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Authors: Juan A. Zaragoza, and Ana Sofia P.S. Reboleira
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Five new hypogean *Occidenchthonius* (Pseudoscorpiones: Chthoniidae) from Portugal

Juan A. Zaragoza1 and Ana Sofia P.S. Reboleira2,3. 1Departamento de Ecología, Facultad de Ciencias, Universidad de Alicante, E-03690 Alicante, Spain. E-mail: ja.zaragoza@ua.es; 2Natural History Museum of Denmark (Zoological Museum), University of Copenhagen, Universitetsparken 15, DK-2100 København Ø, Denmark; 3Departamento de Biología & CESAM, Universidade de Aveiro, Portugal.

Abstract. Five new species of the recently created genus *Occidenchthonius* Zaragoza, 2017 are described from caves of Portugal: *Occidenchthonius alandroalensis* sp. nov., *O. algharbicus* sp. nov., *O. duceensis* sp. nov., *O. goncalvesi* sp. nov. and *O. vachonii* sp. nov. The species *Occidenchthonius cardosoi* (Zaragoza, 2012) and *Chthonius ischnocheles* (Hermann, 1804) are reported from new localities in different karst units of Portugal. New morphological characters are proposed for use in the Chthoniidae taxonomy. An updated key to the genus *Occidenchthonius* is given.

Key words: Pseudoscorpions, taxonomy, caves, karst, Iberian Peninsula.

ZooBank publication: http://zoobank.org:8080/References/A7261030-F4B4-4301-99F5-5C144C948245.

Introduction

The pseudoscorpion genus *Occidenchthonius* Zaragoza, 2017 was recently created to accommodate some species previously assigned to the subgenus *Ephippiochthonius* Beier, 1930. It shares the presence of coxal spines in coxae II and III with the other *Chthonius*-related genera: *Cantabrochthonius* Zaragoza, 2017, *Chthonius* C.L. Koch, 1843, *Ephippiochthonius*, *Globochthonius* Beier, 1931, *Hesperochthonius* Muchmore, 1968, *Microchthonius* Hadžić, 1935, *Neochthonius* Chamberlin, 1929 and *Spelyngochthonius* Beier, 1955 (as termed by Zaragoza 2017). However, *Occidenchthonius* is distinguished by a combination of characters that include: i) ephippiochthonian chelal form; ii) marked ventral hollow (vh) with thicker cuticle before base of movable finger; iii) absence of a medial protuberance between chelal condyles; iv) four setae at the proximal portion of chelal hand in adults and tritonymphs, seta ph3 present; v) absence of paraxial dorsal seta ih3 in some species; vi) third tooth of normal row (mt) of fixed finger modified in shape and orientation; vii) absence of a subdistal protuberance (sp) in the fixed chelal finger of males and tritonymphs; viii) base of movable chelal finger with a distinct enlarged condyle (bc), proximally with a sclerotized and well developed apodeme (ap); ix) absence of lyrifissures ma1 and ma2; x) presence of a bisetose intercoxal tubercle between coxae III and IV; xi) distal marginal seta of pedipalpal coxa disk (dps) distinctly longer than that of coxa I (dcs), exceptionally of same length; xii) sternite III in male and female usually with eight marginal macrosetae, close to the stigmata without lateral short seta on each side; and xiii) male genitalia without a median hiatus dividing each row of the guard-setae (Zaragoza 2017).

*Occidenchthonius* is mainly distributed in the Canary Islands and Southern Iberian Peninsula, currently being the most diverse genus of Chthoniini in both areas (Zaragoza 2017).

Intense fieldwork in caves of Portugal over the last decade provided surprising new genera and species of cave-adapted pseudoscorpion fauna (Reboleira et al. 2010, 2011, 2012, 2013a, b), including five new species of *Occidenchthonius* which are here described, as well as new localities for several previously known species.

METHODS

Specimens were obtained in deep insulated parts of caves along Portugal, using a combination of active and passive standardized collecting methods (see Reboleira 2012).

For scanning electron microscopy (SEM) study, specimens were transferred to absolute ethanol, critical point-dried in a Tousimis Autosamdi 815, serie A, mounted on aluminium stubs, coated with platinum/palladium and studied using a JEOL JSM-6335F scanning electron microscope.

Specimens were examined as temporary glycerine mounts in cavity slides after dissection of one chelicera and one pedipalp, of which the chela was also separated. Posteriorly they were preserved in 70% ethanol inside glass vials, with the dissected articles placed in a glass microvial. When necessary, some specimens were previously cleared by immersion in 60% lactic acid at room temperature for a few days. A trinocular Zeiss Axioslab light microscope was used for detailed study and measurements were taken with an ocular micrometer, using the reference points proposed by Chamberlin (1931).

Measurements are expressed in millimetres, followed by standard ratios in parentheses. The ratios given are length/width for carapace, chelicerae and pedipalps, except in the case of the chela and its hand, for which the depth was used instead of width (Mahnert 2011b). When two different articles are compared, the ratio is the length/length index; if only one measurement is given for an article it corresponds to the length. The general terminology follows Chamberlin (1931), including trichobothriotaxy, with modifications or additions proposed by Harvey (1992) and Judson (2007). The chaetotactic formulae of the carapace and chelicera follow Gabbutt & Vachon (1963). Terminology of setae on carapace, pedipalpal coxa and chelal hand, follows Zaragoza (2017). Lyrifissures terminology for pedipalpal chela and chelicera is as in Zaragoza (2017). Following data are given: lengths and ratio of the anteromedial (ame) and sublateral ocular setae (osl) of the carapace, unless lost; value of the angle formed by setae dps-mps-lps in the pedipalpal coxa disk; ratio chelal hand depth/seta ih2; length of tactile setae on tergites IX and XI and sternite X.
Abbreviations used in the text: Repositories. DEUA: Departamento de Ecología, Universidad de Alicante, Spain; MCNB: Museu de Ciències Naturals de Barcelona; MHNG: Muséum d’Histoire Naturelle, Geneva; MNCN: Museo Nacional de Ciencias Naturales, Madrid; MNHN: Muséum national d’Histoire naturelle, Paris; NHMW: Naturhistorisches Museum Wien; ZMUC: Zoological Museum, Natural History Museum of Denmark. Other abbreviations used in text: A: angle coxal setae dps-mps-lps; al: anterolateral seta of carapace; ane: anteromedial seta of carapace; an: anterior setae row of carapace; ap: apodeme; as: antiaxial sensory setae; bc: basal condyle; dcs: distal marginal seta of coxa I; dh1, dh2, dh3, dh4: distal setae row of chelal hand; di: isolated subapical tooth; dps: distal marginal seta of pedipalpal coxa; fa: antiaxial lyrifissure of fixed chelal finger; fb: basal lyrifissure of fixed chelal finger; fd1, fd2, fd3: dorsal lyrifissures of the fixed chelal finger; fp: paraxial lyrifissure of fixed chelal finger; hd: distal lyrifissure of chelal hand; hp: proximal lyrifissure of chelal hand; ih1, ih2, ih3, ih4, ih5: intermediate setae row of chelal hand; il: intermediate lateral seta of carapace; in: intermedian setae row of carapace; ldb, lst, ldt, lvb, lve, lvt: lyrifissures associated with cheliceral setae db, dst, dt, vb, ve and vt, respectively; lps: lateral marginal seta of pedipalpal coxa; m: microseta; ma1, ma2: antiaxial lyrifissures of movable chelal finger; me: median setae row of carapace; ml: median lateral seta of carapace; mm: median medial seta of carapace; mms: marginal microsetae coxa I; mps: medial seta of pedipalpal coxa; mt: modified tooth; mv1, mv2: ventral lyrifissures of movable chelal finger; oc: ocular setae row of carapace; ol: lateral ocular seta of carapace; om: medial ocular seta of carapace; osl: sublateral ocular seta of carapace; pe: coupled sensilla; ph1, ph2, ph3, ph4: proximal setae row of chelal hand; pl: posterolateral seta of carapace; pm: posteromedial seta of carapace; po: posterior setae row of carapace; sp: subdistal protuberance; T: tactile seta; td: accessory tooth; vh: ventral hollow in chelal hand.

SYSTEMATICS

Discussion of characters and terminology.—Carapacial chaetotaxy: Gabbutt & Vachon (1963) considered that the carapacial setae in Chthoniidae (Hermann, 1804) were lying in five rows: anterior, ocular, median, intermedian and posterior, which they represented by the formula: 4-6-4-2-4. Some of the carapacial setae have been named by Zaragoza (2017) and are included in this study (Fig. 3). Lengths of some carapacial setae have been given in Chthoniidae descriptions (e.g., Mahnert 2011a; Gardini 2013; Zaragoza 2017), usually the anteromedial ones (ane), whose measurements may differ among species (Zaragoza et al. 2007). A character that should be pointed out and mentioned in descriptions is the posterolateral setae which, when they occur, are usually very short, of microsetae size, but sometimes longer (e.g., Zaragoza 2012, 2017). Sublateral ocular setae of carapace (osl) are rarely considerably or even extremely reduced in length in a few species (e.g., Mahnert 1993; Zaragoza 2017; this study); then, it is considered an important interspecific difference and, for a better quantification, the ratio ane/osl is useful.

Chelal hand chaetotaxy: a designation system was proposed by Zaragoza (2017) for the chaetotaxy of the chelal hand in Chthoniidae (Fig. 7). Presence/absence of seta ph3 at the proximal row is a very important character in the diagnosis of the Chthonius-related genera; also the absence of seta ih2 characterizes the machadoi-group within the genus Occidentchthonius (Zaragoza 2017). Other hand setae may show variation in their length, particularly in the genera Ephippiochthonius and Occidentchthonius, as occurs with seta ih4 (Fig. 2) that may be short or as long as the hand depth, which is considered an interspecific variation of taxonomic importance and, for an accurate measure, the ratio hand depth/ih2 length is proposed.

Pedipalp coxal setae: pedipalpal coxa bears three setae in the disk of most chthonid genera, usually 2 marginal and 1 discal setae, being here named dps, mps, and lps (Fig. 1). The importance of the length of the distal marginal seta (dps) of the pedipalpal coxa compared with the length of distal marginal seta (dcs) on coxa I was stated by Zaragoza (2017) for the diagnosis of genus Cantabrochthonius. The position of seta mps is usually extremely discal in comparison with the other two marginal setae; however, the position of mps may rarely be moved close to the line dps-lps in some few species, forming an angle higher than 100° [Mahnert 2011a described 2
marginal and 1 submarginal setae for the species *O. lopezi* (Mahnert, 2011); other Canarian species have the same pattern: *O. canariensis* (Beier, 1965), *O. dubius* (Mahnert, 1993) and *O. setosus* (Mahnert, 1993); J.A. Zaragoza, pers. obs.; also in Portuguese species: *O. duecensis* sp. nov. and *O. vachoni* sp. nov., this study), which is considered an important interspecific character. The angle formed by the areolar insertions of disk setae *dps-mps-lps* is given in descriptions and illustrated (Figs. 6, 36, 43).

