Revista Ibérica de Aracnología, nº **30** (30/06/2017): 3–10.
Grupo Ibérico de Aracnología (S.E.A.). ISSN: 1576 - 9518.

A NEW LEIOBUNUM SPECIES FROM THE IBERIAN PENINSULA (OPILIONES: SCLEROSOMATIDAE: LEIOBUNINAE)

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Abstract: A new *Leiobunum* species is described from Spain, *Leiobunum incantaturbs* **sp.n.** The species is characterised by its colour pattern, large size and very long legs, the absence of denticle rows on the retrolateral sides of coxae I to III and its penial morphology. It has been found in two separate areas, Serranía de Cuenca (Castilla-La Mancha) and Sierra de Gúdar (Teruel, Aragón), both in the southern part of the Sistema Ibérico mountains. An isolated record is from the Spanish Pyrenees in Pobla de Segur (province of Lleida, Catalonia).
Key words: Opiliones, Sclerosomatidae, Leiobuninae, *Leiobunum*, Cordillera Ibérica mountains, Pyrenees, Spain.

Una especie nueva de *Leiobunum* de la Península Ibérica (Opiliones: Sclerosomatidae: Leiobuninae)
Resumen: Se describe una especie nueva de *Leiobunum* de España, *Leiobunum incantaturbs* **sp.n.** Se caracteriza por su patrón de coloración, gran tamaño y muy largas patas, la ausencia de hileras de dentículos en los lados retrolaterales de las coxas I-III y por la morfología penial. Ha sido encontrada en dos áreas separadas, Serranía de Cuenca (Castilla-La Mancha) y Sierra de Gúdar (Teruel, Aragón), ambas en el sur del Sistema Ibérico. Y se atribuye una localidad aislada de Pirineos, en Pobla de Segur (Lleida, Cataluña).
Palabras clave: Opiliones, Sclerosomatidae, Leiobuninae, *Leiobunum*, Sistema Ibérico, Pirineos, España.

Taxonomía: *Leiobunum incantaturbs* Prieto & Wijnhoven **n. sp.**

Introduction

The subfamily Leiobuninae includes 13 genera of which three are represented in Europe: *Leiobunum* C.L.Koch, 1839, *Cosmobunus* Lucas, 1848 and *Nelima* Roewer, 1910 (Kury, 2017). Although the genus *Leiobunum* has a Holarctic range and includes well over one hundred species, recent analyses (Hedin *et al*., 2012; Burns *et al*., 2012) have clearly demonstrated that it is a polyphyletic genus, and this also applies to *Nelima,* with several american and japanese Leiobunine and Gagrelline genera as inner branches of the *Leiobunum/Nelima* radiation. That leaves the taxonomy of the subfamily in a chaotic state to be resolved in the future by the reassignment of many 'exotic' species of *Leiobunum* or *Nelima* to their proper, already created or new, American and Japanese genera. Fortunately, considering the European taxonomy the genus name *Leiobunum* is the oldest and it was erected for a European species. Therefore, future nomenclatural changes for the current European taxa are expected to be comparably few.

Until now seven *Leiobunum* species have been reported from the Iberian Peninsula (Prieto, 2003; Prieto & Fernández 2007; Prieto 2008): *L. argentipalpe* Prieto & Fernández, 2007, *L. blackwalli* Meade, 1861, *L. defectivum* Rambla, 1959 (redescribed by Prieto & Fernández, 2007), *L. granulosum* Prieto & Fernández, 2007, *L. levantinum* Prieto & Fernández, 2007, *L. rotundum* Latreillle, 1798 and *L. lusitanicum* Roewer, 1923. Except for *L. blackwalli* and *L. rotundum*, having large European distribution areas (Martens, 1978), the remaining five species are considered endemics for the Iberian Peninsula. In this contribution we present a new, most likely endemic *Leiobunum* from Spain. It was first mentioned and figured by Prieto (2008, Fig. 11) as *Leiobunum* sp. nov. B. Several more representatives of Leiobuninae from the Iberian Peninsula await a description (Prieto, 2008).

Material and Methods

Specimens were sampled by hand, immediately stored in alcohol 70º and preserved in the collections indicated below. Harvestmen bodies were photographed by combining multiple images taken at different focus distances by a camera attached to a Nikon SMZ1500 stereomicroscope and then stacked with the Helicon Focus 6.2.2 software. Original drawings were based on sketches directly drawn from an Olympus stereo light microscope (100-1000x) with the aid of a calibrated drawing mirror. All measurements are given in mm. Coxal formula (Prieto & Fernández, 2007) is defined as the presence of denticle rows on prolateral (front: F) or retrolateral (back: B) sides of coxae I-IV, indicating weak denticle rows with lower-case letters (f, b) and facultative rows with apostrophe (f', b'). BLI (Beinlänge Index [Staręga, 1972]) is the ratio between the length of femur I and the cephalothorax width (at level of lobes between coxae II and III).

