



Research article

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A redescription of *Harpactea dufouri* (Thorell, 1873) (Araneae, Dysderidae), its occurrence outside the Balearic Islands, and some notes on the *corticalis* group of the genus

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Abstract. *Harpactea dufouri* (Thorell, 1873) was collected in the Gavarres protected natural area in Catalonia, Spain. The specimens were compared with specimens from Mallorca, Balearic Islands, and found to be conspecific. The female of the species is described here for the first time. The new finding proves that *Harpactea dufouri* occurs outside the Balearic Islands. The species, however, may be endemic to Catalonia.

Keywords. Catalonia, *corticalis* group, biodiversity, endemism, Harpacteinae.

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Introduction

The genus *Harpactea* Bristowe, 1939 (type species: *Harpactea hombergi* (Scopoli, 1763)) is the second most speciose genus of the family Dysderidae (Řezáč 2008). The World Spider Catalog (2016) lists 175 valid and accepted species for the genus, which is almost one third of the 534 species described for the family. The focus of distribution of the genus is the Mediterranean area, extending to the Caspian region in the East, and, for some species, to central and northern Europe in the North. Interestingly, almost all species of *Harpactea* have a relatively small distribution area. Only *H. hombergi* (Scopoli, 1763), *H. lepida* (C.L. Koch, 1838), *H. rubicunda* (C.L. Koch, 1838) and *H. saeva* (Herman, 1879) are widespread species. The majority of *Harpactea* species have been described after the publication of Roewer's first spider catalogue (1942). Indeed, Roewer (1942) lists only 26 species that are presently considered as valid species belonging to *Harpactea*. Most of the additional *Harpactea* species have since been described by Alicata, who described 12 species (Alicata 1966a, 1966b, 1966c, 1973, 1974), Brignoli, who described 35 species (Brignoli 1974, 1976, 1977, 1978a, 1978b, 1978c, 1979a, 1979b, 1979c, 1979d, 1980a, 1980b, 1984), Bosmans and coworkers, who described 31 species (Beladjal &

Bosmans 1997; Bosmans & Beladjal 1989, 1991; Russell-Smith & Bosmans 2011; Van Keer & Bosmans 2009), Dunin, who described 23 species (Dunin 1989, 1991, 1992a, 1992b, 1993), and Dimitrov, Lazarov and Naumova, who described 11 species (Dimitrov 1997; Dimitrov & Lazarov 1999; Lazarov 2006a, 2006b, 2008a, 2008b, 2009a, 2009b, 2010; Lazarov & Naumova 2010). Among the 172 species presently known, 111 are known from Europe (including Ukraine) and the eastern Mediterranean (Turkey, Lebanon and Israel), 26 from the Caucasus and the region around the Caspian sea, and 35 from North Africa (Algeria and Tunisia). Among the European species, 16 have been reported from the Iberian peninsula (including the Balearic Islands): *H. aeruginosa* Barrientos, Espuny & Ascaso, 1994, *H. algarvensis* Ferrández, 1990, *H. blasi* Ribera & Ferrández, 1986, *H. dufouri* (Thorell, 1873), *H. fageli* Brignoli, 1980, *H. gaditana* Pesarini, 1988, *H. hispana* (Simon, 1882), *H. hombergi* (Scopoli, 1763), *H. magnibulbi* Machado & Ferrández, 1991, *H. minoccii* Ferrández, 1982, *H. ortegai* Ribera & De Mas, 2003, *H. proxima* Ferrández, 1990, *H. skiakyi* Pesarini, 1988, *H. serena* (Simon, 1907), *H. stalitoides* Ribera, 1993 and *H. subiasi* Ferrández, 1990. Thirteen of these species are endemic (Cardoso & Morano 2010: 18).

