

New Records and Two New Species of the *Anaphothrips* Genus-Group in Iran (Insecta: Thripidae)

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Abstract: A key for the identification of eight genera of *Anaphothrips* genus-group (Thysanoptera: Thripidae) from Iran is provided. Two new species of *Rubiothrips*, namely *R. tongi* sp. nov. and *R. parisae* sp. nov., are described and a key to Iranian *Rubiothrips* species is provided. *Thermothrips* Pelikán, *Rubiothrips vitalbae* (Bagnall) and *Oxythrips claripennis* Priesner, are recorded for the first time in Iran.

Key words: Thrips, taxonomy, *Rubiothrips*, *Thermothrips mohelensis*.

Introduction

Anaphothrips genus-group (Thysanoptera: Thripidae) includes 25 genera in the world, comprising thrips which lack long setae or have a single pair of prominent setae on the posterior margin of pronotum (MOUND, MASUMOTO 2009) (Figs. 1-2, 4). BHATTI (1978) revised the generic concepts of several thripine taxa which lack major setae at the posterior angles of pronotum. MOUND, MASUMOTO (2009) provided a key to the Australian species of the *Anaphothrips* genus-group, and they have focused on Thripinae taxa that share the character absence of long pronotal setae. Recently, the Chinese genera and species of this group were also revised by MIRAB-BALOU *et al.* (2012).

So far, seven genera of this group are known from Iran, *i.e.* *Agalmothrips* Priesner (1 sp.), *Anaphothrips* Uzel (2 spp.), *Aptinothrips* Haliday (3 spp.), *Eremiothrips* Priesner (12 spp.), *Oxythrips* Uzel (4 spp.), *Rubiothrips* Schliephake (1 sp.), and *Tamaricothrips* Priesner (1 sp.) (Table 1) (ZUR STRASSEN 2003, BHATTI *et al.* 2009, MIRAB-BALOU, CHEN 2010a). In this paper, an eighth member of this

group, *Thermothrips* Pelikán, is recorded in Iran for the first time. In addition, two new species of *Rubiothrips*, namely *R. tongi* sp. nov. and *R. parisae* sp. nov. from Western Iran are described here. *Rubiothrips vitalbae* (Bagnall) and *Oxythrips claripennis* Priesner are newly recorded in Iran. A checklist of species of *Anaphothrips* genus-group (Thysanoptera: Thripidae) recorded from Iran is provided (Table 1).

Material and Methods

Specimens were collected from different sites in Iran during 2008–2011. Thrips were prepared and mounted on slides using the method described by MIRAB-BALOU, CHEN (2010b). All observations, measurements, and photographs were taken using a Leica DM IRB microscope and a Leica MZ APO microscope with a Leica Image 1000 system. All measurements are given in micrometers (µm). Type specimens are deposited in the Institute of Insect Sciences, Zhejiang University, Hangzhou, China (ZJUH); in the Insect Collection, Department of Entomology, South China

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Abbreviation. MPGBAS – Medicinal Plants Garden of Bu-Ali Sina; MCS – metanotal campaniform sensilla.

Results

Key to genera of the *Anaphothrips*-group in Iran

1. Pronotum without any posteroangular setae longer than discal setae 2
 - Pronotum with at least one pair of posteroangular or posteromarginal setae longer than discal setae.. 5
 2. Antennal segments III and IV each with simple sense cone 3
 - Antennal segments III and IV each with forked sense cone 4
 3. Antennae 9-segmented; apterous or macropterous; abdominal sternites without discal setae; tarsi 2-segmented; male with a transverse pore plate on abdominal sternites III-VII ... *Agalmothrips* Priesner
 - Antennae 6- or 8-segmented; apterous; abdominal sternites with or without discal setae; tarsi 1- or 2-segmented (tarsi 2-segmented if antennae 8-segmented, in *A. stylifer* Trybom); male without pore plate on abdominal sternites... *Aptinothrips* Haliday
 4. Median pair of setae (S1) on abdominal tergites II-VIII shorter than distance between their bases; abdominal tergite VIII usually with comb at posterior margin..... *Anaphothrips* Uzel
 - Median pair of setae (S1) on abdominal tergites II-VIII longer than distance between their bases; abdominal tergite VIII without comb at posterior margin *Rubiothrips* Schliephake
 5. Tarsi 1-segmented. Pronotum with one or two pairs of posteromarginal setae. [Antennal segment III with a simple sense cone, segment IV with forked sense cone]..... *Thermothrips* Priesner
 - Tarsi 2-segmented. Pronotum usually with four, rarely three or five pairs of posteromarginal setae. 6
 6. Antennae 9-segmented *Eremiothrips* [in part]
 - Antennae 7- or 8-segmented 7
 7. Abdominal tergites III-VI with lines of sculpture medially; sternites without discal setae.... *Oxythrips*
 - Abdominal tergites without lines of sculpture medially; sternites with or without discal setae 8
 8. Head longitudinally striate behind eyes; sternites II with 0-4 discal setae *Tamaricothrips*
 - Head weakly striate behind eyes; sternites II without discal setae *Eremiothrips* (in part)
- Rubiothrips* Schliephake**

