DESCRIPTION OF IMMATURE STAGES AND REDESCRIPTION OF ADULTS OF *KUZINELLUS KUZINI* (WAINSTEIN) FROM WESTERN IRAN

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ABSTRACT: This paper reports the description of immature stages (larva, protonymph and deutonymph) as well as redescription of the adults, female and male, of *Kuzinellus kuzini* (Wainstein, 1962), collected from a walnut infested by the leaf gall mite, *Aceria tristriatus* (Nalepa), in the Hamedan and Lorestan Provinces, Iran. Furthermore, a key and table to the characteristics of all mobile stages are provided.

KEY WORDS: Phytoseiidae, *Kuzinellus*, redescription, biological control.

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INTRODUCTION

Mites of the family Phytoseiidae are effective natural enemies of phytophagous mites, including spider and eriophyid mites; currently some of them are successfully used in biological control programs (Gerson *et al.* 2003; Zhang 2003). Eriophyoid mites have been recognized as an extremely vulnerable prey of predatory mites such as Phytoseiidae. The main reason for their vulnerability is that they are much smaller and slower than the phytoseiids (Sabelis 1992). Sabelis (1996) listed several phytoseiid species that develop and reproduce when fed exclusively on the eriophyoid mites. Different insect and predatory mites were found associated with plant feeders on the walnut trees as well as eriophyid mites and spider mites, and one of the dominant species is *Kuzinellus kuzini* (Wainstein) (Khanjani and Uckermann, 2007).

Kuzinellus kuzini was firstly collected and described as *Paraseiulus kuzini* from leaves of the Persian walnut, Kyrgyzstan (USSR). *K. kunzini* was recorded as a natural enemy of *Aceria tristriatus* (Nalepa) in Western Iran (Khanjani and Uckermann 2007). Also Gupta (2003) reported its association with walnut trees, *Juglans regia* L., from India.

This survey was carried out in 2015-2016 in order to reveal predatory mites associated with walnut orchards infested with the leaf gall mite (*Aceria tristriatus* Nalepa) in the Hamedan and Lorestan provinces. In this study, several predatory agents were recorded and identified. Among them *Kuzinellus kuzini* (Wainstein) had wide distribution and was found frequently. In this paper the immature stages of *K. kuzini* including larva, protonymph and deutonymph are illustrated and described and also the female and male adults are redescribed. This species is considered a possible biological control agent of walnut leaf gall mite in these regions.

MATERIAL AND METHODS

The specimens were collected from walnut (*Juglans regia* L.: Juglandaceae) leaves infested with the leaf gall mite, *Aceria tristriatus* Nalepa, Eriophyidae, in the Hamedan and Lorestan provinces, Iran. The mites were directly mounted on microscope slides in Hoyer's medium. The slides were dried in an oven at about 50 °C and examined with Olympus BX51 microscope (Phase Contrast and Differential Interference Contrast). A Lucida apparatus camera was used for the drawings. The classification system used follows that of Chant and McMurtry (2007). Setal nomenclature is that of Rowell *et al.* (1978) and Chant and Yoshida–Shaul (1991) for dorsal and ventral surfaces of the idiosoma, respectively. Idiosomalsetal patterns are those of Chant and Yoshida–Shaul (1992). All measurements are presented in micrometers (μm). Additionally, the key to mobile stages of the species is prepared.

RESULTS

Family: Phytoseiidae Berlese, 1916: 33.

Subfamily: Typhlodrominae Wainstein, 1962: 131; Chant and McMurtry, 1994: 235.

Tribe: Paraseiulini Wainstein, 1976: 697–698.

Genus: *Kuzinellus* Wainstein, 1976: 699.

Species: *Kuzinellus kuzini* (Wainstein, 1962).

Type species: *Paraseiulus kuzini* Wainstein, 1962: 139.

Diagnosis of genus: Seta *z6* present (in some species only male without *z6*) and inserted about midway between *j6* and *s6*; seta *Z1* absent whereas *JV2* and *JV3* present or absent. They all have dorsal setal pattern 13A: 8A, with 21 pairs of setae (in female); ventral setal pattern JV:ZV, JV–4:

ZV–1,3 or JV–3,4: ZV–1,3. In this species seta *R1* inserted on or out of membrans, esternal shield with posterior margin indistinct, otherwise seta *ST3* usually (but not always) off sternal shield; 2 pairs of metapodal shields; ventrianal shield with 3 or 4 pairs of preanal setae and a pair of preanal pores; peritreme extending anteriorly to level of *j1*; fixed cheliceral digit with 2–6 teeth, movable cheliceral digit with1–3 teeth; legs I–III without macrosetae; leg IV with or without macrosetae usually on basitarsus; calyx of spermatheca variable, but mostly funnel–shaped, saccular or tubular (Chant and McMurtry 2007; Moraes *et al.* 2008).

Kuzinellus kuzini Wainstein, 1962

Diagnosis (female): Dorsal shield with five pairs of solenostomes (*gd2*, *gd4*, *gd6*, *gd8*, *gd9*); seta *z6* presence in female, *JV2* and *JV3* present, With 4 pairs of preanal setae and one pair of preanal pores, seta *R1* on membrane; setae *J5* smooth and *Z5* serrate, calyx of spermatheca tubular, flaring distaly near the vesicul, leg IV with a macroseta on basitarsus that sharp-tipped in adult, dorsal shield setae inserted on small tubercles, movable and fixed digits of chelicera with 2 and 4 teeth, respectively.

Female (Figs. 1–7; n= 8). Idiosoma oval; setal pattern: 13A–8A/JV:ZV. All setae smooth, except for *Z5*, serrate. Setae *R1* inserted on soft membrane.

Dorsum (Fig. 1). Dorsal shield heavily sclerotized and reticulated, 335–343 long, 193–205 wide at level of setae *R1*, with 21 pairs of setae and five pairs solenostomes (*gd1*, *gd2*, *gd5*, *gd6*, *gd8*, *gd9*). Length of setae: *j1* 17–19, *j3* 24–26, *j4* 15–16, *j5* 14–16, *j6* 21–22, *J2* 27–28, *J5* 9–10, *z2* 20–22, *z3* 26–28, *z4* 26–28, *z5* 18–20, *z6* 22–24, *Z4* 38–41, *Z5* 34–36, *s4* 27–29, *s6* 29–31, *S2* 33–36, *S4* 36–38, *S5* 32–33, *r3* 22–24, *R1* 21–22.