Abbreviations

CHW: Collection of Hay Wijnhoven, Nijmegen, Netherlands.
CJM: Arachnological Collection of Jochen Martens, Mainz, Germany.
ZUPV: Arachnological Collection of the Departamento de Zoología y Biología Celular Animal, Universidad del País Vasco, Bilbao, Spain.

Taxonomy

Family Sclerosomatidae Simon, 1879

Subfamily Leiobuninae Banks, 1893

Genus *Leiobunum* C.L.Koch, 1839

***Leiobunum incantaturbs* new species**
Leiobunum sp.nov. B – Prieto, 2008: 60, fig.11

Type locality. Cueva del Nacimiento near La Cueva, municipality of Vega del Codorno (province of Cuenca, Castilla-La Mancha), MGRS coordinates: 30T WK910765, 1400 m a.s.l. On walls and ceiling along the main passage open at bottom of the large entrance of the cave (Fig. 1, 2).

Type material.

Holotype. Male from type locality, C. Prieto, J. Fernández, M. Higuera leg., 26.07.2004 (at walls of a cave). The specimen is deposited in the Museo Nacional de Ciencias Naturales, Madrid (MNCN 20.02/18019).

Paratypes. 1F [ZUPV 1922]; 6F, 15J [ZUPV 1920]; 3M, 8F, 11J [ZUPV 1921]: same data as the holotype. 1M, 5J [ZUPV 1917], La Ciudad Encantada (province of Cuenca, Castilla-La Mancha), 30TWK842511, 1407 m a.s.l. (roof of a rock shelter), C. Prieto, J. Fernández, M. Higuera leg., 25.07.2004. 2M, 1F [ZUPV 4705]; 2M [ZUPV 4706], Tragacete: Fuente de San Blas (province of Cuenca), 30T WK993696, 1430 m a.s.l., C. Prieto leg., 09.08. 2011 (roof of a road bridge). 1M, 1F [CHW; ex-ZUPV 4707]; 1F [ZUPV 4708], type locality, C. Prieto leg., 09.08.2011 (walls and ceiling of the cave gallery). 2M [ZUPV 5151] Cuevas de Almudén: Barranco de San Pedro (province of Teruel, Aragón), 30T XL840088, 1260 m a.s.l., C. Prieto leg., 25.07.2014 (bridge under road). 2F [ZUPV 5152] Miravete de la Sierra: towards Aliaga (province of Teruel, Aragón), 30T XK9501943, 1210 m a.s.l., C. Prieto leg., 26.07.2014 (bridge under road).

Additional material. 2M [CJM 2674], La Pobla de Segur: Congost de Collegats (province of Lleida, Cataluña), 31T CG38, 575 m a.s.l., W. Schawaller leg., 31.08.1980 (walls of an old tunnel).

Description:

Short diagnosis. *Leiobunum incantaturbs* n. sp. can be differentiated from the remaining Iberian *Leiobunum* by the following characters: retrolateral side of coxa I to III without denticles, large body size (males 4.0-6.4) and very long legs, body pale yellowish brown with dark spots including a black saddle, ocularium light with narrow dark rings around the eyes.

Male. Holotype. Body length 5.8, prosoma width 3.2, BLI 3.42. Leg lengths (Tab. I).

Prosoma. Yellowish with prominent dark brown to black patch in front of the eye tubercle (Fig. 3). Prosoma margins bordered with black. Supracheliceral lamellae extended into a pair of blunt projections which bear a few indistinct black denticles (Fig. 4D).

Dorsum. Ground colour of the dorsum pale yellowish with contrasting dark brown to black pattern. Black saddle with a pair of white spots or a row of up to eight spots per abdominal segment. Dorsal integument with microgranulate microsculpture.

Eye tubercle. Rather small (0,6 wide, 0,5 long), set at less than twice its length from the frontal margin (Fig. 4B). About as long as wide, slightly canaliculate, restricted basally and slightly tilted backwards, smooth above with only some sensory setae. Pale yellowish, eyes surrounded by black.

Venter and coxae. Pale yellowish, not contrasting with dorsum. Coxae smooth, with scattered sensilla chaetica. Rows of denticles on prolateral side of coxae I to III and a row at the retrolateral side of coxa IV; prolateral side of coxa IV with a few indistinct denticles, resulting in coxal denticle formula F-F- F- fB (Tab. II). Most denticles are rectangular with a tridentate distal margin. Numbers of coxal denticles in the holotype (coxae I-IV, l/r): 16/14, -/-, 15/8, -/-, 24/23, -/-, 9/12, 19/19. Genital operculum with sensilla chaetica, near the top with a few blunt denticles (Fig. 4C), microsculpture consisting of pointed microgranulae.

Chelicerae. Smooth, pale yellowish, dorsal side of the second segment provided with sensilla chaetica (Fig. 4A). Medially first segment with an irregular row of sensilla chaetica, second segment with extensive field of stout, short sensilla chaetica (Fig. 4A, left).

