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Three new Eastern-Mediterranean endemic species of the *Merodon aureus* group (Diptera: Syrphidae)

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Abstract

The *Merodon aureus* group (Diptera: Syrphidae: Eristalinae) comprises a number of different subgroups and species complexes, including the *M. bessarabicus* subgroup, which is revised here. In this study, we present an identification key to species complexes and species within the *M. bessarabicus* subgroup and focus on clarifying the taxonomic status of previously described species within this subgroup, based on a study of the type material. *Merodon flavicornis* Macquart, a species with an unknown type locality, is re-evaluated and recognized as a valid Western Mediterranean species from France. We describe a new species, *M. adriaticus* **sp. n.,** from *M. bessarabicus* subgroup, as well as another two species with a clearly separate position within the *M. aureus* group due to their distinct morphological features: *M. nisi* **sp. n.** and *M. robustus* **sp. n.**. Results of the present study indicate the high diversity and endemism levels of the genus *Merodon* in Europe.

Key words: *Merodon bessarabicus* subgroup, *Merodon adriaticus* **sp. n.,** *Merodon nisi* **sp. n.,** *Merodon robustus* **sp. n.,** identification keys

Introduction

The genus *Merodon* Meigen (Diptera: Syrphidae: Eristalinae) is distributed throughout the Palaearctic and Afrotropical regions with approximately 160 species currently described (Ståhls *et al.* 2009; Vujić *et al.* 2012). It is the second most species-rich hoverfly genus in Europe (Speight 2016), bolstered by the many recent publications describing new species (e.g. Marcos-García *et al*. 2007; Radenković *et al.* 2011; Vujić *et al.* 2013, 2015). The high diversity of this genus with phytophagous larvae in the Eastern Mediterranean is in correlation with the huge diversity of geophytes, which are the feeding and host plants of *Merodon* larvae (Andrić *et al*. 2014; Ricarte et al. 2008). Adults of *Merodon* species are robust, rapid-flying insects that mimic bumblebees and bees (Hymenoptera: Apidae) (Speight 2016). They generally exhibit territorial behaviour, especially males, and can be observed resting on the ground or on leaves, rather than on flowers as is typical of the majority of hoverflies. Many *Merodon* species show preference for open areas with high temperature (Ante Vujić, personal observations).

The taxonomy and systematics of this large genus is still in need of revision. Besides the monograph of Hurkmans (1993), many recent publications have dealt with taxa considered to constitute monophyletic groups (Mengual *et al*. 2006; Marcos-García *et al.* 2011; Vujić *et al*. 2012, 2015; Popović *et al.* 2015; Šašić *et al.* 2016). Mengual *et al.* (2006) identified four well-supported clades within the genus *Merodon* that shared the same apomorphic morphological characters, *M. desuturinus*, *M. albifrons*, *M. avidus* and *M. aureus* species groups, based on parsimony analysis of cytochrome C oxidase I (COI) sequences and the D2 region of the nuclear 28S rRNA gene of Iberian species.

A similar topology with three lineages was established based on COI and 28S rDNA sequences of *Merodon* species from Europe and Turkey: *M. aureus, M. nigritarsis* (corresponding to the *M. avidus* group of Mengual *et al.* (2006)), and *M. albifrons* + *M. desuturinus* groups (Vujić *et al*. 2012). In both studies, the *M. aureus* group was supported as a monophyletic lineage. This group comprises small-sized species with a short, rounded abdomen and

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a characteristic structure of the hind trochanter and male genitalia (Radenković *et al.* 2011). Many authors have discovered cryptic taxa within this species group based on molecular and morphometric data (Milankov *et al*. 2008; Francuski *et al*. 2011; Šašić *et al*. 2016). Šašić *et al.* (2016) proposed subgroups based on different levels of morphological differentiation in the *M. aureus* group, with minor intraspecific variation facilitating separation between subgroups. Species complexes comprise taxa that are morphologically inseparable based on traditional taxonomic methods, which can only be resolved by employing an integrative-taxonomy approach that involves other sources of data such as molecular markers, morphometrics and ecology. According to Šašić *et al*. (2016), the *M. aureus* group includes four subgroups (*M. aureus* subgroup; *M. bessarabicus* subgroup; *M. cinereus* subgroup; *M. dobrogensis* subgroup), as well as the *Merodon chalybeus* complex and two independent species lineages (*Merodon caerulescens* Loew and *M. unguicornis* Strobl).

The *Merodon bessarabicus* subgroup sensu Šašić *et al*. (2016) consists of species with predominantly yellow tibiae and dark brown to black tergites (including *M. ambiguus* Brădescu*; M. bessarabicus* Paramonov; *M. legionensis* Marcos-García, Vujić & Mengual; *M. quercetorum* Marcos-García, Vujić & Mengual; *M. rufipes* Sack; *M. sapphous* Vujić, Pérez-Bañón & Radenković). In this paper, we revise the *M. bessarabicus* subgroup sensu Šašić *et al.* (2016), evaluating known taxa, describing new ones, and presenting identification keys. In addition, we describe two species endemic to the Aegean islands of Rhodes and Samos that possess distinct morphological features but still belong to the *M. aureus* group.

Material and methods

Studied material. Specimens were sampled from many Mediterranean countries; from Morocco and Spain to the Balkan Peninsula and Turkey, including Mediterranean islands (Figs 1, 6, 11). Specimens were collected from 1997 to 2012. Available specimens of the *M. bessarabicus* subgroup and of two Aegean endemics from the *M. aureus* group were studied, including published and unpublished (new) data. Analysed material has been deposited in museums, universities and private collections with the following acronyms used in the text: CEUA—Entomological Collection of University of Alicante, Spain; FSUNS—University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology, Serbia; MNHN—Natural History Museum, Paris, France; MNMS—National Museum of Natural Sciences, Madrid, Spain; MZPW—Museum and Institute of Zoology of the Polish Academy of Sciences; NBC—Naturalis Biodiversity Centre, Leiden, The Netherlands; AvE col—André van Eck private collection.

FIGURE1. Distribution of *Merodon adriaticus* **sp. n.** (●) and *Merodon rufipes* (▲).

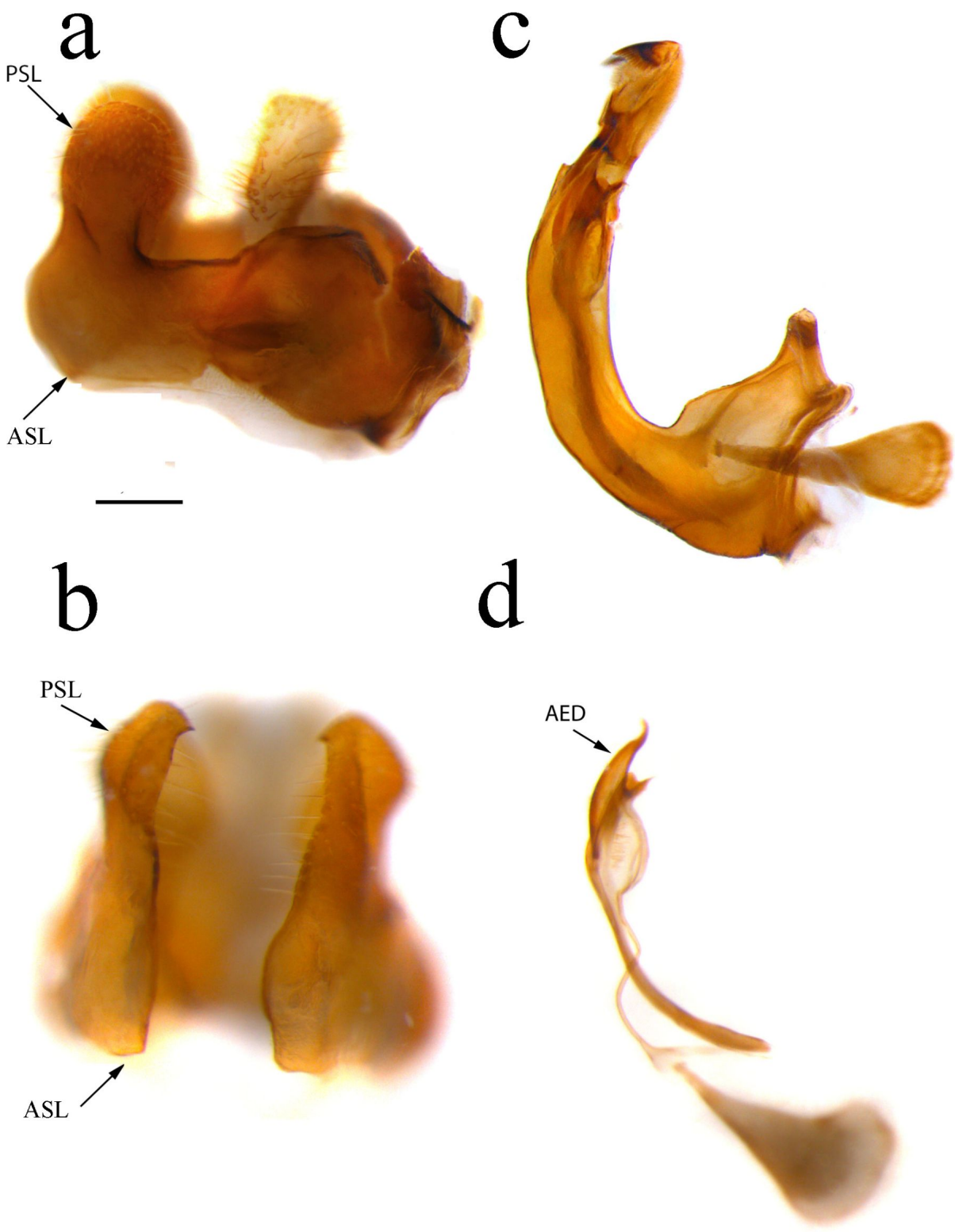

FIGURE 2. Male genitalia of *Merodon rufipes*: a, b—epandrium; c—hypandrium; d—aedeagus and associated structures; a, c, d—lateral view; b—anterior view. ASL—anterior surstyle lobe (ASL refers actually to the place where the anterior surstyle lobe should be, since this is virtually absent from this species); PSL—posterior surstyle lobe; AED—aedeagus. Scale 0.2mm.

Taxonomic study. The type material of all European species described within the *M. aureus* group sensu Radenković *et al.* (2011) was examined. Terminology used in the morphological descriptions follows McAlpine (1981) and, for male genitalia, Marcos-García *et al.* (2007). The male genitalia were extracted from dry specimens

previously relaxed in a closed pot with a high level of humidity. Male genitalia were cleared by boiling in warm 10% potassium hydroxide (KOH) for 3–5 minutes. Acetic acid was then used to neutralize the KOH during 5 seconds. Genitalia were stored in microvials containing glycerol. Specimen measurements were taken in dorsal view with a micrometer and are presented as ranges. Body length was measured from the lunula to the end of the abdomen, and wing length from the base of the epaulet to the wing apex. Numbers of measured specimens are indicated by the notation "n". Photos were made with a Leica DFC320 camera connected to a personal computer. After photographing, CombineZ software (Hadley 2006) was used in order to create composite image with an extended depth of field, created from the in- focus areas of each image.

Distribution maps. Localities with geographic coordinates were used without modification. Records without geographic coordinates were geo-referenced in Google Earth (Google Inc. 2013). Geographic coordinates of localities were represented in DivaGis (v7.5) (Hijmans *et al*. 2012) and distributional maps were created. Satellite-derived land cover data and shaded relief were applied using Natural Earth, free vector and raster map data.

Results

The *M. bessarabicus* subgroup sensu Šašić *et al.* (2016) belongs to the *M. aureus* clade (*sensu lato*) according to Mengual *et al.* (2006) and the *M. aureus* group (*sensu stricto*) according to Radenković *et al.* (2011). The main morphological characters of the *M. aureus* clade (*sensu lato*) are: a pilose posterior part of the mid coxa, presence of a pile patch on the anterior anepisternum below postpronotum, and the specific structure of male genitalia with an undeveloped anterior surstyle lobe (Fig. 2a, 2b: ASL). The *M. aureus* group (*sensu stricto*) comprises species more closely related to *Merodon aureus* Fabricius. Apart from their morphological similarity, these species are phylogenetically related, as noted in publications including genetic data, such as from the Iberian (Mengual *et al.* 2006) and Balkan (Milankov *et al.* 2008) peninsulas. A new synthesis of data concerning all complexes and subgroups is currently being prepared for publication.

The species of the *M. aureus* group are small-sized (8–13 mm) with a short rounded abdomen, a distinct spike on the hind trochanter in males, and a characteristic structure of the male genitalia: posterior surstyle lobe with parallel margins and rounded apex (Fig. 2a, 2b: PSL) and a narrow, elongated, sickle-shaped hypandrium without lateral sclerite of aedeagus (Fig. 2c, 2d). The *M. bessarabicus* subgroup includes species with predominantly yellow to orange tibiae (Fig. 3b) and dark brown to black tergites (Fig. 3a), as two main diagnostic characters.

Species of the *Merodon bessarabicus* subgroup

Merodon adriaticus sp. n.

Figs 1, 3a, 4, 5

Type material. HOLOTYPE: Montenegro: ♂, Boka Kotorska, Morinj, 30–31.viii.1997, leg. A. Vujić (FSUNS). PARATYPE: Croatia: ♂, Dalmatia, Pelješac (FSUNS).

Diagnosis. Species with bluish reflection of mesonotum and green reflection of abdomen; mesonotum predominantly covered with black pile and tergites completely covered with pale pile in male (Fig. 3a). Similar to *M. rufipes*, from which it differs by larger area of black pile on eyes (mostly pale pile in *M. rufipes*); mesoscutum almost completely with black pilosity (in *M. rufipes* black pile present only in posterior half); pilosity on scutellum partly black (Fig. 4b) (completely pale in *M. rufipes*) (Fig. 12b).

Body size. Length: body = 9 mm; wing = 8 mm (n = 2).

Description. **MALE** (Fig. 4). ***Head*** (Fig. 4c, 4d). Antenna orange-brown; basoflagellomere reddish, 1.3–1.5 times longer than pedicel, dorsal margin concave between the arista and the apex, apex acute; arista yellow basally, as long as pedicel and basoflagellomere together. Face and frons shiny black with bluish lustre, covered with long yellow pile and indistinct scarce brownish microtrichia, most visible along eye margin. Oral margin bare, with black lustre. Vertical triangle isosceles, shiny black, predominately covered with long pale pile, except at anterior end with black ones. Eye contiguity about 12 ommatidia long. Ocellar triangle equilateral. Eye pile long, black in the upper third and lower corner, paler in the middle. Occiput shiny, silver-green, except for along eye margin with

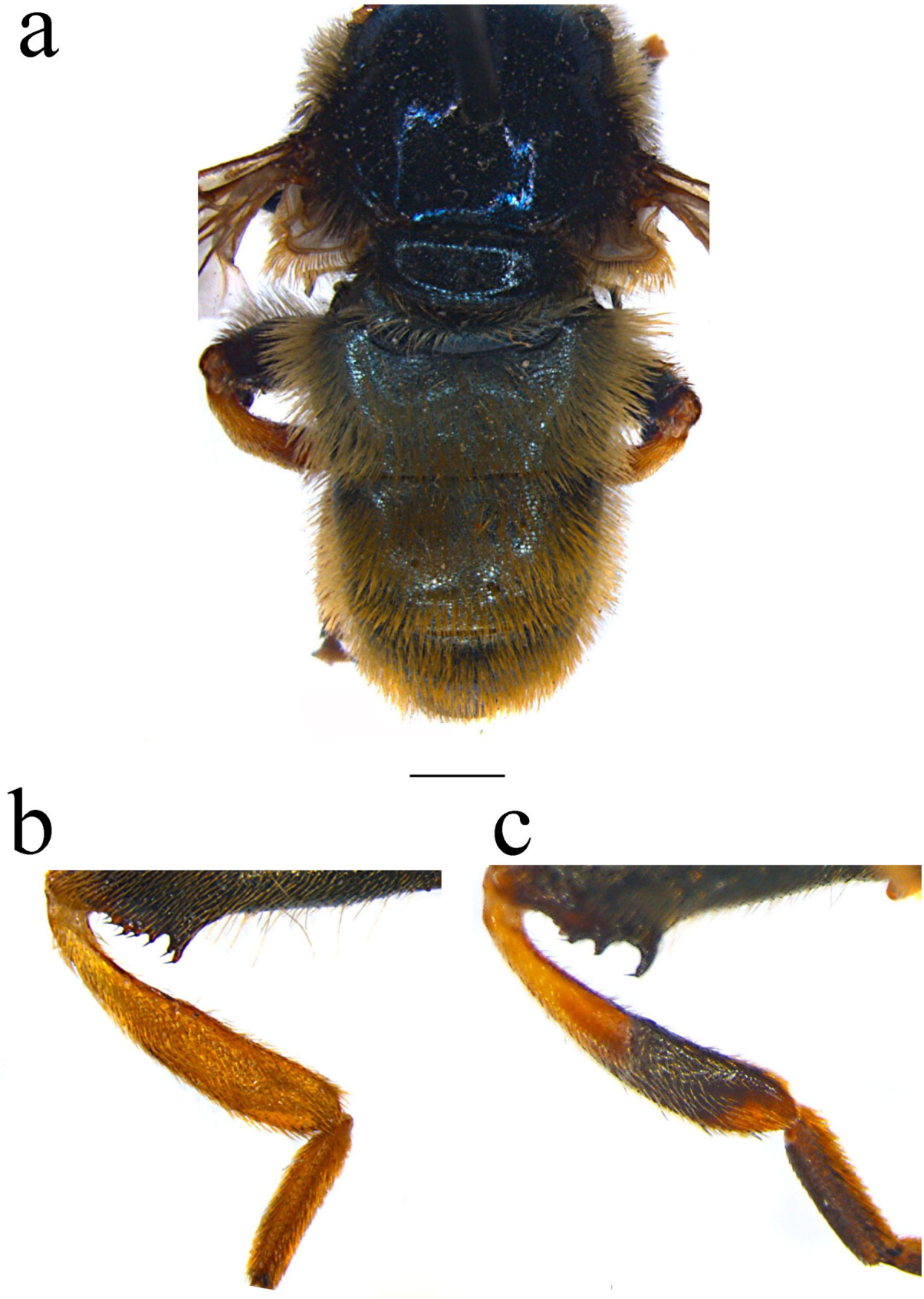

FIGURE 3. Diagnostic characters, males: a—*Merodon adriaticus* **sp. n.**, thorax and abdomen, dorsal view (scale 1mm); b—*Merodon ambiguus*, hind tibia, lateral view (scale 0.5mm); c—*Merodon nisi* **sp. n.**, hind tibia, lateral view (scale 0.5mm).

