

***Zoosetha incisa* Assing, 1998 (Coleoptera, Staphylinidae, Aleocharinae), a new rove beetle for the fauna of Germany and Sweden**

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Abstract

The aleocharine rove beetle *Zoosetha incisa* Assing, 1998 (Coleoptera, Staphylinidae) is recorded from Germany and Sweden for the first time. The genus *Zoosetha* Mulsant & Rey, 1874 is also new to the Scandinavian Peninsula. The new localities considerably extend the known distribution of this rare European species towards the north. Aedeagus, spermatheca and abdominal sternite VIII of *Z. incisa* are illustrated and compared to the sexual characters of the similar, closely related *Z. inconspicua* (Erichson, 1839). The diagnostic characters of the female of *Z. incisa* are illustrated for the first time. The distribution of *Z. incisa* is mapped, and the species' habitat is discussed.

Keywords Oxypodini | Central Europe | *Zoosetha inconspicua* Erichson | distribution | genital characters

1. Introduction

Zoosetha Mulsant & Rey, 1874 is a genus of the aleocharine tribe Oxypodini Thomson, 1859. It presently comprises twelve species in the western Palaearctic (Schülke & Smetana 2015: 717), all of which are rarely found and scarce in collections. Among European aleocharines, the small species with a body length around 2 mm at first sight stand out by their conspicuously coarse punctation of the forebody. *Zoosetha* was thoroughly revised by Assing (1998), who presented a detailed taxonomic history of the genus, a diagnosis including a comparison with similar oxypodine genera, and a key to species. In more recent works, Assing (2003, 2007, 2008) added another new species and biogeographic data to the knowledge of *Zoosetha*.

The first known and most widespread species of the genus is *Z. inconspicua* (Erichson, 1839), the type species of the genus, which Erichson (1839: 116)

described in *Homalota* Mannerheim, 1830 based on an unknown number of specimens from 'Germania' and 'Lutetia', an old name for Paris. *Zoosetha inconspicua* is widely distributed across the Mediterranean, including the Maghreb countries, the Caucasus and Central Europe as far north as Schleswig-Holstein and Berlin in northern Germany (Assing 1998: 77, Schülke & Smetana 2015: 717). In spite of this wide distribution the species is a rarity, as can be inferred from Assing's (2003: 5) distribution map, which is based on fifteen localities only. Aside from Assing's works, only scattered localities were published for Germany, e.g. Berlin, Grunewald (Korge 1989: 39), Rhineland-Palatinate, Schloßböckelheim (Wenzel & Hannig 2001: 88) and Thuringia, Erfurt (Bössneck & Weipert 2007: 160) and Witterda (Hartmann et al. 1996: 179).

In his revision of *Zoosetha*, Assing (1998: 79) distinguished a new species, *Z. incisa*, from *Z. inconspicua* based on two specimens from Vienna, Austria, and

Split, Croatia. Later, he recorded the new species from Italy, Basilicata: Pantano di Pignola (Assing 2003: 6), and Spain, Murcia: Sierra de Ricote (Assing 2007: 771) and Castilla-La Mancha: Sierra de Cujón (Assing 2008: 1311), and published a record from southern France, Vaucluse: Barroux, communicated to him by Marc Tronquet (Assing 2003: 6). In our contribution, we present the first records of *Zoosetha incisa* for Germany and southern Sweden, which considerably extend the known distribution northwards, compare the diagnostic characters of *Z. incisa* and *Z. inconspicua* with consideration of the previously unpublished female genital characters of *Z. incisa*, and discuss some bionomical aspects based on the biotopes of *Z. incisa* and the collecting methods.

2. Material and methods

Material. This contribution is based on the following specimens. The collections in which they are stored are given in brackets.

Zoosetha incisa. Germany: 4 ♂, 2 ♀, Hesse, Fulda: nature reserve 'Haimberg bei Mittelrode' (50°32'38"N, 9°36'04"E), 350 m asl., 18.07.2016, leg. Frisch (Museum für Naturkunde Berlin; coll. Volker Assing, Hannover). Sweden: 1 ♂, Skåne län: Ystad (55°27'5"N, 13°54'53"E), 29.06.2012, leg. Sörensson (coll. Sörensson, Lund); 2 specimens (1 not sexed, 1 ♀), Blekinge län: Sölvesborg, 20.05.2013, 03.06.2013, leg. Ericson (coll. Ericson, Malmö).

