

NEW ECTOPARASITIC ABROLOPHINE MITES  
(ACARI, ERYTHRAEIDAE, *MARANTELOPHUS*)  
ON THRIPS AND APHIDS (INSECTA) FROM IRAN

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Larvae of *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. collected from Kurdistan and Alborz provinces are described and illustrated as ectoparasite of aphids and thrips. A key to the species of *Marantelophus* of the world is presented.

Key words: Trombidiformes, larva, Thysanoptera, Aphididae, Iran.

## INTRODUCTION

There are four genera (*Abrolophus* Berlese, 1981, *Grandjeanella* Southcott, 1961, *Nagoricanellella* Haitlinger, 2009 and *Marantelophus* Haitlinger, 2011) in the subfamily Abrolophinae (Trombidiformes: Prostigmata: Erythraeidae). *Nagoricanellella* have characters that comply with definition of subfamily Abrolophinae so MAĞOL and WOHLTMANN (2012) have cited it mistakenly in Phanolophinae.

Larvae of most species in this subfamily are ectoparasites on Homoptera and Thysanoptera (Insecta) or display a predatory life-style (WOHLTMANN 2000, 2001).

The genus *Marantelophus* is known by the larval stage only and presently includes eight species: *M. alaperti* Haitlinger, 2011 from Indonesia; *M. emmanueli* (Haitlinger, 2010) from Turkey; *M. ainae* (Haitlinger, 2002) from Spain; *M. kamalii* (Saboori et Atamehr, 2000) from Iran; *M. haitlingeri* (Goldarazena et Zhang, 1997) from Spain; *M. multisetosa* (Zhang et Goldarazena, 1996) from Croatia, Greece, Hungary, Romania, San Marino, Spain, Turkey and Ukraine; *M. bella* (Zhang, 1996) from Iran and Turkey; *M. ostovani* (Haitlinger et Saboori, 1996) from Iran. Among them, *M. kamalii* and *M. ostovani* have been described from Iran (ZHANG & GOLDARAZENA 1996, HAITLINGER & SABOORI 1996, GOLDARAZENA & ZHANG 1997, SABOORI & ATAMEHR 2000, HAITLINGER 2002, 2010, 2011, MAĞOL & WOHLTMANN 2012). Parasitic associations of larvae are listed in Table 4.

In this paper, we describe the larva of *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. ectoparasitic on an unidentified Thysanoptera (Insecta) and Aphididae (Insecta) from Karaj and Sanandaj, Iran.

## MATERIAL AND METHODS

Thysanoptera and Aphididae were collected by an insect net or by shaking the foliage on white tray and subsequently preserved in 70% ethanol. Mite specimens were detached by an insect pin cleared in Nessbitt's fluid and mounted in Faure medium (WALTER & KRANTZ 2009). Figures were drawn and measurements were calculated using a BX51 Olympus microscope equipped with a drawing tube and magnification changer. Terminology and abbreviations follow SABOORI *et al.* (2009). Measurements are given in micrometers ( $\mu\text{m}$ ).

### *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. (Figs 1–9)

Diagnosis – Ti III < 80; fn TFe 8–6–6; fn Ti I–III 15–13–13; with 2 fine setulose setae on palp–tarsus.

Description (holotype) – Idiosoma oval, dorsal surface with 60 (for paratypes see Table 2) barbed and pointed setae (Fig. 1), 2 pairs of setae anterior to eyes. Scutum pentagonal, punctate and wider than long (except in paratypes d & e), lateral parts of anterior border rounded and its median part concave, anterolateral and posterolateral borders straight, posterior line convex in median, scutum with 2 pairs of scutalae; PL longer than AL; both with barbs and pointed. Posterior pair of sensilla (S) approximately twice as long as anterior pair (AM), both barbed at posterior half and pointed (Fig. 1). Each side of scutum with one eye, circular, not on platelets; 16 in diameter.

Ventral surface of idiosoma with sternalae I, II and III (1a, 2a & 3a), 4 barbed setae between coxae I & II, 16 barbed setae between coxae II and III (for paratypes see Table 2) and 22 setae behind coxae III (for paratypes see Table 2), all barbed and pointed. Sternalae 1a as long as 2a (for paratypes see Table 2), both longer than sternalae 3a. Sternalae I–III barbed and pointed. Coxalae 1b longer than other coxalae; coxalae 2b longer than coxalae 3b; all coxalae barbed and pointed (Fig. 2). NDV = 60 + 38 = 98 (not clear, 91, 113 & 104 in paratypes 1b–1e).

