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Article

A review of the genus *Reticulolaelaps* Costa and redescription of *R. elsae* (Joharchi, Babaeian & Jalalizand) comb. nov.

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ABSTRACT
Our precise observations on *Laelaspisella elsae* Joharchi, Babaeian & Jalalizand revealed the genus misidentification. We clarify the genus placement, transfer it to *Reticulolaelaps* Costa and redescribe it paying attention to some discrepancies in the original description. A new definition and diagnosis of *Reticulolaelaps* and a key for separation of all known species of this genus are proposed. New information on female morphological characters of *Reticulolaelaps faini* Costa, 1968 is presented, based on specimens collected from soil in Khuzestan and Chaharmahal va Bakhtiari provinces, Iran. *Pseudoparasitus lativentris* (Karg) and *P. jilinensis* Ma are transferred from this genus to *Reticulolaelaps*. A new definition of the genus *Pseudoparasitus* is proposed.

KEY WORDS: New definition; *Laelaspisella*; redescription; *Pseudoparasitus*; Iran.

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INTRODUCTION

The mesostigmatic mite family Laelapidae is ecologically diverse, and comprises obligate and facultative parasites of vertebrates, insect paraphages, and free-living predators that inhabit soil-litter habitats, as well as the nests of vertebrates and arthropods (Krantz and Walter 2009). Intraspecific morphological variations have been seen between different population of a species of this family, due to their presence in different habitats, different behaviors, and a wide range of hosts, especially in species that have a parasitic relationship with their host. This topic has recently been studied in some genera, such as *Gaeolaelaps* Evans & Till, 1966 which led to the recognition of some synonyms (Nemati *et al*. 2018).

Reticulolaelaps Costa, 1968 was recorded in Israel for the first time with *R. faini* as type species (Costa 1968). Based on related literature (Costa 1968; Nemati *et al*. 2013; Joharchi and Babaeian 2015), this genus currently includes three species of well-sclerotized mites: *R. faini* Costa 1968, *R. hallidayi* Joharchi, Nemati & Babaeian, 2013 and *R. costai* Joharchi & Babaeian, 2015. *Reticulolaelaps lativentris* Karg, 1978 was transferred to *Pseudoparasitus* Oudemans by Nemati *et al*. (2013), and subsequently Joharchi and Babaeian (2015) confirmed this change based on observations of two paratype specimens in Karg's collection. Members of this genus occur in low

numbers in various types of litter, animal materials and nests of *Tapinoma* sp. (Hym.: Formicidae) in Israel, Iran and Chile (Costa 1968; Karg 1978; Ghafarian *et al*. 2011; Nemati *et al*. 2013; Joharchi and Babaeian 2015). The life style and biology of *Reticulolaelaps* are still practically unknown.

A new species, *Laelaspisella elsae* Joharchi, Babaeian & Jalalizand, 2016 was described based on morphological characters of adult females from Iran (Joharchi *et al*. 2016), and the definition of the genus was changed to accommodate this species, which resulted in several problems in the genus definition as discussed below.

In this paper the following topics are discussed: 1. Removing *L. elsae* from *Laelaspisella*, redescribing it, and moving it into *Reticulolaelaps*; 2. Proposing a new definition of *Reticulolaelaps*; 3. Revising the current definitions of *Laelaspisella* and *Pseudoparasitus*; 4. Presenting some notes on *R. faini* and *R. costai*; 5. Presenting a key for separation of all known species of *Reticulolaelaps*; 6. Moving *Pseudoparasitus lativentris* (Karg) and *P. jilinensis* Ma into *Reticulolaelaps*.

MATERIALS AND METHODS

Mites were collected from soil in different parts of Chaharmahal va Bakhtiari and Khuzestan provinces, Iran. *Reticulolaelaps* specimens were extracted from samples using Berlese funnels, placed in lactic acid at 55 °C for clearing, and then mounted in Hoyer's medium on permanent microslides for microscopic examination. Taxonomically relevant structures of different species were illustrated using a drawing tube and figures were prepared with Corel X-draw software, based on the scanned line drawings. Measurements of structures are expressed as minimum-maximum ranges in micrometres. We have attempted to identify all pore-like structures, but we acknowledge that some may have been overlooked.

For *Reticulolaelaps faini* the measurements are based on specimens collected from Khuzestan and Chaharmahal va Bakhtiari provinces and deposited in the Acarological laboratory, Plant Protection Department, Agricultural College, Shahrekord University (APAS), Shahrekord, Iran.

Dorsal setae notation and leg and palp chaetotaxy follows that of Lindquist and Evans (1965), Evans (1963a, b), and Evans and Till (1965) respectively. Terminology for idiosomal glands and lyrifissures follows Johnston and Moraza (1991). Length of the dorsal shield is the distance from its anteromedian edge anterior to the bases of setae *j1* to its posteromedian edge posterior to the bases of setae *Z5*; width of the dorsal shield is measured at its widest part; length of the sternal shield is measured along the midline from its anterior edge to its posterior margin, width measured between coxae II (widest point) and slightly above the insertion of *st2* (narrowest point); the length of the anal shield from the anterior margin to the posterior edge of the cribrum, and width was measured at widest point. Setae were measured at level of insertions to their tips and distance between setae as the distance between their insertions. Lengths of leg segments were measured dorsomedially, and tarsi were measured without the stalk and pretarsus.

In the redescription of *Reticulolaelaps elsae*, some specimens were dissected to display the presence of membranous flaps on the gnathosoma, because of their special role as a taxonomic criterion for determination of *Reticulolaelaps* and determine their exact location. These specimens were also used to observe discernable pore-like structures; a separated dorsal shield figure was provided. For this species the measurements given first are those taken directly from specimens with the same data as the holotype and paratypes (19 specimens), followed in parentheses: measurements have been taken from the original species description (Joharchi *et al*. 2016), when it was provided, in order to facilitate comparison. Joharchi *et al*. (2016) stated that paratype specimens were deposited in the Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Iran (JAZM), and the holotype and some other paratypes in Acarological collection, Department of Plant Protection, Yazd Branch, Islamic Azad University (YIAU). However, we were unable to locate those type specimens despite our efforts. In the present work, information from all type materials has been used (see explanation under note on materials examined).

Joharchi and Babaeian (2015) stated that the holotype of *R. costai* was deposited in the Acarological Collection, Department of Plant Protection, Yazd Branch, Islamic Azad University (YIAU), and a paratype was deposited in the Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Iran (JAZM), but we could not locate them. Photographs of the holotype were provided by Prof. Alireza Saboori who helped in contacting the author of this species (Dr. Omid Joharchi) and forwarding the pictures.

For checking the membranous flaps and other important characters of *R. lativentris* Karg, one paratype specimen (male) cited as *Hypoaspis* (*Reticulolaelaps*) *lativentris* at the Museum für Naturkunde Berlin was studied (for more information see specimen examined).

To study the membranous flaps on the inner side of the palp trochanter, the holotype and paratypes of *R. hallidayi* Joharchi, Nemati & Babaeian, 2013 with the following collection data were studied: holotype, female, Iran, Khuzestan Province, Izeh, soil, 30 March 2010, coll., A. Nemati (in APAS); paratypes, seven females and three males, same data as holotype. Two females, Chaharmahal va Bakhtiari Province, Kohrang (Dasht Laleh) (32° 35' 19" N, 50° 12' 03" E) nest of *Messor* sp. (Hym.: Formicidae), coll. A. Khalili-Moghadam, 25 April 2017; one female, Bazoft region (Shykh Ali village) (32° 17' 49" N, 49° 56' 09" E) nest of *Cataglyphis* sp. (Hym., Formicidae), coll. A. Khalili-Moghadam, 30 April 2017; one female, Bazoft region (Mavarz village) (32° 08' 59" N, 50° 06' 15" E) nest of *Camponotus* sp. (Hym.: Formicidae), coll. A. Khalili-Moghadam, 1 June 2017; two females, Bazoft region (Sartang village) (31° 59' 40" N, 50° 53' 39" E), one female, nest of *Lepisiota* sp. (Hym.: Formicidae), coll. A. Khalili-Moghadam, 2 June 2017; one female, Samsami region (Chery mountain) (32° 11' 16" N, 50° 11' 58" E) nest of *Pheidole* sp. (Hym.: Formicidae), (32° 10' 56" N, 50° 12' 34" E) nest of *Tetramorium* sp. (Hym.: Formicidae), coll. A. Khalili-Moghadam, 6 July 2017 and specimens that have been determined as *R. faini* in APAS.

Information on *Gymnolaelaps tonsilis* Karg was based on examination of the holotype and paratypes in the Museum für Naturkunde Berlin, including microslides as follows: Chel. Nr. 3947♂, paratypus, ZMB Kat. Nr. 41478, St. Lucia, Antillen, Gastries, Vigie, Point Eins.: Dr. Mahunka, Budapest, 21 .7.80; Chel. Nr. 3944♀, ZMB Kat. Nr. 41475 (paratypes); Nr. 3945♀, ZMB Kat. Nr. 41476 (paratypes); Nr. 4440 ♀, ZMB Kat. Nr. 42589 (holotypus); Nr. 3943♀, ZMB Kat. Nr. 41474 (paratypes); Nr. 3946♂, ZMB Kat. Nr. 41477 (paratypes) with the same data as above on 11.7.1980].

RESULTS AND DISCUSSION

Genus *Reticulolaelaps* Costa, 1968

Reticulolaelaps Costa, 1968: 26.
Type species: *Reticulolaelaps faini* Costa, 1968.