Zoosetha inconspicua. Lectotype ♂ and paralectotype ♀, France: env. Paris [labelled 'Lutet.' (= Lutetia)], leg. Aubé (Museum für Naturkunde Berlin); 1 ♂, Germany, Brandenburg: Elstal, 1919, leg. Delahon (Museum für Naturkunde Berlin).

Methods. The German specimens of *Zoosetha incisa* were captured in simple pitfall traps - plastic beakers dug into the ground and filled with a mixture of water (45%), spirit (45%) and acetic acid (10%) as a moderate bait and preservative for the trapped specimens. In Sweden, the species was collected by netting insects in flight observed before sunset and by sweeping ground vegetation.

The habitus photograph was created with the montage software Helicon Focus based on a stack of 15 digital images which were taken with a camera attached to a stereoscopic microscope (Fig. 1). Transmitted-light microscopic images were made using the Zeiss Axioscope imaging system and the montage software Picolay with the following magnifications: aedeagi (Figures 2, 3, 6, 7) and spermathecae (Figures 4, 8): 400×, abdominal sternites VIII (Figures 5, 9): 200×.

The pronota were measured magnified 140× using a stereoscopic microscope with an eye-piece linear micrometer.

2.1. Diagnostic characters

Assing (1998: 79) distinguished *Zoosetha incisa* from *Z. inconspicua* by the notably incised apex of the median lobe of the aedeagus (Fig. 3), according to which

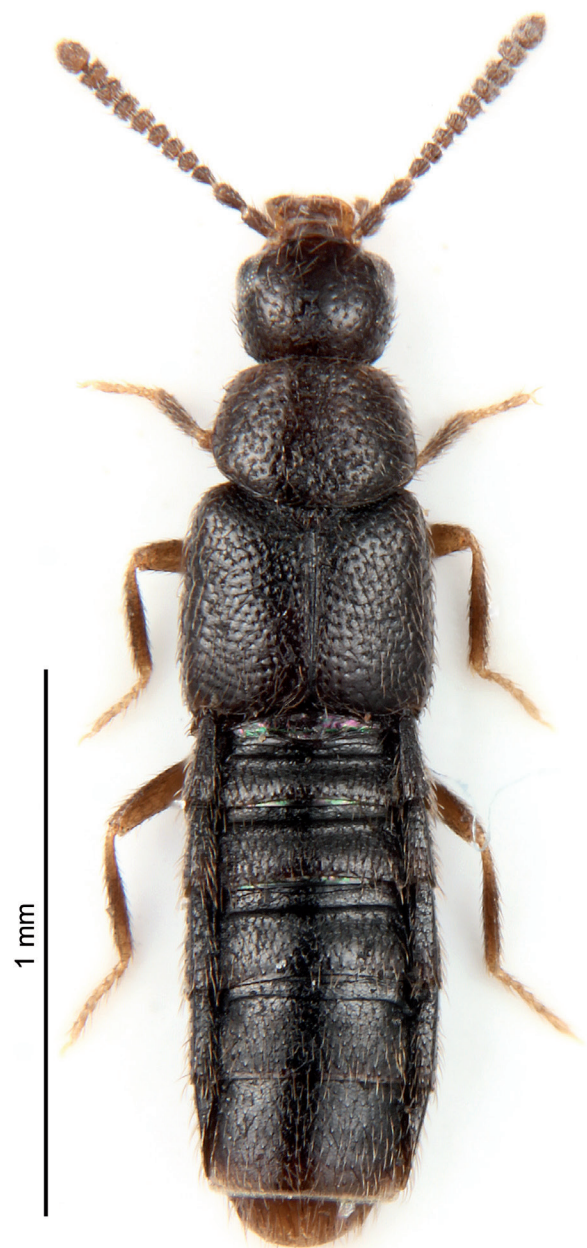


Figure 1. Habitus of *Zoosetha incisa* (Germany, Fulda: nature reserve 'Haimberg bei Mittelrode'). Photo: Bernd Jaeger.



