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A new species of larval *Caeculisoma* (Trombidiformes: Erythraeidae) from Brazil with a key to species

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Abstract

Larvae of *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (Trombidiformes: Erythraeidae) collected from Brazil, is described and illustrated. This is the second species of the genus from Brazil. A key to the larval species of *Caeculisoma* of the world is presented and the key to world genera of larval Callidosomatinae are amended. We suggest considering *Iguatonia seemani* Xu & Jin, 2020 as a junior synonym of *Dambullaeus jianfengensis* Xu & Jin, 2020.

Key words: Callidosomatinae, cave, *Dambullaeus*, *Iguatonia*, *Neomomorangia*

Introduction

The subfamily Callidosomatinae Southcott, 1957 (Trombidiformes: Erythraeidae) comprises 10 genera based on larvae, post-larval forms or both (Hakimitabar & Saboori 2022). Clark (2014) raised the subgenus *Neomomorangia* to generic status but it was not included in the subfamily Callidosomatinae by Hakimitabar & Saboori (2022) without any comment. The genera *Pussardia* Southcott, 1961a, *Harpagella* Southcott, 1996, *Nagoricanella* Haitlinger, 2009 and *Pukakia* Clark, 2014 were placed in Abrolophinae Witte, 1995 (Clark 2014; Kamran & Alatawi 2015) and a key to world genera (larva) was presented by Kohansal *et al*. (2023). The genus *Caeculisoma* (Erythraeidae: Callidosomatinae) consists of 10 species based on larvae and one species based on post-larval forms and larvae respectively as follows: *C. carmenae* Haitlinger, 2008; *C. cooremani* Southcott, 1972; *C. hunanica* Zheng, 2002; *C. huxleyi* Southcott, 1972; *C. mouldsi* Southcott, 1988; *C. nestori* Haitlinger, 2004; *C. sparnoni* Southcott, 1972; *C. penlineatus* Xu and Jin, 2019; *C. semispinus* Xu and Jin, 2019; *C. allopenlineatus* Xu and Jin, 2020, *C. darwiniense* Southcott, 1961, which the members of this genus are known as parasites of Hemiptera, Lepidoptera and Orthoptera (Southcott 1961b, 1972, 1988a; Zheng 2002; Haitlinger 2004, 2008; Mąkol & Wohltmann 2012, 2013; Stroiński *et al*. 2013; Xu *et al*. 2019a, b, 2020). Saboori *et al*. (2023) presented an identification key for 15 species based on post-larval forms. Overall, this genus comprises of 25 species based on larvae (10 species), post-larval forms (14 species) or both (one species) currently.

Up to now, only *C. nestori* has been recorded from Brazil. In this paper, a new species of *Caeculisoma* is described from Brazil, and a key to the world species (larvae) is presented. Also, key to the world genera of larval Callidosomatinae is amended after Hakimitabar & Saboori (2022).

Material and Methods

Collections of mites were carried out during biological inventory in caves, using visual search, the specimens were collected by hand and transferred immediately into vials containing 80% ethanol for preservation. Mites were cleared in Nesbitt's fluid and mounted on glass microscope slides (six slides, three of which with two specimens) using Hoyer's medium (Walter & Krantz 2009). Measurements (given in micrometres, µm) were calculated using a CH30 Olympus microscope and figures were drawn by a BX51 Olympus microscope equipped with a drawing tube. Lengths of leg tarsi were measured without the pretarsus. The terminology and abbreviations are adapted from Robaux (1974), Wohltmann *et al.* (2006) and Saboori *et al.* (2009).

Results

Erythraeidae Robineau-Desvoidy, 1828
Callidosomatinae Southcott, 1957

Key to world genera of larval Callidosomatinae [after Hakimitabar & Saboori (2022) with corrections and modifications]

1. fn Cx 1-1-1, fn Tr 2-2-2, palp femur and genu each with two setae . . . . . *Andrevella* Southcott, 1961a
- fn Cx 1-2-2, fn Tr 1-1-1, palp femur and genu each with one seta 2
2. Scutum with more than 3 pairs of normal setae . . . . . *Momorangia* Southcott, 1972
- Scutum with 3 pairs of normal setae 3
3. ASens posterior to PL. 4
- ASens anterior to PL 5
4. ML distinctly elongated, more than 2–3 times longer than AL and PL. . . . . *Dambullaeus* Haitlinger, 2001
- ML not clearly elongated . . . . . *Iguatonia* Haitlinger, 2004
5. Posterior pedotarsal claws pulvilliform, without hook element. . . . . *Charletonia* Oudemans, 1910
- Posterior pedotarsal claws pulvilliform, with ventrally directed hook 6
6. Odontus with 4–5 terminal teeth, Ti III with a large solenidion . . . . . *Carastrum* Southcott, 1988 (Southcott, 1988b)
- Odontus bifid, Ti III without a large solenidion. 7
7. ASens placed level with or anterior to the line joining center of ML scutalae . . . . . *Callidosoma** Womersley, 1936
- ASens usually between ML and PL scutulae or sometimes level with PL scutalae . . . . . *Caeculisoma* Berlese, 1888

* *Callidosoma guatemalensis* Treat, 1985 and *C. insulare* Treat, 1985 have been placed in this genus (Treat 1985; Mąkol & Wohltmann 2012, 2013), however, ASens situated posterior to the level of ML, which further studies are needed.

Remarks and Discussion

The larval genera of the subfamily Callidosomatinae are distinguished by the following characters: number of scutalae on scutum, number of setae on coxae and trochanter I–III, the position of ASens relative to PL and ML bases, the shape of palp tibial claw (odontus) and presence or absence of hook element on posterior pedotarsal claws.

