

A new species of *Andricus* Hartig oak gallwasp from Iran (Hymenoptera: Cynipidae, Cynipini)

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Abstract. A new species of oak gallwasp, *Andricus rosieae* (Hymenoptera: Cynipidae: Cynipini) is described from Iran. This species is known only from asexual females and induce galls on the acorns of *Quercus infectoria*. Data on the diagnosis, distribution and biology of the new species are given.

Keywords: Cynipini, *Andricus*, taxonomy, Iran, distribution, new species.

Introduction

Only 36 species of oak gallwasps (Hymenoptera, Cynipidae, Cynipini) were recorded in the first work on cynipid fauna of Iran (Chodjai 1980). Since then, a number of works have been published on the oak gallwasp fauna of Iran with descriptions of new species (Melika & Stone 2001, Melika et al. 2004, Azizkhani et al. 2006, Tavakoli et al. 2008, Péntzes et al. 2009). In the recent monograph on cynipid fauna of Iran, 77 species of oak gallwasps were listed (Sadeghi et al. 2010).

Iran lies at the eastern limit of the Western Palaearctic, and recent surveys confirm that its cynipid fauna includes widespread Western Palaearctic species such as *Andricus kollari* (Hartig) and *Cynips quercusfolii* (Linnaeus); species limited to the eastern part of this region such as the *insana* form of *Andricus quercustozae* (Bosc), *Andricus megalucidus* Melika, Stone, Sadeghi & Pujade-Villar and *Aphelonyx persica* Melika, Stone, Sadeghi & Pujade-Villar (Melika et al. 2004); and taxa currently unknown from Turkey that may represent Iranian endemics, including *Andricus stonei* Melika, Tavakoli & Sadeghi, *Dryocosmus tavakolii* Melika, Stone & Azizkhani and *Dryocosmus mikoii* Melika, Tavakoli, Stone & Azizkhani (Azizkhani et al. 2006) and 14 other recently described species (Tavakoli et al. 2008).

Here we describe another endemic from Iran, *Andricus rosieae* n. sp., known to induce galls on acorns of *Quercus infectoria* Olivier (Fagaceae).

Materials and Methods

We follow the current terminology of morphological

structures (Liljeblad & Ronquist 1998, Melika 2006). Abbreviations for fore wing venation follow Ronquist & Nordlander (1989), and cuticular surface terminology follows that of Harris (1979). Measurements and abbreviations used here include: F1-F12: 1st and subsequent flagellomeres; POL: post-ocellar distance, the distance between the inner margins of the posterior ocelli; OOL: ocellar-ocular distance, the distance from the outer edge of a posterior ocellus to the inner margin of the compound eye; and LOL: the distance between lateral and frontal ocelli. The width of the forewing radial cell is measured from the margin of the wing to the Rs vein.

Images of wasp anatomy were produced with a digital Nikon Coolpix 4500 camera attached to a Leica DMLB compound microscope, followed by processing using CombineZP (Alan Hadley) and Adobe Photoshop 6.0. Gall images were taken by M. Tavakoli.

Results

Andricus rosieae Melika & Stone n. sp. (Figs 1-3)

Type material: HOLOTYPE female: IRAN, Lorestan, Ghelaei, ex. *Q. infectoria*, Lor385, coll. M. Tavakoli, Autumn 2006. PARATYPES: 1 female with the same label as the holotype. The holotype and paratype females are deposited at the Pest Diagnostic Department, Plant Protection and Soil Conservation Directorate of County Vas, Tanakajd, Hungary (curator G. Melika).

Description. ASEXUAL female (holotype) (Figs 1.a-e - 2.a-d). Head rusty brown, posteriorly black, with interocellar area, antennal sockets, mandibles and stripe along attachment line of mandibles black or dark brown. Antenna dark brown with black; scape, pedicel, F1-F6 with darker base and lighter proximal 1/3rd; F7-F13 very dark brown to black. Pronotum, mesopleu-

