

TWO NEW SPECIES OF *BARYSCAPUS* FÖRSTER FROM SPAIN (HYMENOPTERA: CHALCIDOIDEA: EULOPHIDAE)

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Abstract: Two new species of *Baryscapus* Förster are described. *Baryscapus salsolae* sp.n. was reared from galls of *Stefaniola salsolae* (Diptera: Cecidomyiidae) on *Salsola vermiculata*. *Baryscapus artemisiae* sp.n. was reared from galls of *Rhopalomyia ambrosinae* (Diptera: Cecidomyiidae) on *Artemisia herba-alba*.

Key words: Hymenoptera, Chalcidoidea, Eulophidae, Tetrastichinae, *Baryscapus*, new species, Spain.

Dos especies nuevas de *Baryscapus* Förster de España (Hymenoptera: Chalcidoidea: Eulophidae)

Resumen: Se describen dos especies nuevas de *Baryscapus* Förster. *Baryscapus salsolae* sp.n. se obtuvo emergiendo de agallas de *Stefaniola salsolae* (Diptera: Cecidomyiidae) en *Salsola vermiculata*. *Baryscapus artemisiae* sp.n. se obtuvo emergiendo de agallas de *Rhopalomyia ambrosinae* (Diptera: Cecidomyiidae) en *Artemisia herba-alba*.

Palabras clave: Hymenoptera, Chalcidoidea, Eulophidae, Tetrastichinae, *Baryscapus*, especie nueva, España.

Taxonomy/Taxonomía: *Baryscapus salsolae* sp.n., *Baryscapus artemisiae* sp.n.

Introduction

The genus *Baryscapus*, in the subfamily Tetrastichinae of Eulophidae, is very speciose and biologically diverse, currently containing 116 recognized species (Noyes, 2013), with a cosmopolitan distribution. It is characterized mainly by the body being black, or usually with metallic reflections, without pale markings but tegulae sometimes yellow, submarginal vein usually with 2 or more dorsal setae, gaster with cercal setae short and subequal in length, malar sulcus distinctly curved, and propodeal spiracles with rim wholly exposed, not covered by a flap of the callus. A few species are known with the submarginal vein having only 1 dorsal seta. The European species have been revised by Graham (1991), and classified in two species groups, *daira* and *evonymellae*. Since Graham's revision, a number of species have been described, several in the *evonymellae* group (Askew, 2007; Askew & Blasco-Zumeta, 1997; Askew & Shaw, 2005; Doğanlar, 1992, 1993; Gates *et al.*, 2005; Kostjukov & Gokhman, 2001; Kostjukov & Tuzlikova, 2002; Nieves-Aldrey & Askew, 2011; Yefremova & Yegorenkova, 2009). 26 species of *Baryscapus* have been recorded in Spain (Noyes, 2013; López-Sebastian *et al.*, 2003; Ribes, 2011), three described from this country (Askew & Blasco-Zumeta, 1997; Nieves-Aldrey & Askew, 2011; Ribes, 2013). Species of *Baryscapus* attack a wide variety of insect hosts (Lepidoptera, Hymenoptera, Coleoptera, Diptera, rarely Neuroptera and Coccoidea), as primary endoparasitoids or hyperparasitoids. Only a few species are known as parasitoids of Cecidomyiidae galls, such as *B. euphorbiae* Graham, which is likely to be a hyperparasitoid, or *B. fumipennis* (Girault), but many others are known as parasitoids of Cynipidae galls. Secondary parasitism, either facultative, obligatory or the preferred mode of development, is common in *Baryscapus* (Askew & Shaw, 2005).

Materials and methods

Specimens of two new species of *Baryscapus* in the *evonymellae* group were found in Lleida province, Spain, during a survey of the Chalcidoidea of the region. They emerged from galls of *Stefaniola salsolae* (Tavares) (Diptera: Cecidomyiidae) on *Salsola vermiculata* L. and from galls of *Rhopalomyia ambrosinae* Gagné (Diptera: Cecidomyiidae) on *Artemisia herba-alba* Asso. Further samples of these galls were collected at several locations and at different seasons of the year. Gall samples were stored indoor in polythene bags, controlled for condensation and fungal growth, and checked periodically for chalcid emergences. All galls from the same location and date were stored in one bag, and no studies or dissecting were done on individual galls, whose common parasitoids are relatively well known.

The specimens of Chalcidoidea that emerged from the galls were either killed with ethyl acetate, or placed directly in ethanol. Specimens in ethanol were dried using HMDS, and mounted on cards. Some antennae and wings were placed on microscope slides for detailed observation, using PVA as the mounting medium. Observations of card mounted specimens were made using a stereomicroscope with a maximum magnification of 90×, and a 144-LED ring as a light source. Measurements were taken mostly at maximum magnification, with an eye-piece micrometer with a scale of 10 mm divided by 100 units. Measurements of the females were taken from the holotype and several paratypes, the range of values for each measurement was evaluated, and any extreme value considered erroneous was either checked for accuracy or discarded. Photographs of whole specimens were taken with a compact digital camera placed over a trinocular stereomicroscope. Details of antennae and wings were similarly taken from slides with a trinocular optical microscope. Multiple images

of each photograph were combined using CombineZ5 software (Alan Hadley, micropics.org.uk). Scanning electron microphotographs (SEM) were taken of HMDS dried and gold coated dissected specimen parts using DSM940A Zeiss equipment, (high vacuum technique), at the “Servei de Microscòpia Electrònica de la Universitat de Lleida” (UdL).

Several species of *Baryscapus* in the *evonymellae* group and *Oomyzus* were examined for comparison while preparing the descriptions. These were mostly from the author’s collection and included *B. globosiclava* Graham, 1991 and *B. ?embolicus* (Kostjukov, 1977). Other species were compared on the basis of descriptions and illustrations. Terminology in the description follows Hymenoptera Anatomy Consortium (2013), except for *dorsellum* (sensu Graham, 1991), used instead of its synonym *metascutellum*. The following abbreviations are used for morphological terms in the text: F1-F4, funicle segments 1-4; C1-C3, club segments 1-3; POL, posterior ocellar length; OOL, ocular ocellar length; OD, ocellar diameter. Measurements of the mesosoma were taken as follows: length in dorsal or lateral view from pronotal collar to apex of propodeum; width in dorsal view between mesoscutum lateral lobes, excluding tegulae; height in lateral view from lower part of mesopleuron adjacent to mid coxa to dorsal surface of scutellum.

Results and discussion

Baryscapus salsolae sp.n.

DIAGNOSIS. Submarginal vein with only 1 dorsal seta, or with 2 setae in one or both wings, rarely more. Forewing with speculum very large, extending as a broad band below marginal vein up to the stigmal vein, speculum closed below and basal fold setose. Tegulae black, legs with tibiae pale brown to testaceous. In the male antennae scape with ventral plaque short, placed in the upper half near the middle, funicle without whorls of long dark setae, F1 much reduced, transverse.

DESCRIPTION.

