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THREE NEW SPECIES OF GNAPHOSIDAE (ARACHNIDA, ARANEAE) COLLECTED IN IBERIAN PENINSULA

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Abstract: This work is placed in the context of a study of arachnofauna associated with the olive groves, located in the district of Beja (South Alentejo, Portugal), using pitfall traps for edaphic specimens. *Haplodrassus ibericus* n. sp., *Zelotes cornipalpus* n. sp. and *Zelotes wallacei* n. sp. are proposed as new species for science and are therefore described for the first time. Illustrations of the genitalia are provided.
Key words: Gnaphosidae, *Haplodrassus*, *Zelotes*, Taxonomy, Iberian Peninsula.

Tres nuevas especies de Gnaphosidae (Arachnida, Araneae) colectadas en la Península Ibérica
Resumen: Este trabajo se sitúa en el contexto de un estudio de aracnofauna asociada con los olivares situados en el distrito de Beja (sur de Alentejo, Portugal), usando trampas de caída para las muestras edáficas. *Haplodrassus ibericus* n. sp., *Zelotes cornipalpus* n. sp. y *Zelotes wallacei* n. sp. se proponen como nuevas especies para la ciencia y, por tanto, se describen por primera vez. Se incluyen ilustraciones de las genitalia.
Palabras clave: Gnaphosidae, *Haplodrassus*, *Zelotes*, Taxonomía, Península Ibérica.

Taxonomy / Taxonomía: *Haplodrassus ibericus* **n. sp.**, *Zelotes cornipalpus* **n. sp.** y *Zelotes wallacei* **n. sp.**

Introduction

The Iberian fauna, especially that one occurring in the southern part, is considerably different from the one that is found in Central Europe. However, it has been less studied and underestimated within general databases, such as "*Spiders of Europe*" (Nentwig *et al*., 2015). In recent decades there has been a substantial increase of taxonomic and faunistic contributions to the Iberian arachnological knowledge (see Cardoso & Morano, 2010; Morano *et al*., 2014).

However, those previous studies have significantly increased the number of recorded species in the Iberian checklist and catalogue and highlight the need for a correct characterization and a deep examination of the Mediterranean taxa.

Among spiders, the genus *Zelotes* Gistel, 1848 is one that entails a greater difficulty for specific identification. This is due to the fact that there is a considerable lack of faunistic studies in many geographical areas, among which the Iberian Peninsula is included. Furthermore, this group of spiders is apparently experiencing a full taxonomic reorganization process because the genus *Zelotes* has been divided into several genera such as *Setaphis* Simon, 1893*, Trachyzelotes* Lohmander, 1944*, Zelominor* Snazell & Murphy, 1997*, Drassyllus* Chamberlin, 1922*, Urozelotes* Mello-Leitao, 1938 and more recently *Heser* Tuneva, 2005 and *Civizelotes* Senglet, 2012 (we mention only those that have Iberian representation). They all share the basic zelotine criteria of having metatarsal combs in their posterior metatarsi, but on the other hand, they present a series of other characters which clearly place them into other distinct genera (see Murphy, 2007 for full review on the matter). The most recent works of Senglet (2004, 2011 and 2012), Wunderlich (2011) and Melic (2014) solve somehow the limited knowledge concerning this group in the Iberian fauna, but more research needs to be done. Two new species of *Zelotes* are described in this paper.

Haplodrassus Chamberlin, 1922 is a Holarctic genus with about a dozen species in Central Europe (Grimm, 1985) and Israel (Levy, 2004) and more than 20 species in the territories of the former Soviet Union. Kovblyuk *et al*. (2012) carried out the most recent revision of the genus concerning Crimea and adjacent areas. The Iberian Peninsula has nine recorded species (Cardoso & Morano, 2010), but the genus has not been studied in depth. In this paper a new species of *Haplodrassus* is described.

Material and methods

The studied material has been obtained partly from the project PTDC/AGR-PRO/111123/2009 ("*The use of biological indicators as tools for assessing the impact of agricultural practices in sustainability of olive grove*"). This study was conducted in eight olive groves located in the district of Beja (South Alentejo, Portugal) during 2011 and 2012. Also, in this work complementary samples are included from other sources within the Iberian Peninsula belonging to the A. Melic collection, as detailed below.

In each olive grove both the tree canopy and soil arthropodofauna were sampled along the two years of study. The soil fauna was obtained using pitfall traps. A total of 16 traps were placed in each grove. All captured individuals

were sorted, counted using a binocular stereomicroscope and preserved in ethanol 70%.

