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COOREMANIA KIETAENSIS SP. NOV. (ASTIGMATA: CANESTRINIIDAE) FROM BOUGAINVILLE ISLAND, PAPUA NEW GUINEA

SUMMARY

Cooremania kietaensis sp. nov. from Papua New Guinea is described and illustrated, based on males, females and protonymphs. All specimens were obtained from undetermined Lucanidae (Coleoptera). All canestriniids known from Papua New Guinea are listed.

Keywords: Acari, taxonomy, new species, Lucanidae, Coleoptera, Papua New Guinea canestriniids.

INTRODUCTION

Insects constitute the most diverse form of animal life in terrestrial ecosystems (Bolu, 2016). The family Lucanidae (Coleoptera) includes about 1200 species in the world fauna which occurring mainly in subtropical regions. The canestriniid mites were found only on 47 lucaniid species and some undetermined species, 17 canestriniid species found on Lucanidae [without determined to the genus for example mentioned by Okabe and Goka (2008)] belonging to 9 genera: *Amboniophela* Haitlinger, 1993, *Canestrinia* Berlese, 1881, *Cooremania* Nesbitt, 1976, *Haitlingeria* Kim, Lee, Choi, Sim and Kim, 2006, *Noemiphela* Haitlinger, 1991, *Rugoniphela* Haitlinger, 1991, *Sandrophela* Haitlinger, 1990, *Uriophela* Haitlinger, 1991 and *Vereoxia* Haitlinger, 1995 (Berlese, 1881, Nesbitt, 1976, Haitlinger, 1990a, 1991, 1993, 1995, Kim et al., 2006).

One species of *Coleopterophagus* (Kishida, 1924) found on Lucanidae not belongs to this genus. Canestriniid mites were found on Lucanidae only in Asia, Europe and Papua New Guinea (Berlese, 1881, Kishida, 1924, Nesbitt, 1976, Haitlinger, 1989a, b, 1990a, 1993, 1995, Kim et al., 2006, Okabe and Goka 2008). From Papua New Guinea were known only two species associated with Lucanidae: *Cooremania wauensis* Nesbitt, 1976 and *Amboinophela bernae* Haitlinger, 1993 (Nesbitt, 1976, Haitlinger, 1993). Moreover, in Papua New

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Guinea were found 20 other species: *Albinorattia igori* Haitlinger, 1989 associated with Cetoniinae (Scarabaeidae), *Sandrophela kokodaica* Haitlinger, 1990 associated with Passandridae, *Athogavia arrybasi* Haitlinger, 1989, *Aurilossongia bolanica* Haitlinger, 1989, *A. guarana* Haitlinger, 1989, *A. norae* Haitlinger, 1989, *Mossongia bissaina* Haitlinger, 1989, *M. savina* Haitlinger, 1989 associated with Dynastinae (Scarabaeidae), *Apalotacarus cidaris* Summers & Schuster, 1981, *A. fusulus* Summers & Schuster, 1981, *A. petilus* Summers & Schuster, 1981, *A. rigescens* Summers & Schuster, 1981, *Arraphosoma ninax* Summers & Schuster, 1981, *Jullongia izae* Haitlinger, 1990, *Lidiophela pecki* (Nesbitt, 1976), *Passalophagus georlei* Nesbitt, 1976, Phaleratus fentoni Nesbitt, 1976, *Photia howdeni* Nesbitt, 1976 and *Sajanophela alfredae* Haitlinger, 1989 associated with Passalidae (Nesbitt, 1976, Summers & Schuster, 1981a, b, Haitlinger, 1989a, b, 1990a, b).

The genus *Cooremania* Nesbitt, 1976 is known only from one species found in Papua New Guinea and differing from all other genera by the presence of peg-like setae on ventral part of idiosoma and legs I-III (in all instars). In this paper we describe a new species *Cooremania kietaensis* from Bougainville Island, Papua New Guinea. It is second species of the genus *Cooremania.*

MATERIALS AND METHODS

Three males, two females and three protonymphs of the new species were obtained from the Lucanidae collection of the Museum of Natural History, Wrocław University. All specimens were preserved in 75% ethanol. Mite specimens were cleared in Nesbitt's solution and mounted in Berlese's medium. Figures were drawn using a Carl Zeiss Axioscope A1 compound microscope. Measurements were made using a NIKON Eclipse 50i compound microscope. All measurements are given in micrometers. The terminology and abbreviations follow Grandjean (1939), Griffiths et al., (1990), Norton (1998), Trach and Khaustov (2011) and Haitlinger and Šundić (2016).

