

## Additions to the knowledge of Portuguese zodariid spiders (Araneae: Zodariidae)

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### Summary

This paper deals with 12 species and one form of zodariid spiders from Portugal. Four species, *Zodarion bacelarae*, *Z. duriense*, *Z. guadianense* and *Z. lusitanicum*, are new, and *Z. extraneum* Denis, 1935 is treated as a distinct form of *Z. styliferum* (Simon, 1870). For three other species, *Amphile-dorus adonis* Jocqué & Bosmans, 2001, *Zodarion jozefienae* Bosmans, 1994, and *Z. merlijni* Bosmans, 1994, females are described for the first time. The last species and *Zodarion segurense* Bosmans, 1994 are recorded from Portugal for the first time. New records are given for four other species, *Selamia reticulata* (Simon, 1870), *Zodarion alacre* (Simon, 1870), *Z. maculatum* (Simon, 1870) and *Z. styliferum* (Simon, 1870). Descriptions are provided for the new species and the form, and distribution maps are presented for all species. At present, 17 zodariid species and one form are known from Portugal.

### Introduction

The Portuguese spider fauna is one of the least known in Europe, though probably one of the richest owing to its southern location and ecological diversity. The occurrence of almost 650 species has been reported from Portugal (Alderweireldt & Bosmans, 2001; Cardoso, 2000) but the real number is obviously much higher. Until recently there have been only two Portuguese zoologists dealing with spiders in a serious and continuous way, Amélia Bacelar and António de Barros Machado, who worked more than 50 years ago. Thanks to an emerging group of students under the initial supervision of CM, spiders in Portugal are being investigated again. So far the group has been invited to participate in several biodiversity projects, such as that concerning the effects of the dam near Alqueva. The main obstacle encountered in these projects is the identification of spiders, as there are a number of undescribed species. Unfortunately, no identification key exists for the Portuguese or Iberian arachnofauna, which makes the task even more difficult. This was true for zodariid spiders until recently when Bosmans (1994) and Jocqué & Bosmans (2001) revised the material

available and included identification keys. These works enabled us to study newly collected rich material of zodariid spiders.

The history of knowledge of Portuguese zodariid spiders is rather short. Until the end of the 19th century only two species, *Zodarion styliferum* (Simon, 1870) and *Selamia reticulata* (Simon, 1870), were known from Portugal (Simon, 1870). Thirty years later three more species, *Z. maculatum* (Simon, 1870), *Z. fuscum* (Simon, 1870) and *Z. elegans* (Simon, 1873), were reported by Bacelar (1928, 1935); however, the last two are considered incorrect identifications (Bosmans, 1994, 1997). Denis (1937, 1939) described *Z. viduum* Denis, 1937 and *Z. machadoi* Denis, 1939. More than 10 years later Machado (1949) gave records for two more species, *Z. alacre* (Simon, 1870) and *Z. timidum* (Simon, 1874), but these turned out to be incorrect (see under *Z. styliferum* f. *extraneum*). Recently Bosmans (1994) described two more new species, *Z. algarvense* and *Z. jozefienae*, and provided records for *Z. alacre* from Portugal. Cardoso (2000) produced evidence for one more species, *Z. rudyi* Bosmans, 1994. Finally, Jocqué & Bosmans (2001) described *Amphile-dorus adonis* and Alderweireldt & Bosmans (2001) found *Z. gregua* Bosmans, 1994. Thus, altogether 11 species of zodariid spiders have hitherto been recorded from Portugal.

The Mediterranean region is very rich in zodariid spiders, particularly those of the genus *Zodarion*. Of 109 species of this genus known in the world, the great majority (73%) occur in the Mediterranean region. Within this region the western part, with about 40 species, seems to be richer in numbers of species than the central (28 species) or eastern part (12 species) (Platnick, 2002). This suggests that the western Mediterranean may have been an important speciation centre for the genus *Zodarion* and that there may still be many undescribed species. The number of zodariid species known in Portugal can be expected to increase in the future (Bosmans, 1994), as the majority of records have come from incidental visits by foreign collectors to favourite places (Cardoso, 2000). This paper presents the description of four new species, one form, and records for two species previously known only from Spain, thus increasing the total number of Portuguese zodariid spiders to 17 species and one form.

### Material and methods

More than 2,400 individuals of zodariid spiders were revised in this study. The majority of the material came from six recent projects, which were run for almost a whole year (or at least for several months) and thus yielded large numbers of specimens. This allowed us to match the appropriate sexes and to record variation in size and colour. Almost all spiders were captured using pitfall traps. Only a few specimens came from institutional collections and incidental collections by the authors.

Diagnostic characters in males are the shapes of the tibial apophysis, median apophysis and embolus. Of

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these, the tibial apophysis seems to be the most important as it is unique for each species. Both the median apophysis and tip of the embolus are considerably smaller (clearly seen only at a large magnification) and therefore the differences are less apparent, particularly between closely related species. For each new species the left male palp is depicted from ventral and retrolateral views. The median apophysis was usually drawn in the resting position; only once was it drawn expanded (for *Z. lusitanicum* sp. n.).

Diagnostic characters in females are the shapes of the epigynal plate and spermathecae. In order to obtain figures of the "vulva", dissected epigynes were cleared in 10% KOH for a few hours. Even in a cleared epigyne the copulatory ducts were hardly visible and often impossible to trace. Therefore, the "vulva" is regarded as a less important diagnostic character. Epigynes are depicted in ventral and dorsal views. The arrangement of hairs in drawings of palps and epigynes is only approximate, and is intended only to distinguish bald and hairy areas.

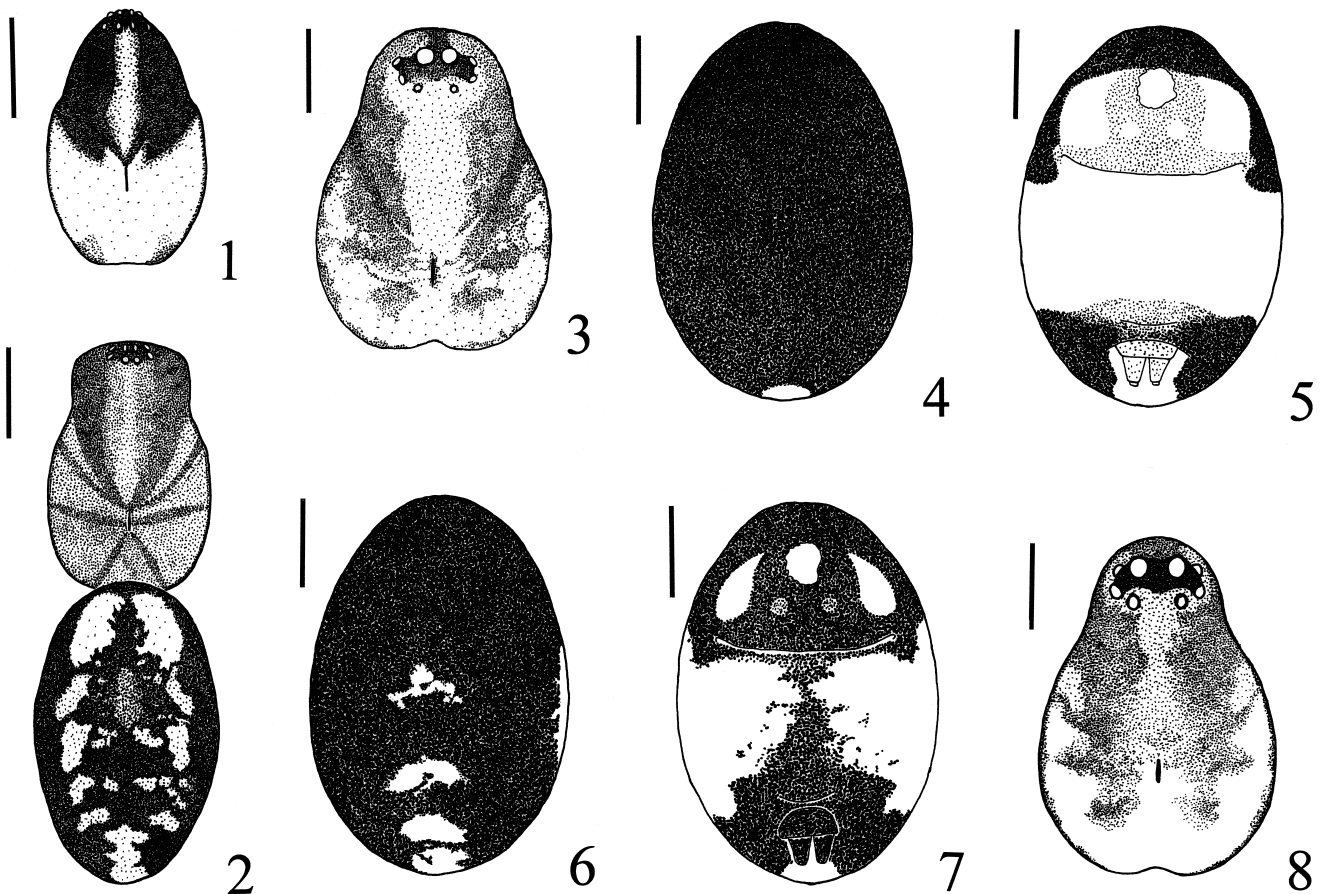
In addition to the morphological characters, body colour appeared to be species specific with negligible variation within species. Pekár (2002) showed that the colour pattern might be used for identification of juvenile *Zodarium* specimens. The colour of the prosoma, coxae, femora, dorsal pattern of opisthosoma (number

of white spots in a row), and venter of opisthosoma (area between epigastric furrow and spinnerets), are the most important characters.

A karyological analysis was performed in order to separate two forms of *Z. styliferum*. Karyotypes were made from 7 individuals of *Z. styliferum* f. *extraneum* and 5 individuals of *Z. styliferum* using the procedure outlined by Pekár & Král (2001). We give here only a short description of the studied karyotypes as these will be dealt with in detail elsewhere (Pekár & Král, in prep.).

