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Research article

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Three new species of European *Coletinia* Wygodzinsky (Zygentoma, Nicoletiidae), with additional records and an updated identification key

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Abstract. We describe three new species of the genus *Coletinia* Wygodzinsky, 1980, the most diverse of the family Nicoletiidae (order Zygentoma = Thysanura s. str.) in Europe: *C. dalmatica* Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov. from Croatia, *C. dextra* Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. from Spain and *C. serrata* Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. from Portugal. *Coletinia dalmatica* sp. nov. seems to be related with *C. maggi* (Grassi, 1887) and both Iberian species belong to the *asymetrica* species group. New material of some previously recognized species (*C. diania* Molero, Bach & Gaju, 2013, *C. intermedia* Molero, Bach & Gaju, 2013, *C. mendesi* Wygodzinsky, 1980, *C. redetecta* Molero, Bach & Gaju, 2013 and *C. tinauti* Molero-Baltanás, Gaju-Ricart & Bach de Roca, 1997) is reported, enlarging in most cases their geographic distribution, and including some new data on their intraspecific variability. Finally, an updated identification key to all known species of the genus *Coletinia* is given.

Keywords. Nicoletiidae, *Coletinia*, European fauna, identification key, intraspecific variability.

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Introduction

The genus *Coletinia* Wygodzinsky, 1980, includes about 20 described species of subterranean Zygentoma Börner, 1904 belonging to the family Nicoletiidae Escherich, 1905 and placed by Mendes (1988) in the subfamily Coletiniinae Mendes, 1988. Insects belonging to this subfamily and genus inhabit subterranean environments, and most species are considered as troglobites, i.e., obligatory, permanent residents of subterranean habitats. The genus *Coletinia* is widespread in Southern Europe, only one species has been described from Turkey (Mendes 1988) and one apparently native species has been found in Brazil (Mendes & Ferreira 2002). The highest number of species of the genus has been reported in the Iberian Peninsula, but samplings in other regions of Southern Europe and Northern Africa may reveal unknown diversity and other hotspots.

The genus was erected by Wygodzinsky (1980) to include species characterized by the following characters: absence of scales, urosternites II–VII entire with exsertile vesicles and eight pairs of styli (inserted in urosternites II–IX). Characters for distinguishing between *Coletinia* and the remaining genera of Coletiniinae were presented by Reboleira *et al.* (2012).

Molero *et al.* (2013) made a revision of this genus in Spain where 9 new species were described at the time. In that work a revision of the main characters used in the taxonomy of the genus was presented and a key for Spanish species was included; three groups of species which probably have phylogenetic sense were also distinguished.

Since this contribution, only one new species has been described: *C. majorensis* Molero, Gaju, López & Bach, 2014 from Fuerteventura (Canary Islands). Additionally, Gilgado & Ortuño (2015) studied a high number of specimens attributed to *C. maggi* (Grassi, 1887) and widened the morphological variability of this species, synonymizing *C. hernandoi* Molero, Bach & Gaju, 2013 with *C. maggi*.

The revision of the genus *Coletinia* faces several shortcomings. About 75% of the species have only been reported in one paper. Only *C. subterranea* (Silvestri, 1902), *C. mendesi* Wygodzinsky, 1980, *C. capolongoi* Wygodzinsky, 1980, *C. tinauti* Molero-Baltanás, Gaju-Ricart & Bach de Roca, 1997, and *C. maggi* have been cited two or more times after their original description, based on additional specimens. Most of these descriptions, especially those made before the revision of European Nicoletiidae by Wygodzinsky (1980) are only useful for distinguishing adult males, but some characters that can be used to distinguish females have been overlooked. The descriptions of several species are based only in one sex: only the female of *C. corsica* (Chopard, 1924) is known, and only the males of *C. setosula* Wygodzinsky, 1980, *C. herculea* Molero, Bach & Gaju, 2013 and *C. diania* Molero, Bach & Gaju, 2013 have been described. Few specimens were available for the description of several species, so their intraspecific variability is poorly known. Moreover, some literature data reporting specimens as *Coletinia* sp. remain unclarified at the specific level (Mendes, 1988).

This work deals with the study of new material from Croatia, Spain, and Portugal, describing three new species and extending the knowledge on the geographic distribution and morphological variability of some other previously described species of the genus. A preliminary revision of the available material of *C. maggi* suggests that this species deserves the status of “group of species”, as proposed by Molero *et al.* (2013) and that *C. hernandoi* could be treated as a valid species, but this species complex is going to be the topic of a separate work, so the present paper focuses on the remaining taxa of the genus, providing an updated identification key for them.

Material and methods

Material studied

Several specimens belonging to some species of the genus *Coletinia* obtained recently are studied. Specimens from Croatia were captured using pitfall traps with rotten poultry as a bait. Specimens from Spain and Portugal were collected directly with an entomological aspirator. Details about the exact localities and habitats of each specimen are given in the Results. All specimens captured were fixed in ethanol 70% for their study in laboratory. After a preliminary study with a stereo microscope, most specimens were dissected and mounted in slides following the usual methods for these insects explained in Molero *et al.* (2013). Identifications were made using a Nikon Labophot light microscope, drawings were made using a camera lucida and micrographs were taken using a Nikon DS-Fi1 digital camera on the microscope. Plates were prepared using GNU Image Manipulation Program (GIMP) ver. 2.10.12.

Institutional abbreviations

MNCN	=	Museo Nacional de Ciencias Naturales, Madrid, Spain
MUHNAC	=	Museu Nacional de História Natural, Entomology, Lisbon, Portugal
UCO	=	Department of Zoology, University of Córdoba, Córdoba, Spain

Remarks on methods for the study of some metrics and characters of *Coletinia* species

The criteria used for describing morphological characters are the same as stated in Molero *et al.* (2013). Nevertheless, considering some problems raised by Gilgado & Ortuño (2015), some clarifications are introduced in this work to understand some metrics regarding several characters.

Ratio length/width (L/W) of the pedicellar apophyses of males

The shape of the pedicellar apophyses of males has been used in previous works to distinguish between species, but the ratio length/width of these apophyses was not mentioned, except by Molero *et al.* (2013), where this quantitative character was used for some descriptions. Nevertheless, the criterium used in this work to establish the length and the width of the apophyses was not described and this could lead to misinterpretations.

The appropriate position to describe this character is the ‘natural’ position, i.e., in dorsal view with antennae attached to head. In this position, apophyses extend dorso-internally, i.e., they emerge from the inner side of the pedicel, and the apophysis is above the basal joints of the flagellum in dorsal view. Sometimes, when antennae are dissected and mounted on slide, the position of apophyses can change and if they are photographed or the ratio length/width is measured in a non-natural position, this should be mentioned.

Regarding the length, it can be measured in two ways: considering the point where the apophysis emerges from the inner side of the pedicel, or the point when it joins with the outer side. As the apophysis emerges from the inner side more basally in the pedicel, its length is higher when the inner length is measured. In this work, both measures are going to be included in description, using the abbreviation iL for the length in the inner side of the pedicel and oL the length considered in the opposite side of the apophysis (see Fig. 1A).

Regarding the width of the apophysis, the higher width is considered for descriptions, which is usually measured in the basal part of apophyses (trunk of the apophysis). This parameter should be measured in the natural position, since some apophyses described as cylindrical do not have a circular section. This issue was discussed by Molero *et al.* (2018), emphasizing that the apophyses of some species of Nicoletiidae have elliptical sections (and this could be the same with several species of *Coletinia* with apparently cylindrical or subcylindrical apophyses), so if these measures are not made in dorsal view, it should be mentioned in the future.

Number of macrochaetae of the disc of the tenth urotergite

For counting this number, we discard the marginal fringe of setae of the lateral and posterior margin of the tergite, together with a submarginal fringe of setae which is usually parallel to the marginal fringe. To delimit which part of the disc is considered for counting the number of setae inserted, we establish for comparison between specimens and species the area comprised between the posterolateral angles of the tergite, placed above them (Fig. 1B), and only consider setae, i.e., discard cilia (sensilla trichodea).

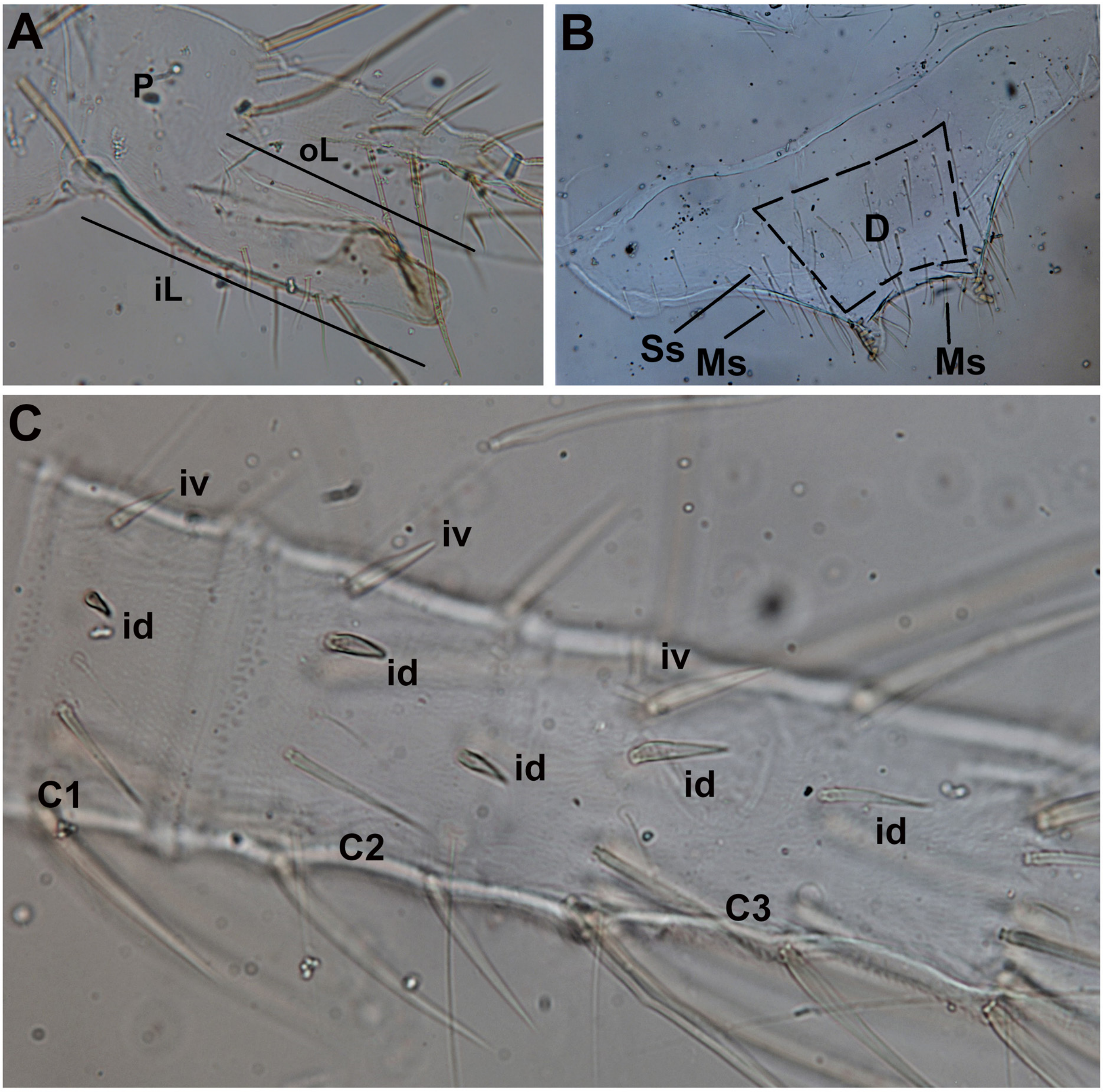

Fig. 1. Characters of taxonomic interest in *Coletinia* Wygodzinsky, 1980. **A**–**C**. *Coletinia tinauti* Molero, Gaju & Bach, 1997 , holotype. **A**. Micrographs of a pedicellar apophysis. **B**. Urotergite X. **C**. Basal part of the left cercus. Abbreviations: C1, C2 and C3 = first, second and third divisions of the cercus (the limit between the first and the second is better in focus); D = disc of the urotergite; id = spines or pegs inserted inner dorsal position; the first id spine in the C2 has blunt apex and can be considered as a peg; iL = inner length of the apophysis; iv = spines inserted in inner ventral position; Ms = marginal setae; oL = outer length of the apophysis; P = pedicel; Ss = submarginal setae.

The problem arises in some specimens preserved and mounted on slides long ago in which many setae have been detached and their insertions are hardly visible, so recently collected material is preferable to describe this character and using it for comparisons.

Number, type, and distribution of pegs/spines in the terminal filaments

Several genera of Nicoletiidae show sexual dimorphism in the chaetotaxy of some basal divisions of their caudal appendages: cerci and paracercus (= appendix dorsalis). The abbreviations C1, C2 and C3 are going to be used for the first, second and third divisions of the cercus and P1, P2 and P3 for similar divisions in the paracercus. Some setae of the inner and dorsal side of male cerci are transformed into pegs with blunt apex, like those of the urotergite X. But in some others the degree of transformation is lower, and they cannot be considered strictly as pegs, because they are acute; however, they are pigmented as pegs and shortened compared with spines in the similar position in females. In some previous descriptions, these shortened spines have been sometimes described as "pegs" or "sensory spines" (Wygodzinsky 1980), but it is preferable to be more precise and distinguish between both states of this character. This distinction is easy in scanning images (Molero *et al.* 2013), but sometimes difficult by light microscopy if higher magnification is not used. In species that lack blunt pegs, the occurrence and degree of sexual dimorphism requires the description of the shortening ratio of male spines respect to female ones (SrC1, SrC2, etc.); these ratios can be quantified as: (length/width of male spines) / (length/width of female spines of a same position of the cercus). Referred to this, some corrections are going to be made in the remarks section of some species in this work.

Additionally, the arrangement of these pegs is very variable, and the intraspecific variability and interspecific differences have not been accurately described. In each division of terminal filaments, it is necessary to indicate the number of rings of setae and the number and position of shortened spines or pegs in each ring; the term "rosettes" for these rings of setae (Smith 2015) is abandoned. Moreover, in this work the following type of formula is going to be tested for describing this arrangement: C1 (1[1*d*]+2[2-3*i*]) means that the first division of the cercus has 1 peg (with blunt apex) in dorsal position of the first ring of setae and 2 or 3 pegs in inner position of the second ring of setae (from basal to distal part of the appendage). Apart from *d* and *i* positions, *id* (inner-dorsal) and *iv* (inner-ventral) are abbreviations that are going to be used for positions in the cercus; *ld* and *rd* (left-dorsal and right-dorsal) are used for lateral to submedian positions in the paracercus. When the modified setae are not blunt pegs but shortened acute spines, the letters indicating the position are not written in italics (if in any species there is variability in the type of modified seta in any position, the characters are written in italics, but some additional comments are made). An example of this is given in Fig. 1C. Thin setae and long unmodified spines are not considered.

