

A new species of silverfish of the genus *Persiatelurina* Molero *et al.*, 2018 (Zygentoma: Nicoletiidae) from Crimea

Новый вид щетинохвосток рода *Persiatelurina* Molero *et al.*, 2018 (Zygentoma: Nicoletiidae) из Крыма

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KEY WORDS: Karadag, Caucasus, Southwestern Iran, Atelurinae, morphology, taxonomy, key to species.

КЛЮЧЕВЫЕ СЛОВА: Карадаг, Кавказ, Югозападный Иран, Atelurinae, морфология, таксономия, видовой ключ.

ABSTRACT. A new silverfish species *Persiatelurina crimeana* **sp.n.** is described from Karadag Nature Reserve in the eastern part of the Crimean Mountains. It differs from other species of this genus: *P. caucasica* (Kaplin, 2016) from Abkhazia, *P. daghestaniana* Kaplin, 2019 from the vicinity of Derbent (Daghestan) and *P. farsiana* Molero *et al.*, 2018 from Southwestern Iran by the structure of the hind margin of urotergite X, number pegs on underside of male uritergite X, number divisions of female ovipositor.

РЕЗЮМЕ. Описан новый вид *Persiatelurina crimeana* **sp.n.** из Карадагского заповедника в восточной части Крымских гор. Он отличается от других видов этого рода: *P. caucasica* (Kaplin, 2016) из Абхазии, *P. daghestaniana* Kaplin, 2019 из окрестности Дербента (Дагестан) и *P. farsiana* Molero *et al.*, 2018 из юго-западного Ирана строением заднего края тергита X брюшка, количеством опорных колышков на нижней стороне тергита X брюшка самца, числом члеников яйцеклада у самки.

Introduction

Silverfish of the family Nicoletiidae are eyeless and lack pigment [Smith, McRae, 2016]. Nicoletiid fauna is very diverse, including six subfamilies and about 90 genera [Mendes, 1994]; among them about 70 genera and more than 140 species belong to the subfamily Atelurinae [Mendes, 2012]. They

are found in soil-related and subterranean habitats in regions with warm temperate, subtropical and tropical climatic conditions. Despite the high species richness, the subfamily has been poorly studied. The genus *Persiatelurina* Molero *et al.*, 2018 with the type species *P. farsiana* Molero *et al.*, 2018 was described from Fars province (Iran) [Tahami *et al.*, 2018] and currently includes only three valid species. In addition to the type Iranian species, one congener, *i.e.* *P. caucasica* (Kaplin, 2016), is known from Abkhazia and another one, *P. daghestaniana* Kaplin, 2021, from Dagestan [Kaplin, 2016; Kaplin, Vasin, 2019]. Species of the genus *Persiatelurina* are characterized by the presence of three pairs of styli on urosternites VII–IX, 1 + 1 exertile vesicles on urosternite II, and 1 + 1 pseudovesicles on urosternite VII; the galea with two apical conules and pretarsi with small pulvilli. Below we describe a new species of the genus, namely *P. crimeana* Kaplin, **sp.n.**, based on specimens from the Karadag Nature Reserve (Crimea).

Materials and methods

Three specimens, which were collected in the Karadag Nature Reserve (Crimea) by the authors were stored in 75% alcohol. The specimens, *i.e.*, holotype (male) and two paratypes (females) were dissected and mounted on glass microscope slides in the Berlese Fluid. Figures were made using microscope and drawing tool. The types of the new species are deposited in the collection of the All-Russian Institute of Plant Protection (VIZR), St Petersburg-Pushkin.

Results and discussion

Order Zygentoma Börner, 1904
Family Nicoletiidae Escherich, 1905
Subfamily Atelurinae Remington, 1954

Genus *Persiatelurina* Molero, Tahami,
Gaju et Sadeghi, 2018

Type species: *Persiatelurina farsiana* Molero, Tahami,
Gaju et Sadeghi, 2018.

Persiatelurina crimeana Kaplin, **sp.n.**
Figs 1–16.