Pedipalps. Robust, pale yellowish (Fig. 5). On the ventral region of the femur six tubercles occur, medially with an additional indistinct row of four black-tipped denticles, base with a short row of four denticles. The patella has black-tipped denticles. Tibia long and slender, ventrally with few small tubercles. Pedipalpal tarsus almost straight, very slightly curved inwards near the top, ventrally with four small denticles. Tibia and tarsus covered with trichomes. Claw pectinate (Fig. 5C).

Legs. Long and slender (Tab. II; BLI= 3.42 in the holotype), ground colour yellowish-brown, trochanters with dark-brown patch on pro- and postlateral side, extending onto the proximal quarter of femora as longitudinal dark-brown stripes. Tips of femora, patellae and tibiae whitish. Base of femora armed in front and back region with a short row of denticles, most prominent on leg femora I and II. Femora provided with irregular rows of black tipped spines, accompanied by a sensillum chaeticum.

Penis. Long and slender (Fig. 6). Base distinctly robust, wider than alate portion. Truncus base tapering, then continuing almost parallel-sided towards the alae. Intrinsic penial muscle in about the proximal third of the penis. Proalate section short. Alate portion well developed and elongated, almost parallel-sided, consisting of two dorsal and two ventral membranes which are fused in the proximal half section, forming two pockets opening to the exterior distally as well as laterally. Ventral membranes attached to the truncus far distally of the dorsal ones, characteristically curved forming irregular folds proximally. Dorsal membranes attached to the truncus more proximally, 'intersecting' with the ventral membranes (from a ventral or dorsal view) in a characteristic curve, extending on to the ventral side and forming two small wings that partly enclose the ventral membranes (Fig. 6A). Wings with internal field of oval-shaped microgranulae. Glans long and tapering, ventral margin concave (Fig. 6B), distally with two pairs of sensory setae. Stylus robust and short, at its base with a distinct bump, tip terminating in a rounded bulge (Fig. 6G, H). Measurements: penis length 2,60; basal truncus width 0,34; truncus to pockets length 1,51; pockets to glans length 0,73; pockets width 0,30; glans length 0,36.



Fig. 1. Type locality of *Leiobunum incantaturbs* n. sp. Cueva del Nacimiento above La Cueva village, municipality of Vega del Codorno (province of Cuenca, Castilla-La Mancha). Photo: vegadelcodorno.net // **Fig. 1.** Localidad típica de *Leiobunum incantaturbs* n. sp. Cueva del Nacimiento, encima del pueblo de La Cueva, municipio de Vega del Codorno (Cuenca, Castilla-La Mancha). Foto: vegadelcodorno.net

Fig. 2. Loose aggregation of *Leiobunum incantaturbs* n. sp. on the ceiling of the main passage from Cueva del Nacimiento (July 26, 2007). Note the abundance of small flies which probably were part of their diet. // **Fig. 2.** Agregación suelta de *Leiobunum incantaturbs* n. sp. en el techo de la galería principal de la Cueva del Nacimiento (26/07/2007). Nótese la abundancia de pequeñas moscas que probablemente formen parte de su dieta.

Table I. *Leiobunum incantaturbs* n. sp. Mean lengths and ranges of leg femora and legs of males (n=9) and females (n=11).

Legs	I	II	III	IV
		Femur length		
Males	10.9 (10.3-11.6)	17.6 (16.8-18.6)	10.8 (10.2-11.4)	13.6 (10.5-15.1)
Females	9.5 (8.8-10.3)	15.9 (14.9-17.8)	9.5 (9.0-10.4)	12.6 (11.9-14.0)
		Total leg length		
Males	48.7 (46-50)	84.6 (74-93)	52.0 (50-55)	69.6 (66-73)
Females	44.2 (41-53)	77.4 (72-85)	44.9 (40-49)	60.2 (54-65)

Table II. *Leiobunum incantaturbs* n. sp. Mean numbers and range of denticles on the prolateral (F) and retrolateral (B) side of the leg coxae I to IV for males (n = 9) and females (n = 11).

Coxae	I		II		III		IV	
Front/Back	F	B	F	B	F	B	F	B
Male	15.7 (11-20)	–	13.2 (5-25)	–	22.1 (12-28)	–	10.8 (4-30)	18.2 (11-30)
Female	13.5 (9-19)	–	8.6 (3-15)	–	14.9 (3-20)	–	3.7 (0-10)	16.3 (10-20)