The authors made a one week field trip to the Gavarres protected natural area in Catalonia, a 300 km² hill massif in the northernmost part of the Catalanian coastal range, characterised by an amazing biodiversity (Bosselaers 2004, Bosselaers in prep.). On this occasion, the junior author collected six specimens of *Harpactea dufouri*, formerly only known from the Balearic Islands. This rare species, including the hitherto unknown female, is redescribed and discussed below.

Material and methods

Specimens were observed, photographed and drawn using Euromex MIC465 and Olympus SZX9 stereo microscopes. For stereo microscope photographs, a Praktica DC440 digital camera was used. Details of the male palp and the vulva were studied with a Zeiss Axio Imager A1 microscope equipped with a Canon Powershot G6 digital camera. The image series obtained were stacked with Zerene Stacker version 1.04 build T201411272115. The vulva was cleaned for microscopy with trypsin (Sigma) for 24 h at room temperature and subsequently cleared in methyl salicylate for observation. The male palp was immobilized in Schwarzkopf “Freezing Gel Extreme 5”, a transparent vinylpyrrolidone-vinylacetate copolymer (CAS 25086-89-9) / carbomer gel (Schröder *et al.* 2000; Schulze zur Wiesche 2006). All measurements are in millimetres. The format for leg spination follows Platnick & Shadab (1975), amended for ventral spine pairs according to Bosselaers & Jocqué (2000: 307). Leg spination is also illustrated in a schematic representation (Fig. 1E–G) where pl, do, rl and ve sides of leg articles are flattened as a folding net (Dürer 1525).

Abbreviations

AE	=	anterior eyes
AER	=	anterior eye row
ALS	=	anterior lateral spinnerets
avg	=	average
CJVK	=	personal collection Johan Van Keer
CRB	=	personal collection Rop Bosmans
do	=	dorsal
fe	=	femur
fr	=	frontal
ICS	=	intercoxal sclerites - intercoxal sclerites are six small triangular or elongated sclerites surrounding the sternum, their tips penetrating between the coxae of the legs - they may be free, or fused with the sternum (Bosselaers & Jocqué 2002: fig. 1K)
MOQ	=	median ocular quadrangle

mt	=	metatarsus
n	=	number of specimens
pa	=	patella
PB	=	pleural bars - pleural bars are narrow, horizontal sclerites between coxae and carapace, one above each coxa (“pièces épimériennes” of Simon (1892: 11, fig. 29)) - they may be fused among each other (Bosselaers & Jocqué 2002: fig. 1P), with intercoxal sclerites and/or with carapace
PCT	=	precoxal triangles - precoxal triangles are small triangular sclerites surrounding the sternum, their tips facing the bases of the coxae (Penniman 1985: 16) - they may be free, or fused with the sternum (Bosselaers & Jocqué 2002: fig. 1K)
PD	=	posterior diverticulum
PE	=	posterior eyes
PER	=	posterior eye row
PI	=	patellar indentation - the patellar indentation is a slit-like membranous indentation on the rl side of the pa. It may be very narrow or rather wide (Simon 1892: 22; Ledoux & Canard 1991: fig. 15a–b)
pl	=	prolateral
PLE	=	posterior lateral eyes
PLS	=	posterior lateral spinnerets
plv	=	prolateral ventral
PME	=	posterior median eyes
PMS	=	posterior median spinnerets
RH	=	retrocoxal hymen - the retrocoxal hymen is a weak spot, in most cases hyaline and lens- to dome-shaped, on the retrolateral face of coxa I (Raven 1998; Bosselaers & Jocqué 2002)
rl	=	retrolateral
rlv	=	retrolateral ventral
sd	=	standard deviation
ta	=	tarsus
TB	=	transversal bar
ti	=	tibia
ve	=	ventral
vt	=	ventral terminal