Gnathosoma with nude galealae (Ga) and two pairs of nude hypostomalae, posterior hypostomalae (pHy) (23) longer than anterior hypostomalae (aHy) (9). Palpal femur and genu each with 2 barbed and pointed setae (Fig. 3). Tibia with 2 barbed and one claw-like setae. Tarsus with 8 setae including 2 barbed and 4 nude normal setae, a solenidion and an eupathidium (Fig. 3). fPp = 0–BB–BB–BBN<sub>2</sub>–NNNNBB $\omega$  $\zeta$ . Palps, ventral gnathosoma and cheliceral bases punctate. Supracoxal seta of palp (*eP*) peg like, 4 long.

Leg segmentation formula: 7–7–7. Leg setal formula: Leg I: Ta–1 $\omega$ , 1e, 2 $\zeta$ , 23n; Ti–2 $\phi$ , 1 $\kappa$ , 15n; Ge–1 $\sigma$ , 1 $\kappa$ , 11n; Tfe–8n; Bfe–4n; Tr–2n; Cx–1n (Figs 4 & 7). Leg II: Ta–1 $\omega$ , 2 $\zeta$ , 20n; Ti–2 $\phi$ , 13n; Ge–1 $\sigma$ , 1 $\kappa$ , 9n; Tfe–6n; Bfe–4n; Tr–2n; Cx–1n (Figs 5 & 8). Leg III: Ta–1 $\zeta$ , 21n; Ti–1 $\phi$ , 13n; Ge–1 $\sigma$ , 9n; Tfe–6n; Bfe–4n; Tr–2n; Cx–1n (Figs 6 & 9). Tarsi with two falciform claws and a thin claw-like empodium. Measurements are given in Table 1.

Type material. The holotype (ARS-20140620-1a) and paratypes (ARS-20140620-1b & 1c) were collected by M. Hakimitabar, ectoparasitic on unidentified Thysanoptera and



**Figs 1–3.** *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. (larva): 1 = dorsal view of idiosoma, 2 = ventral view of idiosoma, 3 = ventral view (right) and dorsal view of gnathosoma (left). Scale bars: 100  $\mu$ m.

Table 1. Metric data of *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. larvae (1a = holotype, 1b-1e = paratypes).

	1a	1b	1c	1d	1e	range	1a	1b	1c	1d	1e	range
SD	64	58	69	68	65	58-69	Ta I (L)	52	62	55	53	52-62
W	71	64	74	65	62	62-74	Ta I (H)	25	25	25	25	25-27
AW	47	42	47	40	35	35-47	Ti I	67	59	63	58	58-67
PW	69	60	69	58	53	53-69	Ge I	57	67	58	55	55-67
MA	20	17	17	18	15	15-20	TFe I	30	35	28	28	28-37
AA	12	12	12	12	10	10-12	BFe I	30	35	40	35	30-40
SB	12	15	15	15	13	12-15	Tr I	32	37	30	33	30-37
ISD	50	44	52	50	45	44-52	Cx I	47	50	43	43	43-50
AP	22	17	22	23	20	17-23	Leg I	315	345	317	305	305-348
AL	27	-	23	23	24	23-27	Ta II (L)	-	52	48	45	45-52
PL	42	33	38	33	33	33-42	Ta II (H)	-	22	23	23	22-23
AM	30	19	22	20	25	19-30	Ti II	57	57	55	55	55-59
S	62	48	48	53	50	48-62	Ge II	54	59	55	50	50-62
DS	25-45	25-40	25-40	25-38	28-33	25-45	TFe II	30	35	28	25	25-35
PDS	27-40	25-30	-	30-40	30-40	25-40	BFe II	30	35	38	30	30-38
1a	37	27	31	38	40	27-40	Tr II	32	35	35	38	32-40
1b	45	44	53	38	43	38-53	Cx II	54	54	58	50	50-62
2a	37	31	31	28	35	28-37	Leg II	-	327	317	293	293-345
2b	37	29	38	30	30	29-38	Ta III (L)	50	54	48	45	45-54
3a	27	-	23	25	30	23-30	Ta III (H)	22	17	23	20	17-23
3b	25	20	25	20	-	20-25	Ti III	77	74	70	73	70-77
GL	109	85	100	93	88	85-109	Ge III	64	71	63	58	58-71

