

THE GENUS *EUPELMUS* DALMAN, 1820 (HYMENOPTERA, CHALCIDOIDEA, EUPELMIDAE) IN PENINSULAR SPAIN AND THE CANARY ISLANDS, WITH TAXONOMIC NOTES AND DESCRIPTIONS OF NEW SPECIES

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ABSTRACT

The occurrence of twenty-six species of *Eupelmus* Dalman in peninsular Spain and the Canary Islands is reported. Eleven species are newly recorded for Spain. Taxonomic, distributional and biological data are given. Two new species and one new subspecies are described. *Eupelmus matranus* Erdős is removed from synonymy under *E. splendens* Giraud and accorded specific rank; *E. valentinus* Bolívar is newly synonymized under *E. testaceiventris* (Motschulsky) and *E. capillaris* Bolívar under *E. fuscipennis* Förster. A key to females is provided.

Key words: Hymenoptera, Chalcidoidea, Eupelmidae, *Eupelmus*, *Macroneura*, Spain, Canary Islands, new species, key.

RESUMEN

El género *Eupelmus* Dalman, 1820 (Hymenoptera, Chalcidoidea, Eupelmidae) en España peninsular e islas Canarias, con notas taxonómicas y descripción de especies nuevas

Se citan 26 especies de *Eupelmus* Dalman de España peninsular e Islas Canarias, 11 de las cuales se citan por primera vez en España. Se describen dos especies y una subespecie nuevas para la ciencia y se aportan nuevos datos taxonómicos, de biología y de distribución de todas las especies listadas. *Eupelmus matranus* Erdős se rehabilita de sinonimia con *E. splendens* Giraud, otorgándole rango específico válido. *Eupelmus valentinus* se sinonimiza de nuevo con *E. testaceiventris* (Motschulsky) y *E. capillaris* Bolívar con *E. fuscipennis* Förster. Se incluye una clave de identificación de las especies basada en las hembras.

Palabras clave: Hymenoptera, Chalcidoidea, Eupelmidae, *Eupelmus*, *Macroneura*, España, Islas Canarias, especies nuevas, clave de identificación.

Introduction

Eupelmus Dalman, 1820 is here considered, following Ruschka (1921) and Gibson (1995), to include species sometimes placed in the genus *Macroneura* Walker, 1837 (= *Eupelmella* Masi,

1919). *Macroneura* and *Eupelmus* are treated as subgenera. *Eupelmus* is well-represented in the Iberian Peninsula and new species have been described from Spain, five by Bolívar (1933) and one by Gijswijt (1993). Ceballos (1956) catalogues only seven species, but the total number of recognized Spanish spe-

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cies is now increased to twenty-six. Some of this increase stems from studies of material housed in the Museo Nacional de Ciencias Naturales (Madrid), much of it collected by García Mercet and Bolívar y Pieltain in the first half of the twentieth century. Substantial contributions to our knowledge of Iberian *Eupelmus* have been made more recently by Nieves-Aldrey (1982) rearing from galls of Cynipidae (Hymenoptera) on *Quercus* in Salamanca and by Pujade (1989) rearing from a diversity of galls in Catalunya, by Gijswijt (1993) collecting on *Juniperus thurifera* L. in Soria, and by Javier Blasco-Zumeta collecting in Los Monegros (Zaragoza). More general collecting in mainland Spain by Z. Boucek, the authors and others, and in the Canary Islands by M. Báez, M. Koponen and others, has contributed additional information.

Two new species and one new subspecies are described here. *E. matranus* Erdős is recognized as a species distinct from *E. splendens* Giraud. A key is provided to the species found in Spain and the Canary Islands.

In the following alphabetically arranged list of Spanish *Eupelmus*, abbreviations are as follows: CBP = C. Bolívar y Pieltain, JBZ = J. Blasco-Zumeta, JNA = J. Nieves Aldrey, JPV = J. Pujade i Villar, MNCN = Museo Nacional de Ciencias Naturales (Madrid), RGM = R. García Mercet, RRA = R. R. Askew.

Eupelmus (Eupelmus)

E. aloysii Russo, 1938: 229-231

New record for Iberian Peninsula (Andorra): Santa Coloma, 1993, JPV, 1 ♀.

A second female specimen is in MNCN; it is without locality but evidently of Italian origin, labelled with a neatly written list (in Italian) of morphological characters, 'agosto 1935-xiii - da Fleotribo-olivo', 'Colección G^A. Mercet' and '7'.

Russo (1938) described *E. aloysii* from material reared in Italy from a branch of olive (*Olea europaea* L.) infested with larvae of *Phloeotribus scarabaeoides* (Bernard) (Coleoptera, Scolytidae).

E. annulatus Nees, 1834: 175-176

Recorded by Nieves-Aldrey (1982) from Salamanca, and Pujade (1989) from Catalunya, as a parasitoid in a range of galls of Cynipidae (Hymenoptera) on *Quercus*.

Specimens in MNCN are from Almería, Madrid and Segovia, collected by CBP, RGM and Lauffer. 1 ♀ Cercedilla (Madrid), viii.1916, leg. Bolívar has relatively well-developed wing marks. More recent records are from Zaragoza (1992, JBZ) and Lérida (1996, RRA).

E. atropurpureus Dalman, 1820: 381

Ruschka (1921) mentions having seen specimens of *E. atropurpureus* from peninsular Spain.

Additional material: Madrid, 1922, RGM and 1923, CBP (MNCN); Santander, 1922, RGM (MNCN); Almería, no date or collector, ex Mercet collection (MNCN); Salamanca, no date or collector, ex Mercet collection (MNCN); Zaragoza, 1980, P. J. Chandler and 1991, JBZ; Huesca, 1997, JBZ and undated, CBP (MNCN); Zamora, Toro, 1986, ex gall *Isocolus lichtensteini* (Mayr) on *Centaurea aspera* L., JNA; La Coruña, Puerto del Son, 1994, JNA.

