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On the subterranean Staphylinidae fauna of South Spain

(Coleoptera)

V. ASSING

Abstract

Staphylinidae from soil samples collected in South Spain, all of them obtained by soil washing, were examined. Seven new species belonging to three subfamilies are described and illustrated: *Alevonota alboculata* sp.n. (Murcia) of the Aleocharinae, *Lusitanopsis lencinai* sp.n. (Murcia) of the Osoriinae, and *Entomoculia* (*Stenotyphlus*) *solanae* sp.n. (Castilla-La Mancha: Albacete), *Paratyphlus deformis* sp.n. (Murcia), *P. magnispina* sp.n. (Castilla-La Mancha: Ciudad Real), *P. lencinai* sp.n. (Murcia), and *P. carmeloi* sp.n. (Murcia) of the Leptotyphlinae. *Paraleptusa anophthalma* (EPPELSHEIM, 1884) is recorded for the first time since the original description; its habitus and the primary sexual characters are illustrated. An overview of the subterranean Staphylinidae fauna previously known from South Spain is provided. The distributions of three genera in the south of the Iberian Peninsula are mapped. New records of some additional species are reported.

Key words: Coleoptera, Staphylinidae, Aleocharinae, Osoriinae, Leptotyphlinae, South Spain, taxonomy, new species, diversity, endemism, endogean fauna.

Introduction

South Spain, which for the purpose of the present paper includes Andalucía (including Gibraltar), Extremadura, the south of Castilla-La Mancha, Murcia, and the south of Valencia (Alicante), is known to host a variety of subterranean Staphylinidae. Disregarding myrmecophiles and nidicolous species living in the burrows of mammals, the subterranean Staphylinidae known from South Spain can be assigned to four categories. Endogean (edaphic) species inhabit the mineral soil and are typically characterized by minute body size, a more or less cylindrical body, short legs and antennae, and adaptive reductions of eyes, wings, and pigmentation. These species are usually collected by excavating and washing soil (soil-washing technique). The hypogean environment is formed by the fissure network in the bedrock, caves, and by crevices in a layer of rocks and stones between the bedrock and the endogean habitat, a stratum commonly referred to as the Superficial Subterranean Habitat (known as MSS; from milieu souterrain superficiel). Staphylinidae living in this environment are mostly found with MSS traps or occasionally in caves. They are generally weakly pigmented, microphthalmous or anophthalmous, and micropterous. However, in constrast to endogean species, they are usually of larger body size, slender habitus, and they tend to have long legs and antennae. The few species that are practically exclusively found in caves are most likely associated with bat dung or similar substrates. Based on available evidence (records rare and confined to a short period of on-ground or above-ground dispersal activity), numerous Staphylinidae species can be assumed to reproduce in a subterranean habitat, but the specific nature of this habitat is essentially unknown. Most of these species belong to the subfamily Aleocharinae, e.g., the genera *Callicerus* GRAVENHORST, 1802, *Pseudosemiris* MACHULKA, 1935, *Alevonota* THOMSON, 1858, *Amarochara* THOMSON, 1858, *Ilyobates* KRAATZ, 1856, *Cousya* MULSANT & REY, 1875, some *Atheta* THOMSON, 1858 (e.g., species of the subgenus *Ceritaxa* MULSANT & REY, 1875), and species of the subgenus *Ceranota* STEPHENS, 1939 of the genus *Aleochara* GRAVENHORST, 1802 (ASSING 1999, 2001, 2002a, 2009, in press, ASSING & WUNDERLE 2008). Species of these taxa are generally collected rarely, mostly during their dispersal period, especially with pitfall traps or on the wing (car-nets, flight interception traps, etc.). For an overview of the characteristics of the

subterranean environment, terminological definitions, and illustrations see GIACHINO & VAILATI (2010) and ORTUÑO et al. (2014). A synopsis of the endogean and hypogean staphylinid fauna of northwestern Spain was recently provided by STRUYVE (2018).

The subterranean Staphylinidae species recorded from South Spain belong to several subfamilies. The Pselaphinae are represented by the genus *Mayetia* MULSANT & REY, 1875 (endogean). Thirteen *Mayetia* species have been recorded from South Spain (Extremadura, southern Castilla-La Mancha); the names of three of these species may be unavailable.

The small subfamily Phloeocharinae is represented in the Western Palaearctic by only one genus, *Phloeocharis* MANNERHEIM, 1830. Several *Phloeocharis* species have been recorded from South Spain, but only one of them, *P. manu* HERNANDO & GARCÍA-LÓPEZ, 2016, appears to be subterranean. This hypogean species was discovered in a cave in Málaga, Andalucía (HERNANDO & GARCÍA-LÓPEZ 2016).

Sepedophilus cavicola (SCRIBA, 1870) is the sole representative of the Tachyporinae regularly found in caves of South Spain. Its habitat, however, is not strictly subterranean, since it is found also epigeically.

Aleocharinae are the most speciose subfamily of Staphylinidae. They are represented in South Spain by at least three endogean species belonging to *Paraleptusa* PEYERIMHOFF, 1901; a fourth species of the genus from Andalucía may be epigeic, since it was found under stones. In addition, species with a subterranean reproduction habitat of uncertain identity belonging to several genera (see above) have been recorded from the region. Two species of *Atheta* appear to be cavernicolous, i.e., most likely associated with bat dung, *A. subcavicola* (BRISOUT DE BARNEVILLE, 1863) and *A. tenebrarum* ASSING, 2006 (ASSING 2006b, ASSING & VOGEL 2003).

Six species of Osoriinae, all of them endogean, have been recorded from South Spain, five of *Lusitanopsis* COIFFAIT, 1961 and one of *Typhlosorius* COIFFAIT, 1958.

The Euaesthetinae are represented in South Spain by at least one endogean species, *Octavius carpetanicus* OUTERELO, 1989. The type material was extracted from soil in Cáceres, Extremadura (OUTERELO 1989). *Euaesthetus brevelytratus* OUTERELO & GAMARRA, 1986 may have a hypogean habitat; the wings and pigmentation are reduced, and it was found in caves.

It is unclear if any of the Scydmaeninae reported from South Spain belong to the subterranean fauna. Species of *Cephennium* MÜLLER & KUNZE, 1822 would be potential candidates, as recent studies of the endogean fauna of the Greek island Crete have shown (ASSING 2018). One subterranean species of *Cephennium* was recently described from northern Spain by JAŁOSZYŃSKI & STRUYVE (2016).

The speciose subfamily Leptotyphlinae exclusively includes endogean species. As many as 72 species and subspecies have been recorded from Spain as a whole, but only eight of these species were known from South Spain. The latter belong to *Entomoculia* CROISSANDEAU, 1891 (one species), *Paratyphlus* BLACKWELDER, 1952 (six species), and *Hesperotyphlus* COIFFAIT, 1955 (one species from Extremadura).

Most of the Spanish subterranean species of the Paederinae belong to the genus *Domene* FAUVEL, 1873. Seven of them are known from South Spain; based on available evidence, they are hypogean. One subspecies of *Medon* STEPHENS, 1833, *M. dilutus spelaeus* (SCRIBA, 1870), may be hypogean too, but this requires confirmation. The same may apply to *Medon apicalis* (KRAATZ, 1857), a species almost exclusively collected on the wing (ASSING 2006a).

