Seidlitzella hoffeinsorum sp. nov., the first representative of the beetle tribe Gymnochilini (Coleoptera: Trogossitidae) from Baltic amber

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ABSTRACT: Based on two well-preserved specimens from late Eocene Baltic amber, a new fossil species belonging to the family Trogossitidae, *Seidlitzella hoffeinsorum* sp. nov., is described. This is the second known fossil species of the tribe Gymnochilini and the second known species of the genus *Seidlitzella*. The systematic and biogeographical relations of the genus to other members of the Gymnochilini are discussed. It is hypothesised that the extant eastern Mediterranean species *Seidlitzella procera* may be phylogenetically related to the genus *Phanodesta*, today distributed in New Zealand, New Caledonia, Lord Howe Island, Juan Fernandez Island and Sulawesi.

KEY WORDS: Cleroidea, Eocene, fossil, new species, Paleogene.

The family Trogossitidae, the bark-gnawing beetles, constitute one of the lesser families of the superfamily Cleroidea, with about 600 recent species described to date (Kolibáč 2013). The modern classification of the Trogossitidae was developed from the classic work of Reitter (1876), later studied by Crowson (1964, 1966, 1970), Barron (1971) and Ślipiński (1992) and, most recently, by Kolibáč (2005, 2006, 2008) and Kolibáč & Leschen (2010).

The tribe Gymnochilini Lacordaire comprises a highly adapted group consisting of eight genera (Leschen & Lackner 2013). They are rapid flyers, living on fallen logs and hunting for bostrichids, scolytids and other insects (with the exception of a number of apterous species of *Phanodesta* Reitter from Juan Fernandez Island). Most of the species have relatively large eyes, pronotum transverse with extended anterior corners and dorsal body surface often covered with scales or tufts of thick setae. Some of them (*Anacypta* Illiger, *Xenoglena* Reitter) strongly resemble the jewel beetles (Buprestidae) in their body shape and swift movement, whilst other species are capable of jumping.

Seidlitzella Jakobson was a monotypic genus in which the single extant species, *S. procera* (Kraatz, 1858), is distributed in Greece, Turkey and Cyprus (Kolibáč 2007). The species is predatory. Adults are found on logs of various trees (e.g., the Cilician fir *Abies cilicica* (Antoine & Kotschy) Carrière, 1855), and larvae have been found under pine bark (Schawaller 1993). It was once considered related to the Palaearctic species of *Leperina* Erichson, as suggested by Schawaller (1993). However, his formal synonymisation of *Seidlitzella* was not confirmed in a recent study by Leschen & Lackner (2013), who established the new genus *Kolibacia* for *Leperina tibialis* Reitter, 1889 and *L. squamulata* (Gebler, 1830).

The list of fossil members of Trogossitidae included about 26 species from the Cenozoic and Mesozoic (Ponomarenko & Kireitshuk 2009–2015; Schmied *et al*. 2009; Kolibáč 2013). In addition, several new fossil trogossitids have been recently described from the Neogene of Germany (Kolibáč *et al.* 2016) and the Jurassic and Cretaceous of Spain and China (Yu *et al.* 2012, 2014, 2015; Peris *et al.* 2014). Interestingly, only two trogossitid species have been described from Baltic amber so far, both classified within the Lophocaterinae (Kolibáč *et al.* 2010; Kolibáč 2011). A brief updated review of described trogossitid fossils can be found in Table 1.

The single fossil species of Gymnochilini previously known is *Gymnocheilis obesa* (Heer, 1862) (described as *Gymnochila* Erichson) from the middle Miocene of Germany (Baden-Württemberg: Öhningen). The second fossil species of Gymnochilini (which is also the second known species of *Seidlitzella*) is described below.