Venter (Fig. 2). Venter of idiosoma with 14 pairs of setae or 29 setae (postanal seta unpaired), sternal shield mostly smooth, with 2 pairs of setae *ST1* 25–27, *ST2* 22–25 and two pairs of lyrifissures (*iv1–2*), distance: *ST1–ST1* 45–48, *ST1–ST2* 30–33, *ST1–ST3* 62–65; posterior margin indistinct; setae *ST3* set on soft integument and 22–24 in length; setae *ST4* 23–25 long and each with one of lyrifissure set on small metasternal shields. Genital shield 105–112 long, 52–55 wide at level setae *ST5*, with one pair setae, *ST5* 18–20 long and distance between *ST5–ST5* 47–50. Two pairs of elongate metapodal platelet (38–43 and 13–16 long). Ventrianal shield smooth, pentagonal, anterior margin convex, 103–109 long, 42–45 wide at level of setae *ZV2* and 57–62 wide at level of anus. Pre-anal region with four pairs of preanal setae *JV1* 13–15, *JV2* 12–14, *JV3* 12–13, *ZV2* 12–14 long and with one pair preanal pores; anal opening surrounded with 3 setae, paranal setae *PA* 14–15 and post anal seta *PST* 16–18 long. Opisthogastric cuticle bearing four pairs of setae, *JV4* 15–16 and *JV5* 29–31, *ZV1* 14–16, *ZV3* 13–14, long, all smooth, and six pairs of lyrifissures.

Chelicerae (Fig. 3). Chelicerae 115–125 in length; fixed digit with four teeth and 25–27 long, *pilus dentilis* 6–7 long, movable digit 22–24 long and with two teeth.

Tectum (Fig. 4). The tectum is convex and 31–34 wide.

Spermatheca (Fig. 5). Calyx tubular shape 8–9 long, flaring distaly near the vesicul 4 wide.

Peritreme (Fig. 1). Stippled; extending to level of setae *j1*, 195–202 long.

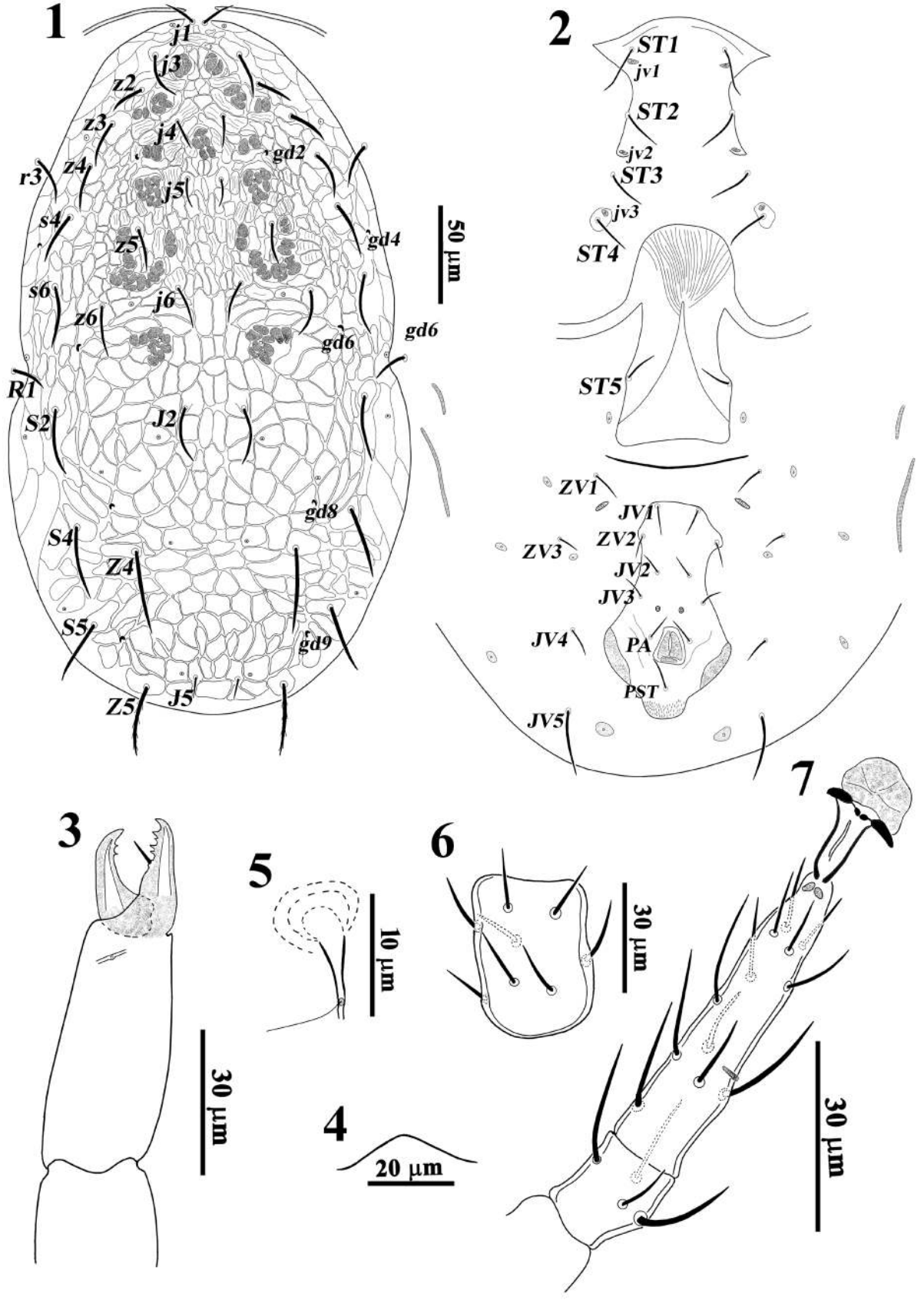
Legs (Figs. 6–7). Length of legs I–IV (excluding pretarsus): 265–275, 213–220, 215–219, 280–286, respectively. Genu II with 8 setae (Fig. 6). Basitarusu IV with one sharp-tipped macroseta 18–20 long (Fig. 7). Number of setae femur–genu–tibia I–IV given in Table 1.

