

Two new species of *Caeculisoma* (Trombidiformes: Erythraeidae) from Madagascar

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Original research

ABSTRACT

Two new species of *Caeculisoma* are described and illustrated/photographed based on post-larval instars from Madagascar. *Caeculisoma banari* n. sp. has two different types of setae on dorsal idiosoma whereas *C. madagascarensis* n. sp. has one type of dorsal idiosomal setae but two different sizes. Details of different characters are presented in photographs and tables.

Keywords soil mites; taxonomy; morphology; systematics; identification key; Madagascar fauna; Ethiopian region

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Introduction

Berlese (1888) defined the genus *Caeculisoma* based on adult specimens of the type species, *C. tuberculatum* collected from Argentina and Paraguay. Later, the following species are described based on larval (L) or post-larval (P) stages or both (L, P): *C. afrum* Cooreman, 1958 (P) from Congo, *C. argus* Vitzthum, 1926 (P) from Indonesia (Sumatra), *C. carmenae* Haitlinger, 2008 (L) from South Africa, *C. claviger* Canestrini, 1897 (P) from Papua New Guinea, *C. cooremani* Southcott, 1972 (L) from Australia, *C. cordipes* Vitzthum, 1935 (P) from French Polynesia, *C. darwiniense* Southcott, 1961 (L, P) from Australia, *C. haussa* Beron, 2000 (P) from Nigeria, *C. hunanica* Zheng, 2002 (L) from China, *C. huxleyi* Southcott, 1972 (L) from New Zealand, *C. infernale* Vitzthum, 1926 (P) from Indonesia (Sumatra), *C. io* Southcott, 1961 (P) from Australia, *C. johnstoni* Womersley, 1934 (P) from Australia, *C. montanum* (Rainbow, 1906) (P) from Australia, *C. mouldsi* Southcott, 1988 (L) from Australia, *C. nasutum* Hirst, 1928 (P) from Australia, *C. nestori* Haitlinger, 2004 (L) from Brazil, *C. sparnoni* Southcott, 1972 (L) from Australia, and *C. sulcatum* (Vitzthum, 1924) (P) from Indonesia (Krakatau, Sunda Strait) and Papua New Guinea, (Canestrini 1897, 1898; Rainbow 1906; Vitzthum 1924, 1926, 1935; Womersley 1934; Cooreman 1958; Southcott 1961, 1972, 1988; Beron 2000; Zheng 2002; Haitlinger 2004, 2008).

Among these 20 species, only *C. darwiniense* was from larval and post-larval instars. All species have been reported from the southern hemisphere except *C. haussa* and *C. hunanica*.

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Australia is more investigated for *Caeculisoma*. Only three species have been described from Africa (Democratic Republic of Congo, Nigeria and South Africa).

In this paper, we describe two new species of post-larval *Caeculisoma* from Ambohitantely Special Reserve and Andasibe National Park, Madagascar.

Material and methods

The mite specimens were extracted using a Winkler apparatus, preserved in 70% ethanol, cleared in Nesbitt's fluid, and mounted in Hoyer's medium on microscope slides (Walter and Krantz 2009). Figures were drawn, and measurements were calculated using an AxioImager A2 (Carl Zeiss, Germany) compound microscope with phase contrast and DIC illumination. Photomicrographs were taken with an AxioCam 506 color (Carl Zeiss, Germany) digital camera. Measurements are given in micrometers (μm) and for holotype followed by paratypes in parentheses (for adults; for deutonymph paratypes range is given without parentheses). Terminology and abbreviations follow Gabryś (1992) and Mąkol (2005). The system defining the place of insertion of specialized setae (relative to segment length) used by Newell (1957) is used here.

Caeculisoma banari n. sp.

Zoobank: [A92A23DD-4C28-41C9-8ACB-86A065BA8E97](https://zoobank.org/A92A23DD-4C28-41C9-8ACB-86A065BA8E97)

Description

Adult female (n = 3)

Idiosoma (Figure 1a & Figure 3a) - Length: 2425 (2198–2293), width, 1837 (1606–1818). Colour was not recorded. Dorsal idiosoma is densely covered with two different types of setae. One is short and fan-like (flattened) with a strong mid-rib and minute projections along the mid-rib (Figure 1b & Figure 3b), 40–62 (40–52); the second type is long, filiform and densely barbed 129–235 (124–272) (Figure 1c, d & Figure 3c). The densely setose dorsum makes it difficult to clearly see the ventral idiosoma.

The crista metopica (Figure 3a) very long 1149 (1319–1327) and extends well beyond the middle of the idiosoma. The anterior sensillary area (ASA) prominent, oval with one pair of smooth ASens 247 (203–206) long, ~26 (30–32) fan-like setae, 51–71 (53–77) long, and 18 (15–18) long and filiform barbed setae, 252–308 (150–262) long, similar to those on dorsal idiosoma (Figure 2b). Anterior process (aP) absent. The posterior sensillary (PSA) area is approximately in the middle of the idiosoma; the distance between the anterior and posterior trichobothria insertions (ISD) is 790 (710–761). The posterior sensillary area (PSA) narrow, smooth (Figure 2c). The crista extends 214 (362–422), behind the posterior sensillary area (pP). PSens 245 (227–256) similar to ASens and smooth. The eyes are at 230 (177–181) (OCM) laterad from the center of the crista, OAS 531 (465–472), OPS 259 (238–296).

Ventral idiosoma is covered with two types of setae. One is short and fan-like (flattened) 51–71 (53–77) with a strong mid-rib and minute projections, similar in shape and size to the dorsal setae; second type is feather-like, 27–37 long (Figure 1e & Figure 3f). Median part of ventral idiosoma from the beginning of idiosoma to anus covered with feather-like setae; other parts covered with a mixture of fan-like and feather-like setae; behind anus only fan-like setae present. Genital opening (Figure 2j) 323 long (only visible in holotype) with two pairs of acetabula and epivalves and centrovalves, covered densely with thin barbed setae (Figure 2k). Anal valves (Figure 2l) oval, 101 (92) long, covered with many thin barbed setae (Figure 2m).

Gnathosoma dorsally covered with anterior crista metopica and fan-like setae and can't be seen clearly. Subcapitulum (Figure 2e) covered with many barbed setae. Chelicerae very long, narrow, dagger-shaped, retractable into idiosoma, and reach behind coxae IV, emarginate except basal and distal ends (Figure 2d). Palps (Figure 2f) narrow, and linear. Trochanter and

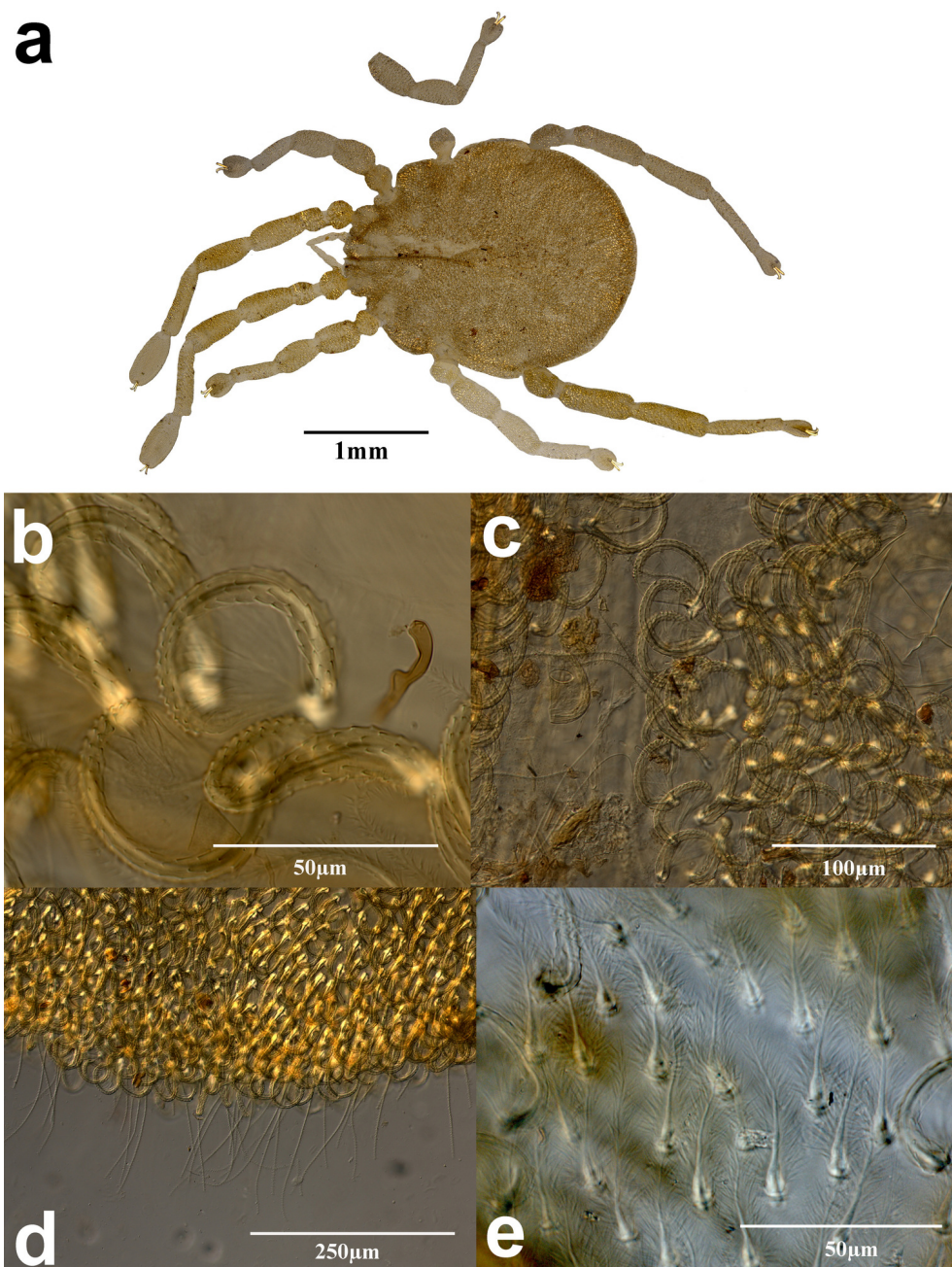


Figure 1 *Caeculisoma banari* n. sp. (Female) photographs: a — Dorsal habitus; b — Fan-like setae on dorsal idiosoma; c — Fan-like and long barbed setae on dorsal idiosoma; d — End of opisthosoma showing a mixture of fan-like and long barbed setae; e — Ventral idiosomal setae.

proximal end of femur could not be observed due to dense dorsal setae. For this reason, the palptrochanter and palpfemur were not measured. All palpal segments covered only with short and barbed setae as shown in Figure 3h for palpal tarsus. Odontus (Figure 3g) small, palp tarsus with 14 (13–15) *omega* (ω) (Figures 3g & i).

All legs (Figures 4–11) with six articulating segments (femur divided). Leg I the longest and leg II the shortest; Ta I longer and differs with other tarsi in shape (Figures 5c & d). Ta IV similar to that of legs II and III but slightly longer. **Tubercles:** Each Ti I–IV with one sub-distal tubercle placed 0.73d (0.74–0.75d), 0.62d (0.65–0.69d), 0.69d (0.71–0.72d), 0.74d (0.76d)

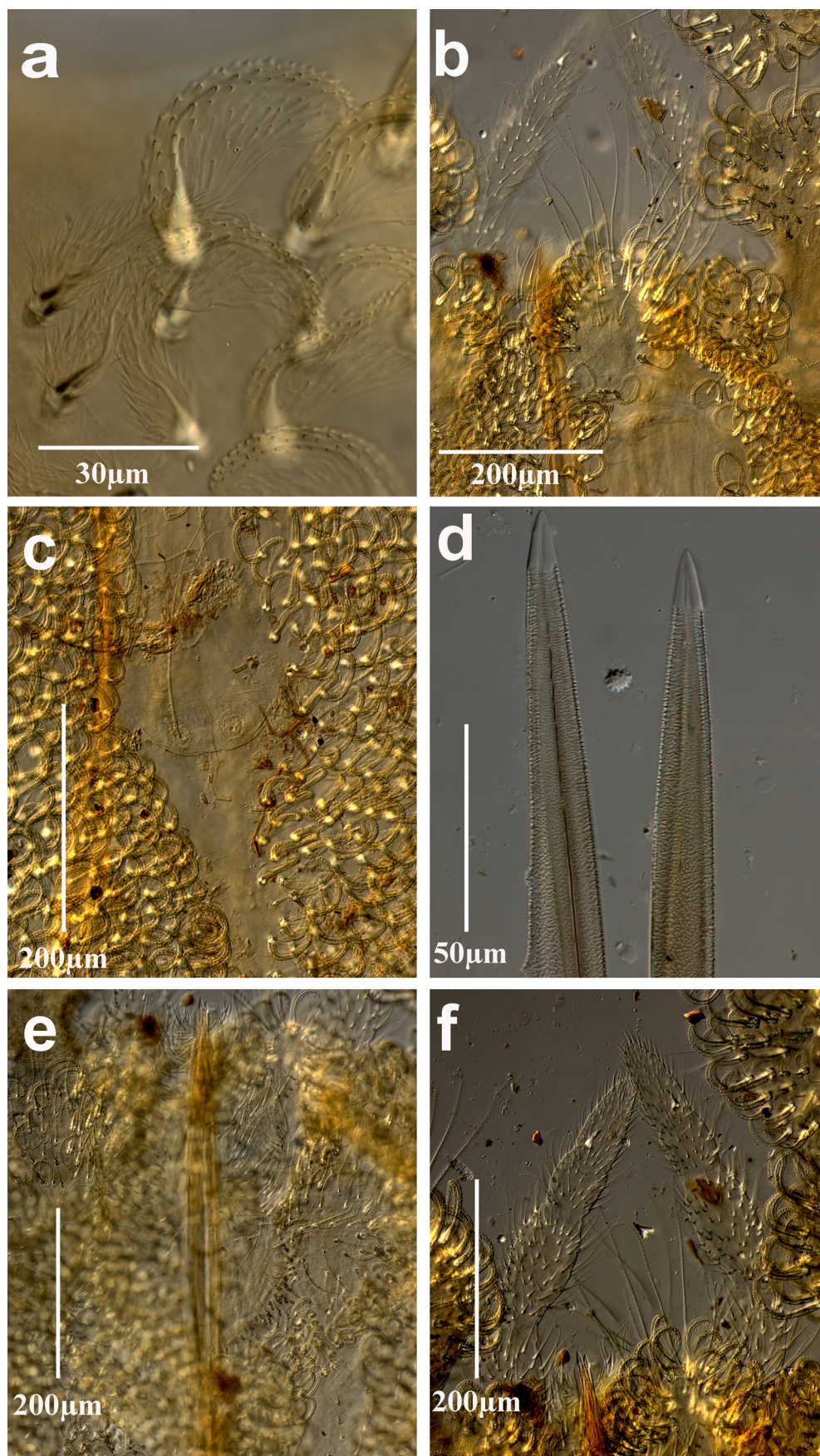


Figure 2 *Caeculisoma banari* n. sp. (Female) photographs: a — Setae on Tr I; b — Anterior sensillary area (ASA); c — Posterior sensillary area (PSA); d — Distal end of chelicerae (from paratype ARS-20230808-1c); e — Subcapitulum, f — Palp.

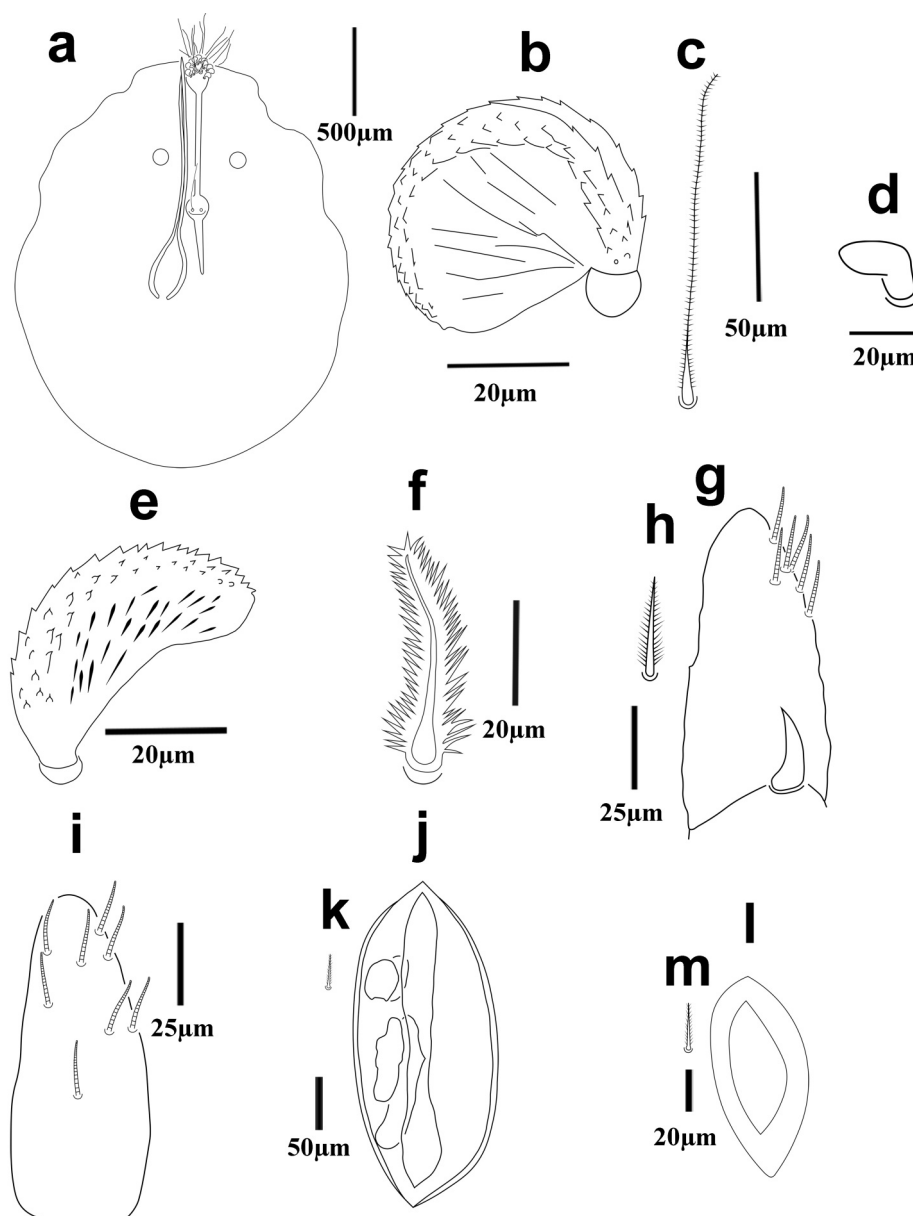


Figure 3 *Caeculisoma banari* n. sp. (Female) drawings: a — Dorsal idiosoma showing crista metopica, eyes and chelicerae; b — Fan-like setae on dorsal idiosoma; c — long barbed setae on dorsal idiosoma; d — Peg-like seta on coxa I; e — Fan-like setae on Tr I; f — Ventral seta; g — Dorsal view of palpal tarsus and odontus (only solenidia are shown and normal setae are omitted); h — Normal seta of palpal tarsus; i — Ventral view of palpal tarsus (only ω were shown and normal setae were omitted); j — Genitalia and acetabula (normal setae omitted); k — Normal seta of genitalia; l — Anus; m — Normal seta of anus.

respectively, and two distal tubercles (Figure 12c) in constrictions (there is a constriction at the distal end of each tibia which has no seta and there are only tubercles in it); all other segments with one distal tubercle except coxae, basifemora and tarsi.

