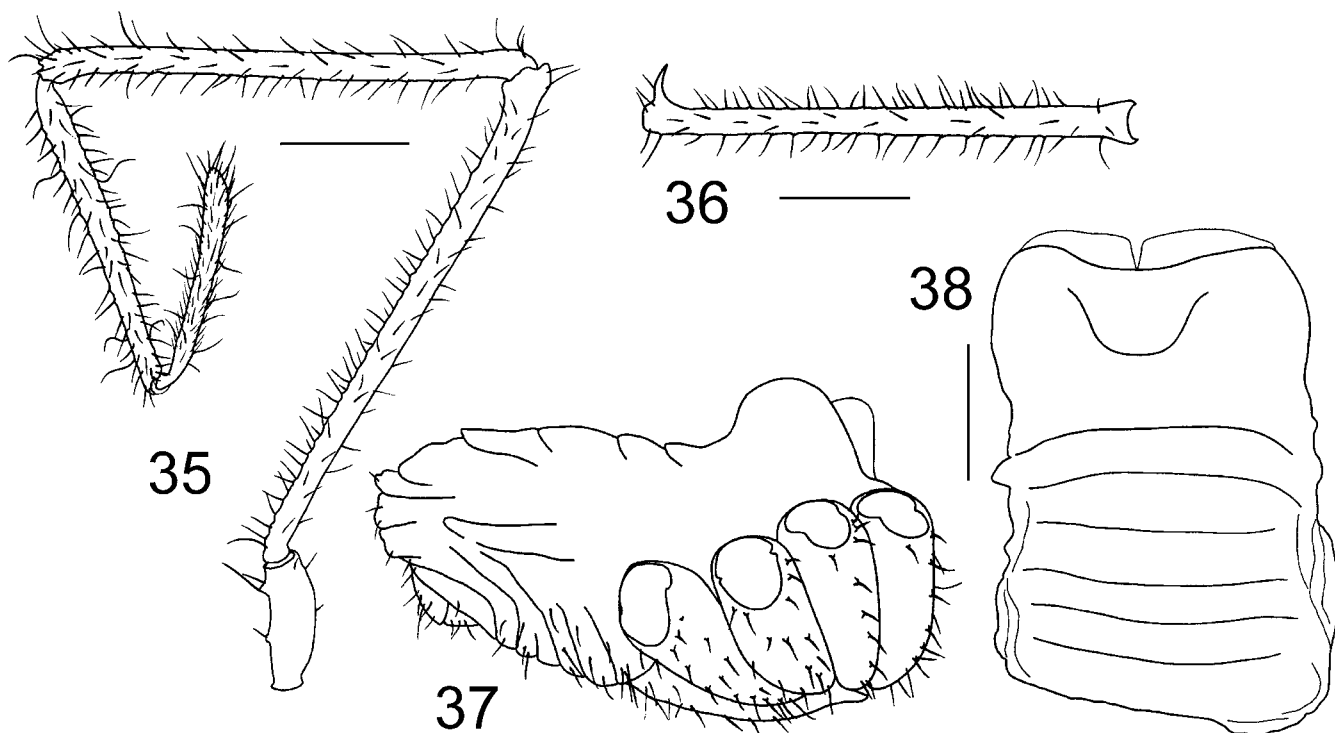
***Nemaspela sokolovi* (Ljovuschin & Starobogatov, 1963)**
(Figs. 5–6, 15–16, 23, 28, 31, 41, 43, Map 1)

Buresiolla sokolovi Ljovuschin & Starobogatov, 1963: 41, 45–47; figs. 1, 3–4.

Nemaspela sokolovi: Ljovuschin, 1972: 66; Šilhavý, 1966: 68–69, 72, fig. 4; Starega, 1978: 202; Chevrizov, 1979: 11, figs. 51–53; Martens, 2006: 175.

Material: RUSSIA: *W. Caucasus, Krasnodar Territory, Sochi*: 1♀ (ZMMU), Vorontsovskaya Cave complex, Dolgaya Cave, 16 August 2000, A. G. Koval; 1♀ (ISEA), s.l., Vorontsovskaya Cave, 17 August 1999, A. G. Koval; 1♀ (ISEA), s.l., Labirintovaya Cave, 20 August 1996, A. G. Koval; 1♀ (ZMMU), s.l., Dolgaya Cave, 9 August 2002, A. G. Koval; 1♂1♀ (ISEA), same cave, 16 August 1999, A. G. Koval.