Each record is identified by the name of the district (in capital letters), name of the locality, e.g. a mountain range or a nearby town (in italics), the name of the site, and the square unit number (UTM). Maps include both new records (presented in this paper) as well as previously published records as these have often been erroneously located in earlier maps.

Abbreviations: AMNH=American Museum of Natural History, New York; BMNH=British Museum of Natural History, London; MBL=Museu Bocage, Lisbon; MNHNP=Muséum national d'Histoire naturelle, Paris; CCM=collection of C. Meierrose, Évora; CPC=collection of P. Cardoso, Baixa da Banheira; CSP=collection of S. Pekár, Brno. Legs: Cx=coxa, Fe=femur, Ti=tibia. Stage: juv=juvenile. All measurements are in mm.



Figs. 1-8: 1-2 *Amphiledorus adonis* Jocqué & Bosmans. 1 Prosoma, male, dorsal view; 2 Prosoma and opisthosoma, female, dorsal view. 3-5 *Zodarium styliferum* f. *extraneum* Denis. 3 Prosoma, male, dorsal view; 4 Opisthosoma, male, dorsal view; 5 Ditto, ventral view. 6-7 *Z. styliferum* (Simon). 6 Opisthosoma, male, dorsal view; 7 Ditto, ventral view. 8 *Z. jozefienae* Bosmans. Prosoma, male, dorsal view. Scale lines=1.0 mm (1-2), 0.4 mm (3-8).

*Amphiledorus adonis* Jocqué & Bosmans, 2001 (Figs. 1–2, 19, 27, Map 1).

*Amphiledorus adonis* Jocqué & Bosmans, 2001: 130, figs. 37–39 (D♂).

**Diagnosis:** For the male see Jocqué & Bosmans (2001). Females are recognised by the position of the copulatory openings, which are close to the septum at the posterior margin of the epigynal plate (Figs. 19, 27).

**Remark:** There is a remarkable sexual dimorphism in the shape of the cephalic part of the prosoma (cf. Figs. 1 and 2).

**Description: Male:** Total length 4.1–5.3; prosoma length 2.2–2.7, width 1.5–1.87. Cephalic part of prosoma tapering anteriorly (Fig. 1). Colour: prosoma variable; in some specimens cephalic part brown to dark brown with thin yellow to orange stripe between eyes and fovea, thoracic part yellow to orange (Fig. 1); in other specimens less contrasting than in female (Fig. 2). Chelicerae brown; sternum orange with dark brown margins; Fe dark brown with greenish tinge; all other leg segments yellow, brown on sides; abdomen dorsally dark brown with two large anterior whitish spots, followed by two rows of four oblique grey spots (as in female, Fig. 2), ventrally pale with brown spots. Palp: see Jocqué & Bosmans (2001).

**Female:** Total length 6.1; prosoma length 2.8, width 1.7. Cephalic part of prosoma rectangular (Fig. 2). Colour: prosoma uniformly yellow to brown with darker cephalic part (Fig. 2); chelicerae brown; sternum brown; legs and abdomen as in male. Epigyne: wide plate strongly developed, divided by longitudinal central septum, copulatory openings at posterior margin near septum (Fig. 19); spermathecae spherical, situated in anterior half of epigyne (Fig. 27).

**Material examined:** ÉVORA DISTRICT (all R. Ramos Silva leg.): *Albufeira do Alqueva*: Ilha no. 93 (UTM 29SPC44), 1♀ 2juv, 12 June 2000 (CSP), 3♂, 31 October 2000 (CSP); Ilha no. 20 (UTM 29SPC33), 5♂, 25 October 2000 (CCM); Ilha no. 27 (UTM 29SPC43), 4♂, 25 October 2000 (CCM).

**Distribution:** So far known only from southern Portugal in the Algarve (Jocqué & Bosmans, 2001) and Évora district (Map 1).

### *Selamia reticulata* (Simon, 1870) (Map 1)

*Lachesis reticulata* Simon, 1870: 53 (D♂♀).

*Storena reticulata*: Bacelar, 1928: 182; 1935: 36.

*Selamia reticulata*: Jocqué & Bosmans, 2001: 116, figs. 1–6 (♂♀).

**Diagnosis:** For both sexes see Jocqué & Bosmans (2001).

**Description:** For both sexes see Jocqué & Bosmans (2001).

**Material examined:** BRAGANÇA DISTRICT (All P. Cardoso leg. (CPC) unless otherwise stated): *Parque Natural do Douro Internacional*: Bemposta (UTM 29TQF17), 1juv, 4 June 2001; Fonte d'Aldeia (UTM 29TQF18), 1♀, 30 May 2001, 1♂, 13 June 2001, 1juv, 27 June 2001, 1♀ 2juv, 3 October 2001, 1♀, 17 October 2001; Freixiosa (UTM 29TQF29), 1♂, 5 June 2001, 2♂, 19 June 2001; Lamoso (UTM 29TQF07), 1♂, 18 June 2001; Mazouco (UTM 29TPF85), 1♂, 24 October 2001; Picote (UTM 29TQF28), 1♀, 7 June 2001; Picotino (UTM 29TPF86), 1♂, 30 May 2001, 1♂, 3 October 2001. *Lousa*: Torre de Moncorvo (UTM 29TPF55), 1♀, 6 April 1942, A. Barros

Machado leg. (MBL, no 1349). VISEU DISTRICT: *S. João da Pesqueira*: Ervedosa do Douro (UTM 29TPF25), 2♀, April 1942, A. Barros Machado leg. (MBL, no. 1553). ÉVORA DISTRICT (A. Espiridião Oliveira leg. (CCM)): *Évora*: São Bento de Castris (UTM 29SNC97), 1♂, 17 May 1998, 3♂ 1♀ 1juv, 1 June 1998, 3♂, 15 June 1998.

**Distribution:** Western Mediterranean (Jocqué & Bosmans, 2001). In Portugal it may occur across the entire country (Map 1).

### *Zodarion alacre* (Simon, 1870) (Map 2)

*Enyo alacris* Simon, 1870: 144 (D♂).

*Zodarion alacre*: Denis, 1937: 18, pl. 3, fig. 23 (D♀); Bosmans, 1994: 131, figs. 57–59, 115–116 (♂♀).

**Diagnosis:** For both sexes see Bosmans (1994).

**Description:** For both sexes see Bosmans (1994).

**Material examined:** BEJA DISTRICT (all P. Cardoso leg. (CPC) unless otherwise stated): *Parque Natural do Vale do Guadiana*: Ribeira de Limas (UTM 29SPB28), 5♂ 8♀ 1juv, 15 May 2000, 16♂ 7♀, 22 May 2000, 5♂ 1♀, 29 May 2000, 3♀, 5 June 2000, 2♀, 19 June 2000, 1♀, 24 July 2000, 3juv, 24 October 2001, S. Pekár leg. (CSP). BRAGANÇA DISTRICT (all P. Cardoso leg. (CPC) unless otherwise stated): *Parque Natural do Douro Internacional*: Barca d'Alva (UTM 29TPF74), 20♂ 2♀, 27 May 2001, 3♂ 2♀, 10 June 2001; Bemposta (UTM 29TQF17), 1♀, 11 June 2001; Castelo Branco (UTM 29TPF87), 1juv, 10 November 2001, S. Pekár leg. (CSP); Constantim (UTM 29TQG21), 2♂, 25 May 2001; Fonte d'Aldeia (UTM 29TQF18), 5♂ 1♀, 30 May 2001, 1♂ 1juv, 13 June 2001, 1♀, 27 June 2001, 1juv, 8 August 2001, 3juv, 27 August 2001; Freixiosa (UTM 29TQF29), 1♂ 1♀ 1juv, 29 May 2001; Mazouco (UTM 29TPF85), 1♂ 2♀, 30 May 2001, 1♂ 1♀, 30 June 2001, 1♀, 11 July 2001, 4♀ 1juv, 8 August 2001, 3♀ 8juv, 5 September 2001; Palão (UTM 29TPF85), 9♂ 2♀, 30 May 2001, 2♀, 27 June 2001, 1juv, 25 July 2001, 2♀ 3juv, 8 August 2001, 2♀ 2juv, 27 August 2001; Picote, 4♂ 1♀, 31 May 2001, 1♀ 1juv, 14 June 2001. ÉVORA DISTRICT: *Albufeira do Alqueva* (all R. Ramos Silva leg. (CCM)): Ilha no. 4 (UTM 29SPC33), 15juv, 24 October 2000; Ilha no. 8 (UTM 29SPC33), 1juv, 29 October 2000; Ilha no. 10 (UTM 29SPC33), 7♂ 1♀, 2 June 2000; Ilha no. 13 (UTM 29SPC33), 1juv, 30 March 2000; Ilha no. 19 (UTM 29SPC33), 2juv, 26 October 2000; Ilha no. 20 (UTM 29SPC33), 2♂ 1♀, 5 June 2000, 2juv, 25 October 2000; Ilha no. 38 (UTM 29SPC43), 1♂ 1juv, 3 April 2000; Ilha no. 39 (UTM 29SPC44), 3juv, 29 October 2000; Ilha no. 40 (UTM 29SPC33), 11juv, 29 October 2000; Ilha no. 64 (UTM 29SPC44), 1♂, 10 April 2000; Ilha no. 65 (UTM 29SPC44), 1juv, 31 October 2000; Ilha no. 69 (UTM 29SPC44), 4juv, 24 October 2000; Ilha no. 70 (UTM 29SPC44), 5♂, 10 April 2000, 15juv, 24 October 2000; Ilha no. 72 (UTM 29SPC35), 2juv, 24 October 2000; Ilha no. 80 (UTM 29SPC46), 3♂, 1 April 2000; Ilha no. 93 (UTM 29SPC44), 2♂ 1♀, 20 April 2000, 1juv, 31 October 2000. *Arraiolos* (all A. Espiridião Oliveira leg. (CCM)): Herdade da Falcoeira (UTM 29SNC89), 1♂, 30 May 1998, 1♂, 13 June 1998, 3♀, 27 June 1998, 1juv, 11 July 1998; Monte das Coelhas (UTM 29SNC89), 1♀, 17 June 1998; 2♀ 4juv, 11 July 1998. *Évora* (all A. Espiridião Oliveira leg. (CCM) unless otherwise stated): Barragem do Monte Novo (UTM 29SPC16), 7♂, 15 May 1998, 2♀, 28 June 1998, 1juv, 12 July 1998; Monte da Valada (UTM 29SNC87), 4♂ 1♀, 6 May 1998, 9♂ 2♀, 27 May 1998 (CSP), 2♂ 2♀, 10 June 1998, 1♀, 24 June 1998; São Bento de Castris (UTM 29SNC97), 1♂, 15 June 1998 (CSP). *Montemor-o-Novo* (A. Espiridião Oliveira leg. (CCM)): Carvalhal dos Arezes (UTM 29SNC77), 3♂ 1♀, 13 June 1998, 1♀, 11 July 1998. *Portel*: Monte do Bulgão (UTM 29SPC13), 5♂ 1♀, 12 June 1998, A. Espiridião Oliveira leg. (CCM). *Redondo* (all A. Espiridião Oliveira leg.): Barragem da Vigia (UTM 29SPC26), 8♂ 1♀, 19 May 1998 (CSP), 1♂ 1♀, 2 June 1998 (CCM), 3♀, 18 June 1998 (CCM); Freixo (UTM 29SPC18), 3juv, 6 July 1998 (CCM). *Reguengos de Monsaraz*: Monte da Tareja (UTM 29SPC36), 1juv, 14 July 1998, A. Espiridião Oliveira leg. (CCM); Reguengos de Monsaraz (UTM 29SPC25), 4♂, 3 April 1998, T. Nobre leg. (CCM). SETÚBAL DISTRICT: *Parque Natural da Arrábida*: Terras do Risco (UTM 29SMC95), 1juv, 6 April 1998, P. Cardoso leg. (CPC).