Male (Figs. 8–12; n= 6). Idiosoma oval; setal pattern: 12A–8A/JV–4:ZV–3, all setae smooth except *Z5* serrate and placed on dorsal shield.

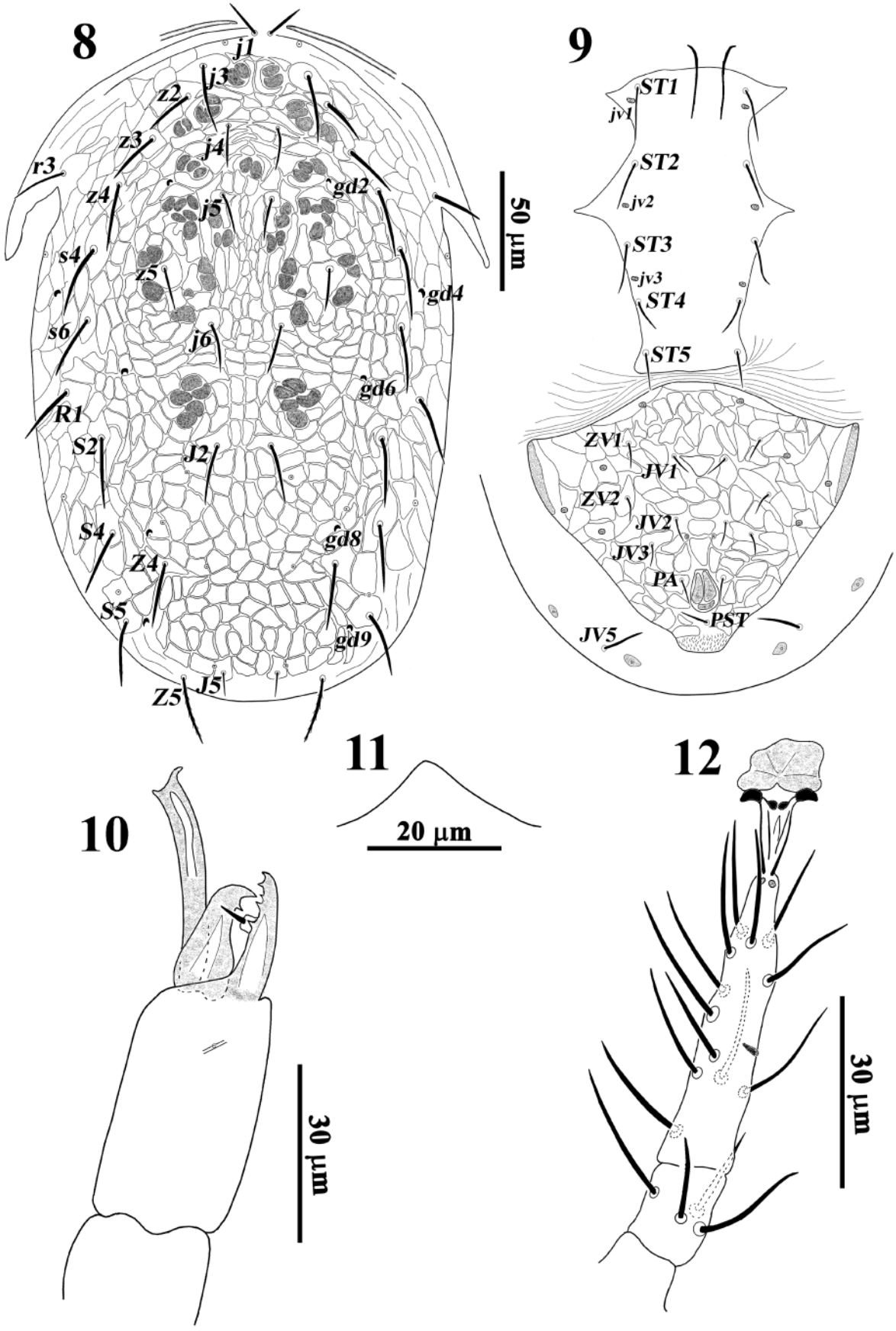
Dorsum (Fig. 8). Dorsal shield heavily sclerotized and reticulated, 265–273 long, 157–168 wide at level of setae *R1*, dorsum with 20 pairs (seta *z6* absent) of setae and five pairs solenostomes (*gd1*, *gd2*, *gd5*, *gd6*, *gd8*, *gd9*). Length of setae:*j1* 17–19, *j3* 26–27, *j4* 16–18, *j5* 17–18, *j6* 20–22, *J2* 22–24, *J5* 9–10, *z2* 22–24, *z3* 24–26, *z4* 25–27, *z5* 17–19, *Z4* 25–27, *Z5* 26–28, *s4* 28–30, *s6* 26–29, *S2* 26–28, *S4* 24–27, *S5* 24–26, *r3* 23–25, *R1* 24–25.

Venter (Fig. 9). Venter of idiosoma with 12 pairs of setae or 25 setae (postanal seta unpaired), sternal shield smooth, five pairs of setae subequal in lengths (*ST1* 23–24, *ST2* 21–23, *ST3* 22–23, *ST4* 16–17, *ST5* 16–18); three pairs of lyrifissures (*iv1–iv3*). Ventrianal shield reticulated, subtriangular; anterior margin convex, 115–122 long, 140–150 wide at level of *ZV2* and 70–75 wide at level of anus; five pairs of pre–anal setae (*JV1* 12–13, *JV2* 10–11, *JV3* 10–12, *ZV1* 12–14 and *ZV2* 9–11); four pairs of lyrifissures and one pair preanal pores. Opisthogastric cuticle with one pair of setae (*JV5* 20–22) and two pairs of lyrifissures. Anal opening surrounded by 3 setae, paraanal setae *PA* 12–13 and post anal seta *PST* 13–14 long.

