

**COLLECTIONS OF ORIBATID MITES FROM SOUTHERN PORTUGAL,
WITH DESCRIPTION OF A NEW SPECIES OF *ORIBATULA*
(ACARI: ORIBATIDA: ORIBATULIDAE)**

U. Ya. Shtanchaeva¹, L. S. Subías², S. G. Ermilov^{3*} and J. Orobotig⁴

¹ Caspian Institute of Biological Resources, Daghestan Scientific Center, Russian Academy of Sciences, Makhachkala 376000, Russia; e-mail: umukusum@mail.ru

² Complutense University, Madrid E-28040, Spain; e-mail: subias@bio.ucm.es

³ Nizhniy Novgorod Referral Center of the Federal service for Veterinary and Phytosanitary Inspection, Nizhniy Novgorod 603107, Russia; e-mail: ermilovacari@yandex.ru

⁴ Universitat de Lleida, Lleida E-25003, Spain; e-mail: jordiorobotig@gmail.com

*Corresponding author

ABSTRACT: In the course of studies of oribatid mites from 12 localities of southern Portugal we found representatives of 121 species, 77 genera, and 45 families, of which 63 species/subspecies are registered for the first time for Portugal. A checklist, collection localities and known distribution of these species are presented. A new species, *Oribatula polytuberculata* sp. n., is described and illustrated; it is clearly distinguishable from all other species of the genus by having a tuberculate notogastral surface.

KEY WORDS: Oribatida, *Oribatula*, new species, fauna, checklist, southern Portugal

INTRODUCTION

The oribatid fauna of Portugal is relatively poorly known, compared to that of other European countries (Dias Bello 1949; Sellnick 1952; Baeta Neves and Brandão da Graça 1957; Gil and Subías, 1990; Subías and Gil 1990, 1991; Gil et al. 1991; Subías and Gil-Martín 1995; Subías 2000; Subías and Mínguez 2001; Weigmann 2008, 2009a, b, 2010, 2011; Ermilov et al. 2012). Herein, we report the results from studying the oribatid mite specimens collected from several localities in southern Portugal. A checklist is presented, along with specific locality data and the known distribution of all recorded taxa. One previously undescribed species of *Oribatula* Berlese, 1896 (Oribatulidae) was among this material, and it is described below as *Oribatula polytuberculata* sp. n.

MATERIALS AND METHODS

All specimens reported here were collected by L.S. Subías on 04 March 1983. They originated from 12 localities in southern Portugal, as follows.

1. Silves (37°11'13" N, 8°26'20" W): soil under *Ceratonia siliqua*.
2. Barranco do Velho (37°14'0" N, 7°56'0" W): soil under *Ceratonia siliqua*.
3. Aguiar (41°7'21" N, 8°31'52" W): soil under *Quercus suber*.
4. Vila do Bispo (37°5'0" N, 8°53'0" W): soil under *Quercus coccifera*.
5. Monte Gordo (37°10'56" N, 7°26'57" W): soil in pine forest.
6. Luzianes (37°35'0" N, 8°29'0" W): soil under *Quercus suber*.