Legs with different types of setae (Figures 4–11). **Coxae:** Coxal fields I–IV covered with fan-like setae, and some distal feather-like setae and a L-shaped ventro-distal peg-like seta (Figure 3d). **Trochanters** (a & b in Figures 4, 6, 8 & 10): Tr I–III with three types of setae (fan-like (Figures 1f & 2e), long barbed and round-ended, and longer, filiform barbed setae

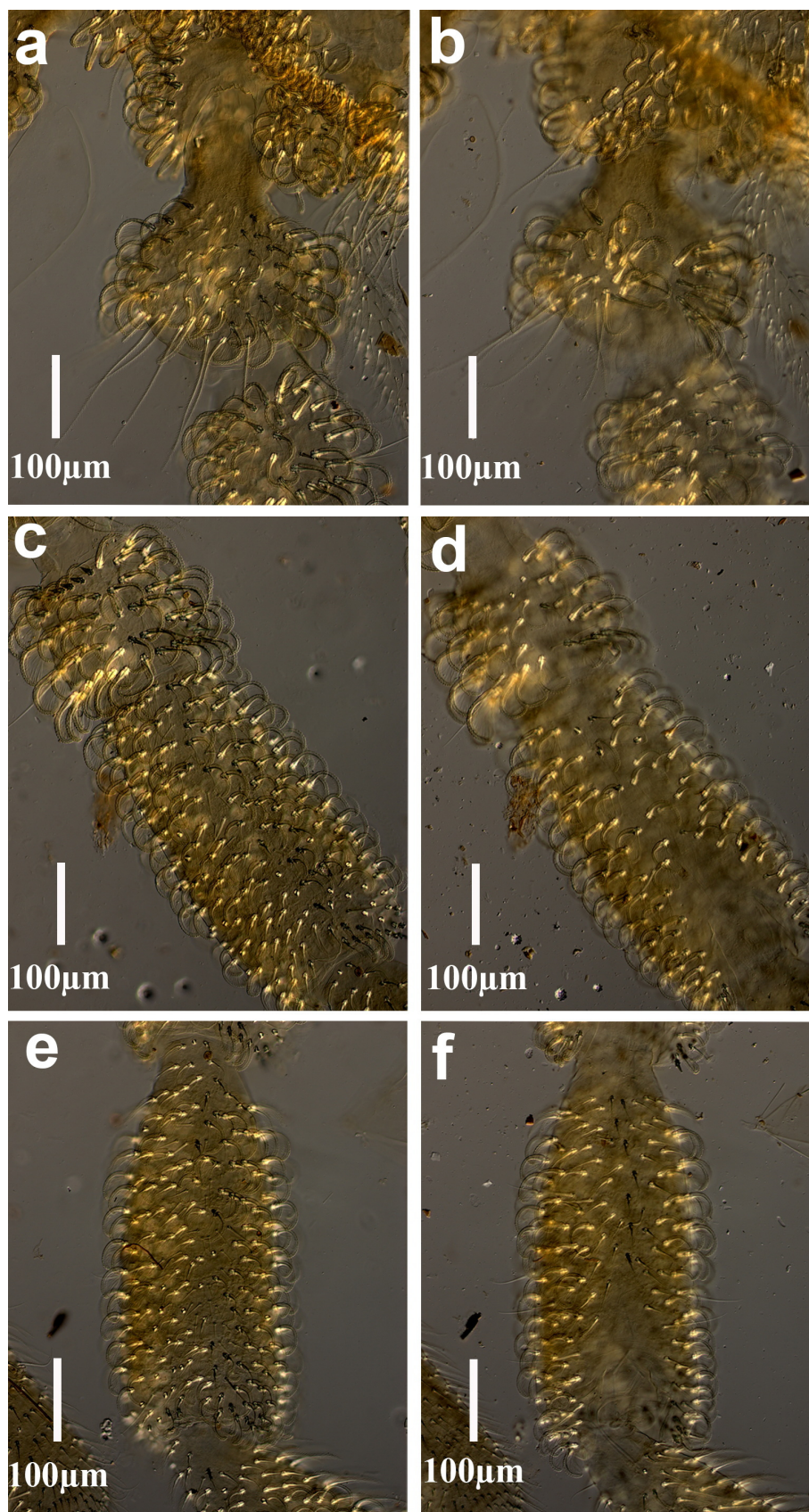


Figure 4 *Caeculisoma banari* n. sp. (Female) photographs: a — Tr I, dorsal view; b — Tr I, ventral view; c — BFe and TFe I, dorsal view; d — BFe and TFe I, ventral view; e — Ge I, dorsal view; f — Ge I, ventral view.

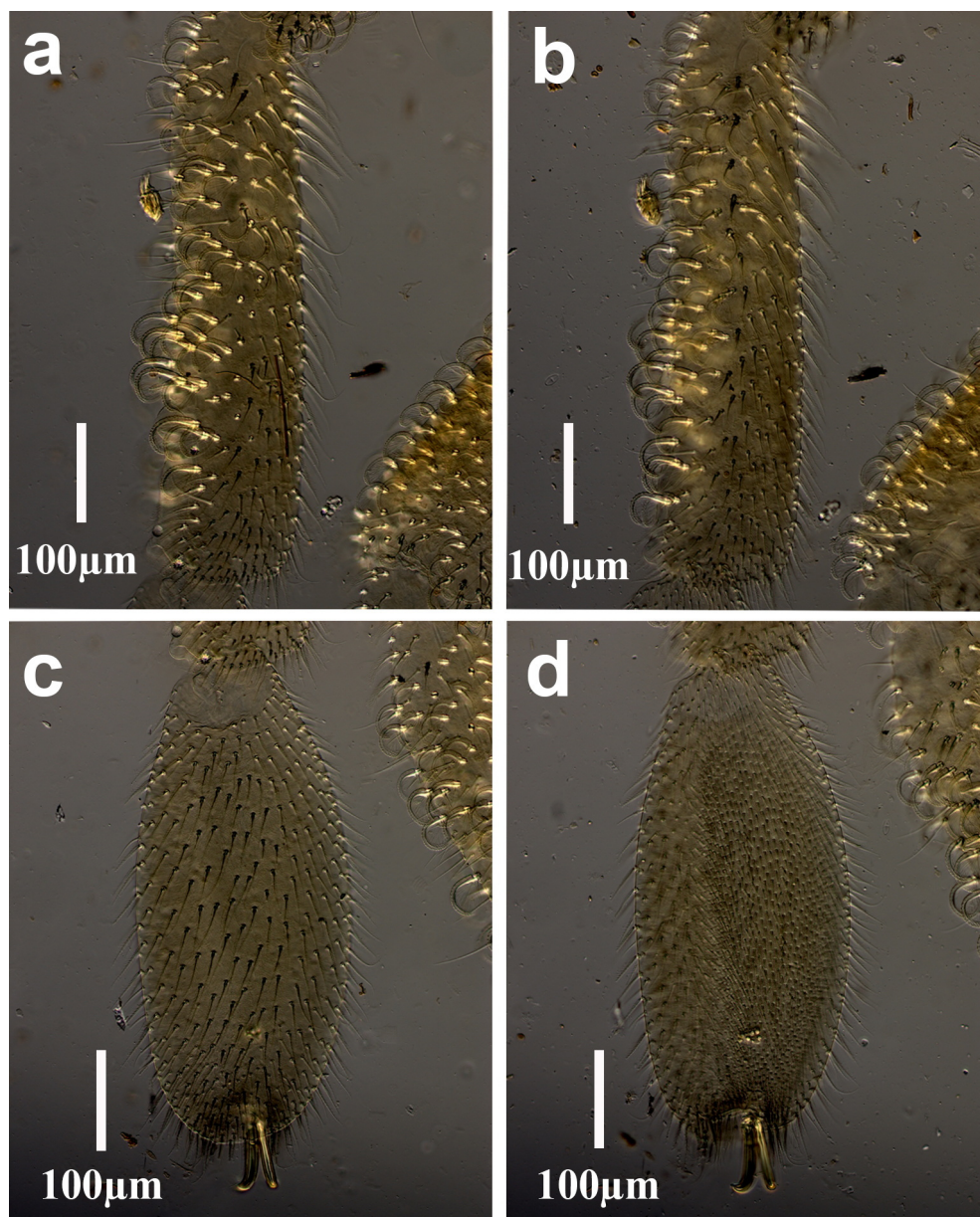


Figure 5 *Caeculisoma banari* n. sp. (Female) photographs: a — Ti I, anterolateral view; b — Ti I, posterolateral view; c — Ta I, dorsal view; d — Ta I, ventral view.

similar to the dorsal idiosoma setae) whereas Tr IV has the same types of setae and 1–2 long nude (dorsal one spine-like and ventral one thin) setae (Figures 4a & b). **Basifemora** (c & d in Figures 4, 6, 8 & 10): All basifemora covered with fan-like setae and long nude setae (except one thin ventral seta). Number of nude setae on BFe I–IV: 3–4, 3–5, 3–5, 3–6. **Telofemora** (c & d in Figures 4, 6, 8 & 10): All telofemora covered with fan-like setae, long nude setae and solenidia (*theta*, θ). Number of nude setae on TFe I–IV: 4–6, 3–4, 4–5, 6–7; one long barbed seta on TFe IV only in the holotype. Number of *Theta* on TFe I–IV: 6–11, 3–6, 7–9, 10–17. **Genua** (e & f in Figures 4, 6, 8 & 10): All genua covered with fan-like setae, long nude setae, feather-like setae with distinct stems and different sizes, and solenidia (*sigma*, σ). Number of nude setae on Ge I–IV: 11–13, 2–9, 5–8, 8–11. Number of *sigma* on Ge I–IV: 18–32, 8–10, 8–13, 17–23. Microsetae (κ) present on Ge I–II (Table 1, Figure 12a). **Tibiae** (a & b in Figures 5, 7, 9

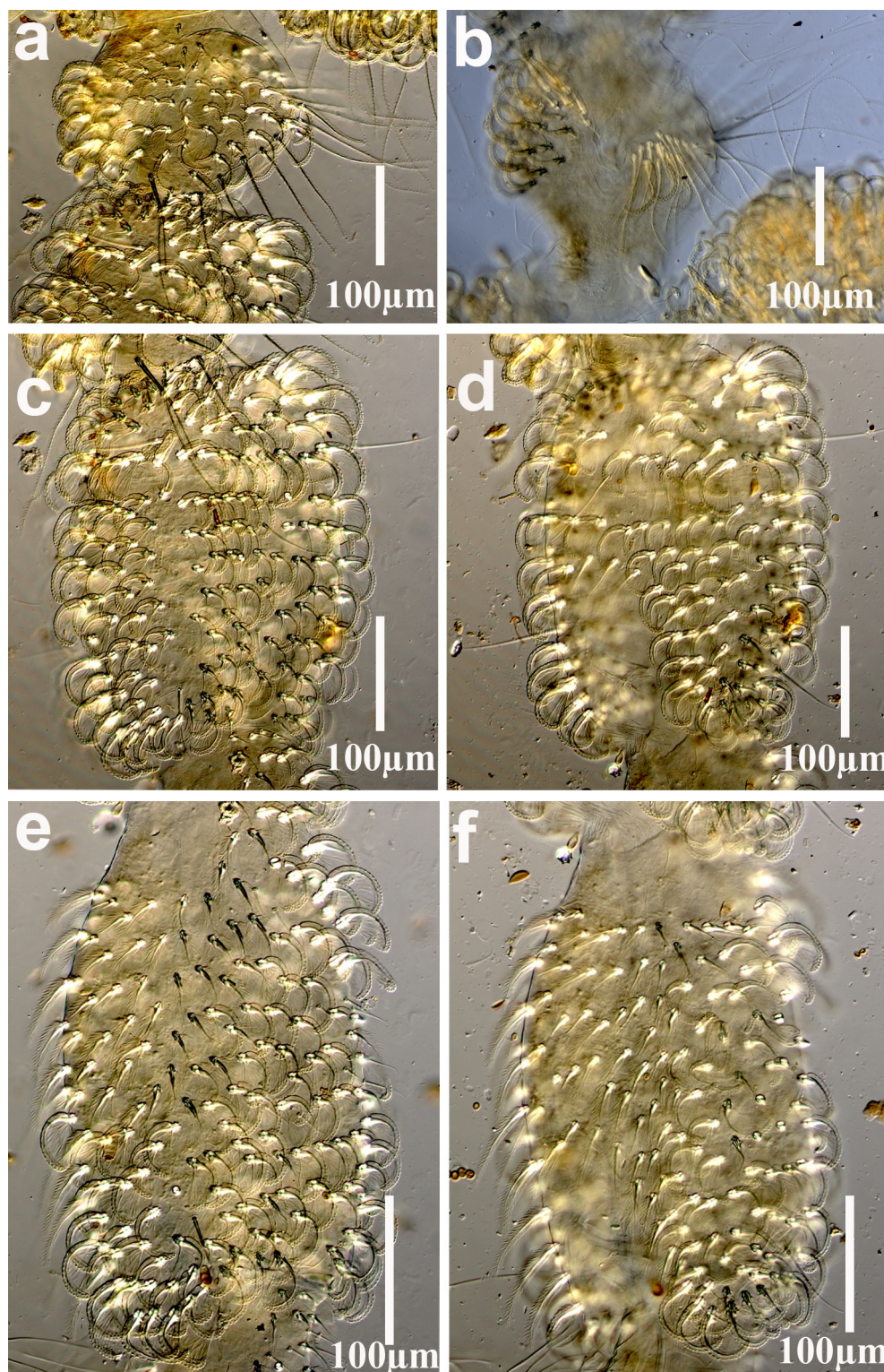


Figure 6 *Caeculisoma banari* n. sp. (Female) photographs: a — Tr II, dorsal view; b — Tr II, ventral view; c — BFe and TFe II, dorsal view; d — BFe and TFe II, ventral view; e — Ge II, dorsal view; f — Ge II, ventral view.

& 11): Dorsal surface of tibiae covered with only fan-like setae; lateral surfaces covered with a mixture of fan-like, feather-like and nude setae; ventral surface covered with feather-like, nude,

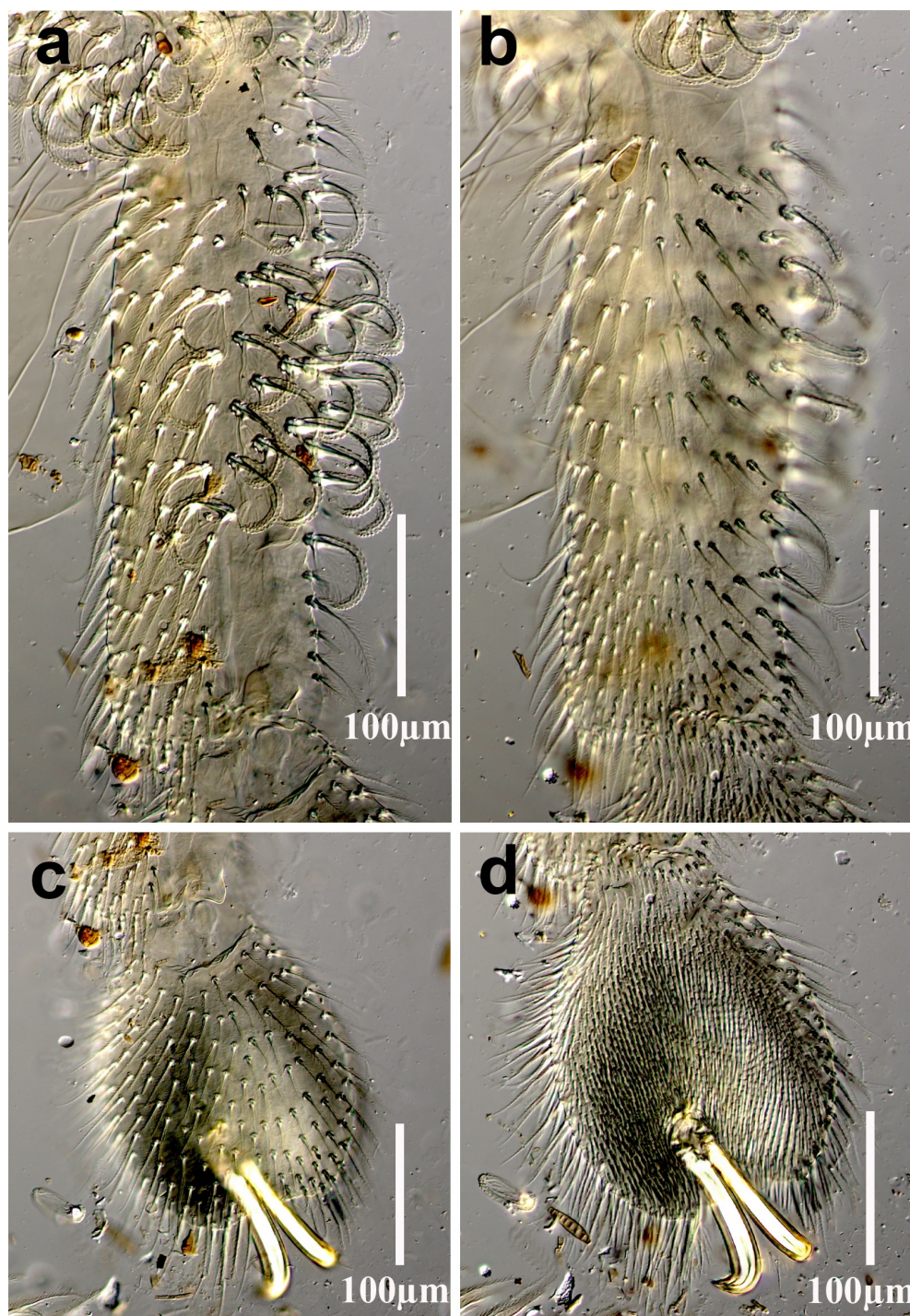


Figure 7 *Caeculisoma banari* n. sp. (Female) photographs: a — Ti II, anterolateral view; b — Ti II, posterolateral view; c — Ta II, dorsal view; d — Ta II, ventral view.