Table 1 (continued)

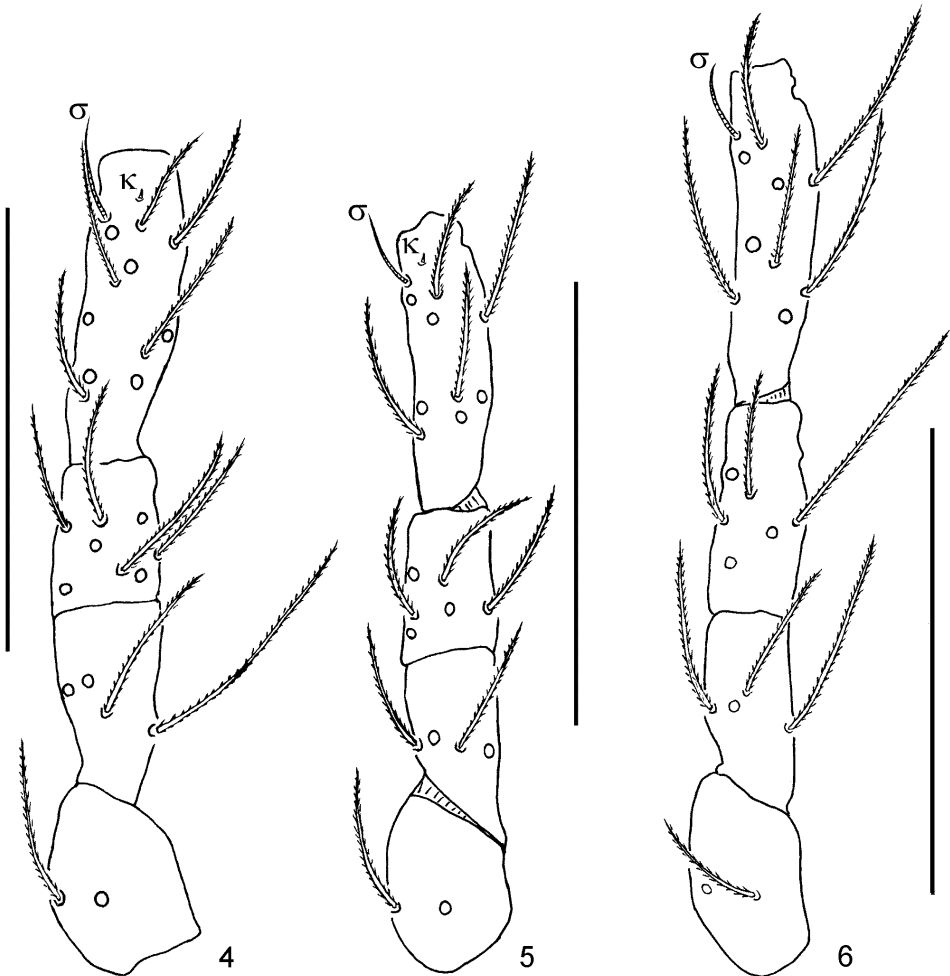
	1a	1b	1c	1d	1e	range	1a	1b	1c	1d	1e	range
PaScFed	47	33	39	35	40	33-47	TFe III	37	37	38	30	30-42
PaScFev	54	46	49	40	50	40-54	BFe III	37	37	40	38	37-42
PaScGed	29	25	26	20	23	20-29	Tr III	37	42	38	38	37-47
PaScGev	26	25	25	28	28	25-28	Cx III	47	59	58	50	47-62
fD	60	-	~56	~62	62	56-62	Leg III	349	374	355	332	332-393
fV	22	-	19	30	26	19-30	IP	-	1046	989	930	930-1086
No. of setae between coxae II and III							1086	-	16	21	16	16-21

Aphididae, 22nd June 2009 in Koushk Bala village, Chalous road, Karaj, Iran (35°59.057'N 51°5.296'E, 1824 m a.s.l.). Other paratypes (ARS-014620-1d & 1e) were collected by F. Afrasiabi and H. Ghobari as ectoparasite of unknown Aphididae on alfalfa (*Medicago sativa*), 30 May 2007, in Kouleh Sareh village, Sanandaj, Iran (46°53'32"N, 57°0'32"E, 1788 m a.s.l.). The holotype and two paratypes (ARS-2014620-1b & 1d) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran. Two paratypes (ARS-2014620-1c & 1e) are deposited in the Acarological Collection, Acarological Society of Iran, Karaj, Iran.