The relatively small number of subterranean Staphylinidae species known from South Spain compared to that recorded from other regions in the Iberian Peninsula suggests that many more species remain to be discovered. This is at least partly confirmed by material recently forwarded

to me by José Luis Lencina, Jumilla. An examination of this material, some of which was obtained by washing soil in various localities primarily in Murcia and adjacent regions, yielded as many as seven new species. Some additional species may be undescribed too, but they have to remain unnamed for want of males.

Material and methods

The material treated in this study is exclusively deposited in the author's collection (cAss).

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss), a Discovery V12 microscope (Zeiss), and a Jenalab compound microscope (Carl Zeiss Jena). The images were created using a digital camera (Nikon Coolpix 995), Axiocam ERc 5s, and Picolay software. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the mandibles (in resting position) to the abdominal apex, the length of the forebody from the anterior margin of the mandibles (in resting position) to the posterior margin of the elytra, head length along the middle from the anterior margin of the clypeus (without ante-clypeus) to the posterior constriction of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of (the median lobe of) the aedeagus from the apex of the ventral process to the base of the aedeagal capsule (except when stated otherwise). The "parameral" side (i.e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

In Leptotyphlinae, a reliable identification at the species level is possible only based on the primary and secondary male sexual characters, thus rendering a detailed description of external characters unnecessary.

Results

Aleocharinae

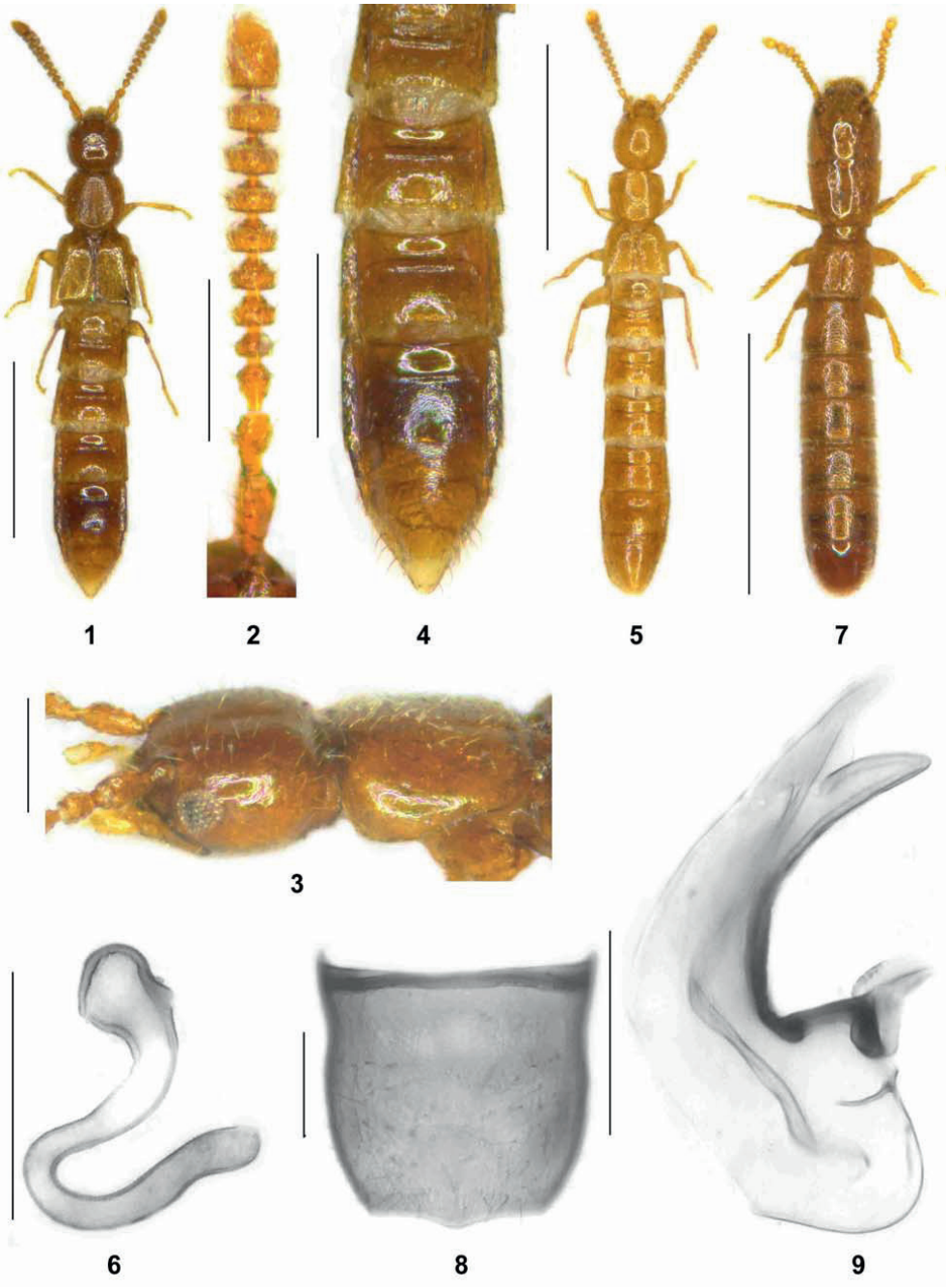
Genus *Alevonota* THOMSON, 1858

According to a recent revision, *Alevonota* is represented in the Western Palaearctic by 26 species (ASSING 2017, ASSING & WUNDERLE 2008). The species of this genus are more or less adapted to subterranean habitats. Some are fully winged, fully pigmented, have large functional eyes, but are only accidentally found in epigeic habitats or on the wing during their dispersal period; their true reproduction habitat is cryptic, probably subterranean. Most of these species are more or less widespread. Others are fully adapted to endogean or hypogean habitats. They are anophthalmous, micropterous, depigmented, and locally endemic. The majority of the species of this category is confined to the Canary Islands (ASSING 2002b). A number of species, however, displays intermediate conditions regarding their adaptive reductions of eye size, pigmentation, and wing length.

Alevonota alboculata sp.n.
(Figs. 1–4, 10–11)

TYPE MATERIAL: **Holotype** ♂: "SPAIN – Cartagena (MU), Cobaticas, 37.608°N, 0.756°W, 50 m, carob tree, soil, 18.III.2004, leg. Lencina & Andújar / Holotypus ♂ *Alevonota alboculata* sp. n. det. V. Assing 2018" (cAss).

ETYMOLOGY: The specific epithet is an adjective composed of alba (white) and oculata (with eyes). It alludes to the reduced pigmentation of the eyes.



Figs. 1–9: *Alevonota alboculata* (1–4), *Paraleptusa anophthalma* (EPPELSHEIM, 1884) (5–6), and *Lusitanopsis lencinai* (7–9): 1, 5, 7) habitus; 2) antenna; 3) head and pronotum in lateral view; 4) abdomen; 6) spermatheca; 8) male sternite VIII; 9) aedeagus in lateral view. Scale bars: 1, 5, 7: 1.0 mm; 4: 0.5 mm; 2–3: 0.2 mm; 6, 8–9: 0.1 mm.

Figs. 10–13: *Alevonota alboculata* (10–11) and *Paraleptusa anophthalma* (12–13): aedeagus in lateral and in ventral view. Scale bar: 0.1 mm.

DESCRIPTION: Body length 2.9 mm (abdomen fully extended); length of forebody 1.2 mm. Habitus as in Fig. 1. Coloration: body yellowish with the head and the abdominal segment VI somewhat darker; legs pale-yellow; antennae dark-yellow.

