



Description of the second larval species of the genus *Perumarocta* (Trombidiformes: Chyzeriidae) from Iran, with new host records

Malihe Haddadi¹ · Javad Noei² · Sara Ramroodi¹ · Ehsan Rakhshani¹ · Alireza Saboori^{3,4}

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Abstract

Perumarocta sibsuranensis Haddadi and Noei sp. n. (Trombidiformes: Chyzeriidae) is described and illustrated from larvae ectoparasitic on Gryllidae (Orthoptera) and Tenebrionidae (Coleoptera), which are new hosts for the genus from Bakhshan and Rahmatabad villages, Saravan and Sib va Suran counties, Sistan and Baluchestan province, Iran. So far, this genus has only been reported from the Nearctic biogeographic region, South American continent, Peru, with the introduction of one species. In this study, it is reported for the first time from the Palaearctic region (Iran). This is the second larval species of *Perumarocta* which is described in the world. The generic diagnosis of the genus *Perumarocta* is revised and a key to the larvae in the subfamilies of Chyzeriidae is provided.

Keywords Acari · New species · Larva · Parasitengona · West Asia

Introduction

Based on the new classification for the terrestrial Parasitengona by Costa et al. (2024), the epifamily Trombellioidae consists of five families including Audyanidae Southcott, 1987, Trombellidae Thor, 1935, Neotrombidiidae Feider, 1955, Johnstonianidae Thor, 1935, and Chyzeriidae Womersley, 1954. The genus *Perumarocta* Haitlinger, 1999 belongs to the family Chyzeriidae and the subfamily Pteridopinae Southcott, 1987 (Mağol and Wohltmann 2012). According to the latest revision of the subfamily Pteridopinae in 2018, this subfamily contains six genera based on larvae [L] or post larval forms [P], including *Cretesenia* Haitlinger, 1999 [L], *Parachyzeria* Hirst, 1926 [P], *Parawenhoekia* Paoli, 1937 (syn.: *Napassenia* Haitlinger, 1999) [L], *Perumarocta* Haitlinger, 1999 [L], *Pteridopus* Newell and Vercammen-Grandjean, 1964 [L], *Iberochyzeria* Mayoral, Welbourn and Barranco, 2018 [L] (Mağol and Wohltmann 2012; Mayoral et al. 2018; Kiany et al. 2025). The genus *Perumarocta* was identified by the introduction of *P. mirsadi* Haitlinger, 1999 ectoparasitic on *Crotonotus* sp. (Orthoptera: Pseudophyllinae) [but the genus name could not be verified in the literature], from Peru, which is the only species of this genus so far (Haitlinger 1999). In this study, the second species of the genus is described and illustrated in association with Gryllidae (Orthoptera) and Tenebrionidae (Coleoptera),

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✉ Javad Noei
noei.javad@birjand.ac.ir

Malihe Haddadi
malihe.haddadi2211@gmail.com

Sara Ramroodi
sararamroodi@uoz.ac.ir; sara_ramroodi@yahoo.com

Ehsan Rakhshani
rakhshani@uoz.ac.ir

Alireza Saboori
saboori@ut.ac.ir

¹ Department of Plant Protection, College of Agriculture, University of Zabol, Zabol, Iran

² Department of Plant Protection, Faculty of Agriculture, University of Birjand, Birjand, Iran

³ Department of Plant Protection, Faculty of Agriculture, Jalal Afshar Zoological Museum, University of Tehran, Karaj, Iran

⁴ Department of Plant Protection, Faculty of Agriculture, Aidin Adnan Menderes University, Aydin, Türkiye

from Sistan and Baluchestan province, Iran. Also, the order Coleoptera and the family Gryllidae (Orthoptera) are recorded as new hosts of *Perumaropecta* larvae.

Materials and methods

Insects were caught by hands in March, May and June 2022, from Bakhshan and Rahmatabad villages, Saravan and Sib va Suran counties, Sistan and Baluchistan province, Iran. The mite specimens were detached from the hosts by an insect pin, cleared in lactophenol solution, and mounted on microscope slides using Hoyer's medium (Walter and Krantz 2009). Figures were drawn using a BX51 Olympus microscope equipped with a drawing tube and magnification changer. Measurements (given in micrometers, μm) were calculated using a CH30 Olympus microscope. The terminology and abbreviations follow Robaux (1974), Wohltmann et al. (2007) and Wohltmann and Małkol (2012).

Systematics

Superfamily Trombidioidea

Epifamily Trombelloidae Thor, 1935

Family Chyzeriidae Womersley, 1954

Subfamily Pteridopinae Southcott, 1987

Genus *Perumaropecta* Haitlinger, 1999

Type species: *Perumaropecta mirsadi* Haitlinger, 1999

Diagnosis of larva (according to Mayoral et al. (2018) with some modifications). Setae *1b*, *2b* and *3b* on coxal fields I–III setiform; scutum trapezoidal, with a naso on the anterior margin; ASens (*vi*) anterior to AL (*ve*); AL setae expanded (in *P. mirsadi*) or normal (*P. sibsuranensis* Haddadi & Noei sp. n.) and set close to the PSens (*sci*) setae; anus with a pair of sclerites each with one or two setae.

