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Andricus protuberans n. sp. (Hymenoptera: Cynipidae: Cynipini), a new species of oak gallwasp from Mexico

Andricus protuberans n. sp. (Hymenoptera: Cynipidae: Cynipini), una nueva especie de avispa gallícola para México

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ABSTRACT

A new species of oak gallwasp, *Andricus protuberans* n. sp.**,** is described from Mexico. Data about diagnosis, distribution and biology of the new species are given.

Key words: Cynipidae, oak, gallwasp, *Andricus*, taxonomy, morphology, distribution, biology.

RESUMEN

Se describe una nueva especie de avispa agallícola de encinos de México, *Andricus protuberans* n. sp. Se proporcionan datos sobre la diagnosis, distribución y biología de la nueva especie.

Palabras clave: Cynipidae, encinos, avispas agallícolas, *Andricus*, taxonomía, morfología, distribución, biología.

The Mexican cynipid gallwasp fauna (Hymenoptera: Cynipidae) is very rich, nevertheless, a big number of species have not been described yet. Pujade-Villar & Ferrer-Suay (2015) mentioned the presence of 183 cynipid species from Mexico, of which 43 belong to the genus *Andricus* (one being introduced, Pujade-Villar *et al*., 2012). However, several species of different genera still need type revision.

Andricus has two morphological groups: species with metasoma smooth (typical forms) and species with metasoma strongly sculptured (probably belonging to a different genus according to Pujade-Villar *et al*., 2011).

Recently the species originally included in *Femuros* and *Erythres* genera (previously synonymized with *Andricus*) are considered as valid (Pujade-Villar & Ferrer-Suay, 2015 and Pujade-Villar & Melika, 2014, respectively). Also, the genus *Dros*, currently synonymized with *Andricus* (according to Melika & Abrahamson, 2002), could also be a valid genus. The species here described belong to the typical *Andricus* genus.

MATERIAL AND METHODS

Material examined was collected in 2012 from Monte Escobedo (State of Zacatecas, Mexico) from galls on the branches of *Quercus eduardii* Trel. and sent to the University of Barcelona (UB) for determination.

Morphological structures follow the current terminology (Liljebald & Ronquist, 1998; Melika, 2006). Abbreviations for fore wing venation follow Ronquist & Nordlander (1989), cuticular surface terminology follows that of Harris (1979). Measurements and abbreviations used here include: F1–F12, 1st and subsequent flagellomeres; POL (post-ocellar distance) is the distance between the inner margins of the posterior ocelli; OOL (ocellar-ocular distance) is the distance from the outer edge of a posterior ocellus to the inner margin of the compound eye; 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.

SEM images were taken by the first author (JP-V) with environmental electron microscope (FEI Quanta 200 ESEM) in the Scientific-Technical University of Barcelona (Spain), with low voltage without any coating. The adult habitus was taken at UB by our colleague (Marcos Roca-Cusachs) using a Leica DFC450 camera attached to a stereomicroscope Leica MZ160A and combining 60 pictures with the program stack and image processing Helicon Focus 6.2.2, while the gall was taken directly to a INFINITYX-21C digital camera with a Canon digital camera (Power Shot SX 210/15).

Type material is deposited in the next institutions:

UB University of Barcelona, Spain (J. Pujade-Villar);
PDL Pest Diagnostic Laboratory (the former Systematic Parasitoid Laboratory, SPL), Tanakajd, Hungary (G. Melika);
AMNH American Museum of Natural History, New York, U.S.A (J. Carpenter).

RESULTS

Andricus protuberans n. sp. (Figs. 1-3)

Etymology. The name of this species is related to the gall shape.

Type material. HOLOTYPE female deposited in col. JP-V (UB): "Mexico, Zacatecas, Monte Escobedo, Arroyo La Targea, 2,311 msnm, 22º27'10.17''N, 103º 19'56.09'' W, (25.v.2011) 10.vi.2011, leg. O. Cabral, R. Treto, L.G. Landa & C. Carrillo, ex *Quercus eduardii*" (white label); Holotype *Andricus protuberans* Pujade-Villar & Ferrer-Suay n. sp., desig. JP-V 2015" (red label). PARATYPES (19 females): same labels than holotype, 8 females JP-V col., 2 females in AMNH and 7 females in PDL (G. Melika collection).

