Revista Ibérica de Aracnología, nº **39** (31/12/2021): 3–11. ARTÍCULO
Grupo Ibérico de Aracnología (S.E.A.). ISSN: 1576 - 9518. http://www.sea-entomologia.org

THE GENUS *BUTHUS* LEACH, 1815 (SCORPIONES: BUTHIDAE) IN THE IBERIAN PENINSULA. PART 3: A NEW SPECIES FROM CENTRAL SPAIN AND NEW RECORDS

Rolando Teruel[1, 2] & Carlos Turiel[3]

[1] Grupo de Sistemática y Ecología de Artrópodos Caribeños. Calle 200 # 3759 entre 37 y 45, Reparto Versalles; La Lisa; La Habana 13500. Cuba. teruelrolando6@gmail.com
[2] Instituto de Ecología y Sistemática (Subdirección de Colecciones Zoológicas), Carretera de Varona # 11835 entre Oriente y Lindero, Reparto Calabazar, Boyeros; La Habana 11900, Cuba.
[3] Niederrheinstrasse 49, 41472 - Neuss, Germany. Centruroides@gmx.de

Abstract: The present paper represents the third contribution to our taxonomic revision of the genus *Buthus* Leach, 1815 in the Iberian Peninsula. Herein, we describe a new species from the Serranía de Cuenca (central Spain) and present additional locality records to complement the known geographical distribution of a further nine species: *Buthus alacanti* Teruel & Turiel, 2020, *Buthus baeticus* Teruel & Turiel, 2020, *Buthus delafuentei* Teruel & Turiel, 2020, *Buthus elongatus* Rossi, 2012, *Buthus ibericus* Lourenço & Vachon, 2004, *Buthus manchego* Teruel & Turiel, 2020, *Buthus montanus* Lourenço & Vachon, 2004, *Buthus occitanus* (Amoreux, 1789) and *Buthus serrano* Teruel & Turiel, 2020. The West European diversity of *Buthus* now reaches 15 species, all of them being local endemics.
Key words: Scorpiones, Buthidae, *Buthus*, taxonomy, new species, new records, Europe.

El género *Buthus* Leach, 1815 (Scorpiones: Buthidae) en la Península Ibérica. Parte 3: una especie nueva de España central y nuevos registros
Resumen: El presente artículo representa la tercera contribución a nuestra revisión taxonómica del género *Buthus* Leach, 1815 en la Península Ibérica. Describimos una especie nueva de la Serranía de Cuenca (España central) y presentamos nuevos registros que complementan la distribución geográfica conocida de otras nueve especies: *Buthus alacanti* Teruel & Turiel, 2020, *Buthus baeticus* Teruel & Turiel, 2020, *Buthus delafuentei* Teruel & Turiel, 2020, *Buthus elongatus* Rossi, 2012, *Buthus ibericus* Lourenço & Vachon, 2004, *Buthus manchego* Teruel & Turiel, 2020, *Buthus montanus* Lourenço & Vachon, 2004, *Buthus occitanus* (Amoreux, 1789) y *Buthus serrano* Teruel & Turiel, 2020. La diversidad de *Buthus* en Europa occidental alcanza ahora 15 especies, todas endémicas locales.
Palabras clave: Scorpiones, Buthidae, *Buthus*, taxonomía, especie nueva, nuevos registros, Europa.

Taxonomía/Taxonomy: *Buthus pedrosousai* **sp. n.**

Introduction

The present paper represents the third sequential delivery in our continued taxonomic revision of the genus *Buthus* Leach, 1815 in the Iberian Peninsula. The first two parts were already published with the last 12-month period (Teruel & Turiel, 2020, 2021), and contributed the following main results:

• Six new species were described from southern Spain: *Buthus alacanti* Teruel & Turiel, 2020, *Buthus baeticus* Teruel & Turiel, 2020, *Buthus delafuentei* Teruel & Turiel, 2020, *Buthus garcialorcai* Teruel & Turiel, 2020, *Buthus manchego* Teruel & Turiel, 2020 and *Buthus serrano* Teruel & Turiel, 2020.

• The four species previously recognized were confirmed and valid and redescribed: *Buthus elongatus* Rossi, 2012, *Buthus ibericus* Lourenço & Vachon, 2004, *Buthus montanus* Lourenço & Vachon, 2004 and *Buthus occitanus* (Amoreux, 1789). A neotype was designated for the latter (an adult male from the original type locality), to consolidate its taxonomic identity by linking it permanently to an existing name-bearing type.

• *Buthus europaeus tridentatus* Franganillo, 1918, was confirmed as a junior synonym of *B. occitanus*. A neotype was also designated for the former (again an adult male from the original type locality), with the same taxonomic purpose as for the latter.

• Two old, neglected species were found to be valid and thus, resurrected from synonymy under *B. occitanus* and thoroughly redescribed: *Buthus ajax* (C. L. Koch, 1839) and *Buthus halius* (C. L. Koch, 1838). That included for each species the designation of an adult male neotype and the clarification of the precise type locality.

With these results alone, the diversity of the *Buthus* in the studied area increased from 4 to 12 species. Nevertheless, within the same timeframe Lourenço (2021) and Ythier (2021) described two additional new species from Portugal: *Buthus lusitanus* Lourenço, 2021 from the central mountains and *Buthus gabani* Ythier, 2021 from the southern coast. Moreover, in the present contribution we describe another new species from the Serranía de Cuenca, one of the main mountain ranges conforming the Iberian System, in central-eastern Spain. Now, the Iberian diversity of the genus reaches 15 nominal species, all of them monotypic and endemic from the Peninsula (fig. 1).