Etymology. Name of this species refers to the locality of some paratypes, Sanandaj city, Iran.

Remarks. There are eight species in this genus. *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. differs from *M. alaperiti* in the longer ISD (44-52 vs. 38), shorter AL (23-27 vs. 58), PL (33-42 vs. 82), GL (85-109 vs. 140), Ta I (52-62 vs. 80), Ta III (45-54 vs. 84), Ti III (70-77 vs. 112), fn TFe I-III (8-6-6 vs. 7-5-5), fn Ti I-III (15-13-13 vs. 12-12-12), fn Ta I-III (23-20-21 vs. 17-15-18), number of setae on Ge I (11 vs. 9), fD (60 vs. 96); from *M. ostovani* in the shorter AL (23-27 vs. 56), Ti (58-67 vs. 82), Ti II (55-59 vs. 84), Ti III (70-77 vs. 102), Ge III (58-71 vs. 90), number of setae on BFe I (4 vs. 3), fn TFe I-III (8-6-6 vs. 7-5-5), number of setae on Ge II (9 vs. 8), , fn Ti I-III (15-13-13 vs. 14-15-10), fn Ta I-III (23-20-21 vs. 26-19-18); from *M. haitlingeri* in the shorter AW (35-47 vs. 70), PW (53-69 vs. 82), AL (23-27 vs. 54), PL (33-42 vs. 67), AM (17-30 vs. 46), L (58-69 vs. 83), W (60-74 vs. 86), Ta I (52-62 vs. 100), Ti I (58-67 vs. 106), Ge I (55-67 vs. 90), Ta II (45-52 vs. 84), Ti II (55-59 vs. 100), Ge II (50-62 vs. 78), Ta III (45-54 vs. 90), Ti III (70-77 vs. 140), Ge III (58-71 vs. 96), fn BFe I-III (4-4-4 vs. 5-5-5), number of setae on TFe II & III (6 vs. 5), num-

ber of setae on Ti I (15 vs. 14), fD (60 vs. 119); from *M. multisetosa* in the shorter Ta II (45–52 vs. 63–65), Ta III (45–54 vs. 66–72), fn BFe I–III (4–4–4 vs. 5–5–5), number of setae on TFe II & III (6 vs. 5), fn Ti I–III (15–13–13 vs. 13–13–11), fn Ta I–III (23–20–21 vs. 25–20–22), fD (60 vs. >140); from *M. bella* in the shorter SB (12–15 vs. 36), AM (17–30 vs. 52), Ta I (52–62 vs. 71), Ti I (58–67 vs. 89), Ta II (45–52 vs. 66), Ti II (55–59 vs. 79), Ta III (45–54 vs. 73), Ti III (70–77 vs. 112), fn TFe I–III (8–6–6 vs. 9–9–8), fn Ge I–III (13–10–10 vs. 11–9–9), fn Ti I–III (15–13–13 vs. 19–17–16); from *M. kamalii* in the shorter AL (23–27 vs. 36), GL (85–109 vs. 124–192), Ta I (52–62 vs. 74–77), Ta II (45–52 vs. 66–74), Ta III (45–54 vs. 74–77), Ti III (70–77 vs. 96–102), fn BFe I–III (4–4–4 vs. 5–5–5), number of setae on