and barbed setae; solenidia (*phi*, ϕ) and sometimes microsetae present (Table 2, Figure 11b). Number of nude setae on Ti I-IV: 7–16, 1–7, 4–6, 3–7. Number of *phi* on Ti I-IV: 33–48, 8–10, 4–10, 3–5. There is one sub-distal tubercle and two distal tubercles at a constriction. There are no setae between these tubercles. **Tarsi** (c & d in Figures 5, 7, 9 & 11): Ta I about two times longer than other tarsi. Ta I covered with barbed setae, solenidia (*omega*, ω), eupathidia (*zeta*,

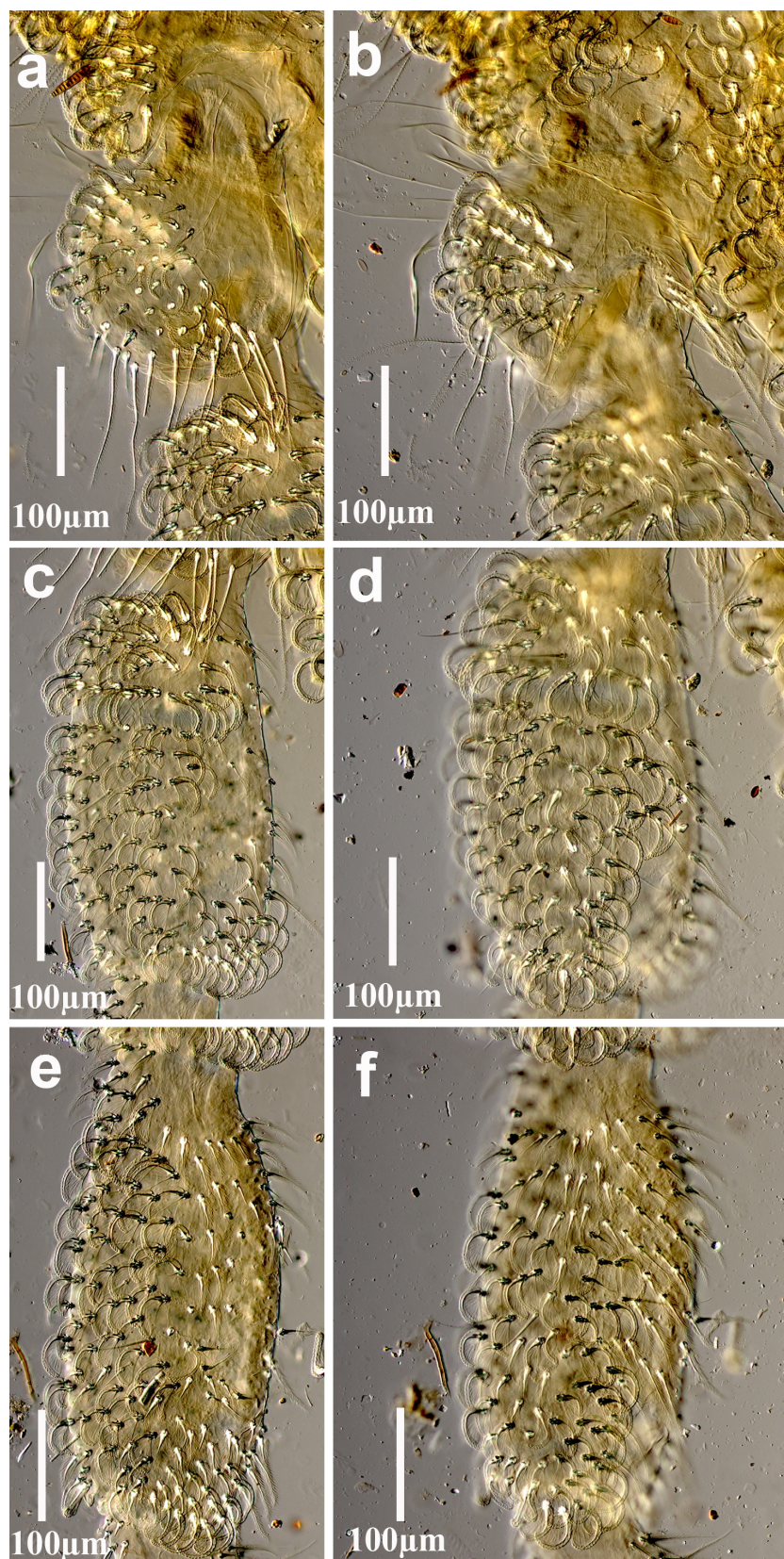


Figure 8 *Caeculisoma banari* n. sp. (Female) photographs: a — Tr III, anterolateral view; b — Tr III, posterolateral view; c — BFe and TFe III, anterolateral view; d — BFe and TFe III, posterolateral view; e — Ge III, anterolateral view; f — Ge III, posterolateral view.

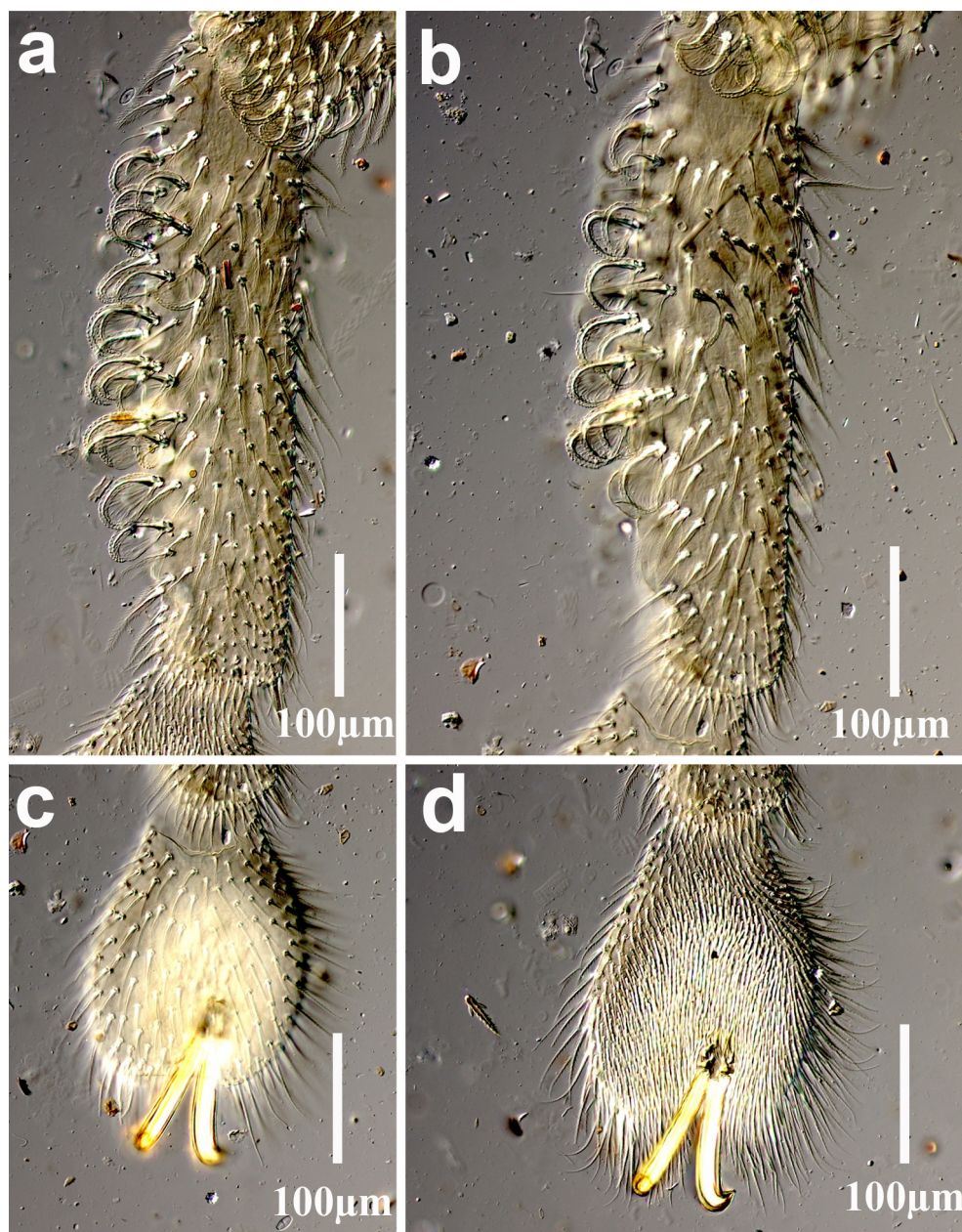


Figure 9 *Caeculisoma banari* n. sp. (Female) photographs: a — Ti III, anterolateral view; b — Ti III, posterolateral view; c — Ta III, dorsal view; d — Ta III, ventral view.

ζ) and a famulus (*epsilon*, ε). The ω on Ta I were too numerous to accurately count. Number of ω on Ta II-IV: 11–18, 6–13, 5–11, ζ on Ta I-II: 2–4, 0–2, and a ε only on Ta I. There are no fan-like or nude setae on tarsi.

Measurements are in Table 1.

Deutonymph (n = 3)

Idiosoma - Length: 1068–1469, width, 875–1147. Color was not recorded when alive. Dorsal idiosoma is covered with two types of setae. One is fan-like (flattened) and short seta with strong mid-rib and minute projections, 32–57. The second setal type is long, filiform and densely barbed, 149–272. Idiosoma is densely covered with fan-like setae that obscured details

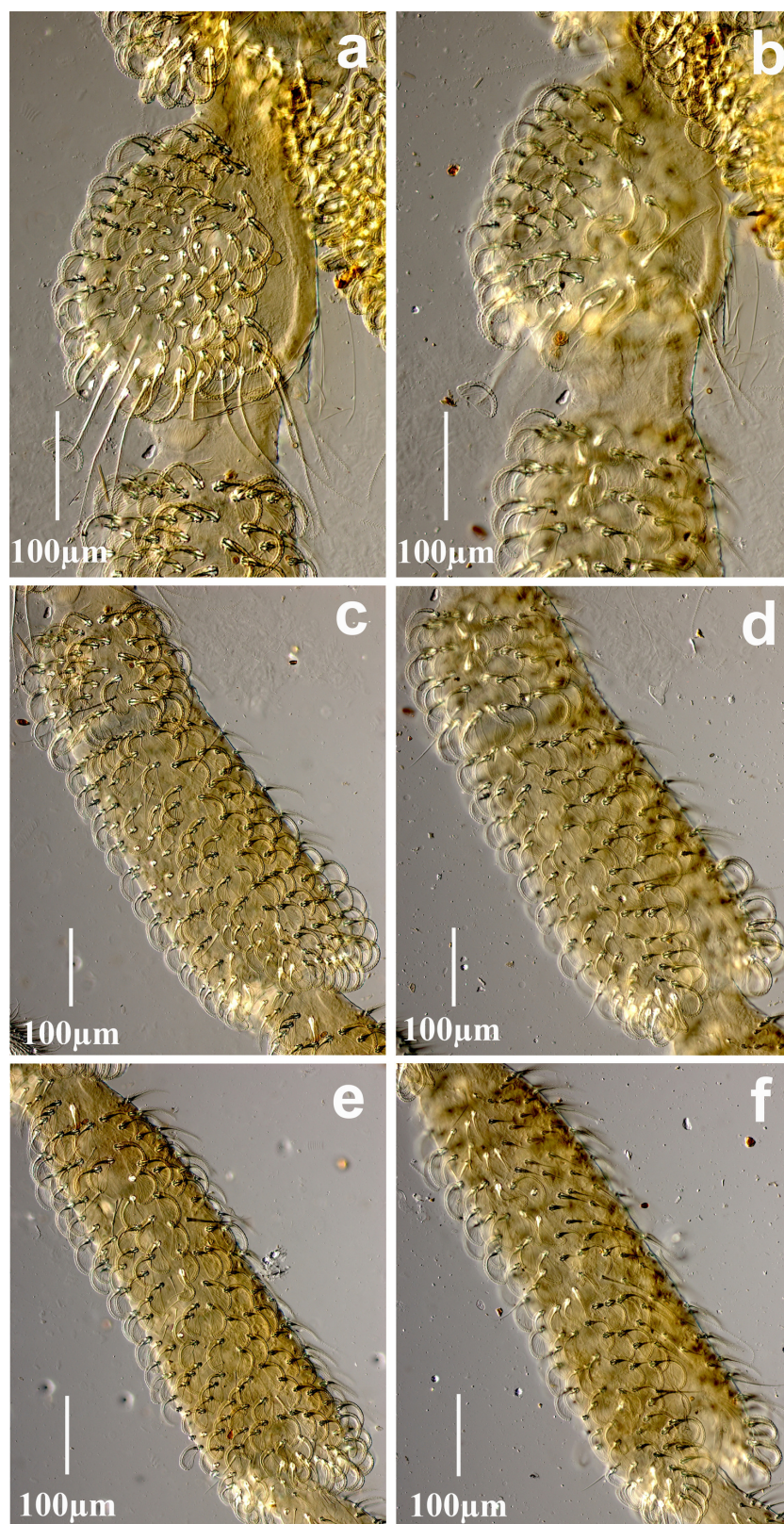


Figure 10 *Caeculisoma banari* n. sp. (Female) photographs: a — Tr IV, anterolateral view; b — Tr IV, posterolateral view; c — BFe and TFe IV, anterolateral view; d — BFe and TFe IV, posterolateral view; e — Ge IV, anterolateral view; f — Ge IV, posterolateral view.

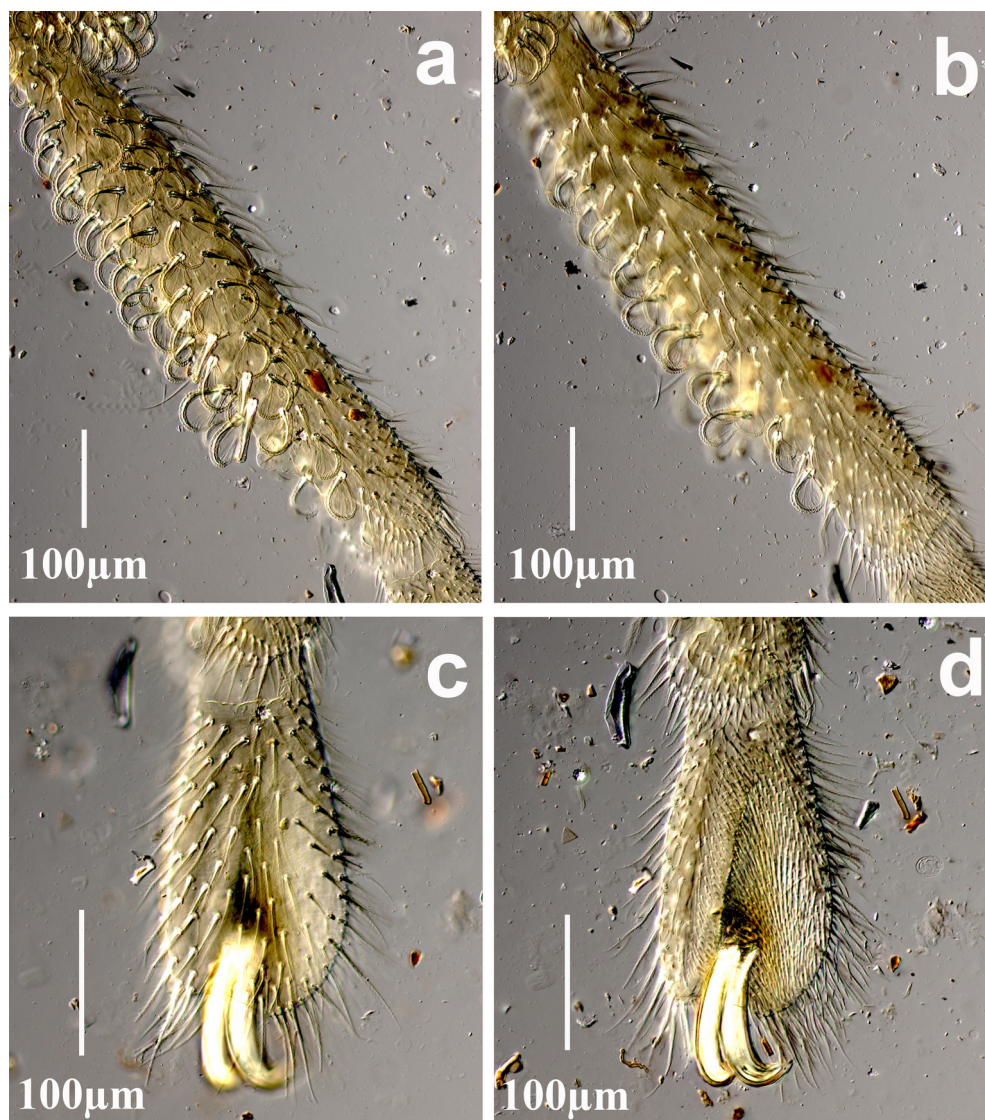


Figure 11 *Caeculisoma banari* n. sp. (Female) photographs: a — Ti IV, anterolateral view; b — Ti IV, posterolateral view; c — Ta IV, dorsal view; d — Ta IV, ventral view.

of the ventral idiosoma.

The crista metopica very long 775–900 and extends well beyond the middle of the idiosoma. The anterior sensillary area is prominent, semi-oval with one pair of smooth ASens 167–217 long, 13–19 fan-like setae, 47–63 long, and 5–10 long and filiform barbed setae, 149–211 long, similar to those on dorsal idiosoma. Anterior process (aP) absent. The posterior sensillary area is approximately in the middle of the idiosoma; the distance between the anterior and posterior trichobothria insertions (ISD) 446–537. This posterior area is narrow and smooth. The crista still extends 177–243, behind the posterior area (pP). PSens 198 similar to ASens and smooth. Each eye is 99–146 (OCM) lateral from the center of the crista and approximately two thirds down the crista (OAS 281–346, OPS 161–191).

