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A new genus and species of Pteromalidae (Hymenoptera, Chalcidoidea) from Spain, parasitic in cynipid galls on *Fumaria*

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Abstract

Neaylax versicolor (Hymenoptera, Cynipidae), which forms galls on fumitory (*Fumaria*), is attacked in Spain by *Rivasia fumariae*, a species of Pteromalidae (Hymenoptera, Chalcidoidea) herein described as new and assigned to a new genus. The new genus has an unusual combination of morphological characters but seems best placed in the pteromalid subfamily Ormocerinae. An account is given of the biology and larval morphology of the new species.

Keywords: Chalcidoidea, Cynipidae, fumitory, *Neaylax*, new taxa, Ormocerinae, Pteromalidae, *Rivasia*

Introduction

The aylacine cynipid gall wasp *Aylax versicolor* Nieves-Aldrey, now provisionally assigned to the genus *Neaylax*, was found to produce galls in the fruits of fumitories (*Fumaria capreolata* and *F. officinalis*) (Nieves-Aldrey 2003). It is the only cynipid known to develop on this genus of Papaveraceae, and has been found in southern France, Greece (Corfu) and Spain. There is a single annual generation with galls developing quite rapidly in spring and falling to the ground when mature.

Some dissected galls of *N. versicolor* each contained a single fully grown chalcidoid larva (Figure 3C) that had consumed the host cynipid larva. These chalcids were reared to adults (Figure 3D–F) and were found to belong to an undescribed genus and species of Pteromalidae, assigned to Ormocerinae but having an exceptional combination of characters that requires a widening of the concept of the subfamily.

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PTEROMALIDAE**ORMOCERINAE***Rivasia* gen. nov.*Description*

Head and thorax with very fine, engraved reticulate sculpture and numerous quite conspicuous hair-pits. Head with occiput not margined; foramen magnum relatively high (Figure 1D); head in dorsal view with frons flat, not produced between eyes and scrobal depression not visible; antenna inserted distinctly below middle of face; clypeus marked off by a groove (Figure 1C), its anterior margin straight; anterior tentorial pits distinct; labrum in about same plane as clypeus. Mandibles (Figure 1C) bidentate. Antenna (Figure 1A) similar in both sexes, 12-segmented, formula 11163 (verified by both light microscope and SEM examination).

Pronotum long (Figure 1E), about as long as mesoscutum, without an offset collar. Mesoscutum with complete, deep notauli (Figure 1E). Scutellum with frenal area marked off by a shallow groove. Metapleuron not reaching hind wing cavity (Figure 1F). Propodeum (Figure 1E) medially shorter than half the length of scutellum; spiracles distant from anterior border. Metacoxa dorsally pilose; metatibia with two apical spurs.

Fore wing (Figure 2C) with postmarginal vein much longer than marginal vein; stigmal vein only a little shorter than marginal vein; stigma not enlarged.

Petiole of gaster short and transverse, smooth; gaster with posterior margins of tergites almost straight; hypopygium of female short, its tip at about one-third of gaster length (Figure 2A).

Type species

Rivasia fumariae sp. n. The genus is named after the locality where host galls were collected, the species after the host plant.

Comment

The correct placement of *Rivasia* within Pteromalidae proved difficult to determine. Applying Graham's (1969) keys it runs to Miscogasterinae, but in the key to tribes of this subfamily, progress beyond the second couplet is baulked by the combination of a relatively long postmarginal vein and bidentate mandibles, on the one hand (as in Micradelini), and metallic coloration and small but developed fore wing speculum on the other. In Micradelini there is no metallic coloration, notably dense pilosity on the eyes and dorsal surface of the thorax, clavate antennae with two or three anelli and transverse funicle segments. Relationship to Micradelini seems distant and *Rivasia* has more the appearance of Ormocerini (upgraded to Ormocerinae by Bouček 1988). However, none of the European genera included in this taxon by Graham (1969), nor any of the genera placed in Ormocerinae by Bouček (1988), have an antenna with just a single anellus followed by six funicle segments and a three-segmented clava, nor a large, campaniform pronotum.