Clark (2014) raised the subgenus *Neomomorangia* to generic status by differing from *Momorangia* by the absence of a posterior pedal tarsal claw hook, dorsal shield almost rectangular, carrying four pairs of thick and short, thickly pectinated (setulose) setae. However, after taking into

account the absence of hook element on posterior pedotarsal claws of *Momorangia binaloudensis* Noei and Saboori, 2015 (in Noei *et al*. 2015), the remaining characters related to the shape of dorsal scutum and scutalae is not strong enough to regard *Neomomorangia* as a separate genus. Hence, we suggest keeping *Neomemorangia* as a subgenus. Probably, Hakimitabar & Saboori (2022) also disagreed with Clark (2014) and ignored *Neomomorangia* without any comment.

The generic diagnosis of the genus *Andrevella*, *Caeculisoma* (larva), *Dambullaeus*, *Iguatonia* and *Momorangia* have been amended respectively by Saboori *et al*. (2007), Xu *et al*. (2019a), Mąkol *et al*. (2014), Xu *et al*. (2020) and Noei *et al*. (2015). Therefore, key to the genera of larval Callidosomatinae is amended. It is questionable that Xu *et al*. (2020) placed *Iguatonia seemani* Xu & Jin, 2020 in *Iguatonia* genus with ML (102–107), while the genus *Dambullaeus* is known in having elongated ML (more than 2–3 times longer than AL and PL) on the scutum. Also, metric data of *Dambullaeus jianfengensis* Xu & Jin, 2020 (Table 3, page 298) is similar to *Iguatonia seemani* Xu & Jin, 2020 (Table 4, page 307). The only difference between them is in the fn Ti I–III (17-17-18 vs. 17-19-19 in *I. seemani*) which more studies should be done and it is probably intraspecific variations.

Genus *Caeculisoma* Berlese, 1888

***Caeculisoma brazilensis* Noei & Šundić sp. nov. (Figs. 1–16)**

Diagnosis: ASens posterior to level of ML; palp tibial claw bifurcate, with two subterminal teeth; SD 130–154, ISD 100–112, PW 95–110, Ti III 340–377.

Description (n = 9)

Dorsum (Fig. 1). Dorsum of idiosoma with 31–35 barbed setae (33 in holotype). All dorsal setae with fine barbs. Scutum rectangular in shape, punctate, with two pairs of sensilla (ASens and PSens) and three pairs of normal setae (AL, ML and PL). ASens posterior to level of ML. PSens longer than ASens, both barbed at distal half (ASens broken in holotype and one paratype). AL, ML and PL subequal, all barbed. Posterolaterally on each side of the scutum one eye, not on platelet (diameter 25–27).

Venter (Fig. 2). Idiosoma ventrally with three pairs of sternal setae (*1a*, *2a*, *3a*); 13–17 setae (13 in holotype) behind coxae III, all ventral setae with fine barbs. Coxa I with one seta, coxa II and III each with two setae. A peg-like supracoxal seta (*elc I*) present on coxa I, 5 long. NDV= (31–35) + (13–17) = 46–51 (46 in holotype).

Gnathosoma (Figs. 3 and 4). Cheliceral bases punctate on the dorsal surface, cheliceral base 117–130 long; cheliceral blade slightly curved, 25–30 long, with a subterminal tooth. Subcapitulum with a nude galealae (*cs*) and two barbed hypostomalae (*as*, *bs*); palp trochanter 37–40 long, palp femur 60–70 long, with one barbed dorsal seta, palp genu 42–50 long, with one barbed dorsal seta. Palp tibia 18–25 long, with three barbed setae; palp tibial claw bifurcate, with two subterminal teeth, 20–25; palp tarsus 22–27 with five nude setae, one solenidion and one eupathidium; fPp= 0-B-B-BBB_2-5Nωζ. Palpal supracoxal seta (*elc P*) peg-like, 6 long.

Legs (Figs. 5–16). Leg segmentation formula 7-7-7. Leg setal formula: Leg I: Ta—1ω, 1ε, 2ζ, 1*z*, 29n (28n in one side of symmetry axis in holotype, ARS-20240410-1a); Ti—2φ, 1*z*, 1κ, 18n; Ge—1σ, 1κ, 12n; TFe—5n; BFe—4n; Tr—1n; Cx—1n (Figs. 5, 8, 11, 14). Leg II: Ta—1ω, 1ζ, 30n; Ti—2φ, 19n; Ge—1κ, 12n; TFe—5n; BFe—4n; Tr—1n; Cx—2n (Figs. 6, 9, 12, 15). Leg III: Ta—1ζ, 30n (31n in one side of symmetry axis in one specimen, ARS-20240410-1b; Ta III in one specimen damaged, ARS-20240410-1f); Ti—1φ, 19n; Ge—12n (13n in one side of symmetry axis in one specimen, ARS-20240410-1c); TFe—5n; BFe—2n; Tr—1n; Cx—2n (Figs. 7, 10, 13, 16).

Each leg tarsus with lateral falciform claws and a claw-like empodium. Posterior tarsal claws pulvilliform with ventrally directed hook element.

Metric data are given in Table 1.