***Perumaropecta sibsuranensis* Haddadi & Noei sp. n.** (Figs. 1–5)

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Diagnosis. Larva

AL setae normal, sternal seta *2a* absent, two setae between coxae II–III, with two pairs of anal setae, AW 100–112, PW 137–155, PL 105–132, Ta I 222–240, Ti I 150–175, Ge I 120–137, Ta II 195–222, Ti II 150–170, Ge II 105–112, Ta III 237–262, Ti III 220–237, Ge III 120–140.

Description. Larva (*n* = 12)

Dorsum (Fig. 1a). Dorsal surface of idiosoma with 29–33 barbed setae (33 in holotype, 29–32 in paratypes, Table 1), each arising from a smooth sclerite. Scutum trapezoidal and sparsely punctate, with a naso, with two pairs of normal setae (AL, PL), and two pairs of sensilla (ASens and PSens); AL shorter and slightly thicker than PL, both barbed; ASens shorter than PSens, barbed in distal half and PSens nude. Posterolaterally on each side of scutum two eye lenses

Fig. 1 *Perumaropecta sibsuranensis* Haddadi and Noei sp. n. (larva). **a** Dorsal view of idiosoma; **b** ventral view of idiosoma

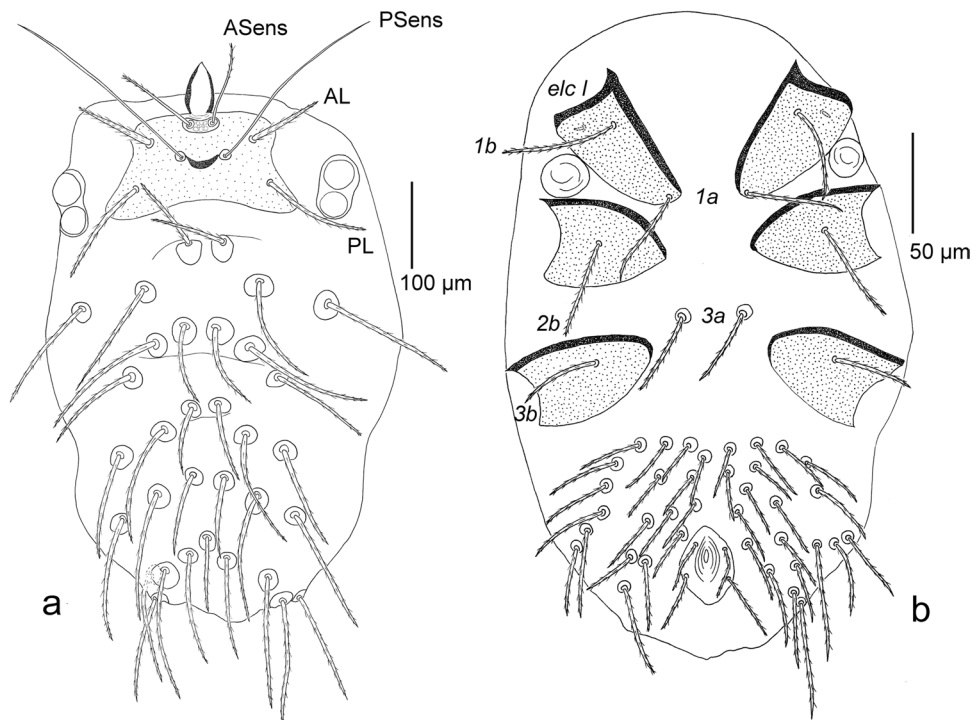


Table 1 Metric and some meristic data of *Perumaropta sibsuranensis* Haddadi and Noei sp. n. (larva): 2a, holotype; 2b–2l, paratypes