*Distribution:* Spain and Portugal (Bosmans, 1994). In Portugal presumably across entire country (Map 2). It occurs syntopically with many other species of this genus, as it is the most abundant *Zodarium* species in Portugal.

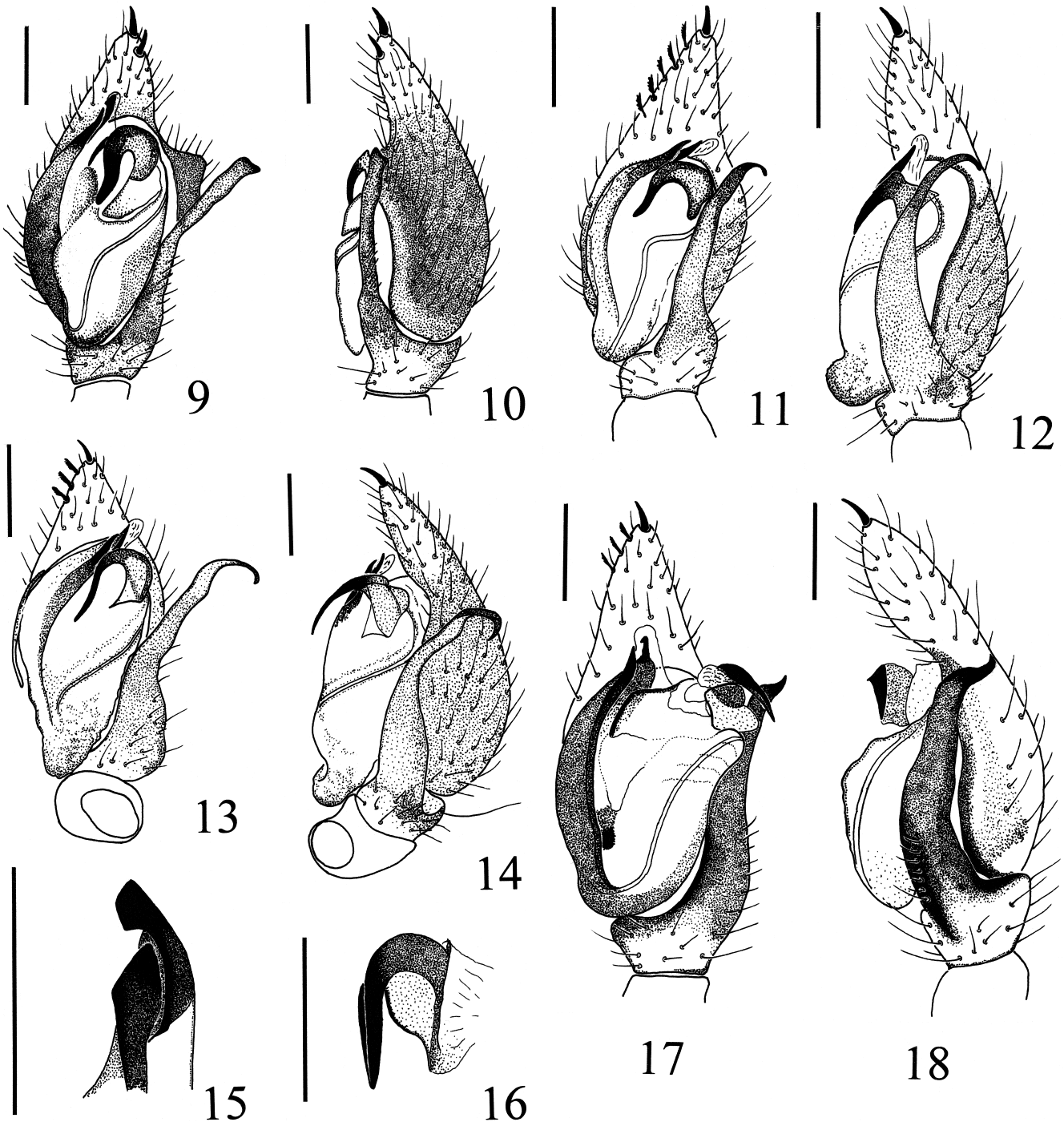
*Zodarium bacelarae* Pekár sp. n. (Figs. 20, 28, Map 3)

*Type material:* Holotype ♀, BRAGANÇA DISTRICT, Torre de Moncorvo, Torre de Moncorvo (UTM 29TPF66), 10 June 1942, A. Barros Machado leg., deposited in MBL, no. 1575, examined.

*Etymology:* The name is a substantive in the genitive case. It is dedicated to the famous Portuguese arachnologist, Amélia Bacelar.

*Diagnosis:* Based on the shape of the epigyne this species belongs to the “*styliferum*” group (Bosmans, 1997). It is closely related to *Zodarium gregua* Bosmans, 1994. Females are recognised by the large median plate with anteriorly converging lateral margins.

*Description: Female:* Total length 4.6; prosoma length 2.5, width 1.5. Colour: prosoma yellow with light brown pattern on sides of head region; chelicerae and sternum yellow; Fe I–II distally light brown, other leg segments



Figs. 9–18: Male palps. 9–10 *Zodarium duriense* Cardoso sp. n. 9 Ventral view; 10 Retrolateral view. 11–12 *Z. styliferum* f. *extraneum* Denis. 11 Ventral view; 12 Retrolateral view. 13–14 *Z. jozefiense* Bosmans. 13 Ventral view; 14 Retrolateral view. 15 *Z. segurense* Bosmans. Teeth of embolus. 16–18 *Z. lusitanicum* Cardoso sp. n. 16 Median apophysis, retrolateral view; 17 Ventral view; 18 Retrolateral view. Scale lines=0.2 mm.

yellow; abdomen dorsally brown, ventrally pale. Epigyne: median plate longer than wide, lateral margins converging anteriorly, postero-lateral angles rounded, anterior margin of plate with tiny ring (Fig. 20); spermathecae oval, separated by  $5 \times$  their diameter (Fig. 28).

*Male*: Unknown.

*Other material examined*: None.

*Distribution*: Known only from the type locality (Map 3).

***Zodarium duriense* Cardoso sp. n.** (Figs. 9–10, 21, 29, Map 4)

*Type material*: Holotype ♂, BRAGANÇA DISTRICT, Parque Natural do Douro Internacional, Barca d'Alva (UTM 29TPF74), 17 June 2001, P. Cardoso leg. Paratype: 1♀, same data. Both deposited in MNHNP.

*Etymology*: The name is an adjective derived from the river Douro that passes the type locality.

*Diagnosis*: Based on the shape of the palpal organs and epigyne this species belongs to the “*styliferum*” group (Bosmans, 1997), and is closely related to *Z. bacelarae* sp. n. Males of *Z. duriense* are recognised by the elongated and thin tibial apophysis, and females by the almost rectangular median plate of the epigyne.

*Description*: *Male*: Total length 3.4–4.2; prosoma length 1.7–2.2, width 1.2–1.6. Colour: prosoma light brown, stripe between eyes and fovea yellow; chelicerae and sternum light brown; Fe I brown with pale base, Fe II–IV yellow with brown distal ends, other leg segments yellow; abdomen dorsally brown, venter mostly whitish. Palp (Figs. 9–10): tibial apophysis long and thin, cymbium with retrolateral process (tutaculum) behind tip of tibial apophysis, median apophysis with stout long curved distal tooth, embolus with hooked terminal and pointed subterminal teeth.

*Female*: Total length 3.4–6.1; prosoma length 1.5–2.9, width 0.9–1.8. Colour: as in male. Epigyne: median plate rather rectangular, twice as long as wide with postero-lateral rounded sclerotised angles, anterior margin of plate with tiny ring (Fig. 21); spermathecae spherical, separated by  $3.6 \times$  their diameter (Fig. 29).