Head approximately as broad as long and of orbicular shape; punctation rather sparse, fine, but distinct; interstices with distinct microreticulation. Eyes (Fig. 3) flat, not protruding from lateral contours of head, and small, composed of approximately 30 ommatidia without pigmentation, less than half as long as distance from posterior margin of eye to posterior constriction of head in dorsal view. Antenna (Fig. 2) 0.7 mm long and distinctly incrassate apically; antennomeres IV–X disc-shaped, all approximately three times as broad as long, gradually increasing in width.

Pronotum approximately as long as broad and approximately 1.05 times as broad as head; punctation rather dense, shallow, and moderately fine; interstices with distinct microreticulation.

Elytra slightly shorter than pronotum; punctation dense and very fine; interstices with very shallow microreticulation. Hind wings reduced.

Abdomen (Fig. 4) slightly narrower than elytra, broadest at segment VI; tergites III–V with pronounced, tergite VI with slightly shallower anterior impression; punctation moderately sparse on anterior, very sparse on posterior tergites; interstices with shallow, but distinct microsculpture; posterior margin of tergite VII without distinct palisade fringe.

♂: sternite VIII obtusely produced posteriorly; median lobe of aedeagus (Figs. 10–11) 0.3 mm long, ventral process smoothly curved in lateral view.

COMPARATIVE NOTES: As can be inferred from the shape of the median lobe of the aedeagus and the absence of modifications of the male posterior tergites, *A. alboculata* belongs to the *A. rufotestacea* group. Based on the synapomorphic presence of an anterior impression on the

abdominal tergite VI, *A. alboculata* is closely allied to *A. vitalei* (BERNHAUER, 1932) (recorded only from Sicily and Israel), together with which it would key out in the key provided by ASSING & WUNDERLE (2008). It is distinguished from this species by smaller body size, shorter antennae with shorter and more transverse preapical antennomeres, a head of orbicular shape (subquadrate in *A. vitalei*), more distinct punctation of the forebody, shorter elytra and reduced hind wings, absence of a distinct palisade fringe at the posterior margin of tergite VII, and above all by the completely different shape of the median lobe of the aedeagus. For illustrations of *A. vitalei* see ASSING & WUNDERLE (2008).

DISTRIBUTION and NATURAL HISTORY: The type locality is situated to the east of Cartagena in the extreme southeast of Murcia Province. The holotype was collected from soil beneath a carob tree at an altitude of 50 m. No other Staphylinidae were present in the sample.

Genus *Paraleptusa* PEYERIMHOFF, 1901

Paraleptusa currently includes 19 locally endemic species distributed in the Mediterranean Region and southern Central Europe, primarily in the West Mediterraenan. Eight species are known from Algeria, four from South Spain, two from Tunisia, two from Greece, one from Morocco, one from Switzerland, and one from the region including northwestern Italy and southeastern France (SCHÜLKE & SMETANA 2015). In the Iberian Peninsula, the genus has been recorded only from the southeast (Fig. 14), from the Sierra de Segura (three species) and the Sierra Espuña (one species) (ASSING 2003, 2007a, 2008). The Iberian species were collected by soil washing or by turning stones near snow.

Paraleptusa anophthalma (EPPELSHEIM, 1884)
(Figs. 5–6, 12–14)

MATERIAL EXAMINED: **SPAIN**: 1 ♂, 1 ♀, Murcia, Moratalla, Sierra de Villafuerte, Fuente de la Piedra, 1585 m, soil washing on slope near spring, 30.III.2015, leg. Lencina (cAss).

This species was originally described from the Sierra Espuña and had not been recorded since. The type material was revised by ASSING (2007a). The mountain where the above specimens were found (Sierra de Villafuerte) is situated approximately 60 km to the northwest of the Sierra Espuña (Fig. 14). Despite some differences in the shape of the spermatheca, the specimens are assumed to be conspecific with the type material, particularly based on the identical shape of the median lobe of the aedeagus. The habitus and the primary sexual characters of the specimens from the Sierra de Villafuerte are illustrated in Figs. 5–6, 12–13.

Genus *Myrmoecia* MULSANT & REY, 1873

Myrmoecia is currently represented by 16 described species, all of them distributed in the Western Palaearctic. However, the genus has never been subject to a modern revision; the latest key to the species known at that time was provided by BERNHAUER (1940).

While *Myrmoecia* species are only accidentally collected by turning stones or by sifting leaf litter, they may be captured less rarely with pitfall traps (ASSING 1994). An association with ants has been suggested in the literature (e.g., HORION 1967), but clear evidence has not been produced. Based on these observations, it seems that the true reproduction habitat is essentially unknown, but most likely subterranean, and the beetles are collected epigeically only during their dispersal period.

Fig. 14: Distribution of *Paraleptusa* in the Iberian Peninsula: *P. spectans* ASSING, 2003: black diamond; *P. ripicola* ASSING, 2007: white circles; *P. andujari* ASSING, 2008: white star; *P. anophthalma*: black circles.

Myrmoecia hispanica (BERNHAUER, 1910)

MATERIAL EXAMINED: **SPAIN**: 1 ♀, Murcia, Moratalla, Charán, 38.25°N 2.00°W, 1120 m, soil under stones in stream bed, 20.III.2004, leg. Lencina & Andújar (cAss); 2 ♀♀, Jumilla (MU), Sierra del Carche, 38°26'50"N 1°10'03"W, 1120 m, MSS, Berlese, 16.X. 2013, leg. Lencina (cAss).

Both of the above records were obtained by washing soil, in one locality from under stones in a dry stream bed and in the other from the MSS layer. Thus, these records agree with the above hypothesis that the true habitat of *Myrmoecia* species is subterranean.

Osoriinae

Genus *Lusitanopsis* COIFFAIT, 1961

Lusitanopsis previously included ten species, three species from Portugal (two from Algarve in the south and one from the north), one from the Canary Islands, two from central and western Spain, and four from South Spain and Gibraltar (ASSING 2007b, SCHÜLKE & SMETANA 2015). The generic affiliations of the species currently attributed to *Lusitanopsis* and *Cylindropsis*

FAUVEL, 1885, however, require revision; for a discussion see ASSING (2007b). The currently known distribution of the genus in the Iberian Peninsula is mapped in Fig. 15.

All the species of *Lusitanopsis* are characterized by the morphological adaptions associated with an endogean habitat: small size, cylindical body, short legs and antennae, reduced pigmentation, completely reduced eyes and hind wings, and very short elytra.