Methods & Material

See complete information in Teruel & Turiel (2020: 4–5) and Teruel & Turiel (2021: 3–4), with the exception of the following two errata:



Fig. 1. The Iberian Peninsula, showing the geographical distribution of the 15 species of *Buthus* recognized to occur there. For each species with multiple topographic records, the type locality is marked in red; in the case of *B. elongatus* it corresponds to a large area, so we marked a central point for visual orientation.

• In the Type Data section of *B. ajax* by Teruel & Turiel (2021: 4), due to an unfortunate typo, the type locality was referred to Toledo Province. Nevertheless, it belongs to Ciudad Real Province, as correctly declared later in the same paper by Teruel & Turiel (2021: 8, 20) both in the Material Examined section and the caption of figure 11d.

• The correct publication date of *B. halius* (as *Androctonus halius*) is 1838, not 1839 as assumed by Teruel & Turiel (2021). Dating appropriately the 16 volumes and 94 parts of the "*Die Arachniden*" series issued by C. W. Hahn & C. L. Koch (1831–1849), is an extremely misleading task that involves a long and convoluted story of errors and misinterpretations, fortunately clarified by Sherborn (1914) and Brignoli (1985).

Systematics

Buthus pedrosousai sp. n.

Figures 1–4. Tables I–III

Buthus occitanus: Lourenço & Rossi, 2013: 13; fig. 10 [misidentification: map area covering south-central Spain].

TYPE DATA. **SPAIN**: CASTILLA-LA MANCHA: Cuenca Province: Portilla Municipality: Serranía de Cuenca: between Ribatajadilla and Zarzuela, along road CUV-9118 (40°17' 53"N 02°08'20"W / 1219 m a.s.l.); 23–24/June/ 2016; C. Turiel; 1♂ holotype (RTO), 2♂♂, 1 juvenile ♂, 3 juvenile ♀♀ paratopotypes (RTO).

ETYMOLOGY. The selected epithet is a patronym honoring the Portuguese scorpiologist Pedro Reis de Sousa (CIBIO: Research Centre in Biodiversity and Genetic Resources, Universidade do Porto, Vairão, Portugal), for his continued interest and important contributions to the taxonomy and molecular genetics of the genus *Buthus*, including our study area.

DIAGNOSIS (based upon adult males only, unless otherwise noted). Adult size moderately large for the genus (64–70 mm). Coloration with base vivid yellow; carapace and tergites with a dark trivittate pattern all along; carapace, tergites and metasoma with carinae infuscate; chelicerae immaculate; pedipalps and legs with carinae faintly infuscate. Pedipalp chela with only a few dark macrosetae scattered on

Table I. Measurements of the three adult types of *Buthus pedrosousai* **sp. n.** Abbreviations: length (L), width (W), posterior width (Wp), depth (D).

Dimensions	(mm)	♂ paratopotype	♂ paratopotype	♂ holotype
Carapace	L / Wp	7.10 / 7.50	7.10 / 7.50	7.50 / 8.00
Mesosoma	L	15.00	15.15	17.25
Metasoma	L	34.66	34.99	37.20
Segment I	L / W / D	5.40 / 5.10 / 4.25	5.42 / 5.05 / 4.30	5.75 / 5.55 / 4.50
Segment II	L / W / D	6.16 / 4.90 / 4.25	6.20 / 4.80 / 4.30	6.75 / 5.25 / 4.50
Segment III	L / W / D	6.45 / 4.68 / 4.05	6.65 / 4.65 / 4.20	6.95 / 5.00 / 4.40
Segment IV	L / W / D	7.40 / 4.44 / 3.79	7.32 / 4.25 / 3.75	7.90 / 4.55 / 3.85
Segment V	L / W / D	9.25 / 3.85 / 3.32	9.40 / 3.85 / 3.25	9.85 / 4.05 / 3.50
Telson	L	7.55	7.45	8.15
Vesicle	L / W / D	4.25 / 3.40 / 3.05	4.25 / 3.55 / 3.10	4.70 / 3.70 / 3.45
Aculeus	L	3.30	3.20	3.45
Pedipalp	L	26.25	25.77	26.63
Femur	L / W	6.25 / 1.80	6.15 / 1.83	6.37 / 2.00
Patella	L / W	7.00 / 2.70	6.87 / 2.65	7.17 / 2.85
Chela	L	13.00	12.75	13.09
Manus	L / W / D	5.00 / 3.30 / 3.90	4.85 / 3.00 / 3.50	5.00 / 3.54 / 3.90
Movable finger	L	8.00	7.90	8.09
Total	**L**	**64.31**	**64.69**	**70.10**

Table II. Selected morphometric ratios of the adult types of *Buthus pedrosousai* **sp. n.** (males only, no adult females available). Abbreviations: length (L), width (W), depth (D). To compare it to the other 14 Iberian species, see Teruel & Turiel (2020: 38; tab. XIII), Teruel & Turiel (2021: 13; tab. III), Ythier (2021: 2, 4), and Lourenço (2021: 5).