Collections

BMNH	=	British Museum of Natural History, London, UK
CJVK	=	personal collection Johan Van Keer
CRB	=	personal collection Rop Bosmans
IZPAN	=	Museum and Institute of Zoology PAS, Warsaw, Poland
MCZ	=	Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA
MNHN	=	Muséum national d’Histoire naturelle, Paris, France
MRSN	=	Museo Regionale di Scienze Naturali, Torino, Italy
MSG	=	Museo civico di Storia naturale “Giacomo Doria”, Genova, Italy
NRM	=	Naturhistoriska Riksmuseet, Stockholm, Sweden
ZMUC	=	Zoologisk Museum Kopenhagen, Denmark

Results

Class Arachnida Cuvier, 1812
Order Araneae Clerck, 1757
Family Dysderidae C.L. Koch, 1837
Genus *Harpactea* Bristowe, 1939

Harpactea dufouri (Thorell, 1873)
Figs 1–2

Harpactes dufourii Thorell, 1873: 561.

Harpactea dufouri – Denis 1961: 236, fig. 1. — Alicata 1966a: 211, fig. 61. — Brignoli 1979c: 114, figs 2–3. — Le Peru 2011: 268, fig. 400.

Diagnosis

Harpactea dufouri differs from *H. corticalis* (Simon, 1882) by the more slender bulbus of the male palp, the more straight conductor and embolus and the larger number of spines on femora III and IV.

Harpactea dufouri somewhat resembles *H. heizerensis* Bosmans & Beladjal, 1991, but differs from it by the knife-shaped, pointed conductor with very sharp teeth, the posterior diverticulum of the vulva consisting of a small ventral and a larger dorsal lobe and by the larger number of spines on femorae III and IV.

Material examined

SPAIN: 2 ♂♂, 4 ♀♀, Catalonia, Baix Empordà, Mont Ras, alt. 103 m, 41°54'55.1" N, 3°8'25.6" E, former quarry converted into lake and picnic area, under stones, 23 Oct. 2013, Van Keer leg. (CJVK) (Fig. 1H); 2 ♂♂, 2 ♀♀, Balearic Islands, Mallorca, Banyalbufar W., Font de Sant Merita, *Platanus* forest, alt. 150 m, sifting litter, 1 Apr. 2003, R. Bosmans leg. et det. (CRB).

Description

Male

Largest specimen Mont Ras, total length 5.50 (avg (n = 4) 4.48, sd 1.08). Carapace length 2.16, width 1.60, yellowish brown with faint grey radial striae, more reddish brown in cephalic region, smooth. Cephalic region slightly wider than half the carapace width, three times as wide as the eye group (Fig. 2A–B). Fovea weak and thin, length 0.32, anterior end 1.42 from front end of carapace.

MOQ length 0.22, anterior width 0.26, posterior width 0.16, AER width 0.26, PER width 0.34. All six eyes ringed with black, PE clear pearly white, almost touching, diameter of PLE 1.5 times PME. AE as large as PLE, pearly white, subquadratic, separated by half their diameter. PER procurved in both do and fr view. Clypeus vertical, 0.05, equal to half the diameter of AE.

Chilum single, triangular, brown and sclerotised. Chelicerae brown, slightly rugose, anterior rim with two teeth close to fang tip, the bigger one furthest from tip. Posterior rim with two small, widely spaced teeth. Labium twice as long as wide, with small anterior notch. Endites long and parallel, with serrula and bluntly pointed anterior end. Exterior margin notched.

Sternum yellow, rebordered, oval, narrowed frontally and protruding between all coxae. Sternum length 1.45, width 1.05, surface smooth, but with tiny, evenly spaced punctures. Four pairs of heavily sclerotised, sharply pointed, dark brown PCT. ICS and PB fused and surrounding coxae.