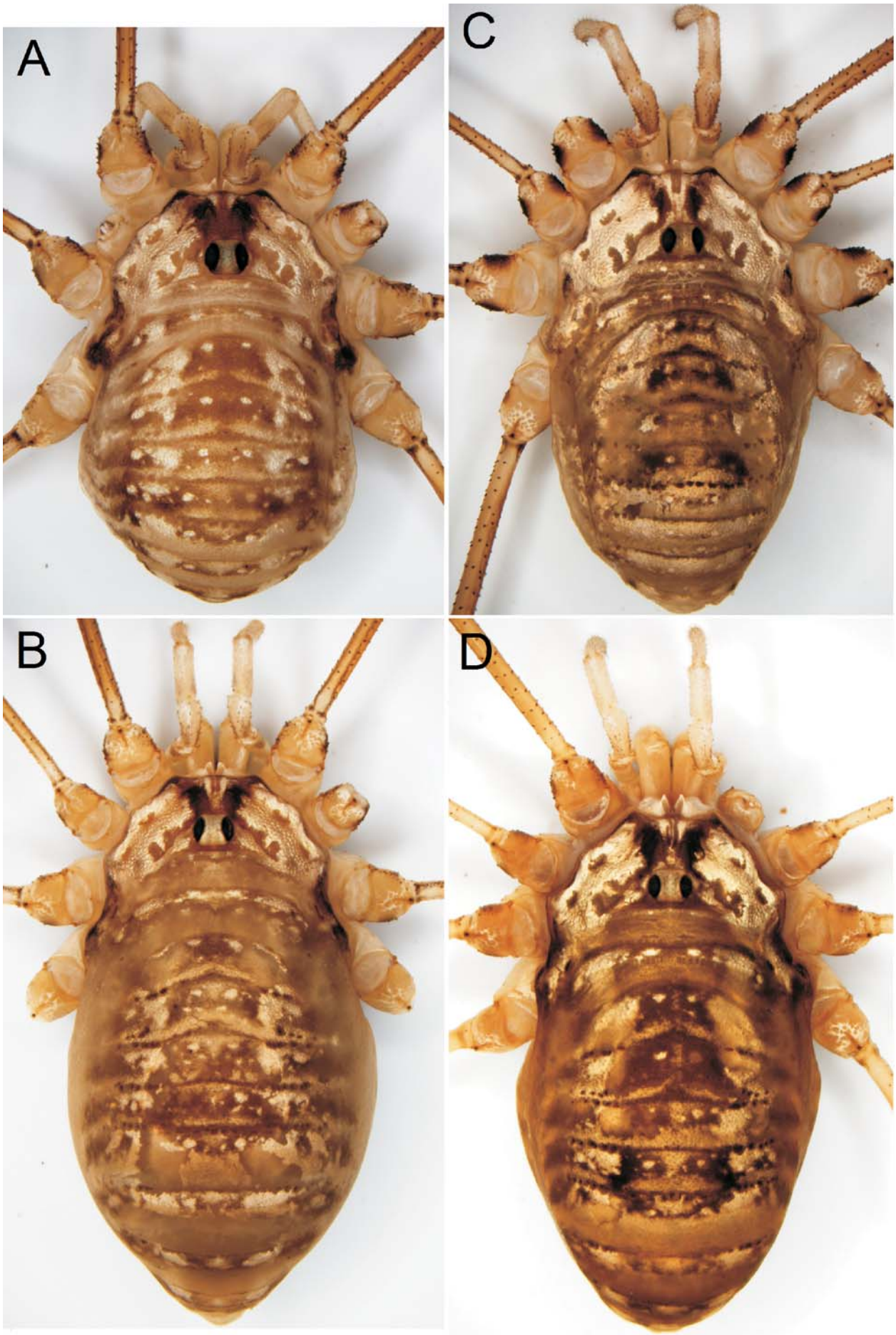


Fig. 3. *Leiobunum incantaturbs* n. sp. A-B, male and female from Tragacete (ZUPV 4707). C, male from Cuevas de Almudén (ZUPV 5151). D, female from Miravete de la Sierra (ZUPV 5152). / **Fig. 3.** *Leiobunum incantaturbs* n. sp. A-B, macho y hembra de Tragacete (ZUPV 4707). C, macho de Cuevas de Almudén (ZUPV 5151). D, hembra de Miravete de la Sierra (ZUPV 5152).