Results

Description of new species

Class Insecta Linnaeus, 1758
Order Zygentoma Börner, 1904
Family Nicoletiidae Escherich, 1905
Genus *Coletinia* Wygodzinsky, 1980

Coletinia dalmatica Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov.
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Figs 2–5

Diagnosis

Insect with cylindrical shape, light yellowish turning to brownish in the abdomen, about 10 mm long. Antennae of males symmetrical, with apophyses widened in its subapical region but lacking processes or lamellae; the apical cone bears a glandular seta. Tibiae with 2 dorsal and 4 ventral spines, lacking lateral spine. Urotergite X of the male with 8 + 6 sensory pegs, 5 of them inserted in the posterolateral lobes. Posterior margin of the urotergite X of the female slightly concave. Disc of the urotergite with 9 thin setae in males and 13 in females. Hind margin of the urosternite VIII of male and of the subgenital plate of female straight. Cerci of males with a series of 4–5 short acute spines. Ovipositor with more than 24 divisions.

Coletinia dalmatica Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov. has unique pedicellar apophyses in males. It is relatively close to *C. maggi*, so it could be included in the '*maggi*' group of species, since the apophyses of the males of this new species are symmetrical and lack lamellae or sclerotized processes. However, these apophyses are not subcylindrical but clearly widened in the subapical part and abruptly narrowed in the apex. Other characters such as the shape of the urosternite VIII in males also suggest the close relationship of this new species to *C. maggi* (at least, to the Italian forms of this taxon). Considering characters of females, the subgenital plate has a straight or truncated posterior margin, while in *C. maggi* this sclerite is convex posteriorly. The subgenital plate of *C. dalmatica* is more similar to that of *C. jeanneli* (Silvestri, 1938) from France, but the disc of the tenth urotergite is apparently devoid of setae in the French species (with about 13 setae in the new Croatian species) and the number of divisions of the ovipositor in *C. jeanneli* is 23, if we trust the illustration of Silvestri (higher in *C. dalmatica*, since 24 divisions are observed in the preserved part). Moreover, compared with Iberian species, the Croatian species lacks lateral spines on the metatibiae.

Etymology

The specific name refers to Dalmatia, the region along the eastern Adriatic coast where this species has been collected.

Material examined

Holotype

CROATIA • ♂; Biograd na Moru, Pakoštane, Vrana, Banđenova jama; 43°55′41″ N, 15°34′45″ E; 30 Apr. 2016; Ž. Fišer leg.; MNCN_Ent 283558, mounted on slide.

Paratypes

CROATIA • 2 ♂♂; same collection data as for holotype; UCO Ref. Z2640, preserved in ethanol • 1 ♀; same collection data as for holotype; MNCN_Ent 283559, mounted on slide.

Description

Measurements. Body length: 9.4 mm in the holotype and 10.3 mm in the female paratype. Body width: 1.6 mm in the holotype and 1.8 in the female paratype. Antennae broken; maximum length preserved: 5.5 mm.

Body. Pale yellowish; the abdomen yellowish brown, darkening in the posterior part. Head with abundant thin and short setae. Macrochaetae inserted in the lateral parts, around the 'ocular' (where the tegument is slightly more sclerotized) and near the anterior angles of the frons. Two pairs of macrosetae are inserted in the lateral margins of the frons, 1 pair above them and another pair on the clypeus, near the posterior angles of the frons (see Fig. 2A–B). Antennal scapus bearing 3 macrochaetae in its distal half and 3 apical additional shorter macrochaetae near the limit with the pedicel. Pedicels symmetric, those of the male with a developed apophysis with subcylindrical shape in their base, slightly widened in their apical part but narrowing sharply in its apex forming a cone where a glandular seta is inserted on an apical fovea (Fig. 2C–D). This apex reaches the fifth annulus of the flagellum. The basal part of the apophysis has only sparse small setae, but in the widened subapical area there are two bifid macrochaetae. Four additional longer macrochaetae are inserted in the pedicel. This division of the antenna in the female is simple, with 5 long macrochaetae, almost twice as long as the width of the pedicel.

Mandibles (Fig. 3A). With two outer small macrochaetae. Galea with two apical cones, lacinia with 4–5 processes and 10–12 setae. Last article of the maxillary palp about 3.9–4.9 times longer than wide, 1.25–1.35 times longer than the penultimate and as long as the antepenultimate (Fig. 3B). Labial palp

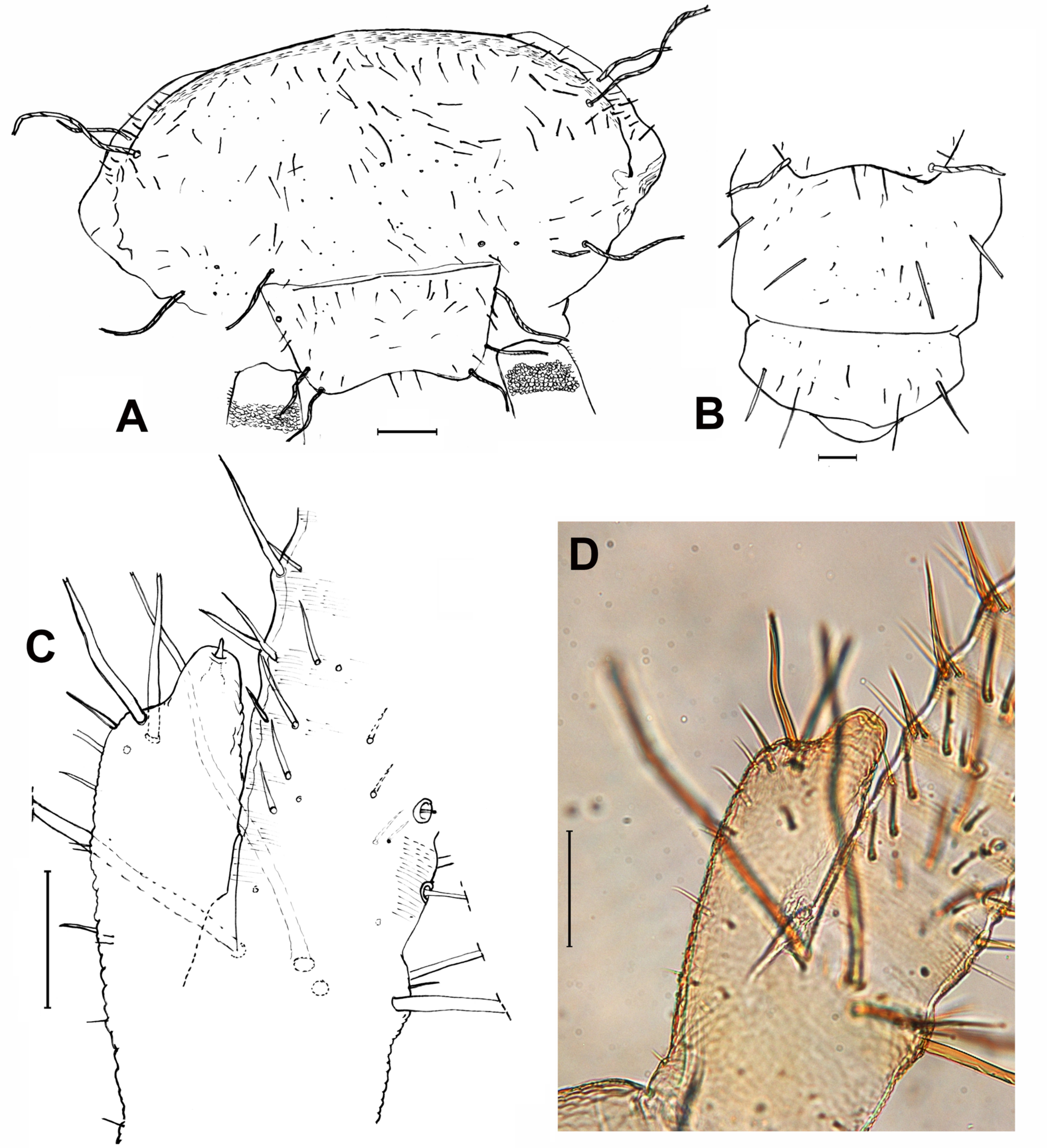

Fig. 2. *Coletinia dalmatica* Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MNCN_Ent 283558). **A**. Head and frons. **B**. Clypeus and labrum. **C**. Pedicellar apophysis. **D**. Micrograph of the same apophysis. Scale bars: A–C = 0.1 mm; D = 0.2 mm.

typical, with several basiconic sensilla (at least 9, 5 of them in the outer side) in the basal half of the last article, apart from the 6 usual papillae (Fig. 3C).

Pronotum (Fig. 3D). Covered with setae that are about $^1/_5$–$^1/_{12}$ times longer than the notum, their margins with a row of acute setae of different length, interspersed with some macrochaetae that are inserted a short distance from the margin. Most of these macrochaetae are lost; the longest preserved are almost half the length of the pronotum. Setae of the mesonotum and metanotum of similar proportions, absent (as it is usual) on the anterior margin.

Legs. The ratio length/width of the tibiae is: 3.8–4 for protibiae (Fig. 3E), 3.7–4.7 for mesotibiae and 4.8–6 for metatibiae. Metatibiae (Fig. 3F) about 1.6 times longer than protibiae. All tibiae show 2 dorsal spines (a medial one and a distal one, except in one protibia of the holotype where both are inserted distally) and 4 ventral ones (2 subdistal and 2 subbasal). Ventral spines as long as the diameter of the respective tibia or slightly shorter. Lateral spines absent on all the tibiae.

Abdomen. Urotergites typical, setae covering the disc are about $^1/_4$–$^1/_{12}$ times longer than each tergite and the longest macrochaetae of the posterior margin (those inserted in the infralateral area) are about 0.5–0.6 times longer than the corresponding tergite. Urotergite X of the male (Fig. 4A) with 8 + 6 sensory pegs, 5 of them inserted in the posterolateral lobes and the remaining in the lateral margins of the tergite (Fig. 4B). The posterior border between these lobes is slightly concave, although a little broken on the slide. Disc of the urotergite with 9 thin setae; apart from these, the lateral and posterior margins of the tergite have two rows of stronger setae (marginal and submarginal). The urotergite X of the female (Fig. 4C) has a slightly concave hind margin; their posterolateral angles bear 1 macrochaetae (about 0.6 times the length of the tergite). The disc of the tergite has 13 thin acute setae. Most of the submarginal setae of the lateral and posterior margin (arranged as in the male, but less dense) are lost and only their insertions are visible. Urosternites without special characters, those with styli (II–VII) with 1 + 1 submedian and 1 + 1 sublateral in the posterior margin, together with 1 + 1 discal macrosetae (Fig. 4D). The VIIIth urosternite of the male is broken but the straight shape of the hind margin between the styli is visible (Fig. 4E).

Male genitalia. Parameres and penis as in Fig. 4F; parameres subcylindrical, slightly wider in their apical part and about 4.3 times longer than their greatest width and about 0.69 as long as stylus IX (including the apical spine of the stylus). Styli IX about 1.2 as long as styli VIII.

Female genitalia. In the female, the subgenital plate is trapezoidal, 0.82 as long as wide at the base and the posterior margin is straight, even slightly concave (Fig. 4G); the disc lacks discal macrochaetae. Ovipositor broken; thus, it is difficult to estimate its relative length with the body or the ninth styli; the preserved part has at least 24 divisions. The apex of a gonapophysis IX is shown in Fig. 5A.

Terminal filaments. Long, maximum length preserved 9.5 mm of a cercus (9 of a paracercus). Cerci of male (Fig. 5B) with 4–5 short acute slightly pigmented spines (apex not truncated as in usual pegs); the basal division (C1) of the cercus has one of these spines and the second division (C2) has 4 (formula C1 (1[1id]) + C2(1[1id] + 2[1id] + 3[1id] + 4[1id]). The shorter spines of the cerci of the female are clearly longer, about 30% longer than in male (Fig. 5C–D); for example, the first spine of the C2 is 9.5 as long as wide in the female and about 7 as long as wide in the male (SrC2 ratio = 0.73). The paracercus of the holotype is lost and only its first division (P1) is preserved, where 2 short acute spines are visible; in the female only one small thin spine is in P1.

Habitat

Cave Banđenova jama is located within Nature Park Vransko Lake, at a hill above the northern part of the lake Vransko jezero, the largest freshwater lake in Croatia. The cave lies at an altitude of ca 85 m a.s.l.

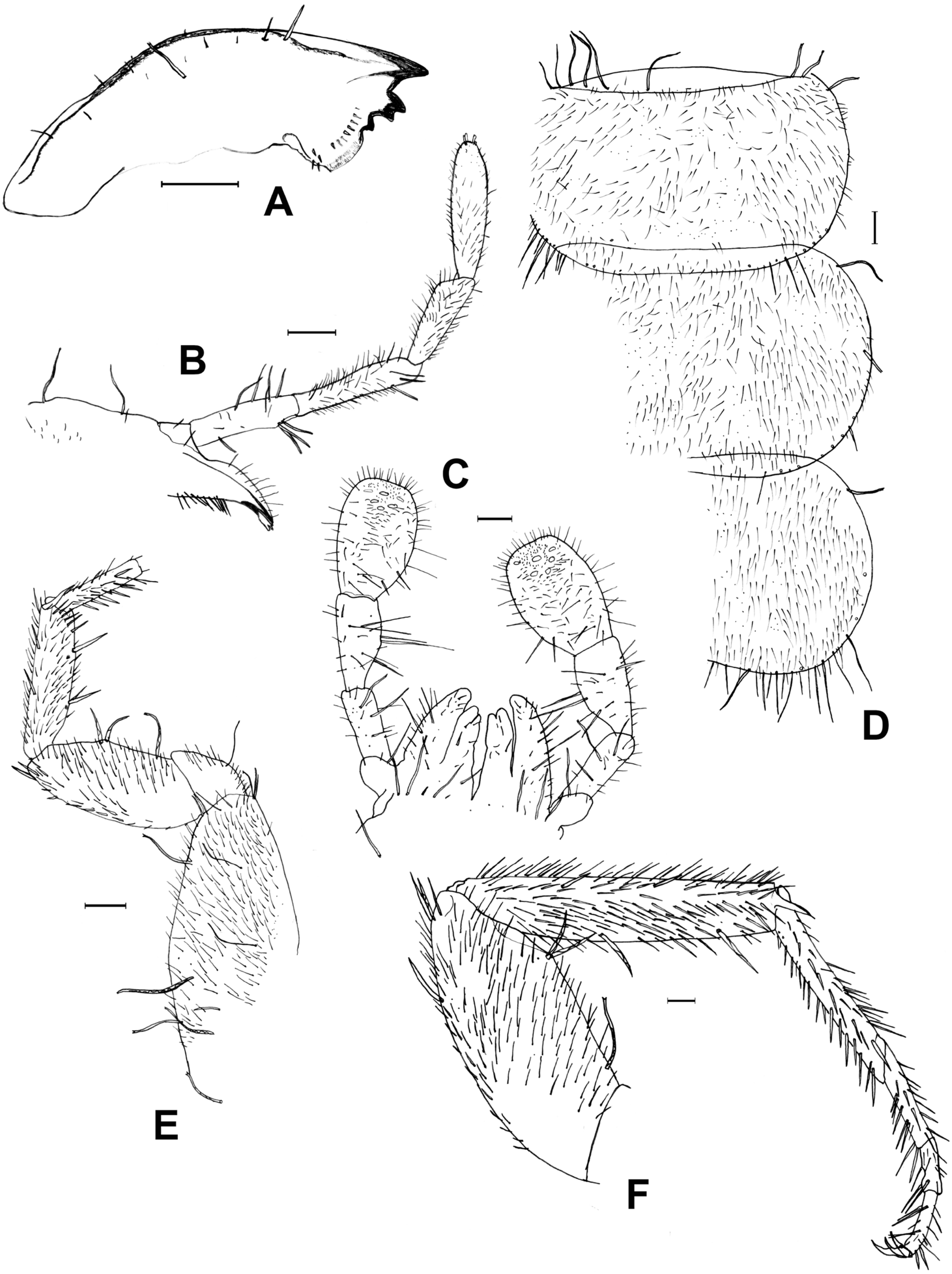

Fig. 3. *Coletinia dalmatica* Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MNCN_Ent 283558). **A**. Mandible. **B**. Maxilla and maxillary palp. **C**. Labial palps and anterior part of the labium. **D**. Thoracic nota. **E**. First leg, excluding apical tarsomeres. **F**. Femur, tibia, tarsal articles and praetarsus of the third leg. Scale bars: A, C, F = 0.1 mm; B, D–E = 0.2 mm.

