



***Dignoptinus*, a new genus for fossil *Dignomus regiomontanus* Alekseev from Eocene Baltic amber, and new status for *Bruchoptinus* Reitter and *Pseudoptinus* Reitter (Coleoptera: Ptinidae)**

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Abstract. The holotype of *Dignomus regiomontanus* Alekseev, 2014, from the Eocene Baltic amber (Tertiary, Paleogene), is re-examined and re-described. *Dignoptinus* gen. nov. is proposed to place this species. *Bruchoptinus* Reitter, 1884, and *Pseudoptinus* Reitter, 1884, described as subgenera of *Ptinus* Linnaeus, 1767, are the closest relatives of the new fossil genus. These two subgenera are proposed as independent genera: *Bruchoptinus* Reitter, 1884 stat. nov. and *Pseudoptinus* Reitter, 1884 stat. nov. Forty-four new combinations for the species of these genera are proposed.

1 Introduction

The Baltic amber beetle assemblage seems to mark the starting point of the documented evolution for many extant coleopteran genera, providing substantial evidence of a general generic stability throughout the Cenozoic.

The family Ptinidae sensu lato, i.e. including the spider beetles and the wood-boring Anobiinae and allied genera (previously recognized as the Anobiidae), is abundant and diverse in the Baltic amber beetle assemblage. The family Ptinidae is represented by 29 described species and numerous still undescribed taxa from Baltic amber inclusions (Bukejs and Alekseev, 2015; Bukejs et al., 2017, 2018a, b; Háva and Zahradník, 2019). *Dignomus regiomontanus* Alekseev, 2014, recently described from Eocene Baltic amber (Alek-

seev, 2014), was the first fossil species identified as belonging to the genus *Dignomus* Wollaston, 1862. The comparison with additional extant spider beetles during the descriptive work of the Baltic amber species *Dignomus francescovitalii* Bukejs, Bellés et Alekseev, 2018, led to the conclusion that the generic placement of *D. regiomontanus* should be revised (Bukejs et al., 2018a). A re-examination of the holotype of *D. regiomontanus*, focusing on the detailed structure of the thorax, tarsi and ventral part of the abdomen, led us to consider that the species belongs to a new genus that shares a number of morphological similarities with the extant representatives of the western Palaearctic *Bruchoptinus* Reitter, 1884 and *Pseudoptinus* Reitter, 1884.

In the present paper, a new extinct genus *Dignoptinus* gen. nov. is described, with *Dignoptinus regiomontanus* (Alekseev, 2014) comb. nov. as the type species. Moreover, in the context of the present study, *Bruchoptinus* Reitter, 1884 stat. nov. and *Pseudoptinus* Reitter, 1884 stat. nov. are proposed as the independent genera.

2 Material and methods

The holotype of *Dignomus regiomontanus* is currently housed in the private collection of Christel and Hans Werner Hoffeins (Hamburg, Germany) (CCHH) and will subsequently be deposited at the Senckenberg Deutsches Entomologisches Institut in Müncheberg, Germany (SDEI).

The amber piece containing the insect was cut, ground, polished, and subsequently embedded in a block of artificial resin by Christel and Hans Werner Hoffeins, in order to facilitate stereoscopic examinations (Hoffeins, 2001).

Observations were made with a Nikon SMZ 745T stereomicroscope. Photographs were taken with a Nikon SMZ 745T stereomicroscope with Nikon DSFi1 digital camera. Extended depth of field at high magnifications was achieved by combining multiple images from a range of focal planes using Helicon Focus 6.0.1 software, and the resulting images were edited using Adobe Photoshop CS5. Measurements were taken using an ocular micrometer and are expressed in millimetres.

3 Systematics

Family **Ptinidae** Latreille, 1802

Subfamily **Ptininae** Latreille, 1802

Tribe **Ptinini** Latreille, 1802

Genus *Dignoptinus* gen. nov.

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Type species *Dignomus regiomontanus* Alekseev, 2014: 247–248, figs. 17–20, 32.8; by present designation.