### TAXONOMY

**Family Chthoniidae** Daday, 1888  
**Subfamily Chthoniinae** Daday, 1888  
**Tribe Chthoniini** Daday, 1888  
**Genus Occidenchthonius** Zaragoza, 2017

**Type species.** *Chthonius (Ephippichthonius) machadoi* Vachon, 1940, by original designation.

### KEY TO ADULTS OF THE *OCCIDENCHTHONIUS* SPECIES

2. Epigean species. Well developed eyes, anterior and posterior eyes with convex lens … 3  
3. Fixed chelal finger with 12–16 teeth and movable with 7. Chela stouter: (δ) 4.5, (γ) 3.8–4.7 times longer than deep… 4  
   Fixed chelal finger with 20–21 teeth, movable 9–10. Chela more slender: (δ) 5.1, (γ) 4.6–4.9 times longer than deep … 5  
4. Basal half of movable chelal finger with 5 or more rounded, partially fused, vestigial teeth, without canals, on raised lamina … 6  
5. Basal half of movable chelal finger with only 1 rounded, vestigial teeth, without canal, on weak lamina … 7  
5. Carapace with a total of 2–8 preocular and ocular microsetae.  
6. Carapace with a total of 16 preocular and ocular microsetae  
   Posterior margin of carapace with 2 (exceptionally 3) setae … 8  
6. Posterior margin of carapace with 4 (very exceptionally 3 or 5) setae  
7. Anophthalmic … 9  
7. Eyes present, at least anterior eyes with weak lens, posterior eyes reduced to indistinct spots … 10  
8. Dorsal face of chelal hand without lyrifissure *hd* … 11  
9. Dorsal face of chelal hand with lyrifissure *hd* … 12  
9. Distal half of movable chelal finger with 9–10 pointed teeth up to slightly proximad of trichobothrium *st*, basal half with 8–12 rounded and fused vestigial teeth up to level slightly proximad of trichobothrium *sb* … 13  
10. Distal half of movable chelal finger with 12–15 pointed teeth up to halfway between trichobothria *st* and *sb*, basal half with 10–12 rounded and fused vestigial teeth up to halfway between trichobothria *sb* and *b* … 14  
10. Anterior medial margin of carapace prominent; chelical spinneret absent in male; stouter and smaller pedipalp: femur (δ) 6.0–6.1, (γ) 5.9 times longer than broad, length (δ) 0.53 mm, (γ) 0.53–0.58 mm; hand (δ) 2.2–2.3, (γ) 2.1 times longer than deep; chela (δ) 5.7–5.8, (γ) 5.0–5.2 times longer than deep, length (δ) 0.71–0.72 mm, (γ) 0.75–0.76 mm … 15  
11. Smaller, chela length (γ) 0.69 mm, 5.0–5.5 times longer than deep; trichobothrium *ist* slightly distad to *esb* … 16  
12. Larger, chela length (γ) 1.08 mm, 6.1 times longer than deep; trichobothrium *ist* distinctly distad of *esb* … 17  
13. Movable chelical finger with isolated subapical tooth (di) … 18  
14. Movable chelical finger without isolated subapical tooth (di) … 19  
15. Posterior margin of carapace with 4 macrosetae … 20  
16. Posterior margin of carapace with 2 macrosetae … 21  
17. Epigean species with normal eyes; carapace with 2 preocular microsetae on each side; fixed chelal finger with 12–16 triangular teeth (not including proximal rounded teeth); smaller: chela length (δ) 0.45–0.57 mm, (γ) 0.50–0.66 mm … 22  
18. Endogeaneous or hypogeaneous species, eyes reduced or absent; carapace with 1 preocular microseta on each side; fixed chelal finger with 17–21 triangular teeth (not including proximal rounded teeth); larger: chela length (δ) 0.89–1.12 mm, (γ) 0.84–1.37 mm … 23  
19. *Occidenchthonius* sp. nov.
15. Proximal half of fixed chelal finger with 2–5 rounded teeth merging into an evident high bulge of marginal lamina. O. parmensis (Beier, 1963)

16. Anophthalmic ................................................. 17

17. Trichobothrium ist distinctly distad of esb .................................. 18

18. Trichobothrium ist proximad of esb .................................. 19

19. Larger and more slender: (♀) pedipalpal femur 7.5 times longer than broad, length 0.88 mm; chela (♀) 7.3 times longer than deep, length 1.23 mm ........................................ O. sendrai (Zaragoza, 1985)

20. Chelicera with 6 setae and 4–5 lateral microsetae on hand. O. thaleri (Gardini, 2009)

21. Larger: pedipalpal femur 7.5 times longer than broad, length 0.71 mm, 5.7 times longer than deep ........................................ O. berninii (Callaini, 1983)

22. Small and less slender: (♀) pedipalpal femur 5.8–6.5 times longer than broad, length 0.52–0.62 mm; chela (♀) 5.2–5.5 times longer than deep, length 0.70–0.86 mm ........... 20

23. Epigean species with well developed eyes.................................................... O. ambrosiae (Carabajal Márquez, García Carrillo & Rodríguez Fernández, 2012)

24. Lyri fissure ldb present on cheliceral hand, close to seta db. Trichobothrium ist slightly distad of esb and well proximad of lyri fissure fb ........................................ O. anae Zaragoza, 2017

25. Posterior row of carapace with 2 macrosetae. O. cardosoi (Zaragoza, 2012)

26. Chelal hand lyri fissure hp absent. O. ducensis sp. nov.

27. Carapace without preocular microsetae ................................................ (O. verai-group). 33

28. Carapace with 2 preocular microsetae on each side ........................................ O. pinai (Zaragoza, 1985)

29. Hypogeic species with well developed eyes.................................................. O. serranoi Zaragoza, 2017

30. Carapace sublateral ocular setae (osl) extremely reduced to microsetae size, ratio setae ame/osl 5.0–7.2 ........................................ O. montagudi Zaragoza, 2017

31. Smaller; pedipalp femur (♀) length 0.72–1.01 mm; chela (♀) length 0.94–1.29 mm ........................................ O. ortunoi Zaragoza, 2017

32. Trichobothrium ist distinctly proximad of lyri fissure fb; trichobothria eb-esb-ist in a straight line; femur (♀) 6.4–6.9 times longer than broad, length 0.72–0.79 mm; chela (♀) 5.6–5.8 (♀) times longer than deep, length 0.94–1.01 mm ........... O. algharbicus sp. nov.

33. Subterranean species, anophthalmic ................................................. 34

34. Epigean species with eyes, anterior pair with convex lens .................................................. O. gardini Zaragoza, 2017

35. Chelicera with 6 macrosetae and 1–2 (rarely 3) lateral microsetae. Trichobothrium ist distinctly distad of esb ........................................ O. giennensis (Zaragoza & Pérez, 2013)

36. Fixed chelal finger with 14–15 teeth; stouter and shorter pedipalp: femur (♀) length 0.39–0.42 mm, 4.8–5.0 times longer than broad, chela (♀) length 0.58–0.60 mm, 4.8–5.0 times longer than deep .............. O. montagudi Zaragoza, 2017

37. Fixed chelal finger with 19 teeth; more slender and longer pedipalp: femur (♀) length 0.54 mm, 6.0 times longer than broad, chela (♀) length 0.71 mm, 5.7 times longer than deep .............. O. lencinal Zaragoza, 2017
37. Trichobothrium ist proximad of or level with lyrifissure fb; smaller species, pedipalpal femur (♀) 5.7–7.5 times longer than broad, length 0.66–0.94 mm, chela (♀) length 0.94–1.29 mm. ................................. 38

38. Trichobothrium ist distinctly distad of lyrifissure fb; larger species, pedipalpal femur (♀) 7.9–8.6 times longer than broad, length about 1.10 mm, chela (♀) length 1.40–1.53 mm. ................................. 46

39. Movable chelal finger with 3–8 rounded vestigial teeth without dental canals in its basal half. ................................. 39

40. Trichobothrium ist distinctly proximad of lyrifissure fb. ................................. 40

41. More slender species, pedipalpal femur (♀) 5.7–5.5 times longer than broad, length 0.80–0.99 mm, 6.4–7.5 times longer than broad; chela (♀) length 1.06–1.38 mm, 5.7–6.5 times longer than deep. ................................. 44

42. Movable chelal finger with 14 vestigial teeth without dental canals in basal half. ................................. 44

43. Smaller: (♀) pedipalpal femur length 0.66–0.75 mm, 5.7–6.4 times longer than broad; chela (♀) length 0.94–1.10 mm, 5.2–5.5 times longer than deep. O. perezi (Carabajal Márquez, García Carrillo & Rodríguez Fernández, 2011)

44. Male spinneret prominent. ................................. O. verai (Zaragoza, 1985)

45. Lyritissure ldb of cheliceral hand present. ................................. O. ventaillo (Beier, 1939)

46. Lyritissure ldb of cheliceral hand absent. ................................. O. espanyoli (Zaragoza & Pérez, 2013)

47. Movable chelal finger with 6–8 vestigial teeth without dental canals in basal half. ................................. O. marcia Zaragoza, 2017

48. Lyritissure ldb of cheliceral hand present. ................................. O. ruizporteru (Carabajal Márquez, García Carrillo & Rodríguez Fernández, 2001)

49. Lyritissure ldb of cheliceral hand absent. ................................. O. ebo Zaragoza, 2017

Occidenchthonius cardosoi (Zaragoza, 2012)
(Figs. 3–9)

Chthonius (Ephippiochthonius) cardosoi Zaragoza 2012:26–27, figs1–9.


Chthonius (E.) cardosoi Zaragoza: Reboleira 2012:212.

Occidenchthonius cardosoi (Zaragoza): Zaragoza 2017:140–143, fig. 229.

Type locality.—PORTUGAL: Arrábida karst massif, Setúbal district, Sesimbra municipality, Gruta do Fumo (38°26′03″N, 09°08′39″W; 209 m a.s.l.).

Material examined.—PORTUGAL: Lisboa district, Montejunto massif, Cadaval municipality, Lamas e Cercal, Algar do Javali (39°12′36″N, 9°02′12″W; 380 m a.s.l.), 1 ♀, 5 April 2009; 1 ♀, 6 June 2009; 1 ♀, 19 November 2009; 1 ♂, 3 ♀, 2 tritonymphs (DEUA), 24 December 2009; all them A.S.P.S. Reboleira. Leiria district, Cesaredas Plateau, Peniche municipality, Bolhos, Gruta dos Bolhos (synonym of Gruta do Casal da Lobre, 39°18′31″N, 9°16′37″W; 145 m a.s.l.), 1 ♀ (DEUA), 18 November 2009, A.S.P.S. Reboleira.

Diagnosis.—Modified from Zaragoza (2017). Occidenchthonius cardosoi is a medium-sized hypogen species, weakly troglomorphic. Movable chelal finger without isolated subapical tooth (db) and spinneret moderately prominent in females, extremely reduced in males, cheliceral lyrifissure ldb present. Anophtalmic, anterior margin of carapace with 1–2 preocular microsetae on each side, posterior margin with 4 macrosetae. Pedipalp coxa setae dps-mps-lps forming a 50–65° angle; chelal hand distinctly depressed at level of ib/ib, with short and very low rounded hump distad of ib/ib and very gentle slope between trichobothria ib/ib and eb; fixed chelal finger with 16–18 teeth; two-thirds distal parts of movable chelal finger with 12–14 pointed teeth with dental canals, basal third of movable chelal finger with 4–6 rounded, partially fused, vestigial teeth without dental canals on raised lamina; pedipalp femur (♀) 6.1, (♀) 5.8–6.2 times longer than broad, length (♀) 0.49 mm, (♀) 0.63–0.66 mm; chela (♀) 5.5, (♀) 5.0–5.5 times longer than deep, length (♀) 0.66 mm, (♀) 0.85–0.89 mm; ratio movable chelal finger/chelal hand (♀) 1.5, (♀) 1.4; lacking lyrifissures ma1 and ma2, all the other chelal patterns and their standard number are present.

Description (adults from Algar do Javali and Gruta dos Bolhos).—Data that coincide with type specimens (Zaragoza 2012, 2017) are omitted. Carapace: subquadrate, slightly longer than broad, constricted posteriorly; medial part of anterior margin strongly prominent, with rudimentary epistome, and strongly dentate, showing variability in its development (Figs. 4a, b, c). Anophtalmic. Chaetotaxy: 20 macrosetae, with 1–2 preocular microsetae on each side, macrosetae formula 4:6:4:2:4; anteromedial setae (ame) 0.08–0.11 mm long, sublateral ocular setae (os) 0.05–0.08 mm, ratio setae ame/os 1.2–1.7; posteromedial setae slightly longer than the posterolateral ones.

Chelicera: hand with 6 setae and 1 lateral microseta (1 female 2 lateral microsetae), seta vb short (0.025–0.040 mm long), microseta 0.015–0.025 mm. Fixed finger (Fig. 5a) with 7–9 teeth proximally decreasing in size, 2–3 proximal microtubercles, two distal teeth distinctly larger than others. Movable finger (Fig. 5b) without an isolated subapical tooth (db), with 5–8 teeth
proximally decreasing in size, 1–2 proximal microtubercles, the distal tooth larger than others; spinneret moderately prominent and apically rounded in female, vestigial and almost absent in male (Fig. 5b); seta gl 0.50–0.55 from base of movable finger. Rallum with 11 blades. Serrula exterior with 14–15 blades, serrula interior with 12 blades.

Abdomen: Tergites IX and XI with 2 sublateral tactile setae on each one (0.16–0.18 and 0.18–0.24 mm long respectively).

Chaetotaxy of sternites II–III 8–10:(3)7–8(3):(2)6–7(2):8, sternite X with 2 submedial tactile setae (0.12–0.21 mm long), genital notch of males flanked by 6–7 setae on each side and 4+4 internal glandular setae.

Coxae: Pedipalpal coxa with distal marginal seta of the disk (dps) 0.06–0.10 mm long, areolar insertions of disk setae dps-mps-lps forming a 50–53° angle (Fig. 6) (59–65° in female types); coxa I 3–4 + 3 marginal microsetae, distal marginal seta (dcs) 0.03–0.07

Figures 3–7.—Occidenchthonius cardosoi (Zaragoza), female holotype and dorsal views, unless stated otherwise. (3) Carapace (modified from Zaragoza 2012). (4) Anterior margin of carapace, partial view, (a) female from Algar do Javali, (b) male from Algar do Javali, (c) female Gruta dos Bolhos. (5) Fingers of left chelicera, male from Algar do Javali, partial view, (a) fixed finger, (b) movable finger. (6) Left pedipalpal coxa, female from Algar do Javali, partial view. (7) Left chela, antiaxial view (modified from Zaragoza 2017). See Methods for abbreviations.
mm long, seta $dps$ distinctly longer than seta $dcs$; II 4 + 5–9 bipinnate coxal spines, III 5 + 4–5 bipinnate coxal spines and IV 6.