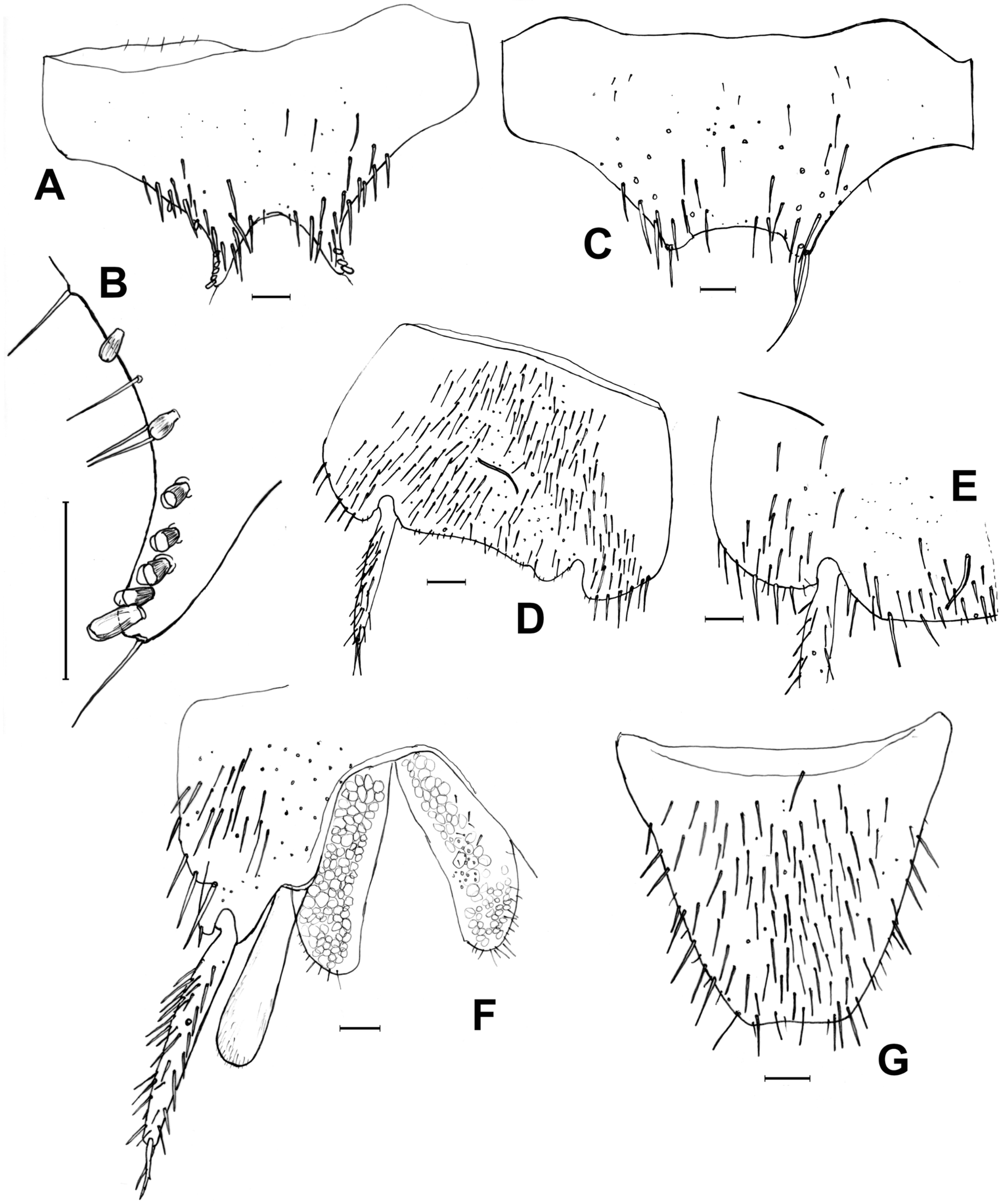

Fig. 4. *Coletinia dalmatica* Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov. **A–B, E–F**. Holotype, ♂ (MNCN_Ent 283558). **C–D, G**. Paratype, ♀ (MNCN_Ent 283559). **A**. Urotergite X. **B**. Detail of the posterolateral lobe of the urotergite X, showing pegs. **C**. Urotergite X. **D**. Urosternite VII. **E**. Hind margin of the right half of the urosternite VIII. **F**. Coxite and styli IX, paramere and penis. **G**. Subgenital plate. Scale bars = 0.1 mm.

and is ca 5.5 km inland from the Adriatic Sea. The cave's relatively small entrance, ca 0.8 × 1 m in size, is hidden amidst a maquis shrubland. It is a small cave, 25 m long and 10 m deep. After a vertical drop of about 2.5 m and a narrow passage, the cave opens into a spacious cavity with rocky bottom. The cave is dry, with no permanent water source. Increased concentrations of CO_2 have been detected in the deepest part of the cave; however, this was not observed during our visits (judged from the fact that

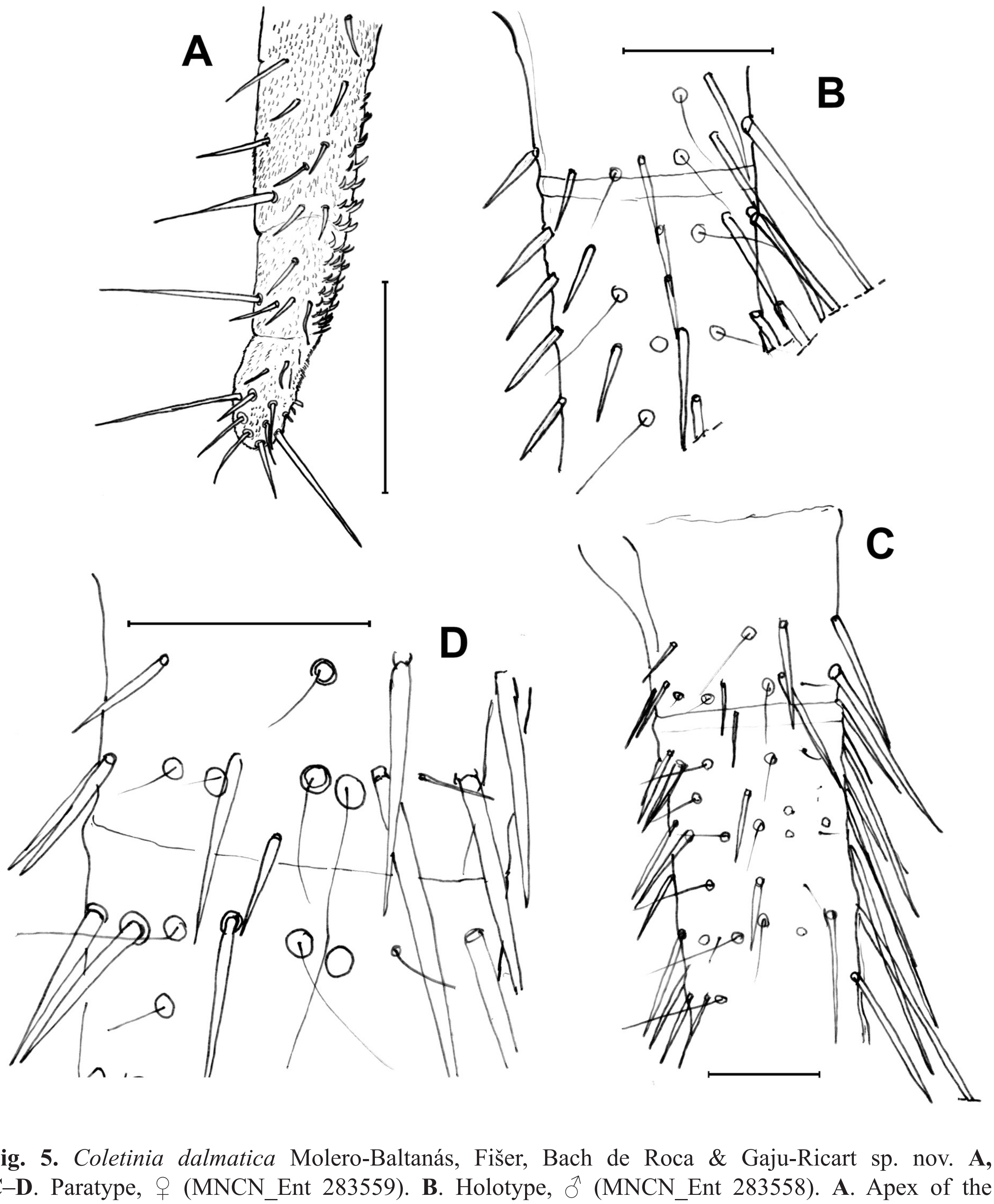

Fig. 5. *Coletinia dalmatica* Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov. **A, C–D**. Paratype, ♀ (MNCN_Ent 283559). **B**. Holotype, ♂ (MNCN_Ent 283558). **A**. Apex of the gonapophysis IX. **B**. First and second divisions of the cercus. **C**. First and second divisions of the cercus. **D**. Detail of the limit between the first and the second division of the cercus. Scale bars = 0.1 mm.

a candle burned normally at the deepest point in the cave). This short description is based on our own observations as well as adapted from Rađa & Vujčić-Karlo (2004).

Coletinia dalmatica sp. nov. was found only at the bottom of the cave, in traps close to a pile of rocks and gravel resembling a small scree. A habitat with similar environmental properties as in this cave scree exists also outside the cave and all around the wider area characterized by the typical Mediterranean maquis shrubland. It is probably best described as a system of interconnected cracks and crevices, a labyrinth of empty air-filled voids of intermediate sizes within rocky fragments, sometimes covered with soil. It is formally known as 'milieu souterrain superficiel' (MSS) and is one of the many shallow subterranean habitats (SSH) recognized thus far. Its main characteristics resemble the ones in caves, i.e., permanent darkness and buffered microclimatic conditions, and are suitable to support subterranean fauna. Culver & Pipan (2014) as well as Mammola *et al.* (2016) provide a thorough review of this habitat type. Because some other species of the genus *Coletinia* were regularly found in MSS and that this cave is probably too small to support a viable population, it seems very likely that *C. dalmatica* inhabits not just the cave but the surrounding MSS as well, although it has not been found there yet. Based on the almost omnipresence of this habitat type in the wider area, the species true distribution range might be quite extensive, and the current single-site occurrence is a consequence of under-sampling or lack of interest and specialists for this animal group in the Dinaric Karst.

Coletinia dalmatica sp. nov. was found only in pitfall traps, but not during the general survey of the cave. It was found in traps at the bottom of the cave, closest to the scree-like pile of rocks and gravel. All four individuals caught were still alive and very active when traps were examined three days after setting them. Besides the silverfish, Collembola Lubbock, 1871, two beetle species of family Cholevidae Kirby, 1837, ground beetle *Laemostenus* sp., and *Psyllipsocus ramburii* Sélys-Longchamps, 1872 (Psocoptera) were found in the pitfall traps. During the general survey of the cave, orthopterans *Gryllomorpha dalmatina* (Ocskay, 1832) and *Dolichopoda* sp., the isopod *Alpioniscus* sp., spiders *Agelena gracilens* Koch, 1841 and *Troglohyphantes* sp., as well as a pseudoscorpion species and the bat tick *Eschatocephalus vespertilionis* (Koch, 1844) were observed. The presence of the latter species hints that bats occasionally visit this cave too. Rađa & Vujčić-Karlo (2004) report also the occurrence of *Spelaeobates* sp., a troglobiontic beetle. Considering this list of taxa, the fauna of this cave appears to comprise mostly non-specialized, troglophilic species, which is not surprising for a small cave with good connections to the surface.

Coletinia dextra Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov.
urn:lsid:zoobank.org:act:D53B37C0-194D-4C61-B0F5-E054321A713C
Figs 6–8

Diagnosis

Light yellowish insect about 7 mm long. Pedicels of male antennae with asymmetrical apophyses; the right apophysis is larger than the left one and similar in structure to those of *C. tinauti*, subcylindrical and with the apex modified bearing a laminar expansion. Left apophysis smaller, its length and width about ⅔ of the right one, tapers apically and lacks glandular seta. All tibiae with one lateral small spine. Male urotergite X with 5+5 pegs. Male VIIIth urosternite with a convex hind margin, protruding and rounded. Cerci without pegs, with two rows of 5–6 basal short acute spines, one pair of them in the basal division. Female unknown.

This species is quite similar to *Coletinia tinauti* but differs mainly in a significant character: the asymmetry of antennae. In *C. tinauti* the antennae have the same size and structure as the right pedicel of the new species. But the left pedicel is less developed in *C. dextra* Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Moreover, other differences with *C. tinauti* are the different shape of the hind margin of the urotergite (straighter between the posterolateral lobes in the new species) and the occurrence of authentic sensory pegs with blunt apex on terminal filaments of *C. tinauti* (although some of the modified setae of cerci and all on the paracercus of *C. tinauti* are acute), which are replaced in the new species by acute short spines. Moreover, the ratio length/width of tibiae seems to be higher in the new species.

Compared with the remaining species with asymmetrical apophyses, *C. dextra* sp. nov. is different to all of them because it has a more developed right apophysis, while the remaining species have a very reduced right apophysis. The more striking similarities are those shared with *C. serrata* Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov., because the apophyses are very similar in shape and structure (see below) but have an inverse position compared to *C. dextra*: the modified and more developed apophysis is the left one and the more reduced and not modified is the right one. Moreover, the shape of the hind margin of the urosternite VIII of males is very convex and rounded in *C. dextra* and almost straight and less protruding in *C. serrata*. More differences are shown in the discussion section of *C. serrata*.

Etymology

The specific name '*dextra*' means 'right side' in Latin, which is related with the unusual asymmetry of the pedicellar apophyses of this species, more developed in the right antenna.