Diagnosis. *Andricus protuberans* n. sp. corresponds to an asexual form and it is characterized by having an antennae with 11 (or obscurely 12) flagellomeres, the head is broadened behind the eyes, the mesoscutum is almost smooth with very few setae, notauli are complete and deep, the median mesoscutal line is absent, the mesopleuron is almost smooth and shiny, propodeal carinae are strong and subparallel, the metasoma is without sculpture, with some sparse setae laterally on the second metasomal tergite, and the ventral spine of the hypopygium is needle-like and short. Fore more morphological comments, see also the discussion.

Description. ASEXUAL FEMALE

Body length. 2.5–2.8 mm (n=6).

Color (Fig. 3d). Head black; clypeous testaceous to brown; mandibles testaceous with black teeth; maxilar and labial palps yellowish; antennae testaceous. Mesosoma black, in some specimens mesoscutum dark chesnut; tegula yellowish; legs including coxae ligth testaceous; forewings without smoked areas, with brown veins. Metasoma chestnut, ligther ventrally.

Head (Figs. 1a-1d). With few white setae nor visible on the lower face, 2.0 times as broad as long from above, 1.5 times as broad as high and as broad as or very slightly broader than mesosoma in front view. Lower face strongly alutaceous with some areas between toruli and compound eyes shiny and weakly sculptured; irradiating striae from clypeous present but not strongly visible. Gena alutaceous, broadened behind eye on frontal vision, 1.7 times as broad as cross diameter of eye in latara view; malar space coriaceous, with irradiating striae, 0.6 times as long as height of eye. POL 1.5 times as long as OOL; OOL 2.0 times as long as length of lateral ocellus and 2.0 times as long as LOL (POL: OOL: OCO is 3:2:1 and diameter of lateral ocellus 1.0). Transfacial distance 1.5 times as broad as height of eye; diameter of antennal torulus 1.4 times as large as distance between them, distance between torulus and inner margin of eye 1.2 times as long as diameter of torulus. Clypeus trapezoidal, delicately alutaceous, with very small elevated central area, ventrally widely emarginated, with a very short median incision; anterior tentorial pits small, epistomal sulcus and clypeo-pleurostomal line very few diferenciated, superficial. Frons, vertex, interocellar area and occiput coriaceous, with few white setae.

Antenna (Fig. 1f). 13-segemented, F11 sometimes sligthly differenciated on two segments; slightly longer than head + mesosoma; scapus not compressed and short 1.4 times as long as pedicel; pedicel not compressed 1.2 times as long as broad; F1 1.2 times as long as F2, 2.0 times as long as pedicel; F2>F3= F4, subsequently shorter; antennal formula is 4: 3: 6: 5: 4: 4: 3.5: 3.5: 3: 3: 3: 3: 5(3+2); placodeal sensilla on F5–F12, on F5–F6, only apically.