RESULTS

Canestriniidae Berlese, 1884

Cooremania Nesbitt, 1976

Type species: *Cooremania wauensis* Nesbitt, 1976, by original designation.

Diagnosis. Propodosomal and sejugal structure absent. The presence of peg-like setae on the ventral surface of all stages. Part of setae on legs I-III peg-like. Males with well developed adanal suckers.

Cooremania kietaensis sp. nov.

(Figs. 1-20)

Diagnosis. Setae 2a, c_3, 3a, 4b, ad_2 and g peg-like. Setae p_1, p_2, p_3 and h_3 tubercle-like in males, peg-like in females, setae vF I, vF II and nG peg-like.

Description. Male (holotype) (n = 3) – Idiosoma with ornamentation on propodosoma and anterior part of hysterosoma; Propodosoma with setae vi, si

and long setae se. Hysterosoma with relatively short setae c_1, c_2, d_1, d_2, e_1, e_2 and f_2 (Fig. 1).

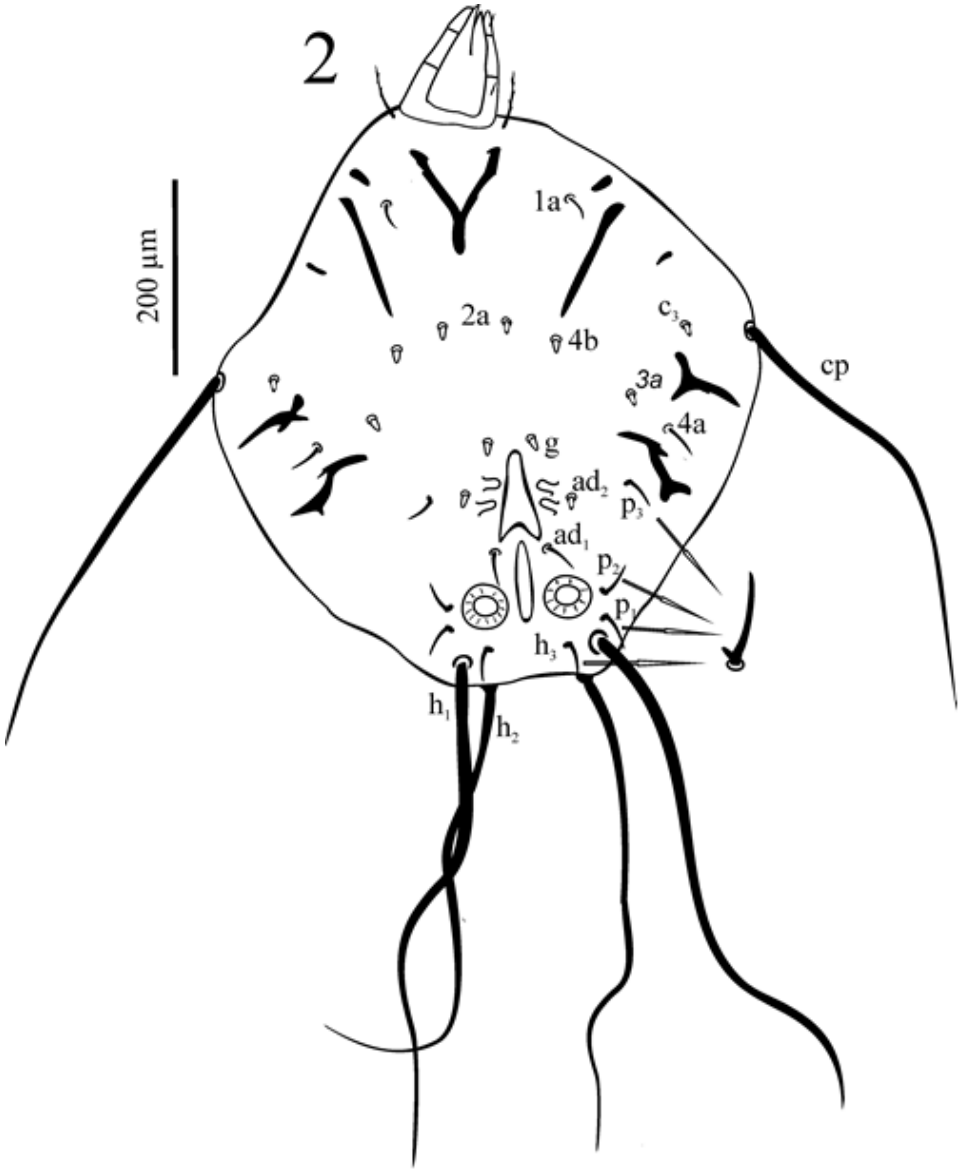
Among setae placed in middle of idiosoma distance $c_1 – c_1$ is the longest, distance $d_1 – d_1$ is longer than distance $e_1 – e_1$ and $e_2 – e_2$ (Table 1).

