Zootaxa 982: 1–13 (2005)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

982

Description of *Ossinissa*, a new pholcid genus from the Canary Islands (Araneae: Pholcidae)

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Abstract

Ossinissa new genus (Araneae, Pholcidae) is described to place a Canarian pholcid species formerly considered belonging to *Spermophorides*. The male of the type species, *Ossinissa justoi* (Wunderlich) new combination, is described for the first time and the female is re-described. This new genus is supported by a revision of the morphological characters of the female, the newly discovered male, and a cladistic analysis.

Key words: spiders, pholcids, new genus, taxonomy, Canaries, El Hierro

Introduction

The Canary archipelago includes seven islands and various islets of volcanic origin situated between 100 and 550 kilometers off the northwest coast of Africa. The proximity to this continent facilitates colonization by North African species. The numerous colonization episodes and the high diversity of habitats, ranging from arid lowlands to humid subtropical forests and alpine zones, offer optimum conditions for the diversification of local fauna. Consequently, the biodiversity of the flora and fauna of the archipelago is high and includes many endemic species and even endemic genera. Spiders (Araneae) are an important component of this high endemism.

The pholcids are one of the spider families with highest diversity in the Canary Islands (Wunderlich 1987, 1992; Dimitrov & Ribera, in press). With few exceptions, such as *Pholcus phalangioides* and *Spermophora senoculata*, all species in the archipelago are endemic. Except for *S. senoculata*, all belong to only two genera: *Pholcus* and *Spermophorides*. The first record of a Canarian pholcid dates from the end of the 19th century, when *P. ornatus* Bösenberg 1895 was described. Thereafter, no new species was recorded until the description of *P. gomerae* by Wunderlich in 1980. After Wunderlich's work,

Accepted by P. Jäger: 4 May 2005; published: 19 May 2005

arachnological research in the archipelago increased significantly and eighteen more species of *Pholcus* have subsequently been described (Wunderlich 1987, 1992; Campos & Wunderlich 1995; Dimitrov & Ribera 2003, in press). The history of the Canarian species of *Spermophorides* is similar. The first twelve species of this genus were initially described as *Spermophora* (Wunderlich 1987). Several years later they were grouped with ten newly described species in a new genus - *Spermophorides* Wunderlich 1992.

In our ongoing work on Macaronesian pholcids, we collected and examined specimens from the Cueva de Don Justo (El Hierro island) that had previously been classified as *Spermophorides justoi* on the basis of the examination of only eight adult females (Wunderlich 1992). After a detailed study of two adult males and twenty females, we conclude that these specimens do not belong to *Spermophorides* nor do they fit the diagnosis of any of the currently known pholcid genera. Here we provide the first description of the male. In addition, we re-describe the female of this species and propose a new genus to accommodate it.

Material and Methods

All measurements given in the text are in millimeters with decimal numbers according to the presumed accuracy. The total body length was calculated as the sum of the prosoma and the opisthosoma, omitting the pedicel.

Specimens were examined under Wild Heerbrugg (12-100X) and Leica MZ16A (10-115X) stereomicroscopes. The female vulvae were removed and treated with a 50% solution of lactic acid in order to make the non-sclerotized tissue transparent. After observation and drawing, the vulvae were washed in distilled water and stored in 70 % ethylic alcohol. For the scanning electron microscope (SEM) photos, the specimens were examined in an Hitachi S2300 and a Leica S 360 scanning electron microscopes.

Specimens of three Canary Islands *Pholcus* very different morphologically between each other (*P. fuerteventurensis*, *P. ornatus* and *P. gomerae*) were examined with SEM in order to study ultrastructural characters used in the cladistic analysis (Figs. 31–39).

The newly collected specimens were deposited in the Departament de Biologia Animal, Universitat de Barcelona (CCRUB). Type material from Canarian Pholcids was borrowed from the Senckenberg Natural History Museum (SMF).

The terminology used is as in Huber 2000. The numerical cladistic analysis was done using NONA, version 2 (Goloboff 1999) and Pee-Wee, version 2.8 (Goloboff 1997). Cladogram manipulation and character optimization were done with WinClada version 1.00.08 (Nixon 2002). For more detailed information on the cladistic analysis see section “Generic relationships”.