1. Material and methods

The holotype is preserved in a polished piece of transparent, orange-tinted amber with a reddish halo around the inclusion. The amber piece is embedded in polyester resin (dimensions 17 × 13 × 8 mm). The specimen is damaged; the left elytron and the left wing are broken and partly absent. The ventral side and head are not clearly visible as they are surrounded by a cloudy coating. Syninclusions consist of four stellate hairs (trichomes), probably from a beech flower (Fagaceae). The paratype is preserved in a polished piece of transparent, yellow-orange amber embedded in polyester resin (dimensions 16 × 13 × 6 mm). The beetle specimen is complete; syninclusions consist of stellate hairs and one specimen of Acari (Oribatida), which is separately deposited under collection number CCHH 1753-2b.

The specimens examined were originally loaned from the private collection of Christel and Hans Werner Hoffeins (CCHH, Hamburg, Germany). Both amber pieces have been deposited at the Senckenberg Deutsches Entomologisches Institut in

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Table 1 An updated review of described fossil species in the family Trogossitidae

Subfamily	Number of species	Period	No. of species/ Country
Trogossitinae	1	Neogene	1 Germany
Trogossitinae	4	Paleogene	1 USA; 3 Germany
Trogossitinae	3	Cretaceous	1 Greenland; 2 Russia
Trogossitinae	2	Jurassic	2 Russia
Peltinae	2	Neogene	1 France; 1 Germany
Peltinae	2	Paleogene	1 USA; 1 Germany
Peltinae	3	Jurassic	1 Russia; 2 China
Lophocaterinae	2	Paleogene	2 Baltic amber
Lophocaterinae	3	Cretaceous	1 Spain; 2 China
Lophocaterinae	2	Jurassic	1 Russia; 1 China
Trogossitidae *inc. sedis*	2	Jurassic	2 China

Müncheberg, Germany (SDEI), as part of the institutional amber collection for permanent preservation.

Photographs of the holotype and recent specimens were taken with a Leica Z16Apo. The body parts of the holotype were measured with LAS 3.6.0 software, which was also used to stack certain images. The body parts of the paratype were measured by means of an ocular grid.

2. Systematic palaeontology

Family Trogossitidae Latreille, 1802
Subfamily Trogossitinae Latreille, 1802
Tribe Gymnochilini Lacordaire, 1854
Genus *Seidlitzella* Jakobson, 1915

Type species. *Peltis procera* Kraatz, 1858.

Diagnosis. Dorsal surface without pubescence and without distinct vestiture composed of scales or thick setae (elytral punctures filled with dust and bearing only minute setae or scales or vestiture absent); head pro- or orthognathous, with antennal grooves and single pair of laterally-situated eyes; ventral part of cranium with long setae at sides; antennal club loose, three-segmented; antennomeres 9–11 with sensorial fields; pronotum distinctly transverse (width/length ratio *c.*1.6–1.7), with anterior angles projecting and acuminate; procoxal cavities externally closed; elytron with ten non-beaded carinae, window punctures absent; protibia with large, hooked spur at apex, with four small spines along outer edge; first tarsomere shortened but present, tarsal formula seemingly 4–4–4; last tarsomere as long as other tarsomeres together; tarsal claw large, without denticle; abdomen with five ventrites.

Remarks. Body unicolorous, compact, lacking distinct vestiture and window punctures (rectangular punctures connected with each other; Leschen & Lackner 2013), and a double row of relatively small, rounded intercarinal punctures distinguish *Seidlitzella* from the eastern Palaearctic genus *Kolibacia* and the "Gondwanan" *Leperina* and *Phanodesta* (Fig. 1A–E). These characters may also be found in the fossils described herein. Species of *Kolibacia* are slimmer, with a distinct vestiture composed of scales or thick setae, and window punctures occurring in the intercarinal spaces of elytra. The absence of large spines along the outer edges in all pairs of tibiae differentiates *Seidlitzella* from species of the genus *Melambia* Erichson, of similar habit (Fig. 1F), in which the elytral vestiture is completely absent and the species are more elongate. The pronotum in *Kolibacia* and *Melambia* is weakly transverse (width/length ratio about 1.1–1.2) whilst the ratio is higher than 1.5 in *Seidlitzella*. Keys to the relevant genera and their detailed diagnoses are included in Kolibáč (2013), Leschen & Lackner (2013), Yoshitomi (2014) and Yoshitomi & Lee (2014). Some outer diagnostic characters of the relevant genera are listed in Table 2.