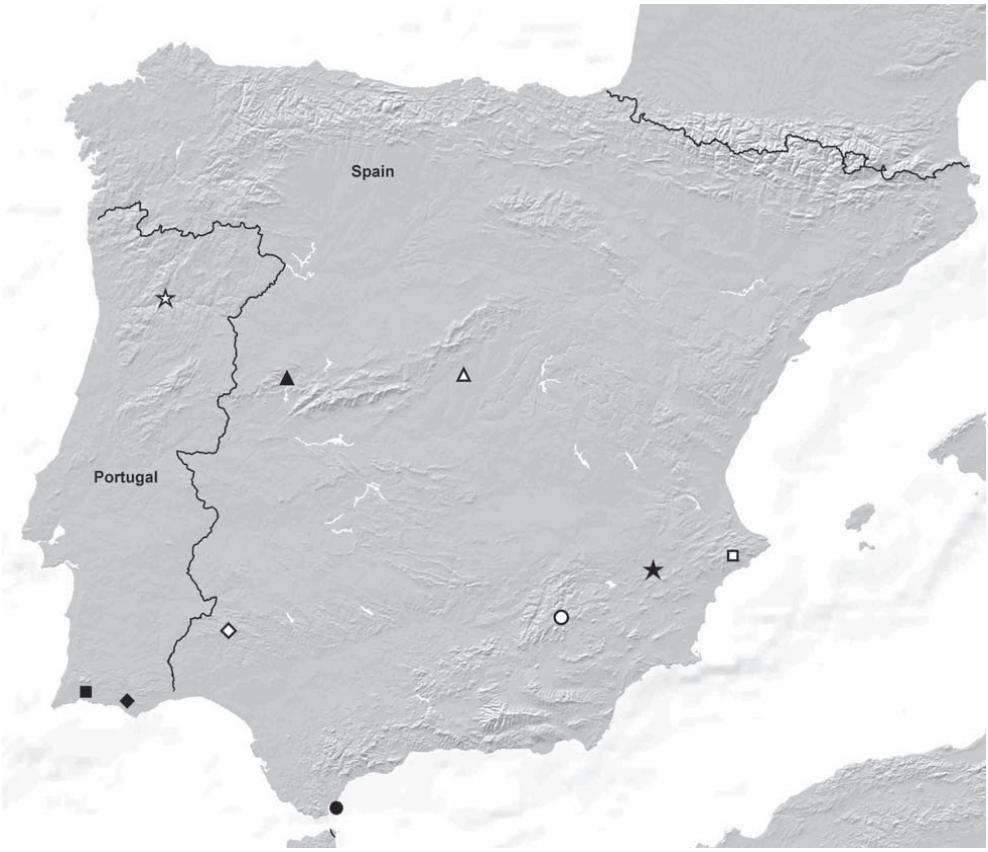


Fig. 15: Distribution of *Lusitanopsis* in the Iberian Peninsula: *L. douroensis* COIFFAIT, 1961: white star; *L. salamantica* OUTERELO, 1977: black triangle; *L. hispanica* OUTERELO, 1981: white triangle; *L. monchica* COIFFAIT, 1969: black square; *L. algarvensis* COIFFAIT, 1965: black diamond; *L. meybohmi* ASSING, 2007: white diamond; *L. herculeana* COIFFAIT, 1965: black circle; *L. segurica* ASSING, 2007: white circle; *L. lencinai*: black star; *L. andujari*: white square.

***Lusitanopsis lencinai* sp.n.**
(Figs. 7–9, 15)

TYPE MATERIAL: **Holotype** ♂: "SPAIN – Murcia, Jumilla, La Alquería, 600 m, 38°31'39"N, 1°18'23"W, soil betw. olive roots, 7.III.2004, leg. Lencina / Holotypus ♂ *Lusitanopsis lencinai* sp. n. det. V. Assing 2018" (cAss). **Paratypes**: 5 ♂♂, 5 ♀♀: same data as holotype (cAss).

ETYMOLOGY: This species is dedicated to José Luis Lencina (Jumilla, Spain), a most enthusiastic coleopterist, who collected the type material of this species and to whom I owe the

generous gift of numerous samples of Staphylinidae from Spain, including all the material that this study is based on.

DESCRIPTION: Body length 2.1–2.5 mm (abdomen fully extended); length of forebody 0.9–1.0 mm. Habitus as in Fig. 7. Coloration: body reddish with reddish-yellow legs and antennae.

Head with extremely fine punctation; microreticulation present in anterior, lateral, and posterior portions, absent in median dorsal portion. Eyes completely reduced. Antennomere II of similar width as antennomere I; antennomere III strongly transverse; antennomeres IV–VI extremely transverse, disc-shaped; antennomeres VII–X strongly transverse, but not disc-shaped, distinctly larger than antennomeres IV–VI, forming a loose club together with antennomere XI.

Pronotum of trapezoid shape, broadest anteriorly, weakly transverse (approximately 1.1 times a broad as long), and approximately as long as broad as head; midline broadly impunctate, on either side delimited by a series composed of 3–6 large punctures; lateral portions with coarse punctures; interstices with distinct microreticulation composed of large meshes.

Elytra approximately 0.7 times as long as pronotum; lateral carina very short, present only at humeral angles; punctation and microsculpture similar to those of pronotum. Hind wings completely reduced.

Abdomen broader than elytra, broadest at segment VII; punctation extremely fine, invisible even at a magnification of 100 ×; microreticulation pronounced.

♂: sternite VIII shaped as in Fig. 8; aedeagus as in Fig. 9.

COMPARATIVE NOTES: *Lusitanopsis lencinai* is reliably distinguished from other species known from South Spain only by the shape of the aedeagus. For illustrations of the aedeagi of these species see ASSING (2007b).

DISTRIBUTION and NATURAL HISTORY: The type locality is situated to the north of Jumilla in northern Murcia (Fig. 15). The specimens were collected from soil between the roots of an olive tree at an altitude of 600 m. No other Staphylinidae were found in the sample.

Lusitanopsis sp.

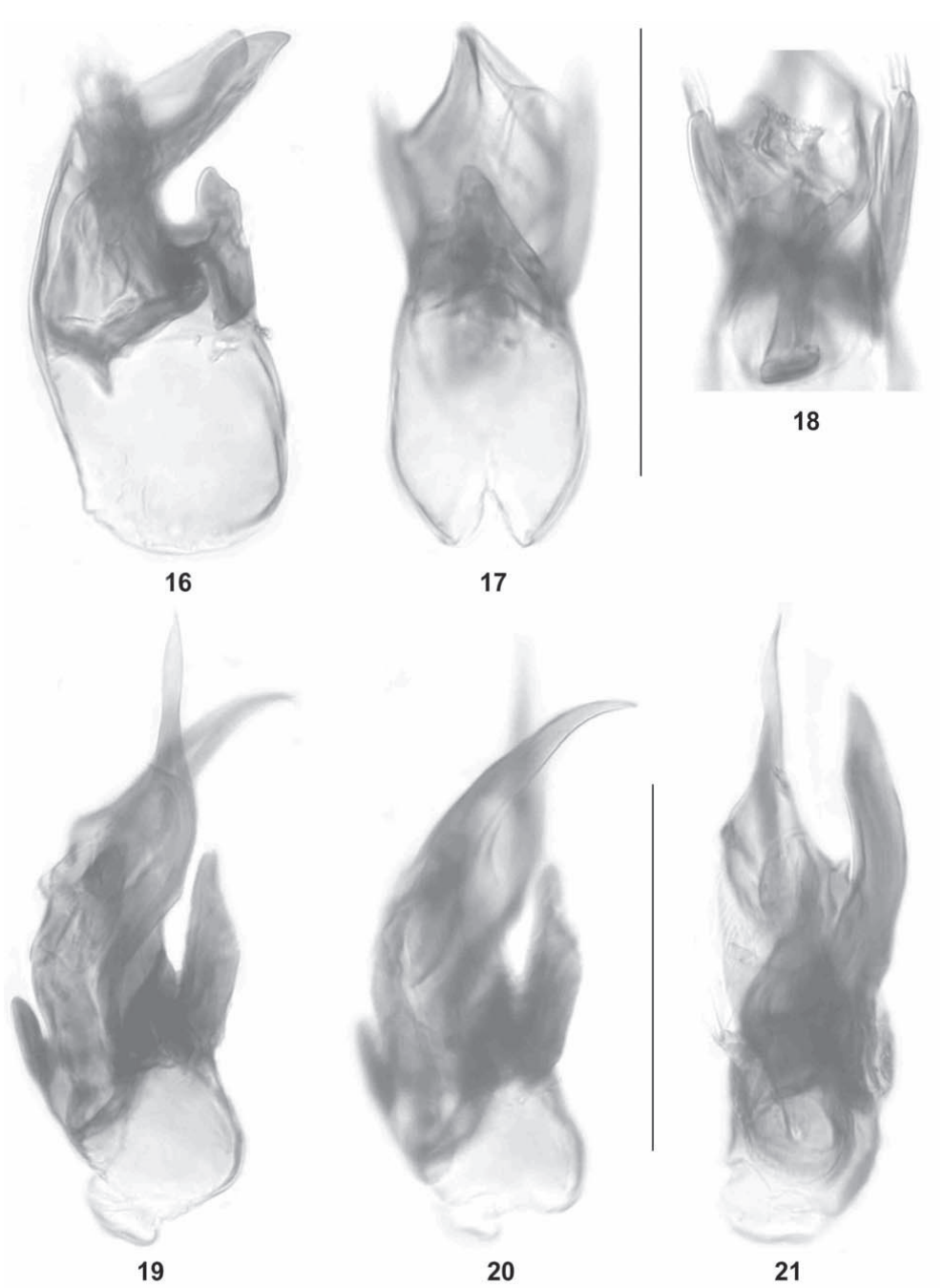
MATERIAL EXAMINED: **SPAIN**: 1 ♀, Murcia, Moratalla, Rambla de la Rogativa, Fuente de los Almeces, 38°09'N 2°14'W, 1100 m, 24.IV.2008, leg. Lencina (cAss); 1 ♀, same data, but 16.II.2006 (cAss).