Ventral idiosoma with two different types of setae. One is short and fan-like (flattened) with strong mid-rib and minute projections; the second type is feather-like 27–37 long. Median part of ventral idiosoma from the beginning of idiosoma to anus covered with feather-like setae; other parts covered with a mixture of fan-like and feather-like setae; only fan-like setae

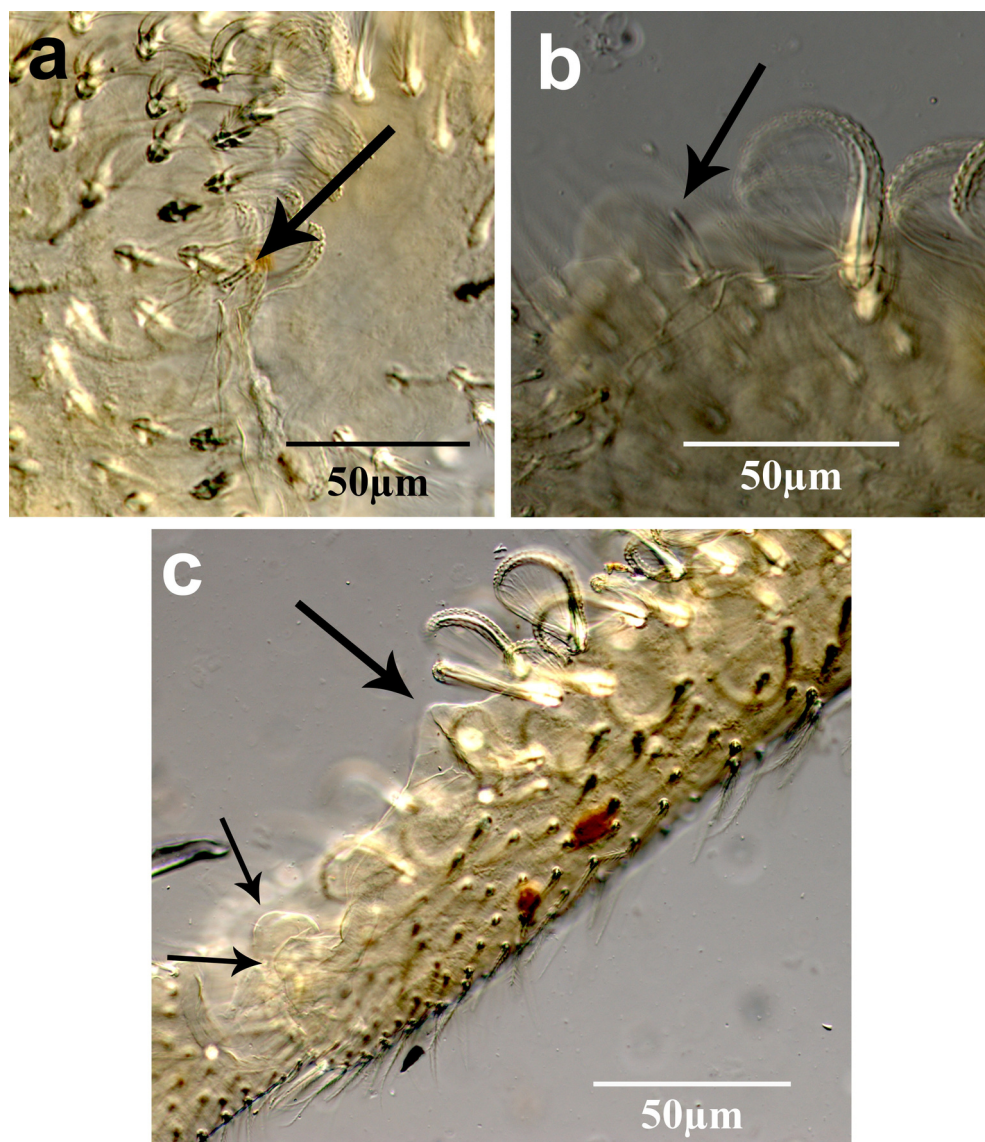


Figure 12 *Caeculisoma banari* n. sp. (Female) photographs: a — Microseta κ on Ge I; b — Microseta κ on Ti I; c — Tubercles on Ti IV. See arrows.

present behind anus. Genital opening small, 58 long, without seta (only visible in a re-mounted paratype specimen ARS-20230808-1f; Figure 13a). Anal valves oval, 46–83 long, covered with 16–20 thin barbed setae.

Gnathosoma covered by the anterior crista metopica and fan-like setae making it difficult to clearly see the gnathosoma. Chelicerae are very long, narrow, dagger-shaped, retractable into idiosoma, and reach behind coxae IV, emarginate except basal and distal ends. Palps narrow, and linear. The base of femur cannot be seen clearly due to dense dorsal fan-like setae. For this reason, palp was measured from genu except for one specimen which was re-mounted it ventral side up. All palpal segments covered with short, barbed setae. Odontus small, palp tarsus with 7–8 ω . Subcapitulum covered with many barbed setae.

All legs with six articulated segments (femur divided). Leg I the longest and leg II the shortest; Ta I longer and differs from other tarsi in shape. Ta IV similar to that of legs II and III but slightly longer. **Tubercles:** Each Ti I–IV with one sub-distal tubercle (0.69–0.72d, 0.65–0.66d, 0.62–0.72d, 0.74–0.77) respectively, and two distal tubercles in constrictions; all

other segments with one distal tubercle except basifemora and tarsi.

Legs with different types of setae. **Coxae:** Cx I-IV covered with fan-like setae and some distal feather-like setae. There is one stout ventro-distal L-shaped peg-like seta on each Cx I-III. **Trochanters:** Tr I-III three types of setae (fan-like, long barbed and round-ended, and longer barbed filiform setae similar to those of dorsal idiosoma) whereas Tr IV has the same types of setae and may have an additional long nude seta. **Basifemora:** All basifemora covered with fan-like setae and long nude (all spine-like except one thin ventral one) setae. Number of nude setae on BFe I-IV: 2–3, 2–3, 1, 3–4 (3 nude + 1 long barbed seta on one side in paratype ARS-20230808-1d). **Telofemora:** All telofemora covered with fan-like setae, long nude setae and *theta* (θ). Number of nude setae on TFe I-IV: 3–5, 3–5, 3–4, 3–5 (4 nude + 1 long barbed seta on one side in paratype ARS-20230808-1f). Number of θ on TFe I-IV: 3–5, 0–3, 4–6, 7–11. **Genua:** All genua covered with fan-like setae, long nude setae, different sizes of feather-like setae with distinct stems and *sigma* (σ). Number of nude setae on Ge I-IV: 5–8, 2–4, 3–4, 5–8. Number of σ on Ge I-IV: 6–13, 3–5, 3–6, 12–15. Microsetae (κ) present on Ge I-II (Table 2,

Table 1 Metric data of *C. banari* n. sp. post-larval forms. 1a, holotype; 1b-1f, paratypes; F, female; DN, deutonymph.

Character	1a (F)	1b (F)	1c (F)	1d (DN)	1e (DN)	1f (DN)	Character	1a (F)	1b (F)	1c (F)	1d (DN)	1e (DN)	1f (DN)
LB	2425	2283	2198	1462	1272	1069	Ta II (L)	242	266	264	165	139	149
WB	1837	1606	1818	897	875	1147	Ta II (H)	190	179	191	132	113	109
ASRo	120	120	-	123	123	134	Ti II	392	404	387	225	248	241
PSG	199	-	-	-	-	274	Ge II	398	407	327	273	198	234
ExG (L)	323	-	-	-	-	58	TFe II	254	269	249	139	153	135
GAn	58	-	-	-	-	107	BFe II	113	116	112	83	72	75
An	101	-	92	83	-	46	Tr II	302	207	285	212	86	207
AnOp	844	-	763	420	-	409	Cx II	254	254	289	253	274	275
PSAn	580	-	589	282	-	431	Leg II	1955	1923	1913	1350	1170	1316
Gop	1003	-	-	-	-	455	Ta III (L)	242	259	254	148	137	157
O-O	436	320	336	247	198	291	Ta III (H)	161	159	170	105	100	98
O	93	80	67	54	42	55	Ti III	482	438	441	263	206	276
OAS	531	472	465	346	281	318	Ge III	381	466	394	295	267	275
OPS	259	238	296	191	165	161	TFe III	288	302	296	185	165	203
ISD	790	710	761	537	446	479	BFe III	125	200	143	105	94	106
OCM	230	177	181	123	99	146	Tr III	284	232	273	221	201	204
ASAL	172	196	185	145	133	140	Cx III	255	255	271	244	239	237
ASAW	151	140	151	104	91	107	Leg III	2057	2152	2072	1461	1309	1458
ASBa	75	109	124	84	92	75	Ta IV (L)	259	277	274	140	134	146
non-fan-like AL	252–308	175–262	150–260	180–211	175–190	149–186	Ta IV (H)	152	152	167	101	81	87
Fan-like AL	51–71	57–77	53–70	48–62	47–59	53–63	Ti IV	630	617	580	410	347	369
ASens	247	206	203	217	191	167	Ge IV	647	626	628	398	336	416
PSens	245	227	256	198	-	-	TFe IV	417	449	413	273	245	276
SBa	24	21	16	20	20	19	BFe IV	178	219	231	125	136	116
SBp	48	49	34	34	32	39	Tr IV	317	325	345	288	244	282
CML	1149	1319	1327	900	775	863	Cx IV	354	345	332	345	343	346
CMW	46	40	42	34	39	31	Leg IV	2802	2858	2803	1979	1785	1951
PSAL	131	89	160	124	101	68	IP	9599	9718	9537	6551	5922	6491
PSAW	130	119	138	100	79	84	PaTr (L)	-	-	-	-	-	58
PSBp	70	78	80	70	60	66	PaTr (W)	-	-	-	-	-	42
pP	214	422	362	209	177	243	PaFe (L)	-	-	-	-	-	102
PSBM	284	500	442	279	237	309	PaFe (W)	-	-	-	-	-	50
Ta I (L)	514	540	499	298	277	305	PaGe (L)	123	143	119	86	69	86
Ta I (H)	227	210	228	136	124	122	PaGe (W)	67	70	69	53	44	51
Ti I	603	534	541	341	299	338	PaTi (L)	63	70	53	58	40	40
Ge I	515	518	454	315	274	310	PaTi (L)	102	101	101	72	64	77
TFe I	438	516	464	291	241	274	PaTi (W)	47	50	45	34	40	38
BFe I	153	196	271	125	161	125	TiCl	25	22	24	20	20	20
Tr I	333	248	312	184	198	205							
Cx I	228	200	207	208	209	209							
Leg I	2785	2785	2749	1761	1658	1766							

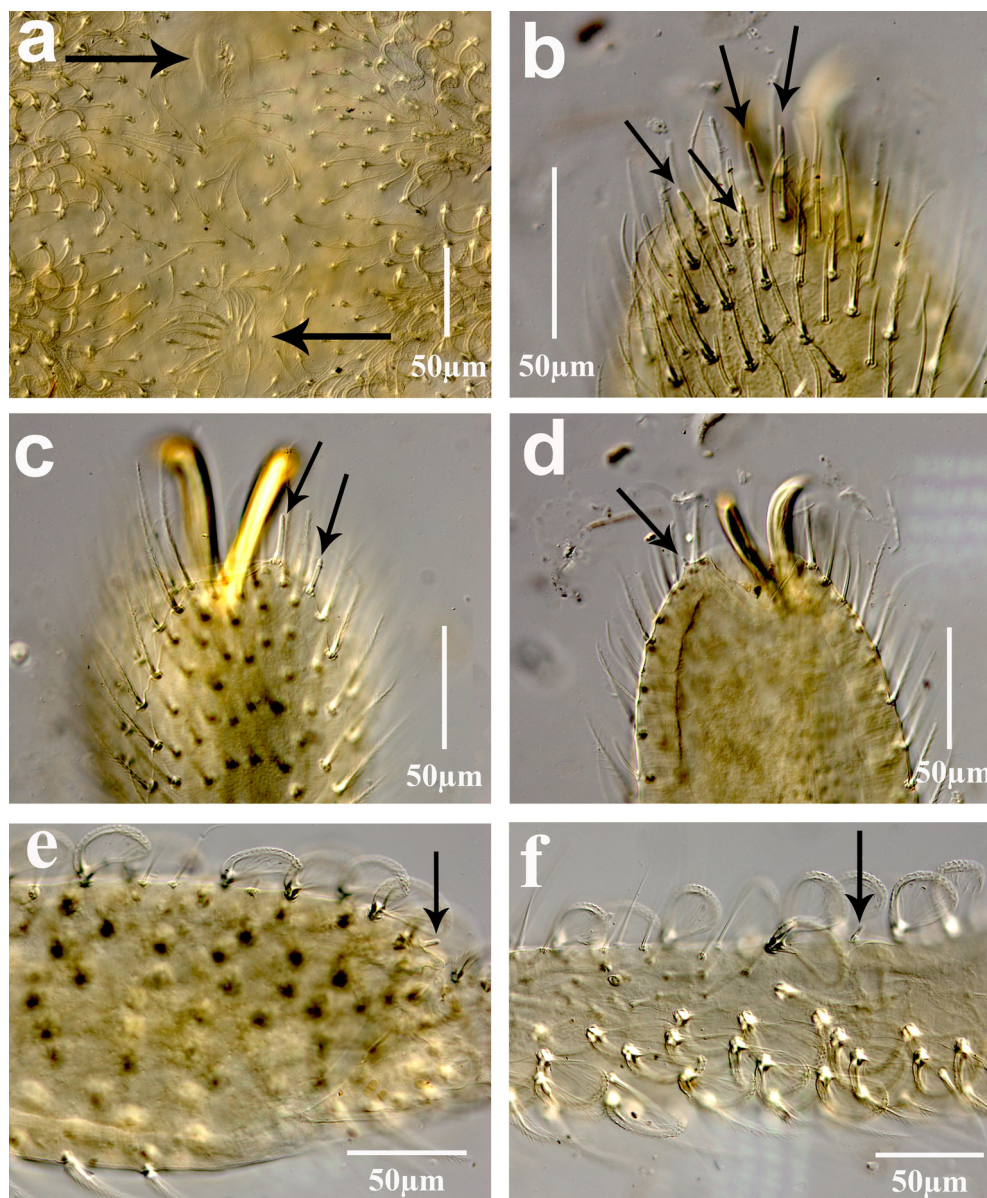


Figure 13 *Caeculisoma banari* n. sp. (Deutonymph) photographs: a — Genital opening (upper arrow) and anus (lower arrow); b — Eupathidia (ζ) on Ta I; c — Eupathidia (ζ) on Ta II; d — Famulus (ϵ) on Ta I; e — Microseta κ on Ge I; f — Microseta κ on Ti I.

Figure 13e). **Tibiae:** Dorsal surface of tibiae with only fan-like setae; lateral surfaces covered with a mixture of fan-like, feather-like and nude setae; ventral surface covered with feather-like, nude and barbed setae. *Phi* (ϕ) and sometimes microsetae (κ) present on Ti I (Table 2, Figure 13f). Number of nude setae on Ti I-IV: 3–6, 0–2, 0–2, 4–5. Number of ϕ on Ti I-IV: 20–31, 4–7, 2–6, 2–3. There is one sub-distal tubercle, and two distal tubercles in a constriction. There are no setae between these tubercles. **Tarsus:** Ta I longer than other tarsi. Ta I covered with barbed setae, *omega* (ω), eupathidia (ζ) and a famulus (ϵ). The ω on Ta I were too numerous to count. Number of solenidia on Ta II-IV: 6–10, 2–7, 2–5, ζ on Ta I-II (Figures 13b & c): 1–4, 0–2, and a ϵ only on Ta I (Figure 13d). There are no fan-like or nude setae on the tarsi.

Measurements are given in Table 1.

Remarks

The new species differs from *C. tuberculatum* in in having fan-like and long filiform barbed dorsal idiosomal setae (vs. setae on tubercles and not as above), CML (1149–1327 vs. ~1900),

Table 2 Meristic data of *C. banari* n. sp. post-larval forms. 1a, holotype; 1b–1f, paratypes; F, female; DN, deutonymph.

Character	1a (F)	1b (F)	1c (F)	1d (DN)	1e (DN)	1f (DN)
No. non-fan-like setae on crista	18	18	15	5	7	10
No. fan-like setae on crista	~ 26	~ 32	~ 30	19	16	13
No. long setae on Tr I	18	19	20, 30	9	9, 10	9
No. long setae on Tr II	23	30	32	7, 8	7, 9	8
No. long setae on Tr III	22	23	24, 26	9	7, 8	5, 7
No. long setae on Tr IV	14, 17	14, 17	20	6, 7	4	3, 5
No. nude setae on Tr IV	2	1, 2	1	0, 1	0, 1	1
No. nude setae on BFe I	4	3	4	3	2	3
No. nude setae on BFe II	3	4, 5	3	3	2, 3	3
No. nude setae on BFe III	3	3, 5	3	1	1	1
No. nude setae on BFe IV	3	4, 6	3	3, 4	2, 3	3
No. nude setae on TFe I	4	5, 6	6	3	4, 5	3, 4
No. nude setae on TFe II	4	3, 4	3, 4	3	2, 4	3
No. nude setae on TFe III	5	4	4, 5	3, 4	3, 4	4, 5
No. nude setae on TFe IV	6, 7	6	6	3, 4	2, 4	4, 5
No. nude setae on Ge I	12	11, 13	11	5, 7	5, 7	7, 8
No. nude setae on Ge II	2	5, 9	6, 7	2, 3	2, 4	3
No. nude setae on Ge III	5	8	5, 7	3, 4	4	3
No. nude setae on Ge IV	10	11	8, 9	6, 7	5, 6	6
No. nude setae on Ti I	9	16	7, 9	5, 6	3	5
No. nude setae on Ti II	1	4, 7	1, 5	0, 2	2	2
No. nude setae on Ti III	4	5, 6	4, 6	1, 2	1, 2	0, 1
No. nude setae on Ti IV	4	7	3–4	5	4	5
No. θ on TFe I	11	6, 8	8, 9	3	4	3, 5
No. θ on TFe II	6	3	3–5	0–2	2–3	3
No. θ on TFe III	9	7	9	5	4, 6	6
No. θ on TFe IV	12, 13	10, 17	15	10	7, 8	8, 11
No. σ on Ge I	32	21, 24	18	12, 13	8	6, 7
No. σ on Ge II	9	9, 10	8, 10	5	4, 5	3, 4
No. σ on Ge III	13	11	8, 10	3, 5	4, 6	5
No. σ on Ge IV	20	17, 23	21, 23	13, 15	12, 13	13, 14
No. ϕ on Ti I	48	33	36	26, 31	20, 25	26
No. ϕ on Ti II	8	10	9, 10	7	4, 5	5, 6
No. ϕ on Ti III	8	7, 10	4, 6	5, 6	2, 3	2
No. ϕ on Ti IV	4	3	5	3	2	2
No. ω on Ta I	many	many	many	many	many	many
No. ω on Ta II	18	11	11, 18	8, 10	6	9, 10
No. ω on Ta III	6	8, 10	10, 13	7	2, 3	6
No. ω on Ta IV	5	8	9, 11	3, 5	3	2, 4
No. κ on Ge I	1	1	1	1	1	1
No. κ on Ge II	1	1	1	1	0, 1	1
No. κ on Ge III	0	0	0	0	0	0
No. κ on Ge IV	0	0	0	0	0	0
No. κ on Ti I	0, 1	0, 1	0, 1	1 (near to tubercle, not distal)	1	not seen
No. κ on Ti II	0, 1	0, 1	0	0	0	0
No. κ on Ti III	0	0	0	0	0	0
No. κ on Ti IV	0	0	0	0	0	0
No. ω on palptarsus	15	15	13	7	8	7
ε on Ta I–II	1, 0	1, 0	1, 0	1, 0	1, 0	1, 0
ζ on Ta I–III	2, 3; 0, 1; 0	3; 1; 0	2, 3; 1; 0	4; 0, 2; 0	3; 1; 0, 1	1; 1; 0
Tubercule formula (Tr–Ti)	1-0-1-1-1(+2)	1-0-1-1-1(+2)	1-0-1-1-1(+2)	1-0-1-1-1(+2)	1-0-1-1-1(+2)	1-0-1-1-1(+2)