Mesosoma (Figs. 2a, 2b, 2e). As long as high; with few white setae. Pronotum alutaceous, with numerous parallel weak carinae laterally, along the ventro-lateral edge emarginated, with few white setae; anterior rim of pronotum narrow. Mesoscutum almost smooth, weak alutaceous in the 1/3 posterior and alutaceous with some piliferous points anteriorly; broader than longer in dorsal view (largest width measured across mesoscutum on the level of the base of tegulae). Notauli complete, deep, slightly converging and broadened at the posterior end; anterior parallel lines few impressed extending to 1/3 length of mesoscutum; parapsidal lines distinct and broad, extending to 2/3 length of mesoscutum, after tegulae level; median mesoscutal line absent. Pubescence situated around notauli and in the anterior 1/3. Mesoscutellum 0.6 times as long as mesoscutum, coriaceous and uniformly rugose and short white setae, rounded in dorsal view, sligthly longer than broad, sligthly overhanging metanotum; scutellar foveae present, bottom rounded, smooth, shining, separated with distinct elevated coriaceous median carina. Mesopleuron very few sculptured, with few white setae, anteriorly with few piliferous points, transeversaly very few unterrumped carinae and rest (including specullum); smooth, shining; dorsal axillar area alutaceous, lateral axillar area alutaceous, both with few setae; axillula, coriaceous, with few white setae; subaxillular bar smooth, shining, triangular, as broad as height of metanotal trough; postalar process long, strong, with parallel strong striae, alutaceous; metapleural sulcus reaching mesopleuron in the upper half of its height. Metascutellum uniformly coriaceous, metanotal trough alutaceous, with few short white setae; ventral impressed area around twice narrower than height of metascutellum smooth; central propodeal area smooth, shiny, with many irregular wrinkles pubescent laterally, lateral propodeal carinae strong, subparallel but curved in outwards in posterior 1/3; lateral propodeal area with few long white setae. Nucha with irregular, short, wrinkles and rugae.

Legs. Foretibiae with very few short applied white setae; tarsal claws with a basal tooth (Fig. 1e).

Wings (Fig. 3d). Forewing sligthly longer than body, hyaline, with short dense cilia on margin, radial cell around 2.7 times as long as wide; R1 almost reaching wing margin, Rs curved, nearly reaching wing margin; 2r curved with

a short protruding into radial cell; areolet present, small, triangular, closed and distinct; M vein directing basalis at its half height, final 1/3 unconspicous.

Metasoma (Fig. 2c). Shorter than head+mesosoma, longer than high in lateral view; only 2nd metasomal tergite with a few short white setae only laterally, all other tergites without setae, smooth, shining; 2nd metasomal tergite occupying 0.75 times as metasoma length in dorsal view. Ventral spine of hypopygium (Fig. 2d) short, prominent part around 3.0 times as long as wide, with sparse, long white setae, extending beyond the apex of spine, not forming a tuff.

Gall (Figs. 3a-c). Multilocular spherical bud galls. Variable diameter (7-15 mm). Hard texture, but easily cuttable. Surface yellow to yellowish-light brown, smooth and shiny, provided with blunt protuberances, like stalagmites (1-3 mm long), sometimes ribbed and curved when longer. Larval cameras (3x1.8 mm) occupying almost the entire interior of the gall, radially disposed, separated by an spongeous tissue and surrounded by a thin yellow wall.

Biology. Only asexual females of *A. protuberans* are known, inducing galls on *Quercus eduardii* Trel. (Section Lobatae of *Quercus*, red oaks), distributed only in Northeastern to Central Western Mexico (Valencia, 2004). Mature galls were collected in May, adults emerged immediately after the galls were collected during May to early June. Galls collected in early June from the State of Hidalgo were all gall-forming emerged, only parasitoids were obtained.

Distribution. Only known from Monte Escobedo (Mexico: Zacatecas). Similar galls (Fig. 3c) have been collected in Los Romeros (State of Hidalgo).

DISCUSSION

In Mexico a total of 184 species has been mentiond (Pujade-Villar & Ferrer-Suay, 2015) of which 43 belong to the genus *Andricus*. The new species has a characterictic galls absolutely different of all gall-wasps known from Mexico.

According to Pujade-Villar *et al*. (2009), only two *Andricus* species are known inducing galls in buds as the species here described: *A. burnetti* (Dailey & Sprenger) and *A. strues* (Kinsey). The new species differs of both mentioned species because the mesoscutum is almost smooth without punctures (sculptured and/or punctuated in *A. burnetti* and *A. strues*). Also, it differs from *A. burnetti* in the mesopleura sculpture and metasomal pilosity (mesopleura punctuated and third metasomal tergite pubescent in *A. burnetti*) and the new species also differs of *A. strues* in the sculpture of mesopleura (present in all mesopleura in *A. strues*).

A very few *Andricus* species have a similar morphology to *A. protuberans* n. sp. (mesoscutum and mesopleuron almost smooth); only *A. brevisramuli* Pujade-Villar, *A. cylindratum* (Kinsey) and all species included originally in *Dros* (currently a synonymy of *Andricus*).

