

## Description of *Odontocynips hansonii* n. sp., from Costa Rica (Hymenoptera: Cynipidae)

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### RESUMEN

Se describe una nueva especie de cinípido gallicola de Costa Rica: *Odontocynips hansonii* n. sp. (Hymenoptera: Cynipidae: Cynipini). La agalla se encuentra en *Quercus insignis*. Representa el primer registro de cinípido gallicola de Costa Rica y la segunda especie del género *Odontocynips*. Se mencionan los caracteres diagnósticos, la distribución y la biología de esta especie. Se discute la validez del género *Odontocynips*.

**Palabras clave:** Cynipidae, gallicola, *Odontocynips*, taxonomía, morfología, distribución, biología.

### ABSTRACT

A new species of cynipid gallwasps, *Odontocynips hansonii* n. sp. (Hymenoptera: Cynipidae: Cynipini), is described from Costa Rica. The gall occurs on *Quercus insignis*. It is the first record of cynipid gallwasp from Costa Rica and it represents the second known species in this genus. Diagnostic characters, data on distribution, and biology are given. Finally, the validity of the genus *Odontocynips* is discussed.

**Key words:** Cynipidae, gall wasp, *Odontocynips*, taxonomy, morphology, distribution, biology.

### INTRODUCTION

The cynipid gallwasp fauna (Hymenoptera: Cynipidae) of Costa Rica is very poorly known. Fergusson (1995) mentioned the presence of different cynipid genera in this country; Díaz *et al.* (2002) listed six species of Cynipidae, while Pujade-Villar & Hanson (2006) estimated that the oak gallwasps (Cynipini) might be represented by more than 30 species. Nevertheless, no species of gallwasps has been described from Costa Rica yet. The new species described here is the first record of a particular oak gallwasp species from Costa Rica.

The genus *Odontocynips* was described by Kieffer (1910); it includes only one described species, *O. nebulosa* Kieffer, 1910, known from USA (Georgia, Arkansas, Missouri, Florida and Texas) (Burks, 1979; Wilson *et al.* 2000), from the asexual generation which induces large irregular multilocular galls on roots of white oaks, *Quercus stellata* Wangenh (Weld, 1921; 1959), *Q. virginiana* Miller and *Q. fusiformis* Small (Wilson *et al.*, 2000). Recently, details of the biology were described by Wilson *et al.* (2000). *Odontocynips* is closely allied to *Andricus* and *Holocynips* genera, however, it is easily distinguishable from all other Cynipini genera by the presence of a strong apical lobe on the hind femur (Melika & Abrahamson, 2002).

The new species described here was collected from *Quercus oocarpa* Liebm. Although Govaerts & Frodin (1998) recognized it as a valid species, Morales (2006) considered it as a young synonymy of *Q. insignis* Martens & Galeotti. For practical reasons, Morales (2006) taxonomy is followed.

*Quercus insignis* (= *Q. oocarpa*) is distributed in Mexico (Veracruz), Belize, Guatemala, Panama (Chiriquí), and Costa Rica (Madrigal-Jiménez, 1997; Govaerts & Frodin, 1998) at the altitude of 1,200-1,900 m. a.s.l. (Standley, 1937), however, going up to 2,300 m a.s.l. in Costa Rica (Burger, 1977). In Costa Rica it is distributed in the mountain range of Tilarán, Central and Talamanca volcanic areas, Tablazo hill, Escazú hills, Acosta and Puriscal coastal areas, and Osa peninsula (Standley, 1937; Burger, 1977).

### MATERIAL AND METHODS

The material examined was collected and kindly sent to us by Paul Hanson from galls collected on the branches of *Quercus insignis* from Costa Rica.

The current terminology of morphological structures as given in Gibson (1985), Ronquist and Nordlander (1989), and Menke (1993) is used here. Abbreviations for the fore wing venation follow Ronquist and Nordlander (1989). Measurements and abbreviations used herein include: F1 - F12, first 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 the lateral ocellus to the inner margin of the compound eye; LOL (lateral-frontal ocellar distance), the distance between lateral and frontal ocellus; and transfacial line, the distance between inner margins of compound eyes measured across toruli. The width of the radial cell measured along 2r.