ISD (710–790 vs. 1100); from *C. montanum* in having fan-like and long filiform barbed (vs. curved, spiniform with narrow sheath), length of body (LB) (2198–2425 vs. 3000); from *C. argus* (Figures 14a & b) in the CML (1149–1327 vs. ~1470), dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. cylindrical, uniformly thick with serrations), leg I (2749–2785 vs. 2200), leg II (1913–1955 vs. 1560), leg III (2057–2152 vs. 1740); from *C. cordipes* in the LB (2198–2425 vs. 1710), O-O (320–436 vs. 280), dorsal idiosomal setae (two different types vs. one type), AL setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. cylindrical, uniformly thick with serrations); Ta I (L) (499–540 vs. 890*), Ta IV (L) (259–277 vs. 510*); from *C. sulcatum* in WB (1606–1837 vs. 1100), dorsal idiosomal setae fan-like and long filiform barbed (vs. sparsely feathered setae and interspersed with long, simple, slender spine); from *C. infernale* in LB (2198–2425 vs. 1185), WB (1606–1837 vs. 720), dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. long, and strong spines, leg I (2748–2786 vs. 1515), leg II (1913–1955 vs. 1185), leg III (2057–2152 vs. 1315), leg IV (2802–2858 vs. 1515); from *C. nasutum* (Figures 14c & d) in the LB (2198–2425 vs. 1700), WB (1606–1837 vs. 1050), Ti I (534–603 vs. 350), Ta I (L) (499–540 vs. 310), dorsal idiosomal setae (two different types vs. one type), shape of fan-like setae (with small projections strong mid-rib vs. with minute projections in line on whole surface); from *C. johnstoni* (Figures 14e & f) in the dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. stout rod-like with strong short serrations); LB (2198–2425 vs. 1380), WB (1606–1837 vs. 812), CML (1149–1327 vs. 800), ISD (710–790 vs. 415), Ti I (534–603 vs. 400), Ta I (L) (499–540 vs. 290), leg I (2749–2785 vs. 2110), leg II (1913–1955 vs. 1300), leg III (2057–2152 vs. 1460), and leg IV (2802–2858 vs. 1950); from *C. darwiniense* (deutonymph) in the ASens (167–217 vs. 118), PSens (198 vs. 150), SBa (19–20 vs. 12), SBp (32–39 vs. 24), dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. tapering, curved, slender and fully barbed); from *C. io* in the dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. cylindrical, uniformly thick with serrations); from *C. afrum* in the dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. cylindrical, uniformly thick with serrations), CML (1149–1327 vs. 2000), ASens (203–247 vs. 170), ISD (710–790 vs. 1100), OCM (160–230 vs. 320) and from *C. haussa* in the dorsal idiosomal setae (two different types vs. one type), dorsal idiosomal setae fan-like and long filiform barbed (vs. cylindrical, uniformly thick with serrations), LB (1069–1462 vs. 1790), CML (775–900 vs. 700), ISD (446–437 vs. 405), Ta I (L) (277–305 vs. 240), and Ti IV (347–410 vs. 280). We were not able to compare our species with *C. claviger* (Figures 14g & h) due to an incomplete description, but Cooreman (1958) reported it had long club-shaped dorsal idiosomal setae. Based on Cooreman's report and pictures obtained from South Australian Museum (SAM), the new species differs from *C. claviger*.

* Vitzthum (1935) wrote 0.089 µm and 0.051 µm for Ta I and IV, respectively. We suggest the measurements were in millimeters not micrometers.

Etymology

The species name *banari* is dedicated to our colleague, Dr. Petr Baňar (Brno, Czech Republic) renowned entomologist, specialist on soil Heteroptera, collector of numerous soil samples in Madagascar.

Type material

The female holotype (ARS-20230808-1a), two female paratypes (ARS-20230808-1b, 1c) and one deutonymph paratype (ARS-20230808-1e), Madagascar, Ambohitantely Spec. Res, 19.IV.2011, 18°11'48,9"S, 47°17'10,5"E, 1602 m a.s.l., sifting leaf litter under palm tree, leg. L.S. Rahanitriniaina, R. Raveloson. One deutonymph paratype (ARS-20230808-1d) with the

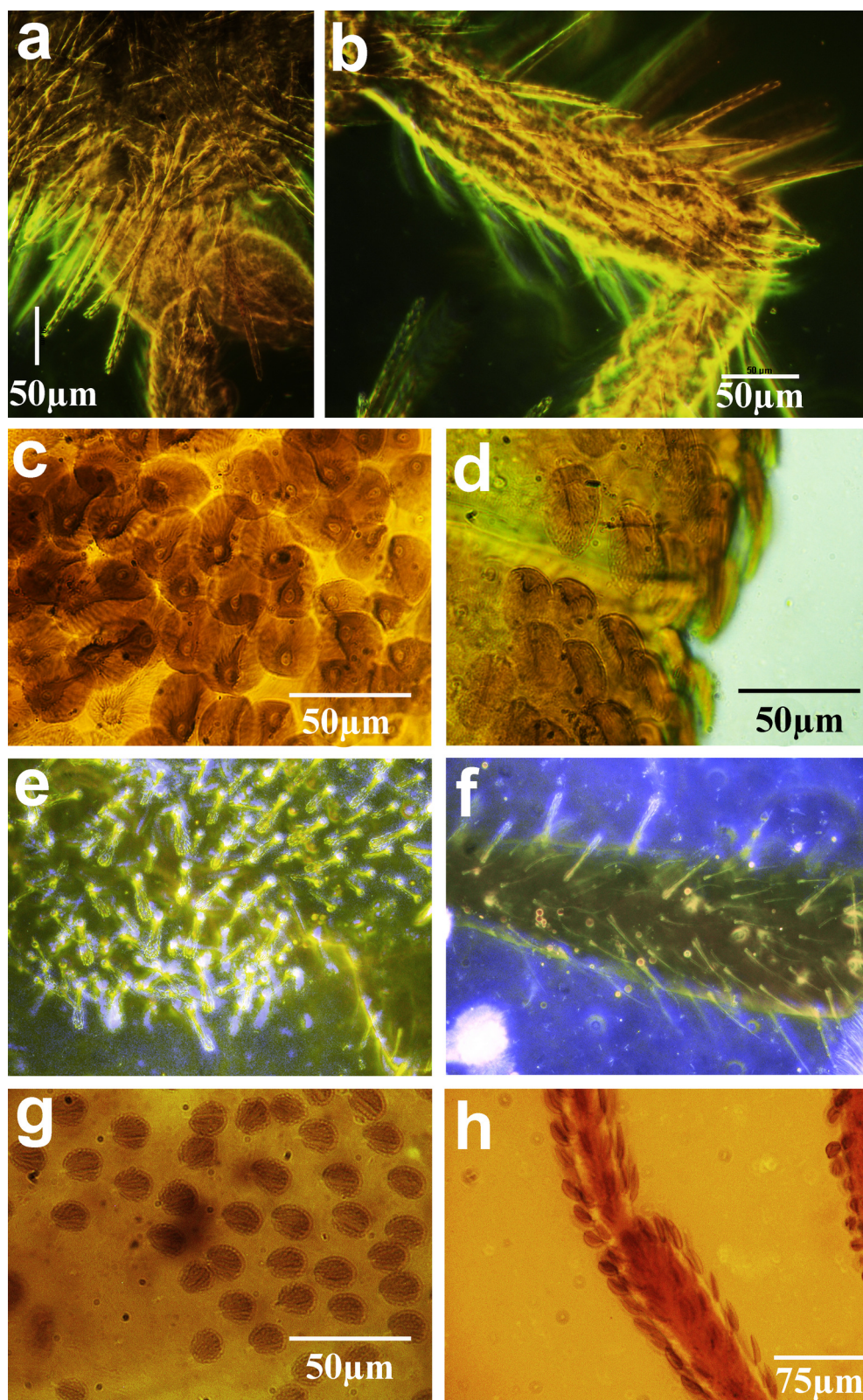


Figure 14 Australian species photographs: a — Setae on dorsal opisthosoma of *Caeculisoma argus*; b — Setae on Ge IV of *Caeculisoma argus*; c — Setae on dorsal idiosoma of *Caeculisoma nasutum* (above coxa IV); d — Setae on Fe IV of *Caeculisoma nasutum*; e — Setae on anterior dorsal idiosoma of *Caeculisoma johnstoni* (out of scale); f — Setae on Ge IV of *Caeculisoma johnstoni* (out of scale); g — Setae on dorsal idiosoma of *Caeculisoma claviger*; h — Setae on Ge IV of *Caeculisoma claviger*.

same data as holotype except 18°10'51,7"S, 47°17'21,6"E, 1593 m a.s.l., leg. R. Raveloson and one deutonymph paratype (ARS-20230808-1f) with the same data as holotype except 18°11'11,0"S, 47°17'08,5"E, 1624 m a.s.l., leg. L.S. Rahanitriina. The holotype and two paratypes (ARS-20230808-1b & 1f) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran, and the other three paratypes are deposited in the Institute of Soil Biology and Biogeochemistry, Biology Centre CAS, České Budějovice, Czech Republic.

***Caeculisoma madagascarensis* n. sp.**

Zoobank: [57B72050-D179-4A98-BD3F-5F9D97E2A481](https://zoobank.org/57B72050-D179-4A98-BD3F-5F9D97E2A481)

Description

Adult female (n = 5)

Idiosoma (Figures 15a & 16a) - Length: 1912 (2092–2543), width, 1616 (1700–2008). Color is not recorded in life but after clearing and mounting yellow to dark brown except palps (Figure 15a); one paratype specimen (ARS-20230808-2e) without color. Dorsal idiosoma is covered with leaf-like setae with two different sizes. One short (Figures 15b & 16b–c), 42–76 (39–78); the second one long with strong median shaft 101–234 (99–243) (Figures 15b & 16b–c).

The crista metopica (Figure 15c) very long 1488 (1324–1816), extending well beyond the middle of the idiosoma. The anterior sensillary area (Figure 10f) prominent, semi-oval with one pair of smooth ASens 85 (101–129) long, 7 (7–10) AL setae, 92–162 (110–196) long. Anterior process (aP) absent. The posterior sensillary area (Figure 17c) located at approximately the middle of the idiosoma; the distance between the anterior and posterior trichobothria insertions (ISD) 792 (727–860). Posterior sensillary area narrow, with small projections (Figure 17d). The crista extends about 543 (435–740), beyond the base of the PSens. PSens 134 (113–147) similar to ASens and smooth. The distance between eye 376 (414–562) and the center of the crista (OCM) is 188 (207–281); OAS 536 (509–609) distinctly longer than OPS 256 (221–279).

Ventral idiosoma covered with two different types of setae. Ventrolateral setae are similar to the dorsal setae in shape and size but more numerous and with distinct barbs (Figures 16c & 17b2); medioventral setae are short and densely barbed, 30–60 long (Figures 16c & 17b–17b1). Genital opening 270 (234–332) long with two pairs of acetabula and epivalves and centrovalves, covered densely with thin barbed setae (Figure 18b). Acetabula (Figure 18c) placed in most cases on one side (right or left) and only in one paratype (ARS-20230808-2c) on both sides. Anal valves (Figure 18d) oval, 68 (78–94) long, and covered with thin barbed setae.

Gnathosoma covered with anterior crista metopica and setae making it difficult to see details clearly. Subcapitulum (Figure 18a) covered with many barbed setae. Chelicerae very long, narrow, dagger-shaped, retractable into idiosoma, and reach behind coxae IV, emarginate except basal and distal ends (Figure 117e). Palps narrow, and linear. Palpal trochanter can't be seen due to dense dorsal idiosomal setae and was not measured. The palps (Figure 17f) were measured starting with the femur. All palpal segments covered with short and barbed setae. Odontus small, palp tarsus (Figures 16d–f) with 13 (10–13) ω .

All legs with six articulating segments (femur divided). Leg I the longest and leg II the shortest; Ta I longer and differs from other tarsi in shape (Figures 21e–f). Ta IV similar to Ta II and III but slightly longer. **Tubercles:** Each Ti I–IV with two sub-distal tubercles 0.79 dorsolateral (dl), 0.83dl (0.77–0.83dl), 0.72dl, 0.76dl (0.72–0.77), 0.72dl, 0.74dl (0.76–0.86), 0.85dl, 0.85dl (0.80–0.86dl) respectively (Figure 19f), and two distal tubercles in constrictions; all other segments with one distal tubercle except basifemora and tarsi.

Legs (Figures 20–27) with one type of leaf-like seta with two different sizes similar to those on dorsal idiosoma except coxal fields, tibiae and tarsi. **Coxae:** Cx I–IV are covered with two types of ventral idiosomal setae. Cx I–III each with a stout ventro-distal L-shaped peg-like seta. **Trochanters** (a & b in Figures 20, 22, 24 & 26): Number of long setae (> 80 in length with

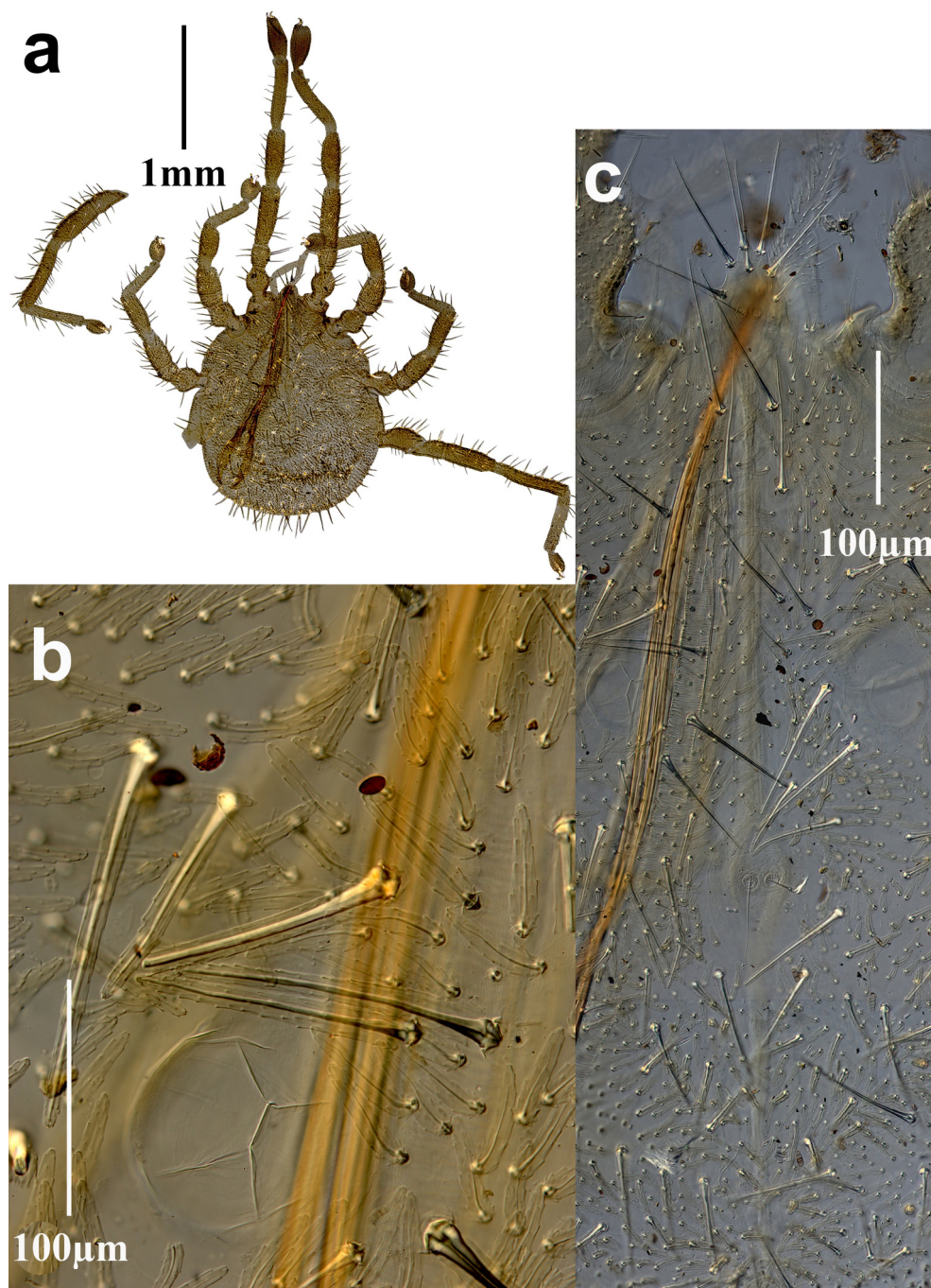


Figure 15 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Dorsal habitus; b — Short and long leaf-like setae on dorsal idiosoma; c — Crista metopica (from paratype ARS-220230808-2c).

distinct median shaft) on Tr I-IV: 11–19, 11–18, 8–14, 12–23. **Basifemora** (c & d in Figures 20, 22, 24 & 26): Number of long setae on BFe I-IV: 8–19 + 0–1 nude, 5–10 + 0–1 nude, 6–13, 8–11. **Telofemora** (c & d in Figures 22 & 24 and e & f in Figures 20 & 26): Number of long setae on TFe I-IV: 19–32, 14–19, 13–20, 16–34; number of *theta* (θ) on TFe I-IV: 0–1, 0–1, 1–2, 0–3. **Genua** (e & f in Figures 22 & 24 and a & b in Figures 21 & 27): Number of long setae on Ge I-IV: 18–33, 18–24, 14–25, 23–33. Number of *sigma* (σ) on Ge I-IV: 17–24, 3–6, 3–9,

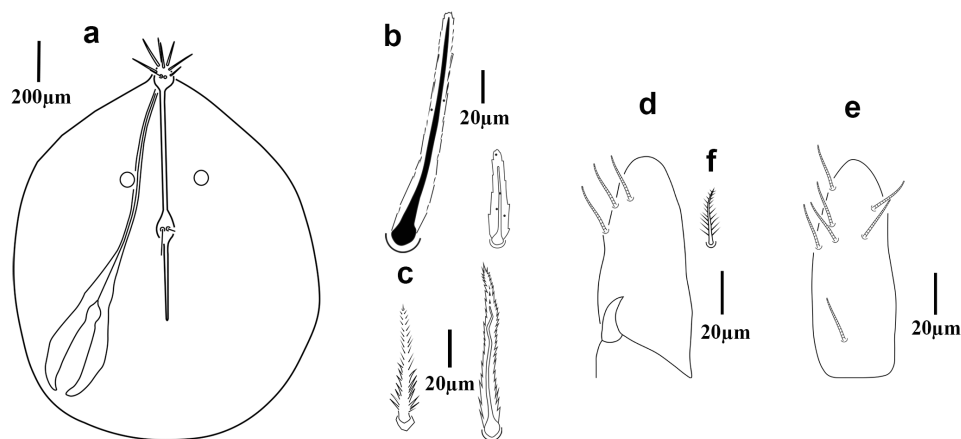


Figure 16 *Caeculisoma madagascarensis* n. sp. (Female) drawings: a — Dorsal idiosoma showing crista metopica, eyes and chelicerae; b — Short and long leaf-like setae on dorsal idiosoma; c — Medioventral (left) and lateroventral setae (right); d — Dorsal view of palpal tarsus and odontus (only ω are shown); e — Ventral view of palpal tarsus (only ω are shown); f — Normal seta of palpal tarsus.