The new species differs from *A. brevisramuli* in pubescence of mesoscutum, notauli length and in shape of scutellar foveae (uniformly pubescent, incomplete and, superficially and not delimited posteriorly in *A. brevisramuli*); also, new species differs from *A. cylindratum* in broadened genae, scutellar foveae, metasoma length and forewing length (not broadened behind compound eyes, narrow foveae, higher than long and very long around 1.8 times body length); also, new species differs from all species included originally in *Dros* (*A. moreliensis* (Kinsey), *A. perlentus* (Kinsey), *A. periscellus* (Kinsey), *A. picatus* (Kinsey), *A. petasus* (Kinsey) and *A. repicatus* (Kinsey) because these species have: head narrowed behind eyes, yellowish body, propodeal carinae not parallel and scutellum with smooth areas.

Finally, as we have mentioned above, *A. protuberans* n. sp. has a different gall of all species mentioned here.

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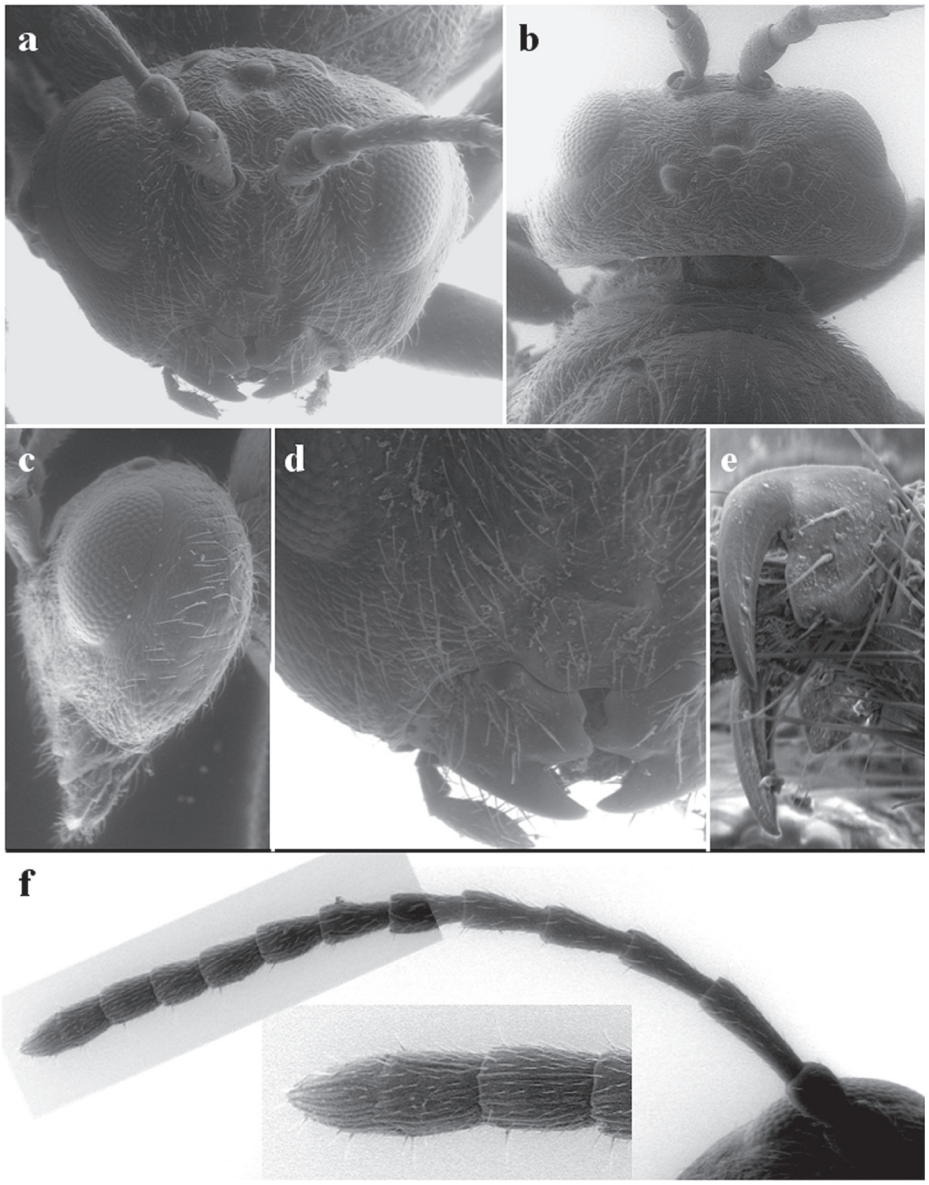