E. cerris Förster, 1860: 128

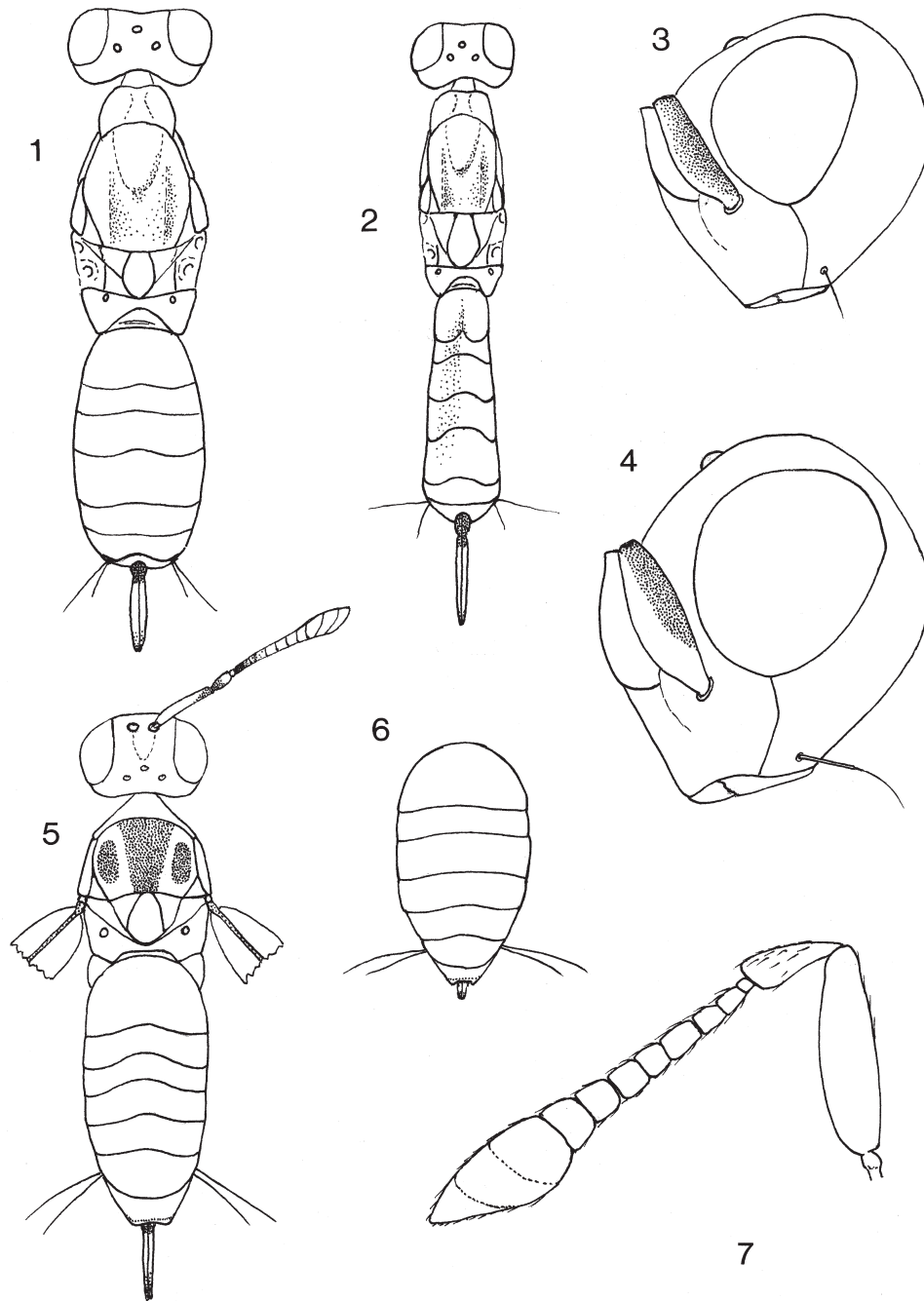
Recorded from peninsular Spain by Nieves-Aldrey (1982) as a parasitoid in galls of *Synophrus politus* Hartig (Hym., Cynipidae) on *Quercus suber* L. in Salamanca. Also found in Madrid (El Pardo), two females emerging 10.vi.1999 from galls of the same host on *Q. suber*, JNA.

E. clavicornis Askew sp. n. (fig. 7)

TYPE MATERIAL: Holotype ♀. Zaragoza, Pina de Ebro, Retuerta de Pina. Reared from a gall of *Etsuhoa thuriferae* Skuhravá, 1995 (Dipt., Cecidomyiidae) on *Juniperus thurifera*, collected 1.viii.1991, J. Blasco-Zumeta. Deposited in MNCN.

Paratypes. 1 ♀, same data as holotype; 1 ♀, same data as holotype except gall collected 28.viii.1991.

FEMALE. Head dark green, shining, with coppery reflections from lower face; antenna with scape and most of pedicel black, weakly metallic; anellus and pedicel at extreme apex pale yellowish; remaining flagellum unicolorous brown. Mesoscutum shining green, coppery anteriorly; scutellum, axillae and sides and venter of thorax mainly coppery. Wings hyaline; venation pale yellow; microtrichiae pale. Legs with coxae concolorous with thorax; femora pale yellow, darkened over about proximal three-quarters (the holotype has darkening only on dorsal surface); tibiae pale yellow with a variably develo-



Figs. 1-7.— *Eupelmus* species. 1) *E. matranus* Erdös, body of ♀ leg. Mercet; 2) *E. splendens* Giraud, ♀ body (reared ex *Pediaspis* gall, France); 3) *E. splendens*, ♂ head; 4) *E. matranus*, ♂ head showing long genal seta; 5) *E. juniperinus* Bolívar, body of ♀ paratype (dark areas of mesoscutum and antenna are stippled); 6) *E. juniperinus thuriferae* subsp. nov., ♀ gaster; 7) *E. clavicornis* sp. nov., ♀ antenna.

Figs. 1-7.— Especies de *Eupelmus*. 1) Cuerpo de la ♀ de *E. matranus* Erdös (leg. Mercet); 2) cuerpo de la ♀ de *E. splendens* Giraud (obtenida de agallas de *Pediaspis* en Francia); 3) cabeza del ♂ de *E. splendens*; 4) cabeza del ♂ de *E. matranus* en la que se ve la larga seta genal; 5) cuerpo del paratipo ♀ de *E. juniperinus* Bolívar (las áreas oscuras de antena y mesoscutum son punteadas); 6) gáster de la ♀ de *E. juniperinus thuriferae* n. subsp.; 7) antena de la ♀ de *E. clavicornis* sp. nov.

ped subbasal brown ring; tarsi with at least basal three segments pale yellow. Gaster with first tergite green, otherwise mainly coppery; ovipositor sheaths mostly pale yellow but with basal two-fifths brown and some indefinite darkening at apex, the extreme apical margin of the sheath black. Length 1.3 (holotype) - 1.6 mm.

Head in dorsal view twice as broad as long; POL 2.2 OOL, posterior ocellus separated from orbit by about 1.2 times its diameter; vertex almost smooth. Head in front view about 1.1 times as broad as high; eyes separated by half head breadth; sculpture of face weak, frons almost smooth, weak striate-reticulate sculpture between eye and mouth; scrobal area not strongly excavated and no ridge between scrobe and eye. Antenna (fig. 7) with pedicel plus flagellum only very slightly longer than breadth of head; scape not expanded, not reaching level of anterior ocellus; pedicel 0.26 times length of flagellum, about as long as anellus plus funicle segments 1-3; anellus subquadrate; funicle broadening distally, basal four segments narrower than pedicel, F1-3 rather longer than broad, F6 subquadrate and about as broad as pedicel, F7 transverse; clava large, comprising almost 0.4 times length of flagellum, not quite twice as long as broad, more than twice as broad as pedicel.