Chelicera (Fig. 10). Chelicera 98–105 long; fixed digit 23–25 long, with four teeth; *pilus den-*



Figs. 1–7. *K. kuzini* (Wainstein) (adult female): 1—dorsal view of idiosoma; 2—ventral view of idiosoma; 3—chelicera; 4—tectum; 5—spermatheca; 6—genu II; 7—tarsus IV.



Figs. 8–12. *K. kuzini* (Wainstein) (adult male): 8—dorsal view of idiosoma; 9—ventral view of idiosoma; 10—chelicera; 11—tectum; 12—tarsus IV.

tilis 4–5 long; movable digit 19–21 long, with one tooth, shaft of spermadactyl 25–28 long, arched and slightly inflated distally.

Tectum (Fig. 11). The tectum 29–31 wide and convex.

Peritreme (Fig. 8). Stippled; extending to level of setae *j1*, 168–173long.

Legs (Fig. 12). Length of legs I–IV (excluding pretarsus): 238–245, 194–198, 190–195, 257–265, respectively. Basitarusu IV with one sharp–tipped macroseta 20–22 long (Fig. 12). The number setae femur–genu–tibia I–IV given in Table 1.

Deutonymph ♀ (Figs. 13–17; n= 6). Idiosoma oval. All idiosomal and leg setae smooth, except *Z4* and *Z5* barbed.

Dorsum (Fig. 13). Dorsal shield reticulated, with mediolateral incision, 269–278 long, 127–129 wide at level of setae *R1*, with 21 pairs of setae and five pairs of solenostomes (*gd2*, *gd4*, *gd6*, *gd8*, *gd9*). Length of setae: *j1* 18–20, *j3* 26–28, *j4* 17–18, *j5* 17–19, *j6* 22–24, *J2* 27–29, *J5* 10–11, *z2* 25–27, *z3* 24–26, *z4* 27–29, *z5* 17–19, *z6* 19–21, *Z4* 36–38, *Z5* 29–30, *s4* 31–33, *s6* 31–33, *S2* 35–37, *S4* 33–35, *S5* 32–33, *r*3 23–25, *R1* 25–27.

Venter (Fig. 14). Sternal shield smooth, anterior margin convex, with four pairs of setae (*ST1* 20–21, *ST2* 17–18, *ST3* 15–16, *ST4* 13–14), three pairs of lyrifissures (*iv1– iv3*); fifth sterna seta (*ST5*) set on soft integument, 12–14 long; a pair of fine elongate metapodal shields 15–19 long. Opisthogastric cuticle with eight pairs of setae (*JV1–5*, *ZV1–3*) and six pairs of lyrifissures, also with one pair of preanal pores. Anal opening surrounded by 3 setae; length of opisthogastric setae: *JV1* 11–12, *JV2* 9–10, *JV3* 8–9, *JV4* 7–8, *JV5* 24–26, *ZV1* 10–11, *ZV2* 9–10, *ZV3* 7–8, *PA* 9–10, *PST* 10–12.

Chelicera (Fig. 15). Chelicera 85–94 long; fixed digit 20–21 long, with four teeth; *pilus dentilis* 4–5 long; movable digit 17–18 long with two teeth.

Peritreme (Fig. 13). Extending to level of setae *z2*, 125–129 long.

Tectum (Fig. 16). The tectum is convex and 25–27 wide.

Legs (Fig. 17). Length of legs I–IV (excluding pretarsus): 244–248, 200–208, 189–195, 243–250, respectively. Basitarsus IV with a knobbed macroseta, 23–24 long (Fig. 17). Numbers of setae on femora, genua and tibiae I–IV are given in Table 1.

Deutonymph ♂ (Figs. 18–22; n= 2). Idiosoma oval, all idiosomal and leg setae smooth, except *Z4* and *Z5*, barbed. This stage by characteristics of the opisthogastric region, without dorsal seta *z6* and smaller size, can be distinguished from female deutonymph.

Dorsum (Fig. 18). Dorsal shield reticulated, with mediolateral incision, 250–258 long, 118–124 wide at level of setae *R1*, with 20 pairs of setae and five pairs of solenostomes (*gd2*, *gd4*, *gd6*, *gd8*, *gd9*). Length of setae: *j1* 18–19, *j3* 25–26, *j4* 18–19, *j5* 17–18, *j6* 22–23, *J2* 27–28, *J5* 11–12, *z2* 25–26, *z3* 24–26, *z4* 28–29, *z5* 18–20, *Z4* 32–35, *Z5* 30–32, *s4* 30–31, *s6* 29–31, *S2* 34–35, *S4* 32–34, *S5* 29–31, *r3* 24–25, *R1* 26–27.

Venter (Fig. 19). Sternal shield smooth, anterior margin convex, with four pairs of setae (*ST1* 18–19, *ST2* 17–18, *ST3* 14–15, *ST4* 11–12), three pairs of lyrifissures (*iv1– iv3*); fifth sterna seta (*ST5*) set on soft integument, 12–13 long; a pair of fine elongate metapodal shields 15–18 long. Opisthogastric cuticle with six pairs of setae (*JV1*, *JV2*, *JV3*, *JV5*, *ZV1* and *ZV2*) and six pairs of lyrifissures, also with one pair preanal pores. Anal opening surrounded by 3 setae; Length of opisthogastric setae: *JV1* 11–12, *JV2* 8–9, *JV3* 9–10, *JV5* 23–25, *ZV1* 10–11, *ZV2* 9–10, *PA* 9–10, *PST* 10–11.

Chelicera (Fig. 20). Chelicera 88–93 long; fixed digit 20–21 long, with four teeth; *pilus dentilis* 4–5 long; movable digit 17–18 long with one teeth.