Seidlitzella hoffeinsorum sp. nov.
(Figs 2–5)

Type material. Holotype, sex unknown; CCHH 1753-1 [ex coll. J. Oehlke 127]. Cenozoic: Baltic amber, Eocene; found on the Baltic Sea coast, Samland Peninsula (formerly East Prussia); deposited in the amber collection of the Senckenberg Deutsches Entomologisches Institut, Muencheberg, Germany (SDEI). Paratype, sex unknown; CCHH 1753-2a; Cenozoic: Baltic amber, Eocene; obtained in Lithuania in 2016; deposited in SDEI.

Diagnosis. *Seidlitzella hoffeinsorum* sp. nov. differs from the extant *S. procera* in the following characters: (1) punctures of

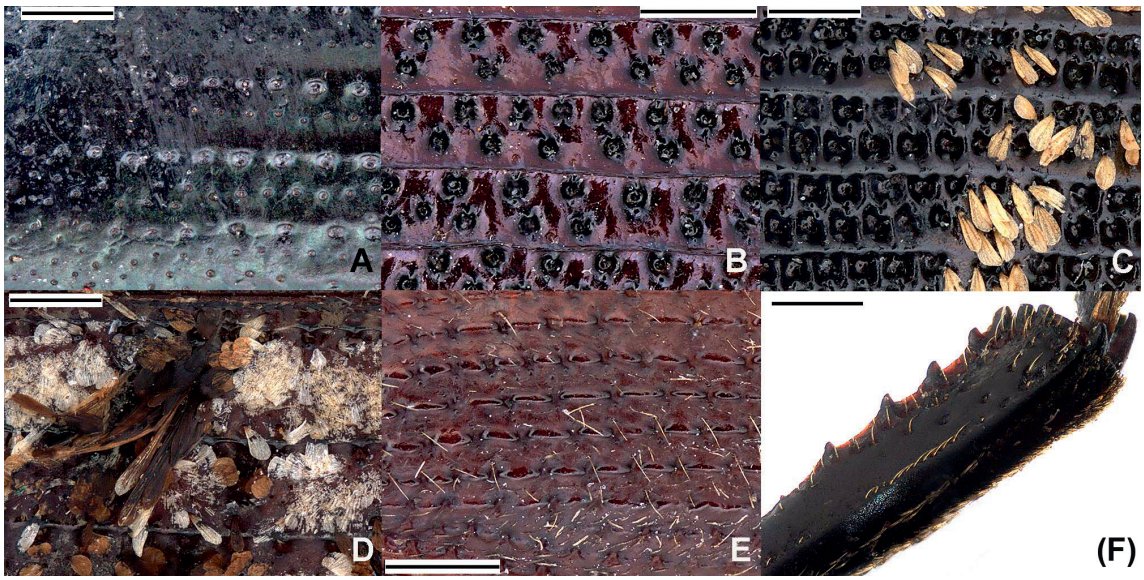

Figure 1 Elytral sculpture and vestiture of extant Gymnochilini: (A) *Melambia gigas* (Fabricius); (B) *Seidlitzella procera* (Kraatz); (C) *Kolibacia squamulata* (Gebler); (D) *Leperina cirrosa* Pascoe; (E) *Phanodesta cribraria* (Blanchard). (F) *Melambia gigas* (Fabricius), apical portion of protibia. Scale bars = 0.5 mm.