**Pedipalp:** femoral chaetotaxy 3:5–6:3:5–6:1. Chelal hand seta $ih2$ distinctly thinner and longer than other hand setae (0.050–0.075 mm long, ratio hand depth/$ih2$ length 1.9–2.7) (0.063–0.065 mm long, ratio 2.8 in female types). Fixed finger with 16–18 mostly pointed teeth and with dental canals, two first distal teeth small, third subdistal tooth ($mt$) of the fixed finger distinctly modified in shape and deviated in orientation with respect to the others, dental row reaching up to slightly proximad to trichobothrium $sb$, usually level sensilla $pc$, 6–10 proximal microtubercles; tip of fixed chelal finger of male with a weak hollow on paraxial face, without subdistal protuberance ($sp$); one pair of long antiaxial sensory setae ($as$) at the base, one level and other strongly distad of lyrifissure $fb$, 0.025–0.040 mm long, distance between them 0.032–0.045 mm, fixed finger depth at the base 0.045–0.058 mm; 4–5 teeth at level of $est/it$ occupying 0.1 mm, distance between apices 0.020–0.028 mm. Two-thirds distal parts of movable finger with 12–14 pointed teeth with dental canals that reach up to proximad of halfway between trichobothria $sb$ and $sh$, two proximal teeth reduced in size, 1–2 distal teeth tiny; third basal part of movable chelal finger with 4–6 rounded, partially fused, vestigial teeth without canals on raised and short lamina, dental row reaching up to level of sensilla $pc$, 6 proximal microtubercules. Trichobothrium $ist$ distinctly distad of $esh$ and slightly proximad of lyrifissure $fh$; distance between $st-sb$ 1.5–1.8 times longer than that between $sh-b$.

**Measurements and ratios:** Specimens from Algar do Javali: male, followed by females in square brackets, when different:

- Body 1.00 [1.16–1.36]. Carapace 0.35/0.31 (1.1) [0.45–0.47/0.41–0.43 (1.1)]. Chelicera 0.30/0.15 (2.0) [0.41/0.19 (2.1–2.2)]. movable finger 0.16 [0.20–0.21]. Pedipalp: femur 0.49/0.08 (6.1) [0.65–0.66/0.11 (6.1–6.2)]. patella 0.20/0.10 (2.0) [0.27–0.28/0.13–0.14 (2.0–2.1)]. chela 0.66/0.12 (5.5) [0.85–0.87/0.17–0.18 (5.0)]. hand 0.26 (2.2) [0.35–0.36 (2.1)]. movable finger 0.39 [0.50]; ratio movable finger/hand 1.5 [1.4]. femur/movable finger 1.3, femur/carapace 1.4, chela/carapace 1.9, chela/femur 1.3.

**Female from Gruta dos Bolhos:** Body 1.0. Carapace 0.42/0.40 (1.0). Chelicera 0.36/0.17 (2.1). movable finger 0.18. Pedipalp: femur 0.52/0.10 (5.5). patella 0.22/0.11 (2.0). chela 0.72/0.14 (5.3). hand 0.30 (2.2). movable finger 0.41; ratio movable finger/hand 1.4. femur/movable finger 1.3, femur/carapace 1.2, chela/carapace 1.7, chela/femur 1.4.

**Description (tritonymphs).**—Carapace slightly longer than broad; medial part of anterior margin moderately prominent and strongly dentate; anophthalmic; macrochaetotaxy as in adult, only one preocular microseta on each side; anteromedial setae ($ame$) 0.075 mm long, sublateral ocular setae ($osl$) 0.040–0.045 mm long, fixed finger depth at the base 0.045–0.058 mm; 3–4 teeth at level of $est/it$ occupying 0.1 mm, distance between apices 0.020–0.028 mm. Two-thirds distal parts of movable finger with 12–14 pointed teeth with dental canals that reach up to proximad of half of trichobothria $sb$ and $sh$, two proximal teeth reduced in size, 1–2 distal teeth tiny; third basal part of movable chelal finger with 4–6 rounded, partially fused, vestigial teeth without canals on raised and short lamina, dental row reaching up to level of sensilla $pc$, 6 proximal microtubercules. Trichobothrium $ist$ distinctly distad of $esh$ and slightly proximad of lyrifissure $fh$; distance between $st-sb$ 1.5–1.8 times longer than that between $sh-b$.

0.050–0.055 mm long, areolar insertions of disk setae dps-mps-lps forming a 50–54° angle; coxa I 3 + 2 marginal microsetae, distal marginal seta (dcs) 0.035–0.040 mm long; II 4 + 6–7 bipinnate coxal spines, III 5 + 4 bipinnate coxal spines and IV 5; intercoxal tubercle bisetose. Pedipalp with femoral chaetotaxy 3:5:2:4:1; chelal hand chaetotaxy 4:4:4, seta ih2 0.050 mm long, ratio hand depth/ih2 length 2.2–2.3; trichobothrium ist forming a straight line with eb-esb, and strongly proximal of lyrifissure fb; fixed finger with 13–14 mostly pointed teeth with dental canals, two first distal teeth small, third substidal tooth modified (mr), 5–6 teeth at level of es/iit occupying 0.1 mm, distance between apices 0.018–0.020 mm; fixed finger with an unique antiaxial sensory setae (as) at the finger base, at level of lyrifissure fb; distal half of movable finger with 10 pointed teeth with dental canals, distal one tiny, substidal small; proximal half of finger with 4–5 rounded, vestigial teeth on raised lamina; coupled sensilla pc distad of trichobothrium b; lacking lyrifissures fd1, ma1 and ma2.

Measurements and ratios (tritonymphs): Body 0.90–0.94. Carapace 0.33–0.34/0.29 (1.1–1.2). Chelicera 0.28/0.14 (2.0), movable finger 0.15–0.16. Pedipalp: femur 0.40–0.42/0.07–0.08 (5.3–5.5), patella 0.17–0.18/0.10 (1.8), chela 0.55–0.57/0.11–0.12 (4.9–5.0), hand 0.22–0.24 (2.0–2.1), movable finger 0.32–0.33; ratio movable finger/hand 1.3–1.4, femur/movable finger 1.2–1.3, femur/carapace 1.2, chela/carapace 1.7, chela/femur 1.4.

Remarks.—Occidentchthonius cardosi (Zaragoza, 2012) is not included in a recognized species-group within the genus. O. cardosi is the only species of the genus without isolated subapical tooth (di) on the cheliceral movable finger, which has 4 setae in the posterior row of the carapace (Fig. 3). Additionally to the type locality, two other populations were found in other caves from two different karst units: Montejunto and Cesaredas (Reboleira 2012), considerably increasing its distribution area. The original species description (Zaragoza 2012; redescribed Zaragoza 2017) was based on two females and new material is now incorporated in the diagnosis, including the previously unknown male and tritonymphs. The female from Gruta dos Bolhos (Cesaredas karst) mostly coincide with the O. cardosi description, but it has a distinctly smaller and stouter pedipalp than the types and the specimens from Algar do Javali (Montejunto karst), so its measurement data are not included in the diagnosis until confirmation with new material from the same locality.

Distribution.—PORTUGAL: Arrábida, Montejunto and Cesaredas karst areas.

Occidentchthonius alandroalensis sp. nov. http://zoobank.org:8080/NomenclaturalActs/E13093D3-9BC9-44FD-B0A8-2D2454E146CD (Figs. 12–18)

Chthonius n. sp. 5: Reboleira 2012: 161.


Paratypes. PORTUGAL: 3 ♀ (DEUA, MNCN, MCNB), 1 tritonymph, 1 deutonymph (DEUA), same locality, 30 December 2009, A.S.P.S. Reboleira.

Diagnosis (female).—Occidentchthonius alandroalensis sp. nov. is a medium-sized, hypogean species included in the machadoi-group. Movable cheliceral finger without isolated subapical tooth (di) and with moderately prominent spinneret in females, unknown in males; cheliceral lyrifissure ldb present. Anophthalmic, anterior margin of carapace without preocular microsetae on each side, posterior margin with 2 macrosetae. Pedipalpal coxa setae dps-mps-lps forming a 51–54° angle; chelal hand weakly depressed at level of ib/isb, with a low hump distad of ib/isb and very gentle slope between trichobothria ib/isb and eb, chelate 4:4:4, seta ih2 absent; fixed chelal finger with 18–19 teeth; movable chelal finger with 16–18 pointed teeth with dental canals, proximally with only one rounded tooth without dental canal on weak lamina; pedipalpal femur (Φ) 7.0–7.5 times longer than broad, length (Φ) 0.95–1.01 mm; chela (Φ) 5.7–5.9 times longer than deep, length (Φ) 1.28–1.36 mm; ratio movable chelal finger/chelal hand (Φ) 1.3–1.4; lacking lyrifissures ma1 and ma2, all the other chelal patterns and their standard number are present.

Description (female).—Body: medium-sized hypogean species, moderately troglomorphic with depigmented integument; weak hisp granulation on lateral surfaces of carapace, on the cheliceral and almost absent on the base of chelal fingers.

Carapace (Fig. 12): subquadrate, weakly constricted posteriorly; medial part of anterior margin (Fig. 13) strongly prominent and dentate, with a rudimentary epistome. Anophthalmic. Chaetotaxy: 18 setae, without preocular microsetae on each side, 2 setae in posterior row, formula 4: 6:4:2:2, anteromedial setae (ame) 0.14–0.15 mm long, sublateral ocular setae (osl) 0.07–0.09 mm, ratio setae ame/osl 1.8–2.1; 4 lyrifissures anteriorly and 2 posteriorly.

Chelicera (Fig. 14): hand with 6 setae and 2 lateral microsetae, seta vb short (0.055–0.070 mm long), microsetae 0.025–0.035 mm; hand with 5 dorsal lyrifissures and one ventral, lyrifissure ldb and all the others (ldst, ldt, lhb, lve, lvt) present. Fixed finger (Fig. 15a) with 10–11 teeth proximally decreasing in size, two distal teeth distinctly larger than others, 2–3 proximal microtubercles. Movable finger (Fig. 15b) without an isolated subapical tooth (di), with 8–9 teeth proximally decreasing in size, the distal tooth larger than others, 0–2 proximal microtubercules; spinoret small and apically rounded in females, unknown in males; seta gl 0.55–0.58 from base of movable finger. Rallum with 11 blades. Serrula exterior with 15–17 blades, serrula interior 13–14 blades.

Abdomen: chaetotaxy of tergites 4:4:4:6:6:6:6:1T2T1:4:1T2T1,0, tergites IX and XI with 2 sublateral tactile setae on each one (0.22–0.27 and 0.30–0.31 mm long respectively). Chaetotaxy of sternites 9–10:(3)8–9(3):(2)6–7(2):7–8:6:6:6:6:6:6:1T2T2:0.2, lateral setae on sternite III microsetae size, sternite X with 2 submedial tactile setae (0.23 mm long).

Coxae: pedipalpal coxa with 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.125–0.130 mm long, areolar insertions of disk setae dps-mps-lps forming a 51–54° angle (Fig. 16); coxa I 3 + 3 marginal microsetae (holotype 3 + 2 in one coxa, normal in the other), distal marginal seta (dcs) 0.075–0.080 mm long, seta dps distinctly longer than seta dcs; II 4 + 10–12 bipinnate coxal spines, III 5 + 7–11 bipinnate coxal spines and IV 6; intercoxal tubercle bisetose.