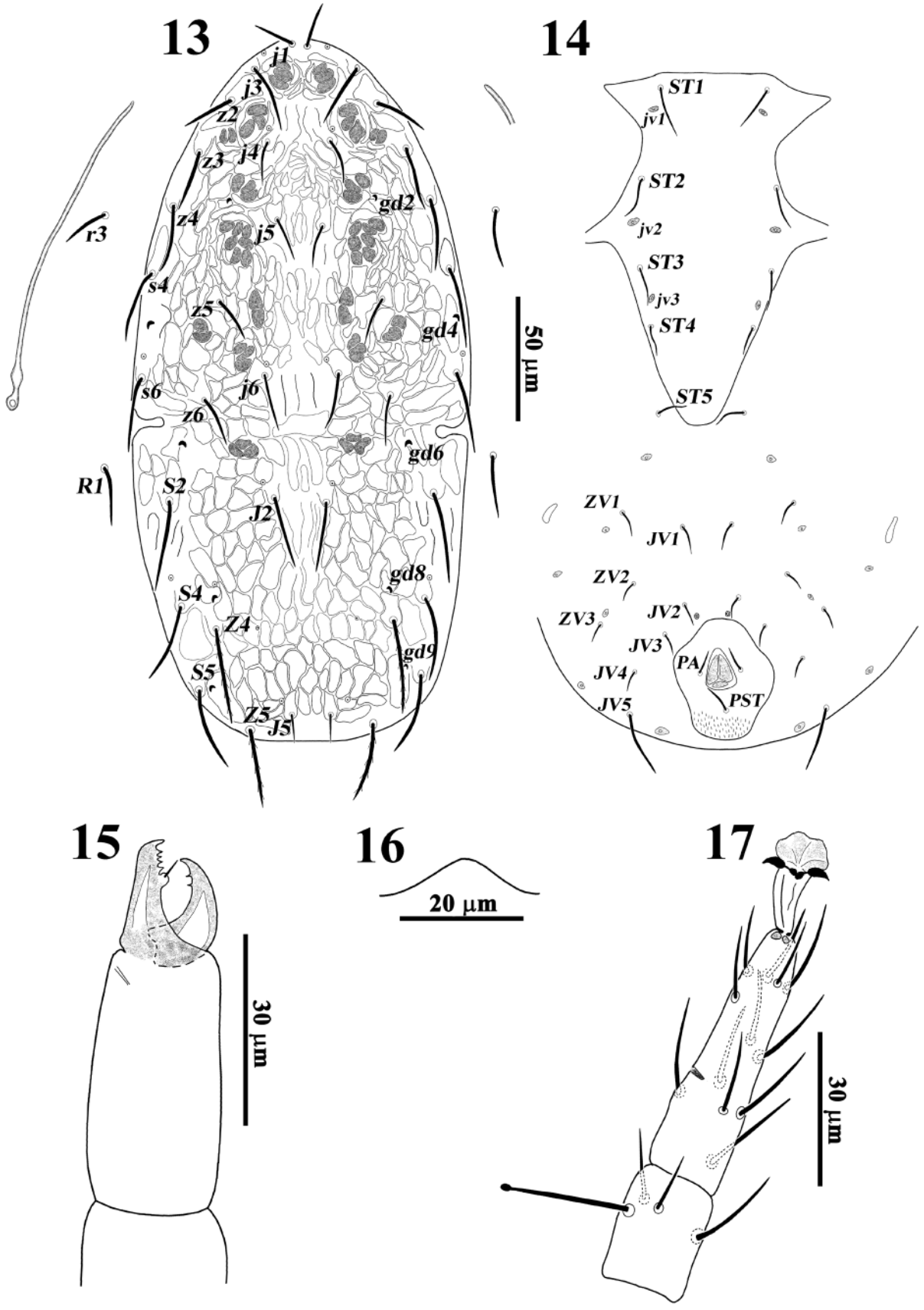
Tectum (Fig. 21). The tectum 24–26 wide and convex.

Peritreme (Fig. 18). Extending to level of setae *z2*, 116–120 long.

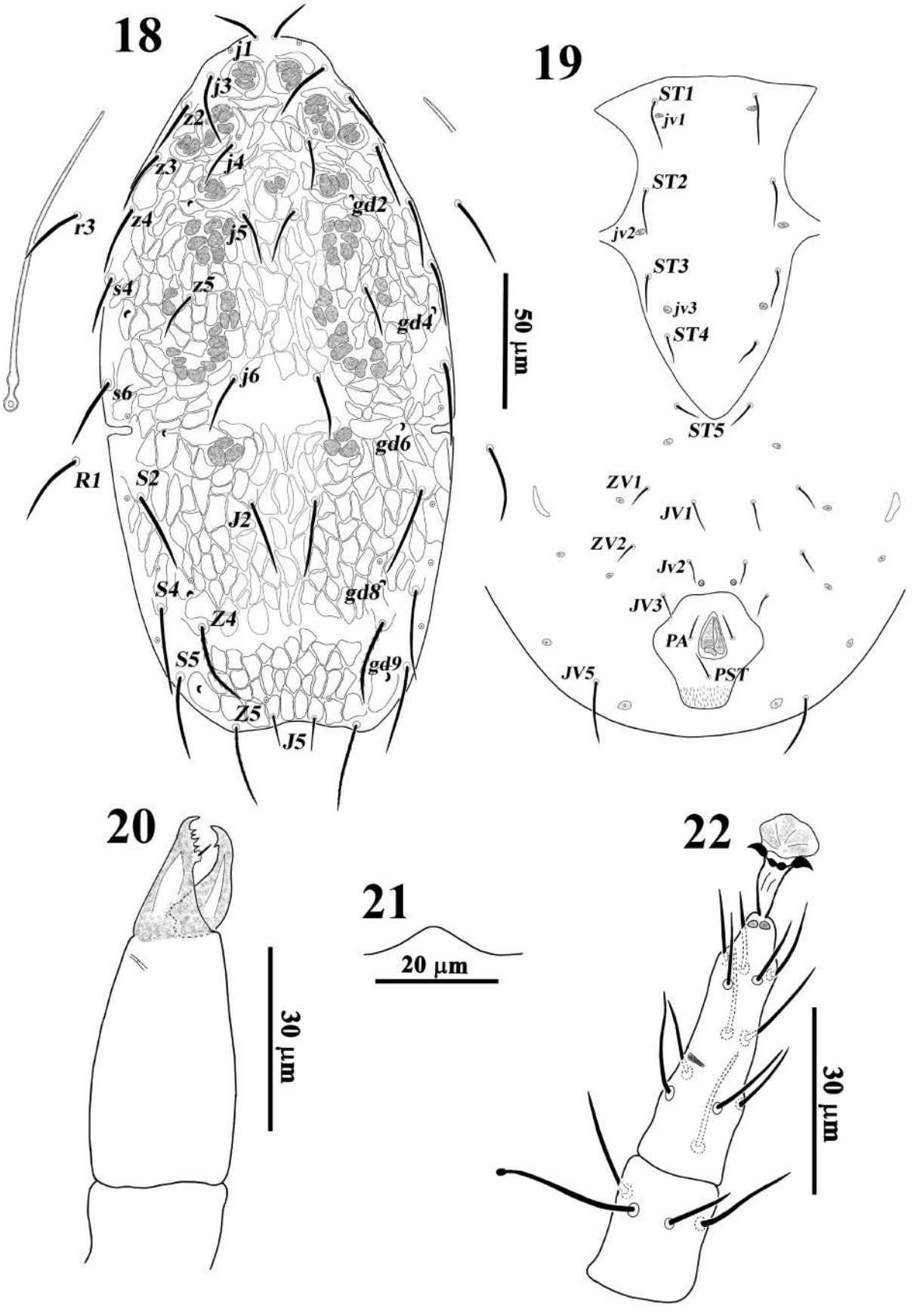
Legs (Fig. 22). Length of legs I–IV(excluding pretarsus): 222–226, 188–193, 180–185, 232–236, respectively. Basitarsus IV with a knobbed macroseta, 24–25 long (22). Numbers of setae on femora, genua and tibiae I–IV are given in Table 1.