Table 2 Comparison of some outer characters in extant genera of Gymnochilini, apart from the "split-eyed group"

Character	*Seidlitzella*	*Melambia*	*Kolibacia*	*Leperina*	*Phanodesta*
pro- and meso-tibia; outer edge	protibia with 4 small spines or spines absent	with 3–5 large spines	2–3 minute spines or spines absent	2–3 minute spines or spines absent	protibia with 4–5 small spines
elytral carinae	distinct, weakly beaded or not at all	feeble	distinct, not beaded	distinct, not beaded	distinct, beaded
elytral punctures	large, rounded	fine, rounded	window punctures	window punctures	absent
elytral punctures	2 rows	2–3 rows	2 rows	2 rows	absent
dorsal vestiture	absent or fine setae	absent	scales + setae	scales + setae	scales + setae or only fine setae

Table 3 Measurements of *Seidlitzella hoffeinsorum* sp. nov.

Measurement	Holotype (mm)	Paratype (mm)
Body length without mandibles	10.02	9.2
Body, max. width	5.00 (approx.)	3.9
Head, length from base to clypeus	1.16	1.0
Head, max. width incl. eyes	2.20	1.9
Head, max. width excl. eyes	2.20	1.9
Head, min. width between eyes	1.80 (approx.)	1.4
Eye, longitudinal diameter	0.50 (approx.)	0.4
Antenna, length	1.96	1.9
Antenna, scape	0.19	0.2
Antenna, pedicel	0.14	0.1
Antenna, antennomeres 3–8	0.85	0.9
Antenna, antennomere 9–11	0.78	0.7
Pronotum, length	2.39	2.0
Pronotum, max. width	3.93	3.4
Elytron, width at base	2.35	1.8
Elytron, max. width	2.50 (approx.)	1.9
Elytron, max. length	6.47	6.3
Protibia	1.43	1.4
Profemur	1.67	1.5
Protarsus (excl. claws)	0.92	0.8
Mesotarsus (excl. claws)	1.00 (approx.)	0.9
Mesotarsal claw	0.36	0.3

pronotum distinctly separated from one another and interspaces several times larger than individual punctures (interspaces not larger than diameter of punctures in *S. procera*); (2) small, thick seta present in middle of each of elytral puncture (elytral setae or scales absent in *S. procera*); (3) elytral carinae weakly beaded (not beaded in *S. procera*); (4) protibia with four small spines along outer edge (spines absent in *S. procera*); (5) smaller species, body length approximately 10 mm (*S. procera* larger, about 12–16 mm).

Description. Body length including mandibles about 10.5 mm (holotype) and 9.7 mm (paratype), further measurements for both specimens appear in Table 3. Body relatively compact and flattened, widest at approximately two-thirds of elytra; dorsal and ventral surfaces, legs and antennae uniformly black or black-brown. Head finely but densely punctate at dorsal and ventral surfaces, but punctures separated from each other; pronotum dorsally very finely punctate, punctures distinctly separated from one another and interspaces several times larger than individual punctures; elytra coarsely and regularly punctate, interspaces approximately as wide as diameter of punctures; each puncture bearing small, whitish, elongate scale or a thick seta. Ventral side of thorax with fine sculpture and without pubescence, abdominal ventrites densely, shortly pubescent.

Head. Eyes laterally situated, not exceeding contour of head; single pair of eyes. Antennal grooves well-developed. Ventral side of cranium with several long setae (sensillae) at sides; ctenidium area obscured by cloudy coating. Maxillary palps slender, terminal palpomere truncate at apex; terminal segment of labial palps coniform. Antenna reaching beyond mid-prothorax, with 11 sparsely pubescent antennomeres; scape robust, much larger than pedicel; antennomeres 3–8 subequal in size; loose, distinct club formed of antennomeres 9–11, asymmetrical; sensorial fields present at inner side of three terminal antennomeres.

Prothorax. Anterior margin distinctly emarginate, anterior angles projecting and acuminate; lateral carina (edge) evenly rounded, not crenulate; pronotum widest midway, basal margin rounded and without distinct denticles at lateral corners. Procoxal cavities widely separated, externally closed; prosternal process robust, its apex widely dilated.

Mesothorax. Mesocoxal cavities rounded, narrowly separated; mesonotum robust, scutum transverse, scutellum rounded. Mesothoracic wing well developed.