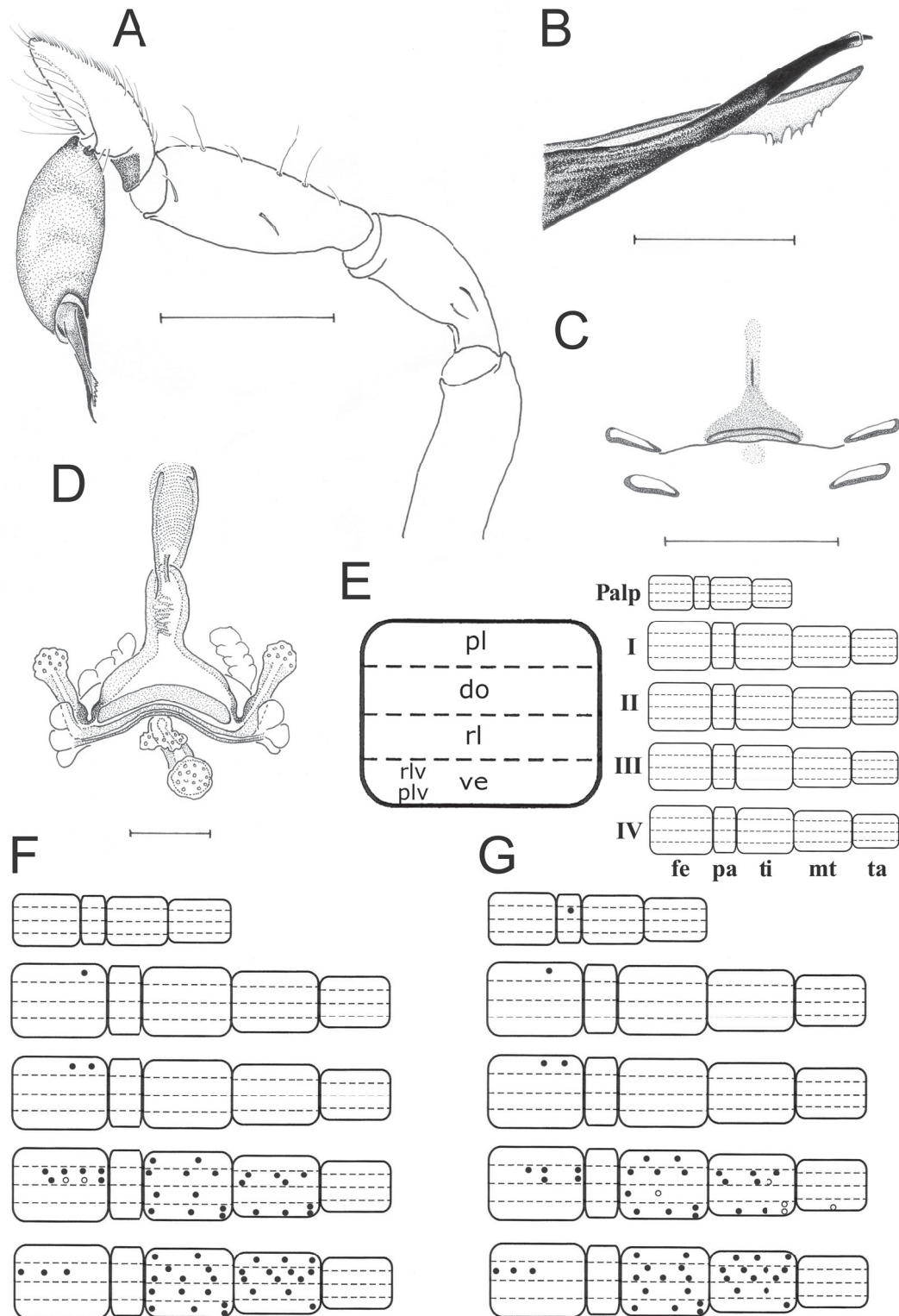


Fig. 1. *Harpactea dufouri* (Thorell, 1873), Mont Ras specimens. **A.** Male palp, prolateral view. **B.** Tip of male embolus and conductor, retrolateral view. **C.** Endogyne, external ventral view, uncleared. **D.** Cleared vulva, ventral view. **E.** Leg spination scheme, legend. **F.** Leg spination scheme of male. White dots are spines present on one leg and absent on the other. **G.** Leg spination scheme of female. White dots are spines present on one leg and absent on the other. Scale bars: A, C = 0.5 mm; B, D = 100 μ m.