SEM pictures were taken with a Stereoscan Leica-360 by Palmira Ros-Farré at a low voltage (700V) and without coating, in order to preserve the specimens.

## DESCRIPTION

*Odontocynips hansonii* new species

(Figs. 1- 3)

**Diagnosis.** The new species can be separated from *O. nebulosa* by the following diagnostic characters: head and mesosoma black, sparser pubescence and punctuation of the head and mesosoma, larger extension of the facial carina, antennae with 12 flagellomeres, smaller proportion between F1:F2, more diverged propodeal carinae, hyaline wings, absence of pubescence from the second metasomal tergum and tarsal claws with a basal lobe. Moreover, the gall of *O. hansonii* occurs on branches, while the gall of *O. nebulosa* is on roots.

**Description** (Figs 1-2), asexual form.

**Length.** Female 4.8-5.2 mm.

**Colour:** Head and mesosoma black and shiny; metasoma red to chestnut black, shiny, posteriorly and dorsally always black; legs, mandibles, scape and pedicel chestnut black.

**Head** (Fig. 1a, b) slightly narrower than thorax, 1.5 times as broad as high, quadrangular in front view; gena broadened behind eye, around 0.3 times the diameter of eye, measuring along transfacial line; malar space without sulcus, 0.4 times as long as eye height; POL: OOL:LOL=8:7:4, diameter of lateral ocellus 3; in frontal view with facial carinae present, frons finely coriaceous, shiny, with piliferous points and sparse white short setae, smooth above compound eyes dorsal and laterally; occiput coriaceous with piliferous points.

**Antenna** (Fig. 2a) 14-segmented; F1 slightly longer than F2, subequal; subsequent flagellomeres progressively shorter, F12 longer than F11.

**Mesosoma** (Figs. 1c; 2b, c) higher than long, concave dorsoventrally; mesoscutum slightly broader than long in dorsal view, finely or indistinctly alutaceous, shiny, with sparse piliferous points and regularly sparse white setae; notauli complete and deep, median mesoscutal line short, extending the most to 1/3 of mesoscutum length; parapsidal lines present and anterior parallel lines distinct. Scutellum rounded, as long as broad in dorsal view, rugose; scutellar foveae large, deep, with shiny rounded bottom; distinct median carina separating them. Sides of pronotum carinae coriaceous; mesopleuron shiny finely alutaceous and with some punctures in the anterior part. Central propodeal area smooth, shiny, with some setae anteriorly, in some specimens with some rugae anteriorly; lateral propodeal carinae strong, coriaceous, diverging, slightly bented outwards posteriorly, median longitudinal carina absent; lateral propodeal area alutaceous with micropiliferous points; propodeal carinae also sculptured, coriaceous.

**Forewing** (Fig. 1e) 1.2 times longer than body, pubescent, with short cilia on margin; radial cell around 3.5 times as long as broad; veins dark brown, strong, with infuscation along them; areolet triangular, closed.

**Legs:** tarsal claws (Fig. 1f) with short but distinct lobe; hind femura (Fig. 1d) with apical basal lobe.

**Metasoma** (Fig. 1d) shiny, smooth, shorter than mesosoma and head together, as high as long; first metasomal tergum with pubescence laterally only; subsequent tergites without pubescence. Ventral spine of hypopygium long, slender, with few long sparse setae; prominent part 7.0 times longer than broad.

**Type material.** HOLOTYPE female with the following labels: "Costa Rica, Cartago, La Gloria, 1700 m, *Quercus oocarpa*, stem swelling, X-1994" (white label), "Holotype *Odontocynips hansonii* Pujade-Villar" (red label), "*Odontocynips hansonii* asexual gen., Pujade-Villar det 2007" (white label). PARATYPES: 8 females with the same labels as the holotype. Holotype, 2 paratypes and galls are deposited in the University of Costa Rica, 4 paratypes in J.P-V collection (University of Barcelona) and 2 paratypes in G. Melika collection (Systematic Parasitoid Laboratory, Tanakajd, Hungary).