6–12. Microsetae present on Ge I–II (Table 4, Figures 18 e & 19b). **Tibiae** (a & b in Figures 21 & 25 and c & d in Figures 21 & 27): Tibiae with long leaf-like setae with thin body and strong shaft, short leaf-like, barbed setae, and *phi* (ϕ). Microsetae (κ) on Ti I–II present (Table 4, Figures 19a & c). Number of long setae on Ti I–IV: 10–15, 7–14, 7–14, 6–15. Number of ϕ on Ti I–IV: many (> 50), 4–10, 3–7, 1–2. There are two tubercles on 9/10 of the segment, and two distal tubercles in a constriction. There are no setae between these tubercles. **Tarsi** (c & d in Figures 23 & 25 and e & f in Figures 21 & 27): Ta I longer than other tarsi. Ta I covered with barbed setae, *omega* (ω), an eupathidium (ζ) and a famulus (ϵ) (Figures 19d & e). The ω on tarsus I are too many to count. Number of solenidia on Ta II–IV: 6–9, 4–9, 3–8. Ta I–III with short leaf-like setae on dorsal surface.

Measurements are given in Table 3.

Remarks

The new species differs from *C. tuberculatum* in the dorsal idiosomal setae (vs. setae on tubercles and not as above), CML (1324–1816 vs. ~ 1900), ISD (730–888 vs. 1100); from *C. montanum* in the length of body (LB) (1912–2543 vs. 3000), leaf-like dorsal idiosomal setae (with two different sizes vs. uniform size); from *C. argus* in the leaf-like dorsal idiosomal setae (vs. cylindrical, uniformly thick with serrations), leg I (2803–3339 vs. 2200), leg II (1882–2239 vs. 1560), leg III (1963–2319 vs. 1740), leg IV (2724–3321 vs. 2200); from *C. cordipes* in the LB (1912–2543 vs. 1710), WB (1616–2008 vs. 995), O–O (376–562 vs. 280), CML (1324–1816 vs. 940), ISD (730–888 vs. 610), AL setae (92–196 vs. ≥ 85), Ta I (L) (375–474 vs. 890*), Ta IV (L) (210–241 vs. 510*); from *C. sulcatum* in WB (1616–2008 vs. 1100), leaf-like dorsal idiosomal setae fan-like and long filiform barbed (vs. sparsely feathered setae and interspersed with long, simple, slender spine); from *C. infernale* in LB (1912–2543 vs. 1185), WB (1616–2008 vs. 720), leaf-like dorsal idiosomal setae (vs. long, strong spines, all smooth above but strongly spined on outside), leg I (2803–3339 vs. 1515), leg II (1882–2239 vs. 1185), leg III (1963–2319 vs. 1315), leg IV (2724–3321 vs. 1515); from *C. nasutum* in the LB (1912–2543 vs. 1700), WB (1616–2008 vs. 1050), Ti I (546–693 vs. 350), Ta I (L) (375–474 vs. 310), leaf-like dorsal idiosomal setae (vs. fan-like); from *C. johnstoni* in the body colour (yellow to dark brown vs. red), leaf-like dorsal idiosomal setae (vs. stout rod-like with strong short serrations), LB (1912–2543 vs. 1380), WB (1616–2008

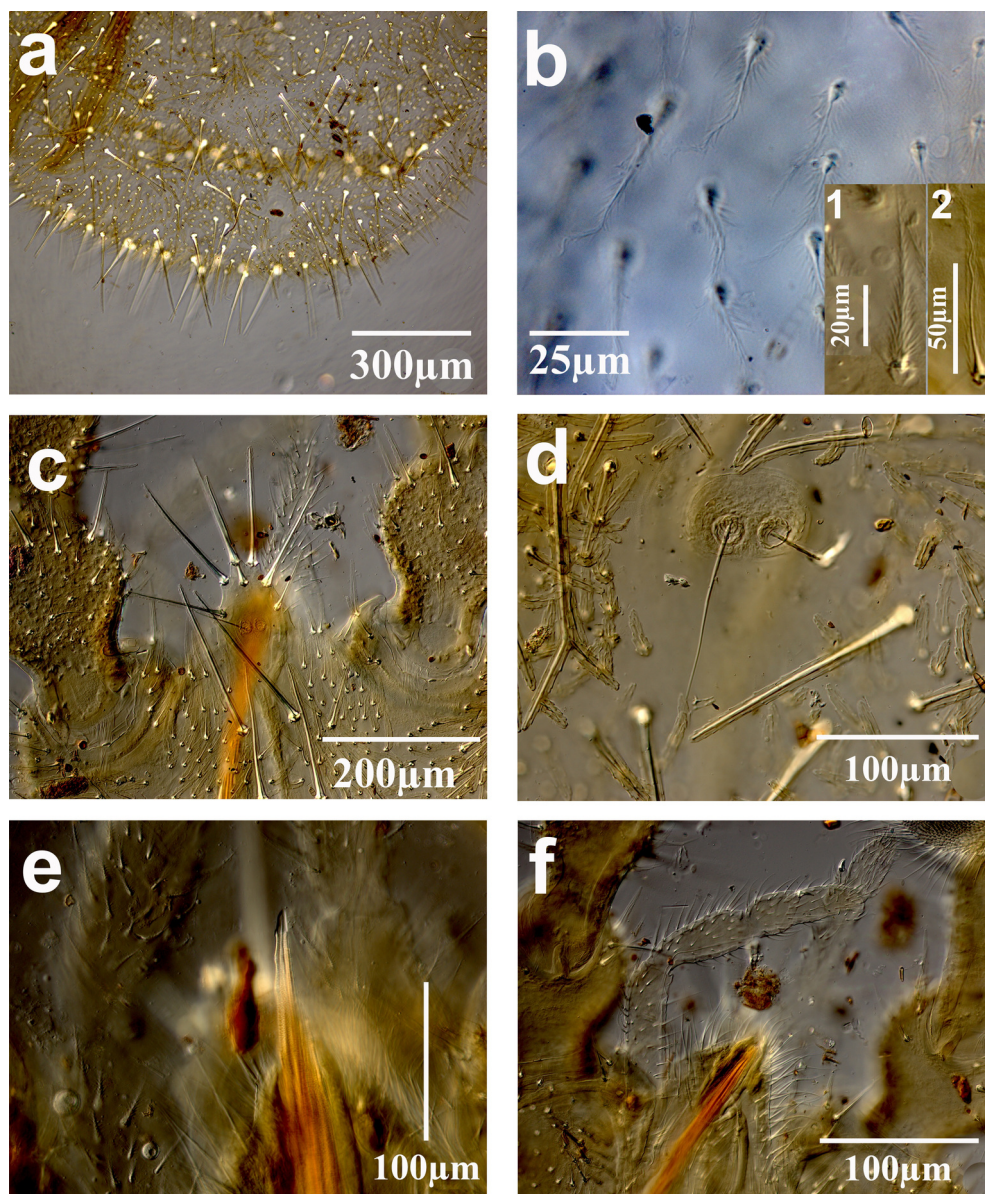


Figure 17 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — End of opisthosoma showing a mixture of short and long leaf-like setae; b — Ventral idiosomal setae (b1, medioventral seta; b2, ventrolateral seta); c — Anterior sensillary area (ASA); d — Posterior sensillary area (PSA); e — Distal end of chelicerae (from paratype ARS-20230808-2b); f — Palp.

vs. 812), CML (1324–1816 vs. 800), ISD (730–888 vs. 415), Ti I (546–693 vs. 400), Ta I (L) (375–474 vs. 290), leg I (2803–3339 vs. 2110), leg II (1882–2239 vs. 1300), leg III (1963–2319 vs. 1460), and leg IV (2724–3321 vs. 1950); from *C. darwiniense* (deutonymph) in the leaf-like dorsal idiosomal setae (vs. tapering, curved, slender and fully barbed); from *C. io* in the leaf-like dorsal idiosomal setae (vs. cylindrical, uniformly thick with serrations); from *C. afrum* in leaf-like dorsal idiosomal setae (vs. cylindrical, uniformly thick with serrations), CML (1324–1816 vs. 2000), ASens (85–129 vs. 170), ISD (730–888 vs. 1100), OCM (188–281 vs. 320); from *C. haussa* in the leaf-like dorsal idiosomal setae (vs. cylindrical, uniformly thick with serrations), LB (1912–2543 vs. 1790), CML (1324–1816 vs. 700), ISD (730–888 vs. 405), Ta I (L) (375–474 vs. 240), Ti I (546–693 vs. 305), Ge I (447–565 vs. 275), Ta II (197–249 vs. 130), Ti II (351–412 vs. 195), Ge II (356–428 vs. 215), Ta III (192–231 vs. 130), Ti III

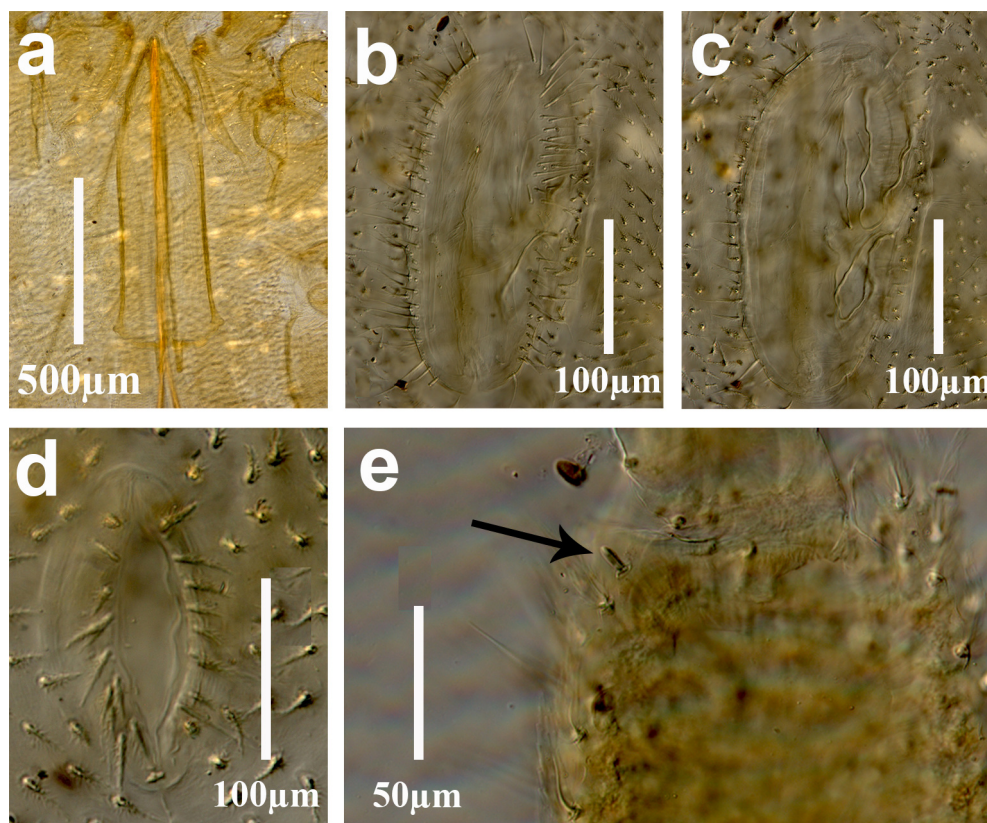


Figure 18 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Subcapitulum; b — Genitalia; c — Acetabula; d — Anus; e — Microseta on Ge I.

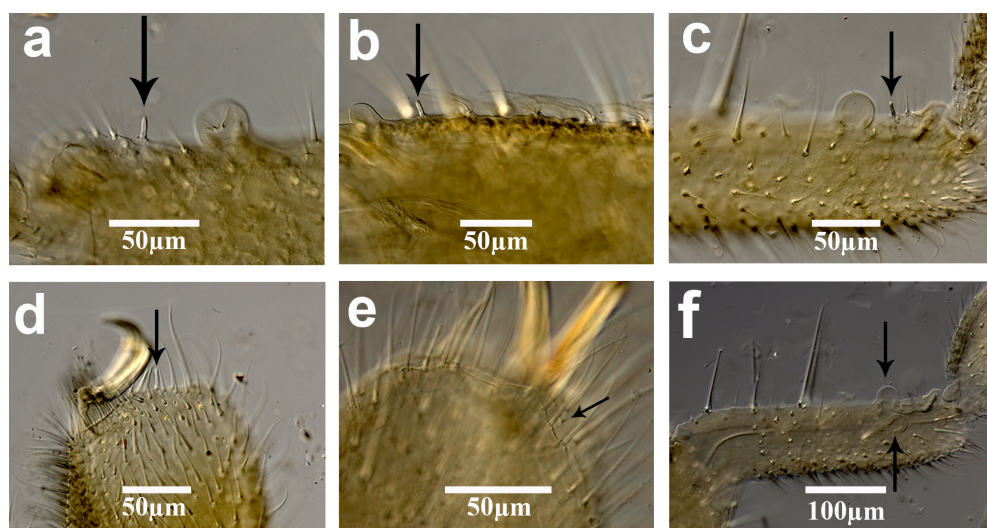


Figure 19 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Microseta κ on Ti I; b — Microseta κ on Ge II; c — Microseta κ on Ti II; d — Eupathidium on Ta I; e — Famulus on Ta I; f — Two tubercles on Ti II before constriction. See arrows.

(373–424 vs. 225), Ge III (409–474 vs. 240), Ta IV (L) (210–241 vs. 135), Ti IV (513–630 vs. 280), Ge I (621–730 vs. 320). We were not able to compare our species with *C. claviger*

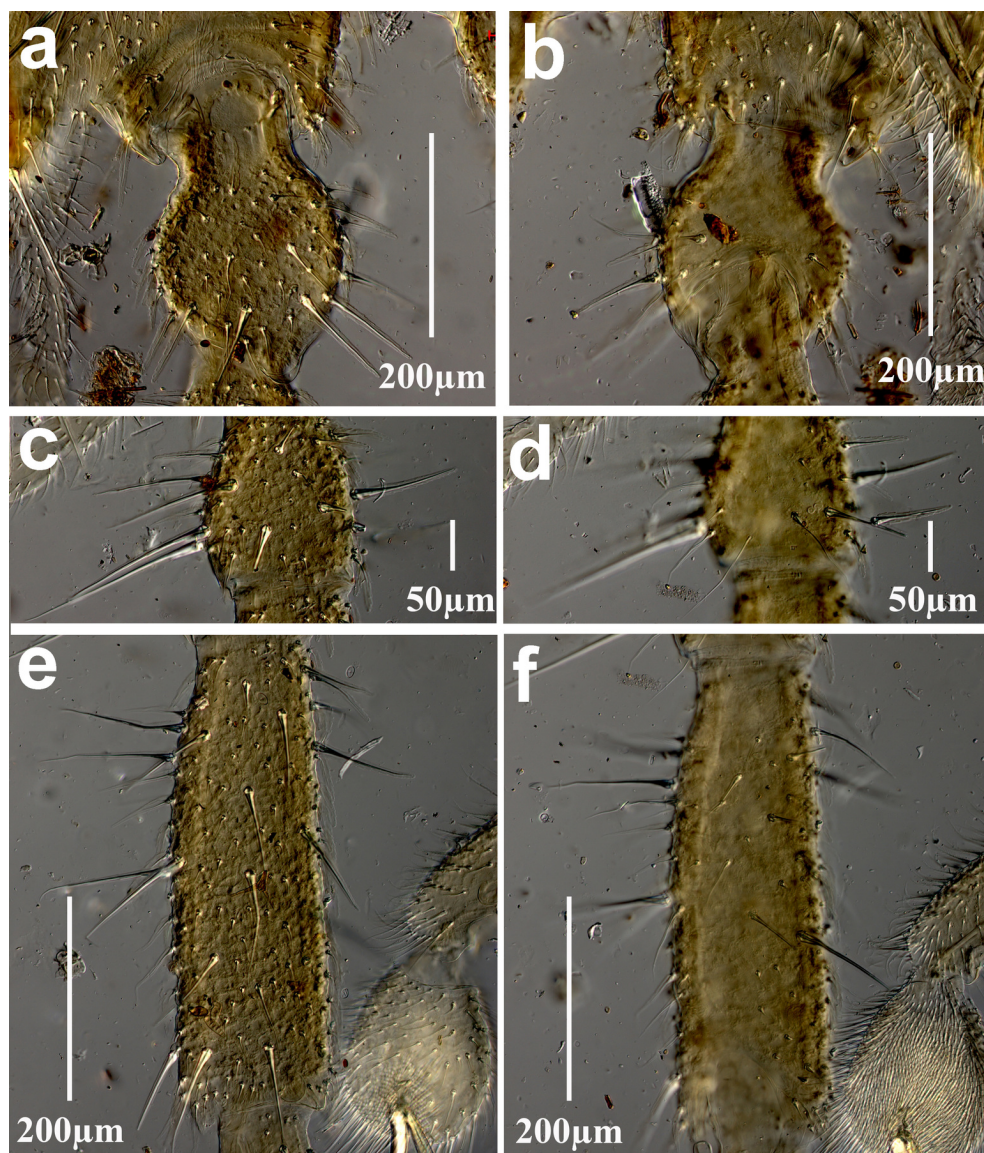


Figure 20 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Tr I, dorsal view; b — Tr I, ventral view; c — BFe I, dorsal view; d — BFe I, ventral view; e — TFe I, dorsal view; f — TFe I, ventral view.

due to an incomplete description, but Cooreman (1958) reported it had long club-shaped dorsal idiosomal setae. Based on Cooreman's report, the new species differs from *C. claviger*.