Ratios	*B. pedrosousai sp. n.*
♂ pedipalp L / carapace L	3.55–3.70
♂ pedipalp chela L/W	3.70–4.25
♂ pedipalp manus L/W	1.41–1.62
♂ pedipalp chela L / movable finger L	1.61–1.62
♂ pedipalp manus W / patella W	1.13–1.24
♂ metasoma L / carapace L	4.88–4.96
♂ metasomal segment I L/W	1.04–1.07
♂ metasomal segment I L/D	1.26–1.28
♂ metasomal segment IV L/W	1.67–1.74
♂ metasomal segment IV L/D	1.95–2.05
♂ metasomal segment V L/W	2.40–2.44
♂ metasomal segment V L/D	2.79–2.89
♂ telson L/W	2.10–2.22
♂ telson L/D	2.36–2.47

Table III. Pectinal tooth count variation in *Buthus pedrosousai* **sp. n.** Abbreviations: number of pectines (N), average (Ave.), standard deviation (SD). To compare it to the other 14 Iberian species, see Teruel & Turiel (2020: 39; tab. XIV), Teruel & Turiel (2021: 13; tab. IV), Ythier (2021: 2, 4), and Lourenço (2021: 2).

Species	Sex	*N*	Pectinal tooth count						Ave.	SD
			27	28	29	30	31	32		
B. pedrosousai **sp. n.**	♂♂	8			1	1	3	3	31.00	± 1.07
	♀♀	6	3	3					27.50	± 0.55

ventral surface; manus globose, with all carinae vestigial to weak, smooth; fingers long (movable finger/manus length ratio: 1.60–1.63), fixed and movable fingers with 12–13 principal rows of denticles (mode 12 and 13, respectively), basal lobe/notch combination obsolete. Pectines with 29–32 teeth in males, 27–28 in females. Metasoma with size and shape standard for the genus (see ratios in tab. II); dorsal lateral and lateral supramedian carinae weakly subcrenulate to subgranulose on segments II–IV, ventral submedians on II–III weakly to moderately raised distally (much stronger and coarser in females); intercarinal tegument glossy to coriaceous, minutely punctate and with minutely reticulate granulation on I–IV (dorsally only) and V (all surfaces); setation sparse, with 2–3 pairs of dark macrosetae on almost all carinae (5–7 pairs on lateral supramedians and ventral laterals of V). Telson vesicle moderately large and globose.

Description (adult male holotype; fig. 2; tabs. I–III).

Coloration. Base vivid yellow, slightly paler on chelicerae, pedipalp fingers, legs, venter and telson. Chelicerae pale yellow, immaculate. Pedipalp femur yellow, with carinae faintly infuscate; patella yellow, with carinae very faintly infuscate, mostly basally; chela manus yellow, immaculate, fingers pale yellow, immaculate. Carapace with all carinae and only few of coarse granulation deeply infuscate, and a large, diffuse dark brown blotch around median ocular tubercle; eyes and ocular tubercles black. Tergites with all carinae and coarse granulation deeply infuscate and with symmetric dark brown spots on lateral areas, defining altogether a clearly trivittate pattern (i.e., a narrow, median solid line plus two broad, variegated lateral stripes, all three well separated). Pectines pale yellowish, with basal portion and basal plate progressively darker due to heavier sclerotization. Sternopectinal region and sternites pale yellow, immaculate. Legs pale yellow, immaculate. Metasoma concolor (i.e., no segments conspicuously darker), vivid yellow and immaculate, with all carinae of ventral surface plus all others of segment V deeply but narrowly infuscate (as very thin dark lines). Telson pale yellow, immaculate, distal half of aculeus blackish.

Chelicerae. With dentition typical for the genus, teeth standard-sized and blunt. Tegument glossy to coriaceous (with a satin sheen) and minutely punctate, dorsodistal portion of manus with fine, glossy granulation scattered and medium-sized, glossy granules irregularly arranged around dorsodistal depression. Setation very dense ventrally, but essentially lacking dorsally except for a patch of macrosetae at fixed finger base plus a large dark macroseta and a few translucent microsetae around dorsodistal depression of manus.

Pedipalps. Size standard for the genus (3.55 times longer than carapace). Femur essentially straight (very slightly bent inwards distally) and with many short and dark setae, largely concentrated along ventrodistal edge; all carinae strong and serrate to granulose, formed by coarse, isolated, glossy granules; intercarinal tegument coriaceous and minutely punctate on glossier areas. Patella straight and with only a few dark setae scattered all over; all carinae moderate to weak and granulose to coarsely costate, the former formed by coarse, isolated, glossy granules; intercarinal tegument glossy to coriaceous (with a satin sheen) and minutely punctate, internal surface with few small to medium-sized, weak denticles. Chela with manus large and globose (length/width ratio = 1.41, length/depth ratio = 1.28, median part widest), much wider than patella (ratio 1.24) and with only a few dark setae scattered on ventral surface, all carinae vestigial to weak but coarse, smooth, intercarinal tegument smooth, glossy and minutely punctate; fingers long (movable 1.62 times longer than underhand), thick and weakly curved, fixed finger with 12/12 principal rows of denticles plus 12/12 inner and 11/11 outer accessory denticles (much coarser than principal denticles), movable finger with 13/13 principal rows of denticles plus 12/12 inner and 12/12 outer accessory denticles (much coarser than principal denticles), and the standard apical subrow with 3/3 denticles (large terminal denticle not included), basal lobe/notch combination obsolete.