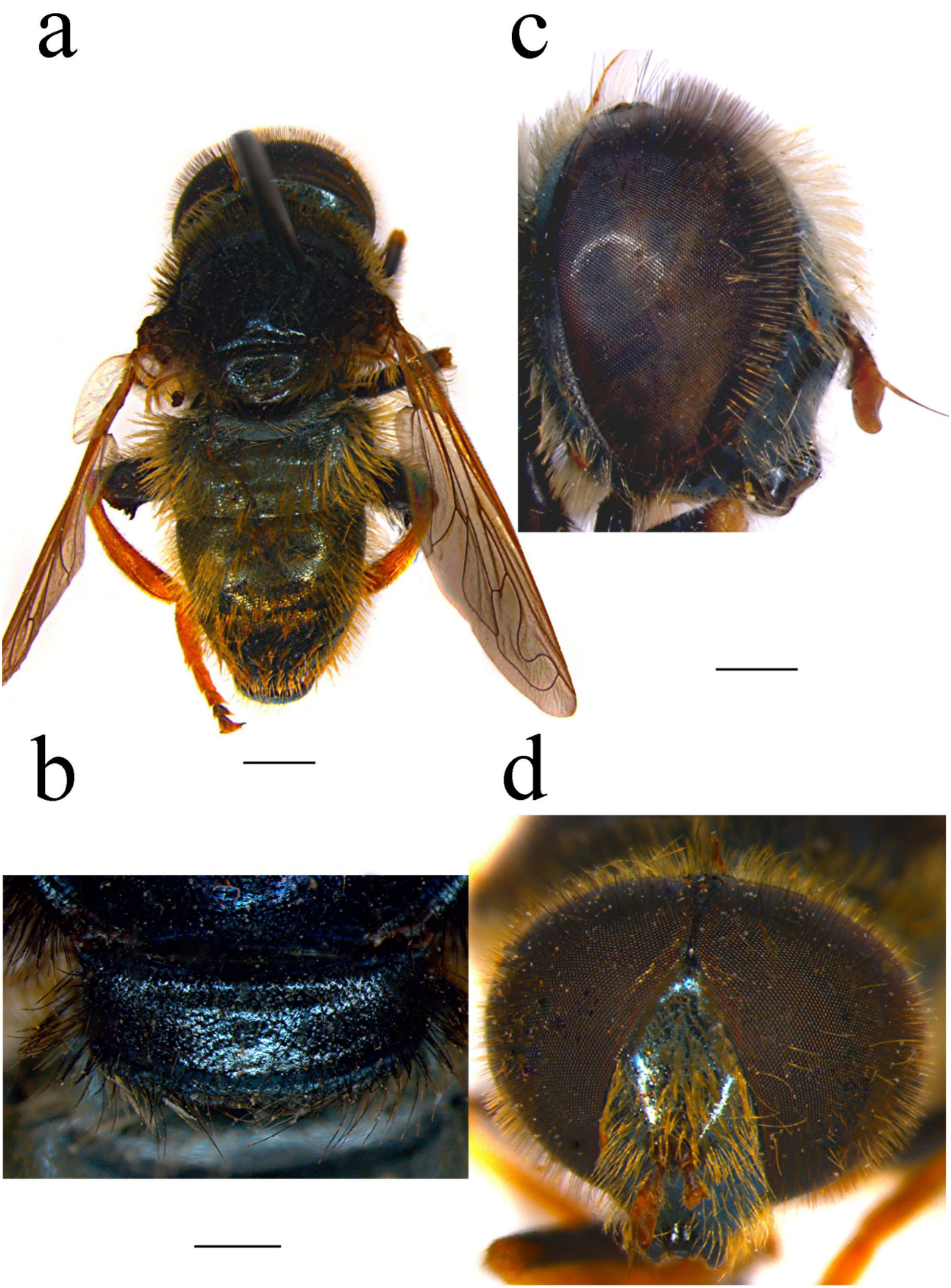

FIGURE 4. *Merodon adriaticus* **sp. n.**, male: a—dorsal view (scale 1mm); b—scutellum, dorsal view (scale 0.5mm); c—head, lateral view (scale 0.5mm); d—head, anterior view (scale 0.5mm).

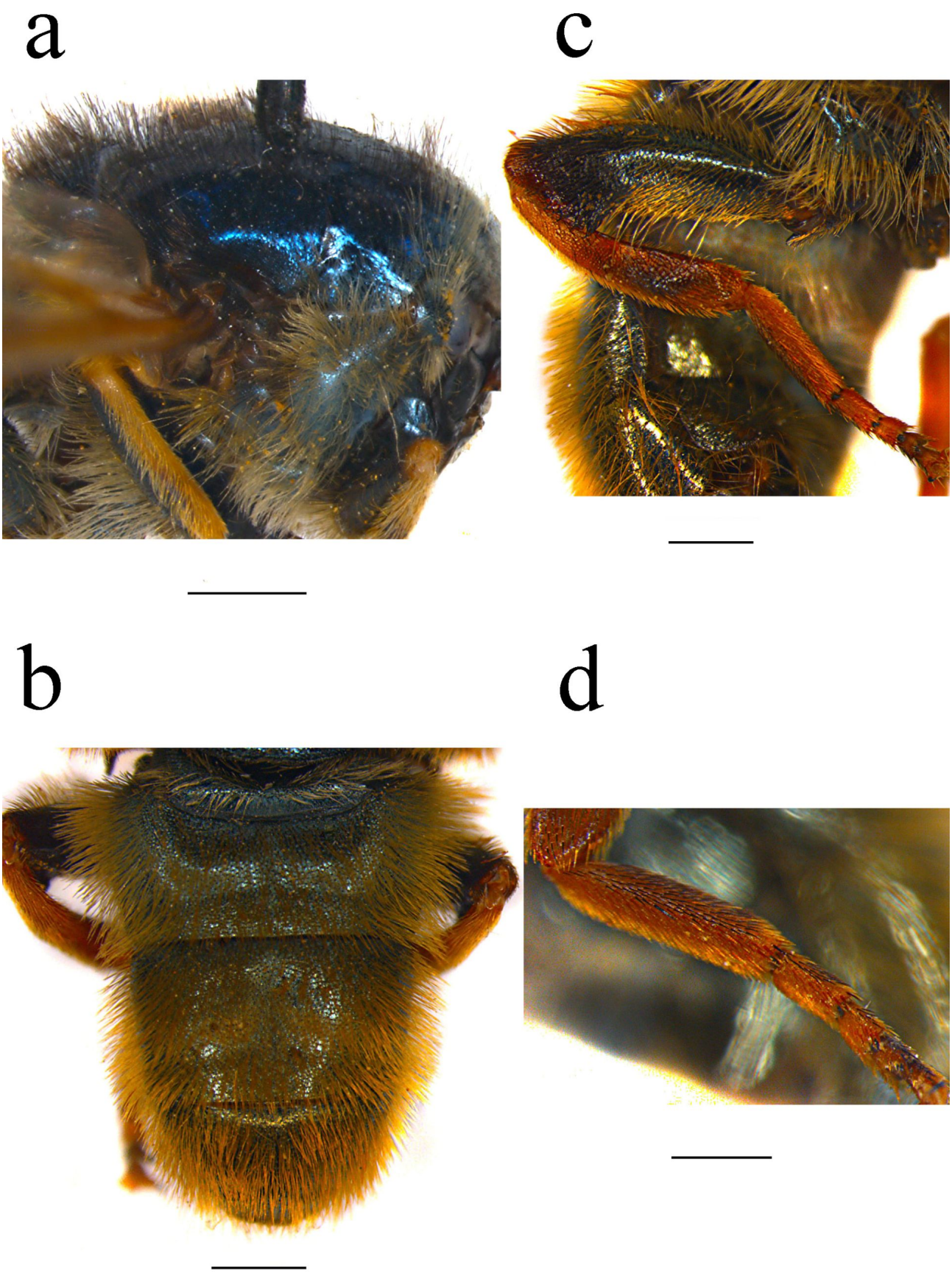

FIGURE 5. *Merodon adriaticus* **sp. n.**, male: a—thorax, lateral view (anterior part of the thorax on the right side, posterior part on the left side) (scale 1mm); b—abdomen, dorsal view (scale 1mm); c—hind leg, lateral view (scale 0.5mm); d—hind tarsi, lateral view (scale 0.5mm).

a narrow stripe of white microtrichia; covered with yellow pile. ***Thorax***. Mesonotum bluish with metallic reflections, predominately covered with long, dense, erect black pile, except pale pile usually present on the anterior margin of mesoscutum and posterior half of scutellum (Figs 3a, 5a); mesoscutum with three very weak longitudinal stripes of dark brown microtrichia in anterior half. Posterior anepisternum, anepimeron and dorsal part of katepisternum with long whitish-yellow pile. Wing light brownish, with yellow veins. Dorsal and ventral calypters brownish. Haltere with light brown pedicel and dark brown capitulum. Femora black with pale apex; pilosity of fore and mid femora predominately black, except yellow pile posteriorly in basal 1/3 of fore femur and posterior side of mid femur; hind femur predominately covered with yellow pile except short black ones in the apical 1/4 (Fig. 5c). Tibiae and tarsi predominantly pale, except weak submedial dark brown ring on tibiae and two brownish apical tarsomeres; covered in yellow pile with some intermixed black ones (hind tarsi dorsally can have more black pile) (Fig. 5d). Hind trochanter with inner spike ending in two angular points (one corner more protruded). ***Abdomen*** (Fig. 5b). Oval, slightly longer than mesonotum; black with green metallic reflections. Tergites II and III with pair of distinct white transverse microtrichose bands interrupted in the middle. Tergites completely covered with yellow pile. Sternites shiny black, covered with long light yellow pile, except for a few black pile on posterior margin of sternite IV. ***Genitalia***. Similar to all other species of the *aureus* group (as in Fig. 2).

FEMALE. Unknown.

Etymology. The word *adriaticus* refers to the known range of the species, restricted to the Adriatic coast.

Range and preferred habitat. Adriatic coast (Fig. 1); Mediterranean scrub, evergreen Adriatic thermophilous *Quercus* forest.

Merodon flavicornis **Macquart**

Figs 6–8, 16c

Macquart (1842: 71) described this species from an unknown locality. In the Macquart collection (MNHN), Thompson (1988) recognized a headless male holotype labelled as "No. 1184, *Merodon flavicornis*". He concluded that this holotype was conspecific with *Merodon aureus* and proposed a new synonymy. The holotype of *Merodon flavicornis* shares the same morphological features as other French specimens that the authors of the present paper examined in different collections and which were found to be different to *Merodon aureus*. Thus, *M. flavicornis* is recognized here as a valid Western Mediterranean species.

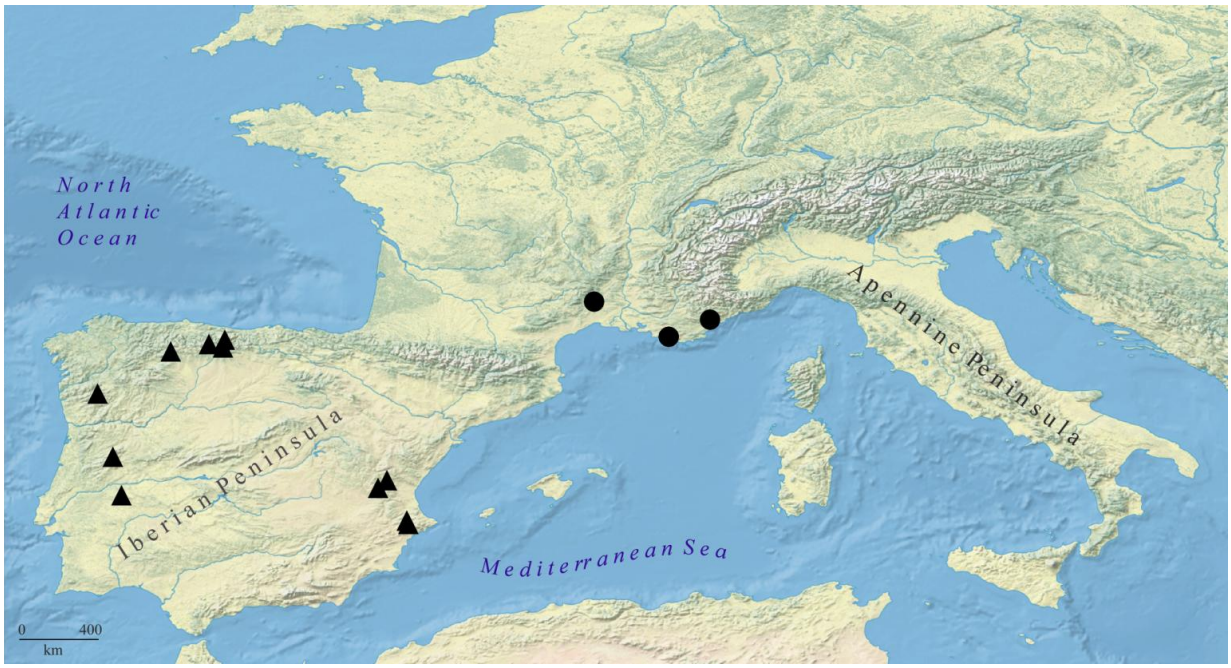

FIGURE 6. Distribution of *Merodon flavicornis* (●) and *Merodon legionensis* (▲).