Diagnosis: In its general appearance and structure of the penis, this species is closest to *N. abchasica*, but can be distinguished by the following characters: male palpal patella distally with acute tooth directed mesally; basal



Figs. 35–38: Male of *Nemaspela kovali* sp. n. **35** Left palp, retrolateral view; **36** Left palpal patella, dorsal view (same in *N. sokolovi*); **37** Body, lateral view; **38** Body, dorsal view. Scale lines=0.5 mm.

segment of chelicerae with long apophysis bifurcated at tip (Figs. 23, 28). See also Table 1.

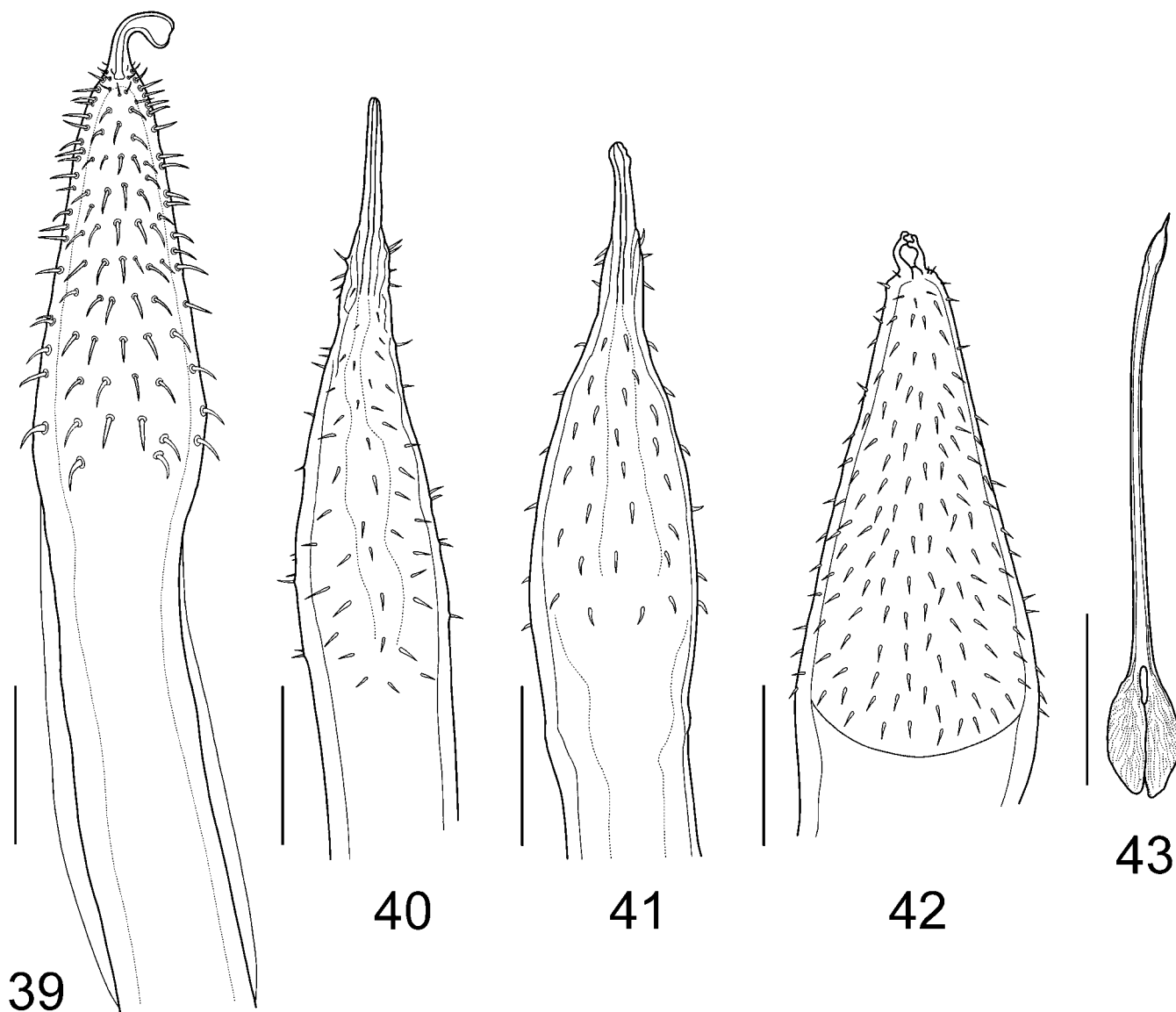
Distribution: Russia: Krasnodar Territory (Ljovuschin & Starobogatov, 1963; Ljovuschin, 1972; Staręga, 1978; Chevrizov, 1979; Martens, 2006; present data) (Map 1).

