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Description of armored scale species from Cypress trees in Iran (Hemiptera: Coccomorpha: Diaspididae)

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Abstract
The new armored scale species *Acanthomytilus cupressicola* Moghaddam **sp. n.** is described and illustrated from specimens collected on Cypress trees in Iran. Although most species of *Acanthomytilus* are known to occur on Poaceae, this is the second species of the genus, except *A. kurdicus* Bodenheimer, that is here recorded from woody plants.
Key words: Diaspididae, new species, *Cupressus* sp., Iran.

گونه جدیدی از شپشک‌های سپردار (Hemiptera: Coccomorpha: Diaspididae) روی درختان سرو در ایران

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چکیده
گونه جدیدی از شپشک‌های سپردار، *Acanthomytilus cupressicola* Moghaddam sp. n. از نمونه‌های جمع‌آوری شده از درختان سرو از ایران توصیف و ترسیم شده است. اکثر گونه‌های جنس *Acanthomytilus* از گندمیان گزارش شده‌اند و این دومین گونه شپشک سپردار از جنس *Acanthomytilus* است که از روی درختان (بعد از شپشک *A. kurdicus*) و از روی گیاه میزبان کیکم، معرفی می‌شود.
واژگان کلیدی. Diaspididae، *Acanthomytilus cupressicola*، گونه جدید، *Cupressus* sp.، ایران

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Introduction

To date following 13 scale insects species (Hemiptera: Coccomorpha) have been recorded on conifers in Iran (Moghaddam, 2013): Coccidae (1 species: *Ceroplastes floridensis* Comstock), Diaspididae (9 species: *Aspidiotus nerii* Bouché, *Carulaspis minima* (Signoret), *Chrysomphalus dictyospermi* (Morgan), *Dynaspidiotus abietis* (Schrank), *Lepidosaphes juniperi* Lindinger, *Leucaspis pusilla* (Löw), *Pseudaulacaspis pentagona* (Targioni Tozzetti), *Torosaspis farsianus* (Balachowsky & Kaussari), and Pseudococcidae (3 species: *Planococcus citri* (Risso), *Planococcus vovae* (Nasonov), *Pseudococcus viburni* (Signoret).

The genus *Acanthomytilus* has been originally described by Borchsenius (1950) and currently includes 13 species worldwide of which only the species *A. kurdicus* Bodenheimer lives on woody plants. The rest of species attack poaceous plants (Garcia *et al*., 2017). Takagi (1970) argued that *Acanthomytilus* species that exist on woody plant

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should not be considered as real members of the genus. Ülgentürk and Kozár (2011) remarked the genus *Acanthomytilus* can be divided into 3 groups; one of these groups may be identical with *Lepidosaphes*, *Torosaspis* and *Acanthomytilus*.The genus *Lepidosaphes* with having the main character of "6 or 7 marginal macroducts, in formula of 1,2,2,1 or 2,2,2,1" is separated from *Acanthomytilus* with "5 marginal macroducts, in formula of 1,2,1,1 or 1,2,2", although Takagi (1970) remarked "*A. kurdicus* is rather similar to *Lepidosaphes* species". Ülgentürk and Kozár (2011) transferred the species *A. farsianus* and *A. cedricola* to the newly established genus *Torosaspis* Ülgentürk and described *T. turica*. The genus *Torosaspis* is separated from *Acanthomytilus* by the following characters: (i) marginal macroducts all single on abdominal segments IV−VII (formula 1,1,1,1), (ii) duct tubercles present near the posterior spiracle and (iii) the median lobes closer together than those on Poaceae. *A. kurdicus* differs from species recorded from Poaceae, in having (i) duct tubercles present near the posterior spiracles; (ii) the space between median lobes as wide as lobes width; (iii) marginal macroducts in formula of 1,2,2.

Material and methods

All specimens were stained and mounted on microscope slides according to the protocol by Williams and Watson (1988). In the Fig. 2, the left side of the main drawing is the dorsum and the right, the venter. Other structures around the main figure are drawn enlarged but not all to the same scale. The morphological terminologies follow Williams and Watson (1988).

The holotype and paratypes are deposited in the Scale Insect Collection of Insects Taxonomy Research Department (ITRD), Iranian Research Institute of Plant Protection (IRIPP), Tehran, Iran.

Results

***Acanthomytilus cupressicola* Moghaddam sp. n.** (Fig 1, 2)

Type data. **Holotype female: Iran,** Gilan province, Roodbar, 36°49'10.5"N 49°25'49.1"E , 188 m altitude, on *Cupressus* sp. (Cupressaceae), 5.xi.1994, M. Moghaddam, coll., No: 756.

Paratypes: 7 adult females, on the same slide including holotype. The holotype is marked on the slide.

Description

Live appearance: Scale of adult female convex, elongate, oyster-shell shaped, light brown in color, with two apical exuviae pale yellow and transparent, scale 1.7−2.0 mm long 0.6–0.8 mm wide. Male unknown (Fig 2: a, b and c).