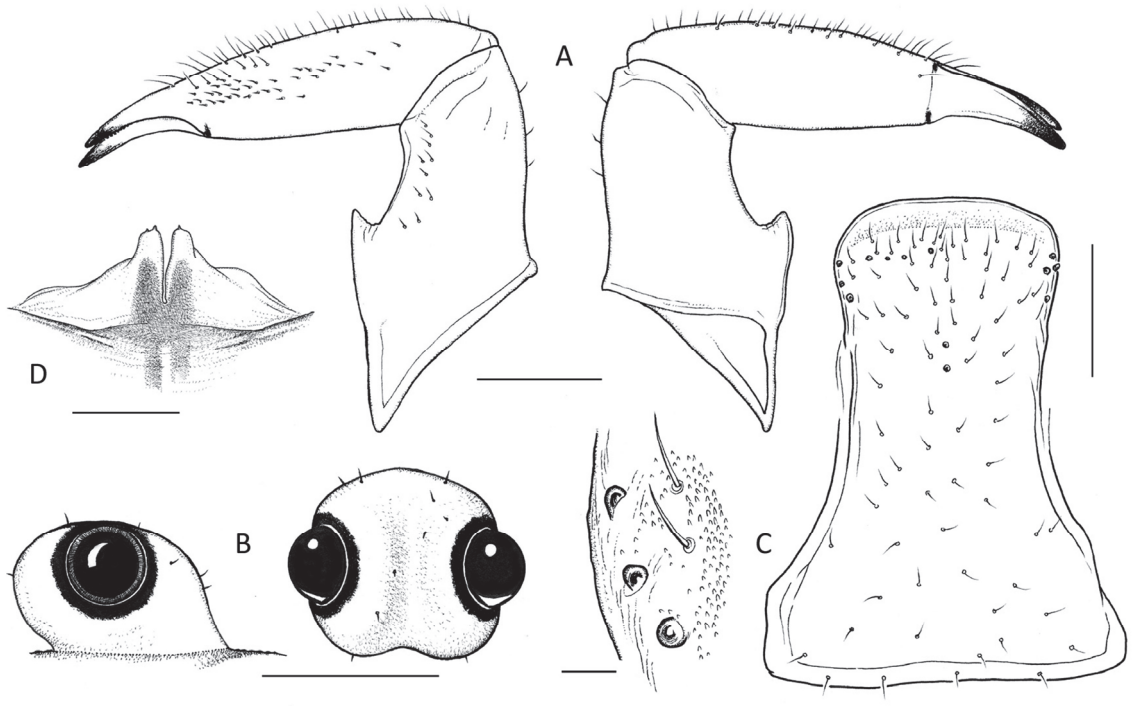


Fig. 4. *Leiobunum incantaturbs* n. sp., male (drawings from specimens from the type locality). A, Right chelicera, left median, right lateral view. B, Eye tubercle, left lateral view (right is front side), right dorsal view (top is front side). C, Genital operculum, left a detail of denticles and microsculpture. D, Supracheliceral lamellae. Scale bars: A-D 0.5 mm, detail of C scale bar 50 µm.
Fig. 4. *Leiobunum incantaturbs* n. sp., macho (figuras de especímenes de la localidad típica). A, Quelícero derecho en vista medial (izquierda) y lateral. B, Oculario, vista lateral (frente hacia la derecha) y dorsal (frente hacia arriba). C, Opérculo genital, con detalle de los dentículos y la microescultura. D, Láminas supraquelicerales. Escalas: A-D, 0.5 mm; detalle de C, 50 µm.