Carapace. Slightly wider than long (length/width ratio = 0.94). Anterior margin essentially straight, with five pairs of short and dark setae. Carinae with lyre-shaped configuration perfectly defined: anterior medians and superciliaries strong, fused into a spoon-shaped figure and formed by coarse, isolated, glossy granules; central laterals and posterior medians strong, fused into an S-shaped figure and formed by coarse, isolated, glossy granules; lateral oculars and central medians strong, not fused and formed by medium-sized to coarse, isolated, glossy granules; posterior laterals moderate and formed by medium-sized to coarse, isolated, glossy granules. Furrows: posterior laterals deep and wide, other furrows obscured by remarkably depressed areas between adjacent carinae. Tegument coriaceous, minutely punctate on glossier areas and irregularly covered by moderately dense, medium-sized, glossy granules largely concentrated along lateral and frontal areas. Median eyes large, separated by more than twice the ocular diameter; lateral eyes much smaller and mostly concealed below a granulose carina.

Sternum. Type 1, very small, triangular and bulky, with one pair of dark macrosetae, plus few inconspicuous minor setae. Tegument finely and very densely granulose, with slightly coarser granules scattered.

Genital operculum. With 4–5 pairs of dark macrosetae and some inconspicuous minor setae. Valves roundly subtriangular, shallowly convex and widely separated along posterior half; tegument smooth, minutely punctate and densely covered by moderately dense, fine to medium-sized, glossy granules along margins except medially. Genital papillae large, thick and not protruding.

Pectines. Long (almost reaching midpoint of leg IV trochanter) and narrowly subtriangular, setation moderately dense and dark. Tooth count 32/31, teeth not swollen. Fulcra large and swollen, paraboloid to round. Basal middle lamella roundly subtriangular. Pre-pectinal plate heavily sclerotized, very short, wide and folded transversely, crescent-shaped; tegument coriaceous. Basal plate heavily sclerotized, wider than long, with 1–2 pairs of dark macrosetae; anterior margin shallowly bilobed, posterior margin markedly convex; tegument coriaceous to minutely and very densely granulose, and with three conspicuous, deep depressions: one anteromedian (transverse, narrow and progressively much deeper medially to become a pit) and two laterals (large and roundly subtriangular).

Legs. Long and slender (but slightly less so than in the remaining Iberian species), with all carinae weak to moderate and smooth to subcrenulate except on femur, where moderate to strong and serrate to dentate. Intercarinal tegument coriaceous and minutely punctate on glossier areas, external surface of femur with many fine, glossy granules scattered. Bristlecombs well developed on I–III; distal part of patella and entire tibia with setation remarkably modified: very dense, short and stout-spiniform. Tibial and pedal spurs very large and thin. Claws medium-sized to long and well curved.

Mesosoma. Size and shape standard for the genus. Tergites coriaceous to minutely and very densely granulose, and irregularly covered by moderately dense, fine to medium-sized, glossy, tuberculate granules more concentrated along lateral areas, lateral margins finely denticulate, posterior margin minutely denticulate; carinae: median longitudinal straight, progressively longer and stronger backwards and formed by medium-sized, isolated, glossy to rough granules, submedians anteriorly divergent, very shallowly S-shaped, progressively longer and stronger backwards and formed by medium-sized, isolated, glossy granules, laterals absent on I–VI, strong, arcuate and formed by medium-sized, isolated, glossy granules on VII. Sternites with some dark macrosetae scattered all over (denser on III); lateral margins of all sternites finely dentate, posterior margin minutely denticulate; carinae present only on posterior two-thirds of each segment: submedians obsolete to weak on III–V (smooth, subcostate and anteriorly divergent to subparallel), moderate on VI (subcostate and parallel) and moderately strong on VII (subcrenulate and parallel, but very slightly convergent anteriorly), laterals absent on III, present on posterior two-thirds of IV–VI (smooth, coarsely costate and sinuose) and present on median third of VII (subcrenulate and very slightly divergent anteriorly); tegument coriaceous with some symmetric, glossy areas, minutely punctate and densely covered by minute granules on anterolateral areas; spiracles very long and slit-like; sternite V without defined median smooth patch.

►**Fig. 2-4.** *Buthus pedrosousai* **sp. n.: 2.** adult male holotype, habitus: **a)** dorsal; **b)** ventral. Scale bar in millimeters. **3.** Photographed alive *in situ*: **a)** adult male from Villar de Domingo García, Cuenca (modified from iNaturalist: https://www.inaturalist.org/observations/91182846); **b)** apparently subadult female from Torcas de los Palancares, Cuenca (modified from iNaturalist: https://www.inaturalist.org/observations/56223997). **4.** Habitat and microhabitat at the precise collecting sites of the type-series: **a)** place of the night sampling with UV; **b)** place of the single specimen found by day.