| Character | 2a | 2b | 2c | 2d | 2e | 2f | 2g | 2h | 2i | 2j | 2k | 2l | Range | <i>P. mirsadi</i> n = 2 |
|--------------|---------|-------|--------|-----|-------|------|------|-----|--------|--------|-------|------|-----------|-------------------------|
| IL | 620 | ~1000 | 630 | 700 | ~1000 | ~700 | ~660 | 490 | 850 | 560 | ~1000 | ~700 | 490–~1000 | 444–926 |
| IW | 380 | - | 450 | 550 | ~700 | ~530 | ~400 | 340 | 560 | 370 | ~800 | ~600 | 340–~800 | 343–843 |
| AW | 112 | 112 | 100 | 105 | 107 | 112 | 107 | 107 | 112 | 112 | 112 | 112 | 100–112 | 80–88 |
| PW | 145 | 150 | 145 | 150 | 150 | 147 | 137 | 137 | 150 | 150 | 155 | 150 | 137–155 | 160–168 |
| GL | 200 | 137 | - | 200 | 150 | 160 | 145 | 150 | 160 | 167 | 162 | 150 | 137–200 | 156–164 |
| ASB + naso | 105 | 102 | - | 112 | 110 | 107 | 100 | 112 | - | - | 100 | 100 | 100–112 | - |
| PSB | 60 | - | - | 72 | 67 | 65 | 62 | 62 | 67 | 60 | 62 | 67 | 60–72 | - |
| SD + naso | 165 | - | - | 184 | 177 | 172 | 162 | 174 | - | - | 162 | 167 | 162–184 | 124–~126 |
| Naso | 57 | 57 | Broken | 59 | 57 | 62 | 65 | 64 | Broken | Broken | 62 | 57 | 57–65 | - |
| W | 202 | 182 | 180 | 187 | 190 | 190 | 182 | 187 | 187 | - | 187 | 200 | 180–202 | 196 |
| AP | 50 | 50 | 50 | 52 | 50 | 42 | 50 | 50 | 47 | 50 | 50 | 50 | 42–52 | 46 |
| ASens | 90 | 90 | 77 | 95 | 90 | 80 | 90 | 87 | 92 | 85 | 82 | 85 | 77–95 | ~76 (1) |
| PSens | 215 | 200 | 192 | 162 | 177 | 187 | 200 | 162 | 200 | - | 162 | 187 | 162–215 | ~158–182 |
| AL | 87 | 82 | 75 | 87 | 75 | 75 | 80 | 80 | 87 | 80 | 80 | 77 | 75–87 | 70–76 |
| PL | 120/112 | 115 | 105 | 132 | 112 | 125 | 112 | 122 | 127 | 105 | 115 | 105 | 105–132 | 88–92 |
| SBa | 25 | 18 | 22 | 25 | 25 | 25 | 22 | 22 | 22 | 25 | 22 | 22 | 18–25 | 16–20 |
| SBp | 47 | 45 | 57 | 50 | 50 | 52 | 50 | 50 | 50 | 50 | 50 | 47 | 45–57 | 50–52 |
| DS min | 77 | 75 | 68 | 85 | 75 | 77 | 75 | 87 | 82 | - | 77 | 82 | 68–87 | 72 |
| DS max | 155 | 138 | 130 | 162 | 162 | 162 | 142 | 150 | 145 | - | 145 | 157 | 130–162 | 110–114 |
| PDS | 125/152 | 137 | 108 | - | - | - | - | - | 145 | 137 | 140 | - | 108–152 | - |
| <i>cs</i> | 37 | 32 | 30 | 37 | 35 | 27 | 30 | 30 | 27 | 30 | 32 | 35 | 27–37 | - |
| <i>bs</i> | 42 | 35 | 37 | 47 | 35 | 37 | 37 | 32 | 45 | Broken | 33 | 40 | 32–47 | ~76–~82 |
| PaScFed | 95 | 88 | 100/90 | 92 | 95 | 90 | 92 | 90 | 97 | 87 | 87 | 90 | 88–100 | 66–70 |
| PaScGed | 57 | 63 | 53 | 62 | 55 | 65 | 62 | 60 | 67 | 60 | 57 | 57 | 53–67 | 52 |
| <i>elc I</i> | 8 | 10 | 10 | 10 | - | - | 10 | 8 | 10 | 8 | 10 | 8 | 8–10 | - |
| <i>elc P</i> | 10 | 8 | 8 | 8 | 8 | 5 | - | 5 | 5 | 10 | 8 | 8 | 5–10 | - |
| ISD | 35 | 37 | 30 | 37 | 37 | 32 | 32 | 30 | 47 | 35 | 47 | 35 | 30–47 | 34–36 |
| <i>3a</i> | 75 | - | 70 | 80 | - | 77 | 74 | 67 | 70 | 75 | 67 | 80 | 67–80 | ~40 |
| <i>Ia</i> | 92 | 87 | 80 | 92 | 87 | 92 | 87 | 87 | 87 | 62 | 90 | 97 | 62–97 | 92–~94 |
| <i>Ib</i> | 102 | 92 | 95 | 100 | 92 | 95 | 100 | 105 | 102 | 112 | 90 | 97 | 90–112 | 68–~82 |
| <i>2b</i> | 97 | 90 | 90 | 102 | 87 | 87 | 105 | 100 | 87 | 100 | 100 | 97 | 87–105 | 80 (1) |
| <i>3b</i> | 77 | 80 | 70 | 82 | 72 | 70 | 67 | 75 | 75 | 80 | 85 | 80 | 67–85 | 76 (1) |
| Ocp | 62 | 67 | 62 | 65 | 62 | 62 | 62 | 62 | 62 | 60 | 62 | 65 | 60–67 | 58–60 |
| Crm I | 30 | 27 | 27 | 32 | 27 | 27 | 27 | 30 | 32 | 30 | 30 | 27 | 27–32 | 26 |
| Crm II | 22/25 | 25 | 22 | 27 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 22 | 22–27 | 26 |
| Ta I (L) | 227 | 225 | 222 | 230 | 237 | 240 | 225 | 225 | 225 | 225 | 225 | 230 | 222–240 | 300 |

Table 1 (continued)