The first identification of the samples took place in the laboratory of Zoology, Autonomous University of Barcelona, using the classical techniques: binocular optics 40 to 80X by Leica Wild-M10 and Leica Wild-M12 and KIOWA Optical SDFZ-TR-PL with cool lighting. The illustrations of the new species were carried out by the procedure described in Melic (2005) using the software Corel Draw X3 (v13) and a Nikon E995 camera. The morphology description for *Haplodrassus* followed Kovblyuk *et al*. (2012) and in the case of *Zelotes* we followed Senglet (2004).

Abbreviations: d: dorsal, p: prolateral, r: retrolateral v: ventral. AME: anterior median eyes; ALE: anterior lateral eyes; PME: posterior median eyes; PLE: posterior lateral eyes. MNCN: Museo Nacional de Ciencias Naturales de Madrid (Spain).

All measurements are given in mm.

Results and discussion

In our study in olive groves, Gnaphosidae is the family that contributed with the highest number of faunistic and taxonomic novelties. Two new species to science of the genus *Zelotes* Gistel, 1848 are described as well as a new species of the genus *Haplodrassus* Chamberlin, 1922.

***Haplodrassus ibericus* Melic, Silva & Barrientos n. sp.**
H. macellinus (Thorell, 1871): Silva, 2013 (misidentification)
Figure 1a-g.

TYPE MATERIAL: Holotype: 1 ♂ olive groves, Póvoa de São Miguel, Beja, Alentejo, Portugal, 38°12'56.883"N, 7º18'53.748"W, 10/XI/2011, A. Silva leg., deposited in MNCN, Registration Number 20.02/17357.
Paratypes: 1 ♂ (it lacks the opisthosoma), same capture data as the holotype, A. Melic coll.; 1 ♀ olive groves, Moura, Beja, Alentejo, Portugal, 38º8'11.0322"N, 7º29'7.116"W, 26/IV/2012, A. Silva leg., Registration Number MNCN 20.02/17358; 1 ♀, Laguna Costera del Mar Menor, Murcia, Spain, 16/IV/1992, J. Miñano leg. Registration Number MNCN 20.02/17359; 6 ♀, same capture data as the previous ♀, A. Melic coll.

COMPARATIVE MATERIAL: *Haplodrassus deserticola* Schmidt & Krause, 1996: 2♂, 1♀, Fuerteventura, Canary Islands, Spain, IV/1999, J. Wunderlich leg., *Haplodrassus macellinus* (Thorell, 1871): 1♂, 2♀, Parque Natural do Vale do Guadiana, Pomarão, Portugal, 120 m. 19-22/V/2006, Pedro Cardoso leg., Zoological Museum of Copenhagen (Denmark) coll.; *Haplodrassus macellinus hebes* (O.P. Cambridge, 1874), Toledo, Spain, 20/VI/1936, M. San Miguel leg., J.A. Pérez det., Registration number MNCN 20.02/12565 Madrid; *Haplodrassus invalidus* (O.P. Cambridge, 1872): 1♂, 1♀, Retuerta de Bullaque, Ciudad Real, Spain, 26/VI/2003, J. Barriga leg.; *Haplodrassus minor* (O.P. Cambridge, 1879): 1♂, 1♀, Retuerta de Bullaque, Ciudad Real, Spain, 30/V/2003 EASY project. Unless otherwise indicated, all specimens in A. Melic coll.

ETYMOLOGY: The specific epithet refers to the known distribution of the new species, the Iberian Peninsula.

DESCRIPTION: Color: Male. Prosoma light brown, darker and reddish in the cephalic region; chelicerae very sclerotized, intense reddish brown; sternum lighter brown, with slightly darker mouthparts. Opisthosoma light gray, without marks, with a weak tuft of dark setae on the anterior dorsal part. Legs brown pale, homogenous and uniform. Palps light colored except the tibial apophysis, dark and black beaded, and the tarsus, dark colored, especially in its basal half. Bulb dark brown, almost black with very sclerotized parts. Female similar to male, but much more uniform and less dark.

Male measurements: firstly the measurements of holotype followed by paratype (if applicable) are indicated. Prosoma: length: 1.65/1.45; Maximum width: 1.30/1.15; Opisthosoma: 1.75; Overall length: 3.65. Female measurements (two paratypes, the smaller and the bigger one): prosoma length: 1.55/1.7; Maximum width: 1.15/1.5; Opisthosoma: 1.45/2.6; Overall length: 3.2/4.5. Leg lengths (two males): I: 3.4/3.9, II: 3.1/3.7, III: 2.85/3.25; IV: 4.45/5.05. Females (two): I: 3.5/4.45, II: 3.05/3.8, III: 2.95/3.35, IV: 4.55/5.0. Male palp measurements: femur 0.65/0.6; Patella: 0.25/0.20; Tibia: 0.25/0.20; Tarsus: 0.6/0.55.