Diagnosis

Dignoptinus gen. nov. is characterized by the following combination of characters: (1) interantennal space flat and narrow, about 0.3 times as wide as long scape; (2) thorax simple, with a posterior constriction typical in Ptininae, without any special structure on the constriction; pronotum with very prominent discal semi-cylindrical protuberance, with parallel sides and smooth at the top; (3) tarsi with five tarsomeres in all legs, with tarsomere 4 notched; (4) abdominal ventrite 4 quite long, more than half as long as ventrite 3.

The long abdominal ventrite 4 (about $0.7 \times$ as long as ventrite 3 in the holotype of *D. regiomontanus*) and the notched tarsomere 4, approaches *Dignoptinus* gen. nov. to *Pseudoptinus* Reitter, 1884 and *Bruchoptinus* Reitter, 1884 (Reitter, 1884a; Freude, 1969; Bellés, 1978; Iablokoff-Khnzorian and Karapetian, 1991). However, the structure of the pronotum, with the prominent discal protuberance, as well as the flat interantennal space, clearly separates *Dignoptinus* gen. nov. from *Pseudoptinus* and *Bruchoptinus*. The species of *Pseudoptinus* show a pronounced sexual dimorphism: body shape is elongated and subparallel in males but oval in females (Reitter, 1884a). The species of *Bruchoptinus* also show a similar sexual dimorphism (Reitter, 1884a), with the exception of *Bruchoptinus palliatus*, in which both sexes are

elongated and subparallel (Iablokoff-Khnzorian and Karapetian, 1991). This suggests that the type specimen of *D. regiomontanus* would be a male, and that the still unknown female might have a general oval shape.

The conspicuous pronotal discal protuberance can appear similar to structures found in extant species of the genus *Dignomus* Wollaston, 1862 (Bellés, 1996). However, the posterior thoracic constriction of *Dignomus* presents an oval structure on each side, which protrudes from the constriction (while *D. regiomontanus* lacks any structure on the constriction). Moreover, the pronotum of *Dignomus*, in addition to a discal protuberance, shows two additional lateral projections, one on each side that have a complex structure that is pointed and, in some cases, horn-shaped and curved backwards. *D. regiomontanus* also possesses lateral protuberances, but they are simple and slightly prominent, like in some *Ptinus* species (Bellés, 1996).

The interantennal space narrow and flat of *D. regiomontanus* appears similar to the extant genus *Trymolophus* Bellés, 1990, from the Mascarene Islands, which has a similar feature and also generally shows a prominent protuberance on the pronotal disc (Bellés, 1990, 1991a). Nevertheless, the species of *Trymolophus* are much more robust in general shape, have the tarsomere 4 simple, and the abdominal ventrite 4 very short (about 0.3–0.4 times as long as ventrite 3, as in most Ptinini). The species of the genus *Singularivultus* Bellés, 1991, also show the interantennal space narrow and flat. However, the unique morphology of the clypeus with a broad frontal concavity above the labrum separates *Singularivultus* from all the remaining Ptininae (Bellés, 1991b). Arguably, the characters shared by *Dignoptinus* gen. nov., *Trymolophus* and *Singularivultus* seem rather derived from independent evolutionary processes than from phylogenetic closeness. Thus they may be considered features that emerged independently in these groups.

Etymology

The name of the new genus is a compound word composed of the generic names “*Dignomus*” (the name of the genus in which the type species was originally placed) and “*Ptinus*” (the name of the type genus of the tribe to which the genus belongs). Gender masculine.

Remarks

The new genus is monotypic, represented by the type species only. Therefore the generic description considerably overlaps that of the species.

Dignoptinus regiomontanus (Alekseev, 2014)
comb. nov. (Figs. 1–2)