Pedipalp: femoral chaetotaxy 3:6:3:5:1. Chela (Fig. 17) with the hand weakly depressed at level of ib/isb, with a low hump distad of ib/isb and very gentle slope between trichobothria ib/isb and eb; weak ventral hollow (vb) before the base of the movable
finger with thicker cuticle; width slightly shorter than depth, maximum width slightly proximad to \(i/b\); chaetotaxy 4:4:4, seta \(ihibit\) absent, seta \(ph3\) present, setae \(dh2\) and \(dh3\) removed to halfway between the distal and the intermediary setal rows, seta \(ih2\) distinctly thinner and longer than other hand setae (0.11–0.12 mm long, ratio hand depth/\(ih2\) length 1.9–2.0); distal end of the hand and base of the chelal fingers with sclerotized condylar complex. Fixed finger with 18–19 pointed teeth and with dental canals, two first distal teeth small, third subdistal tooth (\(mt\)) distinctly modified in shape and deviated in orientation with respect to the others, apically rounded in holotype (Fig. 18a) and one paratype (apparently worn), pointed in the other paratypes (Fig. 18b), distal half with saw-like shape (Fig. 18c), dental row reaching up to level or proximad to trichobothrium \(sb\) and distad to sensilla \(pc\), towards the base smooth or with some extremely tiny proximal microtubercles; tip of fixed finger with a modified

Figures 12–18.—*Occidenchthonius alandroalensis* sp. nov., female holotype and dorsal views, unless stated otherwise. (12) Carapace. (13) Anterior margin of carapace, partial view. (14) Left chelicera. (15) Fingers of left chelicera, partial view, (a) fixed finger, (b) movable finger. (16) Left pedipalpal coxa, partial view. (17) Left chela, antiaxial view. (18) Distal portion of fixed chelal finger, (a) female holotype, antiaxial view, (b) female paratype, antiaxial view, (c) female paratype, antiaxio-ventral view. See Methods for abbreviations.
accessory tooth (td) on antiaxial face; one pair of long antiaxial sensory setae (as) at the base, one level and the other distal of lyrifissure fb, 0.050–0.060 mm long, distance between them 0.055–0.063 mm, fixed finger depth at the base 0.070–0.075 mm; 4 teeth at level of est/it occupying 0.1 mm, distance between apices 0.025–0.030 mm. Movable finger with 16–18 pointed teeth with dental canals, one tiny distal tooth, dental row reaching up to approximately level trichobothrium sb, followed by only one rounded vestigial tooth without dental canal on weak lamina, 4–6 proximal microtubercles; basal condyle (bc) present, basal apodeme long and apically narrowed; coupled sensilla pc halfway between sb and b or slightly closer to b. Trichobothria as in Fig. 17; trichobothrium ist strongly distal of esb and level lyrifissure fb; trichobothria ih/ib equidistant between esb and the base of the hand; distance between sb-st 1.7–2.0 times longer than that between sb-b. Lacking lyrifissures ma1 and ma2, all the other chelal patterns and their standard number are present: fa, fb, fp, hd, hp, fd1, fd2, fd3, mv1 and mv2 (mv2 can be absent in some chelae).

Measurements and ratios: female holotype, followed by female paratypes in square brackets, when different: Body 1.84 [2.12–2.20]. Carapace 0.61/0.55 (1.1) [0.62–0.66/0.56 (1.1–1.2)]. Chelicera 0.53/0.24 (2.2) [0.54–0.56/0.25–0.26 (2.2)], movable finger 0.25 [0.27–0.28]. Pedipalp: femur 0.97/0.13 (7.5) [0.95–1.01/0.14 (7.0–7.2)], patella 0.38/0.16 (2.3) [0.39–0.41/0.17 (2.3–2.5)], chela 1.28/0.22 (5.7) [1.32–1.36/0.23 (5.9)], hand 0.55 (2.5) [0.56–0.57 (2.4–2.5)], movable finger 0.72 [0.75–0.78]; ratio movable finger/hand 1.3 [1.3–1.4], femur/movable finger 1.4 [1.3], carapace/carapace 1.6 [1.5], chela/carapace 2.1, chela/femur 1.3 [1.3–1.4].

Description (tritonymph).—Carapace distinctly longer than broad; medial part of anterior margin distinctly prominent and strongly dentate; anophthalmic; macrochaetotaxy as in adult, without precocular microseta on each side; anteromedial setae (ame) 0.07 mm long, sublateral ocular setae (osl) 0.04 mm long, ratio setae ame/osl 2.0; 4 lyrifissures anteriorly and 2 posteriorly. Cheliceral hand with 5 setae (lacks seta db respect to adults) and 1 lateral microseta; fixed finger with 6 teeth, two distal teeth larger than others; movable finger without an isolated subapical tooth (di), with 5 teeth, the distal one larger than others; spineret prominent as in adult females; seta gl 0.59 from base of movable finger; lyrifissures patterns as in adults. Chaetotaxy of tergites as in adults. Pedipalpal coxa 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.065 mm long, areolar insertions of disk setae dps-mps forming a 54° angle; coxa 1 2+1 marginal microseta, distal marginal seta (dcs) 0.040 mm long, seta dps distinctly longer than seta dcs; II 3 + 7 bipinate coxal spines, III 3 + 6 bipinate coxal spines and IV 3; intercoxal tubercle bisetose. Pedipalp: chelal hand chaetotaxy 4:2:3 (lack setae ih3, ih4, ih5 and ph2 respect to adults), seta ih2 0.045 mm long, ratio hand depth/ih2 length 2.4; fixed pedipalpal finger with 12 teeth, two distal teeth small, third subdistal tooth modified (mt), 5 teeth at level of est/it occupying 0.1 mm, distance between apices 0.0175–0.0225 mm; movable finger with 10 pointed teeth with dental canals and only two rounded vestigial teeth without dental canals on weak lamina; coupled sensilla pc in subbasal position along the movable finger; lyrifissures fa, fp, fb, fd1, fd2, mv2 and mv1 present, lacking all the others.

Measurements and ratios (deutonymph paratype): Body 1.02. Carapace 0.34/0.25 (1.3). Chelicera 0.26/0.12 (2.1). Pedipalp: femur 0.41/0.08 (5.5), patella 0.18/0.09 (1.9), chela 0.57/0.11 (5.3), hand 0.23 (2.1), movable finger 0.34; ratio movable finger/hand 1.5, femur/movable finger 1.2, femur/carapace 1.2, carapace/chela 1.7, chela/femur 1.4.

Remarks.—Occidentonchithonus alandroalensis sp. nov. is an anophthalmic species that is here tentatively assigned to the machadoi-group by the absence of the chelal hand seta ih1, despite not sharing some other characteristics of the group, as the presence of an isolated subapical tooth (di) on chelicera and precocular microseta on carapace, as stated in Zaragoza (2017). Additionally, the shape of the basal lamina on movable chelal finger with only one rounded vestigial teeth (2 in nymphs) without dental canal on weak lamina in O. alandroalensis sp. nov., configures unique characteristics for this species within Occidentonchithonus.

Distribution.—PORTUGAL: Alentejo Region.

Etymology.—The species epithet is a Latin adjective referring to the locality where the type cave is located, Alandroal.

Occidentonchithonus algarbacicus sp. nov.

http://zoobank.org/8080/NomenclaturalActs/C26DF4AB-94F1-40BC-97FC-6C80AA1C320E (Figs. 19–24)

Chthonius af. sp. 1: Reboleira 2012: 161.

Material examined.—Holotype female. PORTUGAL: Algarve region, Faro district, Olhão municipality, Moncarapa-
cho, Gruta da Senhora (37°06′20″N, 7°46′35″W; 85 m a.s.l.), 3 July 2011, A.S.P.S. Reboleira (DEUA).


Other material. PORTUGAL: Algarve region, Faro district, Loulé municipality, Vale Telheiro, Gruta do Vale Telheiro (37°10′13″N, 8°02′05″W; 239 m a.s.l.), 1 ♀, 24.V.2009; 1 ♀, 29 December 2009; all A.S.P.S. Reboleira (DEUA).

Diagnosis. —Occidenchthonius algharbicus sp. nov. is a medium-sized hypogean species, weakly troglomorphic. Mov-

Figures 19–24.—Occidenchthonius algharbicus sp. nov., female holotype and dorsal views, unless stated otherwise: (19) Carapace. (20) Anterior margin of carapace, partial view. (21) Left chelicera (22) Fingers of left chelicera, partial view, (a) fixed finger, (b) movable finger. (23) Left pedipalpal coxa, partial view. (24) Left chela, antiaxial view. See Methods for abbreviations.
able cheliceral finger without isolated subapical tooth (di) and with well developed spinneret in females, unknown in males; lyrifissure ldb and all the others present. Anopthalmic, anterior margin of carapace with one precocular microseta on each side, posterior margin with 2 macrosetae. Pedipalp coxa setae dps-mps-lds forming an angle of 46–59°; cheliceral hand distinctly depressed at level of ib/ishb, with low and long hump distad of ib/ishb and gentle slope between trichobothria ib/ishb and eb; fixed cheliceral finger with 14–15 teeth; two-thirds distal parts of movable cheliceral finger with 10–12 pointed teeth with dental canals, third basal part with 6–7 rounded teeth without dental canals on raised lamina; pedipalpal femur (♀) 6.4–6.9 times longer than broad, length (♀) 0.72–0.79 mm; chela (♀) 5.6–5.8 times longer than deep, length (♀) 0.94–1.01 mm; ratio movable cheliceral finger/cheliceral hand (♀) 1.4–1.5; lacking lyrifissures ma1, and ma2, all the other chelal patterns and their standard number are present.

Description (female).—Body: medium-sized hypognathic species with weak troglomorphic facies and degimentation; weak hispid granulation on lateral surfaces of carapace, on cheliceral hand, on base of fixed cheliceral finger and distally on ventral part of chelal hand.

Carapace (Fig. 19): subquadrate, weakly constricted posteriorly; medial part of anterior margin very weakly prominent or straight and strongly dentate (Fig. 20). Anopthalmic. Chaetotaxy: 18 setae, with one precocular microseta on each side (two female paratypes 0–1, lacking one microseta or lost), 2 setae in posterior row, formula 4:6:4:2:2, anteromedial setae (ame) 0.08–0.09 mm long, sublateral ocular setae (osl) 0.04–0.07 mm, ratio setae ame/osl 1.3–2.3; 4 lyrifissures anteriorly and 2 posteriorly.

Chelicera (Fig. 21): with 6 setae and one lateral microseta on hand, seta vb short (0.03–0.04 mm long), microseta 0.02–0.03 mm; hand with 5 dorsal lyrifissures and one ventral, lyrifissure ldb present. Fixed finger (Fig. 22a) with 9–10 teeth proximally decreasing in size, two distal teeth distinctly larger than others, 1–3 proximal microtubercles. Movable finger (Fig. 22b) without an isolated subapical tooth (di), with 6–8 teeth proximally decreasing in size, the distal tooth larger than others, 1–2 proximal microtubercles; spinneret prominent and well developed in females, unknown in males; seta g1 0.52–0.55 mm from base of movable finger. Rallum with 11 blades. Serrula exterior with 14 blades, serrula interior 11–12 blades.

Abdomen: Chaetotaxy of tergites 4:4:4:4:6:6:6:1T2T1:4:1T2T1:0, tergites IX and XI with 2 sublateral tactile setae on each one (0.16–0.18 and 0.21–0.23 mm respectively). Chaetotaxy of sternites 8–10:(3):6(3):(2)6(2):7–8:6:6:6:6:2T1T2: 0:2, lateral setae on sternite III macrosetae size, sternite X with 2 submedial tactile setae (0.15–0.22 mm long).

Coxa: pedipalpal coxa with 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.08–0.09 mm long, areolar insertions of disk setae dps-mps-lps forming an angle of 46–59° (Fig. 23); coxa I 3 + 3 marginal microsetae, distal marginal seta (dcs) 0.055–0.065 mm long, seta dps distinctly longer than seta dcs; II 4 + 7–11 bipinnate coxal spines, III 5 + 4–5 bipinnate coxal spines and IV 6; intercoxal tubercle bistetose.

Pedipalp: femoral chaetotaxy 3:6:3:5–6:1. Chela (Fig. 24) with hand distinctly depressed at level of ib/ishb, with low and long hump distad of ib/ishb and gentle slope between trichobothria ib/ishb and eb; weak hollow before base of movable finger with thicker cuticle; width approximately equal to depth, maximum width slightly proximal of ib/ishb; chaetotaxy 4:5:4, seta ph3 present, seta dh3 removed to halfway between the distal and the intermediary setal rows, seta ih2 same size as others (0.05 mm long, ratio hand depth/ib2 length 3.5); distal end of the hand and base of the chelal fingers with sclerotized condylar complex. Fixed finger with 14–15 pointed teeth and with dental canals, two first distal teeth small, third subdistal tooth (mt) distinctly modified in shape and deviated in orientation with respect to the others, dental row reaching up to proximad of trichobothrium sb and distad to sensilla pc, 4–9 proximal microtubercles; tip of fixed finger with a modified accessory tooth (td) on antiaxial face; one pair of long antiaxial sensory setae (as) at the base, one level with and the other distad of lyrifissure fb, 0.040–0.055 mm long, distance between them 0.040–0.060 mm, fixed finger depth at the base 0.050–0.060 mm; 3–4 teeth at level of est/it occupying 0.1 mm, distance between apices 0.025–0.035 mm. Two-thirds distal parts of movable finger with 10–12 pointed teeth with dental canals that reach up to distinctly proximal of halfway between trichobothria st and sb, distal tooth tiny, subdistal tooth small; third basal part of movable cheliceral finger with 6–7 rounded (rarely 4), partially fused, vestigial teeth without canals on raised lamina; dental row reaching proximad of sb, approximately level sensilla pe, 1–5 proximal microtubercles; basal condyle (be) present, basal apodeme long and apically indented; coupled sensilla pe halfway between trichobothria sb and b or slightly closer to b. Trichobothria as in Fig. 24; trichobothrium ist forming a straight line with eb-esb and strongly proximal of lyrifissure fb; distance between ib/ishb and the base of the hand slightly shorter than that between ib/ishb and esb; distance between st-sb 1.7–1.9 times longer than that between sb-b. Lacking lyrifissures ma1 and ma2, all the other chelal patterns and their standard number are present (one female lacks mv2 in one chela).