Material studied

Holotype

SPAIN • ♂; Córdoba Province, Cerro Muriano, next to roman copper mines; 38°00′05″ N, 4°45′54″ W; 13 Nov. 2011; R. Molero leg.; MNCN_Ent 283557, mounted on slide.

Description

Measurements. Body length: 9.5 mm. Thorax width: 1.4 mm. Antennae broken; maximum length preserved: 7.5 mm.

Body. Pale yellowish, abdomen slightly brownish and darker, in part due to gut contents. Head with several thin setae that are more abundant on the occipital area and on the labrum: some smaller setae are visible in the middle of the frons and the clypeus. Additionally, some macrosetae are inserted in both sides of the head, in the 'ocular areas', 4+4 surrounding the lateral margins of frons and about 6 on the clypeus (Fig. 6A). Scape of antennae with 6 bifid macrosetae, 3 inserted ventrally in the medial part and 3 dorsally, in a more apical position, shorter than ventral ones. Right pedicel with a developed apophysis, nearly as wide as the base of the flagellum and about 3.5 times longer than its higher width (iL/W = 3.7; oL/W = 2.6); its apex reaches the fourth joint of flagellum (Fig. 6B–C). The basal portion of this apophysis is subcylindrical and the apical portion is slender, truncated, and curved, showing a structure similar to that described for *C. tinauti* (Molero-Baltanás *et al.* 1997; Molero *et al.* 2013), with an apical glandular seta and a subapical lamellar projection. The integument of this apical area is pilose, covered with microtrichia. Left apophysis smaller, its length and width about ⅔ the length of the left one, about 2.8 times longer than its higher width (iL/W = 2.8; oL/W =1.8), distally not truncated but rounded, slightly acute tapering towards the apex and without a visible glandular seta (Fig. 6D). Two bifid long macrosetae are inserted in the inner side of the right apophysis, together with several thin acute setae. The right pedicel has two additional long macrosetae, similar to the four ones inserted in the left pedicel. The left apophysis lacks bifid macrosetae and bears only few small thin acute setae.

Mandibles. Without remarkable features. Apex of the galea with two cones, lacinia with 3–4 laminar processes and 11 setae. Last article of the maxillary palp (Fig. 7A) about 4.5–5 times longer than wide, 1.4 times longer than the penultimate and about as long as or slightly longer than the antepenultimate (ratio n/n-2 about 1–1.1). Labial palp typical of Nicoletiidae (Fig. 7B), with 2 groups of at least 4 basiconic sensilla in the basal half of the last article.

Thorax. Thoracic nota as usual for the genus (Fig. 7C), covered with setae that are about $^{1}/_{12}$ to $^{1}/_{6}$ times longer than the notum, their posterior and lateral margins (and the anterior margin of the pronotum) with macrochaetae and several setae of different length. The longest macrochaetae are about half as long as the corresponding notum.

Legs. The ratio L/W of the tibiae is as follows: protibiae: 3.8–3.9 (Fig. 7D). Mesotibiae: 4.1–4.2. Metatibiae: 4.8–5 (Fig. 7E). Metatibiae about 1.5 times longer than protibiae. All tibiae show 2 dorsal

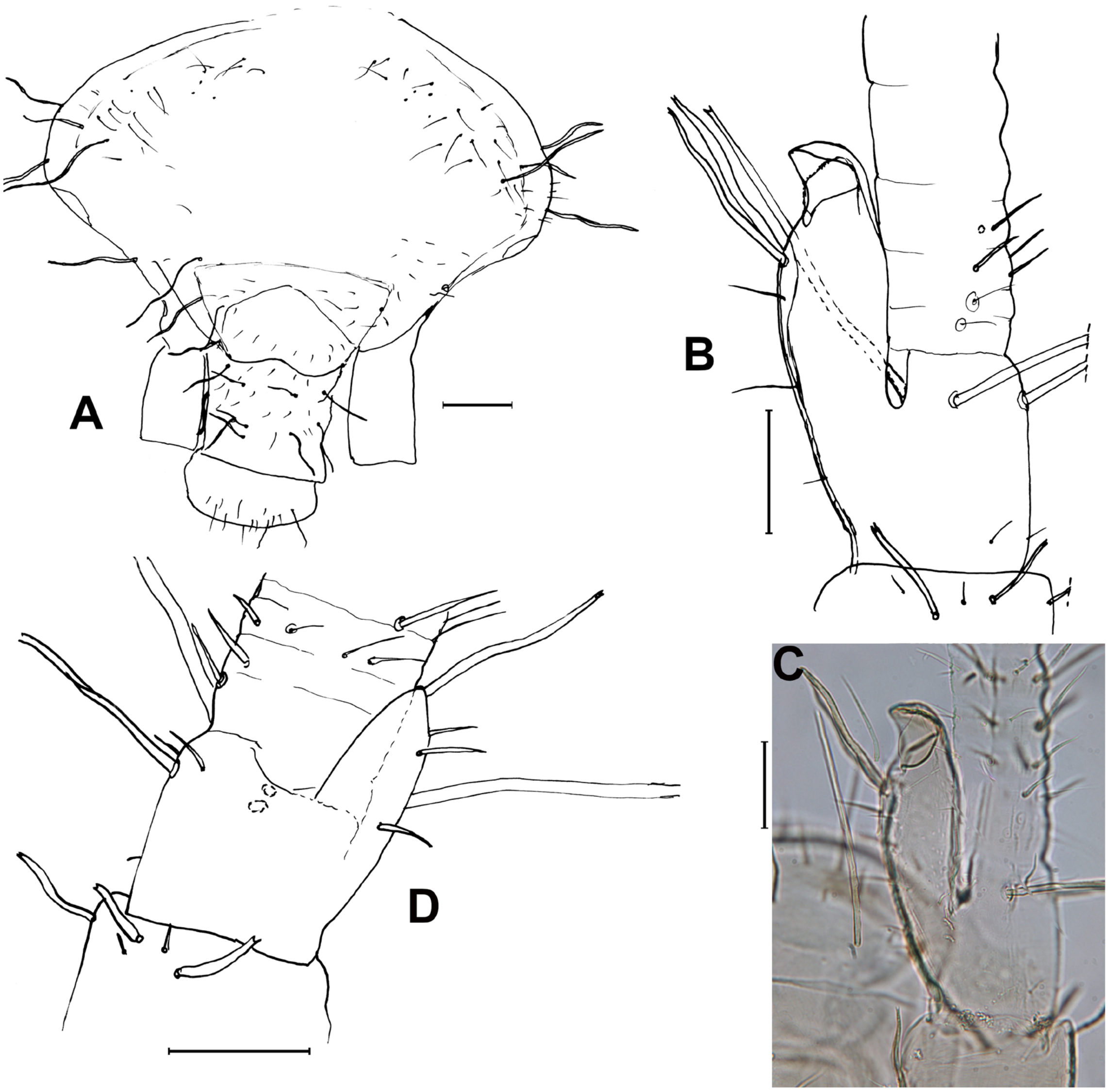

Fig. 6. *Coletinia dextra* Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MNCN_ Ent 283557). **A**. Head. **B**. Right antenna: pedicel with apophysis and basal annuli of the flagellum. **C**. Idem, micrograph. **D**. Left antenna: pedicel with apophysis and basal annuli of the flagellum. Scale bars: A = 0.2 mm; B–D = 0.1 mm.

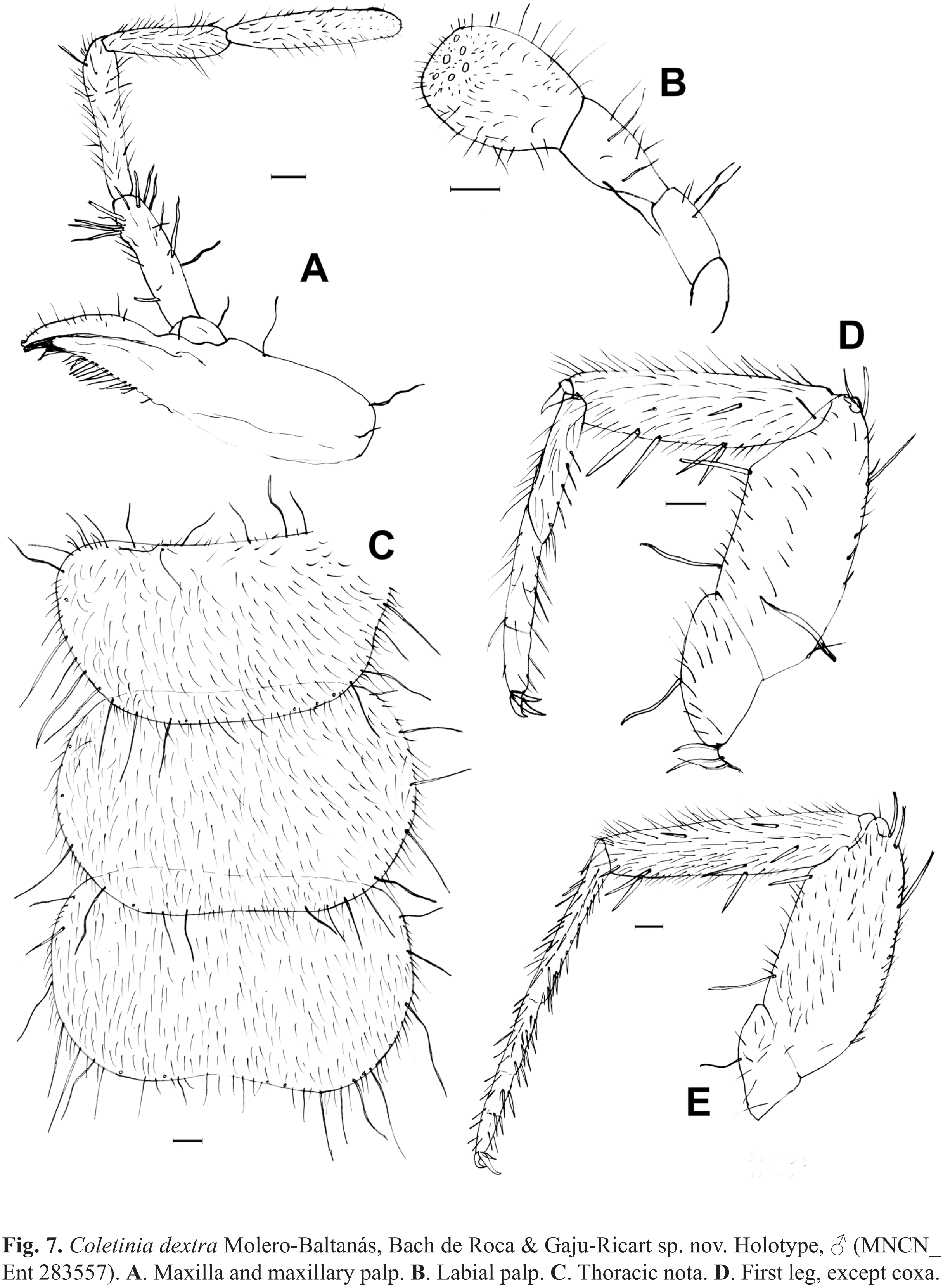

Fig. 7. *Coletinia dextra* Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MNCN_ Ent 283557). **A**. Maxilla and maxillary palp. **B**. Labial palp. **C**. Thoracic nota. **D**. First leg, except coxa. **E**. Third leg, except coxa. Scale bars: A, C–E = 0.1 mm; B = 0.2 mm.

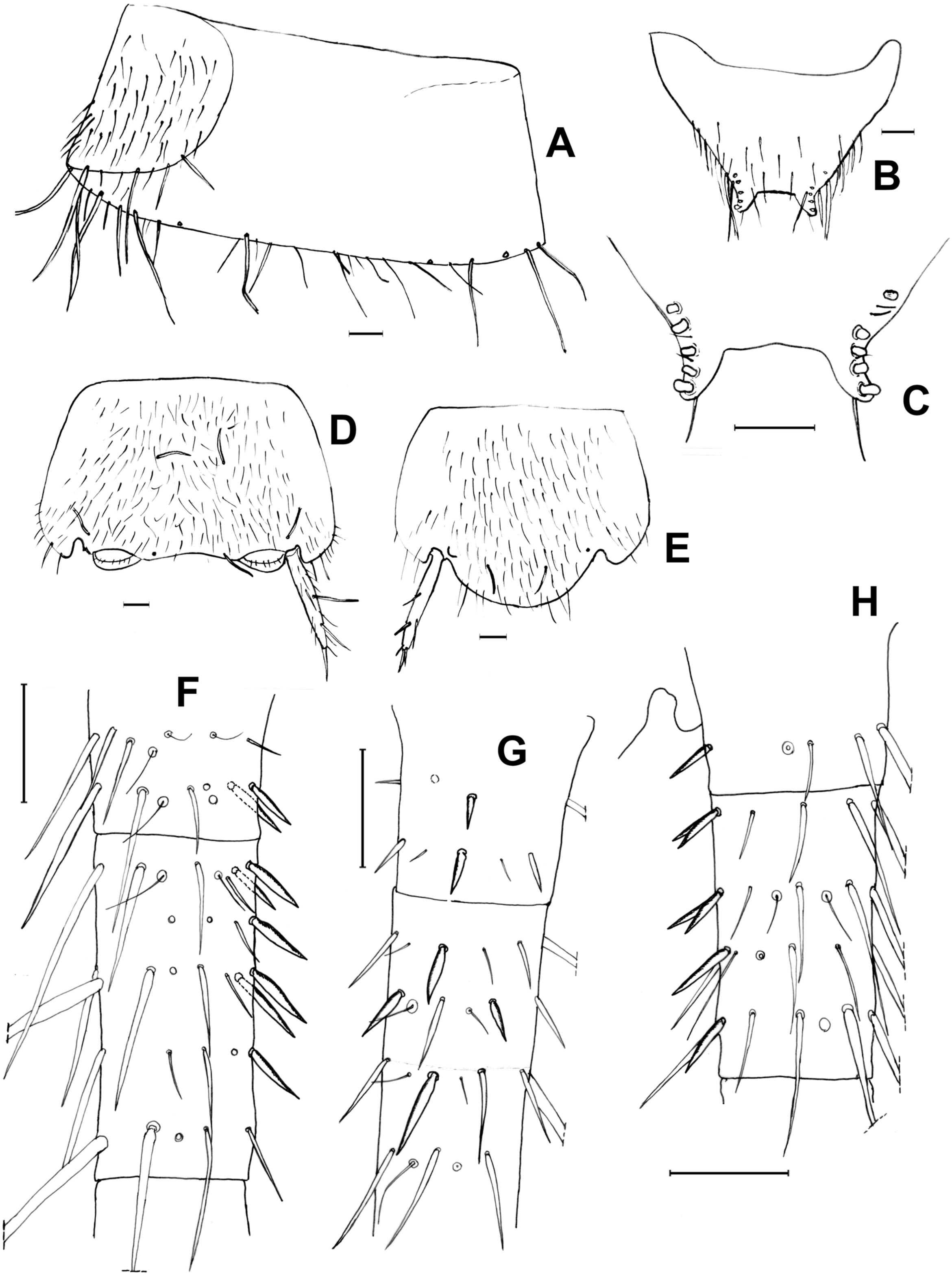

Fig. 8. *Coletinia dextra* Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MNCN_Ent 283557). **A**. Urotergite II. **B**. Urotergite X. **C**. Detail of the hind margin and posterolateral lobes and pegs of the urotergite X. **D**. Urosternite V. **E**. Urosternite VIII. **F**. Left cercus. **G**. Paracercus. **H**. Right cercus. All terminal filaments in dorsal view. Scale bars = 0.1 mm.

spines (a medial one and a distal one, except in protibiae where both are inserted distally) and 4 ventrally (2 subdistal and 2 more proximal). Ventral spines about as long as the diameter of the tibia, those of the protibiae slightly shorter and the subdistal ones of mesotibiae slightly longer. All tibiae with one lateral spine, inserted in the proximal half of the article; those of protibiae are smaller (their length lower than half the diameter of the tibia) and those of meso- and metatibiae bigger, their length is almost ⅔ of the diameter of the respective tibiae.