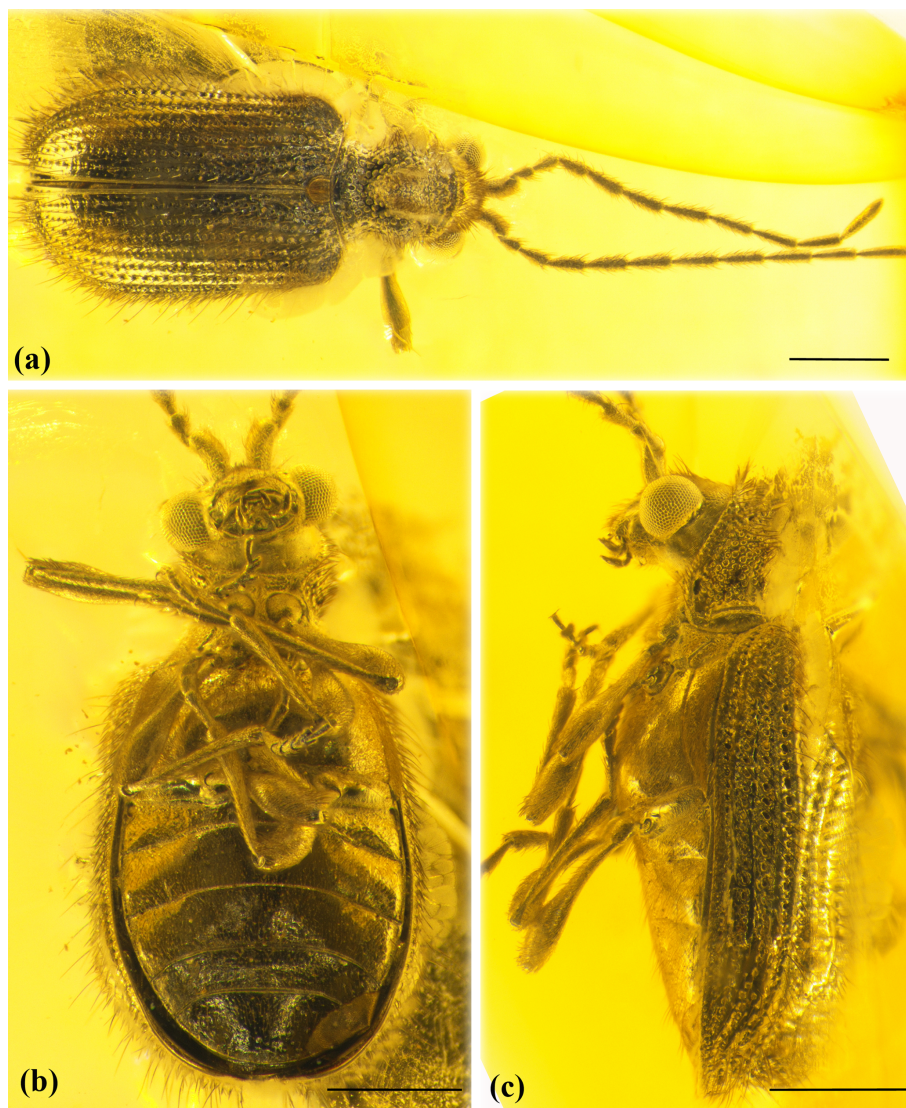


Figure 1. *Dignoptinus regiomontanus* (Alekseev, 2014) gen. et comb. nov., holotype, No. 883-3[CCHH]: (a) habitus, dorsal view; (b) habitus, ventral view; (c) habitus, lateral view. Scale bars = 1 mm.

Holotype

Holotype. No. 883-3[CCHH], complete specimen, adult, possibly male. The beetle inclusion is preserved in a polished piece of transparent amber with a yellowish shade. The small amber piece is embedded in a block of polyester resin (total measurements are 15 mm × 9 mm × 7 mm).

Syninclusion. stellate Fagaceae trichomes.

Type strata and locality

Baltic amber, upper Eocene to mid-Eocene; southern coast of the Baltic Sea (Alekseev, 2014).

Re-description

Size. Medium-sized (body length 3.7 mm, maximum width 1.8 mm); body shape elongate, subparallel and slender, slightly convex; integument uniformly dark brown.

Head. hypognathous. Compound eyes large, hemispherical, strongly prominent, finely faceted, with erect setae inserted between ommatidia. Antennae with 11 antennomeres, filiform and long, slightly shorter than length of body (approximately 3.5 mm); finely and densely pubescent, antennomeres 1–9 with additional sparse, moderately long semirecumbent setae; relative length ratios of antennomeres 1–11 equal to 12 : 6 : 10 : 12 : 13 : 14 : 15 : 15 : 15 : 14 : 19. Terminal segment of maxillary and labial palpi elongate and fusiform. Antennae insertion very close, interantennal space