Thorax dorsally and laterally mainly smooth and shining with sculpture indicated weakly only on scutellum, axilla and front of mesopleuron. Scutellum longer than broad. Mesotibia without apical pegs; mesobasitarsus with small, pale pegs; metacoxa with dorsal surface bare except for long apical setae.

Forewing completely pilose except for elongate-oval speculum, but hairs small, pale and difficult to see; ratios of lengths costal cell: marginal vein: stigmal vein: postmarginal vein as 22:12:11:6.

Gaster excluding ovipositor sheaths a little longer than mesosoma (13:12); ovipositor sheaths half length of rest of gaster and 0.7 times length of hind tibia.

MALE. Unknown.

ETYMOLOGY. *Clava* (Latin), club; *cornus* (Latin), antenna.

BIOLOGY. Three species of *Eupelmus* have been reared from the *Oligotrophus*-like galls of *Etsuhoa thuriferae* collected in the relict juniper woodland of the Retuerta de Pina. The dominant species was *E. pallicornis* Gijswijt, with *E. urozonus* Dalman and *E. clavicornis* scarce. Gijswijt (1993) found *E. pallicornis* plentiful as a parasitoid of a cecidom-

yiid, presumably *E. thuriferae*, galling *J. thurifera* near Soria, with small numbers of *E. urozonus*, but no indication of the presence of a third species of *Eupelmus* in the galls.

COMMENTS. *Eupelmus clavicornis* is a small species which may be recognized by its almost smooth thoracic dorsum including the scutellum, together with its pale and inconspicuous mesobasitarsal pegs, metallic prepectus and tegulae, partially darkened femora and pale-banded ovipositor. The apparently bare proximal half of the dorsal surface of the metacoxa distinguishes *E. clavicornis* from almost all other Palaearctic species of *Eupelmus* (*E. hungaricus* Erdős is the only other species in which this character has been noted).

E. fulvipes Förster, 1860: 127

New record for peninsular Spain: Segovia, San Rafael, 1922, CBP (MNCN), 1 ♀; Zaragoza, Nuevalos, 1994, JNA, 1 ♀.

This species is allied to *E. urozonus* but has almost entirely pale femora and tibiae.

Eupelmus sp. indet.

Jaén, 1974, RRA, 1 ♀.

Like *E. fulvipes*, this species has pale femora and tibiae, but it differs in having pale mesobasitarsal pegs.

E. fuscipennis Förster, 1860: 116

Eupelmus capillaris Bolívar, 1933: 195-197 syn. n.

Zaragoza, Pina de Ebro, 1991, JBZ, 5 ♀ ♀.

No material referable to *E. capillaris* Bolívar could be found in MNCN and its synonymy under *E. fuscipennis* is based solely upon Bolívar's original description. This mentions, in particular, pale mesobasitarsal pegs, ovipositor all black and twice as long as hind tibia, and the scape 2.3 times as long as broad, all characters of *E. fuscipennis*. However, at variance with *E. fuscipennis*, is Bolívar's statement that the wings of *E. capillaris* are clear.

[*E. hartigi* Förster, 1841: 33]

Eupelmus hartigi is known from localities in central and southern Europe (Boucek, 1977) north

to Britain (Graham, 1969) but it has not yet been found inhabiting Spain.

A specimen in the Museo Nacional de Ciencias Naturales in Madrid is believed to be of Italian provenance, probably sent to Mercet together with the specimen of *E. aloysii* mentioned above. Data are: 1 ♀ ex Mercet collection (MNCN) labelled 'Portico do Fleotribo. Eupelmus ... [3 illegible words] ... 1935' and '2'. It agrees reasonably well with the redescription and figure of *E. hartigi* in Ruschka (1921), based upon two Förster specimens.

E. hungaricus Erdős, 1959: 327-330

New record for peninsular Spain: Zaragoza, Pina de Ebro, Retuerta de Pina, Malaise trap, 20.vi.1991, JBZ, 1 ♀.

The type of *E. hungaricus* could not be found when looked for in the Hungarian National Museum (Budapest) in 1996, but the Spanish specimen agrees closely with the original description and figure.

E. juniperinus Bolívar, 1933: 204, 205 (fig. 5)

Described from peninsular Spain (Madrid, Zarzalejo near El Escorial) from specimens collected on *Juniperus oxycedrus* L. The holotype is believed to be lost, but two females located in MNCN are clearly from the type series and have been labelled as paratypes. Each bears a similar handwritten label 'Zarzalejo G. Mercet' and a printed label 'Colección G^A. Mercet'; neither date nor association with *J. oxycedrus* are stated.

A *Eupelmus* similar to nominotypical *E. juniperinus* was found on *Juniperus thurifera* at Soria by Gijswijt (1993) and at Zaragoza by JBZ. Specimens associated with *J. thurifera*, however, have a much shorter ovipositor than those found on *J. oxycedrus*, and it is thought appropriate to recognize them as a new subspecies:

Eupelmus juniperinus thuriferae Askew **subsp. n.**
(fig. 6)

MATERIAL: Holotype ♀. Zaragoza, Pina de Ebro, Retuerta de Pina, swept from *Juniperus thurifera*, 22.v.1992, J. Blasco-Zumeta. Deposited in MNCN.

Paratypes. Same locality as holotype, 1 ♀, Moericke trap, 11.vii.1990, JBZ; 1 ♀, colour water trap, 2.viii.1990, JBZ; 1 ♀, Malaise trap, 23.ix.1991, JBZ; 2 ♀♀, reared from male cones of *J. thurifera* collected 22.ii.1992 and 10.iv.1992, JBZ; 1 ♀,

swept from *J. thurifera*, 8.viii.1992, JBZ. Soria, El Burgo de Osma, 2 ♀♀ on *J. thurifera*, 15 and 19.vi.1994, M. J. Gijswijt.

Additional material. Males trapped by JBZ in the Retuerta de Pina, probably conspecific with the above females, were collected as follows: 1 ♂, Moericke trap, 28.v.1990; 4 ♂♂, Malaise trap, 18.ix.1990; 1 ♂, Malaise trap, 10.ix.1991.

FEMALE. Form and colour as in *E. juniperinus* Bolívar except for ovipositor sheaths (fig. 6) which are very short, only 0.34 times length of hind tibia and 0.13 times length of rest of gaster (0.63 and 0.33 times respectively in nominotypical form (fig. 5).

ETIMOLOGY. From *Juniperus thurifera*.

E. linearis Förster, 1860: 119

New record for peninsular Spain: Madrid, Galapagar, without date, RGM (MNCN), 1 ♀.

E. longicarpus Girault, 1915: 6

Boucek (1988: 561) mentions having seen material of this primarily Australian species from Spain (also India and Zimbabwe). We are unable to provide further information on its Spanish status, and the species is not included in the key below.