Protonymph (Figs. 23–27; n=6). Idiosoma oval, all idiosomal and leg setae smooth, except *Z4* and *Z5*, barbed.

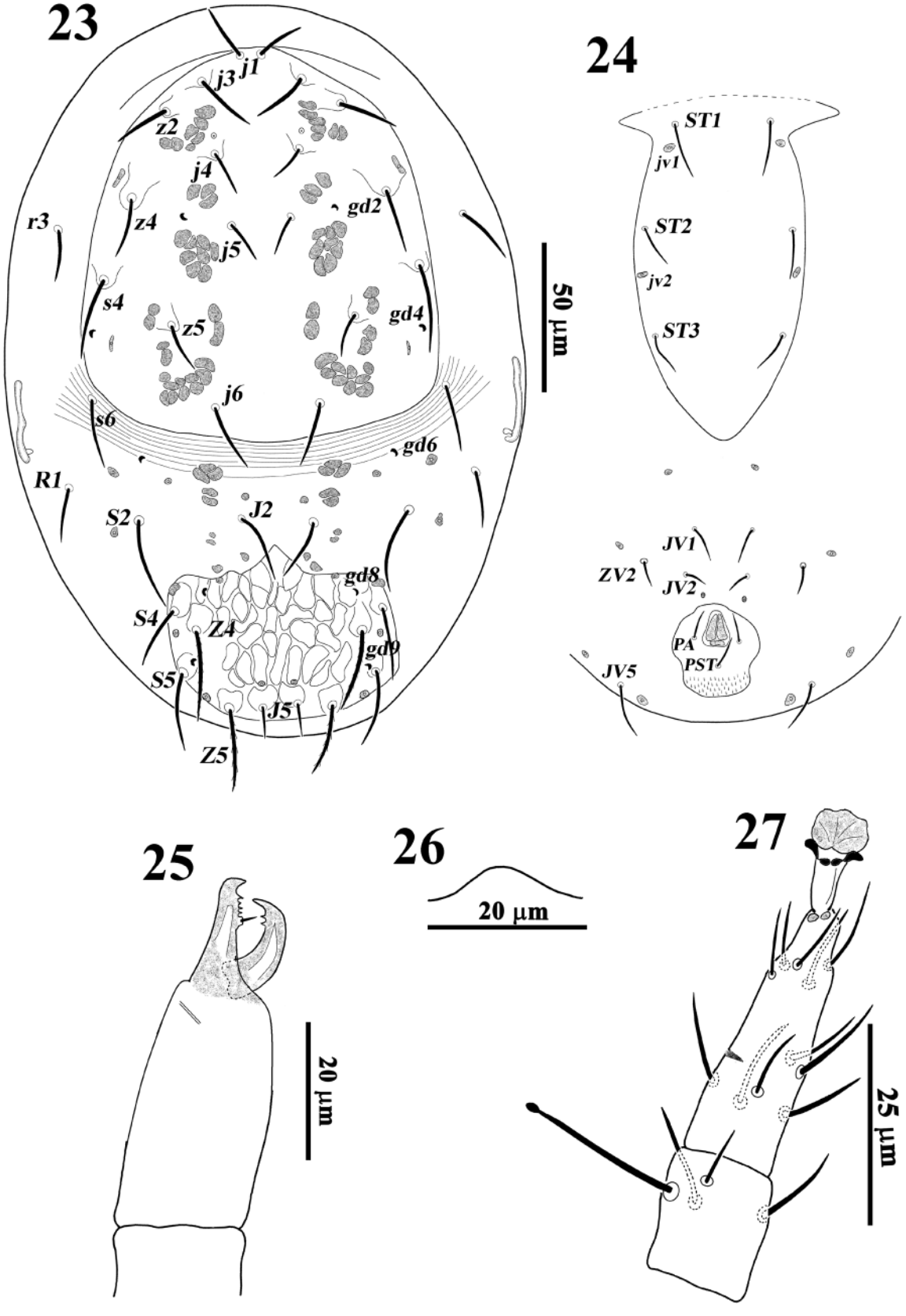
Dorsum (Fig. 23). Dorsum with two separated shields (podonotal and opisthonotal shields); podonotal shield smooth, 130–137 long and 115–120 wide at level of *s4*, with nine pairs of setae (*j1*, *j3*, *j4*, *j5*, *j6*, *z2*, *z4*, *z5*, *s4*), two pairs of solenostomes (*gd2*, *gd4*) and two pairs of lyrifissures; after than this shield with transverse striation; opisthonotal shield reticulated, 56–60 long, 72–75 wide at level of *S4*, with five pairs of setae and two pairs of solenostomes (*gd8*, *gd9*), and four pairs of lyrifissures; setae *J2*, *s6*, *S2*, *r3* and *R1* placed on soft integument (Fig. 23). Length of setae: *j1* 19–18, *j3* 21–22, *j4* 14–15, *j5* 13–15, *j6* 21–23, *J2* 22–24, *J5* 9–10, *z2* 20–22, *z4* 22–24, *z5* 15–17, *Z4* 28–30, *Z5* 24–26, *s4* 28–30, *s6* 24–26, *S2* 28–30,