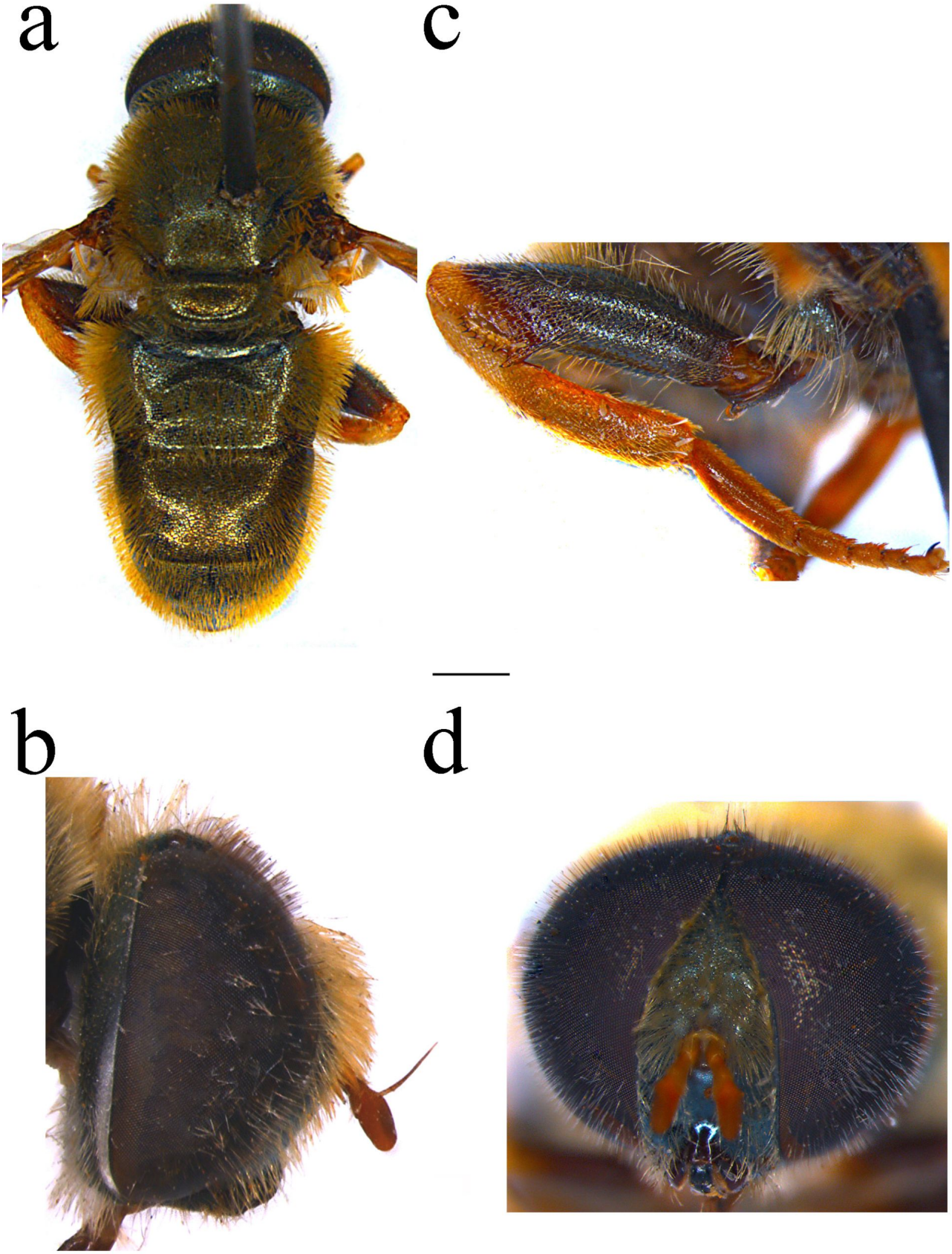

FIGURE 7. *Merodon flavicornis*, male: a—dorsal view (scale 1mm); b—head, lateral view (scale 0.5mm); c—hind leg, lateral view (scale 0.5mm); d—head, anterior view (scale 0.5mm).

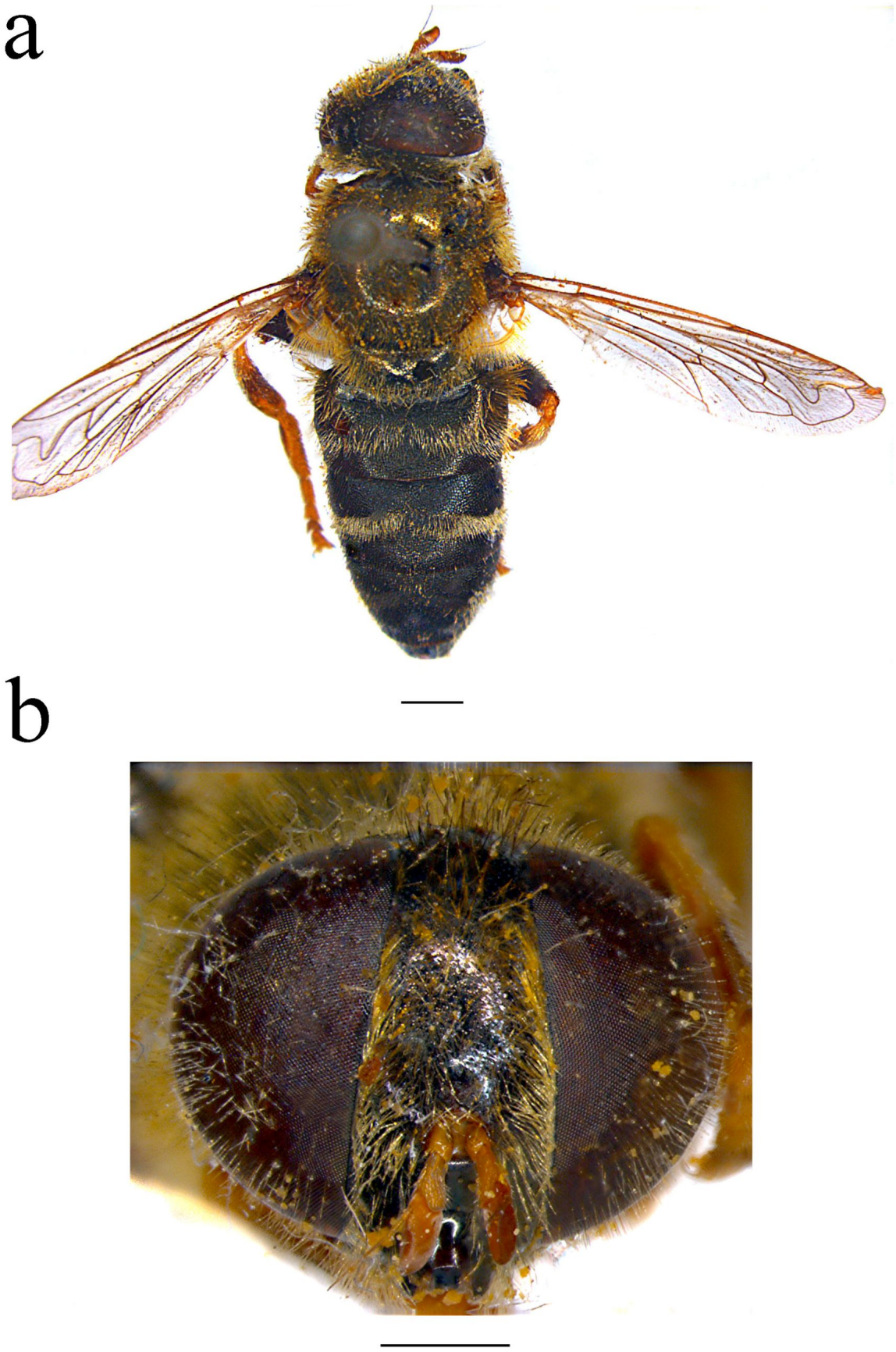

FIGURE 8. *Merodon flavicornis*, female: a—dorsal view (scale 1mm); b—head, anterior view (scale 0.5mm).

Type material. (revised). HOLOTYPE: ♂, "no. 1189" Vockeroth designated as holotype 1969, (MNHN).

New records. France: ♂, Castellet, Le Beausset (Var), 07.x.1918, leg. Ancey Seguy (MNHN); ♂, Le Market, 07.X.1918 (MNHN); ♀, Provence Alpes Cote d'Azur, Var, Montauroux, 06.ix.1961, leg. J. v.d Vecht (RMNH); 1 ♀, Gard, Anduze, leg. A. Boucomont (MNHN).

Diagnosis. Species with completely pale tibiae and tarsi; mesoscutum covered with pale pile; shiny tergites, with golden-bronze reflection, covered with light yellow hairs (Fig. 7a); tergites in male usually without microtrichia; eye pile in male black in upper 1/3 (contrary to *M. legionensis* black in upper 1/2); tarsi light (in *M. legionensis* apical tarsomeres darkened); pale pilosity on tergite V in female (in *M. legionensis* predominately black) and distribution (restricted to France) separate this taxon from the related Western Mediterranean species, *M. legionensis* (Iberian Peninsula).

Body size. Length: body = 8–11 mm; wing 6–9 mm (n = 4).

Re-description. **MALE** (Fig. 7). ***Head*** (Fig. 7b, 7d). Antenna from orange to yellowish; basoflagellomere yellow, 1.3–1.5 times longer than pedicel, dorsal margin concave between the arista and the apex, apex acute; arista orange-yellow basally, brown apically, as long as pedicel and basoflagellomere together. Face shiny black, frons duller, with greenish film; covered with long whitish-yellow pile and scarce indistinct grey microtrichia. Oral margin bare, with black lustre. Vertical triangle isosceles, twice as long as eye contiguity, shiny black, predominately covered with long yellow pile, except for black ones anteriorly. Eye contiguity about 18 ommatidia long. Ocellar triangle equilateral, with pale and black pilosity. Eye pile black in upper 1/3; light yellow pile dominate in central and lower parts. Occiput shiny, silver-green, except along eye margin with a narrow stripe of white microtrichia; covered with yellow pile. ***Thorax***. Mesonotum black, with green-bronze reflections, covered in long, dense, erect yellowish pile (Fig. 7a); mesoscutum with three very weak longitudinal stripes of golden microtrichia in anterior half. Posterior anepisternum, anepimeron and dorsal part of katepisternum with long yellowish pile. Wing yellowish, with light brown veins. Dorsal and ventral calypters light yellow. Haltere with yellow pedicel and light brown capitulum. Femora mostly black, except for pale base and apex. Fore and mid femora covered with long yellow pile posteriorly, the rest with short black pile. Hind femur predominately with pale pilosity and a few black pile apically (Fig. 7c). All tibiae and tarsi pale, covered in yellow pile (Fig. 7c). Hind trochanter with an angular inner spike. ***Abdomen***. Oval, slightly longer than mesonotum; black with golden-bronze reflections. Tergites II–IV dark brown to black and usually without white transverse bands of microtrichia (Fig. 7a). Tergites completely covered with pale pile. Sternites shiny brown, covered with long light yellow pile. ***Genitalia***. Similar to all other species of the *aureus* group.

FEMALE (Fig. 8). Similar to the male except for normal sexual dimorphism and the following characteristics: frons shiny black. Vertex mostly covered with black pile except for posterior end with yellow ones (Fig. 8b). Hind trochanter without spike. Abdomen shiny black, with a pair of white bands of microtrichia on tergites II–IV. On tergite II these bands are subparallel to the anterior margin of the tergite, whereas on tergites III and IV these bands are oblique (Fig. 8a). Tergites partly covered in pale pile; black pile present in central parts of posterior half of tergite II, all of tergite III and anterior half of tergite IV, except on mictrotrichose stripes; tergite V covered in yellow pile with some intermixed black ones.

Range and preferred habitat. France (Fig. 6); thermophilous *Quercus* forest.

Merodon legionensis Marcos-García, Vujić & Mengual

Figs 6, 9, 16b

Type material (revised). HOLOTYPE: Spain: ♂, León, Murias de Paredes, 09.ix.1987, leg. Marcos-García (CEUA). PARATYPES: Spain: ♀, Alicante, Caveta del Buitre, Agres (Natural Park Mariola), 1200 m, 27.viii/ 10.ix.2002, leg. X. Mengual (CEUA); ♀, Alicante, Font Roja, Alcoi (Natural Park, 21.ix.1993, leg. P.M. Isidro (FSUNS); 4 ♀, Alicante, Font Roja, Alcoi (Natural Park), Menetjador, 22.ix.2004, leg. A. Ricarte (CEUA); ♀ Alicante, Font Roja, Alcoi (Natural Park), Menetjador, 22.ix.2004, leg. A. Ricarte (MNMS); ♀, León, Cofiñal, 09.ix.1987, leg. Marcos-García (CEUA); ♀, León, Pandetrave, Santa María de Baldeón, 13.ix.1987, leg. Marcos-García (CEUA); ♀ León, Predosa del Rey, 1100 m, 13.ix.1987, leg. Marcos-García (CEUA); ♂, Valencia, Chelva, 28.viii.1993, leg. Pérez-Bañón (CEUA); ♂, Valencia, Chelva, 28.viii.1993 (MNMS); ♂, Valencia, Utiel, 06.ix.1994, leg. Pérez-Bañón (FSUNS) (Marcos-García *et al.* 2007).

FIGURE 9. *Merodon legionensis*, male: a—abdomen, dorsal view (scale 1mm); b—hind leg, lateral view (scale 0.5mm).

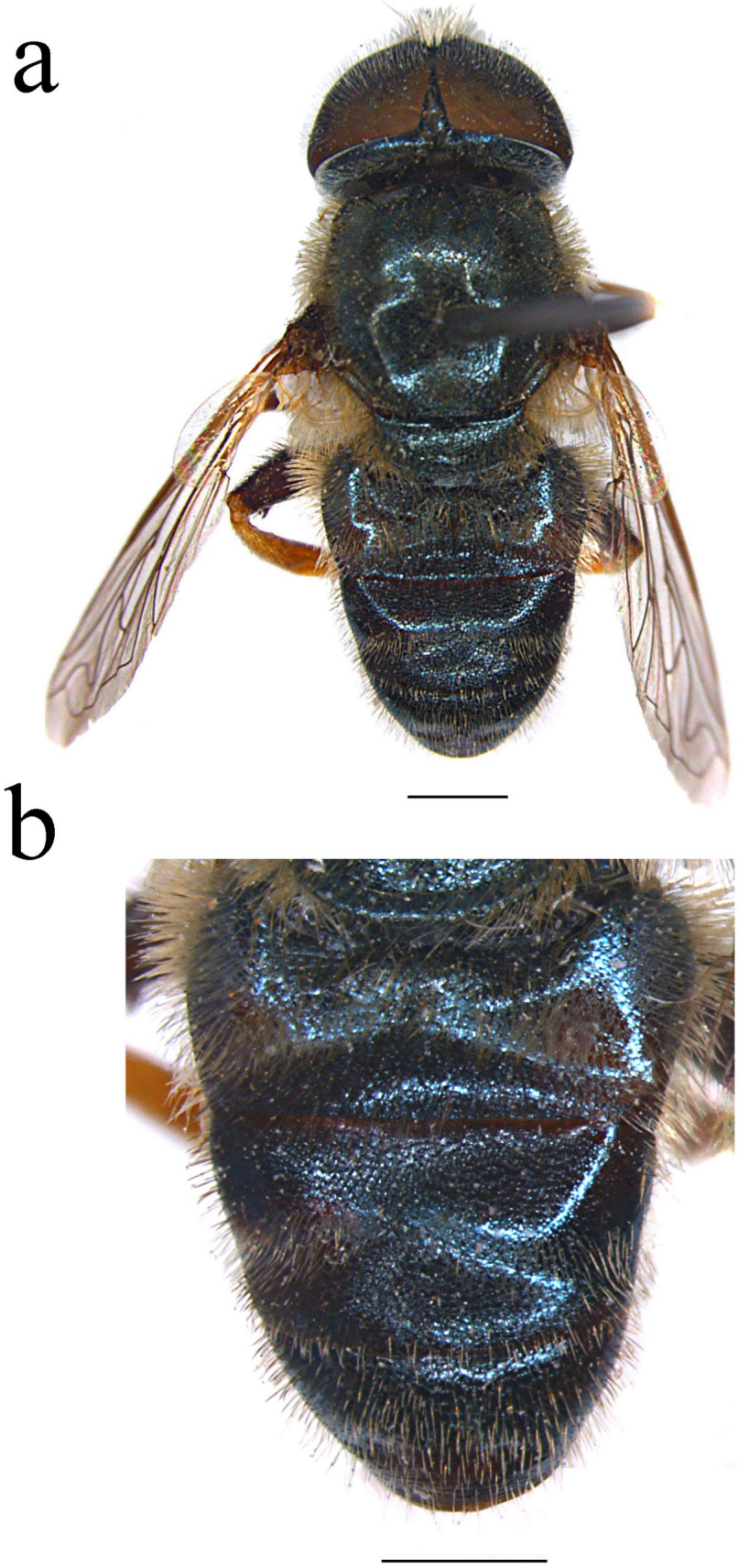

FIGURE 10. *Merodon quercetorum*, male: a—dorsal view; b—abdomen, dorsal view. Scale 1mm.

New records. Portugal: ♂ + ♀, Serra da Estrela, Nave de Santo António, 1600m, 06.ix.2009, leg. J.M. Almeida (AvE col); ♂, Montalegre, Pitões das Junias, 1100m, 10.ix.2012, leg. R. Andrade (AvE col); ♀, Marvão, Quinta da Abegoa, 25.viii.2014, leg. J.M. Almeida (AvE col) (van Eck 2016).

Diagnosis. Species with completely pale tibiae and tarsi except slightly brownish apical two tarsomeres in male, and three tarsomeres in female (Fig. 9b); mesoscutum covered with pale pile; shiny tergites, with golden-bronze reflection, covered with light yellowish hairs; tergites II and III in male with stripes of white microtrichia (Fig. 9a), contrary to related *M. flavicornis* (Fig. 7a); eye pile in male black in upper 1/2 (in *M. flavicornis* black in upper 1/3); pilosity on tergite V in female predominantly black (in *M. flavicornis* pale); distribution restricted to the Iberian Peninsula.

Range and preferred habitat. Iberian Peninsula (Spain and Portugal) (Fig. 6); open ground; unimproved, montane grassland, including open, grassy areas in pine forest or Mediterranean scrub, hedgehog heath, *Quercus rotundifolia* woodland (Speight 2016).