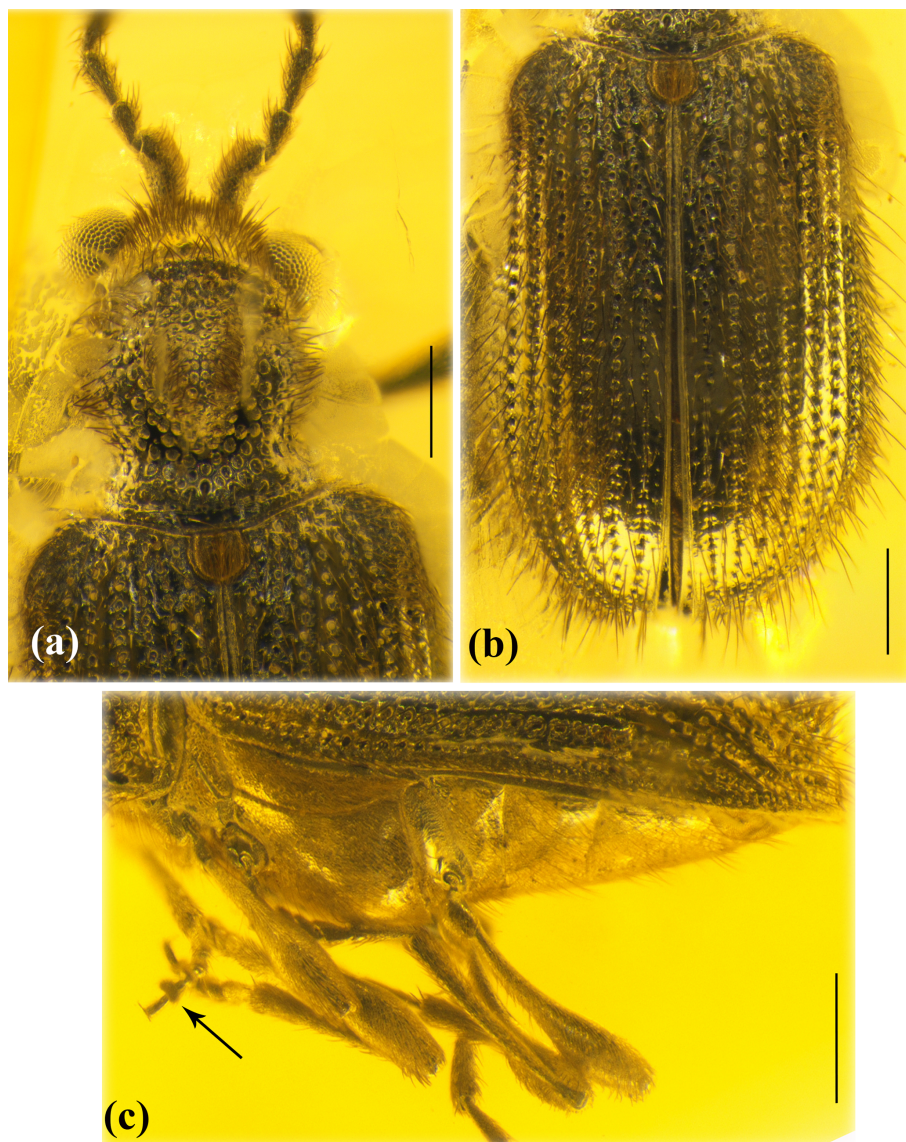


Figure 2. *Dignoptinus regiomontanus* (Alekseev, 2014) gen. et comb. nov., holotype, No. 883-3[CCHH]: (a) details of forebody, dorsal view; (b) elytra, dorsal view; (c) details of metathorax and abdomen, lateral view, the arrow indicate notched tarsomere 4. Scale bars = 0.5 mm.

flat and about 0.3 times as wide as long scape. Forehead and vertex densely pubescent, except glabrous medio-posterior area.

Thorax. with posterior constriction morphologically simple, without any special structure on constriction. Pronotum longitudinal (about 1.3 times as long as wide), distinctly narrower than elytral base; surface coarsely granulate-punctate, densely pubescent; pronotal disc with very prominent protuberance, semi-cylindrical in shape, with parallel sides and without any medial groove at top; two additional medio-lateral protuberances, one at each side of discal one, also present, being inconspicuous and simple in structure. Prosternal process narrow, slightly convex, about 0.3 times as wide as procoxal diameter. Metasternum smooth, cov-

ered with fine pubescence. Scutellum conspicuous, rounded in shape, covered with dense pubescence.