*Other material examined*: BRAGANÇA DISTRICT (all P. Cardoso leg. (CPC)): Parque Natural do Douro Internacional: Barca d'Alva (UTM 29TPF74), 4♂, 17 June 2001; Constantim (UTM 29TQG21), 1♀, 5 June 2001; Fonte d'Aldeia (UTM 29TQF18), 1♂, 13 June 2001; Mazouco (UTM 29TPF85), 2♀, 22 August 2001; Palão (UTM 29TPF85), 1♂, 16 May 2001, 1♀, 13 June 2001, 1♀, 11 July 2001; Picotino (UTM 29TPF86), 1♀, 30 May 2001. PORTO DISTRICT: *Amarante*: Serra do Marão (UTM 29TNF96), 1♀, 10 June 1938, A. Barros Machado leg. (MBL, no. 1404).

*Distribution*: Known from the region along the river Douro (Map 4). In the type locality it occurs syntopically with *Z. lusitanicum* sp. n. and *Z. styliferum* f. *extraneum* Denis.

***Zodarium styliferum* forma *extraneum* Denis, 1935** (Figs. 3–5, 11–12, 22, 30, Map 5)

*Zodarium extraneum* Denis, 1935: 60, fig. 13b (D♀); 1937: 20.

*Zodarium alacre*: Machado, 1949: 20 (misidentification).

*Zodarium timidum*: Machado, 1949: 21 (misidentification).

*Zodarium styliferum*: Bosmans, 1994: 118, figs. 1–3, 81–82 (♂♀, in part).

*Zodarium jozefienae* Bosmans, 1994: 120, figs. 85–86 (♀ only, not ♂).

*Type material*: Holotype ♀, southern Spain, BMNH 8404, examined.

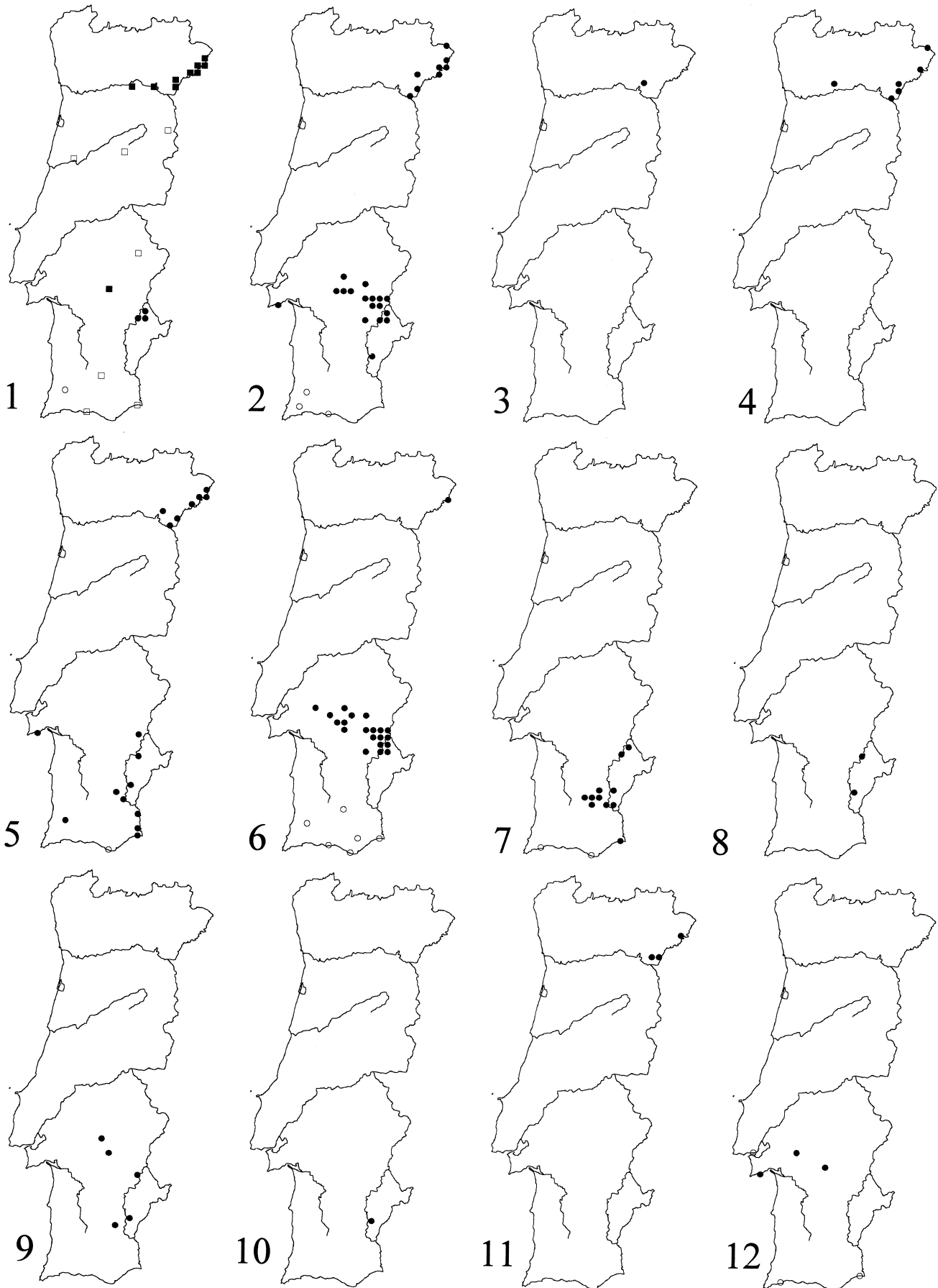
*Remarks*: Denis (1935) distinguished *Z. extraneum* from *Z. styliferum* (see below) based on the body colour. However, Bosmans (1994) synonymised *Z. extraneum* with *Z. styliferum*. We found that *Z. extraneum* differs from *Z. styliferum* in colour and size, with the latter being on average slightly but significantly smaller (prosoma length, t-test,  $p < 0.02$  for both sexes). A comparative study of their karyotypes showed that *extraneum* differs from *Z. styliferum* in the number of chromosomes ( $2n = 24$  in *extraneum*,  $2n = 23$  in *styliferum*) as well as in the sex chromosome system ( $X_1X_20$  in *extraneum*,  $X_10$  in *styliferum*). However, as we failed to find any differences in the structure of the copulatory organs, we treat *extraneum* as a form of *Z. styliferum*. Examination of Machado's material revealed that he misidentified specimens of this form as *Z. alacre* and *Z. timidum* (Machado, 1949). Females in the paratype series of *Z. jozefienae*, designated by Bosmans (1994), were found to be mismatched and to belong to this form.

*Diagnosis*: Specimens of this form differ from *Z. styliferum* by ventrally pale Cx I, basally pale Fe II, and pale venter of abdomen (Fig. 5, cf. Fig. 7).

*Description*: *Male*: Total length 2.4–3.1; prosoma length 1.2–1.5 (mean = 1.33, SE = 0.02,  $n = 20$ ), width 0.8–1.1. Colour: prosoma yellow to brown (Fig. 3); sternum yellow to brown; Cx I ventrally pale, Fe I brown, Fe II–IV yellow with brown distal ends, all other segments yellow; abdomen dorsally dark brown with posterior whitish spot above spinnerets (Fig. 4), venter whitish (Fig. 5). Palp (Figs. 11–12): tibial apophysis thin and long, wide at base, with short distal hook; median apophysis with thin curved distal tooth; embolus with two pointed teeth.

*Female*: Total length 3.1–4.2; prosoma length 1.4–1.9 (mean = 1.63, SE = 0.03,  $n = 20$ ), width 0.9–1.3. Colour: as in male. Epigyne: median plate rectangular, twice as long as wide, with two membranous postero-lateral projections (Fig. 22); spermathecae rather oval, separated by  $c. 4 \times$  their diameter (Fig. 30).

*Other material examined*: PORTUGAL: BEJA DISTRICT (all P. Cardoso leg. (CPC)): Parque Natural do Vale do Guadiana: Algodôr (UTM 29SPB07), 1♀, 22 May 2000, 1♀, 19 June 2000, 1♀, 24 July 2000, 1♀, 14 August 2000, 1♀, 4 September 2000; Ribeira de Limas (UTM 29SPB28), 1♀, 22 May 2000, 1♀, 19 June 2000, 1♀, 24 July 2000, 2♂ 1♀, 16 October 2000; Mértola (UTM 29SPB16), 1♀, 3 July 2000. BRAGANÇA DISTRICT: Parque Natural do Douro Internacional (all P. Cardoso leg. (CPC)): Barca d'Alva (UTM 29TPF74), 9♂, 27 May 2001, 20♂ 2♀ 1juv, 10 June 2001; Fonte d'Aldeia (UTM 29TQF18), 1♂, 30 May 2001, 7♂ 2♀, 13 June 2001, 2♂ 12♀, 27 June 2001, 2♂ 1♀ 1juv, 11 July 2001, 2♂ 8♀, 25 July 2001, 2♀, 8 August 2001, 2♀, 27 August 2001; Frexiosa (UTM 29TQF29), 4♂ 1juv, 29 May 2001; Lamoso (UTM 29TQF07), 1juv, 11 June 2001; Mazouco (UTM 29TPF85), 1♂, 11 July 2001; Palão (UTM 29TPF85), 1♀ 1juv, 30 May 2001, 1♂ 2♀, 13 June 2001, 3♂ 4♀ 5juv, 27 June 2001, 1♂ 3♀ 3juv, 11 July 2001, 1♀ 2juv, 25 July 2001, 6♀ 5juv, 8 August 2001, 1♀ 2juv, 27 August 2001; Picote (UTM 29TQF28), 21♂ 2♀, 31 May 2001, 1♂ 2♀, 14 June 2001. Torre de Moncorvo: Torre de Moncorvo (UTM 29TPF66), 1♂, 10 June 1942, A. Barros Machado leg. (MBL, no. 1574) (Machado, 1949, sub *Z. alacre*).