Definition

The genus is characterized by a well-sclerotized holodorsal shield with slender setae (Figs. 1–3). Tritosternum with small basal part and laciniae fused together for half their length (Figs. 5–7). Four character states are present in the presternal area of different *Reticulolaelaps* species – (1) presternal plates absent (*faini*); (2) presternal plates present, separate from sternal shield (*lativentris, jilinensis*); (3) presternal plates fused to sternal shield (*hallidayi, costai*); (4) presternal plates represented by lightly sclerotized transverse lines (*elsae*). Female sternal shield with three pairs of simple sternal setae, extending at least to the midlevel of coxa III, with *iv1-3* on shield, poroids *iv3* present on the posterolateral extensions (Fig. 4). Metasternal setae *st4* absent (Figs. 4, 25, 30). Exopodal II-III, III-IV, parapodal and endopodal II-III plates fused, surrounding coxae; parapodal plate rounded or triangular, more or less contiguous with but separate from peritrematal and genitoventral shields; endopodals III-IV joined with podal plate posteriorly and with posterolateral extension of sternal

shield anteriorly, endopodals II-III fused with lateral margins of sternal shield, and anterolateral corners acutely produced into narrow arms (endopodal extensions) flanking coxae II and joining exopodals extension between coxae I-II (Figs. 4–9). The left and right endopodals at the anterior level of coxae II are connected by a sclerotized rod-like bridge almost fused with anterior margin of sternal shield (Figs. 4, 9, 30). Genitoventral shield large, expanded posterior to coxae IV, fused with metapodal plates (Figs. 25, 30) or free rod like metapodal plates present (Fig. 4), shield bearing 3–6 pairs of smooth setae including: the genital setae (*st5*) and five (*ZV1–2* and *JV1–3* in *R. faini*, *R. hallidayi*, and *R. costai*), three (*ZV1–2*, *JV1* in *R. lativentris*) or two (*ZV1*, *JV1* in *R. elsae*) additional pairs of setae on its surface, extending near or abutting the anal shield, with strong reticulated ornamentation. Anal shield large with *gv3* on marginal surface (Figs. 4, 8). Surface of pistome faintly reticulated, its anterior margin smooth (Fig. 29). Chelicera with small and robust digits with few teeth. Two large membranous flaps originate near the inner side of the palp trochanter (Figs. 11–13, 28) or the underside of the hypostome (based on Costa 1968; see note below). Corniculi robust and hornlike. Internal malae smaller but similar to corniculi and with two smooth hornlike lobes (Fig. 28). All the sclerotized parts of the body are well ornamented throughout, including the legs (Figs. 15–18). Legs significantly shorter than idiosoma, genu III (2 2/1 2/0 1) and IV (2 2/1 3/1 1) with eight and ten setae respectively. Male with sterno-genitiventral or holoventral shield with ten pairs of setae, with separate anal shield similar to that of the female.

Note

Our observations on dissected specimens of all our *Reticulolaelaps* species in APAS, including specimens identified as *R. faini* from Iran, revealed the attachment of membranous flaps on the inner side of the palp trochanter, but we have not had the opportunity to check the type material of *R. faini* from Israel. Costa (1968) stated that gnathosoma bears ventrally two large membranous flaps that originated in front of the anterior hypostomal setae. Study of dissected specimens of type materials or specimens collected from that area is needed to understand the exact location of these membranous flaps.

Diagnosis

Holodorsal shield reticulated. Tritosternum with small basal part and laciniae fused for half their length. Female sternal shield with concave posterior margin, bearing *iv1–3*. Metasternal setae *st4* absent; left and right endopodals connected by a sclerotized rod-like bridge at the anterior level of coxae II, almost fused with anterior margin of sternal shield. Genitiventral shield large, expanded posterior to coxae IV, extending close to or abutting the anal shield. Surface of epistome faintly reticulated, its anterior margin smooth. With two large membranous flaps anterior to hypostome (see above note). Internal malae smaller than corniculi, with two smooth horn-like lobes. All the sclerotized parts of the body are well ornamented throughout. Male with sterno-genitiventral shield with 10 pairs of setae, with separate anal shield similar to that of the female.

***Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) comb. nov.**

Reticulolaelaps elsae (Joharchi, Babaeian and Jalalizand, 2016)
Laelaspisella elsae Joharchi, Babaeian and Jalalizand, 2016; in Joharchi *et al*. (2016).

Note on materials examined

Nineteen females, Iran, Esfahan, March-April 2002, coll. A. Jalalizand, from bark of elm trees. Six of them used in the original description of *Laelaspisella elsae* by Joharchi *et al*. (2016), were precisely studied. The senior author of the present article (A. Nemati) described this species in 2009–2010 based on 19 specimens mentioned above, but that work was not published because the genus

assignment has been an enigma. In this paper, we will use some of the unpublished results mentioned above, including morphological traits and morphometric data of type materials of this species. Comparison with data presented in the original description of *L. elsae* by Joharchi *et al.* (2016) shows a number of discrepancies in the description of morphological traits and range of measurements, which could hardly be avoided. Below, we present the characters consistently different between *Laelaspisella* and the more closely related genus *Reticulolaelaps*.

Notes on genus assignment of Reticulolaelaps elsae *(Joharchi, Babaeian & Jalalizand, 2016)* ***comb. nov.***

Reticulolaelaps elsae was described in the genus *Laelaspisella* as mentioned above (Joharchi *et al*. 2016). *Laelaspisella* was erected by Marais and Loots (1969) to accommodate two new species: *L. macrodorsalis* Marais & Loots and *L. epigynialis* Marais & Loots, from forest soil in South Africa, Lesotho and Congo. Subsequently, this genus was considered as a subgenus of *Hypoaspis s. lat.* by Karg (1989), who described two additional species, *H.* (*Laelaspisella*) *foramenis* Karg, 1989 and *H.* (*Laelaspisella*) *cavitatis* Karg, 1982, and as a distinct genus by Joharchi and Halliday (2013), Joharchi *et al*. (2016) and Nemati and Gwiazdowicz (2016).

Joharchi and Halliday (2013) considered *Laelaspisella canestrinii* and *L. kabitae* as species of this genus but excluded the two species described by Karg. Subsequently, Joharchi *et al*. (2016) defined the scope of the genus definition more broadly, and introduced in it other species with more diverse attributes (*L. macrodorsalis*, *L. epigynialis*, *L. tonsilis*, *L. kabitae* and *L. canestrinii*).

Joharchi *et al*. (2016) with the description of *L. elsae*, along with various species mentioned above which they considered in this genus, expanded the genus concept; at the same time they had to make several changes in the genus attributes in order to accommodate various characteristics of species. On the other hand, in order to consider these heterogeneous species within a single genus (*Laelaspisella*), many characters must be defined as variable: (1) dorsal seta of chelicera present (*beaulieui*, *canestrinii, elsae*, *kabitae and tonsilis*) or absent (*epigynialis* and *macrodorsalis*); (2) podonotal shield hypertrichous [*epigynialis*, *macrodorsalis* and *tonsilis*: many pairs (about 13 pairs) of setae on podonotal part of dorsal shield have not been drawn by Karg (1989) in the original description of *Gymnolaelaps tonsilis* (his Fig. 1a, p. 336) based on observations that have been done on holotype and paratypes of *Pseudoparasitus tonsilis* Karg, 1989 in the Museum für Naturkunde Berlin (see materials and methods)], or with normal chaetotaxy (*beaulieui*, *canestrinii, elsae* and *kabitae*); (3) setae *Jv5* and *Zv5* expanded (*epigynialis* and *macrodorsalis*) or normal (*beaulieui*, *canestrinii, elsae*, *kabitae and tonsilis*); (4) seta *pd3* on genu I present (*beaulieui*, *canestrinii, elsae*, *kabitae and tonsilis*) or absent (*epigynialis* and *macrodorsalis*); (5) epigynal shield with rounded posterior margin separate from anal shield (*epigynialis* and *macrodorsalis*), or with rounded posterior margin extending to and touching anal shield (*beaulieui*, *canestrinii, elsae*, *kabitae and tonsilis*); (6) anterior margin of epistome smooth rounded (*elsae*) or subtriangular (*beaulieui* and *canestrinii*), mucronate (*epigynialis* and *macrodorsalis*), with irregular minute denticulation (*kabitae*) or with deep denticles (*tonsilis*); (7) distinct sclerotized presternal plates present (*epigynialis*, *kabitae*, *macrodorsalis*, *tonsilis*), or presternal area with lineate reticulation (*beaulieui*, *canestrinii*) or nearly absent (*elsae*); (8) deutosternal groove with six multidentate rows (*beaulieui*, *canestrinii*, *epigynialis*, *kabitae* and *macrodorsalis*) or only with four rows possessing 2–5 denticles (*elsae*); (9) the palp apotele two-tined (*elsae*, *epigynialis*, *macrodorsalis* and *tonsilis*) or three-tined (*beaulieui*, *canestrinii* and *kabitae*); (10) dorsal shield with simple acicular setae (*elsae*, *epigynialis*, *kabitae*, *macrodorsalis* and *tonsilis*) or setae with a small knob at base (*beaulieui* and *canestrinii*); (11) internal malae free medially and densely fringed with very elongate hairs (*epigynialis* and *macrodorsalis*), in addition it possesses two groups of dense and very elongate hairs at basal part of each internal mala (*beaulieui* and *canestrinii*); or internal malae normal and lacking very elongate hairs (*elsae*, *kabitae* and *tonsilis*); (12) setae on epigynal shield: all setae located on margins (*beaulieui*, *canestrinii, elsae*, *epigynialis*, *kabitae and epigynialis* and *tonsilis*) or some of those well inside (*elsae*).

To resolve some of these problems, Nemati and Gwiazdowicz (2016) recently clarified the diagnosis of *Laelaspisella*, proposing a new definition considering the species which should be included in this genus. Based on this work (see Nemati and Gwiazdowicz, 2016) and in the mention of two important apomorphic attributes [spatulate and pilose setae *JV5* and *ZV5* and genu I with only two postero-dorsal setae (2 3/2 2/1 2)], only *Laelaspisella macrodorsalis* and *L. epigynialis* can be considered as members of this genus, excluding the other species mentioned above (Nemati and Gwiazdowicz 2016). On the other hand, for the above species that would require a great variety of character states in *Laelaspisella*, Nemati and Gwiazdowicz (2016) erected the genus *Pogonolaelaps* to accommodate *P. canestrinii* (Berlese) and described *P. beaulieui* Nemati & Gwiazdowicz; the appropriate genus for *L. kabitae* and *L. tonsilis* still requires further study.