TABLE 1. Metric and some meristic data for *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva). 1a, holotype; 1b–1i, paratypes**.**

Character	1a	1b	1c	1d	1e	1f	1g	1h	1i	Range
IL	370	-	2000	1800	1750	1100	1650	365	690	365–2000
IW	260	-	1375	1425	1275	725	1250	242	410	242–1425
SD	130	142	137	145	150	137	154	137	142	130–154
W	113	115	118	108	117	115	115	107	-	107–118
AW	80	82	81	77	82	75	81	80	-	75–82
MW	95	98	97, 105*	92	102	92	98	93	-	92–105
PW	102	105	110	98	107	105	105	95	-	95–110
AA	16	15	13	12	16	17	12	13	13	12–17
SB	18	16	17	20	17	20	17	16	16	16–20
ISD	100	105	112	105	103	105	112	105	107	100–112
AP	55	55	77/66	61	67/62	60	70	66	67	55–77
AL	82	87	85	75	90	80	95	87	87	75–95
ML	77	80	82	75	77	72	broken	82	72	72–82
PL	90	90	86	80	82	81	broken	87	85	80–90
ASens	broken	60	62	62	65	62	62	-	62	60–65
PSens	90	105	110	100	100	-	102	112	112	90–112
DS min.	52	52	55	60	50	60	55	50	50	50–60
DS max.	97	100	105	90	100	102	100	105	100	90–105
1a	82	92	95	85	87	85	91	87	90	82–95
1b	95	102	100	97	92	102	broken	95/107	100	92–107
2a	85	105	105	92	86	87	broken	92	90/97	85–105
$2b_1$	100	105	broken	95	102	102	106	96	97	95–106
$2b_2$	45	47	50	45	45	43	46	45	47	43–50
3a	87	90	87	80	87	90	broken	92	87	80–92
$3b_1$	broken	97	90	85	90	87	105	102	92	85–105
$3b_2$	45	55	52	50	45	45	47	50	47	45–55
GL	175	185	192	182	180	177	187	182	182	175–192
cs	37	45	42	45	42	37	40	40	40	37–45
as	17	21	17	17	25	25	25	20	20	17–25
bs	broken	92	87	92	87	87	broken	92	90	87–92
PaScFed	100	113	87	102	100	102	102	100	97	87–113
PaScGed	37	37	35	45	37	37	37	35	37	35–45
Ta I	198	202	217	200	205	202	207	202	197	197–217
Ti I	280	300	297	287	307	292	310	295	287	280–310
Ge I	195	226	227	215	222	212	228	220	220	195–228
TFe I	90	132	132	127	137	97	135	126	126	90–137
BFe I	125	137	142	135	138	137	136	137	146	125–146
Tr I	70	70	72	70	70	70	72	70	75	70–75
Cx I	87	97	85	80	90	85	90	80	90	80–97
Leg I	1045	1164	1172	1114	1169	1095	1178	1130	1141	1045–1195
Ta II	175	177	187	177	187	172	185	177	177	172–187
Ti II	252	260	252	253	270	260	276	250	251	250–276
Ge II	150	187	180	172	185	160	187	172	175	150–187
TFe II	75	100	105	102	112	80	107	100	107	75–112
BFe II	112	125	127	125	125	117	127	124	124	112–127
Tr II	70	77	75	71	77	75	77	69	75	69–77
Cx II	87	95	97	92	95	97	100	90	95	87–100
Leg II	921	1021	1023	992	1051	961	1059	982	1004	921–1059
Ta III	195	200	202	205	212	195	205	192	195	192–212
Ti III	340	360	350	340	370	350	377	340	340	340–377
Ge III	187	218	218	207	220	190	215	210	206	187–220
TFe III	102	137	150	150	157	107	157	150	152	102–157
BFe III	137	162	170	161	168	137	158	155	161	137–170
Tr III	77	87	87	77	77	80	77	76	82	77–87
Cx III	85	90	97	92	82	90	100	87	95	82–100
Leg III	1123	1254	1274	1232	1286	1149	1289	1210	1231	1123–1289
IP	3089	3439	3469	3338	3506	3205	3526	3322	3376	3089–3526
fD	33	33	35	31	33	35	34	33	34	31–35
fV	13	16	16	14	15	16	17	15	14	13–17
NDV	46	49	51	45	48	51	51	48	48	46–51

* Left side with two ML.

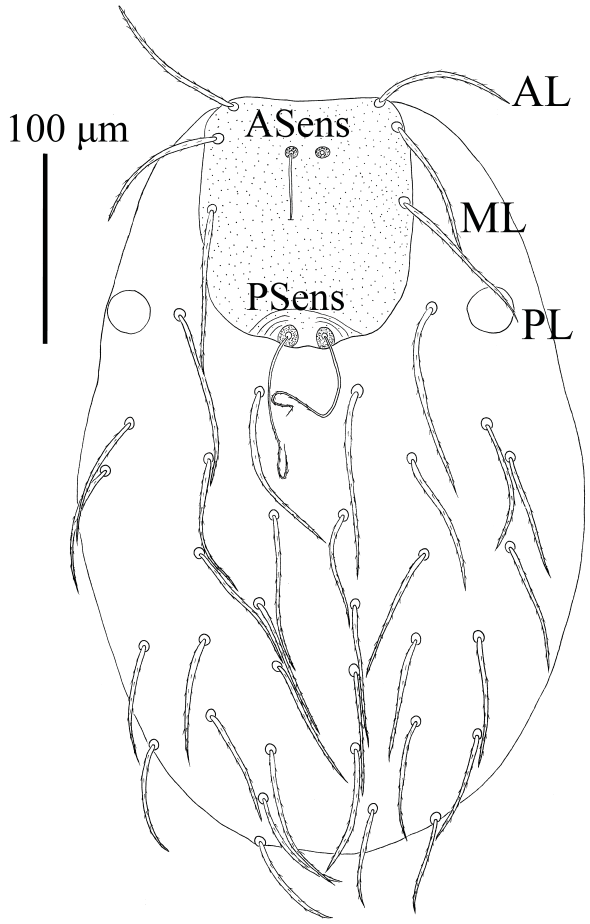


FIGURE 1. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva), Dorsal view of idiosoma.