E. matranus Erdős, 1947: 68-70 **stat. rev.**
(figs. 1, 4)

Eupelmus splendens Bolívar, 1933: 201-203 nec Giraud, 1871

Bolívar's type of his *E. splendens*, collected at Loeches (Madrid) on 5.v.1924, has not been traced, but a specimen in the Mercet collection (MNCN) agrees with the description: Gerona, Palamós, 5.ix.1927 [written as 5-9-927 in Mercet's style], 1 ♀.

Boucek (1977) placed both *E. splendens* Bolívar (invalid homonym) and *E. matranus* Erdős in synonymy with *Eupelmus splendens* Giraud, 1871, but *E. splendens* Giraud, a parasitoid in galls of *Pediaspis* (Hym., Cynipidae), is distinct from *E. matranus* (type in Budapest seen). This confirms Pujade's (1989) doubts about the correctness of the synonymy of the Giraud and Bolívar species, based upon the absence of *Pediaspis* from the type locality of *E. splendens* Bolívar.

Females of *E. matranus* (fig. 1) differ from those of *E. splendens* Giraud (fig. 2) in being larger and relatively broader with longer ovipositors, as indicated in the key to species. Additionally, the antenna of *E. matranus* is relatively longer (pedicel

plus flagellum at least 1.1 times breadth of head; in *E. splendens* their combined length scarcely greater than breadth of head) and less strongly clavate than that of *E. splendens* with the seventh funicle segment less than twice as broad as F1 (fully twice as broad in *E. splendens*) and the clava as long as the pedicel plus first two flagellar segments (only as long as pedicel plus anellus in *E. splendens*).

A male *E. matranus*, collected with a female at St Georges Blancaneix near Bergerac, Dordogne, France (27.v.1981, RRA) differs from reared males of *E. splendens* in having a much longer genal seta. The seta is as long as the genal sulcus (fig. 4) whereas in *E. splendens* the genal seta is only about half the length of the sulcus (fig. 3). Also, the whole of the anterior face of the scape is yellow in *E. matranus* whereas in male *E. splendens* the scape is yellow only at the extreme base and sometimes along its anterior edge.

E. microzonus Förster, 1860: 125

New record for peninsular Spain where it appears to be widespread. The following material is in MNCN: Madrid, El Escorial, no date, Lauffer in Mercet collection, El Pardo, 1922 and 1923, RGM, Vaciamadrid, no date, RGM, Collado-Mediano, 1927, CBP, Torrelodones, 1906, Cabrera; Segovia, San Rafael, 1917, CBP; Almería, no date, in Mercet collection; Zaragoza, Ambel, no date, Dusmet. Further specimens have been taken in Jaén, 1974, RRA; Toledo, Dosbarrios, 1974, RRA; Granada, Puerto del Moro, 1974, RRA; Guadalajara, La Alcarria, 1996, RRA; Zaragoza, Pina de Ebro, 1991, JBZ.

Material reared from galls of the following has also been examined:

Myopites sp. (Diptera, Tephritidae) on *Inula crithmoides* L., Portugal, Algarve, 1999, M. Boness

Aylax minor Hartig (Hym., Cynipidae) on *Papaver* sp., Madrid, 1994, F. Ronquist; on *P. rhoeas* L., Madrid, Arganda, 1995, JNA; on *P. rhoeas*, Portugal, Serra de Arrabida, 1985, JNA.

Barbotinia oraniensis (Barbotin) (Hym., Cynipidae) on *Papaver* sp., Madrid, Arganda, 1986, JNA.

Isocolus lichtensteini (Mayr) (Hym., Cynipidae) on *Centaurea aspera* L., Madrid, Camporeal, 1985, JNA and Zamora, Toro, 1986, JNA.

Phanacis centaureae Förster (Hym., Cynipidae) on *Centaurea* sp., Madrid, 1994, F. Ronquist and Segovia, Tabladillo, 1985, JNA; on *C. scabiosa* L., Guadalajara, Pozo de Guadalajara, 1984, JNA and Soria, Aldehuela de Calatañazor, 1989, JNA.

E. moroderi Bolívar, 1933: 197-199

The holotype from Bétera (Valencia), collected by Moroder, is in MNCN. No other specimen from mainland Spain has been seen, but *E. moroderi* is a common species on the Canary Islands (Gijswijt, 1990). Specimens have been seen from Gran Canaria, La Gomera, La Palma and Tenerife collected by M. Báez (1980-1999), P. J. Chandler (1976), M. Koponen (1992-9), G. Ortega (1980) and RRA (1999). It seems to be associated with a host, almost certainly a cecidomyiid (Dipt.), on the endemic Canarian grass *Hyparrhenia hirta* (L.).

E. pallicornis Gijswijt, 1993: 10-12

Described from material reared in abundance from cecidomyiid (Dipt.) galls, subsequently identified as those of *Etsuhoa thuriferae* Skuhrová, on *Juniperus thurifera* at Soria in 1987, M. J. Gijswijt, and reared from the same host at Zaragoza, Pina de Ebro, 1991-2, JBZ.

E. rostratus Ruschka, 1921: 291-293

New record for peninsular Spain: Zaragoza, Pina de Ebro, Retuerta de Pina, JBZ: 1 ♀, Malaise trap, 24.v.1991; 2 ♀♀, Wilkening trap in *Juniperus thurifera*, 14.iv and 13.v.1994.

Reared from cynipid galls on *Quercus* in central Europe.

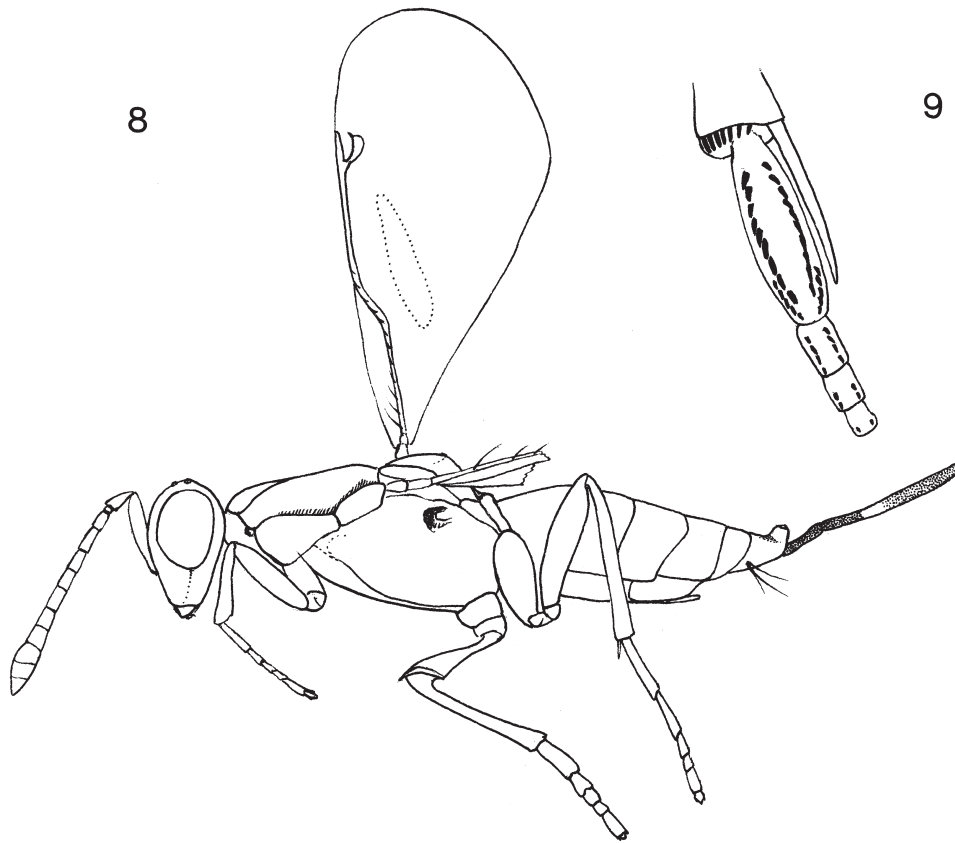
E. splendens Giraud, 1871: 416 (figs. 2, 3)