Metathorax. Metacoxa reaching outer margin of metepisternum; metacoxae narrowly separated. Elytron widened from humeral part towards two-thirds length, apex acute but without mucro; ten carinae, not distinctly beaded (incl. the sutural), present on each elytron (carinae weakly undulate, not perfectly straight; they may be considered weakly beaded); two rows of rounded punctures occur between each pair of carinae; epipleuron distinct in humeral quarter only, then narrowed.

Legs. Procoxa transverse; mesocoxa rounded, weakly projecting; metacoxa strongly transverse. All femora slightly clavate; protibia with four small spines along outer side, row of teeth along apex, two apical spines: one robust, hooked spine and the other straight and medium-sized; meso- and metatibia without distinct spines along outer side, with two straight apical spines. Tarsal formula 5–5–5, but seemingly 4–4–4 because basitarsus small and retracted into apex of tibia, in similar fashion to that of other members of Gymnochilini. Tarsomeres 2–4 equal, without lobes; terminal tarsomere as long as (1)2–4 together; tarsal claws large, curved, without denticles; empodium large, bisetose.

Abdomen with five finely pubescent ventrites.

Etymology. The species is named after Christel and Hans Werner Hoffeins (Hamburg, Germany) who made these fossils available for study.

Remarks. *Gymnocheilis obesa* (Heer, 1862) from the middle Miocene (Sarmatian, *c.*12 mya) in Germany was previously the only fossil species of Trogossitidae: Gymnochilini to be described. According to the original diagnosis, "the body of *G. obesa* is covered with a vestiture of rounded scales, like recent species of *Gymnochila* (*sic*) from Africa" (Heer 1862, pp 56–57, pl. 3; Heer 1865, p. 382). The presence of distinct