| Character | 2a | 2b | 2c | 2d | 2e | 2f | 2g | 2h | 2i | 2j | 2k | 2l | Range | <i>P. mirsadi</i> n = 2 |
|------------------|------|------|-----|------|------|------|------|------|------|------|--------|--------|-----------|-------------------------|
| Tal (H) | 32 | 27 | 32 | 30 | 25 | 27 | 27 | 25 | 27 | 30 | 30 | 30 | 25–32 | - |
| Ti I | 162 | 172 | 150 | 175 | 165 | 165 | 150 | 150 | 160 | 170 | 170 | 160 | 150–175 | 92–96 |
| Ge I | 120 | 135 | 125 | 130 | 127 | 127 | 122 | 125 | 125 | 137 | 130 | 120 | 120–137 | 92 |
| TFe I | 100 | 87 | 100 | 100 | 100 | 97 | 95 | 100 | 105 | 100 | 100 | 100 | 87–105 | 84 |
| BFe I | 87 | 100 | 87 | 90 | 80 | 90 | 82 | 82 | 82 | 87 | 80 | 90 | 80–100 | 64–72 |
| Tr I | 87 | 80 | 75 | 82 | 75 | 87 | 70 | 87 | 75 | 75 | 80 | 60 | 60–87 | 64–66 |
| Cx I | 142 | 137 | 132 | 137 | 140 | 132 | 125 | 127 | 125 | 100 | 100 | 135 | 100–142 | 94–96 |
| Leg I | 925 | 936 | 891 | 944 | 924 | 938 | 869 | 896 | 897 | 894 | 885 | 895 | 869–944 | 792–804 |
| Ta II (L) | 222 | 212 | 195 | 212 | 212 | 207 | 197 | 202 | 215 | 207 | 207 | 200 | 195–222 | ~240–258 |
| Ta II (H) | 32 | 27 | 30 | 30 | 27 | 27 | 27 | 27 | 25 | 32 | 30 | 30 | 25–32 | - |
| Ti II | 162 | 167 | 155 | 162 | 165 | 160 | 150 | 150 | 162 | 170 | 160 | 160 | 150–170 | 72–74 |
| Ge II | 112 | 112 | 110 | 112 | 110 | 112 | 100 | 105 | 110 | 110 | 110 | 110 | 105–112 | 74 |
| TFe II | 100 | 90 | 92 | 95 | 100 | 97 | 97 | 92 | 100 | 97 | 90 | 100 | 90–100 | 76–82 |
| BFe II | 87 | 87 | 85 | 87 | 87 | 87 | 75 | 80 | 82 | 87 | 90 | 80 | 75–90 | 56–60 |
| Tr II | 97 | 87 | 100 | 87 | 100 | 90 | 75 | 87 | 75 | 95 | 80 | 75 | 75–100 | 56–60 |
| Cx II | 133 | 125 | 125 | 125 | 137 | 125 | 125 | 127 | 112 | 125 | 100 | 110 | 100–137 | 92–104 |
| Leg II | 913 | 880 | 862 | 880 | 911 | 878 | 819 | 843 | 856 | 891 | 837 | 835 | 819–913 | 678–792 |
| Ta III (L) | 262 | 257 | - | 252 | 252 | 262 | 237 | 237 | 250 | 250 | Broken | Broken | 237–262 | 304 (1) |
| Ta III (H) | 27 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 27 | Broken | Broken | 25–27 | - |
| Ti III | 237 | 237 | - | 222 | 232 | 230 | 220 | 232 | 230 | 237 | Broken | Broken | 220–237 | 96–102 |
| Ge III | 130 | 132 | 125 | 127 | 127 | 125 | 120 | 132 | 125 | 125 | 130 | 140 | 120–140 | 74–76 |
| TFe III | 130 | 122 | 117 | 125 | 115 | 120 | 122 | 130 | 127 | 130 | 130 | 130 | 115–130 | 92–100 |
| BFe III | 115 | 112 | 105 | 122 | 122 | 122 | 115 | 117 | 120 | 122 | 120 | 110 | 105–122 | 80–84 |
| Tr III | 117 | 107 | 100 | 105 | 100 | 112 | 87 | 105 | 90 | 97 | 110 | 90 | 87–117 | 68–74 |
| Cx III | 145 | 125 | 125 | 125 | 100 | 130 | 125 | 117 | 112 | 122 | 110 | 120 | 100–145 | 100–104 |
| Leg III | 1136 | 1092 | - | 1078 | 1048 | 1101 | 1026 | 1070 | 1054 | 1083 | - | - | 1026–1136 | 834 (1) |
| IP | 2974 | 2908 | - | 2902 | 2883 | 2917 | 2714 | 2809 | 2807 | 2868 | - | - | 2714–2974 | 2430 (1) |
| fD | 33 | - | 29 | - | - | - | 30 | - | 32 | 32 | - | - | 29–33 | 28 |
| fV | 36 | - | 40 | - | - | - | 39 | - | 40 | 40 | - | - | 36–40 | ~38* |
| NDV | 69 | - | 69 | - | - | - | 69 | - | 72 | 72 | - | - | 69–72 | ~66 |
| Palpfemur | 70 | 67 | 62 | 75 | 62 | 62 | 62 | 62 | 62 | 67 | 70 | 67 | 62–75 | - |
| Palp genu | 50 | 45 | 35 | 42 | 32 | 37 | 37 | 32 | 37 | 37 | 42 | 37 | 32–50 | - |
| Palp tibia | 42 | 40 | 37 | 40 | 35 | 47 | 32 | 32 | 37 | 35 | 37 | 30 | 30–47 | - |
| Palp tarsus | 25 | 17 | 25 | 25 | 25 | 20 | 35 | 25 | 25 | 25 | 25 | 25 | 17–35 | - |
| Palp tibial claw | 25 | 42 | 25 | 30 | 25 | 25 | 25 | 25 | 25 | 25 | 30 | 30 | 25–42 | - |
| Cheliceral blade | 42 | 45 | 40 | 42 | 42 | 45 | 40 | 40 | 40 | 50 | Broken | Broken | 40–50 | - |

Table 1 (continued)

| Character | 2a | 2b | 2c | 2d | 2e | 2f | 2g | 2h | 2i | 2j | 2k | 2l | Range | <i>P. mirsadi</i> n = 2 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|-------------------------|
| Cheliceral base | 212 | 142 | 137 | 180 | 147 | 162 | 142 | 150 | 155 | 160 | 162 | 150 | 137–212 | - |

Ocp- length of ocular plate, Crm I- across of anterior cornea, Crm II- across of posterior cornea

*Excluding 3a

situated on a common ocular plate, anterior lens (diameter 27–32) larger than posterior one (diameter 22–27).