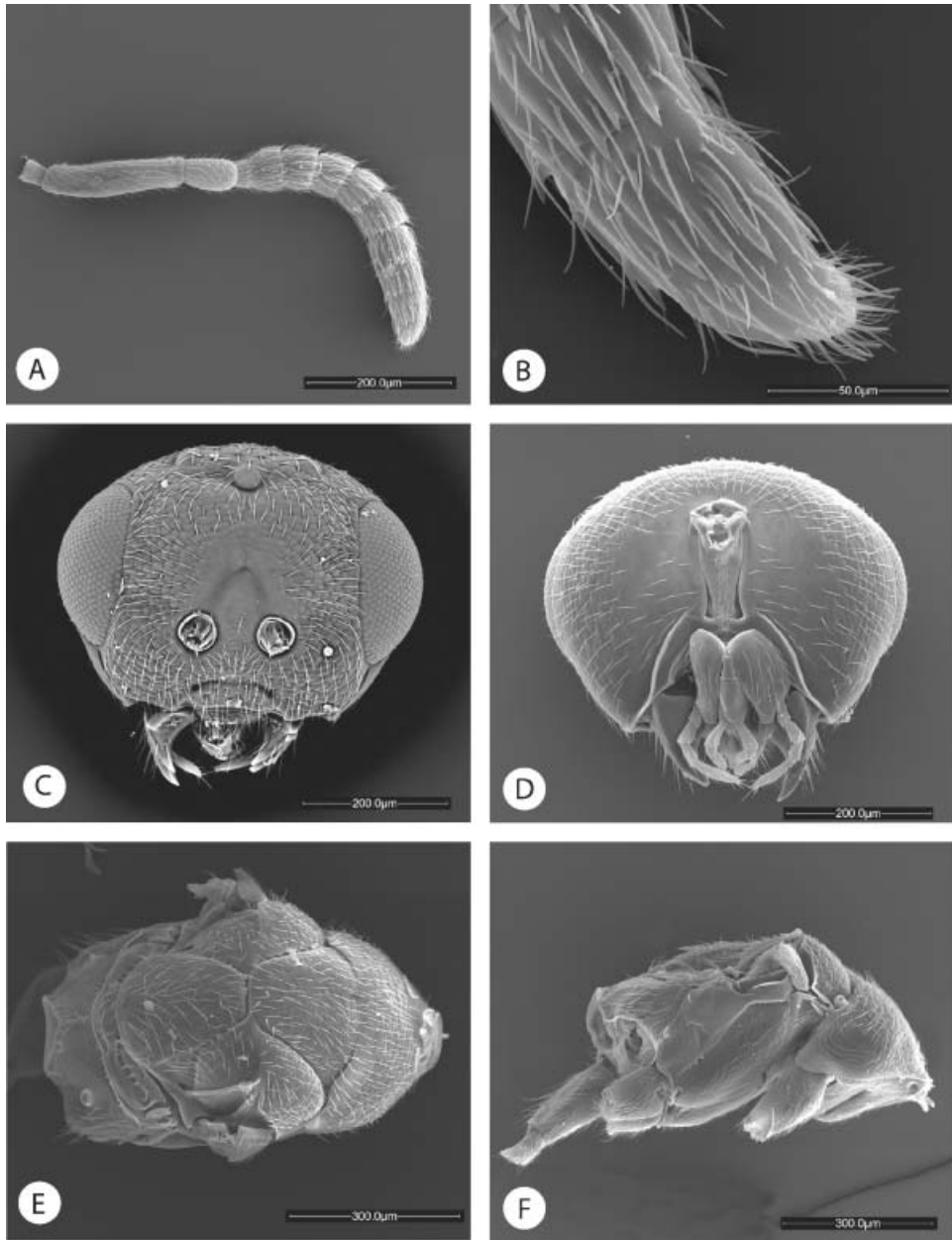


Figure 1. *Rivasia fumariae* sp. n., adult female. (A) Antenna; (B) detail of antennal clava; (C) head in anterior view; (D) head in posterior view; (E) mesosoma in dorsal view; (F) mesosoma in lateral view.

