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Article

First record of larva of the water mite *Hydrachna skorikowi* Piersig (Acari, Hydrachnidia, Hydrachnidae) from Iran

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ABSTRACT
Larvae of water mite *Hydrachna skorikowi* Piersig, 1900 (Acari, Hydrachnidae) were collected on water boatmen species *Corixa punctata* (Illiger, 1807) and *Sigara* sp. (Corixidae) from, Guilan provine, Iran captured by light trap. The redescription of the larva was made based on specimens collected from Guilan province, northern Iran. This is the first record of the larva of *H. skorikowi* from Iran.

KEY WORDS: *Corixa punctata*; parasite; redescription; *Sigara* sp.; water boatmen.

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INTRODUCTION

Larvae of water mites of the genus *Hydrachna*, *Eylais* and *Limnochares* are ectoparasites on aquatic Hemiptera and aquatic Coleoptera (Davids 1972; Smith 1977, 1987; Wainstein 1980; Reilly and McCarthy 1993; Biesiadka and Cichocka 1994; Cichocka 1995; Zawal 2002, 2003; Sánchez *et al*. 2015; Céspedes *et al*. 2019).

Parasitizing larvae of *H. skorikowi* were reported on Corixidae in previous studies (Davids 1972; Smith 1977, 1987; Wainstein 1980, Stevens and Greven 1994; Sánchez *et al*. 2015; Céspedes *et al*. 2019). *Hydrachna skorikowi* lives in standing waters. Its complex life cycle includes a parasitic larval stage, an inactive post-larval resting stage, a free-swimming deutonymph, a second inactive resting stage and the free-swimming adult. The most important hosts are the water boatmen (Hemiptera: Corixidae). Parasitic larvae of *H. skorikowi* feed on haemolymph, deutonymphs and adults feed on eggs of water boatmen (Stevens and Greven 1994, 1999).

So far some records of water mites have been reported from Iran and no comprehensive study has been done yet on larvae of water mites. Arjomandi *et al*. (2019) reported a new record of a parasitising species of *Hydrachna* (Acari, Hydrachnidia) on water beetles *Eretesgriseus* and adult stage of *H. skorikowi* has been recorded from Isfahan province (Pešić *et al*. 2004). Only six species of the genus *Hydrachna* [*H. cruenta* (Müller), *H. globosa lacerata* Lundblad, *H. sepasgozariani* Bader, *H. sistanica* Pešić, Smit & Saboori, *H. skorikowi* Piersig, and *H.* cf. *vaillanti* Viets] were previously known from Iran (Sepasgosarian 1999; Pešić *et al*. 2004, 2012, 2014; Pešić and Saboori

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2007). This study contributes to larval morphology of *H. skorikowi* based on specimens collected from Guilan province, northern Iran and its parasitization on *Corixa punctata* (Illiger, 1807) and *Sigara* sp. (Corixidae) from Iran.

MATERIALS AND METHODS

Parasitized specimens of *Corixa punctata* and *Sigara* sp. were collected by light traps installed in campus of University of Guilan (37° 11' 37.02" N, 49° 38' 27.49" E) near to a water stream and rice farms (Fig. 1). Specimens were fixed and preserved in 70% ethyl alcohol solution after separation from other specimens collected by light trap. Mites cleared in Nesbitt's fluid and then mounted on microscope slides in Hoyer's medium. Bugs species were identified according to Linnavuori and Hosseini (2000) and mite larvae according to Wainstein (1980). Photographs of slide mounted larvae of water mites were taken using a stereomicroscope and phase contrast microscope (HP-41; Korea) equipped with a Canon camera (EOS Kiss X5; Japan). The figures were drawn using Adobe illustrator CC 21.0.0. Measurements are given in micrometers (μm); each measurement corresponds to the average followed (in parentheses) by the respective ranges. The examined materials were deposited in the Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Sciences, University of Guilan, Rasht, Iran.

Figure 1. Light traps installed in sampling site (campus of University of Guilan, Rasht, Iran).