Maps 1–12: Distribution of zodariid spiders in Portugal. Dark symbols=new records, open symbols=published data (Bacelar, 1928; Bosmans, 1994; Jocqué & Bosmans, 2001). **1** *Amphiledorus adonis* Jocqué & Bosmans (circles) and *Selamia reticulata* (Simon) (squares); **2** *Zodarium alacre* (Simon); **3** *Z. bacelarae* Pekár sp. n.; **4** *Z. duriense* Cardoso sp. n.; **5** *Z. styliferum* f. *extraneum* Denis; **6** *Z. styliferum* (Simon); **7** *Z. jozefienae* Bosmans; **8** *Z. merlijni* Bosmans; **9** *Z. segurense* Bosmans; **10** *Z. guadianense* Cardoso sp. n.; **11** *Z. lusitanicum* Cardoso sp. n.; **12** *Z. maculatum* (Simon).

ÉVORA DISTRICT (all R. Ramos Silva leg. (CCM) unless otherwise stated): *Albufeira do Alqueva*: Ilha no. 1 (UTM 29SPC33), 1♂ 1juv, 18 April 2000, 3juv, 30 October 2000; Ilha no. 4 (UTM 29SPC33), 13juv, 24 October 2000; Ilha no. 8 (UTM 29SPC33), 1♀, 18 April 2000, 6juv, 29 October 2000; Ilha no. 10 (UTM 29SPC33), 3♂ 3♀, 2 June 2000, 1♂, 30 October 2000; Ilha no. 13 (UTM 29SPC33), 1juv, 30 March 2000, 1♂ 4juv, 26 October 2000; Ilha no. 19 (UTM 29SPC33), 1♀, 30 March 2000, 1♂ 2juv, 26 October 2000; Ilha no. 20 (UTM 29SPC33), 2♀ 1juv, 25 October 2000 (CSP); Ilha no. 28 (UTM 29SPC43), 4juv, 31 October 2000; Ilha no. 36 (UTM 29SPC43), 1♂ 1juv, 29 October 2000 (CSP); Ilha no. 39 (UTM 29SPC44), 3juv, 29 October 2000; Ilha no. 40 (UTM 29SPC33), 2juv, 29 October 2000; Ilha no. 59 (UTM 29SPC34), 3♂ 2juv, 27 October 2000; Ilha no. 65 (UTM 29SPC44), 3juv, 31 October 2000; Ilha no. 69 (UTM 29SPC44), 14juv, 24 October 2000; Ilha no. 70 (UTM 29SPC44), 9juv, 24 October 2000; Ilha no. 79 (UTM 29SPC45), 2♂ 1juv, 28 October 2000; Ilha no. 80 (UTM 29SPC46), 1♂ 1juv, 1 April 2000, 1♂ 1♀ 2juv, 28 October 2000; Ilha no. 93 (UTM 29SPC44), 1♀ 1juv, 12 June 2000, 8♂ 2♀ 7juv, 31 October 2000. *Portel*: Alqueva (UTM 29SPC32), 1♀, 24 October 2001, S. Pekár leg. (CSP). FARO DISTRICT: *Monte Gordo*: Monte Gordo (UTM 29SPB31), 3♀, 5 April 1971, J. & F. Murphy leg. (AMNH, paratypes of *Z. jozefienae*). *Alcoutim*: Marmeleiro (UTM 29SPB34), 4♂ 2♀ 2juv, 23 October 2001, S. Pekár leg. (CSP). *Castro Marim*: Azinhal (UTM 29SPB32), 1♀, 23 October 2001, S. Pekár leg. (CSP). *Monchique*: Fóia (UTM 29SNB33), 1♀ 7juv, 11 April 1942, A. Barros Machado leg. (MBL, no. 1367) (Machado, 1949, sub *Z. timidum*). SETÚBAL DISTRICT: *Parque Natural da Arrábida*: Terras do Risco (UTM 29SMC95), 1♂, 19 September 1998, P. Cardoso leg. (CPC). SPAIN: SEGOVIA PROVINCE: *La Granja*: Escorial, 1♀, E. Simon leg. (MNHNP, no. AR9929, 24234).

**Distribution:** This form occurs across the eastern part of Portugal (Map 5). Presumably one of the most abundant species in Portugal.

### *Zodarion styliferum* (Simon, 1870) (Figs. 6–7, Map 6)

*Enyo stylifera* Simon, 1870: 102 (D♂♀).

*Zodarium styliferum*: Bacelar, 1935: 36.

*Zodarion styliferum*: Bosmans, 1994: 118, figs. 1–3, 81–82 (♂♀, in part).

**Type material:** Lectotype ♂, paralectotypes 3♂ 12♀, *Hisp. Port.* MNHNP 1511, examined.

**Diagnosis:** For both sexes see Bosmans (1994). Distinguished from *Z. styliferum* f. *extraneum* by Cx I ventrally brown, Fe II basally brown, and venter of abdomen with dark area between epigastric furrow and spinnerets (Fig. 7, cf. Fig. 5).

**Description:** *Male*: Total length 2.2–2.9; prosoma length 1.2–1.3 (mean = 1.22, SE = 0.01, *n* = 20), width 0.8–0.9. Colour: prosoma dark brown; sternum brown; Cx I ventrally brown, Cx II–IV ventrally pale, Fe I–II dark brown, Fe III–IV yellow with dark brown distal ends, other leg segments pale to light brown; abdomen dorsally dark brown with row of 2–5 whitish spots (Fig. 6), venter with dark brown area between epigastric furrow and spinnerets (Fig. 7). Palp: see Bosmans (1994: figs. 1–3); apparently indistinguishable from that of *Z. styliferum* f. *extraneum* (Figs. 11–12).

*Female*: Total length 3.3–4.1; prosoma length 1.3–1.8 (mean = 1.52, SE = 0.03, *n* = 20), width 0.9–1.1. Colour: as in male. Epigyne: see Bosmans (1994: figs. 81–82); apparently indistinguishable from that of *Z. styliferum* f. *extraneum* (Figs. 22, 30).

**Material examined:** PORTUGAL: BRAGANÇA DISTRICT: *Parque Natural do Douro Internacional*: Picote (UTM 29TQF28), 1♂, 14 June 2001, P. Cardoso leg. (CPC): ÉVORA DISTRICT: *Albufeira do Alqueva* (all R. Ramos Silva leg. (CCM) unless otherwise stated):

Ilha no. 1 (UTM 29SPC33), 2♂, 4 April 2000; Ilha no. 8 (UTM 29SPC33), 1♂, 4 April 2000; Ilha no. 10 (UTM 29SPC33), 1♂, 30 October 2000; Ilha no. 19 (UTM 29SPC33), 3♂ 2♀ 1juv, 26 October 2000; Ilha no. 20 (UTM 29SPC33), 10♂ 3♀, 5 June 2000, 5♂ 7♀ 4juv, 25 October 2000 (CSP); Ilha no. 27 (UTM 29SPC43), 3♂ 7♀, 25 October 2000 (CSP); Ilha no. 36 (UTM 29SPC43), 7♂ 1♀, 29 October 2000 (CSP); Ilha no. 40 (UTM 29SPC33), 2♀, 29 October 2000; Ilha no. 44 (UTM 29SPC34), 2♂ 1♀ 2juv, 29 October 2000; Ilha no. 59 (UTM 29SPC34), 4♂ 1♀, 27 October 2000; Ilha no. 64 (UTM 29SPC44), 1♂ 1♀, 31 October 2000; Ilha no. 66 (UTM 29SPC44), 1juv, 15 April 2000, 2♂ 1♀ 2juv, 27 October 2000; Ilha no. 72 (UTM 29SPC35), 1♂, 10 April 2000, 3juv, 24 October 2000; Ilha no. 79 (UTM 29SPC45), 2♂, 1 April 2000, 1♂, 15 April 2000, 3♂ 1♀ 4juv, 28 October 2000; Ilha no. 80 (UTM 29SPC46), 1♂ 1♀, 1 April 2000, 6♂, 28 October 2000. *Arraiolos* (all A. Espiridião Oliveira leg. (CCM)). *Herdade da Falcoeira* (UTM 29SNC89), 3♀, 27 June 1998, 12♂ 22♀ 15juv, 11 July 1998, 9♂ 1♀ 1juv, 30 May 1998, 1♀ 1juv, 13 June 1998; *Monte das Coelhas* (UTM 29SNC89), 2♂ 4♀, 17 June 1998, 1♂ 13♀ 10juv, 11 July 1998; *Vale de Melão* (UTM 29SNC98), 2♂, 24 June 1998, 2♂ 1♀, 9 July 1998. *Évora* (all A. Espiridião Oliveira leg. (CCM) unless otherwise stated): *Barragem do Monte Novo* (UTM 29SPC16), 3♂ 1♀, 15 May 1998, 1♂ 2♀ 1juv, 28 June 1998, 1♂ 4♀ 4juv, 12 July 1998; *Monte da Valada* (UTM 29SNC87), 3♂ 1juv, 6 May 1998, 16♂ 13♀ 1juv, 27 May 1998, 1♂ 3♀, 10 June 1998, 1♂ 5♀, 24 June 1998; *Valverde da Mitra* (UTM 29SNC86), 13♂ 11♀ 4juv, 10 October 2001, S. Pekár leg. (CSP), 1♂ 4♀, 28 November 2001, S. Pekár leg. (CSP); *Ribeira do Medronhal* (UTM 29SPC36), 2♀, 29 June 1998, 2♂ 6♀ 4juv, 14 July 1998. *Montemor-o-Novo* (all A. Espiridião Oliveira leg. (CCM)): *Carvalhal dos Arezes* (UTM 29SNC77), 33♂ 19♀ 1juv, 30 May 1998, 6♂ 4♀, 13 June 1998, 3♀, 27 June 1998, 1♀ 3juv, 10 August 1998, 1♂ 1juv, 20 September 1998; *Freixeira Velha* (UTM 29SNC68), 1juv, 3 October 1998; *Ribeira do Lavre* (UTM 29SNC49), 1♂ 4♀, 26 June 1998. *Portel*: *Monte do Bulgão* (UTM 29SPC13), 1♀, 29 May 1998, A. Espiridião Oliveira leg. (CCM). *Redondo* (all A. Espiridião Oliveira leg. (CCM)): *Barragem da Vigia* (UTM 29SPC26), 2♀ 3juv, 18 June 1998, 30 June 1998; *Freixo* (UTM 29SPC18), 5♂ 3♀, 22 June 1998, 4♂ 1♀ 4juv, 6 July 1998. *Reguengos de Monsaraaz* (all A. Espiridião Oliveira leg. (CCM) unless otherwise stated): *Monte da Tareja* (UTM 29SPC36), 1♂ 4♀ 1juv, 29 June 1998, 108♂ 111♀ 78juv, 14 July 1998; *Reguengos de Monsaraaz* (UTM 29SPC25), 1juv, 17 November 1997, T. Nobre leg. (CCM), 1juv, 23 January 1998, T. Nobre leg. (CCM). SPAIN: CÓRDOBA PROVINCE: Córdoba, 2♀, 1908, E. Simon leg. (MNHNP, no. AR9935, 23549); GUADALAJARA PROVINCE: Guadalajara, 1♂, June 1907, E. Simon leg. (MNHNP, no. AR9934, 23763); MADRID PROVINCE: Casa de Campo, 2♂ 1♀, 1908, E. Simon leg. (MNHNP, no. AR9931, 17857); SEGOVIA PROVINCE: *La Granja*: Escorial, 1♀, E. Simon leg. (MNHNP, no. AR9929, 24234).