Figures 2–5. *Zoosetha incisa* (Germany, Fulda: nature reserve ‘Haimberg bei Mittelrode’): (2) aedeagus in lateral view, (3) aedeagus in ventral view, (4) spermatheca, (5) sternite VIII of female.

Figures 6–9. *Zoosetha inconspicua* (France: env. Paris): (6) aedeagus in lateral view (lectotype), (7) aedeagus in ventral view (lectotype), (8) spermatheca (paralectotype, end of spermatheca at right side of illustration missing), (9) abdominal sternite VIII of female (paralectotype).

Abbreviations: ai – apical incision of median lobe, vl – ventrolateral lamella. Scale bar a: Figures (5), (9); scale bar b: figures (4), (8); scale bar c: figures (2), (3), (6), (7).

he selected the species name. Among the species of *Zoosetha*, which are known to occur in Central Europe, *Z. rufescens* (Kraatz, 1856) has an apical incision of the aedeagus as well, but in this species the incision is much deeper and the shape of the aedeagus differs particularly by the slender apex (Assing 1998: Fig. 3a). According to Assing (1998: 81), *Z. rufescens* is moreover readily distinguished from *Z. incisa* by somewhat larger body size, lighter coloration with the pronotum and elytra reddish brown to dark brown, lighter antennomeres 1 and 2, and finer median punctation of the pronotum. Reliable characters of the exoskeleton for the separation of *Z. incisa* (Fig. 1) and *Z. inconspicua* are, however, still unknown, although Assing (1998: 79) pointed out that the pronota of the two type specimens of *Z. incisa* are more slender (pronotum width : pronotum length = 1.22–1.24) than the pronotum of the specimens of *Z. inconspicua* (1.24–1.37, mean: 1.31) he had seen up to then. The pronota of the six specimens from Hesse and the specimen from Ystad are, however, 1.30–1.38 times as wide as long (mean: 1.34), which is largely within the range of Assing's measurements for *Z. inconspicua*. Thus, the width of the pronotum can not be applied as a diagnostic character for *Z. incisa*.

Besides the remarkable apical incision of the median lobe, males of *Z. incisa* can easily be distinguished from *Z. inconspicua* by the wider, in lateral view triangular apex of the median lobe (Fig. 2) and the presence of two ventrolateral lamellae in about the middle of the length of the median lobe (Fig. 3) with their distal end tooth-like projecting in lateral view (Fig. 2).

The female genital characters of *Z. incisa* have not yet been published. Herein, we illustrate the spermatheca (Fig. 4) and the female sternite VIII (Fig. 5) for the first time. The shape of the spermatheca resembles, however, the one of *Z. inconspicua* (Fig. 8), which is very variable as shown by Assing (1998, Fig. 1k), who illustrates a spermatheca for *Z. inconspicua* which does not differ from the one of *Z. incisa* in Fig. 4. Abdominal sternite VIII perhaps provides a diagnostic character. In the two German females of *Z. incisa*, the posterior margin of abdominal sternite VIII is moderately and evenly convexly curved (Fig. 5), while in *Z. inconspicua* it is notably produced and more strongly convex in middle third (Fig. 9). More females of both species must be examined to clarify if this character is stable and diagnostic.

Due to the fact that *Z. incisa* was described only in 1998, it is missing in volume 5 (Staphylinidae II) of the key-book *Die Käfer Mitteleuropas* (Lohse et al. 1974) including the supplements (Lohse 1989, Assing et al. 1998) just like the genital characters of *Z. inconspicua*. Assing & Schülke (1999: 24, 26) presented, however,

the genital characters of both species in a compilation of supplements to the staphylinid fauna of Central Europe, but records of *Z. inconspicua* in the faunistic literature could refer to *Z. incisa* and should be checked accordingly.