**Gall structure.** Tuberos galls (Fig. 3), irregular or globular, multilocular, woody branch swelling, up to 12 cm in diameter; surface colour and texture similar to that of the branch.

**Host gall.** *Quercus insignis* (= *Q. oocarpa*), according to Morales (2006).

**Distribution.** Known from Costa Rica (Cartago) only.

**Biology.** Only the asexual (parthenogenetic) females are known, like in *O. nebulosa*, associated with certain oak species in the white oak group (section *Quercus*).

**Etymology.** Named in honor of Dr. Paul Hanson, who collected the cynipid material.

## DISCUSSION

## Adults

The generic placement of the new species described here is problematic and here this conflict is commented.

The genus *Odontocynips* has been defined by Weld (1952) based on two characters: the modified femur III and the simple tarsal claws. This genus is known only for a single species *O. nebulosa*; so, the generic variability is not contemplated. *Odontocynips hansonii* has a strong apical lobe in the femur III as *O. nebulosa*; it is an exclusive character to *Odontocynips*. Nevertheless, the tarsal claws of *O. hansonii* have a clear basal lobe (it is not simple as in *O. nebulosa*). Some genera of Cynipini include species with simple and lobed tarsal claws (*Callirhytis* and *Neuroterus*, for example). Then, this difference it is not an objective reason to think that this new species was not *Odontocynips*; just by a single known species it cannot be assured that the species of *Odontocynips* always have simple claws. So, this genus can be morphologically more variable than thought until the moment.

On the other hand, adult morphology of both species (*O. nebulosa* and *O. hansonii*) is very different; it is not possible to confound these species. As commented above, *O. hansonii* has scarcer pubescence and punctuation of the head and mesosoma than *O. nebulosa*, a larger extension of the facial carina, 12 flagellomeres (13 in *O. nebulosa*), absence of pubescence from the second metasomal tergum instead of *O. nebulosa* where it is pubescent, forewings hyaline (infuscated in *O. nebulosa*) and tarsal claws lobed (simple in *O. nebulosa*). For all these differences, it cannot be discarded the possibility of the new species described here could be a new genus; nevertheless, before proceeding to the description of a new genus, it is better to await for a phylogenetic analysis that contemplates a very elevated number of Holarctic genera/species of Holarctic Cynipini. In addition, the intra-generic morphological diversity occurs in other Cynipini groups; for example, *Andricus* is also very variable in the morphology of adults (sexual and asexual) and even different generations have been described in different genera (Pujade-Villar *et al.*, 2001). For all this, the generic intravariability is not an objective reason to differentiate two species in two monotypic genera. Nevertheless, if these species belong to different genera then the lobe of the femur III, typical to define the *Odontocynips* genus, will be a homoplastic character and a redefinition of this genus should be needed.

According to recent morphological phylogenetic studies (Liljeblat *et al.*, 2008) *Odontocynips*, without considering the basal lobe of femur III, is defined by the following characters: (67: 1 → 0) last segment of labial palp long, (68: 2 → 3) 13 flagellomeres in female, (171: 1 → 2) mestosternum with angled incision posteriorly, (237: 0 → 1) 4tg fairly densely pubescent, (241: 0 → 1) ventral part of petiole long and (253: 1 → 0) small group of hairs close to annulus present; these characters appear after managing MacClade in two different optimizations (Liljeblat *pers. com.*). The new species is different in the characters 68 and 237 from *O. nebulosa*; nevertheless, with only a species known these characters are potentially intrageneric variable because they are present in the other Cynipini genera. Then, unfortunately this new information neither clarifies the problematic about *O. nebulosa* and *O. hansonii*. Moreover, and to complicate more this problem, in Liljeblat *et al.* (2008), *Odontocynips* appears in an *Andricus* clade (Fig. 4), next to *Andricus kingi*, and both closely related to a group of *Andricus* species from Europe (*caputedusae-quercusramuli*) and another group of *Andricus* plus several Holarctic genera (*Heteroecus*, *Eumaria*, *Disolcaspis* and *Amphibolips*). Nevertheless, as the generic limits of *Andricus* are less than clear, then, to consider in this moment that *Odontocynips* could belong to *Andricus* genus would only complicate more the *Andricus* status. More species are needed (Holarctic and Palaearctic) in the future phylogenetic analyses to assume this possibility. The new species of *Odontocynips* has some characters from *O. nebulosa* and some others from *Andricus kingi*.