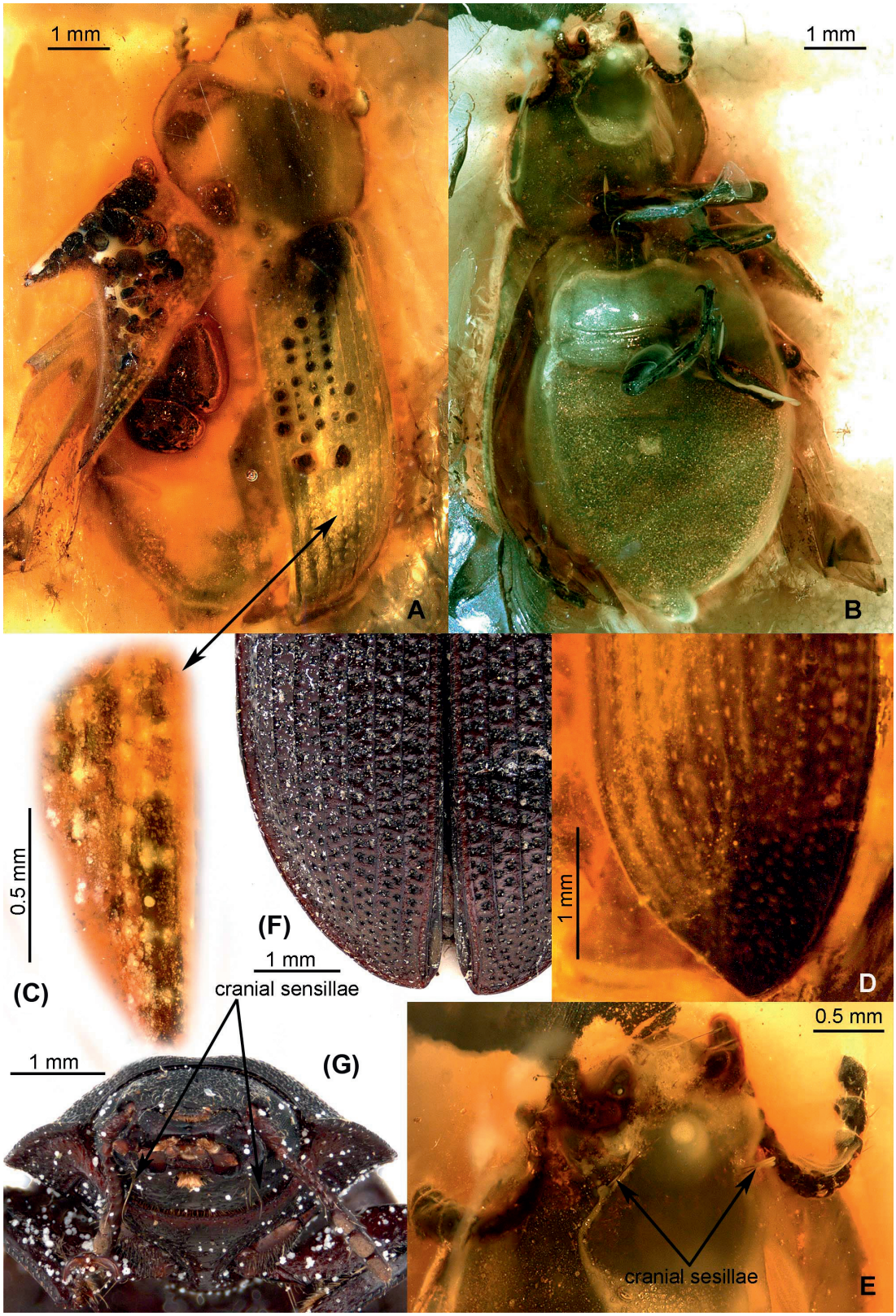

Figure 2 (A–E) *Seidlitzella hoffeinsorum* sp. nov., holotype: (A) dorsal view; (B) ventral view; (C) detail of elytral sculpture; (D) apical part of elytron; (E) head, ventral view. (F–G) *Seidlitzella procera* (Kraatz): (F) apical part of elytra; (G) head and pronotum, anterior view.

dorsal body vestiture distinguishes the latter species from *S. hoffeinsorum* sp. nov. (*cf*. Kolibáč 2013, p. 31, fig. 4D, E). However, it should be noted that a generic classification of *G. obesa* is uncertain without a more exact identification of eye number, since *Gymnocheilis* Dejean and *Leperina* are of similar habit and the dense body vestiture of scales occurs in both genera.

3. Discussion

After *Promanodes serafini* Kolibáč, Schmied, Wappler & Kubisz, 2010 and *P. alleni* Kolibáč, 2011, *Seidlitzella hoffeinsorum* sp. nov. is the third species of Trogossitidae to be described from Baltic amber and the oldest known representative of the tribe Gymnochilini.