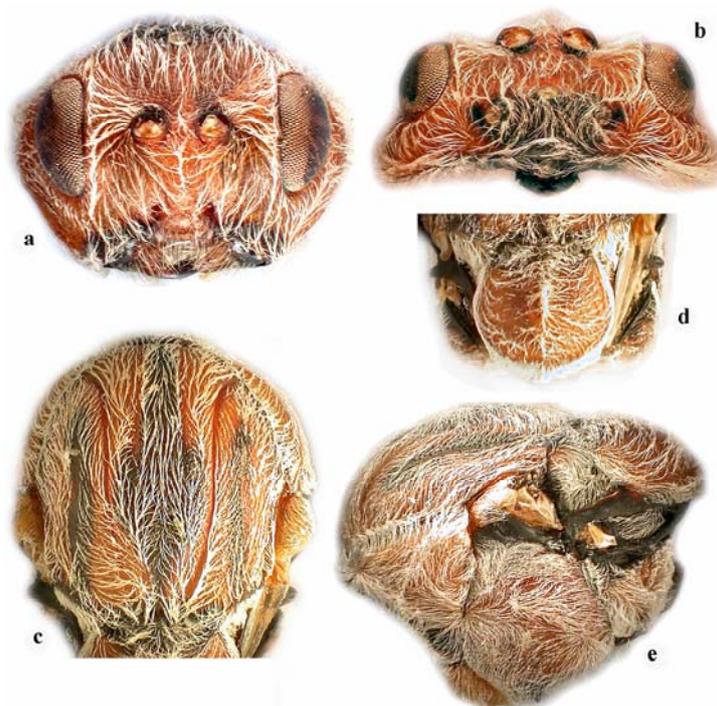


Figure 1. *Andricus rosieae*, n. sp., asexual female: **a**, head (anterior view); **b**, head (dorsal view); **c**, mesoscutum (dorsal view); **d**, mesoscutellum (dorsal view); **e**, mesosoma (lateral view).

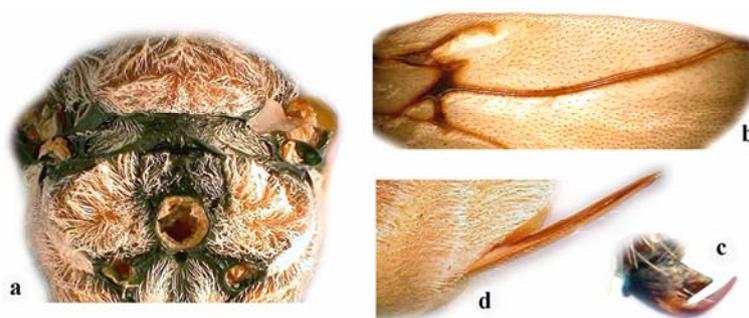


Figure 2. *Andricus rosieae*, n. sp., asexual female: **a**, metascutellum and propodeum (posterodorsal view); **b**, forewing (part); **c**, hind tarsal claw; **d**, ventral spine of hypopygium (lateral view).

ron, mesoscutum, mesoscutellum and lateral propodeal area brown; parapsidal lines, median stripe between notauli, scutellar foveae, metascutellum, metanotal trough, central propodeal area, mesosoma ventrally and 2nd metasomal tergite dorsally black. Coxae, femora brown; tibiae and tarsi dark brown to black, with numerous rows of dense setae. Head, mesosoma and metasoma with uniformly very dense long white setae.

Head coriaceous, 2.2 times as broad as long from above, 1.4 times as broad as high anteriorly and slightly broader than width of mesosoma. Gena coriaceous, as broad as cross diameter of eye, strongly broadened behind eye, well visible in anterior view behind eye. Malar space coriaceous, without striae and malar sulcus, 0.35 times as long as height of eye. POL 2.2 times as long as OOL; OOL equal LOL and 2.5 times as long as diameter

of lateral ocellus, ocelli slightly ovate, equal in size and shape. Transfacial distance 1.6 times as long as height of eye and 1.9 times as long as height of lower face (distance between antennal rim and ventral margin of clypeus); diameter of antennal torulus larger than distance between them, distance between torulus and eye margin 1.4 times as long as diameter of torulus. Lower face coriaceous, with elevated median area and dense setae. Clypeus nearly square, as long as broad with nearly parallel sides, coriaceous, impressed, flat, with some transverse delicate striae ventrally, ventrally emarginate and slightly incised medially, with distinct deep anterior tentorial pits, distinct epistomal sulcus and clypeo-pleurostomal line. Frons coriaceous, with impression above antennal socket. Vertex and occiput coriaceous; interocellar area slightly elevated, with rugose sculpture. Postocciput around occipital foramen impressed, with numerous delicate striae extending to postgenal bridge. Antenna with 13 distinct flagellomeres, longer than head+mesosoma; pedicel nearly 3.0 times shorter than scape, longer than broad, F1 3.0 times as long as pedicel, 1.3 times as long as F2, from F3 till F7 all subsequent flagellomeres shorter; F7-F11 equal in length, F12 equal F13 and slightly longer than F7-F11; placodeal sensilla on F3-F13, in numerous rows, absent on F1-F2.