Merodon quercetorum Marcos-García, Vujić & Mengual

Figs 10, 11

Type material (revised). HOLOTYPE: Spain: ♂, Cáceres, Pto Honduras, Hervás, 1450 m, 28.viii.1980, leg. Marcos-García (CEUA). PARATYPES: Spain: 2 ♀, Alicante, Caveta del Buitre (Natural Park Mariola), Agres, 1200 m, 30.viii–11.ix.2001, leg. X. Mengual (CEUA); 3 ♂+2 ♀, Alicante, Caveta del Buitre, Agres, 1200 m, 14–30.viii.2001, leg. X. Mengual (CEUA); ♂, Alicante, Font Roja (Natural Park), Alcoi, 30.viii.1993, leg. P.M. Isidro (CEUA); ♀, Alicante, Font Roja (Natural Park), Alcoi 10–24.ix.1992, leg. F. Luna (FSUNS); 2 ♀, Ávila, Sierra Candelario, Santiago de Aravalle, 2200 m, 29.viii.1980, leg. Marcos-García (CEUA); 8 ♂+1 ♀, Cáceres, Pto Honduras, Hervás, 1450 m, 28.viii.1980, leg. Marcos-García (CEUA); ♂+ ♀, Cáceres, Pto Honduras, Hervás, 1450 m, 28.viii.1980, leg. Marcos-García (MNMS); ♀ Cáceres, Pto Honduras, Hervás, 1450 m, 28.viii.1980, leg. Marcos-García (FSUNS); 2 ♀, León, Pto. Leitariegos, 10.ix.1987, leg. Marcos-García (CEUA) (Marcos-García *et al.* 2007).

Diagnosis. Species with completely pale tibiae and tarsi; eyes predominantly pale pilose; mesoscutum with black pile near wing basis or with stripe of black pile between wing bases; hind femur usually with black pile in apical half; tergites in male with alternating stripes of pale and black pile (Figs 10a, 10b).

Range and preferred habitat. Iberian Peninsula (Spain) (Fig. 11); Forest and open ground, open areas in thermophilous *Quercus* (*Q. faginea, Q. pyrenaica*) and evergreen oak (*Q. rotundifolia*) forest and open ground at higher altitudes, up to 2200 m (Speight 2016).

FIGURE 11. Distribution of *Merodon nisi* **sp. n.** (●), *Merodon robustus* **sp. n.** (■) and *Merodon quercetorum* (▲).

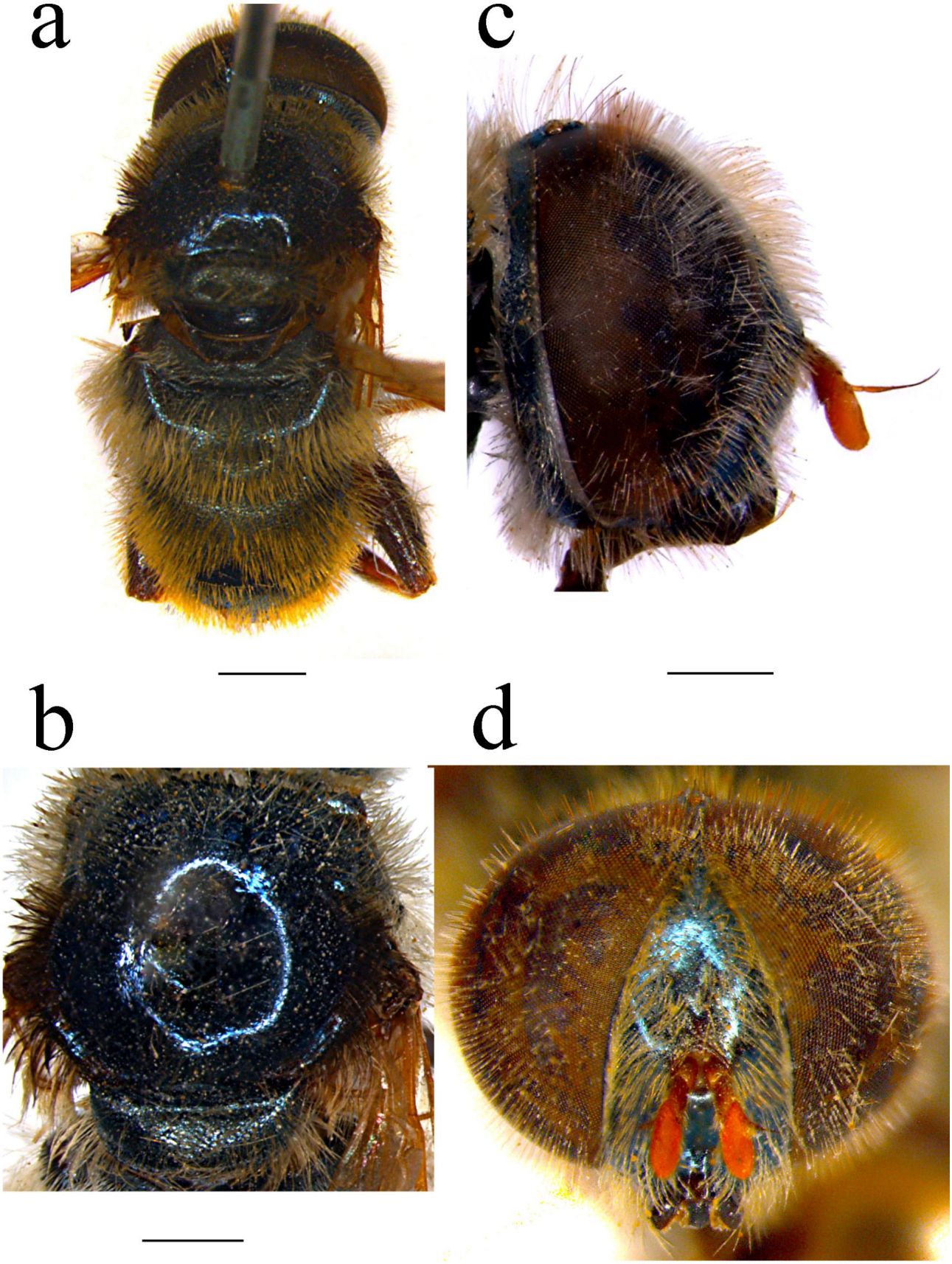

FIGURE 12. *Merodon rufipes*, male: a—dorsal view (scale 1mm); b—thorax, dorsal view (scale 1mm); c—head, lateral view (scale 0.5mm); d—head, anterior view (scale 0.5mm).

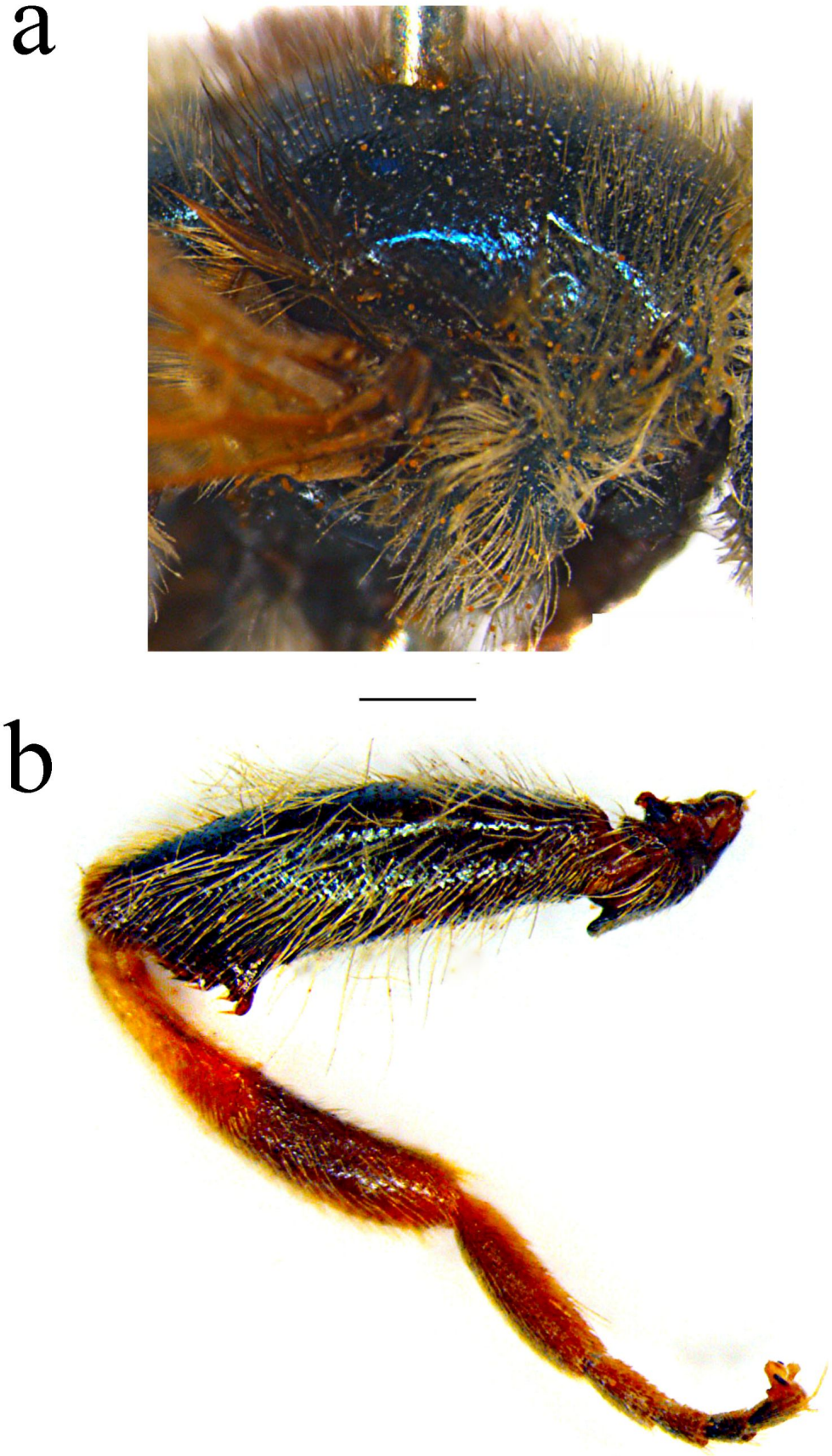

FIGURE 13. *Merodon rufipes*, male: a—thorax, lateral view (anterior part of the thorax on the right side, posterior part on the left side); b—hind leg, lateral view. Scale 0.5mm.

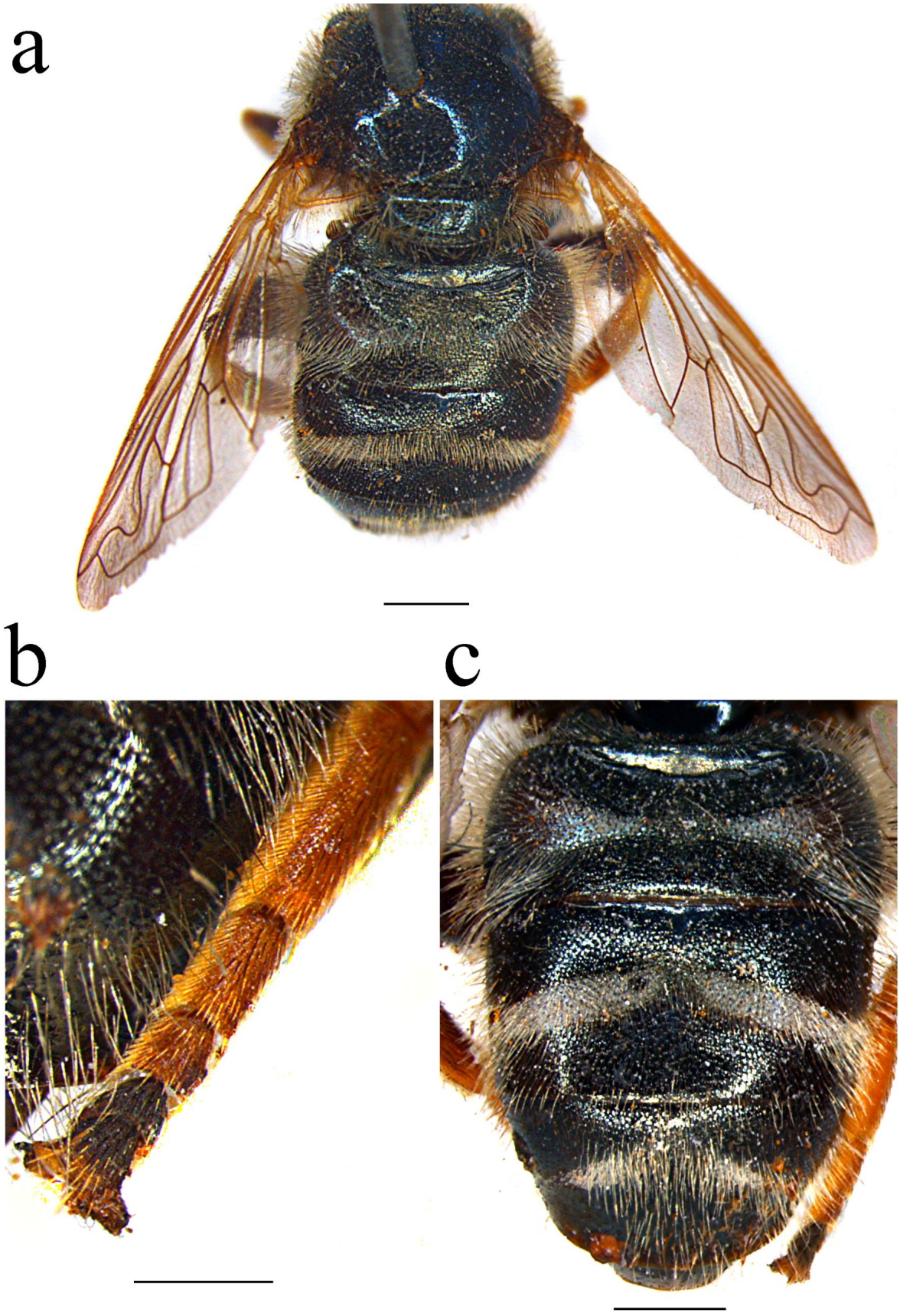

FIGURE 14. *Merodon rufipes*, female: a—thorax and abdomen, dorsal view (scale 1mm); b—hind tarsi, dorsal view (scale 0.5mm); c—abdomen, dorsal view (scale 1mm).

***Merodon rufipes* Sack**
Figs 1, 2, 12–14, 16a

Type material (not revised). Ukraine: 2 ♀, Poltawa (Sack, 1913).

New records. Bulgaria: ♂, Stara planina, Sliven, 13.ix.1960, leg. A. Monko (MZPW); Ukraine: ♂, Kharkiv, 26.viii.1983, leg. Jaroshevskij (RMNH); ♀, Kharkiv, 30.viii.1981, leg. Jaroshevskij (RMNH).

Diagnosis. Species with bluish reflection of mesonotum and green reflection of abdomen (Fig. 12a); posterior half of mesonotum covered with black pile; tergites completely covered in pale pile in male. Similar to *M. adriaticus*, from which it differs by the presence of mostly pale pile on eyes and completely pale pilosity on scutellum (Fig. 12b).

Body size. Length: body = 8–9 mm; wing 6–7.5 mm (n = 3).

Re-description. **MALE** (Fig. 12, 13). ***Head*** (Fig. 12c, 12d). Antenna yellowish brown; basoflagellomere yellowish orange, 1.3–1.5 times longer than pedicel, dorsal margin concave in apical half, apex acute; arista yellow basally, as long as pedicel and basoflagellomere together. Face and frons shiny black, covered with long yellow pile. Oral margin bare, with black lustre. Vertical triangle isosceles, shiny black and covered in long pale pile, except for a few darker pile anteriorly. Eye contiguity about 12 ommatidia long. Ocellar triangle equilateral, covered with predominately pale and a few black pile. Eye pile mostly pale and long, except light brown in upper eye corner. Occiput shiny, except along eye margin with a narrow stripe of white microtrichia, covered with yellow pile. ***Thorax***. Mesoscutum bluish with metallic reflections, covered in long, dense, erect black pile in posterior half (Fig. 13a); scutellum predominately covered with pale pile; mesoscutum with three very weak longitudinal stripes of dark brown to black microtrichia in anterior half. Posterior anepisternum, anepimeron and dorsal part of katepisternum with whitish-yellow long pile. Wing light brownish, with yellow veins. Dorsal and ventral calypters brownish. Haltere with light brown pedicel and dark brown capitulum. Femora dark brown; tibiae pale with weak submedial dark brown to black ring; tarsi darkened dorsally, pale ventrally (except in fore and mid legs, metatarsus also pale dorsally) (Fig. 13b). Legs predominately covered with pale pile, except for short black pile dorsally and antero-dorsally on fore and mid femora, plus a few black ones apically on hind femur. Hind trochanter with an inner spike ending in two angular points. ***Abdomen*** (Fig. 12a). Oval, slightly longer than mesonotum; black with green metallic reflections. Tergites II and III black, usually with a pair of indistinct white transverse bands of microtrichia interrupted in the middle. Tergites completely covered in yellow pile. Sternites shiny black, covered with long light yellow pile. ***Genitalia*** (Fig. 2). Similar to all other species of the *M. aureus* group.