Hydrachna skorikowi Piersig, 1900

Hydrachna schneideri skorikowi Piersig, 1900: 483.
Hydrachna skorikowi integra Viets, 1930: 224.
Hydrachna skorikowi Davids *et al*., 2005: 50.

LARVA

Diagnosis

Hypostomal sucker discoid; palpal tibiotarsus with five different sized spines; first coxal plate wider then long; third coxal plate with short fusiform setae; palpal tibiotarsus with two subequal setae.

Redescription

Dorsum (Figs. 2B, 3) (n = 5) – The total body length 372 (360–380), the width 154 (143–170). Dorsal shield is very large, covered whole idiosoma, with the integument pointed. The dorsal shield length 228 (220–238), the width 154 (143–170). The anterior margin is straight with rounded corners. There are two pairs of eyes in the frontal part of the dorsal shield. Dorsal shield with 7 pairs of setae. The first two predorsal pairs of bristles are situated obliquely behind each other on the foremost part of the dorsal plate, those of the third pair lateral of the second pair of eyes and those of the fourth pair are in line with the three pairs of postdorsal setae along the lateral margins of the dorsal plate.

Venter (Figs. 2A, 4) – There are three pairs of coxal plates, length of them from median line is: E1, 35 (25–40); E2, 32 (28–37); E3, 72 (65–77); the maximum widths are 48 (45–50), 58 (53–62) and 56 (52–60) respectively. Coxal plate 1 with two setae, length Eb1 50 (40–62) and Eb2 48 (40–50; coxal plate 2 without setae and coxal plate 3 with one specific cone shape seta that inserted before the middle of plate, length 18 (15–20), this peculiar shape seta unknown in other species of this genus. The third pair of coxal plate is surrounded, for the greater part, by a distinct suture. Between the diverging third coxal plates is a diamond-shaped sclerite, containing the anal pore. The skin between the gnathosoma and the first coxal plates contains a number of transverse striae.

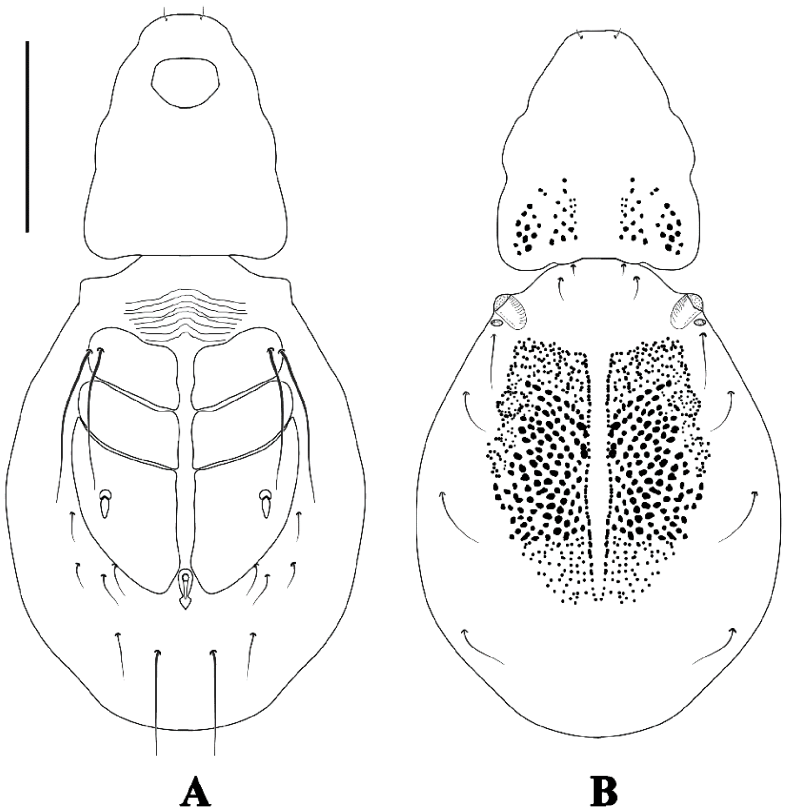

Figure 2. Larva of *Hydrachna skorikowi* – A. Ventral view of body; B. Dorsal view of body. Scale bar: 100 µm.