<http://zoobank.org/urn:lsid:zoobank.org:pub:A1DAC754-0408-42A9-A04B-97F2217E42C5>

MATERIAL. Holotype, ♂ (slides); Republic of Crimea, Karadag Nature Reserve, environs of Kurortnoe, leg. V. Martynov, 3.X.2020, under stones with ants *Tetramorium* sp., 44°54'45"N, 35°11'30"E (VIZR). Paratypes, 2 ♀♀ (slides); same data and place of collection as for holotype (VIZR).

DESCRIPTION. Body length 3.0–3.9 mm; head length 0.22–0.25 mm; thorax length 1.1–1.3 mm. Head width 0.7–0.8 mm; thorax width 1.1–1.4 mm; abdominal segment IX width about 0.50–0.55 mm. General body colour whitish with golden setae and scales. Small size, elongate ateluriform shape, covered with relatively large scales, including head and coxae. Body 2.6–3.0 times longer than wide; head small, about 3.0–3.5 times wider than long. Antennae and cerci partially broken. Male pedicellus of antennae with well-developed almost triangular apophysis not reaching distal margin of the first flagellomere (Fig. 1). Articles of cerci and caudal filament only with one, two or 3–8 dorsal, ventral and lateral trichobothria. Macrochaetae simple or with apical bifurcations.

Basal annuli of flagellum also with trichobothria: the first annulus of antennal flagellum with 4–7, the second one with two, and 3–7th annuli with one trichobothrium. Mandibles with well-developed incisor and molar regions and with a row of macrochaetae along outer surface, first of which with apical bifurcation. Incisor region with five (in male, Fig. 2) or six (in female) incisives. Maxillary palps with five palpomeres. Ultimate palpomere of maxillary palps 1.2 times longer than penultimate in females and in 1.5 times in male. Ultimate palpomere with three apical sensorial papillae of usual form in both females and male (Fig. 3).

Galea of maxilla with two apical conules, one of which more rounded than the other. Apical tooth of lacinia single-top, pectinate prosthema long with about 18 (female) or 16 (male) narrow hyaline projections, five bifurcated hyaline lamellae, first of which large and perpendicular, the rest inclined, and with 3–4 simple macrochaetae and 2–3 small setae along inner margin. Perpendicular lamella in apical part with five lateral projections (Figs 3, 4). Apical palpomere of labial palp ovoid, in female about 1.3–1.4, in male 1.5 times longer than wide, with six typical sensorial papillae (Fig. 5). Undersurface of last three palpomeres of labial palps with numerous relatively shortened and thickened, slightly curved, apically bifurcated setae. Glossae divided into two pairs of lobes, shorter than paraglossae. Paraglossae with simple setae.

Lateral margins of thoracic tergites with a row of setae, two of which in the posterior corners apically bifurcated and the longest, without sensory fields. Anterior border of pronotum with numerous small setae. Posterior margin of pro-, meso-

and metanotum in both female and male with 4, 5 and 7–8 thin setae, respectively (Fig. 6).

Legs quite elongate. Coxae and femora widened (Fig. 7). Ratio length to width of coxae I, II and III about 1.57, 1.35 and 1.43; femora — 1.83, 1.82 and 1.90; tibia — 3.56, 3.37 and 4.05, respectively. Apex of dorsal part of tibia I, II and III with two, femur with one lyriform spines in both female and male (Fig. 8). Tibia also with one relatively large apical spur and four ventral simple macrochaetae. Middle part of femur I, II and III with two long macrochaetae, distal ones bifid and proximal ones simple. Praetarsus with two strong claws, two small pulvilli, medial empodial claw and slightly convex small support oval platform with 3–4 transverse ribs.