Mesosoma slightly longer than high in lateral view; with uniform, dense white setae. Pronotum uniformly coriaceous, with uniform dense white setae. Anterior rim of pronotum narrow, emarginate; propleuron coriaceous, with white setae, strongly concave in mediocentral part. Mesoscutum uniformly coriaceous, longer than broad (width measured across base of tegulae); notauli distinct, complete, reaching pronotum, well-impressed; median mesoscutal line absent; anterior parallel lines distinct, extending to half length of mesoscutum; parapsidal line indicates by black stripe. Mesoscutellum uniformly delicately coriaceous, as broad as long, flat, overhanging metanotum. Scutellar foveae transversely ovate, with rugose bottom and very dense white setae, separated by elevated median carina. Mesopleuron, including speculum, uniformly delicately coriaceous, with dense white setae; mesopleural triangle rugose, with dense white setae. Metapleural sulcus distinct, delimiting area with very dense white setae, reach mesopleuron in upper 1/3rd; preaxilla coriaceous; lateral axillar area with parallel wrinkles, without setae; axillar carina broad,

smooth, shiny with longitudinal striae; axillula slightly ovate, with very dense white setae hidden sculpture; subaxillar bar smooth, shiny, black, in most posterior end higher than height of metanotal trough, covered with very dense long white setae, its sculpture hidden. Metascutellum black, microreticulate, with parallel delicate wrinkles, higher than height of smooth, shiny ventral impressed area. Lateral propodeal carinae strongly elevated, nearly parallel, only slightly curved outwards in posterior 1/3rd, delimiting smooth black central area with few delicate irregular wrinkles, with only few white setae along carinae; lateral propodeal area uniformly coriaceous, with very dense white setae; nucha very short, without striae.

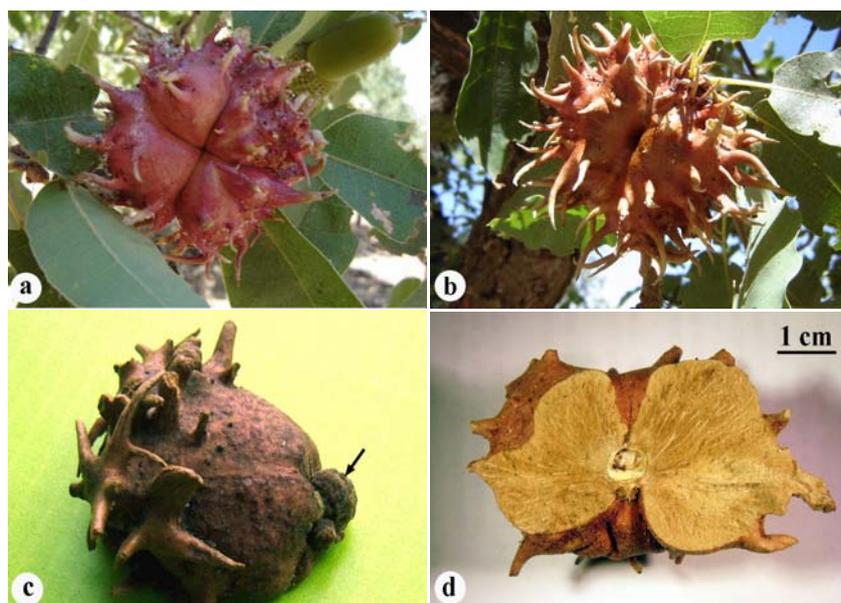
Forewing longer than body, with dark brown veins, margin with dense cilia; radial cell 4.0 times as long as broad, R1 nearly reach wing margin, Rs reach margin; Rs+M distinct in distal 2/3, its projection reach basalis at half height, areolet triangular, well-delimited. Tarsal claws with strong acute, deep basal lobe.

Metasoma as long as head+mesosoma, slightly higher than long in lateral view, smooth, matt. 2nd metasomal tergite occupying half length of metasoma, densely setose laterally, without setae dorsally; all subsequent tergites with very dense white long setae; prominent part of ventral spine of hypopygium long, needle-like, 8.5 times as long as broad, with short sparse white setae ventrally, which not extending beyond apex of spine.

Body length 5.8–6.0 mm (n=2).