2a



2b









Metasoma. Size standard for the genus (4.96 times longer than carapace), but slightly heavier, progressively narrower and lower distally, with segment V both narrowest and lowest. Segment I with ten complete carinae, II–IV with eight, V with five: dorsal laterals weak and serratocrenulate on I, vestigial to obsolete and subcrenulate to sparsely subgranulose on II–IV, absent on V; lateral supramedians weak, subcrenulate on I–II, subgranulose on III–V; lateral inframedians moderately strong and coarsely crenulate, complete on I, present on distal half of II–III, absent on IV–V; ventral laterals weak to moderate and subcrenulate to crenulate on I–IV, strong and coarsely but irregularly serrate to lobate on V (with 2–3 moderately sharp and much larger lobes); ventral submedians moderately weak and subserrate on I, moderate to strong, progressively stronger backwards and serratocrenulate on II–III (feebly to moderately raised distally), strong and serrate on IV, absent on V (but indicated by an incomplete but raised row of coarse granules on basal two-thirds); ventral median absent on I–IV, strong and coarsely serrate on V (bifurcate on distal third). Intercarinal tegument glossy to coriaceous (with a satin sheen) and minutely punctate, with few minute granules scattered but forming a reticulate pattern dorsally on I–IV (progressively denser backwards) and all over V; dorsal furrow complete, wide and shallow on all segments; setation sparse, with 2–3 pairs of dark macrosetae on most carinae (5–7 pairs on lateral supramedians and ventral laterals of V).

Telson. Vesicle moderately large, globose (length/width ratio = 1.27, width/depth ratio = 1.07), with 11 pairs of dark macrosetae and several inconspicuous minor setae scattered all over; tegument glossy and minutely punctate, with traces of glossy granules scattered ventrally and laterally; ventral median carina obsolete, as are two accessory pairs of carinae (ventral laterals and lateral supramedians?), subaculear tubercle absent. Aculeus shorter than vesicle (ratio = 0.73), sharp and well curved.

Females (juvenile paratopotypes; tab. III). Sexual primary dimorphism evident, differing from described male by: **1)** pre-pectinal plate reduced to a tiny oval sclerite, invaginated into the membrane to look like a transverse pit; **2)** genital papillae absent; **3)** pectines smaller, narrower and with lower tooth counts (27–28); **4)** metasoma with all carinae stronger (especially the ventral submedians on segments II–III and ventral laterals on V, which are stronger and coarser).

Variation. In the type-series, adult size varied from 64.3–70.1 mm in males (tab. I); the three available females are all immature.

Base color and dark patterns are the same in all seven type specimens. The only difference is minor: the smaller juveniles have very faint traces of grey variegation on the external surface of pedipalp manus.

Number of principal rows of denticles varied from 12–13 on fixed and movable fingers, with a different and clearly defined mode of 12 in the former and 13 in the latter. Two juvenile females had a fixed finger with dentition aberrant due to regeneration and were excluded from count, but it must be mentioned here that both had the same number of rows in the remaining fingers: 12 in one of them and 13 in the other. Of the five perfect specimens, two adult males and one juvenile female had 12 rows on both fixed fingers and 13 rows on both movable fingers, while the third adult male had 13 rows on all fingers and the juvenile male had asymmetrical counts: left pedipalp with 12/12 rows (both fingers), right with 13/13.

The basal lobe/notch combination has the same degree of development (obsolete) in all available specimens, either juveniles or adults.

Pectinal tooth counts (tab. III) varied from 29–32 in males and 27–28 in females, without a clearly defined mode in either sex. Single-tooth asymmetry was a frequent occurrence, being present in two adult males and one juvenile female (43% of the specimens). Apart from this, a single specimen (14%) had a two-tooth asymmetry: a juvenile male with 29/31.

Comparison. Two reliable characters unambiguously distinguish *B. pedrosousai* **sp. n.** from all other Western European described congeners very easily, even to unaided eye: **1)** a unique shape of adult male pedipalp chelae, which combines a globose manus with fingers essentially lacking basal lobe/notch combination; **2)** leg patella and tibia robust, with the setation very dense and stout-spiniform. All other Iberian species have a globose manus with developed finger basal lobe/notch combination (*B. ajax*, *B. baeticus*, *B. delafuentei*, *B. gabani*, *B. halius*, *B. ibericus*), a slender manus with fingers essentially lacking basal lobe/notch combination (*B. alacanti*, *B. elongatus*, *B. garcialorcai*, *B. montanus*, *B. occitanus*, *B. serrano*), or a slender manus with developed finger basal lobe/notch combination (*B. manchego*).

Moreover, the leg patella and tibia are always more slender, with the spiniform setae of the leg patella and tibia less developed: both thinner and less dense (*B. alacanti*, *B. baeticus*, *B. delafuentei*, *B. garcialorcai*, *B. ibericus*, *B. manchego*), similarly stout, but less dense (*B. halius*, *B. montanus*, *B. serrano*), or similarly dense, but thinner (*B. ajax*, *B. elongatus*, *B. occitanus*); for both *B. gabani* and *B. lusitanus*, this character was not described nor depicted in the original sources (Lourenço, 2021; Ythier, 2021).

By its overall robust habitus and pedipalp shape, the new species is most similar to the first group above, i.e., the "finger-lobed" species). Apart from the two diagnostic characters already discussed above, those six species can be safely distinguished from *B. pedrosousai* **sp. n.** as follows:

- ***B. ajax*: 1)** size in males remarkably larger (70–79 mm); **2)** coloration with base much darker (olivaceous to reddish brown) and with dark pattern blackish and much more developed (chelicerae reticulate, pedipalps and legs with carinae deeply infuscate and with variable reticulations and spots, tergites with the dark trivittate pattern blurred due to extensive variegations); **3)** pedipalps with carinae remarkably stronger and coarser; **4)** pedipalp chela in males with manus much heavier (length/width ratio = 3.24–3.55); **5)** pedipalp fingers with slightly but consistently higher counts of principal rows of denticles (usually 13–14); **6)** metasoma in males remarkably slenderer and with carinae stronger and coarser.
- ***B. baeticus*: 1)** pedipalp fingers in males thinner and with accessory denticles smaller; **2)** carapace and tergites narrower and with intercarinal tegument glossier; **3)** pectines in males longer and narrower, albeit with tooth counts similar (31–33); **4)** metasoma in males slenderer and with carinae stronger; **5)** telson in males with vesicle smaller.
- ***B. delafuentei*: 1)** pedipalp chela in males with manus heavier (length/width ratio = 3.51–3.52), but with fingers longer and thinner; **2)** carapace and tergites narrower and with carinae remarkably stronger and coarser, but with inter-

carinal tegument glossier; **3)** pectines in males with tooth counts consistently higher (30–35); **4)** metasoma in males much slenderer and with carinae stronger; **5)** telson in males with vesicle smaller and with aculeus longer.

• ***B. gabani*: 1)** coloration with base darker (yellowish orange to light brown); **2)** pedipalp chela in males with manus remarkably heavier (length/width ratio = 3.54), but with fingers thinner; **3)** carapace and tergites with carinae stronger and coarser; **4)** metasoma in males slenderer and with carinae stronger; **5)** telson in males with vesicle smaller and with aculeus longer.

• ***B. halius*: 1)** pedipalps with carinae stronger; **2)** pedipalp chela in males with manus much heavier (length/width ratio = 3.40) and with fingers thinner; **3)** carapace and tergites narrower and with carinae remarkably stronger and coarser; **4)** pectines with tooth counts slightly but consistently lower (28–31 in males, 24–28 in females); **5)** sternites III–VI with tegument noticeably matter, coriaceous; **6)** metasoma in males much slenderer and with carinae stronger.

• ***B. ibericus*: 1)** size in males smaller (52–64 mm); **2)** habitus very different, shorter and fatter ("squat", "dumpy"); **3)** pedipalps with carinae much weaker; **4)** pedipalp chela in males with manus heavier (length/width ratio = 3.37–3.72), but with fingers thinner and with accessory denticles smaller; **5)** pectines with tooth counts consistently lower (26–31 in males, 21–26 in females); **6)** whole body and appendages with tegument noticeably glossier; **7)** metasomal segments and telson more robust and swollen.

All the differences mentioned above are very easy to appreciate even to unaided eye: compare figures 2–3 herein to figures 4–6 and 16–20 in Teruel & Turiel (2020: 41–42, 48–50), figures 2–10 in Teruel & Turiel (2021: 15–19) and figures 1–10 in Ythier (2021: 2–3), and also tables I–III herein to tables III–IV, IX–X and XIII–XIV in Teruel & Turiel (2020: 34–39), tables I–IV in Teruel & Turiel (2021: 12–13) and table I in Ythier (2021: 6).

DISTRIBUTION (fig. 1). According to our personal data and high-resolution photographs of collaborators, *B. pedrosousai* **sp. n.** is restricted to a few nearby localities in the median-altitude belt (1000–1500 m a.s.l.) of the southern watershed of the Serranía de Cuenca, in Castilla-La Mancha. Additional samples from this region are currently under study to define the precise geographical range of this scorpion (R. Teruel & C. Turiel, in preparation).

ECOLOGICAL NOTES (fig. 4). This is a lapidicolous scorpion, which digs short burrows and scrapes in compacted clay soil under limestone rocks. The vegetation is dense, primary black pine forest on clay soil with limestone rocks, although all specimens were found in more open places such as exposed rocky outcrops, clearings and road taluses.

Almost all specimens of *B. pedrosousai* **sp. n.** were collected during an UV search in the cold night of June 23, 2016: the scorpions were either sitting still or walking slowly in the cracks and near the base of rocks, on the gently sloped roadside talus (fig. 4a); two juveniles were found climbing on a grass stems, while eating each an adult of the Daesiidae solifuge *Gluvia dorsalis* (Latreille, 1817). An intensive diurnal search during the following morning yielded only an adult male, under a rock along a trail crossing the pine forest (fig. 4b).

The Serranía de Cuenca is one of the main limestone massifs in the Iberian Peninsula, well known by its karstic landscapes. The median-altitude belt inhabited by this scorpion has a peculiar climate within the Continental-Mediterranean type, characterized by a stark contrast between the hot and dry summer and the cold and wet winter.

REMARKS. This species was evidently misidentified as *B. occitanus* by Lourenço & Rossi (2013: 13), who depicted in their figure 10 an occurrence area for the latter that entirely overlaps the former (e.g., compare that image to our figure 1 herein). All specimens and high-resolution scorpion photographs we have examined from this area (the Serranía de Cuenca above 1000 m a.s.l.), are referable only to *B. pedrosousai* **sp. n.**

New Records

The following records improve our knowledge of nine species in a significant way, i.e., most of them expand their geographical distribution, which is especially relevant for five taxa that were previously known from a single locality. However, it is noteworthy to mention here that the photo records extracted from iNaturalist must be regarded as tentative and to be confirmed upon the examination of actual specimens, although we clarify here that we took only those that matched our samples most accurately.