Etymology

The specific epithet is derived from the type locality, Brazil.

Type material

The holotype (ARS-20240410-1a) was collected in a cave named AGR_044, BRAZIL, in the municipality of Pains, Minas Gerais state, 20°19'1.68" S, 51°40'12.85" W, by Spelayon, May 2015; one paratype larva (ARS-20240410-1b) same data as holotype except in MIC_086 cave, 20°25'44.64" S, 51°37'28.30" W, June 2015; four paratype larvae (ARS-20240410-1d, 1e, 1h, 1i) same data as holotype except in MIC_015 cave (MIC_015 and AGR_044 are with same coordinates); three paratype larvae (ARS-20240410-1c, 1f, 1g) same data as holotype.

Type deposition

The holotype is deposited at the Mite Reference Collection, Department of Entomology and Acarology, Escola Superior de Agricultura "Luiz de Queiroz" (MZLQ), Universidade de São Paulo, Piracicaba, São Paulo, Brazil; one paratype larva (ARS-20240410-1b) is deposited at the Coleção de Invertebrados Subterraneos de Lavras, Centro de Estudo em Biologia Subterrânea (CEBS), Departmento de Biologia, Universidade Federal de Lavras, Lavras, Minas Gerais, Brazil; six paratype larvae (ARS-20240410-1c, 1d, 1e, 1f, 1g, 1h, 1i) are deposited in the Acarological

Collection, Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran.

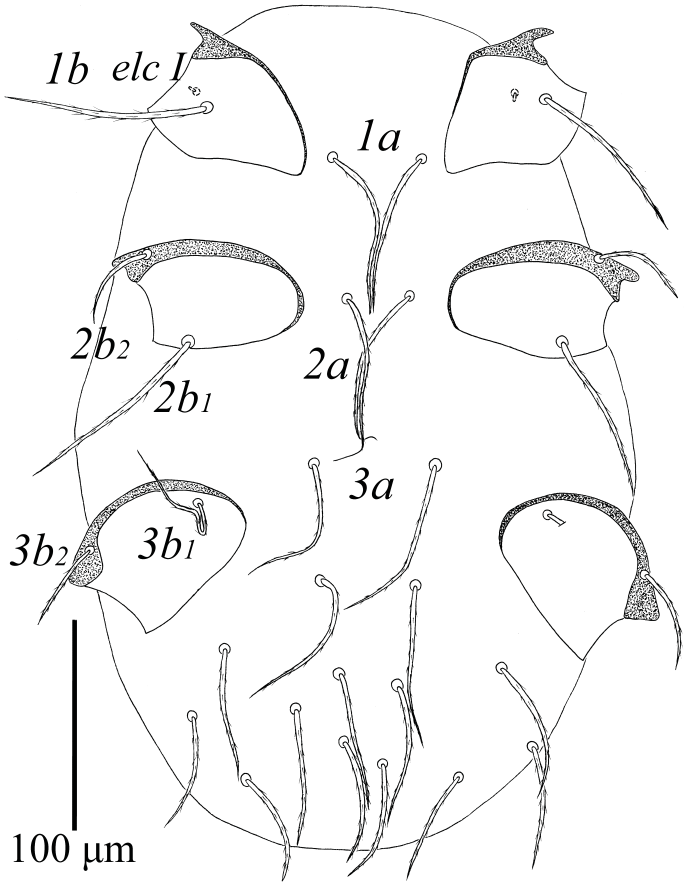


FIGURE 2. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva), Ventral view of idiosoma.