The above females most likely represent an undescribed species. A male would be required for an adequate description.

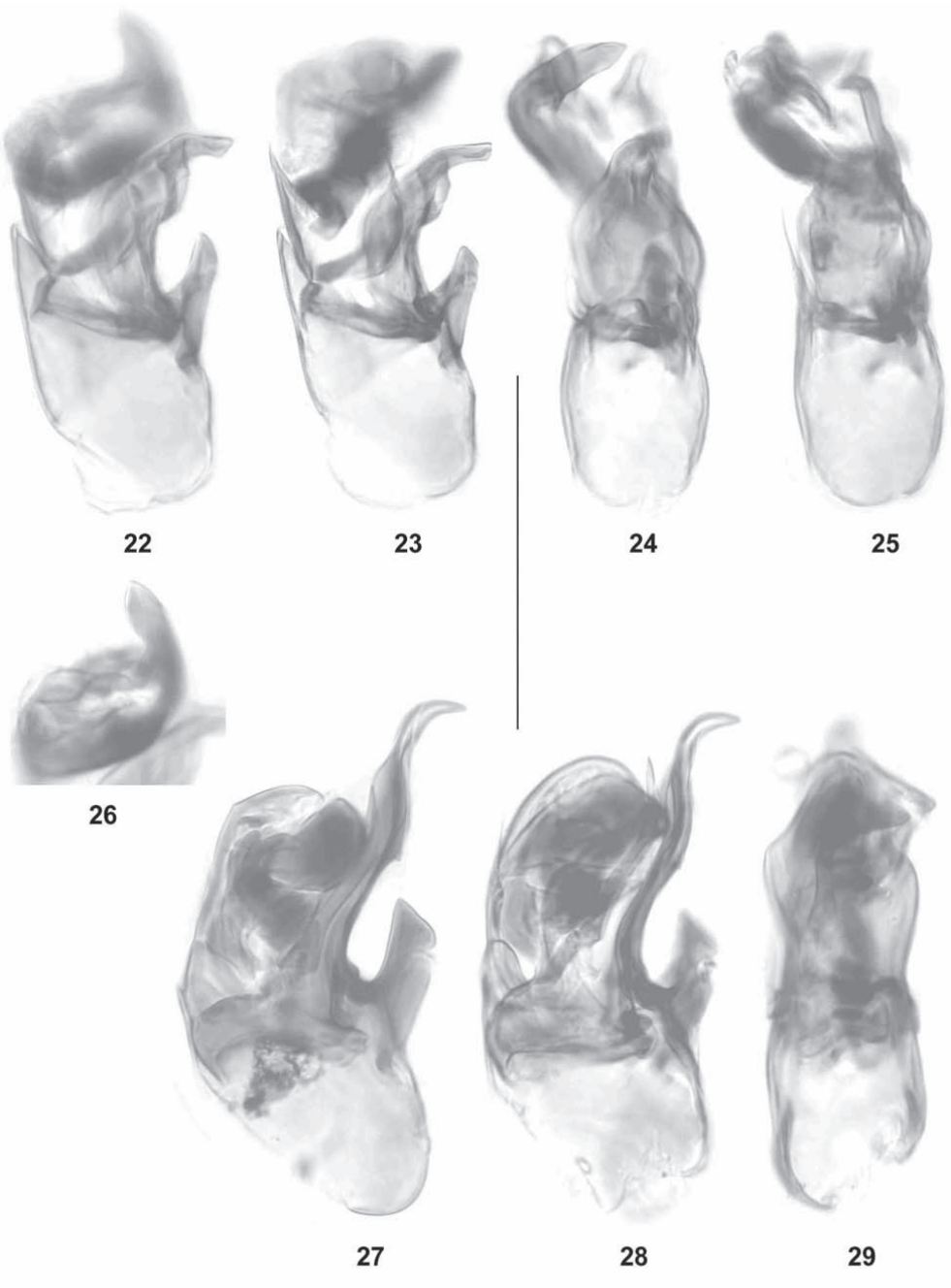
Leptotyphlinae

Genus *Entomoculia* CROISSANDEAU, 1891

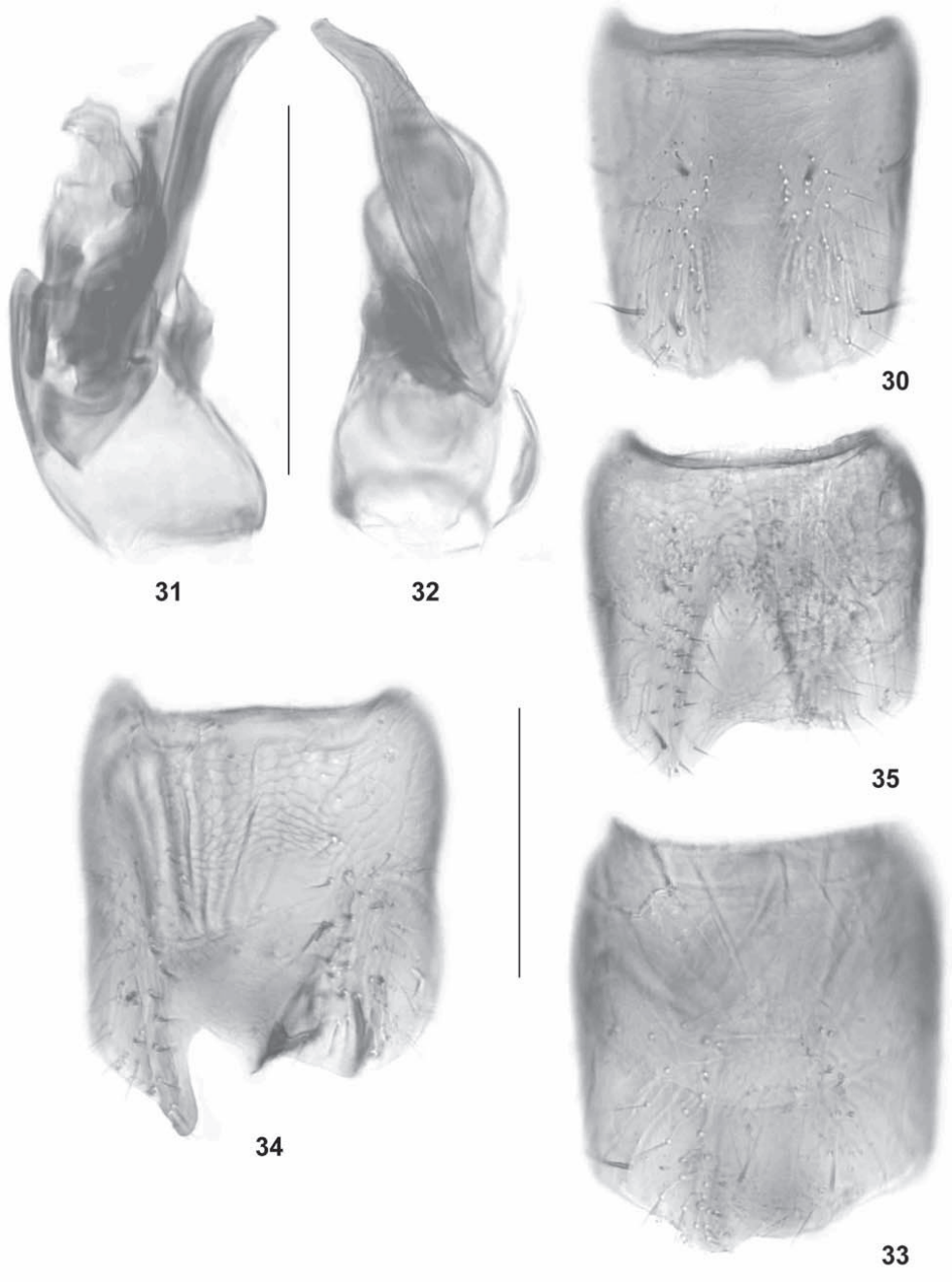
The speciose genus *Entomoculia* is confined to the West Mediterranean Region and the Canary Islands and previously included 132 species and two subspecies, 81 species in the nominal subgenus, 48 species and two subspecies in *Stenotyphlus* COIFFAIT, 1955, and three species incertae sedis (HERNANDO 2015, SCHÜLKE & SMETANA 2015). The species of the nominal subgenus are distributed in Italy (30 species), France (26), Tunisia (10), Algeria (8), northern Spain (6), and the Baleares (1), those of *Stenotyphlus* in France (16 species and two subspecies), northern Spain (14), Algeria (6), Tunisia (4), Italy (3), Morocco (2), the Canary Islands (2), and South Spain (1). The three species incertae sedis have been recorded from northern Spain (2) and France (1). The sole previously described representative from South Spain is *E. melendoi* OUTERELO, 1980 from the Sierra de Cazorla (Jaén).



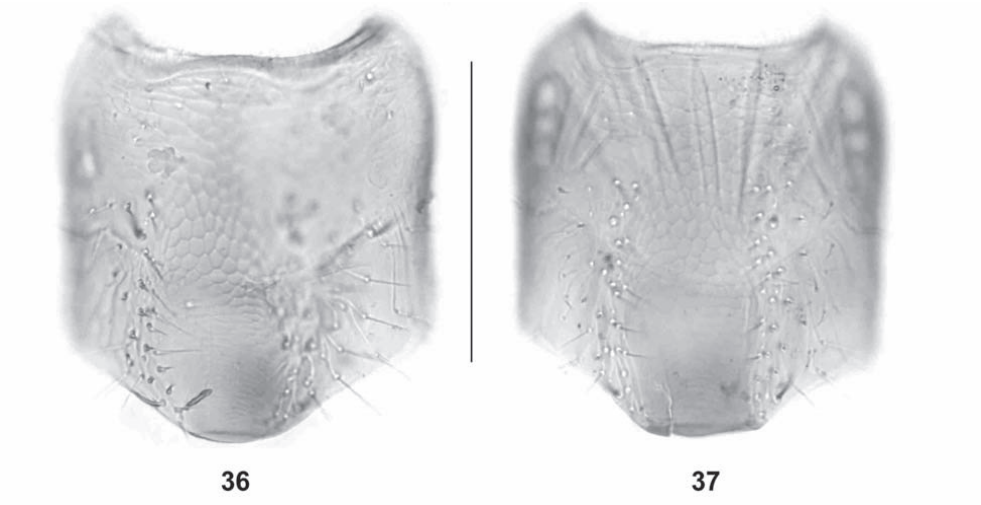
Figs. 16–21: *Entomoculia solanae* (16–18) and *Paratyphlus deformis* (19–21): 16–17, 19–21) aedeagus in lateral and in ventral view; 18) parameres in ventral view. Scale bars: 0.1 mm.



Figs. 22–29: *Paratyphlus magnispinus* (22–26) and *P. lencinai* (27–29): 22–25, 27–29) aedeagus in lateral and in ventral view; 26) apical internal structure of aedeagus in lateral view. Scale bar: 0.1 mm.