7. Abela (38°0'0" N, 8°34'0" W): soil under *Quercus ilex*.

8. San Luiz (37°42'53" N, 8°39'53" W): soil under *Cistus ladaniferus*.

9. Sines (37°55'48" N, 8°46'12" W): soil of mat-torale on dunes.

10. Almadena (37°6'0" N, 8°46'0" W): soil in ruit garden.

11. Monchique (37°19'04" N, 8°33'21" W): soil in *Quercus* forest.

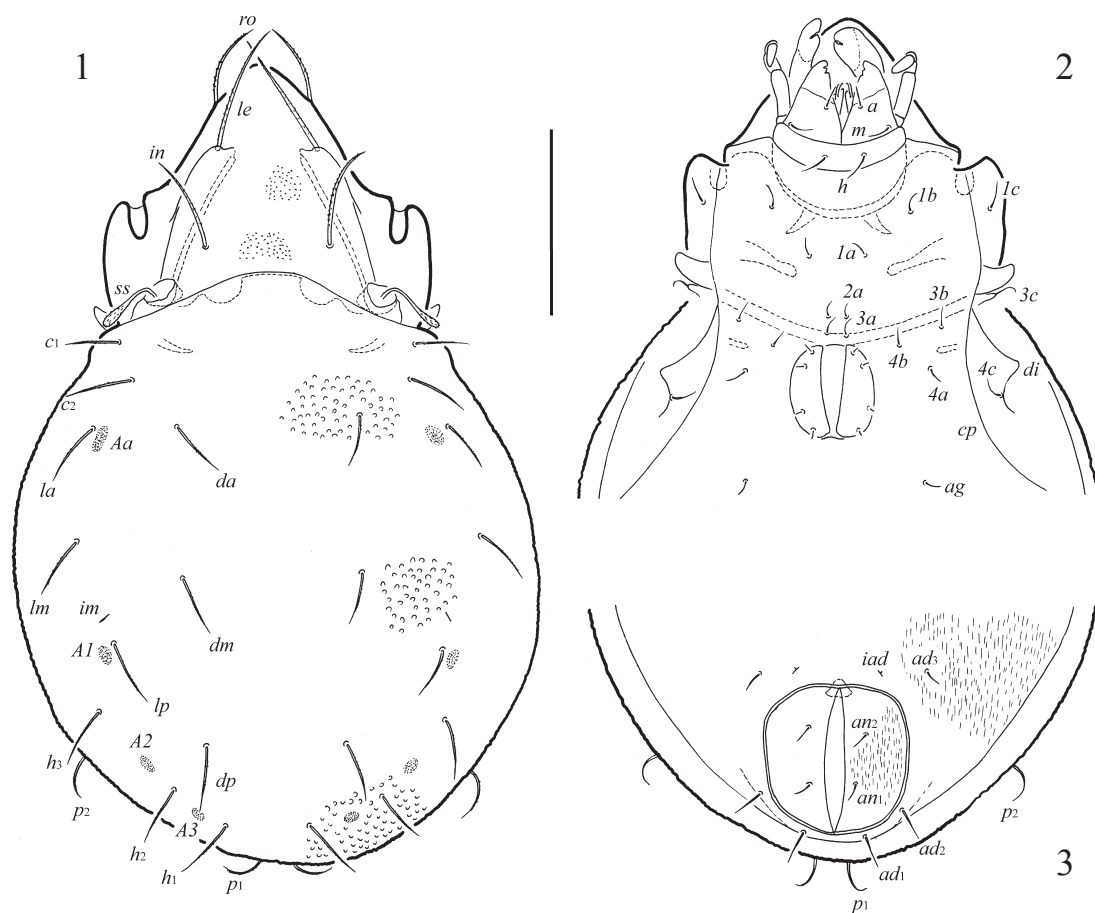
12. Marco (37°19'02" N, 8°33'21" W): moss in *Quercus* forest.

Specimens of the new species were studied and illustrated in lactic acid, mounted on temporary cavity slides for the duration of the study. All body measurements are presented in micrometers. Body length was measured in lateral view. Notogastral width refers to the maximum width in dorsal aspect. Formulae for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulae for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus.

RESULTS

We found representatives of 121 species, 77 genera, and 45 families of oribatid mites of which 63 species/subspecies are registered for the first time for Portugal. Appendix indicates the specific localities where they were collected, and notes their overall known distribution.

At present, 218 species, 120 genera and subgenera, 59 families (including data of this paper) are recorded for Portugal. The geographical analy-



Figs. 1–3. *Oribatula polytuberculata* sp. n., adult: 1 — dorsal view, legs not shown; 2 — gnathosomal, epimeral and genital regions, ventral view, legs not shown; 3 — anal region, ventral view. Scale bar 100 μ m.

sis of Portuguese oribatid mites of studied region has shown that widespread species (with cosmopolitan, semicosmopolitan, holarctic and palearctic distributions) comprise only one-third of the fauna (40 species). The majority of species (> 50%) are included in the Mediterranean oribatid mite group. This group comprises Mediterranean (23), West Mediterranean (7), Iberian (27) and South European (4) species. The other groups are presented by species with southern palearctic (10), western palearctic (6), southern holarctic (2) and tropical (2) distribution. In our data, the rate of endemism of species is 22%. It is consistent with previous results (Gil and Subías 1990) concerning southern Portugal (endemism near 21%).

Description of *Oribatula polytuberculata* Ermilov, Shtanchaeva, Subías et Orbitig sp. n.