**Distribution:** Distributed in south and central Spain (Bosmans, 1994), and in northern and southern Portugal (Map 6).

### *Zodarion jozefienae* Bosmans, 1994 (Figs. 8, 13–14, 23, 31 (Map 7))

*Zodarion jozefienae* Bosmans, 1994: 120, figs. 7–9 (D♂ only, not ♀ = *Z. styliferum* f. *extraneum*).

**Type material:** Holotype ♂, FARO DISTRICT, *Monte Gordo*, Monte Gordo (UTM 29SPB31), 13 April 1971, J. & F. Murphy leg., deposited in AMNH, examined.

**Remarks:** We found both sexes together at several sites where no other *Zodarion* species occurred. Comparison of our material with the type material designated by Bosmans (1994) showed that his female is different, now belonging to *Z. styliferum* f. *extraneum*. The holotype male of *Z. jozefienae* has a darker prosoma compared with our specimens. However, as no other differences were found we consider them to be the same species.

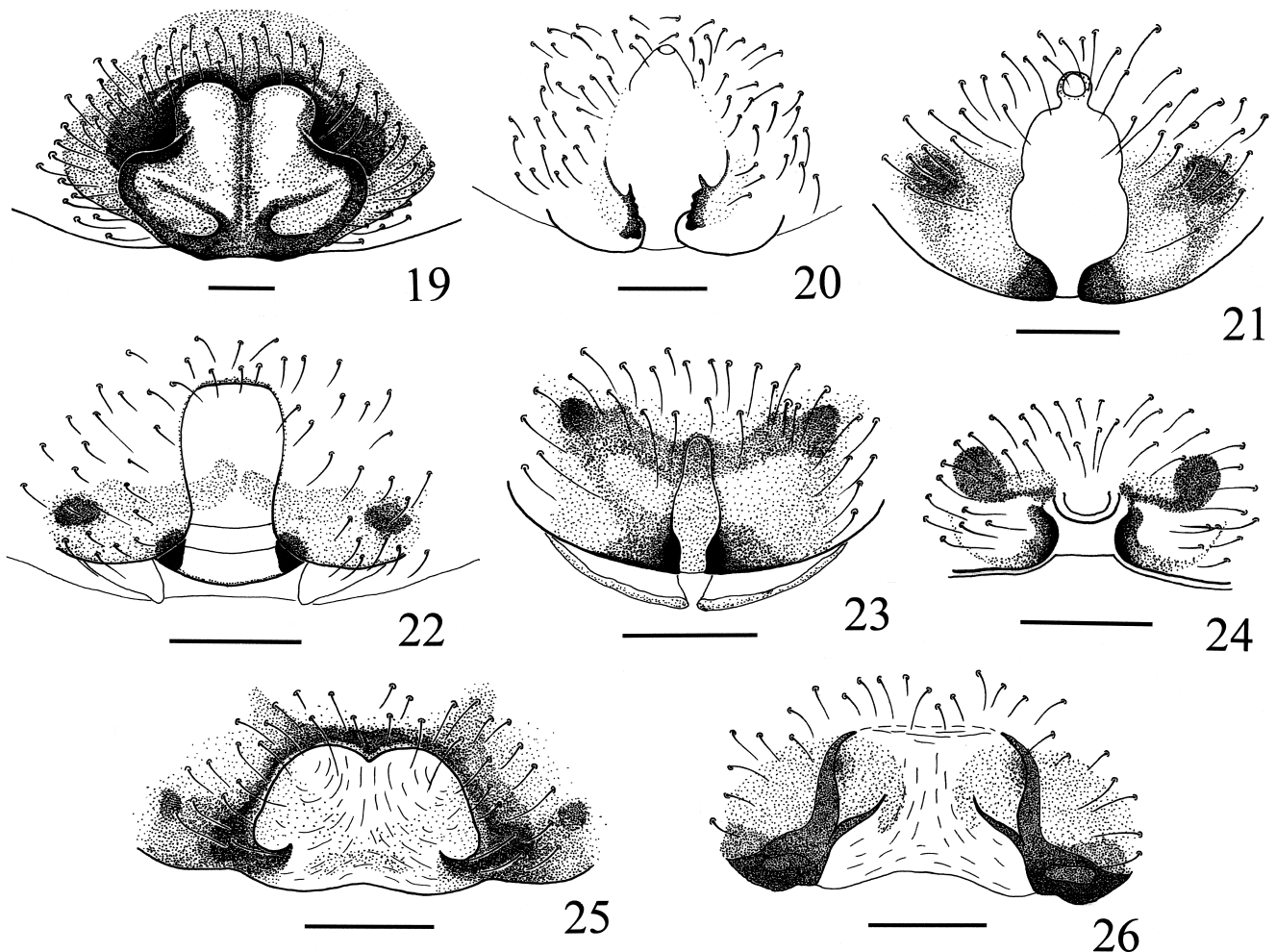
**Diagnosis:** For the male see Bosmans (1994). The female is recognised by the narrow median plate of the epigyne (Fig. 23).

**Description: Male:** Total length 2.3–3.4; prosoma length 1.2–1.7, width 0.8–1.2. Colour: cephalic part of prosoma brown, thoracic part yellow with brown star-like marking (Fig. 8); sternum yellow; Fe I brown, Fe II–IV yellow with brown distal ends, other leg segments yellow; abdomen dorsally dark sepia with row of 4–5 white spots, posterior two fused; venter pale, brown around spinnerets and opercula region. Palp (Figs. 13–14); tibial apophysis thin and long with baso-retrolateral protuberance, terminally with elongated hook; median apophysis with long and thin curved distal tooth; embolus with two pointed teeth.

**Female:** Total length 3.0–5.7; prosoma length 1.3–1.9, width 1.0–1.4. Colour: as in male. Epigyne: median plate narrow,  $c. 4 \times$  as long as wide, with postero-lateral sclerotised angles, and with two membranous postero-lateral projections (Fig. 23); spermathecae rather oval, separated by  $4.8 \times$  their diameter (Fig. 31).

**Other material examined:** BEJA DISTRICT (all C. Meierrose leg. (CCM) unless otherwise stated): *Castro Verde*: Cerro da Guarita (UTM 29SNB87), 1juv, 8 June 2001, 1♂ 1♀, 26 July 2001, 1♂, 2 August 2001, 1♀, 5 September 2001, 1♀, 12 September 2001; *Cuchilhas* (UTM 29SNB87), 1juv, 8 June 2001, 1juv, 7 July 2001, 1♂ 1♀ 1juv, 26 July 2001, 2♂ 5juv, 16 August 2001, 1♀ 5juv, 5 September 2001, 3♀ 1juv, 12