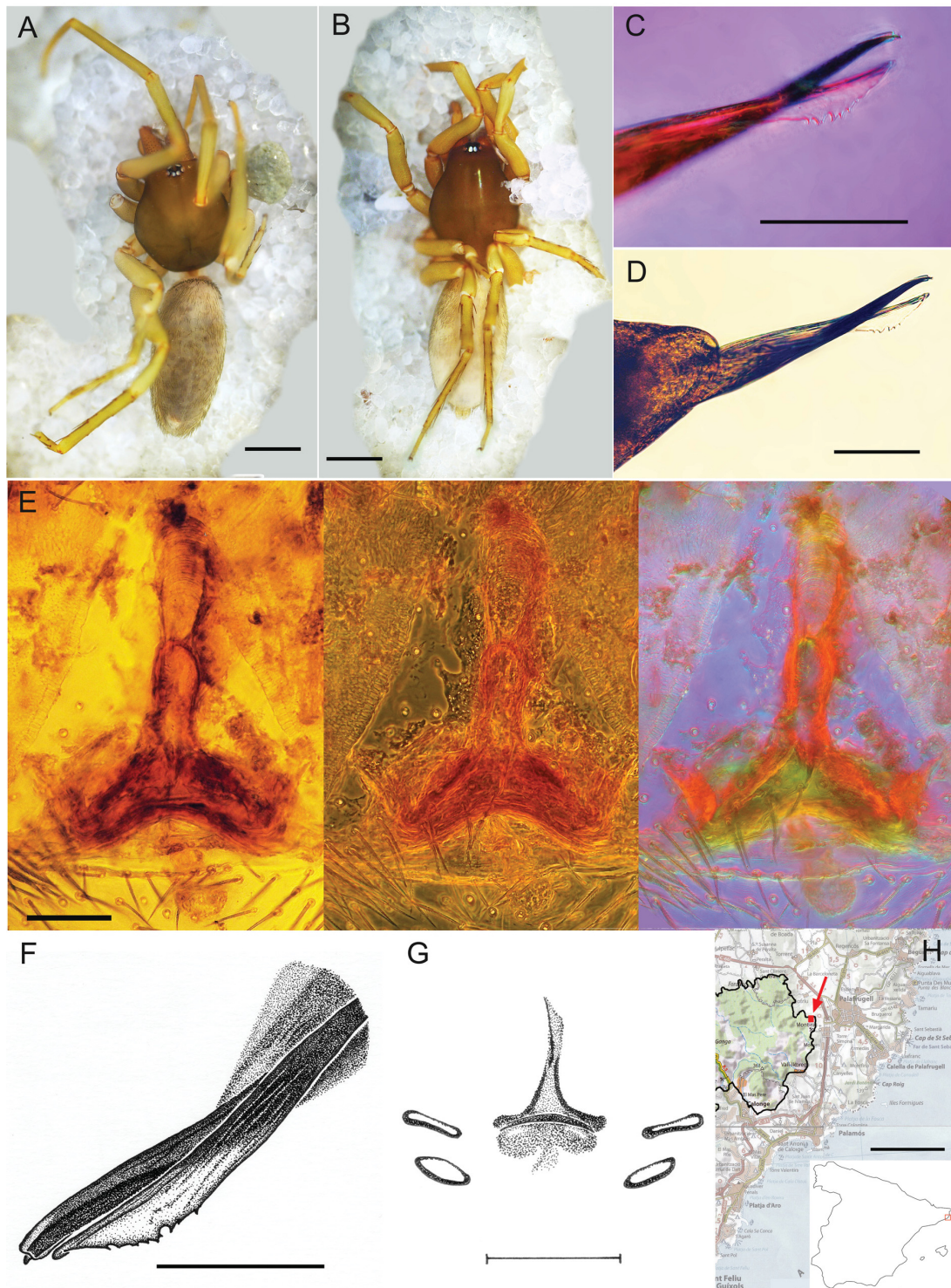


Fig. 2. A–G. *Harpactea dufouri* (Thorell, 1873), Mont Ras specimens, except F–G. **A.** ♂, dorsal view. **B.** ♀, dorsal view. **C.** Tip of male embolus and conductor, retrolateral view, Nomarski interference contrast. **D.** Tip of male embolus and conductor, retrolateral view, bright field. **E.** Cleared vulva, ventral view. Left: bright field, middle: phase contrast, right: Nomarski interference contrast. **F.** Tip of male embolus and conductor, Banyalbufar specimen. **G.** Endogyne, external ventral view, Banyalbufar specimen. — **H.** Map showing the Mont Ras site of *Harpactea dufouri* (red square), the Gavarres are delimited by a black line. Scale bars: A–B = 1 mm; C–F = 100 µm; G = 0.5 mm; H = 5 km.

Legs orange yellow, shiny. Leg formula 1423. No RH, no trochanter notch. PI very narrow, extending along the whole length of pa III, but restricted to the basal third in pa I, II and IV. Ventral terminal preening brush present on mt III and IV. Tarsi with three claws, no claw tufts or tenent hairs. Leg spination (Fig. 1F): fe: I pl 0–0–1; II pl 0–1–1; III do 2–2–2–2; IV do 1–1–1–0; ti: III pl 1–0–1 do 1–1–1 rl 1–1–0 ve 1–1–2; IV pl 1–0–1 do 2–1–2 rl 1–1–1 ve 1–1–2; mt: III do 2–2–1 ve 1–1–2; IV pl 1–1–1 do 2–2–1–2 rl 1–1–0 ve 0–0–1.

Leg measurements:

	fe	pa	ti	mt	ta	Total
I	1.89	1.32	1.84	1.66	0.55	7.26
II	1.58	1.05	1.45	1.34	0.50	5.92
III	1.53	0.53	1.00	1.26	0.45	4.76
IV	1.97	0.82	1.71	1.92	0.58	7.00