Measurements and ratios: female holotype, followed by female paratypes, when different: Body 1.55 [1.38–1.44]. Carapace 0.490–0.451 (1.1) [0.48–0.50/0.41–0.44 (1.1–1.2)]. Chelicera 0.430–0.19 (2.2) [0.42–0.45/0.19–0.20 (2.2)], movable finger 0.20 [0.21–0.22]. Pedipalp: femur 0.79/0.12 (6.9) [0.72–0.74/0.11–0.12 (6.4–6.5)], patella 0.29/0.14 (2.1) [0.28–0.29/ 0.13 (2.1–2.2)], chela 0.98/0.18 (5.6) [0.94–1.01/0.17–0.18 (5.7–5.8)], hand 0.41 (2.3) [0.38–0.41], movable finger 0.56 [0.54– 0.60]; ratio movable finger/hand 1.4 [1.4–1.5], femur/movable finger 1.4 [1.2–1.3], femur/carapace 1.6 [1.5], chela/carapace 2.0, chela/femur 1.2 [1.3–1.4]. Females from Gruta do Vale Teleiho: Body 0.89–1.10. Carapace 0.41–0.43/0.35 (1.2). Chelicera 0.35–0.38/0.16–0.17 (2.1–2.2). Pedipalp: femur 0.54–0.59/0.10 (5.6–6.1), patella 0.21–0.24/0.11–0.12 (2.0), chela 0.74–0.79/0.14–0.15 (5.2–5.3), hand 0.29–0.32 (2.0–2.1), movable finger 0.53–0.55; ratio movable finger/hand 1.5, femur/movable finger 1.2, femur/carapace 1.3–1.4, chela/ carapace 1.8, chela/femur 1.3–1.4.

Description (tritonymph paratype).—Carapace slightly longer than broad; medial part of anterior margin almost straight and strongly dentate; anopthalmic; macrochaetotaxy as in adult, only one precocular microseta on one side, absent in the other; anteromedial setae (ame) 0.055 mm long, sublateral ocular setae (osl) 0.035 mm long, ratio setae ame/osl 1.6: 4
lyrifissures anteriorly and 2 posteriorly. Cheliceral hand with 5 setae (lacks seta it respect to adults) and 1 lateral microseta; fixed finger with 6 teeth, two distal teeth larger than others; movable finger without an isolated subapical tooth (di), with 5 teeth, the distal one larger than others; spinneret prominent as in adult females; seta gl 0.54 from base of movable finger; lyrifissures patterns as in adults. Chaetotaxy of tergites as in adults; sternites 5(2)(5):(2)(1)(5–2):7:6:6:6:1:21T1:0.2. Pedipalpal coxa 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.050 mm long, areolar insertions of disk setae dps-mps-lps forming a 62º angle; coxa I 3 + 2 marginal microsetae, distal marginal seta (dcs) 0.030 mm long; II 4 + 5 bipinnate coxal spines, III 5 + 4 bipinnate coxal spines and IV 5; intercoxal tubercle bisetose. Pedipalp with femoral chaetotaxy 3:5:2:5:1; chelal hand chaetotaxy 4:5:4:5:4:5:4:5:4; seta th 0.025 mm long, ratio hand depth/th length 4:0; trichobothrium ist forming a straight line with eb-esb, and strongly proximad of lyrifissure fb; fixed finger with 14 mostly pointed teeth with dental canals, two first distal teeth small, third subdistal tooth modified (pointed teeth with dental canals, two first distal teeth small, strongly proximad of lyrifissure); all the standard cheliceral lyrifissures are present. Anopthalmic. Anterior margin of carapace with 2 precocular microsetae on each side, posterior margin with 2 macrosetae. Pedipalp coxa setae dps-mps-lps forming an angle of 113–113º; chelal hand distinctly depressed at level of ib/isb, with distinct and short hump distad of ib/isb and gentle slope between trichobothria ib/isb and eb; fixed chelal finger with 18 teeth; distal half of movable chelal finger with 10–11 pointed teeth with dental canals, basal half with 7–8 rounded teeth without canals on raised lamina; pedipalpal femur (⃗⃗⃗) 5.6–6.0 times longer than broad, length (⃗⃗⃗) 0.59–0.63 mm; chela (⃗⃗⃗) 5.9–6.5 times longer than deep, length (⃗⃗⃗) 0.84–0.91 mm; ratio movable chelal finger/chelal hand (⃗⃗⃗) 1.5–1.7; lacking lyrifissures ma1, ma2, and hd; all the other chelal patterns and their standard number are present.

**Description (female).**—Occidenchthonius duecensis sp. nov. is a medium-sized hypogean species, weakly troglomorphic. Movable chelical finger without isolated subapical tooth (di) and with moderately prominent spinneret in females, unknown in males; all the standard cheliceral lyrifissures are present. Anopthalmic, anterior margin of carapace with 2 precocular microsetae on each side, posterior margin with 2 macrosetae. Pedipalp coxa setae dps-mps-lps forming an angle of 113–113º; chelal hand distinctly depressed at level of ib/isb, with distinct and short hump distad of ib/isb and gentle slope between trichobothria ib/isb and eb; fixed chelal finger with 18 teeth; distal half of movable chelal finger with 10–11 pointed teeth with dental canals, basal half with 7–8 rounded teeth without canals on raised lamina; pedipalpal femur (⃗⃗⃗) 5.6–6.0 times longer than broad, length (⃗⃗⃗) 0.59–0.63 mm; chela (⃗⃗⃗) 5.9–6.5 times longer than deep, length (⃗⃗⃗) 0.84–0.91 mm; ratio movable chelal finger/chelal hand (⃗⃗⃗) 1.5–1.7; lacking lyrifissures ma1, ma2, and hd; all the other chelal patterns and their standard number are present.

**Material examined.**—Holotype female. PORTUGAL: Centro region, Sício Massís, Coimbra district, Penela municipality, Taliscas, Dueça Cave System, Gruta do Soprador do Carvalho (39°59′10″N, 8°22′58″W; 200 m a.s.l.), 30.VIII.2009, A.S.P.S. Reboleira (DEUA).


**Diagnosis (female).**—Occidenchthonius duecensis sp. nov. is a medium-sized hypogean species, weakly troglomorphic. Movable chelical finger without isolated subapical tooth (di) and with moderately prominent spinneret in females, unknown in males; all the standard cheliceral lyrifissures are present. Anopthalmic, anterior margin of carapace with 2 precocular microsetae on each side, posterior margin with 2 macrosetae. Pedipalp coxa setae dps-mps-lps forming an angle of 113–113º; chelal hand distinctly depressed at level of ib/isb, with distinct and short hump distad of ib/isb and gentle slope between trichobothria ib/isb and eb; fixed chelal finger with 18 teeth; distal half of movable chelal finger with 10–11 pointed teeth with dental canals, basal half with 7–8 rounded teeth without canals on raised lamina; pedipalpal femur (⃗⃗⃗) 5.6–6.0 times longer than broad, length (⃗⃗⃗) 0.59–0.63 mm; chela (⃗⃗⃗) 5.9–6.5 times longer than deep, length (⃗⃗⃗) 0.84–0.91 mm; ratio movable chelal finger/chelal hand (⃗⃗⃗) 1.5–1.7; lacking lyrifissures ma1, ma2, and hd; all the other chelal patterns and their standard number are present.

**Description (female).**—Body: medium-sized hypogean species of weak troglomorphic facies and degimented integument; weak hispid granulation on lateral surfaces of carapace, on chelical hand and on bases of chelal fingers.

**Carapace** (Fig. 25): subquadrate, weakly constricted posteriorly; medial part of anterior margin weakly prominent and strongly denticate (Fig. 26). Anopthalmic. Chaetotaxy: 18 setae, with 2 (one female paratype with 2–3) precocular microsetae on each side, 2 setae in posterior row, formula 4: 6:4:2:2, anteromedial setae (ame) 0.10–0.11 mm long, sublateral ocular setae (osl) 0.04–0.06 mm, ratio setae ame/osl 1.9–2.5; 4 lyrifissures anteriorly and 2 posteriorly.

**Chelicera** (Fig. 27): hand with 6 setae and usually 2 (one female paratype 3–4) lateral microsetae, seta vb short (0.03–0.04 mm long), microsetae 0.02–0.03 mm; hand with 5 dorsal lyrifissures and one ventral, lyrifissure ldb and all the others present. Fixed finger (Fig. 28a) with 9–11 teeth proximally decreasing in size, two distal teeth distinctly larger than others; spinneret moderately prominent and apically rounded in females, unknown in males; seta gl 0.52–0.56 from base of
movable finger. Rallum with 11 blades. Serrula exterior with 15 blades, serrula interior 11–12 blades.

Abdomen: Chaetotaxy of tergites 4:4:4:4:6:6:6:1T2T1:4:1T2T1:0, tergites IX and XI with 2 sublateral tactile setae on each one (0.22 and 0.22–0.24 mm long respectively). Chaetotaxy of sternites 10:(3):8(3):(2):7(2):7–8:6:6:6:6:2T1T2:0:2, lateral setae on sternite III macrosetae size, sternite X with 2 submedial tactile setae (0.16–0.19 mm long).

Coxae: pedipalpal coxa with 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.065–0.070 mm long, areolar insertions of disk setae dps-mps-lps forming a 113–132° angle (Fig. 29); coxa I 3 + 3 marginal microsetae, distal marginal seta (dcs) 0.050–0.065 mm long.

seta *dps* distinctly longer than seta *dcs*; II 4 + 7–9 bipinnate coxal spines, III 5 + 3–4 bipinnate coxal spines and IV 6; intercoxal tubercle bisetose.

**Pedipalp:** Femoral chaetotaxy 3:6–7:3:5:1. Chela (Fig. 30) with hand distinctly depressed at level of *ib/isb*, with distinct, short hump distad of *ib/isb* and gentle slope between trichobothria *ib/isb* and *eb*; weak hollow before base of movable finger with thicker cuticle; width approximately equal to depth, maximum width slightly proximal of *ib/isb*; chaetotaxy 4:5:4; seta *ph1* present, seta *dh* removed to halfway between the distal and the intermediary setal rows, seta *ih2* distinctly thinner and longer than other hand setae (0.65–0.070 mm long, ratio hand depth/*ih2* length 2.0–2.4); distal end of the hand and base of the chelal fingers with sclerotized condylar complex. Fixed finger with 18 pointed teeth and with dental canals, two first distal teeth small, third subdistal tooth (*mt*) distinctly modified in shape and deviated in orientation with respect to the others, dental row reaching up to proximal to trichobothrium *sb* and level or distal to sensilla *pc*, 4–6 proximal microtubercules; tip of fixed finger with a modified accessory tooth (*td*) on antiaxial face; one pair of long antiaxial sensory setae (*as*) at the base, one level and the other distad of lyrifissure *fb*, 0.030–0.040 mm long, distance between them 0.036–0.042 mm, fixed finger depth at the base 0.045–0.050 mm; 5 teeth at level of *est/it* occupying 0.1 mm, distance between apices 0.023–0.025 mm. Distal half of movable finger with 10–11 pointed teeth with dental canals that reach up to distal or halfway between trichobothria *st* and *sb*, two distal teeth small; basal half of movable chelal finger with 7–8 rounded, partially fused, vestigial teeth without canals on raised lamina; dental row reaching slightly proximad to *sb* or level sensilla *pc*, 3 proximal microtubercules; basal condyle (*bc*) present, basal apodeme long and apically narrowed; coupled sensilla *pc* slightly proximad to trichobothrium *sb* or halfway between *sb* and *b*. Trichobothria as in Fig. 30; trichobothrium *ist* distinct or slightly distad of *esb* and distinct proximad of lyrifissure *fb*; distance between *ib/isb* and the base of the hand slightly longer than that between *ib/isb* and *esb*; distance between *st-sb* 1.9–2.2 times longer than that between *sb-b*. Lacking lyrifissures *ma1*, *ma2* and *hd*, all the other chelal patterns and most of their standard number are present.