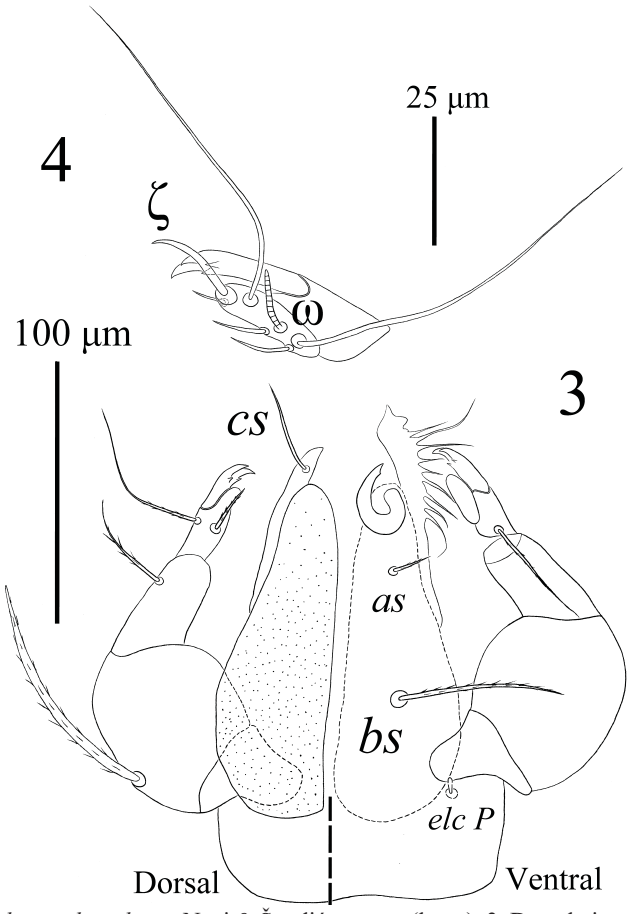
Remarks

The new species belongs to the genus *Caeculisoma* based on the following characters: ASens posterior to ML bases and posterior tarsal claws pulvilliform with ventrally directed hook element. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** is most close to *C. huxleyi* in SD ≥130, ISD ≥ 100, PW ≥ 95, AL ≥ 75, ML ≥ 72 based on the present identification key. The new species differs from *C. huxleyi* in the shorter W (107–118 vs. 133 in *C. huxleyi*), AW (76–82 vs. 94), $2b_2$ (43–50 vs. 63), in the longer *1a* (82–95 vs. 64), $2b_1$ (95–106 vs. 74), $3b_1$ (85–105 vs. 74), *bs* (87–92 vs. 60), Ta I (197–217 vs. 132), Ta III (192–212 vs. 129), Ti I (280–310 vs. 157), Ti III (340–377 vs. 186), Ge I (195–228 vs. 117), Leg I (1045–1195 vs. 725*), Leg II (921–1059 vs. 690*), Leg III (1123–1289 vs. 790*) and palp tibial claw (with two subterminal teeth vs. without subterminal tooth); it differs from *C. darwiniense*, *C. sparnoni* and *C. mouldsi* in the longer SD (130–154 vs. ≤100), ISD (100–112 vs. ≤66), PW (95–110 vs. ≤80), AL (75–95 vs. ≤56, ML (72–82 vs. ≤ 64) and palp tibial claw (with two subterminal teeth vs. without subterminal tooth).

All species of the genus *Caeculisoma* have been reported from the southern hemisphere except *C. allopenlineatus*, *C. haussa*, *C. hunanica*, *C. penlineatus*, *C. semispinus* (Mąkol & Wohltmann 2012, 2013; Xu *et al*. 2019a, b, 2020; Saboori *et al*. 2023). Xu *et al*. (2020) in their identification key

have mentioned mistakenly which Ta II of *C. sparnoni* is without solenidion (see Southcott (1972: 76), figure 37). For this reason and description of the new species, key to the larval species of *Caeculisoma* of the world is updated.

* Including claw.



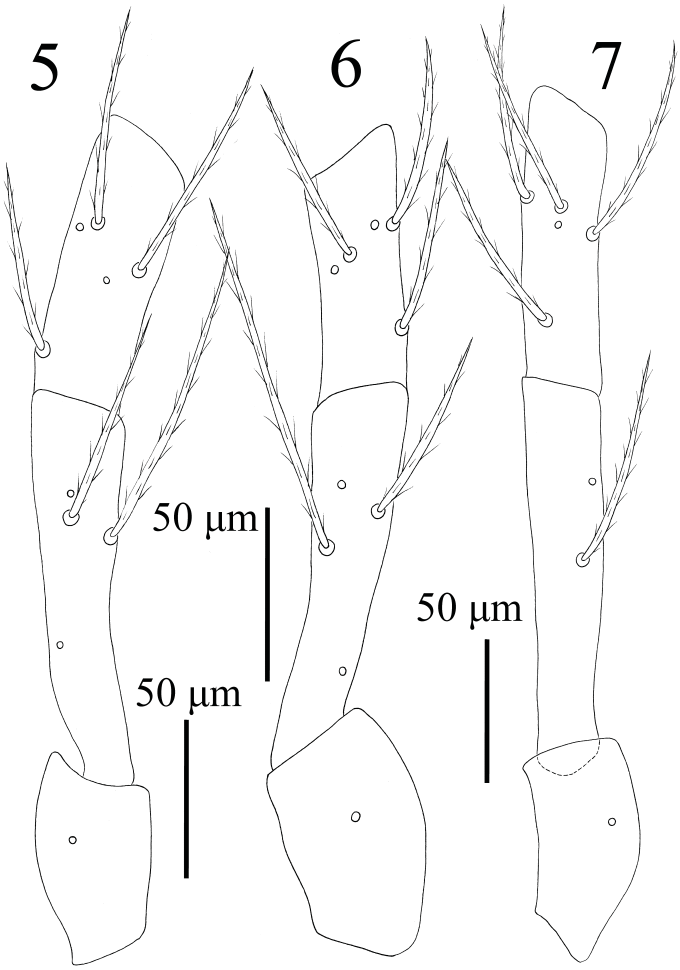
FIGURES 3–4. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva); 3. Dorsal view (left) and ventral view of gnathosoma (right). Supracoxal seta (*elc P*) was not visible on the left side (shown on the right side); 4. Ventral view of palp tarsus.

Key to the species of *Caeculisoma* (larva) of the world [after Xu *et al*. (2020) **with corrections]**