Abdomen grey, covered with thin, pointed grey setae becoming coarser on anterior rim (Fig. 2A). ALS subcylindrical, stout, separated by $\frac{1}{4}$ of their length. PMS thin and conical, PLS thin, subcylindrical, separated by half their length.

Male palp as illustrated (Figs 1A–B, 2C–D, F), with spindle-shaped bulbus, straight, black, simple, pointed embolus and flat, hyaline conductor with a broadened, sharply toothed tip. Both male specimens captured in Mont Ras had the right palp missing. The loss of the palp occurred quite some time before capture, as the scar had completely healed and was sclerotised.

Female

Largest specimen Mont Ras, total length 5.75 (avg (n = 6) 4.70, sd 0.78). Carapace length 2.10, width 1.56, dark yellowish brown with faint grey radial striae, smooth (Fig. 2B). Cephalic region as in male. Fovea weak and thin, length 0.34, anterior end 1.32 from front end of carapace.

MOQ length 0.21, anterior width 0.25, posterior width 0.18, AER width 0.25, PER width 0.37. Eyes as in male. Clypeus vertical, 0.03, equal to one third diameter of AE.

Chilum, chelicerae, labium and endites as in male.

Sternum, PCT, ICS and PB as in male. Sternum length 1.32, width 1.03.

Legs orange yellow, shiny. Leg formula 4123. No RH, no trochanter notch. PI, ventral terminal preening brush and tarsi as in male. Leg spination (Fig. 1G): fe: I pl 0–0–1; II pl 0–1–1; III do 0–1–2–2; IV do 1–1–1–0; ti: III pl 1–0–1 do 1–1–1 rl 1–(0,1)–0 ve 1–1–2; IV pl 1–0–1 do 2–1–2 rl 1–0–1 ve 1–1–2; mt: III do 2–2–(1,2) ve 1–1–(0,2); IV pl 1–1–1 do 2–2–1–2 rl 1–1–0 ve 0–0–1; ta: III ve 0–(0,1)–0.