Table 1. Metric data of *Cooremania kietaensis* sp. nov.; H – holotype, P– paratype, PR – protonymphs.

Character	H ♂	P ♂	P ♂	P ♀	P ♀	PR	PR	PR
IL	526	480	595	730	677	407	481	430
IW	440	444	488	666	617	328	385	388
GL	108	91	100	110	106	90	87	97
GW	80	74	93	79	73	49	55	64
c_1	42	36	40	65	61	42	54	53
c_2	52	46	66	69	69	51	57	65
c_3	11	13	14	15	17	12	13	12
d_1	36	33	42	66	69	44	44	47
d_2	39	57	58	80	76	61	57	68
e_1	26	26	27	87	85	47	-	55
e_2	24	26	31	61	67	51	44	54
h_1	500	447	539	577	-	-	-	-
h_2	472	486	520	517	513	-	197	-
h_3	38	30	27	17	18	12	12	12
cp	425	409	435	490	523	-	-	243
se	390	-	425	498	-	310	-	391
si	54	63	77	75	73	56	52	52
vi	62	60	76	75	92	55	71	60
SW	34	36	44	-	-	-	-	-
SS	54	50	66	-	-	-	-	-
ANL	61	58	69	-	-	-	-	-
PL	69	60	72	-	-	-	-	-
p_1	37	36	32	16	12	15	12	12
p_2	32	30	27	18	13	12	12	12
p_3	23	22	23	13	14	18	18	16
1a	27	30	30	40	40	31	32	26
2a	15	15	15	16	16	11	13	15
3a	14	13	13	17	16	12	14	15
4a	29	29	36	13	18	19	-	-
4b	15	14	18	16	15	-	-	-
g	11	10	13	19	19	11	-	-
f_2	26	27	32	46	47			
Ta I	62	63	68	71	67	44	56	45
Ta II	56	56	64	66	67	49	50	50
Ta III	85	83	83	96	86	65	72	66
Ta IV	93	93	88	119	112	80	87	-
Leg I	221	195	222	227	210	137	157	160
Leg II	200	187	223	-	210	151	160	159
Leg III	235	239	250	264	258	198	192	200
Leg IV	261	229	262	304	282	179	192	-
Ta I ω_1	42	45	55	55	55	35	34	37
Ta I ω_2	11	11	12	15	12	12	10	18

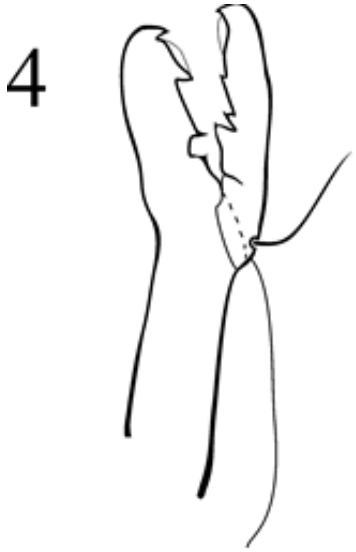
Ta I ω_3	78	66	83	71	82	50	59	60
Ta I d	95	81	100	92	100	79	88	71
Ta I e	40	45	46	46	40	33	35	32
Ta I wa	40	43	29	47	32	33	27	29
Ta I p	20	20	20	30	23	16	20	26
Ta I q	21	-	27	44	17	25	27	22
Ta I la	15	17	22	22	15	16	16	18
Ti I φ	151	152	-	172	171	120	-	126
Ge I σ	49	45	51	53	54	40	34	41
Ge I mG	26	25	33	31	26	18	24	20
Ge I cG	31	34	38	39	36	31	40	35
Fe I vF	7	9	8	9	11	11	9	11
Tr I vTr	35	43	37	22	24	32	33	31
Ta II ω	65	59	56	63	67	51	51	52
Ta II d	72	98	124	115	105	70	76	66
Ta II e	36	48	54	55	49	36	29	31
Ta II wa	29	44	46	39	35	*28*	23	28
Ta II ra	28	45	38	-	44	37	38	21
Ta II la	16	20	18	18	20	-	-	-
Ti II φ	73	70	83	79	82	55	61	69
Ge II σ	36	33	39	36	37	30	29	-
Ge II mG	33	25	37	37	32	18	20	22
Ge II cG	23	20	20	23	24	24	15	18
Fe II vF	10	14	10	12	10	8	10	12
Tr II vTr	35	27	20	30	36	29	-	-
Ta III d	48	67	57	127	117	84	73	-
Ta III e	45	62	47	72	70	33	44	48
Ta III w	25	30	28	54	48	34	28	31
Ti III φ	69	64	83	81	76	44	45	-
Ge III nG	12	12	12	16	13	12	10	11
Tr III vTr	12	12	-	10	13	13	10	13
Ta IV d	121	111	-	142	134	78	90	-
Ta IV w	41	38	41	58	40	34	36	-
Ta IV e	55	60	-	75	73	31	34	-
Ti IV φ	102	-	121	71	68	33	36	-
Tr IV vTr	48	49	-	15	13	-	-	-
c_1-c_1	214	200	-	258	222	158	186	198
d_1-d_1	100	101	116	128	121	85	82	108
e_1-e_1	126	116	129	132	151	103	-	101
e_2-e_2	107	70	106	90	127	75	-	58
ad_1	24	22	23	54	57	-	-	-
ad_2	11	10	11	48	55	-	-	-