Reported by Pujade (1989) as a parasitoid in galls of *Pediaspis aceris* (Gmelin) (Hym., Cynipidae) on *Acer monspessulanum* L. in Catalunya (Montserrat). Distinctions between this species and *E. splendens* Bolívar are given under *E. matranus*.

E. stenozonus Askew sp. n. (figs. 8, 9)

MATERIAL: Holotype ♀ Spain, Canary Islands, La Gomera, above Santiago, 28.iii.1999, R. R. Askew. Deposited in MNCN.

Paratypes. Spain, Canary Islands, Tenerife, Icor, 21.iii.1999, 2 ♀♀; Arico Viejo, La Sabinita, 20.iii.1999, 1 ♀; Chimiche, 20.iii.1999, 1 ♂ 2 ♀♀. La Gomera, Barranco de Santiago, 26.iii.1999, 1 ♂. All leg. R. R. Askew. Some to be deposited in MNCN and the Natural History Museum (London).



Figs. 8-9.— *Eupelmus stenozonus* sp. nov. 8) ♀ holotype body and right forewing (speculum indicated by broken line); 9) ♀ apex of mesotibia and four basal tarsal segments, in ventral view, showing arrangement of black pegs.

Figs. 8-9.— *Eupelmus stenozonus* sp. nov. 8) Cuerpo y ala anterior derecha del holotipo ♀ (speculum indicado por una línea de puntos); 9) vista ventral de la mesotibia y de los cuatro segmentos basales del tarso de la ♀, en los que se aprecia la disposición de las hileras de denticulos negros.

Additional material. La Gomera, Antoncojo, 26.iii.1999, 2 ♀ ♀ (damaged), RRA. Tenerife, Malpais Golmar, 16.iv.1986, 1 ♀, M. Báez.

FEMALE. Body dark green with extensive coppery reflections, especially from mesoscutum; prepectus and tegula metallic. Ovipositor sheath mainly dark, black at base and heavily infuscate apically, but with a narrow yellowish median annulation which occupies at most one-fifth (one-eighth in holotype) of the sheath and is shorter than the proximal black area (fig. 8). Antenna entirely dark with metallic reflections. Wings clear; venation testaceous. Front leg almost entirely black with metallic reflections; middle leg dark from coxa to about two-thirds length of femur, tibia testaceous with basal infuscate annulation, tarsal segments 1-3 tes-

taceous, rest of tarsus infuscate; hind leg dark except apex of femur, extreme base and apical one-fifth of tibia and tarsal segments 1-2(3). Length (including ovipositor) 2.7-3.7 mm (holotype 3.7 mm).

Head in dorsal view 2.15 times as broad as long, slightly broader than mesoscutum; temples short, 0.1 times length of eye; POL about 2.2 times OOL, posterior ocellus separated from orbit by about 1.2 times its diameter. Head in front view 1.25 times as broad as high; eyes separated by 0.42 times head breadth; reticulate sculpture coarse between scrobe and eye, fine between mouth and eye. Antenna with pedicel plus flagellum 1.2 times as long as breadth of head; scape 4.2 times as long as broad with a ventral carina on distal two-thirds; pedicel 0.09

times as long as flagellum, only 0.75 times as long as subquadrate anellus plus first funicle segment in holotype (in smaller specimens about equal to anellus plus F1); funicle broadening and segments shortening distally; F1 about 2.5 times as long as broad and slightly narrower than pedicel, F7 subquadrate and about twice as broad as pedicel; clava comprising 0.25 times length of flagellum and 2.4 times as long as broad.

Mesoscutum with posterior median depressed area entirely reticulate, more coarsely so than scutellum and axilla; scutellum slightly longer than broad; mesopleuron entirely reticulate, finely so on anterior third, extremely finely in a transverse median band, and more coarsely on posterior two-fifths. Mesotibia with an apical row of 5 or 6 dark pegs in front of spur (fig. 9); ventral surfaces of mesotarsal segments 1-4 (fig. 9) with relatively long black pegs, on basitarsus arranged in two longitudinal rows on each side, the anterior rows each comprising 5-7 pegs and overlapping the longer posterior rows of 9-11 pegs each, on T2 in two rows of 4-5 pegs, on T3 in two rows of 2 pegs, and 2 apical pegs on T4. Metacoxa with dorsal surface pilose.

Forewing (fig. 8) with relatively long, sparse pilosity, the speculum relatively broad; ratio of lengths costal cell: marginal vein: stigmal vein: postmarginal vein as 17:14:3:3; stigma angled against stem of stigmal vein, rather large, separated from postmarginal vein by little more than its height and as long as stem of stigmal vein.

Gaster (fig. 8) excluding ovipositor sheath longer than mesosoma (29:26); ovipositor sheath almost 0.7 times length of rest of gaster and 1.16 times length of metatibia, the basal section (before constriction) long, occupying about 0.23 times the total length.

MALE. Head and thorax dark green, sides of thorax bluish green with mesepimeron mainly violet; legs dark, only 'knees' and extreme apices of tibiae of front and middle legs testaceous, two (three) basal segments of middle and hind tarsi whitish. Length 1.5-1.6 mm.

Antenna with scape only about 0.6 times height of eye, about 2.5 times as long as broad; pedicel plus flagellum 1.3 times as long as head breadth; flagellum filiform; first funicle segment subquadrate, as long as pedicel, shorter than F2 which is about 1.5 times as long as broad, F3-7 each about 1.8 times as long as broad, all funicle segments with short but dense pilosity standing out at an angle of about 40°. Gena with long seta only twice

length of adjacent setae, rather thin and weakly curved.

Thorax as in other male *Eupelmus*. Forewing with speculum extending to about middle of marginal vein, partly open below; basal cell entirely pilose; marginal vein 3.2-3.4 times as long as postmarginal vein; stigma angled as in female, large, distinctly longer than stem of stigmal vein.