Type species. — *Spermophorides justoi* Wunderlich 1992

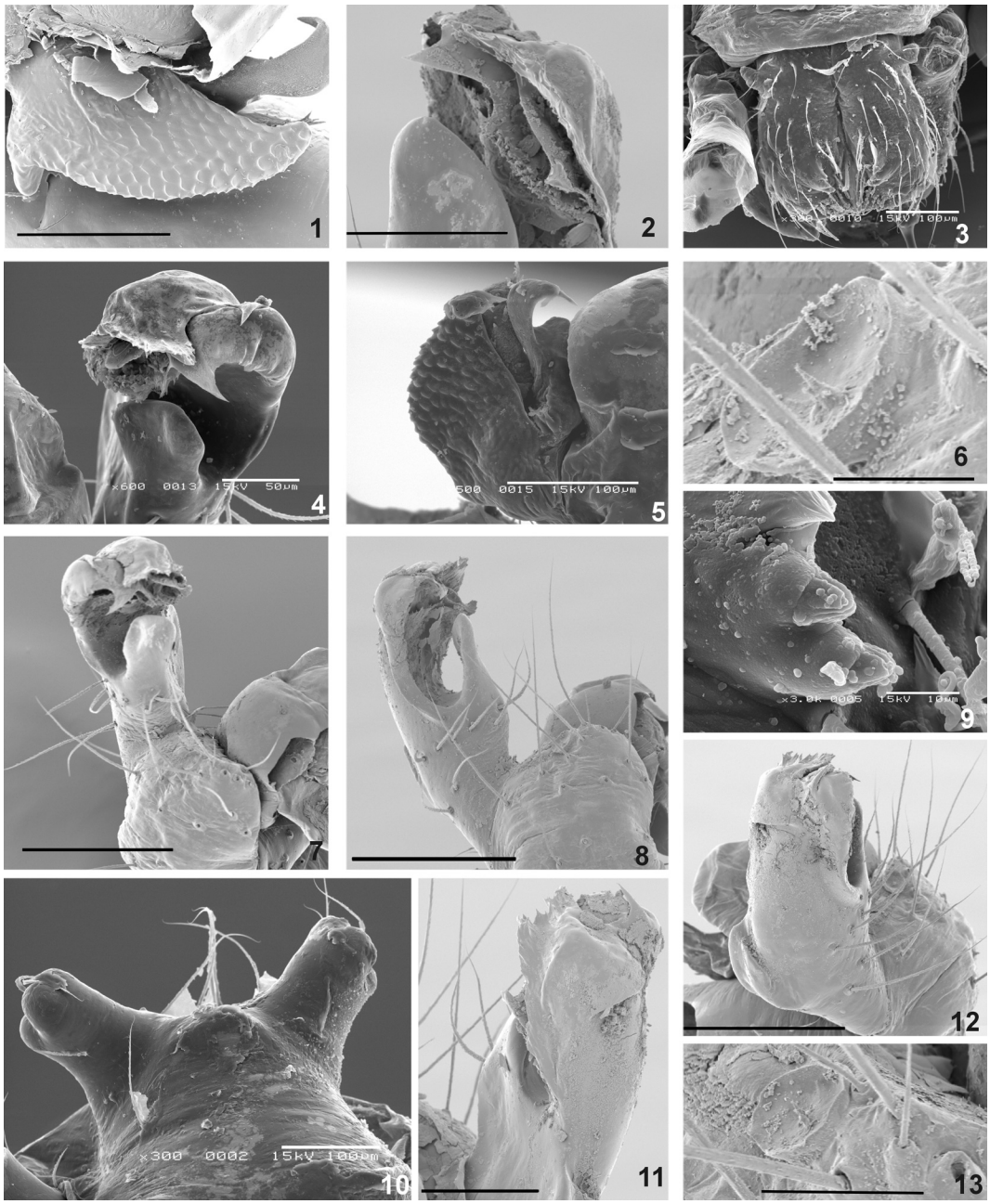
Etymology. — The generic name honors Ossinissa, the last king of El Hierro Island before its conquest by the Norman Jean de Bethencourt at the beginning of the 15th century. Gender is masculine.

Diagnosis. — The opisthosoma is cylindrical in males and oval in females (Fig. 25). Prosoma and habitus as in Figs. 21–22. Ocular area elevated and placed close to the center of the prosoma. Distinguished from closely related genera (*Pholcus, Micropholcus, Leptopholcus* and *Spermophora*) by the shape of the prosoma (Fig. 21) and the morphology of the procursus with characteristic dorso-retrolateral apophysis and concave shape. A useful character for identification purposes is the shape of the tarsal organ (Figs. 6, 13), which in *Ossinissa* new genus is flat (sensu Huber 2000, 2003), while in all closely related genera it is capsulated. Although the small size and the globular shape of the female opisthosoma may lead to some confusion with *Spermophora* or *Spermophorides*, *Ossinissa* new genus can be easily distinguished by the presence of a well-developed uncus (Figs. 1, 5, 14, 20), the structure of the procursus (Fig. 24) and the presence of eight eyes. Additionally, the absence of the "bump" of the epigynum in *Ossinissa* new genus clearly separates this genus from *Spermophorides*, and the lack of pockets in the vulva is a useful trait when differentiating from *Spermophora*.