Ventral side of idiosoma with long setae cp, h_1, h_2, thin setae 1a, 4a, peg-like setae 2a, c3, 3a, 4b, ad_2 and g and tubercle-like setae p_1, p_2, p_3 and h_3. Apodemes I joint medially to form Y – shaped structure, other apodemes as in Fig. 2. Aedagus short. The adanal suckers well developed (Fig. 2).

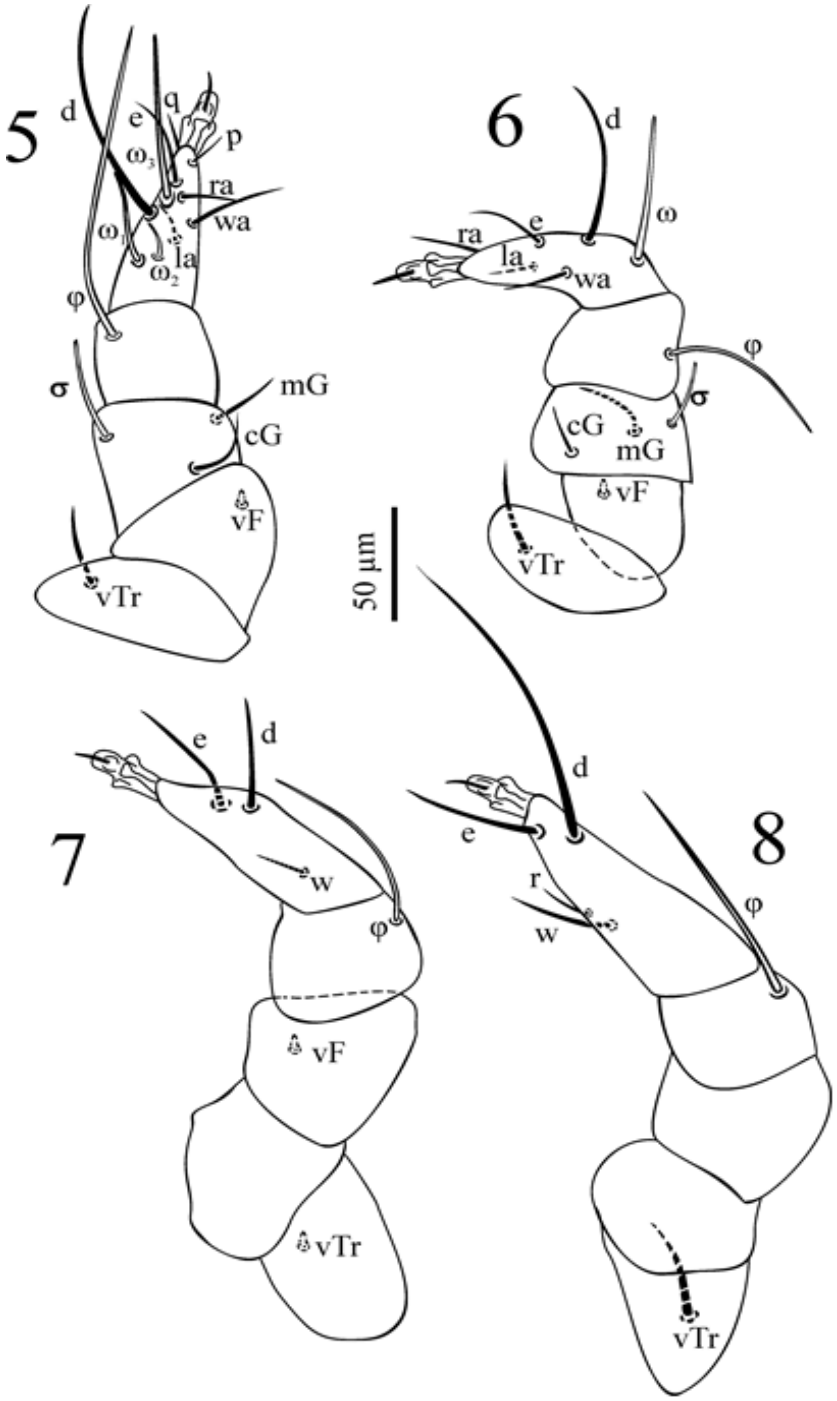


Figures 2. *Cooremania kietaensis* sp. nov. (holotype-male). Ventral view of idiosoma and gnathosoma.