Eyes and interocular distances (holotype ♂): AME separated by their diameter (0.09), ALE by 0.02; PME separated from each other by half of their diameter (0.05) and from PLE by 0.07. PME are the largest (0.10); the remaining are of similar, smaller size (0.09). The quadrangle formed by the four median eyes has an anterior width of 0.28, similar to the posterior, and barely less than the length of 0.30.

Labium slightly wider (0.35) than long (0.32). Male chelicerae with some very sclerotized granules or teeth on the inner central area and a small bump in the longitudinal interior half. In dorsal view, the bump presents two or three teeth or processes. In ventral view, retromargin with two clearly visible teeth, medium sized in relation to the others. Promargin with three teeth, the central larger than the other ones and dark; the other two, small sized, one very close to the central one. Inside and beyond the promargin, other dispersed small teeth are present. Unlike males, the female chelicerae do not present dorsal teeth or protrusions, except for some thick bristles.

Leg spination: In general this species manifest a loss of spines when compared with the indicated by Platnick & Shadab (1975). The spinulation is constant in both legs of the holotype and, when appropriate, paratypes: (♂♀) femur I, II and III, without prolateral spines; femur III without retrolateral spine; (♀) femur II: d100; femur IV without retrolateral spine; (♂) tibia III: v212; tibia IV: v212, r101; (♀) tibia III: p110; (♂♀) metatarsus IV, p012, v202; (♂) metatarsus IV: r102; (♀): r012.

Male palp (fig. 1a-e): Bulb relatively large, with many sclerites exceeding the alveolus. Terminal apophysis evident especially in ventral view, very distinctive and different from other species. It is almost straight on its outer side, with a small central notch; in the internal side there is a central rounded expansion narrowing progressively to form the end of the process, a pointed oblique ridge. Terminal apophysis height exceeds the embolus, which is not usual within the genus. Embolus, dark and sclerotized, ends in a large part, less sclerotized and with a small terminal fold. It presents a projection or wide embolar tooth in the upper third. Median apophysis elongated and pointed at its end, forming a large curvature and clearly visible because of its great size and position, well separated from the bulb. Tibial apophysis appears highly displaced, slightly wider at its base, beaded and only slightly truncated on the half interior top (fig. 1e).