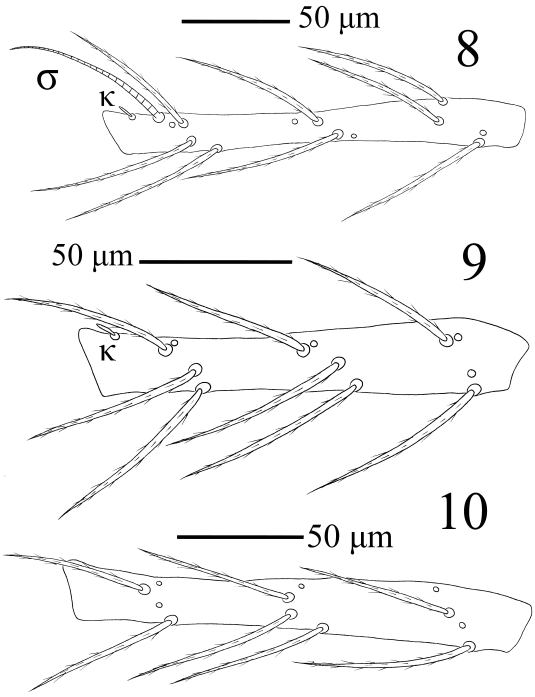
1. ASens bases closer to the level of PL scutalae. 2
- ASens bases closer to the level of ML scutalae 4
2. Four sternalae III between coxae II and III . . . . . *C. cooremani* Southcott, 1972
- Two sternalae III between coxae II and III 3
3. AW 66–75*, W 109–126, BFe I & II with one seta longer than the other pedal normal setae . . . . . *C. penlineatus* Xu & Jin, 2019
- AW 55–57, W 88–96; without a long seta on BFe I & II . . . . . *C. allopenlineatus* Xu & Jin, 2020
4. ASens bases between levels of ML and PL scutalae . . . . . *C. semispinus* Xu & Jin, 2019
- ASens bases closer to the level of ML scutalae 5
5. fn BFe 5-5-2 6
- fn BFe otherwise 7
6. fn Ge 8-8-8, fn Ti 10-10-10 . . . . . *C. carmenae* Haitlinger, 2008

- fn Ge 12-12-12, fn Ti 18-18-18 . . . . . *C. nestori* Haitlinger, 2004
7. fn TFe 5-5-4, Ti I & II with 16 normal setae . . . . . *C. hunanica* Zheng, 2002
- fn TFe 5-5-5, Ti I & II with ≥ 17 normal setae 8
8. SD ≥ 130, ISD ≥ 100, PW ≥ 95, AL ≥ 75, ML ≥ 72 9
- SD ≤ 100, ISD ≤66, PW ≤80, AL ≤56, ML ≤64 10
9. W 107–118, Ti I 280–310, Ge I 195–228, Ti III 340–377, palp tibial claw with two subterminal teeth . . . . . *C. brazilensis* Noei & Šundić **sp. nov.**
- W 133, Ti I 157, Ge I 117, Ti III 186, palp tibial claw without subterminal tooth . . . . . *C. huxleyi* Southcott, 1972
10. Scutum wider than long, fV 17 . . . . . *C. darwiniense* Southcott, 1961b
- Scutum subequal in length and width, fV 12 11
11. Ti I 175–206, Ti III 240–279, ML 44–64, PSens 55–68 . . . . . *C. mouldsi* Southcott, 1988a
- Ti I 83, Ti III 100, ML 29, PSens 42 . . . . . *C. sparnoni* Southcott, 1972

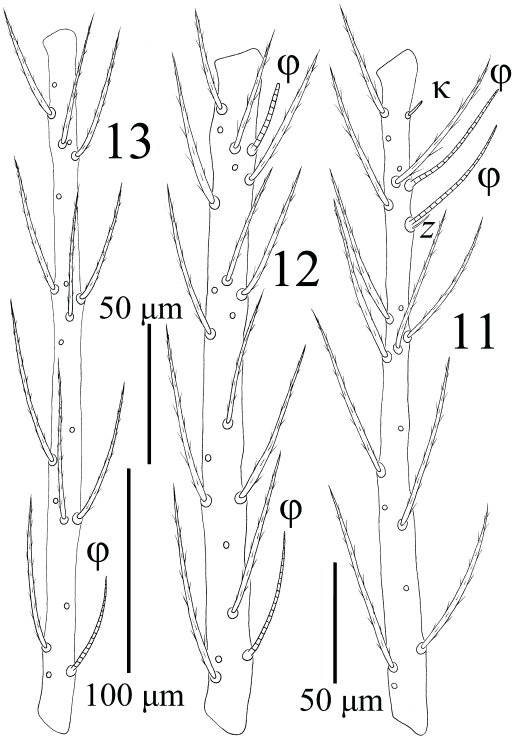
***** Based on Xu *et al*. (2020).



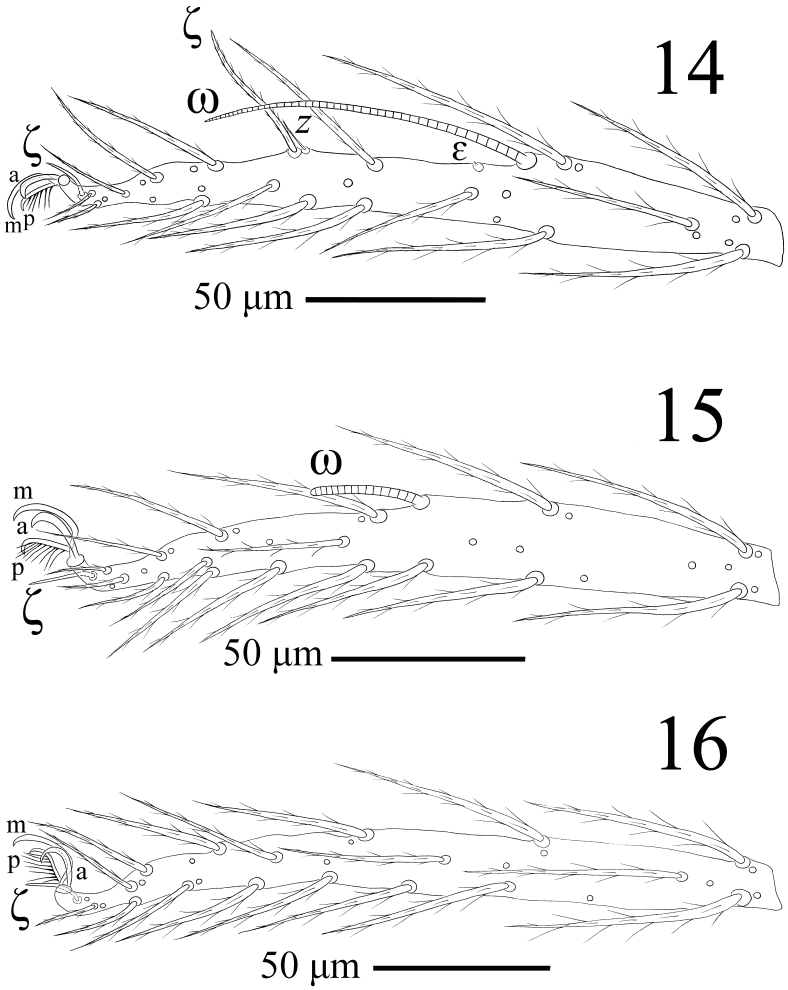
FIGURES 5–7. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva), Leg I–III: 5. Tr–TFe I ; 6. Tr–TFe II; 7. Tr–TFe III.