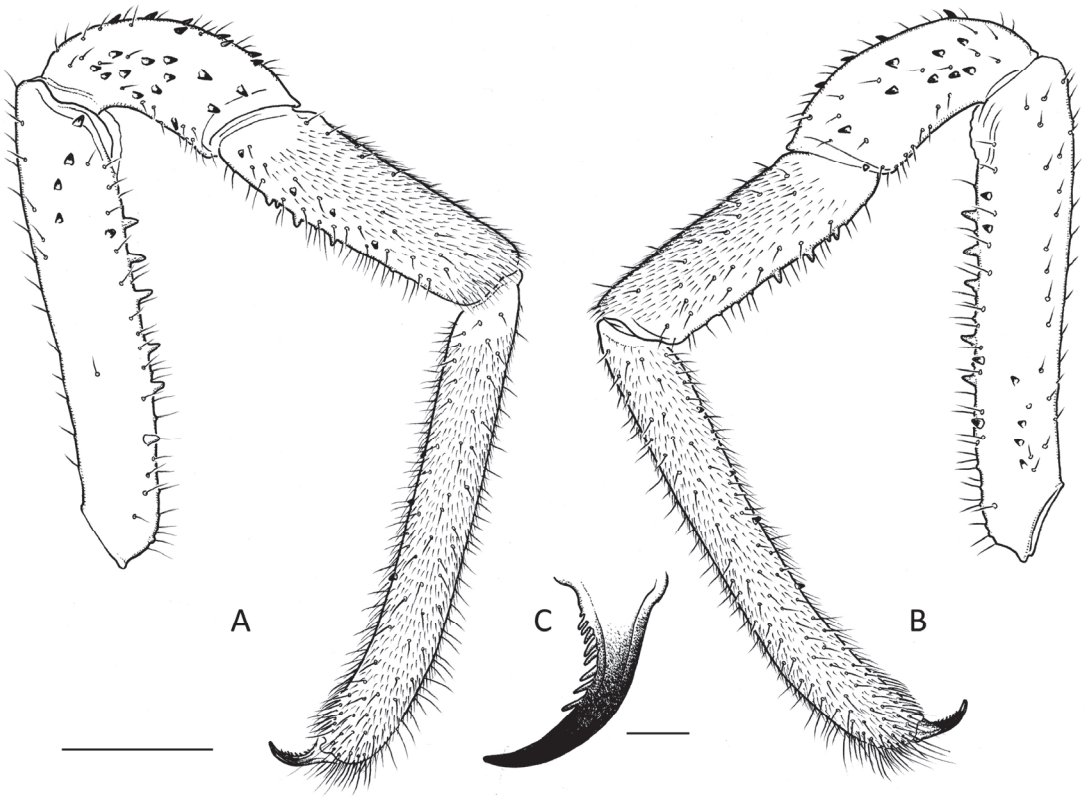


Fig. 5. *Leiobunum incantaturbs* n. sp., male right pedipalp (specimen from the type locality). A, Lateral view. B, Median view. Scale bar 0.5 mm. C. Tarsal claw. Scale bar 50 µm. / **Fig. 5.** *Leiobunum incantaturbs* n. sp., pedipalpo derecho del macho (espécimen de la localidad típica). A, Vista lateral. B, Vista medial. Escala: 0.5 mm. C. Uña del tarso. Escala: 50 µm.

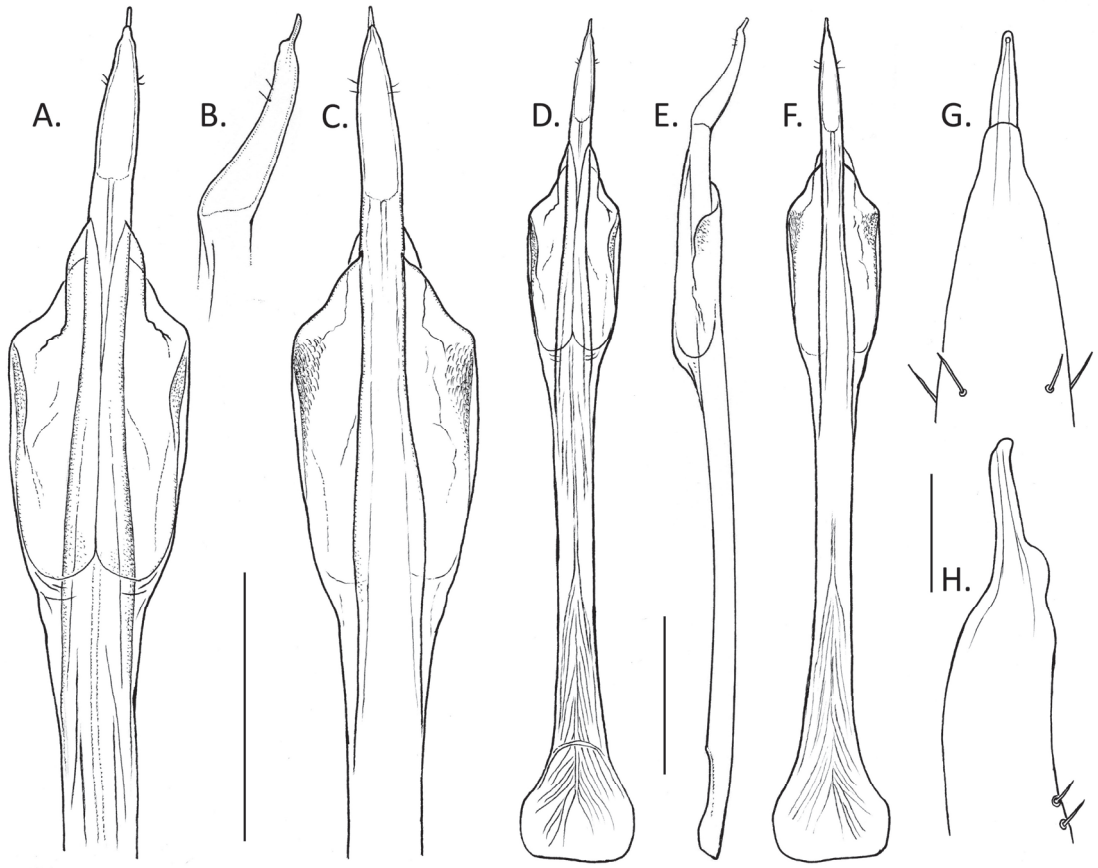


Fig. 6. *Leiobunum incantaturbs* n. sp., penis (specimen from the type locality). A,Ventral view of distal region. B, Lateral view of glans. C, Dorsal view of distal region. D, Ventral view. E, Lateral view. F, Dorsal view. G, Stylus tip, ventral view. H, Stylus tip, lateral view. Scale bars: A-F 0.5 mm; G, H 50 µm. / **Fig. 6.** *Leiobunum incantaturbs* n. sp., pene (espécimen de la localidad típica). A, Vista ventral de la región distal. B, Vista lateral del glande. C, Vista dorsal de la región distal. D, Vista ventral. E, Vista lateral. F, Vista dorsal. G, Punta del estilo, vista ventral. H, Punta del estilo, vista lateral. Escalas: A-F 0.5 mm; G, H 50 µm.



Fig. 7. *Leiobunum incantaturbs* n. sp., female, seminal receptacles (specimen from the type locality). Scale bar 50 µm. / **Fig. 7.** *Leiobunum incantaturbs* n. sp., hembra, receptáculos seminales (espécimen de la localidad típica). Escala: 50 µm.