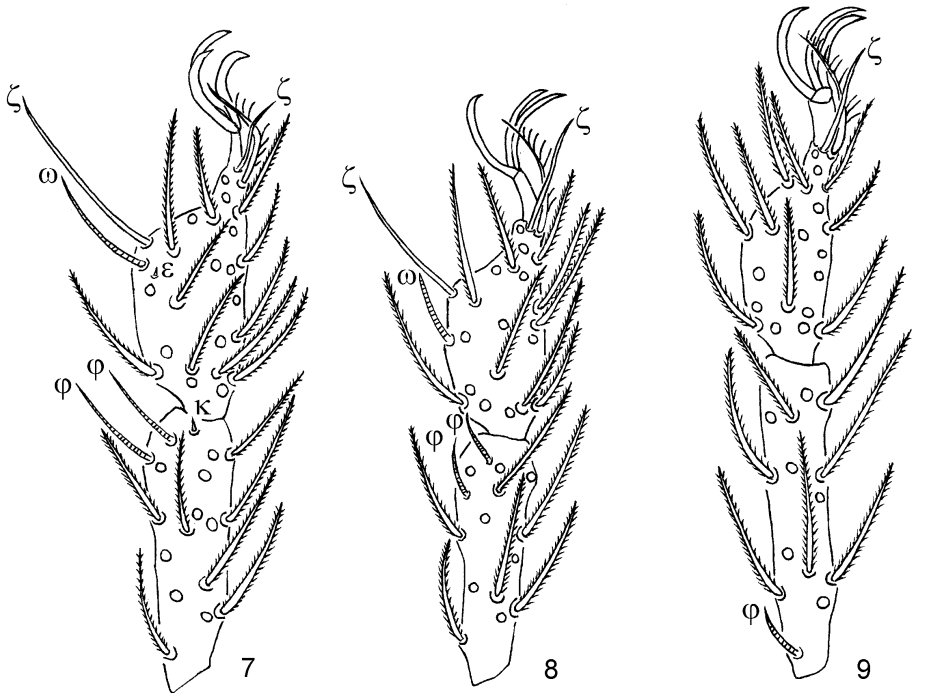


**Figs 4–6.** *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. (larva): 4 = Tr–Ge I, 5 = Tr–Ge II, 6 = Tr–Ge III. Scale bars: 100  $\mu$ m.

TFe II & III (6 vs. 5), number of setae on Ti I (15 vs. 13), fn Ta I–III (23–20–21 vs. 21–22–22), fD (60 vs. 120); from *M. ainae* by SD/W (0.9–1.04 vs. 1.12–1.13), fn TFe I–III (8–6–6 vs. 7–5–5), fn Ge I–III (11–9–9 vs. 10–9–8), fn Ti I–III (15–13–13 vs. 12–12–12), fn Ta I–III (23–20–21 vs. 18–12–14) and from *M. emanueli* by fn TFe I–III (8–6–6 vs. 5–5–5), fn Ge I–III (11–9–9 vs. 8–8–8), fnTi I–III (15–13–13 vs. 10–10–10), fn Ta I–III (23–20–21 vs. 15–13–17) (see Tables 2 & 3).

### KEY TO LARVAL SPECIES OF *MARANTELOPHUS* OF THE WORLD

- |   |   |                                       |
|---|---|---------------------------------------|
| 1 | fn Ge 11–9–9                            | 2                                     |
| – | fn Ge otherwise                         | 5                                     |
| 2 | fn BFe 4–4–4, fnTFe 8–6–6               | <b><i>M. sanandajensis</i> sp. n.</b> |
| – | fn BFe 5–5–5, fnTFe 8–5–5               | 3                                     |
| 3 | Ti III > 135, Ti I with 14 normal setae | <i>M. haitlingeri</i>                 |
| – | Ti III < 110, Ti I with 13 normal setae | 4                                     |



**Figs 7–9.** *Marantelophus sanandajensis* Hakimitabar et Saboori sp. n. (larva): 7 = Ti and Ta I, 8 = Ti and Ta II, 9 = Ti and Ta III. Scale bar: 100  $\mu$ m.

4	Ti III with 13 normal setae	<i>M. kamalii</i>
–	Ti III with 11 normal setae	<i>M. multisetosa</i>
5	fn Ge 8–8–8	<i>M. emanueli</i>
–	fn Ge otherwise	6
6	fn TFe 9–9–8	<i>M. bella</i>
–	fn TFe 7–5–5	7
7	fn Ti 14–15–10	<i>M. ostovani</i>
–	fn Ti 12–12–12	8
8	Ge I & III with 9 normal setae, Ti III > 110	<i>M. alaperti</i>
–	Ge I & III with 10 & 8 normal setae, respectively, Ti III < 90	<i>M. ainae</i>

(see Tables 2 & 3) (ZHANG & GOLDARAZENA 1996, HAITLINGER & SABOORI 1996, GOLDARAZENA & ZHANG 1997, SABOORI & ATAMEHR 2000, HAITLINGER 2002, 2010, 2011).