Gaster obovate, shorter than mesosoma, about twice as long as broad; reticulate sculpture on dorsal surface weakly raised.

ETYMOLOGY. *Stenos* (Greek), narrow; *zone* (Greek), a girdle - referring to the narrow pale band on the ovipositor sheaths. Purists might not approve of deriving a trivial name from Greek, but I follow the precedent of "*microzonus*" and "*urozonus*".

COMMENTS. *Eupelmus stenozonus* is allied to the *E. urozonus*-group, having an entirely metallic thorax, black mesotarsal pegs, pale-banded ovipositor and short postmarginal vein. It is, perhaps, closest to *E. annulatus* but differs in its longer ovipositor with very narrow median pale band, the genal seta of the male is shorter and less curved, and the stigma in both sexes is larger.

E. testaceiventris (Motschulsky, 1863: 49)

Eupelmus valentinus Bolívar, 1933: 200, 201 **syn. n.**

Eupelmus valentinus was described by Bolívar from a female found at Bétera, Province of Valencia. This specimen could not be found in MNCN, but a female labelled 'Barcelona R. G. Mercet 23-8-927' agrees quite well with the description of *E. valentinus* except that the ovipositor sheaths are somewhat shorter, only about as long as the hind tibia and 0.4 times the length of the rest of the gaster (corresponding measurements given in the description are 1.25 and 0.5 times). This specimen is identified as *E. testaceiventris*, described from Ceylon but suggested to be widespread in the Mediterranean region and 'locally common in grassy vegetation in Spain - n. rec.' (Boucek, 1977).

In the Canary Islands *E. testaceiventris* is probably the most numerous species of *Eupelmus* and it has been found on Gran Canaria (1985, M. Báez), La Gomera (1999, M. Báez, M. Koponen, RRA), La Palma (1997 and 1998, M. Koponen), Tenerife (1973, P. J. Chandler; 1984-99, M. Báez and M. Koponen; 1999, RRA). It is a parasitoid of grass-

dwelling Cecidomyiidae (Dipt.) and is found, together with *E. moroderi*, on the grass *Hyparrhenia hirta*.

E. urozonus Dalman, 1820: 378 (aggregate)

Reported by Ruschka (1921) from *Olea* near Barcelona, by Nieves-Aldrey (1982) as a parasitoid in a variety of galls of Cynipidae (Hym.) on *Quercus* in Salamanca, and by Pujade (1989) from galls of Cynipidae on *Quercus* and *Rosa*, from *Myopites olivieri* Kieffer (Dipt., Tephritidae) on *Inula* and *Mikiola fagi* Hartig (Dipt., Cecidomyiidae) on *Fagus* in Catalunya. Gijswijt (1993) records *E. urozonus* from galls of a cecidomyiid (*Etsuhoa thuriferae*) on *Juniperus thurifera* in Soria, and Askew & Blasco-Zumeta (1997, 1998) report its rearing from *Blascoa ephedrae* Askew (Hym., Pteromalidae) and *Eurytoma gallegedrae* Askew (Hym., Eurytomidae) on *Ephedra nebrodensis* Tineo in Los Monegros. Unpublished rearing records are from *Diplolepis rosae* (L.) (Hym., Cynipidae) (Jaca, 1992, RRA), *D. mayri* (Schlechtendal) (Logroño, Ezcaray, 1994, RRA), *Myopites* galls on *Inula* (Gerona, Tossa de Mar, 1961, RRA; Majorca, 1982, M. Boness) and fruits of *Juniperus phoenicea* L. (Canary Islands, La Gomera, 1999, RRA).

The broad host range, together with some very small morphological differences, suggest that *E. urozonus* as currently understood comprises an aggregate of forms which are poorly-differentiated morphologically but distinct biologically.

In MNCN there are specimens of *E. urozonus* agg. from Almería (Mercet collection), Madrid (RGM), Santander (RGM) and Segovia (CBP). Additional localities include San Sebastián (1964, RRA), Jaén (1974, RRA) and Andorra (1992, JPV) and, in the Canary Islands, La Palma (1997 and 1998, M. Koponen) and Tenerife (1989, M. Koponen and 1996, M. Báez).

Eupelmus (Macroneura)

E. (M.) aseculatus Kalina, 1981: 96-99 **comb. n.**

New record for peninsular Spain: Madrid, Vaciamadrid, 1918, CBP (MNCN), El Escorial, 1910, RGM and 1919, CBP (MNCN); Avila, Chamartín, 1918, RGM (MNCN); Jaén, 1974, RRA.

Specimens reared from galls of *Callirhytis glandium* (Giraud) and *C. rufescens* (Mayr) (agamic

generations) (Hym., Cynipidae) on *Quercus suber* from Toledo (1989, JNA) have also been examined.

E. (M.) falcatus (Nicol'skaya, 1952: 493) **comb. n.**

New record for peninsular Spain: Two females from Madrid, Vaciamadrid, 1918, CBP and Montarco, 1907, Cabrera are in MNCN.

A third female in MNCN is probably *E. falcatus* but is unusual in having an infusate scape; it is from Madrid, El Pardo, no date, RGM.

E. (M.) maculatus (Ferrière, 1954: 9) **comb. n.**

New record for peninsular Spain: 1 ♀, Barcelona, 1974, Z. Boucek in RRA collection.

E. (M.) muellneri Ruschka, 1921: 305 **comb. rev.**

Not previously recorded from mainland Spain, but listed from the Canary Islands (La Gomera, Tenerife) by Gijswijt (1990).

Reared from *Myopites* (Dipt. Tephritidae) galls on *Inula*, Gerona, Tossa de Mar, 1961, RRA and Majorca, 1982, M. Boness and *Isocolus lichtensteini* (Mayr) (= *tavaresi* Nieves-Aldrey) (Hym., Cynipidae) galls on *Centaurea nicaeensis* All., Formentera, 1987, M. Boness. Also reared from *Stephaniella atriplicis* (Kieffer) (Dipt., Cecidomyiidae) on *Atriplex halimus* L. and from stems of *Eryngium maritimum* L., Portugal, Algarve, Albufeira, 1995, M. Boness. Additional material from Valencia, no date, RGM (MNCN); Alicante, Torrevieja, 1974, Z. Boucek; Granada, Calahonda, 1988, RRA; Zaragoza, Pina de Ebro, 1992, JBZ.

E. (M.) seculatus (Ferrière, 1954: 5-7) **comb. n.**

Pujade (1989) reared this species from cecidomyiid (?) galls on *Ononis* in Catalunya, and described the male.

Additional records: Madrid, Vaciamadrid, 1923, CBP (MNCN); El Pardo, no date, RGM (MNCN); Loeches, 1924, RGM (MNCN); Torrelodones, 1906, Cabrera; Castellón, Benicasim, 1974, Z. Boucek; Zaragoza, Pina de Ebro, ex galls *Rhopalomyia* (Dipt., Cecidomyiidae) on *Artemisia herba-alba* Asso, 1996, JBZ. A female with scape darkened and weakly metallic, from Vaciamadrid

(1923, RGM (MNCN)), is questionably referable to *E. seculatus*.