September 2001; *Figueirinha* (UTM 29SNB96), 1♂ 6♀ 3juv, 8 June 2001, 4♂ 5♀ 31juv, 7 July 2001, 40♂ 34♀ 10juv, 26 July 2001, 13♂ 15♀ 2juv, 2 August 2001, 7♂ 23♀ 3juv, 16 August 2001, 2♀ 13juv, 5 September 2001, 9juv, 12 September 2001; *Galeguinha* (UTM 29SNB87), 2juv, 8 June 2001, 4♂, 23 June 2001, 6♂ 7juv, 7 July 2001, 2♂ 2♀, 26 July 2001, 2♂, 2 August 2001, 1♂ 4juv, 16 August 2001, 5juv, 5 September 2001, 1♀, 12 September 2001; *Marcos da Ataboeira* (UTM 29SNB87), 2♂ 1♀ 1juv, 2 April 2001, 1♂ 1♀ 13juv, 8 June 2001, 4♂ 2juv, 7 July 2001, 5♂ 7♀ 1juv, 26 July 2001, 3♂ 2juv, 2 August 2001, 1♂ 1♀ 2juv, 16 August 2001, 1♀ 2juv, 5 September 2001; *Monte Barbeiro* (UTM 29SNB87), 3♂ 1juv, 2 April 2001; *Monte do Trigo* (UTM 29SNB87), 3♀ 2juv, 8 June 2001, 5♂ 9juv, 7 July 2001, 10♂ 5♀ 1juv, 26 July 2001, 7♂ 3♀ 2juv, 2 August 2001, 14♂ 2♀ 5juv, 16 August 2001, 1♂ 2♀ 1juv, 5 September 2001, 6juv, 12 September 2001; *Monte dos Navios* (UTM 29SNB87), 1♂ 1♀ 9juv, 8 June 2001, 5♀ 1juv, 7 July 2001, 2♂ 2♀ 1juv, 26 July 2001, 4juv, 16 August 2001, 2juv, 5 September 2001, 2juv, 12 September 2001; *Monte Salto* (UTM 29SNB97), 2♂ 1♀ 9juv, 8 June 2001, 6♂ 1♀ 4juv, 7 July 2001, 16♂ 4♀ 1juv, 26 July 2001, 4♂ 4♀ 5juv, 2 August 2001, 19♂ 5♀ 6juv, 16 August 2001, 2♂ 1♀ 15juv, 5 September 2001, 8juv, 12 September 2001; *Pereiras* (UTM 29SNB87), 1♀ 2juv, 8 June 2001, 3♀ 6juv, 7 July 2001, 3♂ 6♀ 2juv, 26 July 2001, 1♂ 1♀ 2juv, 5 September 2001; *Zambujeira* (UTM 29SNB87), 4♂ 5♀ 2juv, 8 June 2001, 1♂ 1♀, 7 July 2001, 2♂ 6♀ 1juv, 26 July 2001, 1♂ 1♀, 2 August 2001, 2♂ 4♀ 2juv, 16 August 2001, 3♂ 2♀ 1juv, 5 September 2001, 2♂ 1juv, 12 September 2001. *Parque Natural do Vale do Guadiana*: *Alcaria Ruiva* (UTM 29SPB07), 3♀ 11juv, 8 June 2001, 4♂ 2juv, 27 June 2001, 7♂ 3♀ 5juv, 7 July 2001, 4♂ 2♀, 2 August 2001, 4♂ 5♀ 1juv, 16 August 2001, 2♂ 3♀ 2juv, 5 September 2001, 2juv, 12 September 2001; *Algodôr* (UTM 29SPB07) (P. Cardoso leg. (CPC)), 1♂, 22 May 2000, 2♂, 29 May 2000, 1♂, 14 August 2000, 1♀, 4 September 2000; *Azinhal* (UTM 29SPB08), 1♂



Figs. 19–26: Epigynes, ventral views. **19** *Amphiledorus adonis* Jocqué & Bosmans; **20** *Zodarion bacelarae* Pekár sp. n.; **21** *Z. duriense* Cardoso sp. n.; **22** *Z. styliferum* f. *extraneum* Denis; **23** *Z. jozefienae* Bosmans; **24** *Z. merlijni* Bosmans; **25** *Z. guadianense* Cardoso sp. n.; **26** *Z. lusitanicum* Cardoso sp. n. Scale lines=0.2 mm.



11juv, 8 June 2001, 11♂ 6♀, 23 June 2001, 7♂ 5♀ 4juv, 7 July 2001, 26♂ 16♀ 2juv, 26 July 2001, 10♂ 4♀ 6juv, 2 August 2001, 4♂ 7♀ 6juv, 16 August 2001, 1♀ 3juv, 5 September 2001, 2juv, 12 September 2001; Corte Pequena (UTM 29SPB07), 2♀ 12juv, 8 June 2001, 10♂ 4♀ 5juv, 7 July 2001, 8♂ 4♀ 3juv, 26 July 2001, 5♂ 1♀ 3juv, 2 August 2001, 6♂ 10♀ 8juv, 16 August 2001, 3♂ 3♀ 9juv, 5 September 2001, 7juv, 12 September 2001; Mértola (UTM 29SPB16), 1♂ 1♀, 24 July 2000, P. Cardoso leg. (CPC); Moreanes (UTM 29SPB26) (P. Cardoso leg. (CPC)); 1♂, 3 July 2000, 1♂, 17 July 2000, 9♂ 2♀, 14 August 2000, 2♂ 2♀, 21 August 2000, 1♂, 4 September 2000, 2♀, 11 September 2000, 2♀, 18 September 2000; Ribeira de Limas (UTM 29SPB28), 1♂, 19 June 2000, P. Cardoso leg. (CPC). ÉVORA DISTRICT (R. Ramos Silva leg. (CCM)): *Albufeira do Alqueva*: Ilha no. 20 (UTM 29SPC33), 1juv, 25 October 2000; Ilha no. 69 (UTM 29SPC44), 1♂, 10 April 2000, 1♀, 24 April 2000; Ilha no. 93 (UTM 29SPC44), 3♂ 2♀, 12 June 2000.

**Distribution:** Known from southern Portugal (Map 7) and the adjacent Spanish province of Huelva (Bosmans, 1994). It occurs syntopically with *Z. alacre*, *Z. styliferum* f. *extraneum* and *Z. merlijni* (Parque Natural do Vale do Guadiana, Albufeira do Alqueva).

***Zodarion merlijni* Bosmans, 1994** (Figs. 24, 32, Map 8)

*Zodarion merlijni* Bosmans, 1994: 127, figs. 33–35 (D♂).

**Diagnosis:** For the male see Bosmans (1994). Females are recognised by the semi-circular rim at the anterior margin of the epigynal plate (Fig. 24).

**Description:** *Male:* Total length 2.4–3.5; prosoma length 1.3–1.5, width 0.8–1.0. Colour: prosoma yellow with light brown pattern; sternum pale; Fe I light brown, all other leg segments yellow; abdomen dorsally brown

with one whitish spot above spinnerets, venter whitish. Palp: see Bosmans (1994).

**Female:** Total length 3.1–3.6; prosoma length 1.3–1.5, width 0.9–1.1. Colour: as in male. Epigyne: median plate rectangular, very small with postero-lateral rounded sclerotised angles, anterior margin with semi-circular rim (Fig. 24); spermathecae triangular, separated by 5 × their diameter (Fig. 32).

**Material examined:** BEJA DISTRICT (all P. Cardoso leg. (CPC) unless otherwise stated): *Parque Natural do Vale do Guadiana*: Ribeira de Limas (UTM 29SPB28), 1♂, 15 May 2000, 1♂ 2♀, 22 May 2000, 1♂, 29 May 2000, 1♂, 5 June 2000, 1♂, 12 June 2000, 3juv, 7 October 2001, S. Pekár leg. (CSP), 2juv, 24 October 2001, S. Pekár leg. (CSP); Russins (UTM 29SPB28), 1♂, 15 May 2000, 3♂ 1♀, 22 May 2000. ÉVORA DISTRICT: *Albufeira do Alqueva*: Ilha no. 10 (UTM 29SPC33), 1♂, 2 June 2000, R. Ramos Silva leg. (CSP).

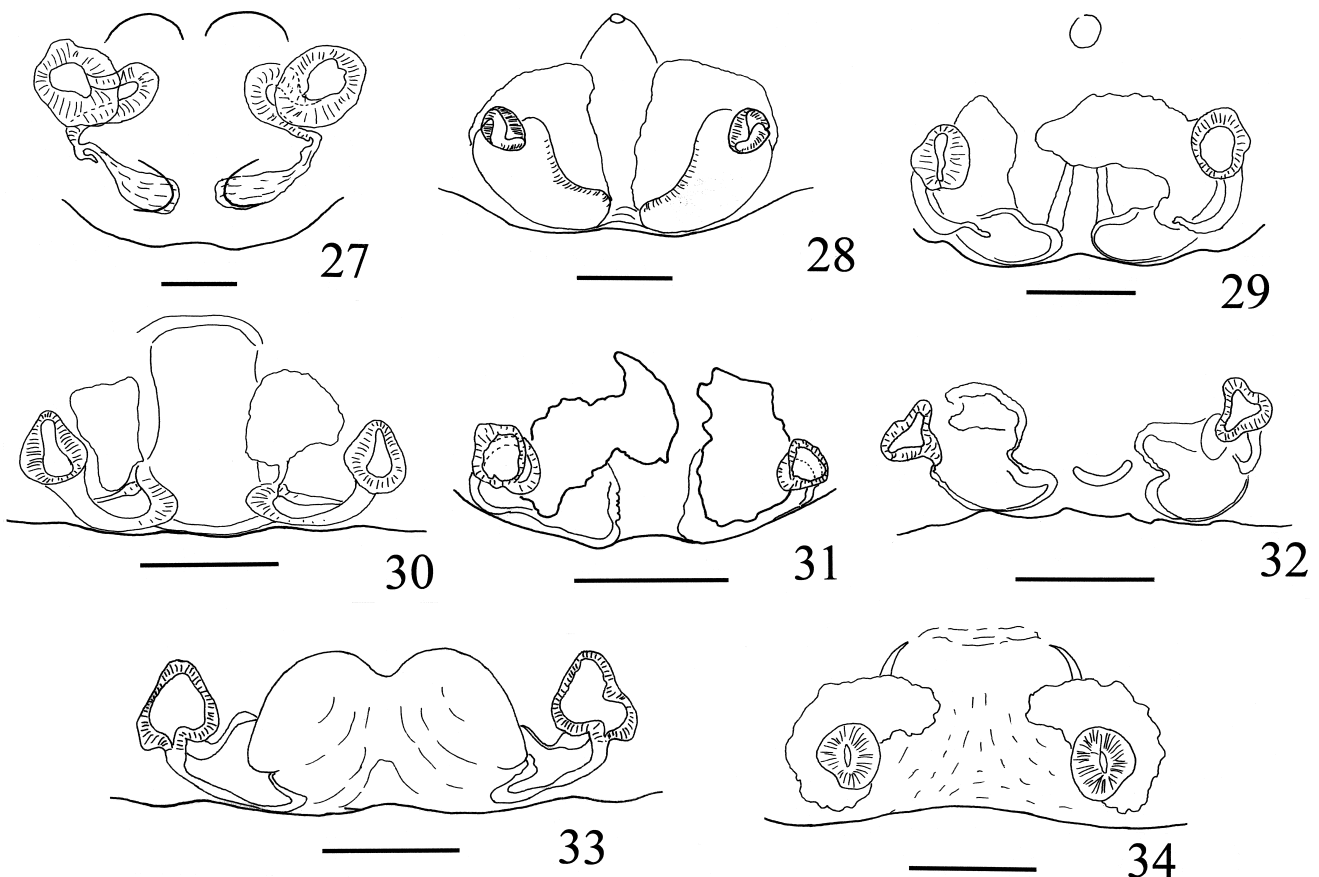
**Distribution:** So far known only from the type locality in Huelva, Spain (Bosmans, 1994) and the adjacent Beja and Évora districts in Portugal (Map 8). Found syntopically with *Z. alacre*, *Z. jozefienae* and *Z. styliferum* f. *extraneum* (Parque Natural do Vale do Guadiana).