Female (figs. 1a, 1c-e, 2): Body length 1.95–2.10 mm. Body (fig. 1a, 1c) with head and mesosoma metallic blackish-bronze, sometimes with purplish or bluish reflections on mesosoma dorsally, and dark bronze reflections on sides of mesosoma. Gaster dorsally purplish-bronze in basal half, and bluish towards apex, gaster in teneral specimens paler at base with the margins of tergites 1–3 yellowish. Tegulae black, posterior part of scapula narrowly yellow. Antennae with scape black, pedicel and flagellum brown. Legs with coxae and femora coloured as body, fore tibia testaceous, mid and hind tibia pale brown to yellowish testaceous, anterior tarsi brown, mid and hind tarsi testaceous except dark apex.

Head in dorsal view 0.9–1.0× as broad as mesoscutum, and 2.23–2.30× as broad as long, temples 0.21–0.24× as long as eye length. POL 2.08–2.30× OOL, OOL 1.45–1.55× OD. Eyes 1.27–1.31× as long as broad, separated by 1.36–1.43× their length, glabrescent. Head in frontal view (fig. 2a) 1.20–1.23× as broad as high, frons convex at sides, with fine alutaceous sculpture and shallow piliferous punctures, clypeus (fig. 2f) with two rounded and distinctly produced teeth. Occipital surface of head (fig. 2b) with shallow alutaceous sculpture. Malar space 0.70–0.75× height of eye, malar sulcus in lateral view (fig. 2e) distinctly curved. Mouth opening 1.13–1.15× as broad as malar space.

Antennae of female (fig. 1e) inserted at level of inferior margin of eyes. Scape 0.86–0.95× height of eye, barely reaching anterior ocellus, 3.9–4.5× as long as broad, with few setae on anterior margin. Pedicel plus flagellum 0.90–0.98× as long as breadth of mesoscutum and 0.96–0.98× as long as breadth of head, pedicel 2.25–2.55× as long as broad and 1.2–1.4× as long as F1. Annular segments 2, the first discoid and the second laminar. Funicle with 3 elongate segments, subequal in length with F2 slightly longer, proximally as stout as pedicel, distally slightly thickening, F3 1.02–1.10× as broad as F1, F1-F3 1.45–1.95×, 1.7–2.2× and 1.55–1.80× as long as broad respectively. Clava 3-segmented, 2.9–3.7× as long as broad, 1.05–1.15× as broad as F3 and 1.0–1.15× as long as F2+F3, clava slightly pointed at apex, apical spine short and indistinct. Funicle segments with short, decumbent pilosity, sensilla in 1 irregular row on each segment.

Mesosoma stout, 1.32–1.43× as long as broad, strongly convex, 0.96–1.04× as broad as high and 1.30–1.43× as long as high, propodeal slope at 45–50°. Pronotum 0.24–0.28× as long as mesoscutum, with scattered adpressed short setae over its surface and a row of longer setae on posterior margin. Mesoscutum (fig. 2c) 1.42–1.55× as broad as long, midlobe 0.9–1.0× as long as broad, with median line distinct, mesoscutum with engraved reticulate-imbricate sculpture, fine and shining, with areoles about 3× as long as broad. Adnotaular setae in a single row of 4–5 pale setae. Scutellum transverse (fig. 2d), 1.22–1.30× as broad as long, 0.70–0.72× as long as mesoscutum, strongly convex in both axes, sculpture similar to that of mesoscutum; scutellar submedian lines nearer to sublateral lines than to each other, enclosing a space 2.30–2.42× as long as broad; scutellum with two pairs of setae, the anterior pair slightly beyond the middle, placed nearer to submedian lines than to sublateral lines, their length 0.6–0.7× distance between submedian lines; circular placoid sensillum present between scutellar setae, nearer to anterior setae. Dorsellum 2.8–3.2× as broad as long, reticulate. Propodeum (fig. 2g) medially 1.15–1.30× as long as dorsellum and 0.28–0.30× as long as scutellum, propodeum width 3.4–3.6× as length at sides, shiny, with obsolescent reticulation, median carina low, callus with 2–3 setae. Propodeal spiracles moderate size, subcircular, separated from hind margin of metanotum by 0.9× their diameter, their rim wholly exposed, spiracles placed in a shallow depression that tapers posteriorly, with the inner edge of the depression running from the spiracles to hind corner of propodeum. Mesosternum slightly convex just in front of trochantal lobes. Legs of moderate length and thickness, hind coxa 2.1–2.3× as long as broad, with shallow engraved reticulation, hind femur 3.6–4.1× as long as broad. Mesotibia with apical spur 0.7–0.9× as long as basitarsus, basitarsus 0.7–0.8× as long as second tarsomere, fourth tarsomere slightly longer than basitarsus.

Forewing (fig. 1d) 2.0–2.1× as long as broad, venation pale brownish, parastigma and stigma slightly darker brown, venation without decolorized breaks on parastigma and base of stigmal vein. Submarginal vein frequently with only 1 dorsal seta, or with 2 setae on one or both wings, exceptionally more. Costal cell 10–12× as long as broad, 1.25–1.42× as long as marginal vein, its lower surface with a complete row of setae. Marginal vein slightly thickened, 3.10–3.85× as long as stigmal vein, with 9–12 setae on its front edge. Stigmal vein at an angle of about 50° with respect to costal wing margin, thick at base and barely expanding distally, stigma small.