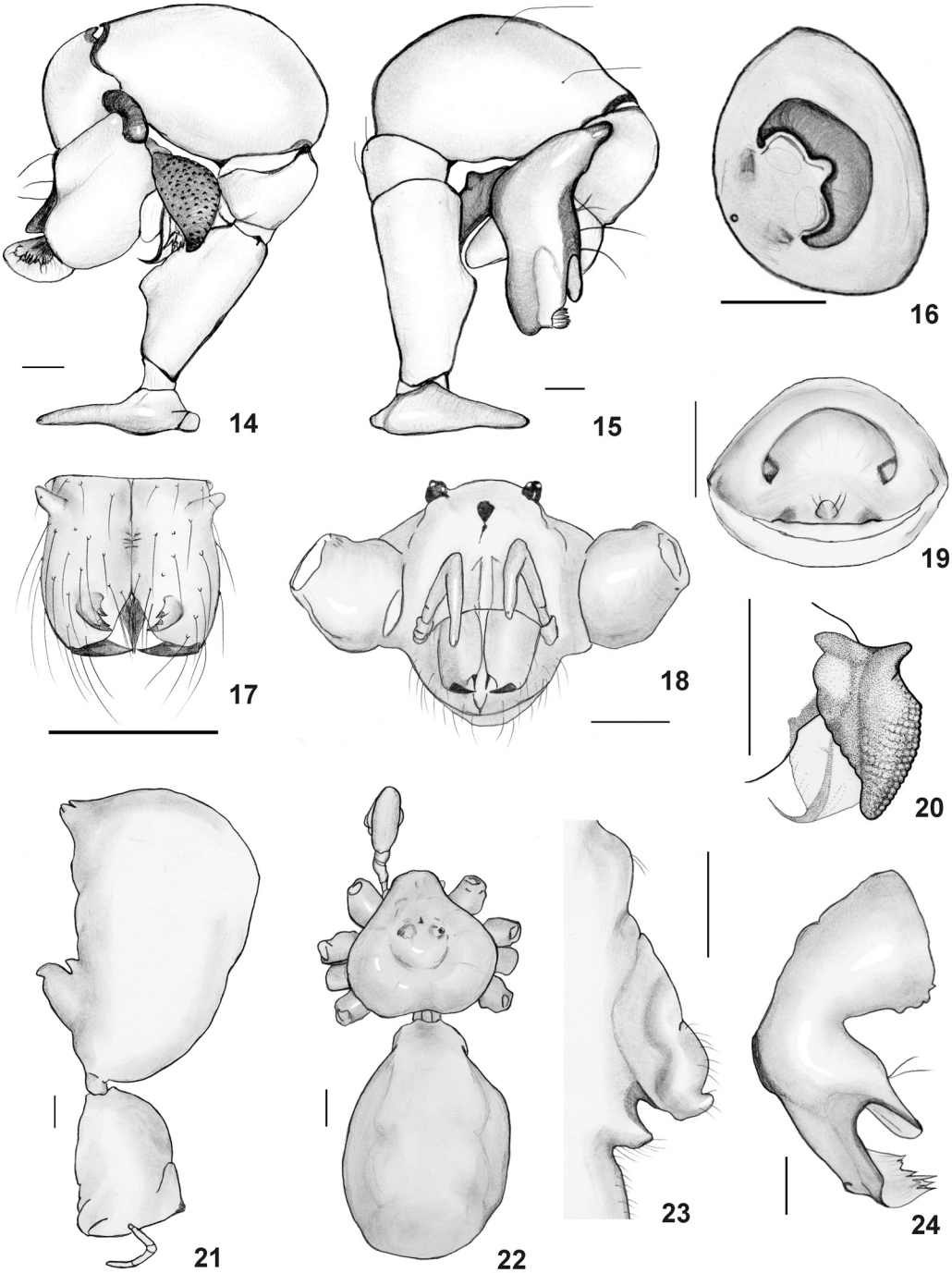
The most important characters that distinguish *Ossinissa* new genus from small-sized *Pholcus* species are: the cavity of the procursus; the dorso-retrolateral apophysis of the procursus, and the shape of the tarsal organ. The absence of a heavily sclerotized structure around the pore plates in the female genitalia of *Ossinissa* new genus is also a good diagnostic character.