Venter (Fig. 1b). Idiosoma ventrally with one pair of barbed sternal setae (3a) and 36–40 barbed ventral setae behind coxa III (36 in holotype, 39–40 in paratypes, Table 1) and a uropore. Each ventral seta arises from a smooth sclerite. Anal plate 55 long in holotype, with one pair of barbed setae on each side. Coxa I with two barbed setae, 1a and 1b; coxa II with barbed seta 2b; coxa III with seta 3b (fn Cx 2–1-1). NDV = 33 + 36 = 69 in holotype (69–72 in paratypes, Table 1). Coxae I–III punctate; all coxalae barbed. Supracoxal seta (*elc* I) present. Claparède's organs between coxae I and II, circular.

Gnathosoma (Fig. 2). Cheliceral bases punctate on dorsal surface; cheliceral blade straight, with numerous small teeth. Subcapitulum with barbed galeala (*cs*) and hypostomala (*bs*); palpfemur and palpgenu, each with one barbed dorsal seta. Palptibia with three barbed setae; palpal tibial

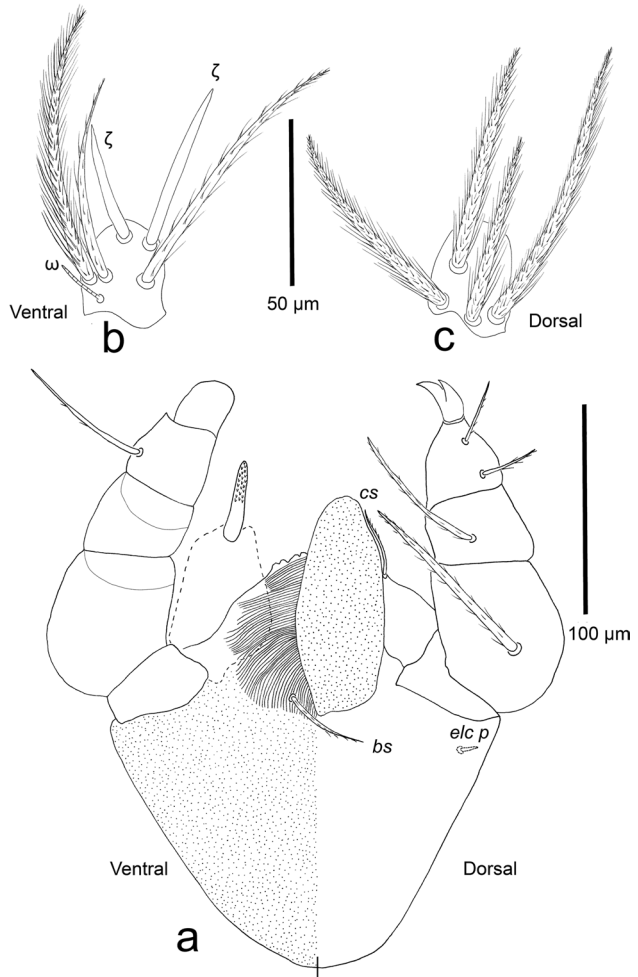


Fig. 2 *Perumaropecta sibirianensis* Haddadi and Noei sp. n. (larva). a Gnathosoma, ventral (left) and dorsal (right) view; b palptarsus, ventral view; c palptarsus, dorsal view

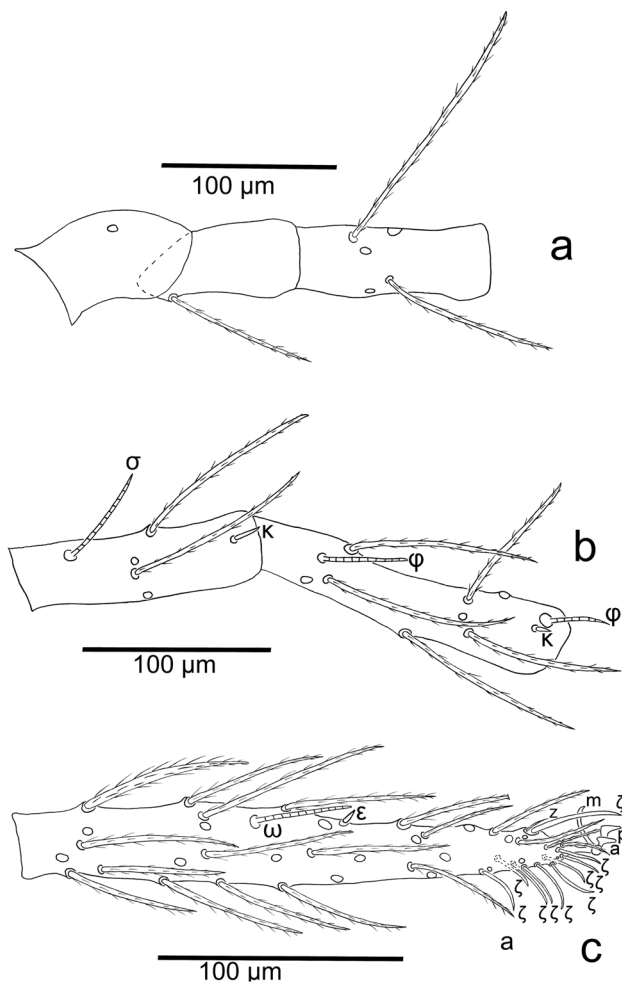


Fig. 3 *Perumaroapta sibsuranensis* Haddadi and Noei sp. n. (larva), leg I: **a** Tr-TFe; **b** Ge-Ti; **c** Ta

claw bifurcate; palptarsus with 7 barbed setae, and with two eupathidia and one solenidion; fPp=0-B-B-BBB₂-7Bωζζ. Palp supracoxal setae (*elcP*) peg-like.