FIGURES 8–10. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva), Leg I–III: 8. Ge I; 9. Ge II; 10. Ge III.



FIGURES 11–13. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva), Leg I–III: 11. Ti I; 12. Ti II; 13. Ti III.



FIGURES 14–16. *Caeculisoma brazilensis* Noei & Šundić **sp. nov.** (larva), Leg I–III: 14. Ta I; 15. Ta II; 16. Ta III.

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References

Berlese, A. (1888) Acari Austro americani quos collegit Aloysius Balzan. Manipulus primus. Species novas circiter quinquaginta complectens. *Bulletino della Societa Entomologica Italiana*, 20, 171–222. (sep. pp. 1–52).

Clark, J. (2014) New erythraeids (Parasitengona) from recent glacial outwash, Southern Alps, New Zealand; *Callidosoma*, *Momorangia*, *Grandjeanella*, and *Pukakia* gen. nov.; with a description of the deutonymph

of *Callidosoma tiki*. *International Journal of Acarology*, 40(2), 174–204.
http://dx.doi.org/10.1080/01647954.2014.898697
Fain, A. & Santiago-Blay, J.A. (1993) A new genus and two new species of mites (Acari) phoretic or parasitic on neotropical Chrysomelidae (Coleoptera). *Acarologia*, 34(4), 337–343.
Haitlinger, R. (2004) *Charletonia domawiti* n. sp., *Caeculisoma nestori* n. sp. and *Iguatonia barbillae* n. gen. and n. sp. from Brazil (Acari: Prostigmata: Erythraeidae). *Genus*, 15(3), 435−444.
Haitlinger, R. (2008) *Caeculisoma carmenae* n. sp. from Republic of South Africa (Acari: Prostigmata: Erythraeidae). *Genus*, 19(1), 139−142.
Haitlinger, R. (2009) A new genus and two new species of mites (Acari: Prostigmata: Erythraeidae) from Macedonia and the Republic of Cape Verde. *Zeszyty Naukowe Uniwersytetu Przyrodniczego we Wrocławiu, Biologia i Hodowla Zwierząt*, 572, 39–48.
Hakimitabar, M. & Saboori, A. (2022) A review of *Charletonia* Oudemans (Trombidiformes: Erythraeidae) based on the larval stage. *Systematic & Applied Acarology*, 27, 1035–1056.
https://doi.org/10.11158/saa.27.6.5
Kamran, M. & Alatawi, F.J. (2015) New species and new records of subfamily Abrolophinae (Acari: Erythraeidae) from Saudi Arabia. *Systematic & Applied Acarology*, 20(2), 195–202.
https://doi.org/10.11158/saa.20.2.6
Kohansal, M., Ramroodi, S., Noei, J. & Rakhshani, E. (2023) New data on *Marantelophus iranicus* and *Empitrombium makolae* (Acari: Erythraeidae, Microtrombidiidae). *Persian Journal of Acarology*, 12(1), 67–79.
Mąkol, J., Moniuszko, H., Świerczewski, D. & Stroiński, A. (2014) Planthopper (Hemiptera: Flatidae) parasitized by larval erythraeid mite (Trombidiformes: Erythraeidae)—a description of two new species from Western Madagascar. *Journal of Insect Science*, 14(194), 1–12.
https://doi.org/10.1093/jisesa/ieu056
Mąkol, J. & Wohltmann, A. (2012) An annotated checklist of terrestrial Parasitengona (Actinotrichida: Prostigmata) of the world, excluding Trombiculidae and Walchiidae. *Annales Zoologici*, 62(3), 359–562.
https://doi.org/10.3161/000345412X656671
Mąkol, J. & Wohltmann, A. (2013) Corrections and additions to the checklist of terrestrial Parasitengona (Actinotrichida: Prostigmata) of the world, excluding Trombiculidae and Walchiidae. *Annales Zoologici*, 63(1), 15–27.
http://doi.org/10.3161/000345413X666075
Noei, J., Rabieh, M.M. & Saboori, A. (2015) First record of *Momorangia* (Acari: Erythraeidae) from Asia with description of a new species. *Systematic & Applied Acarology*, 20(7), 789–798.
http://dx.doi.org/10.11158/saa.20.7.7
Oudemans, A.C. (1910) Acarologische Aanteekeningen XXXII. *Entomologische Berichten*, 53, 67–74.
Robaux, P. (1974) Recherches sur le dévelopement et la biologie des acariens 'Thrombidiidae'. *Mémoires du Muséum National d'Histoire Naturelle (Série A Zoologie)*, 85, 1–186.
Saboori, A., Hajiqanbar, H. & Kamali, K. (2007) First record of the little known genus *Andrevella* Southcott, 1961 (Acari: Erythraeidae) from Iran, with a description of a new species. *Systematic & Applied Acarology*, 12, 47–54.
https://doi.org/10.11158/saa.12.1.7
Saboori, A., Khaustov, A., Hakimitabar, M. & Hajiqanbar, H. (2009) A new genus and species of larval Erythraeinae (Acari: Prostigmata: Erythraeidae) from Ukraine and the taxonomic state of *Zhangiella*. *Zootaxa*, 2203, 22–30.
https://doi.org/10.11646/zootaxa.2203.1.2
Saboori, A., Starý, J., Masoumi, H. & Cakmak, I. (2023) Two new species of *Caeculisoma* (Trombidiformes: Erythraeidae) from Madagascar. *Acarologia*, 63(4), 1225–1259.
https://doi.org/10.24349/vqaq-42d1
Southcott, R.V. (1957) The genus *Myrmicotrombium* Womersley 1934 (Acarina: Erythraeidae), with remarks on the systematics of the Erythraeoidea and Trombidioidea. *Records of the South Australian Museum*, 13(1), 91–98.
Southcott, R.V. (1961a) Studies on the systematics and biology of the Erythraeoidea (Acarina), with a critical revision of the genera and subfamilies. *Australian Journal of Zoology*, 9(3), 367–610.
Southcott, R.V. (1961b) Notes on the genus *Caeculisoma* (Acarina: Erythraeidae) with comments on the biology of the Erythraeoidea. *Transactions of the Royal Society of South Australia*, 84, 163−178.
Southcott, R.V. (1996) On some Australian and other larval Callidosomatinae (Acari: Erythraeidae). *Interna-*