Gnathosoma partly covered by idiosoma, subcapitulum with 2 pairs of nude setae, palps with placed terminally solenidion ω and two pairs of short setae (Fig. 3). Chelicerae with denticles (Fig. 4).

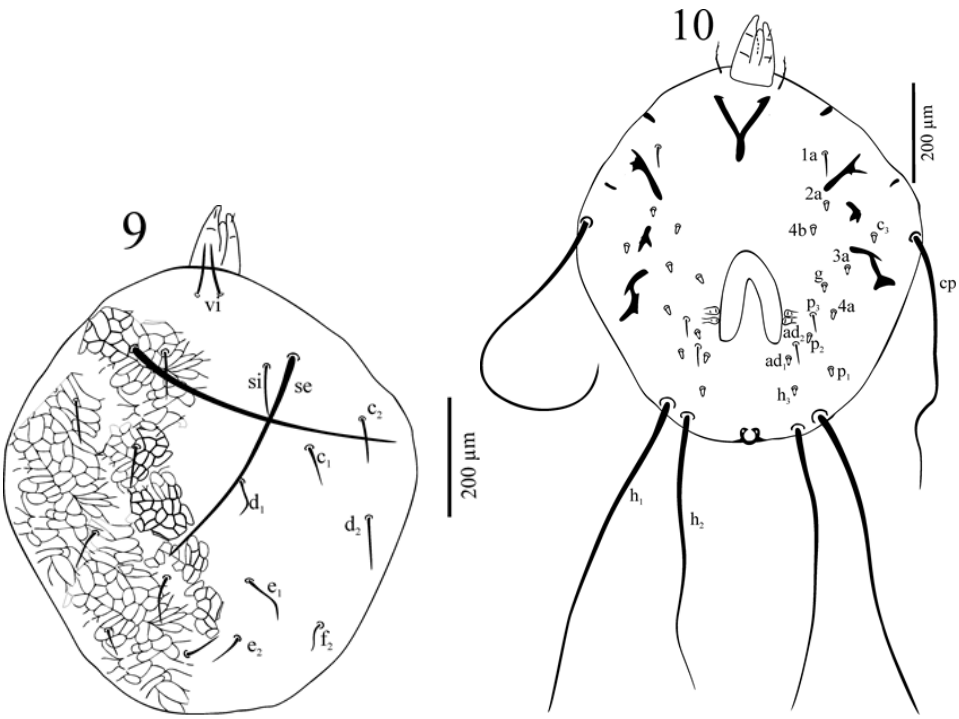


Figures 3-4. *Cooremania kietaensis* sp. nov. (holotype-male). 3. Gnathosoma, 4. Chelicerae.



Figures 5-8. *Cooremania kietaensis* sp. nov. (holotype-male). 5, Leg I, 6, Leg II, 7, Leg III, 8, Leg IV.