Figure 1. *Andricus protuberans* n. sp.: (a) head in frontal view, (b) head in dorsal view, (c) head in lateral view, (d) detail of lower face and malar space, (e) tarsal claws, (f) antennae and detail of last flagellomeres.

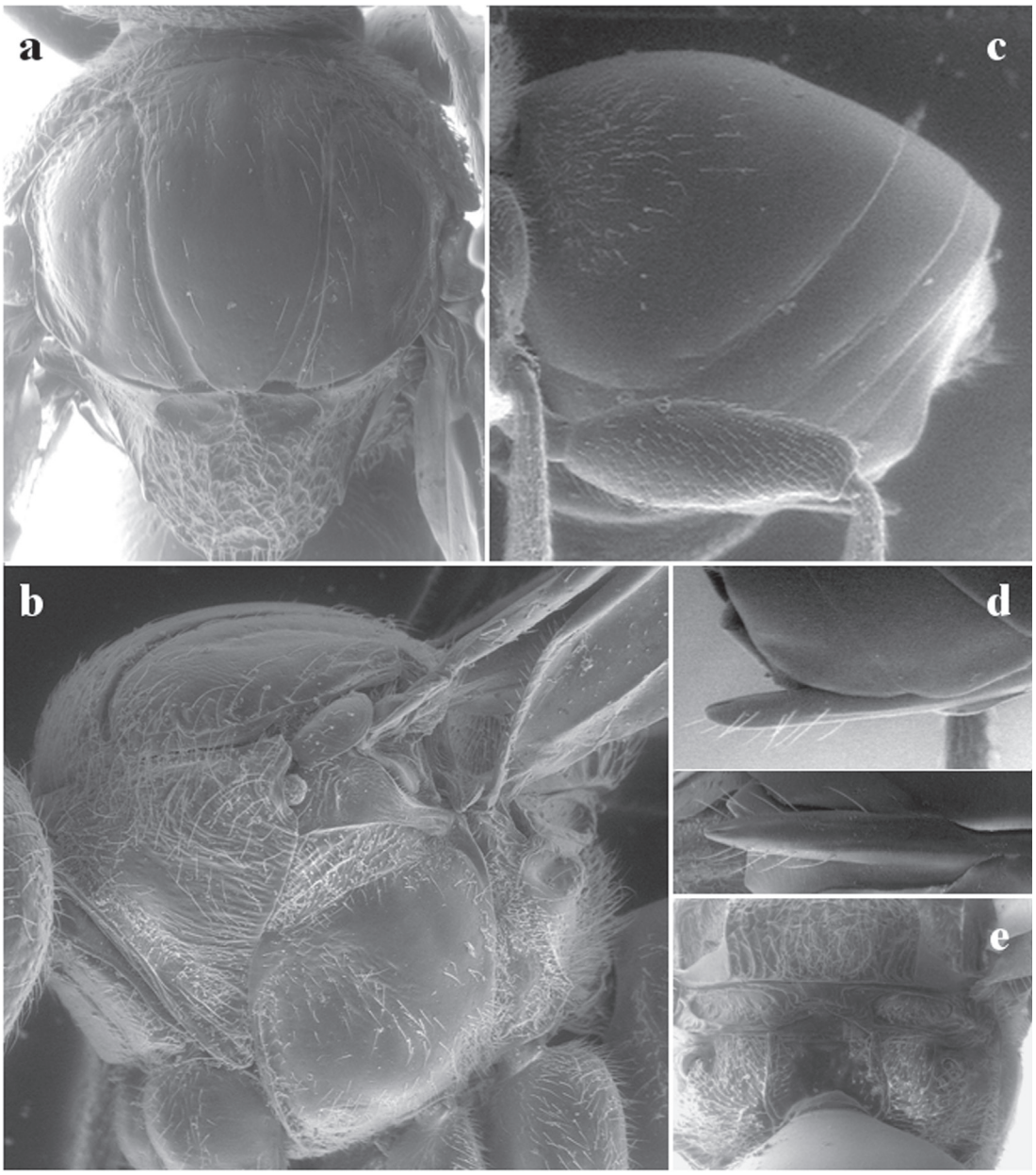

Figure 2. *Andricus protuberans* n. sp.: (a) mesosoma