Urotergites I–VIII infralaterally with 2 + 2 bifid and 3 + 3 additional simple macrosetae; inner setae more robust and longer than others. Posterior margin of urotergites I–VIII with 4–5 setulae in female and 4–6, sometimes 8–10 setulae in male. Urotergite IX with posterolateral corners protruding, with 2 + 2 apical, 4–5 + 4–5 outer and 1–2 + 1–2 inner shorter macrosetae. Urotergite X with semi-circular concave hind margin (Figs 9, 11). Ratio depth to width of concave about 0.53 in female and 0.70 in male. Apex of posterolateral angles of urotergite X with 1 + 1 long and strong macrosetae, inner and outer margin of notch with 3–4 + 3–4 macrosetae. In male, underside of tergite X with 1 + 1 groups, usually consisting of 5 pegs; opposite them, there are also 5 + 5 pegs on the inner lateral side of basal cercomeres (Fig. 9).

Urosternite I with 1 + 1 submedian small setulae. Urosternite II with one pair of submedian vesicles (Fig. 12). Urosternite III with 4–5 + 4–5 (Fig. 13), IV–VI with 5–6 + 5–6 setae in the hind margin. 1 + 1 submedian macrosetae long, apically bifurcated. Urosternite VII with one pair of pseudovesicles and with subgenital plate (Fig. 13). Subgenital plate well-developed, 1.8 times wider than long, with rounded hind margin and with single row of simple setae, apically slightly acute. Styli on urosternites VII–IX. Length ratios of styli (without apical spines) and urosternite VII about 0.58, urocoxites VIII — 0.70, urocoxites IX — 0.80, apical spines and styli — 0.24, 0.22 and 0.20, respectively (Fig. 14).

Male parameres wide, 7-segmented, longer than the penis, and slightly protrude beyond the tips of the coxites IX (Fig. 10).

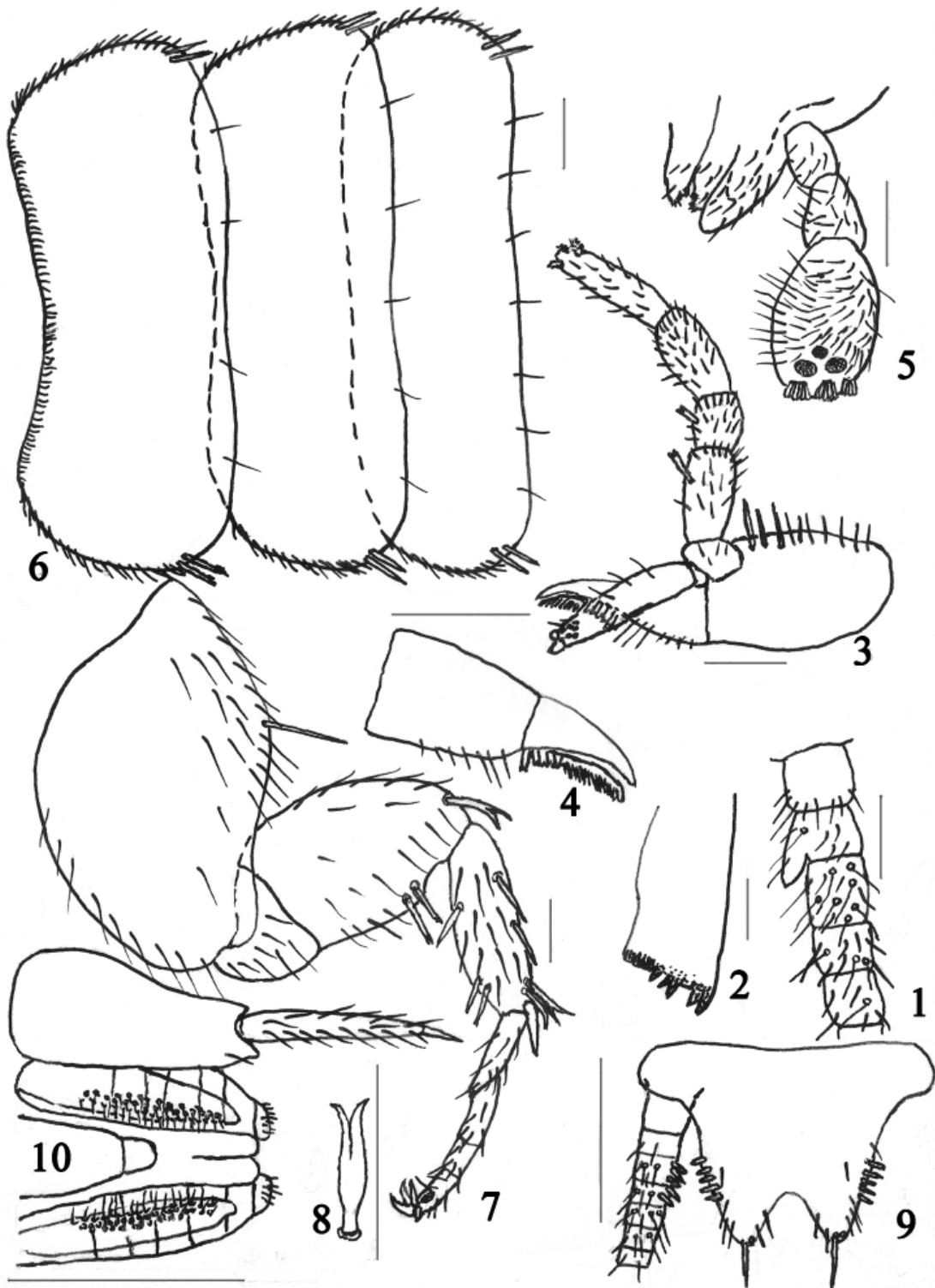
Ovipositor spindle-shaped, slightly shorter than styli IX, gonapophyses VIII and IX with eight divisions and acute apices. Gonapophyses VIII and IX with acute apex. Gonapophyses VIII with numerous outer straight setae. Outer margin of gonapophysis VIII also with one or two thin long sensorial setae on 1st to 7th divisions. Outer margin of gonapophysis IX with one or two long sensorial setae on 2nd to 7th and three such setae on apical division (Figs 15, 16). Gonapophyses IX also with an inner apical spiny area. Apical part of gonapophyses IX also with well-developed oval sensorial field.