Description. — Ochre-yellowish pholcids. Total body length in males slightly smaller than in females. Prosoma shape as in Fig. 21. The ocular area moderately elevated and situated roughly in the center of the prosoma. Eight eyes. In the type species, eyes are reduced, especially the AME. The arrangements of the eyes as in most eight-eyed pholcids; ALE, PME and PLE grouped in two triads placed on the lateral margins of the ocular area. Lateral triads are placed on two short cylindrical outgrowths. AME situated between the triads on the frontal side of the ocular area. Ocular area surrounded by a slight depression of the prosoma. Male chelicerae (Figs. 3, 17) with distal apophyses (Fig. 9) carrying modified hairs (sensu Huber 2000) and proximolateral apophyses. In females, chelicerae bear no apophyses. Male palpal trochanter with retrolateral process, femur cylindrical with ventral bulge. Procursus robust and narrower at the base (Fig. 24), with a cavity open toward the bulb. Distally, procursus with well developed dorso-retrolateral apophysis. Genital bulb with three projections: uncus (Fig. 20), appendix and embolus. Embolus with membranous structure. Leg formula 1423. Legs and body covered with short hairs. Opisthosoma almost cylindrical in males and globular in females. Spinnerets (Figs. 26–29)

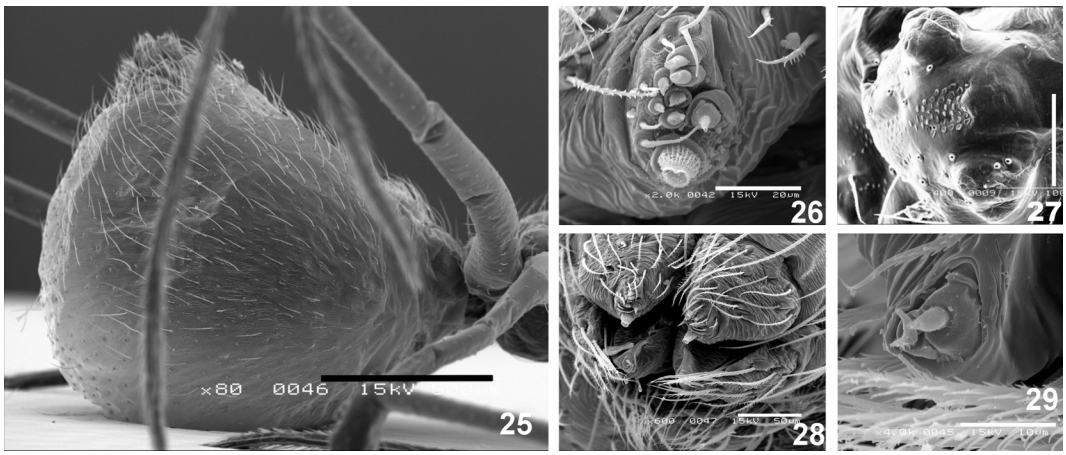
situated ventrally close to the end of the opisthosoma. Epigynum elevated. Vulva with heavily sclerotized valve ridge.



FIGURES 1–13. *Ossinissa justoi* new combination, male. 1. Uncus, retrolateral; 2. Apex of the procursus, retrolateral; 3. Chelicerae, frontal; 4. Procursus, retrolateral; 5. Uncus, dorso-retrolateral; 6. Tarsal organ, lateral; 7. Palp, dorso-retrolateral; 8. Palp with procursus, dorsal; 9. Distal apophyses of the chelicerae, fronto-lateral; 10. Ocular area, frontal; 11. Procursus, ventral; 12. Male palp, prolateral; 13. Tarsal organ, fronto-lateral. Scale bars: 1–5, 10–11: 100 µm; 7–8, 12: 200 µm; 4: 50 µm; 13: 40 µm; 6: 20 µm; 9: 10 µm.



FIGURES 14–24. *Ossinissa justoi* new combination, male (14–15, 17, 20, 22, 24), female (16, 18–19, 21, 23). 14. Male palp, retrolateral; 15. Male palp, prolateral; 16. Vulva, dorsal; 17. Male chelicerae, frontal; 18. Female prosoma, lateral; 19. Epigynum, ventral; 20. Uncus, retrolateral; 21. Female body, lateral; 22. Male body, dorsal; 23. Epigynum, lateral; 24. Procursus, dorsal. Scale bars: 0.2 mm.



FIGURES 25–29. *Ossinissa justoi* new combination, female. 25. Opisthosoma, lateral; 26. Anterior lateral spinnerets, ventral; 27. Ocular area, dorsal; 28. Spinnerets, ventral; 29. Posterior median spinnerets, ventral. Scale bars: 25: 500 µm; 26: 20 µm; 27: 100µm; 29: 10 µm; 28: 50 µm.