Description: Male (from Sochi, Dolgaya Cave): Body length 1.81, width 1.22. Chelicera: basal segment length 0.75, distal segment length 0.89, chela length 0.49, length of apophysis 0.56. Penis length 1.74, width at base 0.23. Length of palp segments: Tr 0.50, Fm 1.71, Pt 1.48, Tb 0.98, Ts 0.72, total 5.39. Length of leg segments. I: Fm 4.07, Pt 0.72, Tb 3.11, Mt 5.46, Ts ?, total ?. II ?. III: Fm 4.18, Pt 0.75, Tb 2.82, Mt 5.34, Ts 2.64, total 15.73. IV: Fm 5.91, Pt 0.84, Tb 3.68, Mt 7.89, Ts 3.32, total 21.64.

Body weakly chitinised (Figs. 5, 15). Carapace and scutum divided by poorly visible furrow; their surfaces almost smooth, weakly granular. Cephalothorax and abdominal tergites without clear boundaries. Last abdominal tergite, on lateral edge, with longitudinal row of setae. Abdominal sternites distinct, each in middle with longitudinal row of hairs. Supracheliceral lamellae smooth. Ocularium very low, slightly swollen (Figs. 5,

15); eyes absent. Chelicerae of normal length; basal segment with long apophysis bifurcated at tip and covered with hairs (Figs. 5, 15, 23, 28); distal and basal segments dorsally with rows of hairs. Palps long and thin (Fig. 31), covered with short and long protruding hairs; patella distally with apical tooth directed mesally (as in Fig. 36 of *N. kovali*); trochanter short, distinctly curved, ventrally with 2–3 forward-protruding tubercles, with long hairs on tips, distal tubercle bifurcated. Legs long, coxae covered with tubercles and hairs; femora long, pseudosegments situated in medial part, their numbers: I 7; II ?; III 8; IV 13. Claws of all legs long, crescent-shaped and identical. Penis long (Figs. 41, 43), glans gradually merging into stylus. Stylus long and thin, expanded at base. Glans covered with spicules directed basally.

Female (from Sochi, Dolgaya Cave): Body length 1.89, width 1.54. Chelicera: basal segment length 0.62, distal segment length 1.01, chela length 0.39. Length of palp segments: Tr 0.59, Fm 1.84, Pt 1.62, Tb 1.13, Ts 0.79, total 5.97. Length of leg segments. I: Fm 3.92, Pt 0.75, Tb 3.02, Mt 2.98, Ts 2.54, total 13.21. II: Fm 6.82,



Figs. 39–43: Glans of *Nemaspela* species. **39** *N. kovali* sp. n.; **40** *N. abchasicca*; **41** *N. sokolovi*; **42** *N. caeca*; **43** *N. sokolovi*, general appearance of penis. Scale lines=0.05 mm (39–42), 0.5 mm (43).

Pt 0.81, Tb 5.68, Mt 11.14, Ts 4.17, total 28.62. III: Fm 4.02, Pt 0.78, Tb 2.92, Mt 5.21, Ts 2.33, total 15.26. IV: Fm 6.03, Pt 0.81, Tb 3.64, Mt 8.91, Ts 3.24, total 22.63.

Similar to male (Figs. 6, 16), but basal segment of chelicerae without apophysis; number of femoral pseudo-segments: I 9; II 17; III 8; IV 10.

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