***Rivasia fumariae* sp. nov.**

(Figures 1–3)

Description

Female. Body dark green with coppery tints. Scape infusate with ventral edge testaceous; pedicel dark brown, faintly metallic; flagellum brown. Legs with coxae concolorous with

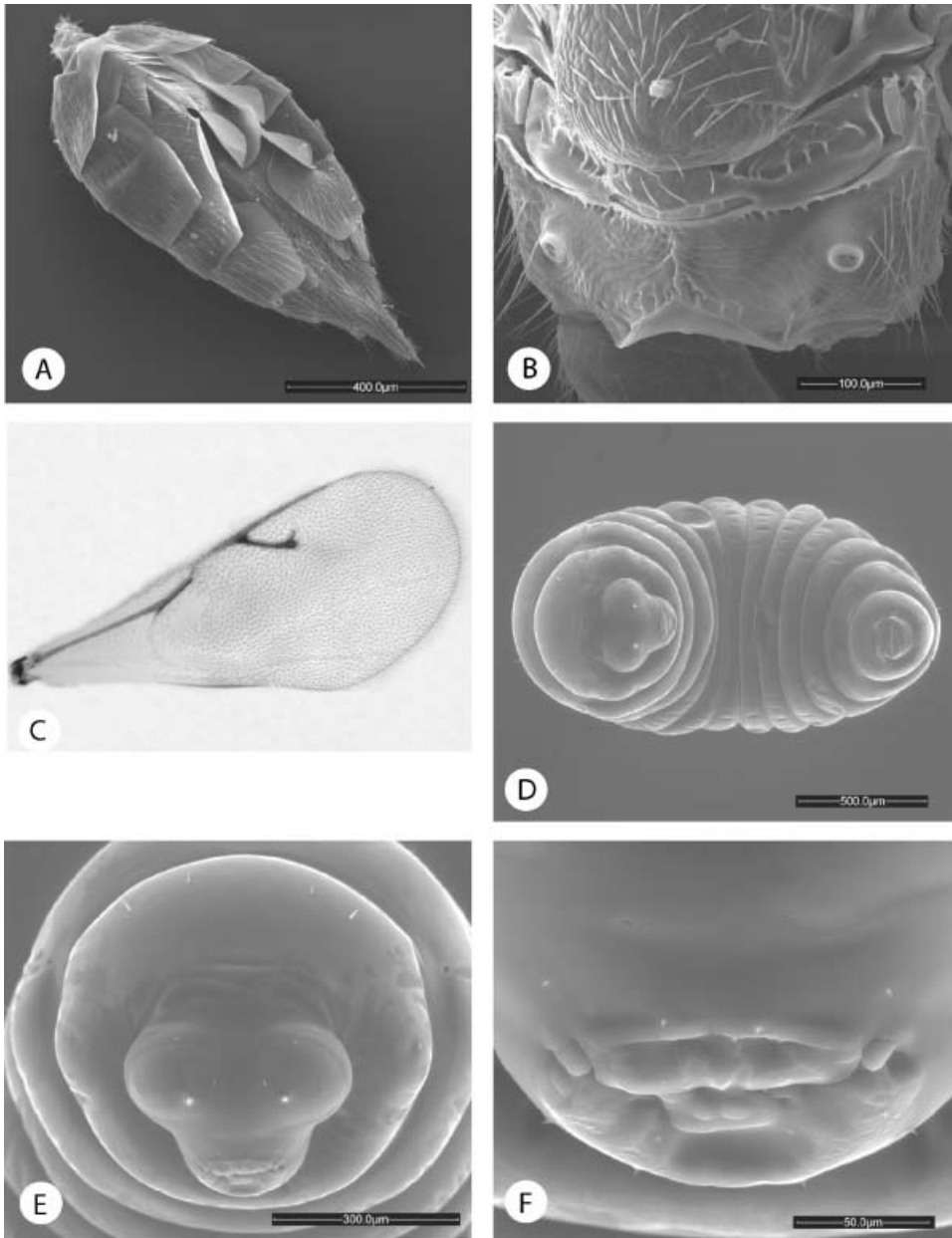


Figure 2. *Rivasia fumariae* sp. n. (A) Adult metasoma in ventral view; (B) mesosoma in posterodorsal view; (C) fore wing; (D) fully grown larva in ventral view; (E) fully grown larva, head in anterior view; (F) fully grown larva, oral region.