FEMALE (Fig. 14). Similar to the male except for normal sexual dimorphism and the following characteristics: vertex with black pile; apical two tarsomeres darkened (Fig. 14b). Abdomen shiny black, with a pair of white bands of microtrichia on tergites II–IV. On tergite II these bands are subparallel to the anterior margin of the tergite, whereas on tergites III and IV these bands are oblique (Fig. 14c). Tergites partly covered with pale pile; black pile on central parts of posterior half of tergite II, all of tergite III and anterior half of tergite IV, except on microtrichose stripes.

Range and preferred habitat. Eastern Europe (Ukraine and Bulgaria) (Fig. 1); eastern thermophilous *Quercus* forest and mesophilous *Fagus* forest.

Other new species of the *Merodon aureus* group from the Aegean islands

During our study of the *M. aureus* group, we found two island endemics from the Eastern Mediterranean. Both taxa have isolated positions within the group because of their unique morphological features. Although they are not members of the *M. bessarabicus* subgroup, we present their descriptions here as contributors to the high diversity of the *M. aureus* group in the Mediterranean area.

***Merodon nisi* sp. n.**
Figs 3c, 11, 17–19, 20a

Type material. HOLOTYPE: Greece**:** ♂, Rhodes, Kalathos (Lindos), 15.x.2012, leg. A. Vujić (FSUNS). PARATYPES: Greece: ♂, ♀, Rhodes, Genadi, 23–27.x.1988, leg. H. Teunissen (RMNH).

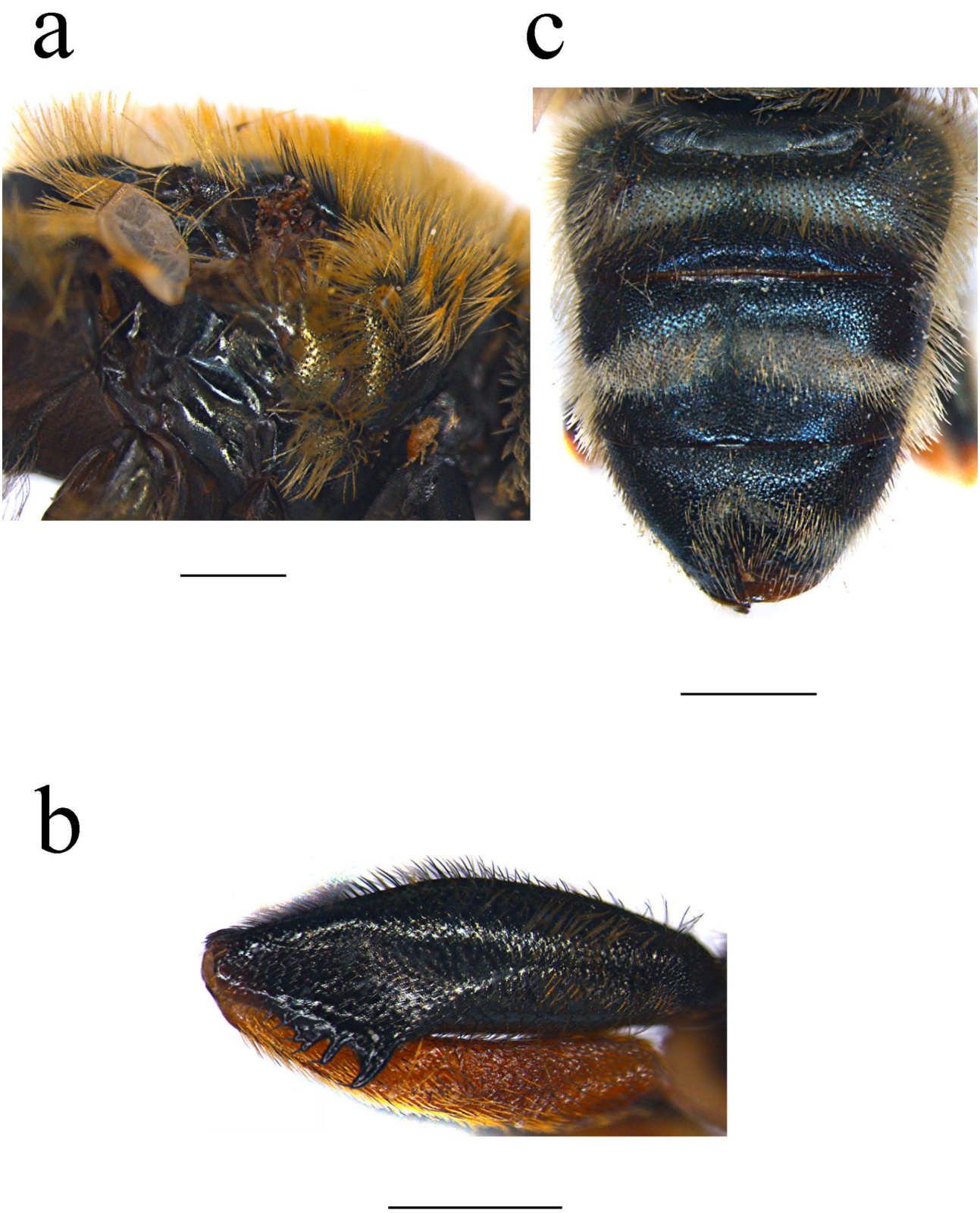

FIGURE 15. Males: a—*Merodon ambiguus*, thorax, lateral view (anterior part of the thorax on the right side, posterior part on the left side) (scale 0.5mm); b—*Merodon bessarabicus*, hind femur and tibia, lateral view (scale 0.5mm); c—*Merodon sapphous*, abdomen, dorsal view (scale 1mm).

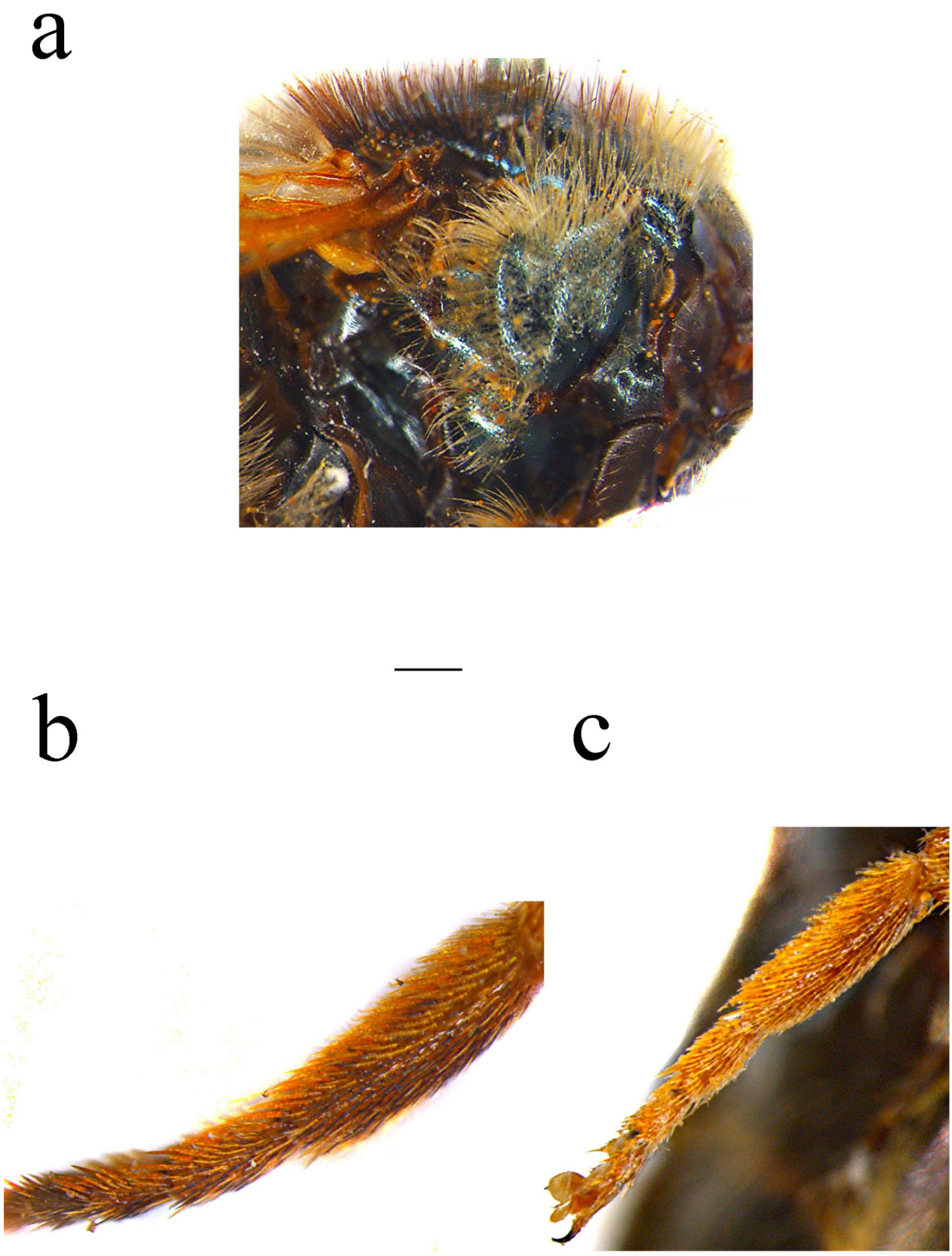

FIGURE 16. Females: a—*Merodon rufipes*, thorax, lateral view (anterior part of the thorax on the right side, posterior part on the left side); b—*Merodon legionensis*, hind tarsi, lateral view; c—*Merodon flavicornis*, hind tarsi, lateral view. Scale 0.5mm.

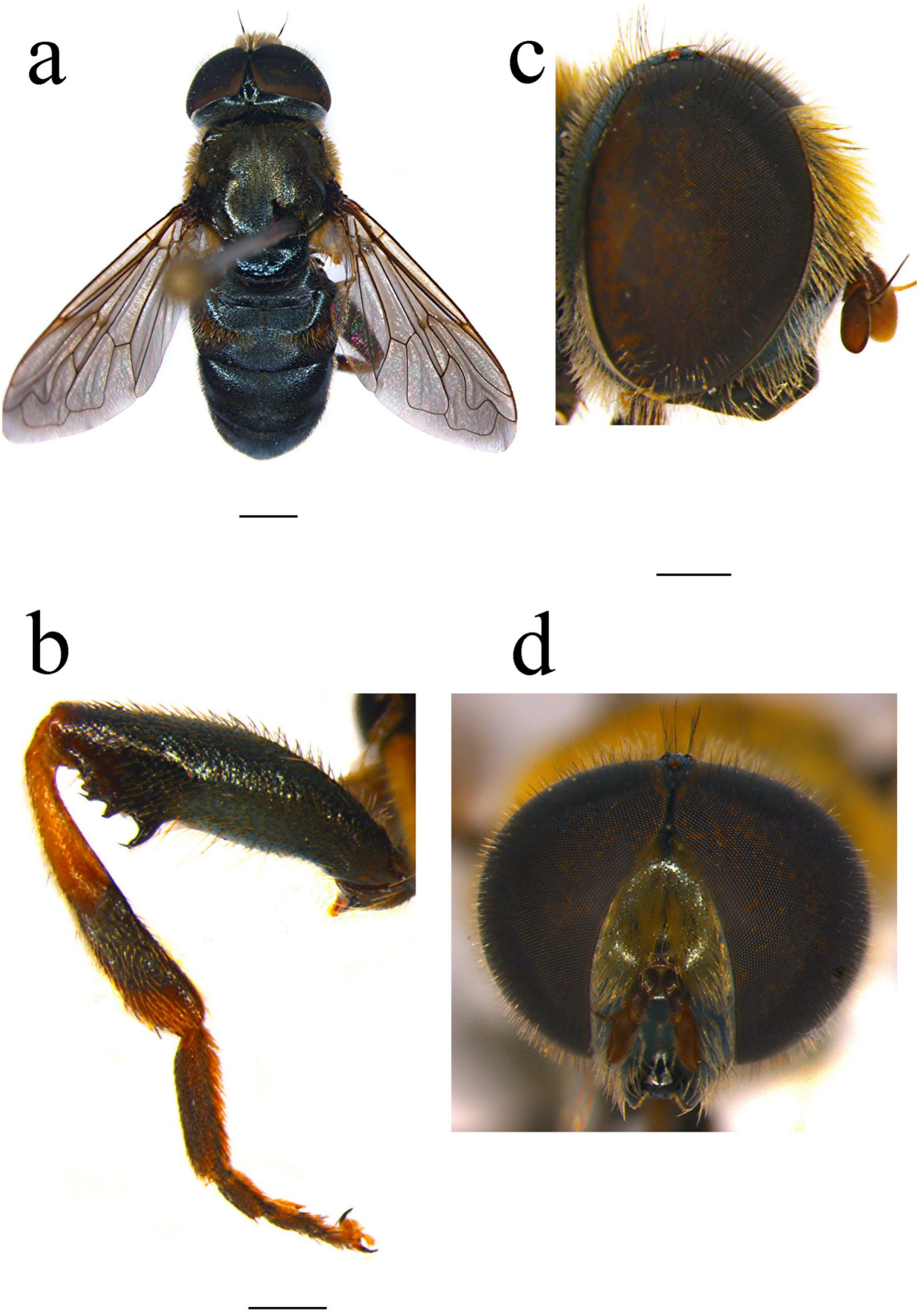

FIGURE 17. *Merodon nisi* **sp. n.**, male: a—dorsal view (scale 1mm); b—hind leg, lateral view (scale 0.5mm); c—head, lateral view (scale 0.5mm); d—head, anterior view (scale 0.5mm).

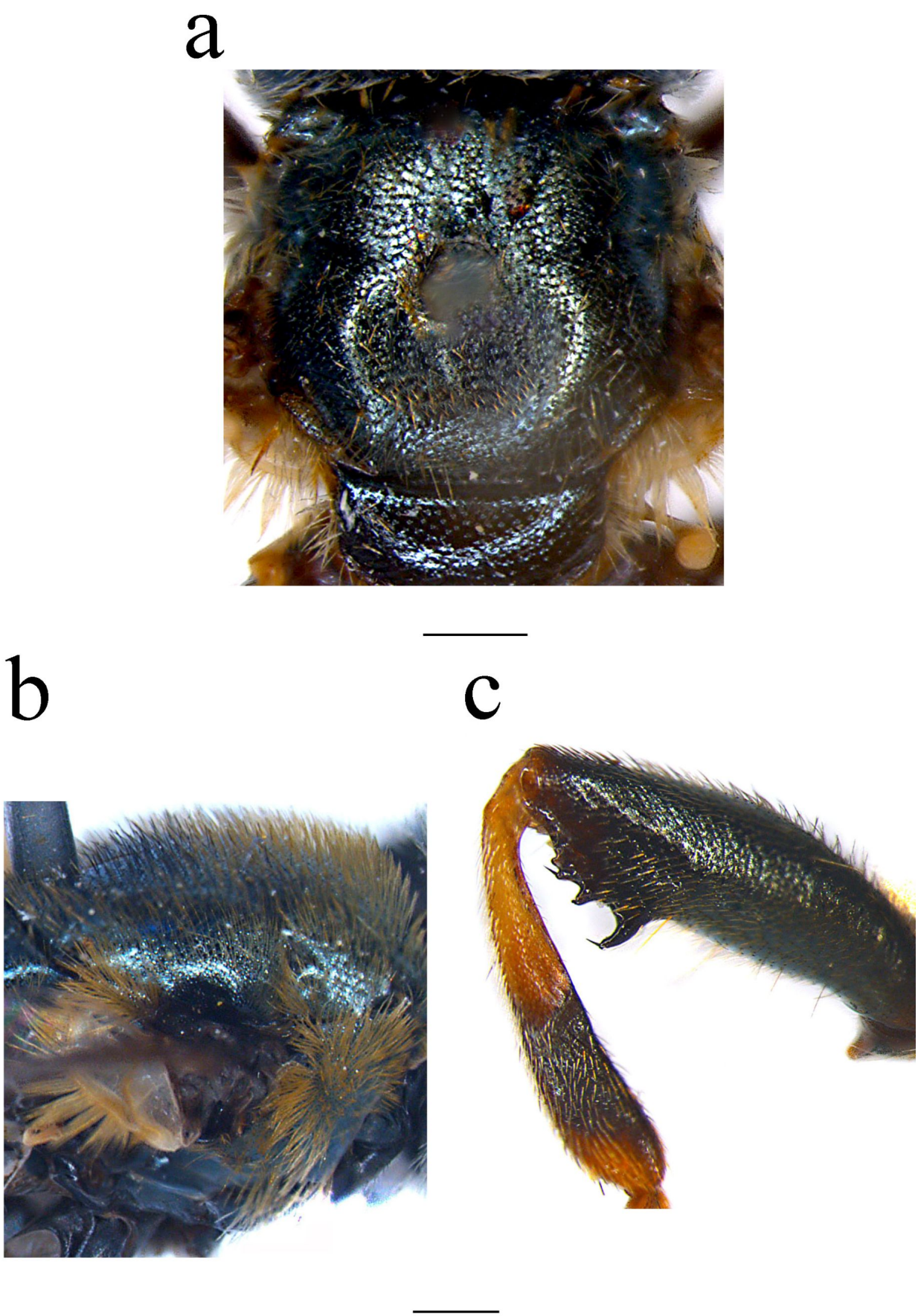

FIGURE 18. *Merodon nisi* **sp. n.**, male: a—thorax, dorsal view; b—thorax, lateral view (anterior part of the thorax on the right side, posterior part on the left side); c—hind femur and tibia, lateral view. Scale 0.5mm.