1. *Buthus alacanti* Teruel & Turiel, 2020

SPAIN: VALENCIA: Alicante Province: Alicante Municipality: Costa Blanca: Saladar de Agua Amarga (38°17'04"N 00°31'25"W / 2 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/20501772). Elche Municipality: Costa Blanca: Los Cabreros (38°15'12"N 00°36'37"W / 25 m a.s.l.); photo of 1 juvenile (https://www.inaturalist.org/observations/34109217). Santa Pola Municipality: Costa Blanca: Venta Vista Alegre (38°12'22"N 00°33'39"W / 30 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/ 41558612).

REMARKS. This species was described from a single locality in coastal Alicante (Teruel & Turiel, 2020: 17). After the new localities recorded herein, *B. alacanti* seems widespread along the central part of the Costa Blanca section of the Mediterranean coast.

2. *Buthus baeticus* Teruel & Turiel, 2020

SPAIN: ANDALUCÍA: Sevilla Province: Carmona Municipality: Depresión Bética: Torre de la Huerta de Martín Pérez (37°29'09"N 05°37'30"W / 132 m a.s.l.); 12/June/2018; C. Turiel; 1♀, 1 juvenile ♂ (RTO). Los Palacios y Villafranca Municipality: Depresión Bética: El Trobal (37°06'35"N 05°56'53"W / 10 m a.s.l.); 2008; 1♀ (photographed by Paco Alarcón).

REMARKS. This species was described from two nearby localities in southern Sevilla and northern Málaga (Teruel & Turiel, 2020: 19), and later Ythier (2021: 2) recorded it from the outskirts of Sevilla city. After that and the new localities recorded herein, *B. baeticus* seems widespread in the mid-low part of Betic Depression, i.e., from the southern bank of Guadalquivir River through the facing (west and north) slopes of the Subbetic Range. See additional data below, under *B. delafuentei*.

3. *Buthus delafuentei* Teruel & Turiel, 2020

SPAIN: ANDALUCÍA: Huelva Province: Cartaya Municipality: between El Rompido and Punta Umbría, 200 m north of road A-5052 (37°13'08.6"N 7°06'05.1"W / 20 m a.s.l.); 30/September/2021; C. Turiel; 2♀♀, 4 juvenile ♂♂, 4 juvenile ♀♀ (RTO). Moguer Municipality: Depresión Bética:

Mazagón: Playa de Las Huesas (37°06'59"N 06°46'58"W / 1 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/14408947). Almonte Municipality: Depresión Bética: Cruz de Domínguez, 1 km north of Matalascañas (37°01' 19"N 06°33'16"W / 10 m a.s.l.); photo of 1 juvenile (https://www.inaturalist.org/observations/71884335).

REMARKS. This species was described from a single locality in south-central Huelva (Teruel & Turiel, 2020: 22). After the new localities recorded herein, it seems widespread in the lowest part of Betic Depression, i.e., the coastal and subcoastal areas of the Cádiz Gulf, on both sides of the Guadalquivir River. The data now available indicate that *B. delafuentei* and *B. baeticus* are parapatric species, whose distribution depends on the soil type: the former is a fossorial, psammophile scorpion that occurs only in sandy soils (including coastal dunes and beaches), usually devoid of superficial rocks and covered with open pine forest, while the latter is a more generalist, lapidicolous scorpion that occurs in silt, clay and to loamy soils, plenty of rocks and with diverse Mediterranean vegetation (both primary and anthropogenic).

4. *Buthus elongatus* Rossi, 2012

SPAIN: ANDALUCÍA: Málaga Province: Marbella Municipality: Sierra Blanca: Ojén: 1 km east-southeast of La Encinilla, along Río Real cross trail (36°34'37"N 04°50'29"W / 425 m a.s.l.); 2021; O. Helker; 1♂, 1♀.

REMARKS. This collecting site is located inside the general type locality, as redefined by Teruel & Turiel (2020: 7).

5. *Buthus ibericus* Lourenço & Vachon, 2004

SPAIN: ANDALUCÍA: Cádiz Province: Arcos de la Frontera Municipality: Olivar de la Herradura (36°37'57"N 05°48' 13"W / 75 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/8652902). Grazalema Municipality: Las Casillas: Puerto de los Acebuches (36°48'04"N 05°23'20"W / 825 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/1694180). La Yesera: Mirador de las Palomas (36°47'14"N 05°22'37"W / 1175 m a.s.l.); photo of 1 juvenile (https://www.inaturalist.org/observations/64764159). Puerto del Boyar: source of Arroyo del Fresnillo, along road CA-9104 (36°46'04"N 05°22'53"W / 1050 m a.s.l.); photo of 1♂ (https://www.inaturalist.org/observations/64764179). Sierra del Pinar: Benamahoma: Llanos del Campo (36°45' 17"N 05°27'16"W / 650 m a.s.l.); photo of 1 juvenile (https://www.inaturalist.org/observations/24321220).

REMARKS. The new localities recorded herein expand the confirmed distribution of this species roughly 9 and 10 km straight-distance to the north and west of the nearest previous records, given by Teruel & Turiel (2020: 10–11).

6. *Buthus manchego* Teruel & Turiel, 2020

SPAIN: CASTILLA-LA MANCHA: Albacete Province: El Bonillo Municipality: Lagunas de Ruidera: Sages, along Villanueva trail (38°54'27"N 02°43'27"W / 950 m a.s.l.); photo of 1♂ (https://www.inaturalist.org/observations/15286811).

REMARKS. This species was described from a single locality in northeastern Ciudad Real (Teruel & Turiel, 2020: 27). The new site recorded herein is located only 16 km straight-distance to the southeast, and represents its first record from adjacent Albacete.