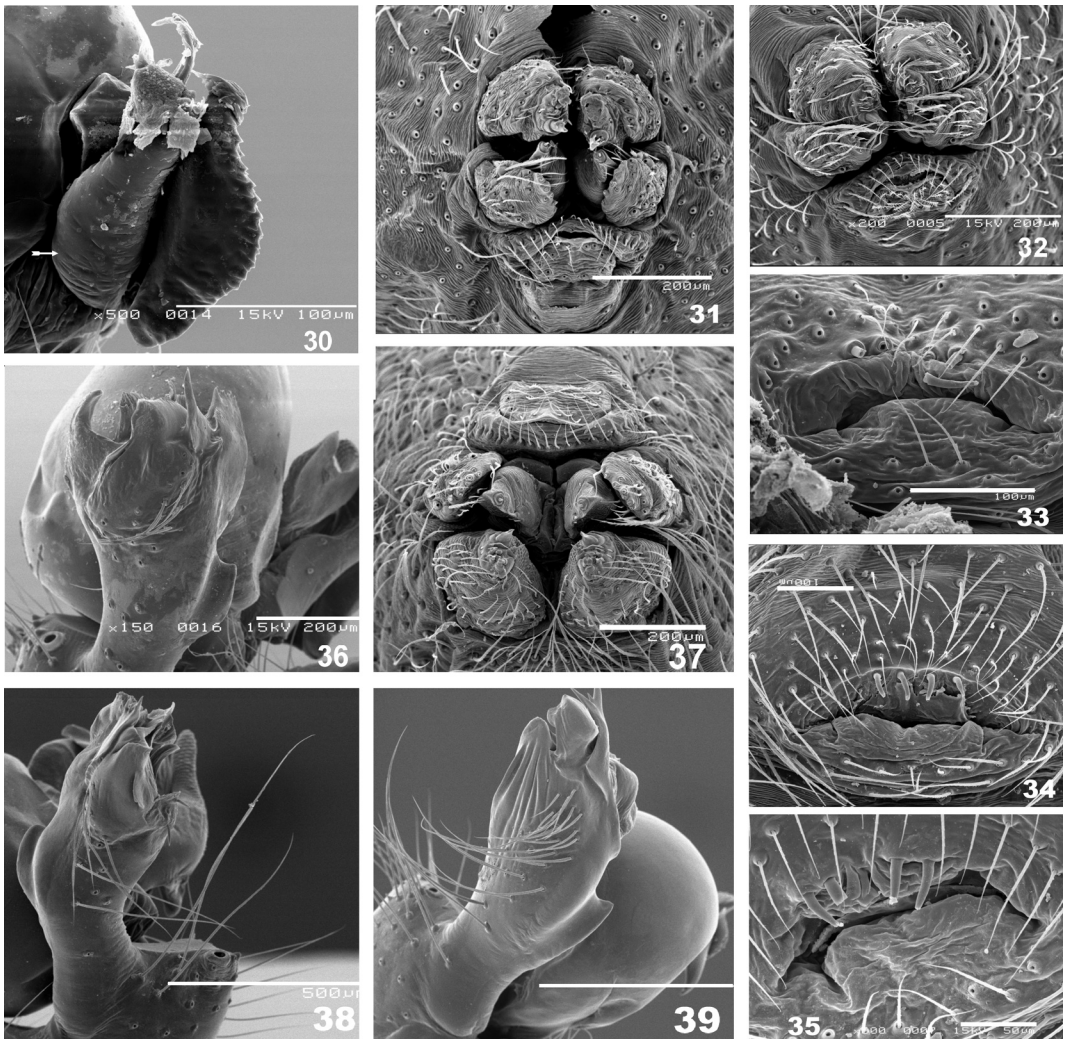
Generic relationships. — This genus shares several synapomorphies with the members of the genus *Pholcus*. The most important of these is the presence of a well-developed uncus. Similarities can be observed in the general structure of the male palp (the shape of femur, tibia and trochanter). The distribution of the eyes is also similar to that in *Pholcus*. However, despite these similarities, the structure of the procursus in *Ossinissa* new genus differs greatly; the tarsal organ is flat while that in *Pholcus* is capsulated; the chelicerae do not have frontal prominences and the morphology of the female vulva is distinct.

Although *O. justoi* was placed initially in *Spermophorides*, it does not share any character with the members of this genus except for the globular shape of the female opisthosoma.