Legs (Figs. 3–5). Leg segmentation formula: 7–7–7; Leg setal formula (Table 2): Leg I: Ta- 1ω, 1ε, 9/10ζ, 1z, 36n; Ti- 2φ, 1κ, 8n; Ge- 1σ, 1κ, 4n; TFe- 5n; BFe- 1n; Tr- 1n; Cx- 2n. (Fig. 3a, b, c). Leg II: Ta- 1ω, 1ε, 1ζ, 33n; Ti- 2φ, 8n; Ge- 1σ, 1κ, 4n; TFe- 4n; BFe- 2n; Tr- 1n; Cx- 1n. (Fig. 4a, b, c). Leg III: Ta- 32n; Ti- 1φ, 8n; Ge- 1σ, 4n; TFe- 4n; BFe- 2n; Tr- 1n; Cx- 1n. (Fig. 5a, b, c). Tarsi with two boomerang-shaped claws and a long simple claw-like empodium. Measurements are given in Table 1.

Material examined

The holotype (ARS-20240909-2a) and paratypes (ARS-20240909-2b-2 l) were collected by Kolsoom Mohammadi

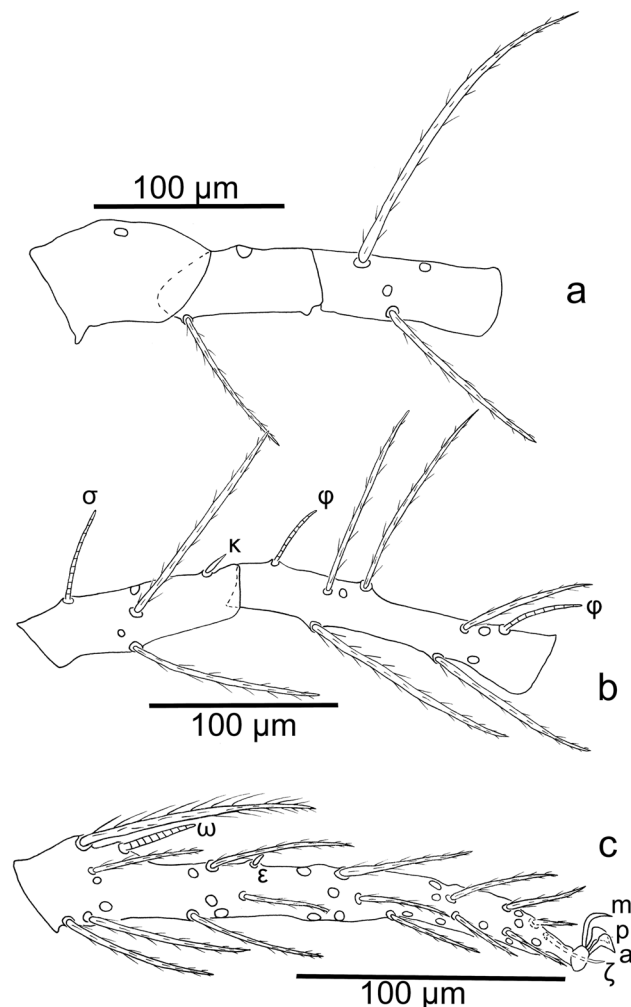


Fig. 4 *Perumaroapta sibsuranensis* Haddadi and Noei sp. n. (larva), leg II: **a** Tr-TFe; **b** Ge-Ti; **c** Ta

Bakhshani, ectoparasitic on Tenebrionidae on 8 March 2022 from Rahmatabad village, Sib va Suran county 61°50'59" E, 27°15'51" N, 1157 m a.s.l, and on Gryllidae on 12 May and 25 June 2022, from Bakhshan village, Saravan county, 62°20'3" E, 27°22'15" N, 1165 m a.s.l, Sistan and Baluchestan province, Iran.

Type deposition

The holotype and seven paratype larvae (ARS-20240909-2b, 2c, 2d, 2e, 2f, 2g, 2h) are deposited in the Acarological Collection, Zoological Museum, College of Agriculture, University of Tehran, Karaj, Iran, and four paratypes (ARS-20240909-2i, 2j, 2k, 2l) are deposited in the collection of the Department of Plant Protection, Faculty of Agriculture, University of Zabol, Zabol, Iran (DPPZ).