Taking into account the morphological characters of *L. elsae* given by Joharchi *et al*. (2016), the variety of character states in *Laelaspisella* would become more complicated (some special characters of *L. elsae* were not mentioned above). Such changes in the definition of the genus resulted in several ambiguities in the diagnosis and scope of genus as cited above. In fact, due to the inappropriate genus assignment, its main traits are not consistent with the genus definition which are confirmed by our studies and observations on type series and other specimens of *L. elsae*. Here while we clarify the genus placement of this species, the morphological characters and the conflicts of the original description are reviewed and presented below. For this purpose, the definition of *Reticulolaelaps* is revised and presented.

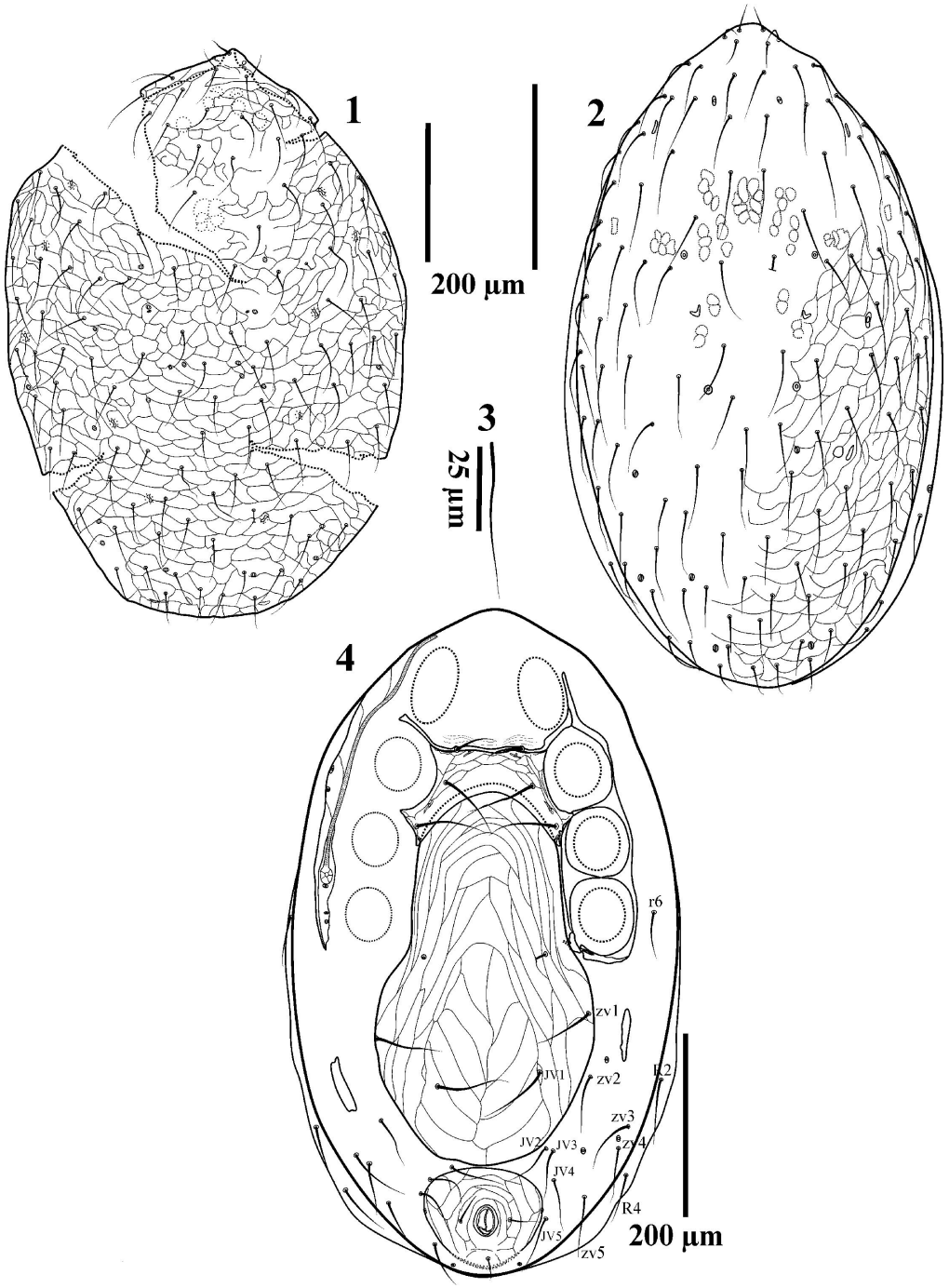
Redescription (female, n = 19)

Material examined

Nineteen females collected from Esfahan (as cited above).

Dorsal idiosoma – Dorsal shield length 515–573 (400–449), width 300–330 (280–333) (Figs. 1–2). Shield oval shaped with convex dorsum and nearly flat venter; shield well-sclerotized and with clear reticulation; with about 111–114 long delicate simple setae (Fig. 3), with unpaired and asymmetrical setae especially in opisthonotal region. The length of *j1*, *z1* 17–22 (13–15), *J5* 22–25 and *Z5* 19–24 are among the shortest setae. Some other setae *j2* 38–42, *j3–6* 41–51, *z2–6* 39–42, *r1–6* 40–51 and *s1–6* 50–56 shorter than the other nominated dorsal shield setae (48–58). Due to the hypertrichy of the dorsal shield (especially on opisthonotal part), recognition of individual setae based on the current standard dorsal setae system is not possible. Shield with ca. 18 pairs of pore-like structures; seven pairs with large slit-like appearance including one pair at the base of *z1* setae, others smaller, circular or ovoid (Fig. 1).

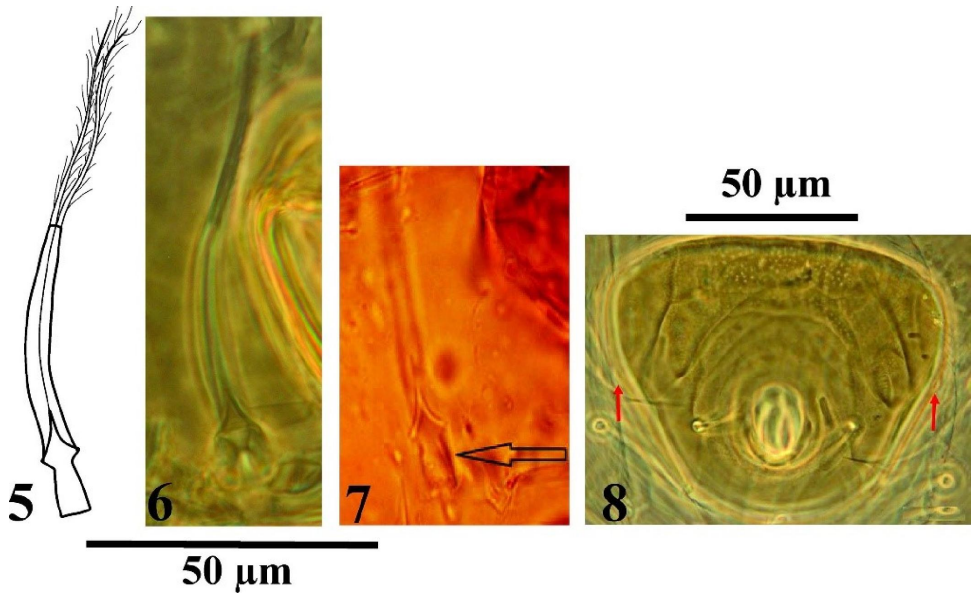
Ventral idiosoma (Fig. 4) – Tritosternum (Figs. 5–7) with 74–87 (base and lacinia) long, with a small arrow-like base (Fig. 7) 10–15 (12–13), paired pilose laciniae 64–72 (33–36): fused at their base for 30–35 (47–49% of their total length) and free for 34–37 (51–53% of their total length); pre-sternal plates fused with sternal shield, this area consists of some lineate reticulation. Sternal shield medially 35–37 (35–43) narrowest between coxae II 97–114 (99–100) widest between coxae II and III 171–185 (120–128), with convex anterior margin, posterior margin concave, some specimens with variation in posterior margin (Fig. 19), posterolateral margins extending to mid-level of coxae III; shield bearing three pairs of smooth pointed setae: *st1* 32–34 (27–32), *st2* 46–56 (35–40), *st3* 58–61 (40–43), distances between *st1-st1* 54–59, *st2-st2* 73–76, *st3-st3* 122–127, *st1-st2* 27–29, *st2-st3* 37–41 and three pairs of lyrifissures, the lyrifissures (*iv1*) between setae *st1* and the second (*iv2*) between *st2* and *st3* and closer to *st3*; the third one (*iv3)* located at posterolateral corners of sternal shield extensions (Figs. 4, 19). Surface with reticulate ornamentation in anterior and lateral margins, extending to *st2* level. Surface of sternal shield medially and posteriorly smooth. Metasternal setae *st4* absent.



Figures 1–4. *Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) – 1, 2. Dorsal idiosoma; 3. An example of dorsal shield seta; 4. Ventral idiosoma.

Endopodal plates II/III fused to lateral margins of sternal shield, endopodal plates III/IV angular, not elongate, narrow in anterior and posterior parts and wide in the middle, posterior tip not fused with suboval podal plate. Genitoventral shield broad, length 271–281 (258–267), length at level of *st5* 134–139, maximum width 193–198 (188–195), posterior edge rounded, extending near anterior margin of anal shield, surface with distinct polygonal ornamentation, bearing the genital setae *st5* 51–61 (50–55) and two additional pairs of setae on its surface: *ZV1* 54–61 and *JV1* 61–64 (50–62), paragenital pores present on podal plates adjacent to the genitoventral shield at level of *st5*. The reticulation and the placement of setae on its surface varies in different specimens as in Figures 20–24. Anal shield suboval and large 78–85 × 98–103 (64–73 × 82–88), wider than long, with distinct

gv3 at lateral margins at level of anterior margin of anal opening (Figs. 4, 8); anterior and posterior margins slightly rounded, surface with polygonal ornamentation, para-anal setae 22–24, longer than unpaired post-anal seta 14–16 [in original description of Joharchi *et al*. (2016) para-anal setae length cited as 12 and post-anal as 20]; cribrum relatively narrow (Fig. 4). Opisthogastric integument with seven pairs (*ZV2–4*, *JV2–5*) and lateral membrane between dorsal and ventral sides of idiosoma with three pairs of smooth setae (*r6*, *R2* and *R4*) with 41–51 long and four pairs of pores. Metapodal plates rode-like 36–44 × 7–9 (34–37 × 9–11). Podal plates posterior to coxae IV rod-like. Stigmata located at midlevel of coxae III-IV, peritremes extending anterior to coxae I. Peritrematal shields wide and reticulate, fused anteriorly with dorsal shield at distances between *z1-s1* setae (Fig. 9) and extending behind stigmata to well behind coxa IV; with three small pore-like structures behind stigma and two on peritrematal shield, at level of coxae II-III.