* Vitzthum (1935) wrote 0.089 μm and 0.051 μm for Ta I and IV, respectively. We suggest the measurements were in millimeters not micrometers.

Etymology

The specific name *madagascarensis* refers to the place of origin, the Madagascar Island.

Type material

The female holotype (ARS-20230808-2a), from Madagascar, Ambohitantely Spec. Res, 19.IV.2011, 18°11'11,0"S, 47°17'08,5"E, 1624 m a.s.l., sifting leaf litter under *Pandanus* sp. (Pandanaceae), leg. L.S. Rahanitriniaina. Two female paratypes (ARS-20230808-2c, 2d) with

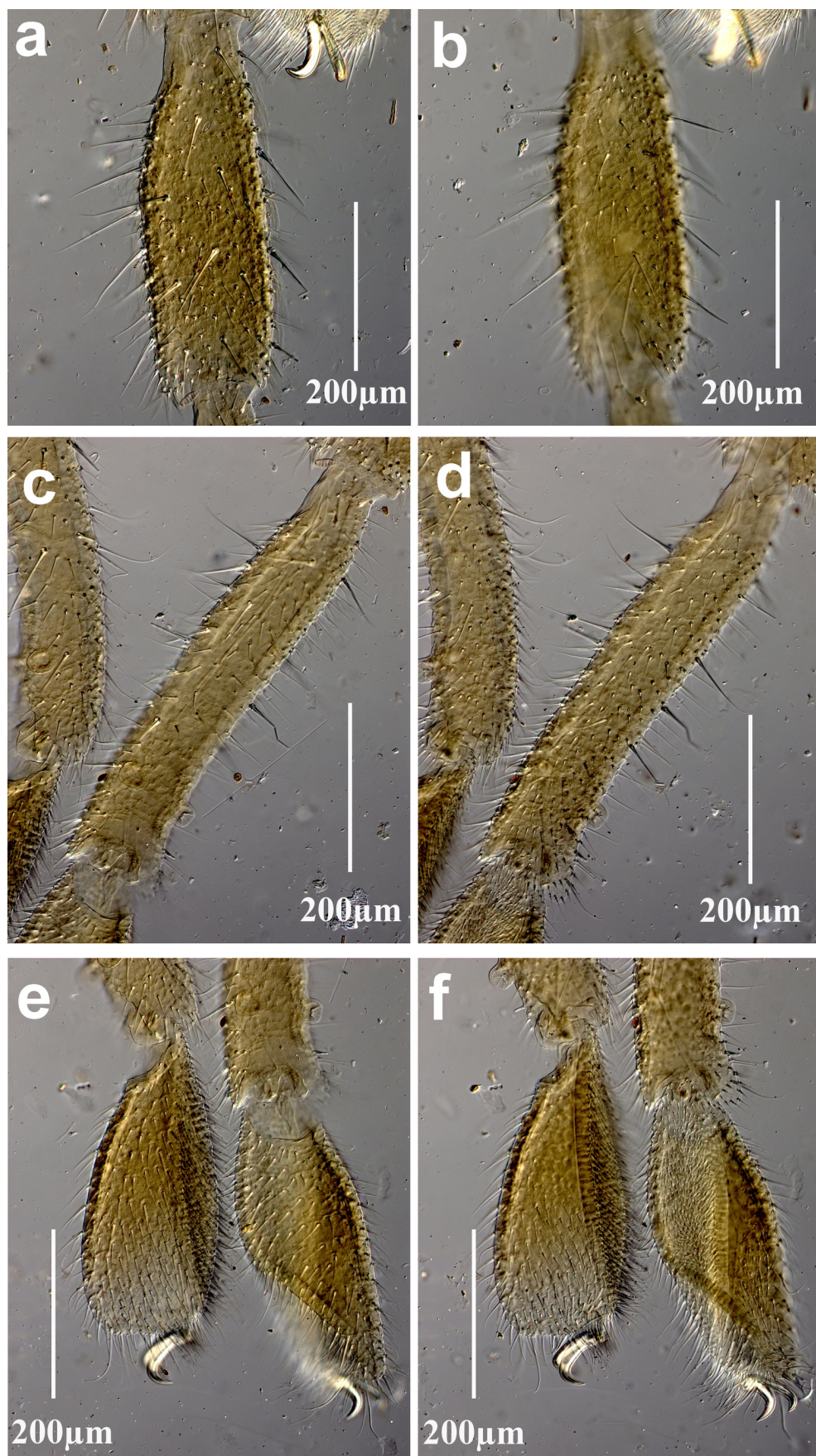


Figure 21 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Ge I, dorsal view; b — Ge I, ventral view; c — Ti I, dorsal view; d — Ti I, ventral view; e — Ta I, anterolateral view; f — Ta I, posterolateral view.

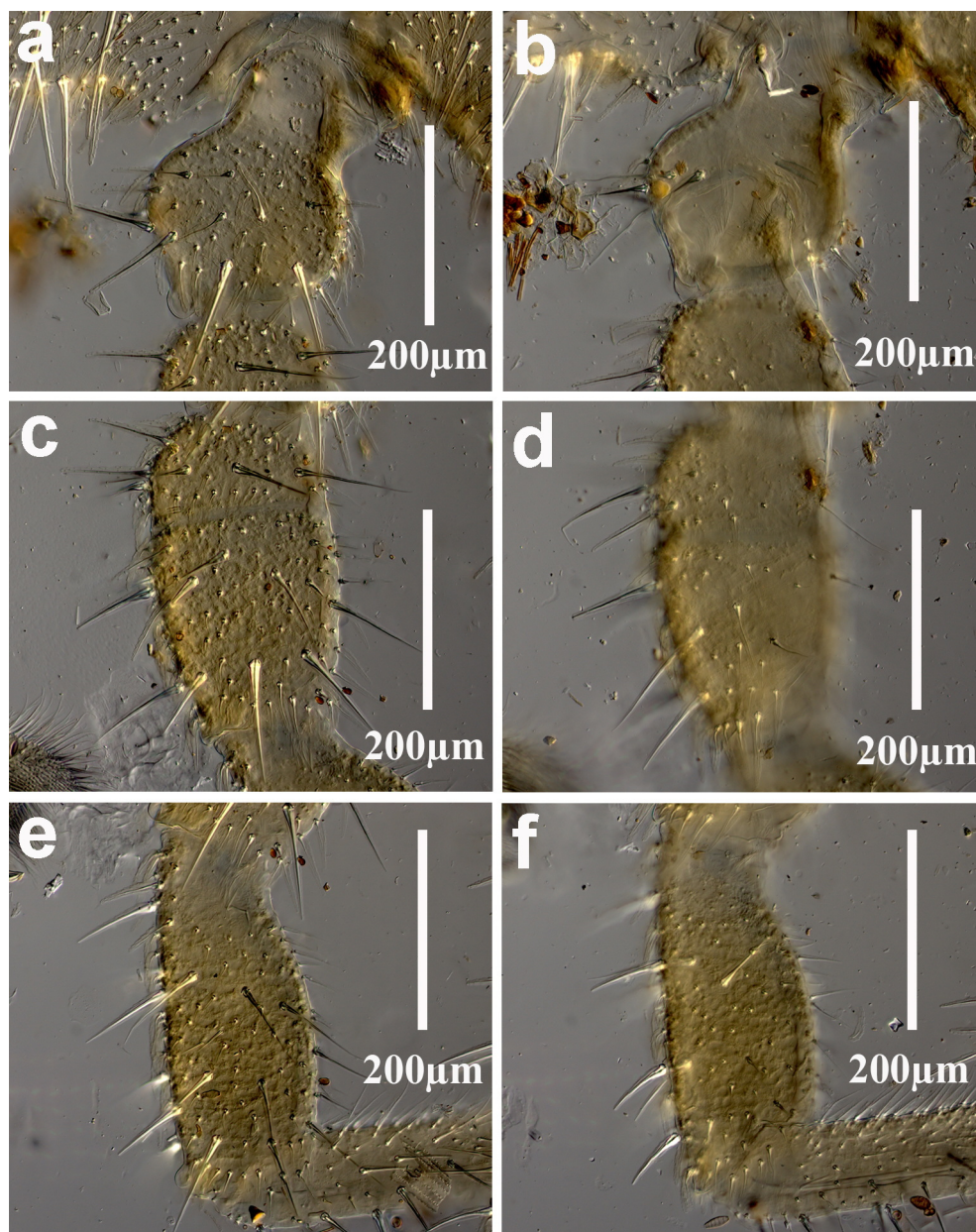


Figure 22 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Tr II, dorsal view; b — Tr II, ventral view; c — BFe and TFe II, anterolateral view; d — BFe and TFe II, posterolateral view; e — Ge II, anterolateral view; f — Ge II, posterolateral view.

the same data as holotype except for 20.IV.2011, 18°11'31,0"S, 47°17'33,3"E, altitude 1630 m a.s.l., sifting forest litter, leg. L.S. Rahanitriniaina and R. Raveloson; one female paratype (ARS-20230808-2e) with the same data as holotype except 18°11'02,5"S, 47°17'12,9"E, altitude 1577 m a.s.l., sifting forest litter, leg. L.S. Rahanitriniaina and one female paratype (ARS-20230808-2b) from Madagascar, Andasibe National Park, 12.IV.2011, 18°56'2,5"S, 48°25'12,2"E, 951 m a.s.l., sifting leaf litter under *Pandanus* sp., leg. P. Baňar and R.S. Rahanitriniaina.

The holotype and two paratypes (ARS-20230808-2b & 2c) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran, and the other two paratypes are deposited in the Institute of Soil Biology and Biogeochemistry, Biology Centre CAS, České Budějovice, Czech

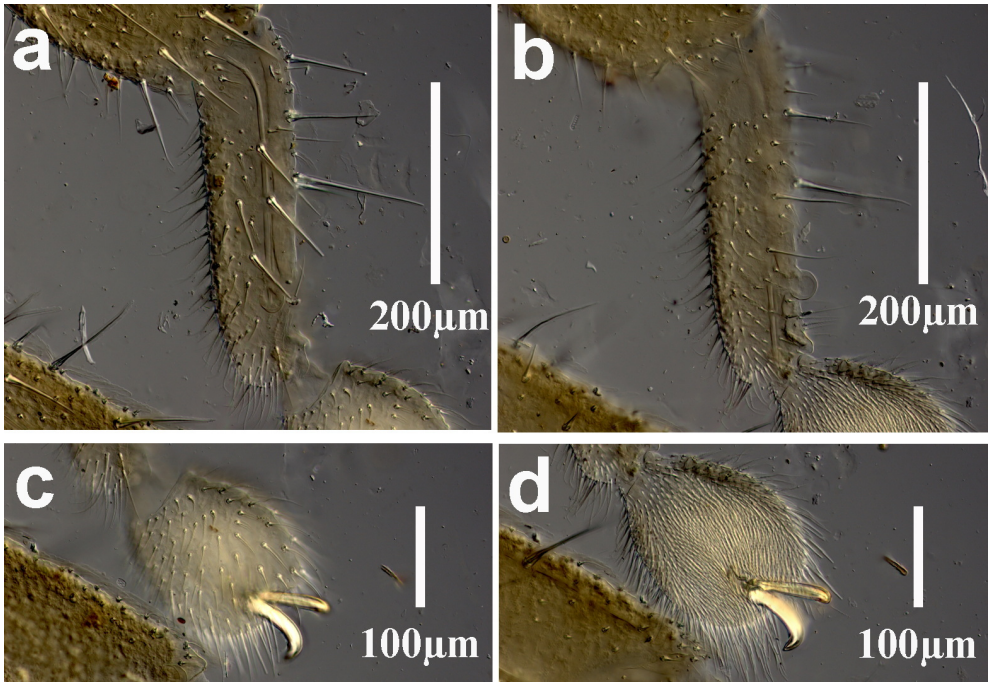


Figure 23 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Ti II, anterolateral view; b — Ti II, posterolateral view; c — Ta II, dorsal view; d — Ta II, ventral view.

Republic.

Key to species of *Caeculisoma* of the world (post-larval forms)

- 1. Dorsal idiosoma with two different types of setae 2
 - Dorsal idiosomal setae of uniform shape 3
- 2. Dorsal idiosoma with fan-like, and barbed filiform setae *C. banari*
 - Dorsal idiosoma with sparsely barbed and nude setae *C. sulcatum*
- 3. Dorsal idiosomal setae with two distinctly different sizes 4
 - Dorsal idiosomal setae uniform in size 9
- 4. Dorsal idiosoma with long and strong spine-like setae *C. infernale*
 - Dorsal idiosoma not as above 5
- 5. The longest dorsal idiosomal setae less than 100 μm, ventral idiosomal setae nude *C. haussa*
 - The longest dorsal idiosomal setae more than 100 μm, ventral idiosomal setae barbed 6
- 6. Leg I > 2700 7
 - Leg I < 2300 8
- 7. Tibiae with one subdistal tubercle, dorsal idiosoma with cylindrical setae *C. afrum*
 - Tibiae with two subdistal tubercles, dorsal idiosoma with leaf-like setae *C. madagascarensis*

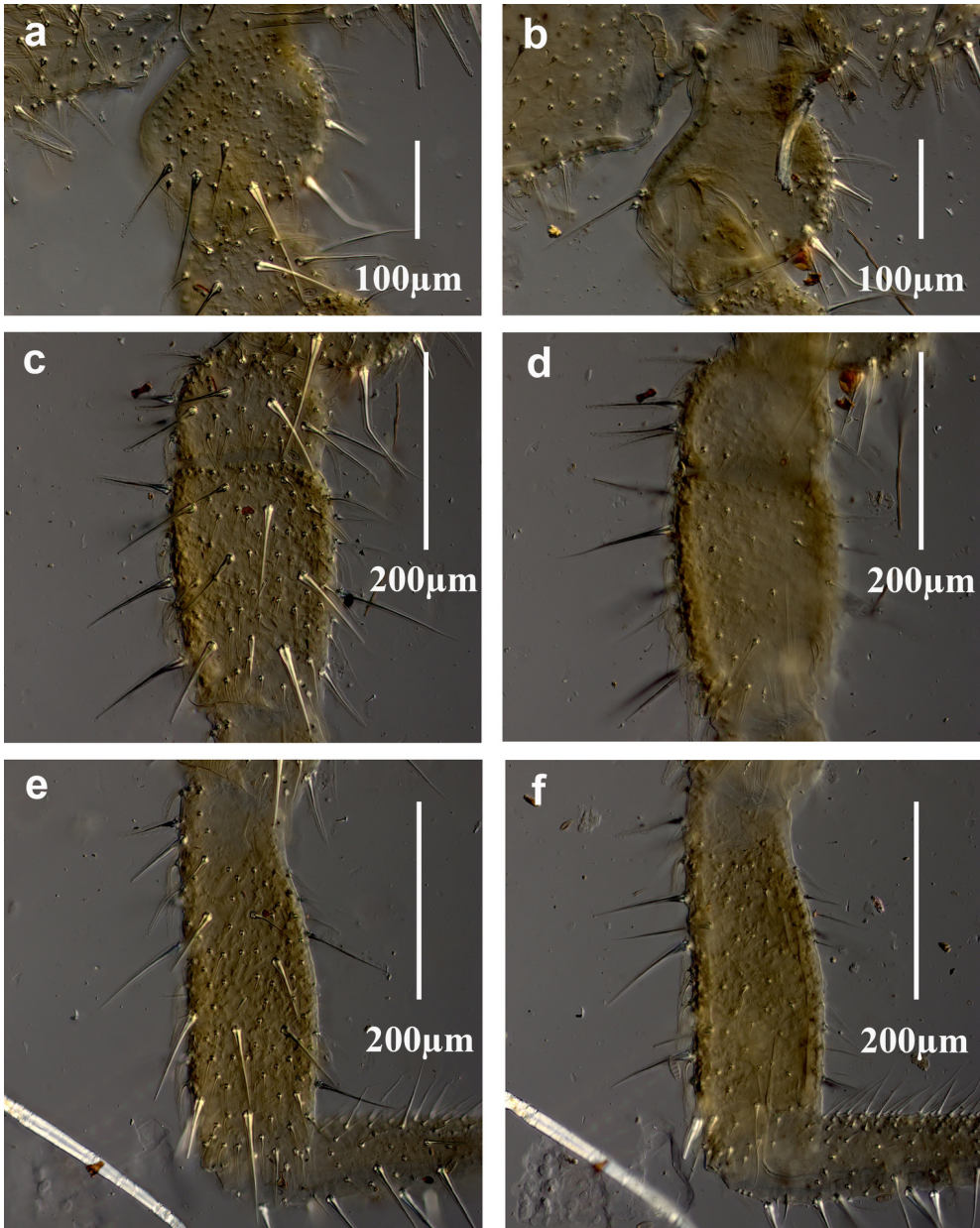


Figure 24 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Tr III, dorsal view; b — Tr III, ventral view; c — BFe and TFe III, dorsal view; d — BFe and TFe III, ventral view; e — Ge III, dorsal view; f — Ge III, ventral view.