Relationships were examined by means of a cladistic analysis. The data matrix used for the analysis is listed in Appendix 1. The matrix was based on Huber 2003 but was modified as follows:

1 Several taxa were deleted, mainly New World genera and ninetines, which would not have contributed to the determination of *Ossinissa* new genus and its close relatives.
2 *O. justoi* and some *Pholcus* species from the Canary Islands were added (*P. fuerteventurensis*, *P. ornatus* and *P. gomerae*).
3 One character was added: 60 – shape of the opisthosoma; 0 – cylindrical, 1 – elevated (the opisthosoma does not present regular height). When the opisthosoma was elevated in one of the two sexes, the species was coded as 1. (Note that the total number of characters is 61 but they are numbered starting from 0).

Using a previously published matrix from which several non-related taxa were deleted resulted in a high number of non-informative characters.



FIGURES 30–39. *Ossinissa justoi* new combination, male. Bulbal projections (arrow indicates embolus), dorso-prolateral. Figures 31, 33, 38. *Pholcus ornatus*, male: 31. Spinnerets, ventral; 33. Gonopore, ventral; 38. Male palp, prolateral. Figures 32, 35–36. *Pholcus fuerteventurensis*, male: 32. Spinnerets, ventral; 35. Gonopore, ventral; 36. Male palp, prolateral. Figures 34, 37, 39. *Pholcus gomerae*, male: 34. Gonopore, ventral; 37. Spinnerets, ventral; 39. Male palp, ventro-prolateral. Scale bars: 30, 33–34: 100µm; 31–32, 36–37, 39: 200µm; 38: 500µm; 35: 50µm.

Running NONA with hold 10000 and mult*1000 gave as a result 81 most parsimonious trees with 94 steps. The strict consensus of these trees is given in Appendix II. In addition, the stability of the clades was estimated by calculating the bootstrap and jackknife support using NONA. In all trees generated by the analysis, *Ossinissa* new genus is placed in a clade formed by *Micropholcus*, *Pholcus* and *Leptopholcus*. In this group *Micropholcus* occupies in most of the cases a basal position, and *Ossinissa* new genus is recognized as the closest relative of *Pholcus*. In all cladograms *Pholcus* appears to be paraphyletic with

respect to *Leptopholcus* and this is supported by both bootstrap and jackknife. This could be one more evidence for the possible synonymy of *Pholcus* and *Leptopholcus* (Brignoli, 1980; Huber, 2001).

The application of implied weighting with Pee-Wee (algorithm that resolves character conflict in favor of characters that present less homoplasy) with K from 1–6 produced the same result as NONA.

The placement of *Ossinissa* new genus outside *Pholcus* in all of the analyses, and the fact that the clade *Pholcus* + *Leptopholcus* appears in all cladograms and is supported by bootstrap and jackknife, upholds the existence of *Ossinissa* new genus as separate genus. Although these results suggest that *Leptopholcus* is a synonym of *Pholcus*, this would need further investigation.

In summary, we conclude that *Ossinissa* new genus is closely related with the genera in the *Pholcus* group: *Pholcus*, *Micropholcus* and *Leptopholcus*.

Distribution. – The distribution of this genus is restricted. The Cueva de Don Justo and the Cueva de los Pocitos on El Hierro Island are the only two locations where it has ever been reported.

Included species. – Currently, this genus includes only one species, *Ossinissa justoi* new combination.

Ossinissa justoi (Wunderlich 1992) new combination

Figs. 1–29

Spermophorides justoi Wunderlich 1992: 329, figs. 207–209

Material examined. — Canary Islands, El Hierro: Cueva de Don Justo: 2 female paratypes, 18 April 1984 (SMF 39763, 37193). 1 male, 1 female, 15 April 1984, J. L. Martin (CCRUB 3517-140, 3518-140); 2 females from the same locality, 6 November 1992, C. Ribera (CCRUB 3519-140, 3520-140); 2 females, 14 September 2000, GIET (Grupo de Investigaciones Espeleológicas de Tenerife) (CCRUB 4557-171); 4 females, 1 juvenile, 27 November 2000, GIET (CCRUB 4558-171, 4559-171); 2 females, 29 January 2000, GIET (CCRUB 4560-171); 1 male, 1 female, 6 October 2000, GIET (CCRUB 4563-171, 4561-171); 4 females, 1 sub adult male, 1 juvenile, 31 January 2000, GIET (CCRUB 4562-171). **Canary Islands, El Hierro: Cueva de los Pocitos**: 2 females, 25 September 2000, GIET (CCRUB 4554-171); 1 female, 8 October 2000, GIET (CCRUB 4555-171); 1 female, 15 October 2000, GIET (CCRUB 4556-171).

Diagnosis. — This species is the only member of *Ossinissa* new genus known at present. Consequently, diagnosis is difficult. However, on the basis of our knowledge on pholcid taxonomy, we can say that this species is characterized by the shape of the apophyses of the procursus; the shape of the uncus and the shape of the appendix of the genital bulb. The most important character of the female is the shape of the valval ridge and the position of the two pore plates in the vulva.