thorax; femora and tibiae bright testaceous, pro- and mesofemora brown on posterior surfaces in basal halves; all tibiae broadly brown on posterior surfaces; tarsi brown. Wings clear; tegulae, and parastigma, stigma and postmarginal veins brown, remainder of venation stramineous. Length 2.4 mm.

Head with vertex, face and clypeus very finely reticulate, the small areoles separated by relatively deeply engraved lines, and with numerous small piliferous punctures. Head in

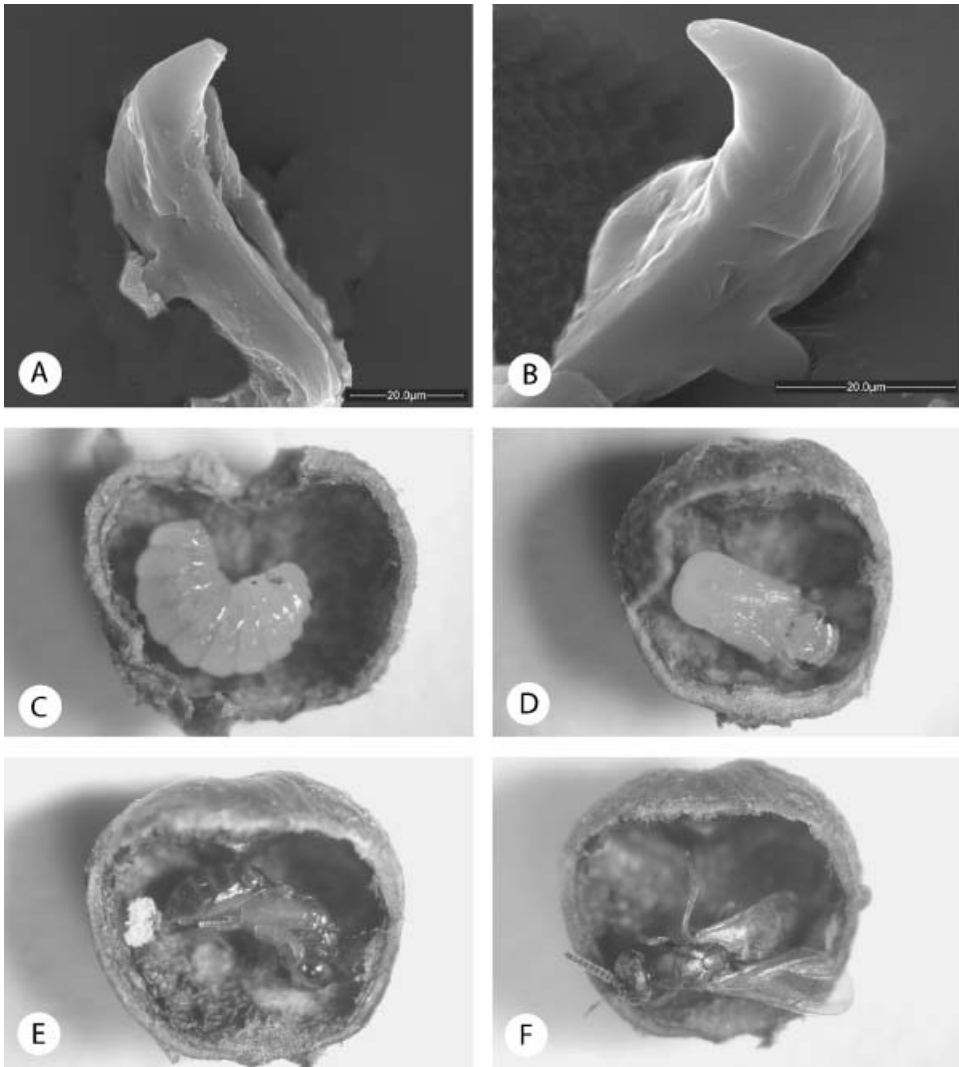


Figure 3. *Rivasia fumariae* sp. n. (A) Larva, left mandible; (B) larva, right mandible; (C) final instar larva *in situ* in gall of *Neaylax versicolor*; (D) pupa *in situ*; (E) late pupa *in situ*; (F) adult just after emerging from pupa.

dorsal view $1.1 \times$ as broad as mesoscutum, $2.1 \times$ as broad as long; temples slightly over half eye length; frons scarcely advanced in front of eyes, almost straight; POL about $2.0 \times$ OOL, posterior ocellus separated from eye by about $2 \times$ its diameter; eye with very short, inconspicuous hairs. Head (Figure 1C) in front view $1.44 \times$ as broad as high; vertex convex; inner eye margins slightly divergent ventrad, minimum (dorsal) separation $1.36 \times$ height of eye; gena gently curved; malar space $0.38 \times$ height of eye; mouth opening broad, more than $3 \times$ malar space; clypeus with anterior margin slightly recessed, very weakly concave; torulus with lower margin about level with bottom of eye and separated from upper margin of clypeus by only its diameter; antennal scrobes shallow, short, extending less than half distance between torulus and anterior ocellus, no interantennal prominence. Antenna (Figure 1A) with scape short, $4.3 \times$ as long as broad, not quite reaching lower margin of anterior ocellus; anellus plus first funicle segment almost as long as pedicel;

flagellum not clavate, broadening only slightly distally, all segments at least slightly broader than long, each with a single, transverse row of linear sensilla, clava (Figure 1B) with an apical tuft of two types of hair, one fine and bent, the other stout and weakly curved.