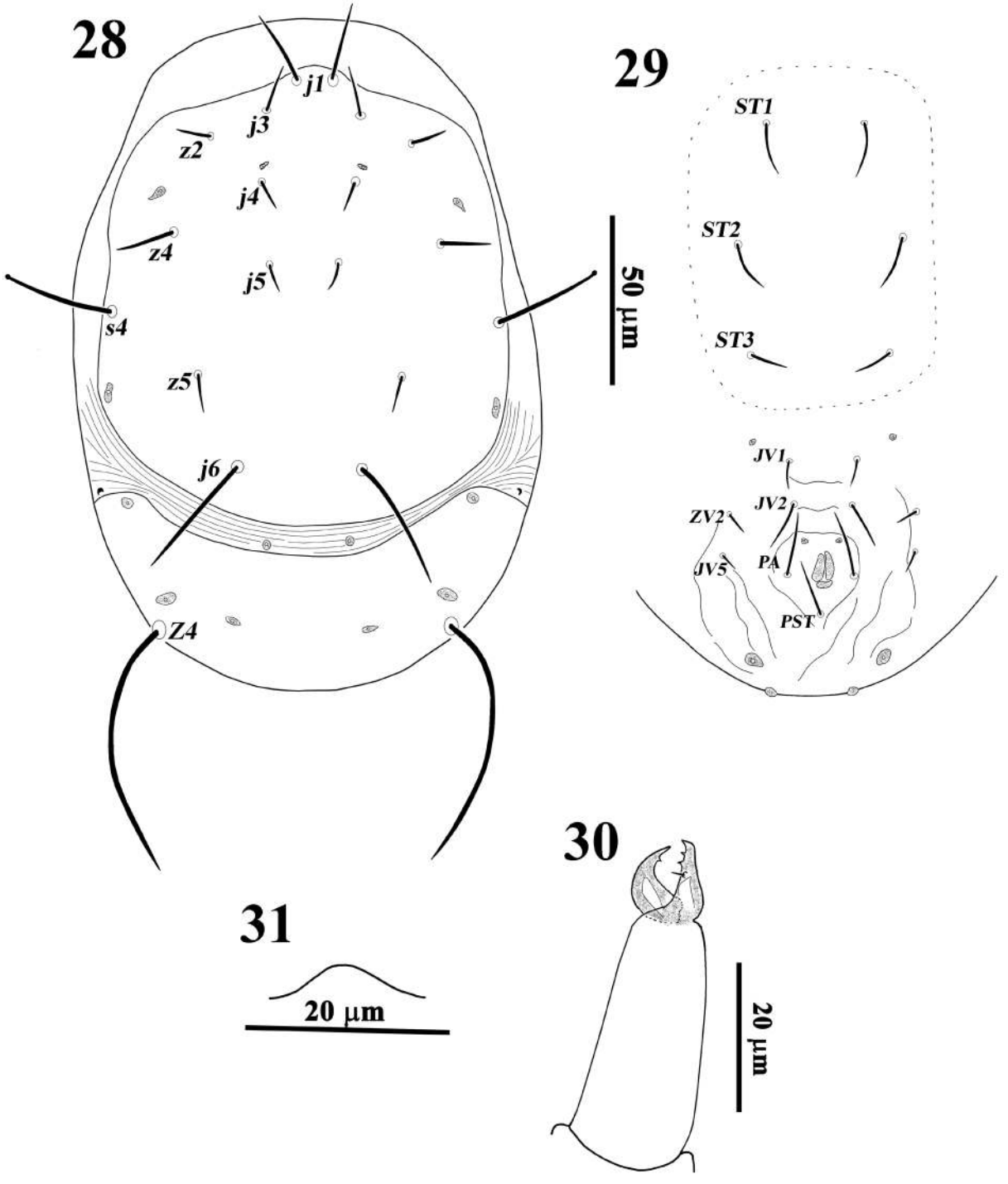
Figs. 13–17. *K. kuzini* (Wainstein) (deutonymph female**)**: 13—dorsal view of idiosoma; 14—ventral view of idiosoma; 15—chelicera; 16—tectum; 17—tarsus IV.



Figs. 18–22. *K. kuzini* (Wainstein) (deutonymph male): 18—dorsal view of idiosoma; 19—ventral view of idiosoma; 20—chelicera; 21—tectum; 22—tarsus IV.



Figs. 23–27. *K. kuzini* (Wainstein) (protonymph**)**: 23—dorsal view of idiosoma; 24—ventral view of idiosoma; 25—chelicera; 26—tectum; 27—tarsus IV.



Figs. 28–31. *K. kuzini* (Wainstein) (larva): 28—dorsal view of idiosoma; 29—ventral view of idiosoma; 30—chelicera; 31—tectum.

S4 22–23, *S5* 25–28,*r3* 17–19, *R1* 20–23. Between podonotal and opisthonotal shields with several pairs of small, irregular plates and lyrifissures also with a pair of solenostome (*gd6*).

Venter (Fig. 24). Sternal shield smooth, with three pairs of setae (*ST1* 18–19, *ST2* 15–16, *ST3* 13–14) and two pairs of lyrifissures (*iv1–iv2*). Opisthogastric cuticle with four pairs of smooth setae (*JV1–2*, *JV5*, *ZV2*), four pair of lyrifissures and one pair preanal pores. Anal opening surrounded by 3 setae (*PA* and *PST*). Length of opisthogastric setae: *JV1* 12–14, *JV2* 8–9, *JV5* 16–18, *ZV 2*7–8, *PA* 10–11, *PST* 9–11.

Chelicera (Fig. 25). Chelicera 75–80 long; fixed digit 17–18 long, with four teeth; *pilus dentilis* 2–3 long; movable digit 14–16 long with two teeth.

Tectum (Fig. 26). The tectum 18–21 wide and convex.

Peritreme (Fig. 23). Short and extending to level between setae *R1–s6*, 26–29 long.