Figs. 1–7

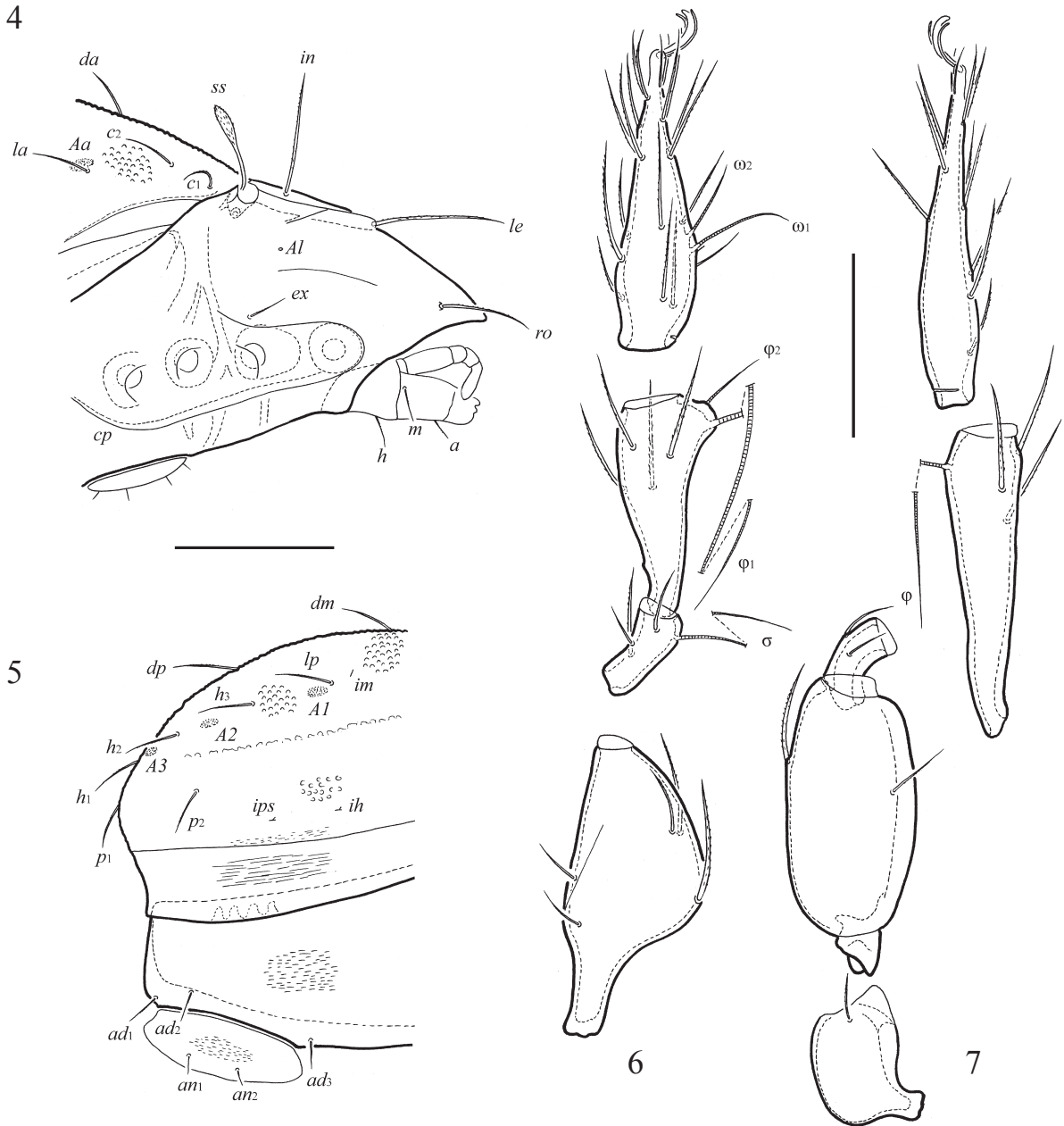
Diagnosis. This species is distinguished from other members of *Oribatula* by the following combination of character states: body size 440–525 \times 275–345; body color light brown to dark brown; prodorsal surface with poorly visible microtubercles; notogastral surface tuberculate; ano-

genital region and anal plates with short, longitudinal striae; lamella broad, slightly widened anteriorly, pair converging anteriorly; sensillus with long stalk and oblong, rounded or distally narrowed head; 13 pairs of notogastral setae setiform, of medium size; four pairs of oval porose areas on notogaster.

Description. Measurements. Body length 445 (holotype, female), 440–525 (24 paratypes); body width 280 (holotype), 275–345 (24 paratypes).

Integument (Figs. 1, 3). Body color light to dark brown. Prodorsal surface with microtubercles. Notogaster surface densely tuberculate (up to 6 in diameter). Anogenital region and anal plates with dense, short, longitudinal striae. Epimeral region and genital plates smooth.