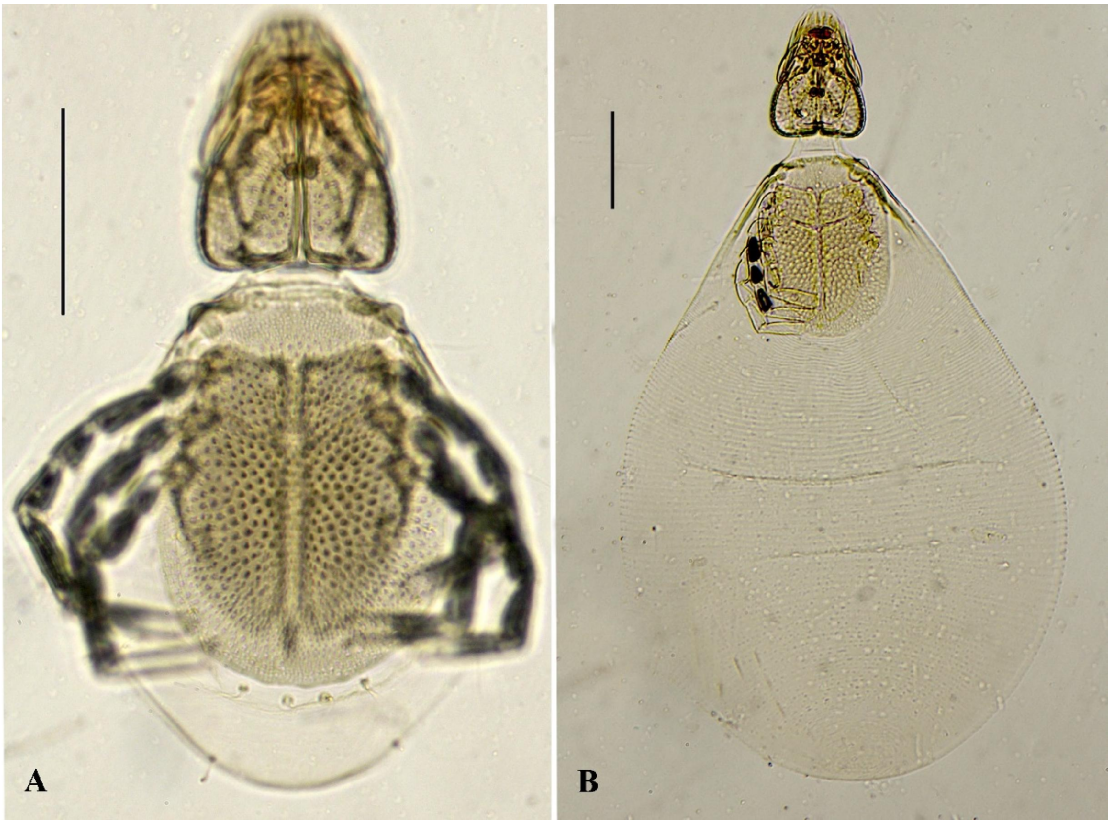

Figure 3. Larva of *Hydrachna skorikowi* (mounted specimens) – A. Dorsal habitus of newly emerged larva; B. Dorsal habitus of parasitizing larvae. Scale bars: 100 µm.