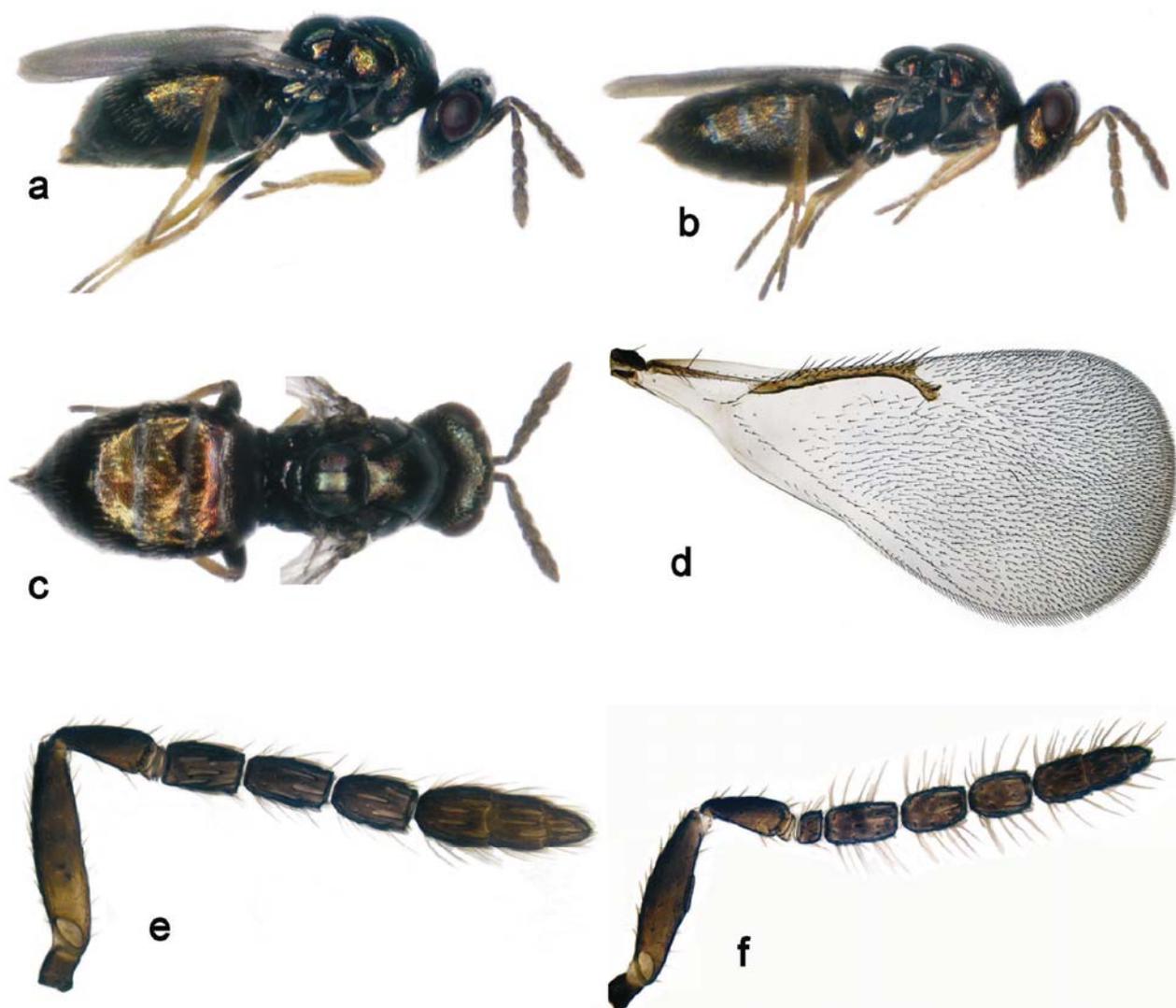


Fig. 1. *Baryscapus salsolae* sp. n. **a)** female, lateral view; **b)** male, lateral view; **c)** female, dorsal view; **d)** female forewing; **e)** female antenna; **f)** male antenna. / *Baryscapus salsolae* sp. n. **a)** hembra, aspecto lateral; **b)** macho, aspecto lateral; **c)** hembra, aspecto dorsal; **d)** ala anterior de la hembra; **e)** antena de la hembra; **f)** antena del macho.

Postmarginal vein a short stub, 0.2–0.4× as long as stigmal vein. Speculum very large, extending as a broad band below marginal vein up to the stigmal vein, closed below or rarely narrowly open below near basal fold, wing surface with moderately sparse pilosity beyond speculum, more densely pilose distally. Basal cell bare, open below, its ventral surface with 3–4 hair bases below submarginal vein, basal fold setose. Forewing marginal cilia 0.23–0.30× as long as stigmal vein. Hindwing subacute at apex, with marginal cilia 0.21–0.25× as long as width of hindwing.

Gaster broadly ovate (fig. 1c), 1.40–1.65× as long as broad, 1.05–1.15× as long as head plus mesosoma, 1.4–1.5× as long and 1.25–1.38× as broad as mesosoma, subacute at apex. Last tergite 2.0–2.8× as broad as long. Cercal setae subequal in length, pale, nearly straight. Ovipositor sheaths very slightly exerted. Hypopygium tip reaching 0.65–0.70× length of gaster. Hypopygium with lateral lobes broad, median lobe less broad, shorter, and narrowing at apex, posteriorly with 1 pair of stronger submedial setae, and usually 3–4

pairs of smaller setae near the middle of lateral lobes, or 5–6 pairs in 2 of 6 samples prepared.

Male (figs. 1b, 1f): Similar to female, differing in antennal and gastral structure. Body (fig. 1b) length 1.5–2.1 mm. Antenna (fig. 1f) with scape very slightly broadened, 3.6–4.2× as long as broad, ventral plaque short, 0.19–0.25× as long as scape, placed in the upper half near the middle. Pedicel plus flagellum 1.0–1.03× as long as breadth of mesoscutum and 0.97–1.02× as long as breadth of head. Funicle with 4 segments, with short suberect setae, without whorls of long dark setae, F1 much reduced, transverse to almost anelliform, 0.50–0.68× as long as broad and 0.28–0.33× as long as F2, F2–F4 elongate, 1.75–1.90×, 1.5–1.7×, and 1.40–1.65× as long as broad respectively. Clava 2.85–3.30× as long as broad, 0.90–1.08× as long as F3+F4. Gaster 1.45–1.70× as long as broad, 1.15–1.43× as long as mesosoma. Male genitalia about 4.5× as long as broad, digitus with one strong spine directed obliquely.