Prodorsum (Figs. 1, 4, 8, 9). Rostrum rounded in dorsal view. Lamella broad, slightly widened anteriorly, pair converging anteriorly. Translamella absent, without rudiments. Rostral (*ro*: 53–61), lamellar (*le*: 73–86) and interlamellar (*in*: 69–73) setae setiform, barbed. Rostral seta inserted on small tubercle. Sensillus (*ss*: 48–58) with long stalk (24–28) and oblong, rounded or distally narrowed, barbed head (24–30).



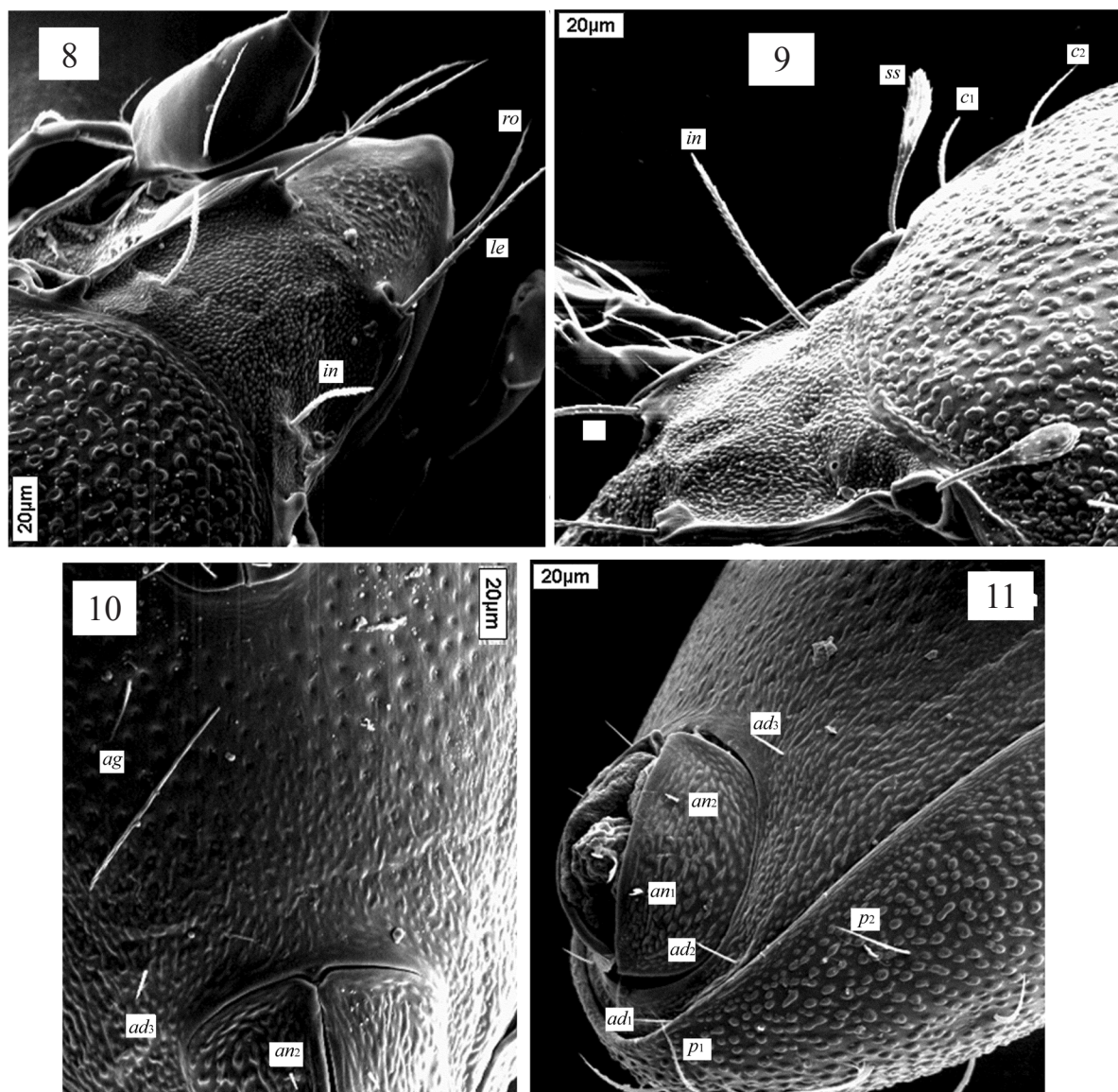
Figs. 4–7. *Oribatula polytuberculata* sp. n., adult: 4 — prodorsum, lateral view, epimeral setae and legs not shown; 5 — notogaster partially, lateral view; 6 — leg I, without trochanter, left, antiaxial view; 7 — leg IV, left, antiaxial view. Scale bar 100 μm (4, 5); scale bar 50 μm (6, 7).