Figs. 30–35: *Entomoculia solanae* (30), *Paratyphlus carmeloi* (31–33), *P. deformis* (34), and *P. magnispinus* (35): 30, 33–35) male sternite VIII; 31–32) aedeagus in lateral and in ventral view. Scale bars: 0.1 mm.



Figs. 36–37: *Paratyphlus lencinai*: male sternite VIII. Scale bar: 0.1 mm.

Entomoculia (*Stenotyphlus*) *solanae* sp.n.
(Figs. 16–18, 30)

TYPE MATERIAL: **Holotype** ♂: "SPAIN – Socovos (AB), Abejuela, 38.369°N, 2.038°W, 700 m, soil of wet slope, 2.II.2008, leg. Lencina & Andújar / Holotypus ♂ *Entomoculia solanae* sp. n. det. V. Assing 2018" (cAss). **Paratype** ♀: same data as holotype (cAss).

ETYMOLOGY: The specific epithet is a noun in apposition derived from Sierra Solana, the mountain where this species was collected.

DESCRIPTION: Body length 1.0–1.1 mm (abdomen fully extended); length of forebody 0.4 mm.

♂: sternite VIII (Fig. 30) weakly oblong, with oblong median impression in posterior two-thirds, posterior margin with small median excision; aedeagus as in Figs. 16–17; parameres (Fig. 18) short, stout, straight, and of equal length.

COMPARATIVE NOTES: *Entomoculia solanae* is distinguished from *E. melendoi*, the only other representative known from South Spain, by the more pronounced posterior excision of the male sternite VIII and by the completely different shape of the aedeagus. For illustrations of *E. melendoi* see OUTERELO (1980).

DISTRIBUTION and NATURAL HISTORY: The type locality is situated in the southern slopes of the Sierra Solana to the north of Abejuela (Albacete), southern Castilla-La Mancha. The type specimens were collected by washing soil from a wet slope at an altitude of 700 m.