**Table 2.** Number of setae on leg segments of nine species of the genus *Marantelophus*: 1 = *M. alaperti*, 2 = *M. ostovani*, 3 = *M. haitlingeri*, 4 = *M. multisetosa*, 5 = *M. bella*, 6 = *M. kamalii*, 7 = *M. ainae*, 8 = *M. sanandajensis* sp. n., 9. *M. emanueli*.

Character	1	2	3	4	5	6	7	8	9
Cx I	1	1	1	1	1	1	1	1	1
Cx II	1	1	1	1	1	1	1	1	1
Cx III	1	1	1	1	1	1	1	1	1
Tr I	2	2	2	2	2	2	2	2	2
Tr II	2	2	2	2	2	2	2	2	2
Tr III	2	2	2	2	2	2	2	2	2
BFe I	4	3	5	5	4	5	4	4	4
BFe II	4	4	5	5	4	5	4	4	4
BFe III	4	4	5	5	4	5	4	4	4
TFe I	7	7	8	8	9	8	7	8	5
TFe II	5	5	5	5	9	5	5	6	5
TFe III	5	5	5	5	8	5	5	6	5
Ge I	9	–	11	11	13	11	10	11	8
Ge II	9	8	9	9	10	9	9	9	8
Ge III	9	9	9	9	10	9	8	9	8



Table 2 (continued)

Character	1	2	3	4	5	6	7	8	9
Ti I	12	14	14	13	19	13	12	15	10
Ti II	12	15	13	13	17	13	12	13	10
Ti III	12	10	13	11	16	13	12	13	10
Ta I*	17	26	26	25	26	21	18	23	15
Ta II*	15	19	22	20	21	22	12	20	13
Ta III*	18	18	25	22	22	22	14	21	17
Cp $\phi$ Ti I	0	0	0	0	0	0	0	0	0
Cp $\zeta$ Ta I	0	0	0	1	1	0	0	0	0
Cp $\zeta$ Ta II	0	0	0	1	1	0	0	0	0
$\zeta$ Ta I	2	–	2	2	2	2	2	2	2
$\zeta$ Ta II	1	–	2	2	2	2	2	2	1
$\zeta$ Ta III	0	–	0	1	1	1	2	1	0
$\epsilon$ Ta I	0	1	1	1	1	1	0	1	0
$\epsilon$ Ta II	0	0	0	1	1	0	0	0	0
$\kappa$ Ge I	1	–	1	1	1	1	1	1	0
$\kappa$ Ge II	1	0	1	1	1	1	1	1	0
$\kappa$ Ti I	1	1	1	1	1	1	1	1	0
$\kappa$ Ti II	0	1	0	0	0	0	1	0	0
$\sigma$ Ge I	1	–	1	1	1	1	1	1	1
$\sigma$ Ge II	1	1	1	1	1	1	1	1	0
$\sigma$ Ge III	1	1	1	1	1	0	1	1	0
$\phi$ Ti I	2	1	2	2	2	2	2	2	2
$\phi$ Ti II	2	1	2	2	2	2	2	2	2
$\phi$ Ti III	1	1	1	1	1	1	1	1	1
$\omega$ Ta I	1	1	1	1	1	1	1	1	1
$\omega$ Ta II	1	1	1	1	1	1	1	1	1
$\omega$ Ta III	0	0	0	0	0	0	0	0	0
Palpaltibia	3	1?	3	3	3	3	3	3	3
Palpalgenu	2N	2B	1B, 1N	2B	2B	2B	2B	2B	2N
Palpalfemur	1B, 1N	1B, 1N	1B, 1N	2B	2B	2B	2B	2B	2N
fD (HT)	96	40	119	>140	42	120	–	60	46

\* These data have variation usually within the larger series of specimens but there are not any variation in *M. sanandajensis* sp. n. because only 5 specimens were collected and studied.

**Table 3.** Measurements of nine species of the genus *Marantelophus*: 1 = *M. alaperti*, 2 = *M. ostovani*, 3 = *M. haitlingeri*, 4 = *M. multisetosa*, 5 = *M. bella*, 6 = *M. kamalii*, 7 = *M. ainae*, 8 = *M. sanandajensis* sp. n., 9. *M. emanueli*.