Elytra. subparallel and long, about 1.5 times as long as wide, and about 2.6 times as long as pronotum; humeri well developed; with round-shaped, moderately large and deep punctures, arranged in regular rows, scutellar striola present; covered with sparse long erect setae, and shorter, dense semirecumbent setae. Metathoracic wings present.

Metaventricle. strongly convex medio-posteriorly, with fine, sparse punctures and fine, dense recumbent pubescence; metepisternum wide, gradually narrowing posteriorly, punctuation and pubescence as on metaventricle.

Legs. slender and long, with fine pubescence; pro- and mesocoxae globose, metacoxae narrow, transverse, all coxae

separated; trochanter short, its apex not reaching elytral margin; tarsal formula 5-5-5, tarsomere 4 notched in all legs.

Abdomen. with five visible ventrites; moderately densely covered with fine, short recumbent pubescence; ventrites 2 and 3 equal in length, ventrite 4 about 0.7 times as wide as ventrite 3; abdominal sutures concave, well visible, sutures between ventrites 1–2 and 2–3 more deeply marked laterally.

4 Discussion

Dignoptinus gen. nov. should be placed close to *Bruchoptinus* stat. nov. and *Pseudoptinus* stat. nov., whose species also have a Palaearctic distribution, predominating in Europe and the Mediterranean region (Reitter, 1884a; Iablokoff-Khnzorian and Karapetian, 1991). *Bruchoptinus* and *Pseudoptinus* were described as subgenera of *Ptinus* Linnaeus, 1767 (Reitter, 1884a) and thus have continued to be considered at this taxonomic level in subsequent papers (e.g. Freude, 1969; Bellés, 1978; Iablokoff-Khnzorian and Karapetian, 1991). However, the characters that separate *Bruchoptinus* and *Pseudoptinus* from *Ptinus* (Reitter, 1884a; Iablokoff-Khnzorian and Karapetian, 1991) are so stable and relevant that they deserve to be considered as independent genera, *Bruchoptinus* Reitter, 1884 stat. nov. and *Pseudoptinus* Reitter, 1884 stat. nov. As for the remaining *Ptinus* subgenera, *Cyphoderes* Mulsant and Rey, 1868 could still be considered a subgenus of *Ptinus*, *Gynopterus* Mulsant and Rey, 1868 would fit better as an independent genus, and *Tectoptynus* Iablokoff-Khnzorian and Karapetyan, 1986 as a subgenus of *Gynopterus*. However, to reach clear conclusions about these additional subgenera, a further thorough phylogenetic analysis would be required. New combinations resulting from the new status formally proposed for *Bruchoptinus* and *Pseudoptinus* are listed below.

Genus *Bruchoptinus* Reitter, 1884: 303 stat. nov.

Type species *Ptinus rufipes* A. G. Olivier (1790) (Zahradník and Háva, 2014)

Diagnosis

Bruchoptinus is characterized by the following combination of characters: (1) in general, males slender, elongate and with subparallel elytra; females robust, with the sides of the elytra rounded (the only exception is *Bruchoptinus palliatus* Perris, 1847, in which both sexes are elongated and have subparallel elytra); (2) interantennal space narrow and acute; (3) thorax with a posterior constriction simple; pronotum with the anterior part uniformly rounded, without any marked longitudinal groove, and with more or less numerous whitish scales inserted on the disc; (4) tarsi with five tarsomeres in all legs, with tarsomere 4 excavated, showing the upper edge very slightly notched, especially in the males; (5) abdominal ventrite 4 quite long, more than half as long as ventrite 3; and

(6) aedeagus with the median lobe simple, and the parameres symmetrical.