Measurements. — Male: Prosoma 0.73 wide, 0.74 long; opisthosoma 0.83 wide, 1.22 long, maximum height 0.50; total body length 1.96. Leg I: 15.0 (femur 4.2 + patella 0.2 + tibia 4.4 + metatarsus 5.1 + tarsus 1.1); leg II: 10.8 (2.9 + 0.2 + 2.9 + 3.8 + 1.0); leg III: tarsus and metatarsus missing (2.4 + 0.2 + 2.2); leg IV: 12.0 (3.4 + 0.2 + 2.9 + 4.6 + 0.9). Palp: 2.8 (femur 0.7 + patella 0.4 + tibia 1.1 + tarsus 0.6), procursus 1.0. Female: Prosoma 0.73 wide, 0.83 long; opisthosoma 1.47 wide, 1.81 long, maximum height 1.47; total body length 2.64. Leg I: 18.1 (femur 4.9 + patella 0.3 + tibia 4.9 + metatarsus 6.3 + tarsus 1.7); leg II: 12.3 (3.5 + 0.3 + 3.2 + 4.2 + 1.1); leg III: 9.5 (2.7 + 0.3 + 2.3 + 3.4 + 0.8); leg IV: 13.8 (4.1 + 0.3 + 3.8 + 4.6 + 1.0). Palp 1.2 (femur 0.5 + patella 0.1 + tibia 0.3 + tarsus 0.3).

Description of the male. — Prosoma pale yellow, well-marked fovea and almost undistinguishable junction between head and thoracic region. Ocular area (Fig. 10) elevated and close to the center of prosoma. Eight eyes surrounded by area with darker pigmentation. ALE, PME and PLE on two cylindrical stems. All eyes strongly reduced, especially AME. A bunch of long hairs placed between the stems. Sternum yellowish. Chelicerae brownish (Figs. 3, 17), with dark distal apophyses. Proximolateral apophyses smaller close to the end of the clypeus. Distal apophyses cylindrical, apically with three small darker modified hairs (Fig. 9). Legs long, slightly darker. Palp as in Figs. 7–8, 12, 14 and 16, trochanter with long retrolateral apophysis, femur cylindrical with ventral bulge bearing a small keel. Procursus characteristic (Figs. 2, 4, 11, 24), robust, brown. Distal part of the procursus about two times wider than its base. Procursus concave the genital bulb. In the last third, an elliptical incision defines a dorso-retrolateral apophysis. Apophysis short, fingerlike and with smooth limits. Procursus terminates with irregularly serrated membrane. Area just beneath the dorsal incision semi-transparent and thinner than rest of procursus. Procursus located dorsally, with few thick and relatively short hairs. Uncus (Figs. 1, 5, 20) well developed. Shape of the uncus and its granulation are characteristic and very useful for diagnosis. Embolus as in Fig. 30. Opisthosoma cylindrical with same color as prosoma. Spinnerets as in Figs. 26–29.

Re-description of the female. — All characters as in male except: chelicerae without apophyses and with a lighter pigmentation. Arrangement and size of eyes as in male but stems of lateral triads much shorter (Fig. 18). Hairs between the stems with regular size. Opisthosoma globular and higher than in male. Epigynum (Figs. 19, 23) elevated. Ventrally epigynum with tiny, almost transparent, triangular plate. Plate of epigynum with two dark zones laterally. Some parts of the vulva can be observed externally. Vulva as in Fig. 16.

Distribution. —— Only known form in the Cueva de Don Justo and Cueva de los Pocitos, El Hierro Island, Canary Islands, Spain.

Biogeographic comments

The presence of this cave-dwelling species on El Hierro, the youngest island in the archi-

pelago, raises questions about the colonization of the Canaries by this animal. This situation is not unique, since on the same island similar cases have been reported (see Oromí & Izquierdo 1994). A good example is the genus *Collartida* (Heteroptera, Reduviidae, Emesinae). The first member of this genus reported in the Canary Islands was *C. anophthalma* (Español & Ribes 1983), which was also found in the Don Justo Cave. Later, another species, *C. tanausu*, was described from a cave on La Palma, the second youngest island (Ribes *et al.* 1998). These two cavernicolous species of Heteroptera are exceptional cases of adaptation to the hypogean environment in this insect group (Maldonado 1994). Again, La Palma and El Hierro are the only islands in the archipelago where the genera *Cixius* (Hemiptera, Cixiidae) and *Meenoplus* (Hemiptera, Meenoplidae) are present, with several species on each island, all troglobites (Hoch & Asche 1993).