Leg measurements:

	fe	pa	ti	mt	ta	Total
I	1.58	1.05	1.34	1.18	0.45	5.60
II	1.39	0.92	1.21	1.05	0.39	4.97
III	1.18	0.50	0.79	1.00	0.34	3.81
IV	1.71	0.79	1.47	1.71	0.55	6.23

Abdomen pinkish grey, covered with thin, pointed grey setae (Fig. 2B). ALS conical, touching. PMS thin and conical, PLS thin, subcylindrical, separated by half their length.

Epigyne essentially absent, all sclerotised parts internal (endogyne, Jocqué & Dippenaar-Schoeman 2006: 120), but TB (“valva posterodorsale” of Alicata (1964: 4), “transversal bar” of Chatzaki & Arnedo (2006: 5)) clearly visible from the outside, as illustrated (Figs 1C, 2G). Vulva with pronounced TB, PD (Chatzaki & Arnedo 2006: 6) consisting of an irregular ventral lobe and a globular dorsal lobe, both with a perforated, glandular aspect (Figs 1D, 2E). Genital atrium (Alicata 1964: 4; Chatzaki & Arnedo 2006: 5) connected on both posterolateral ends to glandular structures. Additional membranous, transparent pouches also present. Spermatheca sausage-shaped, connected to anterior end of genital atrium (Figs 1D, 2E).

Distribution

Only known from the Balearic islands and the Northern part of the Catalanian coastal range (Fig. 1H).

Discussion

The genus *Harpactea* has a quite homogeneous somatic morphology, but there is considerable genitalic diversity, suggesting the existence of a number of subgenera, or even the possibility that several related genera are involved. Simon (1893: 318) was the first to suggest a division of *Harpactes* Templeton, 1835 (preoccupied as the bird name *Harpactes* Swainson, 1833 (Trogonidae) and replaced by *Harpactea* by Bristowe 1939: 5) in three subgroups. However, only one of these groups concerns species presently considered as true *Harpactea*, the other two being composed of species belonging to *Dasumia* Thorell, 1875, *Harpactocrates* Simon, 1914 and *Parachtes* Alicata, 1964.

The first to suggest a subdivision of *Harpactea* as presently delimited is Alicata (1966a: 192). He bases his subdivision on genitalic characteristics and recognises three large groups: one consisting of species reminiscent of *Dasumia*; another, consisting of two subgroups, having a male bulbus with a complex set of apophyses and including *H. hombergi*; and a third group, characterised by a simple, elongated bulbus with 1–3 apophyses (embolus, conductor, pseudoconductor (Brignoli 1978b: 481)), consisting of four subgroups and including *H. corticalis* (Simon, 1882). Brignoli (1978b: 481) recognises two groups: a *corticalis* group with a simple set of apophyses on the bulbus (consisting of six subgroups), and a *hombergi* group with complex apophyses (consisting of four subgroups). Deeleman-Reinhold (1993: 130) recognises four groups, based on a combination of genitalic and leg spination characters: a *corticalis* group, largely similar to Alicata’s and Brignoli’s group with a simple male bulbus, a *hombergi* group characterised by a complex male bulbus, a *lepida* group with a lamellar conductor and a wide PD, and a *rubicunda* group with a large, entirely membranous PD. Beladjal & Bosmans (1997: 24) follow the subdivision of Brignoli (1978b), but add a third group, the *auriga* group, characterised by a globular bulbus and a long, filiform embolus.