8. The shortest dorsal idiosomal setae less than 25, the longest dorsal idiosomal setae less than 140 µm *C. io*
— The shortest dorsal idiosomal setae more than 30, the longest dorsal idiosomal setae more than 180 µm *C. argus*
9. Dorsal idiosomal setae on tubercles (papillae) *C. tuberculatum*
— Dorsal idiosomal setae without tubercles 10
10. Dorsal idiosomal setae cylindrical, uniformly thick with serrations *C. cordipes*
— Dorsal idiosomal setae not as above 11

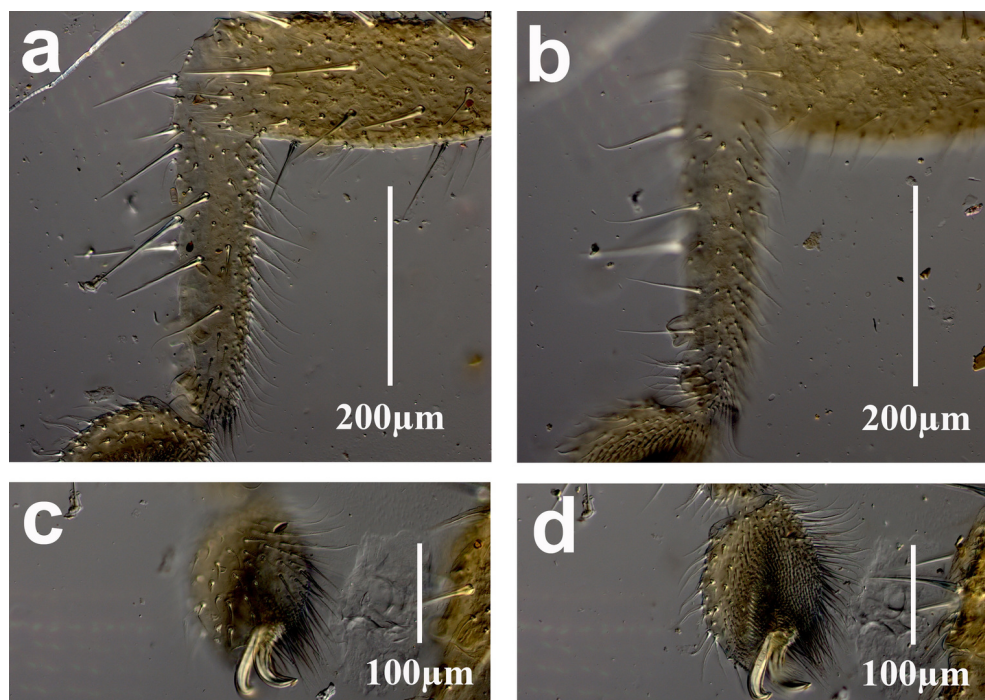


Figure 25 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Ti III, anterolateral view; b — Ti III, posterolateral view; c — Ta III, anterolateral view; d — Ta III, posterolateral view.

11. Dorsal idiosomal setae elongate clubbed papillae with short cilia *C. claviger*
— Dorsal idiosomal setae not as above 12
12. Dorsal idiosomal setae tapering, curved, slender and fully barbed *C. darwiniense*
— Dorsal idiosomal setae not as above 13
13. Dorsal idiosomal setae stout rod-like with strong short serrations *C. johnstoni*
— Dorsal idiosomal setae not as above 14
14. Dorsal idiosomal setae short and curved, spiniform with narrow sheath *C. montanum*
— Dorsal idiosomal setae scale- or leaf-like, with strongly chitinized mid-rib *C. nasutum*

Discussion

The active postlarval instars of most *Caeculisoma* species have not been adequately described. Many were minimally described without figures. In addition, the deposition for most types were not mentioned. All previously species described should be re-described. Here, we tried to explain all characters e.g., number of solenidia on leg segments, eupathidia and famulus on Ta I-II, nude setae on leg segments. The most important character for *Caeculisoma* appear to be the shape of dorsal and ventral idiosomal setae and the leg setae. Some characters seem to have important taxonomic values e.g., number of tubercles on Ti I-IV, number of AL setae on anterior sensillary area and their lengths (See Tables 1–4 for more details). The number of solenidia is highly variable on different segments but it can be used for comparison between species. Also, abnormality in number of setae on leg segments is common. Description of

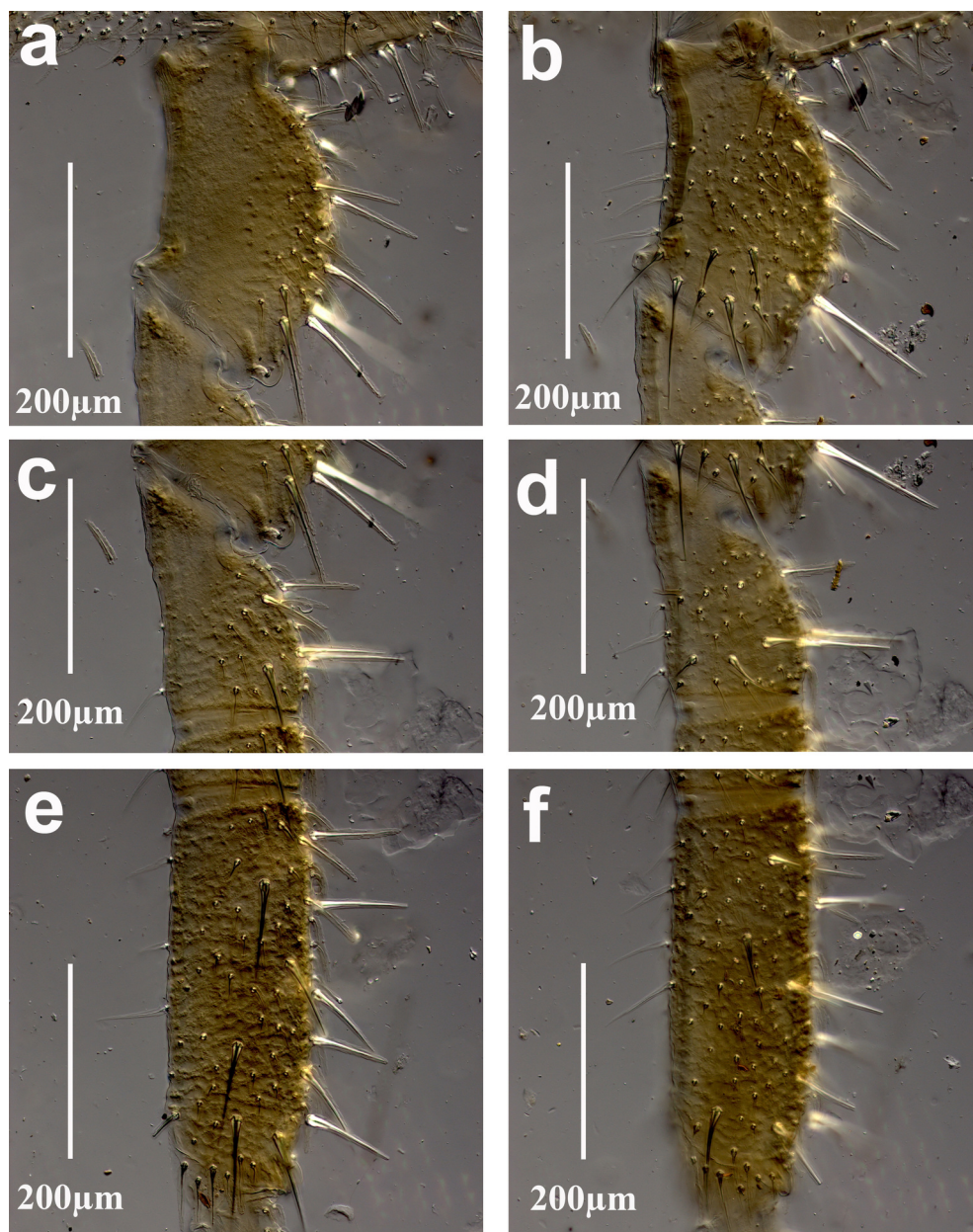


Figure 26 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Tr IV, anterolateral view; b — Tr IV, posterolateral view; c — BFe IV, anterolateral view; d — BFe IV, posterolateral view; e — TFe IV, anterolateral view; f — TFe IV, posterolateral view.

new species will determine what characters are important for future comparisons. It seems all species of *Caeculisoma* have tubercle(s) on leg segments except on basifemora and tarsi. Also, we presented photographs of two new species to show some characters as they as which may be useful for future comparisons.

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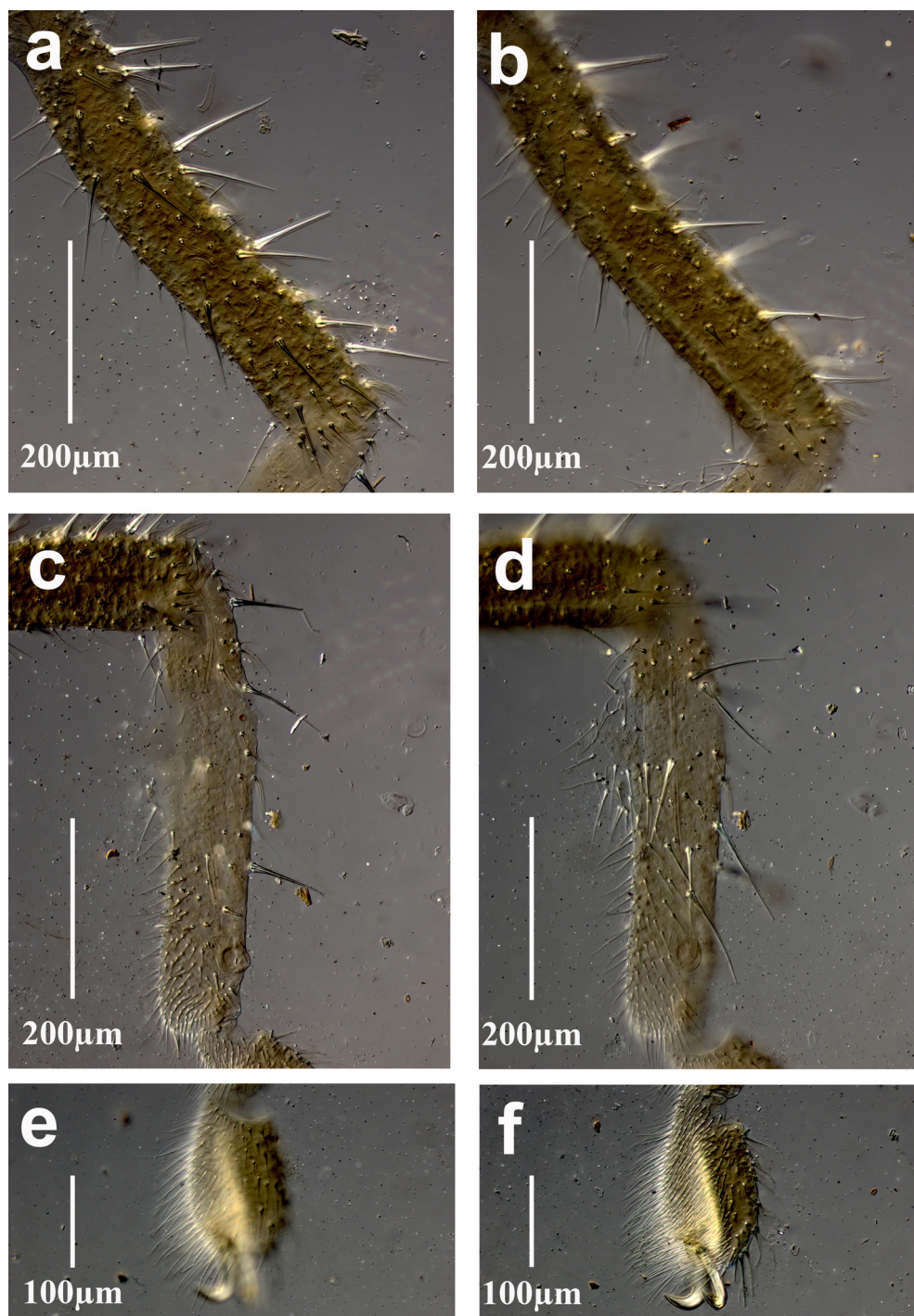


Figure 27 *Caeculisoma madagascarensis* n. sp. (Female) photographs: a — Ge IV, anterolateral view; b — Ge IV, posterolateral view; c — Ti IV, anterolateral view; d — Ti IV, posterolateral view; e — Ta IV, anterolateral view; f — Ta IV, posterolateral view.

ation in study of soil invertebrates; and the Moravian Museum in Brno, Czech Republic, which kindly provided material for our study. Also, we would like to thank Dr. Mamy A. Rakotorijaona (Directeur des Opérations, Madagascar National Parks, Antananarivo) and Dr. Dimby Raharinjanahary (Chargé des Bases de données de suivi biodiversité et recherche, Madagascar National Parks, Antananarivo) for supporting joint Czech-Madagascan research

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Table 3 Metric data of *C. madagascarensis* n. sp. females. 1a, holotype; 1b–1e, paratypes.

Character	1a	1b	1c	1d	1e	Character	1a	1b	1c	1d	1e
LB	1912	~ 2100	2543	2398	2092	Ti II	351	371	412	349	395
WB	1616	~1700	2008	1976	1924	Ge II	356	364	428	377	356
ASRo	74	-	91	116	-	TFe II	226	210	273	237	219
ISD	792	808	888	844	730	BFe II	95	114	158	121	213
PSG	168	321	282	245	269	Tr II	299	322	340	256	265
ExG (L)	270	234	332	307	274	Cx II	358	440	387	404	373
GAn	76	83	54	91	26	Leg II	1882	2023	2239	1993	2063
An	68	91	91	78	94	Ta III (L)	192	199	231	213	216
AnOp	464	534	822	791	730	Ta III (H)	129	137	188	152	175
PSAn	514	638	668	634	569	Ti III	405	424	422	400	373
GOp	608	708	967	960	850	Ge III	409	428	474	435	411
O-O	376	414	464	464	562	TFe III	252	249	302	260	247
O	71	89	90	83	76	BFe III	134	157	167	184	193
OAS	536	543	609	565	509	Tr III	224	279	329	291	296
OPS	256	265	279	279	221	Cx III	347	247	394	338	325
OCM	188	207	232	232	281	Leg III	1963	1983	2319	2121	2061
ASAL	165	138	204	173	166	Ta IV (L)	211	210	221	212	241
ASAW	100	99	151	107	136	Ta IV (H)	111	131	167	154	192
ASBa	94	100	109	98	94	Ti IV	520	527	630	562	513
AL	92–162	112–177	132–196	133–180	110–183	Ge IV	621	641	730	701	627
ASens	85	101	129	115	-	TFe IV	421	416	479	406	414
PSens	134	127	147	113	120	BFe IV	249	228	325	268	289
SBa	20	22	28	20	21	Tr IV	302	356	387	350	384
SBp	33	31	32	32	29	Cx IV	450	457	549	485	486
CML	1488	1535	1816	1552	1324	Leg IV	2724	2835	3321	2984	2954
CMW	27	20	24	33	38	IP	9372	9870	11218	10077	9925
PSAL	142	150	171	130	146	PaTr (L)	-	-	-	-	-
PSAW	82	87	100	97	114	PaTr (W)	-	70	-	-	-
PSBp	59	63	79	44	65	PaFe (L)	208	242	208	152	220
pP	543	564	740	566	435	PaFe (W)	57	61	62	68	77
PSBM	602	627	819	610	500	PaGe (L)	134	174	155	131	120
Ta I (L)	375	414	474	390	424	PaGe (W)	56	63	71	54	72
Ta I (H)	156	194	253	207	202	PaTi (L)	77	50	69	58	57
Ti I	584	656	693	610	546	PaTi (W)	54	59	58	50	66
Ge I	463	456	565	472	447	PaTa (L)	98	101	102	101	93
TFe I	489	524	572	526	447	PaTa (W)	45	48	47	46	49
BFe I	208	188	282	309	267	TiCl	22	20	20	20	24
Tr I	309	345	340	300	282						
Cx I	375	446	413	372	434						
Leg I	2803	3029	3339	2979	2847						
Ta II (L)	197	202	241	249	242						
Ta II (H)	154	151	190	165	185						

Table 4 Meristic data of *C. madagascarensis* n. sp. females. 1a, holotype; 1b-1e, paratypes.

Character	1a	1b	1c	1d	1e
No. AL	7	8	7	10	10
No. Long setae on Tr I	12-15	11-15	17-18	17-19	13-18
No. Long setae on Tr II	11-13	11-15	11	13	14-18
No. Long setae on Tr III	11-13	8	12-14	9-13	12-14
No. Long setae on Tr IV	15-21	17-21	21-22	20-23	12-13
No. long setae on BFe I	12 + 1 nude	12, 14 + 1 nude	18, 19 + 1 nude	12, 14 + 1 nude	8, 10 + 0, 1 nude
No. long setae on BFe II	7, 10 + 1 nude	7, 9 + 0-1 nude	8, 12 + 1 nude	8, 9 + 1 nude	5
No. long setae on BFe III	10, 12	9, 13	7, 9	7, 8	6, 7
No. long setae on BFe IV	9, 10	8, 11	10, 11	9, 10	0
No. long setae on TFe I	19, 27	28, 29	31, 32	21, 26	0
No. long setae on TFe II	14, 17	16, 17	17, 19	17, 19	0
No. long setae on TFe III	13, 20	17, 18	19, 20	18	0
No. long setae on TFe IV	17, 25	16, 21	29, 34	24, 29	0
No. long setae on Ge I	23, 25	18, 24	26, 29	32, 33	0
No. long setae on Ge II	21	18, 23	20, 24	21, 24	0
No. long setae on Ge III	20, 22	14, 25	19, 23	18, 24	0
No. long setae on Ge IV	23	23	28, 33	27	0
No. long setae on Ti I	11	10, 14	13, 15	13, 15	0
No. long setae on Ti II	8, 12	7, 11	11, 14	7, 10	0
No. long setae on Ti III	12	7, 8	11, 14	10	0
No. long setae on Ti IV	10, 14	6, 10	13, 15	12, 14	0
No. θ on TFe I	0	0	0	0, 1	0
No. θ on TFe II	0	0	0, 1	0	0
No. θ on TFe III	1, 2	1	1, 2	1	1
No. θ on TFe IV	0, 1	2	2	1, 2	1, 3
No. σ on Ge I	17, 24	22, 23	20, 24	19, 20	20
No. σ on Ge II	3, 4	4, 6	5, 6	3, 5	4
No. σ on Ge III	3, 4	5, 6	8, 9	7	6
No. σ on Ge IV	6	8, 10	8, 12	9, 10	7, 9
No. ϕ on Ti I	many	many	many	many	many
No. ϕ on Ti II	5, 6	6, 7	10	5, 8	4
No. ϕ on Ti III	3	3	6, 7	4, 5	4
No. ϕ on Ti IV	0	0	2	1	2
No. ω on Ta I	many	many	many	many	many
No. ω on Ta II	8	0	6, 8	7, 9	7, 8
No. ω on Ta III	6	6, 8	4, 8	9	7
No. ω on Ta IV	7	3, 4	2, 8	4	5, 6
No. κ on Ge I	1	1	1	1	1, 2
No. κ on Ge II	1	1	1	1	1
No. κ on Ge III	0	0	0	0	0
No. κ on Ge IV	0	0	0	0	0
No. κ on Ti I	1, 2	2	2	2, 4	1, 3
No. κ on Ti II	1	1	2	1, 2	1
No. κ on Ti III	0	0	0	0	0
No. κ on Ti IV	0	0	0	0	0
No. ε on Ta I-II	1; 0	1; 0	1; 0	1; 0	0; 0
No. ζ on Ta I- III	1; 0; 0	1; 0; 0	1; 0; 0	1; 0; 0	0; 0; 0
No. ω on palptarsus	10	11	12	10	10
Tubercule formula (Tr-Ti)	1-0-1-1-2(+2)	1-0-1-1-2(+2)	1-0-1-1-2(+2)	1-0-1-1-2(+2)	1-0-1-1-2(+2)

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