Notogaster (Figs. 1, 4, 5, 8, 9, 11). Dorsosejugal furrow slightly convex. Humeral projections distinct. Thirteen pairs of setiform, barbed notogastral setae present. Setae p_3 absent in all specimens. Setae p_1 and p_2 curved, others more or less straight. Setae c_1 , p_1 and p_2 (30–34) little shorter than others (36–41). Four pairs of oval porose areas developed dorsally: Aa 16–20 \times 10–12, $A1$ 12–16 \times 8, $A2$ 10–12 \times 6, and $A3$ 8–10 \times 6. Opisthotal gland opening and lyrifissures developed in typical arrangement for genus, but only im well visible.

Lateral part of body (Fig. 4, 5). Exobothridial seta (24–28) setiform, thin, barbed. A thin, poorly

visible line present in the place of localization of a tutorium. Sublamellar line distinct. Sublamellar porose area (Al) very small (2–4), rounded. Porose area Ah not found. Discidium (di) and circumpedicular carina (cp) well developed. Lyrifissures ih and ips distinct.

Gnathosoma (Figs. 2, 4). Subcapitulum longer than wide: 102 \times 73. Hypostomal and adoral setae setiform, slightly barbed; h and m (both 24) longer than a (20) and or_1 , or_2 (12). Length of palp 77. All setae (except distal ones on tarsi) barbed. Length of chelicera 102. Cheliceral setae setiform, slightly thickened, barbed, cha (32) longer than chb (20).



Figs. 8–11. *Oribatula polytuberculata* sp. n., SEM micrographs of adult: 8 — prodorsum and anterior part of notogaster, dorsal view; 9 — prodorsum and anterior part of notogaster, dorso-lateral view; 10 — anogenital region, ventral view; 11 — anogenital region, lateral view. Scale bar 20 µm.

Table. Leg setation and solenidia of *Oribatula polytuberculata* sp. n.

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
I	v'	d, (l), bv'', v''	(l), v', σ	(l), (v), φ ₁ , φ ₂	(ft), (tc), (it), (p), (u), (a), s, (pv), v', (pl), l'', e, ω ₁ , ω ₂
II	v'	d, l' ₁ , l' ₂ , bv'', v''	l', v', σ	(l), (v), φ	(ft), (tc), (it), (p), (u), (a), s, (pv), ω ₁ , ω ₂
III	l', v'	d, l', ev'	l', σ	l', (v), φ	(ft), (tc), (it), (p), (u), (a), s, (pv)
IV	v'	d, ev'	d, l'	l', (v), φ	ft'', (tc), (p), (u), (a), s, (pv)

Epimeral region (Fig. 2). All epimeral setae (16–20) setiform, slightly barbed. Seta 3c inserted on oblong cylindrical tubercle. Sejugal epimeral border complete.

Anogenital region (Figs. 2, 3, 5, 10, 11). Four pairs of genital setae (8–12), one pair of aggenital setae (ag, 12–16), two pairs of anal setae (an₁, an₂, 8–12), three pairs of adanal setae (ad₁, ad₂, ad₃,

16); all setiform, slightly barbed. Lyrifissures *iad* in preanal position.

Legs (Figs 6, 7). Tarsi with three simple claws, median claw obviously thicker than lateral claws. Formulae of leg setation and solenidia: I (1–5–3–4–20) [1–2–2], II (1–5–2–4–15) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homology of setae and solenidia indicated in Table.

Material examined. Holotype (female), paratypes (24 specimens) were obtained from Locality 8 (see *Material and Methods* section).

Type deposition. The holotype and 22 paratypes are deposited in the collection of the Complutense University, Madrid, Spain; two paratypes are in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

Etymology. The specific name “*polytuberculatus*” refers to the numerous tubercles on the notogaster.

Remarks. *Oribatula polytuberculata* sp. n. is most similar morphologically (body size, structure lamella, morphology of porose areas, prodorsal and notogastral setae and ventral side of body) to *Oribatula tibialis* (Nicolet, 1855), but differs from latter and also from the other species of *Oribatula* by the presence of numerous and dense tubercles on notogaster (tubercles absent in the other species).