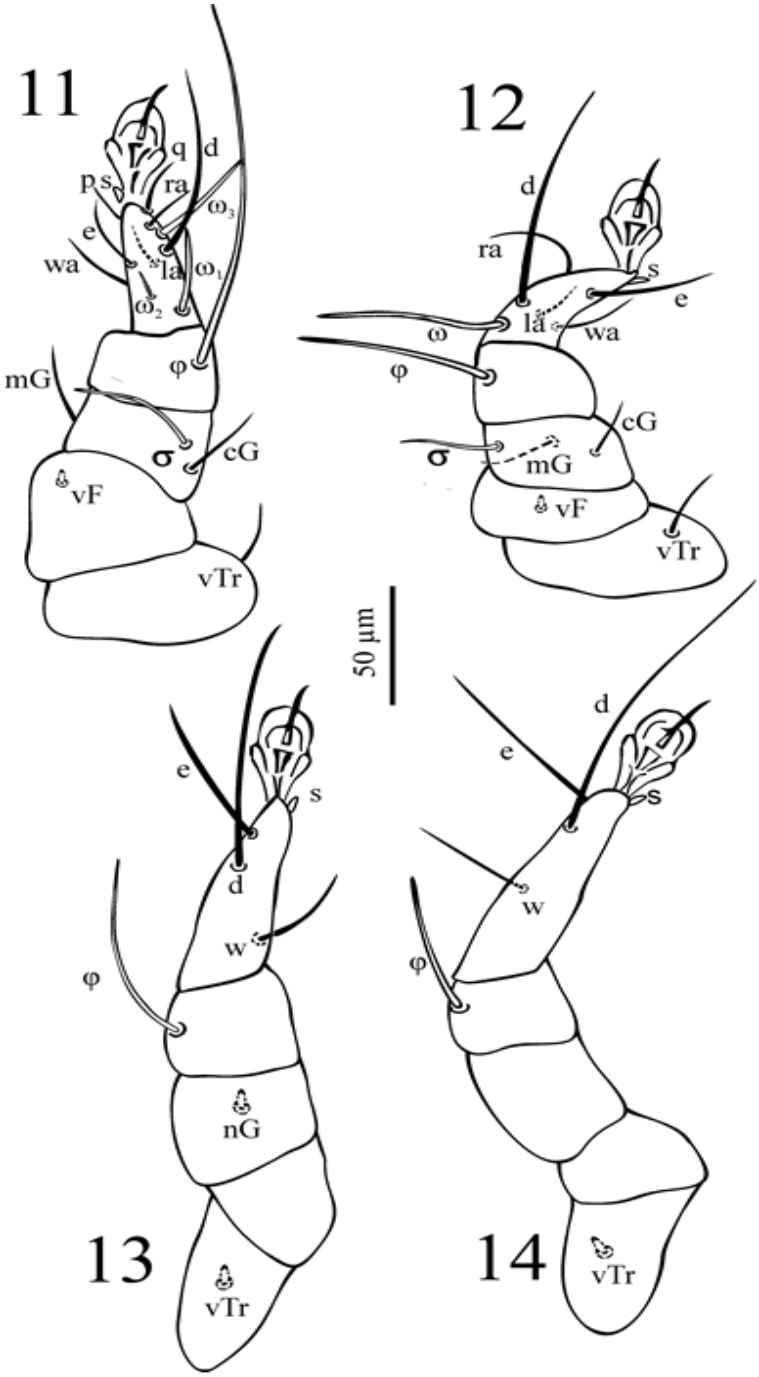
Leg setal formula: Leg I: Ta – ω_1, ω_2, ω_3, d, e, q, p, la, ra, wa, s; Ti – φ, Ge σ, cG, mG; Fe – vF; Tr – vTr (Fig. 5, Table 1). Leg II: Ta – ω, d, e, ra, la, wa, s; Ti – φ, Ge – σ, mG, cG; Fe – vF; Tr – vTr (Fig. 6). Leg III: Ta – d, e, w, s; Ti – φ; Ge – nG; Tr – vTr (Fig. 7). Leg IV: Ta – d, e, w, s; Ti – φ; Tr – vTr (Fig. 8). Leg I: seta d is the longest on Ta, φ is two times longer than φ on Ti II and III and distinctly longer than φ on Ti IV, seta vF is peg-like. Setae vF on Fe II, seta nG on Ge III and Tr III are peg-like.