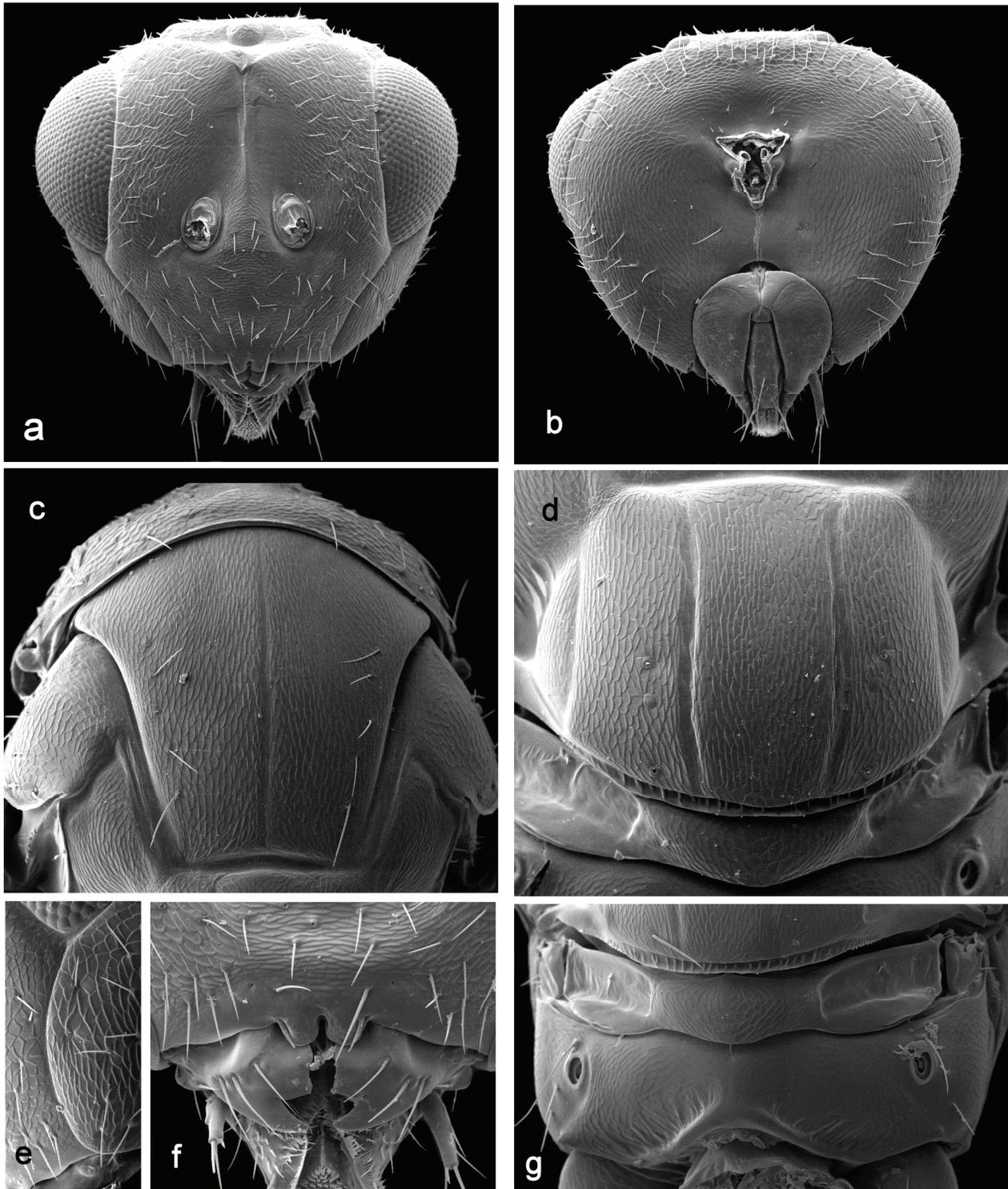


Fig. 2. *Baryscapus salsolae* sp. n., female SEM microphotographs. **a)** head, frontal view; **b)** head, posterior view; **c)** mesoscutum; **d)** scutellum; **e)** malar sulcus; **f)** clypeus and mandibles; **g)** propodeum. / *Baryscapus salsolae* sp. n., hembra, microfotografías SEM. **a)** cabeza, aspecto frontal; **b)** cabeza, aspecto occipital; **c)** mesoscutum; **d)** escutelo; **e)** surco genal; **f)** clipeo y mandíbulas; **g)** propodeo.

TYPE MATERIAL.

HOLOTYPE. SPAIN: Alfès (Lleida), UTM 31T CG00, 1 ♀, reared from *Stefaniola salsolae* (Tavares) galls on *Salsola vermiculata*, collected 23.v.2013, emerged 24.v.2013 (leg. A. Ribes).

ALLOTYPE. SPAIN: 1 ♂, data as for holotype.

PARATYPES. 40 ♀♀, 20 ♂♂, same data as holotype, except emergence dates 24.v-14.vi.2013.

The holotype, allotype and 30 paratypes (20 ♀♀, 10 ♂♂) are deposited in the Museo Nacional de Ciencias Naturales, Madrid, and the remaining 30 paratypes in the author's collection.

ADDITIONAL MATERIAL. 70 ♀♀ 38 ♂♂, all specimens reared from *Stefaniola salsolae* galls on *Salsola vermiculata*. SPAIN, Lleida: Alfès, 50 ♀♀ 27 ♂♂, same data as holotype, except emerging dates 24.v-21.vi.2013 ; Sarroca, UTM 31T

BF99, 2 ♀♀, 1 ♂, galls collected 4.v.2006, emerged 29.v.2006; Aitona, UTM 31T BF89, 3 ♀♀, 1 ♂, galls collected 15.ix.2012, emerged 17-29.ix.2012; Aspa, UTM 31T CF09, 3 ♀♀, 1 ♂, galls collected 9.iv.2013, emerged 24-28.v.2013; Utxesa, UTM 31T BF99, 1 ♀, galls collected 4.vi.2013, emerged 7.vi.2013; Torres de Segre, UTM 31T BF99, 2 ♀♀, 1 ♂, galls collected 11.vi.2013, emerged 28.vi.2013 (leg. A. Ribes); Zaragoza: Pina de Ebro, UTM 30T YL29, 7 ♀♀ 5 ♂♂, from galls collected 22.v.1992, 1 ♀, from galls collected 22.viii.1992, 1 ♀ 2 ♂♂, from galls collected 13.v.1993 (leg. J.Blasco-Zumeta, coll. R.R.Askew). This additional material is not included as paratypes because there are many specimens reared partly stored in ethanol, enough paratypes selected, and several specimens in another collection.

ETYMOLOGY. Named after its host plant.

VARIATION. In *B. salsolae* variation exists in the number of dorsal setae in the submarginal vein. In females, out of 52 specimens examined, 36% have 1 dorsal seta on both wings, 33% have 1 seta on one wing and 2 setae on the other wing, 27% have 2 setae on both forewings, and 4% have 3 or 4 setae on one or both wings. In males proportions of specimens with 1 dorsal seta increased: out of 29 specimens examined 76% have 1 dorsal seta, 17% have 1 seta on one wing and 2 setae on the other wing, and 7% have 2 setae on both wings. With these values combined, the proportion of specimens with 1 seta on one or both wings was 69% in females and 93% in males.

COMMENTS. An unusual feature frequently present in *B. salsolae*, and always in *B. artemisiae* sp.n., described below, is the submarginal vein with only 1 dorsal seta, and this may result in some doubts about their generic placement. Most Tetrastichinae species having submarginal vein with 1 dorsal seta belong to other genera, and *B. artemisiae* and specimens of *B. salsolae* with 1 seta may run to *Oomyzus* using the genera keys in Graham (1991). They differ from *Oomyzus*, however, in the malar sulcus being strongly curved (virtually straight in *Oomyzus*, except in one species), propodeum shiny, with obsolescent reticulation (often with distinct raised reticulation in *Oomyzus*), POL more than twice OOL (usually less than twice OOL in *Oomyzus*), submarginal vein sometimes with 2 setae in one or both wings (1 in *Oomyzus*, except in one species), and biology (known hosts of *Oomyzus* are various, but do not include Cecidomyiidae). *B. salsolae* and *B. artemisiae* resembles also *Dzhanokmenia* with the submarginal vein having 1 dorsal seta, and the venation thickened with a short stigmal vein, but this genus differs in the forewing being without marginal cilia, clypeus with shallow teeth, and antennae inserted below level of inferior margin of eyes. Apart from the character of the number of setae on the submarginal vein, these species much resemble *Baryscapus*, mainly in the malar sulcus being strongly curved, and in the previously mentioned characters which are typical of *Baryscapus* but not of *Oomyzus*. A few species have characters intermediate between both genera and could be provisionally placed in either of them. Within *Baryscapus* there are only two species, *B. embolicus* (Kostjukov) and *B. globosiclava* Graham, having the submarginal vein with only 1 dorsal seta, or sometimes 2 in one wing. *B. salsolae* resembles these species also in other characters, such as the large speculum and thick venation with short stigmal vein, *B. artemisiae* resembles them also in the yellow tegulae, which is unusual in

Baryscapus, and both species resemble them in the shape of male antenna, as commented below. So *B. salsolae* and *B. artemisiae* are placed here in the genus *Baryscapus*, within the *evonymellae* group, where they may form a subgroup together with *B. embolicus* and *B. globosiclava*. Some other undescribed species which may also belong to this subgroup have been found in Spain. Additionally perhaps also included in this subgroup are *B. luculentus* Yefremova & Yegorenkova and *B. sana* Yefremova & Yegorenkova, described from Yemen (Yefremova & Yegorenkova, 2009). These species have a submarginal vein with 2 dorsal setae and they share with *B. embolicus* some characters exceptional in *Baryscapus* such as yellow tegulae and F1 in female reduced, half as long as F2. The male antennae of *B. salsolae* and *B. artemisiae* share with these species from Yemen the character of a much reduced, anelliform F1 which, again, is exceptional in *Baryscapus* (although more frequent in *Oomyzus*). The males of *B. embolicus* and *B. globosiclava* are undescribed, but some specimens collected together with females and which may belong to these species have F1 transverse too. This shape of the male antenna is the only unusual character present simultaneously in all six species. Possibly further data from molecular analysis could clarify relationships between this subgroup of species and other species in *Baryscapus*, *Oomyzus* and *Dzhanokmenia*.