REFERENCES

- Baeta Neves, C.M. and Brandão da Graça, C. J. 1957. Nota sobre a mesofauna (Acarina) dos solos florestais de Portugal. *Portugaliae Acta biologica (B)*, 6 (1): 40–43.
- Dias Bello, A.J. 1949. *Fauna da Manta Morta Florestal (Contribuição para o seu estudo na Mata Nacional das Virtudes)*. Relatório Final de Curso de Engenheiro Silvicultor. Instituto Superior de Agronomia, Lisboa, 70 p.
- Ermilov, S.G., Shtanchaeva, U.Ya. and Subías, L.S. 2012. A new species of *Metabelbella* (Acari: Oribatida: Damaeidae) from *Quercus* forests of Southern Portugal. *International Journal of Acarology*, 38 (4): 282–289.
- Gil, J. and Subías, L.S. 1990. Oribátidos del cabo de San Vicente (Portugal) (Acari, Oribatida). *Boletín de la Asociación Española de Entomología*, 14: 137–151.
- Gil, J., Subías, L.S. and Candelas, E. 1991. La familia Cosmochthoniidae Grandjean, 1947, en la Península Ibérica (Acari: Oribatida). *Zoologica Baetica*, 2: 47–70.
- Sellnick, M. 1952. *Haffenrefferiella nevesi* n. g., n. sp., and new genus and species from Portugal, and *Haffenrefferia glivipes* (C.L. Koch) (Acari, Oribatida). *Portugaliae Acta biologica (B)*, 3 (4): 228–237.
- Subías, L.S. 2000. Nuevos oribátidos (Acariformes, Oribatida) para la fauna de la península Ibérica. *Graellsia*, 56: 21–25.
- Subías, L.S. 2004. Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles). *Graellsia*, 60 (número extraordinario), 3–305. Online version accessed in February 2011, 561 p.; <http://www.ucm.es/info/zoo/Artropodos/Catalogo.pdf>
- Subías, L.S. and Gil, J. 1990. Tres nuevas especies de oribátidos (Acari: Oribatida) de Portugal. *Boletín de la Real Sociedad Española de Historia Natural*, 86 (1–4), 195–202.
- Subías, L.S. and Gil, J. 1991. Tres nuevas especies de la familia Brachychthoniidae (Acari, Oribatida) de sur de Portugal. *Arquivos do Museu Bocage. Nova serie*, 2 (1), 1–10.
- Subías, L.S. and Gil-Martín, J. 1995. Nuevas citas oribatológicas (Acari, Oribatida) para la fauna española. *Boletín de la Asociación Española de Entomología*, 19 (1–2), 25–51.
- Subías, L.S. and Mínguez, M.E. 2001. Listado sistemático de los oribátidos (Acariformes, Oribatida) del noroeste de la península Ibérica. *Graellsia*, 57, 15–27.
- Weigmann, G. 2008. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. I. *Peloptulus sacculiferus* n. sp., an aberrant species of Phenopelopidae compared with similar European species of the genus. *Soil Organisms*, 80 (1): 133–143.
- Weigmann, G. 2009a. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. II. The genera *Zachvatkinibates* and *Punctoribates* (Mycobatiidae). *Soil Organisms*, 81 (1): 85–105.
- Weigmann, G. 2009b. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. III. New species of Scutoverticidae and Scheloribatidae. *Soil Organisms*, 80 (1): 107–127.
- Weigmann, G. 2010. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. IV. The genera *Coronoquadroppia*, *Scheloribates*, *Haplozetes* and *Pilobates*. *Soil Organisms*, 82 (3): 383–406.
- Weigmann, G. 2011. Oribatid mites (Acari: Oribatida) from the coastal region of Portugal. V. *Xenillus*, *Oribatella*, *Galumna*, *Eupelops* and *Lucoppia*. *Soil Organisms*, 83 (2): 287–306.