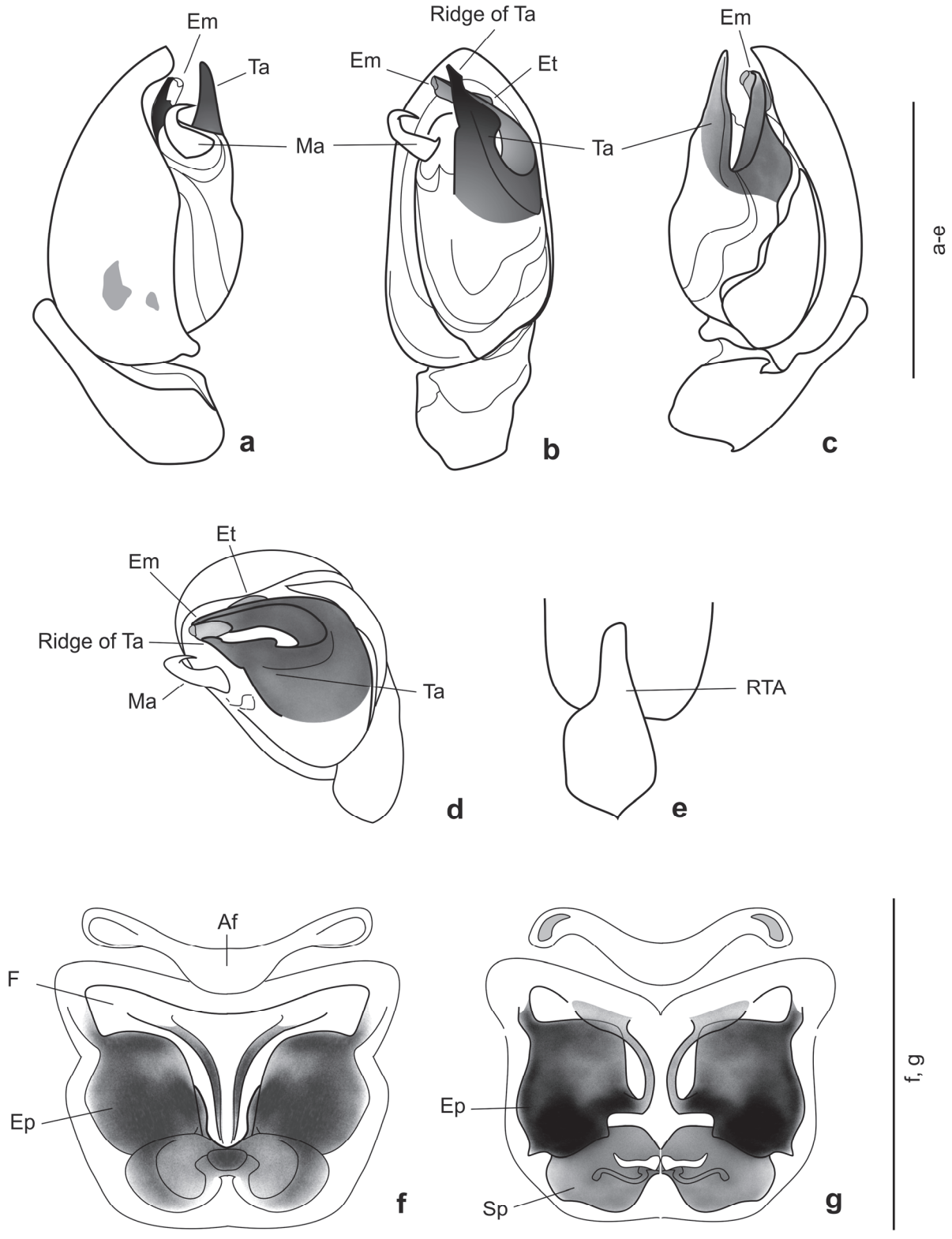


Figure 1. *Haplodrassus ibericus* n. sp. a-e) Male palp: a) retrolateral view; b) ventral view; c) prolateral view; d) apical-ventral view; e) Tibial apophysis, dorsal view; f-g) Female, epigyne: f) ventral view; g) dorsal view (vulva). Scale (a-c, f-g): 0.5 mm. Abbreviations: **Af**: anterior fold; **Em** embolus; **Ep**: epigynal pocket; **Et**: embolar tooth; **F**: epigynal fovea; **Ma**: median apophysis; **RTA**: retrolateral tibial apophysis; **Sp**: Spermatheca; **Ta**: terminal apophysis.

Female (fig. 1f-g): epigyne almost square shaped, slightly wider than long and composed of a set of structures of very compact appearance. In all specimens examined, the presence of waxy substances (as a genital plug) usually hinders the view of some of these sclerites, for this reason it is necessary to remove them previously. Epigynal anterior fold thick and membranous. Epigynal fovea wide on its anterior side and sharply narrowed at its posterior ending. Epigynal pockets wide and sub-square shaped, occupying most of epigyne. Spermathecae squashed and light colored.

DIAGNOSIS: Male: The small size of the species, the singular elongated and pointed shape of the terminal apophysis, the embolus with tooth, together with the shape of the tibial apophysis, can separate this species from other related species.

Haplodrassus ibericus can be distinguished from *H. invalidus* and *H. macellinus* by the presence of a much more rounded and angled terminal apophysis at its top end. In both cases the terminal apophysis forms an angle of about 135° and its tip has just pointy shape. *H. minor* and *H. deserticola* present terminal apophyses relatively narrow and elongated, but never curved and pointed. Two newly described species of Israel by Levy present some apparent similarities: *H. mediterraneus* Levy, 2004 shares the embolar tooth and the pointed shape of the terminal apophysis, although this does not exceed the height of the embolus, but the tibial apophysis is clearly different and as the size of the species, much greater in the latter (Levy, 2004: fig. 66-67; Seyyar, 2011: fig. 1-4). *H. atarot* Levy, 2004 is somehow similar but smaller, especially in the form of the embolus and its expansion at the top of it, but both the terminal apophysis (leaf-shaped and clearly curved at its end) and the tibial apophysis (concave at its distal margin), allow to separating them easily (Levy, 2004: fig. 74-75).

Female: The almost squared epigynal shape, the short distance between material fold and the rest of structures and the shape of the membranous fovea allows to separate this species from other *Haplodrassus*. The closest species is the afore mentioned *H. mediterraneus* of Israel, but the central epigynal fovea is much less marked and considerably wider, and the epigyne presents a wide gap between the pockets and the anterior hood (Levy, 2004: fig. 68-69; Seyyar, 2011: fig. 5-6).