Thorax with dorsal sculpture similar to that of vertex, with very fine, engraved reticulation and many small piliferous punctures. Mesosoma in dorsal view (Figure 1E) $1.7\times$ as long as broad; pronotum $2\times$ as broad as long, campaniform, sloping from posterior margin to neck without indication of a collar; mesoscutum medially about as long as scutellum, $2\times$ as broad as long; scutellum about as broad as long, broadly based with scutello-axillar sutures not strongly convergent, meeting hind margin of mesoscutum only slightly mesad of notauli, a deep groove separating midlobe of mesoscutum from scutellum; frenum with sculpture similar to that of remainder of scutellum, the frenal groove weakly impressed; dorsellum slightly shorter than frenum and with similar sculpture. Mesosoma in lateral view (Figure 1F) $2\times$ as long as high, dorsal surface weakly convex; upper part of mesepisternum smooth. Hind leg with upper surface of coxa densely pilose; tibia with outer apical spur half as long as the inner which is a little longer than the apical breadth of the tibia. Propodeum (Figure 2B) medially $0.36\times$ length of scutellum; median carina weakly raised and irregular; lateral plicae indicated only at the hind margin of propodeum; median area with fine, weakly raised reticulation which tends to form irregular carinulae running obliquely from median carina; spiracle separated from anterior edge of propodeum by about two diameters and scarcely closer to metanotum than to supracoxal flange; callus quite thickly pilose; nucha short.

Fore wing (Figure 2C), basal cell entirely pilose; speculum small, not extending behind marginal vein, separated from cubital vein by a broad band of hairs, and from parastigma by a narrow band; costal cell with submarginal hairs on its upper surface in distal half or more; ratio lengths of costal cell: marginal vein: stigmal vein: postmarginal vein as 106:35:29:54; stigmal vein slightly curved, stigma small, but with relatively long uncus, separated by about $3\times$ its height from costal edge.

Petiole of gaster about $6\times$ as broad as long, smooth. Gaster (Figure 2A) sublanceolate, apically acute, almost $2\times$ as long as broad, longer than rest of body (70:59); ovipositor sheath protruding only slightly; hypopygium with tip at $0.3\times$ gaster length.