A similar distribution pattern is observed for the spider genus *Trogloneta* (Mysmenidae). The troglobite species from this genus in the Canaries (undescribed material) was collected from caves on the two youngest islands, El Hierro and La Palma.

There are two hypotheses to explain the distribution of *Ossinissa* new genus. The first is that this genus colonized El Hierro directly from the continent. Although possible, the probability of this happening more than once in distinct groups is very low. The second hypothesis is that this genus had a much wider distribution in the archipelago in the past, but became extinct in the older islands. This extinction could have been a result of increasing competition with other species. The succession of distinct animal communities and the changes in the environment could account for the extinction of *Ossinissa* new genus in the older islands.

Acknowledgements

We thank Dr Miquel Arnedo for his help with the Pee-Wee program and Dr Salvador Carranza and Dr Pedro Oromi for their valuable comments on a previous draft of the manuscript. We also acknowledge the helpful remarks of Dr Bernhard Huber about the taxonomical position of this new genus. This research was supported by BOS 2002-00629 (Ministerio de Ciencia y Tecnologia, Spain).

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APPENDIX 1

Data matrix used for cladistic analysis

Kukulcania hibernalis (Hentz)	0111?000010?0--00000010??10--00-00?0-0000000000--------10001
Diguetia signata Gerthsch	1??00001000?0--00110000??00--00-0000-0000000000--------1000?
Ninetis subtilissima Simon	01000100111000--0010000110010010-0100-0000000001000000011001
Psilochorus pullilus (Hentz)	01010100001100--0010001101111010-0000-0010000001000000000-001
Coryssocnemis simla Huber	01110100001100--0010101101111010-0000-0010000001000000000-00?
Smeringopus pallidus (Blackwall)	01020100011000--0010001101111110-0010-2000000001000000010000
Crossopriza lyoni (Blackwall)	01020100011100--0010011111111110-0110-2000000001000000010001
Holocnemus pluchei (Scopoli)	01020100011100--0010011101111110-0110-2000000001000000000?0000
Physocyclus globosus (Taczanowski)	01021100001000--0010001101111110-0110-0000000001000001101001
Artema atlanta Walckenaer	01020100011000--0010001101111110-00?0-1000000001000001101000?
Zatavua analalava Huber	110001100?1000--0010001111111010-0001100000001110000000??101
Zatavua griswoldi Huber	11001110011000--0010001111111010-0001100000001110000000010101
Zatavua isalo Huber	110101000?1000--001?00?1?1111010-0001100000001110000000??001
Micropholcus fauroti (Simon)	00000100011000--0010001111111010-0001020001000010000000010000
Pholcus phalangioides (Fuesslin)	00000100011000--0010001111111?10-0001020001000010000000010010
Pholcus fuerteventurensis Wunderlich	00000100011000--0010001111111010-0001020001000010000000010010
Pholcus ornatus Bösenberg	00000100011000--0010001111111010-0001020001000010000000010010
Pholcus gomerae Wunderlich	00000100011000--0010001111111010-0001020001000010000000010010
Leptopholcus delicatulus Franganillo	00000100011000--0010001111111010-0001020001000010000000010010
Spermophorides sp1	11010100001100--0210001111111010-0001000001000011010000010001
Spermophorides sp2	11010100001100--0210001111111010-0001000001000011010000010001
Buitinga asax Huber	100101000111010000100011?1111010-?001030001010010011000010001
Buitinga buhoma Huber	100101000?110101001000111111101101001030001 0?00100?00000??001
Belisana amani Huber	11000100011000--0010001 1?1111010-0001000001100010000000001000?
Belisana sp1	11000100011000--0010001111111010-0001000001000010000000000-00?
Spermophora senoculata (Dugès)	100101000?1100--0010011111111010-0001030001000011100000??001
Spermophora yao Huber	10000100011000--0110001 1?1111010-0001000001000010 0?0100010011
Spermophora lambilloni Huber	10010100011100--0010001111111010-0001020001000010100001??001
Spermophora peninsulae Lawrence	11000100011000--0010001111111010-0001020001200010010100010001
Paramicromerys betsileo Huber	10010100011100--0010001111111010-0001000001002010010000001000?
Paramicromerys coddingtoni Huber	10010100011100--0010011111111010-0001000001002010010000001000?
Paramicromerys nampoinai Huber	100101000?1100--0010011111111010-0001020011102010010000??00?
Ossinissa justoi (Wunderlich)	000001000?1000--0010001 1?1111010-0001020001000010000000000-011

APPENDIX II

Strict consensus of 81 most parsimonious trees found by NONA (L=102; CI=60; RI=76). The numbers above represent the bootstrap, and the numbers bellow the jackknife support for the clades.