DISTRIBUTION: Only known from the southern half of the Iberian Peninsula.

NATURAL HISTORY: The females have been collected in the two different locations in April, in altitude close to the sea level.

***Zelotes cornipalpus* Melic, Silva & Barrientos n. sp.**
Figure 2a-e.

TYPE MATERIAL: Holotype: 1 ♂ Guadiamar River Basin, Seville, Spain, 19/XI/2004, Gloria Luque leg. Deposited in MNCN, Registration Number 20.02/17353.
Paratype: 1 ♂, olive groves, Póvoa de São Miguel, Serpa, Beja, Alentejo, Portugal, 38°12'56.883"N,7°18'53.748"W, 29/X/2012, A. Silva leg., A. Melic. coll.

ADDITIONAL MATERIAL: 1♀ in poor conditions (not designated paratype). Moura, Beja, Alentejo, Portugal, 38º8'11.0322"N, 7º29'7.116"W, 5/VI/2011, A. Silva leg., A. Melic coll.

ETYMOLOGY: The specific epithet *cornipalpus* refers to out growths in the male palps that look like two horns. Noun in apposition, invariable.

DESCRIPTION: Male. Coloration: Prosoma and opisthosoma dark, reddish brown. Legs dark except metatarsus I and II and all tarsi, which are of much lighter color.

Measurements (first those of the holotype followed by paratype): Prosoma: Length: 2.3/1.8; Width: 1.7/1.5. Opisthosoma: 2.9/2.5. Total length: 5.3/4.4. Legs: I: 5.53/4.4; II: 4.80/3.6; III: 4.26/3.2; IV: 6.6/5.1.

The AME are rounded, very small (0.04), separated by a similar distance (0.04), touching the ALE which are the biggest ones (0.11), oval, oblique; all of them form a recurved line, which follows the straight line formed by the posterior eyes, all oblique and oval. The PME eyes are slightly bigger than the PLE (0.09 and 0.07, respectively), separated from each other and from themselves by a distance of 0.02. The quadrangle formed by the median eyes has an anterior width of 0.13, a posterior width of 0.20 and a length of 0.21.

Scutum clearly present, occupying about 40% of the opisthosoma length.

Chelicerae: with three teeth on the promargin and one more tooth, very small, on the retromargin.

Legs (spination): there are two differences from the genus spinulation described in Platnick & Shadab (1983), the holotype metatarsus II presents ventral spines v220 and the paratype presents v210. The femur IV presents a formula p001 in their prolateral spines. The tarsi are scopulated. Metatarsus I and II are scopulated in their basal half.

Palp (fig. 2a-c): With two large embolar lateral processes very sclerotized, dark, horn-shaped; the first, prolateral, conical; the second, thicker and wide at the base, with a projection, directed upward, curving in the upper half in retrolateral direction forming a crescent; in retrolateral view (fig. 2c) the embolar base is visible laterally because the cymbium presents a great slit. The retrolateral tibial apophysis reaches a quarter of the tarsus and is moderately curved in its basal half, from which it curves sharply outward tapering abruptly at its distal end and finishing to a very small upwardly directed tip.

Female: It presents a clearer and more homogeneous color than the male. Measurements: Prosoma: Length: 2.5; Width: 2.0. Opisthosoma: Length: 3.28. Total length: 6.58. Legs: I: 6.5; II: 5.9; III: 5.5; IV: missing in the individual. Legs (spination): metatarsus I, having no ventral spines and the tibia III, presenting p122 and r111. The rest as described in Platnick & Shadab (1983).

Epigyne (fig. 2d-e) of rectangular shape, 20% longer than wide. Anterior margin with long central extensions. Epigynal plate, which occupies more than half the length of the epigyne (fig. 2d), narrow at the top and rounded and slightly widened at basal part. Vulva with wide and rounded side pouches with anterior thin pointy and slightly divergent protrusions. Spermathecae small, rounded.

DIAGNOSIS: The male of this species is easily identified by its peculiar bulb, in which two formations stand out clearly projected forward and prolaterally, looking like horns. Only a few species have a slightly similar appearance: *Zelotes olympi* (Kulczynski, 1903) and *Zelotes talpinus* (L. Koch, 1872) present ventrally a terminal protruding apophysis, while the new species has a double embolar processes in prolateral and upwardly, respectively (see Kovblyuk, 2005: fig. 2.3 and 3.3, and Chatzaki, 2010: fig. 32 and 34). *Zelotes petrensis* (C.L. Koch, 1839) differs by having a more compact globose bulb, with comparatively smaller processes. The retrolateral tibial apophysis is long and straight, while the new species is short and curved.