Abdomen. Urotergites as usual as in *Coletinia*, covered with thin setae that are about $^1/_{10}$–$^1/_4$ times longer than the tergite and with a fringe of macrochaetae and setae of different length in their posterior and lateral margin; the longest macrochaetae are in infralateral position and are about ⅔–$^4/_5$ times longer than the corresponding tergite (Fig. 8A). Xth urotergite of the male with straight posterior border between the posterolateral lobes; each lobe with 5 sensory pegs inserted ventrally in the lateral margin and one thin seta inserted subapically (Fig. 8B–C). All these pegs have a short, subcylindrical shape, truncated in the apex. Disc of the urotergite with thin setae, 8 of them inserted in the central area of the disc between the posterolateral lobes (without counting marginal and submarginal setae; see Fig. 8B).

Male genitalia. Urosternite I poorly preserved. Urosternites II–VII with 1 + 1 submedian, 1 + 1 sublateral and 1 + 1 discal macrosetae (Fig. 8D). The VIIIth urosternite has a convex hind margin (between the styli), somewhat protruding and rounded, although the medial area is almost straight (Fig. 8E). Coxites IX damaged, parameres lost. Styli IX about as long as styli VIII.

Terminal filaments. Long, their basal divisions represented in Fig. 8F–H; maximum length preserved of a cercus: 6.5 mm. Cerci with 8 short acute slightly pigmented spines (apex not truncated as in usual pegs); 2–3 of them are inserted in ventrolateral position of the basal division (C1) and first ring of setae of setae of the second division (C2); the right cercus has an additional ventrolateral short spine in the second ring of setae. The remaining short spines are dorsolateral, 4 in the C2 and 1 basally in the C3 of the right cercus (one per ring of setae) and one in the C1 and 4 in the C2 of the left cercus. The paracercus bears dorsally 6 acute short spines in its basal divisions, two in P1 and 4 in P2, both of P1 are mediodorsal, as well as the first and the last of P2, arranged in the first and third ring of setae of this second division. The second ring of setae has two short spines inserted in mediodorsal position (Fig. 8G). The formula of the left cercus is C1 (1[0] + 2[1iv +1id]) + C2(1[1iv +1id] + 2[1id] + 3[1id] + 4[1id]), of the right cercus C1 (1[1iv]) + C2(1[1iv +1id] + 2[1iv +1id] + 3[1id] + 4[1id]) + C3 (1[1id]) and of the paracercus P1 (1[1d] + 2[1d]) + P2 (1[1d] + 2[1ld+1rd] + 3[1d]). The ratio length/width of these short spines is 6.3–8.5 in cerci and 5.25–8 in the paracercus.

Habitat

The only known specimen of *Coletinia dextra* sp. nov. was found under a flat stone in the surroundings of the village of Cerro Muriano, close to the remains of a Roman copper mine. The insect was captured in the early morning after a rainy period and the underside of the stone was very humid. Representatives of Coletiniinae are usually not found in such a superficial habitat, but probably this specimen came up from a more subterranean place during the previous night and the special circumstances favored the finding. It is very likely that searching in deeper levels of the ground, such as MSS, could be needed to get more specimens of this new taxon.

Coletinia serrata Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov.
urn:lsid:zoobank.org:act:0C4AC44D-C343-42B7-BCC6-AB6B31F6456D
Figs 9 –11

Diagnosis

Insect subcylindrical and yellowish, body 8 mm long. Pedicels of male antennae with asymmetrical apophyses; the left apophysis is bigger and similar to that of *C. tinauti*, subcylindrical and with the apex modified bearing a laminar expansion that shows a denticulated margin (with high magnification). Right apophysis smaller, about ⅔ of the left one, without a visible glandular seta. All tibiae with one lateral small spine. Male urotergite X with 3+4 pegs. Male VIIIth urosternite with a slightly convex (almost straight) hind margin. Paramera 5.5 times longer than wide. Cerci without pegs, each one with a series of 3 basal short acute spines, all of them in the second division. Female unknown.

Coletinia serrata sp. nov. from the region of Alentejo (southern Portugal) can be included in the group of species with asymmetrical antennae in males, where the left pedicellar apophysis is more developed than the right one. Inside this group, the remaining species show a stronger difference in size between both apophyses, because the right one is much reduced. For example, in *C. asymetrica* Bach de Roca, Mendes & Gaju Ricart, 1985 the left apophysis is about 10 times longer than the right one. The difference of size is similar in *C. herculea* or *C. vergitana* Molero, Barranco, Bach & Gaju, 2013, but in these two species subadult specimens show a more symmetric apophysis (Molero *et al.* 2013). Nevertheless, the studied specimen of *C. serrata* is clearly an adult, as indicated by the modified pegs of the terminal filaments and the tenth urotergite. In subadults of *C. herculea* and *C. vergitana* the glandular seta of the apex of the apophysis is developed in both apophyses, but in *C. serrata* this seta is strongly reduced in the right apophysis. Moreover, the shape and projections of the apophyses of asymmetrical species are different to *C. serrata*; the left apophysis of *C. serrata* is more like that of *C. dextra* sp. nov. or those of *C. mendesi* or *C. tinauti*, species with symmetric antennae, although the denticulation of the lamellar subapical expansion of the apophysis is not so clearly denticulated as in *C. serrata*.

Only one species of the genus *Coletinia*, *C. dextra* sp. nov. from Andalusia (Spain), described in this work, shows its right pedicellar apophysis more developed than the left one. The different chirality of antennal apophyses is not the only difference between *C. dextra* and *C. serrata* sp. nov., although more differences could be provided when females of both species were found. The metatibiae of the Spanish species have 2 dorsal spines (only one in the Portuguese species), the number of discal setae of the tenth urotergite is higher in the Spanish species, the shape of the hind margin of the VIIIth urosternite is different and the number of spiniform pegs in terminal filaments is higher in *C. dextra*.

Coletinia serrata sp. nov. perhaps represents the first step of the evolution of species of *Coletinia* with symmetrical antennae to those, as *C. asymetrica* and other species described from the Southern Iberian Peninsula, that have a vestigial right pedicel.

Etymology

The specific name '*serrata*' refers to the denticulate margin of the lamellar expansion of the left pedicellar apophysis, character that has only been observed in this species.

Material examined

Holotype

PORTUGAL • ♂; Alentejo, Santa Margarida do Sado; 38º06′ N, 08º21′ W; 15 May 2007; A. Serrano leg.; MUHNAC, CZ-5646, mounted on slide.

Description

Measurements. Body length: 8 mm. Body width: 1.5 mm. Antennae broken; maximum length preserved: 3.5 mm. Body subcylindrical, yellowish, devoid of scales.

Body. Head with scarce thin setae and some bifid macrochaetae; frons and clypeus as in Fig. 9A. Antennae asymmetric (Fig. 9B–C). The apophysis of the right pedicel is reduced, subcylindrical without a defined apical glandular seta, about 0.45 times as wide as the pedicel and about 3 times longer than wide (iL/W = 3.2; oL/W = 2.6); its apex reaches the second division of the flagellum. Left apophysis bigger (Fig. 9D),

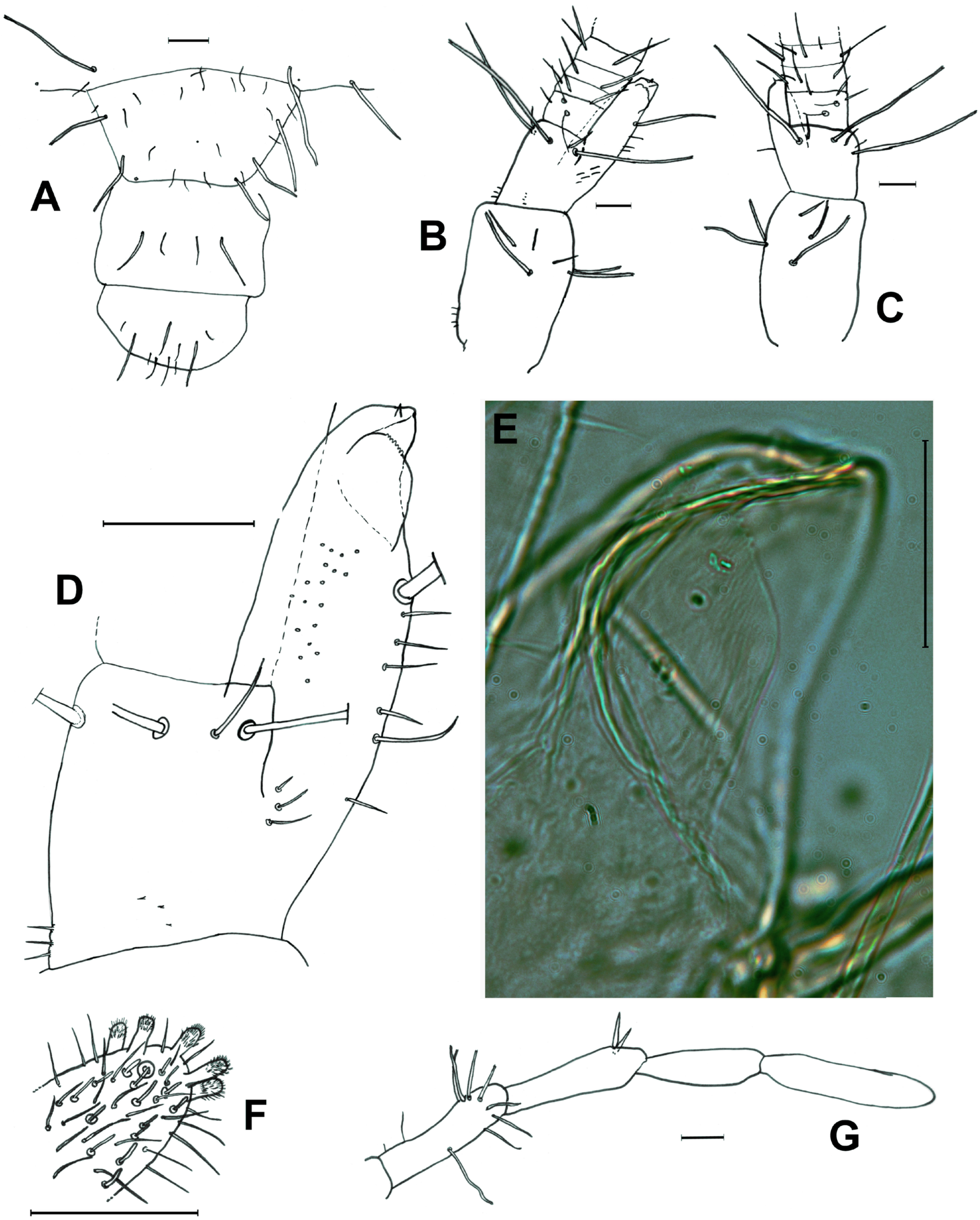

Fig. 9. *Coletinia serrata* Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MUHNAC, CZ-5646). **A**. Frons, clypeus and labrum. **B**. Left antenna: scapus, pedicel with apophysis and basal annuli of the flagellum. **C**. Idem of the right antenna. **D**. Detail of the apophysis of the left pedicel. **E**. Micrograph of the apical part of the apophysis of the left pedicel. **F**. Sensilla of the apical part of the last article of the maxillary palp. **G**. Maxillary palp. Scale bars: A, D, F–G = 0.1 mm; B–C = 0.2 mm; E = 50 µm.

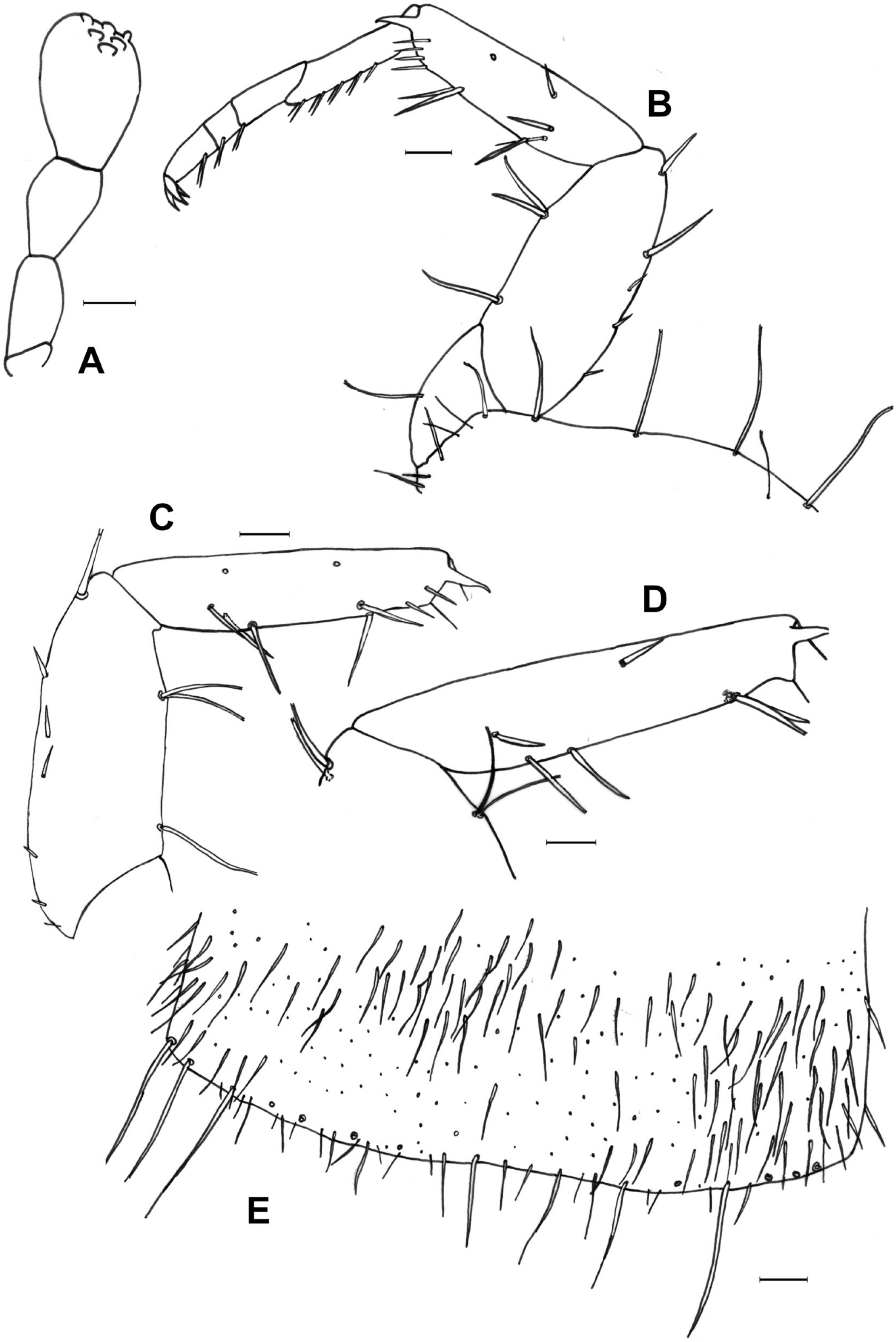

Fig. 10. *Coletinia serrata* Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MUHNAC, CZ-5646). **A**. Labial palp. **B**. First leg, except coxa. **C**. Femur and tibia of the second leg. **D**. Metatibia. **E**. Urotergite II. Scale bars = 0.1 mm.