Charac- ter	1	2	3	4	5	6	7	8	9
AW	38	42	70	39–48	–	44–47	40	35–47	28–32
PW	48	52	82	47–57	–	60	54–58	53–69	44–52
AA	–	14	19	12–13	13	14	16	10–12	8
SB	–	16	16	10–12	36	13–14	12–16	12–15	10
AP	–	24	19	12–18	25	14–19	24	17–23	18–22
AL	58	56	54	25–32	28	36	30–34	23–27	22
PL	82	40	67	38–43	45	44–49	32–36	33–42	28–30
AM	–	36	46	32–35	52	40–41	22–26	17–30	28–30
S	–	–	52	53–58	43	69–77	48–54	48–62	32
SD	70	74	83	49–57	72	58–61	70–72	58–69	54–62
W	–	90	86	52–62	77	66	62–64	62–74	46–58
ISD	38	56	56	31–37	50	41	48–50	44–52	40–44
GL	140	110	–	–	–	124–192	106–110	85–109	88–94
1a	–	42	52	24–34	38	22–25	26–30	27–40	20
1b	–	44	60	25–43	49	41–46	42–44	38–53	30–36
2b	–	34	40	20–36	38	33–36	28–34	21–38	18
3b	–	38	32	19–33	28	22	26–28	20–25	18–20
PaScFed	–	36	–	–	–	38	38–44	33–47	34
PaScFev	–	30	–	–	–	44–49	–	40–54	–
PaScGed	–	26	–	–	–	22–33	26–28	20–29	–
PaScGev	–	20	–	–	–	33	–	25–28	–
Ta I (L)	80	62	100	65–72	71	74–77	50–54	52–62	48
Ta I (H)	–	–	–	–	–	21–24	28–30	25–27	–
Ti I	–	82	106	56–70	89	69–74	68–74	58–67	54–58
Ge I	–	–	90	57–73	73	74–77	70–72	55–67	50–54
TFe I	–	44	50	36–43	45	36–38	34–36	28–37	30
BFe I	–	42	60	45–51	52	44–47	42–48	30–40	30–38
Tr I	–	40	50	38–45	41	42	32–34	30–37	30–32
Cx I	–	52	70	–	–	50–52	54–60	43–50	46–50
Leg I	–	–	526	356–398	433	–	360–368	305–348	292–306
Ta II (L)	–	60	84	63–65	66	66–74	48	45–52	44

**Table 3** (continued)

Charac- ter	1	2	3	4	5	6	7	8	9
Ta II (H)	-	28	-	-	-	18-24	24	22-23	-
Ti II	-	84	100	58-68	79	63-74	60-62	55-59	48-52
Ge II	-	70	78	58-65	60	66-69	56-60	50-62	44-50
TFe II	-	40	40	32-35	39	30-33	32	25-35	24-26
BFe II	-	44	50	42-48	43	36-41	34-38	30-38	22-32
Tr II	-	42	57	41-47	39	36-41	40	32-40	30-34
Cx II	-	64	88	-	-	55	66-72	50-62	42
Leg II	-	-	497	321-377	386	-	338-350	293-345	276
Ta III (L)	84	62		66-72	73	74-77	48-52	45-54	
Ta III (H)	-	22	90	-	-	19-22	22	17-23	-
Ti III	112	102	-	76-106	112	96-102	82-84	70-77	72
Ge III	-	90	140	69-79	78	77-79	72	58-71	
TFe III	-	42	96	38-49	52	41-44	44-46	30-42	
BFe III	-	50	54	47-64	56	47	44-46	37-42	
Tr III	-	46	60	41-50	42	41-42	42-46	37-47	32
Cx III	-	70	60	-	-	58	64-67	47-62	
Leg III			80				-	332-343	
IP							-	930-1086	

**Table 4.** Host of 9 species of the genus *Marantelophus*.

Species	Host
<i>M. alaperti</i>	off host
<i>M. ostovani</i>	undetermined Aphididae
<i>M. haitlingeri</i>	undetermined Heteroptera
<i>M. multisetosa</i>	<i>Thrips tabaci</i>
<i>M. bella</i>	<i>Sericothrips</i> sp.
<i>M. kamalii</i>	off host
<i>M. ainae</i>	off host
<i>M. sanandajensis</i> sp. n.	unidentified Thysanoptera and Aphididae
<i>M. emanueli</i>	off host

\*

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