Females can be identified by the combination of the anterior margin, the long and narrow epigynal plate and the lateral pouches. Its shape could be misidentified as *Zelotes laetus* (O.P. Cambridge, 1872), a species that has a very wide, almost cosmopolitan distribution (World Spider Catalogue, 2015). However, in *Z. laetus* the anterior margin of

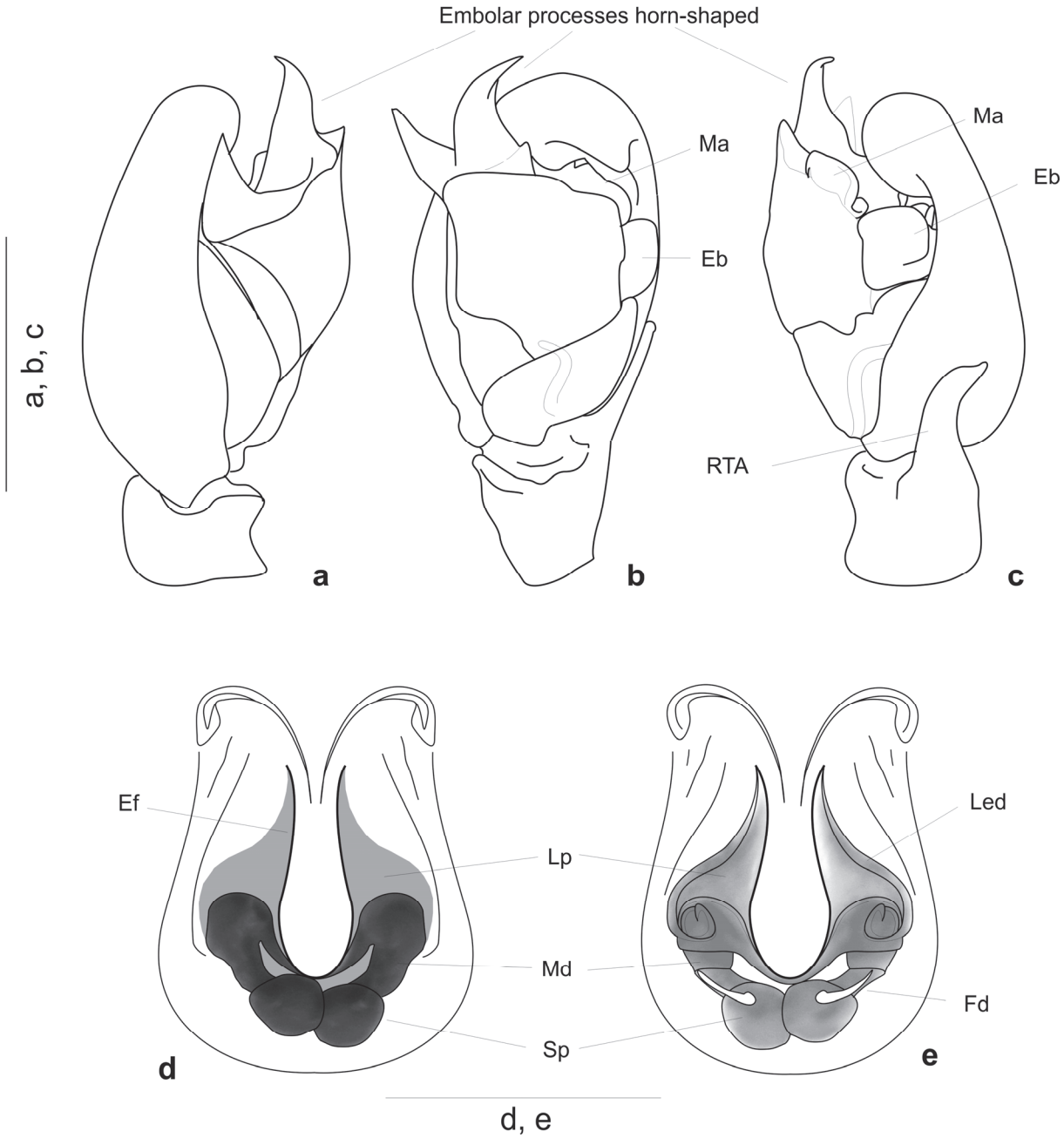


Figure 2. *Zelotes cornipalpus* n. sp. a-c) Male palp: a) prolateral view; b) ventral view; c) retrolateral view. d-e) Epigyne: d) ventral view; e) dorsal view (vulva). Scale: 0.5 mm. Abbreviations: **Eb:** Embolar base; **Ef**: Epigynal fold; **Fd**: Fertilization duct; **Led**: Lateral epigynal duct; **Lp**: Lateral pouch; **Ma**: median apophysis; **Md**: Median duct; **RTA**: retrolateral tibial apophysis; **Sp**: Spermatheca.

the epigyne forms a concave flattened curve and the details of the vulva are very different from the here described species (Platnick & Shadab, 1983: fig. 257-258; Levy, 1998: fig. 60-61)

DISTRIBUTION: Only known in the southern Iberian Peninsula.