ETYMOLOGY. The name of the new species derives from the name of Crimea.

COMPARATIVE REMARKS. The main differences between species are given in Table 1 and in the Key below.

A KEY TO THE SPECIES OF THE GENUS *PERSIATELURINA* MOLERO, TAHAMI, GAJU ET SADEGHI, 2018

- 1(4) Number of setulae on the posterior margin of pronotum 10–11. Ratio depth to width of concave on the hind margin of urotergite X less than 0.5. Number divisions of ovipositor 9.
- 2(3) Ratio depth to width of concave on the hind margin of urotergite X about 0.45. Ratios of lengths of styli (without



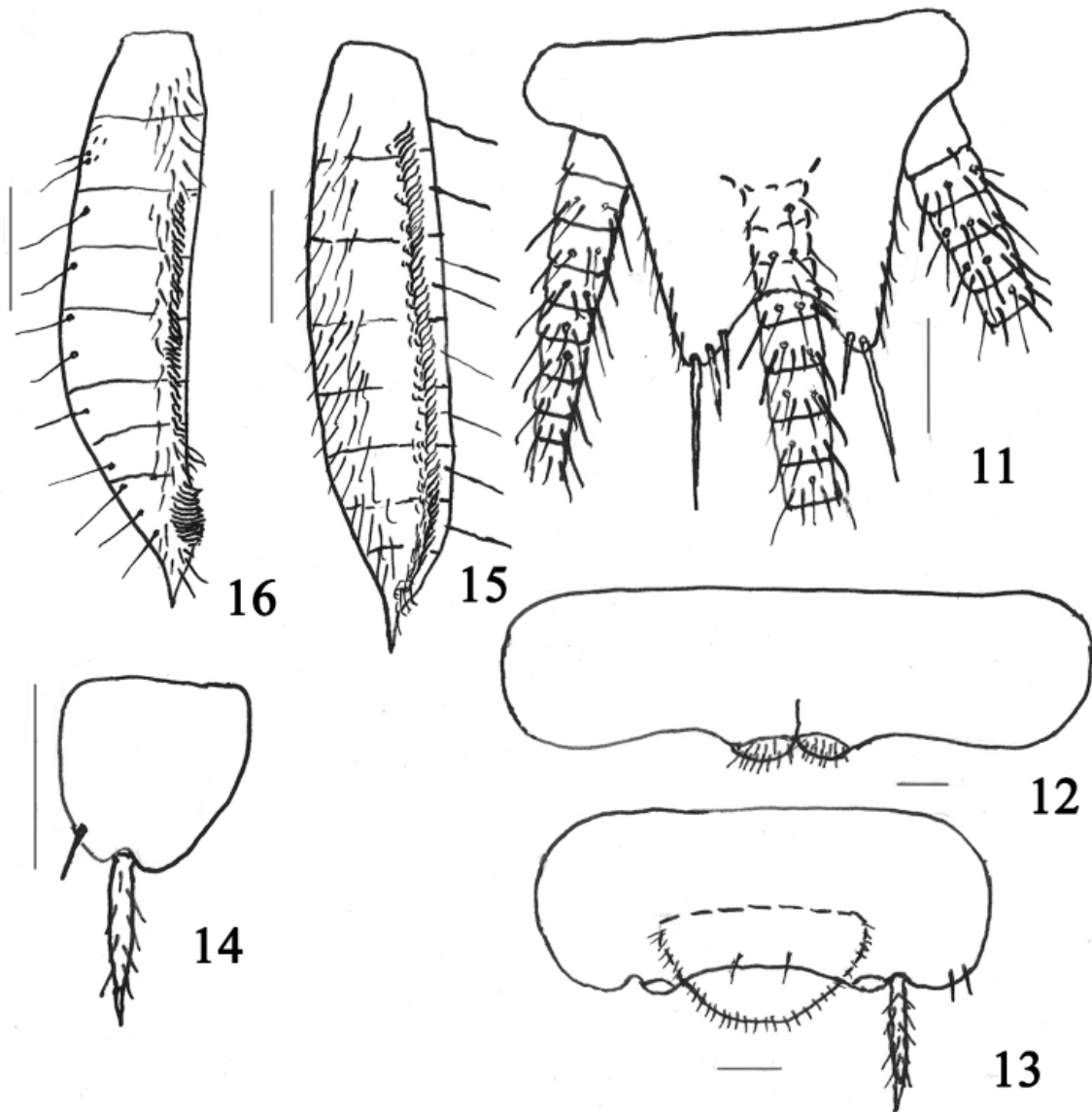
Figs 1–10. *Persiatelurina crimeana* sp.n., holotype (male): 1 — scapus, pedicellus and three fallomeres of flagellum; 2 — apex of mandibula; 3 — maxillary palp and maxilla; 4 — lacinia of maxilla; 5 — labial palp with labium (part); 6 — pro-, meso- and metanotum; 7 — fore leg; 8 — lyriform spine; 9 — urotergite X and cercus with lateral pegs; 10 — penis, parameres, urocoxite IX and stylus. Scale bar: 0.1 mm.

Рис. 1–10. *Persiatelurina crimeana* sp.n., голотип (самец): 1 — основной членик, ножка с апофизом и три членика жгутика усика; 2 — верхина верхней челюсти; 3 — нижнечелюстной щупик и нижняя челюсть; 4 — лациния нижней челюсти; 5 — нижнегубной щупик и нижняя губа (часть); 6 — передне-, средне- и заднегрудной тергиты; 7 — передняя нога; 8 — лировидная щетинка; 9 — тергит X сегмента брюшка и церка с боковыми кольшками; 10 — пенис, параметры, коксит 9-го сегмента брюшка с грифельком. Масштабные линейки: 0,1 мм.