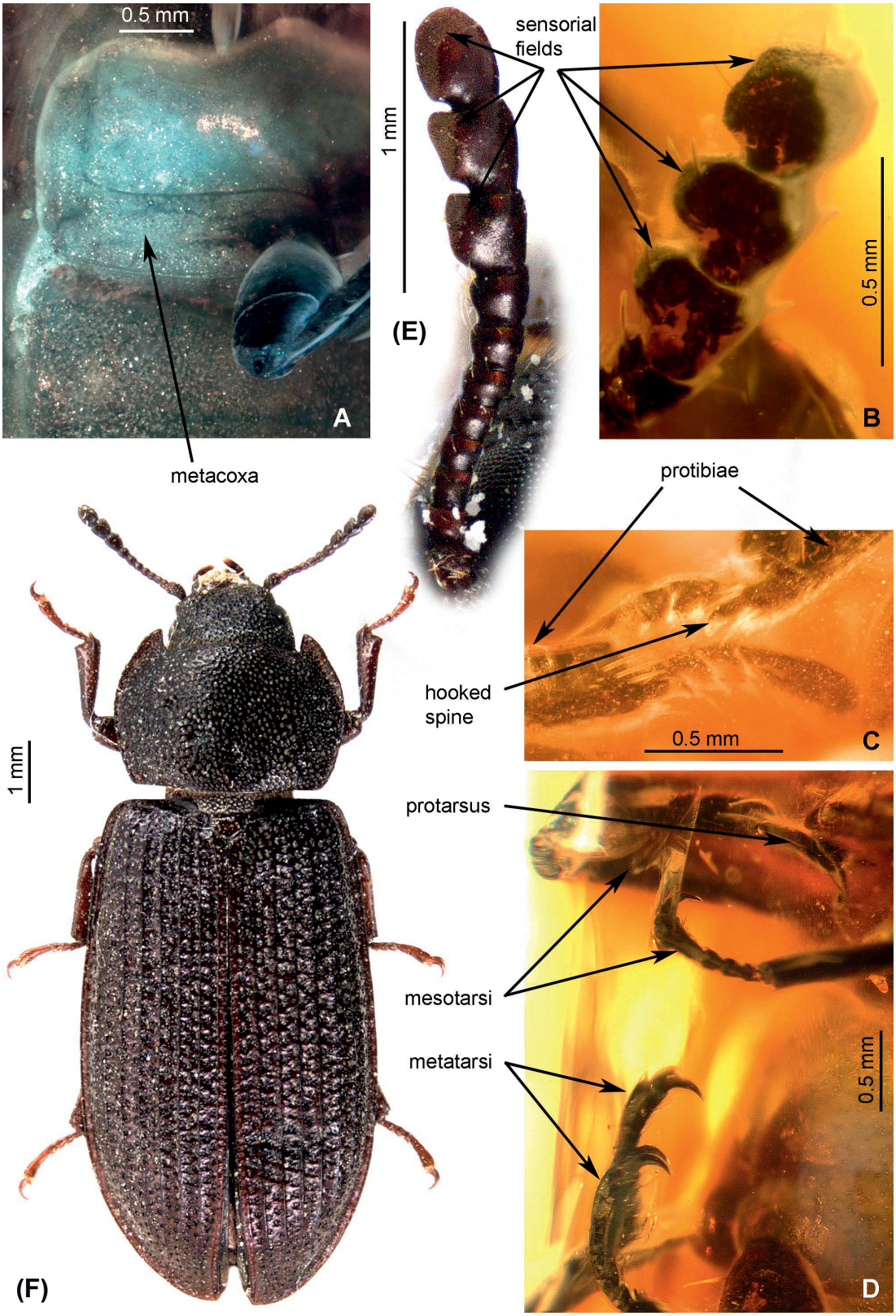

Figure 3 (A–D) *Seidlitzella hoffeinsorum* sp. nov., holotype: (A) part of metathorax, ventral view; (B) antennal club; (C) protarsi; (D) visible parts of legs, lateral view. (E–F) *Seidlitzella procera* (Kraatz): (E) antenna; (F) body, dorsal view.

The restricted eastern Mediterranean distribution of the single recent species *Sedlitzella procera* is unique within Trogossitidae and unusual in all Cleroidea. However, several recent, species-poor European genera have supposed relatives in New Zealand (e.g., *Enoplium* Latreille and *Phymatophaea* Pascoe) or the southernmost part of Africa (e.g., *Korynetes* Herbst) (Kolibáč 2014). There are also examples of a disjunct distribution between European Paleogene fossils and their extant relatives in Cleroidea (namely Trogossitidae, Rhadalidae, Cleridae), today living in North America, sub-Saharan Africa, Madagascar, southeastern Asia, temperate South America, Australia and New Zealand. For example, two species of the extinct Eocene

Figure 4 *Seidlitzella hoffeinsorum* sp. nov., paratype: (A) dorsal view; (B) ventral view. (Photo courtesy of Jonas Damzen.)