NATURAL HISTORY: Adult males are present in the last months of the year (November and December). Given their characteristic appearance, which makes it difficult to confuse with any other species of the genus, it should be a relatively rare species.

***Zelotes wallacei* Melic, Silva & Barrientos n. sp.**
Figure 3a-d.
Zelotes sp. 4: Cárdenas & Barrientos, 2011.

TYPE MATERIAL: Holotype: 1 ♂, olive grove, Nossa Senhora das Neves, Beja, Portugal, 38°0'28.0836"N, 7°47'24.324"W, 8/VI/2011, A. Silva leg., deposited in MNCN, Registration Number 20.02/17354.
Paratype: 1 ♂ Cortijo of Cajil, Albolote, Granada, Spain, 37º20'54.0"N, 3º39'29.6", V-VI/2003, M. Cárdenas leg., A. Melic coll. (sub *Zelotes* sp. 4 in Cárdenas & Barrientos, 2011).

ADDITIONAL MATERIAL: 2♂ from the same locality and date as the holotype. Both specimens dried out, thus, they were not taken into account in the measurement. Deposited in J.A. Barrientos coll.

ETYMOLOGY: The specific epithet *wallacei* refers to the famous naturalist, explorer, geographer and anthropologist Alfred Russel Wallace (1823-1913), co-discoverer of the theory of evolution by natural selection, and during the preparation of this manuscript is the 100th anniversary of his death.

DESCRIPTION: Male. Coloration: Prosoma: reddish brown, darker on the head region; opisthosoma dark gray, with short, dark and spaced setae. Legs reddish brown, with all femurs, tibias and metatarsi III and IV, darkened. Palp dark brown, almost black in the basal edge of the cymbium. Tarsal tibia and tibial apophyses almost black.

Measurements (first those of the holotype followed by paratype): Prosoma: length: 2.75/2.40; Width: 2.15/1.85. Opisthosoma: 3.4/3.20. Total length: 7.10/6.50. Legs: I: 6.95/6.35; II: 6.05/5.65; III: 5.30/4.85; IV: 7.10/6.38.

Eyes and interocular distance (holotype): The anterior eyes are similar in size (0.08), rounded, and the AME and ALE very close to each others. The AME are separated by a distance similar to its diameter (0.08). The PLE are the largest (0.13), followed by the PME (0.10), with which they form a barely recurve line (almost straight). All the eyes are oval, rather rounded. The quadrangle formed by the median eyes has an anterior width of 0.23, a posterior width of 0.28 and a length of 0.18.

Scutum clearly present, occupying approximately 40% of the opisthosoma length.

Chelicerae: four teeth on the promargin, two of them (the central ones) relatively large and wide, and three small teeth on the retromargin. The paratype presents only three and two teeth respectively. The cheliceral fang is long and very dark.

Legs spination: This species differs markedly from the pattern within the genus (Platnick & Shadab, 1983). The tibia I and II present ventral spinulation; tibia III: d1-0-0, r1-1-1; femur IV: r0-0-1; patella IV: r0-1-0; tibia IV: d1-0-0, p2-1-1 and r2-1-1 and only in the metatarsus IV there are some differences between the holotype and paratype: v2-2-1 and v2-2-2 respectively, In general, the result is a greater number of spines compared to the pattern.

Palp (fig. 3a-d) Small palp, almost occupied by the bulb. The latter has sclerotized aspect and several glossy black pieces. In ventral view, the median apophysis emerges clearly (fig. 3b), in the distal top, ending in a sharp edge, like a black keel. In the middle, the terminal apophysis ends pointed. Embolus rotates outwards transversely behind the apophysis, leaving its end hidden, only visible in dorsal view (fig. 3d). The tibial apophysis is observed in retrolateral view (fig. 3c); small, wide and short, reaching only 20% at most of the palp length, dull at its distal end and very dark, almost black at the end.

DIAGNOSIS: The prominent position and shape of the median apophysis, laterally emerging of the bulb, with the position and shape of the embolus rotating transversely behind the terminal apophysis, can separate this species from other known in the Iberian Peninsula and nearby geographic areas. Although not usually a character used in the diagnosis of the group, legs spination of this species is peculiar.