in dorsal view, (b) mesosoma in lateral view, (c) metasoma in lateral view, (d) ventral spine of hypopygium in lateral and ventral view, (e) propodeum.

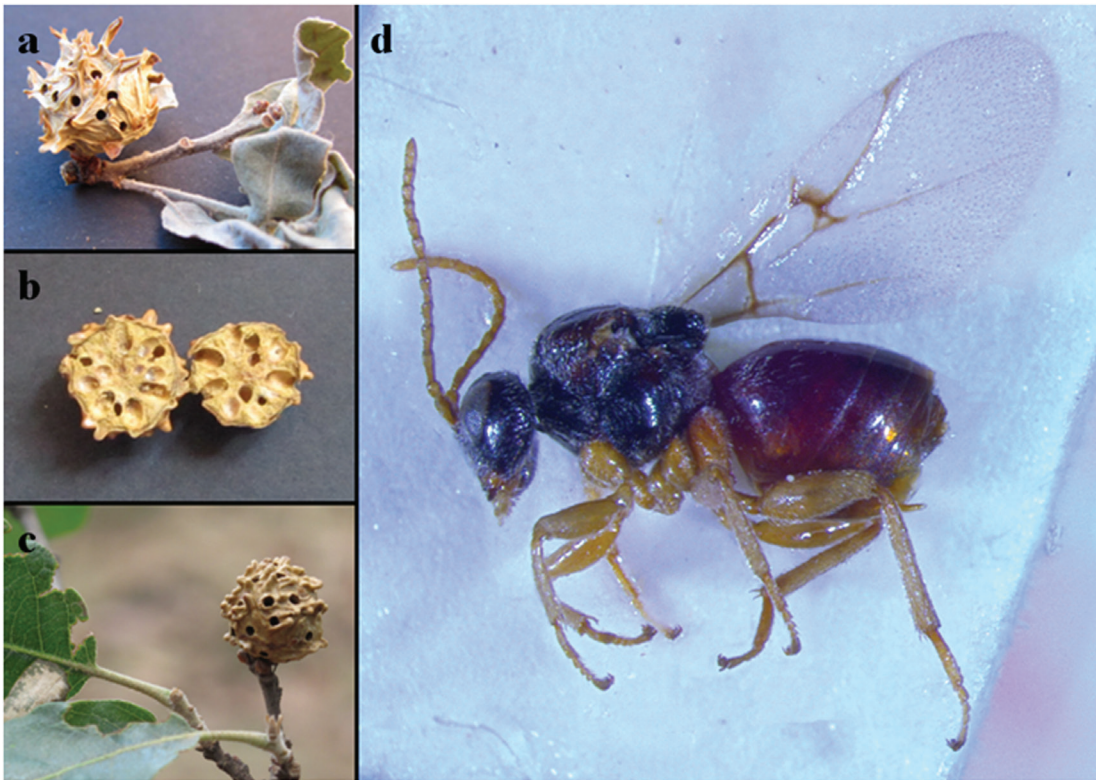

Figure 3. *Andricus protuberans* n. sp.: (a) gall from Zacatecas, (b) the same cuped, (c) gall from Hidalgo, (d) habitus.