Composition

Seventeen species (Borowski, 2007): *Bruchoptinus antennatus* (Pic, 1896) comb. nov.; *Bruchoptinus biformis* (Reitter, 1880) comb. nov.; *Bruchoptinus brevivittis* (Reitter, 1881) comb. nov.; *Bruchoptinus caucasicus* (Pic, 1897) comb. nov.; *Bruchoptinus eduardi* (Pic, 1910) comb. nov.; *Bruchoptinus elbrusicola* (Fleischer, 1915) comb. nov.; *Bruchoptinus femoralis* (Reitter, 1884a) comb. nov.; *Bruchoptinus henoni* (Pic, 1897) comb. nov.; *Bruchoptinus italicus* (Aragona, 1830) comb. nov.; *Bruchoptinus ivanensis* (Reitter, 1902) comb. nov.; *Bruchoptinus libanicus* (Pic, 1899) comb. nov.; *Bruchoptinus palliatus* (Perris, 1847) comb. nov.; *Bruchoptinus pellitus* (Desbrochers des Loges, 1875) comb. nov.; *Bruchoptinus rufipes* (Olivier, 1790) comb. nov.; *Bruchoptinus schatzmayeri* (Pic, 1934) comb. nov.; *Bruchoptinus syriacus* (Pic, 1896) comb. nov.; *Bruchoptinus torretassoi* (Pic, 1934) comb. nov.

Distribution

Western Palaearctic with the species diversity concentration in the eastern Mediterranean area (Fig. 3a).

Genus *Pseudoptinus* Reitter, 1884: 303 stat. nov.

Type species *Ptinus coarcticollis* Sturm, 1837 (Zahradník and Háva, 2014)

Diagnosis

Pseudoptinus is characterized by the following combination of characters: (1) males slender, elongated and with subparallel elytra; females robust, with the sides of the elytra rounded; (2) interantennal space narrow and acute; (3) thorax with a posterior constriction simple; pronotum with the anterior part showing a marked longitudinal groove, and with the pubescence formed by isolated setae more or less long and erect; (4) tarsi with five tarsomeres in all legs, with tarsomere 4 deeply excavated, showing the upper edge clearly notched in males and females; (5) abdominal ventrite 4 quite long, more than half as long as ventrite 3; and (6) aedeagus with the median lobe simple, and the parameres symmetrical.

Composition

Twenty-six species (Borowski, 2007): *Pseudoptinus anatolicus* (Pic, 1900) comb. nov.; *Pseudoptinus arragonicus* (Reitter, 1884b) comb. nov.; *Pseudoptinus auberti* (Abeille de Perrin, 1869) comb. nov.; *Pseudoptinus biserenensis* (Pic, 1905) comb. nov.; *Pseudoptinus capellae* (Reitter, 1880) comb. nov.; *Pseudoptinus coarcticollis* (Sturm, 1837) comb. nov.; *Pseudoptinus cumaniensis* (Pic, 1896) comb. nov.; *Pseudoptinus grandjeani* (Pic, 1895) comb. nov.;