- apical spines) to urosternite VII about 0.74, to urocoxite IX — 0.84. — Daghestan *P. daghestaniana* Kaplin, 2019
- 3(2) Ratio depth to width of concave on the hind margin of urotergite X about 0.27. Ratios of lengths of styli (without apical spines) to urosternite VII about 0.63, to urocoxite IX — about 0.90. — Abkhazia *P. caucasica* (Kaplin, 2016)
- 4(1) Number of setulae on the posterior margin of pronotum 6–8. Ratio depth to width of concave on the hind margin of urotergite X more than 0.5. Number divisions of ovipositor 7–8.
- 5(6) Ratio depth to width of concave on the hind margin of urotergite X — 1.17 (female) and 0.60 (male). Number pegs on underside of male urotergite X — 23–25 + 23–25. Number divisions of ovipositor 7. — South-Western Iran *P. farsiana* Molero, Tahami, Gaju et Sadeghi, 2018
- 6(5) Ratio depth to width of concave on the hind margin of urotergite X in female and male — 0.53 and 0.70, respectively. Number pegs on underside of male urotergite X 5 + 5. Number divisions of ovipositor 8. — Crimea *P. crimeana* Kaplin, **sp.n.**

Competing interests. The authors declare no competing interests.

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Figs 11–16. *Persiatelurina crimeana* **sp.n.**, paratype (female): 11 — urotergite X, cerci and caudal filament (basal parts); 12 — urosternite II; 13 — urosternite VII and subgenital plate; 14 — urocoxite VIII; 15 — gonapophysis VIII; 16 — gonapophysis IX. Scale bar: 0.1 mm.
Рис. 11–16. *Persiatelurina crimeana* **sp.n.**, паратип (самка): 11 — тергит X сегмента брюшка, церки и каудальный филламент (часть); 12 — стернит II сегмента брюшка; 13 — стернит VII сегмента брюшка, грифелек и субгенитальная пластинка; 14 — коксит VIII сегмента брюшка; 15 — передний гонапофиз яйцеклада; 16 — задний гонапофиз яйцеклада. Масштабные линейки: 0,1 мм.

Table 1. Main morphological differences between *Persiatelurina crimeana* sp.n., *P. daghestaniana*, *P. caucasica* and *P. farsiana* [Kaplin, 2016; Kaplin, Vasin, 2019; Tahami *et al.*, 2018].

Таблица 1. Основные морфологические различия между *Persiatelurina crimeana* sp.n., *P. daghestaniana*, *P. caucasica* и *P. farsiana* [Kaplin, 2016; Kaplin, Vasin, 2019; Tahami *et al.*, 2018].

| Morphological characters | | <i>P. daghestaniana</i> | <i>P. caucasica</i> | <i>P. farsiana</i> | <i>P. crimeana</i> sp.n. |
|--|------|-------------------------|---------------------|-------------------------------|--------------------------|
| Body length, mm | | 3.2–3.8 | 4.1–4.6 | 4.5 | 3.1–3.9 |
| Number of macrochaetae on the inner margin of lacinia | | 5 | 7–8 | 4? | 5 |
| Ratio of lengths of ultimate to penultimate palpomeres of maxillary palps | | 1.2 | 1.3 | ? | 1.2 |
| Number of apical sensorial papillae on the ultimate palpomere of maxillary palps | | 4 | 3 | ? | 3 |
| Ratio length to width of tibia | I | 3.7 | 2.9 | 3.0 | 3.6 |
| | II | 4.2 | 2.6–2.7 | | 3.4 |
| | III | 4.5 | 3.2 | | 4.0 |
| Number of setulae on the posterior margin of pronotum | | 10 | 10–11 | 8 | 6–8 |
| Ratio depth to width of concave on the hind margin of urotergite X | | 0.45 ♀ | 0.27♀ | 1.17 ♀ 0.60 ♂ Mean 0.87 | 0.53♀ 0.70♂ |
| Number pegs on underside of male urotergite X | | ? | ? | 23–25 + 23–25 | 5 + 5 |
| Ratios of lengths of styli (without apical spines) to urosternite (VII) or urocoxites (VIII, IX) | VII | 0.74 | 0.63 | ? | 0.58 |
| | VIII | 0.78 | 0.63–0.66 | | 0.70 |
| | IX | 0.84 | 0.88–0.89 | | 0.80 |
| Number divisions of ovipositor | | 9 | 9 | 7 | 8 |

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