DISTRIBUTION: Only known from the southern Iberian Peninsula.

NATURAL HISTORY: Specimens were collected in June in similar agricultural environments typical of the southern Iberian Peninsula.

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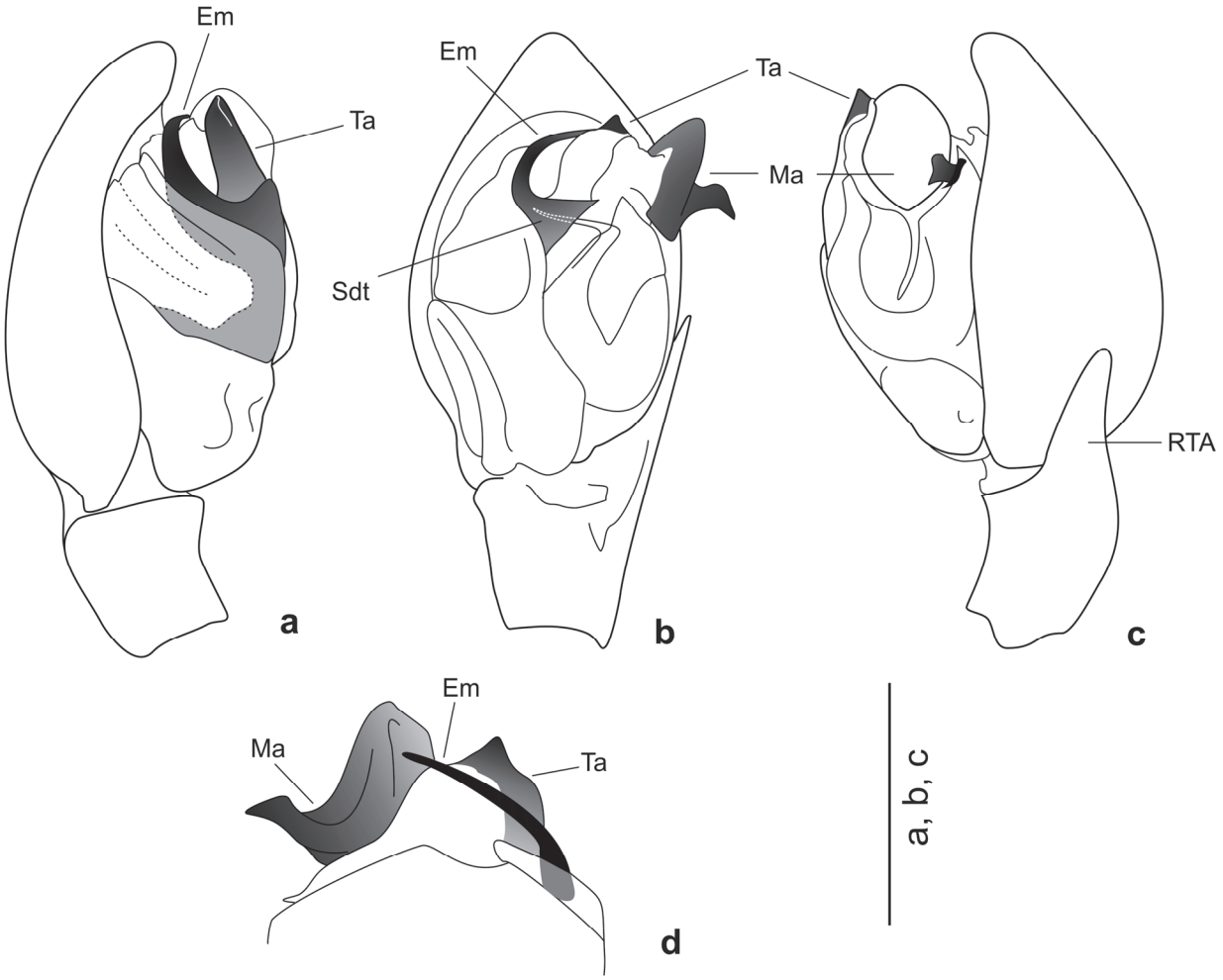


Figure 3. *Zelotes wallacei* n. sp. Male palp: a) prolateral view; b) ventral view; c) retrolateral view; d) dorsal view with discarded cymbium. Scale: 0.5 mm. Abbreviations: **Em** embolus; **Ma**: median apophysis; **RTA**: retrolateral tibial apophysis; **Sdt**: spermathecal duct of the tegulum; **Ta**: terminal apophysis.

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