Figures 5–8. *Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) – 5, 6. Tritosternum; 7. Basal part of tritosternum; 8. Anal shield and *gv3*.

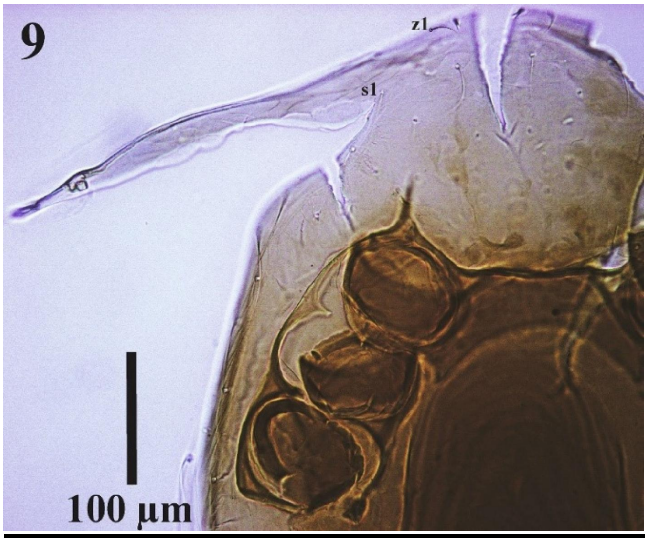
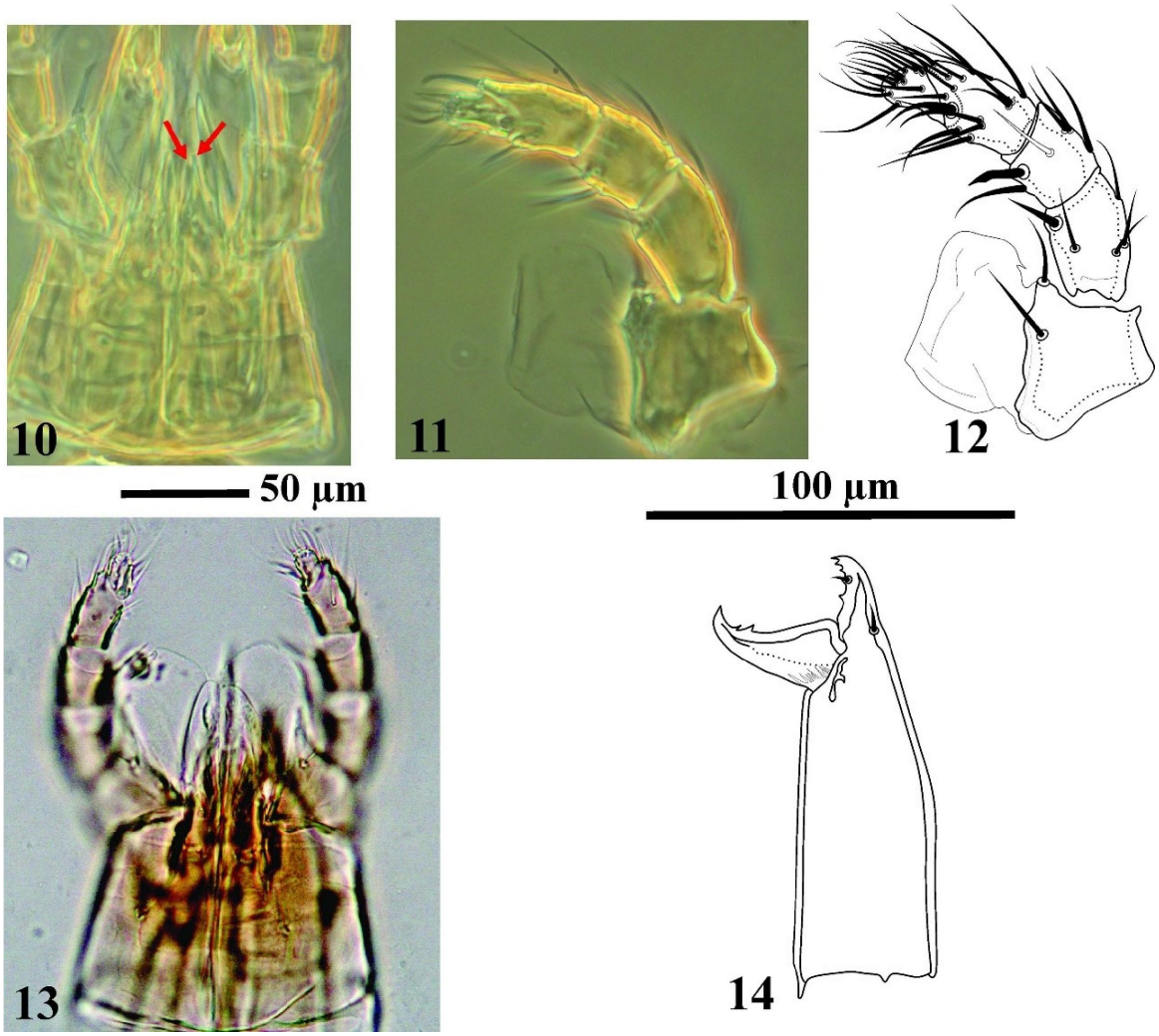


Figure 9. *Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) – Fusion of peritrematal and dorsal shields.

Gnathosoma (Figs. 10–14) – Hypostomal groove with four rows of denticles each with 2–4 small teeth. Corniculi sclerotized, moderately long, extending near midlevel of palp femur. Internal

malae complex, with two pairs of lobes, inner lobes narrow, with smooth edges, outer lobes longer, narrow, pointed (Fig. 10), similar to those in *R. faini* (Fig. 28); labrum elongate, pubescent, extending beyond corniculi. Two large membranous flaps located at anterior part of hypostome attached to the inner surface of palp trochanter (Figs. 11–12), consists of two different parts: inner part smaller adjacent to the corniculi and more condensed, outer part larger balloon-like (Fig. 13), somewhat extending beyond the tip of palp genu. Several specimens were dissected to determine the place of connection of membranous flaps to the gnathosoma. For this purpose, the palps from the basal part (trochanter), were excised from the gnathosoma with special care. This was done to diagnose the connective tissue of this member to the hypostome or palp. Costa (1968) pointed out the origin of membranous flaps slightly in front of the anterior hypostomal setae (*h1*). According to our previous observations, it seemed that the flaps were not connected to the anterior part of hypostome. By separating the palp, it was observed that this membranous flap is connected to the inner surface of the palp trochanter (Figs. 11, 12). Usually in the hypostomal region, when microslides are prepared and due to pressure, the membranous flaps part is torn and only the remains of this flap are seen in the form of strings.