Genus *Paratyphlus* BLACKWELDER, 1952

The distribution of *Paratyphlus* is confined to the east and south of the Iberian Peninsula (including the Baleares) and Northwest Africa. The genus previously included 40 species in two subgenera, the nominal subgenus and *Ischnotyphlus* COIFFAIT, 1957, with twelve of the species listed as incertae sedis (HERNANDO 2016, SCHÜLKE & SMETANA 2015). HERNANDO & FANCELLO (2004) believed *Ischnotyphlus* had been synonymized with *Paratyphlus*, evidently based on a misunderstanding of HERMAN (2001), so that none of the subsequently described species was

assigned to either of the subgenera. Even though the systematic and phylogenetic status of *Ischnotyphlus* may be doubtful, the name has not formally been synonymized and is still valid (SCHÜLKE & SMETANA 2015).

Paratyphlus species were previously known from northeastern Spain (18 species), South Spain (6), the Baleares (4), South Portugal (4), Algeria (4), Morocco (2), and Tunisia (2). The described species from South Spain are *P. episcopus* COIFFAIT, 1965 (Cádiz), *P. espunae* ASSING, 2007 (Murcia), *P. mateui* COIFFAIT, 1955 (Málaga), *P. morandi* COIFFAIT, 1957 (Alicante), *P. torressalai* COIFFAIT, 1957 (Alicante), and *P. tudmirensis* HERNANDO, 2013 (Murcia). Their currently known distributions are illustrated in Fig. 38.

***Paratyphlus deformis* sp.n.**
(Figs. 19–21, 34, 38)

TYPE MATERIAL: **Holotype** ♂: "SPAIN – Murcia, Moratalla, Charán, 1120 m, 38°14'57"N, 2°00'07"W, 20.III.2004, soil under a rock inside a dry riverbed, Lencina & Andújar / Holotypus ♂ *Paratyphlus deformis* sp. n. det. V. Assing 2018" (cAss). **Paratype** ♀: same data as holotype (cAss).

ETYMOLOGY: The specific epithet (Latin, adjective: deformed) alludes to the strongly asymmetric male sternite VIII and aedeagus.

DESCRIPTION: Body length 1.1–1.2 mm (abdomen fully extended); length of forebody 0.5 mm.

♂: sternite VIII (Fig. 34) strongly asymmetric, with oblique posterior excision of distinctive shape; aedeagus (Figs. 19–21) 0.17 mm long, with two long and apically acute processes of different shapes.

COMPARATIVE NOTES: Based on the similarly asymmetric male sternite VIII and the similarly derived general structure of the aedeagus, *P. deformis* is closely allied to *P. tudmirensis* from the Sierra de la Pila (Murcia: Fortuna; 38°13'36"N 1°13'47"W), approximately 70 km to the east of the type locality of *P. deformis*. It is distinguished from this species by the shape of the posterior excision of the male sternite VIII and by the different shapes of the two processes of the aedeagus. For illustrations of *P. tudmirensis* see HERNANDO (2013). The geographically closest congener is *P. espunae* from the Sierra Espuña (Murcia), 55 km to the southeast of the type locality of *P. deformis*. Both species are readily distinguished by the completely different shapes of the male sternite VIII and of the aedeagus. For illustrations of *P. espunae* see ASSING (2007a).

DISTRIBUTION and NATURAL HISTORY: The type locality is situated close to Charán in northwestern Murcia (Fig. 38). The specimens were collected by washing soil from under a stone in a dry stream bed at an altitude of 1120 m.

***Paratyphlus magnispinus* sp.n.**
(Figs. 23–26, 35, 38)

TYPE MATERIAL: **Holotype** ♂: "SPAIN – Fuencaliente (CR), Sierra Madrona, Arroyo de Navalacuenca, 38.5177°N, 4.3818°W, 760 m, soil of stream bank, 10.XI.2005, leg. Lencina & Andújar / Holotypus ♂ *Paratyphlus magnispinus* sp. n. det. V. Assing 2018" (cAss). **Paratypes**: 1 ♂, 5 ♀♀: same data as holotype (cAss).

ETYMOLOGY: The specific epithet is a noun in apposition and composed of the Latin adjective magnus (large) and the Latin noun spinus (spine). It alludes to the massive sclerotized apico-internal structure of the aedeagus.

DESCRIPTION: Body length 1.1–1.3 mm (abdomen fully extended); length of forebody 0.4–0.5 mm.

Fig. 38: Distribution of *Paratyphlus* in the southern Iberian Peninsula: *P. carvoeirensis* COIFFAIT, 1970: black square; *P. algarvensis* COIFFAIT, 1965: white triangles; *P. brazensis* COIFFAIT, 1965: black diamond; *P. delicatulus* COIFFAIT, 1965: black diamond; *P. episcopus*: grey circle; *P. mateui*: grey diamond; *P. magnispinus*: white square; *P. deformis*: black triangle; *P. lencinai*: black star; *P. carmeloi*: black circle; *P. espunae*: white diamond; *P. tudmirensis*: white star; *P. morandi*: white circle; *P. torressalai*: grey triangle.

♂: sternite VIII (Fig. 35) distinctly asymmetric, with large and obliquely V-shaped impressions without pubescence in postero-median portion, posterior excision rather shallow and distinctly asymmetric; aedeagus (Figs. 22–26) 0.11 mm long, with rather short and somewhat bisinuate ventral process (lateral view) and with conspicuously large sclerotized apico-internal structure.

COMPARATIVE NOTES: This species is readily distinguished from all other *Paratyphlus* species known from South Spain by the completely different shape of the ventral process of the aedeagus, by the large sclerotized internal structure of the aedeagus, and by the shape of the male sternite VIII. For illustrations of the male sexual characters of *Paratyphlus* species previously recorded from South Spain see COIFFAIT (1972), ASSING (2007), and HERNANDO (2013).

DISTRIBUTION and NATURAL HISTORY: The type locality is situated near Fuencaliente in the Sierra Madrona in Ciudad Real, southern Castilla-La Mancha, close to the border with Andalucía (Fig. 38). The specimens were collected by washing soil of a stream bank at an altitude of 760 m.

***Paratyphlus lencinai* sp.n.**
(Figs. 27–29, 36–38)

TYPE MATERIAL: **Holotype** ♂: "E – Lorca (MU), Rambla del Estrecho, 37.767°N, 1.748°W, 490 m, reed-bed soil, 7.II.2006, leg. Lencina & Andújar / Holotypus ♂ *Paratyphlus lencinai* sp. n. det. V. Assing 2018" (cAss). **Paratypes**: 1 ♂, 1 ♀: same data as holotype (cAss).

ETYMOLOGY: This species is dedicated to José Luis Lencina, a charismatic coleopterist with a special interest in the beetle fauna of Murcia and one of the two collectors of the type series.

DESCRIPTION: Body length 1.1–1.2 mm (abdomen fully extended); length of forebody 0.4–0.5 mm.

♂: sternite VIII (Figs. 36–37) weakly asymmetric, broadly without pubescence along middle, posterior margin convexly produced; aedeagus (Figs. 27–29) 0.15 mm long, with slender, bisinuate, and apically acute ventral process (lateral view) and with long and moderately sclerotized spine in internal sac.

COMPARATIVE NOTES: *Paratyphlus lencinai* is characterized particularly by the shape of the aedeagus. From all other species known from Murcia and adjacent regions it additionally differs by the posteriorly convexly produced male sternite VIII.

DISTRIBUTION and NATURAL HISTORY: The type locality is situated to the northwest of Lorca, western Murcia (Fig. 38). The specimens were washed from soil of a reed-bed at an altitude of ca. 490 m.