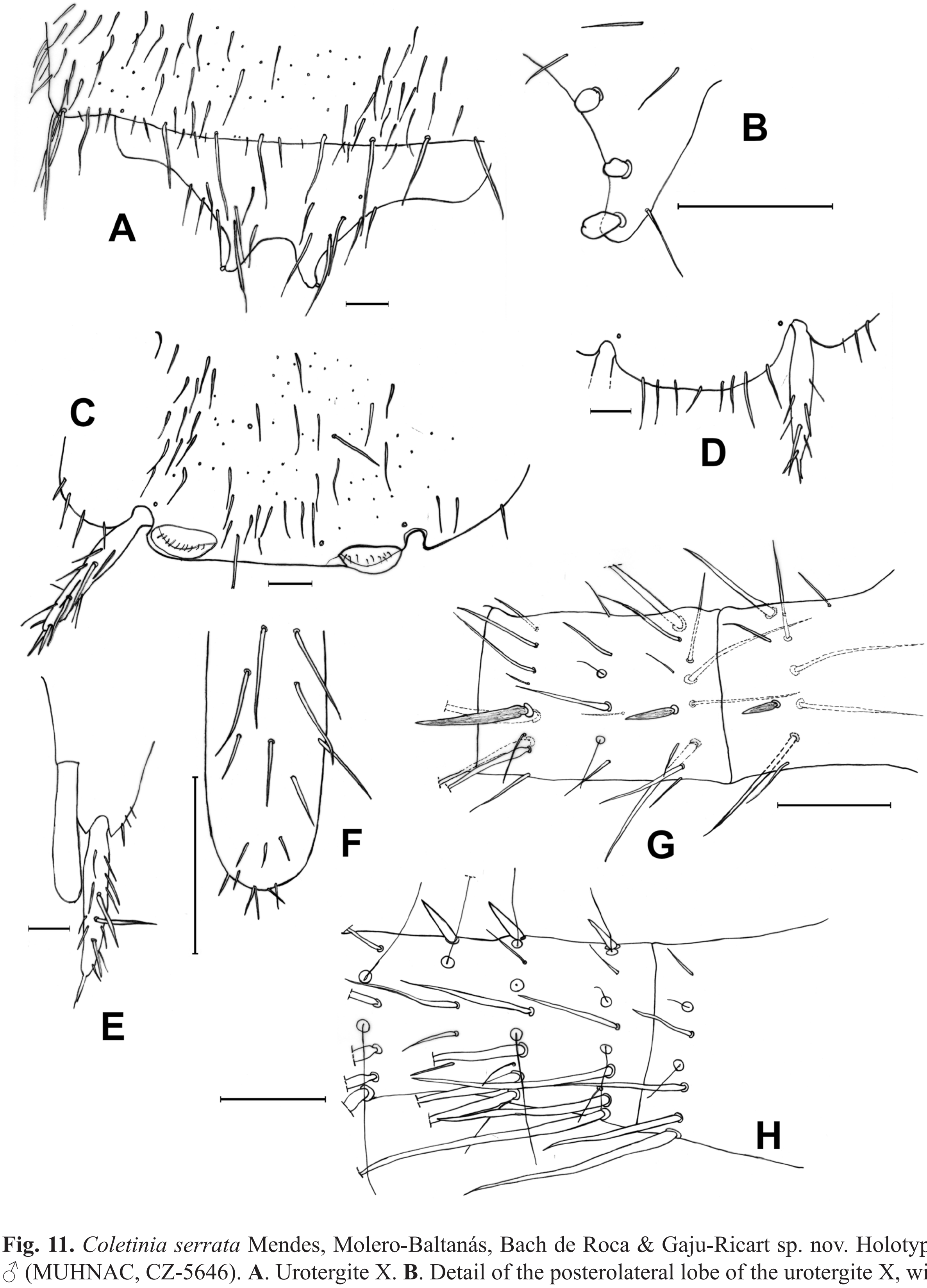

Fig. 11. *Coletinia serrata* Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov. Holotype, ♂ (MUHNAC, CZ-5646). **A**. Urotergite X. **B**. Detail of the posterolateral lobe of the urotergite X, with pegs. **C**. Urosternite V. **D**. Hind margin of the urosternite VIII. **E**. Coxite IX, stylus IX and paramere. **F**. Detail of the apical part of the paramere. **G**. First and second division of the cercus. **H**. First and basal divisions of the paracercus. Scale bars = 0.1 mm.

reaching the fourth division of the flagellum, subcylindrical, with a lamellar expansion in its apical part that shows its distal margin denticulated (with high magnification; see Fig. 9E). A glandular seta is inserted in the apical part of the apophysis, over the lamellar expansion. This left apophysis is about 0.7 times as wide as the pedicel and about 3 times longer than wide (iL/W = 3.5; oL/W = 2.5). The left apophysis is about 1.4 times longer than and 1.5 times as wide as the right one (considering the inner length in dorsal view; see Fig. 9C). Maxillary palps with a lot of basiconic sensilla on the distal article (Fig. 9F) and in the apical part of the penultimate. The distal article is about 4.7 times longer than wide and 1.35 times longer than the penultimate (Fig. 9G). Labial palps typical of Nicoletiidae (Fig. 10A), the last article with 3 basiconic sensilla in the inner side of the basal part and a row of 5 basiconic sensilla in the outer side.

Thorax. Thoracic segments. Typical of the genus, with small setae covering the disc of the nota, their length about $^1/_{12}$ to $^1/_6$ times as long as the segment.

Legs. Protibiae about 3.6 times longer than wide, with 2 dorsal, 1 lateral and 4 ventral acute spines (Fig. 10B). Mesotibiae about 4.3 times longer than wide, with the same number of spines than protibiae (Fig. 10C). Metatibiae almost 1.6 times longer than protibiae and 4.7 times longer than wide, with 1 dorsal, 1 lateral and 4 ventral spines (Fig. 10D). Ventral spines of all tibiae about as long as the width of the tibiae or slightly shorter.

Abdomen. Urotergites covered with thin setae that are $^1/_5$–$^1/_8$ times as long as the tergite (Fig. 10E). Tenth urotergite as in Fig. 11A, with the hind margin concave and almost straight in the bottom of the concavity. Its posterolateral lobes show a low number of pegs, 3 on the right side and 4 on the left side (Fig. 11B). The apical peg of each lobe is bigger than the others. The disc of the urotergite shows 4 setae. Urosternites II–VIII entire and covered with thin setae, bearing one pair of styli and coxal vesicles; their hind margin with 1 + 1 submedian and 1 + 1 sublateral (placed close to the insertion of the styli) short bifid macrosetae; moreover, 1 + 1 discal short macrosetae are present (Fig. 11C). Urosternite VIII somewhat protruding posteriorly, with its hind margin convex, almost straight (Fig. 11D).

Male genitalia. Paramera cylindrical, about 5.5 times longer than wide (Fig. 11E), their distal part as in Fig. 11F.

Terminal filaments. Broken, only their basal part preserved (about 1.5 mm in the paracercus and one cercus). Both cerci bear 3 acute and short spines on their inner side, all of them in the second division and about 4.5–5.5 times longer than wide; their formula is C2(1[1id] + 2[1id] + 3[id]), corresponding to Fig. 11G. The paracercus has one peg in the basal division, one peg in the first ring of setae of the second division and one peg that can be considered as a slightly modified pigmented spine in the third ring of setae, as shown in Fig. 11H; formula P1 (1[d]) + P2 (1[d] + 3[d]). The peg on the basal division and the first one of the second division are about 5–6 times longer than their higher width, the spine in the third ring of setae is about 9.5 times longer than wide.

Habitat

The only known specimen of *Coletinia serrata* sp. nov. was found under a schist stone. This circumstance is similar to what has been commented for *C. dextra*, probably the usual habitat of these species is more subterranean. Nevertheless, specifying an ecological classification to the species described in this work does not make sense due to the small number of samples and specimens found and to the absence of special morphological differences that could be related to different underground lifestyles. All species of *Coletinia* show similar morphological adaptations to live in caves or other subterranean habitats, which are shared with most species of the family Nicoletiidae and which can be considered plesiomorphic in this group (absence of eyes, light pigmentation, slender bodies and long appendages).

New records and variability remarks of previously known species

Coletinia diania Molero, Bach & Gaju, 2013

Coletinia diania Molero, Bach & Gaju in Molero *et al.*, 2013: 29, figs 65–75.

Material examined

SPAIN • 2 ♂♂; Alicante Province, Denia, Cova de la Punta de Benimaqua; 9 Jan. 2016; A. Sendra leg.; UCO, Ref. Z2641.

Distribution

Known only from its type locality in a cave of Alicante Province, in Spain.

Variability remarks

This is the second time this species is found at the same locality of its original description, that was based on only one male specimen. Unfortunately, females are also absent in this new sample and males collected lack the terminal filaments, so it is not possible to confirm the main character distinguishing this species from other related ones (i.e., the high number of pegs in the cerci and the position of two of them at the same level of the second division of the cerci). Regarding remaining diagnostic characters of *C. diania*, the two specimens examined fit well with the description made in Molero *et al.* (2013) and no remarkable variability has been detected. The body length of the new specimens is 1 mm shorter than that of the holotype, and this fact is congruent with a slightly lower number of pegs on the urotergite X (7+7), but they have a slightly higher ratio L/W of tibiae (about 5.3 in the studied specimens, against 5 in the holotype) and of paramera (about 5 in the new specimens, while in the holotype this ratio is about 4–4.5).

The re-examination of the holotype of this species provides the formula of pegs on the cerci: C1 (1[1*id*+0–1*iv*]+2[1*id*])+C2 (1[1*id*]+2[1*id*+0–1*iv*]+3[1*id*+0–1*iv*]+4[1*id*]). Formula of short spines on paracercus: P1(1[1d + 1*ld*])+P2(1[1d + 1*ld*]+2[0]+3[1d]).

Coletinia intermedia Molero, Bach & Gaju, 2013

Coletinia intermedia Molero, Bach & Gaju in Molero *et al.*, 2013: 27, figs 54–64.

Material examined

SPAIN • 1 ♂; Murcia Province, Fortuna, Cueva del Solín; 4 Nov. 1984; M. Ortiz leg.; UCO, Ref. Z2506.

Variability remarks

The male specimen studied from a sample collected a long time ago in a cave at 50 km distance from one of the localities where *C. intermedia* was previously found (Calasparra) is tentatively assigned to this species, although a revision of the group *Coletinia intermedia*+*Coletinia tinauti* should be done, perhaps also including *C. calaforrai*. The only male available from this new locality agrees with *C. intermedia* in most characters but differs in having longer tibiae (ratio L/W of metatibiae about 6.07 while it ranges from 4.8 to 5.1 in other male specimens), a lower number of setae in the disc of the tenth urotergite (7, while other male specimens show 10–11 discal setae), a higher number of pegs in the urotergite X (8+8 while other males of this species show 4–5+4–5 pegs) and longer paramera (their ratio length/width is about 6.1, while it ranges from 4.9 to 5.1 in other specimens). These differences are provisionally interpreted as intraspecific variability, but this should be reassessed in the future together with the variability of *C. tinauti* (see below in the section of this species and in discussion section).

The formula of pegs on cerci of the holotype can not be established because these appendages are damaged in this specimen. In the male collected in Cueva del Puerto (Calasparra, Murcia), the formula of pegs on cerci is: C1 (1[1*id*])+C2 (1[1*id*+0–1iv]+2[1*id*+0–1iv]+3[1*id*]+4[0–1*id*+0–1iv]). This formula is similar in the new specimen from Cueva del Solin but in this case, pegs are less blunt. The formula of paracercus is P1(0d)+P2(1[1d]+2[1d]) in the specimen of Cueva del Puerto and P1(1d)+P2(1[1d]+2[1d]) in the male from Cueva del Solín.

Coletinia mendesi Wygodzinsky, 1980
Fig. 12A–C

Coletinia mendesi Wygodzinsky, 1980: 10–12, fig. 6.

Coletinia mendesi – Molero, Bach, Sendra, Montagud, Barranco & Gaju 2013: 43–45, 47, figs 1a, 4, 6, 8, 134–140.

Material examined

SPAIN • 3 ♂♂, 3 ♀♀; Málaga Province, Marbella, in a nest of *Lasius grandis*; 12 May 2018; C. Pradera leg.; UCO, Ref. Z2631 • 1 ♀; Córdoba Province, Córdoba city; 1 Jun. 2008; M. Gaju leg.; UCO, Ref. Z2643 • 3 ♂♂, 2 juvs; Córdoba Province, Palenciana; 28 Jun. 2001; UCO, Ref. Z2172 (already cited in Molero *et al*., 2013).

Distribution

Endemic to southern Iberian Peninsula: S Portugal and SW Spain.

Variability remarks

Some observations of Spanish specimens have revealed that the apical emargination of the urotergite X of males can be variable and it is wide and shallow in some specimens (Fig. 12A–B). This implies that this character is not useful for distinguishing this species from *C. setosula*, as established in the original description of this Sicilian species.

One character not previously described of this species is the number and size of the macrochaetae of the mandibles. There are 5 or more bifid macrochaetae, at least 3 or them almost as long or, in some cases, slightly longer than the width of the mandible (Fig. 12C), while in the remaining known species of the genus this number is lower (usually 1–3) and they are shorter, at most about half the length of the mandible.

Habitat

Coletinia mendesi inhabits more superficial mediums than most of the remaining species of Coletiniinae, which usually live in caves or other subterranean habitats. *Coletinia mendesi* can be collected under stones and it had been previously collected in ant nests (Mendes 1985), so it can be considered as an occasional or facultative myrmecophile. This is the first time it has been found with ants of the genus *Lasius* Fabricius, 1804.

Coletinia redetecta Molero, Bach & Gaju, 2013

Coletinia redetecta Molero, Bach & Gaju in Molero *et al.*, 2013: 38–40, figs 2a, 7, 102–116.