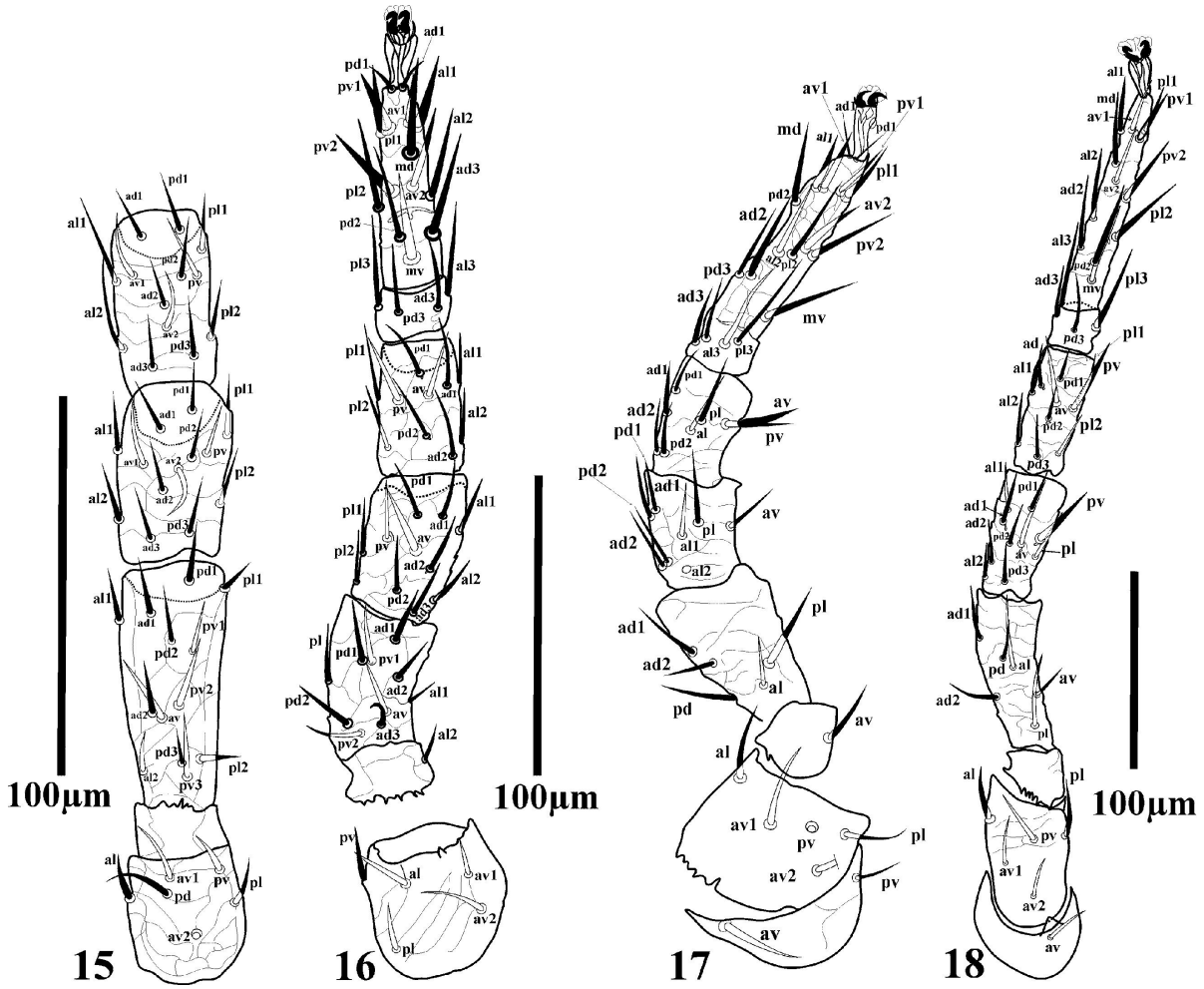


Figures 10–14. *Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) – 10. Internal malae; 11, 12. Palp and membranous flaps; 13. Hypostome with membranous flaps; 14. Chelicera.

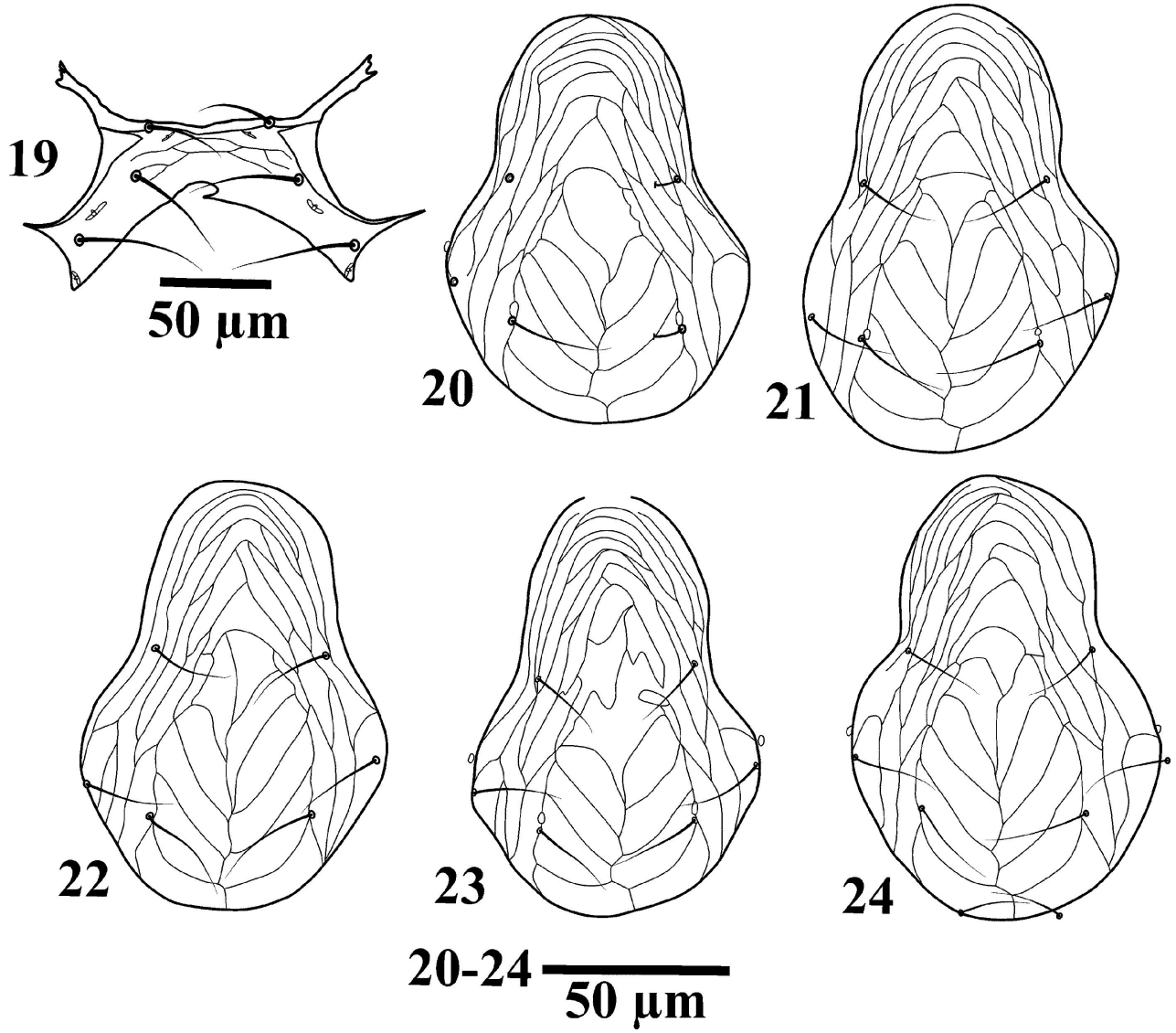
Hypostome with three hypostomal setae (*h1–3*): rostral seta *h1* 37–39 (42–45), *h2* 17–24 (28–30), *h3* 56–59 (67–70), palp coxal seta 24–29 (32–35). Palp chaetotaxy: trochanter 2, femur 5, genu

6, tibia 14, tarsus 15, all setae smooth and needle-like except seta *al* on palp femur long and slightly thicken, *al1* on palp genu short and arrow-like, *al2* longer and pointed; palp tarsal claw with two pointed tines of unequal length (Fig. 12). The lengths of palp segments are as follows: palp- trochanter 29–34, palp-femur 30–32, palp-genu 24–34, palp-tibia 25–32 and palp-tarsus 17–20. Epistome sub-triangular, anterior part membranous, posterior well sclerotized, posterior half with lineate ornamentation similar to *R. faini* (Fig. 29). Fixed digit 39–41 (40–41) of chelicera with four teeth including terminal hook (Fig. 14), second segment 76–85 pilus dentilis moderately robust, dorsal seta short, thick, prostrate, movable digit 35–37 (36–38) with two large teeth, arthrodial membrane with a rounded flap and a row of short filaments.

Legs (Figs. 15–18) – Legs short, well ornamented, legs II and III shorter 295–300, 283–295 (309–320, 302–310), I and IV longer 344–410, 449–464 (349–360, 431–447) (excluding pre-tarsus). Chaetotaxy normal for free-living Laelapidae: **Leg I** (Fig. 15): coxa 0 0/1 0/1 0, trochanter 1 0/2 1/1 1, femur 2 2/1 3/3 2, genu 2 3/2 3/1 2, tibia 2 3/2 3/1 2. **Leg II** (Fig. 16): coxa 0 0/1 0/1 0, trochanter 1 0/2 0/1 1, femur 2 3/1 2/2 1, genu 2 3/1 2/1 2, tibia 2 2/1 2/1 2. **Leg III** (Fig. 17): coxa 0 0/1 0/1 0, trochanter 1 0/2 0/1 1, femur 1 2/1 1/0 1, genu 2 2/1 2/0 1, tibia 1 2/1 2/1 1. **Leg IV** (Fig. 18): coxa 0 0/1 0/0 0, trochanter 1 0/2 0/1 1, femur 1 2/1 1/0 1, genu 2 2/1 3/1 1, tibia 2 1/1 3/1 2. All setae fine and needle-like. Tarsi I-IV with 18 setae 3 3/2 3/2 3 + mv, md. All pre-tarsi with a pair of claws and a long thin membranous ambulacrum.



Figures 15–18. *Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) – 15. Leg I (trochanter-tibia); 16. Leg II (trochanter-tarsus); 17. Leg III (coxa-tarsus); 18. Leg IV (coxa-tarsus).



Figures 19–24. *Reticulolaelaps elsae* (Joharchi, Babaeian & Jalalizand, 2016) – 19. Sternal shield with abnormality in posterior margin; 20–24. Genitiventral shield variations.

Discrepancies of *Reticulolaelaps elsae* with specimens examined

The main discrepancies between the original description and the specimens that we checked (including the holotype and paratypes) are: (1) Dorsal shield with ca. 18 pairs of pore-like structures; seven pairs with large slit-like appearance including one pair at the base of *z1* setae (shield with 12 pairs of pore-like structures, apparently including three pairs of gland pores and eight pairs of poroids in the original description and illustration); (2) Tritosternum 74–87 (base and lacinia) long, with a small arrow-like base 10–15 (12–13), paired pilose laciniae 64–72 (33–36): fused at their base for a length of 30–35 (47–49% of their total length) and free for 34–37 (51–53% of their total length) [tritosternum with paired pilose laciniae (33–36), columnar base (12–13 × 5–6 wide) in the original description and illustration]; (3) Sternal shield surface with reticulate ornamentation in anterior and lateral margins, extending to *st2* level, medially and posteriorly smooth (surface with distinct reticulate ornamentation in the original description and illustration); (4) Metasternal setae *st4* absent (Metasternal setae *st4* apparently absent in the original description); (5) Endopodal plates III/IV angular, not elongate, narrow in anterior and posterior parts and wide in the middle (endopodal plates III/IV elongate, narrow, curved in the original description); (6) Podal plates not enlarged, suboval