tional Journal of Acarology, 21, 253–278.
Southcott, R.V. (1972) Revision of the larvae of the tribe Callidosomatini (Acarina: Erythraeidae) with observations on post-larval instars. *Australian Journal of Zoology*, 20(13), 1−84.
https://doi.org/10.1071/AJZS013
Southcott, R.V. (1988a) Two new larval mites (Acarina: Erythraeidae) ectoparasitic on north Queensland Cicadas. *Records of the South Australian Museum*, 22(2), 103−116.
Southcott, R.V. (1988b) A new Australian larval Callidosomatinae mite (Acarina: Erythraeidae) parasitic on flies, with notes on subfamily and tribe classification. *Proceedings of the Linnean Society of New South Wales*, 2, 193–204.
Stroiński, A., Felska, M. & Mąkol, J. (2013) A review of host-parasite associations between terrestrial Parasitengona (Actinotrichida: Prostigmata) and bugs (Hemiptera). *Annales Zoologici*, 63(1), 195–221.
https://doi.org/10.3161/000345413X669522
Treat A.E. (1985) Larval *Callidosoma* (Acari: Erythraeidae): new records and a new rearing from the Americas. *International Journal of Acarology*, 11, 93–124.
https://doi.org/10.1080/01647958508683401
Walter, D.E. & Krantz, G.W. (2009) Collecting, rearing, and preparing specimens. *In*: Krantz, G.W. & Walter, D.E. (Eds.) *A Manual of Acarology*, 3rd edition. Texas, USA, Texas Tech University Press, pp. 83– 96.
Witte, H. (1995) Evolution and phylogenetic system of the Erythraeoidea (Prostigmata, Parasitengonae). *In*: Kropczyńska, D., Boczek, J. & A. Tomczyk (Eds), *The Acari; Physiological and Ecological Aspects of Acari-Host Relationships*. Dabor, Warszawa, pp.117–148.
Wohltmann, A., Gabryś, G. & Mąkol, J. (2006) [2007] Terrestrial Parasitengona inhabiting transient biotopes. *In*: Gerecke, R. (Ed.), *Süßwasserfauna Mitteleuropas, Vol. 7/2–1, Chelicerata, Acari I. 2007*. Spektrum Elsevier, München, pp. 158–240.
https://doi.org/10.1007/978-3-662-55958-1_6
Womersley, H. (1936) Additions to the trombidiid and erythraeid acarine fauna of Australia and New Zealand. *Journal of the Linnean Society of London*, 269, 107–121.
Xu, S.-Y., Yi, T.-C., Guo, J.-J. & Jin, D.-C. (2019a) A new species of larval *Caeculisoma* (Acari: Erythraeidae: Callidosomatinae) ectoparasitic on insects from China and a revised generic diagnosis. *Zootaxa*, 4604(3), 511–524.
https://doi.org/10.11646/zootaxa.4604.3.7
Xu, S.-Y., Yi, T.-C., Guo, J.-J. & Jin, D.-C. (2019b) A new species of larval *Caeculisoma* (Acari: Erythraeidae) parasitic on cicadas from China with detailed comparison of all larval members in the genus. *Systematic & Applied Acarology*, 24(4), 560–571.
https://doi.org/10.11158/saa.24.4.3
Xu, S.-Y., Yi, T.-C., Guo, J.-J. & Jin, D.-C. (2020) Four new species of larval Callidosomatinae (Acari: Prostigmata: Erythraeidae) and a newly recorded genus *Iguatonia* from China with notes on generic concept. *Systematic & Applied Acarology*, 25(2), 285–326.
https://doi.org/10.11158/saa.25.2.9
Zheng, B.-Y. (2002) A new species of the genus *Caeculisoma* Berlese (Acari: Erythraeidae) in China. *Entomologia sinica*, 9(3), 61−64.
https://doi.org/10.1111/j.1744-7917.2002.tb00155.x

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