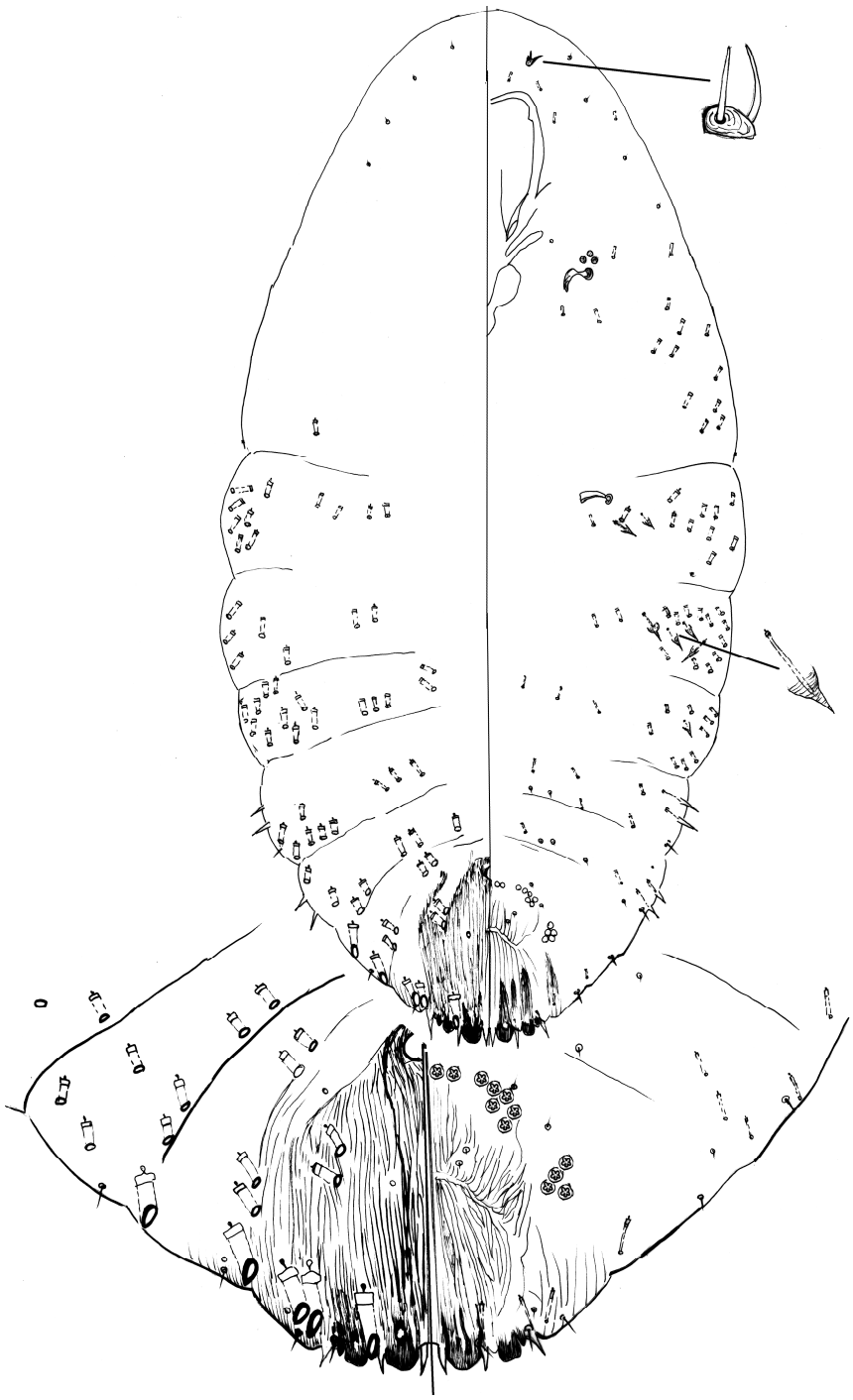

Fig. 1. Adult female of *Acanthomytilus cupressicola* Moghaddam sp. n. (Code 756)

Mounted female (Fig. 1): Adult female oval, membranous except pygidium, 0.66–0.79 mm long, 0.30–0.41 mm wide, widest at metathorax; lateral margins of posterior segments moderately lobed. Pygidium rounded, with 2 definite pairs of lobes; median lobes (L_1), each 6–7 μm long, 10–12 μm wide, separated by a space 7–10 μm wide, slightly diverging, each inner and outer margins with 1 inconspicuous notch. Second lobes (L_2) bilobed, inner

lobule (L_{2a}) slightly smaller than median lobes, without notch on margins; outer lobes (L_{2b}) very small, and sub-triangular. Gland spines each long and slender with a broad base, longer than lobes; present as follows: 2 between median lobes, 1 between L_1 & L_2, and 1 next to L_2; and also gland spines paired on lateral margins of abdominal segments III and IV. Dorsal macroducts of 2 main sizes, largest size present on pygidial margin, with orifice thickly sclerotized on the rim, formula 1,2,1,1. Smaller dorsal ducts present submarginally and submedially on segments I–VI, and also on metathorax and 1 or 2 on mesothorax.