Material examined

SPAIN • 1 ♂, 3 ♀♀; Castellón Province, La Vall de Uixó, Coves de Sant Josep; 15 Oct. 2016; A. Sendra leg.; UCO, Ref. Z2642.

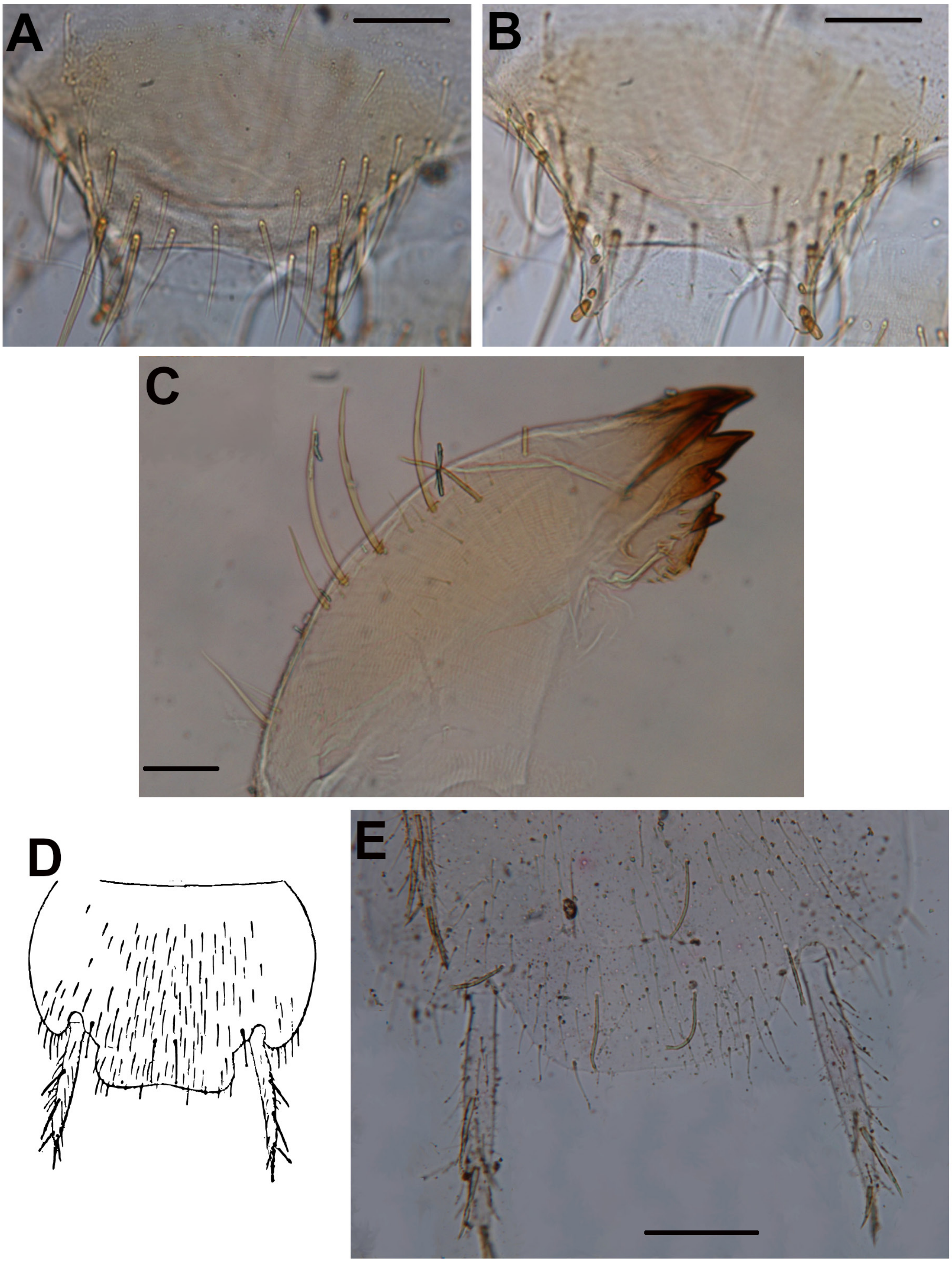

Fig 12. A–C. *Coletinia mendesi* Wygodzinsky, 1980, ♂ from Palenciana (Córdoba) (UCO, Ref. Z2643). **A**. Micrograph of the male urotergite X, focused dorsally. **B**. Idem ventrally; while the dorsal focus shows an almost straight hind margin, in the ventral focus a concave shape is visible between the posterolateral lobes. **C**. Micrograph of a mandible showing the macrochaetae of its outer margin, more numerous than in other species of the genus. **D**. *Coletinia jeanneli* (Silvestri, 1938), ♂. Urosternite VIII of the male according to the original design of Silvestri (1938). **E**. *Coletinia tessella* Molero, Bach & Gaju, 2013, ♂ from the type locality. Micrograph of urosternite VIII. Scale bars = 0.1 mm.

Distribution

Endemic to karstic areas of Castellón Province, in eastern Spain.

Variability remarks

The specimens of this sample were collected in a cave about 78 km to the south of the type locality of the species. They are tentatively assigned to *C. redetecta*, although there are some differences in some characters with the type material. Here, we consider that these differences can be attributed to intraspecific variability. The most important difference is the lower number of ventral macrochaetae in tibiae (in specimens from the type locality, the metatibiae usually have 6 or more ventral macrochaetae and in the new sample the metatibiae bear 5 macrochaetae). A thorough examination of all available specimens has revealed that all tibiae have at least 2 (frequently, 3) dorsal macrochaetae (if only one was reported for this species, this was caused by a loss of the setae, but the insertion of the second one has been detected). This character is shared with *C. longitibia* Molero, Bach & Gaju 2013 and *C. capolongoi*, but not with *C. tessella* Molero, Bach & Gaju, 2013 and all the species of the group *capolongoi* distributed further south, which bear only one dorsal macrochaetae on their metatibiae. This character has been included in the key at the end of this work, but the number of the ventral macrochaetae is excluded due to the variability mentioned above.

The formula of pegs on the cerci of the holotype is: C1 (0)+C2 (1[0*id*]+2[0–1*id*]+3[1*id*]). The only male available from the second locality where the species was found (Avenc d'en Serenge, Cabanes) has the cerci damaged. The formula of cerci in a male of the new locality (La Vall de Uixó) is: C1 (0)+C2 (1[1*id*]+2[1*id*]+3[1*id*]+4[1*id*]). The paracercus in all specimens examined lacks short spines; there are 0–2 thin acute dorsal spines in the first and second divisions of P2.

Coletinia tinauti Molero-Baltanás, Gaju-Ricart & Bach de Roca, 1997

Coletinia tinauti Molero-Baltanás, Gaju-Ricart & Bach de Roca, 1997: 97–104, figs 1–4.

Coletinia tinauti – Molero *et al.* 2013: 49–52, figs 1b, 6b, 9b, 153–163.

Material examined

SPAIN • 14 ♂♂, 8 ♀♀; Jaén Province, Cueva de la Morciguilla; 24 Dec. 2013; GEV leg.; UCO Ref. Z2507.

Variability remarks

The abundant material belonging to this species collected at one locality (22 specimens) allows to assess the variability of *C. tinauti*. This sample comes from a cave about 35 km distance from the type locality of the species, and the insects collected completely fit the original description. Some specimens of this sample have been dissected and examined, concluding that most of their characters are proven to be constant inside the population, such as the shape of the urosternite VIII of males or the number of divisions of the ovipositor. Nevertheless, the variability of some characters proves to be wider than previously known for this species (see Table 1). For example, the shape of the hind margin of the urotergite X in males proves to be variable, since in some specimens it is folded in its median part or is more convex dorsally but more straight ventrally; this agrees with the variability detected for this character in *C. maggi* by Gilgado & Ortuño (2015), although this variability is not detected in *C. tinauti* for females.

The terminal filaments of this species present few pegs with blunt apex (at most 5 but usually 4 or less in each cercus). The paracercus has only, as usual, short, pigmented spines. The formula of the paracercus of the holotype is P1 (1[1*d*])+P2 (1[0]); in this specimen the paracercus is broken and only the first division is preserved. The illustration presented by Molero-Baltanás *et al.* (1997) in the original description corresponds in fact to a cercus.

Variability of the paracercus in other male specimens examined: the first division of the cercus bears in some specimens (as the holotype) one thin acute and small dorsal spine; in other specimens this spine is absent. The second division shows 3 more robust and short dorsal spines (the third longer than the preceding ones) inserted on alternate rings of setae. If the dorsal spine on P1 is absent, these spines are present on the first, third and fifth rings of setae; if the dorsal spine on P1 is present, the modified spines are inserted on the second, fourth and sixth rings of setae. So, the formula can be P1 (1[0])+P2 (1[1d]+2[0]+3[1d]+4[0]+5[1d]) or P1 (1[1d])+P2 (1[0]+2[1d]+3[0]+4[1d]+5[0]+6[1d]). All these spines are acute but clearly different (shorter, more robust, and pigmented) to the unmodified setae of the dorsal side of the paracercus of females.

In cerci, the inner-dorsal spines are more robust than the inner-ventral ones and usually show blunt apex, except those in the C3, and can be considered as pegs, but there is some variability (for example, in the holotype there is only one peg in the first ring of C2, see Fig. 1C). The remaining spines are thinner and frequently acute but always shortened compared with setae in similar position in females. The formula of the left cercus of the holotype (shown in Fig. 3) is: C1 (1[1id+1iv])+C2 (1[1*id*+1iv]+2[1id])+C3 (1[1id+1iv]+2[1id]); the right cercus is drawn by Molero *et al.* (1997: fig. 3.6), except for the second ring of setae of C3, which is damaged (in the caption it is incorrectly indicated as paracercus) and its formula is C1 (1[1*id*+1*iv*])+C2 (1[1*id*+1iv]+2[1id])+C3 (1[1id+1iv]).

Variability of the cercus in other male specimens examined: the limit between the second and the third division of the cercus has a more distal position in most of the remaining specimens observed, so the spines of the first and second ring of setae of C3 in the holotype correspond in these additional specimens to the third and fourth ring of setae of C2. But the arrangement of pegs is similar, with some exceptions:

- The pegs of C1 are absent in some specimens; in this case, the apex of the spine of the third ring of setae of the C2 is blunt.
- Some spines inserted on inner-ventral position can be absent or reduced to thin usual setae (not modified).

Considering this variability, the formula of cerci of most specimens of *C. tinauti* where the division between C2 and C3 is placed beyond the fourth ring of setae is: C1(1[0–1*id*+0–1iv])+C2(1[1*id*+0–1iv]+2[1*id* +0–1iv]+3[1*id*+0–1iv]+4 [0–1*id*+0–1iv]). The maximum number of blunt pegs in C2 is 4.

Key for identification of species of the genus Coletinia

This key is based on that of Wygodzinsky (1980) but includes the 16 new species described afterwards. The females of *Coletinia diania, C. herculea, C. setosula, C. dextra* sp. nov. and *C. serrata* sp. nov. and the males of *Coletinia corsica* Chopard, 1924 are not known, so they are excluded from the key. The original description (only available) of the female *Coletinia corsica* is insufficient to identify some characters considered in this key, so this species is not included. For some characters, figures of original descriptions have been considered when not explicitly described in the text.

Moreover, the variability of *C. maggi* discussed by Gilgado & Ortuño (2015) is left pending, and the distinction established by Molero *et al.* (2013) between *C. maggi* and *C. hernandoi* Molero, Bach & Gaju 2013 is not considered, since both taxa require further investigation. We indicate this in the key as '*Coletinia maggi* species group'.

For some characters, the key of Molero *et al.* (2013) has been used but revised and modified, because the high variability detected in several species, as commented in the discussion section. For example, the shape of the hind margin of the urotergite X has been discarded.

1. Frons with very numerous subequal long setae 2
– Frons with fewer setae, both distinct macrochaetae and short bristles 3

2. Macrochaetae of tibiae robust, the ventral ones of mesotibiae clearly longer than the diameter of the tibia (about 1.5 times this diameter) and bigger than those of metatibiae. Males with parameres that do not reach the level of apex of styli IX. SW Iberian Peninsula .....***C. mendesi*** Wygodzinsky, 1980
– Macrochaetae of tibiae thin, the ventral ones of mesotibiae about as long as the diameter of the tibia and not bigger than those of metatibiae. Parameres large, attaining the level of apex of styli IX. Known from Sicily ....***C. setosula*** Wygodzinsky, 1980

3. Males 4
– Females 24

4. Antennae symmetrical (left and right pedicellar apophyses similarly developed) 12
– Antennae asymmetrical (left and right apophysis with different size and shape) 5

5. Left apophysis with two elongate and narrow ribbon-like processes, longer than the width of the pedicel. Right apophysis less developed and triangular, without apical or subapical seta, its base more than half the width of the pedicel. Italy ....***C. subterranea*** (Silvestri, 1902)
– Apophyses without elongate ribbon-like processes. If processes are present, they are short and not ribbon-like, and their length is lower than the width of the pedicel. Right apophysis with diverse shapes, often with apical or subapical seta; if triangular and without seta, its size is smaller (its base less than half the width of the pedicel) 6

6. The less developed apophysis is at least half the length of the more developed one and is subcylindrical or conical in shape, longer than wide. Terminal filaments without pegs, with acute spines similarly developed to those of females or slightly shortened and robust 7
– The less developed apophysis (right) is very small, less than 0.2 times as long as the more developed one (left) 9

7. The more developed apophysis (left) has a sclerotized subapical ridge and its distal part is clearly wider than the base. Less developed apophysis (right) with subapical glandular seta. Terminal filaments with a setation like that of females; inner spines of cerci thin. Brazil ....
....***C. brasiliensis*** Mendes & Ferreira, 2002.
– The more developed apophysis (left or right) lacks sclerotizations and its width is similar in the distal and in the basal part; the distal area shows a lamellar process. Less developed apophysis (left or right) without a visible subapical seta. Inner spines of cerci shortened and robust (spiniform pegs). S Spain and Portugal 8

8. Left apophysis more developed than the right one. Lamellar process of the left apophysis with denticulate margin .... ***C. serrata*** Mendes, Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov.
– Right apophysis more developed than the left one. Lamellar process of the left apophysis not clearly denticulate, almost straight ....***C. dextra*** Molero-Baltanás, Bach de Roca & Gaju-Ricart sp. nov.