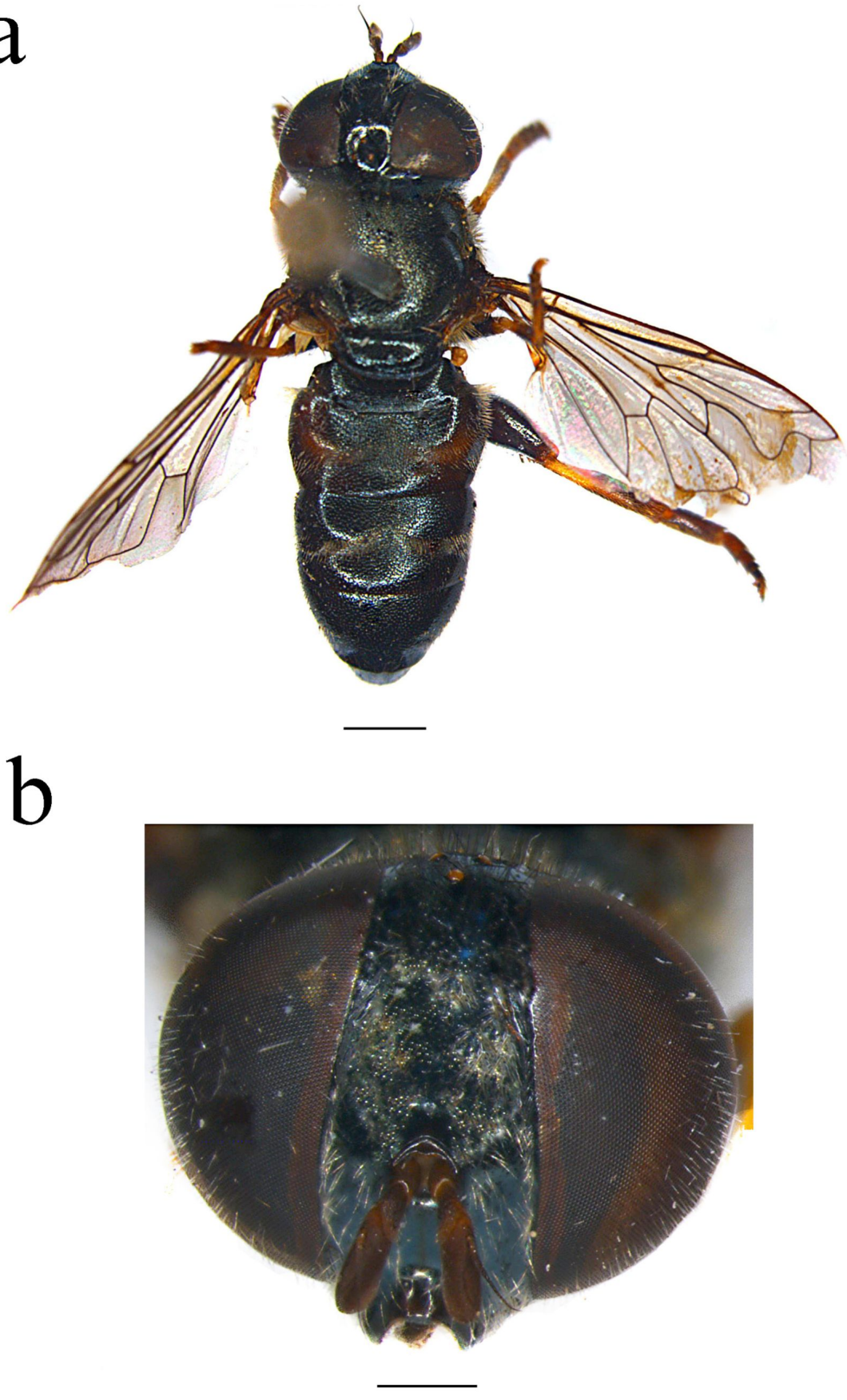

FIGURE 19. *Merodon nisi* **sp. n.**, female: a—dorsal view (scale 1mm); b—head, anterior view (scale 0.5mm).

Diagnosis. Small species with very short body pilosity (Figs 17a, 19a); hind tibia (Figs 17b, 20a) with dark brown to black submedial ring and tarsi of hind leg darkened dorsally (in the *M. bessarabicus* subgroup this character is present only in some specimens); tergite II with a pair of small, rounded, lateral, reddish spots (Figs 17a, 19a).

Body size. Length: body = 6–9 mm; wing 4–6 mm (n = 3).

Description. **MALE** (Fig. 17, 18). ***Head*** (Fig. 17c, 17d). Antenna brown; basoflagellomere 1.3–1.5 times longer than pedicel, dorsal margin concave between the arista and the apex, apex acute; arista light brown basally, as long as pedicel and basoflagellomere together. Face and frons shiny black, with indistinct microtrichose medial facial stripe and microtrichose line along eye margin; covered with whitish pile, except for some intermixed black ones in the upper part of frons. Oral margin bare, black and lustrous. Vertical triangle isosceles, 2.5 times longer than eye contiguity, shiny black and covered in long black pile. Eye contiguity about 8–10 ommatidia long, with a tendency for eyes to be separated. Ocellar triangle equilateral, covered with black pile. Eye pile short, predominately black over the entire surface, except for a postero-ventral corner of pale pile. Occiput shiny, bluish green, except for stripe of white microtrichia along eye margin; covered in whitish pile. ***Thorax***. Mesonotum black with metallic bronze reflections, covered in short, mixed black and light yellow pile; black pile concentrated in the area between wing bases (Fig. 18a, 18b); scutellum predominately covered with sparse, short, black pile, except light yellow pile laterally; mesoscutum with three weak longitudinal stripes of dark brown to black microtrichia in anterior half. Posterior anepisternum, anepimeron and dorsal part of katepisternum with whitish-yellow long pile. Wing brown-greyish, with dark brown veins; spurious vein at the level of bm-cu with spot of dark brown to black microtrichia; pterostigma light brown; completely covered with brown microtrichia except for the following areas with reduced microtrichia: cell bc, proximal half of cell br above and below vena spuria, proximal end of cells bm and cup, small central part of alula. Dorsal and ventral calypters light yellow. Haltere with yellow pedicel and brown capitulum. Femora black, except pale apex; fore and mid femora covered posteriorly with long light yellow pile and both dorsally and anteriorly with short black pile. Hind femur with light yellow pile basally and anteriorly, and with many black pile apically and posteriorly (Fig. 18c). Fore and mid tibiae pale with more or less conspicuous submedial brownish ring; hind tibia pale in basal half and apically (Fig. 17b). Tarsi pale, except for three dark brown, apical tarsomeres in fore and mid legs dorsally (the darkest is tarsomere IV), and all tarsomeres of hind leg dorsally covered in yellow and black pile (Fig. 17b). Hind trochanter with an inner spike ending in two angular points. ***Abdomen***. Oval, slightly longer than mesonotum; extensively black, dull without metallic reflections (Fig. 17a). Tergites II and III with weak white transverse bands of microtrichia interrupted in the middle. Tergite II with a pair of small, orange translucent, oval, lateral spots (Fig. 17a). Tergite I and area that covers lateral spots and microtrichose stripes on tergite II with pale pile, remaining tergites predominately covered with black pile, except for pale pilosity on lateral sides. Central part of tergites covered with very short and adpressed pile. Sternites dull; covered with long light yellow pile, except for posterior half of sternite IV with many black pile. ***Genitalia***. Similar to all other species of the *aureus* group.

FEMALE (Fig. 19). Similar to the male except for normal sexual dimorphism and in the following characteristics: frons covered with more black pile than in male, especially in central part (Fig. 19b). Hind trochanter without spike. Abdomen with a pair of white bands of microtrichia on tergites II and III and, in some specimens, also on tergite IV. On tergite II these bands are subparallel to the anterior margin of the tergite, whereas on tergites III (and IV) these bands are oblique (Fig. 19a).

Etymology. The word *nisi* means 'island' in Greek, and refers to the type locality of this species, i.e. the Aegean island of Rhodes.

Range and preferred habitat. Rhodes island (Greece) (Fig. 11); open, grassy areas in pine forest or Mediterranean scrub.

***Merodon robustus* sp. n.**
Figs 11, 21–24

Type material. HOLOTYPE: Greece: ♂, Samos, Pyrgos, 15.iv.2011, leg. A. Vujić (FSUNS). PARATYPES: Greece: 19 ♂ + 6 ♀, Samos, Pyrgos, 15.iv.2011, leg. A. Vujić (FSUNS); 3 ♂ + 13 ♀, Samos, Pyrgos, 500m, 21–22.iv.1988, leg. J. A. W Lucas (NBC); 5 ♂ + ♀, Samos, Platanos, 600m, 23.iv.1988, leg. J. A. W. Lucas (NBC); ♂, Samos, Spatharaioi-Paghondhas, 15.iv.2011, leg. A. Vujić (FSUNS); ♀, Samos, Karvuni, 26.v.1997, leg. J. P. Duffels (NBC).

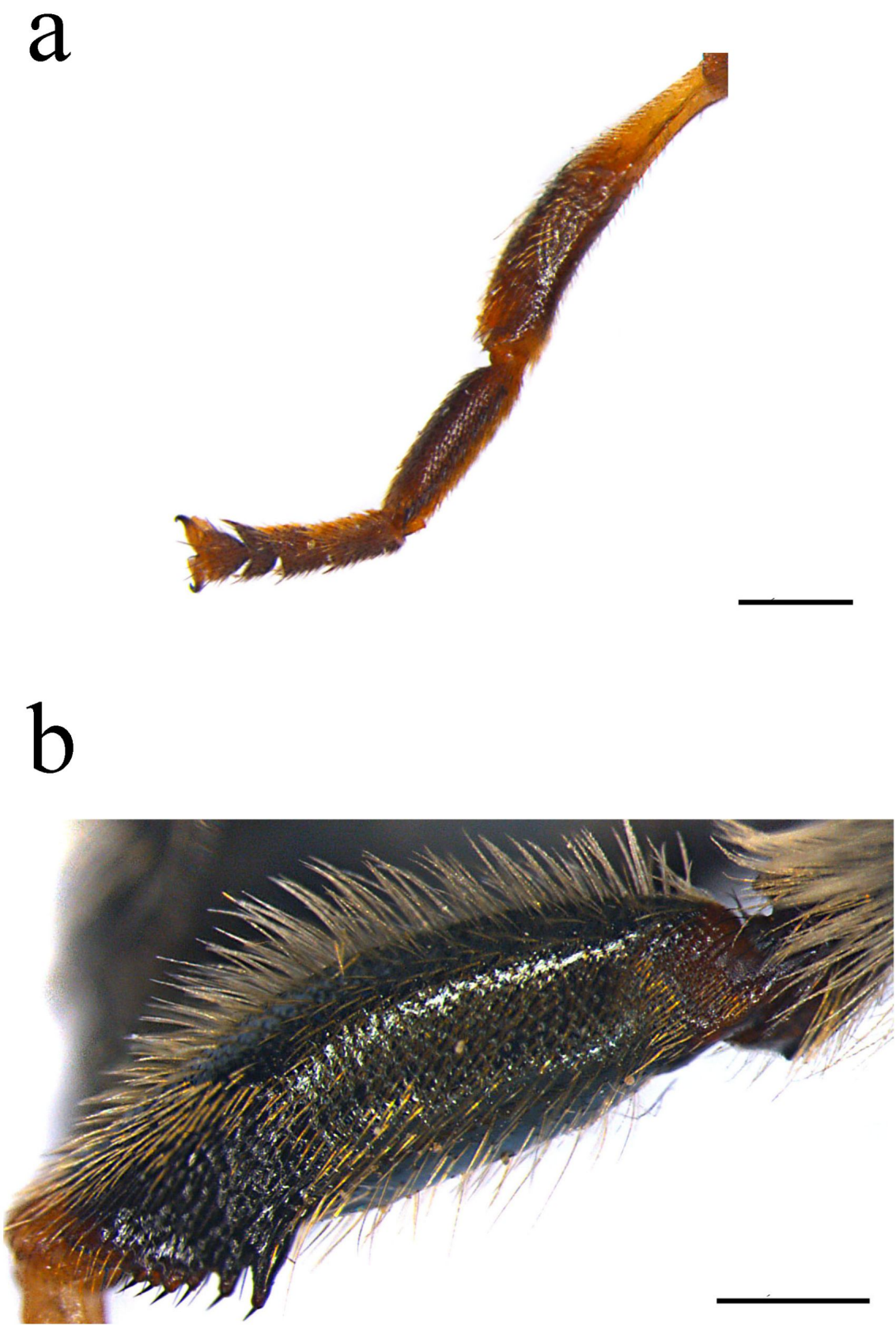

FIGURE 20. Females: a—*Merodon nisi* **sp. n.**, hind tibia and tarsi, lateral view; b—*Merodon ambiguus*, hind femur, lateral view. Scale 0.5mm.

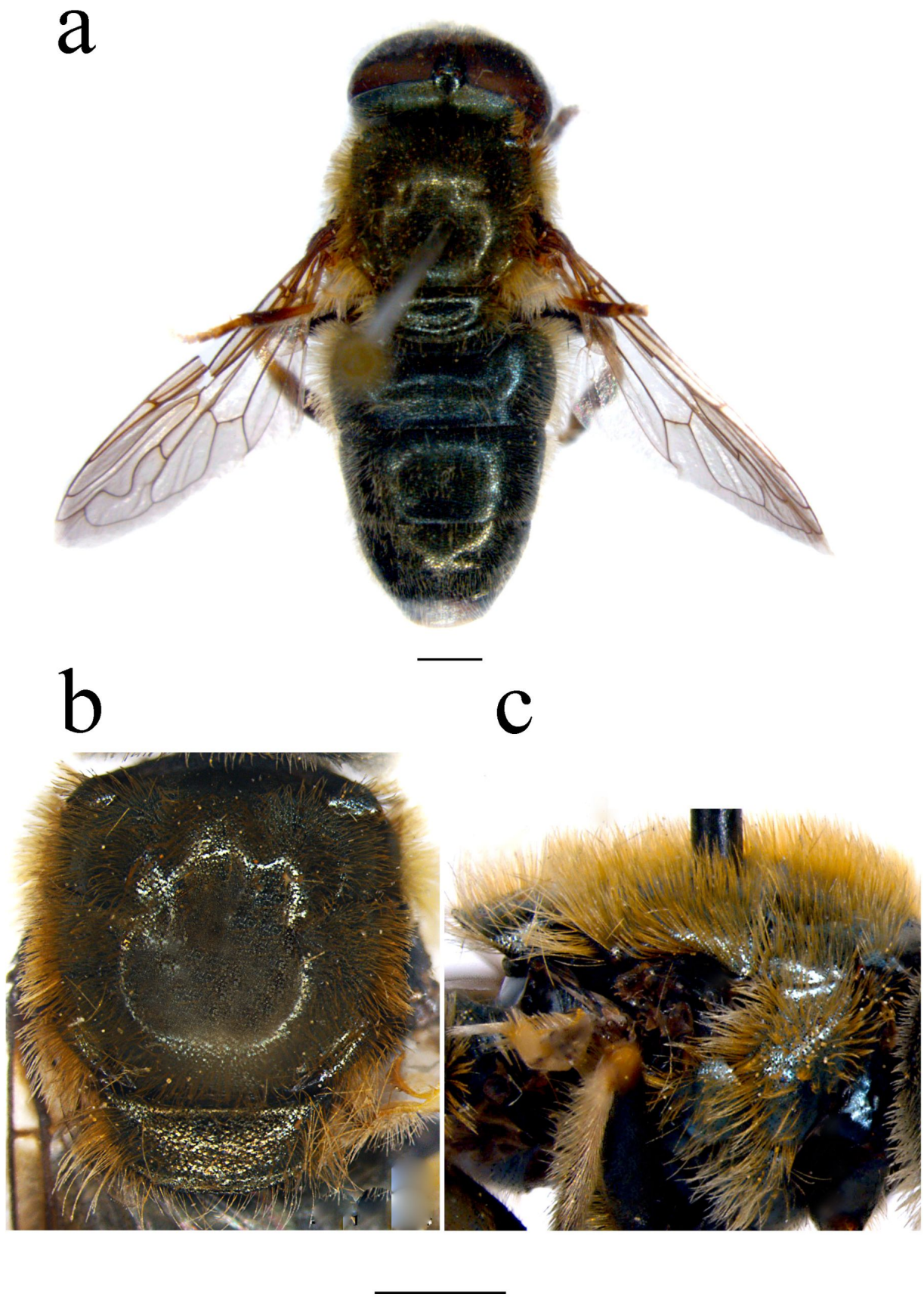

FIGURE 21. *Merodon robustus* **sp. n.**, male: a—dorsal view; b—thorax, dorsal view; c—thorax, lateral view (anterior part of the thorax on the right side, posterior part on the left side). Scale 0.5mm.