Female (Fig. 3 B, D). Body length 4.5-8.2, prosoma width 2.8-3.3, opisthosoma width 3.7-4.8, BLI 3.0-3.3. Colouration of the dorsum very similar as in the male. Females have weaker denticle rows than males. The prolateral row of coxa I and the postlateral row of coxa IV are distinct, while other rows can be weak or absent, resulting in female coxal denticle formula F- f- f- f'B.

Legs. Long and slender (Tab. II), armature of spines less pronounced as in the male.

Seminal receptacles (Fig. 7). The seminal receptacles are located in the sixth ovipositor segment.

ETYMOLOGY. The specific epithet 'incantaturbs' is a Latinized composed noun (in nominative) based on one of the finding places, La Ciudad Encantada, meaning The Enchanted City (incantatum = enchanted; urbs = city, town). La Ciudad Encantada is a famous geological site near the city of Cuenca, consisting of characteristic karst formations, which date back to the Cretaceous.

DISTRIBUTION (Fig. 8): The new species has been found in the southern half of the so-called Iberian System (Sistema Iberica), which is separated from the northern half by the valleys of the rivers Jalón (Ebro tributary) and Henares (Tajo tributary). The southern Iberian System comprises three main sierras, Montes Universales / Serranía de Cuenca (1935 m and 1866 m) at the west and Sierra de Gúdar (2024 m) and Sierra de Javalambre (2020 m) at the east. At present, *Leiobunum incantaturbs* n. sp. has been found in the Serranía de Cuenca

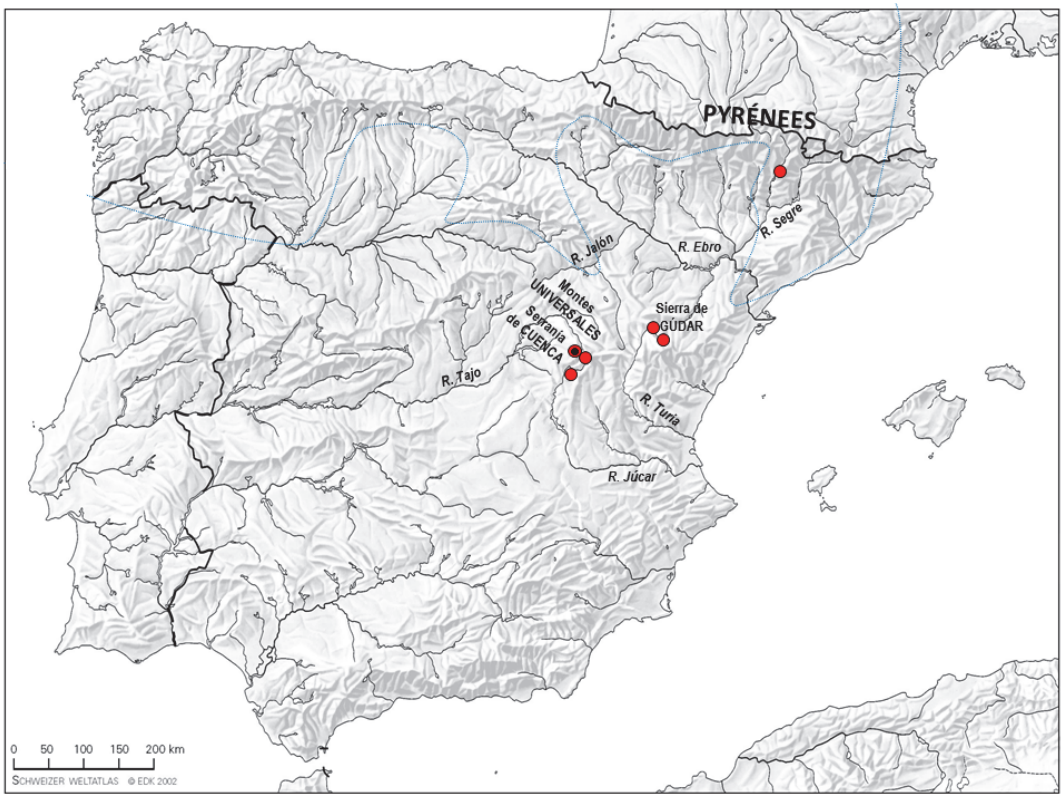


Fig. 8. *Leiobunum incantaturbs* n. sp. geographical distribution. Note that the Pyrenean locality of *L. incantaturbs* is within the range of *L. rotundum* (the dotted line shows its known southern distributional range, according to data summarized in Prieto & Fernández 2007). *L. rotundum* occupies also the northern part of the Iberian System, reaching the Monasterio de Piedra, just south of the Jalón river. / **Fig. 8.** *Leiobunum incantaturbs* n. sp. Distribución geográfica. Nótese que la localidad pirenaica de *L. incantaturbs* está dentro del área conocida de *L. rotundum* (la línea de puntos indica su límite meridional, según los datos recogidos en Prieto & Fernández 2007). *L. rotundum* ocupa también la parte septentrional del Sistema Ibérico, alcanzando el Monasterio de Piedra, justo al sur del río Jalón.