Male. Closely resembles female but with antennal scape broader, $3.3\times$ as long as broad, with a shiny boss extending over most of its anterior edge. Gaster obovate, $1.4\times$ as long as broad, about as long as mesosoma, without ventral plica.

Material

Holotype: ♀, Spain, Madrid, Rivas Vaciamadrid, ex gall of *Neaylax versicolor* Nieves-Aldrey on *Fumaria* sp. collected 25 May 2002, emerged March 2003 (J. L. Nieves-Aldrey). Deposited in Museo Nacional de Ciencias Naturales (Madrid) (MNCN). Allotype: ♂, data as holotype except emergence date January 2003. Deposited in MNCN. Paratypes: 1♀ data as holotype; 4♂ data as allotype. Deposited in The Natural History Museum (London), MNCN and Askew collection.

Additional material. 1♀, same data as holotype, prepared for scanning electron microscopy; 1♀, same data as holotype except emerged February 2003, preserved in alcohol; 1♀ found dead inside gall, still enclosed in pupal case.

Final instar larva

The last instar larva (Figure 2D) is hymenopteriform (Clausen 1940), with clear segmentation and no appendages. The integument is colourless and the shape fusiform, broader in the middle and ventrally curved. The integument is smooth with very few short setae concentrated in the head region and dorsally on the body segments. It measures 1.5–1.8 mm in length and 0.8 mm in breadth. Thirteen body segments follow the head which is trefoil-shaped in anterior view (Figure 2E), $1.3 \times$ as broad as high, with the large dorsal part, the vertex, clearly divided into two lateral parts. A short seta is visible dorsally on each lateral part of the vertex, and the two are separated by a distance slightly more than the distance between the antennae. The two antennal setae are short, each situated slightly above, and mesad to, an antenna. The antennae are small but conspicuous, separated by a distance about $1.6 \times$ as long as the distance between an antenna and the lateral margin of the head. The two genal setae are very short.

The clypeus (Figure 2F) is indistinct, its ventral margin straight, and it bears medially a pair of short clypeal setae; a pair of supraclypeal setae is also visible. The labrum is short and rectangular, straight at its ventral margin and laterally with a pair of papillae; a pair of very inconspicuous setae is visible on its anterior margin. The maxillae are indistinct. The labium is concave without visible setae or palps. The mandibles (Figure 3A, B) are simple and small, each with a single, acute tooth; only the bases of the mandibles are visible underneath the labrum.

Biology

Fully grown larvae of *R. fumariae* were found solitarily in galls of *N. versicolor* where they had fed upon the gall wasp larvae, but it is not known whether they had developed as ecto- or as endoparasitoids. Dates of adult emergence, which are for material retained indoors, indicate a univoltine life-cycle with an early spring (March/April) flight period, which would coincide with the time when *N. versicolor* galls are growing. The larvae appear to develop rapidly and are probably almost or quite fully grown by the time that the galled fruits drop to the ground. It is on the ground that the longest part of the life-cycle is passed.

The sex ratio of *R. fumariae*, from our limited data, seems to be even, with emergence of adult males clearly preceding that of females.

Comment

The problems encountered in assigning *Rivasia fumariae* to Ormocerinae have been discussed above. Its inclusion in that subfamily requires a broadening of the definition of Ormocerinae in order to accommodate the combination of antennal formula 11163, campaniform pronotum, metallic colour and relatively short marginal vein. These characters define *R. fumariae* in Miscogasterinae and Ormocerini *sensu* Graham (1969).

Among European genera of Ormocerinae, there are a few points of similarity between *Rivasia* and *Ormocerus* Walker, most particularly in that both are parasitoids in cynipid galls. *Ormocerus* attacks Cynipini on *Quercus*. Morphologically, however, there are many differences between the two genera, amongst which the more significant are the two anelli, short pronotum and deep scrobes in *Ormocerus*. The taxonomic position of *Rivasia* within Ormocerinae as currently known appears isolated.

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