7. *Buthus montanus* Lourenço & Vachon, 2004

SPAIN: ANDALUCÍA: Granada Province: Bérchules Municipality: Alcútar: slope between Barranco del Agua and Barranco del Cairo (36°57'53"N 03°12'01"W / 1400 m a.s.l.); photo of 1 juvenile (https://www.inaturalist.org/ observations/29033092). Cádiar Municipality: Yátor: end of Camino del Caz trail (37°57'57"N 03°08'30"W / 825 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/29034195). Almería Province: Bayárcal Municipality: Morrón de las Tres Lindres: El Mirador (37°06'54"N 03°01'28"W / 2100 m a.s.l.); photo of 1♀ (https://www.inaturalist.org/observations/16072579).

REMARKS. The new collecting sites are all located inside the general occurrence area of this species, as redefined by Teruel & Turiel (2020: 13), i.e., the upper-median belt of the central part of the Sierra Nevada. Nevertheless, it must be mentioned here that Yátor represents the significantly lowest altitude record for *B. montanus*.

8. *Buthus occitanus* (Amoreux, 1789)

SPAIN: ARAGÓN: Zaragoza Province: Caspe Municipality: 1 km west of La Efesa, near road A-2410 (41°20'59"N 00°05'03"W / 260 m a.s.l.); 17/June/2021; C. Turiel; 2♂♂, 2 juveniles (RTO). CATALUÑA: Tarragona Province: Batea Municipality: Ribera de l'Algars: Ombria del L'Aubanell, near road C-231 (41°06'18"N 0°14'35"E / 300 m a.s.l.); 17/June/2021; C. Turiel; 1♀, 1 juvenile (RTO). Alcover Municipality: Muntanyes de Prades: Camí del Calvari, near road TV-7041 (41°16'03"N 01°10'03"E / 300 m a.s.l.); 17/June/2021; C. Turiel; 1♂, 1♀, 5 juveniles (RTO).

REMARKS. The new collecting sites are all located inside the general occurrence area of this species, as redefined by Teruel & Turiel (2020: 16), i.e., from the Ebro Basin north and eastwards through extreme southeastern France.

9. *Buthus serrano* Teruel & Turiel, 2020

SPAIN: ANDALUCÍA: Granada Province: Cúllar Municipality: Pulpite (37°34'32"N 02°31'44"W / 900 m a.s.l.); photo of 1♂ (https://www.inaturalist.org/observations/42328261).

REMARKS. This species was described from a single locality in northeastern Granada (Teruel & Turiel, 2020: 29). The new site recorded herein, is located only 14 km straight-distance to the southwest.

Acknowledgments

See complete information in Teruel & Turiel (2020: 32) and Teruel & Turiel (2021: 11). In addition to that, we thank Theo Blick (Hummeltal, Germany) for calling our attention on the correct publication date of *Buthus halius* and providing the pertinent papers, Paco Alarcón (Sevilla, Spain) for kindly sharing with us his excellent photos and field data of *B. baeticus*, and to Oliver Helker (Heinsberg, Germany) for providing the new record of *B. elongatus* and pertinent field data.

References

See a complete list in Teruel & Turiel (2020: 32–33), complemented by Teruel & Turiel (2021: 12). Only those sources not listed therein and cited or corrected here follow:

BRIGNOLI, P. M. 1985. On the correct dates of publication of the arachnid taxa described in some works by C. W. Hahn and C. L. Koch (Arachnida). *Bulletin of the British Arachnological Society*, **6**(9): 414–416.

KOCH, C. L. 1838. *Die Arachniden. Getreu nach der Natur abgebildet und beschrieben (Fortsetzung des Hahn'schen Werkes).* Volume 5, Part 4. Nürnberg, in der Zeh'schen Buchhandlung, 158 pp.

LOURENÇO, W. R. 2021. Une nouvelle espèce appartenant au genre *Buthus* Leach, 1815 (Scorpiones: Buthidae) collectée dans le Parc Naturel de la "Serra da Estrela" au Centre du Portugal. *Faunitaxys*, **9**(13): 1–7.

LOURENÇO, W. R. & A. ROSSI 2013. Confirmation of a new species of *Buthus* Leach, 1815 from Sicily (Scorpiones, Buthidae). Biogeographical implications. *Revista Ibérica de Aracnología*, **22**: 9–14.*

SHERBORN, C. D. 1914. On the dates of publication of C. W. Hahn and C. L. Koch "*Die Arachniden*" 1831–1849. *The Annals and Magazine of Natural History*, **14**(8): 143–144.

TERUEL, R. & C. TURIEL 2020. The genus *Buthus* Leach, 1815 (Scorpiones: Buthidae) in the Iberian Peninsula. Part 1: four redescriptions and six new species. *Revista Ibérica de Aracnología*, **37**: 3-60.*

TERUEL, R. & C. TURIEL 2021. The genus *Buthus* Leach, 1815 (Scorpiones: Buthidae) in the Iberian Peninsula. Part 2: two more redescriptions. *Revista Ibérica de Aracnología*, **38**: 3–20.*

YTHIER, E. 2021. The southwesternmost **[*sic*]** scorpion species in Europe: *Buthus gabani* sp. n. from Cape St. Vincent, Algarve, Portugal (Scorpiones: Buthidae). *Faunitaxys*, **9**(25): 1–6.

* Reference available at www.sea-entomologia.org