DIFFERENTIAL DIAGNOSIS. *B. salsolae* females do not run well in Graham's (1991) key to species, and as previously stated, the species has some characters in common with *B. embolicus* and *B. globosiclava* in couplets 2-3, mainly the submarginal vein frequently with only 1 dorsal seta, the speculum large and extending below the marginal vein up to the stigma, and venation thick with a short stigmal vein. It differs from *B. embolicus* in the female antennae with F1, as long as F2 (reduced and 0.5× as long as F2 in *B. embolicus*). It differs from *B. globosiclava* in the female clava being more elongate, 3.2–3.7× as long as broad (1.5× in *B. globosiclava*), and fore coxa and tegulae black (fore coxa and tegulae yellow in *B. globosiclava*). *B. salsolae* mostly resembles *B. artemisiae* sp.n., their differences discussed in its description below. The specimens of *B. salsolae* having the submarginal vein with 2 dorsal setae may run to *B. servadeii* (Domenichini) in Graham's key, because of the long hypopygium reaching 0.65–0.70× length of gaster, but this species differs in the narrower gaster, more than twice as long as broad (1.40–1.65× as long as broad in *B. salsolae*), or alternatively it may run to *B. spenceri* Graham, but this species differs in the forewings with a small speculum, not extending below marginal vein, and the hypopygium shorter. The shape of the depression where the propodeal spiracles are placed, and the circular placoid sensillum on the scutellum, are similar to *B. diorhabdivorus* Gates & Myartseva, and several other *Baryscapus* species. *B. diorhabdivorus* also has a gaster with a long hypopygium, and male antenna with F1 slightly reduced and transverse, but it differs in the submarginal vein having 3 dorsal setae, gaster more elongate, funicle segments barely longer than broad, and different biology, associated with Coleoptera in *Tamarix* sp. (Gates *et al.*, 2005).

The males also do not run well in Graham's (1991) keys. Males of *B. embolicus* and *B. globosiclava* are unknown, and all other species have a submarginal vein with 2 or more dorsal seta, and antennae with F1 not reduced. As commented before, *B. salsolae* males resemble *B. luculentus*

and *B. sana* in having antennae with F1 much reduced, almost anelliform, and lacking whorls of long dark setae, partly similar also in *B. diorhabdivorus*, but they differ from males of these species in the submarginal vein having usually 1 dorsal seta (2 in *B. luculentus* and *B. sana*, 3 in *B. diorhabdivorus*), forewings with speculum broad (speculum absent in *B. luculentus*), F1 transverse but not anelliform (F1 anelliform in *B. sana*), and F2 1.75–1.90× as long as broad (F2 1.2× as long as broad in *B. diorhabdivorus*).

BIOLOGY. *B. salsolae* has been reared from *Stefaniola salsolae* (Cecidomyiidae) galls on *Salsola vermiculata*. It was found emerged in a small proportion of gall samples (six of forty samples), and usually in low numbers, except in one sample where it was the dominant parasitoid. Its exact relationship with the host has not been established as a number of other Cecidomyiidae parasitoids emerged from the same gall samples, including *Idiomacromerus longicornis* Askew, *KoLOPTERNA blascoi* Askew, *Ormyrus monegricus* Askew, *Mesopolobus szelenyii* Bouček, *Platygaster stefaniolae* Buhl, etc, similar to the parasitoids found in the Monegros region, where several parasitoids of *S. salsolae* galls were recorded and described (Askew *et al.*, 2001). It could be a primary parasitoid of Cecidomyiidae, or possibly a secondary parasitoid, as are other species in *Baryscapus*. The species appears to be bivoltine, with two emergence periods, the first in May–June and the second in September. From galls collected in winter, a first generation emerged 24.v–28.vi. From galls collected in summer, some specimens of another generation emerged 26–29.ix. The sex ratio of the specimens was biased towards females: of 154 specimens emerging from all samples, 66% were females.

Baryscapus artemisiae sp.n.

DIAGNOSIS. Submarginal vein with only 1 dorsal seta. Forewing with speculum very large, extending as a broad band below marginal vein up to the stigmal vein, speculum open below and basal fold bare. Mid-lobe of mesoscutum with adnotaular setae in a single row of only 2–3 setae. Tegulae yellow, legs with tibiae and apex of femora yellow. In the male antennae scape with ventral plaque short, placed in the upper half near the middle, funicle without whorls of long dark setae, F1 much reduced, transverse.

DESCRIPTION.

Female (figs. 3a, 3c–e, 4): Body length 1.40–1.65 mm., rarely 1.0–1.2 mm. in dwarfs. Body (fig. 3a, 3c) with head and mesosoma metallic dark bronze, with bluish reflections on head, propodeum, sides of mesosoma, and sometimes dorsum of mesosoma, gaster dorsally dark bronze, sometimes tergites with bluish apical margin or gaster bluish at apical half, gaster ventrally with bluish reflections. Tegulae yellow, sometimes brown at apical margin, posterior part of scapula narrowly yellow. Antennae with scape testaceous to pale brown, paler at base, pedicel brown, flagellum pale brown, sometimes testaceous brown or with clava slightly darker. Legs with coxae coloured as body, anterior and mid trochantellus yellow, femora black at basal two thirds, yellow at apex, the anterior and mid femora entirely yellow on anterior side, only darkened at posterior side, tibiae bright yellow, tarsi testaceous except dark apex.

Head in dorsal view 1.05–1.10× as broad as mesoscutum, and 2.05–2.20× as broad as long, temples 0.21–0.25× as

long as eye length. POL 1.75–2.10× OOL, OOL 1.85–2× OD. Eyes 1.30–1.35× as long as broad, separated by 1.32–1.40× their length, with short sparse setae. Head in frontal view (fig. 4a) 1.15–1.20× as broad as high, frons convex at sides, with fine alutaceous sculpture and shallow piliferous punctures, clypeus (fig. 4e) with two rounded and distinctly produced teeth. Occipital surface of head (fig. 4b) with very shallow alutaceous sculpture. Malar space 0.65–0.70× height of eye, malar sulcus in lateral view distinctly curved. Mouth opening 1.45–1.60× as broad as malar space.