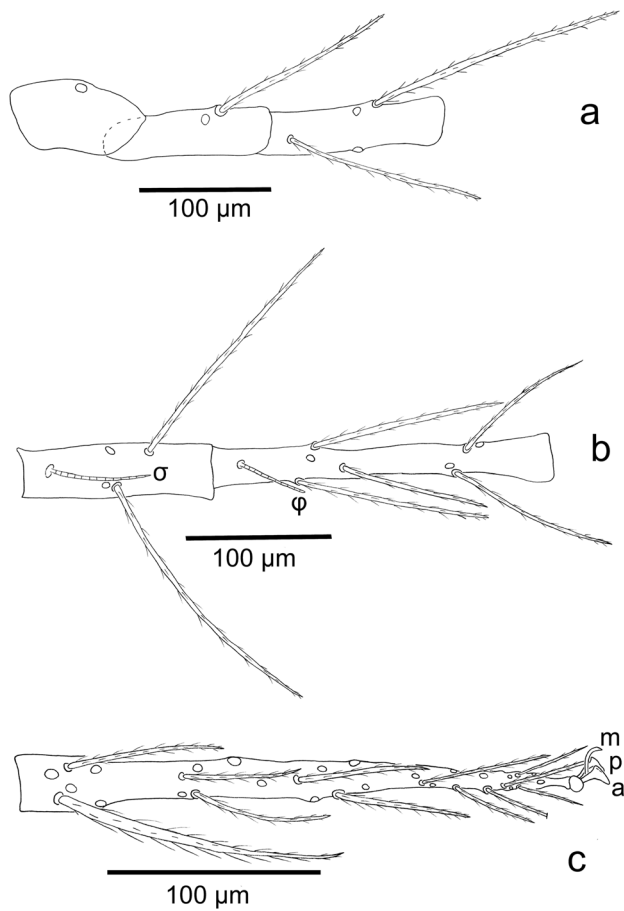


Fig. 5 *Perumaropta sibsuranensis* Haddadi and Noei sp. n. (larva), leg III: **a** Tr-TFe; **b** Ge-Ti; **c** Ta

Etymology

The specific epithet is derived from the type locality, Sib va Suran, Sistan and Baluchestan province, Iran.

Remarks

The new species belongs to the genus *Perumaropta* Haitlinger, 1999. This genus contains only one species: *Perumaropta mirsadi* Haitlinger, 1999. *Perumaropta sibsuranensis* Haddadi and Noei sp. n., differs from *P. mirsadi* in the sternal seta 2a (absent vs. present in *P. mirsadi*), number of setae between coxae II–III (2 vs. ~10, including 3a), shape of AL setae (normal vs. expanded), in the longer AW (100–112 vs. 80–88), PW (137–155 vs. 160–168), PL (105–132 vs. 88–92), PaScFed (88–100 vs. 66–70), 1b (90–112 vs. 68–~82), 2b (87–105 vs. 80), Ti I (150–175 vs. 92–96), Ge I (120–137 vs. 92), Ti II (150–170 vs. 72–74), Ge II (105–112 vs. 74), Ti III (220–237 vs.

96–102), Ge III (120–140 vs. 74–76), DS max. (130–162 vs. 114), in the shorter Ta I (222–240 vs. 300), Ta II (195–222 vs. ~240–258), Ta III (237–262 vs. 304), bs (32–47 vs. ~76–~82), fD (29–33 vs. 28).

Discussion

The monotypic genus *Perumaropta* was established by Haitlinger (1999) with the description of *P. mirsadi* Haitlinger, 1999 from Peru in the South America (Neotropical region). The discovery and description of the new species, from Iran in the present study, expanded the distribution of this genus into the Asian continent (Palearctic region).

The host spectrum of the *Perumaropta* species is expanded to Coleoptera (Tenebrionidae) and the family Gryllidae (Orthoptera), which are reported for the first time. As a result of the new morphological data observed, including shape of scutum (posterior margin of scutum concave), absence of the sternal seta 2a, shape of AL setae, two setae between coxae II–III, and two setae on each anus sclerite, the generic diagnosis for *Perumaropta* of Mayoral et al. (2018) is amended. Also, we observed seven barbed setae with two eupathidia and one solenidion on palptarsus in the new species, while Haitlinger (1999) has pointed out the existence of only eight barbed setae, so more studies need to be done on the type specimens of *P. mirsadi*.

Key to the larvae in the subfamilies of Chyzeriidae (based on Mayoral et al. (2018))

1. Cheliceral blades without numerous small teeth; four pairs of setae on scutum.....*Ralphaudyaninae*, Southcott, 1987 (including *Ralphaudyna*, *Gryllochyzeria*)
- Cheliceral blades with numerous small teeth on at least one surface; three or four pairs of setae on scutum.....2
2. Three pairs of setae on scutum..... *Chyzeriinae*, Womersley, 1954 (including *Chyzeria*, *Nothotrombicula*)
- Four pairs of setae on scutum.....*Pteridopodinae*, Southcott, 1987 (including *Cretenessia*, *Parawenhoekia*, *Perumaropta*, *Pteridopus*, *Iberochyzeria*)

The two known species of *Perumaropta* larvae may be separated as follows:

1. Sternal seta 2a absent; two pairs of anal setae, Ti III 220–237, Ge III 120–140, AW 100–112.....*P. sibsuranensis* Haddadi and Noei sp. n.
- Sternal seta 2a present; one pair of anal setae, Ti III 96–102, Ge III 74–76, AW 80–88.....*P. mirsadi* Haitlinger, 1999