E. (M.) vesicularis (Retzius, 1783: 70, no. 291)

Cited from Majorca (Askew, 1975) and as a parasitoid in several cynipid galls on *Quercus* in Salamanca (Nieves-Aldrey, 1982). Pujade (1989) reported its hosts in Catalunya as *Diastrophus rubi* (Bouché) (Hym., Cynipidae) on *Rubus*, *Myopites olivieri* Kieffer (Dipt., Tephritidae) on *Dittrichia* and *Mikiola fagi* Hartig (Dipt., Cecidomyiidae) on *Fagus*. Specimens have also been reared from galls of *Rhopalomyia* (Dipt., Cecidomyiidae) on *Artemisia* at Zaragoza, Pina de Ebro, 1996, JBZ, and from the following Cynipidae by JNA:

Liposthenus kernerii (Wachtl) on *Nepeta latifolia* D.C., Madrid, El Ventorillo, 1989

Phanacis caulicola (Hedicke) on *Picris echinoides* L., Guadalajara, Valdenoches, 1990

Phanacis centaureae on *Centaurea nigra* L., Guadalajara, El Cardoso de la Sierra, 1986, and on *C. scabiosa*, Guadalajara, Tamajón, 1987

Timaspis phoenixopodos (Mayr) on *Lactuca viminea* (L.), Madrid, Puerto de la Morcuera, 1985

Non-reared material in MNCN was obtained from Madrid, Cercedilla, no date, CBP, El Pardo, no date, RGM and El Escorial, 1892 & 1924, CBP; Segovia, San Rafael, no date, CBP; San Sebastián, 1918, RGM; Bilbao, no date, RGM; La Coruña, no date, RGM. Additional material has been examined from Gerona, Tossa de Mar, 1961, RRA; San Sebastián, Orío, 1964, RRA; and from Jaca (1973), Val d'Aran (1994) and Gavarnie (1977), all RRA in the Pyrenees.

E. (M.) sp. indet. A

1 ♀, Madrid, El Pardo, 1928, RGM (MNCN); 1 ♀, Madrid, Zarzalejo, no date, RGM (MNCN).

These two specimens are probably conspecific. They both have infuscate scapes and pale mesobasitarsal pegs, and appear to belong to the *E. schmiedeknechti* Ruschka group (Kalina, 1981). Further material is required to ascertain their identity.

E. (M.) sp. indet. B

4 ♀♀, ex gall *Aylax papaveris* (Perris) on *Papaver* sp., Malaga, Embalse del Chorro, 1987, JNA.

This material represents a species near *E. (M.) aseculatus*.

Key to Spanish species of *Eupelmus* Dalman (females only)

Keys to most Palaearctic species of the subgenera *Eupelmus* and *Macroneura* will be found respectively in Kalina (1988) and Kalina (1981).

1. Macropterous, or if brachypterous (*E. atropurpureus*), then pronotum without a setose transverse crest; gaster seldom pale only at base but sometimes extensively yellowish; scape most often dark and metallic, sometimes bicoloured, rarely yellow 2
- Brachypterous; pronotum with a transverse crest bearing a row of stout setae; gaster nearly always with base of first tergite contrastingly pale; scape yellow (except in unidentified species) (*Macroneura*) 23
- 2(1) Brachypterous, forewing truncate, triangular, clear, not upturned, with venation complete, the stigmal vein parallel with and close to apical margin; body black with purple reflections; ovipositor all black, not quite half as long as hind tibia .. *E. atropurpureus* Dalman Macropterous 3
- Mesoscutum posteriorly reticulate, not more shiny than scutellum and axillae (in *E. clavicornis* mesoscutum almost smooth but scutellum and axillae also very weakly sculptured and shiny); forewing clear or with general infumation, rarely with a discal cloud 4
- Mesoscutum posteriorly smooth and shiny, contrasting with dull, strongly sculptured scutellum and axillae; forewing with an infumate mark below parastigma and another below stigmal vein, the two marks often connected by weaker infumation 20
- 4(3) Mesotibia at apex and ventral surface of mesobasitarsus with at least some black pegs (e.g. fig. 9); ovipositor very dark basally, pale-banded medially and darkened apically, rarely (*E. stenozonus*) longer than hind tibia 5
- Mesotibia and mesobasitarsus without black pegs, pegs either absent, pale or brown; ovipositor sometimes uniformly dark, sometimes longer than hind tibia 11
- 5(4) Forewing entirely pilose without a speculum; mesopleuron dull, relatively strongly reticulate, more finely so centrally but nowhere almost smooth *E. aloysii* Russo
- Forewing with speculum represented by a bare, oblique linear area (linea calva) below parastigma and basal part of marginal vein; mesopleuron rather shiny, its sculpture fine and weak, parts of disc sometimes almost smooth 6
- 6(5) Ovipositor sheath distinctly longer than hind tibia and almost 0.7 times as long as rest of gaster (fig. 8) *E. stenozonus* Askew
- Ovipositor sheath at most about as long as hind tibia and 0.5 times as long as rest of gaster 7
- 7(6) Ovipositor sheath about as long as hind tibia 8
- Ovipositor sheath at most 0.8 times length of hind tibia 9