**Measurements and ratios:** Male holotype, followed by female paratypes in square brackets, when different: Body 1.60 [1.00–1.36]. Carapace 0.49/0.47 (1.0) [0.43–0.46/0.42–0.44]. Chelicera 0.45/0.22 (2.1) [0.39–0.41/0.19–0.20], movable finger 0.23 [0.20–0.21]. Pedipalp: femur 0.63/0.11 (5.6) [0.59–0.60/0.10–0.11 (5.6–6.0)], patella 0.26/0.13 (2.1) [0.25–0.27/0.12 (2.1–2.3)], chela 0.91/0.16 (5.9) [0.84–0.85/0.13–0.14 (5.9–6.5)], hand 0.35 (2.3) [0.31–0.33 (2.3–2.4)], movable finger 0.55 [0.50–0.53]; ratio movable finger/hand 1.6 [1.5–1.7], femur/ movable finger 1.1 [1.1–1.2], femur/carapace 1.3 [1.3–1.4], chela/carapace 1.9 [1.8–2.0], chela/femur 1.4.

**Remarks.**—*Occidenththonius duecensis* sp. nov. is not included in a recognized species-group within the genus. It shares with *O. vachoni* sp. nov. the hypogean life-style, absence of an isolated subapical tooth on chelicera, posterior row of carapace with 2 macrosetae, presence of precuneus microsetae, chelal hand lyrifissure *hd* absent and pedipalpal coxa setae *dps-mps-lps* forming an angle distinctly greater than 90°. Both species differ by the size of the carapacal subterminal ocular setae (*osl*), not shortened in *O. duecensis* sp. nov. (ratio *ame/osl* 1.9–2.5) and extremely reduced to microsetae size in *O. vachoni* sp. nov. (ratio *ame/osl* 5.0–7.2); additionally, cheliceral lyrifissure *lbv* is present in *O. duecensis* sp. nov. and absent in *O. vachoni* sp. nov.

**Distribution.**—PORTUGAL: Centro Region.

**Etymology.**—The species epithet is a Latin adjective referring to the type locality, the spring of the Dueça River and the major cave of the Dueça Cave System.

*Occidenththonius goncalvesi* sp. nov.


(Figs. 10–11, 31–37)

*Chthonius* n. sp. 4: Reboleira 2012: 161, 162.

**Type locality.**—PORTUGAL: Algarve region, Faro district, Silves municipality, São Bartolomeu de Messines, Algarão do Remexido (37°14′29″N, 8°16′36″W; 131 m a.s.l.).

**Material examined.**—Holotype male. PORTUGAL: Algarve region, Faro district, Silves municipality, São Bartolomeu de Messines, Algarão do Remexido (37°14′29″N, 8°16′36″W; 131 m a.s.l.), 5 September 2009. A.S.P.S. Reboleira (DEUA).

**Paratypes.** PORTUGAL: 1♂, ?; 1 tritonymph [1♂, 1♀, 1 tritonymph (DEUA), 1♀ (MCNB), 1♀ (MNCN), 1♀ (MNHN), 1♀ (NHMW), 1♀ (ZMUC), 15 March 2009; 3♀ [MCNB], (MHNG), (MNHN)], 1♀, 1 tritonymph (DEUA), same locality, 25 July 2009; 2♂, 2♀, 1 tritonymph, 1 deutonymph (DEUA), same locality, 5 September 2009; 5♀, 1 tritonymph (DEUA), same locality, 29 December 2009. Faro district, Loulé municipality, Vale Telheiro, Gruta do Vale Telheiro (37°10′13″N, 8°02′05″W; 239 m a.s.l.), paratypes: 1♂ (DEUA), same locality, 30 January 2009; 2♀ (DEUA), 24 May 2009; 1♀, 1 tritonymph (DEUA), same locality, 29 December 2009. All paratypes A.S.P.S. Reboleira.

**Diagnosis.**—*Occidenththonius goncalvesi* sp. nov. is a medium-large hypogean species, distinctly trigmorphomorphic. Movable cheliceral finger without isolated subapical tooth (*di*) and with moderately prominent spinnneret in females, almost absent in males; cheliceral lyrifissure *lbv* present. Anopthalmic, anterior margin of carapace with one precuneus microseta on each side, posterior margin with 2 macrosetae. Pedipalp coxa setae *dps-mps-lps* forming a 46–52° angle; chelal hand weakly depressed at level of *ib/isb*, with low, almost indistinct hump distad of *ib/isb* and very gentle slope between trichobothria *ib/isb* and *eb*; fixed chelal finger with 17–18 teeth; two-thirds distal parts of movable chelal finger with 12–14 pointed teeth with dental canals, basal third with 5–7 rounded teeth without canals on raised lamina; pedipalpal femur (*δ*) 7.9, (*γ*) 7.4–8.1 times longer than broad, length (*δ*) 0.76–0.91 mm, (*γ*) 0.89–1.01 mm; chela (*δ*) 6.8–7.4, (*γ*) 6.8 times longer than deep, length (*δ*) 0.98–1.23, (*γ*) 1.22–1.29 mm; ratio movable chelal finger/chelal hand (*δ*) 1.5–1.6, (*γ*) 1.4; lacking lyrifissures *ma1* and *ma2*, all the other chelal patterns and their standard number are present.

**Description (adults).**—Body: moderately large, hypogean species with trigmorphomorphic facies and depigmented integu-
ment; weak hispid granulation on lateral surfaces of carapace, on cheliceral hand, on base of movable chelal finger and on distal part of chelal hand.

Carapace (Fig. 31): subquadrate, distinctly longer than broad, weakly constricted posteriorly; medial part of anterior margin prominent, without a well-defined epistome and strongly dentate (Fig. 32). Anophthalmic. Chaetotaxy: 18 setae, with one preocular microsetae on each side (absent or lost in some adults), 2 setae in posterior row, formula 4:6:4:2:2, anteromedial setae (ane) 0.090–0.13 mm long, sublateral

ocular setae (osl) 0.030–0.070 mm long, ratio setae ame/osl 1.8–2.9; 4 lyrifissures anteriorly and 2 posteriorly.

Chelicera (Fig. 33): with 6 setae and one lateral microseta on hand, seta vb short (0.035–0.055 mm long), microseta 0.025–0.035 mm; hand with 5 dorsal lyrifissures and one ventral, lyrifissure lhb present. Fixed finger (Fig. 34a) with 8–13 teeth proximally decreasing in size, two distal teeth distinctly larger than others, 1–2 proximal microtubercules. Movable finger (Fig. 34b) without an isolated subapical tooth (di), with 6–7 teeth proximally decreasing in size, the distal tooth larger than others, 2 proximal microtubercules; spinneret extremely reduced, almost absent, in males (Fig. 34b) and moderately prominent in females (Fig. 35); seta gl 0.55–0.61 mm long, from base of movable finger. Rallum with 11 blades. Serrula exterior with 15 blades, serrula interior 13 blades.

Abdomen: Chaetotaxy of tergites 4:4:4:4:6:6:6:6:1T2T1:4:1T2T1-0, tergites IX and XI with 2 sublateral tactile setae on each one (0.22–0.26 and 0.24–0.30 mm long respectively). Chaetotaxy of sternites 9–11:(36):–8(3):(26–7(2):7–9–6:7–6:6:6:2T1T2:0.2, lateral setae on sternite III macrosetae size, sternite X with 2 submedial tactile setae (0.21–0.25 mm long); moreover, genital notch of males flanked by 5–8 setae on each side and 4–4 internal glandular setae.

Coxae: pedipalp calxa with 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.10–0.13 mm long, areolar insertions of disk setae dps-mps-lps forming a 46–52° angle (Fig. 36); coxa I 3 + 3 marginal microsetae, distal marginal seta (dcs) 0.07–0.09 mm long, seta dps distinctly longer than other setae dcs; II 4 + 6–10 bipinnate coxal spines, III 5 + 4–6 bipinnate coxal spines and IV 5–6; intercoxal tubercle bisetose.

Pedipalp: femoral chaetotaxy 3:6:3:5:1 (rarely 3:5–6:2–4:5–7:1). Chela (Fig. 37) with hand weakly depressed at level of ib/ish, with low, almost indistinct hump distal of ib/ish and very gentle slope between trichobothria ib/ish and eb; weak hollow before base of movable finger with thicker cuticle; width approximately equal than depth, maximum width distinctly proximal of ib/ish; chaetotaxy 4:5:4; setae ph3 present, setae dh1 removed close to the intermediary setal row, seta 2.3 closely smaller than other hand setae (0.055–0.075 mm long, ratio hand depth/hb length 2.4–3.3); distal end of the hand and base of the chelar fingers with sclerotized condylar complex. Fixed finger with 17–18 mostly pointed teeth and with dental canals, two first distal teeth small, third subdistal tooth (mt) distinctly modified in shape and deviated in orientation with respect to the others, 0–3 proximal teeth slightly smaller than the others and apically rounded, dental row reaching up to approximately level sensilla pc, 8–10 proximal microtubercules; tip of fixed finger with a modified accessory tooth (td) on antialaxial face; tip of fixed chelar finger of male with a weak hollow on paraxial face, without subdistal protuberance (sp); one pair of long antialaxial sensory setae (as) at the base, the one level and the other distal of lyrifissure fh, 0.040–0.085 mm long), distance between them 0.060–0.110 mm, fixed finger depth at the base 0.052–0.067 mm; 3–4 teeth at level of est/it occupying 0.1 mm, distance between apices 0.027–0.38 mm. Two-thirds distal parts of movable finger with 12–14 pointed teeth with dental canals that reach up to distinctly proximal halfway between trichobothria st and sb, two distal teeth tiny; third basal part of movable chelal finger with 5–7 rounded, partially fused, vestigial teeth without canals on raised lamina; dental row reaching proximad of sb, often level sensilla pc, 3–8 proximal microtubercules; basal condyle (bc) present, basal apodeme long and apically indented; coupled sensilla pc distad halfway between sb and b, usually slightly proximad to trichobothrium sb. Trichobothria as in Fig. 37; trichobothrium ist distinctly distad of esb and slightly proximad of lyrifissure fb; distance between ib/ish and the base of the hand equal or slightly shorter than that between ib/ish and esb; distance between st-sb 1.8–2.3 times longer than that between sb-b. Lacking lyrifissures ma1 and ma2, all the other chelal patterns and their standard number are present.

Measurements and ratios: male holotype, followed by male paratypes in square brackets, when different: body 1.33 [1.08–1.36]. Carapace 0.44–0.39 (1.1) [0.43–0.49/0.39–0.46 (1.1)]. Chelicera 0.36/0.17 (2.1) [0.39–0.46/0.18–0.20 (2.2–2.3)], movable finger 0.18 [0.19–0.24]. Pedipalp: femur 0.76/0.10 (7.9) [0.76–0.91/0.10–0.12 (7.9)], patella 0.29/0.12 (2.4) [0.28–0.35/0.12–0.13 (2.3–2.7)], chela 0.98/0.14 (7.0) [0.00–1.23/0.13–14.016 (6.8–7.4)], hand 0.39 (2.8) [0.38–0.47 (2.6–2.8)], movable finger 0.58 [0.60–0.75; ratio movable finger/hand 1.5 [1.6], femur/ movable finger 1.3 [1.2–1.3], femur/carapace 1.7 [1.7–1.9], chela/carapace 2.2 [2.3–2.5], chela/femur 1.3 [1.3–1.4]. Female paratypes: body 1.64–1.86. Carapace 0.52–0.53/0.46–0.50 (1.1). Chelicera 0.49–0.50/0.22 (2.2–2.3). Pedipalp: femur 0.89–1.01/0.12–0.13 (7.4–8.1), patella 0.35/0.15 (2.4), chela 1.22–1.29/0.18–0.19 (6.8), hand 0.50–0.54 (2.8), movable finger 0.70–0.74; ratio movable finger/hand 1.4, femur/movable finger 1.3–1.4, femur/carapace 1.7–1.9, chela/carapace 2.3–2.4, chela/femur 1.3–1.4.

Description (tritonymph paratypes).—Carapace distinctly longer than broad; medial part of anterior margin very weakly prominent and strongly dentate; anophalomic; macrochaetotaxy as in adult, without precocular microseta on each side; anteromedial setae (ame) 0.10–011 mm long, sublateral ocular setae (osl) 0.03–0.04 mm long, ratio setae ame/osl 2.8–3.3; 4 lyrifissures anteriorly and 2 posteriorly. Cheliceral hand with 5 setae (lacks seta it respect to adults) and 1 lateral microseta; fixed finger with 8–9 teeth, two distal teeth larger than others; movable finger without an isolated subapical tooth (di), with 4–7 teeth, the distal one larger than others; spinneret prominent as in female adults; seta gl 0.54–0.56 mm from base of movable finger; lyrifissures patterns as in adults. Chaetotaxy of tergites as in adults; sternites 5(2)5(2):1(5):7:6:6:6:1T2T1:0.2. Pedipalp calxa 5 setae (including 2 on the manducatory process), distal marginal seta of the disk (dps) 0.090–0.095 mm long, areolar insertions of disk setae dps-mps-lps forming a 52° angle; coxa I 3 + 2 marginal microsetae; II 4 + 6–8 bipinnate coxal spines, III 5 + 4 bipinnate coxal spines and IV 5; intercoxal tubercle bisetose. Pedipalp with femoral chaetotaxy 2–3:5:2:4–5:1; chela hand chaetotaxy 4.5:4; trichobothrium ist distinctly distad of esb, and distinctly proximad of lyrifissure fb; fixed finger with 14–15 pointed teeth with dental canals, two first distal teeth small, third subdistal tooth modified (mt), 4 teeth at the level of est/it occupying 0.1 mm, distance between apices 0.030–0.033 mm; distal half of movable finger with 11 pointed teeth with dental canals, 2 tiny distal ones; proximal half of finger with 4–5 rounded vestigial
teeth on raised lamina; coupled sensilla pc distal of trichobothrium b; lacking lyrifissures fd3, ma1 and ma2.