APPENDIX

Oribatid mites collected from southern Portugal

Oribatid taxa	Locality (see text)												Distribution ¹
	1	2	3	4	5	6	7	8	9	10	11	12	
Acaronychidae Grandjean, 1932													
Acaronychus Grandjean, 1932													
1. <i>Acaronychus traegardhi</i> Grandjean, 1932*									X				Holarctica south
Ctenacaridae Grandjean, 1954													
Beklemishevia Zachvatkin, 1945													
2. <i>Beklemishevia hispaniola</i> Pérez-Íñigo, 1997*											X		Mediterranea west
Ctenacarus Grandjean, 1939													
3. <i>Ctenacarus araneola</i> (Grandjean, 1932)*	X	X								X		X	Tropics
Brachychthoniidae Thor, 1934													
Brachychthonius Berlese, 1910													
4. <i>Brachychthonius pseudoimmaculatus</i> Subías and Gil-Martín, 1991					X								Mediterranea
Liochthonius Hammen, 1959													
5. <i>Liochthonius brevis</i> (Michael, 1888)									X				Holarctica
6. <i>Liochthonius propinquus</i> Niedbala, 1972*					X								Palaearctica west
Poecilochthonius Balogh, 1943													
7. <i>Poecilochthonius italicus</i> (Berlese, 1910)				X									Holarctica
Sellnickochthonius Krivolutsky, 1964													
8. <i>Sellnickochthonius fuentesi</i> Ruiz, Subías and Kahwash, 1991*												X	Mediterranea
9. <i>Sellnickochthonius furcatus</i> (Weis-Fogh, 1948)*					X								Palaearctica west
10. <i>Sellnickochthonius jacoti</i> (Evans, 1952)*					X								Holarctica
Cosmochthoniidae Grandjean, 1947													
Cosmochthonius Berlese, 1910													
11. <i>Cosmochthonius foliatus</i> Subías, 1982				X					X	X			Mediterranea west
12. <i>Cosmochthonius perezinigo</i> Morell, 1988*									X				Iberia
13. <i>Cosmochthonius semifoveolatus</i> Subías, 1982*	X												Iberia
Haplochthoniidae Hammen, 1959													
Haplochthonius Willmann, 1930													
14. <i>Haplochthonius sanctaeluciae</i> Bernini, 1973*									X				Semicosmopolitan
Sphaerochthoniidae Grandjean, 1947													
Sphaerochthonius Berlese, 1910													
15. <i>Sphaerochthonius splendidus</i> (Berlese, 1904)											X		Cosmopolitan
Lohmanniidae Berlese, 1916													
Papillacarus Kunst, 1959													
16. <i>Papillacarus pseudoaciculatus</i> Mahunka, 1980											X	X	Mediterranea west
Euphthiracaridae Jacot, 1930													
Acrotritia Jacot, 1923													

¹ See Subías (2004, online version 2011)

17. <i>Acrotritia ardua monodactyla</i> (Niedbala, 2002)*		X										X	Holarctica south	
18. <i>Acrotritia hyeroglyphica</i> (Berlese, 1916)												X	Semicosmopolitan	
Phthiracaridae Perty, 1841														
Hoplophthiracarus Jacot, 1933														
19. <i>Hoplophthiracarus illinoisensis</i> (Ewing, 1909)												X	Semicosmopolitan	
Phthiracarus Perty, 1841														
20. <i>Phthiracarus laevigatus</i> (Koch, 1841)												X	Palaearctica	
Steganacarus Ewing, 1917														
21. <i>Steganacarus applicatus</i> (Sellnick, 1920)*						X			X				Palaearctica west	
22. <i>Steganacarus magnus</i> (Nicolet, 1855)												X	Holarctica	
Hermanniellidae Grandjean, 1934														
Hermanniella Berlese, 1908														
23. <i>Hermanniella picea</i> (Koch, 1839)*	X												Holarctica	
Licnodamaeidae Grandjean, 1954														
Licnoliodes Grandjean, 1931														
24. <i>Licnoliodes adminensis</i> Grandjean, 1933												X	X	Mediterranea west
25. <i>Licnoliodes andrei</i> Grandjean, 1931*													X	Palaearctica
Licnobelbidae Grandjean, 1965														
Licnobelba Grandjean, 1931														
26. <i>Licnobelba latiflabellata</i> (Paoli, 1908)												X		Palaearctica west
Gymnodamaeidae Grandjean, 1954														
Adrodamaeus Paschoal, 1984														
27. <i>Adrodamaeus hispanicus</i> (Grandjean, 1928)								X	X			X		Palaearctica south
Jacotella Banks, 1947														
28. <i>Jacotella</i> sp.													X	Iberia
Damaeidae Berlese, 1896														
Belba Heyden, 1826														
29. <i>Belba corynopus</i> (Hermann, 1804)	X											X		Holarctica
Metabelbella Bulanova-Zachvatkina, 1967														
30. <i>Metabelbella janae</i> Pérez-Íñigo jr., 1991								X				X		Iberia
Porobelba Grandjean, 1936														
31. <i>Porobelba grandjeanica</i> Subías, 1977*									X					Iberia
Neoliodidae Sellnick, 1928														
Neoliodes Berlese, 1888														
32. <i>Neoliodes theleproctus</i> (Hermann, 1804)*	X													Semicosmopolitan
33. <i>Neoliodes</i> sp.	X													Iberia
Compactozetidae Luxton, 1988														
Cepheus Koch, 1835														
34. <i>Cepheus latus</i> Koch, 1835								X	X			X		Holarctica
Zetorchestidae Michael, 1898														
Microzetorchestes Balogh, 1943														
35. <i>Microzetorchestes emeryi</i> (Coggi, 1898)	X											X	X	Palaearctica south
Ceratoppiidae Kunst, 1971														
Ceratoppia Berlese, 1908														
36. <i>Ceratoppia bipilis</i> (Hermann, 1804)												X		Holarctica
Gustaviidae Oudemans, 1900														