The Cynipini Holarctic/Neotropical fauna is very conflictive and very complicated to study because after Kinsey (around 1940), no revision has been published (Weld, 1952; Melika & Abrahamson, 2002; Pujade-Villar *et al.*, 2008). To describe a new genus for *Odontocynips hansonii*, when *Odontocynips* has an exclusive morphological femur in Cynipini tribe, given that to both species are morphologically very different, only will be incremented the Holarctic generic chaos. For all these reasons, and according to all mentioned, a second species to *Odontocynips* is described, *O. hansonii*, awaiting to know irrefutably the validity of this genus and the true limits of the generic variability, without discarding the possibility that this new species could belong a new genus next to *Andricus*.

### About gall

The galls of the new species are similar to *Cynips championi* Cameron (1883). According to Pujade-Villar *et al.* (*in press*), Cameron (1883) describes from Guatemala a very peculiar gall that he denominates *Cynips championi*; Ashmead (1899) describes the females of tuberous Mexican galls and considers that they correspond to the species described by Cameron, which is transferred to the *Andricus* genus; Dalla Torre & Kieffer (1910) consider that the Mexican and the Guatemala galls are different species; for this reason, they denominate the specimens described by Ashmead from Mexico as *Cynips ashmeadi*. This species was transferred to the *Andricus* genus by Weld, 1952. On the other hand, Weld (1951) synonymised *Andricus ashmeadi* Bassett, 1900 with *Adleria nigrescens* Gillette, 1889, but Melika & Abrahamson (2002) consider that both included in the *Andricus* genus are different species, then *Andricus ashmeadi* (Dalla Torre & Kieffer, 1910) is a homonymy of *Andricus ashmeadi* Bassett, 1900. Because of all this, and considering that from very similar galls in the Holarctic region can be obtained morphologically different species, Pujade-Villar *et al.* (*in press*) propose a new name to denominate the species collected in Mexico as *Andricus ashmeadi* (Dalla Torre & Kieffer) awaiting being able to study adults of similar galls coming from Guatemala, reason why Pujade-Villar *et al.* (*in press*) considered *Andricus championi* (Cameron) as “dubida species” because the adults are unknown.

The galls collected in Costa Rica resemble those of *Andricus championi* (Cameron, 1883) but the reared adults definitely belong to the *Odontocynips* genus.

For all this mentioned, it is necessary to collect galls in different species of *Quercus* from Guatemala, since the original description of *Andricus championi* does not indicate the host *Quercus* species, to know the validity of *Andricus championi*. In this moment, there are two valid species with tuberous galls: *Odontocynips hansonii* (from Costa Rica on *Q. insignis*) and the “*A. ashmeadi*” (from Mexico on *Quercus* sp).