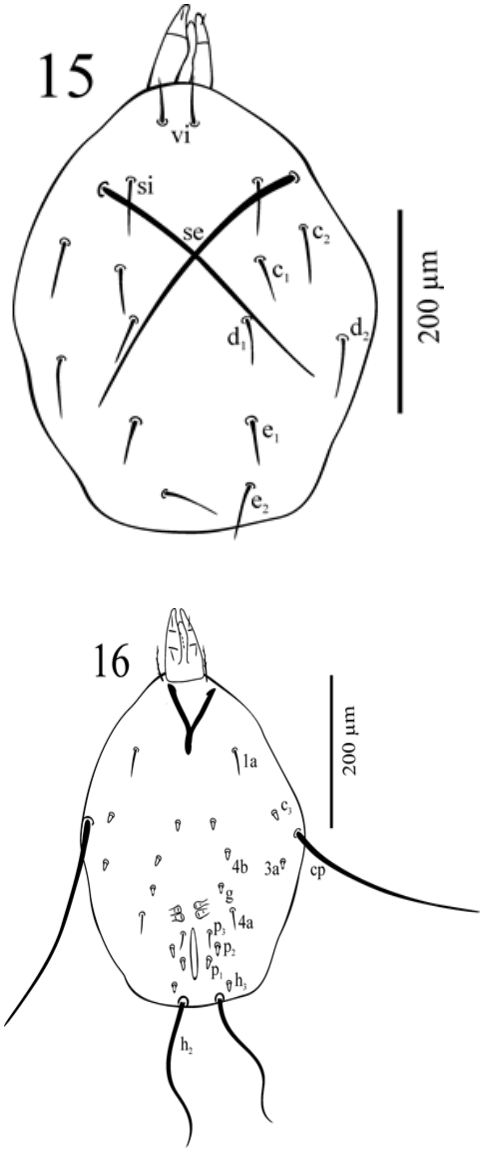
Figures 9-10. *Cooremania kietaensis* sp. nov. (female). 9, Dorsal view of idiosoma and gnathosoma, 10, Ventral view of idiosoma and gnathosoma.

Female (n = 2). The females have longer idiosoma than males, the dorsal setal pattern is identical as in males but all setae are longer, excluding setae h3 and h_2 (one male has this seta longer) (Fig. 9, Table 1).

The whole dorsum is ornamented. Ventral side of idiosoma differs from males in shape of setae in anal and genital region: setae p_1, p_2, p_3 and h_3 are peg-like, in males tubercle-like (Fig. 10). Gnathosoma as in male, partly covered by idiosoma.