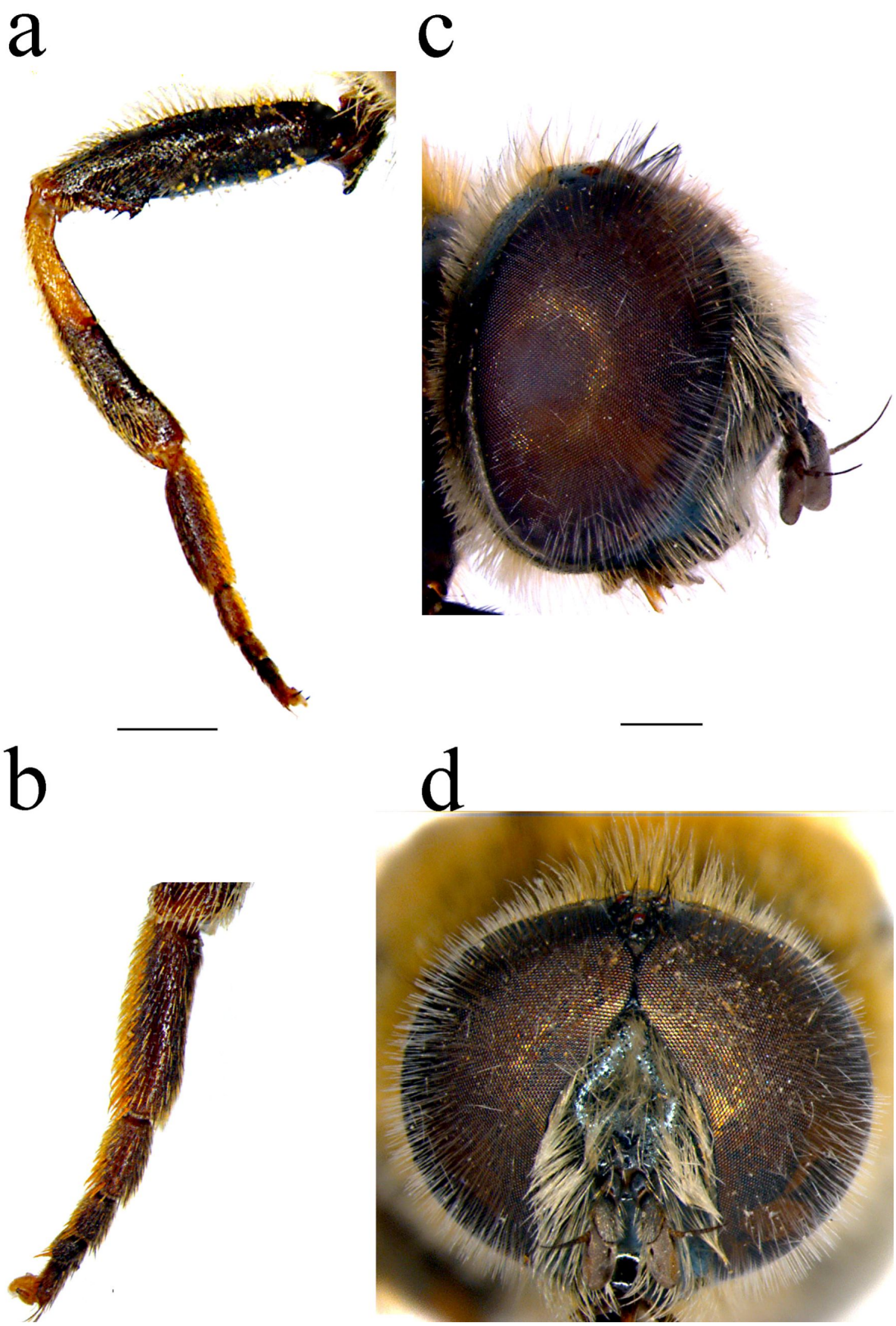

FIGURE 22. *Merodon robustus* **sp. n.**, male: a—hind leg, lateral view (scale 1mm); b—hind tarsi, lateral view (scale 1mm); c—head, lateral view (scale 0.5mm); d—head, anterior view (scale 0.5mm).

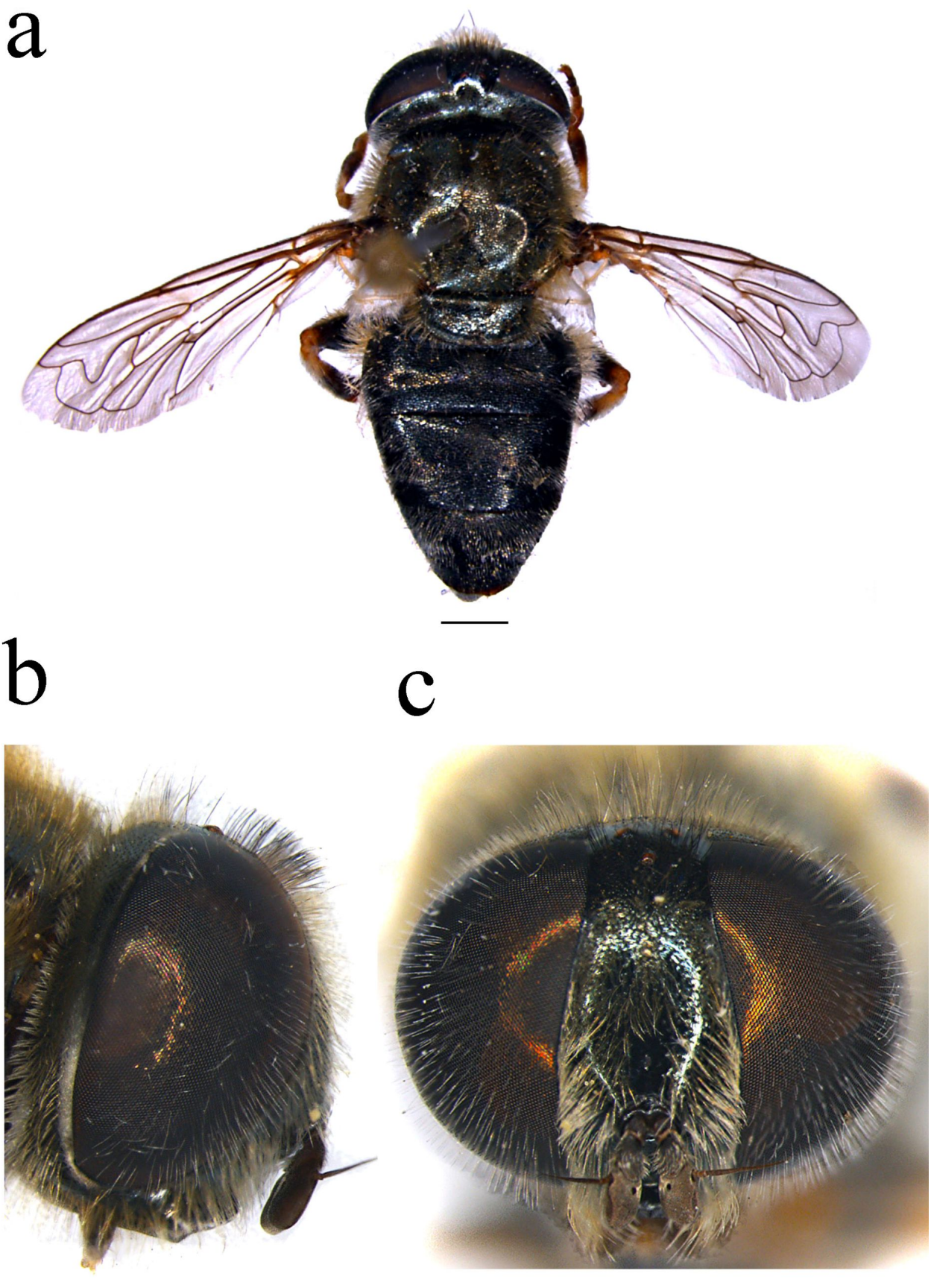

FIGURE 23. *Merodon robustus* **sp. n.**, female: a—dorsal view (scale 1mm); b—head, lateral view (scale 0.5mm); c—head, anterior view (scale 0.5mm).

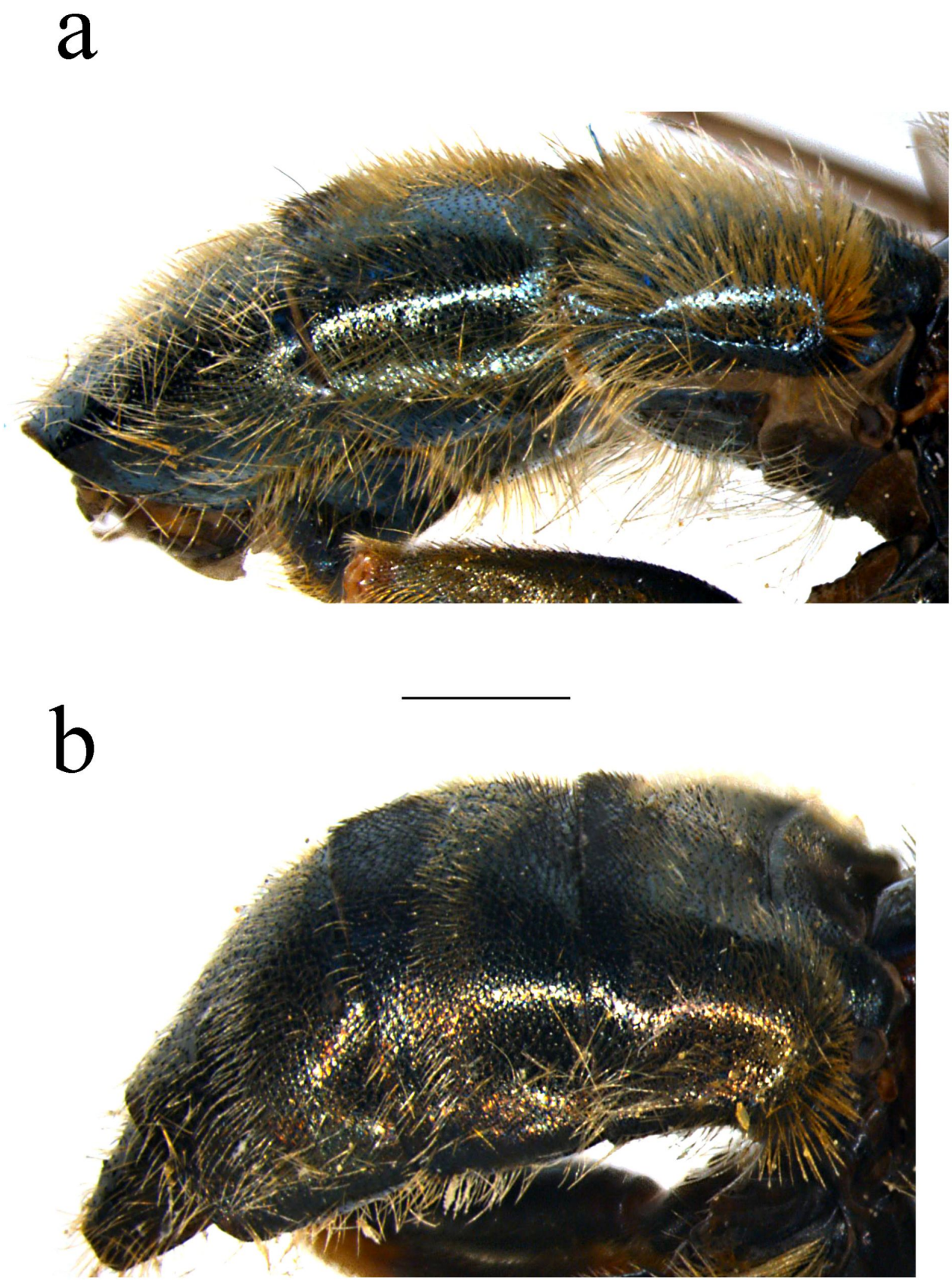

FIGURE 24. *Merodon robustus* **sp. n.**: a—male, abdomen, lateral view; b—female, abdomen, lateral view. Scale 1mm.

Diagnosis. Species with stocky abdomen without any trace of mictrotrichose stripes and the visible black background colour of tergites because of the scarce shortlight yellow pilosity (Figs 21a, 23a); frons above antennae swollen and striated, with median tubercle above lunulae; metatarsus of hind leg with small dorsal depression. This species is similar to *Merodon chalybeus* Wiedemann and *Merodon minutus* Strobl, except for the following differences: *M. robustus* **sp. n.** with whitish to yellowish pile at wing basis, black in *M. minutus* and *M. chalybeus*; *M. robustus* **sp. n.** with pale pilosity on hind femur, in *M. minutus* and *M. chalybeus* with many black pile in the apical half; *M. robustus* **sp. n.** with shiny tergites without any trace of microtrichia, contrary to *M. minutus* and *M. chalybeus* with microtrichose stripes at least on tergite II.

Body size. Length: body = 8–12 mm; wing 6–8 mm (n = 50).

Description. **MALE** (Fig. 21, 22). ***Head*** (Fig. 22c, 22d). Antenna from brown to reddish-brown; basoflagellomere 1.3–1.5 times longer than pedicel, dorsal margin concave between arista and apex, apex acute; arista brown, as long as pedicel and basoflagellomere together. Face and frons shiny black, except indistinct brown microtrichia on facial median stripe and along eye margin; covered in whitish to light yellow pile. Frons above antennae swollen and striated, with median tubercle above lunulae. Oral margin without setae or microtrichia, black and lustrous. Vertical triangle isosceles, 1.5–2.0 times longer than eye contiguity, shiny black without microtrichia and covered with long black pile anteriorly and light yellow pile posteriorly. Ocellar triangle slightly isosceles, covered with mixed black and light yellow pile. Eye contiguity about 10–15 ommatidia long. Eye pile long and pale except for upper eye corner with black pile. Occiput shiny, except stripe of white microtrichia along eye margin; covered with pale pile. ***Thorax*** (Fig. 21b, 21c). Mesonotum black with bronze metallic reflections, covered in long, erect yellowish pile, without any trace of microtrichia. Posterior anepisternum, anepimeron, dorsal part of katepisternum and postalar callus with whitish-yellow long pile**.** Wing brownish, with veins light brown to dark brown; densely covered with brown microtrichia. Dorsal and ventral calypters light yellow. Haltere with light brown pedicel and dark brown capitulum. Legs black except for pale apex of femora, orange basal half (or less) and apex of tibiae, and orange ventral surface of tarsi (first two tarsomeres of fore and mid legs dorsally can be paler). Fore and mid femur covered posteriorly with long light yellow pile and both dorsally and anteriorly with short black pile (Fig. 22a); hind femur with light yellow pilosity. Tibiae and tarsi covered with short yellow-orange pile, except hind tarsi dorsally with black pile (Fig. 22b). Hind trochanter with an inner spike ending in two angular points; metatarsus of hind leg with small dorsal depression. ***Abdomen***. Stocky abdomen; black, with bronze reflection, except for tergite II that is laterally bluish and lustrous. Tergites without any trace of mictrotrichose stripes. Tergites covered with adpressed short light yellow pile, except for a few intermixed black pile medially and more black pile postero-medially on tergites II and III. Sternites brown and shiny; covered with long light yellow pile, except for posterior half of sternite IV with a few black pile. ***Genitalia***. Similar to all other species of the *M. aureus* group.

FEMALE (Fig. 23). Similar to the male except for normal sexual dimorphism and in the following characteristics: ocellar triangle equilateral. Vertex with yellow pile and a few intermixed black ones (Fig. 23b, 23c). Hind trochanter without spike. Pilosity on abdomen shorter than in male; tergites II and III with more black pile in female than in male (Figs 24a, 24b).

Etymology. The Latin adjective *robustus* means solid and robust, and refers to the robust body form of this species.

Range and preferred habitat. Aegean island of Samos (Greece) (Fig. 11); open areas in evergreen Mediterranean oak forest and maquis.

Key to species subgroups and species within the *Merodon aureus* group *sensu* Radenković *et al.* (2011)
[Adapted from Šašić *et al.* (2016)]

1	Body pilosity very short (Fig. 17a), pile on dorsal surface of hind femur shorter than scapus; pile on tergites II and III shorter than basoflagellomere; distal half of hind tibia, and hind tarsi dorsally darkened (Fig. 17b) . . . . . *Merodon nisi* **sp. n.** (Aegean island of Rhodes, Greece)
-	Body pilosity longer, pile on tergites II and III as long as or longer than basoflagellomere 2
2	Tibiae and tarsi mostly pale, at least basal half of fore and mid tibiae and tarsi ventrally 3
-	Tibiae and tarsi predominantly black 4
3	Tergites reddish . . . . . *Merodon dobrogensis* subgroup (Eastern Mediterranean, 3 species)
-	Tergites dark, exceptionally with small orange spots on lateral sides of tergites II and III . . . . .