- 8(7) Scape mostly yellowish, testaceous or reddish
 *E. cerris* Förster
- Scape dark with metallic reflections
 *E. annulatus* Nees
- 9(7) Marginal vein relatively short, a little more than twice
 as long as postmarginal vein which is about 1.2 times
 as long as stigmal vein; mesobasitarsus with fewer
 than ten dark pegs ventrally .. *E. microzonus* Förster
- Marginal vein about 4 times length of postmarginal
 vein which is sometimes not longer than stigmal vein;
 mesobasitarsus with more than twenty dark pegs ven-
 trally 10
- 10(9) Legs except coxae yellow, or at most with some infus-
 cation on front femur; postmarginal vein slightly lon-
 ger than stigmal vein *E. fulvipes* Förster
- Legs with femora and tibiae partly infuscate; postmar-
 ginal vein not longer (usually slightly shorter) than
 stigmal vein *E. urozonus* Dalman
- 11(4) Thorax including prepectus and tegulae metallic, gas-
 ter metallic 12
- Thorax with prepectus and tegulae yellow, gaster
 usually partly yellowish 15
- 12(11) Legs except coxae yellow; ovipositor sheaths hardly
 one-quarter length of gaster and not quite half as long
 as hind tibia sp. indet.
- Legs with femora and tibiae partly infuscate; oviposi-
 tor sheaths longer 13
- 13(12) Ovipositor sheaths broadly pale with only bases and
 apices darkened (half length of gaster, 0.7 times length
 of hind tibia); thoracic dorsum exceedingly weakly
 sculptured, partly smooth, shiny; forewing clear;
 antenna (fig. 7) strongly clavate, clava broader than
 scape which is about 4 times as long as broad, anellus
 paler than rest of flagellum; hind coxa with dorsal sur-
 face bare in basal half *E. clavicornis* Askew
- Ovipositor sheaths uniformly dark, sometimes longer
 than in alternate; thoracic dorsum densely reticulate;
 forewing usually weakly infumate; antenna weakly
 clavate, clava narrower than scape which is less than
 3 times as long as broad, anellus and rest of flagellum
 concolorous; hind coxa dorsally pilose 14
- 14(13) Ovipositor sheaths 0.55 - 0.75 times length of gas-
 ter, 1.6 - 2.0 times length of hind tibia; mesotibia bro-
 adly infuscate medially *E. fuscipennis* Förster
- Ovipositor sheaths 0.4 times length of gaster, 0.85
 times length of hind tibia; mesotibia with a subbasal
 infuscate band occupying about one-third the length
 [*E. hartigi* Förster]
- 15(11) Ovipositor sheaths at least 5.5 times as long as hind
 tibia, entirely dark *E. moroderi* Bolívar
- Ovipositor sheaths at most 2 times as long as hind tibia,
 with a median pale band more or less indicated 16
- 16(15) Forewing with linear speculum; ovipositor sheaths 2
 times as long as hind tibia *E. linearis* Förster
- Forewing without speculum; ovipositor sheaths at
 most only slightly longer than hind tibia 17
- 17(16) Antenna dark with only anellus pale; marginal vein
 length about 2.5 times postmarginal vein and 3.7
 times stigmal vein .. *E. testaceiventris* (Motschulsky)
- Antenna with flagellum pale, only basal funicle seg-
 ments somewhat darkened, basal half of scape yellow;
 marginal vein length about 1.5 times postmarginal and
 2.0 times stigmal vein 18
- 18(17) Thoracic dorsum metallic with only prepectus, tegulae
 and sometimes lateral and posterior edges of mesos-
 cutum, yellow; ovipositor sheaths at least 0.5 times as
 long as rest of gaster *E. pallicornis* Gijswijt
- Thorax dorsally bicoloured (fig. 5), mesoscutum
 yellow with a broad, median, metallic green stripe and
 an oval, green spot on each side; ovipositor sheaths at
 most 0.3 times as long as rest of gaster 19
- 19(18) Ovipositor sheaths about 0.3 times as long as rest of
 gaster (fig. 5) and 0.6 times as long as hind tibia.
 Associated with *Juniperus oxycedrus*
 *E. juniperinus juniperinus* Bolívar
- Ovipositor sheaths very short, only 0.13 times as long
 as rest of gaster (fig. 6) and 0.3 times as long as hind
 tibia. Associated with *Juniperus thurifera*
 *E. juniperinus thuriferae* Askew
- 20(2) Antenna with funicle segments 2-5 white; ovipositor
 sheaths entirely dark, slightly longer than hind tibia,
 mesobasitarsus without black pegs; forewing narrow
 with marginal vein length 4.0 times postmarginal vein
 and more than 7.0 times stigmal vein; thorax metallic;
 scape reaching above vertex; metatibia darkened over
 apical one-third, mesotibia with a broad basal dark
 band; hind coxa bare dorsally in basal half
 *E. hungaricus* Erdős
- Antenna with funicle unicolorous dark; ovipositor
 sheaths with pale median band, shorter than hind tibia;
 mesobasitarsus sometimes with black pegs; forewing
 not narrow with marginal vein length only slightly
 more than 2.0 times postmarginal vein and at most 3.3
 times stigmal vein; prepectus, tegula and sides of pro-
 notum non-metallic reddish yellow; scape sometimes
 not reaching above vertex; tibiae reddish with weak
 basal infuscations; hind coxa dorsally pilose 21
- 21(20) Forewing speculum absent, stigma with exceptionally
 long uncus 0.7 times length of stigmal vein, marginal
 vein more than 3.0 times as long as stigmal vein;
 mesobasitarsus ventrally without dark pegs; antenna
 with scape reaching above vertex and all funicle seg-
 ments longer than wide *E. rostratus* Ruschka
- Forewing speculum present, stigma normal without
 lengthened uncus, marginal vein 2.0 times as long as
 stigmal vein; mesobasitarsus ventrally with black
 pegs; scape not reaching above vertex and last funicle
 segment slightly transverse, F6 subquadrate 22
- 22(21) Ovipositor sheaths (fig. 1) relatively short, 0.6-0.7
 times length of hind tibia and 0.31-0.36 times as long
 as rest of gaster; gaster (fig. 1) not more than 1.1 times
 as long as mesosoma; head in dorsal view 1.75-1.9
 times as broad as long; larger species, length 2.2-2.8
 mm *E. matranus* Erdős
- Ovipositor sheaths (fig. 2) 0.9 times to almost as long
 as hind tibia and 0.42-0.50 times as long as rest of gas-
 ter; gaster at least 1.2 times as long as mesosoma;
 head in dorsal view about 1.6 times as broad as long;
 smaller, more slender species, length 1.7-2.0 mm
 *E. splendens* Giraud
 [Males of *E. matranus* and *E. splendens* differ as described in the text]
- 23(1) Reduced forewing divided into a basal, apically trun-
 cate section and an apical part which is bent upwards
 (the apical part may be broken off); hindwing present;
 mesopleuron finely striate 24

- Forewing reduced to a small, undivided hyaline scale which is apically rounded and adpressed to the thorax; hindwing absent; mesopleuron more strongly longitudinally striate 27
- 24(23) Apical section of forewing distally rounded, not pointed; mesobasitarsus with ventral dark pegs
..... *E. vesicularis* (Retzius)
- Apical section of forewing distally pointed; mesobasitarsus sometimes without ventral dark pegs 25
- 25(24) Mesobasitarsus with ventral dark pegs
..... *E. seculatus* (Ferrière)
- Mesobasitarsus without dark pegs 26
- 26(25) Apical infusate section of forewing longer than half of gaster (excluding ovipositor sheaths) and with stigmal vein visible at about half of its length; ovipositor sheaths about 0.20-0.25 times as long as rest of gaster and 0.35-0.48 times length of hind tibia
..... *E. falcatus* (Nikol'skaya)
- Apical infusate section of forewing shorter than half gastral length and with stigmal vein undeveloped; ovipositor sheaths about 0.4 times as long as rest of gaster and 0.6 times length of hind tibia
..... *E. aseculatus* (Kalina)
- 27(23) Scape dark, sometimes metallic sp(p). indet.
- Scape yellow or testaceous 28
- 28(27) Ovipositor sheaths one-third length of rest of gaster; tegulae dark; mesobasitarsus on each side of ventral surface with 1 or 2 basal pegs and 1 apical peg
..... *E. muellneri* Ruschka
- Ovipositor sheaths one-sixth length of rest of gaster; tegulae white; mesobasitarsus without dark pegs
..... *E. maculatus* (Ferrière)

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