Collections of oribatid mites from southern Portugal

Gustavia Kramer., 1879														
37. <i>Gustavia fusifer</i> (Koch, 1841)											X	Palaearctica west		
Liacaridae Sellnick, 1928														
Adoristes (Gordeeviella) Shtanchaeva, Subías y Arillo, 2010														
38. <i>Adoristes (Gordeeviella) krivolutskyi</i> Shtanchaeva, Subías and Arillo, 2009						X						Mediterranea		
Liacarus (Dorycranosus) Woolley, 1969														
39. <i>Liacarus (Dorycranosus) splendens</i> (Coggi, 1898)*										X		Palaearctica south		
40. <i>Liacarus (Dorycranosus) zachvatkini</i> Kulijev, 1962*											X	Mediterranea		
Xenillidae Woolley e Higgins, 1966														
Xenillus Robineau-Desvoidy, 1839														
41. <i>Xenillus clypeator</i> Robineau-Desvoidy, 1839				X						X		Holarctica		
42. <i>Xenillus ybarrai</i> Morell, 1987*											X	Iberia		
Ctenobelbidae Grandjean, 1965														
Ctenobelba Balogh, 1943														
43. <i>Ctenobelba pulchellula</i> Gil-Martín and Subías, 1997*							X		X		X	X	Iberia	
Ameridae Bulanova-Zachvatkina, 1957														
Amerus Berlese, 1896														
44. <i>Amerus cuspidatus</i> Avanzati, Salomone, Baratti and Bernini, 2003*										X		X	Mediterranea	
Oribellidae Kunst, 1971														
Oribella Berlese, 1908														
45. <i>Oribella pectinata</i> (Michael, 1885)*			X										Holarctica	
Oppiidae Sellnick, 1937														
Graptoppia Balogh, 1983														
46. <i>Graptoppia paraanalisis</i> Subías and Rodríguez, 1985*											X		Palaearctica west	
Ramusella (R.) Hammer, 1962														
47. <i>Ramusella (R.) clavipectinata</i> (Michael, 1885)										X			Cosmopolitan	
48. <i>Ramusella (R.) junonis</i> Pérez-Íñigo, 1986												X	Mediterranea west	
49. <i>Ramusella (R.) sengbuschi</i> Hammer, 1968*										X			Tropics	
50. <i>Ramusella (R.)</i> sp. 1			X									X	Iberia	
51. <i>Ramusella (R.)</i> sp. 2													X	Iberia
Ramusella (Rectoppia) Subías, 1980														
52. <i>Ramusella (Rectoppia) eduardoi</i> Arillo and Subías, 1996*						X								Iberia
Ramuselloppia Subías y Rodríguez, 1986														
53. <i>Ramuselloppia anomala</i> Subías and Rodríguez, 1986*						X			X					Iberia
Rhinoppia Balogh, 1983														
54. <i>Rhinoppia media</i> (Mihelčič, 1956)*										X			X	Mediterranea
55. <i>Rhinoppia obsoleta curtiramosa</i> Subías and Shtanchaeva, 2011*													X	Iberia
56. <i>Rhinoppia subpectinata</i> (Oudemans, 1900)												X		Holarctica
Serratoppia Subías and Mínguez, 1985														

Collections of oribatid mites from southern Portugal

<i>Galumna</i> Heyden, 1826												
120. <i>Galumna gibbula</i> Grandjean, 1956*									X			Mediterranea
<i>Pilogalumna</i> Grandjean, 1956												
121. <i>Pilogalumna crassiclava</i> (Berlese, 1914)*	X		X						X		X	Palearctica south

* species are registered for the first time for Portugal