Table 2 Leg chaetotaxy of *Perumaropta sibsuranensis* Haddadi and Noei sp. n. (larva): 2a, holotype and 2b–2l, paratypes

| Character | 2a | 2b | 2c | 2d | 2e | 2f | 2g* |
|-----------|------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-------------------------|
| Ta I | 1ω, 1ε, 9/10ζ, 1z, 36n | 1ω, 1ε, 10/9ζ, 1z, 34/36n | 1ω, 1ε, 10ζ, 1z, 32/40n | 1ω, 1ε, 10ζ, 1z, 36n | 1ω, 1ε, 10/9ζ, 1z, 39/36n | 1ω, 1ε, 9/10ζ, 1z, 38/37n | 1ω, 1ε, 10ζ, 1z, 32/35n |
| Ti I | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n |
| Ge I | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n |
| TFe I | 5n | 5n | 5n | 5n | 5n | 5n | 5n |
| BFe I | 1n | 1n | 1n | 1n | 1n | 1n | 1n |
| Tr I | 1n | 1n | 1n | 1n | 1n | 1n | 1n |
| Cx I | 2n | 2n | 2n | 2n | 2n | 2n | 2n |
| Ta II | 1ω, 1ε, 1ζ, 33n | 1ω, 1ε, 1ζ, 33n | 1ω, 1ε, 1ζ, 32n | 1ω, 1ε, 1ζ, 33n/ broken | 1ω, 1ε, 1ζ, 34/31n | 1ω, 1ε, 1ζ, 33n | 1ω, 1ε, 1ζ, 32n |
| Ti II | 2φ, 8n | 2φ, 8n | 2φ, 8n | 2φ, 8n/broken | 2φ, 8n | 2φ, 8n | 2φ, 8n |
| Ge II | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n |
| TFe II | 4n | 4n | 4n | 4n | 4n | 4n | 4n |
| BFe II | 2n | 2n | 2n | 2n | 2n | 2n | 2n |
| Tr II | 1n | 1n | 1n | 1n | 1n | 1n | 1n |
| Cx II | 1n | 1n | 1n | 1n | 1n | 1n | 1n |
| Ta III | 32n | 31/30n | 30n | 32/33n | 32n | 32n | 32n |
| Ti III | 1φ, 8n | 1φ, 8n | 1φ, 8n | 1φ, 8n | 1φ, 8n | 1φ, 8n | 1φ, 8n |
| Ge III | 1σ, 4n | 1σ, 4n | 1σ, 4n | 1σ, 4n | 1σ, 4n | 1σ, 4n | 1σ, 4n |
| TFe III | 4n | 4n | 4n | 4n | 4n | 4n | 4n |
| BFe III | 2n | 2n | 2n | 2n | 2n | 2n | 2n |
| Tr III | 1n | 1n | 1n | 1n | 1n | 1n | 1n |
| Cx III | 1n | 1n | 1n | 1n | 1n | 1n | 1n |
| Character | 2h | 2i | 2j | 2k | 2l | | |
| Ta I | 1ω, 1ε, 10ζ, 1z, 36n | 1ω, 1ε, 10ζ, 1z, 36n | 1ω, 1ε, 10/9ζ, 1z, 34/36n | 1ω, 1ε, 10ζ, 1z, 36/35n | 1ω, 1ε, 10ζ, 1z, 35/34n | | |
| Ti I | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | 2φ, 1κ, 8n | | |
| Ge I | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | | |
| TFe I | 5n | 5n | 5n | 5n | 5n | | |
| BFe I | 1n | 1n | 1n | 1n | 1n | | |
| Tr I | 1n | 1n | 1n | 1n | 1n | | |
| Cx I | 2n | 2n | 2n | 2n | 2n | | |
| Ta II | 1ω, 1ε, 1ζ, 33n | 1ω, 1ε, 1ζ, 32n | 1ω, 1ε, 1ζ, 33n | 1ω, 1ε, 1ζ, 33n | 1ω, 1ε, 1ζ, 33n | | |
| Ti II | 2φ, 8n | 2φ, 8n | 2φ, 8n | 2φ, 8n | 2φ, 8n | | |
| Ge II | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | 1σ, 1κ, 4n | | |
| TFe II | 4n | 4n | 4n | 4n | 4n | | |
| BFe II | 2n | 2n | 2n | 2n | 2n | | |
| Tr II | 1n | 1n | 1n | 1n | 1n | | |
| Cx II | 1n | 1n | 1n | 1n | 1n | | |
| Ta III | 32n | 32n | 32n | Broken | Broken | | |
| Ti III | 1φ, 8n | 1φ, 8n | 1φ, 8n | Broken | Broken | | |
| Ge III | 1σ, 4n | 1σ, 4n | 1σ, 4n | Broken | 1σ, 4n | | |
| TFe III | 4n | 4n | 4n | 4n | 4n | | |
| BFe III | 2n | 2n | 2n | 2n | 2n | | |
| Tr III | 1n | 1n | 1n | 1n | 1n | | |
| Cx III | 1n | 1n | 1n | 1n | 1n | | |

*The placement of ε varies between right and left tarsus (proximal position of famulus in relation to solenidion on left tarsus)

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Data availability The specimens listed in this study are deposited in the Acarological collection, Zoological Museum, College of Agriculture, University of Tehran, Karaj, Iran, and in the collection of the Department of Plant Protection, Faculty of Agriculture, University of Zabol, Zabol, Iran and are available from the curator, upon request.

Declarations

Consent For Publication Not applicable.

Ethics approval and consent to participate Not applicable.

Conflict of interests The authors declare that there is no conflict of interest regarding the publication of this paper.

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