Ventrally, ducts as long as dorsal ducts present on lateral margins of thoracic segments and abdominal segments I and II. Intermediate-size ducts, narrower than small ducts but wider than microducts, present medially on head, behind paired spiracles, and in front of abdominal segments. Microducts present, on submarginal and submedian of segment IV and pygidial segments. Perivulvar pores present in 5 groups, 4 or 5 present in median group, 5–7 in each anterolateral group, and 5–10 in each posterolateral group, totally 12–22. Anterior spiracles each with 2 or 3 disc pores; posterior spiracles without disc pore. Anal opening 11–13 μm in diameter, situated at base of pygidium, and 110–115 μm from base of median lobes. Lateral tubercle-like swellings present on back of posterior spiracles, and abdominal segments I and II. Antennae each with 2 enlarged setae.

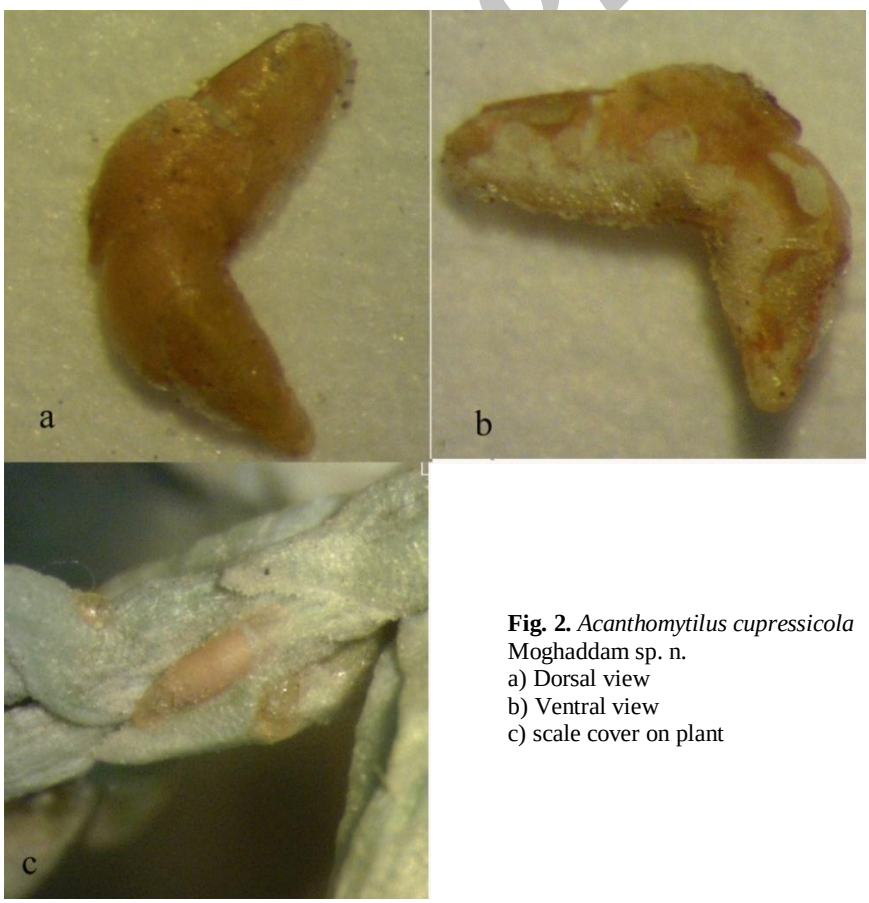

Fig. 2. *Acanthomytilus cupressicola* Moghaddam sp. n.
a) Dorsal view
b) Ventral view
c) scale cover on plant

Comment. This species is characterized by having the following combination of morphological characters: (i) Median lobes distinctly separated from each other; second

lobes bilobed, outer lobule small and sub-triangular; (ii) antennae each with 2 setae; (iii) marginal macroducts 5 in number on each side of pygidium, in formula of 1,2,1,1; (iv) presence of 2 gland spines between the median lobes, singly between segments VI & VII, and 1 lateral to segment VI; (v) ventral tubercle ducts present near each posterior spiracles and on abdominal segments I and II; (vi) anterior spiracles with disc pores.

This species resembles *A. kurdicus* Bodenheimer in having: a) tubular ducts present near posterior spiracles; and differs in (character states on the studied specimens of *A. kurdicus* in brackets): (i) median lobes rounded apically (sub-triangular and with 2 notches on each sides), (ii) gland spines singly present on abdominal segments VI and VII (paired), (iii) median gland spine normal (horn-like), (iv) dorsal marginal ducts in pair on segments VI (in pairs on segments V and VI).

Etymology. The name is based on the Latin genitive of the host plant name *Cupressus*, and the Latin suffix `*-cola*` meaning dweller and is treated as a noun in opposition.

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