Generic diagnosis. Head slightly wider than its length; interocellar setae situated between two hind ocelli. Antennae 8-segmented, with forked sense cone on segments III and IV. Pronotum on the posterior margin without significant posteroangular setae; ferna generally undistributed, sometimes the two parts separated from each other; mesofurca with spinula. Setae S1 on abdominal tergites II-VII well developed and each pair stands side by side much closer to than their own length; these setae always longer than setae S2; the back edge of tergites smooth; tergite VIII without comb on posterior margin, laterally without ctinidia; abdominal sternites without discal setae.

Remarks. *Rubiothrips* species are distinguished from *Anaphothrips* by having paired median setae on the abdominal tergites, long and arising close together, whereas in *Anaphothrip*, they are short and far from each other (ZUR STRASSEN 2003). This genus includes seven species, of which only one species, *R. vitis*, has been recorded in Iran (AKBARZADEH SHOUKAT, SHAYESTEH 2006). Here, two new species and one newly recorded species are referred to.

Key to *Rubiothrips* species from Iran

1. Abdominal tergites III-VI with median setae (S1) situated far from subbasal line (Fig. 3). Head with ocellar setae pair III situated outside of ocellar triangle (Fig. 2). Male with pore plate present on abdominal sternites III-VII (Fig. 5) *R. parisae* Mirab-balou, Chen, **sp. nov.**
- Abdominal tergites III-VI with median setae (S1) closer to the subbasal line (Fig. 6). Head with ocellar setae pair III arising between posterior margins of hind ocelli. Male with glandular area present on abdominal sternites III-VI (not known in *tongi*)... 2
2. Body mainly yellow 3
- Body brown to dark brown *R. tongi* Mirab-balou, Chen, **sp. nov.**
3. Antennal segments III-V bicolored, III-IV in the basal third white to pale yellow, other parts clearly brown to dark brown *R. vitalbae* (Bagnall)
- Antennal segments III-V uniformly brown *R. vitis* (Priesner)

Rubiothrips parisae Mirab-balou, Chen, New Species

(Figs. 1-5)

Etymology: This species is named after first author's wife, Parisa Heidari.

Material examined: Holotype, 1 female, IRAN: Hamedan province, MPGBAS, 48° 600' N, E 34° 867' (1395m a.s.l.), from flow-

ers of *Galium verum* (Rubiaceae), 23.v.2009.

Paratypes (all collected by M. Mirab-balou): 8 females, 2 males, taken with a holotype, with the same data; 8 females, **IRAN**: Hamedan province, MPGBAS, on flowers of *Galium verum* (Rubiaceae), 23.vi.2009; 2 females, **IRAN**: Hamedan province, Saiidieh, 48° 467' N, 34° 783' E (1942m a.s.l.), from leaves of *Ambrosia botrys* (Chenopodiaceae), 03.vi.2009. The holotype and 15 paratypes are deposited in ZJUJH, 4 paratypes in SCAU, 1 paratype in Ilam University.

Description: Female macroptera. Body brown, legs brown to brownish yellow, fore-tibiae much paler than mid- and hind tibiae, all tarsi yellowish brown; antennal segments I-II and IV-VIII brown, III brownish yellow; forewings grayish brown.