Measurements and ratios (tritonymph paratypes): body 1.10–1.12. Carapace 0.41–0.43/0.34–0.37 (1.2). Chelicera 0.36–0.38/0.16–0.18 (2.2–3). Movable finger 0.18. Pedipalp: femur 0.65–0.66/0.10 (6.6–6.8), patella 0.26/0.12 (2.1–2.2), chela 0.83–0.88/0.13–0.14 (6.1–6.3), hand 0.34–0.35 (2.5–2.6), movable finger 0.48–0.52; ratio movable finger/hand 1.4–1.5, femur/movable finger 1.3–1.4, chela/carapace 1.5–1.6, chela/femur 2.0, chela/femur 1.3.

Description (deutonymph paratype).—Carapace distinctly longer than broad; anoschialthic; chelateosty: 4:6:4:2:2, without preocular microsetae. Cheliceral hand with 4 setae (lack setae db and it respect to adults) and without lateral microsetae, only three lyrifissures present: ld1, ldv and lv1; fixed finger with 9 teeth, two distal teeth larger than others; movable finger without an isolated subapical tooth (di), with 5 teeth, the distal one larger than others; chelateosty prominent as in adult females; seta gl 0.55 from base of movable finger. Chelateosty of tergites as in adults; sternites 2:4(1):4(1):6:6:6:6:6:1TT1:0:2. Pedipalpal coxa 5 setae (including 2 on the manducatory process), distal marginal seta of the disk (dps) 0.055 mm long, areolar insertions of disk setae dps-mps-fps forming a 58° angle; coxa I 2 + 1 marginal microseta; II 3 + 3 bipinate coxal spines, III 3 + 2 bipinate coxal spines and IV 3; intercoxal tubercle bisetose. Chelal hand chelateosty 4:3:4 (lack setae ih3 and ih4 respect to adults); fixed pedipalpal finger with 12 teeth, first distal tooth small, second subdistal tooth modified (mt), 5 teeth at level of ext/it occupying 0.1 mm, distance between apices 0.0225–0.0250 mm; movable finger with 9 pointed teeth and 4 rounded, vestigial teeth on weak lamina; coupled sensilla pc in subbasal position along the movable finger; lyrifissures fa, fp, fb, fd1 and mv1 present, absent all the others.

Measurements and ratios (deutonymph paratype): body 0.68. Carapace 0.28/0.19 (1.4). Chelicera 0.22/0.11 (2.1). Pedipalp: femur 0.34/0.07 (5.2), patella 0.15/0.08 (1.9), chela 0.51/0.09 (5.8), hand 0.21/0.23 (2.3), movable finger 0.31; ratio movable finger/hand 1.5, femur/movable finger 1.1, femur/carapace 1.2, chela/carapace 1.9, chela/femur 1.5.

Remarks.—Occidentochtonius vonchoni sp. nov. is not included in any of the recognized species-groups within the genus. O. goncalvesi sp. nov. is similar to O. algharbicus sp. nov. and O. ortunoi, but differs from O. algharbicus sp. nov. by position of trichobothrium ist and has distinctly smaller and stouter pedipalp than O. ortunoi, as compared in the key and in the description of O. algharbicus sp. nov.

Distribution.—PORTUGAL: Algarve region.

Etymology.—This species is named after Professor Fernando Gonçalves, University of Aveiro, in recognition of his contribution to the study of subterranean biology in Portugal.

Occidentochtonius vonchoni sp. nov.
http://zoobank.org:8080/NomenclaturalActs/DDADC044-02F5-455A-AC01-6A5EAE80C4 (Figs. 38–45)

Chthonius n. sp. 3: Reboleira 2012: 164.


Paratypes. PORTUGAL: 2 ♀ (DEUA), same locality, 11 June 2009; 1 ♀ (DEUA), same locality, 20 November 2009; 4 ♀, 13 ♀, 7 tritonymphs, 1 tritonymph (DEUA), 1 ♀, 1 ♀, 1 tritonymph (MCNB), 1 ♀, 1 ♀, 1 tritonymph (MNHN), 1 ♀, 1 ♀, 1 tritonymph (NHMW), 1 ♀, 1 tritonymph (MNCN), 1 ♀, 1 tritonymph (ZMUC), same locality, 29 August 2009. Leiria district, Ansião municipality, Santiago da Guarda, Gruta da Cerâmica (39°55′37″N, 8°31′04″W; 355 m a.s.l.): 2 ♀, 3 ♀, 1 tritonymph paratypes [DEUA], 28 November 2009; 2 ♀, 3 ♀, 1 tritonymph, 1 deutonymph paratypes [DEUA], same locality, 21 March 2010. All paratypes A.S.P.S. Reboleira.

Diagnosis.—Occidentochtonius vonchoni sp. nov. is a medium-sized hypogean species, weakly troglomorphic. Movably cheliceral finger without isolated subapical tooth (di) and with moderately prominent spinneret in females, lacking in males; cheliceral lyrifissure lvb absent. Anopthalmic, anterior margin of carapace with 2 preocular microsetae on each side, sublateral ocular setae (osl) reduced to microsetae size, posterior margin with 2 macrosetae. Pedipalp coxa setae dps-mps-fps forming a 141–153° angle; chelal hand distinctly depressed at level of ibh/ibv, with distinct hump distal of ibh/ibv and gentle slope between trichobothria ibh/ibv and eb; fixed chelal finger with 16–18 teeth; two-thirds distal parts of movable chelal finger with 10–13 pointed teeth with dental canals, basal third with 4–6 rounded teeth without canals on raised lamina; pedipalpal femur (δ) 6.6–6.8, (β) 7.2 times longer than broad, length (δ) 0.52–0.54 mm, (β) 0.76–0.79 mm; chela (δ) 6.3–6.8, (β) 5.9–6.0 times longer than deep, length (δ) 0.70–0.72, (β) 1.00–1.05 mm; ratio movable chelal finger/chelal hand (δ) 1.5–1.6, (β) 1.5; lacking lyrifissures ma1, ma2 and hd, all the other chelal patterns and most of their standard number are present.

Description (adults).—Body: Medium-sized hypogean species of weak troglomorphic facies and depigmented integument; weak hispid granulation on lateral surfaces of carapace, on the cheliceral hand and on base of chelal fingers.

Carapace (Fig. 38): ubiquadruate, distinctly longer than broad, weakly constricted posteriorly; medial part of anterior margin weakly prominent, without a well-defined epistome and strongly dentate (Fig. 39). Anopthalmic. Chelateosty: 18 setae, with 2 (one female paratype 1–2) precocular microsetae on each side, 2 setae in posterior row, formula 4:6:4:2:2, anteromedial setae (ame) 0.090–0.13 mm long, 0.0040–0.0050 mm wide, sublateral ocular setae (osl) reduced to microsetae size: 0.017–0.0250 mm long, 0.0017–0.0025 mm wide, precocular microsetae 0.0125–0.0175 mm long, 0.0017–0.0020 mm wide, ratio setae amesosl 5.0–7.2; 4 lyrifissures anteriorly and 2 posteriorly.

Chelicera (Fig. 40): with 6 setae and 2 lateral microsetae on hand, seta vb very short (0.0125–0.0325 mm long), microsetae 0.0075–0.0225 mm; hand with 4 dorsal lyrifissures and one ventral, lyrifissure lvb absent, ldv and all the others present. Fixed finger (Fig. 41a) with 6–8 teeth proximally decreasing in size, two distal teeth distinctly larger than others, 1–3 proximal microtubercules. Movably finger (Fig. 41b) without an isolated subapical tooth (di), with 5–8 teeth proximally decreasing in size, the distal tooth larger than others, 1–5...
proximal microtubercles; spinneret extremely reduced, almost absent, in males (Fig. 41b) and moderately prominent in females (Fig. 42); seta \( g' \) 0.54–0.60 from base of movable finger. Rallum with 11 blades. Serrula exterior with 14 blades, serrula interior 12 blades.

Abdomen: chaetotaxy of tergites 4:4:4:6:6:6:6:1T2T1:4:1T2T1:0, tergites IX and XI with 2 sublateral tactile setae on each one (0.21–0.22 and 0.26–0.29 mm long respectively). Chaetotaxy of sternites 9–10:(3)6–8(3):(2)6–7(2):6–7:6:6:6:6:2T1T2:0:2, lateral setae on sternite III macrosetae size, sternite

Figures 38–45.—Occidenchthonius vachoni sp. nov., male holotype and dorsal views, unless stated otherwise: (38) Carapace. (39) Anterior margin of carapace, partial view. (40) Left chelicera. (41) Fingers of left chelicera, partial view, (a) fixed finger, (b) movable finger. (42) Movable cheliceral finger, female paratype from Gruta da Senhora da Estrela, partial view. (43) Left pedipalpal coxa, partial view. (44) Left chela, antiaxial view. (45) Distal portion of fixed chelal finger, ventral view. See Methods for abbreviations.
X with 2 submedial tactile setae (0.18 mm long); moreover, genital notch of males flanked by 7–9 setae on each side and 4+4 internal glandular setae.

Coxae: pedipalpal coxa with 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.055–0.090 mm long, areolar insertions of disk setae dps-mps-lps forming an angle of 141–153° (Fig. 43); coxa I 3 + 3 marginal microsetae, distal marginal seta (dcs) 0.045–0.075 mm long, seta dps distinctly longer than seta dcs; II 4 + 7–13 bipinnate coxal spines, III 5 + 4–6 bipinnate coxal spines and IV 6; intercoxal tubercle bifisetose.

Pedipalp: femoral chaetotaxy 3:6:3:5–6:1. Chela (Fig. 44) with hand distinctly depressed at level of ib/isb, with distinct hump distal of ib/isb and gentle slope between trichobothria ib/isb and eb; weak hollow before base of movable finger with thicker cuticle; width slightly longer or equal than depth, maximum width distinctly proximad to ib/isb; chaetotaxy 4:5:4, seta dh1 present, setae dh2 removed close to the intermediary setal row, seta ih2 distinctly thinner and longer than other hand setae (0.050–0.085 mm long, ratio hand depth/ih2 length 1.6–2.7); distal end of the hand and base of the chelal fingers with sclerotized condylar complex. Fixed finger with 16–18 pointed teeth and with dental canals, two first distal teeth small, third subdistal tooth (mt) distinctly modified in shape and deviated in orientation with respect to the others, distal half with saw-like shape (Fig. 45), most proximal tooth slightly smaller than the others and apically rounded, dorsal row reaching up to level sensilla pc, 5–10 proximal microtubercles; tip of fixed finger with a modified accessory tooth (td) on antiaxial face; tip of fixed chelal finger of male with a weak hollow on paraxial face, without subdistal protuberance (sp); one pair of long antiaxial sensory setae (as) at the base, one level and the other distal of lyrifissure fb, 0.025–0.050 mm long, distance between them 0.026–0.040 mm, fixed finger depth at the base 0.043–0.060 mm; 4–5 teeth at level of est/it occupying 0.1 mm, distance between apices 0.020–0.028 mm. Two-thirds distal parts of movable finger with 10–13 pointed teeth with dental canals that reach up to proximad halfway between trichobothria st and sb, distal tooth tiny or absent and reduced to a protuberance; third basal part of movable chelal finger with 4–6 rounded, partially fused, vestigial teeth without canals on raised lamina; dental row reaching proximad of sb, level sensilla pc, 3–6 proximal microtubercules; basal condyle (bc) present, basal apodeme long and apically indented; coupled sensilla pc distal halfway between sb and h, slightly proximad to trichobothrium sb. Trichobothria as in Fig. 44; trichobothrium ist distinct or slightly distal of esb, usually forming almost a straight line with eb-esb, and distinctly proximad of lyrifissure fb; distance between ib/isb and the base of the hand slightly longer than that between ib/isb and esb; distance between st-sb 1.7–2.0 times longer than that between sb-b. Lacking lyrifissures ma1, ma2 and hd, all the other chelal patterns and most of their standard number are present.