shaped (podal plate large and triangular in the original description but suboval in illustration); (7) With distinct *gv3* at lateral margins at level of anterior margin of anal opening (anal pores indistinct in the original description and illustration); (8) Para-anal setae 22–24 longer than unpaired post-anal setae 14–16 [para-anal seta (12) shorter than post-anal seta (20) in original description, but para-anal setae as long as or slightly longer than postanal seta in illustration]; (9) Opisthogastric integument with ten pairs of setae, seven pairs: *ZV2–4*, *JV2–5* on opisthogastric integument and lateral membrane between dorsal and ventral sides of idiosoma with three pairs of smooth setae (*r6*, *R2* and *R4*) with 41–51 long [opisthogastric integument with eight pairs of smooth setae (55–65) in the original description and illustration]; (10) Peritrematal shields wide and reticulate, fused anteriorly with dorsal shield at distances between *z1-s1* setae (not mentioned in original description); (11) Internal malae complex, with two pairs of lobes, inner lobes narrow, with smooth edges, outer lobes longer, narrow, pointed similar to situation which has been observed in *R. faini* (see Fig. 28) [Internal malae complex, with two pairs of lobes, inner lobes narrow and long, with smooth edges, outer lobes very short, narrow, branched]; (12) All palp setae smooth and needle-like except seta *al* on palp femur long and slightly thicken, *al1* on palp genu short and arrow-like, *al2* longer and pointed (all setae smooth and needle-like in original description and without illustration); (13) Palp tarsal claw with two pointed tines of unequal length (palp tarsal claw with two pointed tines of equal length in original description and without illustration); (14) Fixed digit of chelicera with four teeth (fixed digit of chelicera with two small pointed teeth in original description but with four teeth including terminal hook in illustration); (15) Cheliceral dorsal seta short, thick, prostrate (dorsal seta not detected in the original description and illustration); (16) Two large membranous flaps located at anterior part of hypostome attached to the inner surface of palp trochanter (not mentioned in original description and illustration).

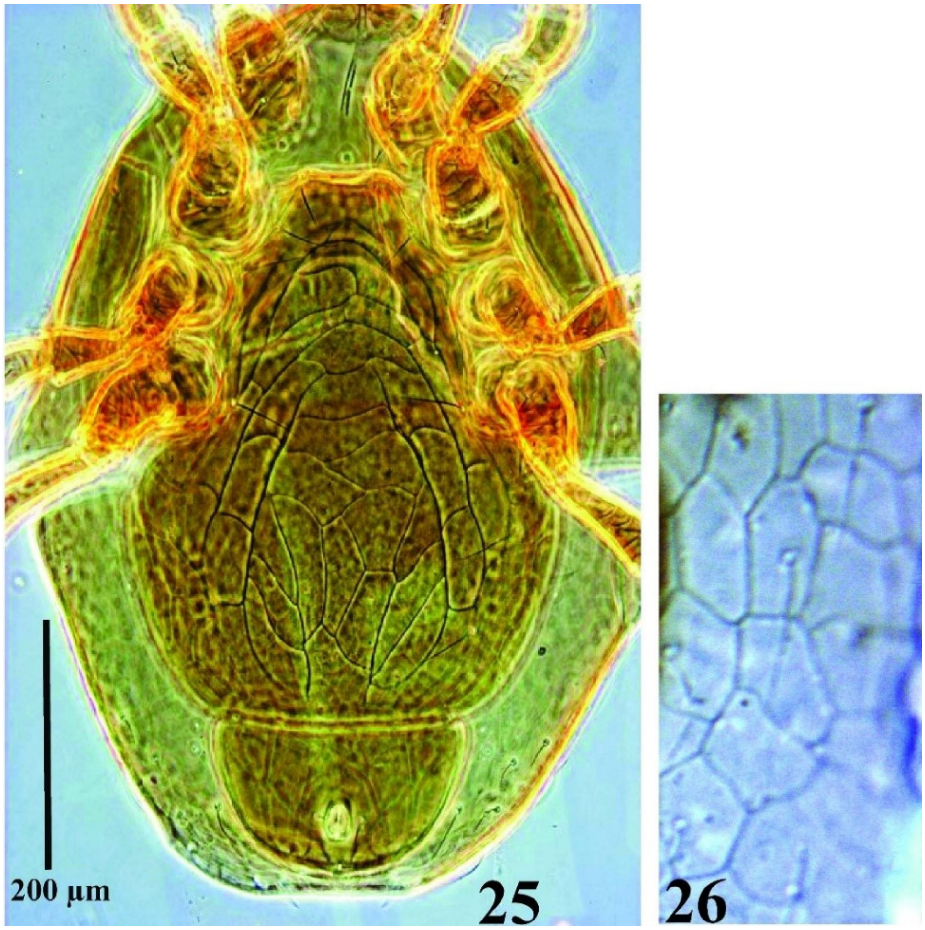
Notes on *Reticulolaelaps faini* Costa, 1968 (Fig. 25–29)

Material examined

Iran, 3 females, 1 male, Khuzestan province, Ghaletol (31° 37′ 55" N 49° 53′ 20" E, alt. 885 m), in soil, coll., A. Nemati, 2011; 2 females, 1 male, Izeh (31° 49′ 52" N 49° 52′ 9" E, alt 845 m) in soil, coll., A. Nemati, 2012; 3 females, Chaharmahal va Bakhtiari province (32° 19′ 39" N 50° 51′ 35" E, alt 2206 m), Lordegan (31˚ 30′ 30" N, 50˚49′ 39" E, H: 1594 m) in soil, coll. A. Nemati, 2012.

Female dorsal shield length 544–554 width 373–383 (n = 5). Shield oval shaped with convex dorsum and flat venter; shield well sclerotized and with strong reticulation (Fig. 26); with about 122–125 long, simple, delicate setae (the difference in the number of counted setae may be due to a counting mistake), with unpaired and asymmetrical setae, setae on shield uniform in length (podonotal 50 and opisthonotal 72–75) and thickness. Some caudal setae like *J5* and *Z5* curved and directed downward 10–20, shorter than the other dorsal setae 27–41. Shield with ca. 18 pairs of lyrifissures and pore-like structures. Tritosternum similar to that of *R. elsae* (Figs. 5–7); pre-sternal plates fused with anterior margin of sternal shield (Fig. 25). Sternal shield (length 49–59 midline) narrowest between coxae II at *st2-st2* 105–120, widest between coxae II and III (173–188), with convex anterior margin and concave posterior margin; shield bearing three pairs of smooth pointed setae: *st1* 36–44, *st2* 37–46, *st3* 50–58 and three pairs of lyrifissures, one pair of lyrifissures (*iv1*) outside setae *st1*, the next one (*iv2*) between *st2* and *st3* and the third one (*iv3*) located at the posterior corners of lateral extensions of sternal shield; surface with distinct reticulate ornamentation at anterior and lateral margins extending to the level of setae *st2*, median and posterior surface smooth. Metasternal setae *st4* absent; endopodal plates II/III fused to sternal shield, endopodal plates III/IV elongate and angulate connected to the large triangular podal plates with elongate sharp posterior tip extending near posterior level of post-stigmatal extension of peritrematal plate and separated from it and genitoventral shield (Fig. 27). Genitoventral shield broad, length 281–295, width at *st5* level 173–188, maximum width 298–312, posterior edge straight, abutting anal shield, surface with polygonal ornamentation, bearing the genital setae (*st5*) 48–55 and five additional pairs of setae (*JV1–3* and

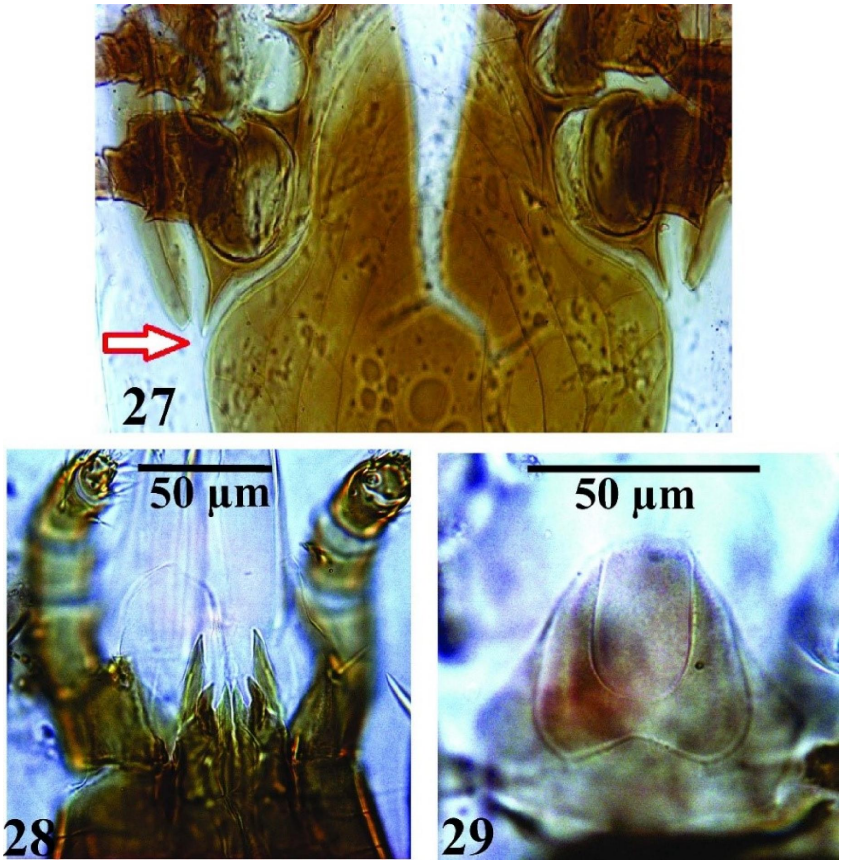
ZV1–2) with 47–56 long on its surface, paragenital pores not seen. Anal shield subtriangular and large, nearly twice as wide as long (88–97 long × 171–180 wide), posterior margin slightly rounded, anterior margin almost straight, surface with polygonal ornamentation, with a pair of slit-shaped lateral pores (*gv3*), para-anal setae 17–20, longer than unpaired post-anal setae 10–13. Opisthogastric integument with six pairs of smooth setae and four pairs of pores; metapodal plates fused with genitoventral shield. Stigmata located at a level near anterior part of coxa IV, peritremes extending anterior to coxae I. Peritrematal shields wide and reticulate, fused with dorsal shield at level of *s1* setae, extending behind stigmata to well behind coxa IV; with three small pore-like structures behind stigma and two on peritrematal shield, at level of coxae II-III.