3. Discussion

Distribution. The previously known records of *Zoosetha incisa* in the northern Mediterranean and Vienna (Assing 1998, 2003, 2007, 2008) suggested a moderately expansive South European distribution. The new finds reveal, however, a much wider distribution in Central Europe north to southern Scandinavia (Fig. 10). The question arises if *Z. incisa* had been overlooked by Central European entomologists until recently owing to its rarity or confusion with *Z. inconspicua* or if the species currently disperses northwards.

Bionomics. Owing to their rarity and the paucity of biotope descriptions, the ecology of *Zoosetha* species is largely unknown. Assing (1998: 76) already pointed out that they are reported from various habitats such as forest litter, alpine grassland, or near water. Likewise, the bionomical information on *Z. incisa* in the literature is scarce, contradictory and does not show a clear ecological picture. In Spain, the species was sifted from grass and moss near rocks at a montane-subalpine altitude of 1460 m in Castilla-La Mancha (Assing 2008: 1311) and from litter and grass roots below *Pinus* and *Ilex* at 1100 m in the Sierra de Ricote, Murcia (Assing 2007: 771). These Spanish biotopes probably show relatively dry conditions. In Italy, Basilicata, *Z. incisa* was, however, collected in the WWF-reserve Lago del Pantano in a marsh near the trunk of *Salix* at an altitude of 770 m (Assing 2003: 6) – a flat, moist area very different from the seemingly drier Spanish mountain sites.

The locality Haimberg of *Z. incisa* in Germany in the Fulda basin between the Vogelsberg and Rhön mountains is situated at an altitude of about 350 m only. Geologically, it constitutes a volcanic basalt hill, which is surrounded by Muschelkalk. While most of the hill is covered with deciduous forest dominated by *Fagus silvatica*, the lower slopes are agriculturally used as hay meadows and fields, which are meager and dry owing to the calcareous soil particularly at the southern slope, where the pitfall traps which produced *Z. incisa* were situated right at the forest margin next to a meadow and arable land (Figs 11, 12). Interestingly, the species was found only in traps right at the forest margin, but was not captured by the remaining 50 traps, many of which were close to the forest margin both within the forest and in the open agricultural area. Obviously, *Z. incisa* was not attracted by the alcoholic and

acetic liquid of these pitfall traps nearby. Moreover, the first author never succeeded in sifting the species, though he frequently examined moss, grass and phytodebris of the respective forest margin using this method. We conclude

that *Z. incisa* obviously inhabits a narrow ecological niche of that forest margin, perhaps a subterranean habitat. In Spain, however, Assing (2007: 771, 2008: 1311) sifted the species from phytodebris and grass roots.