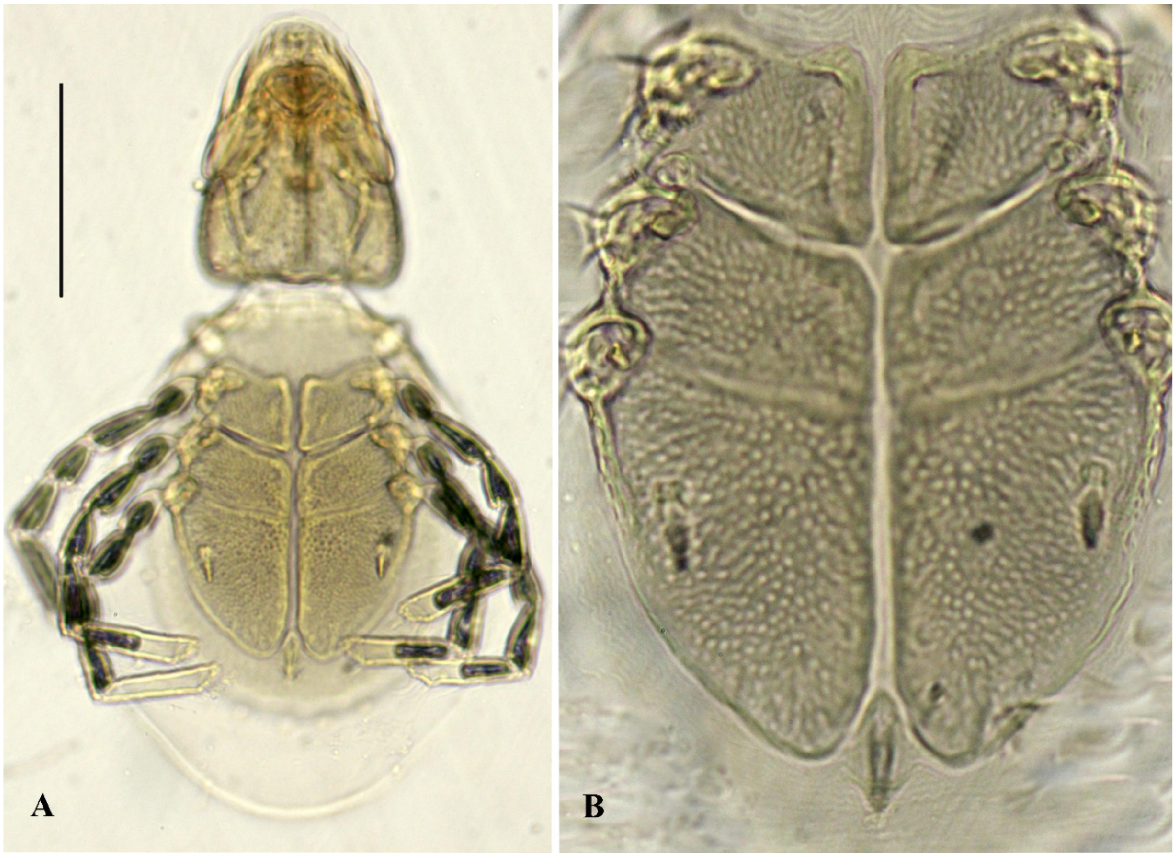

Figure 4. Larva of *Hydrachna skorikowi* (mounted specimens) – A. Ventral view of body; B. Ventral view of coxal plates. Scale bar: 100 µm for A, 40 µm for B.

Gnathosoma (Fig. 5) – The gnathosoma with 143 (135–155) long in middle line and 100 (95–103) wide in posterior margin, gnathosoma with approximately 1/3 of the total body length. Hypostomal sucker discoid, skin space between gnathosoma and first coxal plates with striation.

Figure 5. Larva of *Hydrachna skorikowi* (mounted specimens) – A. Ventral view of gnathosoma; B. Dorsal view of gnathosoma. Scale bar: 50 µm for A, 40 µm for B.

Chelicerae (Fig. 6A) – Chelicera consisting of the basal segment and a blade-like fix digit with 3 small teeth near the tips. Length of chelicerae 48 (45–52).

Pedipalps (Fig. 6B) – Palp with 79 (73–80); lateral length and 73 (68–77); medial length. Length of pedipalpal segments: femur 35 (33–38); genu 17 (13–20); tibiotarsus 28 (25–30). Tibiotarsus with five unequal claws, one longer 22 (18–25) and four shorter and bent 15.

Legs (Fig. 7) – The legs bear bristles and swimming hairs and terminate in a sickle-shaped claw. Legs with five segments (excluding coxal plates). Length of the legs: I, 170 (168–175); II, 167 (159–180); III, 169 (160–180). The length of leg segments, trochanter, femur, genu, tibia and tarsus for legs I-III respectively: I, 24, 32, 26, 31, 57; II, 25, 29, 25, 33, 56; III, 25, 28, 23, 35, 59.