Figures 25–26. *Reticulolaelaps faini* Costa, 1968 – 25. Ventral idiosoma; 26. Detail of dorsal shield reticulation.

Hypostomal groove with four rows of denticles each bearing 2–4 small teeth. Corniculi horn-like and sclerotized. Internal malae complex, with two pairs of lobes, inner lobes narrow, with smooth edges, outer lobes long, narrow, pointed (Fig. 28). Two large membranous flaps at the anterior part of hypostome, attached to the base of the palp trochanter (see related note under genus definition), rostral seta *h1* (38–41), *h2* (18–21), *h3* (48–51), palp-coxal seta (19–23). Palp chaetotaxy: trochanter 2, femur 5, genu 6, tibia 14, tarsus 15, all setae smooth and needle-like except seta *al* on palp femur long and slightly sword-like, *al1* on palp genu short and spine-like, *al2* longer and pointed; palp tarsal claw with two pointed tines of unequal length. Epistome sub-triangular, anterior part membranous, posterior half well sclerotized, with lineate ornamentation (Fig. 29). Fixed digit of chelicera with a terminal hook and three discernable teeth posteriorly, pilus dentilis moderately robust, dorsal seta

short, thick, prostrate, movable digit with two large teeth, arthrodial membrane with a rounded flap and a row of short filaments. The leg chaetotaxy follows that of Nemati *et al*. (2013).



Figures 27–29. *Reticulolaelaps faini* Costa, 1968 – 27. Situation of posterior part of poststigmatal extension of peritrematal shield, Podal and genitoventral shields; 28. Hypostome; 29. Epistome.

Notes on *R. costai* Joharchi & Babaeian, 2015

The information presented here is based on pictures of the holotype provided by Dr. Alireza Saboori, after his contact with the first author of this species (Dr. Omid Joharchi), because we did not find the type materials in JAZM and YIAU, and have not had the opportunity to look at the type specimens of *R. costai* Joharchi & Babaeian, 2015.

In accordance with the information obtained from the study of different species of *Reticulolaelaps,* and their comparison with the original description of *R. costai*, despite the full and detailed description, the following discrepancies in the following statements should be noted:

1. "tritosternum with paired pilose laciniae and columnar base". Based on the following picture of ventral idiosoma, it is obvious that the tritosternum characters are completely similar to those of other *Reticulolaelaps* species and not only the drawing but also measurements presented in the original description are incorrect.

2. The chaetotaxy of genu II in all other species (which have been checked in this study) is 2 3/1 2/1 2; while it was described as 2 3/1 2/1 1 in original description of *R. costai.* Precise checking will be needed to confirm this result.

3. The membranous flaps originated from inside surface of palp trochanter; while it was cited as the ventral hypostome in the original description of *R. costai*.

4. In some species now studied we observed at least 18 pairs of pore-like structures on the dorsal shield. By contrast, Joharchi and Babaeian (2015) stated that dorsal shield had six pairs of pore-like structures, apparently including three pairs of gland pores and three pairs of poroids; lyrifissures near

the base of *z1* large and slit-like, others smaller and ovoid. Most likely, the number of these components in the dorsal shield is more than this number.

5. Based on the original description: genitoventral shield bearing genital setae *st5* and five additional pairs of setae on its surface (*Jv1–2, Zv1–3*). We believe that the setae located on genitoventral shield are *JV1–3* and *ZV1–2*.

Accessing and checking the type materials are needed to better understand and studying the others characters.

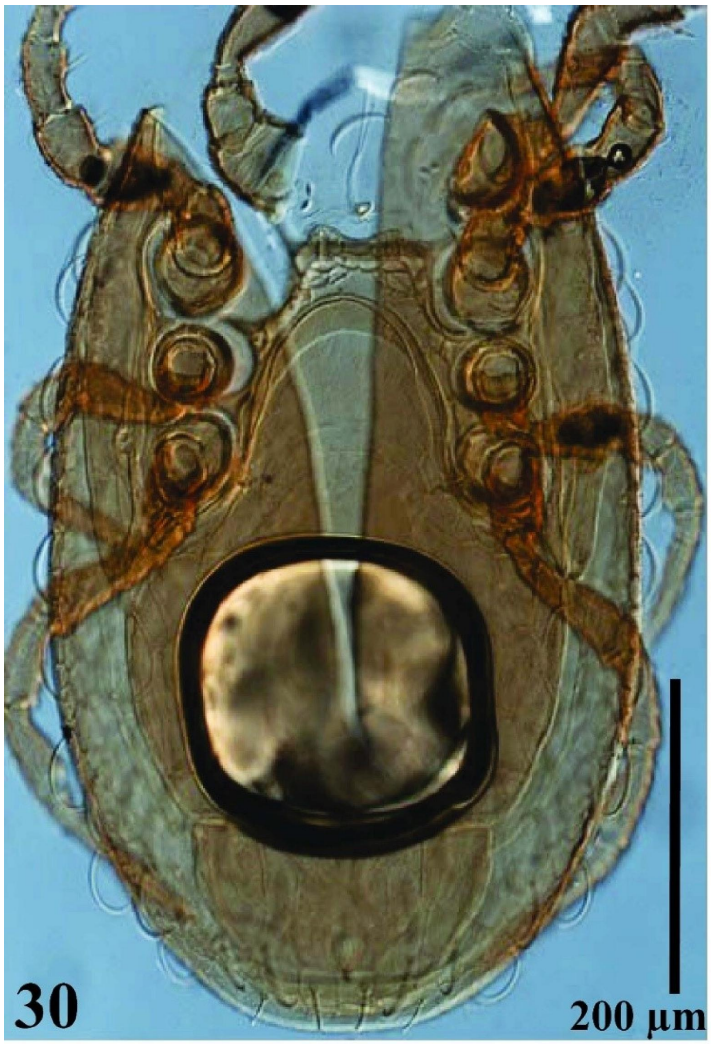


Figure 30. *Reticulolaelaps costai* Joharchi & Babaeian, 2015 (holotype) – Ventral idiosoma.

Genus *Pseudoparasitus* Oudemans, 1902

Pseudoparasitus Oudemans, 1902: 29. Type species *Laelaps meridionalis* G. & R. Canestrini, 1882, by original designation.
Hoplolaelaps Berlese, 1903, Zool. Anz. 27:14.
Laelapsoides Willmann, 1952, Verrof. Inst. Meersforsch. Bremerhaven 1: 150.
Austrogamasellus Domrow, 1957, Proc. Linn. Soc. N.S.W. 81: 204.

Definition

Dorsal shield covering whole dorsum of idiosoma and may be extended to the ventral surface laterally; idiosomal setae smooth and pointed; distinct presternal plates present; sternal shield well

sclerotized, with three pairs of setae (four pairs in *P. indicus* Bhattacharrya, 1977), and two pairs of poroids; genitoventral shield reticulate and large, expanded behind coxa IV, and extending to anal shield, at least two pairs of setae (*ZV1* and *JV1*) on the surface of the shield well inside the edges of it, without strong Λ-shaped lines; anal shield free; palp tarsal claw with three tines; epistome deeply denticulate in anterior margin; podal plate behind coxa IV usually large and variable in shape, not fused with peritrematal and genitoventral shields; chelicera of female chelate-dentate; genu and tibia I normally with three ventral setae, genu II with two ventral setae, genu IV with one ventral (*av*) seta. Internal malae complex, with three pairs of lobes; inner lobes narrow, with serrated edges; medial lobes slightly shorter than inner lobes, with strongly serrated edges; outer lobes long, narrow, pointed, with some serration at base of medial margin.

Note on *Reticulolaelaps lativentris* Karg, 1978

Pseudoparasitus lativentris (Karg). Joharchi and Babaeian (2015): 37.

Specimen examined

Hypoaspis (*Reticulolaelaps*) *lativentris*, male, Nr. 4045, Chel. Karg, 78, ZMB Kat. Nr. 50561, paratypus, Chile, Umgebung von La Union (Prov. Valdivia). Modrige Erde aus feuchtem Wald in tief. Tal. 26.10.1965.

Reticulolaelaps lativentris was described by Karg (1978) from Chile, near La Union, on the road to Valdivia, in muddy soil (Karg 1978; Moreira 2014). Although Nemati *et al*. (2013) and subsequently Joharchi and Babaeian (2015) removed this species from this genus and transferred it to *Pseudoparasitus* Oudemans, 1902, we now consider it as a species of *Reticulolaelaps*. It is difficult to ignore that some characters (dorsal hypertrichous condition, male with separate anal shield and the presence of four rows of deutosternal denticles) of this species are not completely consistent with the previous definition of *Reticulolaelaps* as proposed by Nemati *et al*. (2013) and Joharchi and Babaeian (2015), but this is almost consistent with the definition of *Reticulolaelaps* given in this article.

Joharchi and Babaeian (2015) also stated that *Reticulolaelaps lativentris* does not fit easily into the genus *Pseudoparasitus*, because the epistome has smooth anterior edge, palp tarsal claw has two pointed tines (three-tined, posterior tine small in almost all *Pseudoparasitus*) and metasternal setae *st4* apparently absent (always present in *Pseudoparasitus*). They excluded this species of *Reticulolaelaps* because it lacks the hypostomal flap characteristic of *Reticulolaelaps* species, the chaetotaxy of genu IV (2 2/1 3/0 1) is normal for the genus, its hypostomal groove has six rows of denticles, and the male has a holoventral shield.

