Larval morphology of *Piona stjoerdalensis* (Thor, 1897) (Acari, Hydrachnidia: Pionidae)

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The larva of *Piona stjoerdalensis* Thor, 1897) was described by Wainstein (1980). Stryjecki *et al.* (2015) have presented a photo of the ventral view of the larva *P. stjoerdalensis* which strongly differs from Wainstein's description. The description of the larva *P. stjoerdalensis* are incomplete, complicating the identification of species. The aim of the paper is to study the morphology of larva *P. stjoerdalensis* in detail and compare it with known larvae of the “*coccinea*” group.

Material was collected by the author in stagnant waters of the European part of Russia. To obtain larvae, water mites were maintained in laboratory (room temperature, natural day-night conditions). Eggs and larvae obtained from females kept individually in glass or transparent plastic vessels of 10–15 mm diameter, and a height of 15 mm.


Furthermore, the following abbreviations are used: *P*–1–5, pedipalp segments (trochanter, femur, genu, tibia and tarsus); *I*–Leg–1–5, first leg, segments 1–5 (trochanter, femur, genu, tibia and tarsus) i.e. *III*– Leg–3 = genu of third leg; *C1* – coxal seta located medially on coxa I, *C2* – coxal seta located posterolaterally on coxa I, *C3* – coxal seta located posterolaterally on coxa II, *C4* – coxal seta located anteromedially on coxa III; *s* – solenidion, *ac* – acanthoid seta; *D* – diameter, *H* – height, *L* – length, *W* – width; *n* – number of specimens measured; all measurements are given in micrometers (μm).

**Family Pionidae Thor, 1900**

**Genus *Piona* Koch, 1842**

*Piona stjoerdalensis* (Thor, 1897) (Figs 1–12)

**Material examined.** Adult mites are collected by author in the Samara and Yaroslavl Provinces of Russia. Larvae of *Piona stjoerdalensis* were reared from four females: two females and 22 larvae from Samara Province, two females and 26 larvae from Yaroslavl Province. The duration of the embryonic period was 11–14 days.
**Diagnosis. Larva:** Dorsal plate moderately in size, L 270-315 μm, L/W ratio 1.6–1.7; excretory pore plate triangular with acute anterior angle and smooth surface, L/W ratio 1.0–1.05; II-Leg-4 with 11 setae, II-Leg-4 proximal solenidion longer than distal one; III-Leg-2 with single thickened distal seta, lateral claws and empodial claw in all legs subequal in length.

**Redescription.** Idiosoma flat, dorsal plate in unengorged larvae elongate (L/W ratio 1.7-1.9), covering almost the whole dorsum (Fig. 1), with slightly convex lateral margins, its anterior margin straight or slightly convex, posterior margin rounded; setae Fch longer than Vi, trichobothria Fp and Oi relatively short and subequal. Setae Oe, Hi, He, Sci, Sce, Li, Li and Si situated in soft membrane, Oe longest, Si shortest; Hi, He, Sci, Sce and Le moderately in length.

Coxal plates (Fig. 2) moderately large and elongate, first plates with short pointed apodemes directed laterally, plates II-III with a rudimentary apodeme on each side. Setae Ci relatively short reaching or slightly extending beyond bases of C4; the latter setae relatively thick and slightly longer than C2 and C3, but not reaching to posterior margin of coxal plates III. Setae Ai very long thickened, located on small tubercles. Setae Se, Pe and Pi moderately in length. Excretory pore plate (Figs 3–4) triangular (L/W ratio 1.0–1.05) with acute anterior angle (sometimes with short median projections), posterior margin more or less convex; setae Ai and Ae subequal and forming true transverse row; bases of Ai close to each other and located slightly anteriorly to excretory pore; distance between setae Ae–Ae almost three times longer than distance between Ai–Ai. Surface of excretory pore plate smooth. Surface of dorsal plate and coxal plates punctuated and with reticulations.

Capitulum (Fig. 5) with wide base and relatively narrow rostrum, anterior hypostomal setae much longer than posterior ones. Basal segments of chelicerae (Fig. 6) fused to each other medially,
longer than wide, expanded proximally and tapering distally; cheliceral styles small, crescent–shaped. Surface of capitulum and basal segment of chelicera punctuated and with reticulations.