Gall (Fig. 3.a-f). The gall develops on a stunted acorn and when mature usually covers it and the acorn becoming invisible from outside. Monolocular. The gall is an irregular, usually elliptical growth 30–50 mm in diameter and up to 20–25 mm height, with protruding bumps and stout spines in between them. In the typical form, the spines are 5–10 mm long, irregularly curved and sometimes forked. The body of the gall is much bigger than the length of the spines; the tissue of the gall, even after maturation, is semi-soft, cheese-like, and easy to cut. A small, 4–5 mm in size, slightly elongated thin-walled single larval chamber located at the main base of the gall. The gall is pale green with flexible spines when young, becoming uniformly pinkish, ochra-coloured when mature.

Similar galls. The gall closely resembles the gall of *A. coriarius* (Hartig) but the spines are much shorter and the body of the gall in comparison to



Figures 3. *Andricus rosieae*, n. sp., galls: a–b, mature gall; c, part of the gall (the arrow shows the stunted acorn which on the gall develops); d, dissected gall, with gallwasp larval chamber in the middle (gall photos by M. Tavakoli).

the length of the spines is much bigger. *Andricus rosieae* always developing on a stunted acorn and never on buds, like *A. coriarius* does. Also the gall of *A. coriarius* is known to be multilocular, while in *A. rosieae*, the gall has one central larval chamber, i.e. it is monolocular. This gall can be easily distinguished from all other acorn cup galls: *A. pictus* (Hartig), *A. quercuscalicis* (Burgsdorf), *A. dentimitratus* (Rejtö), and *A. assarehi* Melika & Sadeghi.

Etymology. Named after Rosie Stone, daughter of G.N. Stone.

Diagnosis. By the absence of the median mesoscutal line, *A. rosieae* n. sp. most closely resembles *Andricus coronatus* (Giraud) and *A. hungaricus* Hartig, however it is easily distinguishable by the long ventral spine of the hypopygium, which is 8.5–9.0 times as long as broad, while in *A. coronatus* and *A. hungaricus* the ventral spine of the hypopygium is at most 6.0 times as long as broad. According to the shape of the central propodeal carinae, the new species closely resembles some representatives of the *A. kollari*-species group (*A. amblycerus* (Giraud), *A. aries* (Giraud), *A. corruptrix* (Schlechtendal), and *A. galeatus* (Giraud), which are the only few asexual *Andricus* species with subparallel propodeal carinae). However, the main feature of the *kollari*-

group species is the presence of short, applied or faintly oblique setae on the anterior surface of the fore tibia, while in *A. rosieae* the anterior surface of the fore tibia with long oblique setae.

Biology. Only the asexual females are known to induce galls on *Quercus infectoria*. The galls develop through the summer and mature in October. Adult wasps overwinter in the gall and probably emerge in the following spring. Exact emergence dates are unknown as few adults were cut out from the mature galls in late Autumn, so it is believed that the adults overwinter in the gall and emerge the next year.

Distribution. Currently known from Iran, Lorestan province, Ghelaei only.

Discussion

The phylogenetic relationships within the western palaeartic *Andricus* species were studied on the basis of gall structures' evolution traits, adults' morphology and gene sequences and were divided into six clades: a) *mayri-lucidus*, b) *kollari*, c) *coriarius*, d) *quercuscalicis*, e) *hartigi*, and f) *foecundatrix* clade, and a few species (*Andricus inflator* Hartig, *A. hystrix* Kieffer, *A. gallaurnaeformis* (Fon-

scolombe)) appeared to be nested on the tree away from the main *Andricus* clades (Stone & Cook 1998, Rokas 2001, Rokas et al. 2003, Melika 2006). On the basis of morphological peculiarities and obtained DNA sequence data for the mitochondrial cytochrome b gene and the nuclear 28S D2 region, the herein described *Andricus rosiae*, **n. sp.**, belongs to the *quercuscalicis* clade of *Andricus*, showing that this species is falling into a subclade with *Andricus caputmedusae* (Hartig) (Iranian sequences), *A. dentimitratus* and *A. assarehi* (molecular results will be published elsewhere). Based on the similarity of the gall structures, *A. rosiae* **n. sp.** most closely resembles that of *A. assarehi*, however, can be easily distinguished in the adult's morphology: in *A. rosiae* the antenna with distinct 13 flagellomeres, the median mesoscutal line absent, the prominent part of the ventral spine of the hypopygium 8.5–9.0 times as long as broad, while in *A. assarehi* the antenna with 12 flagellomeres, the median mesoscutal line extending to 1/3 of the mesoscutum length, the prominent part of the ventral spine of the hypopygium much shorter, less than 5.0 times as long as broad.

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