Antennae of female (fig. 3e) inserted at level of inferior margin of eyes. Scape 0.83–0.90× height of eye, not reaching anterior ocellus, 4.5–5.3× as long as broad, with few setae on anterior margin. Pedicel plus flagellum 0.90–0.95× as long as breadth of mesoscutum and 0.83–0.90× as long as breadth of head, pedicel 2.0–2.4× as long as broad and 1.55–2.05× as long as F1. Annular segments 2, the first discoid and the second laminar. Funicle with 3 moderately elongate segments, subequal in length with F2 slightly longer, proximally as stout as pedicel, distally slightly thickening, F3 1.05–1.20× as broad as F1, F1–F3 1.20–1.35×, 1.30–1.65× and 1.10–1.35× as long as broad respectively. Clava 3-segmented, 2.65–3.40× as long as broad, 1.13–1.20× as broad as F3 and 1.30–1.35× as long as F2+F3, clava slightly pointed at apex, apical spine short and indistinct. Funicle segments with short, decumbent pilosity, sensilla in 1 irregular row on each segment.

Mesosoma stout, 1.32–1.40× as long as broad, strongly convex, 1.03–1.06× as broad as high and 1.35–1.50× as long as high, propodeal slope at 45°. Pronotum 0.30–0.35× as long as mesoscutum, with scattered adpressed short setae over its surface and a row of longer setae on posterior margin. Mesoscutum (fig. 4c) 1.6–1.7× as broad as long, midlobe 0.8–0.9× as long as broad, with median line distinct, mesoscutum with engraved reticulate-imbricate sculpture, fine and shining, with areoles about 3× as long as broad. Adnotaular setae in a single row of only 2–3 pale setae. Scutellum transverse (fig. 4d), 1.27–1.40× as broad as long, 0.7× as long as mesoscutum, strongly convex in both axes, sculpture similar to that of mesoscutum; scutellar submedian lines nearer to sublateral lines than to each other, enclosing a space 1.8–2.0× as long as broad; scutellum with two pairs of setae, the anterior pair in the middle, placed slightly nearer to submedian lines than to sublateral lines, their length 0.60–0.65× distance between submedian lines; circular placoid sensillum present between scutellar setae, nearer to anterior setae. Dorsellum 3–3.4× as broad as long, sculptured. Propodeum (fig. 4f) medially short, 1.20–1.43× as long as dorsellum and 0.33–0.40× as long as scutellum, propodeum width 3.0–3.6× as length at sides, shiny, with obsolescent reticulation, median carina low or indistinct, callus with 2(3) setae. Propodeal spiracles small, subcircular, separated from hind margin of metanotum by 0.8–0.9× their diameter, their rim wholly exposed, spiracles placed in a shallow depression that tapers posteriorly, with the inner edge of the depression running from the spiracles to hind corner of propodeum. Mesosternum slightly convex just in front of trochantal lobes. Legs of moderate length and thickness, hind coxa 2.0–2.25× as long as broad, subvertical, with shallow superficial reticulation, hind femur 3.7–3.8× as long as broad. Mesotibia with apical spur 0.8–0.9× as long as basitarsus, basitarsus 0.8× as long as second tarsomere, fourth tarsomere slightly longer than basitarsus.

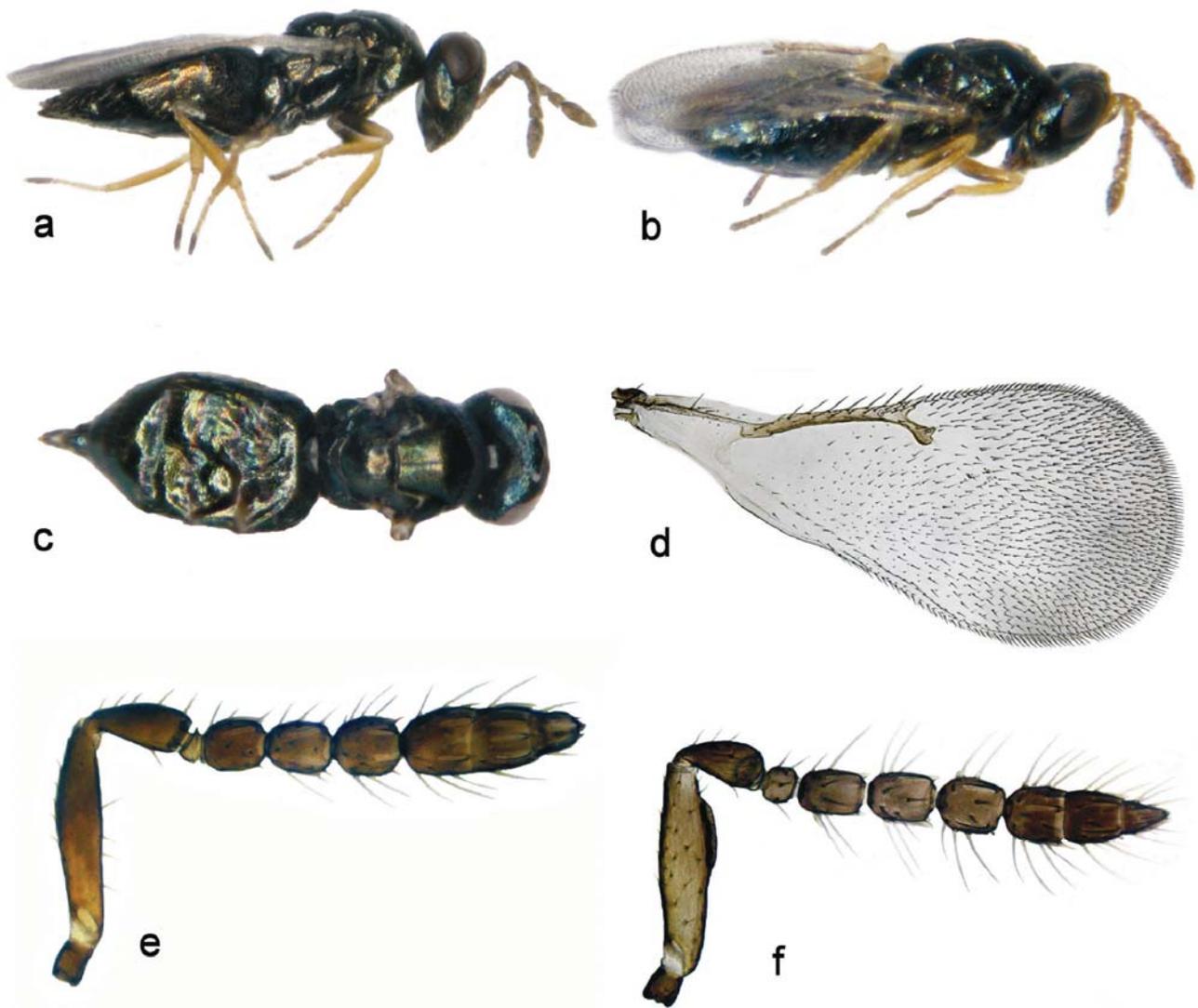


Fig. 3. *Baryscapus artemisiae* sp. n. **a)** female, lateral view; **b)** male, lateral view; **c)** female, dorsal view; **d)** female forewing; **e)** female antenna; **f)** male antenna. / *Baryscapus artemisiae* sp. n. **a)** hembra, aspecto lateral; **b)** macho, aspecto lateral; **c)** hembra, aspecto dorsal; **d)** ala anterior de la hembra; **e)** antena de la hembra; **f)** antena del macho.