We have had the opportunity to study the specimen: *Hypoaspis* (*Reticulolaelaps*) *lativentris*, male, as cited above. We did not find the holotype in the Karg collection in the Berlin Museum. This species with reticulate holodorsal shield is similar to other *Reticulolaelaps* species as shown in Figures 1, 2, 26. The tritosternum has a small basal part and laciniae fused together and half as long (laciniae are free and pilose in *Pseudoparasitus* species). Female sternal shield concave in posterior margin (almost straight in all *Pseudoparasitus*) bears *iv1–3* (with *iv1–2* in *Pseudoparasitus*). Metasternal setae *st4* absent (present in all *Pseudoparasitus*); the left and right endopodals at anterior level of coxae II are connected by a sclerotized rod like bridge almost fused with anterior margin of sternal shield (Figs. 4, 9, 31) (absent in *Pseudoparasitus*). Genitoventral shield large, expanded posterior to coxae IV, extending near the anal shield (genitoventral shield in all species of this genus except *R. elsae*, more expanded laterally than *Pseudoparasitus*). Epistome anterior margin smooth (deeply denticulated in *Pseudoparasitus*). Internal malae smaller than corniculi but similar in shape and with two smooth hornlike lobs (see the diagnosis of *Pseudoparasitus*). All the sclerotized parts of the body including legs are well ornamented throughout (legs of *Pseudoparasitus* lack such character). With two tined palp tarsal claw (three tined in *Pseudoparasitus*). Male with holoventral shield (see the note below). Genu IV with ten setae (with *av* and *pv*) (Fig. 32) (with nine setae, *av*

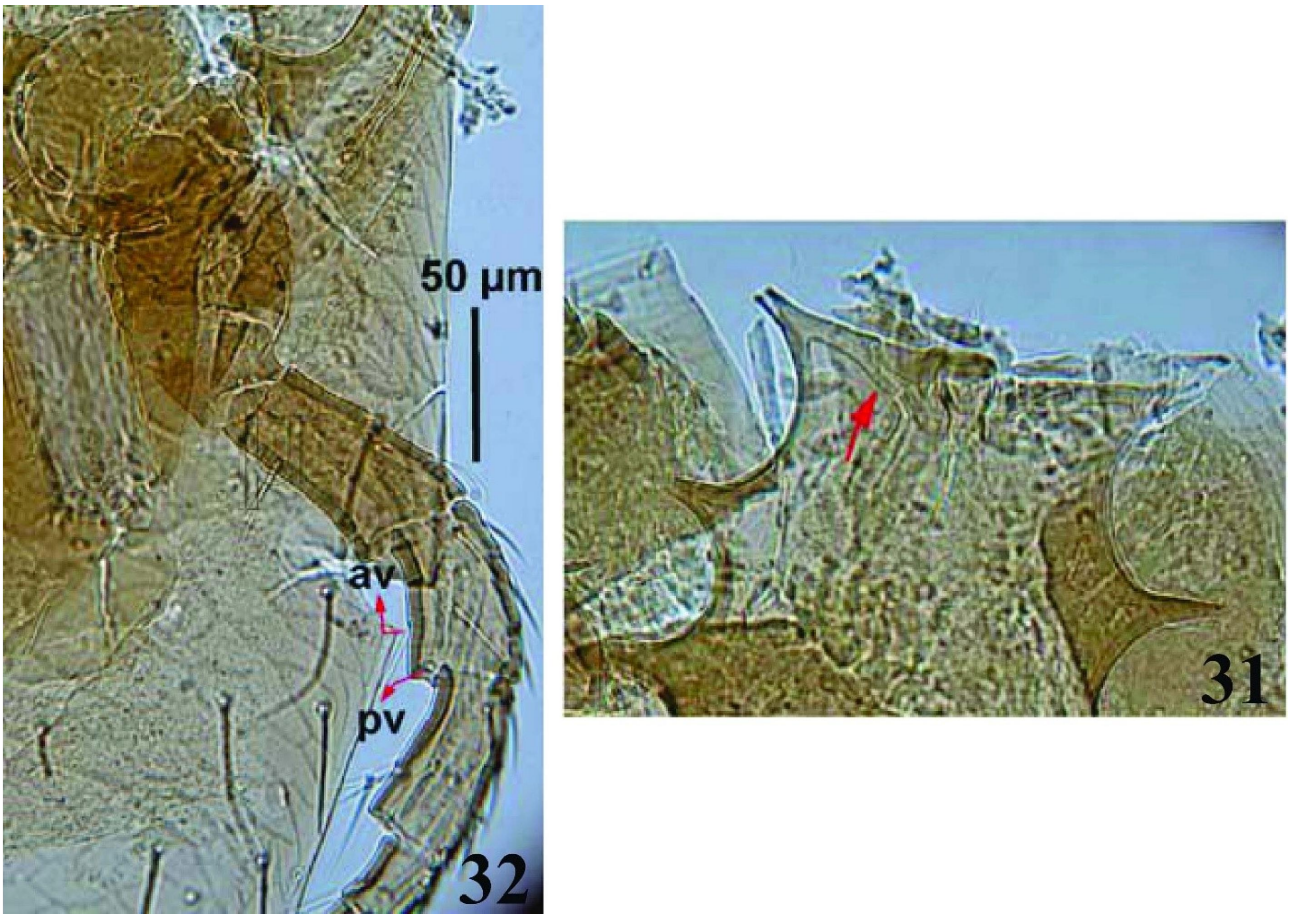
absent, in *Pseudoparasitus*). The remnant of membranous flaps could be seen at anterior side of hypostome in dissected gnathosoma in above mentioned microslide (*Pseudoparasitus* lack such flaps). Consequently, according to the above explanation it transpires that this species has the most important *Reticulolaelaps* genus characters and we put it in its original genus.

Note

In some genera of Laelapidae, male specimens have two conditions of ventral shield fusion. Some species: *Cosmolaelaps rectangularis* Sheals (based on Costa 1968), *Androlaelaps* [*A. cenrocarpus* (Berlese), *A. hirsti* (Keegan), *A. longipes* (Bregetova) and *A. tauffliebi* Till have a male with a separate anal shield. This condition can also be observed in *R. lativentris* male.

The existence of a hypertrichous condition can be seen in some species of some laelapid genera, while the other species of the same genera have normal condition. Some species of *Androlaelaps* have hypertrichous condition in dorsal, ventral or both dorsal and ventral sides, while most species have normal condition of chaetotaxy in ventral and dorsal idiosoma. *Androlaelaps taterae* (Zumpt and Patterson) and *A. walkerae* Till have hypertrichous condition both in dorsal and ventral sides, *A. theseus* Zumpt has this condition in ventral idiosoma.

In order to clarify the above statement, the definition of *Pseudoparasitus* genus was presented above.



Figures 31–32. *Reticulolaelaps lativentris* Krag, 1978 – 31. Endopodals II-III connection; 32. Setae *av* and *pv* of genu IV.

Note on *Reticulolaelaps jilinensis* (Ma, 2004) comb. nov.

Pseudoparasitus jilinensis Ma, 2004: 18.

Pseudoparasitus jilinensis.— Ren & Guo, 2008: 329.

This species was described from forest soil in Changchun city, Jilin Province, China (Ma, 2004). It possesses a dorsal shield covering the whole dorsum and bearing 35 pairs of smooth setae, with presternal shields, sternal shield with anterior surface reticulated, concave posteriorly, bearing three pairs of setae and *iv1–3*. Setae *St4* absent. Genitoventral shield expanded posterior to coxae IV bearing five pairs of setae including *st5*. Podal plate posterior to coxa IV enlarge, triangular with sharp posterior tip. Peritreme long with wide peritrematal shield free posteriorly. Epistome smooth or with irregular teeth anteriorly. The characters of corniculi and internal malae similar to species of *Reticulolaelaps*. In the original description there was no reference to membranous flaps. According to the above explanation, until precise checking of the type materials, we consider this species provisionally in *Reticulolaelaps* and it is not included in the key.

Key to the world species of *Reticulolaelaps* (females)

1. Genitoventral shield with 3–4 pairs of setae 2
– Genitoventral shield with 6 pairs of setae 3
2. Genitoventral shield with 3 pairs of setae, podal plates crescent shape and separated from genitoventral shield ..... ***R. elsae*** (Joharchi *et al*., 2016)
– Genitoventral shield with 4 pairs of setae, podal plates large triangular and fused with genitoventral shield ..... ***R. lativentris*** Karg, 1978
3. Dorsal shield setae falciform and thick ..... ***R. costai*** Joharchi & Babaeian, 2015
– Dorsal shield setae acicular and delicate 4
4. First pair of sternal pores (*iv1*) are outside setae *st1*; dorsal shield with 122–125 setae, most of them don't reach to the base of next setae; anal shield without notch in lateral sides ..... ***R. faini*** Costa, 1968
– First pair of sternal pores (*iv1*) are between setae *st1*; dorsal shield with 116 relatively long setae, most of them reach to the base of next setae, anal shield with notch in the lateral sides ..... ***R. hallidayi*** Joharchi, Nemati & Babaeian, 2013

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مروری بر جنس *Reticulolaelaps* Costa و بازتوصیف *R. elsae* (Joharchi, Babaeian & Jalalizand) comb. nov.

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چکیده

مشاهدات دقیق در این پژوهش روی گونهٔ *Laelaspisella elsae* Joharchi, Babaeian & Jalalizand نشان داد که جنس مربوطه به درستی شناسایی نشده است. در این مطالعه جنس مناسب مشخص شد، این گونه به جنس *Reticulolaelaps* Costa منتقل و با در نظر گرفتن اختلافات مهم آن با توصیف اصلی، بازتوصیف شد. تعریف جدید و صفات افتراقی جنس *Reticulolaelaps* و کلیدی برای تفکیک گونه‌های شناخته شده این جنس ارایه شده است. اطلاعات جدید در مورد ویژگی‌های ریخت‌شناسی کنهٔ مادهٔ *Reticulolaelaps faini* Costa, 1968 بر اساس نمونه‌های جمع‌آوری شده از خاک استان‌های خوزستان، و چهارمحال و بختیاری ارایه شده است. گونه‌های *Pseudoparasitus lativentris* (Karg) و *Pseudoparasitus jilinensis* Ma به جنس *Reticulolaelaps* منتقل شدند. تعریف جدیدی از جنس *Pseudoparasitis* بیان شده است.

واژگان کلیدی: تعریف جدید؛ *Laelaspisella*؛ بازتوصیف؛ *Pseudoparasitus*؛ ایران.

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