Head wider than long, about 1.3-1.4 times, with transverse sculpture behind the eyes and also extending sculpture in ocellar triangle (Fig. 2); three pairs of small ocellar setae present, pair III arising outside ocellar triangle (Fig. 2). Compound eyes with 6 pigmented facets; five pairs of postocular present, these setae as long as ocellar setae III. Mouth-cone short, reaching to the middle of the prosternum. Maxillary palps 3-segmented. Antennae 8-segmented, antennal segments III and IV each with a forked sense cone; segment I without dorsal apical setae; segment III 2.5-2.7 times as long as wide, segment V 1.4-1.6 times as long as broad (Fig. 1); antennal segment V and VI, rather close together (Fig. 22); segment VI constricted at the base, almost imperceptibly stalked (Fig. 1); segments II-VI with rows of microtrichia on both dorsal and ventral surfaces. Pronotum about 1.5-1.6 times longer than wider, with transverse sculpture lines and without long setae. Mesonotum with a pair of campaniform sensilla (CPS) anteromedially. Mesonotum and metanotum with reticulate sculpture, one pair of MCS present, metanotal median setae arising well behind the anterior margin. Spinula present on mesothoracic furca, but absent on metathoracic furca. Forewings with 6-8+1+2-3 setae on first vein, second vein with about 9-10 setae, clavus with four marginal setae and one discal seta. Abdominal tergites III-VI with S1 setae are typically placed far from the subbasal line, about 20-28 μm away (Fig. 3); major setae on abdomen pale; tergites II-VIII sculptured, and with a pair of long setae medially (S1) close together (Fig. 3); tergite VIII without posteromarginal comb; tergites without ctenidia and craspedum; abdominal tergite X tube shape, longer than wide. Abdominal sternites without discal setae (Fig. 4); sternites II-VII with striate sculpture,

sternite II with 2 pairs of posteromarginal setae, III-VII with 3 pairs; median setae on sternite VII arising slightly in front of the posterior margin.

Measurements (holotype female in microns).

Length (width): Body 1860; head 140(200); compound eyes 70, distance between compound eyes 60. Pronotum 150(240). Antennal segments I-VIII length / width as follows: I 22(31); II 42(30), III 52(22); IV 42(22); V 32(21); VI 53(23); VII 17(8); VIII 24(12).

Male macropterous: Similar to female, but smaller (body length 1.3-1.4 mm) and paler; abdominal sternites III-VII with oval pore plate (Fig. 5).

Remarks: This new species easily differs from *Rubiothrips* species (except *R. ferrugineus* and *R. pillichii*) by median setae (S1) on the abdominal tergites III-VI typically located far from the subbasal line (Fig. 3) (vs. S1 setae near subbasal line in other species) and the pore plate of the male situated on the abdominal sternites III-VII. However, *R. ferrugineus* and *R. pillichii* were collected from various species of *Galium* (Rubiaceae) in European countries (ZUR STRASSEN 2003), but in Iran, this new species can be found on the flowers of *Galium verum* (Rubiaceae) and the leaves of *Ambrosia botrys* (Chenopodiaceae).

This new species is similar to *R. ferrugineus*, but it can be distinguished from the latter by the following characters: ocellar setae III situated outside the ocellar triangle (vs. situated inside the ocellar triangle in *R. ferrugineus*); body setae at the end of the abdomen clearly pale (vs. dark in *R. ferrugineus*); and antennal segment VI narrowed at the base, almost imperceptibly stalked (vs. concave at the base and stalked in *R. ferrugineus*). The new species is also distinguished from *R. pillichii* by the following characters: ocellar setae III situated outside the ocellar triangle (vs. situated inside the ocellar triangle in *R. pillichii*); inner sense-cone on antennal segment VI shorter than segments VII and VIII together (but long in *R. pillichii*, uniquely longer than segments VII and VIII together); and antennal segment III paler than II and IV-VI (but as dark as II and IV-VI in *R. pillichii*).

Distribution: Hamedan Province, Iran.

Rubiothrips tongi Mirab-balou, Chen, New Species (Figs. 6-7)

Etymology: This species is named in honor of Professor Xiao-li Tong of South China Agricultural University, Guangzhou, China.

Material examined: Holotype, 1 female, **IRAN**: Hamedan province: Abbasabad, N 48°514', E 34°795' (1824 m a.s.l.), from flowers of *Sonchus arvensis* (Asteraceae), 09.vii.2009.