(three localities in the province of Cuenca, including the type locality) and in the Sierra de Gúdar (two localities in the province of Teruel), which lies a hundred km east from the type locality. Two records from Cuenca (but not the type locality) are located in the Parque Natural de la Serranía de Cuenca.

Moreover, two specimens from a river canyon in the northeastern part of the province of Lleida are also considered conspecific, but not paratypical, because the Congost de Collegats is more than 300km northeast of the type locality, separated by the wide Ebro river basin; also there is a notable altitudinal difference (1210-1430 m a.s.l. versus the Pyrenean records at 575 m a.s.l.).

HABITAT: Most specimens of *L. incantaturbs* n. sp. are collected from walls and ceilings of caves and under bridges (Fig. 1, 2). It is expected they group together in these sheltered spaces during day time to prevent desiccation and as a protection against direct sunlight. Many other Iberian *Leiobunum* species can be found at similar locations (unpublished personal observations). In the type locality small aggregations were recorded at the ceiling and the gallery walls of the large cave and its entrance.

PHENOLOGY: Adults and subadults have been collected end of July, adult specimens in the beginning of August, suggesting that *L. incantaturbs* n. sp. matures in late summer. It probably has a phenology common to many Central-European and Mediterranean *Leiobunum* species, with reproducing populations from late summer till late autumn or early winter.

DISCUSSION: *Leiobunum incantaturbs* is clearly defined by its penial morphology, in combination with the dorsal colour pattern and the configuration of the coxal denticles rows. Moreover, it is quite a large species, being averagely somewhat larger than *Leiobunum defectivum*, the largest Iberian *Leiobunum* so far, with legs I-IV reaching 50, 88, 53 and 69 mm (Prieto & Fernández, 2007). The absence of denticles on coxae I to III suggests that it is not belonging to the species-rich '*rotundum*-group' having formula FB FB F-FB with Iberian representatives: *L. argentipalpe*, *L. defectivum*, *L. lusitanicum*, and *L. rotundum* and North-African species *L. biseriatum* Roewer, 1910, *L. coccineum* Simon, 1878 and *L. cupreum* Simon, 1878 (Prieto & Fernández, 2007). Although till now few molecular data have been published on European Leiobuninae (Hedin *et al*., 2012), the provisional classification of the mentioned species of the '*rotundum*-group' as a natural group of closely related species may turn out to be justified since there are also clear similarities in penial morphology and some secondary characters (postlateral denticle row coxa III lacking; male mostly with uniform dorsal colouration, female more contrasting; pedipalp, chelicera and genital operculum only slightly sexually dimorphic).

The penial morphology of *L. incantaturbs* neither seems to be related to the Iberian *L. granulosum* and *L. levantinum* with which species it does share a similar coxal denticles

arrangement. In this respect the new species seems to stand somewhat apart from other known Iberian taxa. From this it is obvious that the European Leiobuninae should be thoroughly revised based on molecular analyses. This is also clearly demonstrated by a recent morphological revision of the four species belonging to the *Leiobunum rupestre* species group (Martens & Schönhofer, 2016).

The distribution of *L. incantaturbs* n. sp. can be characterized as northeastern Iberian, occurring in the adjacent provinces of Cuenca (Castilla-La Mancha) and Teruel (Aragon). However, the harvestman fauna of the southern part of the Iberian System is very poorly known: within the distributional range of *L. incantaturbs* n. sp. in Cuenca no other records of any *Leiobunum* species have been published (Prieto & Fernández, 2007) and from the province of Teruel no more than two records of *Leiobunum blackwalli* (Rambla, 1998) are documented.

In respect to the odd record in the Spanish Pyrenees (Congost de Collegats, CJM 2647) far distant from the two nuclei in the southern part of the Iberian System, we face a similar paucity of records. There have been reported some findings of *Leiobunum 'biseriatum'* from nearby localities (Roewer 1925) which may refer to our new species. Possibly, *L. incantaturbs* n. sp. is wide-spread in north-eastern mountainous regions of Spain. Yet, because of the limited number of records from the intermediate region, a basin with xeric conditions between the Iberian and Pyrenean chains, this remains to be confirmed.

Acknowledgements

The Basque Government through the Research group on 'Systematics, Biogeography and Population Dynamics' (IT575-13) and the Spanish Ministerio de Ciencia e Innovación (Ref.CGL2008-01131/BOS) have funded the sampling for this work. HW expresses his sincere gratitude towards the Uyttenboogaart-Eliasen Stichting for awarding him with a grant (SUB.2012.05.04) to visit CP at the Basque University in Bilbao as part of a collecting expedition to Morocco and Spain. Jochen Martens kindly provided specimens from his collection.

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