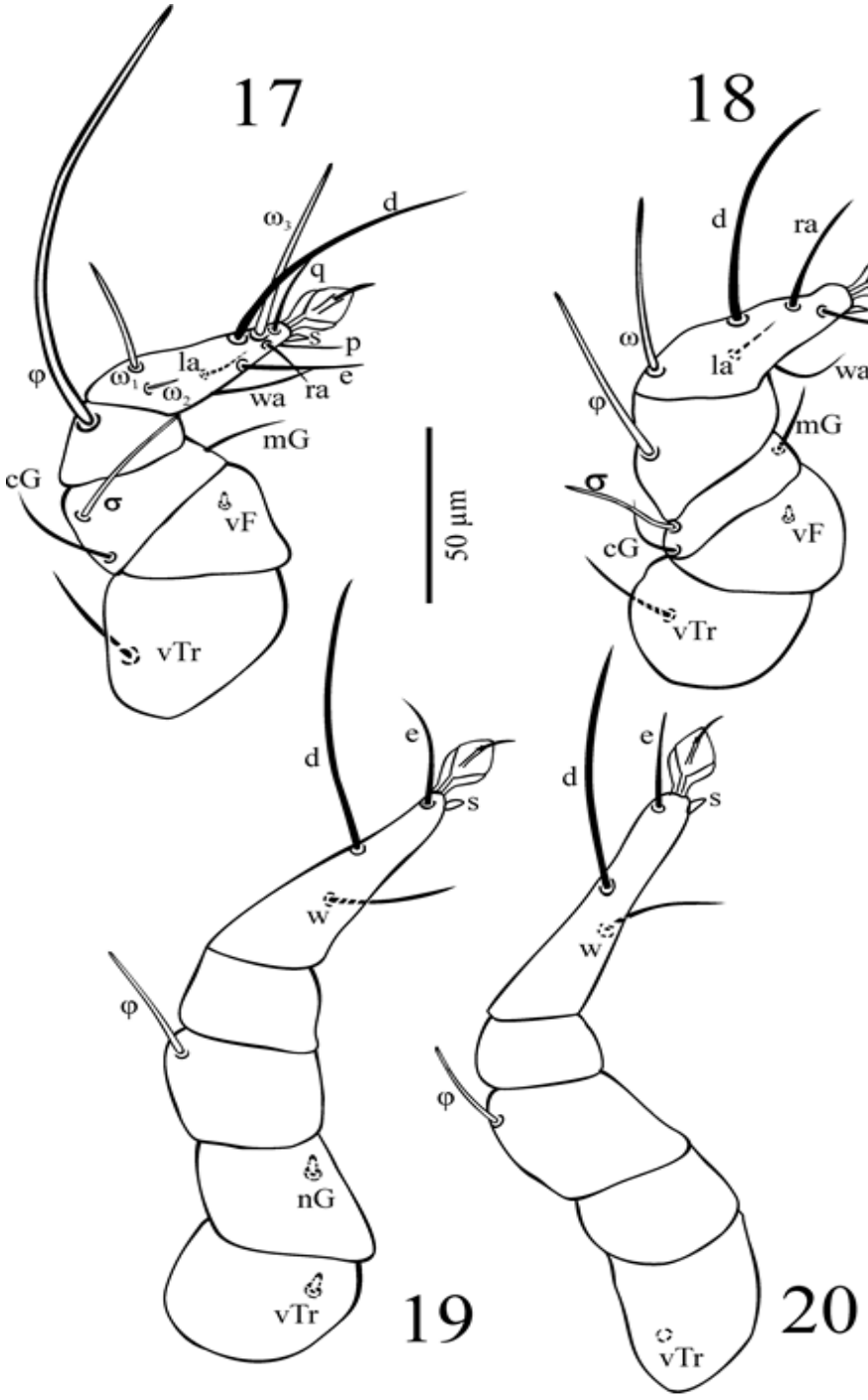


Figures 11-14. *Cooremania kietaensis* sp. nov. (female). 11, Leg I, 12, Leg II, 13, Leg III, 14. Leg IV. Leg setal formula. As in male; the only difference: seta vTr on leg IV is peg-like (Figs. 11-14).



Figures 15-16. *Cooremania kietaensis* sp. nov. (protonymph). 15, Dorsal view of idiosoma and gnathosoma, 16, Ventral view of idiosoma and gnathosoma.

Protonymph (n = 3). Propodosoma with three pairs of setae: long setae se and short setae vi and si. Hysterosoma with seven pairs of setae: long setae h_1 and short setae c_1, c_2, d_1, d_2, e_1 and e_2 (Fig. 15, Table 1) Ventral side of idiosoma with long setae cp and h_2 short and thin setae 1a, 4a and p_3 and peg-like setae c_3, 3a, g, 4b, p_1, p_2 and h_3 (Fig. 16). Gnathosoma as in male, partly covered by idiosoma.



Figures 17-20. *Cooremania kietaensis* sp. nov. (protonymph). 17, Leg I; 18, Leg II; 19, Leg III, 20, Leg IV.

Leg setal formula. Leg I: Ta – ω_1, ω_2, ω_3, d, e, p, la, q, wa, s; Ti – φ; Ge – σ, mG, cG; Fe – vF; Tr —vTr (Fig. 17). Leg II: Ta – ω, d, e, ra, wa, la, s; Ti – φ; Ge – σ, mG, cG; Fe –vF; Tr – vTr (Fig. 18). Leg III: Ta – d, e, w, s; Ti – φ; Ge – nG; Tr – vTr (Fig. 19). Leg IV: Ta – d, e, w, s; Ti – φ; Tr – vTr (Fig. 20). Setae vF on Fe I and Fe II and nG on Ge III nd vTr on Tr III are peg-like.

Measurements are given in Table 1.

Etymology –Named after the type locality.

Type material –Holotype male, seven paratypes: two males and two females and three protonymphs, Kieta, date undetermined, Bougainville Island, Papua New Guinea from undetermined Lucanidae (Insecta; Coleoptera); collector undetermined. All mites are deposited in the Museum of Natural History, Wrocław University, Poland.

Remarks. *Cooremania kietaensis* sp. nov. differs from C. wauensis in males in longer tubercle-like spines with dumpy bases p_1, p_2, p_3, h_3 > 23 μm vs. vs. these setae are peg-like, < 15 μm, setae h1 and se shorter than idiosoma vs. setae h1 and se longer than idiosoma, longer solenidion φ on Ti I (over two times longer than Ta I) vs. solenidion φ on Ti I slightly longer than Ta I, peg-like seta on genu III vs. tubercle-like spine and seven pairs of short setae on hysterosoma vs. six pairs of setae on hysterosoma; in females in posterior margin of idiosoma slightly concave vs. posterior margin almost straight, setae se and h1 shorter than idiosoma vs. setae se and h1 longer than idiosoma, solenidion φ on Ti I over two times longer than Ta I vs. solenidion φ on Ti I shorter than Ta I and hysterosoma with seven pairs of short setae vs. hysterosoma with six pairs of short setae; protonymphs can be not compare on account of laconic Nesbitt description.

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