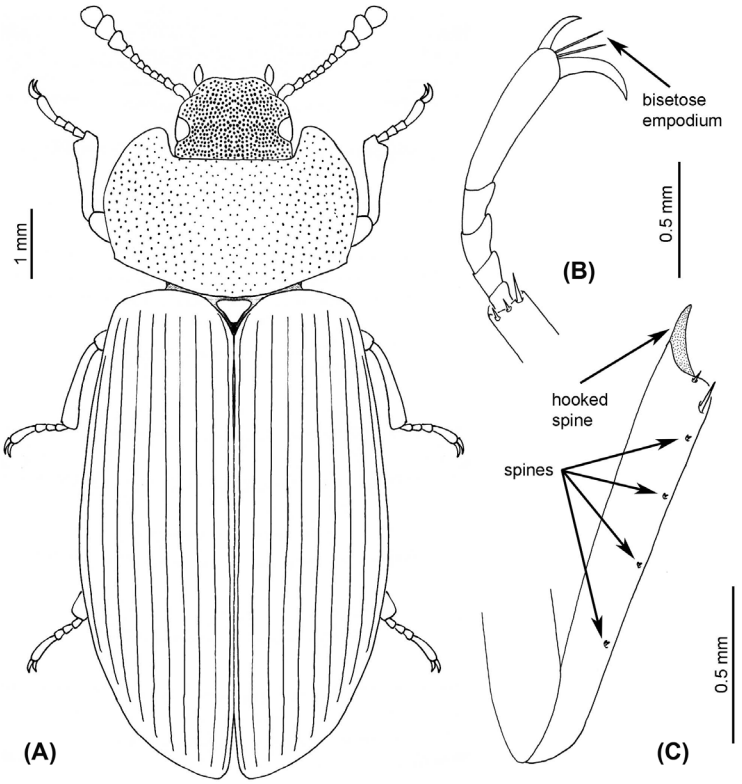

Figure 5 *Seidlitzella hoffeinsorum* sp. nov.: (A) dorsal view, reconstruction; (B) mesotarsus (drawn from paratype); (C) protibial (drawn from paratype).

genus *Promanodes* Kolibáč, Schmied, Wappler & Kubisz are supposedly related to the extant New Zealand genus *Promanus* Sharp (Kolibáč *et al.* 2010). However, Baltic amber species of extant cleroid genera have also been described: *Pseudopallenis* Kuwert and *Xamerpus* Fairmaire (extant species on Madagascar and in eastern Africa); *Cymatodera* Gray and *Phyllobaenus* Dejean (North America); *Orthrius* Gorham (southeastern Asia); *Thanasimodes* Murray, *Strotocera* Schenkling and *Prosymnus* Laporte (Africa); and *Lemidia* Spinola (Chile, Argentina, Australia) (Kolibáč 1997; Kolibáč & Gerstmeier 1997; Majer 1998).

Seidlitzella is situated at the very base of the gymnochiline clade, closely related to *Melambia*, *Phanodesta*, *Leperina* (incl. present *Kolibacia* species) in the phylogenetic analysis of Trogossitidae by Kolibáč (2008), whilst the genus forms a polytomy with the cluster *Kolibacia* (*Phanodesta* + *Leperina*) in an analysis of Gymnochilini by Leschen & Lackner (2013). Yoshitomi (2014) suggests a relation *Seidlitzella* ((*Kolibacia* + *Leperina*) + *Phanodesta*) in his analysis of the gymnochiline "normal-eyed group". Following the above-mentioned morphologically-based phylogenetic analyses (Kolibáč 2008; Leschen & Lackner 2013; Yoshitomi 2014), Palaearctic *Kolibacia* and *Seidlitzella* are related to Gondwanan *Leperina* and *Phanodesta*, not to the Afro-Asian "split-eyed group". External morphological characters of *S. hoffeinsorum* sp. nov., namely, (1) presence of four protibial spines, (2) a possible tendency to beaded elytral carinae, (3) moderate or absent elytral vestiture, and (4) absence of window punctures (Table 2), are in agreement with a definition of the "normal-eyed group"by Leschen & Lackner (2013) and support a hypothesis about a sister relation of recently monotypic *Seidlitzella* and species-rich *Phanodesta* today distributed in New Zealand, New Caledonia, Lord Howe Island, Juan Fernandez Island and Sulawesi. As demonstrated by the fossil evidence of *Seidlitzella hoffeinsorum* described herein, this genus was distributed in the western Palaearctic in the Paleogene.

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