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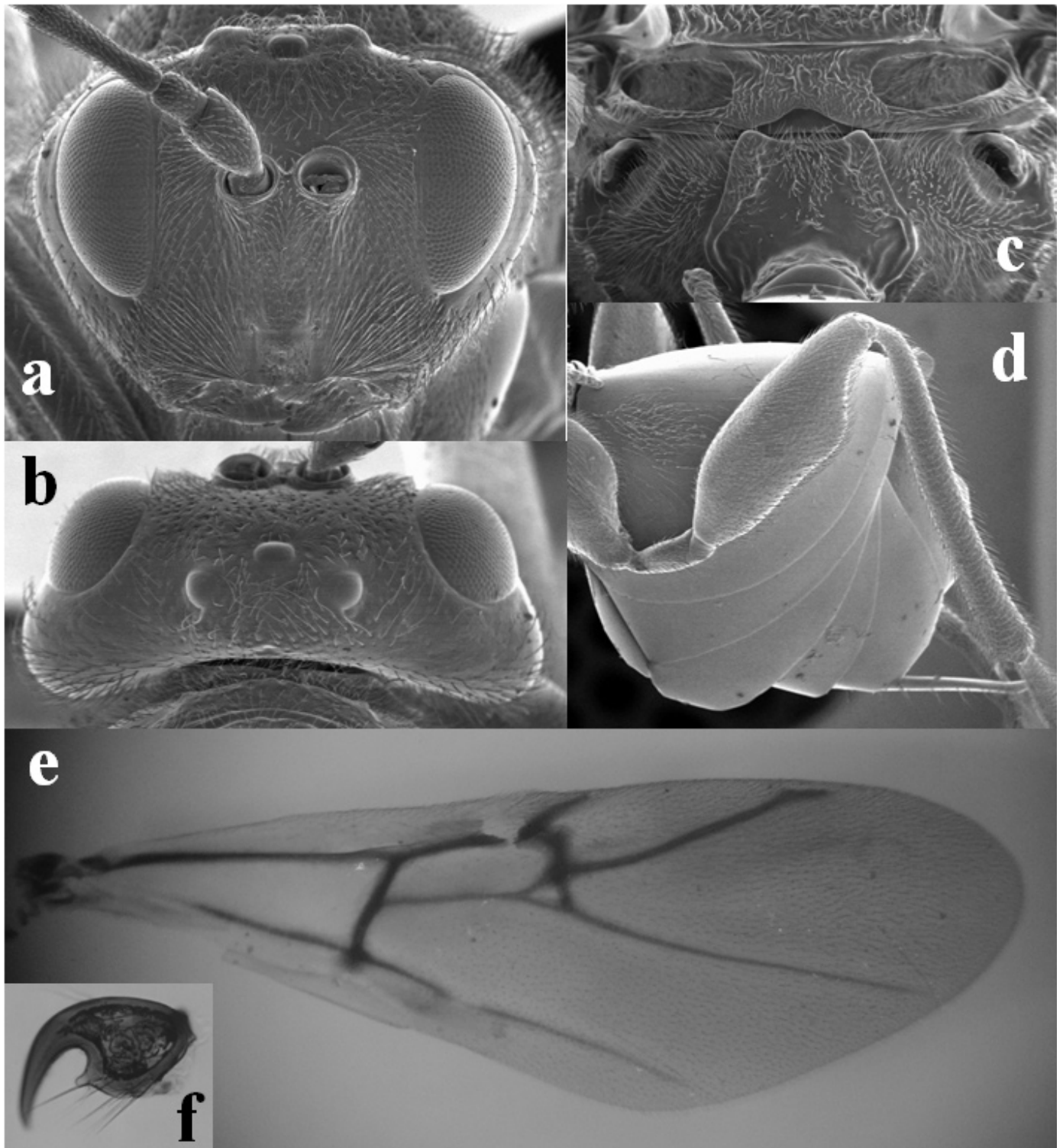


Figure 1.- *Odontocynips hansonii* n. sp.: (a) head in frontal view; (b) head in dorsal view; (c) propodeum; (d) metasoma and femur III; (e) forewings; (f) tarsal claw.