9. Right apophysis of adult males of triangular shape, without glandular seta 10
– Right apophysis of adult males with other shape, with or without apical seta 11

10. Left pedicellar apophysis without lamellar expansion, its sclerotized area placed besides or under the glandular seta; this seta is inserted on apical position. Only known from Córdoba Province (S Spain) .... ***C. asymetrica*** Bach, Mendes & Gaju, 1985
– Lamellar expansion and sclerotized area of the left pedicellar apophysis extending above the glandular seta. Canary Islands ....***C. majorensis*** Molero, Gaju, López & Bach, 2014

11. Posterior margin of eighth urosternite not very protruding (ratio length/width of the protruding part about 0.23) and slightly convex. Apophysis of the left pedicel of adults with a sclerotized region next to the glandular cone and a very well developed subapical lateroexternal process, showing no sclerotizations but densely covered with small hairs. Only known from a cave near Berja (Almería, SE Spain) ....***C. vergitana*** Molero, Barranco, Bach & Gaju, 2013
– Posterior margin of eighth urosternite more protruding (ratio length/width of the protruding part about 0.32) and convex. Apophysis of the left pedicel of adults with two lamellar processes, one apical without sclerotization, and one subapical with hook-shaped sclerotization and with a long and strong macrochaeta plus a few thin setae. Only known from S Spain (Straits of Gibraltar) ....
.... ***C. herculea*** Molero, Bach & Gaju, 2013

12. Pedicellar apophyses simple, subcylindrical, not abruptly narrowed in their apex (simply rounded apically) without sclerotizations or processes (reported from several countries of southern and central Europe, in revision) .... ***Coletinia maggi*** species group
– Pedicellar apophyses not simple, abruptly narrowed or truncate at their apex and/or with processes or sclerotizations 13

13. Pedicellar apophyses large, reaching the limit of annuli 7–8 of the flagellum, and even further elongated by a long thin sclerotised extension abruptly turning back on itself toward its pedicel, furnished with a predistal tooth and whose distal end is spatula like and toothed. Urotergite X with more than 20+20 pegs. Only known from Turkey .... ***C. longissima*** Mendes, 1988
– Pedicellar apophyses smaller and with a different shape. Urotergite X with a lower number of pegs, usually less than 10+10 14

14. Pedicellar apophyses subcylindrical, slightly widened in their distal half but narrowing in its apex forming a glandular cone that is not accompanied by any lamellar projection, sclerotizations of tegument or hook-shaped process. Cerci without blunt pegs, only with acute short spines. Tibiae lacking lateral spines .....***C. dalmatica*** Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov.
– Pedicellar apophysis not widened in their distal half, narrowing in the apex where the glandular cone is visible, and accompanied by lamellar projections, sclerotizations or hook-shaped processes. Cerci usually with blunt pegs in their basal divisions (at least in C2, except for *C. jeanneli*). Tibiae usually with one short lateral spine (not described in *C. bulgarica* (Kozaroff, 1939)) 15

15. Pedicellar apophysis with a subapical hook-shaped projection and a sclerotized area besides the glandular cone. Metatibiae length is, according to the original figures, less than 4 times longer than wide. Only known from Bulgaria ....***C. bulgarica*** (Kozaroff, 1939)
– Pedicellar apophysis different. If presenting hook-shaped projections, there are two or they are not sclerotized. Ratio length/width of metatibiae higher, 4 or more times longer than wide 16

16. Pedicellar apophysis with two curved projections, not lamellar. Hind margin of urosternite VIII very protruding and straight (Fig. 12D). Without blunt pegs on cerci (only acute spines, according to the original description). Known from France .... ***C. jeanneli*** (Silvestri, 1938)
– Pedicellar apophysis with an apical lamellar projection besides the glandular cone (*capolongoi* type). Hind margin of urosternite VIII protruding; if straight, not so protruding (Fig. 12E). Usually with blunt pegs on cerci, at least in C2 17

17. Hind margin of urosternite VIII straight or almost straight 18
– Hind margin of urosternite VIII convex, rounded in the middle area 19

18. Urotergite X with at least 6+6 sensory pegs. Known from caves of Castellón Province (E Spain) .. .. ***C. tessella*** Molero, Bach & Gaju, 2013
– Urotergite X with at most 5+5 sensory pegs. Known from gypsum caves of Almería (SE Spain) ... . ***C. calaforrai*** Molero, Barranco, Bach & Gaju, 2013

19. C2 of cerci with at least 5 pegs, some of them inserted at the same level. Paracercus with some lateral blunt pegs and dorsal spiniform spines. Known only from a cave of Denia, Alicante Province (E Spain) .... ***C. diania*** Molero, Bach & Gaju, 2013
– C2 of cerci with at most 4 pegs; if 5 or more, all of them inserted in a single row. Paracercus usually without blunt pegs, only with acute spiniform dorsal spines 20

20. Ratio L/W of metatibiae higher than 6 21
– Ratio L/W of metatibiae lower than 6 22

21. Ratio L/W of paramera about 5. Ratio L/W of protibiae higher than 4. Ratio L/W of mesotibiae about 5. Only known from a cave in Castellón Province (E Spain) .... ***C. longitibia*** Molero, Bach & Gaju, 2013
– Ratio L/W of paramera about 6. Ratio L/W of protibiae and mesotibiae usually lower than 4. Known from caves in Valencia Province (E Spain) ....***C. capolongoi*** Wygodzinsky, 1980

22. Metatibiae with only 1 dorsal spine. Species from S Spain .... ***C. intermedia / C. tinauti / C. calaforrai***
– Metatibiae usually with 2–3 dorsal spines 23

23. Metatibiae usually with 6 or more ventral spines. Cerci with at most 4 small and subcylindrical pegs. Known from Castellón Province (E Spain) ....***C. redetecta*** Molero, Bach & Gaju, 2013
– Metatibiae with 4–6 ventral spines. Cerci in most cases with more than 4 large pegs .... ***C. capolongoi*** Wygodzinsky, 1980

24. Ratio L/W of metatibiae about 3.5 (following original description and/or designs) 25
– Ratio L/W of metatibiae higher than 3.75 (usually more than 4) 26

25. Ratio L/W of subgenital plate about 0.5, with the hind margin convex, slightly acute. Brazil .... ***C. brasiliensis*** Mendes & Ferreira, 2002
– Ratio L/W of subgenital plate higher, with the hind margin more rounded. Bulgaria .... ***C. bulgarica*** (Kozaroff, 1939)

26. Ovipositor with 30 or more divisions 27
– Ovipositor with fewer than 28 divisions 28

27. Ovipositor with about 30 divisions. Robust and dense setae covering disc of tenth urotergite. Subgenital plate wider at the base than long ....***C. vergitana*** Molero, Barranco, Bach & Gaju, 2013
– Ovipositor with 33–35 divisions. Setae of the disc of the tenth urotergite scarce and thin. Subgenital plate as long as wide at the base .... ***C. asymetrica*** Bach, Mendes & Gaju, 1985

28. L/W of metatibiae higher than 9. L/W of subgenital plate lower than 0.5. Apex of the ovipositor not surpassing the apex of styli IX, with only 12–14 divisions .... ***C. longissima*** Mendes, 1988
– L/W of metatibiae lower, at most about 7. L/W of subgenital plate higher than 0.6. Apex of the ovipositor clearly surpassing the apex of styli IX, in most species with more than 14 divisions 32

29. At least metatibiae with a lateral spine 31
– Tibiae without lateral spines 30

30. Hind margin of subgenital plate truncate, straight ....
.... ***C. dalmatica*** Molero-Baltanás, Fišer, Bach de Roca & Gaju-Ricart sp. nov.
– Hind margin of subgenital plate convex, rounded .... ***Coletinia maggi*** species group (under revision)

31. Protibiae and mesotibiae without lateral spine. Subgenital plate convex, rounded ....
.... ***Coletinia maggi*** species group (under revision)
– Protibiae and mesotibiae with lateral spine (not documented in *C. jeanneli*, but this species has a truncate subgenital plate) 32

32. Apex of the ovipositor surpassing the level of the apex of styli IX by about 3 times their length. Ovipositor with about 25 divisions. L/W of subgenital plate about 0.6–0.7 ....
.... ***C. subterranea*** (Silvestri, 1902)
– Apex of the ovipositor usually surpassing the level of the apex of the styli IX by less than 3 times as long as these styli. Ovipositor with fewer than 25 divisions. L/W of subgenital plate higher than 0.7 33

33. Ratio L/W of metatibiae higher than 6.5 34
– Ratio L/W of metatibiae lower than 6.2 35

34. Ovipositor with about 18 divisions, surpassing the apex of styli IX by 1–1.5 times as long as these styli .... ***C. longitibia*** Molero, Bach & Gaju, 2013
– Ovipositor with fewer than 17 divisions but longer, surpassing the apex of styli IX by about 1.5–2 times their length .... ***C. capolongoi*** Wygodzinsky, 1980

35. Hind margin of subgenital plate straight or almost straight 36
– Hind margin of subgenital plate convex, rounded 39

36. Metatibiae with 2 dorsal spines. Ovipositor with more than 20 divisions, surpassing the level of styli IX by 1.5 times their length (following Silvestri's figures) .... ***C. jeanneli*** (Silvestri, 1938)
– Metatibiae with 1 dorsal spine. Ovipositor with less than 20 divisions, surpassing the level of styli IX by a length that is equal or lower than the length of these styli 37

37. Ovipositor with 14–17 divisions 38
– Ovipositor with more than 17 divisions .... ***C. intermedia / C. tinauti***

38. Ovipositor surpassing the apex of styli IX by more than 1.5 times their length ....
.... ***C. calaforrai*** Molero, Barranco, Bach & Gaju, 2013
– Ovipositor surpassing the apex of styli IX by the length of these latter or less ....
.... ***C. tessella*** Molero, Bach & Gaju, 2013

39. Metatibiae usually with only 1 dorsal spine .... ***C. calaforrai*** Molero, Barranco, Bach & Gaju, 2013
– Metatibiae with 2–3 dorsal spines 40

40. Ovipositor with about 22 divisions. Hind margin of subgenital plate subacute ....
.... ***C. majorensis*** Molero, Gaju, López & Bach, 2014
– Ovipositor with at most 20–21 divisions. Hind margin of subgenital plate rounded or truncate ... 41

41. Hind margin of subgenital plate convex, rounded. Ovipositor with 15–16 divisions ....
.... ***C. capolongoi*** Wygodzinsky, 1980
– Hind margin of subgenital plate truncate, straight or almost straight. Ovipositor with more than 18–20 divisions .... ***C. redetecta*** Molero, Bach & Gaju, 2013

Discussion

Both the new species described in this work and the new data provided for previously known species suggest that the diversity of the genus *Coletinia* is far from being well known. New species are found even in the area where they have been more intensively studied (Iberian Peninsula). The higher diversity of this area compared to other geographic areas where species of the genus are recorded could be more apparent than real, since most countries are scarcely sampled. For example, subterranean habitats of the Balkan Peninsula, from where *C. dalmatica* sp. nov. is recorded in this work, could also be a diversity hotspot for this group of insects. The characters described for this species suggest that it could be included in an evolutionary lineage related to the Italian *Coletinia maggi*; considering geography, this seems a reasonable expectation. Some specimens of *Coletinia* have been previously cited from Croatia, but none of them are attributable to this new species. Mendes (1992) identified some of them from Krk island as *Coletinia* sp. A, because he could not assign them to any species, and males were absent from the sample. Females of Krk island do not correspond to *C. dalmatica* because the shape of the subgenital plate is rounded posteriorly as referred to by Mendes. Wygodzinsky (1980) cited one specimen as *Coletinia* sp. IV from Rovinj (Istria), but this specimen is a young male without developed sexual characters, so a morphological comparison is not possible. The same author reported in the same paper one male specimen from Ombla valley, near Dubrovnik, but this was identified as *Coletinia maggi* and, in fact, its pedicellar apophysis is subcylindrical; differences with the remaining specimens from Italy were detected but interpreted as intraspecific variability.

The two new Iberian species described in this work (*C. dextra* sp. nov. from southwestern Spain and *C. serrata* sp. nov. from southern Portugal) seem to be closely related. The asymmetry of pedicellar apophyses found in *C. dextra* is inverse to the rest of previously known species with asymmetric antennae. As some of these species seem to be symmetric in juvenile stages, it could be interesting to collect more specimens to assess the postembryonic development of this character. The study of females of this species and of *C. serrata* is desirable to describe both species more accurately. The findings of these insects are, however, rare and unpredictable, so it would be convenient to design sampling programs specifically focused on subterranean fauna. This could help, not only to know all the species of *Coletinia* occurring in a geographic area, but also to study more abundant material of previously known taxa, since the variation range of some of them has not been assessed, as suggested by the present revision of material belonging to *C. diania*, *C. mendesi*, and especially to *C. redetecta*, *C. intermedia* and *C. tinauti*.

Wygodzinsky (1980) mentioned one female specimen of *Coletinia* from La Vall de Uixó as *Coletinia* sp. A, while a female specimen from Encenalls was treated as *Coletinia* sp. B. The insects from this second cave were described by Molero *et al.* (2013) as *Coletinia redetecta*. According Wygodzinsky, *Coletinia* sp. A has a lower number of setae in the disc of urotergite X and *Coletinia* sp. B has a stout and shorter ovipositor, but in this work, where we study specimens from La Vall de Uixó, we propose that both forms are conspecific since these characters seem to be somewhat variable inside a population. Nevertheless, a deep study is necessary for establishing if southern and northern populations of *C. redetecta* belong to the same species, which requires a higher number of specimens than those available at the moment, and genetic studies are desirable. As happens also with the problem of *C. tinauti*, *C. intermedia* and *C. calaforrai* (see below), perhaps there is a mosaic of species as a result of the low dispersal ability of these insects that leads to the isolation of populations that are morphologically very similar but become genetically and biologically separated.

After the addition of the new material studied, the variability of some characters of *C. tinauti* results in overlap with the variability range of related species such as *C. intermedia* and *C. calaforrai*. The overlapping with *C. intermedia* is shown in Table 1. Although we think that these three species are valid, the distinction between them becomes more difficult, so a deeper study of these taxa is necessary and, in

Table 1. Overlapping of variability in some characters of specimens identified as *Coletinia tinauti* Molero, Gaju & Bach, 1997 and *C. intermedia* Molero, Bach & Gaju, 2013. Only characters are included that, after the evaluation of additional specimens or re-examination of previously studied material, modify their range of variability respect to those provided by Molero *et al.* (2013). Abbreviation: L/W = ratio length / width.

	C. tinauti	***C. intermedia***
Number of specimens examined for this revision	8 males + 6 females	3 males + 2 females
Maxillary palp: ratio L/W of last article	4–5.62	4–5.05
Ratio L/W protibiae	3.2–3.68	3.42–3.71
Ratio L/W mesotibiae	3.46–4.41	3.52–4.21
Ratio L/W metatibiae	4.08–5.1	4.49–6.07
Hind margin X urotergite males	Concave, but variable	Nearly straight or slightly concave, but variable
X urotergite: number of discal setae in males	9–17	7–11
X urotergite: number of discal setae in females	8–16	10–12
Paramera L/W	5.25–5.82	4.9–6.1
Ovipositor: number of divisions	18–20	17–18
Ovipositor: length surpassing the apex of styli	1.2–2.3	1.6–1.7

general, of the *capolongoi* group, when a higher number of specimens of most of the species belonging to this group was available or molecular studies can be carried out. For the moment, *C. intermedia* and *C. tinauti* are not distinguished in the key presented in this work, and specimens with convex urosternite VIII of *C. calaforrai* are also not distinguished in the key to males.

Table 1 could suggest establishing *C. intermedia* and *C. tinauti* as synonyms, but what we think is that, in fact, both species are species complexes and could be split into different taxa, each of them with a reduced geographic range, which is congruent with troglobitic forms living in isolated karstic areas. The availability of more material from each locality and conducting molecular analyses will likely prove this hypothesis.

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