. . . . . *Merodon bessarabicus* subgroup (central and southern Europe, 6 species)
4 Tergites II and III with pale lateral spots. . . . . *Merodon unguicornis* (Western Mediterranean)
- Tergites uniformly dark 5
5 Mesonotum only with pale pile. . . . . *Merodon aureus* subgroup (central and southern Europe, 3 species)
- Mesonotum, at least near wing base, with black pile 6
6 Species with strong blue body lustre. . . . . *Merodon caerulescens* (Aegean islands)
- Species with dark brown or greenish body lustre 7
7 Tergites without microtrichia, shiny dark brown to black. Frons above antennae swollen and striated, with median tubercle above lunulae; metatarsus of hind leg with small dorsal depression . . . . . *Merodon robustus* **sp. n.** (Aegean island of Samos, Greece)
- Tergites with at least a trace of microtrichose stripes or spots 8
8 Body pile shorter; pile on scutellum in male shorter than hind basitarsus; tergites in female without microtrichose bands, or with small ones on tergites II and III. . . . . *Merodon chalybeus* subgroup (islands, coastal zone or low altitudes in Mediterranean, 4 species)
- Body pile longer; pile on scutellum in male as long as or longer than hind basitarsus; tergites II–IV in female with pair of microtrichose stripes . . . . . *Merodon cinereus* subgroup (Central and South European mountains, 2 species complexes)

Key to species complexes and species of the *Merodon bessarabicus* subgroup
(Distribution data are included)

MALES

1 Tergites only with pale pile 2
- Tergites with pale pile and stripes of black pile 7
2 Mesonotum only with pale pile. 3
- Mesonotum with both pale and black pile, black ones present at least near wing basis 5
3 Tergite II (and III) with a pair of orange lateral spots. . . . . *Merodon luteomaculatus* complex (South-East Europe)
- Tergites uniformly dark brown to black (Fig. 9a) 4
4 Tergites II and III with a pair of lateral microtrichose stripes (Fig. 9a); hind femur black except for paler apical margin (Fig. 9b); pile on eyes black in upper 1/2 . . . . . *Merodon legionensis* (Iberian Peninsula)
- Tergites usually without microtrichia (Fig. 7a); hind femur with yellowish apical fifth, including triangular process (Fig. 7c); pile on eyes black in upper 1/3 . . . . . *Merodon flavicornis* (France)
5 Black pile on mesoscutum distributed only between wing bases (Fig. 15a). . . . . *Merodon ambiguus* complex (Aegean islands, Balkan and Anatolian Peninsulas)
- Pile on at least posterior half of mesoscutum black (as in Fig. 5a). 6
6 Eyes in upper third with black pile; hind femora in apical half with black pile; almost all surface of mesoscutum covered with black pile, except pale stripes of pile on anterior margin; anterior half of scutellum with black pile, posterior half with pale pile (Fig. 4b). . . . . *Merodon adriaticus* **sp. n.** (Adriatic coast)
- Eyes and hind femora mostly covered with pale pile; mesoscutum with black pile on posterior half; scutellum covered with pale pile (Fig. 12b) . . . . . *Merodon rufipes* (Eastern Europe)
7 Mesoscutum covered with pale pile . . . . . *Merodon sapphous* complex (Aegean islands and Anatolian Peninsula)
- Mesoscutum with at least wing bases bearing black pile 8
8 Eyes in upper half covered with black pile. . . . . *Merodon bessarabicus* complex (Anatolian and Balkan Peninsulas)
- Pile of eyes pale or with few black pile in apical fifth . . . . . *Merodon quercetorum* (Iberian Peninsula)

FEMALES

1 Mesonotum covered with pale pile 2
- Mesonotum not entirely pale, also with black pile, at least near wing bases 5
2 Hind femur covered with pale pile 3
- Hind femur with at least a few black pile in apical half . . . . . *Merodon sapphous* complex (Aegean islands and Anatolian Peninsula)
3 Tergite II (and III) with orange lateral spots . . . . . *Merodon luteomaculatus* complex (South-East Europe)
- Tergites uniformly dark brown to black, exceptionally with small pale areas on lateral side of tergite II 4
4 Tarsi on mid and hind legs with short black pile (Fig. 16b); pilosity on tergite 5 predominantly black . . . . . *Merodon legionensis* (Iberian Peninsula)
- Tarsi on mid and hind legs without short black pile (Fig. 16c) (some specimens may have a few short black pile on dorsal side of tarsi); pilosity on tergite V predominantly pale . . . . . *Merodon flavicornis* (France)
5 Mesonotum predominatly covered with black pile (Fig. 16a) . . . . . *Merodon rufipes* (Eastern Europe) (the female of *M. adriaticus* **sp. n.** from the Adriatic coast would most probably key out here)
- Mesonotum with black pilosity near wing basis, or with stripe of black pile between wing bases 6
6 Hind femur covered with pale pile (Fig. 20b) . . . . .

. . . . . *Merodon ambiguus* complex (Aegean islands, Balkan and Anatolian Peninsulas)
- Hind femur with at least a few black pile in apical half 7
7 Eyes covered predominantly with pale pile . . . . . *Merodon quercetorum* (Iberian Peninsula)
- Eyes covered with black pile at least in apical fourth . . . . *Merodon bessarabicus* complex (Anatolian and Balkan Peninsulas)

Diagnoses of the species complexes within the *Merodon bessarabicus* subgroup

The diagnosed species complexes within the *M. bessarabicus* subgroup are supported by morphological characters and, in the absence of distinct morphological features, by molecular and geometric morphometric characters (S. Radenković, Lj. Šašić, A. Vujić, in prep.). Based on the unpublished results of these ongoing integrative-taxonomy studies, we recognize the following four taxa to be species complexes consisting of a variable number of cryptic species:

***Merodom ambiguus* complex** (4 cryptic species)

Mesoscutum with area of black pile near wing basis or with stripe of black pile between wing bases (Fig. 15a); hind femur with pale pile; tergites in male completely covered with pale pile.

***Merodon bessarabicus* complex** (2 cryptic species)

Mesoscutum with black pile near wing basis or with stripe of black pile between wing bases (as on Fig. 15a); hind femur usually with black pile in apical half (Fig. 15b); tergites in male with alternating stripes of pale and black pile (as on Fig. 15c).

***Merodon luteomaculatus* complex** (unpublished name, Radenković *et al.* in prep.) (6 cryptic species)

Tergites II (and III) with pair of orange lateral spots; mesoscutum completely covered with pale pile; hind femur with pale pile; tergites in male completely covered with pale pile.

***Merodon sapphous* complex** (5 cryptic species)

Mesoscutum covered with pale pile, except for a few black ones near the wing bases in some female specimens; hind femur usually with black pile in apical half; tergites in male with alternating stripes of pale and black pile (Fig. 15c).

Discussion

The *M. aureus* group comprises a large number of previously known and newly discovered taxa in the Mediterranean Basin (Marcos-García *et al*. 2007; Vujić *et al*. 2007; Milankov *et al*. 2008; Radenković *et al*. 2011). Šašić *et al.* (2016) presented a total of 21 species belonging to the *M. aureus* group *sensu* Radenković *et al*. (2011). The taxa described in this paper increase the number of known species in the *M. aureus* group to 39, including 13 undescribed cryptic species of the following species complexes: *M. ambiguus*, *M. bessarabicus*, *M. luteomaculatus* and *M. sapphous* (S. Radenković, Lj. Šašić and A. Vujić, pers. comm.). Based on morphology, the *M. bessarabicus* subgroup consists of species and complexes with predominantly yellow tibiae and dark brown to black tergites. The *M. bessarabicus* subgroup includes 9 morphologically distinct taxa, of which 4 are complexes of cryptic species that we recognize through an integrative-taxonomy approach, based on molecular and morphometric data (*M. adriaticus* **sp.n.**, *M. ambiguus* complex, *M. bessarabicus* complex, *M. flavicornis*, *M. legionensis*, *M. luteomaculatus* complex, *M. quercetorum*, *M. rufipes*, *M. sapphous* complex) (S. Radenković, Lj. Šašić, A. Vujić, pers. comm.). Some taxa of the *M. bessarabicus* subgroup are morphologically very similar, but they have different geographic ranges, indicating allopatric speciation:

1) Species with mostly black pilose mesoscutum: *M. rufipes*, distributed in Eastern Europe, and *M. adriaticus* **sp. n.**, endemic to the Adriatic coast.

2) Species with pale pilosity on mesonotum and tergites in males, with a Western Mediterranean distribution: *M. legionensis*, in the Iberian Peninsula, and *M. flavicornis*, in France.

3) The *M. bessarabicus* complex from the Eastern Mediterranean and the Iberian species, *M. quercetorum* are very similar and share the pale-pilose tergites and the presence of black pile near the wing bases.

The additionally described taxa, *M. nisi* **sp. n.** and *M. robustus* **sp. n.**, have very clear and distinct morphological features, unusual for the *M. aureus* group. They are local endemics to Aegean islands; *M. nisi* **sp. n.** was detected on Rhodes and *M. robustus* **sp. n.** on Samos.

All species and complexes from the *M. bessarabicus* subgroup fly in late summer and autumn, unlike other *Merodon* taxa that fly predominantly in spring and early summer or have more than one generation. One of the additionally described species here, *M. nisi* **sp. n.**, follows the same autumnal seasonal pattern as taxa of the *M. bessarabicus* subgroup. In contrast, *M. robustus* **sp. n.** flies in early spring.

Species from the *M. bessarabicus* complex predominantly reside in Mediterranean forests and maquis and sub-Mediterranean forests and scrubs. All species analysed here have a Mediterranean distribution and, only exceptionally, have ranges extending further inland (such as *M. rufipes*). All species are endemic to different parts of the Mediterranean Basin. This may indicate that geographic isolation has been the primary driver of the diversification process in the *M. bessarabicus* subgroup.

References

Andrić, A., Šikoparija, B., Obreht, D., Đan, M., Preradović, J., Radenković, S., Pérez-Bañón, C. & Vujić, A. (2014) DNA barcoding applied: Identification of the larva of *Merodon avidus* (Diptera: Syrphidae). *Acta Entomologica Musei Nationalis Pragae*, 54 (2), 741–757.

Francuski, Lj., Ludoški, J., Vujić, A. & Milankov, V. (2011) Phenotypic evidence for hidden biodiversity in the *Merodon aureus* group (Diptera, Syrphidae) on the Balkan Peninsula: conservation implication. *Journal of Insect Conservation*, 15 (3), 379–388.
https://doi.org/10.1007/s10841-010-9311-5

Google Inc. (2013) Google Earth. Mountain View, California, USA. Available from: https://www.google.com/earth/ (accessed 15 August 2016)

Hadley, A. (2006) CombineZ. Vsn. 5.3. http://www.hadleyweb.pwp.blueyonder.co.uk (accessed 10 June 2016)

Hijmans, R.J., Guarino, L. & Mathur, P. (2012) DIVA-GIS.Vsn. 7.5. A geographic information system for the analysis of species distribution data. Available from: http://www.diva-gis.org (accessed 30 August 2016)

Hurkmans, W. (1993) A monograph of *Merodon* (Diptera: Syrphidae). Part 1. *Tijdschrift Voor Entomologie*, 136, 147–234.

MacQuart, J. (1842) Dipteres exotiques nouveaux ou peu connus. Tome deuxieme. 3e partie. *Mémoires de la Société Royale des sciences, de l'agriculture et des arts, de Lille*, 1842, 162–460.

Marcos-García, M.Á., Vujić, A. & Mengual, X. (2007) Revision of Iberian species of the genus *Merodon* Meigen, 1803 (Diptera: Syrphidae). *European Journal of Entomology*, 104, 531–572.
https://doi.org/10.14411/eje.2007.073

Marcos-García, M.Á., Vujić, A., Ricarte, A. & Ståhls, G. (2011) Towards an integrated taxonomy of the *Merodon equestris* species complex (Diptera: Syrphidae) including description of a new species, with additional data on Iberian *Merodon*. *Canadian Entomologist*, 143 (4), 332–348.
https://doi.org/10.4039/n11-013

McAlpine, J.F. (1981) Morphology and terminology, adults. *In*: McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (Eds.), *Manual of Nearctic Diptera. Vol.1.* Agriculture Canada, Ottawa, pp. 9–63.

Mengual, X., Ståhls, G., Vujić, A. & Marcos-García, M.Á. (2006) Integrative taxonomy of Iberian *Merodon* species (Diptera, Syrphidae). *Zootaxa*, 1377, 1–26.

Milankov, V., Ståhls, G., Stamenković, J. & Vujić, A. (2008) Genetic diversity of populations of *Merodon aureus* and *M. cinereus* species complexes (Diptera, Syrphidae): integrative taxonomy and implications for conservation priorities on the Balkan Peninsula. *Conservation Genetics*, 9 (5), 1125–1137.
https://doi.org/10.1007/s10592-007-9426-8

Popović, D., Ačanski, J., Djan, M., Obreht, D., Vujić, A. & Radenković, S. (2015) Sibling species delimitation and nomenclature of the *Merodon avidus* complex (Diptera: Syrphidae). *European Journal of Entomology*, 112 (4), 790–809.
https://doi.org/10.14411/eje.2015.100

Radenković, S., Vujić, A., Ståhls, G., Pérez-Bañon, C., Rojo, S., Petanidou, T. & Šimiæ, S. (2011) Three new cryptic species of the genus *Merodon* Meigen (Diptera: Syrphidae) from the island of Lesvos (Greece). *Zootaxa*, 2735, 35–56.

Ricarte, A., Marcos-García, M.Á. & Rotheray, G.E. (2008) The early stages and life histories of three *Eumerus* and two *Merodon* species (Diptera: Syrphidae) from the Mediterranean region. *Entomologica Fennica*, 19, 129–141.

Sack, P. (1913) Die Gattung *Merodon* Meigen (*Lampetia* Meig. olim). *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, 31, 427–462.

Šašić, Lj., Ačanski, J., Vujić, A., Ståhls, G., Radenković, S., Milić, D., Obreht- Vidaković, D. & Đan, M. (2016) Molecular and

Morphological Inference of Three Cryptic Species within the *Merodon aureus* Species Group (Diptera: Syrphidae). *PLoS ONE*, 11 (8), e0160001.
https://doi.org/10.1371/journal.pone.0160001

Speight, M.C.D. (2016) Species accounts of European Syrphidae (Diptera), 2016. Syrph the Net, the database of European Syrphidae. *Syrph the Net publications, Dublin*, 93, 1–288.

Ståhls, G., Vujić, A., Pérez-Bañon, C., Radenković, S., Rojo, S. & Petanidou, T. (2009) COI barcodes for identification of *Merodon* hoverflies (Diptera, Syrphidae) of Lesvos Island, Greece. *Molecular Ecology Resources*, 9, 1431–1438.
https://doi.org/10.1111/j.1755-0998.2009.02592.x

Thompson, F.C. (1988) Syrphidae (Diptera) Described from Unknown Localities. *Journal of The New York Entomological Society*, 96 (2), 200–226.

van Eck, A. (2016) Hoverflies (Diptera, Syrphidae) new to the fauna of mainland Portugal, with an updated hoverfly checklist. *Boletín de la Sociedad Entomológica Aragonesa*, 59, 187–203.

Vujić, A., Pérez-Bañón, C., Radenković, S., Ståhls, G., Rojo, S. & Petanidou, T. (2007) Two new species of genus *Merodon* Meigen, 1803 (Syrphidae, Diptera) from the island of Lesvos (Greece), in the eastern Mediterranean. *Annales de la Société Entomologique de France*, 43 (3), 319–326.
https://doi.org/10.1080/00379271.2007.10697527

Vujić, A., Radenković, S., Ståhls, G., Ačanski, J., Stefanović, A., Veselić, S., Andrić, A. & Hayat, R. (2012) Systematics and taxonomy of the *ruficornis* group of genus *Merodon* Meigen (Diptera: Syrphidae). *Systematic Entomology*, 37 (3), 578–602.
https://doi.org/10.1111/j.1365-3113.2012.00631.x

Vujić, A., Radenković, S., Likov, L., Trifunov, S. & Nikolić, T. (2013) Three new species of the *Merodon nigritarsis* group (Diptera: Syrphidae) from the Middle East. *Zootaxa*, 3640 (3), 442–464.
https://doi.org/10.11646/zootaxa.3640.3.7

Vujić, A., Radenković, S., Ačanski, J. & Hayat, R. (2015) Revision of the species of the *Merodon nanus* group (Diptera: Syrphidae) including three new species. *Zootaxa*, 4006 (3), 439–462.
https://doi.org/10.11646/zootaxa.4006.3.2