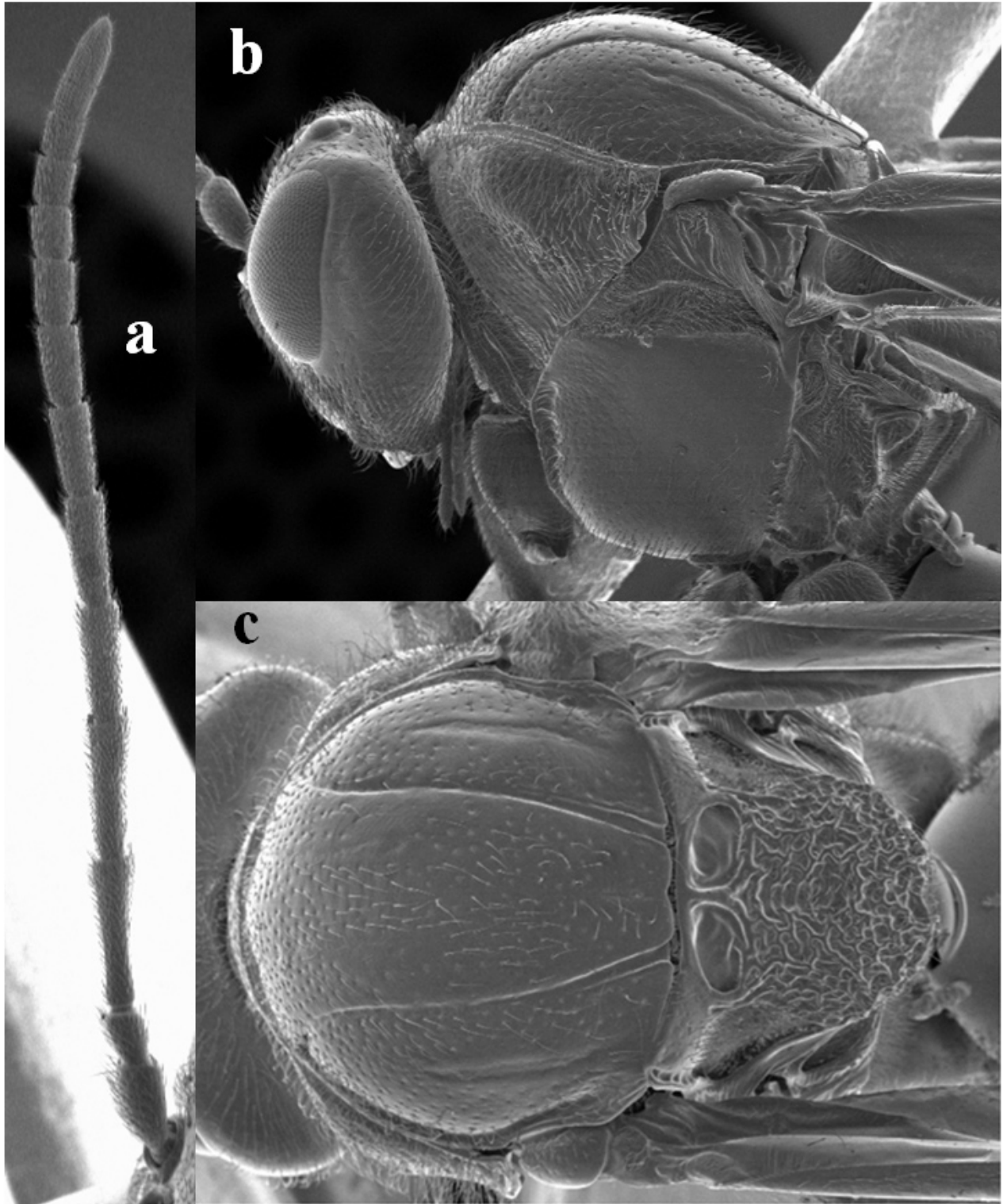


Figure 2.- *Odontocynips hansonii* n. sp.: (a) antenna; (b) head and mesosoma in lateral view; (c) mesosoma in dorsal view.