Material examined

Twelve larvae of *Hydrachna skorikowi* were separated from legs of two water boatmen species *Corixa punctata* (Illiger, 1807) and *Sigara* sp. (Corixidae) (Fig. 8) that collected from light traps installed in campus of University of Guilan (37° 11' 37.02" N, 49° 38' 27.49" E, altitude 29 m a.s.l.) in Rasht, Guilan Province, Iran; July 25, 2004; May 14, 2019; May 17, 2019; coll. Jalil Hajizadeh and Reza Hosseini.

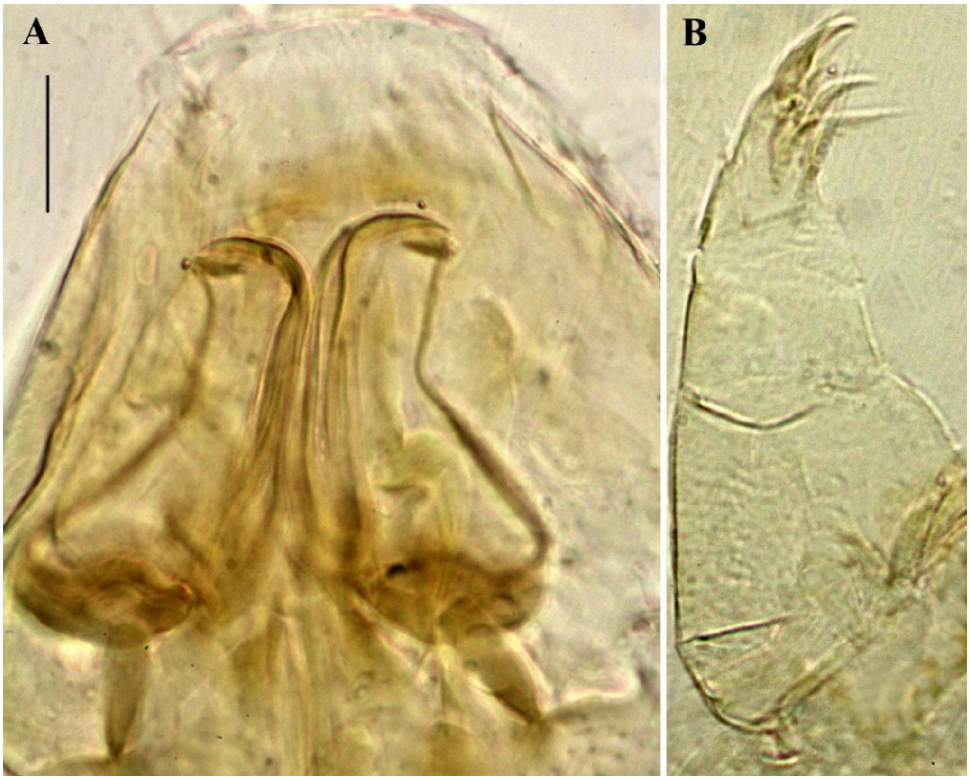

Figure 6. Larva of *Hydrachna skorikowi* (mounted specimens) – A. Chelicerae; B. Pedipalp. Scale bar: 15 µm for A, 13 for B.