***Zodarion segurense* Bosmans, 1994** (Fig. 15, Map 9)

*Zodarion segurense* Bosmans, 1994: 122, figs. 13–15, 89–90 (D♂♀).

**Diagnosis:** For both sexes see Bosmans (1994).

**Remark:** There are a few minor differences, such as the shape of the embolus (Fig. 15), between our specimens and those depicted in Bosmans (1994), which came from Spain. As the type material deposited in the Institut



Figs. 27–34: Vulvae, dorsal views. **27** *Amphiledorus adonis* Jocqué & Bosmans; **28** *Zodarion bacelararum* Pekár sp. n.; **29** *Z. duriense* Cardoso sp. n.; **30** *Z. styliferum* f. *extraneum* Denis; **31** *Z. jozefienae* Bosmans; **32** *Z. merlijni* Bosmans; **33** *Z. guadianense* Cardoso sp. n.; **34** *Z. lusitanicum* Cardoso sp. n. Scale lines=0.2 mm.

Royal des Sciences Naturelles de Belgique (Bruxelles) has been lost, we were unable to compare our specimens with the type material and cannot say whether these minor differences could be used to designate a new species.

*Description:* For both sexes see Bosmans (1994).

*Material examined:* BEJA DISTRICT (P. Cardoso leg. (CPC): *Parque Natural do Vale do Guadiana*: Algodôr (UTM 29SPB07), 1♂, 7 August 2000; Ribeira de Limas (UTM 29SPB28), 1♂, 19 August 2000. ÉVORA DISTRICT (A. Espiridião Oliveira leg. (CSP) unless otherwise stated): *Albufeira do Alqueva*: Ilha no. 55 (UTM 29SPC34), 1♀, 27 October 2000, R. Ramos Silva leg. (CSP); *Arraiolos*: Herdade da Falcoeira (UTM 29SNC89), 1juv, 27 June 1998; *Évora*: São Bento de Castris (UTM 29SNC97), 1♂, 12 July 1998.

*Distribution:* Known only from Jaén in Spain (Bosmans, 1994) and the Beja and Évora districts in Portugal (Map 9).

***Zodarion guadianense* Cardoso sp. n.** (Figs. 25, 33, Map 10).

*Type material:* Holotype ♀, BEJA DISTRICT, *Parque Natural do Vale do Guadiana*, Ribeira de Limas (UTM 29SPB28), 14 August 2000, P. Cardoso leg., deposited in MNHNP.

*Etymology:* The name is an adjective derived from the river Guadiana that passes the type locality.

*Diagnosis:* Based on the shape of the epigyne this species may belong to the “*rubidum*” group (Bosmans, 1997). Females of this species are recognised by wide median plate with lateral pits at posterior margin.

*Description: Female:* Total length 4.3; prosoma length 2.1, width 1.5. Colour: prosoma, chelicerae and sternum uniformly brown; all Fe pale with brown distal ends, all Cx pale, other leg segments light brown; abdomen dorsally dark brown, ventrally pale. Epigyne: median plate wider than long, with posterior weak projection of the anterior margin and with entrances at postero-lateral sides (Fig. 25); spermathecae rather triangular, separated by  $c. 4 \times$  their diameter (Fig. 33).

*Male:* Unknown.

*Other material examined:* None.

*Distribution:* Known only from the type locality in Beja district (Map 10).

***Zodarion lusitanicum* Cardoso sp. n.** (Figs. 16–18, 26, 34, Map 11)

*Type material:* Holotype ♂, BRAGANÇA DISTRICT, *Parque Natural do Douro Internacional*, Fonte d’Aldeia (UTM 29TQF18), 8 August 2001, P. Cardoso leg., deposited in MNHNP. Paratype ♀, BRAGANÇA DISTRICT, *Torre de Moncorvo*, Serra do Reboredo (UTM 29TPF75), 12 September 1941, A. Barros Machado leg., deposited in MBL, no. 1038, examined.

*Etymology:* The name is an adjective, meaning Portuguese.

*Diagnosis:* Based on the shape of the palpal organs and epigyne this species seems to belong to the “*elegans*” group (Bosmans, 1997). Males of this species are recognised by the elongated and thin terminally procurved

tibial apophysis. Females are recognised by the wide median plate with pits situated medio-laterally.

*Description: Male:* Total length 3.2–3.4; prosoma length 1.6–1.9, width 1.0–1.3. Colour: prosoma, chelicerae and sternum almost uniformly brown; all Fe and Ti distally brown, other leg segments yellow; abdomen dorsum brown, venter pale. Palp (Figs. 16–18); tibial apophysis long and thin, terminally slightly procurved; median apophysis short with straight distal tooth (Fig. 16); embolus with terminal tooth hooked and subterminal tooth pointed.

*Female:* Total length 4.5–5.4; prosoma length 1.7–2.1, width 1.2–1.4. Colour: as in male. Epigyne: median plate wider than long, anterior margin straight, entrances at medio-lateral sides (Fig. 26); spermathecae oval, robust, separated by  $c. 2.5 \times$  their diameter (Fig. 34).

*Other material examined:* BRAGANÇA DISTRICT (all P. Cardoso leg. (CPC): *Parque Natural do Douro Internacional*: Fonte d’Aldeia (UTM 29TQF18), 2♂, 11 July 2001, 1♂ 1♀, 8 August 2001; Mazouco (UTM 29TPF85), 1♀, 5 September 2001.

*Distribution:* Known only from three localities in Bragança district (Map 11).

***Zodarion maculatum* (Simon, 1870)** (Map 12)

*Enyo maculata* Simon, 1870: 146 (D♀).

*Zodarium maculatum*: Bacelar, 1935: 36.

*Zodarion maculatum*: Bosmans, 1994: 127, figs. 39–41, 103–104 (♀, D♂); 1997: 270, figs. 6–7, 79–80 (♂♀).

*Diagnosis:* For both sexes see Bosmans (1994).

*Description:* For both sexes see Bosmans (1994).

*Material examined:* ÉVORA DISTRICT (all S. Pekár leg. (CSP) unless otherwise stated): *Évora*: Valverde da Mitra (UTM 29SNC86), 2♂ 1♀, 4 October 2001, 1juv, 10 October 2001, 2♀, 28 November 2001; *Vendas Novas*: Vendas Novas (UTM 29SNC48), 3♂, September 1942, A. Barros Machado leg. (MBL, no. 1280). SETÚBAL DISTRICT: *Parque Natural da Arrábida*: Terras do Risco (UTM 29SMC95), 1♀ 1juv, 18 November 1997, P. Cardoso leg. (CPC).

*Distribution:* Morocco, Spain, Portugal and Sicily (Bosmans, 1994). In Portugal, this species is known only from a few localities in southern Portugal (Map 12). In Évora it occurs syntopically with *Z. styliferum*.

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## Release of urticating hairs by *Avicularia versicolor* (Walckenaer, 1837) (Araneae, Theraphosidae)

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## Summary

The behaviour of releasing urticating hairs is described for the theraphosid spider *Avicularia versicolor*, a species endemic to the islands of Martinique, Guadeloupe and Dominica. In this species, the urticating hairs are thrown from the abdomen dorsum by movements of the tip of tarsus IV against the urticating hair field. Thus, it can be distinguished from other aviculariines, which transfer the urticating hairs through direct contact of the abdomen with the potential predator; instead, it approximates with theraphosines, which throw urticating hairs by using the spines on the ventral surface of metatarsus and tibia of leg IV to dislodge them. Morphological comparisons of typical

urticating hairs of other aviculariines released by contact, airborne hairs of theraphosines, and airborne hairs of *A. versicolor* showed that, despite sharing their general morphology with other aviculariines, *A. versicolor* urticating hairs can be distinguished by the presence of well-developed barbs and their overall narrow shape. These characteristics approximate to those of airborne theraphosine urticating hairs. It is proposed that *A. versicolor* urticating hairs are derived from the typical urticating hairs released by contact found in other aviculariines and the characteristics that allow them to be airborne represent a homoplastic character shared with theraphosine species.

## Introduction

Reports on the defensive use of urticating hairs by New World spiders of the family Theraphosidae have been known for many years (Bates, 1863), but only after the paper of Cooke *et al.* (1972) has the morphology of urticating hairs been investigated. These authors described four morphological types of urticating hairs found on the spiders' abdomen, three types (I, III, and IV) for species which are currently included in the subfamily Theraphosinae, and one type (II) for the genus *Avicularia* Lamarck, 1818 (Aviculariinae). More recently, Marshall & Uetz (1990a) described a further type (V) found on the prolateral surface of the pedipalps of *Ephobopus* Simon, 1892 (Aviculariinae) species, and Pérez-Miles (1998) found type VI on the abdomen of the holotype of *Hemirrhagus cervinus* (Simon, 1891) (Theraphosinae). Whereas most theraphosine species easily flick hairs off the abdomen dorsum when suffering even a slight disturbance, and *Ephobopus* spp. shed hairs from the pedipalps by scratching the urticating hair field