Paratypes (all collected by M. Mirab-balou): 2

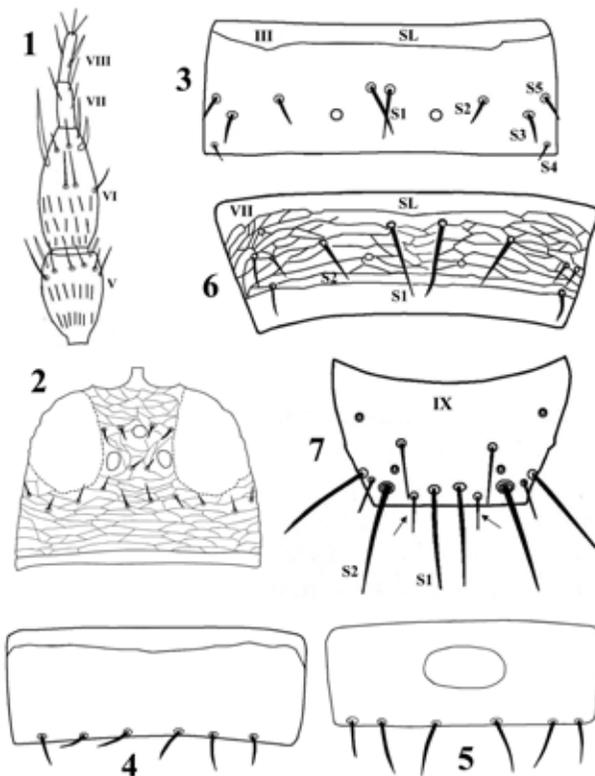
Table 1. The recorded species of *Anaphothrips* genus-group in Iran.

Thrips species	Distribution in Iran (province-wise) [* new distribution place on Iran]
<i>Agalmothrips parviceps</i> Priesner	Khuzestan
<i>Anaphothrips obscurus</i> (Müller)	Khorasan-e-Shomali, Fars, Golestan, Isfahan, Mazandaran, Alborz, Hamedan, Alborz*, Kermanshah*, Qazvin*, Azarbaijan-e-Sharghi*
<i>Anaphothrips sudanensis</i> Trybom	Khorasan-e-Shomali, Khuzestan, Kerman, Fars, Golestan, Hamedan*
<i>Aptinothrips elegans</i> Priesner	Khorasan-e-Shomali, Hamedan*, Alborz*, Kermanshah*, Azarbaijan-e-Sharghi*, Kordestan*.
<i>Aptinothrips rufus</i> (Haliday)	Khorasan-e-Shomali, Tehran, Golestan, Kerman, Azarbaijan-e-Sharghi*, Hamedan*, Kermanshah*, Alborz*, Zanzan*
<i>Aptinothrips stylifer</i> Trybom	Khorasan, Tehran, Molestan, Hamedan*
<i>Eremiothrips antilope</i> (Priesner)	Khuzestan
<i>Eremiothrips arya</i> (zur Strassen)	Tehran
<i>Eremiothrips bhattii</i> Minaei	FARS
<i>Eremiothrips dubius</i> (Priesner)	Kerman, Yazd, Alborz*, Hamedan*
<i>Eremiothrips efflatouni</i> (Priesner)	Khuzestan
<i>Eremiothrips farsi</i> Bhatti, Telmadarraiy	Mazandaran
<i>Eremiothrips shirabudinensis</i> (Jaknontov)	Kerman, Khuzestan, Yazd, Khorasan-e-Shomali
<i>Eremiothrips similis</i> Bhatti	Khuzestan
<i>Eremiothrips taghizadehi</i> (zur Strassen)	Golestan, Tehran, Khuzestan
<i>Eremiothrips tamaricis</i> (zur Strassen)	Golestan
<i>Eremiothrips varius</i> (Bhatti)	Golestan, Khuzestan
<i>Eremiothrips zurstrasseni</i> Bhatti et Ramezani	Khuzestan
<i>Oxythrips halidayi</i> Bagnall	Khuzestan
<i>Oxythrips retamae</i> (Priesner)	Khuzestan
<i>Oxythrips ulmifoliorum</i> (Haliday)	Golestan
<i>Oxythrips wiltshirei</i> Priesner	Fars
<i>Rubiothrips vitis</i> (Priesner)	Azarbaijan-e-Gharbi, Kermanshah*
<i>Tamaricothrips tamaricis</i> (Bagnall)	Kerman

females, collected with the holotype, with the same data; 2 females, Hamedan province, Saiidieh, 48° 467' N, 34° 783' E (1942m a.s.l.), from leaves of *Ambrosia botrys* (Chenopodiaceae), 03.vi.2009. The holotype and 2 paratypes are deposited in ZJUH, 1 paratype in SCAU, and 1 paratype in Ilam University.