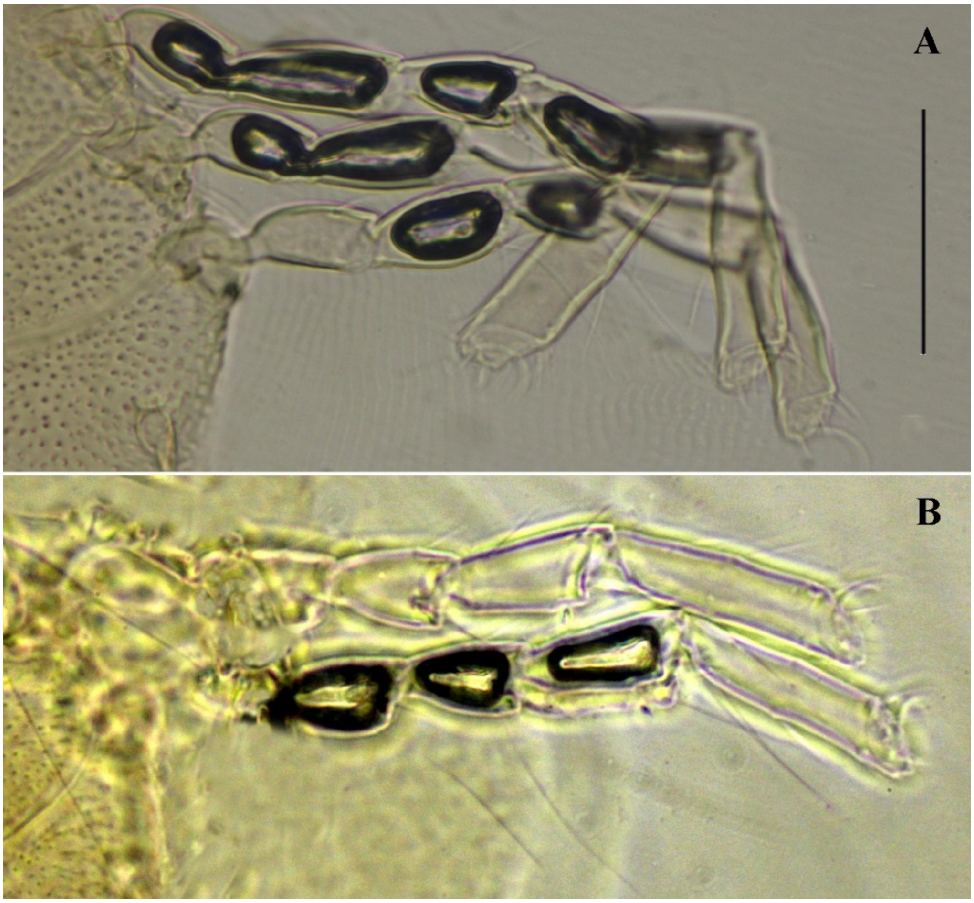

Figure 7. Larva of *Hydrachna skorikowi* (mounted specimens) – A. Legs I-III; B. Legs II-III. Scale bar: 50 µm for A and B.