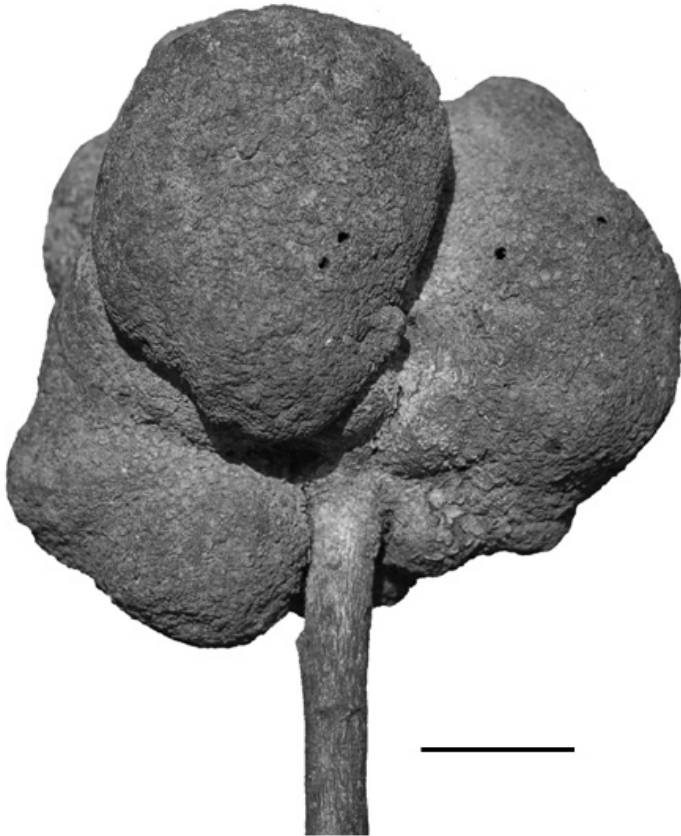


Figure 3.- Gall of *Odontocynips hansonii* n. sp. in *Q. insignis* branches. Scale 3 cm.

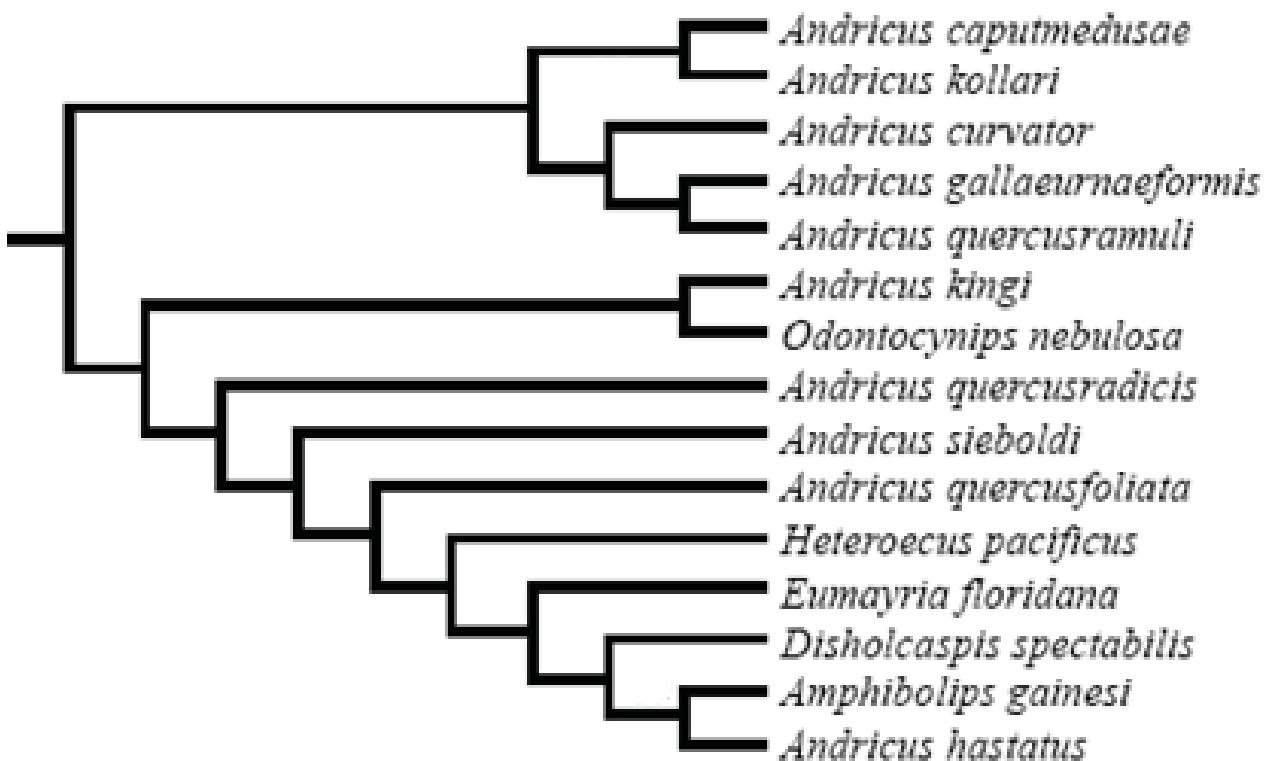


Figure 4.- Phylogenetic position of *Odontocynips* genus, after Liljeblad *et al.* (2008).