Description: Female macroptera. Body and legs light brown, some specimens with dark brown body; antennal segment I white, II-VIII brown, bases of segments II-V paler than others; fore wings light brown. Abdomen with major setae dark. Head about 1.4-1.6 times broader than long; the area behind the eyes and ocellar triangle with transverse sculpture; three pairs of small ocellar setae present, pair III situated inside of the ocellar triangle; eyes with 6 pigmented facets; postocular setae as long as ocellar setae III. Mouth-cone long, reaching to the posterior margin of the prosternum. Maxillary

palps 3-segments. Antennae 8-segmented, antennal segments III and IV each with a forked sense cone; segment I without dorsal apical setae; segment III 3.3-4.0 times as long as broad, segment V 2.2-2.4 times as long as broad; segments II-VI with rows of microtrichia on both the dorsal and ventral surfaces. Pronotum with transverse lines of sculpture, without long setae on the posterior margin, about 1.5 times as long as wide; 4-5 pairs of posteromarginal setae present. Mesonotum with a pair of CPS anteromedially. Metanotum with a reticulate sculpture; one pair of CPS present; median setae short and thick, arising well behind the anterior margin. Mesothoracic furcae with spinula, absent on metathoracic furcae. Forewings veinal setae long, with 7-8+1+2 setae in the first vein, about 9-10 setae in the second vein, clavus with 4 marginal setae and one discal seta. Abdominal segments with brown markings medi-



Figs. 1–7. *Anaphothrips* genus-group. 1–5: *R. parisae* sp. nov. 1 – antennal segments V–VIII, 2 – head, 3 – abdominal tergite III, 4 – sternite IV, 5 – pore plate on sternite VII (male), 6–7: *R. tongi* sp. nov., 6 – abdominal tergite III, 7 – tergite IX.

ally, and shaded laterally. Abdominal tergites II–VIII sculptured with longitudinal lines but smooth medially, laterally with irregular microtrichia on sculpture lines; tergites with a pair of long median setae (S1) much closer together, about 6–12 μm away (Fig. 6); S1 setae on abdominal tergites III–VI close to the subbasal line (Fig. 6); tergite VIII without postero-marginal comb; tergites without ctenidia and craspedum; tergite IX on each side with a minute seta between S1 and S2 setae (Fig. 7). Abdominal sternites without discal setae; sternite II with two pairs of posteromarginal setae, three pairs on III–VII; median setae on sternite VII arising slightly in front of the posterior margin. Ovipositor well-developed.

Measurements (holotype female in microns).

Length (width): Body 1420; head 125(182); compound eyes 70, distance between compound eyes 45. Antennal segments I–VIII length / width as follows: I 22(32); II 42(32), III 55(12); IV 52(22); V 45(20); VI 53(24); VII 12(8); VIII 22(5); pair of long setae medially 30–50. Ovipositor 190–210.

Male: Unknown.

Remarks: This new species is similar to *R. vitis*, but is distinguished from the latter by the following characters: body color brown to dark brown (vs.

mainly yellow in *vitis*); position of ocellar setae pair III which is situated inside of the ocellar triangle (vs. between the posterior margins of hind ocelli in *vitis*); antennal segment I white, II–VIII brown, bases of segments II–V paler than others (vs. V–VIII brown, IV light brown distally, II & III slightly shaded in *vitis*); antennal segment V 2.0–2.3 times as long as broad (vs. 1.7–1.9 times as long as broad in *vitis*); forewings light brown, with long veinal setae (vs. faintly shaded, with small veinal setae); abdominal tergites II–VIII with brown markings medially, and shaded laterally, sculptured with longitudinal lines but smooth medially (vs. yellow abdomen with small brown marking medially, and median area of tergites with transverse lines of sculpture).

According to the key provided by ZUR STRASSEN (2003), this new species is related to *R. sordidus*, but can be separated from the latter because the antennal segment III is shorter (50–55 μm) (vs. 56–63 microns in *sordidus*); abdominal tergite IX with small setae on each side between the setae S1 and S2 (vs. absent in *sordidus*); and metascutum with a pair of CPS (vs. without CPS in *sordidus*).