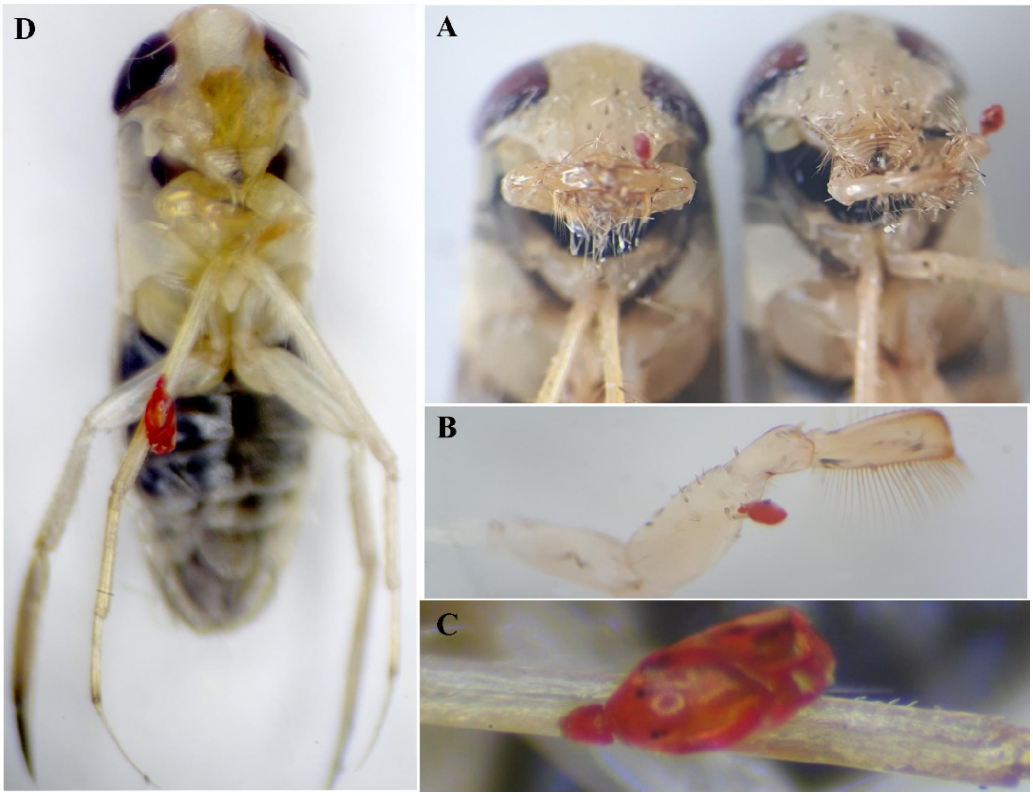

Figure 8. *Corixa punctata* and *Sigara* sp. infected with larvae of *Hydrachna skorikowi* – A & B. Infected fore legs of *Corixa punctata*; C & D. Infected middle leg of *Sigara* sp.

Table 1. Comparison between measurements (in µm) of larvae of *Hydrachna skorikowi* Piersig from Davis (1972) and current study.

Character	Davis (1973)	This study
Total body length	380 (365–385)	372 (360–380)
Body width	165 (155– 170)	154 (143–170).
Dorsal shield length	220	228 (220–238)
Dorsal shield width	160	154 (143–170)
Length of coxal plate I	40–42	35 (25–40)
Length of coxal plate II	28–31	32 (28–37)
Length of coxal plate III	80–84	72 (65–77)
Width of coxal plate I	51	48 (45–50)
Width of coxal plate II	63	58 (53–62)
Width of coxal plate III	68	56 (52–60)
Length of cone shape seta of coxal plate 3	21–23	18 (15–20)
Length of gnathosoma	150–160	143 (135–155)
Palp lateral length	67	79 (73–80)
Palp medial length	46	73 (68–77)
Length of legs I	174	170 (168–175)
Length of legs II	174	167 (159–180)
Length of legs III	181	169 (160–180)
Length of leg I segments (Trochanter to tarsus)	23, 35, 27, 35, 54	24, 32, 26, 31, 57
Length of leg II segments (Trochanter to tarsus)	25, 31, 25, 33, 60	25, 29, 25, 33, 56
Length of leg III segments (Trochanter to tarsus)	27, 33, 25, 38, 58	25, 28, 23, 35, 59

Remarks

Description of the *Hydrachna skorikowi* specimens from the Netherlands (Davis 1972) indicates similarities and some difference between material examined in the current study and Davis'

measurements (Table 1). Based on our three years' collection information from light traps in Guilan province, Iran, infection of water boatmen (Corixidae) specimens by larvae of *H. skorikowi* is started in May. In middle of May and July maximum infection is observed. The infection of bugs continues to September. Unfortunately, we did not continue sampling in the fall season, because for seasonal rainfall in Guilan province. Maximum intensity projection in parasitizing larvae were 720 (600–870) μm (Fig. 3B). The larvae of H. *skorikowi* were found on the legs I-III infected water boatmen (Fig. 8).

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نخستین گزارش از لارو کنهٔ آبزی *Hydrachna skorikowi* Piersig (Acari, Hydrachnidia, Hydrachnidae) از ایران

جلیل حاجی‌زاده* و رضا حسینی

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چکیده

لارو کنهٔ آبزی *Hydrachna skorikowi* Piersig, 1900 (Acari, Hydrachnidae) از روی دو گونه از سن‌های قایقران آب (Corixidae) به نام‌های *Corixa punctata* (Illiger, 1807) و *Sigara* sp. با تله نوری از استان گیلان، ایران جمع‌آوری شد. بازتوصیف لارو این کنه بر اساس نمونه‌های جمع‌آوری شده از استان گیلان، شمال ایران انجام شده است. این نخستین گزارش از لارو کنهٔ آبزی *H. skorikowi* از ایران است.

واژگان کلیدی: *Corixa punctata*؛ انگل؛ بازتوصیف؛ *Sigara* sp.؛ سن‌های قایقران آب.

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