Measurements and ratios: male holotype, followed by male paratypes in square brackets, when different; body 0.99 [1.10–1.12]. Carapace 0.35–0.30 (1.2) [0.37–0.40/0.31–0.32 (1.2–1.3)]. Chelicera 0.31/0.14 (2.2), movable finger 0.15 [0.16]. Pedipalp: femur 0.52/0.08 (6.8) [0.52–0.54/0.08 (6.6–6.7)], patella 0.19/0.09 (2.1) [0.21/0.10 (2.1–2.2)], chela 0.70/0.11 (6.4) [0.71–0.72/0.11–0.12 (6.3–6.8)], hand 0.27 (2.5) [0.28 (2.4–2.5)], movable finger 0.43 [0.42–0.43]; ratio movable finger/hand 1.6 [1.5–1.6], femur/movable finger 1.2 [1.2–1.3], femur/carapace 1.5 [1.4], chela/carapace 2.0 [1.8–1.9], chela/femur 1.3 [1.3–1.4]. Female paratypes: body 1.42–1.62. Carapace 0.52–0.54/0.46–0.48 (1.1). Chelicera 0.43–0.46/0.19–0.21 (2.2). Pedipalp: femur 0.76–0.79/0.11 (7.2), patella 0.30–0.31/0.14 (2.2–2.3), chela 1.00–1.05/0.17–0.18 (5.9–6.0), hand 0.40–0.42 (2.4), movable finger 0.59–0.62; ratio movable finger/hand 1.5, femur/movable finger 1.3, chela/femur 1.5, chela/carapace 1.9, chela/femur 1.3.

Description (tritonymph paratypes).—Carapace slightly longer than broad; medial part of anterior margin weakly prominent and strongly dentate; anophthalmic; macrochaetotaxy as in adult, only one preocular microseta on each side; anteromedial setae (ame) 0.095 mm long, 0.0032 mm wide, sublateral ocular setae (osl) microsetae size: 0.0175 mm long, 0.0017 mm wide, preocular microsetae 0.0150 mm long, 0.0017 mm wide, ratio setae ame/osl 5.4; 4 lyrifissures anteriorly and 2 posteriorly. Cheliceral hand with 5 setae (lacks seta it respect to adults) and 1 lateral microseta; fixed finger with 7–8 teeth, two distal teeth larger than others; movable finger without an isolated subapical tooth (di), with 6–7 teeth, the distal one larger than others; spinneret prominent as in adult female adults; seta gl 0.55–0.56 from base of movable finger; lyrifissures patterns as in adults. Chaetotaxy of tergites as in adults; sternites 5: (2)6(2):(1)(5):6:6:6:6:17T1:0:2. Pedipalpal coxa 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.060–0.070 mm long, areolar insertions of disk setae dps-mps-lps forming an angle of 104–118°; coxa I 3 + 2 marginal microsetae, distal marginal seta (dcs) 0.050 mm long, seta dps distinctly longer than seta dcs; II 4 + 6–10 bipinnate coxal spines, III 5 + 4–6 bipinnate coxal spines and IV 5; intercoxal tubercle bifisetose. Pedipalp with femoral chaetotaxy 3:5:2–4:5:1; chelal hand chaetotaxy 4:5:4, seta ih2 distinctly thinner and longer than others (0.040–0.045 mm long, ratio hand depth/ih2 length 2.0–2.7); trichobothrium ist forming a straight line with eb-esb, and distinctly proximad of lyrifissure fb; fixed finger with 15 pointed teeth with dental canals, two first distal teeth small, third subdistal tooth modified (mt), distal half with saw-like shape; 5 teeth at level of est/it occupying 0.1 mm, distance between apices 0.020–0.025 mm; fixed finger with an unique antiaxial sensory setae (as) at the finger base, at level of lyrifissure fb; distal half of movable finger with 10 pointed teeth with dental canals, 0–1 tiny distal ones; proximal half of finger with 4–5 rounded vestigial teeth on raised lamina; coupled sensilla pc distal of trichobothrium b; lacking lyrifissures fd, hd, ma1 and ma2.

Measurements and ratios (tritonymph paratypes): body 0.96–1.10. Carapace 0.36–0.39/0.31–0.32 (1.2). Chelicera 0.31–0.32/0.15 (2.1), movable finger 0.17. Pedipalp: femur 0.50/0.09 (5.9), patella 0.20–0.21/0.10 (2.0), chela 0.67/0.13 (5.4), hand 0.27–0.28 (2.1–2.2), movable finger 0.38–0.40; ratio movable finger/hand 1.4–1.5, femur/movable finger 1.3, femur/carapace 1.3–1.4, chela/carapace 1.7–1.9, chela/femur 1.3.

Description (deutonymph paratype).—Carapace almost as long as broad; anophthalmic; chaetotaxy: 4:6:4:2:2, without precloacal microsetae. Cheliceral hand with 4 setae (lack setae...
db and it respect to adults) and without lateral microsetae, anteromedial setae (ame) 0.068 mm long, sublateral ocular setae (osl) microsetae size: 0.0075 mm long, ratio setae ame/osl 9.0, only three lyrifissures present: ldt, lve and lvt; fixed finger with 5 teeth, two distal teeth larger than others; movable finger without an isolated subapical tooth (db), with 4 teeth, the distal one larger than others; spinneret prominent as in adult females; seta gl 0.55 from base of movable finger. Chaetotaxy of tergites as in adults; sternites 2:4:4:6:6:6:6:6:1TT1:0:2, stigmatal microsetae apparently absent. Pedipalpal coxa 5 setae (including 2 on manducatory process), distal marginal seta of the disk (dps) 0.045 mm long, areolar insertions of disk setae dps-mps-lps forming a 123° angle; coxa I 2 + 1 marginal microseta, distal marginal seta (dcx) 0.050 mm long; II 3 + 5–6 bipinnate coxal spines, III 3 + 3 bipinnate coxal spines and IV 3; intercoxal tubercle bisetose. Fixed pedipalpal finger with 12 teeth, two first distal teeth small, third subdistal tooth modified (mt), distal half with saw-like shape, 7 teeth at level of est/it occupying 0.1 mm, distance between apices 0.014–0.016 mm; movable finger with 8 pointed teeth and 4 rounded, vestigial teeth on weak lamina; coupled sensilla pc in subbasal position along the movable finger; lyrifissures fa, fp, fb, fd; and mvy present, absent all the others.

Measurements and ratios (deutonymph paratype): body 0.58. Carapace 0.25–0.23 (1.1). Chelicera 0.21–010 (2.1). Pedipalp: femur 0.30/0.12 (5.1), patella 0.14/0.07 (1.9), chela 0.42/0.09 (4.9), hand 0.17 (1.9), movable finger 0.25; ratio movable finger/hand 1.5, femur/movable finger 1.2, femur/carapace 1.2, chela/carapace 1.7, chela/femur 1.4.

Remarks.—Occidenchthonius vachoni sp. nov. is not included in any of the recognized species-groups of the genus. O. vachoni sp. nov. shares many characters with O. duecensis sp. nov., as discussed in the description of the latter species. Additionally, O. vachoni sp. nov. has slender and longer pedipalps than O. duecensis sp. nov.: (♀) femur 7.2 times longer than broad, length 0.76–0.79 mm, chela 5.9–6.0 times longer than deep, length 1.00–1.05 mm, ratio chela/femur 1.3 in O. vachoni sp. nov. versus (♂) femur 5.6–6.0 times longer than broad, length 0.59–0.63 mm, chela 5.9–6.5 times longer than deep, length 0.84–0.91 mm, ratio chela/femur 1.4 in O. duecensis sp. nov.

Distribution.—PORTUGAL: Centro region.

Etymology.—This species is dedicated to the memory of Prof. Max Vachon (1908–1991), for his great contribution to the study of pseudoscorpion fauna and particularly those from Portugal.

Genus Chthonius C.L. Koch, 1843

Chthonius ischnocheles (Hermann, 1804)

Material examined.—PORTUGAL: Sicó Massif, Coimbra district, Penela municipality, Taliscas, Dueça Cave System, Soprador do Carvalho (39°59′10″N, 8°22′58″W; 200 m a.s.l.), 1 ♂, 21 March 2009; 1 ♂, 9 ♀, 2 tritonymphs (DEUA), 30 August 2009; all A.S.P.S. Reboleira. Portugal, Coimbra district, Cantanhede municipality, Portunhos, Gruta d’el Rey (40°17′39″N, 8°32′49″W; 70 m a.s.l.), 4 ♀ (DEUA), 19 May 2009; 2 ♂, 3 ♀, 2 tritonymphs (DEUA), 8 October 2009; all A.S.P.S. Reboleira.

Remarks.—Chthonius ischnocheles inhabits leaf litter, in humid habitats and in moss; in southern Mediterranean regions, it is often found in cave entrances, exhibiting a troglobene life-style with some populations showing weak hypogean adaptations, usually with the reduction of the posterior pair of eyes (e.g., Mahnert 1977), not observed in the specimens of this study.

The species is widespread in Europe and adjacent areas (Harvey 2013): Andorra, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Croatia, Denmark, France (mainland and Corsica), Germany, Great Britain, Greece, Ireland, Italy (mainland, Sardinia and Sicily), Madeira, Malta, Netherlands, Norway, Poland, Portugal (Azores, Madeira archipelagos), Romania, Spain, Serbia, Spain (mainland, Balearic and Canarian archipelagos), Sweden, Switzerland, and Turkey. It has been introduced to Saint Helena Island (South Atlantic Ocean) and several Atlantic Coast and Upper Midwestern states in the U.S.A. In Portugal, this species is only known in the middle of the country (Zaragoza 2007; this study).

DISCUSSION

Currently, three Chthoniidae genera occur in mainland Portugal: Chthonius (3 spp): C. halberti Kew, 1916, C. ischnocheles and C. joniceps Beier, 1931, Ephippiochthonius (3 spp): E. gibus (Beier, 1952), E. portugalensis Zaragoza, 2017 and E. tetrachelatus (Preyssler, 1790), and Occidenchthonius (9 spp): O. alandroalensis sp. nov., O. algarbiascus sp. nov., O. cardosi, O. duecensis sp. nov., O. goncalvesi sp. nov., O. machadoi (Vachon, 1940), O. minutus (Vachon, 1940), O. serranoi Zaragoza, 2017 and O. vachoni sp. nov. (Fig. 46). Portuguese species of the genera Chthonius and Ephippiochthonius are scarce and all epigean, whereas the genus Occidenchthonius is more diverse and mostly represented by troglobiont species.

Occidenchthonius is distributed mostly in Southern Iberian Peninsula: mainland Portugal (Coimbra, Évora, Faro, Leiria, Lisboa and Setúbal districts) and mainland Spain (Andalusia, Castilla-La Mancha, Murcia and Valencian Community regions). Outside of the Iberian Peninsula, only four species are known: O. berninii (Callaini, 1983) and O. cassolai (Beier, 1973), both from Sardinia, O. thaleri (Gardini, 2009) from mainland Italy (Veneto) and O. parmensis (Beier, 1963) which is widespread in Austria, Croatia, Germany, Italy, Slovenia and Switzerland.

Occidenchthonius is a genus that frequently inhabits hidden subterranean ecosystems, i.e., endogean habitats in micro-caverns within the soil, or hypogean habitats in meso and macro-caverns below the soil, and shows a high degree of endemicity. It has also been found at the surface, though up to now such records are scarce (Zaragoza 2017). Due to its small size, we should not dismiss the possibility that the lack of Occidenchthonius in surface ecosystems might be a result of overlooking them during sampling. The discovery of five new Occidenchthonius species in caves of Portugal with microendemic patterns increases to 48 the number of currently known species of the genus (Zaragoza 2017).

Hypogean pseudoscorpions in mainland Portugal are represented by four families, Chthoniidae (Occidenchthonius), Neobisiidae (Roncocereagris Mahnert, 1976) and two remarkable relict monospecific genera: Titanobochica Zaragoza & Reboleira, 2010 (the species name is here changed from Titanobochica magna to Titanobochica magnus, since the suffix
Bochica corresponds to the name of an Amerindian God, masculine in gender) and Lusoblothrus Zaragoza & Reboleira, 2012, of the families Bochicidae and Syarinidae respectively. Pseudoscorpions are now the second most diversified group of troglobions in mainland Portugal; only terrestrial isopods are richer in mainland Portugal (Reboleira et al. 2015).

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Figure 46.—Distribution map of Occidenchthonius spp. in Portugal.

Zaragoza, J.A. 2017. Revision of the *Ephippiochthonius* complex (Pseudoscorpiones, Chthomiidae) in the Iberian Peninsula, Balearic Islands and Macaronesia, with proposed changes to the status of the *Chthonius* subgenera. Zootaxa 4246:1–221.


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