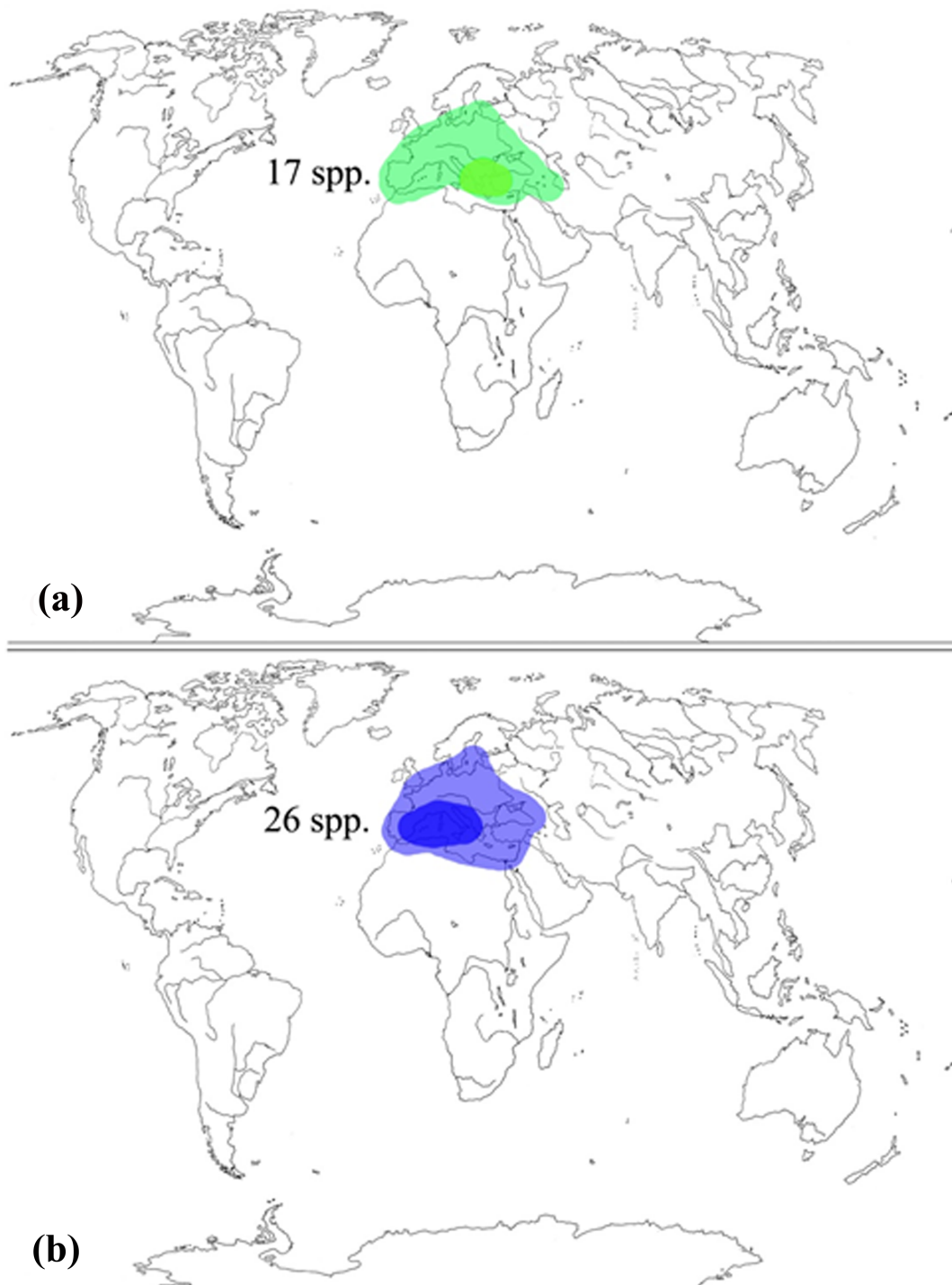


Figure 3. Distribution of the extant genera, close to *Dignoptinus* gen. nov. (vivid areas mark centres of diversity with more than five occurring species): (a) *Bruchoptinus* Reitter, 1884 stat. nov.; (b) *Pseudoptinus* Reitter, 1884 stat. nov.

Pseudoptinus kutzschenbachi (Reitter, 1878) comb. nov.; *Pseudoptinus lederi* (Reitter, 1884) comb. nov.; *Pseudoptinus levantinus* (Sahlberg, 1913) comb. nov.; *Pseudoptinus lichenum* (Marshall, 1802) comb. nov.; *Pseudoptinus maculosus* (Abeille de Perrin, 1895) comb. nov.;

Pseudoptinus madenine (Pic, 1932) comb. nov.; *Pseudoptinus martini* (Pic, 1893) comb. nov.; *Pseudoptinus micans* (Reitter, 1884b) comb. nov.; *Pseudoptinus nikitani* (Reitter, 1884b) comb. nov.; *Pseudoptinus obscuricollis* (Pic, 1895) comb. nov.; *Pseudoptinus oertzeni*

(Reitter, 1888) comb. nov.; *Pseudoptinus peyroni* (Pic, 1899) comb. nov.; *Pseudoptinus rufolimbatus* (Pic, 1908) comb. nov.; *Pseudoptinus rugosicollis* (Desbrochers des Loges, 1875) comb. nov.; *Pseudoptinus sanninensis* (Pic, 1911) comb. nov.; *Pseudoptinus spissicornis* (Abeille de Perrin, 1894) comb. nov.; *Pseudoptinus subaeneus* (Reitter, 1884b) comb. nov.; *Pseudoptinus tauricus* (Reitter, 1884b) comb. nov.

Distribution

Western Palaearctic with most diversity concentrated in the western Mediterranean area (Fig. 3b).

Data availability. No data sets were used in this article.

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