Forewing (fig. 3d) 2.0–2.15× as long as broad, venation yellowish to pale brown, parastigma and stigma sometimes pale brown, venation without decolorized breaks on parastigma and base of stigmal vein. Submarginal vein with only 1 dorsal seta. Costal cell 10× as long as broad, 1.15–1.30× as long as marginal vein, its lower surface with a partial row of setae. Marginal vein slightly thickened, 3.3–3.9× as long as stigmal vein, with 6–8 setae on its front edge. Stigmal vein at an angle of about 50° with respect to costal wing margin, thick at base and barely expanding distally, stigma small. Postmarginal vein a short stub, 0.25–0.35× as long as stigmal vein. Speculum very large, extending as a broad band below marginal vein up to the stigmal vein, open below. Basal cell bare, open below, basal fold asetose. Wing surface with sparse, pale and indistinct pilosity beyond speculum, more dark, distinct and densely pilose distally. Forewing marginal cilia long, 0.5× as long as stigmal vein. Hindwing subacute at

apex, with marginal cilia 0.35–0.40× as long as width of hindwing.

Gaster ovate (fig. 3c), 1.70–1.85× as long as broad, 1.0–1.15× as long as head plus mesosoma, 1.35–1.55× as long and 1.05–1.20× as broad as mesosoma, acute at apex. Last tergite 1.25–1.70× as broad as long. Cercal setae subequal in length, pale, nearly straight. Ovipositor sheaths very slightly exerted. Hypopygium tip reaching 0.45–0.55× length of gaster. Hypopygium with lateral lobes broad, median lobe less broad, shorter, and narrowing at apex, hypopygium posteriorly with 1 pair of stronger submedial setae, and 0–1 pairs of smaller setae near the middle of lateral lobes, in the 2 samples prepared.

Male (figs. 3b, 3f): Similar to female, differing in antennal and gastral structure, and brown tegulae. Body (fig. 3b) length 1.1–1.2 mm. Antenna (fig. 3f) with scape very slightly broadened, 3.7–3.8× as long as broad, ventral plaque moderate,

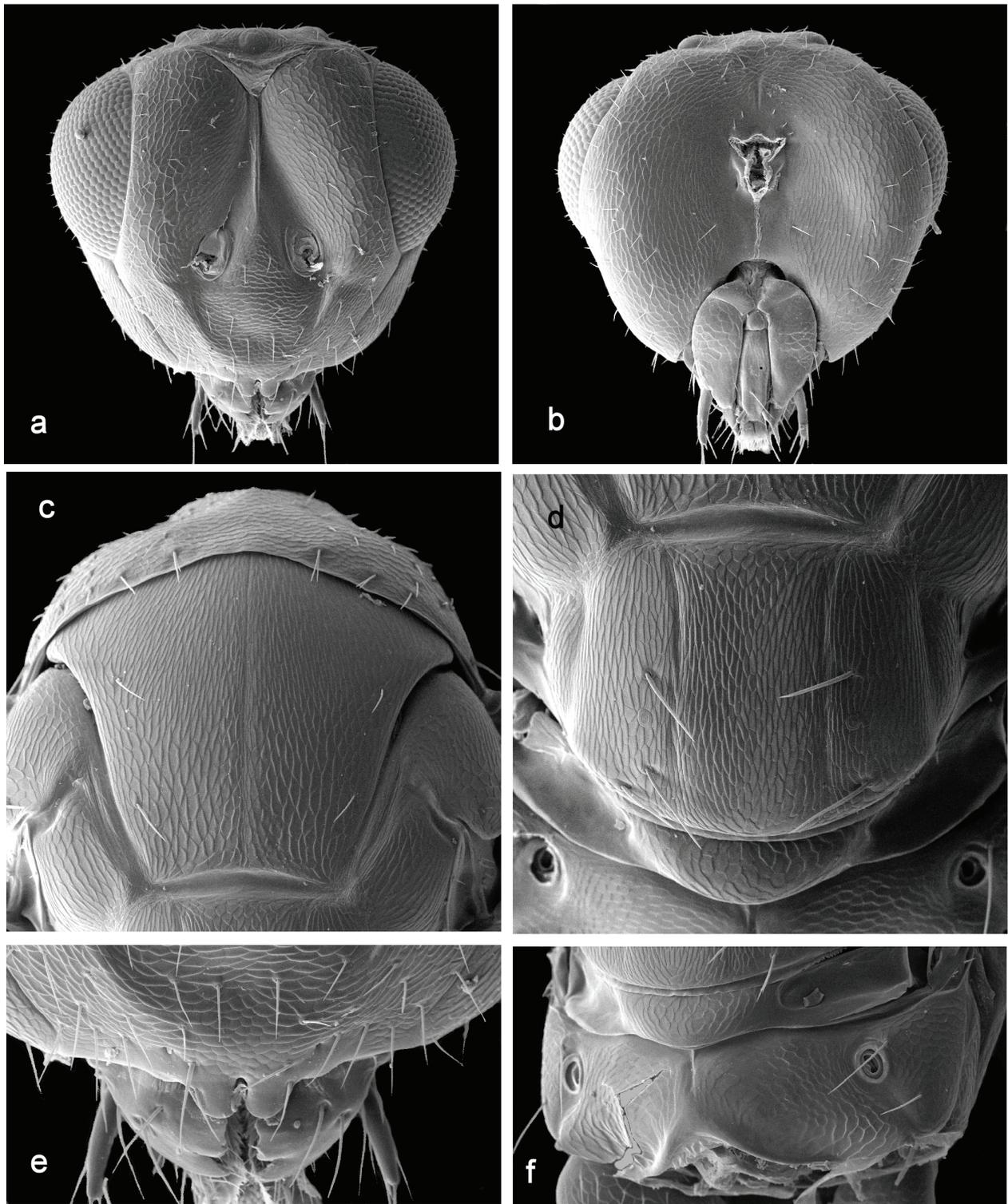


Fig. 4. *Baryscapus artemisiae* sp. n., female SEM microphotographs. **a)** head, frontal view; **b)** head, posterior view; **c)** mesoscutum; **d)** scutellum; **e)** clypeus and mandibles; **f)** propodeum. / *Baryscapus artemisiae* sp. n., hembra, microfotografías SEM. **a)** cabeza, aspecto frontal; **b)** cabeza, aspecto occipital; **c)** mesoscutum; **d)** escutelo; **e)** clipeo y mandíbulas; **f)** propodeo.