***Paratyphlus carmeloi* sp.n.**
(Figs. 31–33, 38)

TYPE MATERIAL: **Holotype** ♂: "E – Lorca (MU), Playa del Siscal, 37.506°N, 1.424°W, 10 m, beach, tributary of barranco, 25.I.2006, leg. Lencina & Andújar / Holotypus ♂ *Paratyphlus carmeloi* sp. n. det. V. Assing 2018" (cAss). **Paratypes**: 4 ♀♀: same data as holotype (cAss).

ETYMOLOGY: This species is dedicated to Carmelo Andújar (currently La Laguna, Canary Islands), specialist of Anillina and one of the collectors of the type series of this and most other species described in the present paper, whom I had the pleasure to get to know during a joint field trip in spring 2007.

DESCRIPTION: Body length 1.0–1.1 mm (abdomen fully extended); length of forebody 0.4 mm.

♂: sternite VIII (Fig. 33) moderately asymmetric, broadly without pubescence along middle, posterior margin obliquely produced, with shallow and asymmetric median concavity; aedeagus (Figs. 31–33) 0.15 mm long, with nearly straight (lateral view) and strongly asymmetric (ventral view) ventral process.

COMPARATIVE NOTES: This species is readily distinguished from all other species known from Murcia and adjacent regions by the distinctive shapes of the male sternite VIII and the aedeagus. It additionally differs from *P. lencinai*, its geographically closest congener, by slightly smaller body size.

DISTRIBUTION and NATURAL HISTORY: The type locality is situated at the coast to the southeast of Lorca, southwestern Murcia (Fig. 38). The type specimens were washed from soil near a beach at the tributary of a barranco at an altitude of 10 m.

***Paratyphlus* spp.**

MATERIAL EXAMINED: **SPAIN**: 1 ♀, Murcia, Lorca, La Parroquia, 37.70°N 1.97°W, 700 m, slope with almond, soil washing, 7.II.2006, leg. Lencina & Andújar (cAss); 1 ♀, Castilla-La Mancha, Ciudad Real, Fuencaliente, El Escorial, Arroyo del Barranco, 2.V.2006, leg. Lencina (cAss).

The above females may represent undescribed species. They remain unnamed for want of males.

Genus *Gynotyphlus* COIFFAIT, 1955

According to SCHÜLKE & SMETANA (2015), *Gynotyphlus* is currently represented by three valid species. Two of them are confined to Corfu and Ipiros (northwestern Greece), respectively. The third species, *G. perpusillus* (DODERO, 1900), is parthenogenetic and distributed across the southern Western Palaearctic from Portugal to Turkey. At present, eleven subspecies, distinguished only by slight differences in the shape of a pair of weakly sclerotized internal structures in the female genital segments, are recognized (COIFFAIT 1972). From a zoogeographic perspective, however, this subspecific concept is highly doubtful. For instance, several subspecies are endemic to regions within the range of *G. perpusillus rhodanicus* COIFFAIT, 1955, which has been recorded from Portugal, France, and Switzerland (COIFFAIT 1972, SCHÜLKE & SMETANA 2015).

Gynotyphlus perpusillus (DODERO, 1900)

MATERIAL EXAMINED: **SPAIN**: 3 ♀♀, Murcia, Moratalla, Fuente de los Almeces, 38°09'N 2°14'W, 1100 m, 24.IV.2008, leg. Lencina (cAss); 2 ♀♀, Murcia, Moratalla, Arroyo Tercero, 38.180°N 2.213°W, 1060 m, 16.II.2006, leg. Lencina (cAss).

The above specimens represent the first records of this species from Spain.

Zusammenfassung

Eine Untersuchung von Staphylinidae aus Boden-Schwemmproben aus Südspanien ergab sieben neue subterrane Arten aus drei Unterfamilien, die beschrieben und abgebildet werden: *Alevonota alboculata* sp.n. (Murcia) (Aleocharinae), *Lusitanopsis lencinai* sp.n. (Murcia) (Osoriinae) sowie fünf Arten der Leptotyphlinae: *Entomoculia* (*Stenotyphlus*) *solanae* sp.n. (Castilla-La Mancha: Albacete), *Paratyphlus deformis* sp.n. (Murcia), *P. magnispina* sp.n. (Castilla-La Mancha: Ciudad Real), *P. lencinai* sp.n. (Murcia) und *P. carmeloi* sp.n. (Murcia). *Paraleptusa anophthalma* (EPPELSHEIM, 1884) wird erstmals seit der Originalbeschreibung nachgewiesen; ihr Habitus und die primären Sexualmerkmale werden abgebildet. Ein Überblick der bislang aus Südspanien nachgewiesenen subterranen Staphylinidenfauna wird gegeben. Die derzeit bekannte Verbreitung von drei Gattungen auf der Iberischen Halbinsel wird anhand von Karten illustriert. Neue Nachweise einiger weiterer Arten werden gemeldet.

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Book Review

SMETANA, A. 2017: Taxonomic review of the "quediine" subtribes of Staphylinini (Coleoptera, Staphylinidae, Staphylininae) of mainland China. – Prague: Nakladatelství Jan Farkač, 434 pp.

According to Aleš Smetana's own words, this is most likely his last opus magnum. Around the mid 1990s, the quediine fauna of China was virtually unknown, except for the island of Taiwan which has been treated by Smetana at about that time. Since then, several genera and a large number of species have been described from mainland China in numerous publications, mostly by Smetana himself but also by a few Chinese authors. The main scope of this newly published work was to combine the entire knowledge of the Chinese quediines into one book up to the end of the year 2014. The still ongoing studies on this taxonomic unit obviously caused some logistic problems, some of which will be mentioned below.

The book itself is impressive, with a sombre but appealing cover design, the front showing a quediine crawling over the map of China. The structure of the contents roughly follows that of Smetana's other larger publications. It provides keys to all taxonomic levels (subtribes, genera, species). Altogether, 16 genera and 284 valid species are treated. There are no detailed descriptions and material sections (the reader is referred to the original publications for those), the taxon chapters only provide information on type material, diagnoses, distribution and habitat, which I regard as absolutely sufficient – the number of pages of the book might have tripled otherwise. Following the taxonomic part, there is a checklist of all taxa, a short list of papers published after the deadline, an extensive bibliography and an index. I will not point out the few (though partly embarassing) type errors here, as Smetana's colleagues (including myself) have already caused him headaches because of those. Also, the lack of the photo credit for the photo of Aleš on the back cover is a minor issue.

More than half of the book is occupied by illustration plates containing many color habitus photographs. The illustration plates, however, are the part of the book that some users might regard as problematic. Many users, particularly those who are too lazy to use keys, simply browse the illustration plates for matching aedeagus shapes to identify their specimens. This procedure is pointless here since the plates are not in systematic order. As pointed out above, the ongoing work on this group in combination with determining a deadline for accommodating newly published papers resulted in a decision to rather arrange the plates according to the original publication year (by using the original illustrations) than to extract the individual original drawings and images and arrange them systematically. As long as the keys are used for identification, this does not pose any problem. However, when it comes to compare body details and genitals of closely related species, the time line structure of the plates becomes quite confusing and cumbersome to use. The only thing that is arranged in one row are the fine habitus photographs.

Final conclusion: Although the book will certainly be out-of-date again in a few years (due to the rich quediine fauna of China with many more taxa to be described in the future), it will serve as a benchmark for quediine studies of the Chinese fauna for quite some time. I am certainly happy to have this compendium in my library and I am glad to see that Aleš Smetana, who has been a friend to me for many years, is still producing such high quality scientific literature since so many decades.

H. SCHILLHAMMER