This new species is associated with the plant families Asteraceae and Chenopodiaceae, whereas, *R. sordidus* was collected from *Galium* species from European countries; and *R. vitis* was collected from grape leaves (Vitaceae) in European countries and Israel (ZUR STRASSEN 2003).

Distribution: Hamedan Province, Iran.

Rubiothrips vitalbae (Bagnall)

Material examined. IRAN: Hamedan Province: Heydareh, 1 male from flowers of *Echium vulgare* (Boraginaceae), 10.vi.2009, M. Mirabalou, (in ZJUH).

Note: This species was identified based on the characters given by ZUR STRASSEN (2003) and here it is recorded for the first time in Iran. This species is readily distinguished from other Iranian *Rubiothrips* by the presence of pore plates on the male abdominal sternites III–VI, antennal segments III–V each in two colors, dark and light brown, and metascutum with a pair of CPS.

Rubiothrips vitis (Priesner)

Material examined: IRAN: Kermanshah Province: 6 females, Kamshur, N 47°100', E 34°717' (1647 m a.s.l.), from leaves of *Vitis vinifera* (Vitaceae), 15.vi.2009; M. Mirabalou, (in ZJUH).

Note: This species (both female and male) was first recorded for the fauna of Iran by AKBARZADEH SHOUKAT, SHAYESTEHE (2006) from Azarbaijan-e-Gharbi Province (without any details); and here, is

the first record for Kermanshah Province. According to ZUR STRASSEN (2003) and MORITZ *et al.* (2001), this species has no campaniform sensilla (CPS) on the metascutum, but there is intraspecific variation among Iranian populations of this species, as we examined four specimens with CPS present on the metascutum and two without this character but with the other characters being the same.

Oxythrips claripennis Priesner

Material examined: IRAN: Hamedan Province: Hamedan, 4 females, 1 male, Darreh Morad Beyg, from flowers of *Malus pumila* (Rosaceae), 08.v.2009, (in ZJUH); Hamedan Province, 2 females, Eram Bld., from flowers of *Euphorbia* sp. (Euphorbiaceae), 05.vi.2009, (in ZJUH); Hamedan Province, 1 female, Aliabad-e Varkaneh, from flowers of *Euphorbia* sp. (Euphorbiaceae), 08.vi.2009, M. Mirab-balou, (in ZJUH).

Note: The male and females of this species were collected from different sites of Hamedan province, Western Iran, and here the species is recorded for the first time in Iran. This species was identified based on the key given by ZUR STRASSEN (2003) and easily distinguished from other species by lack of metanotal campaniform sensilla, presence of 3–4 pairs of posteromarginal setae, irregular craspedum on abdominal tergite VIII and lateral of tergite VII, and median setae on sternite VII situated anterior to the margin.

Thermothrips Pelikán

Material examined: IRAN: Hamedan Province: Bu-Ali Sina University, 48° 514' N, 34° 795' E (alt. 1824m), 2 females, from flowers of *Convolvulus arvensis* (Convolvulaceae), 19.v.2008, M. Mirab-balou, (in ZJUH).

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Thermothrips Pelikán includes only one species in the world, *T. mohelensis* (zur Strassen, 2003). This species is known from *Galium verum* (Rubiaceae) from Western Russia, Turkey, Czech Republic (ZUR STRASSEN 2003), Poland (KUCHARCZYK, KUCHARCZYK 2008) and now Iran. This genus is readily distinguished from other Iranian genera of *Anaphothrips*-group by tarsi 1-segmented, a simple sense cone on antennal segment III and a forked sense cone on segment IV.

Thermothrips mohelensis Pelikán: This species was identified based on the description by ZUR STRASSEN (2003). This species is newly recorded for the fauna of Iran and is characterized by the following characters: body brown, all tarsi yellow, wings pale. Head broader than long, with three pairs of ocellar setae. Pronotum about 2.2 times as wide as long, with two pairs of long posteroangular setae. Metanotum with large sculpture, median pair of setae situated behind the anterior margin. The fore wings with two distal setae on the first vein. Abdominal tergites II-VIII with S1 setae standing very close together; tergite VIII without comb on the posterior margin; sternites III-VII with some discal setae.

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