Pedipalps short and stocky (Fig. 7): P–1 short and without seta; P–2 large, with slightly convex dorsal margin and single dorsal seta near middle of segment; P–3 with very long, thick lateroproximal seta and relatively short dorsodistal one; P–4 with three unequal setae and large dorsodistal claw; P–5 small, with three short and four comparatively long unequal simple setae and rather long solenidion (longer than segment).

Legs 5–segmented, shape and arrangement of setae on legs segments as shown in Figs 8–10. Total number of leg setae, excluding eupathidia, as follows (specialized setae indicated in parentheses): I–Leg-1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); II–Leg-1–5: 1, 7, 5 (s), 11 (2s), 13 (s, ac); III–Leg-1–5: 1, 6, 5 (s), 10 (s), 11(ac). Number of thickened distal setae from trochanter to tarsus: I-Leg: 0, 1, 0, 1, 0; II–Leg: 0, 1, 1, 1, 0; III-Leg: 0, 1, 3, 4, 0. I-Leg-1 with relatively short seta, II–Leg-1 and III–Leg-1 each with long seta. Solenidion on I–Leg-3 and II–Leg-3 longer than solenidion on III–Leg-3; I–Leg-4 and II–Leg-4 with unequal dorsodistal solenidia. Acanthoid seta straight located distally on tarsi of all legs. Lateral claws and empodial claw nearly equal in length, but lateral claws less heavy than empodial claw; empodial claw I-II well curved (Fig. 11), empodial claw III slightly curved (Fig. 12).

Figures 3–7. *Piona stjoerdalensis* (Thor, 1897), larva: 3-4 - excretory pore plate; 5 - capitulum; 6 - chelicerae, dorsal view; 7 - pedipalp, lateral view. Scale bars: 3-6 = 50 μm, 7 = 20 μm


Figures 8–12. *Piona stjoerdalensis* (Thor, 1897), larva: 8 - leg I; 9 - leg II; 10 - leg III; 11 - claws of leg I; 12 - claws of leg III. Scale bars: 8–10 = 50 μm, 11–12 = 20 μm.
**Remarks.** The excretory pore plate in the larva identified as *P. stjoerdalensis* (Stryjecki et al. 2015, Fig. 1,B) is wider than long, with convex anterior margin probably belongs to other species. Similar shape of the excretory pore plate is characteristic for the larva *P. neumani* (Koenike, 1883), larvae of the “*P. nodata*” group (Wainstein 1980) and in some larvae of North American species of the genus *Piona* (Prasad, V. & Cook, D. 1972; Smith 1976). The identification of Stryjecki’s larva need confirmation. The larva *Piona stjoerdalensis* is similar to known larvae of the “*coccinea*” group, i.e., *P. coccinea* (Koch, 1836), *P. imminuta* (Piersig, 1897) and *P. recurva* Lundblad 1920. The distinctions between the named species are presented in the key.

**Key to larvae of the “*coccinea*” group**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Species</th>
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<tr>
<td>1</td>
<td>Dorsal shield large, L &gt; 430 μm (Wainstein 1980, Davids &amp; Kouwets 1987)....</td>
<td><em>P. coccinea</em> (Koch, 1836)</td>
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<tr>
<td>-</td>
<td>Dorsal shield comparatively small, L &lt; 350 μm.</td>
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<td>2</td>
<td>II-Leg-4 with 10 setae, lateral claws in tarsi all legs longer than empodial claw, surface of excretory pore plate with a reticulations (Davids &amp; Kouwets 1987).</td>
<td><em>P. imminuta</em> (Piersig, 1897)</td>
</tr>
<tr>
<td>-</td>
<td>II-Leg-4 with 11 setae, lateral claws and empodial claw in all legs subequal in length, surface of excretory pore plate without a reticulations.</td>
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<tr>
<td>3</td>
<td>II-Leg-3/4 and III-Leg-2 with single thickened distal setae each; setae Ci long, L = 200-235 μm</td>
<td><em>P. stjoerdalensis</em> (Thor, 1897)</td>
</tr>
<tr>
<td>-</td>
<td>II-Leg-3/4 and III-Leg-2 with two thickened distal setae each; setae Ci comparatively short, L = 155-165 μm (Tuzovskij 2014)</td>
<td><em>P. recurva</em> Lundblad 1920</td>
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**References**