Legs (Fig. 27). Length of legs I–IV (excluding pretarsus): 193–197, 157–170, 152–160, 195–205, respectively. Basitarsus IV with a knobbed macroseta, 26–28 long (27). Numbers of setae on femora, genua and tibiae I–IV are given in Table 1.

Larva (Figs. 28–31; n=5). Idiosoma oval, all idiosomal and leg setae smooth.

Dorsum (Fig. 28). Separate podonotal and opisthonotal shields, both smooth; podonotal shield 90–94 long and 115–120 wide at level of setae *s4*, with nine pairs of setae (*j1*, *j3*, *j4*, *j5*, *j6*, *z2*, *z4*, *z5*, *s4*) and three pair of lyrifissures; opisthonotal shield 32–38 long, 115–124 wideat level of solenostome *gd6*, with a pair of setae (*Z4*) and three pairs of lyrifissures. Length of setae: *j1* 20–22, *j3* 13–14, *j4* 8–10, *j5* 7–8, *j6* 37–40, *z2* 11–13, *z4* 15–17, *z5* 9–10, *Z4* 70–74, *s4* 32–34. Setae *s4*, *j6* and *Z4* longer rather other dorsum setae and *s4* knobbed distally. Cuticle between podonotal and opisthonotal shields with transvers striation with a pair of solenostome (*gd6*) and one pair lyrifissure.

Venter (Fig. 29). Sternal shield smooth, and with three pairs of setae of subequal lengths (*ST1* 15–17, *ST2* 13–15, *ST3* 14–15). Opisthogastric cuticle with four pairs of smooth setae (*JV1–2*, *JV5*, *ZV2*) and three pairs of lyrifissures. Length of opisthogastric setae: *JV1* 6–7, *JV2* 17–19, *JV5* 5, *ZV2* 6–7, *PA* 20–22, *PST* 19–20.

Tectum (Fig. 30). The tectum 15–17 wide and convex (Fig. 3).

Chelicera (Fig. 31). Chelicera 60–65 long; fixed digit 12–13 long, with two teeth; *pilus dentilis* 2 long; movable digit 10–11 long with one tooth.

Peritreme. Absent.

Legs. Length of legs I–III (excluding pretarsus): 185–190, 140–146 and 151–155, respectively. Numbers of setae on femur, genu and tibia I–III are given in Table 1.

DISCUSSION

In this study, the morphology and measurements of idiosomal setae in mobile stages of *K. kuzini* are presented. Chaetotaxy of idiosoma and chelicerae in adults (female and male) closely resemble the original description by Wainstein (1962).

Redescription of females of the Iranian specimens resembles that of Gupta (2003) in having same size in idiosomal setae, but it differs by leg IV with a macroseta on basitarsus and genu II with 8 setae opposed to leg IV without a macroseta, and genu II with 7 setae as in Gupta's redesription (Gupta 2003).

Key to mobile stages of *Kuzinellus kuzini* (Wainstein, 1962)

1. Idiosoma with 3 pairs of legs ..... Larva
— Idiosoma with 4 pairs of legs 2
2. Dorsal shield divided, Ge II with 6 setae .... Protonymph
— Dorsal shield entire, Genu II with 8 3
3. Dorsal shield with mediolateral incision ..... Deutonymph 4
— Dorsal shield without mediolateral incision ... Adult 5
4. Opisthogasteral cuticle with 8 pairs of setae, seta *z6* present ..... Deutonymph (♀)
— Opisthogasteral cuticle with 6 pairs of setae, seta *z6* absent ..... Deutonymph (♂)
5. Movable digit of chelicera without spermadactyl, seta *z6* present ..... Female (♀)
— Movable digit of chelicera with spermadactyl, seta *z6* absent ..... Male (♂)

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Table 1
Comparison of characters of all stages of *Kuzinellus kuzini* (Wainstein, 1962)

Ch. / Stage	**L.**	**P.**	**D. (♀)**	**D. (♂)**	**A. (♀)**	**A. (♂)**
j1	+	+	+	+	+	+
j3	+	+	+	+	+	+
j4	+	+	+	+	+	+
j5	+	+	+	+	+	+
j6	+	+	+	+	+	+
J2	–	+	+	+	+	+
J5	–	+	+	+	+	+
z2	+	+	+	+	+	+
z3	–	–	+	+	+	+
z4	+	+	+	+	+	+
z5	+	+	+	+	+	+
z6	–	–	+	–	+	–
Z4	+	+	+	+	+	+
Z5	–	+	+	+	+	+
s4	+	+	+	+	+	+
s6	–	+	+	+	+	+
S2	–	+	+	+	+	+
S4	–	+	+	+	+	+
S5	–	+	+	+	+	+
r3	–	+	+	+	+	+

R1	–	+	+	+	+	+
ST1	+	+	+	+	+	+
ST2	+	+	+	+	+	+
ST3	+	+	+	+	+	+
ST4	–	–	+	+	+	+
ST5	–	–	+	+	+	+
JV1	+	+	+	+	+	+
JV2	+	+	+	+	+	+
JV3	–	–	+	+	+	+
JV4	–	–	+	–	+	–
JV5	+	+	+	+	+	+
ZV1	–	–	+	+	+	+
ZV2	+	+	+	+	+	+
ZV3	–	–	+	–	+	–
Z4	smooth	serrate	serrate	serrate	smooth	smooth
Spermadactyl	–	–	–	–	–	+
Macrosetae on basitarsus IV	–	+	+	+	+	+
Macrosetae distally	–	knobbed	knobbed	knobbed	pointed	pointed
Femora I–IV*	10, 7, 5, –	10, 7, 5, 4	12, 10, 6, 6	12, 10, 6, 6	12, 10, 6, 6	12, 10, 6, 6
Genua I–IV*	8, 6, 6, –	8, 6, 6, 5	10, 8, 7, 7	10, 8, 7, 7	10, 8, 7, 7	10, 8, 7, 7
Tibiae I–IV*	8, 7, 7, –	8, 7, 7, 6	10, 7, 7, 6	10, 7, 7, 6	10, 7, 7, 6	10, 7, 7, 6

Note: **L.**—larva, **P.**—protonymph, **D.**—deutonymph, **A.**—adult, *—numbers of setae.