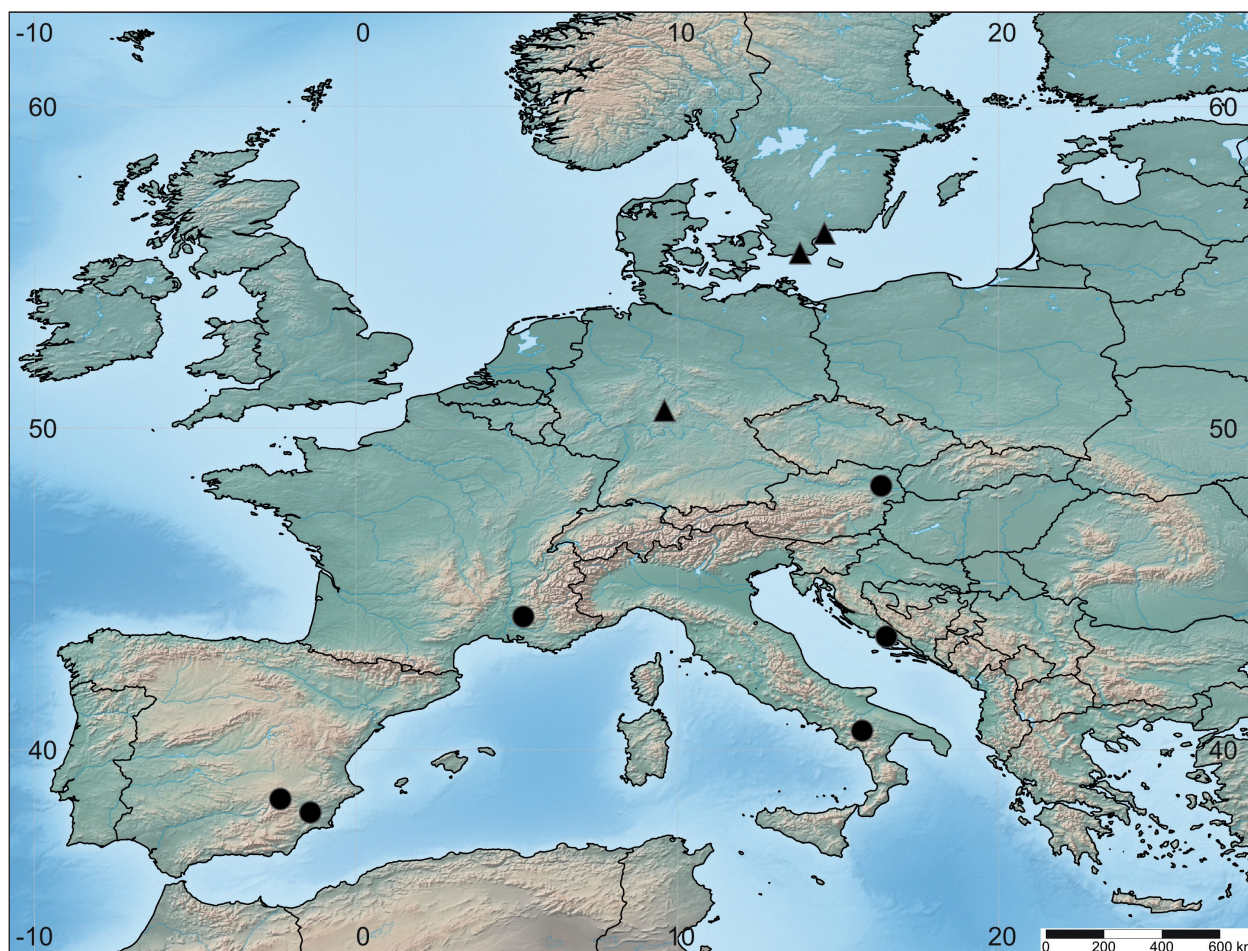


Figure 10. Known distribution of *Zoosetha incisa*: ● Previously known records after Assing (1998, 2003, 2007, 2008). ▲ New records for Germany (Hesse: Haimberg) and Sweden (Skåne län: Ystad, Blekinge län: Sölvesborg).



Figures 11, 12. Habitat of *Zoosetha incisa*: beech forest margin next to meager hay meadow (11) and arable land (12) on Muschelkalk at the southern slope of the nature reserve 'Haimberg bei Mittelrode'. Photos: J. Frisch.

The Swedish localities of *Z. incisa* consist of open fields close to forest margins and in the vicinity of smaller villages. The male from Ystad was netted in flight over semi-dry, open grassland close to a mixed forest margin dominated by pine (*Pinus sylvestris*) and birch (*Betula* sp.) in the late afternoon (Fig. 13). The locality is an extensively used military field of uncertain future, situated about four kilometres from the Swedish south coast. The two specimens at Sölvesborg were swept from herb-rich, thick grassland on the former city dump, subsequently covered by soil and abandoned for regrowth of vegetation, which is now rapidly advancing. The former dump is situated close to the coast and to a large gravel pit with mosaic patches of herbs, grass and naked ground. While its real habitat remains unknown, *Z. incisa* in Sweden seems to prefer open, dry to semi-dry, ecologically disturbed (anthropogenic) habitats. The absence of older records in Swedish collections, the sudden and almost simultaneous occurrence in two geographically widely separate localities, and the increasing general trend of continental insect species moving northwards and reaching Scandinavia during the last decades suggest that *Z. incisa* is a recent immigrant in Sweden.



Figure 13. Open, semi-dry grassland at pine forest margin, locality of *Zoosetha incisa* at Ystad, South Sweden. Photo: M. Sörensson.

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