None of these subdivisions is entirely satisfactory, as they are purely phenetic and no cladistic analysis was performed. Although the hypothesis sounds plausible, there is no proof that the *corticalis* group is “le groupe le plus primitif” (Beladjal & Bosmans 1997: 24), as no phylogenetically valid outgroup comparison (Watrous & Wheeler 1981; Maddison *et al.* 1984) is available. There is even no solid proof that this group actually exists, *id est*, that it is not polyphyletic.

Nevertheless, provisory as they are, the subdivisions proposed to date have some practical advantage, facilitating an overview of the genitalic diversity in the large genus *Harpactea*. Moreover, it has to be admitted that the *corticalis* group is indeed “abbastanza omogeneo” and “abbastanza ben delimitato dagli altri” (Brignoli 1978b: 481), so it can be retained for the time being, until the enormous work of a cladistic analysis of *Harpactea* has been undertaken.

Scrutiny of the available literature suggests that such a *corticalis* group should at least include *H. acuta* Beladjal & Bosmans, 1997, *H. angustata* (Lucas, 1846), *H. arguta* (Simon, 1907), *H. blasi* Ribera &

Ferrández, *H. carusoi* Alicata, 1974, *H. corticalis* (Simon, 1882), *H. dufouri* (Thorell, 1873), *H. dumonti* Bosmans & Beladjal, 1991, *H. gaditana* Pesarini, 1988, *H. gennargentu* Wunderlich, 1995, *H. gridellii* (Caporiacco, 1951), *H. heizerensis* Bosmans & Beladjal, 1991, *H. innupta* Beladjal & Bosmans, 1997, *H. kalaensis* Beladjal & Bosmans, 1997, *H. kareli* Bosmans & Beladjal, 1991, *H. major* (Simon, 1911), *H. mertensi* Bosmans & Beladjal, 1991, *H. minuta* Alicata, 1974, *H. mitidjae* Bosmans & Beladjal, 1991, *H. monicae* Bosmans & Beladjal, 1991, *H. muscicola* (Simon, 1882), *H. oranensis* Bosmans & Beladjal, 1991, *H. ouarsenensis* Bosmans & Beladjal, 1991, *H. piligera* (Thorell, 1875), *H. punica* Alicata, 1974, *H. senalbensis* Beladjal & Bosmans, 1997, *H. sicala* Alicata, 1966, *H. sinuata* Beladjal & Bosmans, 1997, *H. undosa* Beladjal & Bosmans, 1997, *H. yakourensis* Beladjal & Bosmans, 1997, and *H. zannonensis* Alicata, 1966. These 31 species (one fifth of the genus) all occur in the western Mediterranean and they all have small distribution areas.

Three of the 16 Iberic *Harpactea* species can be attributed to the *corticalis* group with some confidence: *H. blasi*, *H. dufouri* and *H. gaditana*.

The specimens collected in Mont Ras were at first considered to be a new species by the authors. Indeed, the illustrations of the male palp of *H. dufouri* in Denis (1961), Alicata (1966a, drawn after Denis) and Le Peru (2011, a synthetic computer drawing) are insufficient to identify the species with certainty. Nevertheless, Brignoli (1979c: fig. 2) illustrates a toothed conductor that is quite similar to the one of the Mont Ras specimens (Fig. 1B, 2C–D), as rightly pointed out by Crespo when refereeing a previous version of this paper. Unfortunately, the type specimen of *H. dufouri* is not present in NRM, where it would normally be kept, given the fact that it was collected by the Swede F. Söderlund (Thorell 1873: 561). The type could also not be traced in BMNH, IZPAN, MCZ, MNHN, MRSN, MSNG or ZMUC. As a result, the type of *H. dufouri* must be considered lost.

However, four adult specimens of *H. dufouri* collected by Bosmans in Mallorca could be studied. They turned out to be conspecific with the Mont Ras material (Figs 1B–C, 2F–G). It can be concluded that *H. dufouri* is not an island endemic, but also occurs in the Catalanian coastal region. The female, described here for the first time, has a genitalic morphology typical for the *corticalis* group of *Harpactea*.

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