0.3× as long as scape, placed in the upper half near the middle. Pedicel plus flagellum 0.93–0.95× as long as breadth of mesoscutum and 0.9× as long as breadth of head. Funicle with 4 segments, with short suberect setae, without whorls of long dark setae, F1 much reduced, transverse, 0.70–0.75× as long as broad and 0.44–0.47× as long as F2, F2–F4 moderately elongate, 1.25–1.40×, 1.25–1.35×, and 1.2–1.4× as long as broad respectively. Clava 2.25–2.90× as long as broad, 1.05–

1.20× as long as F3+F4. Gaster 1.4–1.5× as long as broad, 1.15–1.25× as long as mesosoma. Male genitalia about 4.5× as long as broad, digitus with one strong spine directed obliquely.

TYPE MATERIAL.

HOLOTYPE. SPAIN: Torres de Segre, Tossal de Carrasumada (Lleida), UTM 31T BF99, 1 ♀, reared from *Rhopalomyia*

ambrosinae Gagné galls on *Artemisia herba-alba*, collected 29.i.2013, emerged 6.v.2013 (leg. A. Ribes).

ALLOTYPE. SPAIN: 1 ♂, data as for holotype.

PARATYPES. 15 ♀♀, 3 ♂♂, all specimens reared from *Rhopalomyia ambrosinae* galls on *Artemisia herba-alba*. SPAIN, Lleida: 2 ♀♀, same data as holotype; 5 ♀♀, same data as holotype, except galls collected 28.ii.2012, emerged 13.v.2012; La Granja d'Escarp, UTM 31T BF78, 1 ♂, galls collected 11.i.2007, emerged 6.ii.2007 (forced); Montoliu, UTM 31T CG00, 1 ♀ 1 ♂, galls collected 13.xii.2006, emerged 6-14.i.2007 (forced); Sarroca, UTM 31T BF99, 2 ♀♀, 1 ♂, galls collected 8.ii.2007, emerged 4.iii.2007 (forced); Seròs, UTM 31T BF88, 5 ♀♀, galls collected 3.iii.2008, emerged 2.v.2008.

The holotype, allotype and 8 paratypes (6 ♀♀, 2 ♂♂) are deposited in the Museo Nacional de Ciencias Naturales, Madrid, and the remaining 10 paratypes in the author's collection.

ADDITIONAL MATERIAL. 7 ♀♀ 2 ♂♂, all specimens reared from *Rhopalomyia ambrosinae* galls on *Artemisia herba-alba* (leg. A. Ribes). SPAIN, Lleida: Sarroca, UTM 31T BF99, 2 ♀♀, 2 ♂♂, galls collected 8.ii.2007, emerged 4.iii.2007 (forced); Alfès, UTM 31T CG00, 1 ♀, galls collected 7.ii.2008, emerged 2.v.2008; Torres de Segre, UTM 31T BF99, 2 ♀♀, galls collected 25.i.2008, emerged 14.v.2008; Torres de Segre, UTM 31T BF99, 2 ♀♀, galls collected 28.ii.2012, emerged 13.v.2012. The additional specimens have not been included as paratypes because they are in a worse state of preservation, collapsed, or dissected.

ETYMOLOGY. Named after its host plant.

DIFFERENTIAL DIAGNOSIS. *Baryscapus artemisiae* females are most similar to *B. salsolae*, having as common characters the strongly curved malar sulcus, submarginal vein with only 1 dorsal seta (sometimes 2 in *B. salsolae*), venation thick with short stigmal vein, speculum broad extending below marginal vein up to the stigma, and the propodeum shape. It differs from *B. salsolae* in the smaller size, forewing with speculum open below and basal fold asetose (speculum closed and basal fold setose in *B. salsolae*), tegulae and tibiae yellow, femora more extensively yellow (tegulae black, tibiae brown to testaceous, femora mostly dark in *B. salsolae*), antennae with pedicel plus flagellum 0.83–0.90× as long as breadth of head, F1 and F3 not more than 1.35× as long as broad (pedicel plus flagellum 0.96–0.98× as long as breadth of head, F1 and F3 not less than 1.45× as long as broad in *B. salsolae*), adnotaular setae in rows of only 2–3 setae (4–5 in *B. salsolae*), and gaster 1.70–1.85× as long as broad, with hypopygium reaching up to 0.45–0.55× gaster length (gaster 1.40–1.65× as long as broad, much broader than mesosoma, with hypopygium reaching 0.65–0.70× length of gaster in *B. salsolae*). As for other species of *Baryscapus*, *B. artemisiae* resembles also *B. embolicus* and *B. globosiclava* in the submarginal vein with only 1 dorsal seta, differing from these species in same way as *B. salsolae* does, with F1 not reduced and clava not globose. *B. artemisiae* has also in common with *B. globosiclava* the yellow tegulae, another unusual character present in few species of *Baryscapus*. The low number of adnotaular setae is also noteworthy.

The males of *B. artemisiae* are similar to *B. salsolae*, differing in the smaller size, forewing with speculum open below and basal fold asetose, tibiae and apex of femora more

extensively yellow, antennae shorter, pedicel plus flagellum 0.9× as long as breadth of head, with shorter funicle segments, and F1 0.44–0.47× as long as F2 (pedicel plus flagellum 0.97–1.02× as long as breadth of head, with funicle segments F2-F4 more distinctly elongate, and F1 0.28–0.33× as long as F2 in *B. salsolae*), and scape with ventral plaque longer, 0.3× as long as scape length (0.20–0.25× in *B. salsolae*).

BIOLOGY. *B. artemisiae* has been reared from *Rhopalomyia ambrosinae* (Cecidomyiidae) galls on *Artemisia herba-alba*, present in seven samples. Its exact relationship with the host is not established, as a number of Cecidomyiidae parasitoids emerged from the same gall samples (*Torymus canariensis* Hedqvist, *T. ruschkai* (Hoffmeyer), *Aprostocetus artemisiae* (Erdős), *A. artemisicola* Graham, *Platygaster modesta* Buhl, etc.), and it could be a primary or possibly a secondary parasitoid of Cecidomyiidae, as are other species in *Baryscapus*, in a similar way to *B. salsolae*. The number of generations of this species is not known as it has always been found emerging in spring, between 2-26.v, from galls collected in winter. Perhaps another emergence period exists in autumn, as in *B. salsolae*. The sex ratio was biased towards females: of 30 specimens obtained from all samples, 77% were females. Another species of *Baryscapus* was recently described associated with *Artemisia herba-alba* in the study area (Ribes, 2013), but associated with Tephritidae galls.

The galls of *R. ambrosinae* Gagné, 2004 (= *Navasiella santolinae* Tavares, 1919) were recently diagnosed and illustrated in Spain (Medianero *et al.*, 2007), after it was re-established as a valid species. Some of the references of galls on *Artemisia herba-alba* and its parasitoids in Monegros (Askew *et al.*, 2001), where similar galls were recorded as *R. producticeps* Kieffer, may refer also to *R. ambrosinae*. Both kinds of gall are relatively similarly shaped, *R. producticeps* developing in modified capitula, usually solitarily, while *R. ambrosinae* develops on stem buds, usually in conglomerates and rarely solitarily.

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